COAT - Change Analysis Document

Project Name: EiffelBase
Project ID: 53

Manual inspector:

Legend:
- A: Added
- R: Removed
- C: Changed
- S: Strengthened
- W: Weakened
- $S_{ne}$: non-empty Strengthened
- $W_{ne}$: non-empty Weakened
1 Revision "Old": 87 vs. Revision "New": 88

1.1 Class: TWO WAY LIST

Routine: finish - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

not before

"New" Postcondition

not after

2 Revision "Old": 92 vs. Revision "New": 93

2.1 Class: DYNAMIC_TREE

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

extensible = True
child_contractable = not off

"New" Invariant

extensible = True
child_contractable = not child_off
3 Revision "Old": 176 vs. Revision "New": 177

3.1 Class: RESIZABLE

Routine: automatic\_grow - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tbody>
<tr>
<td>Tool</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Manual</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[
\text{capacity} \geq \text{old capacity} + \text{old capacity} \times \text{growth\_percentage} \// 100 + 1
\]

3.2 Class: ARRAY

Routine: resize - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</thead>
<tbody>
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<td>Tool</td>
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<td>x</td>
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<td>Manual</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

\[
\text{minindex} \leq \text{maxindex}
\]

Routine: force - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<tbody>
<tr>
<td>Tool</td>
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<td>x</td>
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<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3
"Old" Postcondition

\[\text{item} \,(i) = v\]

"New" Postcondition

\[\text{item} \,(i) = v\]
\[\text{capacity} \geq \text{old capacity}\]

### 3.3 Class: SORTED\_LIST

**Routine:** merge - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[\text{old sorted implies sorted}\]

### 3.4 Class: CURSOR\_TREE

**Routine:** put\_left - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[\text{count} = \text{old count} + 1\]
Routine: put - Postcondition changed

Tags: Changed, Strengthened, NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{item} = v \]

"New" Postcondition

\[ \text{item} = v \]
\[ \text{count} = \text{old count} \]

Routine: merge_right - Postcondition changed

Tags: Added, Changed, Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{count} = \text{old count} + \text{other.count} \]

Routine: add - Postcondition changed

Tags: Added, Changed, Strengthened

<table>
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<tr>
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<td></td>
<td></td>
<td>x</td>
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<td></td>
</tr>
</tbody>
</table>
Routine: put_right - Postcondition changed

<table>
<thead>
<tr>
<th></th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{count} = \text{old count} + 1 \]

Routine: merge_left - Postcondition changed

<table>
<thead>
<tr>
<th></th>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{count} = \text{old count} + \text{other.count} \]
Routine: add_left - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{count} = \text{old count} + 1 \]

3.5 Class: SEQUENCE

Routine: append - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{count} \geq \text{old count} \]

Routine: put - Postcondition changed

Tags: Changed Strengthened NEStronger

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<thead>
<tr>
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<th>A</th>
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</tr>
</tbody>
</table>
3.6 Class: CHAIN

Routine: put - Postcondition changed

Tags: Changed Strengthened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

has (v)

"New" Postcondition

\[ \text{count} = \text{old count} + 1 \]

has (v)

Routine: swap - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

has (v)

"New" Postcondition

\[ \text{count} = \text{old count} \]

has (v)
"New" Postcondition

\[ item = \text{old } i_{th} (i) \]
\[ i_{th} (i) = \text{old } item \]

Routine: move - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\((\text{not off}) \implies (index = \text{old } index + i)\)

3.7 Class: LINKED_LIST

Routine: move - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_{ne}</th>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\((\text{old } index + i) \geq 0 \quad \text{and} \quad (\text{old } index + i) \leq (\text{count} + 1) \implies index = (\text{old } index + i)\)

\((\text{old } index + i) \leq 0 \implies \text{before}\)

\((\text{old } index + i) \geq (\text{count} + 1) \implies \text{after}\)
### 3.8 Class: PRIMES
#### Routine: former_prime - Precondition changed

<table>
<thead>
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<th></th>
<th>A</th>
<th>R</th>
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</tr>
</tbody>
</table>

"Old" Precondition

\[ n \geq 2 \]

"New" Precondition

\[ n \geq \text{smallest\_prime} \]

### 3.9 Class: COLLECTION
#### Routine: fill - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<td>x</td>
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</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

other \neq void

### 3.10 Class: SET
#### Routine: put - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

(has \(v\))

"New" Postcondition

\(\text{old has } (v) \implies (\text{count } = \text{old count})\)
\(\text{not old has } (v) \implies (\text{count } = \text{old count} + 1)\)
\(\text{count } \geq \text{old count} \implies \text{has } (v)\)

3.11 Class: BOOL_STRING

Routine: infix "xor" - Precondition changed

Tags: Changed Strengthened NEStronger

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<thead>
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<th></th>
<th>A</th>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

other\(\text{count } = \text{count}\)

"New" Precondition

other\(\text{count } = \text{count}\)
other \(\neq\) Void

Routine: infix "and" - Precondition changed

Tags: Changed Strengthened NEStronger

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<th>A</th>
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</tbody>
</table>

"Old" Precondition

other\(\text{count } = \text{count}\)
"New" Precondition

\[
\text{other.count} = \text{count} \\
\text{other /= Void}
\]

Routine: \textit{infix "or" - Precondition changed}

Tags: Changed Strengthened NEStronger

\[
\begin{array}{cccccc}
\text{Tool} & A & R & C & S & W & S_{ne} & W_{ne} \\
\text{Manual} & x & x & x & & & \\
\end{array}
\]

"Old" Precondition

\[
\text{other.count} = \text{count}
\]

"New" Precondition

\[
\text{other.count} = \text{count} \\
\text{other /= Void}
\]

3.12 Class: \textbf{STRING}

Routine: append - Postcondition changed

Tags: Added Changed Strengthened

\[
\begin{array}{cccccc}
\text{Tool} & A & R & C & S & W & S_{ne} & W_{ne} \\
\text{Manual} & x & x & x & & & \\
\end{array}
\]

"Old" Postcondition

"New" Postcondition

\[
\text{count} = \text{old.count} + \text{s.count}
\]
### Routine: replace_substring - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[
\text{count} = \text{old count} + s.\text{count} - \text{end_pos} + \text{start_pos} - 1
\]

### Routine: remove - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[
\text{count} = \text{old count} - 1
\]

### Routine: mirror - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>$S_{ne}$</th>
<th>$W_{ne}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition
"New" Postcondition

\[ \text{count} = \text{old count} \]

**Routine: prepend - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{count} = \text{old count} + s\text{.count} \]

**Routine: insert - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{count} = \text{old count} + s\text{.count} \]
Routine: precede - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ count = \text{old} \ count + 1 \]

4 Revision "Old": 262 vs. Revision "New": 270

4.1 Class: BOOL_STRING

Routine: infix "xor" - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{other.count} = \text{count} \\
\text{other} \neq \text{Void}
\]

"New" Precondition

\[
\text{other} \neq \text{Void} \\
\text{other.count} = \text{count}
\]
### Routine: infix "and" - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

#### "Old" Precondition

other.count = count  
other /\ne Void

#### "New" Precondition

other /\ne Void  
other.count = count

### Routine: infix "or" - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

#### "Old" Precondition

other.count = count  
other /\ne Void

#### "New" Precondition

other /\ne Void  
other.count = count
5 Revision "Old": 270 vs. Revision "New": 319

5.1 Class: TWO_WAY_LIST
Routine: add_left - Precondition changed

| Tag: Added Changed Strengthened |
|---|---|---|---|---|---|
| Tool | A | R | C | S | W | S_{ne} | W_{ne} |
| Manual | x | x | x |

"Old" Precondition

"New" Precondition

True

5.2 Class: FIXED_LIST
Routine: go_to - Precondition changed

| Tag: Added Changed Strengthened |
|---|---|---|---|---|---|
| Tool | A | R | C | S | W | S_{ne} | W_{ne} |
| Manual | x | x | x |

"Old" Precondition

"New" Precondition

True
5.3 Class: **DYNAMIC_LIST**

**Routine: add_left - Precondition changed**

<table>
<thead>
<tr>
<th>Tags: Removed Changed Weakened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Precondition

not before

"New" Precondition

5.4 Class: **LINKED_LIST**

**Routine: item - Precondition changed**

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Precondition

True

"New" Precondition

**Routine: add_left - Precondition changed**

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>
"Old" Precondition

"New" Precondition

True

6 Revision "Old": 319 vs. Revision "New": 371

6.1 Class: RESIZABLE

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

"New" Invariant

minimal_increase >= 1

Routine: automatic_grow - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

capacity >= old capacity + old capacity * growth_percentage / 100 + 1

"New" Postcondition
**Routine: additional_space - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

**Result** >= 1

**6.2 Class: LINKED_TREE**

**Invariant changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[(child = \text{Void}) \implies \text{child}_{\text{off}}\]

"New" Invariant

\[\text{readable}_{\text{child}} = \text{child}_{\text{readable}}\]

**Routine: make - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>
"Old" Postcondition

"New" Postcondition

is_root
is_leaf

6.3 Class: HIERARCHICAL

Invariant changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

nb_of_successors >= 0

"New" Invariant

successor_count >= 0

6.4 Class: FIXED

Invariant changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

full
count = capacity
"New" Invariant

not resizable

6.5 Class: LINEAR
Invariant changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant
off = after or before

"New" Invariant
off = (after or before)

6.6 Class: TRAVERSABLE
Invariant changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant
off implies exhausted
exhausted implies not readable

"New" Invariant
empty implies off
off implies exhausted
6.7 Class: COMPACT_CURSOR_TREE
Routine: remove - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>R</td>
</tr>
<tr>
<td>C</td>
<td>S</td>
</tr>
<tr>
<td>S</td>
<td>W</td>
</tr>
<tr>
<td>S_{ne}</td>
<td>W_{ne}</td>
</tr>
</tbody>
</table>

"Old" Postcondition

empty or else not off

"New" Postcondition

not before

6.8 Class: ARRAY
Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>R</td>
</tr>
<tr>
<td>C</td>
<td>S</td>
</tr>
<tr>
<td>S</td>
<td>W</td>
</tr>
<tr>
<td>S_{ne}</td>
<td>W_{ne}</td>
</tr>
</tbody>
</table>

"Old" Invariant

capacity = upper - lower + 1
count >= 0

"New" Invariant

capacity = upper - lower + 1
capacity >= 0
Routine: resize - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

lower <= minindex
maxindex <= upper

"New" Postcondition

Routine: force - Postcondition changed

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

item (i) = v
capacity >= old capacity

"New" Postcondition

item (i) = v

6.9 Class: ACTIVE

Invariant changed

Tags: Changed Strengthened NEWstronger

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Invariant

empty implies (not readable) and (not writable)

"New" Invariant

writable implies readable
empty implies (not readable) and (not writable)

6.10 Class: TWO_WAY_LIST

Routine: add_left - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

True

"New" Precondition

6.11 Class: CURSOR_TREE

Invariant changed

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
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</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

depth >= 0
breadth >= 0
not off implies is_leaf = (arity = 0)
above implies (arity <= 1)
(isfirst or islast or is_leaf or is_root) implies not off
off = after or before or above or below
below implies ((after or before) and not above)
above implies not (before or after or below)
after implies not (before or above)
before implies not (after or above)
(empty and (after or before)) implies below
offright = empty or after
offleft = empty or before

"New" Invariant

depth >= 0
breadth >= 0
not off implies is_leaf = (arity = 0)
above implies (arity <= 1)
(isfirst or islast or is_leaf or is_root) implies not off
off = after or before or above or below
below implies ((after or before) and not above)
above implies not (before or after or below)
after implies not (before or above)
before implies not (after or above)
(empty and (after or before)) implies below

Routine: put_left - Precondition changed

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

not before
not above
(level = 1) implies empty
not full

"New" Precondition

not before
not above
(level = 1) implies empty

Routine: put_left - Postcondition changed
Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>$S_{ne}$</th>
<th>$W_{ne}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition
count = old count + 1

"New" Postcondition

Routine: put - Precondition changed
Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>$S_{ne}$</th>
<th>$W_{ne}$</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition
writable

"New" Precondition

Routine: put - Postcondition changed
Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>$S_{ne}$</th>
<th>$W_{ne}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

27
"Old" Postcondition

\[
\text{item} = v \\
\text{count} = \text{old count}
\]

"New" Postcondition

Routine: merge_right - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tags: Changed Weakened NEWeker

"Old" Precondition

\[
\text{not after} \\
\text{not above} \\
(\text{level} = 1) \implies \text{empty} \\
\text{not full}
\]

"New" Precondition

\[
\text{not after} \\
\text{not above} \\
(\text{level} = 1) \implies \text{empty}
\]

Routine: merge_right - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
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</tr>
<tr>
<td>Manual</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Tags: Removed Changed Weakened

"Old" Postcondition

\[
\text{count} = \text{old count} + \text{other.count}
\]
"New" Postcondition

**Routine: put_right - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

- not after
- not above
- \((level = 1)\) implies empty
- not full

"New" Precondition

- not after
- not above
- \((level = 1)\) implies empty

**Routine: put_right - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[count = \text{old count} + 1\]

"New" Postcondition
Routine: fill - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<th>W_ne</th>
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</thead>
<tbody>
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<td>Tool</td>
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<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{count} = \text{other.count} \]

"New" Postcondition

Routine: merge_left - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<th>W_ne</th>
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<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\begin{itemize}
  \item not before
  \item not above
  \item (level = 1) implies empty
  \item not full
\end{itemize}

"New" Precondition

\begin{itemize}
  \item not before
  \item not above
  \item (level = 1) implies empty
\end{itemize}

Routine: merge_left - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
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<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition
\[
\text{count} = \text{old count} + \text{other.count}
\]

"New" Postcondition

Routine: add_left - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Changed Weakened NEWeaker</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Precondition
\begin{align*}
&\text{not before} \\
&\text{not above} \\
&(\text{level} = 1) \text{ implies empty} \\
&\text{not full}
\end{align*}

"New" Precondition
\begin{align*}
&\text{not before} \\
&\text{not above} \\
&(\text{level} = 1) \text{ implies empty}
\end{align*}

Routine: add_left - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Removed Changed Weakened</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>-----</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>
"Old" Postcondition
\[ count = \text{old} \ count + 1 \]

"New" Postcondition

6.12 Class: \textbf{SEQUENCE}

Routine: append - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition
\[ count \geq \text{old} \ count \]

"New" Postcondition

Routine: put - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition
\[ \text{extendible} \]

"New" Precondition
\[ \text{extendible} \]
Routine: put - Postcondition changed

Tags: Changed, Weakened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{count} = \text{old count} + 1 \\
\text{has} (v)
\]

"New" Postcondition

\[
\text{has} (v)
\]

6.13 Class: GENERAL

Routine: standard_clone - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{equal} (\text{Result, Current})
\]

"New" Postcondition

\[
\text{standard_equal} (\text{Result, Current})
\]

6.14 Class: FIXED_LIST

Routine: go_to - Precondition changed

Tags: Removed, Changed, Weakened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Precondition

True

"New" Precondition

Routine: item - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

valid_index (index)

"New" Precondition

Routine: make - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
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<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

n \geq 0

"New" Precondition
Routine: make - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{count} = n \]

"New" Postcondition

\[
\begin{align*}
\text{before} \\
\text{count} = n
\end{align*}
\]

6.15 Class: UNBOUNDED

Invariant changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[ \text{not full} \]

"New" Invariant

6.16 Class: CHAIN

Invariant changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Invariant

\[
\begin{align*}
empty & \implies off \\
index & \geq 0 \\
index & \leq count + 1 \\
on & = ((index = 0) \text{ or } (index = count + 1)) \\
isfirst & = (index = 1) \\
(\text{not } off) & \implies (item = i_{th}(index))
\end{align*}
\]

"New" Invariant

\[
\begin{align*}
empty & \implies off \\
index & \geq 0 \\
index & \leq count + 1 \\
on & = ((index = 0) \text{ or } (index = count + 1)) \\
isfirst & = (\text{not } empty) \text{ and } (index = 1) \\
islast & = (\text{not } empty) \text{ and } (index = count) \\
(\text{not } off) & \implies (item = i_{th}(index))
\end{align*}
\]

Routine: put\_i\_th - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<th>S_ne</th>
<th>W_ne</th>
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<tr>
<td>Tool</td>
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<td>x</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

valid\_index(i)

"New" Precondition

Routine: put\_i\_th - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
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</tbody>
</table>

36
**Routine: put - Precondition changed**

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
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<td>x</td>
<td>x</td>
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<td></td>
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</tbody>
</table>

**"Old" Precondition**

 writable

**"New" Precondition**

**Routine: put - Postcondition changed**

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S_ne</th>
<th>W_ne</th>
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<td>x</td>
<td>x</td>
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<td></td>
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</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**"Old" Postcondition**

\[ i_{th} (i) = v \]

**"New" Postcondition**

\[ i_{th} (i) = v \]

**"Old" Postcondition**

\[ \text{count} = \text{old count} \]

\[ \text{has} (v) \]

**"New" Postcondition**

\[ \text{has} (v) \]
Routine: return - Precondition changed

Tags: Removed, Changed, Weakened

Tool | A | R | C | S | W | S_{ne} | W_{ne} | Manual
--- | --- | --- | --- | --- | --- | --- | ---
 | x | x | x |

"Old" Precondition

mark_stack /= Void

"New" Precondition

Routine: i_th - Precondition changed

Tags: Removed, Changed, Weakened

Tool | A | R | C | S | W | S_{ne} | W_{ne} | Manual
--- | --- | --- | --- | --- | --- | --- | ---
 | x | x | x |

"Old" Precondition

valid_index (i)

"New" Precondition

Routine: swap - Postcondition changed

Tags: Removed, Changed, Weakened

Tool | A | R | C | S | W | S_{ne} | W_{ne} | Manual
--- | --- | --- | --- | --- | --- | --- | ---
 | x | x | x |

"Old" Postcondition
\[ \text{item} = \text{old} \ i_{\text{th}} \ (i) \]
\[ i_{\text{th}} \ (i) = \text{old} \ \text{item} \]

"New" Postcondition

**Routine: move - Postcondition changed**

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ (\text{not off}) \ \text{implies} \ (index = \text{old} \ index + i) \]

"New" Postcondition

---

### 6.17 Class: DISPENSER

**Invariant changed**

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<tr>
<td>Tool</td>
<td></td>
<td>x</td>
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<td></td>
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<tr>
<td>Manual</td>
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<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[ \text{readable} = \text{not empty} \]
\[ \text{writable} = \text{not empty} \]
\[ \text{contractable} = \text{not empty} \]

"New" Invariant

\[ \text{readable} = \text{not empty} \]
\[ \text{writable} = \text{not empty} \]
### 6.18 Class: DYNAMIC_LIST

#### Routine: merge_left - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ \text{not before} \]

"New" Precondition

\[ \text{not before} \]
\[ other \neq \text{Void} \]

#### Routine: merge_right - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<th>W_ne</th>
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<tr>
<td>Tool</td>
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<td>x</td>
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<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ \text{not after} \]

"New" Precondition

\[ \text{not after} \]
\[ other \neq \text{Void} \]

#### Routine: add_left - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<th>S_ne</th>
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<td>x</td>
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</tbody>
</table>

40
"Old" Precondition

"New" Precondition

not before

6.19 Class: BINARY_TREE

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_{ne}</th>
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</table>

"Old" Invariant

arity = 2

"New" Invariant

child_capacity = 2

Routine: has_both - Postcondition changed

<table>
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<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

Result = (has_left and has_right)

"New" Postcondition
Routine: has_right - Postcondition changed

Tags: Removed, Changed, Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

"Old" Postcondition

Result = $(right_{child} \neq \text{Void})$

"New" Postcondition

Routine: remove_left_child - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td></td>
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</tbody>
</table>

"Old" Postcondition

$left_{child} = \text{Void}$

"New" Postcondition

not has_left

Routine: make - Postcondition changed

Tags: Changed, Weakened, NEWeaker

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
<th>W</th>
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<td></td>
</tr>
</tbody>
</table>

42
"Old" Postcondition

\[
\text{item} = v \\
\text{arity} = 2 \\
(\text{left\_child} = \text{Void}) \text{ and } (\text{right\_child} = \text{Void})
\]

"New" Postcondition

\[
is\_root \\
is\_leaf
\]

Routine: has\_left - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
<td></td>
<td></td>
<td>x</td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{Result} = (\text{left\_child} \neq \text{Void})
\]

"New" Postcondition

Routine: remove\_right\_child - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tbody>
</table>

"Old" Postcondition

\[
\text{right\_child} = \text{Void}
\]

"New" Postcondition

\[
\text{not has\_right}
\]
6.20 Class: **LINKED_LIST**

Routine: **move** - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
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<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W__ne</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[(\text{old index} + i) \geq 0 \text{ and } (\text{old index} + i) \leq (\text{count} + 1) \implies \text{index} = (\text{old index} + i)\]

\[(\text{old index} + i) \leq 0 \implies \text{before} \]

\[(\text{old index} + i) \geq (\text{count} + 1) \implies \text{after}\]

"New" Postcondition

Routine: **finish** - Postcondition changed

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
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<td>x</td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[(\text{not empty}) \implies \text{islast}\]

\[\text{empty} \implies \text{before}\]

"New" Postcondition

\[\text{empty} \implies \text{before}\]
Routine: start - Postcondition changed

"Old" Postcondition

not before

"New" Postcondition

empty implies after

Routine: item - Precondition changed

"Old" Precondition

True

"New" Precondition

Routine: add_left - Precondition changed

"Old" Precondition

True

"New" Precondition
"Old" Precondition

True

"New" Precondition

6.21 Class: TREE

Invariant changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<td>Tool</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[
\begin{align*}
  is\_leaf &= (arity = 0) \\
  child\_before &= (child\_index = 0) \\
  child\_isfirst &= (child\_index = 1) \\
  child\_islast &= (child\_index = arity) \\
  child\_after &= (child\_index = arity + 1)
\end{align*}
\]

"New" Invariant

\[
\begin{align*}
  is\_leaf &= (arity = 0) \\
  is\_leaf \implies child\_off \\
  child\_off &= child\_before \lor child\_after \\
  child\_before &= (child\_index = 0) \\
  child\_isfirst &= (not \ is\_leaf \ and \ child\_index = 1) \\
  child\_islast &= (not \ is\_leaf \ and \ child\_index = arity) \\
  child\_after &= (child\_index = arity + 1) \\
  child\_readable \implies child\_parent = Current
\end{align*}
\]

Routine: child\_isfirst - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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</tr>
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<td>Manual</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

**Result implies (not empty)**

"New" Postcondition

**Result implies (not is_leaf)**

**Routine: child_islast - Postcondition changed**

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

**Result implies (not empty)**

"New" Postcondition

**Result implies (not is_leaf)**

### 6.22 Class: **COLLECTION**

**Invariant changed**

<table>
<thead>
<tr>
<th>Tags: Removed Changed Weakened</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<td></td>
<td></td>
<td>W</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

**empty implies not contractable**

"New" Invariant
Routine: fill - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
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<th>S_{ne}</th>
<th>W_{ne}</th>
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<td>Tool</td>
<td>x</td>
<td></td>
<td>x</td>
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<td>x</td>
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<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

other /= Void

"New" Precondition

other /= Void extendible

6.23 Class: BINARY_SEARCH_TREE

Routine: make - Postcondition changed

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

item = v
arity = 2
(left_child = Void) and (right_child = Void)

"New" Postcondition

item = v
(left_child = Void) and (right_child = Void)
6.24 Class: COMPARABLE_STRUCT

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
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<td></td>
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</tr>
</tbody>
</table>

"Old" Invariant

"New" Invariant

\textit{min\_max\_available implies not empty}

Routine: \texttt{min} - Precondition changed

<table>
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<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Precondition

"New" Precondition

\textit{min\_max\_available}

Routine: \texttt{max} - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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<tr>
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<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Precondition

"New" Precondition

\[ \text{min}, \text{max, available} \]

### 6.25 Class: DYNAMIC_TREE

**Invariant changed**

<table>
<thead>
<tr>
<th>Tags: Changed, Weakened</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[ \text{extensible} = \text{True} \]
\[ \text{child}_\text{contractable} = \text{not} \text{ child}_\text{off} \]

"New" Invariant

\[ \text{extendible} \]

### 6.26 Class: CONTAINER

**Invariant changed**

<table>
<thead>
<tr>
<th>Tags: Removed, Changed, Weakened</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
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</tr>
</tbody>
</table>

"Old" Invariant

\[ \text{empty} = (\text{count} = 0) \]
\[ \text{count} \geq 0 \]
### 6.27 Class: STRING

**Invariant changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td>x</td>
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<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

**Old** Invariant

\texttt{extensible} = \texttt{True}

**New** Invariant

- \texttt{extendible}
- \texttt{object\_comparison} = \texttt{False}

**Routine: copy - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
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<th>C</th>
<th>S</th>
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<td>x</td>
<td></td>
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<td></td>
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</tbody>
</table>

**Old** Precondition

\texttt{capacity} = \texttt{other\_capacity}

**New** Precondition
### Routine: copy - Postcondition changed

**Tags:** Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ count = other.count \]

### Routine: append - Postcondition changed

**Tags:** Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ count = old\, count + s.count \]

"New" Postcondition

### Routine: duplicate - Postcondition changed

**Tags:** Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{Result}.\, count = count \]
**Routine: replace_substring - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[\text{count} = \text{old count} + \text{s.count} - \text{end_pos} + \text{start_pos} - 1\]

"New" Postcondition

**Routine: remove - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[\text{count} = \text{old count} - 1\]

"New" Postcondition

**Routine: set - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition
"Old" Precondition

\[
t \neq \text{Void} \\
1 \leq n1 \\
n1 \leq n2 \\
n2 \leq t.\text{count}
\]

"New" Precondition

\[
t \neq \text{Void}
\]

Routine: mirror - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{count} = \text{old count}
\]

"New" Postcondition

Routine: prepend - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{count} = \text{old count} + s.\text{count}
\]

"New" Postcondition
Routine: insert - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ count = old \ count + s.count \]

"New" Postcondition

Routine: precede - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ count = old \ count + 1 \]

"New" Postcondition

7 Revision "Old": 373 vs. Revision "New": 386

7.1 Class: ARRAY

Routine: force - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
7.2 Class: SEQ_STRING

Routine: prepend - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_new</th>
<th>W_new</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{item}(i) = v \]

"New" Postcondition

\[ \text{capacity} \geq \text{old capacity} \]

Routine: mirror - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_new</th>
<th>W_new</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{index} = \text{old index} + \text{s.count} \]

"New" Postcondition

\[ \text{count} = \text{old count} \]
\[ \text{index} = \text{count} - \text{old index} + 1 \]
Routine: precede - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ index = \text{old index} + 1 \]

7.3 Class: STRING

Routine: head - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ count = \min(n, \text{old count}) \]

Routine: append - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

"New" Postcondition

\[ \text{count} = \text{old count} + s\text{.count} \]

Routine: tail - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{count} = \text{min} (n, \text{old count}) \]

Routine: replace_substring - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{count} = \text{old count} + s\text{.count} - \text{end}\_\text{pos} + \text{start}\_\text{pos} - 1 \]
Routine: remove - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>$S_{ne}$</th>
<th>$W_{ne}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

$count = \text{old } count - 1$

Routine: mirror - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>$S_{ne}$</th>
<th>$W_{ne}$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

$count = \text{old } count$

Routine: prepend - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>$S_{ne}$</th>
<th>$W_{ne}$</th>
</tr>
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<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

59
"New" Postcondition

\[ \text{count} = \text{old count} + s.\text{count} \]

Routine: insert - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{count} = \text{old count} + s.\text{count} \]

Routine: precede - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{count} = \text{old count} + 1 \]
8 Revision "Old": 386 vs. Revision "New": 387

8.1 Class: RESIZABLE

Routine: automatic_grow - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

capacity >= old capacity + old capacity * growth_percentage // 100 + 1

8.2 Class: LINEAR

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

off = (after or before)

"New" Invariant

after implies off

Routine: search - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

"New" Postcondition

\[
\begin{align*}
(\text{not exhausted} \land \text{object\_comparison} \land v \neq \text{Void}) & \implies v.\text{is\_equal}(\text{item}) \\
(\text{not exhausted} \land \text{not object\_comparison}) & \implies v = \text{item}
\end{align*}
\]

8.3 Class: ARRAYED\_CIRCULAR

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

"New" Invariant

\[
\begin{align*}
count & \geq 0 \\
\text{starter} & \geq 1 \\
\text{starter} & \leq count
\end{align*}
\]

8.4 Class: TRAVERSABLE

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[
\begin{align*}
\text{empty} & \implies \text{off} \\
\text{off} & \implies \text{exhausted}
\end{align*}
\]
"New" Invariant

(empty implies off)

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

8.5 Class: HASH_TABLE

Routine: forth - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

(not over)

"New" Precondition

(not off)

Routine: item_for_iteration - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
<td></td>
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<td></td>
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</tbody>
</table>

"Old" Precondition

(not over)

"New" Precondition

(not off)
Routine: key_for_iteration - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_{re}</th>
<th>W_{re}</th>
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<tbody>
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<td></td>
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<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
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</tbody>
</table>

"Old" Precondition

\textbf{not over}

"New" Precondition

\textbf{not off}

8.6 Class: LINKED_CIRCULAR

Invariant changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
<th>W</th>
<th>S_{re}</th>
<th>W_{re}</th>
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<tbody>
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<td>Tool</td>
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<td></td>
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</tbody>
</table>

"Old" Invariant

"New" Invariant

\((active = \text{Void}) \implies \text{empty}\)

8.7 Class: CURSOR_TREE

Routine: merge_right - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<th>W_{re}</th>
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</thead>
<tbody>
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</tbody>
</table>
### Precondition

**Old** Precondition

\[
\text{not after} \\
\text{not above} \\
(level = 1) \text{ implies empty}
\]

**New** Precondition

\[
\text{other } \neq \text{ Void} \\
\text{not after} \\
\text{not above} \\
(level = 1) \text{ implies empty}
\]

### Routine: merge_left - Precondition changed

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
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</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

### Precondition

**Old** Precondition

\[
\text{not before} \\
\text{not above} \\
(level = 1) \text{ implies empty}
\]

**New** Precondition

\[
\text{other } \neq \text{ Void} \\
\text{not before} \\
\text{not above} \\
(level = 1) \text{ implies empty}
\]

### Class: LIST

#### Invariant changed

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Tool</td>
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<tr>
<td>Manual</td>
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</tbody>
</table>
8.9 Class: SEQUENCE

Routine: append - Postcondition changed

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<th>A</th>
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<th>C</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ count \geq old\ count \]

Routine: put - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[ has\ (v) \]
"New" Postcondition

\[ \text{count} = \text{old count} + 1 \]

\[ \text{has} \ (v) \]

8.10 Class: PART_SORTED_LIST

Routine: merge - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

(old sorted) implies sorted

8.11 Class: LINKED_QUEUE

Routine: put - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

(old empty) implies (item = v)
8.12 Class: CHAIN

Routine: put - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

has (v)

"New" Postcondition

\[ \text{count} = \text{old count} \]
\[ \text{has (v)} \]

Routine: swap - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<th>C</th>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{item} = \text{old i}_{th} (i) \]
\[ i_{th} (i) = \text{old item} \]

Routine: move - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<th>S_{ne}</th>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

"New" Postcondition

\[
\text{(old index + i > count) implies off}
\]

\[
\text{(old index + i < 1) implies off}
\]

\[
\text{(not off) implies (index = old index + i)}
\]

8.13 Class: TWO\_WAY\_CIRCULAR

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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</thead>
<tbody>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[
\text{(active = Void) implies empty}
\]

8.14 Class: DYNAMIC\_LIST

Routine: put\_left - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
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</tbody>
</table>

"Old" Precondition

\[
\text{offleft implies empty}
\]

"New" Precondition
Routine: merge_left - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{not before} \\
\text{other } /= \text{ Void}
\]

"New" Precondition

Routine: merge_right - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{not after} \\
\text{other } /= \text{ Void}
\]

"New" Precondition

8.15 Class: LINKED_LIST

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

Tags: Removed Changed Weakened

Tags: Changed Strengthened NEStronger

70
"Old" Invariant

| empty implies ((first_element = Void) and (active = Void)) |
| before implies (active = first_element) |
| after implies (active = last_element) |

"New" Invariant

| empty implies ((first_element = Void) and (active = Void)) |
| (active = Void) implies empty |
| before implies (active = first_element) |
| after implies (active = last_element) |

Routine: move - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
</tr>
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<tbody>
<tr>
<td>A</td>
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<td>---</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

| ((old index + i) >= 0 and (old index + i) <= (count + 1)) implies index = (old index + i) |
| (old index + i) <= 0 implies before |
| (old index + i) >= (count + 1) implies after |

8.16 Class: PRIMES

Routine: former_prime - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Removed Changed Weakened</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
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</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>
"Old" Precondition

\[ n \geq \text{smallest\_prime} \]

"New" Precondition

Routine: test\_prime - Precondition changed

<table>
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<th>x</th>
</tr>
</thead>
</table>

Tags: Removed, Changed, Weakened

"Old" Precondition

\[ n \geq 0 \]

"New" Precondition

8.17 Class: \text{DYNAMIC\_CHAIN}

Routine: prune\_all - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>x</th>
</tr>
</thead>
</table>

Tags: Changed

"Old" Postcondition

off

"New" Postcondition

exhausted
8.18 Class: COMPARABLE_STRUCT

Invariant changed

Tags: Changed

```
<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</tbody>
</table>
```

"Old" Invariant

\[\text{min\_max\_available}\text{ implies not empty}\]

"New" Invariant

\[\text{min\_max\_available}\text{ implies not empty}\]

Routine: min - Precondition changed

Tags: Changed

```
<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>W</th>
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</tbody>
</table>
```

"Old" Precondition

\[\text{min\_max\_available}\]

"New" Precondition

\[\text{min\_max\_available}\]

Routine: max - Precondition changed

Tags: Changed

```
<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_{ne}</th>
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```

73
8.19 Class: SET

Routine: changeable_comparisonCriterion - Postcondition changed

<table>
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<th>A</th>
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<th>W</th>
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<td></td>
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</tr>
</tbody>
</table>

"Old" Invariant

before implies empty
after implies empty
off implies empty

"New" Invariant

Result = empty
### Routine: forth - Postcondition changed

**Tags:** Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<td></td>
</tr>
</tbody>
</table>

**“Old” Postcondition**

\textit{not off or else empty}

**“New” Postcondition**

### Routine: remove - Postcondition changed

**Tags:** Removed Changed Weakened

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<tr>
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<th>R</th>
<th>C</th>
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<th>W</th>
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<td></td>
<td>x</td>
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</tr>
</tbody>
</table>

**“Old” Postcondition**

\textit{not off or else empty}

**“New” Postcondition**

### Routine: go\_i\_th - Precondition changed

**Tags:** Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
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</tr>
</tbody>
</table>

**“Old” Precondition**

---

75
\[
i \leq \text{count} \\
i \geq 1 \\
\text{not empty}
\]

"New" Precondition

\[
i \geq 1 \\
\text{not empty}
\]

Routine: go_i.th - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<td>x</td>
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</tbody>
</table>

"Old" Postcondition

\text{not off or else empty}

"New" Postcondition

Routine: back - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

\text{not off or else empty}

"New" Postcondition
Routine: move - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

not off or else empty

"New" Postcondition

8.21 Class: ARRAYED_TREE

Routine: put_child - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

n.parent = Current

"New" Postcondition

9 Revision "Old": 390 vs. Revision "New": 414

9.1 Class: INTEGER_REF

Routine: infix "^" - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tbody>
<tr>
<td>Tool</td>
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<td>x</td>
<td>x</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Precondition

\( \text{other} \neq \text{Void} \)

"New" Precondition

10 Revision "Old": 414 vs. Revision "New": 415

10.1 Class: COMPACT_CURSOR_TREE

Routine: wipe_out - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tbody>
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<td>x</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\( \text{above} \)

"New" Postcondition

\( \text{above} \)
\( \text{empty} \)

10.2 Class: ARGUMENTS

Routine: argument - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tbody>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\( 0 \leq i \)
\( i < \text{argument\_count} \)
"New" Precondition

\[
0 \leq i \\
i \leq \text{argument\_count}
\]

### 10.3 Class: LINKED\_CIRCULAR

**Invariant changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[(\text{active} = \text{Void}) \text{ implies empty}\]

"New" Invariant

### 10.4 Class: CURSOR\_TREE

**Routine: extend - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[\text{not above} \\
(\text{level} = 1) \text{ implies empty}\]

"New" Precondition

\[(\text{level} = 1) \text{ implies empty}\]
10.5 Class: LINKED_QUEUE

Invariant changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<td>Tool</td>
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<td>Manual</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Invariant

"New" Invariant

not empty implies after

10.6 Class: TWO WAY CIRCULAR

Invariant changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
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<td>x</td>
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<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

(active = Void) implies empty

"New" Invariant

10.7 Class: BINARY_TREE

Routine: put_left_child - Precondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
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<td>Manual</td>
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<td></td>
</tr>
</tbody>
</table>

80
"Old" Precondition

\(n.\text{is\_root}\)

"New" Precondition

\(n = \text{Void or else } n.\text{is\_root}\)

Routine: put_right_child - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\(n.\text{is\_root}\)

"New" Precondition

\(n = \text{Void or else } n.\text{is\_root}\)

10.8 Class: TREE

Invariant changed

Tags: Changed, Weakened, NE/Weaker

<table>
<thead>
<tr>
<th>Tool</th>
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<th>C</th>
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<td></td>
<td></td>
<td></td>
<td>x</td>
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</tbody>
</table>

"Old" Invariant

\(\text{is\_leaf} = (\text{arity} = 0)\)

\(\text{is\_leaf} \implies \text{child\_off}\)

\(\text{child\_off} = \text{child\_before or child\_after}\)

\(\text{child\_before} = (\text{child\_index} = 0)\)

\(\text{child\_is\_first} = (\text{not is\_leaf and child\_index} = 1)\)
child_islast = (not is_leaf and child_index = arity)
child_after = (child_index = arity + 1)
child_readable implies child.parent = Current

"New" Invariant

is_leaf = (arity = 0)
child_off = child_before or child_after
child_before = (child_index = 0)
child_isfirst = (not is_leaf and child_index = 1)
child_islast = (not is_leaf and child_index = arity)
child_after = (child_index >= arity + 1)
child_readable implies child.parent = Current

10.9 Class: DYNAMIC_TREE

Invariant changed

Tags: Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
<th>W</th>
<th>S_re</th>
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<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

extendible

"New" Invariant

extendible
child_after = (child_index = arity + 1)

10.10 Class: CIRCULAR

Routine: forth - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
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<th>S_re</th>
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</tr>
</tbody>
</table>

82
"Old" Postcondition

"New" Postcondition

\[(\text{old } \text{index} = \text{count}) \implies (\text{index} = 1)\]

Routine: valid\_cursor\_index - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td>Tool</td>
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<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result = \((i \geq 0) \text{ and } (i \leq \text{count})\)

"New" Postcondition

Result = \(((i \geq 0) \text{ and } (i \leq \text{count}))\)

Routine: before - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
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<td>Manual</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result = \(\text{empty and standard\_before}\)

"New" Postcondition

Result = \((\text{empty and standard\_before})\)
Routine: after - Postcondition changed

"Old" Postcondition

Result = empty and standard_after

"New" Postcondition

Result = (empty and standard_after)

10.11 Class: STRING
Routine: prune_all - Postcondition changed

"Old" Postcondition

"New" Postcondition

\[ count = (\text{old count}) - (\text{old occurrences (c)}) \]

11 Revision "Old": 417 vs. Revision "New": 420

11.1 Class: MULTI_ARRAY_LIST
Invariant changed

"Old" Postcondition

"New" Postcondition
"Old" Invariant

\[
\text{not prunable} \\
\text{writable = not off} \\
\text{readable = not off} \\
\text{extendible}
\]

"New" Invariant

\[
\text{writable = not off} \\
\text{readable = not off} \\
\text{extendible}
\]

11.2 Class: **LINEAR**

Routine: search - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
(\text{not exhausted and object\_comparison and } v /= \text{ Void}) \implies v.\text{is\_equal (item)} \\
(\text{not exhausted and not object\_comparison}) \implies v = \text{ item}
\]

"New" Postcondition

\[
(\text{not exhausted and then object\_comparison and then } v /= \text{ Void and then } item /= \text{ Void}) \implies v.\text{is\_equal (item)} \\
(\text{not exhausted and not object\_comparison}) \implies v = \text{ item}
\]
11.3 Class: ARRAYED_CIRCULAR

Invariant changed

Tags: Changed Weakened Newer

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[ count \geq 0 \]
\[ starter \geq 1 \]
\[ starter \leq count \]

"New" Invariant

\[ count \geq 0 \]
\[ starter \geq 0 \text{ and } starter \leq count \]

Routine: make - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[ count = n \]

"New" Postcondition
11.4 Class: LINEAR_ITERATOR

**Routine: until_do - Postcondition changed**

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\textit{not exhausted} implies \textit{test}

**Routine: continue_for - Precondition changed**

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\textit{target} /\neq \textit{Void}

"New" Precondition

\textit{target} /\neq \textit{Void}

\(n \geq 0\)

\(k \geq 1\)

**Routine: until_continue - Postcondition changed**

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

\[ \text{target\_off or else test invariant\_value} \]

"New" Postcondition

\[ \text{exhausted or else test invariant\_value} \]

**Routine: do\_until - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{not off implies test} \]

"New" Postcondition

\[ \text{not exhausted implies test} \]

**Routine: do\_for - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tr>
</tbody>
</table>

"Old" Precondition

\[ \text{target \neq Void} \]

"New" Precondition

\[ \text{target \neq Void} \]
\[ i \geq 1 \]
\[ n \geq 0 \]
\[ k \geq 1 \]

Routine: do_all - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

off

"New" Postcondition

exhausted

Routine: do_while - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

not off implies not test

"New" Postcondition

not exhausted implies not test
Routine: continue_while - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool</td>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\textbf{not off implies not test}

"New" Postcondition

\textbf{not exhausted implies not test}

Routine: continue_until - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool</td>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\textbf{not off implies test}

"New" Postcondition

\textbf{not exhausted implies test}

Routine: continue_search - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tool</td>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition
\[ \text{not off} = (b = \text{test}) \]

"New" Postcondition
\[ \text{not exhausted} = (b = \text{test}) \]

11.5 Class: SEQUENCE
Routine: put - Precondition changed

<table>
<thead>
<tr>
<th>Tags</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Manual</td>
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<td></td>
<td>x</td>
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<td>x</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition
extendible

"New" Precondition

Routine: put - Postcondition changed

<table>
<thead>
<tr>
<th>Tags</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition
count = old count + 1
has (v)

"New" Postcondition
count = old count + 1
11.6 Class: **CHAIN**

**Invariant changed**

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[
\text{empty implies off} \\
\text{index } \geq 0 \\
\text{index } \leq \text{count} + 1 \\
\text{off} = ((\text{index} = 0) \text{ or } (\text{index} = \text{count} + 1)) \\
\text{isfirst} = ((\text{not empty}) \text{ and } (\text{index} = 1)) \\
\text{islast} = ((\text{not empty}) \text{ and } (\text{index} = \text{count})) \\
(\text{not off}) \text{ implies } (\text{item} = i_{th}(\text{index}))
\]

"New" Invariant

\[
\text{index } \geq 0 \\
\text{index } \leq \text{count} + 1 \\
\text{off} = ((\text{index} = 0) \text{ or } (\text{index} = \text{count} + 1)) \\
\text{isfirst} = ((\text{not empty}) \text{ and } (\text{index} = 1)) \\
\text{islast} = ((\text{not empty}) \text{ and } (\text{index} = \text{count})) \\
(\text{not off}) \text{ implies } (\text{item} = i_{th}(\text{index}))
\]

**Routine: put - Postcondition changed**

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{count} = \text{old count} \\
\text{has } (v)
\]
"New" Postcondition

\[ \text{count} = \text{old count} \]

**Routine: move - Postcondition changed**

<table>
<thead>
<tr>
<th>Tag: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\begin{align*}
\text{old index} + i > \text{count} & \text{ implies off} \\
\text{old index} + i < 1 & \text{ implies off} \\
\text{not off} & \text{ implies \( index = \text{old index} + i \) }
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
\text{old index} + i > \text{count} & \text{ implies exhausted} \\
\text{old index} + i < 1 & \text{ implies exhausted} \\
\text{not exhausted} & \text{ implies \( index = \text{old index} + i \) }
\end{align*}
\]

11.7 Class: **ARRAYED_LIST**

**Routine: remove - Postcondition changed**

<table>
<thead>
<tr>
<th>Tag: Removed Changed Weakened</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{empty implies after} \]

"New" Postcondition
Routine: wipe_out - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

before

"New" Postcondition

12 Revision "Old": 421 vs. Revision "New": 427

12.1 Class: HASH_TABLE

Routine: make - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

keys.capacity >= n and keys.capacity >= 5
content.capacity >= n and content.capacity >= 5
deleted_marks.capacity >= n and deleted_marks.capacity >= 5

"New" Postcondition

keys.capacity >= n and keys.capacity >= minimum_size
content.capacity >= n and content.capacity >= minimum_size
deleted_marks.capacity >= n and deleted_marks.capacity >= minimum_size
### 12.2 Class: BOUNDED_STACK

**Routine:** extendible - Postcondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result = not full

### 12.3 Class: RECURSIVE_CURSOR_TREE

**Routine:** item - Precondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

not off

"New" Precondition

### 12.4 Class: COMPACT_CURSOR_TREE

**Routine:** put_left - Precondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Precondition

"New" Precondition

not above

Routine: wipe_out - Postcondition changed

Tags: Changed Weakened NEWer

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

above
empty

"New" Postcondition

above

Routine: down - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

True
12.5 Class: SEQ_STRING

Invariant changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

extendible

"New" Invariant

Routine: prune - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

not off

"New" Precondition

12.6 Class: GENERAL

Routine: standard_clone - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
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<td>x</td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

\[ \text{standard\_equal (Result, Current)} \]

"New" Postcondition

\[ \text{standard\_equal (Result, other)} \]

12.7 Class: LINKED\_LIST\_CURSOR

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

"New" Invariant

\[ \text{not (before and after)} \]

\[ \text{active = Void implies (before or after)} \]

12.8 Class: MEMORY

Routine: gc\_statistics - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

\[ \text{collector\_type = full\_collector or collector\_type = incremental\_collector} \]

98
12.9 Class: CHAIN

Routine: isfirst - Postcondition changed

"Old" Postcondition

Result implies (not empty)

"New" Postcondition

Result implies not empty

Routine: valid_cursor_index - Postcondition changed

"Old" Postcondition

Result = (i >= 0) and (i <= count + 1)

"New" Postcondition

Result = ((i >= 0) and (i <= count + 1))

Routine: finish - Postcondition changed

"Old" Postcondition

"New" Postcondition
"Old" Postcondition

(\textit{not empty}) \textit{implies} islast

"New" Postcondition

\textit{not empty} \textit{implies} islast

Routine: \textit{start} - Postcondition changed

<table>
<thead>
<tr>
<th>Tags</th>
<th>Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>A R C S W S_{ne} W_{ne}</td>
</tr>
<tr>
<td>Manual &amp;</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Postcondition

(\textit{not empty}) \textit{implies} isfirst

"New" Postcondition

\textit{not empty} \textit{implies} isfirst

Routine: \textit{islast} - Postcondition changed

<table>
<thead>
<tr>
<th>Tags</th>
<th>Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>A R C S W S_{ne} W_{ne}</td>
</tr>
<tr>
<td>Manual &amp;</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result \textit{implies} (\textit{not empty})

"New" Postcondition

Result \textit{implies not empty}
12.10 Class: BINARY_TREE

Routine: has_both - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result = (has_left and has_right)

Routine: has_right - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result = (right_child /= Void)

Routine: arity - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

"New" Postcondition

Result \leq 2

Routine: has_left - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

12.11 Class: LINKED_LIST

Routine: put_right - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

next \neq Void
next.item = v

"New" Postcondition

next \neq Void
not old before implies next.item = v
old before implies active.item = v
12.12 Class: TREE

Routine: child_islast - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result implies (not is_leaf)

"New" Postcondition

Result implies not is_leaf

---

Routine: child_isfirst - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result implies (not is_leaf)

"New" Postcondition

Result implies not is_leaf

---

12.13 Class: FIXED_TREE

Routine: child_contractable - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
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<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

---

103
12.14 Class: STRING

Routine: item - Precondition changed

<table>
<thead>
<tr>
<th>Tag: Removed Changed Weakened</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ i \leq \text{count} \]
\[ i > 0 \]

"New" Precondition

13 Revision "Old": 444 vs. Revision "New": 445

13.1 Class: UNIX_SIGNALS

Routine: catch - Precondition changed

<table>
<thead>
<tr>
<th>Tag: Added Changed Strengthened</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition
"New" Precondition

\texttt{is\_defined (sig)}

\textbf{Routine: reset\_default - Precondition changed}

\begin{tabular}{|c|c|c|c|c|c|c|}
\hline
Tool & A & R & C & S & W & $S_{ne}$ & $W_{ne}$ \\
\hline
Manual & x & x & x & & & & \\
\hline
\end{tabular}

"Old" Precondition

"New" Precondition

\texttt{is\_defined (sig)}

\textbf{Routine: ignore - Precondition changed}

\begin{tabular}{|c|c|c|c|c|c|c|}
\hline
Tool & A & R & C & S & W & $S_{ne}$ & $W_{ne}$ \\
\hline
Manual & x & x & x & & & & \\
\hline
\end{tabular}

"Old" Precondition

"New" Precondition

\texttt{is\_defined (sig)}
13.2 Class: HASH_TABLE

Routine: valid_key - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{Result} = (k \neq \text{Void}) \text{ and then } k.\text{is_hashable} \]

13.3 Class: RANDOM

Routine: set_seed - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
</table>

"Old" Postcondition

"New" Postcondition

\[ seed = s \]

Routine: make - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
</table>
14 Revision "Old": 454 vs. Revision "New": 460

14.1 Class: UNIX_SIGNALS

Routine: catch - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Manual</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\texttt{is\_defined (sig)}

"New" Precondition

Routine: ignore - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\texttt{is\_defined (sig)}

"New" Precondition
14.2 Class: HASH_TABLE

Routine: change_key - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

valid_key(new_key) and valid_key(old_key)

"New" Precondition

Routine: change_key - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

control = changed_constant implies not has(old_key)

"New" Postcondition

14.3 Class: ARRAYED_QUEUE

Invariant changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
14.4 Class: LINKED_LIST

Invariant changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

empty implies ((first_element = Void) and (active = Void))
(active = Void) implies empty
before implies (active = first_element)
after implies (active = last_element)

"New" Invariant

prunable
empty implies ((first_element = Void) and (active = Void))
(active = Void) implies empty
before implies (active = first_element)
after implies (active = last_element)

14.5 Class: COMPARABLE_STRUCT

Routine: min_max_available - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

109
14.6 Class: \textbf{STD\_FILES}

Routine: putstring - Precondition changed

Result implies not empty

\begin{tabular}{|c|c|c|c|c|c|c|}
\hline
& A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
\text{Tool} & x & x & x & & & & \\
\hline
\text{Manual} & & & & & & & \\
\hline
\end{tabular}

14.7 Class: \textbf{ARRAYED\_LIST}

Invariant changed

\begin{tabular}{|c|c|c|c|c|c|c|}
\hline
& A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
\text{Tool} & x & x & x & & & & \\
\hline
\text{Manual} & & & & & & & \\
\hline
\end{tabular}

s /= Void

not full
prunable
15 Revision "Old": 461 vs. Revision "New": 464

15.1 Class: SORTED_LIST

Routine: min - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

not empty

Routine: min - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result = first

Routine: median - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

111
"Old" Precondition

"New" Precondition

\textbf{not empty}

\textbf{Routine: median - Postcondition changed}

\textbf{Tags: Added Changed Strengthened}

\begin{tabular}{|c|c|c|c|c|c|}
\hline
 & A & R & C & S & W & \text{S}_{ne} & \text{W}_{ne} \\
\hline
Tool & x & x & x & & & & \\
Manual & & & & & & & \\
\hline
\end{tabular}

"Old" Postcondition

"New" Postcondition

\textbf{Result} = \text{i}_\text{th} (((\text{count} + 1) \div 2)

\textbf{Routine: max - Precondition changed}

\textbf{Tags: Added Changed Strengthened}

\begin{tabular}{|c|c|c|c|c|c|}
\hline
 & A & R & C & S & W & \text{S}_{ne} & \text{W}_{ne} \\
\hline
Tool & x & x & x & & & & \\
Manual & & & & & & & \\
\hline
\end{tabular}

"Old" Precondition

"New" Precondition

\textbf{not empty}
Routine: max - Postcondition changed

"Old" Postcondition

"New" Postcondition

Result = last

15.2 Class: BINARY_SEARCH_TREE

Routine: min - Postcondition changed

"Old" Postcondition

"New" Postcondition

has (Result)

Routine: sort - Postcondition changed

"Old" Postcondition

"New" Postcondition
Routine: max - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

sorted

Routine: infix "/" - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

other.item \neq 0.0

"New" Precondition

other.item \neq 0

15.3 Class: INTEGER_REF
15.4 Class: **DOUBLE_REF**

Routine: **infix "/"** - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
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<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

other.item /= 0.0

"New" Precondition

other /= 0.0

16 Revision "Old": 481 vs. Revision "New": 484

16.1 Class: **STORABLE**

Routine: **general_store** - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

file /= Void
file.exists
file.is_open_write

"New" Precondition

file /= Void
file.exists
file.is_open_write
file.is_binary
Routine: basic_store - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
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<td></td>
<td>x</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

- file /= Void
- file.exists
- file.is_open_write

"New" Precondition

- file /= Void
- file.exists
- file.is_open_write
- file.is_binary

Routine: retrieved - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
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<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

- file /= Void
- file.exists
- file.is_open_read

"New" Precondition

- file /= Void
- file.exists
- file.is_open_read
- file.is_binary
17 Revision "Old": 484 vs. Revision "New": 491

17.1 Class: STRING

Routine: index_of - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td>x</td>
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<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td>x</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

\[ start \geq 1 \]
\[ start \leq count \]

"New" Precondition

Routine: index_of - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
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<td>x</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{Result} > 0 \text{ implies } item (\text{Result}) = c \]

Routine: substring_index - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
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<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Precondition

"New" Precondition

\[ \text{other} \neq \text{Void} \]
\[ \text{not other}.empty \]
\[ \text{start} \geq 1 \]
\[ \text{start} \leq \text{count} \]

Routine: substring_index - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{Result} > 0 \text{ implies substring} (\text{Result}, \text{Result} + \text{other}.\text{count} - 1).\text{is_equal}(\text{other}) \]

18 Revision "Old": 491 vs. Revision "New": 492

18.1 Class: HASH_TABLE

Routine: valid_key - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
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<tr>
<td>Manual</td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{Result} = (k \neq \text{Void}) \text{ and then } k.\text{is_hashable} \]
"New" Postcondition

\[ \text{Result} = ((k /\neq \text{Void}) \text{ and then } k.\text{is_hashable}) \]

18.2 Class: GENERAL

Routine: standard_equal - Postcondition changed

"Old" Postcondition

\[ \text{Result} = (\text{some} = \text{Void and other} = \text{Void}) \text{ or else } ((\text{some} /\neq \text{Void and other} /\neq \text{Void}) \text{ and then } \text{some.standard_is_equal (other)}) \]

"New" Postcondition

\[ \text{Result} = ((\text{some} = \text{Void and other} = \text{Void}) \text{ or else } ((\text{some} /\neq \text{Void and other} /\neq \text{Void}) \text{ and then } \text{some.standard_is_equal (other)}) \]

Routine: equal - Postcondition changed

"Old" Postcondition

\[ \text{Result} = (\text{some} = \text{Void and other} = \text{Void}) \text{ or else } ((\text{some} /\neq \text{Void and other} /\neq \text{Void}) \text{ and then } \text{some.is_equal (other)}) \]

"New" Postcondition

\[ \text{Result} = ((\text{some} = \text{Void and other} = \text{Void}) \text{ or else } ((\text{some} /\neq \text{Void and other} /\neq \text{Void}) \text{ and then } \text{some.is_equal (other)}) \]

119
19 Revision "Old": 492 vs. Revision "New": 496

19.1 Class: STRING

Routine: fuzzy_index - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

other /= Void
not other.empty
start >= 1
start <= count
fuzzy <= other.count

"New" Precondition

other /= Void
not other.empty
start >= 1
start <= count
fuzzy <= other.count

20 Revision "Old": 517 vs. Revision "New": 518

20.1 Class: STRING

Routine: append - Precondition changed

<table>
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<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
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<td>x</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition
"New" Precondition

\[ s \neq \text{Void} \]

21 Revision "Old": 536 vs. Revision "New": 542

21.1 Class: STORABLE

Routine: general_store - Precondition changed

"Old" Precondition

\[ \text{file} \neq \text{Void} \]
\[ \text{file.exists} \]
\[ \text{file.is_open_write} \]
\[ \text{file.is_binary} \]

"New" Precondition

\[ \text{file} \neq \text{Void} \]
\[ \text{file.exists} \]
\[ \text{file.is_open_write} \]
\[ \text{file.is_plain_text} \]

Routine: basic_store - Precondition changed

"Old" Precondition

\[ \text{file} \neq \text{Void} \]
```plaintext
file /= Void
file.exists
file.is_open_write
file.is_binary

"New" Precondition

file /= Void
file.exists
file.is_open_write
not file.is_plain_text

Routine: retrieved - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
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<td>Tool</td>
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</tr>
</tbody>
</table>

"Old" Precondition

file /= Void
file.exists
file.is_open_read
file.is_binary

"New" Precondition

file /= Void
file.exists
file.is_open_read
not file.is_plain_text

21.2 Class: FILE

Invariant changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tr>
</tbody>
</table>
```

122
"Old" Invariant

"New" Invariant

closed_file \leq mode \text{ and } mode \leq append_read_file
name \neq Void
\text{not name.empty}

22 Revision "Old": 561 vs. Revision "New": 562

22.1 Class: STORABLE

Routine: general_store - Precondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

file \neq Void
file.exists
file.is_open_write
file.is_plain_text

"New" Precondition

file \neq Void
file.exists
file.is_open_write
\text{not file.is_plain_text}
23 Revision "Old": 575 vs. Revision "New": 591

23.1 Class: STRING

Routine: replace_substring_all - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
<th>W</th>
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<tbody>
<tr>
<td>Tool</td>
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<td>x</td>
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</tr>
</tbody>
</table>

"Old" Precondition

original /= Void
new /= Void
not original.empty

"New" Precondition

original /= Void
new /= Void
not original.empty
not empty

24 Revision "Old": 606 vs. Revision "New": 633

24.1 Class: ARRAYED_LIST

Invariant changed

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
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<td>x</td>
<td>x</td>
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</tbody>
</table>

"Old" Invariant

not full
prunable
"New" Invariant

**prunable**

25 Revision "Old": 876 vs. Revision "New": 877

25.1 Class: **STRING**

Routine: left_adjust - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[(\text{count} /= 0) \implies (\text{item}(1) /= \text{"’"})\]

"New" Postcondition

\[(\text{count} /= 0) \implies (\text{item}(1) /= \text{"’"}) \text{ and } (\text{item}(1) /= \text{"%T"}) \text{ and } (\text{item}(1) /= \text{"%R"}) \text{ and } (\text{item}(1) /= \text{"%N"})\]

Routine: right_adjust - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
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</tbody>
</table>

"Old" Postcondition

\[(\text{count} /= 0) \implies (\text{item}(\text{count}) /= \text{"’"})\]

"New" Postcondition

\[(\text{count} /= 0) \implies (\text{item}(\text{count}) /= \text{"’"}) \text{ and } (\text{item}(\text{count}) /= \text{"%T"}) \text{ and } (\text{item}(\text{count}) /= \text{"%R"}) \text{ and } (\text{item}(\text{count}) /= \text{"%N"})\]
26.1 Class: ARRAY

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tbody>
<tr>
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</tr>
</tbody>
</table>

"Old" Invariant

\[ capacity = upper - lower + 1 \]
\[ capacity >= 0 \]

"New" Invariant

\[ count = upper - lower + 1 \]
\[ count >= 0 \]

Routine: resize - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tr>
<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[ lower = \text{minindex.min (old lower)} \]
\[ upper = \text{maxindex.max (old upper)} \]
**Routine: force - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
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<td></td>
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<td>x</td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{item (i)} = v
\]
\[
\text{capacity} \geq \text{old capacity}
\]

"New" Postcondition

\[
\text{item (i)} = v
\]
\[
\text{count} \geq \text{old count}
\]

**Routine: make - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[
(\text{minindex} > \text{maxindex}) \implies (\text{capacity} = 0)
\]
\[
(\text{minindex} \leq \text{maxindex}) \implies (\text{capacity} = \text{maxindex} - \text{minindex} + 1)
\]

"New" Postcondition

\[
(\text{minindex} > \text{maxindex}) \implies (\text{count} = 0)
\]
\[
(\text{minindex} \leq \text{maxindex}) \implies (\text{count} = \text{maxindex} - \text{minindex} + 1)
\]
26.2 Class: ARGUMENTS

Routine: argument - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
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<tbody>
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</tr>
</tbody>
</table>

"Old" Precondition

0 \leq i \\
i \leq \text{argument\_count}

"New" Precondition

i \geq 0 \\
i \leq \text{argument\_count}

Routine: command\_name - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\text{Result} = \text{argument\_0} 

Routine: argument\_count - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tr>
</tbody>
</table>

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"Old" Postcondition

"New" Postcondition

Result $\geq 0$

26.3 Class: BOOLEAN

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[
\text{is}_{\text{equal}} (\neg (\neg \text{Current}))
\]
\[
\neg (\text{Current} \land (\neg \text{Current}))
\]
\[
\text{Current} \lor (\neg \text{Current})
\]

"New" Invariant

Routine: infix "xor" - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<th>C</th>
<th>S</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result $= ((\text{Current} \lor \text{other}) \land \neg (\text{Current} \land \text{other}))$
Routine: infix "and then" - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Manual</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /≠ Void
Result = not (not Current or else not other)

Routine: infix "and" - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>W_ne</th>
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<td></td>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /≠ Void
Result = not (not Current or not other)
Result = (other and Current)
Result implies (Current and then other)

Routine: infix "or" - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W_ne</th>
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<tbody>
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</tbody>
</table>
"Old" Postcondition

"New" Postcondition

<table>
<thead>
<tr>
<th>Result /= Void</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result = not (not Current and not other)</td>
</tr>
<tr>
<td>Result = (other or Current)</td>
</tr>
<tr>
<td>Result implies (Current or else other)</td>
</tr>
</tbody>
</table>

Routine: infix "implies" - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>Wne</th>
<th>Wne</th>
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</thead>
<tbody>
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<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result = (not Current or else other)

Routine: infix "or else" - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
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<th>Wne</th>
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<tbody>
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</table>

"Old" Postcondition

"New" Postcondition

Result /= Void
Result = not (not Current and then not other)
26.4 Class: DOUBLE_REF

Invariant changed

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<tr>
<th>Tool</th>
<th>Manual</th>
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</thead>
<tbody>
<tr>
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</tbody>
</table>

"Old" Invariant

sign * abs = item

"New" Invariant

Routine: infix "/" - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
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</thead>
<tbody>
<tr>
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<td>x</td>
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</tbody>
</table>

"Old" Precondition

other /= 0.0

"New" Precondition

Routine: infix "<" - Precondition changed

<table>
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<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
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<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

Tags: Added Changed Strengthened, Removed Changed Weakened

132
"Old" Precondition

other /= Void

"New" Precondition

26.5 Class: CHARACTER_REF

Routine: infix "<" - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Removed Changed Weakened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Precondition

other /= Void

"New" Precondition

26.6 Class: COMPARABLE

Invariant changed

<table>
<thead>
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<tbody>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Invariant

"New" Invariant

not (Current < Current)
Routine: **infix ”\(\geq\)” - Postcondition changed**

<table>
<thead>
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<th>Tags: Changed</th>
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<th>R</th>
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<td>Manual</td>
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</tbody>
</table>

"Old" Postcondition

Result implies not (Current < other)

"New" Postcondition

Result = (other <= Current)

---

Routine: **infix ”\(<\)” - Postcondition changed**

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Postcondition

Result implies not (Current > other)

"New" Postcondition

Result = (Current < other) or is_equal (other)

---

Routine: **infix ”\(\rangle\)” - Postcondition changed**

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

---

134
"Old" Postcondition

\[
\text{Result implies not } (\text{Current} \leq \text{other})
\]

"New" Postcondition

\[
\text{Result} = (\text{other} < \text{Current})
\]

27 Revision "Old": 1239 vs. Revision "New": 1240

27.1 Class: EXCEPTIONS

Routine: developer_exception_name - Precondition changed

<table>
<thead>
<tr>
<th>Tag: Added Changed Strengthened</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<th>S_{ne}</th>
<th>W_{ne}</th>
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<td>Manual</td>
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</tbody>
</table>

"Old" Precondition

"New" Precondition

\[\text{is_developer_exception}\]

27.2 Class: NUMERIC

Invariant changed

<table>
<thead>
<tr>
<th>Tag: Added Changed Strengthened</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>S_{ne}</th>
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</tr>
</tbody>
</table>

"Old" Invariant
"New" Invariant

\[
equal (\text{Current} + \text{zero}, \text{Current}) \\
equal (\text{Current} - \text{Current}, \text{zero}) \\
equal (\text{Current} \times \text{one}, \text{Current}) \\
divisible (\text{Current}) \implies equal (\text{Current} / \text{Current}, \text{one})
\]

27.3 Class: GENERAL

Invariant changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</tr>
</tbody>
</table>

"Old" Invariant

"New" Invariant

\[
\text{standard_is_equal (Current)} \\
\text{conforms_to (Current)}
\]

Routine: is_equal - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[
\text{Result implies other.is_equal (Current)} \\
\text{standard_is_equal (other) implies Result}
\]
Routine: standard_equal - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{Result} = ((\text{some} = \text{Void} \text{ and } \text{other} = \text{Void}) \text{ or else } ((\text{some} /= \text{Void} \text{ and } \text{other} /= \text{Void}) \text{ and then } \text{some.standard_is_equal (other)}))
\]

"New" Postcondition

\[
\text{Result} = (\text{some} = \text{Void} \text{ and } \text{other} = \text{Void}) \text{ or else } ((\text{some} /= \text{Void} \text{ and } \text{other} /= \text{Void}) \text{ and then } \text{some.standard_is_equal (other)})
\]

Routine: equal - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{Result} = ((\text{some} = \text{Void} \text{ and } \text{other} = \text{Void}) \text{ or else } ((\text{some} /= \text{Void} \text{ and } \text{other} /= \text{Void}) \text{ and then } \text{some.is_equal (other)}))
\]

"New" Postcondition

\[
\text{Result} = (\text{some} = \text{Void} \text{ and } \text{other} = \text{Void}) \text{ or else } ((\text{some} /= \text{Void} \text{ and } \text{other} /= \text{Void}) \text{ and then } \text{some.is_equal (other)})
\]

Routine: standard_copy - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
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</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
</tbody>
</table>

137
"Old" Precondition

\[
\text{other} \neq \text{Void} \\
\text{other}.\text{conforms_to} \ (\text{Current})
\]

"New" Precondition

\[
\text{other} \neq \text{Void} \\
\text{same_type} \ (\text{other})
\]

Routine: standard_copy - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
is_{equal} \ (\text{other})
\]

"New" Postcondition

\[
standard_is_{equal} \ (\text{other})
\]

Routine: deep_equal - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

"Old" Postcondition
"New" Postcondition

\[
\text{standard_equal (some, other) implies Result}
\]
\[
\text{Result implies some.same_type (other)}
\]
\[
\text{Result implies deep_equal (other, some)}
\]

Routine: copy - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

\[
\text{other /= Void}
\]
\[
\text{other.conforms.to (Current)}
\]

"New" Precondition

\[
\text{other /= Void}
\]
\[
\text{same_type (other)}
\]

27.4 Class: HASHABLE

Routine: is_hashable - Postcondition changed

Tags: Changed

<table>
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<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

\[
\text{Result = (Current /= default)}
\]

"New" Postcondition

\[
\text{Result implies (Current /= default)}
\]
27.5 Class: INTEGER_REF

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
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</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
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</tbody>
</table>

"Old" Invariant

"New" Invariant

sign * abs = item

Routine: infix "/" - Precondition changed

<table>
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<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
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</tbody>
</table>

"Old" Precondition

other.item /= 0

"New" Precondition

other /= Void
divisible (other)

Routine: infix "/" - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
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</thead>
<tbody>
<tr>
<td>x</td>
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</tr>
</tbody>
</table>
"Old" Postcondition

"New" Postcondition

Result /= Void

Routine: infix "<" - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Precondition

other /= Void

"New" Precondition

Routine: infix "/" - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
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</tbody>
</table>

"Old" Precondition

other /= Void

"New" Precondition
Routine: infix "\" - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tbody>
</table>

"Old" Precondition

\[\text{other} \neq \text{Void}\]

"New" Precondition

\[\text{other} \neq \text{Void}
\text{divisible (other)}\]

Routine: infix "\" - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
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<th>C</th>
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<td>x</td>
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</tr>
<tr>
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<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[\text{Result} \neq \text{Void}\]

"New" Postcondition

\[\text{Result} \neq \text{Void}\]

27.6 Class: REAL_REF

Invariant changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
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<tbody>
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<td>Tool</td>
<td>x</td>
<td>x</td>
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<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Invariant

"New" Invariant

\[ \text{sign} \ast \text{abs} = \text{item} \]

**Routine: infix "/" - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>S_{ne}</th>
<th>W_{ne}</th>
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</tr>
</tbody>
</table>

"Old" Precondition

\[ \text{other.item} \neq 0.0 \]

"New" Precondition

**Routine: infix "/" - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<th>W_{ne}</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ \text{other} \neq \text{Void} \]

"New" Precondition

143
### 27.7 Class: PART_COMPARABLE

**Routine: infix "><=" - Precondition changed**

<table>
<thead>
<tr>
<th>Tag</th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Precondition

"New" Precondition

other /= Void

**Routine: infix "><=" - Precondition changed**

<table>
<thead>
<tr>
<th>Tag</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td>x</td>
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</table>

"Old" Precondition

"New" Precondition

other /= Void

**Routine: infix ">" - Precondition changed**

<table>
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<tr>
<th>Tag</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
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</tbody>
</table>
“Old” Precondition

“New” Precondition

\( other /\neq Void \)

27.8 Class: STRING

Routine: head - Postcondition changed

<table>
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<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td></td>
</tr>
</tbody>
</table>

"Old“ Postcondition

\[ count = \min (n, \text{old count}) \]

"New“ Postcondition

\[ count = n \cdot \min (\text{old count}) \]

Routine: tail - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old“ Postcondition

\[ count = \min (n, \text{old count}) \]

"New“ Postcondition

\[ count = n \cdot \min (\text{old count}) \]
Routine: put - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W_{ne}</th>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ i \leq count \]
\[ i > 0 \]

"New" Precondition

28 Revision "Old": 1383 vs. Revision "New": 1458

28.1 Class: COMPARABLE

Routine: infix ">=\" - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{Result} = (other \leq \text{Current}) \]

"New" Postcondition

\[ \text{Result} = (other <\text{Current}) \]
29 Revision "Old": 1515 vs. Revision "New": 1516

29.1 Class: **STRING**
Routine: make_from_string - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\(shared\_with\ (s)\)

30 Revision "Old": 1516 vs. Revision "New": 1585

30.1 Class: **COMPARABLE**
Routine: infix "\(>=\)" - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[\text{Result} = (\text{other} < \text{Current})\]

"New" Postcondition

\[\text{Result} = (\text{other} \leq \text{Current})\]
31 Revision "Old": 1671 vs. Revision "New": 1672

31.1 Class: PATH_NAME

Routine: set_volume - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
<td>x</td>
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<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

volume_name /= Void
is_volume_name_valid(volume_name)
path.empty

"New" Precondition

volume_name /= Void
is_volume_name_valid(volume_name)
empty

32 Revision "Old": 1672 vs. Revision "New": 1816

32.1 Class: ARRAY

Routine: make - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
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<tbody>
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<td>x</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

minindex <= maxindex or (minindex = maxindex + 1)
**Routine: make - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\begin{align*}
(minindex > maxindex) & \implies (count = 0) \\
(minindex \leq maxindex) & \implies (count = maxindex - minindex + 1)
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
lower & = minindex \\
upper & = maxindex
\end{align*}
\]

33 Revision "Old": 2113 vs. Revision "New": 2219

**33.1 Class: GENERAL**

**Routine: deep_equal - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\begin{align*}
standard_equal \ (some, \ other) & \implies Result \\
Result & \implies some\_same\_type \ (other) \\
Result & \implies deep\_equal \ (other, \ some)
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
standard_equal \ (some, \ other) & \implies Result \\
(some = Void) & \implies (Result = (other = Void)) \\
(Result \ and \ (some /= Void)) & \implies some\_same\_type \ (other) \\
Result & \implies deep\_equal \ (other, \ some)
\end{align*}
\]

149
34 Revision "Old": 2219 vs. Revision "New": 2245

34.1 Class: STRING

Routine: to_boolean - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S&lt;ne&gt;</th>
<th>W&lt;ne&gt;</th>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

is_boolean

Routine: to_real - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</tbody>
</table>

"Old" Precondition

"New" Precondition

is_real

Routine: to_integer - Precondition changed

<table>
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<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</tbody>
</table>
"Old" Precondition

"New" Precondition

is_integer

Routine: to_double - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</table>

"Old" Precondition

"New" Precondition

is_double

35 Revision "Old": 2600 vs. Revision "New": 2604

35.1 Class: RESIZABLE

Routine: automatic_grow - Postcondition changed

<table>
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<tr>
<th></th>
<th>A</th>
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<th>C</th>
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</tbody>
</table>

"Old" Postcondition

\[ \text{capacity} \geq \text{old \ capacity} + \text{old capacity} \times \text{growth\_percentage} \div 100 + 1 \]

"New" Postcondition

\[ \text{capacity} \geq \text{old \ capacity} + \text{old capacity} \times \text{growth\_percentage} \div 100 \]
36 Revision "Old": 2620 vs. Revision "New": 2691

36.1 Class: PATH_NAME

Routine: is_volume_name_valid - Precondition changed

Tags: Added Changed Strengthened

<table>
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<th>Tool</th>
<th>A</th>
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</tbody>
</table>

"Old" Precondition

vol_name /= Void

"New" Precondition

Routine: is_directory_name_valid - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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</table>

"Old" Precondition

dir_name /= Void

"New" Precondition
37 Revision "Old": 2694 vs. Revision "New": 2695

37.1 Class: LINKED_STACK

Invariant changed

<table>
<thead>
<tr>
<th></th>
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<th>W</th>
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</tbody>
</table>

"Old" Invariant

before

"New" Invariant

Routine: item - Precondition changed

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"Old" Precondition

not empty

"New" Precondition
38 Revision "Old": 3120 vs. Revision "New": 3409

38.1 Class: ARGUMENTS

Routine: command_name - Postcondition changed

<table>
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<tr>
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<tbody>
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</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result = argument (0)

"New" Postcondition

Result.is_equal (argument (0))

39 Revision "Old": 3662 vs. Revision "New": 4029

39.1 Class: CHAIN

Routine: valid_index - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
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</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result = (i >= 1) and (i <= count)

"New" Postcondition

Result = ((i >= 1) and (i <= count))
### 40 Revision "Old": 4032 vs. Revision "New": 4033

**40.1 Class: STRING**

**Routine: from_c** - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
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</tbody>
</table>

**"Old" Precondition**

```c
e_string /= Void
```

**"New" Precondition**

```c
e_string /= default_pointer
```

### 41 Revision "Old": 4980 vs. Revision "New": 4981

**41.1 Class: HASH_TABLE**

**Routine: valid_key** - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
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</tbody>
</table>

**"Old" Postcondition**

```c
Result = (((k /= Void) and then k.is_hashable)
```

**"New" Postcondition**

```c
Result = (k /= dead_key and then k.is_hashable)
```
Routine: put - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

\[
control = \text{inserted\_constant} \implies \text{item\,(key) = new}
\]

"New" Postcondition

\[
\text{inserted} \implies \text{item\,(key) = new}
\]

Routine: replace - Postcondition changed

Tags: Changed

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<thead>
<tr>
<th></th>
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</tbody>
</table>

"Old" Postcondition

\[
control = \text{changed\_constant} \implies \text{item\,(key) = new}
\]

"New" Postcondition

\[
\text{replaced} \implies \text{item\,(key) = new}
\]

Routine: replace_key - Postcondition changed

Tags: Changed

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<thead>
<tr>
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</tr>
</tbody>
</table>
"Old" Postcondition

\[ \text{control} = \text{changed}_{\text{constant}} \implies \neg \text{has} \ (\text{old\_key}) \]

"New" Postcondition

\[ \text{replaced} \implies \neg \text{has} \ (\text{old\_key}) \]

42 Revision "Old": 7187 vs. Revision "New": 7188

42.1 Class: STORABLE

Routine: general_store - Precondition changed

<table>
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<tr>
<th>Tags: Changed</th>
<th>A</th>
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</tbody>
</table>

"Old" Precondition

\[ \text{file} \neq \text{Void} \]
\[ \text{file} . \text{exists} \]
\[ \text{file} . \text{is\_open\_write} \]
\[ \neg \text{file} . \text{is\_plain\_text} \]

"New" Precondition

\[ \text{medium} \neq \text{Void} \]
\[ \text{medium} . \text{exists} \]
\[ \text{medium} . \text{is\_open\_write} \]
\[ \text{medium} . \text{support\_storable} \]

Routine: independent_store - Precondition changed

<table>
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<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</tbody>
</table>
### Old Precondition

```
file /= Void
file.exists
file.is_open_write
not file.is_plain_text
```

### New Precondition

```
medium /= Void
medium.exists
medium.is_open_write
medium.support_storable
```

### Routine: basic_store - Precondition changed

**Tags:** Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tbody>
</table>

### Old Precondition

```
file /= Void
file.exists
file.is_open_write
not file.is_plain_text
```

### New Precondition

```
medium /= Void
medium.exists
medium.is_open_write
medium.support_storable
```

### Routine: retrieved - Precondition changed

**Tags:** Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>
"Old" Precondition

\[
\begin{align*}
\text{file} & \neq \text{Void} \\
\text{file.exists} \\
\text{file.is_open_read} \\
\text{not file.is_plain_text}
\end{align*}
\]

"New" Precondition

\[
\begin{align*}
\text{medium} & \neq \text{Void} \\
\text{medium.exists} \\
\text{medium.is_open_read} \\
\text{medium.support_storable}
\end{align*}
\]

43 Revision "Old": 7526 vs. Revision "New": 7541

43.1 Class: CURSOR_TREE

Routine: extend - Precondition changed

Tag: Removed Changed Weakened

\begin{tabular}{|c|c|c|c|c|c|c|}
\hline
 & A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
Tool & x & x & x & & & & \\
Manual & & & & & & & \\
\hline
\end{tabular}

"Old" Precondition

\( (level = 1) \text{ implies empty} \)

"New" Precondition
44 Revision "Old": 7579 vs. Revision "New": 7582

44.1 Class: HASH_TABLE

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tbody>
</table>

"Old" Invariant

\[ 0 \leq \text{count} \]

"New" Invariant

\[ \text{keys} \neq \text{ Void} \]
\[ \text{content} \neq \text{ Void} \]
\[ 0 \leq \text{count} \]
\[ \text{count} \leq \text{capacity} \]
\[ \text{keys}.\text{count} = \text{capacity} + 1 \]
\[ \text{content}.\text{count} = \text{capacity} + 1 \]
\[ \text{deleted}\_\text{marks}.\text{count} = \text{capacity} \]
\[ \text{keys}.\text{lower} = 0 \]
\[ \text{content}.\text{lower} = 0 \]
\[ \text{deleted}\_\text{marks}.\text{lower} = 0 \]

\text{off or truly\_occupied (iteration\_position)}

Routine: valid_key - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

\text{Result} = (k \neq \text{dead}\_\text{key} \text{ and then } k.\text{is\_hashable})

160
"New" Postcondition

**Result**

**Routine: put - Postcondition changed**

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
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</tbody>
</table>

"Old" Postcondition

\[\text{inserted implies } \text{item} (\text{key}) = \text{new}\]

"New" Postcondition

\[\text{inserted implies } \text{item} (\text{key}) = \text{new}\]

\[\text{inserted implies } (\text{count} = \text{old count} + 1)\]

\[\text{conflict implies } (\text{count} = \text{old count})\]

**Routine: remove - Precondition changed**

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

\[\text{valid key} (\text{key})\]

"New" Precondition


**Routine: remove - Postcondition changed**

Tags: Changed, Strengthened, NEStronger

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
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<th>S</th>
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</tbody>
</table>

"Old" Postcondition

**not has (key)**

"New" Postcondition

**not has (key)**

found implies \( (\text{count} = \text{old count} - 1) \)

**Routine: clear_all - Postcondition changed**

Tags: Added, Changed, Strengthened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\( \text{position} = 0 \)

\( \text{count} = 0 \)

**not has_default**

\( \text{control} = 0 \)

**Routine: replace - Precondition changed**

Tags: Removed, Changed, Weakened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
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</tbody>
</table>

162
"Old" Precondition

\[ \text{valid\_key}(\text{key}) \]

"New" Precondition

Routine: replace\_key - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
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</table>

"Old" Precondition

\[ \text{valid\_key}(\text{new\_key}) \text{ and } \text{valid\_key}(\text{old\_key}) \]

"New" Precondition

Routine: replace\_key - Postcondition changed

Tags: Changed Strengthened NEStronger

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</table>

"Old" Postcondition

\[ \text{replaced} \text{ implies not } \text{has}(\text{old\_key}) \]

"New" Postcondition

\[ \begin{align*}
(\text{replaced} \text{ and not equal } (\text{new\_key}, \text{old\_key})) & \text{ implies } (\text{not has}(\text{old\_key})) \\
\text{replaced} & \text{ implies } (\text{has}(\text{new\_key})) \\
\text{count} & = \text{old count}
\end{align*} \]
**Routine: force - Precondition changed**

<table>
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<tr>
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<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

```
valid_key (key)
```

"New" Precondition

```
True
```

**Routine: force - Postcondition changed**

<table>
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<tr>
<th>Tags: Changed Strengthened</th>
<th>A</th>
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</tbody>
</table>

"Old" Postcondition

```
item (key) = new
```

"New" Postcondition

```
item (key) = new
(count = old count) or (count = old count + 1)
inserted
```

**Routine: make - Postcondition changed**

<table>
<thead>
<tr>
<th>Tags: Changed Weakened</th>
<th>A</th>
<th>R</th>
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</tbody>
</table>
"Old" Postcondition

\[
\begin{align*}
\text{keys.capacity} & \geq n \quad \text{and} \quad \text{keys.capacity} \geq \text{minimum_size} \\
\text{content.capacity} & \geq n \quad \text{and} \quad \text{content.capacity} \geq \text{minimum_size} \\
\text{deleted_marks.capacity} & \geq n \quad \text{and} \quad \text{deleted_marks.capacity} \geq \text{minimum_size}
\end{align*}
\]

"New" Postcondition

\[
\text{capacity} \geq n \quad \text{and} \quad \text{capacity} \geq \text{minimum_size}
\]

45 Revision "Old": 7582 vs. Revision "New": 7666

45.1 Class: ARRAY

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[
\begin{align*}
\text{count} & = \text{upper} - \text{lower} + 1 \\
\text{count} & \geq 0
\end{align*}
\]

"New" Invariant

\[
\begin{align*}
\text{capacity} & = \text{upper} - \text{lower} + 1 \\
\text{count} & \geq 0
\end{align*}
\]

46 Revision "Old": 7668 vs. Revision "New": 7669

46.1 Class: FIXED_LIST

Routine: make - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

before
count = n

"New" Postcondition

before
count = 0

47 Revision "Old": 7726 vs. Revision "New": 7727

47.1 Class: STRING

Routine: substring - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</tr>
</tbody>
</table>

"Old" Precondition

1 <= n1
n1 <= n2
n2 <= count

"New" Precondition

Routine: substring - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<td></td>
</tr>
</tbody>
</table>

166
"Old" Postcondition

\[ \text{Result}.\text{count} = n_2 - n_1 + 1 \]

"New" Postcondition

\[ \text{Result}.\text{count} = n_2 - n_1 + 1 \text{ or } \text{Result}.\text{count} = 0 \]

Routine: fill_character - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

full
\( (count = capacity) \text{ and } (capacity = old \ capacity) \)

Routine: fill_blank - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

full
\( (count = capacity) \text{ and } (capacity = old \ capacity) \)
48 Revision "Old": 7786 vs. Revision "New": 7787

48.1 Class: RECURSIVE_CURSOR_TREE

Invariant changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{re}</th>
<th>W_{re}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

"New" Invariant

not above implies active_{parent.child} = active

49 Revision "Old": 8018 vs. Revision "New": 8038

49.1 Class: HASH_TABLE

Invariant changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{re}</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td></td>
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<tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

keys /= Void
ccontent /= Void
0 <= count
ccount <= capacity
keys.count = capacity + 1
ccontent.count = capacity + 1
dele te d_marks.count = capacity
keys.lower = 0
ccontent.lower = 0
deleted_marks.lower = 0
c off or truly_occupied (iteration_position)
"New" Invariant

\[
\begin{align*}
\text{keys} & \neq \text{Void} \\
\text{content} & \neq \text{Void} \\
\text{keys.count} & = \text{capacity} + 1 \\
\text{content.count} & = \text{capacity} + 1 \\
\text{deleted_marks.count} & = \text{capacity} \\
\text{keys.lower} & = 0 \\
\text{content.lower} & = 0 \\
\text{deleted_marks.lower} & = 0 \\
\text{off or truly.occupied} & (\text{iteration.position}) \\
\text{control} & \geq 0 \\
\text{special_status} & = (\text{conflict or inserted or replaced or removed or found or not_found}) \\
\text{(max.occupation} & > 0) \; \text{and} \; (\text{max.occupation} < 100) \\
\text{(initial.occupation} & > 0) \; \text{and} \; (\text{initial.occupation} < 100) \\
\text{initial.occupation} & < \text{max.occupation} \\
0 & \leq \text{count} \\
\text{count} & \leq \text{capacity} \\
\text{count} \times 100 & \leq \text{capacity} \times \text{max.occupation} \\
\text{count} & \leq \text{used_slot.count} \\
0 & \leq \text{count} \\
\text{used_slot.count} & \leq \text{capacity}
\end{align*}
\]

Routine: put - Postcondition changed

Tags: Changed Strengthened NEStronger

\[
\begin{array}{cccccccc}
\text{Tool} & A & R & C & S & W & S_{ne} & W_{ne} \\
\text{Manual} & x & x & x & x & & & \\
\end{array}
\]

"Old" Postcondition

\[
\begin{align*}
\text{inserted implies} & \quad \text{item.(key)} = \text{new} \\
\text{inserted implies} & \quad (\text{count} = \text{old.count} + 1) \\
\text{conflict implies} & \quad (\text{count} = \text{old.count})
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
\text{conflict or inserted} \\
\text{inserted implies} & \quad \text{item.(key)} = \text{new} \\
\text{inserted implies} & \quad (\text{count} = \text{old.count} + 1)
\end{align*}
\]

169
inserted implies ((used_slot_count = old used_slot_count + 1) or (used_slot_count = count))

conflict implies (count = old count)

conflict implies (used_slot_count = old used_slot_count)

Routine: remove - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<tr>
<td>Tool</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

not has (key)

found implies (count = old count - 1)

"New" Postcondition

removed or not_found

not has (key)

found implies (count = old count - 1)

used_slot_count = old used_slot_count

Routine: search - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<tr>
<td>Tool</td>
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<td>x</td>
<td>x</td>
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<tr>
<td>Manual</td>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

found or not_found

found implies (search_item = content.item (position))
Routine: clear_all - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
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<tr>
<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

def position = 0
def count = 0

def not has_default
def control = 0

"New" Postcondition

def position = 0
def count = 0

def used_slot_count = 0

def not has_default

def not special_status

Routine: replace - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{replaced} \implies \text{item} (\text{key}) = \text{new}
\]

"New" Postcondition

\[
\text{replaced or not_found} \\
\text{replaced} \implies \text{item} (\text{key}) = \text{new} \\
\text{not_found} \implies \text{item} (\text{key}) = \text{old} (\text{item} (\text{key}))
\]
Routine: replace_key - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[(\text{replaced and not equal (new_key, old_key)}) \implies (\text{not has (old_key)})\]
\[\text{replaced implies (has (new_key))}\]
\[\text{count} = \text{old count}\]

"New" Postcondition

\[\text{count} = \text{old count}\]
\[\text{used_slot_count} = \text{old used_slot_count}\]
\[\text{replaced or conflict or not_found}\]
\[(\text{replaced and not equal (new_key, old_key)}) \implies (\text{not has (old_key)})\]
\[(\text{replaced or conflict}) = \text{has (new_key)}\]
\[\text{replaced implies (item (new_key) = old (item (old_key)))}\]
\[\text{not_found} = \text{old (not has (old_key))}\]
\[\text{conflict} = \text{old (has (new_key))}\]
\[\text{conflict implies (item (new_key) = old (item (new_key))))}\]

Routine: force - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
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<th>A</th>
<th>R</th>
<th>C</th>
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<td>Tool</td>
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<tr>
<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[\text{item (key)} = \text{new}\]
\[(\text{count} = \text{old count}) \text{ or (count} = \text{old count + 1)}\]
\[\text{inserted}\]

"New" Postcondition

\[\text{inserted}\]
item (key) = new
(count = old count) or (count = old count + 1)
(used_slot_count = old used_slot_count) or (used_slot_count = old used_slot_count + 1)
or (used_slot_count = count)

Routine: make - Postcondition changed
Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Postcondition

capacity >= n and capacity >= minimum_size

"New" Postcondition

count * 100 < capacity * initial_occupation
capacity >= minimum_capacity
not special_status

50 Revision "Old": 8385 vs. Revision "New": 8394

50.1 Class: BOOL_STRING

Routine: make - Precondition changed
Tags: Changed

<table>
<thead>
<tr>
<th></th>
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</table>

"Old" Precondition

n > 0
51 Revision "Old": 8889 vs. Revision "New": 9032

51.1 Class: COMPARABLE

Routine: infix "\leq" - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

Result = (Current < other) or is_equal (other)

"New" Postcondition

Result = ((Current < other) or is_equal (other))

52 Revision "Old": 9149 vs. Revision "New": 9155

52.1 Class: HASH_TABLE

Routine: put - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\textit{conflict or inserted}
\begin{align*}
\text{inserted implies } & \text{item (key) = new} \\
\text{inserted implies } & \text{count = old count + 1}
\end{align*}
\textit{inserted implies }((\textit{used\_slot\_count} = \textit{old\_used\_slot\_count} + 1) \textit{ or } (\textit{used\_slot\_count} = \textit{count}))

\textit{conflict implies } (\textit{count} = \textit{old\_count})

\textit{conflict implies } (\textit{used\_slot\_count} = \textit{old\_used\_slot\_count})

\textit{"New" Postcondition}

\textit{conflict or inserted}
\textit{inserted implies } \textit{item\ (key)} = \textit{new}
\textit{inserted implies } \textit{has\ (key)}
\textit{inserted implies } (\textit{count} = \textit{old\_count} + 1)
\textit{inserted implies } ((\textit{used\_slot\_count} = \textit{old\_used\_slot\_count} + 1) \textit{ or } (\textit{used\_slot\_count} = \textit{count}))
\textit{conflict implies } (\textit{count} = \textit{old\_count})
\textit{conflict implies } (\textit{item\ (key)} = \textit{old\ (item\ (key))})
\textit{conflict implies } (\textit{used\_slot\_count} = \textit{old\ used\_slot\_count})
\textit{found\_item} = \textit{item\ (key)}
\textit{inserted implies } (\textit{found\_item} = \textit{new})
\textit{conflict implies } (\textit{found\_item} = \textit{old\ (item\ (key))})
\textit{has\_default} = ((\textit{inserted and (key} = \textit{computed\_default\_key}) \textit{ or } ((\textit{conflict or (key} /= \textit{computed\_default\_key}) \textit{ and } (\textit{old\ has\_default})))

\textbf{Routine: remove - Postcondition changed}

\textbf{Tags:} Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textit{"Old" Postcondition}

\textit{removed or not\_found}
\textit{not has\ (key)}
\textit{found implies } (\textit{count} = \textit{old\ count} - 1)
\textit{used\_slot\_count} = \textit{old\ used\_slot\_count}

\textit{"New" Postcondition}

\textit{removed or not\_found}
\textit{not has\ (key)}
\textit{found implies } (\textit{count} = \textit{old\ count} - 1)
**used_slot_count = old used_slot_count**

(key = computed_default_key) implies (not has_default)

(key /= computed_default_key) implies (has_default = old has_default)

---

**Routine: has - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

(key = computed_default_key) implies (Result = has_default)

---

**Routine: after - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[
\text{Result} = (\text{not has_default and \ (iteration_position >= capacity)}) \text{ or (has_default and } \\
\text{iteration_position = (capacity + 1))})
\]
Routine: search - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
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</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

found or not_found
found implies (search_item = content.item (position))

"New" Postcondition

found or not_found
found implies (found_item = content.item (position))

Routine: key_for_iteration - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
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</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result = key_at (iteration_position)

Routine: replace - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>
"Old" Postcondition

replaced or not_found
replaced implies item (key) = new
not_found implies item (key) = old (item (key))

"New" Postcondition

replaced or not_found
replaced implies item (key) = new
not_found implies item (key) = old (item (key))
found_item = old (item (key))

Routine: replace_key - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

count = old count
used_slot_count = old used_slot_count
replaced or conflict or not_found
(replaced and not equal (new_key, old_key)) implies (not has (old_key))
(replaced or conflict) = has (new_key)
replaced implies (item (new_key) = old (item (old_key)))
not_found = old (not has (old_key))
conflict = old (has (new_key))
conflict implies (item (new_key) = old (item (new_key)))

"New" Postcondition

count = old count
used_slot_count = old used_slot_count
replaced or conflict or not_found
(replaced and not equal (new_key, old_key)) implies (not has (old_key))
(replaced or conflict) = has (new_key)
replaced implies (item (new_key) = old (item (old_key)))
not_found = old (not has (old_key))
conflict = old (has (new_key))
conflict implies (item (new_key) = old (item (new_key)))

has_default = ((new_key = computed_default_key) or ((new_key /= computed_default_key) and (old has_default)))

Routine: item - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[(\text{not } (\text{has } (\text{key}))) \implies (\text{Result } = \text{computed_default_value})\]

Routine: force - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[\text{inserted}
\item (\text{key}) = \text{new}
(\text{count } = \text{old count}) \text{ or } (\text{count } = \text{old count } + 1)
(\text{used_slot_count } = \text{old used_slot_count}) \text{ or } (\text{used_slot_count } = \text{old used_slot_count } + 1)
\text{ or } (\text{used_slot_count } = \text{count})\]

"New" Postcondition

\[\item (\text{key}) = \text{new}
\text{has } (\text{key})
\text{found or not_found}\]
\[
\text{not\_found} = \text{not} (\text{old has} \ (\text{key}))
\]
\[
(\text{count} = \text{old count}) \text{ or } (\text{count} = \text{old count} + 1)
\]
\[
(\text{used}\_\text{slot}\_\text{count} = \text{old used}\_\text{slot}\_\text{count}) \text{ or } (\text{used}\_\text{slot}\_\text{count} = \text{old used}\_\text{slot}\_\text{count} + 1)
\]
\[
\text{or } (\text{used}\_\text{slot}\_\text{count} = \text{count})
\]
\[
\text{found\_item} = \text{old} (\text{item} \ (\text{key}))
\]
\[
\text{not\_found} \implies (\text{found\_item} = \text{computed}\_\text{default}\_\text{value})
\]
\[
\text{has\_default} = ((\text{key} = \text{computed}\_\text{default}\_\text{key}) \text{ or } ((\text{key} /= \text{computed}\_\text{default}\_\text{key}) \text{ and } (\text{old has\_default})))
\]

**Routine: make - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S\text{ne}</th>
<th>W\text{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**"Old" Postcondition**

\[
\text{count} \times 100 < \text{capacity} \times \text{initial}\_\text{occupation}
\]
\[
\text{capacity} >= \text{minimum}\_\text{capacity}
\]
\[
\text{not special\_status}
\]

**"New" Postcondition**

\[
\text{n} \times 100 < \text{capacity} \times \text{initial}\_\text{occupation}
\]
\[
\text{minimum}\_\text{capacity} \times 100 < \text{capacity} \times \text{initial}\_\text{occupation}
\]
\[
\text{capacity} >= \text{minimum}\_\text{capacity}
\]
\[
\text{not special\_status}
\]

53 Revision "Old": 9224 vs. Revision "New": 9242

53.1 Class: HASH\_TABLE

**Invariant changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S\text{ne}</th>
<th>W\text{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

180
"Old" Invariant

```plaintext
keys /= Void
content /= Void
keys.count = capacity + 1
content.count = capacity + 1
deleted_marks.count = capacity
keys.lower = 0
content.lower = 0
deleted_marks.lower = 0
off or truly_occupied (iteration_position)
control >= 0
special_status = (conflict or inserted or replaced or removed or found or not_found)
(max_occupation > 0) and (max_occupation < 100)
(initial_occupation > 0) and (initial_occupation < 100)
initial_occupation < max_occupation
0 <= count
count <= capacity
count * 100 <= capacity * max_occupation
count <= used_slot_count
0 <= count
used_slot_count <= capacity
```

"New" Invariant

```plaintext
keys /= Void
content /= Void
keys.count = capacity + 1
content.count = capacity + 1
deleted_marks.count = capacity
keys.lower = 0
content.lower = 0
deleted_marks.lower = 0
off or truly_occupied (iteration_position)
control >= 0
special_status = (conflict or inserted or replaced or removed or found or not_found)
(max_occupation > 0) and (max_occupation < 100)
(initial_occupation > 0) and (initial_occupation < 100)
initial_occupation < max_occupation
0 <= count
count <= capacity
count * 100 <= capacity * max_occupation
count <= used_slot_count
0 <= count
used_slot_count <= capacity
```
54 Revision ”Old”: 9242 vs. Revision ”New”: 9259

54.1 Class: ARRAYED_LIST

Invariant changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

”Old” Invariant

prunable

”New” Invariant

prunable
lower = 1

55 Revision ”Old”: 9820 vs. Revision ”New”: 9877

55.1 Class: STRING

Routine: append_character - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

”Old” Postcondition

\(item (\text{count}) = c\)

182
"New" Postcondition

\[ \text{item (count)} = c \]
\[ \text{count} = \text{old count} + 1 \]

Routine: append - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
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<td></td>
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<tr>
<td>Manual</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{count} = \text{old count} + s\text{.count} \]

"New" Postcondition

\[ \text{count} = \text{old count} + \text{old s.count} \]

56 Revision "Old": 9877 vs. Revision "New": 9879

56.1 Class: ARGUMENTS

Routine: separate_word_option_value - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
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<td>x</td>
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<tr>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ \text{opt} /= \text{Void} \]
\[ \text{not opt.empty} \]

"New" Precondition

\[ \text{opt} /= \text{Void} \]
\[ \text{not opt.empty} \]
Routine: has_word_option - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</tr>
</tbody>
</table>

"Old" Precondition

opt /= Void
not opt.empty

"New" Precondition

Routine: separate_character_option_value - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<tr>
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</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

o /= "%U"

Routine: has_character_option - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</tbody>
</table>

184
"Old" Precondition

\[ \text{opt} /= \text{"\%U"} \]

"New" Precondition

Routine: set_option_sign - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ c /= \text{"\%U"} \]

"New" Precondition

Routine: set_option_sign - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{option\_sign} = c \]

"New" Postcondition

185
57 Revision "Old": 9934 vs. Revision "New": 10045

57.1 Class: HASH_TABLE

Routine: force - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tr>
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<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{item (key)} = \text{new} \\
\text{has (key)} \\
\text{found or not_found} \\
\text{not_found} = \text{not (old has (key))} \\
(\text{count} = \text{old count}) \text{ or } (\text{count} = \text{old count} + 1) \\
(\text{used_slot_count} = \text{old used_slot_count}) \text{ or } (\text{used_slot_count} = \text{old used_slot_count} + 1) \\
\text{ or (used_slot_count} = \text{count}) \\
\text{found_item} = \text{old (item (key))} \\
\text{not_found implies (found_item} = \text{computed_default_value) } \\
\text{has_default} = ((\text{key} = \text{computed_default_key}) \text{ or ((key} /= \text{computed_default_key}) \text{ and (}} \\
\text{old has_default)))
\]

"New" Postcondition

\[
\text{item (key)} = \text{new} \\
\text{has (key)} \\
\text{found or not_found} \\
\text{not_found} = \text{not (old has (key))} \\
(\text{count} = \text{old count}) \text{ or } (\text{count} = \text{old count} + 1) \\
(\text{used_slot_count} = \text{old used_slot_count}) \text{ or } (\text{used_slot_count} = \text{old used_slot_count} + 1) \\
\text{ or (used_slot_count} = \text{count}) \\
\text{found implies (found_item} = \text{old (item (key))) } \\
\text{not_found implies (found_item} = \text{computed_default_value} \text{) } \\
\text{has_default} = ((\text{key} = \text{computed_default_key}) \text{ or ((key} /= \text{computed_default_key}) \text{ and (}} \\
\text{old has_default)))
\]
58 Revision "Old": 10045 vs. Revision "New": 10047

58.1 Class: BOOLEAN_REF

Invariant changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
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<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[ \text{is\_equal (not (not Current))} \]
\[ \text{not (Current and (not Current))} \]
\[ \text{Current or (not Current)} \]

"New" Invariant

\[ \text{is\_equal (not (not Current))} \]
\[ \text{not (Current and (not Current))} \]
\[ \text{Current or else (not Current)} \]

59 Revision "Old": 10243 vs. Revision "New": 10527

59.1 Class: STRING

Routine: replace_substring_all - Precondition changed

Tags: Changed, Weakened, NE\text{Weaker}

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
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<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ \text{original /= Void} \]
\[ \text{new /= Void} \]
\[ \text{not original\_empty} \]
\[ \text{not empty} \]
60 Revision "Old": 11088 vs. Revision "New": 11325

60.1 Class: BOOLEAN_REF

Routine: infix "and then" - Postcondition changed

"Old" Postcondition

\[
\text{Result} /= \text{Void} \\
\text{Result} = \text{not (not Current or else not other)}
\]

"New" Postcondition

\[
\text{Result} = \text{not (not Current or else not other)}
\]

Routine: infix "and" - Postcondition changed

"Old" Postcondition

\[
\text{Result} /= \text{Void} \\
\text{Result} = \text{not (not Current or not other)} \\
\text{Result} = (\text{other and Current}) \\
\text{Result implies (Current and then other)}
\]
"New" Postcondition

Result = not (not Current or not other)
Result = (other and Current)
Result implies (Current and then other)

Routine: infix "or" - Postcondition changed

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W_{ne}</th>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result /= Void
Result = not (not Current and not other)
Result = (other or Current)
Result implies (Current or else other)

"New" Postcondition

Result = not (not Current and not other)
Result = (other or Current)
Result implies (Current or else other)

Routine: infix "or else" - Postcondition changed

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<td>x</td>
<td></td>
<td>x</td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result /= Void
Result = not (not Current and then not other)
"New" Postcondition

Result = not (not Current and then not other)

61 Revision "Old": 12496 vs. Revision "New": 12663

61.1 Class: TUPLE

Routine: is_character_item - Precondition changed

<table>
<thead>
<tr>
<th>Tag: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S\textsubscript{ne}</th>
<th>W\textsubscript{ne}</th>
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</tbody>
</table>

"Old" Precondition

valid\_index (idx)

"New" Precondition

valid\_index (index)

Routine: boolean\_item - Precondition changed

<table>
<thead>
<tr>
<th>Tag: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S\textsubscript{ne}</th>
<th>W\textsubscript{ne}</th>
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</tbody>
</table>

"Old" Precondition

valid\_index (idx)

is\_boolean\_item (idx)

"New" Precondition

valid\_index (index)

is\_boolean\_item (index)
Routine: is_pointer_item - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
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<th>W_{ne}</th>
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</tbody>
</table>

"Old" Precondition

valid\_index (idx)

"New" Precondition

valid\_index (index)

Routine: integer\_item - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
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<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<td></td>
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<td></td>
<td></td>
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</tbody>
</table>

"Old" Precondition

valid\_index (idx)
is\_integer\_item (idx)

"New" Precondition

valid\_index (index)
is\_integer\_item (index)

Routine: is_real\_item - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

191
"Old" Precondition

\[
\text{valid\_index (idx)}
\]

"New" Precondition

\[
\text{valid\_index (index)}
\]

**Routine: real\_item - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{valid\_index (idx)}
\]

\[
\text{is\_real\_item (idx) or else is\_integer\_item (idx)}
\]

"New" Precondition

\[
\text{valid\_index (index)}
\]

\[
\text{is\_real\_item (index) or else is\_integer\_item (index)}
\]

**Routine: is\_boolean\_item - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
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<td></td>
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<td></td>
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</tbody>
</table>

"Old" Precondition

\[
\text{valid\_index (idx)}
\]

"New" Precondition

\[
\text{valid\_index (index)}
\]

192
Routine: double_item - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</tbody>
</table>

"Old" Precondition

valid_index (idx)
is_numeric_item (idx)

"New" Precondition

valid_index (index)
is_numeric_item (index)

Routine: pointer_item - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

valid_index (idx)
is_pointer_item (idx)

"New" Precondition

valid_index (index)
is_pointer_item (index)

Routine: is_numeric_item - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</tbody>
</table>

193
"Old" Precondition
valid_index (idx)

"New" Precondition
valid_index (index)

Routine: character_item - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
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<th>C</th>
<th>S</th>
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</tbody>
</table>

"Old" Precondition
valid_index (idx)
is_character_item (idx)

"New" Precondition
valid_index (index)
is_character_item (index)

Routine: is_reference_item - Precondition changed

<table>
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<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
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<th>S</th>
<th>W</th>
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</tbody>
</table>

"Old" Precondition
valid_index (idx)

194
"New" Precondition

valid_index (index)

Routine: is_integer_item - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
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</tr>
</tbody>
</table>

"Old" Precondition

valid_index (idx)

"New" Precondition

valid_index (index)

Routine: is_double_item - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
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</tr>
</tbody>
</table>

"Old" Precondition

valid_index (idx)

"New" Precondition

valid_index (index)

195
62 Revision "Old": 12663 vs. Revision "New": 12665

62.1 Class: FUNCTION

Routine: eval - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

tgt /= Void
valid_arguments (args)
callable

"New" Precondition

valid_arguments (args)
callable

62.2 Class: ROUTINE

Routine: call - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<tbody>
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</tbody>
</table>

"Old" Precondition

tgt /= Void
valid_arguments (args)
callable

"New" Precondition

valid_arguments (args)
callable
### Routine: adapt_from - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

other.callable implies callable

### Routine: copy - Postcondition changed

<table>
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<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

other.callable implies callable

### 63 Revision "Old": 13221 vs. Revision "New": 13222

#### 63.1 Class: STRING

### Routine: clear_all - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
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</tbody>
</table>

197
"Old" Precondition

area /= Void

"New" Precondition

64 Revision "Old": 13752 vs. Revision "New": 13899

64.1 Class: LINEAR
Routine: search - Postcondition changed

<table>
<thead>
<tr>
<th>Tags</th>
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<tr>
<td>Tool</td>
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</tr>
<tr>
<td>Manual</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

(not exhausted and then object_comparison and then v /= Void and then item /= Void) implies v.is_equal(item)
(not exhausted and not object_comparison) implies v = item

"New" Postcondition

(not exhausted and object_comparison) implies equal(v, item)
(not exhausted and not object_comparison) implies v = item

65 Revision "Old": 14977 vs. Revision "New": 15014

65.1 Class: STREAM
Invariant changed

<table>
<thead>
<tr>
<th>Tags</th>
<th>Removed Changed Weakened</th>
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<tr>
<td>Tool</td>
<td>x x x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
</tr>
</tbody>
</table>
"Old" Invariant

\[
\text{closed\_stream} \leq \text{mode} \text{ and } \text{mode} \leq \text{output\_stream} \\
\text{name} \neq \text{Void} \\
\text{not name\_empty}
\]

"New" Invariant

66 Revision "Old": 15014 vs. Revision "New": 15160

66.1 Class: MEMORY

Routine: set_collection_period - Precondition changed

<table>
<thead>
<tr>
<th>Tags</th>
<th>Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{value} > 0
\]

"New" Precondition

\[
\text{value} \geq 0
\]

67 Revision "Old": 16204 vs. Revision "New": 16224

67.1 Class: GENERAL

Routine: setup - Postcondition changed

<table>
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<tr>
<th>Tags</th>
<th>Removed</th>
<th>Changed</th>
<th>Weakened</th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>
"Old" Postcondition

consistent (other)

"New" Postcondition

68 Revision "Old": 16224 vs. Revision "New": 16427

68.1 Class: STRING

Routine: infix "" + - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result /= Void
count = Result.count − s.count

"New" Postcondition

Result /= Void
Result.count = count + s.count

69 Revision "Old": 16779 vs. Revision "New": 16780

69.1 Class: ARRAY

Routine: resize - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
</tr>
</tbody>
</table>

200
"Old" Postcondition

\[
\begin{align*}
\text{lower} &= \minindex.\min (\text{old} \text{ lower}) \\
\text{upper} &= \maxindex.\max (\text{old} \text{ upper})
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
\text{lower} &= \minindex \text{ or else } \text{lower} = \text{old} \text{ lower} \\
\text{upper} &= \maxindex \text{ or else } \text{upper} = \text{old} \text{ upper}
\end{align*}
\]

70 Revision "Old": 18585 vs. Revision "New": 18586

70.1 Class: ARRAY

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
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</tr>
<tr>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[
\begin{align*}
\text{capacity} &= \text{upper} - \text{lower} + 1 \\
\text{count} &\geq 0
\end{align*}
\]

"New" Invariant

\[
\begin{align*}
\text{capacity} &= \text{upper} - \text{lower} + 1 \\
\text{count} &\geq 0 \\
\text{index_set.count} &= \text{count}
\end{align*}
\]

70.2 Class: CHAIN

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</tr>
</tbody>
</table>

201
"Old" Invariant

\[
\begin{align*}
index & \geq 0 \\
index & \leq count + 1 \\
own & = (((index = 0) \text{ or } (index = count + 1)) \\
isfirst & = ((\text{not empty}) \text{ and } (index = 1)) \\
islast & = ((\text{not empty}) \text{ and } (index = count)) \\
(\text{not off}) & \implies (item = i_{\text{th}}(index))
\end{align*}
\]

"New" Invariant

\[
\begin{align*}
index & \geq 0 \\
index & \leq count + 1 \\
own & = (((index = 0) \text{ or } (index = count + 1)) \\
isfirst & = ((\text{not empty}) \text{ and } (index = 1)) \\
islast & = ((\text{not empty}) \text{ and } (index = count)) \\
(\text{not off}) & \implies (item = i_{\text{th}}(index)) \\
index_{\text{set}}.count & = count
\end{align*}
\]

\[\text{70.3 Class: INDEXABLE} \]

Invariant changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
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</tbody>
</table>

"Old" Invariant

\[index_{\text{set}} \neq \text{Void}\]

"New" Invariant

\[index_{\text{set}} \neq \text{Void}\]
70.4 Class: STRING

Invariant changed

Tags: Changed Strengthened NEStronger

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<tr>
<th></th>
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<th>R</th>
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</table>

"Old" Invariant

extendible

object\_comparison = False

"New" Invariant

extendible

object\_comparison = False

index\_set.count = count

71 Revision "Old": 18586 vs. Revision "New": 18592

71.1 Class: INTEGER\_INTERVAL

Routine: valid\_index - Postcondition changed

Tags: Changed

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</tbody>
</table>

"Old" Postcondition

Result = ((i >= lower) and (i >= upper))

"New" Postcondition

Result = ((i >= lower) and (i <= upper))
72 Revision "Old": 18858 vs. Revision "New": 18885

72.1 Class: INTEGER\_INTERVAL

Routine: extend - Postcondition changed

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</tbody>
</table>

"Old" Postcondition

\[
\text{lower} = (\text{old lower}).\min (v)
\]
\[
\text{upper} = (\text{old upper}).\min (v)
\]

"New" Postcondition

\[
\text{lower} = (\text{old lower}).\min (v)
\]
\[
\text{upper} = (\text{old upper}).\max (v)
\]

Routine: linear\_representation - Postcondition changed

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<th>S</th>
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</table>

"Old" Postcondition

**Result** = \text{as\_array.linear\_representation}

"New" Postcondition
Routine: to_c - Postcondition changed

<table>
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<tr>
<th>Tool</th>
<th>Manual</th>
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</thead>
<tbody>
<tr>
<td>x</td>
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</tbody>
</table>

"Old" Postcondition

Result = as_array.to_c

"New" Postcondition

73 Revision "Old": 19225 vs. Revision "New": 19468

73.1 Class: INTEGER_REF

Routine: one - Postcondition changed

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<tr>
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<tbody>
<tr>
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</tbody>
</table>

"Old" Postcondition

Result = 1

"New" Postcondition

Routine: zero - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
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</tr>
</thead>
<tbody>
<tr>
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73.2 Class: REAL_REF

Routine: one - Postcondition changed

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<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
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</tbody>
</table>

"Old" Postcondition

**Result** = 0

"New" Postcondition

---

Routine: zero - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td>x</td>
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</tbody>
</table>

"Old" Postcondition

**Result** = 1.0

"New" Postcondition

---

Routine: zero - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

**Result** = 0.0

"New" Postcondition
Routine: floor - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
</table>

"Old" Postcondition

Result $\leq$ item
item $-$ Result $< one$

"New" Postcondition

Result $\leq$ item
item $-$ Result $< Result\cdot one$

Routine: ceiling - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
</table>

"Old" Postcondition

Result $\geq$ item
Result $-$ item $< one$

"New" Postcondition

Result $\geq$ item
Result $-$ item $< item\cdot one$
73.3 Class: DOUBLE_REF

Routine: one - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_{ne}</th>
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<td>Tool</td>
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<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result = 1.0

"New" Postcondition

Routine: zero - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tr>
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<td>x</td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result = 0.0

"New" Postcondition

Routine: floor - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
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<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

<table>
<thead>
<tr>
<th>Result</th>
<th>&lt;= item</th>
</tr>
</thead>
<tbody>
<tr>
<td>item - Result</td>
<td>&lt; one</td>
</tr>
</tbody>
</table>

"New" Postcondition

<table>
<thead>
<tr>
<th>Result</th>
<th>&lt;= item</th>
</tr>
</thead>
<tbody>
<tr>
<td>item - Result</td>
<td>&lt; Result_one</td>
</tr>
</tbody>
</table>

Routine: ceiling - Postcondition changed

Tags: Changed

<table>
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<tr>
<th>Tool</th>
<th>A</th>
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<th>W_{ne}</th>
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</tbody>
</table>

"Old" Postcondition

<table>
<thead>
<tr>
<th>Result</th>
<th>&gt;= item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Result - item</td>
<td>&lt; one</td>
</tr>
</tbody>
</table>

"New" Postcondition

<table>
<thead>
<tr>
<th>Result</th>
<th>&gt;= item</th>
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<tbody>
<tr>
<td>Result - item</td>
<td>&lt; item_one</td>
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</tbody>
</table>

74 Revision "Old": 19468 vs. Revision "New": 19564

74.1 Class: INTERNAL

Routine: dynamic\_type - Postcondition changed

Tags: Added Changed Strengthened

<table>
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<tr>
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75 Revision "Old": 19567 vs. Revision "New": 19570

75.1 Class: REAL_REF

Invariant changed

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</tbody>
</table>

"Old" Invariant

\[ \text{sign} \ast \text{abs} = \text{item} \]

"New" Invariant

\[ \text{item} \neq 1 / 0 \text{ and } \text{item} \neq 0 / 0 \text{ implies } \text{sign} \ast \text{abs} = \text{item} \]

75.2 Class: DOUBLE_REF

Invariant changed

<table>
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<tr>
<th>Tool</th>
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"Old" Invariant

\[ \text{sign} \ast \text{abs} = \text{item} \]

210
"New" Invariant

\[
\text{item} \neq 1 / 0 \text{ and } \text{item} \neq 0 / 0 \text{ implies sign } \ast \text{abs} = \text{item}
\]

76 Revision "Old": 19570 vs. Revision "New": 19571

76.1 Class: TUPLE

Invariant changed

Tags: Added Changed Strengthened

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</table>

"Old" Invariant

\[lower = 1\]

"New" Invariant

77 Revision "Old": 19571 vs. Revision "New": 19573

77.1 Class: FUNCTION

Routine: eval - Precondition changed

Tags: Changed

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</table>

"Old" Precondition

\[
\text{valid}_\text{arguments (args)} \\text{callable}
\]
"New" Precondition

valid_operands (args)
callable

Routine: item - Precondition changed

Tags: Changed

<table>
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<th></th>
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</table>

"Old" Precondition

valid_arguments (args)
callable

"New" Precondition

valid_operands (args)
callable

78 Revision "Old": 19573 vs. Revision "New": 19575

78.1 Class: ROUTINE

Routine: call - Precondition changed

Tags: Changed

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"Old" Precondition

valid_arguments (args)
callable

212
"New" Precondition

valid_operands (args)
callable

Routine: set_arguments - Precondition changed

<table>
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<tr>
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</table>

"Old" Precondition

valid_arguments (args)

"New" Precondition

79 Revision "Old": 19689 vs. Revision "New": 20578

79.1 Class: REAL_REF

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

item / 1 / 0 and item / 0 / 0 implies sign * abs = item

"New" Invariant
79.2 Class: DOUBLE_REF

Invariant changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td>Tool</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[item \neq 1 / 0 \text{ and } item \neq 0 / 0 \text{ implies } sign \ast abs = item\]

"New" Invariant

80 Revision "Old": 20578 vs. Revision "New": 21846

80.1 Class: FORMAT_DOUBLE

Routine: formatted - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<th>C</th>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[\text{Result} \neq \text{Void}\]
\[\text{Result}.count \geq width\]

"New" Postcondition

\[\text{Result} \neq \text{Void}\]
\[\text{not justified or Result}.count \geq width\]
81 Revision "Old": 23341 vs. Revision "New": 23491

81.1 Class: TWO_WAY_CURSOR_TREE

Routine: put_root - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
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<td>Tool</td>
<td></td>
<td>x</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

empty

"New" Precondition

is_empty

Routine: make - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

above
eempty

"New" Postcondition

above
is_empty
### 81.2 Class: RECURSIVE_CURSOR_TREE

**Routine: remove - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</thead>
<tbody>
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<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

*empty or else not off*

"New" Postcondition

*is_empty or else not off*

### 81.3 Class: COMPACT_CURSOR_TREE

**Routine: make - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

*above
empty*

"New" Postcondition

*above
is_empty*
### 81.4 Class: ACTIVE

**Invariant changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

`writable` implies `readable`

`empty` implies (not `readable`) and (not `writable`)

"New" Invariant

`writable` implies `readable`

`is_empty` implies (not `readable`) and (not `writable`)

### 81.5 Class: LINKED_CURSOR_TREE

**Routine: put_root - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

`empty`

"New" Precondition

`is_empty`
Routine: make - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

above
empty

"New" Postcondition

above
is\_empty

81.6 Class: FINITE

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</tr>
</tbody>
</table>

"Old" Invariant

empty = (count = 0)
count >= 0

"New" Invariant

is\_empty = (count = 0)
count >= 0
81.7 Class: INFINITE

Invariant changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tr>
</tbody>
</table>

"Old" Invariant

not empty

full

"New" Invariant

not is_empty

full

82 Revision "Old": 23597 vs. Revision "New": 25847

82.1 Class: INTERNAL

Routine: dynamic_type - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

Result > 0

"New" Postcondition
82.2 Class: COMPARABLE_SET

Routine: min - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<td>Tool</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

not empty

"New" Precondition

not is_empty

Routine: max - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

not empty

"New" Precondition

not is_empty

82.3 Class: BILINEAR

Invariant changed

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Invariant

\[ \text{not (after and before)} \]
\[ \text{empty implies (after or before)} \]
\[ \text{before implies off} \]

"New" Invariant

\[ \text{not (after and before)} \]
\[ \text{before implies off} \]

82.4 Class: TUPLE

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
<tr>
<td>R</td>
<td>x</td>
</tr>
<tr>
<td>C</td>
<td>x</td>
</tr>
<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
</tr>
</tbody>
</table>

82.5 Class: TRAVERSABLE

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
<tr>
<td>R</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[ \text{lower = 1} \]

"New" Invariant

empty implies off
"New" Invariant

\[ \text{is\_}empty \text{ implies } \text{off} \]

---

### 82.6 Class: RECURSIVE_CURSOR_TREE

**Routine:** arity - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Added</th>
<th>Changed</th>
<th>Strengthened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

"Old" Precondition

\[ \text{not } \text{off or else } \text{above} \]

---

"New" Precondition

---

### 82.7 Class: ARRAYED_QUEUE

**Invariant changed**

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>Strengthened</th>
<th>NEStronger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

---

"Old" Invariant

\[ \text{not full} \\
\text{extendible} \\
\text{prunable} \]

---

"New" Invariant

\[ \text{not full} \\
\text{extendible} \\
\text{prunable} \]

222
is_empty implies all_default

82.8 Class: PATH_NAME

Routine: set_volume - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tr>
</tbody>
</table>

"Old" Precondition

volume_name /= Void
is_volume_name_valid (volume_name)
empty

"New" Precondition

volume_name /= Void
is_volume_name_valid (volume_name)
is_empty

Routine: extend_from_array - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</tbody>
</table>

"Old" Precondition

directories /= Void and then not (directories.empty)

"New" Precondition

directories /= Void and then not (directories.is_empty)
82.9 Class: **ARRAY**

**Invariant changed**

| Tool | x | x | x |
| Manual |   |   |   |

"Old" Invariant

\[
\text{capacity} = \text{upper} - \text{lower} + 1 \\
\text{count} \geq 0 \\
\text{index\_set\_count} = \text{count}
\]

"New" Invariant

\[
\text{area} \neq \text{Void} \\
\text{capacity} = \text{upper} - \text{lower} + 1 \\
\text{count} \geq 0 \\
\text{valid\_index\_set} \\
((\text{index\_set\_lower} = \text{lower}) \text{ and } (\text{index\_set\_upper} = \text{lower} + \text{count} - 1))
\]

**Routine: count - Postcondition changed**

| Tool | x | x | x |   |   |
| Manual |   |   |   |   |   |

"Old" Postcondition

"New" Postcondition

\[
\text{Result} = \text{upper} - \text{lower} + 1
\]
Routine: resize - Precondition changed

"Old" Precondition
minindex \leq maxindex

"New" Precondition
min_index \leq max_index

Routine: resize - Postcondition changed

"Old" Postcondition
lower = minindex or else lower = old lower
upper = maxindex or else upper = old upper

"New" Postcondition
lower = min_index or else lower = old lower
upper = max_index or else upper = old upper

Routine: clear_all - Postcondition changed

"Old" Postcondition

"New" Postcondition

"Old" Postcondition

all_cleared

"New" Postcondition

lower = old lower
upper = old upper
all_default

Routine: discard_items - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

all_cleared

"New" Postcondition

all_default

Routine: make - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tr>
</tbody>
</table>

"Old" Precondition

\[ \text{minindex} \leq \text{maxindex} \text{ or } (\text{minindex} = \text{maxindex} + 1) \]

"New" Precondition

\[ \text{min_index} \leq \text{max_index} + 1 \]
Routine: make - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{lower} = \text{minindex} \\
\text{upper} = \text{maxindex}
\]

"New" Postcondition

\[
\text{lower} = \text{min\_index} \\
\text{upper} = \text{max\_index} \\
\text{all\_default}
\]

82.10 Class: LINEAR_ITERATOR

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td></td>
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<td>x</td>
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</tr>
</tbody>
</table>

"Old" Invariant

\[
\text{target} \neq \text{Void} \\
\text{item\_tuple} \neq \text{Void} \\
\text{internal\_item\_tuple} \neq \text{Void}
\]

"New" Invariant
Routine: forth - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_{ne}</th>
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<tr>
<td>Tool</td>
<td>x</td>
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<td></td>
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<tr>
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</tr>
</tbody>
</table>

"Old" Precondition

target /= Void

"New" Precondition

Routine: exhausted - Precondition changed

Tags: Removed Changed Weakened

<table>
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<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

target /= Void

"New" Precondition

Routine: until_do - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

not exhausted implies test
"New" Postcondition

\[ \text{not } \text{exhausted implies } \text{test.item} (\text{item}_\text{tuple}) \]

Routine: `continue_for` - Precondition changed

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tr>
</tbody>
</table>

"Old" Precondition

- \( \text{target} \neq \text{Void} \)
- \( n \geq 0 \)
- \( k \geq 1 \)

"New" Precondition

- \( n \geq 0 \)
- \( k \geq 1 \)

Routine: `until_continue` - Precondition changed

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</table>

"Old" Precondition

- \( \text{target} \neq \text{Void} \)
- \( \text{invariant}_\text{value} \)

"New" Precondition

- \( \text{invariant}_\text{value} \)
Routine: until_continue - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
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<th>Manual</th>
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</thead>
<tbody>
<tr>
<td>x</td>
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</table>

"Old" Postcondition

exhausted or else test
invariant_value

"New" Postcondition

exhausted or else test.item (item_tuple)
invariant_value

Routine: while_do - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
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</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
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</tbody>
</table>

"Old" Postcondition

not exhausted implies not test

"New" Postcondition

not exhausted implies not test.item (item_tuple)

Routine: do_until - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

\textit{not} exhausted \textit{implies} test

"New" Postcondition

\textit{not} exhausted \textit{implies} test.item (item\_tuple)

Routine: \texttt{do\_for} - Precondition changed

\begin{tabular}{|c|c|c|c|c|c|}
\hline
& A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
Tool & x & x & x & & & & \\
Manual & & & & & & & \\
\hline
\end{tabular}

"Old" Precondition

\texttt{target} /= Void

\begin{itemize}
\item \textit{i} \texttt{>=} 1
\item \textit{n} \texttt{>=} 0
\item \textit{k} \texttt{>=} 1
\end{itemize}

"New" Precondition

\begin{itemize}
\item \textit{i} \texttt{>=} 1
\item \textit{n} \texttt{>=} 0
\item \textit{k} \texttt{>=} 1
\end{itemize}

Routine: \texttt{do\_while} - Postcondition changed

\begin{tabular}{|c|c|c|c|c|c|}
\hline
& A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
Tool & x & & & & & & \\
Manual & & & & & & & \\
\hline
\end{tabular}

"Old" Postcondition

\textit{not} exhausted \textit{implies} \textit{not} test
"New" Postcondition

\[ \text{not } \text{exhausted implies not } \text{test.item (item\_tuple)} \]

Routine: start - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</table>

"Old" Precondition

\[ \text{target } \neq \text{ Void} \]

"New" Precondition

Routine: search - Precondition changed

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<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Precondition

\[ \text{target } \neq \text{ Void} \]

"New" Precondition
Routine: off - Precondition changed

Tags: Removed, Changed, Weakened

<table>
<thead>
<tr>
<th></th>
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<th>R</th>
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</tbody>
</table>

"Old" Precondition

\[
target \neq \text{Void}
\]

"New" Precondition

Routine: continue_while - Precondition changed

Tags: Changed, Weakened, NEWeaker

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tbody>
</table>

"Old" Precondition

\[
target \neq \text{Void}
\]

\[
invariant\_value
\]

"New" Precondition

\[
invariant\_value
\]

Routine: continue_while - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tr>
</tbody>
</table>
"Old" Postcondition
\[ \text{not} \text{ exhausted implies not} \text{ test} \]

"New" Postcondition
\[ \text{not} \text{ exhausted implies not} \text{ test.item (item_tuple)} \]

Routine: \text{while}_\text{continue} - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
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<th>R</th>
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<td>Tool</td>
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</tbody>
</table>

"Old" Postcondition
\[ \text{not} \text{ exhausted implies not} \text{ test} \]

"New" Postcondition
\[ \text{not} \text{ exhausted implies not} \text{ test.item (item_tuple)} \]

Routine: \text{continue}_\text{until} - Precondition changed

Tags: Changed Weakened Newer

<table>
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<tr>
<th></th>
<th>A</th>
<th>R</th>
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<tr>
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</tr>
</tbody>
</table>

"Old" Precondition
\[ \text{target} \neq \text{Void} \]
\[ \text{invariant}_\text{value} \]

"New" Precondition
\[ \text{invariant}_\text{value} \]
**Routine: continue_until - Postcondition changed**

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>W</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

not exhausted implies test

"New" Postcondition

not exhausted implies test.item (item_tuple)

---

**Routine: continue_search - Precondition changed**

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

target /= Void

"New" Precondition

---

**Routine: continue_search - Postcondition changed**

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>
82.11 Class: TWO\_WAY\_LIST

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tr>
</tbody>
</table>

"Old" Invariant

\[ \text{not is\_empty implies (first\_element \neq Void and last\_element \neq Void)} \]
\[ \text{first\_element \neq Void implies first\_element\_left = Void} \]
\[ \text{last\_element \neq Void implies last\_element\_right = Void} \]

"New" Invariant

82.12 Class: ARGUMENTS

Routine: separate\_word\_option\_value - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Precondition

\[ \text{opt \neq Void} \]
\[ \text{not opt\_empty} \]
"New" Precondition

\[ opt /= \text{Void} \]
\[ \text{not} \ opt \text{.is_empty} \]

Routine: coalesced_word_option_value - Precondition changed

<table>
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<tr>
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</table>

"Old" Precondition

\[ opt /= \text{Void} \]
\[ \text{not} \ opt \text{.empty} \]

"New" Precondition

\[ opt /= \text{Void} \]
\[ \text{not} \ opt \text{.is_empty} \]

Routine: index_of_beginning_with_word_option - Precondition changed

<table>
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<tr>
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<th>S</th>
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</tbody>
</table>

"Old" Precondition

\[ opt /= \text{Void} \]
\[ \text{not} \ opt \text{.empty} \]

"New" Precondition

\[ opt /= \text{Void} \]
\[ \text{not} \ opt \text{.is_empty} \]
Routine:  index_of_word_option - Precondition changed

Tags: Changed

<table>
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</tbody>
</table>

"Old" Precondition

\[\text{opt} \neq \text{Void} \]
\[\text{not} \ \text{opt}.\text{empty} \]

"New" Precondition

\[\text{opt} \neq \text{Void} \]
\[\text{not} \ \text{opt}.\text{is_empty} \]

82.13 Class: STORABLE

Routine:  store_by_name - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

\[\text{file_name} \neq \text{Void} \]
\[\text{not} \ \text{file_name}.\text{empty} \]

"New" Precondition

\[\text{file_name} \neq \text{Void} \]
\[\text{not} \ \text{file_name}.\text{is_empty} \]

238
Routine: retrieve_by_name - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

file_name /= Void
not file_name.empty

"New" Precondition

file_name /= Void
not file_name.is_empty

82.14 Class: SORTED_LIST

Routine: min - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

not empty

"New" Precondition

not is_empty

Routine: median - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<th>W_ne</th>
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</tbody>
</table>
"Old" Precondition

not empty

"New" Precondition

not is_empty

Routine: max - Precondition changed

<table>
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<th>A</th>
<th>R</th>
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<td></td>
<td>x</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

not empty

"New" Precondition

not is_empty

82.15 Class: CURSOR_TREE

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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<tbody>
<tr>
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<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

depth >= 0
breadth >= 0
not off implies is_leaf = (arity = 0)
above implies (arity <= 1)
isfirst or islast or is_leaf or is_root) implies not off
\[
\text{off} = \text{after or before or above or below}
\]

below implies ((after or before) and not above)

above implies not (before or after or below)

after implies not (before or above)

before implies not (after or above)

(\text{empty and (after or before)}) implies below

"New" Invariant

\[
\begin{align*}
\text{depth} & \geq 0 \\
\text{breadth} & \geq 0 \\
\text{not off} & \text{ implies is_leaf = (arity = 0)}
\end{align*}
\]

above implies (arity \leq 1)

(isfirst or islast or is_leaf or is_root) implies not off

off = after or before or above or below

below implies ((after or before) and not above)

above implies not (before or after or below)

after implies not (before or above)

before implies not (after or above)

(\text{is_empty and (after or before)}) implies below

Routine: put_left - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<th>W_{ne}</th>
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<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

not before

not above

(level = 1) implies empty

"New" Precondition

not before

not above

(level = 1) implies is_empty
### Routine: merge_right - Precondition changed

<table>
<thead>
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</thead>
<tbody>
<tr>
<td>Tool</td>
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<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

**"Old" Precondition**

- other $\neq$ Void
- not after
- not above
- $(level = 1)$ implies empty

**"New" Precondition**

- other $\neq$ Void
- not after
- not above
- $(level = 1)$ implies is_empty

### Routine: fill - Precondition changed

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<tbody>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

**"Old" Precondition**

- empty

**"New" Precondition**

- is_empty
Routine: merge_left - Precondition changed

"Old" Precondition
other /= Void
not before
not above
(level = 1) implies empty

"New" Precondition
other /= Void
not before
not above
(level = 1) implies is_empty

Routine: start - Postcondition changed

"Old" Postcondition
not empty implies is_root

"New" Postcondition
not is_empty implies is_root
82.16 Class: NUMERIC

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<td>Manual</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[
equal (\text{Current} + \text{zero}, \text{Current})
\]
\[
equal (\text{Current} - \text{Current}, \text{zero})
\]
\[
equal (\text{Current} \ast \text{one}, \text{Current})
\]
\[
divisible (\text{Current}) \implies equal (\text{Current} / \text{Current}, \text{one})
\]

"New" Invariant

82.17 Class: FILE

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
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</tr>
</tbody>
</table>

"Old" Invariant

\[
\text{closed\_file} \leq \text{mode} \text{ and } \text{mode} \leq \text{append\_read\_file}
\]
\[
\text{name} /\neq \text{Void}
\]
\[
\text{not} \text{name\_empty}
\]

"New" Invariant

\[
\text{closed\_file} \leq \text{mode} \text{ and } \text{mode} \leq \text{append\_read\_file}
\]
\[
\text{name} /\neq \text{Void}
\]
\[
\text{not} \text{name\_is\_empty}
\]
**Routine: make_create_read_write - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
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<th>Wn</th>
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<tbody>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
fn \neq Void \\
\text{not } fn\text{.empty}
\]

"New" Precondition

\[
fn \neq Void \\
\text{not } fn\text{.is_empty}
\]

**Routine: make_open_append - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>Sn</th>
<th>Wn</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
fn \neq Void \\
\text{not } fn\text{.empty}
\]

"New" Precondition

\[
fn \neq Void \\
\text{not } fn\text{.is_empty}
\]

**Routine: make_open_read_append - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>Sn</th>
<th>Wn</th>
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<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Precondition

\[ fn \neq Void \]
\[ \text{not } fn\.empty \]

"New" Precondition

\[ fn \neq Void \]
\[ \text{not } fn\.is\_empty \]

Routine: make_open_read - Precondition changed

<table>
<thead>
<tr>
<th>Tags</th>
<th>Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ fn \neq Void \]
\[ \text{not } fn\.empty \]

"New" Precondition

\[ fn \neq Void \]
\[ \text{not } fn\.is\_empty \]

Routine: make_open_write - Precondition changed

<table>
<thead>
<tr>
<th>Tags</th>
<th>Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
</tr>
</tbody>
</table>

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"Old" Precondition
\[
fn \neq \text{Void} \\
\text{not } fn.\text{empty}
\]

"New" Precondition
\[
fn \neq \text{Void} \\
\text{not } fn.\text{is_empty}
\]

Routine: make_open_read_write - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

Tags: Changed

"Old" Precondition
\[
fn \neq \text{Void} \\
\text{not } fn.\text{empty}
\]

"New" Precondition
\[
fn \neq \text{Void} \\
\text{not } fn.\text{is_empty}
\]

Routine: make - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

Tags: Changed

"Old" Precondition
\[
fn \neq \text{Void} \\
\text{not } fn.\text{empty}
\]
"New" Precondition

\[ fn \neq \text{Void} \]
\[ \text{not} \ fn.\text{is_empty} \]

82.18 Class: INTEGER_INTERVAL

Invariant changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[ \text{count} = \text{upper} - \text{lower} + 1 \]
\[ \text{equal} (\text{index_set}, \text{Current}) \]

"New" Invariant

\[ \text{upper_defined and lower_defined implies count} = \text{upper} - \text{lower} + 1 \]
\[ \text{equal} (\text{index_set}, \text{Current}) \]

Routine: adapt - Postcondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>Changed</th>
<th>Strengthened</th>
<th>NEStronger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
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<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{lower} = \text{other.lower} \]
\[ \text{upper} = \text{other.upper} \]

"New" Postcondition

\[ \text{lower} = \text{other.lower} \]
upper = other.upper
lower_defined = other.lower_defined
upperDefined = other.upper_defined

Routine: has - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<th>W_{ne}</th>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{Result} = ((v \geq lower) \land (v \leq upper)) \]

"New" Postcondition

\[ \text{Result} = upper_{defined} \implies v \leq upper \land lower_{defined} \implies v \geq lower \]

Routine: exists1 - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</tbody>
</table>

"Old" Precondition


"New" Precondition

\[ upper_{defined} \text{ and } lower_{defined} \]
Routine: occurrences - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

(Result = 1) = ((v >= lower) and (v <= upper))
(Result /= 1) = (Result = 0)

"New" Postcondition

Result = 1 implies has (v)
Result /= 1 implies Result = 0

Routine: hold_count - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Precondition

"New" Precondition

upper_defined and lower_defined

Routine: copy - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
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<td>x</td>
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</tr>
</tbody>
</table>
"Old" Postcondition

\[
\begin{align*}
\text{lower} &= \text{other.lower} \\
\text{upper} &= \text{other.upper}
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
\text{lower} &= \text{other.lower} \\
\text{upper} &= \text{other.upper} \\
\text{lower\_defined} &= \text{other.lower\_defined} \\
\text{upper\_defined} &= \text{other.upper\_defined}
\end{align*}
\]

Routine: is_equal - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tr>
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<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{Result} = ((\text{lower} = \text{other.lower}) \text{ and } (\text{upper} = \text{other.upper}))
\]

"New" Postcondition

\[
\begin{align*}
\text{Result} &= \text{lower\_defined implies other.lower\_defined and lower} = \text{other.lower and upper\_defined implies other.upper\_defined and upper} = \text{other.upper}
\end{align*}
\]

Routine: as_array - Precondition changed

<table>
<thead>
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<th>R</th>
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<th>S</th>
<th>W</th>
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<th>W_{ne}</th>
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</table>

"Old" Precondition
"New" Precondition

<table>
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<th>S</th>
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</tbody>
</table>

Routine: *exists* - Precondition changed

Tags: Added Changed Strengthened

"Old" Precondition

"New" Precondition

*upper_set and lower_set*

---

"New" Precondition

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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<td>x</td>
<td>x</td>
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</table>

Routine: *to_c* - Precondition changed

Tags: Added Changed Strengthened

"Old" Precondition

"New" Precondition

*upper_set and lower_set*
Routine: for_all - Precondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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<td>x</td>
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</table>

"Old" Precondition

"New" Precondition

upper_defined and lower_defined

82.19 Class: LINKED_QUEUE

Invariant changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

not empty implies after

"New" Invariant

not is_empty implies after

Routine: put - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

(old empty) implies (item = v)

"New" Postcondition

(old is_empty) implies (item = v)

Routine: duplicate - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

n > 0

"New" Precondition

Routine: item - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

not empty

"New" Precondition
**Routine: item - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**"Old" Postcondition**

**"New" Postcondition**

\[ \text{not } is\_empty \implies (active = last\_element) \]

**82.20 Class: FIXED\_LIST**

**Invariant changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**"Old" Invariant**

**"New" Invariant**

\[ is\_empty \implies \text{all\_default} \]

**82.21 Class: CHAIN**

**Invariant changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

255
"Old" Invariant

\[
\begin{align*}
\text{index} & \geq 0 \\
\text{index} & \leq \text{count} + 1 \\
\text{off} & = ((\text{index} = 0) \lor (\text{index} = \text{count} + 1)) \\
is\text{first} & = ((\text{not empty}) \land (\text{index} = 1)) \\
is\text{last} & = ((\text{not empty}) \land (\text{index} = \text{count})) \\
\text{not off} & \implies (\text{item} = \text{i}_\text{th} (\text{index})) \\
\text{index.set.count} & = \text{count}
\end{align*}
\]

"New" Invariant

\[
\begin{align*}
\text{index} & \geq 0 \\
\text{index} & \leq \text{count} + 1 \\
\text{off} & = ((\text{index} = 0) \lor (\text{index} = \text{count} + 1)) \\
is\text{first} & = ((\text{not is_empty}) \land (\text{index} = 1)) \\
is\text{last} & = ((\text{not is_empty}) \land (\text{index} = \text{count})) \\
\text{not off} & \implies (\text{item} = \text{i}_\text{th} (\text{index})) \\
\text{index.set.count} & = \text{count}
\end{align*}
\]

Routine: is\text{first} - Postcondition changed

Tags: Changed

\begin{tabular}{|l|c|c|c|c|c|c|}
\hline
 & A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
Tool & & & & x & & \\
\hline
Manual & & & & & & \\
\hline
\end{tabular}

"Old" Postcondition

\[
\text{Result implies not empty}
\]

"New" Postcondition

\[
\text{Result implies not is_empty}
\]

Routine: last - Precondition changed

Tags: Changed

\begin{tabular}{|l|c|c|c|c|c|c|}
\hline
 & A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
Tool & & & & x & & \\
\hline
Manual & & & & & & \\
\hline
\end{tabular}

256
"Old" Precondition

\[ \text{not empty} \]

"New" Precondition

\[ \text{not \ is\_empty} \]

**Routine: finish - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{not empty implies islast} \]

"New" Postcondition

\[ \text{not is\_empty implies islast} \]

**Routine: start - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{not empty implies isfirst} \]
"New" Postcondition

\[
\text{not is\_empty implies isfirst}
\]

Routine: islast - Postcondition changed

"Old" Postcondition

\[
\text{Result implies not empty}
\]

"New" Postcondition

\[
\text{Result implies not is\_empty}
\]

Routine: first - Precondition changed

"Old" Precondition

\[
\text{not empty}
\]

"New" Precondition

\[
\text{not is\_empty}
\]
82.22 Class: DISPENSER

Invariant changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[
\text{readable} = \text{not empty} \\
\text{writable} = \text{not empty}
\]

"New" Invariant

\[
\text{readable} = \text{not is_empty} \\
\text{writable} = \text{not is_empty}
\]

82.23 Class: DYNAMIC_LIST

Routine: merge_left - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

other.is_empty

Routine: merge_right - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

"New" Postcondition

other.is_empty

---

82.24 Class: FORMAT_INTEGER

Routine: sign_dr_cr - Postcondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

sign_string.is_equal ("DR CR")

"New" Postcondition

sign_string.is_equal ("DR CR")

Routine: sign_cr_dr - Postcondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

sign_string.is_equal ("CR DR")
### "New" Postcondition

\[ \text{sign\_string}\_is\_equal(\text{"CR DR"}) \]

### 82.25 Class: LINKED\_LIST

**Invariant changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**"Old" Invariant**

\[
\text{prunable} \\
\text{empty} \implies ((\text{first\_element} = \text{Void}) \ \text{and} \ (\text{active} = \text{Void})) \\
(\text{active} = \text{Void}) \implies \text{empty} \\
\text{before} \implies (\text{active} = \text{first\_element}) \\
\text{after} \implies (\text{active} = \text{last\_element})
\]

**"New" Invariant**

\[
\text{prunable} \\
\text{is\_empty} \implies ((\text{first\_element} = \text{Void}) \ \text{and} \ (\text{active} = \text{Void})) \\
(\text{active} = \text{Void}) \implies \text{is\_empty} \\
\text{before} \implies (\text{active} = \text{first\_element}) \\
\text{after} \implies (\text{active} = \text{last\_element})
\]

### Routine: finish - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**"Old" Postcondition**

\[
\text{empty} \implies \text{before}
\]

261
"New" Postcondition

\textit{is\_empty} \textit{implies} \textit{before}

\textbf{Routine:} start - Postcondition changed

\begin{tabular}{|c|c|c|c|c|c|c|}
\hline
 & A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
Tool & & & & x & & & \\
\hline
Manual & & & & & & & \\
\hline
\end{tabular}

"Old" Postcondition

\textit{empty} \textit{implies} \textit{after}

"New" Postcondition

\textit{is\_empty} \textit{implies} \textit{after}

\textbf{82.26 Class: TREE}

\textbf{Invariant changed}

\begin{tabular}{|c|c|c|c|c|c|c|}
\hline
 & A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
Tool & & & & x & & & \\
\hline
Manual & & & & & & & \\
\hline
\end{tabular}

"Old" Invariant

\begin{itemize}
  \item \textit{is\_leaf} = (arity = 0)
  \item \textit{child\_off} = \textit{child\_before} or \textit{child\_after}
  \item \textit{child\_before} = (child\_index = 0)
  \item \textit{child\_isfirst} = (not \textit{is\_leaf} and \textit{child\_index} = 1)
  \item \textit{child\_islast} = (not \textit{is\_leaf} and \textit{child\_index} = \textit{arity})
  \item \textit{child\_after} = (child\_index >= \textit{arity} + 1)
  \item \textit{child\_Readable} implies \textit{child\_parent} = \textbf{Current}
\end{itemize}
"New" Invariant

is_leaf = (arity = 0)
child_off = child_before or child_after
child_before = (child_index = 0)
child_isfirst = (not is_leaf and child_index = 1)
child_islast = (not is_leaf and child_index = child_capacity)
child_after = (child_index >= child_capacity + 1)
child_readable implies child.parent = Current

Routine: valid_cursor_index - Postcondition changed
Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition
Result = (i >= 0) and (i <= arity + 1)

"New" Postcondition
Result = (i >= 0) and (i <= child_capacity + 1)

Routine: is_sibling - Precondition changed
Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition
other /= Void

263
82.27 Class: ITERATOR

Invariant changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

"New" Invariant

\[ \text{target} /= \text{Void} \]

Routine: invariant\_value - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ \text{target} /= \text{Void} \]

"New" Precondition

82.28 Class: BINARY\_SEARCH\_TREE

Routine: make - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

264
82.29 Class: COMPARABLE_STRUCT

Invariant changed

```
<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
```

"Old" Invariant

\[
\text{min}_\text{max}\_\text{available} \text{ implies not } \text{empty}
\]

"New" Invariant

\[
\text{min}_\text{max}\_\text{available} \text{ implies not } \text{is}_\text{empty}
\]

Routine: min\_max\_available - Postcondition changed

```
<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
```

"Old" Postcondition

\[
\text{Result implies not } \text{empty}
\]

"New" Postcondition

\[
\text{Result implies not } \text{is}_\text{empty}
\]
82.30 Class: INTEGER_REF

Routine: infix "/" - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result / ≠ Void

"New" Postcondition

82.31 Class: REAL_REF

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

sign * abs = item

"New" Invariant

82.32 Class: BINARY_SEARCH_TREE_SET

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Invariant

"New" Invariant

\[ \text{tree} \neq \text{Void} \implies \text{object\_comparison} = \text{tree}.\text{object\_comparison} \]

82.33 Class: SET

Routine: changeable\_comparison\_criterion - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{Result} = \text{empty} \]

"New" Postcondition

\[ \text{Result} = \text{is\_empty} \]

82.34 Class: DOUBLE\_REF

Invariant changed

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
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<td></td>
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<tr>
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<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

"New" Invariant

\[ \text{sign} \ast \text{abs} = \text{item} \]
82.35 Class: CIRCULAR

Invariant changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Invariant

\begin{align*}
&\text{before implies empty} \\
&\text{after implies empty} \\
&\text{off implies empty}
\end{align*}

"New" Invariant

\begin{align*}
&\text{before implies is_empty} \\
&\text{after implies is_empty} \\
&\text{off implies is_empty}
\end{align*}

Routine: before - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Postcondition

\textbf{Result} = (\text{empty and standard}_{\text{before}})

"New" Postcondition

\textbf{Result} = (\text{is_empty and standard}_{\text{before}})
Routine: after - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result = (empty and standard_after)

"New" Postcondition

Result = (is_empty and standard_after)

Routine: off - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result = empty

"New" Postcondition

Result = is_empty

Routine: go_i_th - Precondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Precondition

\[ i \geq 1 \]
\[ \text{not empty} \]

"New" Precondition

\[ i \geq 1 \]
\[ \text{not is_empty} \]

82.36 Class: HEAP_PRIORITY_QUEUE

Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

"New" Invariant

\[ \text{is_empty implies all_default} \]

82.37 Class: CHARACTER_REF

Routine: infix "<" - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition
"New" Postcondition

\[
\text{Result} = (\text{code} < \text{other.code})
\]

### 82.38 Class: ANY

**Invariant changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

"New" Invariant

\[
\text{standard_is_equal (Current)}
\]

\[
\text{conforms_to (Current)}
\]

### 82.39 Class: FILE_NAME

**Routine: add_extension - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
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<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{ext} /= \text{Void}
\]

\[
\text{not ext.empty}
\]

\[
\text{is_extension_valid (ext)}
\]

"New" Precondition

\[
\text{ext} /= \text{Void}
\]

\[
\text{not ext.is_empty}
\]
is_extension_valid (ext)

82.40 Class: DIRECTORY

Routine: delete - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

exists
empty

"New" Precondition

exists
is_empty

Routine: empty - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

exists

"New" Precondition
82.41 Class: **ARRAYED_LIST**

**Invariant changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Invariant

prunable
lower = 1

"New" Invariant

prunable
lower = 1
is_empty implies all_default

**Routine: remove - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Postcondition

index = old index

"New" Postcondition

**Routine: finish - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

273
"Old" Postcondition

empty implies before

"New" Postcondition

is_empty implies before

Routine: start - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

empty implies after

"New" Postcondition

is_empty implies after

82.42 Class: STRING

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

extendible

object\_comparison = False

index\_set.count = count
"New" Invariant

extendible
not object_comparison
index_set.count = count

Routine: replace_substring_all - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

original /= Void
new /= Void
not original.empty

"New" Precondition

original /= Void
new /= Void
not original.is_empty

Routine: character_justify - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

position <= capacity
position >= 1
pivot /= ' '
not empty

275
"New" Precondition

\[
\begin{align*}
\text{position} & \leq \text{capacity} \\
\text{position} & \geq 1 \\
\text{pivot} & \neq \text{'}\text{'} \\
\text{not} & \text{ is_empty}
\end{align*}
\]

Routine: from_c - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[
\text{not has ('}\%\text{U}')
\]

Routine: index_of - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td>Tool</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\begin{align*}
\text{start} & \geq 1 \\
\text{start} & \leq \text{count}
\end{align*}
\]

"New" Precondition

\[
\begin{align*}
\text{start} & \geq 1 \\
\text{start} & \leq \text{count} + 1
\end{align*}
\]
Routine: fuzzy_index - Precondition changed

"Old" Precondition

\[ \text{other} \neq \text{Void} \]
\[ \text{not} \ other\text{.empty} \]
\[ \text{start} \geq 1 \]
\[ \text{start} \leq \text{count} \]
\[ \text{fuzz} \leq \text{other.count} \]

"New" Precondition

\[ \text{other} \neq \text{Void} \]
\[ \text{not} \ other\text{.is_empty} \]
\[ \text{start} \geq 1 \]
\[ \text{start} \leq \text{count} \]
\[ \text{fuzz} \leq \text{other.count} \]

Routine: substring_index - Precondition changed

"Old" Precondition

\[ \text{other} \neq \text{Void} \]
\[ \text{not} \ other\text{.empty} \]
\[ \text{start} \geq 1 \]
\[ \text{start} \leq \text{count} \]

"New" Precondition

\[ \text{other} \neq \text{Void} \]
\[ \text{not} \ other\text{.is_empty} \]
\( \text{start} \geq 1 \)
\( \text{start} \leq \text{count} \)

**83 Revision "Old": 25848 vs. Revision "New": 25862**

### 83.1 Class: INTEGER_INTERVAL

**Routine:** has - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
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<th>S</th>
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<th>S_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
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<td></td>
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<td></td>
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</tr>
<tr>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{Result} = \text{upper-defined implies v} \leq \text{upper and lower-defined implies v} \geq \text{lower}
\]

"New" Postcondition

\[
\text{Result} = ((\text{upper-defined implies v} \leq \text{upper}) \text{ and (lower-defined implies v} \geq \text{lower}))
\]

**Routine:** is_equal - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{Result} = \text{lower-defined implies other.lower_defined and lower = other.lower and upper_defined implies other.upper_defined and upper = other.upper}
\]

"New" Postcondition

\[
\text{Result} = (((\text{lower-defined implies (other.lower_defined and lower = other.lower)}) \text{ and (upper-defined implies (other.upper_defined and upper = other.upper)))})
\]

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84 Revision "Old": 25862 vs. Revision "New": 25866

84.1 Class: INTEGER INTERVAL

Invariant changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Invariant

upper\_defined and lower\_defined implies count = upper - lower + 1
equal (index\_set, Current)

"New" Invariant

upper\_defined and lower\_defined implies count = upper - lower + 1
equal (index\_set, Current)
upper\_defined and lower\_defined

85 Revision "Old": 26673 vs. Revision "New": 26711

85.1 Class: ARRAY

Invariant changed

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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<th>S_{ne}</th>
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<tbody>
<tr>
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<td>x</td>
<td>x</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Invariant

area /= Void
capacity = upper - lower + 1
count >= 0
valid_index\_set
((index\_set.lower = lower) and (index\_set.upper = lower + count - 1))
"New" Invariant

\[
\begin{align*}
\text{area} & \neq \text{Void} \\
\text{capacity} & = \text{upper} - \text{lower} + 1 \\
\text{count} & \geq 0 \\
\text{valid\_index\_set} &
\end{align*}
\]

86 Revision "Old": 27078 vs. Revision "New": 27098

86.1 Class: BIT_REF

Invariant changed

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<thead>
<tr>
<th></th>
<th>A</th>
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</tbody>
</table>

"Old" Invariant

"New" Invariant

\[
\text{count} > 0
\]

87 Revision "Old": 27813 vs. Revision "New": 27814

87.1 Class: EXECUTION_ENVIRONMENT

Routine: root\_directory\_name - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<th>S</th>
<th>W</th>
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</tbody>
</table>

"Old" Postcondition
Routine: current_working_directory - Postcondition changed

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<th>C</th>
<th>S</th>
<th>W</th>
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</tr>
</tbody>
</table>

88 Revision "Old": 27814 vs. Revision "New": 27899

88.1 Class: INTEGER_REF

Routine: ascii_char - Precondition changed

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<th></th>
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<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tbody>
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</tbody>
</table>

is_valid_character_code
Routine: to_character - Precondition changed

<table>
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<tr>
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<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

\texttt{is_valid_character_code}

"New" Precondition

88.2 Class: CHARACTER_REF

Routine: previous - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\texttt{item /= '%U'}

"New" Precondition

\texttt{(item.code - 1).is_valid_character_code}

Routine: next - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>
"Old" Precondition

\[ \text{item} \neq '' \]

"New" Precondition

\[
(item.code + 1).\text{is_valid_character_code}
\]

**Routine: infix "" + - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{\text{ref}}</th>
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</tr>
</tbody>
</table>

"Old" Precondition

\[
\begin{align*}
\text{item.code} + \text{incr} & \leq 255 \\
\text{item.code} + \text{incr} & \geq 0
\end{align*}
\]

"New" Precondition

\[
(item.code + \text{incr}).\text{is_valid_character_code}
\]

**Routine: infix "" − - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tbody>
</table>

"Old" Precondition

\[
\begin{align*}
\text{item.code} - \text{decr} & \leq 255 \\
\text{item.code} - \text{decr} & \geq 0
\end{align*}
\]

"New" Precondition

\[
(item.code - \text{decr}).\text{is_valid_character_code}
\]
89 Revision "Old": 28647 vs. Revision "New": 28717

89.1 Class: INTEGER

Routine: to_c - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Removed Changed Weakened</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</tbody>
</table>

"Old" Precondition

upper\_defined and lower\_defined

"New" Precondition

90 Revision "Old": 29791 vs. Revision "New": 29792

90.1 Class: STRING

Routine: substring - Postcondition changed

<table>
<thead>
<tr>
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<th>A</th>
<th>R</th>
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<th>S</th>
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</tbody>
</table>

"Old" Postcondition

Result.count = n2 - n1 + 1 or Result.count = 0

"New" Postcondition

Result.count = end\_index - start\_index + 1 or Result.count = 0
Routine: insert - Precondition changed

"Old" Precondition

\[ s \neq \text{Void} \]
\[ i \leq \text{count} \]
\[ i > 0 \]

"New" Precondition

\[ s \neq \text{Void} \]
\[ i \leq \text{count} + 1 \]
\[ i > 0 \]

91 Revision "Old": 29943 vs. Revision "New": 29956

91.1 Class: BOOL_STRING

Routine: put - Precondition changed

"Old" Precondition

\[ 1 \leq i \]
\[ i \leq \text{count} \]

"New" Precondition
**Routine:** item - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tr>
</tbody>
</table>

"Old" Precondition

1 \(\leq i\)

\(i \leq count\)

"New" Precondition

---

92 Revision "Old": 30255 vs. Revision "New": 30384

92.1 Class: LINEAR

**Routine:** for\_all - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td></td>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\(is\_empty\) implies Result
93 Revision "Old": 30589 vs. Revision "New": 30725

93.1 Class: **STRING**

Routine: remove_substring - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<th>S\text{ne}</th>
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</tr>
</tbody>
</table>

"Old" Precondition

\[1 \leq \text{start\_index} \]
\[\text{end\_index} \leq \text{count} \]
\[\text{start\_index} \leq \text{end\_index} + 1 \]

"New" Precondition

\[1 \leq \text{start\_index} \]
\[\text{end\_index} \leq \text{count} \]
\[\text{start\_index} \leq \text{end\_index} \]

94 Revision "Old": 31052 vs. Revision "New": 31208

94.1 Class: **RAW\_FILE**

Routine: put_data - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
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<td></td>
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</tbody>
</table>

"Old" Precondition

"New" Precondition

\[p \neq \text{default\_pointer} \]
95 Revision "Old": 31859 vs. Revision "New": 31860

95.1 Class: INTEGER_64_REF

Routine: to_integer.8 - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
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</tbody>
</table>

"Old" Precondition

\[item \geq -128\]
\[item \leq 127\]

"New" Precondition

\[item \geq \text{feature } \{\text{INTEGER}_8\}.\min \text{value}\]
\[item \leq \text{feature } \{\text{INTEGER}_8\}.\max \text{value}\]

Routine: to_integer - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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</tr>
</tbody>
</table>

"Old" Precondition

\[item \geq -2147483648\]
\[item \leq 2147483647\]

"New" Precondition

\[item \geq \text{feature } \{\text{INTEGER}\}.\min \text{value}\]
\[item \leq \text{feature } \{\text{INTEGER}\}.\max \text{value}\]
Routine: to_integer_16 - Precondition changed


"Old" Precondition

\[ \text{item} \geq -32768 \]
\[ \text{item} \leq 32767 \]

"New" Precondition

\[ \text{item} \geq \text{feature} \{ \text{INTEGER}_16 \}.\text{min\_value} \]
\[ \text{item} \leq \text{feature} \{ \text{INTEGER}_16 \}.\text{max\_value} \]

95.2 Class: INTEGER_16_REF

Routine: to_integer_8 - Precondition changed


"Old" Precondition

\[ \text{item} \geq -128 \]
\[ \text{item} \leq 127 \]

"New" Precondition

\[ \text{item} \geq \text{feature} \{ \text{INTEGER}_8 \}.\text{min\_value} \]
\[ \text{item} \leq \text{feature} \{ \text{INTEGER}_8 \}.\text{max\_value} \]
### 95.3 Class: INTEGER_REF

**Routine: to_integer_8 - Precondition changed**

<table>
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<th>C</th>
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</tbody>
</table>

"Old" Precondition

\[
\text{item} \geq -128 \\
\text{item} \leq 127
\]

"New" Precondition

\[
\text{item} \geq \text{feature} \{\text{INTEGER}_8\}.\text{min\_value} \\
\text{item} \leq \text{feature} \{\text{INTEGER}_8\}.\text{max\_value}
\]

**Routine: to_integer_16 - Precondition changed**

<table>
<thead>
<tr>
<th>A</th>
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</table>

"Old" Precondition

\[
\text{item} \geq -32768 \\
\text{item} \leq 32767
\]

"New" Precondition

\[
\text{item} \geq \text{feature} \{\text{INTEGER}_16\}.\text{min\_value} \\
\text{item} \leq \text{feature} \{\text{INTEGER}_16\}.\text{max\_value}
\]
96 Revision "Old": 31922 vs. Revision "New": 31933

96.1 Class: HASH_TABLE

Invariant changed

Tags: Changed Weakened NEWeaker

<table>
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<tr>
<th>Tool</th>
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</tr>
</tbody>
</table>

"Old" Invariant

```plaintext
keys /= Void
content /= Void
keys.count = capacity + 1
content.count = capacity + 1
deleted_marks.count = capacity
keys.lower = 0
content.lower = 0
deleted_marks.lower = 0
off or truly_occupied (iteration.position)
control >= 0
special_status = (conflict or inserted or replaced or removed or found or not_found)
(max_occupation > 0) and (max_occupation < 100)
(initial_occupation > 0) and (initial_occupation < 100)
initial_occupation < max_occupation
0 <= count
count <= capacity
count * 100 <= capacity * max_occupation
count <= used_slot_count
0 <= count
used_slot_count <= capacity
extra_space >= 0
```

"New" Invariant

```plaintext
keys /= Void
content /= Void
keys.count = capacity + 1
content.count = capacity + 1
deleted_marks.count = capacity
off or truly_occupied (iteration.position)
control >= 0
```
special\_status = (conflict or inserted or replaced or removed or found or not\_found)

\( \text{(max\_occupation > 0) and (max\_occupation < 100)} \)

\( \text{(initial\_occupation > 0) and (initial\_occupation < 100)} \)

\( \text{initial\_occupation < max\_occupation} \)

\( 0 \leq \text{count} \)

\( \text{count} \leq \text{capacity} \)

\( \text{count} \leq \text{capacity} \times \text{max\_occupation} \)

\( \text{count} \leq \text{used\_slot\_count} \)

\( 0 \leq \text{count} \)

\( \text{used\_slot\_count} \leq \text{capacity} \)

\( \text{extra\_space} \geq 0 \)

### 97 Revision "Old": 32328 vs. Revision "New": 32442

#### 97.1 Class: INTERNAL

#### Routine: type\_conforms\_to - Precondition changed

<table>
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<tr>
<th></th>
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</tbody>
</table>

**"Old" Precondition**

**"New" Precondition**

\( \text{type1} > 0 \)

\( \text{type2} > 0 \)

#### Routine: new\_instance\_of - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

292
"Old" Precondition

"New" Precondition

\[ type_id > 0 \]
\[ \text{not is\_special\_type (type\_id)} \]

Routine: new\_instance\_of - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{not is\_special (Result)} \]
\[ \text{dynamic\_type (Result) = type\_id} \]

Routine: is\_instance\_of - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>object /= Void</td>
</tr>
</tbody>
</table>

"New" Precondition

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>object /= Void</td>
</tr>
<tr>
<td>type_id &gt; 0</td>
</tr>
</tbody>
</table>
98 Revision "Old": 32653 vs. Revision "New": 32654

98.1 Class: DYNAMIC_LIST

Routine: merge_left - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

\textit{other.is_empty}

"New" Postcondition

Routine: merge_right - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
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<tbody>
<tr>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

\textit{other.is_empty}

"New" Postcondition
Revision "Old": 32654 vs. Revision "New": 32749

99.1 Class: INTEGER_64_REF

Routine: infix "|<<" - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /≠ Void

Routine: ascii_char - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
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<td>x</td>
<td>x</td>
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<tr>
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</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

is_valid_character_code

Routine: bit_shift - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
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<td>x</td>
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</tbody>
</table>
**Routine: `bit_not` - Postcondition changed**

<table>
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<tr>
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<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Result** /\= Void

---

**Routine: `infix "&"` - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Result** /\= Void

---

"Old" Precondition

"New" Precondition

\( i /= \text{Void} \)
Routine: infix "&" - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /= Void

Routine: set_item - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

item = i

Routine: infix "|>>" - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Manual</td>
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<td>x</td>
<td>x</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

297
\[
\text{"New" Postcondition}
\]

\textbf{Result} \neq \text{Void}

\section*{Routine: infix "|" - Precondition changed}

\textbf{Tags: Added Changed Strengthened}

\begin{tabular}{|c|c|c|c|c|c|}
\hline
 & A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
Tool & x & x & x & & & \\
Manual & & & & & & \\
\hline
\end{tabular}

\section*{"Old" Precondition}

\section*{"New" Precondition}

\texttt{i} \neq \text{Void}

\section*{Routine: infix "|" - Postcondition changed}

\textbf{Tags: Added Changed Strengthened}

\begin{tabular}{|c|c|c|c|c|c|}
\hline
 & A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
Tool & x & x & x & & & \\
Manual & & & & & & \\
\hline
\end{tabular}

\section*{"Old" Postcondition}

\section*{"New" Postcondition}

\textbf{Result} \neq \text{Void}
### Routine: bit_xor - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

i /= Void

"New" Precondition

### Routine: bit_xor - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /= Void

### 99.2 Class: INTEGER_8_REF

### Routine: infix "|<<" - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Manual</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

299
**Routine: ascii_char - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Result** \( /= \) **Void**

**Routine: bit_shift - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Result** \( /= \) **Void**
**Routine: `bit_not` - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
<tr>
<td>R</td>
<td>x</td>
</tr>
<tr>
<td>C</td>
<td>x</td>
</tr>
<tr>
<td>S</td>
<td>W</td>
</tr>
<tr>
<td>$S_{ne}$</td>
<td>$W_{ne}$</td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result $\neq$ Void

**Routine: `infix "&"` - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
<tr>
<td>R</td>
<td>x</td>
</tr>
<tr>
<td>C</td>
<td>x</td>
</tr>
<tr>
<td>S</td>
<td>W</td>
</tr>
<tr>
<td>$S_{ne}$</td>
<td>$W_{ne}$</td>
</tr>
</tbody>
</table>

"Old" Precondition

$i \neq$ Void

**Routine: `infix "&"` - Postcondition changed**

"Old" Postcondition

301
"New" Postcondition

Result \(\neq\) Void

Routine: \texttt{set\_item} - Postcondition changed

Tags: Added Changed Strengthened

\begin{tabular}{|c|c|c|c|c|c|}
\hline
 & A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
Tool & x & x & x & & & & \\
Manual & & & & & & & \\
\hline
\end{tabular}

"Old" Postcondition

"New" Postcondition

\(item = i\)

Routine: \texttt{infix "|>>"} - Postcondition changed

Tags: Added Changed Strengthened

\begin{tabular}{|c|c|c|c|c|c|}
\hline
 & A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
Tool & x & x & x & & & & \\
Manual & & & & & & & \\
\hline
\end{tabular}

"Old" Postcondition

"New" Postcondition

Result \(\neq\) Void
Routine: **infix "|"** - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
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<td>Tool</td>
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</tbody>
</table>

"Old" Precondition

"New" Precondition

\( i /= \text{Void} \)

Routine: **infix "|"** - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<td>Manual</td>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\( \text{Result} /= \text{Void} \)

Routine: **bit\_xor** - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

303
"New" Precondition

\( i \neq \text{Void} \)

Routine: bit_xor - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /\neq \text{Void}

99.3 Class: INTEGER_16_REF

Routine: infix "|<<" - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
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<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /\neq \text{Void}
Routine: ascii_char - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

is_valid_character_code

Routine: bit_shift - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /= Void

Routine: bit_not - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

305
"New" Postcondition

Result \(/= \text{Void}\)

Routine: \text{infix "\&"} - Precondition changed

Tags: Added Changed Strengthened

\[
\begin{array}{ccccccc}
\text{Tool} & A & R & C & S & W & S_{ne} & W_{ne} \\
\text{Manual} & x & x & x & & & & \\
\end{array}
\]

"Old" Precondition

"New" Precondition

\(i /= \text{Void}\)

Routine: \text{infix "\&"} - Postcondition changed

Tags: Added Changed Strengthened

\[
\begin{array}{ccccccc}
\text{Tool} & A & R & C & S & W & S_{ne} & W_{ne} \\
\text{Manual} & x & x & x & & & & \\
\end{array}
\]

"Old" Postcondition

"New" Postcondition

Result \(/= \text{Void}\)
Routine: set_item - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Postcondition

item = i

"New" Postcondition

Routine: infix "|>>" - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /= Void

Routine: infix "|" - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Precondition
"New" Precondition

\[ i \neq \text{Void} \]

**Routine: infix "|" - Postcondition changed**

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{\text{ne}}</th>
<th>W_{\text{ne}}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

**Result** \( i \neq \text{Void} \)

**Routine: bit_xor - Precondition changed**

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{\text{ne}}</th>
<th>W_{\text{ne}}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

\[ i \neq \text{Void} \]
Routine: bit_xor - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result \neq Void

99.4 Class: INTEGER_REF

Routine: infix "|<<" - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result \neq Void

Routine: bit_shift - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

309
"Old" Postcondition

"New" Postcondition

Result /= Void

Routine: bit\_not - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /= Void

Routine: infix \"&\" - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

i /= Void
**Routine: infix "&" - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

**Result** /= Void

**Routine: set_item - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[item = i\]

**Routine: infix "|>>" - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition
"New" Postcondition

Result /= Void

Routine: infix "|" - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

i /= Void

Routine: infix "|" - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /= Void

312
Routine: bit_xor - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\( i /= \text{ Void} \)

"New" Precondition

Routine: bit_xor - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result \( /= \text{ Void} \)

100 Revision "Old": 33052 vs. Revision "New": 33079

100.1 Class: STRING

Routine: insert_string - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition
\[ \text{count} = \text{old count} + \text{s.count} \]

"New" Postcondition
\[ \text{is_equal (old substring (1, i - 1) + old clone (s) + old substring (i, count))} \]

101 Revision "Old": 33080 vs. Revision "New": 33082

101.1 Class: STRING
Routine: replace_character - Postcondition changed
Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition
\[ (\text{count} = \text{old count}) \land (\text{capacity} = \text{old capacity}) \]

"New" Postcondition
\[ (\text{count} = \text{old count}) \land (\text{capacity} = \text{old capacity}) \]
\[ \text{occurrences (c) = count} \]

Routine: insert - Postcondition changed
Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition
\[ \text{count} = \text{old count} + \text{s.count} \]
"New" Postcondition

\[
is_{\text{equal}}(\text{old substring} (1, i - 1) + \text{old clone} (s) + \text{old substring} (i, \text{count}))
\]

Routine: remove_substring - Precondition changed

<table>
<thead>
<tr>
<th>Tags</th>
<th>Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
1 \leq \text{start\_index} \\
\text{end\_index} \leq \text{count} \\
\text{start\_index} \leq \text{end\_index}
\]

"New" Precondition

\[
1 \leq \text{start\_index} \\
\text{end\_index} \leq \text{count} \\
\text{start\_index} \leq \text{end\_index} + 1
\]

Routine: replace_substring - Postcondition changed

<table>
<thead>
<tr>
<th>Tags</th>
<th>Changed Strenthened NEStronger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x x x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{count} = \text{old count} + s.\text{count} - \text{end\_pos} + \text{start\_pos} - 1
\]

"New" Postcondition

\[
\text{count} = \text{old count} + \text{old s.count} - \text{end\_pos} + \text{start\_pos} - 1 \\
\text{is\_equal}(\text{old substring} (1, \text{start\_pos} - 1) + s + \text{substring} (\text{end\_pos} + 1, \text{count}))
\]
102 Revision "Old": 33153 vs. Revision "New": 33154

102.1 Class: STRING
Routine: make_from_string - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

shared_with (s)

"New" Postcondition

not shared_with (s)

103 Revision "Old": 33371 vs. Revision "New": 33412

103.1 Class: STRING
Routine: replace_character - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

(count = old count) and (capacity = old capacity)  
occurrences (c) = count

"New" Postcondition

(count = old count) and (capacity >= old capacity)  
occurrences (c) = count
Routine: fill_with - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
</table>

"Old" Postcondition

\[
(count = \text{old count}) \land (capacity = \text{old capacity}) \\
\text{occurrences}(c) = count
\]

"New" Postcondition

\[
(count = \text{old count}) \land (capacity \geq \text{old capacity}) \\
\text{occurrences}(c) = count
\]

Routine: replace_substring - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
</table>

"Old" Precondition

\[
s \neq \text{Void} \\
end_pos \leq count \\
start_pos \leq end_pos \\
start_pos > 0
\]

"New" Precondition

\[
s \neq \text{Void} \\
1 \leq start\_index \\
end\_index \leq count \\
start\_index \leq end\_index + 1
\]
Routine: replace_substring - Postcondition changed

"Old" Postcondition

\[
\begin{align*}
\text{count} &= \text{old count} + \text{old s.count} - \text{end.pos} + \text{start.pos} - 1 \\
\text{is_equal} (\text{old} (\text{substring} (1, \text{start.pos} - 1) + s + \text{substring} (\text{end.pos} + 1, \text{count})))
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
\text{count} &= \text{old count} + \text{old s.count} - \text{end.index} + \text{start.index} - 1 \\
\text{is_equal} (\text{old} (\text{substring} (1, \text{start.index} - 1) + s + \text{substring} (\text{end.index} + 1, \text{count})))
\end{align*}
\]

Routine: substring_index - Precondition changed

"Old" Precondition

\[
\begin{align*}
\text{other} &\neq \text{Void} \\
\text{not} \text{ other.is_empty} \\
\text{start} &\geq 1 \\
\text{start} &\leq \text{count}
\end{align*}
\]

"New" Precondition

\[
\begin{align*}
\text{other} &\neq \text{Void} \\
\text{start.index} &\geq 1 \text{ and } \text{start.index} \leq \text{count} + 1
\end{align*}
\]
Routine: substring_index - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
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<th>W_{ne}</th>
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<tbody>
<tr>
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<td></td>
<td></td>
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<td>x</td>
<td>x</td>
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<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Postcondition
Result > 0 implies substring (Result, Result + other.count - 1).is_equal (other)

"New" Postcondition
Result = 0 or else (start_index <= Result and Result <= count - other.count + 1)
(Result = 0) = not substring (start_index, count).has_substring (other)
Result >= start_index implies other.same_string (substring (Result, Result + other .count - 1))
Result > start_index implies not substring (start_index, Result + other.count - 2).
 has_substring (other)

Routine: replace_blank - Postcondition changed

Tags: Changed

<table>
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<td>Manual</td>
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</tbody>
</table>

"Old" Postcondition
(count = old count) and (capacity = old capacity)

"New" Postcondition
(count = old count) and (capacity >= old capacity)
104 Revision "Old": 34883 vs. Revision "New": 34909

104.1 Class: HEAP_PRIORITY_QUEUE
Routine: duplicate - Precondition changed

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<thead>
<tr>
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</tbody>
</table>

"Old" Precondition

\[ n \geq 0 \]
\[ n \leq \text{count} \]

"New" Precondition

105 Revision "Old": 34940 vs. Revision "New": 34949

105.1 Class: MANAGED_POINTER
Routine: read_integer_8 - Precondition changed

<table>
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<tr>
<th></th>
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<th>R</th>
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</tbody>
</table>

"Old" Precondition

\[ \text{pos} \leq \text{count} \]

"New" Precondition

\[ (\text{pos} + 1) \leq \text{count} \]
106 Revision "Old": 35765 vs. Revision "New": 35768

106.1 Class: MEMORY_STREAM

Invariant changed

<table>
<thead>
<tr>
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</table>

"Old" Invariant

area /= default_pointer

"New" Invariant

area /= Void
area.item /= default_pointer

107 Revision "Old": 35768 vs. Revision "New": 35769

107.1 Class: MEMORY_STREAM

Routine: force - Precondition changed

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</table>

"Old" Precondition

"New" Precondition

i > 0
108 Revision "Old": 35769 vs. Revision "New": 35803

108.1 Class: MEMORY_STREAM

Invariant changed

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<table>
<thead>
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</tr>
</tbody>
</table>
```

"Old" Invariant

\[
\text{area} /\neq \text{Void}
\]

\[
\text{area}.\text{item} /\neq \text{default}\_\text{pointer}
\]

"New" Invariant

\[
\text{internal}\_\text{area} /\neq \text{Void}
\]

\[
\text{area} /\neq \text{default}\_\text{pointer}
\]

109 Revision "Old": 35857 vs. Revision "New": 35943

109.1 Class: MISMATCH_INFORMATION

Invariant changed

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</tbody>
</table>
```

"Old" Invariant

"New" Invariant

\[
\text{mismatch}\_\text{information} /\neq \text{Void} \implies \text{Current} = \text{mismatch}\_\text{information}
\]
110 Revision "Old": 35943 vs. Revision "New": 35994

110.1 Class: TREE

Invariant changed

<table>
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</tbody>
</table>

"Old" Invariant

\[
\text{is_leaf} = (\text{arity} = 0) \\
\text{child_off} = \text{child_before or child_after} \\
\text{child_before} = (\text{child_index} = 0) \\
\text{child isFirst} = (\text{not is_leaf and child_index} = 1) \\
\text{child isLast} = (\text{not is_leaf and child_index} = \text{child_capacity}) \\
\text{child after} = (\text{child_index} >= \text{child_capacity} + 1) \\
\text{child readable implies child parent} = \text{Current}
\]

"New" Invariant

\[
\text{is_leaf} = (\text{arity} = 0) \\
\text{child_off} = \text{child_before or child_after} \\
\text{child_before} = (\text{child_index} = 0) \\
\text{child isFirst} = (\text{not is_leaf and child_index} = 1) \\
\text{child isLast} = (\text{not is_leaf and child_index} = \text{child_capacity}) \\
\text{child after} = (\text{child_index} >= \text{child_capacity} + 1)
\]

111 Revision "Old": 35994 vs. Revision "New": 35996

111.1 Class: TREE

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th></th>
<th>A</th>
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</tr>
</tbody>
</table>

323
"Old" Invariant

\begin{align*}
is\_leaf &= (arity = 0) \\
\text{child\_off} &= \text{child\_before or child\_after} \\
\text{child\_before} &= (\text{child\_index} = 0) \\
\text{child\_isfirst} &= (\text{not is\_leaf and child\_index} = 1) \\
\text{child\_islast} &= (\text{not is\_leaf and child\_index} = \text{child\_capacity}) \\
\text{child\_after} &= (\text{child\_index} \geq \text{child\_capacity} + 1)
\end{align*}

"New" Invariant

\begin{align*}
\text{child\_readable} \implies \text{child\_parent} &= \text{Current} \\
is\_leaf &= (arity = 0) \\
\text{child\_off} &= \text{child\_before or child\_after} \\
\text{child\_before} &= (\text{child\_index} = 0) \\
\text{child\_isfirst} &= (\text{not is\_leaf and child\_index} = 1) \\
\text{child\_islast} &= (\text{not is\_leaf and child\_index} = \text{child\_capacity}) \\
\text{child\_after} &= (\text{child\_index} \geq \text{child\_capacity} + 1)
\end{align*}

112 Revision "Old": 35997 vs. Revision "New": 35998

112.1 Class: FIXED_TREE

Routine: make - Postcondition changed

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</tbody>
</table>

"Old" Postcondition

\begin{align*}
\text{item} &= v \\
\text{arity} &= n
\end{align*}

"New" Postcondition

\begin{align*}
\text{item} &= v \\
\text{arity} &= 0
\end{align*}
113 Revision "Old": 36257 vs. Revision "New": 36258

113.1 Class: POINTER_REF
Routine: memory_alloc - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Precondition

\[ a_{size} \geq 0 \]

"New" Precondition

\[ a_{size} > 0 \]

114 Revision "Old": 36314 vs. Revision "New": 36315

114.1 Class: MISMATCH_INFORMATION
Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
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</tbody>
</table>

"Old" Invariant

\[ mismatch_{information} \neq \text{Void} \implies \text{Current} = mismatch_{information} \]

"New" Invariant

\[(\text{create \{MISMATCH_CORRECTOR\}).mismatch_{information} \neq \text{Void} \implies \text{Current} = (\text{create \{MISMATCH_CORRECTOR\}).mismatch_{information}.} \]
115 Revision "Old": 36338 vs. Revision "New": 36430

115.1 Class: INTERNAL
Routine: field_type - Postcondition changed

<table>
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<tr>
<th>Tags: Added Changed Strengthened</th>
<th>A</th>
<th>R</th>
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</table>

"Old" Postcondition

"New" Postcondition

Result $\geq 0$

Routine: field_type_of_type - Postcondition changed

<table>
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<tr>
<th>Tags: Added Changed Strengthened</th>
<th>A</th>
<th>R</th>
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</table>

"Old" Postcondition

"New" Postcondition

Result $\geq 0$

Routine: new_special_any_instance - Precondition changed

<table>
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<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>
"Old" Precondition

\[
\begin{align*}
\text{count} & \geq 0 \\
\text{type_id} & > 0 \\
\text{is\_special\_any\_type} & (\text{type_id})
\end{align*}
\]

"New" Precondition

\[
\begin{align*}
\text{count} & \geq 0 \\
\text{type_id} & \geq 0 \\
\text{is\_special\_any\_type} & (\text{type_id})
\end{align*}
\]

**Routine:** field\_static\_type\_of\_type - Postcondition changed

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<tr>
<th></th>
<th>A</th>
<th>R</th>
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"Old" Postcondition

"New" Postcondition

**Result** \( \geq 0 \)

**Routine:** new\_instance\_of - Precondition changed

<table>
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<tr>
<th></th>
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</tr>
</tbody>
</table>

"Old" Precondition

\[
\begin{align*}
\text{type_id} & > 0 \\
\text{not is\_special\_type} & (\text{type_id})
\end{align*}
\]
"New" Precondition

\[
\begin{align*}
\text{type}_id & \geq 0 \\
\text{not } & \text{is\_special\_type } (\text{type}_id)
\end{align*}
\]

**Routine: dynamic_type - Postcondition changed**

Tags: Added Changed Strengthened

<table>
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<tr>
<th></th>
<th>A</th>
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</table>

"Old" Postcondition

"New" Postcondition

**Result** \( \geq 0 \)

**Routine: type_conforms_to - Precondition changed**

Tags: Changed

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<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

\[
\begin{align*}
\text{type}_1 & > 0 \\
\text{type}_2 & > 0
\end{align*}
\]

"New" Precondition

\[
\begin{align*}
\text{type}_1 & \geq 0 \\
\text{type}_2 & \geq 0
\end{align*}
\]
### Routine: `generic_dynamic_type` - Postcondition changed

**Tags:** Added, Changed, Strengthened

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</table>

"Old" Postcondition

"New" Postcondition

**Result:** \( \geq 0 \)

### Routine: `is_special_type` - Precondition changed

**Tags:** Changed

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<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

\( type_{id} > 0 \)

"New" Precondition

\( type_{id} \geq 0 \)

### Routine: `is_special_any_type` - Precondition changed

**Tags:** Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td><strong>Tool</strong></td>
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<td><strong>Manual</strong></td>
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</tr>
</tbody>
</table>

329
"Old" Precondition

\[ \text{type\_id} > 0 \]

"New" Precondition

\[ \text{type\_id} \geq 0 \]

**Routine: is\_instance\_of - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tbody>
</table>

"Old" Precondition

\[ \text{object} \neq \text{Void} \]
\[ \text{type\_id} > 0 \]

"New" Precondition

\[ \text{object} \neq \text{Void} \]
\[ \text{type\_id} \geq 0 \]

**116 Revision "Old": 36430 vs. Revision "New": 36520**

**116.1 Class: STRING**

**Routine: make\_from\_string - Postcondition changed**

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<th></th>
<th>A</th>
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</tbody>
</table>

"Old" Postcondition

\[ \text{not shared\_with (s)} \]

330
"New" Postcondition

\[
\text{Current } /= s \text{ implies not shared\_with } (s)
\]

117 Revision "Old": 36667 vs. Revision "New": 36668

117.1 Class: MANAGED\_POINTER

Routine: read\_pointer - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tr>
</tbody>
</table>

"Old" Precondition

\[
(pos + 1) \leq count
\]

"New" Precondition

\[
(pos + \text{feature}\{\text{PLATFORM}.pointer\_bytes\}) \leq count
\]

118 Revision "Old": 36668 vs. Revision "New": 36715

118.1 Class: MANAGED\_POINTER

Routine: put\_integer\_64\_be - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tbody>
</table>

"Old" Precondition

\[
(pos + 8) \leq count
\]
"New" Precondition

\[(pos + \text{integer}_64\_\text{bytes}) \leq count\]

**Routine: put\_integer\_64\_be - Postcondition changed**

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[i = \text{read}\_\text{integer}_64\_\text{be}(pos)\]

**Routine: put\_integer\_32\_be - Precondition changed**

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

\[(pos + 4) \leq count\]

"New" Precondition

\[(pos + \text{integer}_32\_\text{bytes}) \leq count\]
Routine: put_integer_32_be - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ i = \text{read_integer}_32\text{_be}\ (pos) \]

Routine: put_integer_16_be - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

\[ (pos + 2) \leq count \]

"New" Precondition

\[ (pos + \text{integer}_16\text{_bytes}) \leq count \]

Routine: put_integer_16_be - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
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<th>W</th>
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</tbody>
</table>

"Old" Postcondition

333
"New" Postcondition

\[ i = \text{read}_{\text{integer}}_{16 \text{be}} (\text{pos}) \]

Routine: \text{put}_{\text{real}} - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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<th>S</th>
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</tbody>
</table>

"Old" Precondition

\[ (\text{pos} + 4) \leq \text{count} \]

"New" Precondition

\[ (\text{pos} + \text{real}\_\text{bytes}) \leq \text{count} \]

Routine: \text{put}_{\text{real}} - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ r = \text{read}_{\text{real}} (\text{pos}) \]
Routine: put_double - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

\((pos + 8) \leq count\)

"New" Precondition

\((pos + \text{double_bytes}) \leq count\)

Routine: put_double - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\(d = \text{read_double}(pos)\)

Routine: put_integer_8 - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td>Tool</td>
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</tbody>
</table>
"Old" Precondition

\[(\text{pos} + 1) \leq \text{count}\]

"New" Precondition

\[(\text{pos} + \text{integer}_8\_bytes) \leq \text{count}\]

Routine: put\_integer\_8 - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[i = \text{read\_integer\_8} (\text{pos})\]

Routine: put\_integer\_16 - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Precondition

\[(\text{pos} + 2) \leq \text{count}\]

"New" Precondition

\[(\text{pos} + \text{integer\_16\_bytes}) \leq \text{count}\]

336
Routine: put_integer_16 - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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"Old" Postcondition

"New" Postcondition

\[i = \text{read\_integer\_16}(\text{pos})\]

Routine: put_integer_64 - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
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</tbody>
</table>

"Old" Precondition

\[(\text{pos} + 8) \leq \text{count}\]

"New" Precondition

\[(\text{pos} + \text{integer\_64\_bytes}) \leq \text{count}\]

Routine: put_integer_64 - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
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</tbody>
</table>

"Old" Postcondition
"New" Postcondition

\[ i = \text{read\_integer\_64} \ (pos) \]

**Routine: read_pointer - Precondition changed**

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</table>

"Old" Precondition

\[ (pos + \text{feature} \ {\{PLATFORM\}.pointer\_bytes}) \leq count \]

"New" Precondition

\[ (pos + pointer\_bytes) \leq count \]

**Routine: put_array - Precondition changed**

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

\[ (pos + data.count) \leq count \]

"New" Precondition

\[ data \neq \text{Void} \]
\[ (pos + data.count) \leq count \]

338
Routine: put_array - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
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</thead>
<tbody>
<tr>
<td>x</td>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[
data.is\_equal\ (read\_array\ (pos,\ data\_count))\]

Routine: put_integer_32 - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
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</thead>
<tbody>
<tr>
<td>x</td>
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</tbody>
</table>

"Old" Precondition

\[(pos + 4) \leq count\]

"New" Precondition

\[(pos + integer\_32\_bytes) \leq count\]

Routine: put_integer_32 - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
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</thead>
<tbody>
<tr>
<td>x</td>
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</tbody>
</table>

"Old" Postcondition

339
"New" Postcondition

\[ i = \text{read\_integer\_32}(\text{pos}) \]

**Routine: read\_integer\_8 - Precondition changed**

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tbody>
</table>

"Old" Precondition

\[(\text{pos} + 1) \leq \text{count}\]

"New" Precondition

\[(\text{pos} + \text{integer\_8\_bytes}) \leq \text{count}\]

**119 Revision "Old": 37024 vs. Revision "New": 37025**

**119.1 Class: FIXED\_TREE**

**Routine: put\_child - Precondition changed**

Tags: Added Changed Strengthened

<table>
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<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

"New" Precondition

\[\text{arity} < \text{capacity}\]
120 Revision "Old": 37426 vs. Revision "New": 37444

120.1 Class: ROUTINE
Routine: set_operands - Postcondition changed
Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
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<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

equal (operands, args)

"New" Postcondition

121 Revision "Old": 37485 vs. Revision "New": 37491

121.1 Class: ROUTINE
Routine: set_operands - Postcondition changed
Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

equal (operands, args)

"New" Postcondition

(operands /= Void implies equal (operands, args)) or (operands = Void implies (args = Void or else args.is_empty))
122 Revision "Old": 37492 vs. Revision "New": 37509

122.1 Class: TUPLE

Routine: put - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

valid_index (index)

"New" Precondition

valid_index (index)
valid_type_for_index (v, index)

123 Revision "Old": 37509 vs. Revision "New": 37514

123.1 Class: ARRAYED_LIST

Routine: make_from_array - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

before
count = a.count

"New" Postcondition
Routine: make - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

before

"New" Postcondition

before
is_empty

124 Revision "Old": 38294 vs. Revision "New": 38400

124.1 Class: GC_INFO

Routine: make - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

memory = incremental_collector or memory = full_collector

Routine: make - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

"New" Postcondition

\( type = memory \)

124.2 Class: MEM_INFO

Routine: make - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

\( memory = total\_memory \text{ or } memory = eiffel\_memory \text{ or } memory = c\_memory \)

125 Revision "Old": 38562 vs. Revision "New": 38577

125.1 Class: PATH_NAME

Routine: make_from_string - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

\( p \neq \text{ Void} \)

344
126 Revision "Old": 38819 vs. Revision "New": 38920

126.1 Class: EXECUTION_ENVIRONMENT

Routine: put - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{key} \neq \text{Void} \\
\text{key.count} > 0 \\
\text{value} \neq \text{Void}
\]

"New" Precondition

\[
\text{key} \neq \text{Void} \\
\not\text{key.is_empty} \\
\not\text{key.has ("%U"}) \\
\text{value} \neq \text{Void} \\
\not\text{value.has ("%U")}
\]

Routine: get - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{s} \neq \text{Void}
\]

"New" Precondition

\[
\text{s} \neq \text{Void} \\
\not\text{s.has ("%U")}
\]
127 Revision ”Old”: 38933 vs. Revision ”New”: 38960

127.1 Class: MANAGED_Pointer

Routine: put_integer_64_be - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_Ne</th>
<th>W_Ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

\[(pos + integer_64_bytes) \leq count\]

"New" Precondition

\[pos \geq 0\]

\[(pos + integer_64_bytes) \leq count\]

Routine: put_integer_16_be - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_Ne</th>
<th>W_Ne</th>
</tr>
</thead>
<tbody>
<tr>
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<td>x</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[(pos + integer_16_bytes) \leq count\]

"New" Precondition

\[pos \geq 0\]

\[(pos + integer_16_bytes) \leq count\]

346
Routine: put_integer_8 - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
<tr>
<td>R</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
</tr>
<tr>
<td>W_ne</td>
<td>x</td>
</tr>
<tr>
<td>S_ne</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
(pos + \text{integer}_8\_\text{bytes}) \leq count
\]

"New" Precondition

\[
pos \geq 0 \\
(pos + \text{integer}_8\_\text{bytes}) \leq count
\]

Routine: read_integer_16_be - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
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<tr>
<td>R</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
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<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
</tr>
<tr>
<td>W_ne</td>
<td>x</td>
</tr>
<tr>
<td>S_ne</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
(pos + \text{integer}_16\_\text{bytes}) \leq count
\]

"New" Precondition

\[
pos \geq 0 \\
(pos + \text{integer}_16\_\text{bytes}) \leq count
\]

Routine: read_integer_32_be - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
<tr>
<td>R</td>
<td></td>
</tr>
<tr>
<td>C</td>
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<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
</tr>
<tr>
<td>W_ne</td>
<td>x</td>
</tr>
<tr>
<td>S_ne</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
(pos + \text{integer}_32\_\text{bytes}) \leq count
\]

"New" Precondition

\[
pos \geq 0 \\
(pos + \text{integer}_32\_\text{bytes}) \leq count
\]
"Old" Precondition

\[(\text{pos} + \text{integer\_32\_bytes}) \leq \text{count}\]

"New" Precondition

\[
\begin{align*}
\text{pos} & \geq 0 \\
(\text{pos} + \text{integer\_32\_bytes}) & \leq \text{count}
\end{align*}
\]

Routine: put\_integer\_32 - Precondition changed

Tags: Changed Strengthened NStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[(\text{pos} + \text{integer\_32\_bytes}) \leq \text{count}\]

"New" Precondition

\[
\begin{align*}
\text{pos} & \geq 0 \\
(\text{pos} + \text{integer\_32\_bytes}) & \leq \text{count}
\end{align*}
\]

Routine: put\_array - Precondition changed

Tags: Changed Strengthened NStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\begin{align*}
data & \neq \text{Void} \\
(\text{pos} + \text{data.count}) & \leq \text{count}
\end{align*}
\]
"New" Precondition

\[
data /\neq \text{Void} \\
pos \geq 0 \\
(pos + data.count) \leq count
\]

Routine: read_integer_64 - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[(pos + \text{integer}_64\_bytes) \leq count\]

"New" Precondition

\[
pos \geq 0 \\
(pos + \text{integer}_64\_bytes) \leq count
\]

Routine: read_integer_8 - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[(pos + \text{integer}_8\_bytes) \leq count\]

"New" Precondition

\[
pos \geq 0 \\
(pos + \text{integer}_8\_bytes) \leq count
\]
**Routine: read_character - Precondition changed**

```
<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
```

"Old" Precondition

\[(pos + \text{character\_bytes}) \leq count\]

"New" Precondition

\[pos \geq 0\]

\[(pos + \text{character\_bytes}) \leq count\]

**Routine: put_pointer - Precondition changed**

```
<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
```

"Old" Precondition

\[(pos + \text{pointer\_bytes}) \leq count\]

"New" Precondition

\[pos \geq 0\]

\[(pos + \text{pointer\_bytes}) \leq count\]

**Routine: put_integer_32_be - Precondition changed**

```
<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td></td>
<td>x</td>
</tr>
</tbody>
</table>
```

"Old" Precondition

\[(pos + \text{integer\_bytes}) \leq count\]

"New" Precondition

\[pos \geq 0\]

\[(pos + \text{integer\_bytes}) \leq count\]
### "Old" Precondition

\[(\text{pos} + \text{integer\_32\_bytes}) \leq \text{count}\]

### "New" Precondition

\[
\begin{align*}
\text{pos} & \geq 0 \\
(\text{pos} + \text{integer\_32\_bytes}) & \leq \text{count}
\end{align*}
\]

**Routine: put\_integer\_8\_be - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### "Old" Precondition

\[(\text{pos} + \text{integer\_8\_bytes}) \leq \text{count}\]

### "New" Precondition

\[
\begin{align*}
\text{pos} & \geq 0 \\
(\text{pos} + \text{integer\_8\_bytes}) & \leq \text{count}
\end{align*}
\]

**Routine: read\_array - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### "Old" Precondition

\[
\begin{align*}
\text{a\_count} & > 0 \\
(\text{pos} + \text{a\_count}) & \leq \text{count}
\end{align*}
\]
"New" Precondition

\[
\begin{align*}
    \text{pos} & \geq 0 \\
    \text{a\_count} & > 0 \\
    (\text{pos} + \text{a\_count}) & \leq \text{count}
\end{align*}
\]

Routine: \text{put\_real} - Precondition changed

Tags: Changed Strengthened NEStronger

\[
\begin{array}{cccccc}
\text{Tool} & A & \text{R} & \text{C} & \text{S} & \text{W} & \text{S\_ne} & \text{W\_ne} \\
& \text{x} & \text{x} & \text{x} & & & & \\
\text{Manual} & & & & & & & \\
\end{array}
\]

"Old" Precondition

\[
(pos + \text{real\_bytes}) \leq \text{count}
\]

"New" Precondition

\[
\begin{align*}
    \text{pos} & \geq 0 \\
    (\text{pos} + \text{real\_bytes}) & \leq \text{count}
\end{align*}
\]

Routine: \text{put\_double} - Precondition changed

Tags: Changed Strengthened NEStronger

\[
\begin{array}{cccccc}
\text{Tool} & A & \text{R} & \text{C} & \text{S} & \text{W} & \text{S\_ne} & \text{W\_ne} \\
& \text{x} & \text{x} & \text{x} & & & & \\
\text{Manual} & & & & & & & \\
\end{array}
\]

"Old" Precondition

\[
(pos + \text{double\_bytes}) \leq \text{count}
\]

"New" Precondition

\[
\begin{align*}
    \text{pos} & \geq 0 \\
    (\text{pos} + \text{double\_bytes}) & \leq \text{count}
\end{align*}
\]

352
Routine: `put_character` - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>R</td>
</tr>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Precondition

\[(pos + \text{character_bytes}) \leq count\]

"New" Precondition

\[pos \geq 0\]
\[(pos + \text{character_bytes}) \leq count\]

Routine: `put_integer_16` - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>R</td>
</tr>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Precondition

\[(pos + \text{integer}_16\_bytes) \leq count\]

"New" Precondition

\[pos \geq 0\]
\[(pos + \text{integer}_16\_bytes) \leq count\]

Routine: `put_integer_64` - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>R</td>
</tr>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

353
"Old" Precondition

\[(pos + integer\_64\_bytes) \leq count\]

"New" Precondition

\[pos \geq 0\]

\[(pos + integer\_64\_bytes) \leq count\]

**Routine: read_real - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[(pos + real\_bytes) \leq count\]

"New" Precondition

\[pos \geq 0\]

\[(pos + real\_bytes) \leq count\]

**Routine: read_integer\_32 - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[(pos + integer\_32\_bytes) \leq count\]

"New" Precondition

\[pos \geq 0\]

\[(pos + integer\_32\_bytes) \leq count\]

354
Routine: read_integer_16 - Precondition changed

"Old" Precondition

\[(pos + \text{integer}_16\_bytes) <= \text{count}\]

"New" Precondition

\[pos >= 0\]
\[(pos + \text{integer}_16\_bytes) <= \text{count}\]

Routine: read_integer_8_be - Precondition changed

"Old" Precondition

\[(pos + \text{integer}_8\_bytes) <= \text{count}\]

"New" Precondition

\[pos >= 0\]
\[(pos + \text{integer}_8\_bytes) <= \text{count}\]

Routine: read_integer_64_be - Precondition changed

"Old" Precondition

"New" Precondition

\[pos >= 0\]
\[(pos + \text{integer}_64\_bytes) <= \text{count}\]
"Old" Precondition

\[(\text{pos + integer}_64\_\text{bytes}) \leq \text{count}\]

"New" Precondition

\[\text{pos} \geq 0\]
\[(\text{pos + integer}_64\_\text{bytes}) \leq \text{count}\]

**Routine: read_double - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[(\text{pos + double}_\text{bytes}) \leq \text{count}\]

"New" Precondition

\[\text{pos} \geq 0\]
\[(\text{pos + double}_\text{bytes}) \leq \text{count}\]

**Routine: put_boolean - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[(\text{pos + boolean}_\text{bytes}) \leq \text{count}\]

"New" Precondition

\[\text{pos} \geq 0\]
\[(\text{pos + boolean}_\text{bytes}) \leq \text{count}\]
Routine: `read_boolean` - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
<tr>
<td>R</td>
<td>x</td>
</tr>
<tr>
<td>C</td>
<td>x</td>
</tr>
<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
</tr>
<tr>
<td>S_{ne}</td>
<td>x</td>
</tr>
<tr>
<td>W_{ne}</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[(\text{pos} + \text{boolean}_{\text{bytes}}) \leq \text{count}\]

"New" Precondition

\[\text{pos} \geq 0\]

\[(\text{pos} + \text{boolean}_{\text{bytes}}) \leq \text{count}\]

Routine: `read_pointer` - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
<tr>
<td>R</td>
<td>x</td>
</tr>
<tr>
<td>C</td>
<td>x</td>
</tr>
<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
</tr>
<tr>
<td>S_{ne}</td>
<td>x</td>
</tr>
<tr>
<td>W_{ne}</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[(\text{pos} + \text{pointer}_{\text{bytes}}) \leq \text{count}\]

"New" Precondition

\[\text{pos} \geq 0\]

\[(\text{pos} + \text{pointer}_{\text{bytes}}) \leq \text{count}\]
128 Revision "Old": 39222 vs. Revision "New": 39274

128.1 Class: STREAM
Routine: retrieved - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

True

129 Revision "Old": 39274 vs. Revision "New": 39446

129.1 Class: STRING
Routine: last_index_of - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result > 0 implies item(Result) = c

"New" Postcondition

Result >= 0
Result > 0 implies item(Result) = c
Routine: index_of - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result > 0 implies item(Result) = c

"New" Postcondition

Result >= 0
Result > 0 implies item(Result) = c

130 Revision "Old": 40332 vs. Revision "New": 40357

130.1 Class: C_STRING

Routine: set_count - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

a_count > 0

"New" Precondition

a_count >= 0
131 Revision "Old": 40652 vs. Revision "New": 40657

131.1 Class: FILE

Routine: make_create_read_write - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

exists
is_open_read
is_open_write

"New" Postcondition

name = fn
exists
is_open_read
is_open_write

Routine: make_open_append - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

exists
is_open_append

"New" Postcondition

name = fn
exists
is_open_append

360
Routine: make_open_read_append - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

exists
is_open_read
is_open_append

"New" Postcondition

name = fn
exists
is_open_read
is_open_append

Routine: make_open_read - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

exists
is_open_read

"New" Postcondition

name = fn
exists
is_open_read

361
Routine: make_open_write - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>Sne</th>
<th>Wne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
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</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

exists
is_open_write

"New" Postcondition

name = fn
exists
is_open_write

Routine: make_open_read_write - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>Sne</th>
<th>Wne</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

exists
is_open_read
is_open_write

"New" Postcondition

name = fn
exists
is_open_read
is_open_write
Routine: make - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{name}.\text{is\_equal (fn) is\_closed}
\]

"New" Postcondition

\[
\text{name} = \text{fn is\_closed}
\]

132 Revision "Old": 40714 vs. Revision "New": 40715

132.1 Class: STRING

Routine: insert_string - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{is\_equal (old substring (1, i - 1) + old clone (s) + old substring (i, count))}
\]

"New" Postcondition

\[
\text{is\_equal (old substring (1, i - 1) + old (s.twin) + old substring (i, count))}
\]
Routine: insert - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
</table>

"Old" Postcondition

\[ \text{is\_equal (old substring (1, i - 1) + old clone (s) + old substring (i, count))} \]

"New" Postcondition

\[ \text{is\_equal (old substring (1, i - 1) + old (s.twin) + old substring (i, count))} \]

133 Revision "Old": 40715 vs. Revision "New": 40717

133.1 Class: HASH_TABLE

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
</table>

"Old" Invariant

\[
\begin{align*}
\text{keys} & \neq \text{Void} \\
\text{content} & \neq \text{Void} \\
\text{keys.count} & = \text{capacity} + 1 \\
\text{content.count} & = \text{capacity} + 1 \\
\text{deleted_marks.count} & = \text{capacity} \\
\text{off or truly\_occupied (iteration\_position)} \\
\text{control} & \geq 0 \\
\text{special\_status} & = (\text{conflict or inserted or replaced or removed or found or not\_found}) \\
\text{(max\_occupation} & > 0) \quad \text{and} \quad \text{(max\_occupation} < 100) \\
\text{(initial\_occupation} & > 0) \quad \text{and} \quad \text{(initial\_occupation} < 100) \\
\text{initial\_occupation} & < \text{max\_occupation} \\
0 & \leq \text{count} \\
\text{count} & \leq \text{capacity}
\end{align*}
\]
\[ \text{count} \times 100 \leq \text{capacity} \times \text{max\_occupation} \]
\[ \text{count} \leq \text{used\_slot\_count} \]
\[ 0 \leq \text{count} \]
\[ \text{used\_slot\_count} \leq \text{capacity} \]
\[ \text{extra\_space} \geq 0 \]

"New" Invariant

\[ \text{keys} \neq \text{Void} \]
\[ \text{content} \neq \text{Void} \]
\[ \text{deleted\_marks} \neq \text{Void} \]
\[ \text{keys}.\text{count} = \text{capacity} + 1 \]
\[ \text{content}.\text{count} = \text{capacity} + 1 \]
\[ \text{deleted\_marks}.\text{count} = \text{capacity} \]
\[ \text{off or truly\_occupied} (\text{iteration\_position}) \]
\[ \text{control} \geq 0 \]
\[ \text{special\_status} = (\text{conflict or inserted or replaced or removed or found or not\_found}) \]
\[ (\text{max\_occupation} > 0) \text{ and } (\text{max\_occupation} < 100) \]
\[ (\text{initial\_occupation} > 0) \text{ and } (\text{initial\_occupation} < 100) \]
\[ \text{initial\_occupation} < \text{max\_occupation} \]
\[ 0 \leq \text{count} \]
\[ \text{count} \leq \text{capacity} \]
\[ \text{count} \times 100 \leq \text{capacity} \times \text{max\_occupation} \]
\[ \text{count} \leq \text{used\_slot\_count} \]
\[ 0 \leq \text{count} \]
\[ \text{used\_slot\_count} \leq \text{capacity} \]
\[ \text{extra\_space} \geq 0 \]

134 Revision "Old": 40778 vs. Revision "New": 40790

134.1 Class: HASH_TABLE

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
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<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant
\[
\begin{align*}
\text{keys} & \neq \text{Void} \\
\text{content} & \neq \text{Void} \\
\text{deleted\_marks} & \neq \text{Void} \\
\text{keys}.\text{count} & = \text{capacity} + 1 \\
\text{content}.\text{count} & = \text{capacity} + 1 \\
\text{deleted\_marks}.\text{count} & = \text{capacity} \\
\text{off}\text{ or}\text{ truly\_occupied}\text{ (iteration\_position)} \\
\text{control} & > = 0 \\
\text{special\_status} & = (\text{conflict}\text{ or}\text{ inserted}\text{ or}\text{ replaced}\text{ or}\text{ removed}\text{ or}\text{ found}\text{ or}\text{ not\_found}) \\
(\text{max\_occupation} > 0)\text{ and } (\text{max\_occupation} < 100) \\
(\text{initial\_occupation} > 0)\text{ and } (\text{initial\_occupation} < 100) \\
\text{initial\_occupation} & < \text{max\_occupation} \\
0 & <= \text{count} \\
\text{count} & <= \text{capacity} \\
\text{count} * 100 & <= \text{capacity} * \text{max\_occupation} \\
\text{count} & <= \text{used\_slot\_count} \\
0 & <= \text{count} \\
\text{used\_slot\_count} & <= \text{capacity} \\
\text{extra\_space} & >= 0
\end{align*}
\]

"New" Invariant

\[
\begin{align*}
\text{keys} & \neq \text{Void} \\
\text{content} & \neq \text{Void} \\
\text{deleted\_marks} & \neq \text{Void} \\
\text{keys}.\text{count} & = \text{capacity} + 1 \\
\text{content}.\text{count} & = \text{capacity} + 1 \\
\text{deleted\_marks}.\text{count} & = \text{capacity} + 1 \\
\text{off}\text{ or}\text{ truly\_occupied}\text{ (iteration\_position)} \\
\text{control} & > = 0 \\
\text{special\_status} & = (\text{conflict}\text{ or}\text{ inserted}\text{ or}\text{ replaced}\text{ or}\text{ removed}\text{ or}\text{ found}\text{ or}\text{ not\_found}) \\
(\text{max\_occupation} > 0)\text{ and } (\text{max\_occupation} < 100) \\
(\text{initial\_occupation} > 0)\text{ and } (\text{initial\_occupation} < 100) \\
\text{initial\_occupation} & < \text{max\_occupation} \\
0 & <= \text{count} \\
\text{count} & <= \text{capacity} \\
\text{count} * 100 & <= \text{capacity} * \text{max\_occupation} \\
\text{count} & <= \text{used\_slot\_count} \\
0 & <= \text{count} \\
\text{used\_slot\_count} & <= \text{capacity} \\
\text{extra\_space} & >= 0
\end{align*}
\]
### 135 Revision "Old": 40859 vs. Revision "New": 40868

#### 135.1 Class: ARGUMENTS

Routine: argument_array - Postcondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>Added</th>
<th>Changed</th>
<th>Strengthened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /= Void

### 136 Revision "Old": 40910 vs. Revision "New": 40964

#### 136.1 Class: MANAGED_POINTER

Routine: resize - Precondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>Added</th>
<th>Changed</th>
<th>Strengthened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

not is_shared
Routine: copy - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[(\text{old \ is\_shared and not \ is\_shared}) \implies (\text{other.count} > \text{old.count})\]

Routine: append - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
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<tr>
<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Precondition

other \neq \text{Void}

"New" Precondition

not \text{is\_shared}

other \neq \text{Void}

137 Revision "Old": 41358 vs. Revision "New": 41378

137.1 Class: C\_STRING

Routine: string - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Manual</td>
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</tr>
</tbody>
</table>
138 Revision "Old": 43347 vs. Revision "New": 43391

138.1 Class: INTERNAL

Routine: class_name_of_type - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
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</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

`type_id >= 0`

Routine: field_type_of_type - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
<th>W</th>
<th>S_ne</th>
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<td>x</td>
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</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

`i >= 1`

`i <= field_count_of_type (type_id)`
"New" Precondition

\[ type\_id \geq 0 \]
\[ i \geq 1 \]
\[ i \leq field\_count\_of\_type\ (type\_id) \]

Routine: field_count_of_type - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
<td>x</td>
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</tbody>
</table>

"Old" Precondition

"New" Precondition

\[ type\_id \geq 0 \]

Routine: type_name_of_type - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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</thead>
<tbody>
<tr>
<td>x</td>
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</tbody>
</table>

"Old" Precondition

"New" Precondition

\[ type\_id \geq 0 \]

370
Routine: field\_static\_type\_of\_type - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
<th>W</th>
<th>S\textsubscript{ne}</th>
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<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
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</tbody>
</table>

"Old" Precondition

\[ i \geq 1 \]
\[ i \leq \text{field\_count\_of\_type}(\text{type\_id}) \]

"New" Precondition

\[ \text{type\_id} \geq 0 \]
\[ i \geq 1 \]
\[ i \leq \text{field\_count\_of\_type}(\text{type\_id}) \]

Routine: generic\_dynamic\_type\_of\_type - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<th>W\textsubscript{ne}</th>
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<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
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<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

\[ \text{type\_id} \geq 0 \]
\[ \text{generic\_count\_of\_type}(\text{type\_id}) > 0 \]
\[ i > 0 \text{ and } i \leq \text{generic\_count\_of\_type}(\text{type\_id}) \]

Routine: generic\_dynamic\_type - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<th>C</th>
<th>S</th>
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<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
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</tr>
</tbody>
</table>

371
"Old" Precondition

object /= Void

\[ \text{generic\_count (object)} > 0 \]

\[ i > 0 \text{ and } i \leq \text{generic\_count (object)} \]

"New" Precondition

Routine: \textit{field\_name\_of\_type} - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
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<tr>
<td>Tool</td>
<td></td>
<td>x</td>
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<tr>
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</tr>
</tbody>
</table>

"Old" Precondition

\[ i \geq 1 \]

\[ i \leq \text{field\_count\_of\_type (type\_id)} \]

"New" Precondition

\[ \text{type\_id} \geq 0 \]

\[ i \geq 1 \]

\[ i \leq \text{field\_count\_of\_type (type\_id)} \]

139 Revision "Old": 43391 vs. Revision "New": 43810

139.1 Class: SPECIAL

Routine: \textit{same\_items} - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
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<td>Manual</td>
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</tr>
</tbody>
</table>

372
"Old" Precondition

upper \geq -1
upper < count
other \neq Void
upper < other.count

"New" Precondition

upper_bound \geq -1
upper_bound < count
other \neq Void
upper_bound < other.count

Routine: same_items - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
<td></td>
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<td></td>
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<tr>
<td>Manual</td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

upper = -1 \implies \text{Result}

"New" Postcondition

upper_bound = -1 \implies \text{Result}

Routine: all_default - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tbody>
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<td>Tool</td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

upper \geq -1
upper < count

"New" Precondition

upper_bound >= −1
upper_bound < count

Routine: all_default - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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<tbody>
<tr>
<td>Tool</td>
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<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

upper = −1 implies Result

"New" Postcondition

upper_bound = −1 implies Result

140 Revision "Old": 45543 vs. Revision "New": 45547

140.1 Class: BINARY_TREE

Routine: arity - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Postcondition

Result <= 2
"New" Postcondition

\[ \text{Result} \leq \text{child\_capacity} \]

Routine: make - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</tbody>
</table>

"Old" Postcondition

- \( \text{is\_root} \)
- \( \text{is\_leaf} \)

"New" Postcondition

- \( \text{item} = v \)
- \( \text{is\_root} \)
- \( \text{is\_leaf} \)

140.2 Class: STRING

Routine: substring\_index\_in\_bounds - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

\[ \text{Result} > 0 \implies \text{substring (Result, Result + other.count - 1).is\_equal (other)} \]

"New" Postcondition

\[ \text{Result} > 0 \implies \text{other.is\_equal (substring (Result, Result + other.count - 1))} \]
141 Revision "Old": 47243 vs. Revision "New": 47441

141.1 Class: INTERNAL
Routine: set_reference_field - Precondition changed

Tags: Changed, Strengthened, NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</tr>
</tbody>
</table>

"Old" Precondition

\[
object \neq Void \\
i \geq 1 \\
i \leq field\_count (object) \\
field\_type (i, object) = reference\_type
\]

"New" Precondition

\[
object \neq Void \\
i \geq 1 \\
i \leq field\_count (object) \\
field\_type (i, object) = reference\_type \\
type\_conforms\_to (dynamic\_type (value), field\_static\_type\_of\_type (i, dynamic\_type (object)))
\]

142 Revision "Old": 47504 vs. Revision "New": 47510

142.1 Class: INTERNAL
Routine: set_reference_field - Precondition changed

Tags: Changed

<table>
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<tr>
<th></th>
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</tr>
</tbody>
</table>

"Old" Precondition

\[
object \neq Void
\]
i >= 1
i <= field_count (object)
field_type (i, object) = reference_type
type_conforms_to (dynamic_type (value), field_static_type_of_type (i, dynamic_type (object)))

"New" Precondition

object /= Void
i >= 1
i <= field_count (object)
field_type (i, object) = reference_type
value /= Void implies type_conforms_to (dynamic_type (value),
field_static_type_of_type (i, dynamic_type (object)))

143 Revision "Old": 47880 vs. Revision "New": 48074

143.1 Class: NATURAL_16_REF
Routine: bit_shift - Postcondition changed
Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td></td>
<td></td>
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<tr>
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</tr>
</tbody>
</table>

"Old" Postcondition

Result /= Void

"New" Postcondition

143.2 Class: INTEGER_16_REF
Routine: bit_shift - Postcondition changed
Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tr>
</tbody>
</table>

377
"Old" Postcondition

Result /≠ Void

"New" Postcondition

143.3 Class: INTEGER_REF

Routine: bit_shift - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

Result /≠ Void

"New" Postcondition

143.4 Class: NATURAL_64_REF

Routine: bit_shift - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
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</table>

"Old" Postcondition

Result /≠ Void

378
143.5 Class: NATURAL_8_REF
Routine: bit_shift - Postcondition changed

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<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</table>

"Old" Postcondition

Result \ /= Void

"New" Postcondition

143.6 Class: INTEGER_64_REF
Routine: bit_shift - Postcondition changed

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<th>A</th>
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</tbody>
</table>

"Old" Postcondition

Result \ /= Void

"New" Postcondition
143.7 Class: INTEGER_8_REF
Routine: bit_shift - Postcondition changed

<table>
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<tr>
<th>Tool</th>
<th>A</th>
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"Old" Postcondition

Result \neq Void

"New" Postcondition

143.8 Class: NATURAL_32_REF
Routine: bit_shift - Postcondition changed

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<th>A</th>
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</tbody>
</table>

"Old" Postcondition

Result \neq Void

"New" Postcondition

380
144 Revision "Old": 48074 vs. Revision "New": 48081

144.1 Class: MEMORY_STREAM
Routine: area - Postcondition changed

<table>
<thead>
<tr>
<th>Tag: Changed</th>
<th>A</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

**Result** /= Void

"New" Postcondition

**Result** /= default_pointer

145 Revision "Old": 48133 vs. Revision "New": 48137

145.1 Class: STRING
Routine: prepend - Postcondition changed

<table>
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</tr>
</tbody>
</table>

"Old" Postcondition

$count = \text{old count} + s.count$

"New" Postcondition

$count = \text{old} (\text{count} + s.count)$
146 Revision "Old": 48319 vs. Revision "New": 48433

146.1 Class: STRING

Routine: append_character - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{item (count)} = c \]
\[ \text{count} = \text{old \ count} + 1 \]

"New" Postcondition

\[ \text{item (count)} = c \]
\[ \text{count} = \text{old \ count} + 1 \]
\[ \text{elks\_checking implies substring (1, count \ - \ 1).is\_equal (old \ twin)} \]

Routine: to_boolean - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
<td>Manual</td>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ (\text{Result} = \text{same\_string (true\_constant)}) \text{ or (not Result} = \text{same\_string (false\_constant )}) \]
**Routine: substring - Postcondition changed**

Tags: Changed, Strengthened, NEStronger

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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<tbody>
<tr>
<td>Manual</td>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{Result}.\text{count} = \text{end\_index} - \text{start\_index} + 1 \text{ or } \text{Result}.\text{count} = 0
\]

"New" Postcondition

\[
\begin{align*}
\text{Result} /\neq \text{Void} \\
\text{Result}.\text{count} = \text{end\_index} - \text{start\_index} + 1 \text{ or } \text{Result}.\text{count} = 0 \\
\text{Result}.\text{count} > 0 \implies \text{Result}.\text{item} (1) = \text{item} (\text{start\_index}) \\
\text{Result}.\text{count} > 0 \implies \text{Result}.\text{substring} (2, \text{Result}.\text{count}).\text{is\_equal} (\text{substring} (\text{start\_index} + 1, \text{end\_index}))
\end{align*}
\]

**Routine: remove\_head - Postcondition changed**

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
is\_equal (\text{old} \text{ substring} (n.\min (\text{count}) + 1, \text{count}))
\]

"New" Postcondition

\[
elks\_checking \implies is\_equal (\text{old} \text{ substring} (n.\min (\text{count}) + 1, \text{count}))
\]

**Routine: tail - Postcondition changed**

Tags: Changed, Strengthened, NEStronger

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

383
"Old" Postcondition

\[\text{count} = n.\text{min}(\text{old count})\]

"New" Postcondition

\[\text{count} = n.\text{min}(\text{old count})\]
\[\text{elks\_checking implies is\_equal(\text{old substring(count - n.min(count) + 1, count})})\]

Routine: is\_boolean - Postcondition changed

<table>
<thead>
<tr>
<th>Tag: Added Changed Strengthened</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result = (as\_lower\_has\_substring(true\_constant) or as\_lower\_has\_substring(
false\_constant))

Routine: right\_adjust - Postcondition changed

<table>
<thead>
<tr>
<th>Tag: Changed Strengthened NEStronger</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Postcondition

(count /= 0) implies ((item (count) /= '.') and (item (count) /= '%T') and (item (count) /= '%R') and (item (count) /= '%N'))
"New" Postcondition
\[ \text{count} \leq \text{old count} \]
\[(\text{count} \neq 0) \implies ((\text{item (count)} \neq ') \text{ and } (\text{item (count)} \neq '%T') \text{ and } (\text{item (count)} \neq '%R') \text{ and } (\text{item (count)} \neq '%N'))\]
\[\text{elks\_checking \implies is\_equal ((old twin).substring (1, count))}\]

Routine: insert_string - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Postcondition
\[\text{is\_equal (old substring (1, i - 1)} + \text{old (s.twin}) + \text{old substring (i, count))}\]

"New" Postcondition
\[\text{elks\_checking \implies (is\_equal (old substring (1, i - 1} + \text{old (s.twin}) + \text{old substring (i, count))})\]

Routine: put - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition
\[\text{count} = \text{old count} \]
\[\text{elks\_checking \implies substring (1, i - 1).is\_equal (old substring (1, i - 1))}\]
\[\text{elks\_checking \implies substring (i + 1, count).is\_equal (old substring (i + 1, count))}\]

385
Routine: remove - Postcondition changed

Tags: Changed, Strengthened, NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Postcondition

\[ \text{count} = \text{old} \ \text{count} - 1 \]

"New" Postcondition

\[ \text{count} = \text{old} \ \text{count} - 1 \]

\[ \text{elks\_checking implies is\_equal} \ (\text{old substring} \ (1, i - 1) + \text{old substring} \ (i + 1, \ \text{count})) \]

Routine: to_upper - Postcondition changed

Tags: Added, Changed, Strengthened

<table>
<thead>
<tr>
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<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{elks\_checking implies is\_equal} \ (\text{old as\_upper}) \]

Routine: has_substring - Postcondition changed

Tags: Added, Changed, Strengthened

<table>
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<tr>
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</tbody>
</table>

386
"Old" Postcondition

"New" Postcondition

\[
\begin{align*}
\text{count} < \text{other.count} & \implies \text{not Result} \\
(\text{count} \geq \text{other.count} \text{ and then } \text{other.same_string (substring (1, other.count})) & \implies \text{Result} \\
(\text{count} \geq \text{other.count} \text{ and then not other.same_string (substring (1, other.count))) & \implies (\text{Result} = \text{substring (2, count).has_substring (other)})
\end{align*}
\]

Routine: remove_tail - Postcondition changed

<table>
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<tr>
<th>Tag: Changed</th>
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<th>R</th>
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</tbody>
</table>

"Old" Postcondition

\[\text{is_equal (old substring (1, count – n.min (count)))}\]

"New" Postcondition

\[\text{elks.checking implies is_equal (old substring (1, count – n.min (count)))}\]

Routine: replace_character - Postcondition changed

<table>
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</tbody>
</table>

"Old" Postcondition

\[(\text{count} = \text{old count}) \text{ and } (\text{capacity} \geq \text{old capacity}) \text{ occurrences (c) = count}\]
"New" Postcondition

(count = old count) and (capacity >= old capacity)
elks_checking implies occurrences (c) = count

Routine: insert_character - Postcondition changed

"Old" Postcondition

count = old count + 1

"New" Postcondition

count = old count + 1
item (i) = c
elks_checking implies substring (1, i - 1).is_equal (old substring (1, i - 1))
elks_checking implies substring (i + 1, count).is_equal (old substring (i, count))

Routine: keep_head - Postcondition changed

"Old" Postcondition

count = n.min (old count)

"New" Postcondition

count = n.min (old count)
elks_checking implies is_equal (old substring (1, n.min (count)))
Routine: **fill_with** - Postcondition changed

<table>
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<tr>
<th>Tool</th>
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</table>

"Old" Postcondition

\[(\text{count} = \text{old count}) \text{ and } (\text{capacity} \geq \text{old capacity})\]
\noccurrences \((c) = \text{count}\)

"New" Postcondition

\[(\text{count} = \text{old count}) \text{ and } (\text{capacity} \geq \text{old capacity})\]
\nelks\_checking implies occurrences \((c) = \text{count}\)

Routine: **insert** - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[\text{is\_equal (old substring (1, i - 1)) + old (s.twin)} + \text{old substring (i, count)}\]

"New" Postcondition

\nelks\_checking implies \(\text{is\_equal (old substring (1, i - 1)) + old (s.twin)} + \text{old substring (i, count))}\)

Routine: **make\_filled** - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

\[ \text{count} = n \]
\[ \text{occurrences}\ (c) = \text{count} \]

"New" Postcondition

\[ \text{count} = n \]
\[ \text{capacity} \geq n \]
\[ \text{occurrences}\ (c) = \text{count} \]

Routine: has - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{count} = 0 \implies \neg \text{Result} \]
\[ \text{count} > 0 \text{ and then item}\ (1) = c \implies \text{Result} \]
\[ (\text{count} > 0 \text{ and then item}\ (1) \neq c) \implies (\text{Result} = \text{substring}\ (2, \text{count}).\text{has}\ (c)) \]

Routine: append_string - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ s \neq \text{Void} \implies (\text{els}_\text{checking} \implies \text{is_equal}\ (\text{old}\ \text{twin} + \text{old}\ s.twin)) \]
Routine: occurrences - Postcondition changed

Tag: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td>x</td>
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<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[
\begin{align*}
\text{count} = 0 & \implies \text{Result} = 0 \\
(\text{count} > 0 \text{ and then item (1) }&\neq c) \implies \text{Result} = \text{substring (2, count)}. \\
\text{occurrences (c)} & \\
(\text{count} > 0 \text{ and then item (1) }&= c) \implies \text{Result} = 1 + \text{substring (2, count)}. \\
\text{occurrences (c)} &
\end{align*}
\]

Routine: left_adjust - Postcondition changed

Tag: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>W_{ne}</th>
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<tr>
<td>Tool</td>
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<td>x</td>
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<td>Manual</td>
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<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
(\text{count }/\neq 0) \implies (\text{item (1) }\neq \text{ ‘’ } \text{ and } \text{item (1) }\neq \text{ ‘%T’ } \text{ and } \text{item (1) }\neq \text{ ‘%R’ } \text{ and } \text{item (1) }\neq \text{ ‘%N’})
\]

"New" Postcondition

\[
\begin{align*}
\text{count } &= \leq \text{old count} \\
(\text{count }/\neq 0) & \implies (\text{item (1) }\neq \text{ ‘’ } \text{ and } \text{item (1) }\neq \text{ ‘%T’ } \text{ and } \text{item (1) }\neq \text{ ‘%R’ } \text{ and } \text{item (1) }\neq \text{ ‘%N’}) \\
\text{elks\_checking} & \implies \text{is\_equal (old twin).substring (old count } - \text{ count } + 1, \text{ old count })
\end{align*}
\]
Routine: head - Postcondition changed

"Old" Postcondition
\[ \text{count} = n.\min(\text{old count}) \]

"New" Postcondition
\[ \text{count} = n.\min(\text{old count}) \]
\[ \text{elks\_checking implies is\_equal(\text{old substring}(1, n.\min(\text{count})))} \]

Routine: index\_of - Precondition changed

"Old" Precondition
\[ \text{start} >= 1 \]
\[ \text{start} <= \text{count} + 1 \]

"New" Precondition
\[ \text{start\_index} >= 1 \]
\[ \text{start\_index} <= \text{count} + 1 \]

Routine: index\_of - Postcondition changed

"Old" Postcondition

"New" Postcondition

"Old" Postcondition

\[ \text{Result} \geq 0 \]
\[ \text{Result} > 0 \text{ implies } \text{item (Result)} = c \]

"New" Postcondition

\[ \text{Result} = 0 \text{ or } (\text{start\_index} \leq \text{Result} \text{ and } \text{Result} \leq \text{count}) \]
\[ (\text{Result} = 0) = \text{not substring (start\_index, count).has (c)} \]
\[ \text{substring (start\_index, count).has (c) implies \text{item (Result)} = c} \]
\[ \text{substring (start\_index, count).has (c) implies not substring (start\_index, \text{Result} - 1).has (c)} \]

Routine: append - Postcondition changed

{\text{Tags: Changed Strengthened NEStronger}}

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{count} = \text{old count} + \text{old s.count} \]

"New" Postcondition

\[ \text{count} = \text{old count} + \text{old s.count} \]
\[ \text{elks\_checking implies is\_equal (old twin + old s.twin)} \]

Routine: remove_substring - Postcondition changed

{\text{Tags: Changed}}

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{is\_equal (old substring (1, start\_index - 1) + old substring (end\_index + 1, count))} \]
"New" Postcondition

\[
\text{elks\_checking implies } \text{is\_equal (old substring (1, start\_index - 1) + old substring (end\_index + 1, count))}
\]

Routine: subcopy - Postcondition changed

![Table]

"Old" Postcondition

"New" Postcondition

\[
\text{count = old count + old s.count - end\_index + start\_index - 1 is\_equal (old (substring (1, start\_index - 1) + s + substring (end\_index + 1, count))}
\]

Routine: replace_substring - Postcondition changed

![Table]

"Old" Postcondition

\[
\text{count = old count + old s.count - end\_index + start\_index - 1 is\_equal (old (substring (1, start\_index - 1) + s + substring (end\_index + 1, count))}
\]

"New" Postcondition

\[
\text{count = old count + old s.count - end\_index + start\_index - 1 is\_equal (old (substring (1, start\_index - 1) + s + substring (end\_index + 1, count))}
\]
Routine: to_integer - Postcondition changed

"Old" Postcondition

"New" Postcondition

\[
\begin{align*}
\text{count} = 1 & \implies \text{Result} = ("0123456789").\text{index}\_of\textunderscore\text{item}\textunderscore(1, 1) - 1 \\
\text{count} = 2 & \quad \text{and} \quad \text{item}\textunderscore(1) = '-.' \implies \text{Result} = -\text{substring}\(2, 2).\text{to}\_\text{integer} \\
\text{count} = 2 & \quad \text{and} \quad \text{item}\textunderscore(1) = '+' \implies \text{Result} = \text{substring}\(2, 2).\text{to}\_\text{integer} \\
\text{count} > 2 & \quad \text{or} \quad \text{count} = 2 \quad \text{and} \quad \text{not} \quad (\"+\-\".\text{has}\(\text{item}\textunderscore(1))) \implies \text{Result} /\!\!// 10 = \\
& \quad \text{substring}\(1, \text{count} - 1).\text{to}\_\text{integer} \quad \text{and} \quad (\text{Result} \text{\textbackslash\!\!//} 10).\text{abs} = \text{substring}\(\text{count}, \\
\end{align*}
\]

Routine: make_from_string - Postcondition changed

"Old" Postcondition

Current \(!= s\) implies not shared\_with\( (s)\)

"New" Postcondition

Current \(!= s\) implies not shared\_with\( (s)\)
same\_string\( (s)\)
Routine: share - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

other.count = count

"New" Postcondition

other.count = count
other.area = area

Routine: prepend - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

count = old (count + s.count)

count = old (count + s.count)
elks_checking implies string.is_equal (old (s.twin) + old substring (1, count))

Routine: keep_tail - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

\[ \text{count} = \text{n.min (old count)} \]

"New" Postcondition

\[ \text{count} = \text{n.min (old count)} \]
\[ \text{elks\_checking implies is\_equal (old substring (count – n.min (count) + 1, count))} \]

Routine: replace\_blank - Postcondition changed

\[
\begin{array}{cccccc}
\text{Tool} & A & R & C & S & W & S_{ne} & W_{ne} \\
\text{Manual} & x & x & x \\
\end{array}
\]

"Old" Postcondition

\[ (\text{count} = \text{old count}) \text{ and } (\text{capacity} \geq \text{old capacity}) \]

"New" Postcondition

\[ (\text{count} = \text{old count}) \text{ and } (\text{capacity} \geq \text{old capacity}) \]
\[ \text{elks\_checking implies occurrences (‘ ’) = count} \]

Routine: infix "" + - Postcondition changed

\[
\begin{array}{cccccc}
\text{Tool} & A & R & C & S & W & S_{ne} & W_{ne} \\
\text{Manual} & x & x & x \\
\end{array}
\]

"Old" Postcondition

\[
\begin{align*}
\text{Result} \neq \text{Void} \\
\text{Result}.\text{count} &= \text{count} + s.\text{count}
\end{align*}
\]

397
"New" Postcondition

\[ \text{Result} \neq \text{Void} \]
\[ \text{Result}.\text{count} = \text{count} + s.\text{count} \]
\[ \text{elks}\_\text{checking} \text{ implies } \text{Result}.\text{substring}(1, \text{count}).\text{is}\_\text{equal}(\text{Current}) \]
\[ \text{elks}\_\text{checking} \text{ implies } \text{Result}.\text{substring}(\text{count} + 1, \text{count} + s.\text{count}).\text{same}\_\text{string}(s) \]

Routine: \text{to_lower} - Postcondition changed

<table>
<thead>
<tr>
<th>Tag: Added Changed Strengthened</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{re}</th>
<th>W_{re}</th>
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<tr>
<td>Tool</td>
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<td>x</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{elks}\_\text{checking} \text{ implies } \text{is}\_\text{equal}(\text{old as_lower}) \]

Routine: \text{out} - Postcondition changed

<table>
<thead>
<tr>
<th>Tag: Added Changed Strengthened</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
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<tr>
<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{Result} \neq \text{Void} \]
\[ \text{same}\_\text{type}(\"\") \text{ implies } \text{Result}.\text{same}\_\text{string}(\text{Current}) \]
### 147 Revision "Old": 48435 vs. Revision "New": 48436

#### 147.1 Class: TUPLE

Routine: integer_item - Precondition changed

<table>
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<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tr>
</tbody>
</table>

"Old" Precondition

- valid_index (index)
- is_integer_item (index)

"New" Precondition

- valid_index (index)
- is_integer_32_item (index)

Routine: real_item - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Precondition

- valid_index (index)
- is_real_item (index) or else is_integer_item (index)

"New" Precondition

- valid_index (index)
- is_real_item (index)
Routine: put_integer - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<tbody>
<tr>
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</tbody>
</table>

"Old" Precondition

valid_index (index)
is_integer_item (index)

"New" Precondition

valid_index (index)
is_integer_32_item (index)

Routine: double_item - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
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<tr>
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</tbody>
</table>

"Old" Precondition

valid_index (index)
is_numeric_item (index)

"New" Precondition

valid_index (index)
is_double_item (index)
Revision "Old": 48439 vs. Revision "New": 48440

Class: INTERNAL

Routine: set_integer_field - Precondition changed

<table>
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<tr>
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<td>Tool</td>
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</tr>
</tbody>
</table>

"Old" Precondition

\[ \text{object} /\!\!=\!/ \text{Void} \]
\[ i \geq 1 \]
\[ i \leq \text{field_count} \ (\text{object}) \]
\[ \text{field_type} \ (i, \text{object}) = \text{integer_type} \]

"New" Precondition

\[ \text{object} /\!\!=\!/ \text{Void} \]
\[ i \geq 1 \]
\[ i \leq \text{field_count} \ (\text{object}) \]
\[ \text{field_type} \ (i, \text{object}) = \text{integer}_{32}\_\text{type} \]

Routine: integer_field - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
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<tr>
<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Precondition

\[ \text{object} /\!\!=\!/ \text{Void} \]
\[ i \geq 1 \]
\[ i \leq \text{field_count} \ (\text{object}) \]
\[ \text{field_type} \ (i, \text{object}) = \text{integer_type} \]

"New" Precondition
\texttt{object /= Void}

\texttt{i >= 1}

\texttt{i <= \text{field\_count} (object)}

\texttt{field\_type (i, object) = integer\_32\_type}

### 149 Revision "Old": 48957 vs. Revision "New": 48972

#### 149.1 Class: MANAGED\_POINTER

**Routine: put\_double - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
<td></td>
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<td>x</td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[d = \text{read\_double} (pos)\]

"New" Postcondition

\[d = \text{read\_real\_64} (pos)\]

**Routine: put\_real - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<th>W_{ne}</th>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[r = \text{read\_real} (pos)\]

"New" Postcondition

\[r = \text{read\_real\_32} (pos)\]
150 Revision "Old": 50684 vs. Revision "New": 50685

150.1 Class: RAW_FILE

Routine: read_data - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ p \neq \text{default} \]

"New" Precondition

\[ p \neq \text{default} \]

file_readable

Routine: put_data - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<th>W_{ne}</th>
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<tbody>
<tr>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ p \neq \text{default} \]

"New" Precondition

\[ p \neq \text{default} \]

extendible
151 Revision "Old": 50686 vs. Revision "New": 50687

151.1 Class: INTERNAL

Routine: mark - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<th>W_{ne}</th>
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<tbody>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\texttt{is\_marked(obj)}

Routine: unmark - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tbody>
<tr>
<td>Tool</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\texttt{not\ is\_marked(obj)}
152 Revision "Old": 50689 vs. Revision "New": 50804

152.1 Class: **FILE**

Routine: read_to_managed_pointer - Precondition changed

<table>
<thead>
<tr>
<th>Tags:</th>
<th>Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
</tr>
</tbody>
</table>

**"Old" Precondition**

\[
p \neq \text{Void} \\
p\.count \geq \text{nb\_bytes} \\
\text{file\_readable}
\]

**"New" Precondition**

\[
p \neq \text{Void} \\
p\.count \geq \text{nb\_bytes} + \text{start\_pos} \\
\text{file\_readable}
\]

153 Revision "Old": 50817 vs. Revision "New": 50939

153.1 Class: **INTERNAL**

Routine: mark - Precondition changed

<table>
<thead>
<tr>
<th>Tags:</th>
<th>Changed</th>
<th>Strengthened</th>
<th>NEStronger</th>
</tr>
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<tbody>
<tr>
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<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**"Old" Precondition**

\[
\text{obj} \neq \text{Void}
\]

**"New" Precondition**

\[
\text{obj} \neq \text{Void} \\
\text{not is\_marked (obj)}
\]
Routine: unmark - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tbody>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[\text{obj} \neq \text{Void}\]

"New" Precondition

\[\text{obj} \neq \text{Void}\]
\[\text{is\_marked}(\text{obj})\]

154 Revision "Old": 50943 vs. Revision "New": 50998

154.1 Class: HASH_TABLE

Invariant changed

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<th>S_{ne}</th>
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<tbody>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[\text{keys} \neq \text{Void}\]
\[\text{content} \neq \text{Void}\]
\[\text{deleted\_marks} \neq \text{Void}\]
\[\text{keys.count} = \text{capacity} + 1\]
\[\text{content.count} = \text{capacity} + 1\]
\[\text{deleted\_marks.count} = \text{capacity} + 1\]
\[\text{off or truly\_occupied (iteration\_position)}\]
\[\text{control} \geq 0\]
\[\text{special\_status} = (\text{conflict or inserted or replaced or replaced or removed or found or not\_found})\]
\[\text{(max\_occupation} > 0) \text{ and (max\_occupation} < 100)\]
\[\text{(initial\_occupation} > 0) \text{ and (initial\_occupation} < 100)\]
\[\text{initial\_occupation} < \text{max\_occupation}\]
```
0 \leq count
\text{count} \leq \text{capacity}
\text{count} \times 100 \leq \text{capacity} \times \text{max\_occupation}
\text{count} \leq \text{used\_slot\_count}
0 \leq \text{count}
\text{used\_slot\_count} \leq \text{capacity}
\text{extra\_space} \geq 0

"New" Invariant

\text{keys} /= \text{Void}
\text{content} /= \text{Void}
\text{deleted\_marks} /= \text{Void}
\text{keys.\text{count}} = \text{capacity} + 1
\text{content.\text{count}} = \text{capacity} + 1
\text{deleted\_marks.\text{count}} = \text{capacity} + 1
\text{off} or \text{truly\_occupied} (\text{iteration\_position})
\text{control} \geq 0
\text{special\_status} = (\text{conflict or inserted or replaced or removed or found or not\_found})
(\text{max\_occupation} > 0) and (\text{max\_occupation} < 1)
(\text{initial\_occupation} > 0) and (\text{initial\_occupation} < 1)
\text{initial\_occupation} < \text{max\_occupation}
0 \leq \text{count}
\text{count} \leq \text{capacity}
\text{count} \leq \text{capacity} \times \text{max\_occupation}
\text{count} \leq \text{used\_slot\_count}
0 \leq \text{count}
\text{used\_slot\_count} \leq \text{capacity}

Routine: accommodate - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\text{count} = \text{old\ count}
\text{used\_slot\_count} = \text{count}
\text{count} \times 100 < \text{capacity} \times \text{initial\_occupation}
```
"New" Postcondition

\begin{align*}
\text{count} &= \text{old count} \\
\text{used_slot_count} &= \text{count} \\
\text{count} &< \text{capacity} \times \text{initial_occupation}
\end{align*}

Routine: make - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

\begin{align*}
\text{n} \times 100 &< \text{capacity} \times \text{initial_occupation} \\
\text{minimum_capacity} \times 100 &< \text{capacity} \times \text{initial_occupation} \\
\text{capacity} &\geq \text{minimum_capacity} \\
\text{not special_status}
\end{align*}

"New" Postcondition

\begin{align*}
\text{n} &< \text{capacity} \times \text{initial_occupation} \\
\text{minimum_capacity} &< \text{capacity} \times \text{initial_occupation} \\
\text{capacity} &\geq \text{minimum_capacity} \\
\text{not special_status}
\end{align*}

155 Revision "Old": 50998 vs. Revision "New": 51342

155.1 Class: INTERNAL

Routine: dynamic_type_from_string - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
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</tr>
</tbody>
</table>

408
"Old" Precondition

\[ \text{class_type} /= \text{Void} \]

"New" Precondition

\[ \text{class_type} /= \text{Void} \]
\[ \text{not class_type}.\text{is_empty} \]
\[ \text{is_valid_type_string (class_type)} \]

156 Revision "Old": 51723 vs. Revision "New": 51764

156.1 Class: MANAGED_POINTER

Invariant changed

Tags: Changed

| Tool  | ARCSW | S|$n_e$ | $W_{ne}$ |
|-------|-------|-----|--------|
| Manual| x     |     |        |

"Old" Invariant

\[ \text{item} /= \text{default_pointer} \]
\[ \text{count} \geq 0 \]

"New" Invariant

\[ \text{item} = \text{default_pointer} \implies (\text{count} = 0 \text{ and } \text{is_shared}) \]
\[ \text{count} \geq 0 \]

157 Revision "Old": 51765 vs. Revision "New": 51767

157.1 Class: C_STRING

Routine: substring - Postcondition changed

Tags: Added Changed Strengthened

| Tool  | ARCSW | S|$n_e$ | $W_{ne}$ |
|-------|-------|-----|--------|
| Manual| x     | x   |        |
158 Revision "Old": 51768 vs. Revision "New": 51769

158.1 Class: CHARACTER_REF
Routine: infix "<" - Postcondition changed

<table>
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<tr>
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<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

Result = (code < other.code)

"New" Postcondition

Result = (item.code < other.code)

159 Revision "Old": 51771 vs. Revision "New": 51772

159.1 Class: SPECIAL
Routine: base_address - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</tbody>
</table>

"Old" Precondition

Result /= Void
"New" Precondition

not feature \{PLATFORM\}.is_dotnet

Routine: non_overlapping_move - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>\textit{S}\textsubscript{ne}</th>
<th>\textit{W}\textsubscript{ne}</th>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

source\_index >= 0
destination\_index >= 0
source\_index /= destination\_index
(source\_index < destination\_index \textbf{implies} source\_index + n < destination\_index) \textbf{or} (source\_index > destination\_index \textbf{implies} destination\_index + n < source\_index)
source\_index + n < count
destination\_index + n < count

"New" Precondition

source\_index >= 0
destination\_index >= 0
n >= 0
source\_index /= destination\_index
(source\_index < destination\_index \textbf{implies} source\_index + n < destination\_index) \textbf{or} (source\_index > destination\_index \textbf{implies} destination\_index + n < source\_index)
source\_index + n <= count
destination\_index + n <= count

Routine: item_address - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>\textit{S}\textsubscript{ne}</th>
<th>\textit{W}\textsubscript{ne}</th>
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<td>x</td>
<td>x</td>
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<td></td>
</tr>
</tbody>
</table>

411
"Old" Precondition

\[ i \geq 0 \]
\[ i < \text{count} \]

"New" Precondition

\[ \text{not feature } \{ \text{PLATFORM}.is\_dotnet \} \]
\[ i \geq 0 \]
\[ i < \text{count} \]

Routine: overlapping\_move - Precondition changed

Tags: Changed Strengthened NeStronger

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
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<th>S_{ne}</th>
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<tr>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ \text{source\_index} \geq 0 \]
\[ \text{destination\_index} \geq 0 \]
\[ \text{source\_index} \neq \text{destination\_index} \]
\[ \text{source\_index} + n < \text{count} \]
\[ \text{destination\_index} + n < \text{count} \]

"New" Precondition

\[ \text{source\_index} \geq 0 \]
\[ \text{destination\_index} \geq 0 \]
\[ n \geq 0 \]
\[ \text{source\_index} \neq \text{destination\_index} \]
\[ \text{source\_index} + n \leq \text{count} \]
\[ \text{destination\_index} + n \leq \text{count} \]
160 Revision "Old": 51772 vs. Revision "New": 51773

160.1 Class: STRING

Invariant changed

<table>
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<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Invariant

extendible
not object\_comparison
index\_set\_count = count

"New" Invariant

extendible
not object\_comparison
index\_set\_count = count
area /= Void

Routine: to\_c - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
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</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

not feature \{PLATFORM\}.is\_dotnet
Routine: left_adjust - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
</table>

"Old" Postcondition

\[
\text{count} \leq \text{old count} \\
(\text{count} \neq 0) \implies ((\text{item}\ (1) \neq ' ') \text{ and } (\text{item}\ (1) \neq '%T') \text{ and } (\text{item}\ (1) \neq '%R')) \text{ and } (\text{item}\ (1) \neq '%N')) \\
\text{elks\_checking} \implies \text{is\_equal} ((\text{old twin}).\text{substring}\ ((\text{old count} - \text{count} + 1), \text{old count} ))
\]

"New" Postcondition

\[
\text{count} \leq \text{old count} \\
\text{not is\_empty} \implies \text{not item}\ (1)\text{.is\_space} \\
\text{elks\_checking} \implies \text{is\_equal} ((\text{old twin}).\text{substring}\ ((\text{old count} - \text{count} + 1), \text{old count} ))
\]

Routine: grow - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
</table>

"Old" Precondition

\[
\text{newsize} \geq 0
\]

"New" Precondition
160.2 Class: **ARRAY**

Routine: `to_c` - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<tr>
<td>Manual</td>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

**not feature** `{PLATFORM}.is_dotnet`

161 Revision "Old": 51798 vs. Revision "New": 51799

161.1 Class: **STRING**

Routine: `adapt` - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

```
Result /= Void
Result.shared_with (s)
```
162 Revision "Old": 51835 vs. Revision "New": 51842

162.1 Class: C_STRING

Routine: read_substring_into - Precondition changed

"Old" Precondition

\[ \text{a_string} \neq \text{Void} \]
\[ \text{start_pos} > = 1 \]
\[ \text{start_pos} \leq \text{end_pos} + 1 \]
\[ \text{end_pos} \leq \text{count} \]
\[ \text{a_string.count} \geq \text{end_pos} - \text{start_pos} + 1 \]

"New" Precondition

\[ \text{a_string} \neq \text{Void} \]
\[ \text{start_pos} > = 1 \]
\[ \text{start_pos} \leq \text{end_pos} + 1 \]
\[ \text{end_pos} \leq \text{capacity} \]
\[ \text{a_string.count} \geq \text{end_pos} - \text{start_pos} + 1 \]

Routine: substring - Precondition changed

"Old" Precondition

\[ \text{start_pos} > = 1 \]
\[ \text{start_pos} \leq \text{end_pos} + 1 \]
\[ \text{end_pos} \leq \text{count} \]
"New" Precondition

\[
start_{pos} \geq 1 \\
start_{pos} \leq end_{pos} + 1 \\
end_{pos} \leq capacity
\]

163 Revision "Old": 52481 vs. Revision "New": 52487

163.1 Class: SPECIAL

Routine: aliased_resized_area_and_keep - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

\[n > \text{count}\]

"New" Precondition

\[
n \geq 0 \\
j \geq 0 \\
k \geq 0 \\
k \leq \text{count}
\]

164 Revision "Old": 52628 vs. Revision "New": 52679

164.1 Class: MANAGED_POINTER

Routine: resize - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
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<td>Manual</td>
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<td></td>
</tr>
</tbody>
</table>
"Old" Precondition

\[
\text{not } is\_shared
\]

"New" Precondition

\[
n \geq 0 \\
\text{not } is\_shared
\]

165 Revision "Old": 53375 vs. Revision "New": 53441

165.1 Class: STRING

Routine: right\_justify - Postcondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
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<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[\text{count } = \text{old count}\]

166 Revision "Old": 54207 vs. Revision "New": 54281

166.1 Class: INTEGER\_INTERVAL

Routine: exists1 - Precondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
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<td>Manual</td>
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</tr>
</tbody>
</table>

418
"Old" Precondition

**upper_defined** and **lower_defined**

"New" Precondition

**upper_defined** and **lower_defined**

**condition /= Void**

**Routine: hold_count - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Manual</td>
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<td></td>
</tr>
</tbody>
</table>

**Tags: Changed Strengthened NEStronger**

"Old" Precondition

**upper_defined** and **lower_defined**

"New" Precondition

**upper_defined** and **lower_defined**

**condition /= Void**

**Routine: exists - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
</tr>
</tbody>
</table>

**Tags: Changed Strengthened NEStronger**

"Old" Precondition

**upper_defined** and **lower_defined**

"New" Precondition

**upper_defined** and **lower_defined**

**condition /= Void**

419
Routine: for_all - Precondition changed

Tags: Changed, Strengthened, NEStronger

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

upper\_defined \text{ and } lower\_defined

"New" Precondition

upper\_defined \text{ and } lower\_defined
\text{ condition } \neq \text{ Void}

167 Revision "Old": 54886 vs. Revision "New": 54937

167.1 Class: STRING

Routine: to\_integer\_64 - Precondition changed

Tags: Removed, Changed, Weakened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

is\_integer

"New" Precondition

Routine: to\_integer - Precondition changed

Tags: Removed, Changed, Weakened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>
"Old" Precondition

**is_integer**

"New" Precondition

Routine: **to_integer** - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S\text{_re}</th>
<th>W\text{_re}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[
\begin{align*}
\text{count} = 1 & \implies \text{Result} = ("0123456789").\text{index\_of}(\text{item}\ (1),\ 1) - 1 \\
\text{count} = 2 & \text{ and } \text{item}\ (1) = '-' \implies \text{Result} = -\text{substring}\ (2,\ 2).\text{to\_integer} \\
\text{count} = 2 & \text{ and } \text{item}\ (1) = '+' \implies \text{Result} = \text{substring}\ (2,\ 2).\text{to\_integer} \\
\text{count} > 2 & \text{ or } \text{count} = 2 & \text{ and } \neg (("\+-\").\text{has}\ (\text{item}\ (1))) & \implies \text{Result} = \text{substring}\ (1,\ \text{count}\ -\ 1).\text{to\_integer} & \text{ and } (\text{Result} \sslash\ 10).\text{abs} = \text{substring}\ (\text{count},\ \text{count})\text{.to\_integer}
\end{align*}
\]

"New" Postcondition

168 Revision "Old": 54986 vs. Revision "New": 54993

168.1 Class: STRING\_TO\_INTEGER\_STATE\_MACHINE

Routine: **parse** - Precondition changed

Tags: Changed Weakened NEWeaker

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S\text{_re}</th>
<th>W\text{_re}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Precondition

\begin{verbatim}
s /= Void
not s.is_empty
start_position > 0
start_position <= s.count
start_position <= end_position
end_position <= s.count
\end{verbatim}

"New" Precondition

\begin{verbatim}
s /= Void
start_position > 0
end_position <= s.count
\end{verbatim}

169 Revision "Old": 55088 vs. Revision "New": 55089

169.1 Class: STRING_TO_INTEGER_STATE_MACHINE

Routine: parsed_natural_8 - Precondition changed

\begin{verbatim}
  A  R  C  S  W  S_{ne}  W_{ne}
Tool  x  x  x
Manual
\end{verbatim}

"Old" Precondition

\begin{verbatim}
conversion_type = type_natural_8
is_integral_integer
not overflowed
\end{verbatim}

"New" Precondition

Routine: parsed_integer_8 - Precondition changed

\begin{verbatim}
  A  R  C  S  W  S_{ne}  W_{ne}
Tool  x  x  x
Manual
\end{verbatim}
"Old" Precondition

\[
\text{conversion\_type} = \text{type\_integer\_8} \\
\text{is\_integral\_integer} \\
\text{not\ overflowed}
\]

"New" Precondition

Routine: \text{parsed\_natural\_16} - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{conversion\_type} = \text{type\_natural\_16} \\
\text{is\_integral\_integer} \\
\text{not\ overflowed}
\]

"New" Precondition

Routine: \text{parsed\_integer\_64} - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{conversion\_type} = \text{type\_integer\_64} \\
\text{is\_integral\_integer} \\
\text{not\ overflowed}
\]
Routine: parsed_integer_16 - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

conversion_type = type_integer_16
is_integral_integer
not overflowed

"New" Precondition

Routine: parsed_integer_32 - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
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<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
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</tbody>
</table>

"Old" Precondition

conversion_type = type_integer_32
is_integral_integer
not overflowed

"New" Precondition
Routine: parsed_natural_64 - Precondition changed

Tags: Removed, Changed, Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
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<tr>
<td>Tool</td>
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<td>x</td>
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</tbody>
</table>

"Old" Precondition

conversion_type = type_natural_64
is_integral_integer
not overflowed

"New" Precondition

Routine: reset - Postcondition changed

Tags: Changed, Weakened, Newer

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Postcondition

last_state = state_0
not overflowed
part1 = 0
part2 = 0
part1_length = 0
sign = 0
trailing_white_spaces_acceptable
leading_white_spaces_acceptable
conversion_type = type

"New" Postcondition

last_state = state_0
not overflowed
part1 = 0
part2 = 0

425
Routine: parsed_natural_32 - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

conversion_type = type_natural_32
is_integral_integer
not overflowed

"New" Precondition

170 Revision "Old": 55089 vs. Revision "New": 55090

170.1 Class: STRING

Routine: to_integer_16 - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<th>S_{ne}</th>
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</table>

"Old" Precondition

"New" Precondition

is_integer_16

426
Routine: to\_integer\_8 - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
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<tbody>
<tr>
<td>x</td>
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</tbody>
</table>

"Old" Precondition

"New" Precondition

is\_integer\_8

Routine: to\_natural\_8 - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
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</thead>
<tbody>
<tr>
<td>x</td>
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</tbody>
</table>

"Old" Precondition

"New" Precondition

is\_natural\_8

Routine: to\_natural - Precondition changed

Tags: Added Changed Strengthened

<table>
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<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

"Old" Precondition

427
"New" Precondition

\[ \text{is\_natural} \]

**Routine: to\_natural\_64 - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

\[ \text{is\_natural\_64} \]

**Routine: to\_natural\_16 - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
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<td>x</td>
<td>x</td>
<td>x</td>
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</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

\[ \text{is\_natural\_16} \]
Routine: to_integer_64 - Precondition changed

"Old" Precondition

"New" Precondition

is_integer_64

Routine: to_integer - Precondition changed

"Old" Precondition

"New" Precondition

is_integer_32

171 Revision "Old": 55186 vs. Revision "New": 55366

171.1 Class: INTERNAL

Routine: dynamic_type_from_string - Postcondition changed

171 Revision "Old": 55186 vs. Revision "New": 55366

171.1 Class: INTERNAL

Routine: dynamic_type_from_string - Postcondition changed
"Old" Postcondition

Result = -1 or else Result >= 0

"New" Postcondition

Result = -1 or Result = none_type or Result >= 0

172 Revision "Old": 56117 vs. Revision "New": 56120

172.1 Class: STRING

Routine: to_boolean - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
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<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

(Result = same_string (true_constant)) or (not Result = same_string (false_constant))

"New" Postcondition

(Result = true_constant.same_string (as_lower)) or (not Result = false_constant. 
same_string (as_lower))

Routine: is_boolean - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result = (as_lower.has_substring (true_constant) or as_lower.has_substring ( 
false_constant))
"New" Postcondition

\[
\text{Result} = (\text{true constant.same_string (as_lower) or false constant.same_string (as_lower) or false constant.same_string (as_lower))}
\]

173 Revision "Old": 56937 vs. Revision "New": 57034

173.1 Class: HASH_TABLE
Routine: put - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>Sne</th>
<th>Wne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{conflict or inserted}
\text{inserted implies item (key) = new}
\text{inserted implies has (key)}
\text{inserted implies (count = old count + 1)}
\text{inserted implies ((used_slot_count = old used_slot_count + 1) or (used_slot_count = old count))}
\text{conflict implies (count = old count)}
\text{conflict implies (item (key) = old (item (key)))}
\text{conflict implies (used_slot_count = old used_slot_count)}
\text{found_item = item (key)}
\text{inserted implies (found_item = new)}
\text{conflict implies (found_item = old (item (key)))}
\text{has_default = ((inserted and (key = computed_default_key)) or ((conflict or (key /= computed_default_key)) and (old has_default)))}
\]

"New" Postcondition

\[
\text{conflict or inserted}
\text{inserted implies item (key) = new}
\text{inserted implies has (key)}
\text{inserted implies (count = old count + 1)}
\text{conflict implies (count = old count)}
\text{conflict implies (item (key) = old (item (key)))}
\text{conflict implies (used_slot_count = old used_slot_count)}
\]

431
\text{found\_item} = \text{item (key)}

\text{inserted} \implies (\text{found\_item} = \text{new})

\text{conflict} \implies (\text{found\_item} = \text{old (item (key))})

\text{has\_default} = ((\text{inserted} \text{ and} (\text{key} = \text{computed\_default\_key})) \text{ or } ((\text{conflict} \text{ or} (\text{key} /= \text{computed\_default\_key})) \text{ and } (\text{old has\_default})))

\text{Routine: replace\_key - Postcondition changed}

\text{Tags: Changed Weakened NEWeaker}

\begin{tabular}{|c|c|c|c|c|c|c|c|}
\hline
& A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
Tool & \text{x} & \text{x} & \text{x} & \text{x} & \text{x} & \text{x} & \text{x} \\
\hline
Manual & \text{x} & \text{x} & \text{x} & \text{x} & \text{x} & \text{x} & \text{x} \\
\hline
\end{tabular}

"Old" Postcondition

\text{count} = \text{old count}

\text{used\_slot\_count} = \text{old used\_slot\_count}

\text{replaced or conflict or not\_found}

(\text{replaced and not equal (new\_key, old\_key)}) \implies (\text{not has (old\_key)})

(\text{replaced or conflict}) = \text{has (new\_key)}

\text{replaced} \implies (\text{item (new\_key)} = \text{old (item (old\_key))})

\text{not\_found} = \text{old (not has (old\_key))}

\text{conflict} = \text{old (has (new\_key))}

\text{conflict} \implies (\text{item (new\_key)} = \text{old (item (new\_key)))}

\text{has\_default} = ((\text{new\_key} = \text{computed\_default\_key}) \text{ or } ((\text{new\_key} /= \text{computed\_default\_key}) \text{ and } (\text{old has\_default})))

"New" Postcondition

\text{count} = \text{old count}

\text{replaced or conflict or not\_found}

(\text{replaced and not equal (new\_key, old\_key)}) \implies (\text{not has (old\_key)})

(\text{replaced or conflict}) = \text{has (new\_key)}

\text{replaced} \implies (\text{item (new\_key)} = \text{old (item (old\_key))})

\text{not\_found} = \text{old (not has (old\_key))}

\text{conflict} = \text{old (has (new\_key))}

\text{conflict} \implies (\text{item (new\_key)} = \text{old (item (new\_key)))}

\text{has\_default} = ((\text{new\_key} = \text{computed\_default\_key}) \text{ or } ((\text{new\_key} /= \text{computed\_default\_key}) \text{ and } (\text{old has\_default})))
174 Revision "Old": 57133 vs. Revision "New": 57159

174.1 Class: STD_FILES

Routine: read_stream - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

last_string /= Void

Routine: error - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /= Void

Routine: read_word - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
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<tr>
<td>Manual</td>
<td>x</td>
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<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

433
"Old" Postcondition

"New" Postcondition

\[ \text{last\_string} 
eq \text{Void} \]

**Routine: input - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
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<td>Manual</td>
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<td></td>
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<td></td>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{Result} 
eq \text{Void} \]

**Routine: read\_line - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
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<td>Manual</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{last\_string} 
eq \text{Void} \]
Routine: output - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
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<td>x</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result $\neq$ Void

175 Revision "Old": 57159 vs. Revision "New": 57160

175.1 Class: FILE

Routine: read_word - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
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<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

last_string $\neq$ Void
176 Revision "Old": 57160 vs. Revision "New": 57204

176.1 Class: HASH_TABLE

Routine: replace_key - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>Sn</th>
<th>Wn</th>
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<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\begin{align*}
\text{count} &= \text{old value of count} \\
\text{replaced or conflict or not_found} &\quad \text{implies} \\
(\text{replaced and not equal (new_key, old_key)}) &\implies (\text{not has (old_key)}) \\
(\text{replaced or conflict}) &= \text{has (new_key)} \\
\text{replaced implies (item (new_key) = old (item (old_key)))} &\quad \text{implies} \\
\text{not_found} &= \text{old (not has (old_key))} \\
\text{conflict} &= \text{old (has (new_key))} \\
\text{conflict implies (item (new_key) = old (item (new_key)))} &\quad \text{implies} \\
\text{has_default} &= ((\text{new_key = computed_default_key} \quad \text{or} \quad (\text{new_key /= computed_default_key}) \quad \text{and} \quad \text{old has_default}))
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
\text{count} &= \text{old value of count} \\
\text{replaced or conflict or not_found} &\quad \text{implies} \\
(\text{replaced and not equal (new_key, old_key)}) &\implies (\text{not has (old_key)}) \\
(\text{replaced or conflict}) &= \text{has (new_key)} \\
\text{replaced implies (item (new_key) = old (item (old_key)))} &\quad \text{implies} \\
(\text{not_found or conflict}) &= \text{old (not has (old_key))} \\
\text{conflict} &= \text{old (has (new_key))} \\
\text{conflict implies (item (new_key) = old (item (new_key)))} &\quad \text{implies} \\
\text{has_default} &= ((\text{new_key = computed_default_key} \quad \text{or} \quad (\text{new_key /= computed_default_key}) \quad \text{and} \quad \text{old has_default}))
\end{align*}
\]
177 Revision "Old": 57422 vs. Revision "New": 57607

177.1 Class: NATURAL_16_REF

Routine: ascii_char - Precondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

"Old" Precondition

is_valid_character_code

"New" Precondition

is_valid_character_8_code

Routine: to_character - Precondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
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<tr>
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</tbody>
</table>

"Old" Precondition

is_valid_character_code

"New" Precondition

is_valid_character_8_code
## 177.2 Class: INTEGER_16_REF

**Routine: ascii_char - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
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</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>R</td>
</tr>
<tr>
<td>S</td>
<td>W</td>
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</tbody>
</table>

"Old" Precondition

`is_valid_character_code`

"New" Precondition

`is_valid_character_8_code`

## 177.3 Class: INTEGER_REF

**Routine: ascii_char - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>R</td>
</tr>
<tr>
<td>S</td>
<td>W</td>
</tr>
</tbody>
</table>

"Old" Precondition

`is_valid_character_code`

"New" Precondition

`is_valid_character_8_code`

438
"Old" Precondition

`is_valid_character_code`

"New" Precondition

`is_valid_character_8_code`

**Routine: to_character - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S-ne</th>
<th>W-ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
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<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

`is_valid_character_code`

"New" Precondition

`is_valid_character_8_code`

**177.4 Class: NATURAL_64_REF**

**Routine: ascii_char - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S-ne</th>
<th>W-ne</th>
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<tbody>
<tr>
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</tbody>
</table>

"Old" Precondition

`is_valid_character_code`

"New" Precondition

`is_valid_character_8_code`

439
Routine: `to_character` - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
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<td></td>
</tr>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

`is_valid_character_code`

"New" Precondition

`is_valid_character_8_code`

177.5 Class: C_STRING

Routine: `set_string` - Precondition changed

Tags: Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
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<td></td>
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</tr>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

`a_string /= Void`

"New" Precondition

`a_string /= Void`

`a_string.is_valid_as_string_8`

177.6 Class: STRING

Routine: `substring` - Postcondition changed

Tags: Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

440
"Old" Postcondition

\[
\text{Result} /\neq \text{Void} \\
\text{Result}.\text{count} = \text{end\_index} - \text{start\_index} + 1 \text{ or Result}.\text{count} = 0 \\
\text{Result}.\text{count} > 0 \text{ implies Result}.\text{item}(1) = \text{item}(\text{start\_index}) \\
\text{Result}.\text{count} > 0 \text{ implies Result}.\text{substring}(2, \text{Result}.\text{count}).\text{is\_equal} (\text{substring}( \text{start\_index} + 1, \text{end\_index}))
\]

"New" Postcondition

\[
\text{Result}.\text{count} > 0 \text{ implies Result}.\text{item}(1) = \text{item}(\text{start\_index}) \\
\text{Result}.\text{count} > 0 \text{ implies Result}.\text{substring}(2, \text{Result}.\text{count}).\text{is\_equal} (\text{substring}( \text{start\_index} + 1, \text{end\_index}))
\]

Routine: remove - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
i \leq \text{count} \\
i > 0
\]

"New" Precondition

Routine: remove - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

441
"Old" Postcondition

\[
\text{count} = \text{old count} - 1 \\
\text{elks}\_\text{checking implies is}\_\text{equal (old substring (1, i - 1) + old substring (i + 1, count) )}
\]

"New" Postcondition

Routine: resize - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Removed, Changed, Weakened</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{newsize} \geq 0
\]

"New" Precondition

177.7 Class: NATURAL_8_REF

Routine: ascii_char - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>---</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{is}\_\text{valid}\_\text{character}\_\text{code}
\]

"New" Precondition

\[
\text{is}\_\text{valid}\_\text{character\_8\_code}
\]
**Routine: to_character - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

`is_valid_character_code`

"New" Precondition

`is_valid_character_8_code`

---

**177.8 Class: INTEGER_64_REF**

**Routine: ascii_char - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

`is_valid_character_code`

"New" Precondition

`is_valid_character_8_code`

---

**Routine: to_character - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
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<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

443
"Old" Precondition

```
is_valid_character_code
```

"New" Precondition

```
is_valid_character_8_code
```

### 177.9 Class: INTEGER_8_REF

**Routine: ascii_char - Precondition changed**

- Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

```
is_valid_character_code
```

"New" Precondition

```
is_valid_character_8_code
```

**Routine: to_character - Precondition changed**

- Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

```
is_valid_character_code
```

"New" Precondition

```
is_valid_character_8_code
```
177.10 Class: STRING_SEACHER

Invariant changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>Changed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

deltas /= Void
\[\text{deltas.count} \leq \text{max_ascii_character_value} + 1\]

"New" Invariant

deltas /= Void
\[\text{deltas.count} = \text{max_ascii_character_value} + 1\]

Routine: substring_index - Precondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>Changed</th>
<th>Strengthened</th>
<th>NEStronger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[\text{a_string} /= \text{Void}\]
\[\text{a_pattern} /= \text{Void}\]
\[\text{start_pos} \geq 1\]
\[\text{start_pos} \leq \text{end_pos} + 1\]
\[\text{end_pos} \leq \text{a_string.count}\]

"New" Precondition

\[\text{a_string} /= \text{Void}\]
\[\text{a_pattern} /= \text{Void}\]
\[\text{a_pattern.is_valid_as_string_8}\]
\[\text{start_pos} \geq 1\]
\[\text{start_pos} \leq \text{end_pos} + 1\]
\[\text{end_pos} \leq \text{a_string.count}\]
Routine: substring_index_with_deltas - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_re</th>
<th>W_re</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
a_string /= Void \\
a_pattern /= Void \\
\text{not a_pattern.is_empty}\ \\
start_pos >= 1 \\
start_pos <= end_pos + 1 \\
end_pos <= a_string.count
\]

"New" Precondition

\[
a_string /= Void \\
a_pattern /= Void \\
a_pattern.is_valid_as_string_8 \\
\text{not a_pattern.is_empty}\ \\
start_pos >= 1 \\
start_pos <= end_pos + 1 \\
end_pos <= a_string.count
\]

Routine: initialize_deltas - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_re</th>
<th>W_re</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
a_pattern /= Void
\]

"New" Precondition

\[
a_pattern /= Void \\
a_pattern.is_valid_as_string_8
\]

446
Routine: fuzzy_index - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

“Old” Precondition

\[
a_{\text{string}} \neq \text{Void} \\
a_{\text{pattern}} \neq \text{Void} \\
\text{not} \ a_{\text{pattern}.\text{is_empty}} \\
\text{start\_pos} \geq 1 \\
\text{start\_pos} \leq \text{end\_pos} + 1 \\
\text{end\_pos} \leq a_{\text{string}.\text{count}} \\
fuzzy \geq 0 \\
fuzzy \leq a_{\text{pattern}.\text{count}}
\]

“New” Precondition

\[
a_{\text{string}} \neq \text{Void} \\
a_{\text{pattern}} \neq \text{Void} \\
a_{\text{pattern}.\text{is_valid\_as\_string\_8}} \\
\text{not} \ a_{\text{pattern}.\text{is_empty}} \\
\text{start\_pos} \geq 1 \\
\text{start\_pos} \leq \text{end\_pos} + 1 \\
\text{end\_pos} \leq a_{\text{string}.\text{count}} \\
fuzzy \geq 0 \\
fuzzy \leq a_{\text{pattern}.\text{count}}
\]

177.11 Class: NATURAL_32_REF

Routine: ascii_char - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
</tr>
</tbody>
</table>

“Old” Precondition
Routine: to_character - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

is_valid_character_code

"New" Precondition

is_valid_character_8_code

177.12 Class: CHARACTER_REF

Routine: next - Precondition changed

Tags: Changed - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
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<td></td>
<td>x</td>
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<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

(item.code + 1).is_valid_character_code

"New" Precondition

(item.code + 1).is_valid_character_8_code
**Routine: previous - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[(item.code - 1).is\_valid\_character\_code\]

"New" Precondition

\[(item.code - 1).is\_valid\_character\_8\_code\]

**Routine: infix "+" - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[(item.code + incr).is\_valid\_character\_code\]

"New" Precondition

\[(item.code + incr).is\_valid\_character\_8\_code\]

**Routine: infix "−" - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

449
"Old" Precondition

\[(\text{item.code} - \text{decr}).\text{is_valid_character_code}\]

"New" Precondition

\[(\text{item.code} - \text{decr}).\text{is_valid_character_8_code}\]

178 Revision "Old": 57625 vs. Revision "New": 57626

178.1 Class: \text{SYSTEM\_STRING\_FACTORY}

Routine: \text{read\_system\_string\_into} - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[\text{feature \{PLATFORM\}; is_dotnet}\]
\[\text{a\_str} /= \text{Void}\]
\[\text{a\_result} /= \text{Void}\]

"New" Precondition

\[\text{feature \{PLATFORM\}; is_dotnet}\]
\[\text{a\_str} /= \text{Void}\]
\[\text{a\_result} /= \text{Void}\]
\[\text{a\_result.count} = \text{a\_str.length}\]
179 Revision "Old": 58766 vs. Revision "New": 58804

179.1 Class: STRING_GENERAL
Routine: as_string_32 - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<td>x</td>
<td>x</td>
<td></td>
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<td></td>
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</tbody>
</table>

"Old" Postcondition

Result /≠ Void

"New" Postcondition

Result /≠ Void
(is_string_32 and Result = Current) or (not is_string_32 and Result /= Current)

Routine: to_string_8 - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>Sns</th>
<th>Wns</th>
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<td>x</td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result /≠ Void

"New" Postcondition

Result /≠ Void
(is_string_8 and Result = Current) or (not is_string_8 and Result /= Current)
Routine: as_string_8 - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result /= Void

"New" Postcondition

Result /= Void
(is_string_8 and Result = Current) or (not is_string_8 and Result /= Current)

180 Revision "Old": 59177 vs. Revision "New": 59211

180.1 Class: HASH_TABLE

Routine: replace_key - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

count = old count
replaced or conflict or not_found
(replaced and not equal (new_key, old_key)) implies (not has (old_key))
(replaced or conflict) = has (new_key)
replaced implies (item (new_key) = old (item (old_key)))
(not_found or conflict) = old (not has (old_key))
conflict = old (has (new_key))
conflict implies (item (new_key) = old (item (new_key)))
has_default = ((new_key = computed_default_key) or ((new_key /= computed_default_key) and (old has_default)))
"New" Postcondition

\[\text{count} = \text{old count} \]
\[\text{replaced or conflict or not_found} \]
\[(\text{replaced and not equal (new_key, old_key)}) \implies (\text{not has (old_key)})\]
\[(\text{replaced implies (item (new_key) = old (item (old_key)))}) \]
\[(\text{not_found implies old (not has (old_key))}) \]
\[(\text{conflict = old (has (new_key))}) \]
\[(\text{conflict implies (item (new_key) = old (item (new_key))}) \]
\[\text{has_default} = ((\text{new_key} = \text{computed_default_key}) \text{ or } ((\text{new_key} /= \text{computed_default_key}) \text{ and } (\text{old has_default}))) \]

181 Revision "Old": 59409 vs. Revision "New": 59494

181.1 Class: FILE

Routine: change name - Precondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>Changed</th>
<th>Strengthened</th>
<th>NEStronger</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[\text{new_name} /= \text{Void}\]
\[\text{exists}\]

"New" Precondition

\[\text{new_name} /= \text{Void}\]
\[\text{not new_name.is_empty}\]
\[\text{exists}\]
182 Revision "Old": 59648 vs. Revision "New": 59822

182.1 Class: STRING

Routine: append - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

s /= Void

"New" Precondition

Routine: append - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ count = \text{old count} + \text{old s.count} \]

\[ \text{elks_checking implies is_equal (old twin + old s.twin)} \]

"New" Postcondition

182.2 Class: STRING_32

Routine: append - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

454
"Old" Precondition

\( s \neq \text{Void} \)

"New" Precondition

Routine: append - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{new}</th>
<th>W_{new}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ count = \text{old } count + \text{old } s.count \]
\[ \text{elks}_\text{checking implies } \text{is_equal (old } t\text{win + old } s.t\text{win)} \]

"New" Postcondition

183 Revision "Old": 59827 vs. Revision "New": 59830

183.1 Class: STRING

Routine: append - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_{new}</th>
<th>W_{new}</th>
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</thead>
<tbody>
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<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

\( s \neq \text{Void} \)
### Routine: append - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**"Old" Postcondition**

**"New" Postcondition**

\[
\text{count} = \text{old count} + \text{old s.count} \\
\text{elks\_checking implies is\_equal} (\text{old twin} + \text{old s.twin})
\]

### 183.2 Class: STRING_32

### Routine: append - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**"Old" Precondition**

**"New" Precondition**

\[
s != \text{Void}
\]

### Routine: append - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

"New" Postcondition

\[ \text{count = old count + old s.count} \]
\[ \text{elks\_checking implies is\_equal (old twin + old s.twin)} \]

184 Revision "Old": 61495 vs. Revision "New": 61569

184.1 Class: INTERNAL HELPER

Routine: enable_pre_ecma_mapping - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
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<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{is\_pre\_ecma\_mapping\_enabled} \]

"New" Postcondition

\[ \text{not is\_pre\_ecma\_mapping\_disabled} \]

Routine: disable_pre_ecma_mapping - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{not is\_pre\_ecma\_mapping\_enabled} \]
"New" Postcondition

is_pre_ecma_mapping_disabled

---

185 Revision "Old": 62378 vs. Revision "New": 62447

185.1 Class: FUNCTION

Routine: eval - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

valid_operands (args)
callable

"New" Precondition

valid_operands (args)

---

Routine: item - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

valid_operands (args)
callable

"New" Precondition

valid_operands (args)
185.2 Class: ROUTINE

Invariant changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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<td>Manual</td>
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<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

"New" Invariant

callable

Routine: adapt_from - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

other.callable implies callable

"New" Postcondition

Routine: adapt - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

459
"Old" Postcondition

other.callable implies callable

"New" Postcondition

186 Revision "Old": 62926 vs. Revision "New": 62928

186.1 Class: RANDOM

Routine: double_i.th - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
</tr>
</thead>
<tbody>
<tr>
<td>A R C S W S_{ne} W_{ne}</td>
</tr>
<tr>
<td>Tool   x  x  x</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Precondition

\( i > 0 \)

"New" Precondition

Routine: real_j.th - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Added Changed Strengthened</th>
</tr>
</thead>
<tbody>
<tr>
<td>A R C S W S_{ne} W_{ne}</td>
</tr>
<tr>
<td>Tool   x  x  x</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Precondition

\( i > 0 \)

"New" Precondition

460
187 Revision "Old": 62928 vs. Revision "New": 62940

187.1 Class: ARRAY

Routine: subarray - Precondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{valid\_index (start\_pos)} \\
\text{valid\_index (end\_pos)} \\
\text{(start\_pos <= end\_pos) or (start\_pos = end\_pos + 1)}
\]

"New" Precondition

\[
\text{valid\_index (start\_pos)} \\
\text{end\_pos <= upper} \\
\text{(start\_pos <= end\_pos) or (start\_pos = end\_pos + 1)}
\]

188 Revision "Old": 62989 vs. Revision "New": 63071

188.1 Class: TYPE

Routine: attempt - Postcondition changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{Result} = \text{obj} \text{ or } \text{Result} = \text{Void}
\]

"New" Postcondition

\[
\text{Result} = \text{obj} \text{ or } \text{Result} = \text{default\_value}
\]
189 Revision "Old": 63978 vs. Revision "New": 64229

189.1 Class: ANY

Routine: operating_environment - Postcondition changed

| Tool | x | x | x |

"Old" Postcondition

"New" Postcondition

Result /= Void

Routine: generator - Postcondition changed

| Tool | x | x | x |

"Old" Postcondition

"New" Postcondition

Result /= Void

Routine: deep_twin - Postcondition changed

| Tool | x | x | x |

462
"Old" Postcondition

deep_equal (Current, Result)

"New" Postcondition

Result /= Void
depth_equal (Current, Result)

Routine: io - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
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<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /= Void

Routine: generating_type - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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<td>Manual</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /= Void
Routine: out - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S&lt;sub&gt;ne&lt;/sub&gt;</th>
<th>W&lt;sub&gt;ne&lt;/sub&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
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<td></td>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result /= Void

190 Revision "Old": 64853 vs. Revision "New": 64854

190.1 Class: EXECUTION_ENVIRONMENT

Routine: put - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S&lt;sub&gt;ne&lt;/sub&gt;</th>
<th>W&lt;sub&gt;ne&lt;/sub&gt;</th>
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<tbody>
<tr>
<td>Tool</td>
<td>x</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\( (\text{return\_code} = 0) \implies (\text{value}.is\_equal (\text{get} (\text{key}))) \)

"New" Postcondition

\( (\text{return\_code} = 0) \implies (\text{equal} (\text{value}, \text{get} (\text{key})) \text{ or else } (\text{value}.is\_empty \text{ and then } (\text{get} (\text{key}) = \text{Void}))) \)
191 Revision "Old": 65135 vs. Revision "New": 65167

191.1 Class: STRING_8
Routine: string - Postcondition changed

Tags: Changed

<table>
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<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>Sre</th>
<th>Wre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result /= Void
Result.same_type ("")

\[
\begin{align*}
\text{count} > 0 \text{ implies } & \text{Result.item (1) = item (1)} \\
\text{count} > 1 \text{ implies } & \text{Result.substring (2, count).is_equal (substring (2, count).string)}
\end{align*}
\]

"New" Postcondition

Result /= Void
Result.same_type (create \{STRING_8\}.make_empty)

\[
\begin{align*}
\text{count} > 0 \text{ implies } & \text{Result.item (1) = item (1)} \\
\text{count} > 1 \text{ implies } & \text{Result.substring (2, count).is_equal (substring (2, count).string)}
\end{align*}
\]

191.2 Class: HASH_TABLE
Routine: search - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>Sre</th>
<th>Wre</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

found or not_found
found implies (found_item = content.item (position))

"New" Postcondition

found or not_found
found implies (found_item = item (key))
191.3 Class: STRING_32
Routine: string - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{Result} \neq \text{Void} \\
\text{Result}.\text{same}\_\text{type} \left(\"\"\right) \\
\text{count} > 0 \implies \text{Result}.\text{item} \left(1\right) = \text{item} \left(1\right) \\
\text{count} > 1 \implies \text{Result}.\text{substring} \left(2, \text{count}\right).\text{is}\_\text{equal} \left(\text{substring} \left(2, \text{count}\right).\text{string}\right)
\]

"New" Postcondition

\[
\text{Result} \neq \text{Void} \\
\text{Result}.\text{same}\_\text{type} \left(\text{create} \left\{ \text{STRING}_32\right\}.\text{make}\_\text{empty}\right) \\
\text{count} > 0 \implies \text{Result}.\text{item} \left(1\right) = \text{item} \left(1\right) \\
\text{count} > 1 \implies \text{Result}.\text{substring} \left(2, \text{count}\right).\text{is}\_\text{equal} \left(\text{substring} \left(2, \text{count}\right).\text{string}\right)
\]

192 Revision "Old": 65291 vs. Revision "New": 65382

192.1 Class: HASH_TABLE

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[
\text{keys} \neq \text{ Void} \\
\text{content} \neq \text{ Void} \\
\text{deleted}\_\text{marks} \neq \text{ Void} \\
\text{keys}.\text{count} = \text{capacity} + 1 \\
\text{content}.\text{count} = \text{capacity} + 1
\]

466
deleted_marks.count = capacity + 1
count = (iteration_position)
control >= 0
special_status = (conflict or inserted or replaced or removed or found or not_found)
(max_occupation > 0) and (max_occupation < 1)
(initial_occupation > 0) and (initial_occupation < 1)
initial_occupation < max_occupation
0 <= count
control <= capacity
count <= capacity * max_occupation
count <= used_slot_count
0 <= count
used_slot_count <= capacity

"New" Invariant

keys /= Void
count /= Void
deleted_marks /= Void
keys.count = capacity + 1
count = capacity + 1
deleted_marks.count = capacity + 1
off or truly_occupied (iteration_position)
control >= 0
special_status = (conflict or inserted or replaced or removed or found or not_found)
0 <= count
control <= capacity
count <= used_slot_count
0 <= count
used_slot_count <= capacity

Routine: accommodate - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
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<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

count = old count

467
used_slot_count = count
count < capacity * initial_occupation

"New" Postcondition

count = old count
used_slot_count = count
count < capacity

Routine: make - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
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<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

n < capacity * initial_occupation
minimum_capacity < capacity * initial_occupation
capacity >= minimum_capacity
not special_status

"New" Postcondition

n < capacity
minimum_capacity < capacity
capacity >= minimum_capacity
not special_status

193 Revision "Old": 65592 vs. Revision "New": 65618

193.1 Class: SPECIAL

Routine: copy_data - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

468
"Old" Precondition

other /= Void
source_index >= 0
destination_index >= 0
n >= 0
source_index + n <= other.count
destination_index + n <= count

"New" Precondition

other /= Void
source_index >= 0
destination_index >= 0
n >= 0
source_index + n <= other.count
destination_index + n <= count
same_type (other)

194 Revision "Old": 65802 vs. Revision "New": 66144

194.1 Class: INTERNAL_HELPER

Routine: enable_pre_ecma_mapping - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S\text{ne}</th>
<th>W\text{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\text{not is\_pre\_ecma\_mapping\_disabled}

"New" Postcondition
Routine: disable_pre_ecma_mapping - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

is_pre_ecma_mapping_disabled

"New" Postcondition

195 Revision "Old": 66309 vs. Revision "New": 68

195.1 Class: REAL_32_REF

Routine: rounded_real_32 - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{Result} = \text{sign} \times ((\text{abs} + 0.5).\text{floor})
\]

"New" Postcondition

\[
\text{Result} = \text{sign} \times ((\text{abs} + 0.5).\text{floor}_{\text{real}32})
\]

195.2 Class: ROUTINE

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
195.3 Class: CHARACTER_32_REF

Routine: infix "<" - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result = (code < other.code)

195.4 Class: CHARACTER_8_REF

Routine: infix "<" - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result = (item.code < other.code)
"New" Postcondition

\[
\text{Result} = (\text{code} < \text{other.code})
\]

195.5 Class: ARGUMENTS

Routine: argument - Postcondition changed

\begin{tabular}{|c|c|c|c|c|c|c|}
\hline
& A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
Tool & x & x & x & & & & \\
\hline
Manual & & & & & & & \\
\hline
\end{tabular}

"Old" Postcondition

"New" Postcondition

\[
\text{Result} \neq \text{Void}
\]

196 Revision "Old": 74 vs. Revision "New": 77

196.1 Class: LINEAR_ITERATOR

Invariant changed

\begin{tabular}{|c|c|c|c|c|c|c|}
\hline
& A & R & C & S & W & S_{ne} & W_{ne} \\
\hline
Tool & & & & & x & & \\
\hline
Manual & & & & & & & \\
\hline
\end{tabular}

"Old" Invariant

\[
\begin{align*}
\text{target} & \neq \text{Void} \\
\text{item_tuple} & \neq \text{Void} \\
\text{internal_item_tuple} & \neq \text{Void}
\end{align*}
\]
"New" Invariant

\[
target /= \text{Void} \\
\text{internal}_\text{item}_\text{tuple} /= \text{Void} \\
\text{not} \ \text{exhausted} \ \text{implies} \ \text{item}_\text{tuple} /= \text{Void}
\]

Routine: item\_tuple - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

\text{not target.off}

Routine: item - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td></td>
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<td></td>
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<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\text{target /= Void}

"New" Precondition

\text{not target.off}
197 Revision "Old": 81 vs. Revision "New": 82

197.1 Class: SPECIAL

Routine: copy_data - Precondition changed

```
<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

"Old" Precondition

\[
\text{other} /= \text{Void} \\
\text{source\_index} >= 0 \\
\text{destination\_index} >= 0 \\
n >= 0 \\
\text{source\_index} + n <= \text{other\_count} \\
\text{destination\_index} + n <= \text{count} \\
\text{same\_type (other)}
\]

"New" Precondition

\[
\text{other} /= \text{Void} \\
\text{source\_index} >= 0 \\
\text{destination\_index} >= 0 \\
n >= 0 \\
\text{source\_index} + n <= \text{other\_count} \\
\text{destination\_index} + n <= \text{count} \\
\text{other\_conforms\_to (Current)}
\]

198 Revision "Old": 85 vs. Revision "New": 86

198.1 Class: ANY

Routine: generator - Postcondition changed

```
<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
```

474
"Old" Postcondition

Result /≠ Void

"New" Postcondition

Result /≠ Void
not Result.is_empty

Routine: generating_type - Postcondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
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<td>x</td>
<td>x</td>
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<td>Manual</td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result /≠ Void

"New" Postcondition

Result /≠ Void
not Result.is_empty

199 Revision "Old": 90 vs. Revision "New": 91

199.1 Class: HASH_TABLE

Routine: valid_key - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<tbody>
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<td>Tool</td>
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<td>Manual</td>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

Result

475
200 Revision "Old": 91 vs. Revision "New": 92

200.1 Class: RESIZABLE

Routine: automatic_grow - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{capacity} \geq \text{old} \ \text{capacity} + \text{old} \ \text{capacity} \times \frac{\text{growth\_percentage}}{100} \]

"New" Postcondition

\[ \text{capacity} \geq \text{old} \ \text{capacity} + \text{old} \ \text{additional\_space} \]

201 Revision "Old": 94 vs. Revision "New": 95

201.1 Class: STRING_8

Routine: substring - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
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<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\begin{align*}
\text{Result\_count} > 0 & \implies \text{Result\_item (1)} = \text{item (start\_index)} \\
\text{Result\_count} > 0 & \implies \text{Result\_substring (2, Result\_count).is_equal (substring (start\_index + 1, end\_index))}
\end{align*}
\]
201.2 Class: **STRING**\_**32**
Routine: **substring** - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

"Old" Postcondition

\[
\text{Result.count} > 0 \implies \text{Result.item (1)} = \text{item (start\_index)} \\
\text{Result.count} > 0 \implies \text{Result.substring (2, Result.count).is_equal (substring (start\_index + 1, end\_index))}
\]

"New" Postcondition

202 Revision "Old": 95 vs. Revision "New": 96

202.1 Class: **HASH\_TABLE**
Routine: **make** - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
n < \text{capacity} \\
\text{minimum\_capacity} < \text{capacity} \\
\text{capacity} \geq \text{minimum\_capacity} \\
\text{not special\_status}
\]
"New" Postcondition

\[
\begin{align*}
    n &< \text{capacity} \\
    \text{capacity} &> \text{minimum\_capacity} \\
    \text{not} &\text{ special\_status}
\end{align*}
\]

203 Revision "Old": 107 vs. Revision "New": 108

203.1 Class: BINARY\_SEARCH\_TREE

Routine: has - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
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</tbody>
</table>

"Old" Precondition

\[ v /= \text{Void} \]

"New" Precondition

204 Revision "Old": 111 vs. Revision "New": 112

204.1 Class: IDENTIFIED\_ROUTINES

Routine: eif\_id\_object - Precondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Precondition
"New" Precondition

\[ an_{id} \geq 0 \]

Routine: `eif_object_id_free` - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Precondition

"New" Precondition

\[ an_{id} \geq 0 \]

204.2 Class: IDENTIFIED

Routine: `object_id` - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<tr>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[ id_{object} (\text{Result}) = \text{Current} \]

"New" Postcondition

\[ \text{Result} > 0 \implies id_{object} (\text{Result}) = \text{Current} \]
205 Revision "Old": 113 vs. Revision "New": 114

205.1 Class: IDENTIFIED_ROUTINES

Routine: eif_object_id - Postcondition changed

<table>
<thead>
<tr>
<th>Tags:</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_new</th>
<th>W_new</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result > 0

206 Revision "Old": 114 vs. Revision "New": 115

206.1 Class: STRING_8

Routine: ends_with - Postcondition changed

<table>
<thead>
<tr>
<th>Tags:</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_new</th>
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</tbody>
</table>

"Old" Postcondition

Result = substring (count − s.count + 1, count).is_equal (s)

"New" Postcondition

Result = s.same_string (substring (count − s.count + 1, count))
Routine: starts_with - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Postcondition

Result = substring (1, s.count).is_equal (s)

"New" Postcondition

Result = s.same_string (substring (1, s.count))

206.2 Class: STRING_32

Routine: ends_with - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</tbody>
</table>

"Old" Postcondition

Result = substring (count − s.count + 1, count).is_equal (s)

"New" Postcondition

Result = s.same_string (substring (count − s.count + 1, count))

Routine: starts_with - Postcondition changed

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
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</tbody>
</table>
"Old" Postcondition

Result = substring (1, s.count).is_equal (s)

"New" Postcondition

Result = s.same_string (substring (1, s.count))

207 Revision "Old": 120 vs. Revision "New": 170

207.1 Class: MANAGED_POINTER

Routine: put_real_64 - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition

pos >= 0
(pos + double_bytes) <= count

"New" Precondition

pos >= 0
(pos + real_64_bytes) <= count

Routine: read_real_64 - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Precondition

pos >= 0
(pos + double_bytes) <= count
"New" Precondition

\[ pos \geq 0 \]
\[ (pos + \text{real}_64\_bytes) \leq count \]

Routine: \textit{put\_double} - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
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</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ pos \geq 0 \]
\[ (pos + \text{double\_bytes}) \leq count \]

"New" Precondition

\[ pos \geq 0 \]
\[ (pos + \text{real}_64\_bytes) \leq count \]

Routine: \textit{read\_real} - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
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</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>---------------</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ pos \geq 0 \]
\[ (pos + \text{real\_bytes}) \leq count \]

"New" Precondition

\[ pos \geq 0 \]
\[ (pos + \text{real}_32\_bytes) \leq count \]
Routine: read_real_32 - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_re</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

pos >= 0
(pos + real_bytes) <= count

"New" Precondition

pos >= 0
(pos + real_32_bytes) <= count

Routine: put_real_32 - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_re</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

pos >= 0
(pos + real_bytes) <= count

"New" Precondition

pos >= 0
(pos + real_32_bytes) <= count

Routine: put_array - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_re</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
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</tr>
</tbody>
</table>

484
"Old" Postcondition
\[ \text{data.is_equal}(\text{read_array}(\text{pos}, \text{data.count})) \]

"New" Postcondition
\[ \text{read_array}(\text{pos}, \text{data.count}).\text{is_equal}(\text{data}) \]

**Routine: read_character - Precondition changed**

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<tr>
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<td></td>
<td>x</td>
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<tr>
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</tbody>
</table>

"Old" Precondition
\[ \text{pos} \geq 0 \]
\[ (\text{pos} + \text{character._bytes}) \leq \text{count} \]

"New" Precondition
\[ \text{pos} \geq 0 \]
\[ (\text{pos} + \text{character._bytes}) \leq \text{count} \]

**Routine: put_real - Precondition changed**

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Precondition
\[ \text{pos} \geq 0 \]
\[ (\text{pos} + \text{real._bytes}) \leq \text{count} \]
"New" Precondition

\[ pos \geq 0 \]
\[ (pos + \text{real\_32\_bytes}) \leq count \]

Routine: put_character - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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<th>W</th>
<th>S_{ne}</th>
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<td></td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

\[ pos \geq 0 \]
\[ (pos + \text{character\_bytes}) \leq count \]

"New" Precondition

\[ pos \geq 0 \]
\[ (pos + \text{character\_8\_bytes}) \leq count \]

Routine: read_double - Precondition changed

Tags: Changed

<table>
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<tr>
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<td></td>
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</tbody>
</table>

"Old" Precondition

\[ pos \geq 0 \]
\[ (pos + \text{double\_bytes}) \leq count \]

"New" Precondition

\[ pos \geq 0 \]
\[ (pos + \text{real\_64\_bytes}) \leq count \]
207.2 Class: **TUPLE**

**Routine: put_reference - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
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<th>W</th>
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<tbody>
<tr>
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<td>x</td>
<td>x</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

- **valid_index** (index)
- **is_reference_item** (index)

"New" Precondition

- **valid_index** (index)
- **valid_type_for_index** (v, index)
- **is_reference_item** (index)

207.3 Class: **TWO WAY LIST**

**Invariant changed**

<table>
<thead>
<tr>
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<th>A</th>
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</tbody>
</table>

"Old" Invariant

- **not is_empty implies** (first_element /= Void and last_element /= Void)
- first_element /= Void implies first_element.left = Void
- last_element /= Void implies last_element.right = Void

"New" Invariant

- **not is_empty implies** (first_element /= Void and last_element /= Void)
- \{f: like first_element\} first_element implies f.left = Void
- \{l: like last_element\} last_element implies l.right = Void
207.4 Class: MEM_INFO

Invariant changed

<table>
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</tbody>
</table>

"Old" Invariant

\[ total = free + used + overhead \]

"New" Invariant

\[ total_{64} = free_{64} + used_{64} + overhead_{64} \]

207.5 Class: SPECIAL

Routine: put - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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<th>S</th>
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</tbody>
</table>

"Old" Postcondition

\[ item (i) = v \]

"New" Postcondition

Routine: same_items - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</tbody>
</table>
"Old" Precondition

\[
\text{upper\_bound} >= -1 \\
\text{upper\_bound} < \text{count} \\
\text{other} /= \text{Void} \\
\text{upper\_bound} < \text{other\_count}
\]

"New" Precondition

\[
\text{start\_index} >= 0 \\
\text{start\_index} <= \text{end\_index} + 1 \\
\text{end\_index} < \text{count} \\
\text{other} /= \text{Void} \\
\text{end\_index} < \text{other\_count}
\]

Routine: \text{same\_items} - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<th>C</th>
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<tbody>
<tr>
<td>Tool</td>
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</tbody>
</table>

"Old" Postcondition

\[
\text{upper\_bound} = -1 \implies \text{Result}
\]

"New" Postcondition

\[
(\text{end\_index} < \text{start\_index}) \implies \text{Result}
\]

Routine: \text{clear\_all} - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
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<td>x</td>
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</tr>
<tr>
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<td>x</td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

489
"New" Postcondition

all_default (0, upper)

Routine: all_default - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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<tbody>
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</tr>
</tbody>
</table>

"Old" Precondition

upper_bound \geq -1
upper_bound < count

"New" Precondition

start_index \geq 0
start_index \leq end_index + 1
end_index < count

Routine: all_default - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<th>S_ne</th>
<th>W_ne</th>
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</tbody>
</table>

"Old" Postcondition

upper_bound = -1 implies Result

"New" Postcondition

(\text{end_index} < \text{start_index}) implies Result
Routine: upper - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>$S_{ne}$</th>
<th>$W_{ne}$</th>
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<tbody>
<tr>
<td>Manual</td>
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<td>x</td>
<td>x</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[ \text{lower} \leq \text{Result} + 1 \]

Routine: fill_with - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>$S_{ne}$</th>
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<tbody>
<tr>
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<td></td>
<td>x</td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\begin{align*}
\text{start\_index} & \geq 0 \\
\text{start\_index} & \leq \text{end\_index} \\
\text{end\_index} & < \text{count}
\end{align*}

"New" Precondition

\begin{align*}
\text{start\_index} & \geq 0 \\
\text{start\_index} & \leq \text{end\_index} + 1 \\
\text{end\_index} & < \text{count}
\end{align*}

Routine: valid_index - Postcondition changed

Tags: Added Changed Strengthened

<table>
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<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<th>$S_{ne}$</th>
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</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
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</tr>
</tbody>
</table>
"Old" Postcondition

"New" Postcondition

Result = ((0 <= i) and (i < count))

Routine: capacity - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result >= 0

Routine: resized_area - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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<th>S</th>
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</tbody>
</table>

"Old" Precondition

n > count

"New" Precondition

n >= 0

492
207.6 Class: INTERNAL_HELPER

Routine: is_valid_type_string - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<th>C</th>
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<td></td>
<td></td>
<td></td>
<td>x</td>
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</tr>
</tbody>
</table>

"Old" Precondition

\[ s \neq \text{Void} \]
\[ \text{not } s.\text{is_empty} \]

"New" Precondition

207.7 Class: BOOLEAN_REF

Invariant changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td>x</td>
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</tr>
</tbody>
</table>

"Old" Invariant

\[ \text{is_equal (not (not Current))} \]
\[ \text{not (Current and (not Current))} \]
\[ \text{Current or else (not Current)} \]

"New" Invariant

\[ \text{is_equal (not (not Current))} \]
\[ \text{not (Current and (not Current))} \]
\[ \text{Current or (not Current)} \]
Routine: to_reference - Postcondition changed

Tags: Changed, Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Postcondition

Result \neq Void

"New" Postcondition

Result \neq Void
Result.item = item

Routine: to_integer - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

Result = 0 or Result = 1
item implies Result = 1

"New" Postcondition

not item implies Result = 0
item implies Result = 1
207.8 Class: BINARY_SEARCH_TREE_SET

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[
\text{tree } \neq \text{ Void implies } \text{object\_comparison } = \text{ tree\_object\_comparison}
\]

"New" Invariant

\[
\{ t: \text{like } \text{tree} \} \text{ tree implies } \text{object\_comparison } = t.\text{object\_comparison}
\]

207.9 Class: NATURAL_64_REF

Routine: to_integer_32 - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{item } \leq \text{ feature } \{ \text{INTEGER}\}.\text{max\_value\_to\_natural}_64
\]

"New" Precondition

\[
\text{item } \leq \text{ feature } \{ \text{INTEGER}_32\}.\text{max\_value\_to\_natural}_64
\]
207.10 Class: CHARACTER_32_REF

Routine: natural_32_code - Postcondition changed

Tags: Added Changed Strengthened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result $\geq min\_value$ and Result $\leq max\_value$

207.11 Class: INTEGER_64_REF

Routine: to_integer - Precondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</tr>
</tbody>
</table>

"Old" Precondition

item $\geq$ feature $\{INTEGER\}.min\_value$
n
item $\leq$ feature $\{INTEGER\}.max\_value$

"New" Precondition

item $\geq$ feature $\{INTEGER_32\}.min\_value$
n
item $\leq$ feature $\{INTEGER_32\}.max\_value$
207.12 Class: RECURSIVE_CURSOR_TREE

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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<th>S</th>
<th>W</th>
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<tbody>
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<td></td>
<td></td>
<td></td>
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</tbody>
</table>

"Old" Invariant

not above implies active_parent.child = active

"New" Invariant

not above implies (\{a: like active_parent\} active_parent and then a.child = active)

207.13 Class: ARRAY

Routine: all_default - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

Result = (count = 0 or else ((item (upper) = Void or else item (upper) = item (upper).default) and subarray (lower, upper - 1).all_default))

"New" Postcondition

Result = (count = 0 or else (not \{i: like item\} item (upper) or else i = i.default) and subarray (lower, upper - 1).all_default))
207.14 Class: CHARACTER_8_REF
Routine: code - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
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<td></td>
<td>x</td>
<td>x</td>
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</tbody>
</table>

"Old" Postcondition

"New" Postcondition

Result \geq 0

Result \geq \text{min}\_value \text{ and } Result \leq \text{max}\_value

207.15 Class: BI_LINKABLE
Invariant changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td>Tool</td>
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</tbody>
</table>

"Old" Invariant

(right /= Void) \text{ implies } (right.left = \text{Current})
(left /= Void) \text{ implies } (left.right = \text{Current})

"New" Invariant

\{r: \text{like right}\} right \text{ implies } (r.left = \text{Current})
\{l: \text{like left}\} left \text{ implies } (l.right = \text{Current})
207.16 Class: NATURAL_32_REF

Routine: to_hex_string - Postcondition changed

"Old" Postcondition

```plaintext
Result /= Void
Result.count = (create {PLATFORM}).integer_bits // 4
```

"New" Postcondition

```plaintext
Result /= Void
Result.count = (create {PLATFORM}).integer_32_bits // 4
```

Routine: to_integer_32 - Precondition changed

"Old" Precondition

```plaintext
item <= feature {INTEGER}.max_value.to_natural_32
```

"New" Precondition

```plaintext
item <= feature {INTEGER_32}.max_value.to_natural_32
```
207.17 Class: **LINKED_LIST**

Routine: *put_left* - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</tbody>
</table>

"Old" Postcondition

\[
\text{previous} \neq \text{Void} \\
\text{previous.item} = v
\]

"New" Postcondition

\[
\text{previous} \neq \text{Void} \\
\{q : \text{like previous}\} \text{ previous and then } q.item = v
\]

Routine: *put_right* - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

\[
\text{next} \neq \text{Void} \\
\text{not old before implies } \text{next.item} = v \\
\text{old before implies } \text{active.item} = v
\]

"New" Postcondition

\[
\text{next} \neq \text{Void} \\
\text{not old before implies } (\{n : \text{like next}\} \text{ next and then } n.item = v) \\
\text{old before implies } (\{c : \text{like active}\} \text{ active and then } c.item = v)
\]
207.18 Class: TREE

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
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<th>S</th>
<th>W</th>
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</tbody>
</table>

"Old" Invariant

\[ \text{child-readable implies child.parent} = \text{Current} \]
\[ \text{is_leaf} = (\text{arity} = 0) \]
\[ \text{child.off} = \text{child.before or child.after} \]
\[ \text{child.before} = (\text{child.index} = 0) \]
\[ \text{child.is.first} = (\text{not is_leaf and child.index} = 1) \]
\[ \text{child.is.last} = (\text{not is_leaf and child.index} = \text{child.capacity}) \]
\[ \text{child.after} = (\text{child.index} \geq \text{child.capacity} + 1) \]

"New" Invariant

\[ \text{child-readable implies \{c: like child\} child and then c.parent} = \text{Current} \]
\[ \text{is_leaf} = (\text{arity} = 0) \]
\[ \text{child.off} = \text{child.before or child.after} \]
\[ \text{child.before} = (\text{child.index} = 0) \]
\[ \text{child.is.first} = (\text{not is_leaf and child.index} = 1) \]
\[ \text{child.is.last} = (\text{not is_leaf and child.index} = \text{child.capacity}) \]
\[ \text{child.after} = (\text{child.index} \geq \text{child.capacity} + 1) \]

207.19 Class: HASHABLE

Routine: is_hashable - Postcondition changed

<table>
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<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

\[ \text{Result implies (Current} /= \text{default)} \]
207.20 Class: INTEGER_32_REF

Routine: to_hex_string - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
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</table>

"Old" Postcondition

Result /= Void
Result.count = (create {PLATFORM}).integer_bits // 4

"New" Postcondition

Result /= Void
Result.count = (create {PLATFORM}).integer_32_bits // 4

207.21 Class: EXECUTION_ENVIRONMENT

Routine: put - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

(return_code = 0) implies (equal (value, get (key)) or else (value.is_empty and then (get (key) = Void)))

"New" Postcondition

(return_code = 0) implies (equal (get (key), value) or else (value.is_empty and then (get (key) = Void)))

502
### 207.22 Class: Fixed_Tree

#### Routine: put_left - Postcondition changed

<table>
<thead>
<tr>
<th>Tag: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
left_{\text{sibling}}.\text{item} = v
\]

"New" Postcondition

\[
\{ l: \text{like left}_{\text{sibling}} \} \left( \text{left}_{\text{sibling}} \text{ and then } l.item = v \right)
\]

#### Routine: put_right - Postcondition changed

<table>
<thead>
<tr>
<th>Tag: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
right_{\text{sibling}}.\text{item} = v
\]

"New" Postcondition

\[
\{ r: \text{like right}_{\text{sibling}} \} \left( \text{right}_{\text{sibling}} \text{ and then } r.item = v \right)
\]

### 207.23 Class: Any

#### Routine: deep_equal - Postcondition changed

<table>
<thead>
<tr>
<th>Tag: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

503
"Old" Postcondition

\[
\begin{align*}
\text{standard_equal} \ (\text{some}, \text{other}) &\implies \text{Result} \\
(\text{some} = \text{Void}) &\implies (\text{Result} = (\text{other} = \text{Void})) \\
(\text{Result} \text{ and } (\text{some} /= \text{Void})) &\implies \text{some.same_type} (\text{other}) \\
\text{Result} &\implies \text{deep_equal} (\text{other}, \text{some})
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
\text{standard_equal} \ (\text{some}, \text{other}) &\implies \text{Result} \\
(\text{some} = \text{Void}) &\implies (\text{Result} = (\text{other} = \text{Void})) \\
(\text{Result} \text{ and } (\text{some} /= \text{Void})) &\implies (\text{other} /= \text{Void} \text{ and then } \text{some.same_type} (\text{other})) \\
\text{Result} &\implies \text{deep_equal} (\text{other}, \text{some})
\end{align*}
\]

208 Revision "Old": 185 vs. Revision "New": 186

208.1 Class: STRINGGENERAL

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S ne</th>
<th>W ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\textbf{not is.immutable}

"New" Invariant

208.2 Class: STRING.8

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S ne</th>
<th>W ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

504
"Old" Invariant

extendible
not object_comparison
index_set.count = count
area /= Void

"New" Invariant

extendible
not object_comparison

Routine: as_lower - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
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<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
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<td></td>
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<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result.count = count
count > 0 implies Result.item (1) = item (1).as_lower
count > 1 implies Result.substring (2, count).is_equal (substring (2, count).as_lower)

"New" Postcondition

Routine: as_upper - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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<tr>
<td>Tool</td>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result.count = count
count > 0 implies Result.item (1) = item (1).as_upper
\[ \text{count} > 1 \implies \text{Result}.\text{substring}(2, \text{count}).\text{is_equal}(\text{substring}(2, \text{count}).\text{as_upper}) \]

"New" Postcondition

**Routine: mirrored - Postcondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

**Result.count = count**

"New" Postcondition

**Routine: make_from_cil - Precondition changed**

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
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<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

**feature \{PLATFORM\}.is_dotnet**

"New" Precondition
**Routine: prepend - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
<tr>
<td>R</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td></td>
</tr>
<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
</tr>
<tr>
<td>S_{ne}</td>
<td>W_{ne}</td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{count} = \text{old} \ (\text{count} + \text{s.count}) \\
\text{elks\_checking\ implies\ \text{string\_is\_equal}\ (\text{old} \ (\text{s.twin}) + \text{old} \ \text{substring} \ (1, \ \text{count}))}
\]

"New" Postcondition

\[
\text{count} = \text{old} \ (\text{count} + \text{s.count}) \\
\text{elks\_checking\ implies\ \text{string\_is\_equal}\ (\text{old} \ (\text{s.twin\_as\_string\_8}) + \text{old} \ \text{substring} \ (1, \ \text{count}))}
\]

**Routine: make_from_c - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
<tr>
<td>R</td>
<td>x</td>
</tr>
<tr>
<td>C</td>
<td>x</td>
</tr>
<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
</tr>
<tr>
<td>S_{ne}</td>
<td>W_{ne}</td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{e\_string} \neq \text{default\_pointer}
\]

"New" Precondition

**Routine: infix ""+ - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>x</td>
</tr>
<tr>
<td>R</td>
<td>x</td>
</tr>
<tr>
<td>C</td>
<td>x</td>
</tr>
<tr>
<td>S</td>
<td></td>
</tr>
<tr>
<td>W</td>
<td></td>
</tr>
<tr>
<td>S_{ne}</td>
<td>W_{ne}</td>
</tr>
</tbody>
</table>

Tags: Changed

507
"Old" Precondition

s /= Void

"New" Precondition

Routine: infix "" + - Postcondition changed

Tags: Removed Changed Weakened

\[
\begin{array}{cccccc}
    & A & R & C & S & W & S_{ne} & W_{ne} \\
Tool & x & x & x & & & & \\
Manual & & & & & & & \\
\end{array}
\]

"Old" Postcondition

Result /= Void

\[
\text{Result.count} = \text{count} + s.\text{count} \\
elks\_checking \ implies \ Result.\text{substring}(1, \ \text{count}).\text{is\_equal}(\text{Current}) \\
elks\_checking \ implies \ Result.\text{substring}(\text{count} + 1, \ \text{count} + s.\text{count}).\text{same\_string}(s)
\]

"New" Postcondition

208.3 Class: STRING_32

Invariant changed

Tags: Changed Weakened NEWeaker

\[
\begin{array}{cccccc}
    & A & R & C & S & W & S_{ne} & W_{ne} \\
Tool & x & x & x & & & & \\
Manual & & & & & & & \\
\end{array}
\]

"Old" Invariant

extendible

not object\_comparison

index\_set.count = count

area /= Void
"New" Invariant

extendible
not object_comparison

Routine: as_lower - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S ne</th>
<th>W ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

is_valid_as_string_8

"New" Precondition

Routine: as_lower - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S ne</th>
<th>W ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
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<td>x</td>
<td></td>
<td>x</td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result.count = count

count > 0 implies Result.item (1) = item (1).as_lower

count > 1 implies Result.substring (2, count).is_equal (substring (2, count).as_lower)

"New" Postcondition
**Routine: as_upper - Precondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
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<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

is\_valid\_as\_string\_8

"New" Precondition

**Routine: as_upper - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result\_count = count

count > 0 implies Result\_item (1) = item (1).as\_upper

count > 1 implies Result\_substring (2, count).is\_equal (substring (2, count).as\_upper)

"New" Postcondition

**Routine: mirrored - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"New" Postcondition
"Old" Postcondition

\[ \text{Result.count} = \text{count} \]

"New" Postcondition

Routine: make_from_cil - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

feature \{PLATFORM\}.is_dotnet

"New" Precondition

Routine: prepend - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{count} = \text{old} \left( \text{count} + s.\text{count} \right) \]
\[ \text{elks_checking implies} \ \text{string.is_equal} \left( \text{old} \ (s.\text{twin}) + \text{old} \ \text{substring} \ (1, \text{count}) \right) \]

"New" Postcondition

\[ \text{count} = \text{old} \left( \text{count} + s.\text{count} \right) \]
\[ \text{elks_checking implies} \ \text{string.is_equal} \left( \text{old} \ (s.\text{twin}.as_string.32) + \text{old} \ \text{substring} \ (1, \text{count}) \right) \]
Routine: `make_from_c` - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ e_{\text{string}} \neq \text{default\_pointer} \]

"New" Precondition

Routine: `infix `"`` +` - Precondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td>Manual</td>
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<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ s \neq \text{Void} \]

"New" Precondition

Routine: `infix `"`` +` - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
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<tr>
<td>Tool</td>
<td>x</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition
\[ \text{Result} \neq \text{Void} \\]
\[ \text{Result}.\text{count} = \text{count} + s.\text{count} \]
\[ \text{elks}_\text{checking} \text{ implies } \text{Result}.\text{substring} (1, \text{count}).\text{is_equal} (\text{Current}) \]
\[ \text{elks}_\text{checking} \text{ implies } \text{Result}.\text{substring} (\text{count} + 1, \text{count} + s.\text{count}).\text{same_string} (s) \]

"New" Postcondition

209 Revision "Old": 187 vs. Revision "New": 188

209.1 Class: IDENTIFIED_ROUTINES

Routine: eif.object_id - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
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<td></td>
</tr>
<tr>
<td>Manual</td>
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<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result > 0

"New" Postcondition

Result > 0
\[ eif\_id\_object (\text{Result}) = an\_object \]

Routine: eif.object_id_free - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
<td>x</td>
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<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

513
"New" Postcondition

\[ eif.id\_object (an\_id) = \text{Void} \]

210 Revision "Old": 189 vs. Revision "New": 190

210.1 Class: BOOLEAN_REF

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

\[
\text{is\_equal (not \ (not Current))}
\]
\[
\text{not \ (Current and \ (not Current))}
\]
\[
\text{Current or \ (not Current)}
\]

"New" Invariant

\[
\text{(not \ (not Current)) . is\_equal \ (Current)}
\]
\[
\text{not \ ((not Current) \ and \ Current)}
\]
\[
\text{(not Current) \ or \ Current}
\]

211 Revision "Old": 190 vs. Revision "New": 191

211.1 Class: HASH_TABLE

Routine: force - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
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</tr>
</tbody>
</table>
"Old" Precondition

True

"New" Precondition

212 Revision "Old": 192 vs. Revision "New": 193

212.1 Class: READABLE_STRING_8

Routine: valid_index - Postcondition changed

Tags: Added, Changed, Strengthened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\[
\text{Result} = (1 \leq i \text{ and } i \leq \text{count})
\]

212.2 Class: READABLE_STRING_32

Routine: to_boolean - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

(\[\text{Result} = \text{true}\_\text{constant. same\_string (as\_lower)} \] or (not \[\text{Result} = \text{false}\_\text{constant. same\_string (as\_lower)}\])
"New" Postcondition

\[(\text{Result} = \text{as}\_\text{lower}, \text{same}\_\text{string} (\text{true}\_\text{constant})) \text{ or (not Result} = \text{as}\_\text{lower}.
\text{same}\_\text{string} (\text{false}\_\text{constant}))\]

**Routine: valid_index - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
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<td>x</td>
<td>x</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

**Routine: out - Postcondition changed**

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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<th>S</th>
<th>W</th>
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<tbody>
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<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

**Result \neq Void**
\[\text{same}\_\text{type} (\text{""}) \text{ implies Result}\_\text{same}\_\text{string} (\text{Current})\]

"New" Postcondition

**Result \neq Void**
\[\text{same}\_\text{type} (\text{""}) \text{ implies same}\_\text{string} (\text{Result})\]
213 Revision "Old": 196 vs. Revision "New": 197

213.1 Class: SPECIAL

Routine: same_items - Precondition changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tr>
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<tr>
<td>Manual</td>
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<td></td>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Precondition

\[
\begin{align*}
\text{start\_index} & \geq 0 \\
\text{start\_index} & \leq \text{end\_index} + 1 \\
\text{end\_index} & < \text{count} \\
\text{other} & \neq \text{Void} \\
\text{end\_index} & < \text{other\_count}
\end{align*}
\]

"New" Precondition

\[
\begin{align*}
\text{other} & \neq \text{Void} \\
\text{source\_index} & \geq 0 \\
\text{destination\_index} & \geq 0 \\
n & \geq 0 \\
\text{source\_index} + n & \leq \text{other\_count} \\
\text{destination\_index} + n & \leq \text{count}
\end{align*}
\]

Routine: same_items - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</tr>
</tbody>
</table>

"Old" Postcondition

\((\text{end\_index} < \text{start\_index}) \implies \text{Result})\)

"New" Postcondition

\((n = 0) \implies \text{Result})\)
### Routine: non_overlapping_move - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>(S_{ne})</th>
<th>(W_{ne})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
<td></td>
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<td>Manual</td>
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</tr>
</tbody>
</table>

**"Old" Postcondition**

**"New" Postcondition**

same\_items (\texttt{Current}, source\_index, destination\_index, n)

### Routine: aliased_resized_area - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>(S_{ne})</th>
<th>(W_{ne})</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td>x</td>
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<td>Manual</td>
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<td></td>
</tr>
</tbody>
</table>

**"Old" Postcondition**

**"New" Postcondition**

\texttt{Result} /= Void
\texttt{Result.count} = n

\texttt{Result} /= Void
\texttt{Result.count} = n
\texttt{Result.same_items (old twin, 0, 0, old count)}

### Routine: overlapping_move - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>(S_{ne})</th>
<th>(W_{ne})</th>
</tr>
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<tbody>
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<td>x</td>
<td>x</td>
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</tr>
</tbody>
</table>
"Old" Postcondition

"New" Postcondition

.same_items (old twin, source_index, destination_index, n)

Routine: resized_area - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<td></td>
<td>x</td>
<td></td>
<td>x</td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

Result /= Void
Result /= Current
Result.count = n

"New" Postcondition

Result /= Void
Result /= Current
Result.count = n
Result.same_items (Current, 0, 0, n.min (old count))

Routine: move_data - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
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<td>x</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

.same_items (old twin, source_index, destination_index, n)
Routine: copy_data - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tr>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

"New" Postcondition

\textit{same\_items (other, source\_index, destination\_index, n)}

214 Revision "Old": 198 vs. Revision "New": 199

214.1 Class: ARGUMENTS

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
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<td>x</td>
<td></td>
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</tbody>
</table>

"Old" Invariant

"New" Invariant

\textit{argument\_array.is\_equal (internal\_argument\_array)}

Routine: argument\_array - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<td>x</td>
<td>x</td>
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</tr>
</tbody>
</table>

520
"Old" Postcondition

\[
\text{Result } /= \text{ Void}
\]

"New" Postcondition

\[
\text{Result } /= \text{ Void} \\
\text{Result}.\text{object\_comparison}
\]

215 Revision "Old": 201 vs. Revision "New": 202

215.1 Class: SPECIAL

Routine: same\_items - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td>x</td>
<td></td>
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</tr>
</tbody>
</table>

"Old" Precondition

\[
\text{other } /= \text{ Void} \\
\text{source\_index } >= 0 \\
\text{destination\_index } >= 0 \\
\text{n } >= 0 \\
\text{source\_index + n } <= \text{ other\_count} \\
\text{destination\_index + n } <= \text{ count}
\]

"New" Precondition

\[
\text{other } /= \text{ Void} \\
\text{other\_index } >= 0 \\
\text{current\_index } >= 0 \\
\text{n } >= 0 \\
\text{other\_index + n } <= \text{ other\_count} \\
\text{current\_index + n } <= \text{ count}
\]
216 Revision "Old": 203 vs. Revision "New": 204

216.1 Class: UNIX_FILE_INFO

Routine: is_access_executable - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
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</tbody>
</table>

"Old" Precondition

file_name /= Void

"New" Precondition

Routine: is_access_readable - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</tbody>
</table>

"Old" Precondition

file_name /= Void

"New" Precondition

Routine: is_access_writable - Precondition changed

<table>
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<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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</tbody>
</table>

"Old" Precondition

file_name /= Void

"New" Precondition
217 Revision "Old": 218 vs. Revision "New": 219

217.1 Class: ROUTINE

Routine: set_target - Precondition changed

Tags: Changed Weakened NEWer

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_re</th>
<th>W_re</th>
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<td></td>
<td>x</td>
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</tbody>
</table>

"Old" Precondition

- a_target /= Void
- is_target_closed
- target /= Void
- target.same_type (a_target)

"New" Precondition

- a_target /= Void
- is_target_closed
- target /= Void

218 Revision "Old": 248 vs. Revision "New": 249

218.1 Class: TYPE

Routine: adapt - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>
"Old" Postcondition

\[ \text{equal} (\text{Result}, \ g) \]

"New" Postcondition

\[ \text{Result} \sim g \]

218.2 Class: MANAGED\_POINTER

Routine: put\_array - Postcondition changed

```
<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
</tr>
</tbody>
</table>
```

"Old" Postcondition

\[ \text{read\_array (pos, data.count).is\_equal (data)} \]

"New" Postcondition

\[ \text{read\_array (pos, data.count) \sim data} \]

218.3 Class: LINEAR

Routine: search - Postcondition changed

```
<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</tr>
</tbody>
</table>
```

"Old" Postcondition

\[ \text{(not exhausted and object\_comparison)} \implies \text{equal (v, item)} \]
\[ \text{(not exhausted and not object\_comparison)} \implies v = \text{item} \]
"New" Postcondition

\[
\text{not exhausted and object\_comparison} \implies v \sim \text{item} \\
\text{not exhausted and not object\_comparison} \implies v = \text{item}
\]

218.4 Class: READABLE\_STRING\_8

Routine: same\_string - Postcondition changed

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</thead>
<tbody>
<tr>
<td>Tool</td>
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<td>Manual</td>
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</tbody>
</table>

"Old" Postcondition

\[
\text{Result} = \text{string\_is\_equal (other\_string)}
\]

"New" Postcondition

\[
\text{Result} = (\text{string} \sim \text{other\_string})
\]

Routine: substring\_index\_in\_bounds - Postcondition changed

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<tr>
<td>Tool</td>
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<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{Result} > 0 \implies \text{other\_is\_equal (substring (Result, Result + other\_count - 1))}
\]

"New" Postcondition

\[
\text{Result} > 0 \implies \text{other} \sim \text{substring (Result, Result + other\_count - 1)}
\]
Routine: string_representation - Postcondition changed

"Old" Postcondition

\[ \text{Result} \neq \text{Void} \]
\[ \text{Result}.\text{same_type} (\text{create} \{\text{STRING}_8\}.\text{make_empty}) \]
\[ \text{count} > 0 \implies \text{Result}.\text{item} (1) = \text{item} (1) \]
\[ \text{count} > 1 \implies \text{Result} \cdot \text{substring} (2, \text{count}).\text{is_equal} (\text{substring} (2, \text{count}).\text{string}) \]

"New" Postcondition

\[ \text{Result} \neq \text{Void} \]
\[ \text{Result}.\text{same_type} (\text{create} \{\text{STRING}_8\}.\text{make_empty}) \]
\[ \text{count} > 0 \implies \text{Result}.\text{item} (1) = \text{item} (1) \]
\[ \text{count} > 1 \implies \text{Result} \cdot \text{substring} (2, \text{count}) \sim \text{substring} (2, \text{count}).\text{string} \]

Routine: is_case_insensitive_equal - Postcondition changed

"Old" Postcondition

\[ \text{Result} \implies \text{other}.\text{is_case_insensitive_equal} (\text{Current}) \]
\[ \text{standard_is_equal} (\text{other}) \implies \text{Result} \]
\[ \text{as_lower.is_equal} (\text{other.as_lower}) \implies \text{Result} \]

"New" Postcondition

\[ \text{Result} \implies \text{other}.\text{is_case_insensitive_equal} (\text{Current}) \]
\[ \text{standard_is_equal} (\text{other}) \implies \text{Result} \]
\[ \text{as_lower} \sim \text{other.as_lower} \implies \text{Result} \]
Routine: string - Postcondition changed

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<th>A</th>
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"Old" Postcondition

Result /= Void
Result.same_type (create {STRING_8}.make_empty)
count > 0 implies Result.item (1) = item (1)
count > 1 implies Result.substring (2, count).is_equal (substring (2, count).string)

"New" Postcondition

Result /= Void
Result.same_type (create {STRING_8}.make_empty)
count > 0 implies Result.item (1) = item (1)
count > 1 implies Result.substring (2, count) ~ substring (2, count).string

218.5 Class: FILE

Routine: change_name - Postcondition changed

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"Old" Postcondition

name.is_equal (new_name)

"New" Postcondition

name ~ new_name
218.6 Class: INTEGER_INTERVAL

Invariant changed

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<th>A</th>
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"Old" Invariant

upper_{defined} \text{ and } lower_{defined} \implies count = upper - lower + 1
\text{equal}\ (\text{index\_set}\ , \text{Current})
upper_{defined} \text{ and } lower_{defined}

"New" Invariant

upper_{defined} \text{ and } lower_{defined} \implies count = upper - lower + 1
index\_set \sim \text{Current}
upper_{defined} \text{ and } lower_{defined}

Routine: index\_set - Postcondition changed

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"Old" Postcondition

equal\ (\text{Result}\ , \text{Current})

"New" Postcondition

\text{Result} \sim \text{Current}
218.7 Class: STRING_GENERAL

Routine: append - Postcondition changed

Tags: Changed

"Old" Postcondition

\[ \text{count} = \text{old count} + \text{old s.count} \]
\[ \text{elks\_checking implies to\_string\_32.\_is\_equal (old to\_string\_32.twin + old s.to\_string\_32.twin)} \]

"New" Postcondition

\[ \text{count} = \text{old count} + \text{old s.count} \]
\[ \text{elks\_checking implies to\_string\_32 \sim (old to\_string\_32.twin + old s.to\_string\_32.twin)} \]

Routine: append\_code - Postcondition changed

Tags: Changed

"Old" Postcondition

\[ \text{code (count)} = c \]
\[ \text{count} = \text{old count} + 1 \]
\[ \text{elks\_checking implies substring (1, count - 1).\_is\_equal (old twin)} \]

"New" Postcondition

\[ \text{code (count)} = c \]
\[ \text{count} = \text{old count} + 1 \]
\[ \text{elks\_checking implies substring (1, count - 1) \sim (old twin)} \]
218.8 Class: FORMAT_INTEGER

Routine: sign_dr_cr - Postcondition changed

"Old" Postcondition

\[\text{sign_string} \text{.is_equal} ("DR CR")\]

"New" Postcondition

\[\text{sign_string} \sim "DR CR"\]

Routine: sign_floatin_dollar_signed - Postcondition changed

"Old" Postcondition

\[\text{sign_string} \text{.is_equal} ("-\$+\$")\]

"New" Postcondition

\[\text{sign_string} \sim "-\$+\$"\]

Routine: sign_floatin_dollar - Postcondition changed

"Old" Postcondition

\[\text{sign_string} \text{.is_equal} ("\$+\$")\]

"New" Postcondition

\[\text{sign_string} \sim "\$+\$""]
"Old" Postcondition

\[ \text{sign_string.is_equal ("$$\$\$\$"\}) } \]

"New" Postcondition

\[ \text{sign_string \sim "$$\$\$\$"\} } \]

Routine: \text{sign_normal} - Postcondition changed

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"Old" Postcondition

\[ \text{sign_string.is_equal ("\- +"\}) } \]

"New" Postcondition

\[ \text{sign_string \sim \"\- +"\} } \]

Routine: \text{set_sign} - Postcondition changed

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"Old" Postcondition

\[ \text{sign_string.is_equal (s\}) } \]

"New" Postcondition

\[ \text{sign_string \sim s\} } \]
Routine: sign_cr_dr - Postcondition changed

"Old" Postcondition

sign_string.is_equal ("CR DR")

"New" Postcondition

sign_string ~ "CR DR"

218.9 Class: READABLE_STRING_32
Routine: same_string - Postcondition changed

"Old" Postcondition

Result = string.is_equal (other.string)

"New" Postcondition

Result = (string ~ other.string)

Routine: substring_index_in_bounds - Postcondition changed

"Old" Postcondition

Result = string.is_equal (other.string)

"New" Postcondition

Result = (string ~ other.string)
"Old" Postcondition
\[
\text{Result} > 0 \implies \text{other}.\text{is}_\text{equal} (\text{substring} (\text{Result}, \text{Result} + \text{other}.\text{count} - 1))
\]

"New" Postcondition
\[
\text{Result} > 0 \implies \text{other} \sim \text{substring} (\text{Result}, \text{Result} + \text{other}.\text{count} - 1)
\]

Routine: string_representation - Postcondition changed

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"Old" Postcondition
\[
\text{Result} \neq \text{Void} \\
\text{Result}.\text{same}_\text{type} (\text{create} \{\text{STRING}_32\}.\text{make}_\text{empty}) \\
\text{count} > 0 \implies \text{Result}.\text{item} (1) = \text{item} (1) \\
\text{count} > 1 \implies \text{Result}.\text{substring} (2, \text{count}).\text{is}_\text{equal} (\text{substring} (2, \text{count}).\text{string})
\]

"New" Postcondition
\[
\text{Result} \neq \text{Void} \\
\text{Result}.\text{same}_\text{type} (\text{create} \{\text{STRING}_32\}.\text{make}_\text{empty}) \\
\text{count} > 0 \implies \text{Result}.\text{item} (1) = \text{item} (1) \\
\text{count} > 1 \implies \text{Result}.\text{substring} (2, \text{count}) \sim \text{substring} (2, \text{count}).\text{string}
\]

Routine: is_case_insensitive_equal - Postcondition changed

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"Old" Postcondition
\[
\text{Result} \implies \text{other}.\text{is}_\text{case}_\text{insensitive}_\text{equal} (\text{Current})
\]
standard_is_equal (other) implies Result
as_lower.is_equal (other.as_lower) implies Result

"New" Postcondition

Result implies other.is_case_insensitive_equal (Current)
standard_is_equal (other) implies Result
as_lower ~ other.as_lower implies Result

Routine: string - Postcondition changed

Tags: Changed

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"Old" Postcondition

Result /= Void
Result.same_type (create {STRING_32}.make_empty)
count > 0 implies Result.item (1) = item (1)
count > 1 implies Result.substring (2, count).is_equal (substring (2, count).string)

"New" Postcondition

Result /= Void
Result.same_type (create {STRING_32}.make_empty)
count > 0 implies Result.item (1) = item (1)
count > 1 implies Result.substring (2, count) ~ substring (2, count).string

218.10 Class: BOOLEAN_REF

Invariant changed

Tags: Changed

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534
"Old" Invariant

\[
(\text{not } (\text{not Current})) \land \text{is} \_\text{equal} (\text{Current}) \\
\text{not } ((\text{not Current}) \land \text{Current}) \\
(\text{not Current}) \lor \text{Current}
\]

"New" Invariant

\[
(\text{not } (\text{not Current})) \land \neg (\text{Current}) \\
\text{not } ((\text{not Current}) \land \text{Current}) \\
(\text{not Current}) \lor \text{Current}
\]

218.11 Class: **COMPARABLE**

Routine: three\_way\_comparison - Postcondition changed

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<td>Manual</td>
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</table>

"Old" Postcondition

\[
(\text{Result} = 0) = \text{is} \_\text{equal} (\text{other}) \\
(\text{Result} = -1) = (\text{Current} < \text{other}) \\
(\text{Result} = 1) = (\text{Current} > \text{other})
\]

"New" Postcondition

\[
(\text{Result} = 0) = (\text{Current} \land \neg \text{other}) \\
(\text{Result} = -1) = (\text{Current} < \text{other}) \\
(\text{Result} = 1) = (\text{Current} > \text{other})
\]

Routine: is\_less\_equal - Postcondition changed

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</tbody>
</table>

535
"Old" Postcondition

\[ \text{Result} = ((\text{Current} < \text{other}) \text{ or } \text{is_equal (other)}) \]

"New" Postcondition

\[ \text{Result} = ((\text{Current} < \text{other}) \text{ or } (\text{Current} \sim \text{other})) \]

218.12 Class: DIRECTORY
Routine: change_name - Postcondition changed

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<tr>
<th>A</th>
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"Old" Postcondition

\[ \text{name.is_equal (new_name)} \]

"New" Postcondition

\[ \text{name \sim new_name} \]

218.13 Class: ROUTINE
Routine: set_operands - Postcondition changed

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"Old" Postcondition

\[ (\text{operands} \neq \text{Void} \text{ implies } \text{equal (operands, args)}) \text{ or } (\text{operands} = \text{Void} \text{ implies } (\text{args} = \text{Void} \text{ or else args.is_empty})) \]
"New" Postcondition

\[(\text{operands} \neq \text{Void}) \implies (\text{operands} \sim \text{args}) \text{ or } (\text{operands} = \text{Void} \implies (\text{args} = \text{Void} \text{ or else } \text{args.is_empty}))\]

218.14 Class: **STRING.8**

Routine: append_character - Postcondition changed

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"Old" Postcondition

\[
\text{item (count)} = c \\
\text{count} = \text{old count} + 1 \\
\text{elks_checking implies substring (1, count – 1).is_equal (old twin)}
\]

"New" Postcondition

\[
\text{item (count)} = c \\
\text{count} = \text{old count} + 1 \\
\text{elks_checking implies substring (1, count – 1) \sim (old twin)}
\]

Routine: append_string - Postcondition changed

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"Old" Postcondition

\[
\text{s \neq Void implies (elks_checking implies is_equal (old twin + old s.twin))}
\]

"New" Postcondition

\[
\text{s \neq Void implies (elks_checking implies Current \sim (old twin + old s.twin))}
\]

537
Routine: left_adjust - Postcondition changed

"Old" Postcondition

\[
\begin{align*}
  \text{count} & \leq \text{old count} \\
  \text{not is_empty} & \implies \text{not item (1).is_space} \\
  \text{elks_checking} & \implies \text{is_equal ((old twin).substring (old count – count + 1, old count))}
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
  \text{count} & \leq \text{old count} \\
  \text{not is_empty} & \implies \text{not item (1).is_space} \\
  \text{elks_checking} & \implies \text{Current \sim ((old twin).substring (old count – count + 1, old count))}
\end{align*}
\]

Routine: head - Postcondition changed

"Old" Postcondition

\[
\begin{align*}
  \text{count} & = n.\min (\text{old count}) \\
  \text{elks_checking} & \implies \text{is_equal (old substring (1, n.\min (\text{count}))}
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
  \text{count} & = n.\min (\text{old count}) \\
  \text{elks_checking} & \implies \text{Current \sim (old substring (1, n.\min (\text{count}))}
\end{align*}
\]

538
Routine: append - Postcondition changed

"Old" Postcondition
\[
\text{count} = \text{old count} + \text{old s.count} \\
\text{elks.checking implies is_equal (old twin + old s.twin)}
\]

"New" Postcondition
\[
\text{count} = \text{old count} + \text{old s.count} \\
\text{elks.checking implies Current \sim (old twin + old s.twin)}
\]

Routine: remove_head - Postcondition changed

"Old" Postcondition
\[
\text{elks.checking implies is_equal (old substring (n.min (count) + 1, count))}
\]

"New" Postcondition
\[
\text{elks.checking implies Current \sim (old substring (n.min (count) + 1, count))}
\]

Routine: remove_substring - Postcondition changed

"Old" Postcondition
\[
\text{elks.checking implies is_equal (old substring (n.min (count) + 1, count))}
\]

"New" Postcondition
\[
\text{elks.checking implies Current \sim (old substring (n.min (count) + 1, count))}
\]
"Old" Postcondition

\[
elks\_checking \text{ implies } \text{is\_equal (}\text{old substring}\ (1, \text{start\_index} - 1) + \text{old substring}\ (\text{end\_index} + 1, \text{count}))
\]

"New" Postcondition

\[
elks\_checking \text{ implies } \text{Current} \sim (\text{old substring}\ (1, \text{start\_index} - 1) + \text{old substring}\ (\text{end\_index} + 1, \text{count}))
\]

Routine: tail - Postcondition changed

<table>
<thead>
<tr>
<th>Tag: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
count = n.\text{min}\ (\text{old count})
\]

\[
elks\_checking \text{ implies } \text{is\_equal (}\text{old substring}\ (\text{count} - n.\text{min}\ (\text{count}) + 1, \text{count}))
\]

"New" Postcondition

\[
count = n.\text{min}\ (\text{old count})
\]

\[
elks\_checking \text{ implies } \text{Current} \sim (\text{old substring}\ (\text{count} - n.\text{min}\ (\text{count}) + 1, \text{count}))
\]

Routine: subcopy - Postcondition changed

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<th>C</th>
<th>S</th>
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<th>S_{ne}</th>
<th>W_{ne}</th>
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<td>Tool</td>
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<td>x</td>
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<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
count = \text{old count}
\]

\[
elks\_checking \text{ implies } \text{is\_equal (}\text{old substring}\ (1, \text{index\_pos} - 1) + \text{old other\_substring}\ (\text{start\_pos}, \text{end\_pos}) + \text{old substring}\ (\text{index\_pos} + (\text{end\_pos} - \text{start\_pos} + 1), \text{count})))
\]
"New" Postcondition

\[\text{count} = \text{old count}\]
\[\text{elks checking implies } (\text{Current } \uparrow \text{old substring } (1, \text{index pos} - 1) + \text{old other. substring } (\text{start pos} , \text{end pos}) + \text{old substring } (\text{index pos} + (\text{end pos} - \text{start pos} + 1), \text{count}))\]

Routine: right_adjust - Postcondition changed

<table>
<thead>
<tr>
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<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[\text{count} \leq \text{old count}\]
\[\text{(count } \neq 0\text{) implies ((item (count) } \neq ‘’\text{) and (item (count) } \neq ‘%T’\text{) and (item (count) } \neq ‘%R’\text{) and (item (count) } \neq ‘%N’\text{})}\]
\[\text{elks checking implies } \text{is_equal } ((\text{old twin}).\text{substring } (1, \text{count}))\]

"New" Postcondition

\[\text{count} \leq \text{old count}\]
\[\text{(count } \neq 0\text{) implies ((item (count) } \neq ‘’\text{) and (item (count) } \neq ‘%T’\text{) and (item (count) } \neq ‘%R’\text{) and (item (count) } \neq ‘%N’\text{})}\]
\[\text{elks checking implies } \text{Current } \uparrow ((\text{old twin}).\text{substring } (1, \text{count}))\]

Routine: insert_string - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[\text{elks checking implies } \text{is_equal } (\text{old substring } (1, i - 1) + \text{old } (s.twin) + \text{old substring } (i, \text{count}))\]

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"New" Postcondition

\[
\text{elks\_checking\ implies\ (Current} \sim (\text{old\ substring\ } (1, i - 1) + \text{old\ } s.\text{twin} + \text{old\ substring\ } (i, \text{count})))
\]

Routine: replace\_substring - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
<td>Manual</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
count = \text{old\ count} + \text{old\ } s.\text{count} - \text{end\_index} + \text{start\_index} - 1
\]

\[
\text{elks\_checking\ implies\ (is\_equal\ (old\ substring\ } (1, \text{start\_index} - 1) + s + \text{substring\ } (\text{end\_index} + 1, \text{count})))
\]

"New" Postcondition

\[
count = \text{old\ count} + \text{old\ } s.\text{count} - \text{end\_index} + \text{start\_index} - 1
\]

\[
\text{elks\_checking\ implies\ (Current} \sim (\text{old\ substring\ } (1, \text{start\_index} - 1) + s + \text{substring\ } (\text{end\_index} + 1, \text{count})))
\]

Routine: put - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
count = \text{old\ count}
\]

\[
\text{elks\_checking\ implies\ substring\ } (1, i - 1).\text{is\_equal\ (old\ substring\ } (1, i - 1))
\]

\[
\text{elks\_checking\ implies\ substring\ } (i + 1, \text{count}).\text{is\_equal\ (old\ substring\ } (i + 1, \text{count}))
\]
"New" Postcondition

\[
\text{count} = \text{old count}
\]

\[
\text{elks\_checking implies substring (1, i - 1) \neg (old substring (1, i - 1))}
\]

\[
\text{elks\_checking implies substring (i + 1, count) \neg (old substring (i + 1, count))}
\]

Routine: to\_upper - Postcondition changed

<table>
<thead>
<tr>
<th>Tag: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{elks\_checking implies is\_equal (old as\_upper)}
\]

"New" Postcondition

\[
\text{elks\_checking implies Current \neg (old as\_upper)}
\]

Routine: set - Postcondition changed

<table>
<thead>
<tr>
<th>Tag: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>x</td>
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<td></td>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{is\_equal (t.substring (n1, n2))}
\]

"New” Postcondition

\[
\text{Current \neg (t.substring (n1, n2))}
\]
### Routine: remove_tail - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**"Old" Postcondition**

\[
\text{elks\_checking \ implies \ is\_equal (old \ substring (1, \ count - \ n.min (count)))}
\]

**"New" Postcondition**

\[
\text{elks\_checking \ implies \ Current \ \sim (old \ substring (1, \ count - \ n.min (count)))}
\]

### Routine: prepend - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**"Old" Postcondition**

\[
\text{count = old (count + s.count)}
\]

\[
\text{elks\_checking \ implies \ string.is\_equal (old (s.twin.as\_string.s) + old \ substring (1, \ count))}
\]

**"New" Postcondition**

\[
\text{count = old (count + s.count)}
\]

\[
\text{elks\_checking \ implies \ string \ \sim (old (s.twin.as\_string.s) + old \ substring (1, \ count))}
\]

### Routine: insert_character - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

\[
\begin{align*}
\text{count} &= \text{old count} + 1 \\
\text{item} (i) &= c \\
\text{elsks}_\text{checking} &\implies \text{substring} (1, i - 1).\text{is_equal} (\text{old substring} (1, i - 1)) \\
\text{elsks}_\text{checking} &\implies \text{substring} (i + 1, \text{count}).\text{is_equal} (\text{old substring} (i, \text{count}))
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
\text{count} &= \text{old count} + 1 \\
\text{item} (i) &= c \\
\text{elsks}_\text{checking} &\implies \text{substring} (1, i - 1) \sim (\text{old substring} (1, i - 1)) \\
\text{elsks}_\text{checking} &\implies \text{substring} (i + 1, \text{count}) \sim (\text{old substring} (i, \text{count}))
\end{align*}
\]

Routine: keep_tail - Postcondition changed

\[\text{Tags: Changed} \]

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
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<tbody>
<tr>
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<td>Manual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\begin{align*}
\text{count} &= n.\text{min} (\text{old count}) \\
\text{elsks}_\text{checking} &\implies \text{is_equal} (\text{old substring} (\text{count} - n.\text{min} (\text{count}) + 1, \text{count}))
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
\text{count} &= n.\text{min} (\text{old count}) \\
\text{elsks}_\text{checking} &\implies \text{Current} \sim (\text{old substring} (\text{count} - n.\text{min} (\text{count}) + 1, \text{count}))
\end{align*}
\]

Routine: keep_head - Postcondition changed

\[\text{Tags: Changed} \]

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

\[\text{count} = n \cdot \text{min}(\text{old count})\]
\[\text{elks} \text{ checking}\ \text{implies}\ \text{is_equal}(\text{old substring}(1, n \cdot \text{min}(\text{count})))\]

"New" Postcondition

\[\text{count} = n \cdot \text{min}(\text{old count})\]
\[\text{elks} \text{ checking}\ \text{implies}\ \text{Current} \sim (\text{old substring}(1, n \cdot \text{min}(\text{count})))\]

Routine: to_lower - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

"Old" Postcondition

\[\text{elks} \text{ checking}\ \text{implies}\ \text{is_equal}(\text{old as_lower})\]

"New" Postcondition

\[\text{elks} \text{ checking}\ \text{implies}\ \text{Current} \sim (\text{old as_lower})\]

Routine: insert - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<tbody>
<tr>
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<td></td>
<td></td>
<td></td>
<td></td>
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</tbody>
</table>

"Old" Postcondition

\[\text{elks} \text{ checking}\ \text{implies}\ \text{is_equal}(\text{old substring}(1, i - 1) + \text{old } (s.twin) + \text{old substring}(i, \text{count}))\]
"New" Postcondition

```plaintext
elks_checking implies (Current ~ (old substring (1, i - 1) + old (s_twin) + old substring (i, count)))
```

218.15 Class: HASH_TABLE

Routine: replace_key - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

```plaintext
count = old count
replaced or conflict or not_found
(replaced and not equal (new_key, old_key)) implies (not has (old_key))
(replaced or conflict) = has (new_key)
replaced implies (item (new_key) = old (item (old_key)))
not_found implies old (not has (old_key))
conflict = old (has (new_key))
conflict implies (item (new_key) = old (item (new_key)))
has_default = ((new_key = computed_default_key) or ((new_key /= computed_default_key) and (old has_default)))
```

"New" Postcondition

```plaintext
count = old count
replaced or conflict or not_found
(replaced and new_key ~ old_key) implies (not has (old_key))
(replaced or conflict) = has (new_key)
replaced implies (item (new_key) = old (item (old_key)))
not_found implies old (not has (old_key))
conflict = old (has (new_key))
conflict implies (item (new_key) = old (item (new_key)))
has_default = ((new_key = computed_default_key) or ((new_key /= computed_default_key) and (old has_default)))
```
### 218.16 Class: **ARRAY**

**Routine: copy - Postcondition changed**

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<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{area.is_equal (other.area)}
\]

"New" Postcondition

\[
\text{area \sim other.area}
\]

### 218.17 Class: **EXCEPTION**

**Routine: set_message - Postcondition changed**

<table>
<thead>
<tr>
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<th>R</th>
<th>C</th>
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<th>S_{ne}</th>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{equal (message, a_message)}
\]

"New" Postcondition

\[
\text{message \sim a_message}
\]
218.18 Class: ARGUMENTS

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
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</tbody>
</table>

"Old" Invariant

\[ \text{argument\_array}.\text{is\_equal}(\text{internal\_argument\_array}) \]

"New" Invariant

\[ \text{argument\_array} \sim \text{internal\_argument\_array} \]

Routine: command_name - Postcondition changed

<table>
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<tr>
<th>Tool</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{Result}.\text{is\_equal}(\text{argument}(0)) \]

"New" Postcondition

\[ \text{Result} \sim \text{argument}(0) \]

218.19 Class: STRING_32

Routine: append_character - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>Manual</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>


"Old" Postcondition

\[
\text{item (count)} = c \\
\text{count} = \text{old count} + 1 \\
\text{elks\_checking implies substring (1, count - 1).is\_equal (old twin)}
\]

"New" Postcondition

\[
\text{item (count)} = c \\
\text{count} = \text{old count} + 1 \\
\text{elks\_checking implies substring (1, count - 1) \sim (old twin)}
\]

Routine: append\_string - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_ne</th>
<th>W_ne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
s /\!\!=\!\!= \text{Void implies (elks\_checking implies is\_equal (old twin + old s.twin))}
\]

"New" Postcondition

\[
s /\!\!=\!\!= \text{Void implies (elks\_checking implies Current \sim (old twin + old s.twin))}
\]

Routine: left\_adjust - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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</thead>
<tbody>
<tr>
<td>Manual</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{count} \leq \text{old count} \\
\text{not is\_empty implies not item (1).is\_space} \\
\text{elks\_checking implies is\_equal ((old twin).substring (old count - count + 1, old count))}
\]

550
"New" Postcondition
\[
\text{count} \leq \text{old count} \\
\text{not is_empty implies not item (1).is_space} \\
elks\_checking \text{ implies Current } \sim ((\text{old twin}).\text{substring (old count } - \text{ count } + 1, \text{ old count}))
\]

Routine: head - Postcondition changed

"Old" Postcondition
\[
\text{count} = \text{n.min (old count)} \\
elks\_checking \text{ implies is_equal (old substring (1, n.min (count)))}
\]

"New" Postcondition
\[
\text{count} = \text{n.min (old count)} \\
elks\_checking \text{ implies Current } \sim (\text{old substring (1, n.min (count)))}
\]

Routine: append - Postcondition changed

"Old" Postcondition
\[
\text{count} = \text{old count} + \text{old s.count} \\
elks\_checking \text{ implies is_equal (old twin + old s.twin)}
\]

"New" Postcondition
\[
\text{count} = \text{old count} + \text{old s.count}
\]

551
elks_checking implies Current \( \sim (\text{old twin} + \text{old s.twin}) \)

**Routine: remove_head - Postcondition changed**

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
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<th>S</th>
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</tr>
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<tbody>
<tr>
<td>Tool</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{elks_checking implies is_equal (old substring (n.min (count) + 1, count))}
\]

"New" Postcondition

\[
\text{elks_checking implies Current \( \sim (\text{old substring (n.min (count) + 1, count)}) \)}
\]

**Routine: remove_substring - Postcondition changed**

<table>
<thead>
<tr>
<th>Tags: Changed</th>
<th>A</th>
<th>R</th>
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<th>S</th>
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<tr>
<td>Tool</td>
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<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{elks_checking implies is_equal (old substring (1, start_index - 1) + old substring (end_index + 1, count))}
\]

"New" Postcondition

\[
\text{elks_checking implies Current \( \sim (\text{old substring (1, start_index - 1) + old substring (end_index + 1, count)}) \)}
\]
Routine: tail - Postcondition changed

"Old" Postcondition
\[
\text{count} = \text{n.min} (\text{old count})
\]
\[
\text{elks.checking implies is.equal (old substring (count – n.min (count) + 1, count))}
\]

"New" Postcondition
\[
\text{count} = \text{n.min} (\text{old count})
\]
\[
\text{elks.checking implies Current ~ (old substring (count – n.min (count) + 1, count))}
\]

Routine: subcopy - Postcondition changed

"Old" Postcondition
\[
\text{count} = \text{old count}
\]
\[
\text{elks.checking implies is.equal (old substring (1, index_pos – 1) + old other.substring (start_pos, end_pos) + old substring (index_pos + (end_pos – start_pos + 1), count))}
\]

"New" Postcondition
\[
\text{count} = \text{old count}
\]
\[
\text{elks.checking implies (Current ~ (old substring (1, index_pos – 1) + old other.substring (start_pos, end_pos) + old substring (index_pos + (end_pos – start_pos + 1), count))}
\]
Routine: right_adjust - Postcondition changed

"Old" Postcondition

\[
\text{count} \leq \text{old count} \\
(\text{count} /\neq 0) \implies ((\text{item}(\text{count}) /\neq ' ') \text{ and (item (count) /\neq '%T') and (item (count) /\neq '%R') and (item (count) /\neq '%N'))} \\
\text{elks\_checking implies is\_equal ((old twin).substring (1, count))}
\]

"New" Postcondition

\[
\text{count} \leq \text{old count} \\
(\text{count} /\neq 0) \implies ((\text{item}(\text{count}) /\neq ' ') \text{ and (item (count) /\neq '%T') and (item (count) /\neq '%R') and (item (count) /\neq '%N'))} \\
\text{elks\_checking implies Current \~ ((old twin).substring (1, count))}
\]

Routine: insert_string - Postcondition changed

"Old" Postcondition

\[
\text{elks\_checking implies (is\_equal (old substring (1, i - 1) + old (s.twin) + old substring (i, count))}
\]

"New" Postcondition

\[
\text{elks\_checking implies (Current \~ (old substring (1, i - 1) + old (s.twin) + old substring (i, count)))}
\]
Routine: replace_substring - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

\begin{align*}
\text{count} &= \text{old } \text{count} + \text{old } s.\text{count} - \text{end_index} + \text{start_index} - 1 \\
\text{elks\_checking\ implies\ (is\_equal\ (old \ (substring\ (1, \text{start\_index} - 1) + s + substring\ (end\_index + 1, \text{count}))))}
\end{align*}

"New" Postcondition

\begin{align*}
\text{count} &= \text{old } \text{count} + \text{old } s.\text{count} - \text{end_index} + \text{start_index} - 1 \\
\text{elks\_checking\ implies\ (Current \sim (old \ (substring\ (1, \text{start\_index} - 1) + s + substring\ (end\_index + 1, \text{count}))))}
\end{align*}

Routine: put - Postcondition changed

<table>
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<th></th>
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</tr>
</tbody>
</table>

"Old" Postcondition

\begin{align*}
\text{count} &= \text{old } \text{count} \\
\text{elks\_checking\ implies\ substring\ (1, \ i - 1).is\_equal\ (old \ substring\ (1, \ i - 1))} \\
\text{elks\_checking\ implies\ substring\ (i + 1, \ count).is\_equal\ (old \ substring\ (i + 1, \ count))}
\end{align*}

"New" Postcondition

\begin{align*}
\text{count} &= \text{old } \text{count} \\
\text{elks\_checking\ implies\ substring\ (1, \ i - 1) \sim (old \ substring\ (1, \ i - 1))} \\
\text{elks\_checking\ implies\ substring\ (i + 1, \ count) \sim (old \ substring\ (i + 1, \ count))}
\end{align*}
Routine: to_upper - Postcondition changed

"Old" Postcondition

elks_checking implies is_equal (old as_upper)

"New" Postcondition

elks_checking implies Current \sim (old as_upper)

Routine: set - Postcondition changed

"Old" Postcondition

is_equal \(t\text{.substring (n1, n2)}\)

"New" Postcondition

Current \sim (t\text{.substring (n1, n2)})

Routine: remove_tail - Postcondition changed

"Old" Postcondition

"New" Postcondition
"Old" Postcondition

\[ \text{elks\_checking implies is\_equal (old substring (1, count \text{ - } n.\text{min} (count)))} \]

"New" Postcondition

\[ \text{elks\_checking implies Current \~ (old substring (1, count \text{ - } n.\text{min} (count)))} \]

Routine: prepend - Postcondition changed

<table>
<thead>
<tr>
<th>Tag: Changed</th>
<th>A</th>
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<tbody>
<tr>
<td>Tool</td>
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<td></td>
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<tr>
<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{count = old} (\text{count + s.count}) \]
\[ \text{elks\_checking implies string.is\_equal (old (s.twin.as\_string_{32}) + old substring (1, count))} \]

"New" Postcondition

\[ \text{count = old} (\text{count + s.count}) \]
\[ \text{elks\_checking implies string \~ (old (s.twin.as\_string_{32}) + old substring (1, count))} \]

Routine: insert\_character - Postcondition changed

<table>
<thead>
<tr>
<th>Tag: Changed</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<tbody>
<tr>
<td>Tool</td>
<td></td>
<td></td>
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<tr>
<td>Manual</td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ \text{count = old count + 1} \]
\[ \text{item (i) = c} \]
\[ \text{elks\_checking implies substring (1, i - 1).is\_equal (old substring (1, i - 1))} \]
\[ \text{elks\_checking implies substring (i + 1, count).is\_equal (old substring (i, count))} \]
"New" Postcondition

\[
\begin{align*}
\text{count} &= \text{old count} + 1 \\
\text{item } (i) &= c \\
\text{elks\_checking implies substring } & (1, i - 1) \sim (\text{old substring } (1, i - 1)) \\
\text{elks\_checking implies substring } & (i + 1, \text{count}) \sim (\text{old substring } (i, \text{count}))
\end{align*}
\]

Routine: keep\_tail - Postcondition changed

\[
\begin{array}{|c|c|c|c|c|c|}
\hline
\text{Tool} & A & R & C & S & W \\
\hline
\text{Manual} & x & & & & \\
\hline
\end{array}
\]

"Old" Postcondition

\[
\begin{align*}
\text{count} &= \text{n.min } (\text{old count}) \\
\text{elks\_checking implies is\_equal } & \text{(old substring } (\text{count } - \text{n.min } (\text{count}) + 1, \text{count}))
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
\text{count} &= \text{n.min } (\text{old count}) \\
\text{elks\_checking implies Current } & \sim (\text{old substring } (\text{count } - \text{n.min } (\text{count}) + 1, \text{count}))
\end{align*}
\]

Routine: keep\_head - Postcondition changed

\[
\begin{array}{|c|c|c|c|c|c|}
\hline
\text{Tool} & A & R & C & S & W \\
\hline
\text{Manual} & x & & & & \\
\hline
\end{array}
\]

"Old" Postcondition

\[
\begin{align*}
\text{count} &= \text{n.min } (\text{old count}) \\
\text{elks\_checking implies is\_equal } & \text{(old substring } (1, \text{n.min } (\text{count})))
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
\text{count} &= \text{n.min } (\text{old count})
\end{align*}
\]
elks_checking implies Current \~ (\text{old} \ \text{substring} \ (1, \ n.min \ (\text{count})))

### Routine: to_lower - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

elks_checking implies is_equal (\text{old} \ \text{as_lower})

"New" Postcondition

elks_checking implies Current \~ (\text{old} \ \text{as_lower})

### Routine: insert - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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<td>Tool</td>
<td></td>
<td>x</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

elks_checking implies (is_equal (\text{old} \ \text{substring} \ (1, \ i - 1) + \text{old} \ (s.twin) + \text{old} \ \text{substring} \ (i, \ \text{count})))

"New" Postcondition

elks_checking implies (Current \~ (\text{old} \ \text{substring} \ (1, \ i - 1) + \text{old} \ (s.twin) + \text{old} \ \text{substring} \ (i, \ \text{count})))
218.20 Class: STRING_TO_NUMERIC_CONVERTOR
Routine: set_trailing_separators - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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<td></td>
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</tr>
</tbody>
</table>

"Old" Postcondition

trailing_separators.is_equal (separators)

"New" Postcondition

trailing_separators ~ separators

Routine: set_leading_separators - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<td></td>
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<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

leading_separators.is_equal (separators)

"New" Postcondition

leading_separators ~ separators

218.21 Class: EXECUTION_ENVIRONMENT
Routine: put - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
"Old" Postcondition

\[(\text{return\_code} = 0) \implies (\text{equal} (\text{get} (\text{key}), \text{value}) \text{ or else} (\text{value}.\text{is\_empty} \text{ and then} (\text{get} (\text{key}) = \text{Void})))\]

"New" Postcondition

\[(\text{return\_code} = 0) \implies ((\text{get} (\text{key}) \sim \text{value}) \text{ or else} (\text{value}.\text{is\_empty} \text{ and then} (\text{get} (\text{key}) = \text{Void})))\]

218.22 Class: ANY

Routine: twin - Postcondition changed

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[\text{Result} \neq \text{Void}\]
\[\text{Result}.\text{is\_equal} (\text{Current})\]

"New" Postcondition

\[\text{Result} \neq \text{Void}\]
\[\text{Result} \sim \text{Current}\]

Routine: copy - Postcondition changed

<table>
<thead>
<tr>
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</thead>
<tbody>
<tr>
<td>A</td>
</tr>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[\text{is\_equal} (\text{other})\]

561
"New" Postcondition

Current \sim other

Routine: is_equal - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<th>S</th>
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<tbody>
<tr>
<td>Tool</td>
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</tbody>
</table>

"Old" Postcondition

Result implies other.is_equal (Current)
standard_is_equal (other) implies Result

"New" Postcondition

Result implies other \sim Current
standard_is_equal (other) implies Result

Routine: clone - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<td>Tool</td>
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</tbody>
</table>

"Old" Postcondition

equal (Result, other)

"New" Postcondition

Result \sim other


219 Revision "Old": 250 vs. Revision "New": 251

219.1 Class: HASH_TABLE

Routine: replace_key - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

count = old count
replaced or conflict or not_found
(replaced and new_key /\ old_key) implies (not has (old_key))
(replaced or conflict) = has (new_key)
replaced implies (item (new_key) = old (item (old_key)))
not_found implies old (not has (old_key))
conflict = old (has (new_key))
conflict implies (item (new_key) = old (item (new_key)))
has_default = ((new_key = computed_default_key) or ((new_key /= computed_default_key) and (old has_default)))

"New" Postcondition

count = old count
replaced or conflict or not_found
(replaced and not same_keys (new_key, old_key)) implies (not has (old_key))
(replaced or conflict) = has (new_key)
replaced implies (item (new_key) = old (item (old_key)))
not_found implies old (not has (old_key))
conflict = old (has (new_key))
conflict implies (item (new_key) = old (item (new_key)))
has_default = ((new_key = computed_default_key) or ((new_key /= computed_default_key) and (old has_default)))
220 Revision "Old": 251 vs. Revision "New": 252

220.1 Class: EXECUTION_ENVIRONMENT
Routine: put - Postcondition changed

<table>
<thead>
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<th>Tool</th>
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<tbody>
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</tbody>
</table>

"Old" Postcondition

\[(\text{return\_code} = 0) \implies ((\text{get\_key}) \neq \text{value}) \text{ or else } \text{value.is\_empty \ and \ then } (\text{get\_key} = \text{Void}))\]

"New" Postcondition

\[(\text{return\_code} = 0) \implies ((\text{get\_key}) \neq \text{value.string}) \text{ or else } \text{value.is\_empty \ and then } (\text{get\_key} = \text{Void}))\]

221 Revision "Old": 256 vs. Revision "New": 257

221.1 Class: READABLE_STRING_8
Routine: substring_index_in_bounds - Postcondition changed

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<tr>
<th>Tool</th>
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</table>

"Old" Postcondition

\[\text{Result} > 0 \implies \text{other} \neq \text{substring (Result, Result + other.count - 1)}\]

"New" Postcondition

\[\text{Result} > 0 \implies \text{other\_same\_string (substring (Result, Result + other.count - 1))}\]
221.2 Class: READABLE_STRING_32

Routine: substring_index_in_bounds - Postcondition changed

Tags: Changed

<table>
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<th>Tool</th>
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<tbody>
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</table>

"Old" Postcondition

\[ \text{Result} > 0 \text{ implies } \text{other} \sim \text{substring(\text{Result, Result} + \text{other.count} - 1)} \]

"New" Postcondition

\[ \text{Result} > 0 \text{ implies } \text{other.same_string(\text{substring(\text{Result, Result} + \text{other.count} - 1)})} \]

221.3 Class: STRING_8

Routine: replace_character - Postcondition changed

Tags: Changed

<table>
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<tbody>
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</tbody>
</table>

"Old" Postcondition

\[ (\text{count} = \text{old count}) \text{ and } (\text{capacity} \geq \text{old capacity}) \]
\[ \text{elks\_checking implies occurrences (c) = count} \]

"New" Postcondition

\[ (\text{count} = \text{old count}) \text{ and } (\text{capacity} = \text{old capacity}) \]
\[ \text{elks\_checking implies occurrences (c) = count} \]
Routine: replace_blank - Postcondition changed

"Old" Postcondition

\[(\text{count} = \text{old count}) \text{ and } (\text{capacity} \geq \text{old capacity})\]
\[\text{elks\_checking implies occurrences (' ') = count}\]

"New" Postcondition

\[(\text{count} = \text{old count}) \text{ and } (\text{capacity} = \text{old capacity})\]
\[\text{elks\_checking implies occurrences (' ') = count}\]

Routine: fill_with - Postcondition changed

"Old" Postcondition

\[(\text{count} = \text{old count}) \text{ and } (\text{capacity} \geq \text{old capacity})\]
\[\text{elks\_checking implies occurrences (c) = count}\]

"New" Postcondition

\[(\text{count} = \text{old count}) \text{ and } (\text{capacity} = \text{old capacity})\]
\[\text{elks\_checking implies occurrences (c) = count}\]
221.4 Class: READABLE_STRING_GENERAL

Routine: as_string_32 - Postcondition changed

"Old" Postcondition

\[ \text{Result} \neq \text{Void} \]
\[ (\text{is}_{\text{string}_32} \text{ and Result} = \text{Current}) \text{ or } (\text{not is}_{\text{string}_32} \text{ and Result} \neq \text{Current}) \]

"New" Postcondition

\[ \text{Result} \neq \text{Void} \]
\[ (\text{same}_{\text{type}} (\text{create} \{ \text{STRING}_{32} \}.\text{make}_{\text{empty}}) \text{ and Result} = \text{Current}) \text{ or } (\text{not same}_{\text{type}} (\text{create} \{ \text{STRING}_{32} \}.\text{make}_{\text{empty}}) \text{ and Result} \neq \text{Current}) \]

Routine: as_string_8 - Postcondition changed

"Old" Postcondition

\[ \text{Result} \neq \text{Void} \]
\[ (\text{is}_{\text{string}_8} \text{ and Result} = \text{Current}) \text{ or } (\text{not is}_{\text{string}_8} \text{ and Result} \neq \text{Current}) \]

"New" Postcondition

\[ \text{Result} \neq \text{Void} \]
\[ (\text{same}_{\text{type}} (\text{""}) \text{ and Result} = \text{Current}) \text{ or } (\text{not same}_{\text{type}} (\text{""}) \text{ and Result} \neq \text{Current}) \]

567
221.5 Class: STRING_32

Routine: replace_character - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

(count = old count) and (capacity >= old capacity)

elks_checking implies occurrences (c) = count

"New" Postcondition

(count = old count) and (capacity = old capacity)

elks_checking implies occurrences (c) = count

Routine: replace_blank - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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</table>

"Old" Postcondition

(count = old count) and (capacity >= old capacity)

elks_checking implies occurrences (‘’ ) = count

"New" Postcondition

(count = old count) and (capacity = old capacity)

elks_checking implies occurrences (‘’ ) = count
Routine: fill_with - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td>x</td>
<td></td>
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</tbody>
</table>

"Old" Postcondition

(count = old\(\) count) and (capacity >= old\(\) capacity)

elks\_checking implies occurrences (c) = count

"New" Postcondition

(count = old\(\) count) and (capacity = old\(\) capacity)

elks\_checking implies occurrences (c) = count

222 Revision "Old": 258 vs. Revision "New": 259

222.1 Class: INTERNAL

Routine: set_reference_field - Precondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<tr>
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</table>

"Old" Precondition

\texttt{object / Void}

\(i >= 1\)

\(i <= field\_count (object)\)

\texttt{field\_type (i, object) = reference\_type}

\texttt{value / Void implies type\_conforms\_to (dynamic\_type (value),}

\texttt{field\_static\_type\_of\_type (i, dynamic\_type (object)))}

"New" Precondition

\texttt{object / Void}

\(i >= 1\)
i <= field_count (object)
field_type (i, object) = reference_type
is_attached_type (field_static_type_of_type (i, dynamic_type (object))) implies value /= Void
value /= Void implies field_conforms_to (dynamic_type (value),
   field_static_type_of_type (i, dynamic_type (object)))

223 Revision "Old": 280 vs. Revision "New": 281

223.1 Class: TWO_WAY_LIST
Invariant changed

"Old" Invariant
not is_empty implies (first_element /= Void and last_element /= Void)
{f: like first_element} first_element implies f.left = Void
{l: like last_element} last_element implies l.right = Void

"New" Invariant
not is_empty implies (first_element /= Void and last_element /= Void)
attached first_element as f implies f.left = Void
attached last_element as l implies l.right = Void

223.2 Class: BINARY_SEARCH_TREE_SET
Invariant changed
"Old" Invariant
\[
\{t: \text{like} \ \text{tree}\} \ \text{tree implies} \ \text{object\_comparison} = t\text{.object\_comparison}
\]

"New" Invariant
\[
\text{attached tree as } t \ \text{implies} \ \text{object\_comparison} = t\text{.object\_comparison}
\]

223.3 Class: RECURSIVE\_CURSOR\_TREE

Invariant changed

<table>
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<tr>
<th></th>
<th>A</th>
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<td>Tool</td>
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"Old" Invariant
\[
\text{not above implies} \ (\{a: \text{like} \ \text{active\_parent}\} \ \text{active\_parent and then} \ a\text{.child} = \text{active})
\]

"New" Invariant
\[
\text{not above implies} \ (\text{attached active\_parent as } a \ \text{and then} \ a\text{.child} = \text{active})
\]

223.4 Class: ARRAY

Routine: all\_default - Postcondition changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</table>

"Old" Postcondition
\[
\text{Result} = (\text{count} = 0 \ \text{or else} \ (\text{not} \ \{i: \text{like} \ \text{item}\} \ \text{item} \ (\text{upper}) \ \text{or else} \ i = i\text{.default})
\ \text{and} \ \text{subarray} \ (\text{lower}, \ \text{upper} - 1).\text{all\_default})
\]

571
"New" Postcondition

\[
\text{Result} = (\text{count} = 0 \text{ or else } (\text{not attached \{like item\}item (upper) as } i \text{ or else } i = i.\text{default}) \text{ and subarray (lower, upper - 1).all_default})
\]

223.5 Class: BI_LINKABLE

Invariant changed

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"Old" Invariant

\{r: like right\} right implies (r.left = Current)
\{l: like left\} left implies (l.right = Current)

"New" Invariant

attached right as r implies (r.left = Current)
attached left as l implies (l.right = Current)

223.6 Class: LINKED_LIST

Routine: put_left - Postcondition changed

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<th>Tag: Changed</th>
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<th>R</th>
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</table>

"Old" Postcondition

previous /= Void
\{q: like previous\} previous and then q.item = v
"New" Postcondition

\[ \text{previous} \neq \text{Void} \]
\[ \text{attached previous as } q \text{ and then } q.\text{item} = v \]

Routine: put_right - Postcondition changed

Tags: Changed

223.7 Class: TREE

Invariant changed

"Old" Invariant

\[ \text{child readable} \implies (\{c: \text{like child}\} \text{ child and then } c.\text{parent} = \text{Current}) \]
\[ \text{is leaf} = (\text{arity} = 0) \]
\[ \text{child off} = \text{child before} \text{ or } \text{child after} \]
\[ \text{child before} = (\text{child index} = 0) \]
\[
\begin{align*}
\text{child\_isfirst} &= (\text{not is\_leaf and child\_index} = 1) \\
\text{child\_islast} &= (\text{not is\_leaf and child\_index} = \text{child\_capacity}) \\
\text{child\_after} &= (\text{child\_index} \geq \text{child\_capacity} + 1)
\end{align*}
\]

"New" Invariant

\[
\begin{align*}
\text{child\_readable} \implies (\text{attached child as c and then c.parent} = \text{Current}) \\
\text{is\_leaf} &= (\text{arity} = 0) \\
\text{child\_off} &= \text{child\_before or child\_after} \\
\text{child\_before} &= (\text{child\_index} = 0) \\
\text{child\_isfirst} &= (\text{not is\_leaf and child\_index} = 1) \\
\text{child\_islast} &= (\text{not is\_leaf and child\_index} = \text{child\_capacity}) \\
\text{child\_after} &= (\text{child\_index} \geq \text{child\_capacity} + 1)
\end{align*}
\]

223.8 Class: FIXED_TREE

Routine: put_left - Postcondition changed

\[
\begin{array}{|c|c|c|c|c|c|c|}
\hline
\text{Tag} & \text{A} & \text{R} & \text{C} & \text{S} & \text{W} & \text{S\_ne} & \text{W\_ne} \\
\hline
\text{Tool} & & & & & x & & \\
\hline
\text{Manual} & & & & & & & \\
\hline
\end{array}
\]

"Old" Postcondition

\[
\{ l : \text{like left\_sibling} \} \text{ left\_sibling and then l.item} = v
\]

"New" Postcondition

\[
\text{attached left\_sibling as l and then l.item} = v
\]

Routine: put_right - Postcondition changed

\[
\begin{array}{|c|c|c|c|c|c|c|}
\hline
\text{Tag} & \text{A} & \text{R} & \text{C} & \text{S} & \text{W} & \text{S\_ne} & \text{W\_ne} \\
\hline
\text{Tool} & & & & & x & & \\
\hline
\text{Manual} & & & & & & & \\
\hline
\end{array}
\]

574
"Old" Postcondition
\{ r: like right_sibling \} right_sibling and then r.item = v

"New" Postcondition
attached right_sibling as r and then r.item = v

224 Revision "Old": 284 vs. Revision "New": 285

224.1 Class: IDENTIFIED_ROUTINES
Routine: eif_current_object_id - Postcondition changed

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</table>

"Old" Postcondition
Result > 0
eif_id_object (Result) = Current

"New" Postcondition
Result > 0
eif_is_object_id_of_current (Result)

225 Revision "Old": 296 vs. Revision "New": 297

225.1 Class: TYPE
Routine: attempt - Postcondition changed

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</table>
"Old" Postcondition

\[
\text{Result} = \text{obj or Result} = \text{default} \_\text{value}
\]

"New" Postcondition

\[
\text{Result} = \text{obj or Result} = \text{default} \_\text{detachable} \_\text{value}
\]

226 Revision "Old": 300 vs. Revision "New": 310

226.1 Class: READABLE\_STRING\_GENERAL

Routine: as\_string\_32 - Postcondition changed

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<table>
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<tbody>
<tr>
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</tbody>
</table>
```

"Old" Postcondition

\[
\text{Result} /\neq \text{Void}
\]

\[
\text{(same\_type (create \{STRING\_32\}.make\_empty) and Result = Current) or (not same\_type (create \{STRING\_32\}.make\_empty) and Result /= Current)}
\]

"New" Postcondition

\[
\text{Result} /\neq \text{Void}
\]

\[
\text{(conforms\_to (create \{STRING\_32\}.make\_empty) and Result = Current) or (not conforms\_to (create \{STRING\_32\}.make\_empty) and Result /= Current)}
\]

Routine: as\_string\_8 - Postcondition changed

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<table>
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</tbody>
</table>
```

576
"Old" Postcondition

\[
\begin{align*}
\text{Result} & \neq \text{Void} \\
\text{(same\_type} ("")) \text{ and Result } &= \text{Current)} \text{ or (not same\_type} ("")) \text{ and Result } &= \text{Current)}
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
\text{Result} & \neq \text{Void} \\
\text{(conforms\_to} ("")) \text{ and Result } &= \text{Current)} \text{ or (not conforms\_to} ("")) \text{ and Result } &= \text{Current)}
\end{align*}
\]

227 Revision "Old": 312 vs. Revision "New": 343

227.1 Class: READABLE_STRING_GENERAL

Routine: to_string_8 - Postcondition changed

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</tbody>
</table>

"Old" Postcondition

\[
\begin{align*}
\text{Result} & \neq \text{Void} \\
\text{(is\_string_8} \text{ and Result } &= \text{Current)} \text{ or (not is\_string_8} \text{ and Result } &= \text{Current)}
\end{align*}
\]

"New" Postcondition

\[
\begin{align*}
\text{Result} & \neq \text{Void} \\
\text{(conforms\_to} ("")) \text{ and Result } &= \text{Current)} \text{ or (not conforms\_to} ("")) \text{ and Result } &= \text{Current)}
\end{align*}
\]

577
228 Revision "Old": 343 vs. Revision "New": 347

228.1 Class: FORMAT_DOUBLE

Routine: make - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
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<tbody>
<tr>
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</table>

"Old" Postcondition

\[
\text{fill} \text{character} = \ ' ' \\
\text{show} \text{sign} \text{negative} \\
\text{no} \text{separator} \\
\text{width} = w \\
\text{right} \text{justified} \\
\text{leading} \text{sign} \\
\text{decimals} = d \\
\text{decimal} = '.'
\]

"New" Postcondition

\[
\text{fill} \text{character} = \ ' ' \\
\text{show} \text{sign} \text{negative} \\
\text{no} \text{separator} \\
\text{width} = w \\
\text{right} \text{justified} \\
\text{leading} \text{sign} \\
\text{decimals} = d \\
\text{decimal} = '\'. \\
\text{trailing} \text{zeros} \text{shown}
\]
### 229 Revision "Old": 347 vs. Revision "New": 352

#### 229.1 Class: BOOLEAN_REF

**Invariant changed**

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_re</th>
<th>W_re</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manual</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

**"Old" Invariant**

\[
\text{(not (not Current))} \not\rightarrow (\text{Current})
\]

\[
\text{not } ((\text{not Current}) \text{ and Current})
\]

\[
\text{(not Current) or Current}
\]

**"New" Invariant**

\[
\text{(not (not Current)), item = item}
\]

\[
\text{not } ((\text{not Current}) \text{ and Current})
\]

\[
\text{(not Current) or Current}
\]

### 230 Revision "Old": 352 vs. Revision "New": 353

#### 230.1 Class: FORMAT_DOUBLE

**Routine: hide_trailing_zeros - Postcondition changed**

<table>
<thead>
<tr>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_re</th>
<th>W_re</th>
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<tbody>
<tr>
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<tr>
<td>Manual</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
</tbody>
</table>

**"Old" Postcondition**

\[
\text{trailing_zeros_shown}
\]

**"New" Postcondition**

\[
\text{not trailing_zeros_shown}
\]
Routine: show_trailing_zeros - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
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<tbody>
<tr>
<td>Tool</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

not trailing_zeros_shown

"New" Postcondition

trailing_zeros_shown

231 Revision "Old": 382 vs. Revision "New": 384

231.1 Class: ANY

Routine: deep_equal - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
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</tbody>
</table>

"Old" Postcondition

standard_equal (some, other) implies Result
(some = Void) implies (Result = (other = Void))
(Result and (some /= Void)) implies (other /= Void and then some.same_type (other))
Result implies deep_equal (other, some)

"New" Postcondition

standard_equal (a, b) implies Result
(a = Void) implies (Result = (b = Void))
(Result and (a /= Void)) implies (b /= Void and then a.same_type (b))
Result implies deep_equal (b, a)
Routine: standard\_equal - Postcondition changed

\begin{tabular}{|l|c|c|c|c|c|c|c|}
\hline
 & A & R & C & S & W & S\_ne & W\_ne \\
\hline
Tool & x & & & & & & \\
Manual & & & & & & & \\
\hline
\end{tabular}

"Old" Postcondition
\[ \text{Result} = (\text{some} = \text{Void and other} = \text{Void}) \text{ or else } ((\text{some} /= \text{Void and other} /= \text{Void}) \text{ and then some.standard\_is\_equal (other)}) \]

"New" Postcondition
\[ \text{Result} = (a = \text{Void and b} = \text{Void}) \text{ or else } ((a /= \text{Void and b} /= \text{Void}) \text{ and then a.standard\_is\_equal (b)}) \]

Routine: equal - Postcondition changed

\begin{tabular}{|l|c|c|c|c|c|c|c|}
\hline
 & A & R & C & S & W & S\_ne & W\_ne \\
\hline
Tool & x & & & & & & \\
Manual & & & & & & & \\
\hline
\end{tabular}

"Old" Postcondition
\[ \text{Result} = (\text{some} = \text{Void and other} = \text{Void}) \text{ or else } ((\text{some} /= \text{Void and other} /= \text{Void}) \text{ and then some.is\_equal (other)}) \]

"New" Postcondition
\[ \text{Result} = (a = \text{Void and b} = \text{Void}) \text{ or else } ((a /= \text{Void and b} /= \text{Void}) \text{ and then a.is\_equal (b)}) \]
232 Revision "Old": 396 vs. Revision "New": 401

232.1 Class: FORMAT_INTEGER

Invariant changed

Tags: Changed Strengthened NEStronger

<table>
<thead>
<tr>
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</tbody>
</table>

"Old" Invariant

- $sign_string 
eq Void$
- $width \geq 1$
- $no\_justification \leq justification \text{ and } justification \leq right\_justification$

"New" Invariant

- $sign_string 
eq Void$
- $sign\_string.count \geq 3$
- $sign\_string.count \mod 3 = 0$
- $width \geq 1$
- $no\_justification \leq justification \text{ and } justification \leq right\_justification$

Routine: sign_dr_cr - Postcondition changed

Tags: Changed

<table>
<thead>
<tr>
<th></th>
<th>A</th>
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<td>x</td>
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</tbody>
</table>

"Old" Postcondition

- $sign\_string \sim \"DR CR\"$

"New" Postcondition

- $sign\_string \sim \"DR CR\"$
Routine: sign_cr_dr - Postcondition changed

"Old" Postcondition

\[ \text{sign}_\text{string} \sim \text{"CR DR"} \]

"New" Postcondition

\[ \text{sign}_\text{string} \sim \text{"CR DR"} \]

233 Revision "Old": 406 vs. Revision "New": 415

233.1 Class: REAL_32_REF

Invariant changed

"Old" Invariant

\[ \text{sign} \ast \text{abs} = \text{item} \]

"New" Invariant

\[ \text{not} \ \text{item.is_nan} \ \text{implies} \ \text{sign} \ast \text{abs} = \text{item} \]

Routine: rounded_real_32 - Postcondition changed
"Old" Postcondition

\[
\text{Result} = \text{sign} \ast ((\text{abs} + 0.5).\text{floor}_\text{real}\_32)
\]

"New" Postcondition

\[
\text{Result} = \text{sign} \ast ((\text{abs} + \{\text{REAL}\_32\} 0.5).\text{floor}_\text{real}\_32)
\]

233.2 Class: REAL\_64\_REF

Invariant changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>A</th>
<th>R</th>
<th>C</th>
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<th>W</th>
<th>S_ne</th>
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<tr>
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</tr>
</tbody>
</table>

"Old" Invariant

\[
\text{sign} \ast \text{abs} = \text{item}
\]

"New" Invariant

\[
\text{not \ item.is_nan \ implies} \ \text{sign} \ast \text{abs} = \text{item}
\]

234 Revision "Old": 425 vs. Revision "New": 427

234.1 Class: MISMATCH\_INFORMATION

Invariant changed

<table>
<thead>
<tr>
<th>Tag</th>
<th>A</th>
<th>R</th>
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<th>S</th>
<th>W</th>
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<td></td>
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<tr>
<td>Manual</td>
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</tr>
</tbody>
</table>

"Old" Invariant

\[
(\text{create } \{\text{MISMATCH\_CORRECTOR}\}).\text{mismatch\_information} /= \text{Void} \ \text{implies} \\
\text{Current} = (\text{create } \{\text{MISMATCH\_CORRECTOR}\}).\text{mismatch\_information}
\]

584
235 Revision "Old": 435 vs. Revision "New": 447

235.1 Class: ARRAYED_QUEUE

Invariant changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
<th>W_{ne}</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Invariant

not full  
extendible  
prunable  
is_empty implies all_default

"New" Invariant

extendible  
prunable  
is_empty implies all_default

Routine: make - Postcondition changed

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
<th>S_{ne}</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>x</td>
<td></td>
<td>x</td>
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</tr>
</tbody>
</table>

"Old" Postcondition

capacity = n
236 Revision "Old": 480 vs. Revision "New": 493

236.1 Class: STRING_8

Routine: keep_tail - Precondition changed

<table>
<thead>
<tr>
<th>Tags: Removed Changed Weakened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Precondition

\[ n \geq 0 \]

"New" Precondition

Routine: keep_tail - Postcondition changed

<table>
<thead>
<tr>
<th>Tags: Removed Changed Weakened</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tool</td>
</tr>
<tr>
<td>Manual</td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[ count = n.min (old \ count) \]
\[ elks\_checking \ implies \ Current \ \sim (old \ substring (count - n.min (count) + 1, count)) \]

"New" Postcondition

\[
\text{capacity} = n \\
is\_empty
\]
Routine: keep_head - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
<th>W</th>
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</thead>
<tbody>
<tr>
<td>Tool</td>
<td>x</td>
<td>x</td>
<td></td>
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</tr>
<tr>
<td>Manual</td>
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<td></td>
<td>x</td>
<td></td>
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</tbody>
</table>

"Old" Precondition

\[ n >= 0 \]

"New" Precondition

Routine: keep_head - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
<th>S</th>
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<tbody>
<tr>
<td>Tool</td>
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<td>x</td>
<td>x</td>
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<td></td>
<td>x</td>
<td>x</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

"Old" Postcondition

\[
\text{count} = n.\min (\text{old\ count})
\]
\[
\text{elks\ checking\ implies\ Current\ \sim (old\ substring\ (1,\ n.\min\ (\text{count})))}
\]

"New" Postcondition

236.2 Class: STRING_32

Routine: keep_tail - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>R</th>
<th>C</th>
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<td>Tool</td>
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<td></td>
<td>x</td>
<td></td>
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</tbody>
</table>
"Old" Precondition

\[ n \geq 0 \]

"New" Precondition

Routine: keep_tail - Postcondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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<tr>
<td>Manual</td>
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<td>x</td>
<td>x</td>
<td></td>
<td></td>
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</tbody>
</table>

"Old" Postcondition

\[
\text{count} = n.\text{min} (\text{old count}) \\
\text{elks}\_\text{checking implies Current} \sim (\text{old substring} (\text{count} - n.\text{min} (\text{count}) + 1, \text{count}))
\]

"New" Postcondition

Routine: keep_head - Precondition changed

Tags: Removed Changed Weakened

<table>
<thead>
<tr>
<th>Tool</th>
<th>A</th>
<th>R</th>
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</table>

"Old" Precondition

\[ n \geq 0 \]

"New" Precondition
Routine: keep_head - Postcondition changed

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<td>S</td>
<td>W</td>
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<tr>
<td>W_{ne}</td>
<td>W_{ne}</td>
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</table>

"Old" Postcondition

\[
\text{count} = \text{n.min (old count)}
\]

\[
\text{elks_checking implies Current} \sim (\text{old substring (1, n.min (count))})
\]

"New" Postcondition

237 Revision "Old": 504 vs. Revision "New": 510

237.1 Class: INDEXABLE

Invariant changed

<table>
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<tr>
<td>A</td>
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<td>W</td>
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<tr>
<td>S_{ne}</td>
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</tbody>
</table>

"Old" Invariant

\[\text{index_set /} = \text{Void}\]

"New" Invariant