Introduction to Eiffel

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Overview

Part 1: Language Constructs

- Basics: class definition, if then else, expressions, loops and across, creation procedures
- Inheritance: redefinition and multiple inheritance
- Exception Handling
- Once Routines
- Style rules
- Generics
- Agents and Tuples
- Information Hiding

Part 2: Contracts

- Preconditions, postconditions and class invariants
- Contracts in inheritance

Part 3: Libraries

- EiffelBase and Vision2

Part 4: EiffelStudio

- Editor, browsing, compiler and debugger

Eiffel and EiffelStudio

Version 7.1

The full version number is 7.1.8.8986

http://sourceforge.net/projects/eiffelstudio/files/EiffelStudio%207.1/Build_88986/

Make sure to have a look at all the resources listed in the wiki:

https://github.com/DOSE-ETH/dose2012/wiki/Eiffel

Part 1: Language constructs

1.1 BASICS

Class declaration: Eiffel vs Java:

```
class
    ACCOUNT
end
```

```
public class Account {

}
```

Constructors

```
class
    ACCOUNT
create
    make,
    make_balance
feature
    make
        do …
        end
    make_balance (i: INTEGER)
        do …
        end

end
```

```
public class Account {
        public Account() {...}
        public Account (int b) {...}
}
```

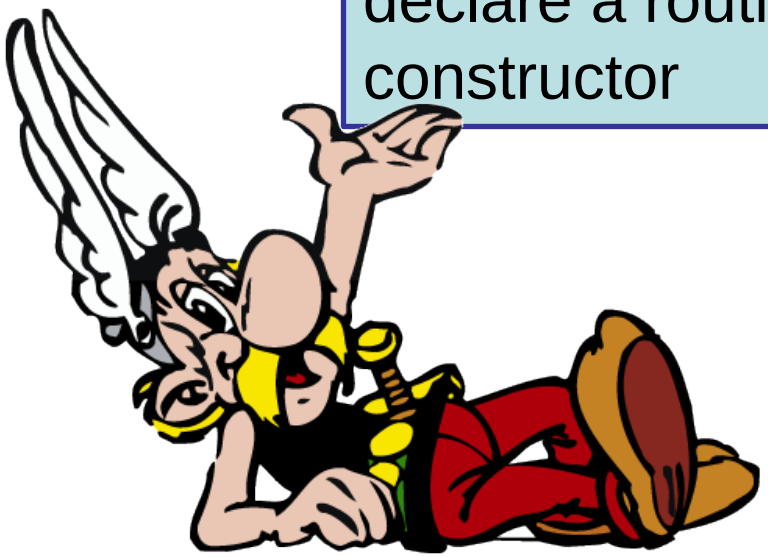
Constructors

```
class
    ACCOUNT
create
    make, make_balance,
    make_name

feature
    make
        do …
        end
    make_balance (i: INTEGER)
        do …
        end
    make_name (s: STRING)
        do …
        end
end
```

```
public class Account {
    public Account() {...}
    public Account (int b) {...}
    public Account (string s) {...}
}
```

Constructors can have any name; use the **create** clause to declare a routine as constructor



Overloading

```
class
    PRINTER

feature
    print_int (a_int: INTEGER)
        do … end

    print_real (a_real: REAL)
        do … end

    print_string (a_str: STRING)
        do … end
end
```

```
public class Printer {
    public void print(int i) {...}
    public void print(float f) {...}
    public void print(String s) {...}
}
```

Eiffel does not support overloading!

Creating Objects

```
class
    BANK

feature
    pay_bill
        local
            b1: ACCOUNT
        do
            create b1.make
        end

end
```

```
public class Bank {
  public void payBill() {
      Account b1 = new Account();
  }
```

Creating Objects

```
class
    BANK

feature
    pay_bill
        local
            b1, b2: ACCOUNT
        do
            create b1.make
            create b2.make_balance (2)
        end

end
```

```
public class Bank {
  public void payBill() {
      Account b1 = new Account();
      Account b2 = new Account (2);
  }
```

Create objects using the **create** keyword; declare the local variables in the **local** clause

Creating Objects: default create

```
class
  MAIN

feature
  root
    local
      b1: BANK
    do
      create b1
     –- corresponds to
    –- create b1.default_create
      b1.pay_bill
    end

end
```

```
class
    BANK

feature
    pay_bill
        do
            …
        end
end
```

All classes inherit from ANY (Object in Java). If no creation procedure is specified, *default_create* is used (inherited from ANY)

Creating Objects: default create

```
class
    BANK
inherit
    ANY
      redefine
          default_create
      end

create
    default_create

feature
    …
end
```

The routine default_create can be redefined

Features

```
class
  ACCOUNT
feature -- Initialization
  make     do … end
  make_balance (i: INTEGER)
          do … end
  make_name (s: STRING)
          do … end

feature –- Basic operations
  deposit (i: INTEGER) do … end
  withdraw (i: INTEGER) do … end
  transfer (b: ACCOUNT) do … end

feature –- Access
  balance: INTEGER do … end
end
```

```
public class Account {
  public Account() {...}
  public Account (int b) {...}
  public Account (string s) {...}
  public void deposit (int i) {...}
  public void withdraw (int i) {...}
  public void transfer(Account b) .
  public int balance() {...}
}
```

The **feature** clause is used to group routines and for information hiding (see 1.8)

Expressions and Conditionals

```
feature
    foo
        do
            if b and (c or d) then
                x := 5
                …
            end
        end
end
```

```
    foo
        do
            if b and then (c or else d) then
                …
            end
        end
end
```

```
public foo() {
    if (b & (c | d)) {
        x = 5;
        ...
    }
}
```

```
public foo() {
    if (b && (c || d)) {
        ...
    }
}
```

Return and breaks

```
class
    B

feature
    foo: INTEGER
        do
            Result := 5
        end

end
```

```
public class B {
  public int foo() {
      return 5;
  }
```

Eiffel does not support neither breaks, continues nor return

Loops

```
print
    local
        i: INTEGER
    do
        from
            i := 1
        until
            i >= 10
        loop
            ...
            i := i + 1
        end
end
```

```
public class Printer {
    public void print() {
        for(int i=1;i<10;i++) {
            ...
        }
    }
}
```

Loops: Example 2

```
print
    local
        i: INTEGER
    do
        from
            i := 1
        until
            i >= 10
        loop
            i := i + 1
        end
end
```

```
public class Printer {
    public void print() {
        int i=1;
        while(i<10) {
            i++;
        }
    }
}
```

Loops: Traversing a list

```
print_1
    do
        from list.start
        until list.after
        loop
            list.item.print
            list.forth
        end
    end

print_2
    do
        across list as e loop
            e.item.print
        end
    end
```

```
public class Printer {
    public void print() {
        for(Element e: list) {
            e.print();
        }
    }
}
```

Basic Types

Eiffel:	Java:
BOOLEAN	boolean
CHARACTER	char, byte
INTEGER	short, int
INTEGER_64	long
REAL	float
DOUBLE	double
STRING	String