**Automatic code inspection**

**Main concept**

Syntactical matching of rules violation

Rule – is description of set of ASTs that can be reason for the one of the mentioned above problems.

**How it works**

Input program → Parser → AST → Tree traverser → Warning list

For expressing some rules representation of AST should contain whitespaces, tabulations, EOLs, comments

Rules represented via Java code or XML XQuery

**Existing tools**

- Checkstyle
  - http://checkstyle.sourceforge.net/
- PMD
  - http://pmd.sourceforge.net/
- FindBugs
  - http://findbugs.sourceforge.net/
- JCSC (Java Coding Standard Checker)
  - http://jcsc.sourceforge.net/

**Why PMD?**

Support user rules creation via both Java code and XML XQuery
Standard rules cover wide range of rule types
Stable version
Support plug-ins for various IDE
What does 'PMD' mean?

- Pretty Much Done
- Project Mess Detector
- Project Monitoring Directives
- Project Meets Deadline
- Programming Mistake Detector
- Pounds Mistakes Dead
- PMD Meaning Discovery (recursion, hooray!)
- Programs of Mass Destruction
- A 'Chaotic Metal' rock band name
  "Pretty Marry Dies"

Application of the PMD

- Select standard rules
- Write project specific rules
- Select rules parameters

Future development: automatic bug fixing

Program transformation via rewriting rules. For example StrategoXT.
http://www.program-transformation.org/Stratego/JavaFront

\[
\begin{align*}
R_1 & \Rightarrow R'_1 \\
R_2 & \Rightarrow R'_2
\end{align*}
\]

Future development: integration with a prover

```
requires i > 5;
int f(int i){
    if (i < 2) //UnconditionalIfStatement
        return i +1;
    else
        return i -1;
}
```

Future development: empirics for filtering warnings

Goal:
- Decrease warnings number
- Remove false warnings

Problems:
- Fuzzy warning criteria
- Context depending warnings

Pros and cons

Pros
- Don't require any additional efforts.
- Users don't need have any specific knowledge. It's enough that user understand notion of the AST.

Cons
- Not sound. It's possible that many from the found warnings are not real errors.
- Not complete. It can miss many real errors.