



Robotics Programming Laboratory

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Software Engineering Tools

A Story of a Woodcutter



...

- "I must be losing my strength", the woodcutter thought.

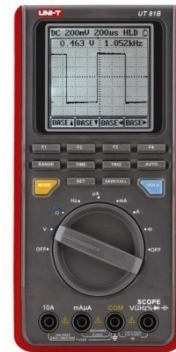
- "When was the last time you sharpened your axe?" the boss asked.

- "Sharpen? I had no time to sharpen my axe.

I have been very busy trying to cut trees..."



Why do we use tools?



Because things we usually create are complicated and with tools we can create them easier.



SE - the multi-person construction of multi-version software
(David Parnas, 1975)



Tools

- Minimize time of routine operations
- Minimize human factor
- Provide more information about the system
- Provide more information about the process

Which SE tools do you use?





IDEs provide:

- Syntax highlighting/checking
- Auto completion
- Feature "navigation" (e.g. Go to the definition)
- Refactoring tools (see following slides)

General purpose text editors can also offer **some** of these features!

One of the main advantages of using general purpose text editor: you don't have to install any additional software to start writing your code.



Refactoring



Code refactoring is a "disciplined technique for restructuring an existing body of code, altering its internal structure without changing its external behavior"



Techniques that allow for more abstraction

- Encapsulate Field
- Generalize Type
- Replace type-checking code with State/Strategy
- Replace conditional with polymorphism

Techniques for breaking code apart into more logical pieces

- Componentization
- Extract Class
- Extract Method

Techniques for improving names and location of code

- Move Method or Move Field
- Rename Method or Rename Field
- Pull Up
- Push Down



Refactoring Tools: Examples



Integrated refactoring tools:

- Eclipse
- NetBeans
- MS VisualStudio
- EiffelStudio

ReSharper



Integrated debuggers:

- EiffelStudio
- MS VisualStudio
- Eclipse

GDB (GNU Debugger) - a command-line debugger for several languages, including C and C++

DDD (Data Display Debugger) - is a graphical front-end for command-line debuggers such as GDB

Valgrind (memory debugger)



Integrated profilers

- Eclipse
- MS VisualStudio
- NetBeans
- EiffelStudio

Intel VTune



Unit testing

- JUnit
- NUnit
- CppUnit
- Autotest

GUI testing

- Selenium (web applications)

Testing multi-threaded applications

- ConTest



TDD cycle:

- Add a test
- Run all tests and see if the new one fails
- Write some code
- Run tests
- Refactor code
- Repeat