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Software Engineering Tools

A Story of a Woodcutter

...

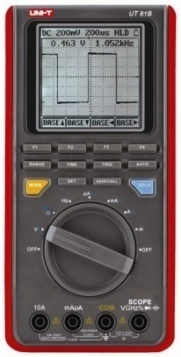
-"I must be losing my strength", the woodcutter thought.

- "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..."

Engineering Tools

Why do we use tools?



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

Software Engineering definition

SE - the multi-person construction of multi-version software

(David Parnas, 1975)

Benefits of Using Tools

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?

Text editors vs. IDEs

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"

Refactoring techniques

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

Debuggers

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)

Profilers & Performance analyzers

Integrated profilers

- Eclipse
- MS VisualStudio
- NetBeans
- EiffelStudio

Intel VTune

Testing

Unit testing

- JUnit
- NUnit
- CppUnit
- Autotest

GUI testing

- Selenium (web applications)

Testing multi-threaded applications

- ConTest

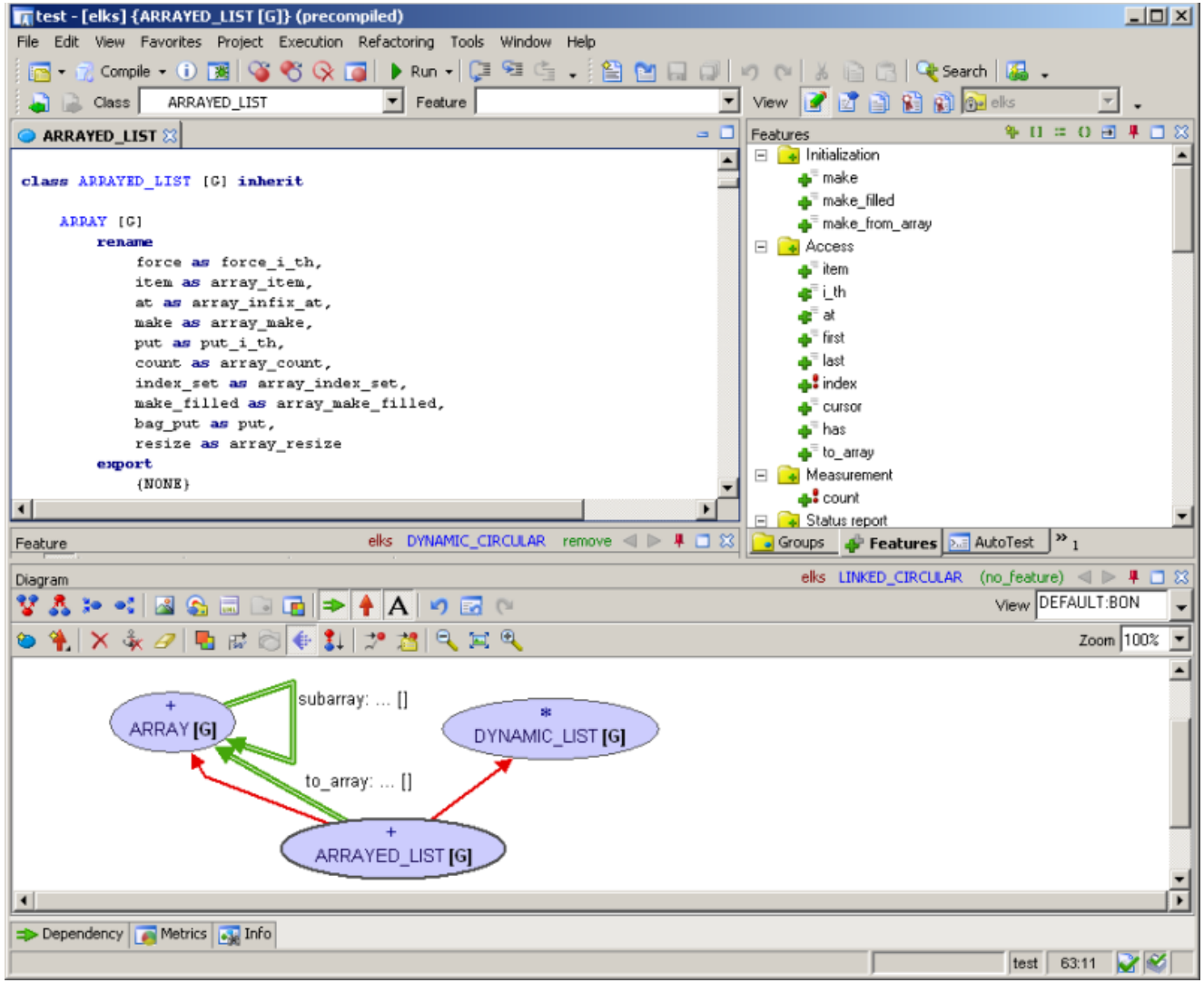
Test-Driven Development

TDD cycle:

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

EiffelStudio

DEMO



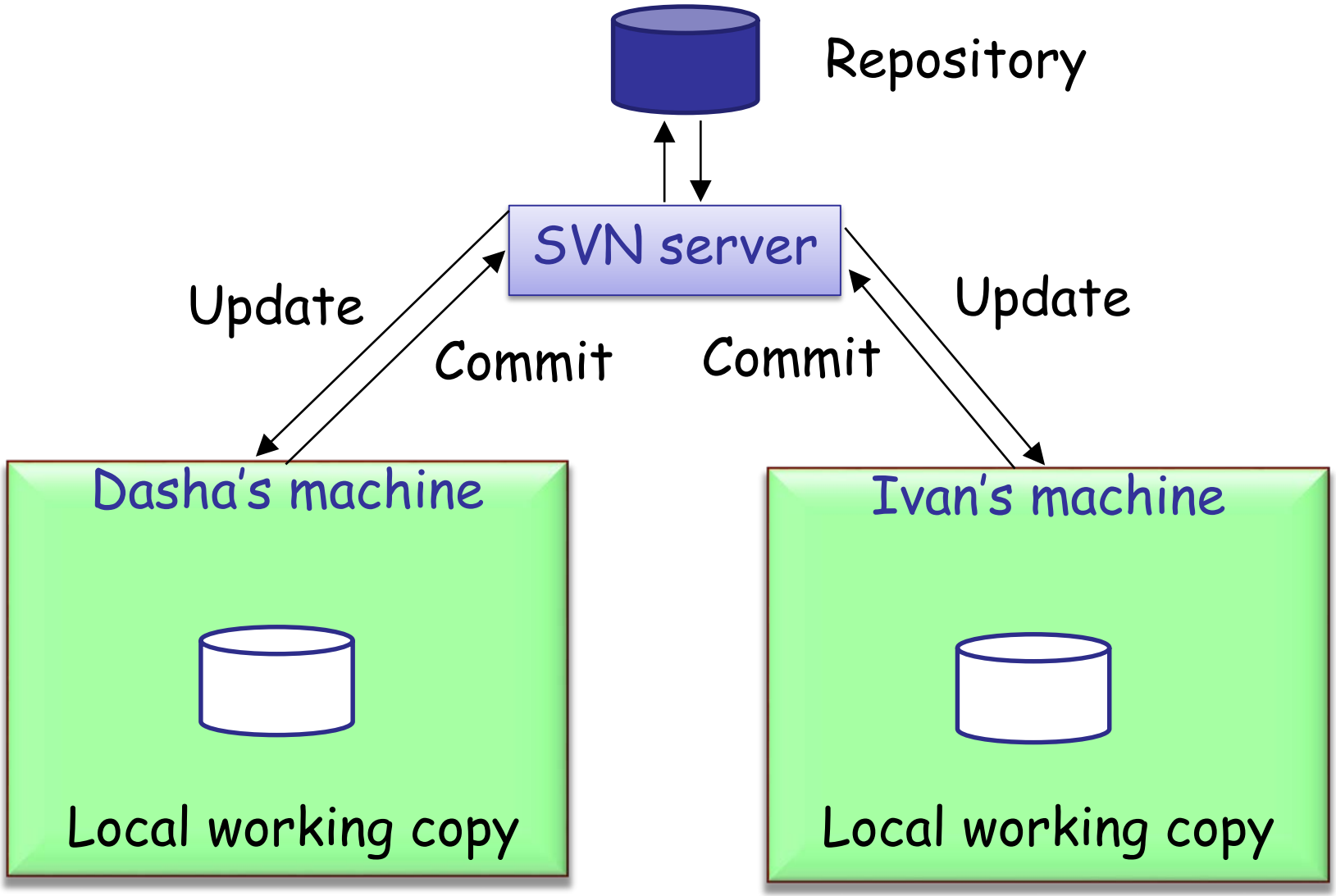
Version control

SVN

Git

Mercurial

SVN


Repository
SVN server
Update
Commit
Commit
Update
Dasha's machine
Local working copy
Ivan's machine
Local working copy

SVN basics

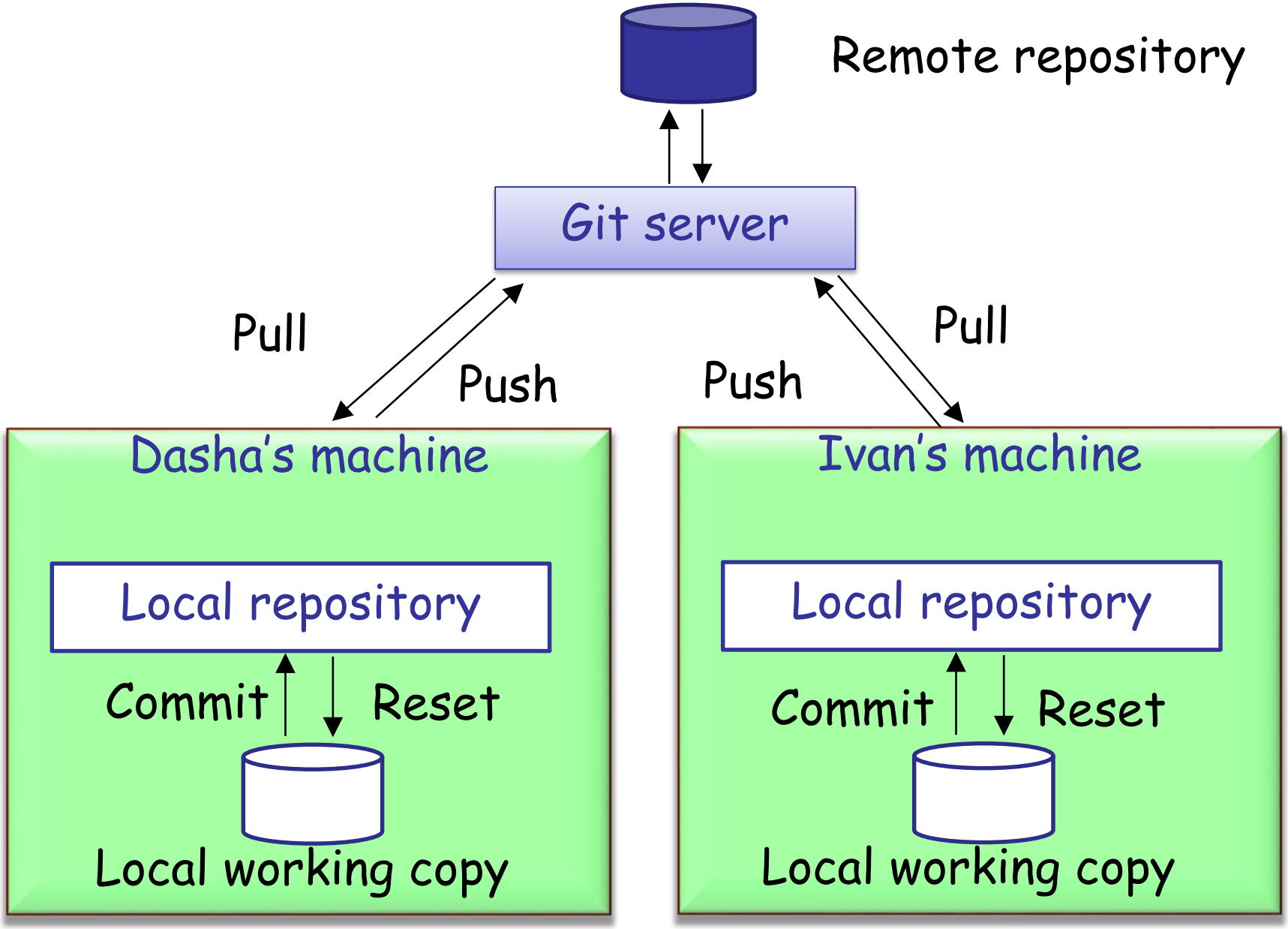
Commands:

- checkout
- add
- remove
- update
- revert
- diff
- commit

Common terms:

- Diff
- Revision
- Branch
- Merge

Git


Remote repository
Git server
Pull
Push
Push
Pull
Dasha's machine
Local repository
Commit
Reset
Local working copy
Ivan's machine
Local repository
Commit
Reset
Local working copy

Git basics

Commands:

- clone
- add
- rm
- status
- pull
- commit
- push

Git workflows:

- Centralized
- Feature Branch
- Gitflow
- Forking
- ...

Bug trackers, Issue trackers

JIRA

Bugzilla

Redmine

Trac

Jazz

Build tools

Ant

Maven

Cmake

Continious Integration

Jenkins

Teamcity

Object-oriented analysis and design

BON

UML