Advanced Tools for Software Development and Monitoring

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Goal of this course

• Show selected advanced tools (and features)

• Using tools to solve more complex problems

• Basic principles of their functioning (internals)
Expectations

- Basic knowledge of common platforms
  - UNIX/Linux, Windows, Java
- Advanced knowledge of main programming languages (C/C++, Java, C#)
- Experience with developing large systems
- Minimal experience with developing web applications
  - PHP, JavaScript, HTML, Servlets/JSP, ASP.NET
Plan for each lecture

- Brief introduction
- Presentations (3-4)
- Questionnaire
Presentations

• Content
  ▪ General overview (purpose, features)
  ▪ Live demo (how to use a given tool)
  ▪ Technical details (implementation)
  ▪ Your experience (opinion, limitations)
  ▪ Practical exercises & small examples

• Duration
  ▪ Long: 30 m
  ▪ Short: 15 m
Questionnaire

• Feedback
  ▪ Content (how useful it was)
  ▪ Quality of the presentation
  ▪ Your own comments
    • topic, tools, presentations
Grading

• Presentations: 2
  ▪ one long (30 m), one short (15 m)

• Attendance: 60%
  ▪ Submitted questionnaires
Topics 1

- Software building
  - GNU Autotools, Maven, Scons, Ivy, Gradle, CMake
  - Controlling the build process with GCC (writing linker scripts)

- Functional testing
  - Unit testing with mock objects (Mockito, Rhino Mocks, moq)
  - New libraries for unit testing (TestNG)
  - Test coverage & mutation testing
    - Jester, Jumble, NinjaTurtles, Cobertura, Clover
  - Testing web applications (HtmlUnit, Selenium, Jasmine, WatiN)

- Debugging
  - Advanced features of GDB (remote, multi-threaded, etc)
  - JPDA: Java Platform Debugger Architecture (JVM TI, JDI)
  - Firebug (web development)
Topics 2

- Runtime monitoring
  - Java Management Extensions (JMX)

- Performance testing
  - JMeter, VisualVM, gcov

- Instrumentation (PIN, RoadRunner)

- Bytecode manipulation (ASM, Javassist)

- Code generation (Acceleo, AutoMapper)

- Software packaging and installation
  - apt, rpm, portage, windows installers, msi files, Docker
Topics 3

- Continuous integration (Jenkins, Cruise Control, TeamCity)
- Code review systems (Gerrit)
- Bug trackers (JIRA, Youtrack)
- Source code management (Fisheye, Perforce)

- Cross development (with GCC)
- Hardware emulators (QEMU)
- Virtualization: hypervisors (Xen)

Tools for dynamic programming languages
  - Short general overview (main specifics and distinct features)
  - Gem (Ruby), package (Python), NPM (for Node.js), Bundler (Ruby), Capistrano, spock (Groovy)
Choose your topic
Contact

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- **Office hours**
  - Tue 15:30-17:00, Wed 15:30-17:00