

INF 111 / CSE 121:
Software Tools and Methods

Lecture Notes for Fall Quarter, 2007
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Set 3

(Some slides adapted from Susan E. Sim)

Announcements

- Lab on Friday – Eclipse
- Add / Drop

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Previous Class...

- Brief Review of S/W Engineering
- Introduction to Tools & Methods

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Today's Lecture

- **What are Software Tools & Methods**

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Notations, Tools & Methods

- **Tools:**
 - Machines, Executable Programs
- **Methods:**
 - Processes, Procedures
- **Notations:**
 - Languages Used by Tools and Methods


Remember the Guitar Example ...

Tool: Guitar

Method: How I play (strum/pick/style)

Notation: Music


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Applying Tools in SE

- **Computer Aided Software Engineering (CASE)**
- **Different types of CASE Products:**
 - A Simple Tool
 - ▣ Supports 1 specific task
 - A Toolkit
 - ▣ A Set of Independent Tools
 - A Workbench
 - ▣ Supports a set of tasks or activities (maybe Requirements & Specs only)
 - ▣ May be several tools that work together
 - An Environment
 - ▣ Supports the entire process
 - ▣ May be several workbenches – integrated


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Environments

- Often Focused on Some Aspect
 - Language-Centered
 - Program Structures
 - Grammatical Descriptions
 - Integrated
 - Data Repository
 - Process-Centered
 - Development Process


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Analyst Workbench or Upper CASE

- Supports Upper Part of the Waterfall
 - Requirements
 - Design
- Tools to Support
 - Drawing Tools
 - Simple → Complex
 - Database
 - Data Analysis Tool
 - Consistency Checking, Completeness
 - Generate Reports
 - Adhere to Company Standards
- Examples:
 - Argo UML
 - Rational Rose
 - TogetherJ

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Programmer Workbench or Lower CASE

- Supports Lower Part of the Waterfall
 - Implementation
 - Testing
 - Maintenance
- Tools to Support
 - Language Sensitive Text Editor (WebEdit)
 - Debugging
 - Code Generators
 - Syntax Checker
 - Performance Analyzer
 - Configuration Management
 - Compiler
 - Generation of Test Data
 - Unit Test Tools
 - Simulation
 - Regression Testing
 - Refactoring Tools

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What is Refactoring?

- **Cleaning up Code**
 - Does not change the output
 - Renaming Variables
 - Restructuring Code
 - Changing Logic
- **Helps with:**
 - Legacy Code → Code Atrophy
 - Spaghetti Code

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Management Workbench

- **Supports Management of the Project**
 - Planning
 - Control
- **Tools to Support**
 - Configuration Control
 - Design or Data Analysis
 - Workflow
 - Work Assignment
 - Assigning Resources Efficiently
 - Cost Estimation
 - Reliability
 - Estimates Reliability
 - Forecasting Testing time

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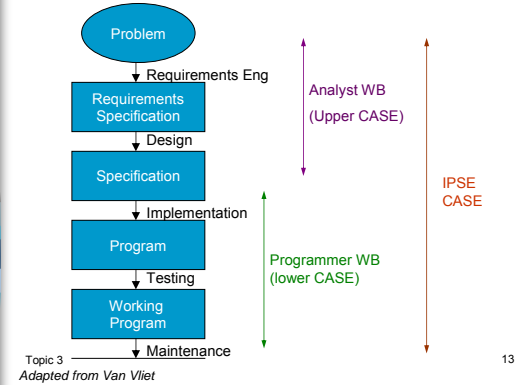
Integrated Project Support Environments (IPSE)

- **Supports the Entire Project**
 - Analyst Workbench
 - Programmer Workbench
 - Management Workbench
- **Tight Integration vs. Loose Integration**

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Integrated Environments / Workbenches



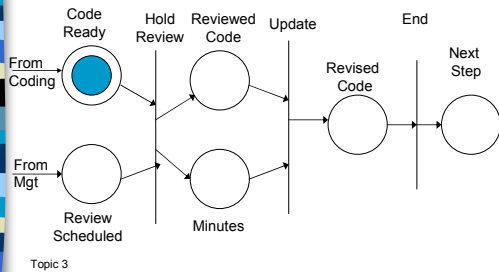
Process-Centered Environment (PSEE)

- Supports the Development Process
- Closely Tied to Process Modeling
 - Petri-Nets
 - State Transition Diagrams
 - Etc...
- Tends to support Back-End (Imp. & Testing)
 - Easier to Formalize

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Petri-Net View of PSEE



Some of the Tools/Environments We Will Use

- Eclipse JDT
- JUnit
- Eclipse Plugins
- Argo UML (Or Rational Rose)
- Etc...

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Remember -- Selecting a Tool?

IDEAL TYPICALLY

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Methods

- A **Method** is a technical prescription for how to perform a collection of activities, focusing on integration of techniques and guidance on their use.
- Prescribe → to lay down a rule
- A **Technique** is a prescription of how to perform a particular activity
 - May include rules on how to describe a product of that activity in a particular notation
 - Smaller than a Method
 - Example: Unit Testing

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Graphically

Technique – How to perform as specific Activity

- Activity 2
- Activity 1
- Activity 3

Method – How to perform Many Activities


```

graph TD
    A1((Activity 1)) --> Line[ ]
    A2((Activity 2)) --> Line
    Line --> A3((Activity 3))
    
```

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Tools vs. Methods

- **Construction**
 - Tools
 - ▣ Hammer
 - ▣ Saw
 - ▣ Measuring Tape
 - Methods
 - ▣ Rules for Construction



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Tools vs. Methods – Take 2

- **I give you a camera**
- **I teach you how to take a picture:**
 - Auto-focus
 - Push the Button
- **I teach you how to shoot a very nice picture**
 - Lighting
 - Aperture
 - Shutter Speed
 - Composition



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Method vs. Methodology

- A **method** is a description of how we do something
- A **methodology** is the study of methods
- Methodology (from Wikipedia)

The common idea here is the collection, the comparative study, and the critique of the individual methods that are used in the given discipline or field of inquiry

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Notations

- A **notation** is a representation scheme (or language)
- A **process model** is an abstract description of how to conduct a collection of activities, focusing on resource usage and **dependencies** between activities
 - Often expressed using a notation

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