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**

Previous Class…

- **Brief Review of S/W Engineering**
- **Introduction to Tools & Methods**
- **Review Questions**
  - What are the 3 elements that are necessary to create a S/W product?
    - (hint: 3 P's)
  - What is a S/W Lifecycle Model?
  - Why do we need tools?
  - Name 3 types of S/W techology:
    - How do they differ?
  - Why is there a gap between research and practice?

Today's Lecture

- **What are Software Tools & Methods**

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

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

Environments

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

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

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

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

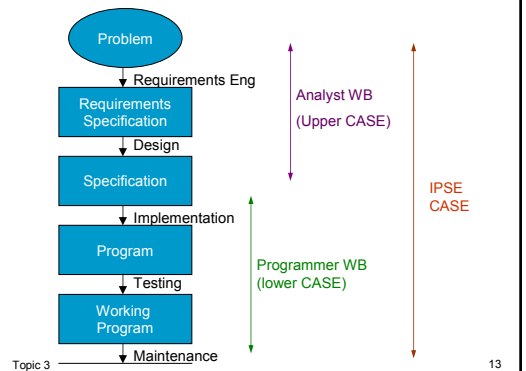
Management Workbench

- **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

Integrated Project Support Environments (IPSE)

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

Integrated Environments / Workbenches

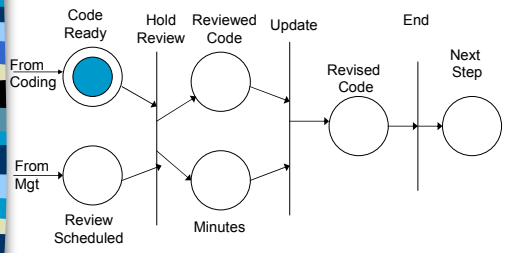


Adapted from Van Vliet

Process-Centered Environment (PSEE)

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

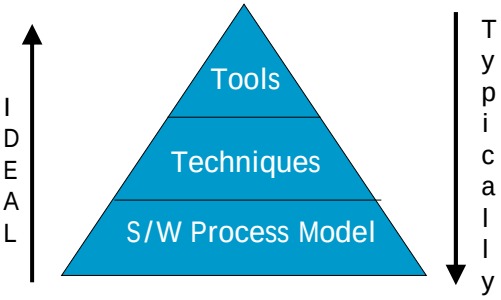
Petri-Net View of PSEE



Some of the Tools/Environments We Will Use

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

Remember -- Selecting a Tool?



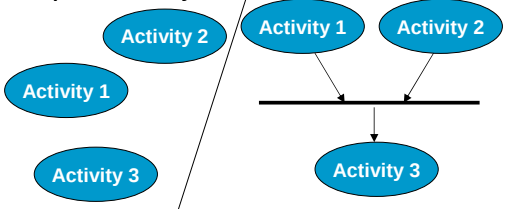
Methods

- 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 activitity in a particular notation
  - Smaller than a Method
  - Example: Unit Testing

Graphically

Technique –
How to perform
as specific Activity

Method –
How to perform
Many Activities



Tools vs. Methods

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

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

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

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**