Implementation Work Flow

CSC 532: Advanced Software Engineer
Louisiana Tech University
Topics to cover

- Introduction
- Artifacts
- Workers
- Activities
Introduction

- Fundamental goal is to build a working version of system.
- Craft out the Architecture
- Implement the Design in terms of components.
- Plan System Integrations
- Implement Design classes and subsystems
- Unit test components
- Integrate Components.
Implementation Workflow Activities and Workers

Architect & Developers

System Integrator

Component Engineer

Architectural Implementation

Integrate System

Implement a Subsystem/component

Implement a Class

Perform a Test
Artifacts

- Implementation Model
  - Component
  - Implementation subsystem
  - Interface

- Architecture Description
  - View of Implementation Model

- Integration Build Plan
Implementation Model

- Describes how elements of design model are implemented in terms of components such as source code, executable, etc.

- Describe how components are organized using the structuring and modularization mechanisms of the implementation environment and programming languages

- Hierarchy of Implementation (sub) Systems containing Components and Interfaces
Component

- Physical packaging of model elements
- Standard stereotypes which the UML assigns
  - <<executable>> -- a program that may run on a node
  - <<library>> -- static or dynamic library
  - <<file>> -- static or dynamic library
  - <<table>> -- a database table
  - <<document>> -- a document
  - technology specific (<<ActiveX>>, <<Applet>>, <<DLL>>, <<CORBA Component>>, etc.)
Component Diagram

<<Page>>
Search.html

<<Executable>>
Search.exe

<<Page>>
Front.html

<<table>>
Book.html

<<table>>
Author.
Implementation of subsystem

- Organize implementation model artifacts into more manageable pieces
- Manifested by a “packaging mechanism” in implementation environment
  - Component packages
  - Interfaces
- Trace one-to-one with design subsystems
  - same dependencies to other subsystems, interfaces
  - provides same interfaces
    - maps one-to-one with which components or other implementation subsystems within the subsystem provide the interfaces of the subsystem
Interface

- As in design, interfaces define the operations implemented by components and implementation subsystems.
- A component that realizes (and thus provides) an interface must implement all the operations defined by the interface.
Component implementation with build tools

- Build tools
  - Unix make
  - Ant: XML based build tool
  - Organize implementation into modules
    - source
    - Document
    - Output (binary)
    - package
Architectural Description

- implementation model
- Decomposition of implementation model into subsystems, their interfaces, and dependencies between them
- Key components
  - trace to architecturally significant design classes
  - executable components
  - components that are general, central, or implement generic design mechanisms that many other components depend on
Integrate Build Plan

- Describes the build that will occur within a given iteration.
- Build plan for each increment
  - list of functionality: use cases and/or scenarios
  - list of implementation subsystems and components
- Test each build, including regression tests
- Configuration management with the build plan
WORKERS

- ARCHITECT
- COMPONENT ENGINEER
- SYSTEM INTEGRATOR
ARCHITECT

- Outlines the implementation model.
- Ensure the completeness and correctness.
- Mapping the executable components onto nodes within the deployment model.
- Include the components from the implementation model and the updated contents of deployment model.
Component Engineer

- Is responsible for the source code of the components and subsystems.
- For coding the interfaces associated with components and subsystems.
- Is responsible for unit testing of his or her components.
Unit Testing

- Specification testing

- Note that black box testing is not unit testing

- Structural testing or white box testing
  - control flow graph
  - Method flow graph
  - Class flow graph
System Integrator

- Is responsible for designing integration build plan and performing incremental integration.
Implementation Workflow
Activities and Workers

Architect

System Integrator

Component Engineer

Architectural Implementation

Integrate System

Implement a Subsystem

Perform a Unit Test

Implement a Class
End chapter Questions/Review

- What are main activities in this workflow?
- Describe what are necessary tools or processes in this workflow and how they can help growing maturity of, improving quality of the SW product?