Software Product Line

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References

• Google: software product line
• Software Factories: Assembling Applications with Patterns, Models, Frameworks, and Tools, Jack Greenfield, Keith Short et al., Addison Wesley, 2005
Motivation

• Many businesses seek software supports for various automation
• Software industries have troubles meeting the expectations from the businesses to support their operation
• Factors:
  – growing complexity
  – time to delivery/market
  – continuous changes, control&improvement
Approach

• Learning from Industrial Revolution
  – How to make a software in a “factory”
  – Through a product line
Software Product Line

• Develop a product’s model using common components

• Success Story:
  – Boing 757 and 767 have 60% common components
What makes SPL different?

- Plan a series of products that share features.
- Require software engineering techniques to share code among products.
- A strategy to implement shared features by shared code in a set of products and in a structure to make the product production effective and efficient.
Basic Building Block

- Patterns recur in software development
- A framework to enable the development of software based on a common architectural style
  - adapting, configuring and assembling components
- A language is then defined to support the assembly process
- The tools then help developers
  - assembly the software
  - engage customers and respond rapidly to changes in requirements
  - capture design decisions
  - produce executable code
Big Issues

• Complexity
  – Encapsulation (increase of abstraction)
  – Responsibility partition

• Change
  – Replaced the software
  – Preserved as long as viable
  – Modify according to changes

• Old paradigm
  – Monolithic construction
  – Excessive Generality
  – One-off development
  – Process Immaturity
Basic Idea

• Software Product Line
  – is a systematic reuse
  – identifying the common features and recurring forms of variation in a specific domain to produce a family of software products
  – *wishes* more quickly, more cheaply and with less risk and higher quality than would be feasible by producing them individually
Process Overview
Software Product Line

- A product is differentiated with others in the family by its features
- Software product lines as solutions to variable problems
Where Families are Identified
Software Product Line Development

• Goal
  – develop assets to develop a software family

• Process model
  – iterative and parallel (not sequential)
Software Product Development

• Goal
  – to produce a member of the product family
Product Line Deployment

• How to implement this paradigm
• Start-up:
  – transition from developing individual product to family-based one
• Operation
  – different development approach
  – how to manage this operation
Product Line Evolution

• Main driver
  – business and technology

• Change management approach
  – long-term concerns
  – conservative to change
Assignment

• Download and get familiar with
  – GNU Health
  – OpenEMR

Try to identify patterns!!