On the design and development of program families

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Overview

• Objective
  – Definition of program families
    • A set of programs
    – First common features of these programs
    – Then variation of each program
  – Example: Microsoft Office Family
  – Three techniques
    • Traditional method: Sequential development method
    • Two new methods:
      – Stepwise refinement method
      – Specification of information hiding modules method


Overview (cont’d)

• Technique Overview
  – Sequential Method
    • Features
    • Disadvantages

start

start point

an incomplete program

a complete program
Overview (cont’d)
– Stepwise Method Vs. Specification Method
  • Features
  • Combination

Impact
• Product line
  – Definition: a group of products that share a set of
    commonalities that meet the requirements of the market
  – CMU/SEI: a Framework of Software Product Line
    Practice
  – CMU/SEI: 1st Software Product Line Conference (SPLC1)
    in 2000
• Information hiding design principle in Object-
  Oriented programming languages
• And so on

Related 1:
Commonality Analysis
• Objective
  – To identify the common features and variations
    among family members
• Technique Overview
  – FAST (Family-oriented Abstraction, Specification and
    Translation) process
  – An early step of the FAST process
  – Participants:
    • Moderator, recorder, family analysis experts

in 2nd International Workshop on Development and Evolution of Software Architectures for
Related 1 (cont’d)
– Result: Commonality Analysis Document
– Form: to hold a series of meetings
  • Five stages:
    – Prepare
    – Plan
    – Analyze: central part
    – Quantify
    – Review
  • Applicability:
    – Has been practiced in Lucent Technologies
  • How it extends Parnas’ work?
    – Provide a process

Related 2:
Adaptable Components

• Objective
  – One component represents a family of components

• Technique Overview
  – An adaptable component has a group of parameters of adaptability

Related 2 (cont’d)
– Two models of reuse:
  • Usual reuse model
    – Select from a library of components
    – Customize and then construct a new component
    – Time-consuming, error-prone
  • Adaptable component based reuse model
    – Select from the name of adaptable component
    – Make the decisions of parameters

• How it extends Parnas’ work?
  – A component family

Related 3:
Combining Product Line Engineering with Options Thinking

- **Objective**
  - To introduce an appropriate economic model to justify the use of product line approach

- **Technique Overview**
  - Product line approach needs more initial investment
  - The DCF Model can be used to justify the use of product line in cell phone companies
  - The DCF is not suitable to justify product line approach in an evolutionary product
  - The BSOP Model is a Model used in stock market to value the option. It is more suitable to justify an evolutionary product


Related 3 (cont’d)

- **How it extends Parnas’ work**
  - Product line is an extension of program family
  - This work introduces an economic model to justify the use of the product line
Uncited: Multi-Staged Scoping for Software Product Lines

- Objective
  - To propose a scoping method for the product line approach
- Technique Overview
  - Why we need scoping?
  - What requirements a sound scoping method should meet?
  - Three components of the proposed scoping method
    - Product line mapping, domain based scoping, feature based scoping


Why it should have cited the paper

- This paper should have cited Parnas’ paper for the same reason as the previous paper
  - Product line is a industrial interpretation of program family
  - This paper proposes a scoping method in product line

References

References
