Software Product Lines

Lecture Topics

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Overview – Lecture Topics

Classic Approaches for Variability

1. Introduction
2. Runtime Variability and Clone-and-Own
3. Modularity and Design Patterns

Modeling and Implementing Features

4. Feature Modeling
5. Techniques for Embedded Software
6. Techniques for Application Software
7. Language-Based Techniques
8. Development Process

Quality Assurance and Maintenance

9. Feature Interactions
10. Product-Line Analyses
11. Product-Line Testing
12. Evolution and Maintenance

Overview – 1. Introduction

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Overview – 2. Runtime Variability and Clone-and-Own

Runtime Variability
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Clone-and-Own
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Managed Clone-and-Own
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Overview – 3. Modularity and Design Patterns

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Overview – 2. Feature Modeling

Feature Models
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Representations and Translations
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Automated Analyses
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Overview – 5. Techniques for Embedded Software

Build Systems
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Preprocessors
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Feature Traceability
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Overview – 6. Techniques for Application Software

Components
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Services and Microservices
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White-Box and Black-Box Frameworks
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Overview – 7. Language-Based Techniques

Mixins
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FOP
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AOP
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Overview – 8. Development Process

Domain and Application Engineering
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Overview on Implementation Techniques
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Adoption of Product Lines
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Overview – 9. Feature Interactions

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Overview – 10. Product-Line Analyses

Analysis Strategies
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Analysis of Feature Mappings
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Analysis of Variable Code
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Overview – 11. Product-Line Testing

Combinatorial Interaction Testing
- Motivation
- Pairwise Interaction Testing
- A Greedy Algorithm
- Meta-Heuristic Search
- T-Wise Interaction Testing
- Effectiveness of Combinatorial Interaction Testing
- Efficiency of Combinatorial Interaction Testing
- Summary

Solution-Space Sampling
- Coverage in Single-System Engineering
- Coverage of Ifdef Blocks
- Presence-Condition Coverage
- Encoding Solution Space in Feature Models
- Overview on Coverage Criteria
- Overview on Input for Sampling Algorithms
- Summary

Sampling without Coverage
- Random Sampling
- Uniform Random Sampling
- Automation in Product Sampling
- Expert Knowledge in Sampling
- Testing the Linux Kernel
- Missing: Test-Case Selection/Generation
- Summary

Overview – 12. Evolution and Maintenance

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