Product Lines and Software Architecture

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Growing Sophistication of Consumer Devices

Complexity

- 1965
- 1979
- 2000
- 1990

Moore’s Law

- 1 kB
- 64 kB

- 2 MB
Families of Related Products

A Television Product Family

- Price
- Region
- Output Device

Other axes of diversity: image, sound, data processing, user interface, connectivity, ...
The Necessity and Benefit of Product Lines

- Building each of these TVs from scratch would likely put Philips out of business
- Reusing structure, behaviors, and component implementations is increasingly important to successful business practice
  - It simplifies the software development task
  - It reduces the development time and cost
  - It improves the overall system reliability
- Recognizing and exploiting commonality and variability across products
Reuse as the Big Win

- Architecture: reuse of
  - Ideas
  - Knowledge
  - Patterns
  - Engineering guidance
  - Well-worn experience

- Product families: reuse of
  - Structure
  - Behaviors
  - Implementations
  - Test suites...
Added Benefit – Product Populations

**Convergence**

- TV + VCR = TVCR
- TV + DVD = TV-DVD
- TV + HD = Tivo
- TV + STB = Digital TV
- TV + Audio = Home Theater
The Centerpiece – Architecture

Product Lines and Software Architecture
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Product Line Application Areas

- Consumer electronics
- Automotive electronics
- Medical devices
- Games
- Telephones (cellular and desktop)
Software Architecture

- Software architecture is there:
  - To help you understand the consequences of your decisions
  - To enable you to focus your time productively
  - To enable reuse that pays off in market-dominating product lines
    - With a TECHNICAL basis
  - With notations, tools, analytical techniques that put muscle to the ideas

Korea Connections...

- Taylor is scheduled to lecture on software architecture at:
  - Samsung (in Korea)
  - Korean Software Engineering Society
- March 2012