CSE P503:
Principles of Software Engineering

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Tonight's agenda

- Brief discussion: Alloy
- Software design: aspect-oriented design and programming
- Discussion: NATO and SWEBOK…
- Assignment 3 research papers – more information
- One-minute paper

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Discussion: Alloy

- [Some folks are not done, so this is not about the assignment per se]
- Reactions to Alloy as an approach and as a tool?
- Potentially useful to you in some situations?
  – If so, which ones?
  – If not, why not?
- Other?

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Aspect-oriented design & programming

- Very broadly, an approach in which crosscutting concerns are separated (modularized) from the core design and program
- The intent is to allow those crosscutting concerns to be defined and changed as independently as possible from the core design and program

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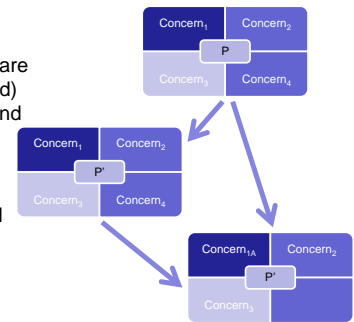
Crosscutting concerns

- Software concerns that pervade a program but are largely orthogonal to the program's core domain
- Each crosscutting concern must itself have some consistency and integrity, but with the code dispersed throughout a program maintaining and changing a concern can be difficult and error-prone
- Examples of crosscutting concerns might include
  - Logging, user interface preferences, authentication/authorization, …

Brief historical perspective

- Weaknesses in some information hiding assumptions: open implementation
  - Last week: base- vs. meta-interface
  - client control over some aspects of implementation through meta-interface
  - separate "red vs. blue" code to some degree
- Weaknesses in some uses of object-oriented inheritance: subject-oriented programming

Subject-oriented programming

- Harrison, Ossher, et al. @ IBM Research
- Different clients have different views of the entities in a system
- Example: a "tree" may be viewed by a botanist, an ecologist, a logger, a squirrel, etc.
- Therefore, need to represent entities in different ways to different users
- Motivation for "overthrowing the dominant decomposition"
- Conventional OO programming fails to allow this easily: issues in identity, support for change, etc.

To the first order…

- …and only the first order
- SOP preceded AOP
- AOP was articulated better and proselytized better
- The distinctions are real, but arguably not substantial
- They are, roughly, now considered one and the same under the aegis of AOP

Main implementations (for Java)

- AspectJ (http://www.eclipse.org/aspectj/)
- Hyper/J (http://www.alphaworks.ibm.com/tech/hyperj)
    – Perhaps out of date
- Wikipedia lists perhaps 100 different aspect-oriented implementations for a couple of dozen languages (e.g., C/C++, PHP, Python, Ruby, …)
- 10+ books in 3+ (natural) languages

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http://video.google.com/videoplay?docid=85669233113 15412414&q=engEDU

- Can stop video for questions/discussions

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AOP: discussion

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NATO: what's different now?

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SWEBOK: promising?

Assignment 3 – research papers

- A secondary research report
- Require the definition of a topic, and approval by me, identification of pertinent papers and materials (perhaps with help from me), perhaps some hands-on experience for some kinds of topics, and finally a scholarly report on the topic and your analysis of it, complete with citations, open questions, etc.
- The list of potential topics is enormous, but perhaps a few examples might help: state-of-the-research in ... symbolic execution, random testing, code searching, reliability models, software inspections, program slicing, automatic theorem proving, clone analysis,

Sample: one style

- On the whole, the following papers from an ICSE 2000 "future of software engineering" track are in roughly the style I'd like -- http://www.informatik.uni-trier.de/~ley/db/conf/icse/future2000.html is the whole list (in the ACM Digital Library)
- Some are much better than others, and the part that looks to the future could/should be reduced with an added focus on current status. But still, the feel is reasonable.
- As for length, roughly the same as these (10 conference pages) is fine, but I'm flexible within reason..

One-minute paper

- Key point? Open question? Mid-course correction?

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