Modularity

Software Architecture

UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Tao Xie, Professor
Computer Science @ Illinois
Learning Objectives

By the end of this video, you will be able to
• Explain the differences between coupling and cohesion.
• List major types of cohesion.
• Explain information hiding for accomplishing modularity.
• List major reasons for achieving modularity.
• Explain what Conway’s Law is about.
• List major ways to achieve modularity.
Functional Independence

Cohesion

Coupling
Coupling

- Measure of interconnection among modules
- The degree to which one module depends on others
- Minimize coupling
Cohesion

- Measure of interconnection **within** a module
- The degree to which **one part** of a module depends on another
- Maximize cohesion
Major Types of Cohesion

• Coincidental – grouped by chance

• Logical – same idea

• Temporal – same time

• Procedural – one after another

• Communicational – shared data

• Sequential – output of one being input of the other

• Functional - a single well-defined task
Turn Spaghetti Code ...
... Into a Few Modules
• Each module should hide a design decision from others
• Ideally, one design decision per module, but usually design decisions are closely related
Example Design Decisions

• Representation of data

• Use of a particular software package

• Use of a particular printer

• Use of a particular operating system

• Use of a particular algorithm
Other Reasons for Modularity

• Collaborative/distributed development: reduced communication

• Security – compartmentalization

• Reliability – localization of failure

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Conway’s Law
The architecture of a system is the same as the structure of the group that developed it

(Conway, 1968)
Making Trade-Offs: Should You Do It?

Moving functionality from one module to another causes:

Module Coupling

Module 1 Cohesion

Module 2 Cohesion
Ways to Achieve Modularity

• Reuse a design with good modularity

• Think about and hide design decisions

• Reduce coupling and increase cohesion

• Eliminate duplication

• Reduce impact of changes
References


The End