SENG5802: Software Engineering II - Software Design
Design Patterns II

Outline

What is design? (1/2)

A creative activity

Not an "industrial" activity

Is it engineering at all?

What is design? (2/2)

But, what is engineering then?

Design requires a few essential elements.

- Understanding
- Background
- Ideas
- Freedom
- Tools
- Judgment

Design Inspiration

You need ideas

Where do they come from?

- Preparing our mind
- Chance

Lateral Thinking

- Randomness
- Provocation
- Challenge
- Concept fan
- Disproving

Edward de Bono, 1967

Outline

Design Context

S & T recommend starting with elements of design which establish context

What is the context of design?

Module dependencies

- Afferent coupling (C_a): number of other modules that **depend on the module** somehow
- Efferent coupling (C_e): number of other modules that **the module depends on** somehow
- Instability ($I = \frac{C_e}{C_a + C_e}$): resilience to change
  - Abstractness: proportion of abstract elements in a module "Software package metrics" Robert Martin

Managing coupling

Keep dependencies under control

Prefer delegation over inheritance

Avoid circular dependencies

Many ways to break or invert dependencies

Improving cohesion

Are switch statements evil?

When, exactly, are they a sign of poor cohesion?

Outline

Outline

Bridge

GOF – *Decouple an abstraction from its implementation so the two can vary independently*

Solves common cases of "powerset" subtypes that arise from two orthogonal sources of variability

Outline

Abstract Factory

GOF – *provide an interface for creating families of related or dependent objects without specifying their concrete classes*

Consider the SalesOrder scenario

Creating a SaleOrder