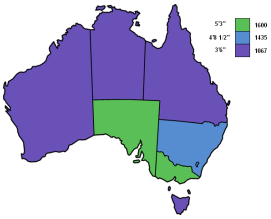
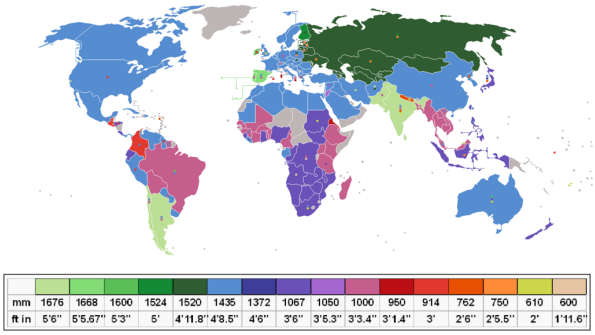
Design Patterns

by Willem van Straten and Andrew Cain

Certain design issues arise repeatedly in object-oriented solutions

It is counter-productive to reinvent the wheel





Many design issues have already been solved!

stackoverflow

Good developers learn from others **how** to achieve good object-oriented design

A → B

Recognize and exploit Design Patterns to increase productivity

Design patterns record solutions to commonly encountered problems

Roles and responsibilities must be factored into classes with appropriate granularity

Appropriate inheritance hierarchies must be defined

Appropriate delegation, collaboration and other relationships must be established

Experienced designers re-use elements of successful solutions

Recognize recurring patterns in interfaces and relationships

Reuse elements of successful designs based on prior experience

Solve problems without reinventing or rediscovering

Design Patterns codify important and recurring solutions

Design Patterns make it easier to identify abstractions and reuse proven design solutions

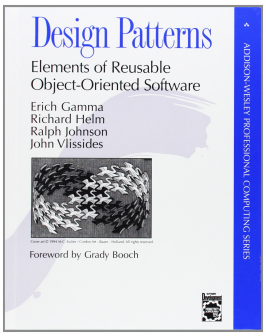
Design Patterns make proven solutions accessible to new developers

Solutions based on Design Patterns
are reusable, extensible, and maintainable

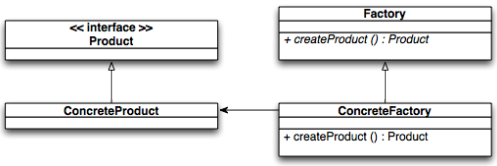
Recognize Design Patterns
to save time and effort

Design Patterns are broadly
classified into three categories:

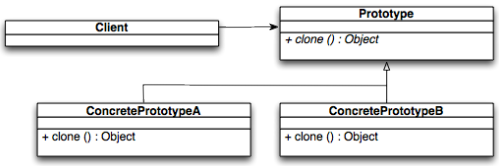
1. Creational – ways to create objects
2. Structural – ways to assemble objects
3. Behavioural – ways to perform common tasks



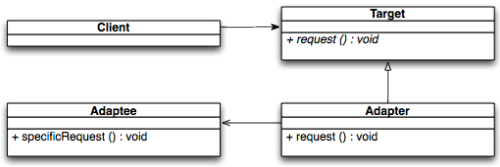
Creational: Factory Method



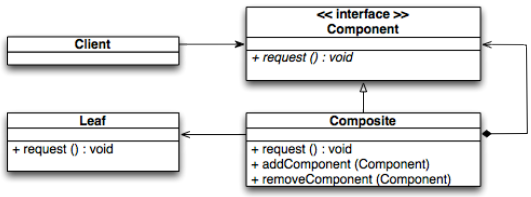
Creational: Prototype



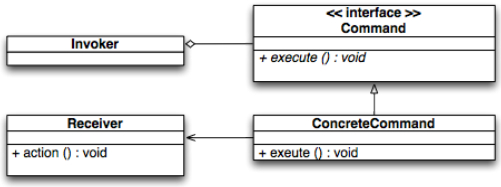
Structural: Adapter



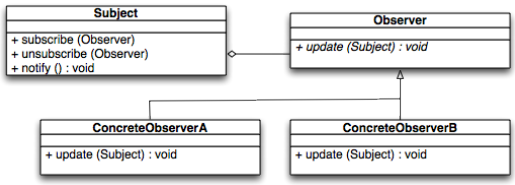
Structural: Composite



Behavioural: Command



Behavioural: Observer



Use Design Patterns to achieve and communicate good OO design

Design Patterns are based on two principles of reusable OO design

Program to an interface,
not an implementation

Favour object composition
over class inheritance

In short:
depend on abstractions

Implementations based on
Design Patterns more readily
achieve good design

Reusable

Extensible

Maintainable

Design Patterns provide a shared vocabulary of high-level concepts

Capture essential structural elements of an architecture

Codification of intuitive knowledge of experienced developers

Communicate and justify key design decisions

Will you be able to recognize and use design patterns to solve problems?

Many design problems have already been solved.

Commonly occurring Design Patterns have been identified and codified

Recognize Design Patterns and use them to convey and justify design decisions

Design Patterns lead to less work

This Week's Tasks

Semester Test: Learn from First Opportunity

Look Ahead: Plan remainder of semester

Credit Task 3: Case Study – Iteration 6