

Design Patterns: Behavioural

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CMPT166

Dr. Sean Ho

Trinity Western University

See also:
Vince Huston,
JavaCamp

Quiz 6: 12min, 20pts

- What is **Activity** in Android?
Describe some examples.
Is an Activity a complete application? [6]
- Why do Android applications not have a **main()** method? [4]
- What are Android **string resources**?
Why are they cool? [4]
- Name and describe two **Creational** design patterns from the “Gang of Four” book.
Describe an example usage of each. [6]

Quiz 6: answers #1-2

- What is **Activity** in Android? [6]
 - Presents **UI** for one focused **endeavour** by the user
 - e.g., **dialogue** to get username/password
 - An app generally has **several** Activities
- Why do Android applications not have a **main()**?
 - Each Activity is an **entry point** into the app
 - **Modular design** so other apps can use parts of your app

Quiz 6: answers #3

- What are Android **string resources**? Why are they cool? [4]
 - **Name-value** pairs, stored in **res/values/strings.xml**
 - Don't **hard-code** strings in code/properties, but refer to **string ID**
 - Facilitates **internationalization**: Android selects appropriate **strings.xml** based on current **locale**

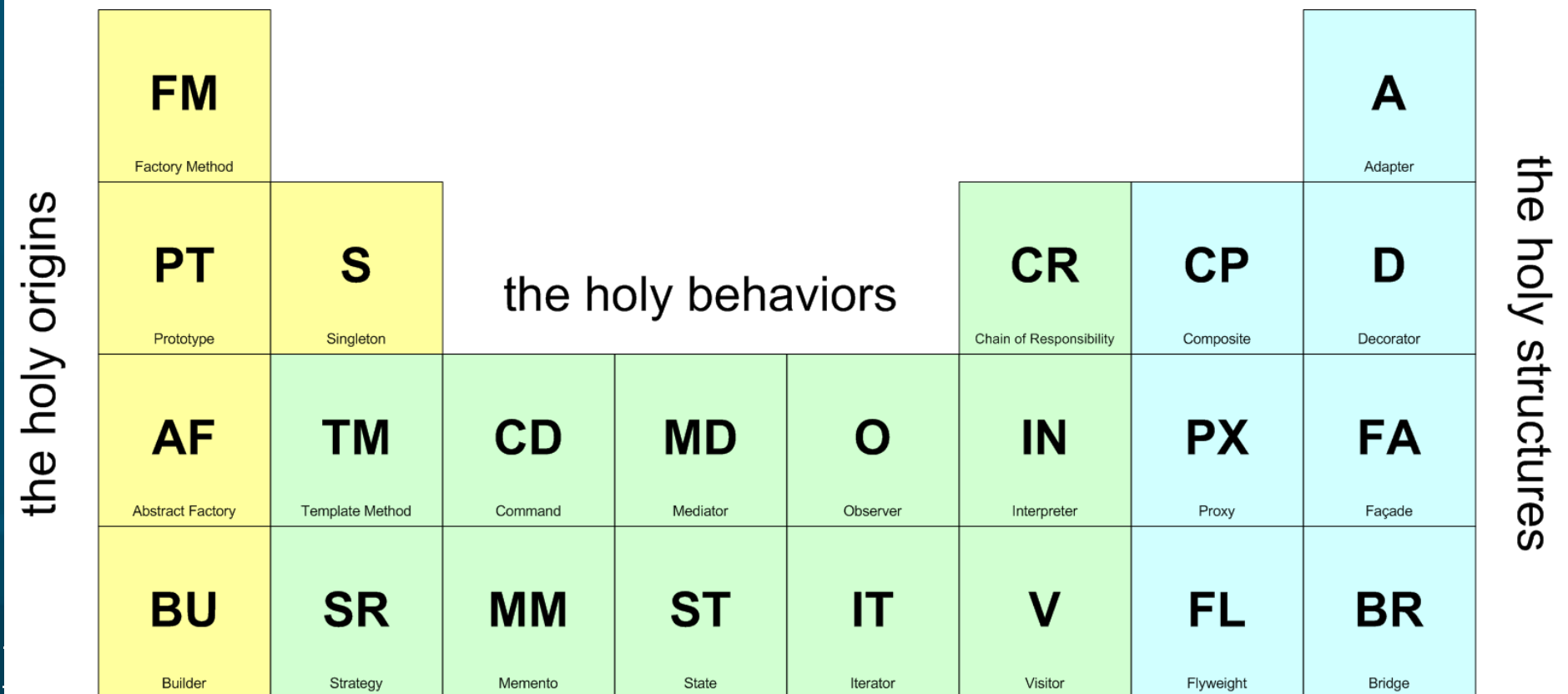
Quiz 6: answers #4

- Name and describe two **Creational** design patterns from the “Gang of Four” book. **[6]**
 - **Factory Method**: “virtual constructor”
 - **Abstract Factory**: “kits” for similar objects
 - **Builder**: Director delegates to Builders
 - **Prototype**: clone an existing object
 - **Singleton**: allow only one instance

Design patterns (GoF)

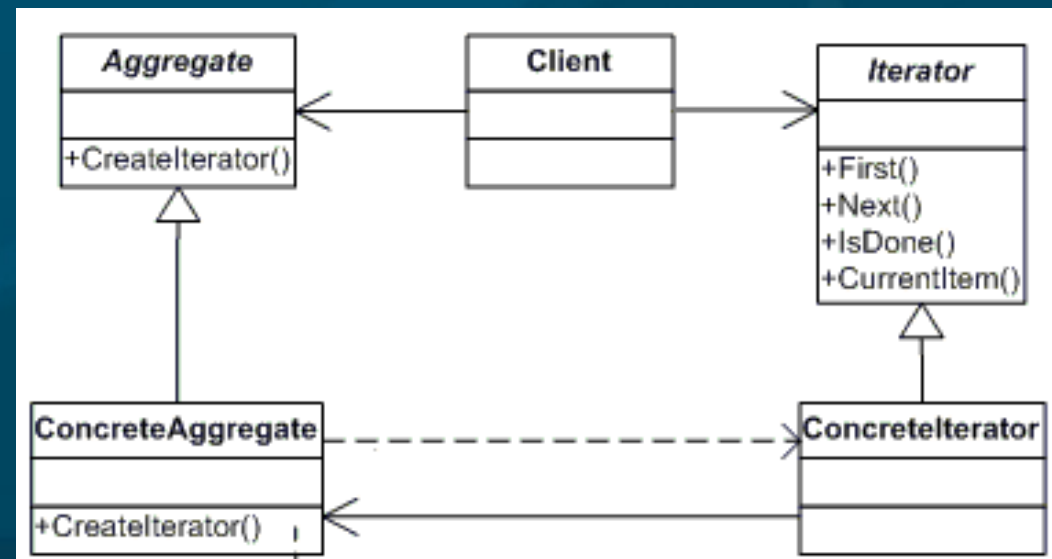
- Reusable **templates** for designing programs
May be very **high-level**, indep. of prog. language

The Sacred Elements of the Faith



Behavioural pattern: Iterator

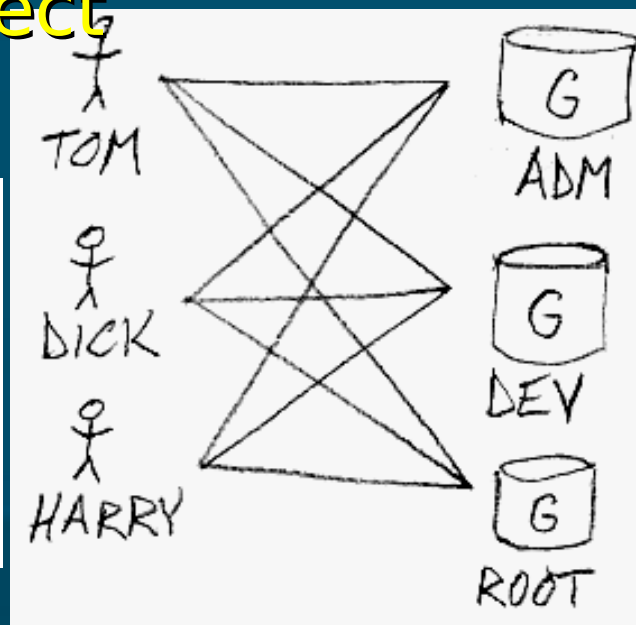
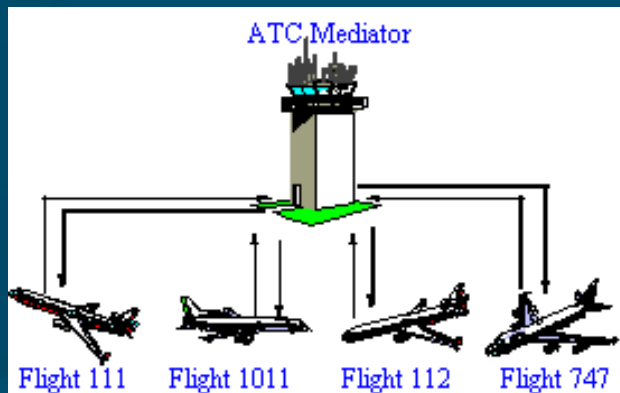
- Abstract interface to **traverse** a collection
- **Hide** how the collection is **stored**
- Client **interface**: **first**, **next**, **isDone**
- e.g., **secretary** knows her own filing system; boss only needs ask for “**next document**”
- e.g., **for/each** loop through **dictionaries**:
 - **Order** irrelevant



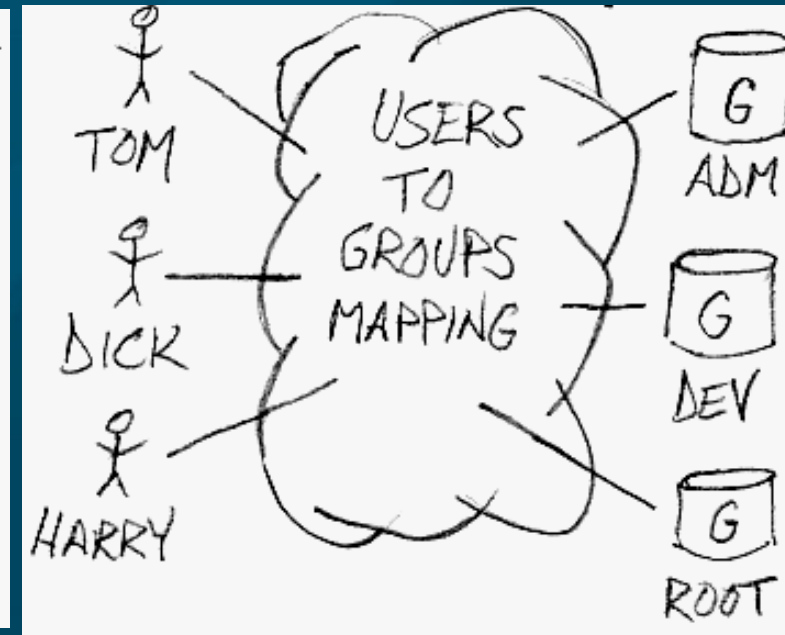
Behavioural pattern: Mediator

- Simplify **many-to-many** relationships with one central object that all actors interact with
 - Loose **coupling** of peers
- Encapsulate many **interactions** (e.g., methods) into one **object**

■ e.g., ATC



w/o mediator



with mediator

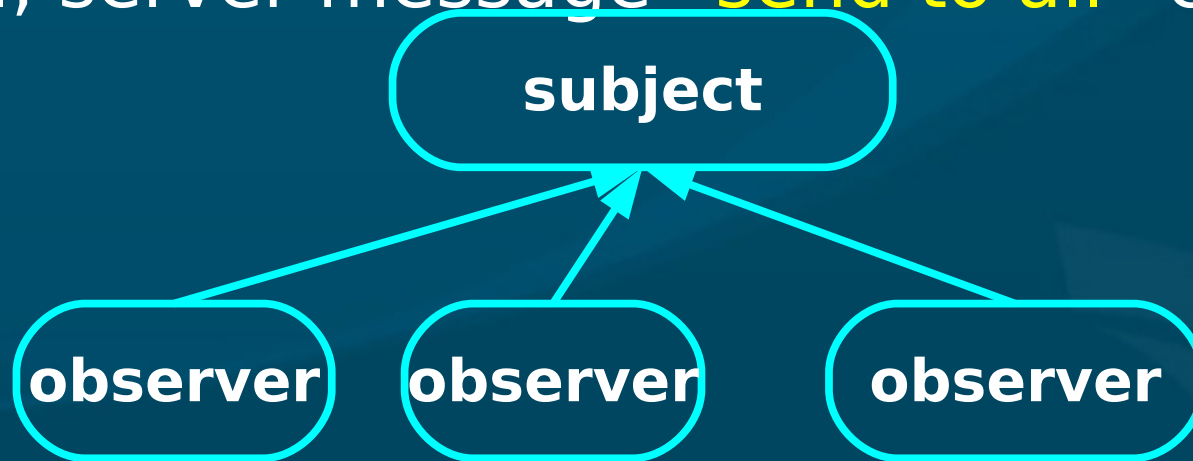
Behavioural pattern: Memento

- Record object **state** and restore it transparently
 - e.g., pickling/**serialization**
- Allows **undo/redo**, checkpoint/**snapshot**, etc.
- **Originator**: object that knows how to **snapshot**
- **Caretaker**: **requests** Originator to snapshot, **keeps** Memento, and **restores** Originator later
- **Memento**: object representing Originator **state**



Behavioural pattern: Observer

- **One-to-many** dependency between objects so that when the **subject** changes state, all its **observers** are notified and updated
 - e.g., TV/radio **broadcast**
 - e.g., **RSS** feeds
 - e.g., server message “**send to all**” clients



Behavioural patterns

- **Chain of responsibility**: avoid coupling **sender** directly to **receiver** by passing through chain
- **Command**: make **requests** into objects
- **Interpreter**: define macro **language** + **parser**
- **Iterator**: access all elements of a **collection**
- **Mediator**: object encapsulating the **interactions** of a set of objects: promotes **loose coupling**
- **Memento**: save/restore **state** of object
- **Observer**: decouple **viewers** from the subject
 - *(and others: TemplateMethod, State, Strategy, Visitor)*

Design patterns (GoF)

The Sacred Elements of the Faith

the holy origins	FM Factory Method	the holy behaviors					A Adapter	the holy structures	
	PT Prototype	S Singleton				CR Chain of Responsibility	CP Composite		D Decorator
	AF Abstract Factory	TM Template Method	CD Command	MD Mediator	O Observer	IN Interpreter	PX Proxy		FA Façade
	BU Builder	SR Strategy	MM Memento	ST State	IT Iterator	V Visitor	FL Flyweight		BR Bridge