

Material and some slide content from:

- GoF Design Patterns (book)
- Heads up Design Patterns (book)

Design Pattern Intro & MidTerm Review

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Why design patterns?

Ease communication by using a shared **vocabulary**

Enhance **flexibility** for future change

Leverage existing design knowledge

Increase **reusability** of developed code

Motivational example

MidTerm Review

Intended Learning Outcomes:

“**Critique** an existing architecture or design.”

“**Differentiate** how various architectural styles and design patterns enhance and degrade functional- and non-functional properties.”

“**Generate** and **justify** an architecture and/or design given a collection of requirements.”

“**Produce** and **present** concise and unambiguous architecture and design descriptions.”

“**Create** and **implement** an architecture and design, refining it into a complete system.”

ILO 1: Critique

“**Critique** an existing architecture or design.”

So what is architecture?

“The set of principal design decisions”

- Focuses on those decisions that are hard to change once the system is built.
- Components, connectors, topology.

ILO 1: Critique

“**Critique** an existing architecture or design.”

Why is architecting software hard?

What has improved complexity?

ILO 1: Critique

“**Critique** an existing architecture or design.”

Example:

Given GWTs architecture, what is one benefit of 2nd generation web apps compared to GWT-based web-apps?

ILO 2: Differentiate

“**Differentiate** how various architectural styles and design patterns enhance and degrade functional- and non-functional properties.”

What is an architectural style?

What is a design pattern?

ILO 2: Differentiate

“**Differentiate** how various architectural styles and design patterns enhance and degrade functional- and non-functional properties.”

Abstraction:

Separation of concerns:

ILO 2: Differentiate

“**Differentiate** how various architectural styles and design patterns enhance and degrade functional- and non-functional properties.”

FPs:

NFPs:

Covered Styles:

ILO 2: Differentiate

“**Differentiate** how various architectural styles and design patterns enhance and degrade functional- and non-functional properties.”

Security:

Security Arch Principles:

ILO 3: Generate and Justify

“**Generate** and **justify** and architecture and/or design given a collection of requirements.”

Analysis vs design:

Example: Apply your knowledge of architectural styles to architect a system that allows the application to dynamically shift computation resources as the system executes. Provide a component diagram. Justify your selection of architectural style.

ILO 3: Generate and Justify

“**Generate** and **justify** and architecture and/or design given a collection of requirements.”

Example:

The OSI network model has been successfully leveraged for many years; how has its architecture influenced the success of the standard network stack?

ILO 4: Produce and Present

“**Produce** and **present** concise and unambiguous architecture and design descriptions.”

Alternative views:

Statechart diagram

Component diagram

Sequence diagram

Deployment diagram

ILO 4: Produce and Present

“**Produce** and **present** concise and unambiguous architecture and design descriptions.”

Example:

- Create a component diagram for an event-based system that has a Producer component and a Consumer component connected to an event bus.

ILO 5: Create and Implement

“**Create** and **implement** an architecture and design, refining it into a complete system.”

This is really about the project.