Design, Architecture & User Interface Principles

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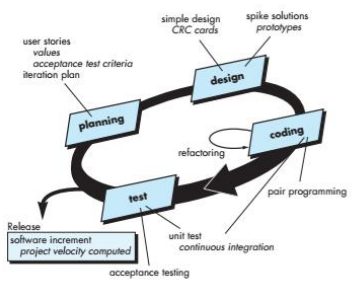
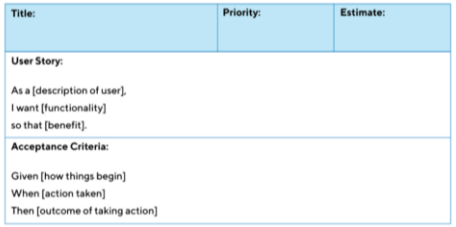
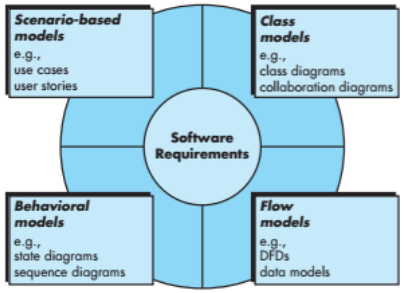
CECS 445

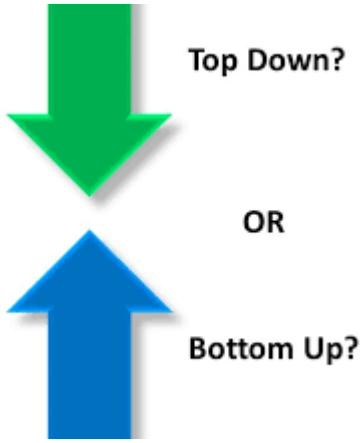
Lecture 3: February 2nd, 2021

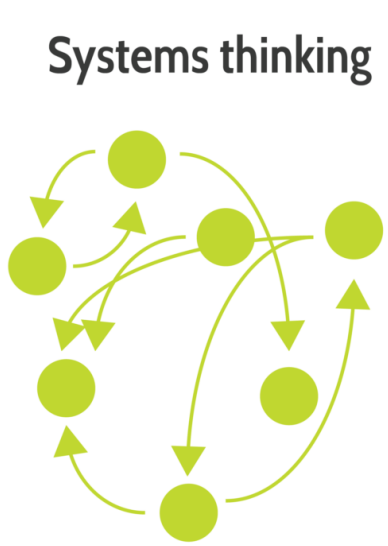
Last Time…







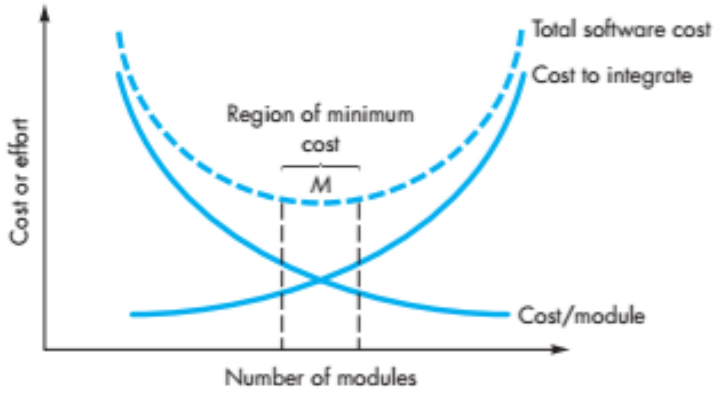


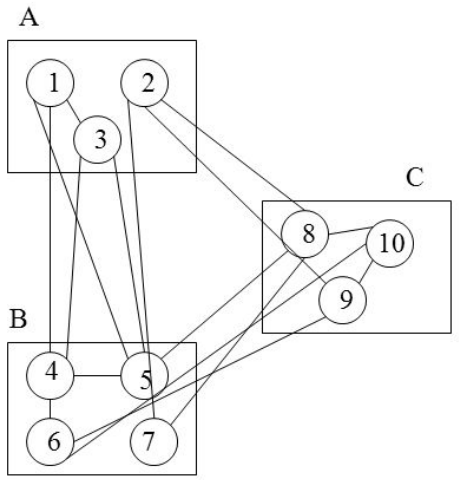


- Design
- Architecture
- Interfaces

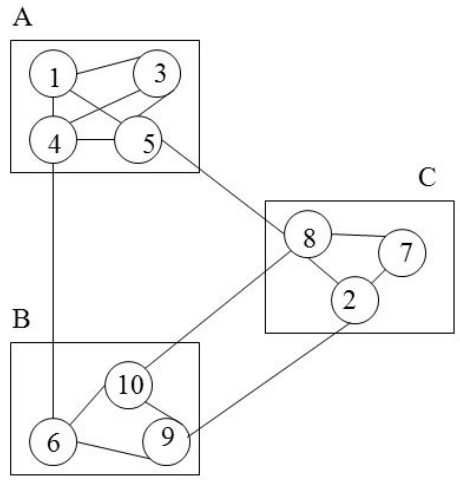
Design Principles

- Abstraction
- Modularity
- Functional Independence
  (Cohesion vs. Coupling)
- Patterns
- Information Hiding



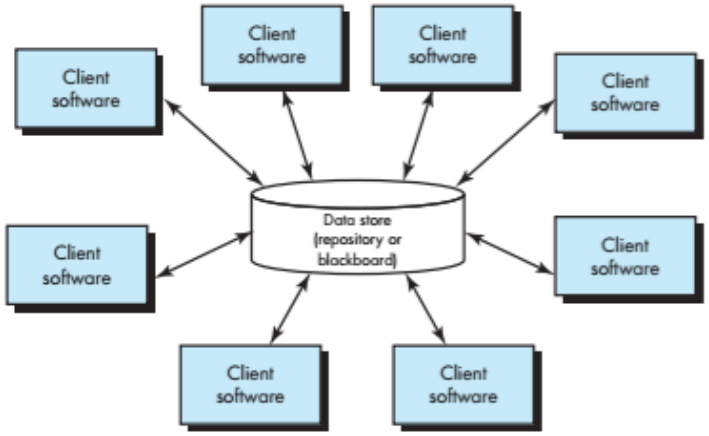


Bad modularization:
low cohesion, high coupling

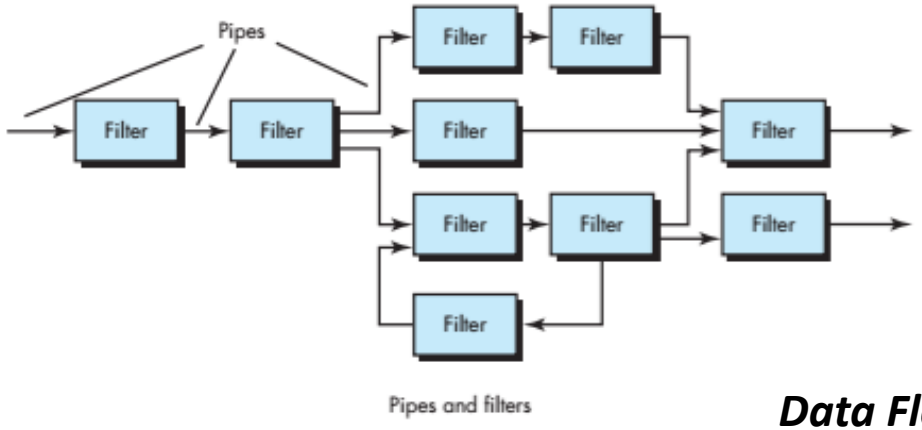


Good modularization:
high cohesion, low coupling

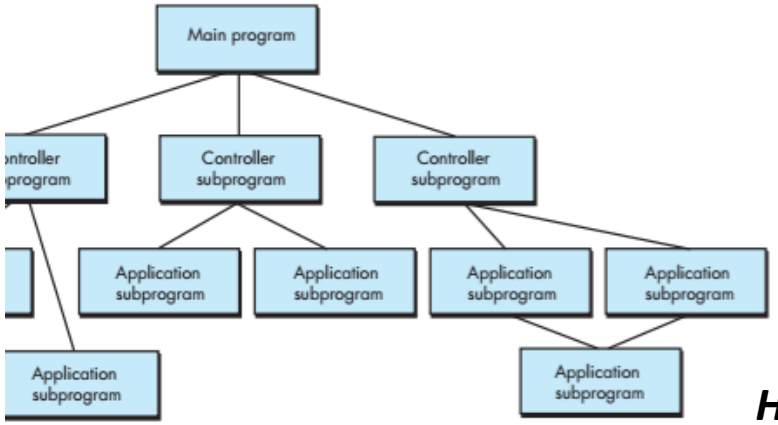
Architecture Types



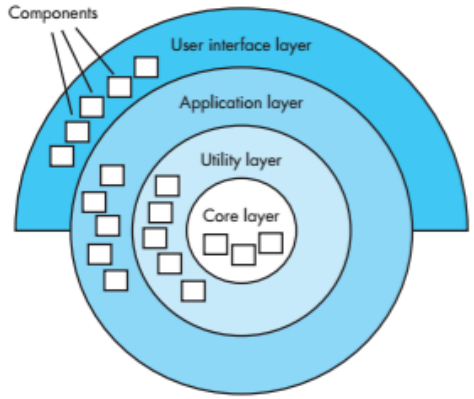
Data-Centric



Data Flow

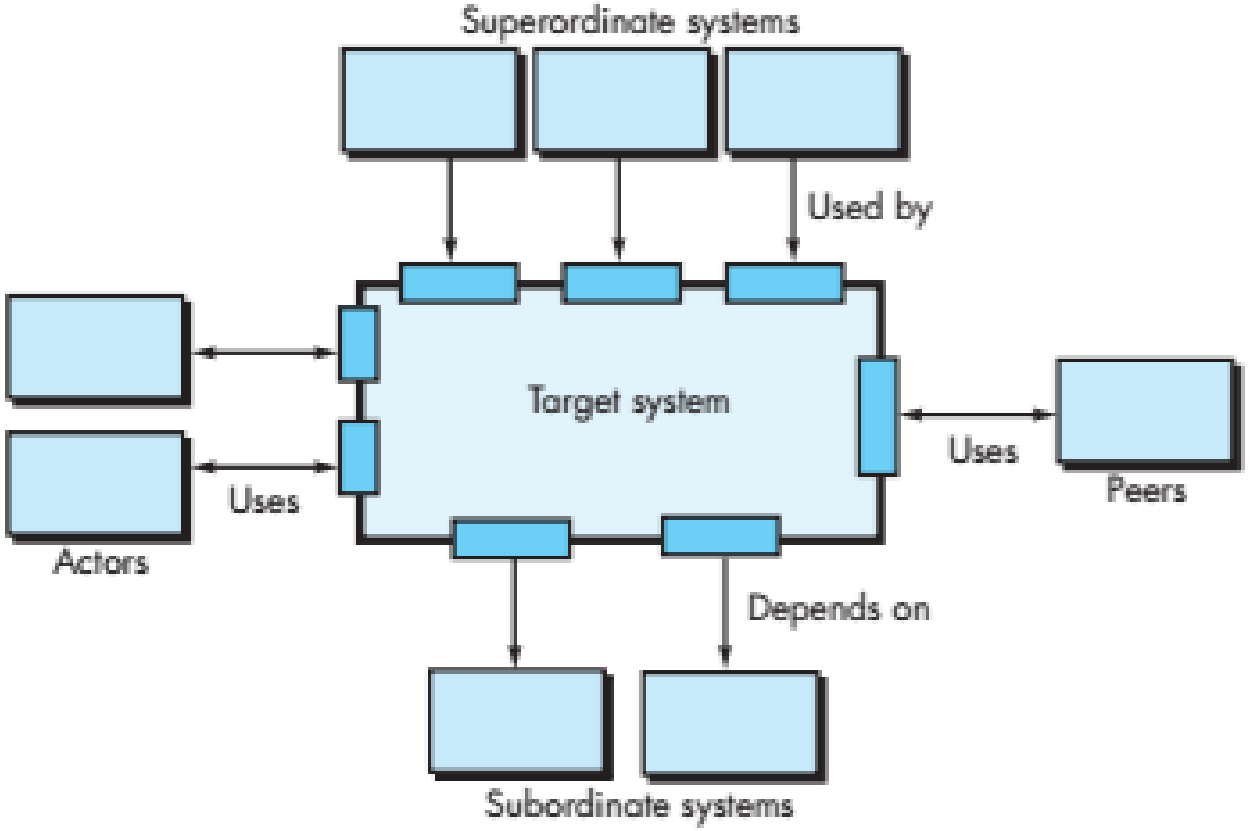


Hierarchical



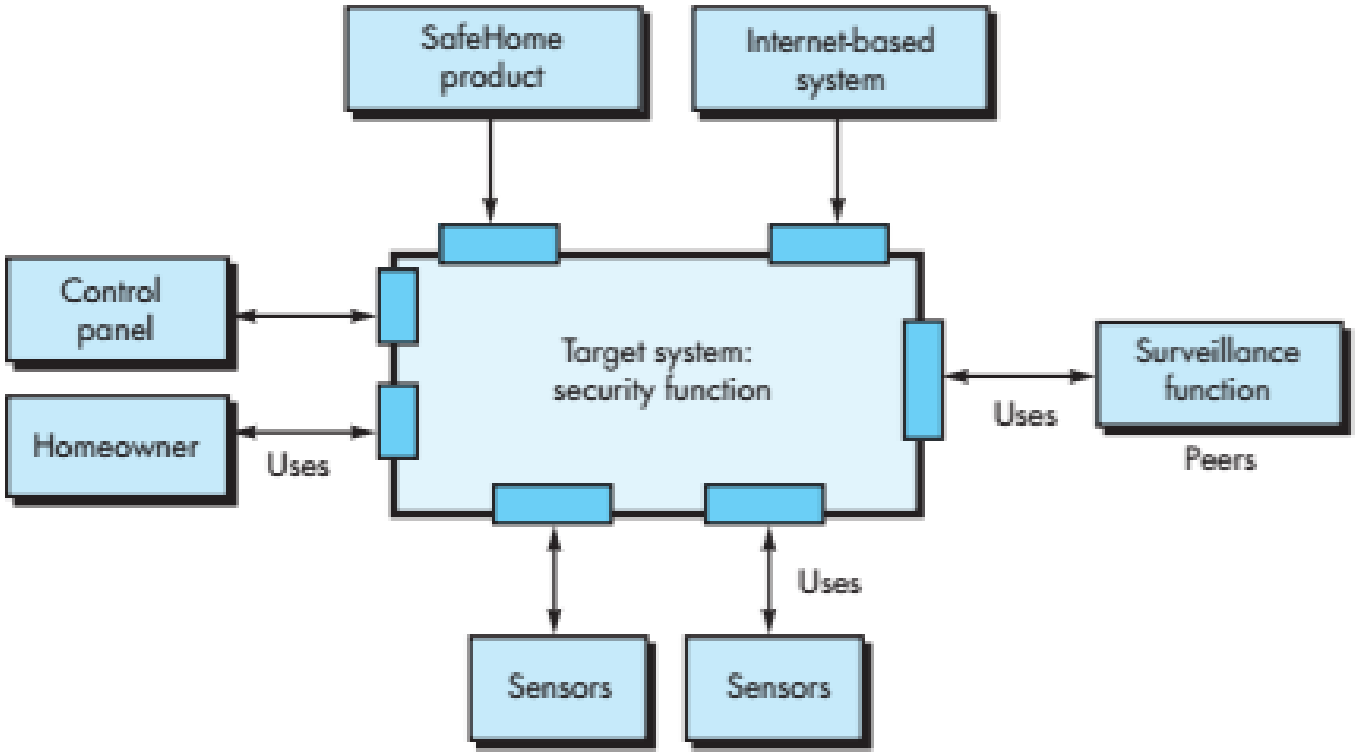
Layered

Architecture Principles



- *Superordinate systems*—those systems that use the target system as part of some higher-level processing scheme.
- *Subordinate systems*—those systems that are used by the target system and provide data or processing that are necessary to complete target system functionality.
- *Peer-level systems*—those systems that interact on a peer-to-peer basis (i.e., information is either produced or consumed by the peers and the target system.
- *Actors*—entities (people, devices) that interact with the target system by producing or consuming information that is necessary for requisite processing.

Architecture Examples



- *Superordinate systems*—those systems that use the target system as part of some higher-level processing scheme.
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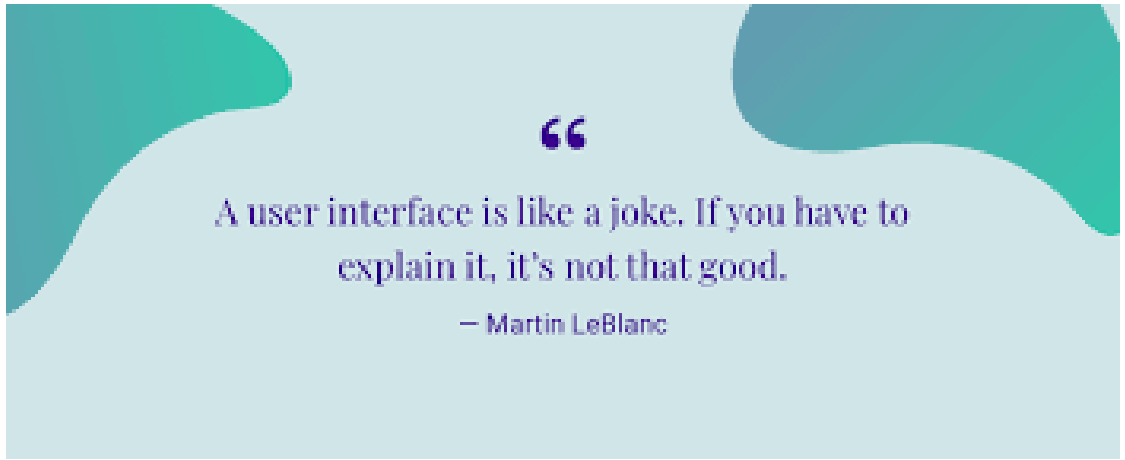
User Interface Principles

- Place the user in control
- Reduce the user's memory load
- Make the interface consistent



User Interface Examples

iOS Human Interface Guidelines

Overview
- Design Principles
- What's New in iOS 10
- Interface Essentials

Interaction
Features
Visual Design
Graphics
UI Bars
UI Views
UI Controls
Extensions
Technologies
Resources

Aesthetic Integrity

Aesthetic integrity represents how well an app's appearance and behavior integrate with its function. For example, an app that helps people perform a serious task can keep them focused by using subtle, unobtrusive graphics, standard controls, and predictable behaviors. On the other hand, an immersive app, such as a game, can deliver a captivating appearance that promises fun and excitement, while encouraging discovery.

Consistency

A consistent app implements familiar standards and paradigms by using system-provided interface elements, well-known icons, standard text styles, and uniform terminology. The app incorporates features and behaviors in ways people expect.

Direct Manipulation

The direct manipulation of onscreen content engages people and facilitates understanding. Users experience direct manipulation when they rotate the device or use gestures to affect onscreen content. Through direct manipulation, they can see the immediate, visible results of their actions.

Feedback

Feedback acknowledges actions and shows results to keep people informed. The built-in iOS apps provide perceptible feedback in response to every user action. Interactive elements are highlighted briefly when tapped, progress indicators communicate the status of long-running operations, and animation and sound help clarify the results of actions.

Metaphors

People learn more quickly when an app's virtual objects and actions are metaphors for familiar experiences—whether rooted in the real or digital world. Metaphors work well in iOS because people physically interact with the screen. They move views out of the way to expose content beneath. They drag and swipe content. They toggle switches, move sliders, and scroll through picker values. They even flick through pages of books and magazines.

User Control

Throughout iOS, people—not apps—are in control. An app can suggest a course of action or warn about dangerous consequences, but it's usually a mistake for the app to take over the decision-making. The best apps find the correct balance between enabling users and avoiding unwanted outcomes. An app can make people feel like they're in control by keeping interactive elements familiar and predictable, confirming destructive actions, and making it easy to cancel operations, even when they're already underway.

- #1 The Golden **Principle**: The user is your friend.
- #2 Technology is for efficiency.
- #3 KPIs are secondary.
- #4 Decentralized ecosystem.