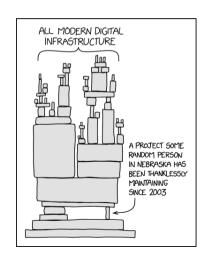
## Software Architecture

CSSE6400

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Question

## What is *Software Architecture*?

Software Architecture is design.

Design is not software architecture.

But...

## Software Architecture is hard to define.

#### Let's hear from an expert



Okay so...

## Definition 1. Software Architecture

The important stuff; whatever that is.

Question

## What do *you* want from this course?

Maybe...

## Definition 2. Software Architecture: The Course

A set of tools, processes, and design patterns which enable me to deliver high quality software.

## High Quality Software?<sup>1</sup>

Functional Requirements – Functional features to be delivered.

Constraints – Real world constraints on development.

Principles – Ideas adopted to encourage design consistency.

Quality Attributes – Quality of service and cross-cutting concerns.

<sup>&</sup>lt;sup>1</sup>Yes, "high quality" is intentionally vague.

## Functional Requirements

- Architecture must enable delivery of functionality.
- Support interaction model.
  - A mobile dating app may be difficult to deliver using *Pipe and Filter*.
- Don't over architect.
  - A mobile dating app doesn't need a six-layer PCBMER architecture.

#### **Constraints**

- Externally determined restrictions
- Time and budget
- Technology
  - Interoperability with existing systems
  - Deployment platform
  - Vendor relationships
- People
- Organisation
  - Strategic or tactical system?
  - Politics may limit choices

## **Principles**

- Standards developers are expected to follow
  - Avoid unintentionally breaking the architecture
- e.g. Architectural structure
  - Layering strategy
  - Location of business logic
  - Stateless components

Question

# What are *Quality Attributes*?

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#### **Answer**

Non-functional requirements for the success of software.

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- Scalability The software can handle peaks of high demand by taking advantage of available computing resources.
- Extensibility Features or extensions can be easily added to the base software.
  - Testibility The software is designed so that *automated tests* can be easily deployed.

**Problem** 

Software cannot meet all quality attributes.

"Solution"

Software architects prioritise the important attributes.

"Solution"

# Software architects prioritise the important attributes.

Definition 3. The First Law of Software Architecture

Everything in software architecture is a trade-off.

## Definition 4. Wicked Architecture [2]

There are often *no clear problem descriptions*, *no clear solutions*, good or bad solutions, *no clear rules* when to "stop" architecting and mostly team rather than individual work.

## Definition 5. Wicked Architecture [2]

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Don't expect "clean" solutions.

Why now?

Architecture is more important today thanks to *expectations* and *infrastructure*.

Big design up front is dumb.

Doing no design up front is even dumber.

- Dave Thomas

#### References

[1] Mark Richards and Neal Ford.

Fundamentals of Software Architecture: An Engineering Approach. O'Reilly Media, Inc., January 2020.

[2] Matthias Galster and Samuil Angelov.

What makes teaching software architecture difficult?

In Proceedings of the 38th International Conference on Software Engineering Companion, ICSE '16, pages 356–359. Association for Computing Machinery, 2016.