# Introduction

*Software Architecture*

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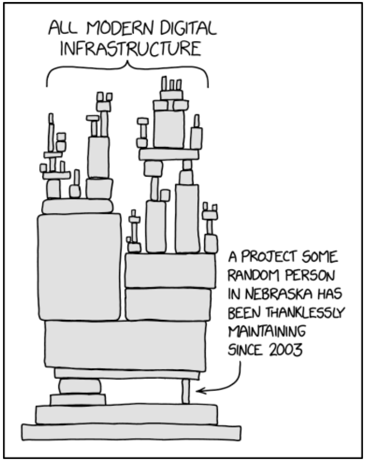
ALL MODERN DIGITAL INFRASTRUCTURE
A PROJECT SOME RANDOM PERSON IN NEBRASKA HAS BEEN THANKLESSLY MAINTAINING SINCE 2003

*Question*

## What is *Software Architecture*?

*Software Architecture* is design.

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*Design* is *not* software architecture.

*So...*

*Software Architecture* is hard to define.

## *Let's hear from an expert*

https://www.youtube.com/watch?v=DngAZyWMGR0

*Okay so...*

*Definition 0.* Software Architecture

The important stuff; whatever that is.

*Question*

What do *you* want from this course?

*Maybe...*

*Definition 0.* Software Architecture: The Course

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

## High Quality Software?[1]

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 & cross-cutting concerns.

[1] 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*?

*Question*

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*Answer*

Non-functional requirements for the success of software.

Hint: CSSE3002 / CSSE3012

## Quality Attributes: Examples

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Testibility 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.

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on a software-by-software basis

*Definition 0.* The First Law of Software Architecture

*[Richards and Ford, 2020]*

Everything in software architecture is a trade-off.

*Definition 0.* Wicked Architecture*[Galster and Angelov, 2016]*

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.

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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

[Galster and Angelov, 2016] Galster, M. and Angelov, S. (2016). 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.

[Richards and Ford, 2020] Richards, M. and Ford, N. (2020). *Fundamentals of Software Architecture: An Engineering Approach.* O'Reilly Media, Inc.