Software Architecture in Practice

Defining Software Architecture

Bass' definition

The software architecture of a system is the set of **structures** needed to reason about the system, which comprise software **elements**, **relations** among them, and the **properties** of both.
[Bass et al., 2021]

- (Views define *what* elements and relations are!)

Discussion

AARHUS UNIVERSITET

- Software architecture as bridge between *goals* and *system…*

The basic principle of software architecture is every software system is constructed to satisfy an organization's business goals, and that the architecture of a system is a bridge between those (often abstract) business goals and the final (concrete) resulting system. While the path from abstract goals to concrete systems can be complex, the good news is that software architectures can be designed, analyzed, and documented using known techniques that will support the achievement of these business goals. The complexity can be tamed, made tractable.

StructureS!

- is the set of **structures** (plural)…

- There is not just one…
  - "The architecture is shown in *this* diagram"…
    - Is a misunderstanding

- At the very least there are 3 distinct structures
  - Design time, execution time, allocation time

Abstraction

- Software Architecture as **Abstraction** !
  - omit detail in order to cope with complexity
  - common overview – common goal
  - overview and compact documentation
  - ... and perhaps reuse

- The key point is…
  - What is a detail to be omitted, what is an essential, *architectural,* aspect?
    - Ala interfaces' public and private methods…

Representation

- *Every* software system has an architecture
  - it may, however, not be known to anyone ☺
  - meaning there is a difference between *architecture* and *architecture representation*

- Architecture:
  - *reality* embedded in system

- Architecture representation:
  - our description of it
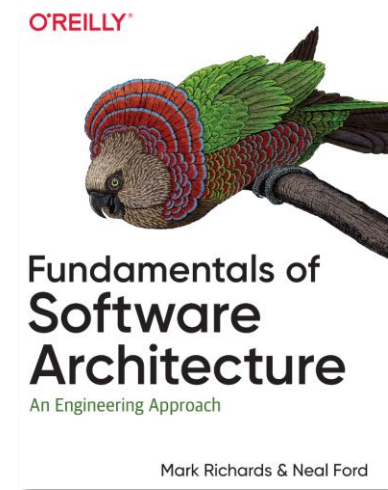   - in documents, in our collective minds, on napkins, …

AARHUS UNIVERSITET

- **Architecture may be "good" or "bad"**
  - raises the issue of *architecture evaluation*
  - … and evaluation criteria
  - … and who defines the criteria?
  - … and how we measure?

- How do you define 'good' ?

- How do you measure quality?

A Broader Definition

- Richards & Ford
  - *Software architecture consists of the **structure** of the system, combined with **architecture characteristics** the system must support, **architecture decisions**, and finally **design principles.***

  - While our definition does not really mention as much – we *will* cover it all ☺

- Mark Richards, 2020

Architecture is the stuff you can't Google.

- Dylan Beattie and many others

"The Stuff That's Hard To Change"

  - https://www.youtube.com/watch?v=3LtQWxhqjqI

Architecture is about the important stuff...whatever that is.

—Ralph Johnson

Broader Perspective

- Software architect?

- Systems architect
  - Concerned with the totality of hardware, software, and humans

- Enterprise architect
  - Concerned with the structure and behavior of an organization's processes, information flow, personnel, and organizational subunits.

AARHUS UNIVERSITET

"Having an explicit and well-communicated architecture is the first step towards ensuring architectural conformance."

as-built corresponds to *as-designed*