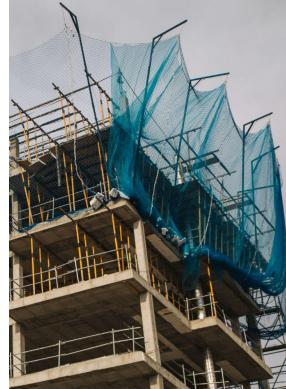


Implementing Software Architecture

Software Engineering Course – 5
2024-2025



Agenda

01

**Software
Architecture Recap**

02

**Non-functional
requirements**

03

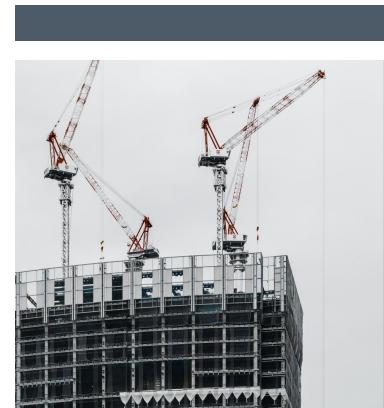
Trade-off analysis

04

**Architecture
Decision Records**

05

Architecture Pitfalls



Software Architecture

Building the right product

Functional Requirements

Building the product right

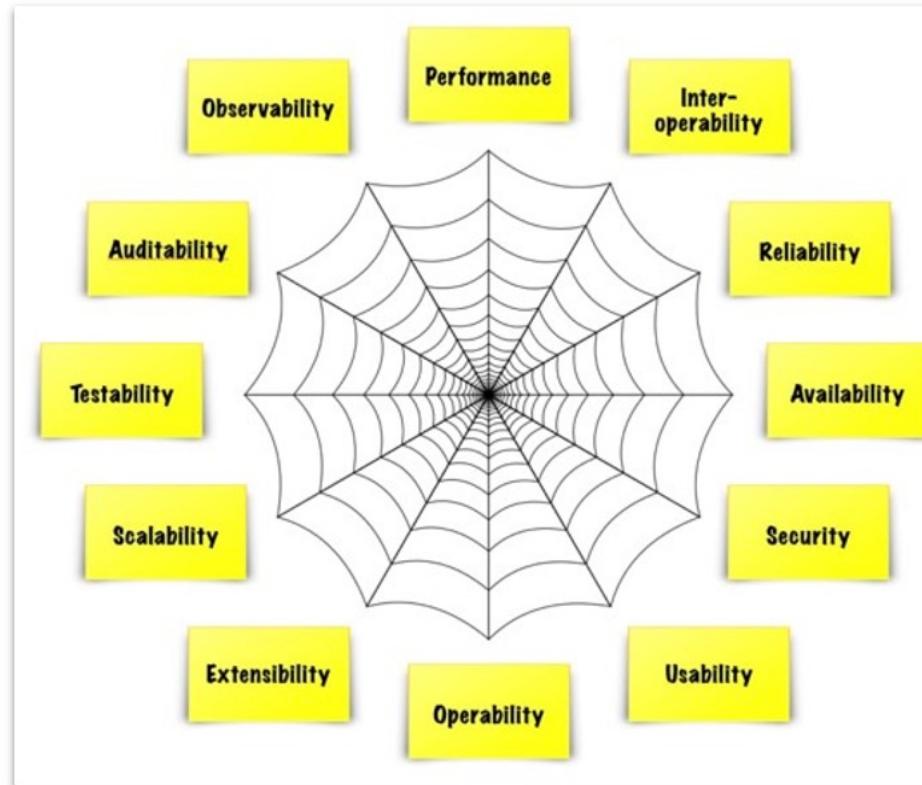
Non-Functional Requirements

Non-Functional Requirements

Table 4.2 Non-functional system quality attributes

Attribute	Key issue
Responsiveness	Does the system return results to users in a reasonable time?
Reliability	Do the system features behave as expected by both developers and users?
Availability	Can the system deliver its services when requested by users?
Security	Does the system protect itself and users' data from unauthorized attacks and intrusions?
Usability	Can system users access the features that they need and use them quickly and without errors?
Maintainability	Can the system be readily updated and new features added without undue costs?
Resilience	Can the system continue to deliver user services in the event of partial failure or external attack?

Non-Functional Requirements



Functionality vs. Quality

Functional Requirement	Quality Attribute
New accounts should have a user defined password.	Users should immediately change the system assigned password into a user defined one Security
Create a homepage where the user can see all their information	Homepage screen should load up in less than 0.2 seconds Performance
Create a form which would process and validate user's data	The form should be modular, as the required fields are highly dynamic Modifiability

Quality Attribute Scenario

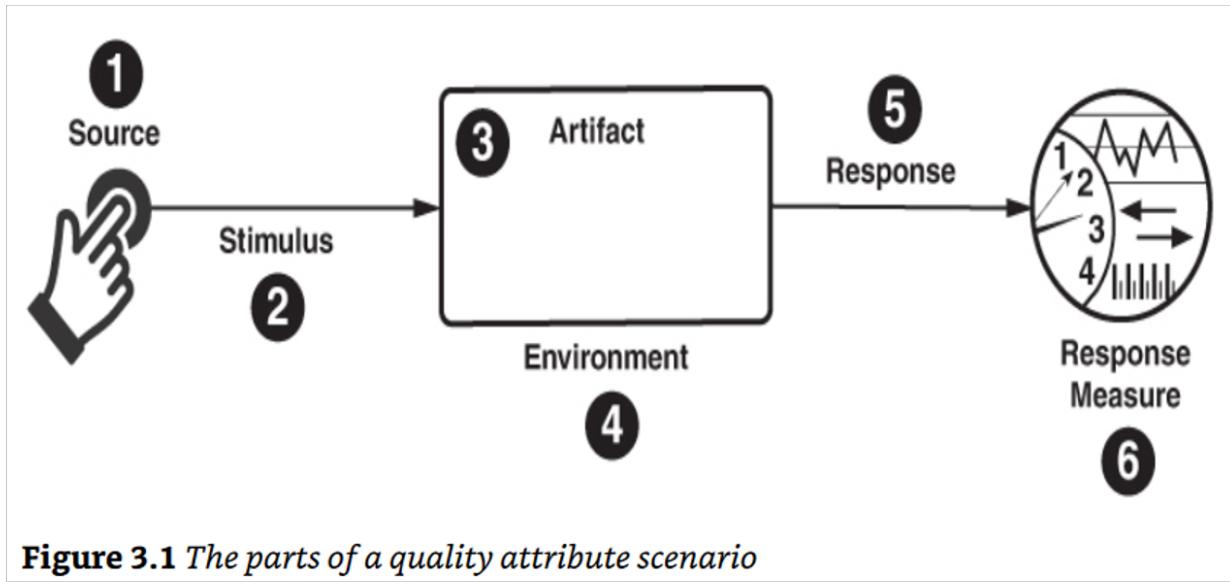


Figure 3.1 The parts of a quality attribute scenario

Example: Modifiability Quality Attribute Scenario

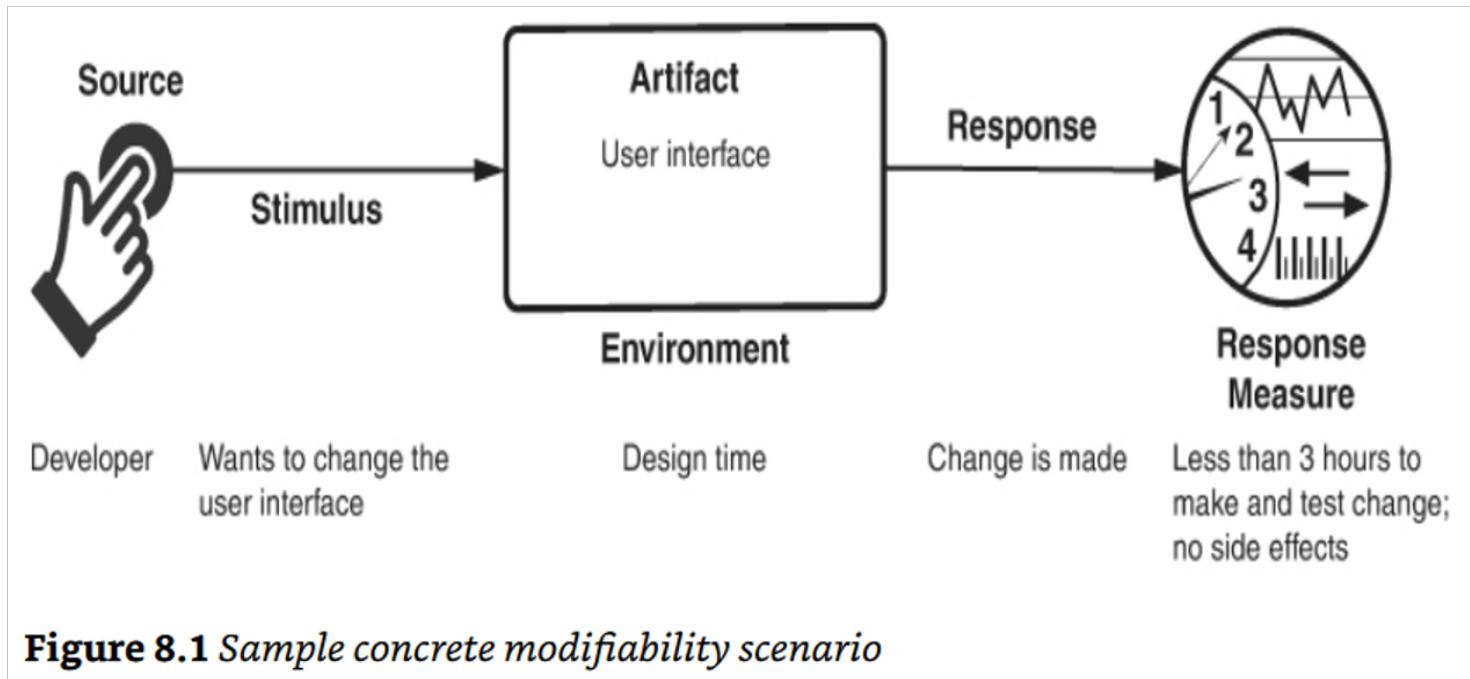
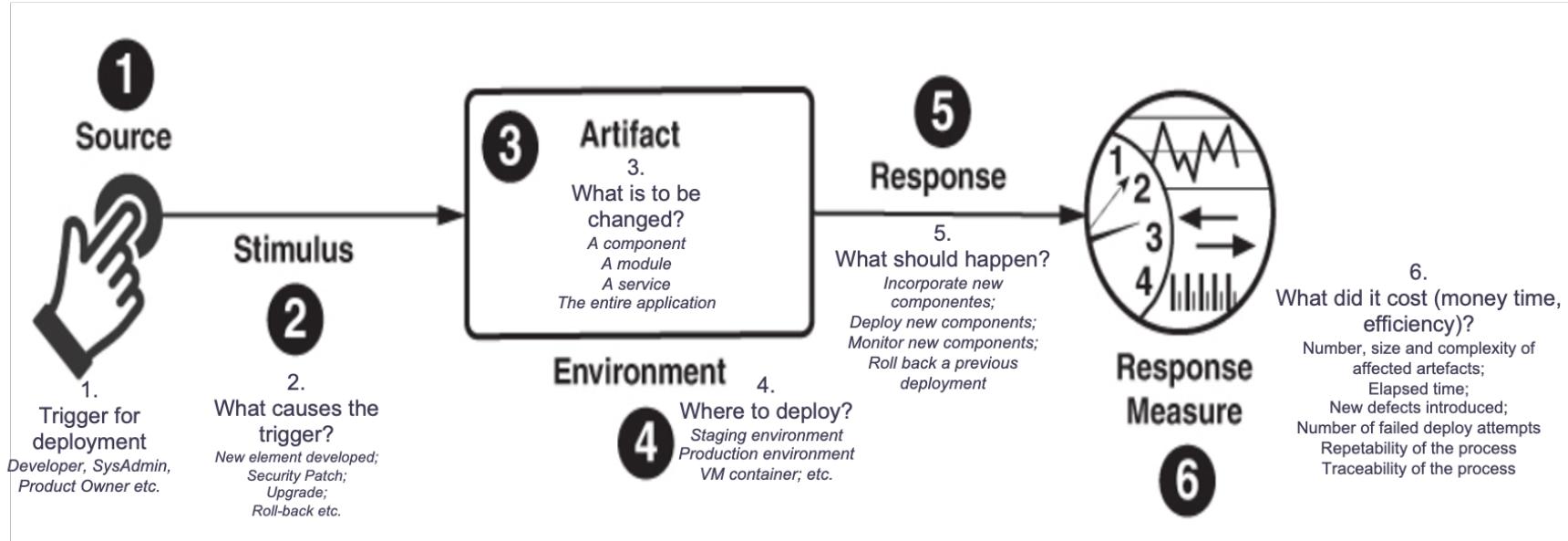
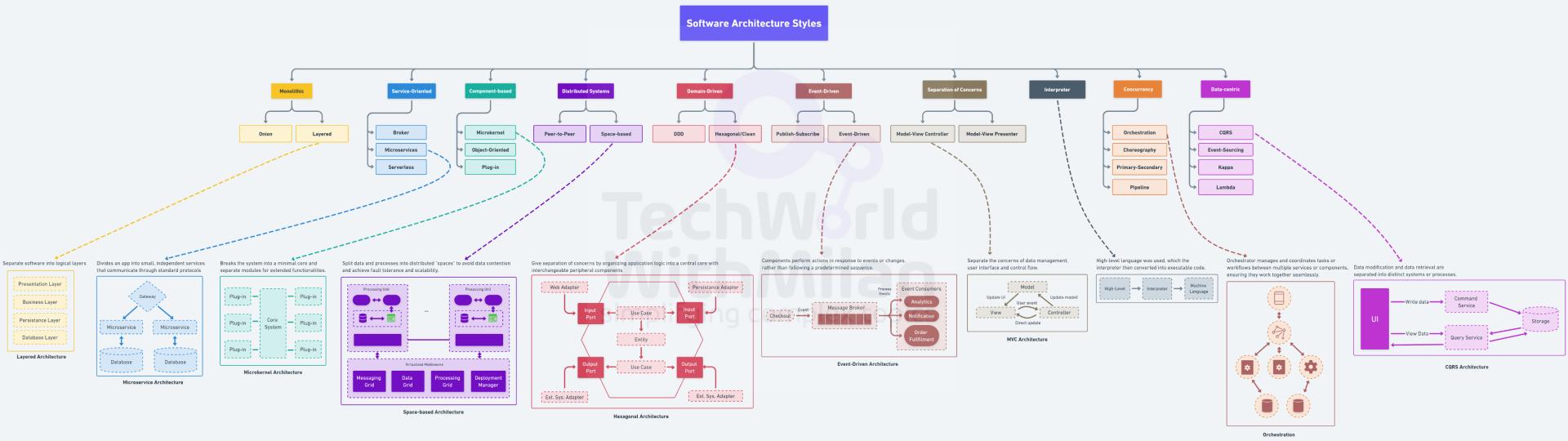


Figure 8.1 Sample concrete modifiability scenario

General Scenario



Software Architecture Styles

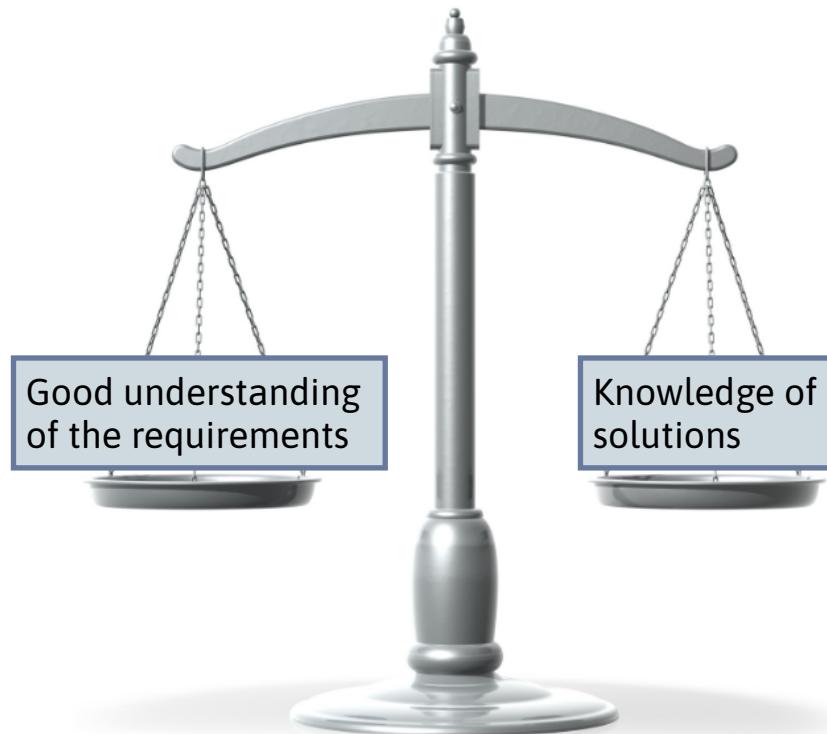


Kahoot!

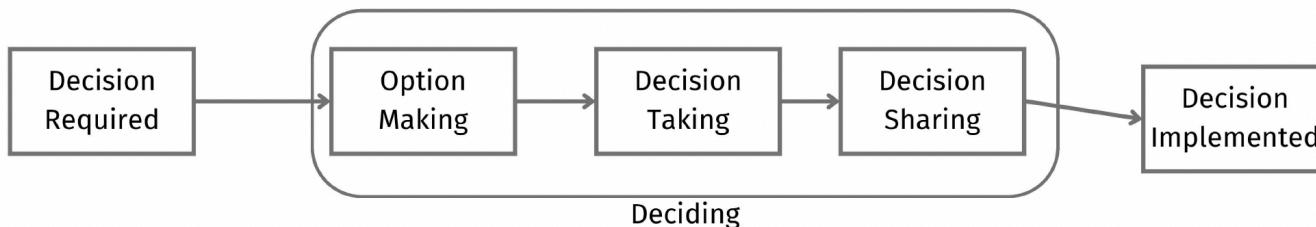
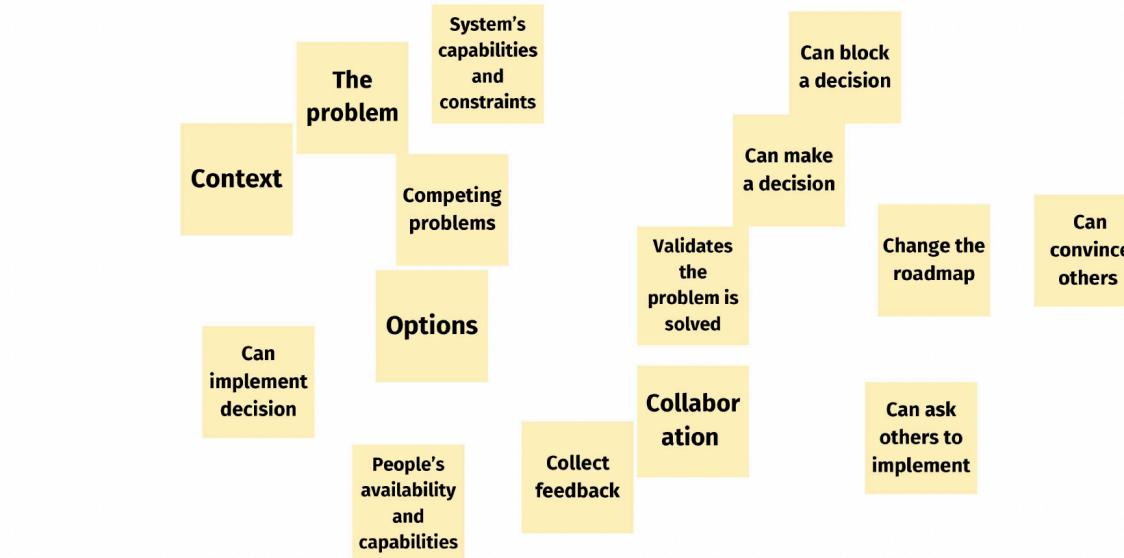
Trade-off Analysis



Trade-off Analysis



“Ingredients” of a decision

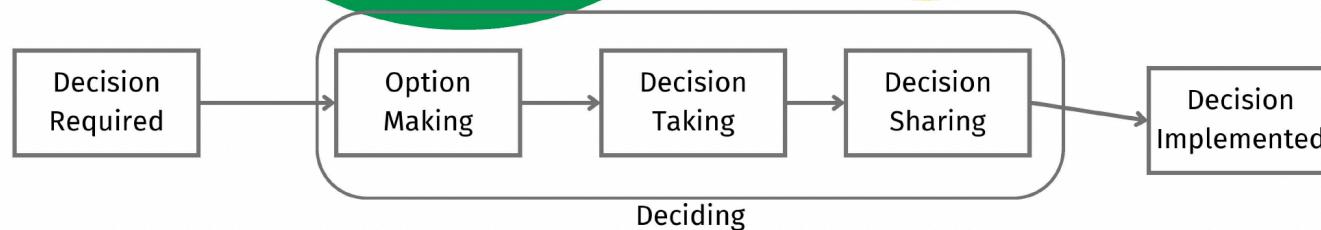
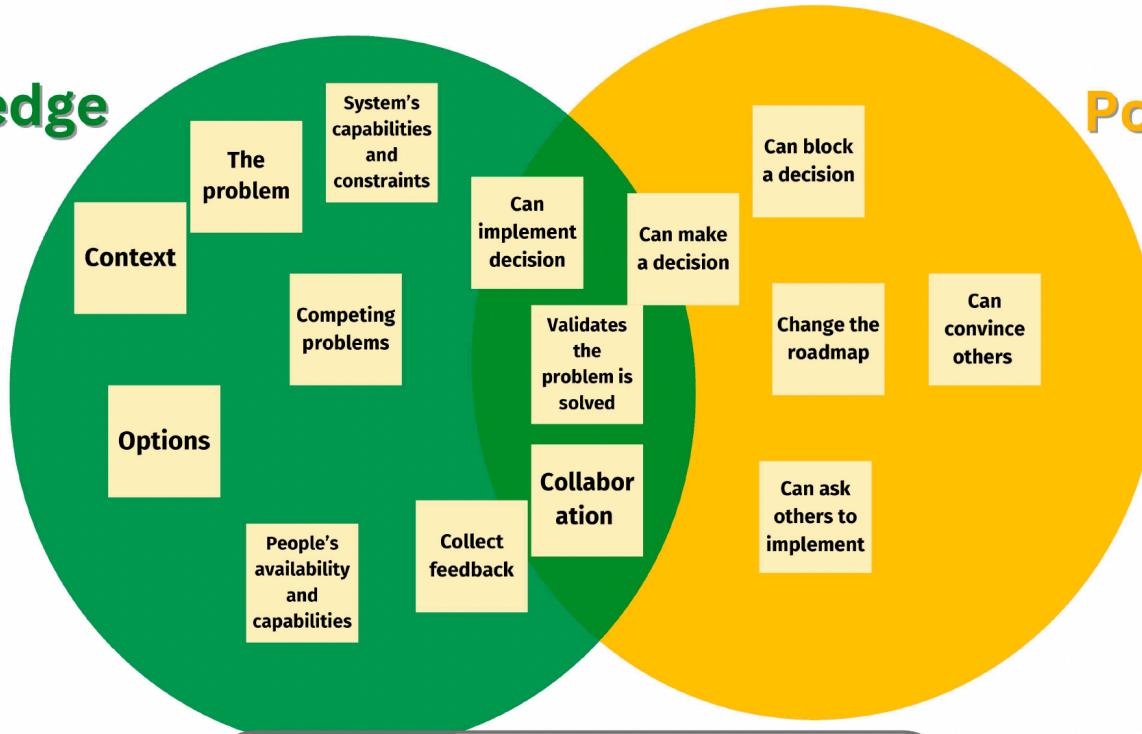


Andrea Magnorsky
www.roundcrisis.com



Knowledge

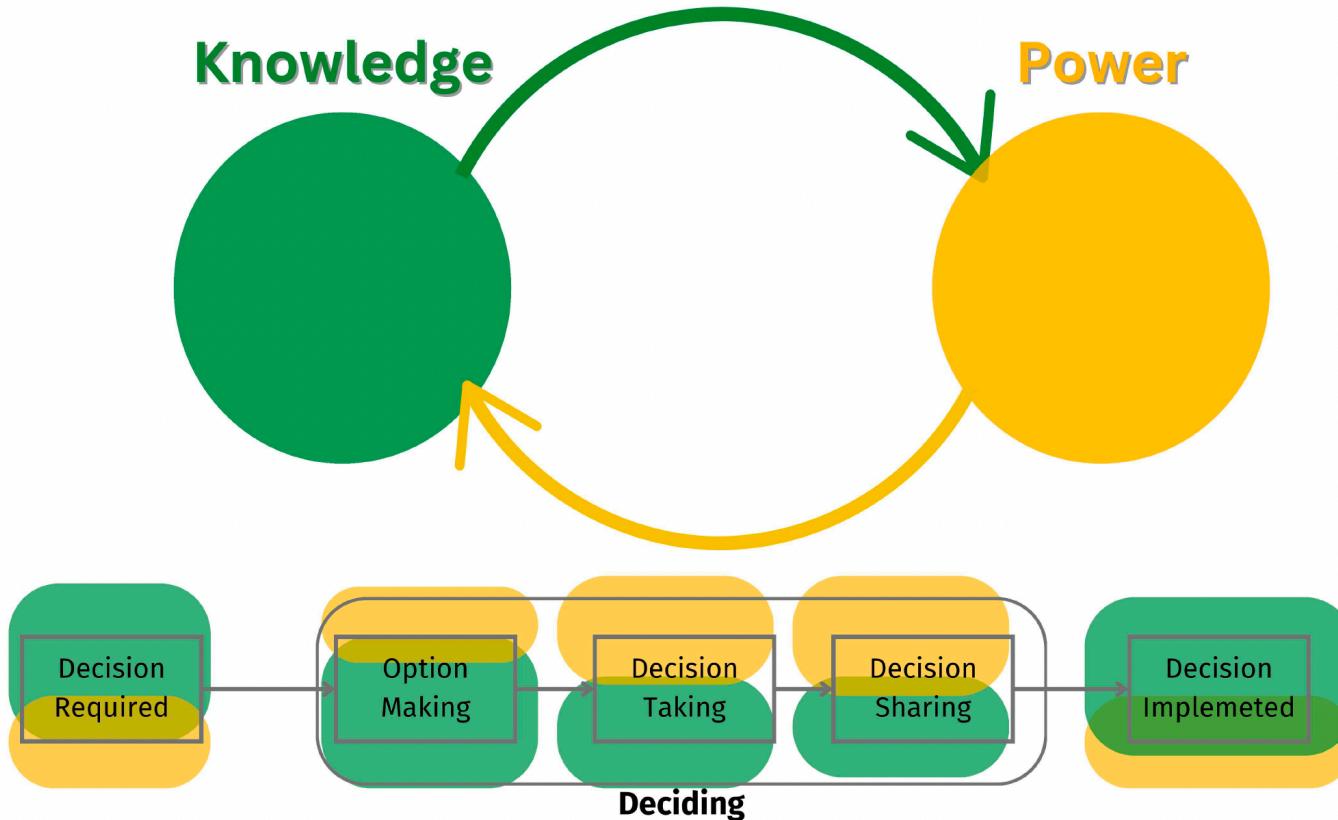
Power





Knowledge

Power



Architecture Decision Records

ADR Format	
<input type="checkbox"/>	TITLE
<input type="checkbox"/>	Short description stating the architecture decision
<input type="checkbox"/>	STATUS
<input type="checkbox"/>	Proposed, Accepted, Superseded
<input type="checkbox"/>	CONTEXT
<input type="checkbox"/>	What is forcing me to make this decision?
<input type="checkbox"/>	DECISION
<input type="checkbox"/>	The decision and corresponding justification
<input type="checkbox"/>	CONSEQUENCES
<input type="checkbox"/>	What is the impact of this decision?
<input type="checkbox"/>	COMPLIANCE
<input type="checkbox"/>	How will I ensure compliance with this decision?
<input type="checkbox"/>	NOTES
<input type="checkbox"/>	Metadata for this decision (author, etc.)

Figure 19-1. Basic ADR structure

You can find in Teams the Chapter that tells you how to build an Architecture Decision Record

Architecture Decision Records

ADR 76. Asynchronous Pub/Sub Messaging Between Bidding Services

STATUS

Accepted

CONTEXT

The Bid Capture Service, upon receiving a bid from an online bidder or from a live bidder via the auctioneer, must forward that bid onto the Bid Streamer Service and the Bidder Tracker Service. This could be done using asynchronous point-to-point (p2p) messaging, asynchronous publish-and-subscribe (pub/sub) messaging, or REST via the Online Auction API Layer.

DECISION

We will use asynchronous pub/sub messaging between the Bid Capture Service, Bid Streamer Service, and the Bidder Tracker Service.

The Bid Capture Service does not need any information back from the Bid Streamer Service or Bidder Tracker Service.

The Bid Streamer Service must receive bids in the exact order they were accepted by the Bid Capture Service. Using messaging and queues automatically guarantees the bid order for the stream.

CONSEQUENCES

We will require clustering and high availability of the message queues.

Internal bid events will be bypassing security checks done in the API layer.

UPDATE: Upon review at the April 14th, 2020 ARB meeting, the ARB decided that this was an acceptable trade-off and no additional security checks would be needed for bid events between these services.

COMPLIANCE

We will use periodic manual code and design reviews to ensure that asynchronous pub/sub messaging is being used between the Bid Capture Service, Bid Streamer Service, and the Bidder Tracker Service.

NOTES

Author: Subashini Nadella

Approved By: ARB Meeting Members, 14 APRIL 2020

Last Updated: 15 APRIL 2020 by Subashini Nadella

Figure 19-5. ADR 76. Asynchronous Pub/Sub Messaging Between Bidding Services

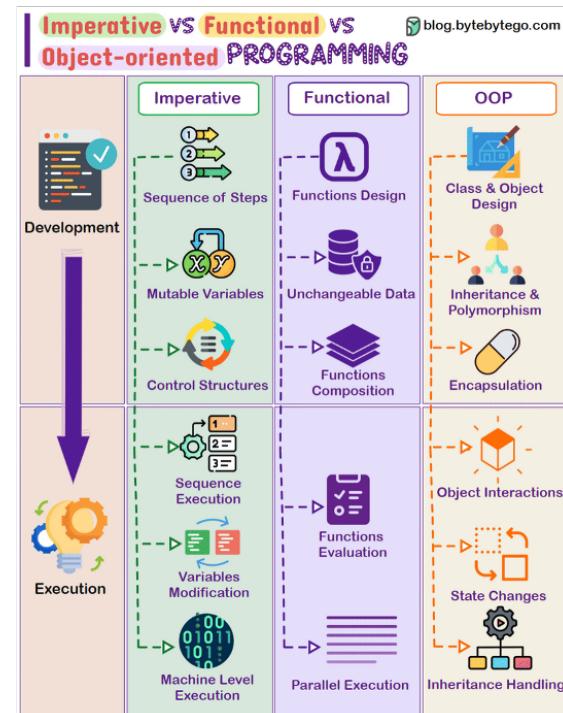
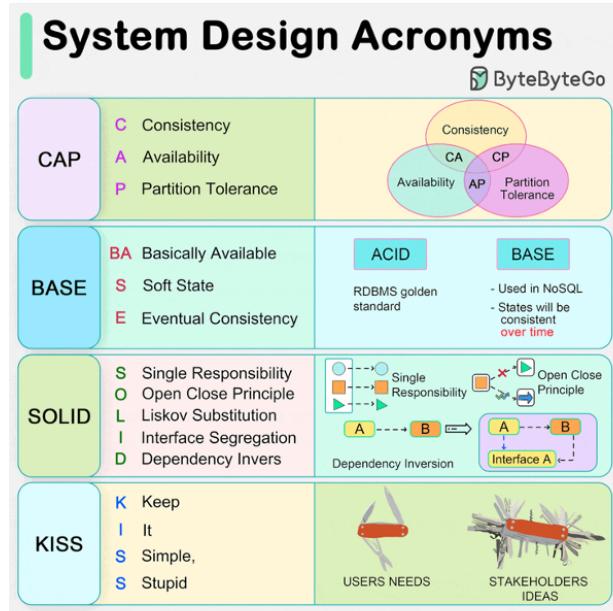
Pitfalls of Software Architecture

- ✓ Don't let one person make of influence all the decisions
- ✓ Don't let reuse goals dictate bad decisions
- ✓ Don't let business decisions dictate your architecture. Build NFRs.
- ✓ Don't compromise quality for faster delivery
 - ✓ Create Technical Debt consciously
- ✓ Don't copy successful architecture. Design it yourself.
- ✓ Don't generalise if you aren't sure if it needs to be generalised.
- ✓ Build architecture incrementally
- ✓ Publish often.

Learning resources for future Software Architects



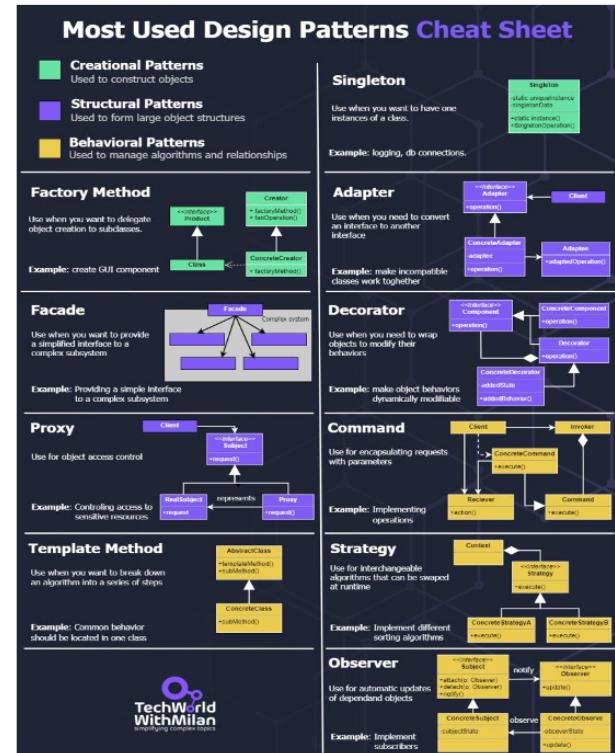
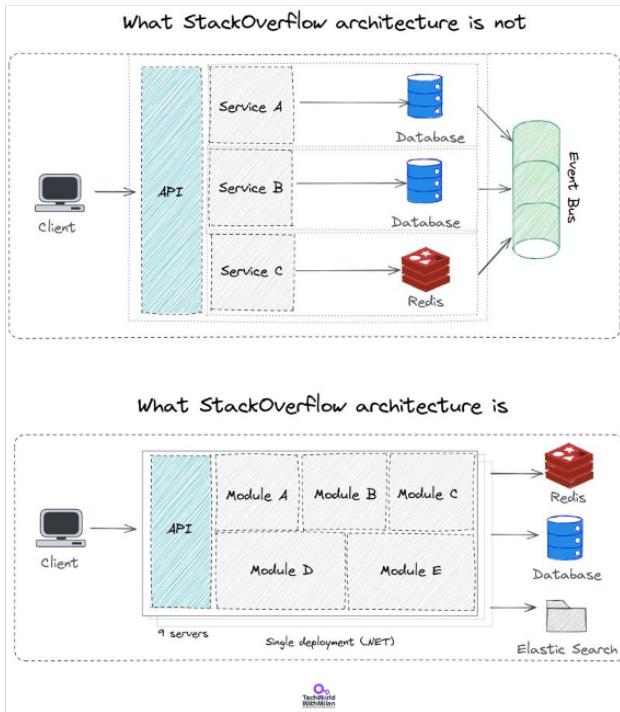
ByteByteGo
By Alex Xu



Learning resources for future Software Architects



TechWorldWithMilan
Dr Milan Milanović



Learning resources for future Software Architects



ThePrimeTime - YouTube

ThePrimeTime is a YouTube channel that provides learning resources for future software architects. It features two hosts, often wearing headphones, discussing various topics related to programming, architecture, and technology. The channel has a diverse range of content, including tier lists, code reviews, and discussions on specific tools and platforms like Google, WhatsApp, and Vim. Many of the videos include code snippets and diagrams to illustrate their points.

- Become -10x Engineer** (22:22) - How to ~10x Engineer Correctly (389K views, 6 months ago)
- How Much Memory for 1,000,000 Threads in 7 Languages** (22:21) - Go, Rust, C#, Elixir, Java, Node.js, Python (389K views, 5 months ago)
- MAXIMUM CRINGE Programming Language Tier List** (22:45) - Prime Reacts
- Stop Recommending Clean Code** (27:05) - private void includeSetupPages() { includePageContent(); includeTeardownPage(); updatePageContent(); } (306K views, 5 months ago)
- Have We Forgotten How To Program??** (22:53) - Prime Reacts (291K views, 6 months ago)
- 8 Design Patterns** (22:10) - Elements of Reusable Object-Oriented Software by Grady Booch (282K views, 9 months ago)
- Interview With Sr Rust Developer** (15:01) - Prime Reacts (270K views, 4 months ago)
- IS THIS SOFTWARE DEV?** (19:17) - soy dev, chad lead (265K views, 7 months ago)
- \$400K?!** (15:10) - \$400,000 a Year and 10 Hours A Week At GOOGLE (252K views, 1 month ago)
- 50 BILLION MESSAGES PER DAY WITH 32 ENGINEERS** (14:58) - Prime Reacts (250K views, 2 months ago)
- Carmack Doesn't Like Vim** (26:52) - Prime Reacts (245K views, 7 months ago)
- 120x Faster Algorithm By Nested Loops** (21:21) - 120x faster algorithm by nested loops (242K views, 1 month ago)

Learning resources for future Software Architects

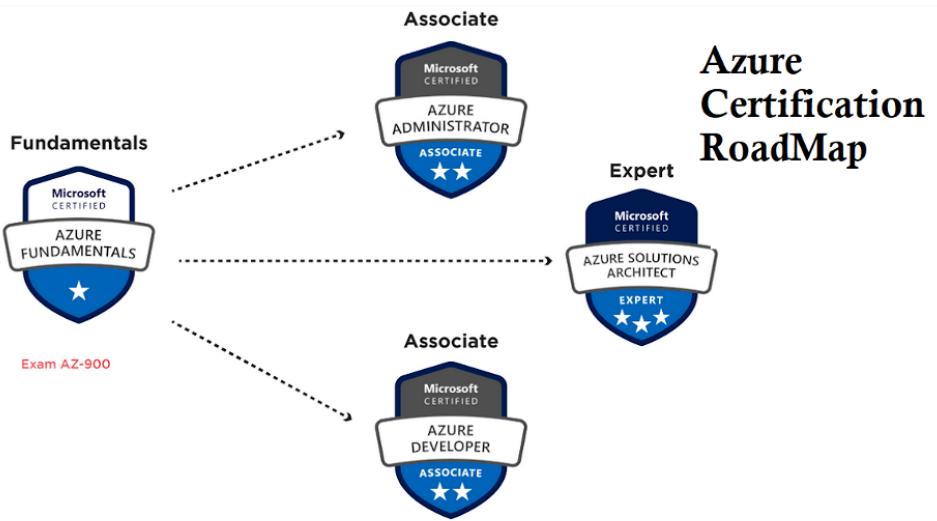


Theo - t3. gg - YouTube

The grid displays 12 video thumbnails from Theo's channel:

- The REAL Cost Of AWS**: 404K views • 7 months ago
- T3 Stack Tutorial - FROM 0 TO PROD FOR \$0**: 370K views • 8 months ago
- Using AI To Code Better? ChatGPT and Copilot change everything**: 300K views • 11 months ago
- DAN ABRAMOV SLAYS LIVE CODE INTERVIEW**: 298K views • 1 year ago
- We fixed React**: 12:00 PM - Oct 14, 2022
1K Retweets 768 Quote Tweets 42.1K Likes 11:50
- The Biggest Change In React's History**: 292K views • 1 year ago
- CSS in 2023 - Tailwind vs MUI vs Bootstrap vs Chakra vs...**: 287K views • 1 year ago
- Building a MODERN Full Stack App for FREE w/ NextJS 12, Typescript, Prisma and more...**: 274K views • 1 year ago
- You can stop using Redux**: 10:00 AM - Jun 21, 2022 - Twitter for iPhone
1K Retweets 768 Quote Tweets 42.1K Likes 36:39
- You still use Redux?**: 231K views • 1 year ago
- Heroku Is Dead, Here's What I Recommend**: 196K views • 1 year ago
- Stop Using Javascript Objects**: 188K views • 1 year ago
- You Might Be Using Typescript Wrong...**: 186K views • 1 year ago
- Getting A Tech Job In 2023**: 182K views • 9 months ago

Courses and Certifications for Software Architects



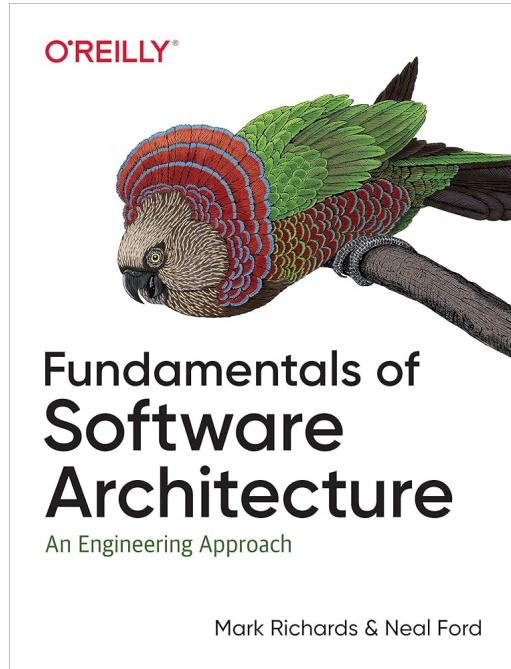
Azure Certification RoadMap



Nu vă recomand să cheltuiți banii voștri pentru astfel de certificări.
Mulți angajatori oferă în oferta de angajarea accesul la cursuri.

Books

Books aren't for learning tools/languages/syntax.
Books are for understanding patterns of thought.



Next time on ...

Course 7

Please read from

Fundamentals of Software Architecture (Mark Richards & Neal Ford):

- Chapter 19 – Architecture Decisions (separated PDF in Teams)

Engineering Software Products (Ian Sommerville)

- Chapter 4 - 4.5 Technology Issues

