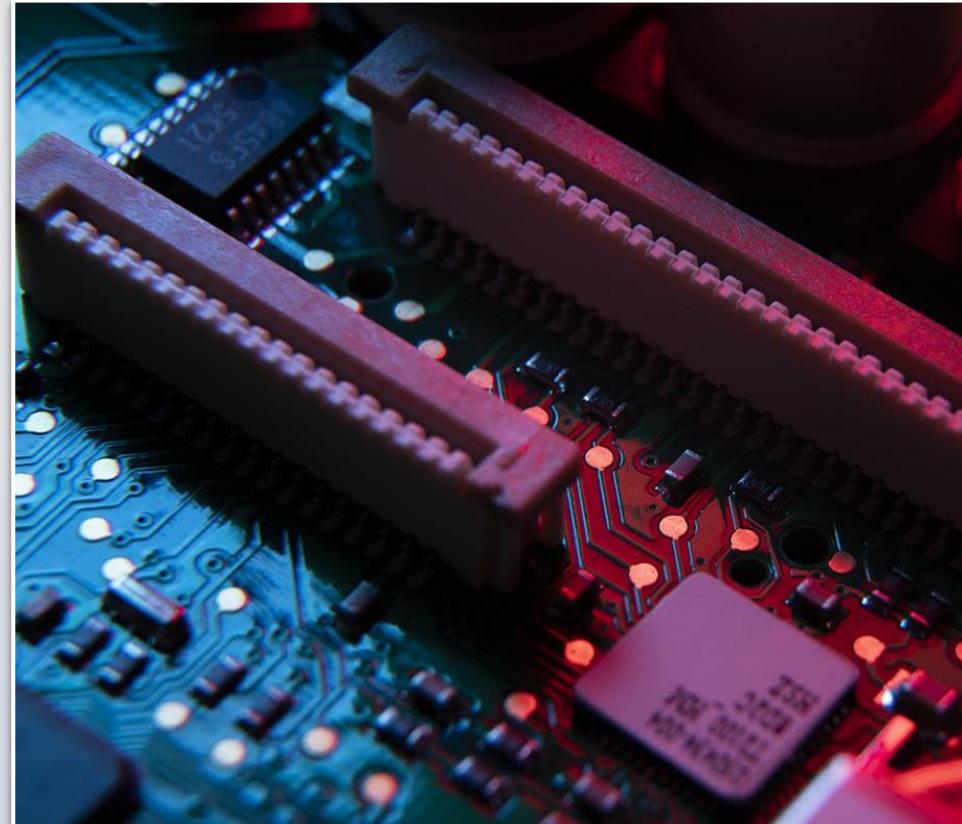


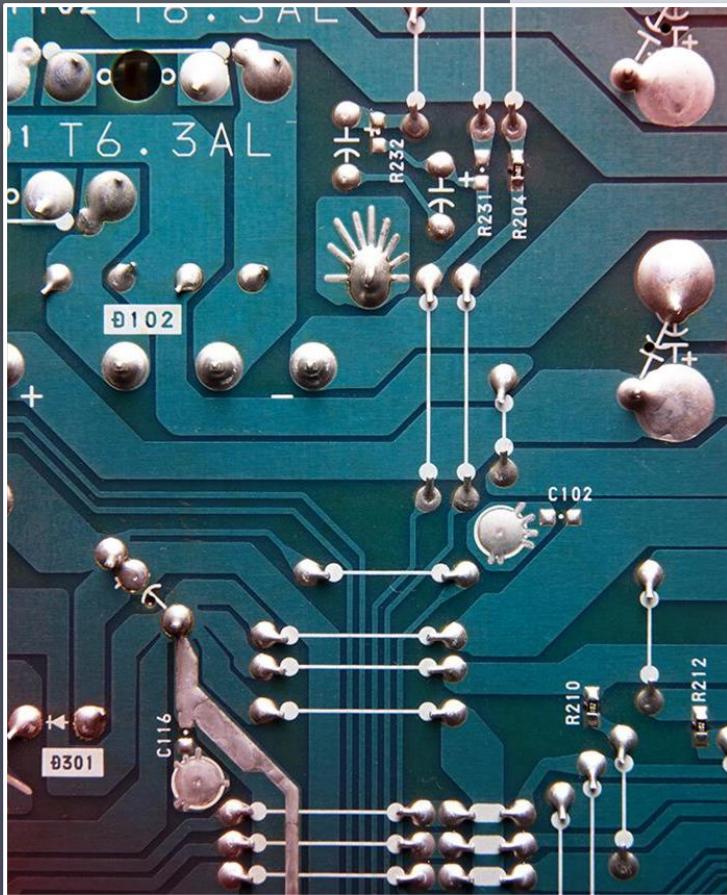


Software Architecture

Curs Software Engineering

2023 - 2024



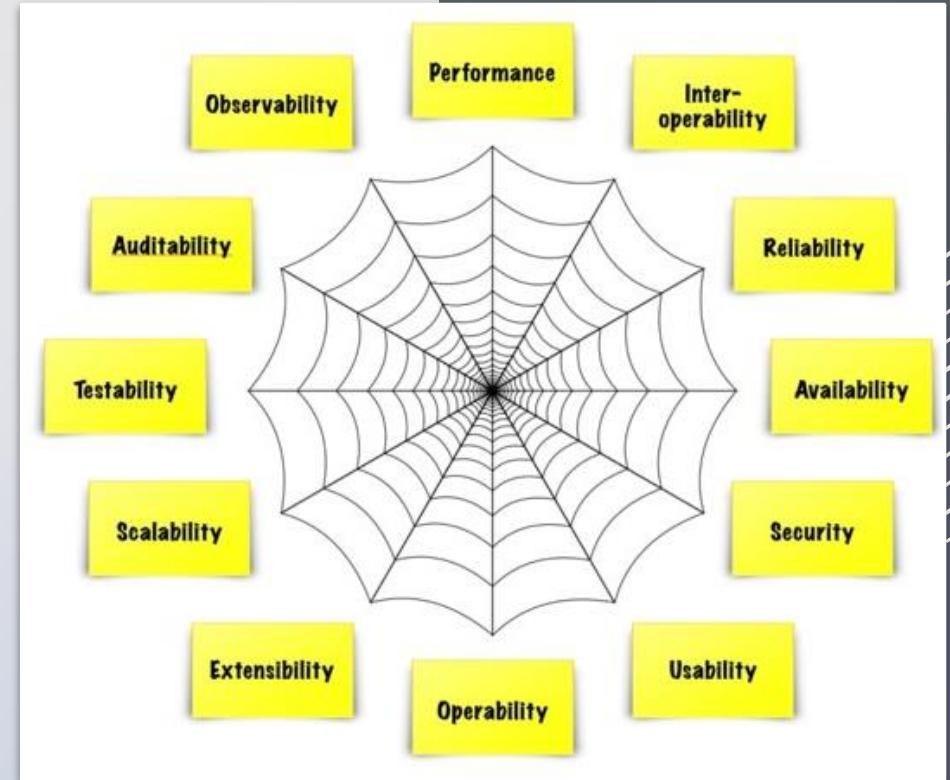


1

Software Qualities

Software Qualities

A quality attribute is a measurable or testable property of a system that is used to indicate how well the system satisfies the needs of its stakeholders beyond the basic function of the system.



Software Qualities



vs.

Non-functional requirements



Software Qualities



***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

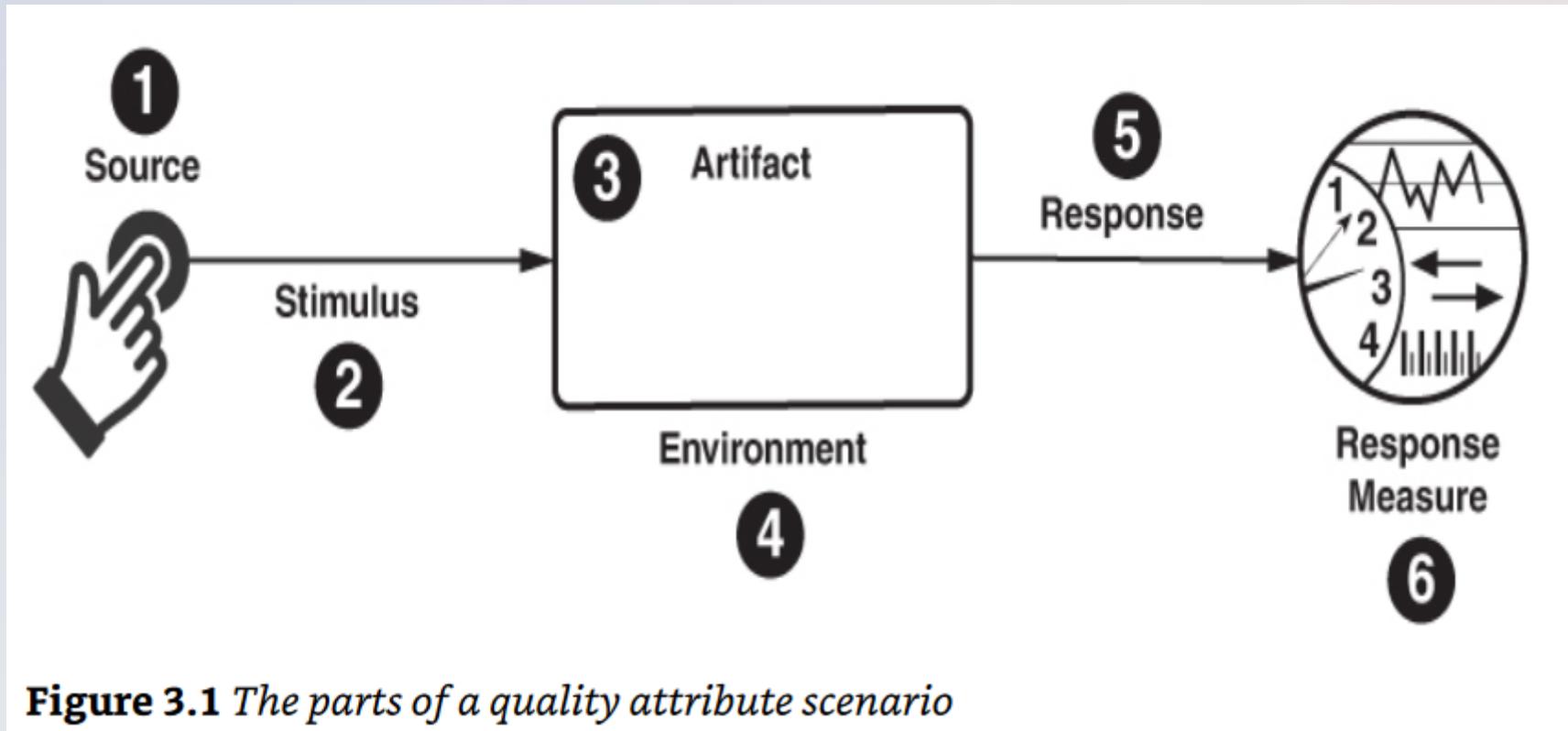


Figure 3.1 *The parts of a quality attribute scenario*

Example: Modifiability Quality Attribute Scenario

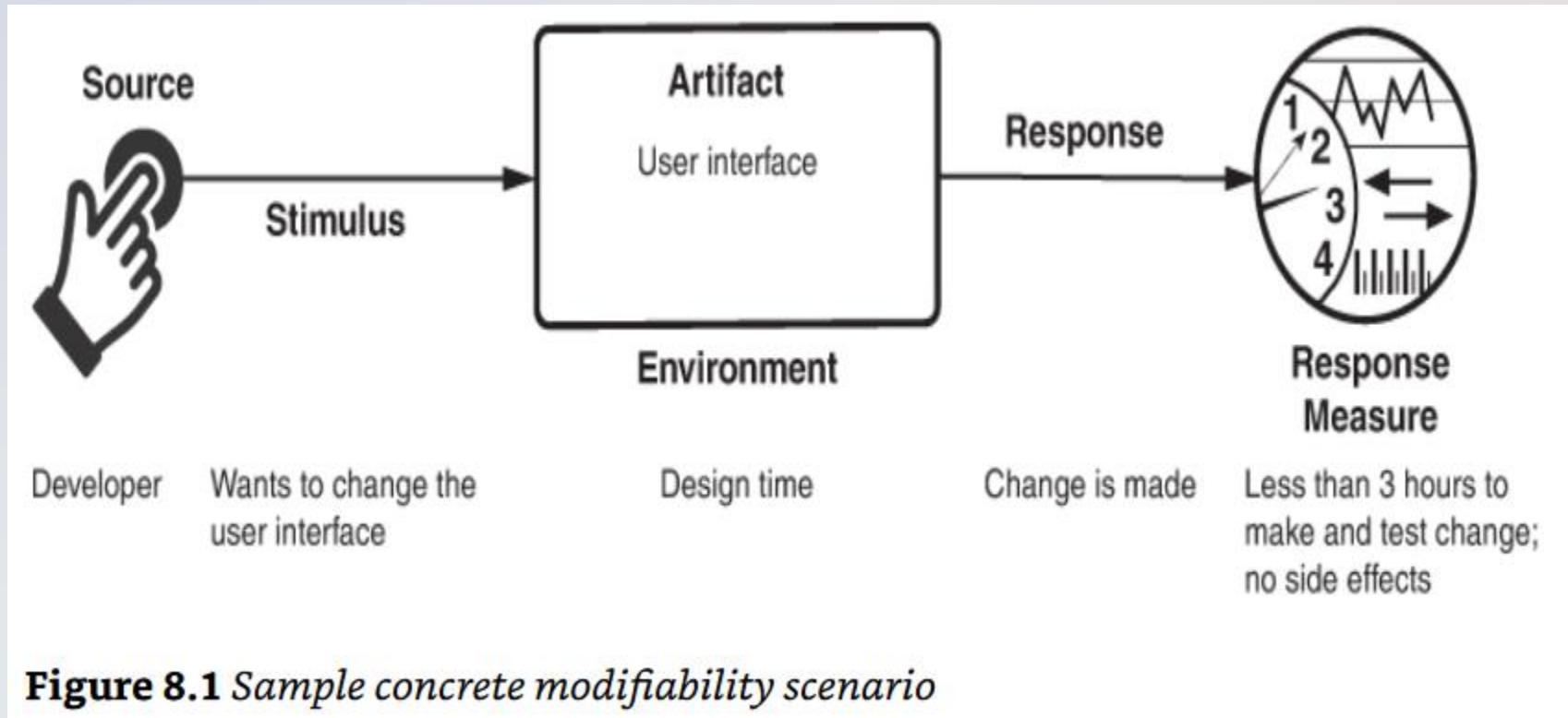
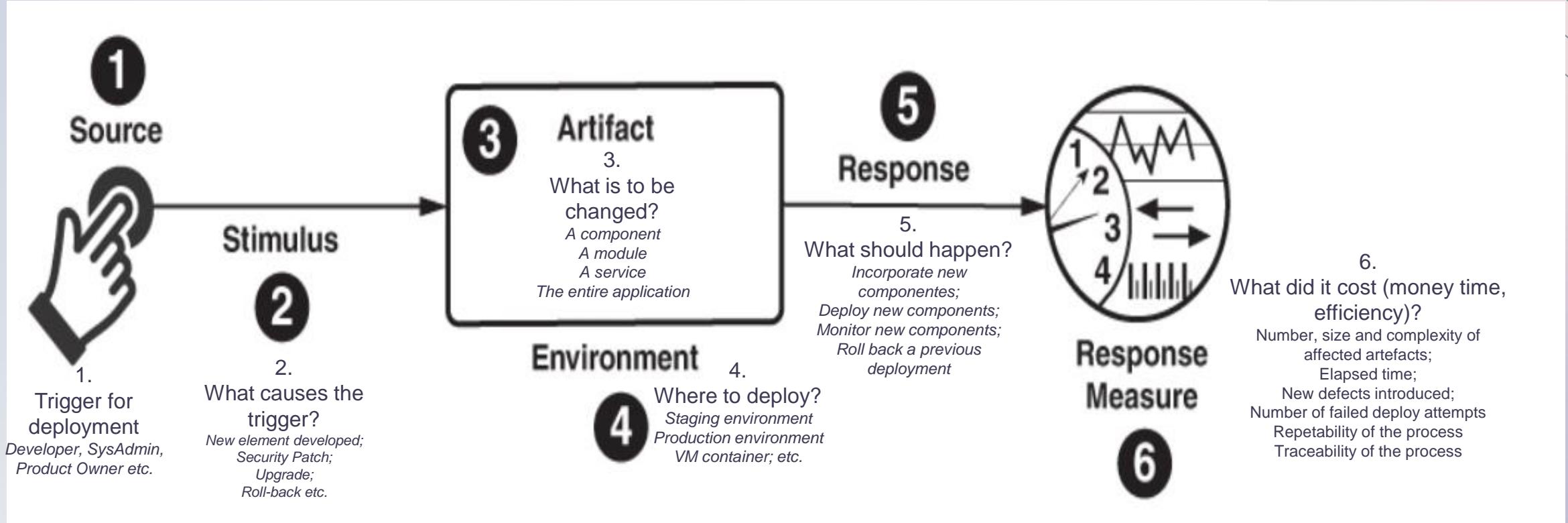


Figure 8.1 Sample concrete modifiability scenario

General Scenario

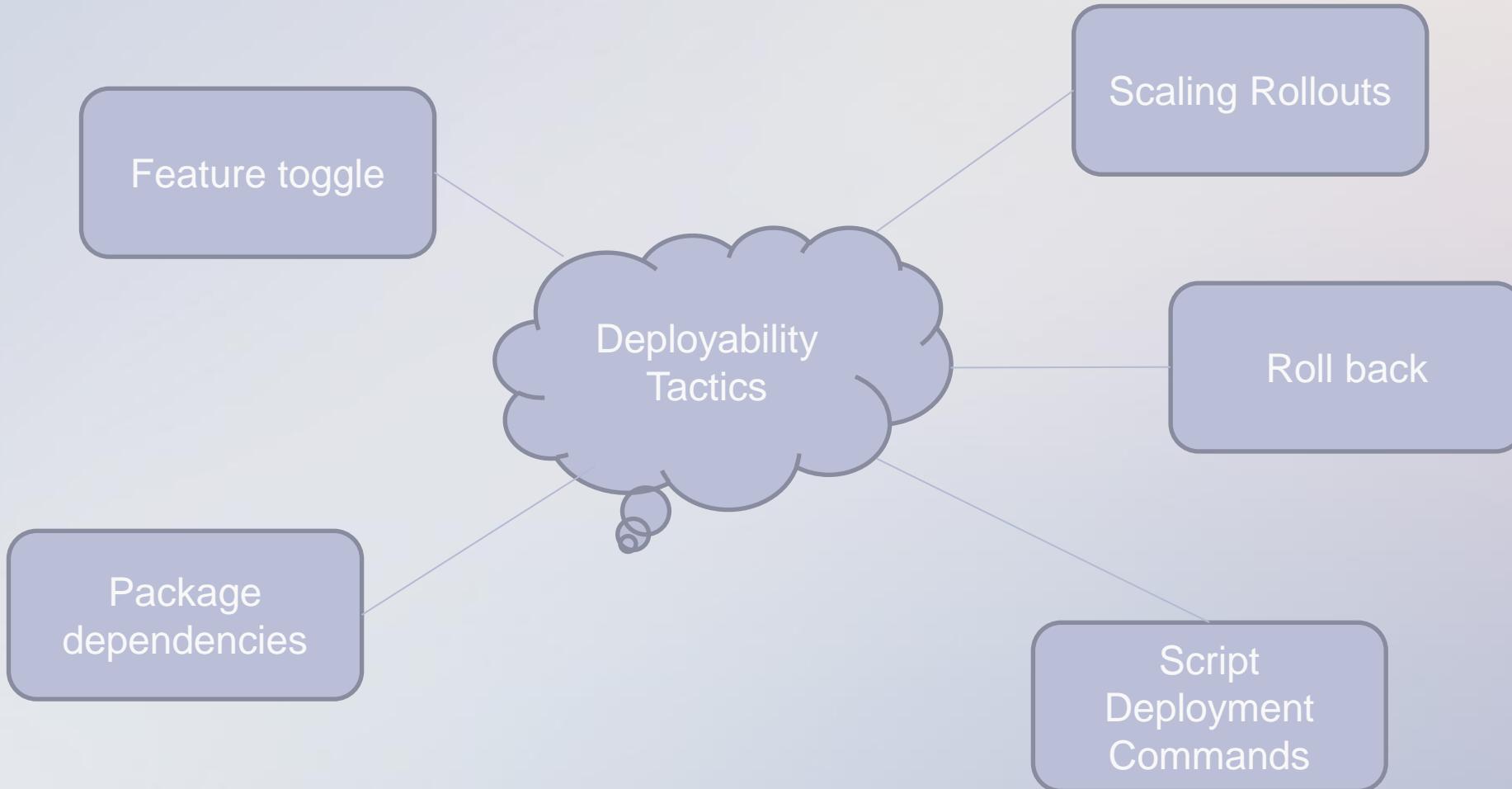


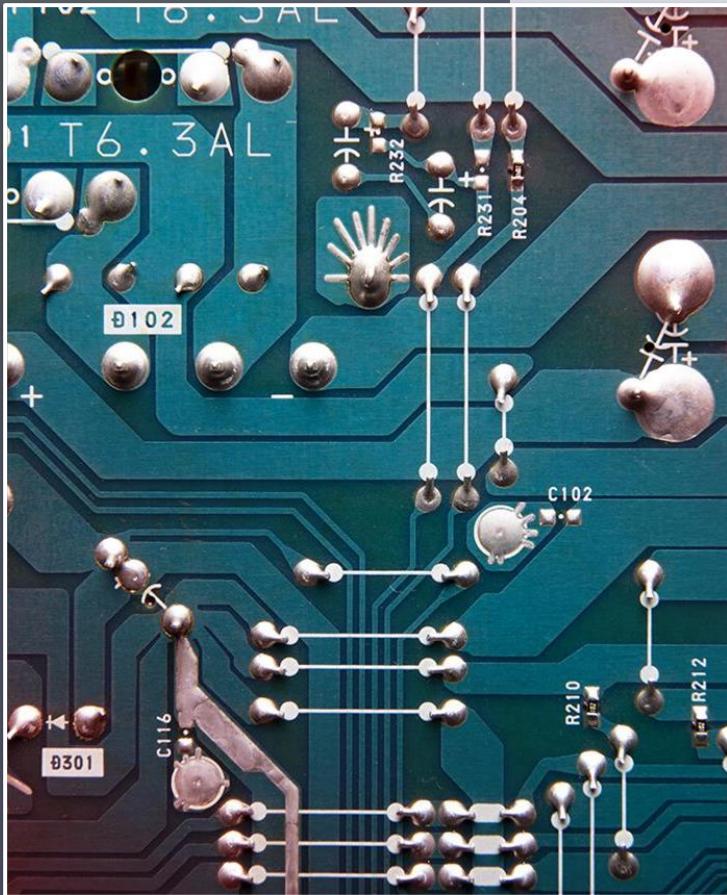
Tactics

Tactics are decisions implemented in order to achieve quality attribute scenarios



Deployability Tactics





...

2

Software Architecture

Defining Software Architecture



Geisel Library, University of California, San Diego¹



Bosco Verticale, Milan³



State Hermitage Museum, St. Petersburg²



Padoga of Kaiyuan,
Dingzhou⁴



¹<https://www.architecturaldigest.com/gallery/brutalist-buildings-on-college-campuses>

²<https://www.corinthia.com/st-petersburg/discover-st-petersburg/top-10-things-to-see-in-the-hermitage-collection/>

³<https://www.greenqueen.com.hk/urban-forest-of-the-future-how-to-turn-our-cities-into-treetopias/the-bosco-verticale-vertical-forest-in-milan-shutterstock/>

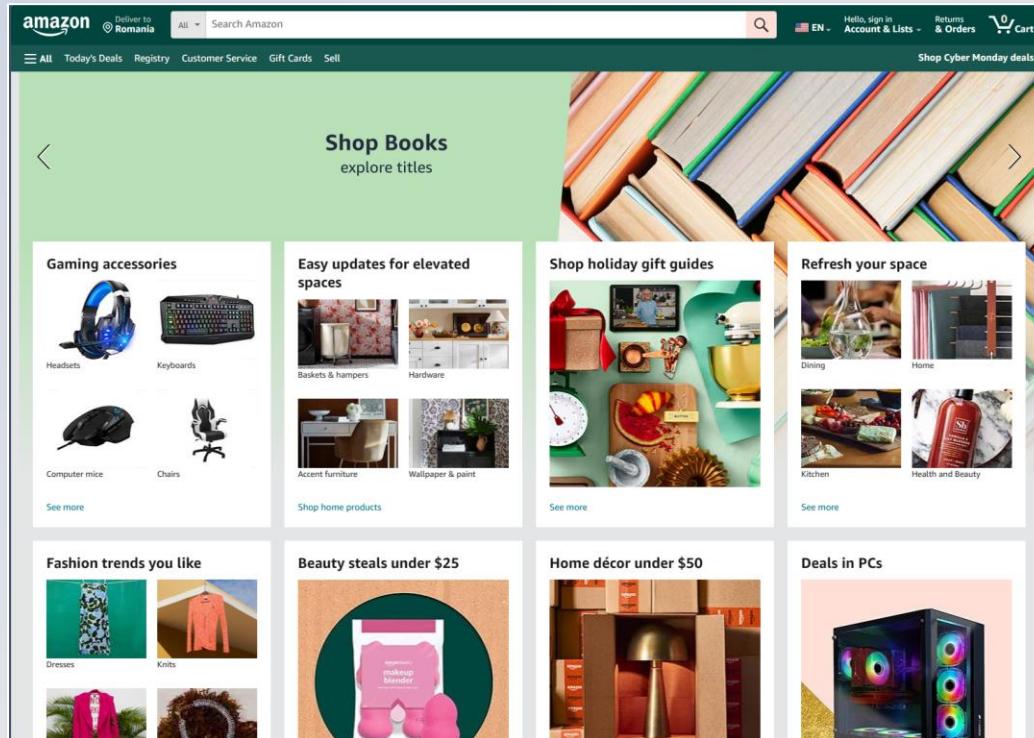
⁴https://www.123rf.com/photo_10521896_padoga-of-kaiyuan.html

Defining Software Architecture

*"The set of structures needed to **reason** about the system, which comprise software **elements**, **relations** among them, and **properties** of both."*

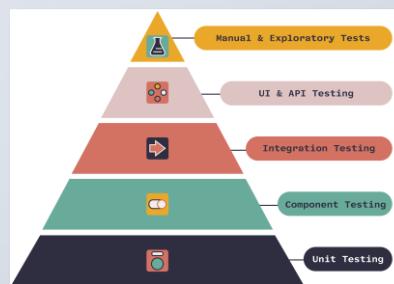
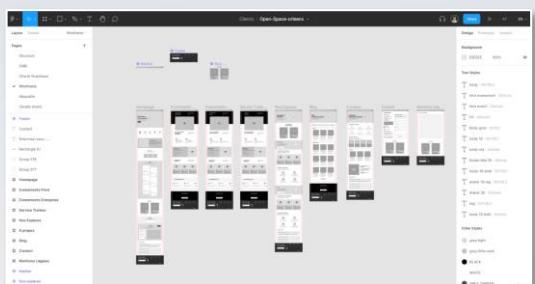
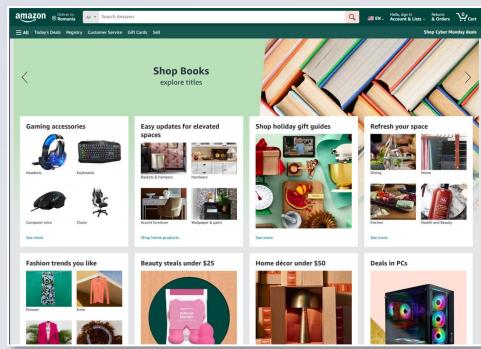
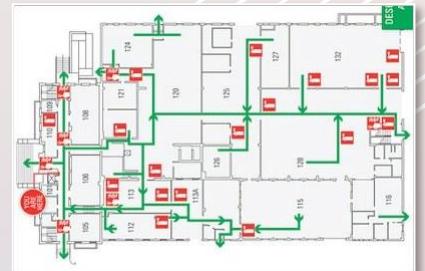
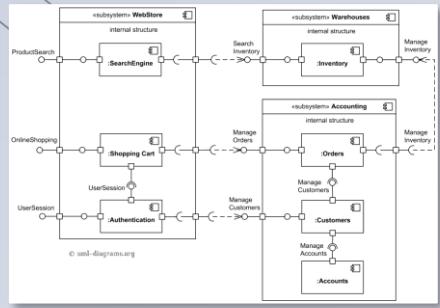


DALL-E 3 generated image of "Software Architecture"



Bosco Verticale, Milan





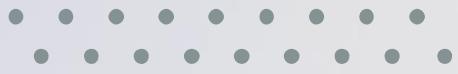


Architectural Patterns

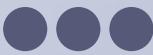
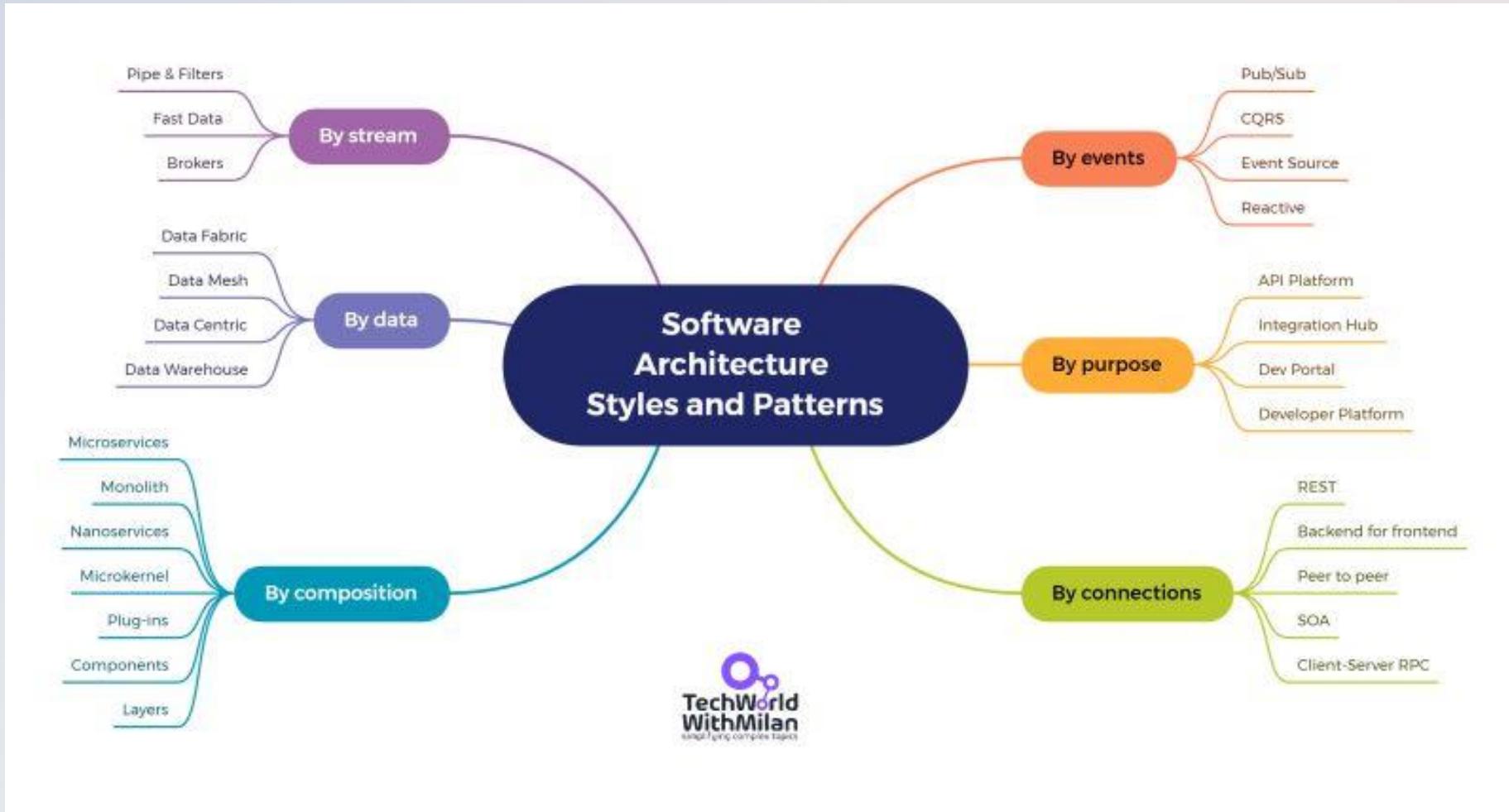
Architectural Patterns are **reusable solutions** to common problems that provide a structural framework for software applications.

Pattern	Tactic
Solution that defines a fundamental architectural choice	Solution that solves a punctual requirement
Generally produces tradeoffs	A “best solution” can be identified

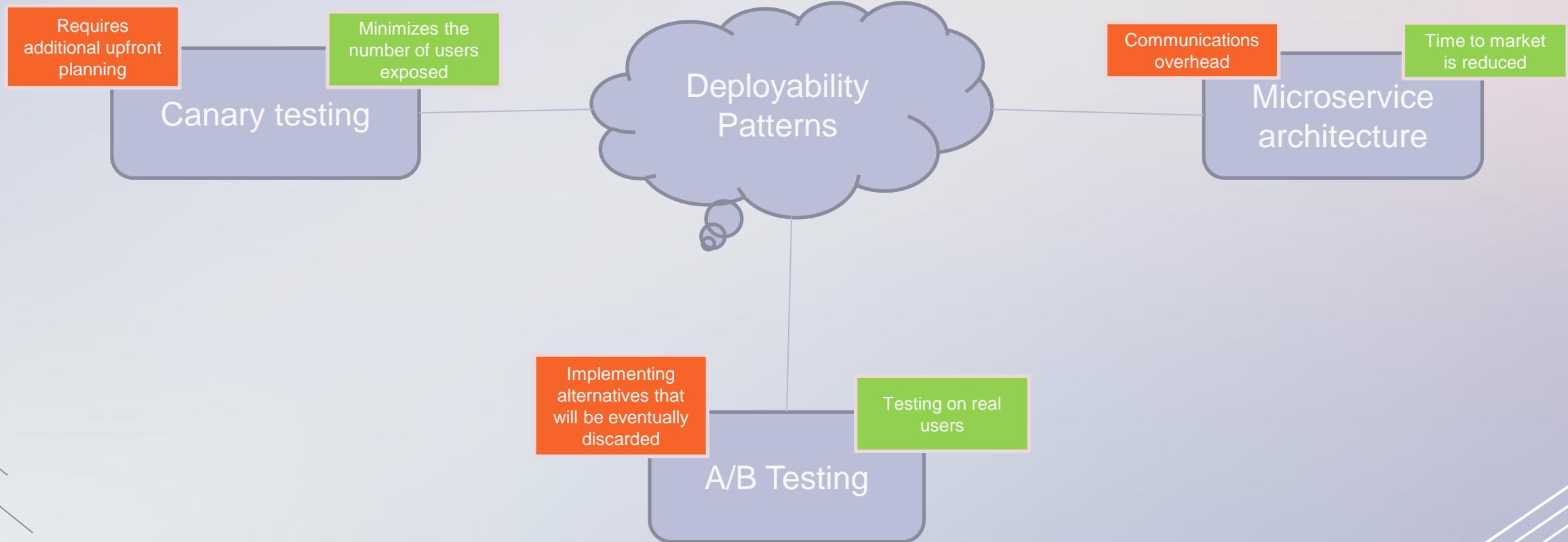




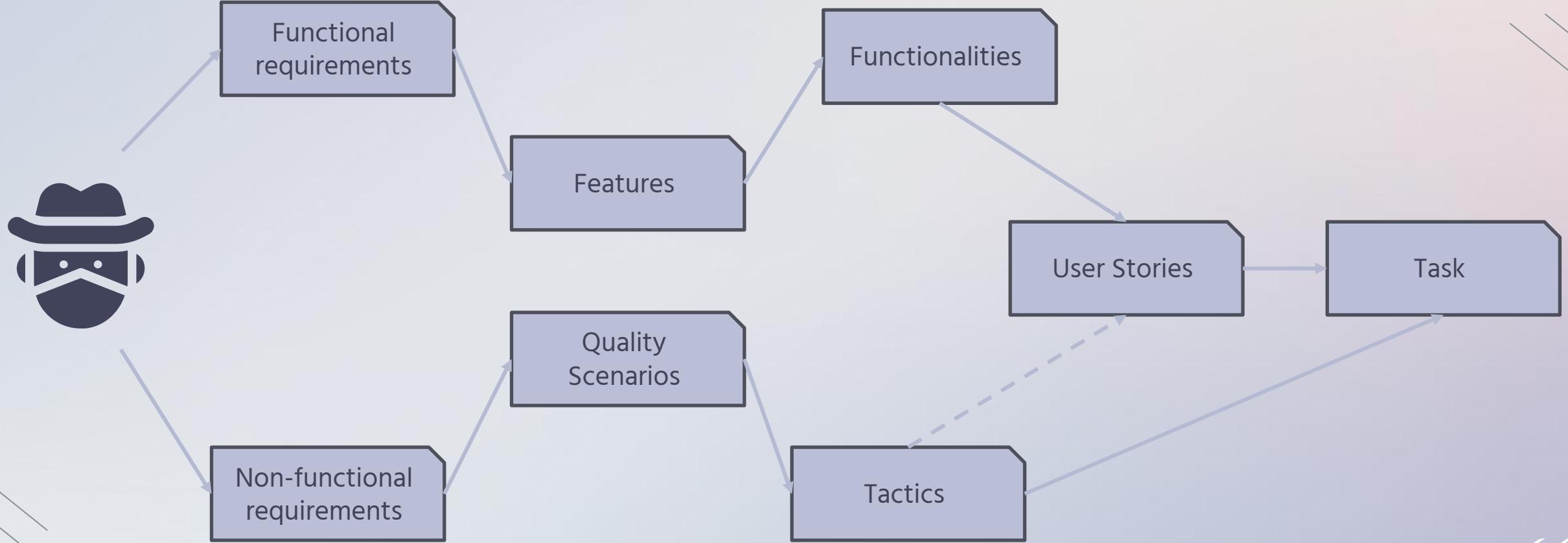
Software Architecture Categorization



Deployability Patterns

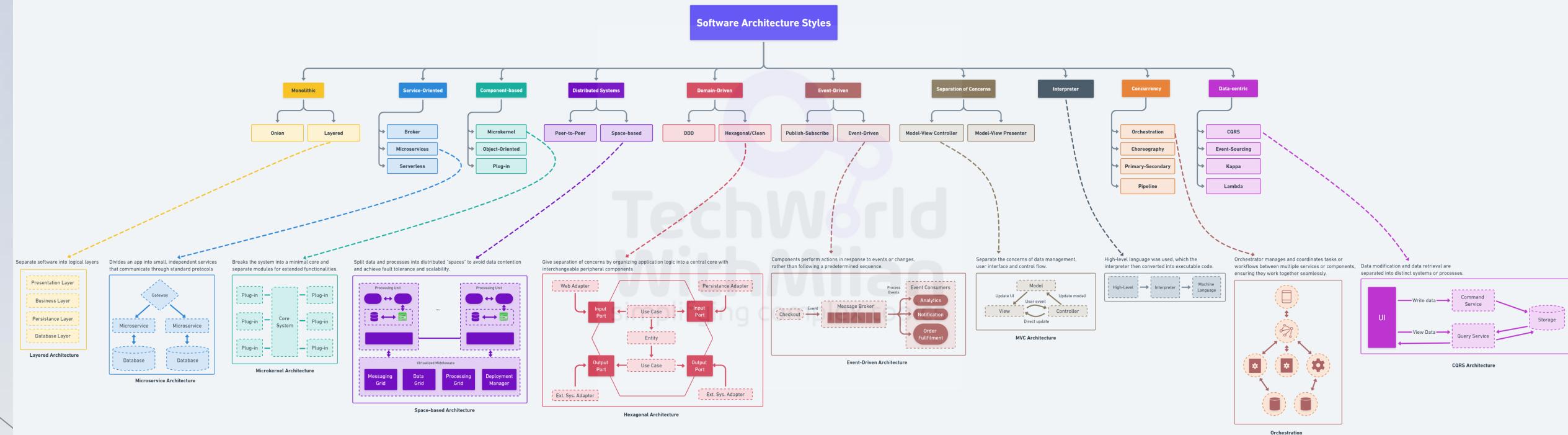


Putting it all together

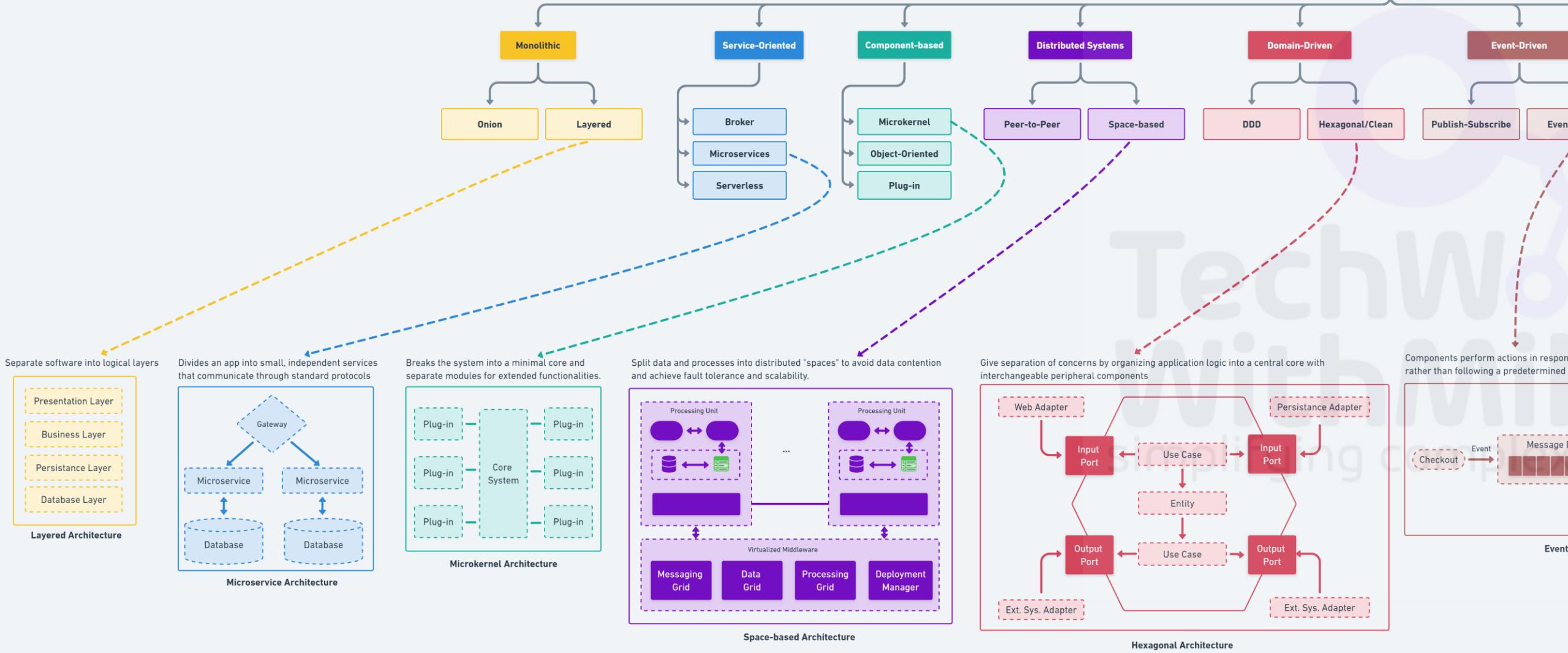


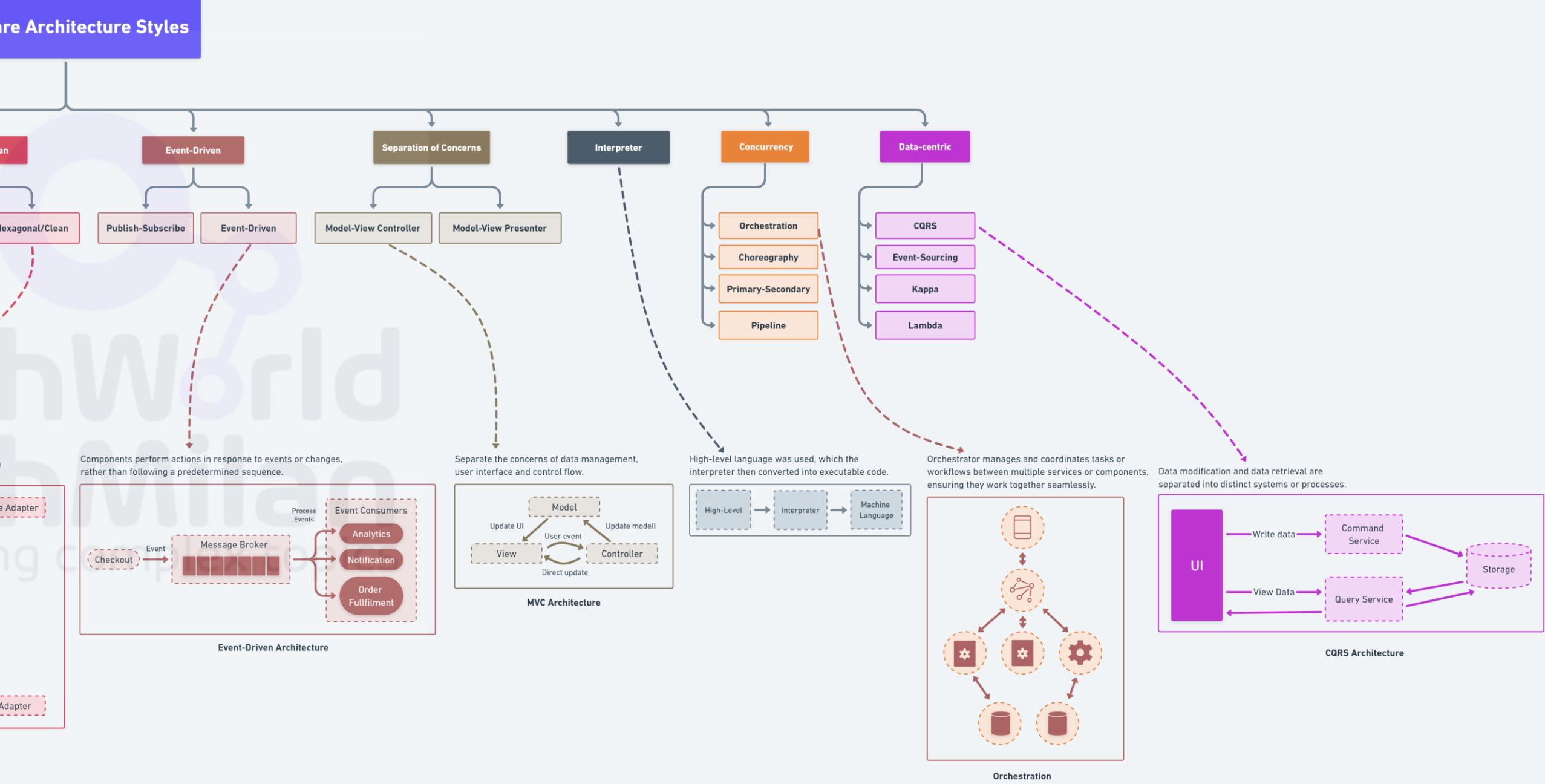


Software Architecture Styles



Software Architecture Styles





Where to learn more about them

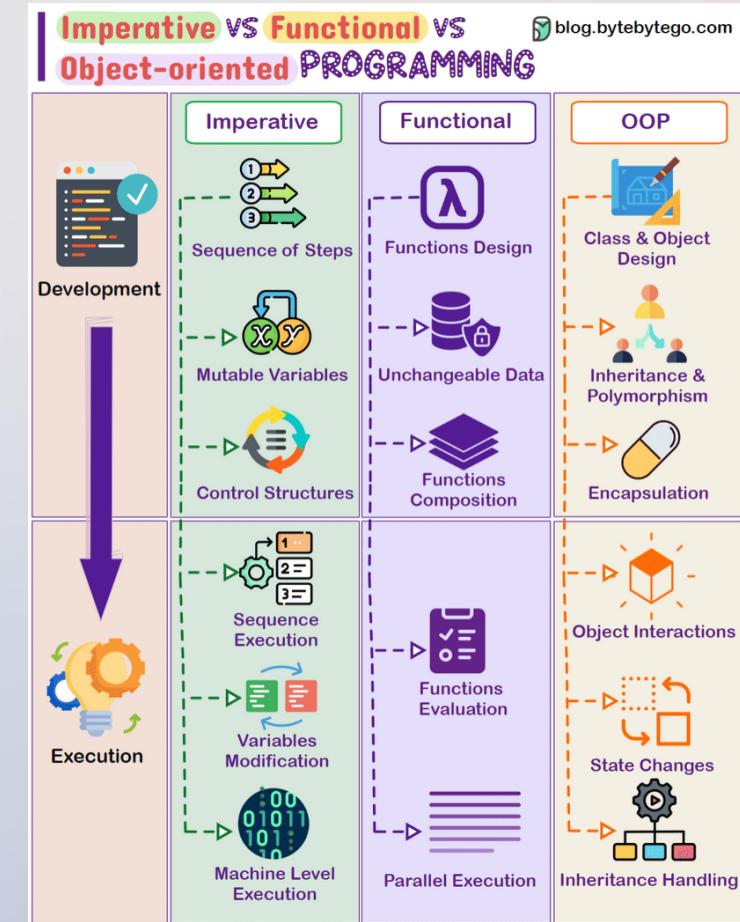
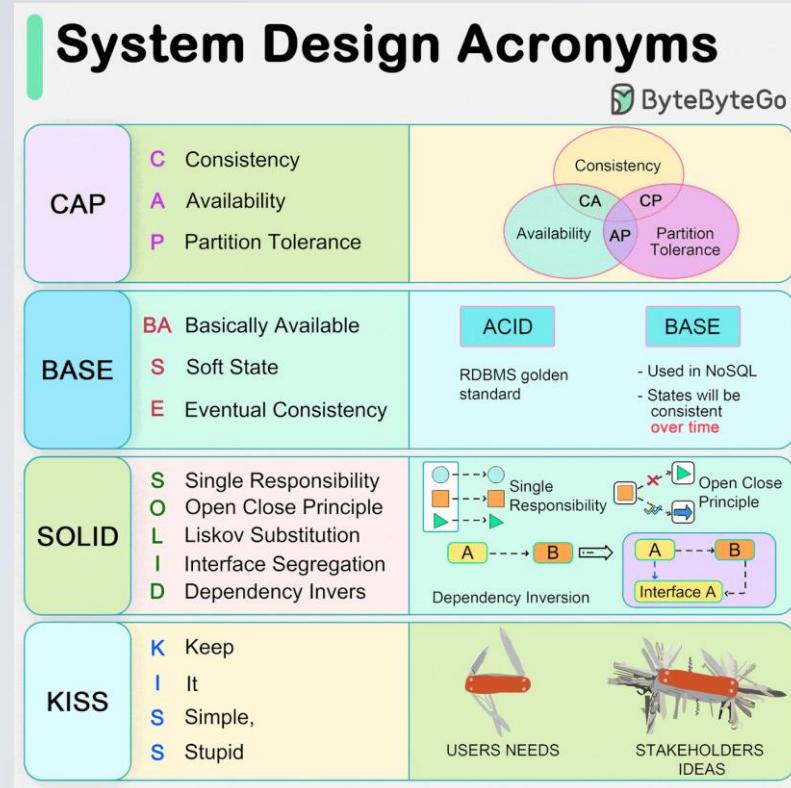
[Cloud design patterns - Azure Architecture Center | Microsoft Learn](#)



Learning resources for future Software Architects



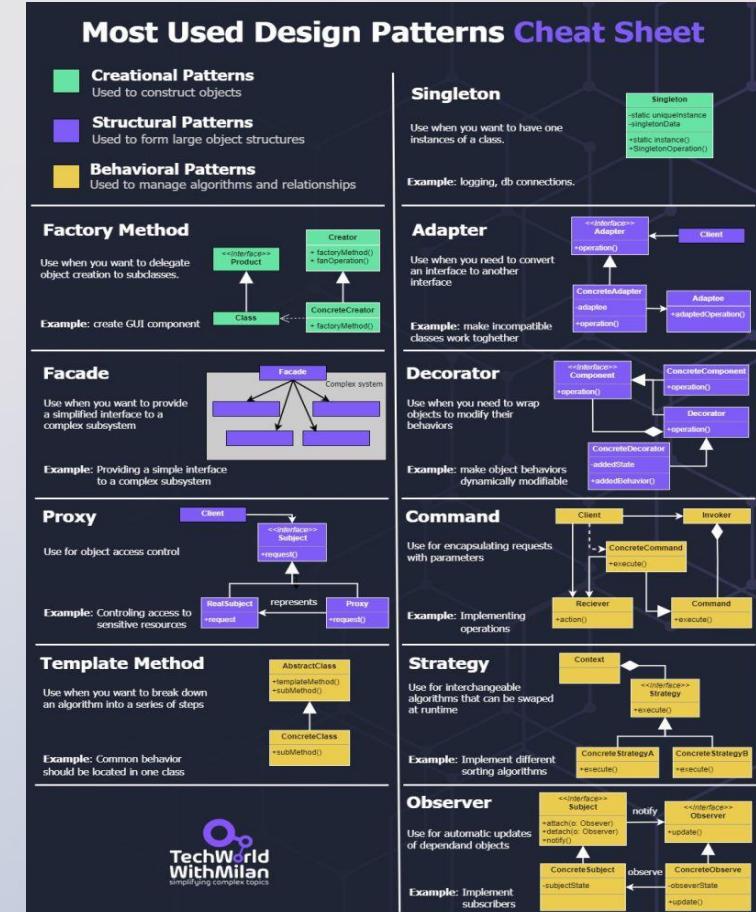
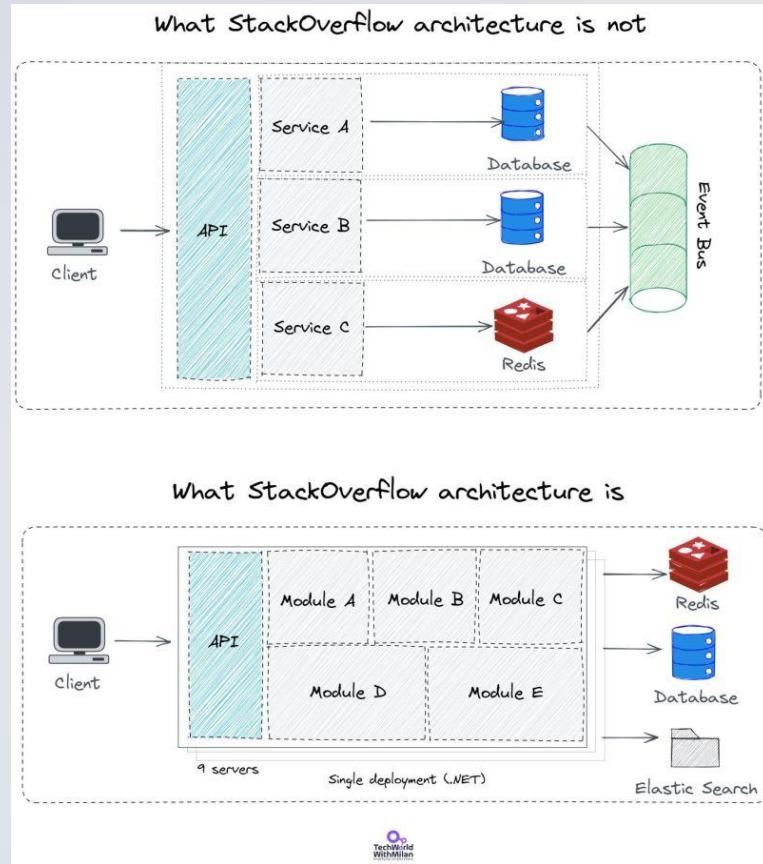
ByteByteGo
By Alex Xu



Learning resources for future Software Architects



TechWorldWithMilan
Dr Milan Milanović





Learning resources for future Software Architects



ThePrimeTime - YouTube

ThePrimeTime channel features 16 video thumbnails:

- Become -10x Engineer** (22:22) - How to -10x Engineer Correctly | Prime Reacts
- Go** (26:21) - How Much Memory for 1,000,000 Threads in 7 Languages | Go, Rust, C#, Elixir, Java,...
- MAXIMUM CRINGE Programming Language Tier List** (22:45) - MAXIMUM CRINGE Programming Language Tier List | Prime Reacts
- Stop Recommending Clean Code** (27:05) - Stop Recommending Clean Code | Prime Reacts
- function ligma(eventCount)** (22:53) - Have We Forgotten How To Program?? | Prime Reacts
- Design Patterns** (19:04) - 8 Design Patterns | Prime Reacts
- Interview With Sr Rust Developer** (22:10) - Interview With Sr Rust Developer | Prime Reacts
- soy dev chad lead** (15:01) - IS THIS SOFTWARE DEV? | Prime Reacts
- \$400K?!** (15:10) - \$400,000 a Year and 10 Hours A Week At GOOGLE
- 50 BILLION MESSAGES PER DAY WITH 32 ENGINEERS** (14:58) - 50 BILLION MESSAGES PER DAY WITH 32 ENGINEERS | Prime Reacts
- Carmack Doesn't Like Vim** (26:52) - Carmack Doesn't Like Vim | Prime Reacts
- 120x faster?!** (21:21) - 120x Faster Algorithm By Nested Loops





Learning resources for future Software Architects



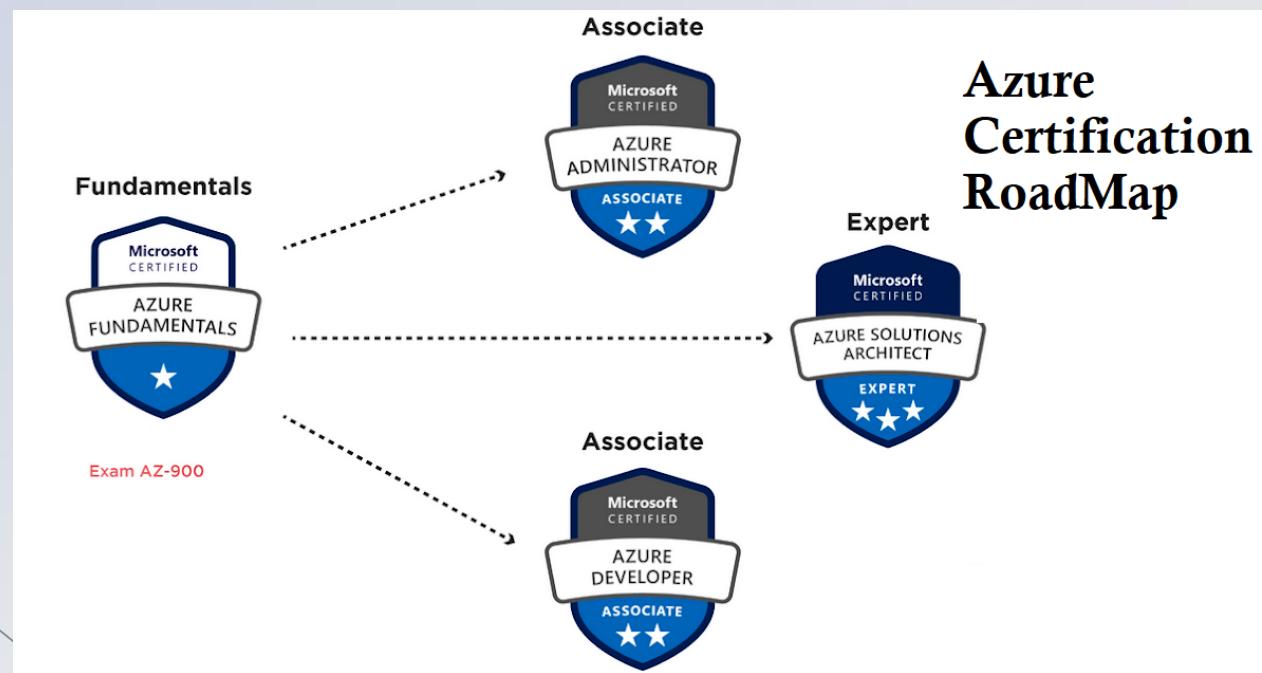
Theo - t3.gg - YouTube

The collage consists of 12 video thumbnails arranged in three rows of four. Each thumbnail includes the video title, view count, and upload date.

- Thumbnail 1:** Data Servers (\$1405 vs \$0.02), CDNs (\$1014 vs \$0.02), and AWS costs (\$3,742 vs \$0.05).
Title: The REAL Cost Of AWS
Views: 404K
Uploaded: 7 months ago
- Thumbnail 2:** Modern Web Dev Tutorial.
Title: T3 Stack Tutorial - FROM 0 TO PROD FOR \$0 (Next.js, tRPC, TypeScript, Tailwind, Prisma...)
Views: 370K
Uploaded: 8 months ago
- Thumbnail 3:** No More Devs?
Title: Using AI To Code Better? ChatGPT and Copilot change everything
Views: 300K
Uploaded: 11 months ago
- Thumbnail 4:** Dan Abramov SLAYS LIVE CODE INTERVIEW.
Title: Dan Abramov SLAYS Frontend interview w/ Ex-Twitch Engineer
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- Thumbnail 5:** We fixed React.
Title: The Biggest Change In React's History
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- Thumbnail 6:** CSS in 2023 - Tailwind vs MUI vs Bootstrap vs Chakra vs...
Title: Building a MODERN Full Stack App for FREE w/ NextJS 12, Typescript, Prisma and more...
Views: 287K
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- Thumbnail 7:** You can stop using Redux.
Title: You still use Redux?
Views: 231K
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- Thumbnail 8:** Heroku Is Dead, Here's What I Recommend.
Title: Stop Using Javascript Objects
Views: 196K
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- Thumbnail 9:** You Might Be Using Typescript Wrong...
Title: Stop Using Javascript Objects
Views: 186K
Uploaded: 1 year ago
- Thumbnail 10:** Getting A Tech Job In 2023.
Title: Getting A Tech Job In 2023
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Uploaded: 9 months ago



Courses and Certifications for Software Architects



Azure Certification RoadMap

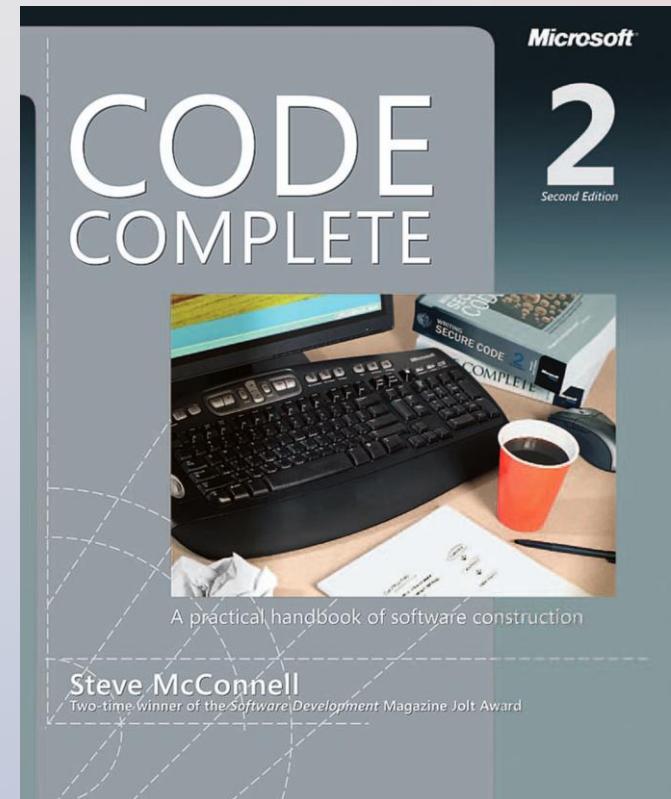
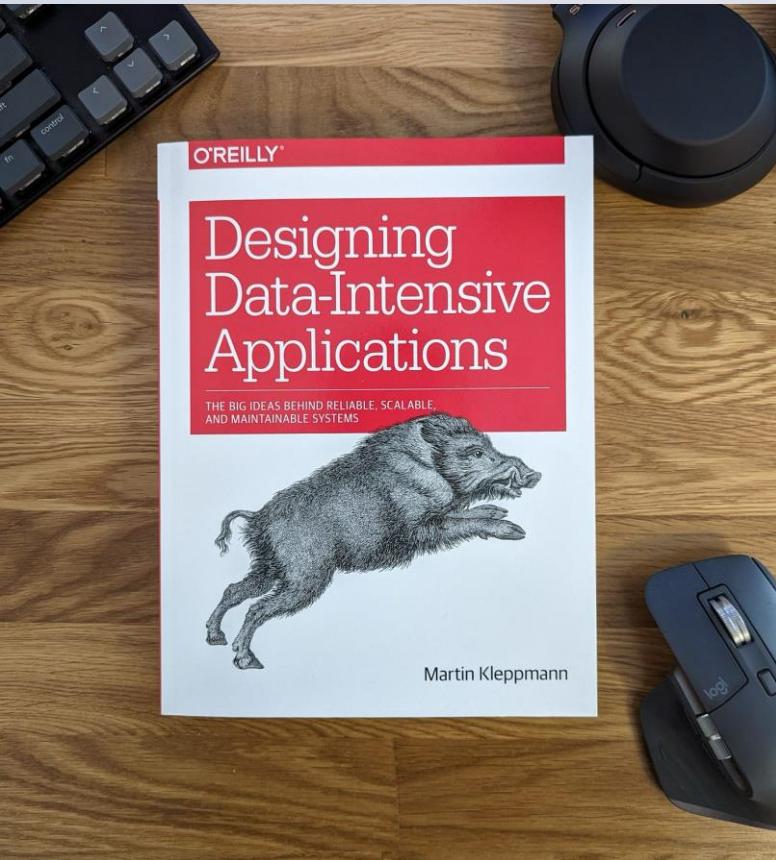


Nu vă recomand să cheltuiți banii voștri pentru astfel de certificări.
Mulți angajatori oferă în oferta de angajarea accesul la cursuri.



Books

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



Next week – CI/CD

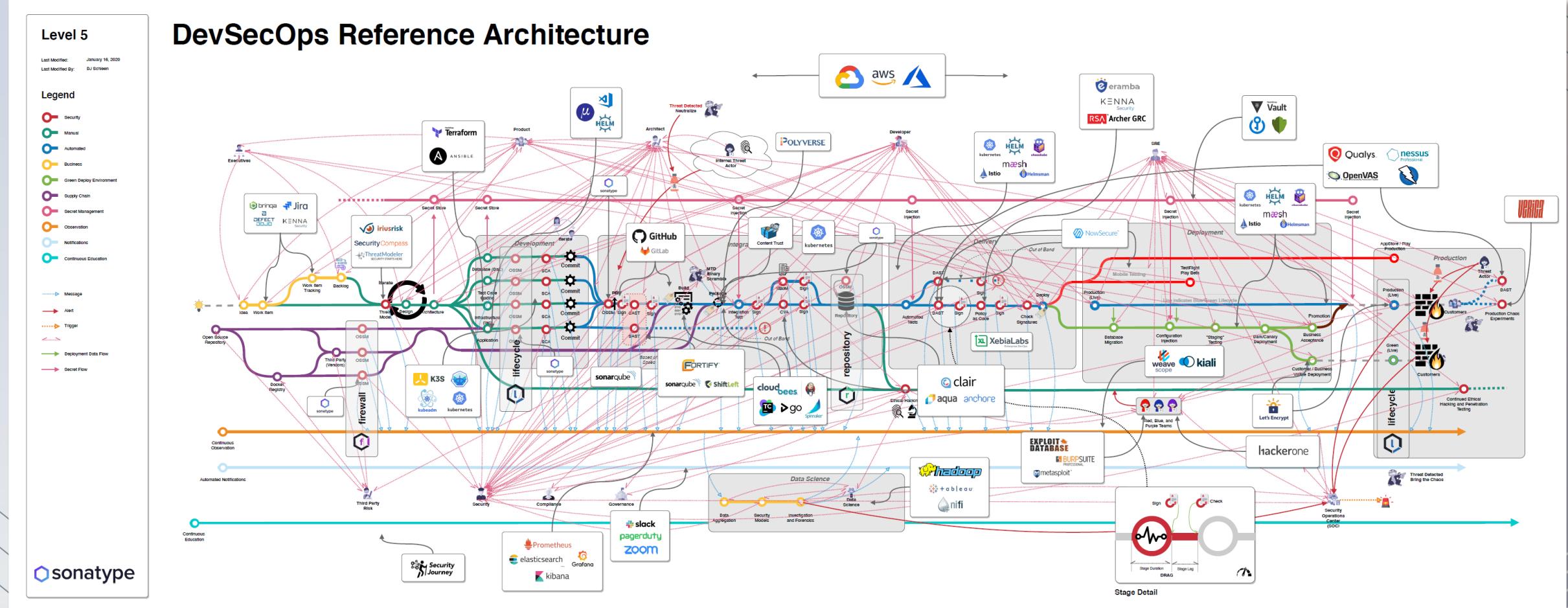


Image sources

Slide 6:

- [How To Present Better Architectural Plans | illustrach](#)
- [Building Evacuation Plans — Faculty and Staff — Penn State College of Agricultural Sciences \(psu.edu\)](#)
- [File:Earthquake-protector.gif - Wikibooks, open books for an open world](#)
- [Top 10 open-source application monitoring tools \(techgenix.com\)](#)