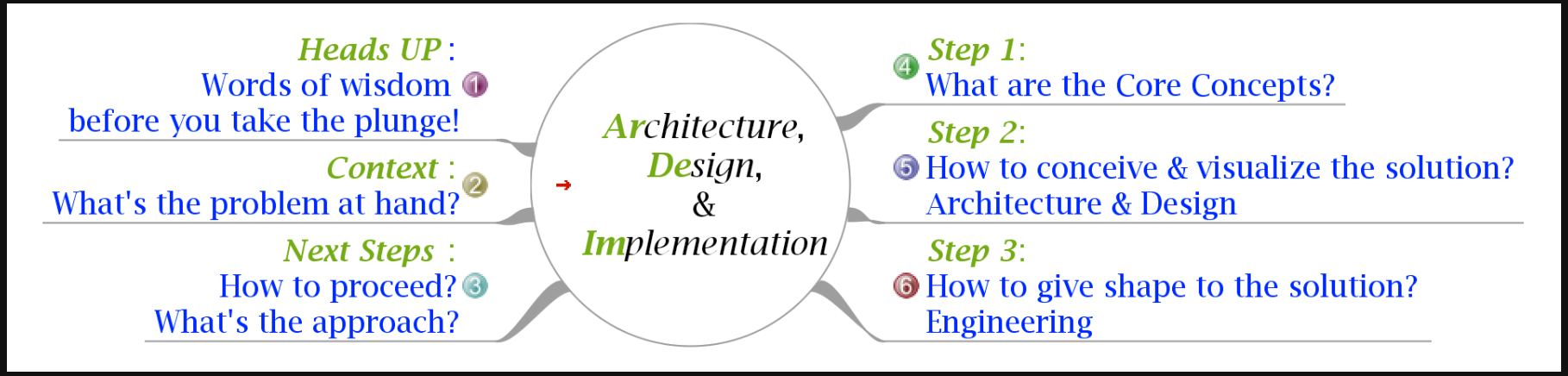
ArDeIm v5

(Ar)chitecture, &
(De)sign, &
(Im)plementation

- A How-To journey from a Single Line Requirement to Release -

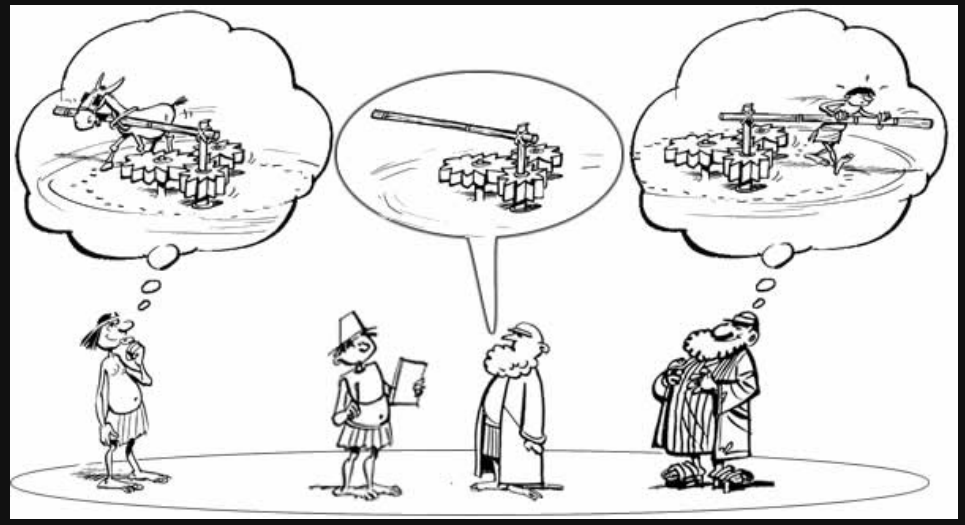
- Lay of the Land -



Heads UP!

Heads UP!

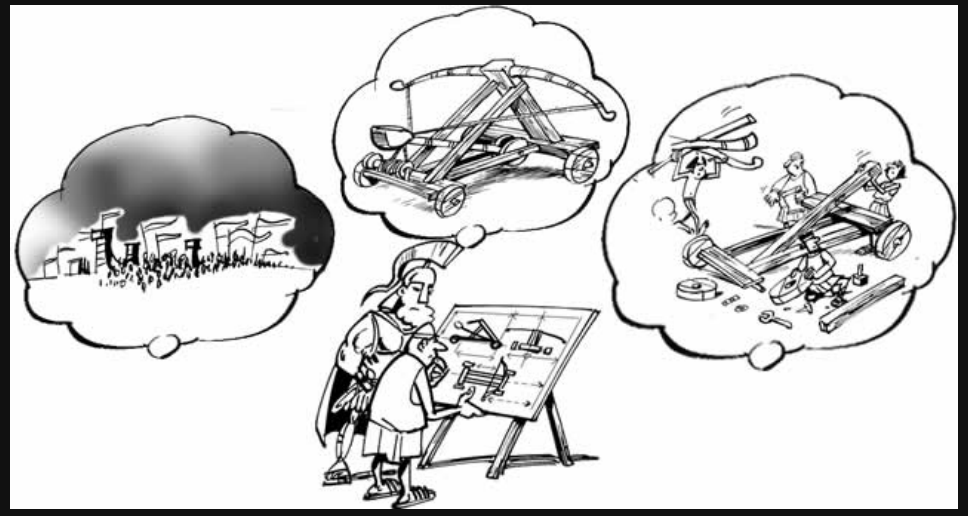
What you think is what you get!



Specific & relevant details helps you think through a better

Heads UP!

Prespectives & Concerns Differ!

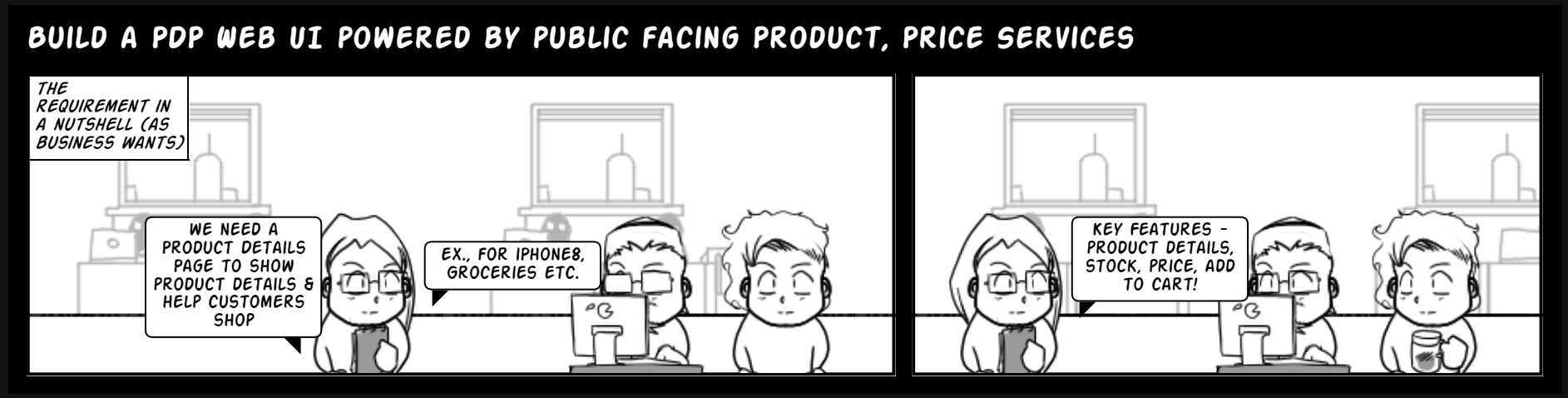


Understand Business Needs vs Functionalities vs Implementation

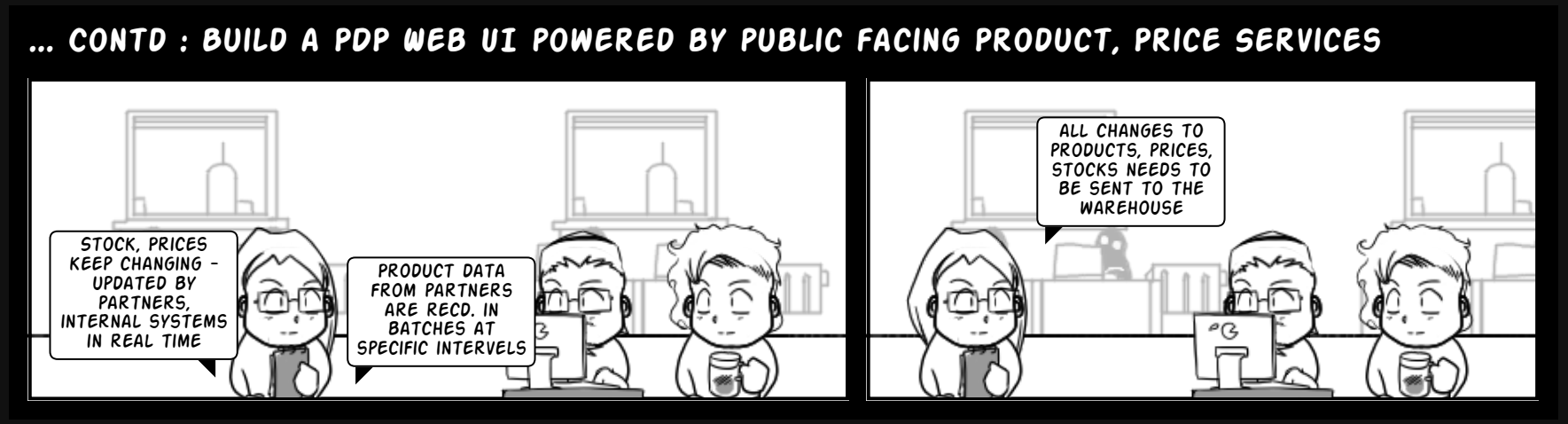
Context


THE TEAM!
BIANCA*PROD. MANAGER
KESIEV*JR. ENGG.
LARA*SR. ENGG.
PETER*DIVINE VOICE!
ANNA*DEV. MANAGER

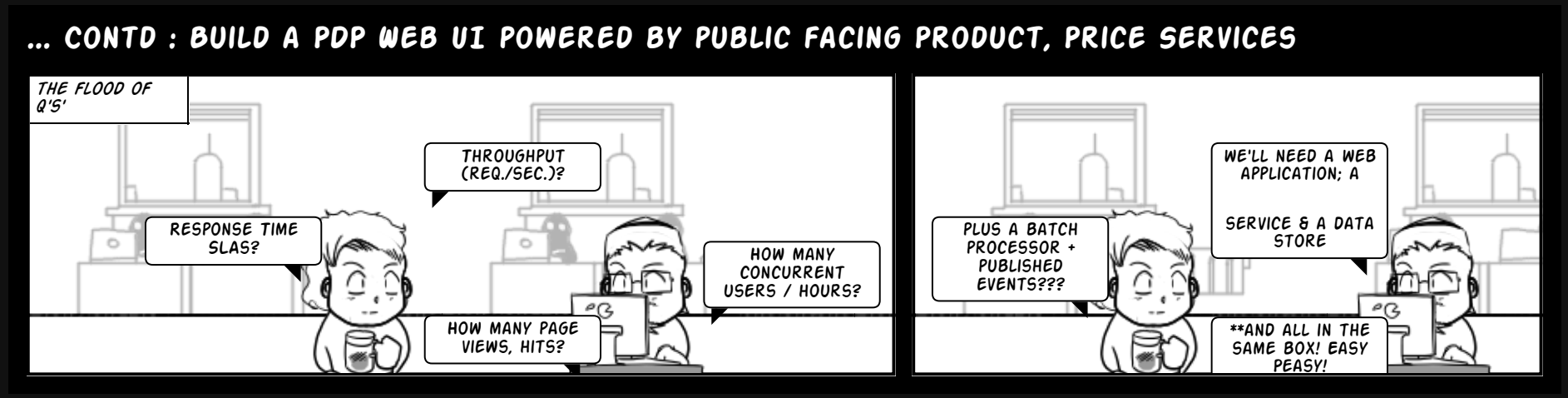
Context


BUILD A PDP WEB UI POWERED BY PUBLIC FACING PRODUCT, PRICE SERVICES
THE REQUIREMENT IN A NUTSHELL (AS BUSINESS WANTS)
WE NEED A PRODUCT DETAILS PAGE TO SHOW PRODUCT DETAILS & HELP CUSTOMERS SHOP
EX., FOR IPHONE8, GROCERIES ETC.
KEY FEATURES - PRODUCT DETAILS, STOCK, PRICE, ADD TO CART!

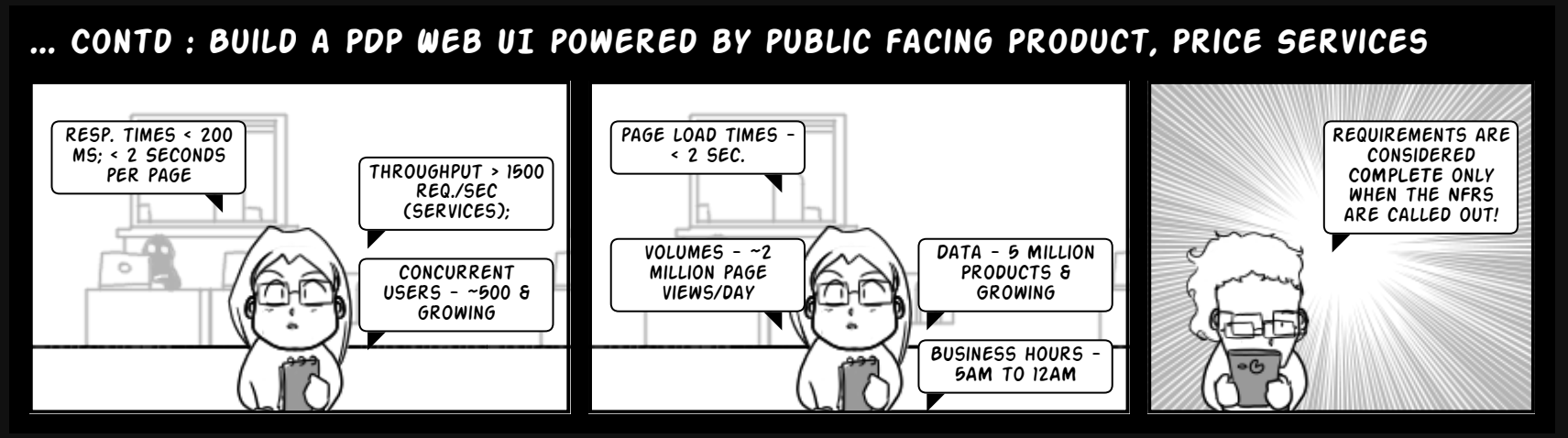
Context


... CONTD : BUILD A PDP WEB UI POWERED BY PUBLIC FACING PRODUCT, PRICE SERVICES
STOCK, PRICES KEEP CHANGING - UPDATED BY PARTNERS, INTERNAL SYSTEMS IN REAL TIME
PRODUCT DATA FROM PARTNERS ARE RECD. IN BATCHES AT SPECIFIC INTERVELS
ALL CHANGES TO PRODUCTS, PRICES, STOCKS NEEDS TO BE SENT TO THE WAREHOUSE

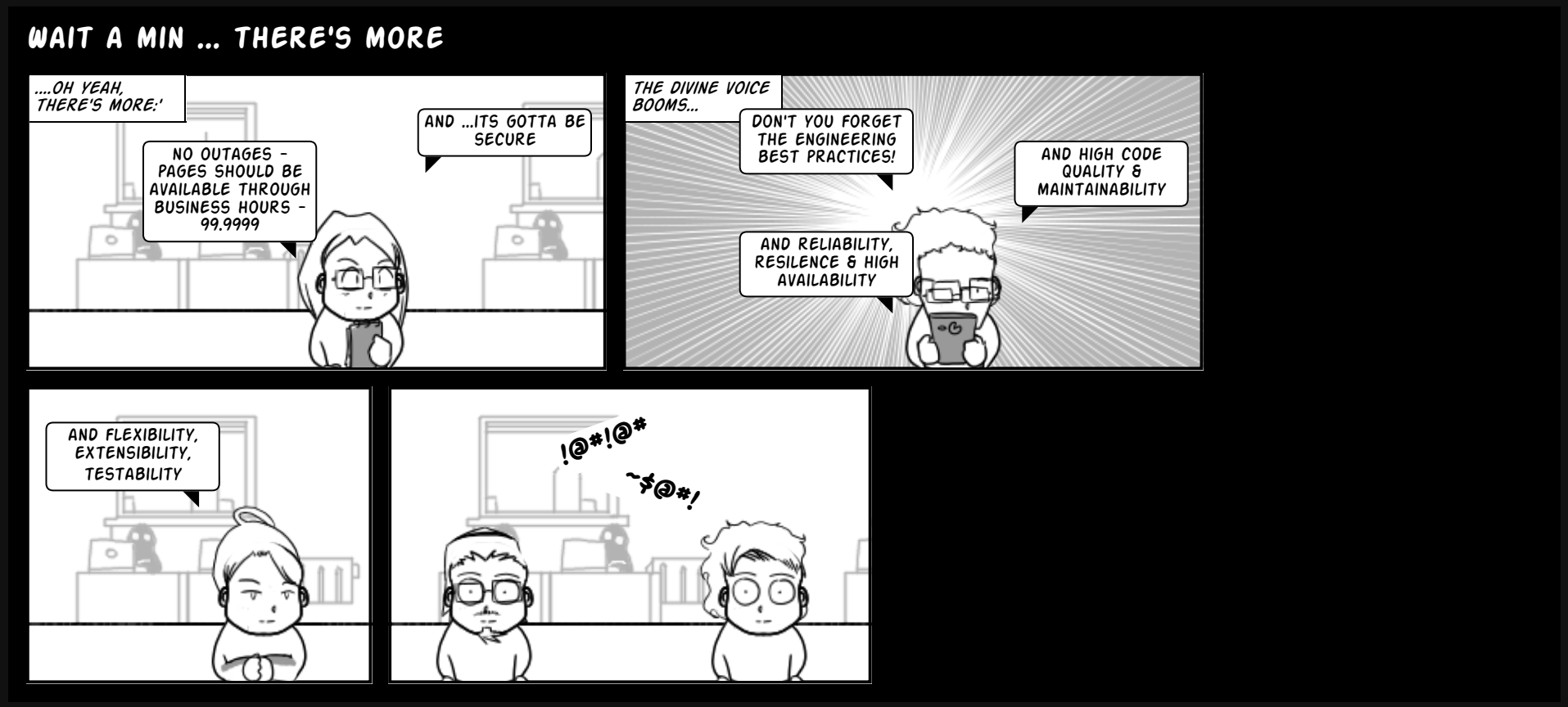
Context


... CONTD : BUILD A PDP WEB UI POWERED BY PUBLIC FACING PRODUCT, PRICE SERVICES
THE FLOOD OF Q'S'
RESPONSE TIME SLAS?
THROUGHPUT (REQ./SEC.)?
HOW MANY PAGE VIEWS, HITS?
HOW MANY CONCURRENT USERS / HOURS?
PLUS A BATCH PROCESSOR + PUBLISHED EVENTS???
WE'LL NEED A WEB APPLICATION; A SERVICE & A DATA STORE
**AND ALL IN THE SAME BOX! EASY PEASY!

Context

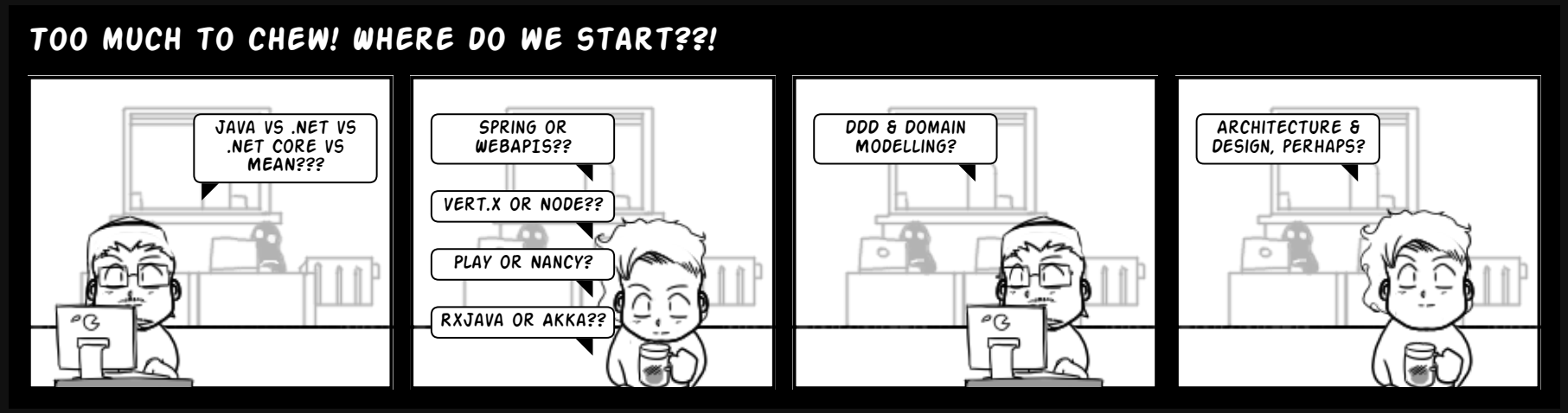

... CONTD : BUILD A PDP WEB UI POWERED BY PUBLIC FACING PRODUCT, PRICE SERVICES
RESP. TIMES < 200 MS; < 2 SECONDS PER PAGE
THROUGHPUT > 1500 REQ./SEC (SERVICES);
CONCURRENT USERS - ~500 & GROWING
PAGE LOAD TIMES - < 2 SEC.
VOLUMES - ~2 MILLION PAGE VIEWS/DAY
DATA - 5 MILLION PRODUCTS & GROWING
BUSINESS HOURS - 5AM TO 12AM
REQUIREMENTS ARE CONSIDERED COMPLETE ONLY WHEN THE NFRS ARE CALLED OUT!

Context



Whew! So, What Next?

Next Steps

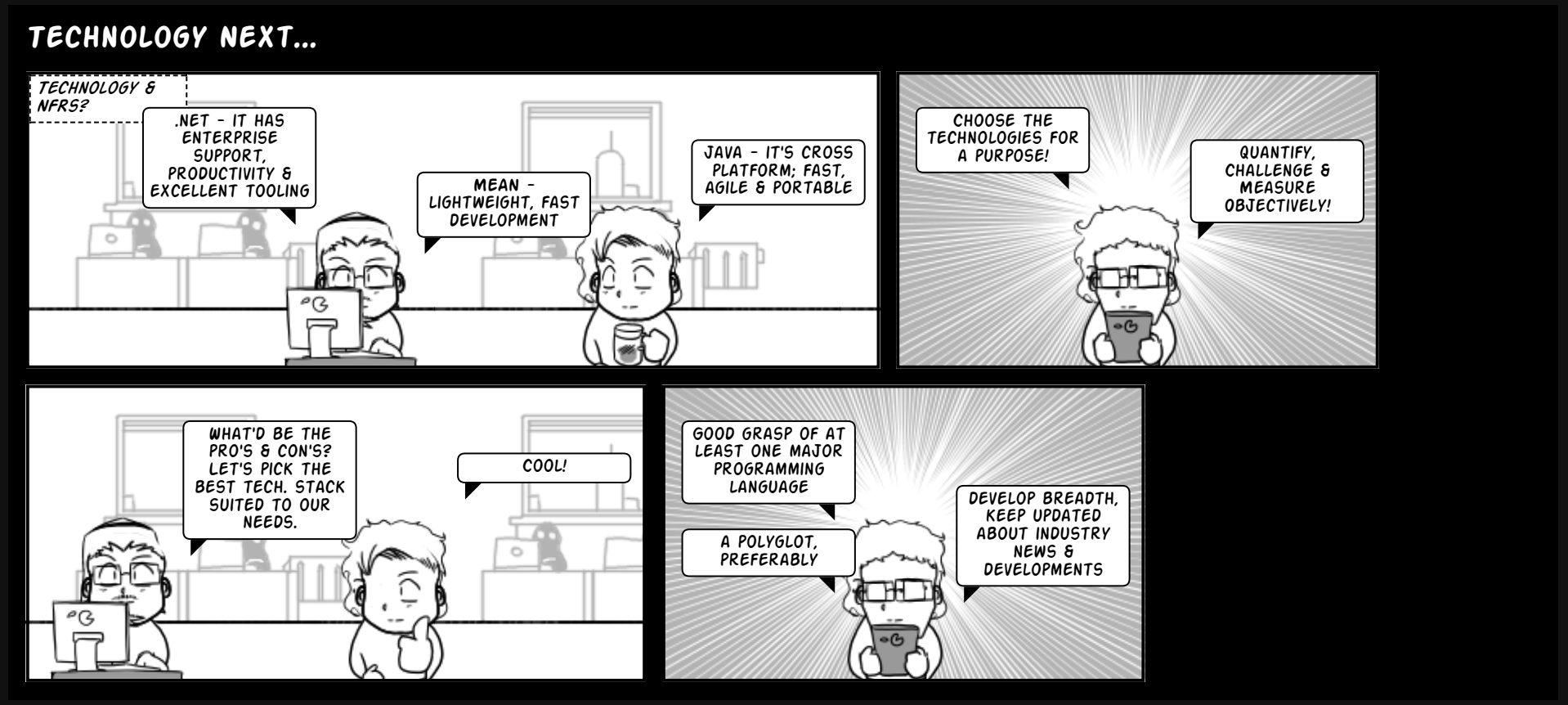


- Build Functionality first, then Iterate addressing the NFRs -

Next Steps

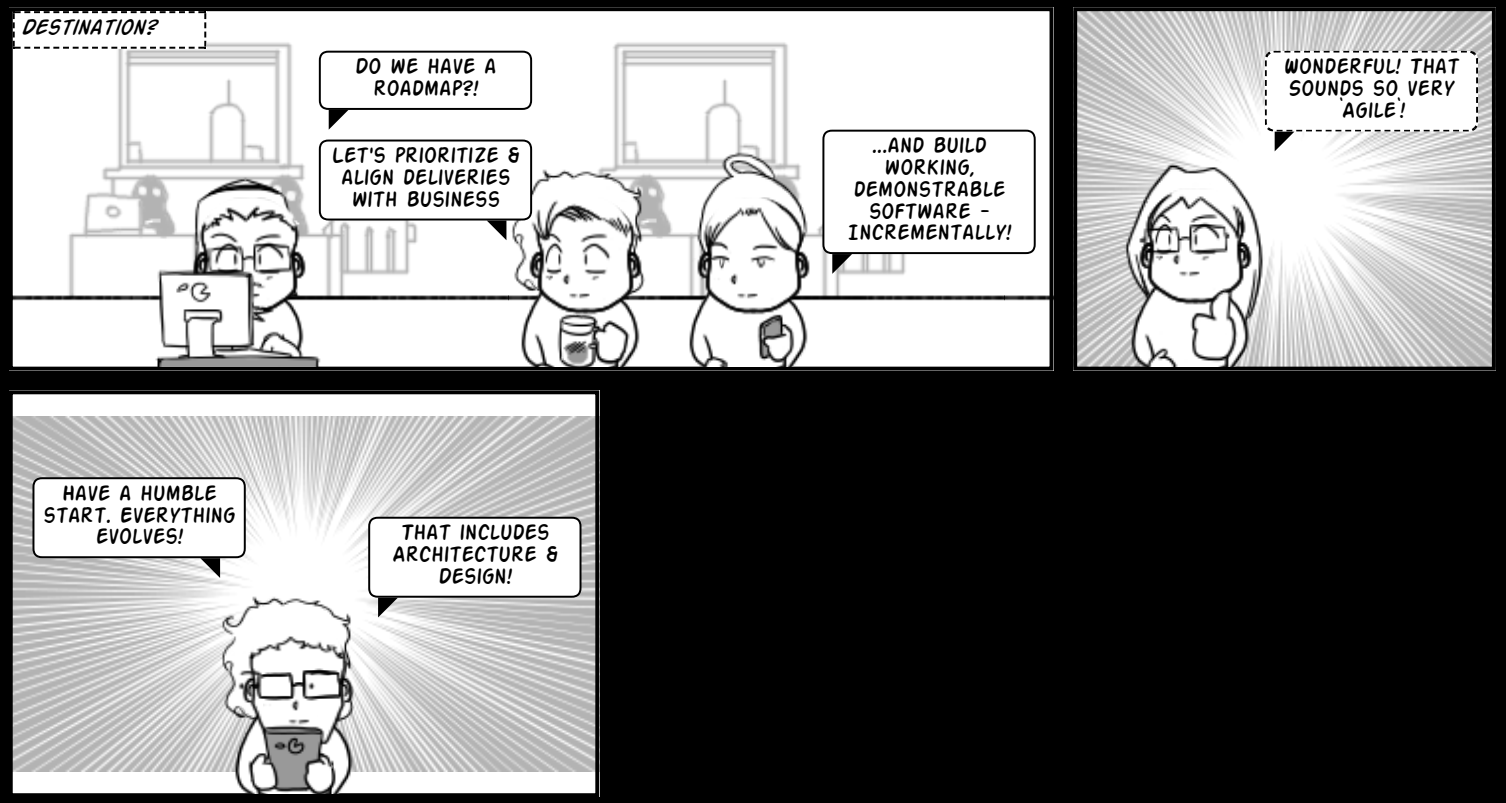

FUNCTIONALITY FIRST
FUNCTIONALITY - PDP PAGE? SERVICES? PARTNER BATCHES??
LET'S START WITH PDP!
NOPE! SERVICES FIRST!
DATA FOR THE SERVICES? PARTNER BATCHES FIRST!
START WITH DATA MODELS; SERVICES & UI FOLLOW LATER IN PARALLEL!
EVERY INDEPENDENT ROAD CONVERGES @ A CIRCLE!

Next Steps


TECHNOLOGY NEXT...
TECHNOLOGY & NFRS?
.NET - IT HAS ENTERPRISE SUPPORT, PRODUCTIVITY & EXCELLENT TOOLING
MEAN - LIGHTWEIGHT, FAST DEVELOPMENT
JAVA - IT'S CROSS PLATFORM; FAST, AGILE & PORTABLE
CHOOSE THE TECHNOLOGIES FOR A PURPOSE!
QUANTIFY, CHALLENGE & MEASURE OBJECTIVELY!
WHAT'D BE THE PRO'S & CON'S? LET'S PICK THE BEST TECH. STACK SUITED TO OUR NEEDS.
COOL!
GOOD GRASP OF AT LEAST ONE MAJOR PROGRAMMING LANGUAGE
A POLYGLOT, PREFERABLY
DEVELOP BREADTH, KEEP UPDATED ABOUT INDUSTRY NEWS & DEVELOPMENTS

Next Steps

DON'T LOSE SIGHT OF THE DESTINATION!



- Fret Not! Help is not far! -

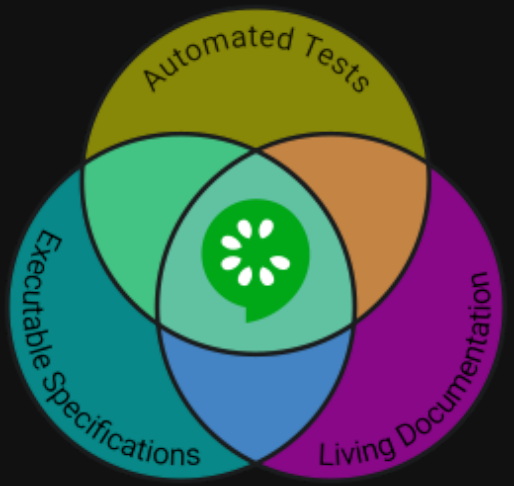
Next Steps

Data first, Design & Implementation follows next...

```
Core Concepts
        - TDD, BDD, DDD
Architecture & Design
        - Architectural Styles & Views
        - Technology Selection (How & Why)
        - Polyglot DataStores
        - NFRs & Tradeoffs
Engineering
        - Best Practices
        - Design Patterns
        - Design Principles (SOLID)
        - Code Smells
        - CI-CD & DevOPS first culture
        - Programming Paradigms (Functional, Imperative)
```

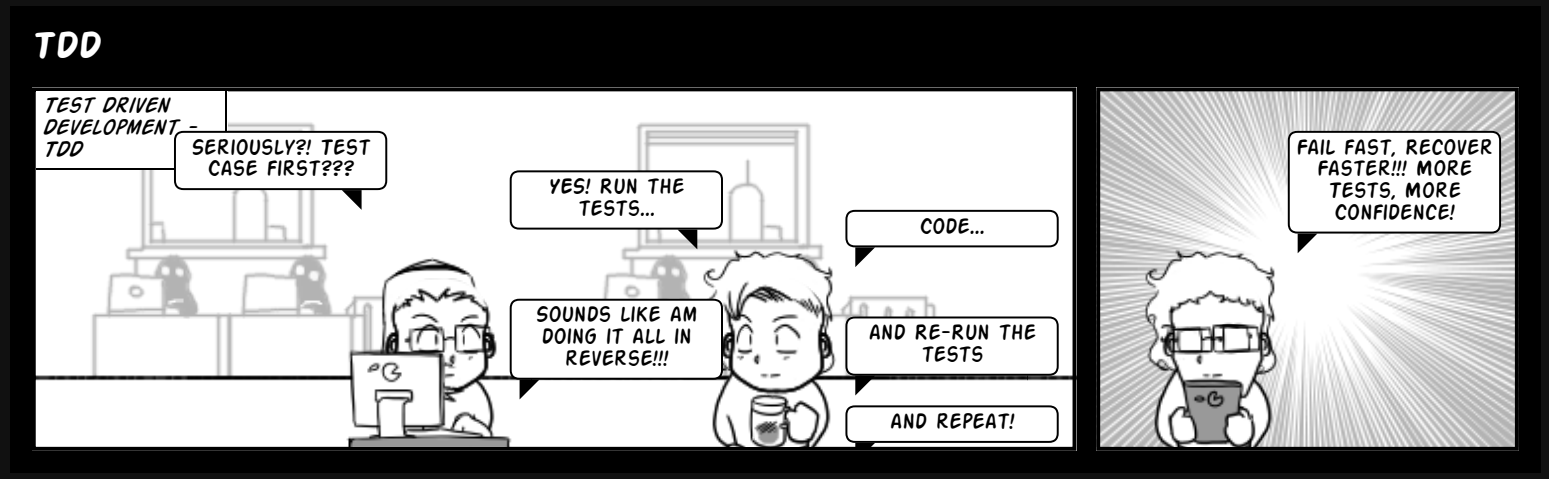
Core Concepts ...

Core Concepts ...



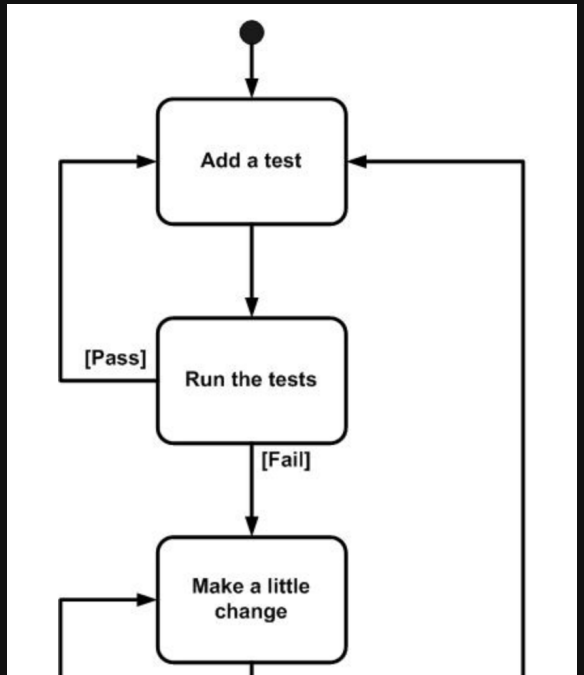
Benefits of BDD
BDD Frameworks

Core Concepts ...

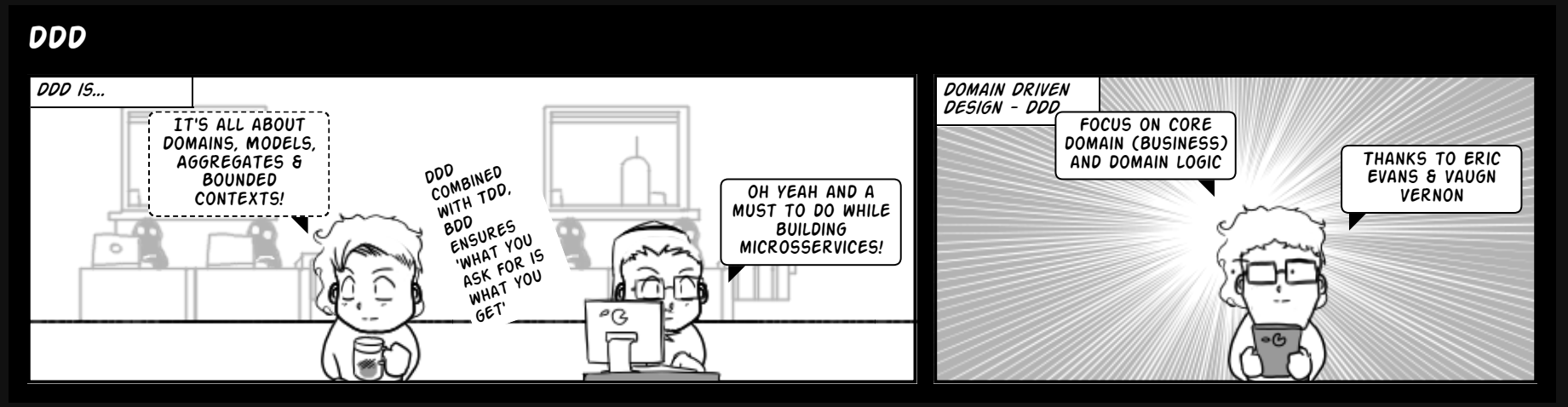


TDD Example
Introduction to TDD

Core Concepts ...

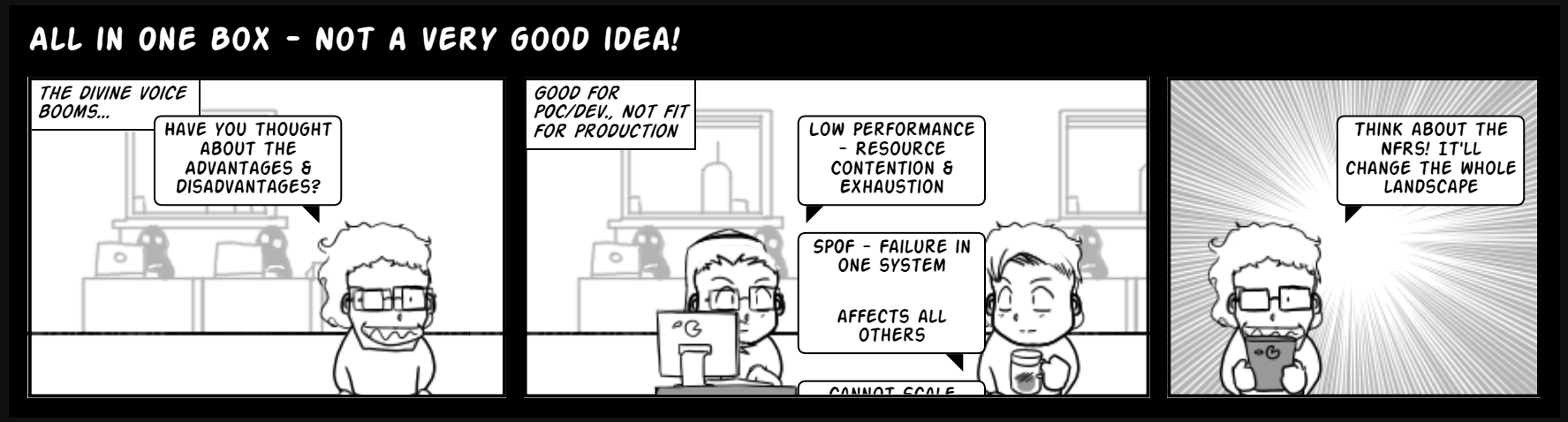


Core Concepts ...



CQRS & Domain Driven Design
Awesome DDD - Nick Chamberlain
DDD Example
DDD Books
Domain Driven Design - Reference
The Ideal Domain-Driven Design Aggregate Store?
DDD & MicroServices

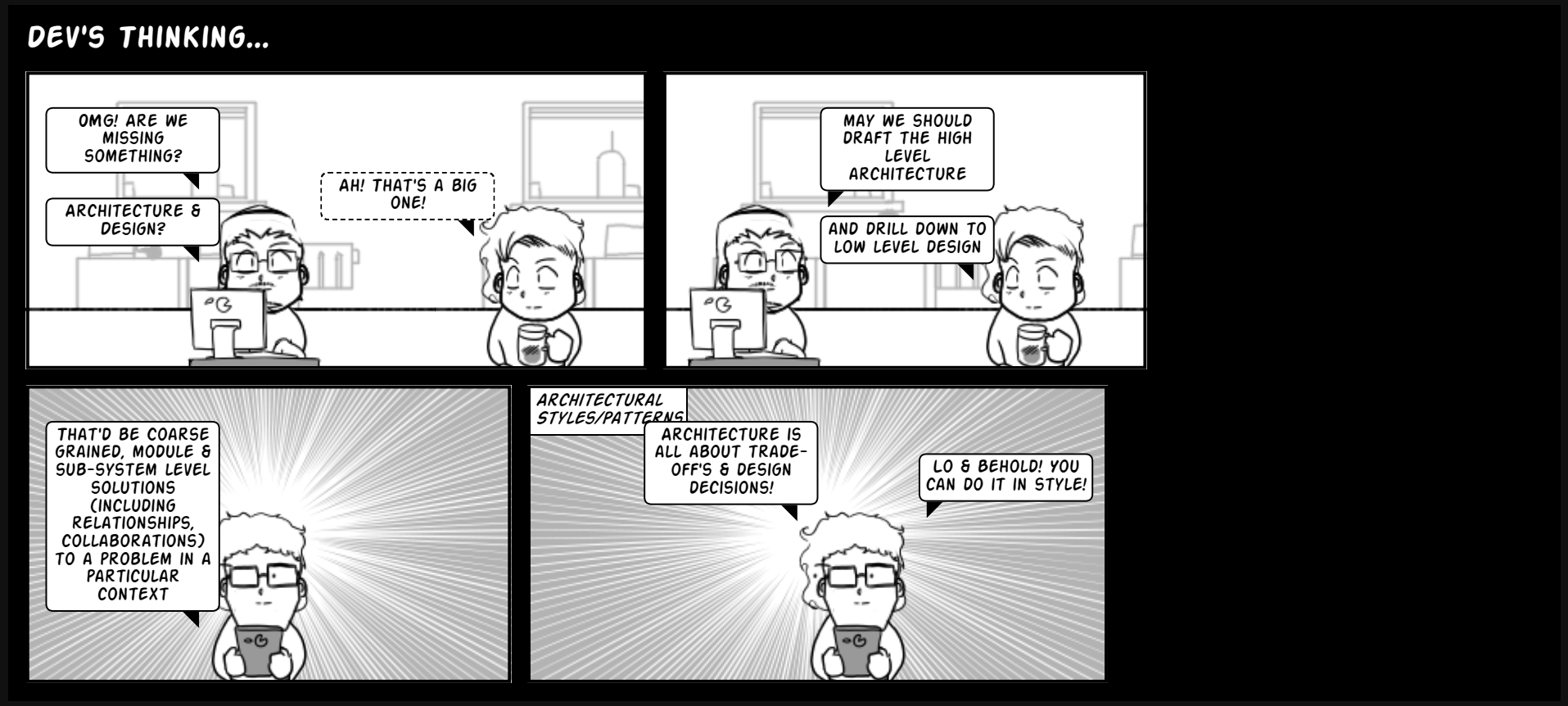
Architecture & Design ...



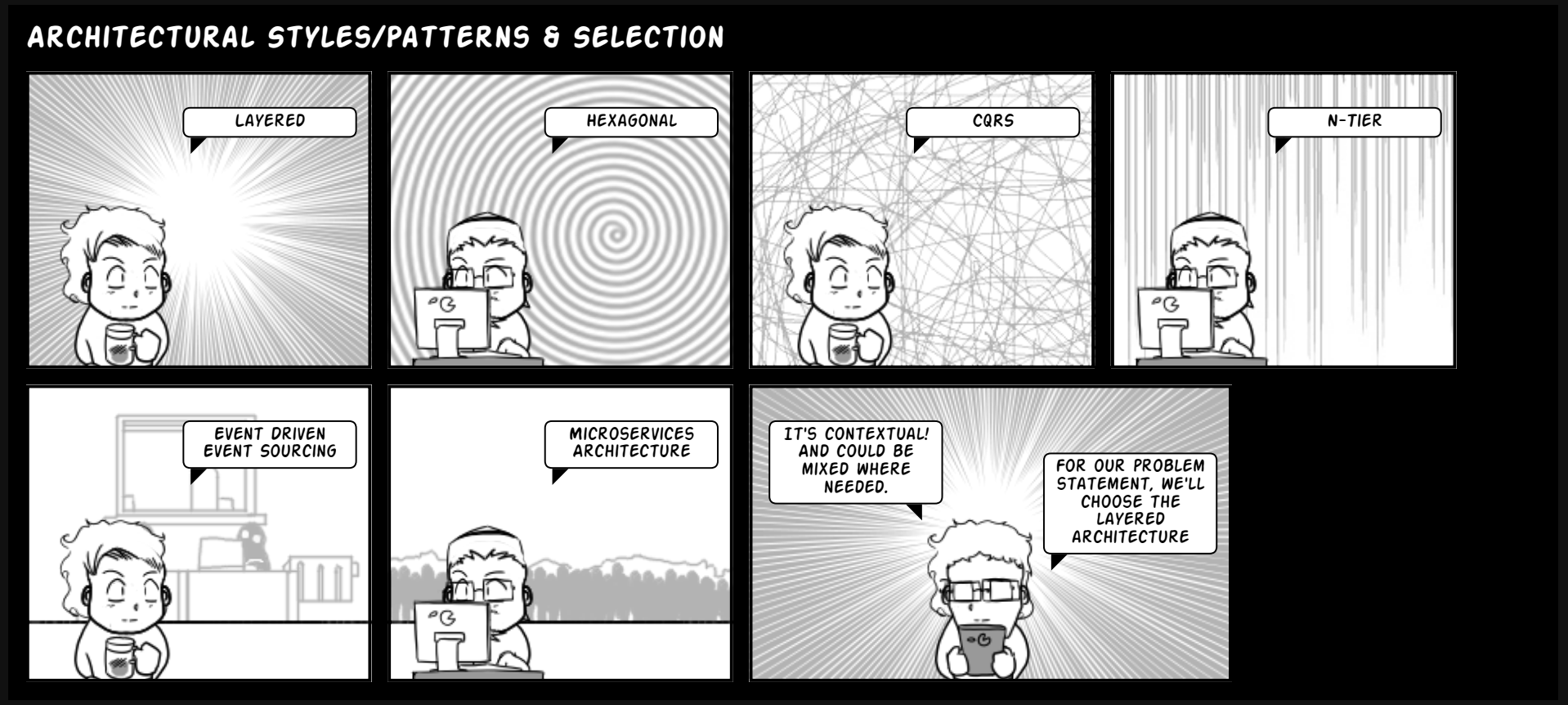
*** Remember All in One Box? (Slide 4.5)

NFRs / QA (Quality Attributes)

Architecture & Design ...

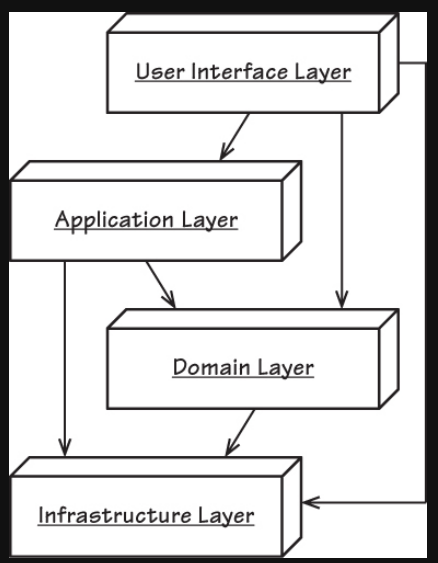


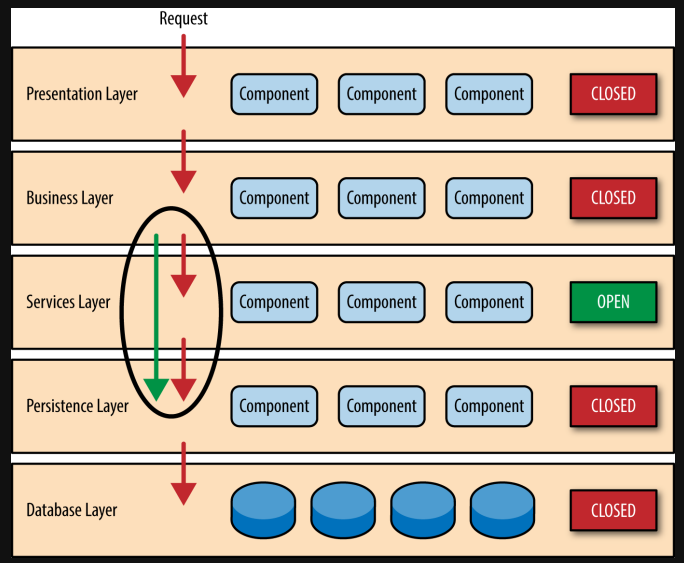
Architecture & Design ...

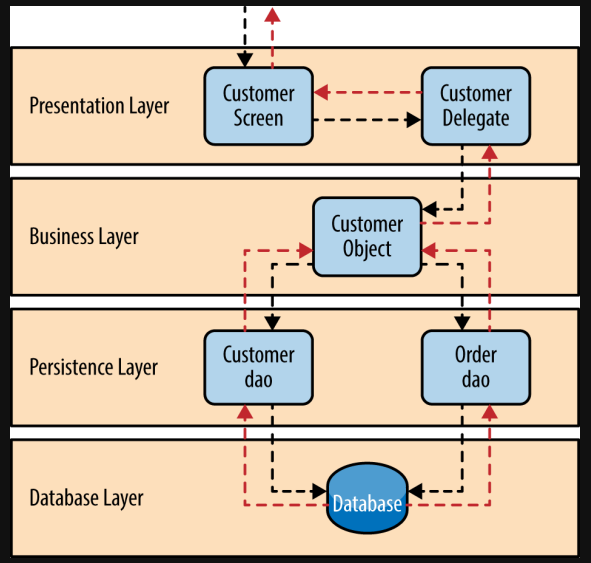


Architecture & Design ...

Layered Architecture



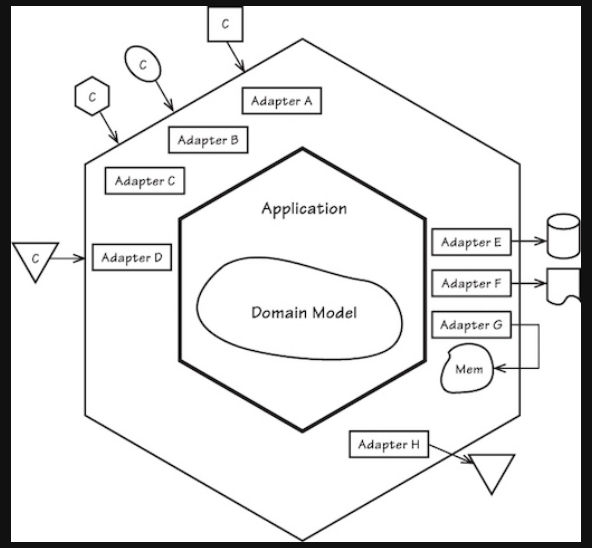


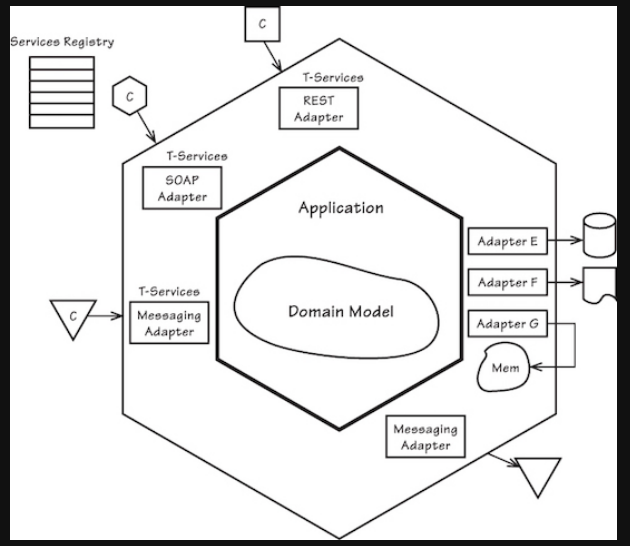


- Separation of Concerns - Simple Logical Decomposition, Top Down with Isolation -

Architecture & Design ...

Hexagonal Architecture

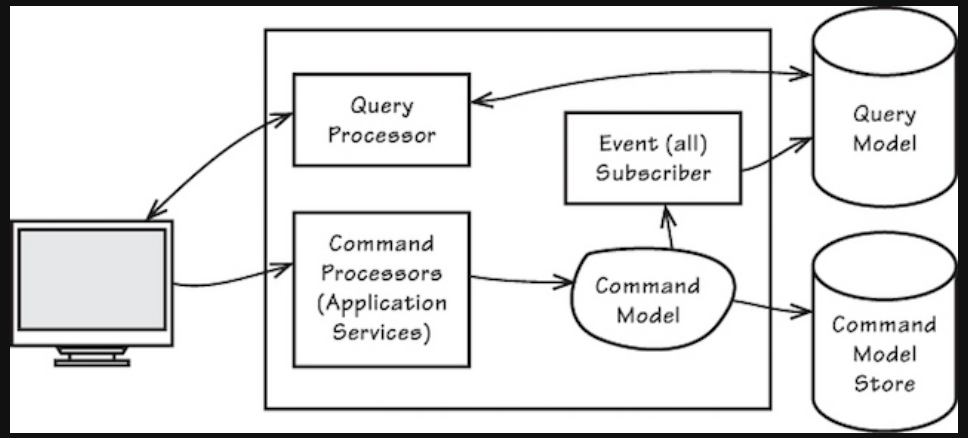




-Allow an application to equally be driven by users, programs, automated test or batch scripts, and to be developed and tested in isolation from its eventual run-time devices and databases

Architecture & Design ...

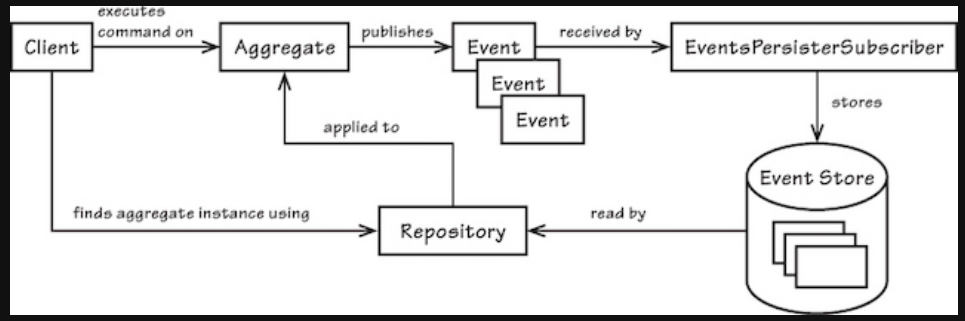
CQRS



- Separate Flow for Queries (Reads) and Create (Writes) -

Architecture & Design ...

Event Sourcing

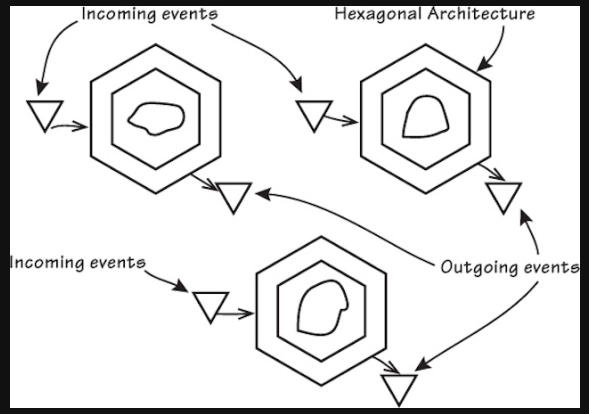


- Events are Immutable! There are no Updates & Deletes. Changes in state are stored as new events -

```
Event Sourcing Concept - Martin Fowler
Event Sourcing Example #1
Event Sourcing Example #2
```

Architecture & Design ...

Event Driven

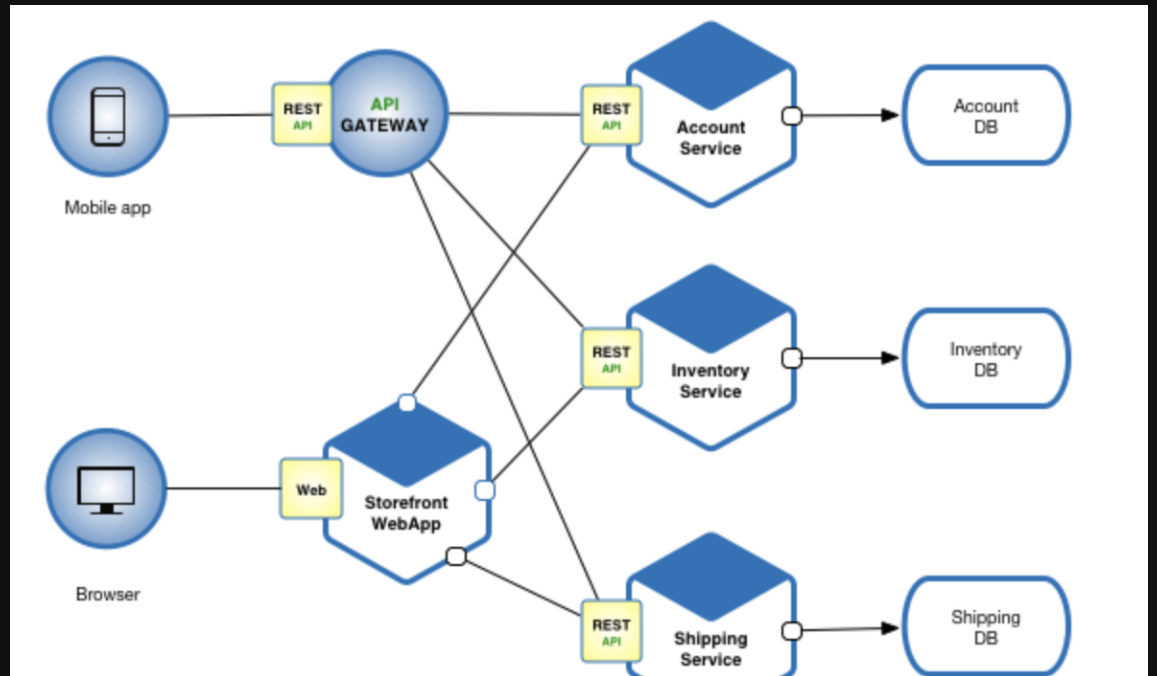


- Different Systems integrate using Domain Events -

Event Driven Architecture
Event Driven Data Management for Microservices

Architecture & Design ...

MicroServices Architecture

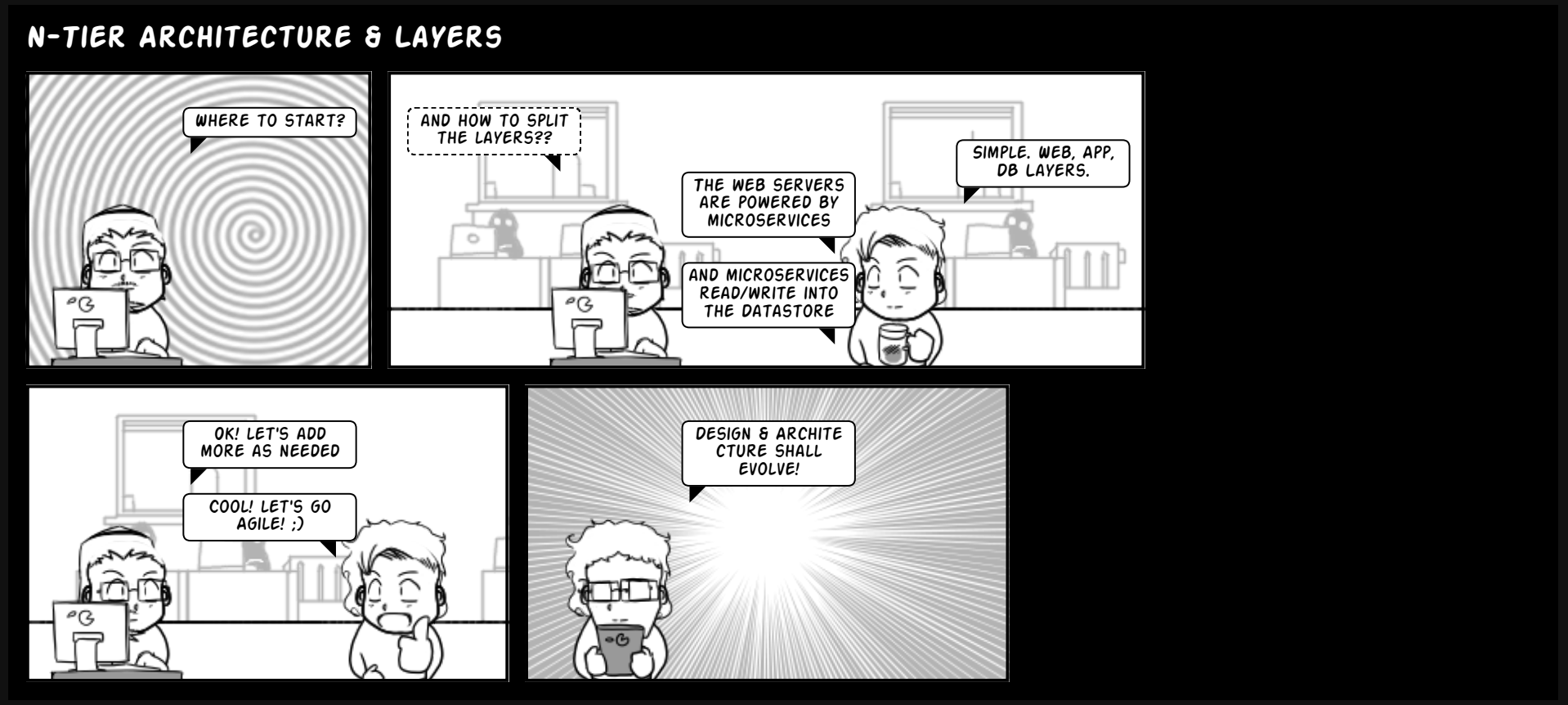


Architecture & Design ...

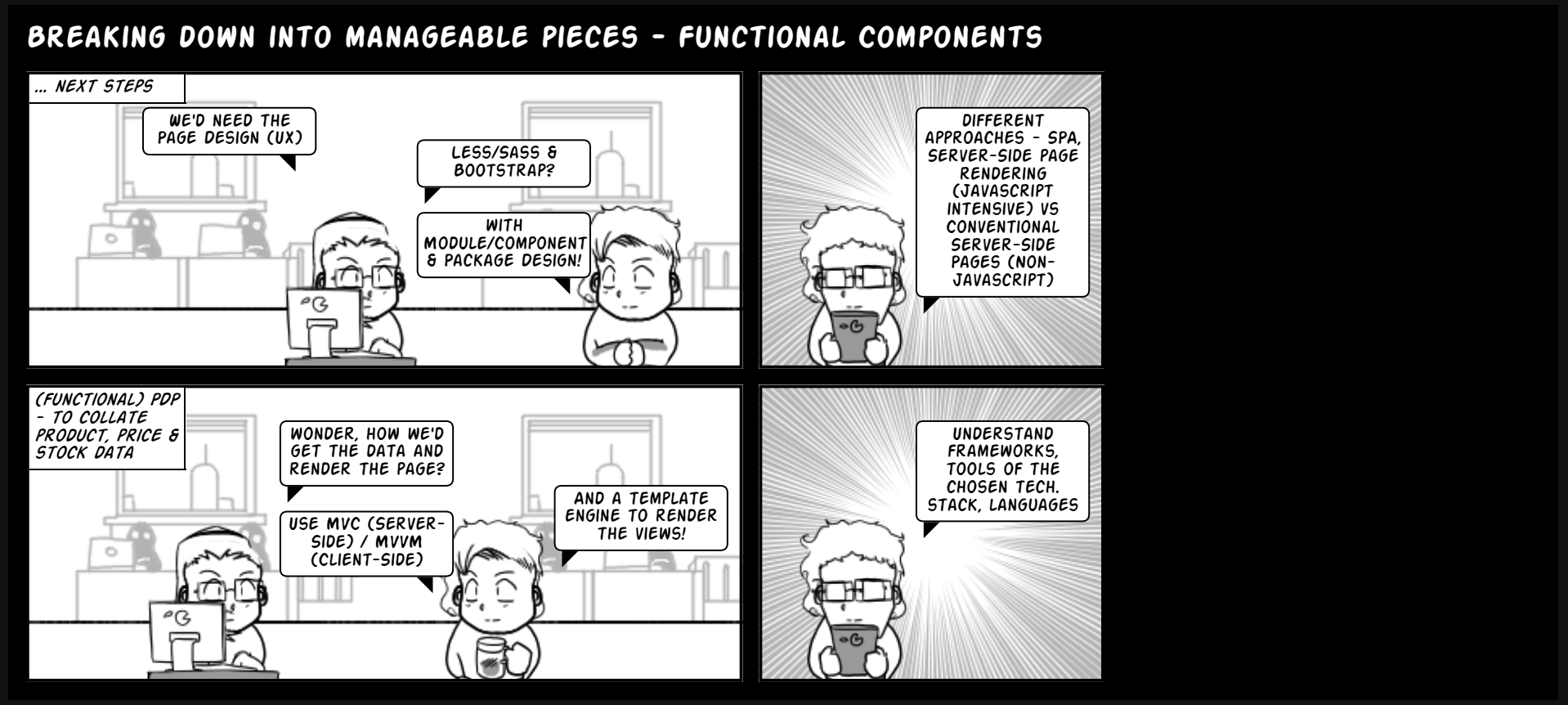
MicroServices Resource Guide
MicroServices (as defined by Martin Fowler)
Sam Newman on MicroServices!
MicroServices Architecture

MicroServices - What, When & How
Chris Richardson on MicroServices
An Introduction to MicroServices from NGINX
(7 parts article series)

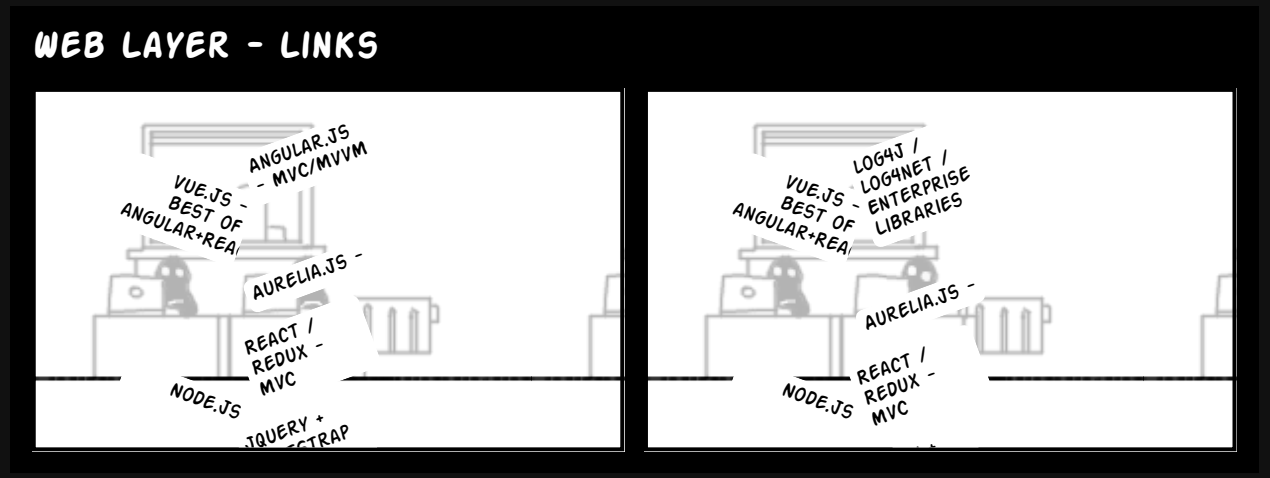
Architecture & Design ...



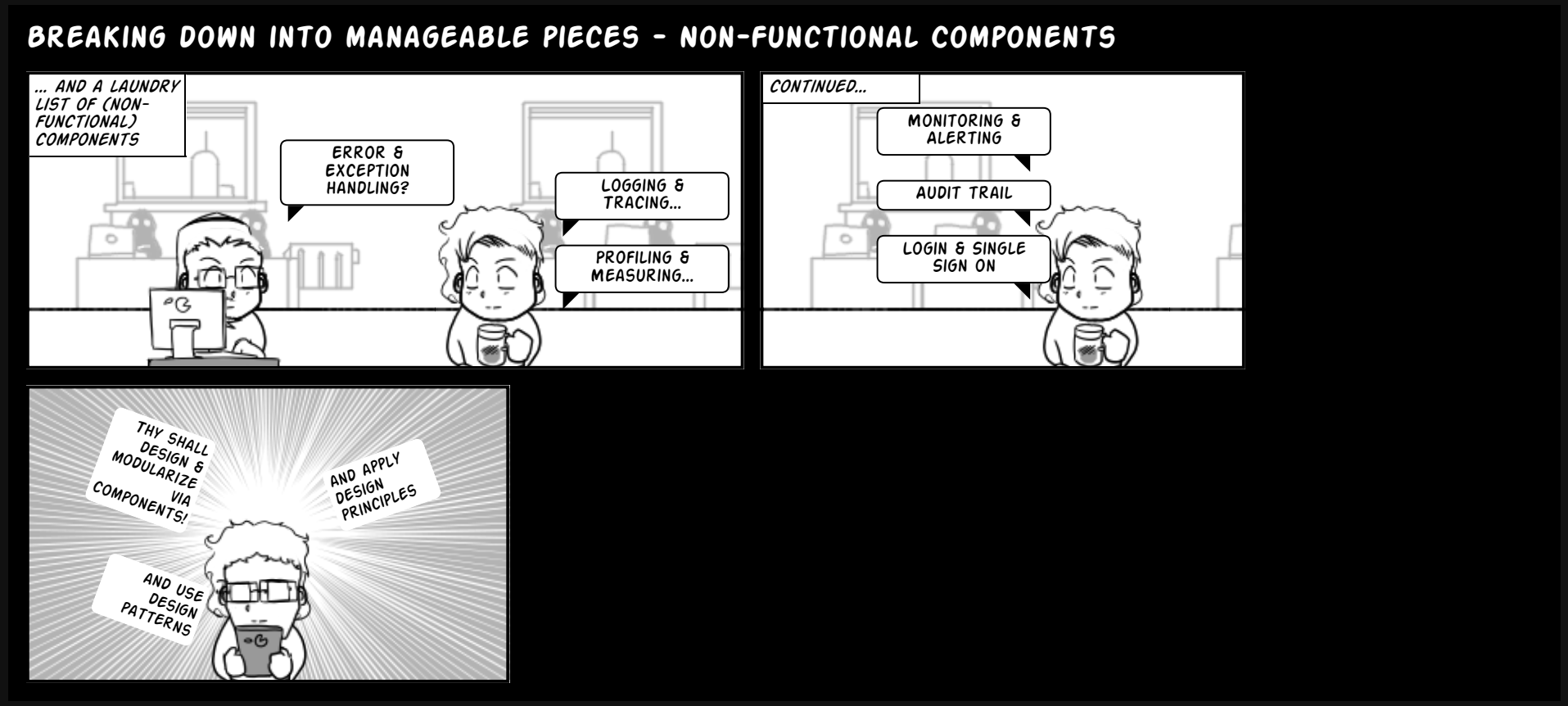
Architecture & Design ...



Architecture & Design ...



Architecture & Design ...



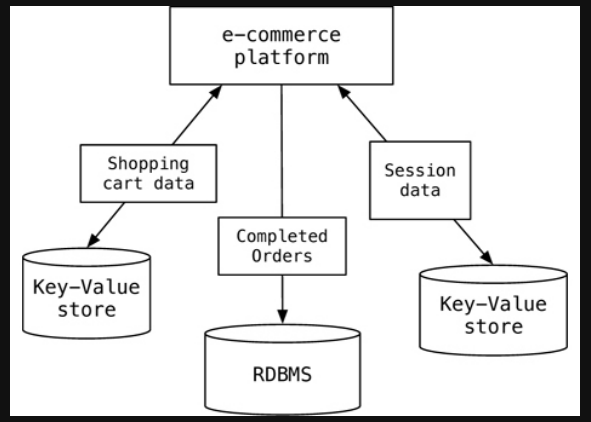
Architecture & Design ...

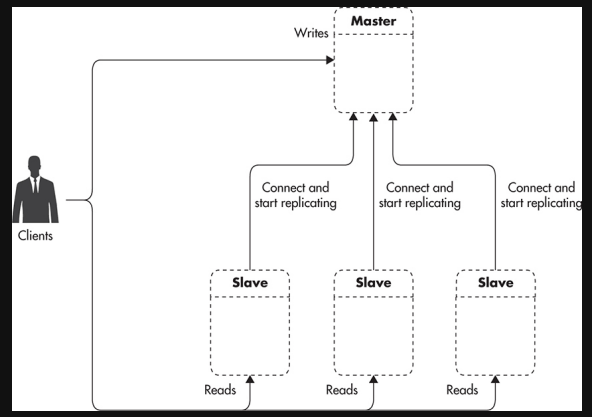
Microsoft Patterns & Practices
Microsoft Application & Architecture Guide

Shaping Software - Architecture
Clean MicroService Architecture
Coding the Architecture
Software & Systems Architecture

Architecture & Design ...

Choose Polyglot DataStores for different data needs

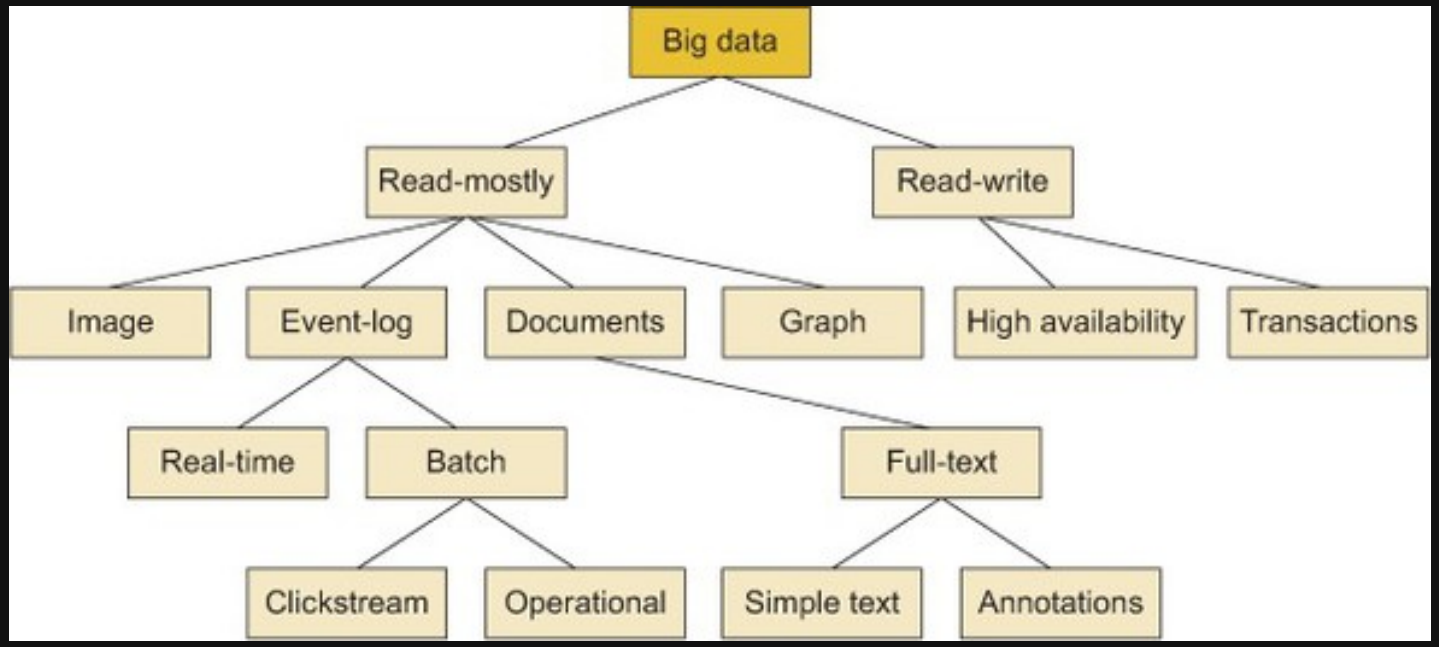




- RDBMS's for transactional needs (w replication), NoSQL for Scalability -

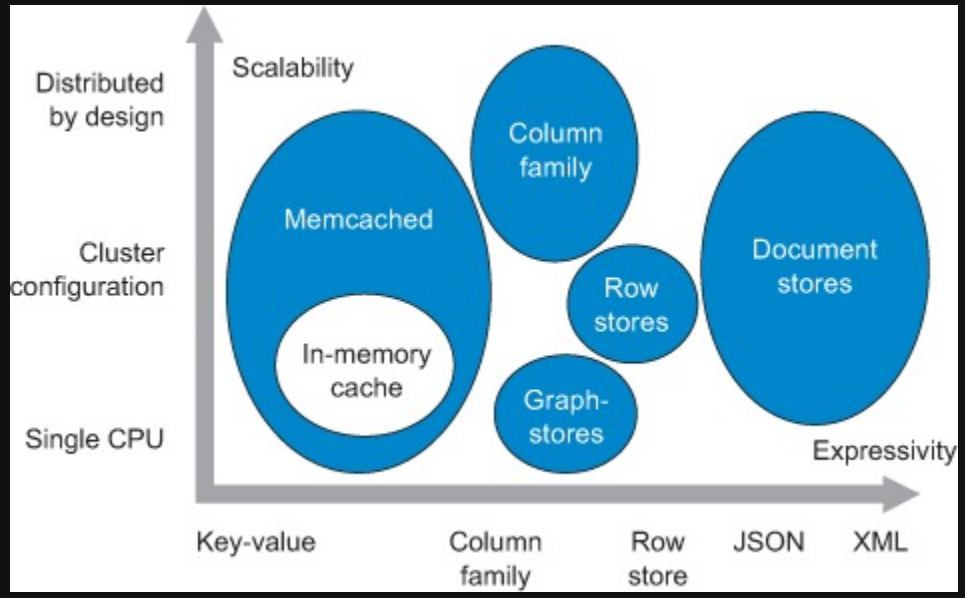
Architecture & Design ...

Tips to choose the right data store based on the use case

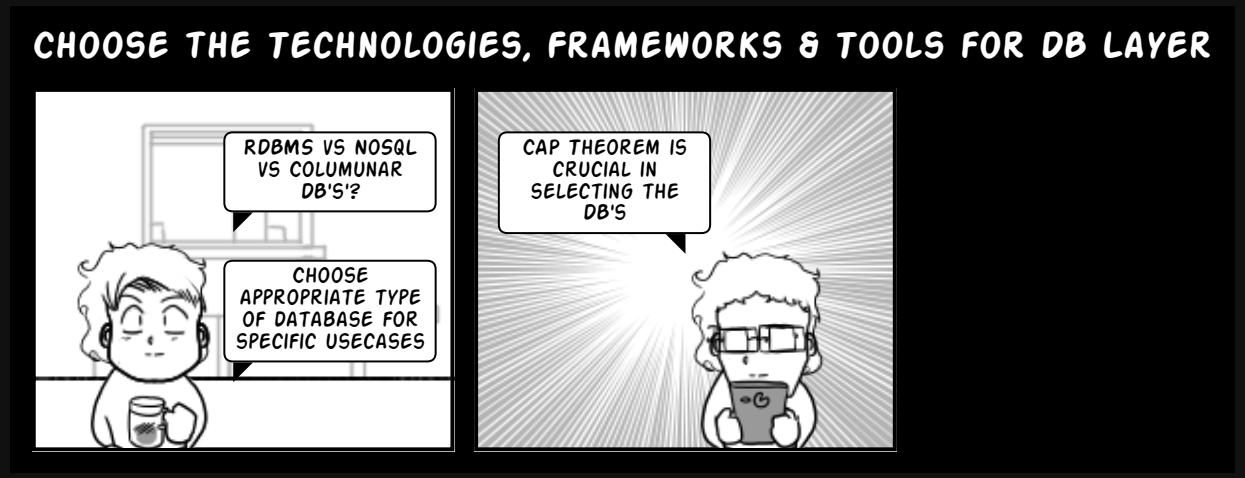


Architecture & Design ...

Tips to choose the right data store based on the type of data stored

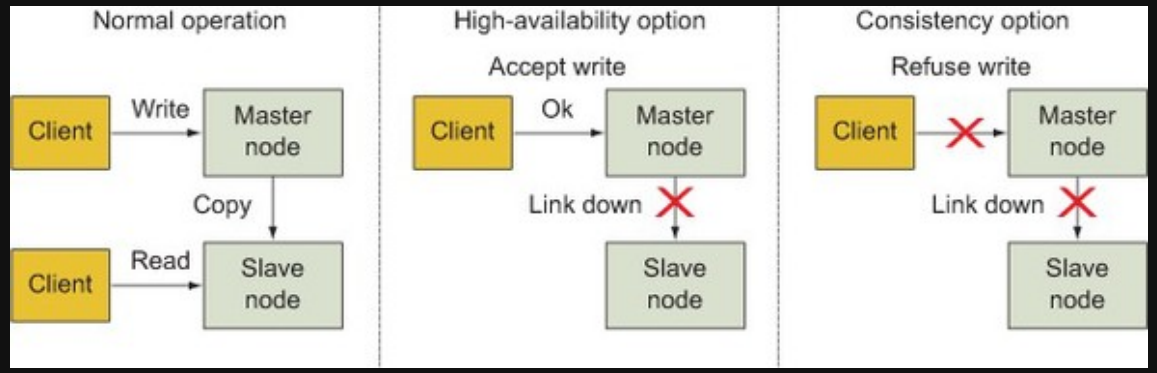


Architecture & Design ...



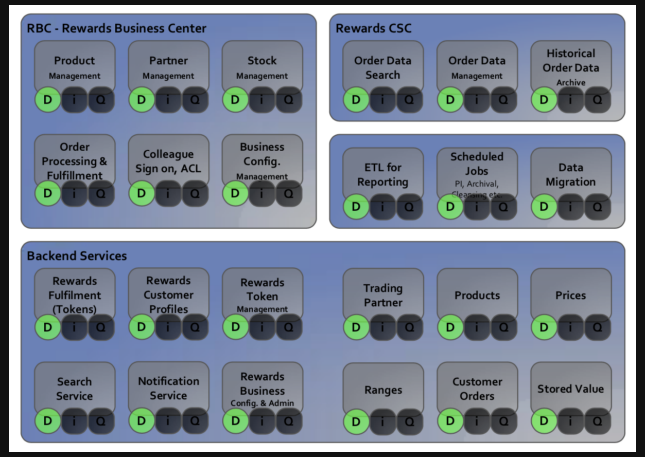
Architecture & Design ...

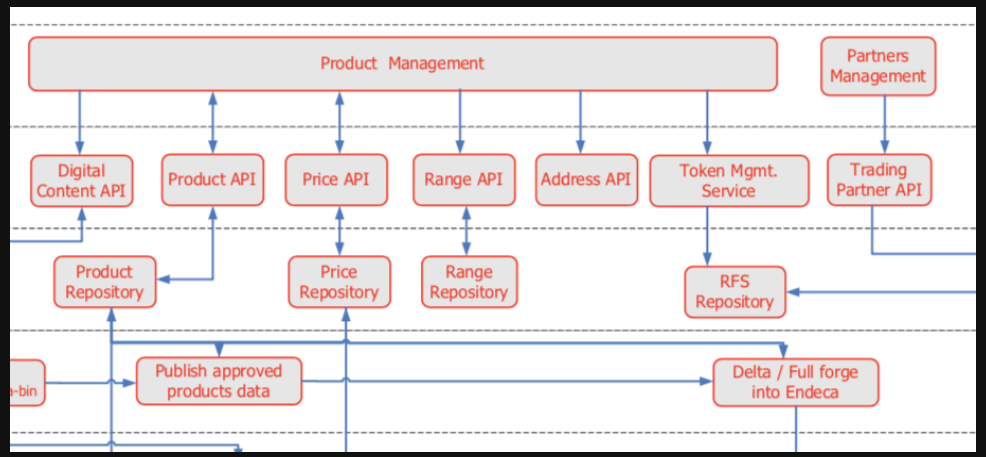
CAP Theorem



- Choosing between Availability, Consistency & Partition Tolerance -

Architecture & Design ...

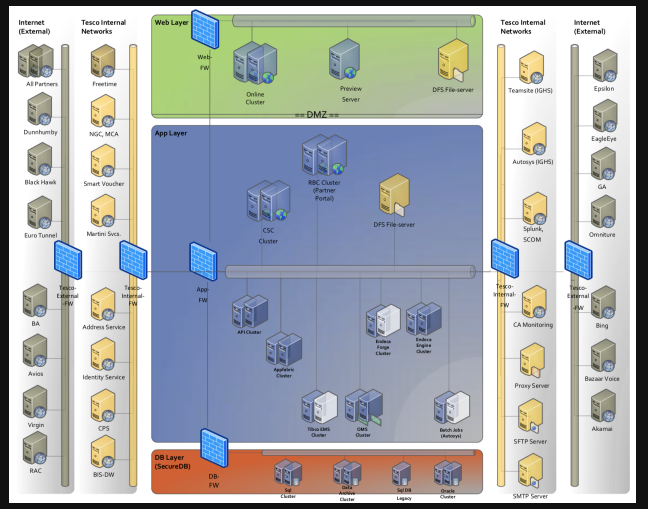




- Logical, Logical Connectivity Views -

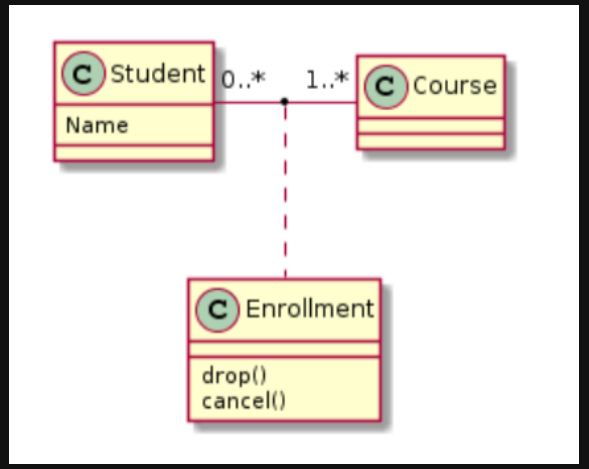
yED from yWorks

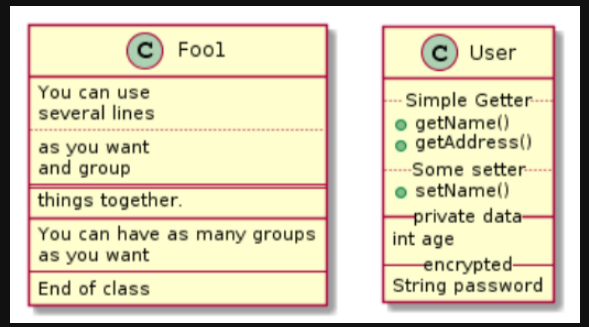
Architecture & Design ...

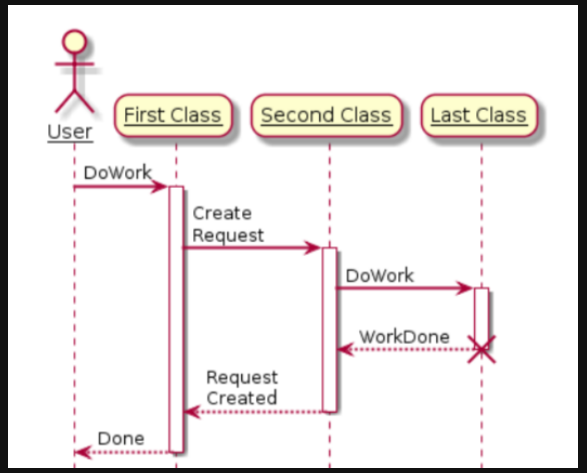


- Physical View -

Architecture & Design ...







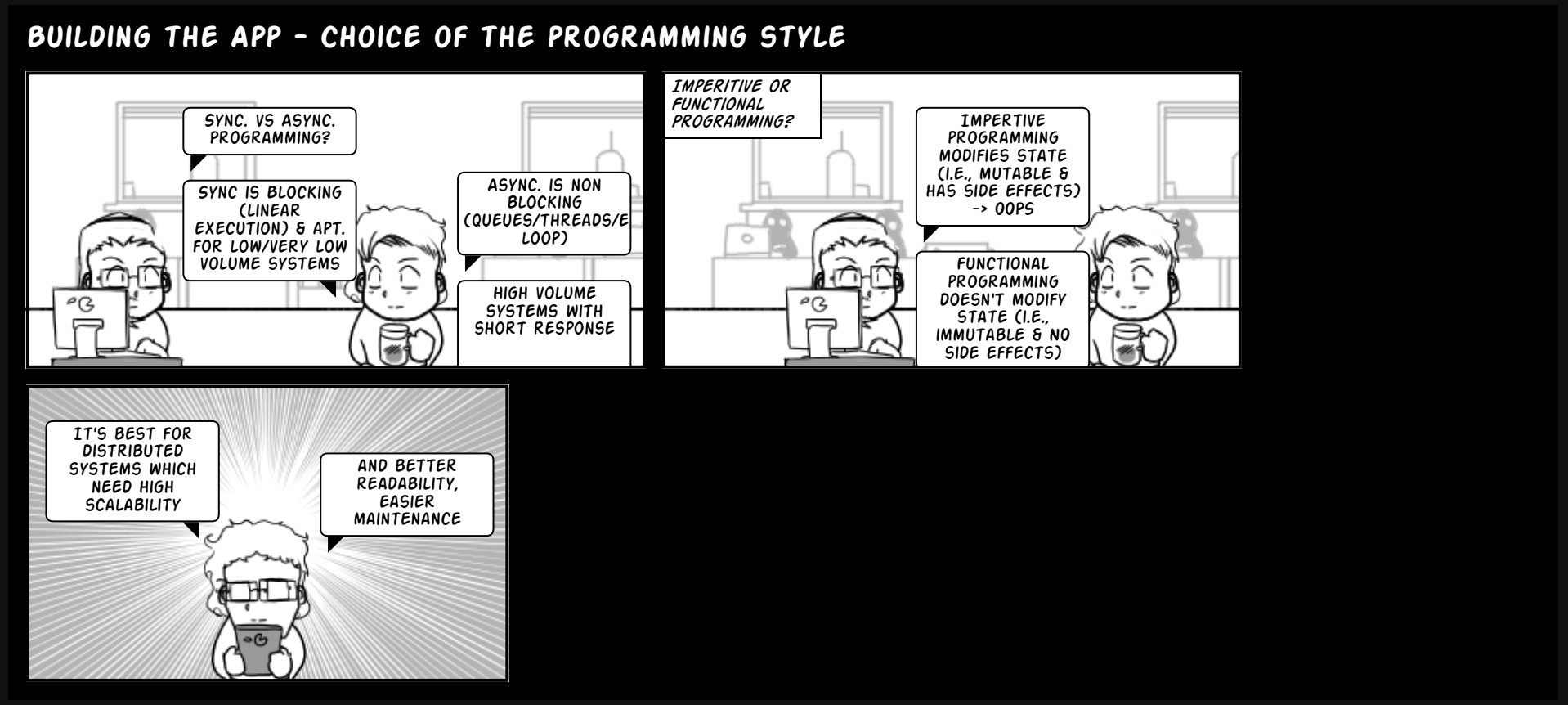
- Class & Sequence Diagrams -

PlantUML for Declarative diagrams

Engineering ...

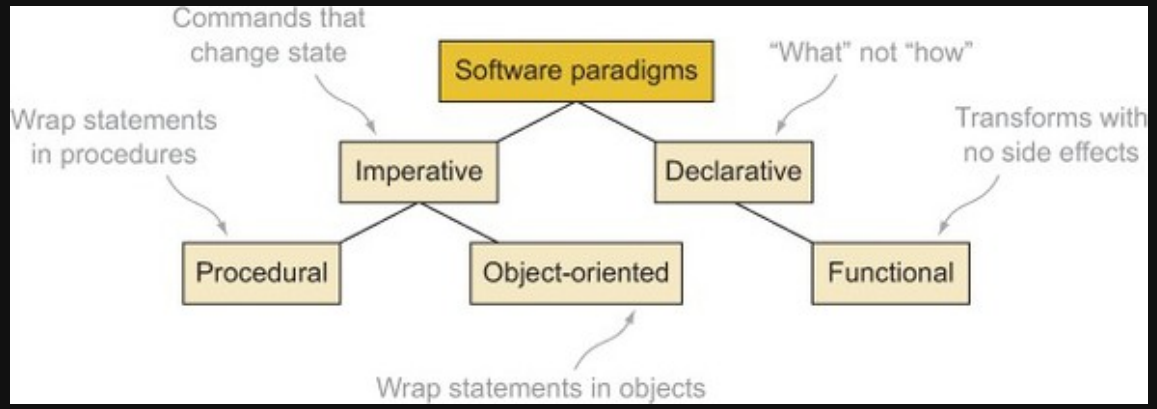
Follow Alistair Cockburn - Agile & Engineering Guru!
Microsoft Engineering Best Practices & Guidance

Engineering ...



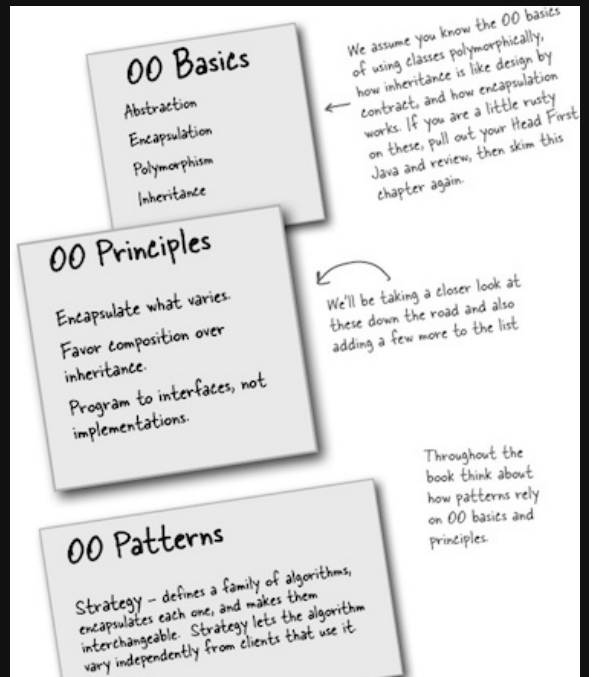
Engineering ...

Software Paradigms



Engineering ...

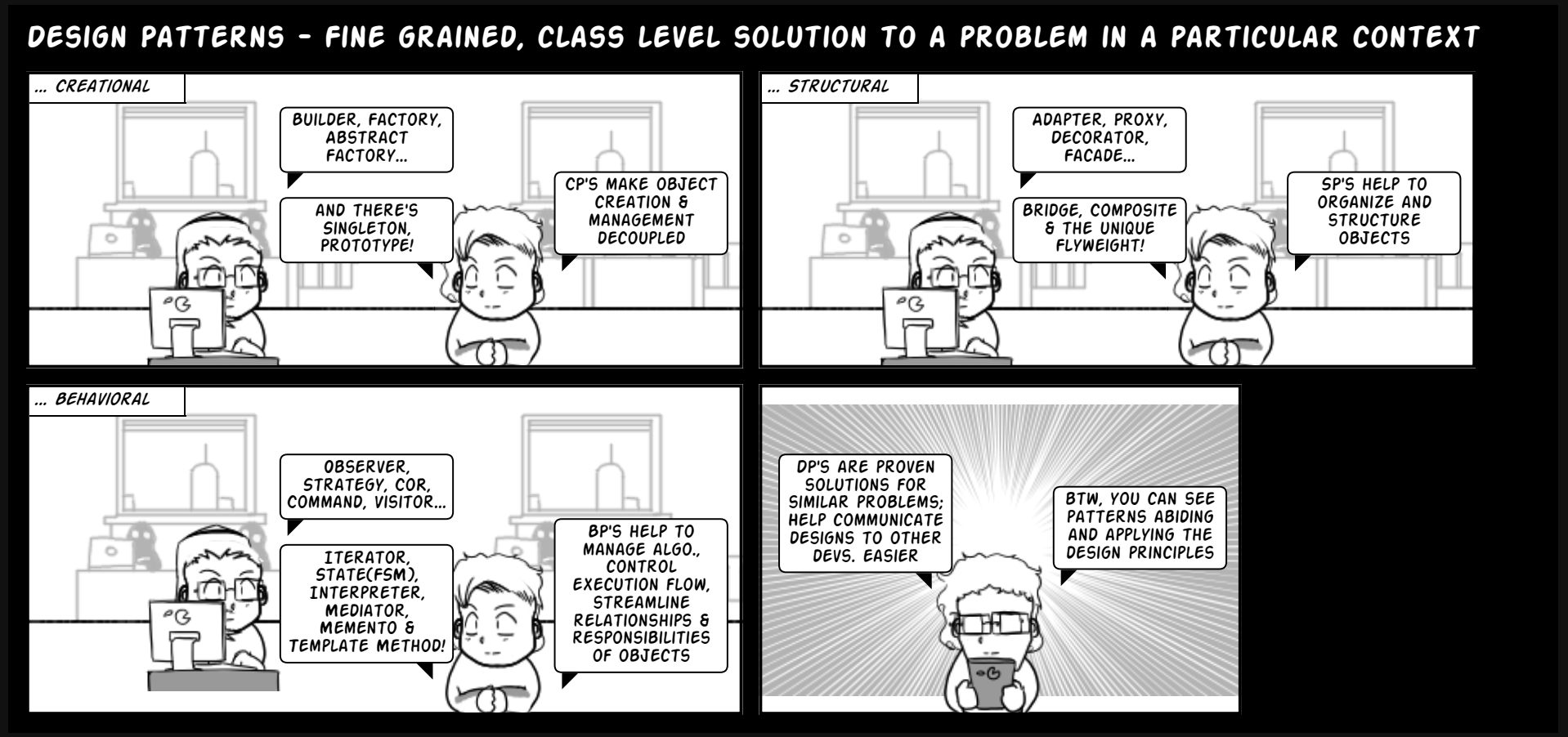
OOPS!



Engineering ...

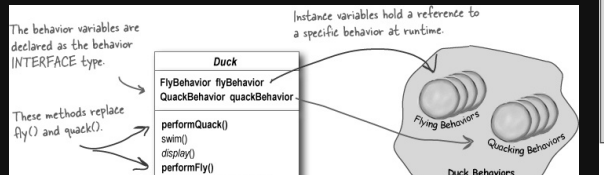
A Practical Intro to Functional Programming

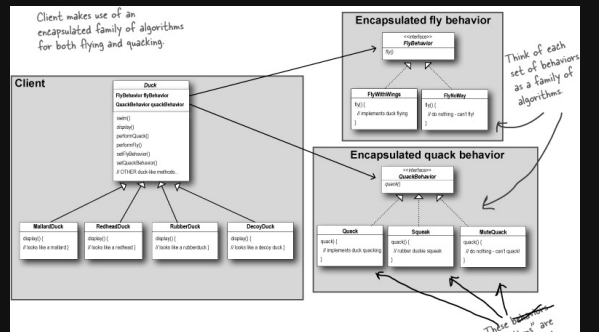
Engineering ...

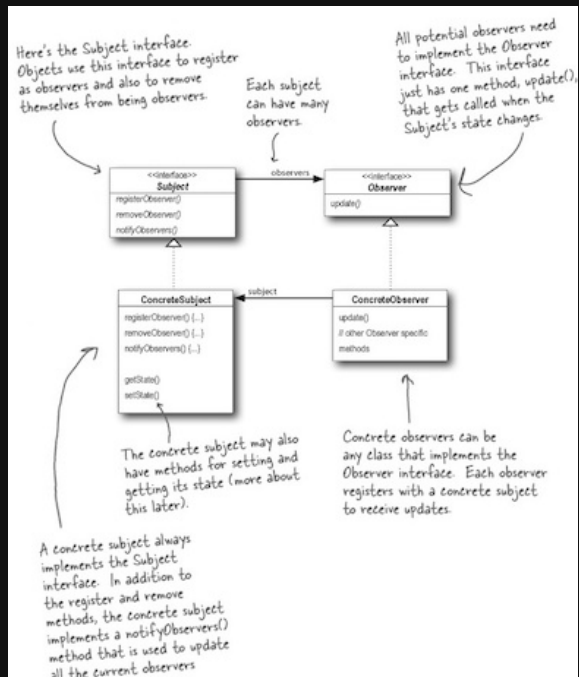


Design Patterns

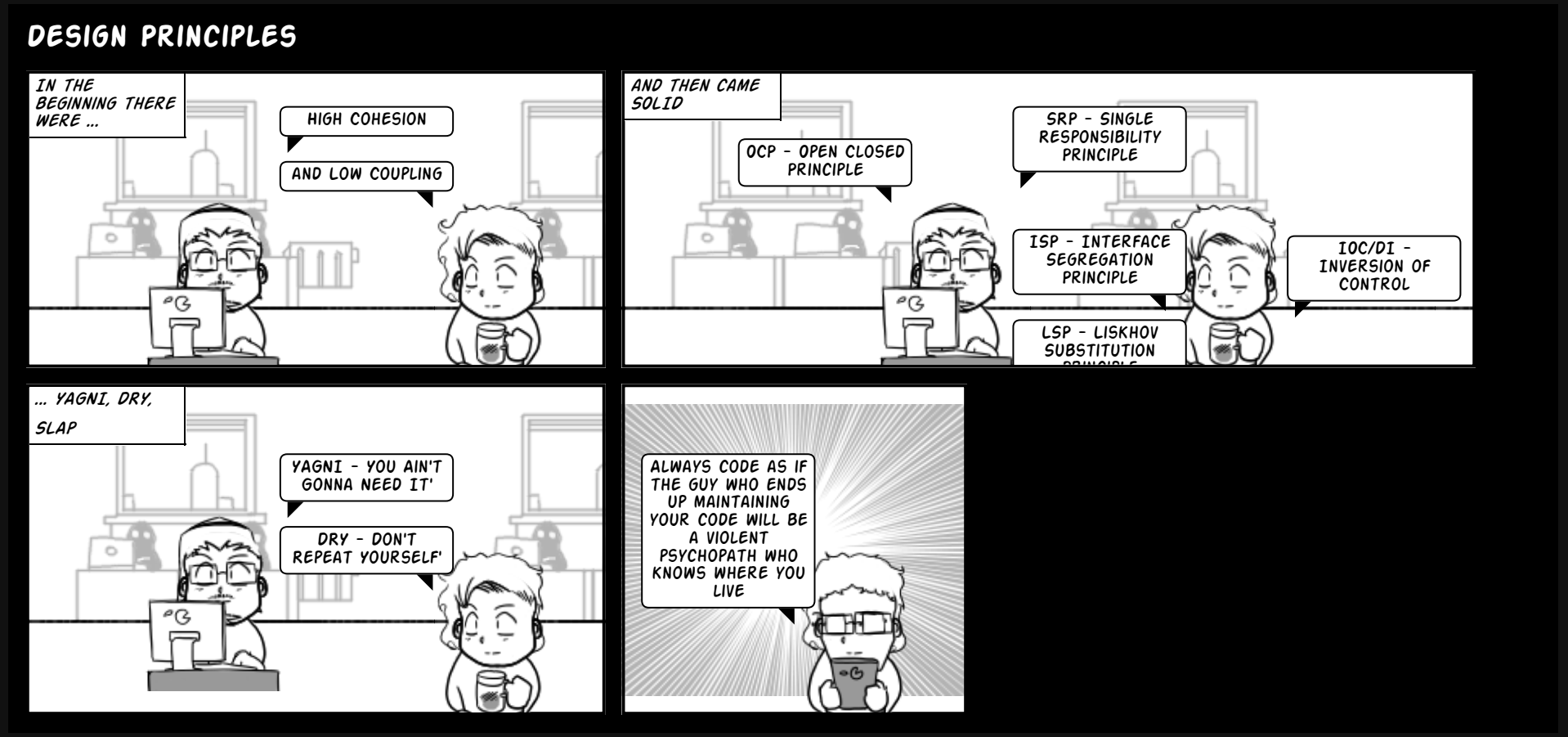
Engineering ...





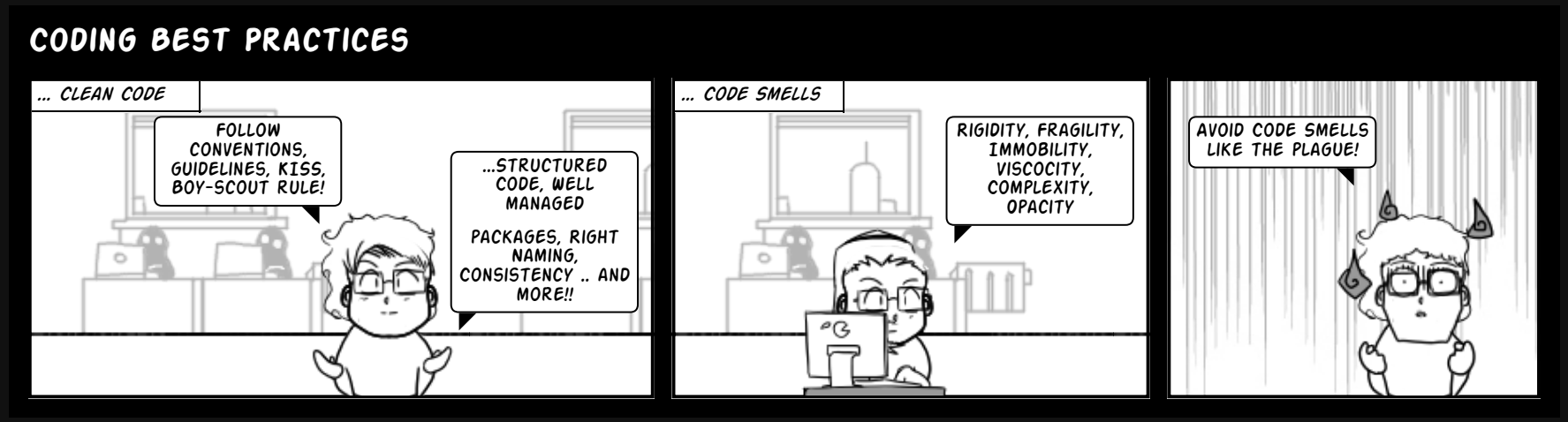


Engineering ...



Principles Wiki

NFR's : Quality....



NFR's : Quality....

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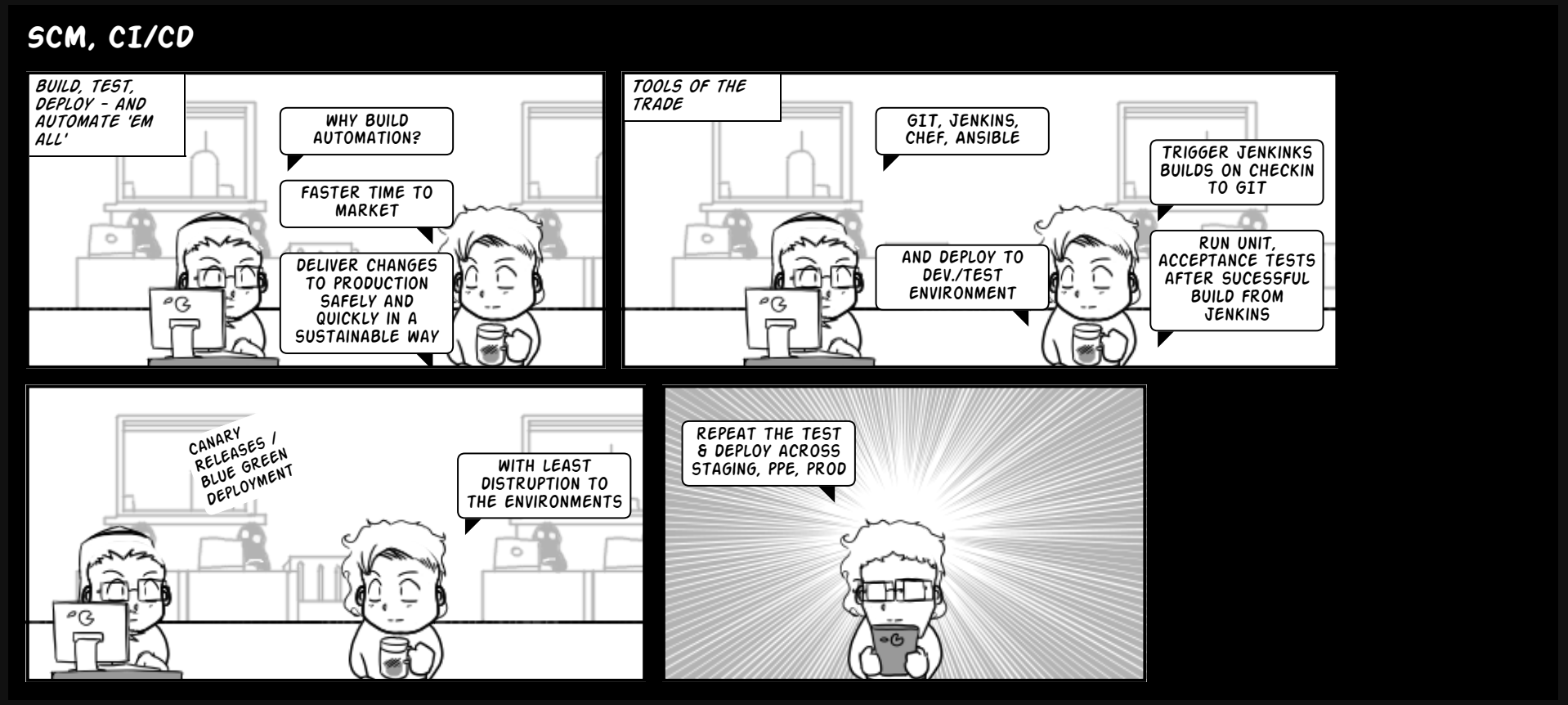
Clean Code Cheatsheet
Software Craftsmanship
Essential Programming Books - Bibles

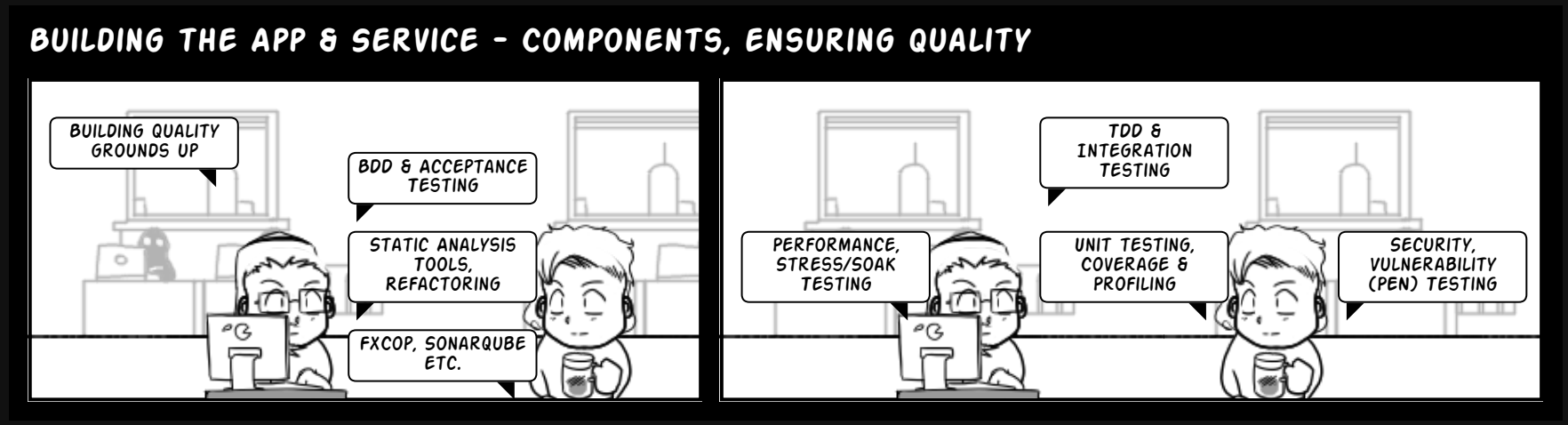
Influential CS Books
Code Smells
```

NFR's : Quality....

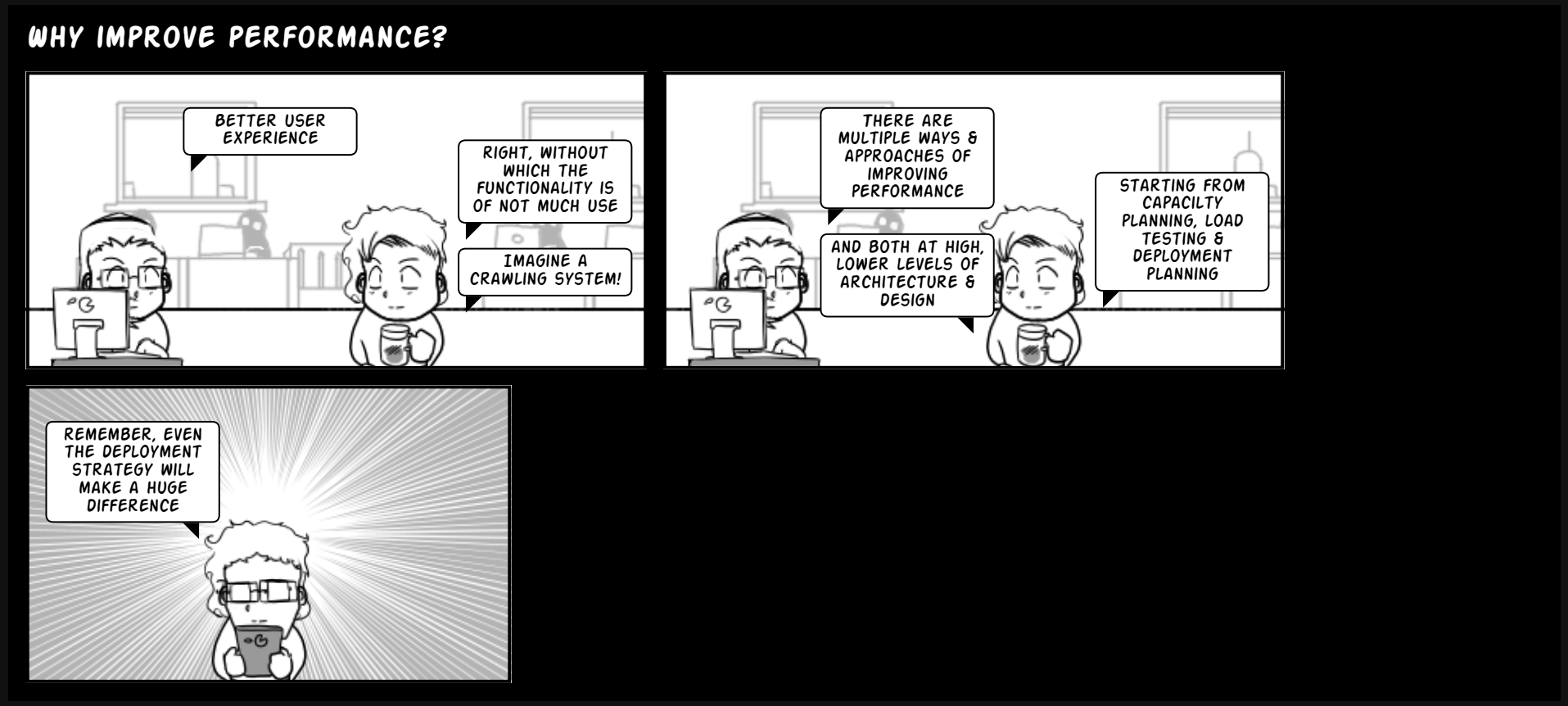
NFR's : Quality....



NFR's : Quality....



NFR's : Performance



NFR's : Performance

```
Performance Testing
Awesome Web Performance Optimization

Path To Performance - Podcast
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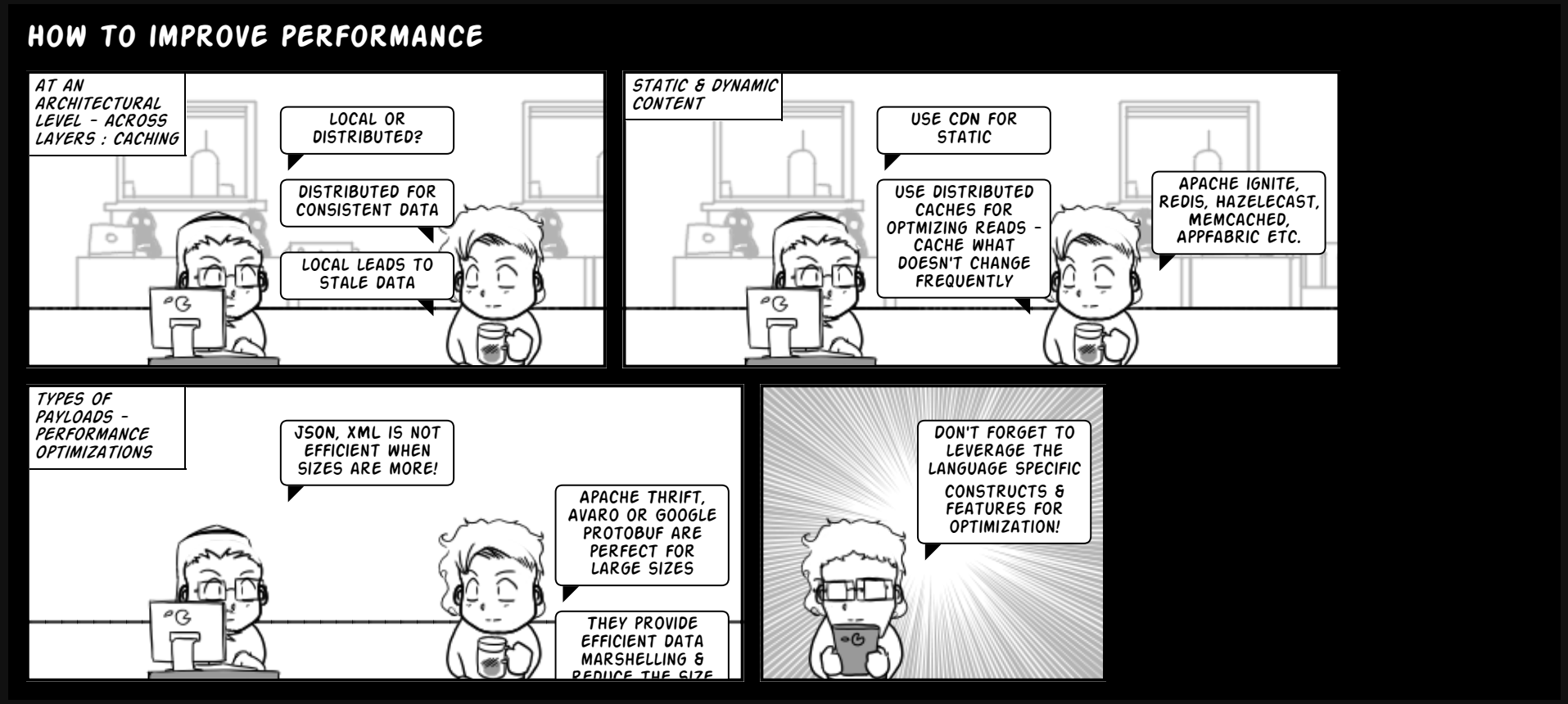
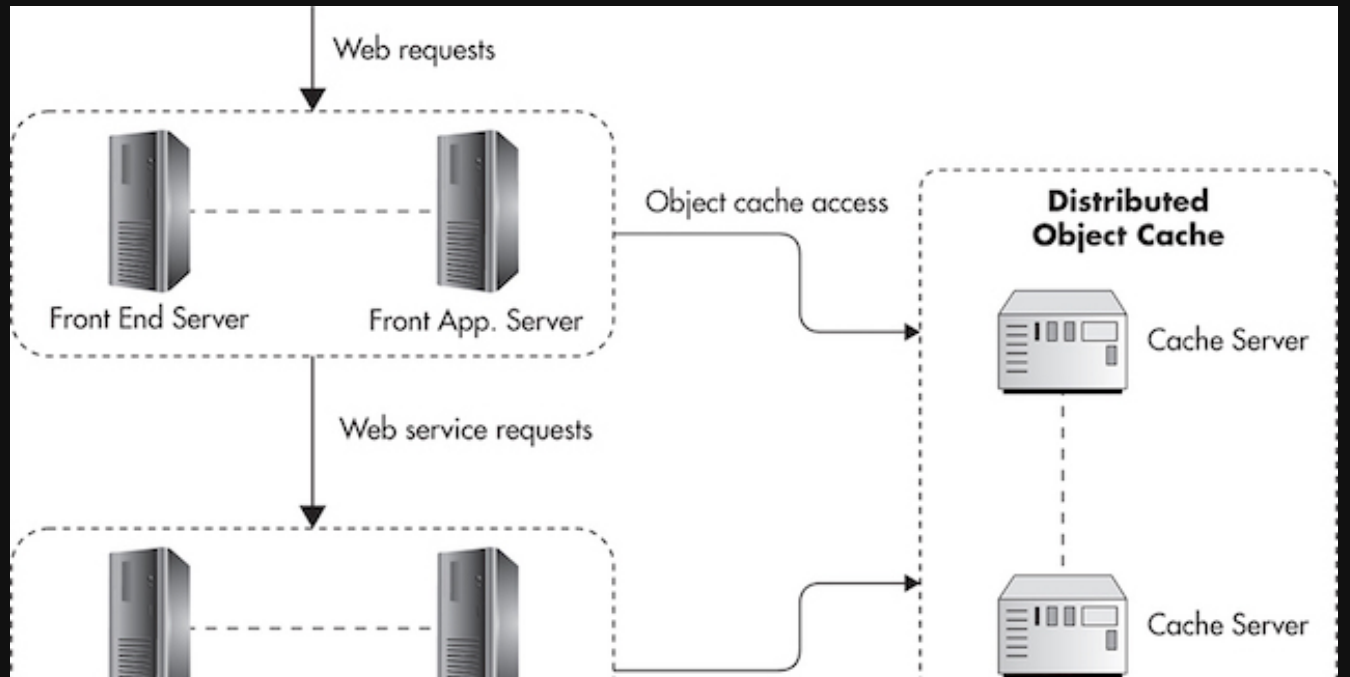
NFR's : Performance



C# Internals
C# async/await
CLR via C#
Java Performance Tuning

NFR's : Performance



NFR's : Performance

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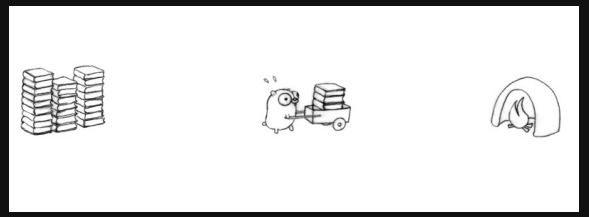
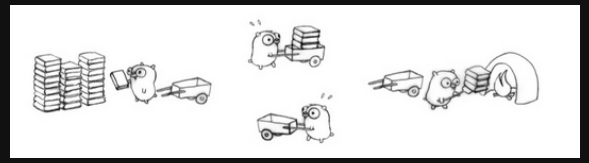
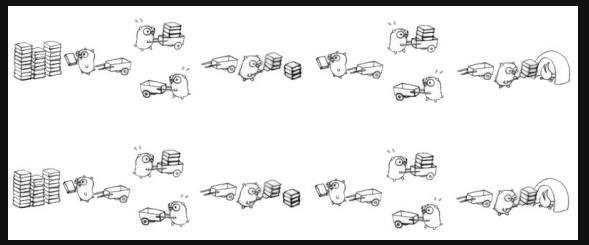
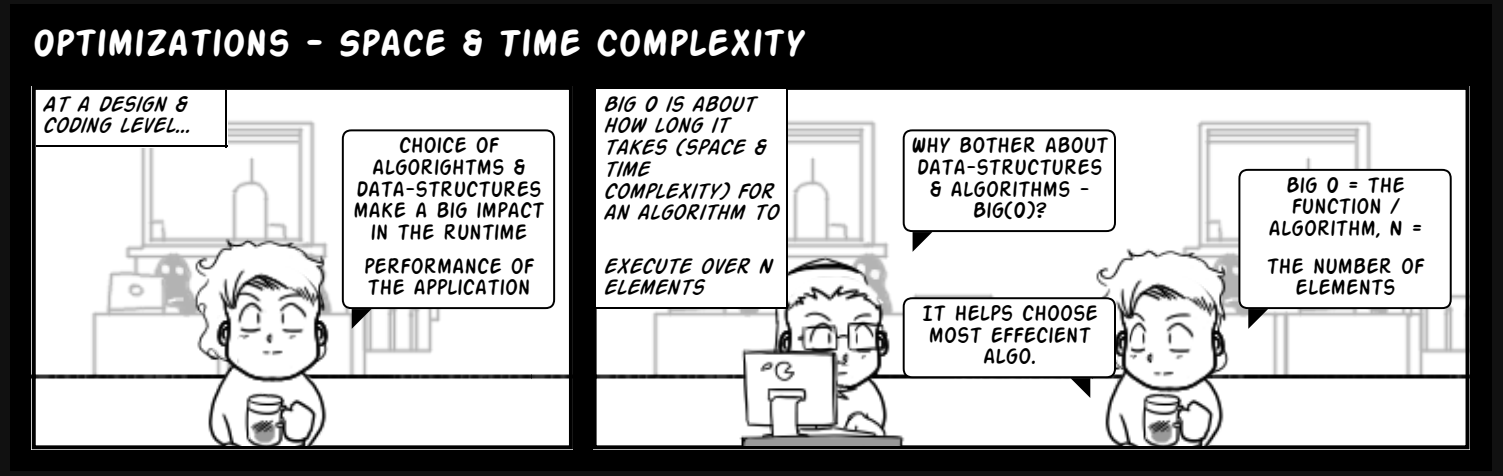




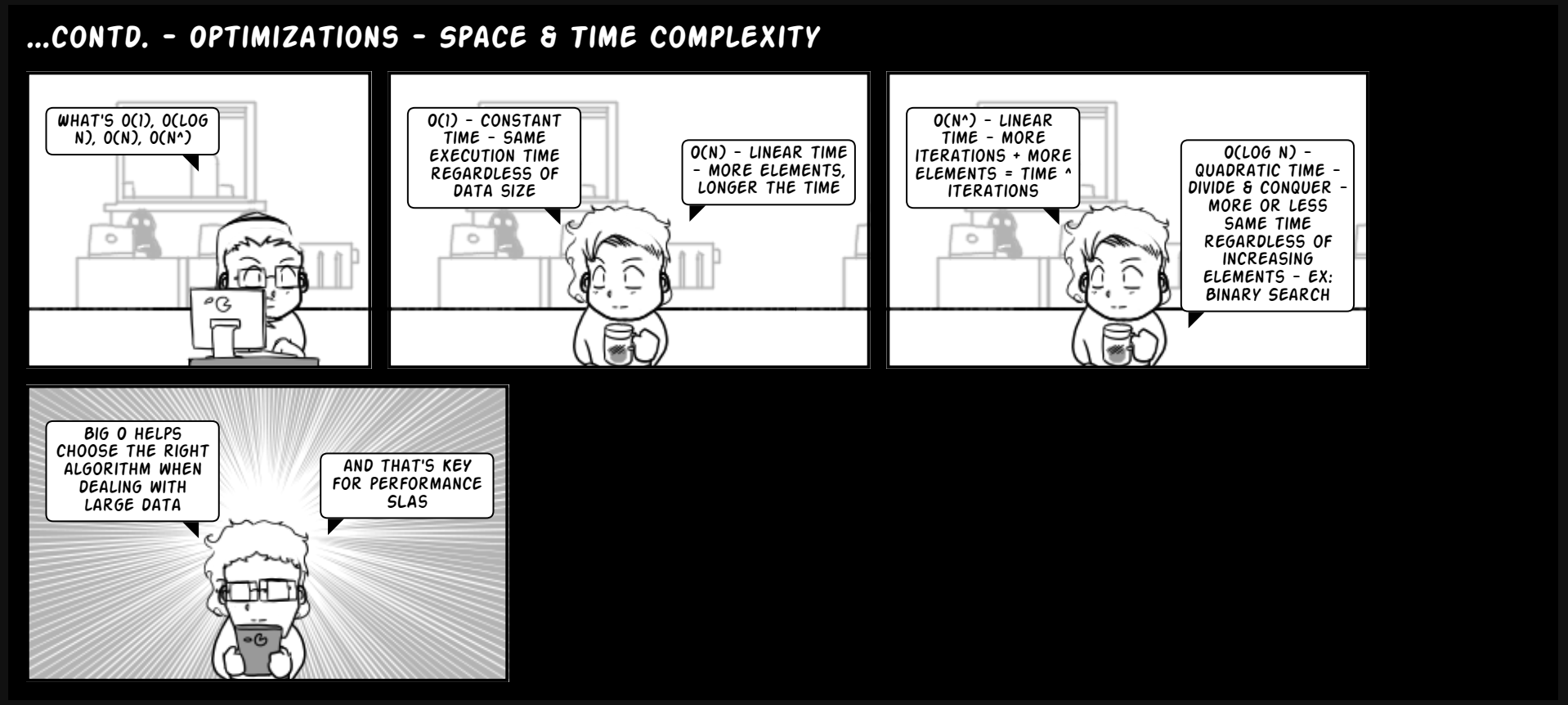


Concurrency vs Parallelism
Threading in C#

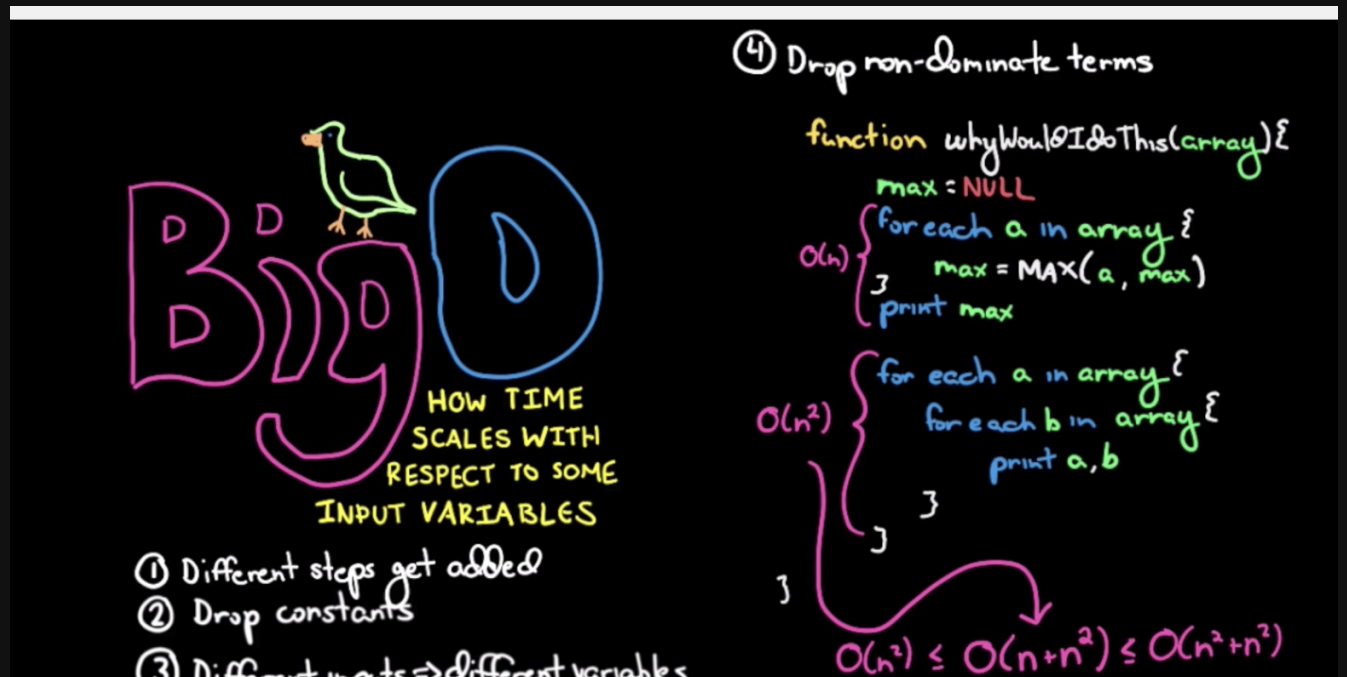
NFR's : Performance



NFR's : Performance



NFR's : Performance

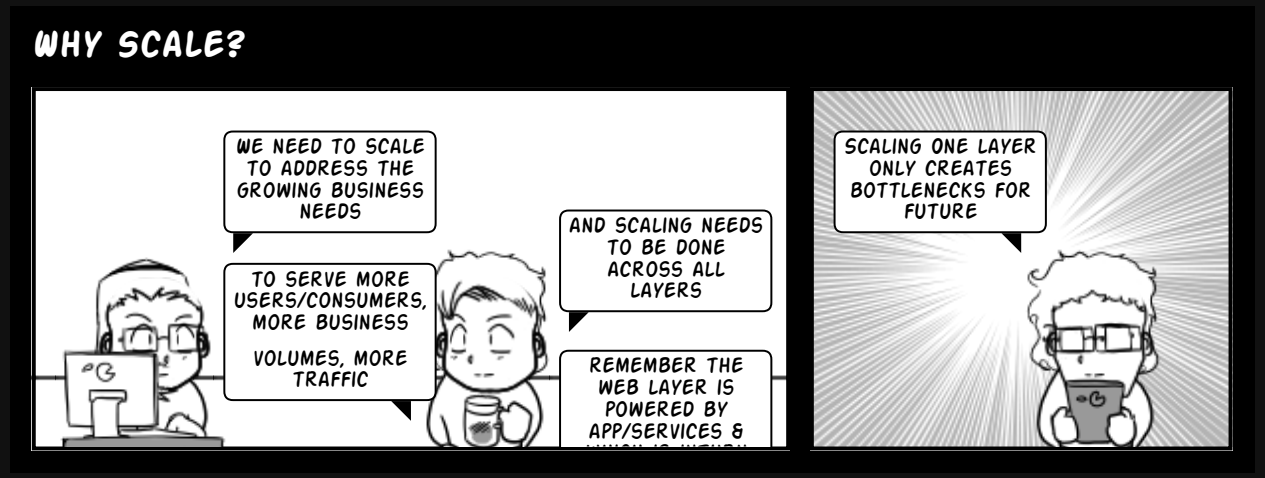


NFR's : Performance

A Beginners guide to big-o-notation
Big-O notation in 5 minutes — The basics
Big O Notation explained
Big O Notation: A Few Examples

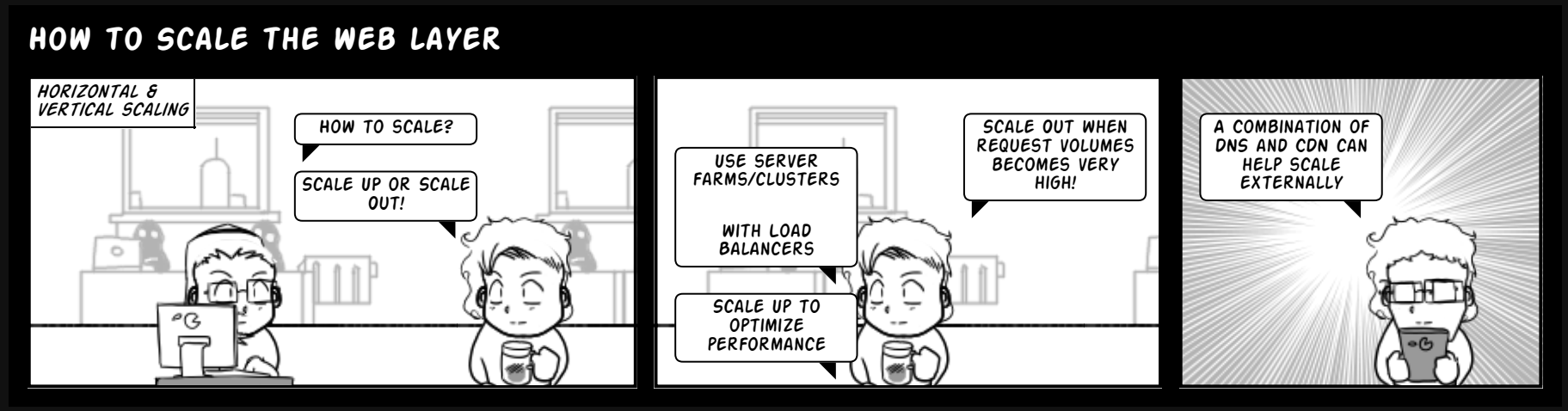
Big O CheatSheet
Algorithms for dummies
Algorithimic Complexity
Understanding Big O

NFR's : Scalability

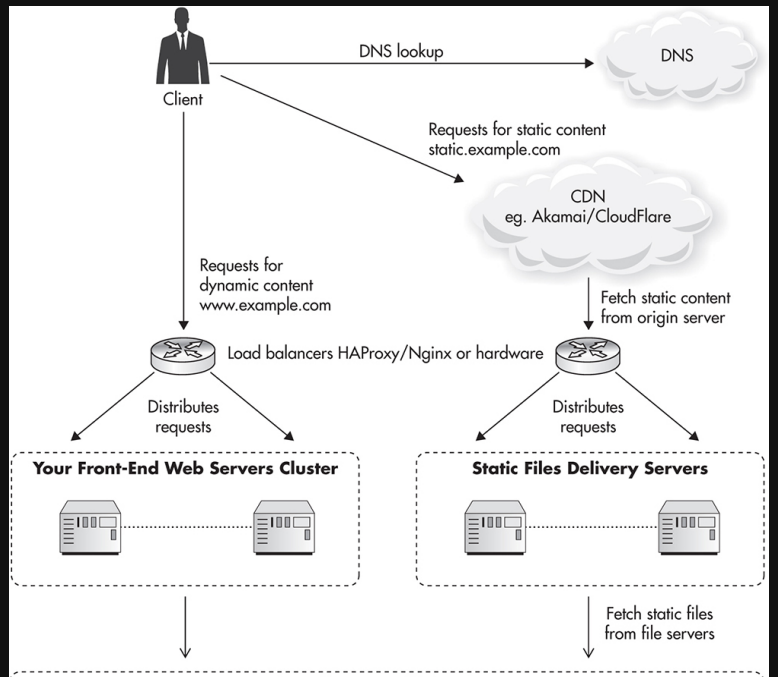


Awesome Scalability
Microsoft Improving Perfmormance & Scalability

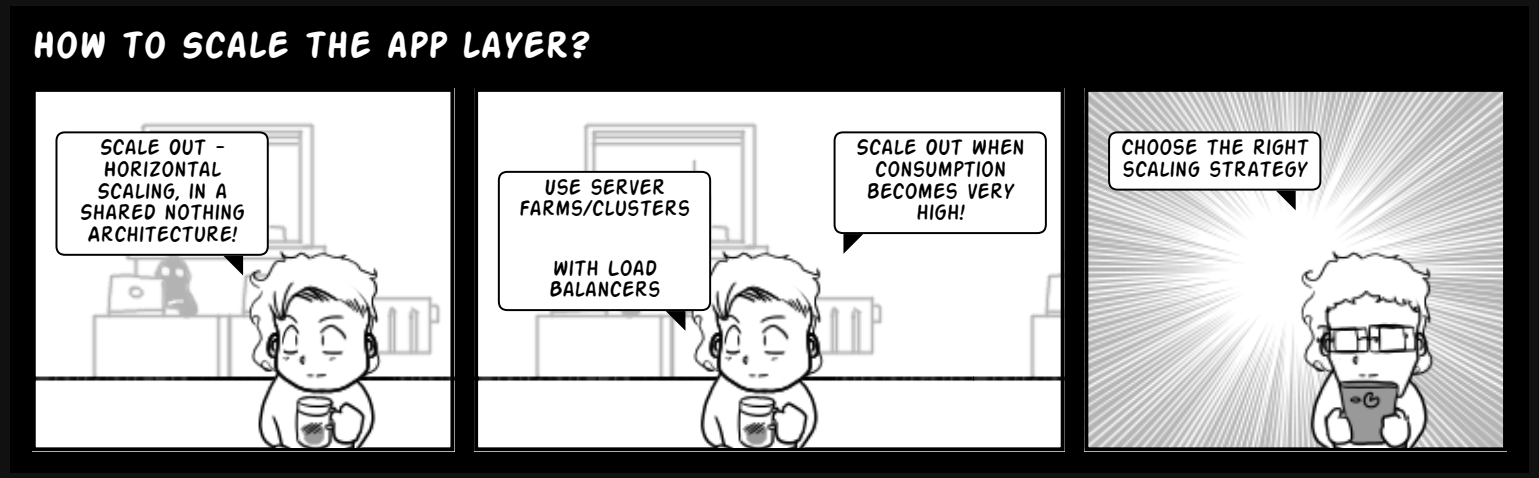
NFR's : Scalability



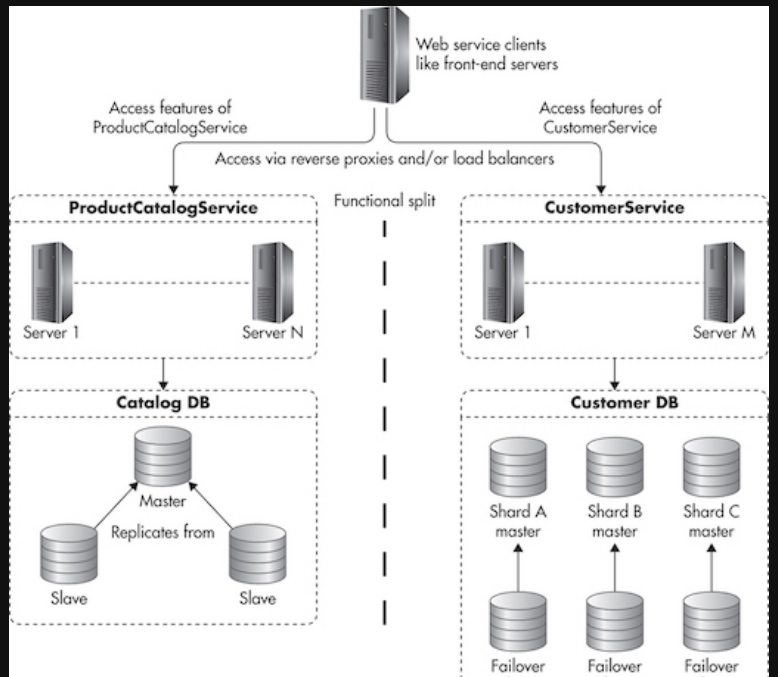
NFR's : Scalability



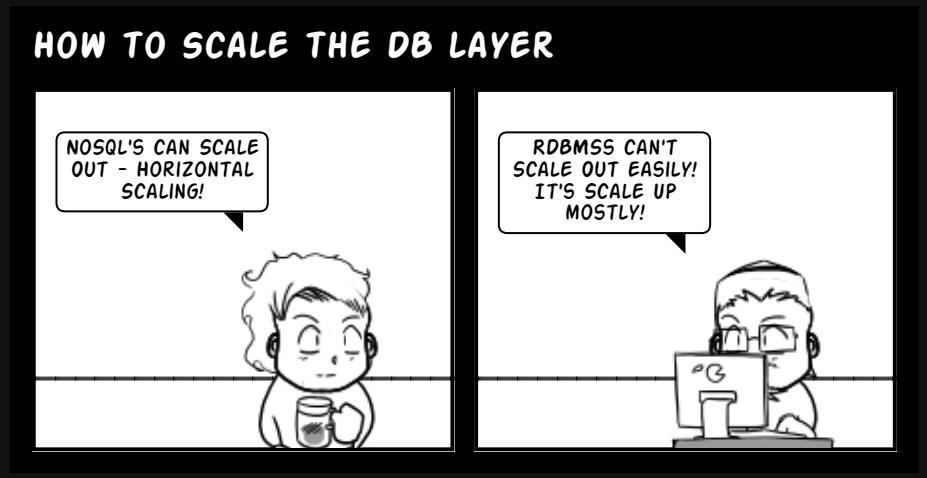
NFR's : Scalability



NFR's : Scalability

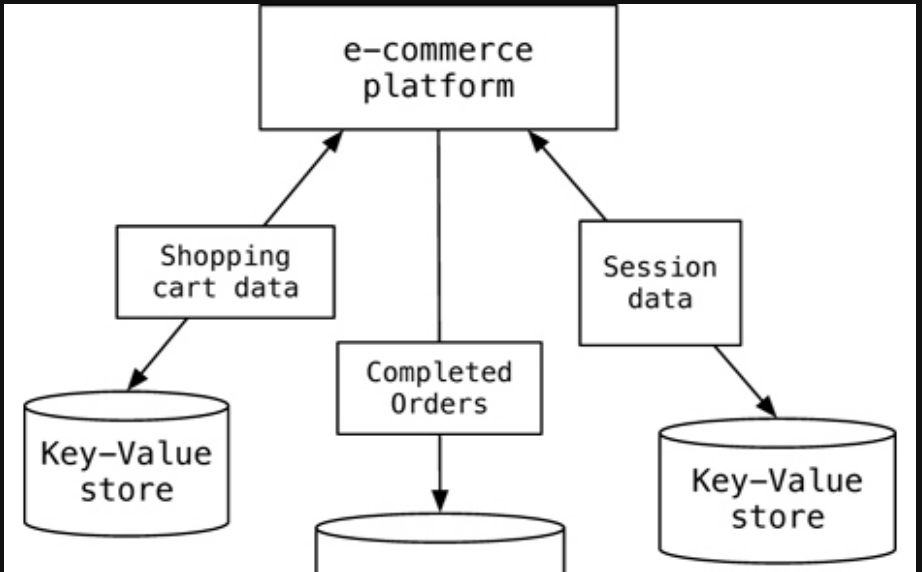


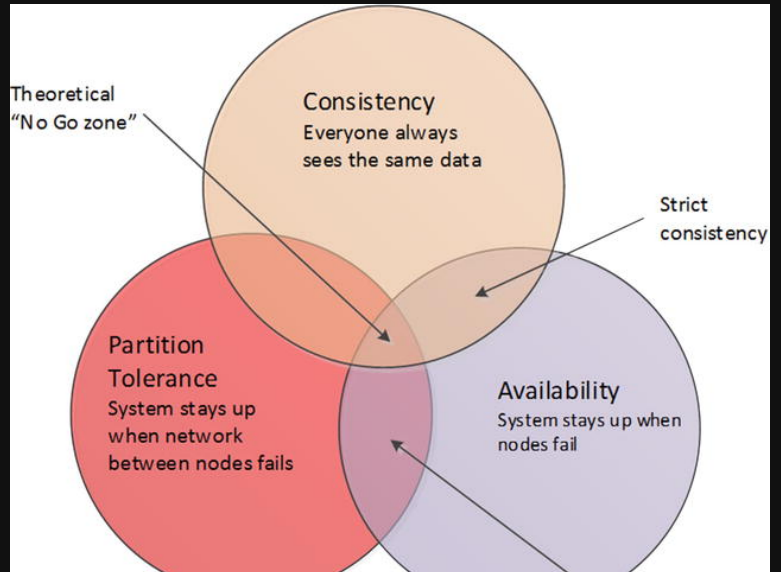
NFR's : Scalability



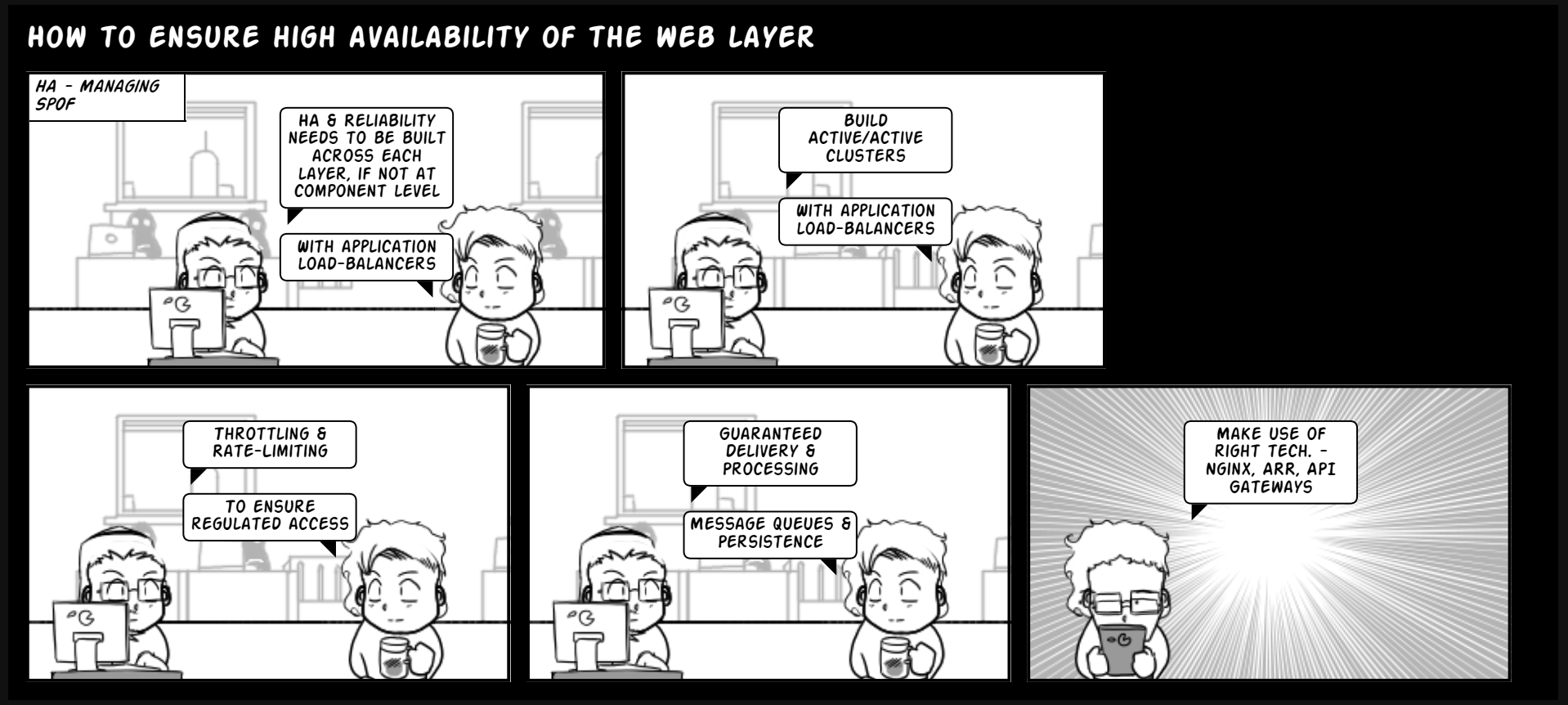
NFR's : Scalability

- Revisiting DB Scaling & CAP -





NFR's : HA & Reliability



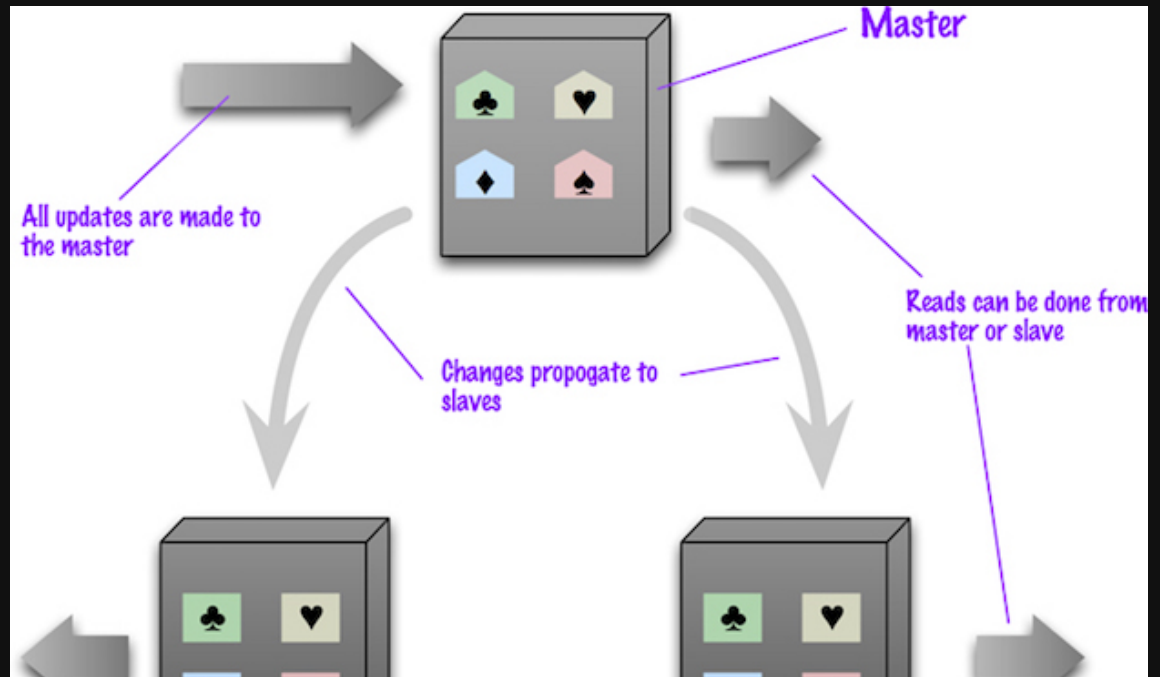
NFR's : HA & Reliability

NFR's : HA & Reliability

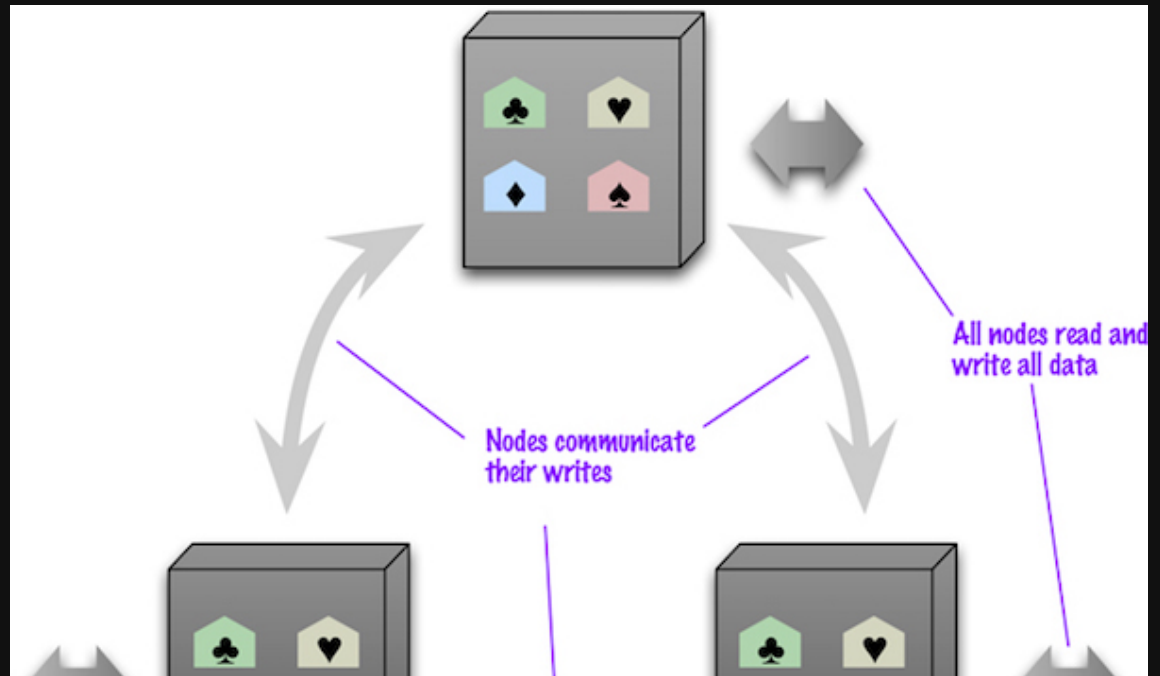
Scalability + HA go hand in hand!
HA Calls for more than one server;

An Active / Active HA cannot be possible without either Scale UP or Scale Out

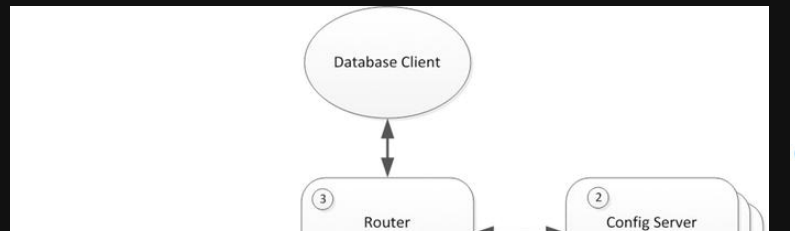
NFR's : HA & Reliability

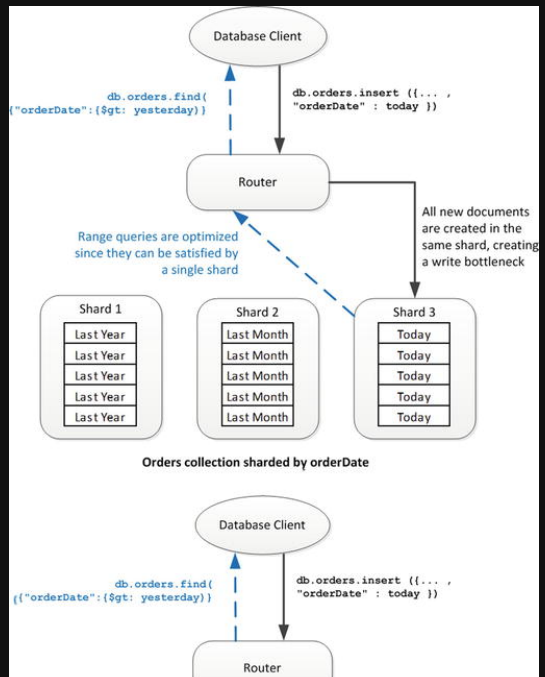


NFR's : HA & Reliability

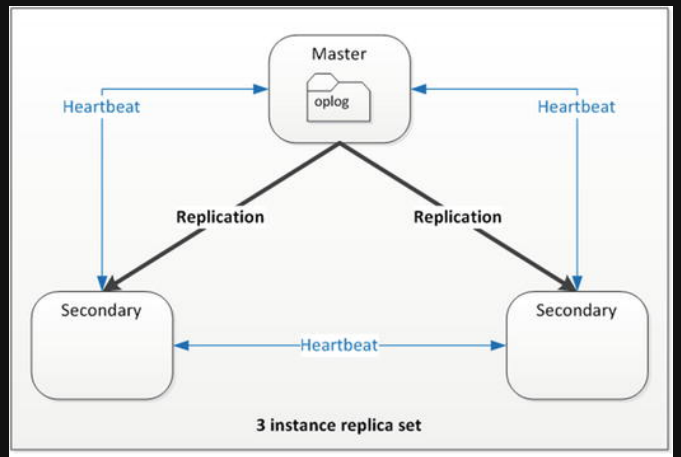


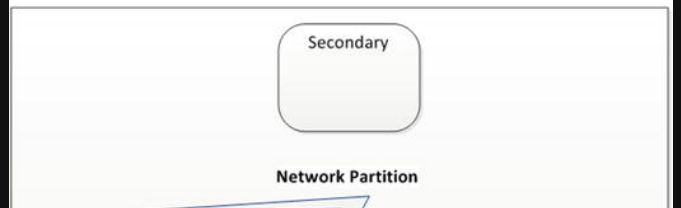
NFR's : HA & Reliability



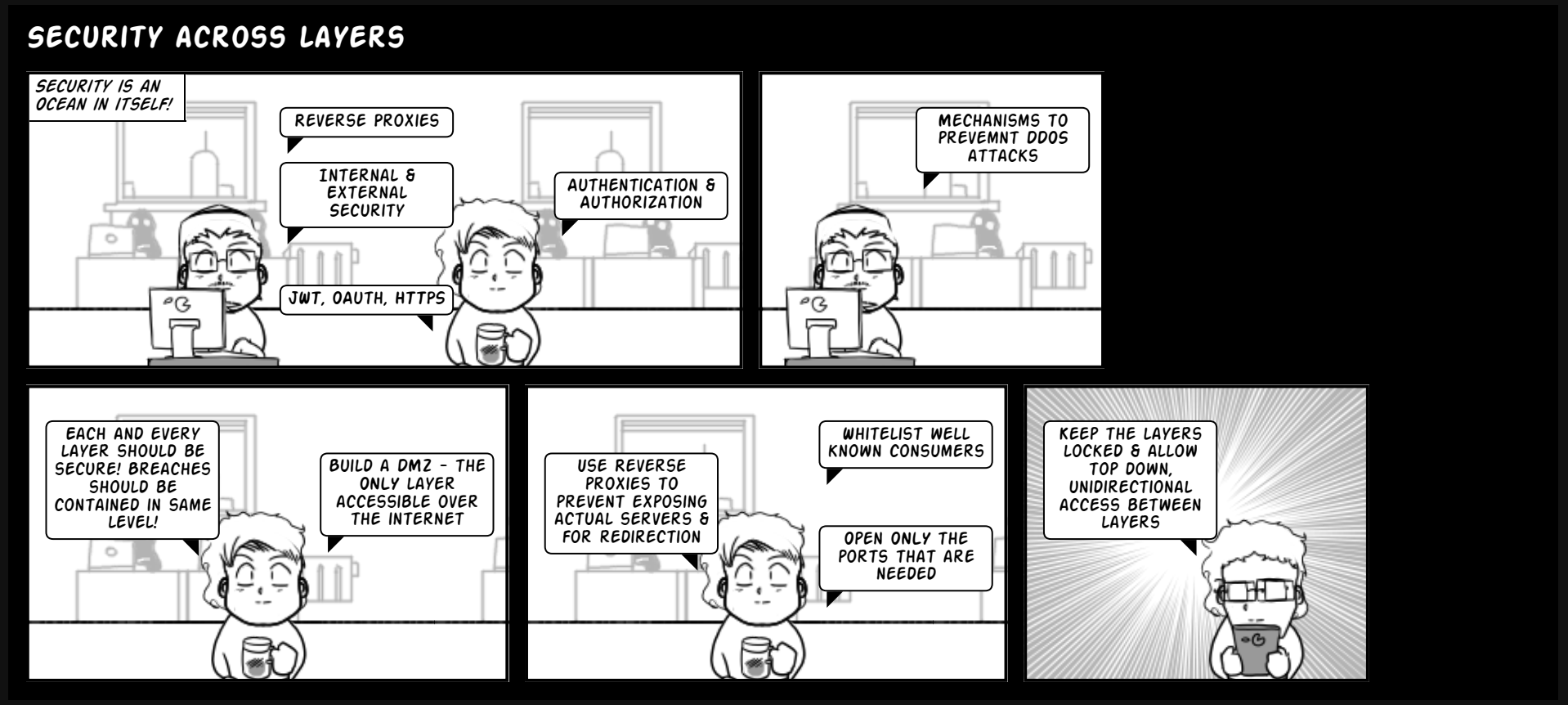


NFR's : HA & Reliability

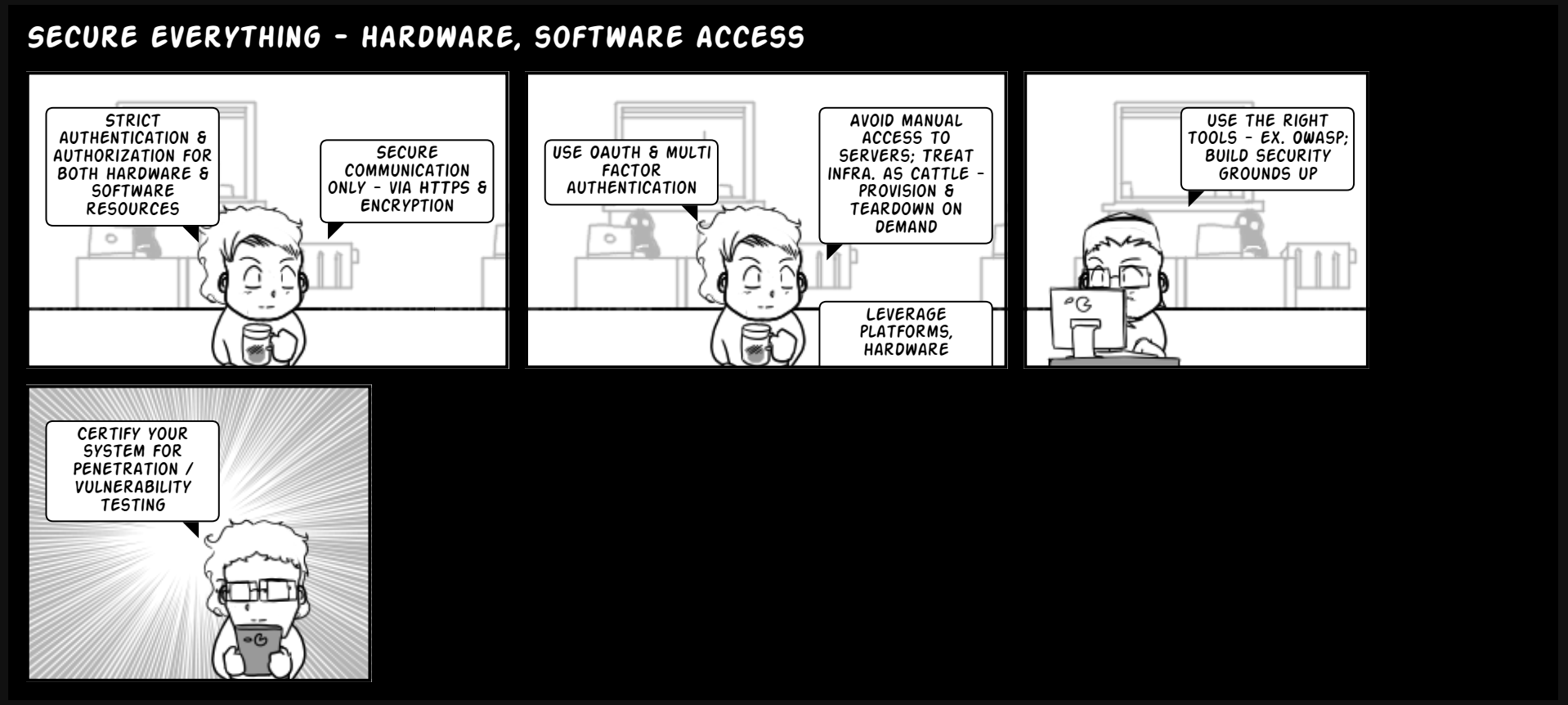




NFR's : Securing the System



NFR's : Securing the System

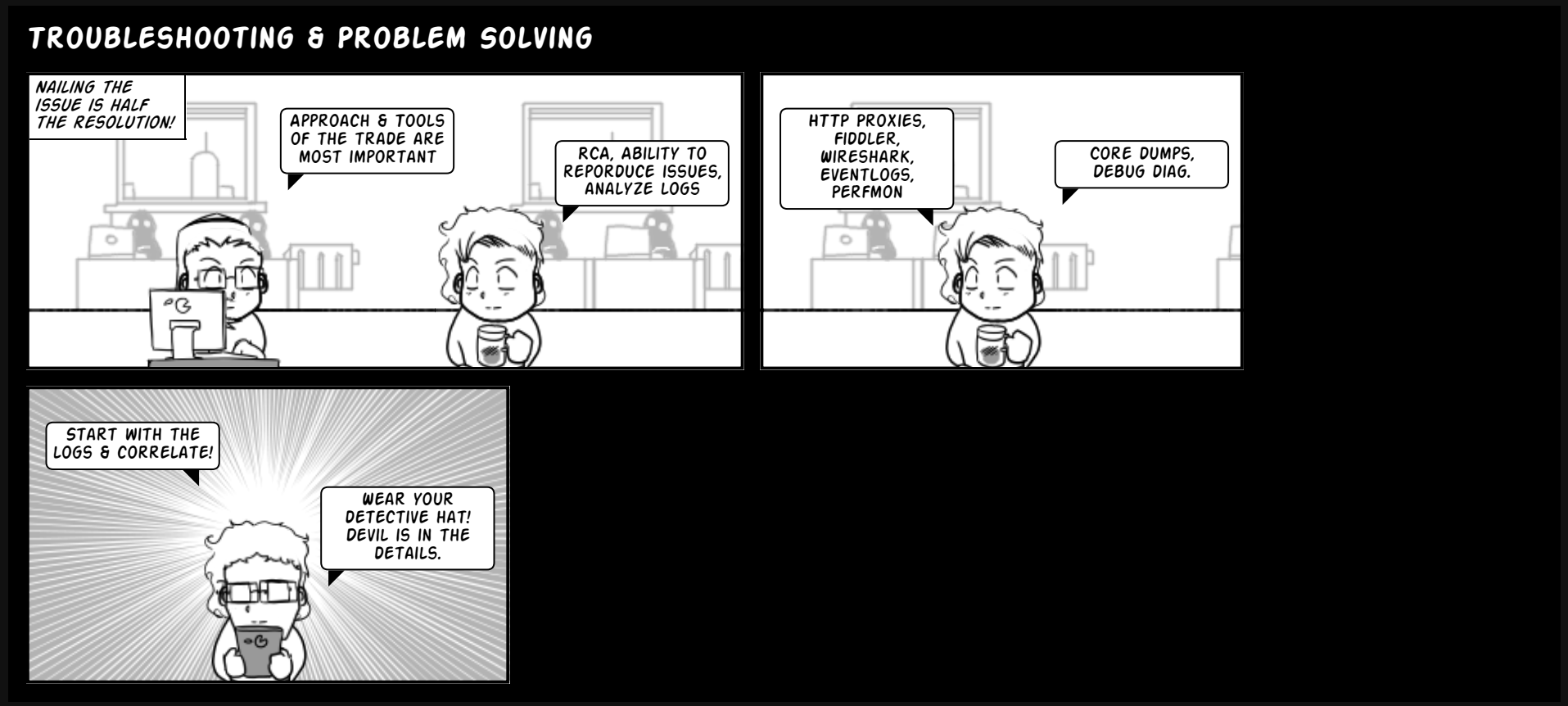


NFR's : Securing the System

Microsoft Patterns & Practices Guidance - Security
Microsoft Web Application Security: Threats and Countermeasures
Azure Security

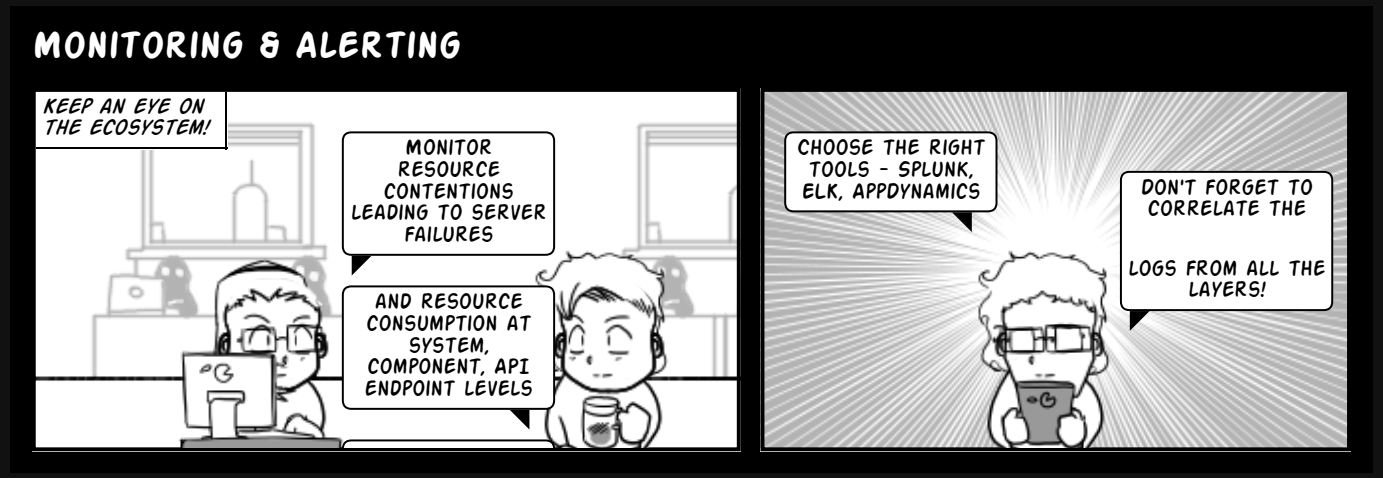
OWASP
Vulnerability Testing vs Penetration Testing

Operational needs



JConsole
VisualVM - All in One Java troubleshooting tool
JRockit Mission Control
Debugging .Net Framework Apps

Operational needs



Links

Donne Martin's System Design Primer

- The Single Most absolute reference and superbly organized collection of resources for system design -

Links

Sources every engineer & architect should follow!

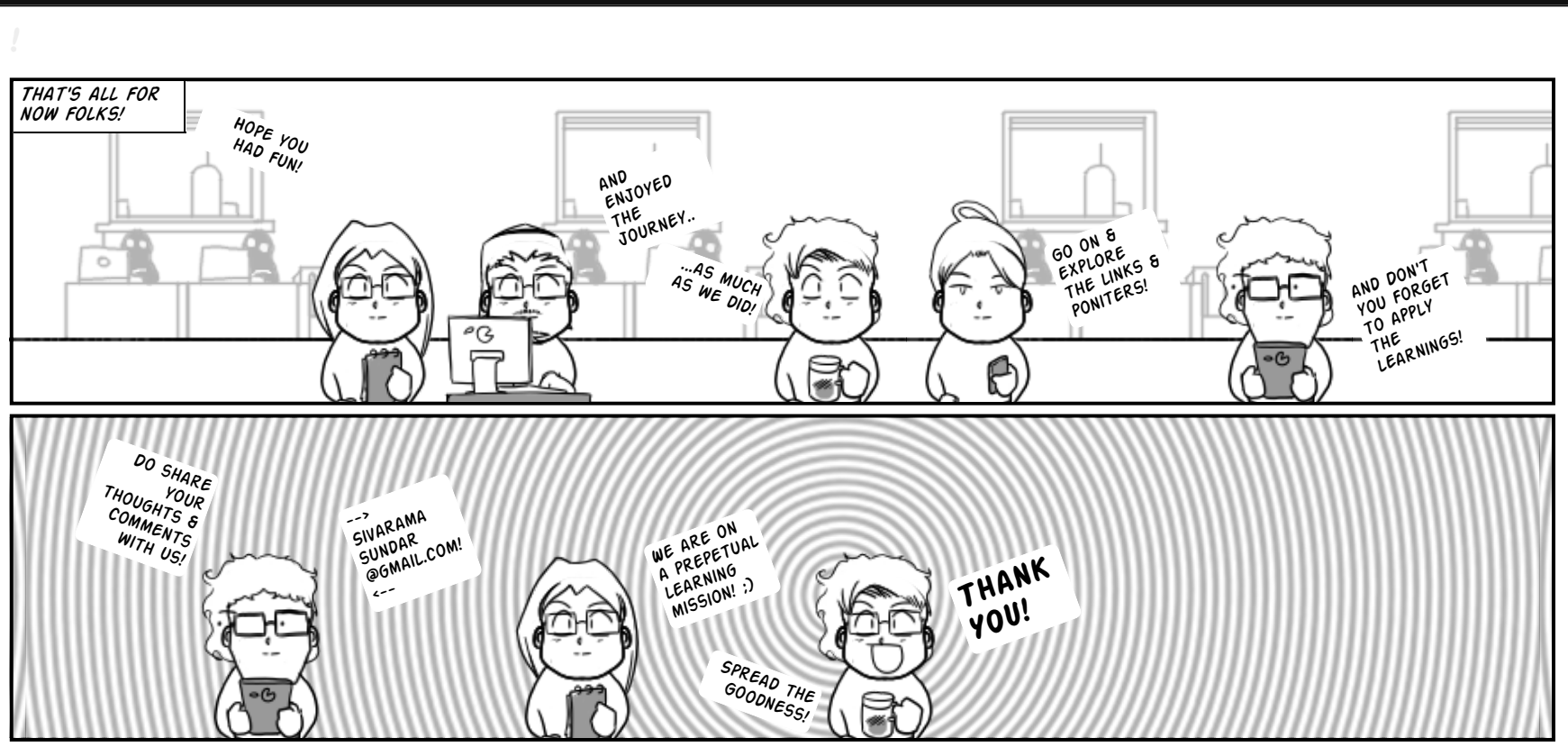
InfoQ Tech. Hub
High Scalability - Real Time Architectures

DZone Tech. Hub
HackerNoon - Bleeding edge of tech.
Hacker News

Links

There's much much more, and these links give you good starting points

```
NetFlix OSS
Everything about MicroServices
Cloud Foundry
Cloud Native Computing Foundation
A curated list of awesome resources
Foundations of Software Engineering
System Design Inputs
Awesome Software Craftsmanship
Awesome BigData - All about data stores & databases
Microservice Patterns
```


THAT'S ALL FOR NOW FOLKS!
HOPE YOU HAD FUN!
AND ENJOYED THE JOURNEY..
...AS MUCH AS WE DID!
GO ON & EXPLORE THE LINKS & PONITERS!
AND DON'T YOU FORGET TO APPLY THE LEARNINGS!
DO SHARE YOUR THOUGHTS & COMMENTS WITH US!
--> SIVARAMA SUNDAR @GMAIL.COM! <--
WE ARE ON A PREPETUAL LEARNING MISSION! ;)
SPREAD THE GOODNESS!
THANK YOU!

Contributors

Authors:

SivaramaSundar Concept, Storyboard, Content

Karthik Kalkur - v1 - Arch. Styles, NoSQL; Reviews
Suresh Balasubramaniam - v3, v4 - Reviews; Restructuring
Thanu Sunderasan - v3, v4 - Reviews; Restructuring
Manas Ranjan Dash Reviews & Debates
Amit Saluja Reviews & Debates

Inspiration & Support:

Rashmi Subbanna
Ashwini Karumbaiah
Rajat Pandit

Credits:

reveal.js JS Presentation Framework
stripthis (kesiev) JS Comic Framework


ARE WE THERE YET?
A journey of a thousand miles begins with a single step ... And lots of coffee!
Visit Jim Hunt at facebook.com/huntcartoons