

Architecture for Developer

A Beginner's Guide to Understanding & Building Enterprise Architecture

Speaker

Name: Thanaphoom Babparn (ธนภูมิ บัปพาน)

Role: Software Engineer (Backend)

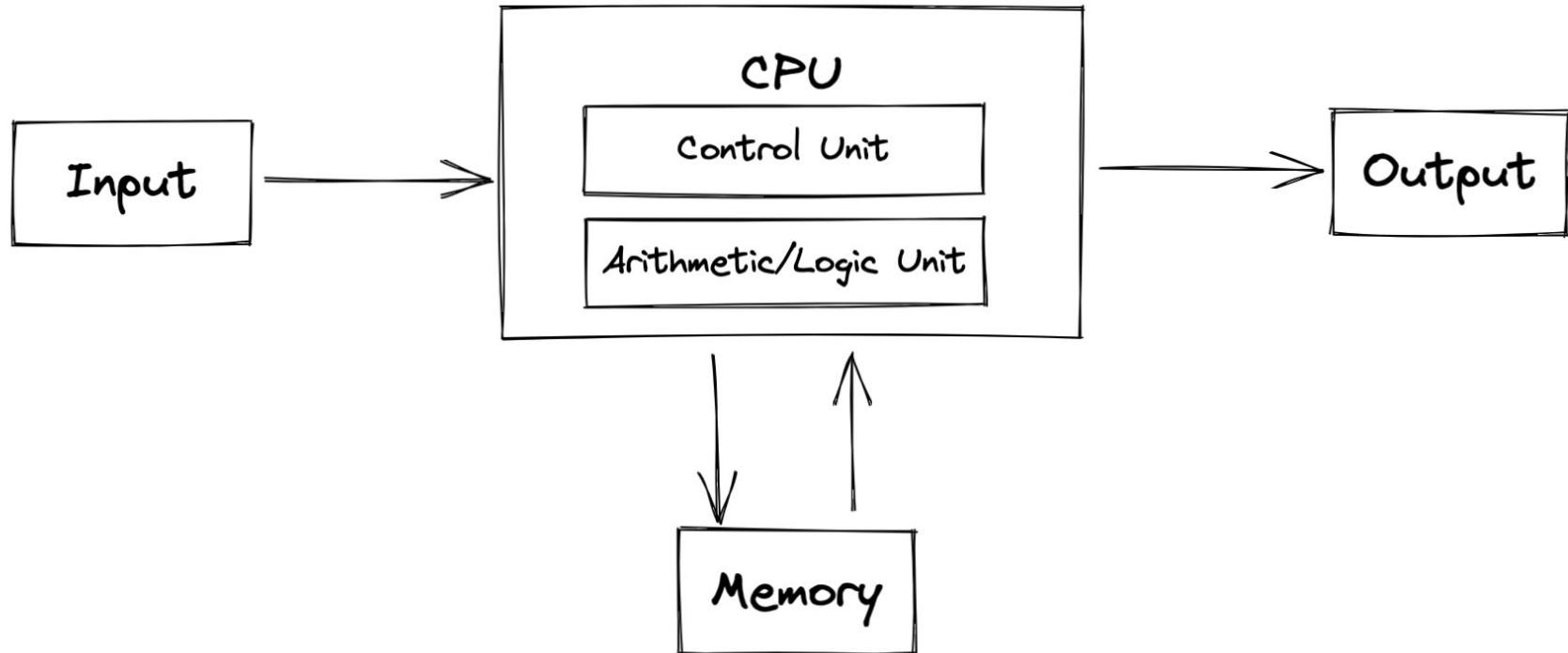
Hobby: Writing individual blog posts

[My Linktree](#)



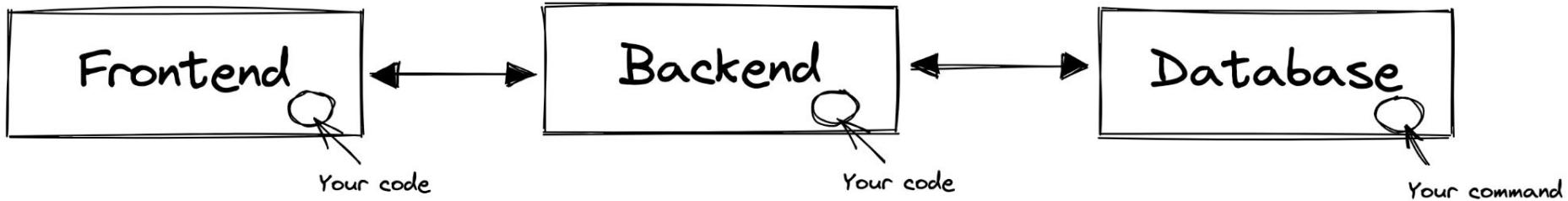
Let's start!





Classic?

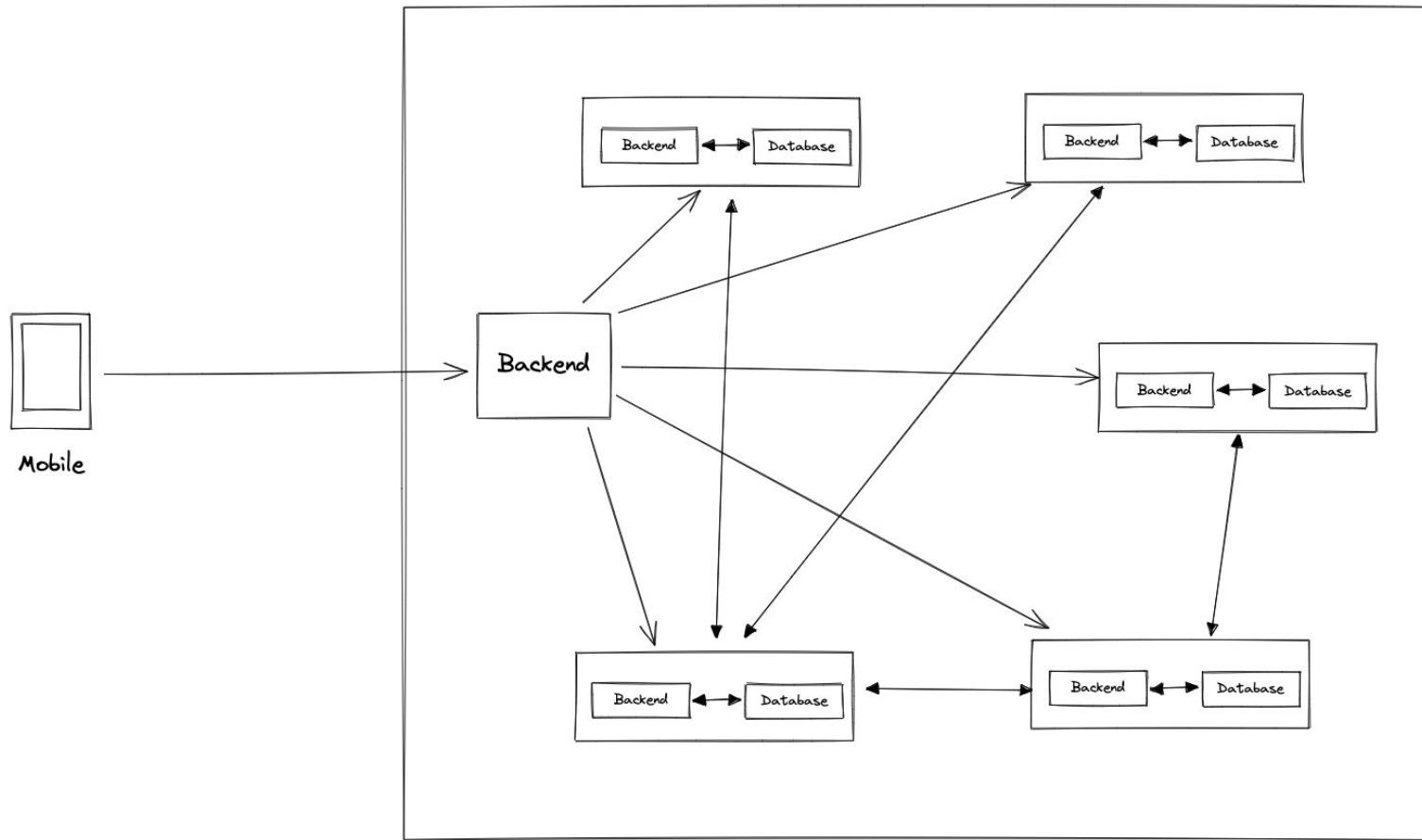


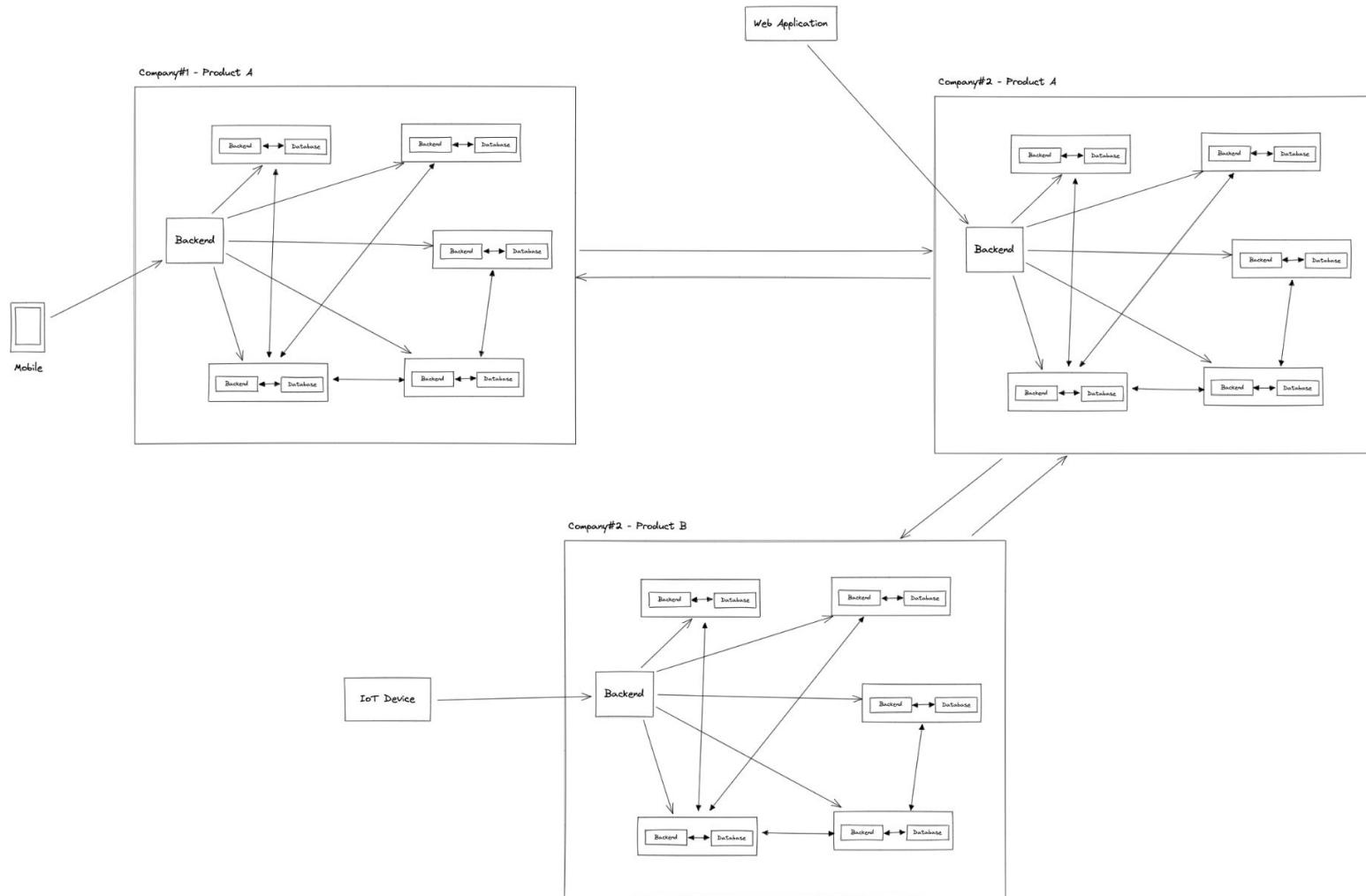


Let's adjustment



Product A



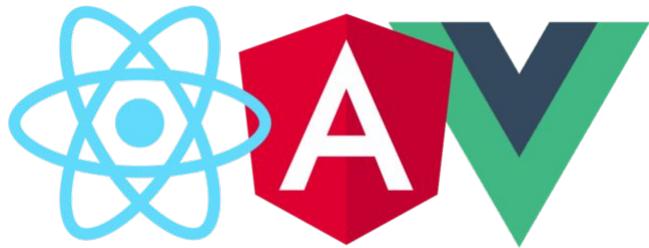




Relax & Dive into it

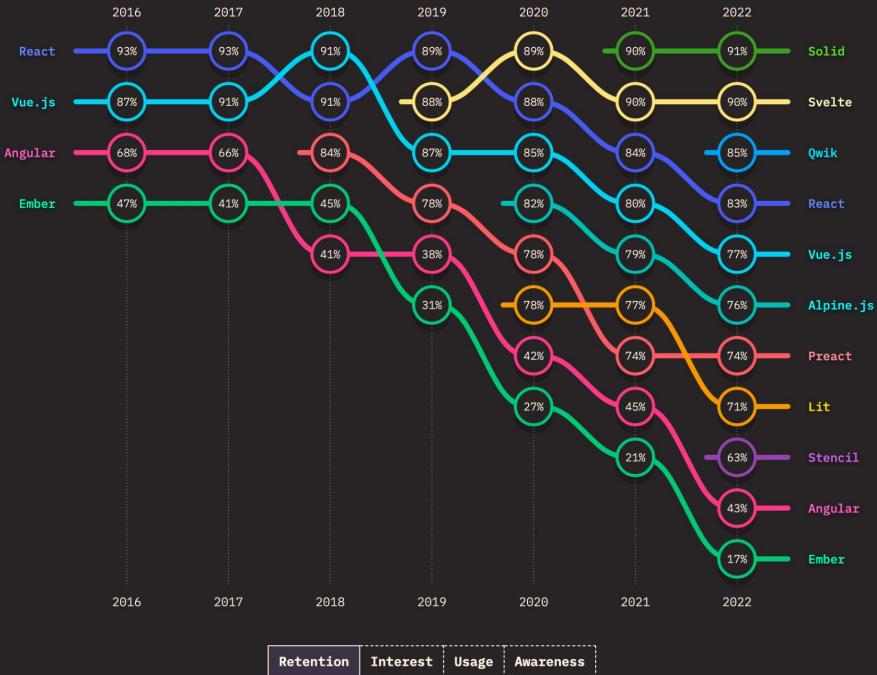


Frontend



RANKINGS OVER TIME

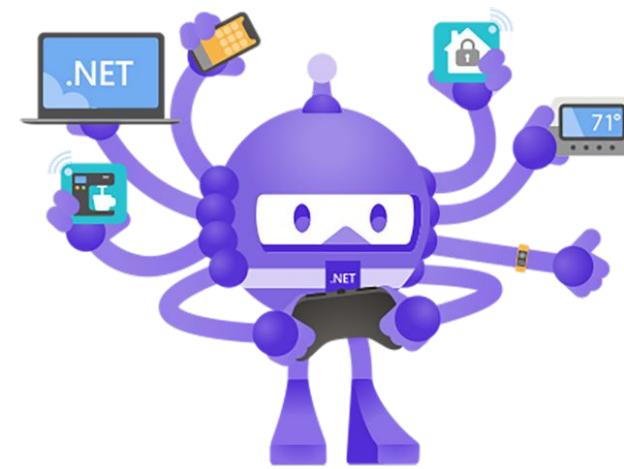
Retention, interest, usage, and awareness ratio rankings.

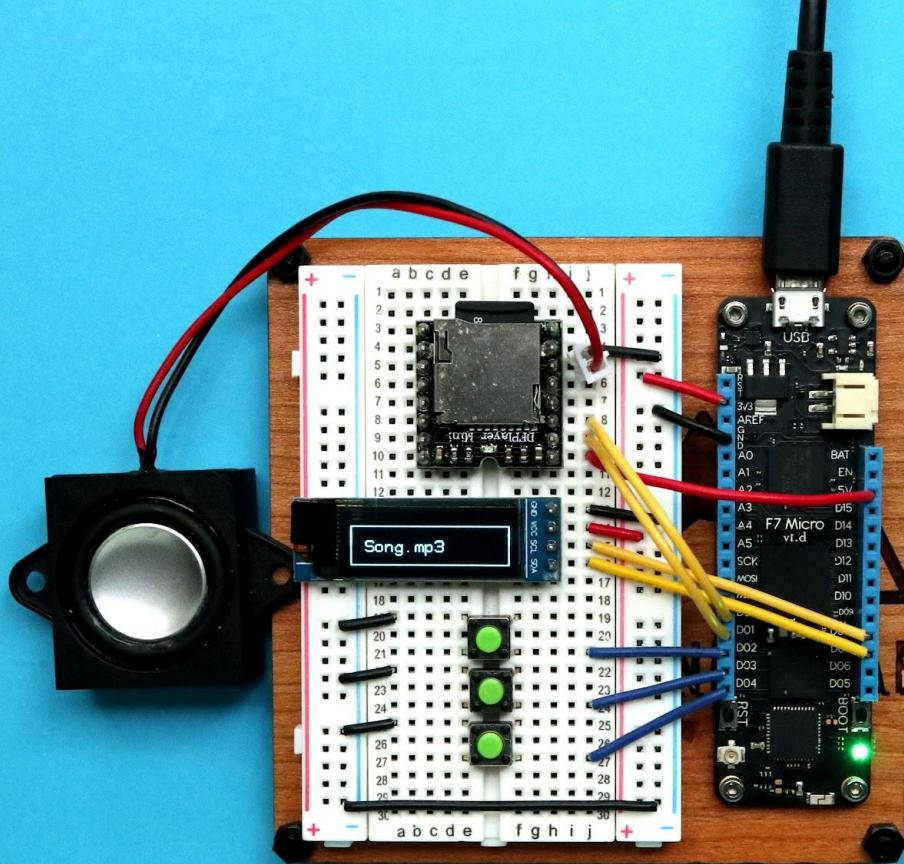


Retention Interest Usage Awareness

Technologies with less than 10% awareness not included. Each ratio is defined as follows:

- Retention: $\text{would use again} / (\text{would use again} + \text{would not use again})$
- Interest: $\text{want to learn} / (\text{want to learn} + \text{not interested})$
- Usage: $(\text{would use again} + \text{would not use again}) / \text{total}$
- Awareness: $(\text{total} - \text{never heard}) / \text{total}$



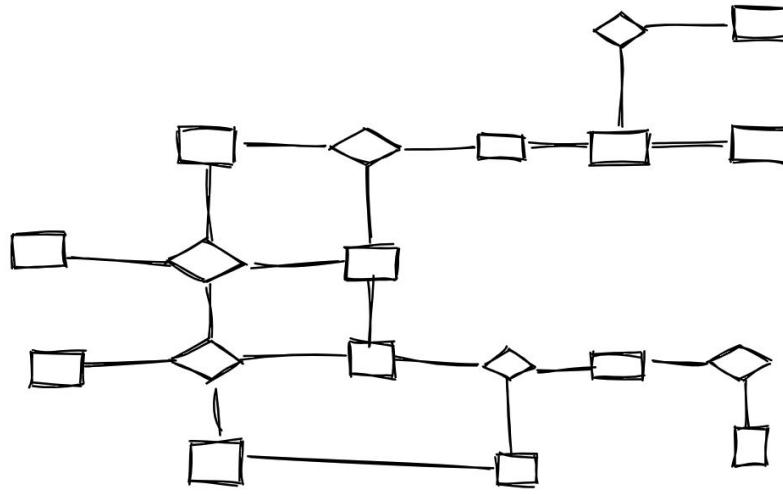
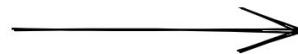




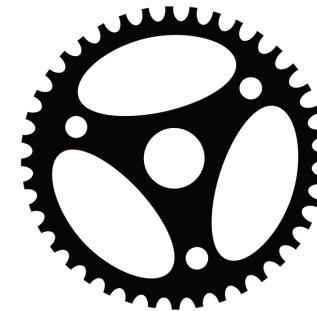
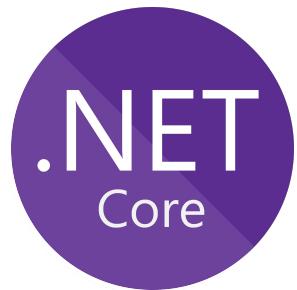
Frontend
Interact with nature

Backend

FE



Business Logic



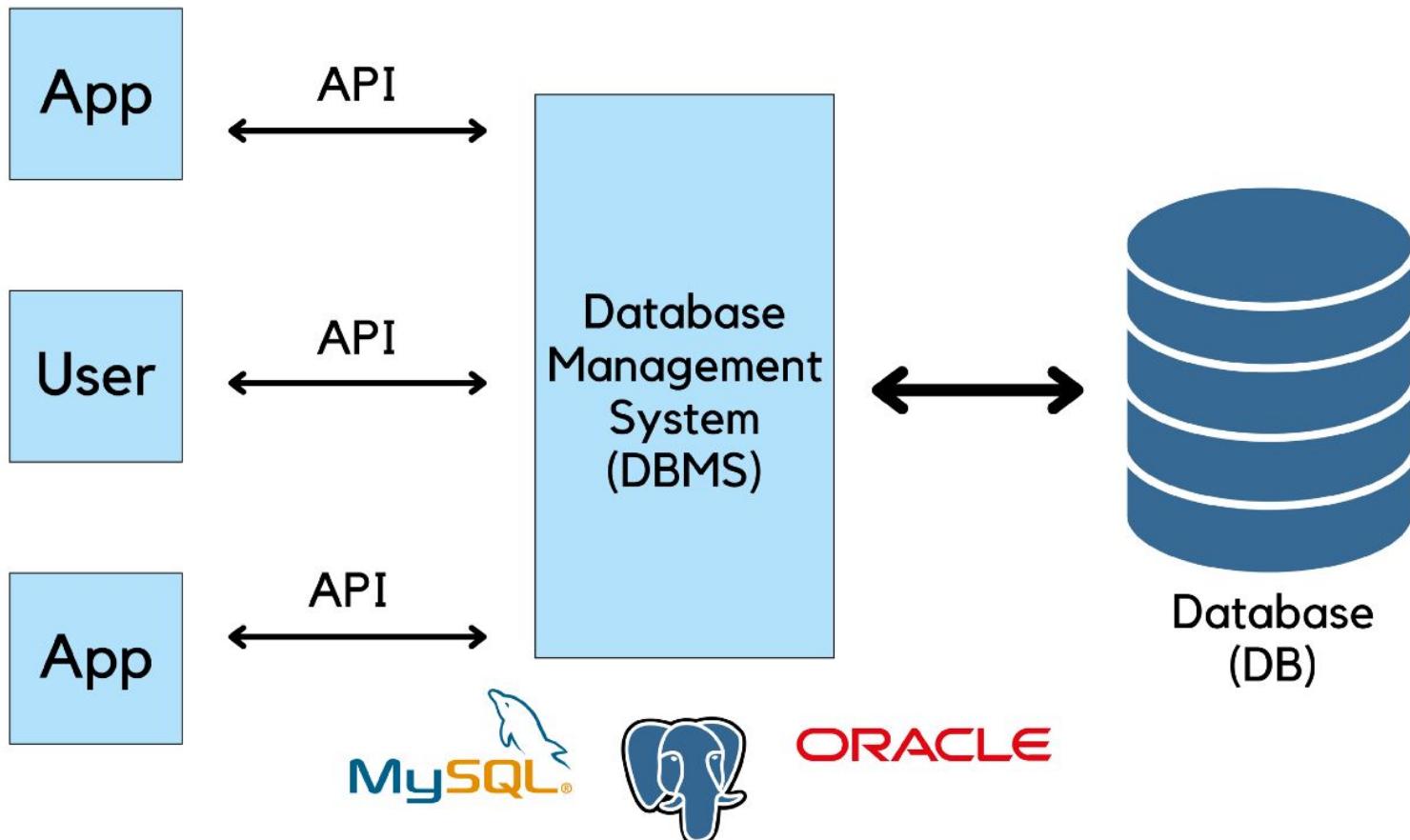
Express

and much more...

Backend Business Logic & Manage Data

Database & Storage





OLTP (Online Transaction Processing)	OLAP (Online Analytical Processing)
Used for transactional processing, which involves high volumes of short, simple transactions	Used for analytical processing, which involves complex queries on large volumes of data
Designed to process transactions in real time or near-real time	Designed to process queries offline or in batch mode, with response times ranging from minutes to hours
Optimized for data integrity, consistency, and concurrency	Optimized for data aggregation, summarization, and analysis
Typical data sources include transactional databases, such as relational databases	Typical data sources include data warehouses, data lakes, and other big data stores
Data is stored in a normalized format, with each piece of data stored in a separate table	Data is stored in a denormalized format, with data pre-aggregated and summarized for faster queries
Queries are simple and focused on individual transactions or records	Queries are complex and may involve multiple tables and aggregations
Examples of OLTP applications include order processing, inventory management, and online banking	Examples of OLAP applications include data mining, business intelligence, and financial analysis

CRUD

- Create
- Read
- Update
- Delete

SQL (Structured Query Language)

```
INSERT INTO products (id, name, price, description)
VALUES (1001, 'iPhone 13', 999.00, 'The latest iPhone with A15 Bionic
chip and Ceramic Shield front cover.');
```

SQL (Structured Query Language)

```
SELECT * FROM products WHERE id = 1001;
```

```
SELECT name, price  
FROM products  
WHERE price < 1000.00  
ORDER BY price DESC;
```

SQL (Structured Query Language)

```
UPDATE products SET price = 899.00 WHERE id = 1001;
```

SQL (Structured Query Language)

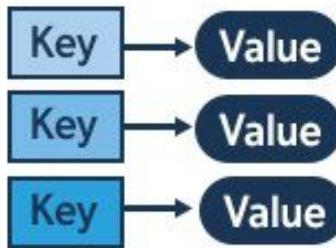
```
DELETE FROM products WHERE id = 1001;
```

A large bonfire at night, with bright orange and yellow flames and glowing embers. The fire is intense, with many sparks flying upwards. The background is dark, making the fire stand out.

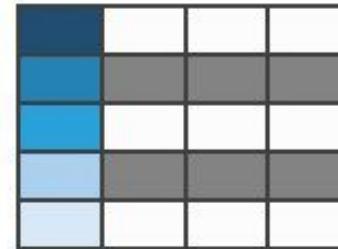
DELETE FROM products;

NoSQL?

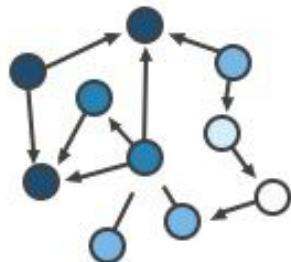
Key-Value



Column-Family



Graph

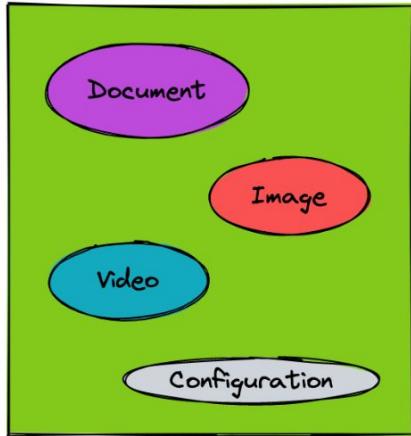


Document



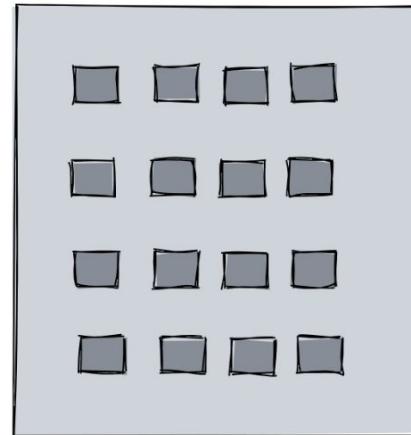
RDBMS	NoSQL
Organizes data into tables with predefined columns and relationships	Organizes data in a variety of formats, such as key-value pairs, documents, or graphs
Uses SQL to interact with data	Uses a variety of languages and APIs
Provides strong ACID support	Provides flexibility and scalability for handling large volumes of data with eventual consistency, dynamic schema, and horizontal scaling
Optimized for structured data with complex relationships and ad-hoc queries	Optimized for unstructured or semi-structured data with simple queries and fast access
Vertical scaling (Horizontal scaling also possible)	Horizontal scaling is relatively easy and straightforward
Normalization	Denormalization

Object Storage



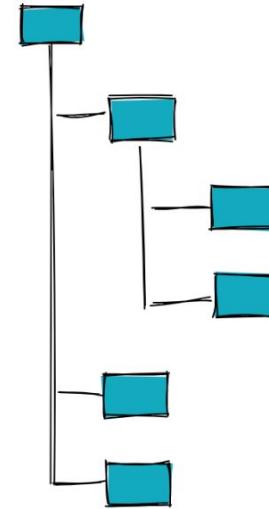
Object Identifier
Reference

Block Storage



Fixed size of block

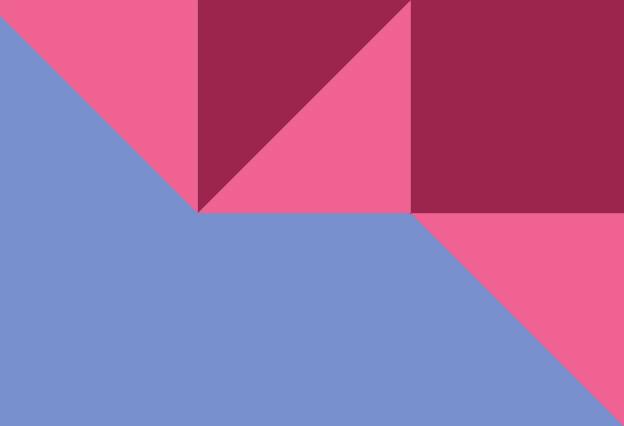
File Storage



Hierarchy file structure

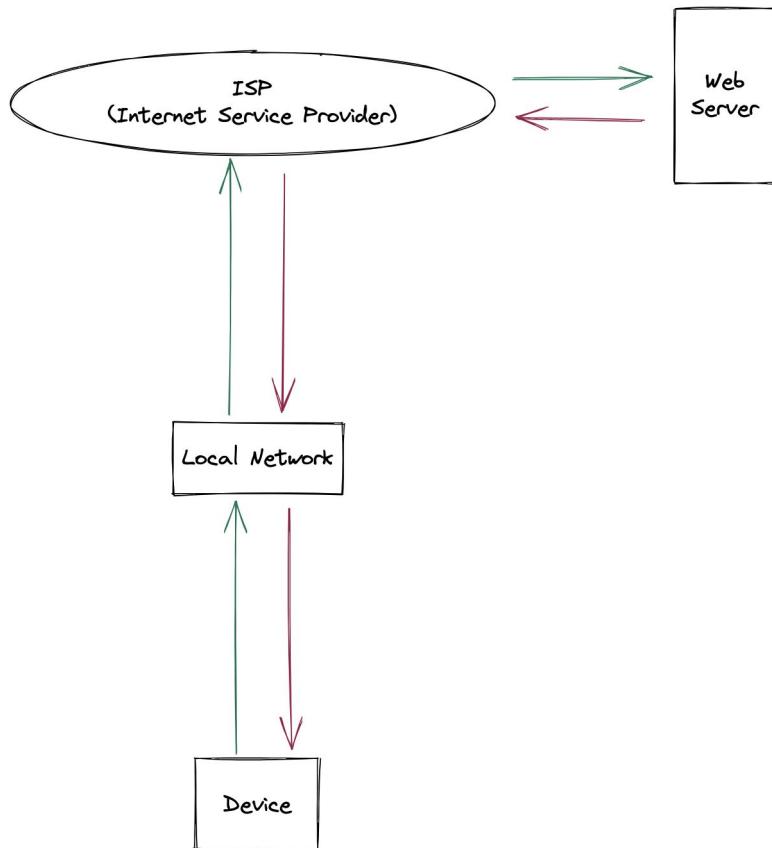
Database & Storage

Storing & Persist Data for future usage



Fun Fact:
SQL able to use in non-tech
(Business, Marketing, etc)

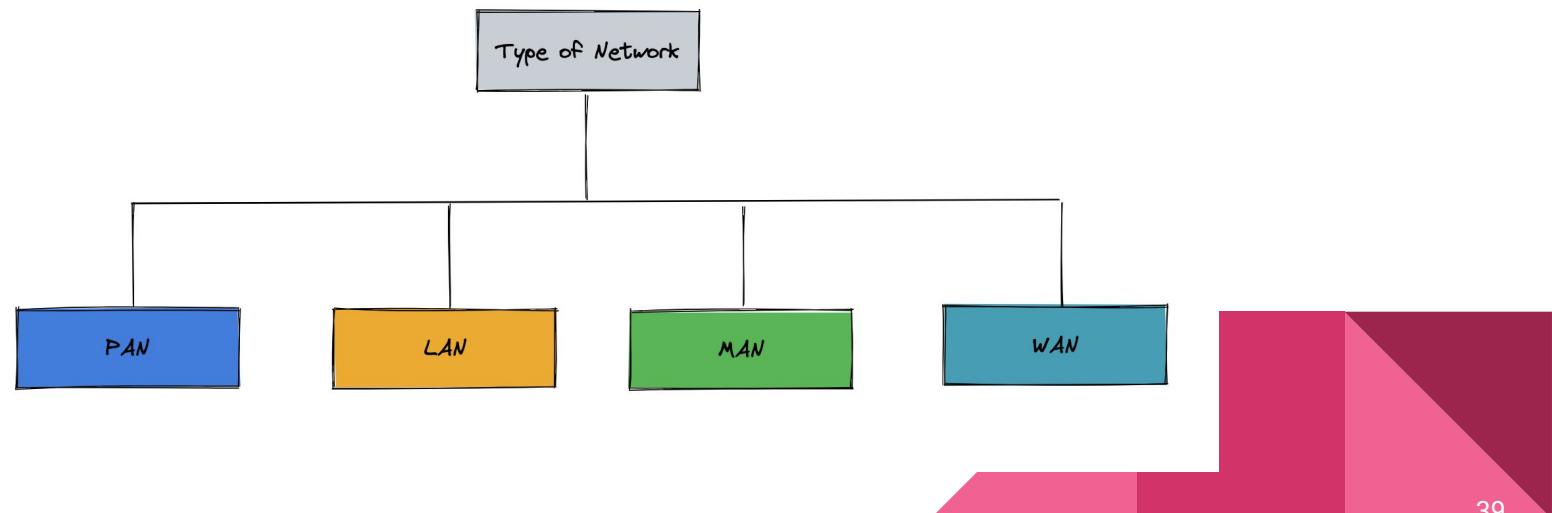
Network & Protocols



How Internet work - 101

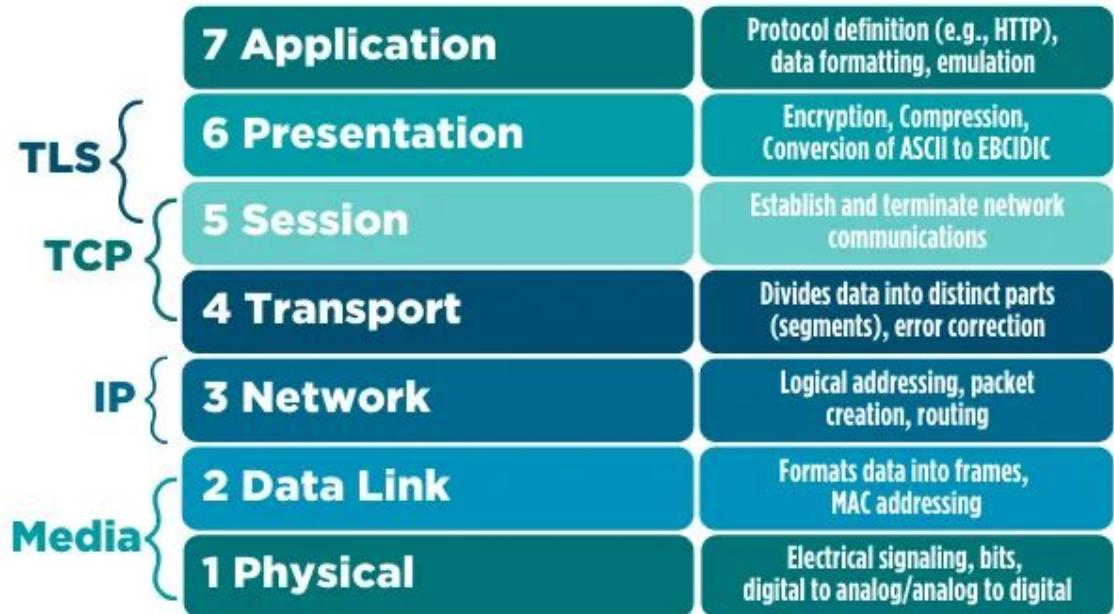
Network

Collection of interconnected devices and systems that are linked together to share resources and exchange information



Protocols

Sets of rules and standards that govern the way information is transmitted, received, and processed over a network



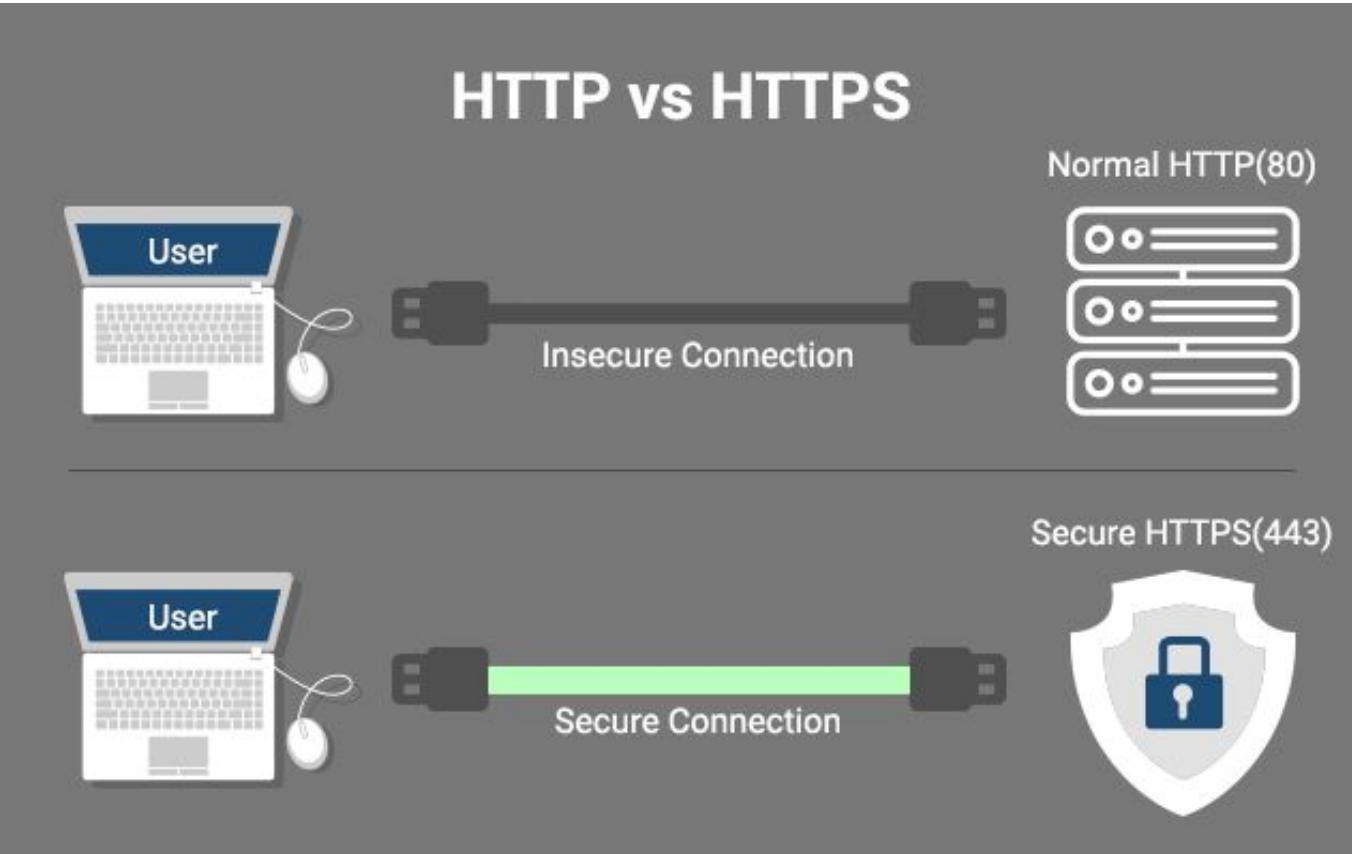
Source: [Innovating and Problem Solving with the Open Systems Interconnection Reference Model \(OSI/RM\)](#)

Ports

- Logical connection point on a computer or network device that allows it to accept and transmit data
- Identify specific communication channels for different types of data

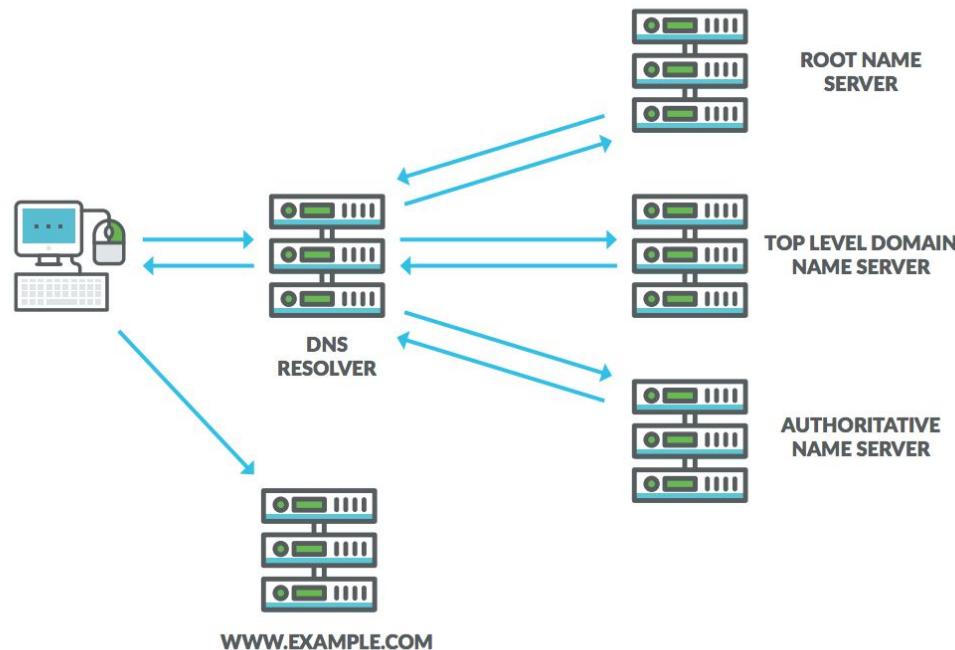
Protocol	Port
HTTP	80
HTTPS	443
FTP	21
SMTP	25
POP3	110
IMAP	143
SSH	22
Telnet	23
DNS	53
DHCP	67
RDP (Remote Desktop Protocol)	3389
Microsoft SQL Server	1433
Oracle Database	1521
MySQL	3306

HTTP vs HTTPS



Source: What is HTTP, HTTPS? Learn about HTTP & HTTPS protocols?

DNS (Domain Name System)

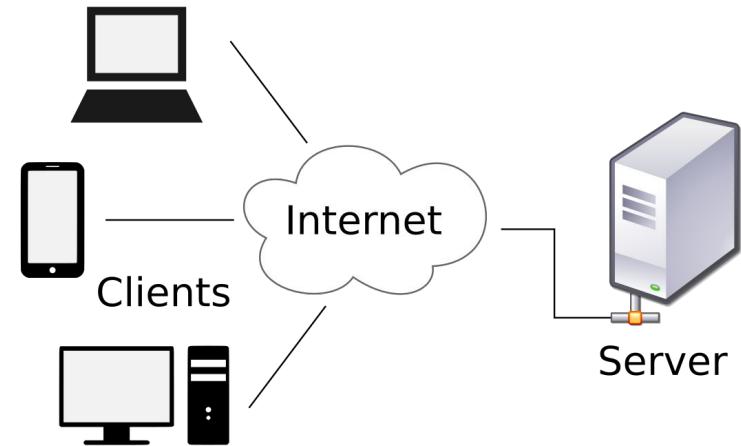


Source: [Domain Name System](#)

Server

Server

- A computer system
- Provides services or resources to other computers or devices on a network
- Used to store and manage data
- Run applications and programs, and facilitate communication
- Collaboration between different devices and users



Types of Servers in Computing



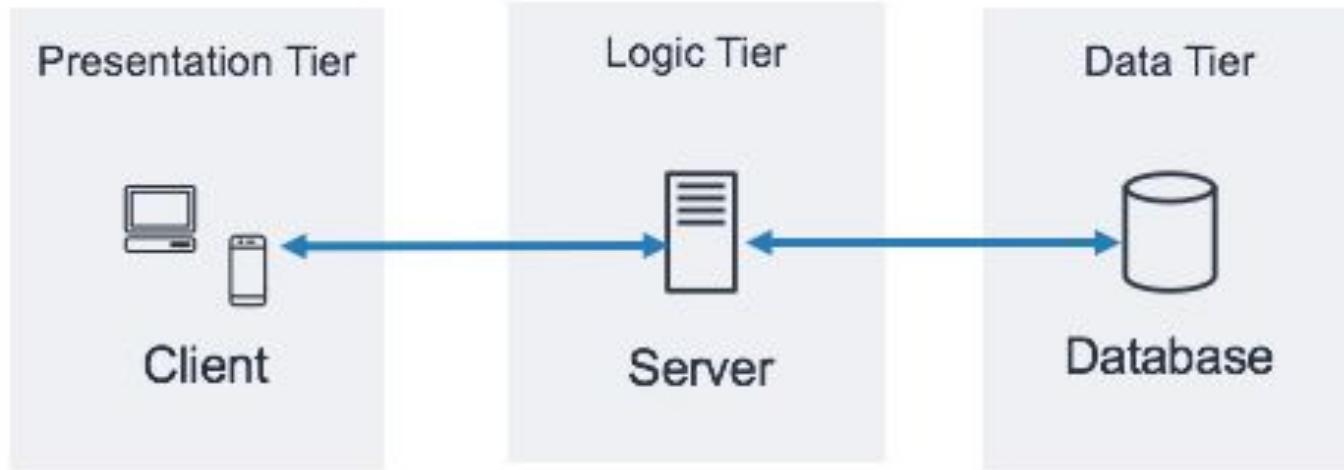
Source: [15 Different Types of Servers in Computing](#)



Let's move advanced

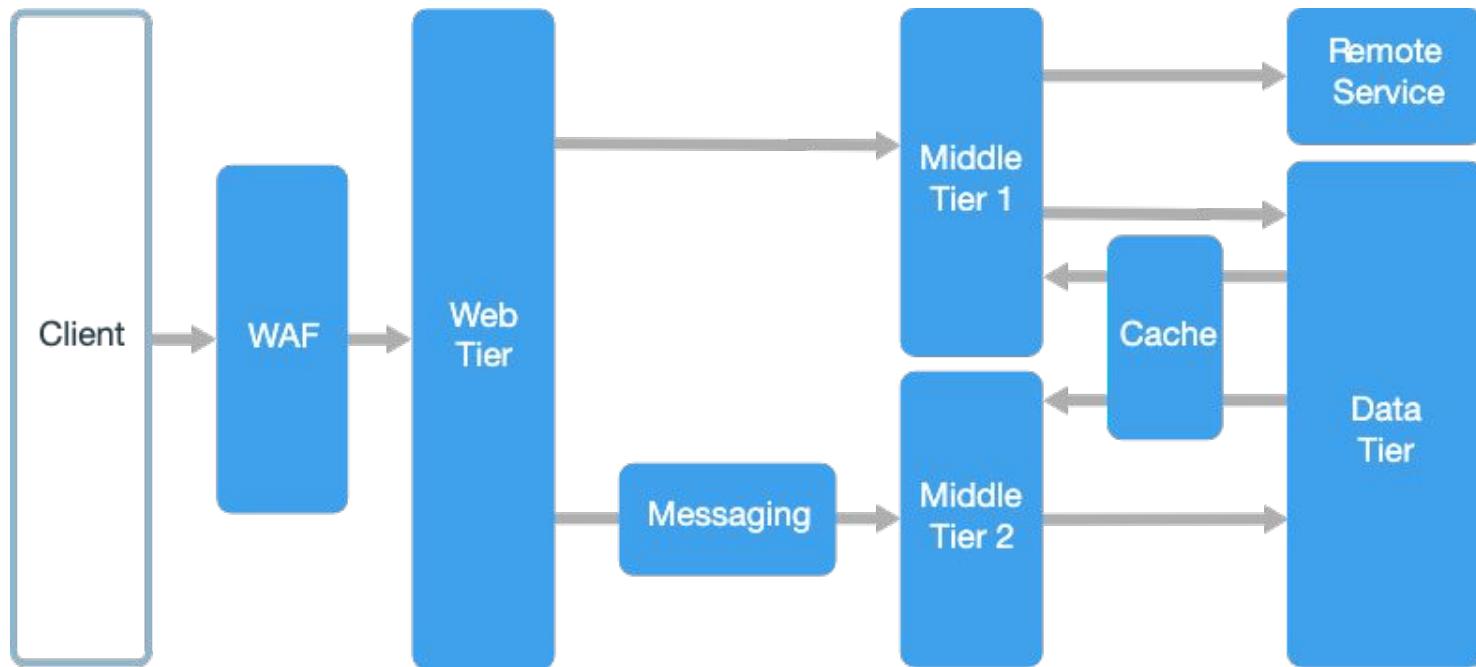
Common Architecture

3-Tier Architecture



Source: [Three-tier architecture overview](#)

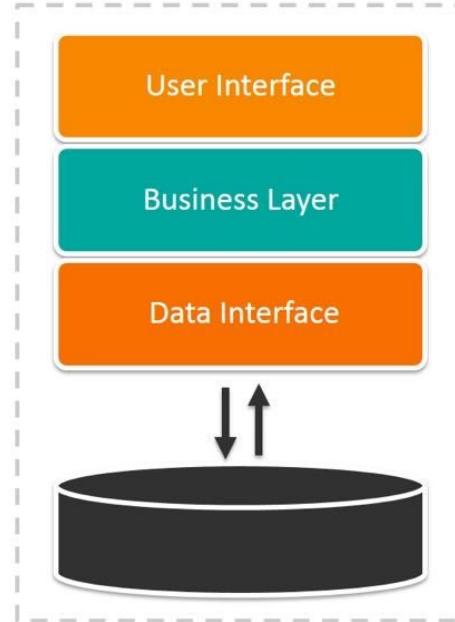
N-Tier Architecture



Source: [N-tier architecture style](#)

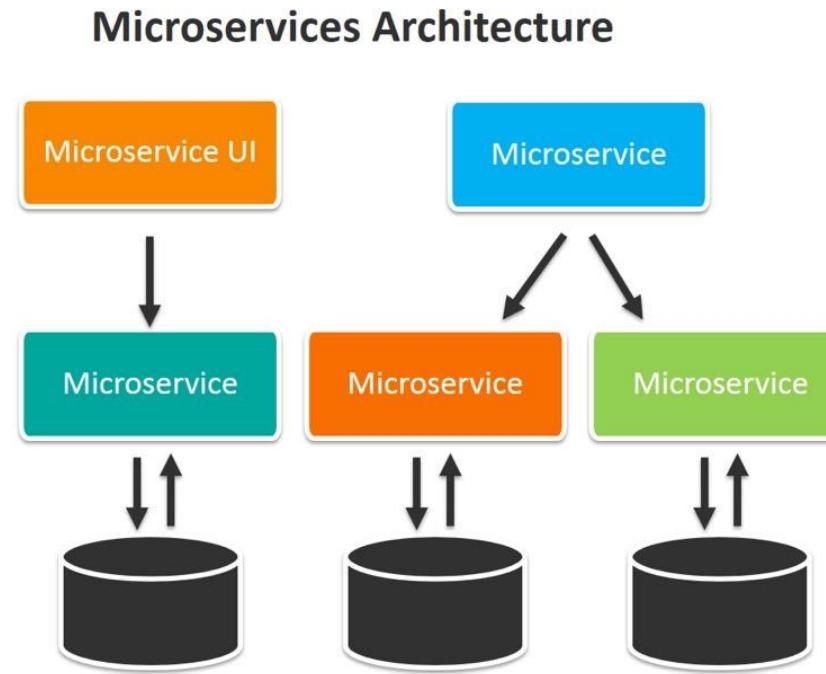
Monolithic Architecture

Monolithic Architecture



Source: [Microservices vs. Monolithic Architectures](#)

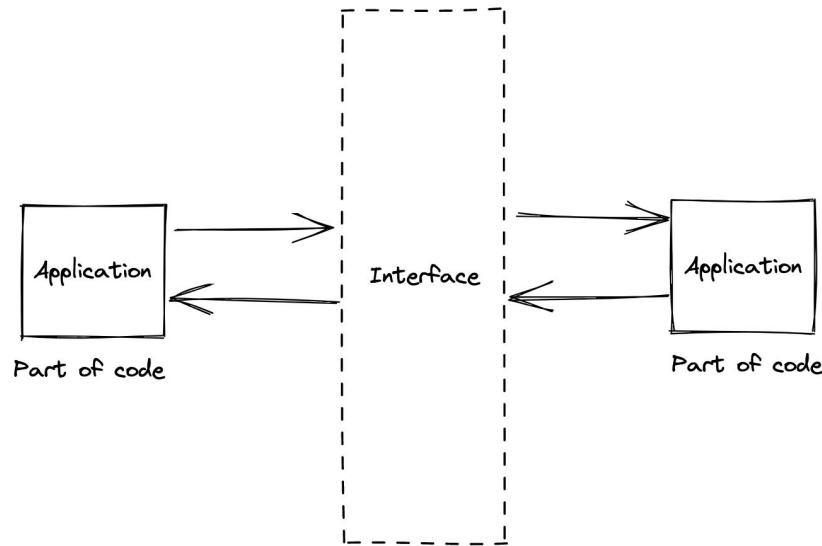
Microservice Architecture



Source: [Microservices vs. Monolithic Architectures](#)

Service Communications

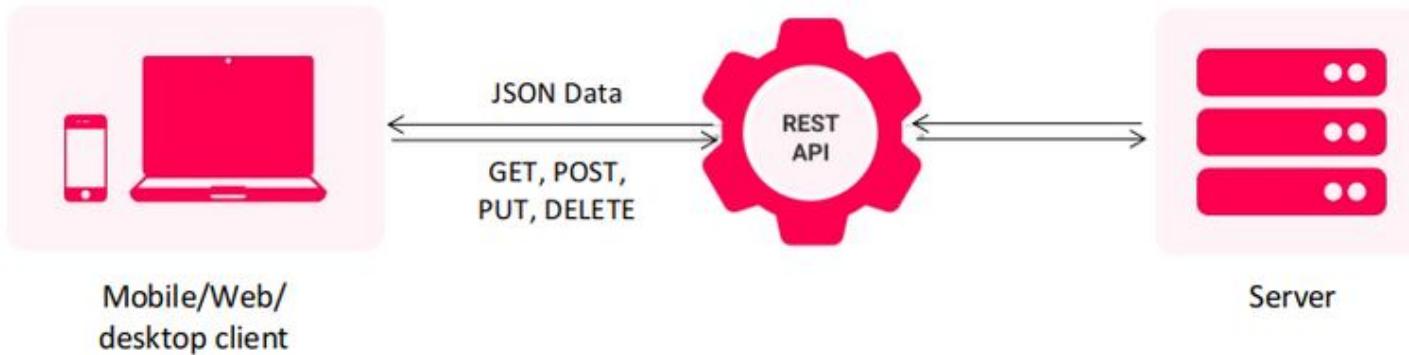
Application Programming Interface (API)



Set of rules & standards

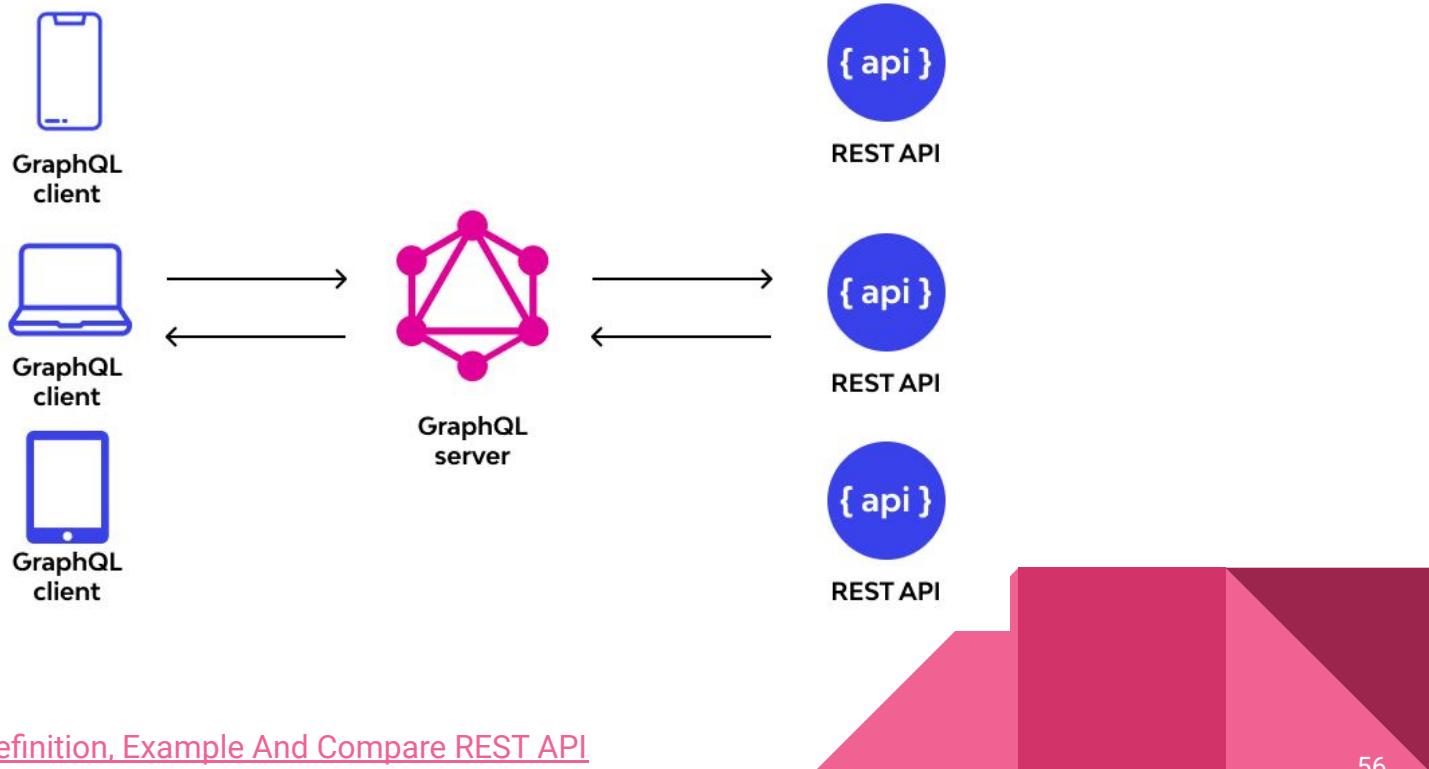
Synchronous Communication - RESTful

REST API Model



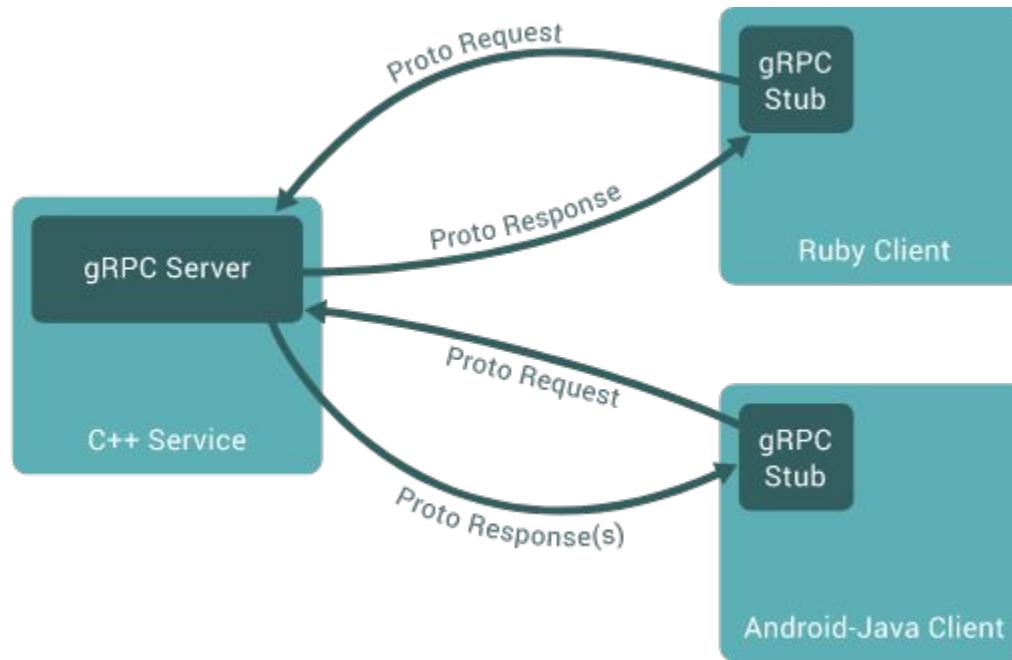
Source: [10 Best Practices to Follow for REST API Development](#)

Synchronous Communication - GraphQL



Source: [What Is GraphQL? Definition, Example And Compare REST API](#)

Synchronous Communication - gRPC



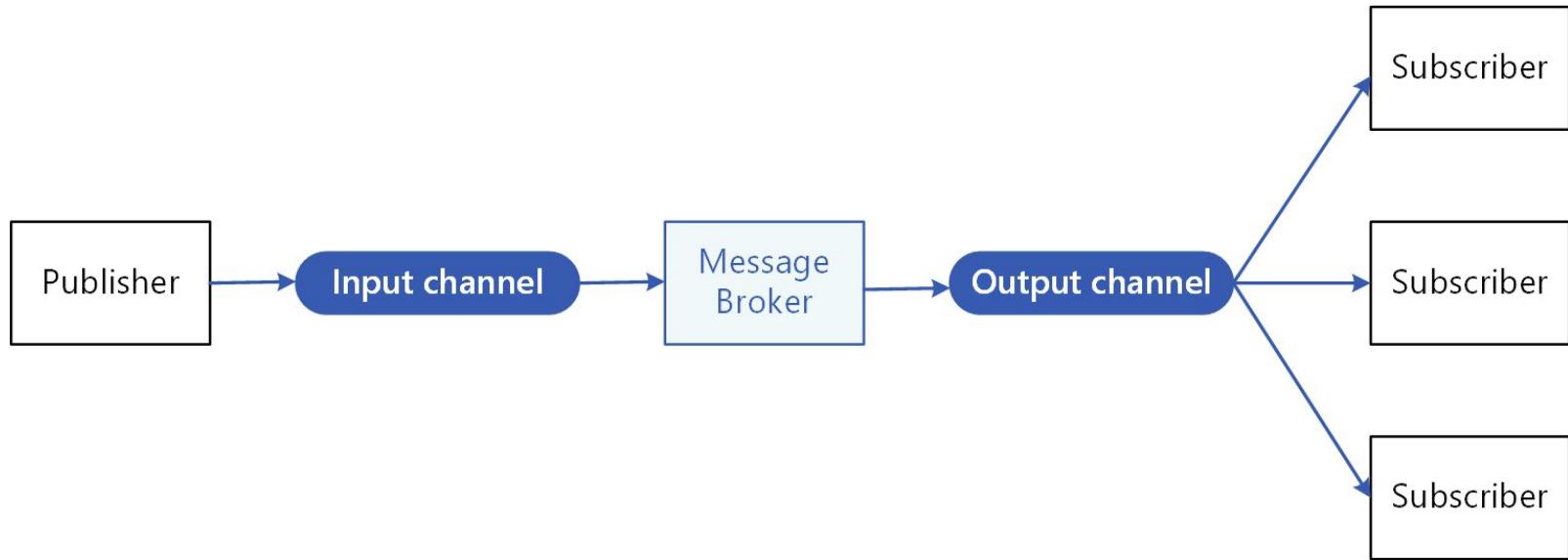
Source: [Introduction to gRPC](#)

Asynchronous Communication - Message Queue



Source: [Message Queues](#)

Asynchronous Communication - Publish/Subscribe



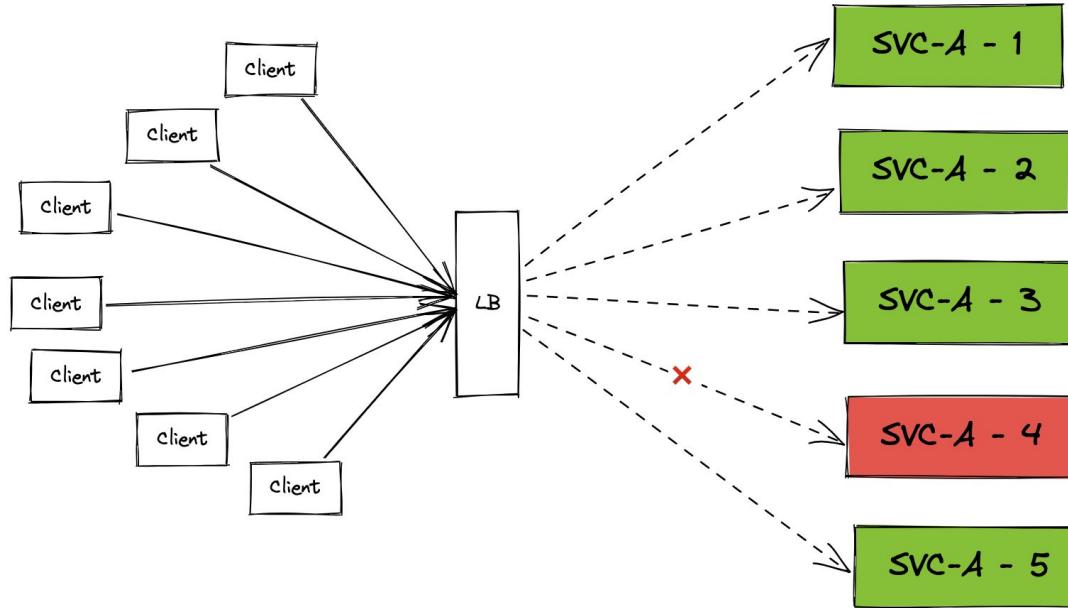
Source: [Publisher-Subscriber pattern](#)



Synchronous - I'll wait

Asynchronous - Do it, I'll go

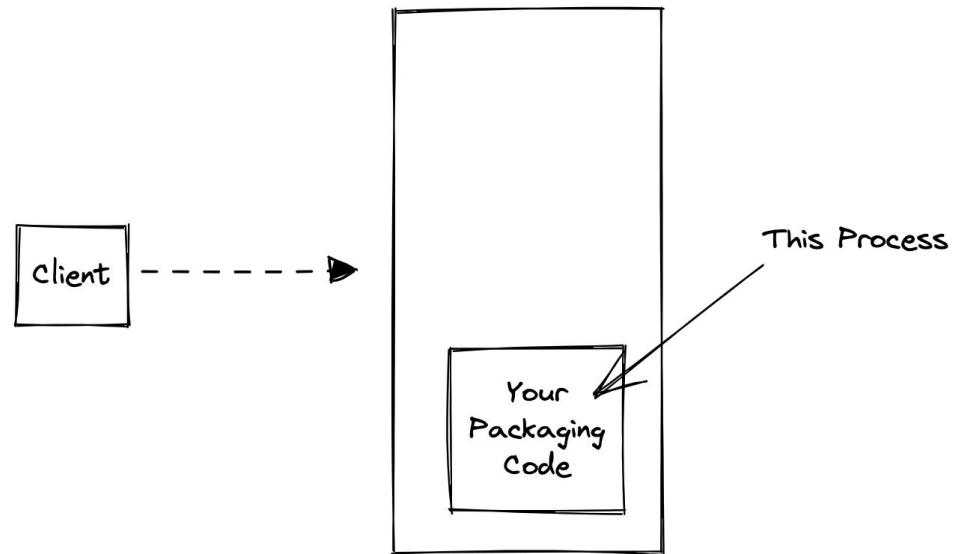
Additional - Load Balancer

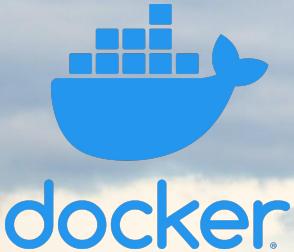


Deployment

Deployment

- Building
- Testing
- **Packaging**
- Publish to Production





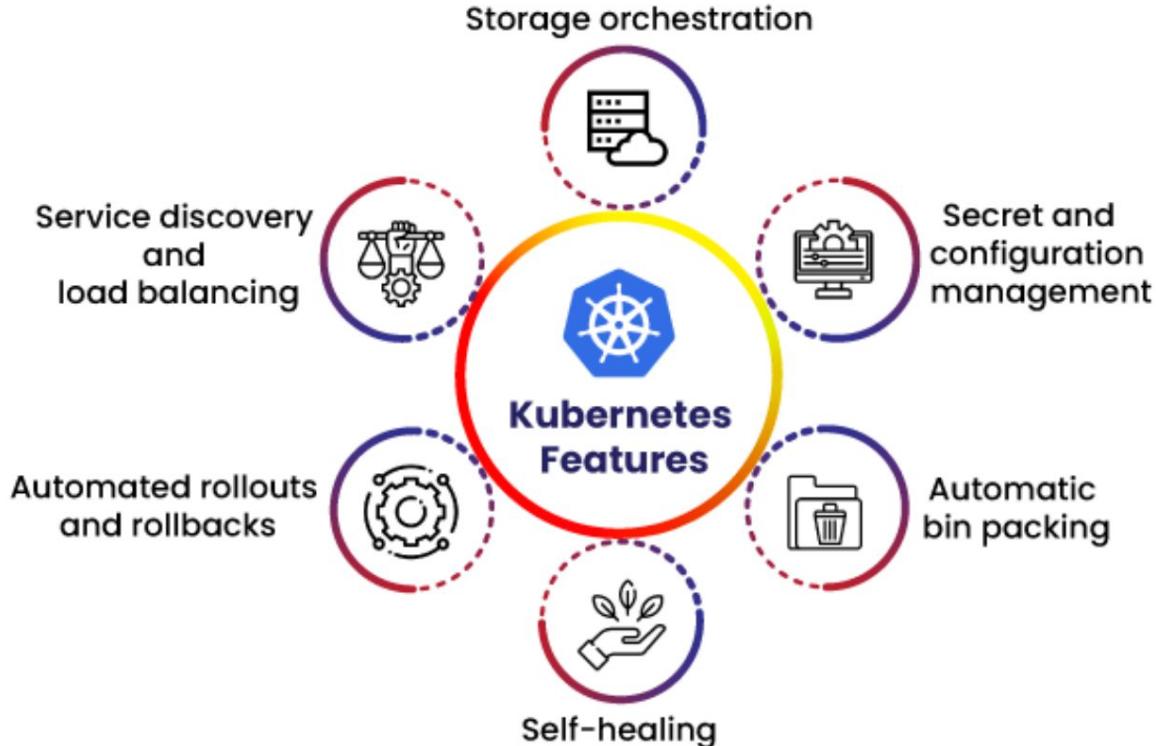
Fun Fact

Don't do this at home

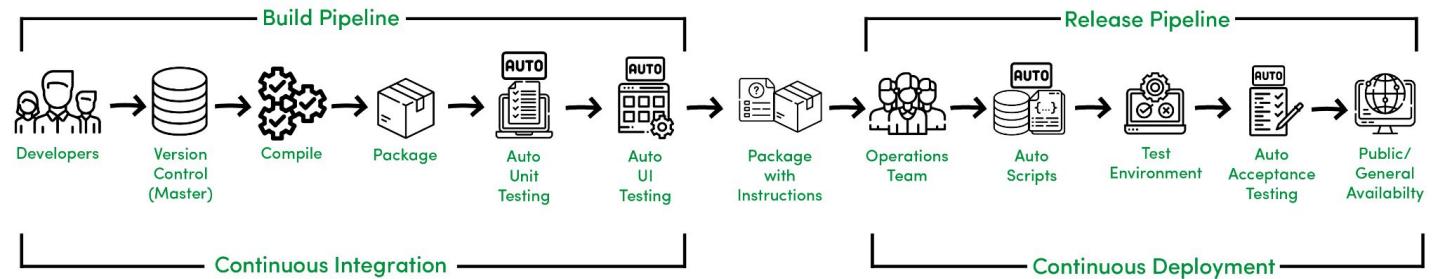
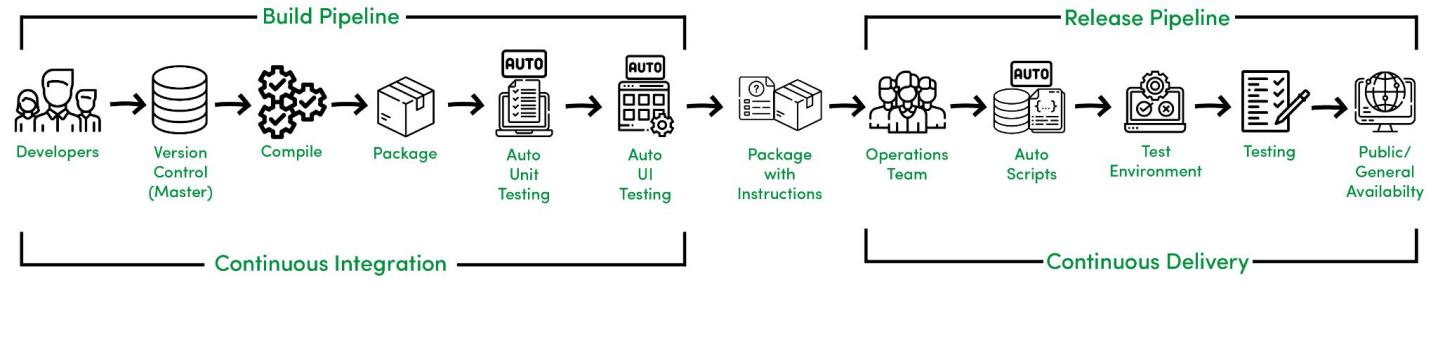
Fun Fact

on Friyay! 🔥

Don't do this at ~~home~~

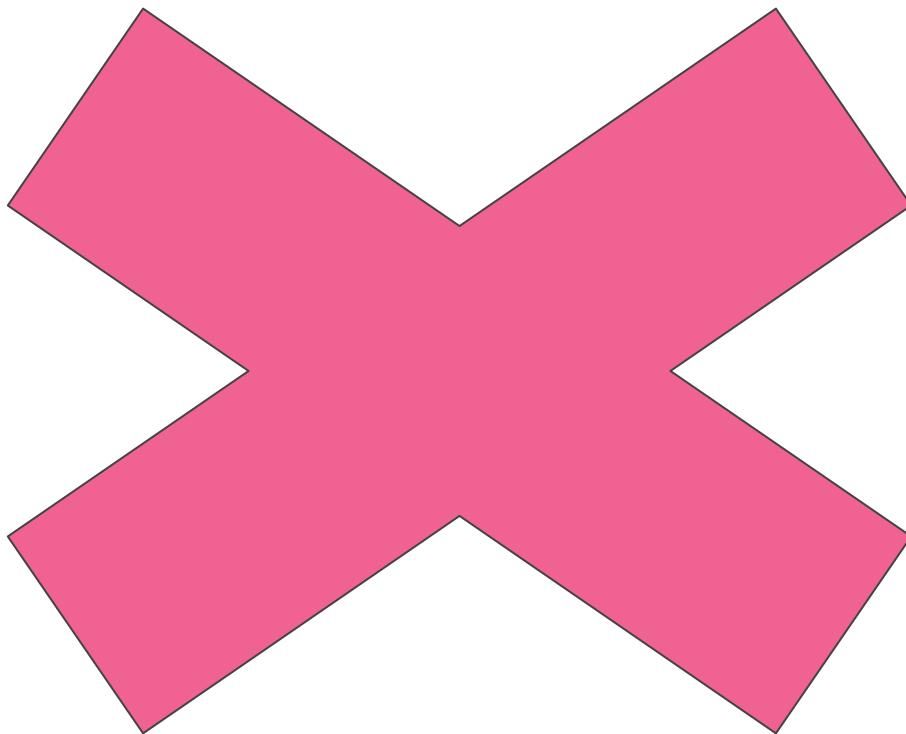


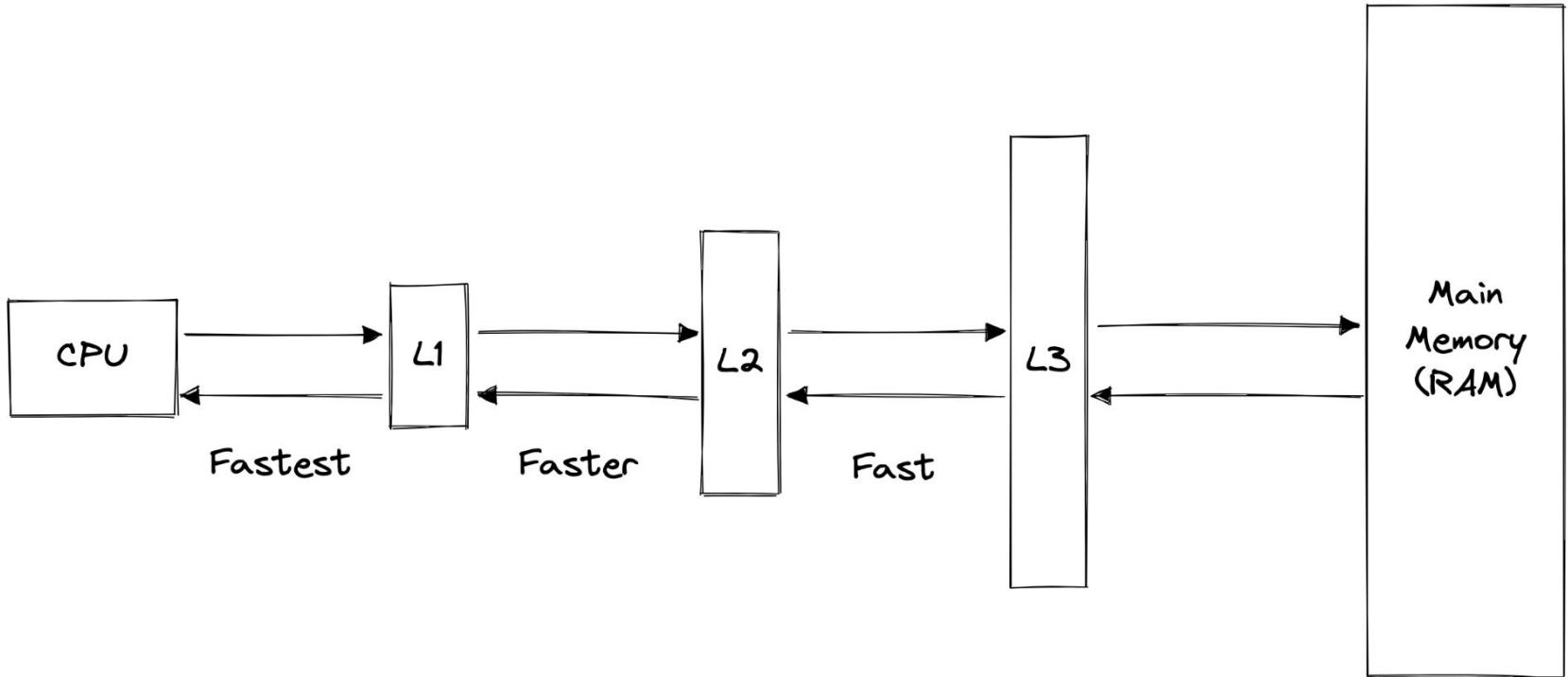
Source: [4 Major Benefits of Using Kubernetes](#)



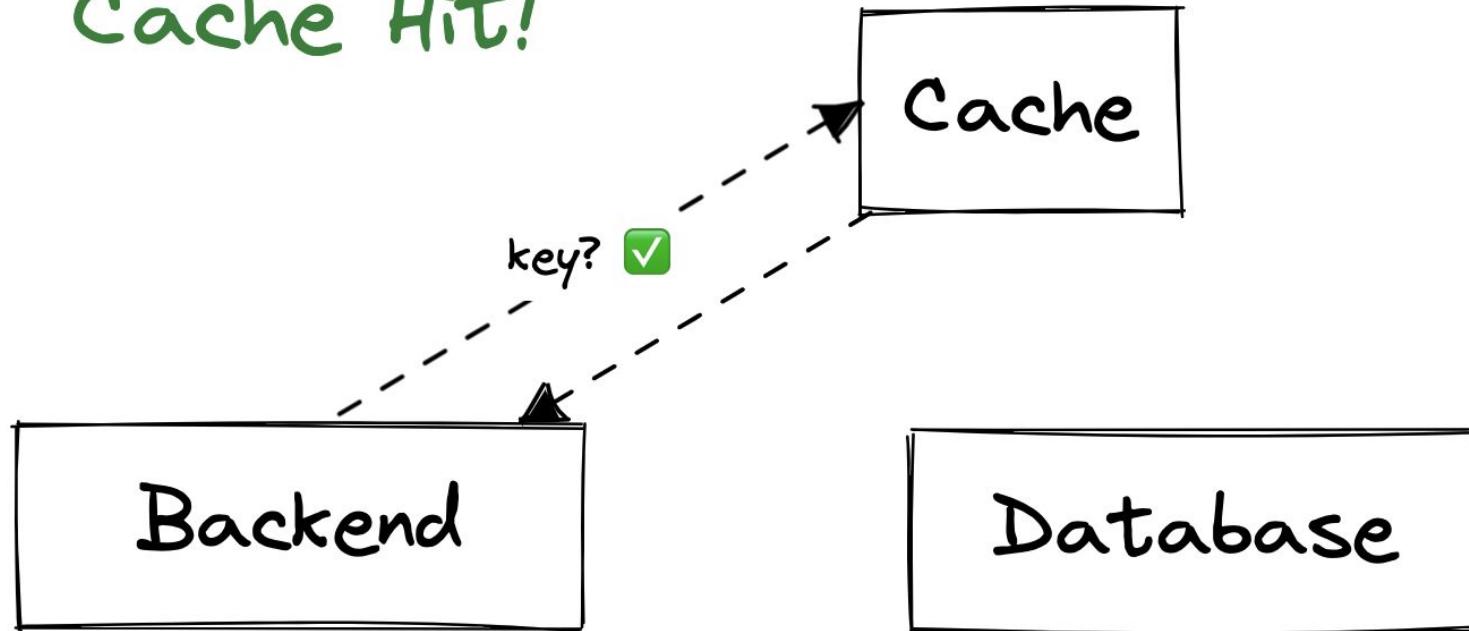
Source: [CI/CD: Continuous Integration and Continuous Delivery](#)

Cache

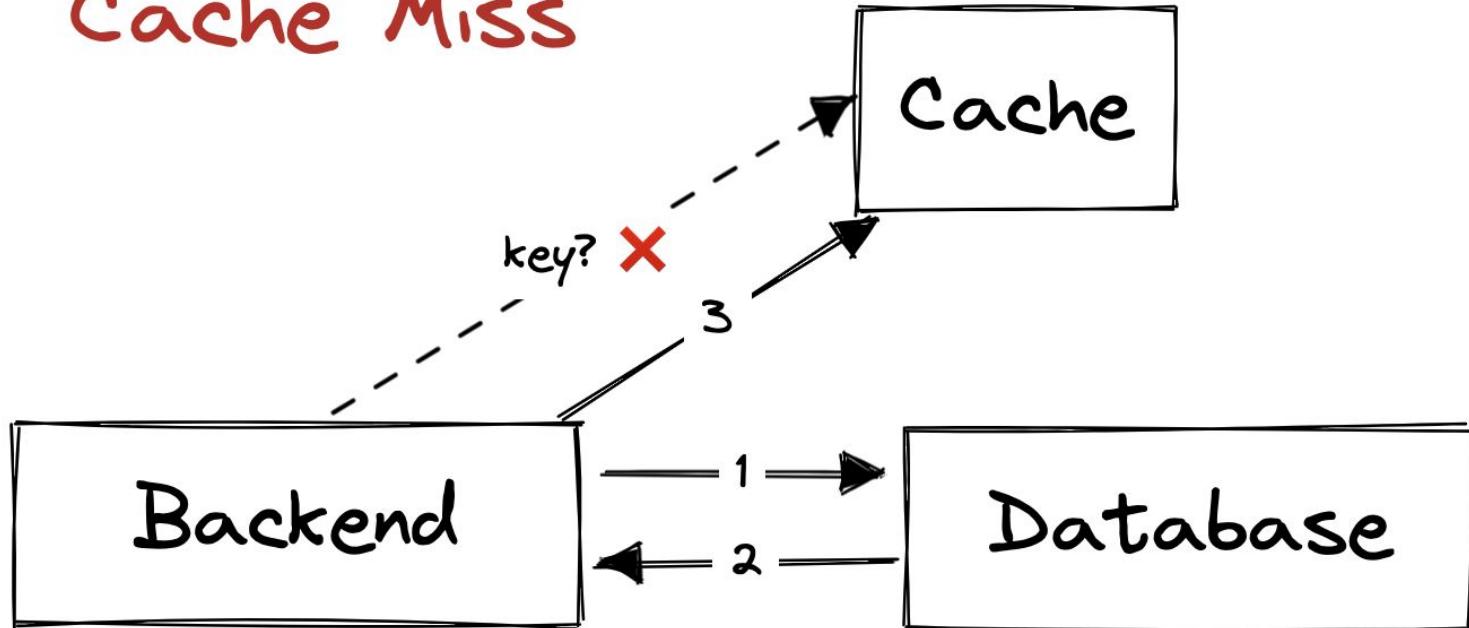




Cache Hit!



Cache Miss



Cloud Computing



5 Essential Characteristics of Cloud Computing

Ref: The NIST Definition of Cloud Computing

<http://csrc.nist.gov/publications/nistpubs/800-145/SP800-145.pdf>



On-demand
self-service



Ubiquitous
network
access



Location
transparent
resource
pooling

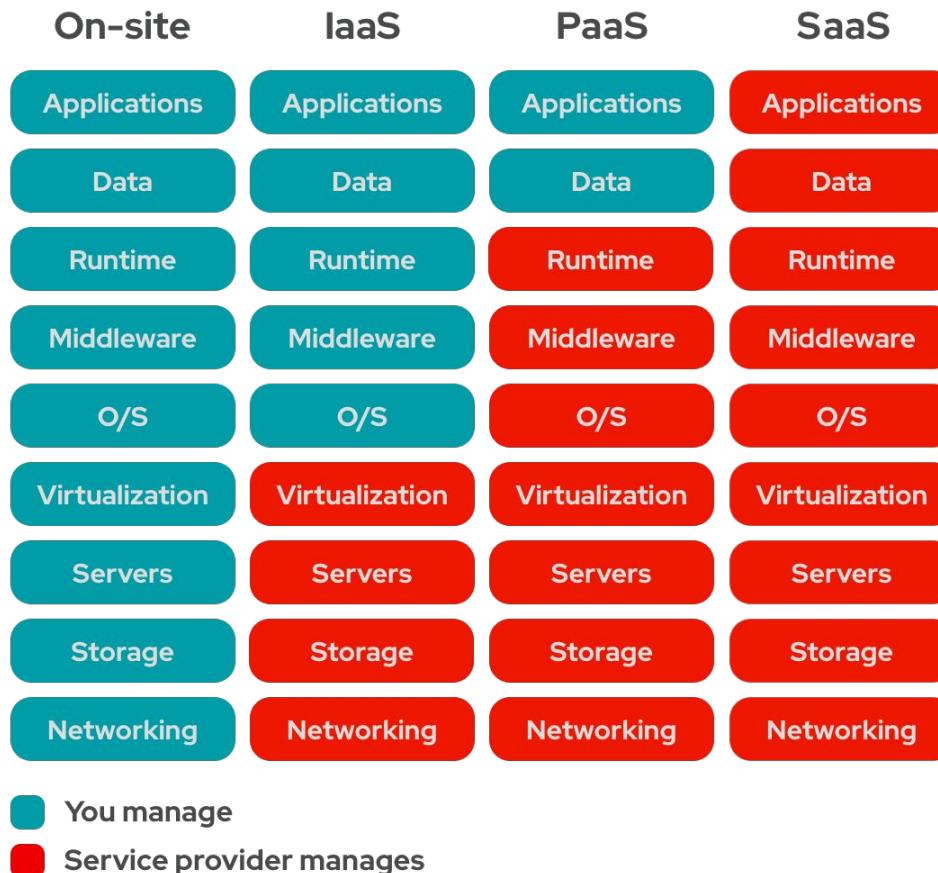


Rapid
elasticity

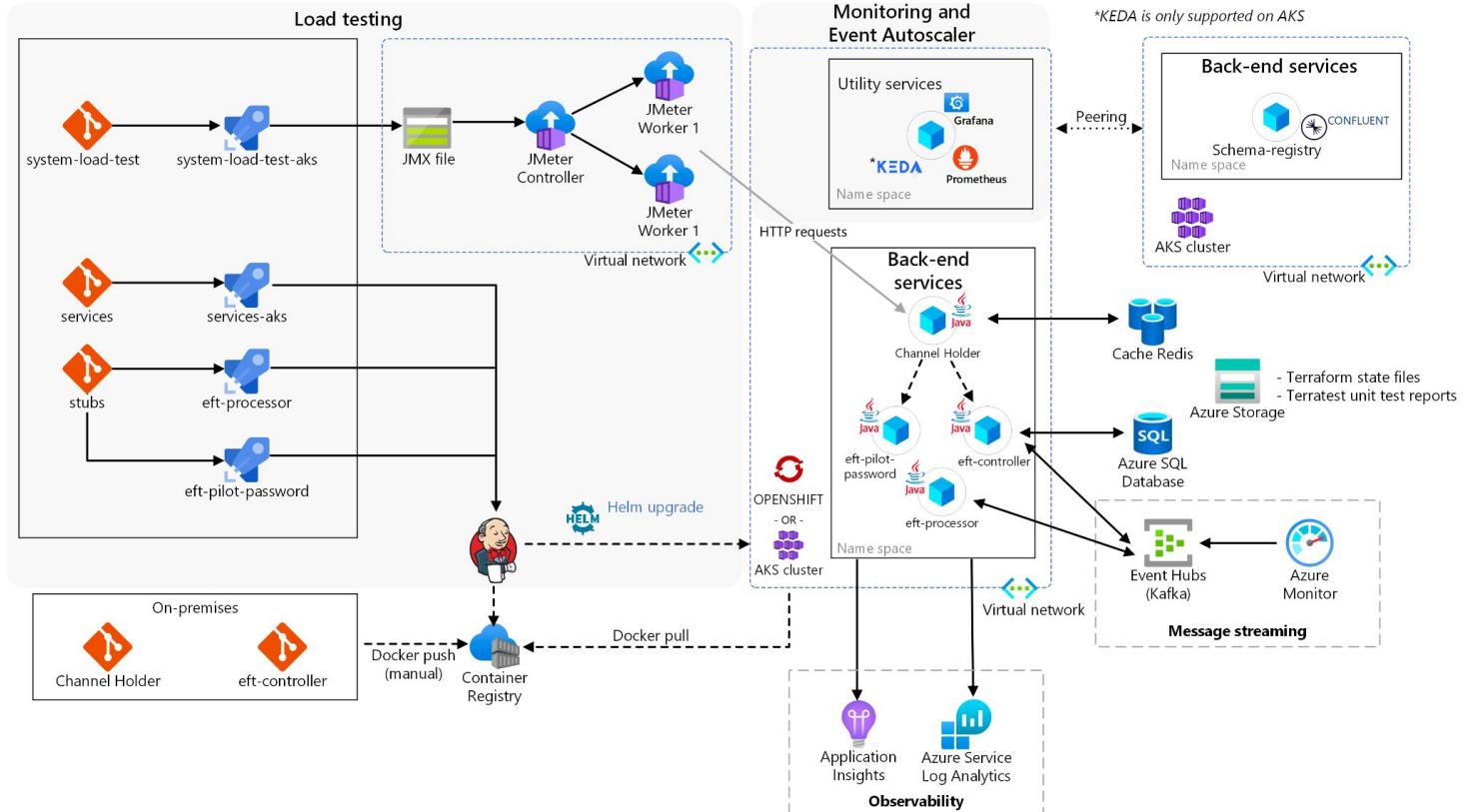


Measured
service with
pay per use

Source: <http://aka.ms/532>



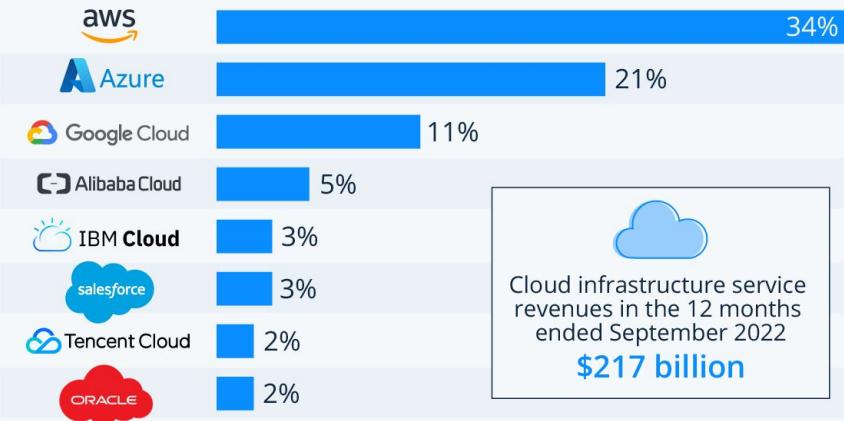
Source: [IaaS vs. PaaS vs. SaaS](#)



Source: [Banking system cloud transformation on Azure](#)

Amazon, Microsoft & Google Dominate Cloud Market

Worldwide market share of leading cloud infrastructure service providers in Q3 2022*



* includes platform as a service (PaaS) and infrastructure as a service (IaaS)
as well as hosted private cloud services

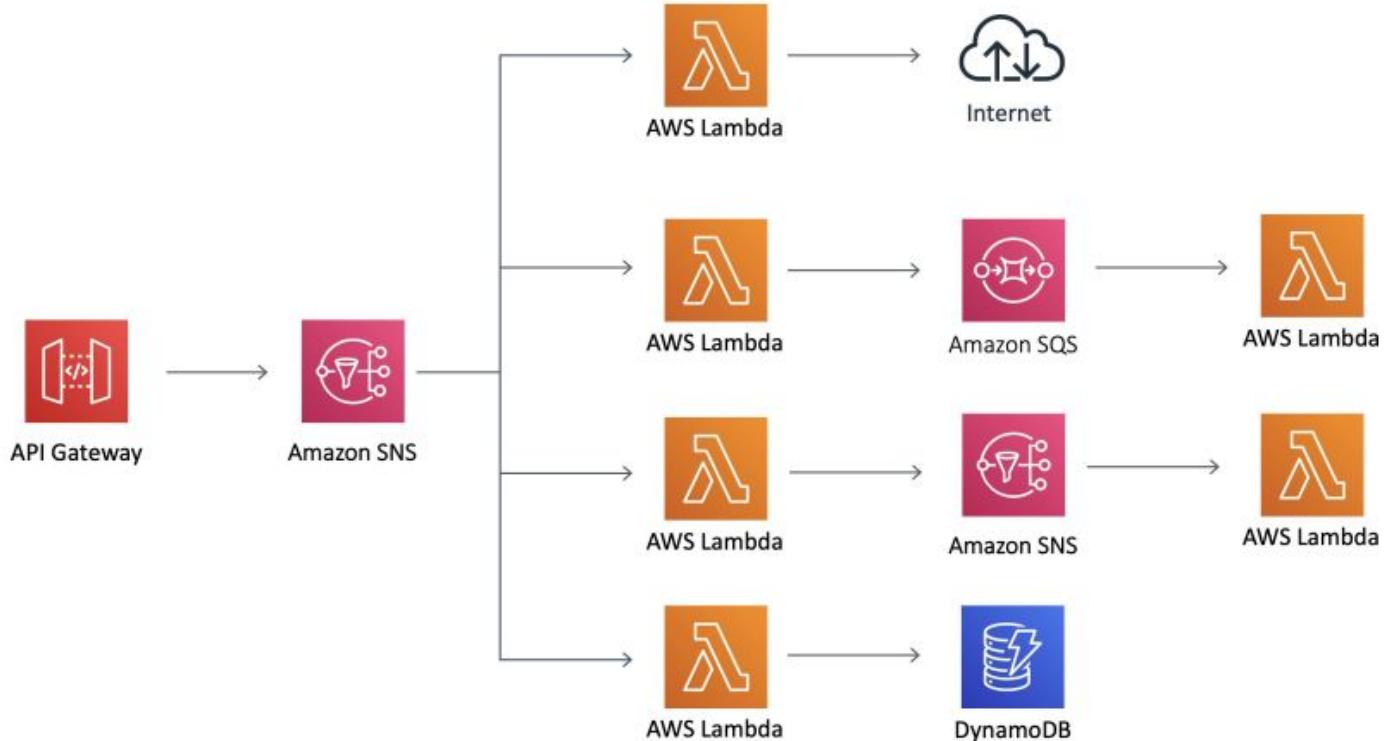
Source: Synergy Research Group



statista

Source: [Amazon, Microsoft & Google Dominate Cloud Market](#)

Serverless Architecture



Source: [Liberty IT Adopts Serverless Best Practices Using AWS Cloud Development Kit](#)



```
const faas = (x) => "do something stable"
const awsLambda = aws(faas)
const azFunc = azure(faas)
const cloudFunc = gcp(faas)
```



$$y = f(x)$$

```
const faas = (x) => "do something stable"
const awsLambda = aws(faas)
const azFunc = azure(faas)
const cloudFunc = gcp(faas)
```

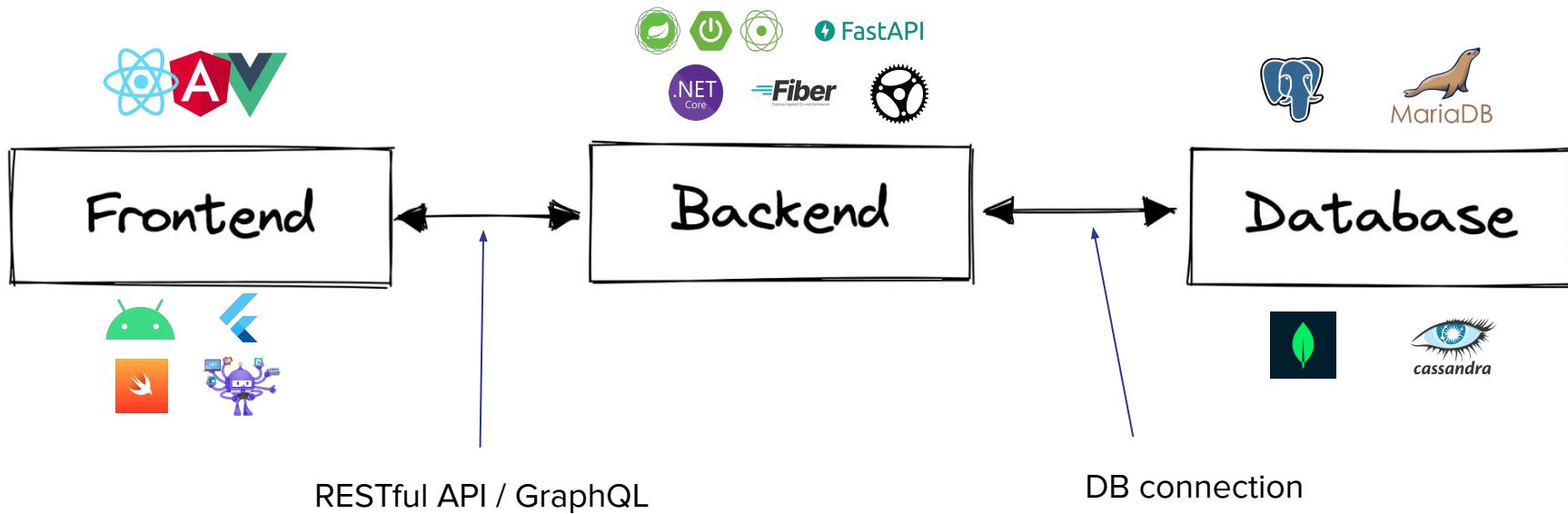
AWS, Azure, GCP, Alibaba?

Cloud computing!

Retake a look again 😊



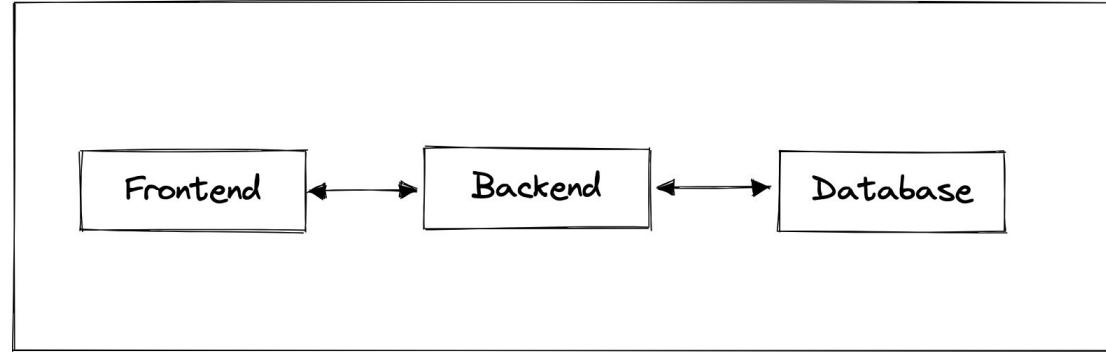
My Example



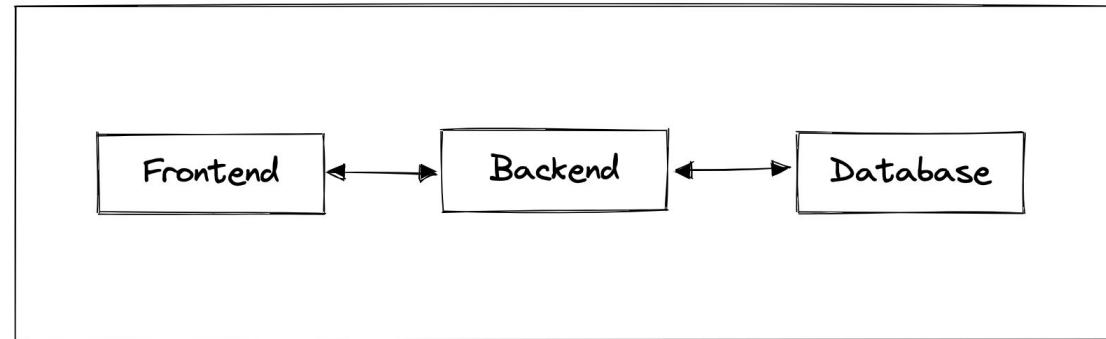
Make your own architecture



Department#1

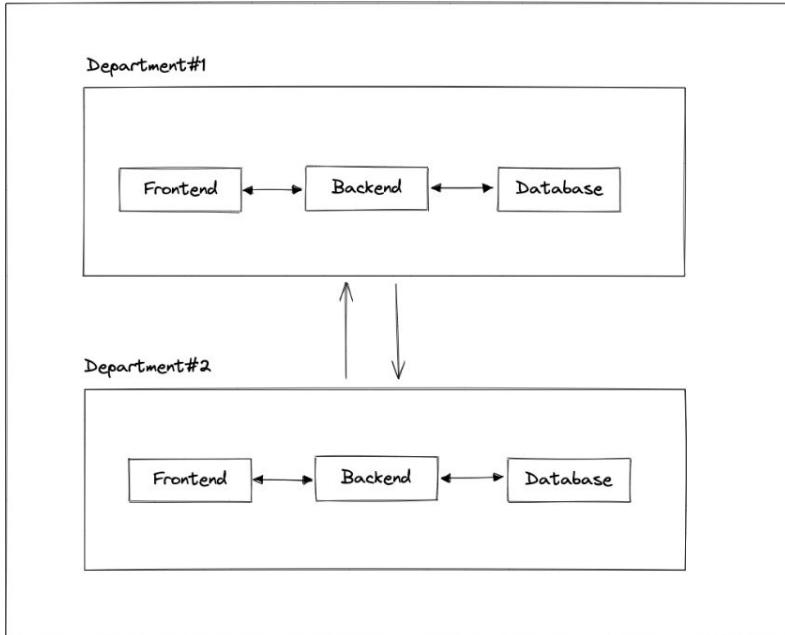


Department#2

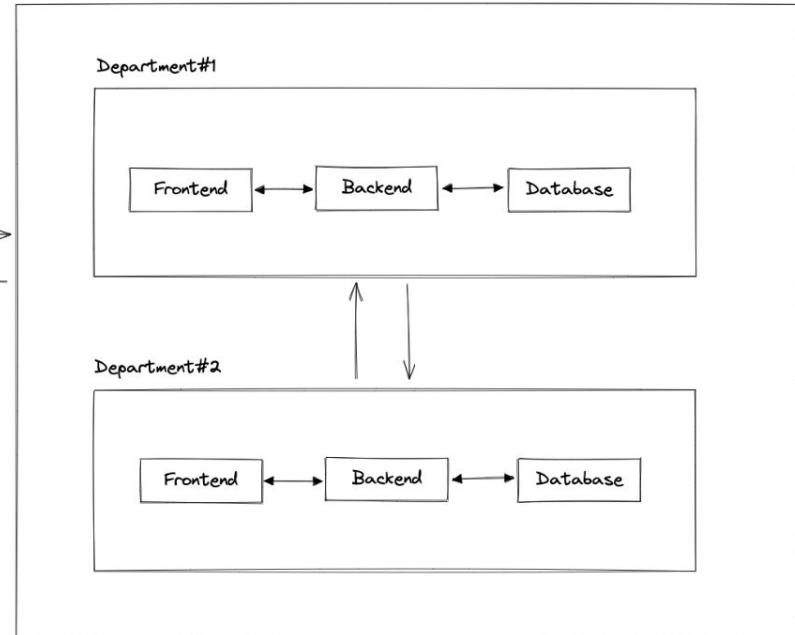


Sync? Async? 🤔

Company A



Company B

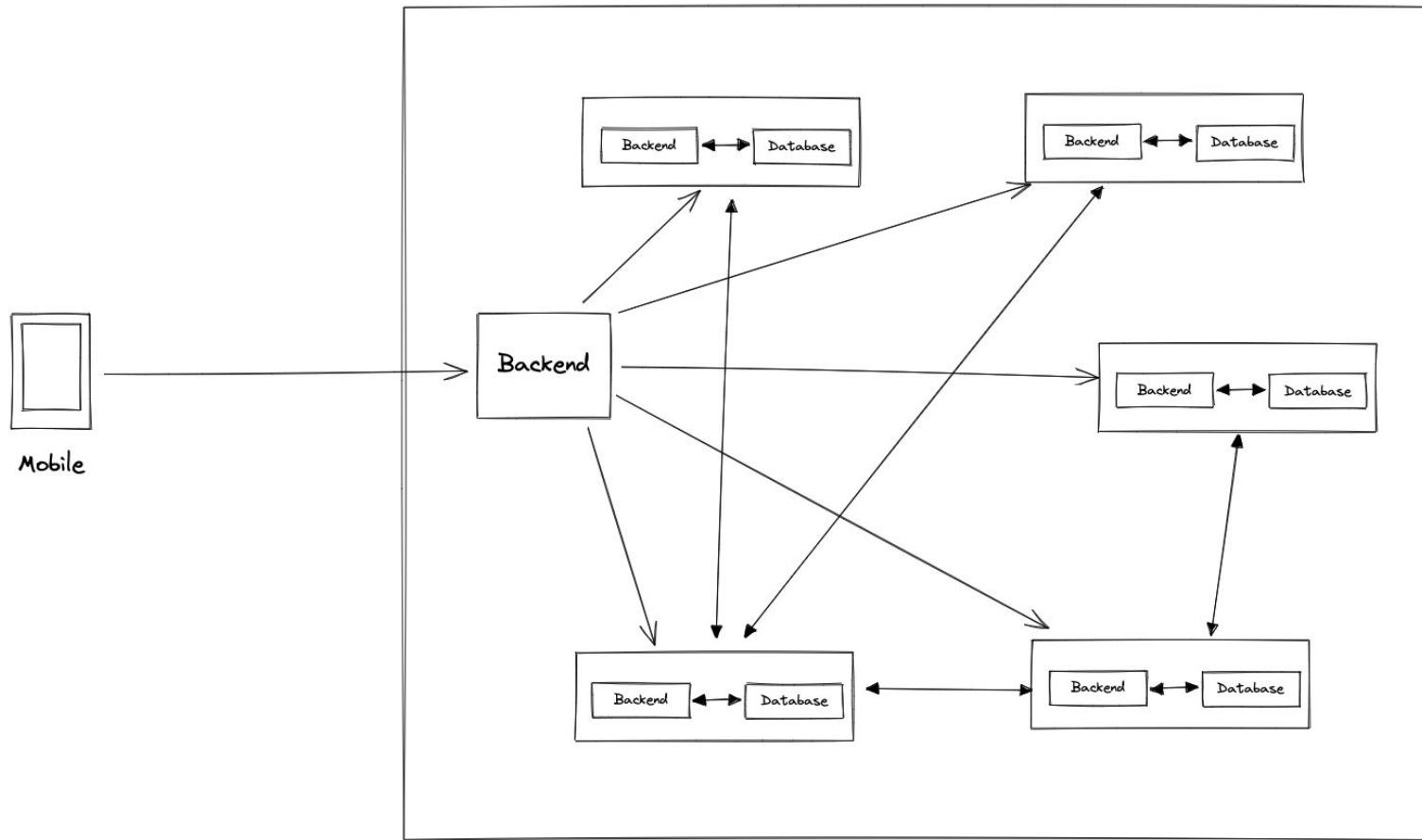


Sync? Async? 🤔

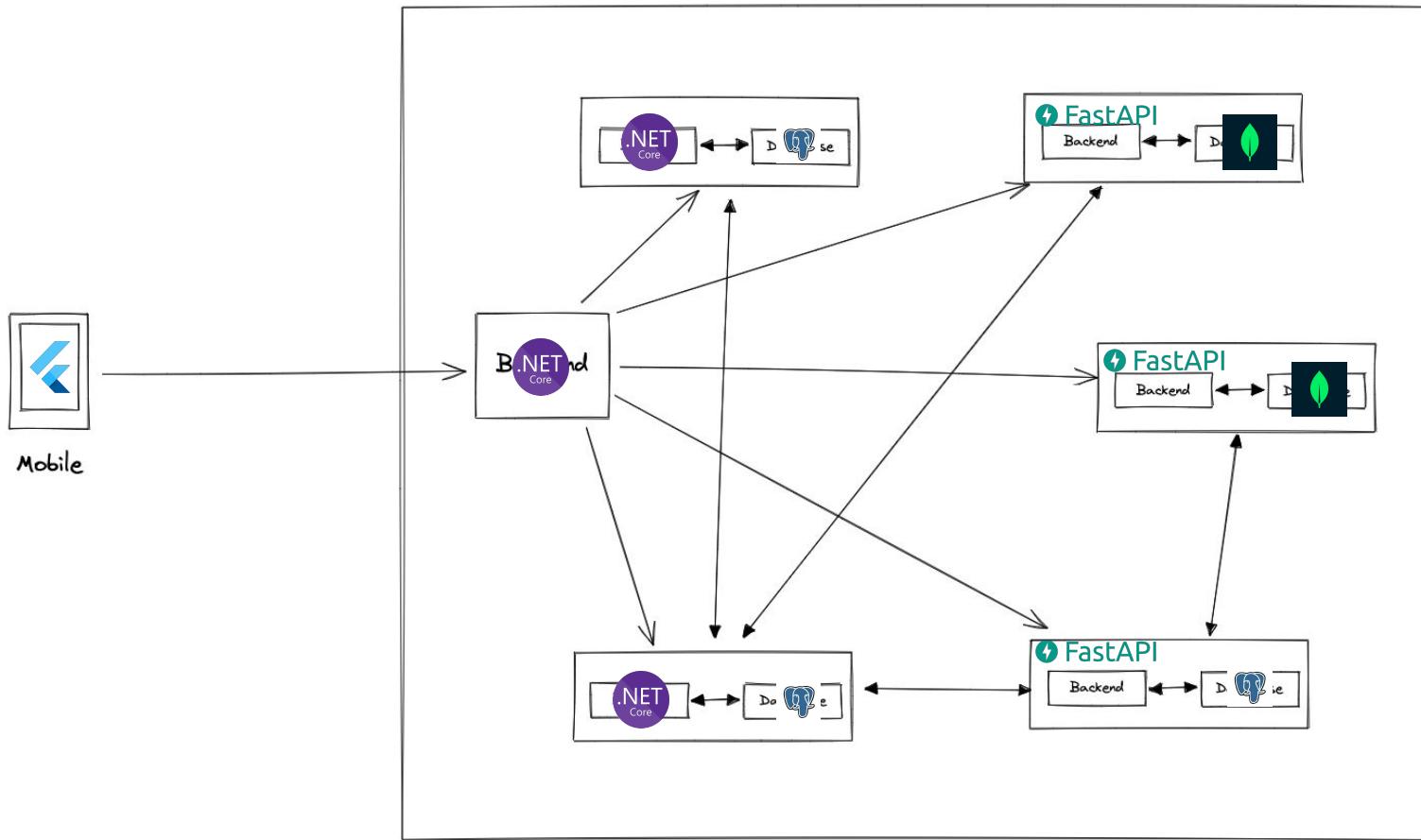


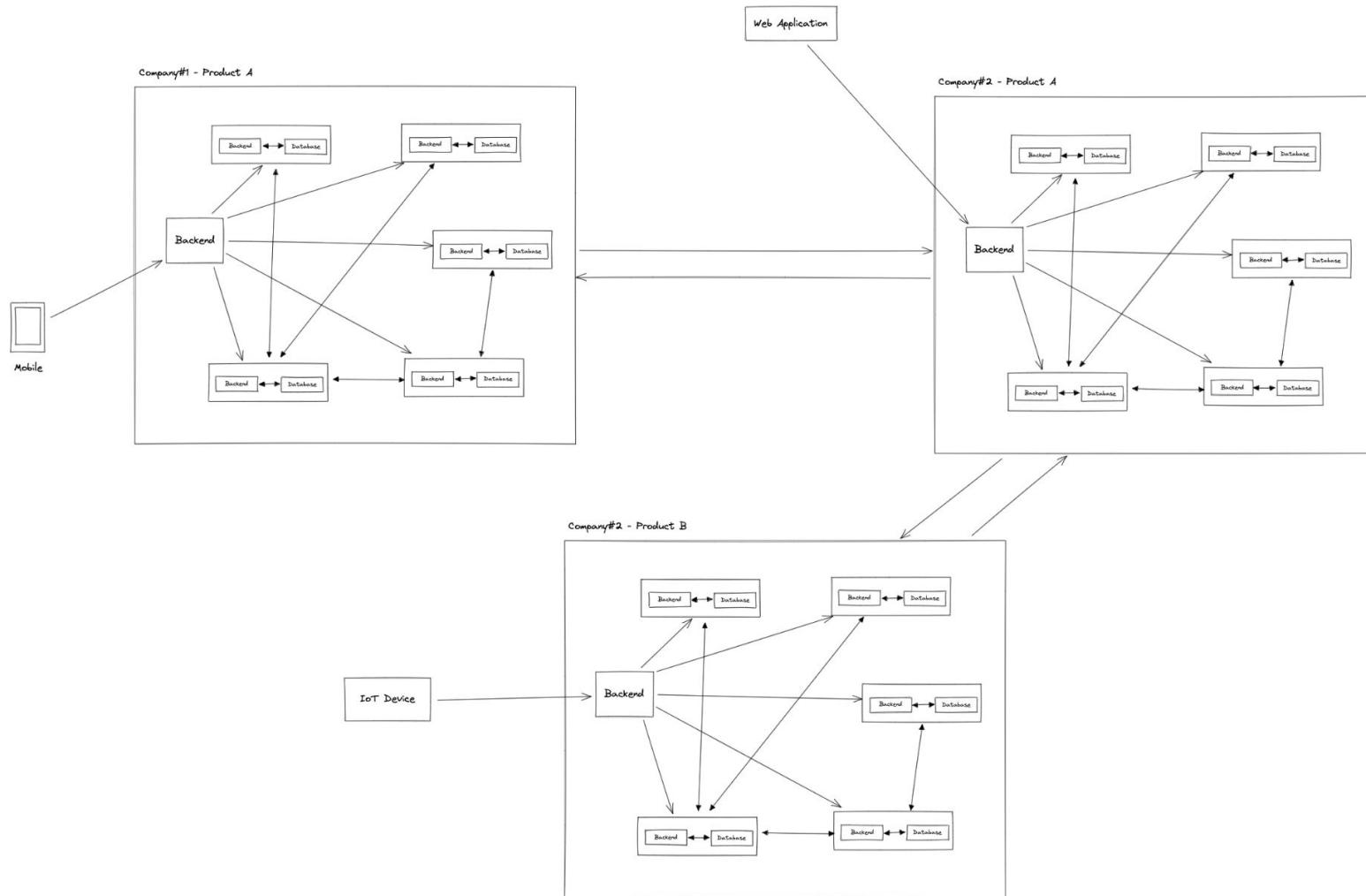
What about this?

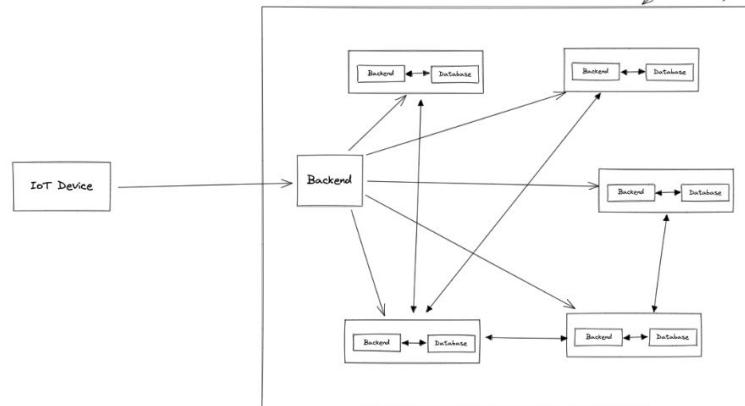
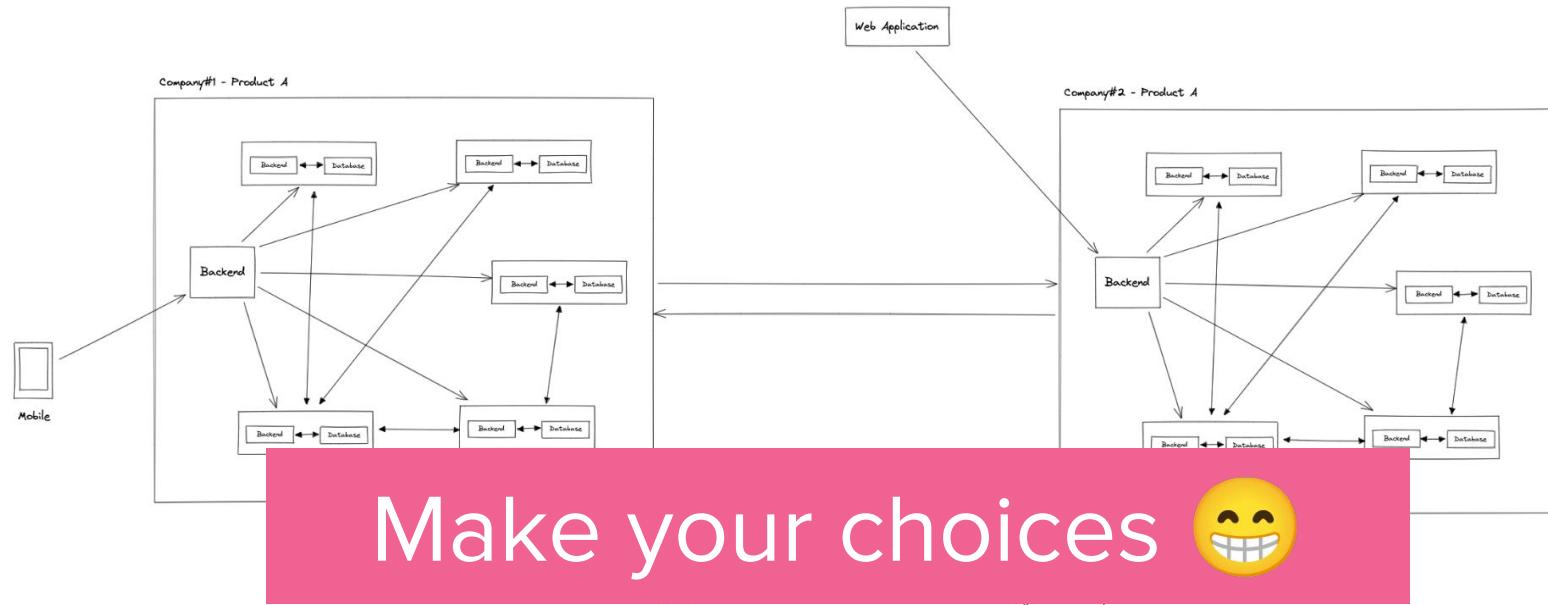
Product A



Product A







That's why fundamentals
call "fundamentals"

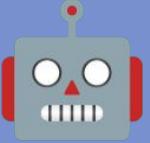


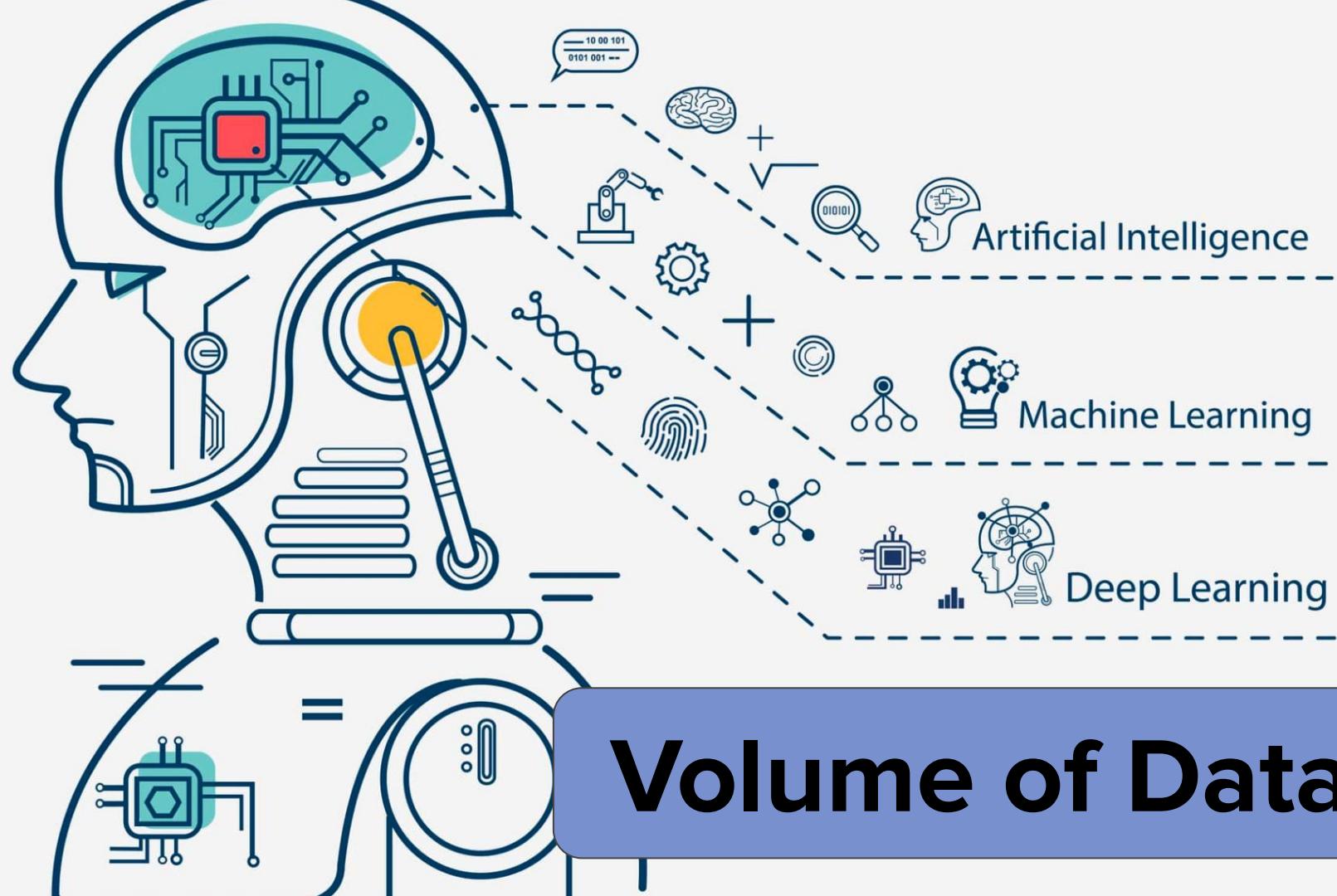
Exclude topics

- Dev(Sec)Ops
- Cloud-Native
- Agile
- Testing
- Security



AI Era?





Volume of Data

The six Vs of Big Data

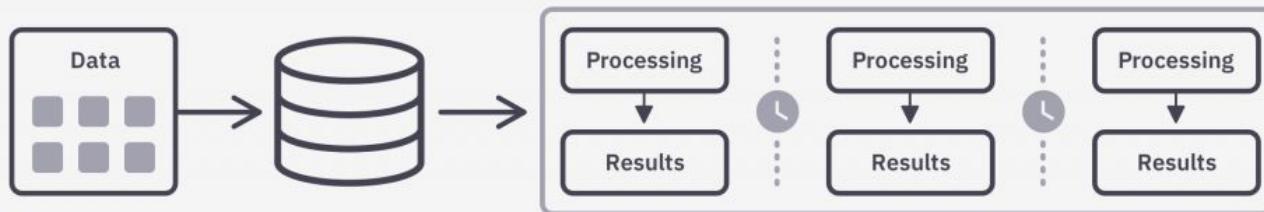
Big data is a collection of data from various sources, often characterized by what's become known as the 3Vs: volume and velocity.

Over time, other Vs have been added to descriptions of big data:

VOLUME	VARIETY	VELOCITY	VERACITY	VALUE	VARIABILITY
The amount of data from myriad sources 	The types of data: structured, semi-structured, unstructured 	The speed at which big data is generated 	The degree to which big data can be trusted 	The business value of the data collected 	The ways in which the big data can be used and formatted 

Source: [BIG DATA IN EDUCATION: HOW DATA SCIENCE TRANSFORMS EDUCATION PROCESS](#)

Batch Processing



Data Stream Processing



Source: [Stream data model and architecture](#)

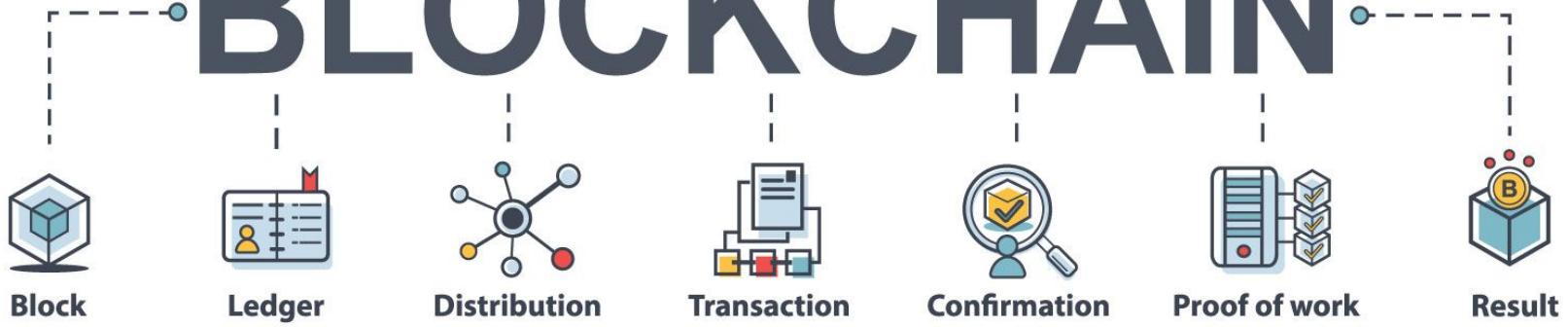


AI required high computing

That's why cloud computing

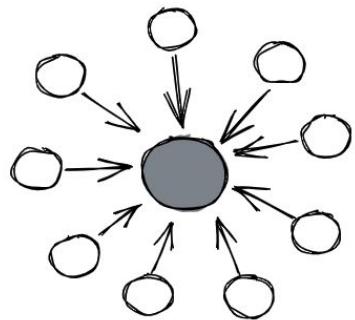
Blockchain?

BLOCKCHAIN

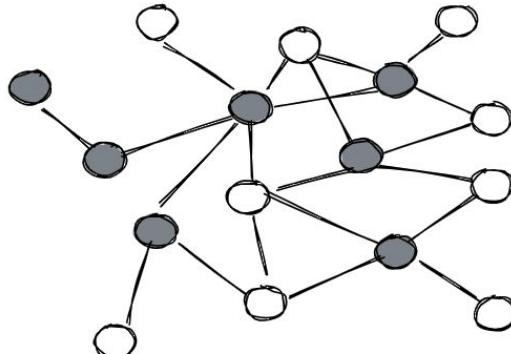


Source: [The Beginning of a New Era in Technology: Blockchain Traceability](#)

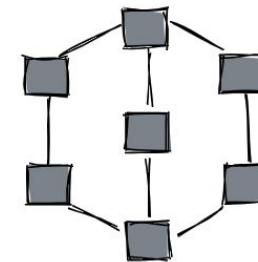
Web 1.0



Web 2.0



Web 3.0

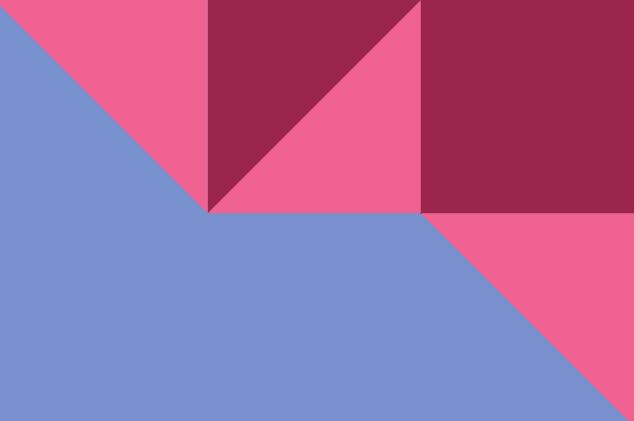


Now

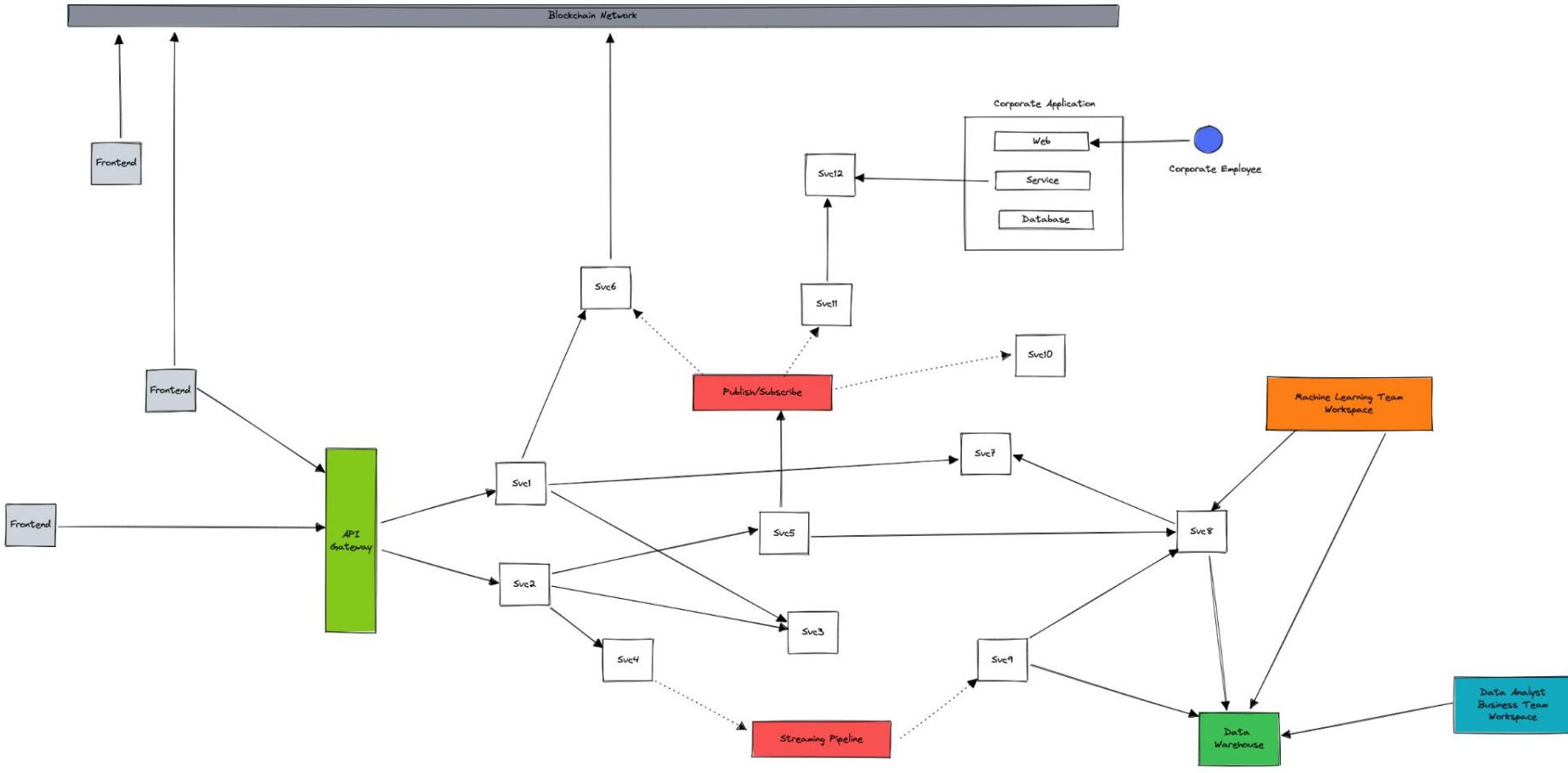
Emerging Trend



Source: [What are DApps in Blockchain?](#)



Let's combine all of them

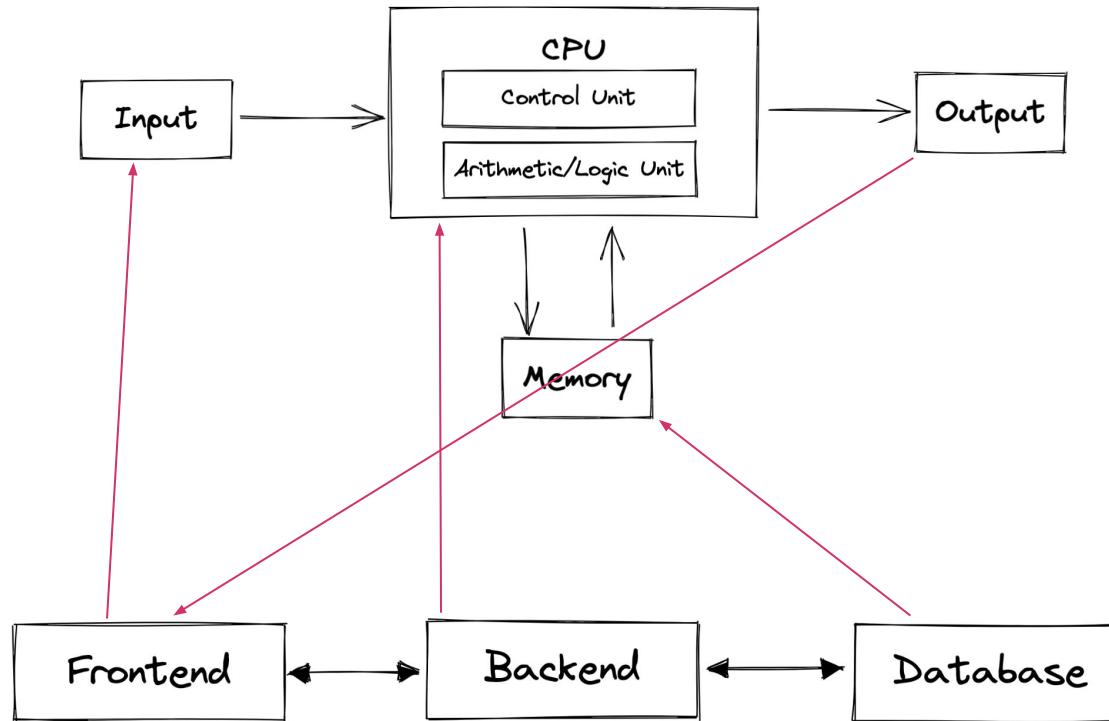


That's why fundamentals
call "fundamentals"





Let's back to the origin



That's why fundamentals
call "fundamentals"



