Developer to CTO

CS 7002

Romain Untereiner

Develop

Throwback to yesterday:
information/data layers

A framework for thinking about data and analytics.

Analytics
Added context to some metrics to tell a story that will inform future decision making.

KPIs
Simply the most important metrics that matter to your business.

Metrics
The collection of one or more measurements to give a standard value of something meaningful.

Measurement
The foundation of all data–driven businesses, collecting data from actions in the systems powers everything above it.

Basic setup for building tech

What do you need ?

Basic setup for building tech

- Ad-hoc setup
    - **UNIX** please
    - **Code editor** / IDE
    - **Docker**
    - for DS folks: python notebook

- **Code repository**

- **Domain name**: anyone that is famous and cheap

- **Server** - what is it?

What is an infrastructure?

Guess

LMGIFY

Information Technology infrastructure is defined broadly as a set of information technology (IT) components that are the foundation of an IT service; typically physical components (server and networking hardware and facilities), but also various software and network components.
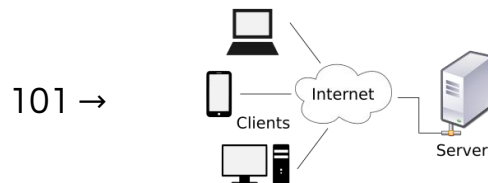
Said differently: *"the thing that is going to make my code run"*

What is a server?

Guess

What is a server?

It is a piece of **computer hardware** with **software** inside that **provides functionality** for other **programs** or **devices** through a **network**

101 →

Said differently: *"a computer available on (inter)net"*

A server is a special computer?

Yes!

It usually has:
     - motherboard
     - central processing unit (CPU)
     - data storage
          - hard drive
          - RAM
   (- graphics card)

And hasn't:
     - monitor
     - sound card
     - GUI

101 computer science

User Applications	Application
OS Interface	Operating system's
Scheduler and Resource Manager	Kernel
File Systems & Network Protocols	Assembler
Device Drivers	Firmware
Computer Hardware	Hardware

Server types

- Web server

- API server

- Database server

- (http) Proxy server

- Storage server

- Queue server

What is a network?

Guess

What is a network?

It is a **group of computers** that use a set of common **communication protocols** over digital **interconnections** for the purpose of **sharing resources** located on or provided by the **network nodes**

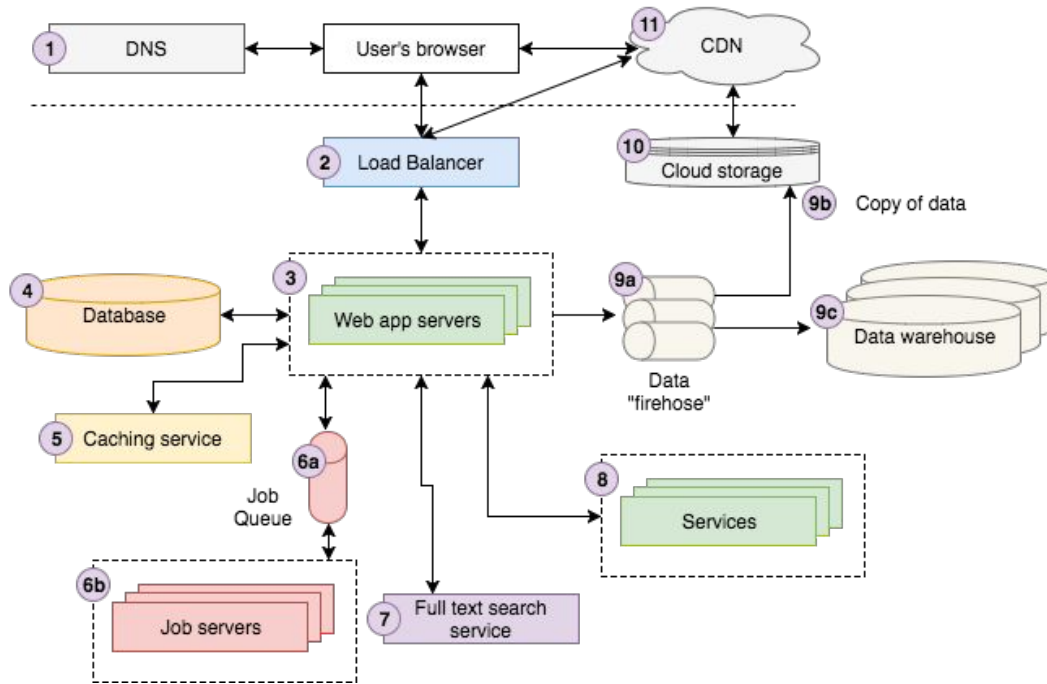Said differently: *"computers connected together"*

101 networking
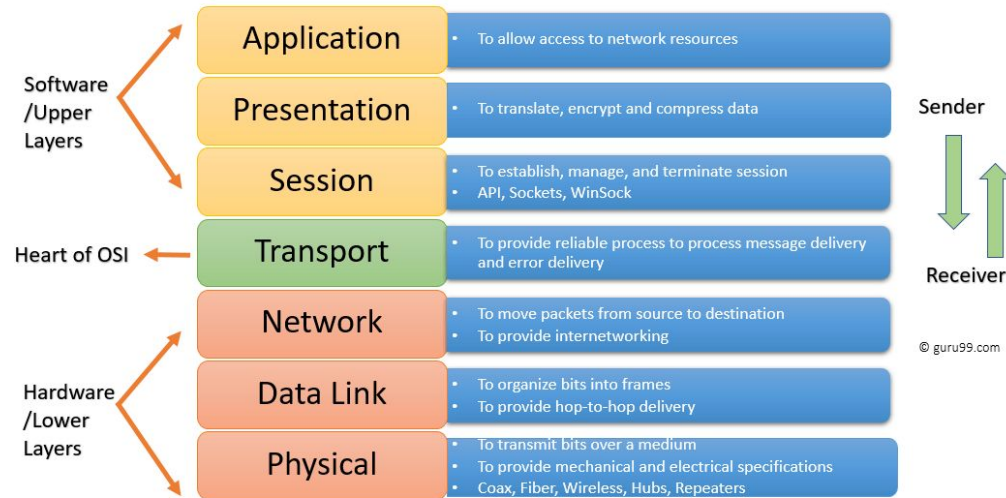
101 networking

Working Of Different Layers

Host1:
1. Application Layer
2. Transport Layer
3. Network Layer
4. Data Link Layer
5. Physical Layer

Router1:
1. Network Layer
2. Data Link Layer
3. Physical Layer

Router2:
1. Network Layer
2. Data Link Layer
3. Physical Layer

Host2:
1. Application Layer
2. Transport Layer
3. Network Layer
4. Data Link Layer
5. Physical Layer

Host1 — Router1 — Router2 — Host2
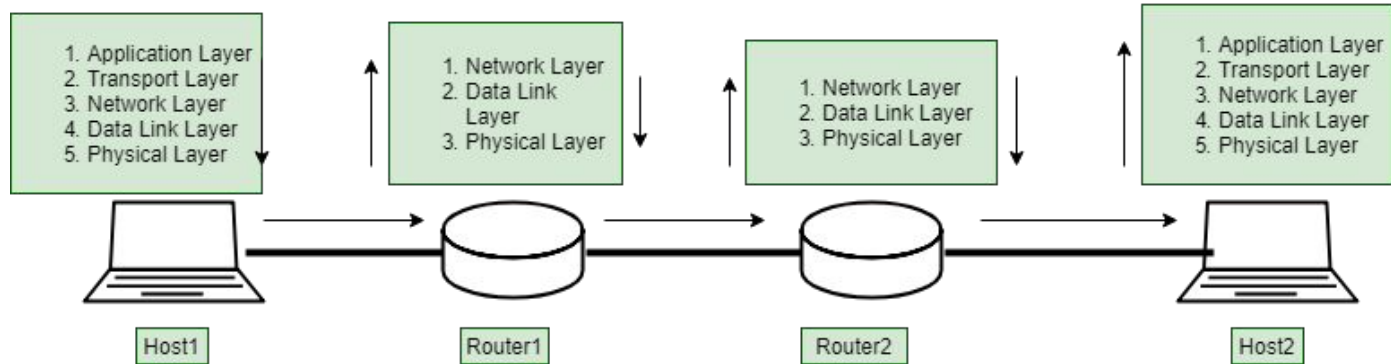
Network concepts

- Firewall

- Router

- Switch

- Load Balancer

Let's talk real

What is an architecture?

Guess

What is an architecture?

It is the overall **design** of a **computing system** and the **logical** and **physical interrelationships** between its **components**.
The architecture specifies the hardware, software, access methods and protocols used throughout the system.

Said differently: *"the design of the infrastructure elements' relations"*

Architecture functions

- DNS

- Network

- Server

- Database

- Proxy

- Load Balancer

- Queue

- CDN

Basic architecture

Single Server

User ——— Server
http://example.com/

example.com → 91.21.245.2

DNS

Basic architecture

Separate Database Server

User — Application Server — Database Server

http://example.com/

Private Network
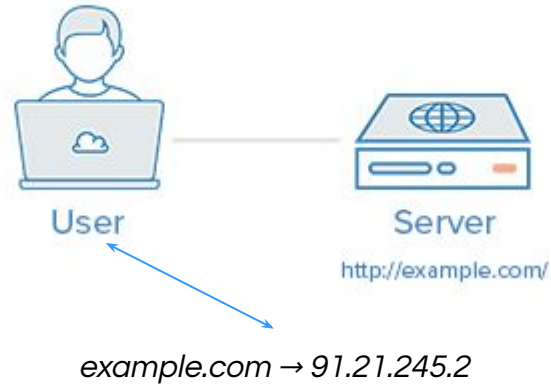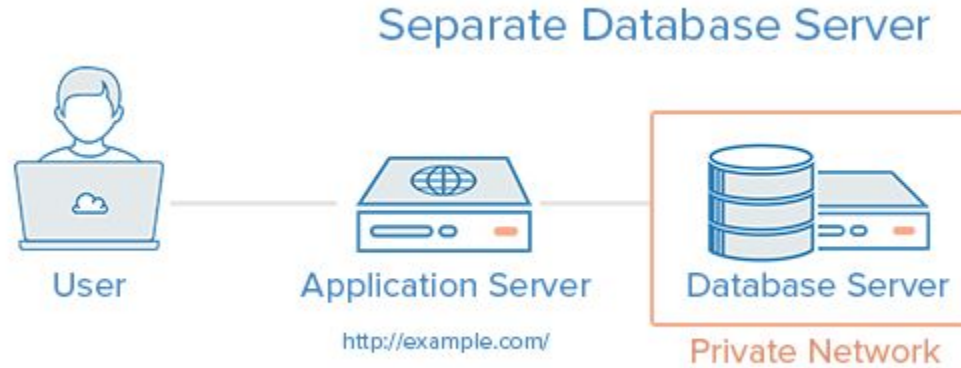
Scalable basic architecture

Scalable & caching basic architecture

HTTP Accelerator

User

HTTP Accelerator Server

http://example.com/

Application Server

Database Server

Private Network
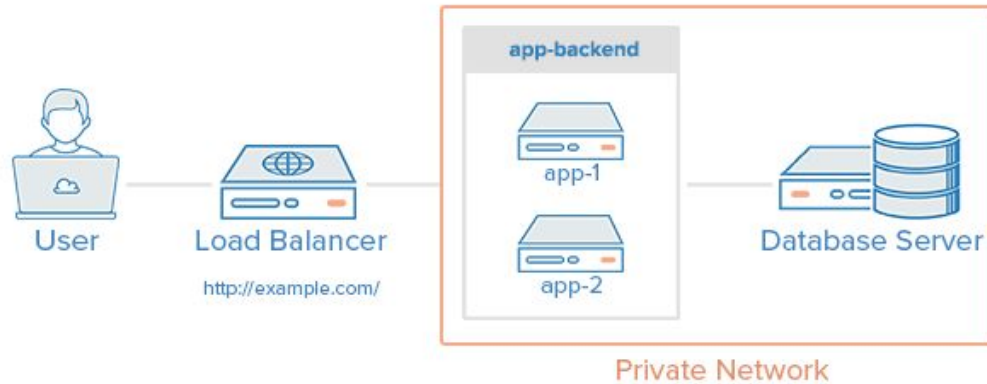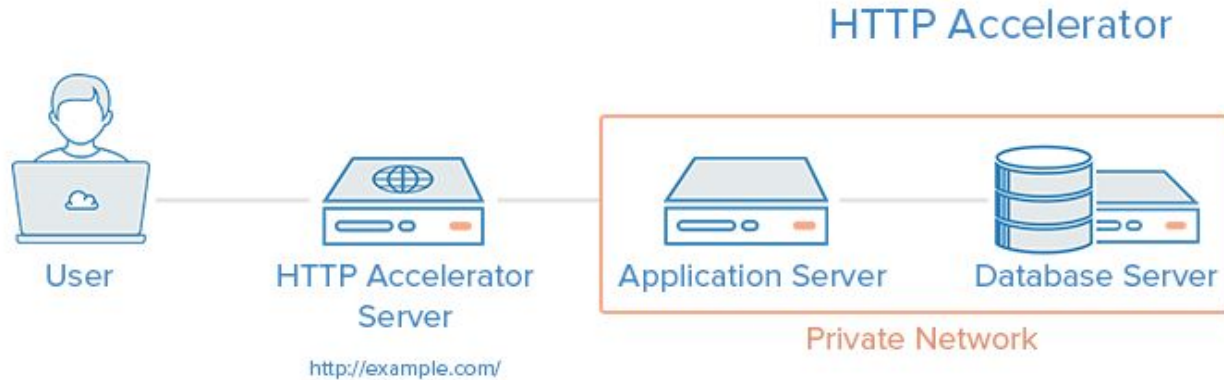
Replicated, scalable & caching basic architecture

Primary-Replica Database Replication
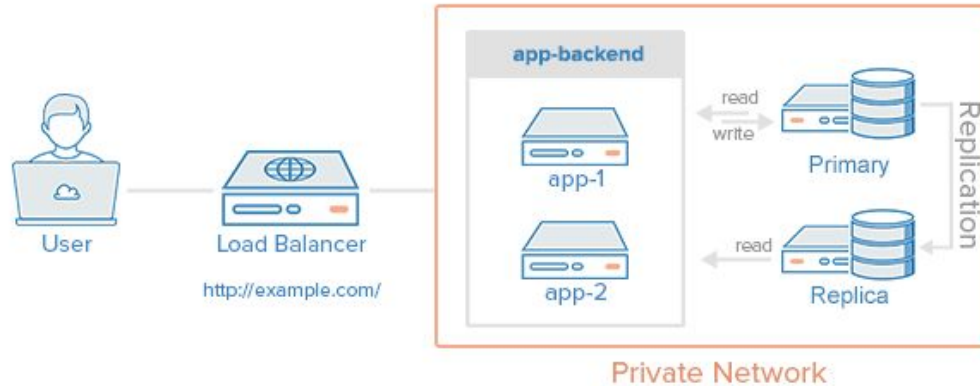
All together

Load Balancer + Cache + Replication Example
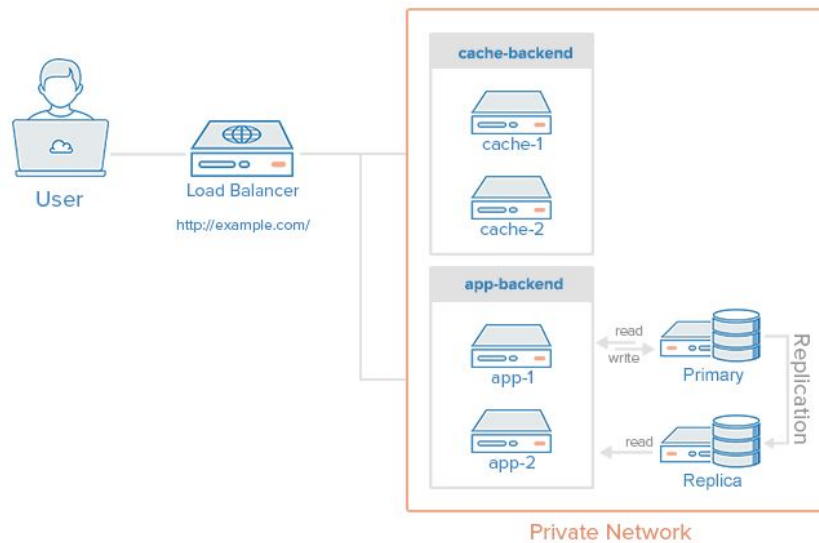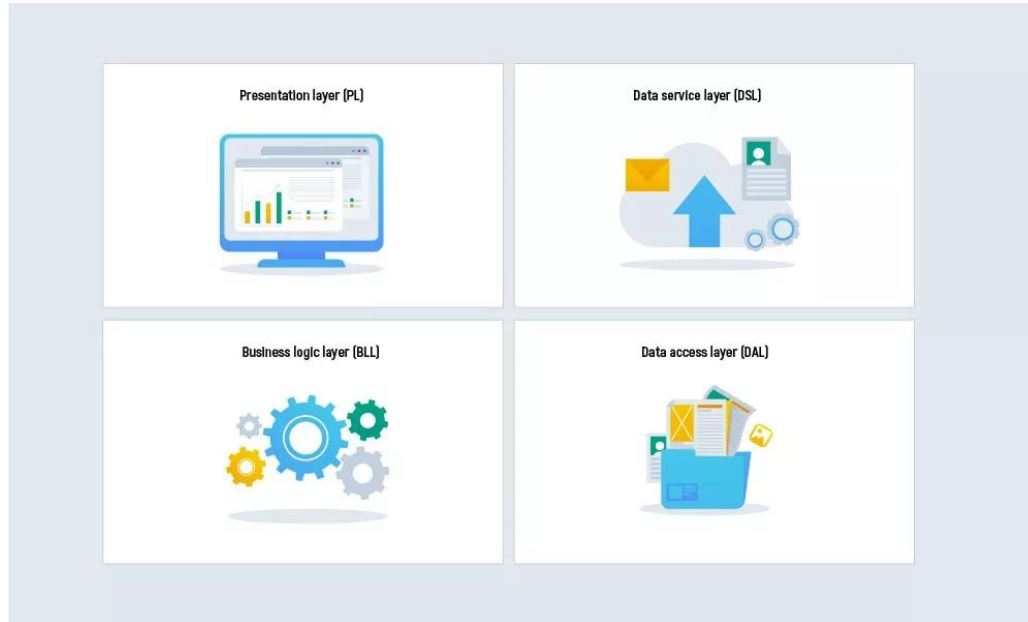
Architecture concepts

- SPOF

- Redundancy

- Replication

- Service

- Server-less

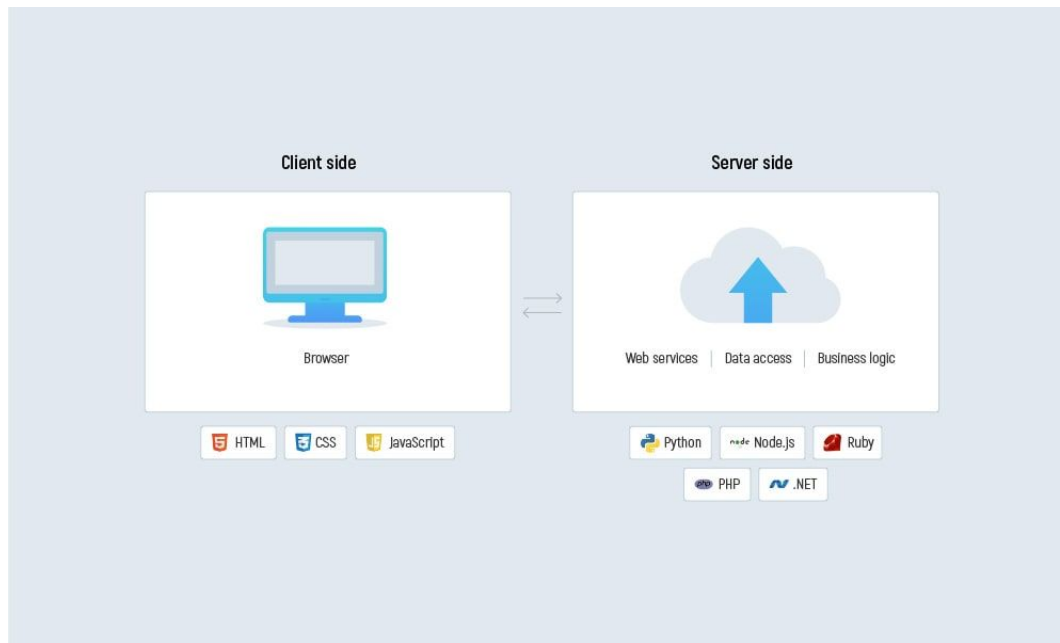- Managed vs Hosted service
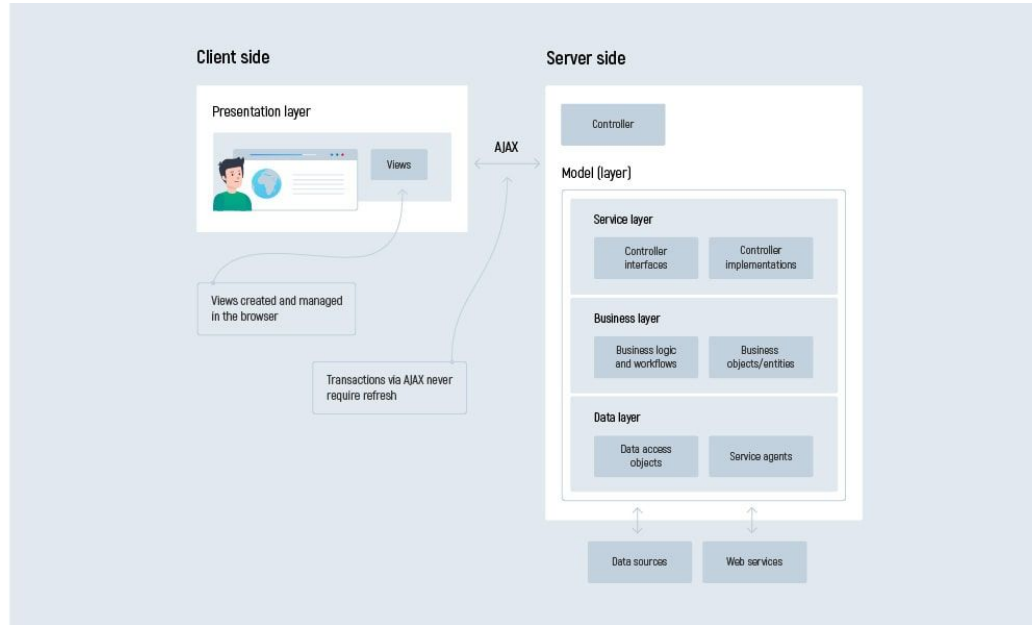
A web architecture

Web application layers

Presentation layer (PL)

Data service layer (DSL)

Business logic layer (BLL)

Data access layer (DAL)
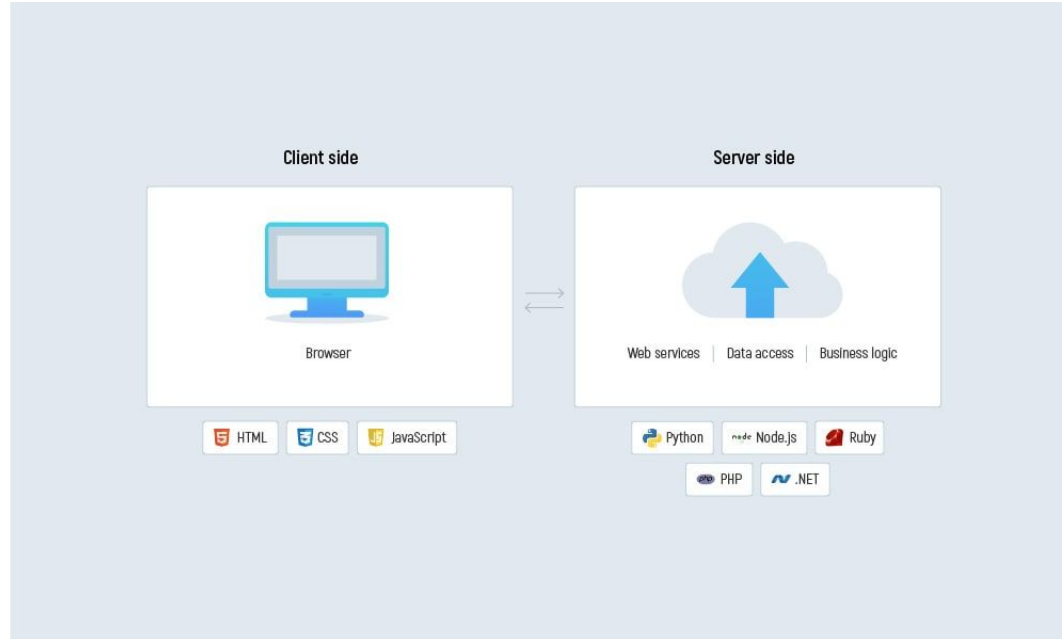
The server side rendered arch.

Client side | Server side

Browser

HTML CSS JavaScript

Web services | Data access | Business logic

Python Node.js Ruby
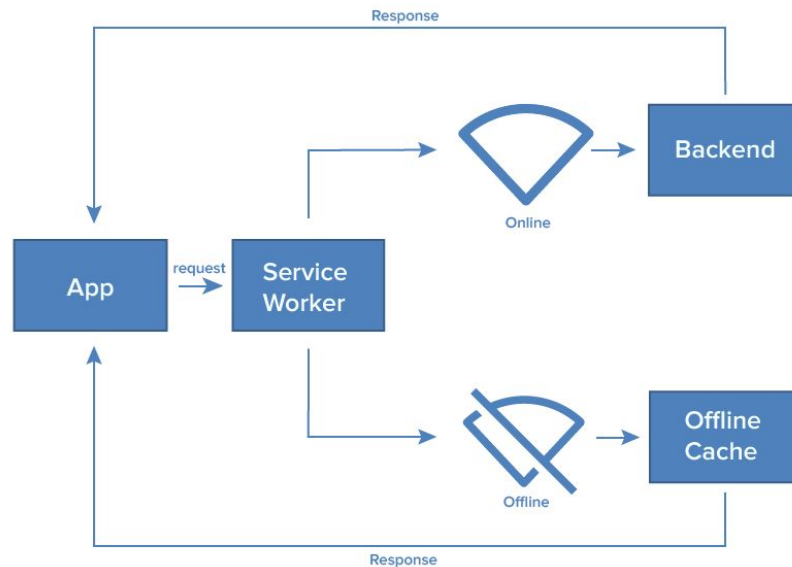PHP .NET
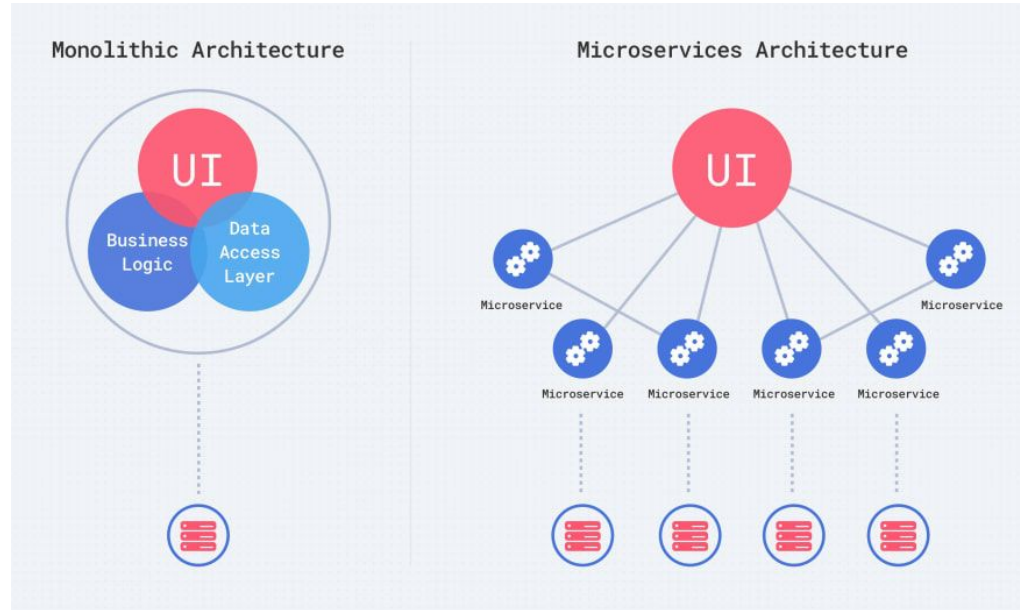
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220

The SPA architecture

The PWA architecture

Architectures patterns

- SOA: service oriented architecture

- CQRS: Command Query Response Segregation
(https://medium.com/@sderosiaux/cqrs-what-why-how-945543482313)

- EDA: event driven architecture

→ invites to create multiple small services instead of one big

Monolith vs Microservices
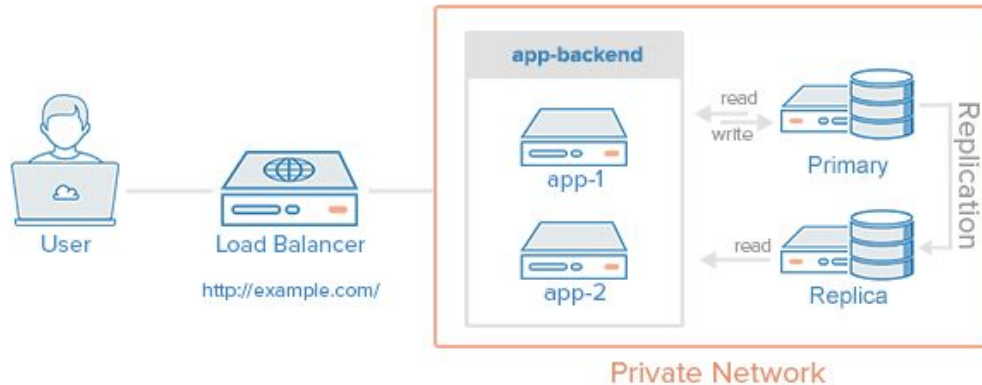
Architectures patterns

- SOA: service oriented architecture

- CQRS: Command Query Response Segregation
(https://medium.com/@sderosiaux/cqrs-what-why-how-945543482313)

- EDA: event driven architecture

Something good to begin with

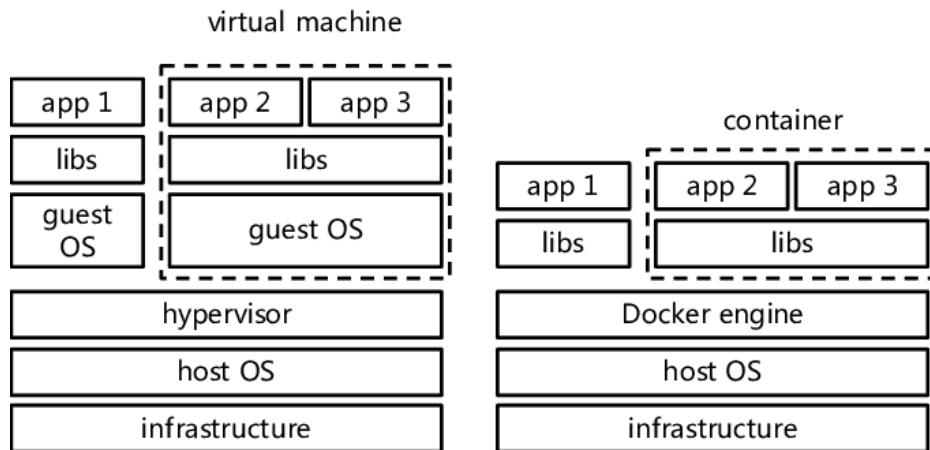## Primary-Replica Database Replication

Using:
-   PWA (SSR)
-   REST API
-   SQL db

What are a VM and a container?

It's yet harder, but try to guess

What are a VM and a container?

Session learnings

- Basic setup for building tech

- What is an infrastructure

- The main elements of an infrastructure

- What is architecture

Next session

- Develop modern systems

- What is the cloud

- The main element of the cloud

- How to create a modern infrastructure