

# Cloud Workshop

Cloud Technology Essentials

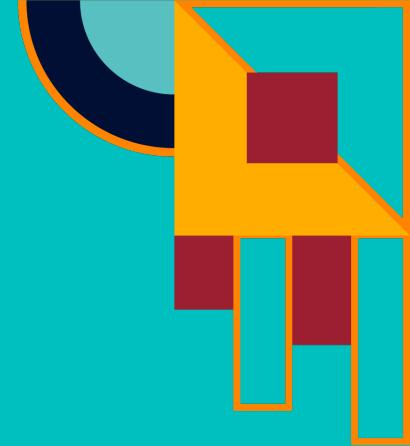


# Outline

Networking 1 2 Cloud

Deployment 3 4 Breakout

More on Cloud 5 6 Q & A



# Networking

## Essential Basics

How information is transmitted over **computer networks**,  
network architecture, HTTP, APIs, and web applications





# Networking Objectives

Layers of Networking

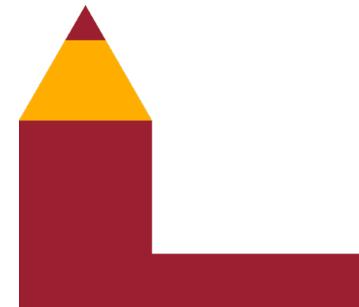
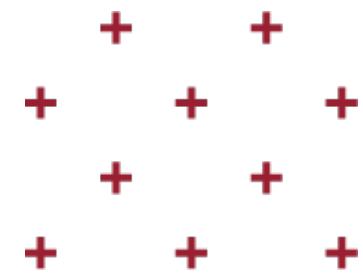
Requests and responses

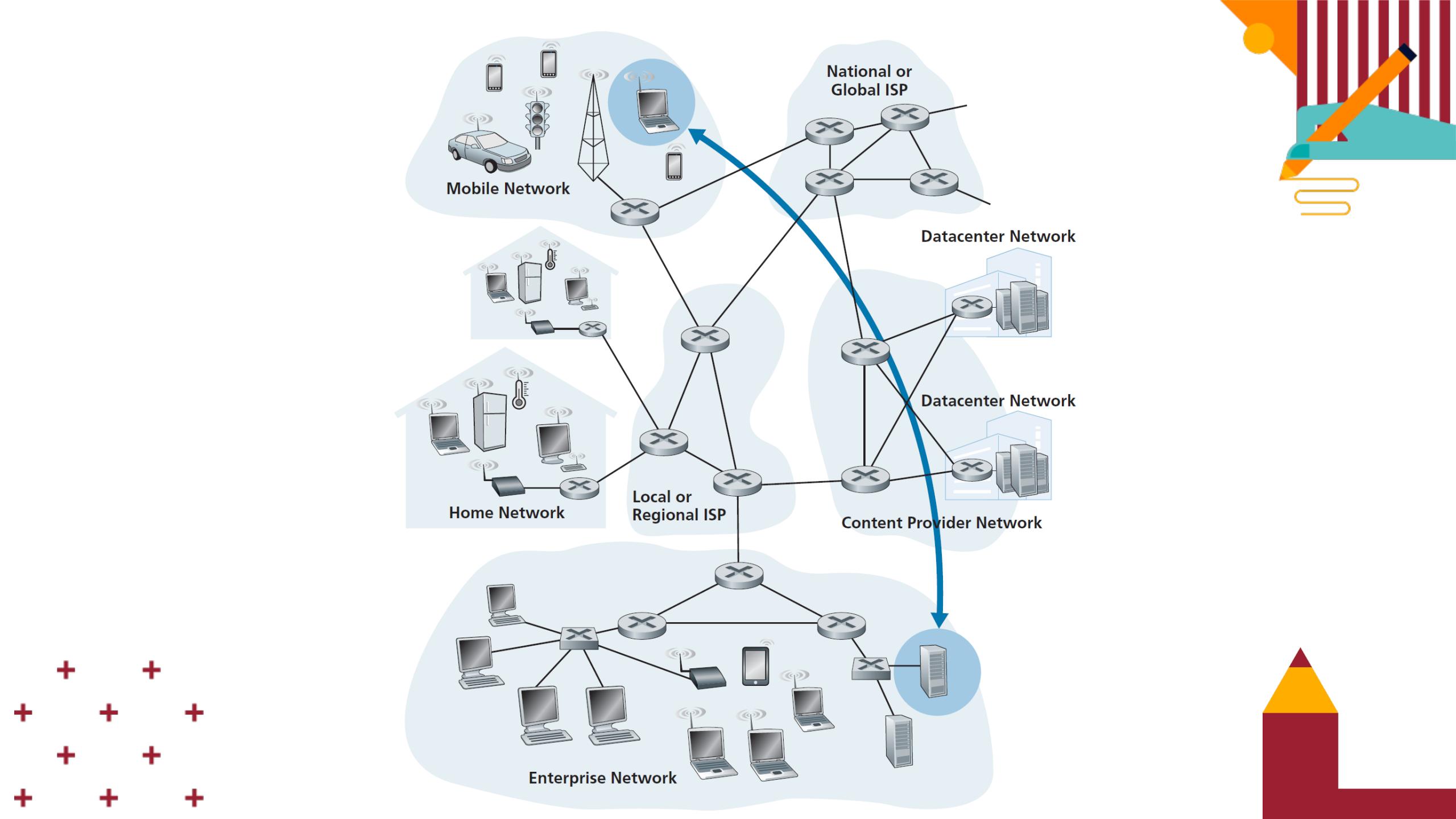
Data exchange in the Internet

API

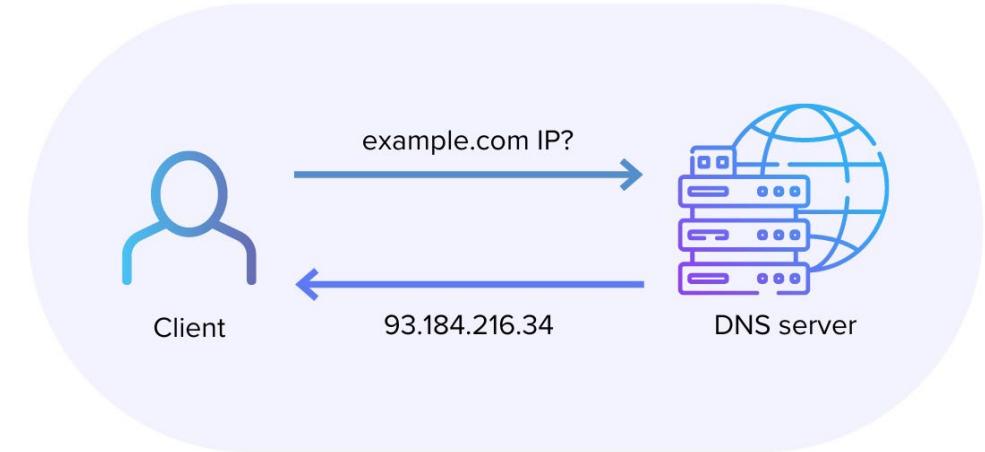
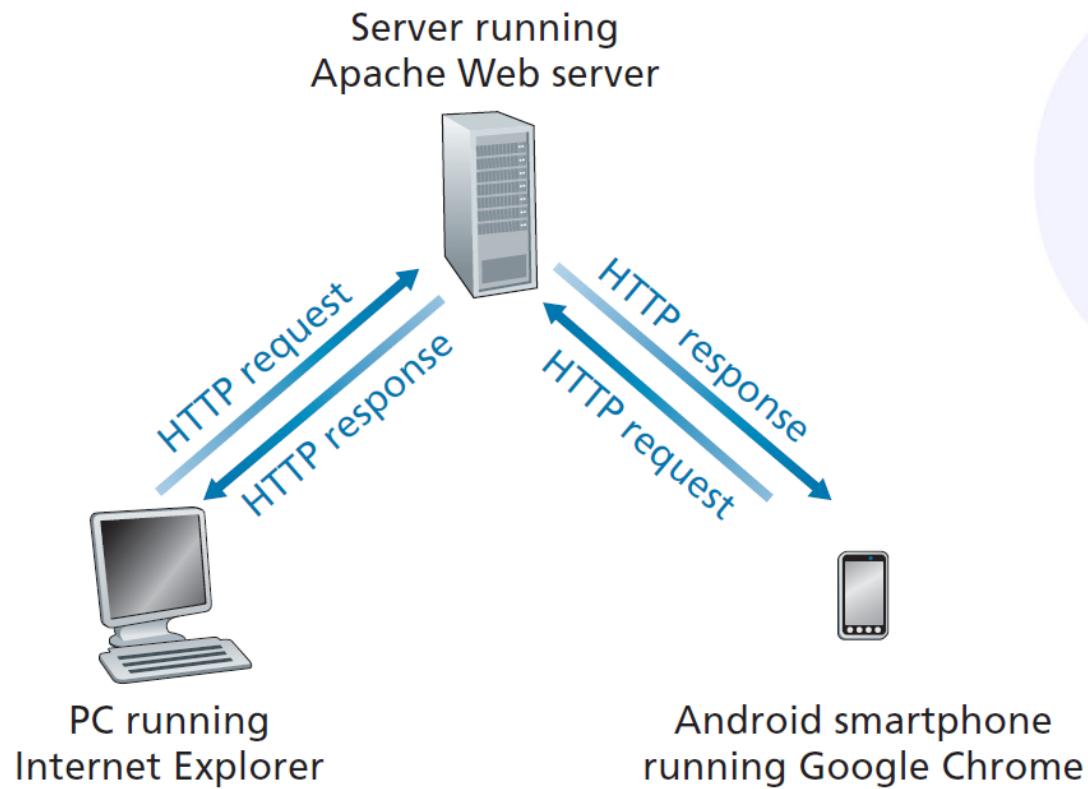
Web applications

Flask





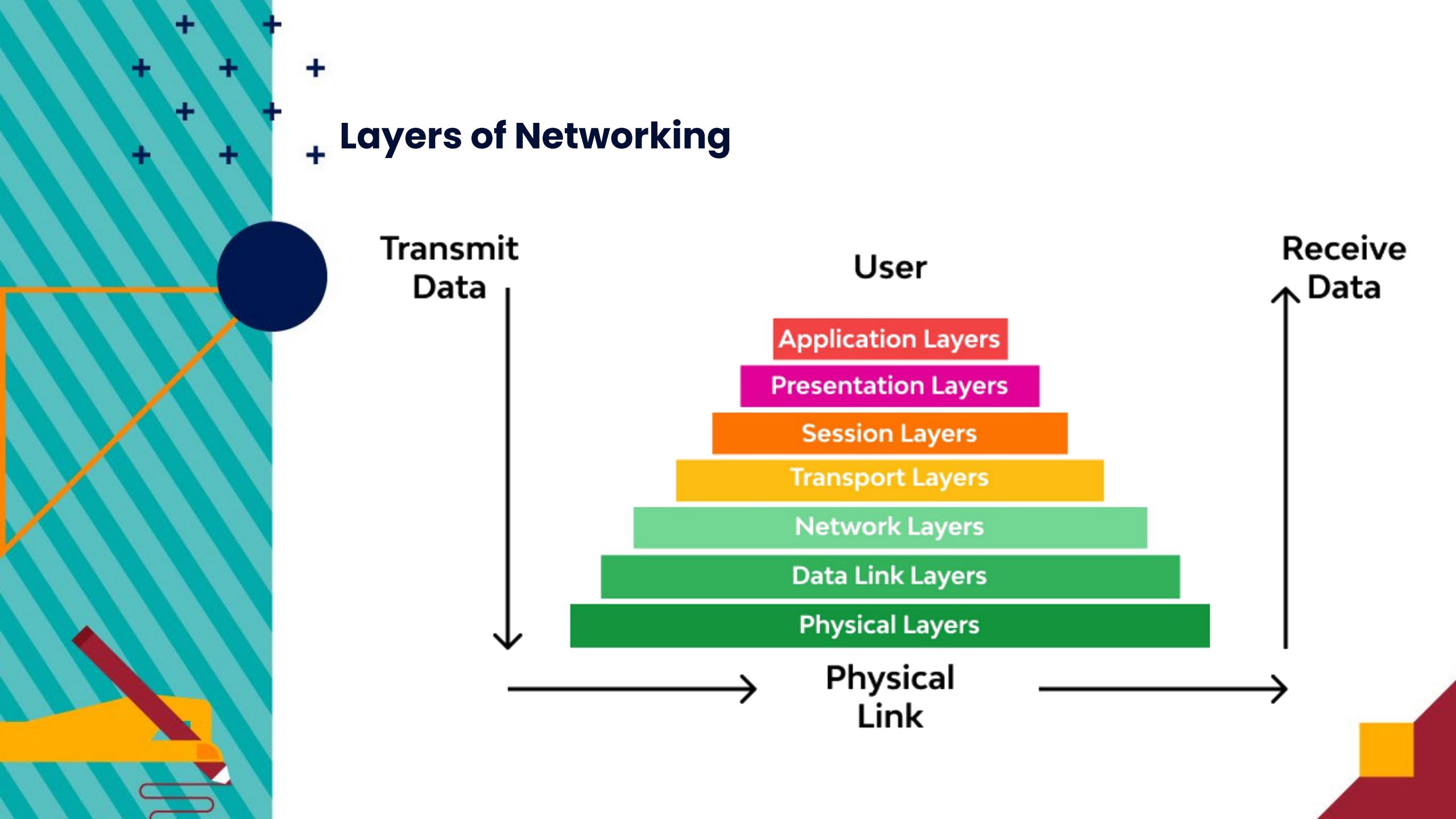
# Request – Response

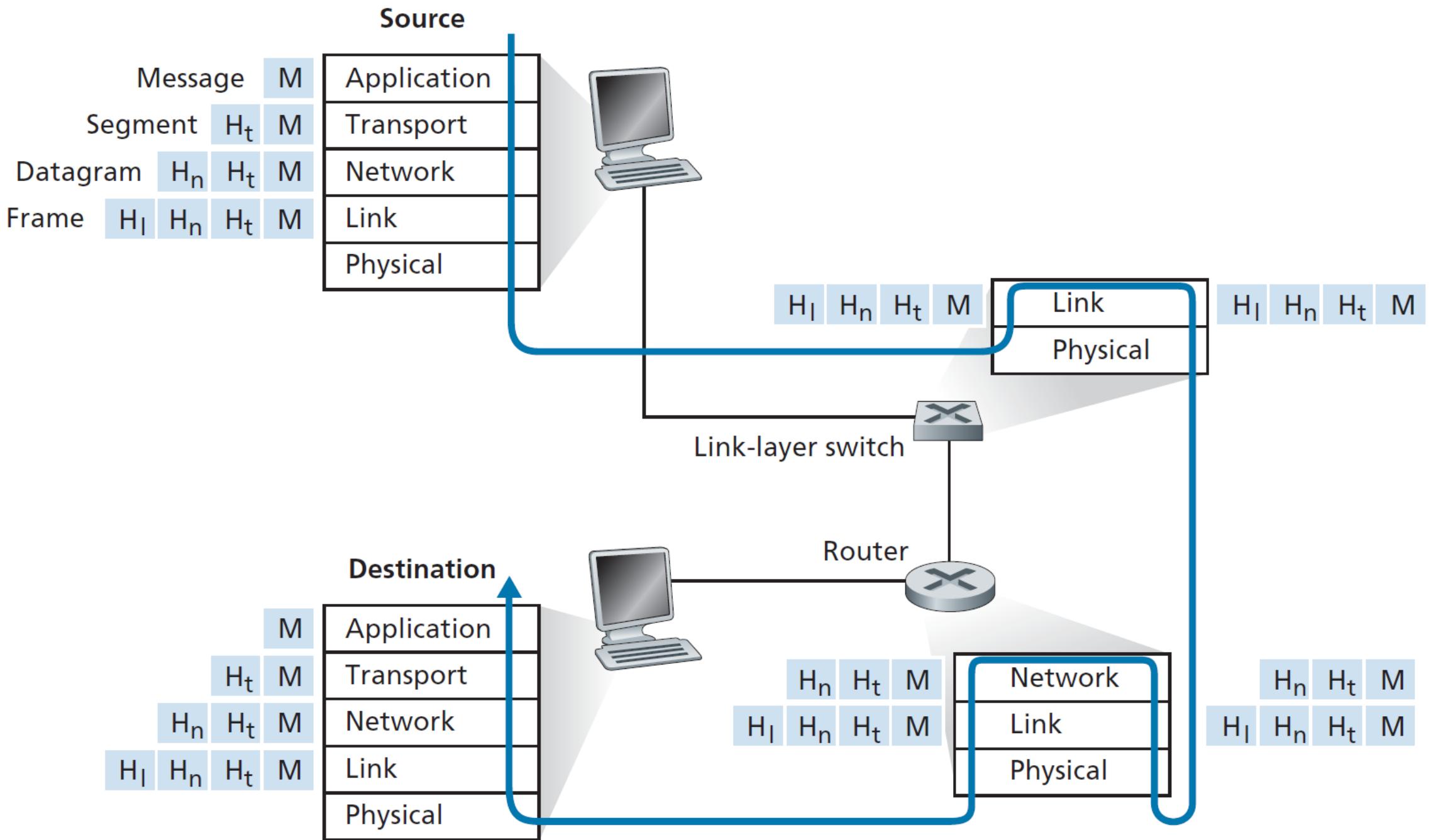


**HTTP Methods:**

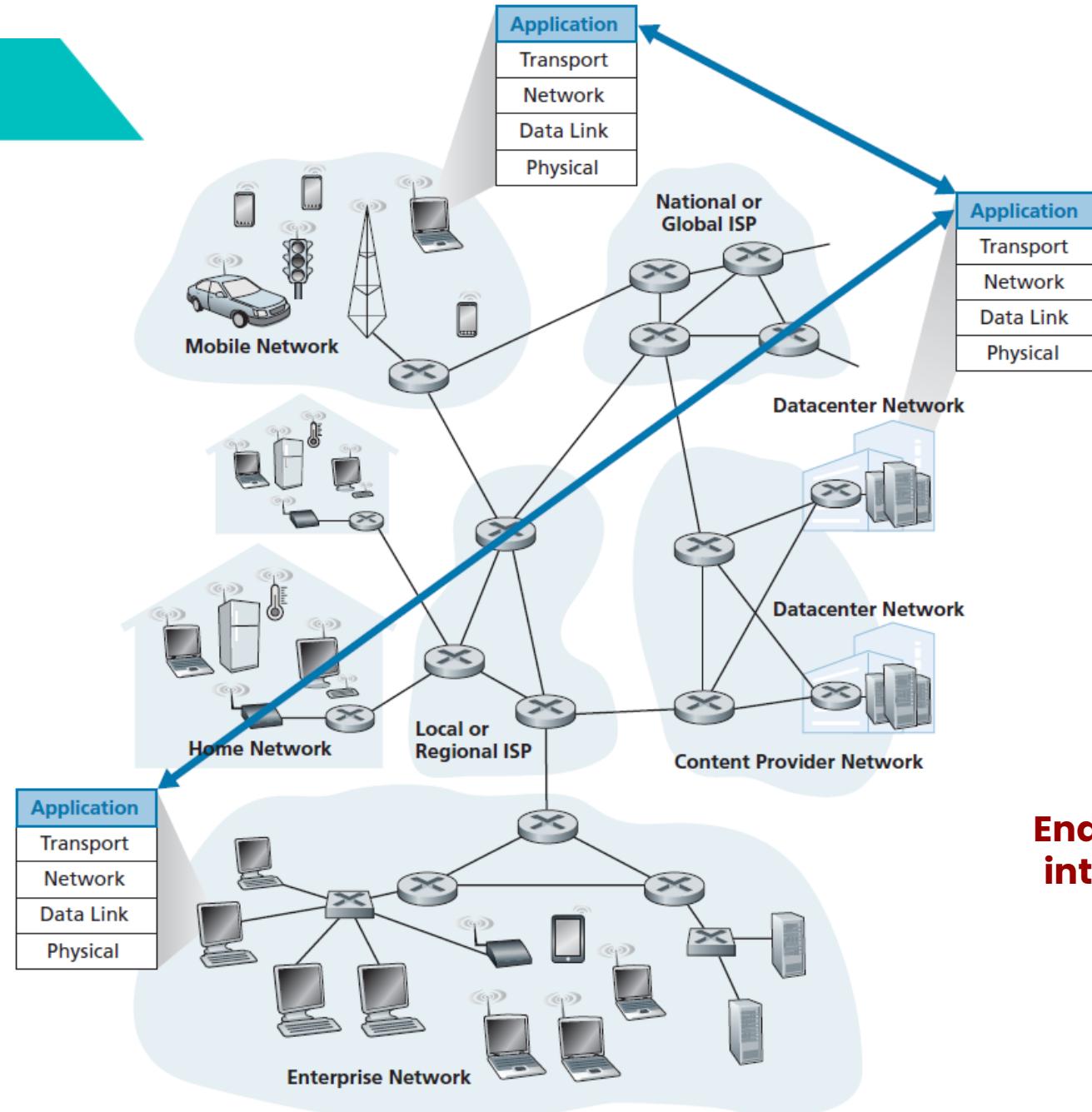
**GET, POST, PUT, DELETE**

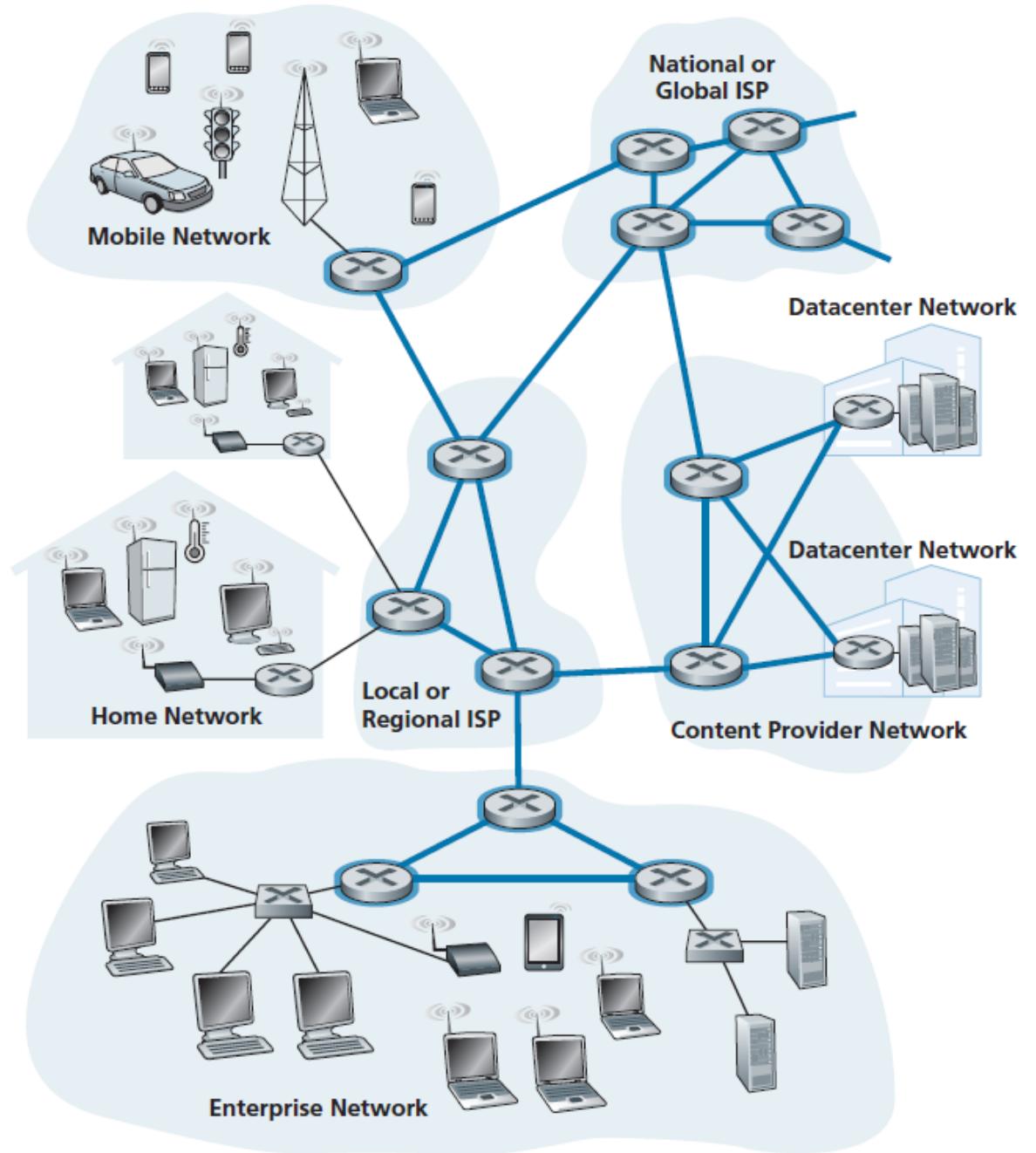
# Layers of Networking



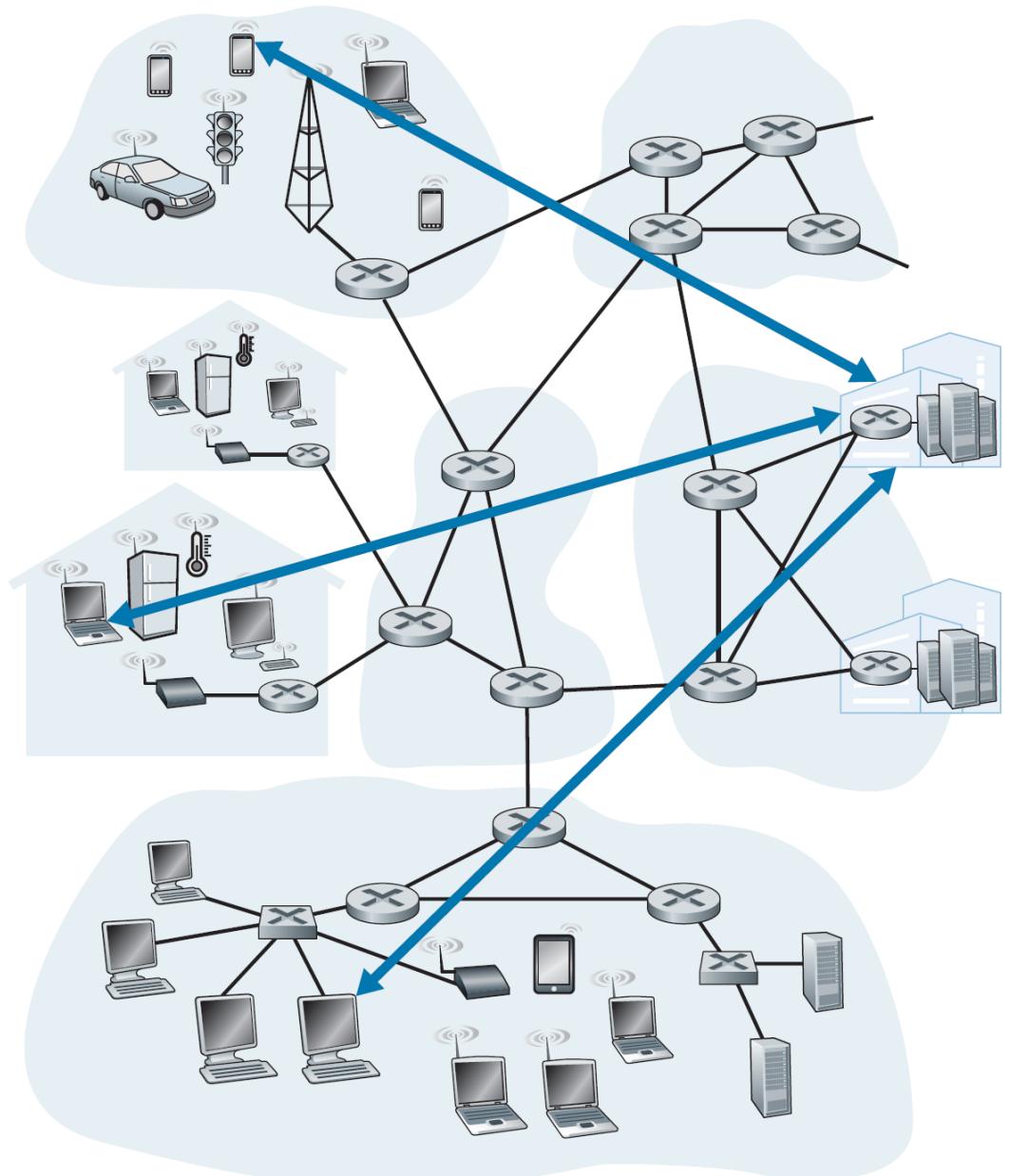


# Network Architecture

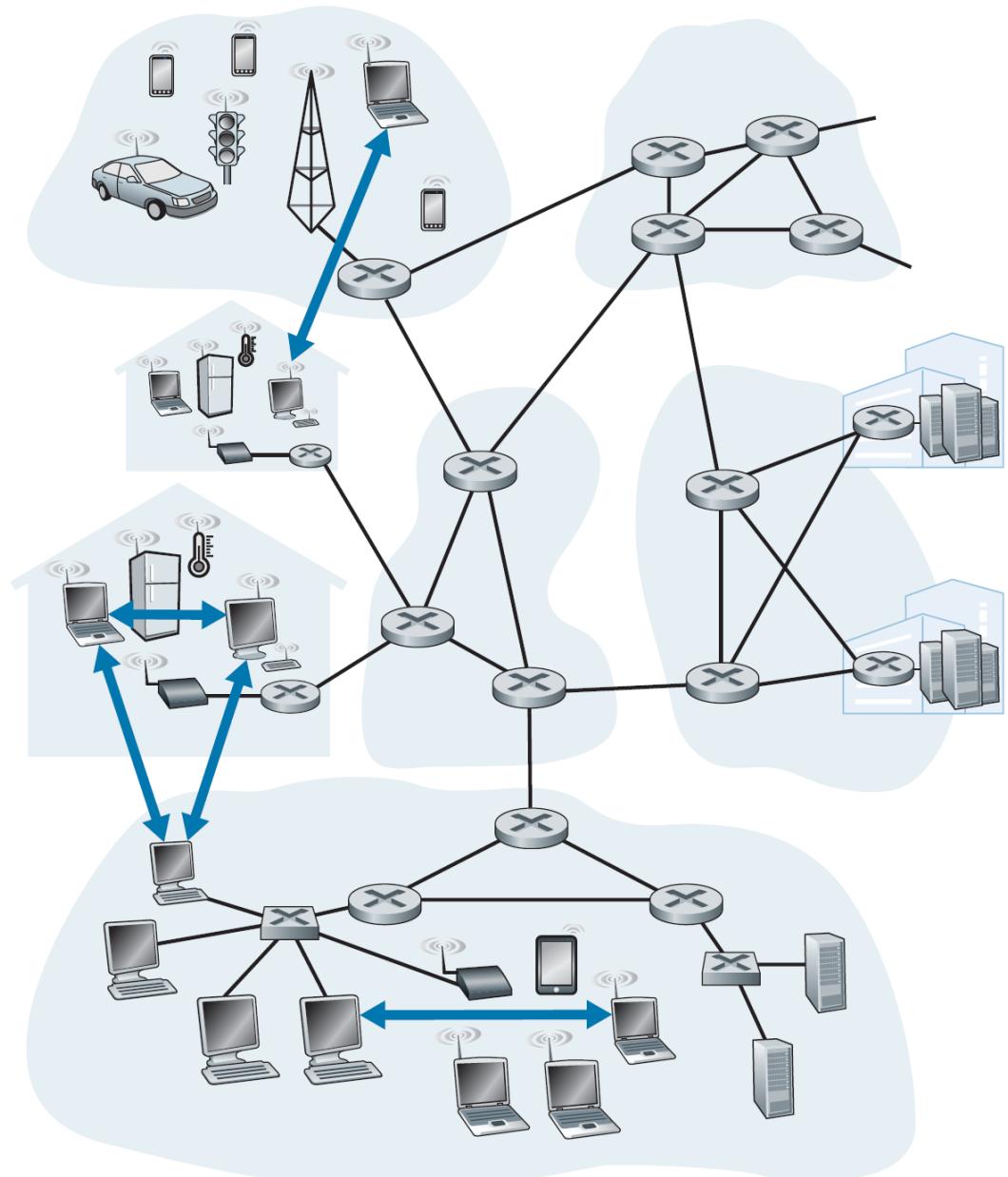




**Network core**



a. Client-server architecture

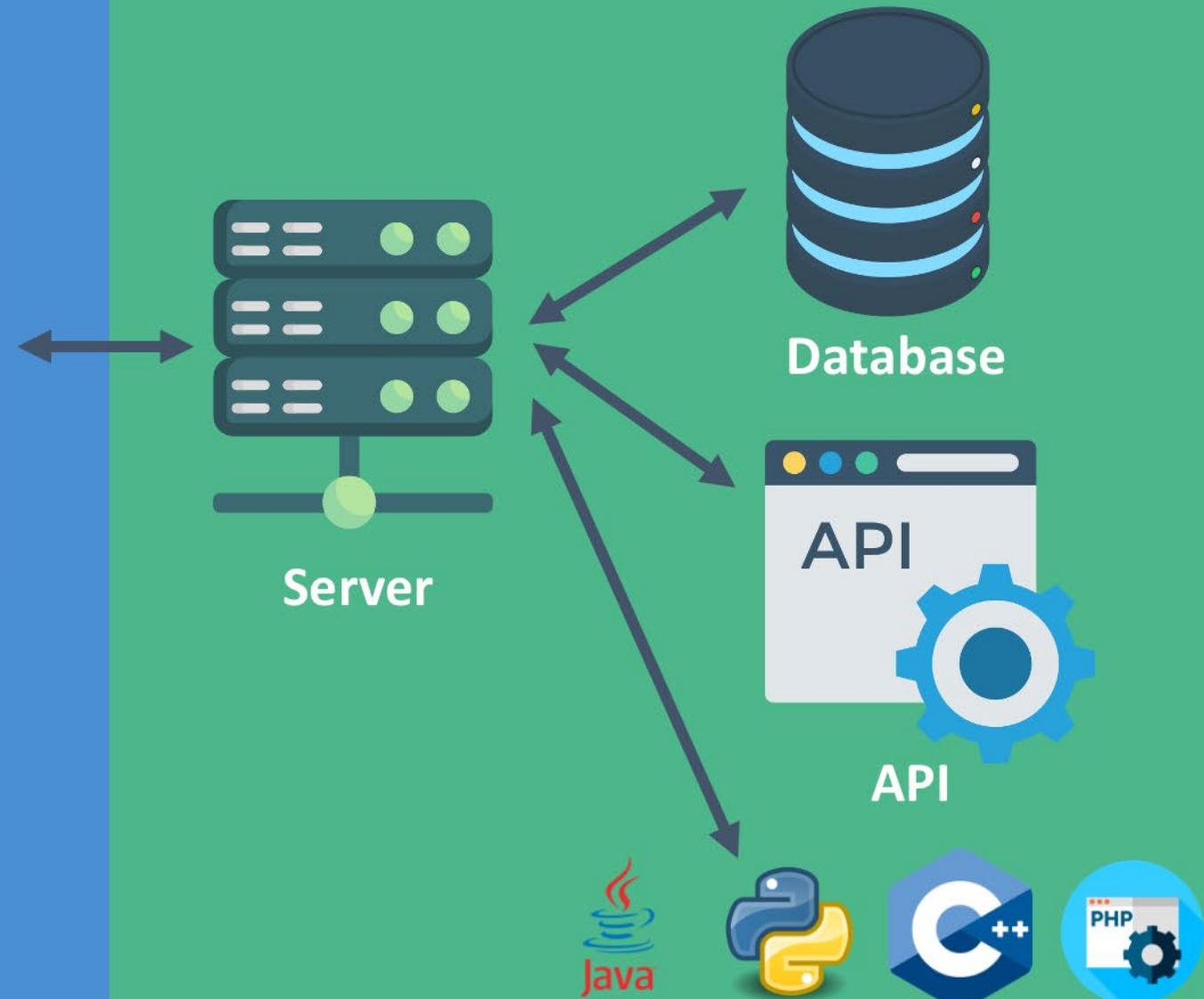


b. Peer-to-peer architecture

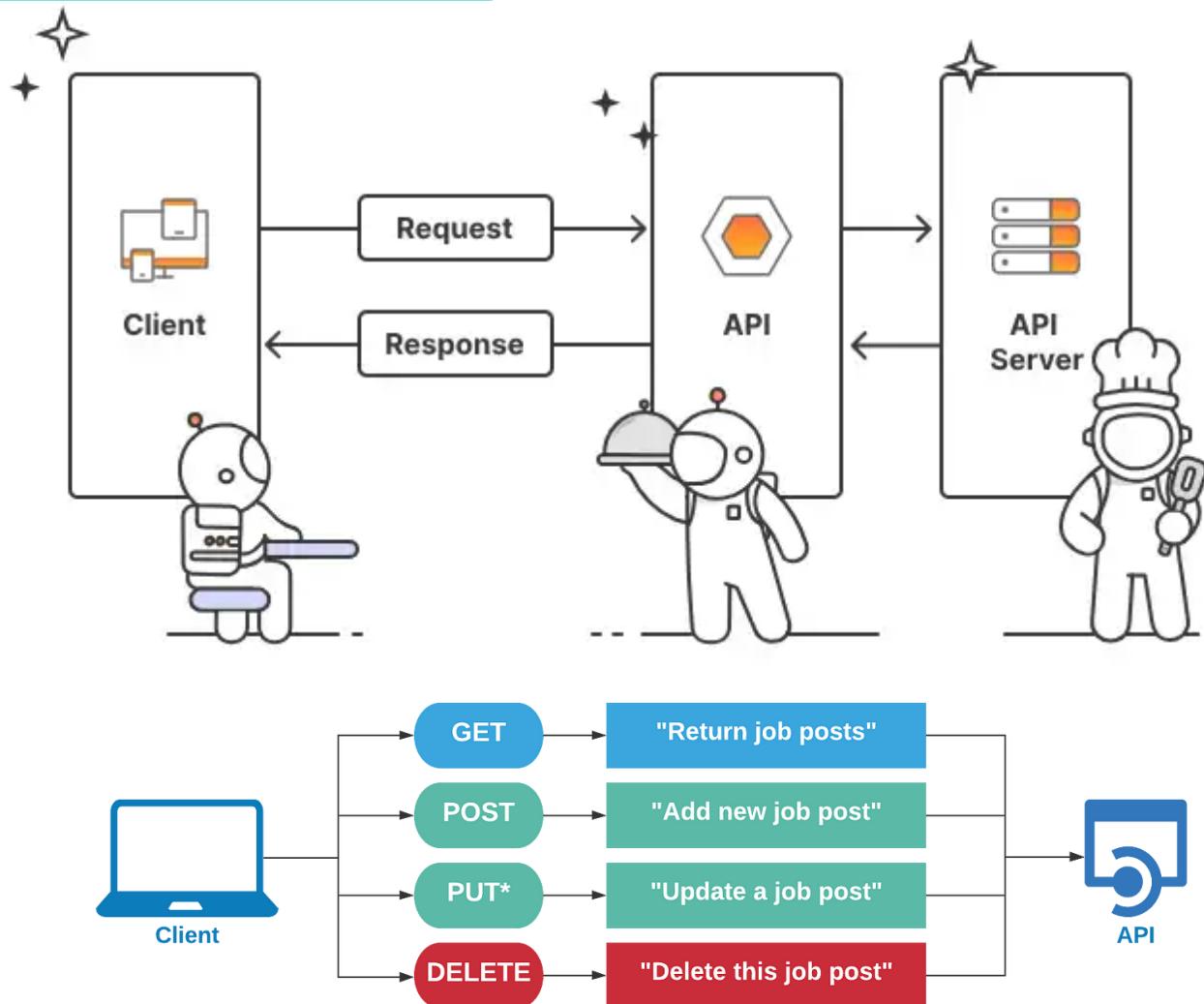
# FRONT-END



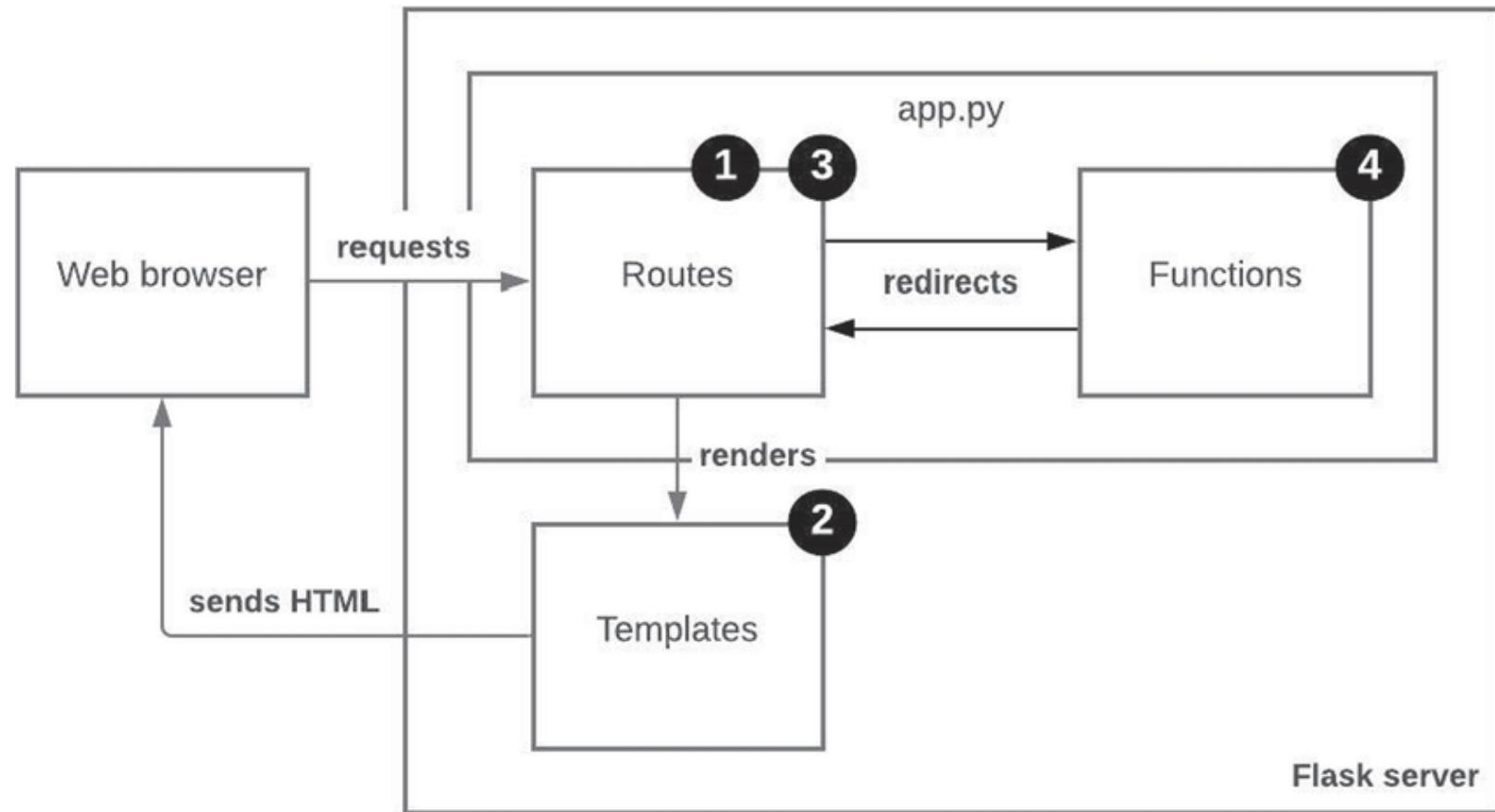
# BACK-END



# Application Program Interface



# Flask



**Flask - Python framework for web application**

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# Cloud

## Cloud Technology

Cloud **Infrastructure, Platform, and Software as a Service**





# Cloud Objectives

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What is Cloud?

IaaS, PaaS, SaaS

How do we use Cloud?

Different ways of Deployment

Do we need Cloud?

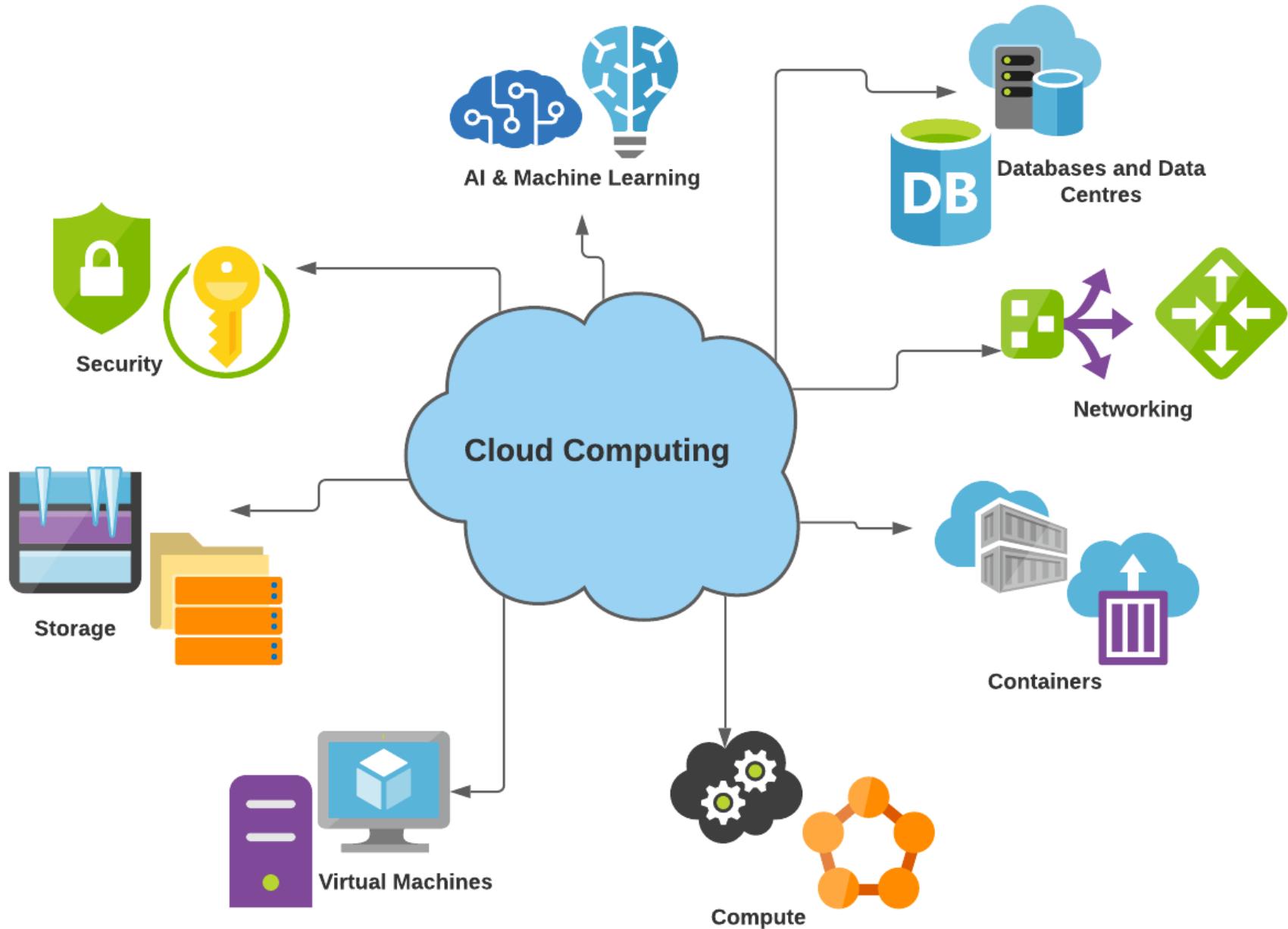
Pros and Cons

+

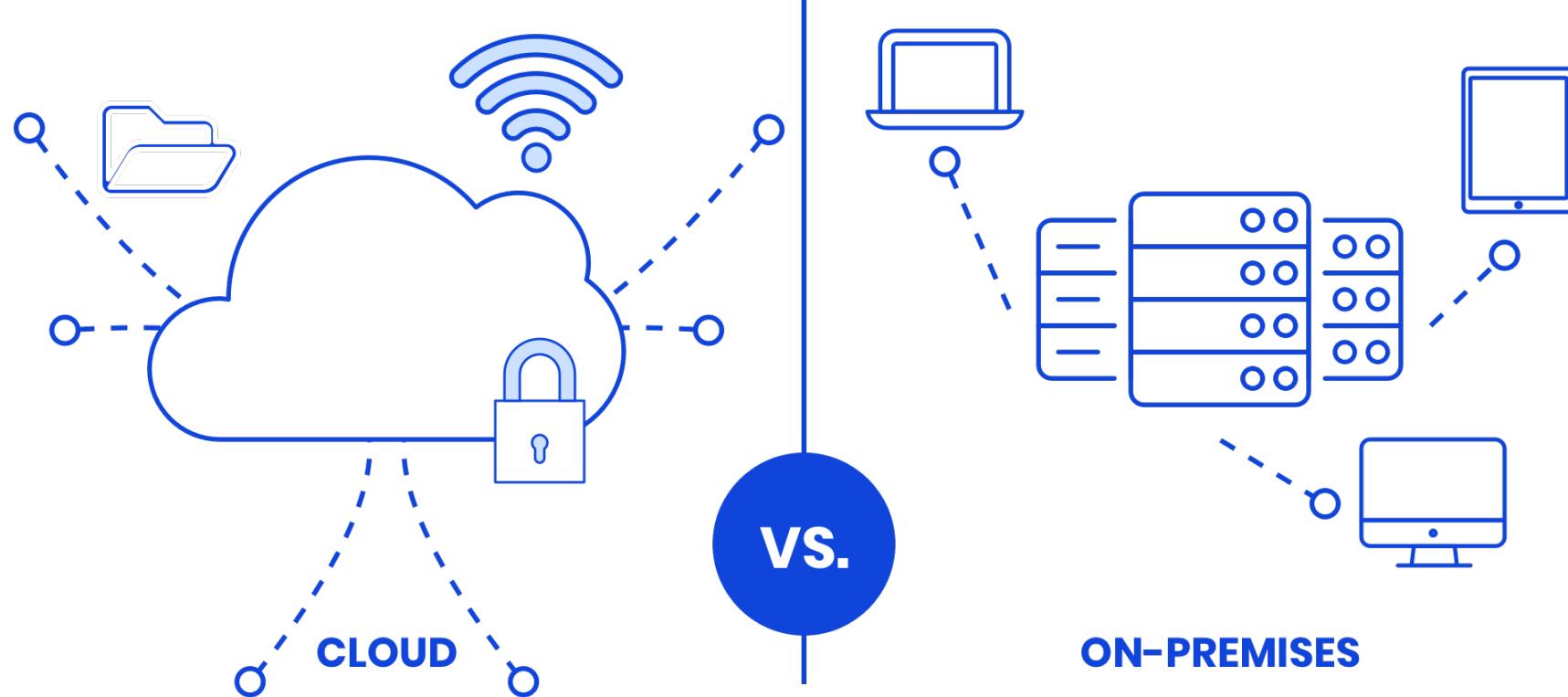
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## Cloud vs on-premise





## On- Premises

### Pros

- » Full Data Control 
- » Full Hard- and Software Control 
- » Full Access Reliability 
- » No Operating Software Cost 
- » Performance 
- » Customizations 

### Cons

- » Maintenance and Acquisition Costs 
- » Internal Knowledge 
- » Full Responsibility 
- » Long-term Reliability 



## Cloud- Base

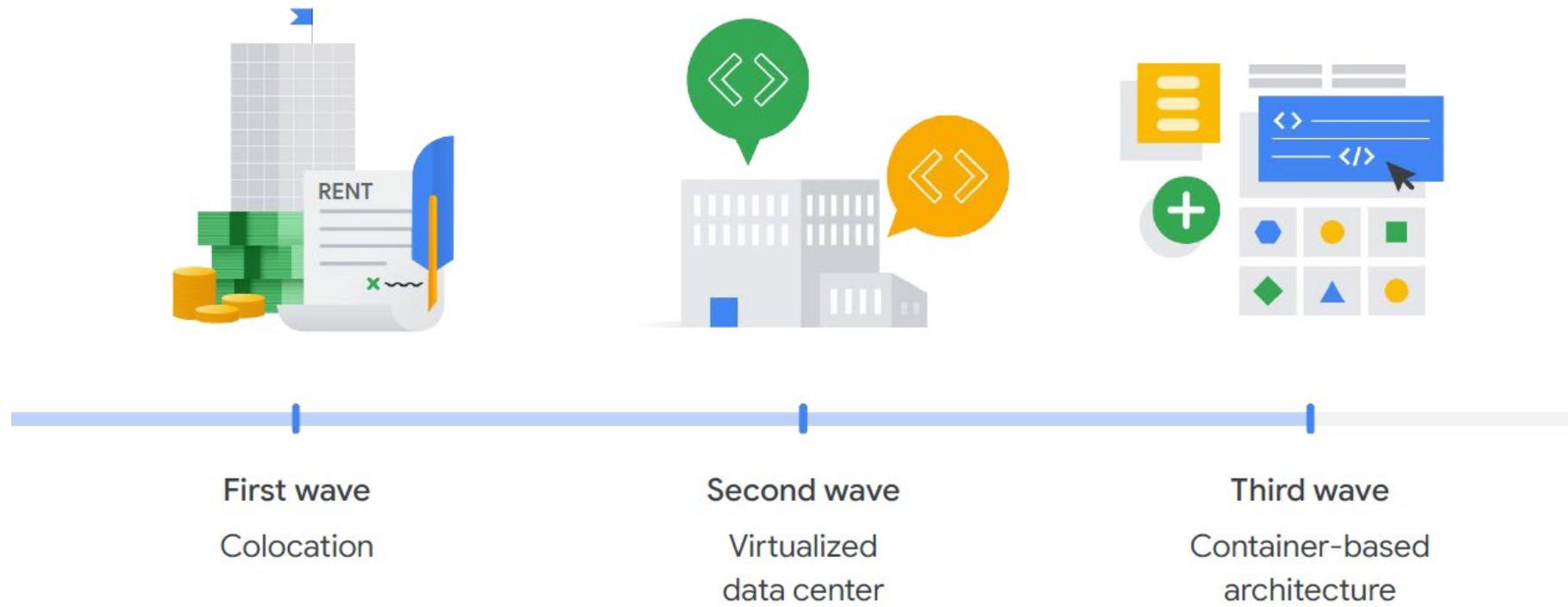
### Pros

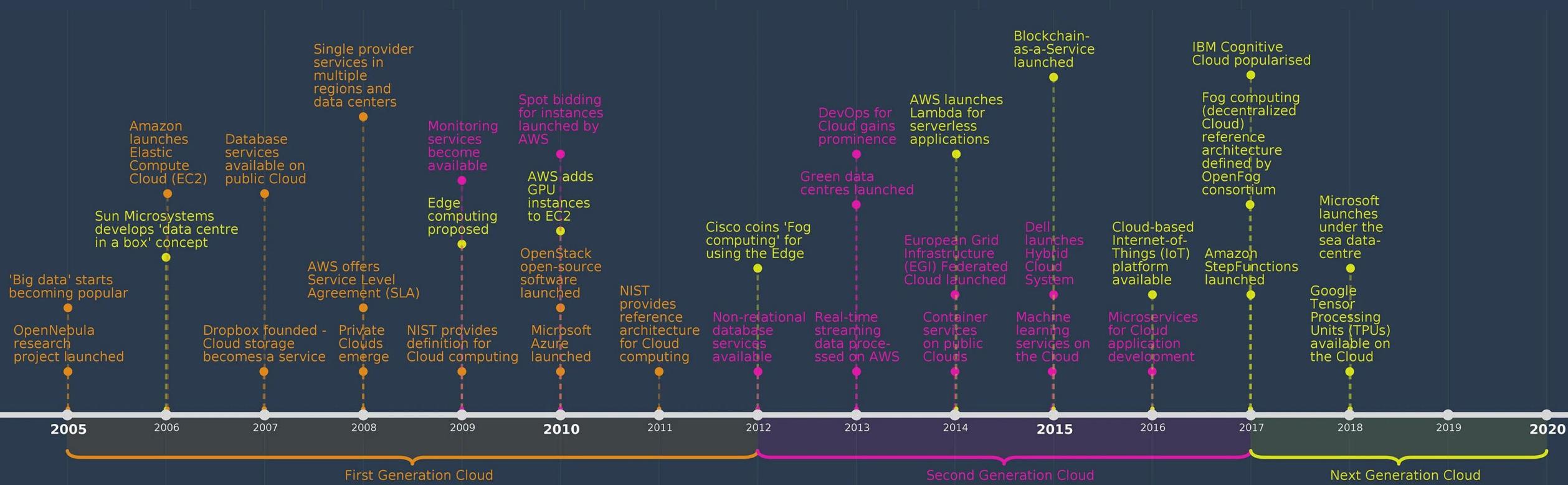
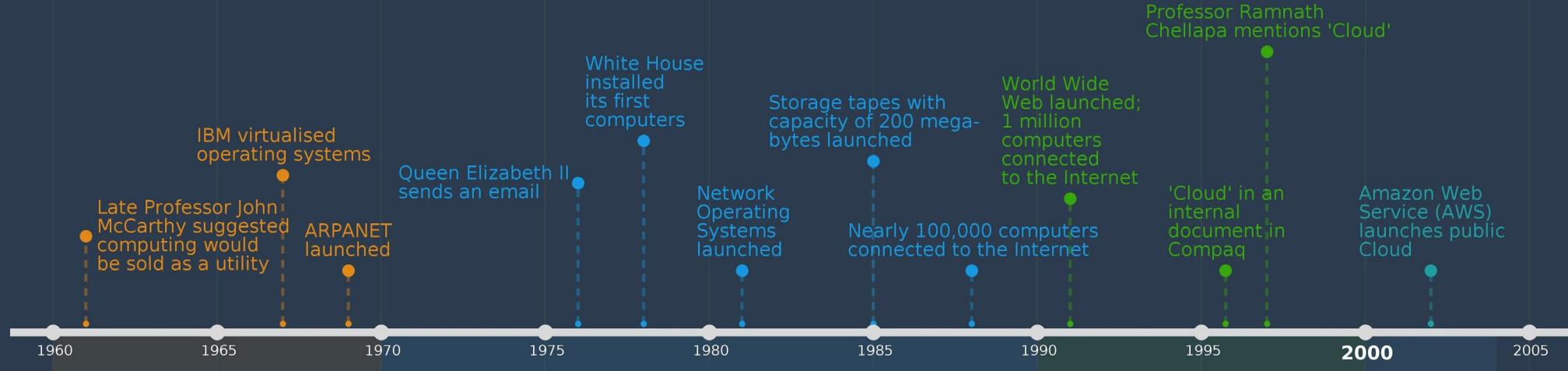
- » Easy Set-up 
- » Low Acquisition and Maintenance Costs 
- » Flexibility and Scalability 
- » Accessibility and Integration 
- » Updates and Security 
- » Back-up and Data Restore 
- » Disaster Recovery 

### Cons

- » On-going Software Costs 
- » Performance Limitations 
- » Internet Access 

# Evolution of Cloud



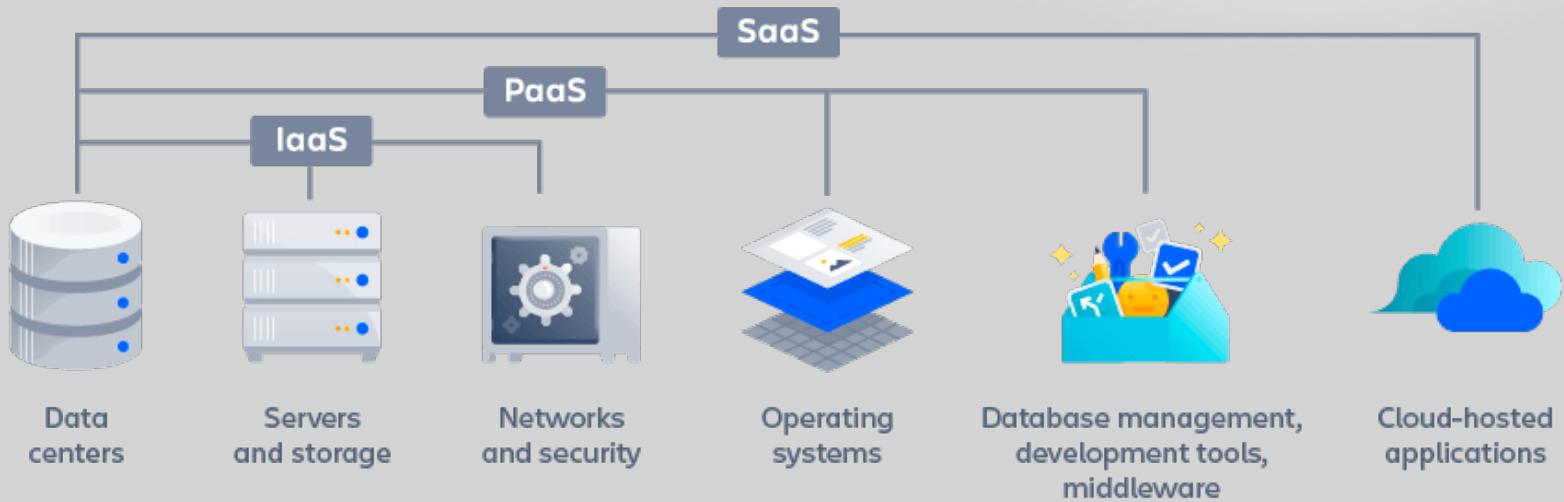
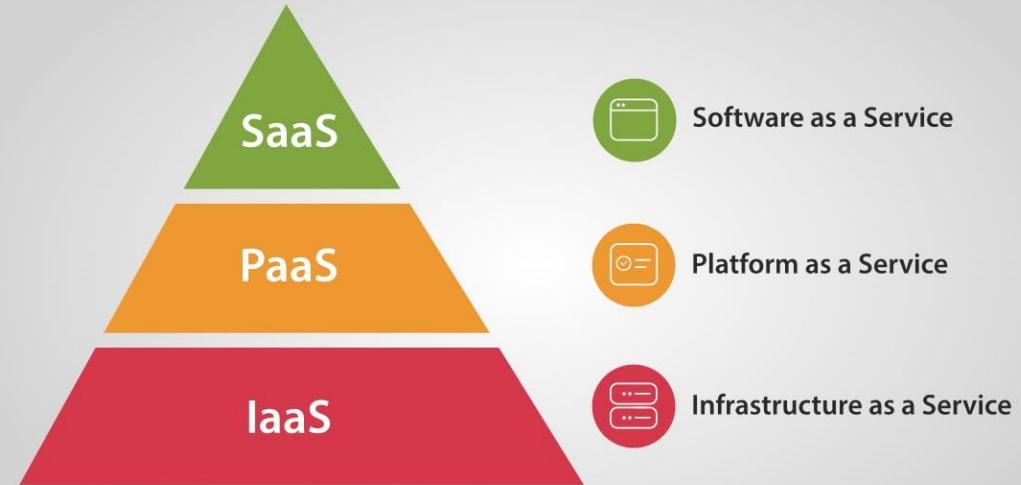


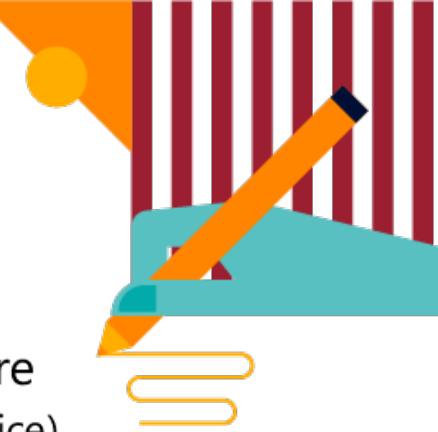
## Cloud Providers



and many more

# Cloud offerings





You Manage

Cloud Provider  
Manages

On-premises  
(Private Cloud)

Data & Access

Applications

Runtime

Operating System

Virtual Machine

Compute

Networking

Storage

Infrastructure  
(as a Service)

Data & Access

Applications

Runtime

Operating System

Virtual Machine

Compute

Networking

Storage

Platform  
(as a Service)

Data & Access

Applications

Runtime

Operating System

Virtual Machine

Compute

Networking

Storage

Software  
(as a Service)

Data & Access

Applications

Runtime

Operating System

Virtual Machine

Compute

Networking

Storage

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# Deploying to Google Cloud



## Compute Engine

Run large-scale workloads on virtual machines hosted on Google's infrastructure



## App Engine

A platform for building scalable web apps and mobile backends



## Kubernetes

Run Docker containers on Google's infrastructure, powered by Kubernetes



## Cloud Run

Fully managed compute platform for deploying and scaling containerized applications quickly and securely.



## Cloud Functions

A serverless platform for building event-based microservices triggered by events in GCP

Compute Engine	Kubernetes Engine	App Engine	Cloud Functions
Virtual infrastructure Raw compute Granular control			
Containerized apps Data center as PC	PaaS Preset run-times Focus on app logic	FaaS Event-driven architecture Glue pieces together	
Think about it as			
Base layer Unit = VM	Managed Kubernetes Unit = container	Serverless before it was cool Unit = application	Event-driven compute Unit = functions
Good for			
Existing systems	Running in multiple environments	Web-facing applications	Extending services with code, HTTP glue, lightweight ETL
Pros & cons			
<ul style="list-style-type: none"> <li>[+] Very fast network interconnect</li> <li>[+] Any machine shape</li> <li>[+] Provisioned under 30 seconds</li> <li>[+] SW licensing requirements</li> <li>[+] Low-latency storage options</li> <li>[+] Non-HTTP network protocols</li> <li>[+] Live migration</li> <li>[-] Slow scaling speed</li> <li>[-] Need to handle updates</li> </ul>	<ul style="list-style-type: none"> <li>[+] Open source</li> <li>[+] Logical level representation</li> <li>[+] Non-HTTP protocols</li> <li>[-] Must use containers</li> </ul>	<ul style="list-style-type: none"> <li>[+] Code first, HTTP req/res</li> <li>[+] Production version mgmt.</li> <li>[-] Constrained runtimes</li> </ul>	<ul style="list-style-type: none"> <li>[+] Events via Pub/Sub, GCS...</li> <li>[+] Fully-managed environment</li> <li>[+] Pay only for what you use</li> <li>[+] Standard Node.js runtime</li> <li>[-] Must interact via events</li> <li>[-] Function-level granularity</li> </ul>

## Costs in Cloud



**Most of services are paid**



**Free tier amount for  
many services**



**Free trial period  
3 month with GCP**

**Control usage  
Use budget limits**

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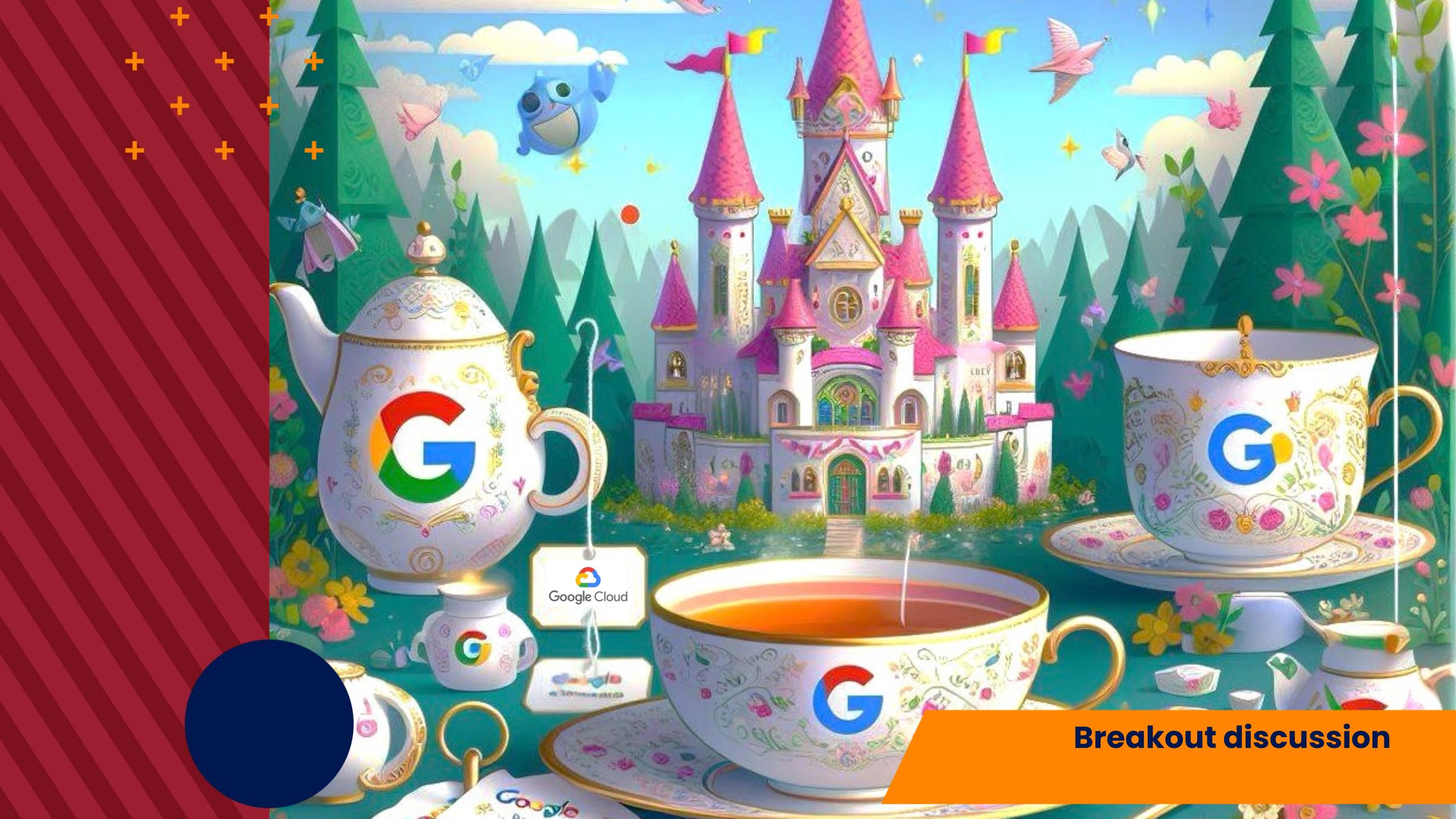
After trial period see what [free tier offers](#), control usage and set budget limits



**Google Cloud App Engine  
deployment**

# Breakout activity





**Breakout discussion**



If you are a **data scientist** do you need to  
know about **networking and cloud services?**

**Discussion**

# Advanced topics

# More on Cloud

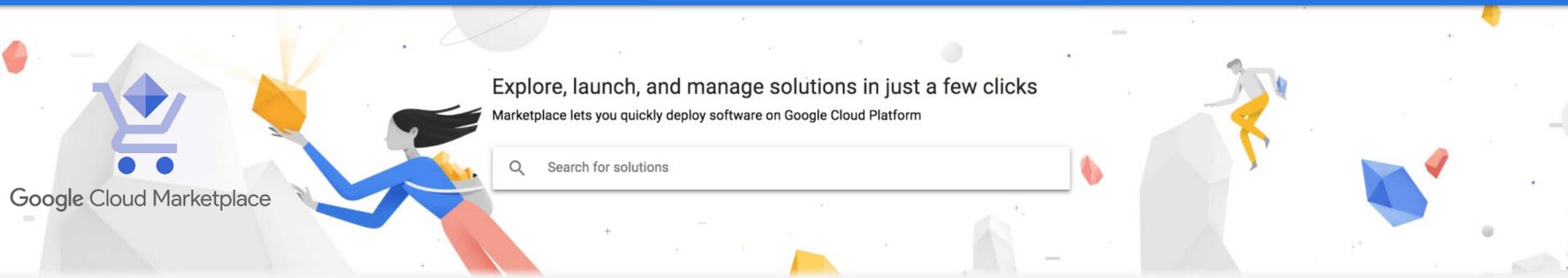
## **Cloud services** and costs in cloud

# Further topics



# Google Cloud offerings



[Browse all solutions](#)[Recommended](#)[Your solutions](#)[Filter by](#)

Virtual machines (529)

Google Cloud Platform (38)

APIs &amp; services (326)

Kubernetes apps (27)

Container images (44)

Datasets (101)

Operating systems (48)

Developer stacks (108)

Networking (88)

Databases (95)

Developer tools (199)

Blog &amp; CMS (100)

**Compute Engine**

Google

**Geocoding API**

Google

Scalable, high-performance virtual machines  
Convert between addresses and geographic coordinates.**Maps JavaScript API**

Google

Maps for your website

**App Engine**

Google

A platform to build web and mobile apps that scale automatically

**WordPress**

Google Click to Deploy

Web publishing platform for building multiple blogs and

**Places API**

Google

Get detailed information about 100 million places

Type APIs &amp; services

[Featured](#)**SAP HANA, express edition (server + applications)**

SAP

In-memory Platform for Business Digital Transformation

Type Virtual machines

**NVIDIA GPU Cloud Image for Deep Learning and HPC**

NVIDIA

Optimized for GPU-Accelerated Containers

Type Virtual machines

**VM-Series Next-Generation Firewall Bundle 2**

Palo Alto Networks, Inc.

Next-Generation Firewall from Palo Alto Networks

Type Virtual machines

**Traffic Manager Enterprise Edition & WAF - 1 Gbps**

Pulse Secure, LLC

Leading-edge traffic management &amp; security with granular control

Type Virtual machines

**SendGrid Email API**

SendGrid

Integrate quickly and test for free with SMTP &amp; Web APIs

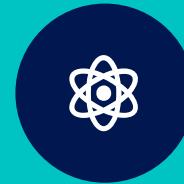
Type APIs &amp; services

[Virtual machines](#)[VIEW ALL \(529\)](#)

## Further topics



**Storage, SQL**



**Big Data**



**Containers**



**Continuous Integration /  
Continuous Deployment**

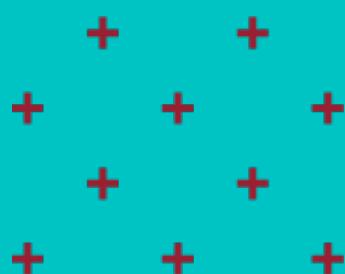


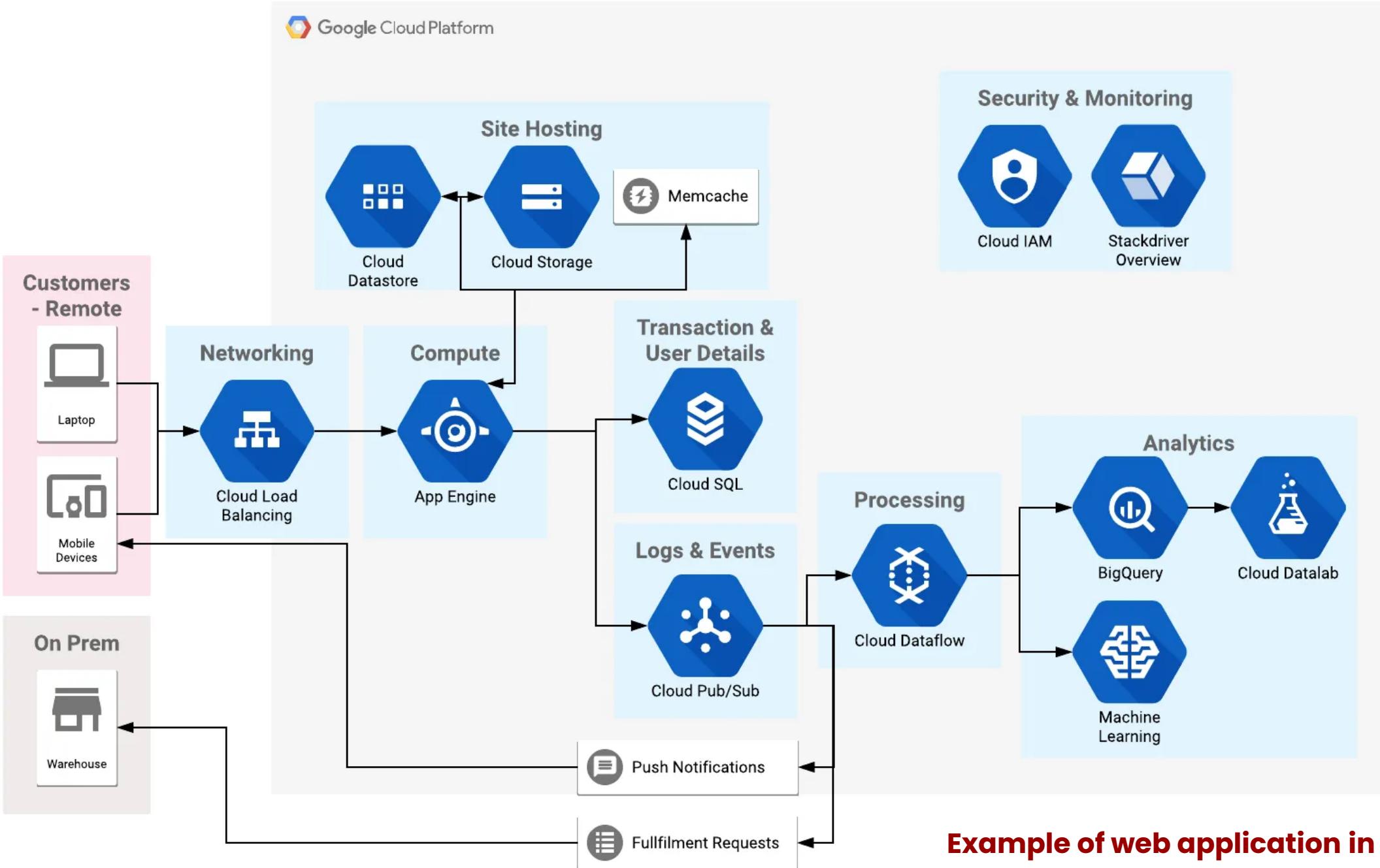
**Scaling  
Load Balancing**



**ML and AI in Cloud**

Suggested Study resources





# Q & A

# Thank You!

Mit | Emerging  
Talent

