

Public Cloud Services Intro



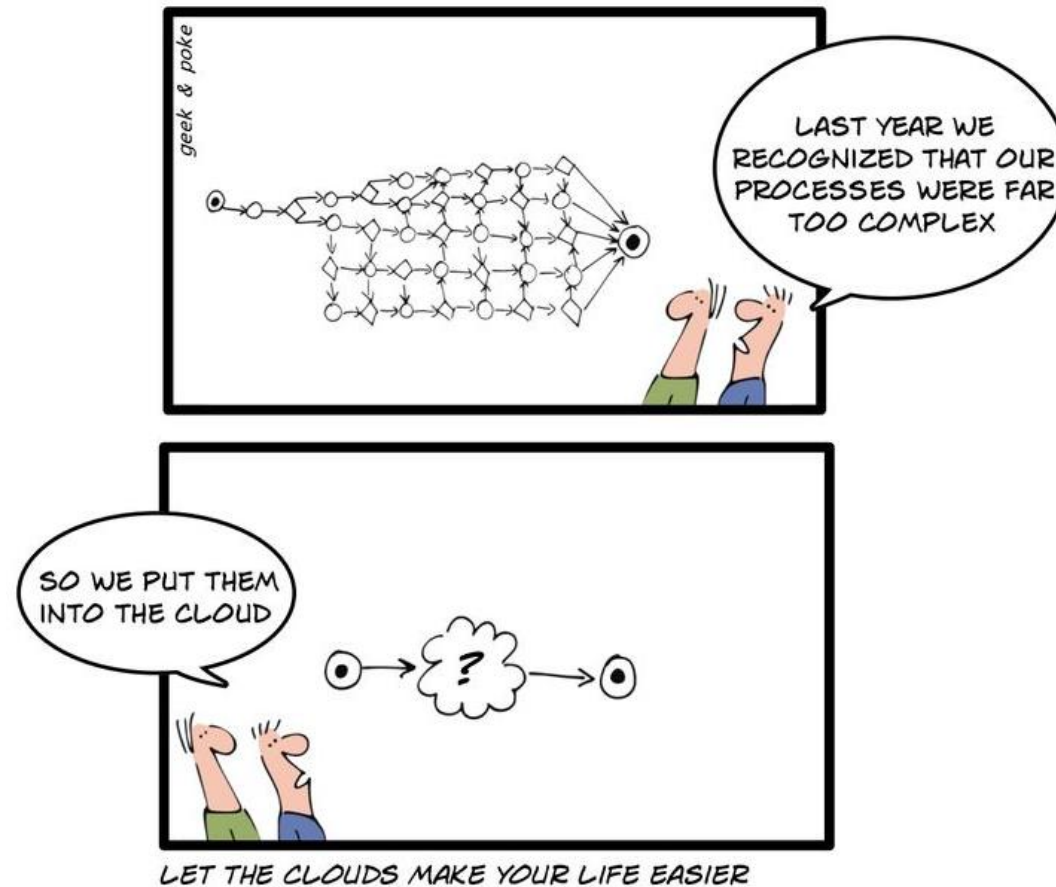
Learning Objective of this session

- Acknowledgement about different players in the cloud market
- Awareness about different cloud services and their delivery models
- Pro's and Con's about Hyperscaler Infrastructure
- Additional Literature: 01-introduction unter <https://learning.oreilly.com/playlists/a27d30d7-f139-4476-9c3a-e0abeb0f89da>

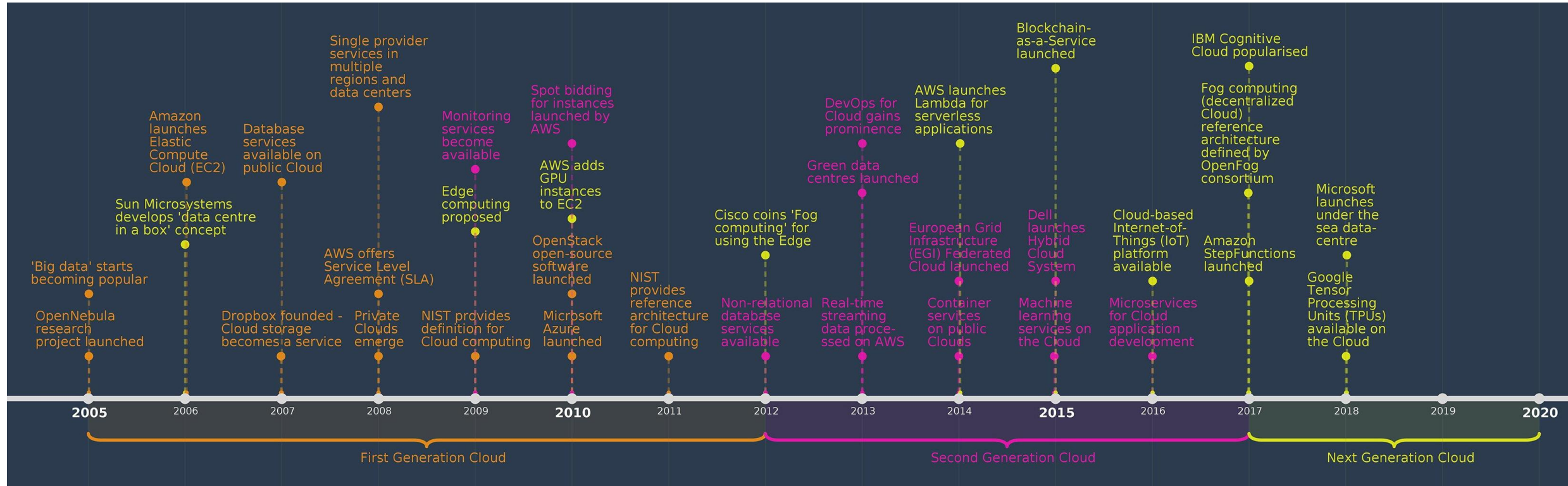
How Dilbert sees the cloud...



How Geek and Poke sees it...



Evolution about Public Clouds





What attributes has a cloud?

NIST definition covers 5 aspects:

- *Broad Network Access*: Cloud Infrastructure must be accessible via Ethernet (not necessarily public Ips)
- *On Demand Self Service*: Customer can order / remove infrastructure to her needs
- *Resource Pooling*: Resources on infrastructure are shared between customers
- *Rapid Elasticity*: Fast/Instant allocation and deallocation of resources
- *Measure Service*: Usage is metered in detail (time: minutes; size: bytes; transfer: bits/sec, etc.), can be used for pay-as-you-go.

<https://nvlpubs.nist.gov/nistpubs/Legacy/SP/nistspecialpublication800-145.pdf>

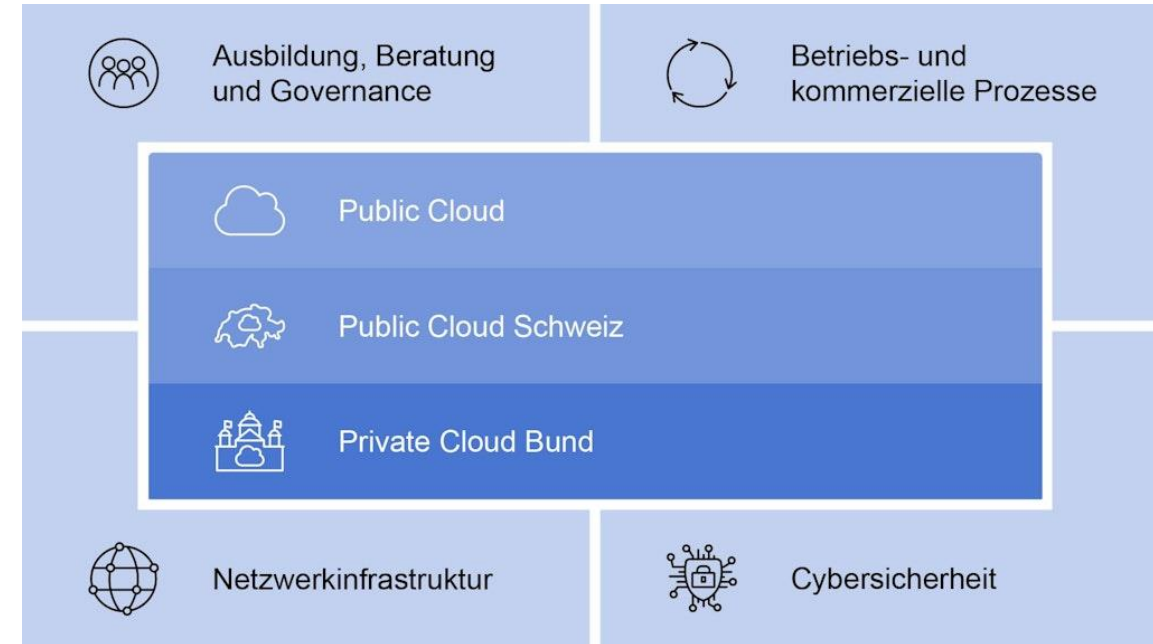
How can clouds be provided? - Cloud Deployment Models

- **Private cloud** for exclusive use by a single organization
 - Within the perimeters of its firewall
 - Third-party may manage the cloud
 - Does not scale as well as Public clouds (often not a real cloud)
- **Public cloud** for the general public
 - Multi-tenant
 - General purpose
 - No full control over the data → Confidential Compute
- **Community Cloud** for organizations that have shared concerns (e.g., government, universities)
- **Hybrid Cloud** composition of two or more distinct cloud infrastructures (e.g., private and public)
 - Hardly seen in reality, as companies often stick to one/two public clouds and their on-premise bare metal (which is not a cloud).

The holy grail

Hybrid Cloud:

- Common model in the market
- Combination of (multiple) public clouds with private cloud (AWS, Azure, Google, usw.)
- Seamless integration of private and public world in a common, easy-to-use stack
- Should be able to host legacy application
- Cloud-native application might be rescheduled on demand

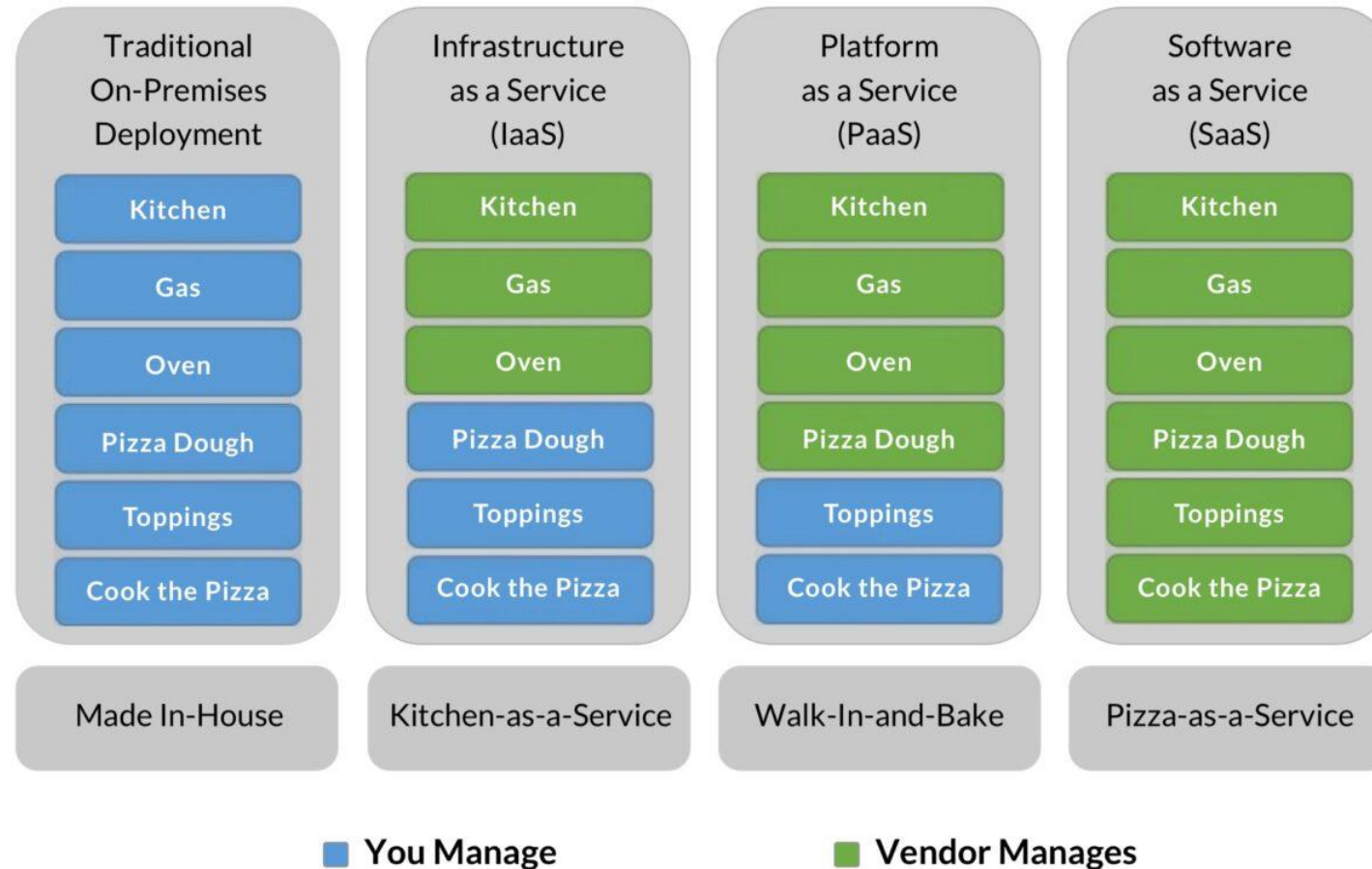


Problems?

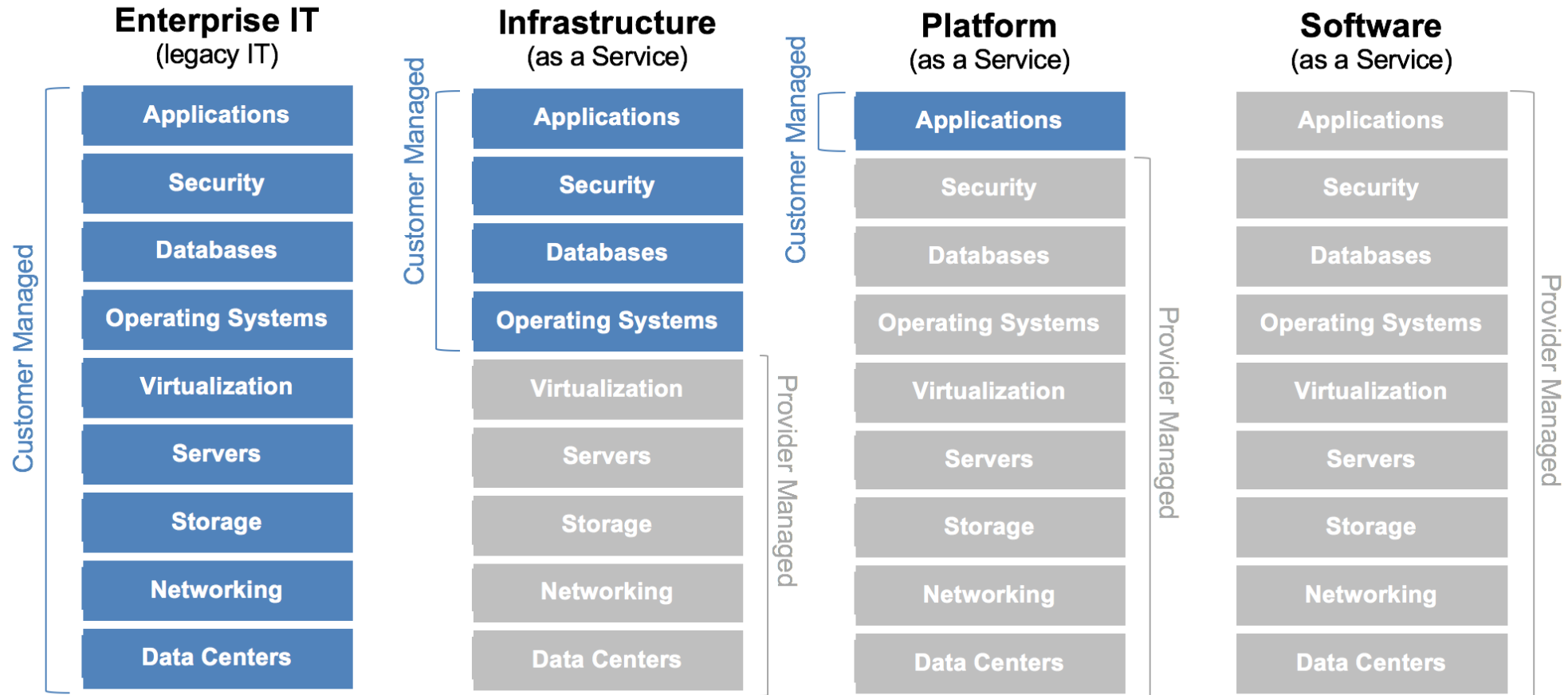
- Lorem

...as a service

New Pizza as a Service



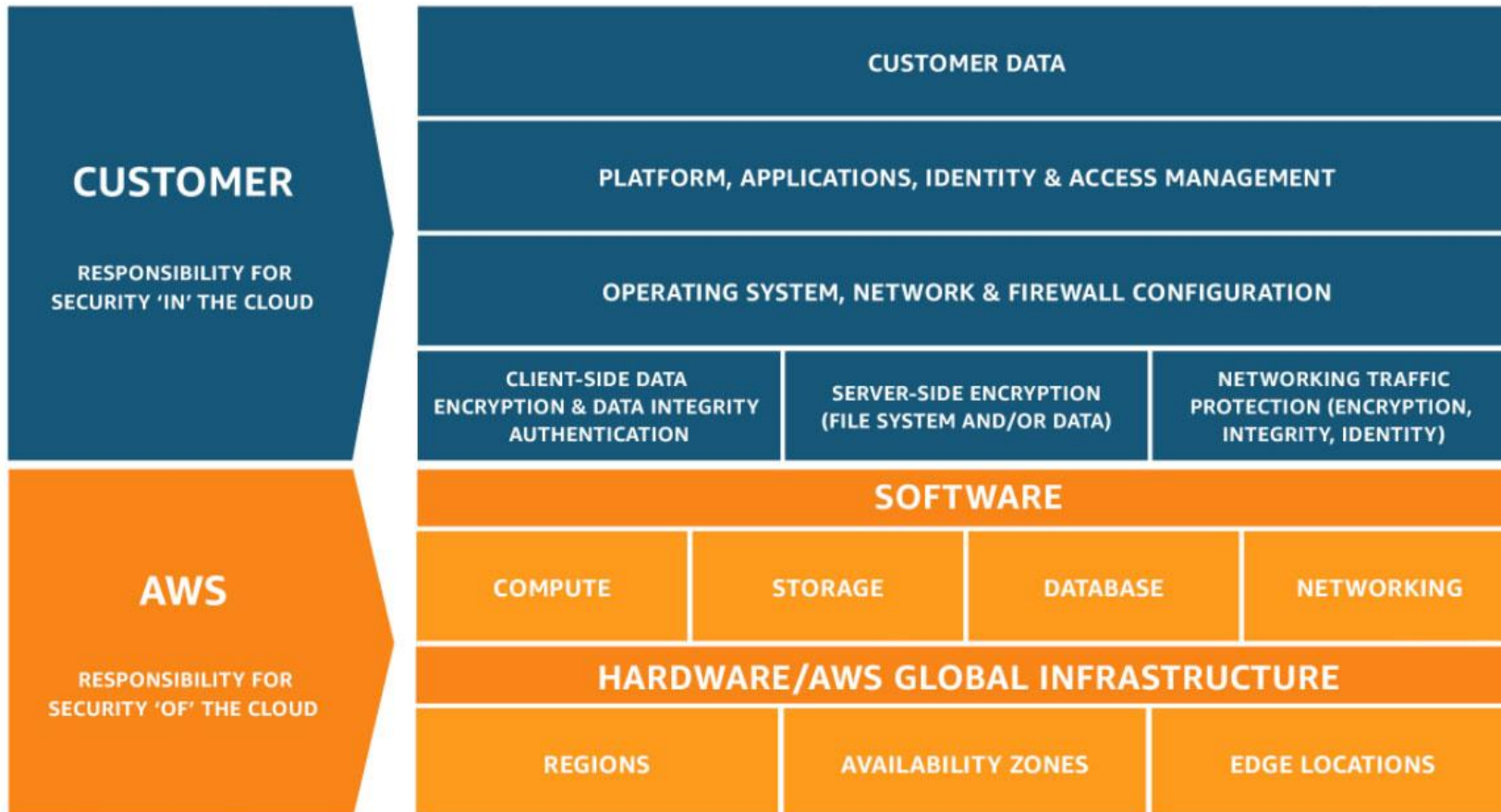
Cloud Services Classification



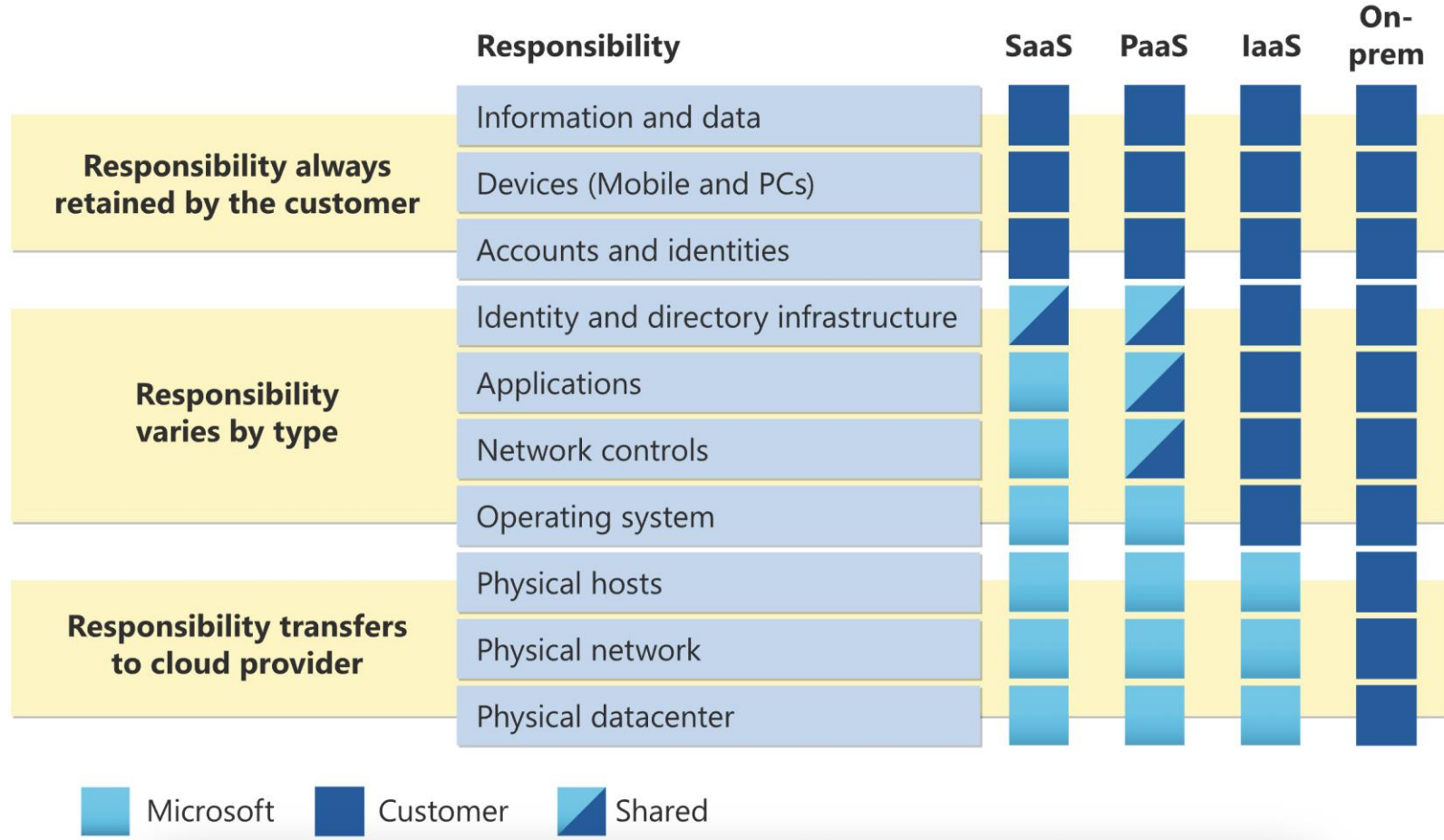
Service Classes

- Different degree of abstraction and standardization
 - (IaaS > PaaS > SaaS, where “>” means more abstract and more standardized)
- Operating Model depends on level of service model
 - Different Operating Tasks between Provider and Customer
- Higher-level services are very often cheaper than lower-level services
 - Why?

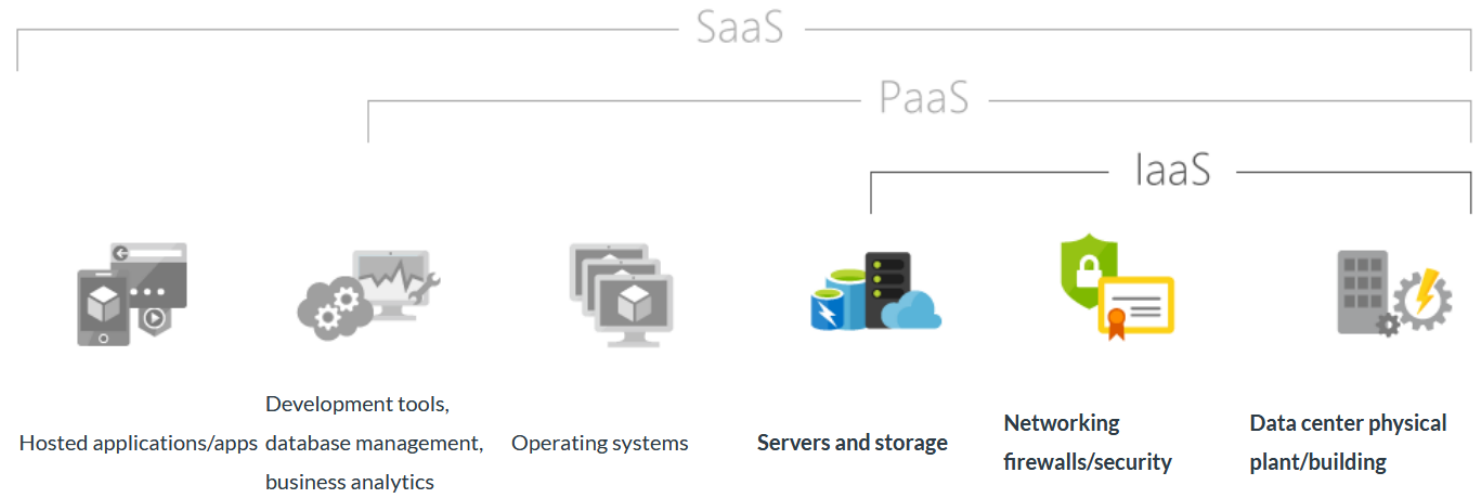
Operating Model



Operating Model



IaaS – Infrastructure as a Service



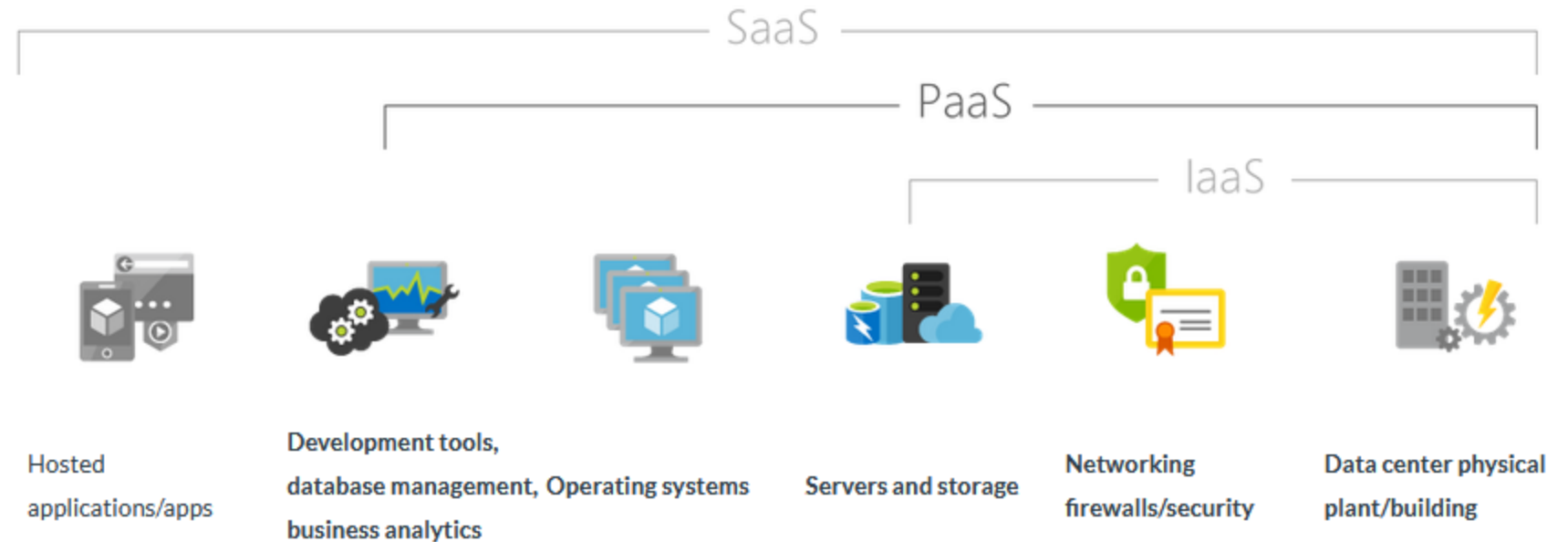
Use Cases:

- Operating from »bare metal« servers in the cloud
- Often used for
 - Legacy Application Stacks / Monoliths
 - High Performance Computing
 - Custom Installationen

IaaS – Pro's and Con's

- Reduction of investment (No costs for hardware)
 - All costs included (housing, power, etc.)
- Best Practice Blueprints of OS-Installations
 - Blueprinting also possible to be done by yourself with IaC
 - OS-based automatisms can be applied on all machines
- Disaster Recovery und Business Continuity on OS-Level
- Fast adaption of resources (vertical scaling)
- High Security due to automated audits and monitoring
- Economy of Scale: Provider scales with own infrastructure and achieves faster Return on Invest
- Most expensive services
- Capacity Management done by customer, no automated vertical scaling:
 - Adaption of resources results in need to restart service
- Operating of system must be done by customer
- No easy horizontal scaling possible due to disks / need shared storage

PaaS – Platform as a Service



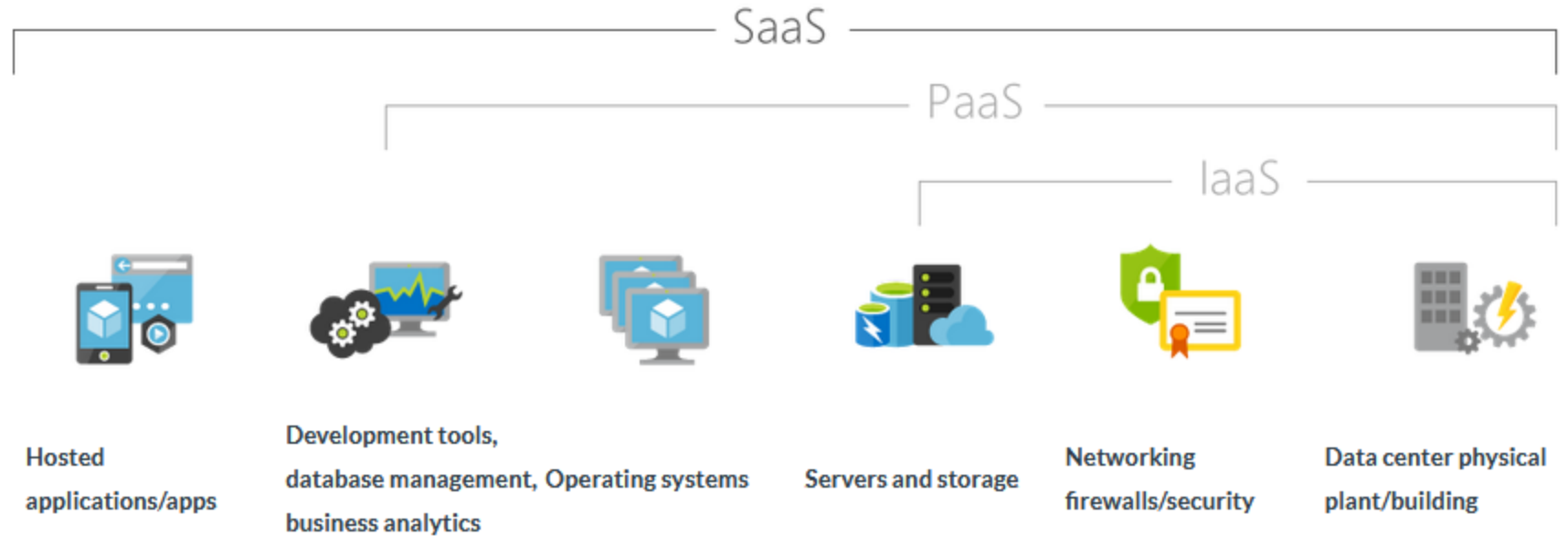
Use Cases:

- Deployment Frameworks included (Building, testing, deploying, managing, updating)
- Operating of own business code, (often containerized applications)
 - Analytics und Business Intelligence
 - Authentication, Workflow Engines, Directory Services, etc.

PaaS – Pro's and Con's

- Shorter Development Cycles (From Coding to Production)
- Innovative, integrated toolchain
 - Support for entire lifecycle including updates
- Clean shared-responsible model especially for containerized applications
 - By using e.g. Kubernetes, even syneries with entire ecosystem
- No OS-Operating / OS-Lifecycle
- Automated scaling
 - Especially in horizontal scalable microservice architectures
- Vendor Locking
 - Native Services (e.g. ECS for Container) cheaper than cloud-agnostic services (e.g. Kubernetes) for same service
- Very often opinionated by the cloud provider itself
- Steep learning curve
 - Custom knowledge on product itself

SaaS – Software as a Service



Use Cases:

- Office365 / Google G-Suite
- ERP und CRM-Systeme
- Atlassian Suite, Github
- Browserstack (Testing)

SaaS – Pro's and Con's

- Direct Usage Product, no / few own operating necessary
- Customer can focus on own business, no (shadow) IT necessary
- High Availability / Disaster Recovery included
- Scales with number user (often)
- Vendor Locking, no export very often not practical usable
 - Even though EU data act is in place...
- Can get expensive though (due to missing lifecycle of users)
 - No buy possible in most cases
- No / few adaption to own workflows / characteristics possible
- If outage occurs....

Atlassian Outage

**Atlassian** @Atlassian · [Follow](#)

While running a maintenance script, a small number of sites were disabled unintentionally. We're sorry for the frustration this incident is causing and we are continuing to move through the various stages for restoration. [1/3]

2:56 AM · Apr 7, 2022



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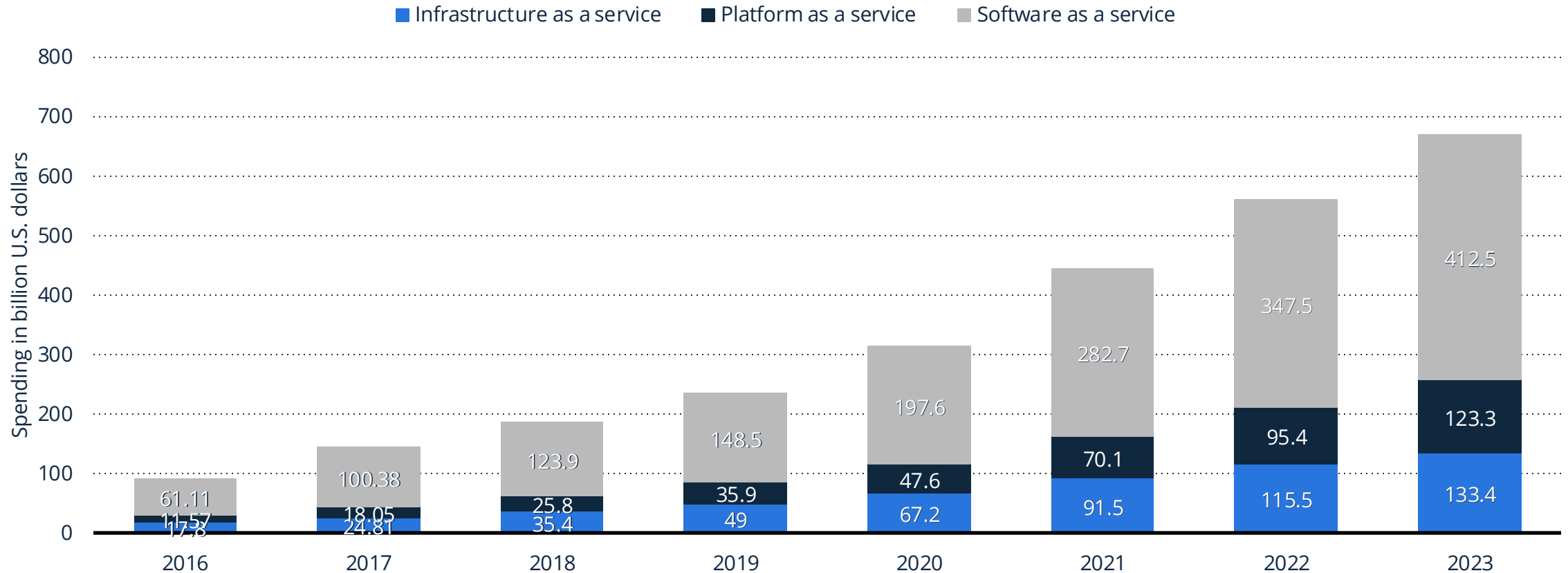
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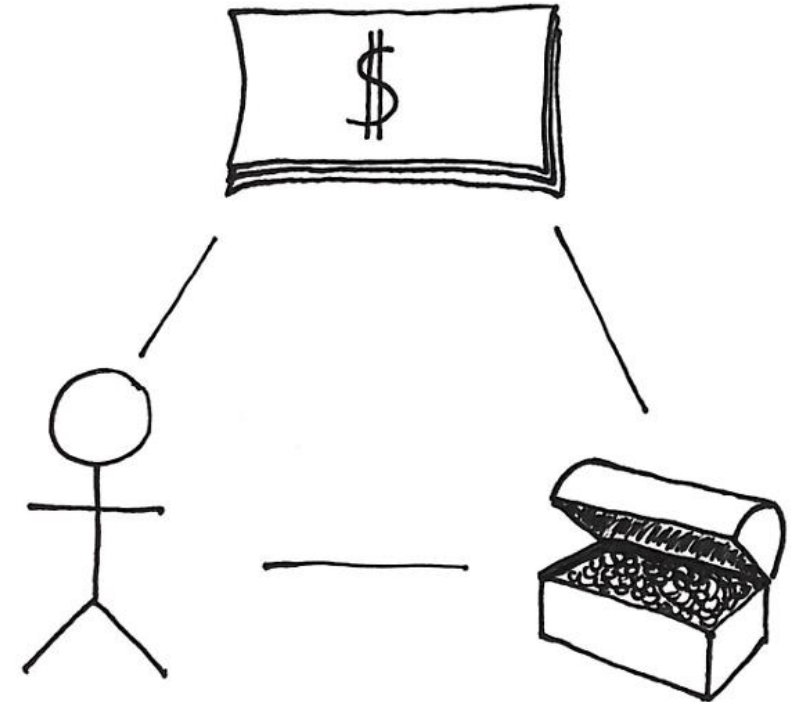
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Distributed of Service Models



Why to use Public Cloud Infrastructures?

- Faster time to market
- Increase of Agility (shift left)
- Increase of Availability
- Easier / Flexible Capacity Planning
- Better Security / Compliance
 - Including Best Practices
- Focusing on Business Value instead of Infrastructure
 - Cost reduction of own IT
- Pay-as-you-go models



OPEX vs CAPEX

CAPEX (Capital Expenditure)

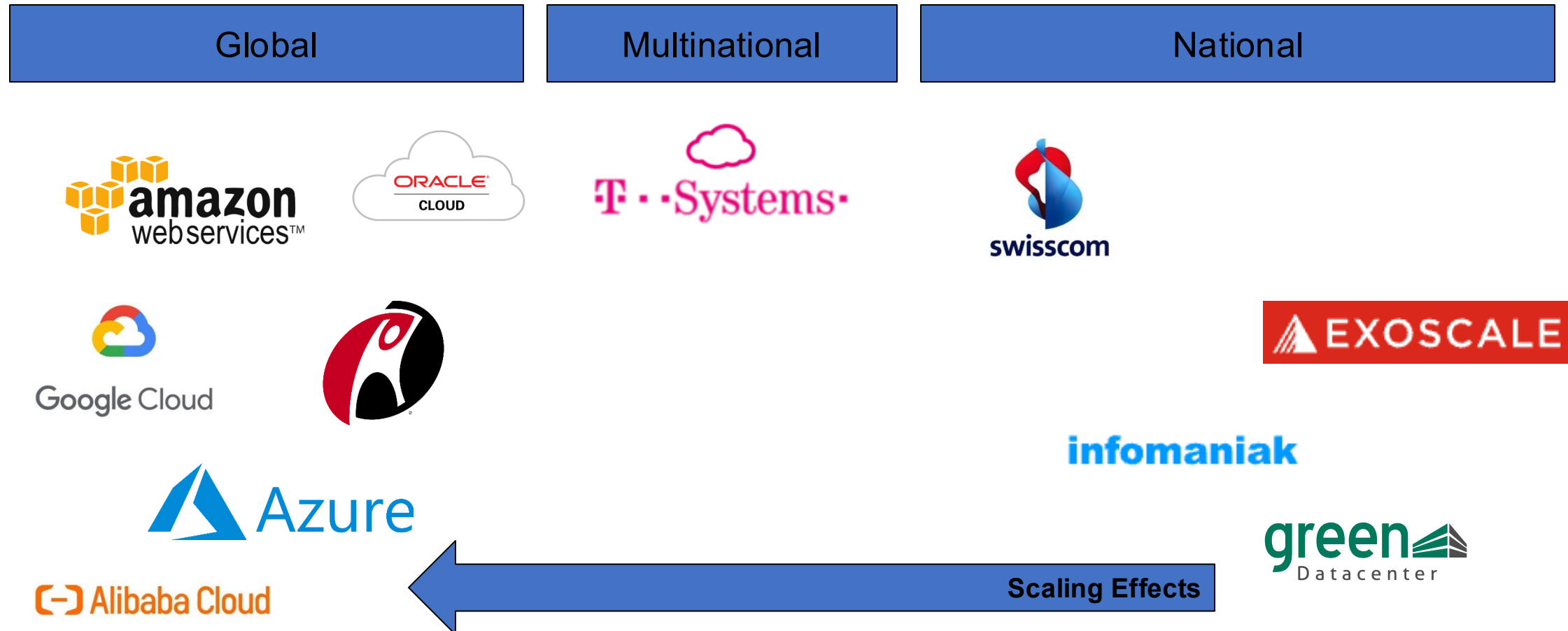
- Investment Costs like buying housing, hardware evt.
- Needs to be activated in the budget
- Money leaves the company
- For the duration of the hardware, the costs are distributed as loss

OPEX (*operational expenditure*)

- reoccurring costs
- Dampers the income for a fixed period of time

Companies seek to switch to OPEX due to better steering of costs

Swiss Market Overview



Cloud in this lecture....

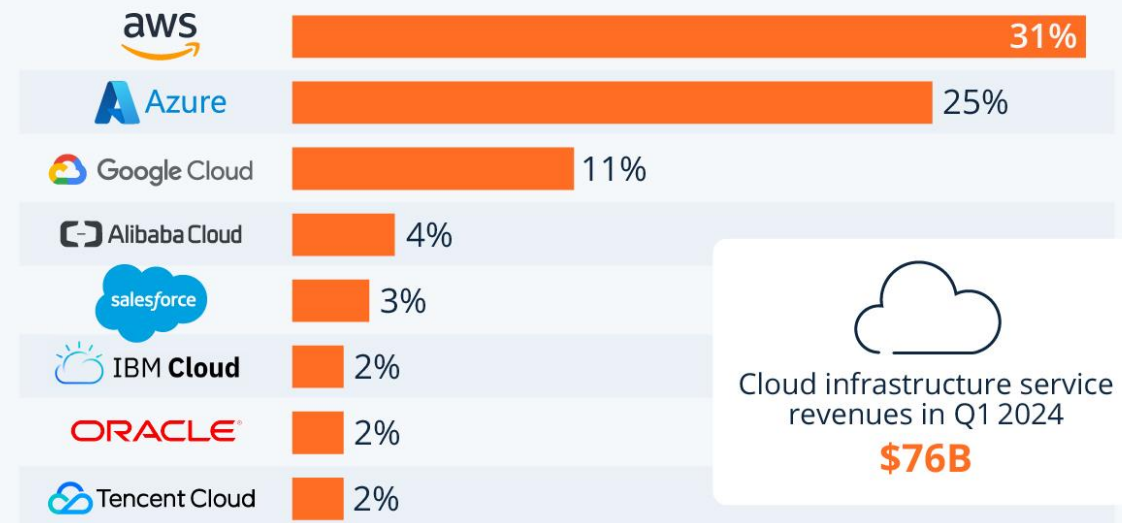
When we speak of cloud, we mean “real”* cloud infrastructures.

→ **We focus on Hyperscaler Infrastructure (namely AWS and Azure) when we use the cloud.**

* real = according to NIST-definition.

Amazon Maintains Cloud Lead as Microsoft Edges Closer

Worldwide market share of leading cloud infrastructure service providers in Q1 2024*



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

Source: Synergy Research Group



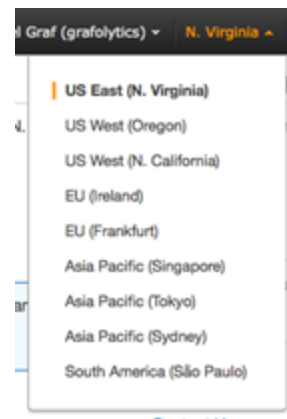
Infrastructure within hyperscaler

AWS



- 34 regions
- 108 data centers
- 600+ edge sites

Azure



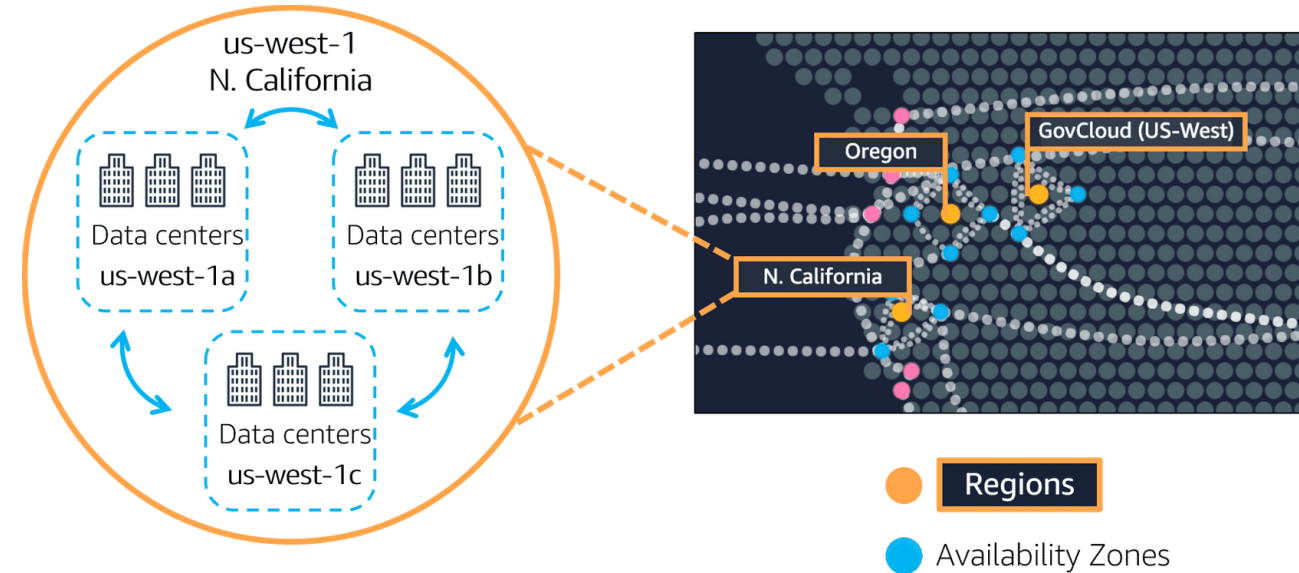
Region and Availability Zones

Region:

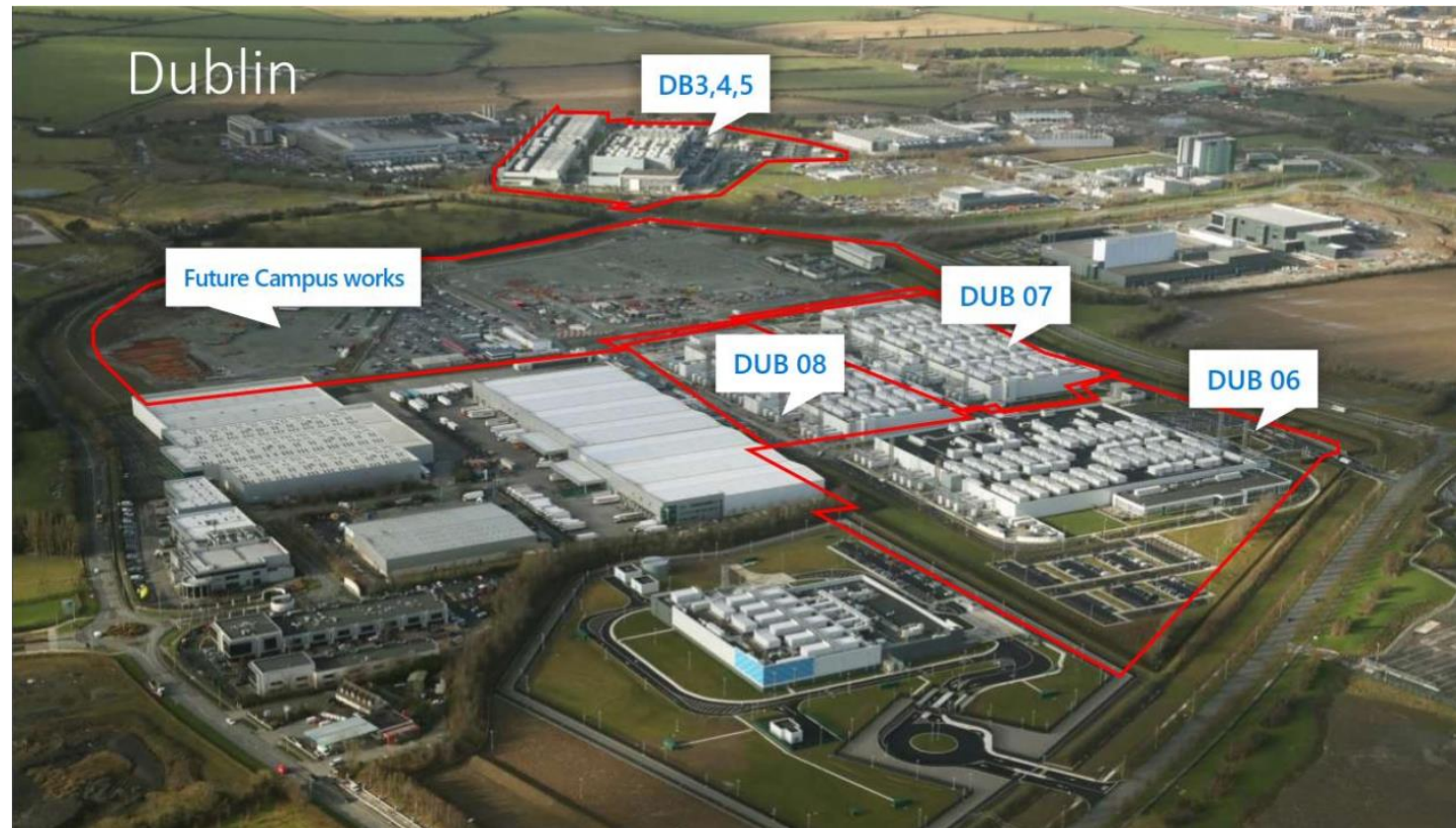
- Geographical Region consisting of multiple independent computing centers

Availability Zone:

- One defined Computing Center / Site within an availability zone



Sites



Sites



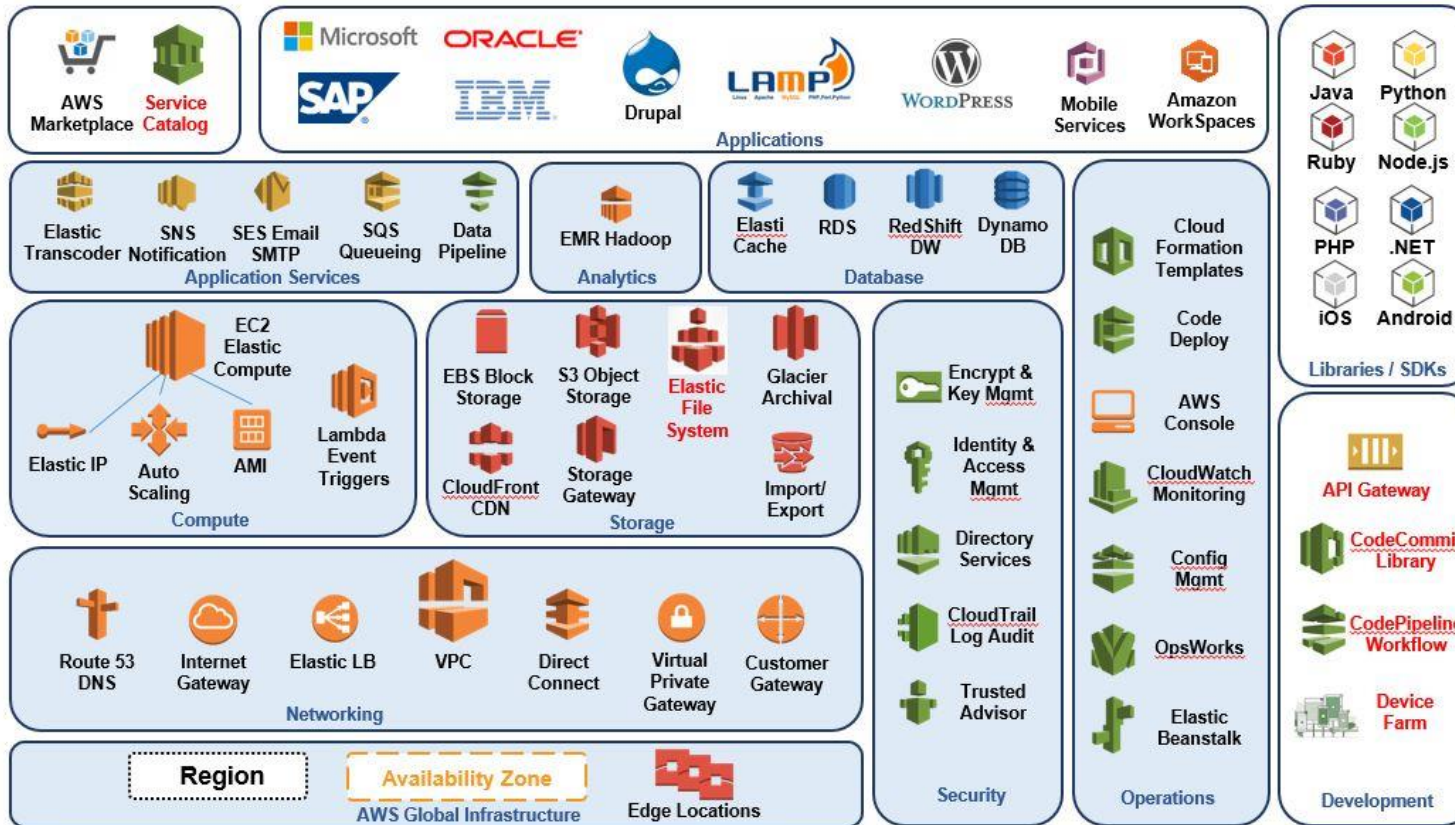
Sites



What do you need to access hyperscaler infrastructure?



AWS Services

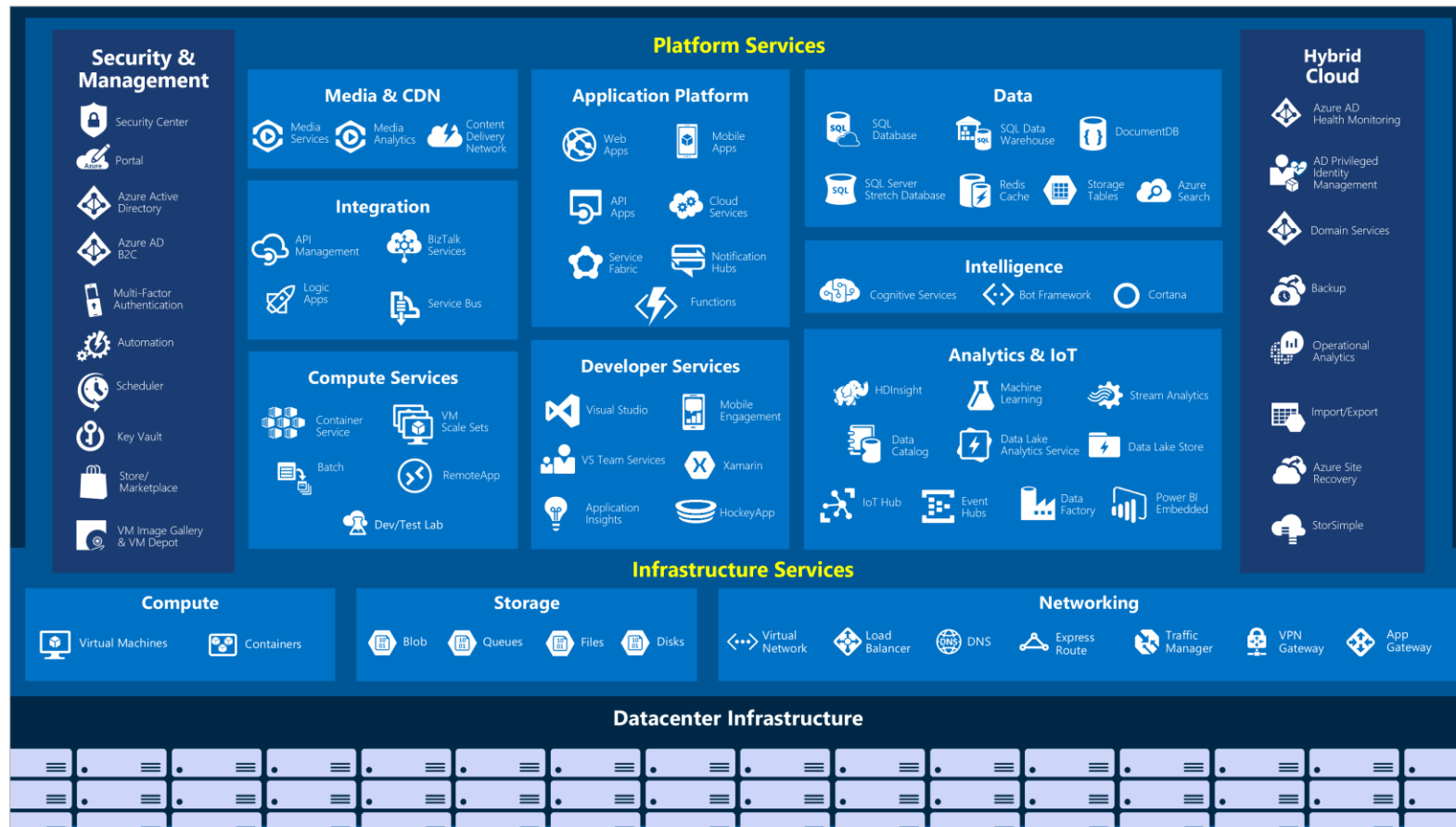


More than **>200** different IaaS-, PaaS- or SaaS-Services available.

Famous Services are:

- AWS EC2 (Compute based VM)
- AWS EBS und S3 (Storage)
- AWS Lambda (Serverless Computing)
- AWS CodeCommit (GIT Repo)
- AWS RDS (DB-Services)
- AWS S3 Glacier (Archive Storage)
- AWS Config (Config Management)
- AWS VPC
- AWS EKS (Kubernetes)
-

Azure Services



More than **>200** different IaaS-, PaaS- or SaaS-Services available.
Famous Services are:

- Azure Virtual Computer (Compute based VM)
- Azure Disk Storage und Azure Blob Storage (Storage)
- Azure Functions (Serverless Computing)
- Azure DevOps (GIT Repos und DevOps Toolchain)
- Azure SQL Databases (DB-Services)
- Azure Archive (Archive Storage)
- Azure Network
- AKS (Kubernetes)
-

Summary

- Cloud Computing is a game changer related to implementing and providing services
- The Public Cloud Sector is still growing
 - Push of AI increase the growth
- Cloud Services are cheaper because of providing scaling services
- Choosing services is not easy and must respect
 - Architectural considerations
 - Vendor Lockin
 - Operating Model
 - Use Case



