

## Definition

- remote on-demand servers to host, store, manage and process data
  - stored as `[[Distributed Data Storage]]` in `[[Data Center]]` instead of own locally hosted servers

## Service Models

**IaaS: Infrastructure as a service** (e.g., storage/compute nodes)

**PaaS: Platform as a service** (e.g., distributed systems/frameworks)

**SaaS: Software as a Service** (e.g., email, databases, office, github)

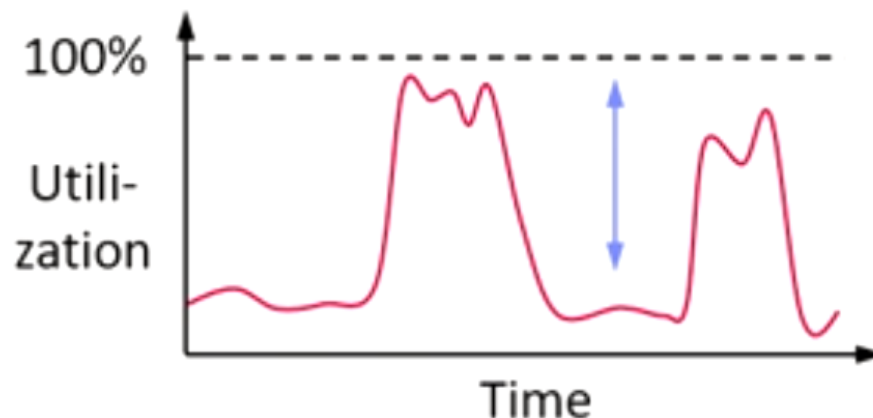
## Cloud Industry

### Transforming IT Industry/Landscape

- Since ~2010 increasing move from on-prem to cloud resources
- System software licenses become increasingly irrelevant
- Few cloud providers dominate IaaS/PaaS/SaaS markets (w/ 2018 revenue):  
[Microsoft Azure Cloud](#) (\$ 32.2B), [Amazon AWS](#) (\$ 25.7B), [Google Cloud](#) (N/A),  
[IBM Cloud](#) (\$ 19.2B), [Oracle Cloud](#) (\$ 5.3B), [Alibaba Cloud](#) (\$ 2.1B)

## Benefits

- pay as you go
  - no upfront cost
  - pay per use or acquired resources
  - variable utilization
    - \* prevents having too many/not enough resources



- \*
  - economies of scale
    - purchasing IT infrastructure at scale ==> lower cost
      - \* hardware as well as IT infrastructure know-how
    - focus on scale-out HW over scale-up ==> lower cost
  - elasticity

- flexibility on resource demand
- work for 10 days on 1 nodes ==> 1 day on 10 nodes

100 days @ 1 node

≈

1 day @ 100 nodes

\*

- assuming perfect scalability

(but beware Amdahl's law:  
max speedup **sp = 1/s**)

\*

- \* 5% not parallelizable ==> max speed up 20x
- \* 25% not parallelizable ==> max speed up 4x

## Characteristics and Deployment Models

### Characteristics

- **On-demand self service:** unilateral resource provision
- **Broad network access:** network accessibility
- **Resource pooling:** resource virtualization / multi-tenancy
- **Rapid elasticity:** scale out/in on demand
- **Measured service:** utilization monitoring/reporting

### Deployment Models

- **Public cloud:** general public, on premise of cloud provider
- **Hybrid cloud:** combination of two or more of the above
- **Community cloud:** single community (one or more orgs)
- **Private cloud:** single org, on/off premises

MS Azure  
Private Cloud  
IBM Cloud Private

[[Data Management]]