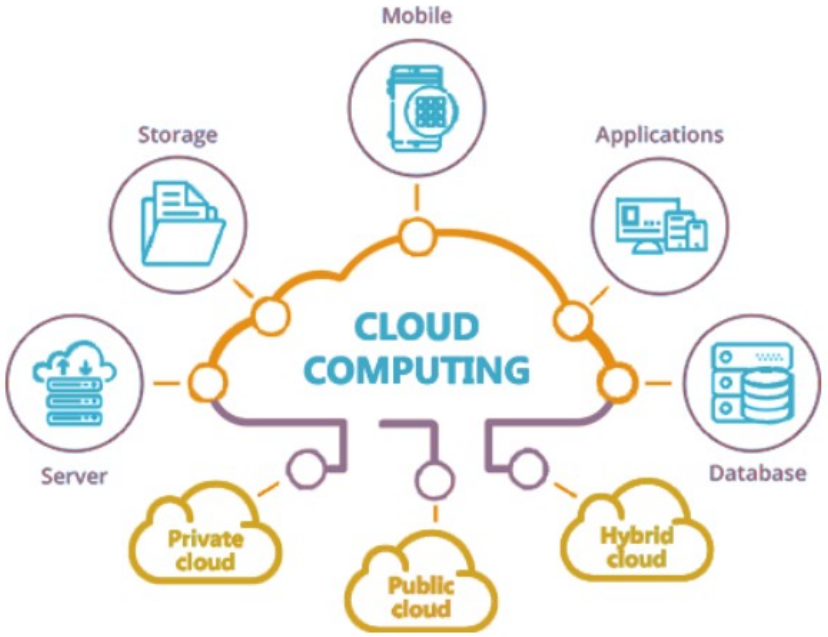


Cloud Computing 101

Ravindu Nirmal Fernando | SLIIT | March 2024

Cloud Computing Principles

- Technology is abstracted away from the user.
  - e.g. hardware and software management is the responsibility of the cloud provider
- Location-independent (if you have enough bandwidth)
- Cloud Services have a scalable architecture
- Dynamic
- Request-driven
- Clouds have multi-tenancy
- Several clients using the same resources

Features of Cloud

- Scale and Elasticity
- Resource pooling
- Location independence
- On-demand self-service provisioning
- Web services interfaces
- Billing and metering services
- Monitoring and measuring performance
- Providing security to customers

What is Cloud Computing?

Gartner

- Cloud computing is a style of computing in which scalable and elastic IT - enabled capabilities are delivered as a service using internet technologies.

Forrester Research

- A standardized IT capability (services, software, or infrastructure)delivered in a pay-per-use, self-service way.

NIST

- Cloud computing is a model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction.

Everything as a Service

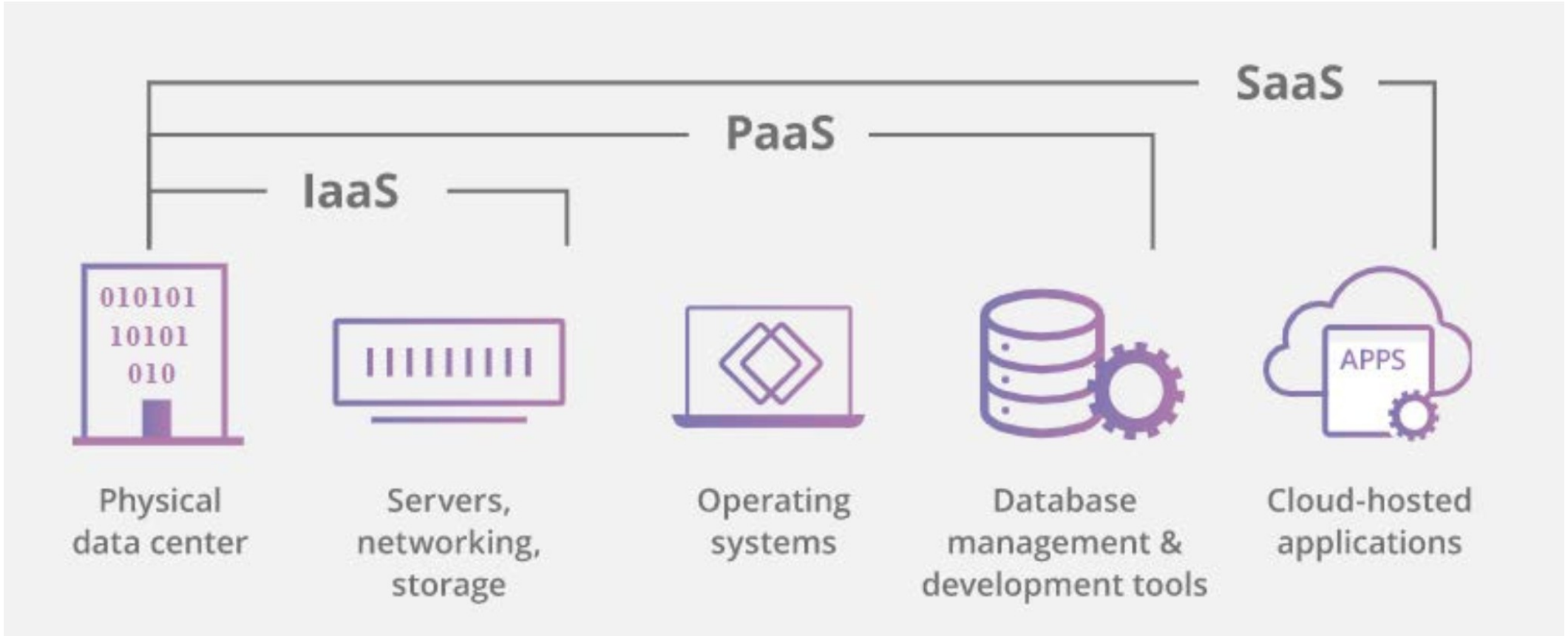
- Traditionally applications ran on dedicated hardware
- Clouds provide everything (hardware, software, applications, etc.) as a service

The Business Case for the Cloud

- Supporting business agility
- Reducing capital expenditure

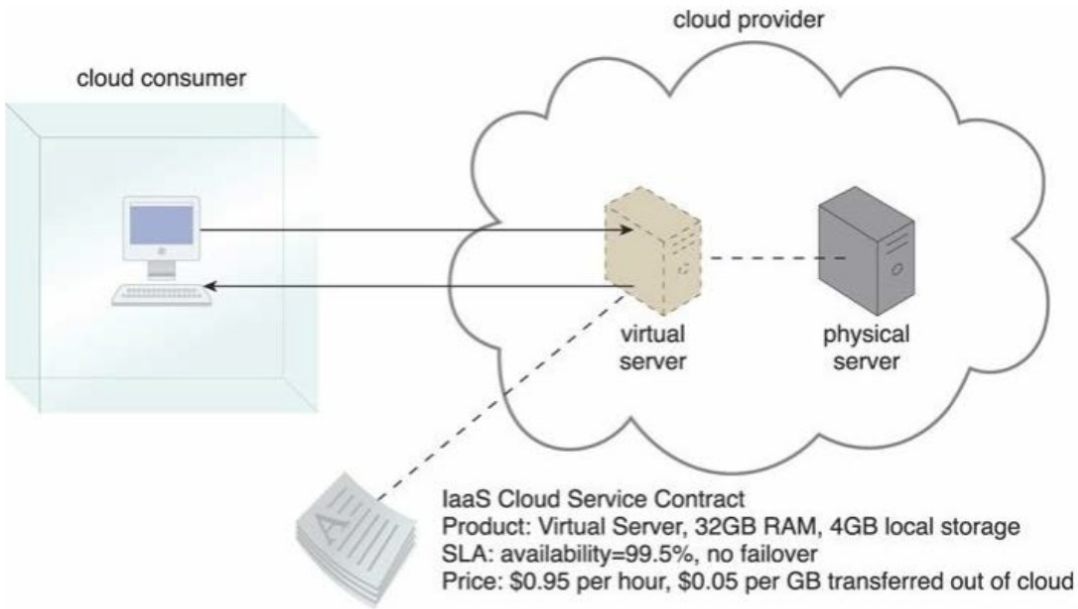
Cloud Service/ Delivery Models

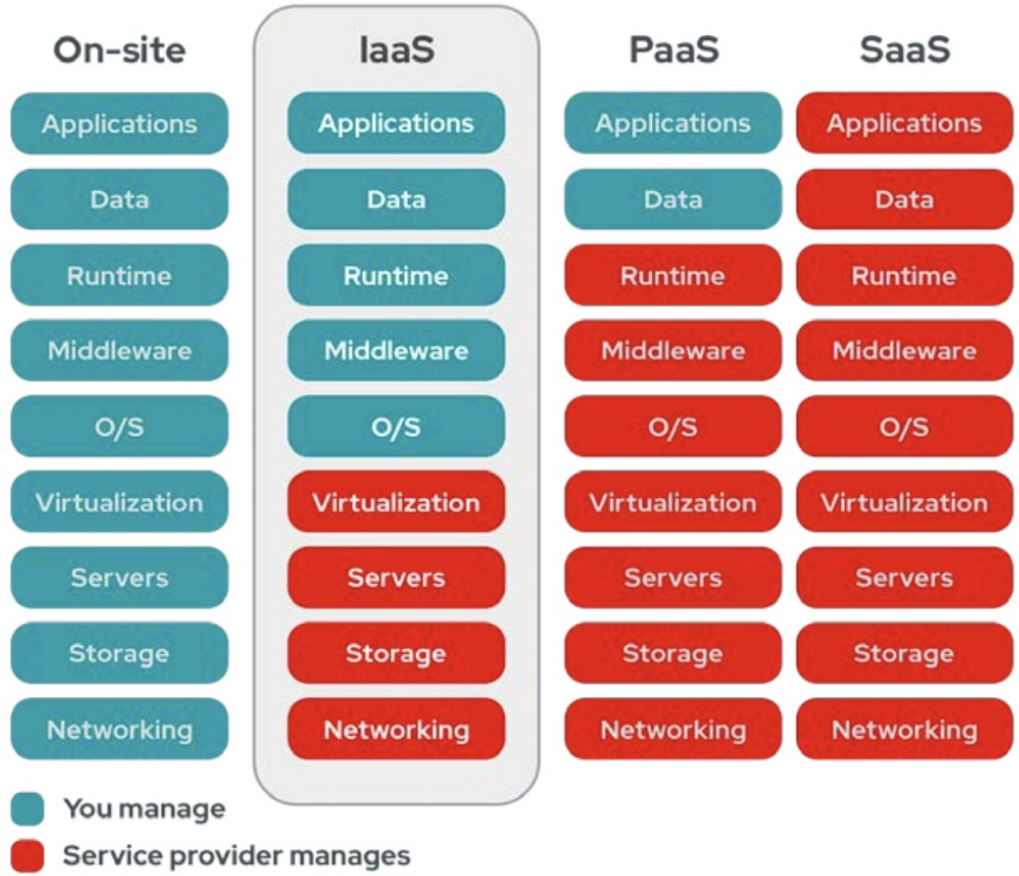
- Cloud Software as a Service (SaaS)
  - Use provider's applications over a network
- Cloud Platform as a Service (PaaS)
  - Deploy customer-created applications to a cloud
- Cloud Infrastructure as a Service (IaaS)
  - Rent processing, storage, network capacity, and other fundamental computing resources


SaaS
PaaS
IaaS
010101
10101
010
APPS
Physical data center
Servers, networking, storage
Operating systems
Database management & development tools
Cloud-hosted applications

Infrastructure as a Service (IaaS)

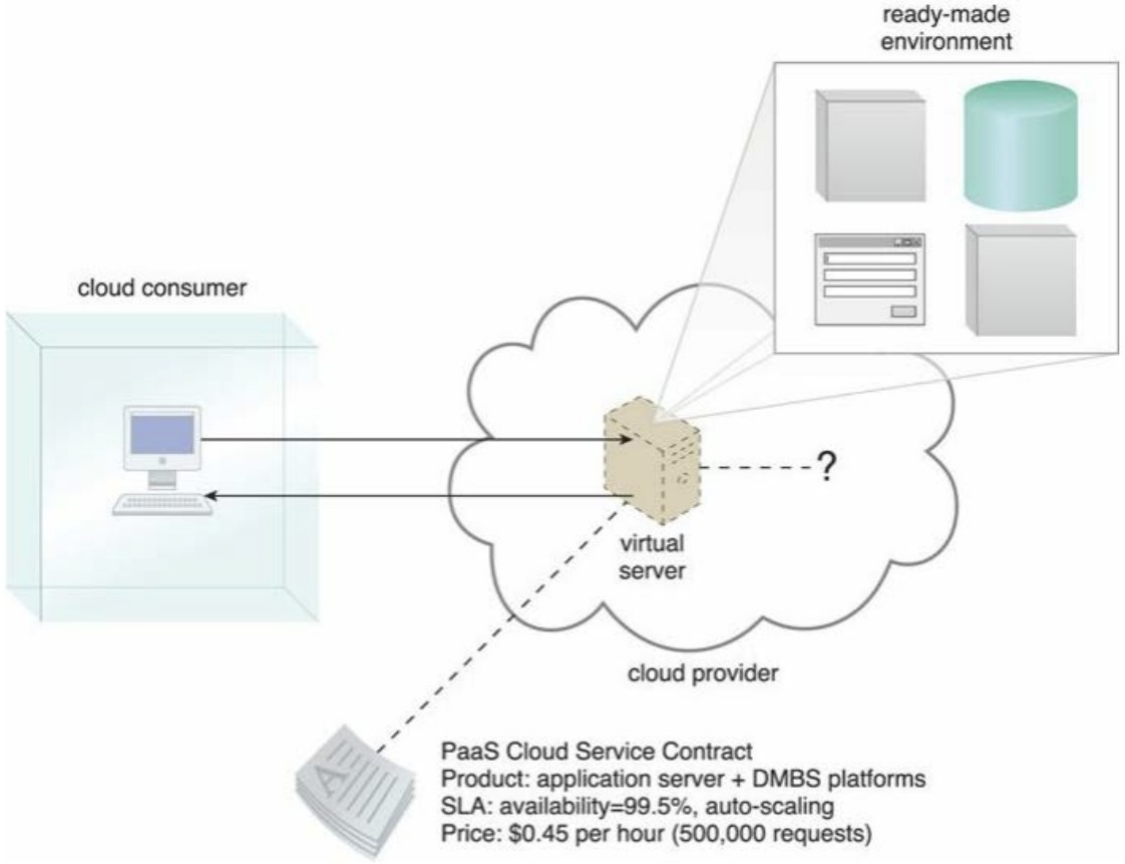
- Delivery of a compute foundation as a service.
  - servers
  - networking technology
  - storage
  - data center space
- Includes the delivery of
  - operating systems and
  - virtualization technology to manage the resources.
- Customer rents computing resources rather than buying and installing them
- Paid on a usage basis
- May include dynamic scaling
- Agreed on service level


cloud provider
cloud consumer
virtual server
physical server
IaaS Cloud Service Contract
Product: Virtual Server, 32GB RAM, 4GB local storage
SLA: availability=99.5%, no failover
Price: $0.95 per hour, $0.05 per GB transferred out of cloud

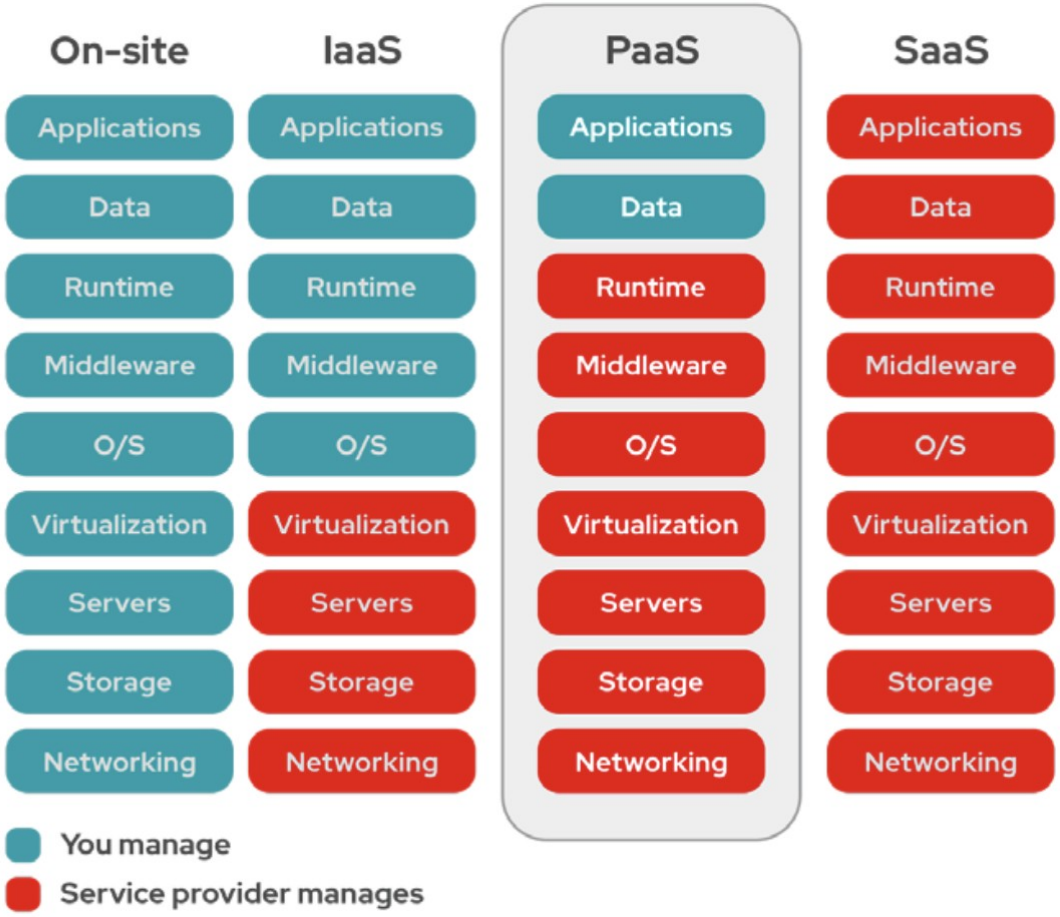

On-site
IaaS
PaaS
SaaS
Applications
Data
Runtime
Middleware
O/S
Virtualization
Servers
Storage
Networking
You manage
Service provider manages

Platform as a Service (PaaS)

- Delivers a solution stack (ready-made) for both
  - software development and
  - a runtime environment
- Easy to develop applications
- May be constrained
- Danger of lock-in
- allow you to focus on the deployment and management of your applications.
- Cloud consumer is spared the administrative burden of setting up and maintaining the bare infrastructure IT resources

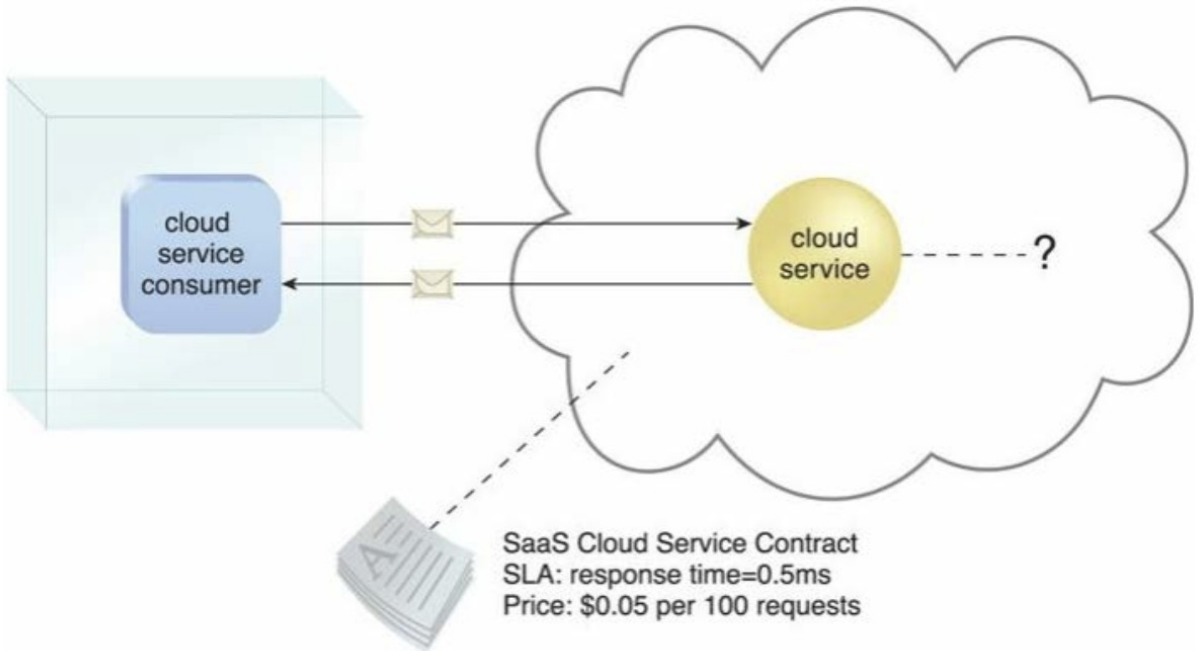


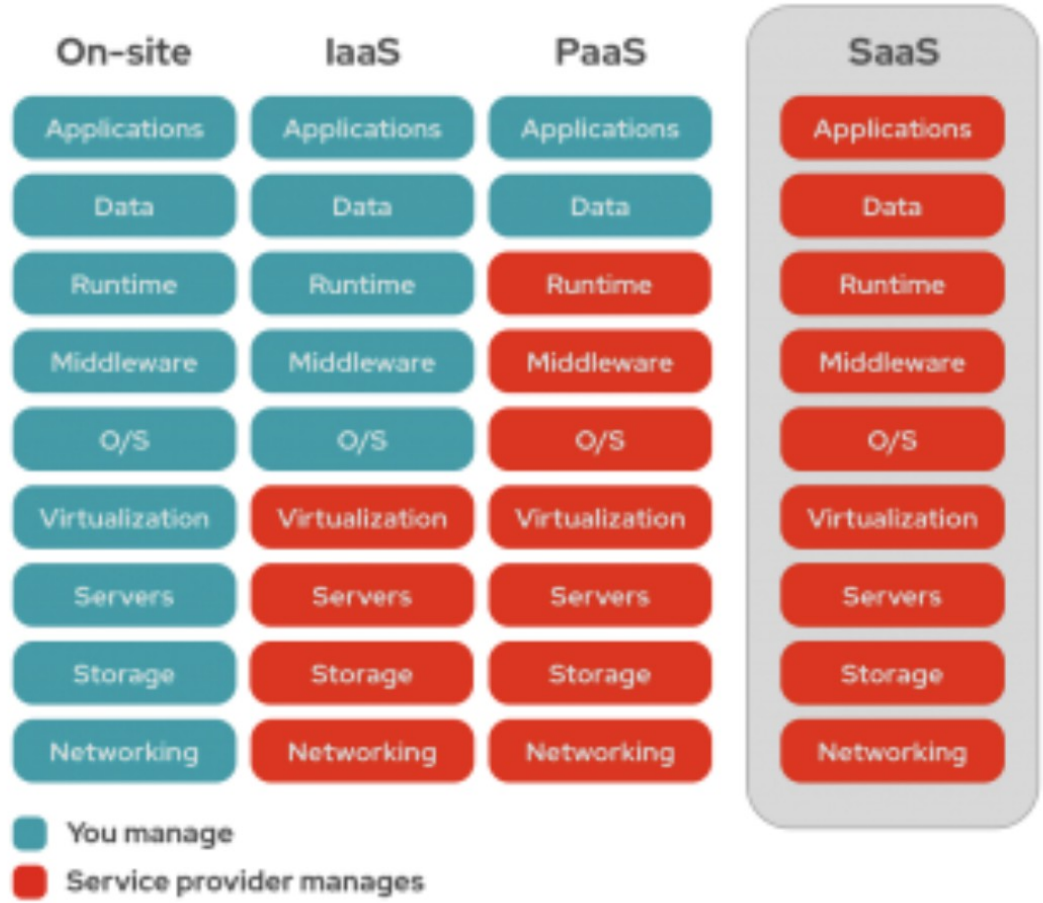
https://www.redhat.com/en/topics/cloud-computing/what-is-paas

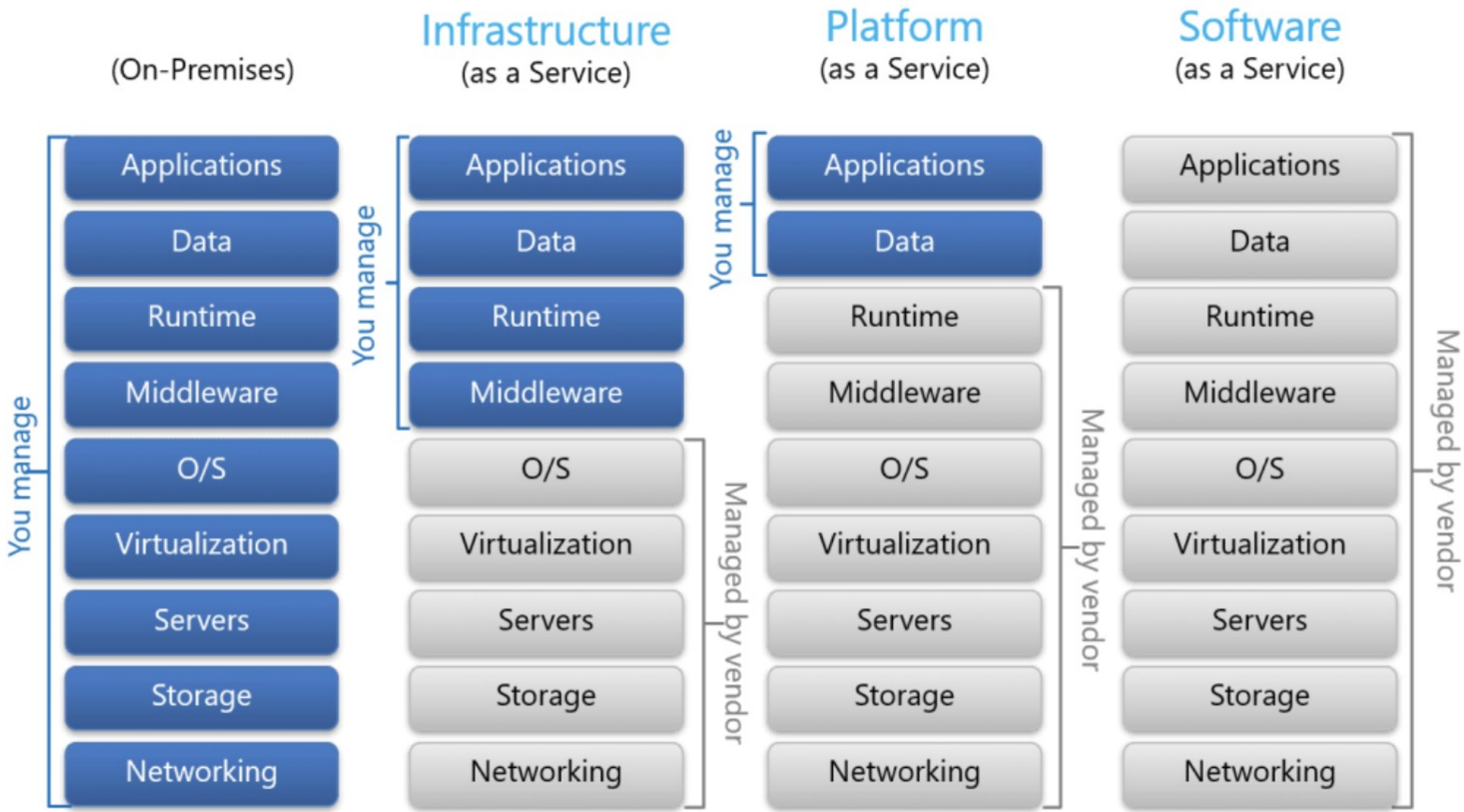


Software as a Service (SaaS)

- Service provider offers specific applications offered as a “product”
  - hosted by the provider
  - Consumed by the customer
- May be customised by the customer
- Information stored by the provider
- No necessity to purchase any hardware
- The SaaS vendor
  - Operates
  - Maintains and
  - Supports all the software, hardware, and communications technology
- The price is on a per-use basis and involves no upfront capital costs.


cloud
service
consumer
cloud
service
?
SaaS Cloud Service Contract
SLA: response time=0.5ms
Price: $0.05 per 100 requests


On-site
IaaS
PaaS
SaaS
Applications
Data
Runtime
Middleware
O/S
Virtualization
Servers
Storage
Networking
You manage
Service provider manages


(On-Premises)
Infrastructure
(as a Service)
Platform
(as a Service)
Software
(as a Service)
You manage
Applications
Data
Runtime
Middleware
O/S
Virtualization
Servers
Storage
Networking
You manage
Managed by vendor
You manage
Managed by vendor
Managed by vendor

Choosing between IaaS, PaaS, SaaS

IaaS

- Flexibility, finer control, & performance
- Still need some level of infrastructure maintenance
- Scaling, configuration, security

PaaS

- Speedy development, better integration, automated scaling, no maintenance needs
- Relatively low-customization, Vendor lock-in

SaaS

- Fastest for common applications
- Little customization

Cloud service/ delivery models variations

Many specialized variations of the three base cloud delivery models have emerged

- Storage as a Service
- Database as a Service
- Security as a Service
- Communication as a Service
- Integration as a Service
- Testing as a Service
- Process as a Service

Cloud Deployment Models

- **Private cloud**
  - enterprise owned or leased. Resources are dedicated to enterprise
- **Public cloud**
  - Sold to the public, mega-scale infrastructure
- **Hybrid cloud**
  - composition of two or more clouds. Mostly deployment between public and private
- Community cloud
  - shared infrastructure for specific community
- Personal cloud
  - your own cloud – belongs to you

- Cloud computing often leverages:
  - Massive scale
  - Virtualization
  - Resilient computing
  - Low cost software
  - Geographic distribution
  - Service orientation
  - Advanced security technologies

Selection of a Cloud Service

Know what you want first

- What services are available?
- What is your pricing model?
- What are your scaling options?
- What are your security measures?
- Where are your datacenters located?
- What are SLA terms?
- Customer support
- Reputation

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