NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE

IaaS, SaaS and PaaS

Cloud Infrastructure Engineering

Nanyang Technological University
& Skills Union - 2022/2023

Course Content

- Quick Check-In
- Dive into the basics of IaaS, PaaS and SaaS
- Explore the difference between the different service models
- Explore the use cases for each service model

Time	What	How or Why
7:15pm - 7:25pm	Part 1 - Presentation	Overview of IaaS, PaaS and SaaS
7:25pm - 7:45pm	Part 2 - Presentation & Hands-on Activity	Introduction to IaaS
7:45pm - 7:55pm	Break	
7:55pm - 8:15pm	Part 3 - Presentation & Hands-on Activity	Introduction to PaaS
8:15pm - 8:35pm	Part 4 - Presentation & Hands-on Activity	Introduction to SaaS
8:35pm - 8:45pm	Summary	Summary of lessons
8:45pm - 10:00pm	Assignment & Wrap Up	

Self Study Check-In

Q1) Give an example of IaaS that you know of

Q2) Give an example of PaaS that you know of

Q3) Give an example of SaaS that you know of

What is IaaS, PaaS, and SaaS?

Brief Intro to Service Models

Most cloud providers offer these 3 service models:

- IaaS
- PaaS
- SaaS

Depending on your company's requirements, you may utilize different compute resources that belong to 1 of the 3 models above.

Overview

SaaS
Software
as a Service
IaaS
Infrastructure
as a Service
PaaS
Platform
as a Service

Infra As A Service (IaaS)

Contains the basic building blocks for cloud IT and typically provide access to networking features, computers (virtual or on dedicated hardware), and data storage space.

Infrastructure as a Service provides you with the **highest level of flexibility and management control** over your IT resources and is most similar to existing IT resources that many IT departments and developers are familiar with today.

Platform As A Service (PaaS)

Removes the need for organizations to manage the underlying infrastructure and allow you to **focus on the deployment and management of your applications**.

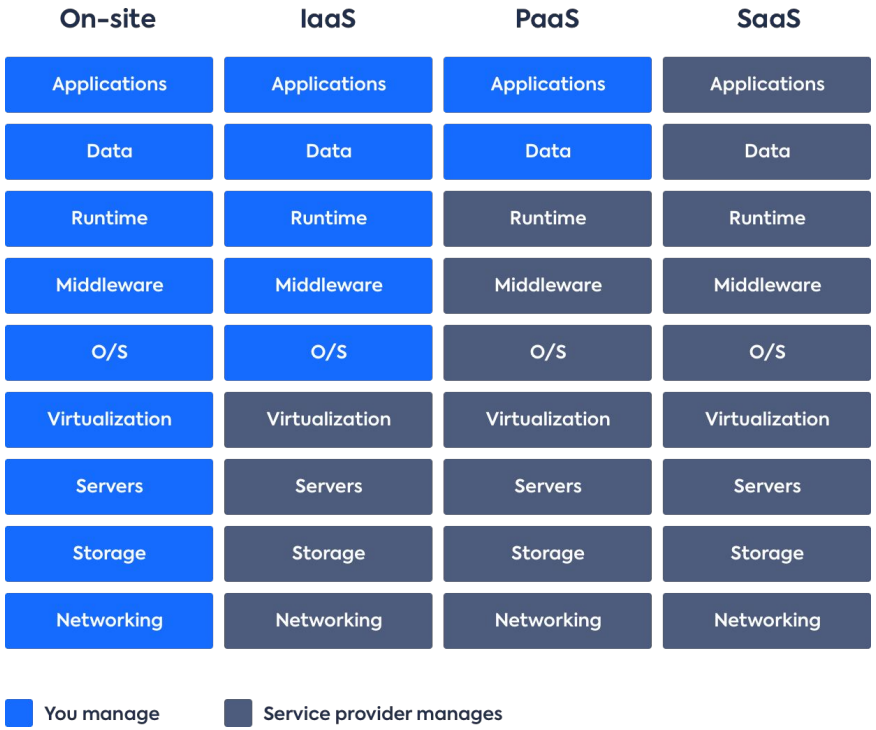
This helps you **be more efficient** as you don't need to worry about resource procurement, capacity planning, software maintenance, patching, or any of the other undifferentiated heavy lifting involved in running your application.

Software As A Service (SaaS)

Provides you with a complete product that is **run and managed by the service provider.**

With a SaaS offering you do not have to think about how the service is maintained or how the underlying infrastructure is managed; you only need to think about **how you will use that particular piece of software**.

Service Model



IaaS

IaaS Overview

AWS IaaS helps businesses to **digitize more quickly** while allowing them to integrate all their data on a single platform.

Additionally, it **enables businesses to scale up and down** at any given time to suit their needs.

All these features make AWS IaaS a widely-used platform by companies nowadays.

IaaS Examples

Storage

- AWS S3
- AWS EBS

Compute

- AWS EC2

IaaS Benefits

- Speed of provisioning resources
- Flexibility in configuring resources
- Competitive pricing (pay-as-you-go)
- Backup and recovery
- Reliability

IaaS Characteristics

- Resources are available as a service
- Cost depends on the consumption
- Highly scalable
- Allow multiple users to access a single piece of hardware
- The organization has complete control of the infrastructure
- Dynamic and flexible

IaaS Use Cases

- Startups and small companies which want to avoid spending time and money in producing hardware and software.
- Larger companies which **prefer complete control over their applications and infrastructure,** but want to purchase only what is needed for the app development.
- Companies with rapid growth potential that like to keep **altering hardware and software** as per their demands for scaling up.

IaaS Challenges

- **Security threats** which may arise from the host or other virtual machines
- Customers' **inability to access their data** when vendor outages happen
- Required **team training** to learn how to manage new infrastructure

PaaS

PaaS Overview

This service gives programmers the **building blocks** they need to create apps.

In its most basic form, a third-party vendor will give users hardware and software tools over the Internet, leaving users **only responsible for the design and development of applications**.

The PaaS service provider will host all hardware and software on its own network.

PaaS Examples

AWS Elastic Beanstalk

AWS RDS

AWS DynamoDB

PaaS Benefits

- Availability of application development environment which saves users a lot of time and money.
- Users **don’t need to worry about platform maintenance and backup services** which are entirely managed by cloud technology.
- More time to **focus on application** rather than infrastructure.
- The infrastructure is stored directly in the cloud, and users can always access it immediately.
- Flexible development according to users’ need of using advanced software.

PaaS Characteristics

- Resources can easily be scaled up or down as your business changes.
- Provides a variety of services to facilitate the development, testing, and deployment of apps.
- Multiple users can access via the same development application.
- Able to integrate with web services and databases.

PaaS Use Cases

- PaaS is a great option if you're looking for a time- and money-saving solution. By managing software updates and security patches for the developer, PaaS **frees up more time** to focus on the **application development**, such as designing, testing, and deploying the app.

PaaS Challenges

- Dependent on the provider's functional capabilities, speed, and reliability.
- **Compatibility** problems may arise when existing infrastructure is incorporated into a new environment.
- **Security risks** due to its availability in the public environment.
- Potential **conflict** with organizational requirements and regulations

SaaS

SaaS Overview

SaaS Overview

Software distribution model whose applications are hosted and made discoverable to the customers over the Internet.

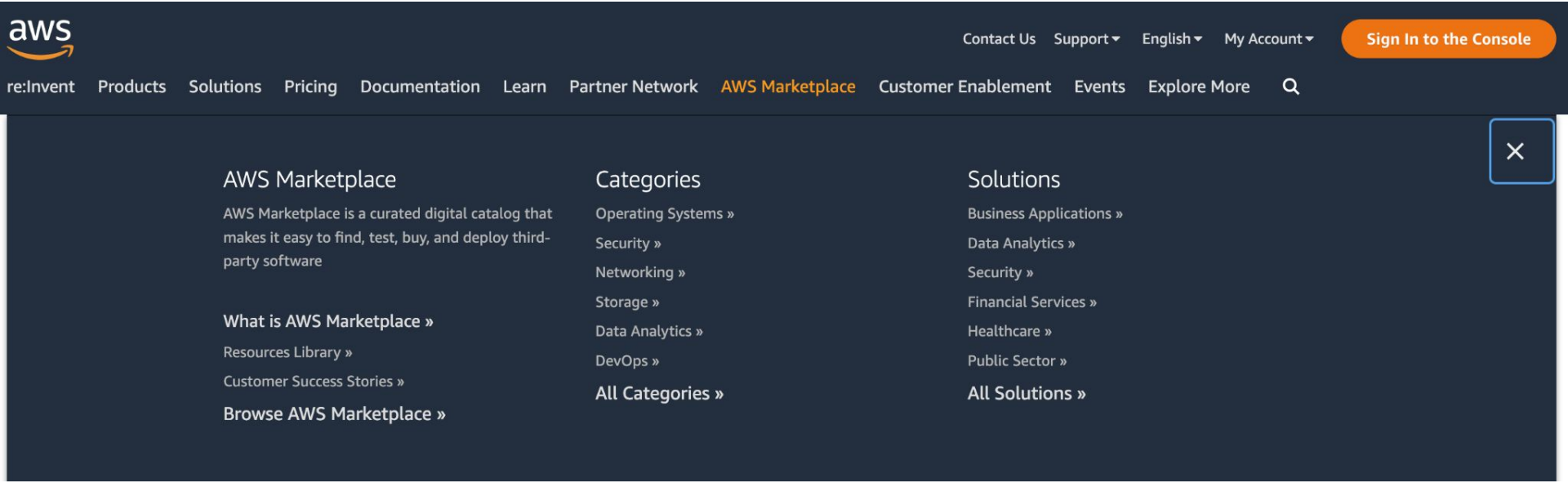
When embracing this solution, you will have the **access to the application**, along with its security, availability, and performance **managed by the provider**.

SaaS is also one of Amazon’s web services favored by a large number of users worldwide.

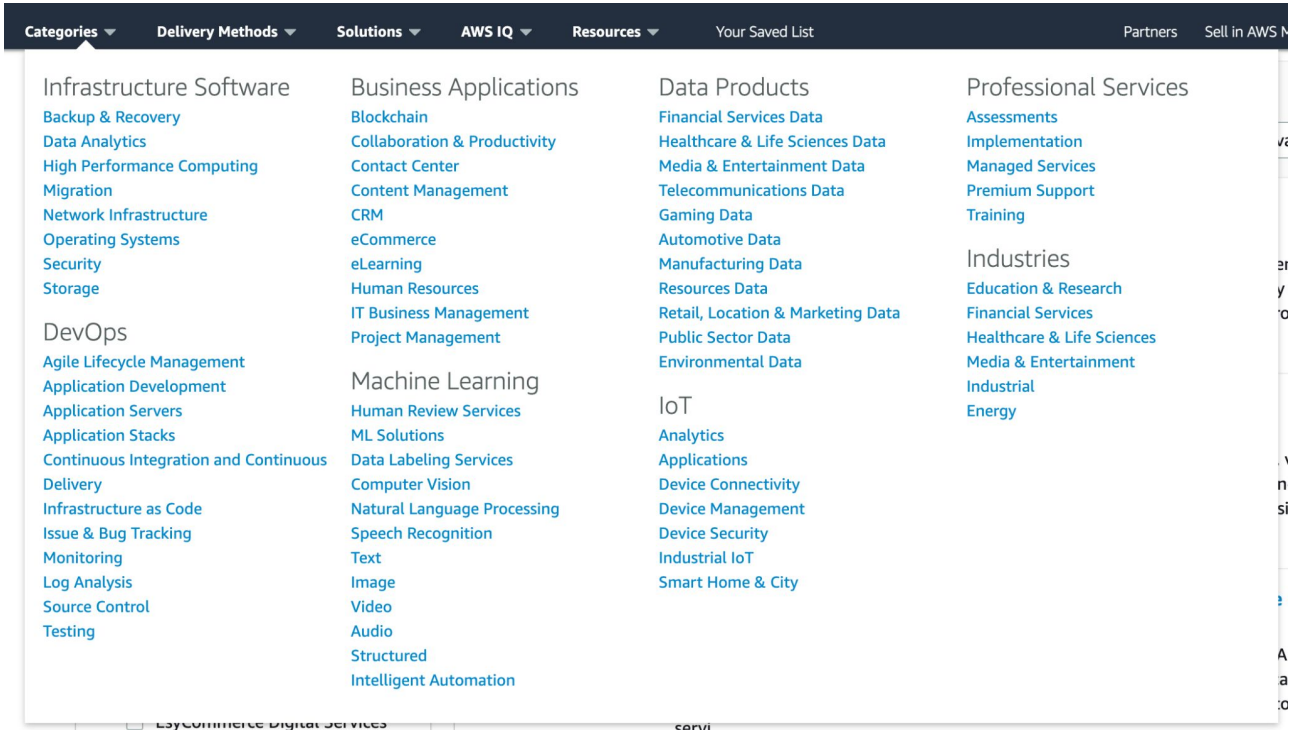
SaaS Examples

- SAP
- CyberArk
- SnowFlake
- Databricks
- MongoDB
- Grafana
- Prometheus

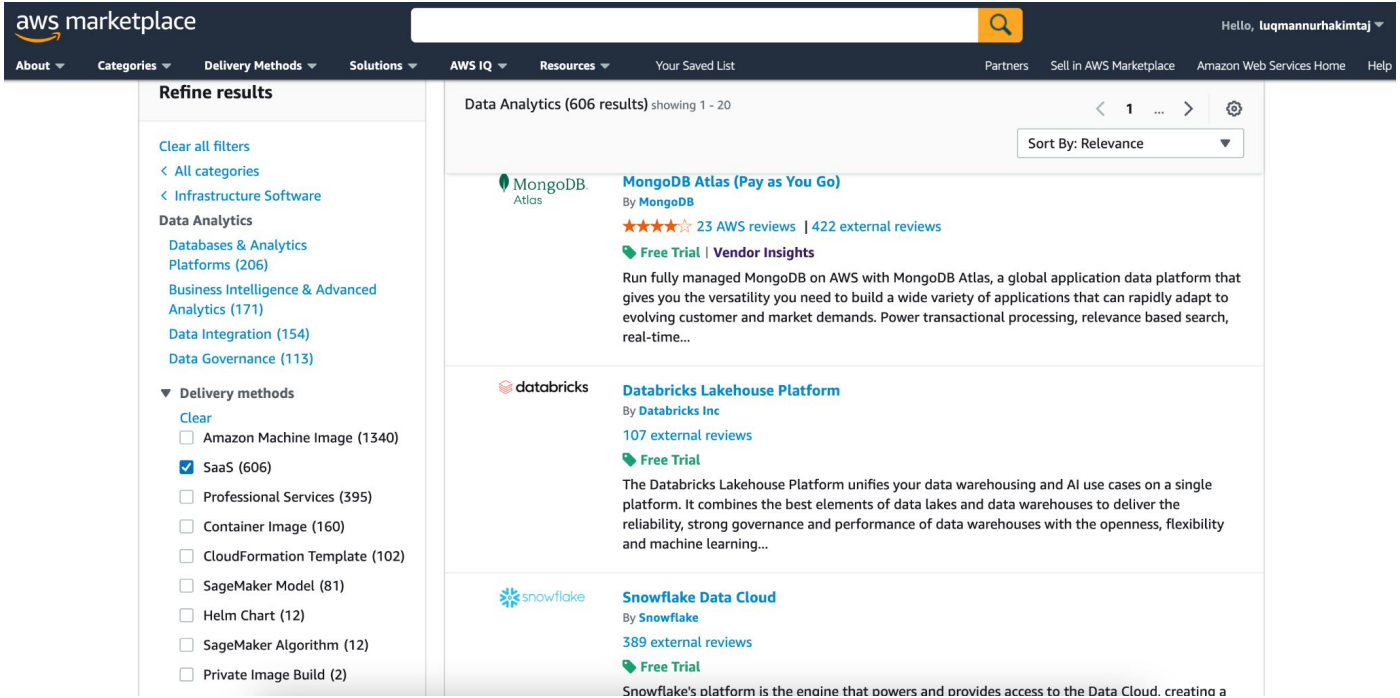
SaaS Examples



SaaS Examples



SaaS Examples



SaaS Examples

- Customer Relationship Management (CRM)
- Enterprise Resource Planning (ERP)
- Email marketing software
- Accounting software
- Human resources software
- Security software
- Communication software
- Contact Center software like Amazon Connect

SaaS Characteristics

- Managed from a central location.
- Hosted on a remote server.
- Accessible over the internet.
- Users have the hardware or software updated by the provider.

SaaS Use Cases

- Startups or small companies that wish to **start running their eCommerce site quickly** and have little time for server issues or software.
- Companies which prefer quick, easy, and affordable collaboration.
- Companies with **infrequently-used applications** such as tax software.
- Companies which want to provide both web and mobile access for customers.

SaaS Benefits

- Able to use directly over the network **without having to install any software**.
- Lower upfront cost
- Reduced ongoing cost
- Rapid deployment
- Automatic updates
- Strong integration with AWS services
- Real-time data analytics

SaaS Challenges

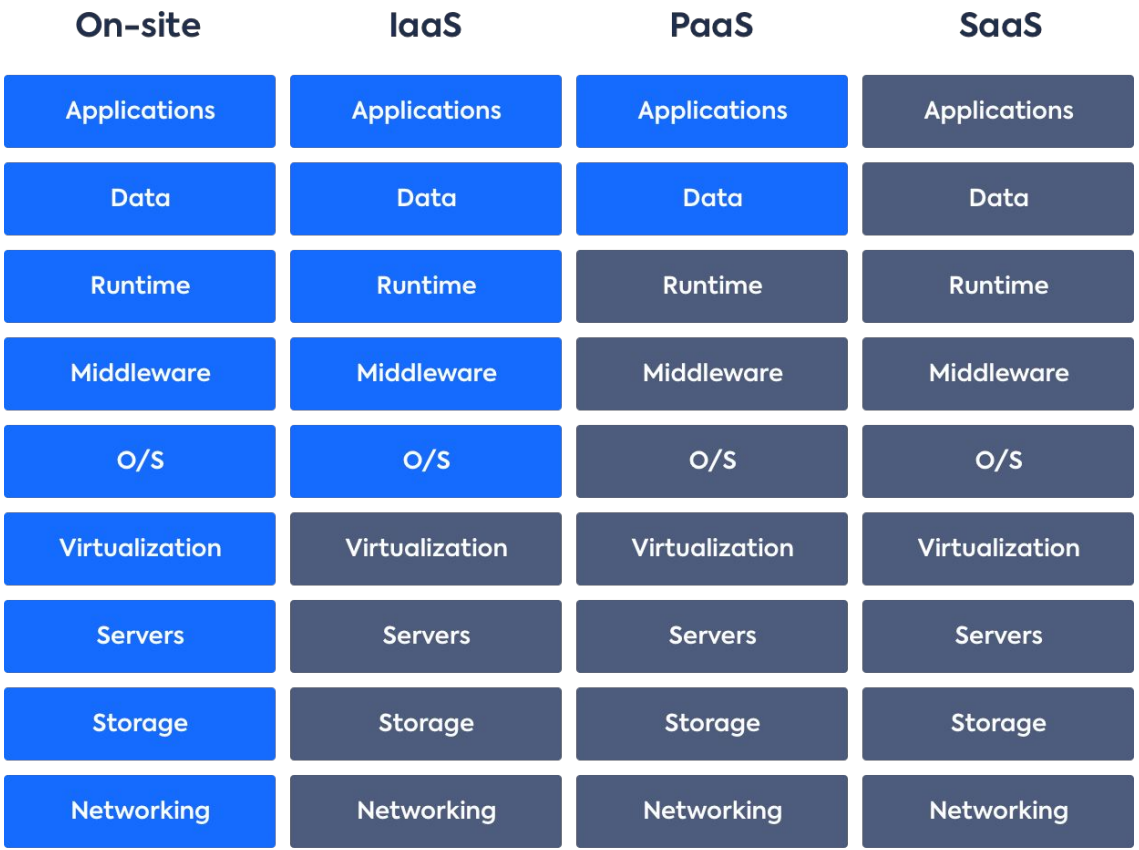
- Some are difficult to integrate with existing apps and services.
- **Security risks** due to its availability in the public environment.
- **Limited customization** capabilities.
- **Loss of operational control** which affects how PaaS solutions are managed, provisioned, and operated.

IaaS, PaaS, SaaS Activity

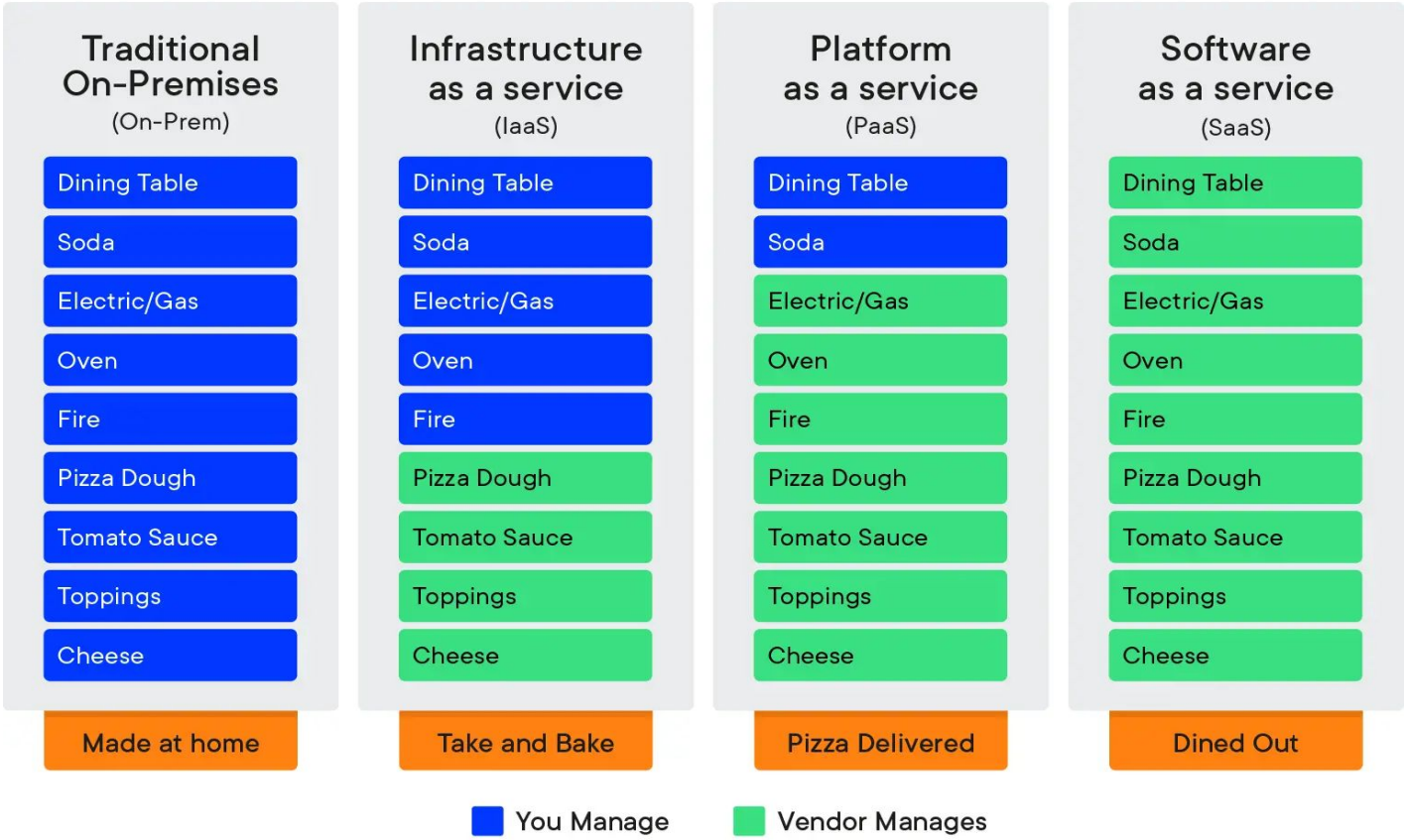
- Will your **Applications** be managed by you or your provider?
- Will your **Data** be managed by you or your provider?
- Will your **Runtime** be managed by you or your provider?
- Will your **Middleware** be managed by you or your provider?
- Will your **Operating System** be managed by you or your provider?
- Will your **Virtualization** be managed by you or your provider?
- Will your **Servers** be managed by you or your provider?
- Will your **Storage** be managed by you or your provider?
- Will your **Networking** be managed by you or your provider?

Break Time

Comparison


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

Pizza as a service



Activity

- Which one is more beneficial for you? IaaS, PaaS or SaaS
- If you are a decision maker, what you think you will use the most and will be implemented on your team/ company?

Group Assignment

Work with your group to define your own business and your own IaaS / PaaS or SaaS based on discussed threats that might be happen to your business

1. Define your business
2. Define your Infra
3. Define your Platform
4. Define Your SaaS

Activity

Learner:

- Clean up AWS.
- Remove/delete/terminate all service/ resources that created.

Instructor

- Clean up AWS.
- Remove/delete/terminate all service/ resources that created.
- Check the AWS account after learner clean up.

What’s Next?