What is cloud computing?

UNDERSTANDING CLOUD COMPUTING



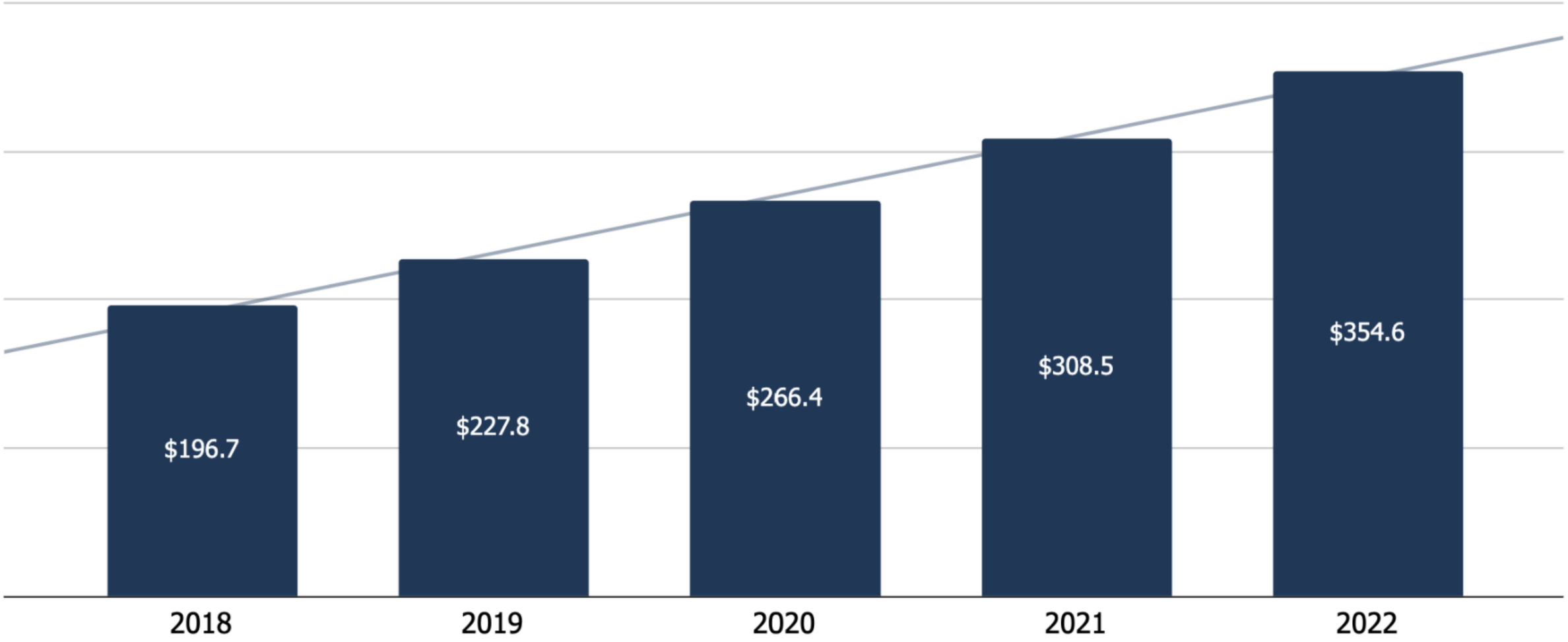
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The importance of the cloud



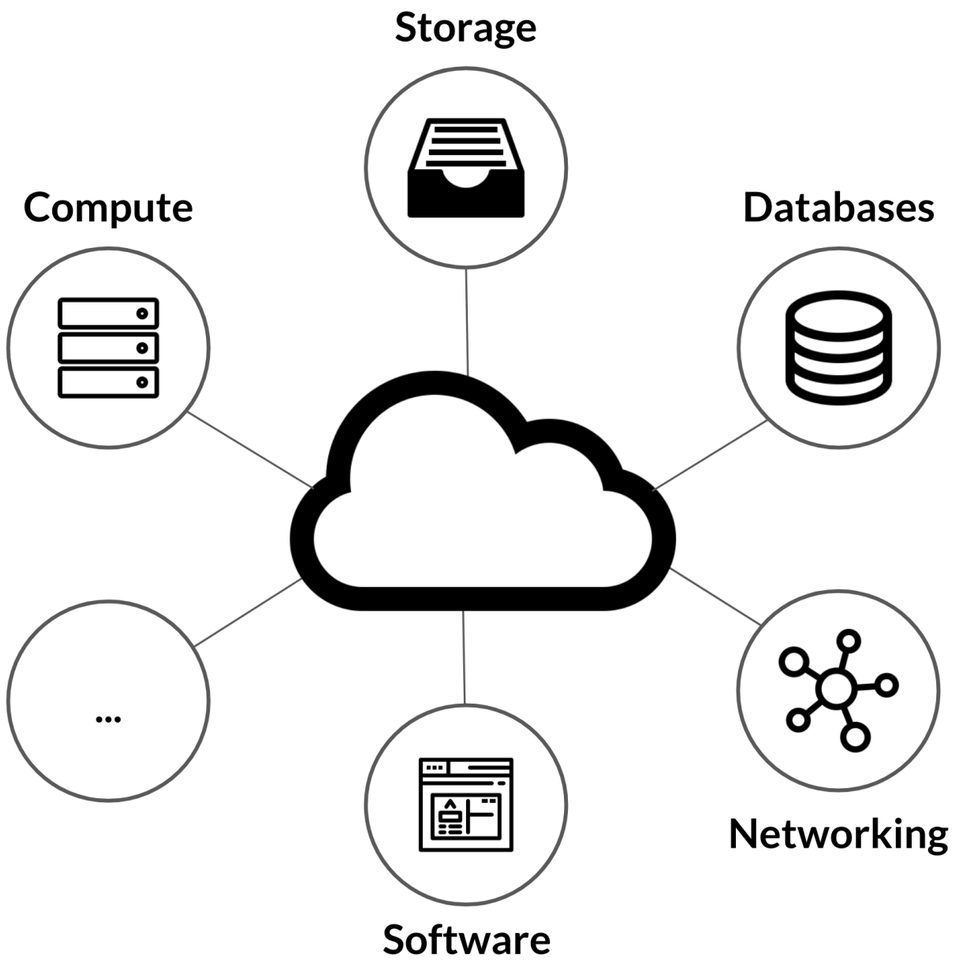
Worldwide Public Cloud Service Revenue Forecast (Billions of U.S. Dollars)



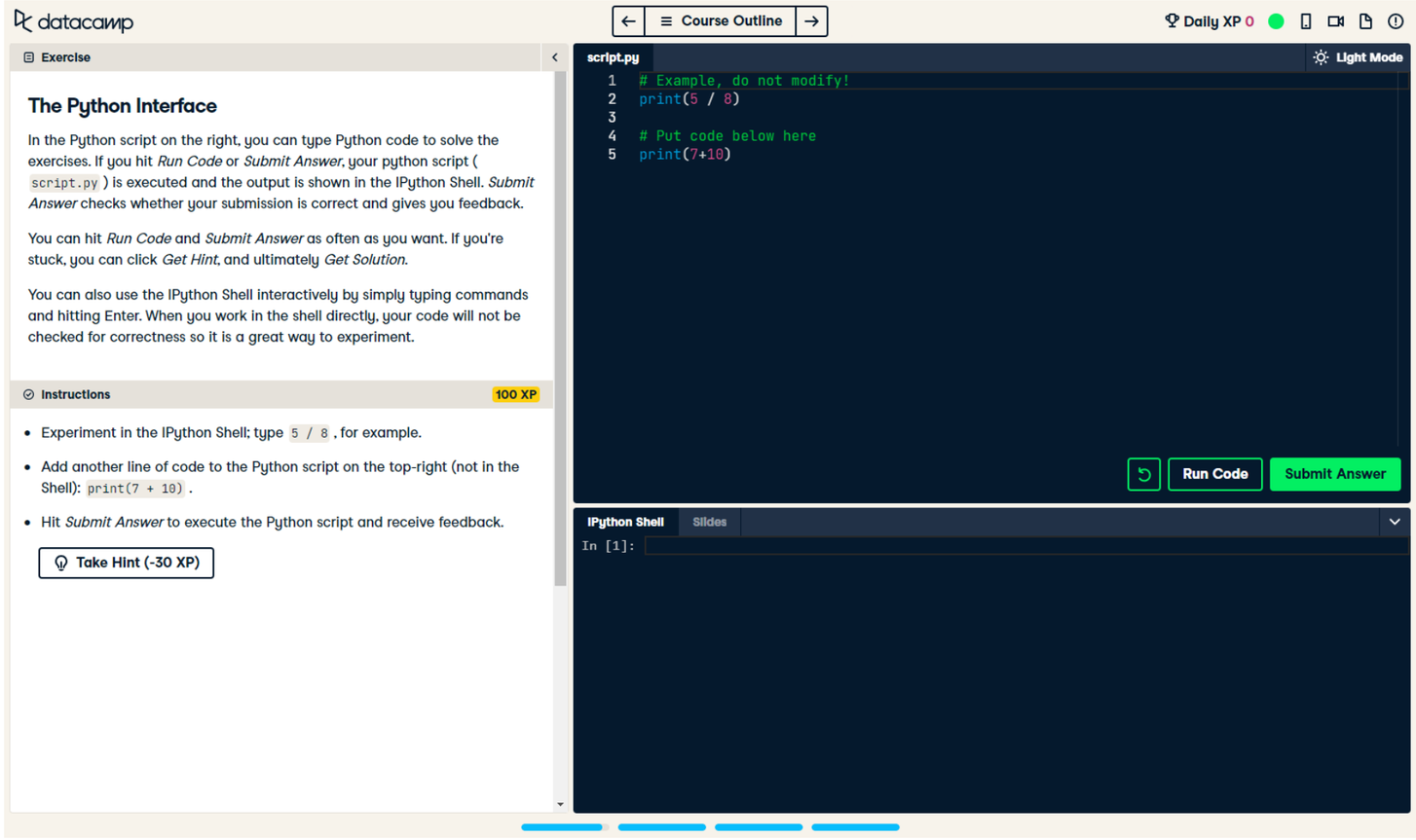
Source: https://www.gartner.com/en/newsroom/press-releases/2019-11-13-gartner-forecasts-worldwide-public-cloud-revenue-to-grow-17-percent-in-2020

Cloud computing definition

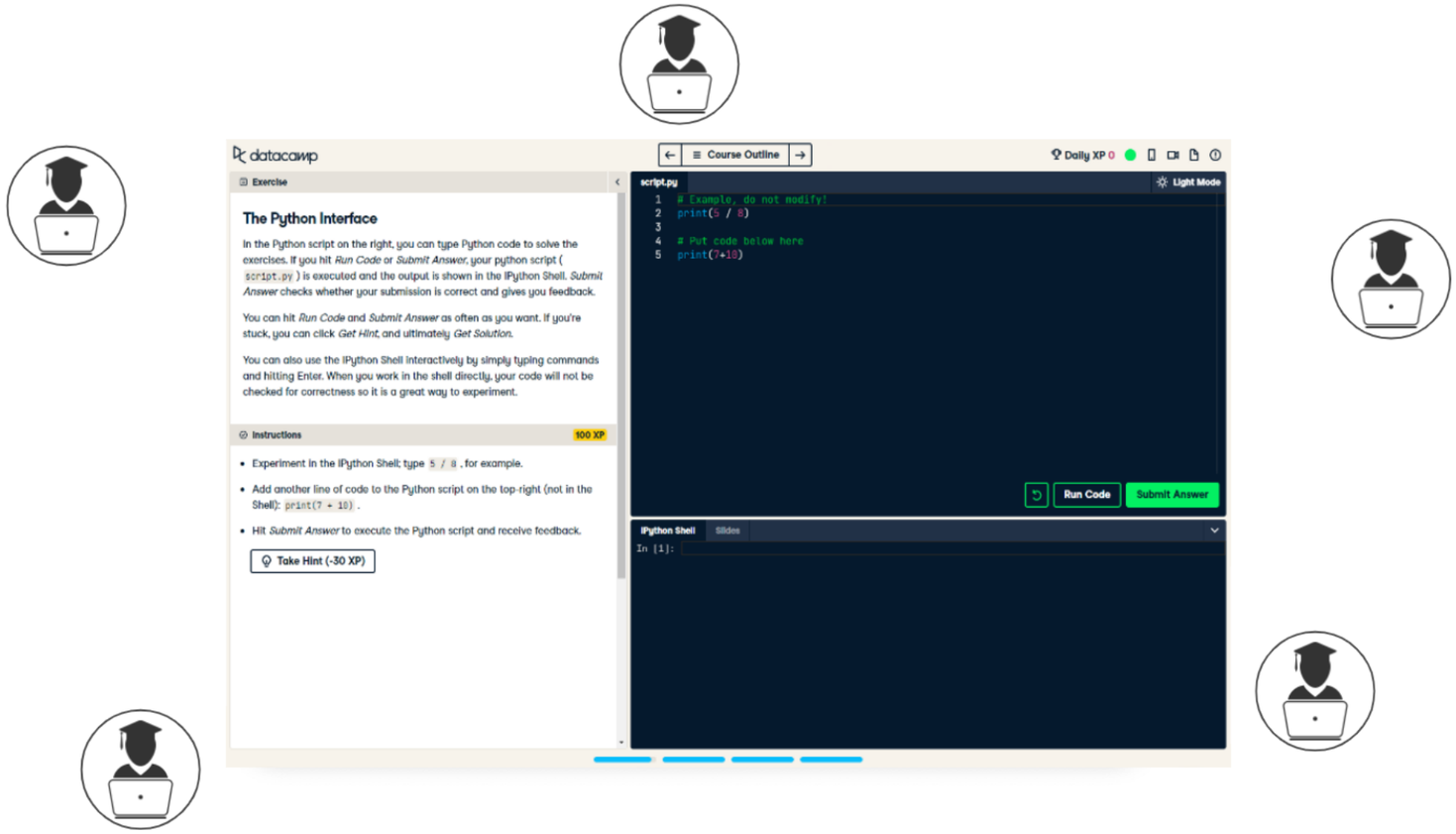
> Cloud computing is the delivery of technology services - including compute, storage, databases, networking, software, and many more - over the internet with pay-as-you-go pricing.



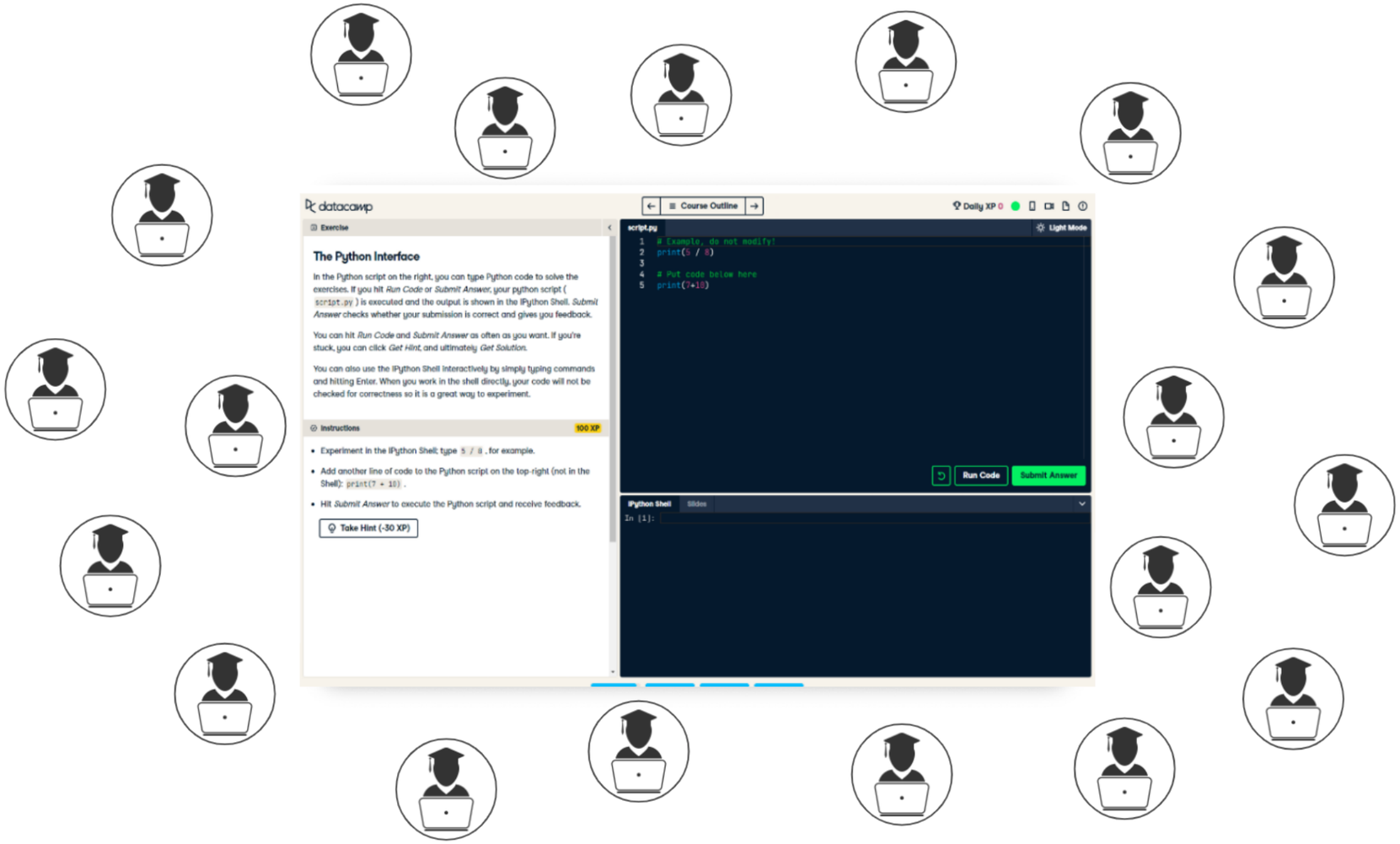
Use case - hosting a website



Users learn on DataCamp



Free week increases traffic



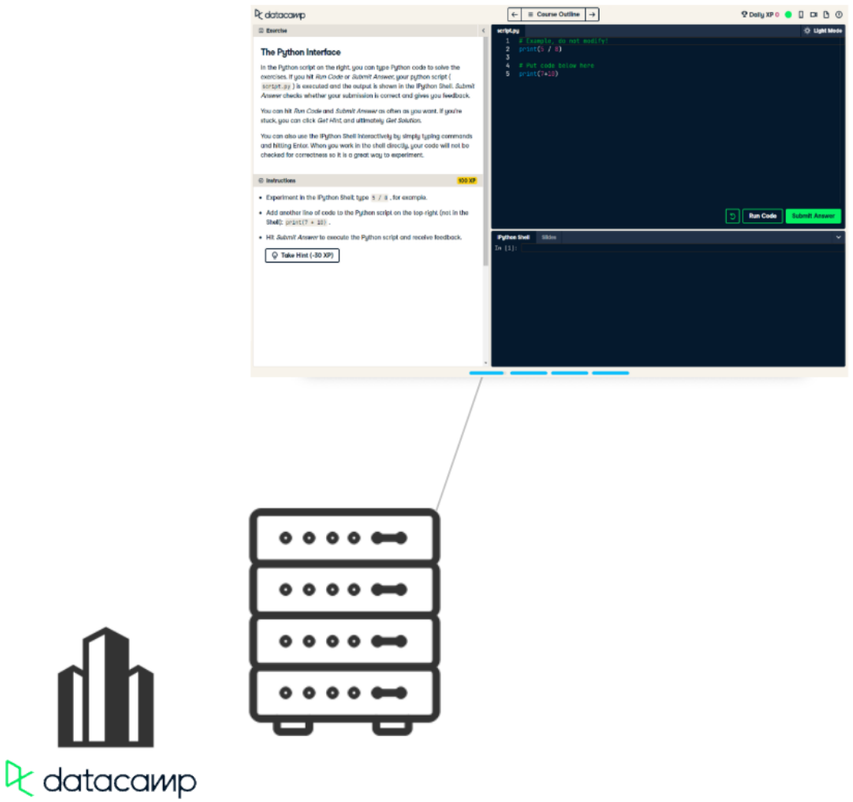
High traffic leads to slow service



Users stop learning on DataCamp

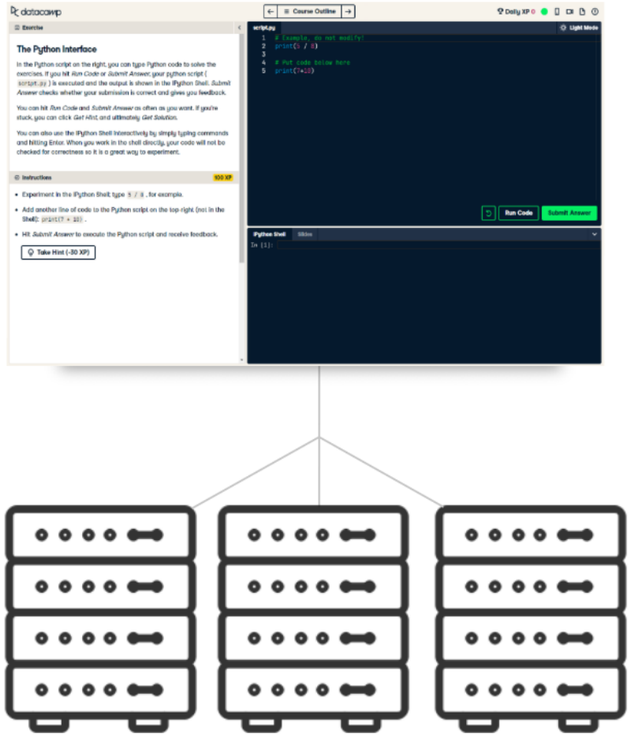


Hosting a website using an on-premise server



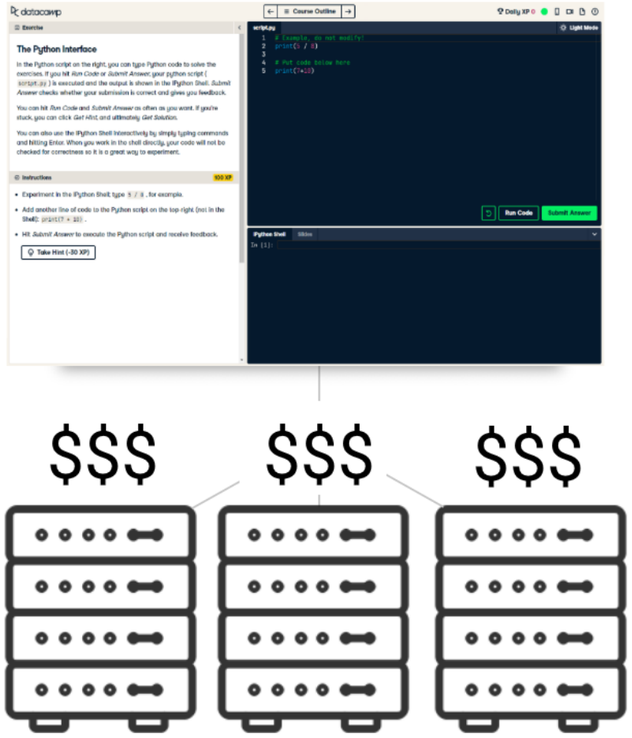
- Server
  - powerful computer
  - you can connect to remotely
- Located on the premises

Hosting a website using an on-premise server



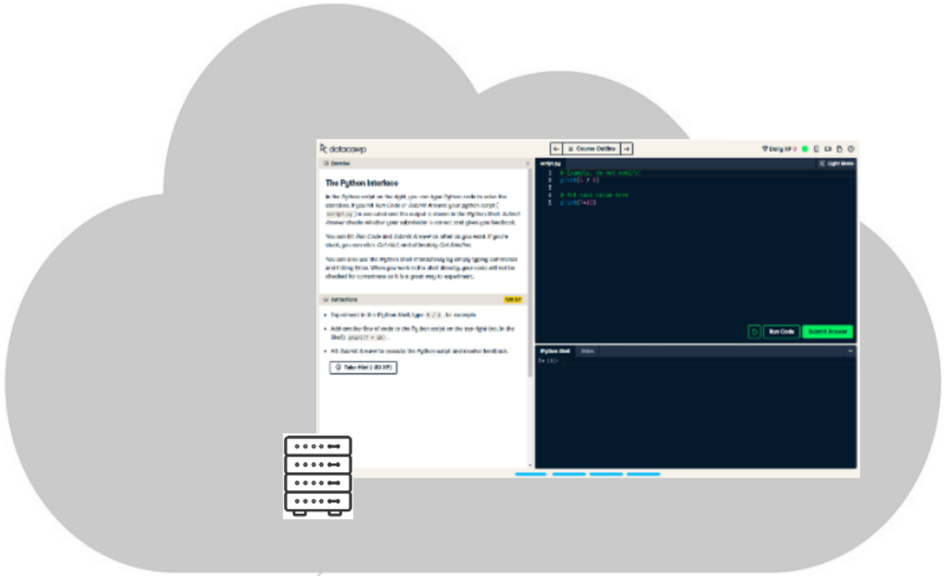
- More people start using the website
- Buy/rent new servers

Hosting a website using an on-premise server



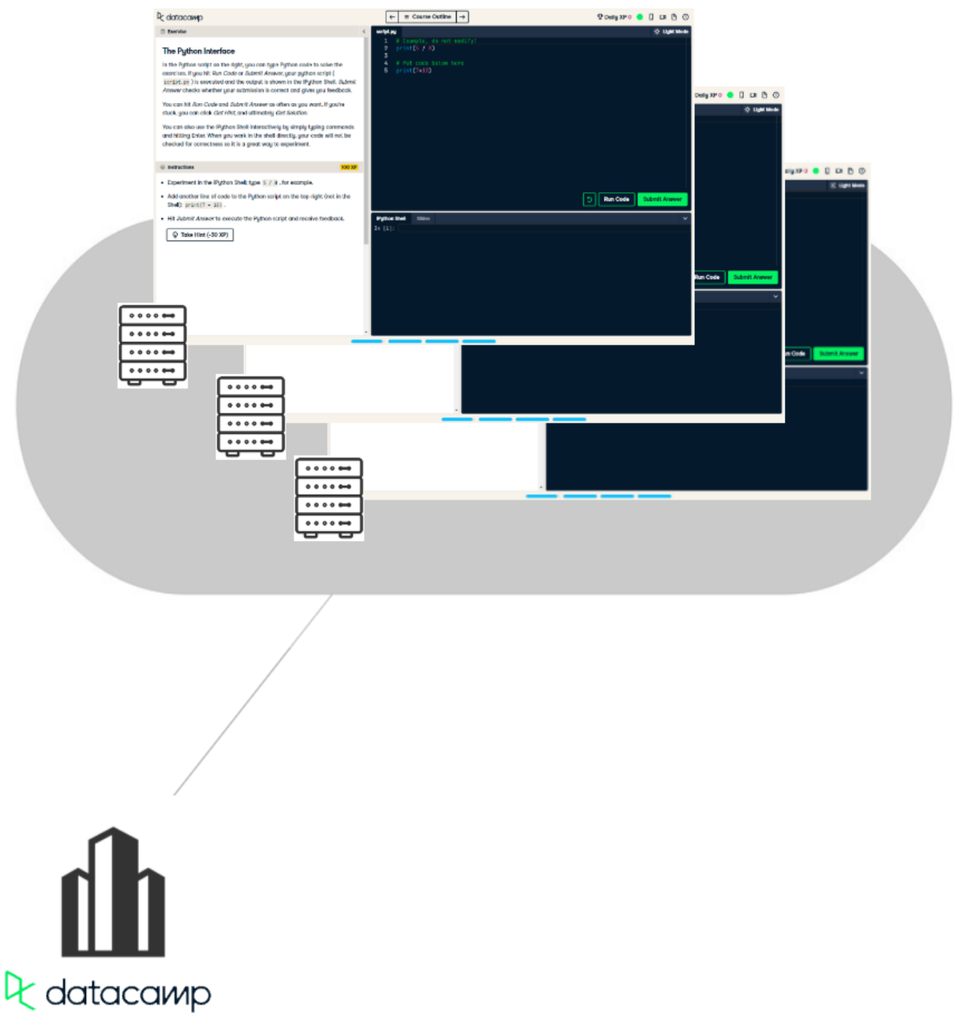
- More people start using the website
- Buy/rent new servers
  - Take time to set up
  - Cost a lot of money

Hosting a website using a cloud server



- Cloud server
- Access to computing power instantly when you need it

Hosting a website using a cloud server



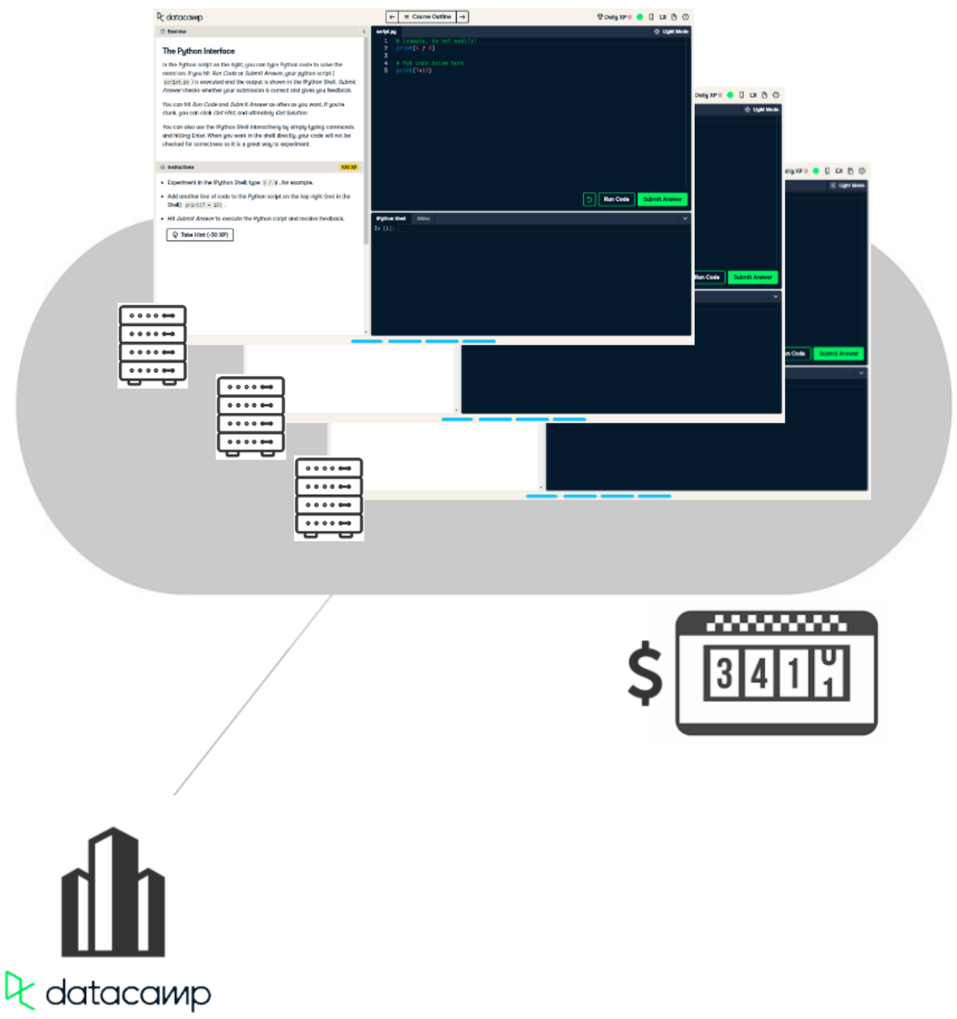
- More people start using the website
- Access more cloud servers

Hosting a website using a cloud server



- More people start using the website
- Access more cloud servers
- Easily release redundant cloud servers

Hosting a website using a cloud server



- More people start using the website
- Access more cloud servers
- Easily release redundant cloud servers
- Pay-as-you go billing

Cloud computing vs. on-premise

Cloud

- Scalable
- Fast set-up speed
- Pay-as-you-go

On-premise

- Less scalable
- Takes time to set up
- Ongoing costs

The best solution depends on the use case!

Other uses of cloud computing



- Store, back up, and recover data
- Create cloud-native applications
- Stream audio and video
- Deliver software on demand
- Analyze data
- Embed artificial intelligence models
- ...

Cloud computing companies













Let's practice!

UNDERSTANDING CLOUD COMPUTING

The power of the cloud

UNDERSTANDING CLOUD COMPUTING

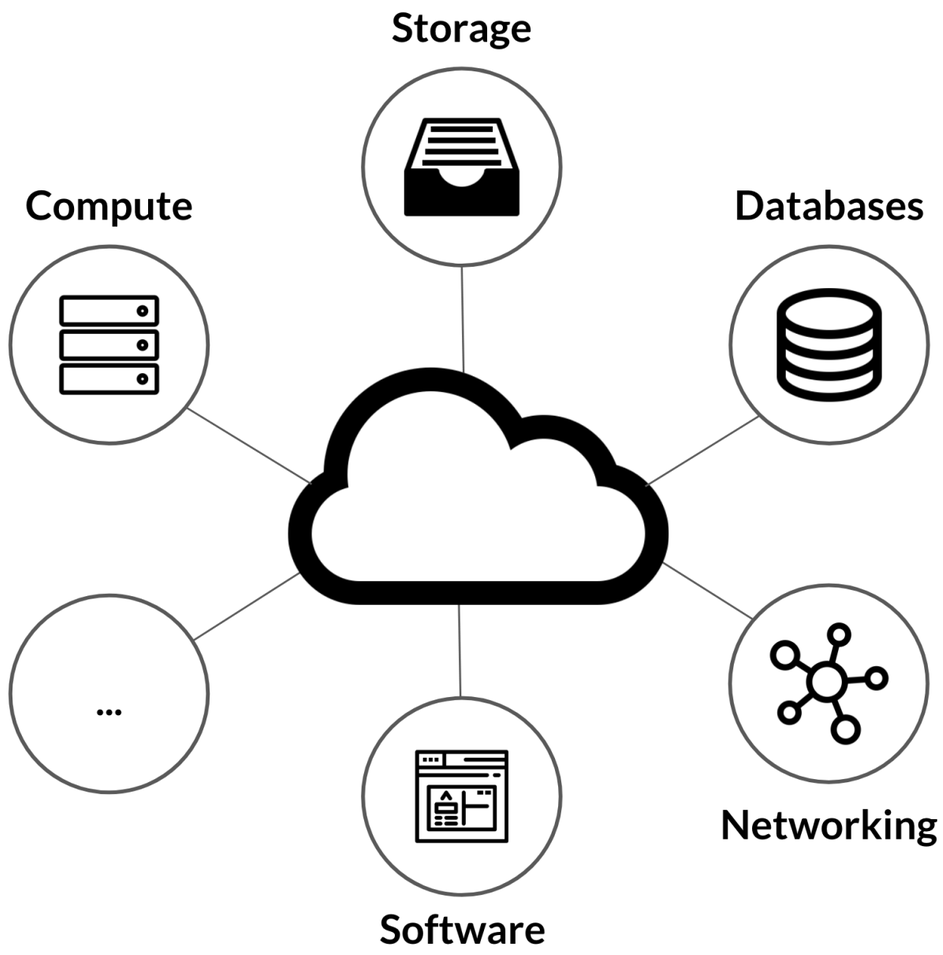


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Cloud services

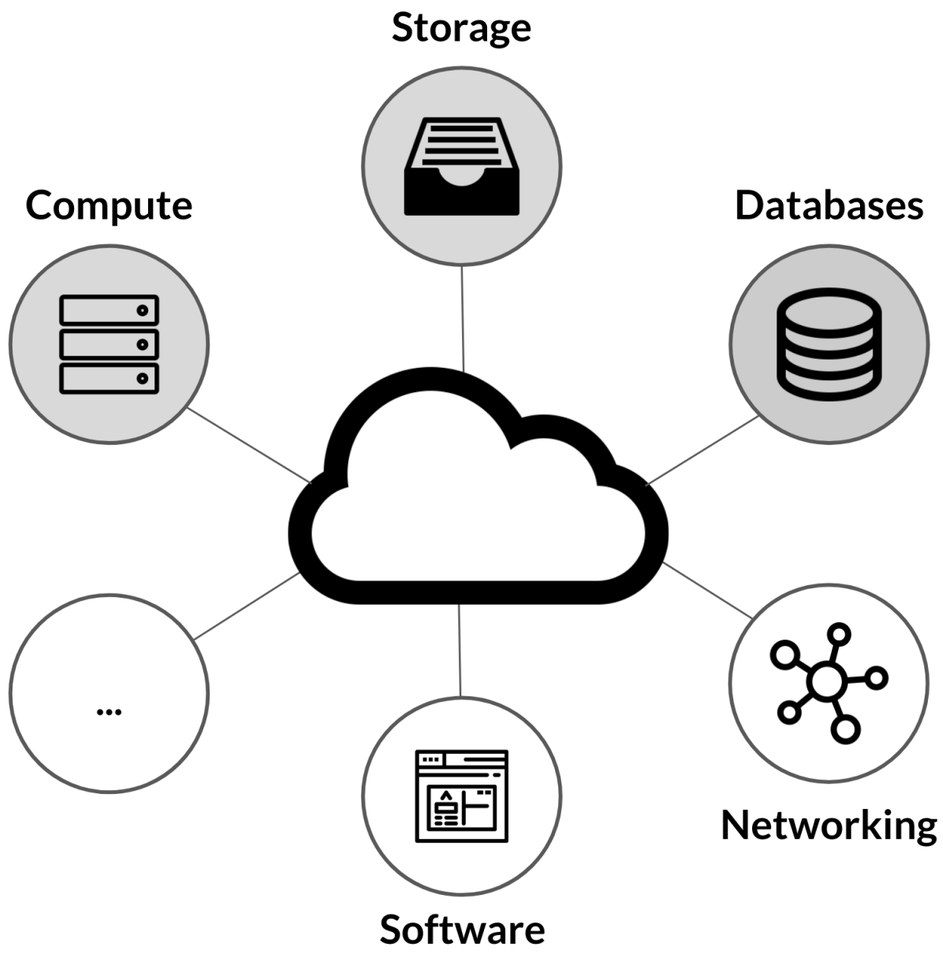
> Cloud computing is the delivery of technology services - including compute, storage, databases, networking, software, and many more - over the internet with pay-as-you-go pricing.



Cloud services

> Cloud computing is the delivery of technology services - including **compute**, **storage**, **databases**, networking, software, and many more - over the internet with pay-as-you-go pricing.

- **Compute**: provide the brains to process your workload
- **Storage**: save and store data
- **Databases**: store more structured sets of data



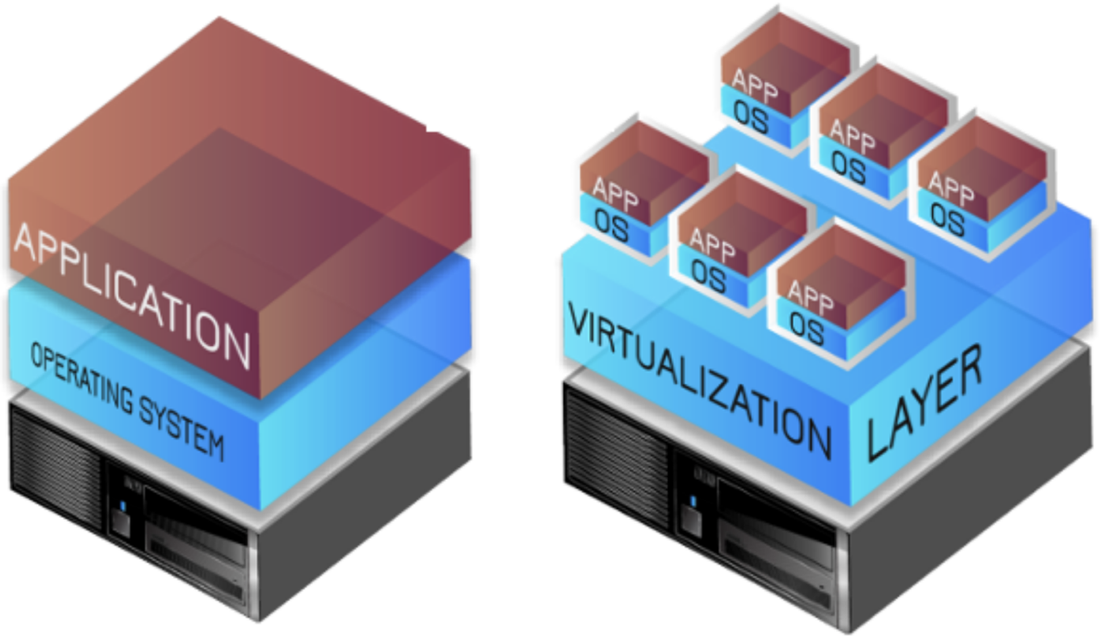
Cloud computing characteristics

- Virtualization
- Scalability
- Cost
- Speed
- Performance
- Growth
- Reliability
- Security

Virtualization

Fundamental technology that powers cloud computing

- Physical server -> multiple virtual servers
- Maximizes the output of individual servers
- Economies of scale



Traditional Server

Virtualized Server

Scalability

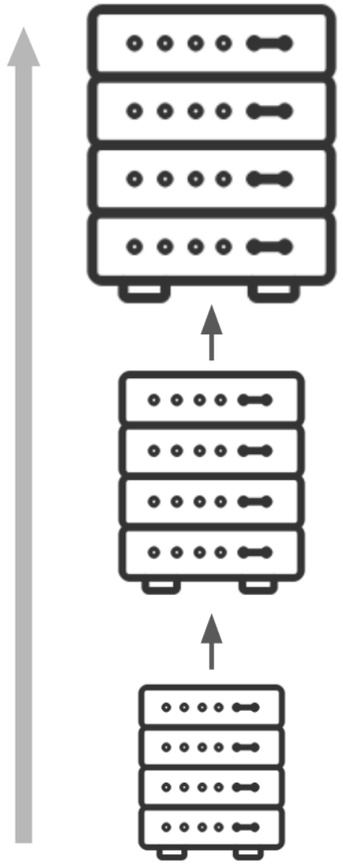
Easily add and remove resources as you need them

- Example: e-commerce site
- Needs more resources during peak times
- Scale resources as necessary



Vertical Scaling

Increase the power of the instance



Horizontal Scaling

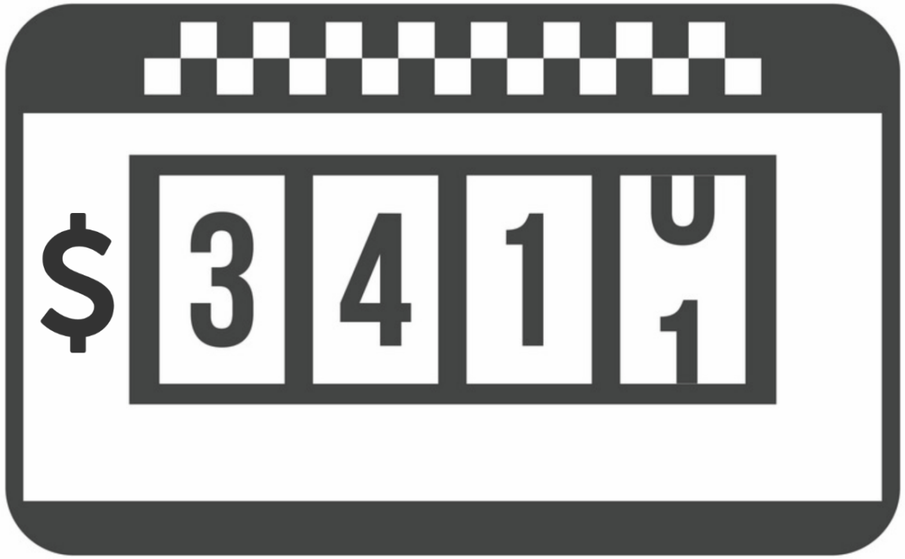
Add more instances



Cost

Only pay for resources when you are using them

- Pay-as-you-go
- No capital expenses of:
  - Buying hardware and software
  - Managing on-site infrastructure



In some cases, an on-premise solution might be more cost-efficient. The best solution depends on the use case.

Speed

Immediate access to ready-to-go cloud resources

- On-demand resourcing
- Fast set-up time
- Deploy services in a matter of minutes



Performance

Access to fast and efficient computing resources

- **Data center:** houses an organization's IT operations and equipment
- Cloud gives access to:
  - Worldwide network of data centers
  - Fast and efficient computing hardware



Growth

Grow using a wide range of resources and services

- On-demand resourcing limits growth constraints
- Provision resources across a global network



Reliability

Guaranteed durability and availability of data and services

- Data is duplicated across data centers
- Availability is ensured even in cases of natural disasters



Security

Secure storage and management of your data

- External party responsible for security
- Particularly risky for businesses in highly regulated sectors
- Cloud is becoming more and more secure

In some cases, an on-premise solution might be preferred. The best solution depends on the use case.



Let's practice!

UNDERSTANDING CLOUD COMPUTING

Cloud service models

UNDERSTANDING CLOUD COMPUTING



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Car analogy

On-premise

Buying a car



Cloud

'Renting' a car

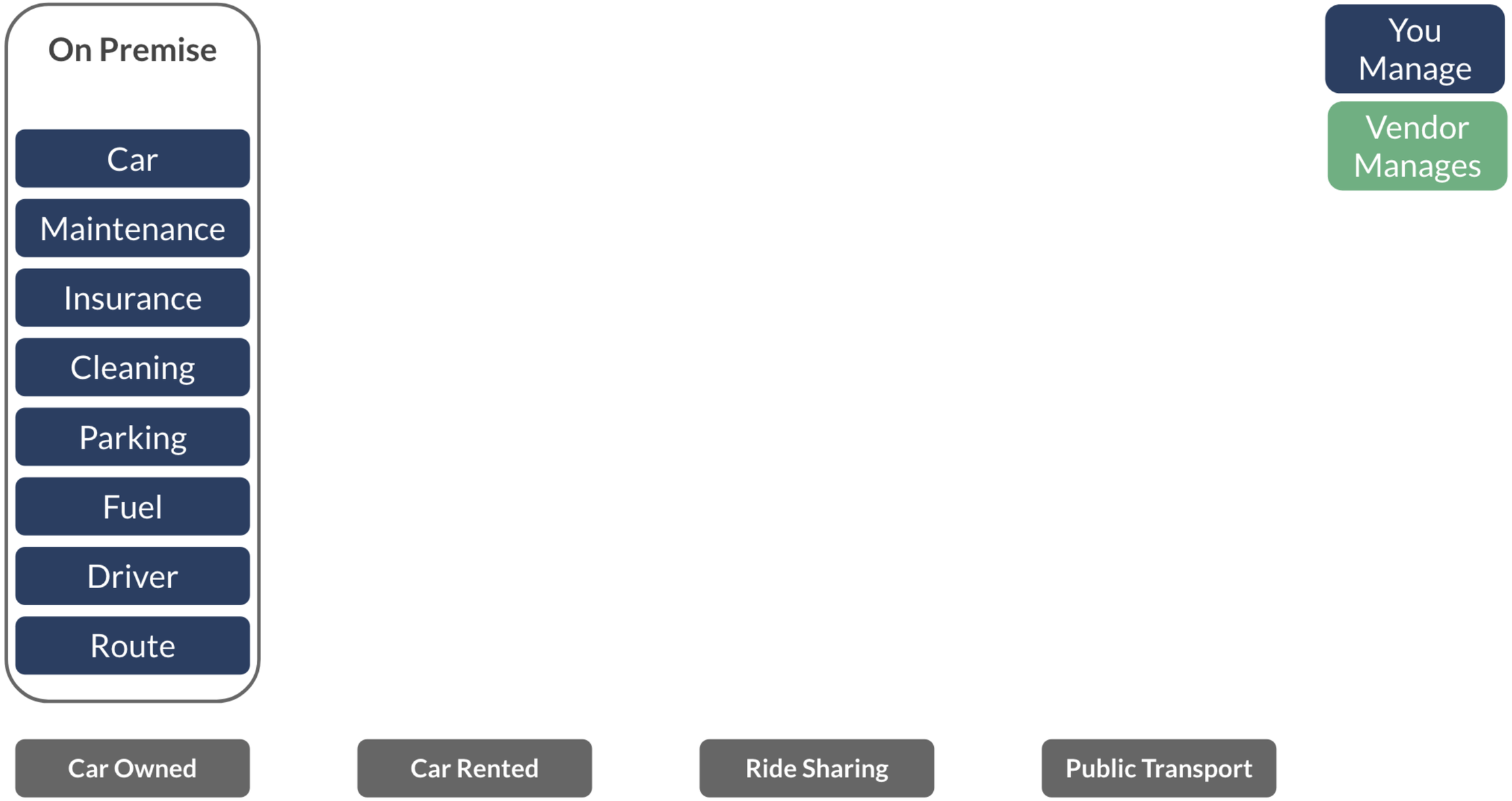


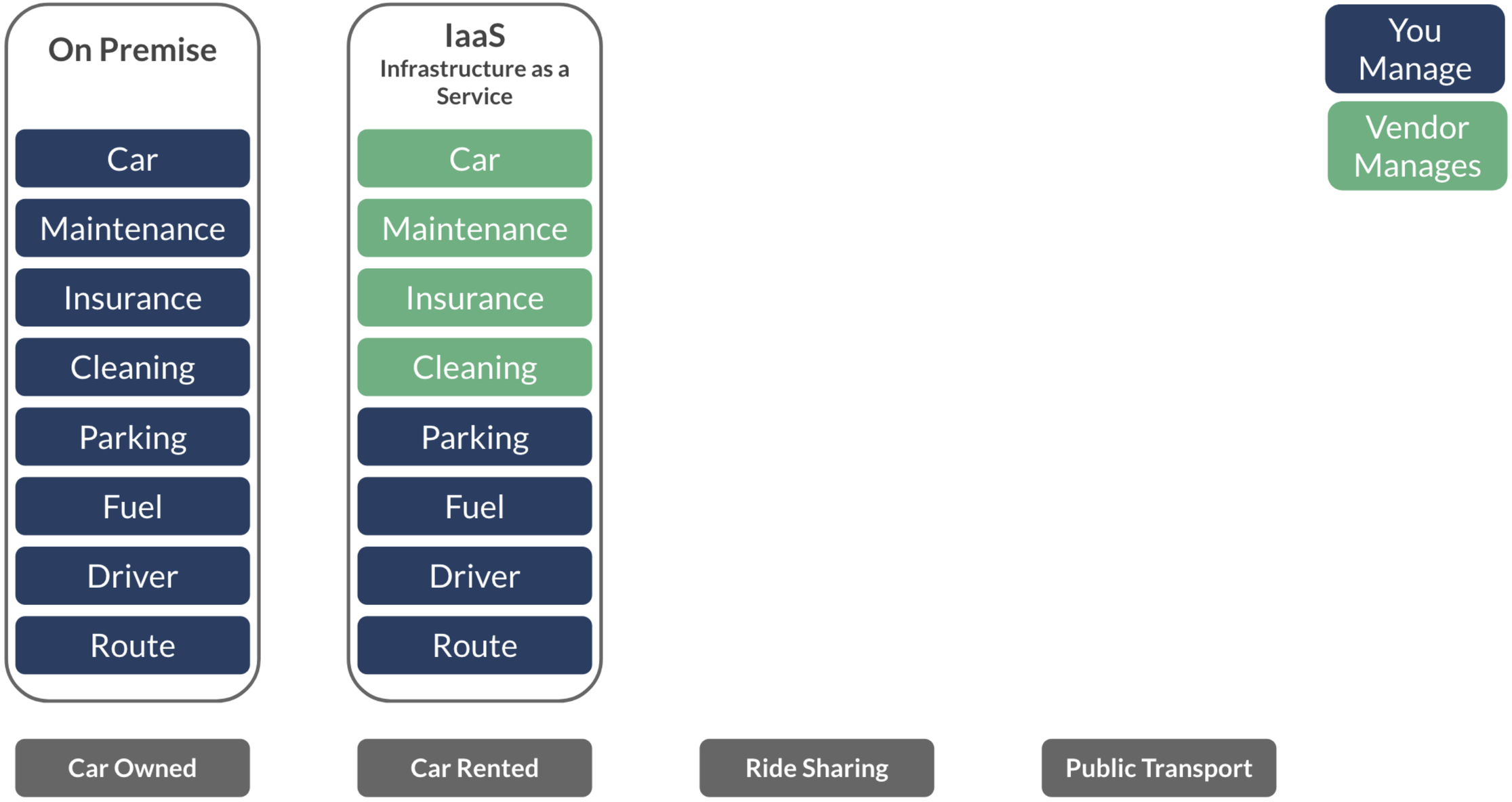
Car Owned

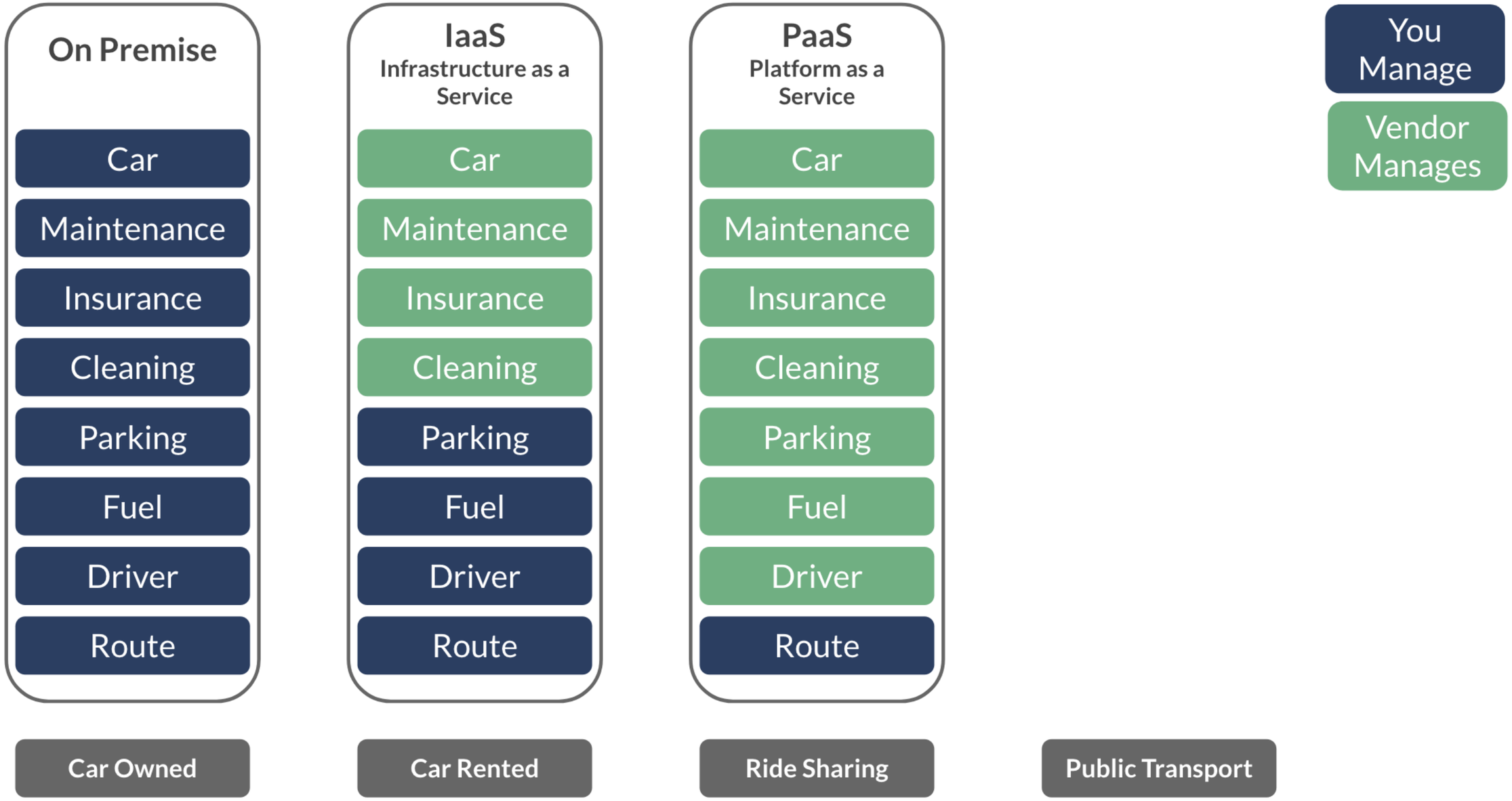
Car Rented

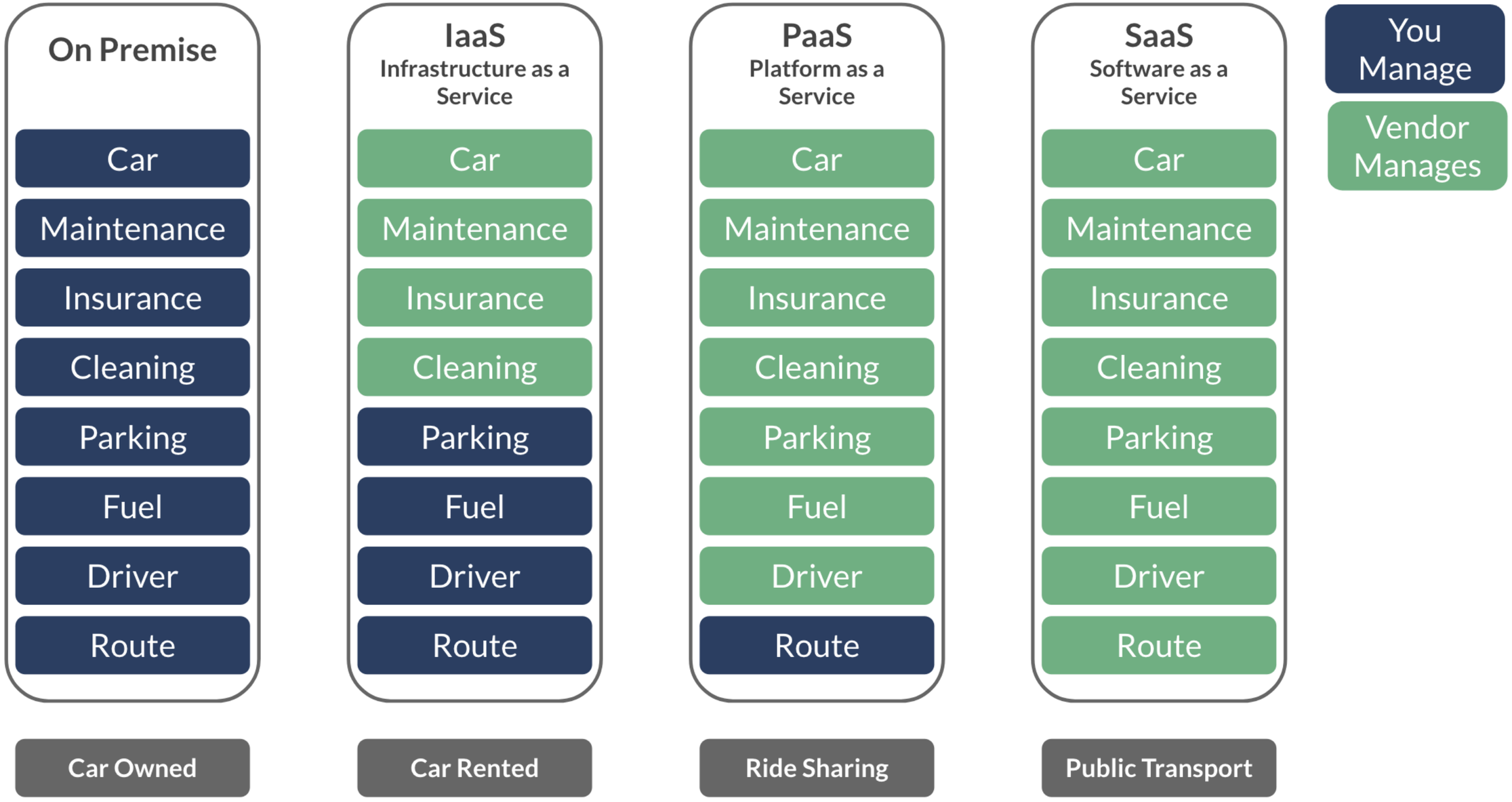
Ride Sharing

Public Transport

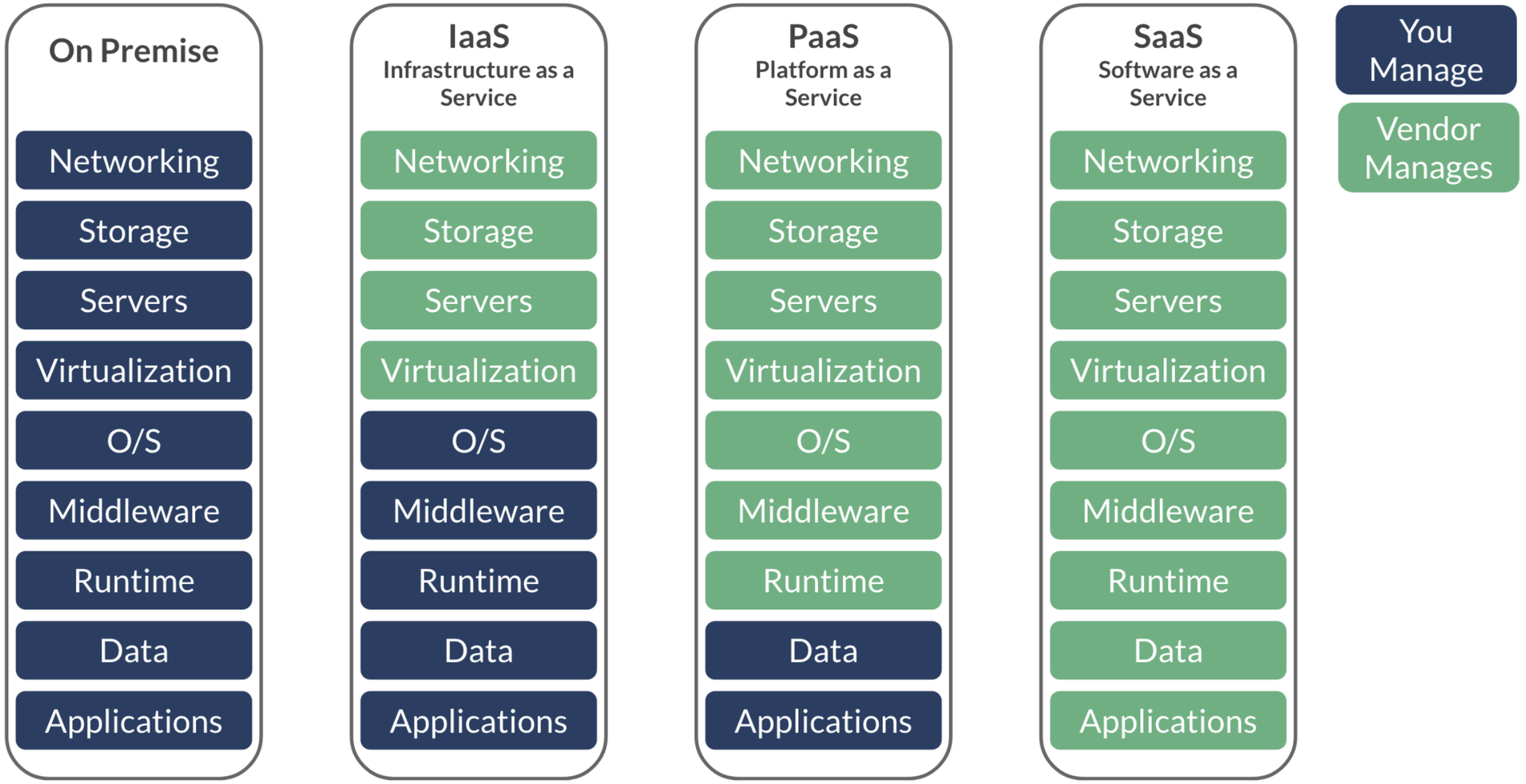

On Premise
Car
Maintenance
Insurance
Cleaning
Parking
Fuel
Driver
Route
You Manage
Vendor Manages
Car Owned
Car Rented
Ride Sharing
Public Transport


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Cloud service models



Cloud service models

	IaaS Infrastructure as a Service	**PaaS** Platform as a Service	**SaaS** Software as a Service
Definition			
Advantages			
Users			
Examples			

Cloud service models

	IaaS Infrastructure as a Service	**PaaS** Platform as a Service	**SaaS** Software as a Service
Definition	Cloud-based alternative to on-premise infrastructure		
Advantages	Scalable alternative to expensive on-premise infrastructure		
Users	System admins		
Examples	Cloud server from e.g. Google Compute Engine, Microsoft Azure, Amazon Web Services		

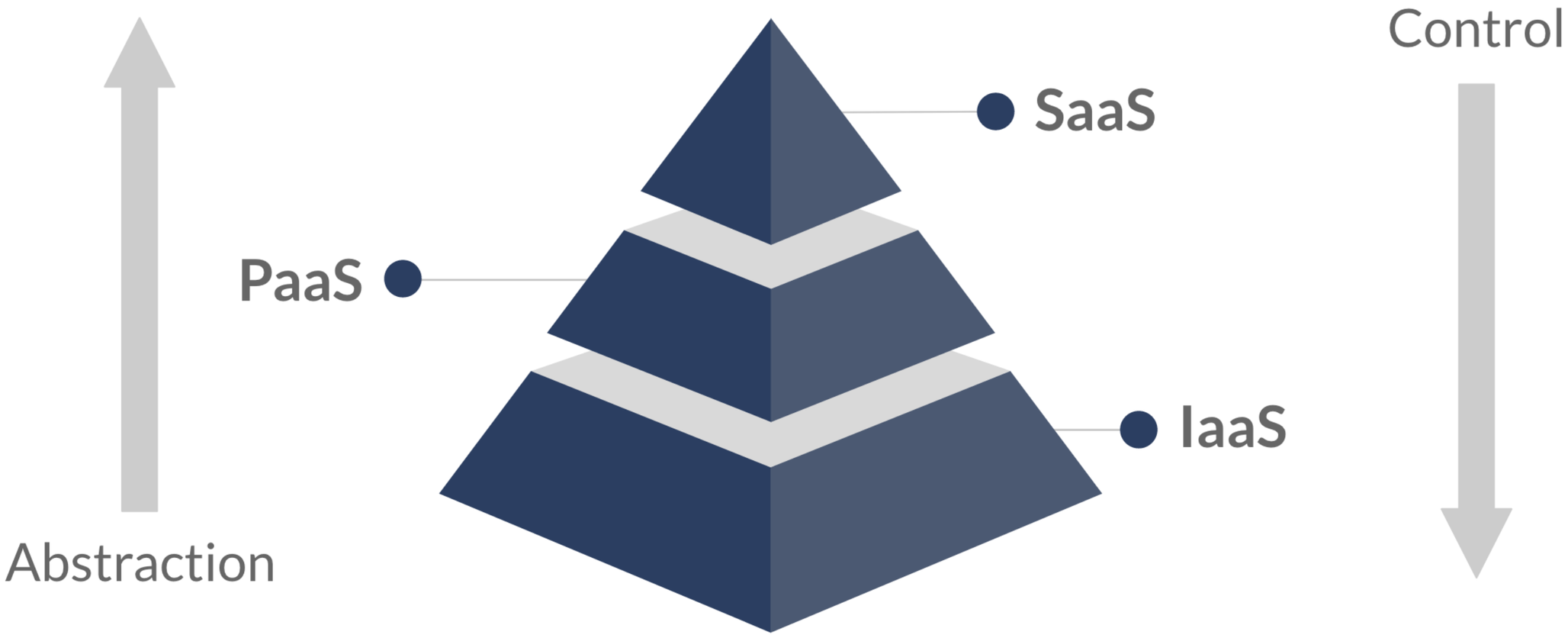
Cloud service models

	IaaS Infrastructure as a Service	**PaaS** Platform as a Service	**SaaS** Software as a Service
Definition	Cloud-based alternative to on-premise infrastructure	Hardware and software tools over the internet used to develop applications	
Advantages	Scalable alternative to expensive on-premise infrastructure	Developers don't need to start from scratch when creating applications	
Users	System admins	Developers	
Examples	Cloud server from e.g. Google Compute Engine, Microsoft Azure, Amazon Web Services	Web apps, logic apps e.g. Google App Engine, Windows Azure, AWS Elastic Beanstalk	

Cloud service models

	IaaS Infrastructure as a Service	**PaaS** Platform as a Service	**SaaS** Software as a Service
Definition	Cloud-based alternative to on-premise infrastructure	Hardware and software tools over the internet used to develop applications	Software available over the internet, usually for a monthly subscription fee
Advantages	Scalable alternative to expensive on-premise infrastructure	Developers don't need to start from scratch when creating applications	No need to install software on your computer
Users	System admins	Developers	End customers
Examples	Cloud server from e.g. Google Compute Engine, Microsoft Azure, Amazon Web Services	Web apps, logic apps e.g. Google App Engine, Windows Azure, AWS Elastic Beanstalk	Internet applications e.g. Google G Suite, Microsoft Office 365, Dropbox

The cloud pyramid



Other cloud service models

- FaaS (Function as a Service)
  - Variation on SaaS
  - Focuses on a function (part of the software)
  - e.g., identity authentication, payment transactions
  - Uses a "serverless" billing model



Other service models

- Hardware as a Service (HaaS)
- Storage as a Service (SaaS)
- Database as a Service (DBaaS)
- Disaster Recovery as a Service (DRaaS)
- Network as a Service (NaaS)
- ...

XaaS (Anything as a Service)

Let's practice!

UNDERSTANDING CLOUD COMPUTING