

What is cloud computing?

UNDERSTANDING CLOUD COMPUTING



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The importance of the cloud



The Register ✅ @TheRegister · 26 Oct 2018

Amazon is at this point a money-printing cloud machine with a grocery store by the parking lot

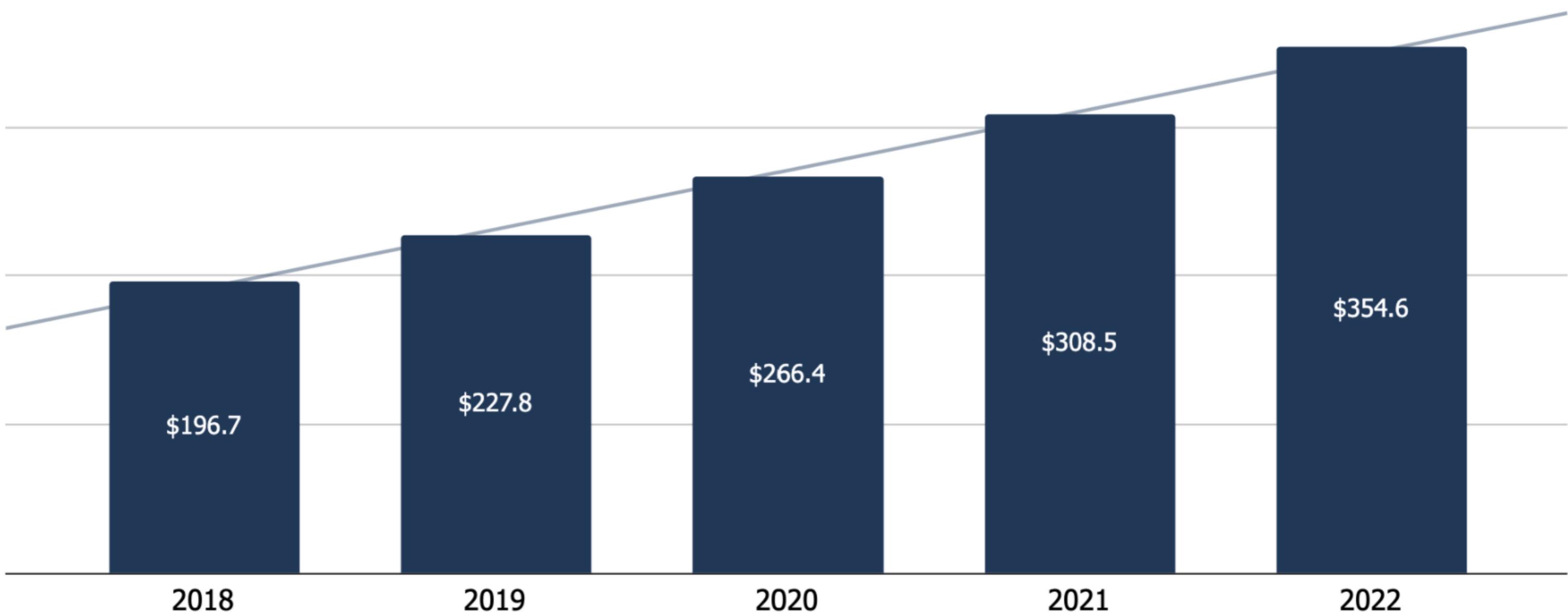


Amazon is at this point a money-printing cloud machin...

\$3bn-a-quarter in profit and most of coming in from
AWS

🔗 theregister.com

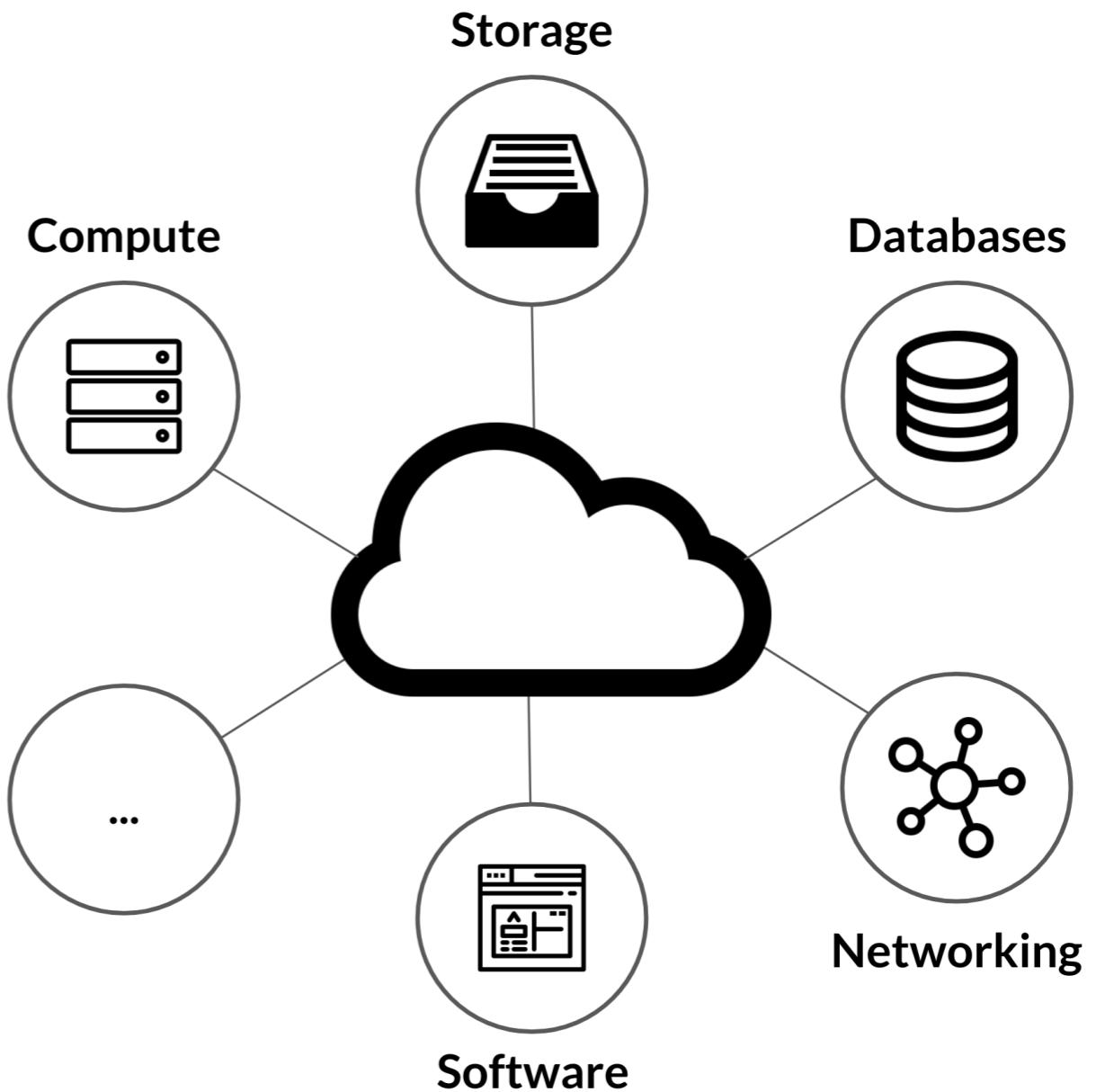
Worldwide Public Cloud Service Revenue Forecast (Billions of U.S. Dollars)



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

The screenshot shows a DataCamp exercise interface for "The Python Interface". On the left, there's an "Exercise" panel with instructions and a list of tasks. On the right, there's a code editor and an IPython Shell.

Exercise Panel:

- Title:** The Python Interface
- Description:** In the Python script on the right, you can type Python code to solve the exercises. If you hit *Run Code* or *Submit Answer*, your python script (`script.py`) is executed and the output is shown in the IPython Shell. *Submit Answer* checks whether your submission is correct and gives you feedback.
- Instructions:** 100 XP
- Experiment in the IPython Shell; type `5 / 8`, for example.
 - Add another line of code to the Python script on the top-right (not in the Shell): `print(7 + 10)`.
 - Hit *Submit Answer* to execute the Python script and receive feedback.
- Buttons:** Take Hint (-30 XP), Run Code, Submit Answer

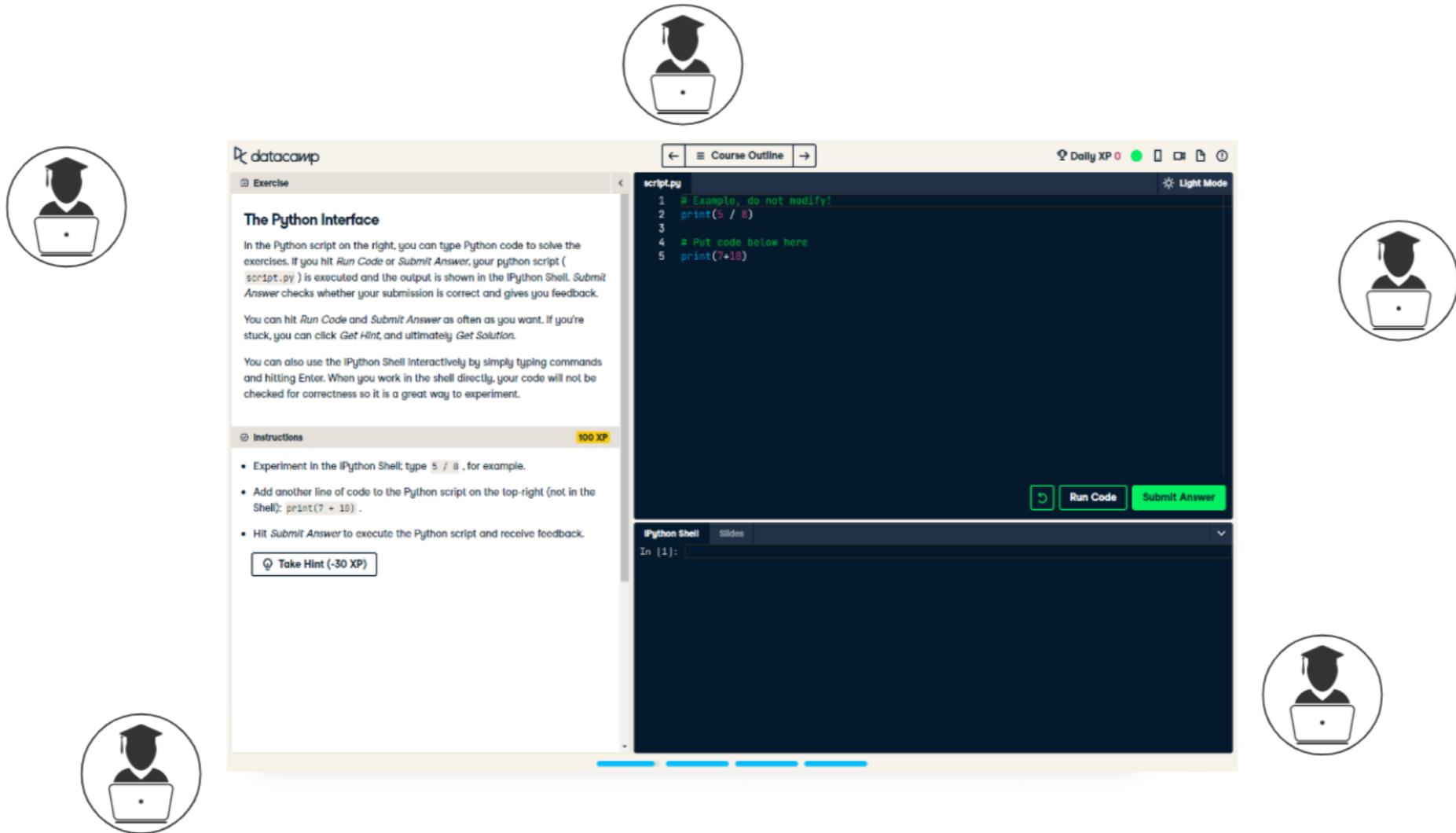
Code Editor:

```
script.py
1 # Example, do not modify!
2 print(5 / 8)
3
4 # Put code below here
5 print(7+10)
```

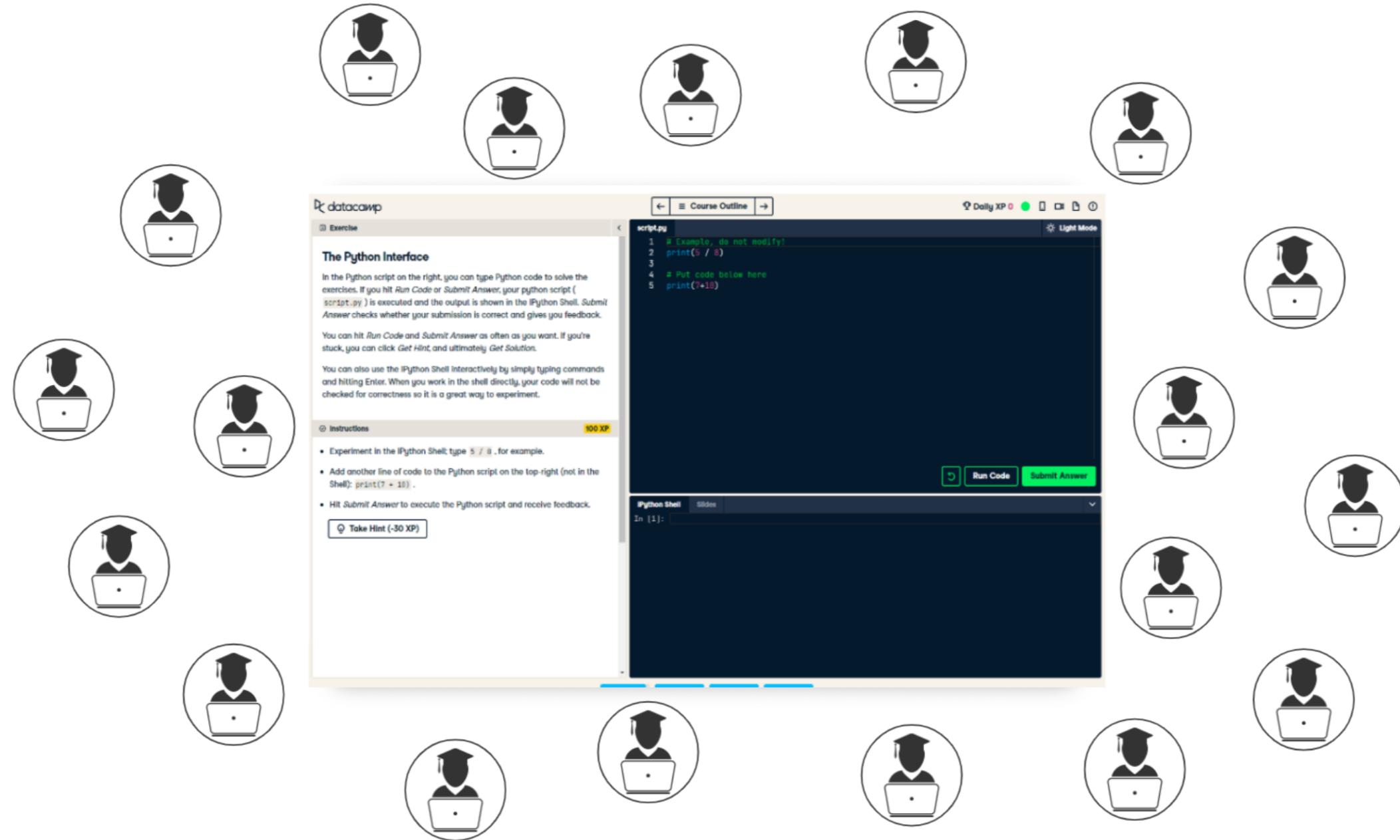
IPython Shell:

In [1]:

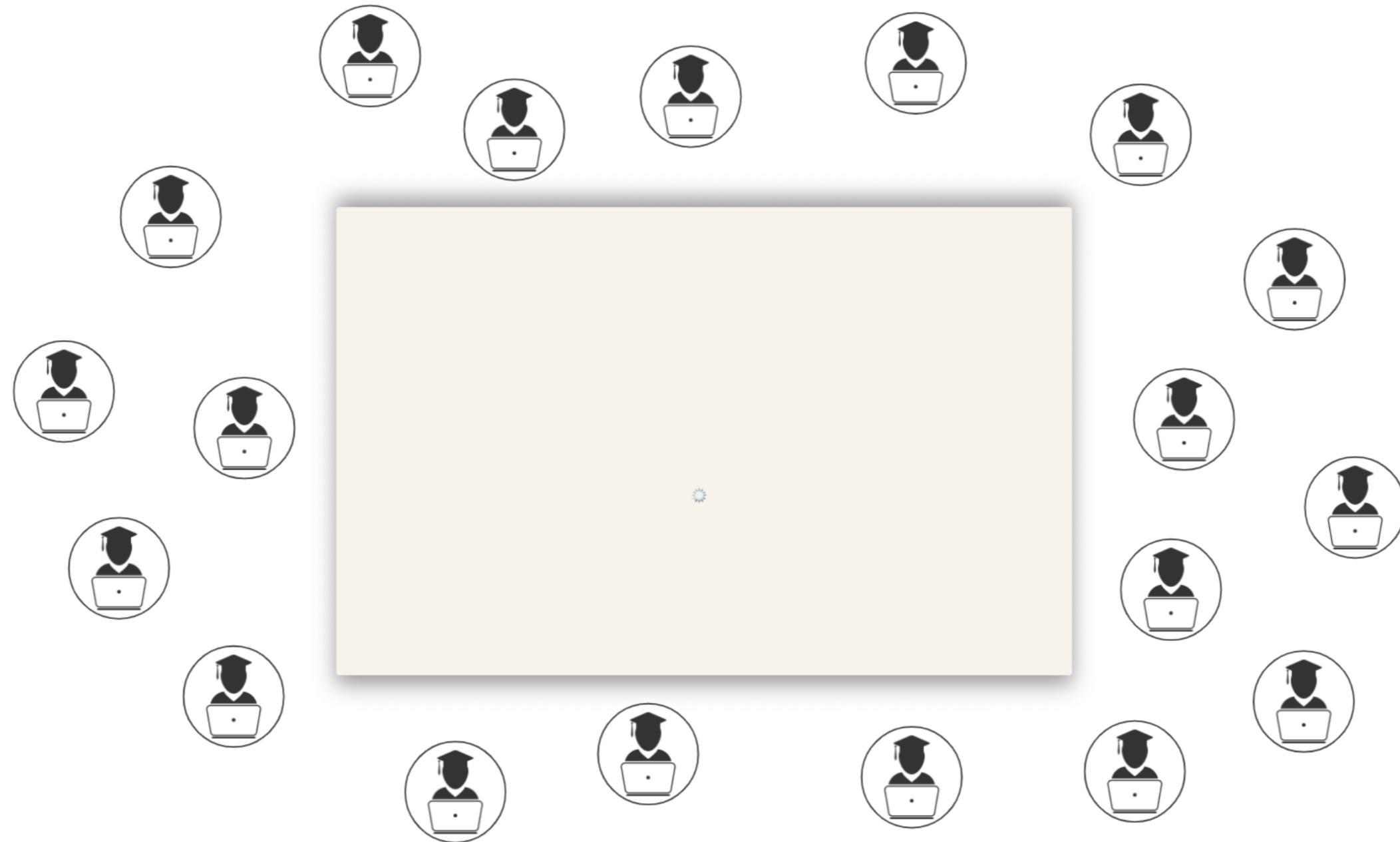
Users learn on DataCamp



Free week increases traffic



High traffic leads to slow service

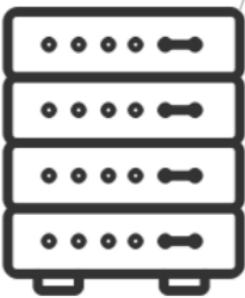
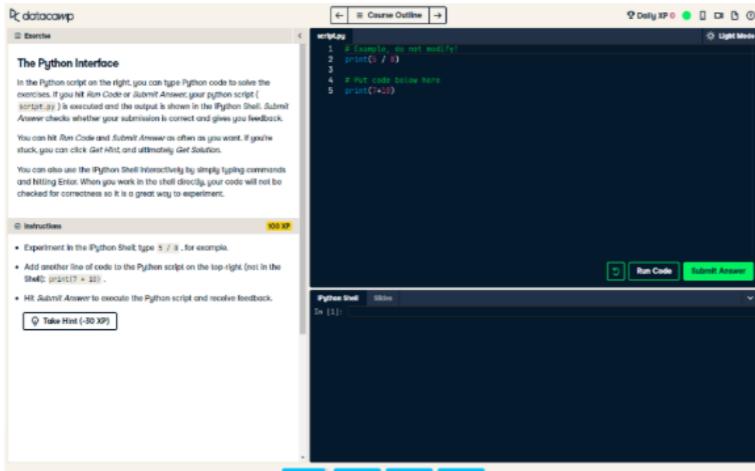


Users stop learning on DataCamp



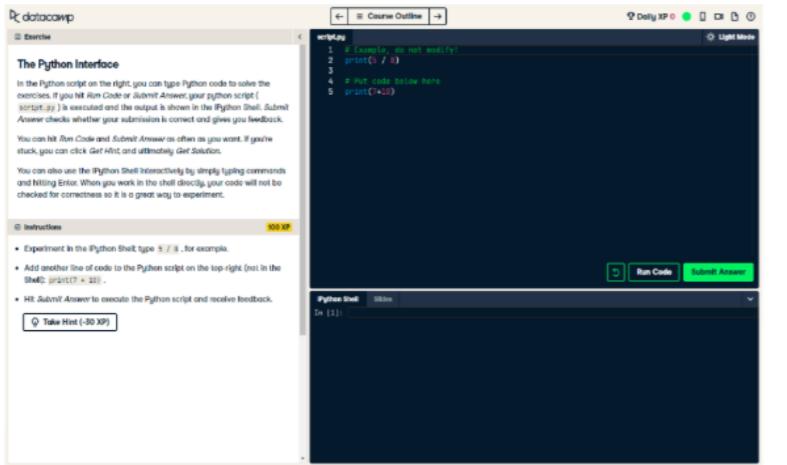
Hosting a website using an on-premise server

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



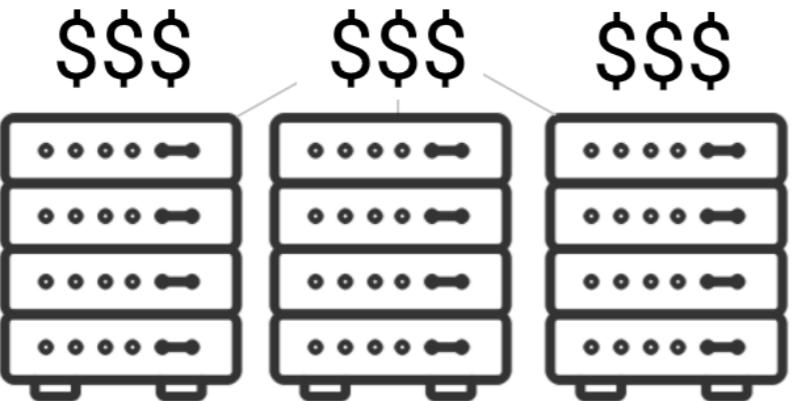
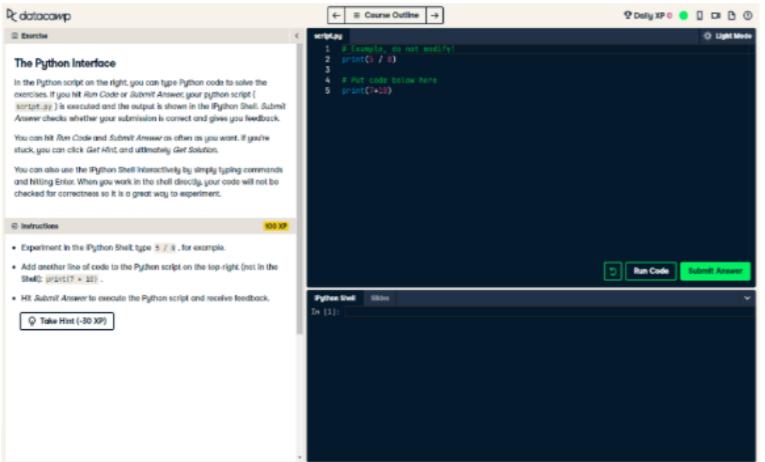
Hosting a website using an on-premise server

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



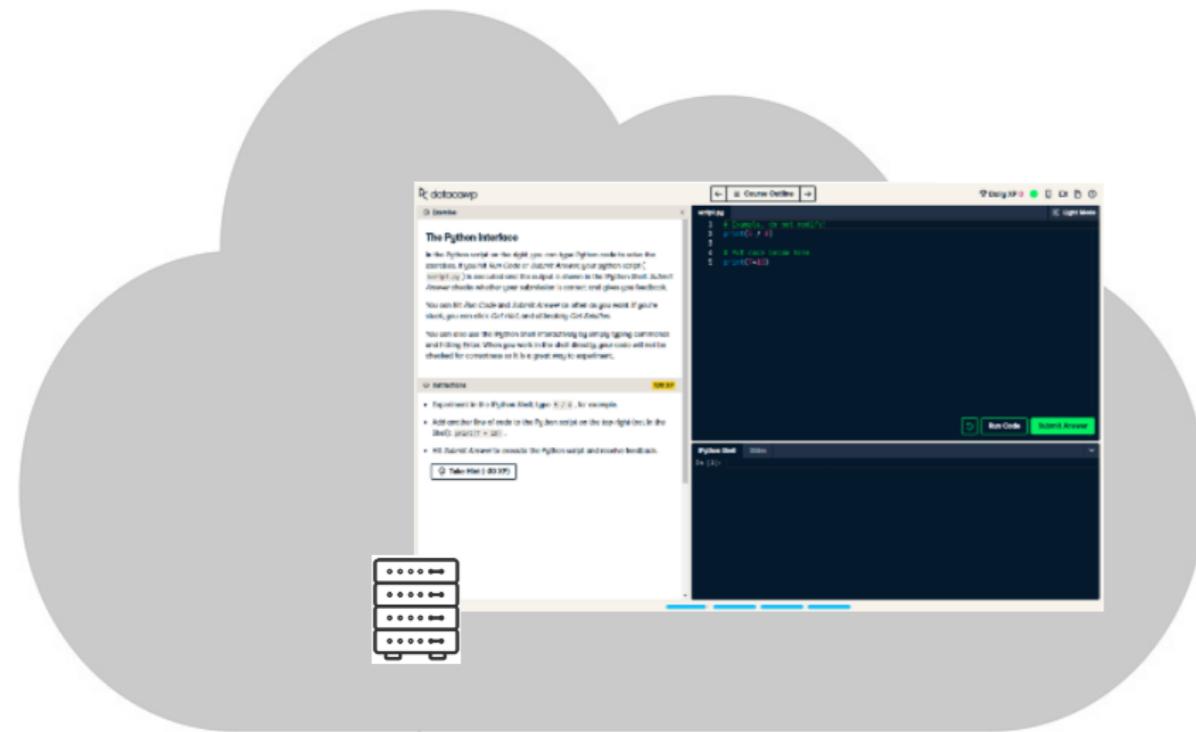
Hosting a website using an on-premise server

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



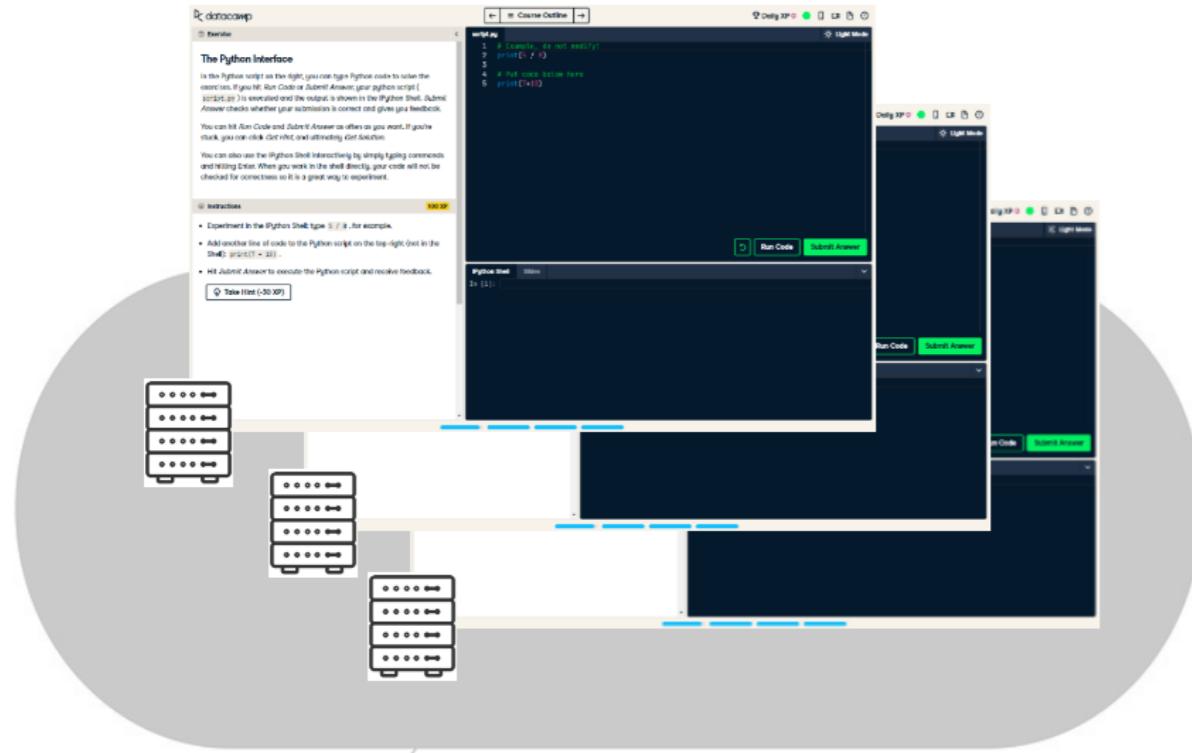
Hosting a website using a cloud server

- 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



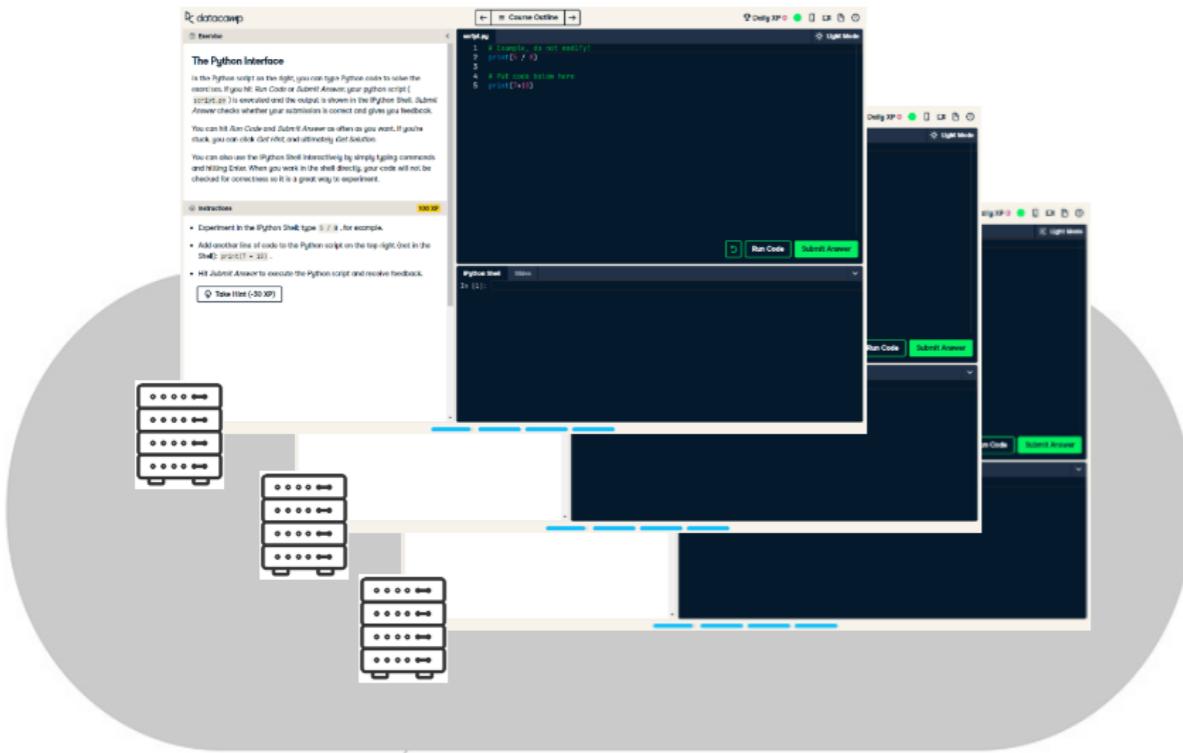
Hosting a website using a cloud server



- 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



NETFLIX



Google

Let's practice!

UNDERSTANDING CLOUD COMPUTING

The power of the cloud

UNDERSTANDING CLOUD COMPUTING

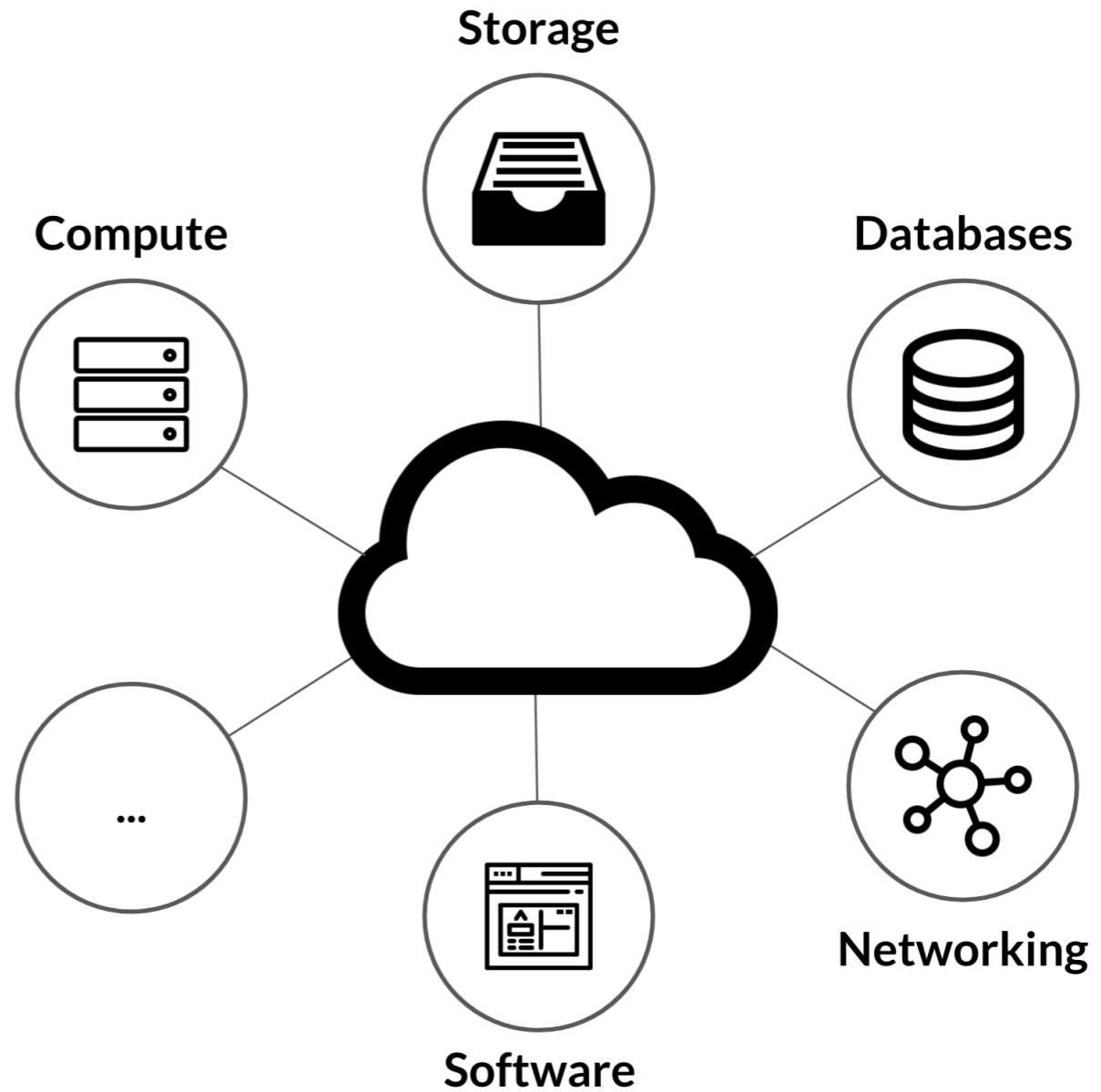


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Cloud services

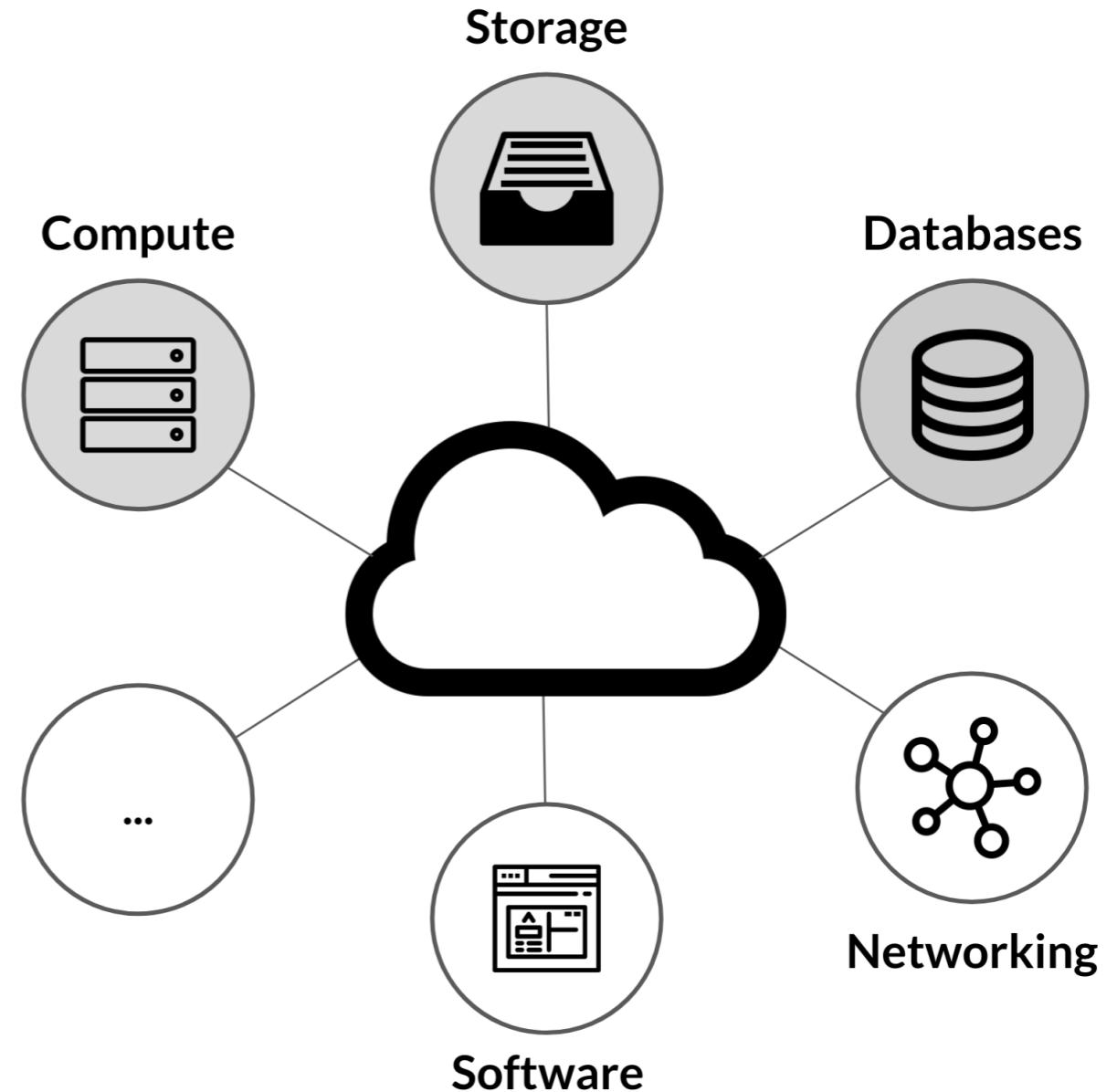
Cloud computing is the delivery of technology services - including compute, storage, databases, networking, software, and many more - over the internet with pay-as-you-go pricing.



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



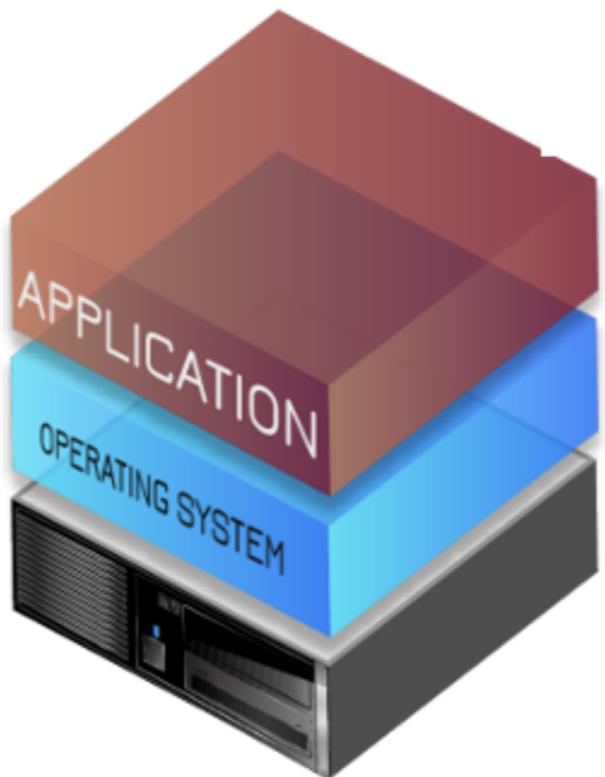
Cloud computing characteristics

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

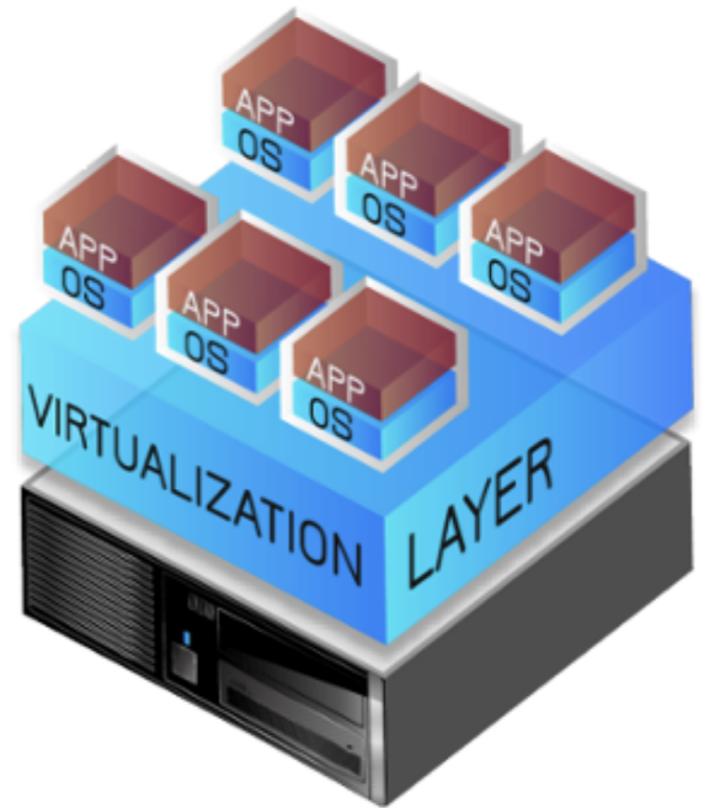
Virtualization

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

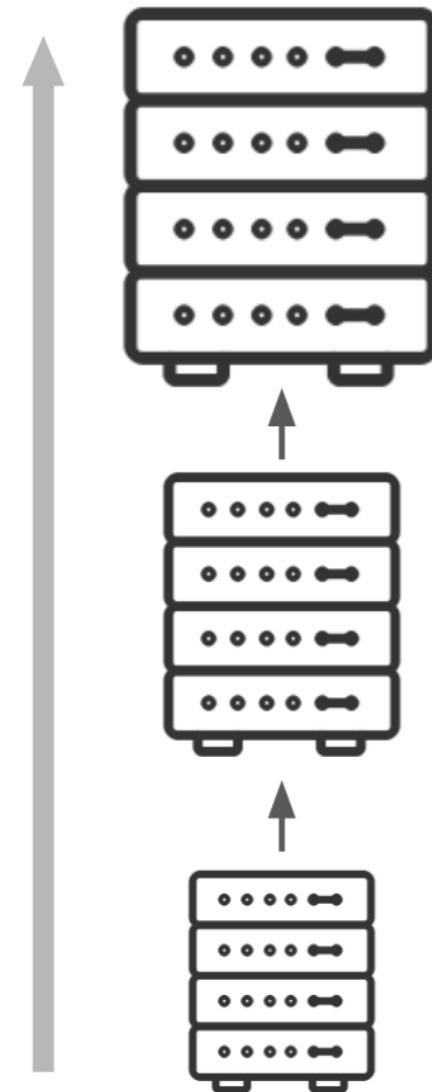
Easily add and remove resources as you need them

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



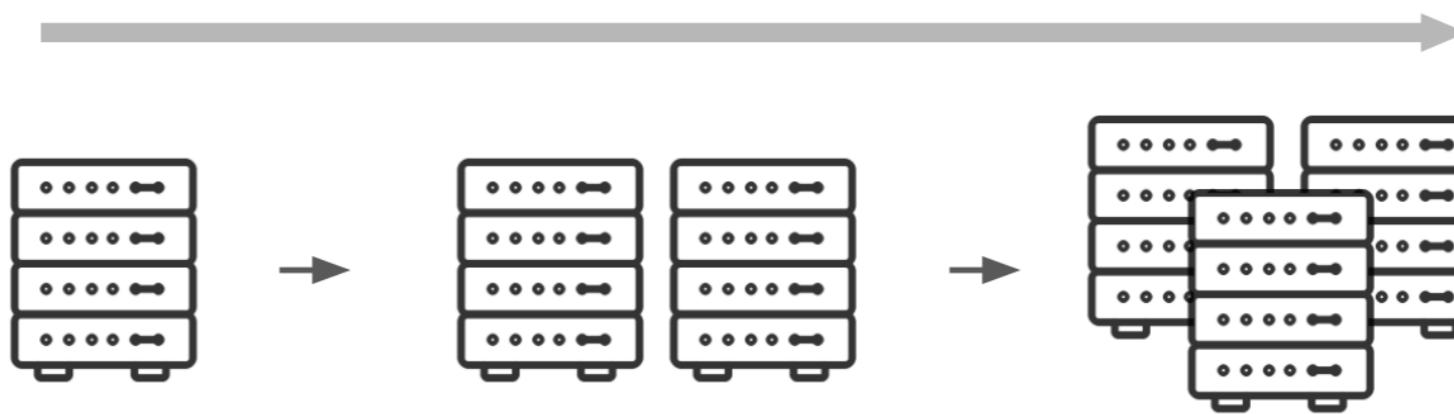
Vertical Scaling

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

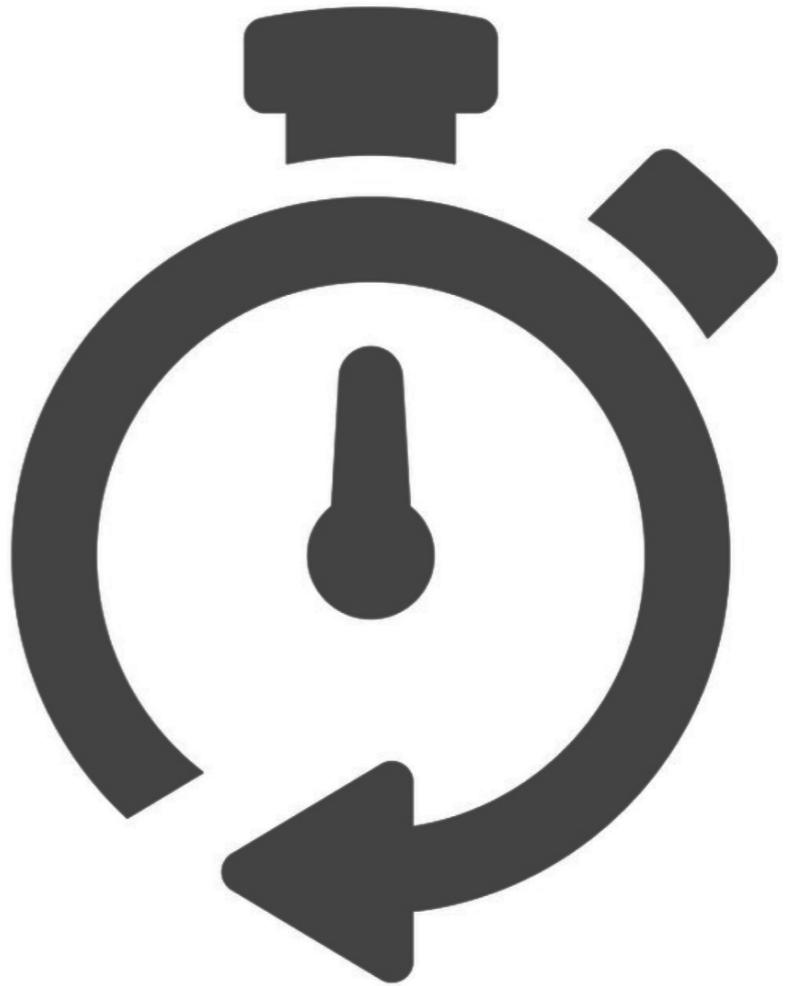


In some cases, an on-premise solution might be more cost-efficient. The best solution depends on the use case.

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

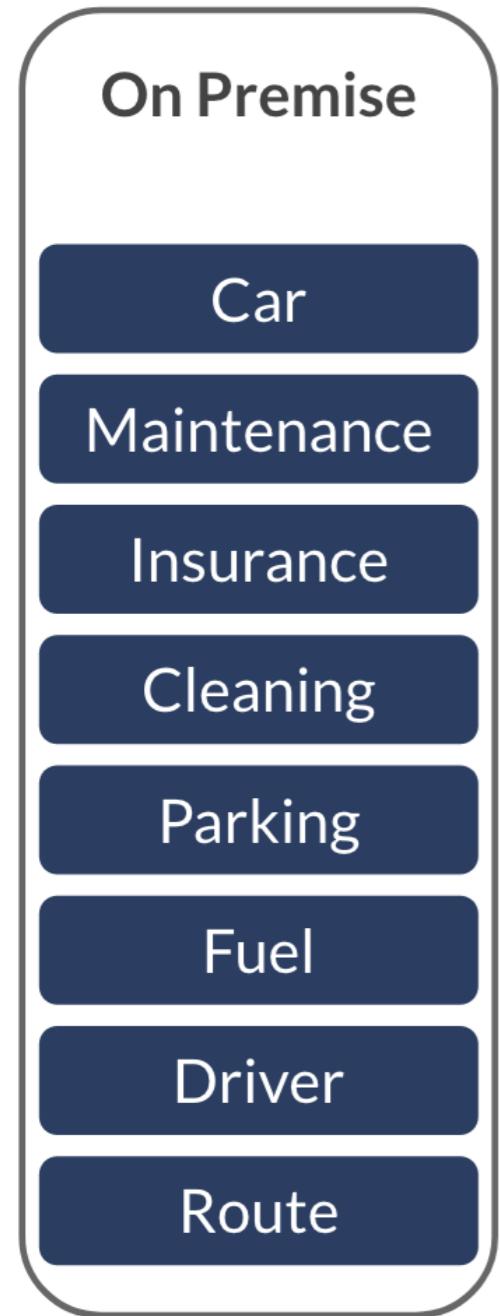


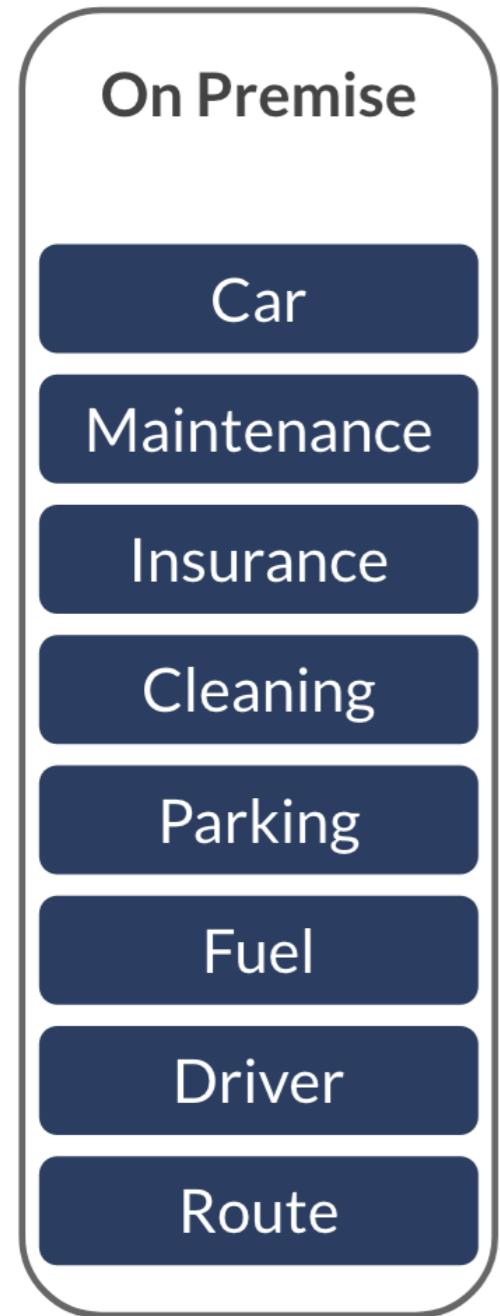
Car Owned

Car Rented

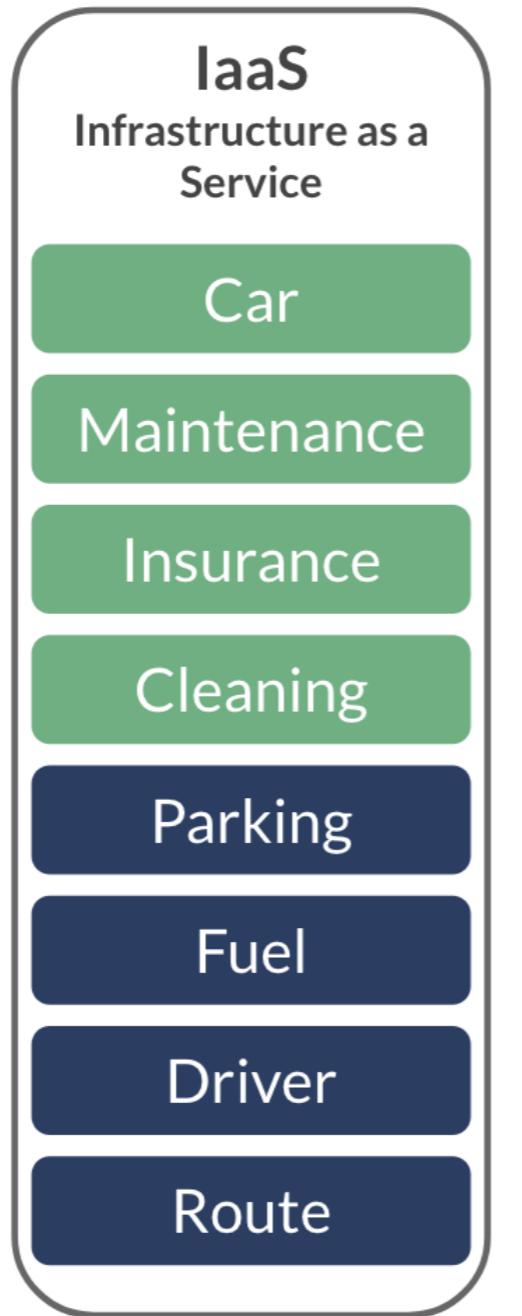
Ride Sharing

Public Transport



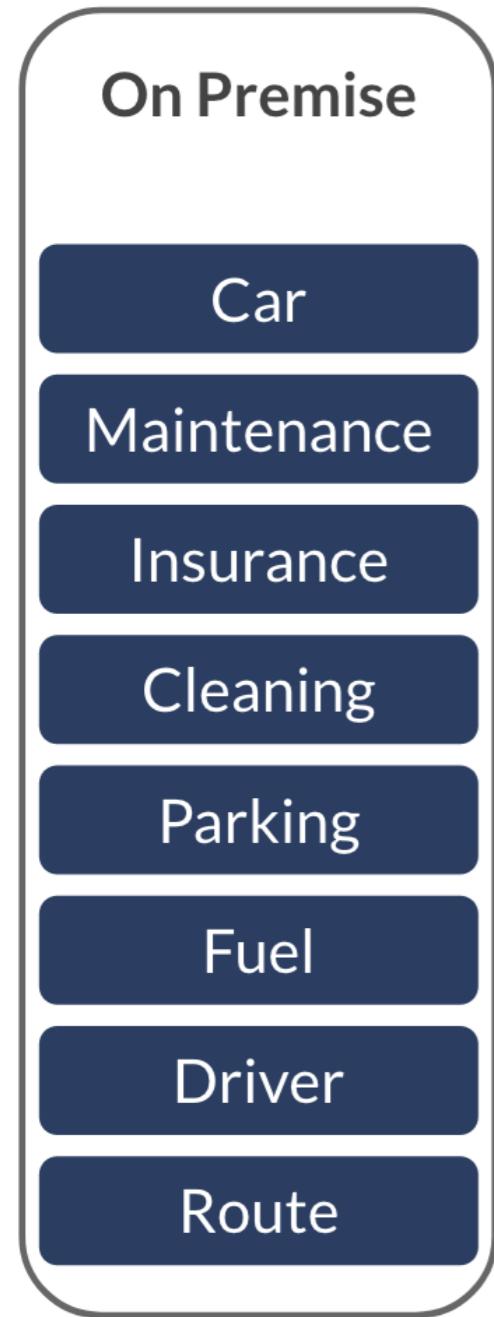


Car Owned

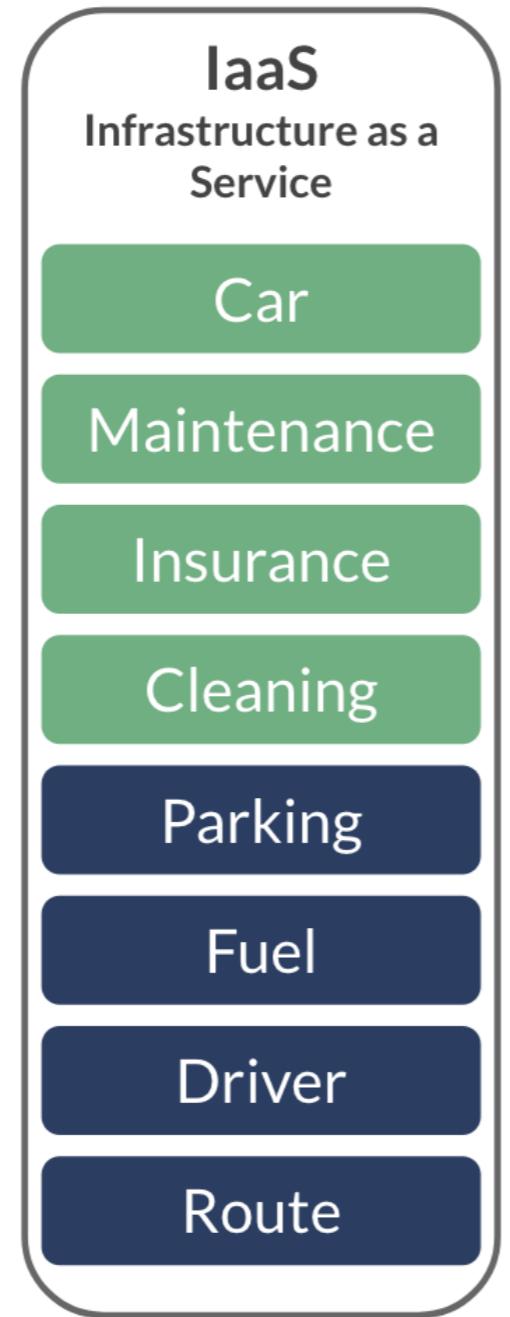


Car Rented

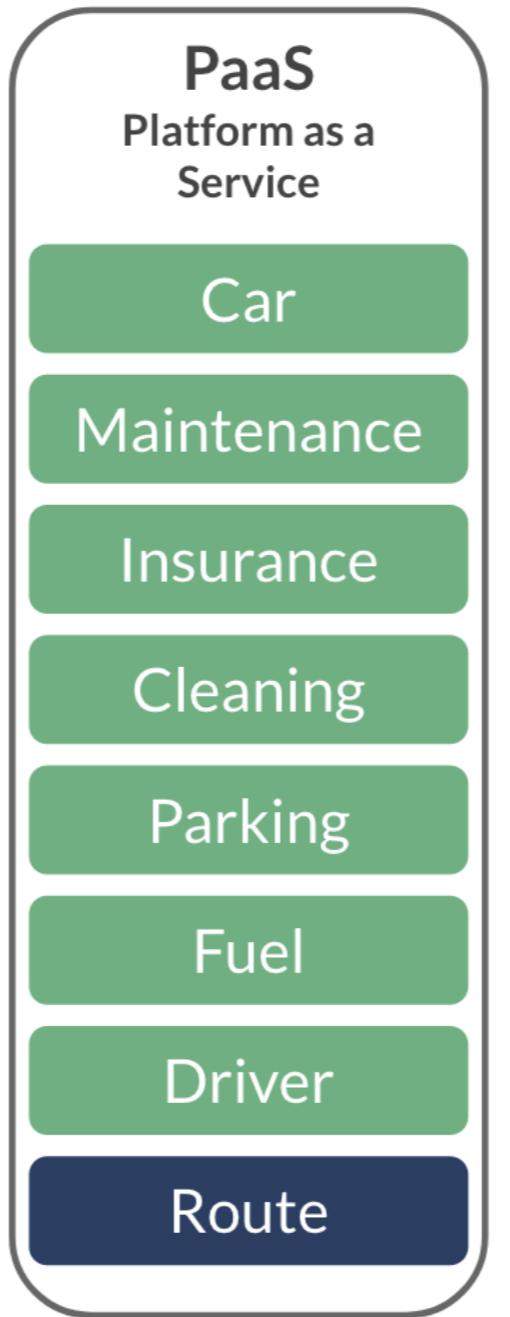
You Manage
Vendor Manages



Car Owned

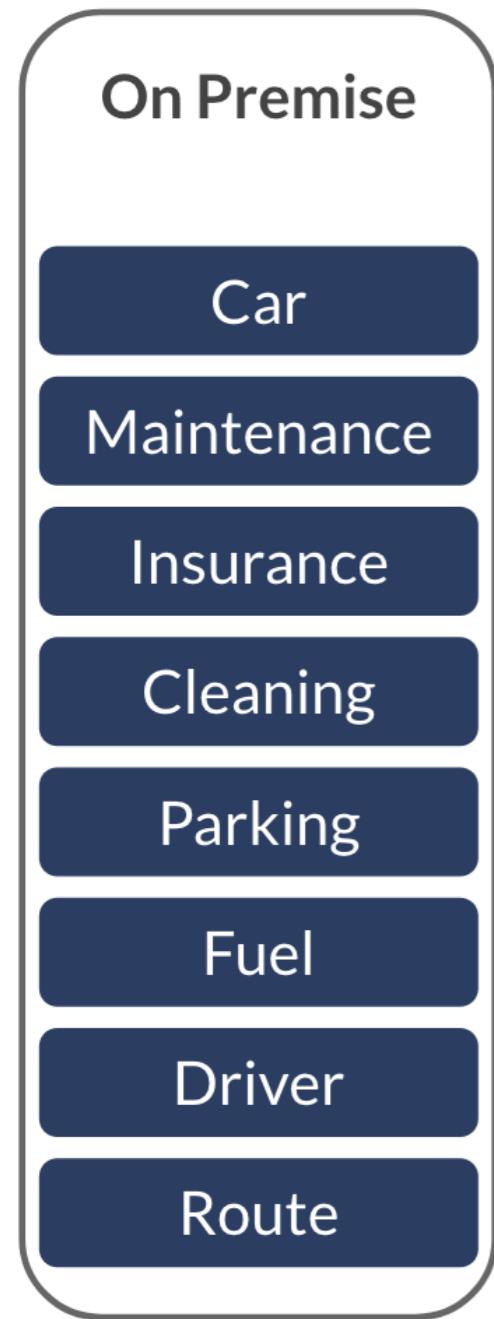


Car Rented

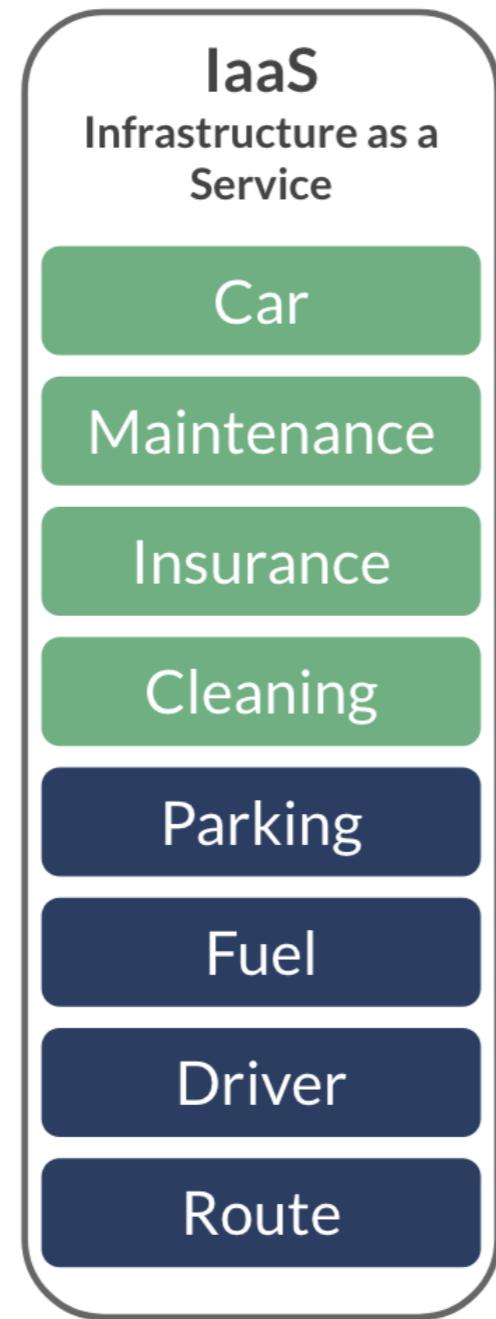


Ride Sharing

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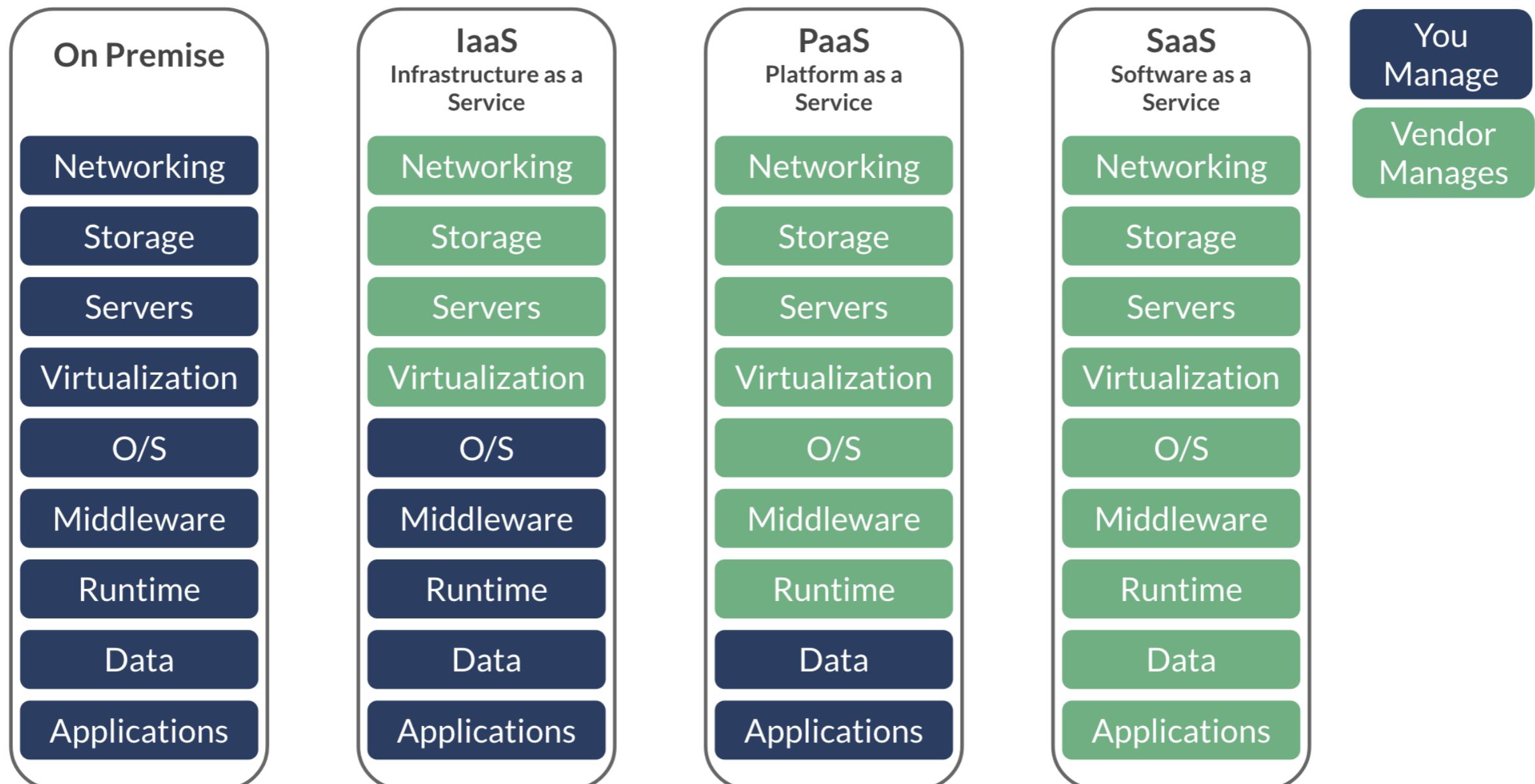
Ride Sharing



Public Transport

You Manage
Vendor Manages

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		

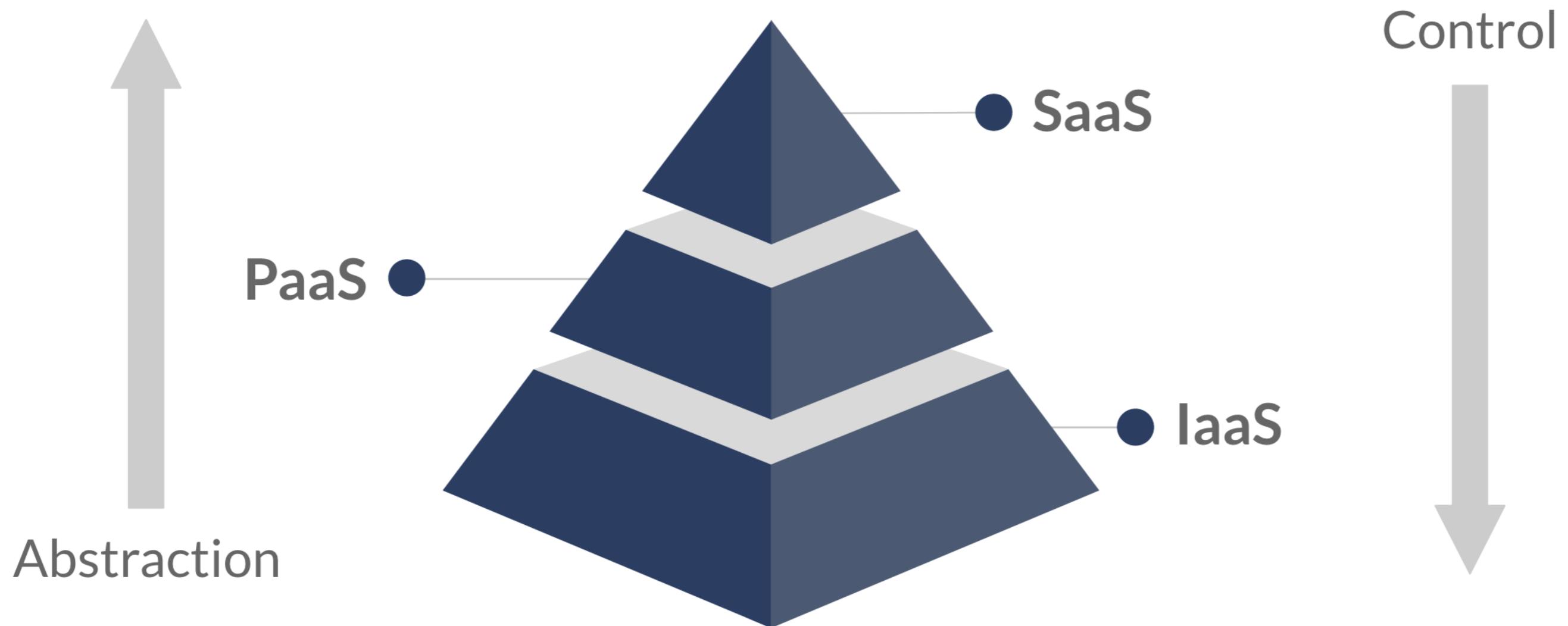
Cloud service models

	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

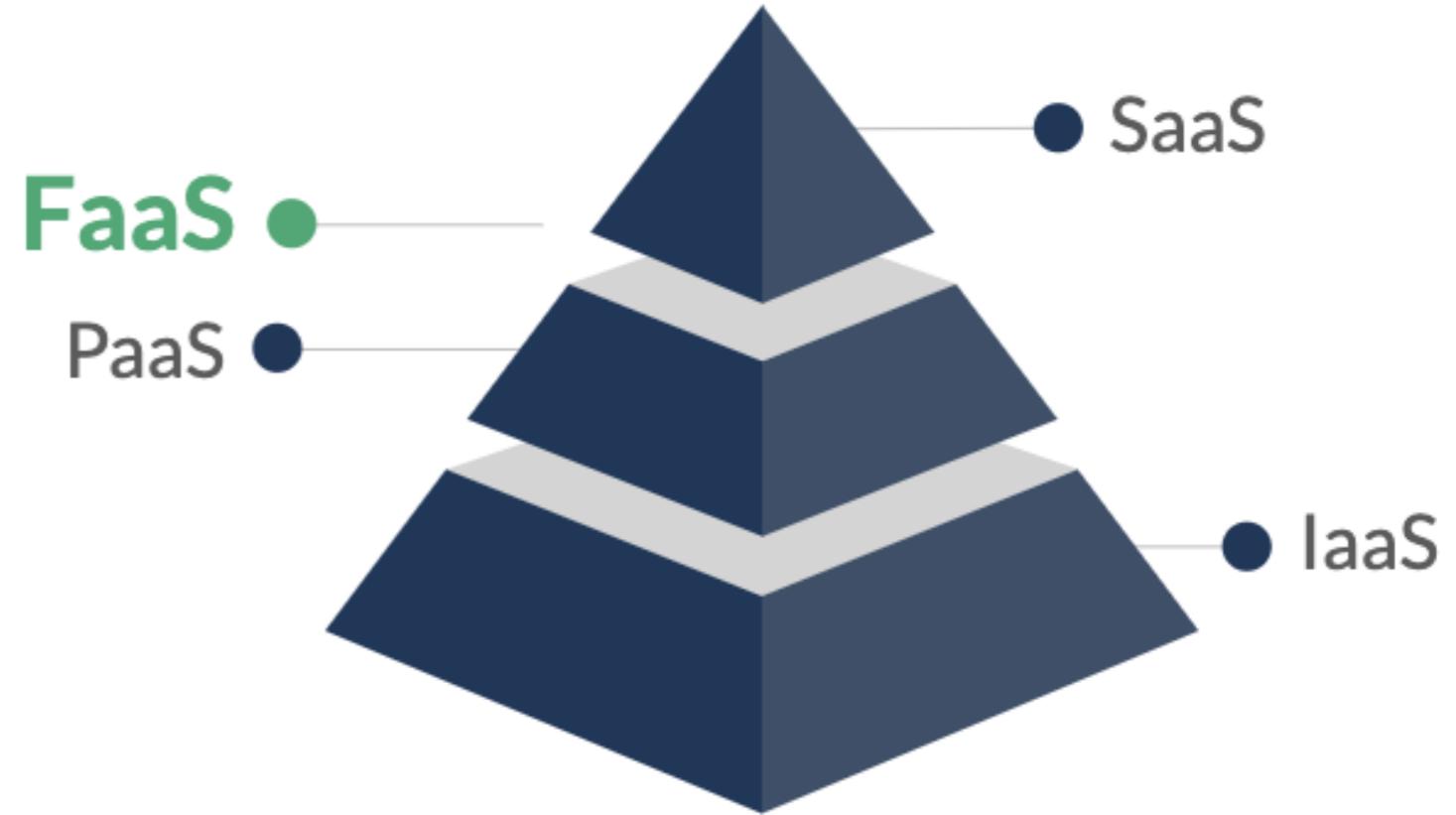
	IaaS Infrastructure as a Service	PaaS Platform as a Service	SaaS Software as a Service
Definition	Cloud-based alternative to on-premise infrastructure	Hardware and software tools over the internet used to develop applications	Software available over the internet, usually for a monthly subscription fee
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)
- Database as a Service (DBaaS)
- Disaster Recovery as a Service (DRaaS)
- Network as a Service (NaaS)
- **XaaS (Anything as a Service)**

Let's practice!

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