



DevOps for startups

with Azure & GitHub

Christopher MANEU
Azure Engineer & Advocate @ Microsoft R&D
@cmaneu

```
chris@Azure:~$ cat agenda.md
```

```
# You said DevOps?
```

```
# Checklist for DevOps in  
startups
```

```
# Getting started
```

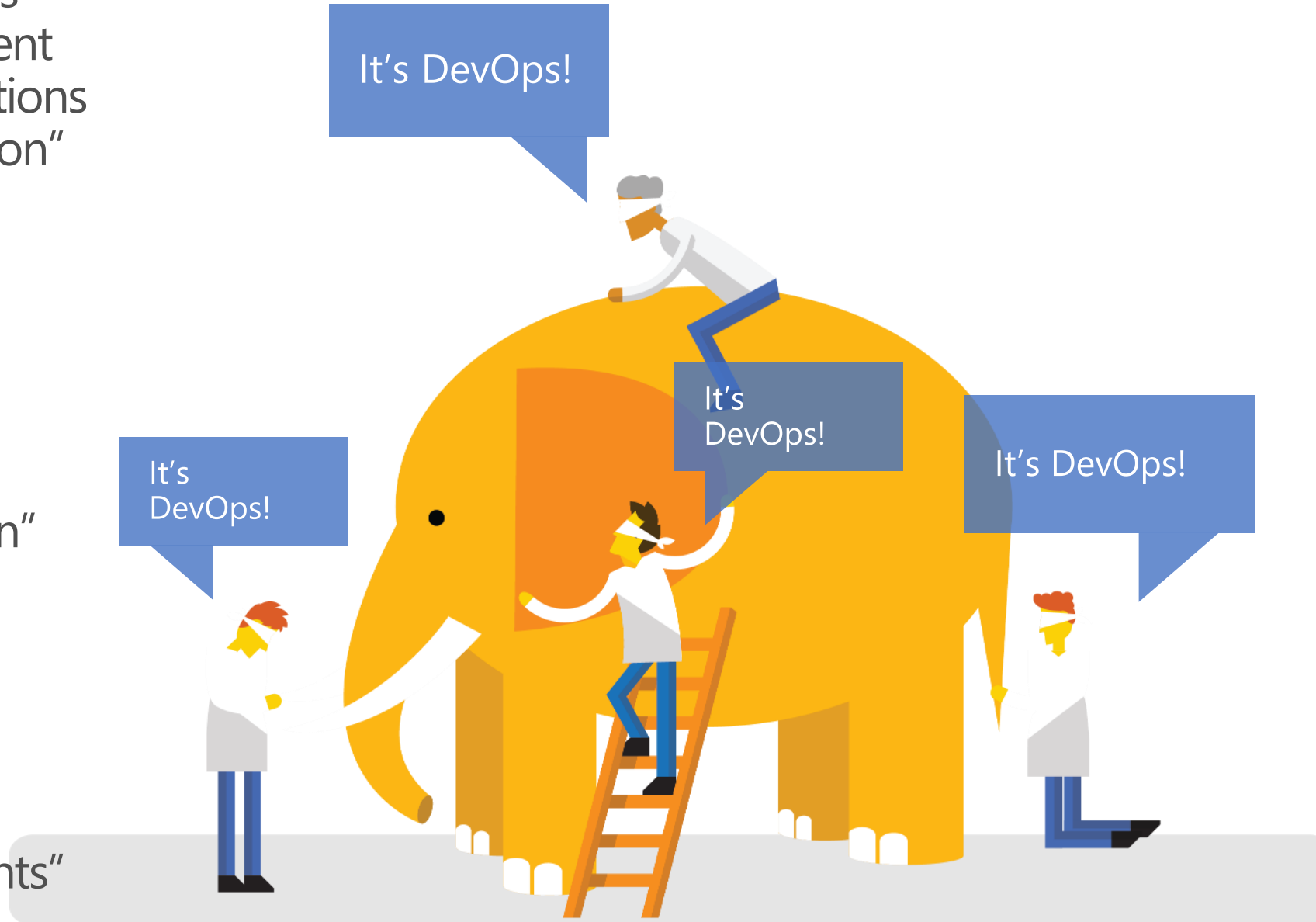
```
# Q&A
```

You said DevOps?

“DevOps is development and operations collaboration”

“DevOps is using automation”

“DevOps is small deployments”



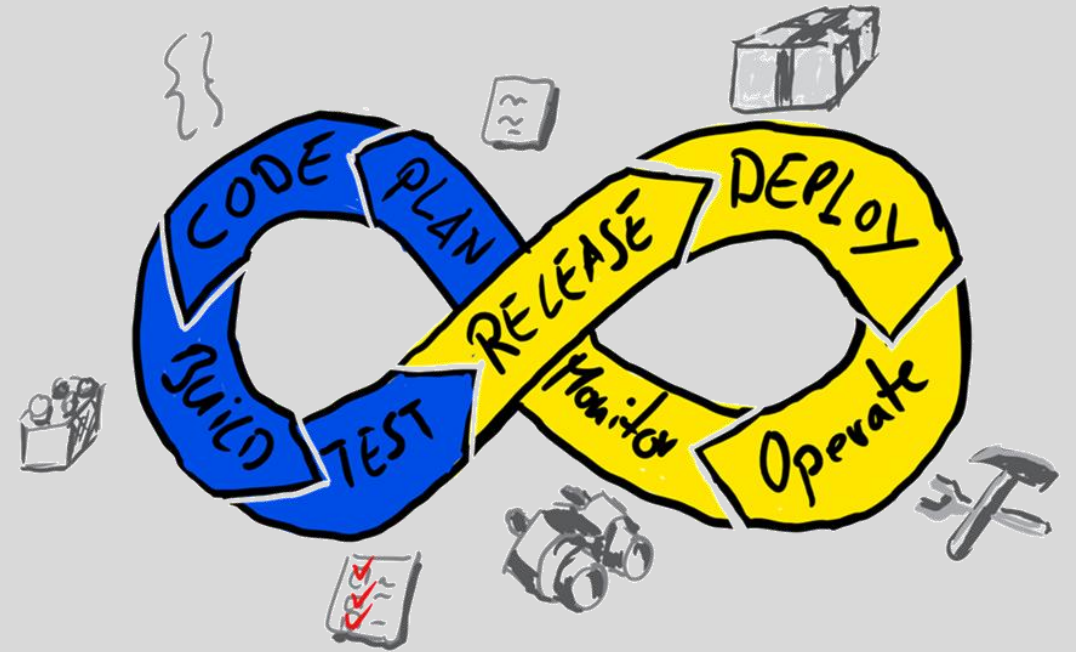
“DevOps is treating your infrastructure as code”

“DevOps is feature switches”

“Kanban for Ops?”

What is DevOps?

DevOps is the union of people, process, and tools to enable continuous delivery of value to our customers.



Increase flow of value

Shorten cycle times

Continuously Improve

Microsoft DevOps Transformation

Before

- 4-6 month milestones
- Horizontal teams
- Personal offices
- Long planning cycles
- PM, Dev, Test
- Yearly customer engagement
- Feature branches
- 20+ person teams
- Secret roadmap
- Bug debt
- 100 page spec documents
- Private repositories
- Deep organizational hierarchy
- Success is a measure of install numbers
- Features shipped once a year

After

- 3-week sprints
- Vertical teams
- Team rooms
- Continual Planning & Learning
- PM & Engineering
- Continual customer engagement
- Everyone in master
- 8-12 person teams
- Publicly shared roadmap
- Zero debt
- Mockups in PPT
- Inner source
- Flattened organization hierarchy
- User satisfaction determines success
- Features shipped every sprint

Checklist for DevOps in Startups

Checklist for DevOps in Startups

- ✓ A Source Control with a branching strategy, pull requests & versionning
- ✓ A Build Infrastructure
- ✓ Application configuration & secrets management
- ✓ Infrastructure as Code
- ✓ Feedback management

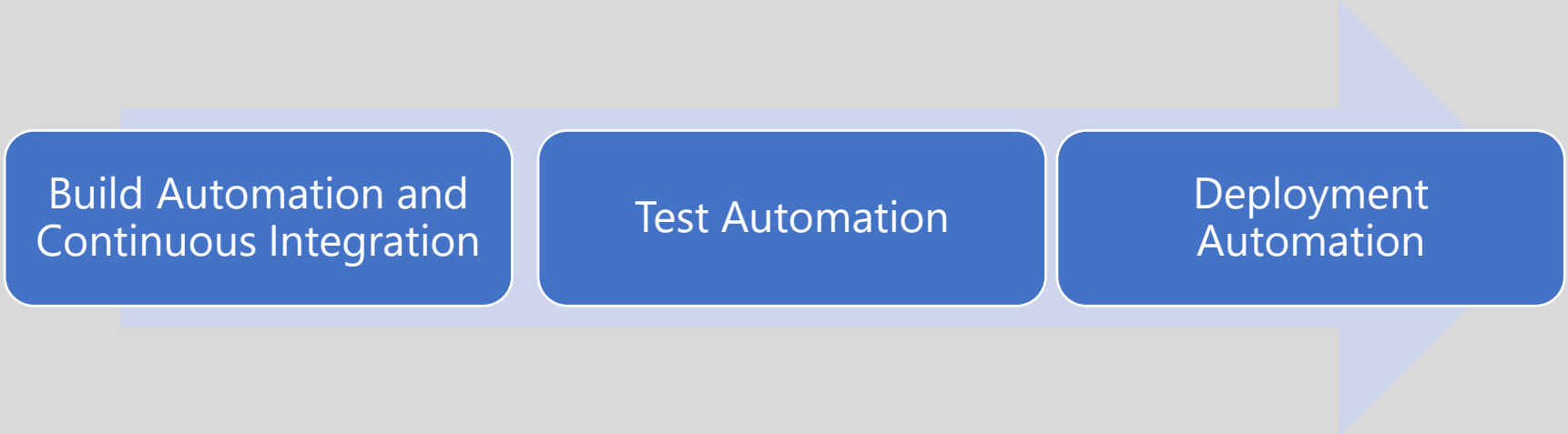
Source Control & Pull Requests

- Either GitHub or Azure DevOps Repos
- Both enables Pull Requests
- Git Semantic Versioning doable on both
- Monorepo / multirepo
- Branching strategy (all on master, GitFlow, ...)



Build Infrastructure

- Azure DevOps Pipelines can handle the whole
- Both enables Pull Requests
- Git Semantic Versioning doable on both
- Monorepo / multirepo
- Branching strategy (all on master, GitFlow, ...)



Build Automation and
Continuous Integration

Test Automation

Deployment
Automation

Application configuration & Feature Flags



Application secrets & certificates



- Centralize application secrets
- Securely store secrets and keys
- Monitor access and use
- Simplified administration of application secret
- Integrate with other Azure services

Application configuration & Feature Flags



- Azure DevOps

App & usage telemetry



Our Definition of Done

Live in production,
collecting telemetry
that examines the
hypothesis which
motivated the
deployment.



Getting started

```
chris@Azure:~$ ./cloud-computing
```



Key concepts

High availability

Fault tolerance

Scalability

Elasticity

Global reach

Customer latency capabilities

Agility

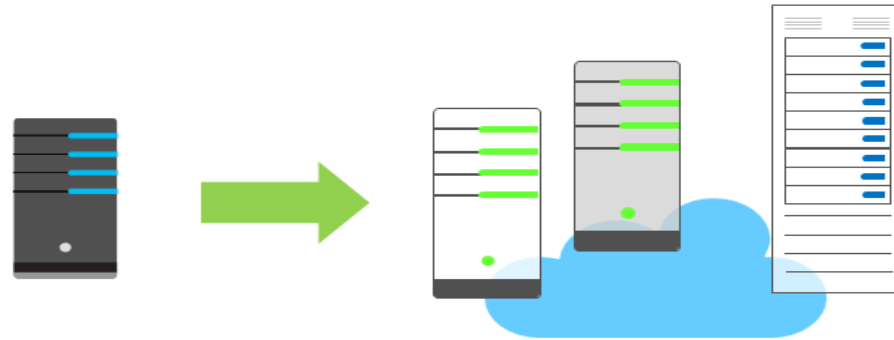
Predictive cost considerations

Disaster recovery

Security

Economies of scale

- The concept of *economies of scale* is the ability to reduce costs and gain efficiency when operating at a larger scale in comparison to operating at a smaller scale.



- Cloud providers are very large businesses, and thus can leverage the benefits of economies of scale and then pass those benefits on to their customers.

CapEx vs. OpEx

- **Capital Expenditure (CapEx)**

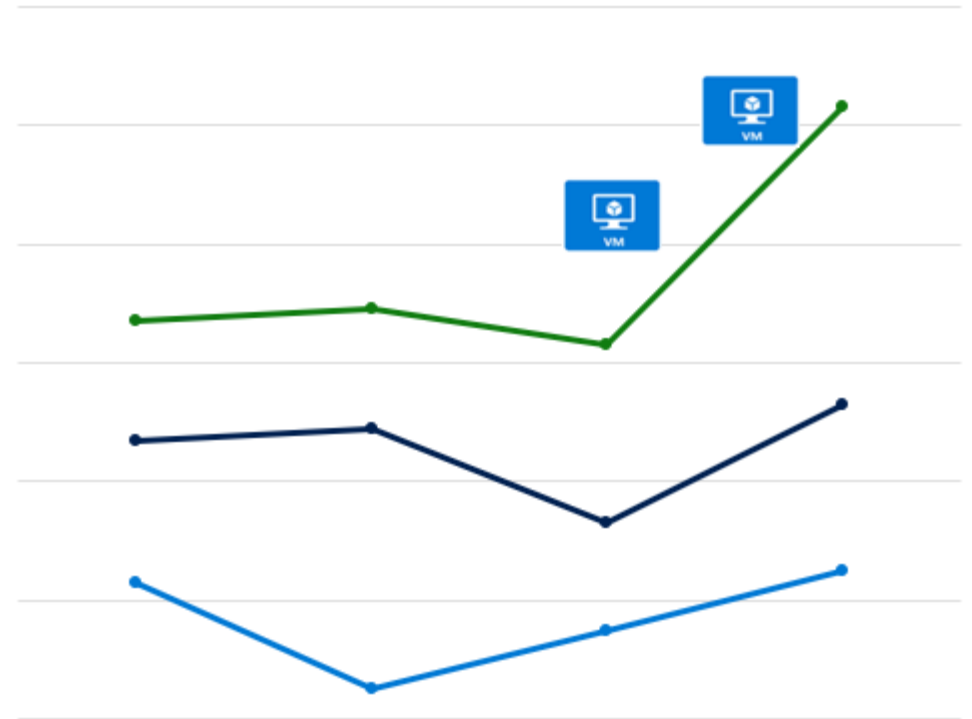
- Spend on physical infrastructure upfront.
- Deduct the expense from your tax bill.
- High upfront cost, value of investment reduces over time.

- **Operational Expenditure (OpEx)**

- Spend on services or products as needed.
- Get billed immediately.
- Deduct the expense from your tax bill in the same year.
- No upfront cost, pay-as-you use.

Consumption-based model

- No upfront costs.
- No need to purchase and manage costly infrastructure.
- Ability to pay for additional resources as they are needed.
- Ability to stop paying for resources that are no longer needed.



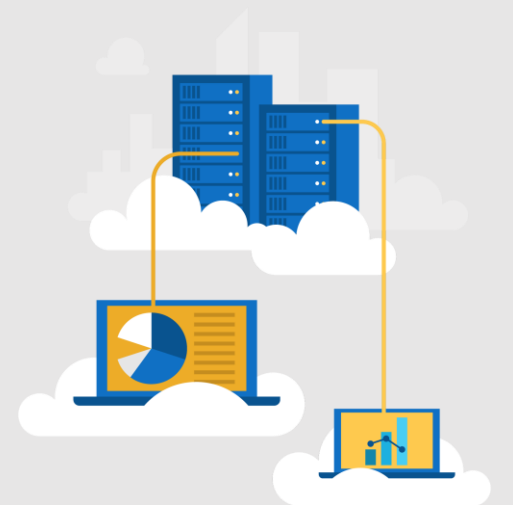
Cloud computing

- **Compute power** - such as Linux servers or web applications.
- **Storage** - such as files and databases.
- **Networking** - such as secure connections between the cloud provider and your company.
- **Analytics** - such as visualizing telemetry and performance data.



Cloud providers include Microsoft, Amazon, and Google

Types of cloud models



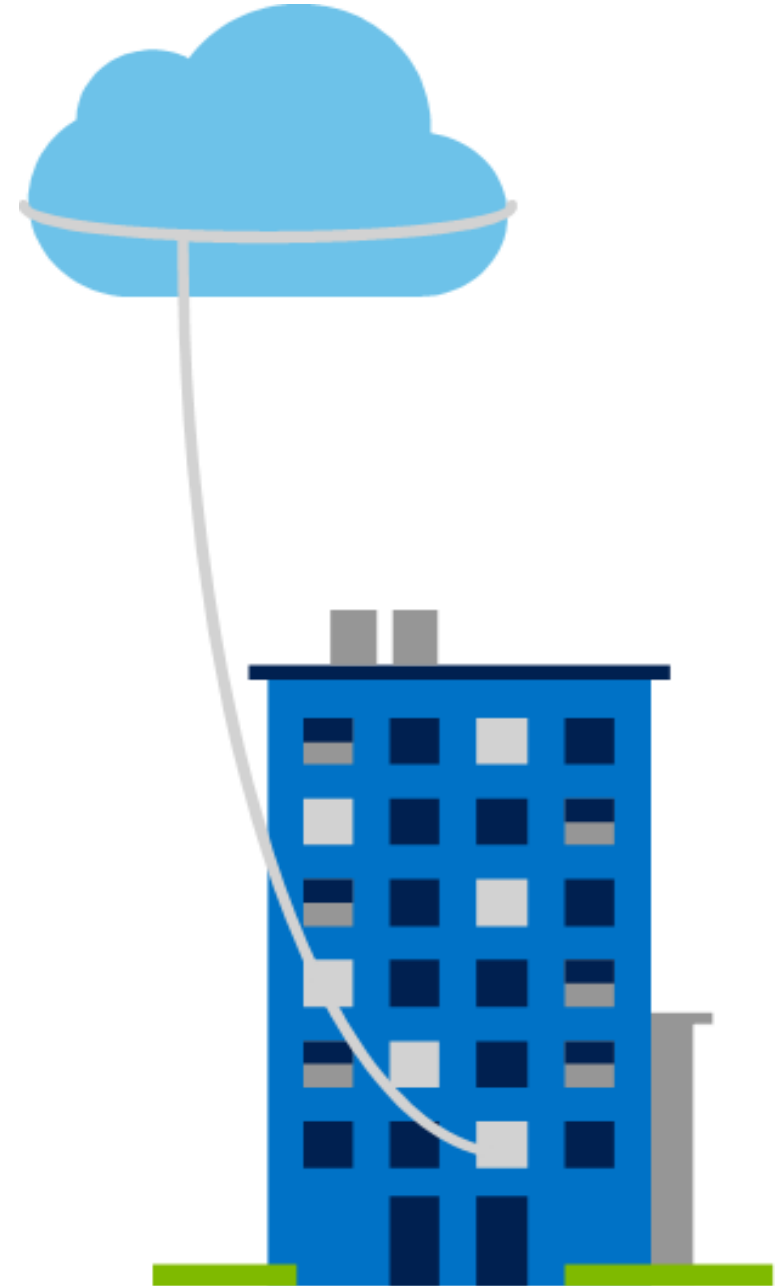
Public cloud



- Owned by cloud services or *hosting* provider.
- Provides resources and services to multiple organizations and users.
- Accessed via secure network connection (typically over the internet).

Private cloud

- Owned and operated by the organization that uses cloud resources.
- Organizations create a cloud environment in their datacenter.
- Self-service access to compute resources provided to users within the organization.
- Organizations responsible for operating the services they provide.



Hybrid cloud



Combines *Public* and *Private* clouds to allow applications to run in the most appropriate location.

Cloud model comparison

Public cloud:

- No capital expenditures to scale up.
- Applications can be quickly provisioned and deprovisioned.
- Organizations pay only for what they use.

Private cloud:

- Organizations have complete control over resources.
- Organizations have complete control over security.

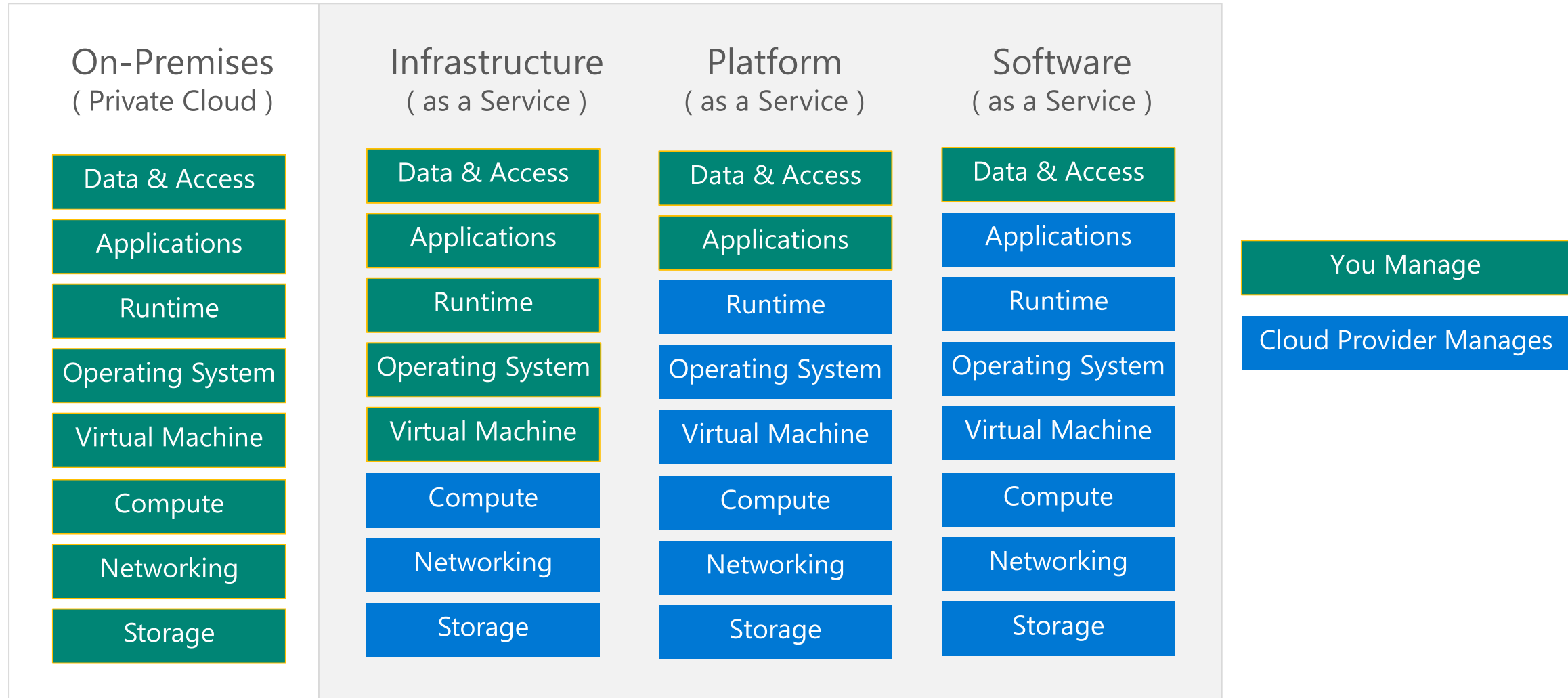
Hybrid cloud:

- Most flexibility.
- Organizations determine where to run their applications.
- Organizations control security, compliance, or legal requirements.

Types of cloud services

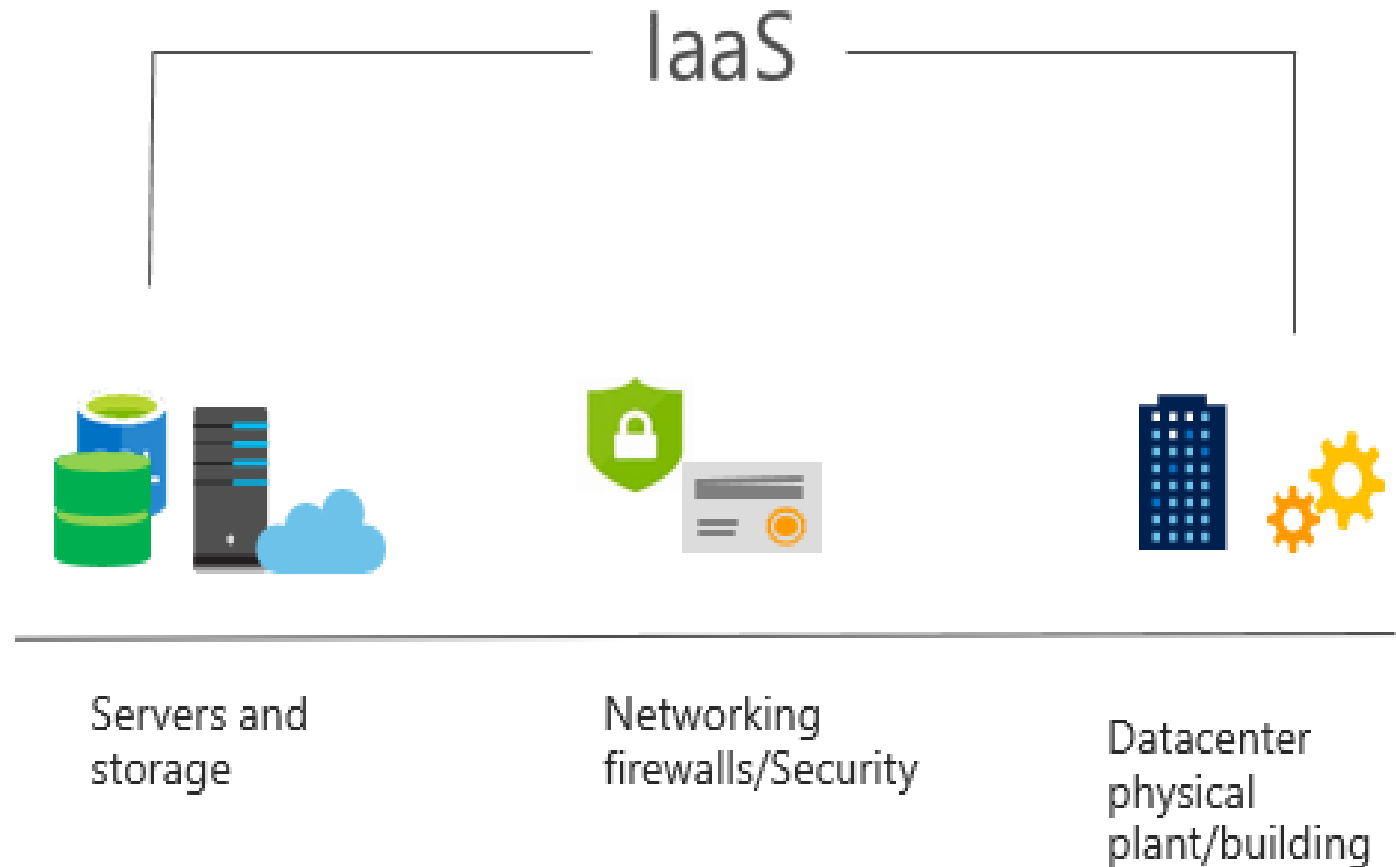


Shared responsibility model

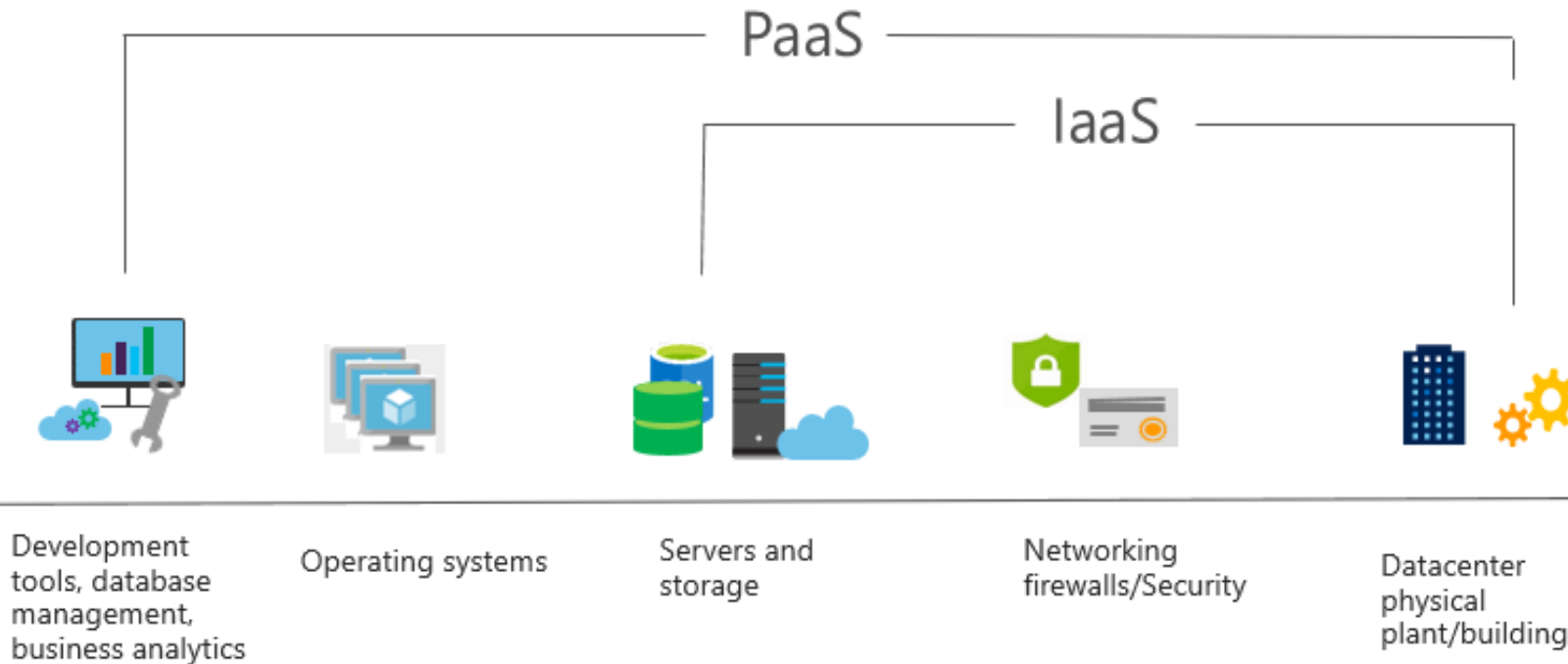


Infrastructure as a Service (IaaS)

- Most basic cloud computing services category.
- Build pay-as-you-go IT infrastructure by renting servers, virtual machines, storage, networks, and operating systems from a cloud provider.
- Instant computing infrastructure, provisioned and managed over the internet.

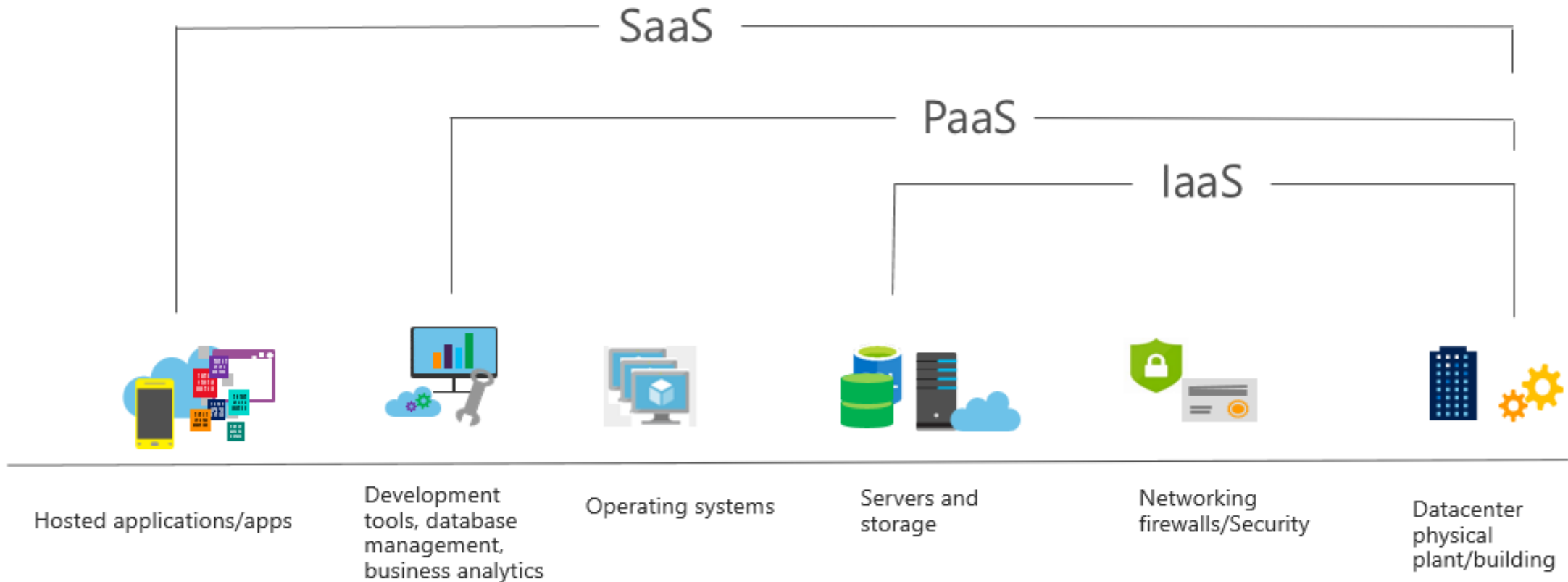


Platform as a Service (PaaS)



- Provides environment for building, testing, and deploying software applications.
- Helps create applications quickly, without focusing on managing underlying infrastructure.

Software as a Service (SaaS)



Centrally hosted and managed software for end users. Users connect to and use cloud-based apps over the internet. For example, Microsoft Office 365, email, and calendars.

Cloud service comparison

IaaS

- The most flexible cloud service.
- You configure and manage the hardware for your application.

PaaS

- Focus on application development.
- Platform management is handled by the cloud provider.

SaaS

- Pay-as-you-go pricing model.
- Users pay for the software they use on a subscription model.

```
chris@Azure:~$ ./azure-intro
```

What is Azure?



Edge Devices

Azure Stack Hub Azure Stack Edge Azure Sphere Azure Kinect HoloLens



Serverless

Web	Databases
Mobile	Analytics
Mixed Reality	AI + Machine Learning
Containers	Internet of Things
Events + Integration	Media



Infrastructure

Compute Networking Storage Security Identity



Tools

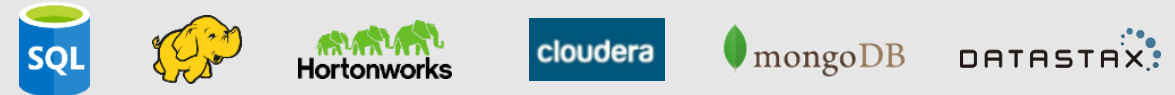
Visual Studio
GitHub
PowerApps
Power BI

Works with popular tools and frameworks

Management



Databases & middleware



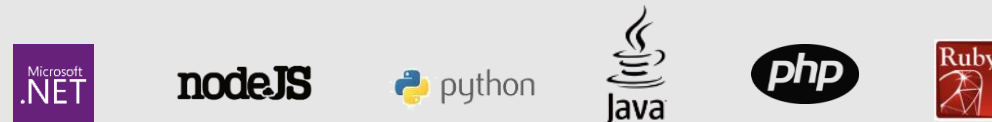
Applications



Infrastructure



App frameworks





Global



55 Azure regions

Largest geographical footprint of any cloud provider with more than **55** Azure regions



Secure



Microsoft Cyber Defense Operations Center

>3,500 full-time security professionals

6.5 trillion global signals daily

\$1 billion annual cybersecurity investment



Compliant

91 Compliance offerings

GLOBAL

- ISO 27001:2013
- ISO 27017:2015
- ISO 27018:2014
- ISO 22301:2012
- ISO 9001:2015
- ISO 20000-1:2011
- SOC 1 Type 2
- SOC 2 Type 2
- SOC 3
- CIS Benchmark
- CSA STAR Certification
- CSA STAR Attestation
- CSA STAR Self-Assessment
- WCAG 2.0 (ISO 40500:2012)

U.S. GOVT

- FedRAMP High
- FedRAMP Moderate
- EAR
- ITAR
- DoD DISA SRG Level 5
- DoD DISA SRG Level 4
- DoD DISA SRG Level 2
- DFARS
- DoE 10 CFR Part 810
- NIST SP 800-171
- NIST CSF
- Section 508 VPATs
- FIPS 140-2
- CJIS
- IRS 1075
- CNSSI 1253

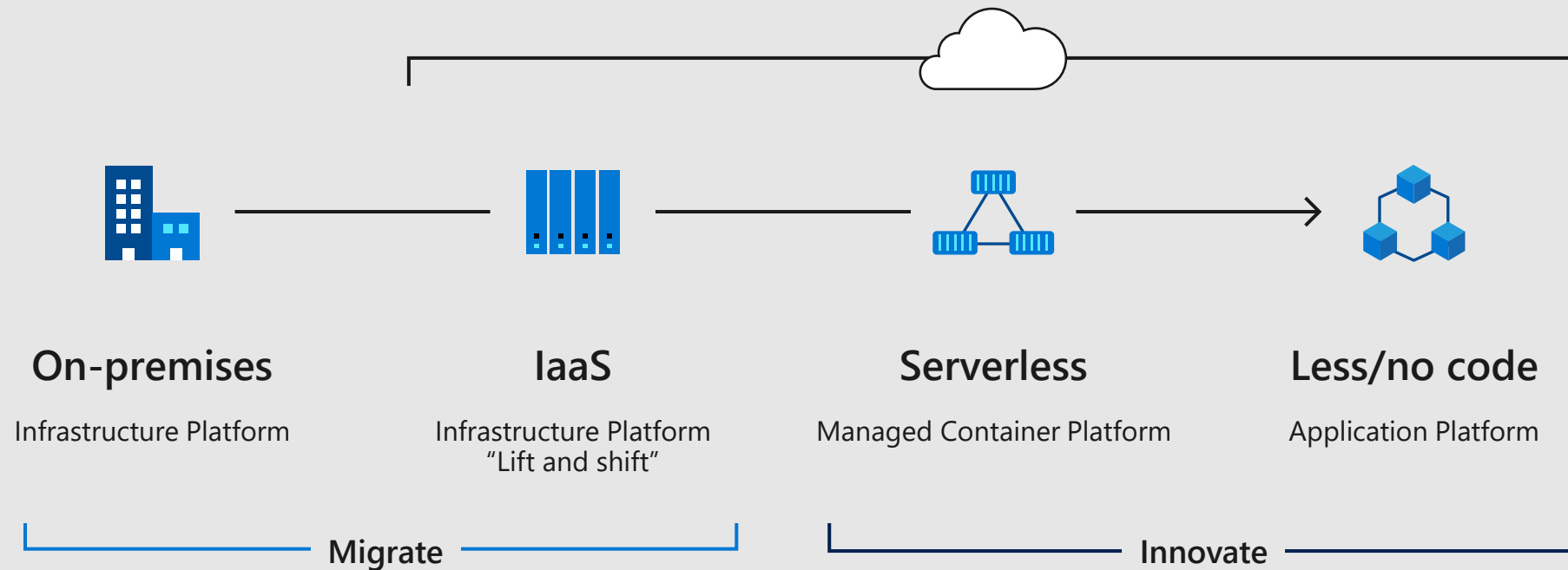
INDUSTRY

- PCI DSS Level 1
- GLBA (US)
- FFIEC (US)
- Shared Assessments (US)
- SEC 17a-4 (US)
- CFTC 1.31 (US)
- FINRA 4511 (US)
- SOX (US)
- 23 NYCRR 500 (US)
- OSFI (Canada)
- FCA + PRA (UK)
- APRA (Australia)
- FINMA (Switzerland)
- FSA (Denmark)
- RBI + IRDAI (India)
- MAS + ABS (Singapore)
- NBB + FSMA (Belgium)
- AFM + DNB (Netherlands)
- AMF + ACPR (France)
- KNF (Poland)
- European Banking Authority (EBA)
- FISC (Japan)
- HIPAA BAA (US)
- HITRUST Certification
- GxP (FDA 21 CFR Part 11)
- MARS-E (US)
- NHS IG Toolkit (UK)
- NEN 7510:2011 (Netherlands)
- FERPA (US)
- CDSA
- MPAA (US)
- FACT (UK)
- DPP (UK)

REGIONAL

- Argentina PDPA
- Australia IRAP Unclassified
- Australia IRAP PROTECTED
- Canada Privacy Laws
- China GB 18030:2005
- China DJCP (MLPS) Level 3
- China TRUCS / CCCPPF
- EU EN 301 549
- EU ENISA IAF
- EU Model Clauses
- EU – US Privacy Shield
- GDPR
- Germany CS
- Germany IT-Grundschutz workbook
- India MeitY
- Japan CS Mark Gold
- Japan My Number Act
- Netherlands BIR 2012
- New Zealand Gov CIO Framework
- Singapore MTCS Level 3
- Spain ENS High
- Spain DPA
- UK Cyber Essentials Plus
- UK G-Cloud
- UK PASF

Journey to the cloud



Azure compute services



- Azure VMs use Infrastructure as a Service (IaaS) to provide computing power in the cloud.



- VM scale sets are designed for automatic scaling of identical VMs.



- App services is a Platform as a Service (PaaS) offering to build, deploy, and scale enterprise-grade web, mobile, and API apps.



- Functions perform compute actions based on an event.

Azure database services



- Azure Cosmos DB is a globally-distributed database service that enables you to elastically and independently scale throughput and storage.



- Azure SQL Database is a relational database as a service (DaaS) based on the latest stable version of the Microsoft SQL Server database engine.



- Azure Database Migration is a fully-managed service designed to enable seamless migrations from multiple database sources to Azure data platforms with minimal downtime.

These are just a few of our database offerings.

Internet of Things



- Azure IoT Central is a fully-managed global IoT SaaS solution that makes it easy to connect, monitor, and manage your IoT assets at scale.



- Azure IoT Hub is a managed service hosted in the cloud that acts as a central message hub for bidirectional communication between your IoT application and the devices it manages.

These are just two of our IoT offerings. Use the IoT Product Selector to determine which product is best for your situation.

Artificial Intelligence



- Azure Machine Learning service provides a cloud-based environment used to develop, train, test, deploy, manage, and track machine learning models.

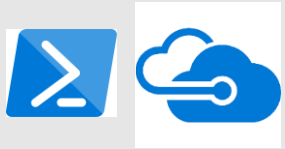


- Azure Machine Learning Studio is a collaborative, drag-and-drop visual workspace where you can build, test, and deploy machine learning solutions without needing to write code.

Azure management tools



- Azure portal



- Azure PowerShell and Azure Command-Line Interface (CLI)



- Azure Cloud Shell



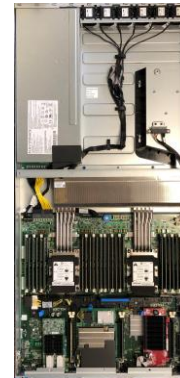
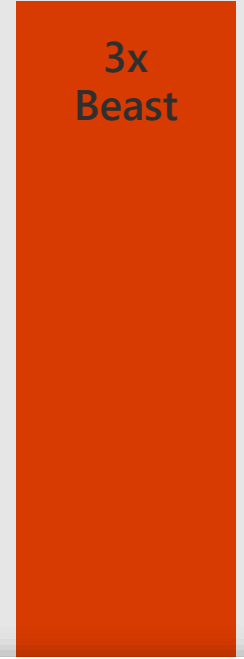
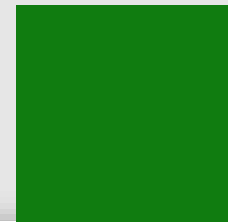
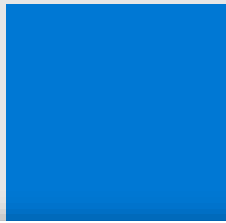
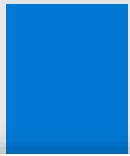
- Azure mobile app



- Azure REST API

Azure servers: General purpose

↕ RAM ↔ Cores



Gen 2

Processor	2 x 6 Core 2.1 GHz
Memory	32 GiB
Hard Drive	6 x 500 GB
SSD	None
NIC	1 Gb/s

Godzilla

Processor	2 x 16 Core 2.0 GHz
Memory	512 GiB
Hard Drive	None
SSD	9 x 800 GB
NIC	40 Gb/s

Intel Gen 6

Processor	2 x Skylake 24 Core 2.7GHz
Memory	768GiB DDR4
Hard Drive	None
SSD	4 x 960 GB M.2 SSDs and 1 x 960 GB SATA
NIC	40 Gb/s + FPGA

Optimized Gen 6

Processor	2 x 24 core Skylake Lake
Memory	192 GB DDR4
Hard Drive	None
SSD	5 x 960 GB M.2 NVMe
NIC	40 Gb/s + FPGA

AMD Gen 6

Processor	2 x 32 core Naples
Memory	512 GB DDR4
Hard Drive	None
SSD	7 x 960 GB M.2 NVMe
NIC	50 Gb/s + FPGA

Intel Gen 7

Processor	2 x 26 core Cascade Lake
Memory	576 GB DDR4
Hard Drive	None
SSD	7 x 960 GB M.2 NVMe
NIC	50 Gb/s + FPGA

AMD Gen 7

Processor	2 x 32 core Rome
Memory	768 GB DDR4
Hard Drive	None
SSD	7 x 960 GB M.2 NVMe
NIC	50 Gb/s + FPGA

Beast

Processor	4 x 18 Core 2.5 GHz
Memory	4096 GiB
Hard Drive	None
SSD	4 x 2 TB NVMe, 1 x 960 GB SATA
NIC	40 Gb/s

Beast v2

Processor	8 x 28 Core 2.5 GHz
Memory	12 TiB
Hard Drive	None
SSD	4 x 2 TB NVMe, 1 x 960 GB SATA
NIC	50 Gb/s

Dublin

DB3

DB4



Dublin

DB5

DB3

DB4



Dublin

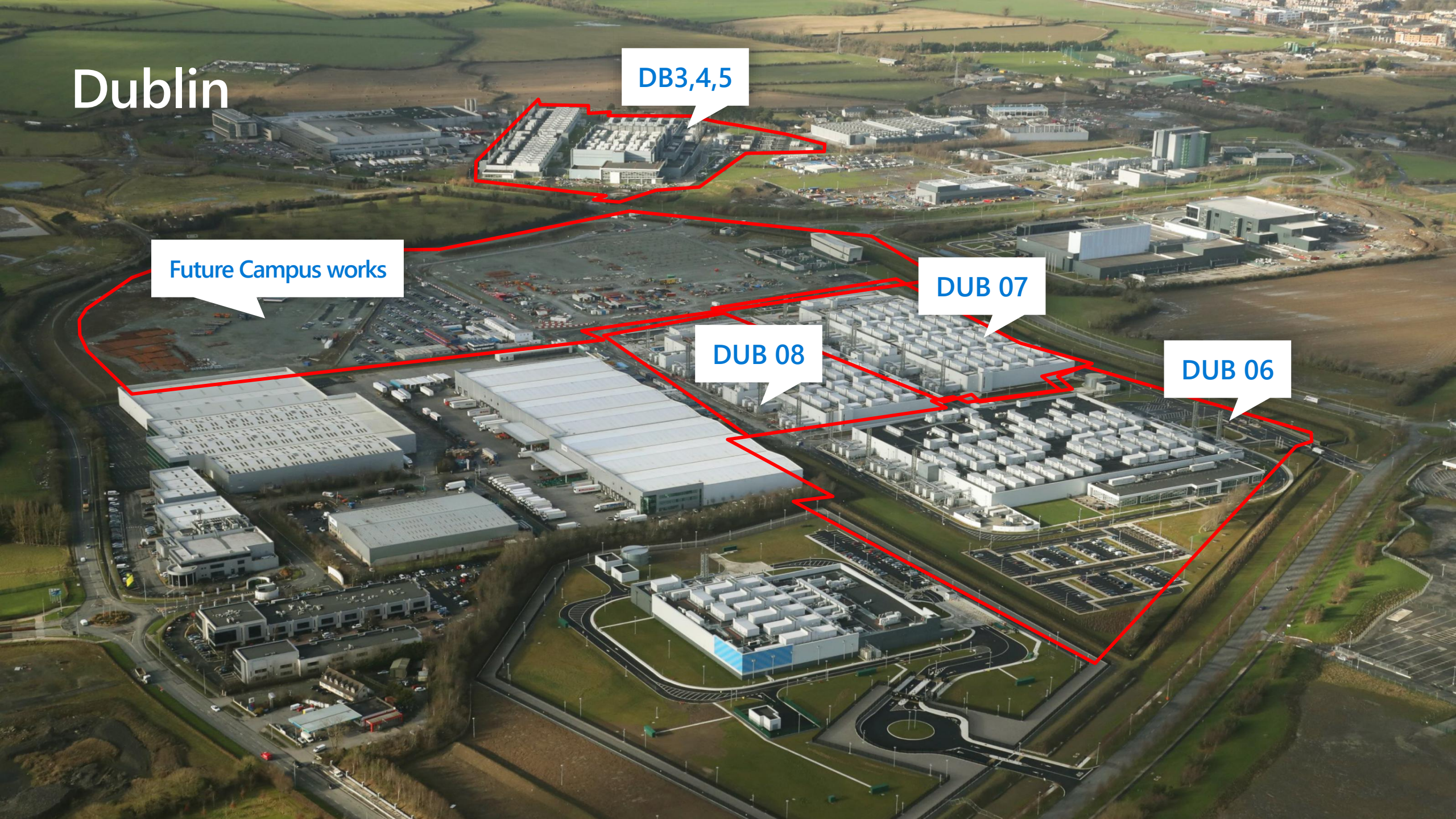
DB3,4,5

Future Campus works

DUB 07

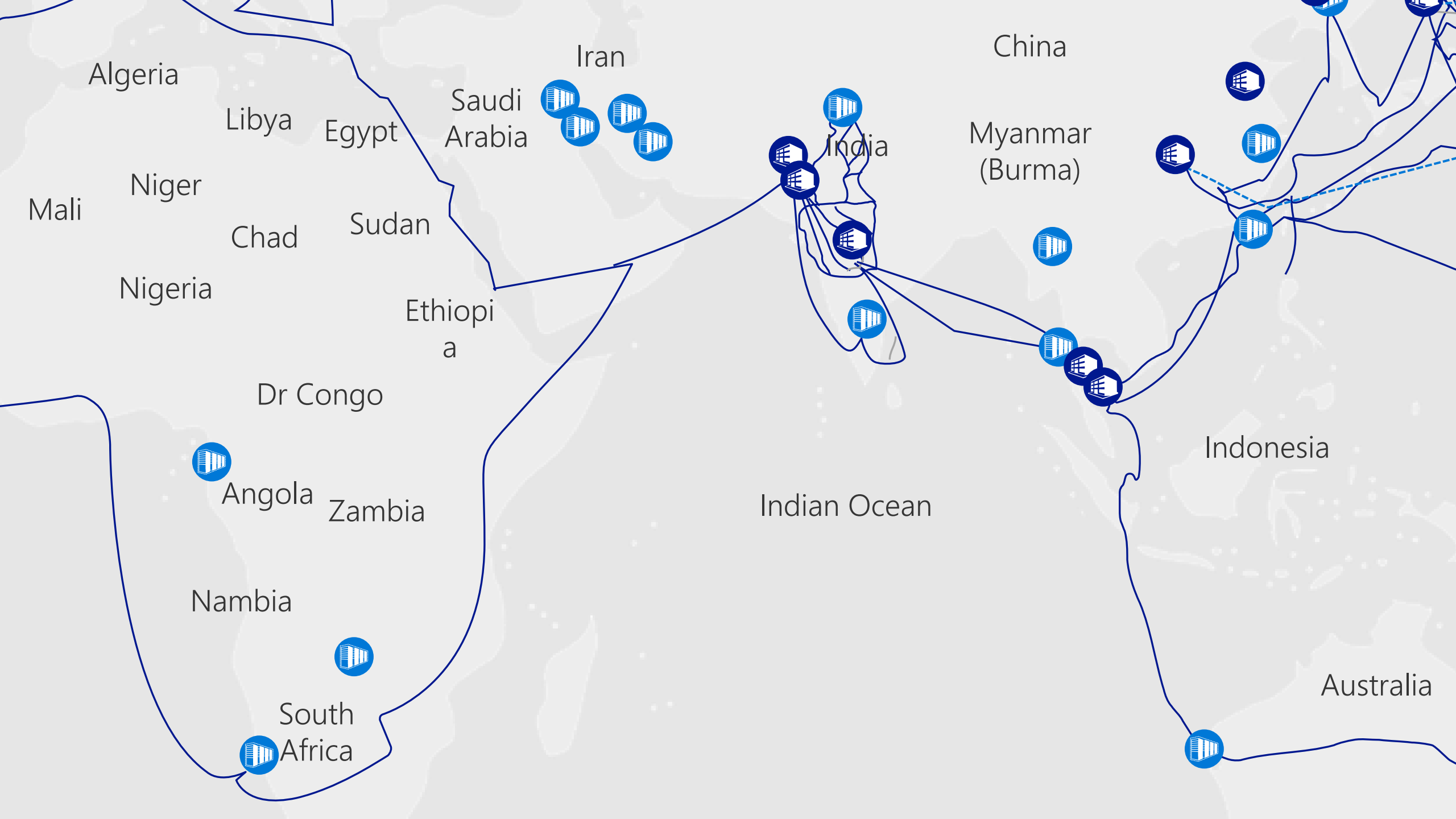
DUB 08

DUB 06

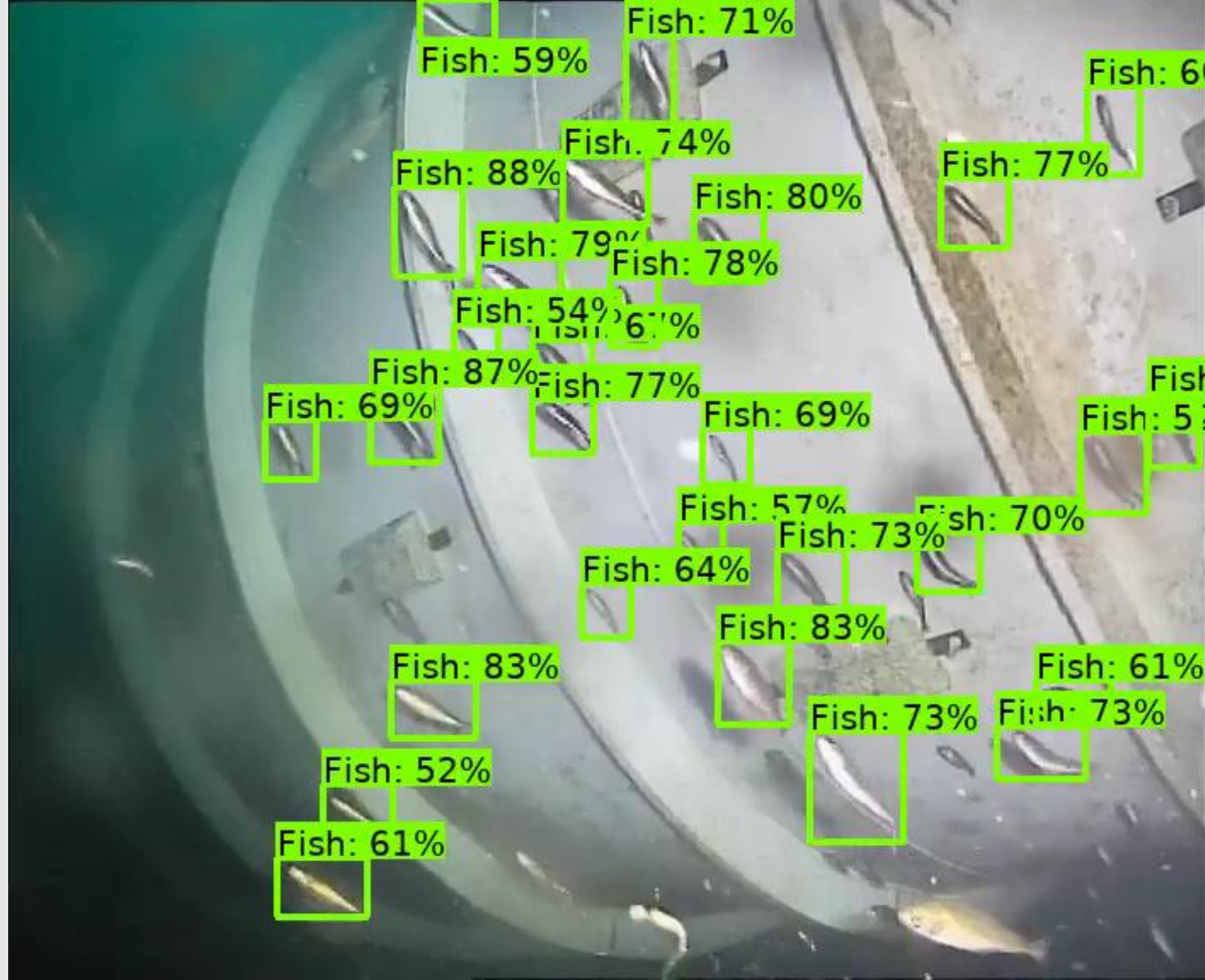


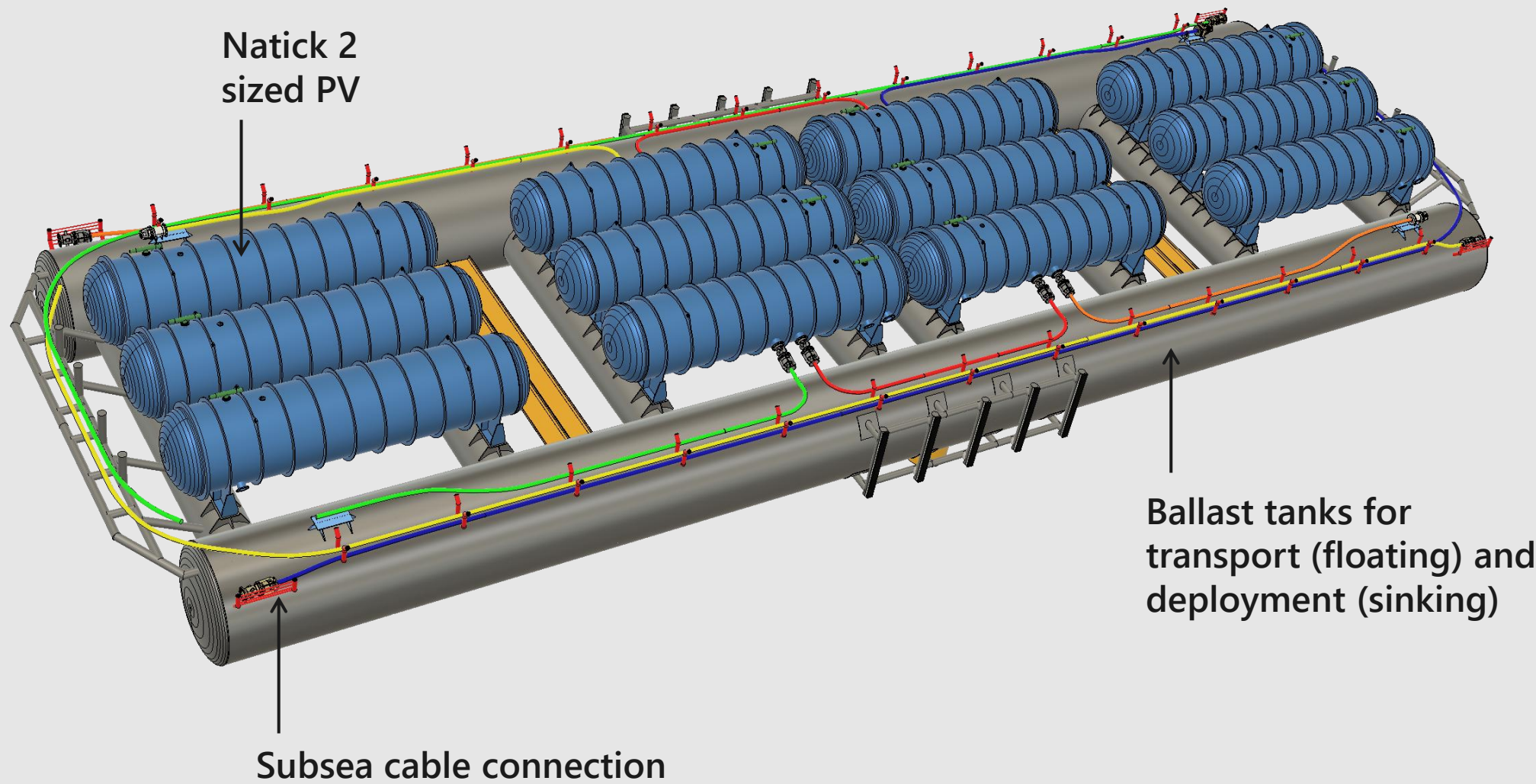
Singapore













```
chris@Azure:~$ ./azure-for-students
```

Get an Azure Subscription

Is your school registered on Azure for Education?

Go to <https://portal.azure.com> and search for « Education » in the search bar.

If not,
<https://aka.ms/azure-student>

Scenario #1 – My portfolio website

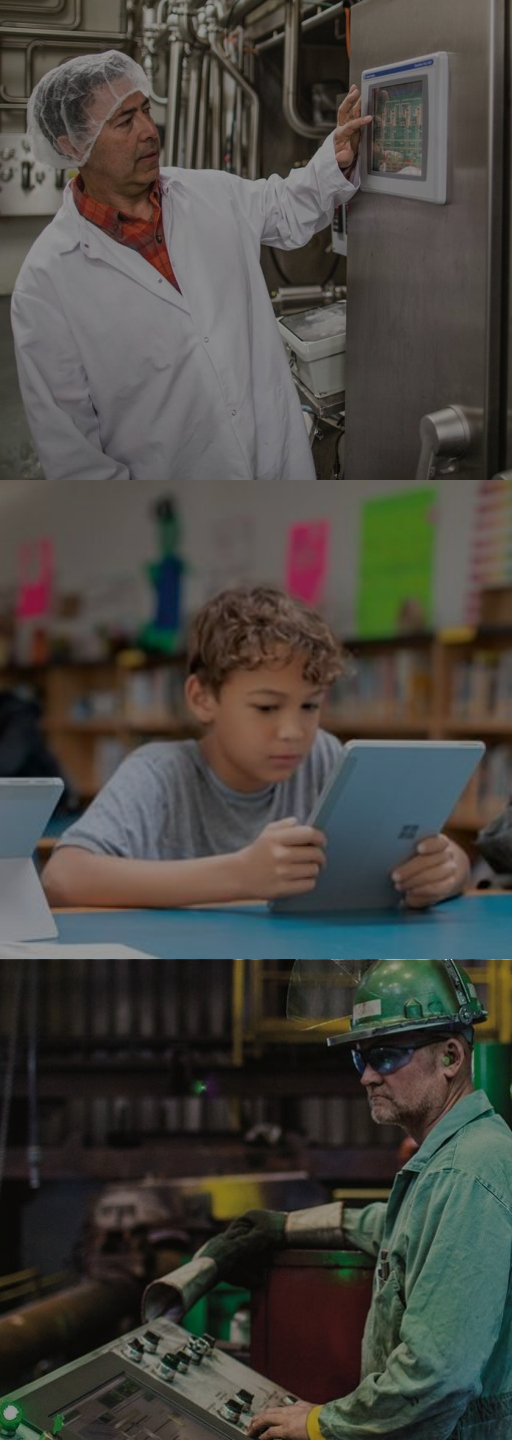
Scenario #2

Let's do some project together

Scenario #3

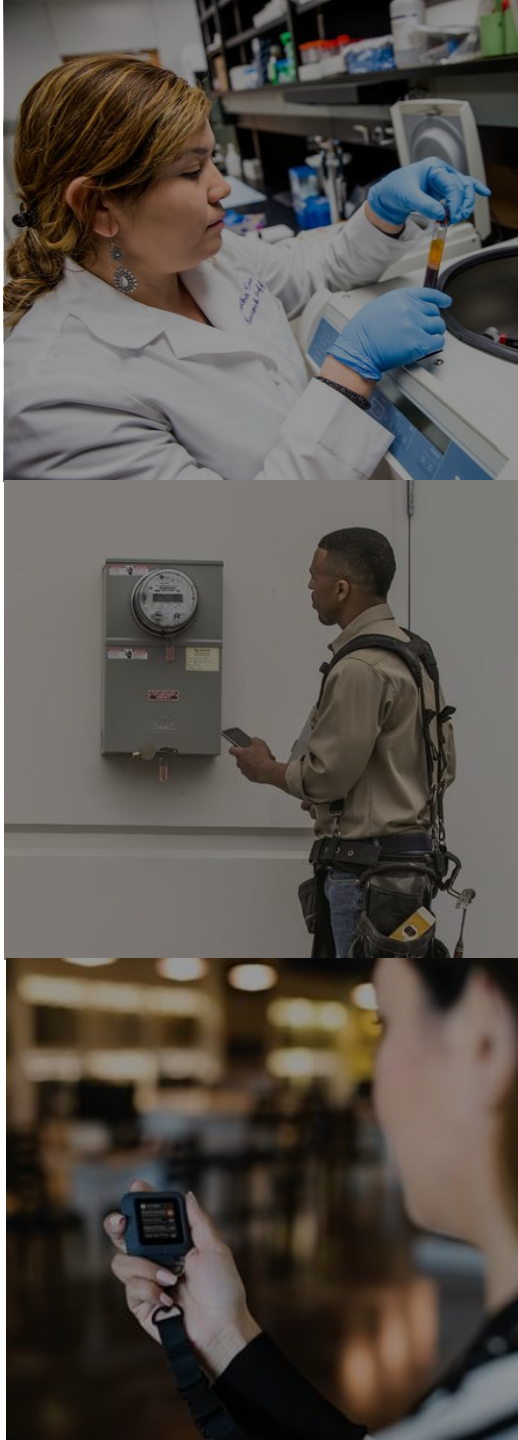
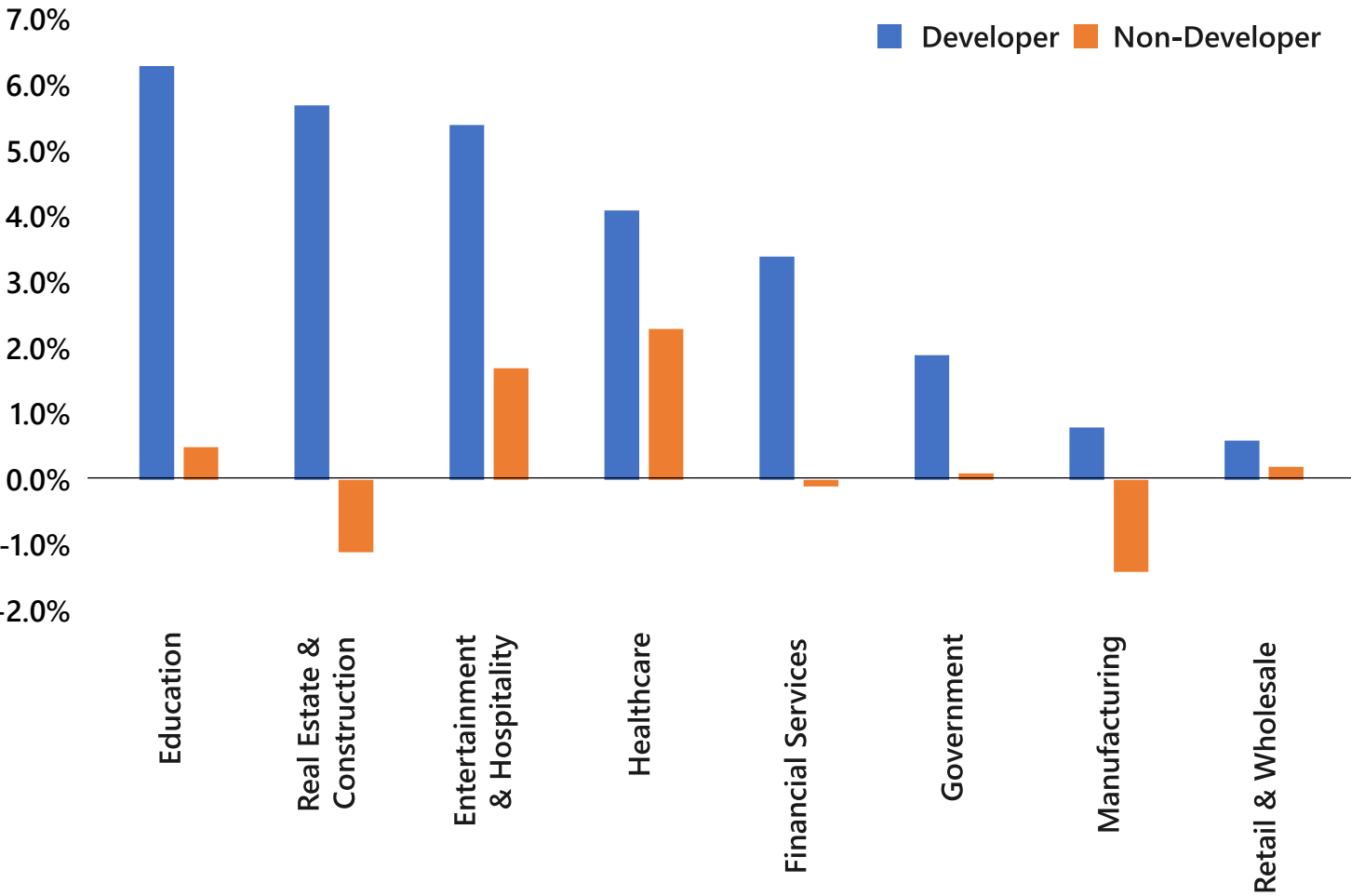
Do you AI?

```
chris@Azure:~$ shutdown 11:30
```



Nearly every industry is being affected...

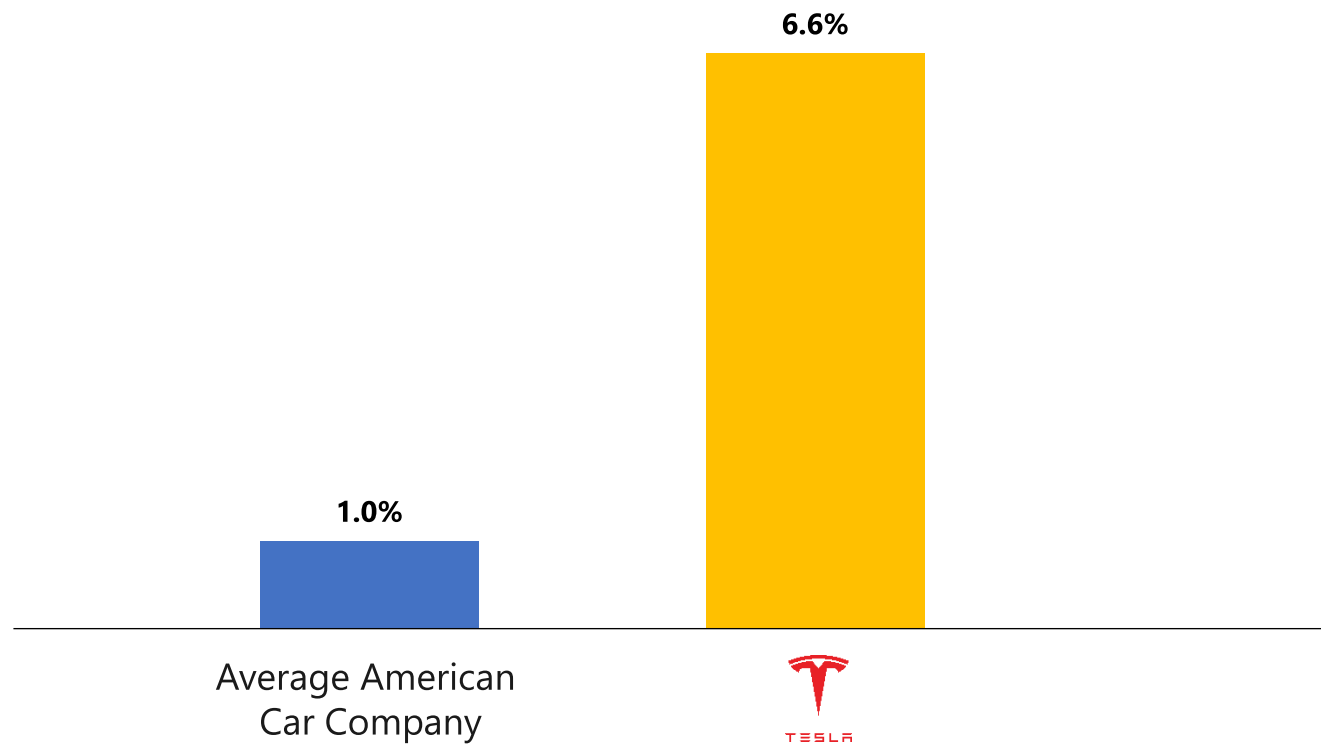
Developer Growth
By industry (US), 2006-2016



Role of software in Automotive

Role of SW in Auto

Developers as a % of Overall Headcount



Cloud-related jobs

- Cloud Engineer
- Cloud « Native » Developer
- Cloud Administrator
- Cloud Architect
- Cloud Finance Specialist
- *Service Reliability Engineer*
- *Devops Engineer*
- *AI Engineer / Data Engineer*
- *Security Engineer*

Microsoft Learn

Aka.ms/GoLearn

Get Started >

Administrateur ✕

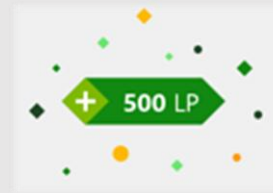
Architecte de solutions ✕

Ingénieur Données ✕

Développeur ✕

Des exercices étapes par étapes

- Du microapprentissage guide par métier, difficulté, ou produit/service
- Videos, tutoriels, et travaux pratiques



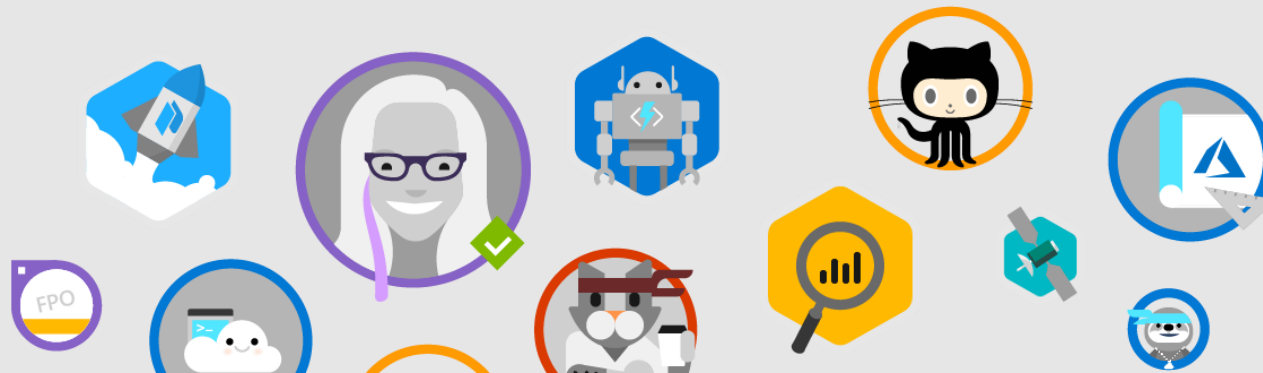
Gamification & Succès

- Débloquez des "succès" au fur et à mesure de la réalisation d'exercices pratiques
- Historique des modules complétés



"Pret à apprendre"

- Tout le contenu est gratuit
- Création gratuite de bac à sable pour manipuler Azure et les autres services, sans carte bleue ou codes
- Contenu disponible dans plusieurs langues (dont Anglais et Français) et différents langages de programmation
- Pas d'installation, environnement entièrement dans le navigateur



Créer une machine virtuelle - Lea

+

← → ↺

https://docs.microsoft.com/fr-fr/learn/modules/welcome-to-azure/4-create-a-vm?pivots=linux-cloud

☆ 🌐 😊 ⋮

 **Microsoft Azure**

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NIVEAU 1  300/1799 XP  cmaneu

1. Dans Cloud Shell à droite de cette page, exécutez la commande `az vm create` pour créer votre machine virtuelle. La commande suivante crée la machine virtuelle à l'emplacement « USA Est ». Vous pouvez remplacer cet emplacement par l'un de ceux répertoriés ci-dessus ; nous vous recommandons d'en sélectionner un proche de chez vous.

Azure CLI

 Copier

```
az vm create \
  --name myVM \
  --resource-group 4bf06032-7062-4476-be4b-dc4a308c2282 \
  --image UbuntuLTS \
  --location eastus \
  --size Standard_DS2_v2 \
  --admin-username azureuser \
  --generate-ssh-keys
```

💡 Conseil

Vous pouvez utiliser le bouton **Copier** pour copier des commandes dans le Presse-papiers. Pour coller, cliquez avec le bouton droit sur une nouvelle ligne dans la fenêtre Cloud Shell et sélectionnez **Coller** ou utilisez le raccourci clavier

🔄 | Azure Cloud Shell

Commentaires 

Requesting a Cloud Shell.**Succeeded.**
Connecting terminal...

Welcome to Azure Cloud Shell

Type "az" to use Azure CLI 2.0
Type "help" to learn about Cloud Shell

**christopher@Azure:~\$ az vm create **
**> --name myVM **
**> --resource-group 4bf06032-7062-4476-be4b-dc4a308c2282 **
**> --image UbuntuLTS **
**> --location eastus **
**> --size Standard_DS2_v2 **
**> --admin-username azureuser **
> --generate-ssh-keys
SSH key files '/home/christopher/.ssh/id_rsa' and '/home/christopher/.ssh/id_rsa.pub'
have been generated under ~/.ssh to allow SSH access to the VM. If using machines wi
thout permanent storage, back up your keys to a safe location.
[- Running ..

Aka.ms/GoLearn



Microsoft's global student technology competition is here

Bring your idea to life for the chance to win travel, mentoring, cash, and other prizes.

Register now

ImagineCup.com



Learn, Lead, and Share as a Microsoft Student Partner

We're looking for on-campus leaders with a passion for making a difference, building vibrant communities, and sharing the latest tech with their peers.

studentpartners.microsoft.com





Microsoft is hiring.

Vous êtes à la recherche **d'un stage de 6 mois** (démarrage juillet 2020) ?

Technical Customer Facing,
Digital Marketing & Communication, Commercial,
Business & Sales Operations, Engineering

Nos offres sont en ligne du 15 janvier au 15 février 2020 !

[APPLY NOW !*](#)

** Pour être éligible vous devez être en M1 ou M2*





Microsoft is hiring.

Vous êtes à la recherche **d'un apprentissage de 12 ou 24 mois**
(démarrage septembre 2020) ?

Technical Customer Facing, Business & Sales Operations, Digital
Marketing & Communication, Commercial, RH, Finance, Droit

Nos offres sont en ligne du 10 février au 10 mars 2020 !

APPLY NOW !*

**Pour être éligible vous devez être en M1 ou M2*





Microsoft is hiring.

Vous êtes à la recherche **d'un CDI**
(programme graduate)?

Technical Account Management
Technical Consulting

Nos offres sont en ligne du 1er mars au
1er avril 2020 !

APPLY NOW !*



Bibliography

<https://opensource.guide/>

Image credits



Photo by [Nacho Rochon](#) on [Unsplash](#)



Q&A

Christopher MANEU
Azure Engineer & Advocate @ Microsoft R&D
@cmaneu



Thanks !

Christopher MANEU
Azure Engineer & Advocate @ Microsoft R&D
@cmaneu

Demos

- Personal portfolio
 - Do in VS Code
 - Push to static storage
 - Push to Github pages
- DevOps project
 - Create
 - Boards
 - Build
 - Deploy