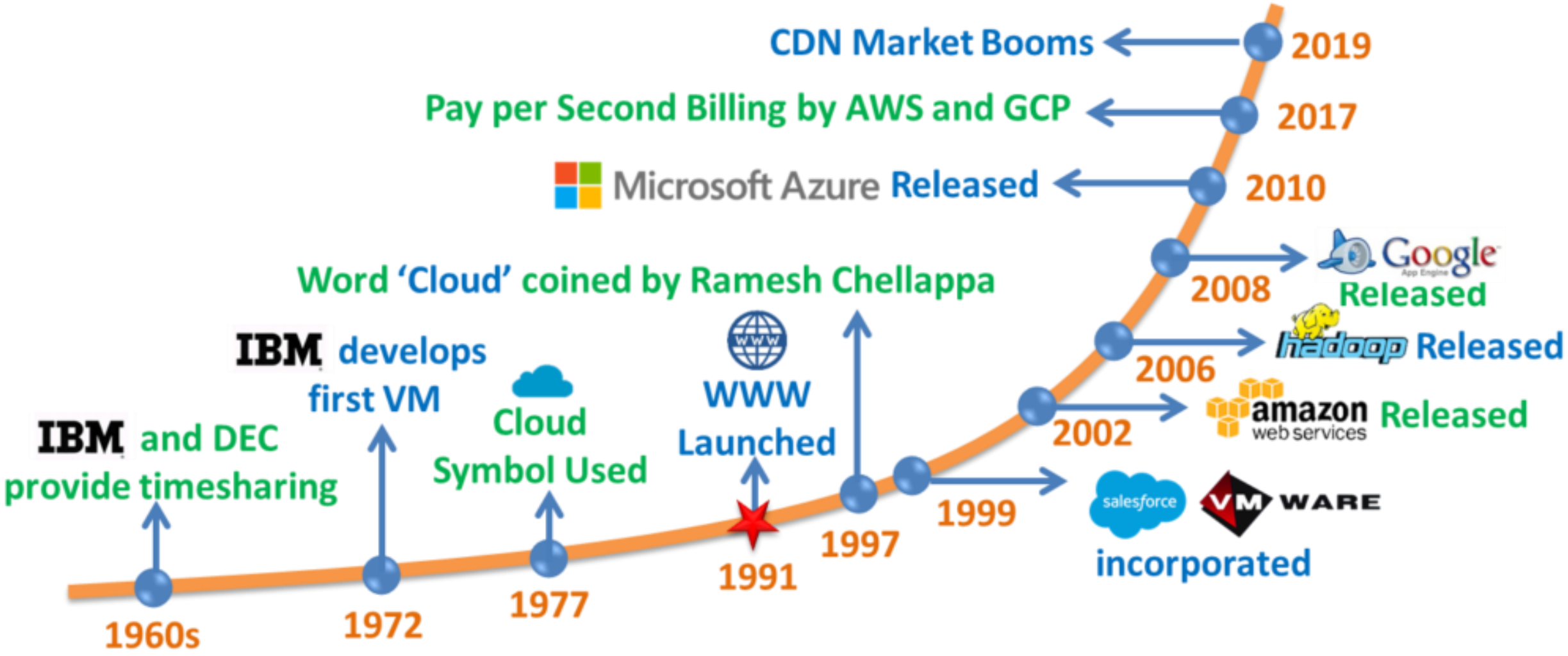
Cloud Computing- AWS

Amith Ashokan

History Of Cloud Computing:



https://simplycoding.in/wp-content/uploads/2020/07/History-of-Cloud-Computing-1024x433.png

Earlier Challenges with Computing

- **Setup Cost:**
  Heavy Investment for Setup
- **Resource Intensive**
- **Scalability to Core business**
- **Security Risk**

Cloud computing with AWS

- ❑ Most functionality
- ❑ Largest community of customers and partners
- ❑ Most secure
- ❑ Fastest pace of innovation

Careers in Cloud Technologies

- **Computer System Analyst**
- **Cloud Network Engineer**
- **Cloud Solutions Architect**

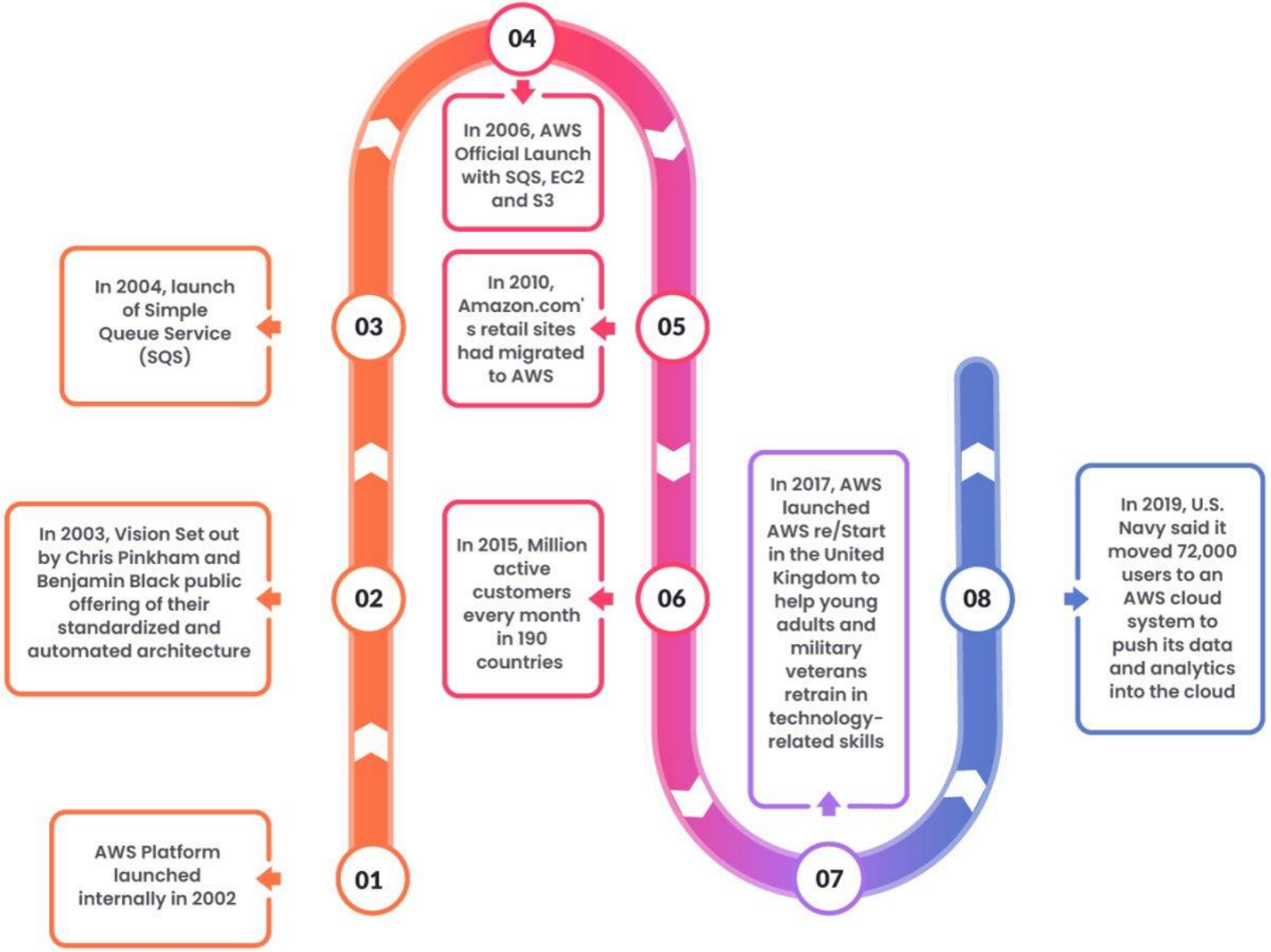
... many more.

What Motivates You?

What are Top 5 Best Paying Related AWS Jobs in the U.S.

Job Title	Annual Salary	Weekly Pay
AWS Solution Architect Professional	$163,525	$3,145

Quick History Of AWS:



AWS Regions:

What is Cloud Computing : Know -How

Cloud computing refers to the practice of utilizing remote servers over the internet to access and employ computer services, such as program execution or data storage, rather than relying on local resources on one's own device.

Characteristics Cloud Computing

- ❑ Broad Network Access
- ❑ On-Demand Self-Service
- ❑ Resource Pooling
- ❑ Rapid Elasticity
- ❑ Measured Service

Cloud Computing : Delivery Models

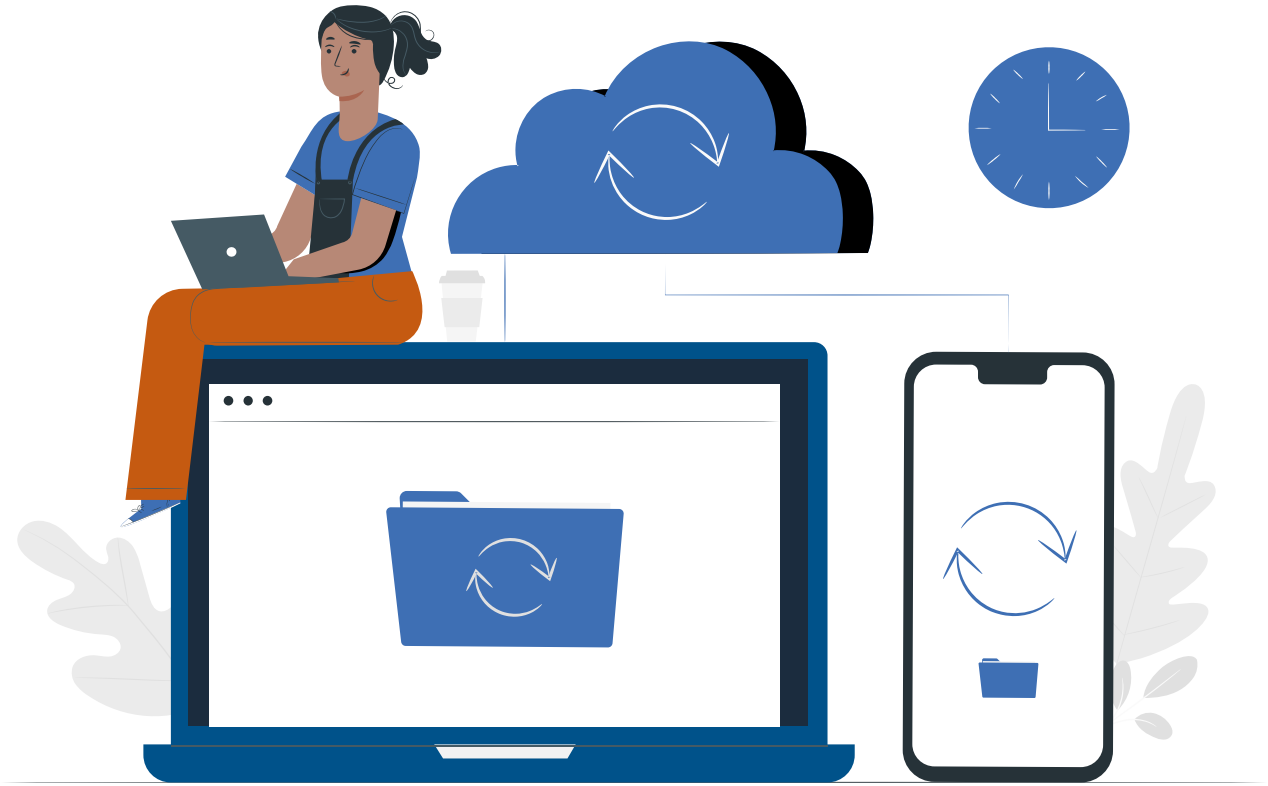
- Software as a Service (SaaS)
- Platform as a Service (PaaS)
- Infrastructure as a Service (IaaS)

Infrastructure as a Service (IaaS)

IAAS (Infrastructure as a Service) involves the utilization of essential computing resources, including processing capabilities, storage capacity, networking components, and middleware, by the user.

Platform as a Service (PaaS)

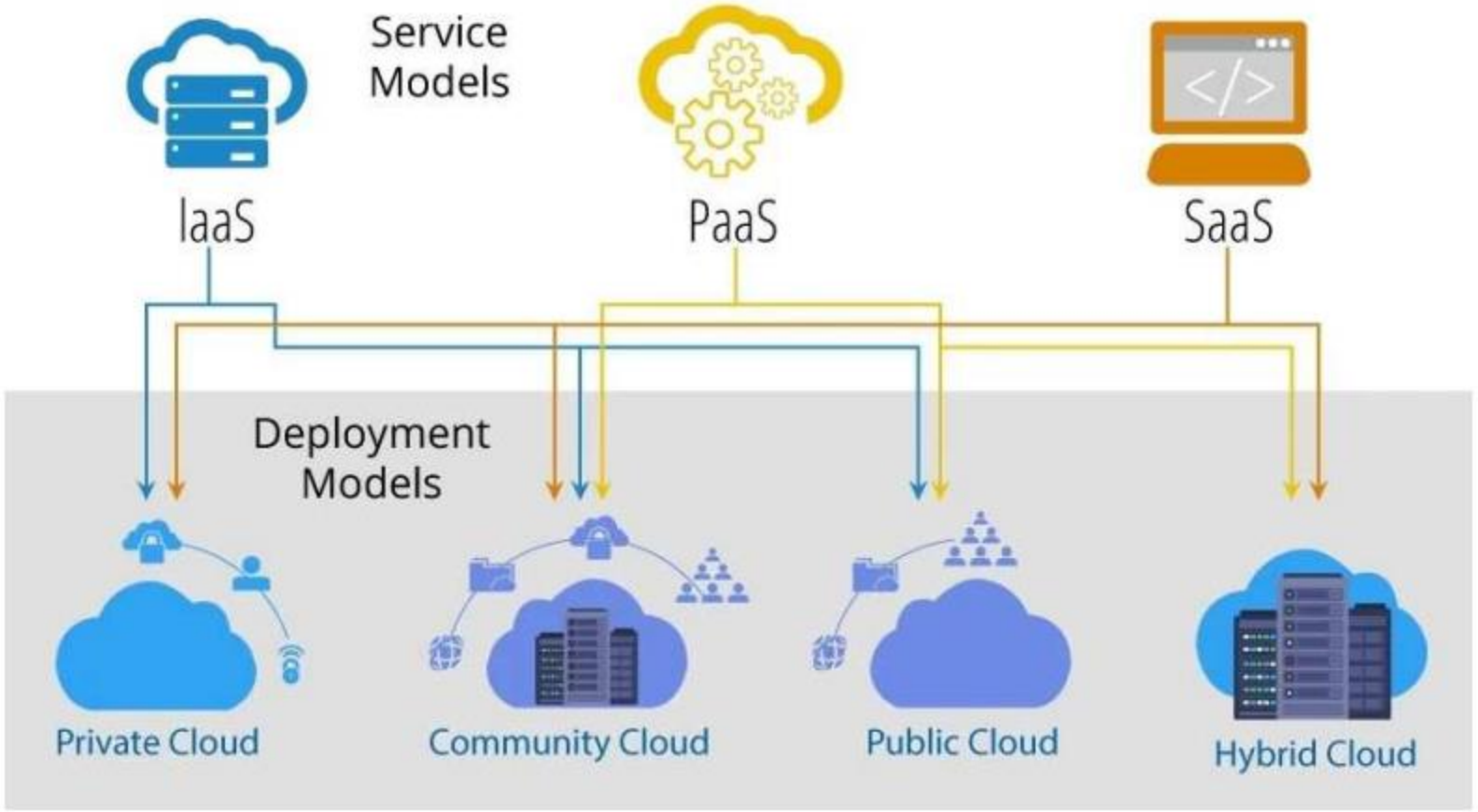
PAAS (Platform as a Service) involves the utilization of a hosting environment by the consumer for their applications.



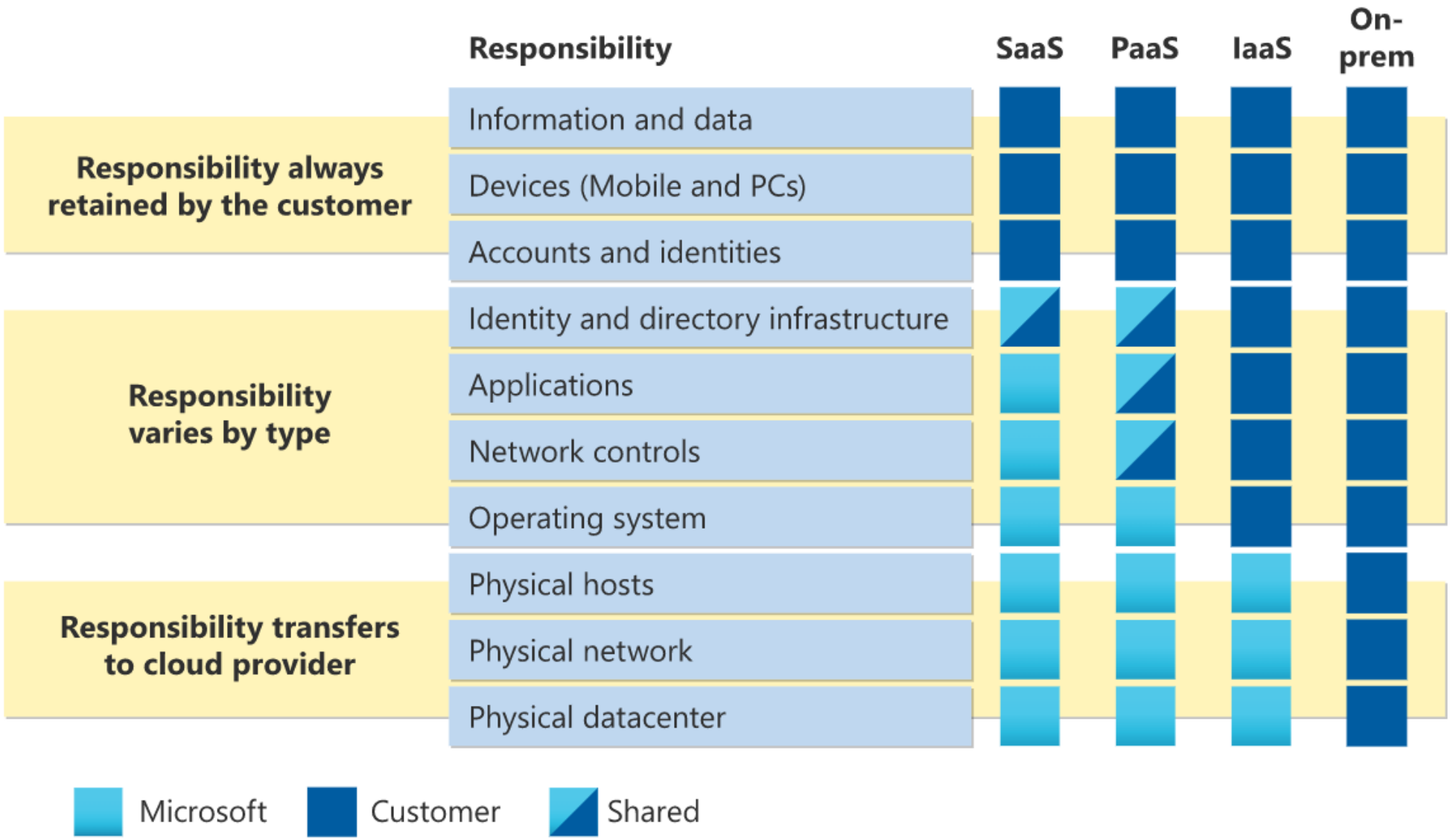
Software as a Service (SaaS)

SAAS (Software as a Service) involves the utilization of an application by the consumer, without having control over the underlying operating system, hardware, or network infrastructure on which it operates.

Cloud Computing models



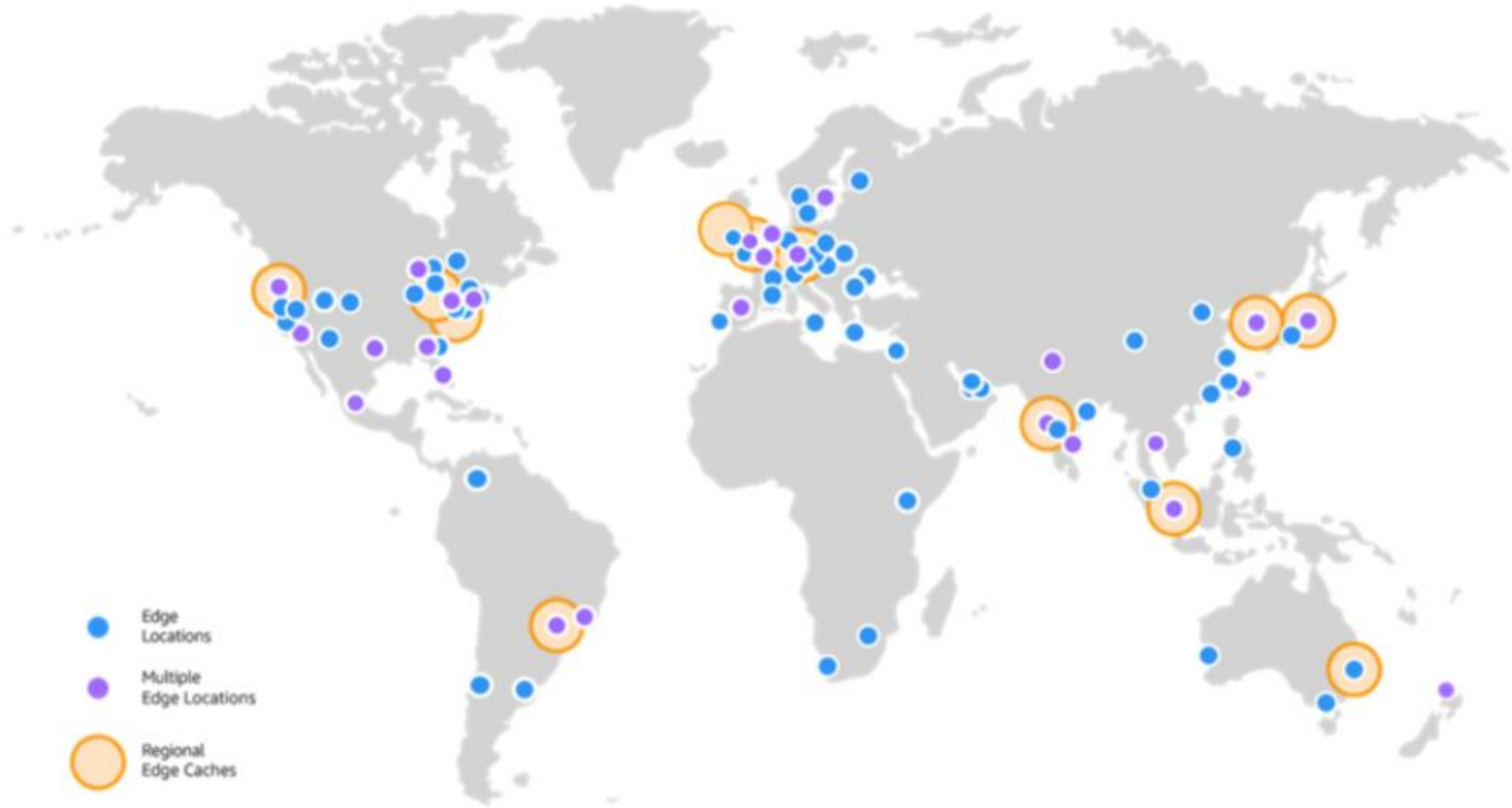
Understanding : The Responsibility Model –(ref.Microsoft/AWS)



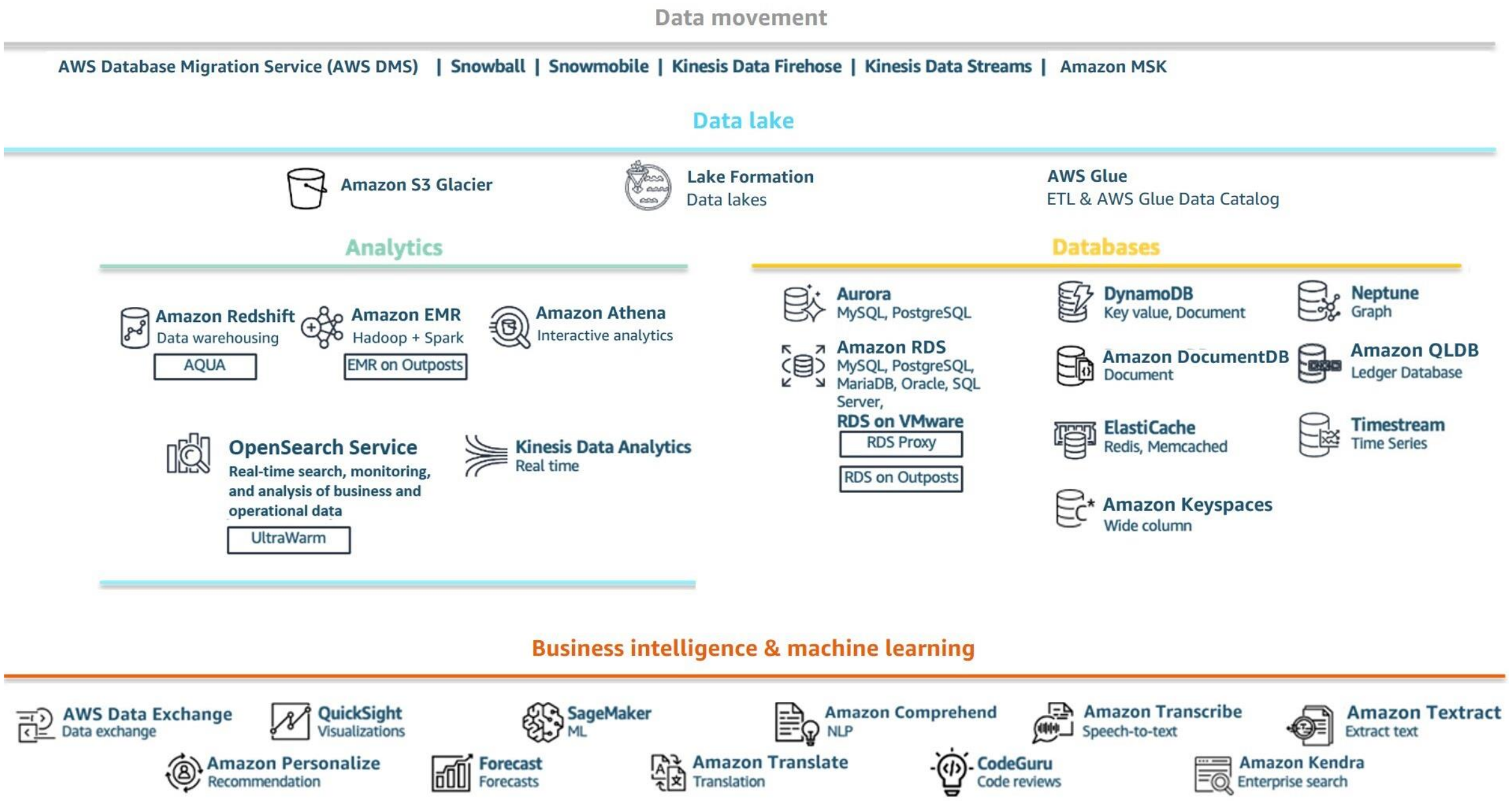
Ref: Microsoft

Cloud Computing Implementation

Edge Locations



Data Movement



Use Case : Logistics and Project Management in the Cloud

- Manage with Cloud

  - Storage
  - Virtual Machine
  - Kubernetes Service

  ... Many more

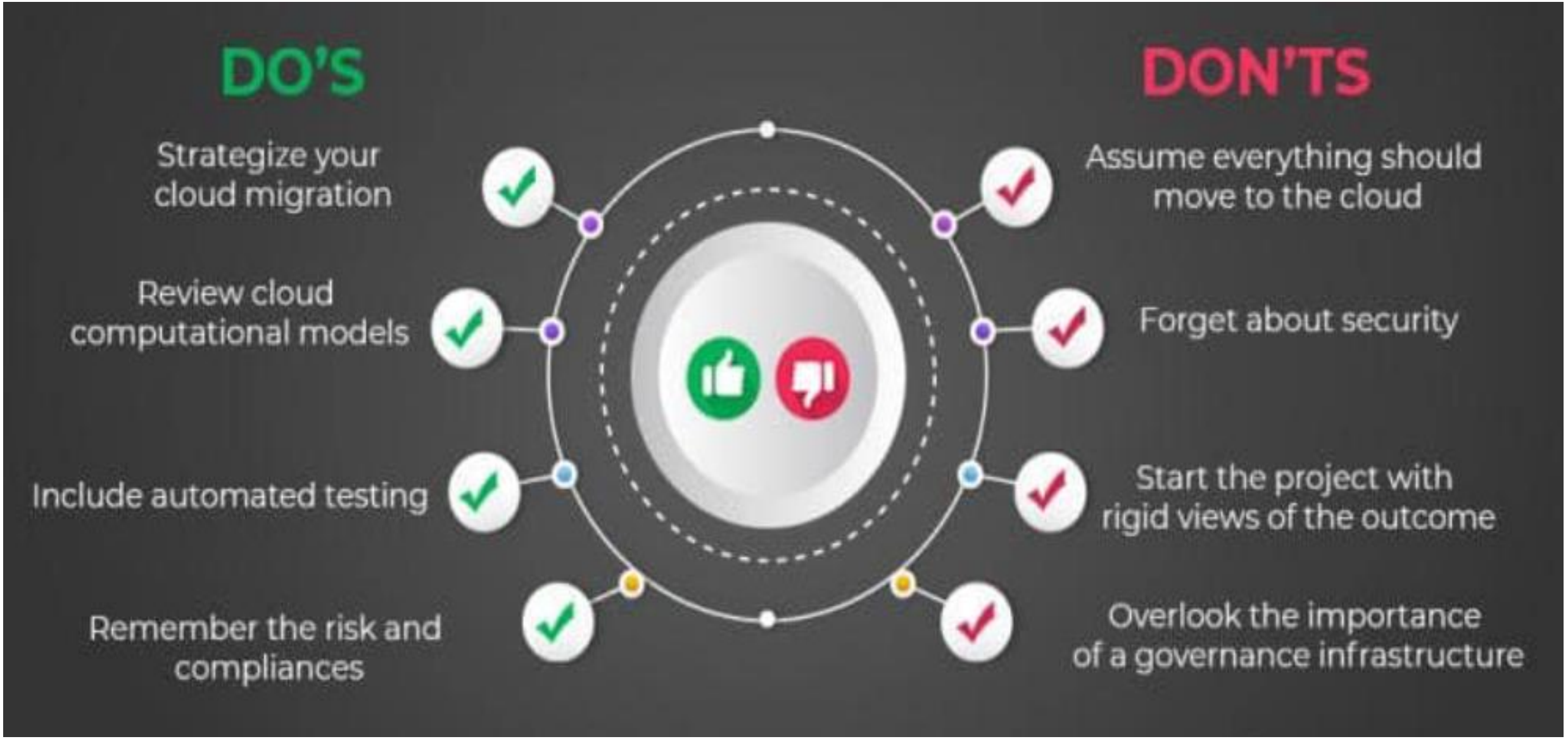
How to Choose a Database on AWS

https://aws.amazon.com/getting-started/decision-guides/databases-on-aws-how-to-choose/

Amazon Relational Database Service: Amazon RDS

- ❑ Scalability
- ❑ Automated Backups and Recovery
- ❑ Multi-AZ deployment
- ❑ Easy Management
- ❑ Security

DO's and Don'ts Of Cloud Computing



Understanding cloud environments and technologies

❑Public clouds

Pools of virtual resources developed from hardware owned and managed by a third party company like Amazon Web Services (AWS), Google Cloud, IBM, and Microsoft. These resources are automatically provisioned and allocated among multiple clients through self-service interfaces. .

https://www.redhat.com/rhdc/managed-files/ma-hybrid-cloud-automation-e-book-f32113-202210-en.pdf
https://www.pragimtech.com/blog/cloud/what-is-a-hybrid-cloud/

Understanding cloud environments and technologies

Benefits

- No upfront capex
- Pay as you go
- No maintenance
- Highly scalable
- Highly reliable

Limitations

- Low visibility and control
- Compliance and legal risks
- Cost concerns

Use Case

- Unlimited scalability
- Varying peak demands
- Fast growing businesses
- Backup & disaster recovery solutions

Understanding cloud environments and technologies

❑Private clouds

Cloud environments that are dedicated to a single end user group or organization. They are typically owned and managed by the organization and operated within its firewall.

Understanding cloud environments and technologies

Benefits

- Better security
- Better control
- Predictable costs
- Legal compliance

Limitations

- Limited scalability
- Huge initial capex
- Limited access

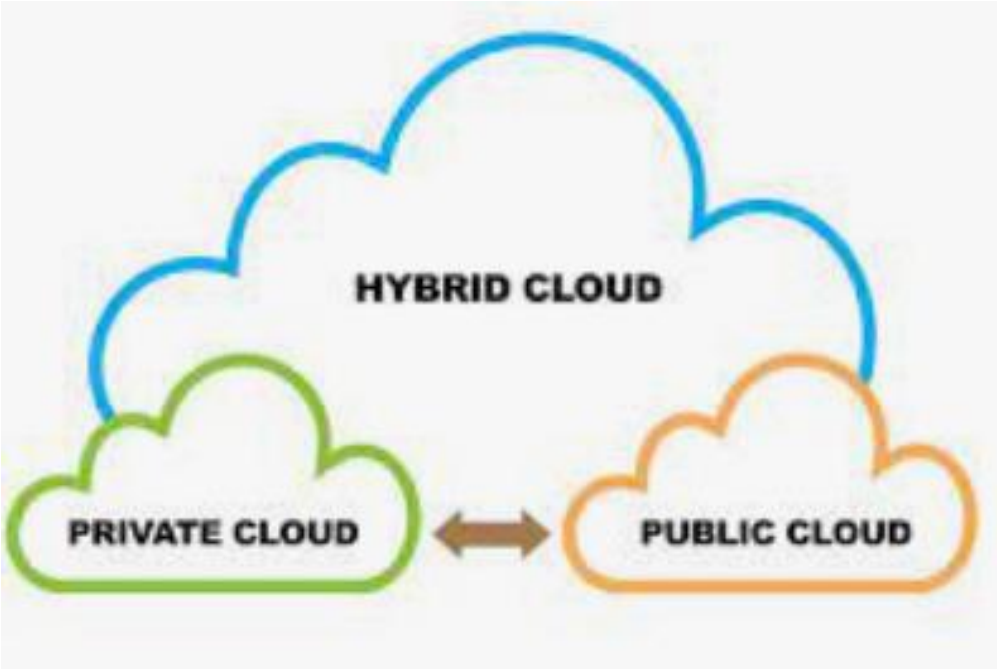
Use Case

- Highly regulated businesses
- Tech companies that require complete control
- Large companies that require custom solutions

Understanding cloud environments and technologies

❑Hybrid clouds

IT is a IT architecture that incorporates some degree of workload portability, orchestration, and management across two or more environments, including private cloud, public cloud, virtualized, and bare-metal environments..



Understanding cloud environments and technologies

Benefits

- Best of both the worlds
- Better Control
- Cost-effective

Limitations

- Low visibility and control
- Additional complexity
- Compliance and legal risks
- Cost concerns

Use Case

- Best of both the worlds
- Switch between different delivery models based on security & scalability requirements

Understanding cloud environments and technologies

❑Multi cloud

It is a cloud approach made up of more than one cloud service, from more than one private or public cloud vendor.

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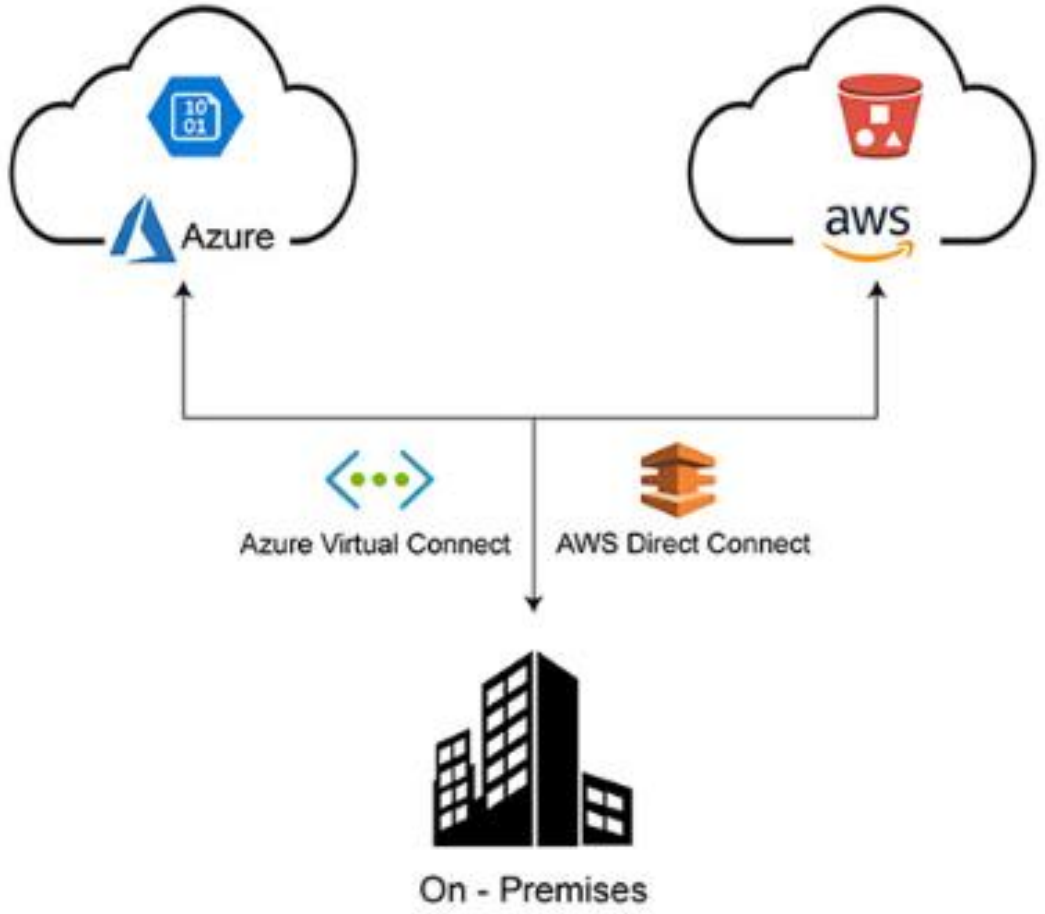

Understanding cloud environments and technologies

❑**Community cloud**

Community cloud computing refers to a shared cloud computing service environment that is targeted to a limited set of organizations or employees (such as banks or heads of trading firms).

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Understanding cloud environments and technologies

	Private Cloud	Public Cloud	Hybrid Cloud
Cloud Hardware	The entire cloud infrastructure (i.e the physical servers, storage, networking etc) must be procured by the organisation that owns the private cloud	The public cloud service provider like Amazon or Microsoft provides the infrastructure	For the private cloud, your organisation must provide the infrastructure where as the public cloud service provider provides the infrastructure for the public cloud
Tenancy	Single-tenancy. A private cloud is usually used by a single organisation.	Multi-tenancy: A public cloud is used by multiple organizations.	The private part of the hybrid cloud is used by a single organisation. The public part of the hybrid cloud is used by multiple organisations.

https://www.pragimtech.com/blog/cloud/private-vs-public-vs-hybrid-cloud/

Understanding cloud environments and technologies

	Private Cloud	Public Cloud	Hybrid Cloud
Data Center Location	Inside the organization’s corporate network.	Anywhere on the Internet. Public cloud (like AWS and Azure) data centers for example, are typically located in many countries across the entire world.	The private cloud data center is typically inside the organisation's corporate network and the public cloud data center could be anywhere on the internet.
Scalability	Private cloud scalability is limited by the amount of infrastructure. Beyond certain point it is impossible to scale up, unless the organisation procures additional hardware and set it up.	We never run out of resources in a public cloud. It provides near-unlimited scalability.	The scalability of the private cloud services and resources is limited by the underlying available infrastructure, where as with the public cloud services we do not have such a limitation.

Understanding cloud environments and technologies

	Private Cloud	Public Cloud	Hybrid Cloud
Cloud Maintenance	The organization itself is responsible for setting up and maintaining the private cloud.	The cloud service provider is responsible for setting up and maintaining the public cloud. Organizations and even general public can use the public cloud services by paying a monthly fee.	The private cloud is managed by the organization that owns it where as the public cloud is managed by the cloud service provider.
Costs	Invloves huge initial capital expenditure as the organization must purchase all the cloud hardware, set it up and maintain there on. To maintain the private cloud, the organization needs to hire work force. So there is monthly operating expenditure as well.	With the public cloud there is no initial capital expenditure, but you pay a monthly fee for the public cloud services you use. The more you use the services, the more you have to pay. The overall price tag may be higher than what you anticipated, especially if you use lot of public cloud services for a long time.	With the private cloud, the organization is faced with both, the intital capital expenditure as well as monthly operating expenses to maintain it. With the public cloud you pay a monthly fee for the services and resources you use.
Accessibility	Only the organization that owns the private cloud can access private cloud resources and services.	A public cloud is exposed to the public. So, anyone can access it's resources and services.	Private cloud services can be accessed only by the organization that owns it where as public cloud services can be accessed by anyone.

Understanding : Cloud Computing

What you mean by Cloud Scalability?

Cloud scalability in cloud computing refers to the ability to increase or decrease IT resources as needed to meet changing demand.

Scalability is one of the hallmarks of the cloud and the primary driver of its exploding popularity with businesses.

Understanding : Cloud Computing

What is the Concept of Time to Market(TTM) in Cloud Computing?

Time to market (TTM) is the total length of time it takes to bring a product from conception to market availability. Companies use time-to-market metrics during new product development (NPD) and new product introduction (NPI) as they strive to gain first-mover advantages (e.g., market share, sales revenue).

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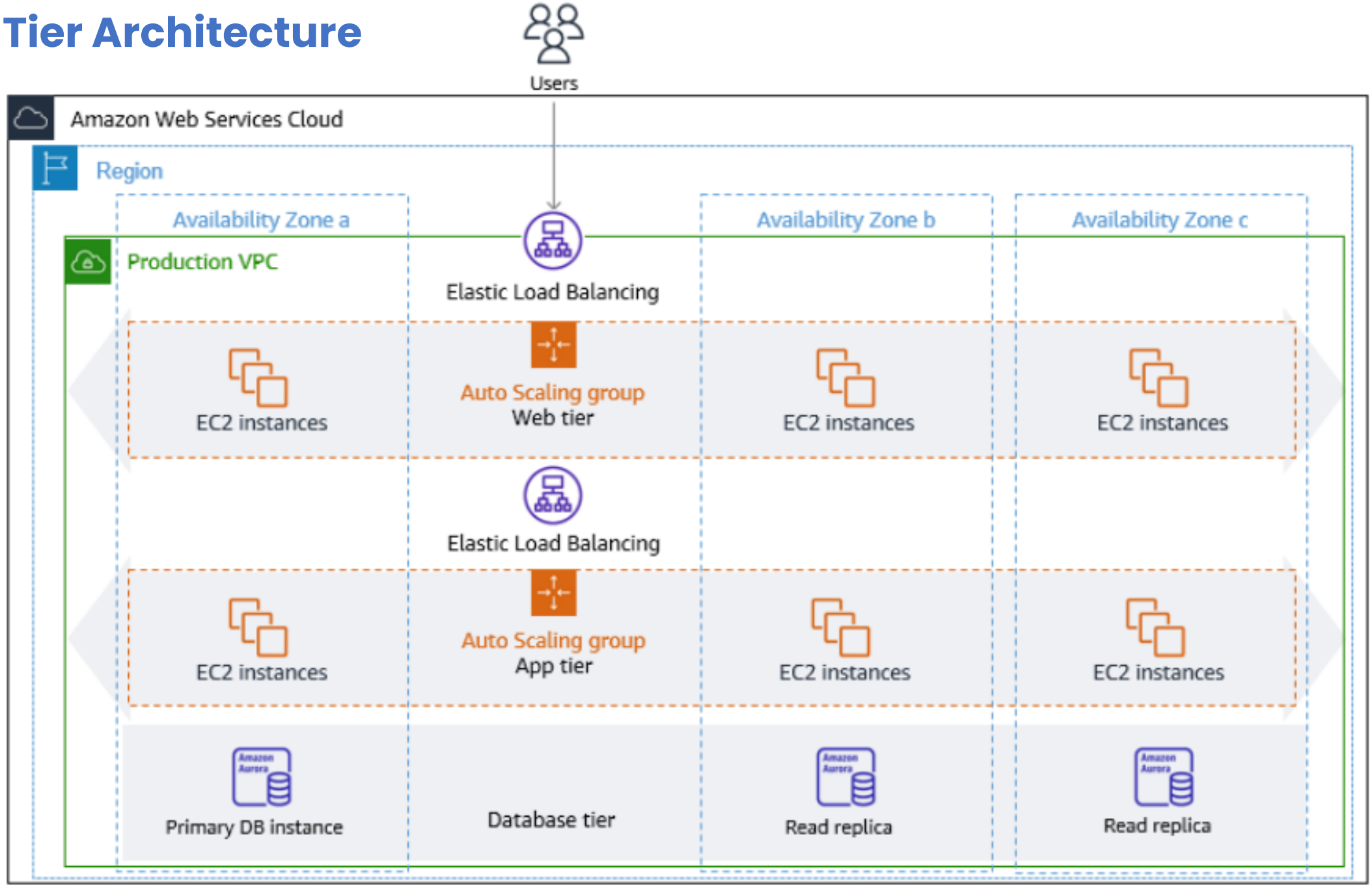
Understanding : Content Delivery Network (CDN)

Customers use Amazon CloudFront to stream video to viewers across the globe using a wide variety of protocols that are layered on top of HTTP.

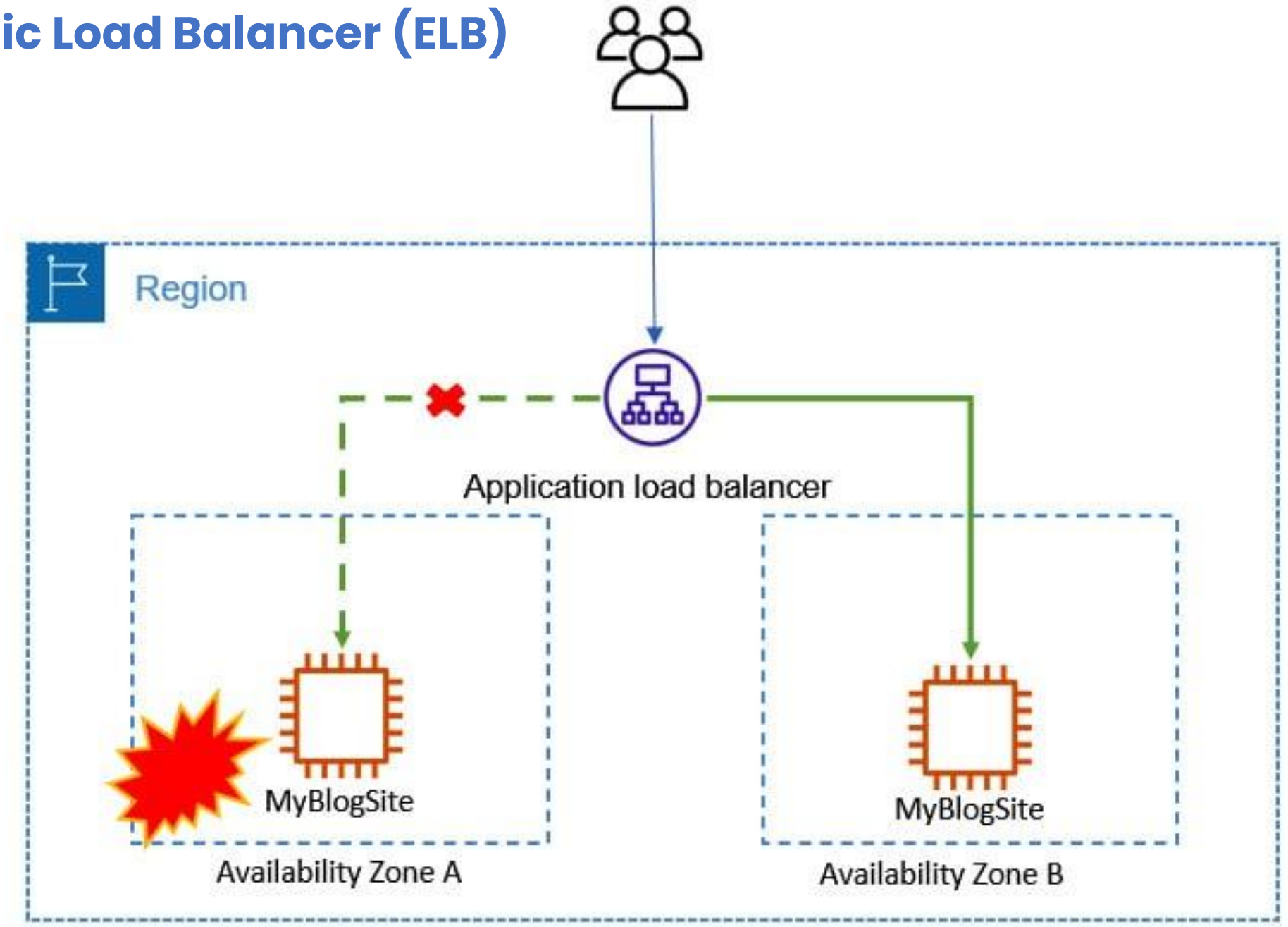
The Amazon Content Delivery Network (CDN) can be used with AWS Elemental Media Services to implement two different types of video streaming.
First, we will take a look at on-demand streaming of content stored in Amazon Simple Storage Service (Amazon S3).
After that, we'll examine live streaming of events or 24x7 channels.
For best practices, read the Amazon CloudFront for Media White Paper.

https://aws.amazon.com/cloudfront/streaming/

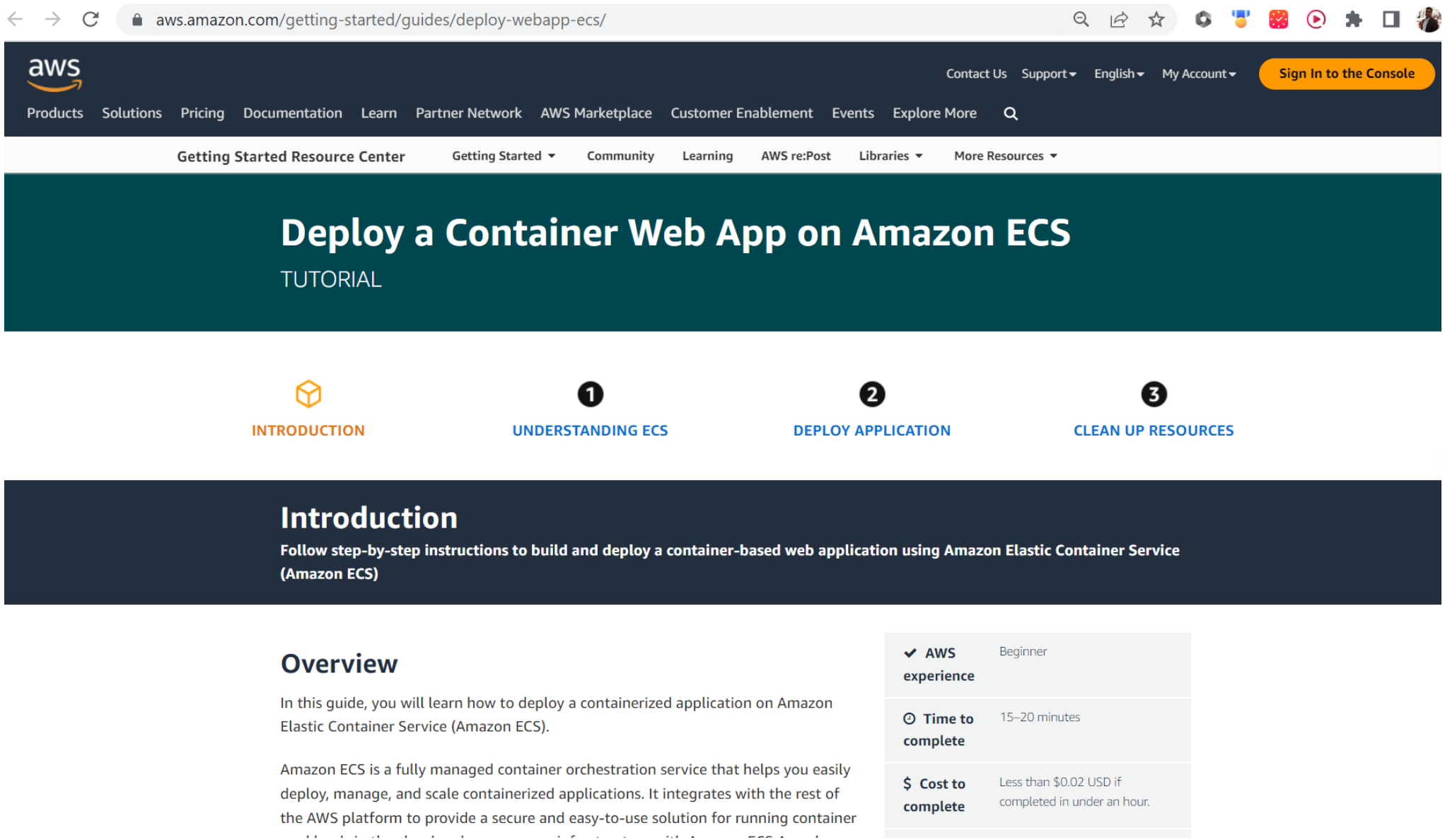
Multi-Tier Architecture



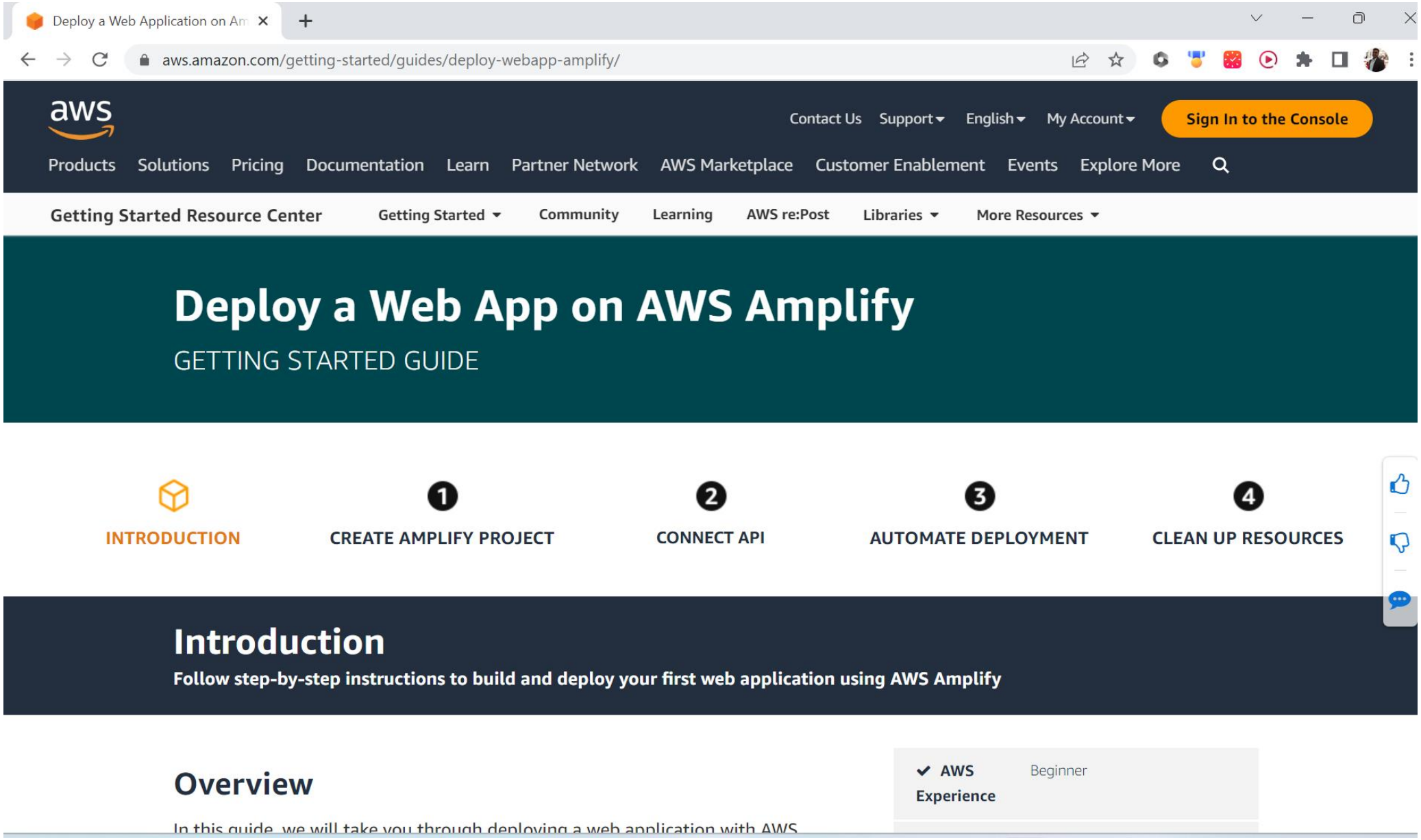
Amazon Elastic Load Balancer (ELB)



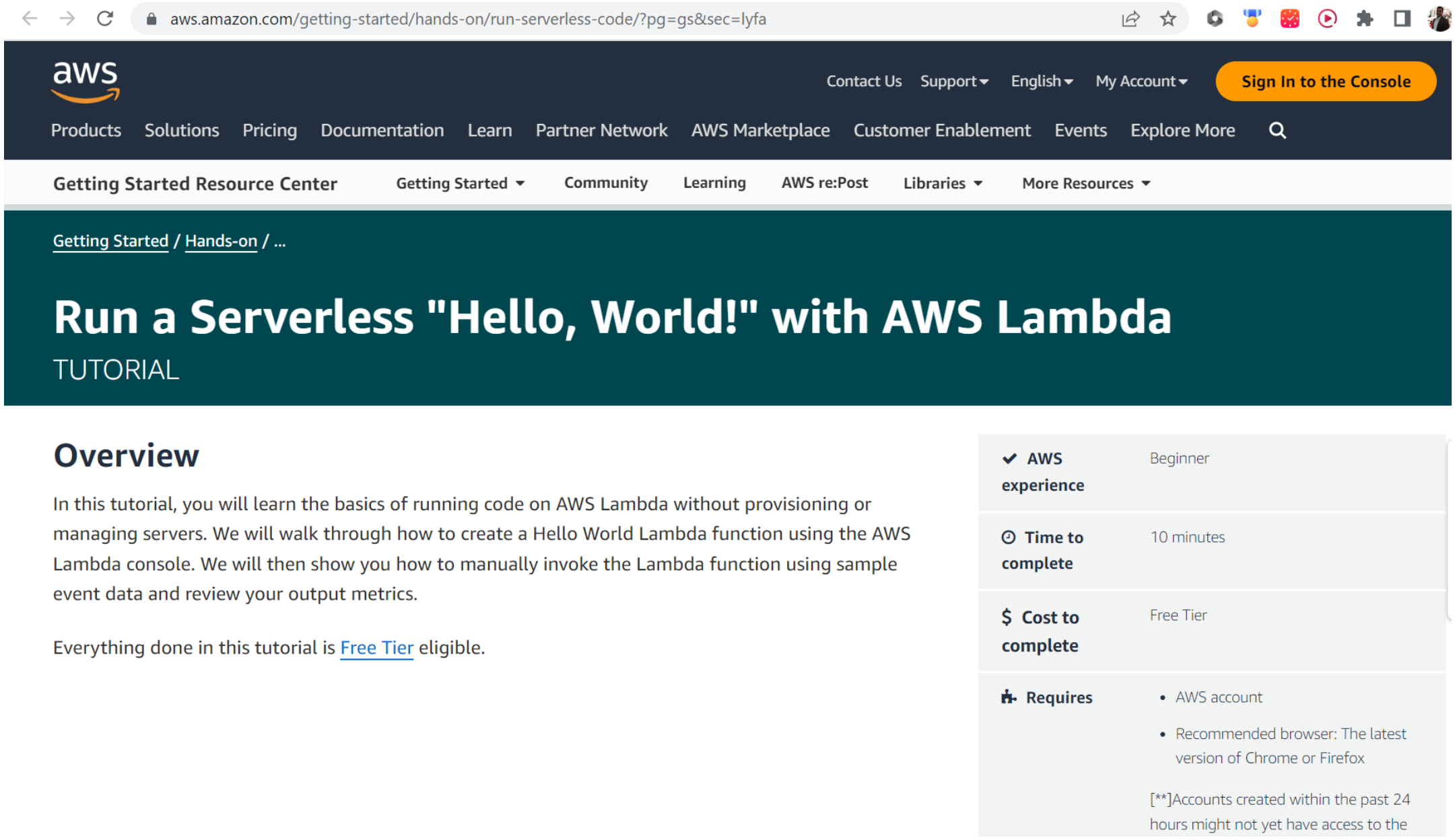
All about Projects : WebApp on Amazon ECS



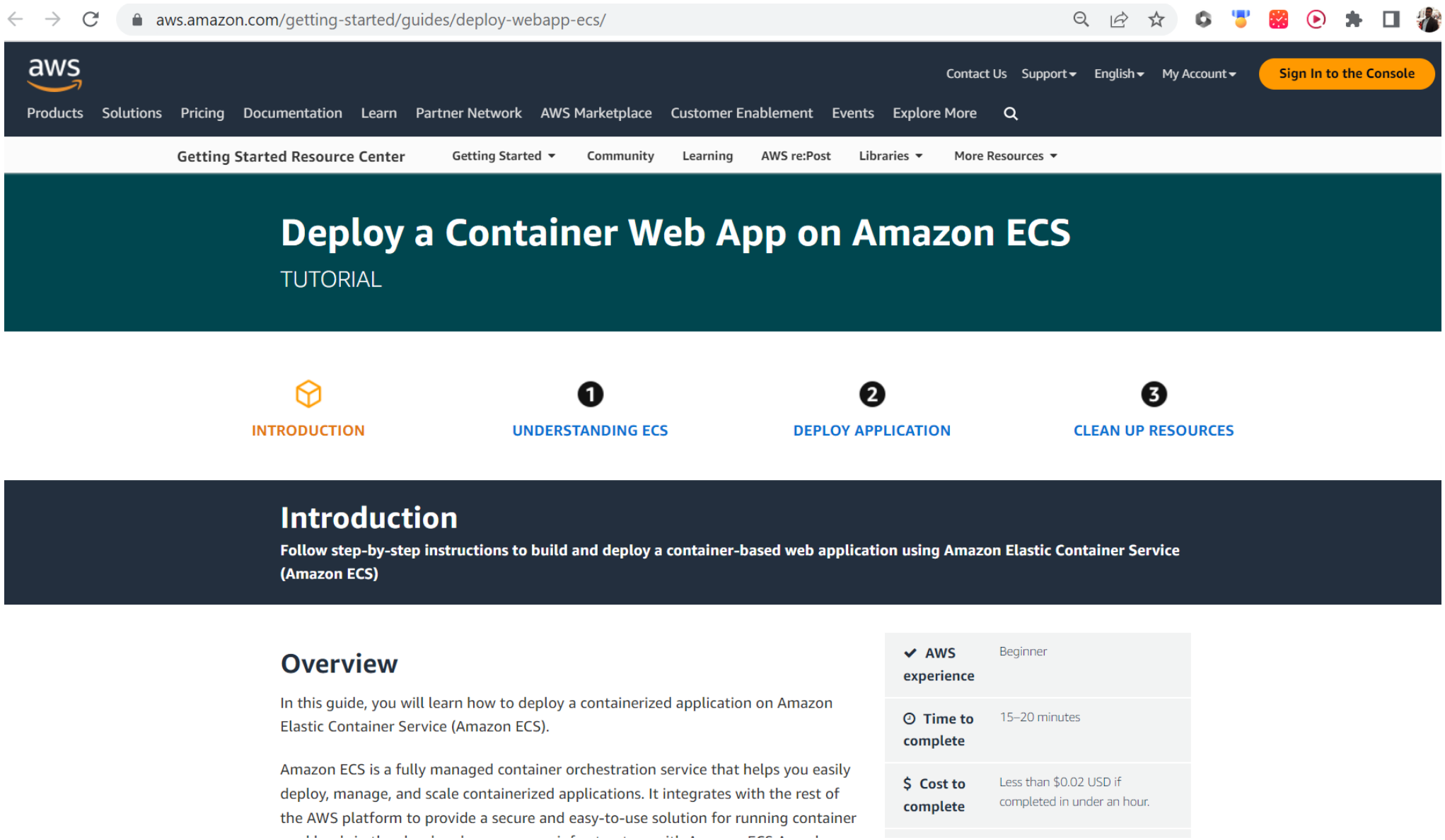
All about Projects : WebApp on AWS Amplify



All about Projects : Run Serverless : AWS Lambda



All about Projects : WebApp on Amazon ECS



What is AWS Instances ?

Support Plan For AWS

Basic	Developer	Business	Enterprise
Offers only non-technical customer support	Technical support offered during business hours alone (8:00 a.m. to 6:00 p.m.—customer local time zone)	24/7 phone, email, and chat access to Cloud Support engineers	24/7 phone, email, and chat access to Cloud Support engineers
	General guidance offered within 24 business hours	General guidance offered within 24 hours	General guidance offered within 24 hours
	System impaired troubleshooting offered within 12 business hours	System impaired troubleshooting offered within 12 hours	System impaired-troubleshooting offered within 12 hours
		Production system-impaired support within 4 hours	Production system-impaired support within 4 hours
		Production system-down support within 1 hour	Production system-down support within 1 hour
			Business-critical-system down support within 15 minutes

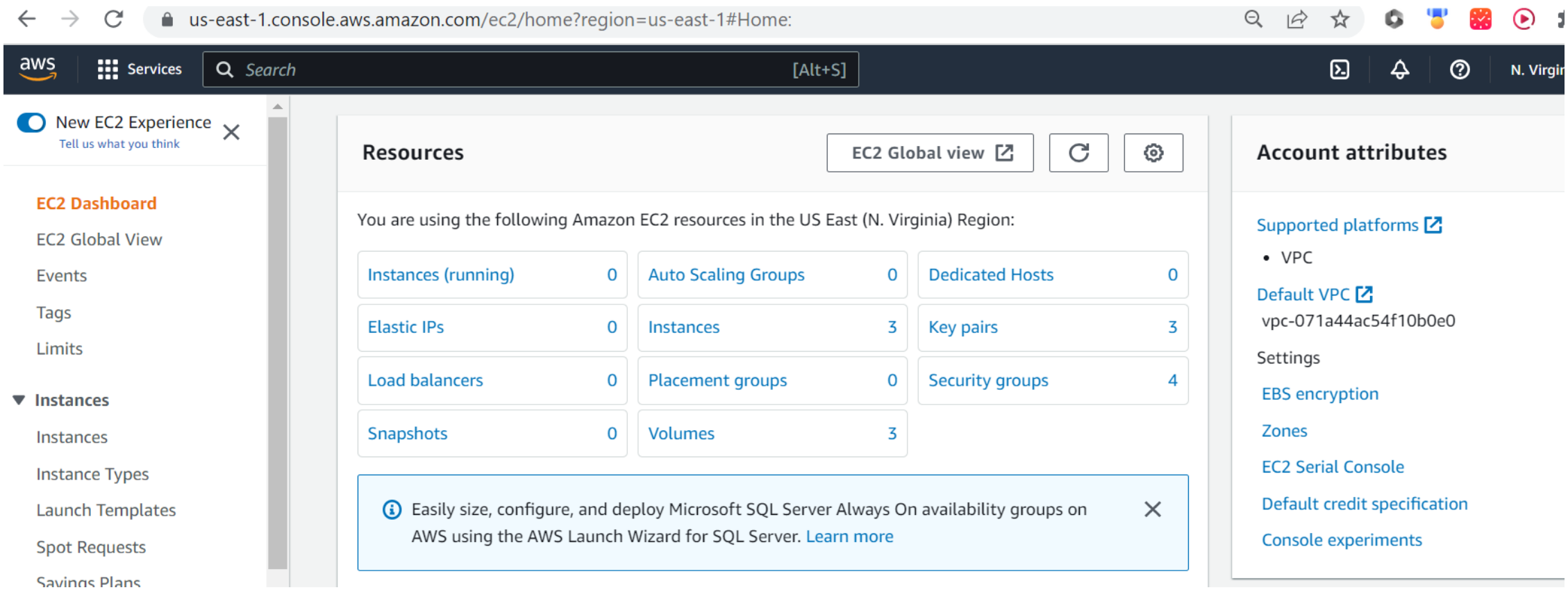
AWS : Cloud data lifecycle phases

Organizations can use AWS Cloud services in each stage of the data lifecycle to quickly and cost-effectively prepare, process, and present data to derive more value from it. The five data lifecycle stages include:

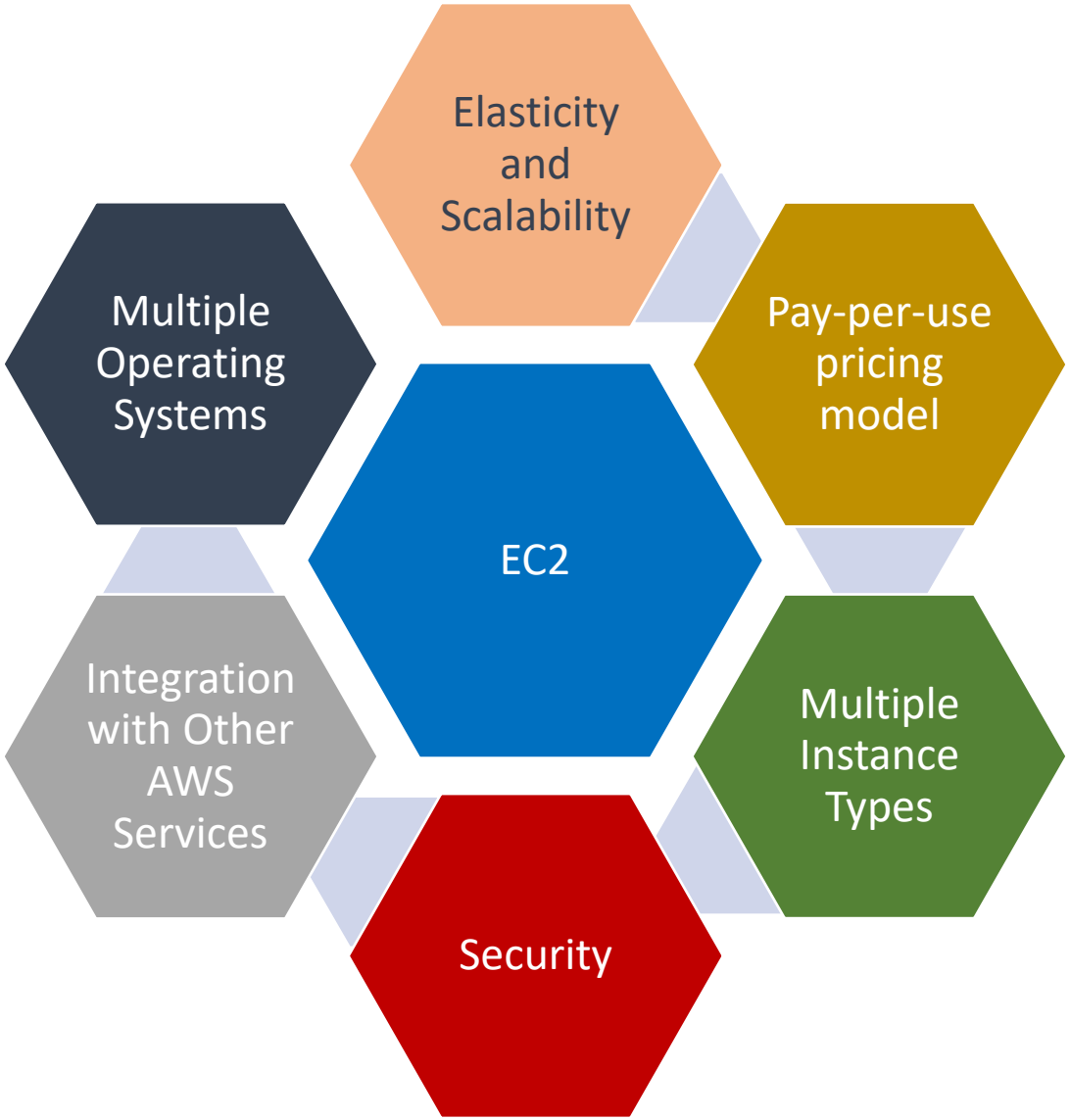
- ❑ **Data ingestion,**
- ❑ **Data staging,**
- ❑ **Data cleansing,**
- ❑ **Data analytics and visualization, and**
- ❑ **Data archiving**.

https://pages.awscloud.com/data-lifecycle-reference-guide.html

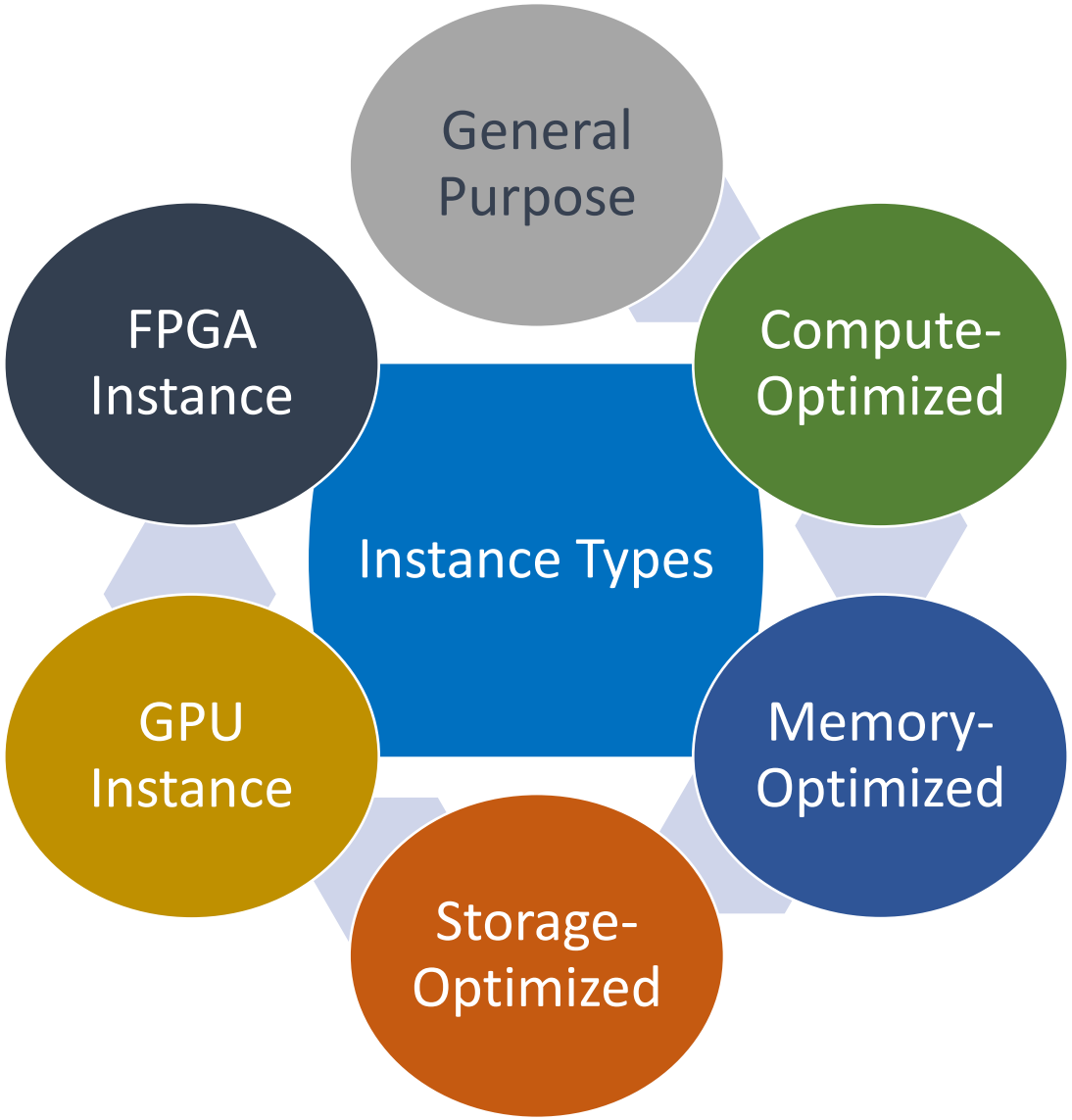
Introduction : EC2



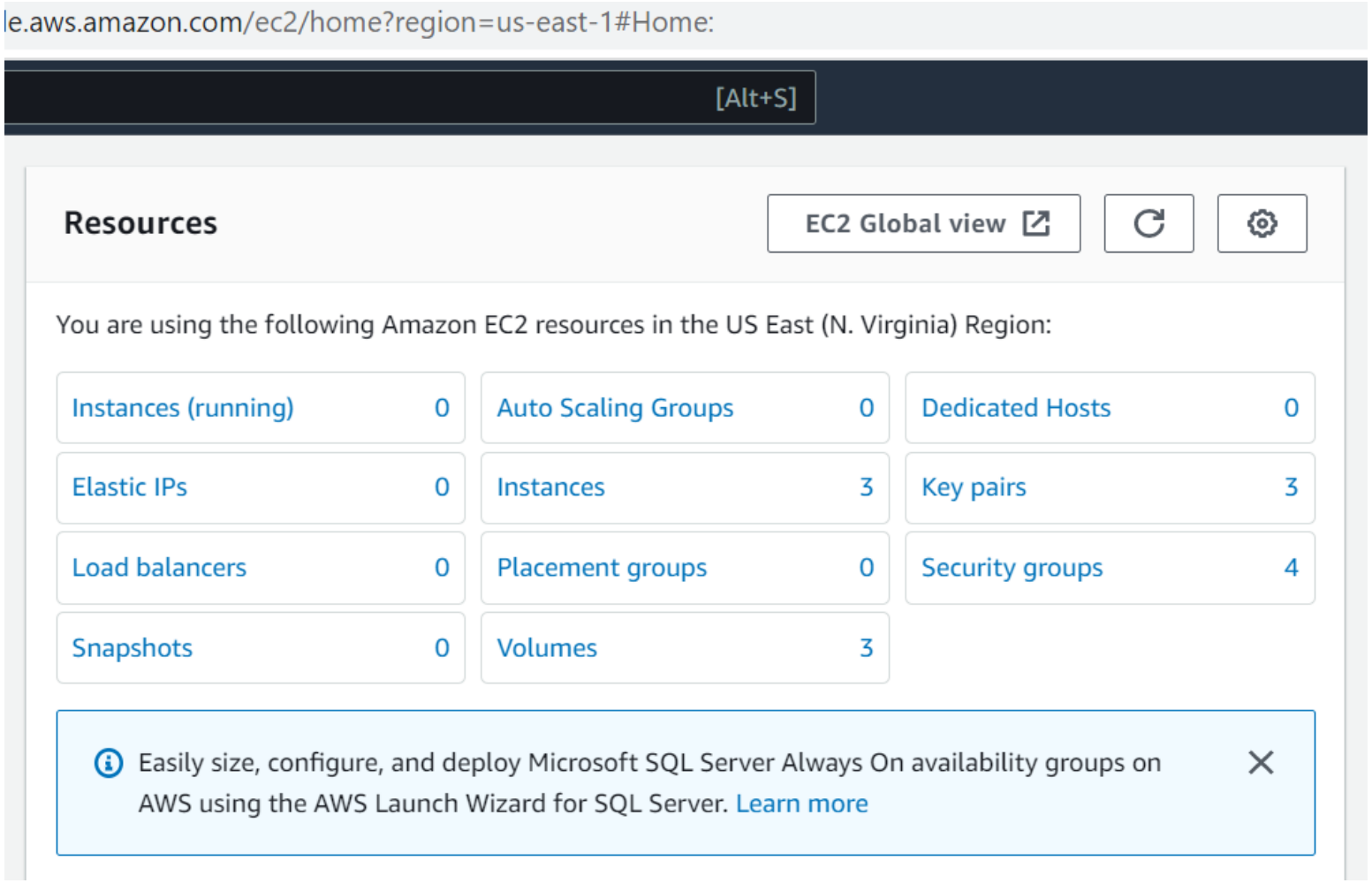
Introduction : Features of EC2



EC2 Instance Types :

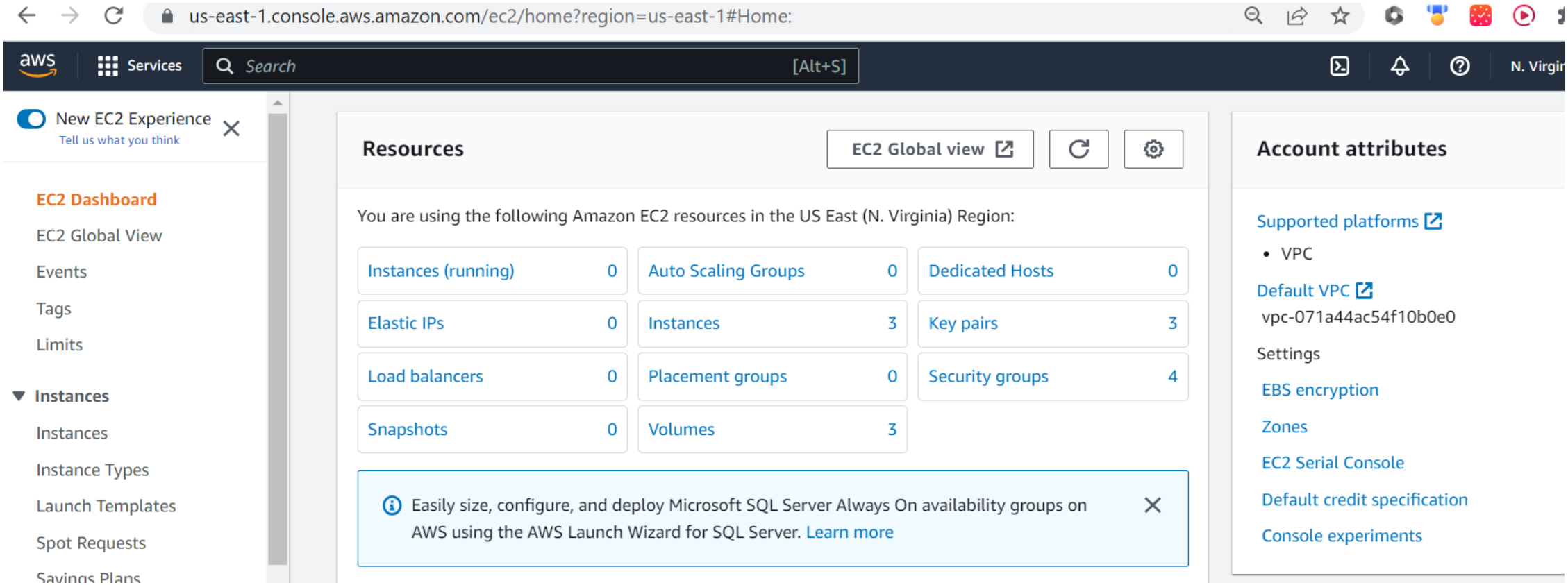


Introduction : Creating New Images of Running Instances



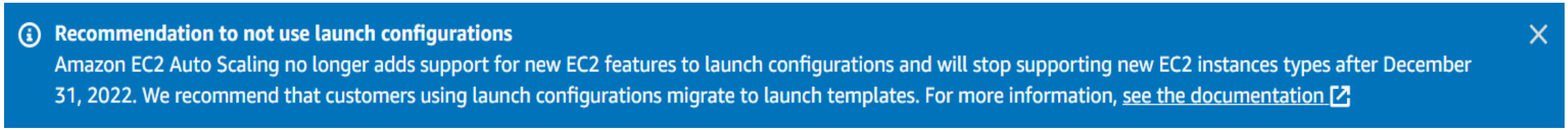
https://docs.aws.amazon.com/imagebuilder/latest/userguide/create-images.html

Introduction : EC2 Image Builder



https://docs.aws.amazon.com/imagebuilder/latest/userguide/create-images.html

AutoScaling : EC2

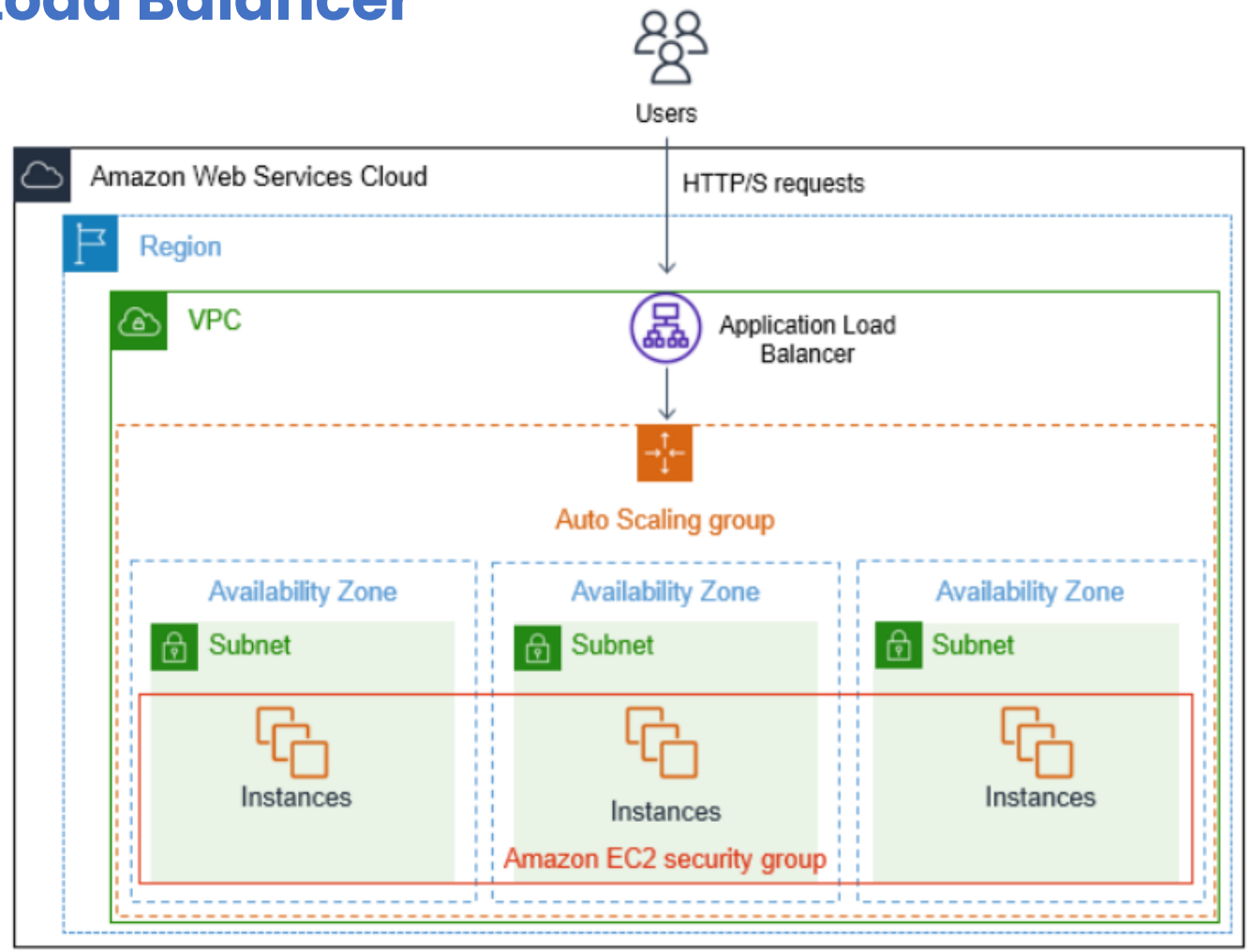


https://docs.aws.amazon.com/autoscaling/ec2/userguide/get-started-with-ec2-auto-scaling.html

AWS : Elastic Beanstalk

AWS Elastic Beanstalk makes it even easier for developers to quickly deploy and manage applications in the AWS Cloud. Developers simply upload their application, and Elastic Beanstalk automatically handles the deployment details of capacity provisioning, load balancing, auto-scaling, and application health monitoring.

EC2 : Auto Scaling Load Balancer

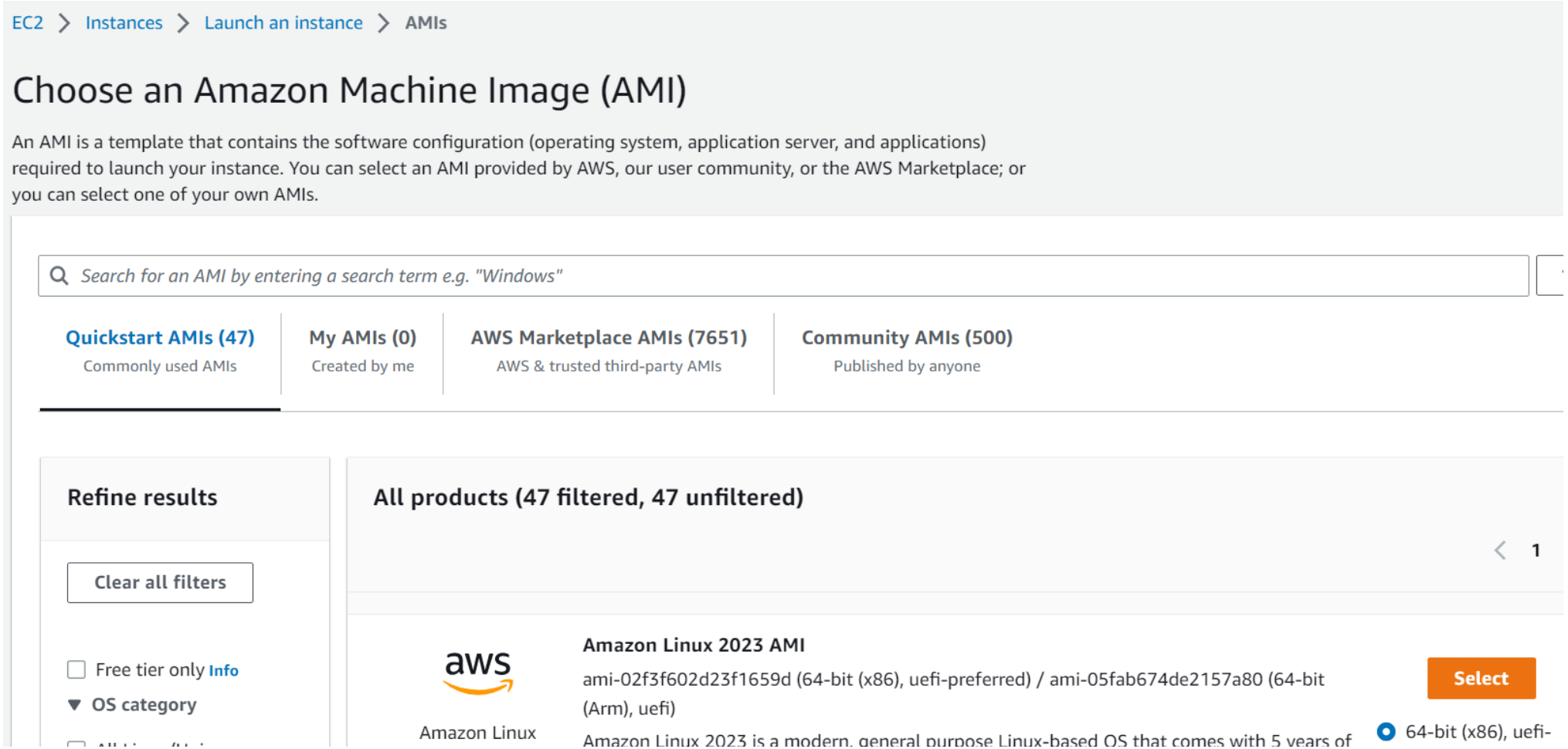


https://docs.aws.amazon.com/autoscaling/ec2/userguide/tutorial-ec2-auto-scaling-load-balancer.html

AMI : Amazon Machine Image

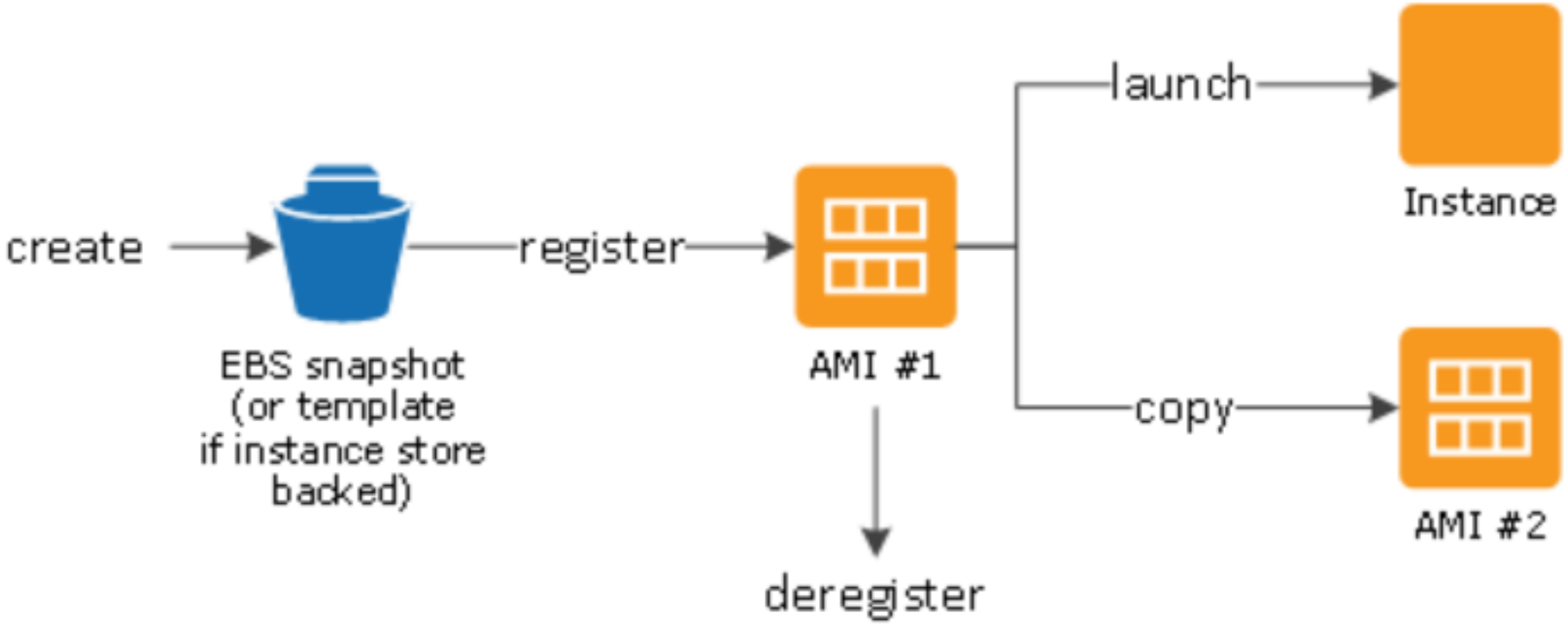
An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance.

AMI : Amazon Machine Image



An AMI is a template that contains the software configuration (operating system, application server, and applications) required to launch your instance.

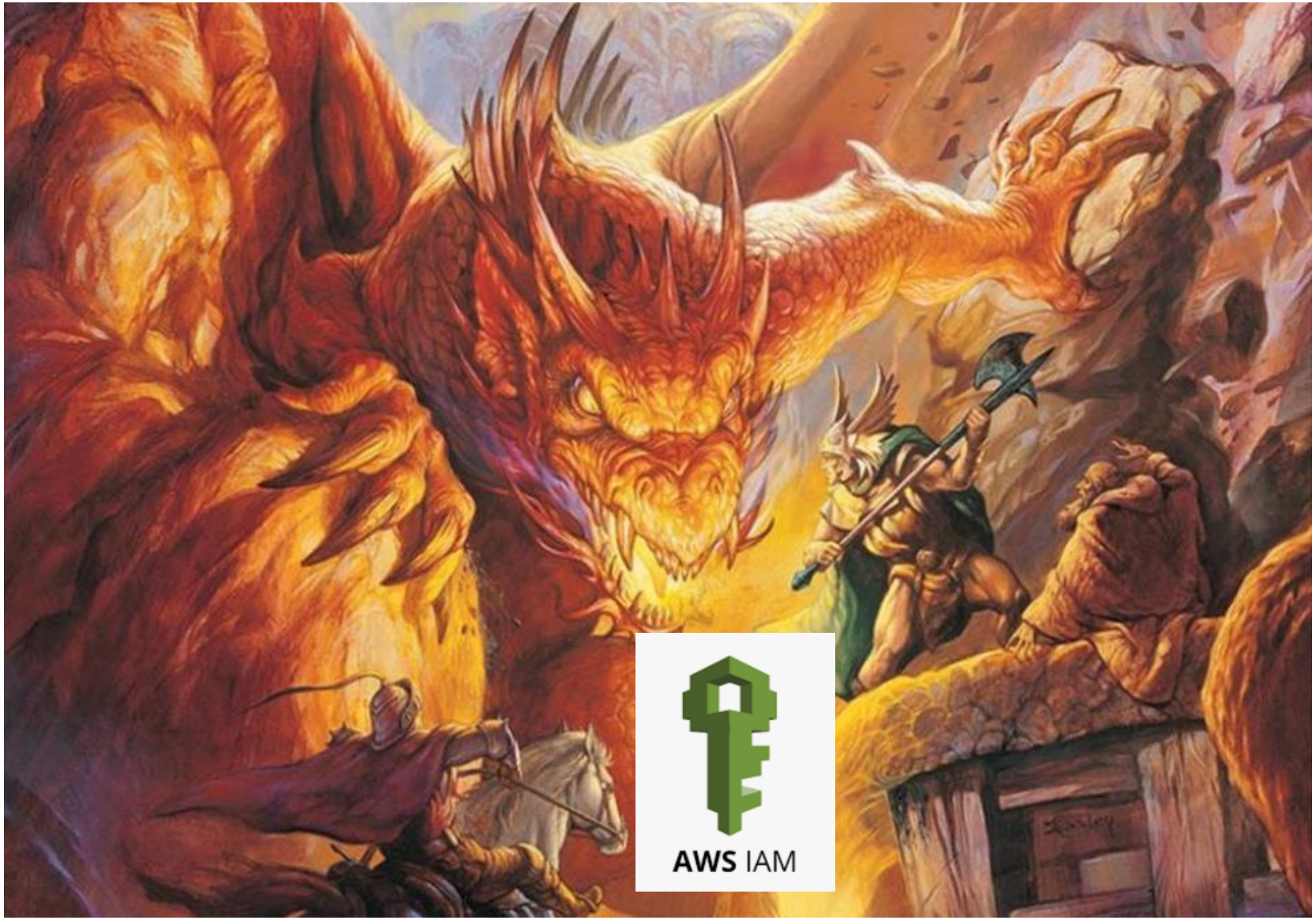
HOW To : Modify Existing Amazon Machine Images (AMIs)



https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/AMIs.html

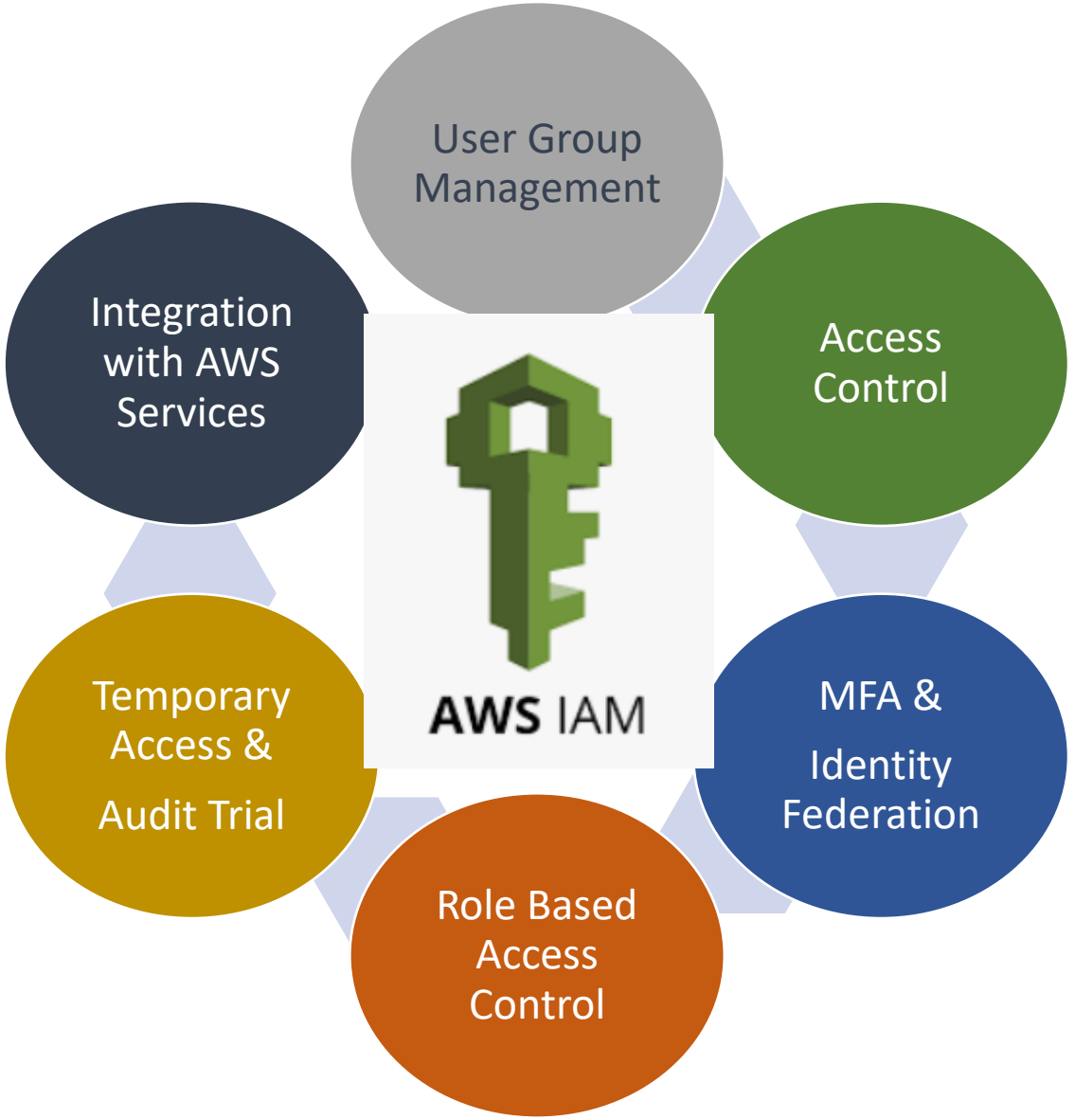
https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/ComponentsAMIs.html

AWS : AWS Identity and Access Management (IAM)



AWS : AWS Identity and Access Management (IAM)

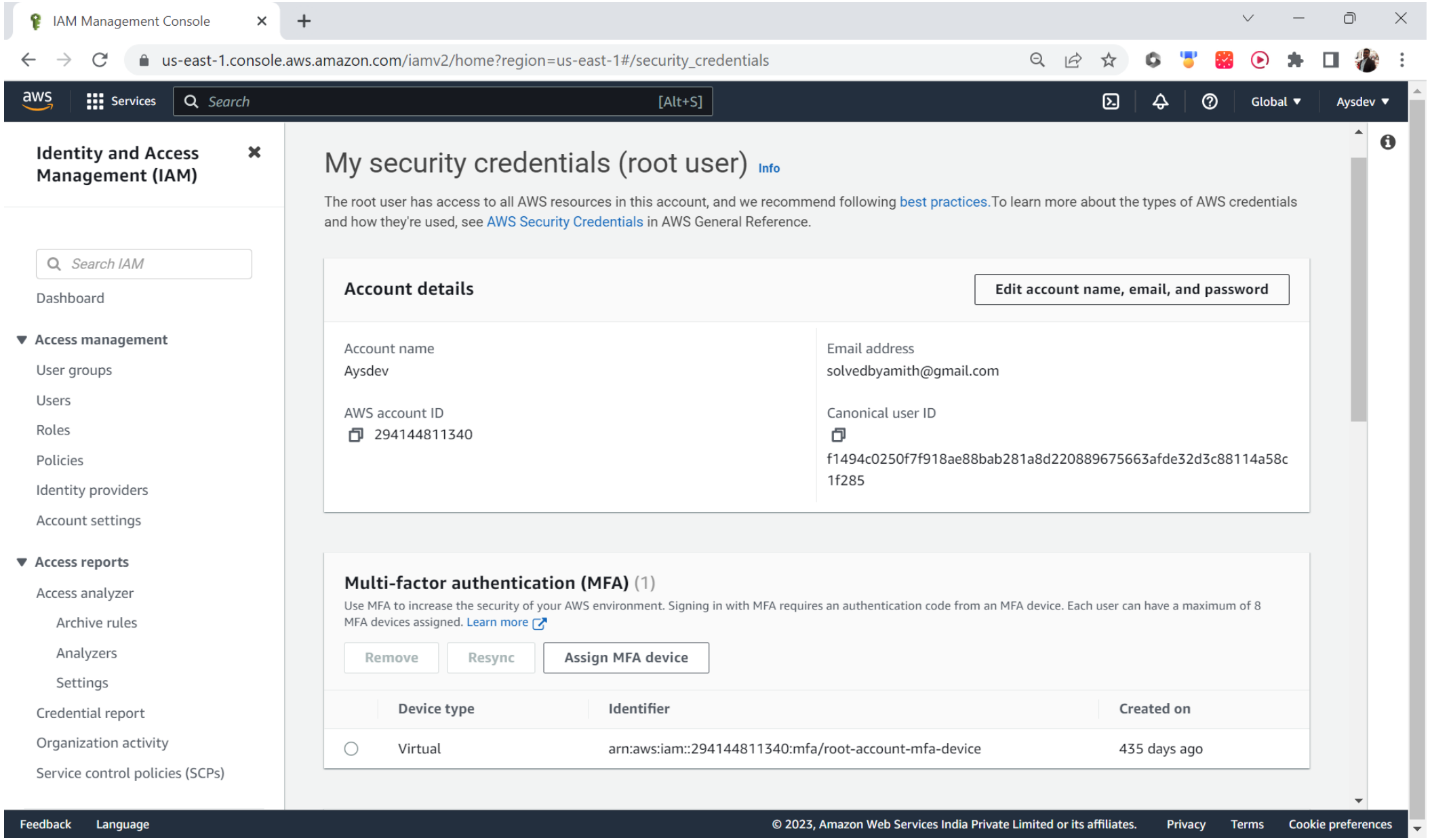
(IAM) is a web service that helps you securely control access to AWS resources.
With IAM, you can centrally manage permissions that control which AWS resources users can access.



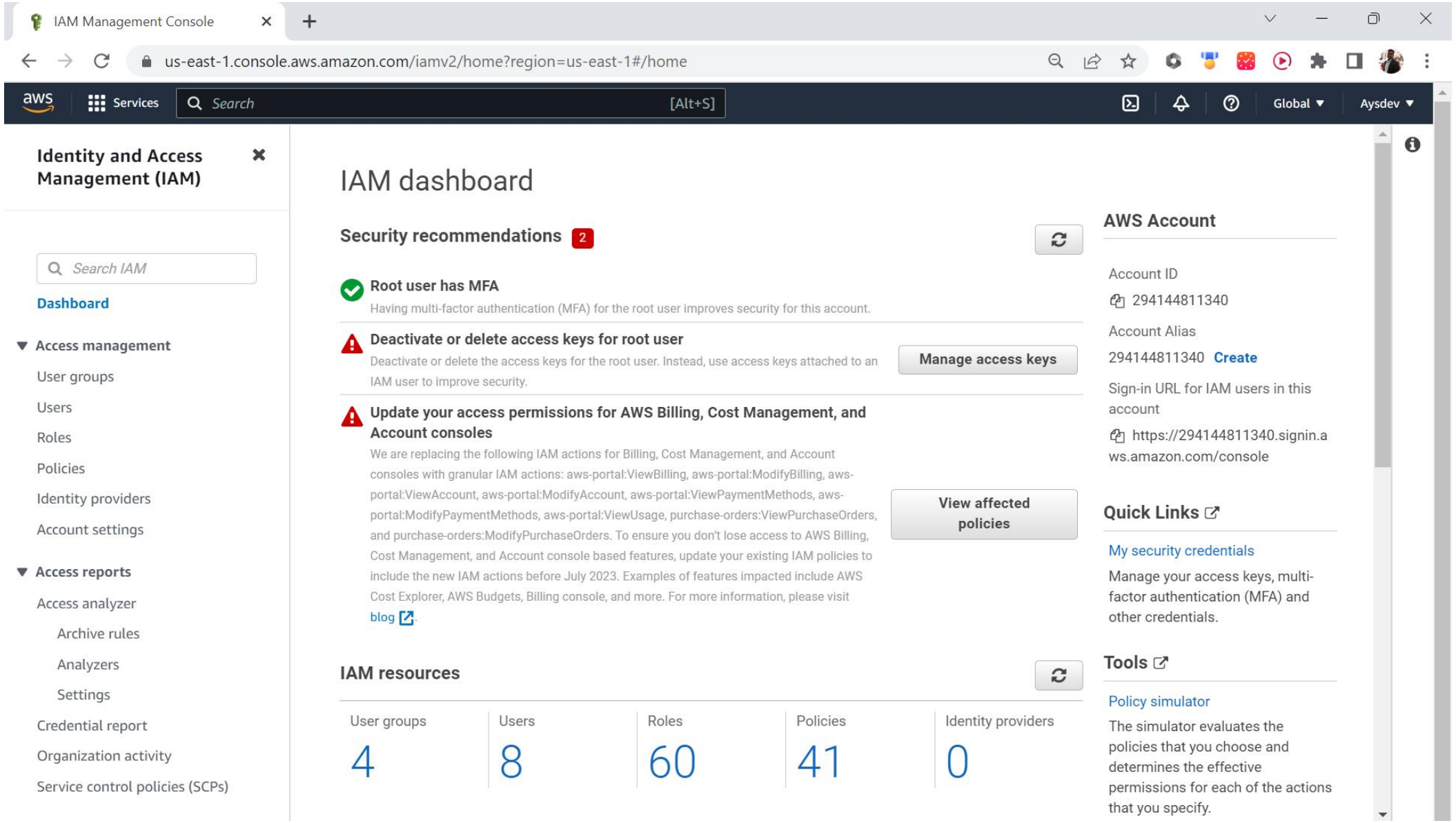
You use IAM to control who is authenticated (signed in) and authorized (has permissions) to use resources.

https://docs.aws.amazon.com/IAM/latest/UserGuide/introduction.html

Understanding : IAM



Understanding : IAM

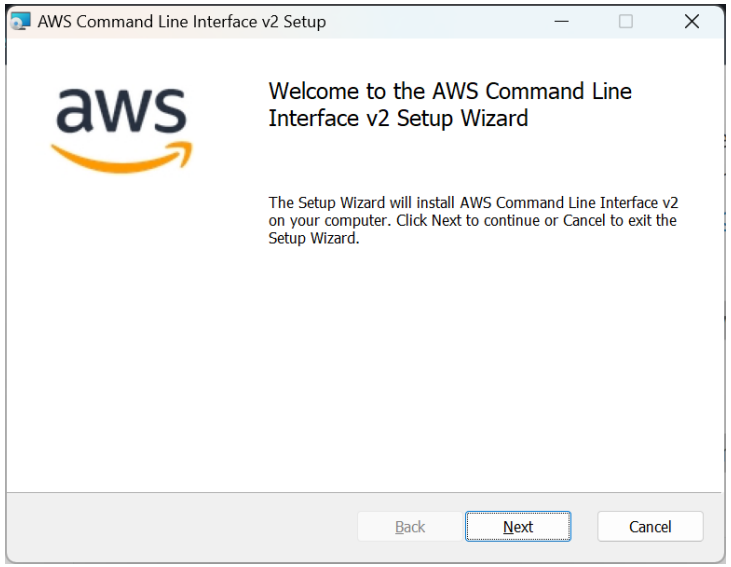


AWS : Installing / Updating Latest version of AWS CLI

AWS Command Line Interface (AWS CLI) is a unified tool that provides a consistent interface for interacting with all parts of Amazon Web Services.

Download and run the AWS CLI MSI installer for Windows (64-bit):
https://awscli.amazonaws.com/AWSCLIV2.msi

run the msiexec command to run the MSI installer.



https://docs.aws.amazon.com/cli/latest/userguide/getting-started-install.html

https://github.com/awsdocs/aws-doc-sdk-examples

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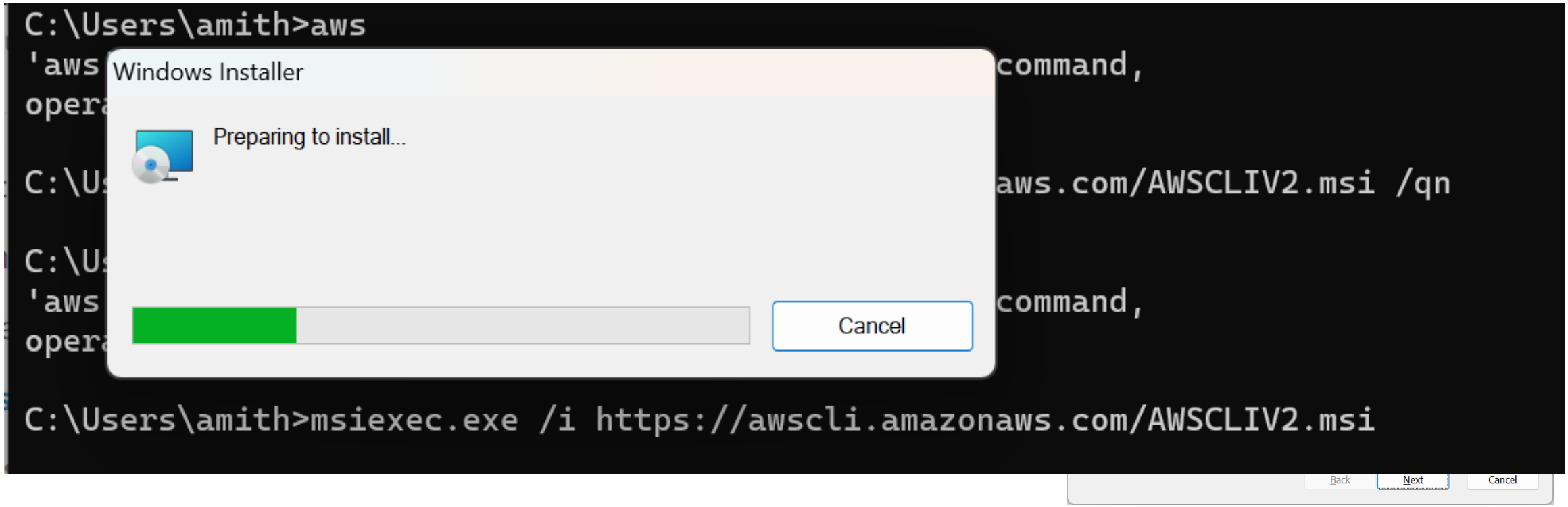

https://docs.aws.amazon.com/cli/latest/userguide/getting-started-install.html

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AWS : Installing / Updating Latest version of AWS CLI

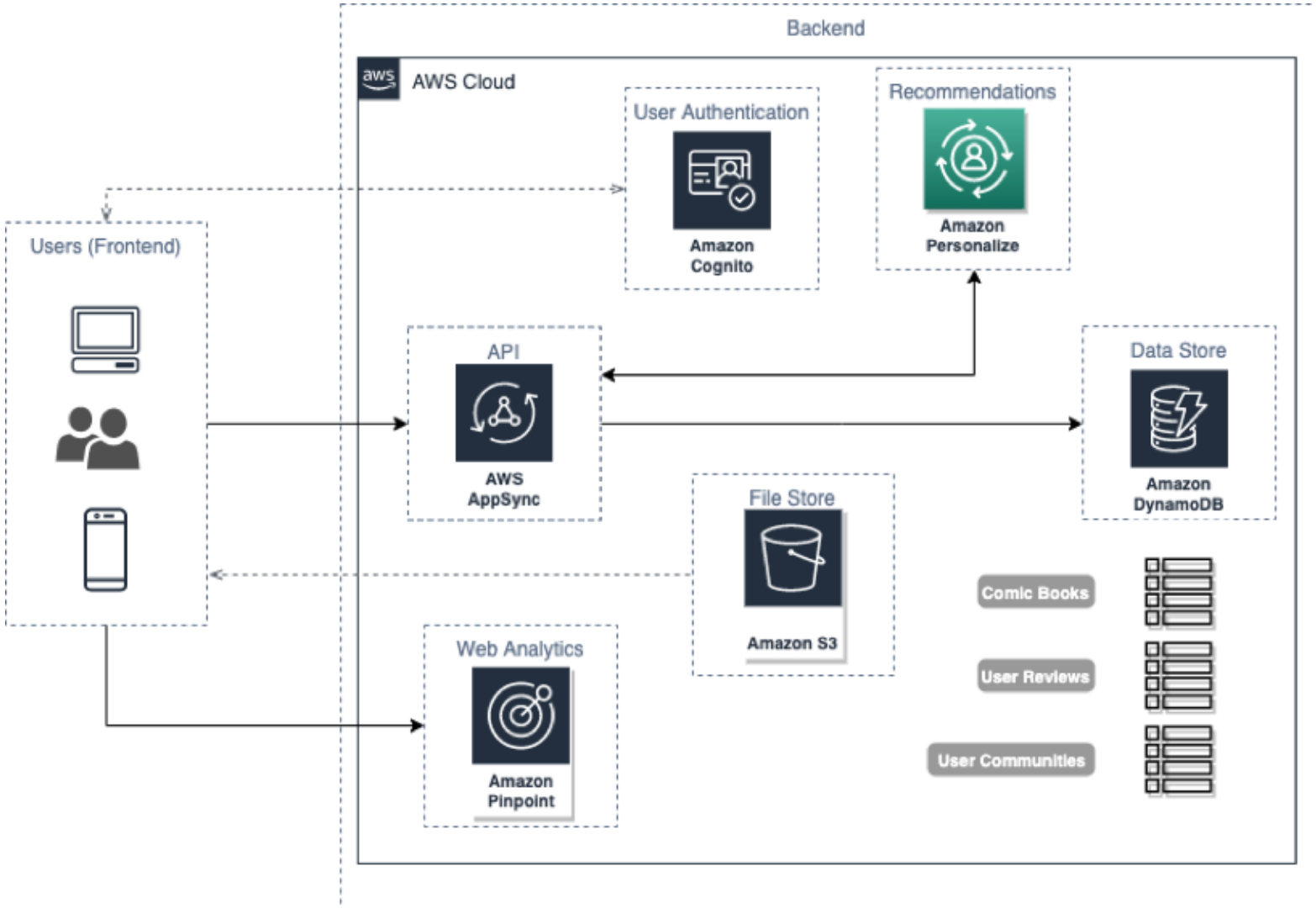
AWS Command Line Interface (AWS CLI) is a unified tool that provides a consistent interface for interacting with all parts of Amazon Web Services.

```
$ aws configure
AWS Access Key ID [None]: AKIAIOSFODNN7EXAMPLE
AWS Secret Access Key [None]: wJalrXUtnFEMI/K7MDENG/bPxRfiCYEXAMPLEKEY
Default region name [None]: us-west-2
Default output format [None]: ENTER
```

https://docs.aws.amazon.com/cli/latest/userguide/getting-started-install.html

https://github.com/awsdocs/aws-doc-sdk-examples

Overview : Building a Web-App



https://aws.amazon.com/startups/start-building/how-to-build-a-web-app/

AWS : WEBSITE on Wordpress | Ubuntu | EC2

```
ubuntu@[redacted]:~$ sudo ufw allow OpenSSH
Rules updated
Rules updated (v6)
ubuntu@[redacted]:~$ sudo ufw allow in "Apache Full"
Rules updated
Rules updated (v6)
ubuntu@[redacted]:~$ sudo ufw enable
Command may disrupt existing ssh connections. Proceed with operation (y|n)? y
Firewall is active and enabled on system startup
ubuntu@[redacted]:~$ sudo ufw status
Status: active

To                         Action      From
--                         ------      ----
OpenSSH                    ALLOW       Anywhere
Apache Full                ALLOW       Anywhere
OpenSSH (v6)               ALLOW       Anywhere (v6)
Apache Full (v6)           ALLOW       Anywhere (v6)
```

AWS : Elastic IPs

AWS Elastic IPs are **permanently reserved IP addresses** that you can associate with a running EC2 instance, and that persist across reboots and even server changes, so you won't have to change your DNS whenever your server restarts.

What is an elastic IP address?

An Elastic IP address is a static IPv4 address designed for dynamic cloud computing. An Elastic IP address is allocated to your AWS account, and is yours until you release it. By using an Elastic IP address, you can mask the failure of an instance or software by rapidly remapping the address to another instance in your account.

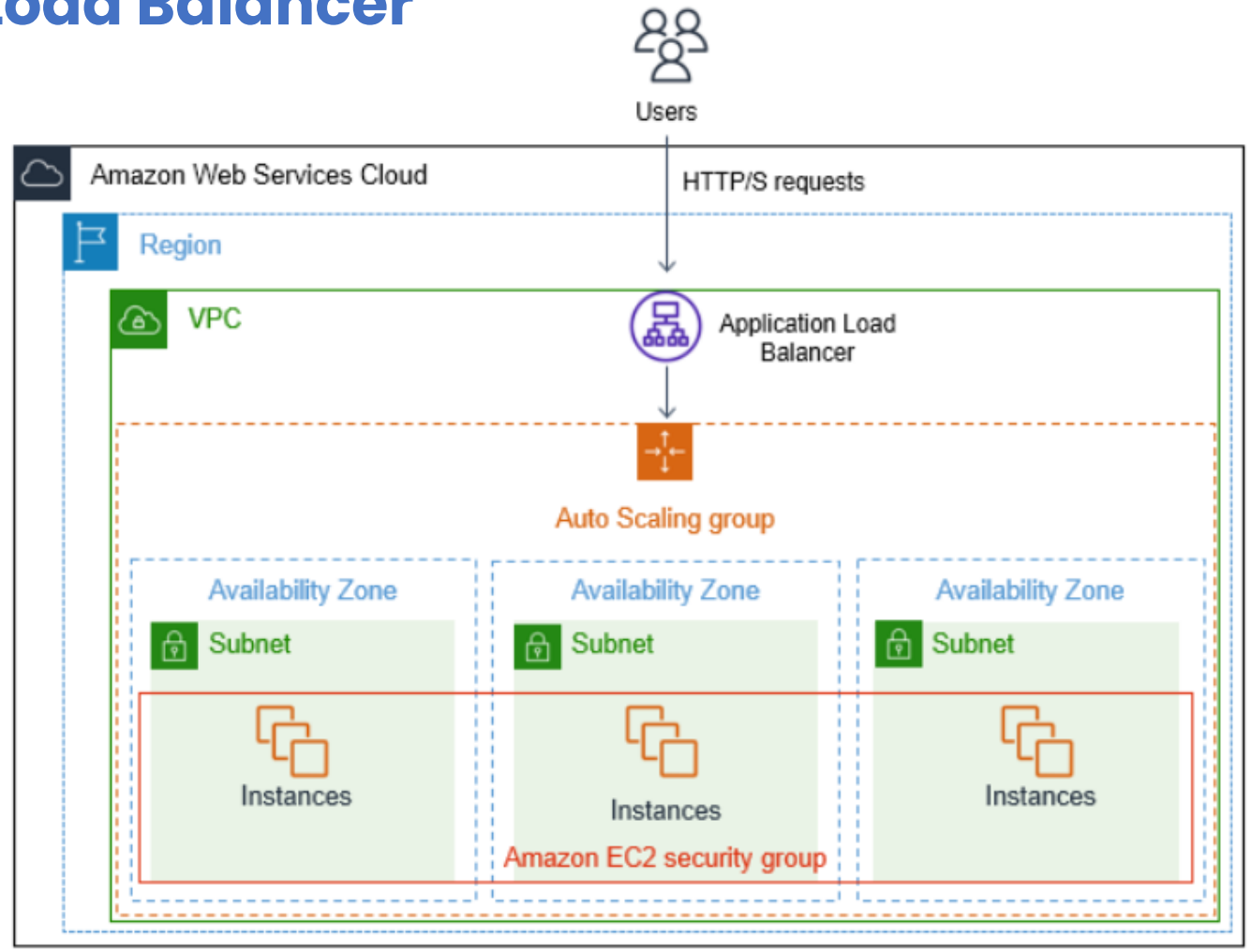
https://docs.aws.amazon.com/AWSEC2/latest/UserGuide/elastic-ip-addresses-eip.html

What is Elastic Load Balancing?

- Elastic Load Balancing automatically distributes your incoming traffic across multiple targets, such as EC2 instances, containers, and IP addresses, in one or more Availability Zones.
- It monitors the health of its registered targets, and routes traffic only to the healthy targets.
- Elastic Load Balancing scales your load balancer capacity automatically in response to changes in incoming traffic.

https://docs.aws.amazon.com/elasticloadbalancing/latest/userguide/what-is-load-balancing.html

EC2 : Auto Scaling Load Balancer



https://docs.aws.amazon.com/autoscaling/ec2/userguide/tutorial-ec2-auto-scaling-load-balancer.html

AWS : Terms to Remember

- Amazon Web Services (AWS): A cloud-based computing platform that provides a range of services, including computing, storage, networking, database, and analytics.
- Elastic Compute Cloud (EC2): A web service that provides resizable compute capacity in the cloud. EC2 instances can be launched and terminated as needed, and users only pay for the compute time they use.
- Simple Storage Service (S3): A scalable object storage service that provides secure and durable data storage for a wide range of applications.
- Relational Database Service (RDS): A fully managed service that makes it easy to set up, operate, and scale a relational database in the cloud.
- Elastic Load Balancing (ELB): A service that automatically distributes incoming application traffic across multiple EC2 instances, making it easier to handle varying levels of traffic and improve application availability.

AWS : Terms to Remember

- Auto Scaling: A service that automatically adjusts the number of EC2 instances in a group based on changes in demand for the application.
- Virtual Private Cloud (VPC): A virtual network that provides a secure and isolated environment for running resources in the cloud.
- Lambda: A serverless computing service that allows users to run code without provisioning or managing servers.
- Identity and Access Management (IAM): A service that allows users to manage access to AWS resources by creating and managing AWS users and groups, and setting permissions and policies.
- CloudFormation: A service that allows users to define and deploy infrastructure as code, making it easier to manage and automate AWS resources.