DALHOUSIE UNIVERSITY
Inspiring Minds

Cloud SERVICES in AMAZON AWS

CSCI 5408:

Data Management, Warehousing, and Analytics

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Discussion on Assignment # 1 and 2

Q1. What issues you faced in assignment # 1?

Q2. Why Elastic Search was faster than RDBMS?

Q3. Why we do not do joins in NoSQL?

Q4. How we do aggregation in Elastic Search?

Q5. Where in industry Elastic Search should be used?

Q6. What is Elastic Load Balancer?

Q7. How much load can be increased through parallel requests? If using one computer how much efficiency you can gain? Explain

Q8. Why is Casandra used ?

Q9. What is connection string?

Q10. How to handle failure in REST service?

Elastic Compute Cloud (EC2)

Amazon **Elastic Compute Cloud** (Amazon **EC2**) is a web service

that provides resizable **compute** capacity in the **cloud.**

It is designed to make web-scale **cloud computing** easier

for developers. Amazon **EC2's** simple web service interface allows you to obtain and configure capacity with minimal friction.

amazon web services™ | EC2

EC2 – Elastic Compute Cloud

blazeclan

EC2 is a Web Service that provides resizable Compute Capacity in the Cloud.

PRICING

Pay by Hour
- On Demand
- Reserved Instance
- Spot Instances

PRICING PARAMETERS
- Region
- EC2 Instance type
  - vCPU
  - ECU
  - Memory (GiB)
  - Instance Storage (GB)
  - Operating System

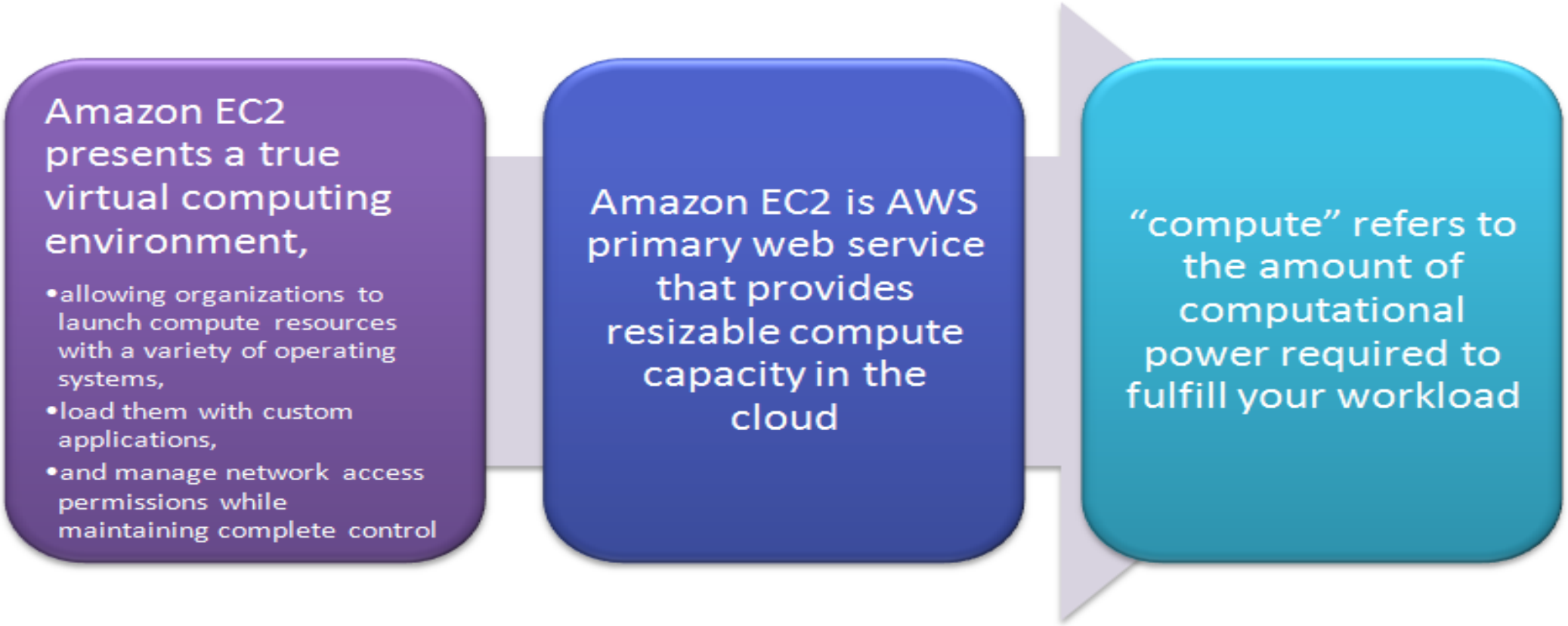
FREE TIER
- 750 hours Linux / UNIX, RHEL, SLES
- 750 hours Windows

30 TYPES OF INSTANCES
- Linux – Ubuntu, Red Hat Enterprise Linux, SUSE Linux
- Windows, Windows SQL Standard, Windows with SQL Web

EC2 | Auto Scaling | ELB | Work Spaces | Direct Connect | Route 53 | VPC | EMR | Kinesis

Elastic Compute Cloud (EC2)

Amazon EC2

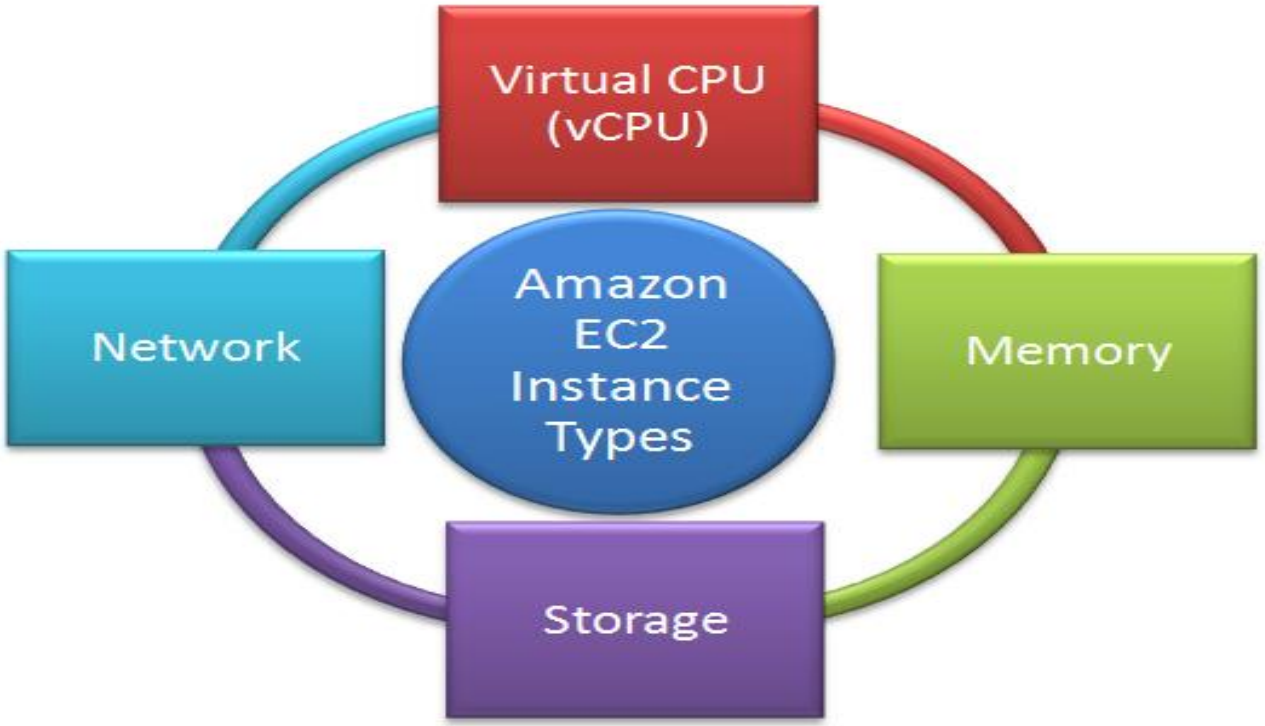


https://aws.amazon.com/ec2/

Elastic Compute Cloud (EC2)

Amazon EC2 Instance Types

Instance types defines the virtual hardware supporting an Amazon EC2



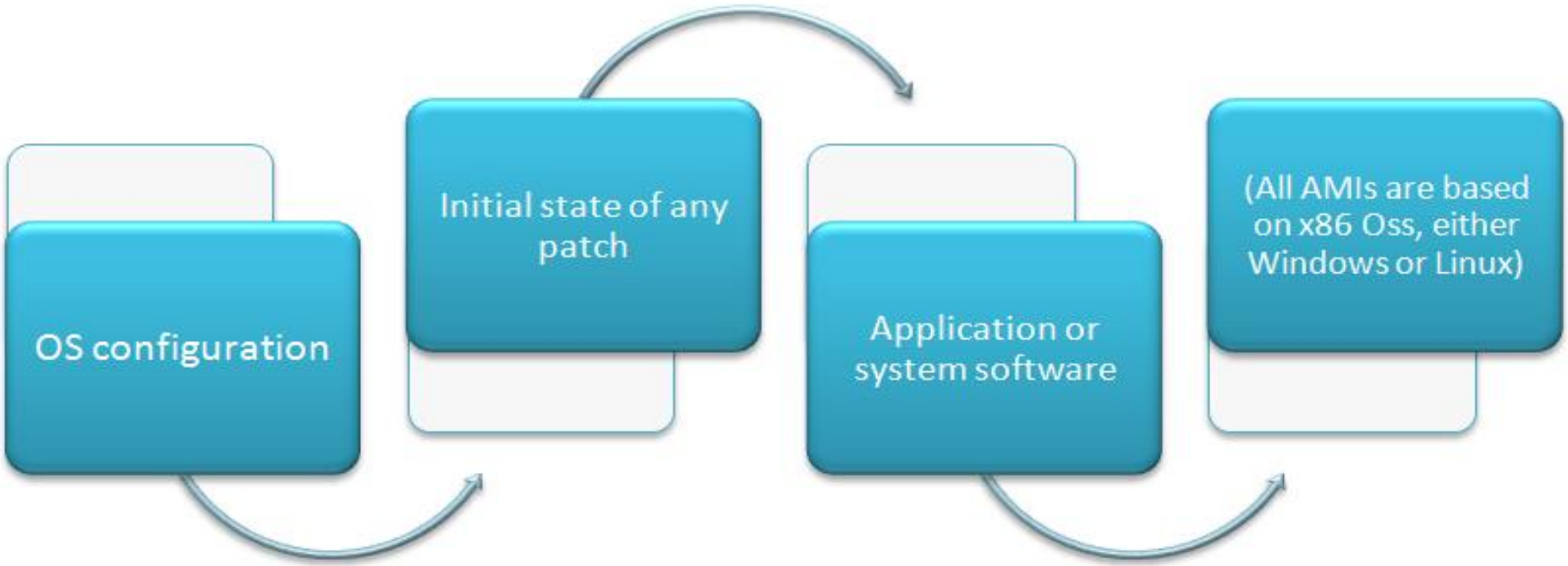
Instance types defines the virtual hardware supporting an Amazon EC2

- c4 Computed optimized – • for workload requiring significant processing
- r#3- Memory optimized – •for memory intensive workloads
- i2- Storage optimized – •requiring high amounts of SSD storage
- g2 - GPU • compute workloads (graphics)

Elastic Compute Cloud (EC2)

AMI – Amazon Machine Images

Amazon Machine Images (AMI) defines the initial software that will be on an instance when it is launched. It defines:

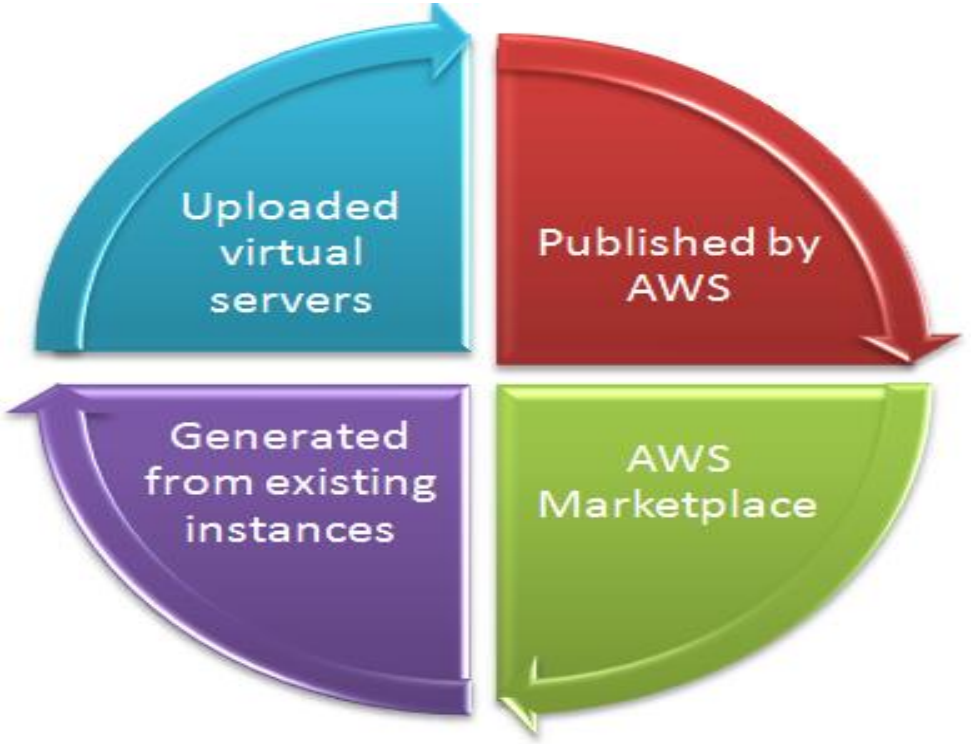


https://aws.amazon.com/ec2/

Elastic Compute Cloud (EC2)

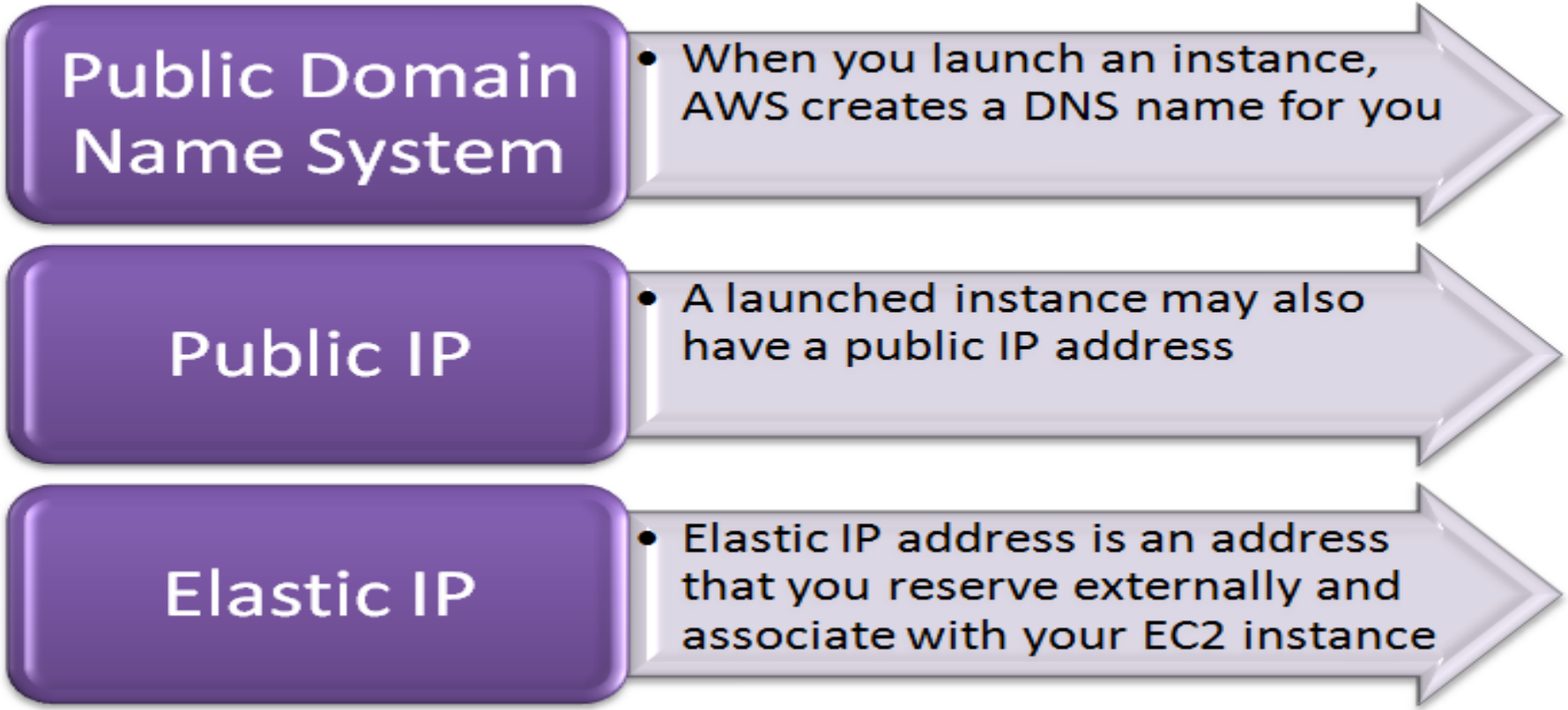
AMI – Amazon Machine Images

Four sources of AMI:



Elastic Compute Cloud (EC2)

Addresses of an Instance



Elastic Compute Cloud (EC2)

Public-Private key pairs

Amazon uses public-private key cryptography

Amazon encrypts login information using public key and distribute private key to the user

User uses private key to decrypt the information while logging in

With accurate private key, login information can be decrypted easily and user would be given access to the system

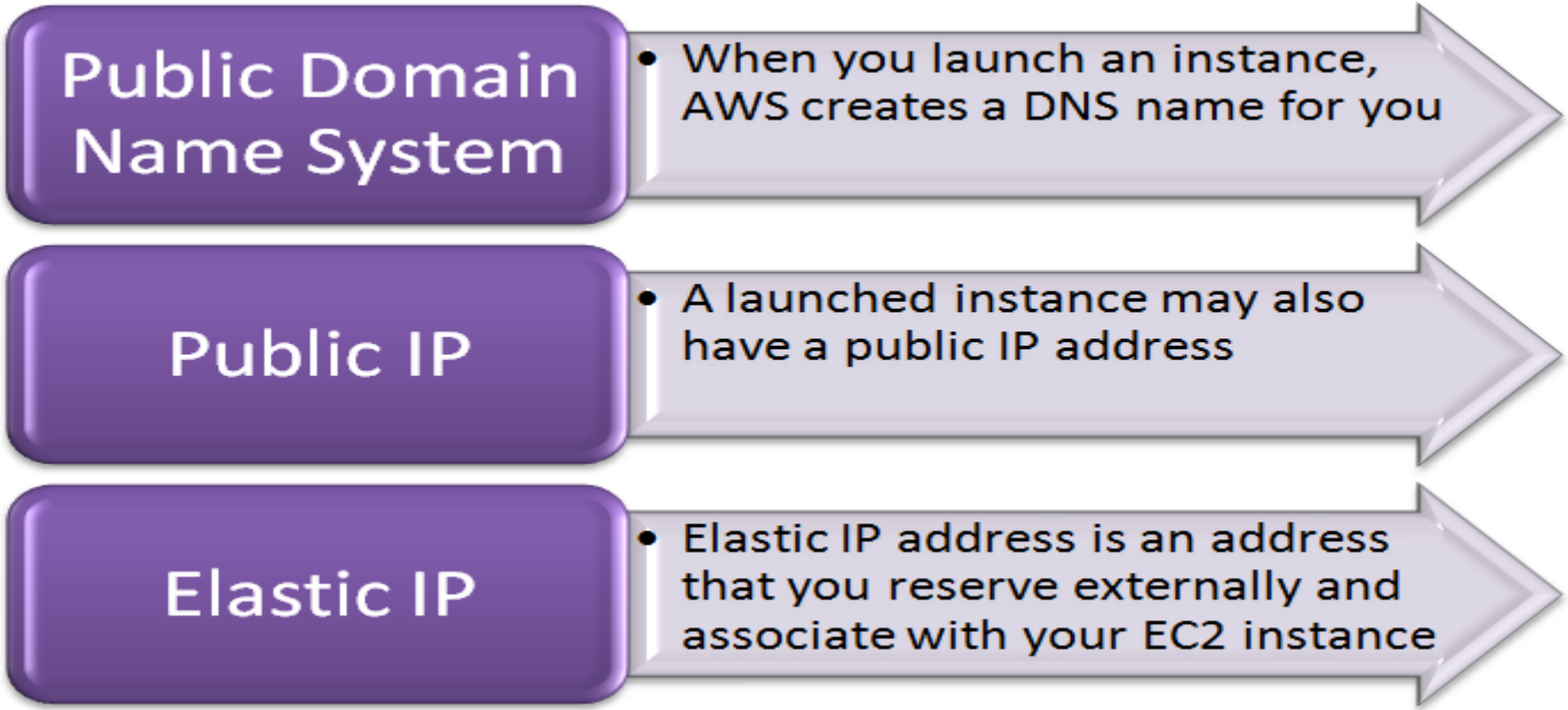
Virtual Firewall Protection

AWS allows you to control traffic in and out of your instances through virtual firewalls called security groups

Security groups allow you to control traffic based on port, protocol, and source destination

Elastic Compute Cloud (EC2)

Lifecycle of Instances



Elastic Compute Cloud (EC2)

Lifecycle of Instances

Launching – Bootstrapping

The process of providing code to be run on an instance at launch is called bootstrapping

One of the parameter when an instance is launched is a string value called user data

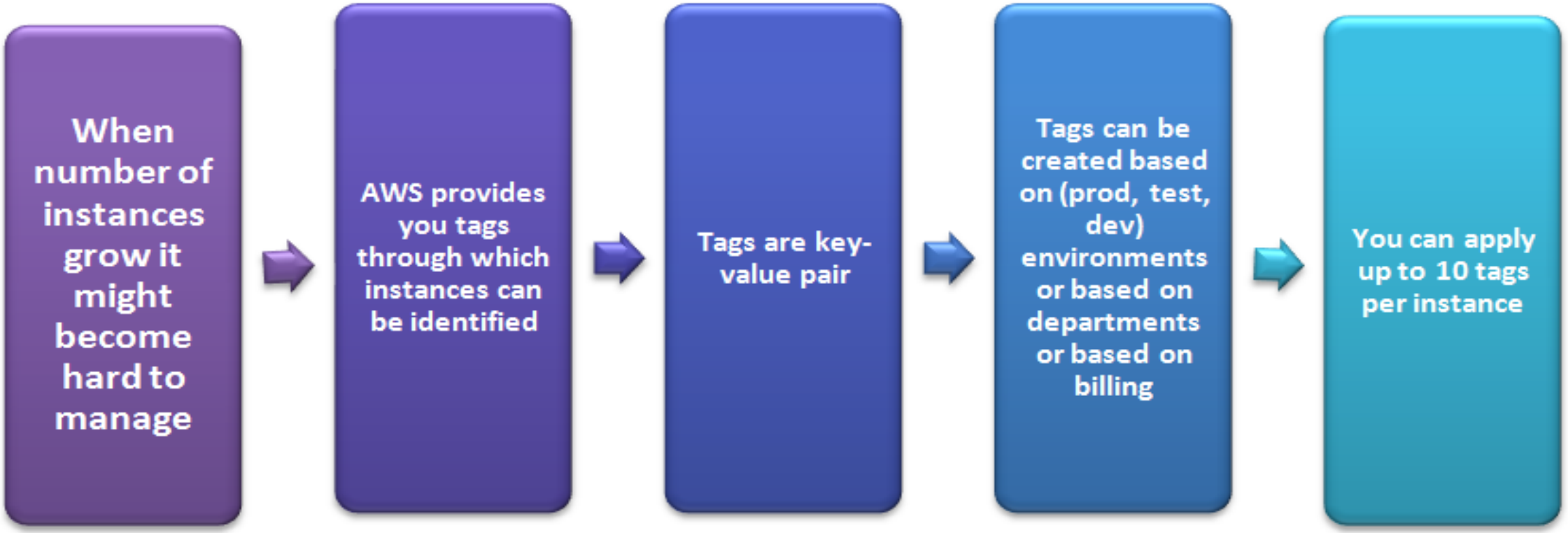
One Linux we execute Shell script, on windows we run Power script or bash script

Script can perform:

- Applying patches
- Enrolling in directory service
- Installing application software
- Copying a program to be run from storage on the instance
- Installing configuration management software

Elastic Compute Cloud (EC2)

Managing instances

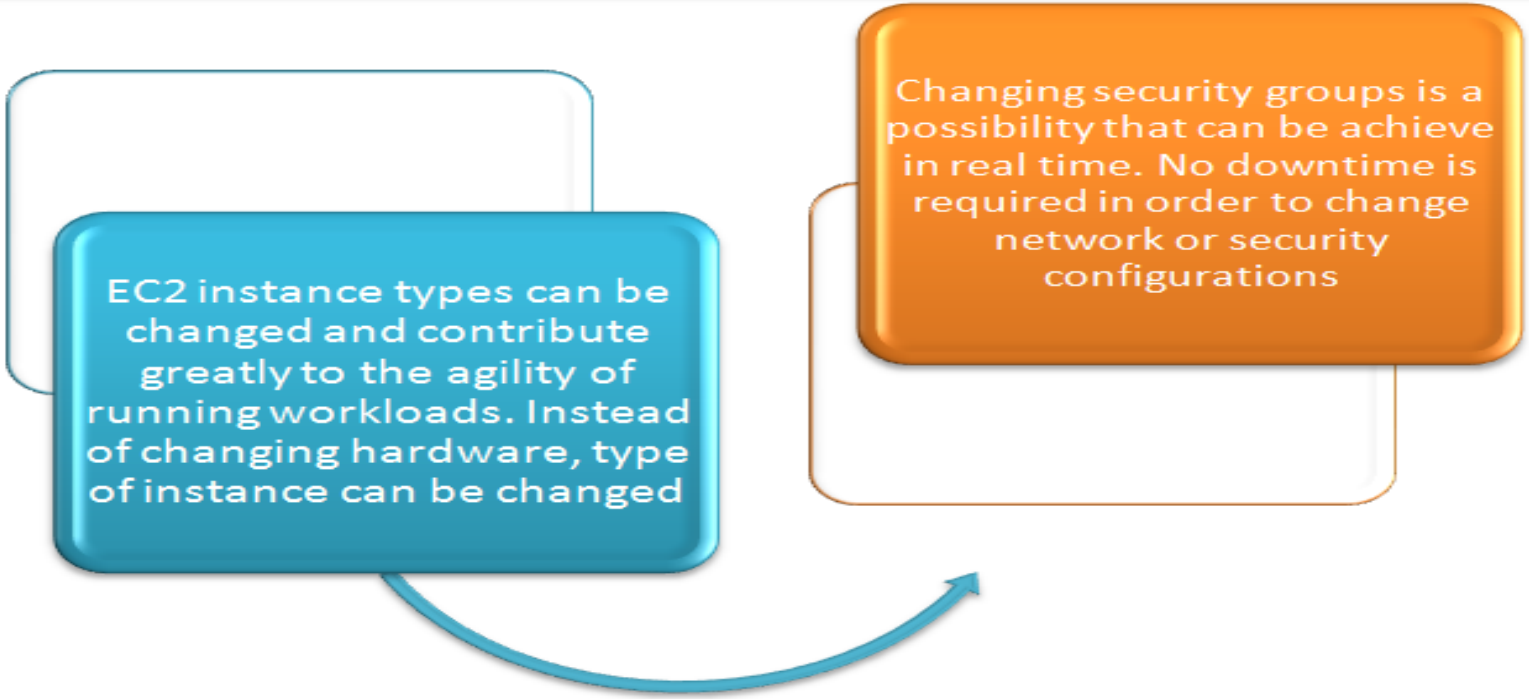


Elastic Compute Cloud (EC2)

Monitoring & Managing instances

Amazon offers a service called CloudWatch that provides monitoring and alerting for Amazon EC2 instances

Changing instances configuration:



Elastic Compute Cloud (EC2)

Termination of instances

When an AWS instance is no longer required, the state can be changed to terminated and Amazon will completely shutdown the instance and remove it from infrastructure

Elastic Compute Cloud (EC2)

BENEFITS OF ELASTIC COMPUTE CLOUDE EC2

https://aws.amazon.com/ec2/

Elastic Compute Cloud (EC2)

BENEFITS OF ELASTIC COMPUTE CLOUDE EC2

Elastic Web-Scale Computing

- **Amazon EC2 enables you to increase or decrease capacity within minutes, not hours or days.**
- **You can commission one, hundreds or even thousands of server instances simultaneously.**
- **Of course, because this is all controlled with web service APIs, your application can automatically scale itself up and down depending on its needs.**

Completely Controlled

- You have complete control of your instances. You have root access to each one, and you can interact with them as you would any machine.
- You can stop your instance while retaining the data on your boot partition and then subsequently restart the same instance using web service APIs.
- Instances can be rebooted remotely using web service APIs. You also have access to console output of your instances

https://aws.amazon.com/ec2/

Elastic Compute Cloud (EC2)

BENEFITS OF ELASTIC COMPUTE CLOUDE EC2

Flexible Cloud Hosting Services

You have the choice of multiple instance types, operating systems, and software packages.

Amazon EC2 allows you to select a configuration of memory, CPU, instance storage, and the boot partition size that is optimal for your choice of operating system and application.

For example, your choice of operating systems includes numerous Linux distributions or Microsoft Windows Server

Designed for use with other Amazon Web Services

Amazon EC2 works in conjunction with Amazon Simple Storage Service (Amazon S3), Amazon Relational Database Service (Amazon RDS), Amazon SimpleDB and Amazon Simple Queue Service (Amazon SQS)

to provide a complete solution for computing, query processing and storage across a wide range of applications.

https://aws.amazon.com/ec2/

Elastic Compute Cloud (EC2)

BENEFITS OF ELASTIC COMPUTE CLOUDE EC2

Reliable

Amazon EC2 offers a highly reliable environment where replacement instances can be rapidly and predictably commissioned.

The service runs within Amazon's proven network infrastructure and data centers.

The Amazon EC2 Service Level Agreement commitment is 99.95% availability for each Amazon EC2 Region

Secure

Amazon EC2 works in conjunction with Amazon VPC to provide security and robust networking functionality for your compute resources.

If you do not have a default VPC you must create a VPC and launch instances into that VPC to leverage advanced networking features such as private subnets, outbound security group filtering, network ACLs, Dedicated Instances, and VPN connections.

https://aws.amazon.com/ec2/

Elastic Compute Cloud (EC2)

BENEFITS OF ELASTIC COMPUTE CLOUDE EC2

Inexpensive

Amazon EC2 passes on to you the financial benefits of Amazon's scale

You pay a very low rate for the compute capacity you actually consume. See Amazon EC2 Instance Purchasing Options for a more detailed description

Easy to Start

Quickly get started with Amazon EC2 by visiting AWS Marketplace to choose preconfigured software on Amazon Machine Images (AMIs).

You can quickly deploy this software to EC2 via 1-Click launch or with the EC2 console

https://aws.amazon.com/ec2/

Amazon Simple Storage (S3)

AMAZON S3 SERVICE

Amazon Simple Storage Service is storage for the Internet. It is designed to make web-scale computing easier for developers.

Amazon S3 has a simple web services interface that you can use to store and retrieve any amount of data, at any time, from anywhere on the web.

It gives any developer access to the same highly scalable, reliable, fast, inexpensive data storage infrastructure that Amazon uses to run its own global network of web sites.

The service aims to maximize benefits of scale and to pass those benefits on to developers.

Amazon Simple Storage (S3)

The Core Concepts of AMAZON S3

http://docs.aws.amazon.com/AmazonS3/latest/dev/Introduction.html

Amazon Simple Storage (S3)

The Core Concepts of AMAZON S3

Buckets

A bucket is a container for objects stored in Amazon S3. Every object is contained in a bucket.

For example, if the object named photos/puppy.jpg is stored in the johnsmith bucket, then it is addressable using the URLhttp://johnsmith.s3.amazonaws.com/photos/puppy.jpg

Buckets serve several purposes: they organize the Amazon S3 namespace at the highest level, they identify the account responsible for storage and data transfer charges, they play a role in access control, and they serve as the unit of aggregation for usage reporting.

You can configure buckets so that they are created in a specific region. For more information, see Buckets and Regions. You can also configure a bucket so that every time an object is added to it, Amazon S3 generates a unique version ID and assigns it to the object. For more information, see Versioning.

http://docs.aws.amazon.com/AmazonS3/latest/dev/Introduction.html

Amazon Simple Storage (S3)

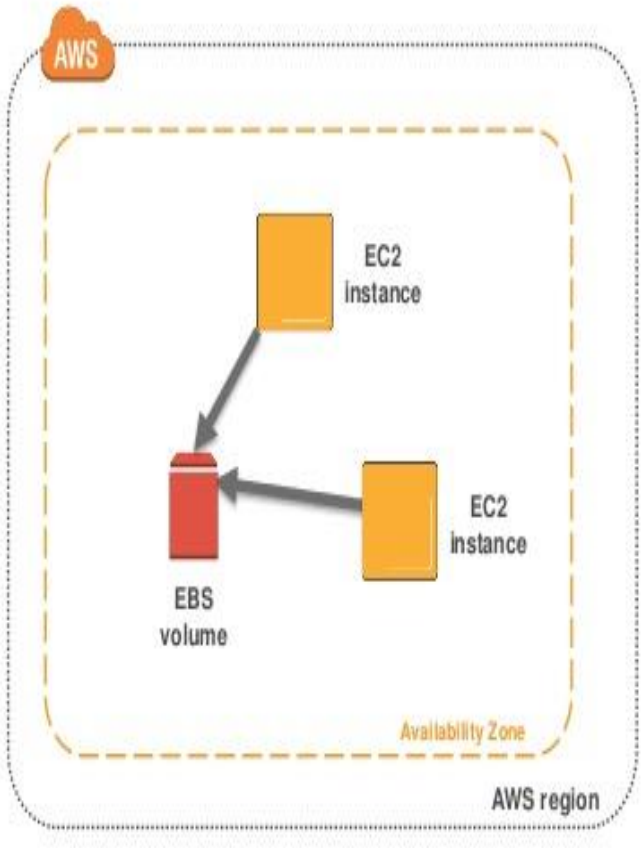
The Core Concepts of AMAZON S3

- Objects are the fundamental entities stored in Amazon S3
- Objects consist of object data and metadata
- The metadata is a set of name-value pairs that describe the object
- These include some default metadata, such as the date last modified, and standard HTTP metadata, such as Content-Type
- An object is uniquely identified within a bucket by a key (name) and a version ID

http://docs.aws.amazon.com/AmazonS3/latest/dev/Introduction.html

Elastic Block Store(EBS)

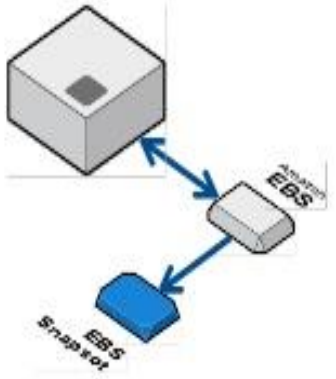
What is Amazon EBS?



- Availability Zone specifi
- Persist independently of the EC2 instance

Amazon Elastic Block Store (EBS)

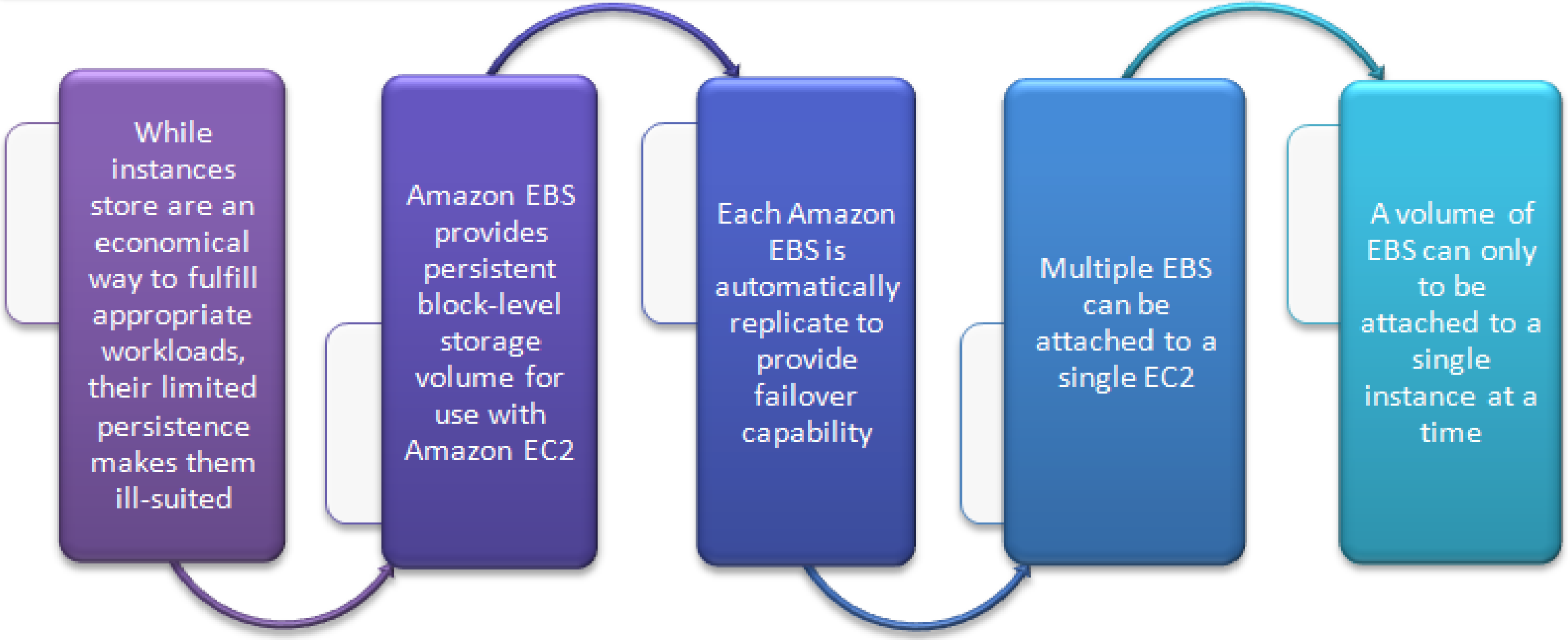
Elastic Block Storage: Persistent Storage for EC2



Feature	Details
High performance file system	Mount EBS as drives and format as required
Flexible size	Volumes from 1GB to 1TB in size
Secure	Private to your instances
Available	Replicated within an Availability Zone
Backups	Volumes can be snapshotted for point in time restore
Monitoring	Detailed metrics captured via Cloud Watch

amazon web services

Elastic Block Store(EBS)



Elastic Cache

In-memory Caching

One of the common characteristics of a successful application is a fast and responsive user experience

In 2007, testing of Amazon's online retail store showed that for every 100ms increase in load times, sales decreased by 1%

Caching frequently used data is one of the most important performance optimization you can make in your application

Compared to querying data from in-memory cache, querying a database is an expensive operation

By storing or moving frequently accessed data in-memory, application developers can significantly improve the performance and responsiveness of read heavy applications

Amazon Elastic Cache

Amazon ElastiCache is a web service that simplifies the setup and management of distributed in-memory caching

With amazon ElastiCache you can chose from a mem-cached or redis protocol compliant cache engine and quickly launch a cluster in minutes

Using Amazon ElastiCache, you can implement any number of caching patterns

Retrieving a flat key from an in-memory cache will always be faster than the most optimized database query

Amazon Elastic Cache

Types of Cache

Memcache – Memcached provides a very simple interface that allows you to write and read objects into in-memory key/value data stores

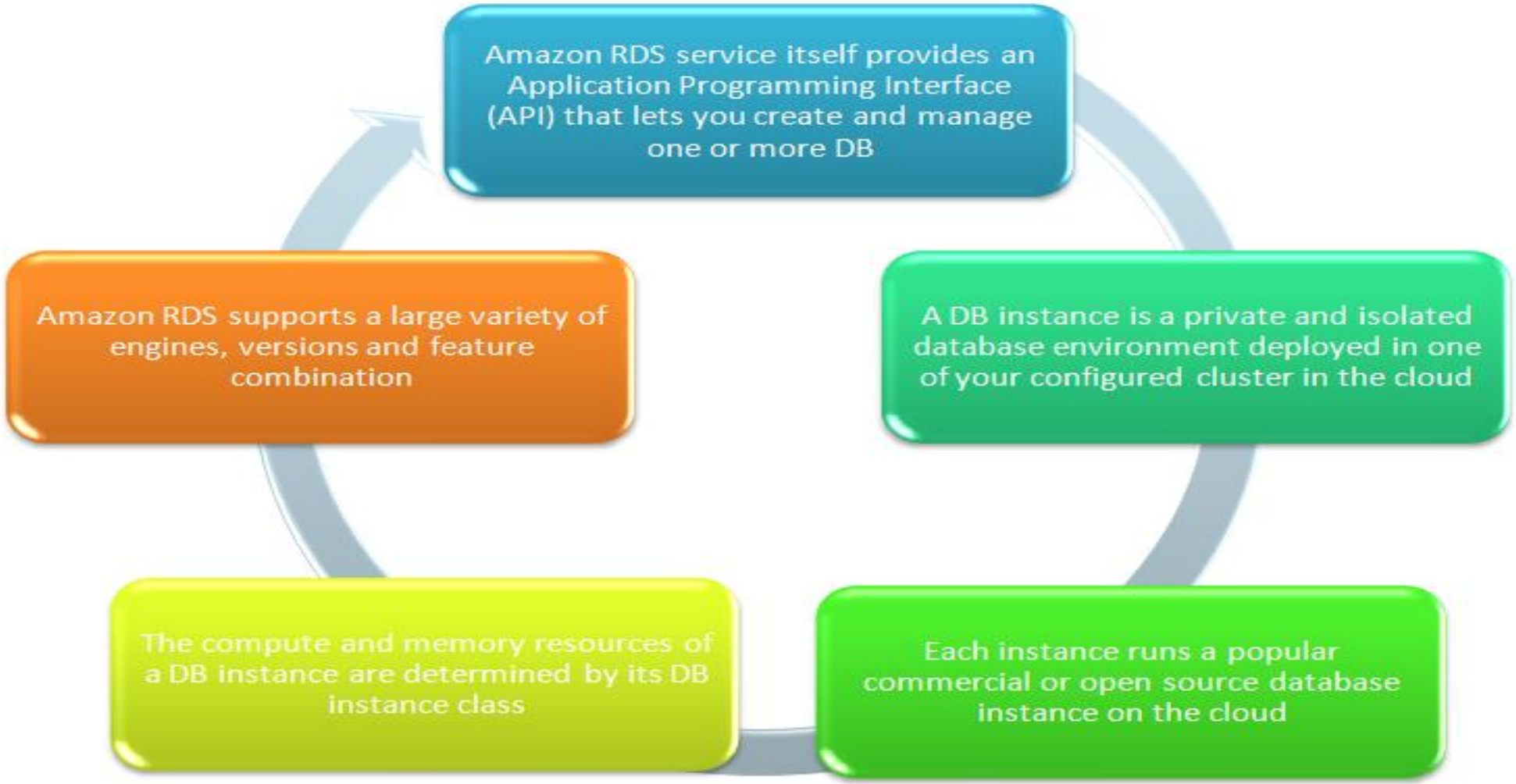
- With ElastiCache, you can elastically grow and shrink a cluster of Memcached nodes to meet your demands
- Memcache are volatile memory and cannot be persisted

Redis Cache: Unlike Memcached, Redis supports the ability to persist the in-memory data onto disk

- Redis also has advanced features that make is easy to sort or rank data
- Examples include building an active dashboard for mobile application or serving a high-speed message broker in a distributed system

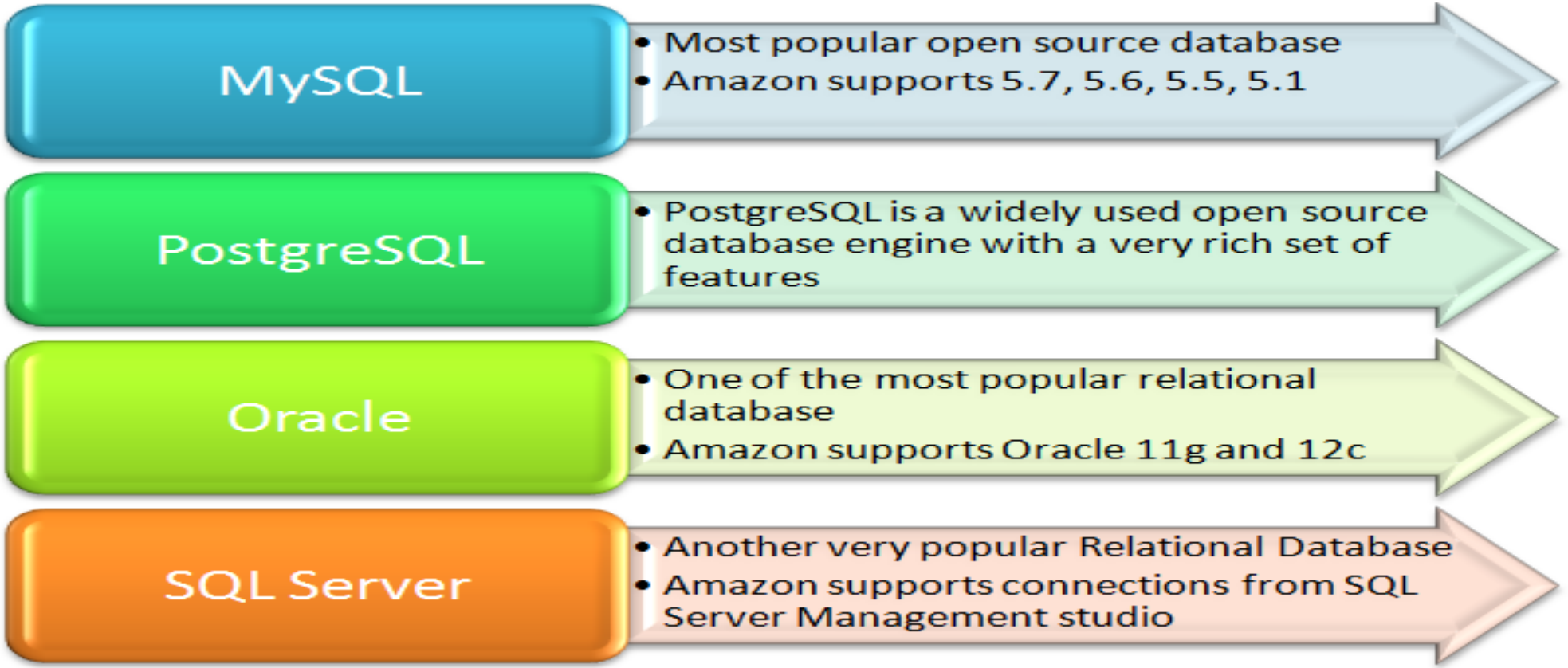
https://aws.amazon.com/ec2/

Relational and Dynamo DB



Relational and Dynamo DB

Types of RDS



Quiz

Q1. In what ways does Amazon simple storage (S3) object storage differs from block and file storage?

Q2. What are some key characteristics of Amazon Simple storage?

a. All objects have a URL

b. Store unlimited amount of data

c. Objects are world readable by default

d. S3 has a REST API interface to access

e. You must pre-allocate storage in bucket

Q3. Your web application needs four instances to support steady traffic nearly all the time. On last day of each month traffic triples. What is the cost effective way to handle this?

Q4. State difference between a database and a cache?

Q5. Benefits of using Memcache over Redis?

Reading material

AWS Certified Solutions Architect Official Study Guide: Associate Exam

URL: https://www.amazon.ca/Certified-Solutions-Architect-Official-Study/dp/1119138558

Amazon AWS Documentation

https://aws.amazon.com/documentation/


ANY
QUESTIONS
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