

Chapter 1



Cloud Computing Concepts

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❖ About Amazon Certifications

- ✍ AWS Certification validates cloud expertise to help professionals highlight in-demand skills and organizations build effective, innovative teams for cloud initiatives using AWS.

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AWS Certification validates cloud expertise to help professionals highlight in-demand skills and organizations build effective, innovative teams for cloud initiatives using AWS. Choose from diverse certification exams by role and specialty designed to empower individuals and teams to meet their unique goals.

Type of Amazon Certifications

Available AWS Certifications

aws certified
Updated May 2019

Professional

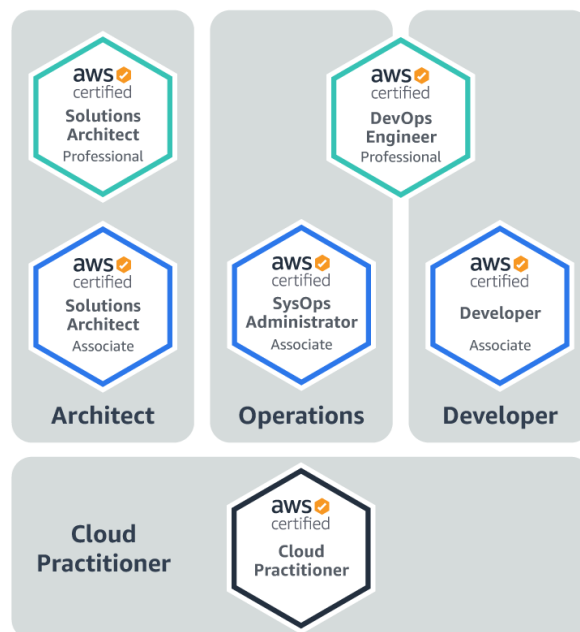
Two years of comprehensive experience designing, operating, and troubleshooting solutions using the AWS Cloud

Associate

One year of experience solving problems and implementing solutions using the AWS Cloud

Foundational

Six months of fundamental AWS Cloud and industry knowledge



Specialty

Technical AWS Cloud experience in the Specialty domain as specified in the [exam guide](#)



AWS Exam Objectives

- ✓ Define what the AWS Cloud is and the basic global infrastructure
- ✓ Describe basic AWS Cloud architectural principles
- ✓ Describe the AWS Cloud value proposition
- ✓ Describe key services on the AWS platform and their common use cases (for example, compute and analytics)
- ✓ Describe basic security and compliance aspects of the AWS platform and the shared security model

- ✓ Define the billing, account management, and pricing models
- ✓ Identify sources of documentation or technical assistance (for example, whitepapers or support tickets)
- ✓ Describe basic/core characteristics of deploying and operating in the AWS Cloud

Objective Map

Domain	% of Examination
Domain 1: Cloud Concepts	28%
Domain 2: Security	24%
Domain 3: Technology	36%
Domain 4: Billing and Pricing	12%
Total	100%

❖ What is Amazon Web Services?

- ✍ Amazon Web Services (AWS) is a secure cloud services platform, offering
- ▶ Computing Power,
 - ▶ Database Storage,
 - ▶ Content Delivery and
 - ▶ Other Functionality On-demand

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Amazon Web Services (AWS) is a comprehensive, evolving cloud computing platform provided by Amazon. It provides a mix of infrastructure as a service (IaaS), platform as a service (PaaS) and packaged software as a service (SaaS) offerings.

With AWS you can choose the particular solutions you need, and pay for precisely what you use, bringing about lower capital consumption and quicker time to an incentive without yielding application execution or user experience.

Amazon Web Services (AWS) offers a powerful, completely included, technology framework platform on the cloud; involving an expansive arrangement of figuring, storage, database, examination, application, and sending services that help associations advance quicker, lower IT costs, and scale applications. AWS contributions are fortified by a scope of supporting parts like management tools, networking services, and application expansion services with different interfaces to AWS application programming interface (API) based services. These segments incorporate resources like programming development units (SDKs), integrated development environment (IDE) toolkits, and command line tools.

AWS is a pioneer in cloud technology. Its pace of development is financed and continued through economies of scale and responsibility to conveying items and services that issue the most to clients.



AWS Certification helps learners build credibility and confidence by validating their cloud expertise with an industry-recognized credential and organizations identify skilled professionals to lead cloud initiatives using AWS.

❖ What is Cloud Computing?

✍ Cloud Computing is the delivery of computing services—including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet (“the cloud”) to offer faster innovation, flexible resources, and economies of scale.

✍ Types of Cloud

1. Public Cloud
2. Private Cloud
3. Hybrid Cloud
4. Community Cloud

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Cloud Computing is the delivery of computing services—including servers, storage, databases, networking, software, analytics, and intelligence—over the Internet (“the cloud”) to offer faster innovation, flexible resources, and economies of scale. You typically pay only for cloud services you use, helping lower your operating costs, run your infrastructure more efficiently and scale as your business needs change.

Types of Cloud

1. Public Cloud
2. Private Cloud
3. Hybrid Cloud
4. Community Cloud

What is Public Cloud?

The whole computing infrastructure are in the cloud computing company like AWS, Azure, iCloud etc. Public cloud uses shared resources. Multiple customers share the same cloud infrastructure. UBER Car rental application executes in Other people server (Amazon web services cloud server). Currently UBER moves their application to Microsoft Azure Cloud server for cut down the cost.

What is Private Cloud?

Private Cloud uses dedicated private hardware. Each organization uses their own cloud infrastructure. The cloud infrastructures do not shared by others. The security and control level are highest while using a private network. But it cost more than public cloud.

What is Hybrid Cloud?

Hybrid Cloud uses both public and private cloud. Public cloud can be used to interact with customers. Data can be stored in the private cloud for the security reason.

What is Community Cloud?

Community cloud provides infrastructure which is shared between various communities with common concerns. For example, a community cloud can belong to a government of a single country.

❖ Server Hosting Mode

- ✍ Option 1: They can buy their own server and execute their application.
- ✍ Option 2: They can host and execute their application in Other people Cloud platform like Amazon Web Services.

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UBER has two options to execute their car rental application.

Option 1: They can buy their own server and execute their application.

Option 2: They can host and execute their application in Other people Cloud platform like Amazon Web Services.

In both the cases, UBER needs following resources sufficiently:

- ✓ CPU for Processing (Computation)
- ✓ Memory (RAM)
- ✓ Network
- ✓ Storage (Hard Disk)

Key Goals

In both server hosting modes, there are two key goals:

1. Avoiding Over Provisioning
2. Fast Deployment

On-premise software is installed locally, on a company's own computers and servers. Some vendors also offer "hybrid" deployments, in which cloud software is hosted on an organization's private servers.

On-premise cloud computing means the cloud infrastructure is running inside the company and is managed by a product such as OpenStack. For example, an enterprise may want flexible provisioning of their resources, but not allow hating on external cloud providers.

❖ About Amazon

- ✍ Cloud provides various benefits for any kind of businesses.
- ✍ Amazon has few hundred thousand network servers. Amazon has hundreds of best trained network engineers.
- ✍ AWS provides multiple layer of redundancy.
- ✍ This means that when one component fails, AWS automatically moves the application processing to another computer.

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What advantages Cloud Provider Provides?

- ✓ Efficiency / cost reduction
- ✓ Data security
- ✓ Scalability
- ✓ Mobility
- ✓ Disaster recovery
- ✓ Competitive edge
- ✓ Control

What Amazon has?

Amazon has few hundred thousand network servers. Amazon has hundreds of best trained network engineers.

What Amazon can provide?

AWS provides multiple layer of redundancy. This means that when one component fails, AWS automatically moves the application processing to another computer. For example, if one hard disk (one component) AWS automatically moves the data to another hard disk. Another example is if one computer fails, AWS moves the application processing to another computer automatically and instantly.

In Amazon, resources are connected in various geographically remote locations; therefore, the failure of one complete region could trigger a predefined relocation. For example, if there is a failure in America Region, the Asia region computer will automatically picks up the execution. The network requests are automatically re-routed to the new relocation.

AWS provides CPU as required basis. In other words, on demand basis. Therefore, customers can use the CPU as needed basis.

AWS provides the resources on demand basis, therefore customer can pay-as-you-go basis. Customers will pay based on usage rather than fixed cost. This will cut down the cost compare to execute the application workloads locally (on premises hosting). The main advantages of pay-as-you-go method is that there are no wasted resources, since customers only pay for services used, rather than provisioning for a certain amount of resources that may or may not be used.

❖ Types of Security Threats

🔗 In Cloud Computing, there are two types of security threats:

1. Security Threats Faced by Cloud Providers
2. Security Threats Faced by Customers

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In Cloud Computing, there are two types of security threats:

1. Security Threats Faced by Cloud Providers
2. Security Threats Faced by Customers

A data breach (or leak) is possibly the most widespread cloud security concern. It usually happens as a result of cloud computing security attacks, when unauthorized users or programs gain access to confidential data and can view, copy, or transmit it.

Secured Infrastructure

AWS provides security for their underlying Networking and Compute Infrastructure

- ✓ Apply Single Sign-On for multiple accounts with various service providers to make it easier on the IT administration staff to monitor the cloud.
- ✓ Use virtual firewalls instead of first-generation firewalls
- ✓ Incorporate data loss prevention tools

❖ Payment Model

- ✂ Pay-per-use It is also called as Metered Payment Services.
- ✂ It is one type of payment structure where customer pays what they actually used from the unlimited resources.

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Pay-per-Use

Metered services (also called pay-per-use) is any type of payment structure in which a customer has access to potentially unlimited resources but only pays for what they actually use. Metered services are becoming increasingly common in enterprise information technology (IT) environments. With utility computing, for example, a company can purchase computing resources to match fluctuating needs. This approach is promoted as being more cost-effective for the company than maintaining a large infrastructure that exceeds the company's average computing power requirements.



Cost Saving Payment Model

The adaptability of oneself serve framework licenses use designs that would have been inconceivable utilizing conventional register standards. Suppose you have to rapidly test a conceivable application configuration you're dealing with. In the days of yore, even if the test kept going just 60 minutes, you would in any case need to discover free limit on a physical server in the server room. When the test finished, you'd in any case be paying the support and proprietorship costs of that server limit even on the off chance that it was inert.

In the cloud, conversely, you fire up an instance, run it for the period of time your test requires, and then shut it down. You'll be charged for just that testing time, which, in a few cases, could cost you a small amount of a penny. Since there's no human processing associated with cloud figure charging, it's as simple for a provider to charge a couple of pennies as it is thousands of dollars. This metered installment makes it conceivable to consider completely better approaches for testing and conveying your applications, and it regularly implies your cost-cycle costs will be considerably lower than they would on the off chance that you were utilizing physical servers running on-premises.

❖ Server Virtualization

- ✍ Server Virtualization is a process of partitioning the physical servers into multiple isolated virtual environment.
- ✍ The virtual environments are sometimes called virtual private servers, but they are also known as guests, instances, containers or emulations.
- ✍ Server Virtualization masks the server resources.
- ✍ In other words, Server Virtualization allows the cloud provider to provide on-demand compute resources for their customers in variety of configuration.

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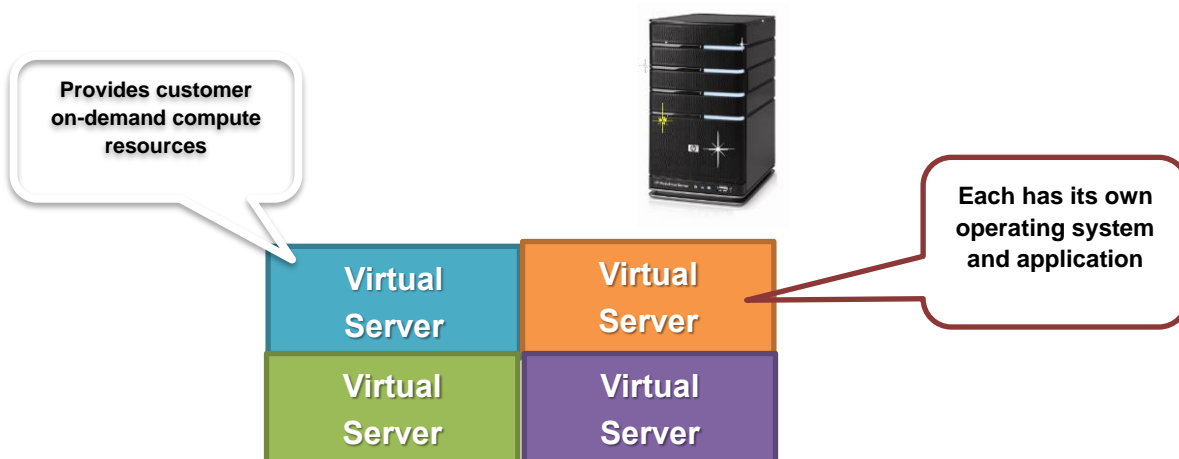
The secret sauce that lets cloud providers give their customers on-demand compute resources in such a wide scope of configurations is virtualization. At the point when you demand a virtual machine (VM) with a specific processor speed, memory limit, and storage size, AWS doesn't send some poor specialist going through the lobbies of its data focus searching for an accessible machine with precisely that profile.

Server virtualization endeavors to address both of these issues in a single singular motion. By utilizing uniquely planned programming, a director can change over one physical server into numerous virtual machines. Each virtual server acts like a special physical gadget, fit for running its very own working framework (OS). In principle, you could make enough virtual servers to utilize the majority of a machine's processing power, however by and by that is not generally the best idea.

Virtualization is definitely not another idea. PC researchers have been making virtual machines on supercomputers for quite a long time. In any case, it's just been a couple of years since virtualization has turned out to be achievable for servers. In the realm of data technology (IT), server virtualization is a hotly debated issue. It's as yet a youthful technology and a few organizations offer distinctive approaches.-

Server virtualization is a parcel of physical servers into numerous virtual servers. Here, each virtual server is running its own working framework and applications. It very well may be said that server virtualization in cloud figuring is the concealing of server resources. The server knows about the identity of individual physical servers. The single physical server is divided into numerous detached virtual servers, with the assistance of programming.

Today, the organizations contain an enormous number of servers yet don't utilize them. This outcomes as, the misuse of costly servers. We can utilize server virtualization in IT foundation, this can lessen cost by expanding the usage of existing servers. Server virtualization by and large advantages from little to medium scale applications.



❖ Cloud Platform Models

🔗 Server Platform Models

1. Cloud Platform Models : IaaS
2. Cloud Platform Models : PaaS
3. Cloud Platform Models : SaaS

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Cloud Platform Models : IaaS

Infrastructure as a service (IaaS) is also known as hardware as a service (HaaS). IaaS rapidly scale up and down with your demand. Therefore, you can pay only for what you used.

AWS : IaaS

It delivers instant computer infrastructure on a rental basis. It is provisioned and managed over the Internet.

**Elastic Cloud
Compute (EC2) for
virtual machine**

**Elastic Block Store
(EBS) for storage
volumes instances**

**Elastic Load
Balancing**

Cloud Platform Models : PaaS

Organizations typically use PaaS for these scenarios

Development framework. PaaS provides a framework that developers can build upon to develop or customise cloud-based applications. Similar to the way you create an Excel macro, PaaS lets developers create applications using built-in software components. Cloud features such as scalability, high-availability and multi-tenant capability are included, reducing the amount of coding that developers must do.

AWS : PaaS

**Elastic Beanstalk
instances**

**Elastic Container
Service (ECS)**

Cloud Platform Models : SaaS

SaaS applications are sometimes called Web-based software, on-demand software, or hosted software.

If you have used a web-based email service such as Outlook, Hotmail or Yahoo! Mail, then you have already used a form of SaaS. With these services, you log into your account over the Internet, often from a web browser. The

email software is located on the service provider's network and your messages are stored there as well. You can access your email and stored messages from a web browser on any computer or Internet-connected device.

SaaS Products



Responsibilities on each Cloud Model

Based on

- ✓ Application
- ✓ Security
- ✓ Database
- ✓ Middleware
- ✓ OS
- ✓ Networking
- ✓ Virtualization
- ✓ Server Storage
- ✓ Server Hardware

❖ Serverless Computing

- ✎ Serverless Computing is a way of providing backend as a Services (BaaS) on a pay-as-you-go basis.
- ✎ Serverless computing eliminates the tasks on servers, infrastructure and OS management.
- ✎ In other words, Serverless allows the developer to build and deploy application without thinking about servers.
- ✎ Serverless computing is driven by the reaction to events and triggers happening in near-real-time in the cloud

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The term 'serverless' is somewhat misleading, as there are still servers providing these backend services, but all of the server space and infrastructure concerns are handled by the vendor. Serverless means that the developers can do their work without having to worry about servers at all.

It is also called as Serverless Workloads.

Example of backend services :

1. Database Services
2. Storage Services
3. Etc

What are the advantages of serverless computing?

Lower costs - Serverless computing is generally very cost-effective, as traditional cloud providers of backend services (server allocation) often result in the user paying for unused space or idle CPU time.

Simplified scalability - Developers using serverless architecture don't have to worry about policies to scale up their code. The serverless vendor handles all of the scaling on demand.

Simplified backend code - With FaaS, developers can create simple functions that independently perform a single purpose, like making an API call.

Quicker turnaround - Serverless architecture can significantly cut time to market. Instead of needing a complicated deploy process to roll out bug fixes and new features, developers can add and modify code on a piecemeal basis.

Serverless Computing Example

- ✎ A file is **uploaded** to the **website**.
- ✎ This action can trigger a **lambda function** which will **zip the file**, if the **file size is > 10 MB**

❖ Key Principles of Cloud Provider

📌 Key Principles of Cloud Provider

1. Security
2. Elasticity

Key Principles of Cloud Provider

1. Security
2. Elasticity

Key Principles of Cloud Provider : Scalability

For any application, whenever a demand for the resources, the scalable service will automatically grow in capacity.

The cloud provider must constantly monitor the hosted application health.

Suppose, the hosted application needs a additional RAM, the scalable service should able to provide that with no time.

Key Principles of Cloud Provider : Elasticity

AWS has the name Elastic in many services like Elastic Compute Cloud, Elastic Load Balancing, Elastic Beanstalk, and so on.

In these services, addition resources are added when the demand spikes.

Additional resources are automatically shut down when demand drop back down.