# INFOSEC Skills

## Course 01:
## Cloud concepts

# INFOSEC Skills

# What you'll learn

- ➤ Knowledge check

- ➤ Cloud computing essentials

- ➤ Benefits of cloud computing

- ➤ AWS cloud economics

- ➤ Cloud computing deployment models

- ➤ Cloud architecture design principles

- ➤ Knowledge check review

- ➤ Cloud concepts summary

# C01: About the exam

# About the exam

**AWS CLF-C01**

The AWS Certified Cloud Practitioner examination is intended for individuals who have the knowledge and skills necessary to effectively demonstrate an overall understanding of the AWS Cloud, independent of specific technical roles:

- **Intended audience**
  - Aspiring certified AWS cloud practitioners
  - Technical & non-technical seeking knowledge of the AWS platform

- Current Version: CLF-C01
- Cost: $100

# Exam questions

The AWS Certified Cloud Practitioner examination is intended for individuals who have the knowledge and skills necessary to effectively demonstrate an overall understanding of the AWS Cloud, independent of specific technical roles:

- 65 graded questions
- 15 research questions (varies)
- **70% passing score** (100 - 1000)
- Question response types*:
  - Multiple-choice
  - Multiple-response: Select two correct answers out of five

*Unanswered questions are marked incorrect

# About the exam

**Cloud Concepts (28%)**

- Understand AWS cloud concepts
  - 35 – 35 Qs

**Technology (36%)**

- Understand core AWS services
- 45 – 55 Qs

**Security (24%)**

- Understand security and compliance within the AWS cloud
- 30 – 36 Qs

**Billing and Pricing (12%)**

- Understand the economics of the AWS cloud
- 15 – 18 Qs

# C01: Domain knowledge check

# Question response types

| Multiple Choice | Multiple Response |
|---|---|
| • Choose one correct answer: | • Choose two (2) correct answers out of five (5): |

What service is used for threat detection and monitoring of malicious/unauthorized behaviour?

- ◯ AWS CloudHSM
- 🟢 Amazon GuardDuty
- ◯ AWS KMS
- ◯ AWS Shield

Which services are not security services offered by AWS?

- ◯ AWS CloudHSM
- 🟢 Amazon GuardDuty
- ◯ AWS KMS
- ◯ AWS Shield
- 🟢 AWS S3

# Knowledge check (1 of 3)

**Cloud Concepts**

**Question: Which of the following is an AWS Well-Architected Framework design principle related to reliability?**

A.   Deployment to a single availability zone

B.   Ability to recover from failure

C.   Design for cost optimization

D.   Perform operations as code

# Knowledge check (1 of 3)

**Cloud Concepts**

**Question: Which of the following is an AWS Well-Architected Framework design principle related to reliability?**

A.    Deployment to a single availability zone

**B.    Ability to recover from failure**

C.    Design for cost optimization

D.    Perform operations as code

Answer: B. Ability to recover from failure

**Cloud Concepts**

# Knowledge check (2 of 3)

**Question: Which term describes a system designed to withstand the failure of multiple components?**

A.   Scalability

B.   Elasticity

C.   High availability

D.   Decoupling

# Knowledge check (2 of 3)

**Cloud Concepts**

**Question: Which term describes a system designed to withstand the failure of multiple components?**

A. Scalability

B. Elasticity

**C. High availability**

D. Decoupling

Answer: C. High availability

# Knowledge check (3 of 3)

**Cloud Concepts**

**Question: According to AWS, what is the benefit of elasticity?**

A. Minimize storage requirements by reducing logging and auditing activities

B. Scale systems to the required capacity based on changes in demand

C. Enable AWS to automatically select the most cost-effective services

D. Accelerate the design process because recovery from failure is automated, reducing the need for testing

**Cloud Concepts**

**Question: According to AWS, what is the benefit of elasticity?**

A.  Minimize storage requirements by reducing logging and auditing activities

**B.  Scale systems to the required capacity based on changes in demand**

C.  Enable AWS to automatically select the most cost-effective services

D.  Accelerate the design process because recovery from failure is automated, reducing the need for testing

Answer: B. Scale systems to the required capacity based on changes in demand

# C01: Cloud computing essentials

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# What is
# AWS Cloud?

AWS offers a versatile cloud platform with on-demand IT resources, enabling businesses and individuals to access a wide range of services quickly and affordably.

## 200+ Services

Amazon EC2

Database

Simple Storage Service

Amazon CloudFront

Amazon CloudWatch
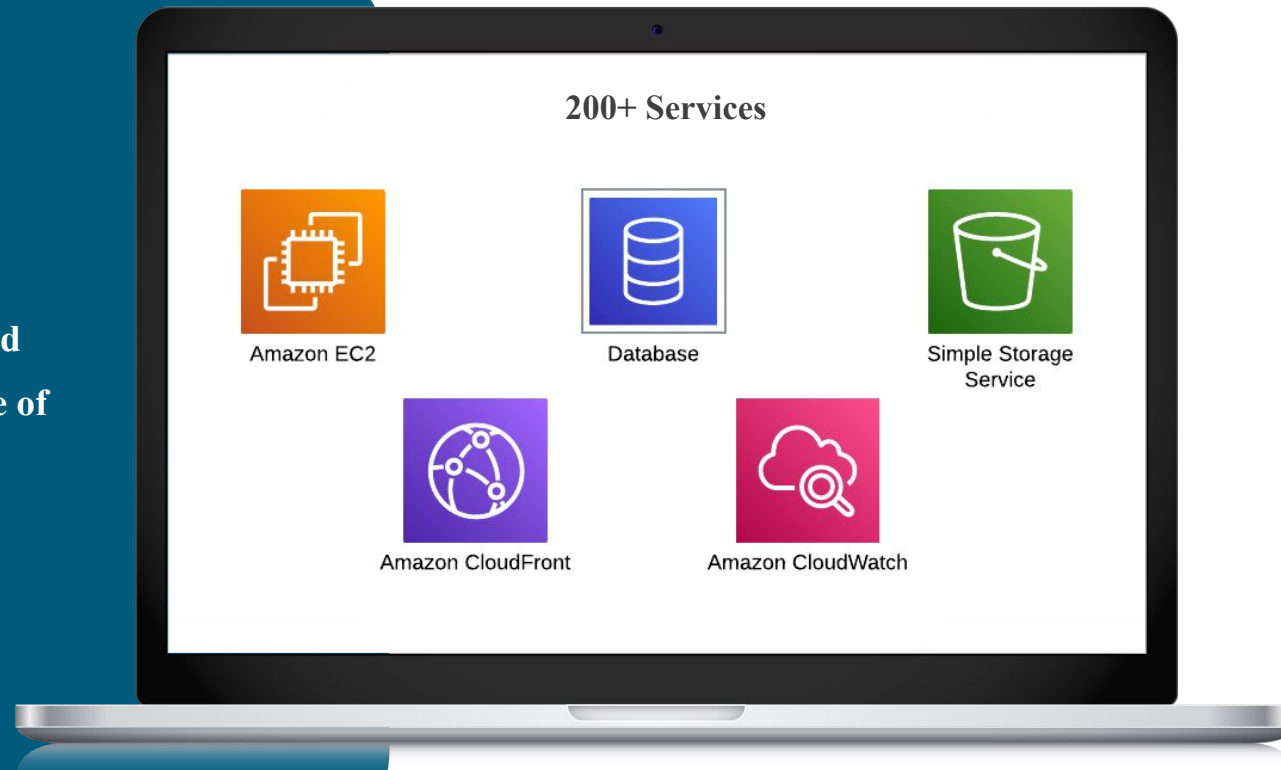
## Advantages

✓ Cost-effective, pay-as-you-go pricing

✓ Scalability

✓ Global reach

✓

# Traditional deployments vs. cloud deployments

**Traditional deployment**

- Monolithic Infrastructure (difficult to change)

- Upfront capital and operating expenses (e.g., servers, buildings, security equipment and manpower, etc.)

- Limited remote access for on-premises data and applications

- High TCO (Total Cost of Ownership)

**Cloud deployment**

- Fast, flexible, and scalable infrastructure on-demand

- Pay-as-you-go or subscription costs

- Greater accessibility and collaboration (via the internet)

- Lower TCO (Total Cost of Ownership)

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# C01: Benefits of cloud computing

# Word definition

### Agility

The ability to rapidly develop, deploy and update AWS resources quickly in respond to changing business needs. This makes it easy to respond to changes in the market or user demands.

### Elasticity

AWS allows you to easily adjust your resources based on your needs. You can quickly scale up or down your computing power, storage, or other services, which helps you manage costs and maintain performance.

### Scalability

AWS can handle your growing needs by providing you with the ability to scale your resources easily. Whether you have a small project or a large enterprise, AWS has the capacity to support your growth.

# Word definition (cont'd)

### Reliability

AWS maintains a reliable infrastructure by using multiple data centers, making sure your data is always available when you need it. If one data center faces an issue, others can take over, ensuring uninterrupted service.

### High availability

AWS has data centers across the globe, which allows your applications to run continuously without downtime. This means users can access your services at any time, without interruptions.

### Security

AWS provides a comprehensive set of security services customizable features to help protect customer data and applications. These services include identity and access management, encryption, network security, logging and monitoring, and more.

# Word definition (cont'd)

**Pay-as-you-go pricing**

AWS charges you only for the resources you actually use, without any long-term commitments. This means you don't have to pay for unused services or worry about predicting your future needs.

**Global reach**

With data centers in multiple countries, AWS allows you to reach a global audience without any additional investment. This helps you expand your business to new markets and serve customers around the world.

**Economy of scale**

As more users join the AWS platform, the cost of providing services decreases. This enables AWS to offer lower prices, which ultimately saves you money.

# Benefits of AWS

### Pay-as-you-go pricing
Only pay for resources used, optimizing costs and reallocating savings to grow the business.

### Increase speed and agility
Rapid access to IT resources allows for faster innovation and increased organizational flexibility.

### Benefit from massive economies of scale
Lower prices due to aggregated usage, benefiting from AWS's massive customer base.

### Realize cost savings
Focus on core business functions, rather than maintaining data centers, maximizing value.

### Stop guessing capacity
Flexible scaling eliminates costly idle resources or limited capacity issues.

### Go global in minutes
Deploy applications worldwide with low latency, providing an enhanced customer experience at minimal cost.

# C01: AWS cloud economics

**Optimizing the cost of AWS cloud computing resources**

# Total cost of ownership

**Operational expenses (OpEx)**

Ongoing costs for running IT infrastructure, minimized in cloud environments like AWS with pay-as-you-go pricing.

**Capital expenses (CapEx)**

Up-front costs for physical hardware and equipment, reduced in AWS as they own and maintain the infrastructure.

**On-premises labor costs**

Salaries and benefits for IT staff managing on-premises infrastructure, often lowered in cloud as provider handles maintenance.

**Cloud impact on software licensing**

Expenses for managing software licenses, simplified and potentially cheaper with pay-as-you-go model in the cloud.

# TCO example

An online retail store currently maintains its own data center infrastructure, including servers, storage, and networking equipment, to host its e-commerce platform, manage inventory, and process orders.

## Traditional deployment

- 10 physical servers
- 50 TB of storage
- Networking equipment
- Security appliances
- Data center space, power and cooling
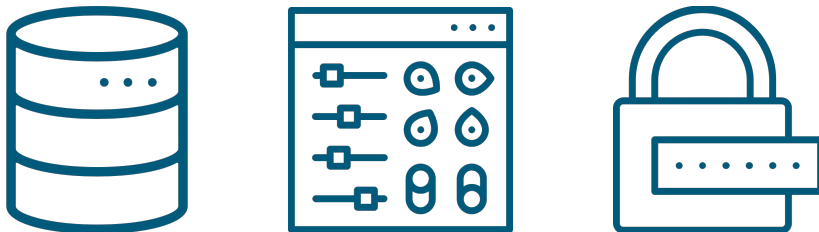
## Cloud deployment

- Migrate e-commerce platform to Amazon EC2 instances
- Use Amazon RDS for database management
- Store inventory data in Amazon S3
- Leverage Amazon CloudFront for content delivery
- Implement AWS security services for protection

**RIGHT-SIZED WORKLOADS**

**Optimize** the resources allocated to workloads to achieve the desired performance at the lowest possible cost

**Right-sized Infrastructure**

Benefits of automation

Reduce compliance scope

Managed services

# Right-sized infrastructure

**Improved performance**

Optimize resource usage and reduce the risk of bottlenecks or other issues that can impact workload performance.

**Cost savings**

Optimize resource usage and reduce waste, leading to cost savings over time.

**Increased efficiency**

Optimize resource usage and eliminate waste to reduce the time and effort required to manage workloads.

**Enhanced scalability**

Quickly and easily scale their resources up or down to meet changing business needs.

**Improved security and compliance**

Improve the security and compliance posture of their AWS resource by reducing the attack surface of workloads.

**BENEFITS OF AUTOMATION**

**Helps** organizations achieve greater efficiency, reliability, scalability, and cost savings while also improving consistency and agility

Right-sized infrastructure

**Benefits of automation**

Reduce compliance scope

Managed services

# Benefits of automation

**Increased efficiency**
Reduce the time and effort required to complete manual tasks.

**Improve reliability**
Eliminate errors and reduce the risk of downtime or other issues.

**Enhanced scalability**
Quickly and easily scale their AWS resources up or down to meet changing business needs.

**Cost savings**
Optimize resource usage and reduce wasted resources.,

**Consistency**
Ensure that AWS resources are provisioned and configured consistently across environments.

**Agility**
Rapidly deploy and update AWS resources, allowing teams to quickly respond to changing business needs.

# AWS Cloud Services

**Amazon EC2**

**Compute**–

Processing power for running applications and workloads

**Simple Storage Service**

**Storage**

Scalable and durable data storage solutions for various use cases.

**Database**

**Database**–

Store and retrieve structured, unstructured, and in-memory data

**Amazon CloudFront**

**Networking**

Ensures secure, reliable, and fast connections between resources and services

**Amazon GuardDuty**

**Security**

Protects and manages access to cloud resources, data, and applications

**REDUCE COMPLIANCE SCOPE**

**Achieve greater efficiency, reliability, scalability, and cost savings, while also improving consistency and agility**

Right-sized infrastructure

1

Benefits of automation

**Reduce compliance scope**

Managed services

# Reduce compliance scope

**Enhanced security**
AWS Managed Services ensures infrastructure and application compliance via automated patching, backups, log monitoring, and access control.

**Operational efficiency**
Automate deployment, monitoring and maintenance with AWS Managed Services, reducing overhead and refocusing on customer value.

**Reduced cost**
Save on hiring IT staff, hardware and software expenses by leveraging AWS Managed Services for infrastructure and application management.

**Scalability**
Effortlessly scale infrastructure and services to match business demands with AWS Managed Services.

**Proactive management**
Detect and address issues before they affect business operations with proactive management and monitoring from AWS Managed Services.

**Reduce** administrative and operational overhead by offloading infrastructure management tasks to AWS

Right-sized infrastructure

Benefits of automation

Reduce compliance scope

**Managed services**

# Managed services

- **Monitoring and event management:** AWS Managed Services provides monitoring and event management for infrastructure and application services, allowing organizations to proactively identify and resolve issues. Examples
    — Amazon CloudWatch
    — AWS X-Ray
    — Amazon EventBridge

- **Backup and restore:** AWS Managed Services provides backup and restore services for infrastructure and application services, ensuring that data is protected and recoverable in the event of a disaster.
    — AWS Backup
    — Amazon S3 Glacier
    — Amazon RDS (with built-in automated backups)

- **Security and compliance:** AWS Managed Services provides security and compliance features such as access control, encryption, and compliance reporting to help meet regulatory requirements.
    — Amazon GuardDuty
    — AWS Security Hub
    — AWS Identity and Access Management (IAM)

# Managed services (cont'd)

- **Patching and automation:** AWS Managed Services provides automated patching and software updates for infrastructure and application services, ensuring that systems are up-to-date and secure.

  — AWS Systems Manager

  — AWS OpsWorks

  — AWS Elastic Beanstalk (with managed platform updates)

- **Service desk:** AWS Managed Services provides a service desk for infrastructure and application services, allowing organizations to quickly resolve issues and escalate tickets as needed.

  — AWS Support

  — Amazon Connect

  — AWS Managed Services (AMS) itself, as it provides a service desk for supported AWS infrastructure and application services.

# Cloud computing deployment models

# Cloud computing models

The **cloud computing model** represents the services, servers and components that a company employs to develop and manage an application or workload in the cloud. There are three (3) cloud computing models:

- Infrastructure-as-a-Service (IaaS)

- Platform-as-a-Service (PaaS)

- Software-as-a-Service (SaaS)

Each type of cloud service and deployment method provides you with different levels of control, flexibility, and management. Understanding the differences between Infrastructure-as-a-Service, Platform-as-a-Service, and Software-as-a-Service can help you decide what set of services is right for your needs.

# Cloud computing models (cont'd)

**Infrastructure-as-a-Service (IaaS)**

IaaS offers fundamental cloud IT infrastructure, such as virtual servers, networking, messaging and storage, providing flexibility and control over IT resources.

**Platform-as-a-Service (PaaS)**

PaaS eliminates the need to manage underlying infrastructure, allowing organizations to focus on deploying and managing applications, streamlining resource procurement and maintenance tasks.

**Software-as-a-Service (SaaS)**

SaaS delivers a fully managed product run by the cloud service provider, requiring users to only focus on utilizing the software, such as web-based email or Amazon Workspaces for cloud-native persistent desktops.

# Cloud computing models (cont'd)

The AWS Cloud Architecture Design Principles are a set of guidelines that help customers design and operate reliable, secure, efficient and cost-effective systems in the cloud. These design principles can be applied through use of the AWS Well-Architected Framework by evaluating and improving cloud systems in these six (6) key areas:
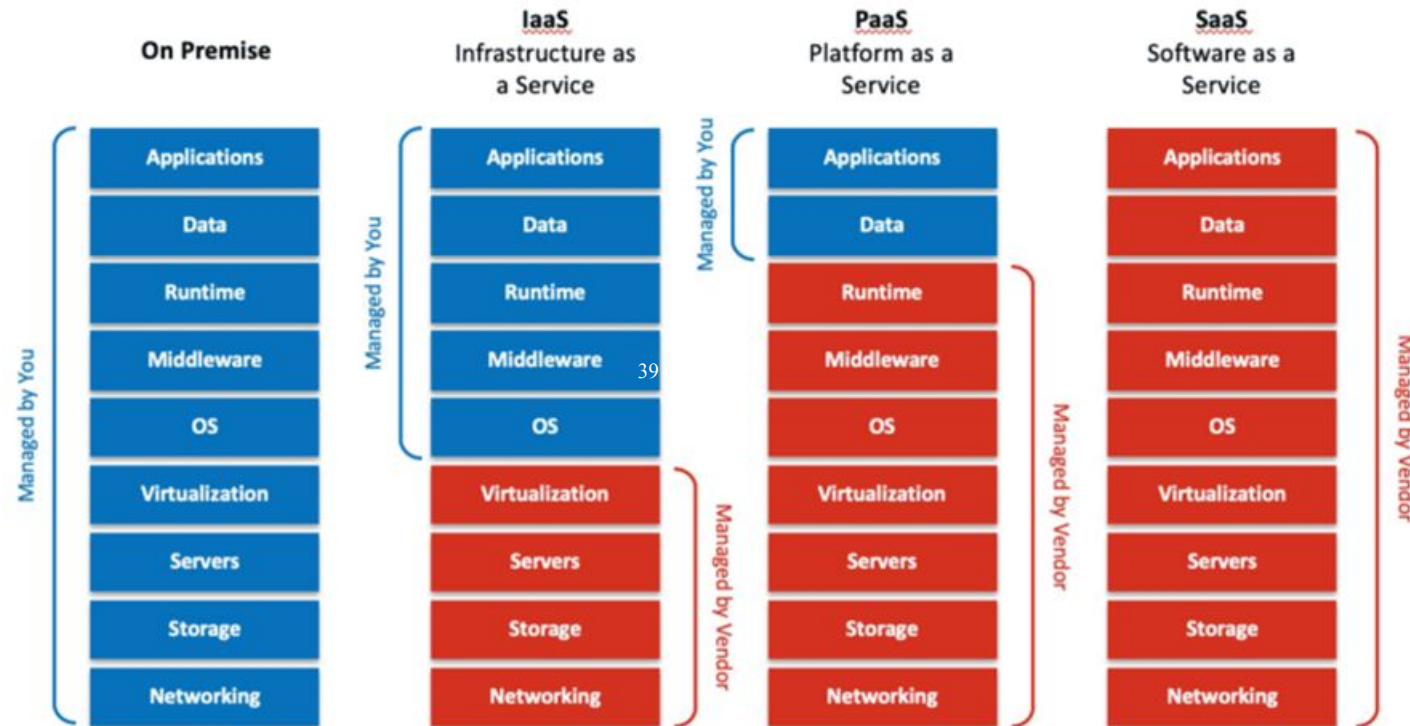
# Cloud computing deployment models

# Cloud deployment models

➤ A cloud deployment model dictates which parts of an application or workload runs in the cloud. There are three main types of cloud deployment models:

- Cloud
- Hybrid
- On-premises

# Cloud computing models (cont'd)

### Cloud

Applications fully deployed and run in the cloud, leveraging cloud infrastructure and services for scalability, management and abstraction from core infrastructure requirements.

### Hybrid

Combines cloud-based resources with on-premises infrastructure, extending an organization's infrastructure into the cloud and connecting cloud resources to internal systems for a more flexible and scalable solution.

### On-premises

Also known as "private cloud," this model utilizes virtualization and resource management tools for dedicated resources but lacks many benefits offered by cloud computing.

# Cloud architecture design principles

# Cloud architecture design principles

**The AWS Cloud Architecture Design Principles** are a set of guidelines that help customers design and operate reliable, secure, efficient, and cost-effective systems in the cloud. These design principles can be applied through use of the AWS Well-Architected Framework by evaluating and improving cloud systems in these **six (6) key areas:**

1. Operational excellence
2. Security
3. Reliability
4. Performance efficiency
5. Cost optimization
6. Sustainability

Incorporating these key areas (also known as pillars) into your architecture will help you produce stable and efficient systems.

# Cloud architecture design principles (cont'd)

**Operational excellence**
Streamline processes, monitor systems and continuously improve for efficient and effective operations.

**Security**
Protect data, assets and systems by assessing risks, ensuring compliance and managing identities.

**Reliability**
Build resilient systems that can recover from disruptions, handle failures and scale with demand.

**Performance efficiency**
Optimize resource usage to meet requirements while adapting to evolving technologies and demands.

**Cost optimization**
Minimize costs with cost-effective resources and continuous analysis for ongoing refinement.

**Sustainability**
Design environmentally friendly systems by considering energy consumption, resource usage, and waste reduction.

**AWS Well-Architected Framework Tool** is a consistent way to measure and document how your architecture meets the AWS best practices.

# Design principles

**Cloud architecture design principles** aim at maximizing four (4) main design principles of cloud computing.
These include the ability to:

### Design for failure
Build systems to be resilient, anticipating and handling failures gracefully to maintain uptime.

### Decouple components versus monolithic architecture
Break architecture into smaller, independent components to increase flexibility and reduce the impact of failures.

### Implement elasticity in the cloud versus on-premises
Adapt resource allocation dynamically in response to varying workloads for cost efficiency and improved performance.

### Think in parallel
Leverage concurrent execution of tasks to optimize performance, minimize latency and better utilize resources.

# Knowledge question review

**Test your knowledge**

# Knowledge check (1 of 3)

**Cloud Concepts**

**Question: Which of the following is an AWS Well-Architected Framework design principle related to reliability?**

A.   Deployment to a single availability zone

B.   Ability to recover from failure

C.   Design for cost optimization

D.   Perform operations as code

# Knowledge check (1 of 3)

**Cloud Concepts**

**Question: Which of the following is an AWS Well-Architected Framework design principle related to reliability?**

A.    Deployment to a single availability zone

**B.    Ability to recover from failure**

C.    Design for cost optimization

D.    Perform operations as code

**Answer: B. Ability to recover from failure**

According to the AWS Well-Architected Framework, the ability to recover from failure is a design principle related to reliability. It emphasizes the importance of building resilient systems that can handle infrastructure or service disruptions, withstand component failures and scale horizontally to meet demand

**Cloud Concepts**

**Question: Which term describes a system designed to withstand the failure of multiple components?**

A.   Scalability

B.   Elasticity

C.   High availability

D.   Decoupling

**Cloud Concepts**

**Question: Which term describes a system designed to withstand the failure of multiple components?**

A.  Scalability

B.  Elasticity

C.  **High availability**

D.  Decoupling

**Answer: C. High availability**

High availability is one of the pillars of this framework. High availability refers to a system designed to withstand the failure of multiple components, ensuring continuous operation and minimizing downtime. This is achieved by using redundancy, fault tolerance and automatic recovery mechanisms.

# Knowledge check (3 of 3)

**Cloud Concepts**

**Question: According to AWS, what is the benefit of elasticity?**

A.   Minimize storage requirements by reducing logging and auditing activities

B.   Scale systems to the required capacity based on changes in demand

C.   Enable AWS to automatically select the most cost-effective services

D.   Accelerate the design process because recovery from failure is automated, reducing the need for testing

# Knowledge check (3 of 3)

**Cloud Concepts**

**Question: According to AWS, what is the benefit of elasticity?**

A.    Minimize storage requirements by reducing logging and auditing activities

**B.**    **Scale systems to the required capacity based on changes in demand**

C.    Enable AWS to automatically select the most cost-effective services

D.    Accelerate the design process because recovery from failure is automated, reducing the need for testing

**Answer: B. Scale systems to the required capacity based on changes in demand**

Elasticity is a key concept in AWS, which allows customers to automatically and dynamically scale their infrastructure up or down based on the changes in demand. This helps customers to optimize their costs and ensure they have the necessary resources available when needed.

# Cloud concepts summary

# Summary

## Cloud computing essentials

- **Cloud computing:** Cloud The on-demand delivery of compute power, database, storage, applications and other IT resources through a cloud services platform.
- **AWS**: A cloud computing platform that offers clouds services

## Benefits

- **Elasticity/scalability:** Scale resources up or down, based on demand
- **Cost-effective:** Eliminate upfront capital expenses and reduce operational costs
- **Agility and speed:** Quickly deploy and manage applications and services
- **Pay-as-you-go pricing:** Pay for only what you use
- **Security and compliance:** Robust security features and compliance certifications
- **Innovation:** Access to cutting-edge technology for rapid innovation

# Summary (cont'd)

## TCO (Total Cost of Ownership)

- **Operational expenses (OpEx):** Ongoing expenses to run a business

- **Capital expenses (CapEx):** Initial investment in assets or infrastructure

- **Labor costs:** Expenses related to on-premises operations

- **Software licensing costs:** Reduced costs when moving to the cloud

## Reduced costs

- **Right-sized infrastructure:** Match infrastructure to actual needs

- **Automation benefits:** Streamline processes and reduce manual tasks

- **Reduced compliance scope:** Simplified reporting and audits

- **Managed services:** Services like RDS, ECS, EKS and DynamoDB simplify infrastructure management

- Reducing costs by moving to the cloud (by offloading infrastructure operations to AWS)

# Summary (cont'd)

## Cloud computing models

- **Infrastructure-as-a-Service (IaaS):** Rent virtualized computing resources over the internet (Example: AWS EC2)

- **Platform-as-a-Service (PaaS):** Develop, run and manage applications without dealing with underlying infrastructure (Example: AWS Elastic Beanstalk)

- **Software-as-a-Service (SaaS):** Access software applications over the internet on a subscription basis (Example: Salesforce)

## Cloud architecture design principles

- **Design for failure:** Build systems to withstand failures and ensure continued operation

- **Decouple components:** Break down applications into smaller, independent parts (Example: Monolithic architecture vs. microservices)

- **Implement elasticity:** Scale resources up or down, depending on demand (Example: On-premises vs. cloud)

- **Think parallel:** Utilize multiple processes or resources to achieve better performance and efficiency

# Up next: C02 — Security