

**Hardware Networking**

**Business Continuity In The Cloud**

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**1. How to Configure, Develop, and Maintain Security and Privacy in Cloud?**

Security and privacy in cloud computing involve protecting data, applications, and infrastructure from unauthorized access, data breaches, and cyber threats. The process can be divided into:

**A. Configuring Security in Cloud**

1. **Identity and Access Management (IAM)**
   * Use IAM roles and policies to define who can access which resources.
   * Implement Multi-Factor Authentication (MFA) for better security.
   * Follow the principle of least privilege (PoLP).
2. **Data Encryption**
   * Encrypt data at rest (stored data) and in transit (moving data).
   * Use cloud provider encryption tools like AWS KMS, Azure Key Vault, and Google Cloud KMS.
3. **Firewalls and Network Security**
   * Configure security groups and Virtual Private Cloud (VPC) settings to control traffic.
   * Use Web Application Firewalls (WAF) to prevent attacks like SQL injection and cross-site scripting.
4. **Monitoring and Logging**
   * Enable monitoring tools like AWS CloudTrail, Azure Monitor, and Google Cloud Logging.
   * Set up alerts for unusual activity.

**B. Developing Secure Applications in Cloud**

* Follow Secure Software Development Lifecycle (SDLC).
* Implement DevSecOps to integrate security in development and deployment.
* Use security scanning tools to detect vulnerabilities.

**C. Maintaining Security and Privacy in Cloud**

* Regularly update and patch software.
* Perform periodic security audits.
* Implement backup and disaster recovery plans.

**2. What is Portability in Cloud?**

Cloud portability refers to the ability to move applications, workloads, and data between different cloud environments with minimal modifications.

**Types of Cloud Portability:**

* **Application Portability:** Moving applications from one cloud provider to another without rewriting code.
* **Data Portability:** Transferring data between different cloud storage services.
* **Platform Portability:** Migrating an entire cloud environment with dependencies intact.

**Challenges in Cloud Portability:**

* Differences in APIs and services between cloud providers.
* Data format inconsistencies.
* Licensing issues and vendor lock-in.

**3. What is Reliability and High Availability in Cloud?**

* **Reliability** refers to the ability of a cloud system to operate consistently without failures.
* **High Availability (HA)** ensures that applications remain accessible even in the event of hardware/software failures.

**Ways to Achieve High Availability in Cloud:**

1. **Redundancy and Failover** – Deploy multiple instances of applications across different regions.
2. **Load Balancing** – Distribute traffic to prevent overload on a single server.
3. **Auto Scaling** – Automatically adjust resources based on demand.
4. **Disaster Recovery (DR)** – Have a backup plan using secondary data centers or cloud regions.

Cloud providers offer built-in HA features such as AWS Elastic Load Balancer, Azure Traffic Manager, and Google Cloud Load Balancing.

**4. Describe Mobility Cloud Computing**

Mobility Cloud Computing refers to providing cloud-based services to mobile devices, enabling users to access applications and data from anywhere.

**Key Features:**

* **Anywhere Access:** Users can access resources from any device (smartphones, tablets).
* **Synchronization:** Data syncs across multiple devices.
* **Security:** Uses encryption and authentication to secure mobile data.

**Examples:**

* Google Drive, Dropbox (cloud storage).
* Microsoft Office 365, Google Workspace (productivity apps).
* AWS Lambda, Firebase Cloud Functions (serverless computing for mobile apps).

**5. Describe AWS, Azure, Google Cloud Platforms**

**Amazon Web Services (AWS)**

* Launched: 2006
* Market Share: Largest cloud provider (~32%).
* Strengths: Strong ecosystem, vast services, global reach.
* Services: EC2 (compute), S3 (storage), RDS (database), Lambda (serverless).

**Microsoft Azure**

* Launched: 2010
* Market Share: Second-largest (~22%).
* Strengths: Hybrid cloud capabilities, integrates well with Microsoft products.
* Services: Virtual Machines (compute), Blob Storage, Azure SQL Database, Azure Functions.

**Google Cloud Platform (GCP)**

* Launched: 2011
* Market Share: Third-largest (~11%).
* Strengths: AI/ML capabilities, Kubernetes expertise.
* Services: Compute Engine, Cloud Storage, BigQuery (analytics), Cloud Functions.

**6. Accessing AWS, Azure, and Google Cloud Portals**

Each cloud provider has a web portal for managing services:

* **AWS:** [AWS Management Console](https://aws.amazon.com/console/)
* **Azure:** [Azure Portal](https://portal.azure.com/)
* **GCP:** [Google Cloud Console](https://console.cloud.google.com/)

You need to sign up, create a free-tier account, and authenticate via IAM policies or MFA.

**7. Create Compute, Network, and Storage on AWS, Azure, GCP**

**A. AWS**

* **Compute:** Create an EC2 instance using AWS Console.
* **Network:** Set up a Virtual Private Cloud (VPC) and define subnets.
* **Storage:** Use Amazon S3 or Elastic Block Storage (EBS).

**B. Azure**

* **Compute:** Deploy a Virtual Machine (VM) via Azure Portal.
* **Network:** Configure a Virtual Network (VNet).
* **Storage:** Use Azure Blob Storage.

**C. GCP**

* **Compute:** Create a VM using Compute Engine.
* **Network:** Set up a Virtual Private Cloud (VPC).
* **Storage:** Use Google Cloud Storage (GCS).

**8. Compare Cloud Pricing (AWS, Azure, GCP)**

Cloud pricing depends on compute, storage, and networking resources. Here's a basic comparison:

| **Service** | **AWS** | **Azure** | **GCP** |
| --- | --- | --- | --- |
| **Compute (VM 4 vCPUs, 16GB RAM, per month)** | ~$110 | ~$120 | ~$105 |
| **Storage (100GB SSD, per month)** | ~$10 | ~$12 | ~$9 |
| **Data Transfer (per GB)** | $0.09 | $0.08 | $0.12 |

**Pricing Factors:**

* AWS offers Pay-as-you-go, Spot Instances (cheaper).
* Azure provides Hybrid Benefits for Microsoft users.
* GCP has sustained use discounts.