**Cloud Security Essentials**

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

**Configuration:**

* Use **Identity and Access Management (IAM)** to control who can access resources.
* Enable **encryption** (at rest and in transit).
* Apply **firewalls**, **security groups**, and **network ACLs**.
* Configure **Multi-Factor Authentication (MFA)** for all user logins.

**Development:**

* Write secure code using best practices (e.g., input validation, least privilege).
* Use **DevSecOps** – integrate security checks in the development pipeline.
* Regularly scan code with **static and dynamic analysis tools**.

**Maintenance:**

* Regular **patching** and **updates** of software and OS.
* Monitor logs using services like **AWS CloudTrail**, **Azure Monitor**, or **GCP Logging**.
* Conduct regular **audits**, **security assessments**, and **compliance checks**.

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

**Portability** means the ability to move applications and data easily from one cloud provider to another (e.g., from AWS to Azure), or from on-premises to cloud without major rework.

* Benefits:
  + Avoids vendor lock-in
  + Improves flexibility and backup options
* Achieved using:
  + Containers (like Docker)
  + Multi-cloud strategies
  + Standard APIs and open formats

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

* **Reliability**: The ability of a system to run continuously without failure.
  + Achieved through **redundancy**, **automated backups**, and **fault tolerance**.
* **High Availability (HA)**: Ensures services remain operational with minimal downtime.
  + Achieved using **load balancers**, **multiple zones/regions**, and **replication**.

Example:

* AWS uses **Availability Zones**
* Azure uses **Availability Sets & Zones**
* GCP uses **Regions & Zones**

**4. Describe Mobility Cloud Computing**

**Mobility in Cloud Computing** refers to accessing cloud resources from mobile devices like smartphones and tablets.

* Enables users to:
  + Access data and apps anytime, anywhere.
  + Sync data across devices in real-time.
* Examples:
  + Google Drive, OneDrive, iCloud
  + Mobile management tools like Microsoft Intune, AWS AppSync

Benefits:

* Flexibility
* Real-time access
* Increased productivity

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

| **Feature** | **AWS** | **Azure** | **Google Cloud Platform (GCP)** |
| --- | --- | --- | --- |
| Owner | Amazon | Microsoft | Google |
| Launch Year | 2006 | 2010 | 2008 |
| Compute | EC2 | Virtual Machines | Compute Engine |
| Storage | S3 | Azure Blob Storage | Cloud Storage |
| Database | RDS, DynamoDB | SQL Database, Cosmos DB | BigQuery, Cloud SQL |
| Popular Tools | Lambda, CloudFormation | Azure DevOps, Logic Apps | Dataflow, Kubernetes Engine |
| Best For | Enterprise + Startups | Enterprises using Microsoft | Data & Machine Learning Workloads |

**6. Accessing AWS, Azure, and GCP (Example: AWS Portal)**

**Steps to Access AWS Portal:**

1. Go to: <https://aws.amazon.com>
2. Click **Sign In to the Console**
3. Use your **AWS credentials** to log in.
4. You can now access services like **EC2 (compute)**, **S3 (storage)**, **VPC (networking)**.

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

**✅ AWS**

* **Compute**: Launch EC2 instance
* **Network**: Create a VPC and subnet
* **Storage**: Create S3 bucket or EBS volume

**✅ Azure**

* **Compute**: Create Virtual Machine
* **Network**: Create Virtual Network (VNet)
* **Storage**: Create Blob Storage or Disk

**✅ GCP**

* **Compute**: Create VM instance in Compute Engine
* **Network**: Create VPC and subnetwork
* **Storage**: Create Cloud Storage bucket

All platforms offer step-by-step wizards to create these resources via GUI or CLI.

**8. Compare Cloud Pricing of Resources and Services (AWS, Azure, GCP)**

Here’s a **general comparison** (as of recent market trends – actual pricing varies by region, instance type, and usage):

| **Feature** | **AWS (Amazon)** | **Azure (Microsoft)** | **GCP (Google)** |
| --- | --- | --- | --- |
| **Compute (VM)** | Moderate | Slightly higher | Often cheapest (sustained discounts) |
| **Storage (Object)** | $0.023/GB (S3) | $0.0184/GB (Blob) | $0.020/GB (Cloud Storage) |
| **Free Tier** | 12-month free + always free | 12-month free + always free | 90-day $300 credit |
| **Billing Model** | Pay-as-you-go + reserved | Pay-as-you-go + reserved | Pay-as-you-go + sustained use |
| **Discount Options** | Reserved, Spot Instances | Reserved, Spot VMs | Sustained + Committed Use |

* Azure: https://azure.microsoft.com/en-us/pricing/calculator
* GCP: https://cloud.google.com/products/calculator