Experiment 7: Compare Free-Tier Cloud Providers (Unit 2)

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1. Objective

To perform a **comparative analysis** of free-tier offerings of **AWS, Microsoft Azure, and Google Cloud Platform (GCP)** by documenting services, deploying a simple workload, and evaluating performance, ease of use, and features.

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2. Platform / Tools Required

- **Cloud Accounts** (Free Tier):
  - **Amazon Web Services (AWS)** – Free Tier for 12 months.
  - **Microsoft Azure** – Free Trial with credits + limited always-free services.
  - **Google Cloud Platform (GCP)** – Free Trial credits + always-free services.
- **Workload Example**:
  - Deploy a small **Virtual Machine (VM)** instance or a simple **web application**.
- **Other Tools**:
  - Web browser
  - Cloud CLI tools (AWS CLI, Azure CLI, gcloud SDK)
  - Benchmarking tool (e.g., `ping`, `ab` for HTTP load testing, or simple app response time).

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3. Theory

The three leading cloud providers—**AWS, Azure, and GCP**—offer free-tier accounts for learning and experimentation.

- **AWS Free Tier**: Provides EC2 t2.micro/t3.micro instance (750 hours/month), S3 storage (5 GB), Lambda (1M free requests), and more.
- **Azure Free Trial**: Provides $200 credits for 30 days + 12 months free limited services (VMs, Blob storage, SQL DB).
- **GCP Free Tier**: $300 credits for 90 days + always-free small VM (f1-micro in certain regions), Cloud Functions, and BigQuery limits.

Key Comparison Factors:

- Free services and resource limits
- User interface (UI) and ease of deployment
- Performance of deployed workload
- Features and integration options

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4. Experiment Setup & Procedure

Step 1: Document Free-Tier Services

- Visit each provider's official Free Tier page.
- Note down:
  - Free VM size and duration
  - Storage limits
  - Networking bandwidth
  - Serverless options (Lambda, Functions, Cloud Functions)
  - Databases and other free-tier services

Prepare a **comparison table**.

Step 2: Deploy Similar Workloads

- **Workload Example**: Deploy a small VM or a basic Python/Node.js web app.

1. **AWS (EC2)**
   - Launch a free-tier t2.micro instance.
   - Install web server (Apache/Flask/Node.js).
   - Deploy sample app (e.g., "Hello Cloud").
2. **Azure (Virtual Machine)**
   - Create a free-tier B1s VM.
   - Install web server/application.
   - Deploy the same app.
3. **GCP (Compute Engine)**
   - Launch f1-micro VM (always free in selected regions).
   - Deploy the same app.

Step 3: Compare Performance and Features

- Measure **response time** using browser or load testing tools (`curl`, `ab`).
- Note **UI experience** (console navigation, ease of setup).
- Record **limitations** (credits, region restrictions, quotas).

Step 4: Create Comparison Matrix

Example structure:

Feature / Criteria	AWS Free Tier	Azure Free Tier	GCP Free Tier
Free VM Type	t2.micro (750 hrs)	B1s (750 hrs)	f1-micro (always free)

Feature / Criteria	AWS Free Tier	Azure Free Tier	GCP Free Tier
Free Storage	5 GB S3	5 GB Blob Storage	5 GB Cloud Storage
Free Serverless	Lambda (1M req)	Azure Functions (1M)	Cloud Functions (2M)
Free DB	RDS (750 hrs)	SQL DB (250 GB)	Firestore / BigQuery
Ease of UI	Medium	Beginner-friendly	Simple & clean
Performance (response)	<X ms	<Y ms	<Z ms
Credits	None	$200 for 30 days	$300 for 90 days

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5. Observations

- Document service availability in free tier.
- Note practical differences during deployment.
- Record performance metrics (latency, uptime, response time).

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6. Result

Successfully compared free-tier services of **AWS, Azure, and GCP** by deploying a common workload and analyzing features, performance, and ease of use. Prepared a **comparison matrix** highlighting similarities and differences.

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7. Viva Questions

1. What are the key differences between AWS, Azure, and GCP free tiers?
2. Why do cloud providers offer free-tier services?
3. Which provider is best for **learning serverless computing** and why?
4. How do free credits (Azure $200, GCP $300) impact experimentation?
5. If given a startup project, which free-tier cloud would you choose initially?

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8. Expected Outcome

Students will:

- Gain hands-on experience in working with multiple cloud providers.
- Understand **service limits and free-tier offerings**.
- Develop a **critical comparison matrix** of major cloud platforms.
- Build analytical skills for selecting the best provider based on requirements.