# Question 1

**Study the scenario and complete the question(s) that follow(s):**

Your organization is building a Software-as-a-Service (SaaS) platform designed to serve enterprise clients worldwide. The platform will handle sensitive customer data, must comply with data residency laws, and needs high availability and low latency for users in North America, Europe, and Asia.

The development team is planning to deploy the application backend using Amazon ECS with Fargate, store data in Amazon Aurora, and deliver content through Amazon CloudFront. The application will have APIs exposed through Amazon API Gateway and use AWS WAF for security.

You are tasked with reviewing the proposed architecture using the AWS Well-Architected Framework pillars (Operational Excellence, Security, Reliability, Performance Efficiency, and Cost Optimization).

* 1. Explain the role of the following AWS services in the proposed architecture: Amazon ECS with Fargate, Aurora, CloudFront.
  2. Analyse how AWS Global Services such as Route 53, CloudFront, and IAM can be used to improve global performance, security and user access management for the SaaS application.
  3. Evaluate two major risks related to data residency and compliance when operating across multiple regions. Propose AWS-native features or configurations that address these concerns.
  4. Recommend how to leverage multi-region deployment and Route 53 failover routing policy to improve availability and disaster recovery, ensuring minimal downtime.
  5. Apply three principles from three different Well-Architected Framework pillars to enhance the proposed architecture design. Justify each with a specific AWS service or design decision

# Question 2

**Study the scenario and complete the question(s) that follow(s):**

You are the cloud architect for a startup planning to launch a web-based productivity app. The application backend will be hosted using **Amazon EC2**, while frontend assets will be served through **Amazon S3 and CloudFront**. The company expects moderate usage with potential spikes during marketing events.

The proposed architecture includes:

* 4 EC2 t3.medium instances (Linux) in us-east-1, running 24/7
* 500 GB of standard Amazon EBS gp3 volume storage (attached to one EC2 Volume) with no snapshot storage.
* 1 TB of S3 Standard storage for static assets (in us-east-1)
* Monthly data transfer:
  + 500 GB from EC2 to the Internet
  + 800 GB from S3 via CloudFront to the Internet.
* Use of AWS Systems Manager (Advanced Instance Tier) at full capacity.
* @Trusted Advisor checks activated (via Business Support Plan)
* The following pricing Assumptions can be considered:
  + Total Hours 730 hours in a month
  + Pricing (on-demand): ~$0.0416/hour
  + gp3 pricing (us-east-1): ~$0.08/GB/month
  + S3 Standard cost: ~$0.023/GB
  + First 1 GB free; + $0.09/GB
  + CloudFront: ~$0.085/GB
  + The organisation intends to use AWS Systems Manager Advanced features @ $0.00695 per managed instance/hour.

# Question 3

**Study the scenario and complete the question(s) that follow(s):**

You are a Cloud Engineer for a startup, **FinSecureTech**, which is deploying its first secure web application on AWS. The company requires a secure and scalable network architecture using Amazon VPC. The architecture must support both public-facing web servers and private backend servers (such as databases), with strict network access control.

3.1 You are tasked with designing and configuring a custom VPC that meets the following requirements: (NB take screenshots of all configurations and tag resources).

a.     The VPC should have a **CIDR block of 172.16.0.0/16**.

* + VPC name: FinSecureTech

 (2 marks)

1. Create **two public subnets** (one in each Availability Zone) for hosting web servers.
   * publicSubnet\_1: 172.16.1.0/24
   * publicSubnet\_2: 172.16.2.0/24

 (2 marks)

1. Create **two private subnets** (one in each Availability Zone) for backend services such as RDS.
   * privateSubnet\_1: 172.16.10.0/24
   * privateSubnet\_2: 172.16.20.0/24

(2 marks)

3.2 Launch an EC2 Web Server Instance

·        Name: Web Server 1

·        AMI: **Amazon Linux**

·        **Amazon Linux 2023 AMI (64bit)**

·        Instance type:**t2.micro**

·        Key pair name**: vockey**.

·        Subnet: publicSubnet\_1

·        **Auto-assign public IP: enable**

·        **SecurityGroup** name: SG\_Public

·        1. Type: SSH and source: anywhere, Description: SSH for admin

·        2. Type: HTTPS and source: Anywhere, Description: permit Web requests

(8 marks)

3.3 Set up an **Internet Gateway (IGW)**  and connect it to your vpc.

* **Name**: my-internet-gateway
* Take a screenshot showing the IGW attached to the correct VPC

  (2 marks)

3.4

a. Create two route tables: one for public subnets with a route to the internet gateway (0.0.0.0/0), and one for private subnets without any external routes. Associate each route table with the appropriate subnets.

·        Name: publicRouteTable associated with public subnet

·        Name: privateRouteTable associated with private subnet

(4 marks)

a.   Configure the public subnet routing table to route to the internet gateway.

  (2 marks)

3.5 Connect to the EC2 via SSH and update the packages

     (3 marks)

3.6 Explain why the web servers are placed in public subnets and the database servers in private subnets. What are the security and design benefits of this approach?

# References

Baumann, B., 2021. *Lessons Learned from the Waste Management ERP Failure.* [Online]   
Available at: https://www.panorama-consulting.com/waste-management-erp-failure/  
[Accessed 6 August 2025].

Grant, G., Fruhlinger, J., Peter, S. & Wailgun, T., 2025. *18 famous ERP disasters, dustups, and disappointments.* [Online]   
Available at: https://www.cio.com/article/278677/enterprise-resource-planning-10-famous-erp-disasters-dustups-and-disappointments.html  
[Accessed 5 August 2025].

Reynolds, G. W. et al., 2021. *Principles of Information Systems.* 14 ed. Boston: Cengage Learning, Inc..