D782 - Task 1 - Attempt 1

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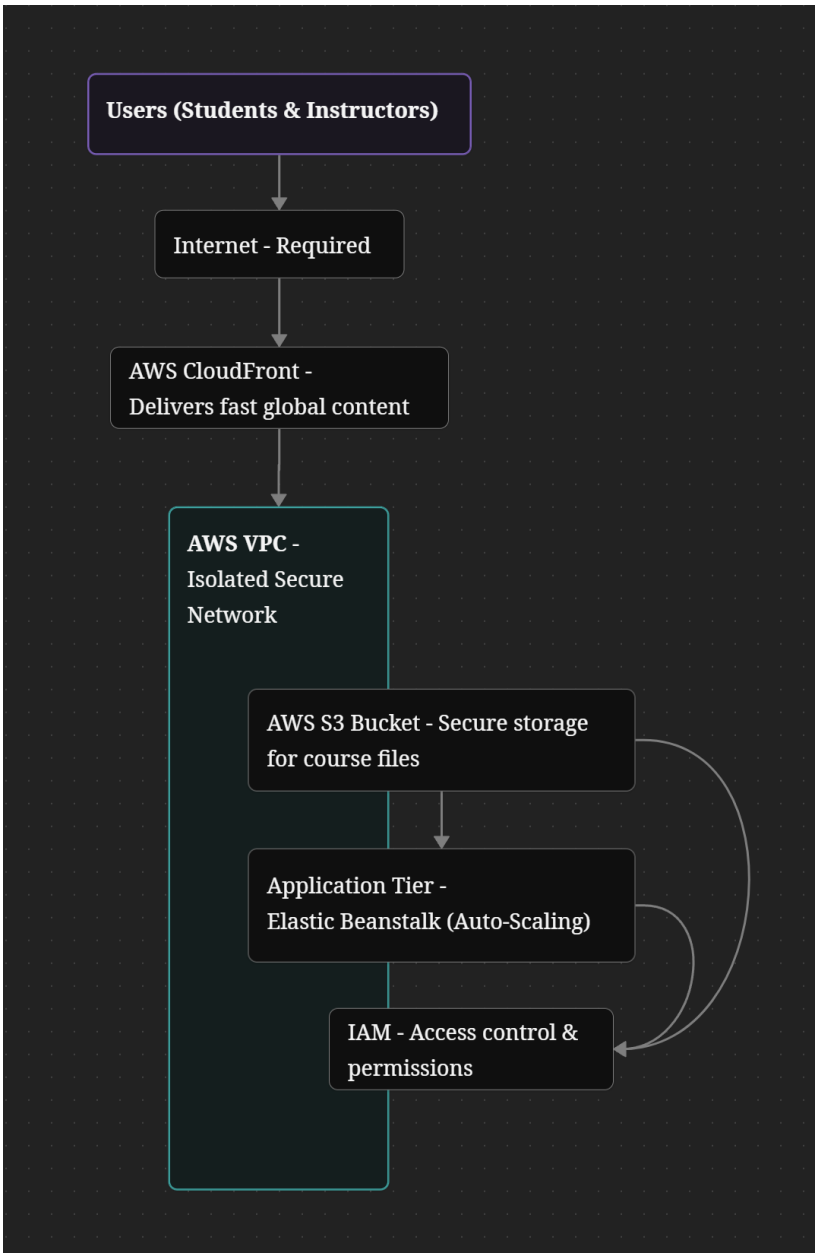
Cloud-Based Solution for CloudCampusIQ

A. Architecture Diagram



A4. Architecture Diagram Summary

The architecture diagram illustrates CloudCampusIQ's cloud-based solution on AWS, designed to support scalability, security, and high performance. Users (students and instructors) access the platform through the internet, with content delivered globally via AWS CloudFront for fast and reliable performance. The application is hosted inside an AWS Virtual Private Cloud (VPC), providing an isolated and secure environment. Within the VPC, Elastic Beanstalk manages the application tier, automatically scaling resources to handle up to 10,000 concurrent users. Course materials such as videos and PDFs are stored in an Amazon S3 bucket, which provides durable and secure storage. Security is enforced through AWS Identity and Access Management (IAM), which controls authentication and permissions for accessing both the application and stored content.

B1. Description of Cloud Provider

Amazon Web Services (AWS) was chosen for CloudCampusIQ because it directly addresses the platform's current challenges with scalability, performance, and compliance. As the user base grows toward 10,000 concurrent learners, AWS's global infrastructure and Elastic Beanstalk make it possible to deploy applications that automatically scale to meet demand without downtime. Amazon S3 provides secure and cost-effective storage for large course materials such as high-definition video lectures and lab environments, while CloudFront ensures fast, reliable content delivery to students worldwide. AWS also supports compliance with SOC 2, GDPR, and FERPA, which is critical as CloudCampusIQ expands into enterprise and educational markets. Finally, AWS Identity and Access Management (IAM) offers fine-grained access control to protect sensitive learning materials and manage user permissions effectively.

B2. Cloud Service Model Decision

The most suitable service model for CloudCampusIQ is **Platform as a Service (PaaS)** using AWS Elastic Beanstalk. This model allows the development team to focus on improving the learning platform without the overhead of manually configuring servers or managing complex infrastructure. Elastic Beanstalk automatically handles deployment, scaling, and load balancing, ensuring the application can support up to 10,000 concurrent users while maintaining consistent performance. PaaS also provides built-in integration with AWS services like S3 for storage, IAM for secure access control, and CloudFront for fast global content delivery. This approach reduces operational complexity, accelerates feature delivery, and supports CloudCampusIQ's need for reliable growth at a predictable cost.

B3. Cloud Service Provider/On-Premises Solutions Comparison

Leveraging AWS cloud services provides CloudCampusIQ with scalability and cost efficiency that far exceed on-premises alternatives. For example, AWS Elastic Beanstalk and EC2 instances can scale to support 10,000 or more concurrent learners at peak demand, while CloudFront ensures low-latency delivery to a global user base in over 100+ edge locations. An equivalent on-premises setup would require investing in multiple high-end servers (approx. $10,000–$15,000 each) plus networking equipment and redundant storage, easily exceeding $200,000 in upfront costs.

In contrast, AWS's pay-as-you-go pricing keeps monthly operating costs within the allocated $25,000 budget, while also avoiding over-provisioning during low-traffic periods. AWS also includes built-in compliance and IAM security features, eliminating the need for separate third-party tools. On-premises infrastructure would demand a larger IT staff, higher maintenance costs,

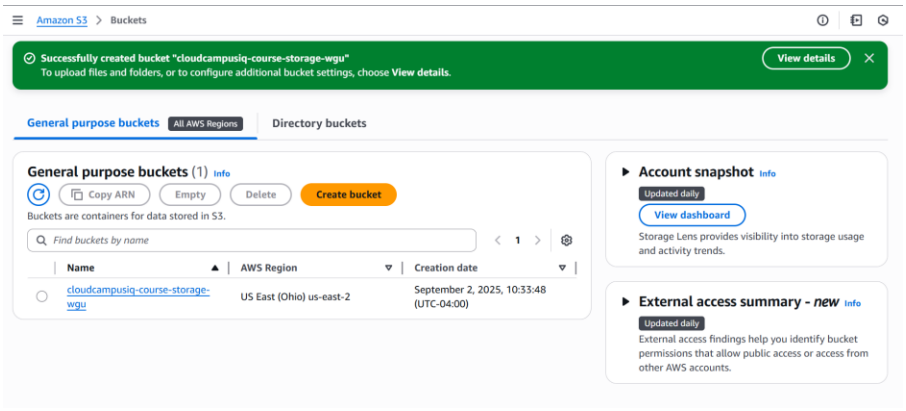
and slower scalability, making it a less practical choice for CloudCampusIQ's rapid global expansion.

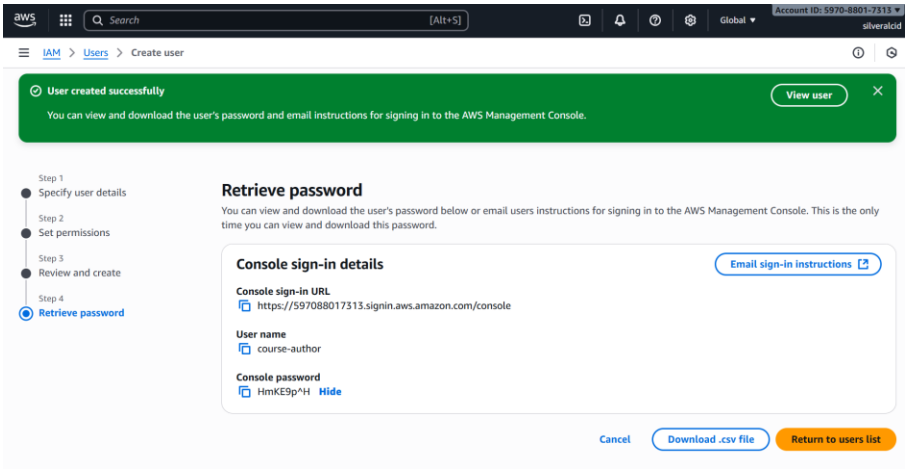
C1. Storage Service Choice

Amazon S3 was selected as the storage service because it provides secure, scalable, and cost-effective storage for CloudCampusIQ's diverse course materials, including videos, PDFs, and lab files. S3 supports fine-grained access control through AWS Identity and Access Management (IAM) and bucket policies, ensuring that only authenticated instructors and students can access specific resources. This is critical for protecting sensitive educational content while meeting compliance requirements such as FERPA and GDPR. S3 also integrates with CloudFront to deliver high-definition video lectures quickly across regions, reducing the lag students currently experience.

Additionally, S3 lifecycle policies can automatically transition older or infrequently accessed files (such as archived course versions) to lower-cost storage classes such as S3 Glacier, reducing long-term storage expenses while maintaining compliance with retention requirements.

C2. Submission of Screenshots & Explanation of Lifecycle Management Plan





Bucket policy

Edit Delete

The bucket policy, written in JSON, provides access to the objects stored in the bucket. Bucket policies don't apply to objects owned by other accounts. Learn more

Public access is blocked because Block Public Access settings are turned on for this bucket
To determine which settings are turned on, check your Block Public Access settings for this bucket. Learn more about using Amazon S3 Block Public Access

Copy

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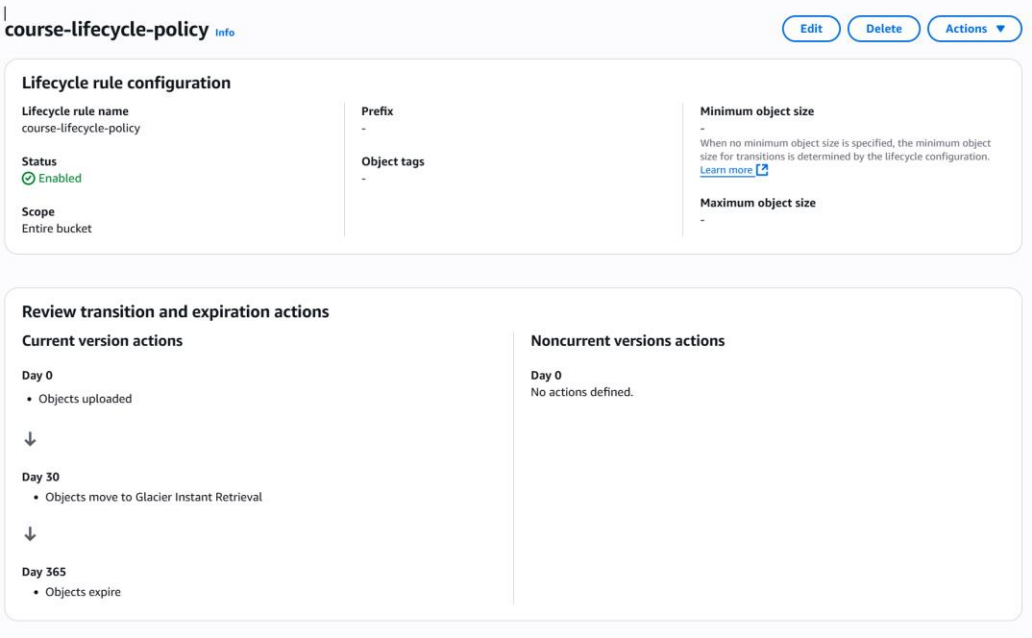
{
  "Version": "2012-10-17",
  "Statement": [
    {
      "Sid": "AllowCourseAuthorUserAccess",
      "Effect": "Allow",
      "Principal": {
        "AWS": "arn:aws:iam::597088017313:user/course-author"
      },
      "Action": "s3:*",
      "Resource": [
        "arn:aws:s3:::cloudcampusiq-course-storage-wgu",
        "arn:aws:s3:::cloudcampusiq-course-storage-wgu/*"
      ]
    }
  ]
}
```



The lifecycle management plan for CloudCampusIQ's Amazon S3 storage is designed to be easy to configure while still reducing costs:

- **New Files (0–30 Days):** All uploaded course materials (videos, PDFs, labs) stay in **S3 Standard** for fast access.
- **After 30 Days:** Files are automatically transitioned to **S3 Glacier Instant Retrieval**, which is much cheaper but still allows quick access if needed.
- **After 365 Days:** Files older than one year are automatically deleted if they are no longer required.

This setup only requires creating a single lifecycle rule in the S3 bucket console with two transitions (to Glacier after 30 days and expiration after 365 days). It is free to set up, takes just a few clicks in AWS, and ensures CloudCampusIQ keeps costs under control while meeting retention needs.