

TERMS OF REFERENCE (ToR) FOR THE PROCUREMENT OF CONSULTANCY SERVICE TO EVALUATE THE IN-COUNTRY CLOUD INFRASTRUCTURE AND HOSTING SERVICE PROVIDERS

Background

Ethiopia has developed “Digital Ethiopia 2025” as a roadmap for the country's digital transformation initiatives. In line with this strategy, the FDRE Ministry of Education (MoE) has recently approved the Digital Skills Country Action Plan (DSCAP) for 2020-2030 (MoE 2030). The action plan outlines five strategies to advance the sector's goals related to ICT. These are (i) Establishing enabling policies, digital skills framework, and digital skills assessment, (ii) Reform of digital skills programs, (iii) Enhancing the use of technology in teaching and learning, (iv) connecting educational institutions to high-speed broadband and improving campus network digital services, and (v) Capacity building and process reengineering. The national digital education strategy is framed according to this roadmap and needs to be in line with other national and institutional policies.

Over the years, MoE and Higher Education Institutes (HEIs) have invested in building connectivity and enhancing the ICT infrastructure. However, the state of digital education, notably e-learning, remains limited due to many different factors, of which the absence of standard content production studios at the HEIs is one. The low penetration of e-learning has not only resulted in compromised quality, affordability, and accessibility of education but also made the sector vulnerable to external shocks. The latter was particularly pronounced during the COVID-19 pandemic when all the HEIs were closed and unable to reach their students.

About e-SHE Partnership

In response to the broader strategy and lessons from the COVID-19 shocks, MoE and HEIs are scaling up their investments in digital education. The e-Learning for Strengthening Higher Education (e-SHE) is one of the initiatives that complement these ongoing investments. It is a five-year plan implemented by the FDRE Ministry of Education in partnership with Mastercard Foundation, Arizona State University, and Shayashone PLC. The overall goal is to strengthen the higher education system in Ethiopia through the utilization of digital technology for teaching and

Learning and equipping youth with the skills needed for employment and entrepreneurship. The specific targets are:

1. Building multimedia centers at five cluster-lead universities that ultimately serve the 50 universities. These studios are anticipated to play a vital role in the production and deployment of high-quality digital content for online and/or blended education.
2. Adopting and rolling out the OpenEdx learning management platform and Student Information System (SIS) to support Ethiopian universities in delivering online education.
3. Building capacities of 100 system administrators, 35,000 instructors, and 800,000 students in management, content development, and utilization of the envisaged Learning Management System (LMS).
4. Supporting institutionalization and scale-up of e-learning for higher education and beyond by (1) designing and enacting appropriate national policies and strategies and (2) putting the relevant organizational structure in place and embedding it within the institutions for sustainability.
5. Promoting e-learning across universities by creating high-standard model content that enables universities and instructors to benchmark

The rationale for the rapid assessment of cloud Infrastructure

The current deployment of the e-SHE platform has been entirely dependent on AWS and several third-party tools and services, which has not been optimal in a resilient digital education system within the Ethiopian higher education context. To promote the long-term sustainability and resilience of the e-SHE platforms, the partnership acknowledged the necessity of exploring the capabilities of local hosting providers. This exploration aims to find in-country cloud service providers that can deliver services at least comparable to those offered by AWS, ensuring compatibility, reliability, security, and scalability for future growth, as well as compliance with local regulations in safeguarding sensitive information.

The assessment will evaluate the technical viability of local alternatives for hosting the e-SHE platforms in identifying strengths and weaknesses of the service providers and potential.

Risks, and provide recommendations aiming to enhance the long-term sustainability and resilience of the e-SHE platforms.

Objectives of the consultancy assignment

The main objective of the assignment will be evaluating and identifying potential in-country cloud infrastructure and hosting service providers' ability to deliver services for the deployment of the e-SHE platform, primarily considering reliability, security, scalability, and cost-effectiveness of the providers and producing technically feasible and actionable recommendations.

Scope of the assignment

- Develop service providers' evaluation metric based on the annex document attached below (Please refer to Annex – One)
- Validate the evaluation metrics with the relevant partners' technical team
- Identify potential service providers and conduct the evaluation
- Conduct site visits to the potential service providers
- Produce a draft report to the e-SHE team for review.
- Incorporate comments and produce a final technical report.

Focus areas of the assignment

- Service Equivalency Assessment:
- Compute Services: Evaluate the providers' ability to offer services / equivalent to:
 - Instances
 - Elastic Compute Cloud (EC2)
 - Auto Scaling Groups
 - Elastic Kubernetes Service (EKS)
 - Amazon Machine Image (AMI)
- Storage Solutions: Assess the providers' storage offerings or services equivalent to:
 - Simple Storage Service (Amazon S3)
 - EBS Volume
 - Snapshots
- Networking: Review the providers' networking capabilities or equivalent services, including
 - Virtual Private Cloud (VPC)
 - NAT Gateway
 - Route 53 (DNS management)
 - Elastic Load Balancing (ELB)
- Database Services: Assess the providers' storage offerings or services equivalent to:

- Relational Database Service (RDS)
 - DynamoDB
 - MongoDB Atlas
 - ClickHouse Cloud
- Security: Evaluate the providers' security offerings/service equivalent to
 - Security Group
 - Identity and Access Management (IAM)
 - Key Management Service (KMS)
 - AWS Cognito (for user authentication)
- Monitoring and Management: Assess the providers' monitoring tools and their ability to deliver functionality or similar to:
 - CloudWatch
- Other Services: Review the provider's offerings or similar services with:
 - API Gateway
 - AWS Lambda (serverless computing)
 - Simple Email Service (SES)
 - Simple Queue Service (Amazon SQS)
 - AWS Amplify (for front-end development and hosting)
 - Elemental Media Convert (video encoding)
 - Transcribe (speech-to-text service)
 - EBS CSI Driver (for Kubernetes volume management)
 - CloudFront (Content Delivery Network – CDN)
- Compatibility and Scalability:
 - Ensure that the providers' services are compatible with the e-SHE platform's technical requirements.
 - Assess the scalability of the providers' solutions to handle current and future workloads.
- Operational Readiness:
 - Evaluate the providers' operational processes, including disaster recovery, capacity planning, and hardware lifecycle management.
 - Identify any gaps in operational practices that could impact the platform's performance or reliability.
- Risk Identification:
 - Highlight potential risks associated with migrating from AWS to the in-country providers.
 - Document any limitations or weaknesses in the providers' infrastructure or services.
- Risk and Gap Analysis:
 - A clear outline of risks and gaps in the providers' infrastructure and services.

- Recommendations for mitigating identified risks.
- Operational Improvement Recommendations:
 - Specific suggestions for improving the providers' operational processes to meet enterprise cloud hosting standards.

Required Education and Technical Skills

Education and Experience

- Master's degree or above in Cloud computing, Communication engineering, Telecom Engineering, Computer Science, Information Technology, Cybersecurity, or a related field.
- Industrial certifications, preferably AWS Certified Solutions Architect, Microsoft Azure Solutions Expert, Google Professional Cloud Architect, or equivalent are highly desirable.
- At least 5 years of experience in cloud infrastructure implementation or management.
- Proven track record of implementing cloud-based solutions in local enterprises or multinational projects in Ethiopia.

Technical Skills

- Experience in cloud computing models IaaS, PaaS, and/or SaaS
- Proficiency in cloud infrastructure management, preferably AWS, Microsoft Azure, or Google Cloud Platform.
- Hands-on experience with containerization and orchestration tools, preferably Docker.
- Hands-on experience with network and storage solutions infrastructure architecture in a cloud environment.
- Hands-on experience in cloud security best practices and compliance standards
- Experience in DR strategies and Backup practices
- Hands-on experience in assessing service reliability, scalability, and performance metrics.
- Hands-on experience in identifying potential risks and mitigation strategies of cloud services
- Strong verbal and written communication skills for reporting findings and recommendations
- Awareness of current trends and emerging technologies in cloud computing.
- Ability to engage with stakeholders to understand requirements and expectations
- Become familiar with cost optimization strategies and financial management tools for cloud billing.
- Ability to analyze complex information and make informed decisions.

Timeline

The assessment is expected to be completed within 8 weeks of signing the contract. The consultant is expected to work for 12 man-days within three months, and eight weeks and a detailed work plan will be agreed upon during the inception phase.

Application Procedure

Interested applicants should submit their CV to info@shayashone.com by April 27, 2025.

No.	Provided AWS Services for e-SHE	Brief Description of AWS Service	Link to AWS Documentation	<i>Hosting Vendor A</i> AWS-Equivalent Service Equivalent Link to Documentation	<i>Hosting Vendor B</i> AWS-Equivalent Service Equivalent Link to Documentation	<i>Hosting Vendor C</i> AWS-Equivalent Service Equivalent Link to Documentation
1	API Gateway	Amazon API Gateway is a fully managed service that makes it easy for developers to create, publish, maintain, monitor, and secure REST, HTTP, and WebSocket APIs at any scale that act as the "front door" for their applications to access backend services. REST APIs are traditional HTTP APIs that use HTTP methods like GET, POST, PUT, and DELETE to interact with resources. WebSocket APIs enable	https://docs.aws.amazon.com/apigateway/latest/developerguide/welcome.html			

		two-way communication between a client and a server, making them ideal for real-time applications. API Gateway supports containerized and				
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		Serverless workloads, as well as web applications.				
2	AWS Lambda	AWS Lambda is a serverless computing service provided by Amazon Web Services (AWS) that allows developers to run code without provisioning or managing servers. It enables developers to build and run applications and services without worrying about the underlying infrastructure.	What is AWS Lambda? - AWS Lambda			
3	Simple Email Service (SES)	Amazon Simple Email Service (SES) is a cloud-based email sending and receiving service provided by AWS. It is designed to help businesses and developers send and receive email traffic at scale while maintaining high deliverability rates.	What is Amazon SES? - Amazon Simple Email Service			
4	Simple Queue Service (Amazon SQS)	Amazon Simple Queue Service (Amazon SQS) is a fully managed message queuing.	What is Amazon Simple Queue Service?			

		Service provided by Amazon Web Services (AWS). It enables developers to decouple and scale distributed applications by allowing them to send, store, and receive messages between software components or microservices.				
5	Simple Storage Service (Amazon S3)	Amazon Simple Storage Service (Amazon S3) is a fully managed object storage service provided by Amazon Web Services (AWS). It is designed to store and retrieve any amount of data from anywhere on the internet and can be used for a variety of use cases, including backup and recovery, archiving, big data analytics, and more.	What is Amazon Simple Queue Service?			
6	AWS Cognito	AWS Cognito is a managed service provided by Amazon Web Services (AWS) that enables developers to add user	Amazon Cognito user pools			

		Sign up, sign in, and access control to their web and mobile applications quickly and easily.				
7	AWS Amplify	AWS Amplify is a development platform provided by Amazon Web Services (AWS) that makes it easy for developers to build scalable, secure, and feature-rich web and mobile applications. Amplify provides a set of tools and services that enable developers to build cloud-powered applications faster and more efficiently.	Welcome to AWS Amplify Hosting			
8	Elastic Compute Cloud (EC2)	Amazon EC2 (Elastic Compute Cloud) is a central component of Amazon Web Services (AWS), offering scalable virtual servers, or instances, in the cloud. This service enables users to run applications on a flexible, pay-as-you-go basis, making it a popular choice for a wide	Get started with Amazon EC2 - Amazon Elastic Compute Cloud			

		Range of computing needs. EC2 provides various instance types tailored for different workloads, such as General Purpose, Compute Optimized, Memory Optimized, Storage Optimized, and GPU Instances. Users can select instances based on their specific performance requirements and budget constraints.				
9	Instances	An Amazon EC2 instance is a virtual server in the AWS cloud environment. You have full control over your instance from the time that you first start it (referred to as launching an instance) until you delete it (referred to as terminating an instance). You can choose from a variety of operating systems when you launch your instance. You can connect to your instance and customize it to meet.	Amazon EC2 instances - Amazon Elastic Compute Cloud			

		Your needs. EC2 instances form the backbone of the Open edX deployment, providing the necessary computing power to handle user requests.				
10	EBS Volume	An Amazon EBS volume is a durable, block-level storage device that you can attach to your instances. After you attach a volume to an instance, you can use it as you would use a physical hard drive. EBS volumes are used to store Open edX data.	Amazon EBS volumes			
11	Snapshots	AWS Elastic Compute Cloud (EC2) snapshots are used to create point-in-time backups of Open edX data.	Take a snapshot of an EC2 instance - AWS Prescriptive Guidance.			
12	Security Group	A security group controls the traffic that is allowed to reach and leave the resources that it is associated with. For example, after you associate a security	Amazon EC2 security groups for your EC2 instances - Amazon Elastic Compute Cloud			

		Group with an EC2 instance, it controls the inbound and outbound traffic for the instance.				
13	Amazon Machine Image (AMI)	An Amazon Machine Image (AMI) is an image that provides the software that is required to set up and boot an Amazon EC2 instance. Each AMI also contains a block device mapping that specifies the block devices to attach to the instances that you launch.	Amazon Machine Images in Amazon EC2 - Amazon Elastic Compute Cloud			
14	Auto Scaling Groups	An Auto Scaling group contains a collection of EC2 instances that are treated as a logical grouping for automatic scaling and management. An Auto Scaling group also lets you use Amazon EC2 Auto Scaling features such as health check replacements and scaling policies. Both maintain the number of instances in an Auto Scaling group.	Get started with Amazon EC2 Auto Scaling.			

		Automatic scaling is the core functionality of the Amazon EC2 Auto Scaling service.				
15	Elastic Kubernetes Service (EKS)	Amazon EKS (Elastic Kubernetes Service) is a managed service provided by AWS that simplifies the deployment, management, and scaling of Kubernetes clusters. Kubernetes is an open-source container orchestration platform that automates the deployment, scaling, and operation of containerized applications. EKS abstracts the complexity of managing Kubernetes infrastructure, allowing developers to focus on building and running their applications.	Get started with Amazon EKS.			
16	Cluster	An Amazon EKS cluster consists of two primary components: The Amazon EKS control plane consists.	What is Container Orchestration?			

		Of control plane nodes that run the Kubernetes software.				
17	EBS CSI driver	The Amazon EBS CSI driver makes Amazon EBS volumes for these types of Kubernetes volumes: generic ephemeral volumes and persistent volumes.	Using Kubernetes Container Storage Interface drivers - AWS Storage Gateway			
18	Elastic Load Balancing (ELB)	Amazon Elastic Load Balancing (ELB) is a managed service from AWS designed to automatically distribute incoming application or network traffic across multiple targets, such as Amazon EC2 instances, containers, and IP addresses. This distribution helps prevent any single instance from becoming overwhelmed, thus improving the fault tolerance and availability of applications. By managing the load among various backend resources,	Getting Started with Application Load Balancers			

		ELB ensures optimal performance and maintains high availability.				
19	CloudWatch	Amazon CloudWatch is a monitoring and management service provided by AWS that offers comprehensive visibility into your cloud resources and applications. It enables you to collect and track metrics, collect and monitor log files, and set alarms. CloudWatch helps in gaining actionable insights into system performance and operational health, ensuring that applications run smoothly and issues are identified quickly.	What is Amazon CloudWatch? - Amazon CloudWatch			
20	Relational Database Service (RDS)	Amazon RDS (Relational Database Service) is a managed service by AWS that simplifies the process of setting up, operating, and scaling relational databases in the cloud. RDS supports several	What is Amazon Relational Database Service (Amazon RDS)?			

		Popular database engines, including Amazon Aurora, MySQL, MariaDB, PostgreSQL, Oracle, and Microsoft SQL Server, provide flexibility to choose the best fit for your application needs.				
21	CloudFront	AWS CloudWatch monitors and manages the performance and operational health of the Open edX deployment with built-in logging, monitoring, and alerting services.	What is Amazon CloudFront? - Amazon CloudFront			
22	Elemental MediaConvert	AWS Elemental Media Convert is a cloud-based video processing service that allows users to convert and package video content for on-demand delivery to a wide variety of devices. It is part of the AWS Media Services suite and provides high-quality video transcoding with a focus on scalability, flexibility, and ease of	What is AWS Elemental MediaConvert?			

		Use. MediaConvert is designed to meet the needs of content creators, broadcasters, and streaming platforms by offering a comprehensive set of features for video processing.				
23	DynamoDB	Amazon DynamoDB is a fully managed NoSQL database service provided by AWS that delivers fast and predictable performance with seamless scalability. It is designed to handle large-scale applications with millions of requests per second, making it ideal for use cases such as gaming, IoT, mobile apps, and real-time analytics. DynamoDB's architecture allows it to support both document and key-value data models, offering flexibility for a wide range of application requirements.	What is Amazon DynamoDB? - Amazon DynamoDB			

	Transcribe	Amazon Transcribe is a fully managed automatic speech recognition (ASR) service provided by AWS that enables developers to convert spoken language into text quickly and accurately. The service is designed to handle a wide variety of use cases, including transcribing audio and video content, generating subtitles, creating voice-based applications, and converting customer service calls into text for analysis.	What is Amazon Transcribe? - Amazon Transcribe			
24	Virtual Private Cloud (VPC)	AWS Virtual Private Cloud (VPC) allows the deployment of AWS resources in a logically isolated virtual network, providing enhanced security and control.	What is Amazon VPC? - Amazon Virtual Private Cloud			
25	NAT gateway	A NAT gateway is a Network Address Translation (NAT) service. You can use a NAT gateway so that instances in a private	NAT gateways - Amazon Virtual Private Cloud			

		Subnets can connect to services outside your VPC, but external services cannot initiate a connection with those instances.				
26	Key Management Service (KMS)	AWS Key Management Service (AWS KMS) is an AWS-managed service that makes it easy for you to create and control the encryption keys that are used to encrypt your data. They never leave AWS KMS unencrypted	AWS Key Management Service			
27	Identity and Access Management (IAM)	AWS Identity and Access Management (IAM) is used to manage and scale workload and workforce access securely, with granular permission and access controls.	What is IAM? - AWS Identity and Access Management			
28	Route 53	Amazon Route 53 is a highly available and scalable Domain Name System (DNS) web service. We use Route 53 to perform three main functions: domain registration,	Amazon Route 53			

		DNS routing and health checking.				
29	MongoDB Atlas	MongoDB Atlas is a fully managed database service used for storing non-relational data required by Open edX.	What is MongoDB? - MongoDB Manual v8.0 - MongoDB Docs			
30	ClickHouse Cloud	ClickHouse is a fully managed, open-source, high-performance a columnar database designed for real-time analytics and OLAP (Online Analytical Processing) workloads regarding Open edX.	ClickHouse Cloud Getting Started			