



Learning Management Systems

Moodle on Amazon Web Services (AWS)

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Agenda

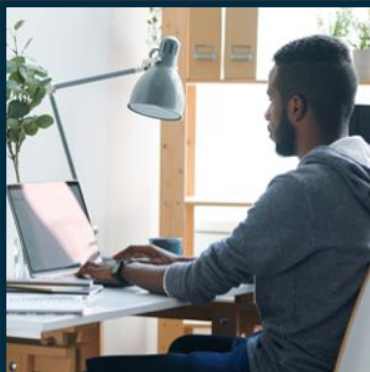
- Evolving Trends of Teach & Learn
- Revolutionizing Education, Empowered through Cloud Innovation
- Moodle as Learning Management System
- Reference Architecture Deep Dive
- Why Moodle on AWS

The way we teach and learn are changing

A person with a beard, wearing a grey hoodie, is sitting at a wooden desk in a modern, well-lit office or home workspace. They are working on a laptop. The desk has a lamp, a plant, and some papers. The background shows a whiteboard and a window with a plant.

- The globalization of the economy has driven the need to work and study from **anywhere** with **anyone** at **any time**.
- The new normal has impacted how we **live, work, study, and communicate**.
- You can no longer assume that all learning processes gets done within the **traditional classrooms**.
- Schools are increasingly looking for options for students and teachers to work and study **securely** from **any location**.

AWS is actively helping schools quickly scale their technology and infrastructure to enable **remote teachers and students to connect and learn securely from home.**



Teacher



Student

Cloud computing for **education**



Higher Education

Accelerate research time to results with agile and flexible solutions.



K12 Schools

Streamline school IT operations, save money, and keep student information safe in the AWS Cloud.



EdTechs

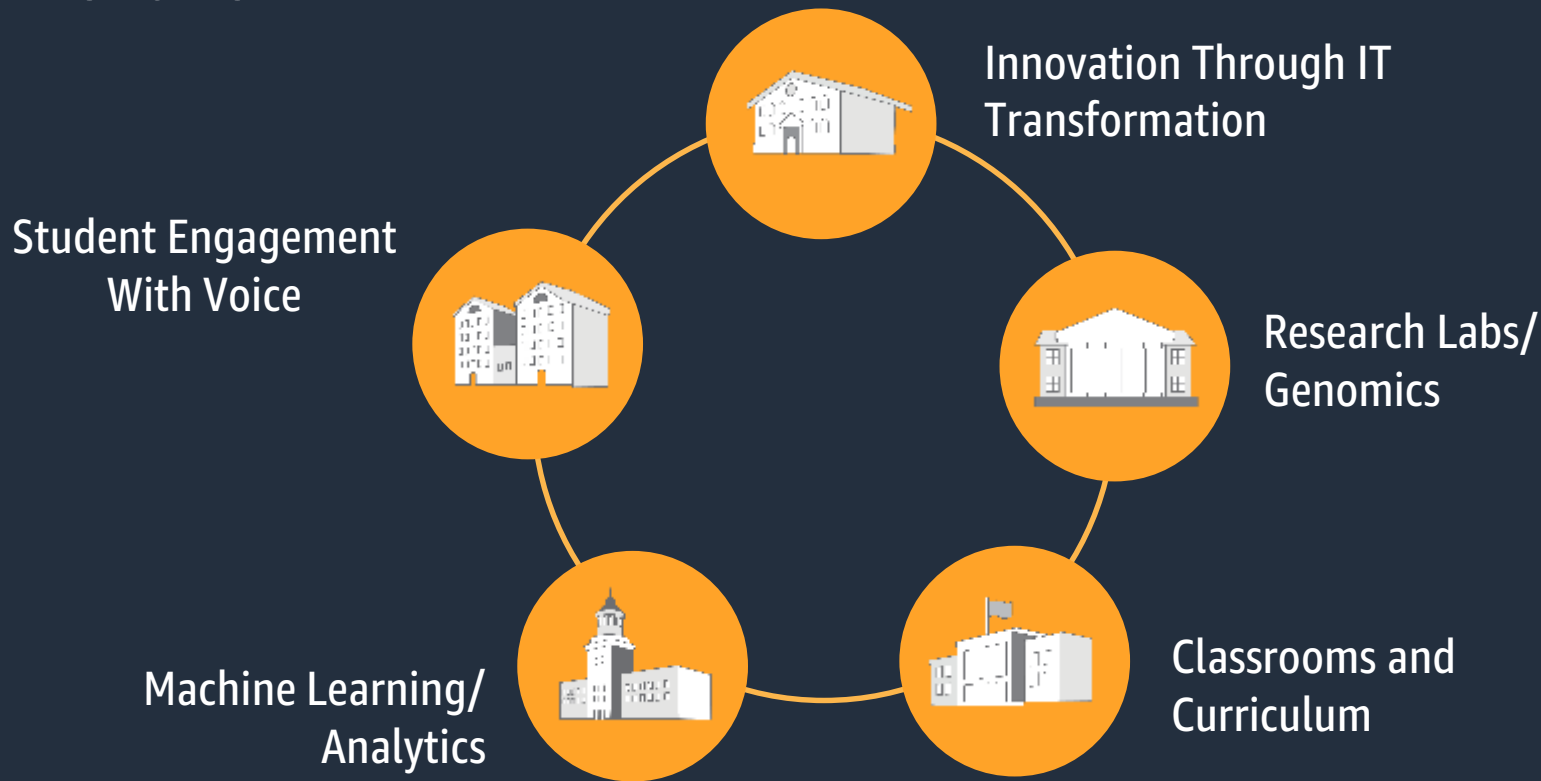
Innovate and build the next generation of online learning, analytics, and school management solutions.



Learning Companies

Transform 21st century learning through interactive and personalized digital content.

Revolutionizing Education, Empowered through Cloud Innovation





Learning Management System

Empowering educators to improve our world:

Moodle allows educators to create a private space online, filled with tools that easily create courses and activities, all optimized for collaborative learning.

Popular uses in Moodle for Higher Education



Online exams

Set online exams using assessment tools, such as Quizzes (with setup options such as multiple choice, true/false) ready to be populated.



Active learning

Work and learn together in forums and wikis, encourage self reflection and peer assessment with dedicated tools, and get feedback through polls and surveys.



Online and offline learning

Submit or grade assignments, post in forums, play SCORM packages, and more - on and offline - using the free Moodle Mobile app or Moodle Desktop.



Single sign-on with existing systems

Educators, learners and all users can access all their online portals and systems with Moodle using just a single sign-on.



Online grading

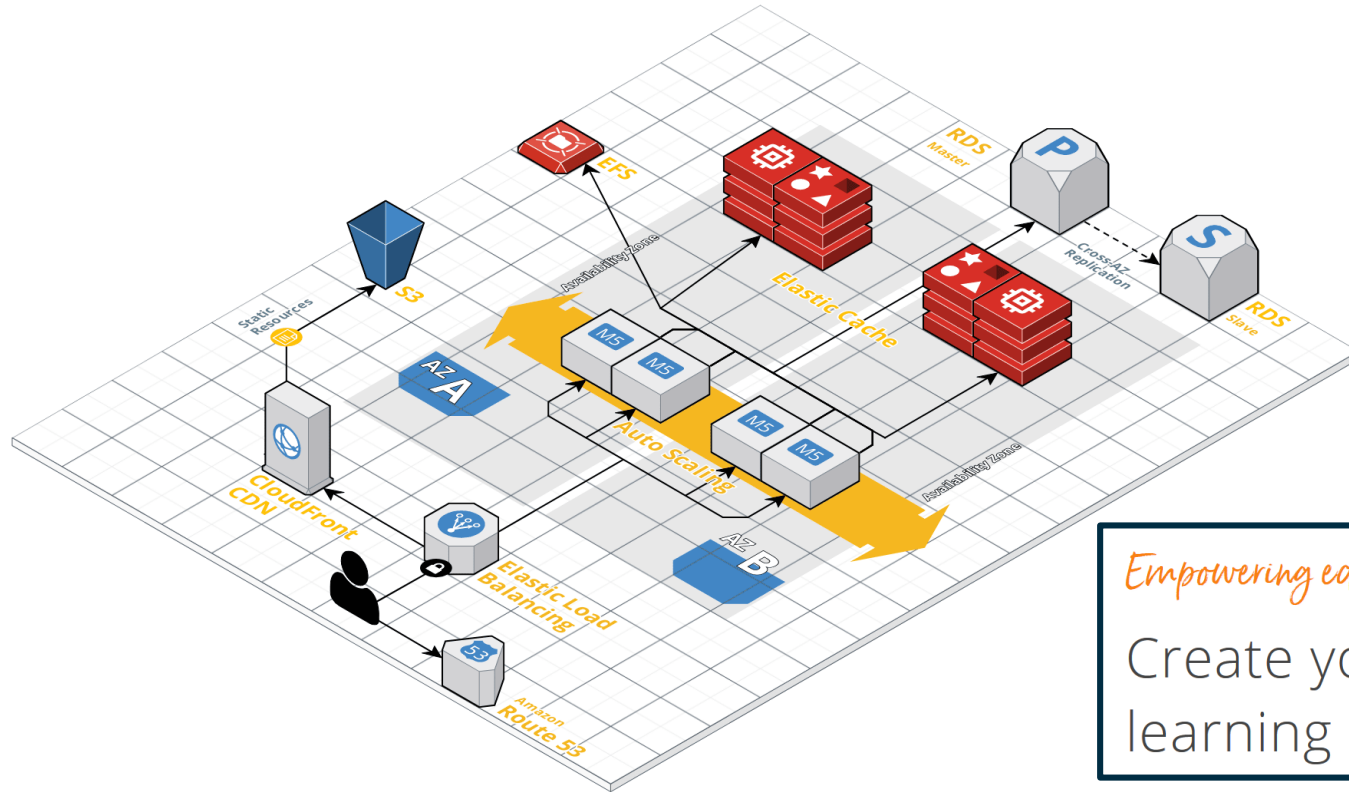
Use custom grading scales and rubrics, assign different markers to assignments, manage grade moderation and control when marks are released.

Challenges for Learning Management System On-Premise

- Usage of LMS such as Moodle is seasonal and will normally peaked at events such as student registrations, online learnings and online exams
- Most learning institutions are experiencing challenges with their on-premise LMS:
 - Current On-Premise Infrastructure unable to cope with the surge of demand with online learning
 - Expensive Up-front Investment on hardware – and customer don't know how much to invest
 - Aging Hardware leading to reliability issues
 - Lack of IT staffs to support with the sudden surge of demand



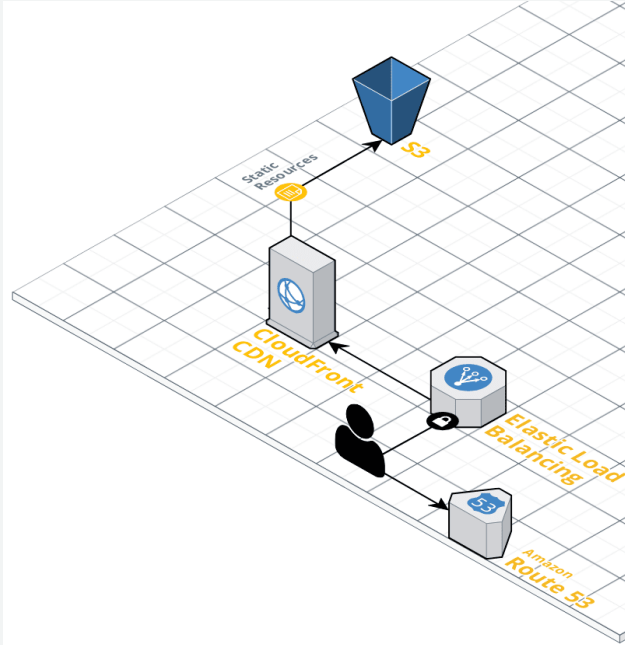
Highly Available & Scalable Moodle on AWS



Empowering educators to improve our world
Create your perfect online learning environment.

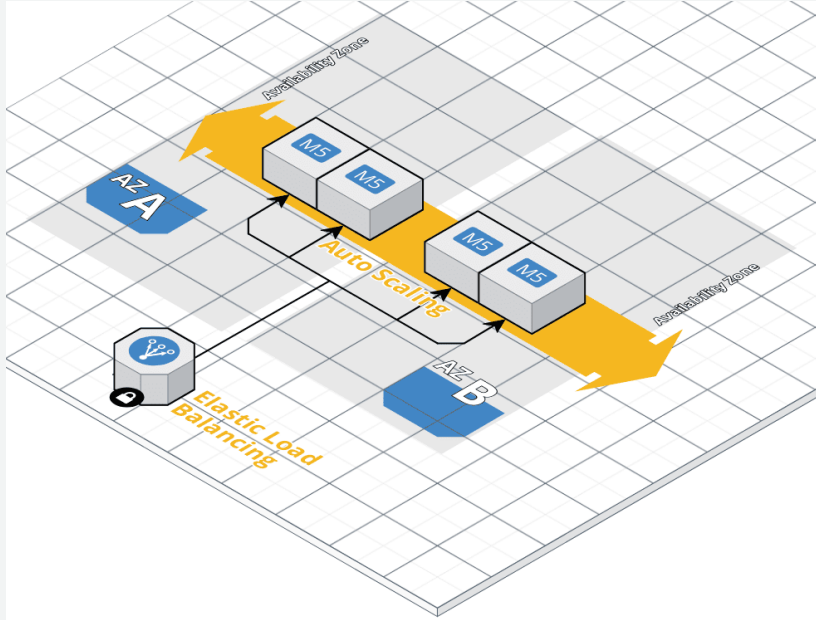


Secure & Highly Performant Front End Infrastructure



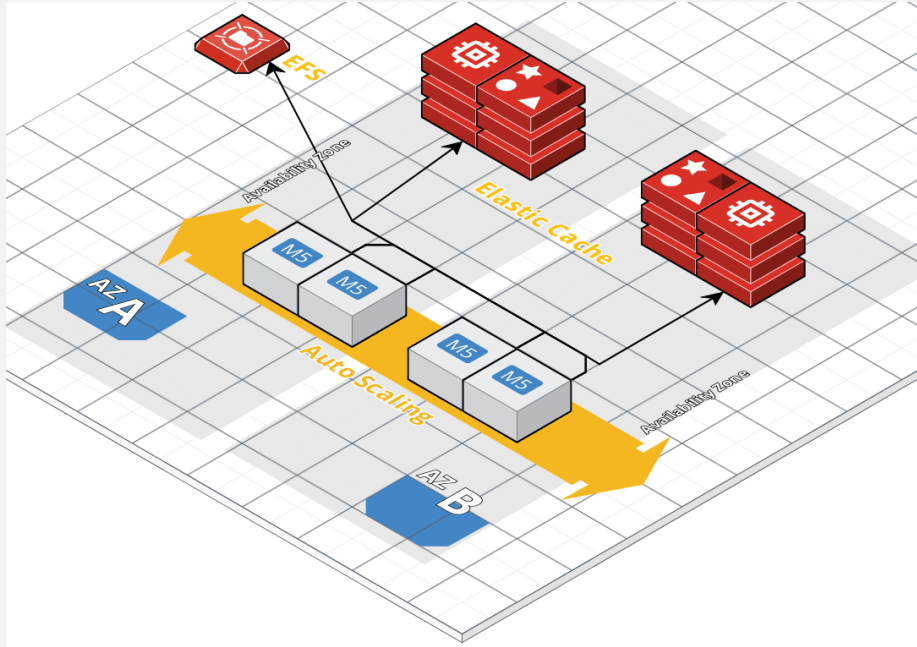
- **Route53** – Public DNS
- **CloudFront** – Cache static files such as video, images and documents
- **S3** – object store as origin
- **Application Load Balancer** - Load Balance Users across Application Servers
- **WAF & Shield** – Protection against threats
- **ACM** – Certificate Management

Highly Available & Auto-Scalable Fleet of Application Servers



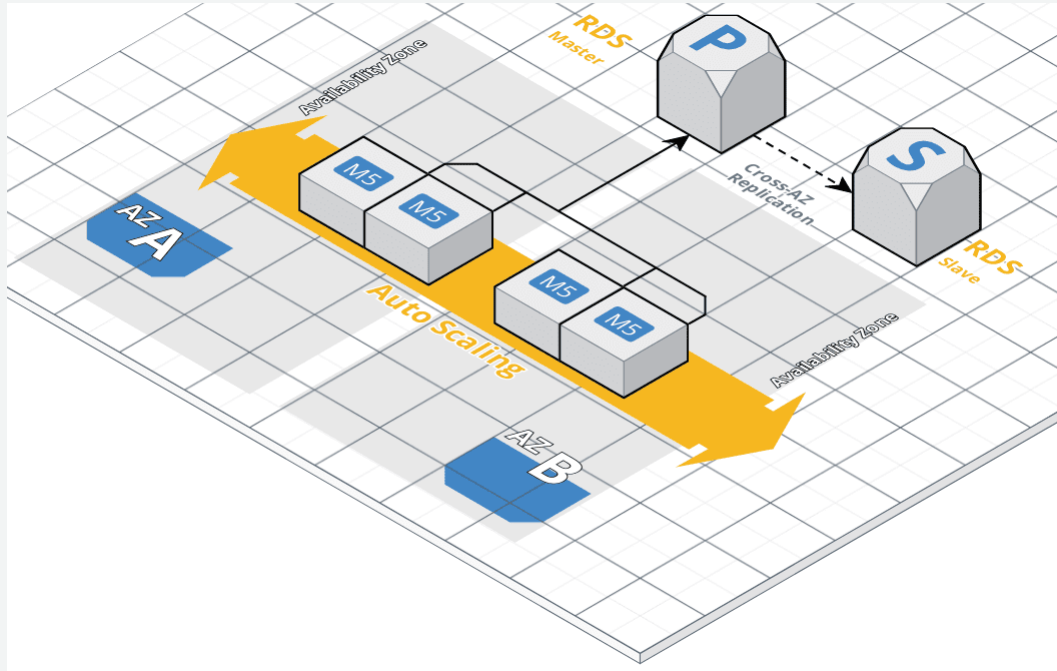
- Deploy EC2 instances across multiple **Availability Zone**
- Create & configure **Auto-Scaling Group** to automatically scale the Application Tier horizontally
- **Scaling Rules** can be based on active user requests (static) or resource utilization (dynamic)

Improve Performance with In-Memory Caching



- Store your Moodle Data into a shared file system using **Elastic File System** which will be automatically mounted to the EC2 instances
- Improve performance of Moodle by using **Elastic Cache**
 - **Memcached** – Application Stores
 - **RedisCache** – Session Stores

Backend Database with RDS



- Backend Database leveraging on Relational Database Service
- Deployed across multi-availability zone for HA
- No Public Access, only securely via Application Servers

Additional Security Considerations

- Only Allow ALB to face internet
- S3, EC2 & RDS Instances should not be exposed to internet directly
- Security Group only allow just-enough ports for communications between resources. Do not allow more than what you need
- Secure in-transit communications through SSL encryption
- Session Manager to remote manage the servers if needs be. Not even Bastion Host!

DEMO

Why Customers are running Moodle on AWS

- **Proven Technology** – AWS has the most proven operational & security cloud platform
- **Highly Scalable** – Scale to meet the different demands of business users
- **Highly Available** – Able to provide high availability of systems that is able to withstand various failure situations
- **Highly Secure** – Highly Proven security platform with sophisticated security defense controls to protect business privacy requirements
- **Low TCO** – Variable expense without capital upfront, Pay for What You Need

Broad and Deep Functionality

TECHNICAL & BUSINESS SUPPORT

- Support
- Professional Services
- Optimization Guidance
- Partner Ecosystem
- Training & Certification
- Solutions Management
- Account Management
- Security & Billing Reports
- Personalized Dashboard

MARKETPLACE

- Business Apps
- Business Intelligence
- DevOps Tools
- Security
- Networking
- Databases
- Storage

ANALYTICS

- Data Warehousing
- Business Intelligence
- Hadoop/Spark
- Streaming Data Analysis
- Streaming Data Collection

DEV OPS

- One-click App Deployment
- Resource Templates
- Build & Test
- Application Lifecycle Management
- DevOps Resource Management
- Triggers
- Containers
- Analyze & Debug
- Patching

MOBILE SERVICES

- API Gateway
- Single Integrated Console
- Identity
- Sync
- Mobile Analytics
- Mobile App Testing
- Targeted Push Notifications

IoT

- Rules Engine
- Device Shadows
- Device SDKs
- Device Gateway
- Registry
- Local Compute

MACHINE LEARNING

- Custom Model Training & Hosting
- Image & Scene Recognition
- Facial Recognition & Analysis
- Facial Search
- Text to Speech
- Conversational Chatbots
- Deep Learning (Apache MXNet, TensorFlow, & others)

ENTERPRISE APPS

- Virtual Desktops
- Sharing & Collaboration
- Corporate Email
- App Streaming
- Communications
- Contact Center

HYBRID ARCHITECTURE

- Data Integration
- Integrated Networking
- Integrated Identity & Access
- Integrated Resource & Deployment Management
- Integrated Devices & Edge Systems

MIGRATION

- Schema Conversion
- Exabyte-Scale Data Migration
- Application Migration
- Database Migration
- Server Migration

APP SERVICES

- Queueing & Notifications
- Email
- Workflow
- Transcoding
- Search

INFRASTRUCTURE

CORE SERVICES

- Regions
- Availability Zones
- Points of Presence
- Compute: VMs, Auto-scaling, Load Balancing, Containers, Virtual Private Servers, Batch Computing, Cloud Functions, Elastic GPUs, Edge Computing
- Storage: Object, Blocks, File, Archival, Import/Export, Exabyte-scale data transfer
- Databases: Relational, NoSQL, Caching, Migration, PostgreSQL compatible
- Networking: VPC, DX, DNS
- CDN

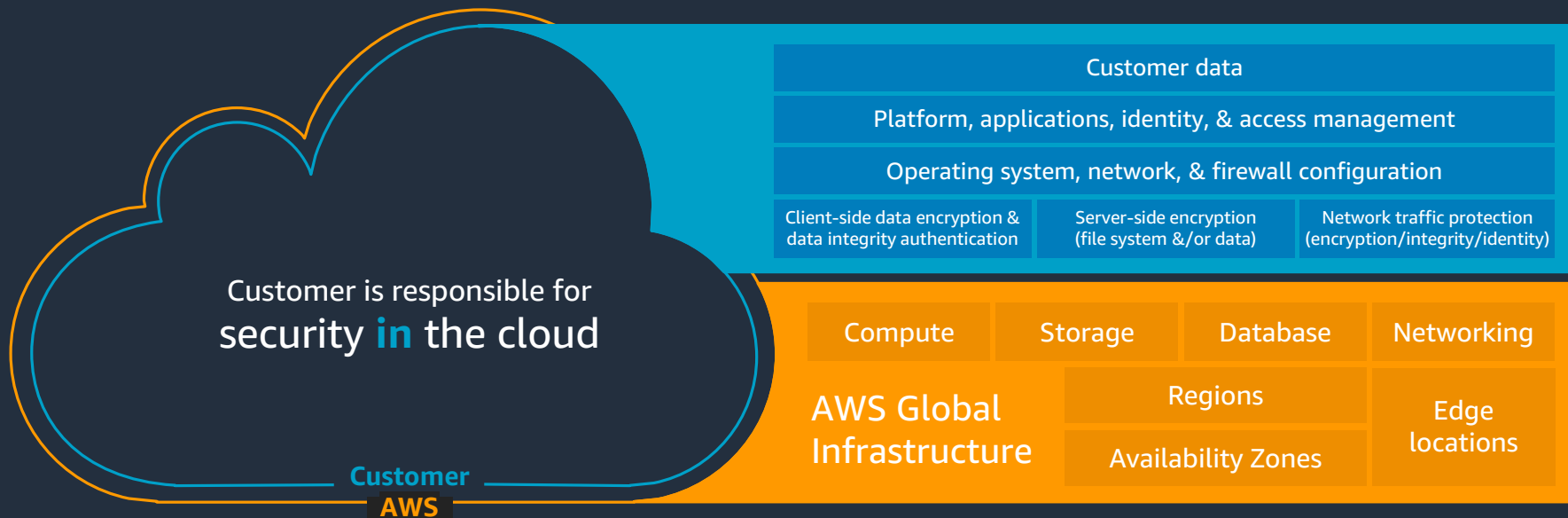
SECURITY & COMPLIANCE

- Identity Management
- Access Control
- Monitoring & Logs
- Assessment & Reporting
- Web Application Firewall
- Configuration Compliance
- Key Management & Storage
- Account Grouping
- Resource & Usage Auditing
- DDOS Protection

MANAGEMENT TOOLS

- Manage Resources
- Service Catalogue
- Configuration Tracking
- Monitoring
- Server Management
- Resource Templates

Share your security responsibility with AWS



AWS is responsible for security **of** the cloud

Figure 1. Magic Quadrant for Cloud Infrastructure as a Service, Worldwide



AWS recognized as a cloud leader for the 9th consecutive year

Gartner, Magic Quadrant for Cloud Infrastructure as a Service, Worldwide, Raj Bala, Bob Gill, Dennis Smith, David Wright, July 2019. ID G00365830. Gartner does not endorse any vendor, product or service depicted in its research publications, and does not advise technology users to select only those vendors with the highest ratings. Gartner research publications consist of the opinions of Gartner's research organization and should not be construed as statements of fact. Gartner disclaims all warranties, expressed or implied, with respect to this research, including any warranties of merchantability or fitness for a particular purpose. The Gartner logo is a trademark and service mark of Gartner, Inc., and/or its affiliates, and is used herein with permission. All rights reserved.

Education is build on AWS



There is no compression
algorithm for experience

Success Story: AMA University Online Education

Bobby Khan
Account Director, WW Public Sector - ASEAN
Amazon Web Services



AMA University Online Education is the first full online education program in the Philippines. Their mission is to respond to the cultural shift to a digitized age, opening its doors for anyone from the Philippines and abroad who are willing to learn and advance their knowledge.

The Challenges

- AMA is one of the Philippines' largest users of Moodle to allow both students and teachers to study and teach online.
- The IT department at AMA has built a data center to manage the volume of demands for their applications including the learning management and student information systems.
- AMA wanted to rapidly grow student enrollment by 10x
- Difficult to serve these students with their current IT infrastructure.

Why AWS

- AMA decided to work with Nephila Web Technology, an AWS and Moodle partner to build a cloud environment using AWS for speed, scalability and cost-savings.
- AMA uses EC2 for fast deployment of servers in minutes compared to months if it was going to be on premises.
- AMA also uses auto-scaling to quickly scale-up their capacity during peak periods such as student examination months in April and September and scale-down during school breaks.

50% DISCOUNT on ALL FEES for TRANSFEREES on tuition fees for FRESHMEN
ENROLL NOW!

AMA
Makati Campus

The Benefit

- AMA is able to grow their fully online student population from 1,000 to 13,000 – in 4 years.
- The rest of the 40,000 students doing blended learning are now adopting very quickly to fully online model beginning this August.

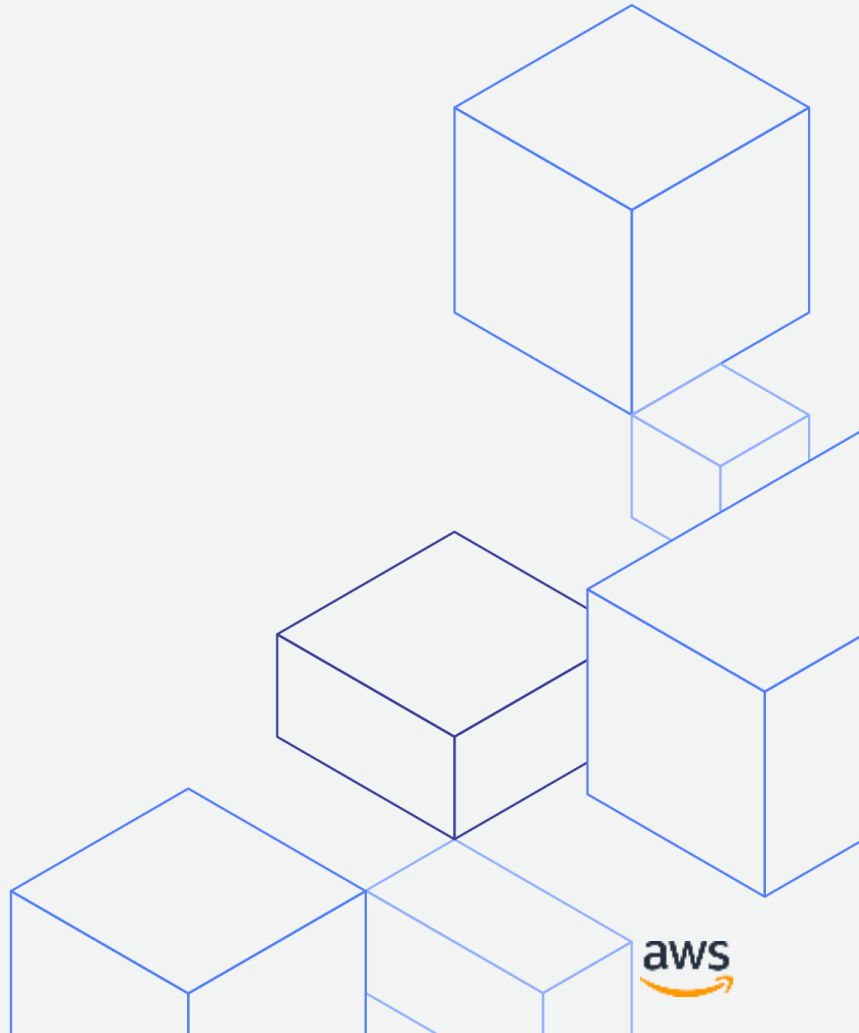
“We invested north of a hundred fifty million pesos in AMA Online Education. To be online is the way to go. We can be everywhere in the world. You can access it anytime at your own pace, at your own leisure.

- ” Amable “Miguel” C. Aguiluz IX, Vice Chairman and Chief Executive Officer of AMA Education System

Source: bworldonline.com/ama-invests-p150m-on-online-education/

QnA

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Resource Links

- Moodle Performance Consideration - https://docs.moodle.org/39/en/Performance_recommendations
- Moodle Performance FAQ - https://docs.moodle.org/39/en/Performance_FAQ
- Moodle on AWS Referenced Architecture - <https://github.com/aws-samples/aws-refarch-moodle>

Thank You

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