Academy Cloud Foundations

Module 1: Introduction to Cloud Computing

Module 2: AWS Core Services

Module 3: AWS Cloud Security

Module 4: Cloud Architecture

Module 5: Cloud Billing and Support

Instructor Guide

Version 1.0.18
(Lab Version 1.0.19)

Corrections or feedback on the course, please email us at: aws-course-feedback@amazon.com.

For all other questions, contact us at: https://aws.amazon.com/contact-us/aws-training/.

Contents

Introduction

Course Description

Academy Cloud Foundations is an AWS Academy course designed to provide students with an overall understanding of the AWS Cloud, independent of specific technical roles. It provides a detailed overview of cloud concepts, AWS core services and their pricing, security, architecture, and support.

This course prepares individuals for the AWS Certified Cloud Practitioner exam. This course is taught through instructor-led classes, hands-on labs, and assessments. The student kit includes course manuals, access to labs, assessments, and a discount voucher for the certification exam.

Course Objectives

Upon completion of this course, learners should be able to:

- Define what the AWS Cloud is including the basic global infrastructure
- Describe the AWS Cloud value proposition and the key services on the AWS platform and their common use cases (e.g., compute, analysis, etc.)
- Describe basic AWS Cloud architectural principles
- Describe basic security and compliance aspects of the AWS platform and the shared security model
- Define the billing, account management, and pricing models
- Identify sources of documentation or technical assistance (e.g., whitepapers, support tickets, etc.)
- Describe basic/core characteristics of deploying and operating in the AWS

Intended Audience

This course is intended for undergraduate, graduate or professional students seeking cloud computing expertise.

Prerequisites

Academy Cloud Foundations requires general IT technical and business knowledge.

Delivery Method

This course is delivered through a mix of:

- Instructor-led or self-paced review, discussions and demonstrations
- Hands-on Lab Exercises
- Knowledge assessments

Duration

Academy Cloud Foundations is designed for 20 hours of class time.

Location Setup for This Course

This section goes over the requirements that need to be met by onsite locations for AWS Academy class.

Classroom Requirements

The room should meet the below requirements:

- Software: Putty, Remote Desktop for MAC OS (if not present)
- Classroom environment with individual computers for each student that attends the course(s)
- Wi-Fi able to sustain 5 Mbps connection (as measured by at speedtest.net) accessible by each student
- The classroom will have internet access and any firewalls must be open for outbound RDP & SSH traffic
- Large whiteboard with whiteboard markers for the Course instructor
- LCD projector and projection screen

Lab Room Specifications (Technical)

If you can successfully complete the following tests, your classroom is ready:

Test 1 – ssh session to a Linux machine from Windows (Windows users only)

- **Test Preparation**: Download these two files to your computer to the same folder (for example, to a folder such as C:\Temp that you create on your laptop beforehand):

```
https://s3.amazonaws.com/bucket-with-pictures/putty.exe

https://s3.amazonaws.com/bucket-with-pictures/oregon.zip
```

- **Test**: Open a Windows command prompt window, by typing “cmd” on your task bar at the bottom. Navigate to the folder above (using the “cd” command to the particular folder, e.g. cd \Temp), then run these two commands to connect via “ssh” to my test Linux machine in AWS:

```
> rename oregon.zip oregon.ppk

> putty -i oregon.ppk ec2-user@34.217.104.91
```

- If asked for confirmation, click on “Yes”.
- If this worked, you should see a new window open up with a successful login using PuTTY on a Linux machine. In that window, enter the following command:

```
$ hostname
```


- **Test Success**: A single line of output with the name of the host you connected will be displayed.

Test 2 – Remote Desktop session to a Windows machine from Windows

- **Test Preparation**: On your task bar, type Windows Remote Connection (or rdp) to open up the Remote Desktop client in Windows. Using this client, connect to the host 34.235.111.110 as the user Administrator. For password, use G756sg97(Make sure the connection succeeds).
- **Test Success**: You see the desktop of this new Windows machine.

Test 3 – Outbound Port 80 to anywhere check (standard web browsing)

- **Test Preparation**: Open browser to http://aws.amazon.com
- **Test Success**: Should display the web page without errors

Test 4 – Basic connectivity check, AWS Console

- **Test Preparation**: Using Chrome or Firefox, open browser to http://aws.amazon.com/ and click on the “Sign in the Console” button.
- **Test Success**: Should log in to the AWS console without errors

Test 5 – Reachability Test, multiple AWS Regions

- **Test Preparation**: Using Chrome or Firefox, navigate to: http://ec2-reachability.amazonaws.com/
- **Test Success**: Verify that you get green checkmarks in the Test column for all listed addresses. It is adequate if you do this on the default screen which tests for IPv4 connectivity only.

Note: For the Cloud Computing Architecture course (CCA) only the addresses under “North Virginia” and “Oregon” are utilized. No other AWS regions are used in our labs.

Test 6 - Outbound Port 443 to anywhere (ssl web browsing)

- **Test Preparation**: Open browser to https://www.ssllabs.com/ssltest/viewMyClient.html
- **Test Success**: Should display the web page without errors

Test 7 - Sufficient bandwidth to accommodate classroom of up to 30 people [5mbps]

- **Test Preparation**: Use an external speed measuring service (e.g. http://www.speedtest.net/) and run three tests (at least 10 minutes apart each) to obtain an average speed
- **Test Success**: An average speed measurement that meets the required [5mbps]

Protocol	**HTTP**	**HTTPS**	**SSH**	**RDP**
Port	80	443	22	3389
Academy ACF	✓	✓	✓	✓

Test 8 - Whitelisting of AWS IPs*

Have the firewall opened for the latest AWS public IP ranges mentioned in the link - AWS IP Address Ranges

Note: Most education institutions are already in compliance. This statement applies to environments with tight firewall chains.

Preparing to Teach this Course

This section is included to help instructors prepare themselves for teaching *Academy Cloud Foundations (version 1.0)*.

About the Presentations

Presentation materials have been provided to accompany the delivery of each module. Details that explain the slide content are contained in the slide notes.

Several slides are included for each lab that enable you to show the students an overview of the tasks they will complete in the lab and associated infrastructure information. The diagrams are also available to them in their Lab Manuals.

About the Knowledge Assessments

All knowledge assessments are hosted in the AWS Learning Management System. Students can access the knowledge assessments via AWS Training Portal (www.aws.training).

About the Labs

Download the *Platforms Guide for Educators* from the Academy Portal for lab connection details.

Module 1: Cloud Concepts Overview

Module 1 Outline

Task/Module/Lab	Content Delivery Time Estimate	Knowledge Assessment Time Estimate (minutes)
UNIT 1: Introduction to Cloud Computing		
Welcome: Course Overview	0:30	--
SECTION 1.0.1 What is Cloud Computing?	1:00	0:10
SECTION 1.0.2 Cloud Economics	1:00	0:10
SECTION 1.0.3 AWS Global Infrastructure	0:30	0:10
Unit Total Time (in minutes)	180 (3 hrs)	0:30

SECTION 1.0.1 - What is Cloud Computing?

This module introduces students to concepts of cloud computing, the advantages of cloud computing, a comparison of cloud and on- premises computing, and a description of the AWS Cloud Adoption Framework.

At the end of this module, the student will be able to:

- Define different types of cloud computing to understand internet-based computing and three broad categories of cloud computing.
- Describe the six advantages of cloud computing that are helping organizations make the decision to get out of the low-value parts of IT and focus on things that drive business success.
- Describe cloud deployment models to understand alternative models of cloud usage.
- Explain the AWS Cloud Adoption Framework (AWS CAF) which helps organizations understand how cloud adoption transforms the way they work.

Optional learning activity: Break students into groups. Assign each group a core service (compute, networking, storage, database, and security and identity) and ask them to search out the core service in the console. They should prepare and present a basic report for the class regarding to introduce their assigned service.

Please instruct students to complete the corresponding knowledge assessment for this module in order to be marked 'complete'.

SECTION 1.0.2 - Cloud Economics

This module explains the AWS pricing philosophy, fundamental pricing characteristics and total cost of ownership (TCO). Pricing reviews the core characteristics that have the greatest impact on cost. TCO describes what elements to consider in a comparison analysis of acquisition and maintenance costs for an on-premises system and a cloud-based system.

At the end of this module, the student will be able to:

- Describe the three fundamental characteristics of service charges for with AWS
- Define what is meant by Total Cost of Ownership
- Identify the key Total Cost of Ownership considerations for comparing an on premises and a cloud solution

Please instruct students to complete the corresponding knowledge assessment for this module in order to be marked 'complete'.

SECTION 1.0.3 – AWS Global Infrastructure

This module introduces students to the AWS Global Infrastructure.

At the end of this module, the student will be able to:

- Distinguish between AWS regions and availability zones

- Describe the purpose of AWS edge locations

Please instruct students to complete the corresponding knowledge assessment for this module in order to be marked 'complete'.

Module 2: AWS Core Services

Module 2 Outline

Task/Module/Lab	Content Delivery Time Estimate	Knowledge Assessment Time Estimate (minutes)
UNIT 2: AWS Core Services		
SECTION 2.0.1 Compute Services **Lab 01** – Introduction to Amazon EC2	2:00 0:45	0:10
SECTION 2.0.2 Storage Services **Lab 02** – Working with EBS	1:30 0:45	0:10
SECTION 2.0.3 Amazon VPC **Lab 03** – Build your VPC and Launch a Web Server	1:00 0:45	0:10
SECTION 2.0.4 Database Services **Lab 04** – Build your DB server and interact with your DB using an App	1:30 0:45	0:10
SECTION 2.0.5 Elastic Load Balancing, Amazon CloudWatch, Auto Scaling **Lab 05** – Scale and Load Balance your Architecture	1:00 0:45	0:10
Unit Total Time (in minutes)	645 (10 hrs 45 min)	0:50

SECTION 2.0.1 - Compute Services Overview

This section introduces students to different AWS compute services including Amazon EC2 that provides compute resources. Compute refers to the amount of computational power required to process a workload.

At the end of the compute section, the student will be able to:

- Describe several AWS compute services and their usage
- Explain the different Amazon EC2 types and their usage

- Describe an Amazon Machine Image (AMI) and it uses with Amazon EC2
- Explain Amazon EC2 pricing and billing
- Explain AWS Lambda and serverless computing
- Review AWS Elastic Beanstalk

Please demonstrate Amazon EC2. An example demonstration can be found in the video content for this course. Next, have students complete ***Lab 1, Introduction to Amazon EC2***.

Finally, instruct students to complete the corresponding knowledge assessment for this module in order to be marked 'complete'.

SECTION 2.0.2 – Storage Services Overview

Cloud storage is a critical component of cloud computing, holding the information used by applications. This module introduces AWS storage resources and their pricing.

At the end of the storage section, the student will be able to:

- Understand the differences between storage solutions
- Identify the appropriate storage solution
- Understand the pricing differences between different storage alternatives

Please demonstrate Amazon Elastic Block Store (Amazon EBS). An example demonstration can be found in the video content for this course. Next, have students complete ***Lab 2, Working with Amazon EBS***.

Complete the following service demonstrations at the appropriate point in the discussion:

- Amazon Simple Storage Service (Amazon S3)
- Amazon Elastic File System (Amazon EFS)
- Amazon Glacier

Examples of each of these demonstrations can be found in the video content for this course.

Finally, instruct students to complete the corresponding knowledge assessment for this module in order to be marked 'complete'.

SECTION 2.0.3 – Amazon Virtual Private Cloud (Amazon VPC) Overview

Amazon VPC is a custom-defined network within the AWS Cloud. It enables you to design and implement an independent network that operates in the cloud.

At the end of the VPC section, the student will be able to:

- Understand virtual networking in the cloud with Amazon VPC
- Explain how to create virtual firewalls with security groups
- Describe how Amazon CloudFront securely delivers data, videos, applications, and APIs to viewers with low latency and high transfer speeds.

Please demonstrate Amazon VPC. An example demonstration can be found in the video content for this course. Next, have students complete ***Lab 3, Build Your Amazon VPC and Launch a Web Server***.

Finally, instruct students to complete the corresponding knowledge assessment for this module in order to be marked 'complete'.

SECTION 2.0.4 – Database Overview

Database management systems are the crucial link for management of this data. Like other cloud services, cloud databases offer significant cost advantages over traditional database strategies. This module reviews several AWS database solutions.

At the end of the database section, the student will be able to:

- Describe different AWS database solutions
- Explain the difference between managed and unmanaged database solutions
- Explain the differences between SQL and NoSQL database solutions
- Describe availability differences of alternative database solutions

Please demonstrate Amazon Relational Database System (Amazon RDS). Next, demonstrate Amazon DynamoDB. Example demonstrations can be found in the video content for this course.

Upon completion of the database materials, have students complete ***Lab 4, Build Your DB Server and Interact with your DB using an App***.

Finally, instruct students to complete the corresponding knowledge assessment for this module in order to be marked 'complete'.

SECTION 2.0.5 – Elastic Load Balancing, Amazon CloudWatch, Auto Scaling Overview

This module reviews Elastic Load Balancing (ELB), Amazon CloudWatch and Auto Scaling and how they help build robust and highly available architectures.

At the end of the storage section, the student will be able to:

- Understand how to distribute traffic across Amazon EC2 instances using ELB
- Understand how Auto Scaling can be utilized to launch and release servers in response to workload changes
- Describe how CloudWatch enables you to monitor AWS resources and applications in real time

Upon completion of this material, have students complete **Lab 5, Scale and Load Balance Your Architecture**.

Finally, instruct students to complete the corresponding knowledge assessment for this module in order to be marked 'complete'.

Module 3: AWS Cloud Security

Module 3 Outline

Task/Module/Lab	Content Delivery Time Estimate	Knowledge Assessment Time Estimate (minutes)
UNIT 3: AWS Cloud Security		
SECTION 3.0.1 AWS Shared Responsibility Model	0:15	-
SECTION 3.0.2 AWS Identity and Access Management **Lab 06** – Introduction to AWS IAM	0:35 0:45	-
SECTION 3.0.3 AWS Trusted Advisor	0:10	-
SECTION 3.0.4 CloudTrail	0:10	-
SECTION 3.0.5 AWS Config	0:10	-
SECTION 3.0.6 AWS Day One Best Practice Review	0:15	-
SECTION 3.0.7 AWS Security and Compliance Programs	0:20	-
SECTION 3.0.8 AWS Security Resources	0:15	-
Optional: AWS Day One Demonstration	0:20	-
Unit Total Time (in minutes)	195 (3 hrs 15 min)	0:10

SECTION Module 3 – AWS Cloud Security

Helping to protect the confidentiality, integrity, and availability of systems and data is critical to AWS. This module is intended to provide an introduction to AWS's approach to security, including the controls in the AWS environment and some of the products and features that AWS makes available to customers to meet their security objectives.

At the end of this module, the student will be able to:

- Describe the AWS Shared Responsibility Model
- Explain the difference between AWS Identity and Access Management (IAM) Users, Groups and Roles
- Describe different types of security credentials
- Review AWS Trusted Advisor checks

- Discuss security compliance and security compliance resources
- Understand and implement Day 1 best practices with a new AWS account

Please demonstrate AWS IAM. An example demonstration can be found in the video content for this course. There is an optional Day 1 walkthrough that can be used to walk through a full Day 1 setup.

Have students complete ***Lab 6, Introduction to AWS IAM***. Finally, instruct students to complete the corresponding knowledge assessment for this module in order to be marked 'complete'.

Module 4: Cloud Architecting

Module 4 Outline

Task/Module/Lab	Content Delivery Time Estimate	Knowledge Assessment Time Estimate (minutes)
UNIT 4: Cloud Architecting		
SECTION 4.0.1 Introduction to the Well-Architected Framework	0:25	-
SECTION 4.0.2 Well-Architected Design Principles	0:15	-
SECTION 4.0.3 Understanding Reliability and High Availability	0:10	-
SECTION 4.0.4 Example: Transitioning a Data Center to the Cloud	0:10	-
Unit Total Time (in minutes)	60 (1 hr)	0:10

SECTION 4.0.1 – Introduction to the Well-Architected Framework

Having well-architected systems greatly increases the likelihood of business success. In this part, we explore the architectural best practices for designing and operating reliable, secure, efficient, and cost-effective systems in the cloud.

At the end of this module, the student will be able to:

- Explain the architectural pillars

SECTION 4.0.2 – Introduction to the Well-Architected Framework

In this part, we further explore design principles by comparing practices in a traditional environment to practices for cloud environments

At the end of this module, the student will be able to:

- Explain the well-architected design principles

SECTION 4.0.3 – Understanding Reliability and High Availability

Failures are costly to businesses. In this part, we take an in-depth look at Reliability and High Availability and what it means to design for these important attributes.

At the end of this module, the student will be able to:

- Incorporate high availability and reliability into a cloud architecture design
- Understand the business impact of design decisions

SECTION 4.0.4 – Example: Transitioning a Data Center to the Cloud

In this part, we look at a traditional on-premises or corporate data center–based infrastructure and walk through an example of how this could be set up and run on AWS.

At the end of this module, the student will be able to:

- Explain how the benefits of cloud computing could be leveraged by a data center
- Identify a well-architected solution, utilizing AWS services, to migrate the on-premises solution to a cloud solution

Please instruct students to complete the corresponding knowledge assessment for this module in order to be marked 'complete'.

Module 5: Cloud Billing and Support Services

Module 5 Outline

Task/Module/Lab	Content Deliver Time Estimate	Knowledge Assessment Time Estimate (minutes)
UNIT 5: AWS Billing and Support Services		
SECTION 5.0.1 AWS Organizations	0:10	
SECTION 5.0.2 AWS Billing and Cost Management	0:10	
SECTION 5.0.3 Support Services	0:10	-
Unit Total Time (in minutes)	0:30	0:10

SECTION 5.0.1 – AWS Organizations

Support of any solution is critical. In this module, we review different support options and their associated services and costs.

At the end of this part, the student will be able to:

- Identify different support plan levels and their associated service levels
- Understand the prices associated with each of the support plans

SECTION 5.0.2 – AWS Billing and Cost Management

AWS Billing and Cost Management is the service you use to pay your AWS bill, monitor your usage and budget your costs

At the end of this part, the student will:

- Understand the elements of the AWS Billing Dashboard
- Understand the different tools available in AWS Billing and Cost Management to review current billing and forecast future costs

SECTION 5.0.3 – AWS Support Services

Support of any solution is critical. In this module, we review different support options and their associated services and costs.

At the end of this part, the student will be able to:

- Identify different support plan levels and their associated service levels
- Understand the prices associated with each of the support plans

Please instruct students to complete the corresponding knowledge assessment for this module in order to be marked ‘complete’.

