Course orientation on
Cloud Services Architecting Practices

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Dept. of Information Management, Tamkang University

http://mail.tku.edu.tw/myday
2019-09-12
Tamkang University + AWS Academy

Accredited Instructor

Accredited Educator

AWS certified Cloud Practitioner

AWS certified Solutions Architect Associate
Cloud Services Architecting Practices

Min-Yuh Day

(TLMXB4P) (M2436) (2790)

2 Credits, Elective

Thu 9, 10 (16:10-18:00) B113
課程簡介

- 雲端服務架構實務課程主要介紹：AWS 技術基礎和在 AWS 上建立架構。
- AWS 技術基礎介紹 AWS 產品、服務和常見解決方案。
- 在 AWS 上建立架構內容涵蓋在 AWS 上建置 IT 基礎架構的基礎。
- 解決方案架構師如何透過了解 AWS 服務來優化對 AWS 雲端的使用，及如何讓這些服務符合雲端解決方案。
- AWS 雲端最佳實務與建議的設計模式，協助學員思考在 AWS 上架構最佳 IT 解決方案的程序。
Course Introduction

• This course, **Cloud Services Architecting Practices**, introduces **AWS Technical Essentials** and **Architecting on AWS**.

• In **AWS Technical Essentials**, students will learn about AWS products, services, and common solutions.

• **Architecting on AWS** covers fundamentals of building IT infrastructure on the AWS platform.

• Students will learn how to optimize the AWS Cloud by understanding how AWS services fit into cloud-based solutions.

• In addition, students explore AWS Cloud best practices and design patterns for architecting optimal IT solutions on AWS.
課程目標

• 與 AWS 平台有關的術語和概念
• 瀏覽 AWS 管理主控台的方法
• AWS 安全措施和 AWS Identity and Access Management (IAM) 的關鍵概念
• 根據 AWS 架構原則和最佳實務做出架構決策
• 利用 AWS 服務，讓您的基礎設施可擴展、可靠且高度可用
Course Objective

• Terminology and concepts related to the AWS platform
• How to navigate the AWS Management Console
• Key concepts of AWS security measures and AWS Identity and Access Management (IAM)
• Make architectural decisions based on AWS architectural principles and best practices
• Leverage AWS services to make your infrastructure scalable, reliable, and highly available
<table>
<thead>
<tr>
<th>週次 (Week)</th>
<th>日期 (Date)</th>
<th>內容 (Subject/Topics)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2019/09/12</td>
<td>Course orientation on Cloud Services Architecting Practices</td>
</tr>
<tr>
<td>2</td>
<td>2019/09/19</td>
<td>Introduction to Cloud Computing</td>
</tr>
<tr>
<td>3</td>
<td>2019/09/26</td>
<td>Getting Started with AWS: AWS Compute, Storage, and Networking</td>
</tr>
<tr>
<td>4</td>
<td>2019/10/03</td>
<td>Creating Amazon EC2 instances with Microsoft Windows</td>
</tr>
<tr>
<td>5</td>
<td>2019/10/10</td>
<td>國慶日放假</td>
</tr>
<tr>
<td>6</td>
<td>2019/10/17</td>
<td>Build Your Virtual Private Cloud (VPC) and Launch a Web Server, Working with Amazon Elastic Block Store (EBS)</td>
</tr>
</tbody>
</table>
週次 (Week)  |  日期 (Date)  |  內容 (Subject/Topics)
--- | --- | ---
7  | 2019/10/24 | AWS Security, Identity, and Access Management: Introduction to AWS Identity and Access Management (IAM)
8  | 2019/10/31 | AWS Database Options: Build Your Database Server and Interact with Your Database using an Application
9  | 2019/11/07 | AWS Elasticity and Management Tools: Scale and Load Balance Your Architecture
10 | 2019/11/14 | 期中考試週
11 | 2019/11/21 | Architecting on AWS: Introduction to System Design
12 | 2019/11/28 | Cloud Billing and Support Services
週次 (Week) 日期 (Date) 內容 (Subject/Topics)
13 2019/12/05 Designing Your Environment and Deploy a Web Application on AWS
14 2019/12/12 Group discussion: Forklift an Existing Application onto AWS
15 2019/12/19 System Design for High Availability (Part I)
16 2019/12/26 Making Your Environment Highly Available
17 2020/01/02 System Design for High Availability (Part II)
18 2020/01/09 期末考試週
教學目標之教學方法與評量方法

• 教學方法
  • 講述、討論、發表、實作、體驗、模擬

• 評量方法
  • 測驗、討論、實作、報告
學期成績計算方式

• 期中評量：30.0％
• 期末評量：30.0％
• 平時評量：40.0％（課堂參與及報告討論表現）
教材課本與參考書籍

- 教材課本 (Textbook)
  - Slides
  - AWS Academy Cloud Foundations (AWS ACF), AWS Academy
  - AWS Academy Cloud Architecting (AWS ACA), AWS Academy
• 參考書籍 (References)
  • Ben Piper and David Clinton (2019), 
  • AWS Technical Essentials
    • https://aws.amazon.com/training/course-descriptions/essentials/
  • Architecting on AWS
    • https://aws.amazon.com/training/course-descriptions/architect/
  • AWS Cloud Practitioner Essentials (Second Edition)
    • https://aws.amazon.com/training/course-descriptions/cloud-practitioner-essentials/
  • AWS Certified Cloud Practitioner
    • https://aws.amazon.com/certification/certified-cloud-practitioner/
  • AWS Certified Solutions Architect – Associate
    • https://aws.amazon.com/certification/certified-solutions-architect-associate/
Available AWS Certifications

**Professional**
Two years of comprehensive experience designing, operating, and troubleshooting solutions using the AWS Cloud

**Associate**
One year of experience solving problems and implementing solutions using the AWS Cloud

**Foundational**
Six months of fundamental AWS Cloud and industry knowledge

**SAA**

**CLF**

https://aws.amazon.com/certification/
AWS Certified Cloud Practitioner

• This certification provides individuals in a larger variety of cloud and technology roles with a way to validate their AWS Cloud knowledge and enhance their professional credibility.

• This exam covers four domains, including cloud concepts, security, technology, and billing and pricing.

https://aws.amazon.com/certification/certified-cloud-practitioner/
AWS Certified Solutions Architect – Associate

• This certification validates your ability to effectively demonstrate knowledge of how to architect and deploy secure and robust applications on AWS technologies.

• This exam is for anyone with at least one year of hands-on experience designing available, cost-efficient, fault-tolerant, and scalable and distributed systems on AWS.

AWS Academy and Certifications

• AWS Academy Cloud Foundations (ACF)
  • AWS Certified Cloud Practitioner (CLF-C01) (2020/01/02)
    • https://aws.amazon.com/certification/certified-cloud-practitioner/

• AWS Academy Cloud Architecting (ACA)
  • AWS Certified Solutions Architect – Associate (SAA-C01) (2020/05/15)
    • https://aws.amazon.com/certification/certified-solutions-architect-associate/

https://aws.amazon.com/training/awsacademy/
AWS Academy and Certifications

• AWS Academy **Cloud Foundations (ACF)**
  • **AWS Certified Cloud Practitioner (CLF-C01)** (2020/01/02)
  • AWS Cloud Practitioner Essentials (Second Edition)
    • [https://aws.amazon.com/training/course-descriptions/cloud-practitioner-essentials/](https://aws.amazon.com/training/course-descriptions/cloud-practitioner-essentials/)
  • AWS Technical Essentials
    • [https://aws.amazon.com/training/course-descriptions/essentials/](https://aws.amazon.com/training/course-descriptions/essentials/)

• AWS Academy **Cloud Architecting (ACA)**
  • **AWS Certified Solutions Architect – Associate (SAA-C01)** (2020/05/15)
    • **Architecting on AWS**
      • [https://aws.amazon.com/training/course-descriptions/architect/](https://aws.amazon.com/training/course-descriptions/architect/)

[https://aws.amazon.com/training/awsacademy/](https://aws.amazon.com/training/awsacademy/)
# AWS Certified Cloud Practitioner (CLF-C01)

<table>
<thead>
<tr>
<th>Domain</th>
<th>% of Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain 1: Cloud Concepts</td>
<td>26%</td>
</tr>
<tr>
<td>Domain 2: Security and Compliance</td>
<td>25%</td>
</tr>
<tr>
<td>Domain 3: Technology</td>
<td>33%</td>
</tr>
<tr>
<td>Domain 4: Billing and Pricing</td>
<td>16%</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td><strong>100%</strong></td>
</tr>
</tbody>
</table>

## AWS Certified Solutions Architect – Associate (SAA-C01)

<table>
<thead>
<tr>
<th>Domain</th>
<th>% of Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain 1: Design <strong>Resilient</strong> Architectures</td>
<td>34%</td>
</tr>
<tr>
<td>Domain 2: Define <strong>Performant</strong> Architectures</td>
<td>24%</td>
</tr>
<tr>
<td>Domain 3: Specify <strong>Secure</strong> Applications and Architectures</td>
<td>26%</td>
</tr>
<tr>
<td>Domain 4: Design <strong>Cost-Optimized</strong> Architectures</td>
<td>10%</td>
</tr>
<tr>
<td>Domain 5: Define <strong>Operationally Excellent</strong> Architectures</td>
<td>6%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
</tr>
</tbody>
</table>

• Domain 1: Cloud Concepts
  • 1.1 Define the AWS Cloud and its value proposition
  • 1.2 Identify aspects of AWS Cloud economics
  • 1.3 List the different cloud architecture design principles

Source: https://aws.amazon.com/certification/certified-cloud-practitioner/
Domain 2: Security and Compliance

- 2.1 Define the AWS shared responsibility model
- 2.2 Define AWS Cloud security and compliance concepts
- 2.3 Identify AWS access management capabilities
- 2.4 Identify resources for security support

Source: https://aws.amazon.com/certification/certified-cloud-practitioner/
AWS Certified Cloud Practitioner (CLF-C01)

• **Domain 3: Technology**
  • 3.1 Define methods of deploying and operating in the AWS Cloud
  • 3.2 Define the AWS global infrastructure
  • 3.3 Identify the core AWS services
  • 3.4 Identify resources for technology support

• Domain 4: **Billing and Pricing**
  
  • 4.1 Compare and contrast the various pricing models for AWS
  • 4.2 Recognize the various account structures in relation to AWS billing and pricing
  • 4.3 Identify resources available for billing support

AWS Certified Solutions Architect – Associate (SAA-C01)

• Domain 1: Design Resilient Architectures
  • 1.1 Choose reliable/resilient storage.
  • 1.2 Determine how to design decoupling mechanisms using AWS services.
  • 1.3 Determine how to design a multi-tier architecture solution.
  • 1.4 Determine how to design high availability and/or fault tolerant architectures.

Source: https://aws.amazon.com/certification/certified-solutions-architect-associate
• Domain 2: Define **Performant** Architectures
  • 2.1 Choose performant storage and databases.
  • 2.2 Apply caching to improve performance.
  • 2.3 Design solutions for elasticity and scalability.

• Domain 3: Specify Secure Applications and Architectures
  • 3.1 Determine how to secure application tiers.
  • 3.2 Determine how to secure data.
  • 3.3 Define the networking infrastructure for a single VPC application.
• Domain 4: Design **Cost-Optimized Architectures**
  • 4.1 Determine how to design cost-optimized storage.
  • 4.2 Determine how to design cost-optimized compute.

• Domain 5: Define **Operationally-Excellent Architectures**
  • 5.1 Choose design features in solutions that enable operational excellence.

<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amazon EC2</td>
<td>Virtual servers in the cloud</td>
</tr>
<tr>
<td>Amazon Elastic Container Service</td>
<td>Run and manage docker containers</td>
</tr>
<tr>
<td>AWS Batch</td>
<td>Run batch jobs at any scale</td>
</tr>
<tr>
<td>AWS Lambda</td>
<td>Run code without thinking about servers</td>
</tr>
<tr>
<td>AWS Wavelength</td>
<td>Deliver ultra-low latency applications for 5G devices</td>
</tr>
<tr>
<td>Amazon EC2 Auto Scaling</td>
<td>Scale compute capacity to meet demand</td>
</tr>
<tr>
<td>Amazon Elastic Kubernetes Service</td>
<td>Run managed Kubernetes on AWS</td>
</tr>
<tr>
<td>AWS Elastic Beanstalk</td>
<td>Run and manage web apps</td>
</tr>
<tr>
<td>AWS Outposts</td>
<td>Run AWS infrastructure on-premises</td>
</tr>
<tr>
<td>VMware Cloud on AWS</td>
<td>Build a hybrid cloud without custom hardware</td>
</tr>
<tr>
<td>Amazon Elastic Container Registry</td>
<td>Store and retrieve docker images</td>
</tr>
<tr>
<td>Amazon Lightsail</td>
<td>Launch and manage virtual private servers</td>
</tr>
<tr>
<td>AWS Fargate</td>
<td>Run containers without managing servers or clusters</td>
</tr>
<tr>
<td>AWS Serverless Application Repository</td>
<td>Discover, deploy, and publish serverless applications</td>
</tr>
</tbody>
</table>
AWS Database

- Amazon Aurora
  High Performance Managed Relational Database

- Amazon ElastiCache
  In-memory Caching System

- Amazon Quantum Ledger Database (QLDB)
  Fully managed ledger database

- Amazon Redshift
  Fast, Simple, Cost-effective Data Warehousing

- Amazon DynamoDB
  Managed NoSQL Database

- Amazon Managed Apache Cassandra Service
  Managed Cassandra-compatible database

- Amazon RDS
  Managed Relational Database Service for MySQL, PostgreSQL, Oracle, SQL Server, and MariaDB

- Amazon DocumentDB (with MongoDB compatibility)
  Fully managed document database

- Amazon Neptune
  Fully Managed Graph Database Service

- Amazon RDS on VMware
  Automate on-premises database management

- Amazon Timestream
  Fully managed time series database

- AWS Database Migration Service
  Migrate Databases with Minimal Downtime

Source: [https://aws.amazon.com/](https://aws.amazon.com/)
AWS Storage

Amazon Simple Storage Service (S3)
Scalable Storage in the Cloud

Amazon F5x for Lustre
High-performance file system integrated with S3

AWS Backup
Centralized backup across AWS services

CloudEndure Disaster Recovery
Highly automated disaster recovery

Amazon Elastic Block Store (EBS)
EC2 block storage volumes

Amazon FSx for Windows File Server
Fully managed Windows native file system

AWS Snow Family
Physical devices to migrate data into and out of AWS

Amazon Elastic File System (EFS)
Fully managed file system for EC2

Amazon S3 Glacier
Low-cost Archive Storage in the Cloud

AWS Storage Gateway
Hybrid Storage Integration

Source: https://aws.amazon.com/
AWS Networking & Content Delivery

Amazon VPC
Isolated Cloud Resources

Amazon Route 53
Scalable Domain Name System

AWS Cloud Map
Application resource registry for microservices

AWS Transit Gateway
Easily scale VPC and account connections

Amazon API Gateway
Build, Deploy, and Manage APIs

AWS PrivateLink
Securely Access Services Hosted on AWS

AWS Direct Connect
Dedicated Network Connection to AWS

Elastic Load Balancing
Distribute incoming traffic across multiple targets

Amazon CloudFront
Global Content Delivery Network

AWS App Mesh
Monitor and control microservices

AWS Global Accelerator
Improve application availability and performance

Source: [https://aws.amazon.com/](https://aws.amazon.com/)
## AWS Security, Identity & Compliance

<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>AWS Identity &amp; Access Management</strong></td>
<td>Manage User Access and Encryption Keys</td>
</tr>
<tr>
<td><strong>Amazon GuardDuty</strong></td>
<td>Managed Threat Detection Service</td>
</tr>
<tr>
<td><strong>AWS Artifact</strong></td>
<td>On-demand access to AWS compliance reports</td>
</tr>
<tr>
<td><strong>AWS Directory Service</strong></td>
<td>Host and Manage Active Directory</td>
</tr>
<tr>
<td><strong>AWS Resource Access Manager</strong></td>
<td>Simple, secure service to share AWS resources</td>
</tr>
<tr>
<td><strong>AWS Shield</strong></td>
<td>DDoS Protection</td>
</tr>
<tr>
<td><strong>Amazon Cognito</strong></td>
<td>Identity Management for your Apps</td>
</tr>
<tr>
<td><strong>Amazon Inspector</strong></td>
<td>Analyze Application Security</td>
</tr>
<tr>
<td><strong>AWS Certificate Manager</strong></td>
<td>Provision, Manage, and Deploy SSL/TLS Certificates</td>
</tr>
<tr>
<td><strong>AWS Firewall Manager</strong></td>
<td>Central Management of Firewall Rules</td>
</tr>
<tr>
<td><strong>AWS Secrets Manager</strong></td>
<td>Rotate, Manage, and Retrieve Secrets</td>
</tr>
<tr>
<td><strong>AWS Single Sign-On</strong></td>
<td>Cloud Single Sign-On (SSO) Service</td>
</tr>
<tr>
<td><strong>Amazon Detective</strong></td>
<td>Investigate potential security issues</td>
</tr>
<tr>
<td><strong>Amazon Macie</strong></td>
<td>Discover, Classify, and Protect your Data</td>
</tr>
<tr>
<td><strong>AWS CloudHSM</strong></td>
<td>Hardware-based Key Storage for Regulatory Compliance</td>
</tr>
<tr>
<td><strong>AWS Key Management Service</strong></td>
<td>Managed Creation and Control of Encryption Keys</td>
</tr>
<tr>
<td><strong>AWS Security Hub</strong></td>
<td>Unified security and compliance center</td>
</tr>
<tr>
<td><strong>AWS WAF</strong></td>
<td>Filter Malicious Web Traffic</td>
</tr>
</tbody>
</table>

Source: [https://aws.amazon.com/](https://aws.amazon.com/)
## AWS Cost Management

### AWS Cost Explorer
- Analyze Your AWS Cost and Usage

### AWS Budgets
- Set Custom Cost and Usage Budgets

### AWS Cost and Usage Report
- Access Comprehensive Cost and Usage Information

#### Reserved Instance Reporting
- Dive Deeper into Your Reserved Instances (RIs)

#### Savings Plans
- Save up to 72% on compute usage with flexible pricing

Source: [https://aws.amazon.com/](https://aws.amazon.com/)
• Amazon **EC2**
  • Virtual servers in the cloud

• Amazon **Simple Storage Service (S3)**
  • Scalable storage in the cloud

• Amazon **Aurora**
  • High performance managed relational database

• Amazon **DynamoDB**
  • Managed NoSQL database

• Amazon **RDS**
  • Managed relational database service for MySQL, PostgreSQL, Oracle, SQL Server, and MariaDB

Source: [https://aws.amazon.com/](https://aws.amazon.com/)
AWS Services

- **AWS Lambda**
  - Run code without thinking about servers
- **AWS Elastic Beanstalk**
  - Run and manage web apps
- **Amazon VPC**
  - Isolated cloud resources
- **Amazon Lightsail**
  - Launch and manage virtual private servers
- **Amazon SageMaker**
  - Build, train, and deploy machine learning models at scale

Source: [https://aws.amazon.com/](https://aws.amazon.com/)
Summary

• 雲端服務架構實務課程主要介紹：AWS 技術基礎和在 AWS 上建立架構。
• AWS 技術基礎介紹 AWS 產品、服務和常見解決方案。
• 在 AWS 上建立架構內容涵蓋在 AWS 上建置 IT 基礎架構的基礎。
• 解決方案架構師如何透過了解 AWS 服務來優化對 AWS 雲端的使用，及如何讓這些服務符合雲端解決方案。
• AWS 雲端最佳實務與建議的設計模式，協助學員思考在 AWS 上架構最佳 IT 解決方案的程序。
Contact Information

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專任副教授
淡江大學 資訊管理學系

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網址：http://mail.tku.edu.tw/myday/