Introduction to Amazon Web Services (AWS) Certifications Roadmap

Host: 陳仁偉 教授 (Prof. Jen Wel Chen)
Information Management, SEC, Chinese Culture University
Time: 2022/3/13 (Sunday) 13:00-15:00
Place: 202教室 大夏館 台北市建國南路二段231號

戴敏育 副教授
Min-Yuh Day, Ph.D, Associate Professor
國立臺北大學 資訊管理研究所
Institute of Information Management, National Taipei University
https://web.ntpu.edu.tw/~myday
2022-03-13
戴敏育博士 (Min-Yuh Day, Ph.D.)
國立臺北大學 資訊管理研究所 副教授
中央研究院 資訊科學研究所 訪問學人
國立臺灣大學 資訊管理 博士

Publications Co-Chairs, IEEE/ACM International Conference on Advances in Social Networks Analysis and Mining (ASONAM 2013- )
Program Co-Chair, IEEE International Workshop on Empirical Methods for Recognizing Inference in TExt (IEEE EM-RITE 2012- )
Publications Chair, The IEEE International Conference on Information Reuse and Integration for Data Science (IEEE IRI)
Outline

• Amazon Web Services (AWS)
• AWS Certifications Roadmap
### AWS Products and Services

<table>
<thead>
<tr>
<th>Category</th>
<th>Products</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analytics</td>
<td>Application Integration</td>
</tr>
<tr>
<td>Business Applications</td>
<td>Compute</td>
</tr>
<tr>
<td>End User Computing</td>
<td>Game Tech</td>
</tr>
<tr>
<td>Media Services</td>
<td>Internet of Things</td>
</tr>
<tr>
<td>Robotics</td>
<td>Mobile</td>
</tr>
<tr>
<td>Satellite</td>
<td>Networking &amp; Content Delivery</td>
</tr>
<tr>
<td>Security, Identity &amp; Compliance</td>
<td>Storage</td>
</tr>
<tr>
<td>AWS Cost Management</td>
<td>AWS Cost Management</td>
</tr>
<tr>
<td>Blockchain</td>
<td>Developer Tools</td>
</tr>
<tr>
<td>Management &amp; Governance</td>
<td>Quantum Technologies</td>
</tr>
</tbody>
</table>

Source: [https://aws.amazon.com/](https://aws.amazon.com/)
<table>
<thead>
<tr>
<th>AWS Compute</th>
<th>Source: <a href="https://aws.amazon.com/">https://aws.amazon.com/</a></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Amazon EC2</strong>&lt;br&gt;Virtual servers in the cloud</td>
<td><strong>Amazon EC2 Auto Scaling</strong>&lt;br&gt;Scale compute capacity to meet demand</td>
</tr>
<tr>
<td><strong>Amazon Elastic Container Service</strong>&lt;br&gt;Run and manage docker containers</td>
<td><strong>Amazon Elastic Kubernetes Service</strong>&lt;br&gt;Run managed Kubernetes on AWS</td>
</tr>
<tr>
<td><strong>AWS Batch</strong>&lt;br&gt;Run batch jobs at any scale</td>
<td><strong>AWS Elastic Beanstalk</strong>&lt;br&gt;Run and manage web apps</td>
</tr>
<tr>
<td><strong>AWS Lambda</strong>&lt;br&gt;Run code without thinking about servers</td>
<td><strong>AWS Outposts</strong>&lt;br&gt;Run AWS infrastructure on-premises</td>
</tr>
<tr>
<td><strong>AWS Wavelength</strong>&lt;br&gt;Deliver ultra-low latency applications for 5G devices</td>
<td><strong>VMware Cloud on AWS</strong>&lt;br&gt;Build a hybrid cloud without custom hardware</td>
</tr>
<tr>
<td><strong>Amazon Elastic Container Registry</strong>&lt;br&gt;Store and retrieve docker images</td>
<td><strong>Amazon Lightsail</strong>&lt;br&gt;Launch and manage virtual private servers</td>
</tr>
<tr>
<td><strong>AWS Fargate</strong>&lt;br&gt;Run containers without managing servers or clusters</td>
<td><strong>AWS Serverless Application Repository</strong>&lt;br&gt;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

AWS Database Migration Service
Migrate Databases with Minimal Downtime

Source: https://aws.amazon.com/
AWS Storage

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

Amazon Elastic Block Store (EBS)
EC2 block storage volumes

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

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

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

Amazon S3 Glacier
Low-cost Archive Storage in the Cloud

AWS Backup
Centralized backup across AWS services

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

CloudEndure Disaster Recovery
Highly automated disaster recovery

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

<table>
<thead>
<tr>
<th>Service</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AWS Cost Explorer</td>
<td>Analyze Your AWS Cost and Usage</td>
</tr>
<tr>
<td>Reserved Instance Reporting</td>
<td>Dive Deeper into Your Reserved Instances (RIs)</td>
</tr>
<tr>
<td>AWS Budgets</td>
<td>Set Custom Cost and Usage Budgets</td>
</tr>
<tr>
<td>AWS Cost and Usage Report</td>
<td>Access Comprehensive Cost and Usage Information</td>
</tr>
<tr>
<td>Savings Plans</td>
<td>Save up to 72% on compute usage with flexible pricing</td>
</tr>
</tbody>
</table>

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

• 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/
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/
Available AWS Certifications

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

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

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

**Specialty**
- Technical AWS Cloud experience in the Specialty domain as specified in the exam guide

- **AWS certified**
  - Solutions Architect Professional
  - DevOps Engineer Professional
  - Advanced Networking Specialty
  - Data Analytics Specialty
  - Database Specialty
  - Machine Learning Specialty
  - Security Specialty

[https://aws.amazon.com/certification/](https://aws.amazon.com/certification/)
Available AWS Certifications

1. CLF (Cloud Practitioner)
   - 六個月的基礎 AWS 雲端和產業知識
   - 雲端從業人員

2. SAA (Solutions Architect Associate)
   - 一年使用 AWS 雲端解決問題和實作解決方案的經驗
   - 架構師

3. SAP (Solutions Architect Professional)
   - 兩年使用 AWS 雲端設計、操作及疑難排查解決方案的廣泛經驗

4. DevOps Engineer Professional
   - 開發人員

5. Cloud Practitioner
   - 开发人员

6. DevOps Engineer Associate
   - 管理人员

7. Solutions Architect Associate
   - 架構師

8. Solutions Architect Professional
   - 架構師

9. Certified Data Analytics Specialty
   - 数据分析专家

10. Certified Advanced Networking Specialty
    - 高级网络专家

11. Certified Machine Learning Specialty
    - 机器学习专家

12. Certified Database Specialty
    - 数据库专家

https://aws.amazon.com/certification/
AWS Certification

AWS Certification
Validate technical skills and cloud expertise to grow your career and business.

Get started

Certification exam guides and details
Explore our role-based certifications and our Specialty certifications in specific technical areas. Select an exam to learn more:

Options for taking your exam
Curious about how to take your AWS Certification exam? We offer flexible, convenient options for taking exams so you can select what works best for you.

Access your AWS Certification Account
Schedule and take exams from your AWS Certification Account. You can also access your AWS Certified benefits, such as your digital badge and 50% discount voucher for a future exam.

https://aws.amazon.com/certification/
AWS Certification

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

Specialty
Technical AWS Cloud experience in the Specialty domain as specified in the exam guide

https://aws.amazon.com/certification/
AWS Certification

Format
65 questions; either multiple choice or multiple response

Type
Foundational

Delivery Method
Testing center or online proctored exam

Time
90 minutes to complete the exam

Cost
100 USD (Practice Exam: 20 USD)

Language
Available in English, Indonesian (Bahasa), Japanese, Korean, and Simplified Chinese

https://aws.amazon.com/certification/
AWS Certification

Format
65 questions; either multiple choice or multiple response

Type
Associate

Delivery Method
Testing center or online proctored exam

Time
130 minutes to complete the exam

Cost
150 USD (Practice exam: 20 USD)

Language
Available in English, Japanese, Korean, and Simplified Chinese

https://aws.amazon.com/certification/
AWS Certification

Professional

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

Format
75 questions; either multiple choice or multiple response

Type
Professional

Delivery Method
Testing center or online proctored exam

Time
180 minutes to complete the exam

Cost
300 USD (Practice Exam: 40 USD)

Language
Available in English, Japanese, Korean, and Simplified Chinese

https://aws.amazon.com/certification/
AWS Certification

**Format**
65 questions; either multiple choice or multiple response

**Type**
Associate

**Delivery Method**
Testing center or online proctored exam

**Time**
130 minutes to complete the exam

**Cost**
150 USD (Practice exam: 20 USD)

**Language**
Available in English, Japanese, Korean, and Simplified Chinese

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

https://aws.amazon.com/certification/
AWS Certification

Format
65 questions; either multiple choice or multiple response

Type
Associate

Delivery Method
Testing center or online proctored exam

Time
130 mins to complete the exam

Cost
150 USD (Practice exam: 20 USD)

Language
Available in English, Japanese, Korean, and Simplified Chinese

https://aws.amazon.com/certification/
AWS Certification

Professional

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

Format
75 questions; either multiple choice or multiple response

Type
Professional

Delivery Method
Testing center or online proctored exam

Time
180 minutes to complete the exam

Cost
300 USD (Practice exam: 40 USD)

Language
Available in English, Japanese, Korean, and Simplified Chinese

https://aws.amazon.com/certification/
AWS Certification

Specialty
Technical AWS Cloud experience in the Specialty domain as specified in the exam guide

Format
65 questions; either multiple choice or multiple response

Type
Specialty

Delivery Method
Testing center or online proctored exam

Time
180 minutes to complete the exam

Cost
300 USD (Practice exam: 40 USD)

Language
Available in English, Japanese, Korean, and Simplified Chinese

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

- Level: **Foundational**
- Length: **90 minutes** to complete the exam
- Cost: **100 USD**
- Format: **65 questions**; either multiple choice or multiple response
- Delivery method: **Pearson VUE** and PSI; testing center or online proctored exam

AWS Certified Solutions Architect – Associate

• Level: Associate
• Length: 130 minutes to complete the exam
• Cost: 150 USD
• Format: 65 questions; either multiple choice or multiple response
• Delivery method: Pearson VUE and PSI; testing center or online proctored exam

AWS Certified SysOps Administrator - Associate

- Level: Associate
- Length: 180 minutes to complete the exam
- Cost: 150 USD
- Format: 65 scoring opportunities that may be multiple choice, multiple response, or exam lab
- Delivery method: Pearson VUE and PSI; testing center or online proctored exam

https://aws.amazon.com/certification/certified-sysops-admin-associate
AWS Certified Solutions Architect – Associate

- Level: Associate
- Length: **130 minutes** to complete the exam
- Cost: **150 USD**
- Format: **65 questions**; either multiple choice or multiple response
- Delivery method: **Pearson VUE** and PSI; testing center or online proctored exam

AWS Certified Solutions Architect - Professional

- Level: Professional
- Length: 180 minutes to complete the exam
- Cost: 300 USD
- Format: 75 questions; either multiple choice or multiple response
- Delivery method: Pearson VUE and PSI; testing center or online proctored exam

https://aws.amazon.com/certification/certified-solutions-architect-professional
AWS Certified DevOps Engineer - Professional

- Level: Professional
- Length: 180 minutes to complete the exam
- Cost: 300 USD
- Format: 75 questions; either multiple choice or multiple response
- Delivery method: Pearson VUE and PSI; testing center or online proctored exam

https://aws.amazon.com/certification/certified-devops-engineer-professional
AWS Certified Security - Specialty

• Level: Specialty
• Length: 170 minutes to complete the exam
• Cost: 300 USD
• Format: 65 questions; either multiple choice or multiple response
• Delivery method: Pearson VUE and PSI; testing center or online proctored exam

https://aws.amazon.com/certification/certified-security-specialty
AWS Certified Database - Specialty

• Level: Specialty
• Length: 180 minutes to complete the exam
• Cost: 300 USD
• Format: 65 questions; either multiple choice or multiple response
• Delivery method: Pearson VUE and PSI; testing center or online proctored exam

https://aws.amazon.com/certification/certified-database-specialty
AWS Certified Machine Learning – Specialty

• Level: Specialty
• Length: 180 minutes to complete the exam
• Cost: 300 USD
• Format: 65 questions; either multiple choice or multiple response
• Delivery method: Pearson VUE and PSI; testing center or online proctored exam

https://aws.amazon.com/certification/certified-machine-learning-specialty/
AWS Certified Data Analytics - Specialty

- Level: Specialty
- Length: 180 minutes to complete the exam
- Cost: 300 USD
- Format: 65 questions; either multiple choice or multiple response
- Delivery method: Pearson VUE and PSI; testing center or online proctored exam

AWS Certified Advanced Networking - Specialty

- Level: Specialty
- Length: 170 minutes to complete the exam
- Cost: 300 USD
- Format: 65 questions; either multiple choice or multiple response
- Delivery method: Pearson VUE and PSI; testing center or online proctored exam

https://aws.amazon.com/certification/certified-advanced-networking-specialty
AWS Certifications Roadmap

- AWS Certified Cloud Practitioner
- AWS Certified Solutions Architect - Associate
- AWS Certified Developer - Associate
- AWS Certified SysOps Administrator - Associate
- AWS Certified DevOps Engineer - Professional
- AWS Certified Solutions Architect - Professional
- AWS Certified Security Specialty
- AWS Certified Advanced Networking Specialty
- AWS Certified Database Specialty
- AWS Certified Data Analytics Specialty
- AWS Certified Machine Learning Specialty

https://aws.amazon.com/certification/
AWS Certifications Roadmap

Cloud Architect

https://aws.amazon.com/certification/
AWS Certifications Roadmap

Cloud Developer

https://aws.amazon.com/certification/
AWS Certifications Roadmap

DevOps

https://aws.amazon.com/certification/
AWS Certifications Roadmap

Data Analytics / Machine Learning

https://aws.amazon.com/certification/
AWS Certifications Roadmap

Security

https://aws.amazon.com/certification/
AWS Certified Cloud Practitioner (CLF-C01)
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 (SAA-C02)

Source: https://aws.amazon.com/certification/certified-solutions-architect-associate
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)
    • https://aws.amazon.com/certification/certified-cloud-practitioner/

• AWS Academy Cloud Architecting (ACA)
  • AWS Certified Solutions Architect – Associate (SAA-C02)
    • https://aws.amazon.com/certification/certified-solutions-architect-associate/

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>TOTAL</td>
<td>100%</td>
</tr>
</tbody>
</table>

# AWS Certified Solutions Architect – Associate (SAA-C02)

<table>
<thead>
<tr>
<th>Domain</th>
<th>% of Examination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Domain 1: Design Resilient Architectures</td>
<td>30%</td>
</tr>
<tr>
<td>Domain 2: Design High-Performing Architectures</td>
<td>28%</td>
</tr>
<tr>
<td>Domain 3: Specify Secure Applications and Architectures</td>
<td>24%</td>
</tr>
<tr>
<td>Domain 4: Design Cost-Optimized Architectures</td>
<td>18%</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100%</td>
</tr>
</tbody>
</table>

AWS Certified Cloud Practitioner (CLF-C01)

Source: https://aws.amazon.com/certification/certified-cloud-practitioner/
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
• 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
• 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

Source: https://aws.amazon.com/certification/certified-cloud-practitioner/
AWS Certified Solutions Architect – Associate (SAA-C02)

Source: https://aws.amazon.com/certification/certified-solutions-architect-associate
• Domain 1: Design Resilient Architectures
  • 1.1 Design a multi-tier architecture solution
  • 1.2 Design highly available and/or fault-tolerant architectures
  • 1.3 Design decoupling mechanisms using AWS services
  • 1.4 Choose appropriate resilient storage

Source: https://aws.amazon.com/certification/certified-solutions-architect-associate
AWS Certified Solutions Architect – Associate (SAA-C02)

• Domain 2: Design **High-Performing Architectures**
  
  • 2.1 Identify elastic and scalable compute solutions for a workload
  
  • 2.2 Select high-performing and scalable storage solutions for a workload
  
  • 2.3 Select high-performing networking solutions for a workload
  
  • 2.4 Choose high-performing database solutions for a workload

Source: https://aws.amazon.com/certification/certified-solutions-architect-associate
• Domain 3: Design Secure Applications and Architectures
  • 3.1 Design secure access to AWS resources
  • 3.2 Design secure application tiers
  • 3.3 Select appropriate data security options

Source: https://aws.amazon.com/certification/certified-solutions-architect-associate
Domain 4: Design Cost-Optimized Architectures

- 4.1 Identify cost-effective storage solutions
- 4.2 Identify cost-effective compute and database services
- 4.3 Design cost-optimized network architectures

Source: https://aws.amazon.com/certification/certified-solutions-architect-associate
## AWS Certifications
### Exam Pricing

<table>
<thead>
<tr>
<th>Exam Type</th>
<th>Price in USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Foundational</td>
<td>$100</td>
</tr>
<tr>
<td>Associate</td>
<td>$150</td>
</tr>
<tr>
<td>Professional</td>
<td>$300</td>
</tr>
<tr>
<td>Specialty</td>
<td>$300</td>
</tr>
</tbody>
</table>
AWS Certified Security – Specialty validates expertise in securing data and workloads in the AWS Cloud
AWS Certified Security – Specialty is intended for individuals who perform a security role and have at least two years of hands-on experience securing AWS workloads.

- Five years of IT security experience in designing and implementing security solutions and at least two years of hands-on experience in securing AWS workloads
- Working knowledge of AWS security services and features of services to provide a secure production environment and an understanding of security operations and risks
- Knowledge of the AWS shared responsibility model and its application; security controls for workloads on AWS; logging and monitoring strategies; cloud security threat models; patch management and security automation; ways to enhance AWS security services with third-party tools and services; and disaster recovery controls, including BCP and backups, encryption, access control, and data retention
- Understanding of specialized data classifications and AWS data protection mechanisms, data-encryption methods and AWS mechanisms to implement them, and secure internet protocols and AWS mechanisms to implement them
- Ability to make tradeoff decisions with regard to cost, security, and deployment complexity to meet a set of application requirements

https://aws.amazon.com/certification/certified-security-specialty
AWS Certified Security - Specialty

- AWS Certified Security – Specialty 適用於曾擔任安全角色而且至少兩年保護 AWS 工作負載實務經驗的個人。
  - 具備五年的安全解決方案設計與實作相關 IT 安全工作經驗，以及至少兩年的 AWS 工作負載安全保護實務經驗。
  - 具有 AWS 安全服務和服務功能的工作知識，可提供安全的生產環境且理解安全作業和風險
  - 了解 AWS 共同的責任模型及其應用；AWS 上工作負載的安全控制；日誌記錄和監控策略；雲端安全威脅模型；修補程式管理和安全自動化；使用第三方工具和服務增強 AWS 安全服務的方法；以及災難復原控制，包括 BCP 和備份、加密、存取控制和資料保留
  - 了解專門的資料分類和 AWS 資料保護機制、資料加密方法和實施它們的 AWS 機制，以及安全的網際網路通訊協定和實作它們的 AWS 機制
  - 能夠根據成本、安全性和部署複雜性做出權衡的決策，滿足一組應用程式需求

https://aws.amazon.com/certification/certified-security-specialty
企業雲端運算入門
(Foundation of Business Cloud Computing)

雲端概念概述
(Cloud Concepts Overview)

謝榮桂 (Jung-Kuei Hsieh), 戴敏育 (Min-Yuh Day)
National Taipei University

2022-02-23
教學目標

• 本課程主要介紹亞馬遜公司的雲端運算服務 Amazon Web Services (AWS)，對於想要全面瞭解企業雲端運算概念的同學，本課程將詳細介紹雲概念、AWS 核心服務、安全性、架構、定價和相關支援等服務，並以通過認證 AWS Certified Cloud Practitioner 為目標。
Course Objectives

• This course introduces Amazon Web Services (AWS), the cloud computing service of Amazon.

• For students who want to fully understand the concept of enterprise cloud computing, this course will introduce the AWS Academy Cloud Foundations.


• The course objective is training students to pass the certification of AWS Certified Cloud Practitioner.
內容綱要

• 說明如何使用 AWS 帳戶的最佳實務
• 說明AWS架構完善的框架和設計原則
• 說明AWS高可用性和可靠性
• 描述AWS設計決策的業務影響
• 描述AWS如何設置組織結構以簡化帳單和提高帳戶可見性
• 說明AWS替代支援選項和功能
Course Outline

1. Cloud Concepts Overview
2. Cloud Economics and Billing
3. AWS Global Infrastructure Overview
4. AWS Cloud Security
5. Networking and Content Delivery
6. Cloud Compute
7. Cloud Storage
8. Cloud Databases
9. Cloud Architecture
10. Cloud Automatic Scaling and Monitoring
<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>2022/02/23</td>
<td>雲端概念概述 (Cloud Concepts Overview)</td>
</tr>
<tr>
<td>2</td>
<td>2022/03/02</td>
<td>雲端經濟與計費 (Cloud Economics and Billing)</td>
</tr>
<tr>
<td>3</td>
<td>2022/03/09</td>
<td>AWS全球基礎設施概述 (AWS Global Infrastructure Overview)</td>
</tr>
<tr>
<td>4</td>
<td>2022/03/16</td>
<td>AWS雲端安全 (AWS Cloud Security)</td>
</tr>
<tr>
<td>5</td>
<td>2022/03/23</td>
<td>網路和內容交付 (Networking and Content Delivery)</td>
</tr>
<tr>
<td>6</td>
<td>2022/03/30</td>
<td>雲端計算 (Cloud Compute)</td>
</tr>
<tr>
<td>週次 (Week)</td>
<td>日期 (Date)</td>
<td>內容 (Subject/Topics)</td>
</tr>
<tr>
<td>------------</td>
<td>------------</td>
<td>------------------------------------------</td>
</tr>
<tr>
<td>7</td>
<td>2022/04/06</td>
<td>放假一天 (Make-up Holiday, No Classes)</td>
</tr>
<tr>
<td>8</td>
<td>2022/04/13</td>
<td>雲端儲存 (Cloud Storage)</td>
</tr>
<tr>
<td>9</td>
<td>2022/04/20</td>
<td>雲端數據庫 (Cloud Databases)</td>
</tr>
<tr>
<td>10</td>
<td>2022/04/27</td>
<td>雲端架構 (Cloud Architecture)</td>
</tr>
<tr>
<td>11</td>
<td>2022/05/04</td>
<td>雲端自動擴展和監控 (Cloud Automatic Scaling and Monitoring)</td>
</tr>
<tr>
<td>12</td>
<td>2022/05/11</td>
<td>學生自主學習 (Self-learning)</td>
</tr>
</tbody>
</table>
週次 (Week)  日期 (Date)  內容 (Subject/Topics)
13  2022/05/18  學生自主學習 (Self-learning)
14  2022/05/25  雲端專案成果報告與討論 (Cloud Project Presentation and Discussion)
15  2022/06/01  學生自主學習 (Self-learning)
16  2022/06/08  期末專案成果報告 (Final Project Presentation)
17  2022/06/15  學生自主學習 (Self-learning)
18  2022/06/22  學生自主學習 (Self-learning)
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.

Web Application with AWS Core Services
AWS Application Services

AWS Security Services

AWS
Serverless Architecture
AWS Serverless Airline Booking

Source: https://github.com/aws-samples/aws-serverless-airline-booking
AWS Serverless Airline Booking Stack

**UI/UX**
- Quasar framework
- Vue.js
- AWS Amplify

**Data/Lang**
- Amazon DynamoDB
- Python
- TypeScript
- JavaScript

**API/Auth**
- AWS AppSync
- Amazon API Gateway
- Amazon Cognito

**Messaging**
- Amazon SNS
- AWS Step Functions

Source: [https://github.com/aws-samples/aws-serverless-airline-booking](https://github.com/aws-samples/aws-serverless-airline-booking)
AWS Serverless Airline Booking
High level infrastructure architecture

Source: https://github.com/aws-samples/aws-serverless-airline-booking
### AWS Serverless Architecture

### AWS Operational Responsibility Models

<table>
<thead>
<tr>
<th>Compute</th>
<th>Databases</th>
<th>Storage</th>
<th>Messaging</th>
<th>Analytics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Virtual Machine</td>
<td>MySQL</td>
<td>Storage</td>
<td>ESBs</td>
<td>Hadoop</td>
</tr>
<tr>
<td>Amazon EC2</td>
<td>MySQL on EC2</td>
<td>Amazon S3</td>
<td>Amazon MQ</td>
<td>Hadoop on EC2</td>
</tr>
<tr>
<td>AWS Elastic Beanstalk</td>
<td>Amazon RDS MySQL</td>
<td>Amazon SNS / SQS</td>
<td>Amazon Kinesis</td>
<td>Amazon EMR</td>
</tr>
<tr>
<td>Fargate</td>
<td>Amazon Aurora</td>
<td>Amazon Athena</td>
<td>Amazon SNS / SQS</td>
<td>Amazon Elasticsearch Service</td>
</tr>
<tr>
<td>AWS Lambda</td>
<td>Amazon Aurora Serverless</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Source: Heitor Lessa (2019), How to build a full stack serverless airline ticketing web app, [https://www.youtube.com/watch?v=MyoOeHTa2ag](https://www.youtube.com/watch?v=MyoOeHTa2ag)
Build a Serverless Web Application
Build a Serverless Web Application

with AWS Lambda, Amazon API Gateway, Amazon S3, Amazon DynamoDB, and Amazon Cognito

Overview

In this tutorial, you'll create a simple serverless web application that enables users to request unicorn rides from the Wild Rydes fleet. The application will present users with an HTML based user interface for indicating the location where they would like to be picked up and will interface on the backend with a RESTful web service to submit the request and dispatch a nearby unicorn. The application will also provide facilities for users to register with the service and log in before requesting rides.

Application Architecture

AWS Experience: Beginner

Time to complete: 2 hours

Cost to complete: Each service used in this architecture is eligible for the AWS Free Tier. If you are outside the usage limits of the Free Tier, completing this tutorial will cost you less than $0.25*.
Build a Serverless Web Application
with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito

Source: https://aws.amazon.com/getting-started/projects/build-serverless-web-app-lambda-apigateway-s3-dynamodb-cognito/
Build a Serverless Web Application with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito.

Source: https://aws.amazon.com/getting-started/projects/build-serverless-web-app-lambda-apigateway-s3-dynamodb-cognito/
Build a Serverless Web Application with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito

Static Web Hosting

Amazon S3 hosts static web resources including HTML, CSS, JavaScript, and image files which are loaded in the user's browser.

Source: https://aws.amazon.com/getting-started/projects/build-serverless-web-app-lambda-apigateway-s3-dynamodb-cognito/
Build a Serverless Web Application with Amazon S3, AWS Lambda, Amazon API Gateway, Amazon DynamoDB, and Amazon Cognito

Source: https://aws.amazon.com/getting-started/projects/build-serverless-web-app-lambda-apigateway-s3-dynamodb-cognito/
User Management

Amazon Cognito provides user management and authentication functions to secure the backend API.
Build a Serverless Web Application
with Amazon S3, AWS Lambda, Amazon API Gateway,
Amazon DynamoDB, and Amazon Cognito

Source: https://aws.amazon.com/getting-started/projects/build-serverless-web-app-lambda-apigateway-s3-dynamodb-cognito/
Serverless Backend

Amazon DynamoDB provides a persistence layer where data can be stored by the API's Lambda function.
Build a Serverless Web Application

with Amazon S3, AWS Lambda, Amazon API Gateway,
Amazon DynamoDB, and Amazon Cognito

Source: https://aws.amazon.com/getting-started/projects/build-serverless-web-app-lambda-apigateway-s3-dynamodb-cognito/
Build a Serverless Web Application
with Amazon S3, AWS Lambda, Amazon API Gateway,
Amazon DynamoDB, and Amazon Cognito

RESTful API
JavaScript executed in the browser sends and receives data from a public backend API built using Lambda and API Gateway.

Source: https://aws.amazon.com/getting-started/projects/build-serverless-web-app-lambda-apigateway-s3-dynamodb-cognito/
5 Terminate resources

Resource Cleanup

You will terminate an Amazon S3 bucket, an Amazon Cognito User Pool, an AWS Lambda function, an IAM role, a DynamoDB table, a REST API, and a CloudWatch Log.

It is a best practice to delete resources you are no longer using to avoid unwanted charges.

Source: https://aws.amazon.com/getting-started/projects/build-serverless-web-app-lambda-apigateway-s3-dynamodb-cognito/
References

- https://aws.amazon.com/certification/
- https://www.aws.training/
- https://aws.amazon.com/training/awsacademy/
- https://aws.amazon.com/education/awseducate/
- AWS Certified Cloud Practitioner
  - https://aws.amazon.com/certification/certified-cloud-practitioner/
- AWS Certified Solutions Architect – Associate
- AWS Cloud Practitioner Essentials (Second Edition)
  - https://aws.amazon.com/training/course-descriptions/cloud-practitioner-essentials/
- Architecting on AWS
  - https://aws.amazon.com/training/course-descriptions/architect/
Introduction to Amazon Web Services (AWS) Certifications Roadmap

Host: 陳仁偉 教授 (Prof. Jen Wel Chen)
Information Management, SEC, Chinese Culture University
Time: 2022/3/13 (Sunday) 13:00-15:00
Place: 202教室 大夏館 台北市建國南路二段231號

Min-Yuh Day, Ph.D, Associate Professor
Institute of Information Management, National Taipei University
https://web.ntpu.edu.tw/~myday
2022-03-13