

## AWS Certified Solutions Architect - Professional (SAP-C02) Exam Guide

### Introduction

The AWS Certified Solutions Architect - Professional (SAP-C02) exam is intended for individuals who perform a solutions architect role. The exam validates a candidate's advanced technical skills and experience in designing optimized AWS solutions that are based on the AWS Well-Architected Framework.

The exam also validates a candidate's ability to complete the following tasks within the scope of the AWS Well-Architected Framework:

- Design for organizational complexity.
- Design for new solutions.
- Continuously improve existing solutions.
- Accelerate workload migration and modernization.

### Target candidate description

The target candidate has 2 or more years of experience in using AWS services to design and implement cloud solutions. This candidate has the ability to evaluate cloud application requirements and make architectural recommendations for deployment of applications on AWS. This candidate also can provide expert guidance about architectural design that extends across multiple applications and projects within a complex organization.

### Job tasks and knowledge that are out of scope for the target candidate

The following list contains job tasks that the target candidate is not expected to be able to perform and knowledge that the target candidate is not expected to have. This list is non-exhaustive. These tasks and knowledge are out of scope for the exam:

- Frontend development for mobile apps
- 12-factor app methodology
- In-depth knowledge of operating systems

Refer to the Appendix for a list of technologies and concepts that might appear on the exam, a list of in-scope AWS services and features, and a list of out-of-scope AWS services and features.

## Exam content

### Response types

The exam contains one or more of the following question types:

- **Multiple choice:** Has one correct response and three incorrect responses (distractors).
- **Multiple response:** Has two or more correct responses out of five or more response options. You must select all the correct responses to receive credit for the question.

Unanswered questions are scored as incorrect. There is no penalty for guessing. The exam includes 65 questions that affect your score.

### Unscored content

The exam includes 10 unscored questions that do not affect your score. AWS collects information about performance on these unscored questions to evaluate them for future use as scored questions. The unscored questions are not identified on the exam.

### Exam results

The AWS Certified Solutions Architect - Professional (SAP-C02) exam has a pass or fail designation. The exam is scored against a minimum standard established by AWS professionals who follow certification industry best practices and guidelines.

Your results for the exam are reported as a scaled score of 100–1,000. The minimum passing score is 750. Your score shows how you performed on the exam as a whole and whether you passed. Scaled scoring models help equate scores across multiple exam forms that might have slightly different difficulty levels.

Your score report could contain a table of classifications of your performance at each section level. The exam uses a compensatory scoring model, which means that you do not need to achieve a passing score in each section. You need to pass only the overall exam.

Each section of the exam has a specific weighting, so some sections have more questions than other sections have. The table of classifications contains general information that highlights your strengths and weaknesses. Use caution when you interpret section-level feedback.

## Content outline

This exam guide includes weightings, content domains, and tasks for the exam. This guide does not provide a comprehensive list of the content on the exam. However, additional context for each task is available to help you prepare for the exam.

The exam has the following content domains and weightings:

- Content Domain 1: Design Solutions for Organizational Complexity (26% of scored content)
- Content Domain 2: Design for New Solutions (29% of scored content)
- Content Domain 3: Continuous Improvement for Existing Solutions (25% of scored content)
- Content Domain 4: Accelerate Workload Migration and Modernization (20% of scored content)

### Content Domain 1: Design Solutions for Organizational Complexity

Task 1.1: Architect network connectivity strategies.

Knowledge of:

- AWS Global Infrastructure
- AWS networking concepts (for example, Amazon Virtual Private Cloud [Amazon VPC], AWS Direct Connect, AWS VPN, transitive routing, AWS container services)
- Hybrid DNS concepts (for example, Amazon Route 53 Resolver, on-premises DNS integration)
- Network segmentation (for example, subnetting, IP addressing, connectivity among VPCs)
- Network traffic monitoring

Skills in:

- Evaluating connectivity options for multiple VPCs
- Evaluating connectivity options for on-premises, co-location, and cloud integration
- Selecting AWS Regions and Availability Zones based on network and latency requirements
- Troubleshooting traffic flows by using AWS tools
- Using service endpoints for service integrations

Task 1.2: Prescribe security controls.

Knowledge of:

- AWS Identity and Access Management (IAM) and AWS IAM Identity Center
- Route tables, security groups, and network ACLs
- Encryption keys and certificate management (for example, AWS Key Management Service [AWS KMS], AWS Certificate Manager [ACM])
- AWS security, identity, and compliance tools (for example, AWS CloudTrail, AWS Identity and Access Management Access Analyzer, AWS Security Hub, Amazon Inspector)

Skills in:

- Evaluating cross-account access management
- Integrating with third-party identity providers
- Deploying encryption strategies for data at rest and data in transit
- Developing a strategy for centralized security event notifications and auditing

Task 1.3: Design reliable and resilient architectures.

Knowledge of:

- Recovery time objectives (RTOs) and recovery point objectives (RPOs)
- Disaster recovery strategies (for example, using AWS Elastic Disaster Recovery, pilot light, warm standby, and multi-site)
- Data backup and restoration

Skills in:

- Designing disaster recovery solutions based on RTO and RPO requirements
- Implementing architectures to automatically recover from failure
- Developing the optimal architecture by considering scale-up and scale-out options
- Designing an effective backup and restoration strategy

Task 1.4: Design a multi-account AWS environment.

Knowledge of:

- AWS Organizations and AWS Control Tower
- Multi-account event notifications
- AWS resource sharing across environments

Skills in:

- Evaluating the most appropriate account structure for organizational requirements
- Recommending a strategy for central logging and event notifications
- Developing a multi-account governance model

Task 1.5: Determine cost optimization and visibility strategies.

Knowledge of:

- AWS cost and usage monitoring tools (for example, AWS Trusted Advisor, AWS Pricing Calculator, AWS Cost Explorer, AWS Budgets)
- AWS purchasing options (for example, Reserved Instances, Savings Plans, Spot Instances)
- AWS rightsizing visibility tools (for example, AWS Compute Optimizer, Amazon Simple Storage Service [Amazon S3] Storage Lens)

Skills in:

- Monitoring cost and usage with AWS tools
- Developing an effective tagging strategy that maps costs to business units
- Understanding how purchasing options affect cost and performance

## Content Domain 2: Design for New Solutions

Task 2.1: Design a deployment strategy to meet business requirements.

Knowledge of:

- Infrastructure as code (IaC) (for example, AWS CloudFormation)
- Continuous integration and continuous delivery (CI/CD)
- Change management processes
- Configuration management tools (for example, AWS Systems Manager)

Skills in:

- Determining an application or upgrade path for new services and features
- Selecting services to develop deployment strategies and implement appropriate rollback mechanisms
- Adopting managed services as needed to reduce infrastructure provisioning and patching overhead
- Making advanced technologies accessible by delegating complex development and deployment tasks to AWS

Task 2.2: Design a solution to ensure business continuity.

Knowledge of:

- AWS Global Infrastructure
- AWS networking concepts (for example, Route 53, routing methods)
- RTOs and RPOs
- Disaster recovery scenarios (for example, backup and restore, pilot light, warm standby, multi-site)
- Disaster recovery solutions on AWS

Skills in:

- Configuring disaster recovery solutions
- Configuring data and database replication
- Performing disaster recovery testing
- Architecting a backup solution that is automated, is cost-effective, and supports business continuity across multiple Availability Zones or Regions
- Designing an architecture that provides application and infrastructure availability in the event of a disruption
- Using processes and components for centralized monitoring to proactively recover from system failures

### Task 2.3: Determine security controls based on requirements.

Knowledge of:

- IAM
- Route tables, security groups, and network ACLs
- Encryption options for data at rest and data in transit
- AWS service endpoints
- Credential management services
- AWS managed security services (for example, AWS Shield, AWS WAF, Amazon GuardDuty, AWS Security Hub)

Skills in:

- Specifying IAM users and IAM roles that adhere to the principle of least privilege access
- Specifying inbound and outbound network flows by using security group rules and network ACL rules
- Developing attack mitigation strategies for large-scale web applications
- Developing encryption strategies for data at rest and data in transit
- Specifying service endpoints for service integrations
- Developing strategies for patch management to remain compliant with organizational standards

### Task 2.4: Design a strategy to meet reliability requirements.

Knowledge of:

- AWS Global Infrastructure
- AWS storage services and replication strategies (for example Amazon S3, Amazon Relational Database Service [Amazon RDS], Amazon ElastiCache)
- Multi-AZ and multi-Region architectures
- Auto scaling policies and events
- Application integration (for example, Amazon Simple Notification Service [Amazon SNS], Amazon Simple Queue Service [Amazon SQS], AWS Step Functions)
- Service quotas and limits

Skills in:

- Designing highly available application environments based on business requirements
- Using advanced techniques to design for failure and ensure seamless system recoverability
- Implementing loosely coupled dependencies
- Operating and maintaining high-availability architectures (for example, application failovers, database failovers)
- Using AWS managed services for high availability
- Implementing DNS routing policies (for example, Route 53 latency-based routing, geolocation routing, simple routing)

Task 2.5: Design a solution to meet performance objectives.

Knowledge of:

- Performance monitoring technologies
- Storage options on AWS
- Instance families and use cases
- Purpose-built databases

Skills in:

- Designing large-scale application architectures for a variety of access patterns
- Designing an elastic architecture based on business objectives
- Applying design patterns to meet performance objectives with caching, buffering, and replicas
- Developing a process methodology for selecting purpose-built services for required tasks
- Designing a rightsizing strategy

Task 2.6: Determine a cost optimization strategy to meet solution goals and objectives.

Knowledge of:

- AWS cost and usage monitoring tools (for example, Cost Explorer, Trusted Advisor, AWS Pricing Calculator)
- Pricing models (for example, Reserved Instances, Savings Plans)
- Storage tiering
- Data transfer costs
- AWS managed service offerings

Skills in:

- Identifying opportunities to select and rightsize infrastructure for cost-effective resources
- Identifying appropriate pricing models
- Performing data transfer modeling and selecting services to reduce data transfer costs
- Developing a strategy and implementing controls for expenditure and usage awareness

### **Content Domain 3: Continuous Improvement for Existing Solutions**

Task 3.1: Determine a strategy to improve overall operational excellence.

Knowledge of:

- Alerting and automatic remediation strategies
- Disaster recovery planning
- Monitoring and logging solutions (for example, Amazon CloudWatch)
- CI/CD pipelines and deployment strategies (for example, blue/green, all-at-once, rolling)
- Configuration management tools (for example, Systems Manager)

Skills in:

- Determining the most appropriate logging and monitoring strategy
- Evaluating current deployment processes for improvement opportunities
- Prioritizing opportunities for automation within a solution stack
- Recommending the appropriate AWS solution to enable configuration management automation
- Engineering failure scenario activities to support and exercise an understanding of recovery actions

Task 3.2: Determine a strategy to improve security.

Knowledge of:

- Data retention, data sensitivity, and data regulatory requirements
- Automated monitoring and remediation strategies (for example, AWS Config rules)
- Secrets management (for example, Systems Manager, AWS Secrets Manager)
- Principle of least privilege access
- Security-specific AWS solutions
- Patching practices
- Backup practices and methods

Skills in:

- Evaluating a strategy for the secure management of secrets and credentials
- Auditing an environment for least privilege access
- Reviewing implemented solutions to ensure security at every layer
- Reviewing comprehensive traceability of users and services
- Prioritizing automated responses to the detection of vulnerabilities
- Designing and implementing a patch and update process
- Designing and implementing a backup process
- Employing remediation techniques

### Task 3.3: Determine a strategy to improve performance.

Knowledge of:

- High-performing systems architectures (for example, auto scaling, instance fleets, placement groups)
- Global service offerings (for example, AWS Global Accelerator, Amazon CloudFront, edge computing services)
- Monitoring tool sets and services (for example, CloudWatch)
- Service level agreements (SLAs) and key performance indicators (KPIs)

Skills in:

- Translating business requirements to measurable metrics
- Testing potential remediation solutions and making recommendations
- Proposing opportunities for the adoption of new technologies and managed services
- Assessing solutions and applying rightsizing based on requirements
- Identifying and examining performance bottlenecks

### Task 3.4: Determine a strategy to improve reliability.

Knowledge of:

- AWS Global Infrastructure
- Data replication methods
- Scaling methodologies (for example, load balancing, auto scaling)
- High availability and resiliency
- Disaster recovery methods and tools
- Service quotas and limits

Skills in:

- Understanding application growth and usage trends
- Evaluating existing architecture to determine areas that are not sufficiently reliable
- Remediating single points of failure
- Enabling data replication, self-healing, and elastic features and services

### Task 3.5: Identify opportunities for cost optimizations.

Knowledge of:

- Cost-conscious architecture choices (for example, using Spot Instances, scaling policies, and rightsizing resources)
- Price model adoptions (for example, Reserved Instances, Savings Plans)
- Networking and data transfer costs
- Cost management, alerting, and reporting

Skills in:

- Analyzing usage reports to identify underutilized and overutilized resources
- Using AWS solutions to identify unused resources
- Designing billing alarms based on expected usage patterns
- Investigating AWS Cost and Usage Reports at a granular level
- Using tagging for cost allocation and reporting

## Content Domain 4: Accelerate Workload Migration and Modernization

### Task 4.1: Select existing workloads and processes for potential migration.

Knowledge of:

- Migration assessment and tracking tools (for example, AWS Migration Hub)
- Portfolio assessment
- Asset planning
- Prioritization and migration of workloads (for example, wave planning)

Skills in:

- Completing an application migration assessment
- Evaluating applications according to the seven common migration strategies (7Rs)
- Evaluating total cost of ownership (TCO)

### Task 4.2: Determine the optimal migration approach for existing workloads.

Knowledge of:

- Data migration options and tools (for example, AWS DataSync, AWS Transfer Family, AWS Snow Family, S3 Transfer Acceleration)
- Application migration tools (for example, AWS Application Discovery Service, AWS Application Migration Service)
- AWS networking services and DNS (for example, Direct Connect, AWS Site-to-Site VPN, Route 53)
- Identity services (for example, IAM Identity Center, AWS Directory Service)
- Database migration tools (for example, AWS Database Migration Service [AWS DMS], AWS Schema Conversion Tool [AWS SCT])
- Governance tools (for example, AWS Control Tower, Organizations)

Skills in:

- Selecting the appropriate database transfer mechanism
- Selecting the appropriate application transfer mechanism
- Selecting the appropriate data transfer service and migration strategy
- Applying the appropriate security methods to migration tools
- Selecting the appropriate governance model

### Task 4.3: Determine a new architecture for existing workloads.

Knowledge of:

- Compute services (for example, Amazon Elastic Compute Cloud [Amazon EC2], AWS Elastic Beanstalk)
- Containers (for example, Amazon Elastic Container Service [Amazon ECS], Amazon Elastic Kubernetes Service [Amazon EKS], AWS Fargate, Amazon Elastic Container Registry [Amazon ECR])
- AWS storage services (for example, Amazon Elastic Block Store [Amazon EBS], Amazon Elastic File System [Amazon EFS], Amazon FSx, Amazon S3, Volume Gateway)
- Databases (for example, Amazon DynamoDB, Amazon OpenSearch Service, Amazon RDS, self-managed databases on Amazon EC2)

Skills in:

- Selecting the appropriate compute platform
- Selecting the appropriate container hosting platform
- Selecting the appropriate storage service
- Selecting the appropriate database platform

Task 4.4: Determine opportunities for modernization and enhancements.

Knowledge of:

- Serverless compute offerings (for example, AWS Lambda)
- Containers (for example, Amazon ECS, Amazon EKS, Fargate)
- AWS storage services (for example, Amazon S3, Amazon EFS)
- Purpose-built databases (for example, DynamoDB, Amazon Aurora Serverless, ElastiCache)
- Integration services (for example, Amazon SQS, Amazon SNS, Amazon EventBridge, Step Functions)

Skills in:

- Identifying opportunities to decouple application components
- Identifying opportunities for serverless solutions
- Selecting the appropriate service for containers
- Identifying opportunities for purpose-built databases
- Selecting the appropriate application integration service

## Appendix

### Technologies and concepts that might appear on the exam

The following list contains technologies and concepts that might appear on the exam. This list is non-exhaustive and is subject to change. The order and placement of the items in this list is no indication of their relative weight or importance on the exam:

- Compute
- Cost management
- Database
- Disaster recovery
- High availability
- Management and governance
- Microservices and component decoupling
- Migration and data transfer
- Networking, connectivity, and content delivery
- Security
- Serverless design principles
- Storage

### Mentions of AWS services on the exam

AWS Certification is reducing the reading load on this exam by using official short names for well-known AWS service names that contain abbreviations or parenthetical information. For example, *Amazon Simple Notification Service (Amazon SNS)* appears on the exam as *Amazon SNS*.

The Help feature in the exam (available for every question) contains the list of the short AWS service names and their corresponding full names.

You can consult [AWS Service Names](#) on the AWS Certification website for the list of services that appear as their short names on the exam. Any services that are on the list but that are out of scope for the exam will not appear on the exam.

**Note:** Not every abbreviation is fully spelled out on the exam or available in the Help feature. The official full name for some AWS services includes an abbreviation that is never expanded (for example, Amazon API Gateway, Amazon EMR). The exam also might contain other abbreviations that the target audience is expected to know.

## In-scope AWS services and features

The following list contains AWS services and features that are in scope for the exam.

This list is non-exhaustive and is subject to change. AWS offerings appear in categories that align with the offerings' primary functions:

Analytics:

- Amazon Athena
- AWS Data Exchange
- Amazon Data Firehose
- Amazon EMR
- AWS Glue
- Amazon Kinesis Data Streams
- AWS Lake Formation
- Amazon Managed Service for Apache Flink
- Amazon Managed Streaming for Apache Kafka (Amazon MSK)
- Amazon OpenSearch Service
- Amazon QuickSight

Application Integration:

- Amazon AppFlow
- AWS AppSync
- Amazon EventBridge
- Amazon MQ
- Amazon Simple Notification Service (Amazon SNS)
- Amazon Simple Queue Service (Amazon SQS)
- AWS Step Functions

Blockchain:

- Amazon Managed Blockchain

Business Applications:

- Amazon Simple Email Service (Amazon SES)

### Cloud Financial Management:

- AWS Budgets
- AWS Cost and Usage Report
- AWS Cost Explorer
- Savings Plans

### Compute:

- AWS App Runner
- AWS Auto Scaling
- AWS Batch
- AWS Elastic Beanstalk
- Amazon Elastic Compute Cloud (Amazon EC2)
- Amazon EC2 Auto Scaling
- AWS Fargate
- AWS Lambda
- Amazon Lightsail
- AWS Outposts
- AWS Wavelength

### Containers:

- Amazon Elastic Container Registry (Amazon ECR)
- Amazon Elastic Container Service (Amazon ECS)
- Amazon ECS Anywhere
- Amazon Elastic Kubernetes Service (Amazon EKS)
- Amazon EKS Anywhere
- Amazon EKS Distro

### Database:

- Amazon Aurora
- Amazon Aurora Serverless
- Amazon DocumentDB (with MongoDB compatibility)
- Amazon DynamoDB
- Amazon ElastiCache
- Amazon Keyspaces (for Apache Cassandra)
- Amazon Neptune
- Amazon Relational Database Service (Amazon RDS)
- Amazon Redshift
- Amazon Timestream

### Developer Tools:

- AWS CodeArtifact
- AWS CodeBuild
- AWS CodeDeploy
- Amazon CodeGuru
- AWS CodePipeline
- AWS X-Ray

### End User Computing:

- Amazon AppStream 2.0
- Amazon WorkSpaces

### Frontend Web and Mobile:

- AWS Amplify
- Amazon API Gateway
- AWS Device Farm
- Amazon Pinpoint

### Internet of Things (IoT):

- AWS IoT Core
- AWS IoT Device Defender
- AWS IoT Device Management
- AWS IoT Events
- AWS IoT Greengrass
- AWS IoT SiteWise
- AWS IoT Things Graph
- AWS IoT 1-Click

### Machine Learning:

- Amazon Comprehend
- Amazon Fraud Detector
- Amazon Kendra
- Amazon Lex
- Amazon Personalize
- Amazon Polly
- Amazon Rekognition
- Amazon SageMaker AI (previously known as Amazon SageMaker)
- Amazon Textract
- Amazon Transcribe
- Amazon Translate

### Management and Governance:

- AWS CloudFormation
- AWS CloudTrail
- Amazon CloudWatch
- Amazon CloudWatch Logs
- AWS Command Line Interface (AWS CLI)
- AWS Compute Optimizer
- AWS Config
- AWS Control Tower
- AWS Health Dashboard
- AWS License Manager
- Amazon Managed Grafana

- Amazon Managed Service for Prometheus
- AWS Management Console
- AWS Organizations
- AWS Proton
- AWS Service Catalog
- Service Quotas
- AWS Systems Manager
- AWS Trusted Advisor
- AWS Well-Architected Tool

Media Services:

- Amazon Elastic Transcoder
- Amazon Kinesis Video Streams

Migration and Transfer:

- AWS Application Discovery Service
- AWS Application Migration Service
- AWS Database Migration Service (AWS DMS)
- AWS DataSync
- AWS Migration Hub
- AWS Schema Conversion Tool (AWS SCT)
- AWS Snow Family
- AWS Transfer Family

Networking and Content Delivery:

- Amazon CloudFront
- AWS Direct Connect
- Elastic Load Balancing (ELB)
- AWS Global Accelerator
- AWS PrivateLink
- Amazon Route 53
- AWS Transit Gateway
- Amazon Virtual Private Cloud (Amazon VPC)
- AWS VPN

## Security, Identity, and Compliance:

- AWS Artifact
- AWS Audit Manager
- AWS Certificate Manager (ACM)
- AWS CloudHSM
- Amazon Cognito
- Amazon Detective
- AWS Directory Service
- AWS Firewall Manager
- Amazon GuardDuty
- AWS IAM Identity Center
- AWS Identity and Access Management (IAM)
- Amazon Inspector
- AWS Key Management Service (AWS KMS)
- Amazon Macie
- AWS Network Firewall
- AWS Resource Access Manager (AWS RAM)
- AWS Secrets Manager
- AWS Security Hub
- AWS Security Token Service (AWS STS)
- AWS Shield
- AWS WAF

## Storage:

- AWS Backup
- Amazon Elastic Block Store (Amazon EBS)
- AWS Elastic Disaster Recovery
- Amazon Elastic File System (Amazon EFS)
- Amazon FSx (for all types)
- Amazon Simple Storage Service (Amazon S3)
- Amazon S3 Glacier
- AWS Storage Gateway

## Out-of-scope AWS services and features

The following list contains AWS services and features that are out of scope for the exam. This list is non-exhaustive and is subject to change. AWS offerings that are entirely unrelated to the target job roles for the exam are excluded from this list:

Game Tech:

- Amazon GameLift

## Survey

How useful was this exam guide? Let us know by [taking our survey](#).