The Architect's Blueprint

AWS Solutions Architect

Associate — SAA-C03 Success Guide

SAA-C03 ASSOCIATE

Deep-Dive Design Patterns · HA Architecture · Decision Matrices · 2025/2026 Exam Ready

The SAA-C03 is one of the most respected certifications in the cloud industry. It validates your ability to design **scalable, resilient, secure, and cost-optimized architectures** on AWS. This guide doesn't just tell you what services exist — it teaches you how to *think like an architect*. That's the difference between guessing and knowing.

Questions	65 (Multiple Choice + Multiple Response)
Duration	130 Minutes
Passing Score	720 / 1000
Cost	$150 USD per attempt
Recommended Experience	1+ year designing AWS cloud solutions

Exam Domain Weights

Domain	Focus Area	Exam Weight
Domain 1	Design Secure Architectures	30%
Domain 2	Design Resilient Architectures	26%
Domain 3	Design High-Performing Architectures	24%
Domain 4	Design Cost-Optimized Architectures	20%

■ **EXAM WATCH**

Domain 1 (Secure Architectures) is 30% — the single largest domain. Master IAM, VPC design, encryption, and the Shared Responsibility Model before anything else. Then tackle Domain 2 (Resilient) — HA and fault tolerance are the heart of this exam.

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MODULE 1: Design Secure Architectures

Domain 1 — 30% | IAM, VPC, Encryption, Detective Controls

IAM — The Foundation of Everything Secure

Every SAA-C03 scenario eventually comes back to IAM. The question isn't *whether* to use IAM — it's *which* IAM construct to use. Master this hierarchy.

IAM Construct	Why It Exists & How It Works	When to Use It
IAM Roles (EC2 Instance Profile)	The ONLY correct way to give an EC2 instance permissions to call AWS services. Never use access keys embedded in code.	EC2 calling S3, DynamoDB, STS
IAM Roles (Cross-Account)	Allow a role in Account A to assume a role in Account B. Defined via trust policy.	Multi-account architectures
IAM Policies (Resource-based)	Policies attached TO a resource (e.g., S3 bucket policy). Can grant access to different accounts.	S3 cross-account access
IAM Policies (Identity-based)	Policies attached TO a user/role/group. Control what that entity CAN do.	User/role permission boundaries
Service Control Policies (SCPs)	Applied at the AWS Organizations level. Set the MAXIMUM permissions an account can have. They override all other policies.	Multi-account governance guardrails
Permission Boundaries	Cap the maximum permissions an IAM entity can receive. Prevents privilege escalation.	Delegated admin patterns

■ EXAM WATCH

SCPs do NOT grant permissions — they LIMIT them. An SCP of 'Deny S3' beats any identity policy that allows S3. The evaluation order is: SCPs → Permission Boundaries → Identity Policies → Resource Policies. Know this evaluation logic — it appears in complex multi-step exam scenarios.

VPC Design — The Architect's Canvas

Every secure architecture starts with proper VPC design. Think of the VPC as your private, isolated section of AWS's global network. Your job is to control what gets in, what gets out, and what talks to what.

Component	What It Does & Key Property	Best For
Public Subnet	Has route to Internet Gateway. Resources get public IPs. Exposed to internet.	Web servers, load balancers, NAT Gateway
Private Subnet	No route to Internet Gateway. Resources have private IPs only. Internet via NAT Gateway.	App servers, databases, Lambda
Internet Gateway (IGW)	Enables bidirectional traffic between VPC and internet. One per VPC. Attach to route table.	Public subnet internet access

NAT Gateway	AWS-managed. Allows private subnet instances to reach internet OUTBOUND. Highly available per AZ.	Private EC2 downloading patches
Security Group	Instance-level stateful firewall. Allow rules only. Return traffic auto-permitted.	Every EC2, RDS, Lambda endpoint
Network ACL (NACL)	Subnet-level STATELESS firewall. Numbered rules processed in order. Supports DENY rules.	Subnet-wide block rules, IP blacklisting
VPC Endpoints (Gateway)	Free. Private access to S3 and DynamoDB without leaving the AWS network. No IGW needed.	EC2 accessing S3/DynamoDB privately
VPC Endpoints (Interface)	Powered by PrivateLink. Private access to 100+ AWS services via private IP in your VPC.	Accessing SQS, SNS, KMS privately
VPC Peering	One-to-one VPC connection. Private IP traffic. NOT transitive.	2-3 VPC direct connections
AWS Transit Gateway	Hub-and-spoke model. Connect hundreds of VPCs + on-premises via one gateway. Transitive routing.	Enterprise multi-VPC mesh networks

ARCHITECTURAL CHOICE | VPC Peering vs Transit Gateway

Use VPC Peering when you have 2-3 VPCs that need direct, private connectivity — it's simpler and free. Use AWS Transit Gateway when you have 4+ VPCs or need transitive routing (VPC-A talks to VPC-C through VPC-B). Transit Gateway charges per attachment and data processed, but massively reduces complexity at scale.

Encryption Strategy

Service	What It Does	When to Choose It
AWS KMS	Customer-managed CMKs or AWS-managed keys. Integrated with S3, EBS, RDS, Lambda, Secrets Manager. Audit via CloudTrail.	Standard encryption needs
AWS CloudHSM	Dedicated hardware security module. You OWN the key material. FIPS 140-2 Level 3. AWS cannot access keys.	Strict compliance, financial/gov sector
S3 Encryption	SSE-S3 (AWS manages keys), SSE-KMS (you manage via KMS), SSE-C (you provide keys), Client-side.	Data at rest in S3
EBS Encryption	Enable at creation. Uses KMS. Encrypts data at rest, in transit between EC2 and EBS, and all snapshots.	Database and boot volumes
TLS/HTTPS	ACM (AWS Certificate Manager) provides free SSL/TLS certs for CloudFront, ALB, API Gateway.	Data in transit

■ EXAM WATCH

KMS vs CloudHSM: KMS is multi-tenant (AWS manages the HSM hardware, you manage keys). CloudHSM is single-tenant (YOU own the dedicated HSM hardware, AWS cannot access your keys). If an exam question mentions 'regulatory requirement' or 'you must own key material' — the answer is CloudHSM.

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MODULE 2: Design Resilient Architectures

Domain 2 — 26% | HA, Fault Tolerance, DR Strategies

Resilience is about designing systems that **survive failure**. On the SAA-C03, every HA question comes down to one principle: *eliminate single points of failure by distributing across multiple AZs.*

Elastic Load Balancing (ELB) — Deep Comparison

Load Balancer	Technical Characteristics	Use Case
Application Load Balancer (ALB)	Layer 7 (HTTP/HTTPS). Content-based routing (path, host, headers, query string). WebSocket support. Built for microservices.	Web apps, REST APIs, microservices, container-based apps
Network Load Balancer (NLB)	Layer 4 (TCP/UDP/TLS). Extreme performance — millions of req/sec, ultra-low latency. Static IP per AZ. Preserves source IP.	Real-time gaming, IoT, financial trading, TCP passthrough
Gateway Load Balancer (GWLB)	Layer 3. Deploys 3rd-party virtual appliances (firewalls, IDS/IPS) transparently. Uses GENEVE protocol.	Inline security inspection, firewall appliances

ARCHITECTURAL CHOICE | ALB vs NLB — The Classic Exam Question

Default to ALB for web applications — it's Layer 7, supports path-based routing (/api vs /web), sticky sessions, WebSocket, and host-based routing. Choose NLB when: (1) you need extreme performance (millions of RPS), (2) you need a static IP address for whitelisting, (3) you're passing TCP/UDP traffic that must not be terminated at the load balancer. NLB preserves the client IP; ALB replaces it.

Auto Scaling — Scaling Strategies

Strategy	How It Works	When to Use
Target Tracking	Set a target metric (e.g., CPU = 50%). ASG automatically adds/removes instances to maintain it.	Most scenarios, simplest to configure
Step Scaling	Add/remove instances in steps based on CloudWatch alarm thresholds.	Gradual, predictable traffic increases
Scheduled Scaling	Pre-defined scale events at specific times (e.g., scale out every Monday 9 AM).	Predictable traffic patterns (business hours)

Predictive Scaling	ML-powered. Analyzes historical traffic to forecast and pre-scale before demand arrives.	Daily/weekly recurring patterns

Disaster Recovery (DR) Strategies — RTO and RPO

RTO (Recovery Time Objective) = How quickly must you recover? **RPO** (Recovery Point Objective) = How much data loss is acceptable?

DR Strategy	How It Works	Best For
Backup & Restore	Slowest, cheapest. Backup data to S3. Restore from scratch on failure. RTO: Hours. RPO: Hours.	Non-critical systems, low budget
Pilot Light	Core infrastructure running at minimal scale in DR region. Scale up on failure. RTO: 10s of minutes. RPO: Minutes.	Moderate criticality, cost-conscious
Warm Standby	Scaled-down version of full environment running in DR. Promote to full size on failure. RTO: Minutes. RPO: Seconds-minutes.	High criticality applications
Multi-Site Active/Active	Full production in 2+ regions simultaneously. Traffic split between them. Instant failover. RTO: Near-zero. RPO: Near-zero.	Mission-critical, near-zero downtime

■ **EXAM WATCH**

RTO and RPO are inversely related to cost: the LOWER the RTO/RPO, the HIGHER the cost. Exam scenario: 'lowest cost DR' = Backup & Restore. 'Mission-critical, near-zero downtime' = Multi-Site Active/Active. Always match the strategy to the stated RTO/RPO requirement.

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MODULE 3: High-Performance Compute Architecture

EC2 Deep Dive, Lambda Patterns, Containers

EC2 Instance Type Selection Matrix

Family	Characteristics	Use Case
General Purpose (T3, M6i, M7g)	Balanced CPU/memory. T-types have burstable CPU with CPU Credits.	Web servers, dev environments, small DBs
Compute Optimized (C6i, C7g)	High vCPU-to-memory ratio. Best price/performance for CPU-intensive tasks.	Video encoding, HPC, batch processing, gaming
Memory Optimized (R6i, X2, z1d)	High memory-to-vCPU ratio. Ideal for in-memory databases and data sets.	Redis, SAP HANA, in-memory analytics
Storage Optimized (I4i, D3, H1)	High sequential disk I/O, local NVMe SSD.	NoSQL databases, data warehousing, Hadoop

Accelerated Computing (P4, G5, Inf2, Trn1)	GPU or AWS Trainium/Inferentia chips for ML training and inference.	Deep learning, video rendering, generative AI
Graviton (g suffix: m7g)	ARM-based AWS-designed chips. Up to 40% better price/performance than x86.	Most general-purpose and compute workloads

■ **PRO TIP**

Graviton instances (any instance with 'g' suffix like m7g, c7g, r7g) offer the best price/performance in their category. For exam scenarios asking 'most cost-effective compute,' always consider Graviton. Inf2 = ML inference. Trn1 = ML training. These are tested in AI/ML architecture scenarios.

Lambda Architecture Patterns

Pattern	How It Works	When to Use It
Synchronous	Caller waits for response. Direct invocation via API Gateway, ALB, SDK.	REST APIs, real-time user-facing functions
Asynchronous	Lambda queues event, returns immediately. Retries on failure. Dead Letter Queue for failed events.	S3 event triggers, SNS, EventBridge — fire and forget
Event Source Mapping	Lambda polls SQS, Kinesis, DynamoDB Streams. Batch processing built-in.	Stream processing, queue consumers
Lambda@Edge	Runs Lambda at CloudFront Edge Locations globally. Sub-ms latency.	A/B testing, auth at edge, URL rewrites, personalization
Provisioned Concurrency	Pre-warms Lambda instances. Eliminates cold starts for latency-sensitive apps.	Real-time APIs with strict SLA requirements

ARCHITECTURAL CHOICE | Lambda vs EC2 vs Fargate — Which Compute to Choose

Lambda: Event-driven, short-lived (max 15 min), stateless, no server management. Cost per invocation. EC2: Full OS control, long-running processes, stateful workloads, custom software. You manage patching. Fargate: Containerized workloads without managing EC2 clusters. Serverless containers. Longer running than Lambda. ECS on EC2: Containers WITH control over the underlying instance fleet (needed for GPU, specialized networking, spot).

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MODULE 4: Advanced Storage Architecture

S3 Design Patterns, EBS, EFS, FSx — Deep Comparisons

S3 Architecture Patterns

Feature	How It Works	Use Case
S3 Versioning	Every PUT creates a new version. DELETE just adds a delete marker. Previous versions recoverable.	Compliance, accidental deletion protection

S3 Replication (CRR)	Cross-Region Replication. Async copy to different region. Requires versioning.	Disaster recovery, global data distribution
S3 Replication (SRR)	Same-Region Replication. Copy to different bucket in same region.	Log aggregation, dev/test copies
S3 MFA Delete	Requires MFA to permanently delete objects or change versioning config.	Highest data protection requirement
S3 Object Lock (WORM)	Compliance mode (cannot override) or Governance mode (with admin permissions). Time-based or indefinite.	SEC 17a-4, FINRA, CFTC regulatory compliance
S3 Transfer Acceleration	Uses CloudFront Edge Locations for fast global uploads to S3.	Users worldwide uploading large files
S3 Multipart Upload	Upload large objects in parts. Required for >5GB. Recommended for >100MB.	Large file uploads, resumable transfers
S3 Event Notifications	Trigger Lambda, SQS, or SNS on object PUT, DELETE, etc.	Event-driven file processing pipelines
S3 Presigned URLs	Generate a time-limited URL granting temporary access to a private object.	Secure temporary file sharing

Block & File Storage: EBS vs EFS vs FSx

Service	Key Technical Properties	Use Case
Amazon EBS (gp3, io2)	Block storage. Attached to ONE EC2 in ONE AZ. Persistent. gp3 = baseline 3,000 IOPS free. io2 = up to 256K IOPS.	OS volumes, databases, Kafka
EBS io2 Block Express	Sub-ms latency. Up to 256K IOPS. SAN-class performance in the cloud.	SAP HANA, Oracle, I/O intensive DBs
Amazon EFS	NFSv4.1 shared file system. Automatically scales. Multi-AZ. Linux only. Performance modes: General Purpose + Max I/O.	Shared CMS, web serving, CI/CD artifacts, containers
Amazon FSx for Windows	Fully managed Windows File Server. SMB protocol. Active Directory integration.	Windows workloads, .NET apps, SharePoint
Amazon FSx for Lustre	High-performance parallel file system. Sub-ms latency. Integrates with S3 for import/export.	HPC, ML training, financial modeling, genomics
Amazon FSx for NetApp ONTAP	NetApp ONTAP on AWS. NFS + SMB + iSCSI. Multi-AZ. Storage efficiency (dedup, compression).	Enterprise NetApp migration lift-and-shift

ARCHITECTURAL CHOICE | EBS vs EFS vs FSx — The Storage Selection Framework

EBS: Need block storage attached to a single EC2? EBS. Need high IOPS database? Use io2 Block Express. EFS: Need shared file storage across multiple Linux EC2 instances simultaneously? EFS. FSx for Windows: Need SMB shares with Active Directory integration for Windows apps? FSx for Windows. FSx for Lustre: Need the fastest possible file system for HPC or ML training? FSx for Lustre. The exam will give you a scenario — map the requirement to the storage type.

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MODULE 5: Database Architecture & Selection

Aurora vs RDS, DynamoDB Patterns, Caching Layer Design

Amazon RDS vs Aurora — The Deep Dive

Option	Technical Details	Best For
Amazon RDS	Managed relational DB on existing engines. Multi-AZ = standby replica (NOT readable). Read Replicas = async readable copies (up to 5).	Traditional RDBMS lift-and-shift, existing app compatibility
Amazon Aurora	AWS-rebuilt engine. 6 copies of data across 3 AZs automatically. Up to 15 readable replicas. Storage auto-scales to 128TB. 5x MySQL speed.	New greenfield apps needing high performance + HA
Aurora Serverless v2	Auto-scales compute in fine-grained increments in seconds. Pay per ACU-second.	Variable/unpredictable traffic, dev environments, SaaS multi-tenant
Aurora Global Database	Primary region + up to 5 read-only secondary regions. <1 second replication lag. Promotes in <1 min on failure.	Global apps, DR with RPO < 1 second
RDS Multi-AZ	Synchronous standby replica in different AZ. Automatic failover in 1-2 min. Standby is NOT readable.	HA for production RDS, not for read scaling
RDS Read Replicas	Async replication. Readable. Can be in different region. Can be promoted to standalone DB.	Read-heavy workloads, reporting, analytics offload

■ EXAM WATCH

RDS Multi-AZ ≠ Read Replicas. Multi-AZ = HA (standby, NOT readable, synchronous). Read Replica = performance (readable copy, asynchronous). Classic trick: 'I need to improve database performance for read-heavy apps' = Read Replicas, NOT Multi-AZ. 'I need high availability and automatic failover' = Multi-AZ.

DynamoDB — Architecture Patterns for Architects

Pattern	How It Works	Use Case
DynamoDB Streams + Lambda	Capture item-level changes. Trigger Lambda for event-driven processing.	Real-time event processing, change data capture

DynamoDB DAX	In-memory cache in front of DynamoDB. Microsecond reads. API-compatible. No app code change for cache reads.	Read-heavy apps needing microsecond latency
DynamoDB Global Tables	Multi-Region, multi-active replication. Write in any region, reads globally. Sub-second replication.	Global applications needing local writes
DynamoDB TTL	Auto-delete items after a specified timestamp attribute. No cost for deletes.	Session stores, temporary data, IoT events
DynamoDB On-Demand	No capacity planning. Pay per request. Scales instantly to any traffic level.	Unpredictable traffic spikes, new apps
DynamoDB Provisioned + Auto Scaling	Set capacity. Auto Scaling adjusts within min/max bounds. More cost-effective for steady traffic.	Predictable, steady-state traffic with cost optimization

Caching Layer: ElastiCache Redis vs Memcached

Option	Technical Properties	Best For
ElastiCache Redis	Data structures (strings, hashes, lists, sets, sorted sets). Persistence. Replication. Multi-AZ. Pub/Sub. Lua scripting. Cluster mode.	Session mgmt, leaderboards, real-time analytics, pub/sub, geospatial
ElastiCache Memcached	Simple key-value only. Multi-threaded (uses all CPU cores). No replication. No persistence. Simpler, faster for pure caching.	Simple object caching, high-throughput pure cache (no persistence needed)

ARCHITECTURAL CHOICE | Redis vs Memcached — One-Line Rule

Choose Redis when you need ANY of: persistence, replication, failover, complex data structures, pub/sub messaging, sorted sets (leaderboards), or geospatial. Choose Memcached only when you need a simple, pure cache with no persistence and want to use multiple CPU cores efficiently. In practice, Redis wins 90% of the time on SAA exam scenarios.

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MODULE 6: Advanced Networking Architecture

VPC Design, Connectivity, DNS, CloudFront Patterns

Hybrid Connectivity: Direct Connect vs VPN

Option	Technical Properties	Best For
AWS Site-to-Site VPN	Encrypted IPSec tunnels over the public internet. Quick to set up (<1 hour). Bandwidth varies.	Fast setup, lower cost, backup for Direct Connect, acceptable latency
AWS Direct Connect	Dedicated private fiber line (1Gbps or 10Gbps). Consistent latency, no internet variability. Takes weeks to provision.	Consistent bandwidth, compliance, large data transfer, latency-sensitive

Direct Connect + VPN	VPN runs over Direct Connect for encrypted + consistent connectivity.	Maximum security + performance combination
AWS VPN CloudHub	Hub-and-spoke VPN model. Multiple on-premises sites connected through AWS VGW.	Multiple branch offices connecting to AWS

ARCHITECTURAL CHOICE | Direct Connect vs VPN — The Exam Decision

VPN: Need connectivity fast? Don't mind internet variability? Budget-conscious? Choose VPN. Direct Connect: Need consistent, dedicated bandwidth? Transferring petabytes? Compliance requires no internet? Latency-sensitive workloads? Choose Direct Connect. Resilience pattern: Use Direct Connect as primary + VPN as failover backup.

Route 53 Routing Policies — Architect's Decision Guide

Policy	Logic & Key Property	Use Case
Simple	One record, one or multiple values returned. No health checks.	Single resource, no HA needed
Weighted	Route X% of traffic to resource A, Y% to B. Health check aware.	A/B testing, gradual blue/green deployments
Latency-Based	Routes to the AWS region with lowest latency for the user.	Global app serving nearest region to user
Failover	Primary + standby. Routes to secondary when primary health check fails.	Active-passive DR configuration
Geolocation	Routes based on user's geographic location (country/continent). Not latency-based.	Content localization, legal compliance, regional content
Geoproximity	Routes based on geographic proximity with bias. Requires Route 53 Traffic Flow.	Shift traffic between regions with fine-grained control
Multivalue Answer	Returns multiple healthy records (up to 8). Client-side load balancing. NOT a substitute for ALB.	Simple client-side load distribution
IP-Based	Route based on user's IP CIDR. You control the CIDR-to-endpoint mapping.	ISP optimization, known IP range routing

■ EXAM WATCH

Geolocation ≠ Latency-Based. Geolocation routes by WHERE the user IS (country/region). Latency routes by WHERE the fastest AWS Region IS. A user in Europe might have lower latency to us-east-1 than eu-west-1 depending on network conditions — Latency routing handles this, Geolocation does not.

MODULE 7: Application Integration & Decoupling Patterns

SQS, SNS, EventBridge, Step Functions — Design for Loose Coupling

The SAA-C03 loves decoupling scenarios. Tight coupling = when one service fails, everything fails. **Loose coupling = when one service fails, the others continue independently.** Your job as an architect is to identify which integration service creates the right level of decoupling.

Service	Technical Properties	Architectural Use
Amazon SQS (Standard)	Distributed queue. At-least-once delivery. Best-effort ordering. Scales to unlimited throughput. Consumers PULL messages.	Decoupling microservices, async task processing, worker queues
Amazon SQS (FIFO)	Exactly-once processing. Strict ordering preserved. Up to 3,000 TPS (with batching). Message deduplication.	Financial transactions, ordered event processing, inventory
Amazon SNS	Pub/Sub fan-out. Publishers send to topics. Subscribers (SQS, Lambda, HTTP, email, SMS) receive. PUSH-based.	Fan-out to multiple consumers, notifications, alert systems
Amazon EventBridge	Serverless event bus. Route events from AWS services, SaaS apps, or custom apps to targets using rules. Schema registry.	Complex event routing, SaaS integrations, cross-account events
AWS Step Functions	Visual workflow orchestration. State machines. Handles retries, error catching, parallel execution, human approval.	Multi-step business processes, ML pipelines, order processing
Amazon Kinesis Data Streams	Real-time data streaming. Process in ORDER. Data retained up to 365 days. Multiple consumers possible.	Real-time analytics, clickstreams, IoT telemetry ingestion
Amazon Kinesis Firehose	Fully managed delivery to S3, Redshift, OpenSearch, Splunk. No coding for consumers. Near-real-time.	ETL to data lake/warehouse, log aggregation
Amazon MQ	Managed Apache ActiveMQ or RabbitMQ. For migrating existing on-prem message brokers (JMS, AMQP, STOMP).	Lift-and-shift of existing JMS/RabbitMQ workloads

ARCHITECTURAL CHOICE | SQS vs SNS vs EventBridge — Choosing the Right Pattern

SQS: One producer, one consumer type, queue-based, consumer pulls. Use for task offloading and decoupling. SNS: One producer, MANY consumer types (fan-out). Publisher pushes to all subscribers simultaneously. SNS + SQS Fan-Out: Send to SNS topic, fan out to multiple SQS queues — the most resilient pattern. EventBridge: Complex routing rules, SaaS app integration, schema-based event filtering. Step Functions: When you need to ORCHESTRATE a multi-step workflow with error handling and state management.

■ EXAM WATCH

SQS FIFO vs Standard: Use FIFO when message ORDER matters (financial transactions). Use Standard for maximum throughput when ordering doesn't matter. FIFO has lower max throughput — don't use it just 'to be safe' if ordering isn't required.

MODULE 8: Design Cost-Optimized Architectures

Domain 4 — 20% | Savings Plans, Right-Sizing, Storage Tiering

EC2 Cost Optimization Framework

Strategy	Mechanics & Discount	Best For
Spot Instances	Up to 90% off. Interruptible with 2-min warning. Best for stateless, fault-tolerant, flexible-start workloads.	Batch processing, data analysis, CI/CD, rendering
Reserved Instances (Standard)	1-yr or 3-yr commitment to specific instance family/region. Up to 72% off. Cannot change instance type.	Steady-state, predictable 24/7 workloads
Reserved Instances (Convertible)	Less discount (~54%) but can change instance type/family during term.	When you expect to change instance requirements
Savings Plans (Compute)	Commit to $/hour. Applies automatically to EC2, Fargate, Lambda across all regions/families.	Flexible compute usage across multiple services
Savings Plans (EC2 Instance)	Deeper discount but locked to specific instance family in a region.	Predictable EC2 usage in specific region
AWS Compute Optimizer	ML-powered recommendations to right-size EC2, Lambda, EBS based on your actual usage metrics.	Finding over-provisioned resources to downsize

S3 Intelligent-Tiering & Lifecycle Policies

S3 is where most architectures store data at rest — and where most teams **overpay**. The fix is lifecycle policies that automatically move data to cheaper storage classes as it ages.

- **Lifecycle Transition Rule example:** S3 Standard → S3 Standard-IA (after 30 days) → S3 Glacier Flexible (after 90 days) → S3 Glacier Deep Archive (after 365 days)
- **S3 Intelligent-Tiering:** Let AWS automatically monitor access patterns and move objects between Standard and IA tiers — no lifecycle rule needed. Best when access patterns are unknown or change over time.
- **S3 Storage Lens:** Provides organization-wide visibility into storage usage and activity metrics — find your most expensive buckets.

■ PRO TIP

The Well-Architected Cost Optimization Pillar mantra: 'Right-size, then commit.' Step 1: Use Compute Optimizer to right-size your EC2 instances. Step 2: Use Savings Plans or RIs on the correctly-sized fleet. Never commit to Reserved Instances on over-provisioned instances — you're locking in wasted spend.

MODULE 9: Monitoring, Logging & Operational Excellence

CloudWatch, X-Ray, CloudTrail, Config — Observability Stack

Service/Feature	What It Captures & How	Operational Use
Amazon CloudWatch Metrics	Collects metrics from all AWS services. Custom metrics from your app. Granularity: 1-min (detailed) or 5-min (standard).	Performance dashboards, capacity planning
CloudWatch Alarms	Triggers actions (SNS, Auto Scaling, EC2 action) when metric crosses threshold.	PagerDuty alerts, Auto Scaling triggers
CloudWatch Logs	Centralized log aggregation. Log Groups → Log Streams. Metric Filters create metrics FROM logs.	Application logs, Lambda logs, VPC Flow Logs
CloudWatch Log Insights	Interactive query language for CloudWatch Logs. Analyze TB of logs in seconds.	Ad-hoc log analysis, debugging production issues
AWS X-Ray	Distributed tracing for microservices. Visualize request flow across services. Identify latency bottlenecks.	Debugging Lambda chains, API Gateway to DynamoDB traces
AWS CloudTrail	Management + data plane API logging. S3 data events, Lambda invocations (with data events enabled). Immutable audit trail.	Security forensics, compliance auditing, change tracking
AWS Config	Continuous recording of resource configurations. Rules check compliance. Timeline view of changes.	Compliance, drift detection, security posture management
Amazon EventBridge (rules)	React to state changes in AWS services (e.g., EC2 state change, CodePipeline failure) with automated actions.	Automated ops responses, remediation workflows

■ **EXAM WATCH**

CloudTrail vs CloudWatch vs Config: CloudTrail = WHO did WHAT API call (audit log). CloudWatch = HOW is my system PERFORMING (metrics/alarms). Config = HOW has my resource CHANGED over time (configuration history). Exam scenario: 'I need to know who deleted an S3 bucket' = CloudTrail. 'I need to know when security groups changed' = AWS Config. 'I need an alert when CPU > 90%' = CloudWatch.

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MODULE 10: Serverless Architecture Patterns

Lambda, API Gateway, DynamoDB, Step Functions — Design at Scale

The Standard Serverless Web App Pattern

The most common SAA-C03 serverless architecture: **Route 53** → **CloudFront** → **S3 (static content) + API Gateway** → **Lambda** → **DynamoDB**. This pattern is fully managed, scales to zero, and costs nothing when idle.

Pattern/Feature	Technical Details	When to Use
API Gateway REST vs HTTP	REST API: Full features (usage plans, API keys, WAF, caching, request/response transformation). HTTP API: Simpler, faster, 70% cheaper. Supports JWT auth, Lambda, HTTP proxy only.	REST: Full enterprise API. HTTP: Lightweight, low-cost APIs
Lambda Layers	Shared code/libraries packaged separately. Reduces deployment package size. Up to 5 layers per function.	Common dependencies (NumPy, pandas, Powertools)
Lambda Destinations	Send async invocation results (success OR failure) to SQS, SNS, Lambda, or EventBridge.	Post-processing workflows, error handling pipelines
Lambda Power Tuning	AWS open-source tool. Find the optimal memory size for your function. More memory = more CPU = faster = cheaper.	Cost/performance optimization for production Lambda
Step Functions Standard	Long-running (up to 1 year). Audit history. Idempotent. Charged per state transition.	Order processing, human approval workflows
Step Functions Express	High-volume, short-duration (up to 5 min). Charged per number of executions + duration.	IoT data processing, high-frequency event handling

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MODULE 11: AI/ML Architecture & Amazon Bedrock

2025/2026 Exam Update — GenAI Architecture Patterns Are Tested

The SAA-C03 exam now tests your ability to design AI/ML solutions architecturally — not just know what services exist. The key is understanding **where Bedrock fits in a solution and how it integrates with other AWS services.**

Service	What It Does	Architectural Role
Amazon Bedrock (Core)	Managed API access to Foundation Models: Amazon Titan, Anthropic Claude, Meta Llama, Mistral, Cohere. No infra to manage. Private by default.	Building GenAI apps without managing ML infrastructure
Bedrock Knowledge Bases	Connect FMs to your data sources (S3, Confluence, SharePoint). RAG (Retrieval-Augmented Generation) built-in.	Enterprise Q&A; bots grounded in your proprietary data
Bedrock Agents	Autonomous agents that can take multi-step actions using tools (Lambda functions, APIs). Plan and execute tasks.	Automated workflows, intelligent assistants that act

Bedrock Guardrails	Apply safety filters: topic denial, content filtering, PII redaction, hallucination detection.	Enterprise GenAI with compliance and safety requirements
Bedrock Model Evaluation	Evaluate FM outputs on accuracy, robustness, toxicity. Human or automated evaluation.	Selecting the right FM for your use case
Amazon SageMaker	Full ML platform: data prep, training (distributed), tuning, deployment, monitoring. For custom model training.	Teams building custom ML models from scratch
SageMaker JumpStart	Pre-built ML solutions and pre-trained model hub. One-click deployment and fine-tuning.	Fast prototyping, fine-tuning open-source models
Amazon Q Developer	AI coding assistant. Real-time code suggestions, security scanning, and debugging in IDEs.	Developer productivity, code reviews, security fixes

ARCHITECTURAL CHOICE | Bedrock vs SageMaker — The GenAI Architect's Decision

Bedrock: You need to BUILD an AI application using EXISTING foundation models quickly. You don't want to train or manage ML infrastructure. Use Bedrock for chatbots, content generation, summarization, code generation, and RAG pipelines. It's the serverless GenAI platform. SageMaker: You need to TRAIN a CUSTOM model on your own proprietary dataset, or fine-tune an open-source model with your data at scale. SageMaker gives you full control of the ML lifecycle. Most SAA-C03 GenAI scenarios = Bedrock.

■ PRO TIP

RAG (Retrieval-Augmented Generation) is the dominant GenAI architecture pattern on the exam. Pattern: User query → Bedrock Knowledge Bases retrieves relevant docs from S3/vector store → FM generates answer grounded in your data. This eliminates hallucinations and keeps data private. Know this flow — it will appear as a scenario question.

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MODULE 12: AWS Well-Architected Framework

6 Pillars — The Architect's Evaluation Lens

Pillar	What It Means & Key Design Principle	Key AWS Services
Operational Excellence	Run and monitor systems. Automate changes. Respond to events. Continuously improve. Key: Infrastructure as Code (CloudFormation), CI/CD, runbooks.	CloudFormation, CodePipeline, CloudWatch, Systems Manager
Security	Protect information and systems. IAM least privilege. Encryption everywhere. Detect threats. Key: Defense in depth, shared responsibility, automated security.	IAM, KMS, Shield, WAF, GuardDuty, Security Hub
Reliability	Recover from failures. Scale dynamically. Manage service limits. Key: Multi-AZ, Auto Scaling, backups, tested DR procedures.	Auto Scaling, ELB, Route 53, RDS Multi-AZ, AWS Backup

Performance Efficiency	Use compute resources efficiently. Select right resource types. Monitor performance. Key: Serverless-first, managed services, global distribution.	Lambda, Fargate, CloudFront, ElastiCache, Graviton
Cost Optimization	Avoid unnecessary costs. Right-size resources. Match supply to demand. Key: Pay for what you use, measure efficiency, stop guessing.	Cost Explorer, Savings Plans, Spot, S3 Intelligent-Tiering
Sustainability	Minimize environmental impact. Maximize utilization. Adopt efficient hardware/software. Key: Serverless to reduce idle capacity, right-size aggressively.	Lambda, Graviton, S3 lifecycle policies, managed services

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ARCHITECT'S EXAM STRATEGY: Your 10-Day Study Plan

- **Days 1-2: Secure Architectures (Domain 1)** — IAM deep-dive, VPC design, SG vs NACL, KMS vs CloudHSM. 30% of exam — master this first.
- **Days 3-4: Resilient Architectures (Domain 2)** — ELB types, Auto Scaling strategies, DR patterns, RTO vs RPO. Multi-AZ everywhere.
- **Days 5-6: High-Performance Architecture (Domain 3)** — EC2 instance families, Aurora vs RDS, DynamoDB patterns, ElastiCache Redis vs Memcached.
- **Day 7: Networking Deep-Dive** — VPC connectivity, Transit Gateway, Direct Connect vs VPN, Route 53 routing policies.
- **Day 8: Integration + Serverless + AI/ML** — SQS vs SNS vs EventBridge, Step Functions, Lambda patterns, Bedrock RAG architecture.
- **Day 9: Cost Optimization + Well-Architected** — Domain 4 — Spot vs RI vs Savings Plans, S3 lifecycle, Compute Optimizer.
- **Day 10: Full Practice Exam + Review** — Take a timed full-length exam at CloudExamPro.com. Review every wrong answer. Rest.

■ EXAM WATCH

The SAA-C03 asks SCENARIO-based questions. They give you a business situation and ask for the BEST architectural solution. Two or three answer choices will be technically correct — your job is to pick the MOST optimal for the stated requirements (cost, performance, availability, security). Always re-read the question to find the constraint that eliminates options.

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