AWS Practioner Study Guide

Content by Jeanne Boyarsky and Janeice DelVecchio

Note: if you are seeing this reference without reading the blog first, please go back and do that. (https://www.selikoff.net/2019/01/20/how-i-recommend-studying-for-the-aws-certified-cloud-practitioner-exam/)

Infrastructure

Region	• Physical location/geographic area with 2+ availability zones. • Minimize latency by deploying to 2+ regions
AZ (Availability Zone)	• Physically/logically isolated data centers • Data provisioned across AZs • Not all zones offer all services
Data Center	• 1+ per AZ
Edge Location	• Host Cloudfront (Content delivery network) for faster delivery of static content with low latency/high transfer speeds • More edge locations than AZs • Caches data

Pricing

Basics	• Usually no charge for inbound data or data within AWS region • Pay for CPU, data storage, outbound data transfer • The more you use, the less it costs
On demand	• Pay as you go • Most services pay per second of use • Good for short term, spiky or unpredictable use
Reservations	• Up to 75% less • 1-3 year commitment • Pay none/partial/all up front • Costs less if pay more up front • Good for steady state usage
Spot	• Up to 90% less • Pay for unused capacity • Unpredictable when runs • Ends when complete or price goes above bid
Dedicated instance	• Pay set hourly price • Dedicated hardware for VPC • Can use existing software licenses
Free tier	• Some services free forever – VPC, Elastic Beanstalk, , CloudFormation, IAM, , Autoscaling, Opsworks, DynamoDB, Glacier, Lambda, Glue, Cognito, SNS, SES, SQS, SWF, Cloudwatch, Xray, Storage Gateway, etc • Some services free 12 months – EC2, S3, RDS, CloudFront

Support

Basic	• 7 trusted advisor checks, personal health dashboard, docs/support forms
Developer	• Basic + email support • 1 contact • Response time 24 hours for general, 12 hours for impaired system
Business	• Developer + full trusted advisor checks, phone support • Unlimited contacts • Response time 1 hour for prod down
Enterprise	• Business + senior cloud support engineers • Response time 15 minutes for business critical systems • Includes Well Architected Review by AWS Solution Architects, self packed labs, concierge support team, dedicated technical account manager
Support forms for	• Encountering Abuse (sent to Abuse team) • Increasing limits beyond a point • Penetration testing
Acceptable Use Policy	• What you'd expect; don't do bad things

Compute

EC2 (Elastic Compute Cloud)	• Virtual server • Proper name is EC2 instances • Pay as you go. Pay for time running • Maintain control • Don't have to provision/maintain server • Assigned both public/private IP • Has instance metadata • Responsible for patching OS
VPC (Virtual Private Cloud)	• Isolate compute resources • Control network config, access, what expose, etc • Can span AZs
ECS (Elastic Container Service)	• Supports Docker containers
AMI	• Amazon Machine Image • Can use variety of preconfigured ones or create own • Specifies type of hardware • Bootable
Lambda	• Serverless • Pay only for compute by fraction of millisecond

	• Ideal for variable/intermittent workloads • Auto-scales • Supports many programming languages • Limited disk space/memory • Must run less than 5 minutes

Networking

IGW (Internet Gateway)	• Allows access to internet from VPC
Subnet	• Divides VPC • Public subnets can access internet • Private subnets cannot (by default) • VPC can have multiple subnets
Route tables	• Register traffic leaving subnet
NAT Gateway	• Allows private subnet to access internet
CIDR (classless interdomain routing)	• Internal IP address look like 10.0.0.0/16
Direct Connect	• On premises to VPC connectivity or VPC to VPC connectivity
PrivateLink	• Connects to VPCs through endpoints
VPC Peering	• Connect to VPCs privately
Route 53	• DNS • Geolocation routing • Latency based routing • Defaults to up to 50 domain names • Global service
Elastic IP	• Static IPv4 address • Up to 5 per region • Pay if have more than one and not associated with running instance

Deploying

Elastic Beanstalk	• PaaS application server • Supplies all infrastructure so can just deploy app
CloudFormation	• Manage/provision collections of servers

Load balancing/scaling

Application Load Balancer	• HTTP/HTTPS level • Includes HTTPs and WebSockets • Can route by path or hosts
Network Load Balancer	• TCP level
ELB (Elastic Load Balancer) – classic load balancer	• Older loader balancer • Supports both HTTP/TCP levels • Can mix with internal load balancers • Supports single region

Auto Scaling	• Adds more EC2 instances as needed • Specify conditions/policy for when add/remove instances • Create launch config (what create if need new instance), group (constraints on what create) and policy (when to scale) • Limit to 20 EC2 instances per region
Listener	• Checks for connection requests to load balancer
Target	• Destination for traffic based on rules
Target groups	• 1+ targets • Target can be in multiple groups • Can do health check by target group

Basic Storage

S3 (Simple Storage Service)	• Object data up to 5TB • Can access by URL • API to get data; not associated with specific server • Can access via HTTP/HTTPS • Objects grouped into S3 buckets. Can have up to 100. Can set policies on buckets. • Can replicate across regions • Durability is always 11 nines. Means probability of losing an object. • Availability is 4 nines for standard and 3 nines for SIA (standard infrequent access)
EBS (Elastic Block Store)	• Block storage • Storage for EC2 • Persistent data • General Purpose (SSD), Provisioned IOPS (SSD), magnetic • Automatically replicated within AZ. Can copy to other region for recovery • Snapshots are backups
EFS (Elastic File System)	• File storage for EC2

Advanced Storage/Data

Aurora	• Managed database service • 5x faster than MySQL/Postgres • Faster version of MySQL • Defaults to replicating twice in each of 3 AZs
RDS (Relational Database Service)	• Supports Aurora, MySQL, PostgresSQL, Oracle, MS SQL Server and MariaDB • Set up own IP, subnet, access control, etc

	• Automatically generates standby database in another AZ • Can create read replicas in different region for all but Oracle and MS SQL Server
DynamoDB	• Managed NoSQL service • Access by query (key) or scan (non-key attribute)
RedShift	• Managed data warehouse service • Uses SQL • Supports petabytes of data • OLAP
Snowball Edge	• Physically transport 100TB of data
Snowball	• Physically transport petabytes of data
Snowmobile	• Physically transport up to 100 petabytes of data
Glacier	• Data archiving • Each archive up to 40TB • Infrequent access • Data encrypted by default • Archive – document stored • Vault – container for storing archives. Has access policy and lock policy (can't alter when locked) • Data comes from S3 (via lifecycle policies), SDK, CLI or snowball/snowmobile import • Takes minutes or hours to retrieve data depending on cost Bulk/Standard/Expedited
Transfer Acceleration	• Transfer files over the internet across long distances with S3 bucket
DMS (Data Migration Service)	• Migrate non-AWS database to cloud
EMR (Elastic map reduce)	• Hadoop
Glue	• ETL (extract load transform)
Storage Gateway	• Links to on premises data environment
Athena	• Serverless queries
Kinesis	• Streaming data
Kinesis Firehose	• Data load
Neptune	• Graph database

"Simple" services

SES (Simple email service)	• Email
SNS (Simple Notification Service)	• Publish messages • Supports HTTP/S, Email, Email JSON, SMS, SQS
SQS (Simple Queue Service)	• Hosted queue • Visible for 12 hours by default

SWF (Simple Workflow)	• Workflow • Activity worker implements a task

Security

NACL (network access control list)	• Stateless • Like passport control • Checks access each time on entry/exit • Optional • At subnet level
Security Groups	• Built in firewall for virtual servers • Set up rules • Can control by protocol/port/IP • By default, controls inbound (blocks all) and outbound traffic (allows all)
Shield	• Protects against DDoS (distributed denial of service) • Free level built into EC 2 • Two levels • Advanced level requires Business plan or higher
WAF (Web Application Firewall)	• Blocks common attacks (ex: XSS) • Global service
Shared responsibility model	• Amazon – “of the cloud” • Customer – “in the cloud”
Guard Duty	• Threat detection

IAM

IAM (Identity and Access Management)	• Control access • Can’t recover lost credentials • Allows each user up to two active keys • Global service
Identities	• People/processes/services • Unit of authentication
Groups	• Collections of users
Root user	• Initial user created • Unrestricted access • Only use to create initial other users • Required to use CLI • Recommended to delete access keys
Role	• Identity with permission policies • Does not have own credentials • Used for apps • Used for SSO where authenticated at company
Temporary credentials	• Credentials with restricted permission for a specific task

Policy	• Applied to user/role/group to grant permissions
Access types	• Programmatic access • Management console access

Monitoring

TCO (Total Cost of Ownership) Calculator	• Determine costs before using • Don't need to be AWS customer yet • Compares on-prem and collocation to pure AWS
Trusted Advisor	• Check security, fault tolerance, performance, cost savings. • For existing customers • Red (immediate action), yellow (investigate), green (good) • Can get notification when checks fail • Focuses on services
Cost Explorer	• Billing visibility for current customers • Can see last 13 months of data • Forecasts costs for next three months
Budgets	• Alerts when costs exceed plan
Cost and Usage Report	• Shows costs by category
CloudTrail	• Records user activity/API calls
CloudWatch	• Monitoring logs • Aggregates logs • Can set billing alarm • Basic and Detailed plans • Defaults to 5 minute granularity for basic and 1 minute for detailed
Inspector	• Find possible security issues • Focuses on S3 level • Automated compliance
Artifact	• View compliance reports
Migration Hub	• Track progress of migrations across AWS and partners

For Programmers and Dev/Ops

AWS SDKs	• APIs
OpsWorks	• DevOps platform • Uses Chef
CodeStar	• UI for Development
CodeCommit	• Version control
CodeDeploy	• Automated deployment
CodePipeline	• Continuous Delivery

Pillars of Architecture

Operational Excellence	• Operations as code • Annotate documentation • Make frequent, small, reversible changes • Refine operations procedures frequently • Anticipate failure • Learn from operational failures
Security	• Implement a strong security foundation • Enable traceability • Apply security at all layers • Automate security best practices • Protect data in transit and at rest • Prepare for security events
Reliability	• Test recovery procedures • Automatically recover from failure • Scale horizontally to increase aggregate system availability Stop guessing capacity • Manage change in automation
Performance Efficiency	• Democratize advanced technologies • Go global in minutes • Use serverless architectures • Experiment more often • Mechanical sympathy
Cost Optimization	• Adopt a consumption model • Measure overall efficiency • Stop spending money on data center operations • Analyze and attribute expenditure • Use managed services to reduce cost of ownership

Recovery

Pilot Light	• Quick recovery option> Minimal version always running
Slowest to fastest	• Backup & Restore • Pilot Light • Warm Standby • Multi Site
Fault tolerance	• Stays up even if parts fail • More strict than High Availability

Random other services

CloudFront	• CDN (content delivery network) • Can act as a cache to serve objects from S3

	• Global service
Cognito	• User sign up/access control
Config	• Configuration history
Fargate	• Run containers
Macie	• Machine learning about security
QuickSight	• Business analytics
Server Migration Service	• Agentless migration from on-prem
Transcoder	• Media conversion
Workspaces	• Virtual desktop
Xray	• Distributed debugging/tracing

Random other concepts

Assurance Programs	• Include Certification/Attestation and Laws/Regulation/Privacy
Risk/Compliance Program	• Risk Management, Control Environment and Information Security
Marketplace	• Find software solutions

Pricing Details

Free	• Data in usually free • Data transfer within a region usually free
EC2	• Server time used • Machine (type and config) • # instances • Load balancing and autoscaling • Monitoring level • OS & Software packages
S3	• Storage (amount and class) • Requests (# and types) • Data transfer (out)
EBS	• Volumes (data used) • IO Operations per second • Snapshot (backups) • Data transfer (out)
RDS	• Server time used • Database (type, #) • Storage • # Requests • Data transfer (out)
Cloudfront	• Traffic distribution (regions) • Requests (# and type) • Data transfer (out)