

# HPE Digital Learner Architecting on Amazon Web Services (Advanced) Content Pack

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<b>Content Pack category</b>	Category 2
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This self-paced eLearning Content Pack represents a baseline training series for IT individuals who are transitioning to a cloud architect role utilizing the Amazon Web Services (AWS) public cloud environment. This is a comprehensive advanced training series that includes two core areas defined as “Advanced Architecting on AWS” and “AWS Professional Solutions Architect” and includes many advanced areas required to plan, design and implement a hybrid cloud utilizing the AWS public cloud.

## Audience

Candidates for the AWS Certified Solutions Architect - Professional exam and other learners with advanced cloud implementation skills looking to get the best out of the Amazon Web Services platform

Professional Solutions Architect”, to ensure completeness across a multitude of critical required areas and to provide a path to AWS certification.

Areas of interest for the “Advanced Architecting on AWS” series include costing, deployment management, cloud migration and architecture, data storage architecture, security architecture, and scalability and elasticity.

Areas of interest for the “AWS Professional Solutions Architect” series include high availability, costing, network design, data storage, data replication, security controls, data security, scalability and elasticity, cloud migration and hybrid architecture.

This comprehensive training will enable the student to transition to an advanced cloud architect role within a typical AWS public cloud environment and will also assist with the path to AWS Certification.

## Content Pack objectives

This Content Pack provides the information necessary for an intermediate cloud architect to uplift their skills to an advanced cloud architect role within a typical Amazon Web Services (AWS) public cloud environment. This training introduces many advanced knowledge areas which are critical for a cloud architect transitioning to an advanced IT/cloud team role in the AWS public cloud domain. Areas of focus are segmented into two separate areas, “Advanced Architecting on AWS” and “AWS

## Detailed Content Pack outline

### Advanced Architecting on Amazon Web Services: HA and Business Continuity

Disaster recovery is a perfect fit for cloud technologies given the scalable and redundant properties of cloud systems. Traditional disaster recovery requires a sizable investment in site, hardware and personnel. This course contrasts disaster recovery for traditional and cloud technologies. It also looks at highly available systems and cloud disaster recovery techniques.

- Describe availability levels in Amazon Web Services
- Describe the components of high availability in Amazon Web Services
- Describe a traditional, pre-cloud disaster recovery solution with different levels of off-site duplication of data and services
- Describe recovery time objective metrics for a disaster recovery system
- Describe recovery point objective metrics for a disaster recovery system
- Calculate recovery point objective and recovery time objective metrics for a disaster recovery system
- Describe backup and restore services on Amazon Web Services
- Describe the pilot light method of disaster recovery using Amazon Web Services
- Describe warm standby disaster recovery solutions using Amazon Web Services
- Describe multi-site disaster recovery solutions using Amazon Web Services
- Describe the impact of synchronous and asynchronous replication in Amazon Web Services
- Describe regions in Amazon Web Services and the part they play in disaster recovery systems
- Describe levels of availability configurable through Amazon Web Services
- Describe multi-availability zone high availability on Amazon Web Services
- Describe multi-region high availability on Amazon Web Services
- Describe the process of failover and failback in a disaster recovery solution on Amazon Web Services
- Describe Amazon Web Services' self-healing capabilities
- Describe the self-healing capabilities of individual Amazon Web Services components
- Describe how bootstrapping is used in a self-healing system on Amazon Web Services
- Describe how Amazon Machine Images are used on Amazon Web Services
- Describe how Elastic Block Store is used with Amazon Machine Images on Amazon Web Services
- Describe how Elastic IPs are used in a self-healing system on Amazon Web Services
- Describe how Elastic Load Balancing is used in a self-healing system on Amazon Web Services
- Describe how the reserved instances feature is used in a self-healing system on Amazon Web Services
- Choose Amazon Web Services components to create a high availability solution and a disaster recovery solution

### Advanced Architecting on Amazon Web Services: Costing

One of the key advantages of cloud systems is the economies of scale gained from using the world's largest cloud platform. The cloud cost model, however, is different from traditional IT and a deep knowledge of costing is required to make the most fiscally efficient systems possible. This course covers the basics of Amazon pricing and billing and goes on to extrapolate the relative economy of various cloud architectures.

- Describe the principles of cloud pricing generally, and Amazon Web Services specifically
- Calculate the cost of a service using the Amazon Web Services Simple Monthly Calculator
- Describe the pricing characteristics of Amazon Web Services Elastic Compute Cloud
- Describe the pricing characteristics of Amazon Web Services Simple Storage Service
- Describe the pricing characteristics of Amazon Web Services Elastic Block Store
- Describe the pricing characteristics of Amazon Web Services Relational Database Service
- Describe the pricing characteristics of Amazon Web Services CloudFront
- Describe how Amazon Web Services Elastic Compute Cloud reserved instances can be used to lower costs
- Describe billing and cost management principles on Amazon Web Services
- Manage billing for Amazon Web Services accounts
- Use Amazon Web Services Cost Explorer to view and analyze spending on Amazon Web Services
- Create and view a budget on Amazon Web Services
- Describe consolidated billing for multiple Amazon Web Services accounts
- Sign up for consolidated billing on Amazon Web Services
- Add an account to consolidated billing on Amazon Web Services
- Move an account from one bill to another in consolidated billing on Amazon Web Services
- Convert a payer account to a linked account in consolidated billing on Amazon Web Services
- Describe the business benefits of different cloud architectures
- Describe the cost drivers on Amazon Web Services
- Describe a cost analysis methodology on Amazon Web Services
- Use costing analysis tools to derive cost information for Amazon Web Services
- Describe a static site costing example on Amazon Web Services
- Describe a costing example using Elastic Compute Cloud and Relational Database Service on Amazon Web Services
- Describe a costing example using auto scaling and load balancing on Amazon Web Services
- Describe tools and techniques used to cost a cloud application on Amazon Web Services

**Advanced Architecting on Amazon Web Services: Deployment Management**

Deployment in elastic, automated cloud systems is significantly different from the traditional methods of on-site IT. Automation is the key to cloud deployment and meeting the cloud promises of elasticity, scalability and fault tolerance. This course looks at managing deployment cycles through the life cycle of an application and various architectures to support the stages. It also looks at the extensive range of cloud deployment services available through Amazon Web Services.

- Describe the application life cycle on Amazon Web Services
- Describe the development phase of the application life cycle on Amazon Web Services
- Describe the build phase of the application life cycle on Amazon Web Services
- Describe the test phase of the application life cycle on Amazon Web Services
- Describe the release phase of the application life cycle on Amazon Web Services
- Describe the analyze phase of the application life cycle on Amazon Web Services
- Describe Amazon Web Services' architecture for development environments
- Describe Amazon Web Services' architecture for build environments
- Describe Amazon Web Services' architecture for test environments
- Describe Amazon Web Services' OpsWorks
- Use the OpsWorks console for administration on Amazon Web Services
- Create a Linux stack using OpsWorks on Amazon Web Services
- Create a Windows stack using OpsWorks on Amazon Web Services
- Describe the features and functionality of Amazon Web Services' Elastic Beanstalk
- Describe the architecture of Amazon Web Services Elastic Beanstalk
- Create an application in Amazon Web Services' Elastic Beanstalk
- Manage an Amazon Web Services Elastic Beanstalk environment
- Describe the features and functionality of Amazon Web Services' CloudFormation
- Describe how Amazon Web Services' CloudFormation and Elastic Beanstalk can be used together to manage infrastructure
- Describe how templates are used in Amazon Web Services' CloudFormation
- Use CloudFormer to create a CloudFormation template
- Describe the stages and tools used to deploy an application on Amazon Web Services

**Advanced Architecting on Amazon Web Services: Cloud Migration and Architecture**

Broad network connectivity is part of the definition of cloud computing and network design is a key task in architecting a cloud solution. Amazon Web Services provides a wide range of virtual networking tools, from Elastic IPs at the machine level to Direct Connect for connecting entire sites. This course covers the design theory for virtual networks running on AWS. It also covers using these networks for application migration and hybrid cloud creation.

- Describe Virtual Private Clouds on Amazon Web Services
- Describe the Elastic IP service on Amazon Web Services
- Create a Virtual Private Cloud in Amazon Web Services
- Launch an Elastic Compute Cloud instance into a Virtual Private Cloud on Amazon Web Services
- Assign an Elastic IP to an Elastic Compute Cloud instance on Amazon Web Services
- Describe the relationship between Virtual Private Clouds and IP subnets on Amazon Web Services
- Describe the process of routing between subnets on Amazon Web Services
- Describe security measures for network security and subnet routing in Amazon Web Services
- Add a subnet to a Virtual Private Cloud in Amazon Web Services
- Delete a subnet from a Virtual Private Cloud in Amazon Web Services
- Describe the cloud leveraging phase of a cloud migration
- Describe hybrid cloud architectures
- Describe Domain Name System configurations for hybrid cloud implementations
- Describe a hybrid cloud implementation with virtual private networks
- Describe a hybrid cloud implementation with Amazon Web Services' Direct Connect
- Design an Amazon Web Services network and connectivity for a hybrid cloud app
- Describe virtual private networks on Amazon Web Services
- Describe options for routing when using virtual private networks on Amazon Web Services
- Describe redundant virtual private network architectures on Amazon Web Services
- Create a virtual private network gateway in Amazon Web Services
- Enable access to a virtual private network in Amazon Web Services
- Create a virtual private network connection in Amazon Web Services
- Describe Amazon Web Services' Direct Connect
- Describe strategies for migrating to the cloud
- Describe the cloud assessment phase of a cloud migration
- Describe the proof of concept phase of a cloud migration
- Describe the data migration phase of a cloud migration
- Describe the application migration phase of a cloud migration

**Advanced Architecting on Amazon Web Services: Data Storage Architecture**

Data storage on Amazon Web Services can be managed at the object or block level. Selecting the right storage architecture is key to getting the underpinnings of your cloud services right. This course goes in-depth on EBS and S3 to show how they support various application architectures.

- Describe the storage architecture for Amazon Web Services' Simple Storage Service
- Describe the storage architecture for Amazon Web Services' Elastic Block Store
- Describe storage area networks with Amazon Web Services' Elastic Block Store volumes
- Describe Amazon Web Services' Storage Gateway
- Describe Amazon Web Services' Storage Gateway gateway-cached volumes
- Describe Amazon Web Services' Storage Gateway gateway-stored volumes
- Describe Amazon Web Services' Storage Gateway gateway-virtual tape library
- Plan a deployment of Amazon Web Services' Storage Gateway
- Activate Amazon Web Services' Storage Gateway
- Describe an example of content and media serving architecture on Amazon Web Services
- Describe an example of web application hosting architecture on Amazon Web Services
- Describe an example of media sharing architecture on Amazon Web Services
- Describe an example of file synchronization architecture on Amazon Web Services
- Describe an example of disaster recovery architecture on Amazon Web Services
- Describe an example of relational database architecture on Amazon Web Services
- Describe an example of nonrelational database architecture on Amazon Web Services
- Describe an example of architecture using ElastiCache on Amazon Web Services
- Describe an example of data warehousing architecture on Amazon Web Services
- Describe an example of architecture that uses databases on Amazon Machine Images in Amazon Web Services
- Describe scalability options for Amazon Web Services' Relational Database Service
- Describe scalability in an Amazon Web Services NoSQL database
- Describe Amazon Web Services' Relational Database Service instance replication
- Describe Simple Storage Service cross-region replication scenarios
- Configure cross-region replication for a Simple Storage Service bucket in Amazon Web Services
- Describe snapshot replication for Elastic Block Store on Amazon Web Services
- Design a storage architecture for a given set of constraints on Amazon Web Services

**Advanced Architecting on Amazon Web Services: Security Architecture**

Security is paramount for connected applications, and this is never more true than in the cloud. Amazon provides comprehensive advice and information about their services and how to protect and harden them. This course guides you through that information. Data at rest and data in transit are secured systematically, service-by-service.

- Define and categorize assets on Amazon Web Services as part of an information security management system
- Design an information security management system for Amazon Web Services
- Describe security considerations for accounts and identities on Amazon Web Services
- Describe security considerations for identity federation on Amazon Web Services
- Describe security considerations for managing access to Elastic Compute Cloud instances on Amazon Web Services
- Describe the shared responsibility model on Amazon Web Services
- Describe infrastructure services in the context of the shared responsibility model on Amazon Web Services
- Describe container services in the context of the shared responsibility model on Amazon Web Services
- Describe abstracted services in the context of the shared responsibility model on Amazon Web Services
- Describe security considerations for managing encryption keys on Amazon Web Services
- Describe risks to data at rest in Amazon Web Services
- Describe mitigation steps for protecting data at rest on Amazon Web Services' Simple Storage Service
- Describe mitigation steps for protecting data at rest on Amazon Web Services' Elastic Block Store
- Describe mitigation steps for protecting data at rest on Amazon Web Services' Relational Database Service
- Describe mitigation steps for protecting data at rest on Amazon Web Services' Glacier
- Describe mitigation steps for protecting data at rest on Amazon Web Services' Elastic MapReduce
- Describe considerations for decommissioning data on Amazon Web Services
- Describe risks to data in transit on Amazon Web Services
- Describe steps for protecting Amazon Web Services' administration traffic
- Describe mitigation steps for protecting data in transit to Amazon Web Services' Simple Storage Service and Relational Database Service
- Describe mitigation steps for protecting data in transit to Amazon Web Services' Elastic MapReduce
- Describe steps for mitigating compromise and abuse of systems on Amazon Web Services
- Describe network security implementation with Amazon Web Services' Virtual Private Cloud
- Describe security zoning and segmentation for security on Amazon Web Services
- Describe mitigation steps for securing systems peripheral to Amazon Web Services
- Describe a layered approach to security defense for Amazon Web Services
- Describe a security approach for an application with a given set of services on Amazon Web Services

**Advanced Architecting on Amazon Web Services: Scalability and Elasticity**

Scalability and elasticity are the two promises of cloud computing that elevate it above traditional IT and provide the potential for global scale and cost-effective applications. This course covers scaling and elasticity in multitier architectures and for different AWS Services

- Describe the architectural technique of loose coupling for application on Amazon Web Services
- Describe the principle of designing for failure as it relates to cloud application on Amazon Web Services
- Describe how auto scaling is used in loosely coupled systems on Amazon Web Services
- Describe how Elastic Load Balancing is used in loosely coupled systems on Amazon Web Services
- Describe how multi-availability zone architectures are used on Amazon Web Services
- Describe how Route 53 Domain Name Service can be used for scaling the front end of application architectures on Amazon Web Services
- Describe how Elastic Compute Cloud instances can be used for scaling the front end of application architectures on Amazon Web Services
- Describe how Elastic Load Balancer can be used for scaling the front end of application architectures on Amazon Web Services
- Describe how Auto Scaling Groups can be used for scaling the front end of application architectures on Amazon Web Services
- Describe how CloudFront CDN can be used for scaling the front end of application architectures on Amazon Web Services
- Describe how Simple Storage Service can be used for scaling the front end of application architectures on Amazon Web Services
- Describe how Elastic Compute Cloud instances can be used for scaling the middle tier of application architectures on Amazon Web Services
- Describe how Elastic Load Balancer can be used for scaling the middle tier of application architectures on Amazon Web Services
- Describe how Auto Scaling Groups can be used for scaling the middle tier of application architectures on Amazon Web Services
- Describe how Relational Database Service can be used to scale the database tier of application architectures on Amazon Web Services
- Describe how Dynamo can be used to scale the database tier of application architectures on Amazon Web Services
- Describe how NoSQL can be used to scale the database tier of application architectures on Amazon Web Services
- Describe how Elastic Block Store can be used to scale the database tier of application architectures on Amazon Web Services
- Describe vertical scaling for applications on Amazon Web Services
- Describe horizontal scaling for applications on Amazon Web Services
- Describe use cases for vertical scaling on Amazon Web Services
- Describe use cases for horizontal scaling on Amazon Web Services
- Plan scaling options for an application on Amazon Web Services

**High Availability**

In this course, you will explore the various services and infrastructure options available in AWS to build fault tolerant and highly available systems in the cloud.

- Provide an overview and list the characteristics and benefits of high availability in AWS, and compare functionality to fault tolerance
- Describe service level agreements to better understand exactly what AWS is promising customers
- List the consequences of single points of failure in AWS
- List the benefits of AWS Global Infrastructure
- Describe the benefits of Elastic Load Balancing with AWS
- Describe how EBS volumes are highly available and reliable in AWS
- Configure Auto Scaling to maintain application performance and availability in AWS
- Describe the importance of having a failure management plan in AWS

**AWS Professional Solution Architect: Business Continuity**

In this course, you will explore the different strategies, solutions and techniques available in AWS to ensure minimal downtime in the event of a disaster.

- Describe the importance of having the right backup strategy in AWS
- Create an Amazon Machine Image (AMI)
- Create an EBS snapshot
- Describe RTO and RPO
- Describe the different disaster recovery architectures such as pilot light, warm standby, multi-site
- Demonstrate how to use Amazon Glacier for archiving
- Demonstrate how to use Amazon S3 for archiving
- Describe usage scenarios for the AWS Storage Gateway
- Describe both synchronous replication and asynchronous replication techniques in AWS
- Implement auto healing in AWS

**AWS Professional Solution Architect: Costing**

AWS offers various pricing models that allow customers to pay only for what they use. In this course, you will explore these pricing models as well as cost considerations for various architectures.

- List the various pricing models such as pay as you go, pay less when you reserve, pay even less per unit by using more and pay even less as AWS grows
- Demonstrate how to calculate estimated monthly charges
- Demonstrate how to best use the Billing and Cost Management console
- List cost considerations when deploying and maintaining EC2
- List cost considerations when deploying and maintaining S3
- List cost considerations when deploying and maintaining EBS
- List cost and considerations when deploying and maintaining RDS
- List cost and considerations when deploying CloudFront
- Demonstrate the consolidated billing process
- Describe how to use additional cost saving techniques such as EC2 reserved instances or spot instances

**AWS Professional Solution Architect: Deployment Management**

In this course, you will explore the various deployment services used to build and deploy scalable, highly available and fault tolerant system in AWS.

- Describe how to manage the lifecycle of an application on AWS
- Create environments for development and testing with AWS
- Demonstrate how to use the AWS Elastic Beanstalk service
- Demonstrate the AWS CloudFormation deployment model
- Demonstrate the AWS OpsWorks application management service
- Demonstrate how to use the AWS CodeCommit service
- Use the AWS CodePipeline service
- Use the AWS CodeDeploy service
- Use the Amazon ECS service

**AWS Professional Solution Architect: Network Design**

In this course, you will discover how to implement AWS networking and connectivity features while you learn about AWS network design.

- Provide an overview of a Virtual Private Cloud (VPC) and its features
- Demonstrate common VPC configurations based on criteria such as user access, system access and routing
- Demonstrate VPC security capabilities
- Configure network firewall options
- Discuss subnets and network routing
- Discuss Network-to-AWS VPC connectivity options
- Discuss Amazon VPC-to-AWS VPC connectivity options
- Demonstrate how to configure an AWS VPN Gateway
- Configure VPC peering
- Configure network access control lists

**AWS Professional Solution Architect: Data Storage**

In this course, you will discover how to plan storage and database options as well as how to choose the appropriate data storage architecture.

- Demonstrate the benefits of implementing Amazon S3 storage
- List the benefits of implementing Amazon Glacier storage
- Describe when to use Amazon EFS storage options
- Demonstrate how to use Amazon EBS storage options
- List the benefits of Amazon EC2 instance storage
- Describe when to use AWS StorageG
- List the benefits of using AWS Snowball
- Demonstrate how to use Amazon CloudFront storage solutions
- Describe the different AWS database options such as relational, NoSQL, graph and in-memory

**AWS Professional Solution Architect: Data Replication**

Data replication in AWS is used to synchronize data from one location to another. In this course, you will discover the various data replication options in AWS.

- Discuss how the AWS database migration service supports continuous data replication
- List the benefits of synchronous replication in AWS
- Discuss the features of cross-region replication in AWS
- Demonstrate how to deploy Microsoft SQL Server through RDS
- Demonstrate how to deploy MySQL in AWS
- Describe the benefits of using Amazon Redshift for data warehouse replication

**AWS Professional Solution Architect: Security Controls**

AWS offers various features to help protect confidentiality, integrity and the availability of data. In this course, you will explore the AWS security processes.

- Compare AWS security responsibilities with customer security responsibilities
- List the benefits of an AWS global security infrastructure
- List the various AWS compliance programs
- List the various AWS physical and environmental security options, such as fire detection equipment and climate control
- Describe AWS business continuity management features, such as availability and incident response
- List AWS network security features, such as secure access points and transmission protection
- Describe AWS access features for review and audit, background checks and credential policy
- List AWS software and infrastructure change management features
- List AWS account security features
- Describe compute services in AWS
- Describe storage services in AWS
- Compare different storage options and database services in AWS
- List the different analytical and mobile services in AWS

**AWS Professional Solution Architect: Data Security**

In this course, you will explore the various systems and controls used to ensure data security in an AWS implementation.

- Design an information security management system
- List the features of IAM
- Provide an overview of IAM and create an IAM admin user
- Provide an overview of IAM permissions
- List the various IAM identities
- Demonstrate IAM access management features such as policies
- Troubleshoot general IAM issues
- Describe how to protect data at rest using encryption
- List the security benefits of VPC
- Describe when to use network segmentation
- Describe how to secure periphery systems
- List the benefits of layered security

**AWS Professional Solution Architect: Scalability and Elasticity**

AWS offers various scaling and elasticity features to ensure resources are available as infrastructure changes. This course covers how to design the most appropriate scaling architecture.

- Describe the difference between scalability and elasticity
- Design a loosely coupled system
- Demonstrate how to change a web server instance type
- Describe how to implement the most appropriate middle tier scaling architecture
- Describe how to implement the most appropriate data storage scaling architecture
- Differentiate between horizontal and vertical scaling

**AWS Professional Solution Architect: Cloud Migration**

In this course, you will discover the various strategies and best practices for performing an AWS migration.

- List the steps involved in performing an initial cloud assessment
- Describe the five phases of the migration process
- Describe the steps involved in designing a proof of concept
- Demonstrate what is involved in an AWS data migration
- Describe how to migrate applications to the AWS cloud
- Describe how to leverage the cloud after migration
- Describe how to optimize your cloud-based application
- Describe how to migrate batch processes
- Discuss migrating backend processing pipelines
- Implement migration tracking

**AWS Professional Solution Architect: Hybrid Architecture**

Hybrid architectures allow organizations to integrate on-premises resources with cloud resources. In this course, you will discover how to implement hybrid architectures as well as hybrid data lakes.

- List data integration features of a hybrid architecture
- List integrated networking features of a hybrid architecture
- List the requirements to link AWS to an existing on-premises Active Directory environment
- List integrated resource and deployment management features in a hybrid deployment
- List integrated devices and edge systems in a hybrid deployment
- Describe when to deploy a hybrid data lake

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