UDACITY
FOR ENTERPRISE

AWS Cloud Architect

NANODEGREE SYLLABUS

Overview

AWS Cloud Architect Nanodegree Degree Program

Play a critical role in an organization's cloud computing strategy as an AWS Cloud Architect. Learn to plan, design, and implement secure cloud infrastructure in AWS at scale. Begin by designing and building high availability infrastructure and then move on to building scalable, secure, and cost-optimized architecture.

Finally, explore and execute best practices and strategies around securing access to cloud services and infrastructure.

A graduate of this program will be able to:

- Design and deploy a fault tolerant and resilient web service architecture in AWS.
- Monitor availability and simulate and test failure scenarios and recovery.
- Optimize cloud service infrastructure for cost and performance.
- Use Terraform to provision and configure AWS services in a global configuration.
- Evaluate a cloud environment's security vulnerabilities.
- Apply best practices in cloud security to harden and secure the environment.
- Design a DevSecOps pipeline that will scan infrastructure as code, AMI and containers, and AWS cloud configuration for vulnerabilities.

Program Information

TIME
3 months
Study 10 hours/week

LEVEL
Specialist

PREREQUISITES
Experience with Cloud Computing, Programming, and AWS.

HARDWARE/SOFTWARE REQUIRED
A computer running recent versions of Windows, Mac OS X, or Linux and an unmetered broadband Internet connection. For an ideal learning experience, a computer with Mac or Linux OS is recommended. You will use AWS CLI, AWS CloudFormation, Terraform, Lucidchart or other diagramming software, and Github in this Nanodegree program.

LEARN MORE ABOUT THIS NANODEGREE
Contact us at enterpriseNDs@udacity.com.

Our Classroom Experience
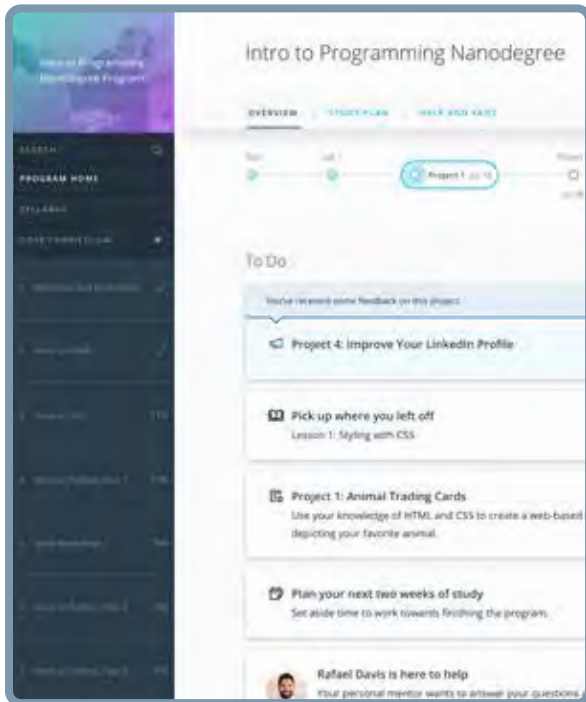
REAL-WORLD PROJECTS
Learners build new skills through industry-relevant projects and receive personalized feedback from our network of 900+ project reviewers. Our simple user interface makes it easy to submit projects as often as needed and receive unlimited feedback.

KNOWLEDGE
Answers to most questions can be found with Knowledge, our proprietary wiki. Learners can search questions asked by others and discover in real-time how to solve challenges.

LEARNER HUB
Learners leverage the power of community through a simple, yet powerful chat interface built within the classroom. Learner Hub connects learners with their technical mentor and fellow learners.

WORKSPACES
Learners can check the output and quality of their code by testing it on interactive workspaces that are integrated into the classroom.

QUIZZES
Understanding concepts learned during lessons is made simple with auto-graded quizzes. Learners can easily go back and brush up on concepts at anytime during the course.
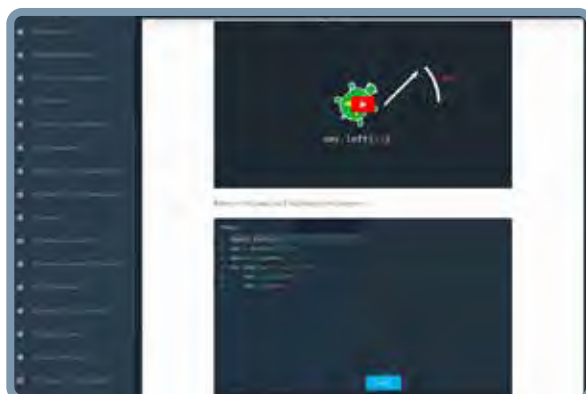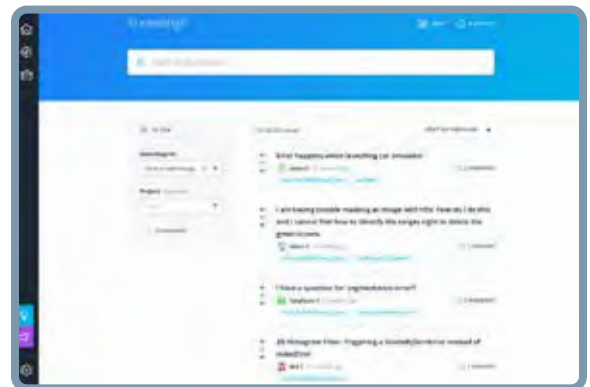
CUSTOM STUDY PLANS
Mentors create a custom study plan tailored to learners' needs. This plan keeps track of progress toward learner goals.

PROGRESS TRACKER
Personalized milestone reminders help learners stay on track and focused as they work to complete their Nanodegree program.

Learn with the Best

Tom Verbiscer

DIRECTOR OF ENGINEERING AT CURRENT MEDIA

Tom is a coach and builder specializing in creating, running, and advancing highly scalable, reliable, and flexible platforms. He is AWS Certified at the professional tier as both an AWS Solutions Architect, and DevOps Engineer.

Leslie Bell

TECHNICAL TRAINER AT AWS

Leslie Bell is a Senior Solutions Architect specializing in IT Governance and Disaster Recovery. She has worked in technology across a number of industries, from scientific research, chemical analysis, transportation, to insurance to cloud-based infrastructure.

Mehdi Rezvi

SENIOR CLOUD ARCHITECT AT NUERA AUTOMOTIVE SOLUTIONS

Mehdi is a senior cloud architect and consultant based out of the Chicago area. He loves helping companies large and small build, deploy, and run their applications in the cloud. Most recently, he has worked with companies such as 2ndWatch and GuidePoint Security.

Course 1: Design for Availability, Reliability, and Resiliency

In this course, you'll use the highly available constructs within AWS to create highly available and resilient systems and networks. Then, you will build with AWS services and understand their redundant capabilities. You'll explore the connection between the technical aspects of these systems and business operations and objectives. Finally, you will practice what to do when things fail and how to handle these situations.

Project	Recoverability in AWS

In this project, you will build a multi-availability zone, multi-region database. You will demonstrate how applications can use this distributed infrastructure and migrate your primary database from one geographical region to another. You will also create a versioned website and demonstrate how it is protected from accidental or malicious disruption, with an ability to turn-back-the-clock when something disrupts your normal operations.

LESSON TITLE	LEARNING OUTCOMES
AVAILABILITY ZONES AND REGIONS	· Build on the AWS global infrastructure. · Take advantage of the multiple availability options on AWS. · Build multiple AWS VPCs to suit requirements. · Create custom isolated networks to meet business needs.
BUILDING FOR RESILIENCY	· Take advantage of different high availability options on AWS. · Create multi-AZ services. · Create multi-region services. · Identify what availability options exist for which AWS services. · Take advantage of resilient features in AWS services.
BUSINESS OBJECTIVES	· Calculate availability in terms of up and down time. · Set reasonable business metrics for RTO and RPO. · Make determinations on what types of DR plans a company needs. · Implement a DR plan.

Course 1: Design for Availability, Reliability, and Resiliency, cont.

LESSON TITLE	LEARNING OUTCOMES
SECURITY	· Learn the importance of security in the cloud. · See Identity & Access Management (IAM) in action. · Secure applications using IAM users, groups, and policies.
MONITOR, REACT, AND RECOVER	· Monitor AWS applications. · Alert on problems in applications. · Recover failures in your platform. · Understand testing and tradeoffs in automating recovery from failure.

Course 2: Design for Performance and Scalability

In this course, you will use AWS tools to identify and implement best practices for cost, and identify and understand the elements required to design and architect scalable infrastructure. You will be able to modify traditional infrastructure for performance, and identify architectures and workloads where serverless infrastructure should be considered to meet cost and performance goals. Finally, you will be able to provision and destroy infrastructure from the command line using the AWS CLI and Terraform.

| Project | Design, Provision, and Monitor AWS Infrastructure at Scale |

In this project, you will plan, design, provision, and monitor infrastructure in AWS using industry-standard and open source tools. You will practice the skills you have learned throughout the course to optimize infrastructure for cost and performance. You will also use Terraform to provision and configure AWS services in a global configuration.

LESSON TITLE	LEARNING OUTCOMES
INTRODUCTION TO DESIGN FOR COST, PERFORMANCE, AND SCALABILITY	• Recognize the major differences between traditional data centers and cloud. • Understand how cloud infrastructure offers scalability and elasticity with potentially reduced costs. • Understand the objectives of the cloud infrastructure team.
COST AND MONITORING	• Understand the power of cloud computing. • Estimate and calculating cloud costs. • Use workload knowledge and planning factor to reduce costs. • Adapt infrastructure to meet budget and performance requirements. • Select the optimal DB type when migrating to the cloud. • Use file retention policies to reduce storage costs and management overhead.

Course 2: Design for Performance and Scalability, cont.

LESSON TITLE	LEARNING OUTCOMES
HIGH PERFORMANCE	· Define and document performance goals. · Identify and resolve performance bottlenecks. · Understand elasticity and scalability. · Select the best instance for your performance goals. · Leverage archiving options for cost and performance.
SERVERS AND SECURITY GROUPS	· Compare cloud migration vs cloud native strategies. · Identify expected obstacles when re-architecting a solution for the cloud. · Understand the benefits of serverless architecture. · Analyze the tradeoffs between traditional and serverless architectures. · Explain the benefits of containers.
STORAGE AND DATABASES	· Identify how automation can reduce error and effort. · Understand the benefits of IaC. · Explain the tradeoffs using different provisioning tools. · Provision infrastructure using the AWS CLI and Terraform. · Manage Terraform State and Terraform using best practices.

Course 3: Design for Security

In this course, you will explore best practices and strategies around securing access to cloud services and infrastructure. You will also use tools and methods available with public cloud ecosystems— such as AWS — to ensure that data stored in the cloud is protected. Finally, you will investigate security practices around monitoring and defending cloud based applications and environments.

| Project | Securing the Recipe Vault Application |

In this project, you will deploy and assess a simple web application environment's security posture. You'll have a chance to test the security of the environment by simulating an attack scenario and exploiting cloud configuration vulnerabilities. You'll also set up monitoring to identify suspicious behavior and vulnerable configurations and you will remediate the identified misconfigurations. Finally, you will tie it all together by proposing a DevOps build pipeline that includes security best practices.

| LESSON TITLE	LEARNING OUTCOMES
SECURING ACCESS TO CLOUD SERVICES	· Apply Identity and Access Management best practices. · Use Identity and Access Management roles to access cloud services. · Fine-tune least privilege Identity and Access Management policies. · Understand Identity Federation concepts in the cloud.
SECURING ACCESS TO CLOUD INFRASTRUCTURE	· Compare techniques to set up secure access to cloud servers. · Understand options available to establish secure connectivity to cloud networks. · Investigate methods for controlling network ingress and egress in the cloud. · Assess the network access points of your environment.

Course 3: Design for Security, cont.

| LESSON TITLE	LEARNING OUTCOMES
PROTECTING DATA STORED IN THE CLOUD	· Understand options available in the cloud for encrypting data at rest. · Use cloud SDKs to encrypt data from within the application code. · Use server-side encryption to ensure data is protected by cloud services. · Apply best practices for securing S3 storage. · Structure roles and responsibilities around key usage.
DEFENSIVE SECURITY IN THE CLOUD	· Identify vulnerabilities within infrastructure as code and OS configuration. · Use cloud native tools to identify insecure and out of compliant configurations in your environment. · Leverage methods to defend against and detect exploits and intrusion-related behavior. · Incorporate "shift-left" security practices into a DevOps deployment pipeline.

Our Nanodegree Programs Include:
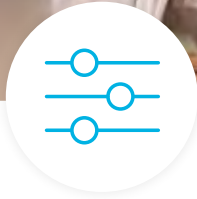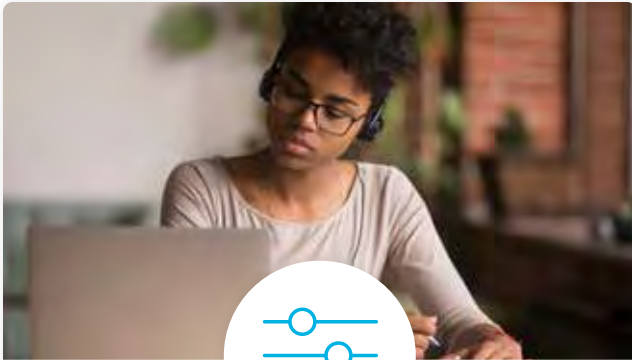
Pre-Assessments

Our in-depth workforce assessments identify your team's current level of knowledge in key areas. Results are used to generate custom learning paths designed to equip your workforce with the most applicable skill sets.
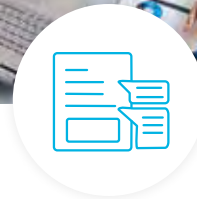
Dashboard & Progress Reports

Our interactive dashboard (enterprise management console) allows administrators to manage employee onboarding, track course progress, perform bulk enrollments and more.

Industry Validation & Reviews

Learners' progress and subject knowledge is tested and validated by industry experts and leaders from our advisory board. These in-depth reviews ensure your teams have achieved competency.

Real World Hands-on Projects

Through a series of rigorous, real-world projects, your employees learn and apply new techniques, analyze results, and produce actionable insights. Project portfolios demonstrate learners' growing proficiency and subject mastery.

Our Review Process

Real-life Reviewers for Real-life Projects

Real-world projects are at the core of our Nanodegree programs because hands-on learning is the best way to master a new skill. Receiving relevant feedback from an industry expert is a critical part of that learning process, and infinitely more useful than that from peers or automated grading systems. Udacity has a network of over 900 experienced project reviewers who provide personalized and timely feedback to help all learners succeed.

Vaibhav
UDACITY LEARNER

"I never felt overwhelmed while pursuing the Nanodegree program due to the valuable support of the reviewers, and now I am more confident in converting my ideas to reality."

now at

CODING VISIONS INFOTECH

All learners benefit from:

Line-by-line feedback for coding projects	Industry tips and best practices	Advice on additional resources to research	Unlimited submissions and feedback loops

How it Works
Real-world projects are integrated within the classroom experience, making for a seamless review process flow.

- Go through the lessons and work on the projects that follow
- Get help from your technical mentor, if needed
- Submit your project work
- Receive personalized feedback from the reviewer
- If the submission is not satisfactory, resubmit your project
- Continue submitting and receiving feedback from the reviewer until you successfully complete your project

About our Project Reviewers

Our expert project reviewers are evaluated against the highest standards and graded based on learners' progress. Here's how they measure up to ensure your success.

900+	1.8M	3	4.85 /5
Expert Project Reviewers	**Projects Reviewed**	**Hours Average Turnaround**	**Average Reviewer Rating**
Are hand-picked to provide detailed feedback on your project submissions.	Our reviewers have extensive experience in guiding learners through their course projects.	You can resubmit your project on the same day for additional feedback.	Our learners love the quality of the feedback they receive from our experienced reviewers.

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