UDACITY

NANODEGREE PROGRAM SYLLABUS

Cloud Developer



Overview

Start by learning the fundamentals of cloud development and deployment with AWS. Then, build different apps leveraging microservices, Kubernetes clusters, and serverless application technology.

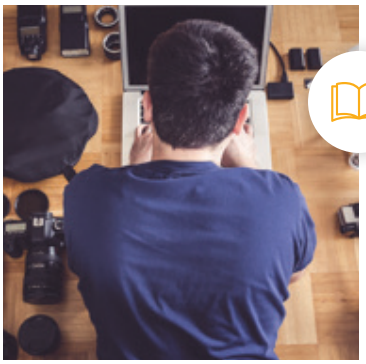
Cloud Developers design and develop secure cloud applications, services, and products. This can include everything from back-end, front-end, web application, full-stack, and cloud application deployment. You will develop cloud-native applications or migrate legacy applications to cloud. This role is a great fit for traditional software engineers and developers who want to build applications on cloud technologies.

In the program, you will:

- Build a static website using AWS
- Develop and deploy cloud-native full-stack applications on AWS
- Refactor monolithic apps to microservices, and scale using Kubernetes
- Develop and deploy a serverless application using AWS Lambda



Estimated Time: 4 Months at 10 hours / week



Prerequisites: Intermediate Javascript, Linux Command Line, HTML/CSS



Flexible Learning: Self-paced, so you can learn on the schedule that works best for you



Need Help?
udacity.com/advisor
Discuss this program with an enrollment advisor.

Course 1: Cloud Fundamentals

The cloud has become a key enabler for innovation with beneficial features like high availability, unlimited capacity, and on-demand scalability and elasticity. Learn the fundamentals of cloud computing while being introduced to compute power, security, storage, networking, messaging, and management services in the cloud. While learning the fundamentals, you will explore tools and services offered by Amazon Web Services (AWS) through interactive hands-on exercises. By the end of the course, you will have deployed your first website to AWS.

Course Project
Deploy Static Website on AWS

The cloud is perfect for hosting static websites that only include HTML, CSS, and JavaScript files that require no server-side processing. In this project, you will deploy a static website to AWS. First, you will create a S3 bucket, configure the bucket for website hosting, and secure it using IAM policies. Next, you will upload the website files to your bucket and speed up content delivery using AWS's content distribution network service, CloudFront. Lastly, you will access your website in a browser using the unique S3 endpoint.

	LEARNING OUTCOMES	
LESSON ONE	**Cloud Overview**	• Learn the basics of cloud computing including cloud deployment models, benefits, and popular options • Explore services provided by Amazon Web Services(AWS)
LESSON TWO	**Foundational and Compute Services**	• Learn why we need servers, compute power, and security • Explore AWS compute services like Elastic Cloud Compute (EC2), Virtual Private Cloud (VPC), Lambda for serverless framework, and Elastic Beanstalk in action • Launch a secure EC2 instance, create and execute a Lambda, and deploy an application to Elastic Beanstalk
LESSON THREE	**Storage and Content Delivery**	• Learn why we need storage and content delivery in the cloud • Learn storage services like S3, DynamoDB, Relational Database Service (RDS), and CloudFront • Create a DynamoDB table, launch a MySQL database instance, and create a CloudFront distribution

	LEARNING OUTCOMES	
LESSON FOUR	**Security**	• Learn the importance of security in the cloud • See Identity & Access Management (IAM) in action • Secure applications using IAM users, groups, and policies
LESSON FIVE	**Networking & Elasticity**	• Learn the basics of networking and elasticity in the cloud • Examine services like Route 53, EC2 Auto Scaling, and Elastic Load Balancing • Add an auto scaling policy to your EC2 instance
LESSON SIX	**Messaging & Containers**	• Learn the basics of messaging and containers in the cloud • Explore services like Simple Notification Service (SNS), Simple Queue Service (SQS), and Elastic Container Service (ECS) • Create cloud notifications using SNS
LESSON SEVEN	**AWS Management**	• Learn why we need logging, auditing, and resource management in the cloud • Understand services like Cloud Watch, Cloud Trail, Cloud Formation, and the AWS Command Line Interface (CLI) • Explore the CLI





Course 2: Full Stack Apps on AWS

Explore the foundational concepts of designing and deploying scalable, extendable, and maintainable full stack applications using modern cloud architecture. All concepts are covered at a fundamental level and motivated with practical, real world programming exercises. Through the course, you'll have built and deployed a multi-service cloud stack. By the end of this course, you'll understand key design decisions and useful tools to maintain your application.

Course Project
Udagram: Your Own Instagram on AWS

In this project, you will develop a cloud-based application for uploading, listing, and filtering images. You will use Node.js Express, a popular javascript framework for networked application development to develop this application. You will implement a REST API to issue commands using HTTP, store data in Amazon Web Services Relational Data Service (RDS) and S3, extend the codebase with secure authentication signon features, and deploy to Amazon Web Services Elastic Beanstalk. These are the hard skills you'll need in any Cloud developer role.

	LEARNING OUTCOMES	
LESSON ONE	**Cloud Basics**	• Learn key terminology and building blocks of a cloud system • Understand design paradigm of modern cloud applications
LESSON TWO	**Set Up Best Practices**	• Implement a process so you write quality code, working alone or on teams. • Learn unit and integration testing, a better way to git, and how to use packaged dependencies.
LESSON THREE	**Storing Data in the Cloud**	• Set up and start using a cloud-based relational database for storing user data using AWS RDS • Implement a filestore for media like images using AWS S3

	LEARNING OUTCOMES	
LESSON FOUR	**Deploying to the Cloud**	• Consume cloud data services (database and filestore) within your server application • Deploy your application using AWS Elastic Beanstalk.
LESSON FIVE	**User Authentication and Security**	• Learn common mistakes and modern techniques for dealing with security and new set of cloud authentication challenges
LESSON SIX	**Scaling and Fixing**	• Cloud systems need to be maintained as dependencies are updated and there is more demand for your service. Explore tools and process to minimize growing pains





Course 3: Monolith to Microservices at Scale

Microservices are becoming the default mode of developing and deploying applications at scale. The microservices architecture makes it easier to scale an application to a large system and is a great enabler for continuous integration and delivery. Microservices architecture allows independent scaling, independent releases and deployments and independent development so that each service has its own codebase. In this course we will cover the best practices on how to develop and deploy microservices. You will learn topics such as different microservice architecture patterns, independent scaling, resiliency, securing microservices, and best practices for monitoring and logging. By the end of this course, you should be able to design and build an application using a microservice architecture.

Course Project
Refactor Monolith to Microservices and Deploy

In this project, you will take an existing application named Udagram and refactor it into a microservice architecture with lean services. You will build out a CI/CD process that automatically builds and deploys Docker images to a Kubernetes cluster. The Kubernetes cluster will be configured to help solve common challenges related to scale and security.

	LEARNING OUTCOMES	
LESSON ONE	**Microservices Design Principles and Best Practices**	• Learn different microservices architecture designs and how to divide an application into microservices
LESSON TWO	**Containers Using Docker**	• Build and run your first container image using Docker • Debug container and store these images using container registry
LESSON THREE	**Automating the Application Development Lifecycle**	• Understand CI/CD benefits and use Travis to build CI/CD pipeline • Integrate github and CI/CD and automate testing with CI

	LEARNING OUTCOMES	
LESSON FOUR	**Orchestration with Kubernetes**	• Learn the fundamentals of Kubernetes • Configure and launch an auto-scaling, self-healing Kubernetes cluster • Deploy your microservices using Kubernetes cluster
LESSON FIVE	**Best Practices and Design Patterns for Kubernetes in Production**	• Implement service registration and discovery • Configure scaling and self-healing • Secure microservices • Implement monitoring and logging for microservices deployment • Improve resilience and availability into cloud applications







Course 4: Develop & Deploy Serverless App

Serverless technologies have become very popular recently because they can increase the speed of development and drastically reduce the cost of running a cloud infrastructure. This course combines the theory of using serverless technologies with the practice of developing a complex serverless application. You will learn advanced serverless features such as implementing WebSockets and stream processing, and learn about serverless best practices throughout the course.

Course Project
Serverless Application

In this project you will develop an Instagram-like serverless service for uploading, listing, and filtering images. You will begin with building serverless REST APIs using API Gateway and AWS Lambda, a stack of serverless technologies on AWS. You will then implement an API to interact with this application, store data in AWS DynamoDB, S3, and Elasticsearch, secure your application with authentication, and deploy to Amazon Web Services using a Serverless framework.

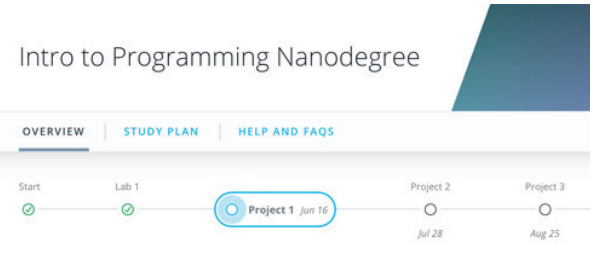
Course Project
Capstone Project

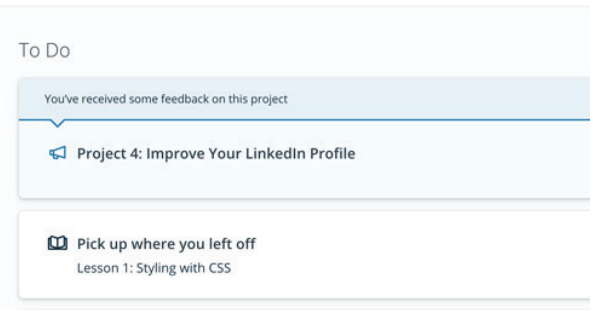
The purpose of the cloud development capstone project is to give you a chance to combine what you've learned throughout the program. This project will be an important part of your portfolio that will help you achieve your cloud development-related career goals. In the capstone project, each project is unique to the student. You'll build an application on AWS based on predefined criteria. Students will define the scope of the project, come up feature list and decide which AWS services to use to meet availability and performance criteria.

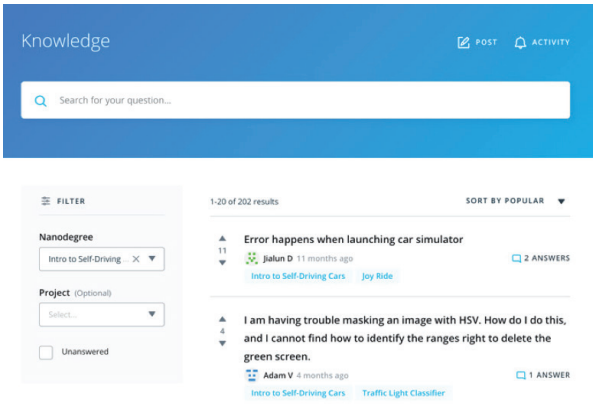
	LEARNING OUTCOMES	
LESSON ONE	**Introduction to Serverless**	• Learn the main components of a serverless application • Implement simple application using Function as a Service (FaaS)
LESSON TWO	**REST APIs for Serverless**	• Build a simple REST API using serverless technologies such as API Gateway, AWS Lambda, and AWS DynamoDB and use it in React based web application

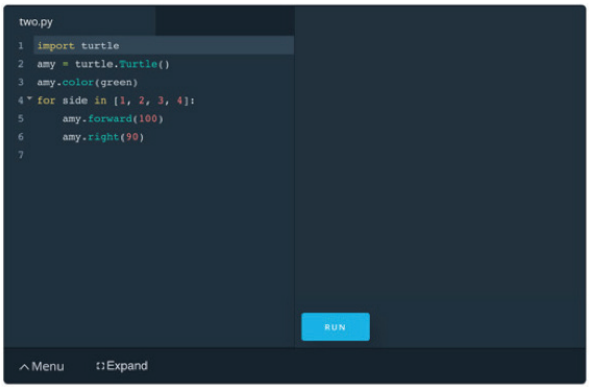
LESSON THREE	**Serverless Framework**	• Build, package and deploy serverless applications using Serverless framework • Implement additional features using advanced DynamoDB features
LESSON FOUR	**Events Processing with Serverless**	• Improve our application using FaaS ability to execute custom logic when particular events occur in the system • Add WebSockets support and full-text search to your app
LESSON FIVE	**Implementing Authentication**	• Implement authentication in a serverless application using popular serverless service Auth0 in your app API and client application. • Learn to store secrets for our serverless application using AWS Secrets Manager
LESSON SIX	**Serverless Best Practices**	• Learn how to test serverless applications, minimize risk of vendor lock-in, create multiple stages of our API and improve security and observability of our application
LESSON SEVEN	**Serverless GraphQL**	• Implement Udagram application using another serverless component called AWS AppSync that allows to easily create GraphQL API for cloud resources without writing much backend code.

Our Classroom Experience









REAL-WORLD PROJECTS

Build your skills through industry-relevant projects. Get personalized feedback from our network of 900+ project reviewers. Our simple interface makes it easy to submit your projects as often as you need and receive unlimited feedback on your work.

KNOWLEDGE

Find answers to your questions with Knowledge, our proprietary wiki. Search questions asked by other students, connect with technical mentors, and discover in real-time how to solve the challenges that you encounter.

STUDENT HUB

Leverage the power of community through a simple, yet powerful chat interface built within the classroom. Use Student Hub to connect with your fellow students in your Executive Program.

WORKSPACES

See your code in action. Check the output and quality of your code by running them on workspaces that are a part of our classroom.

QUIZZES

Check your understanding of concepts learned in the program by answering simple and auto-graded quizzes. Easily go back to the lessons to brush up on concepts anytime you get an answer wrong.

CUSTOM STUDY PLANS

Preschedule your study times and save them to your personal calendar to create a custom study plan. Program regular reminders to keep track of your progress toward your goals and completion of your program.

PROGRESS TRACKER

Stay on track to complete your Nanodegree program with useful milestone reminders.

Learn with the Best



Kesha Williams

INSTRUCTOR

Kesha has over 20 years experience in software development and is a software engineering manager at Chick-fil-A, routinely leading innovation teams in proving out the use of cloud services to solve complex business problems. She was recently named an Alexa Champion by Amazon.



Gabriel Ruttner

INSTRUCTOR

Gabe is the CTO at Ursa & Tech Advisor for Start-Ups. Gabe has expertise in building cloud-based machine learning and natural language processing services at early stage tech companies. He holds technical degrees from Cornell University and Stony Brook University.



Justin Lee

INSTRUCTOR

Justin is an engineer specializing in designing modern data platforms and scalable systems. He has been a consultant for Fortune 500 companies and has traveled the world to work with his clients. He provides mentorship and interviews developers through Codementor and has a BS in Computer Science from UCLA.



Ivan Mushketyk

INSTRUCTOR

Ivan formerly worked at Amazon Web Services (AWS), where he built features for cloud services such as CloudWatch, and his professional experience includes cloud, networking and blockchain. Ivan is also a prolific Open Source contributor, blogger, and online instructor.

All Our Nanodegree Programs Include:



EXPERIENCED PROJECT REVIEWERS

REVIEWER SERVICES

- Personalized feedback & line by line code reviews
- 1600+ Reviewers with a 4.85/5 average rating
- 3 hour average project review turnaround time
- Unlimited submissions and feedback loops
- Practical tips and industry best practices
- Additional suggested resources to improve

TECHNICAL MENTOR SUPPORT

MENTORSHIP SERVICES

- Questions answered quickly by our team of technical mentors
- 1000+ Mentors with a 4.7/5 average rating
- Support for all your technical questions

PERSONAL CAREER SERVICES

CAREER COACHING

- Personal assistance in your job search
- Monthly 1-on-1 calls
- Personalized feedback and career guidance
- Interview preparation
- Resume services
- Github portfolio review
- LinkedIn profile optimization

Frequently Asked Questions

PROGRAM OVERVIEW



WHY SHOULD I ENROLL?

The cloud developer field is expected to continue growing rapidly over the next several years, and there's huge demand for cloud developers across industries.

Udacity has collaborated with industry professionals to offer a world-class learning experience so you can advance your software development career. You will get hands-on experience building and deploying full stack apps, converting monolith to microservices and developing serverless app on the cloud, and more. Udacity provides high-quality support as you master in-demand skills that will qualify you for high-value jobs in cloud computing field and help you land a job you love.

By the end of the Nanodegree program, you will have an impressive portfolio of real-world projects and valuable hands-on experience.

WHAT JOBS WILL THIS PROGRAM PREPARE ME FOR?

This program is designed to prepare students to become Cloud Developers. This includes job titles such as cloud developer, full stack developer, cloud engineers, and others. Cloud development skills are also helpful for adjacent software engineering roles.

HOW DO I KNOW IF THIS PROGRAM IS RIGHT FOR ME?

This Nanodegree program offers an ideal path for experienced software/web developers to advance their career. If you enjoy building web applications and want to learn to learn how to build them on cloud, this is a great way to get hands-on practice with a variety of cloud computing principles and best practices.

The prerequisites for this program include proficiency in JavaScript and Web development (HTML, CSS). You should also be comfortable with linux basic commands and object-oriented programming concepts.

ENROLLMENT AND ADMISSION

DO I NEED TO APPLY? WHAT ARE THE ADMISSION CRITERIA?

There is no application. This Nanodegree program accepts everyone, regardless of experience and specific background.

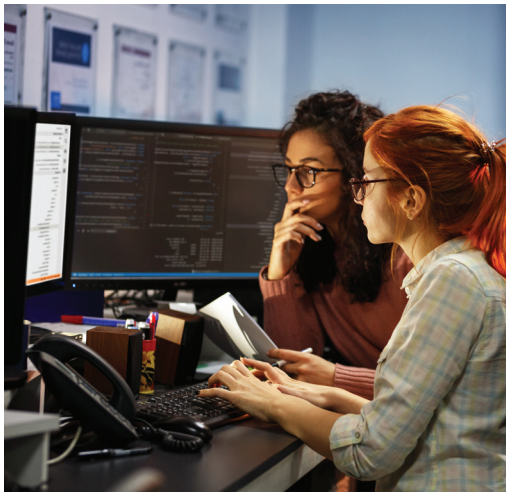
WHAT ARE THE PREREQUISITES FOR ENROLLMENT?

To optimize your success in this program, we've created a list of prerequisites and recommendations to help you prepare for the curriculum. To enroll, you should have experience in the following:

FAQs Continued

- Intermediate programming skills in Javascript

You should also have some familiarity with:
- Web development (HTML, CSS)
- Object Oriented Programming
- Linux Command Line Basics



IF I DO NOT MEET THE REQUIREMENTS TO ENROLL, WHAT SHOULD I DO?

If you believe you need more preparation, here are some additional resources you can use:
- Intro to Computer Science
- Linux Command Line Basics
- Intro to Programming Nanodegree program
- Front End Web Developer Nanodegree

TUITION AND TERM OF PROGRAM

HOW IS THIS NANODEGREE PROGRAM STRUCTURED?

The Cloud Developer Nanodegree program is comprised of content and curriculum to support 5 (five) projects. We estimate that students can complete the program in four (4) months working 10 hours per week.

Each project will be reviewed by the Udacity reviewer network. Feedback will be provided and if you do not pass the project, you will be asked to resubmit the project until it passes.

HOW LONG IS THIS NANODEGREE PROGRAM?

Access to this Nanodegree program runs for the length of time specified in the payment card above. If you do not graduate within that time period, you will continue learning with month to month payments. See the **Terms of Use** and **FAQs** for other policies regarding the terms of access to our Nanodegree programs.

CAN I SWITCH MY START DATE? CAN I GET A REFUND?

Please see the Udacity Nanodegree program **FAQs** for policies on enrollment in our programs.

SOFTWARE AND HARDWARE

WHAT SOFTWARE AND VERSIONS WILL I NEED IN THIS PROGRAM?

For this Nanodegree program, you will need a desktop or laptop 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.