IT 0175 - AWS CLOUD ARCHITECTING

Catalog Description

Prerequisite: Completion of IT 105 and IT 170 with grades of "C" or better
Hours: 72 (54 lecture, 18 laboratory)
Description: Covers the fundamentals of building IT infrastructure on Amazon Web Services (AWS). The course is designed to teach solutions architects how to optimize their use of the AWS Cloud by understanding AWS services and how they fit into cloud-based solutions. Although architectural solutions can differ depending on the industry, type of application, and size of the business, this course emphasizes best practices for the AWS Cloud that apply to all of them. It also recommends various design patterns to help you think through the process of architecting optimal IT solutions on AWS. Throughout the course, students will explore case studies that showcase how some AWS customers have designed their infrastructures and the strategies and services that they have implemented. Finally, this course provides opportunities for students to build a variety of infrastructures through a guided, hands-on approach. (CSU)

Course Student Learning Outcomes

- CSLO #1: Research, analyze and evaluate information to solve business problems using appropriate cloud architecture technology.
- CSLO #2: Design and produce cloud architecture technology solutions incorporating current trends, security, and best practices.
- CSLO #3: Effectively employ cloud architecture technology concepts and terminology in professional communication.
- CSLO #4: Demonstrate marketable cloud architecture technology career skills.

Effective Term

Fall 2023

Course Type

Credit - Degree-applicable

Contact Hours

72

Outside of Class Hours

90

Total Student Learning Hours

162

Course Objectives

Upon completion of this course, students will be able to:
Lecture:
1. Describe how cloud adoption transforms the way IT systems work
2. Describe the benefits of cloud computing with Amazon Web Services
3. Discuss how to design systems that are secure, reliable, high-performing, and cost efficient
4. Describe principles to consider when migrating or designing new applications for the cloud
5. Identify the design patterns and architectural options applied in a variety of use cases
6. Define high availability, fault tolerance, and scalability
7. Discuss how to avoid single points of failure
8. Describe why load balancing is a key architectural component for AWS-powered applications
9. Describe how to leverage the capabilities of AWS to support automation
10. Articulate the importance of making systems highly cohesive and loosely coupled
11. Describe system coupling to support the distributed nature of applications built for the cloud
12. Describe database services for storing and deploying web-accessible applications
13. Describe how the AWS Well-Architected Framework improves cloud-based architectures
14. Describe the business impact of design decisions
15. Describe how to secure data at every layer in the application
16. Describe the appropriate tools and services to provide security-focused content
17. Describe the design principles and best practices of the Reliability pillar.
Lab:
1. Create, manage, provision, and update related resources using AWS CloudFormation
2. Select compute, storage, database, and networking resources to improve performance
3. Choose AWS services that have built-in fault tolerance or can be designed for fault tolerance
4. Compare structured query language (SQL) databases with NoSQL databases
5. Evaluate the most important performance metrics for your applications
6. Follow best practices to eliminate unneeded costs or sub-optimal resources
7. Troubleshoot common errors
8. Identify the design principles and best practices of the Operational Excellence pillar
9. Demonstrate the benefits of Infrastructure as Code

General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

- CSU Transferable

Methods of Evaluation

- Classroom Discussions
  - Example: Students will be placed in groups to discuss the topics just reviewed. Then as a whole, the class will discuss best practices and clarify any outstanding questions. The instructor will verify the accuracy and completeness of the discussion and add clarifications. A grade for participation may be assigned. Example: In class, students will discuss with their groups the industry best practices for Identity and Access Management

(User Access/Security). Then as a whole, the class will come together to share conclusions and outstanding questions.

- Objective Examinations
  - Example: Students will be given a knowledge check quiz at the end of each section/module containing multiple choice questions. They will also take a practice certification test. Grading will be based on percentage of correct answers and used to measure the level of understanding of the topics covered. Example question: True or false? Unlimited services are available via the free tier to new AWS customers for 12 months following their AWS sign-up date. Answer: False
- Skill Demonstrations
  - Example: Students will complete hands-on lab activities using instructions provided through an online lab environment and will be graded based on accuracy and completion of assigned tasks. Example: In Lab 1: Introduction to Amazon Elastic Computer Cloud (EC2), students will use the AWS Console to launch a web server with termination protection enabled, monitor their EC2 instance, modify the security group that their web server is using to allow Hypertext-Transfer-Protocol (HTTP) access, resize their EC2 instance to scale, explore EC2 limits, test the termination protection, and terminate their EC2 instance.

Repeatable

No

Methods of Instruction

- Laboratory
- Lecture/Discussion
- Distance Learning

Lab:

1. Students will use the online lab environment portal to get hands-on experience in the Amazon Console using the step-by-step instructions for working with the AWS CloudFormation tool. The instructor will help as needed, clarify concepts, and verify completion of the task. (Lab Objective 12)

Lecture:

1. Instructor will utilize the lecture materials provided by Amazon to give a lecture describing the various architecture options such as fully cloud based, on premious and mixed. Students will listen and engage in discussion with their peers regarding the advantages and disadvantages of each. (Lecture Objective 5)

Distance Learning

1. During an online lecture, faculty will review how to manage and control costs related to deploying AWS in a business environment. Students are required to review cost associated with deploying servers/system in the cloud on an ongoing basis. (Lab Objective 6)

Typical Out of Class Assignments
Reading Assignments

Examples: 1. Review the assigned AWS whitepaper on AWS Virtual Private Cloud (VPC) Connectivity Options and be prepared to discuss in class. 2. Watch/Read the slides with audio provided by Amazon for

Module 4 - Designing for High Availability II and be prepared to take the Knowledge Check Quiz.

Writing, Problem Solving or Performance

1. Using the AWS Console and instructions provided through an online lab environment, students will create a multi subnet Virtual Private Cloud (VPC). Afterwards they will be prepared to discuss and help fellow classmates. 2. Using the AWS Console and instructions provided through an online lab environment, students will get hands-on experience with how to control High Availability Across Regions. Afterwards they will be prepared to discuss security and user access best practices.

Other (Term projects, research papers, portfolios, etc.)

Computer based projects to demonstrate students' ability to apply skill sets from written instructions.

Required Materials
Other materials and-or supplies required of students that contribute to the cost of the course.

Online content - AWS