CSYE 7220 Deployment and Operation of Software Applications

Course Information
Course Title: DevOps
Course Number: CSYE 7220
Term and Year: Summer 1 2024
Credit Hour: 4
Course Format: On-Ground

Instructor Information
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Course Prerequisites
Graduate Level CSYE 6220 Minimum Grade of B- or Graduate Level INFO 6250 Minimum Grade of B-

Course Description
This class is an introduction on how to set up and operate software assembly lines on Public Clouds in the fashion of a "Ford Model T" assembly line. This class introduces you to the basic operations, methodologies, and principles of *enterprise* software development, where developers and system administrators skillsets merge to manage both software *development* and software *operations*.

You will learn how companies like Uber and Netflix engineer enterprise applications as *microservice*s, the basic unit of modern enterprise software, and the fundamentals of *Public Clouds*, all of which are often part of job interview questions.

In the same way that languages like Java, C#, and Python power app development, languages like *Terraform*, *Chef*, and *Ansible* provision apps on Public Clouds and speed up IT (we are going to use Terraform in class).

If application *development* is about building an aircraft, *operations* is the aircraft carrier that launches them into service. We will be using *AWS + Azure* as our Aircraft Carriers, with *GitHub* Continuous integration and Continuous Delivery (*CI/CD*) pipelines for deployment and *Prometheus* pods for monitoring.

Optimizing software so that it can run on the Cloud implies leveraging the parallel power of the Cloud. There is another Aircraft Carrier called a *Virtual Machine*, allowing you to host your app in a *Container* and launch it either locally on your laptop or directly on the Cloud. You will learn how to containerize a Web app written in C#, java, python, or Node with *Docker* and deploy it and scale it as a microservice. You will learn how to deploy a fleet of Containers as app-hosting *pods* and how to to scale them with *Kubernetes* middleware.

Learning Outcomes

Learning outcomes common to all College of Engineering Graduate programs:
1. *An ability to identify, formulate, and solve complex engineering problems.*
2. *An ability to explain and apply engineering design principles, as appropriate to the program's educational objectives.*
3. *An ability to produce solutions that meet specified end-user needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors.*

The Information Systems Program accepts students of different engineering backgrounds with minimum programming skills and produces first class Information Systems engineers that operate at the intersection of real-world complexity, software development, and IT management. Graduating students will be able to construct end-to-end advanced software applications that meet business needs.

Specific Learning Outcomes for the class:

This class in *hands-on* with in-class and homework labs and students working in groups, implementing microservices architectures as application developers and putting them in production as Cloud System administrators on AWS VMs, AWS ECS/EKS services, Azure VMs, and Azure AKS services, using GitHub CI/CD, and Terraform, Docker, Kubernetes, and Prometheus.

Textbook

None

Attendance Policy

Students are expected to complete course readings, participate in class discussions or other learning activities during the unit, and complete written assignments for each unit during the time of that unit.

Late Work Policy

Students must submit assignments by the deadline in the time zone noted in the syllabus.
Students must communicate with TAs and faculty prior to the deadline if they anticipate work will be submitted late. Work submitted late without prior communication will loose points in proportion to how late it is submitted.

Grading/Evaluation Standards

30% Homework, 30% Midterm, 30% Final Project, 10% helping other students.

Course Schedule

- Module 1: DevOps principles and introduction to AWS and Azure
- Module 2: Web archtectures and implementations in Node, C#, Java, and Python
- Module 3: DevOps with AWS and Azure Common Language Infrastructure
- Module 4: Publiv Cloud deployment with Terraform
- Module 5: Microservice architectures and Docker

- Module 6: Deployment and scalability with Kubernetes
- Module 7: Continuous Integration and Continuous Deployment (CI/CD) with AWS Elastic Container Service (ECS)
- Module 8: Kubernetes clusters on AWS and Azure
- Module 9: Monitoring and telemetry with Prometheus, Grafana, and Consul
- Module 10: Special Topics

End-of-Course Evaluation Surveys

Your feedback regarding your educational experience in this class is very important to the College of Professional Studies. Your comments will make a difference in the future planning and presentation of our curriculum.

At the end of this course, please take the time to complete the evaluation survey at **https://neu.evaluationkit.com**. Your survey responses are **completely anonymous and confidential**. For courses 6 weeks in length or shorter, surveys will be open one week prior to the end of the courses; for courses greater than 6 weeks in length, surveys will be open for two weeks. An email will be sent to your HuskyMail account notifying you when surveys are available.

Academic Integrity

A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship ensures that students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire University.

As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields. Northeastern University expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind according to the highest ethical standards, as set forth either explicitly or implicitly in this Code or by the direction of instructors.

Go to http://www.northeastern.edu/osccr/academic-integrity-policy/ to access the full academic integrity policy.

Student Accommodations

Northeastern University and the Disability Resource Center (DRC) are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act (ADAAA) to participate fully in the activities of the university. To receive accommodations through the DRC, students must provide appropriate documentation that demonstrates a current substantially limiting disability.

For more information, visit http://www.northeastern.edu/drc/getting-started-with-the-drc/.

Library Services

The Northeastern University Library is at the hub of campus intellectual life. Resources include over 900,000 print volumes, 206,500 e-books, and 70,225 electronic journals.

For more information and for Education specific resources, visit http://subjectguides.lib.neu.edu/edresearch.

24/7 Blackboard Technical Help
For immediate technical support for Blackboard, call 617-373-4357 or emailhelp@northeastern.edu

Within Blackboard, open a support case via the red support button on the right side of the screen, click Create Case

myNortheastern, e-mail, and basic technical support
Visit the Information Technology Services (ITS) Support Portal
Email: help@northeastern.edu
ITS Customer Service Desk: 617-373-4357

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Please visit http://www.northeastern.edu/oidi/ for complete information on Diversity and Inclusion

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