New York University
Computer Science Department
Courant Institute of Mathematical Sciences

Course Title: Cloud Computing
Instructor: Jean-Claude Franchitti
Course Number: csci-ga.3033-026
Session: 3

Assignment #3

I. Due

March 3, 2022 at the beginning of class.

II. Objectives

1. Understand how to leverage IoT Edge platform services on the Cloud in a Fog and Edge application development context.
2. Learn how to Create an IoT Hub, register an IoT Edge device to your IoT hub, install and start the IoT Edge runtime on your device, and remotely deploy a module to an IoT Edge device and send telemetry to IoT Hub.
3. Learn how to turn your smart phone into an IoT device.

III. References

1. Slides and handouts posted on the course Web site
2. Relevant course textbook sections
3. Microsoft Azure IoT (https://docs.microsoft.com/en-us/azure/iot-fundamentals/)
4. IoT Material on other Big Clouds websites
5. Cloud Computing – IoT Use Case
6. AWS Tutorial on Deploying Cloud IoT Application
7. RabbittMQ and Mosquitto brokers documentation

IV. Software Required

1. Microsoft Word.
2. Win Zip as necessary.

V. Assignment

Part 1: How to Enable Compute VNFs and 5G with Azure

Read articles 1 and 2 mentioned in slide #3-136 of the Session 3 presentation (i.e., Assignments & Readings slide); also refer to the video mentioned in slide #3-14 of the Session 3 presentation (i.e., Introduction to MEC slide) that

explains how to enable compute VNFs and 5G with Azure. Write a short summary paper based on the articles (and video) to explain how networking and 5G enable the next generation of cloud-connected fog and edge solutions; give examples of fog and edge solutions.

Part 2: Deploy an IoT Edge Module using Microsoft Azure IoT capabilities

a. Implement and document the following tutorials (on either Linux or Windows)

https://docs.microsoft.com/en-us/azure/iot-edge/quickstart-linux

https://docs.microsoft.com/en-us/azure/iot-edge/quickstart

b. Implement similar functionality using AWS, GCP, and IBM Cloud IoT capabilities.

c. Implement similar functionality using Mosquitto or RabbitMQ

Part 3: Turn your smart phone into an IoT device

Implement and document a solution based on the following tutorials:

https://docs.microsoft.com/en-us/samples/azure-samples/azure-iot-samples-ios/azure-iot-samples-for-ios-platform/

https://developer.ibm.com/tutorials/iot-mobile-phone-iot-device-bluemix-apps-trs/

Part 4: Extra Credit

Complete the list of IoT Edge tutorials that follow the link labeled as:

https://docs.microsoft.com/en-us/azure/iot-edge/quickstart

(in particular the “end-to-end example of machine learning at the edge”)

VI. Deliverables

1. Electronic:

Your assignment file must submitted via NYU Brightspace. The file must be created and sent by the beginning of class. After the class period, the homework is late. The email clock is the official clock.

2. Cover page and other formatting requirements:

The cover page supplied on the next page must be the first page of your assignment file.

Fill in the blank area for each field.

NOTE:

The sequence of the electronic submission is:

1. **Cover sheet**
2. **Assignment Answer Sheet(s)**

3. Grading guidelines:

Assignment Layout (15%)

- o Assignment is neatly assembled on 8 1/2 by 11 layout.
- o Cover page with your name (last name first followed by a comma then first name), username and section number with a signed statement of independent effort is included.
- o File name is correct.

Answers to Individual Questions (85%):

- o Answers to all questions in section V Part 1-4 above are complete and correct.
- o Assumptions provided as required.

(100 points total, all questions weighted equally)

VII. Sample Cover Sheet:

Name _____ Date: _____
(last name, first name)
Section: _____

Assignment 3

Total in points (100 points total): _____

Professor's Comments:

Affirmation of my Independent Effort: _____
(Sign here)