CS4440 Introduction to Operating Systems
Bonus Project: Develop and Deploy an Application in the Cloud

Objectives:

- Get an experience of using cloud service.
- Develop and deploy applications in the cloud.
- Evaluate the performance of the cloud application.

Problem Statement:

1. Choose a representative cloud platform (e.g., Amazon AWS, Microsoft Azure, Google Cloud, or IBM Cloud) that offer free account for students. Register and create an account.
2. Establish multiple instances in the cloud to run parallel programming applications.
3. Deploy and run an application in the above instances in the cloud. The application needs to be either a parallel programming application or a web service with interaction with local client. Application options include but are not limited to:
    a. Take a real application that you use in your research, classes, or for fun, convert it to parallel form using a cloud programming model, such as Hadoop or Spark, and get it to run on as many processors as possible. For example, you can convert the parallel file compression application in your Project 1 to run in the cloud.
    b. Deploy an application that uses MPI or OpenMP. Compare the application's performance (e.g., speedup) by using different numbers of processors.
    c. Build a distributed web service in the cloud. For example, you can develop a distributed web crawler system that uses multiple crawler processes to crawl a set of websites, and process/organize the data in a way that is easy to search.
    d. Build a scalable web service. Design a simple interactive web site that lets you upload stories and images, like a social networking site. Use Condor to evaluate how many requests per second that one little site can supply. Then, modify the site to use cloud services for scalability -- store your data in HBase or SimpleDB, and use load balancers to scale up the web servers. Show that you site can grow to handle hundreds or thousands of users at once.
    e. Develop and deploy a web service in the cloud, and interact with the client side running on your laptop. For example, you can deploy the secondary file system server from your Project 3 in the cloud, and interact with the server using the client running on your laptop.

Materials to be submitted:

1. Submit your code on CSNS.
2. Each team needs to demo their cloud application to get the grade.