M7024E Laboratory 2: Programming Cloud Services - Storage Services

Welcome to the second laboratory of the M7024E: Cloud Services course. In this course, we will use the application programming interfaces (APIs) provided by the Amazon Web services[1] to program Cloud services that require storage, such as the Amazon S3 blob storage service.

1 Objectives

The objective of this lab is to:

- Setup a programming environment for building (using programming tools and languages) Cloud services for a major Cloud provider, for example, Amazon Web services (AWS);
- Develop Cloud services for file storage, listing and retrieval using the APIs provided by the AWS.

2 Exercises

****You can choose a programming language of your choice****

Exercise a: In this exercise, you will learn how to setup the programming environment to create Cloud services using the APIs provided by AWS.

1. Go through the lecture on *"Programming Cloud Services"* and setup your credentials on your computer. You should have the credentials when an AWS account was created for you in lab 1.
2. Download the *AWS SDK for Java Developer Guide: Rel. 2.0*[2] .
3. Download the latest version of the Java SDK.
4. Download the latest version of Java IDE, for example Netbeans, IntelliJ or Eclipse.
5. Setup the AWS SDK for Java as described in the lecture. You might want to use Apache Maven that is usually a part of an Java IDE, for example, NetBeans.

[1] https://aws.amazon.com/. Retrieved: 14 Nov. 2022.
[2] https://docs.aws.amazon.com/sdk-for-java/v2/developer-guide/welcome.html[Online]. Accessed: 14 Nov. 2022.

6. Setup your Java project and the pom.xml file. See pg. 8 of the Java Developer Guide.

Exercise b: In this exercise, you will learn how to use the storage service provided by AWS.

1. Identify ways of creating the Amazon S3 service clients. Look at the lecture slides and the Java Developer Guide.

   (a) Explain in detail how the Amazon S3 service clients are created by providing details of the packages and classes involved. Create a diagram of the dependencies involved.

2. Create a Java program to *create a bucket* in *three regions* of your choice.

   (a) Explain in detail the steps involved, and explain the output.

3. Create a Java program that *lists your buckets* in the *region* of your choice.

4. Create a Java program to *upload objects* in your *newly created bucket.*

5. Create a Java program to delete *a particular objects* from your *newly created bucket.*

Exercise c: Create a Java program to upload and download objects (sizes 1MB, 10 MB, 100 MB and 500MB) from the three regions used in the above exercise. Measure the object upload and download latency from these regions. Plot and explain the results in your report. Think about statistical analysis and any assumptions made.

Optional Exercise d: This may lead you to higher marks and *may* put you in good books of your professor. Repeat Exercises a and b using the Apache jclouds API. [3]

[3] https://jclouds.apache.org/. Access date 14 Nov. 2022.