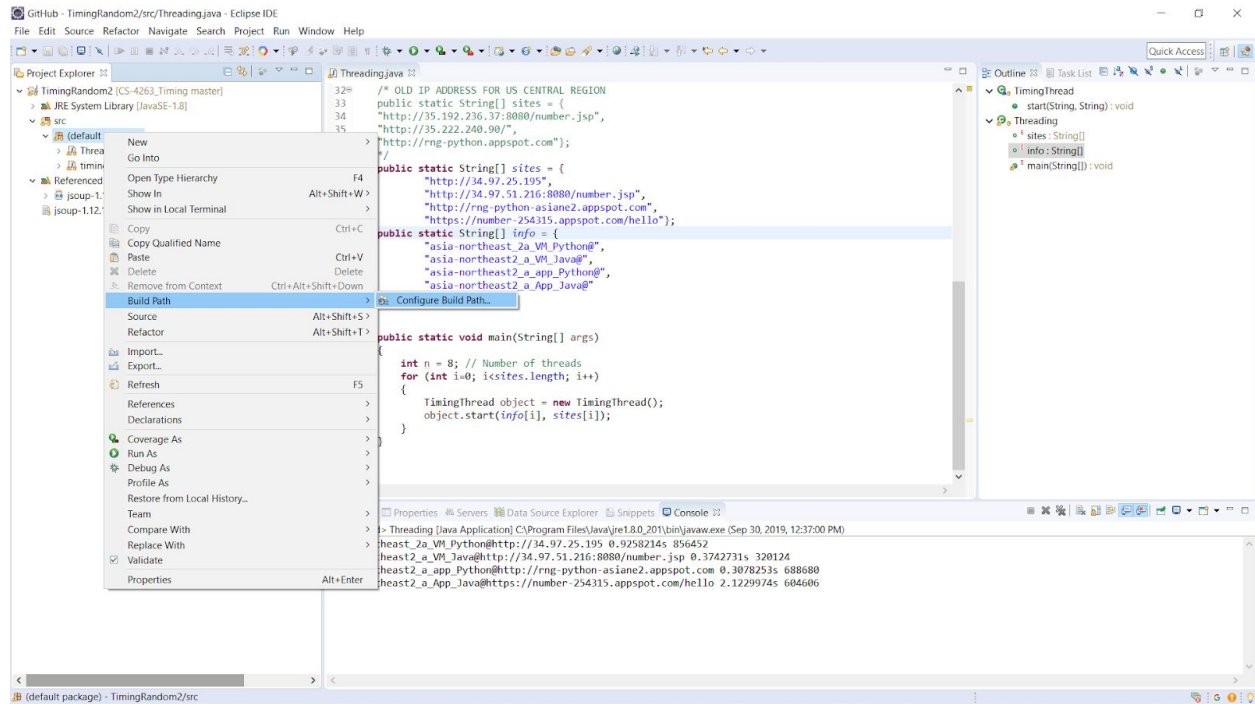


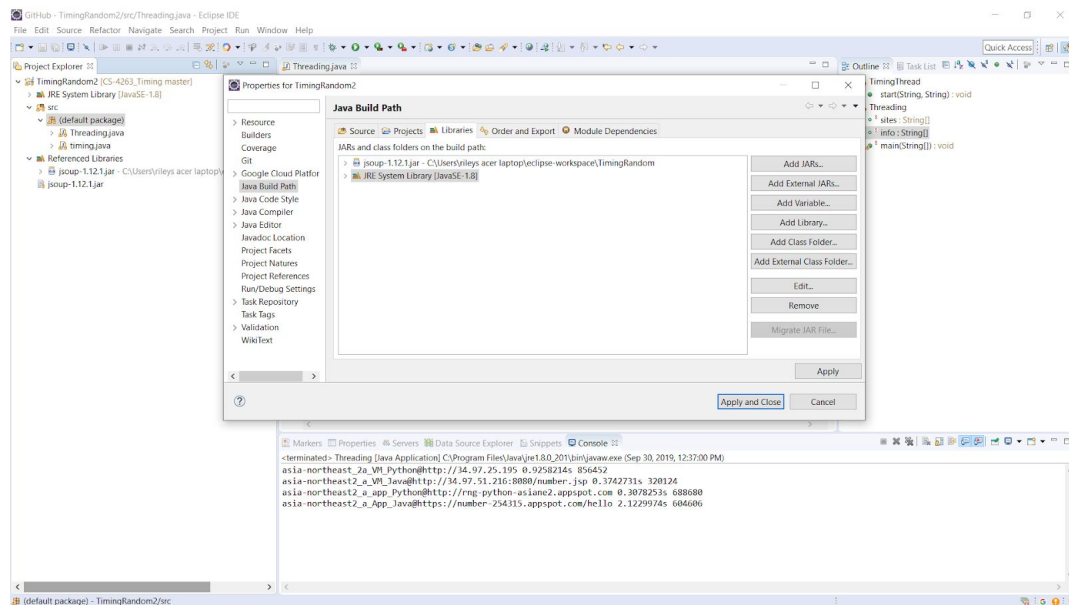
Github Link: [https://github.com/coolstones/CS-4263\\_Timing](https://github.com/coolstones/CS-4263_Timing)

## Installation Instructions:

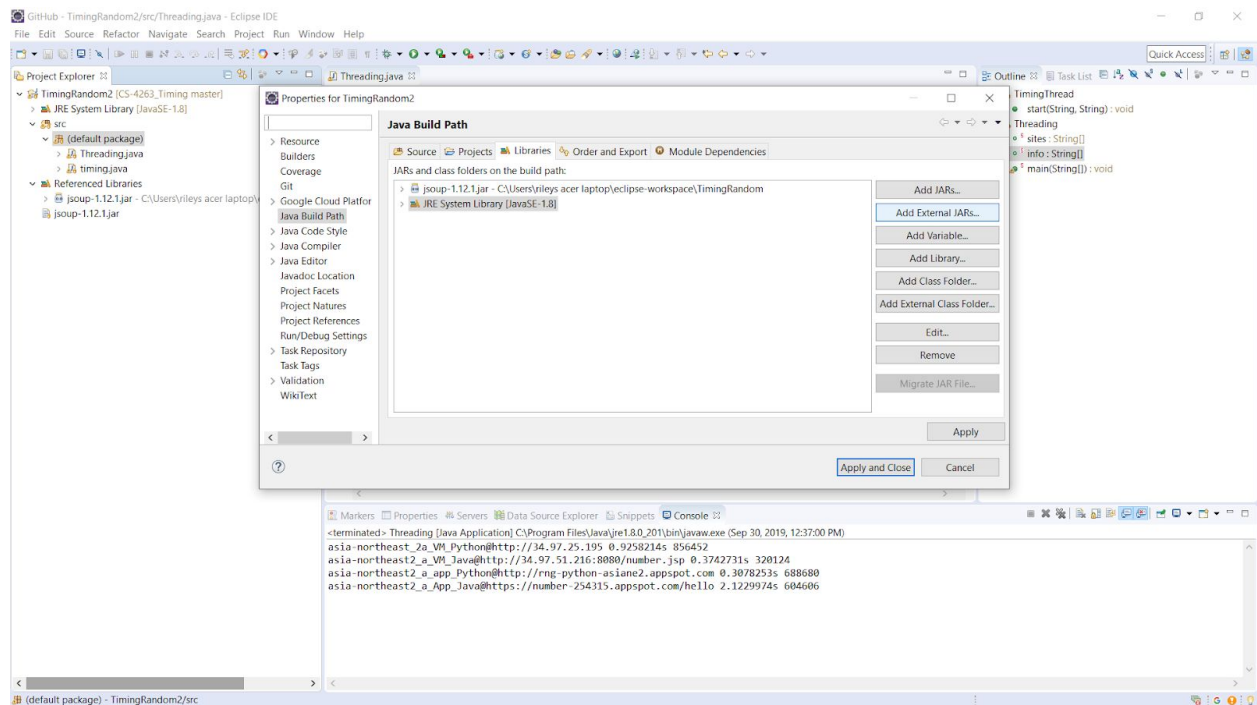
When your IDE first starts, right click the Default Package within the project and src folder. Navigate to Build Path and then click Configure Build Path.



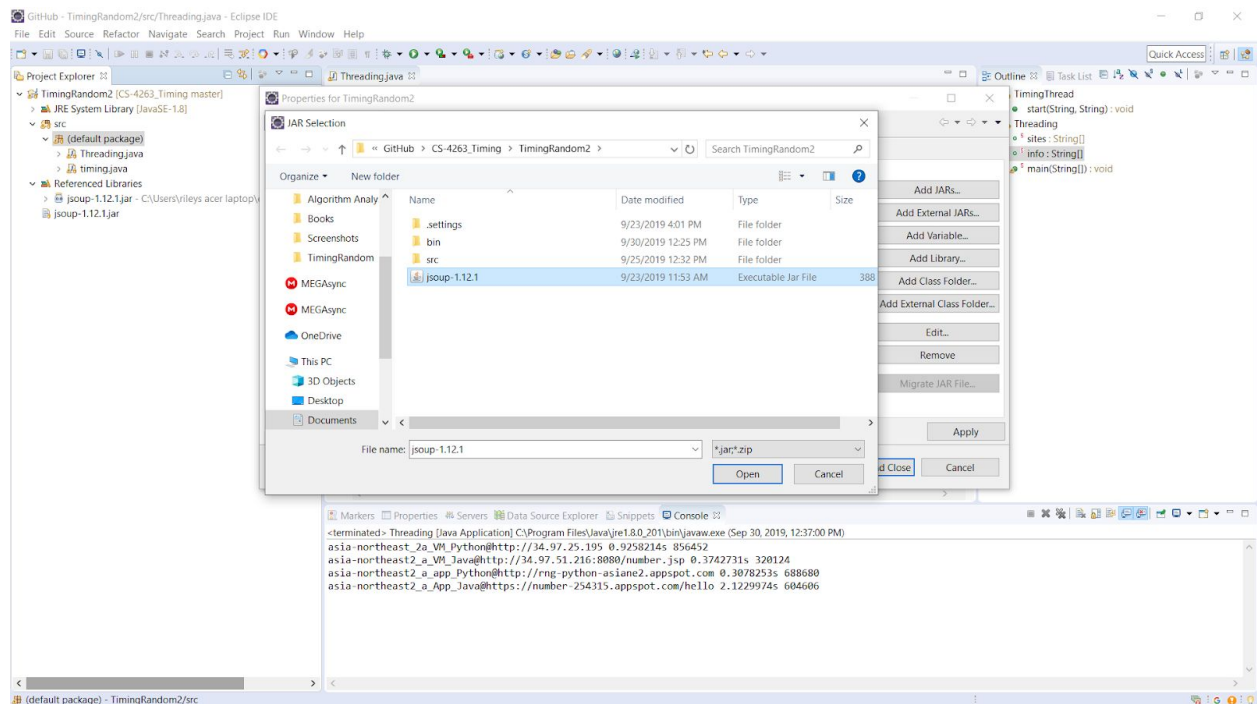
When the new window opens, click on the tab marked Libraries.



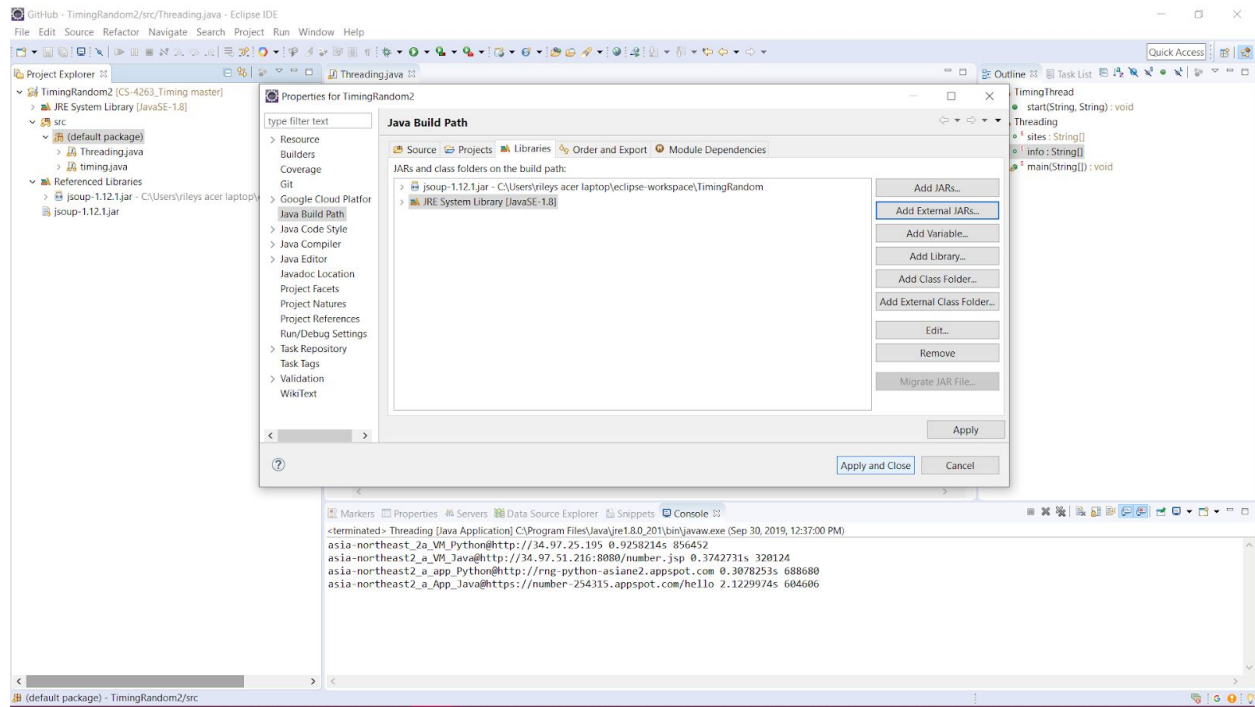
Then click Add External JARs.



When the file explorer opens click on jsoup-1.12.1. This file should be in the main project folder.

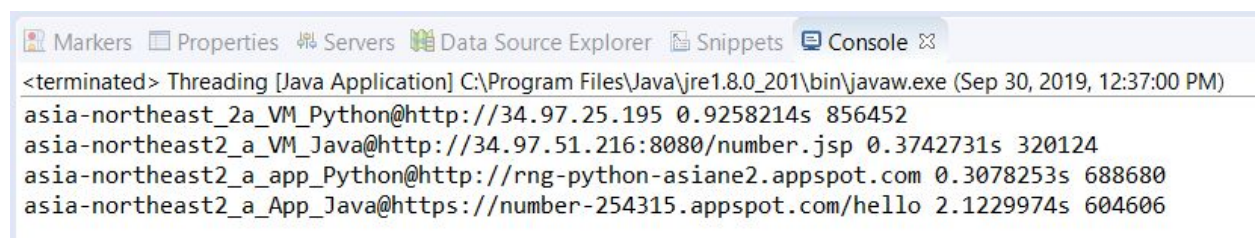


Once it is added to the list of libraries, then click Apply and Close. This should resolve the dependency-based errors with the program.



You can then change the IP Addresses and Site info by modifying the strings within the data arrays of “sites” and “info”

**Example output:**



This project required us to move our VM instances to a different region, Asia in this case.

A VM can be cloned by creating an image of the drive and following the normal creation page, changing the region, and the hard disk image.

We then had to start our web servers to be accessed externally. This is an example of us starting a tomcat server on our virtual machine. This allowed us to host file to be accessed simply by a link like this one: <http://34.97.51.216:8080/number.jsp>

Each server will have different output as it runs depending on the framework used, but they may look something like the following:

```
rileypate3797@pate-asiane: /usr/local/tomcat9/bin - Google Chrome
ssh.cloud.google.com/projects/elegant-beach-214716/zones/asia-northeast2-a/instances/pate-asiane?authuser=0&hl=en_US&projectN...
System load: 0.0      Processes: 95
Usage of /: 49.1% of 9.52GB  Users logged in: 0
Memory usage: 80%      IP address for ens4: 10.174.0.2
Swap usage: 0%

* Kata Containers are now fully integrated in Charmed Kubernetes 1.16!
Yes, charms take the Krazy out of K8s Kata Kluster Konstruktion.

https://ubuntu.com/kubernetes/docs/release-notes

Get cloud support with Ubuntu Advantage Cloud Guest:
http://www.ubuntu.com/business/services/cloud

* Canonical Livepatch is available for installation.
- Reduce system reboots and improve kernel security. Activate at:
https://ubuntu.com/livepatch

49 packages can be updated.
11 updates are security updates.

Last login: Wed Sep 25 17:37:01 2019 from 74.125.45.164
rileypate3797@pate-asiane:~$ cd ../../
rileypate3797@pate-asiane:/$ cd usr/local/tomcat9/
rileypate3797@pate-asiane:/usr/local/tomcat9$ dir
BUILDING.txt  J.jsp  NOTICE  RELEASE-NOTES  bin  lib  temp  work
CONTRIBUTING.md  LICENSE  README.md  RUNNING.txt  conf  logs  webapps
rileypate3797@pate-asiane:/usr/local/tomcat9$ cd bin
rileypate3797@pate-asiane:/usr/local/tomcat9/bin$ dir
bootstrap.jar  commons-daemon-native.tar.gz  digest.sh  shutdown.sh  tool-wrapper.sh
catalina-tasks.xml  commons-daemon.jar  makebase.bat  startup.bat  version.bat
catalina.bat  configtest.bat  makebase.sh  startup.sh  version.sh
catalina.sh  configtest.sh  setclasspath.bat  tomcat-juli.jar
ciphers.bat  daemon.sh  setclasspath.sh  tomcat-native.tar.gz
ciphers.sh  digest.bat  shutdown.bat  tool-wrapper.bat
rileypate3797@pate-asiane:/usr/local/tomcat9/bin$ ./startup.sh
Using CATALINA_BASE: /usr/local/tomcat9
Using CATALINA_HOME: /usr/local/tomcat9
Using CATALINA_TMPDIR: /usr/local/tomcat9/temp
Using JRE_HOME: /usr
Using CLASSPATH: /usr/local/tomcat9/bin/bootstrap.jar:/usr/local/tomcat9/bin/tomcat-juli.jar
Tomcat started.
rileypate3797@pate-asiane:/usr/local/tomcat9/bin$
```

The screenshot shows a web browser window with the address bar displaying `https://randn-254517.appspot.com/hello`. Below the browser, a terminal window titled "Google Cloud SDK Shell" is open. The terminal output shows the following:

```

Compute Engine API is enabled for your project on the
https://console.developers.google.com/apis page.

Your Google Cloud SDK is configured and ready to use!

* Commands that require authentication will use saptala05@gmail.com by default
* Commands will reference project 'number-254315' by default
Run 'gcloud help config' to learn how to change individual settings

This gcloud configuration is called [default]. You can create additional configurations if you work with multiple accounts and/or projects.
Run 'gcloud topic configurations' to learn more.

Some things to try next:

* Run 'gcloud --help' to see the Cloud Platform services you can interact with. And run 'gcloud help COMMAND' to get help on any gcloud command.
* Run 'gcloud topic --help' to learn about advanced features of the SDK like arg files and output formatting

C:\Users\user\AppData\Local\Google\Cloud SDK>gcloud app browse --project=number-254315
Opening [https://number-254315.appspot.com] in a new tab in your default browser.

C:\Users\user\AppData\Local\Google\Cloud SDK>gcloud app browse --project=randn-254517
Opening [https://randn-254517.appspot.com] in a new tab in your default browser.

C:\Users\user\AppData\Local\Google\Cloud SDK>gcloud app browse --project=randn-254517
Opening [https://randn-254517.appspot.com] in a new tab in your default browser.

C:\Users\user\AppData\Local\Google\Cloud SDK>

```

Step by step implementation of Java App Engine application

Before you start, you need to install Eclipse IDE for Java EE Developers

Step1: Go to GCP and create a new App Engine project

Step2: Configure your Eclipse IDE. What you need to do is to install Google Cloud Tools for Eclipse from the Eclipse Marketplace.

After completing the installation, go ahead and restart your Eclipse IDE.

Step3: Now go to Eclipse IDE and you should be able to create an App Engine Java Project. For this assignment, I have created a Google App Engine Standard Java Project.

Click File>New>Other>Google App Engine Standard Java Project

Enter a name for your project and leave the other fields as their defaults.



Now click >Finish

You have created your project!!!

Step4: Go back to GCP and copy the project id of the project where you want your application to be deployed into.

Step5: Go back to eclipse, go to appengine-web.xml file and paste  
<application>?</application>

“?” is your Project id.

Step6: Now save your application. You are now ready to deploy your application.

Right click the project in the Package Explorer and select Deploy to App Engine Standard. In the account box, click Deploy.

The status of the deployment appears in the Eclipse Console. Once the deployment is completed, a browser window opens and displays the output of your Servlet.

Your application is now running on Google Cloud!!!!!!

By modifying our previous project, we were able to add in information about each web server as well as clean up the resulting output. By performing these changes we were able to access each server while showing the number of seconds it took to access:

```

28
29 // Main Class
30 public class Threading
31 {
32     /* OLD IP ADDRESS FOR US CENTRAL REGION
33     public static String[] sites = {
34         "http://35.192.236.37:8080/number.jsp",
35         "http://35.222.240.90/",
36         "http://rng-python.appspot.com");
37     */
38     public static String[] sites = {
39         "http://34.97.25.195",
40         "http://34.97.51.216:8080/number.jsp",
41         "http://rng-python-asiane2.appspot.com",
42         "https://number-254315.appspot.com/hello");
43     public static String[] info = {
44         "asia-northeast2_a_VM_Python@",
45         "asia-northeast2_a_VM_Java@",
46         "asia-northeast2_a_app_Python@",
47         "asia-northeast2_a_App_Java@"
48     };
49
50
51     public static void main(String[] args)
52     {
53
54         for (int i=0; i<sites.length; i++)
55         {
56             TimingThread object = new TimingThread();
57             object.start(info[i], sites[i]);
58         }
59     }
60 }

```

```

<terminated> Threading [Java Application] C:\Program Files\Java\jre1.8.0_201\bin\javaw.exe (Sep 30, 2019, 5:39:13 PM)
asia-northeast2_a_VM_Python@http://34.97.25.195 2.2465719s 200402
asia-northeast2_a_VM_Java@http://34.97.51.216:8080/number.jsp 0.2925288s 725297
http://rng-python-asiane2.appspot.com Failed to connect
asia-northeast2_a_App_Java@https://number-254315.appspot.com/hello 1.6086611s 373380

```

Another Screenshot with added data points to show scalability:

```

<terminated> Threading [Java Application] C:\Program Files\Java\jre1.8.0_201\bin\javaw.exe (Sep 30, 2019, 6:24:55 PM)
asia-northeast2_a_VM_Python@http://34.97.25.195 0.9199184s 624696
asia-northeast2_a_VM_Java@http://34.97.51.216:8080/number.jsp 0.3043244s 242625
asia-northeast2_a_app_Python@http://104.155.173.130/ 0.1201508s 189126
asia-northeast2_a_App_Java@https://number-254315.appspot.com/hello 1.3761063s 948983
us-central1_a_app_Python@https://agile-genius-254017.appspot.com 0.1172984s 102113
us-central1_a_vm_Java@http://35.192.236.37:8080/number.jsp 0.059838s 80122

```