

1. Crear una máquina virtual Linux, preferiblemente con java.

The screenshot shows the AWS Management Console's 'Launch Instance Wizard' at Step 1: Choose an Amazon Machine Image (AMI). The console is in Spanish. The left sidebar shows navigation options like 'My AMIs', 'AWS Marketplace', and 'Community AMIs'. The main area displays a list of AMIs. The 'Amazon Linux 2018.03.0 (HVM), SSD Volume Type' AMI is highlighted with a red box. Below the list, there is a section for 'Are you launching a database instance? Try Amazon RDS.' with a link to learn more about RDS.

AMI	Root device type	Virtualization type	ENA Enabled
Amazon Linux 2 AMI (HVM), SSD Volume Type	efs	hvm	Yes
Amazon Linux 2018.03.0 (HVM), SSD Volume Type	efs	hvm	Yes
Red Hat Enterprise Linux 8 (HVM), SSD Volume Type	efs	hvm	Yes
SUSE Linux Enterprise Server 15 SP1 (HVM), SSD Volume Type	efs	hvm	Yes
Ubuntu Server 18.04 LTS (HVM), SSD Volume Type	efs	hvm	Yes

2. Revisar la instancia de la máquina

The screenshot shows the AWS Management Console's 'Instances' page. The 'awsintro' instance is selected, and its details are shown in the 'Description' tab. The instance is a t2.micro instance in the us-east-1a Availability Zone, running the Amazon Linux 2018.03.0 AMI. The instance is in the 'running' state, and its public IP address is 52.91.223.35.

Name	Instance ID	Instance Type	Availability Zone	Instance State	Status Checks	Alarm Status	Public DNS (IPv4)	IPv4 Public IP	IPv6 IPs	Key Name	Monitoring	Launch
ApiSpark	i-07ea04a355500bdf	t2.micro	us-east-1a	stopped	None	None	-	-	-	aws-c2	disabled	March
dataNode	i-0b4603a2979c5241d	t2.micro	us-east-1b	stopped	None	None	-	-	-	willson	disabled	March
awsintro	i-0ed89ecce81d52e4b	t2.micro	us-east-1a	running	Initializing	None	ec2-52-91-223-35.com...	52.91.223.35	-	willson	disabled	March
nameNode	i-0b6a851388c0351	t2.micro	us-east-1b	stopped	None	None	-	-	-	willson	disabled	March

Instance: i-0ed89ecce81d52e4b (awsintro) Public DNS: ec2-52-91-223-35.compute-1.amazonaws.com

Description	Status Checks	Monitoring	Tags
Instance ID: i-0ed89ecce81d52e4b Instance state: running Instance type: t2.micro You may not have permission to access AWS Compute Optimizer. Private DNS: ip-172-31-37-253.ec2.internal Private IPs: 172.31.37.253 Secondary private IPs: -	Public DNS (IPv4): ec2-52-91-223-35.compute-1.amazonaws.com IPv4 Public IP: 52.91.223.35 IPv6 IPs: - Elastic IPs: - Availability zone: us-east-1a Security groups: launch-wizard-7, view inbound rules, view outbound rules Scheduled events: No scheduled events		

3. Conectarse a la maquina virtual.

The screenshot shows the AWS Management Console interface. A modal dialog titled "Connect to your instance" is open, providing instructions on how to connect to an EC2 instance. The dialog includes a "Connection method" section with three options: "A standalone SSH client", "Session Manager", and "EC2 Instance Connect (browser-based SSH connection)". Below this, it lists steps to access the instance, including opening an SSH client, locating the private key file, and connecting to the instance using its Public DNS. An example command is provided: `ssh -i [keyfile] ec2-user@ec2-52-91-223-35.compute-1.amazonaws.com`. The dialog also includes a warning about the default AMI username and a link to the connection documentation.

Connect to your instance

Connection method

- ☒ A standalone SSH client
- ☐ Session Manager
- ☐ EC2 Instance Connect (browser-based SSH connection)

To access your instance:

1. Open an SSH client. (find out how to [connect using PuTTY](#))
2. Locate your private key file [redacted].pem. The wizard automatically detects the key you used to launch the instance.
3. Your key must not be publicly viewable for SSH to work. Use this command if needed:
`chmod 400 [redacted].pem`
4. Connect to your instance using its Public DNS:
`ec2-52-91-223-35.compute-1.amazonaws.com`

Example:

```
ssh -i [redacted].pem ec2-user@ec2-52-91-223-35.compute-1.amazonaws.com
```

Please note that in most cases the username above will be correct, however please ensure that you read your AMI usage instructions to ensure that the AMI owner has not changed the default AMI username.

If you need any assistance connecting to your instance, please see our [connection documentation](#).

Close

4. Conectarse a la máquina, una forma de hacerlo desde windows es con gitbash.

```
ec2-user@ip-172-31-37-253:~  
willson@DESKTOP-3V142AS MINGW64 ~/Downloads  
$ chmod 400 pem  
willson@DESKTOP-3V142AS MINGW64 ~/Downloads  
$ ssh -i "pem" ec2-user@ec2-52-91-223-35.compute-1.amazonaws.com  
The authenticity of host 'ec2-52-91-223-35.compute-1.amazonaws.com (52.91.223.35)' can't be established.  
ECDSA key fingerprint is  
Are you sure you want to continue connecting (yes/no/[fingerprint])? yes  
Warning: Permanently added 'ec2-52-91-223-35.compute-1.amazonaws.com,52.91.223.35' (ECDSA) to the list of known hosts.  
  
 _ | _ | _ )  
 _ | ( / Amazon Linux AMI  
 _ | \ | _ |  
  
https://aws.amazon.com/amazon-linux-ami/2018.03-release-notes/  
4 package(s) needed for security, out of 10 available  
Run "sudo yum update" to apply all updates.  
[ec2-user@ip-172-31-37-253 ~]$ sudo yum install java-1.8.0  
Loaded plugins: priorities, update-motd, upgrade-helper  
amzn-main | 2.1 kB 00:00:00  
amzn-updates | 2.5 kB 00:00:00  
Resolving Dependencies  
--> Running transaction check  
--> Package java-1.8.0-openjdk.x86_64 1:1.8.0.242.b08-0.50.amzn1 will be installed  
--> Processing Dependency: java-1.8.0-openjdk-headless(x86-64) = 1:1.8.0.242.b08-0.50.amzn1 for package: 1:java-1.8.0-openjdk-1.8.0.242.b08-0.50.amzn1.x86_64  
--> Running transaction check  
--> Package java-1.8.0-openjdk-headless.x86_64 1:1.8.0.242.b08-0.50.amzn1 will be installed  
amzn-main/latest/filelists_db | 5.7 MB 00:00:00  
amzn-updates/latest/filelists_db | 13 MB 00:00:01  
--> Processing Dependency: lksctp-tools(x86-64) for package: 1:java-1.8.0-openjdk-headless-1.8.0.242.b08-0.50.amzn1.x86_64  
--> Processing Dependency: cups-libs(x86-64) for package: 1:java-1.8.0-openjdk-headless-1.8.0.242.b08-0.50.amzn1.x86_64  
--> Running transaction check  
--> Package cups-libs.x86_64 1:1.4.2-67.21.amzn1 will be installed  
--> Processing Dependency: libtiff.so.5(LIBTIFF_4.0) (64bit) for package: 1:cups-libs-1.4.2-67.21.amzn1.x86_64  
--> Processing Dependency: libgnutls.so.26(GNUTLS_1_4) (64bit) for package: 1:cups-libs-1.4.2-67.21.amzn1.x86_64  
--> Processing Dependency: libtiff.so.5() (64bit) for package: 1:cups-libs-1.4.2-67.21.amzn1.x86_64  
--> Processing Dependency: libgnutls.so.26() (64bit) for package: 1:cups-libs-1.4.2-67.21.amzn1.x86_64  
--> Processing Dependency: libavahi-common.so.3() (64bit) for package: 1:cups-libs-1.4.2-67.21.amzn1.x86_64  
--> Processing Dependency: libavahi-client.so.3() (64bit) for package: 1:cups-libs-1.4.2-67.21.amzn1.x86_64  
--> Package lksctp-tools.x86_64 0:1.0.10-7.7.amzn1 will be installed  
--> Running transaction check  
--> Package avahi-libs.x86_64 0:0.6.25-12.17.amzn1 will be installed  
--> Package gnutls.x86_64 0:2.12.23-21.18.amzn1 will be installed  
--> Package libtiff.x86_64 0:4.0.3-32.34.amzn1 will be installed  
--> Processing Dependency: libjbig.so.2.0() (64bit) for package: libtiff-4.0.3-32.34.amzn1.x86_64  
--> Running transaction check  
--> Package jbigkit-libs.x86_64 0:2.0-11.4.amzn1 will be installed  
--> Finished Dependency Resolution  
  
Dependencies Resolved  
  
=====
```

Package	Arch	Version	Repository	Size
Installing:				
java-1.8.0-openjdk	x86_64	1:1.8.0.242.b08-0.50.amzn1	amzn-updates	322 k
Installing for dependencies:				
avahi-libs	x86_64	0.6.25-12.17.amzn1	amzn-main	64 k
cups-libs	x86_64	1:1.4.2-67.21.amzn1	amzn-main	364 k
gnutls	x86_64	2.12.23-21.18.amzn1	amzn-main	450 k
java-1.8.0-openjdk-headless	x86_64	1:1.8.0.242.b08-0.50.amzn1	amzn-updates	40 M
jbigkit-libs	x86_64	2.0-11.4.amzn1	amzn-main	47 k
libtiff	x86_64	4.0.3-32.34.amzn1	amzn-updates	439 k
lksctp-tools	x86_64	1.0.10-7.7.amzn1	amzn-main	89 k

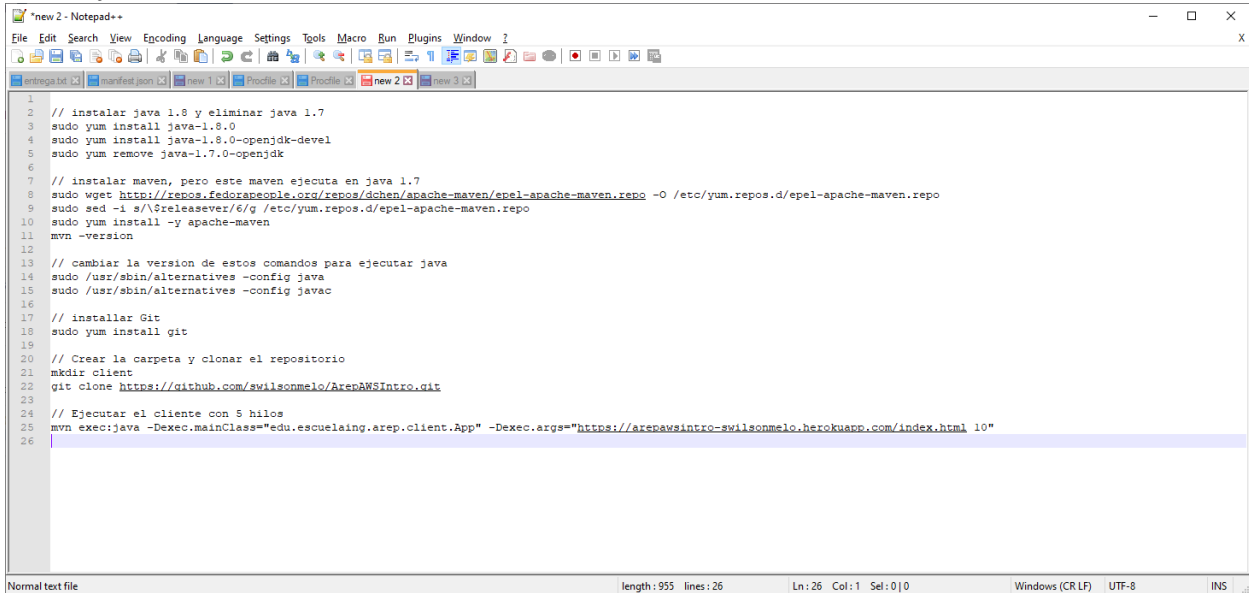
```
=====
```

Transaction Summary

```
=====
```

Install 1 Package (+7 Dependent packages)

5. Instalar java 8, agregar el jdk de java 8, eliminar java 7, instalar maven, configurar los comandos java y javac para que funcionen con java 8, clonar el repositorio y hacer un mvn exec para ejecutar el cliente.



```
1 // instalar java 1.8 y eliminar java 1.7
2 sudo yum install java-1.8.0
3 sudo yum install java-1.8.0-openjdk-devel
4 sudo yum remove java-1.7.0-openjdk
5
6
7 // instalar maven, pero este maven ejecuta en java 1.7
8 sudo wget http://repos.fedorapeople.org/repos/dchen/apache-maven/epel-apache-maven.repo -O /etc/yum.repos.d/epel-apache-maven.repo
9 sudo sed -i s/$releasever/6/g /etc/yum.repos.d/epel-apache-maven.repo
10 sudo yum install -y apache-maven
11 mvn -version
12
13 // cambiar la version de estos comandos para ejecutar java
14 sudo /usr/sbin/alternatives --config java
15 sudo /usr/sbin/alternatives --config javac
16
17 // instalar Git
18 sudo yum install git
19
20 // Crear la carpeta y clonar el repositorio
21 mkdir client
22 git clone https://github.com/swilsonmelo/ArpaAWSIntro.git
23
24 // Ejecutar el cliente con 5 hilos
25 mvn exec:java -Dexec.mainClass="edu.esucelaing.arp.client.App" -Dexec.args="https://arpaawsintro-swilsonmelo.herokuapp.com/index.html 10"
26
```

```
// instalar java 1.8 y eliminar java 1.7
```

```
sudo yum install java-1.8.0
```

```
sudo yum install java-1.8.0-openjdk-devel
```

```
sudo yum remove java-1.7.0-openjdk
```

```
// instalar maven, pero este maven ejecuta en java 1.7
```

```
sudo wget http://repos.fedorapeople.org/repos/dchen/apache-maven/epel-apache-maven.repo -O
/etc/yum.repos.d/epel-apache-maven.repo
```

```
sudo sed -i s/$releasever/6/g /etc/yum.repos.d/epel-apache-maven.repo
```

```
sudo yum install -y apache-maven
```

```
mvn -version
```

```
// cambiar la version de estos comandos para ejecutar java
```

```
sudo /usr/sbin/alternatives --config java
```

```
sudo /usr/sbin/alternatives --config javac
```

```
// instalar Git
```

```
sudo yum install git
```

// Crear la carpeta y clonar el repositorio


mkdir client

git clone https://github.com/swilsonmelo/ArepAWSIntro.git

// Ejecutar el cliente con 5 hilos

mvn exec:java -Dexec.mainClass="edu.escuelaing.arep.client.App" -Dexec.args="https://arepawsintro-swilsonmelo.herokuapp.com/index.html 10"

6. Ejecutar el cliente haciendo una petición al servidor en heroku obteniendo el index.html y con 10 hilos



```
ec2-user@ip-172-31-37-253:~/client/ArepAWSIntro
willson@DESKTOP-3V142AS MINGW64 ~/Downloads
$ ssh -i "willson.pem" ec2-user@ec2-52-91-223-35.compute-1.amazonaws.com
Last login: Tue Mar 10 05:34:03 2020 from 181.61.39.237

 _ _ _ _ _
| | | | |
|_|_|_|_|_ Amazon Linux AMI

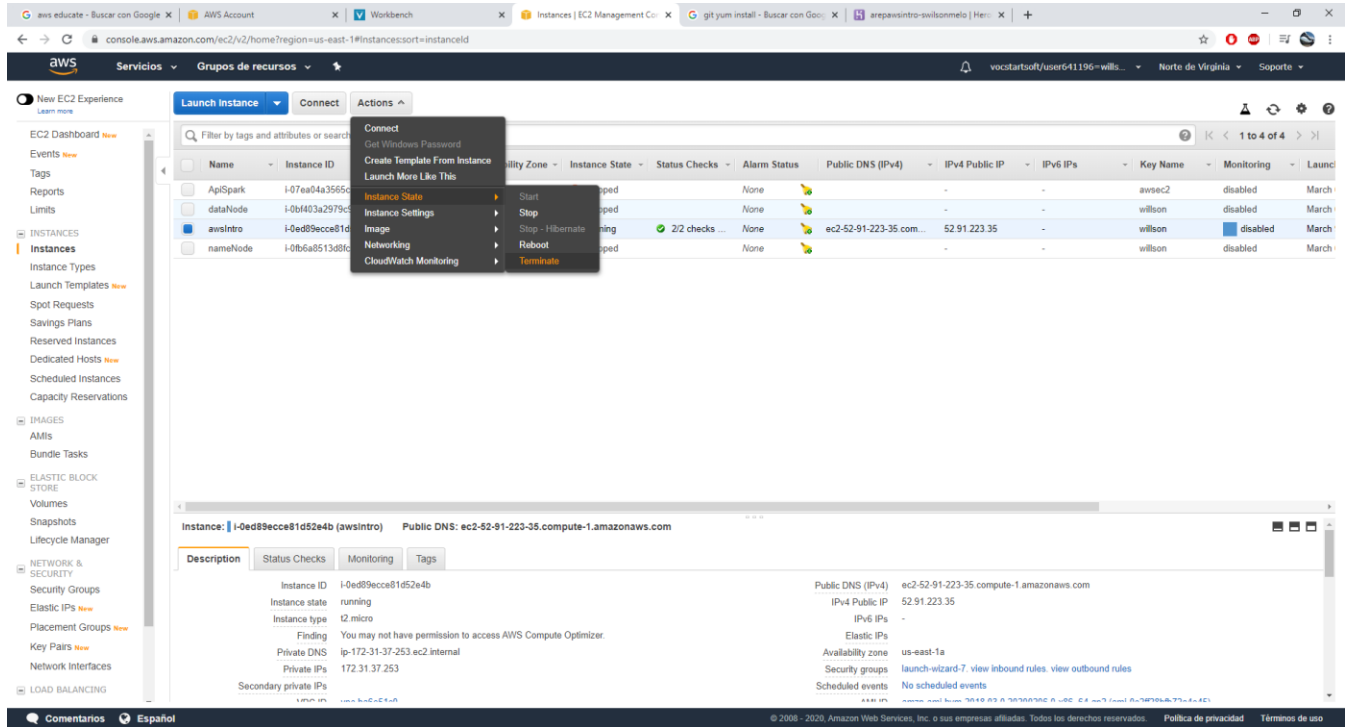
https://aws.amazon.com/amazon-linux-ami/2018.03-release-notes/
4 package(s) needed for security, out of 10 available
Run "sudo yum update" to apply all updates.
[ec2-user@ip-172-31-37-253 ~]$ ls
client
[ec2-user@ip-172-31-37-253 ~]$ cd client/
[ec2-user@ip-172-31-37-253 client]$ ls
ArepAWSIntro
[ec2-user@ip-172-31-37-253 client]$ cd ArepAWSIntro/
[ec2-user@ip-172-31-37-253 ArepAWSIntro]$ ls
LICENSE pom.xml Procfile README.md src target
[ec2-user@ip-172-31-37-253 ArepAWSIntro]$ mvn exec:java -Dexec.mainClass="edu.escuelaing.arep.client.App" -Dexec.args="https://arepawsintro-swilsonmelo.herokuapp.com/index.html 10"
[INFO] Scanning for projects...
[WARNING]
[WARNING] Some problems were encountered while building the effective model for edu.escuelaing.arep.app:ArepAWSIntro:jar:1.0-SNAPSHOT.
[WARNING] 'dependencies.dependency.(groupId:artifactId:type:classifier)' must be unique: junit:junit:jar -> version 3.8.1 vs 4.12 @ line 23, column 21
[WARNING]
[WARNING] It is highly recommended to fix these problems because they threaten the stability of your build.
[WARNING]
[WARNING] For this reason, future Maven versions might no longer support building such malformed projects.
[WARNING]
[INFO]
[INFO] -----
[INFO] Building ArepAWSIntro 1.0-SNAPSHOT
[INFO] -----
[INFO]
[INFO] >>> exec-maven-plugin:1.2.1:java (default-cli) > validate @ ArepAWSIntro >>>
[INFO]
[INFO] <<< exec-maven-plugin:1.2.1:java (default-cli) < validate @ ArepAWSIntro <<<
[INFO]
[INFO] --- exec-maven-plugin:1.2.1:java (default-cli) @ ArepAWSIntro ---
https://arepawsintro-swilsonmelo.herokuapp.com/index.html 10
Time(seconds): 885 0.885
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 1.789 s
[INFO] Finished at: 2020-03-10T05:34:47Z
[INFO] Final Memory: 8M/21M
[INFO] -----
[ec2-user@ip-172-31-37-253 ArepAWSIntro]$ |
```

- Después de probar el servidor hacer las pruebas necesarias para obtener las gráficas y salir de la máquina con el comando exit.

```
MINGW64/c/Users/willson/Downloads
[ec2-user@ip-172-31-37-253 ArepAWSIntro]$ mvn exec:java -Dexec.mainClass="edu.escuelaing.arep.client.App" -Dexec.args="https://arepawsintro-swilsonmelo.herokuapp.com/java.png 500"
[INFO] Scanning for projects...
[WARNING]
[WARNING] Some problems were encountered while building the effective model for edu.escuelaing.arep.app:ArepAWSIntro:jar:1.0-SNAPSHOT
[WARNING] 'dependencies.dependency.(groupId:artifactId:type:classifier)' must be unique: junit:junit:jar -> version 3.8.1 vs 4.12 @ line 23, column 21
[WARNING]
[WARNING] It is highly recommended to fix these problems because they threaten the stability of your build.
[WARNING]
[WARNING] For this reason, future Maven versions might no longer support building such malformed projects.
[WARNING]
[INFO] -----
[INFO] Building ArepAWSIntro 1.0-SNAPSHOT
[INFO] -----
[INFO] >>> exec-maven-plugin:1.2.1:java (default-cli) > validate @ ArepAWSIntro >>>
[INFO] <<< exec-maven-plugin:1.2.1:java (default-cli) < validate @ ArepAWSIntro <<<
[INFO]
[INFO] --- exec-maven-plugin:1.2.1:java (default-cli) @ ArepAWSIntro ---
https://arepawsintro-swilsonmelo.herokuapp.com/java.png 500
Time(seconds): 22012 22.012
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 22.909 s
[INFO] Finished at: 2020-03-10T05:43:00Z
[INFO] Final Memory: 8M/29M
[INFO] -----
[ec2-user@ip-172-31-37-253 ArepAWSIntro]$ mvn exec:java -Dexec.mainClass="edu.escuelaing.arep.client.App" -Dexec.args="https://arepawsintro-swilsonmelo.herokuapp.com/java.png 1000"
[INFO] Scanning for projects...
[WARNING]
[WARNING] Some problems were encountered while building the effective model for edu.escuelaing.arep.app:ArepAWSIntro:jar:1.0-SNAPSHOT
[WARNING] 'dependencies.dependency.(groupId:artifactId:type:classifier)' must be unique: junit:junit:jar -> version 3.8.1 vs 4.12 @ line 23, column 21
[WARNING]
[WARNING] It is highly recommended to fix these problems because they threaten the stability of your build.
[WARNING]
[WARNING] For this reason, future Maven versions might no longer support building such malformed projects.
[WARNING]
[INFO] -----
[INFO] Building ArepAWSIntro 1.0-SNAPSHOT
[INFO] -----
[INFO] >>> exec-maven-plugin:1.2.1:java (default-cli) > validate @ ArepAWSIntro >>>
[INFO] <<< exec-maven-plugin:1.2.1:java (default-cli) < validate @ ArepAWSIntro <<<
[INFO]
[INFO] --- exec-maven-plugin:1.2.1:java (default-cli) @ ArepAWSIntro ---
https://arepawsintro-swilsonmelo.herokuapp.com/java.png 1000
Time(seconds): 73894 73.894
[INFO] -----
[INFO] BUILD SUCCESS
[INFO] -----
[INFO] Total time: 01:14 min
[INFO] Finished at: 2020-03-10T05:44:38Z
[INFO] Final Memory: 8M/30M
[INFO] -----
[ec2-user@ip-172-31-37-253 ArepAWSIntro]$ exit
logout
Connection to ec2-52-91-223-35.compute-1.amazonaws.com closed.

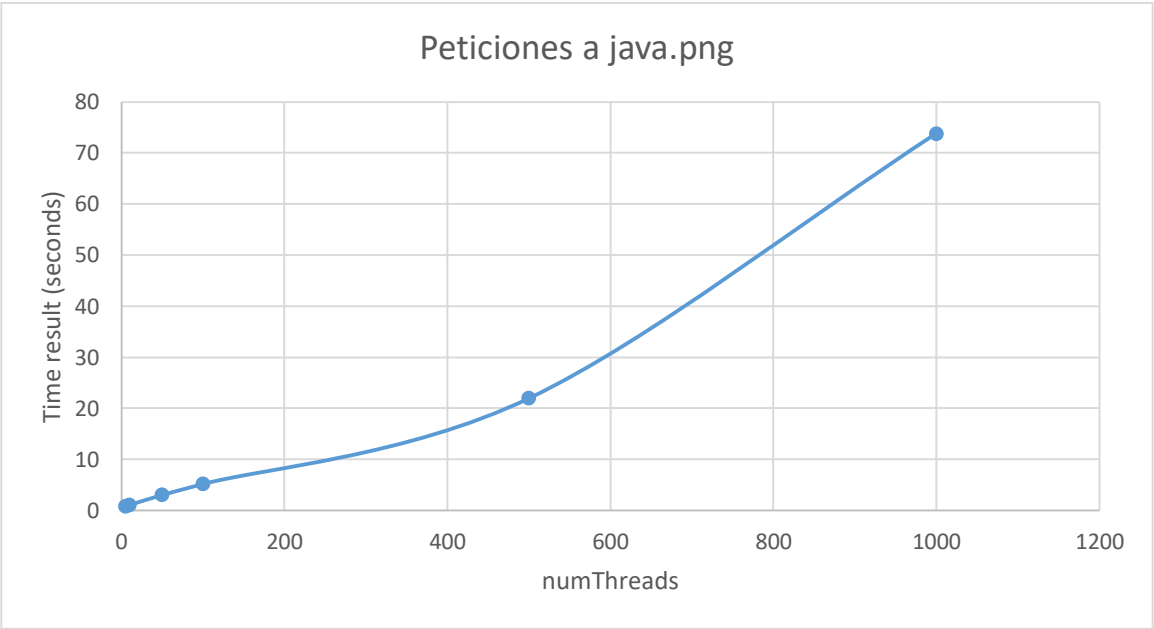
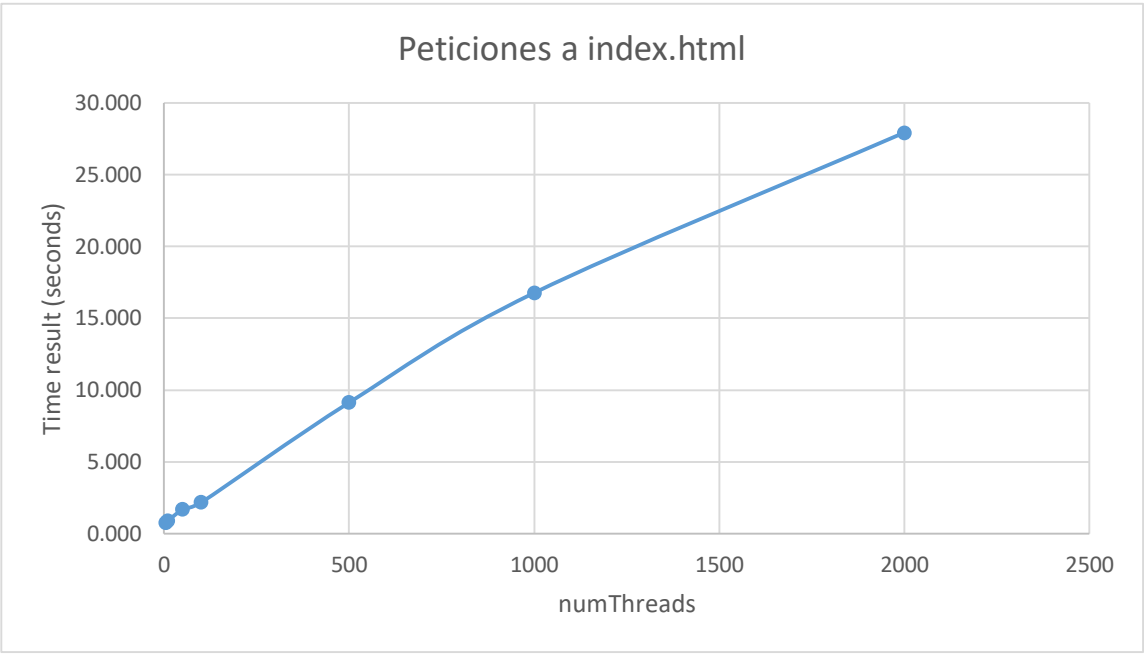
willson@DESKTOP-3V142AS MINGW64 ~/Downloads
$ |
```

8. Apagar la máquina para que no consuma los créditos que tenemos.



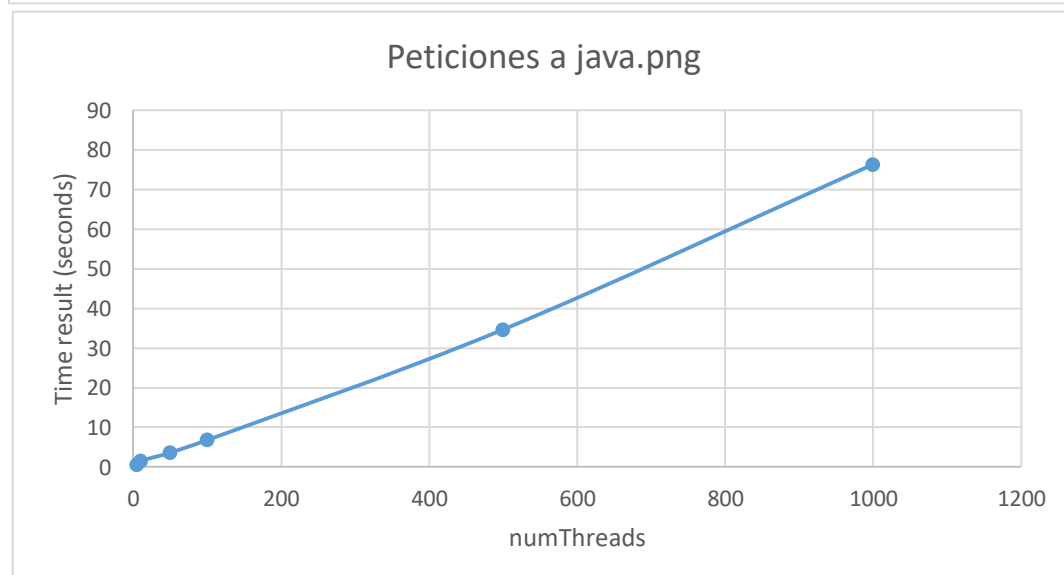
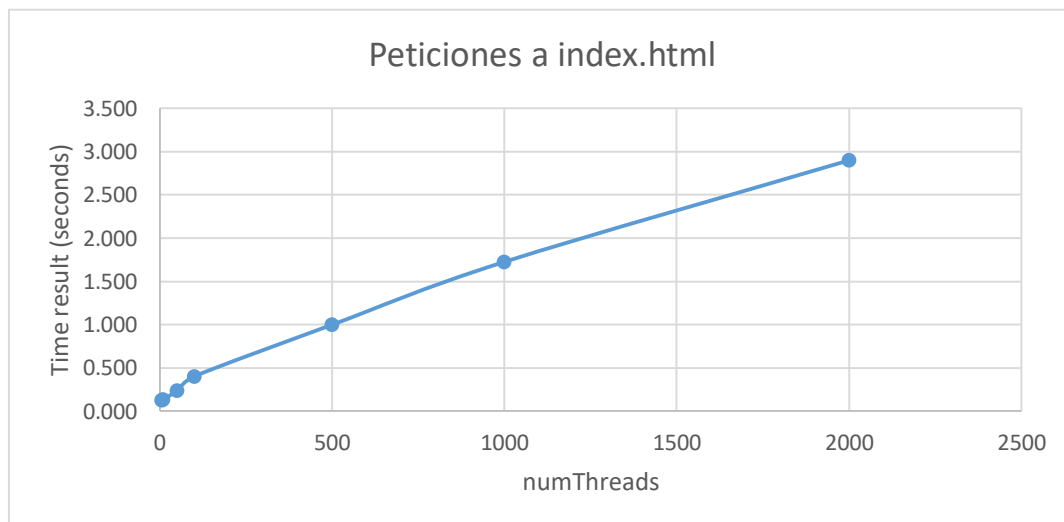
9. Tabular y graficar los resultados de tiempo al momento de hacer las peticiones a heroku, tanto del recurso html como del png.

Peticiones a heroku					
Index.html			java.png		
numThreads	Time result (seconds)		numThreads	Time result (seconds)	
5	0.766		5	0.877	
10	0.892		10	1.138	
50	1.666		50	3.095	
100	2.16		100	5.239	
500	9.118		500	22.012	
1000	16.752		1000	73.84	
2000	27.906				



10. Por último, tabular y graficar los resultados de tiempo al momento de hacer las peticiones a al localhost. Ya que noté que estas peticiones al servidor corriendo localmente es más eficiente, tanto del recurso html como del png.

Peticiones a localhost			
Index.html		java.png	
numThreads	Time result (seconds)	numThreads	Time result (seconds)
5	0.126	5	0.59
10	0.134	10	1.488
50	0.242	50	3.589
100	0.404	100	6.786
500	1.001	500	34.677
1000	1.728	1000	76.36
2000	2.902		



Como conclusión podemos ver una gran diferencia al momento de pedir el recurso `index.html`, el servidor `localhost` resuelve las peticiones mucho más rápido que el servidor desplegado en heroku.