In Selenium 4, **Grid** has three modes to implement.

1) **Standalone Mode**
2) **Hub & Node Mode**
3) **Distributed Mode**

1. Selenium Grid Standalone:-

1. Download the Selenium Server Grid from https://www.selenium.dev/downloads/
2. Create a new folder in your framework with the name “SelGrid” and put the downloaded jar in the same folder.
3. Now right-click on the folder and copy the path in this case it has the below path in MAC.
   “/Users/ankitshrivastava/eclipse-workspace/Selenium4_POC/SelGrid”

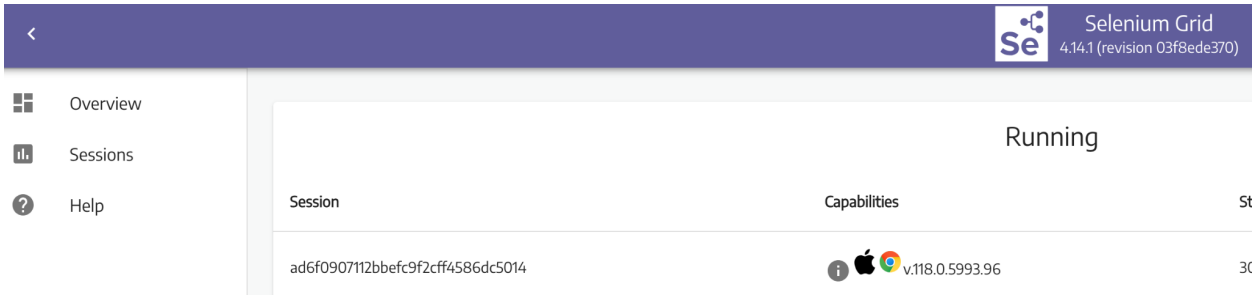
4. Open the terminal type “cd” and paste the above path and hit enter, it will show all necessary commands and information.
5. Now fire the below command in the terminal.
   “java -jar selenium-server-4.14.1.jar standalone”

6. Now create the Grid run setup and add a few test scripts.

```
WebDriver driver ;
    @Test
    public void webElement_ScreenshotDemo() throws IOException
    {
  ChromeOptions grid_options = new ChromeOptions ();
            grid_options.setPageLoadStrategy(PageLoadStrategy.NORMAL);
            grid_options.addArguments("start-maximized");
            driver = new RemoteWebDriver(new URL ("http://localhost:4444/"),grid_options);

             WebDriver driver          = new ChromeDriver ();
             driver.get("https://www.webdriveruniversity.com/Contact-Us/contactus.html");
             driver.manage().window().maximize();
             File srcFile = ((TakesScreenshot) driver).getScreenshotAs(OutputType.FILE);
             WebElement element  = driver.findElement(By.xpath("//h2[@name='contactme']"));
             srcFile = element.getScreenshotAs(OutputType.FILE);
             FileUtils.copyFile(srcFile, new File("./auto2_test_store.png"));
             driver.quit();
    }
```

7. Run the script using the testNG and observe on the grid using the URL http://192.168.1.2:4444/ui#
8. You will the below session information



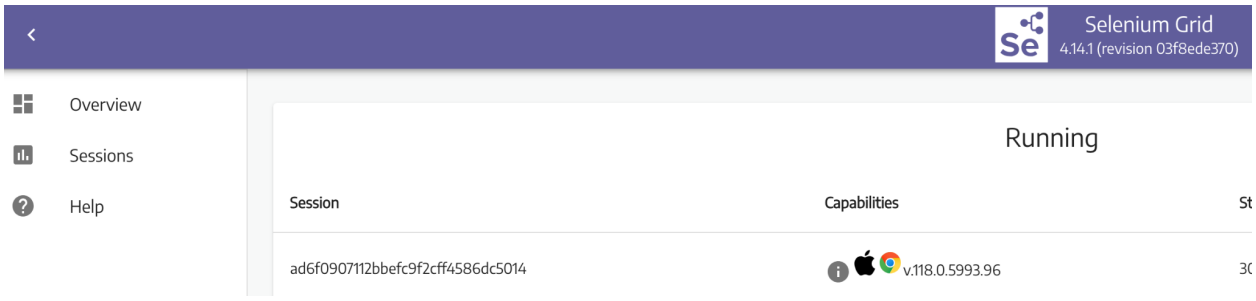
2. Selenium Classic Grid -

1. Fire the below command in the terminal, you will get the necessary commands and information.
   "java -jar selenium-server-4.14.1.jar hub --help"
2. Fire the command "java -jar selenium-server-4.14.1.jar hub" , it will start the Hub and in the console will show the URL

```
ankitshrivastava@ttnpl-3903 SelGrid %  java -jar selenium-server-4.14.1.jar hub
18:57:51.902 INFO [LoggingOptions.configureLogEncoding] - Using the system default encoding
18:57:51.909 INFO [OpenTelemetryTracer.createTracer] - Using OpenTelemetry for tracing
18:57:52.015 INFO [BoundZmqEventBus.<init>] - XPUB binding to [binding to tcp://*:4442, advertising as tcp://[2401:4900:1c5c:54
ing to tcp://*:4443, advertising as tcp://[2401:4900:1c5c:5469:e97d:f9b9:ab22:e641%en0]:4443]
18:57:52.060 INFO [UnboundZmqEventBus.<init>] - Connecting to tcp://[2401:4900:1c5c:5469:e97d:f9b9:ab22:e641%en0]:4442 and tcp:
18:57:52.081 INFO [UnboundZmqEventBus.<init>] - Sockets created
18:57:53.083 INFO [UnboundZmqEventBus.<init>] - Event bus ready
18:57:53.581 INFO [Hub.execute] - Started Selenium Hub 4.14.1 (revision 03f8ede370): http://192.168.1.2:4444
```

Selenium Hub is started on http://192.168.1.2:4444

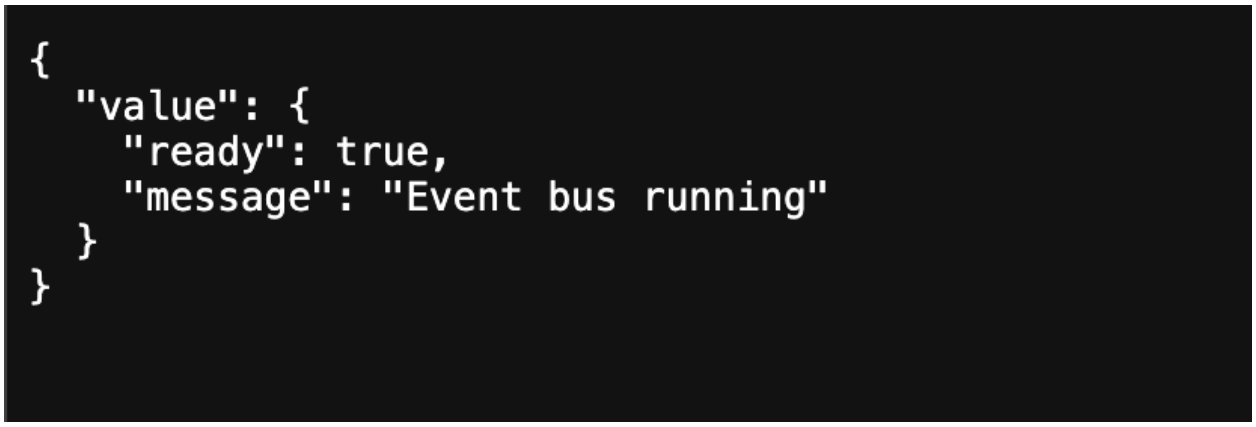
3. Now we have to register the node with the Hub, open one new terminal window reach the same folder, and fire the command "ava -jar selenium-server-4.14.1.jar hub --help"
4. Now the node will be registered at "http://192.168.1.2:5555"
5. Now execute the test script, it will start the session on the node.



6. If we want to setup the node in a different machine then use the below command.
   "java -jar selenium-server-4.14.1.jar node —detect-drivers true —publish-events tcp://172.19.208.1:4442 —subscribe-events tcp://172.19.208.1:4443"

3. Fully Distributed:-

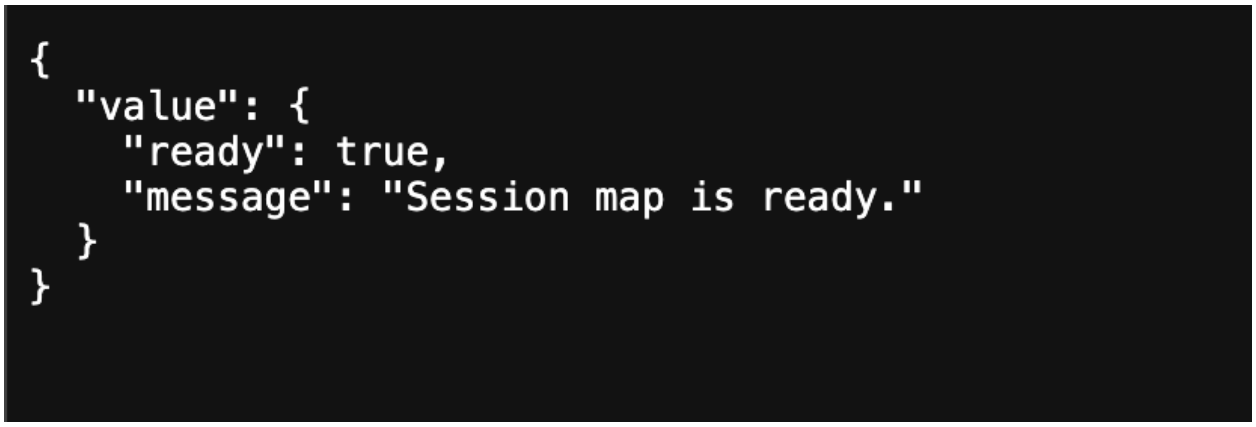
1. To set the **Event Bus** open the terminal and fire the below command'
   "java -jar selenium-server-4.14.1.jar event-bus"
2. This will start the event bus, access the **http://10.1.209.225:5557/status** to see the status you will get the below output.



3. Now it is time to create the session.
Fire the below commend in the terminal to create the session.

"java -jar selenium-server-4.14.1.jar event-bus"

4. Access the **http://10.1.209.225:5556/status** your session will be created and below output will be shown.



5. Now this is the time to start the **Session Queue**, access **http://10.1.209.225:5559/status** to see the status you will get below output.

6. Now in the last step we have to setup the distributor, fire the below commend
“java -jar selenium-server-4.14.1.jar distributor --sessions http://10.1.209.225:5556/ --sessionqueue http://10.1.209.225:5559/ -- bind-bus false”. This will star the distributor.

7.Now run the below commend to setup the Router.
“java -jar selenium-server-4.14.1.jar router --sessions http://10.1.209.225:5556/ --sessionqueue http://10.1.209.225:5559/ --distributor http://10.1.209.225:5553/”

8. Now it will give one URL on which Grid will be running.**http://10.1.209.225:4444/ui**
9.Now we cna run our test script on the grid.