Desy Summer Student Program

My Name is Muhammad Uzair Nadeem currently doing my bachelor's in Computer Science. I was selected in Desy summer student programme 2022 in remote version. I worked with Desy IT Group under Supervision of Alexander Paul Miller and Thomas Beermann. The project I was assigned includes building a Proof of Concept testing platform using industry standard technologies, including Selenium Grid, Kubernetes and Linux and develop tests that run on multiple browsers and take advantage of this platform to verify that services are running correctly. Such tests can then be integrated into DESY's testing infrastructure.

Firstly, I made myself get to know to selenium by reading selenium official documentation and by taking online courses on YouTube then I setup selenium on my laptop and start writing simple unit test in python language on different website for practice.

After having a bit grip on selenium, I familiarized myself with basic container concepts in Dockers. I Install docker on my device and gain some experience with images and containers by running some python tests using Chrome from the container.

After this I setup kubernetes by installing minikube and tried to setup selenium grid locally on my machine by making .yaml files for selenium hub and browsers but due to insufficient memory space in my device I was facing issues.
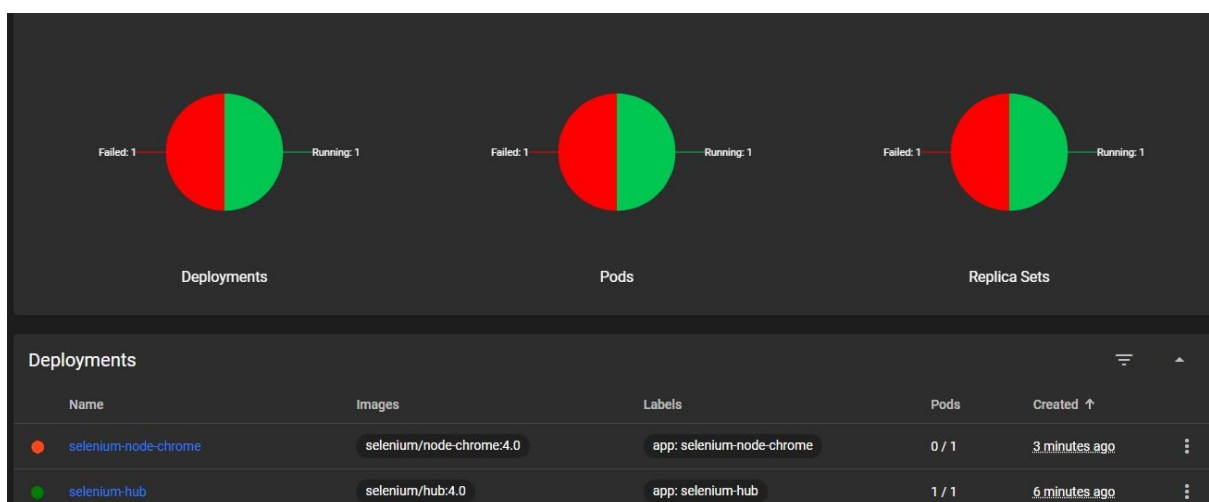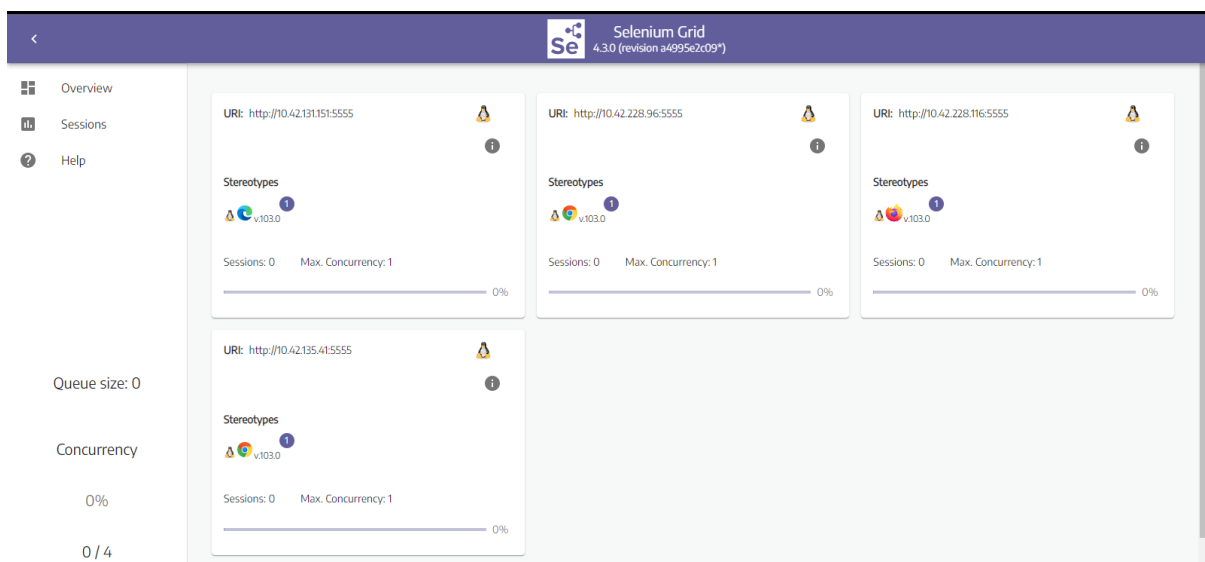
To counter this issue, I remotely accessed the pal server at desy using putty but at first I faced issue in accessing the pal server because I don't have the permissions to access it so Thomas and Paul helped me out in getting the permission to access the server and then setup the Selenium Grid on this server by using helm chart to deploy docker images to kubernetes.

After Setting up the Selenium Grid on Pal I again tried to run the unit test but failed to run because the tests were written in python3 and pal didn't support python3 so to solve this issue Paul and Thomas came up with plan of using desy JupyterLab so I signup on https://jupyter.desy.de/ and start working.

First thing I did after setting everything up as it can be seen previous selenium grid picture I replicate the browser Node so that we can have more than one instance of each browser and we can run multiple unit test in parallel on same browser and it same as increasing the concurrency of browser.

My next task was to write code that allows the tester to pass the browser name as parameter while running the script and unit test run on specified browser and for this I wrote a setUp method that only initiate the browser specified which can be seen from selenium grid and code was this.

```python
def setUp(self) -> None:

    if self.Browser_Option =="chrome":
        chrome_options = webdriver.ChromeOptions()
        self.driver = webdriver.Remote(
        command_executor=self.DRIVER_ADDR,
        options=chrome_options)
    elif self.Browser_Option=="edge":
        edge_options = webdriver.EdgeOptions()
        self.driver = webdriver.Remote(
        command_executor=self.DRIVER_ADDR,
        options=edge_options)
    elif self.Browser_Option=="firefox":
        firefox_options = webdriver.FirefoxOptions()
        self.driver = webdriver.Remote(
        command_executor=self.DRIVER_ADDR,
        options=firefox_options)
    else:
        chrome_options = webdriver.ChromeOptions()
        self.driver = webdriver.Remote(
        command_executor=self.DRIVER_ADDR,
        options=chrome_options)
    self.driver.implicitly_wait(10)
    self.driver.maximize_window()
```

After that I was assigned to write code that run the unit test at same time in parallel on different browser and to accomplish this I used the concept of multi-threading in python through this we can make parent-child processes so I introduce thread local which is a object that can be used to store unique data for each thread so I passed each browser name for each thread and did couple changes in setup method and introduce a startup method to initiate all this.

```
def startup(chooseBrowser):

    TestServicePage.localdata.browser=chooseBrowser
    TestServicePage.DRIVER_ADDR = "http://test-ingress.selenium.131.169.234.237.nip.io"
    TestServicePage.PAGE_ADDR = "https://helmholtz.cloud"
    suite=unittest.TestLoader().loadTestsFromTestCase(TestServicePage)
    runner=unittest.TextTestRunner()
    runner.run(suite)


TestServicePage.localdata=threading.local()
trd1 = threading.Thread(target=startup,args=("edge",))
trd2 = threading.Thread(target=startup,args=("firefox",))
trd3 = threading.Thread(target=startup,args=("chrome",))

trd1.start()
trd2.start()
trd3.start()
```

After doing this I was able to successfully run the unit tests in parallel in different browser by running just one run command which was the main goal of this task as it can be seen from selenium grid.
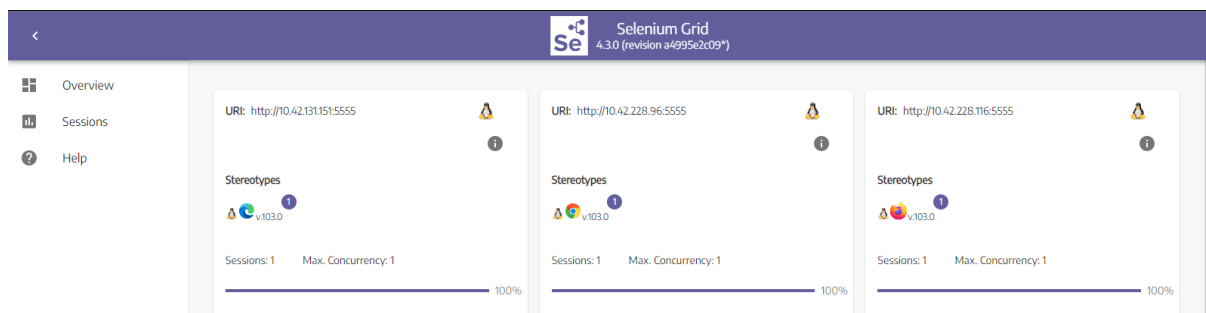
In the End I would say i learned a lot in this desy summer student program and gain experience in key industries technologies like dockers, Kubernetes, functional testing, and various web technologies that would help me a lot in future and I am looking forward for this type of opportunity next year also.