CS6474: Software Testing Laboratory
(Spring 2023)

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Contents

CS6474: Software Testing Laboratory 2023

SELENIUM

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1 Selenium

Selenium is a free (open-source) automated testing framework used to validate web applications across different browsers and platforms. You can use multiple programming languages like Java, C#, Python, etc to create Selenium Test Scripts. Testing done using the Selenium testing tool is usually referred to as Selenium Testing.

Selenium Tool Suite

Selenium Software is not just a single tool but a suite of software, each piece catering to different Selenium QA testing needs of an organization. Here is the list of tools

- Selenium Integrated Development Environment (IDE)
- Selenium Remote Control (RC)
- WebDriver
- Selenium Grid

1.1 IRCTC

Selenium IDE Screenshot IRCTC website.

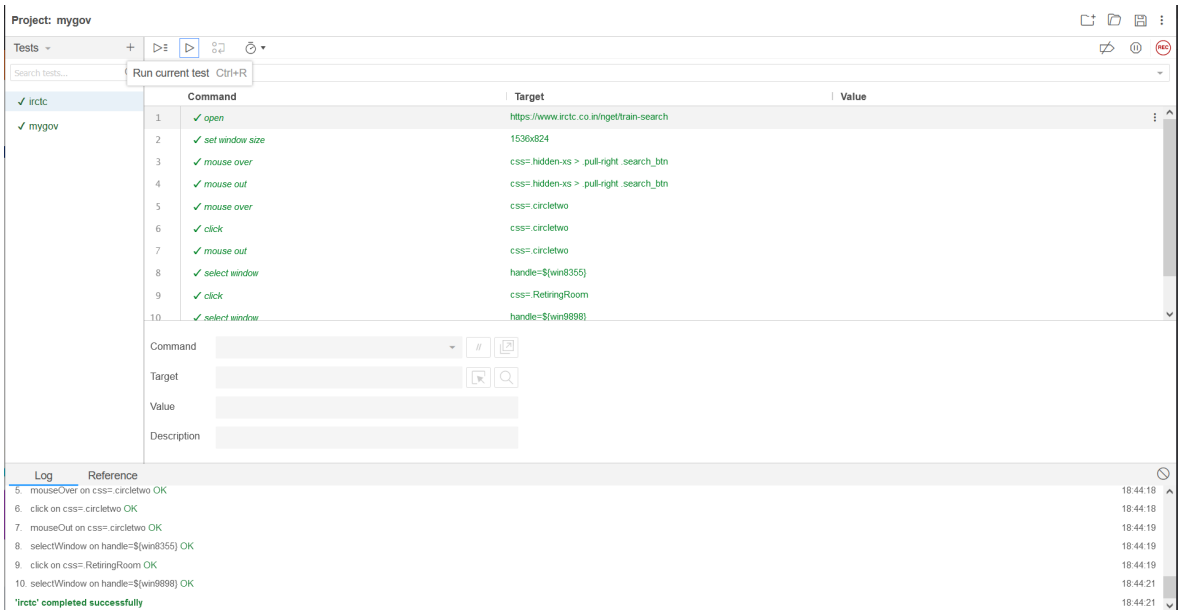

Figure 1: IRCTC Website

1.1.1 IRCTC pytest code

```
# Generated by Selenium IDE
import pytest
import time
import json
from selenium import webdriver
```

```
6  from selenium.webdriver.common.by import By
7  from selenium.webdriver.common.action_chains import ActionChains
8  from selenium.webdriver.support import expected_conditions
9  from selenium.webdriver.support.wait import WebDriverWait
10 from selenium.webdriver.common.keys import Keys
11 from selenium.webdriver.common.desired_capabilities import
       DesiredCapabilities
12
13 class TestIrctc():
14   def setup_method(self, method):
15     self.driver = webdriver.Firefox()
16     self.vars = {}
17
18   def teardown_method(self, method):
19     self.driver.quit()
20
21   def wait_for_window(self, timeout = 2):
22     time.sleep(round(timeout / 1000))
23     wh_now = self.driver.window_handles
24     wh_then = self.vars["window_handles"]
25     if len(wh_now) > len(wh_then):
26       return set(wh_now).difference(set(wh_then)).pop()
27
28   def test_irctc(self):
29     self.driver.get("https://www.irctc.co.in/nget/train-search")
30     self.driver.set_window_size(1536, 824)
31     element = self.driver.find_element(By.CSS_SELECTOR, ".hidden-
           xs > .pull-right .search_btn")
32     actions = ActionChains(self.driver)
33     actions.move_to_element(element).perform()
34     element = self.driver.find_element(By.CSS_SELECTOR, "body")
35     actions = ActionChains(self.driver)
36     actions.move_to_element(element, 0, 0).perform()
37     element = self.driver.find_element(By.CSS_SELECTOR, ".
           circletwo")
38     actions = ActionChains(self.driver)
39     actions.move_to_element(element).perform()
40     self.vars["window_handles"] = self.driver.window_handles
41     self.driver.find_element(By.CSS_SELECTOR, ".circletwo").click
           ()
42     self.vars["win8355"] = self.wait_for_window(2000)
43     element = self.driver.find_element(By.CSS_SELECTOR, "body")
44     actions = ActionChains(self.driver)
45     actions.move_to_element(element, 0, 0).perform()
46     self.driver.switch_to.window(self.vars["win8355"])
47     self.vars["window_handles"] = self.driver.window_handles
48     self.driver.find_element(By.CSS_SELECTOR, ".RetiringRoom").
           click()
```

```
49      self.vars["win9898"] = self.wait_for_window(2000)
50      self.driver.switch_to.window(self.vars["win9898"])
```

1.2 MyGOV

Selenium IDE Screenshot MyGov website.

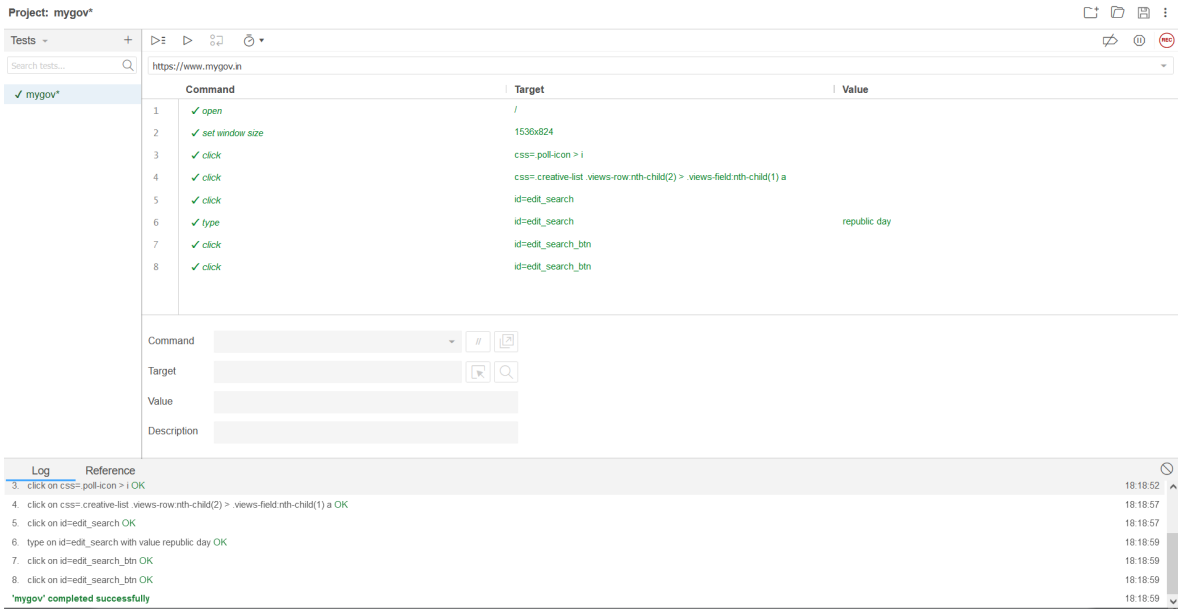

Figure 2: MyGov Website

1.2.1 MyGov pytest code

```
1  # Generated by Selenium IDE
2  import pytest
3  import time
4  import json
5  from selenium import webdriver
6  from selenium.webdriver.common.by import By
7  from selenium.webdriver.common.action_chains import ActionChains
8  from selenium.webdriver.support import expected_conditions
9  from selenium.webdriver.support.wait import WebDriverWait
10 from selenium.webdriver.common.keys import Keys
11 from selenium.webdriver.common.desired_capabilities import
       DesiredCapabilities
12
13 class TestMygov():
14   def setup_method(self, method):
15     self.driver = webdriver.Firefox()
16     self.vars = {}
17
```

```
18    def teardown_method(self, method):
19      self.driver.quit()
20
21    def test_mygov(self):
22      self.driver.get("https://www.mygov.in/")
23      self.driver.set_window_size(1536, 824)
24      self.driver.find_element(By.CSS_SELECTOR, ".poll-icon > i").
          click()
25      self.driver.find_element(By.CSS_SELECTOR, ".creative-list .
          views-row:nth-child(2) > .views-field:nth-child(1) a").
          click()
26      self.driver.find_element(By.ID, "edit_search").click()
27      self.driver.find_element(By.ID, "edit_search").send_keys("
          republic day")
28      self.driver.find_element(By.ID, "edit_search_btn").click()
29      self.driver.find_element(By.ID, "edit_search_btn").click()
```

1.3 CoWin

Selenium IDE Screenshot CoWIN website.

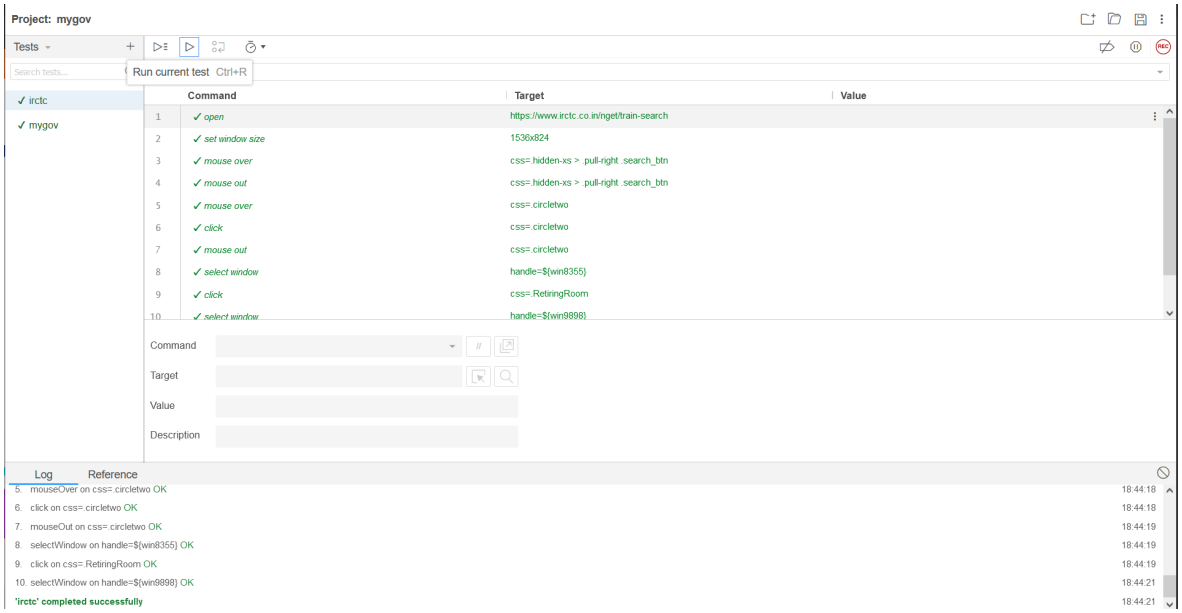

Figure 3: CoWIN Website

1.3.1 CoWIN pytest code

```
1  # Generated by Selenium IDE
2  import pytest
3  import time
4  import json
```

```
5  from selenium import webdriver
6  from selenium.webdriver.common.by import By
7  from selenium.webdriver.common.action_chains import ActionChains
8  from selenium.webdriver.support import expected_conditions
9  from selenium.webdriver.support.wait import WebDriverWait
10 from selenium.webdriver.common.keys import Keys
11 from selenium.webdriver.common.desired_capabilities import
       DesiredCapabilities
12
13 class TestCoWin():
14   def setup_method(self, method):
15     self.driver = webdriver.Firefox()
16     self.vars = {}
17
18   def teardown_method(self, method):
19     self.driver.quit()
20
21   def test_coWin(self):
22     self.driver.get("https://www.cowin.gov.in/")
23     self.driver.find_element(By.CSS_SELECTOR, ".accessibility-
         plugin-ac:nth-child(2) > .dropdwnbtn").click()
24     assert self.driver.title == "CoWIN"
```

1.4 GFG

Selenium IDE Screenshot GFG website.

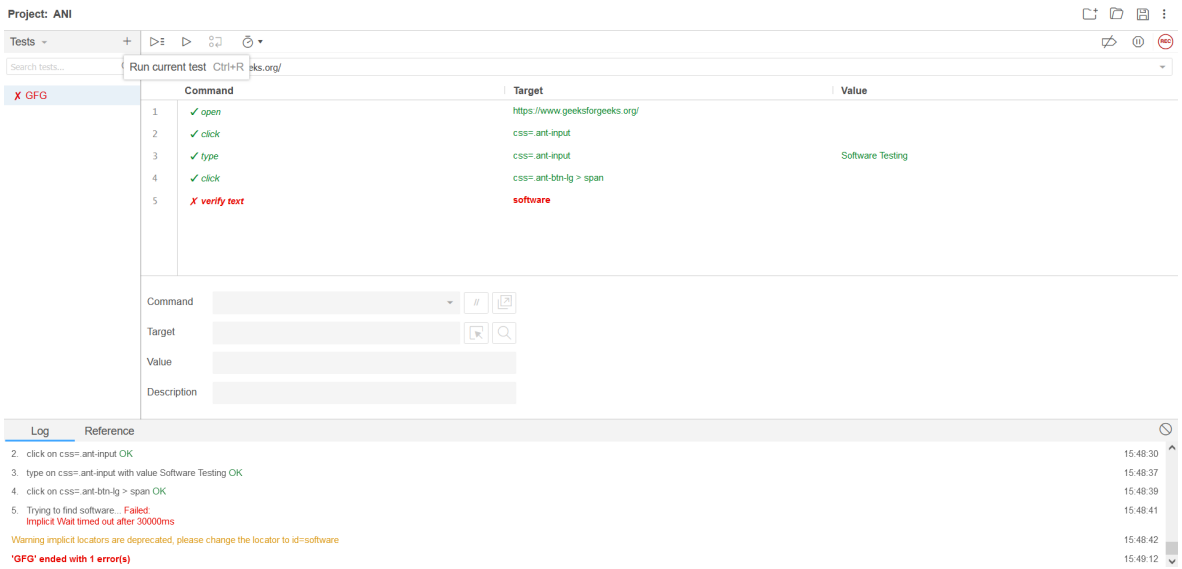

Figure 4: GFG Website

1.4.1 Failure

verify text failed because not able to verify the word software in the searched page.

1.5 Sarkariresult

Selenium IDE Screenshot of sarkariresult.com website.

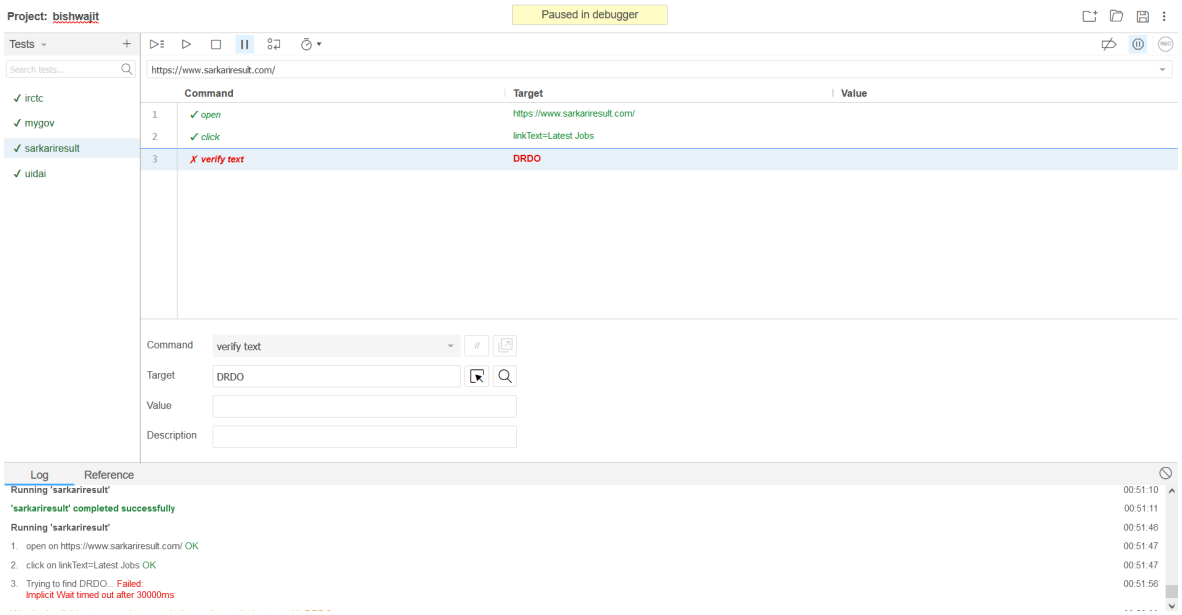

Figure 5: Sarkariresult Website

1.5.1 Failed Case

verify text failed because not able to verify the word "$DRDO$" in the searched page,

1.6 UIDAI

Selenium IDE Screenshot of website.

1.6.1 UIDAI pytest code

```
# Generated by Selenium IDE
import pytest
import time
import json
from selenium import webdriver
from selenium.webdriver.common.by import By
from selenium.webdriver.common.action_chains import ActionChains
```

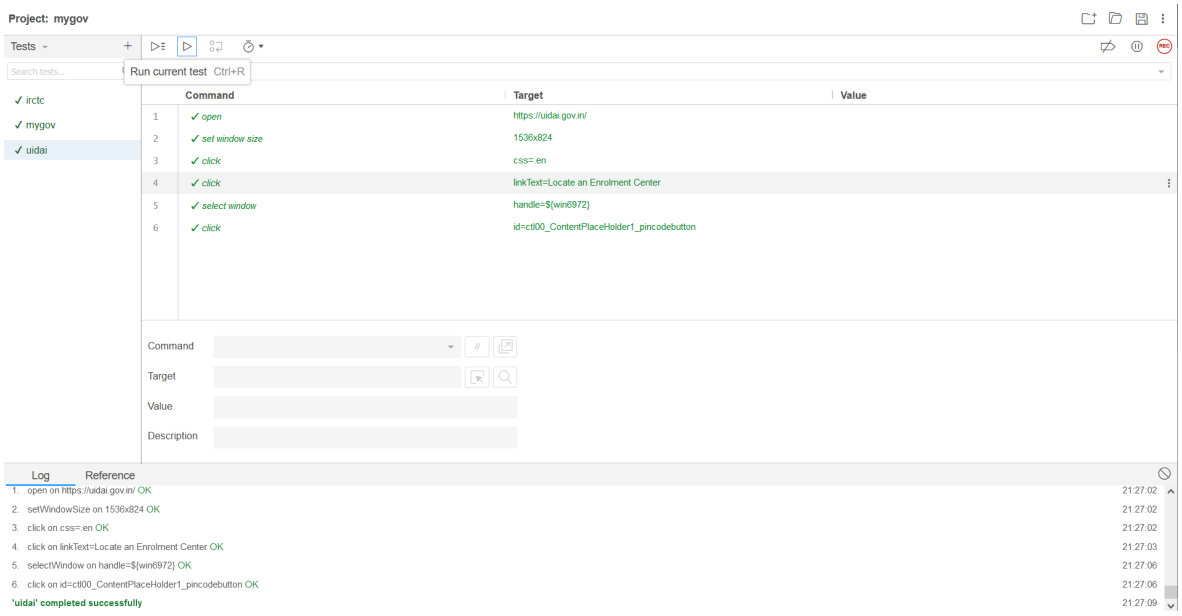

Figure 6: UIDAI Website

```
from selenium.webdriver.support import expected_conditions
from selenium.webdriver.support.wait import WebDriverWait
from selenium.webdriver.common.keys import Keys
from selenium.webdriver.common.desired_capabilities import
    DesiredCapabilities

class TestUidai():
  def setup_method(self, method):
    self.driver = webdriver.Firefox()
    self.vars = {}

  def teardown_method(self, method):
    self.driver.quit()

  def wait_for_window(self, timeout = 2):
    time.sleep(round(timeout / 1000))
    wh_now = self.driver.window_handles
    wh_then = self.vars["window_handles"]
    if len(wh_now) > len(wh_then):
      return set(wh_now).difference(set(wh_then)).pop()

  def test_uidai(self):
    self.driver.get("https://uidai.gov.in/")
    self.driver.set_window_size(1536, 824)
    self.driver.find_element(By.CSS_SELECTOR, ".en").click()
    self.vars["window_handles"] = self.driver.window_handles
    self.driver.find_element(By.LINK_TEXT, "Locate an Enrolment
        Center").click()
    self.vars["win6972"] = self.wait_for_window(2000)
```

```
    self.driver.switch_to.window(self.vars["win6972"])
    self.driver.find_element(By.ID, "
        ctl00_ContentPlaceHolder1_pincodebutton").click()
```

1.7 Nasa

Selenium IDE Screenshot of Nasa website.

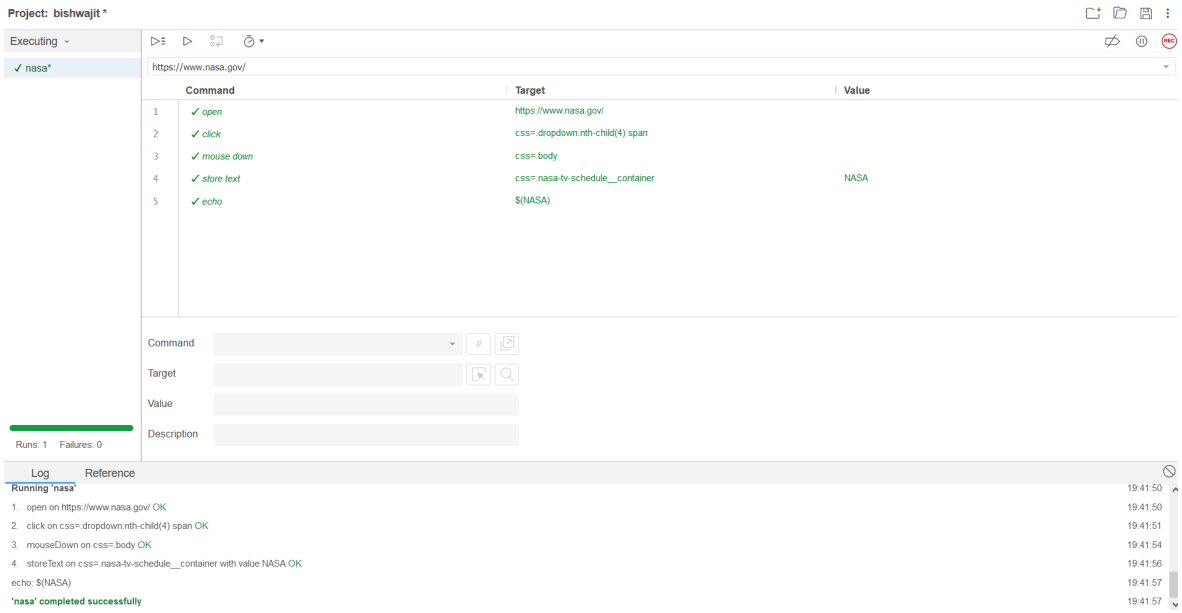

Figure 7: Nasa Website

1.7.1 Command Used

- echo
- store text
- mouse down

1.7.2 Nasa pytest code

```
# Generated by Selenium IDE
import pytest
import time
import json
from selenium import webdriver
from selenium.webdriver.common.by import By
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.support import expected_conditions
from selenium.webdriver.support.wait import WebDriverWait
from selenium.webdriver.common.keys import Keys
```

```
11 from selenium.webdriver.common.desired_capabilities import
       DesiredCapabilities
12
13 class TestNasa():
14   def setup_method(self, method):
15     self.driver = webdriver.Firefox()
16     self.vars = {}
17
18   def teardown_method(self, method):
19     self.driver.quit()
20
21   def test_nasa(self):
22     self.driver.get("https://www.nasa.gov/")
23     self.driver.find_element(By.CSS_SELECTOR, ".dropdown:nth-
           child(4) span").click()
24     element = self.driver.find_element(By.CSS_SELECTOR, ".body")
25     actions = ActionChains(self.driver)
26     actions.move_to_element(element).click_and_hold().perform()
27     self.vars["NASA"] = self.driver.find_element(By.CSS_SELECTOR,
           ".nasa-tv-schedule__container").text
28     print("$(NASA)")
```

1.8 Tutorialspoint

Selenium IDE Screenshot tutorialspoint.com website.

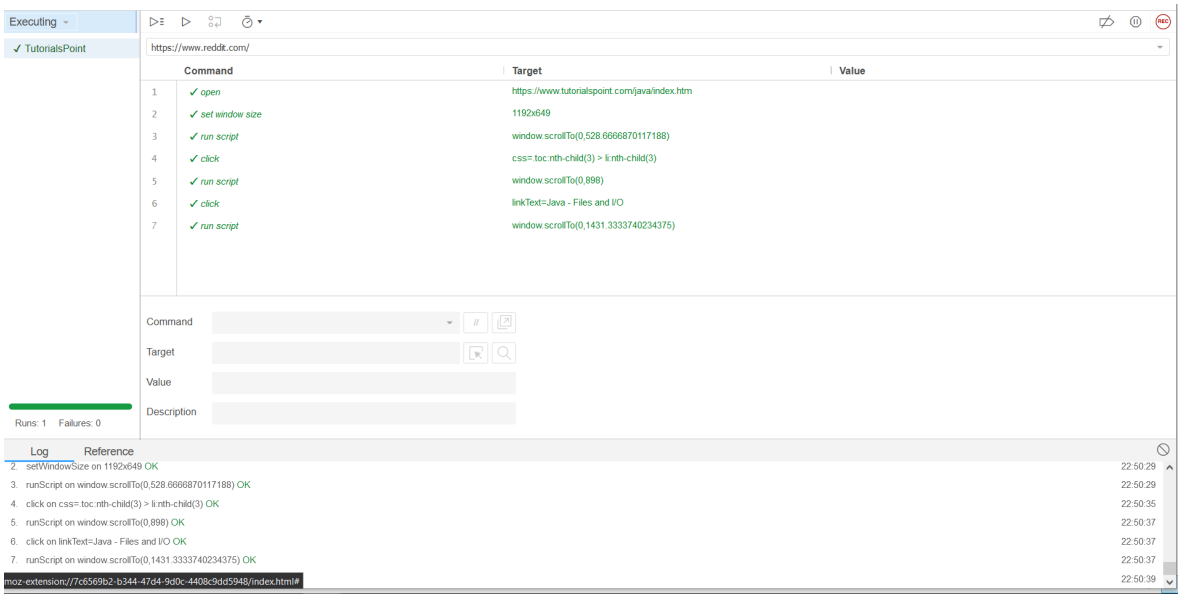

Figure 8: tutorialsoint Website

1.8.1 tutorialsoint pytest code

```python
# Generated by Selenium IDE
import pytest
import time
import json
from selenium import webdriver
from selenium.webdriver.common.by import By
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.support import expected_conditions
from selenium.webdriver.support.wait import WebDriverWait
from selenium.webdriver.common.keys import Keys
from selenium.webdriver.common.desired_capabilities import
   DesiredCapabilities

class TestTutorialsPoint():
  def setup_method(self, method):
    self.driver = webdriver.Firefox()
    self.vars = {}

  def teardown_method(self, method):
    self.driver.quit()

  def test_tutorialsPoint(self):
    self.driver.get("https://www.tutorialspoint.com/java/index.
       htm")
    self.driver.set_window_size(1192, 649)
    self.driver.execute_script("window.scrollTo
       (0,528.6666870117188)")
    self.driver.find_element(By.CSS_SELECTOR, ".toc:nth-child(3)
       > li:nth-child(3)").click()
    self.driver.execute_script("window.scrollTo(0,898)")
    self.driver.find_element(By.LINK_TEXT, "Java - Files and I/O"
       ).click()
    self.driver.execute_script("window.scrollTo
       (0,1431.3333740234375)")
```

1.9 Passort Seva Kendra

Selenium IDE Screenshot IRCTC website.

1.9.1 Passort Seva Kendra pytest code

```python
# Generated by Selenium IDE
import pytest
import time
import json
from selenium import webdriver
```

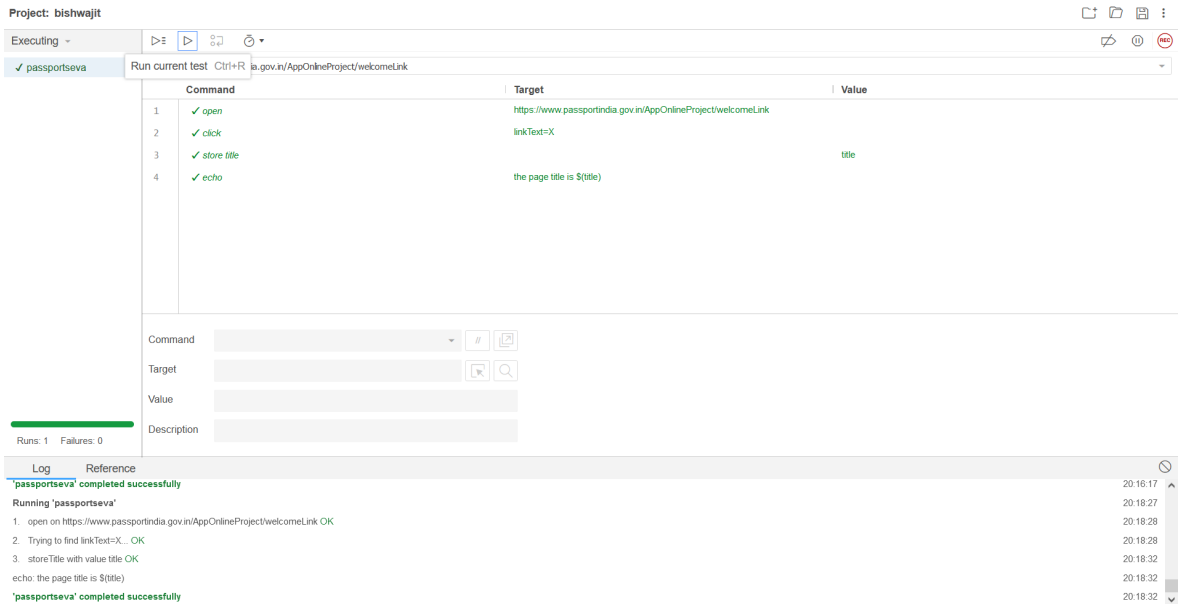

Figure 9: Passort Seva Kendra Website

```
from selenium.webdriver.common.by import By
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.support import expected_conditions
from selenium.webdriver.support.wait import WebDriverWait
from selenium.webdriver.common.keys import Keys
from selenium.webdriver.common.desired_capabilities import
    DesiredCapabilities

class TestPassportseva():
  def setup_method(self, method):
    self.driver = webdriver.Firefox()
    self.vars = {}

  def teardown_method(self, method):
    self.driver.quit()

  def test_passportseva(self):
    self.driver.get("https://www.passportindia.gov.in/
        AppOnlineProject/welcomeLink")
    self.driver.find_element(By.LINK_TEXT, "X").click()
    self.vars["title"] = self.driver.title
    print("the page title is $(title)")
```

1.10 Wikipedia

Selenium IDE Screenshot of Wikipedia website.

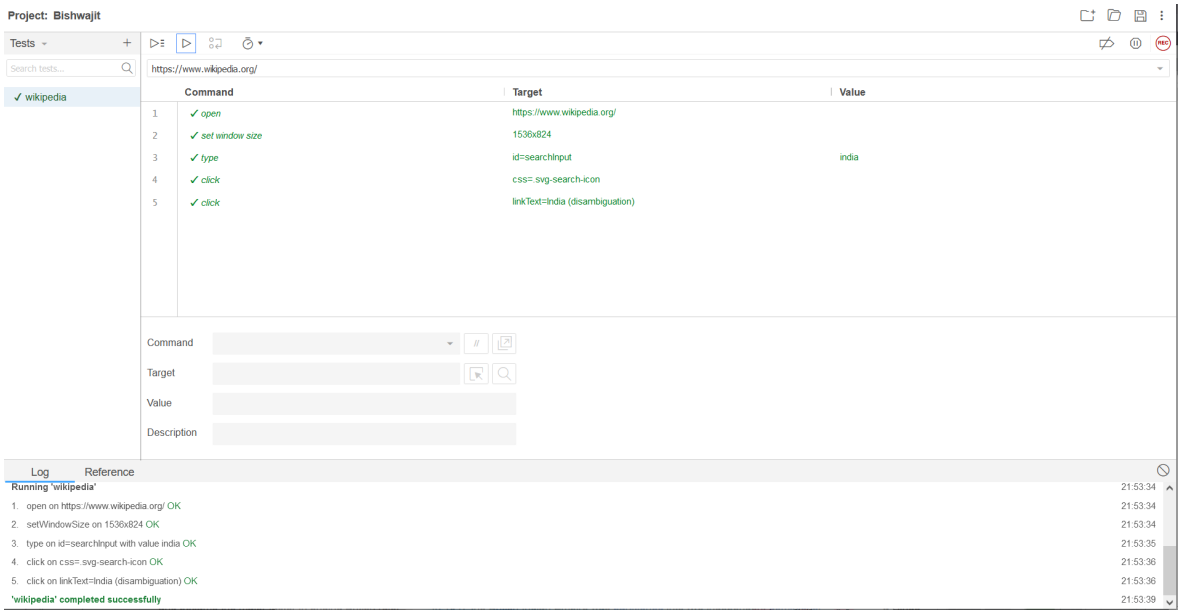

Figure 10: Wikipedia Website

1.10.1 Wikipedia pytest code

```
# Generated by Selenium IDE
import pytest
import time
import json
from selenium import webdriver
from selenium.webdriver.common.by import By
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.support import expected_conditions
from selenium.webdriver.support.wait import WebDriverWait
from selenium.webdriver.common.keys import Keys
from selenium.webdriver.common.desired_capabilities import
    DesiredCapabilities

class TestWikipedia():
  def setup_method(self, method):
    self.driver = webdriver.Firefox()
    self.vars = {}

  def teardown_method(self, method):
    self.driver.quit()

  def test_wikipedia(self):
    self.driver.get("https://www.wikipedia.org/")
    self.driver.set_window_size(1536, 824)
    self.driver.find_element(By.ID, "searchInput").send_keys("
        india")
```

```
25      self.driver.find_element(By.CSS_SELECTOR, ".svg-search-icon")
            .click()
26      self.driver.find_element(By.LINK_TEXT, "India (disambiguation
            )").click()
```

1.11 Zimbra

Selenium IDE Screenshot of Zimbra mail.

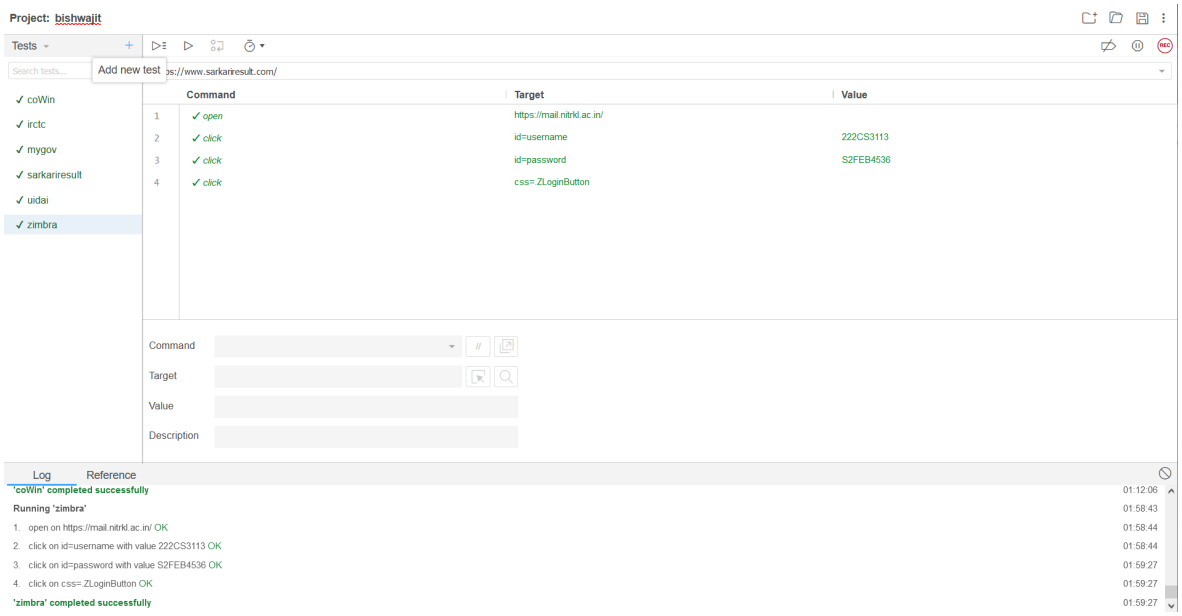

Figure 11: Zimbra mail

1.11.1 Zimbra pytest code

```
1  # Generated by Selenium IDE
2  import pytest
3  import time
4  import json
5  from selenium import webdriver
6  from selenium.webdriver.common.by import By
7  from selenium.webdriver.common.action_chains import ActionChains
8  from selenium.webdriver.support import expected_conditions
9  from selenium.webdriver.support.wait import WebDriverWait
10 from selenium.webdriver.common.keys import Keys
11 from selenium.webdriver.common.desired_capabilities import
       DesiredCapabilities
12
13 class TestZimbra():
14   def setup_method(self, method):
15     self.driver = webdriver.Firefox()
```

```
    self.vars = {}

  def teardown_method(self, method):
    self.driver.quit()

  def test_zimbra(self):
    self.driver.get("https://mail.nitrkl.ac.in/")
    self.driver.find_element(By.ID, "username").click()
    self.driver.find_element(By.ID, "password").click()
    self.driver.find_element(By.CSS_SELECTOR, ".ZLoginButton").
        click()
```

1.12 EDX

Selenium IDE Screenshot of edX website.

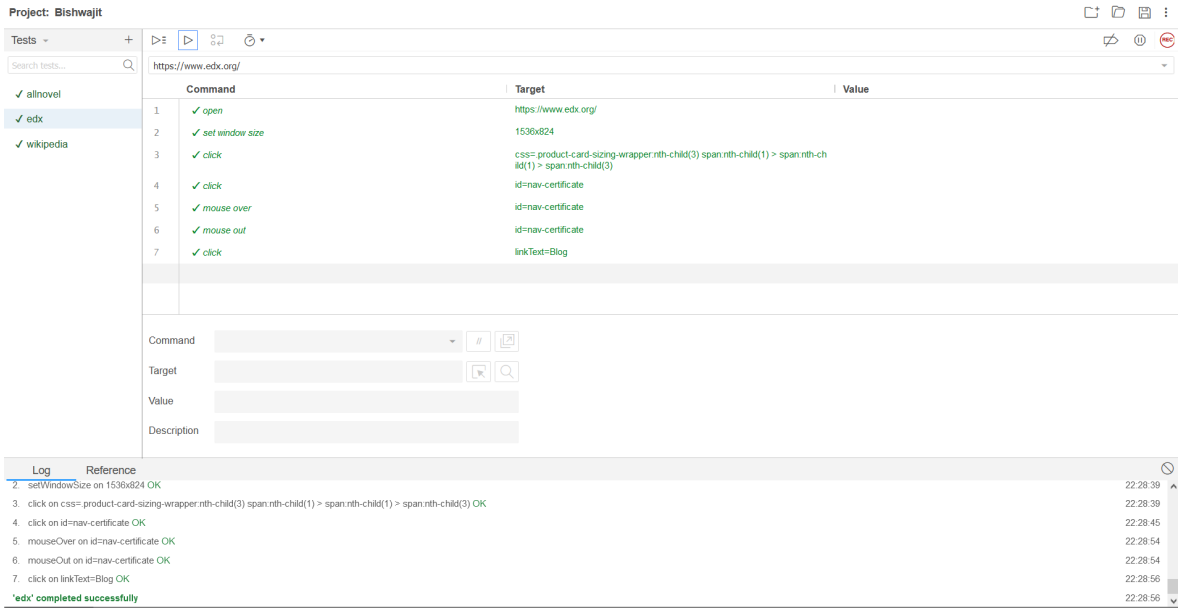

Figure 12: EDX Website

1.12.1 EDX pytest code

```
# Generated by Selenium IDE
import pytest
import time
import json
from selenium import webdriver
from selenium.webdriver.common.by import By
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.support import expected_conditions
from selenium.webdriver.support.wait import WebDriverWait
```

```
from selenium.webdriver.common.keys import Keys
from selenium.webdriver.common.desired_capabilities import
   DesiredCapabilities

class TestEdx():
  def setup_method(self, method):
    self.driver = webdriver.Firefox()
    self.vars = {}

  def teardown_method(self, method):
    self.driver.quit()

  def test_edx(self):
    self.driver.get("https://www.edx.org/")
    self.driver.set_window_size(1536, 824)
    self.driver.find_element(By.CSS_SELECTOR, ".product-card-
       sizing-wrapper:nth-child(3) span:nth-child(1) > span:nth-
       child(1) > span:nth-child(3)").click()
    self.driver.find_element(By.ID, "nav-certificate").click()
    element = self.driver.find_element(By.ID, "nav-certificate")
    actions = ActionChains(self.driver)
    actions.move_to_element(element).perform()
    element = self.driver.find_element(By.CSS_SELECTOR, "body")
    actions = ActionChains(self.driver)
    actions.move_to_element(element, 0, 0).perform()
    self.driver.find_element(By.LINK_TEXT, "Blog").click()
```

1.13 LeetCode

Selenium IDE Screenshot of LeetCode website.

1.13.1 LeetCode pytest code

```
# Generated by Selenium IDE
import pytest
import time
import json
from selenium import webdriver
from selenium.webdriver.common.by import By
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.support import expected_conditions
from selenium.webdriver.support.wait import WebDriverWait
from selenium.webdriver.common.keys import Keys
from selenium.webdriver.common.desired_capabilities import
   DesiredCapabilities

```

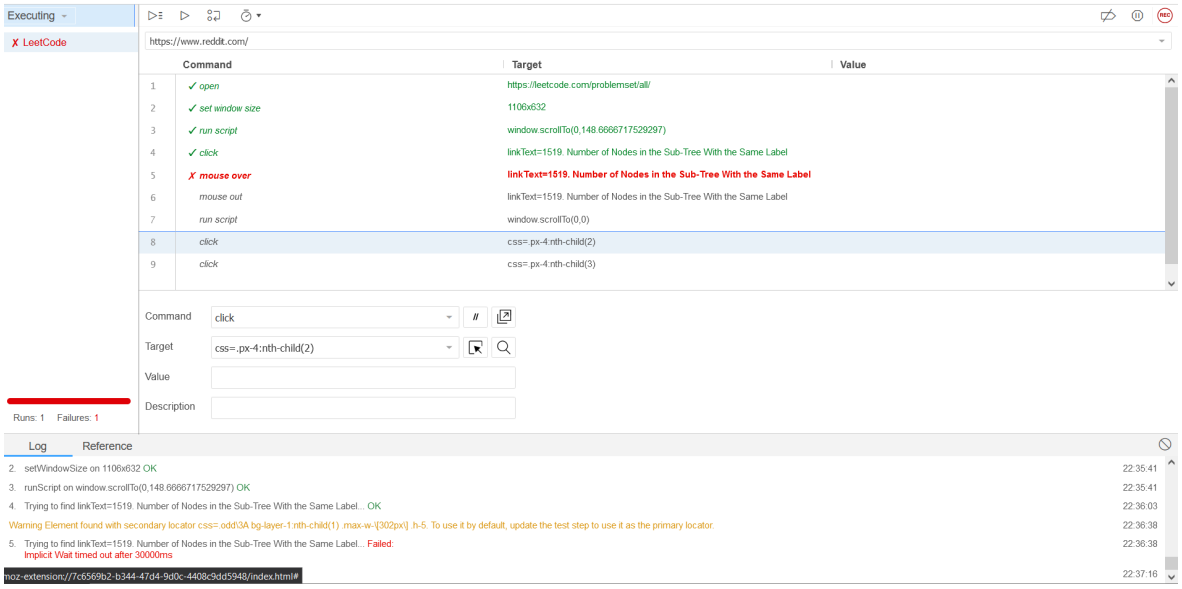

Figure 13: LeetCode Website

```
13 class TestLeetCode():
14   def setup_method(self, method):
15     self.driver = webdriver.Firefox()
16     self.vars = {}
17
18   def teardown_method(self, method):
19     self.driver.quit()
20
21   def test_leetCode(self):
22     self.driver.get("https://leetcode.com/problemset/all/")
23     self.driver.set_window_size(1106, 632)
24     self.driver.execute_script("window.scrollTo
         (0,148.6666717529297)")
25     self.driver.find_element(By.LINK_TEXT, "1519. Number of Nodes
          in the Sub-Tree With the Same Label").click()
26     element = self.driver.find_element(By.LINK_TEXT, "1519.
         Number of Nodes in the Sub-Tree With the Same Label")
27     actions = ActionChains(self.driver)
28     actions.move_to_element(element).perform()
29     element = self.driver.find_element(By.CSS_SELECTOR, "body")
30     actions = ActionChains(self.driver)
31     actions.move_to_element(element, 0, 0).perform()
32     self.driver.execute_script("window.scrollTo(0,0)")
33     self.driver.find_element(By.CSS_SELECTOR, ".px-4:nth-child(2)
         ").click()
34     self.driver.find_element(By.CSS_SELECTOR, ".px-4:nth-child(3)
         ").click()
```

1.14 Allnovel

Selenium IDE Screenshot IRCTC website.

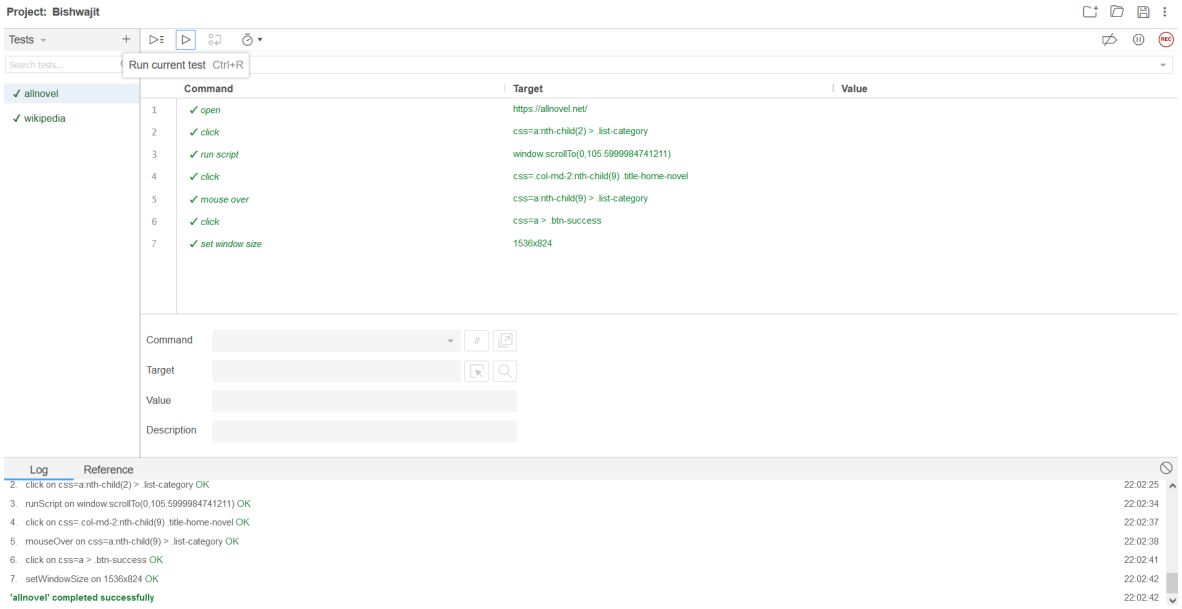

Figure 14: Allnovel Website

1.14.1 Allnovel pytest code

```
# Generated by Selenium IDE
import pytest
import time
import json
from selenium import webdriver
from selenium.webdriver.common.by import By
from selenium.webdriver.common.action_chains import ActionChains
from selenium.webdriver.support import expected_conditions
from selenium.webdriver.support.wait import WebDriverWait
from selenium.webdriver.common.keys import Keys
from selenium.webdriver.common.desired_capabilities import
    DesiredCapabilities

class TestAllnovel():
  def setup_method(self, method):
    self.driver = webdriver.Firefox()
    self.vars = {}

  def teardown_method(self, method):
    self.driver.quit()

  def test_allnovel(self):
    self.driver.get("https://allnovel.net/")
```

```
23      self.driver.find_element(By.CSS_SELECTOR, "a:nth-child(2) > .
            list-category").click()
24      self.driver.execute_script("window.scrollTo
            (0,105.5999984741211)")
25      self.driver.find_element(By.CSS_SELECTOR, ".col-md-2:nth-
            child(9) .title-home-novel").click()
26      element = self.driver.find_element(By.CSS_SELECTOR, "a:nth-
            child(9) > .list-category")
27      actions = ActionChains(self.driver)
28      actions.move_to_element(element).perform()
29      self.driver.find_element(By.CSS_SELECTOR, "a > .btn-success")
            .click()
30      self.driver.set_window_size(1536, 824)
```

1.15 Coursera

Selenium IDE Screenshot of Coursera website.

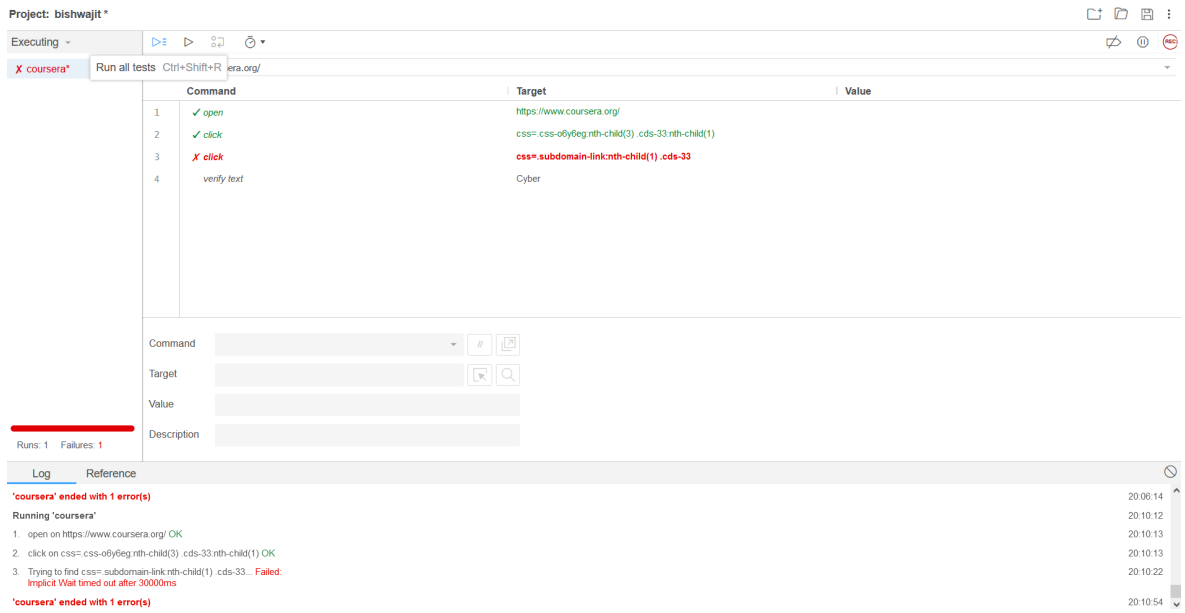

Figure 15: Coursera Website

1.15.1 Failed

Implicit Timed out

CS6474: Software Testing Laboratory 2023

SELENIUM RC

Prepared by
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2 Selenium RC

Selenium RC is a key part in Selenium. It is a framework for testing that allows testers and developers to design test scripts in multiple languages to automate frontend UI test cases. It has a client library and a server that starts and quits the browser sessions by default

Server injects Selenium core (a program in JavaScript) to the browser. The Selenium Core gets the commands from the RC server. Selenium Core executes the commands in JavaScript. Then the JavaScript commands provide instructions to the browser. Finally, the browser runs the instructions given by the Selenium Core and sends a complete status of the execution to the server. This final result is the output received by the user.

Selenium RC is deprecated because of the reasons listed below

Command related usage is present in Selenium RC.

- Selenium RC comprises an additional layer of JavaScript known as the core which makes it slower.
- Selenium RC has complicated and redundant APIs.
- Selenium RC is not compatible with the HTMLUnit browser (required for headless execution).
- Selenium RC has in-built HTML report generation features for test results.
- Selenium RC has selenium.typeKeys and selenium.type APIs which have similar tasks. While Selenium webdriver has only one method sendKeys which takes care of all inputting tasks.
- Selenium RC cannot be used for testing mobile applications like android phones, iphone, iPad, and so on.
- Maintaining a large regression suite is difficult in Selenium RC.
- Additional software and third-party APIs are not supported in Selenium RC.
- Not capable of executing Selenium webdriver scripts from Selenium RC.
- Has in-built report generation features but it is not upto to the mark.
- Installation of Remote Control Server is required prior to running of scripts in Selenium RC.

2.1 Calculator.net

Selenium RC Screenshot of Calculator.net website.

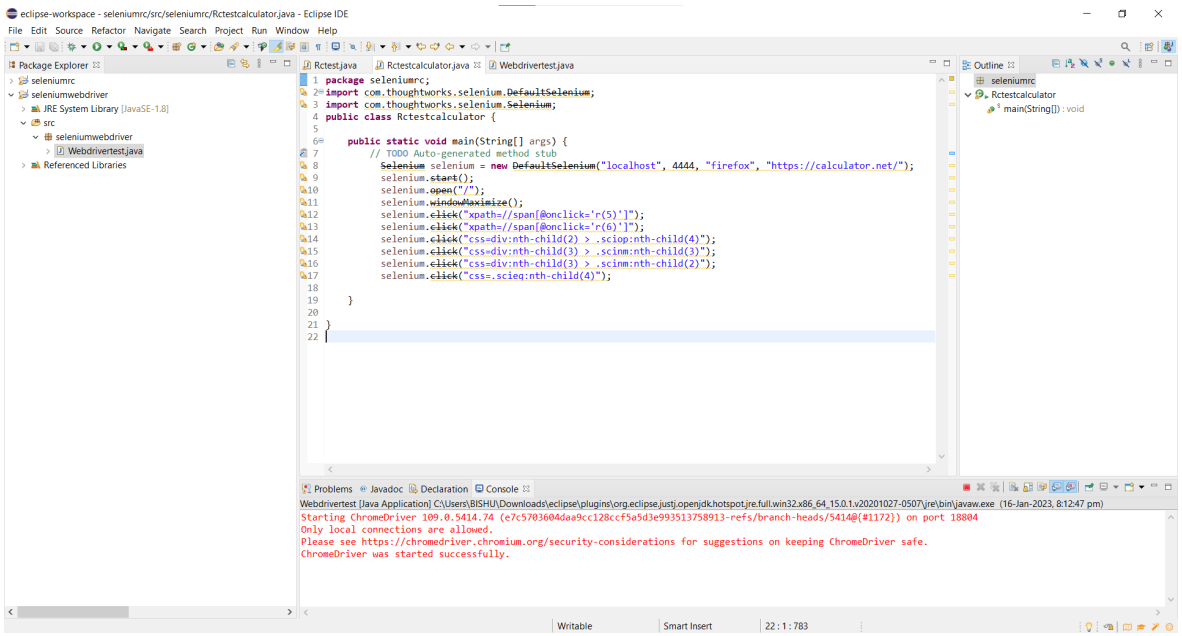

Figure 16: Selenium RC for Calculator.net Website

2.1.1 Selenium RC calculator

```
package seleniumrc;
import com.thoughtworks.selenium.DefaultSelenium;
import com.thoughtworks.selenium.Selenium;
public class Rctestcalculator {

 public static void main(String[] args) {
  // TODO Auto-generated method stub
    Selenium selenium = new DefaultSelenium("localhost", 4444, "
       firefox", "https://calculator.net/");
    selenium.start();
    selenium.open("/");
    selenium.windowMaximize();
    selenium.click("xpath=//span[@onclick='r(5)']");
    selenium.click("xpath=//span[@onclick='r(6)']");
    selenium.click("css=div:nth-child(2) > .sciop:nth-child(4)");
    selenium.click("css=div:nth-child(3) > .scinm:nth-child(3)");
    selenium.click("css=div:nth-child(3) > .scinm:nth-child(2)");
    selenium.click("css=.scieq:nth-child(4)");

 }
}
```

2.2 Coursera

Selenium RC Screenshot of Coursera website.

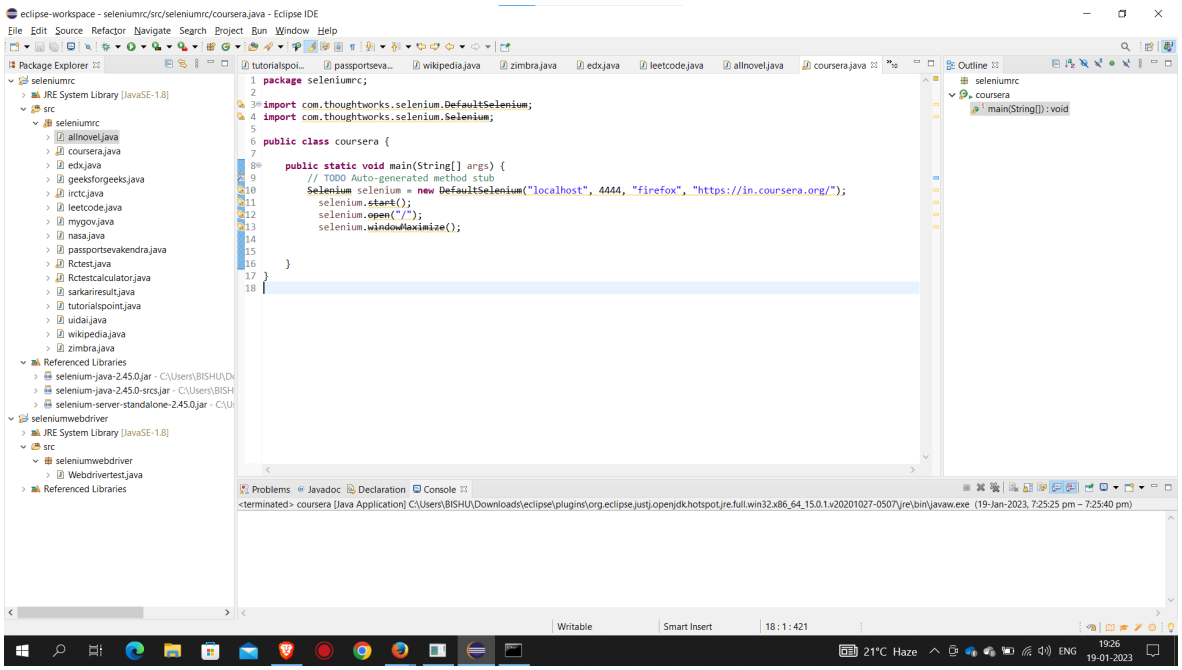

Figure 17: Selenium RC for Coursera Website

2.2.1 Selenium RC Coursera

```
1  package seleniumrc;
2
3  import com.thoughtworks.selenium.DefaultSelenium;
4  import com.thoughtworks.selenium.Selenium;
5
6  public class coursera {
7
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   Selenium selenium = new DefaultSelenium("localhost", 4444, "
       firefox", "https://in.coursera.org/");
11     selenium.start();
12     selenium.open("/");
13     selenium.windowMaximize();
14
15
16  }
17 }
```

2.3 IRCTC

Selenium RC Screenshot of IRCTC website.

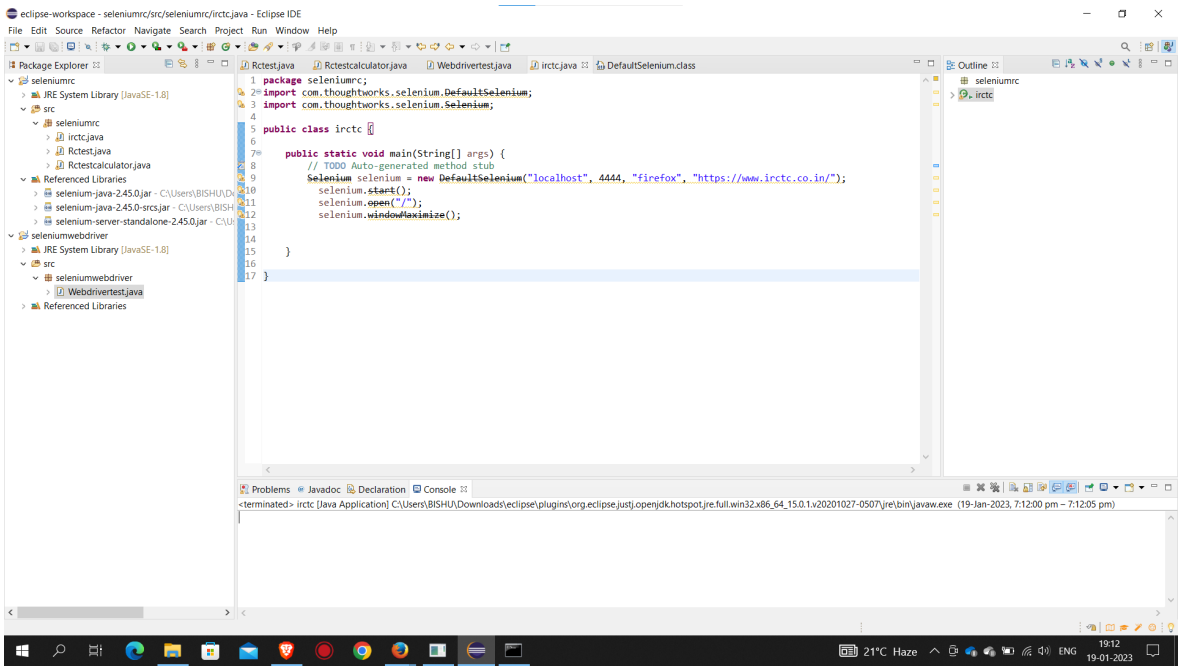

Figure 18: Selenium RC for IRCTC Website

2.3.1 Selenium RC IRCTC

```
1  package seleniumrc;
2  import com.thoughtworks.selenium.DefaultSelenium;
3  import com.thoughtworks.selenium.Selenium;
4
5  public class irctc {
6
7   public static void main(String[] args) {
8    // TODO Auto-generated method stub
9    Selenium selenium = new DefaultSelenium("localhost", 4444, "
       firefox", "https://www.irctc.co.in/");
10     selenium.start();
11     selenium.open("/");
12     selenium.windowMaximize();
13
14
15  }
16
17 }
```

2.4 Allnovel

Selenium RC Screenshot of Allnovel website.

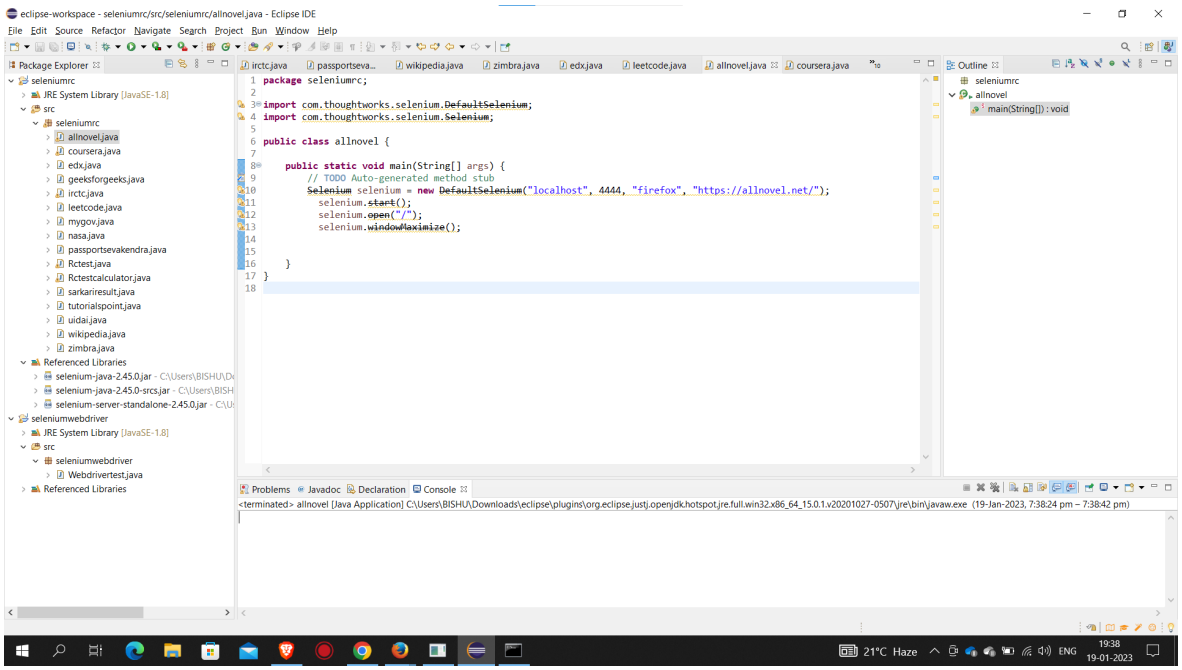

Figure 19: Selenium RC for Allnovel Website

2.4.1 Selenium RC Allnovel

```
1  package seleniumrc;
2
3  import com.thoughtworks.selenium.DefaultSelenium;
4  import com.thoughtworks.selenium.Selenium;
5
6  public class allnovel {
7
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   Selenium selenium = new DefaultSelenium("localhost", 4444, "
       firefox", "https://allnovel.net/");
11     selenium.start();
12     selenium.open("/");
13     selenium.windowMaximize();
14
15
16  }
17 }
```

2.5 EDX

Selenium RC Screenshot of EDX website.

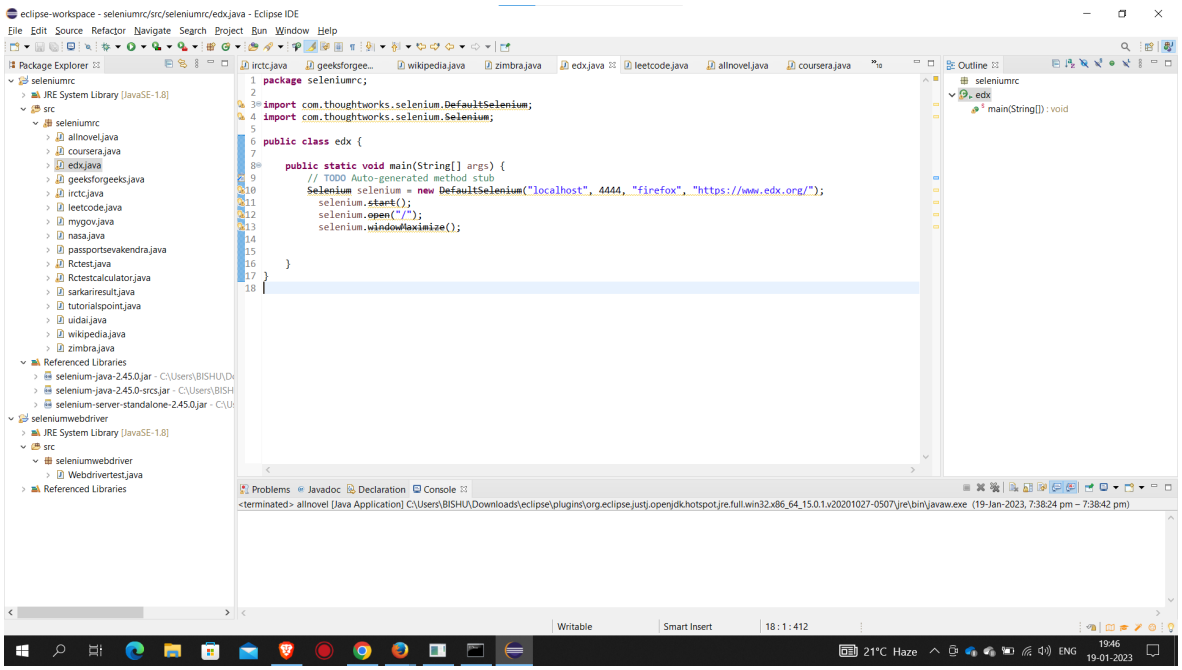

Figure 20: Selenium RC for EDX Website

2.5.1 Selenium RC EDX

```
1  package seleniumrc;
2
3  import com.thoughtworks.selenium.DefaultSelenium;
4  import com.thoughtworks.selenium.Selenium;
5
6  public class edx {
7
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   Selenium selenium = new DefaultSelenium("localhost", 4444, "
       firefox", "https://www.edx.org/");
11     selenium.start();
12     selenium.open("/");
13     selenium.windowMaximize();
14
15
16  }
17 }
```

2.6 Geeksforgeeks

Selenium RC Screenshot of Geeksforgeeks website.

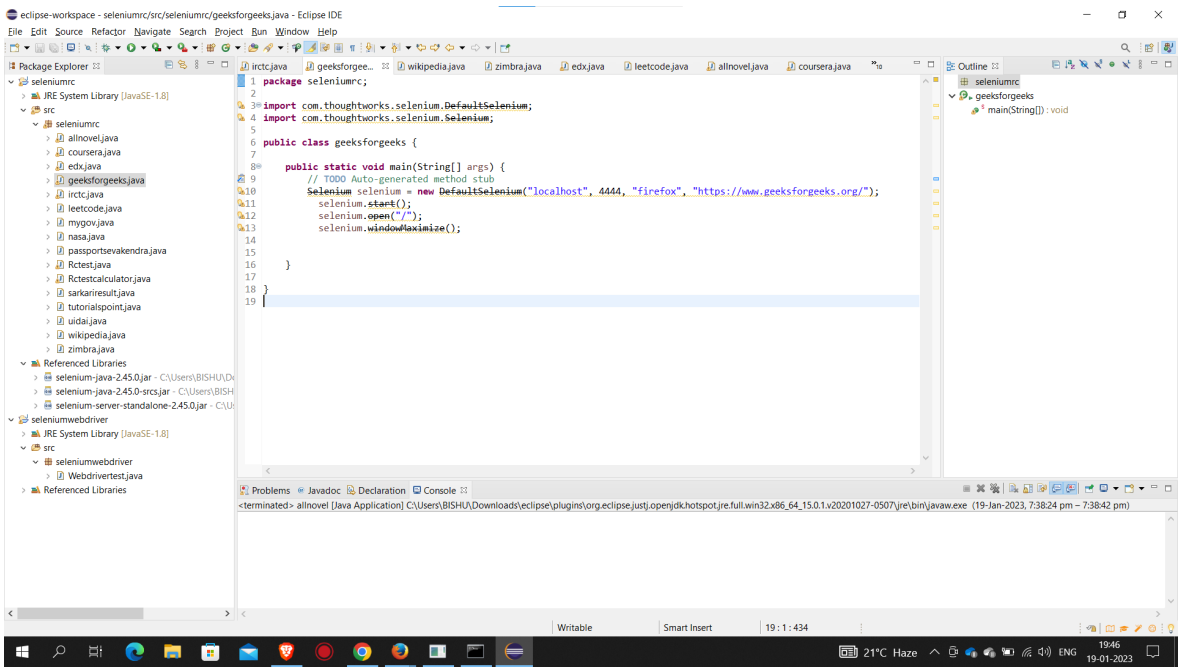

Figure 21: Selenium RC for Geeksforgeeks Website

2.6.1 Selenium RC Geeksforgeeks

```
1  package seleniumrc;
2
3  import com.thoughtworks.selenium.DefaultSelenium;
4  import com.thoughtworks.selenium.Selenium;
5
6  public class geeksforgeeks {
7
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   Selenium selenium = new DefaultSelenium("localhost", 4444, "
        firefox", "https://www.geeksforgeeks.org/");
11     selenium.start();
12     selenium.open("/");
13     selenium.windowMaximize();
14
15
16  }
17
18 }
```

2.7 Leetcode

Selenium RC Screenshot of Leetcode website.

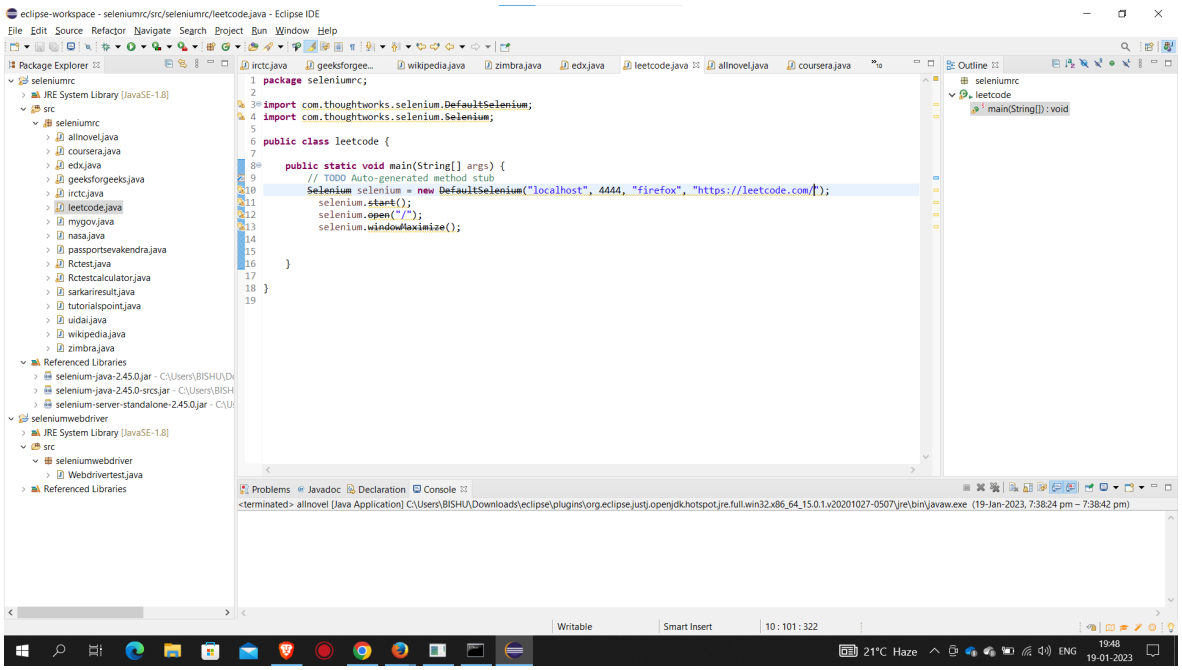

Figure 22: Selenium RC for Leetcode Website

2.7.1 Selenium RC Leetcode

```
1  package seleniumrc;
2
3  import com.thoughtworks.selenium.DefaultSelenium;
4  import com.thoughtworks.selenium.Selenium;
5
6  public class leetcode {
7
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   Selenium selenium = new DefaultSelenium("localhost", 4444, "
        firefox", "https://leetcode.com/");
11     selenium.start();
12     selenium.open("/");
13     selenium.windowMaximize();
14
15
16  }
17
18 }
```

2.8 NASA

Selenium RC Screenshot of NASA website.

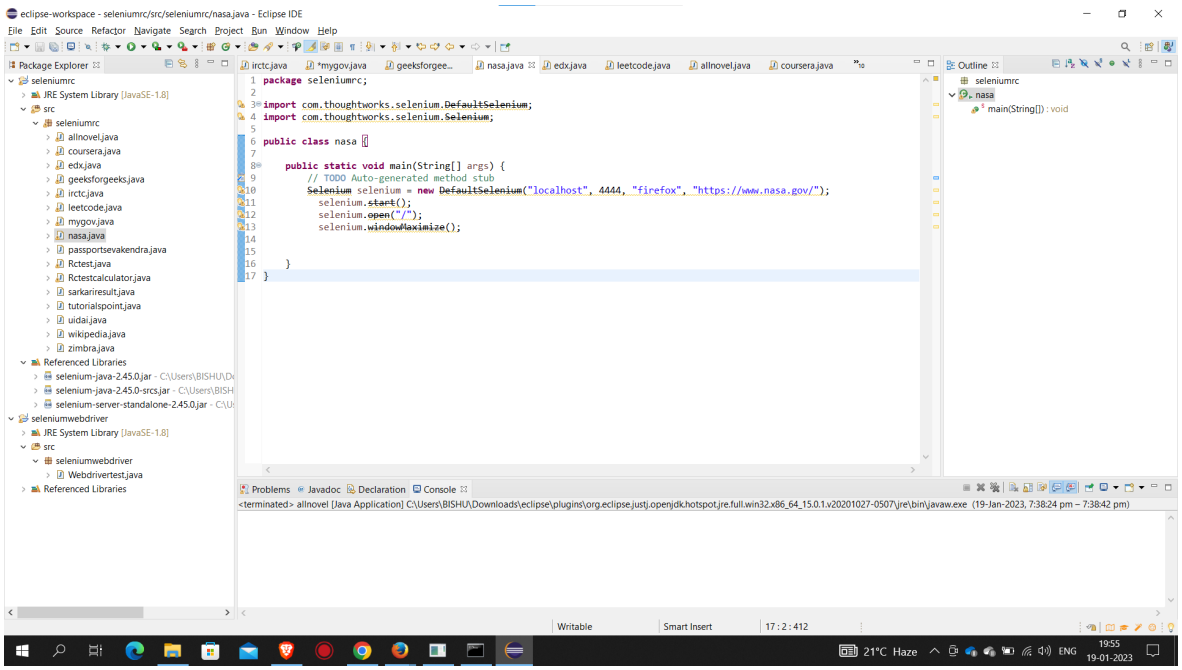

Figure 23: Selenium RC for NASA Website

2.8.1 Selenium RC NASA

```
1  package seleniumrc;
2
3  import com.thoughtworks.selenium.DefaultSelenium;
4  import com.thoughtworks.selenium.Selenium;
5
6  public class nasa {
7
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   Selenium selenium = new DefaultSelenium("localhost", 4444, "
       firefox", "https://www.nasa.gov/");
11     selenium.start();
12     selenium.open("/");
13     selenium.windowMaximize();
14
15
16  }
17 }
```

2.9 MyGov

Selenium RC Screenshot of MyGov website.

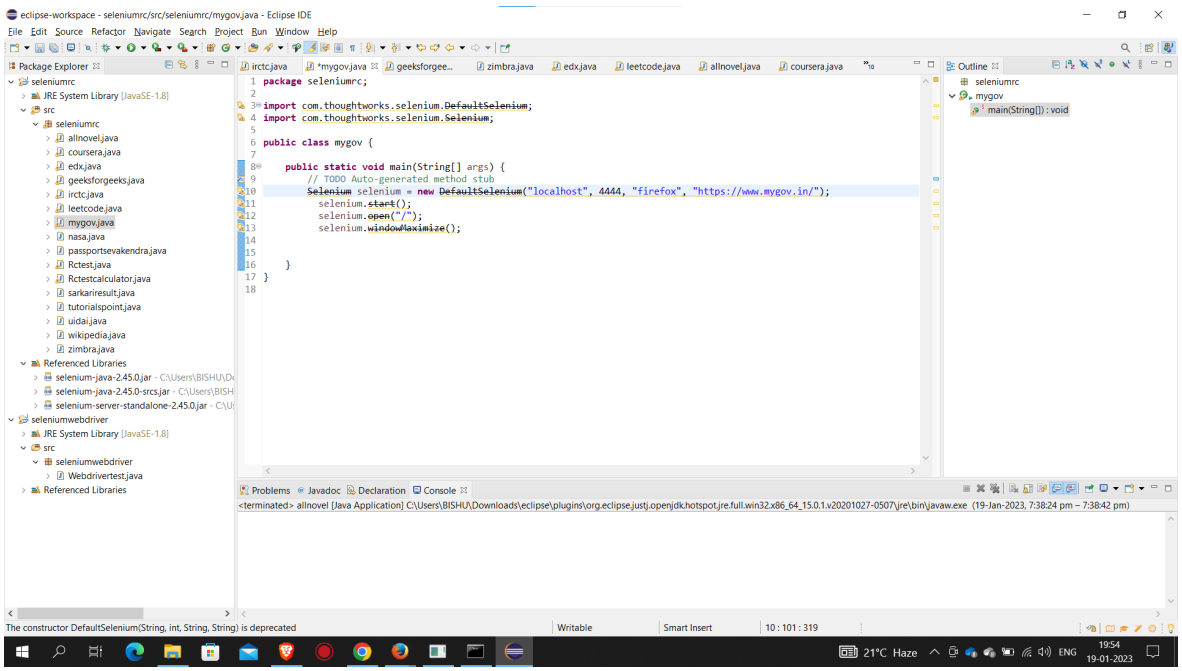

Figure 24: Selenium RC for MyGov Website

2.9.1 Selenium RC MyGov

```
1  package seleniumrc;
2
3  import com.thoughtworks.selenium.DefaultSelenium;
4  import com.thoughtworks.selenium.Selenium;
5
6  public class mygov {
7
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   Selenium selenium = new DefaultSelenium("localhost", 4444, "
        firefox", "https://www.mygov.in/");
11     selenium.start();
12     selenium.open("/");
13     selenium.windowMaximize();
14
15
16  }
17 }
```

2.10 PassportIndia

Selenium RC Screenshot of PassportIndia website.

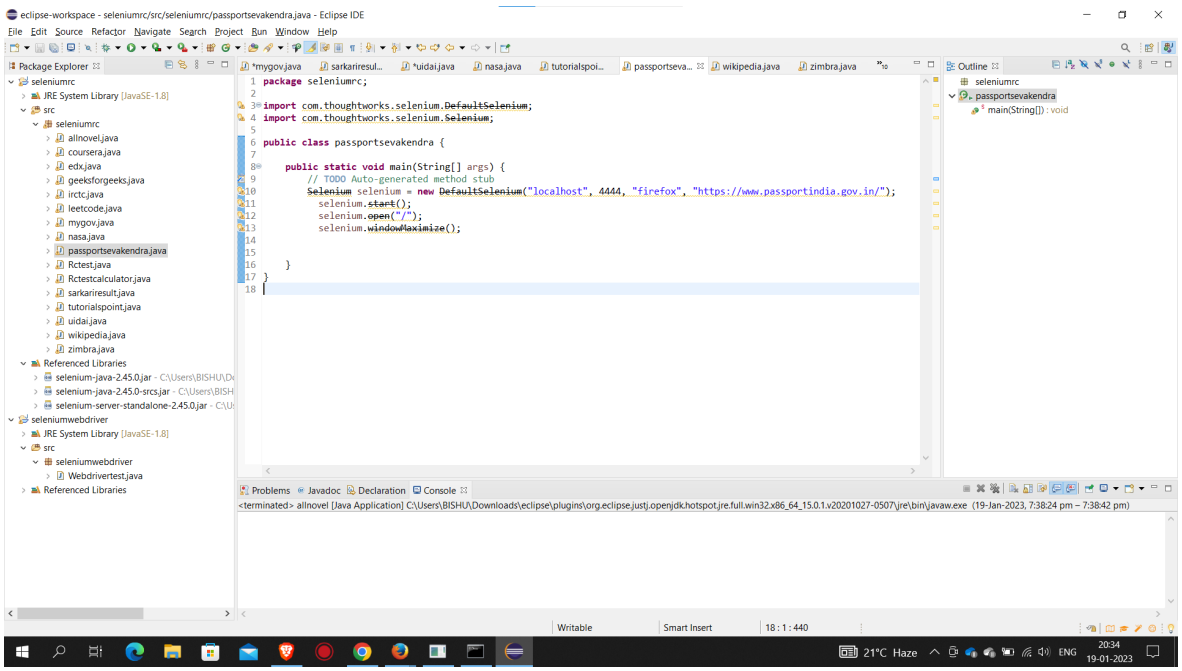

Figure 25: Selenium RC for PassportIndia Website

2.10.1 Selenium RC PassportIndia

```
1  package seleniumrc;
2
3  import com.thoughtworks.selenium.DefaultSelenium;
4  import com.thoughtworks.selenium.Selenium;
5
6  public class passportsevakendra {
7
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   Selenium selenium = new DefaultSelenium("localhost", 4444, "
       firefox", "https://www.passportindia.gov.in/");
11     selenium.start();
12     selenium.open("/");
13     selenium.windowMaximize();
14
15
16  }
17 }
```

2.11 Sarkariresult

Selenium RC Screenshot of Sarkariresult website.

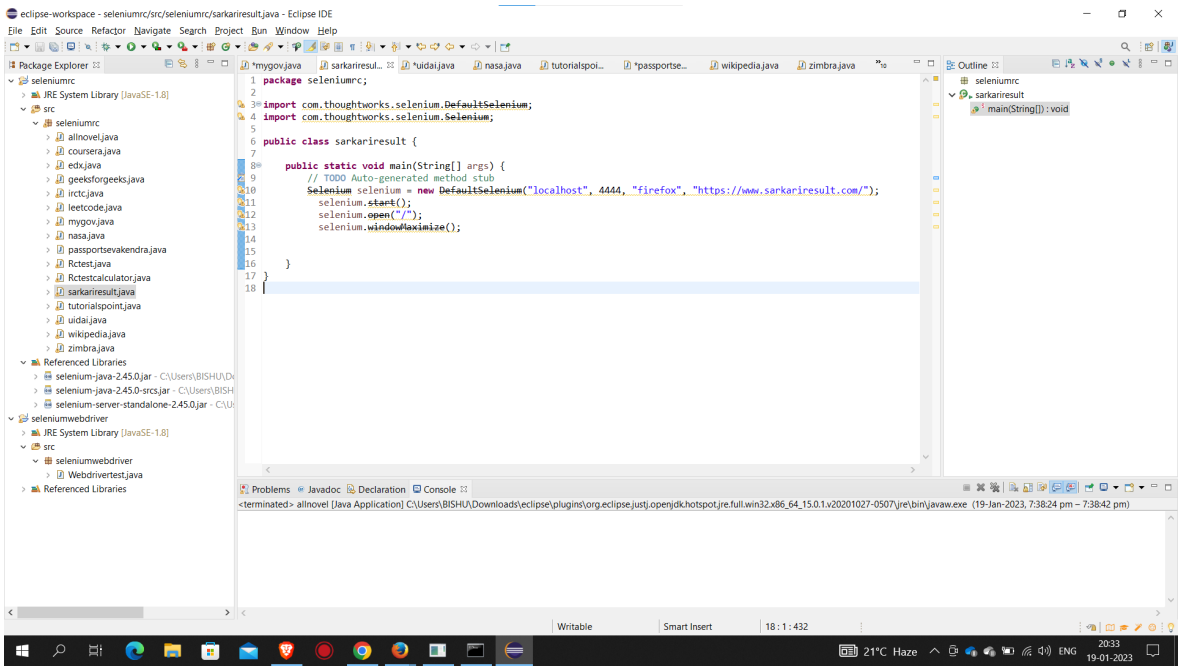

Figure 26: Selenium RC for Sarkariresult Website

2.11.1 Selenium RC Sarkariresult

```
1  package seleniumrc;
2
3  import com.thoughtworks.selenium.DefaultSelenium;
4  import com.thoughtworks.selenium.Selenium;
5
6  public class sarkariresult {
7
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   Selenium selenium = new DefaultSelenium("localhost", 4444, "
       firefox", "https://www.sarkariresult.com/");
11     selenium.start();
12     selenium.open("/");
13     selenium.windowMaximize();
14
15
16  }
17 }
```

2.12 Tutorialspoint

Selenium RC Screenshot of Tutorialspoint website.

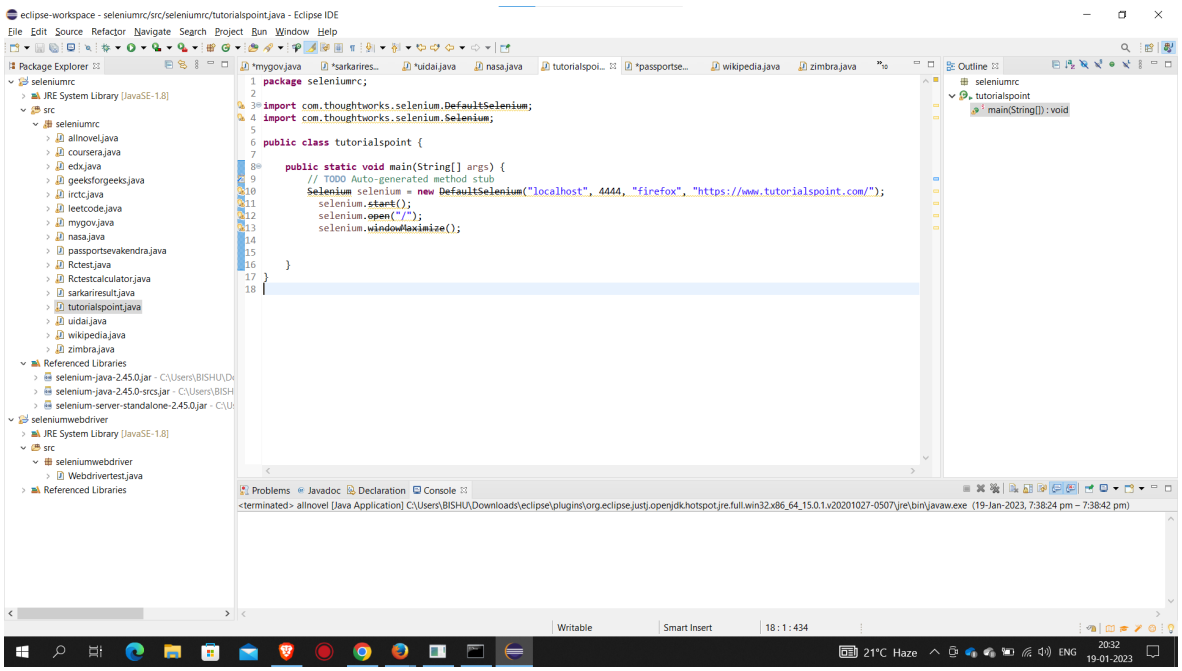

Figure 27: Selenium RC for Tutorialspoint Website

2.12.1 Selenium RC Tutorialspoint

```
1  package seleniumrc;
2
3  import com.thoughtworks.selenium.DefaultSelenium;
4  import com.thoughtworks.selenium.Selenium;
5
6  public class tutorialspoint {
7
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   Selenium selenium = new DefaultSelenium("localhost", 4444, "
       firefox", "https://www.tutorialspoint.com/");
11     selenium.start();
12     selenium.open("/");
13     selenium.windowMaximize();
14
15
16  }
17 }
```

2.13 Wikipedia

Selenium RC Screenshot of wikipedia website.

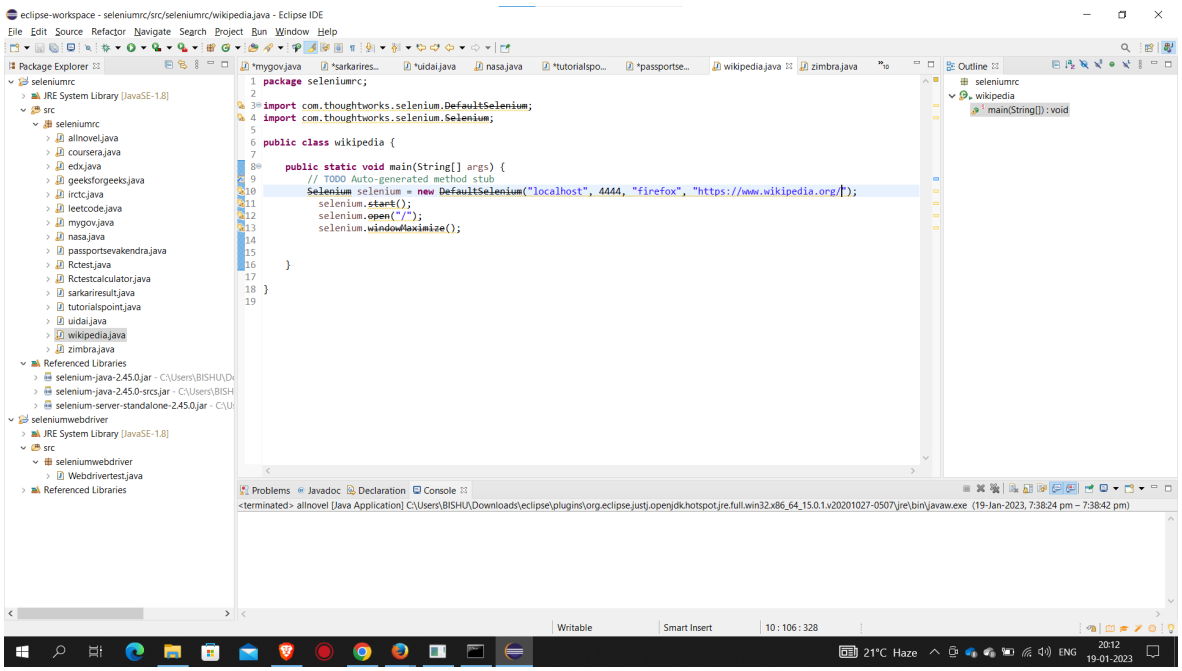

Figure 28: Selenium RC for wikipedia Website

2.13.1 Selenium RC wikipedia

```
1  package seleniumrc;
2
3  import com.thoughtworks.selenium.DefaultSelenium;
4  import com.thoughtworks.selenium.Selenium;
5
6  public class wikipedia {
7
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   Selenium selenium = new DefaultSelenium("localhost", 4444, "
       firefox", "https://www.wikipedia.org/");
11     selenium.start();
12     selenium.open("/");
13     selenium.windowMaximize();
14
15
16  }
17
18 }
```

2.14 UIDAI

Selenium RC Screenshot of UIDAI website.

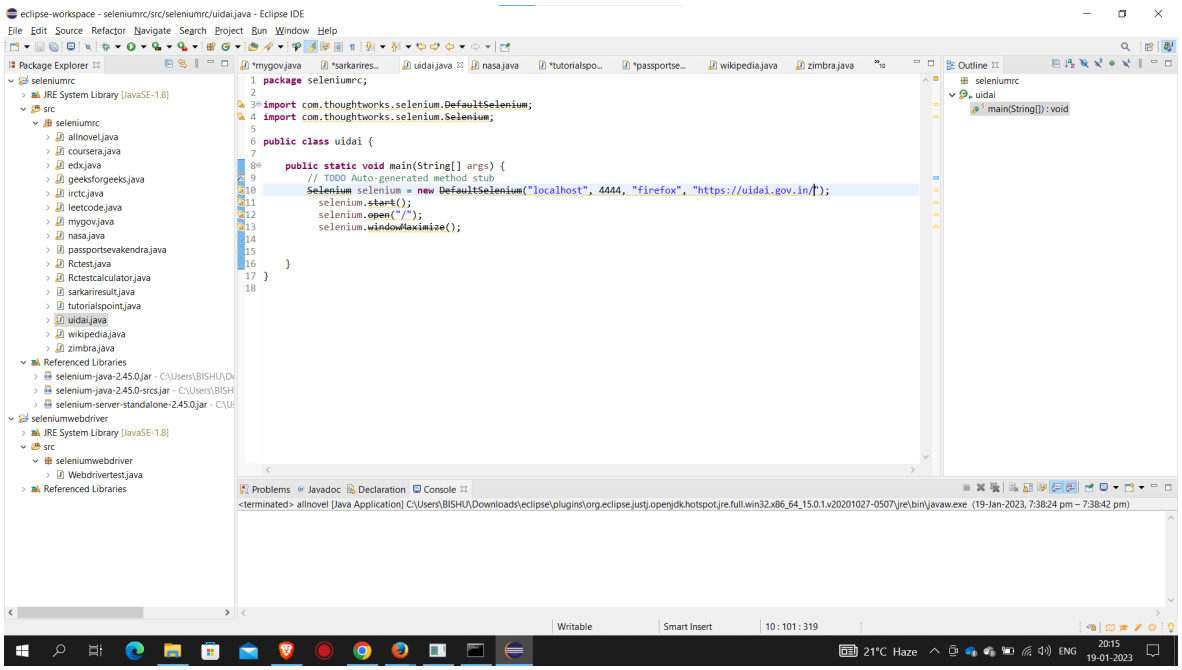

Figure 29: Selenium RC for UIDAI Website

2.14.1 Selenium RC UIDAI

```
1  package seleniumrc;
2  import com.thoughtworks.selenium.DefaultSelenium;
3  import com.thoughtworks.selenium.Selenium;
4
5  public class irctc {
6
7   public static void main(String[] args) {
8    // TODO Auto-generated method stub
9    Selenium selenium = new DefaultSelenium("localhost", 4444, "
       firefox", "https://www.irctc.co.in/");
10     selenium.start();
11     selenium.open("/");
12     selenium.windowMaximize();
13
14
15  }
16
17 }
```

2.15 Zimbra

Selenium RC Screenshot of Zimbra website.

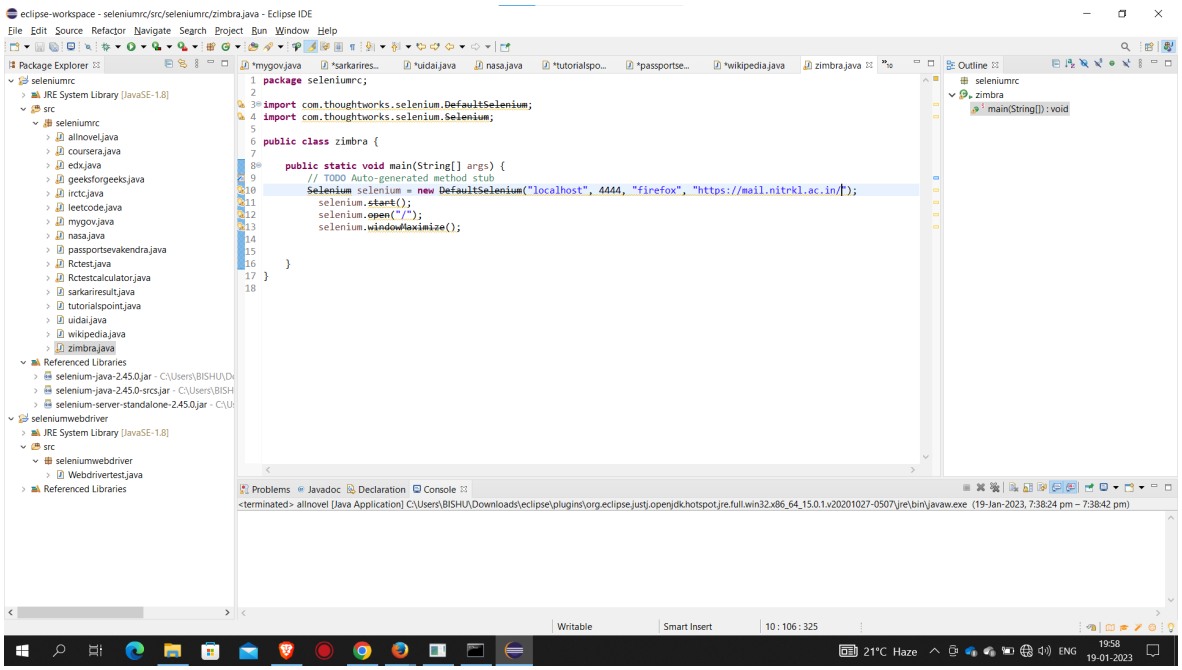

Figure 30: Selenium RC for Zimbra Website

2.15.1 Selenium RC Zimbra

```
1  package seleniumrc;
2
3  import com.thoughtworks.selenium.DefaultSelenium;
4  import com.thoughtworks.selenium.Selenium;
5
6  public class zimbra {
7
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   Selenium selenium = new DefaultSelenium("localhost", 4444, "
       firefox", "https://mail.nitrkl.ac.in/");
11     selenium.start();
12     selenium.open("/");
13     selenium.windowMaximize();
14
15
16  }
17 }
```

CS6474: Software Testing Laboratory 2023

SELENIUM WEBDRIVER

Prepared by
BISHWAJIT PRASAD GOND
222CS3113

3 Selenium WebDriver

Selenium WebDriver is the most important component of Selenium Tool's Suite. The latest release "Selenium 2.0" is integrated with WebDriver API which provides a simpler and more concise programming interface.

The following image will give you a fair understanding of Selenium components and the Test Automation Tools.

Selenium WebDriver was first introduced as a part of Selenium v2.0. The initial version of Selenium i.e Selenium v1 consisted of only IDE, WebDriver and Grid. However, with the release of Selenium v3, WebDriver has been deprecated and moved to legacy package.

In WebDriver, test scripts can be developed using any of the supported programming languages and can be run directly in most modern web browsers. Languages supported by WebDriver include C#, Java, Perl, PHP, Python and Ruby.

3.1 Google Search

Selenium WebDriver Screenshot of Calculator.net website.

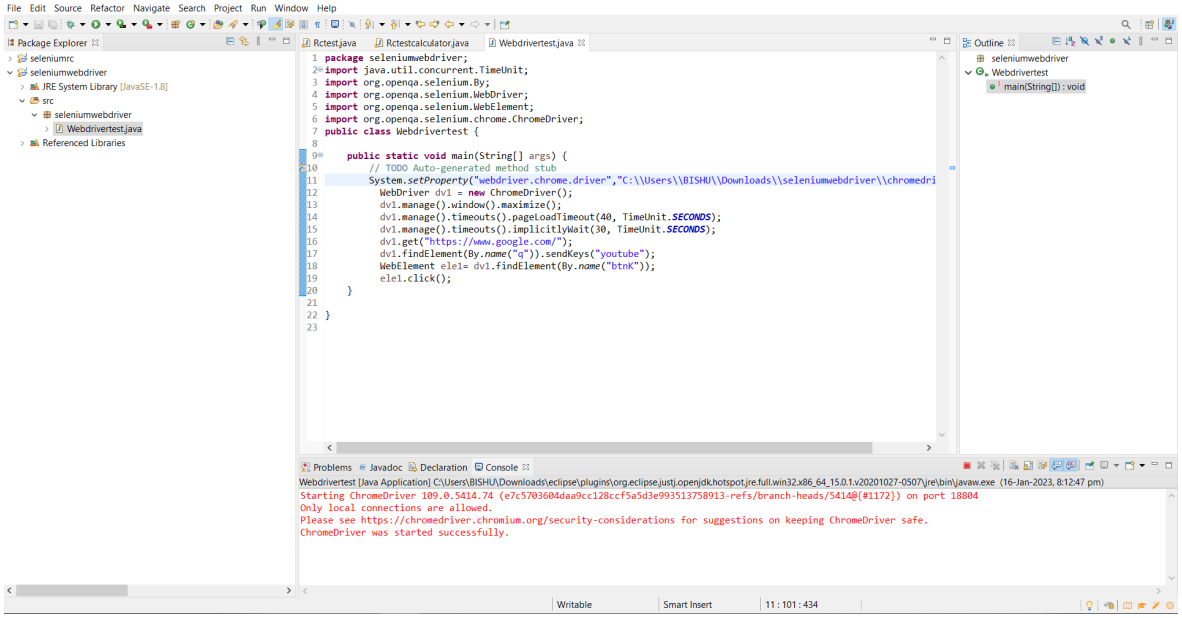

Figure 31: Google search WebDrive

3.1.1 Selenium WebDriver google search

```
1  package seleniumwebdriver;
2  import java.util.concurrent.TimeUnit;
3  import org.openqa.selenium.By;
4  import org.openqa.selenium.WebDriver;
5  import org.openqa.selenium.WebElement;
6  import org.openqa.selenium.chrome.ChromeDriver;
7  public class Webdrivertest {
8
9   public static void main(String[] args) {
10   // TODO Auto-generated method stub
11   System.setProperty("webdriver.chrome.driver","C:\\Users\\BISHU
       \\Downloads\\seleniumwebdriver\\chromedriver.exe");
12     WebDriver dv1 = new ChromeDriver();
13     dv1.manage().window().maximize();
14     dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
         ;
15     dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
16     dv1.get("https://www.google.com/");
17     dv1.findElement(By.name("q")).sendKeys("youtube");
18     WebElement ele1= dv1.findElement(By.name("btnK"));
19     ele1.click();
20   }
21 }
```

3.2 Calculator.net

Selenium WebDriver Screenshot of Calculator.net website.

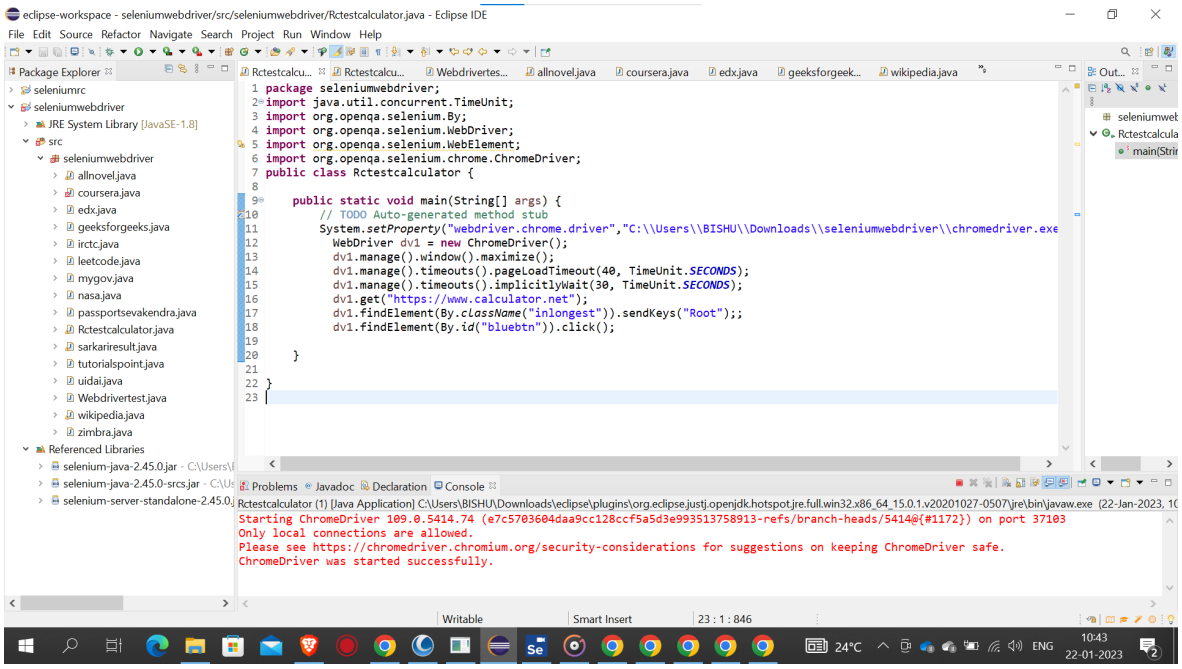

Figure 32: Selenium WebDriver for Calculator.net Website

3.2.1 Selenium WebDriver calculator

```
1  package seleniumwebdriver;
2  import java.util.concurrent.TimeUnit;
3  import org.openqa.selenium.By;
4  import org.openqa.selenium.WebDriver;
5  import org.openqa.selenium.WebElement;
6  import org.openqa.selenium.chrome.ChromeDriver;
7  public class calculator {
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   System.setProperty("webdriver.chrome.driver","C:\\Users\\BISHU
       \\Downloads\\seleniumwebdriver\\chromedriver.exe");
11     WebDriver dv1 = new ChromeDriver();
12     dv1.manage().window().maximize();
13     dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
         ;
14     dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
15     dv1.get("https://www.calculator.net");
16     dv1.findElement(By.className("inlongest")).sendKeys("Root");;
17     dv1.findElement(By.id("bluebtn")).click();
18   }
19 }
```

3.3 Coursera

Selenium WebDriver Screenshot of Coursera website.

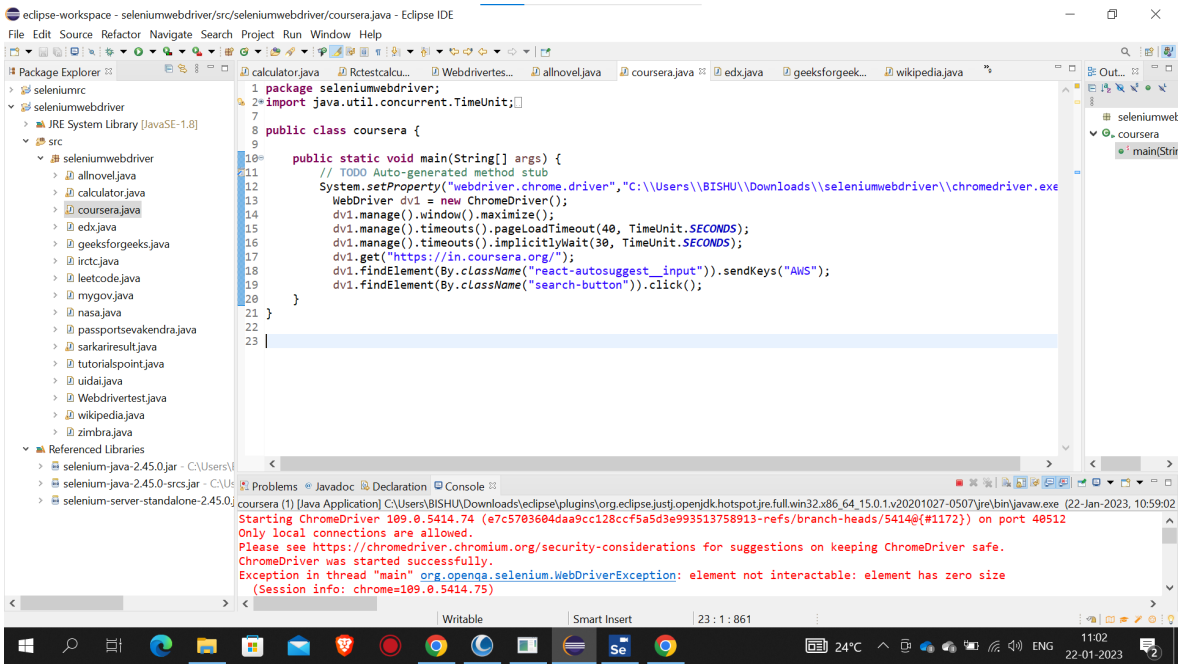

Figure 33: Selenium WebDriver for Coursera Website

3.3.1 Selenium WebDriver Coursera

```
1  package seleniumwebdriver;
2  import java.util.concurrent.TimeUnit;
3  import org.openqa.selenium.By;
4  import org.openqa.selenium.WebDriver;
5  import org.openqa.selenium.WebElement;
6  import org.openqa.selenium.chrome.ChromeDriver;
7  public class coursera {
8   public static void main(String[] args) {
9   System.setProperty("webdriver.chrome.driver","C:\\Users\\BISHU\\
       Downloads\\seleniumwebdriver\\chromedriver.exe");
10     WebDriver dv1 = new ChromeDriver();
11     dv1.manage().window().maximize();
12     dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
          ;
13     dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
14     dv1.get("https://in.coursera.org/");
15     dv1.findElement(By.className("react-autosuggest__input")).
          sendKeys("AWS");
16     dv1.findElement(By.className("search-button")).click();
17   }
18 }
```

3.4 IRCTC

Selenium WebDriver Screenshot of IRCTC website.

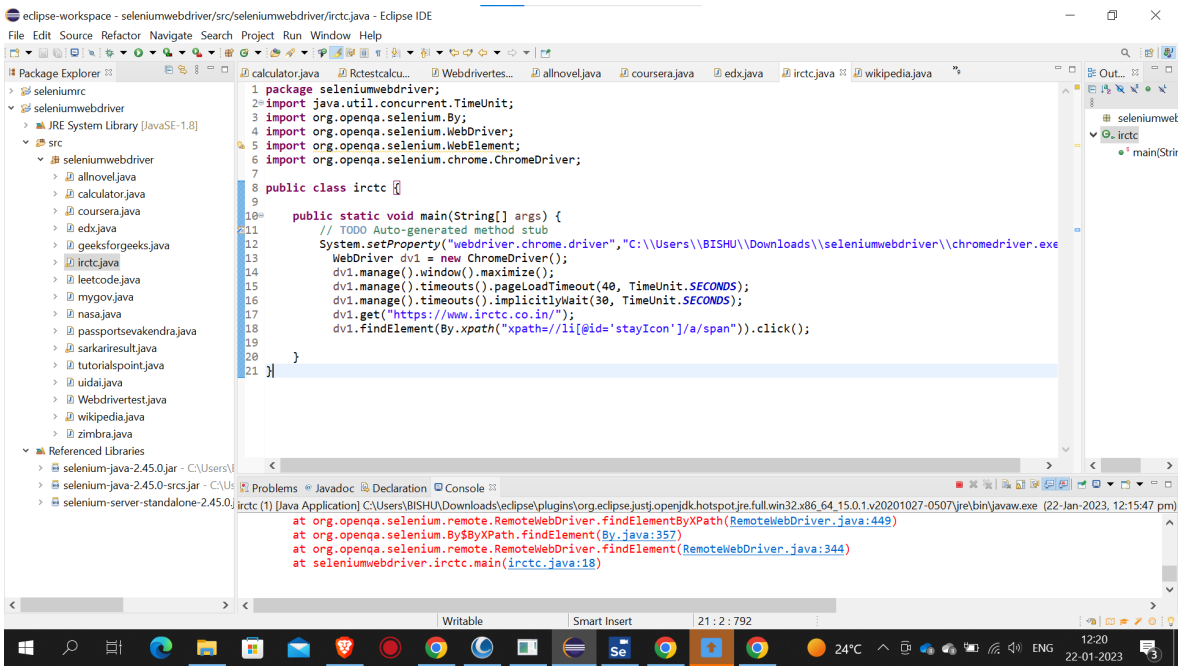

Figure 34: Selenium WebDriver for IRCTC Website

3.4.1 Selenium WebDriver IRCTC

```
1  package seleniumwebdriver;
2  import java.util.concurrent.TimeUnit;
3  import org.openqa.selenium.By;
4  import org.openqa.selenium.WebDriver;
5  import org.openqa.selenium.WebElement;
6  import org.openqa.selenium.chrome.ChromeDriver;
7
8  public class irctc {
9
10  public static void main(String[] args) {
11   // TODO Auto-generated method stub
12   System.setProperty("webdriver.chrome.driver","C:\\Users\\BISHU
        \\Downloads\\seleniumwebdriver\\chromedriver.exe");
13     WebDriver dv1 = new ChromeDriver();
14     dv1.manage().window().maximize();
15     dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
          ;
16     dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
17     dv1.get("https://www.irctc.co.in/");
18     dv1.findElement(By.xpath("xpath=//li[@id='stayIcon']/a/span")
          ).click();
```

```
19
20   }
21 }
```

3.5 Allnovel

Selenium WebDriver Screenshot of Allnovel website.

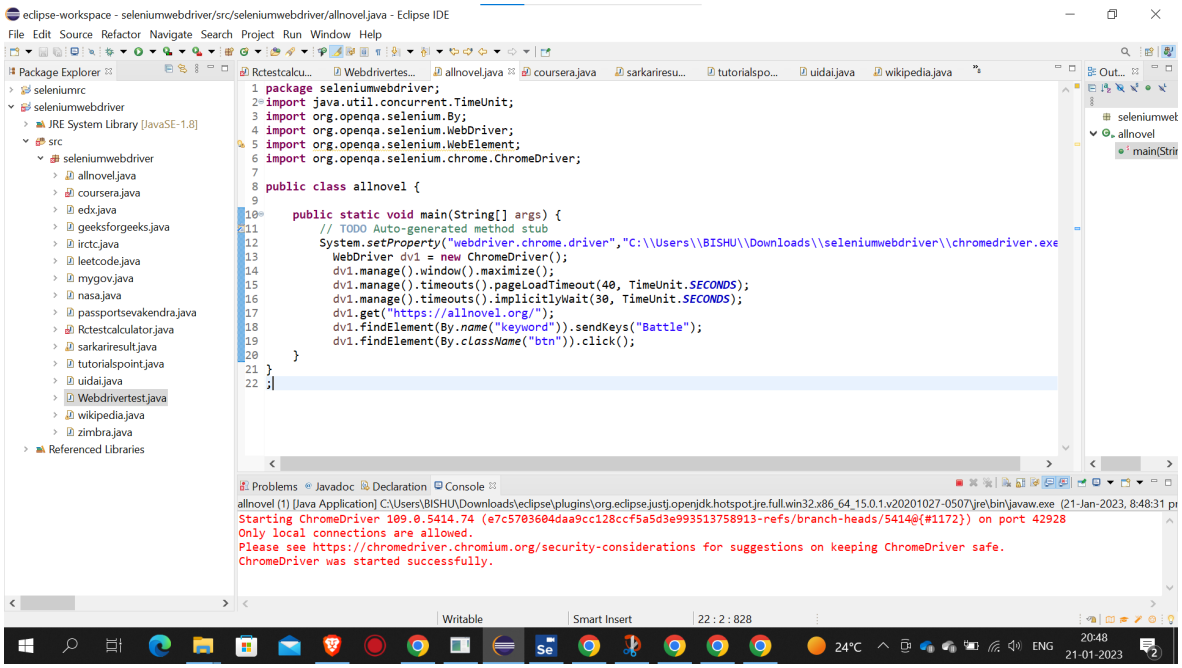

Figure 35: Selenium WebDriver for Allnovel Website

3.5.1 Selenium WebDriver Allnovel

```
1  package seleniumwebdriver;
2  import java.util.concurrent.TimeUnit;
3  import org.openqa.selenium.By;
4  import org.openqa.selenium.WebDriver;
5  import org.openqa.selenium.WebElement;
6  import org.openqa.selenium.chrome.ChromeDriver;
7  public class allnovel {
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub  System.setProperty("
       webdriver.chrome.driver","C:\\Users\\BISHU\\Downloads\\
       seleniumwebdriver\\chromedriver.exe");
10     WebDriver dv1 = new ChromeDriver();
11     dv1.manage().window().maximize();
12     dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
         ;
13     dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
```

```
    dv1.get("https://allnovel.org/");
    dv1.findElement(By.name("keyword")).sendKeys("Battle");
    dv1.findElement(By.className("btn")).click();
 }
}
;
```

3.6 EDX

Selenium WebDriver Screenshot of EDX website.

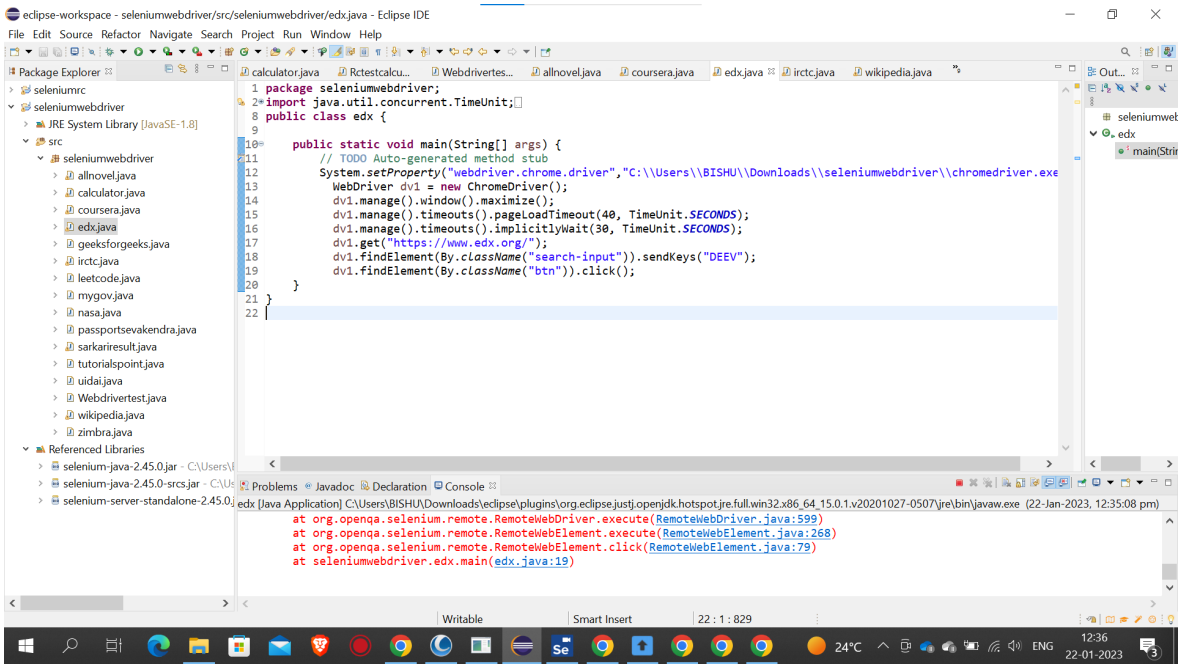

Figure 36: Selenium WebDriver for EDX Website

3.6.1 Selenium WebDriver EDX

```
package seleniumwebdriver;
import java.util.concurrent.TimeUnit;

import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;
public class edx {

 public static void main(String[] args) {
  // TODO Auto-generated method stub
  System.setProperty("webdriver.chrome.driver","C:\\Users\\BISHU
     \\Downloads\\seleniumwebdriver\\chromedriver.exe");
```

```
13      WebDriver dv1 = new ChromeDriver();
14      dv1.manage().window().maximize();
15      dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
            ;
16      dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
17      dv1.get("https://www.edx.org/");
18      dv1.findElement(By.className("search-input")).sendKeys("DEEV"
            );
19      dv1.findElement(By.className("btn")).click();
20  }
21  }
```

3.7 Geeksforgeeks

Selenium WebDriver Screenshot of Geeksforgeeks website.

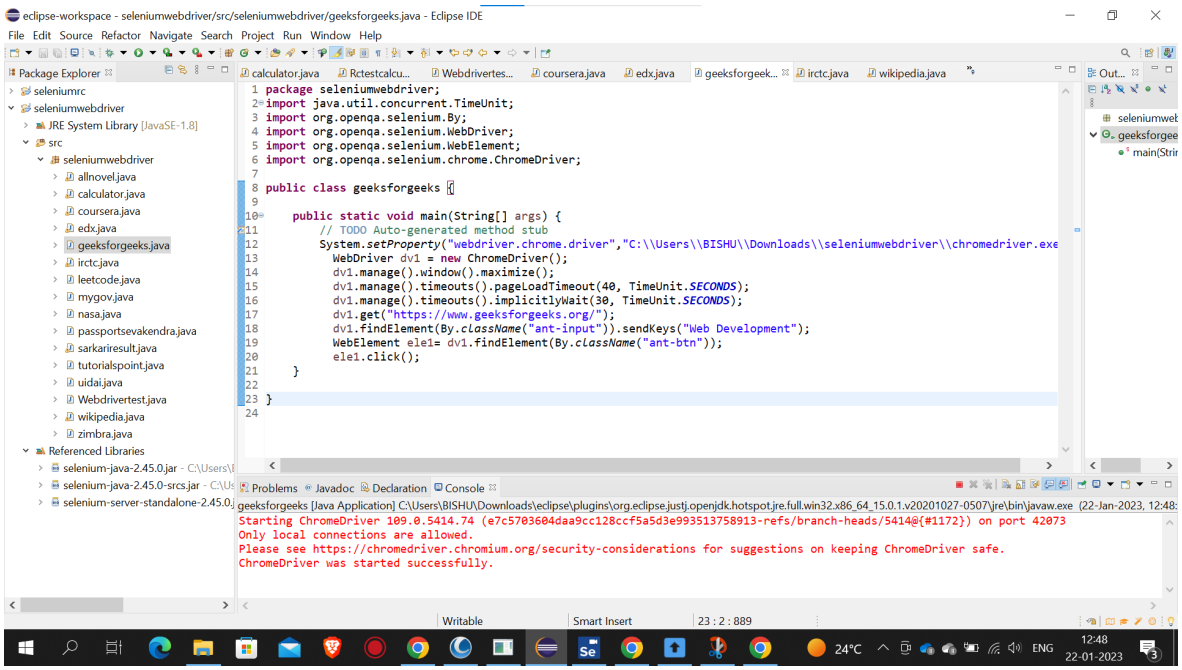

Figure 37: Selenium WebDriver for Geeksforgeeks Website

3.7.1 Selenium WebDriver Geeksforgeeks

```
1  package seleniumwebdriver;
2  import java.util.concurrent.TimeUnit;
3  import org.openqa.selenium.By;
4  import org.openqa.selenium.WebDriver;
5  import org.openqa.selenium.WebElement;
6  import org.openqa.selenium.chrome.ChromeDriver;
7
8  public class geeksforgeeks {
```

```
9
10  public static void main(String[] args) {
11   // TODO Auto-generated method stub
12   System.setProperty("webdriver.chrome.driver","C:\\Users\\BISHU
        \\Downloads\\seleniumwebdriver\\chromedriver.exe");
13     WebDriver dv1 = new ChromeDriver();
14     dv1.manage().window().maximize();
15     dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
          ;
16     dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
17     dv1.get("https://www.geeksforgeeks.org/");
18     dv1.findElement(By.className("ant-input")).sendKeys("Web
          Development");
19     WebElement ele1= dv1.findElement(By.className("ant-btn"));
20     ele1.click();
21  }
22
23 }
```

3.8 Youtube

Selenium WebDriver Screenshot of Youtube website.

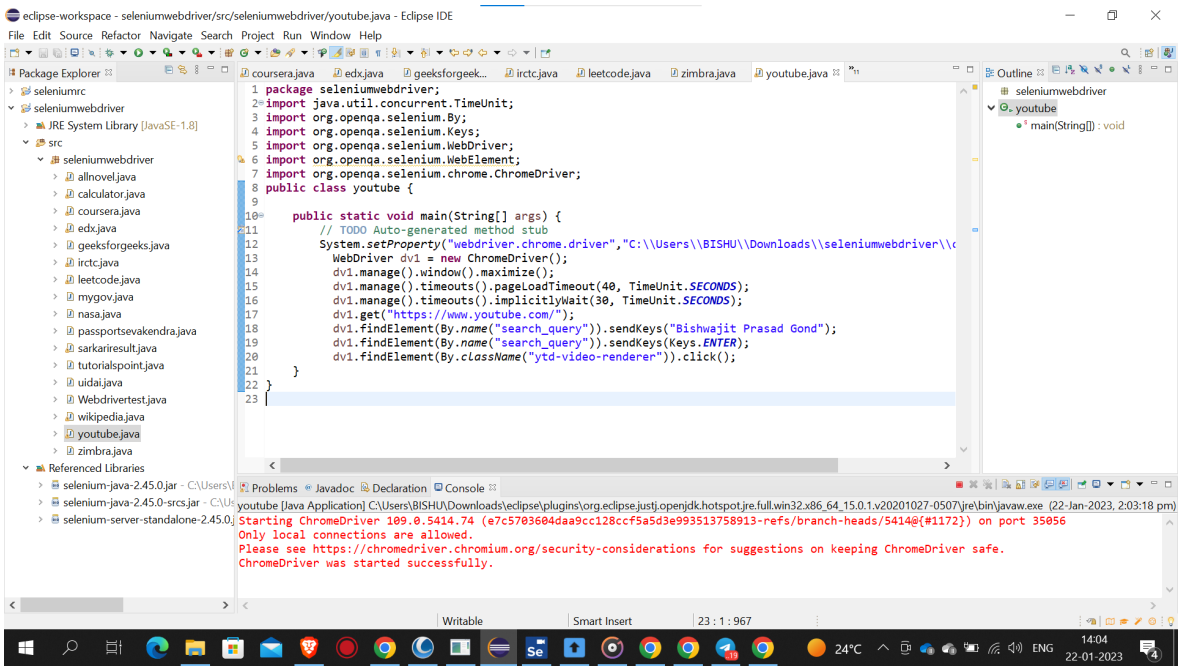

Figure 38: Selenium WebDriver for Youtube Website

3.8.1 Selenium WebDriver Youtube

```
package seleniumwebdriver;
import java.util.concurrent.TimeUnit;
import org.openqa.selenium.By;
import org.openqa.selenium.Keys;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.WebElement;
import org.openqa.selenium.chrome.ChromeDriver;
public class youtube {

 public static void main(String[] args) {
  // TODO Auto-generated method stub
  System.setProperty("webdriver.chrome.driver","C:\\Users\\BISHU
     \\Downloads\\seleniumwebdriver\\chromedriver.exe");
    WebDriver dv1 = new ChromeDriver();
    dv1.manage().window().maximize();
    dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
       ;
    dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
    dv1.get("https://www.youtube.com/");
    dv1.findElement(By.name("search_query")).sendKeys("Bishwajit
       Prasad Gond");
    dv1.findElement(By.name("search_query")).sendKeys(Keys.ENTER)
       ;
       dv1.findElement(By.className("ytd-video-renderer")).click
          ();
 }
}
```

3.9 Indgovtjobs

Selenium WebDriver Screenshot of indgovtjobs website.

3.9.1 Selenium WebDriver indgovtjobs

```
package seleniumwebdriver;

import java.util.concurrent.TimeUnit;
import org.openqa.selenium.By;
import org.openqa.selenium.WebDriver;
import org.openqa.selenium.chrome.ChromeDriver;

public class indgovtjobs {

 public static void main(String[] args) {
  // TODO Auto-generated method stub
```

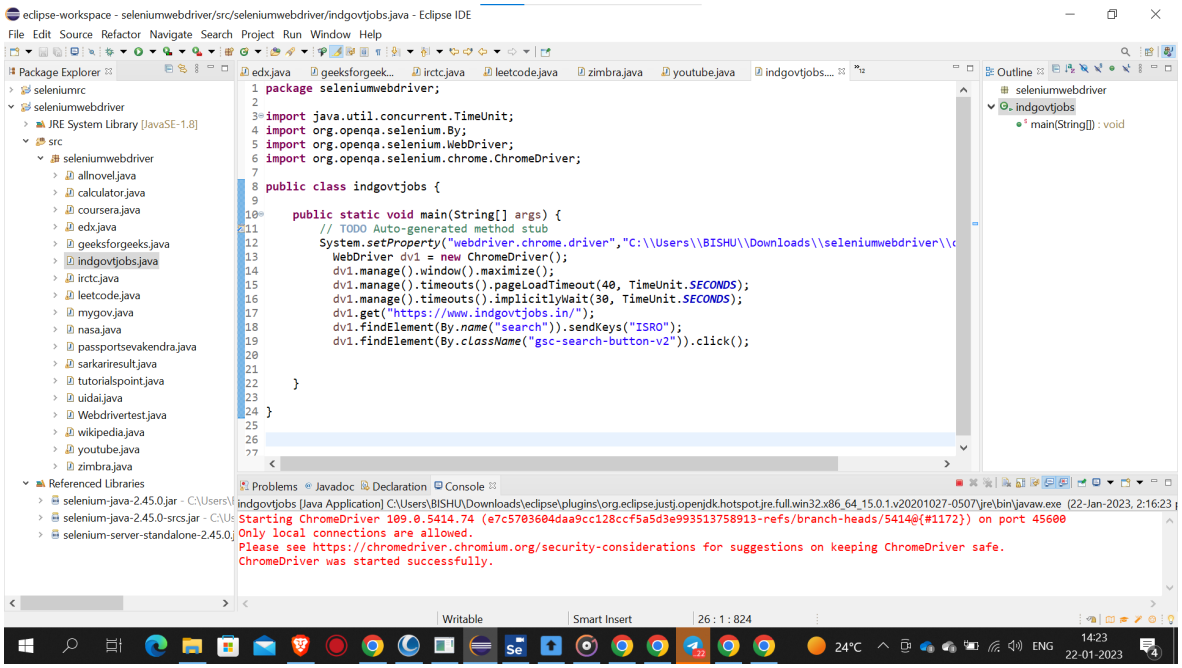

Figure 39: Selenium WebDriver for indgovtjobs Website

```
12    System.setProperty("webdriver.chrome.driver","C:\\Users\\BISHU
          \\Downloads\\seleniumwebdriver\\chromedriver.exe");
13      WebDriver dv1 = new ChromeDriver();
14      dv1.manage().window().maximize();
15      dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
            ;
16      dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
17      dv1.get("https://www.indgovtjobs.in/");
18      dv1.findElement(By.name("search")).sendKeys("ISRO");
19      dv1.findElement(By.className("gsc-search-button-v2")).click()
            ;
20
21
22   }
23
24 }
```

3.10 MyGov

Selenium WebDriver Screenshot of MyGov website.

3.10.1 Selenium WebDriver MyGov

```
1 package seleniumwebdriver;
2 import java.util.concurrent.TimeUnit;
3 import org.openqa.selenium.By;
```

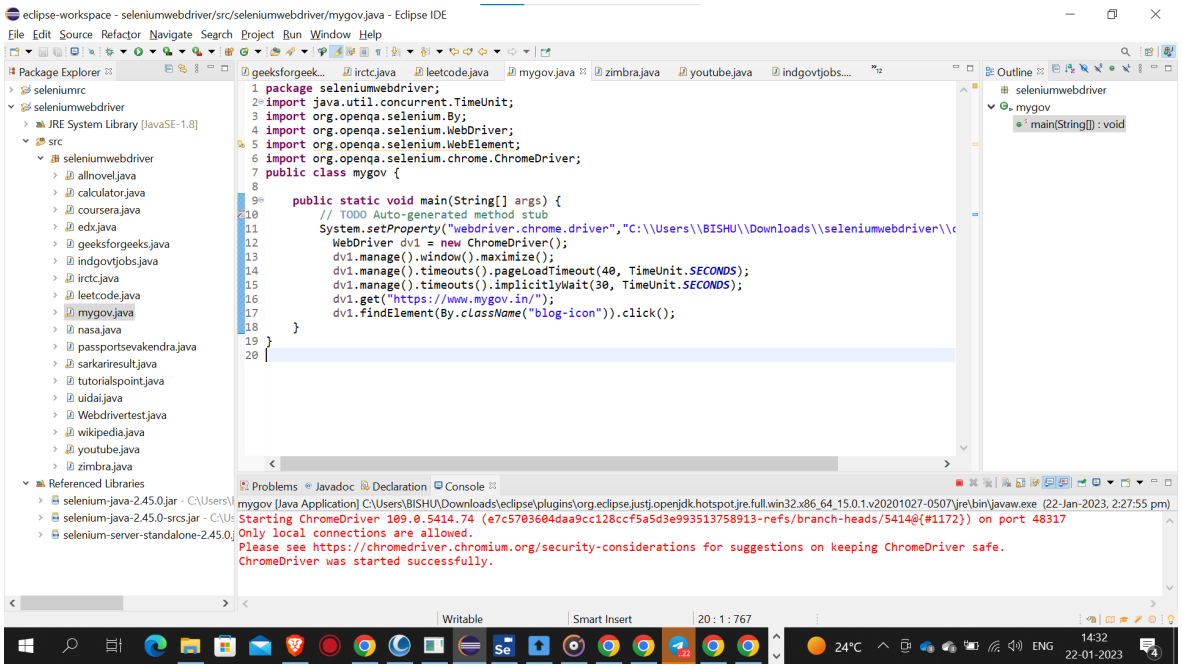

Figure 40: Selenium WebDriver for MyGov Website

```
4  import org.openqa.selenium.WebDriver;
5  import org.openqa.selenium.WebElement;
6  import org.openqa.selenium.chrome.ChromeDriver;
7  public class mygov {
8
9   public static void main(String[] args) {
10   // TODO Auto-generated method stub
11   System.setProperty("webdriver.chrome.driver","C:\\Users\\BISHU
       \\Downloads\\seleniumwebdriver\\chromedriver.exe");
12     WebDriver dv1 = new ChromeDriver();
13     dv1.manage().window().maximize();
14     dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
         ;
15     dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
16     dv1.get("https://www.mygov.in/");
17     dv1.findElement(By.className("blog-icon")).click();
18  }
19 }
```

3.11 PassportIndia

Selenium WebDriver Screenshot of PassportIndia website.

3.11.1 Selenium WebDriver PassportIndia

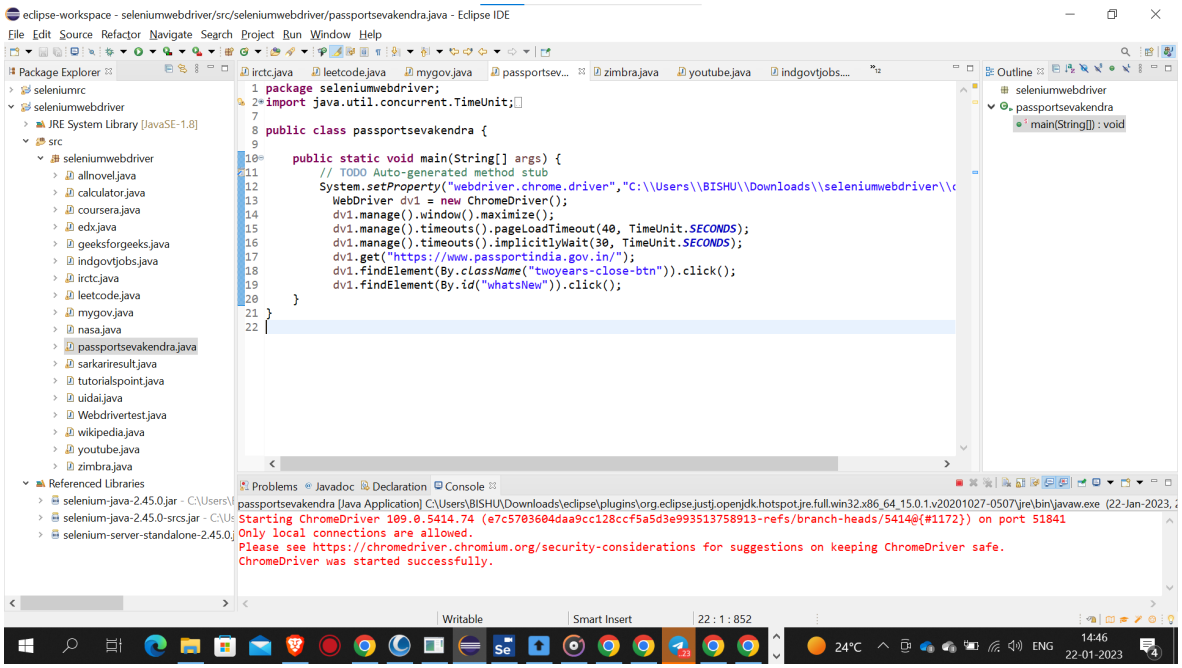

Figure 41: Selenium WebDriver for PassportIndia Website

```
1  package seleniumwebdriver;
2  import java.util.concurrent.TimeUnit;
3  import org.openqa.selenium.By;
4  import org.openqa.selenium.WebDriver;
5  import org.openqa.selenium.WebElement;
6  import org.openqa.selenium.chrome.ChromeDriver;
7
8  public class passportsevakendra {
9
10  public static void main(String[] args) {
11   // TODO Auto-generated method stub
12   System.setProperty("webdriver.chrome.driver","C:\\Users\\BISHU
        \\Downloads\\seleniumwebdriver\\chromedriver.exe");
13     WebDriver dv1 = new ChromeDriver();
14     dv1.manage().window().maximize();
15     dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
          ;
16     dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
17     dv1.get("https://www.passportindia.gov.in/");
18     dv1.findElement(By.className("twoyears-close-btn")).click();
19     dv1.findElement(By.id("whatsNew")).click();
20  }
21 }
```

3.12 Wikipedia

Selenium WebDriver Screenshot of wikipedia website.

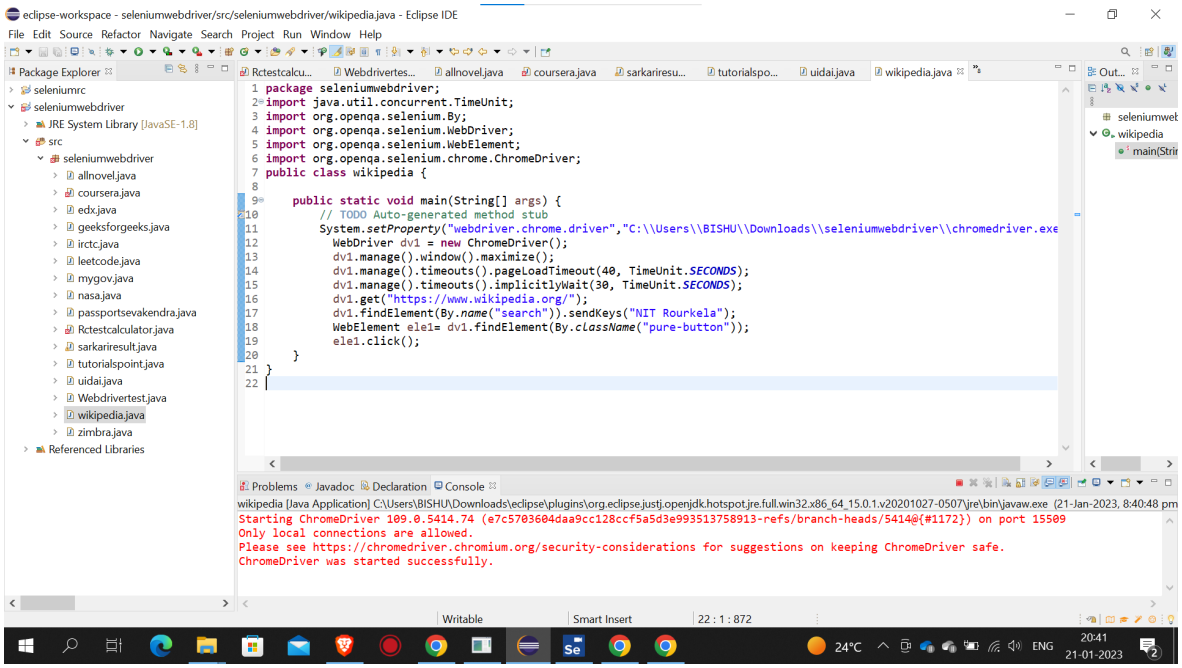

Figure 42: Selenium WebDriver for wikipedia Website

3.12.1 Selenium WebDriver wikipedia

```
1  package seleniumWebDriver;
2
3  import com.thoughtworks.selenium.DefaultSelenium;
4  import com.thoughtworks.selenium.Selenium;
5
6  public class wikipedia {
7
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   System.setProperty("webdriver.chrome.driver","C:\\Users\\BISHU
       \\Downloads\\seleniumwebdriver\\chromedriver.exe");
11     WebDriver dv1 = new ChromeDriver();
12     dv1.manage().window().maximize();
13     dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
         ;
14     dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
15     dv1.get("https://www.wikipedia.org/");
16     dv1.findElement(By.name("search")).sendKeys("NIT Rourkela");
17     dv1.findElement(By.className("pure-button")).click();
18   }
19
20 }
```

3.13 UIDAI

Selenium WebDriver Screenshot of UIDAI website.

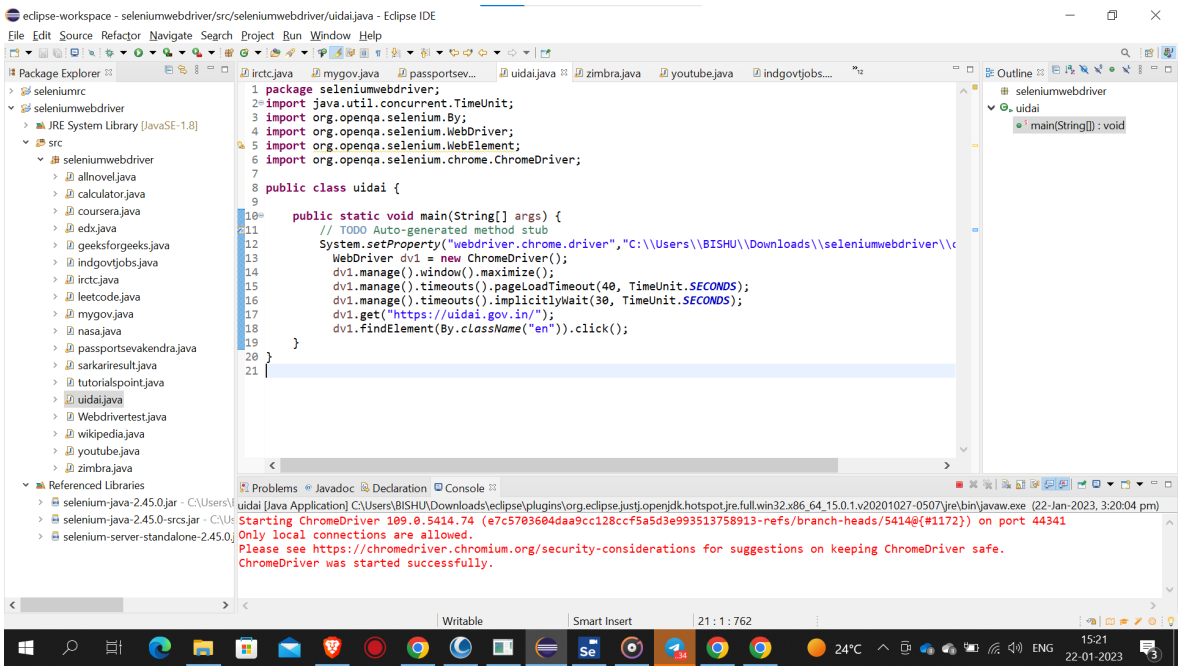

Figure 43: Selenium WebDriver for UIDAI Website

3.13.1 Selenium WebDriver UIDAI

```
1  package seleniumwebdriver;
2  import java.util.concurrent.TimeUnit;
3  import org.openqa.selenium.By;
4  import org.openqa.selenium.WebDriver;
5  import org.openqa.selenium.WebElement;
6  import org.openqa.selenium.chrome.ChromeDriver;
7  public class uidai {
8   public static void main(String[] args) {
9    // TODO Auto-generated method stub
10   System.setProperty("webdriver.chrome.driver","C:\\Users\\BISHU
       \\Downloads\\seleniumwebdriver\\chromedriver.exe");
11     WebDriver dv1 = new ChromeDriver();
12     dv1.manage().window().maximize();
13     dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
         ;
14     dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
15     dv1.get("https://uidai.gov.in/");
16     dv1.findElement(By.className("en")).click();
17   }
18 }
```

3.14 Zimbra

Selenium WebDriver Screenshot of Zimbra website.

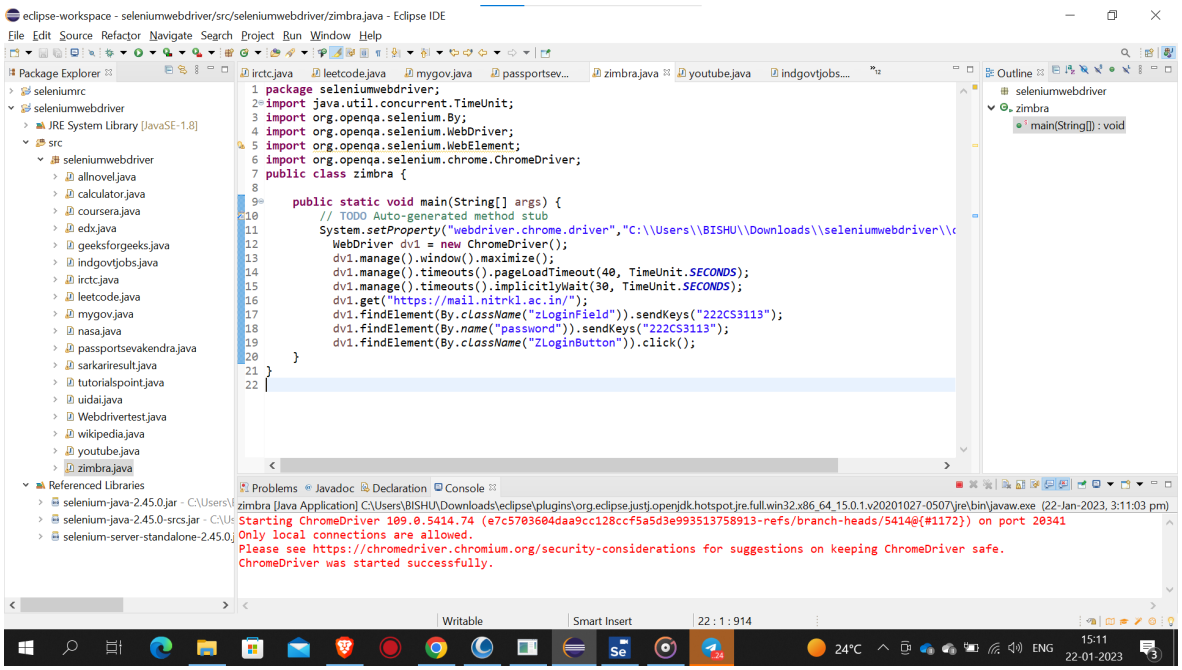

Figure 44: Selenium WebDriver for Zimbra Website

3.14.1 Selenium WebDriver Zimbra

```
1  package seleniumwebdriver;
2  import java.util.concurrent.TimeUnit;
3  import org.openqa.selenium.By;
4  import org.openqa.selenium.WebDriver;
5  import org.openqa.selenium.WebElement;
6  import org.openqa.selenium.chrome.ChromeDriver;
7  public class zimbra {
8
9   public static void main(String[] args) {
10   // TODO Auto-generated method stub
11   System.setProperty("webdriver.chrome.driver","C:\\Users\\BISHU
       \\Downloads\\seleniumwebdriver\\chromedriver.exe");
12     WebDriver dv1 = new ChromeDriver();
13     dv1.manage().window().maximize();
14     dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
         ;
15     dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
16     dv1.get("https://mail.nitrkl.ac.in/");
17     dv1.findElement(By.className("zLoginField")).sendKeys("222
         CS3113");
18     dv1.findElement(By.name("password")).sendKeys("222CS3113");
```

```
    dv1.findElement(By.className("ZLoginButton")).click();
 }
}
```

3.15 Maxdroid

Selenium WebDriver Screenshot of Maxdroid website.

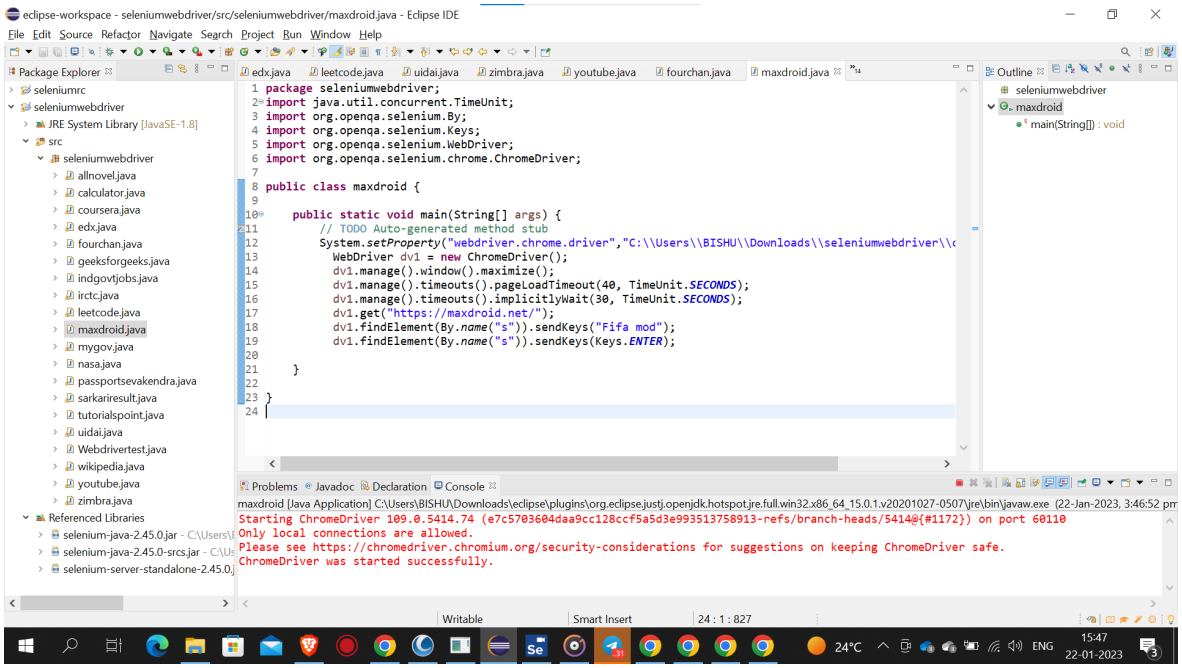

Figure 45: Selenium WebDriver for Maxdroid Website

3.15.1 Selenium WebDriver Maxdroid

```
1  package seleniumwebdriver;
2  import java.util.concurrent.TimeUnit;
3  import org.openqa.selenium.By;
4  import org.openqa.selenium.Keys;
5  import org.openqa.selenium.WebDriver;
6  import org.openqa.selenium.chrome.ChromeDriver;
7
8  public class maxdroid {
9
10  public static void main(String[] args) {
11   // TODO Auto-generated method stub
12   System.setProperty("webdriver.chrome.driver","C:\\Users\\BISHU
       \\Downloads\\seleniumwebdriver\\chromedriver.exe");
13     WebDriver dv1 = new ChromeDriver();
14     dv1.manage().window().maximize();
```

```
15      dv1.manage().timeouts().pageLoadTimeout(40, TimeUnit.SECONDS)
            ;
16      dv1.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
17      dv1.get("https://maxdroid.net/");
18      dv1.findElement(By.name("s")).sendKeys("Fifa mod");
19      dv1.findElement(By.name("s")).sendKeys(Keys.ENTER);
20
21   }
22
23  }
```

CS6474 : Software Testing Laboratory 2023

CUCKOO SANDBOX

Prepared by
BISHWAJIT PRASAD GOND
222CS3113

4 Cuckoo Sandbox

A Cuckoo Sandbox is a tool that is used to launch malware in a secure and isolated environment, the idea is the sandbox fools the malware into thinking it has infected a genuine host.

The sandbox will then record the activity of the malware and then generate a report on what the malware has attempted to do while in this secure environment.

These are great for security teams and malware analysts as they can be used to quickly gather IOC's which may be required for a security incident or a starting point for a piece of intel, it gives you quick and detailed information on how the malware is likely to behave.

Most commercial malware sandboxes are expensive, such as McAfee's enterprise version called Artemis. However Cuckoo is open source and free to download, and from my experience, the resulting output is almost identical.

Even though Cuckoo is free to download it can be quite complicated and time-consuming to set up for the first time, this is due to the Cuckoo requiring a number of dependencies, however once in place, it is an incredibly useful tool.

Once set up, Cuckoo is able to analyze many different malicious files (executables, office documents, pdf files, emails, malicious scripts) as well as malicious websites.

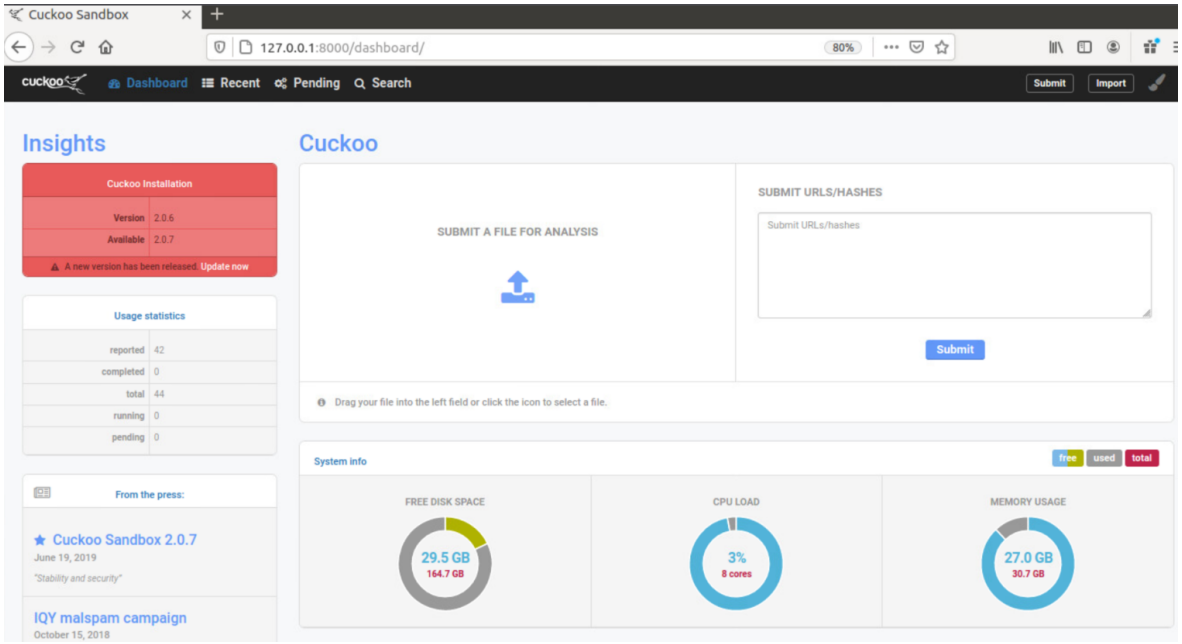

Figure 46: Cuckoo Sandbox Dashboard

4.0.1 Tcases CMD command

```
1 Sudo apt update
2 Sudo apt upgrade
3 sudo apt-get install python python-pip python-dev libffi-dev
    libssl-dev
```

```
sudo apt-get install python-virtualenv python-setuptools
sudo apt-get install libjpeg-dev zlib1g-dev swig
sudo apt-get install mongodb
sudo apt-get install postgresql   libpq-dev
sudo apt install virtualbox
open virtualbox
create vboxnet0
sudo apt-get install tcpdump apparmor-utils
sudo groupadd pcap
sudo usermod -a -G pcap cuckoo
sudo chgrp pcap /usr/sbin/tcpdump
sudo setcap cap_net_raw,cap_net_admin=eip /usr/sbin/tcpdump
getcap /usr/sbin/tcpdump
sudo aa-disable /usr/sbin/tcpdump
sudo pip install m2crypto
sudo usermod -a -G vboxusers cuckoo
go to https://gist.github.com/jstrosch/
   de20131dda2aac5cd1116dd44b8f2474
chmod  +x cuckoo-setup-virtualenv.sh
sudo -u cuckoo ./cuckoo-setup-virtualenv.sh
source ~/.bashrc
mkvirtualenv -p python2.7 cuckoo-test
pip install -U pip setuptools
pip install -U cuckoo
wget https://cuckoo.sh/win7ultimate.iso
ls -lah
sudo mkdir /mnt/win7
sudo chown cuckoo:cuckoo /mnt/win7
sudo mount -o ro,loop win7ultimate.iso /mnt/win7
sudo apt-get -y install build-essential libssl-dev libffi-dev
python-dev genisoimage
sudo apt-get -y install zlib1g-dev libjpeg-dev
sudo apt-get -y install python-pip python-virtualenv python-
   setuptools swig
pip install -U vmcloak
vmcloak
** delete vboxnet from virtualbox **
vmcloak-vboxnet0
vmcloak init --verbose --win7x64 win7x64base --cpus 2 --ramsize
   2048
vmcloak clone win7x64base win7x64cuckoo
vmcloak install win7x64cuckoo ie11
vmcloak snapshot --count 1 win7x64cuckoo 192.168.56.101
vmcloak list vms
cuckoo init
cd ~/.cuckoo/
ls
cd conf/
```

```
ls
cuckoo community
nano virtualbox.conf
make mode = gui
while read -r vm ip; do cuckoo machine --add $vm $ip; done < <(
   vmcloak list vms)
nano virtualbox.conf
delete cuckoo and its data
open new terminal
ip a
sudo sysctl -w net.ipv4.conf.vboxnet0.forwarding=1
   sudo sysctl -w net.ipv4.conf.eth0.forwarding=1
open new terminal
workon cuckoo-test
cuckoo rooter --sudo --group cuckoo

nano routing.conf
change internet = eth0
nano reporting.conf
change mongodb enabled = yes
open new terminal
workon cuckoo-test
cuckoo

open new terminal
workon cuckoo-test
cuckoo web --host 127.0.0.1 --port 8080
```

open new terminal

4.1 Command Explanation

4.1.1 Sudo apt update

The sudo apt-get update command is used to download package information from all configured sources. The sources often defined in the /etc/apt/sources. list file and other files located in /etc/apt/sources.

4.1.2 Sudo apt upgrade

apt-get upgrade actually installs newer versions of the packages you have. After updating the lists, the package manager knows about available updates for the software you have installed.

4.1.3 sudo apt-get install python python-pip python-dev libffi-dev libssl-dev

python python-pip python-dev libffi-dev libssl-dev software packages from the apt repositories are required to get Cuckoo to install and run properly.

4.1.4 sudo apt-get install python-virtualenv python-setuptools

python-virtualenv python-setuptools are requried to get cuckoo to install and run properly.

4.1.5 sudo apt-get install libjpeg-dev zlib1g-dev swig

libjpeg-dev zlib1g-dev swig are requried to get cuckoo to install and run properly.

4.1.6 sudo apt-get install mongodb

Django-based Web Interface, MongoDB is required.

4.1.7 sudo apt-get install postgresql libpq-dev

libpq is a set of library functions that allow client programs to pass queries to the PostgreSQL backend server and to receive the results of these queries.

4.1.8 sudo apt install virtualbox

This command downloads and install virtual box with the newest version.

4.1.9 virtualbox

This command is used to open the virtualbox.

4.1.10 Create vboxnet0

This command is create a new host that is a gateway between host and guest.

4.1.11 sudo apt-get install tcpdump apparmor-utils

This command installs the apparmor-utils. You need to install tcpdump in order to dump network traffic which occurs during analysis.

4.1.12 sudo usermod -a -G pcap cuckoo

The usermod command modifies the system account files to reflect the changes that are specified on the command line.

4.1.13 sudo setcap cap_net_raw,cap_net_admin=eip /usr/sbin/tcpdump

setcap sets the capabilities of each specified filename to the capabilities specified.

4.1.14 getcap /usr/sbin/tcpdump

getcap displays the name and capabilities of each specified file

4.1.15 sudo aa-disable /usr/sbin/tcpdump

aa-disable is used to disable one or more profiles. This command will unload the profile from the kernel and prevent the profile from being loaded on AppArmor startup

4.1.16 sudo pip install m2crypto

This command is used to install m2crypto.

4.1.17 sudo usermod -a -G vboxusers cuckoo

The usermod command modifies the system account files.

4.1.18 cuckoo-setup-virtualenv.sh

we are downloading sh file `https://gist.github.com/jstrosch/de20131dda2aac5cd1116dd44b8f2474`

4.1.19 sudo –u cuckoo ./cuckoo-setup-virtualenv.sh

The -u option allows you to run a command as the specified user name or user ID. So, you can run the command as a user other than the root.

4.1.20 source /.bashrc

For the changes to be applied, run the source command with the .bashrc file as an argument.

4.1.21 mkvirtualenv –p python2.7 cuckoo-test

This command is used for create new python environment for cuckoo.

4.1.22 pip install –U pip setuptools

Upgrade all packages to the newest available version of pip setuptools.

4.1.23 pip install –U cuckoo

Although the above, a global installation of Cuckoo in your OS works mostly fine, we highly recommend installing Cuckoo in a virtualenv.

4.1.24 wget https://cuckoo.sh/win7ultimate.iso

We are downloading virtaulbox win7ultimate.iso

4.1.25 ls –lah

List information about the FILEs (the current directory by default).

4.1.26 sudo mkdir /mnt/win7

Create the DIRECTORY, if they do not already exist.

4.1.27 sudo chown cuckoo:cuckoo /mnt/win7

These system calls change the owner and group of a file

4.1.28 sudo mount -o ro,loop win7ultimate.iso /mnt/win7

The mount options from command line will be appended to the list of op etc/fstab.tions from / The usual behavior is that the last option wins if there are more duplicated options.

4.1.29 sudo apt-get -y install build-essential libssl-dev libffi-dev python-dev genisoimage

Before we install Cuckoo and VMCloak, the installation of multiple packages is required. These are dependencies VMCloak or Cuckoo require to function

4.1.30 sudo apt-get -y install zlib1g-dev libjpeg-dev

For the jpeg supports we want run above command.

4.1.31 sudo apt-get -y install python-pip python-virtualenv python-setuptools swig

Above command used for create the dependency between cuckoo and vmcloak.

4.1.32 pip install –U vmcloak

VMCloak only supports VirtualBox. Using this command install the vmcloak.

4.1.33 vmcloak

VMCloak is a utility for automatically creating Virtual Machines with Windows as guest Operating System. It has been tailored to generate Virtual Machines directly usable from within Cuckoo Sandbox, but it can also be used for other purposes as Cuckoo‘s components can be omitted through the configuration.

4.1.34 vmcloak-vboxnet0

This command create and start the vboxnet0 network.

4.1.35 vmcloak init –verbose –win7x64 win7x64base –cpus 2 –ramsize 2048

Create the VM and automatically install Windows. A Cuckoo analysis VM should have at least 2GB of memory and preferably two or more CPU cores.

4.1.36 vmcloak clone win7x64base win7x64cuckoo

This commands Creating cuckoo clone image form base file.

4.1.37 vmcloak install win7x64cuckoo ie11

This command is used for install internet explorer.

4.1.38 vmcloak snapshot –count 1 win7x64cuckoo 192.168.56.101

This command creating the snapshots of vms with ip address

4.1.39 vmcloak list vms

Listed the vm using above command.

4.1.40 cuckoo init

Creating the directory before use the cuckoo.

4.1.41 cd /.cuckoo/

This command is used to move to the cuckoo directory.

4.1.42 ls

After run above command it shows the list of directory content.

4.1.43 cd conf/

Here we can do some configurations the files.

4.1.44 ls

After run above command it shows the list of directory content.

4.1.45 cuckoo community

Install cuckoo community, which has useful signatures that will be useful while in analysis.

4.1.46 nano virtualbox.conf

We are using nano text editor to edit virtualbox.conf

4.1.47 make mode = gui

We are enabling GUI render for user friendly dashboard

4.1.48 while read -r vm ip; do cuckoo machine –add $vm $ip; done <<(vmcloak list vms)

Time to add the created VMs to Cuckoo. We will use the cuckoo machine $--add < vmname >< ip >$ to tell Cuckoo to add the machine to its configuration. This has to be done for each machine, so let's make life easier and use vmcloak list vms.

4.1.49 nano virtualbox.conf

We are using nano text editor to edit virtualbox.conf

4.1.50 sudo sysctl -w net.ipv4.conf.vboxnet0.forwarding=1

We are configuring virtualbox to allow ip forwarding.

4.1.51 sudo sysctl -w net.ipv4.conf.eth0.forwarding=1

We are configuring eth0 to allow ip forwarding.

4.1.52 workon cuckoo-test

This command is use to switch to cuckoo in virtual environment any further command in this environment will be executed in cuckoo-test.

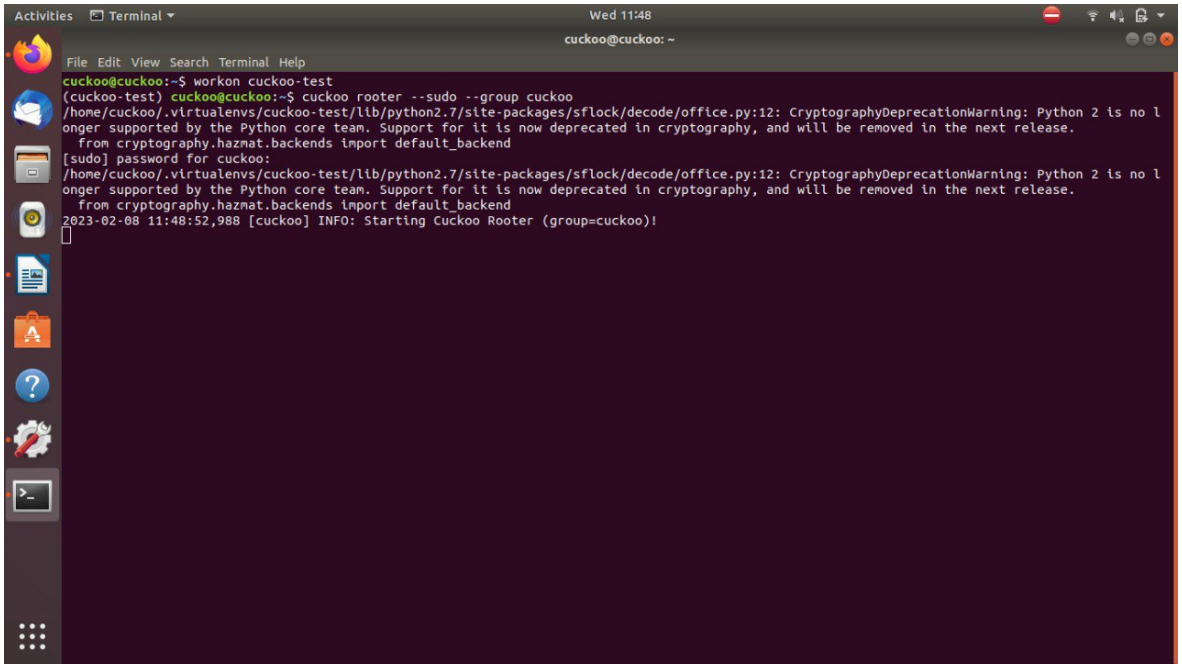

Figure 47: Screenshot of workon cuckoo-test

4.1.53 cuckoo rooter –sudo –group cuckoo

Since Cuckoo is installed in a virtualenv, and the Cuckoo user should not have root privileges, we can do the following from a root privileged user.

4.1.54 nano routing.conf

We are using nano text editor to edit routing.conf
change internet = eth0
nano reporting.conf
change mongodb enabled = yes

Again we are opening new terminal for running the below command.

4.1.55 workon cuckoo-test

This command is use to switch to cuckoo in virtual environment any further command in this environment will be executed in cuckoo-test.

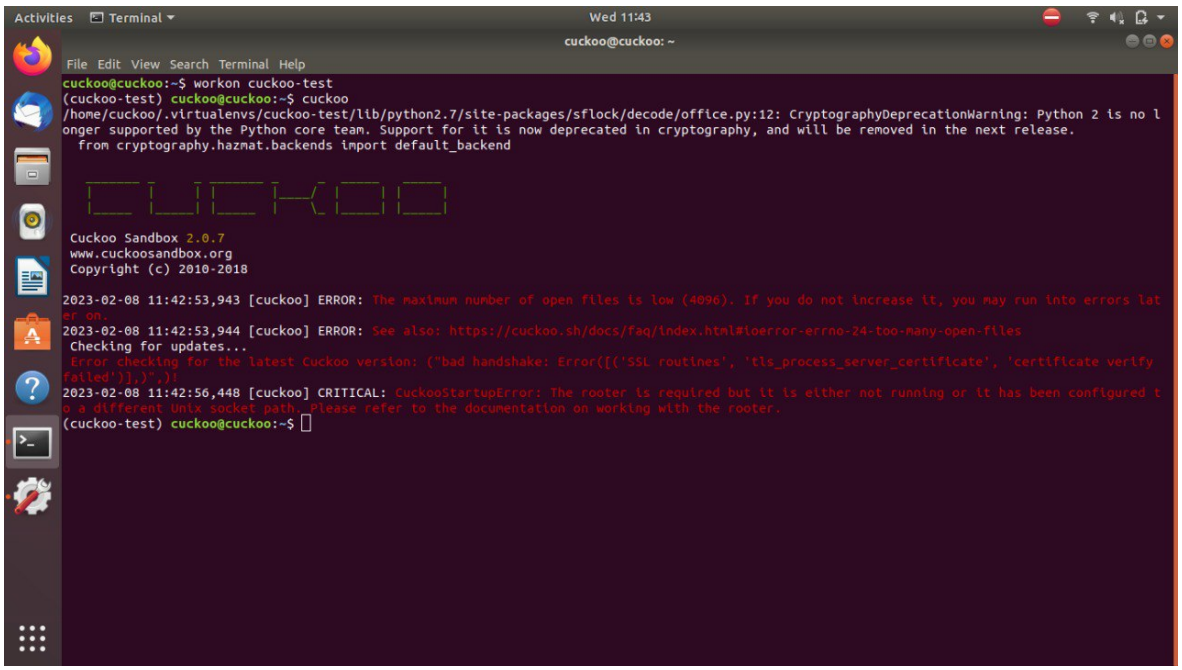

Figure 48: Screenshot of cuckoo

4.1.56 cuckoo

This Command is Used to start cuckoo program.

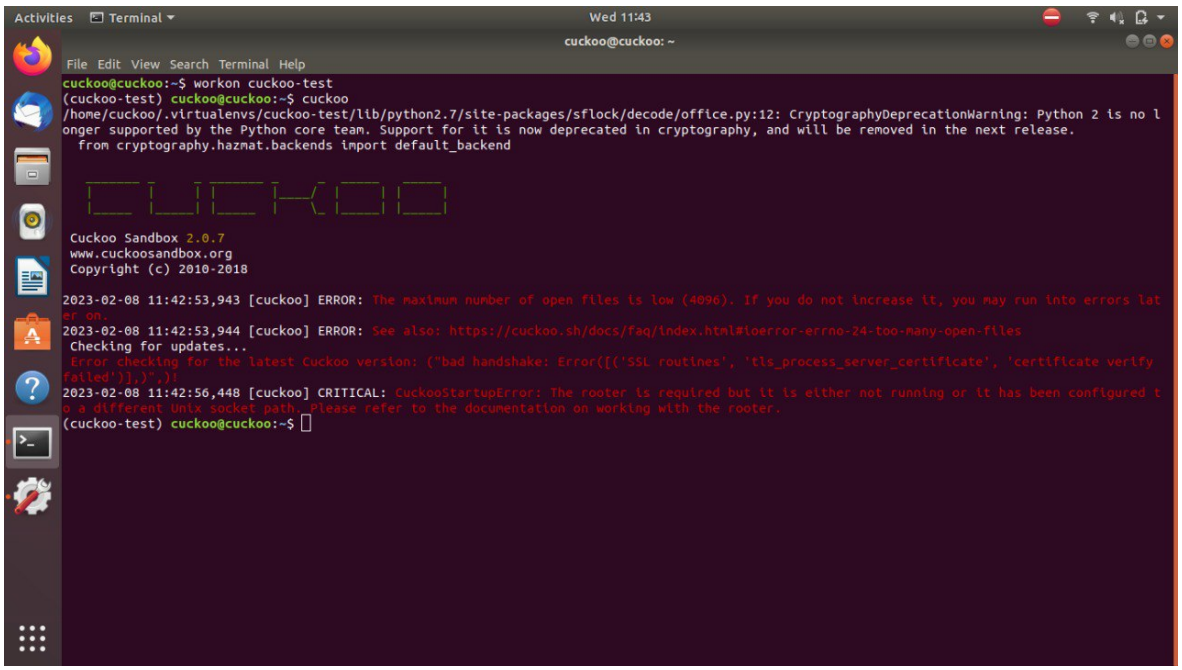

Figure 49: Screenshot of workon cuckoo-test

4.1.57 workon cuckoo-test

This command is use to switch to cuckoo in virtual environment any further command in this environment will be executed in cuckoo-test.

4.1.58 cuckoo web –host 127.0.0.1 –port 8080

We are opening GUI based cuckoo dashboard on Internet Explorer on IP 127.0.0.1 port: 8080

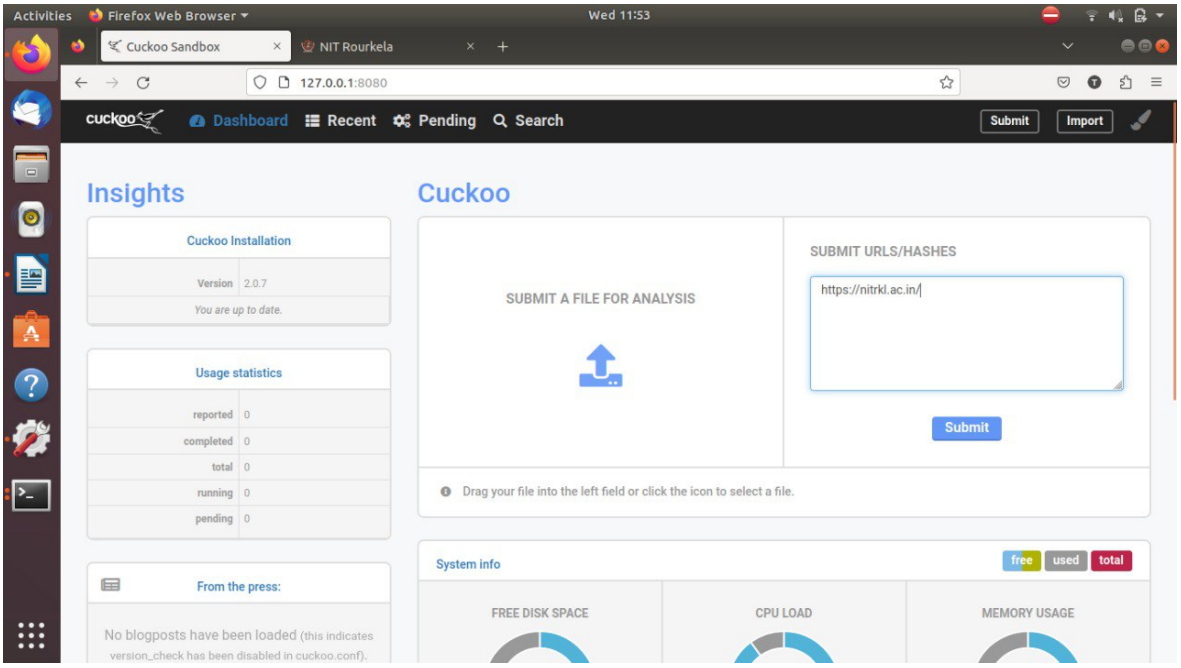

Figure 50: Screenshot of cuckoo dashboard

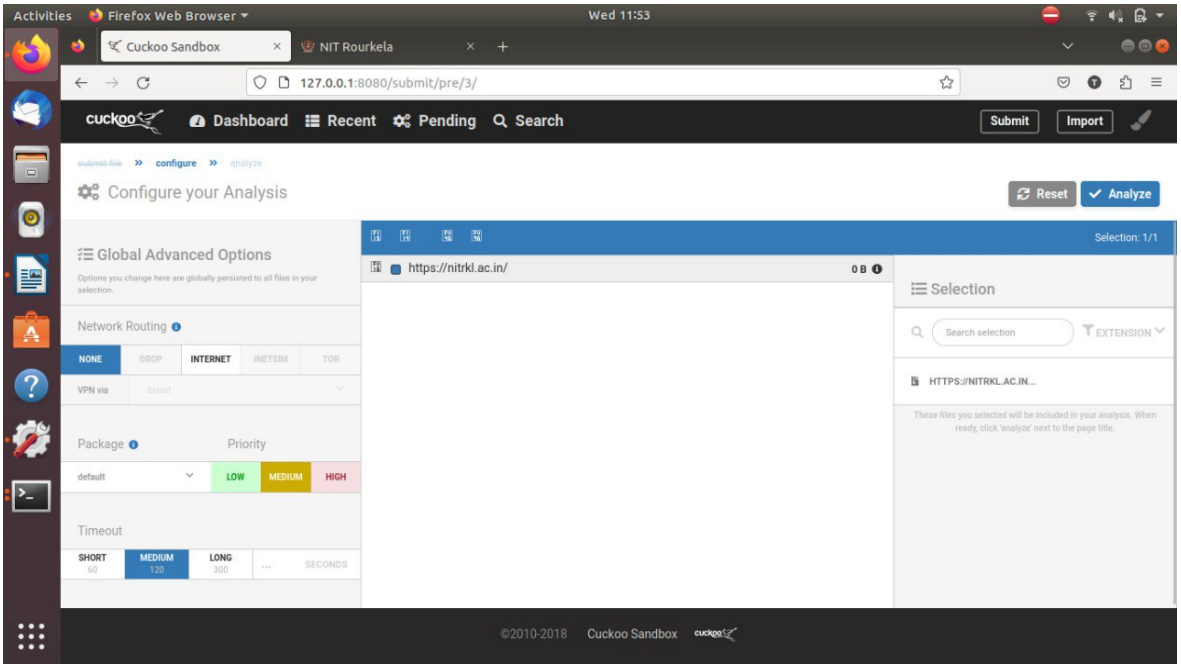

Figure 51: Screenshot of url injection using cuckoo

CS6474: Software Testing Laboratory 2023

TCASES

Prepared by
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5 Tcases

Tcases is a tool for designing tests. It doesn't matter what kind of system you are testing. Nor does it matter what level of the system you are testing — unit, subsystem, or full system. You can use Tcases to design your tests in any of these situations. With Tcases, you define the input space for your system-under-test and the level of coverage that you want. Then Tcases generates a minimal set of test cases that meets your requirements.

Tcases is primarily a tool for black-box test design. For such tests, the concept of "coverage" is different from structural testing criteria such as line coverage, branch coverage, etc. Instead, Tcases is guided by coverage of the input space of your system.

5.0.1 Tcases CMD command

```
1 D:\Tcase\tcases-3.7.1\docs\examples\xml\icecream3>tcases Ice-
    Cream-Input.xml
2 D:\Tcase\tcases-3.7.1\docs\examples\xml\icecream3>tcases -J Ice-
    Cream-Input.xml
3 D:\Tcase\tcases-3.7.1\docs\examples\xml\icecream3>tcases -H Ice-
    Cream-Input.xml
4 D:\Tcase\tcases-3.7.1\docs\examples\xml\icecream3>tcases-reducer
    Ice-Cream-Input.xml
5 D:\Tcase\tcases-3.7.1\docs\examples\xml\icecream3>
```

5.1 Annotations-Test

5.1.1 Specification

Usage: Check different geometrical shape

We can add shape by using addShape function by passing parameter to
1) Type: CIRCLE, RECTANGLE, LINE etc
2) Size: In cm
3) Colour: RED, GREEN etc

5.1.2 XML Code

```
1 <!--
2 Usage: ADD or Create different geometrical shape
3
4 We can add shape by using addShape function
5 by passing parameter to
6 1) Type: CIRCLE, RECTANGLE, LINE etc
7 2) Size: In cm
8 3) Colour: RED, GREEN etc
```

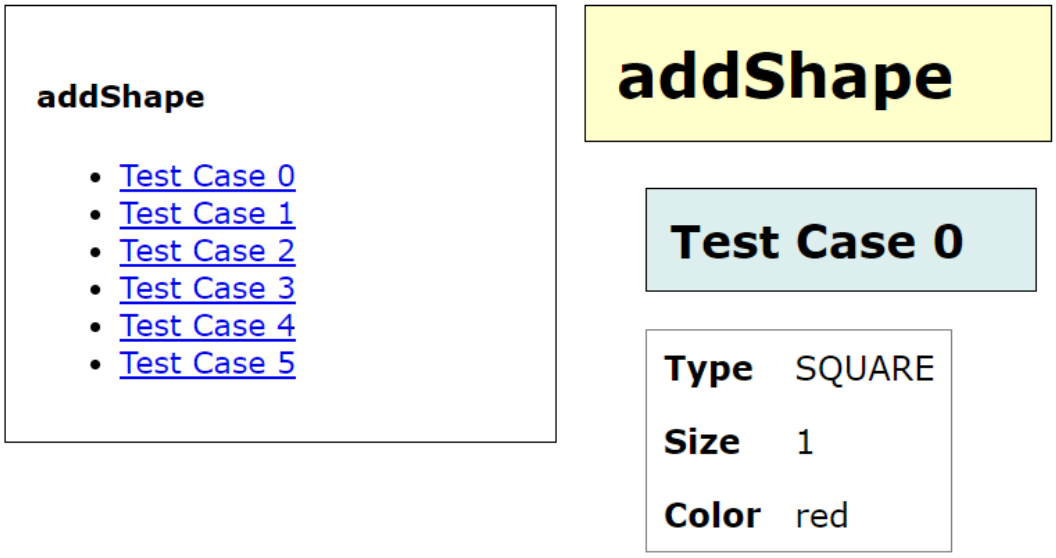

Figure 52: Annotations-Test HTML View

```
9
10  -->
11  <System name="Examples">
12      <Function name="addShape">
13          <!-- Test case annotations -->
14          <Has name="pageType" value="Page"/>
15          <Has name="pageName" value="page"/>
16          <Has name="pageValue" value="new Page()"/>
17
18          <Input>
19
20              <Var name="Type">
21                  <!-- Variable binding annotations -->
22                  <Has name="varType" value="Shape"/>
23                  <Has name="varName" value="shape"/>
24                  <Has name="varEval" value="new Shape"/>
25
26                  <Value name="SQUARE"/>
27                  <Value name="CIRCLE"/>
28                  <Value name="LINE" property="1D"/>
29              </Var>
30
31              <Var name="Size">
32                  <!-- Variable binding annotations -->
33                  <Has name="varType" value="int"/>
34                  <Has name="varName" value="size"/>
35                  <Has name="varApply" value="setSize"/>
36
37                  <Value name="1"/>
```

```
                <Value name="10"/>
                <Value name="100" property="Large"/>
            </Var>

            <Var name="Color">
                <!-- Variable binding annotations -->
                <Has name="varType" value="String"/>
                <Has name="varName" value="color"/>
                <Has name="varApply" value="setColor"/>

                <Value name="red"/>
                <Value name="green"/>
                <Value name="blue"/>
            </Var>
        </Input>
    </Function>
</System>
```

5.2 Ice-Cream Input

5.2.1 Specification

Usage: Checking different Scoop level & toppings of ice-cream

We can add different levels of scoops in different condition of cone functions
for example
1) If cone is not there then we will not add any scoop of ice-cream.
2) If cone is there and customer want Plain ice-cream then we can add maximum of 1 scoop and 1 topping in ice-cream.
3) If cone is there and customer want Plenty ice-cream then we can add min of 1 and maximum of 2 scoop and 2 topping in ice-cream.
4) If cone is there and customer want Grande ice-cream then we can add maximum of 4 scoop and 3 maximum and 1 minimum topping in ice-cream.
5) If cone is there and customer want Too-much ice-cream then we can add maximum of 3 scoop and 4 minimum topping in ice-cream.
6) If cone is there and customer want Too-much ice-cream then we can add maximum of 4 scoop and 5 minimum topping in ice-cream.

5.2.2 XML Code

```
<System name="Ice-Cream">
    <Function name="Cones">
        <Input>
            <Var name="Cone">
```

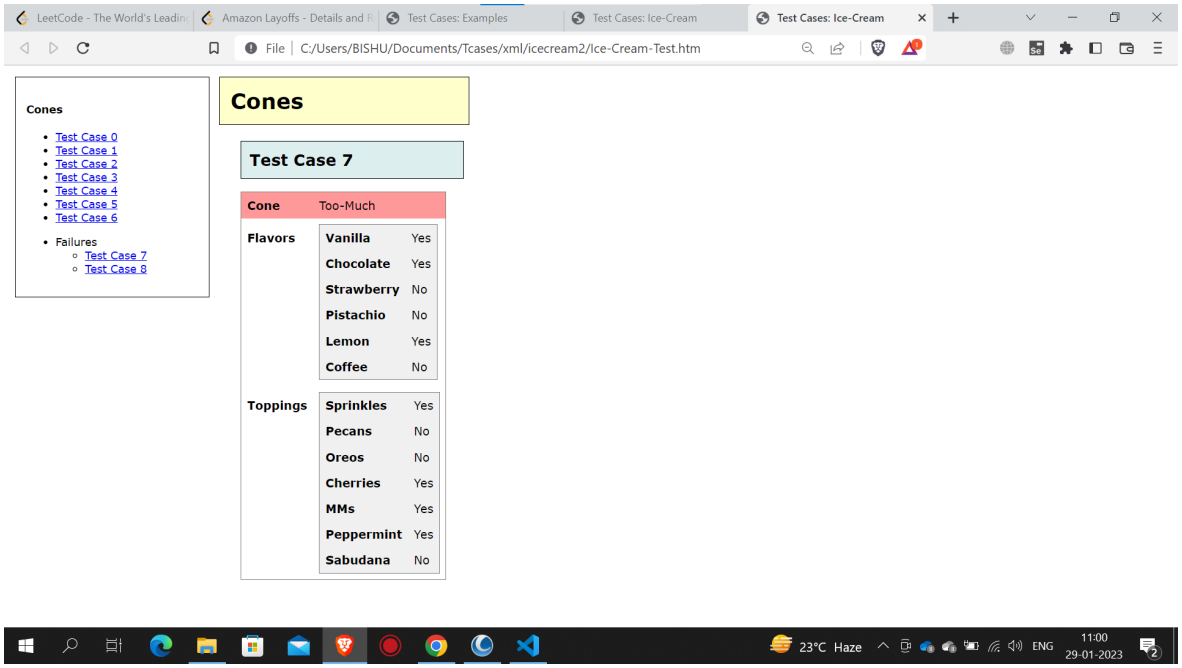

Figure 53: Ice-Cream HTML Test cases View

```
5                   <Value name="Empty" failure="false">
6                       <When>
7                           <LessThan property="scoop" max="1"/>
8                       </When>
9                   </Value>
10                  <Value name="Plain">
11                      <When>
12                          <AllOf>
13                              <Equals property="scoop" count="1"/>
14                              <NotMoreThan property="topping" max="
                                    1"/>
15                          </AllOf>
16                      </When>
17                  </Value>
18                  <Value name="Plenty">
19                      <When>
20                          <AllOf>
21                              <Between property="scoop" min="1" max
                                    ="2"/>
22                              <NotMoreThan property="topping" max="
                                    2"/>
23                          </AllOf>
24                      </When>
25                  </Value>
26                  <Value name="Grande">
27                      <When>
28                          <AllOf>
```

```
                            <Between property="scoop"
                               exclusiveMin="0" exclusiveMax="4"/
                               >
                            <Between property="topping" min="1"
                               max="3"/>
                        </AllOf>
                    </When>
                </Value>
                <Value name="Too-Much" failure="true">
                    <When>
                        <AnyOf>
                            <MoreThan property="scoop" min="3"/>
                            <NotLessThan property="topping" min="
                               4"/>
                        </AnyOf>
                    </When>
                </Value>
                <Value name="Too-too-Much" failure="true">
                    <When>
                        <AnyOf>
                            <MoreThan property="scoop" min="4"/>
                            <NotLessThan property="topping" min="
                               5"/>
                        </AnyOf>
                    </When>
                </Value>
            </Var>

            <VarSet name="Flavors">
                <Var name="Vanilla">
                    <Value name="Yes" property="scoop"/>
                    <Value name="No"/>
                </Var>
                <Var name="Chocolate">
                    <Value name="Yes" property="scoop"/>
                    <Value name="No"/>
                </Var>
                <Var name="Strawberry">
                    <Value name="Yes" property="scoop"/>
                    <Value name="No"/>
                </Var>
                <Var name="Pistachio">
                    <Value name="Yes" property="scoop"/>
                    <Value name="No"/>
                </Var>
                <Var name="Lemon">
                    <Value name="Yes" property="scoop"/>
                    <Value name="No"/>
```

```
72                  </Var>
73                  <Var name="Coffee">
74                      <Value name="Yes" property="scoop"/>
75                      <Value name="No"/>
76                  </Var>
77              </VarSet>
78
79              <VarSet name="Toppings" when="scoop">
80                  <Var name="Sprinkles">
81                      <Value name="Yes" property="topping"/>
82                      <Value name="No"/>
83                  </Var>
84                  <Var name="Pecans">
85                      <Value name="Yes" property="topping"/>
86                      <Value name="No"/>
87                  </Var>
88                  <Var name="Oreos">
89                      <Value name="Yes" property="topping"/>
90                      <Value name="No"/>
91                  </Var>
92                  <Var name="Cherries">
93                      <Value name="Yes" property="topping"/>
94                      <Value name="No"/>
95                  </Var>
96                  <Var name="MMs">
97                      <Value name="Yes" property="topping"/>
98                      <Value name="No"/>
99                  </Var>
100                 <Var name="Peppermint">
101                     <Value name="Yes" property="topping"/>
102                     <Value name="No"/>
103                 </Var>
104                 <Var name="Sabudana">
105                     <Value name="Yes" property="topping"/>
106                     <Value name="No"/>
107                 </Var>
108             </VarSet>
109         </Input>
110     </Function>
111 </System>
```

5.3 Tcases-Input

5.3.1 Specification

Usage: Represents a set of command line options. Command line arguments have the following form. [-c tupleSize] [-f outFile] [-g genDef] [-n] [-I] [-o outDir] [-p name=value] [-r seed] [-R]

[-t testDef] [-T contentType] [-v] [-x transformDef — -J — -H] [inputDef]

where:
-c tupleSize If -c is defined, use the given default tupleSize for all generators. This updates the generator definitions specified by the genDef file.

-f outFile If -f is defined, test definition output is written to the specified outFile, relative to the given outDir. If omitted, test definitions are written to the file specified by the -t option. If an output path cannot be derived, output is written to standard output.

-g genDef If -g is defined, test definitions are created using the generator(s) specified by the given genDef file. If omitted, the default generator definition is used. The default generator definition is read from the corresponding *-Generators file in the same directory as the inputDef, if it exists. Otherwise, the default TupleGenerator is used for all functions.

-H If -H is defined, test definition output is transformed into an HTML report. The resulting HTML file is written to the specified outDir.

-J If -J is defined, test definition output is transformed into Java source code for a JUnit test class. The resulting Java source file is written to the specified outDir. The following parameters (see the -p option) affect the results of this transform.

class: The name of the class under test. If omitted, the default is defined by the system parameter.

system: The name of the system under test. If omitted, the default is defined by the inputDef.

throws: A boolean value (true/false, yes/no). If true, generated test methods are declared to throw Exception. If omitted, the default is false.

values: A boolean value (true/false, yes/no). If true, comments listing all input variable assignments are included in the body of each test method. If omitted, the default is true.

-n If -n is defined, any previous contents of the testDef are ignored. If omitted, new test definitions are based on the previous testDef.

-I If -I is defined, no test definitions are produced. Instead, a JSON document containing the effective system input definition is written to the outDir. The effective system input definition, which is used to generate test definitions, is the result of normalizing all input schemas and adding any schema-derived value definitions.

-o outDir If -o is defined, test definition output is written to the specified directory. If omitted, the default outDir is the directory containing the inputDef or, if reading from standard input, the current working directory. If an output path cannot be derived, output is written to standard output.

-p name=value Defines the value of a transform parameter. Any number of -p options may

be specified. This option is meaningful only if the -x or -J option is given.

-r seed If -r is defined, use the given random number seed for all generators. This updates the generator definitions specified by the genDef file. -R Choose a new random number seed for all generators. This updates the generator definitions specified by the genDef file.

-x transformDef If -x is defined, test definition output is transformed according to the XSLT transform defined by the transformDef file. If relative, the transformDef path is assumed to be relative to the directory containing the inputDef.

-t testDef If -t is defined, new test definitions are based on the contents of the specified testDef file, relative to the directory containing the inputDef. Also, unless the -f option is given, new test definition output is written to the specified testDef path, relative to the outDir. If omitted, the default testDef name is derived from the inputDef name.

-T contentType Defines the default content type for the files read and produced. The contentType must be one of ”json” or ”xml”. The default content type is assumed for any file that is not specified explicitly or that does not have a recognized extension. If omitted, the default content type is derived from the inputDef name.

-v Prints the current Tcases version identifier to standard output.

inputDef The system input definition is read from the given inputDef. If omitted, the system input definition is read from standard input. Otherwise, the system input definition is read from the first one of the following files that can be located.
inputDef
inputDef-Input.xml
inputDef.xml
inputDef-Input.json
inputDef.json

5.3.2 Tcases XML Code

```
<System name="Tcases">
  <Function name="run">
    <Input>

      <!-- Option: -c -->
      <VarSet name="defaultTupleSize">
        <Var name="defined">
          <Value name="Yes" property="defaultTupleSize"/>
          <Value name="No"/>
        </Var>

        <Var name="isNumber" when="defaultTupleSize">
```

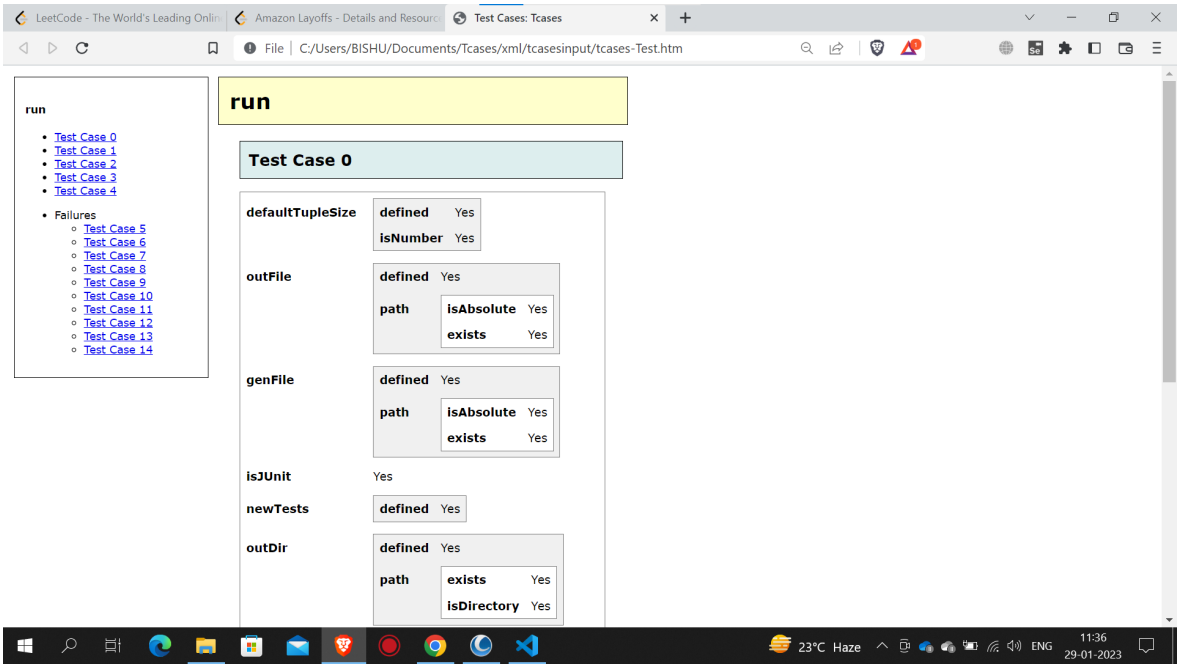

Figure 54: TCases Html View

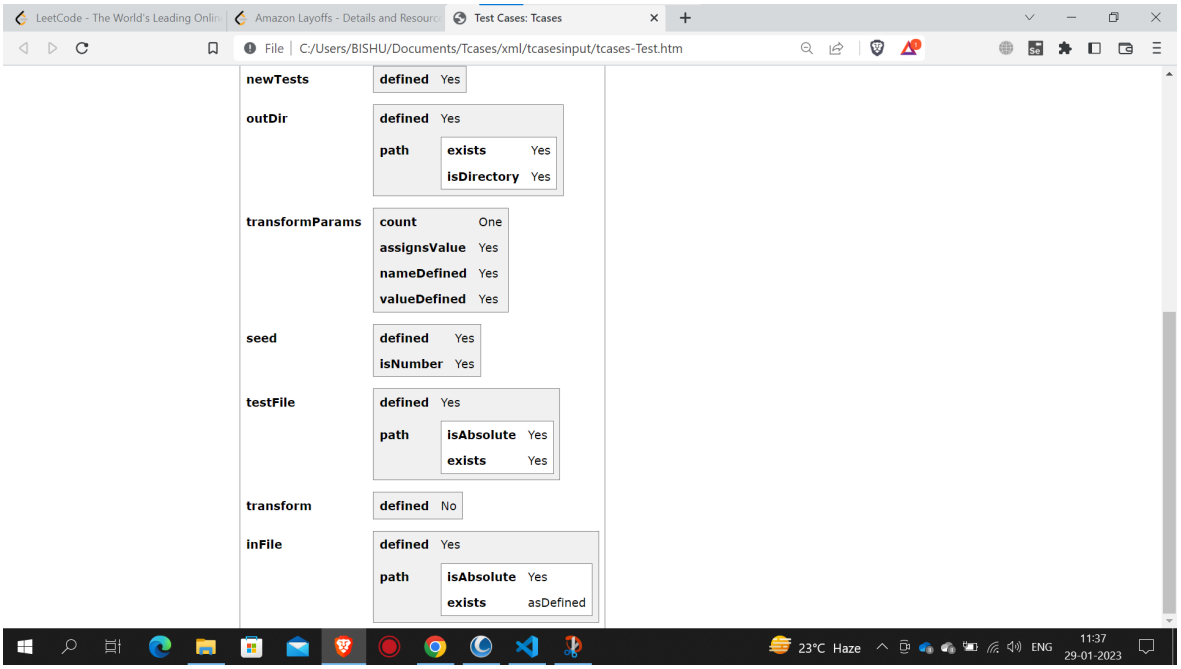

Figure 55: TCases Html View

```
13          <Value name="Yes"/>
14          <Value name="No" failure="true"/>
15        </Var>
16      </VarSet>
17
18      <!-- Option: -f -->
19      <VarSet name="outFile">
20        <Var name="defined">
```

```
21          <Value name="Yes" property="outFile"/>
22          <Value name="No"/>
23          <Value name="TransformOutputUndefined" failure="true"
               when="transformedOut, testFileExists"/>
24        </Var>
25
26        <VarSet name="path" when="outFile">
27          <Var name="isAbsolute">
28            <Value name="Yes"/>
29            <Value name="No"/>
30          </Var>
31          <Var name="exists">
32            <Value name="Yes" property="outFileExists"/>
33            <Value name="No"/>
34          </Var>
35        </VarSet>
36      </VarSet>
37
38      <!-- Option: -g -->
39      <VarSet name="genFile">
40        <Var name="defined">
41          <Value name="Yes" property="genFile"/>
42          <Value name="No"/>
43        </Var>
44
45        <VarSet name="path" when="genFile">
46          <Var name="isAbsolute">
47            <Value name="Yes"/>
48            <Value name="No"/>
49          </Var>
50          <Var name="exists">
51            <Value name="Yes"/>
52            <Value name="No" failure="true"/>
53          </Var>
54        </VarSet>
55
56        <Var name="default" whenNot="genFile">
57          <Value name="ForInputExists" when="inFile"/>
58          <Value name="ForInputNone" when="inFile"/>
59          <Value name="Standard" whenNot="inFile"/>
60        </Var>
61      </VarSet>
62
63      <!-- Option: -J -->
64      <Var name="isJUnit">
65        <Value name="Yes" property="isJUnit, transformedOut"
             whenNot="transform"/>
66        <Value name="No" when="transform"/>
```

```
67          <Value name="NotAllowed" when="transform" failure="true"/
                >
68        </Var>
69
70        <!-- Option: -n -->
71        <VarSet name="newTests">
72          <Var name="defined" when="testFileExists">
73            <Value name="Yes"/>
74            <Value name="No"/>
75          </Var>
76        </VarSet>
77
78        <!-- Option: -o -->
79        <VarSet name="outDir">
80          <Var name="defined">
81            <Value name="Yes" property="outDir"/>
82            <Value name="No"/>
83          </Var>
84
85          <VarSet name="path" when="outDir">
86            <Var name="exists">
87              <Value name="Yes" property="outDirExists"/>
88              <Value name="No"/>
89            </Var>
90            <Var name="isDirectory" when="outDirExists">
91              <Value name="Yes"/>
92              <Value name="No" failure="true"/>
93            </Var>
94          </VarSet>
95        </VarSet>
96
97        <!-- Option: -p -->
98        <VarSet name="transformParams">
99          <When>
100           <AnyOf property="transform, isJUnit"/>
101         </When>
102         <Var name="count">
103           <Value name="One" property="params"/>
104           <Value name="Many" property="params"/>
105           <Value name="None"/>
106         </Var>
107         <Var name="assignsValue" when="params">
108           <Value name="Yes"/>
109           <Value name="No" failure="true"/>
110         </Var>
111         <Var name="nameDefined" when="params">
112           <Value name="Yes"/>
113           <Value name="No" failure="true"/>
```

```
114         </Var>
115         <Var name="valueDefined" when="params">
116           <Value name="Yes"/>
117           <Value name="No"/>
118         </Var>
119       </VarSet>
120
121       <!-- Option: -r -->
122       <VarSet name="seed">
123         <Var name="defined">
124           <Value name="Yes" property="random"/>
125           <Value name="No"/>
126         </Var>
127
128         <Var name="isNumber" when="random">
129           <Value name="Yes"/>
130           <Value name="No" failure="true"/>
131         </Var>
132       </VarSet>
133
134       <!-- Option: -t -->
135       <VarSet name="testFile">
136         <Var name="defined">
137           <Value name="Yes" property="testFile"/>
138           <Value name="No"/>
139         </Var>
140
141         <VarSet name="path" when="testFile">
142           <Var name="isAbsolute">
143             <Value name="Yes"/>
144             <Value name="No"/>
145           </Var>
146           <Var name="exists">
147             <Value name="Yes" property="testFileExists"/>
148             <Value name="No"/>
149           </Var>
150         </VarSet>
151
152         <VarSet name="default" whenNot="testFile">
153           <Var name="exists">
154             <Value name="Yes" property="testFileExists"/>
155             <Value name="No"/>
156           </Var>
157         </VarSet>
158       </VarSet>
159
160       <!-- Option: -x -->
161       <VarSet name="transform">
```

```
        <Var name="defined">
          <Value name="Yes" property="transform, transformedOut"/
             >
          <Value name="No"/>
        </Var>
        <VarSet name="path" when="transform">
          <Var name="isAbsolute">
            <Value name="Yes"/>
            <Value name="No"/>
          </Var>
          <Var name="exists">
            <Value name="Yes"/>
            <Value name="No" failure="true"/>
          </Var>
        </VarSet>
      </VarSet>

      <!-- Input definition file -->
      <VarSet name="inFile">
        <Var name="defined">
          <Value name="Yes" property="inFile"/>
          <Value name="No"/>
        </Var>
        <VarSet name="path" when="inFile">
          <Var name="isAbsolute">
            <Value name="Yes"/>
            <Value name="No"/>
          </Var>
          <Var name="exists">
            <Value name="asDefined"/>
            <Value name="withInputXml"/>
            <Value name="withXml"/>
            <Value name="No" failure="true"/>
          </Var>
        </VarSet>
      </VarSet>

    </Input>
  </Function>
</System>
```

5.4 Find-Input

5.4.1 Specification

Usage: find pattern file

Locates one or more instances of a given pattern in a text file.

All lines in the file that contain the pattern are written to standard output. A line containing the pattern is written only once, regardless of the number of times the pattern occurs in it.

The pattern is any sequence of characters whose length does not exceed the maximum length of a line in the file. To include a blank in the pattern, the entire pattern must be enclosed in quotes (”). To include a quotation mark in the pattern, two quotes in a row (””) must be used.

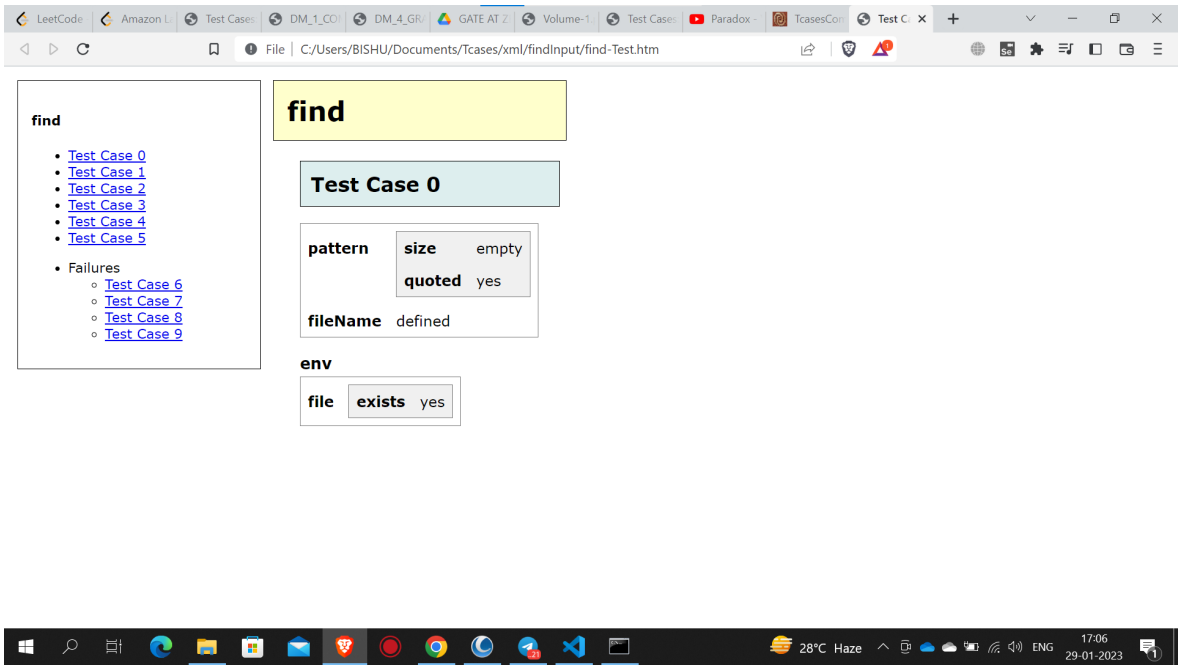

Figure 56: Find-Input HTML View

5.4.2 Find-Input XML Code

```
1
2  <System name="Examples">
3    <Function name="find">
4      <!--
5           Usage: find pattern file
6
7           Locates one or more instances of a given pattern in a
               text file.
8
9           All lines in the file that contain the pattern are
               written to standard output. A
10          line containing the pattern is written only once,
               regardless of the number of
11          times the pattern occurs in it.
12
13          The pattern is any sequence of characters whose length
               does not exceed the
```

```
14          maximum length of a line in the file. To include a blank
                in the pattern, the
15          entire pattern must be enclosed in quotes ("). To
               include a quotation mark in the
16          pattern, two quotes in a row ("") must be used.
17        -->
18      <Input type="arg">
19        <VarSet name="pattern" when="fileExists">
20          <Var name="size">
21            <Value name="empty" property="empty"/>
22            <Value name="singleChar" property="singleChar"/>
23            <Value name="manyChars"/>
24          </Var>
25          <Var name="quoted">
26            <Value name="yes" property="quoted"/>
27            <Value name="no" whenNot="empty"/>
28            <Value name="unterminated" failure="true"/>
29          </Var>
30          <Var name="blanks" whenNot="empty">
31            <Value name="none"/>
32            <Value name="one" when="quoted, singleChar"/>
33            <Value name="many">
34              <When>
35                <AllOf property="quoted">
36                  <Not property="singleChar"/>
37                </AllOf>
38              </When>
39            </Value>
40          </Var>
41          <Var name="embeddedQuotes" whenNot="empty, singleChar">
42            <Value name="none"/>
43            <Value name="one"/>
44            <Value name="many" once="true"/>
45          </Var>
46        </VarSet>
47
48        <Var name="fileName">
49          <Value name="defined" property="fileName"/>
50          <Value name="missing" failure="true"/>
51        </Var>
52      </Input>
53
54      <Input type="env">
55        <VarSet name="file" when="fileName">
56          <Var name="exists">
57            <Value name="yes" property="fileExists"/>
58            <Value name="no" failure="true"/>
59          </Var>
```

```
60          <VarSet name="contents" when="fileExists" whenNot="empty"
               >
61            <Var name="linesLongerThanPattern">
62              <Value name="one" property="matchable" once="true"/>
63              <Value name="many" property="matchable"/>
64              <Value name="none" failure="true"/>
65            </Var>
66            <Var name="patterns" when="matchable" whenNot="empty">
67              <Value name="none" once="true"/>
68              <Value name="one" property="match"/>
69              <Value name="many" property="match, many"/>
70            </Var>
71            <Var name="patternsInLine" when="match">
72              <Value name="one"/>
73              <Value name="many" once="true" when="many"/>
74            </Var>
75          </VarSet>
76        </VarSet>
77      </Input>
78
79    </Function>
80  </System>
```

CS6474: Software Testing Laboratory 2023

JCUTE

Prepared by
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6 JCute

The Java Concolic Unit Testing Engine (jCUTE) automatically generates unit tests for Java programs. Concolic execution combines randomized concrete execution with symbolic execution and automatic constraint solving. Symbolic execution allows jCUTE to discern inputs that lead down different execution paths; randomized concrete execution helps it overcome limitations of the constraint solver, like the inability to analyze system calls or solve general systems of non-linear integer equations. Through this combination, jCUTE is able to generate test cases that execute many different execution paths in real Java programs.

jCUTE supports multi-threaded programs. It can discover race conditions and deadlocks through systematic schedule exploration.

Write code for scenarios given below using Java and apply concolic testing to improve branch coverage.

6.1 Checking prime numbers, odd numbers, or even numbers.

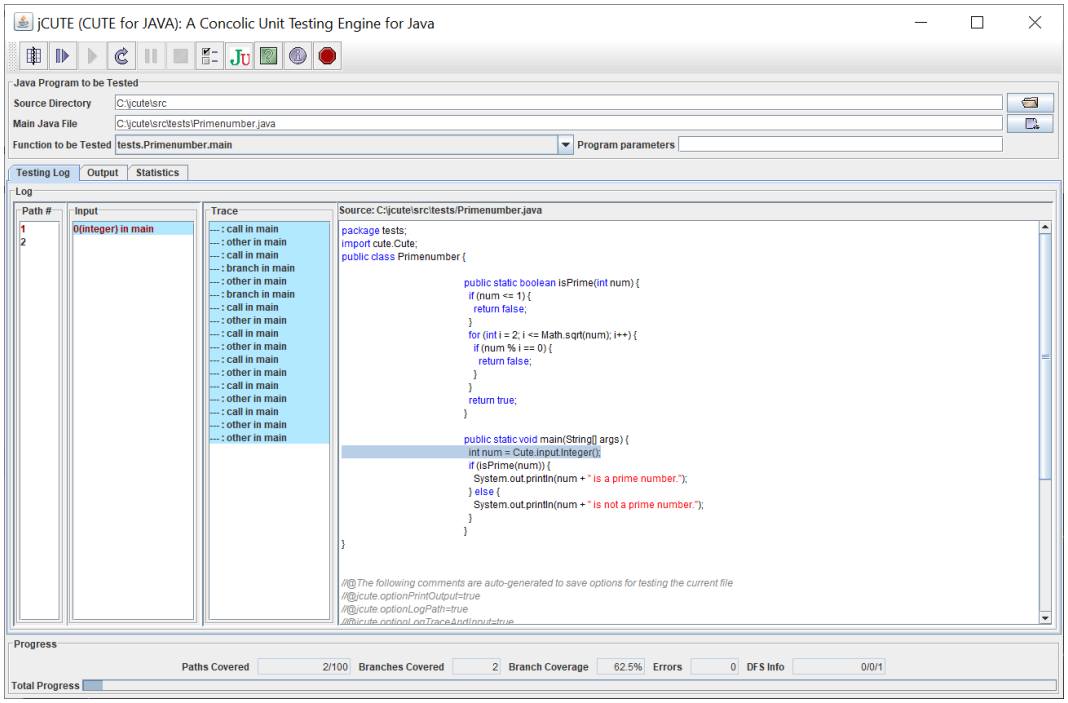

Figure 57: Testing log

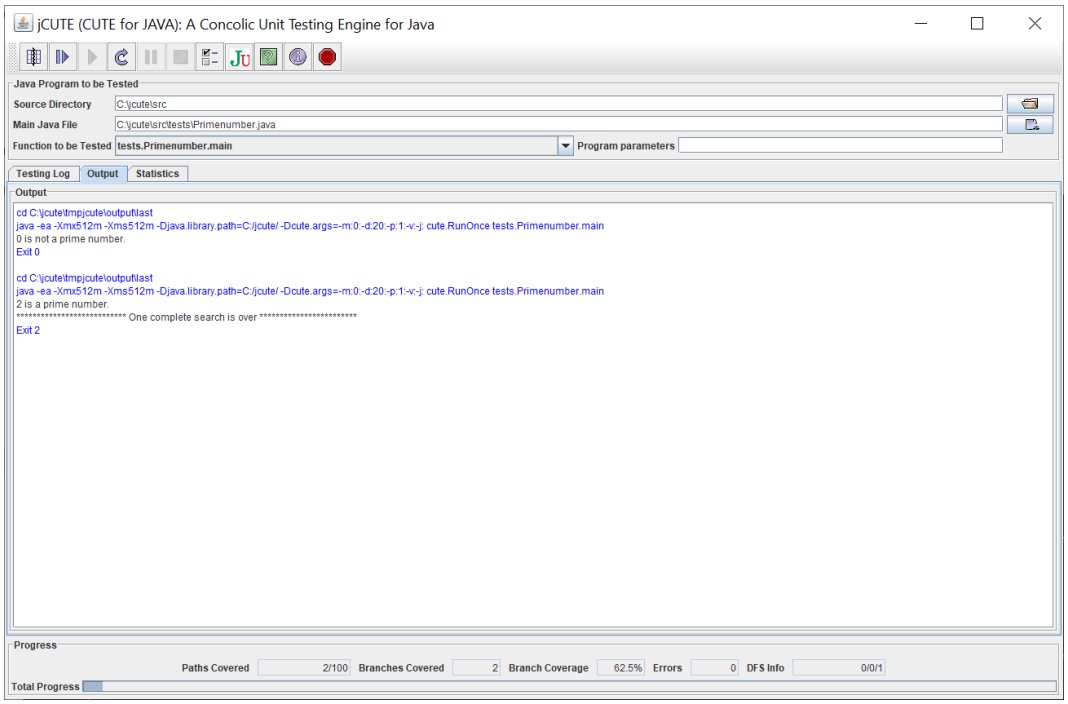

Figure 58: Output

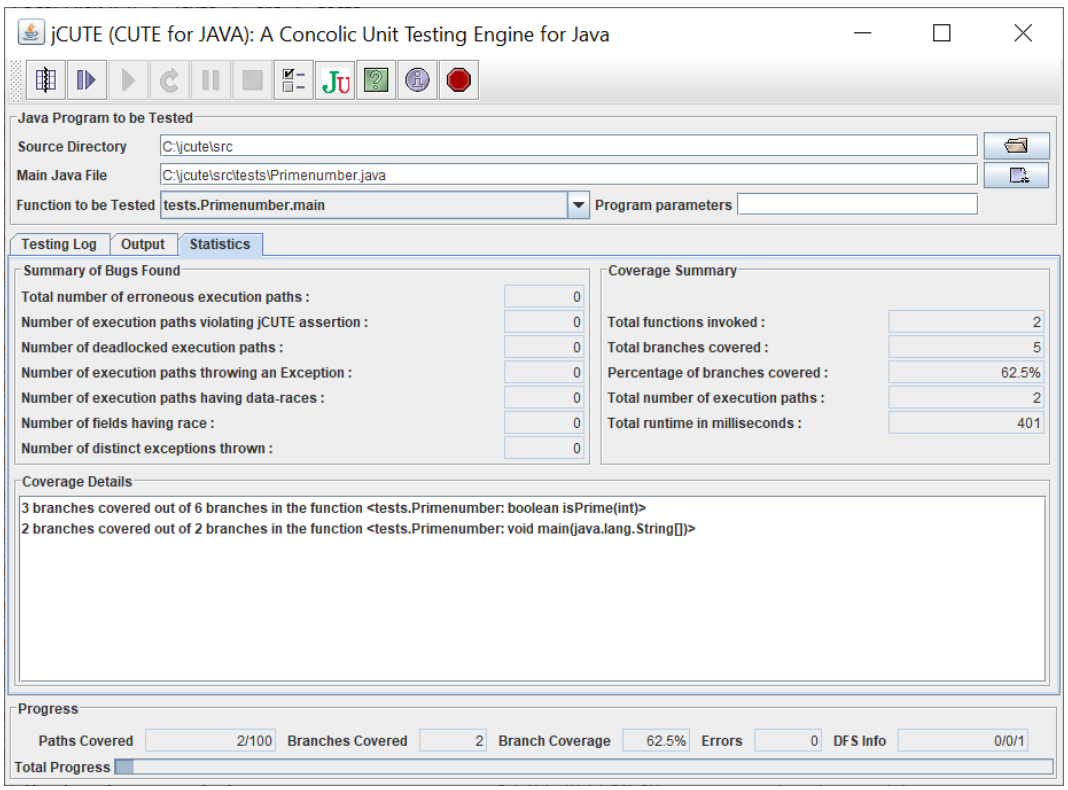

Figure 59: Statistics Screenshot

6.2 Checking odd numbers, or even numbers.

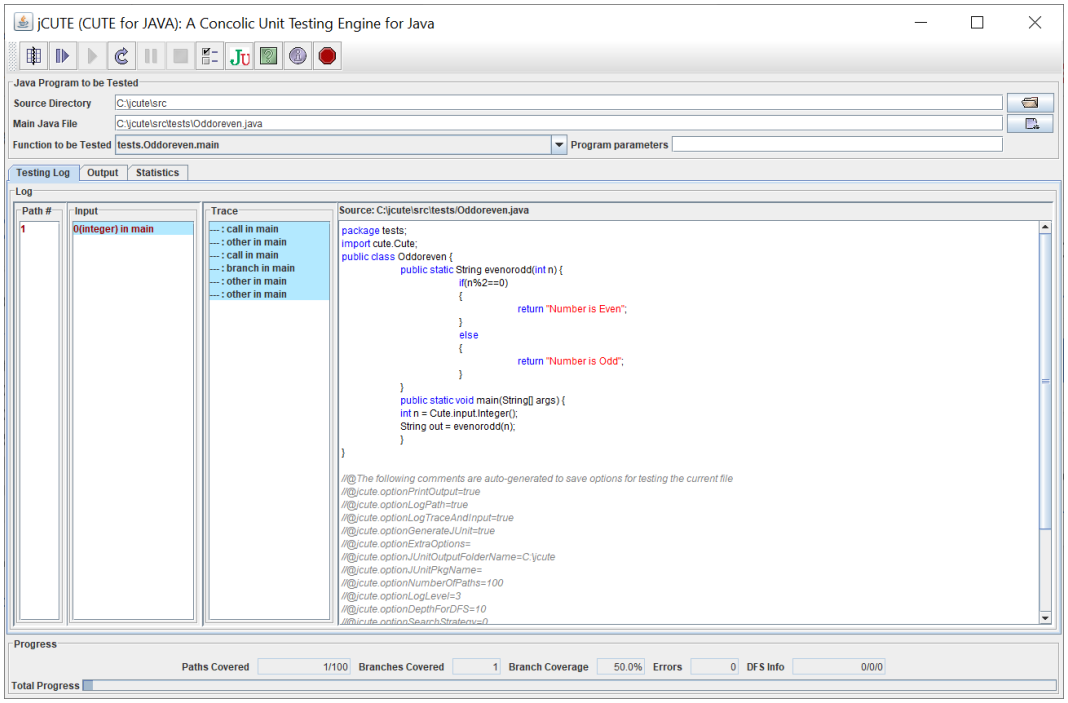

Figure 60: Testing log

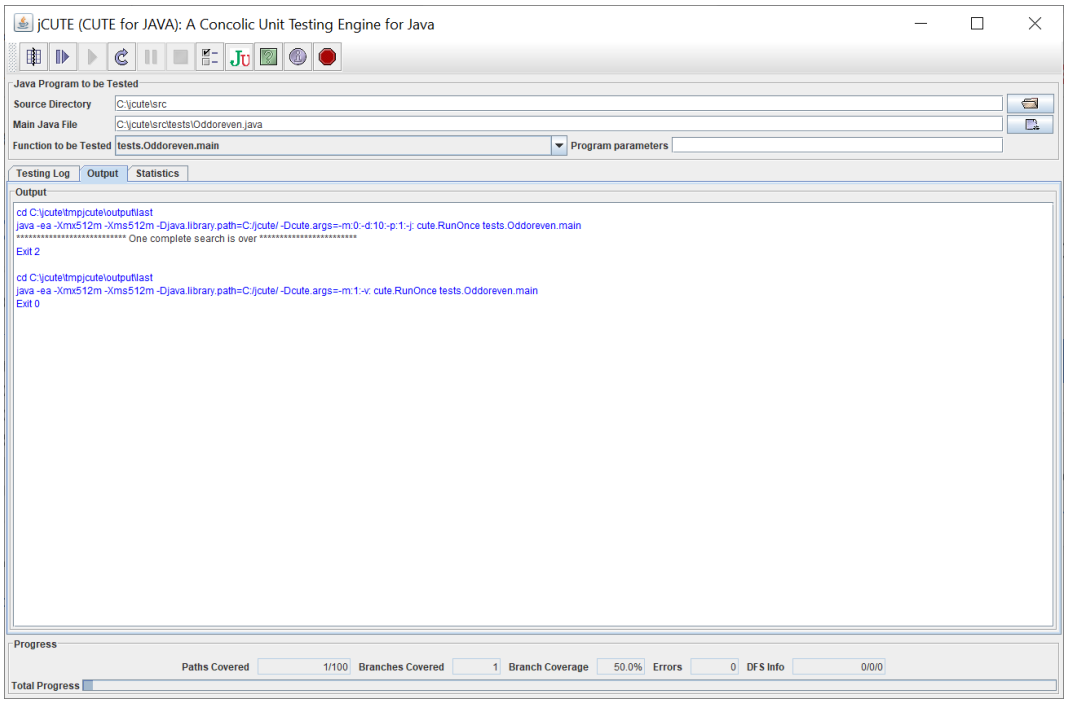

Figure 61: Output

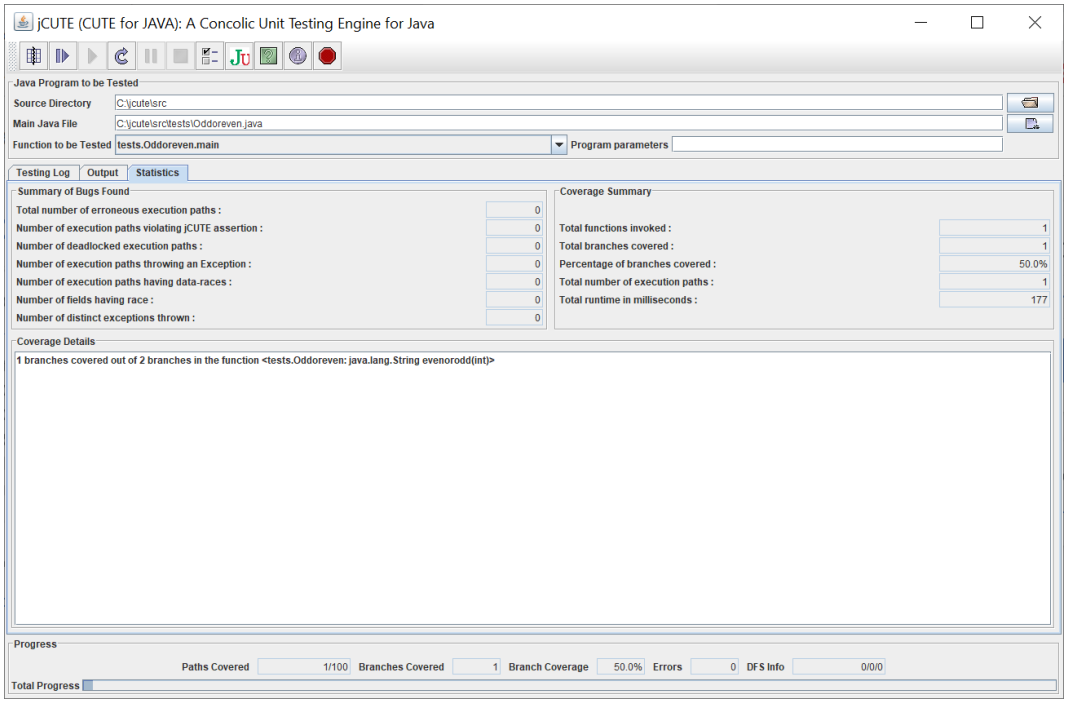

Figure 62: Statistics Screenshot

6.3 Calculator based on floating-point 32-bit numbers.

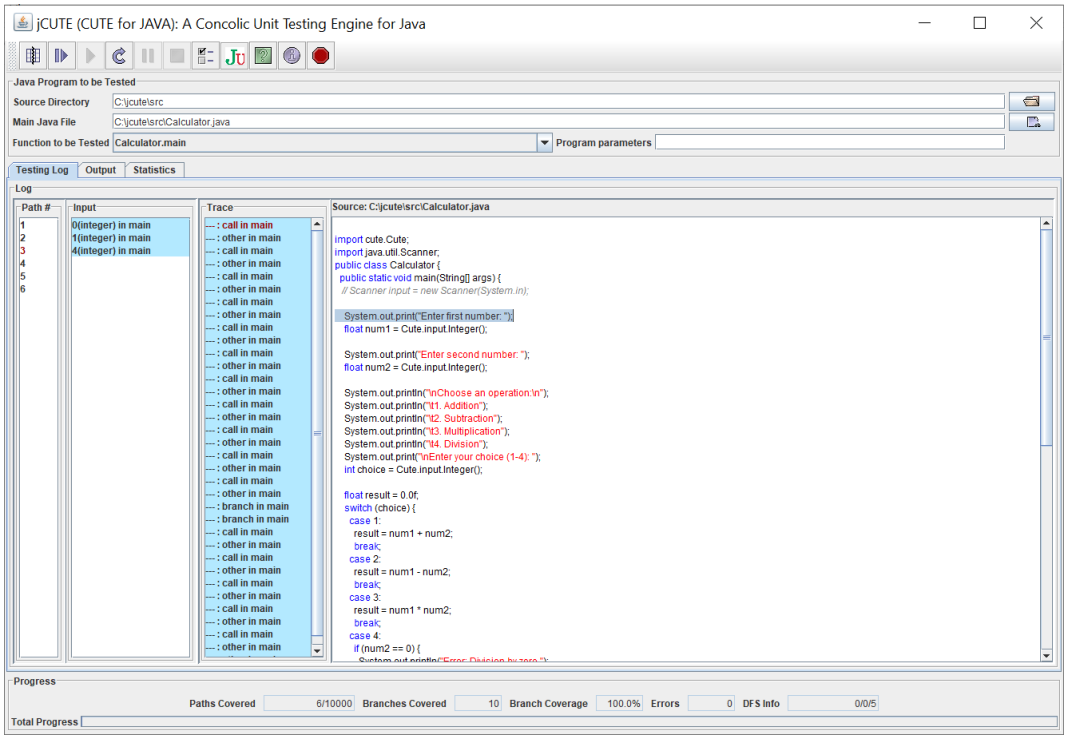

Figure 63: Testing log

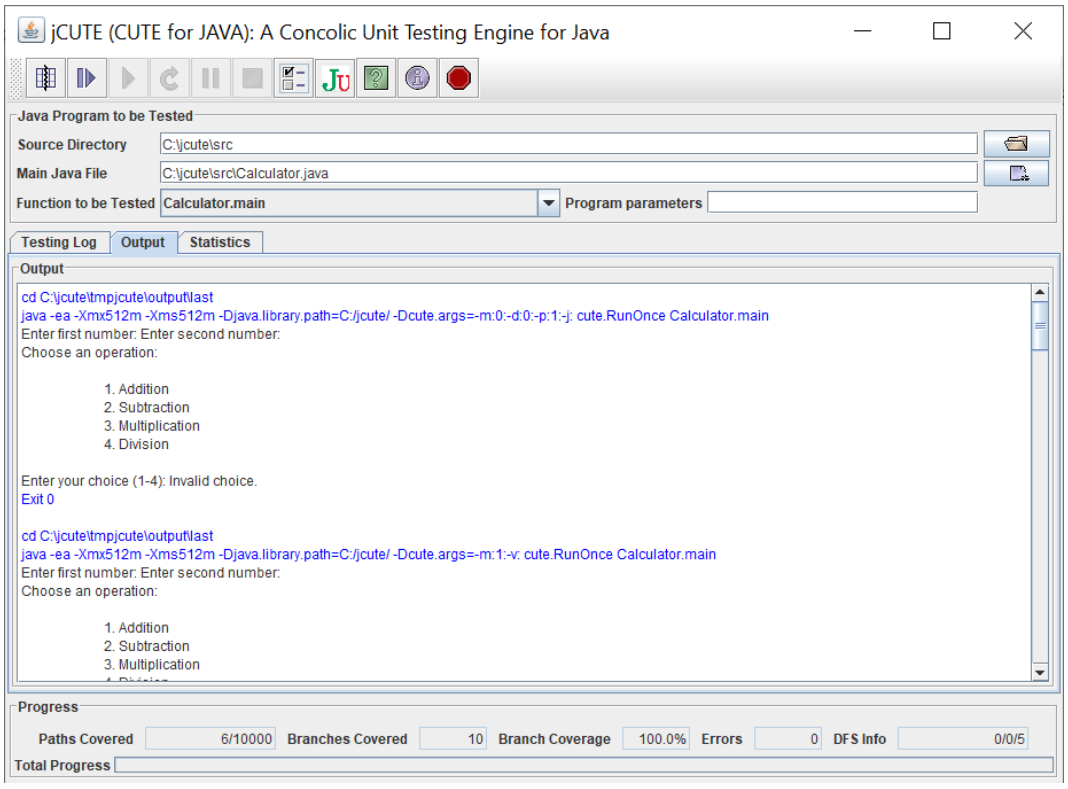

Figure 64: Output

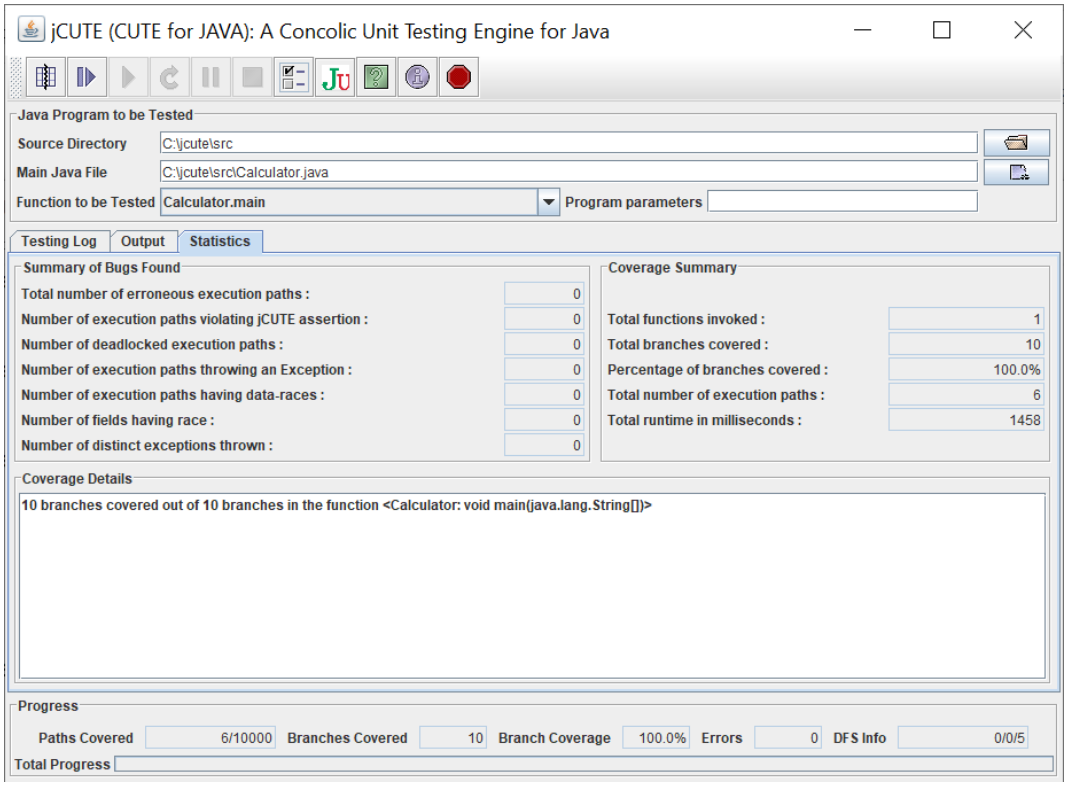

Figure 65: Statistics Screenshot

6.4 Reverse an array.

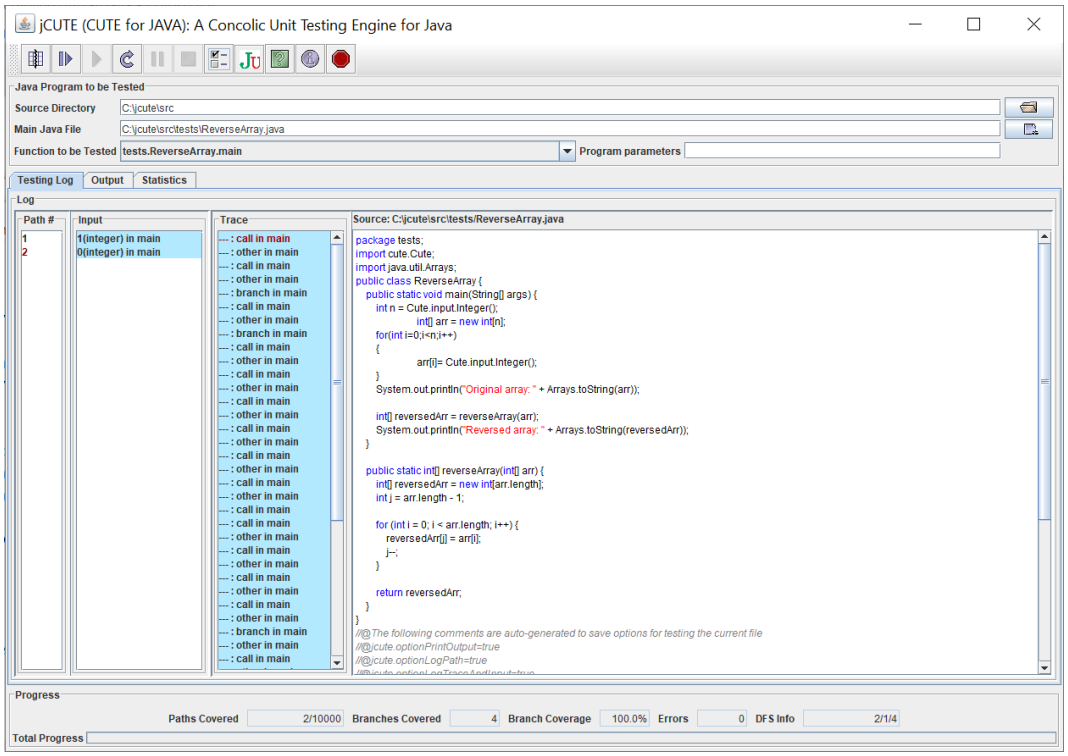

Figure 66: Testing log

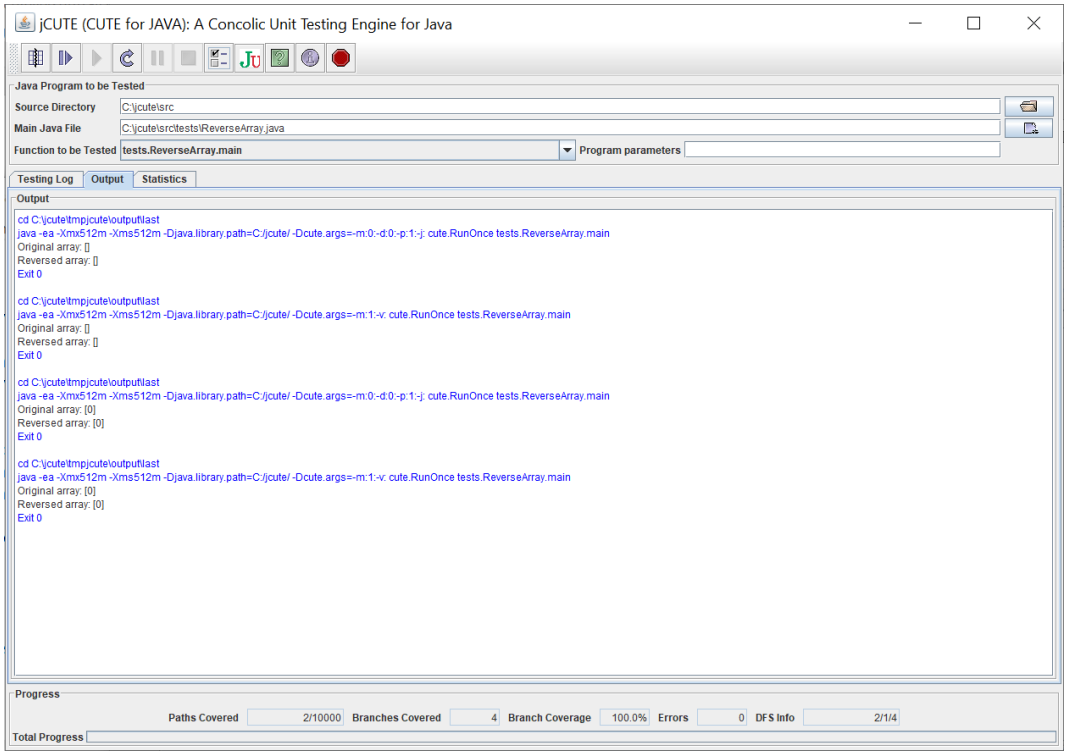

Figure 67: Output

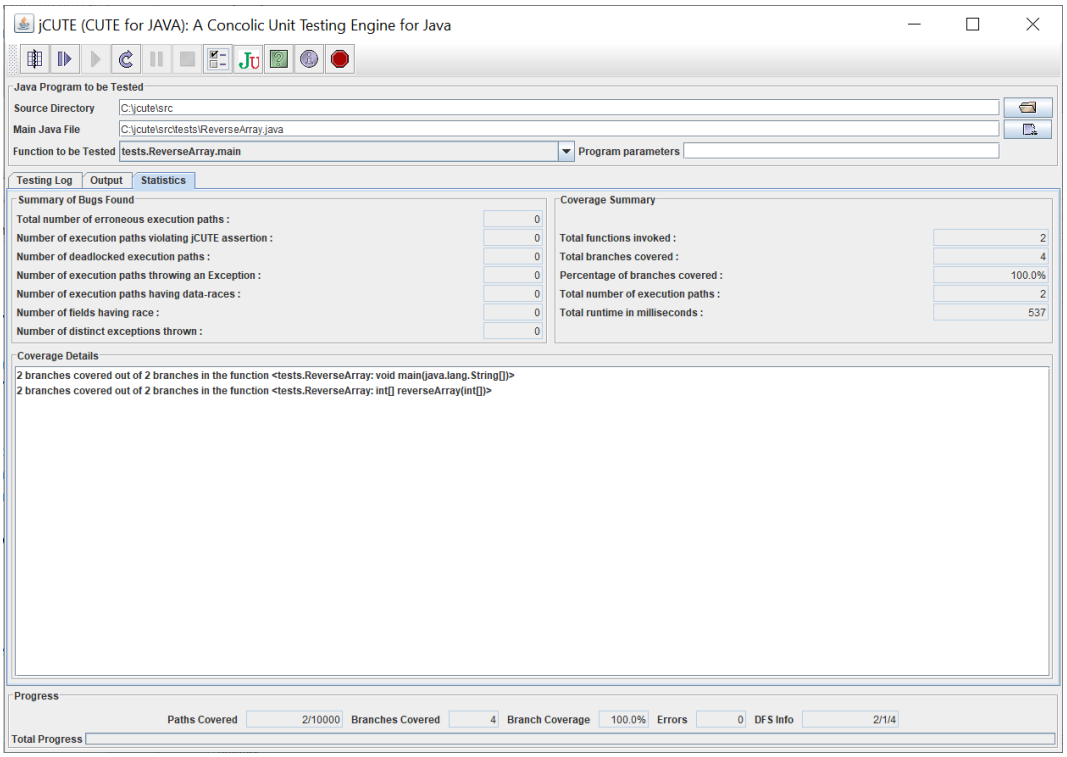

Figure 68: Statistics Screenshot

6.5 Decimal to hexadecimal.

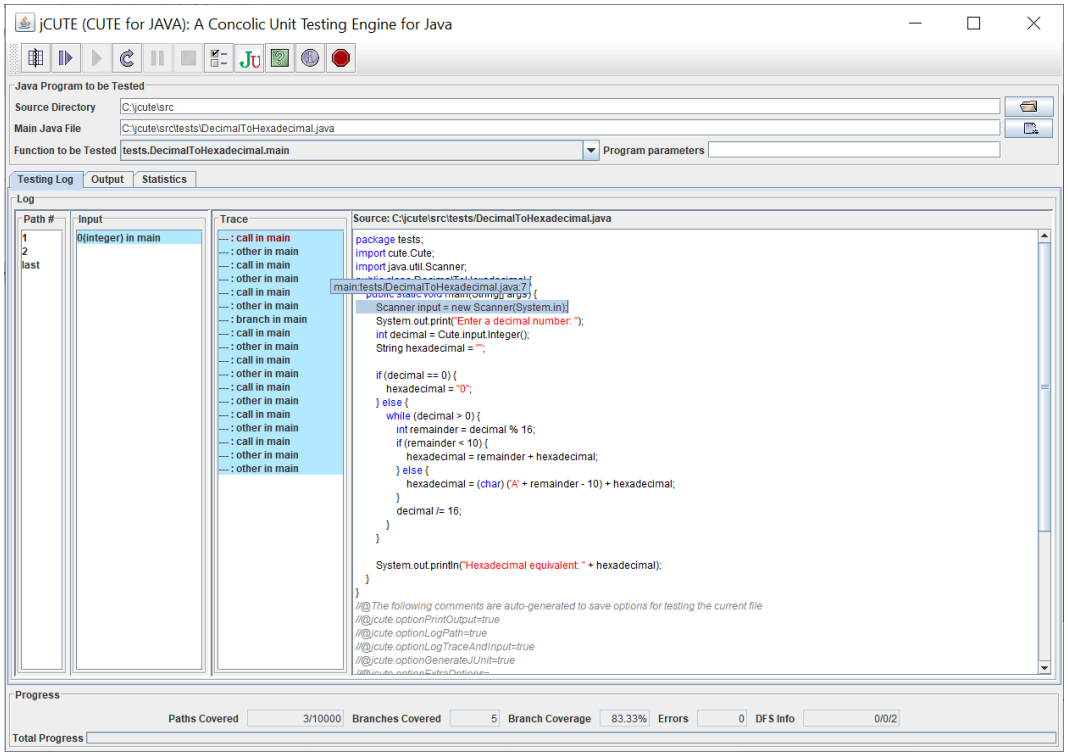

Figure 69: Testing log

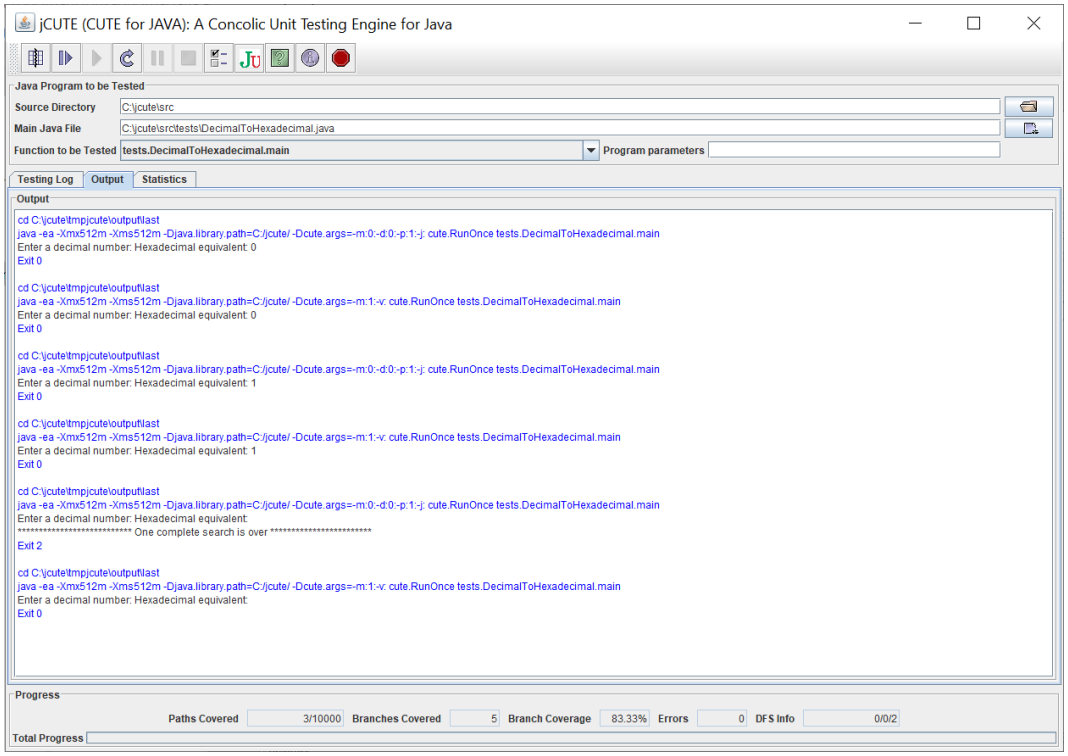

Figure 70: Output

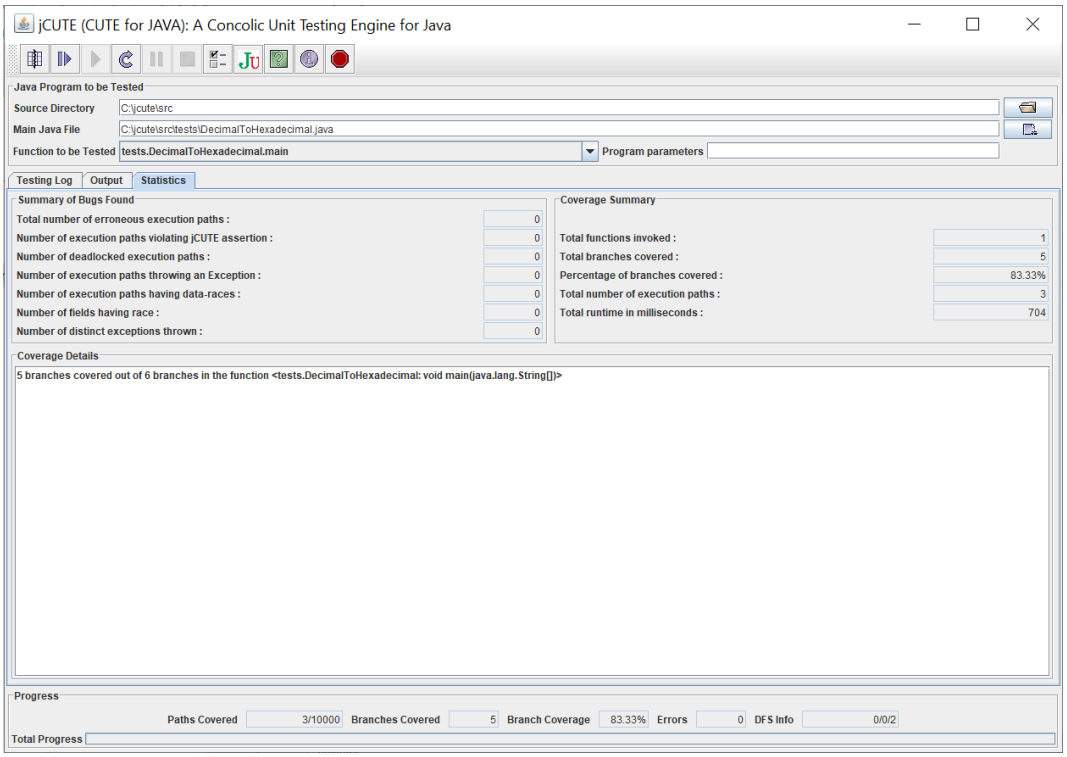

Figure 71: Statistics Screenshot

6.6 Grade students based on marks.

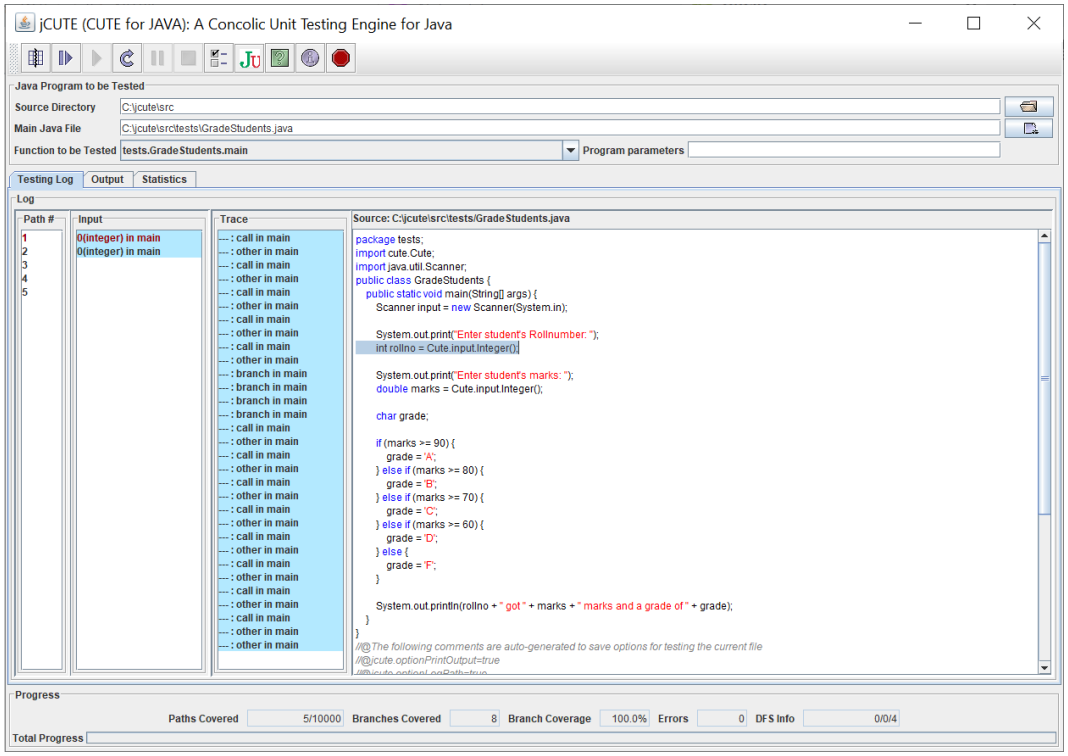

Figure 72: Testing log

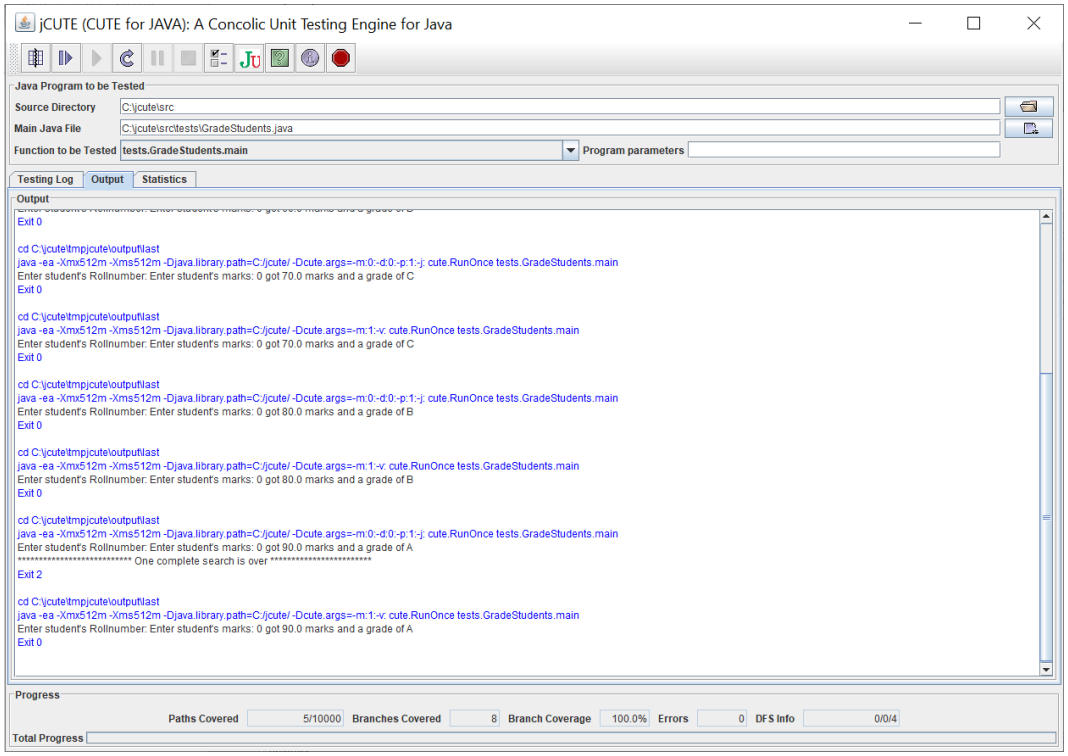

Figure 73: Output

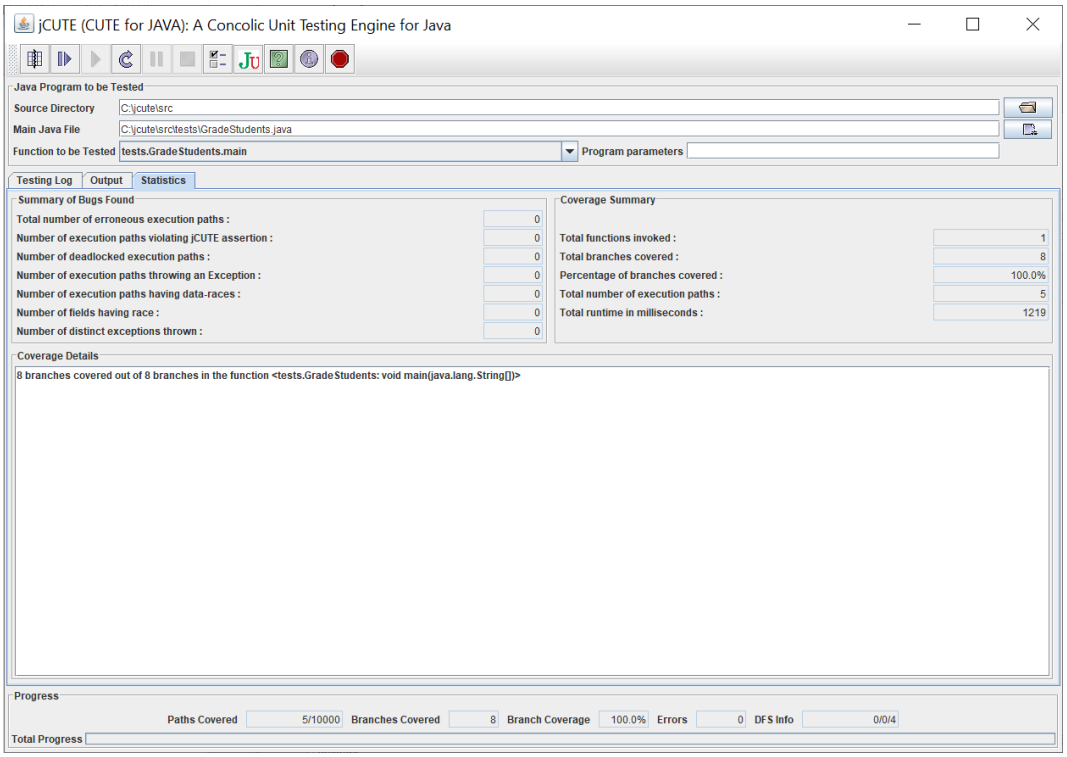

Figure 74: Statistics Screenshot

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JUMBLE

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7 Jumble

Jumble is a mutation testing tool which changes the Java code at byte code level. It runs a unit test case and applies certain set of mutations.

Passed Mutations: Changes in code which do not affect the final output

Failed Mutations: Changes in code which change the final output

Score : It is the percentage of passed mutations out of the total mutations. It is used to assess the validity of our test suite.

Jumble is a class level mutation testing tool that works in conjunction with JUnit. The purpose of mutation testing is to provide a measure of the effectiveness of test cases. A single mutation is performed on the code to be tested, the corresponding test cases are then executed. If the modified code fails the tests, then this increases confidence in the tests. Conversely, if the modified code passes the tests this indicates a testing deficiency.

Example Here is some example Jumble output for a Java class called ”Foo”, which has some JUnit tests in a class called ”FooTest”.

Jumble starts by running the unit tests (in FooTest.class) on the unmodified Foo class to check that they all pass, and to measure the time taken by each test. Then it will mutate Foo in various ways and run the tests again to see if they detect the mutation. It continues this process until all mutations of Foo have been tried.

Installation and Usage

Release 1.3.0 of Jumble is available as an Eclipse plugin. Just add `http://jumble.sourceforge.net/update/` to Eclipse as an update site, and you will be able to install Jumble. Then you should be able to right-click on any class and do Jumble Mutation Tester / Analyse tests of this class to mutate the class and analyse its tests. Note that you click on your source code class, NOT on the JUnit tests.

For command line usage, just download jumble_1.x.y.jar via the Sourceforge Files release system, and run it with java -jar jumble_1.x.y.jar –help to see the help message.

Solve the below programs in Java

7.1 Write a program to generate a Factorial of numbers (where stack length should be at 3 (max)). The numbers should be 5, 3, 8, and 15.

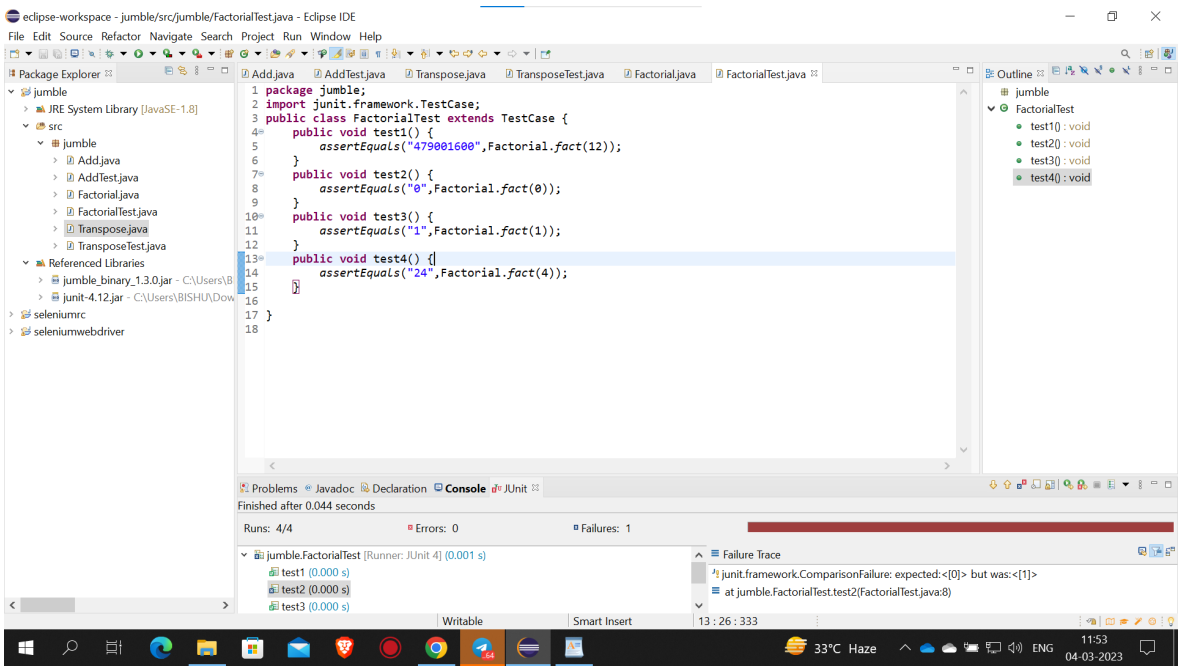

Figure 75: Jumble Test Case

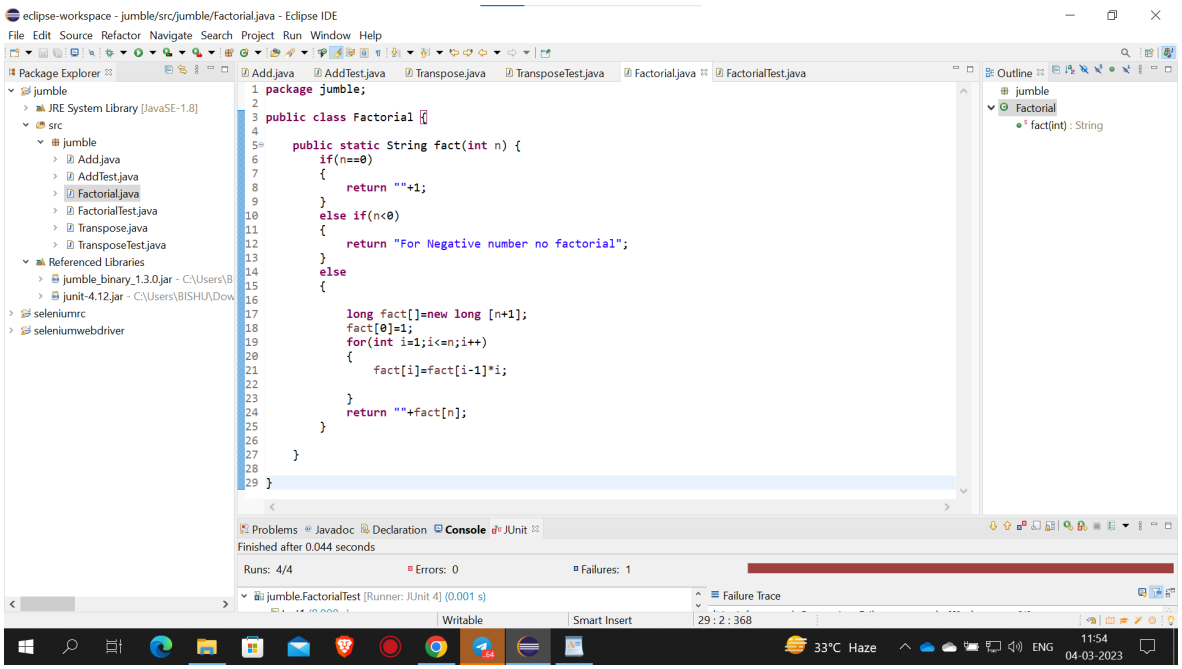

Figure 76: Factorial Code

7.2 Write a program to generate Fibonacci numbers.

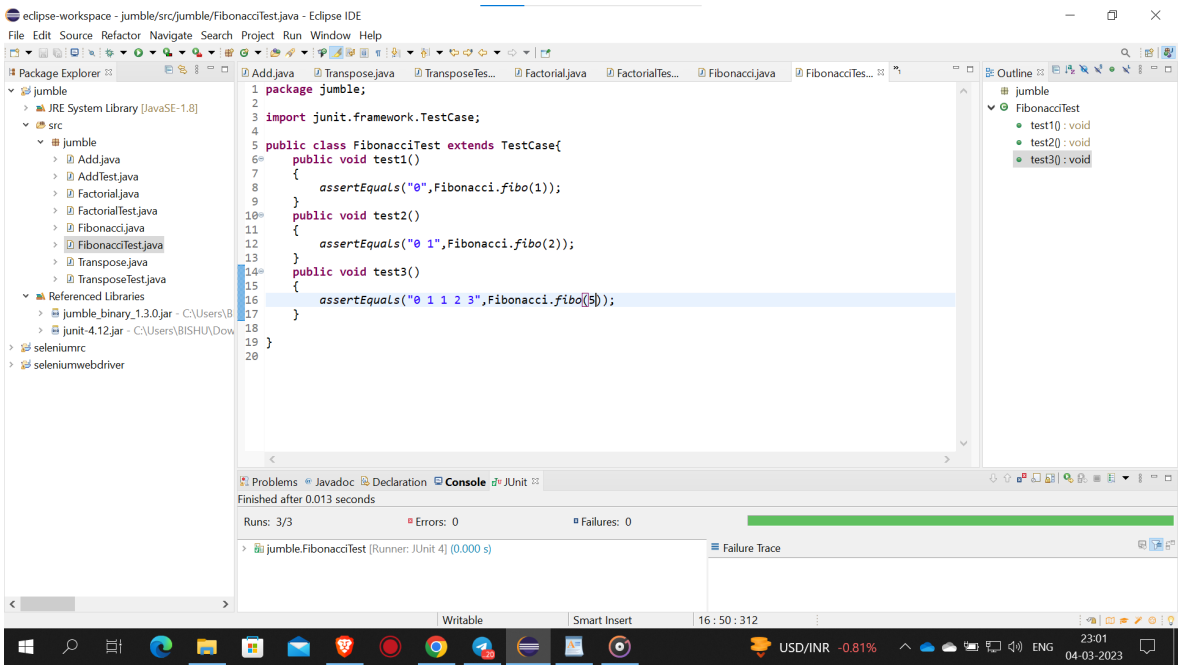

Figure 77: Jumble Test Case

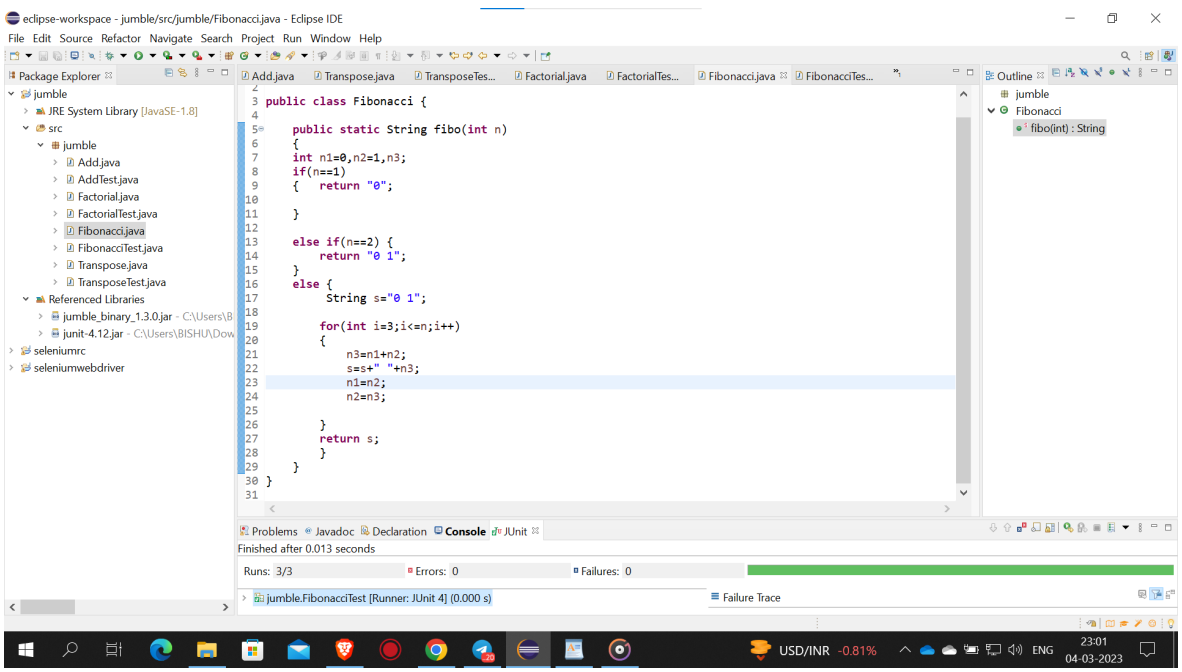

Figure 78: Fibonacci Code

7.3 Write a program that performs sorting of a group of integer values using the quick sort technique.

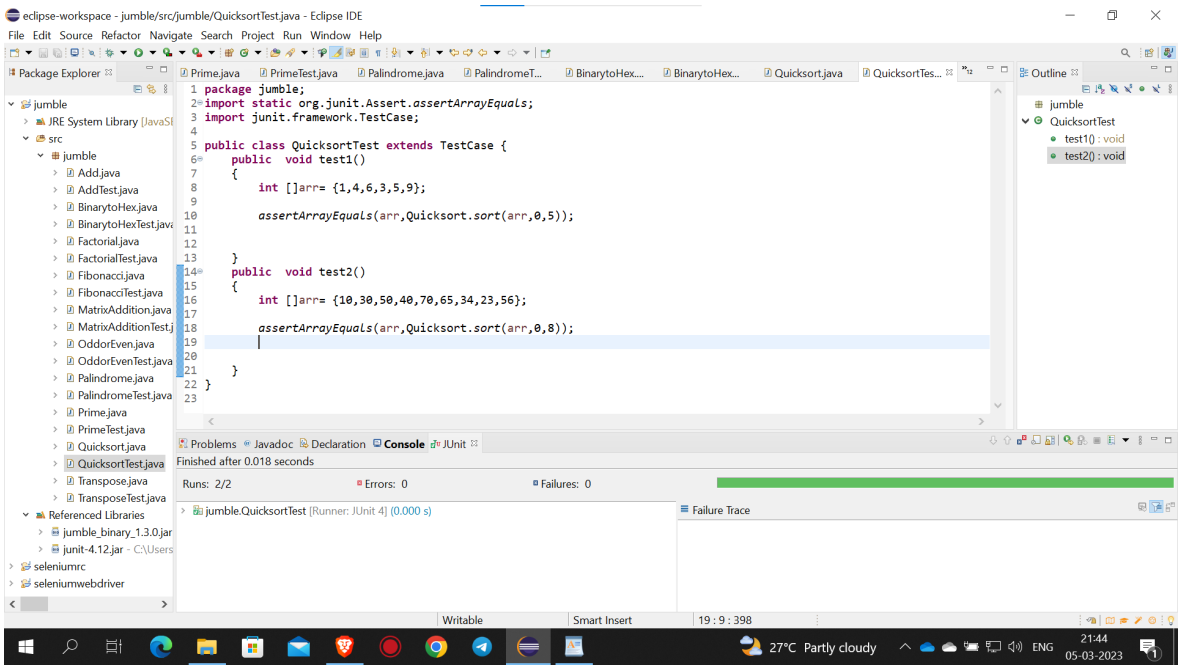

Figure 79: Jumble Test Case

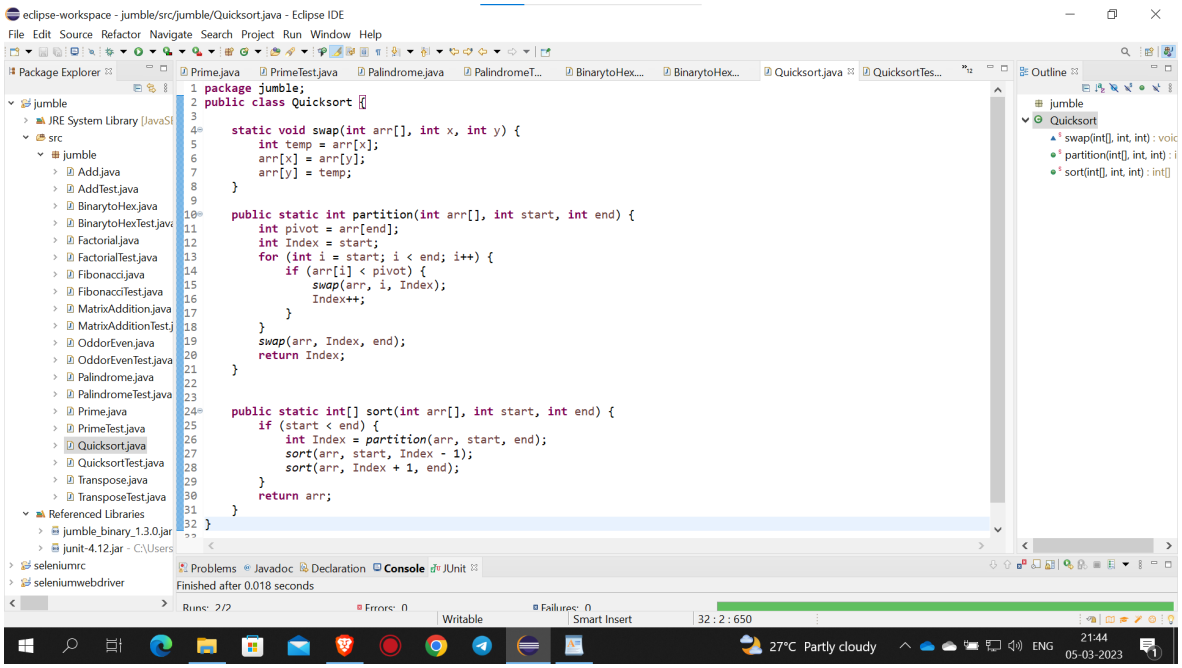

Figure 80: Quicksort Code

7.4 Write a program that accepts elements of a matrix and displays its transpose.

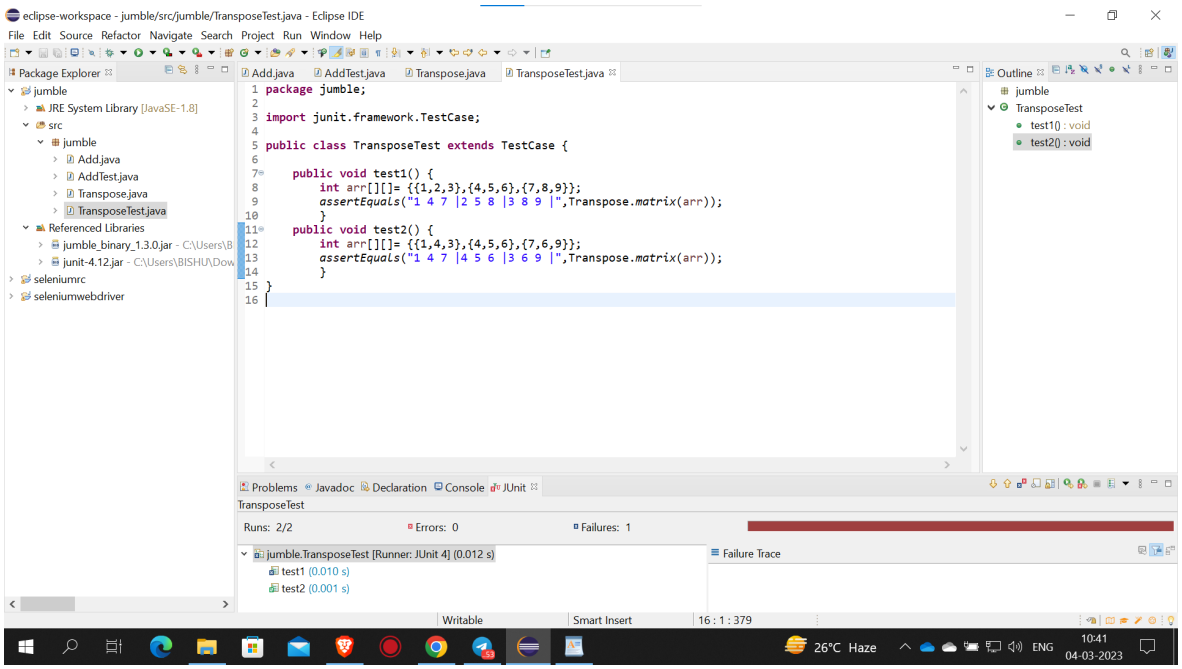

Figure 81: Jumble Test Case

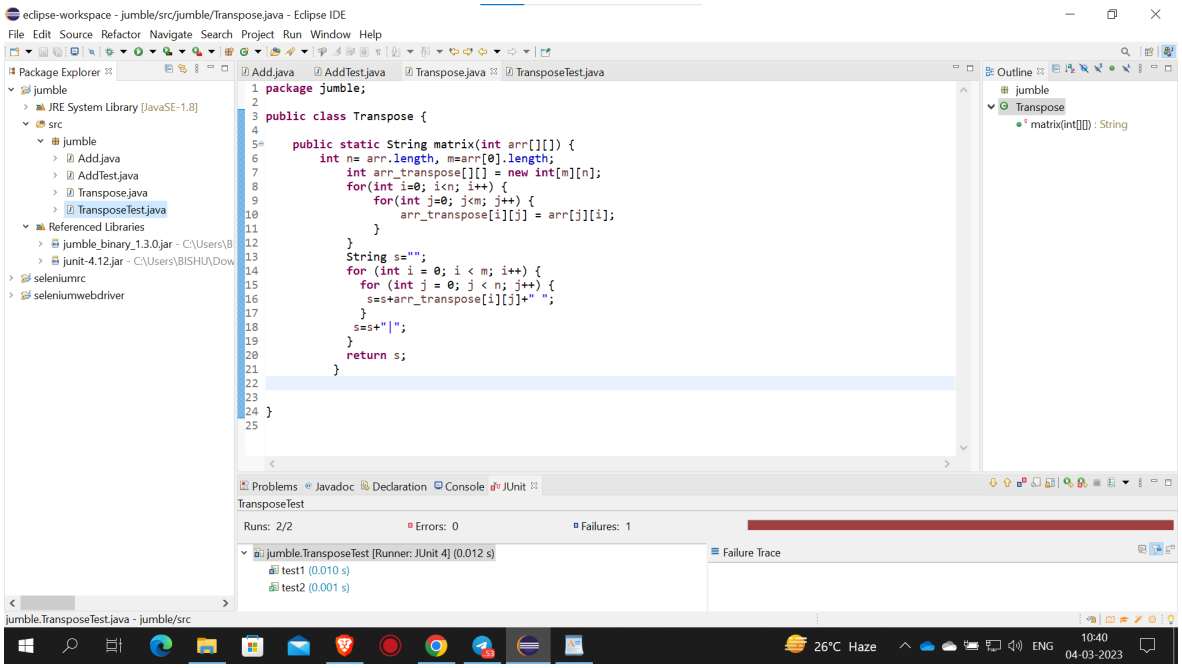

Figure 82: Matrix Transpose Code

7.5 Write a program to add two matrices and display the sum matrix.

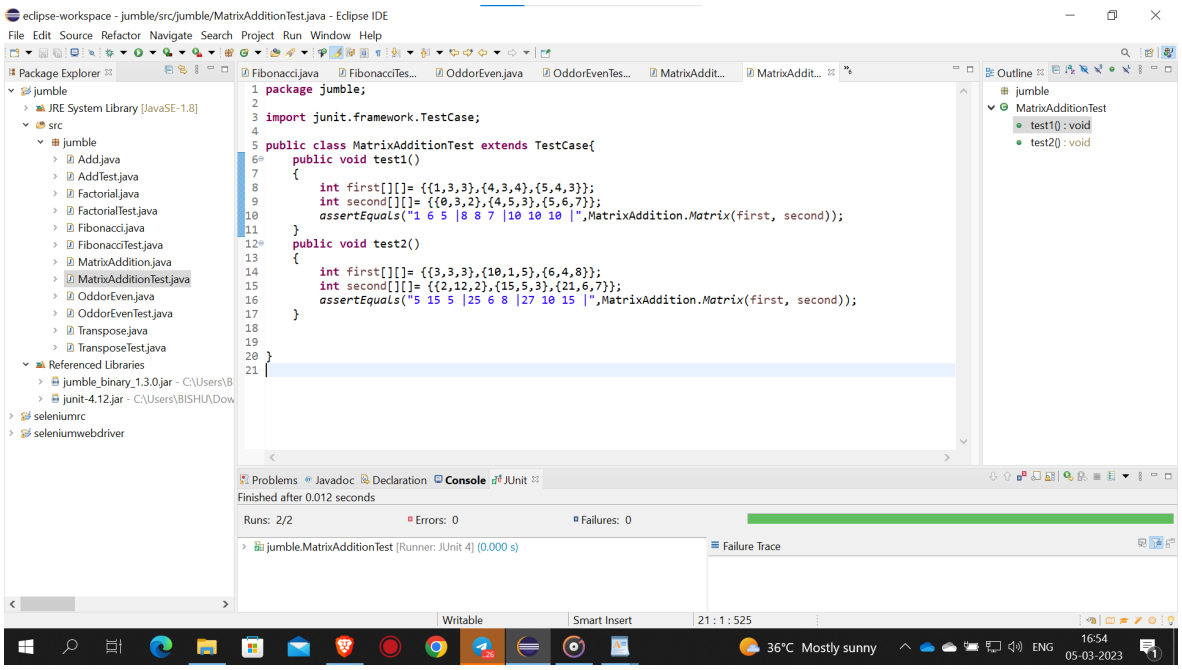

Figure 83: Jumble Test Case

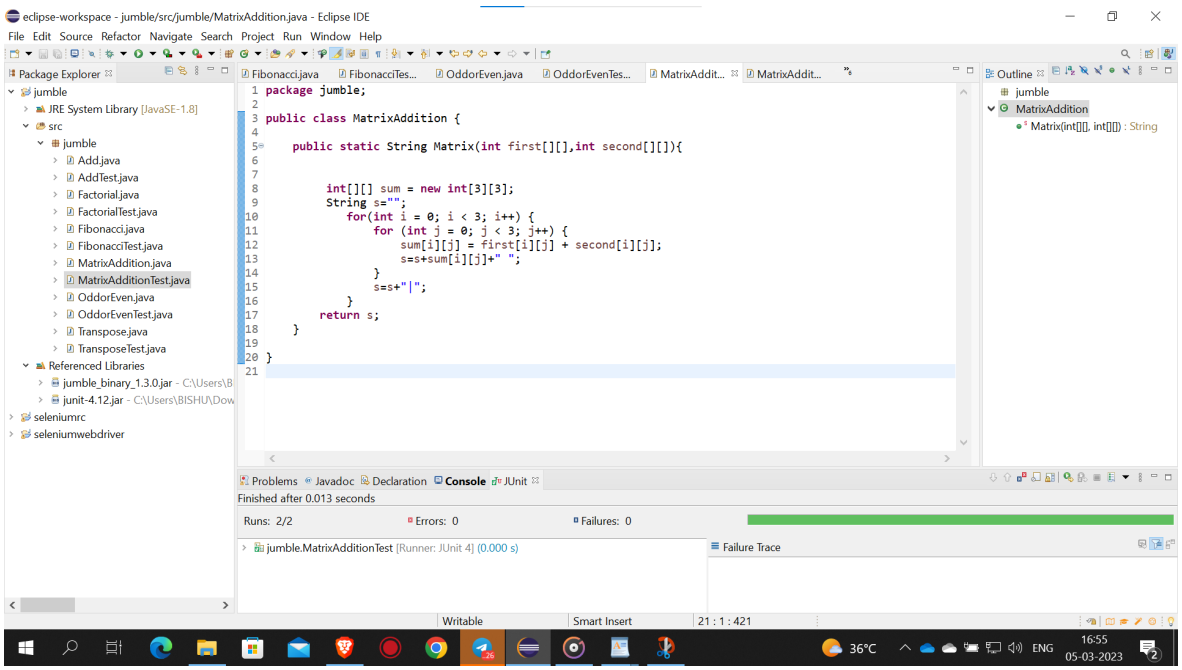

Figure 84: Matrix Addition Code

7.6 Write a program to Print Prime Numbers from 1 to 100 using Scanner Class and For Loop.

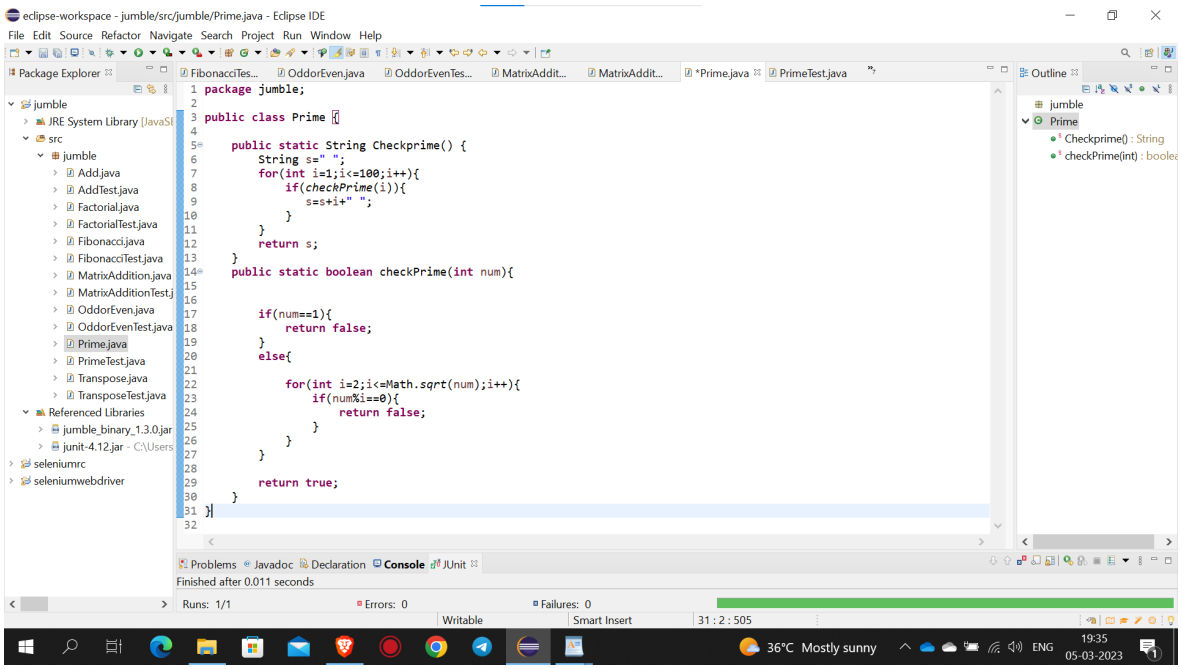

Figure 85: Jumble Test Case

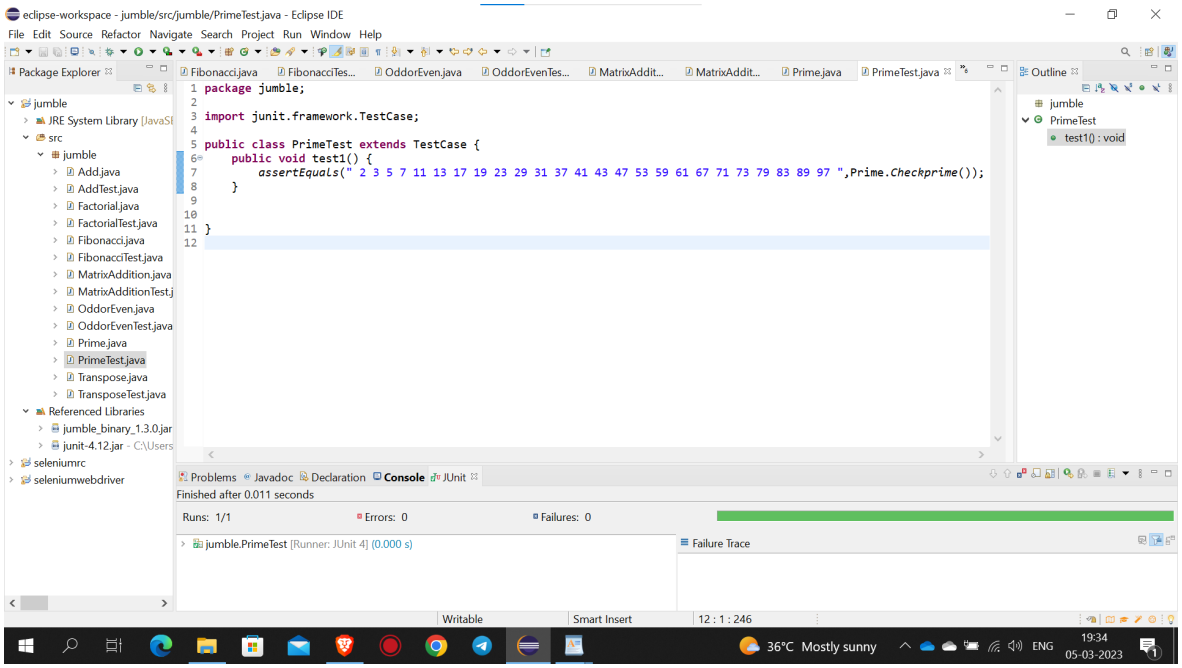

Figure 86: Prime Code

7.7 Write a program to generate a palindrome of numbers.

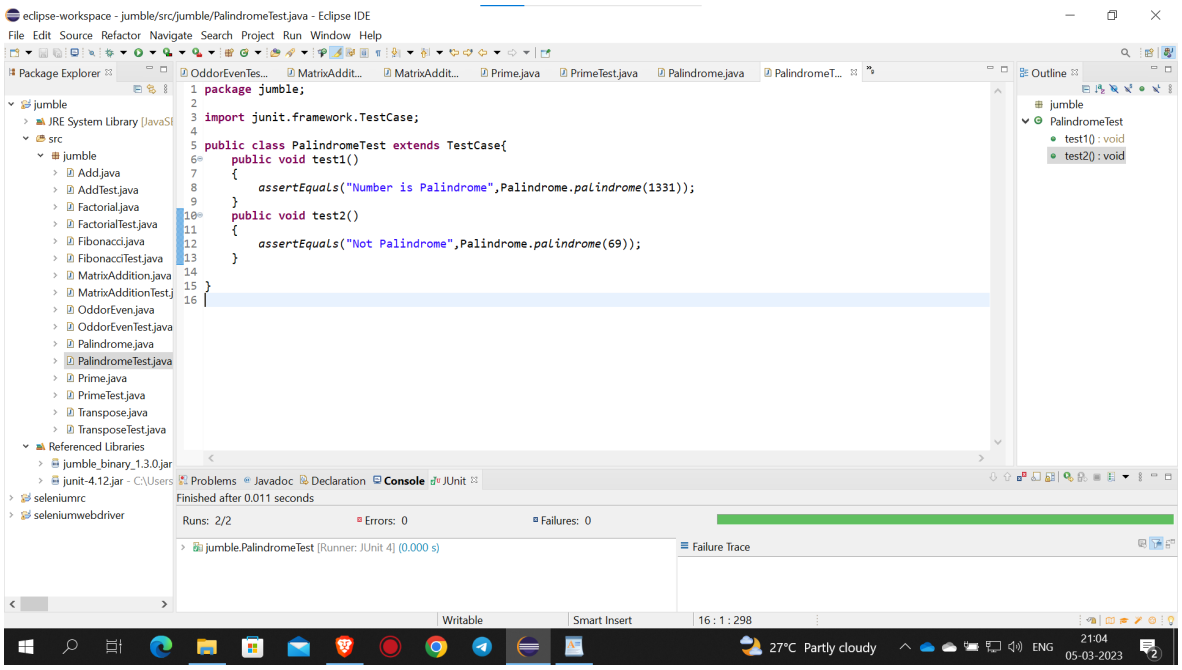

Figure 87: Jumble Test Case

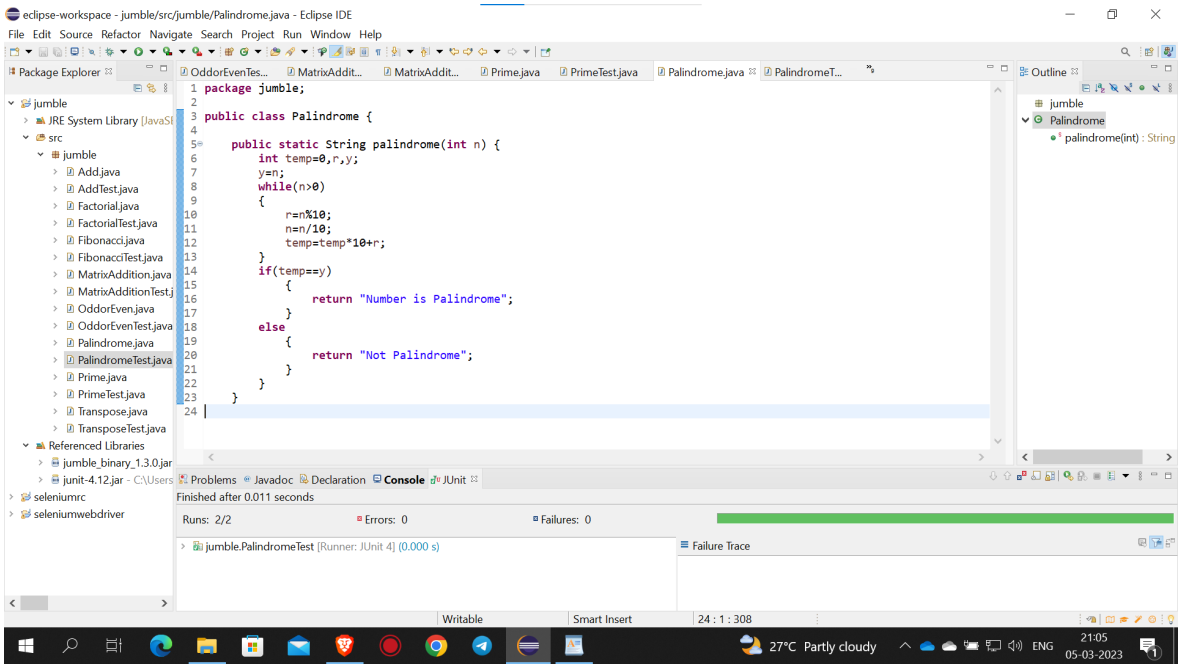

Figure 88: Palindrome Code

7.8 Write a program to find out the sum of two arrays.

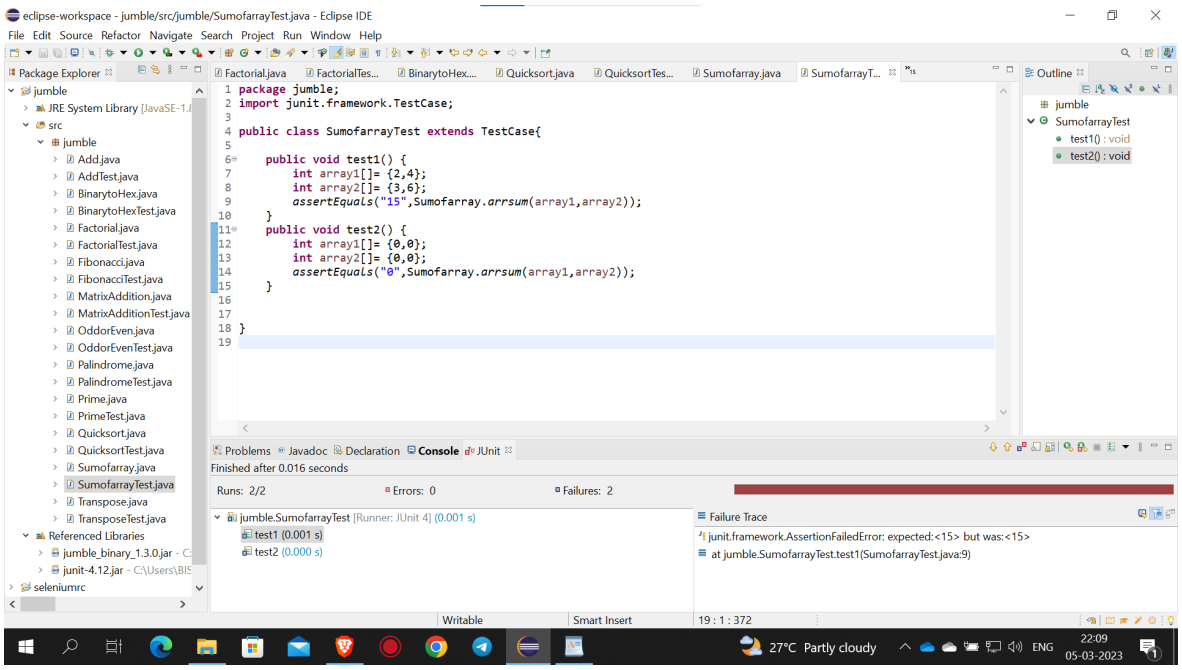

Figure 89: Jumble Test Case

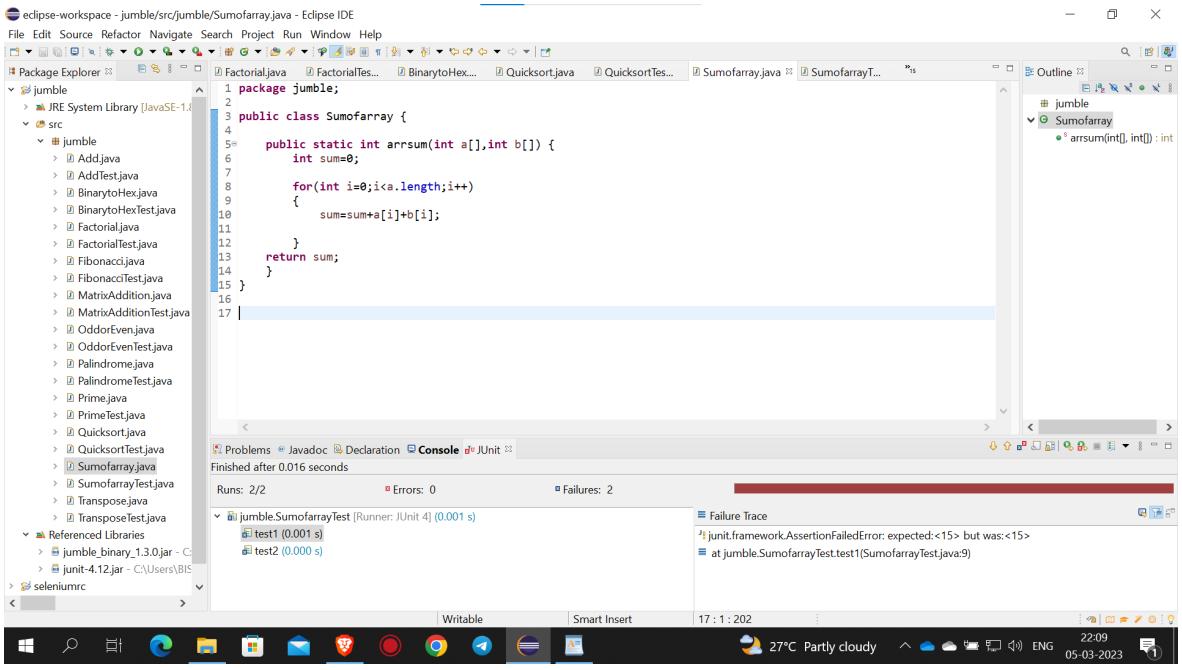

Figure 90: Sum of Array Code

7.9 Write a program to check whether the number is even or odd.

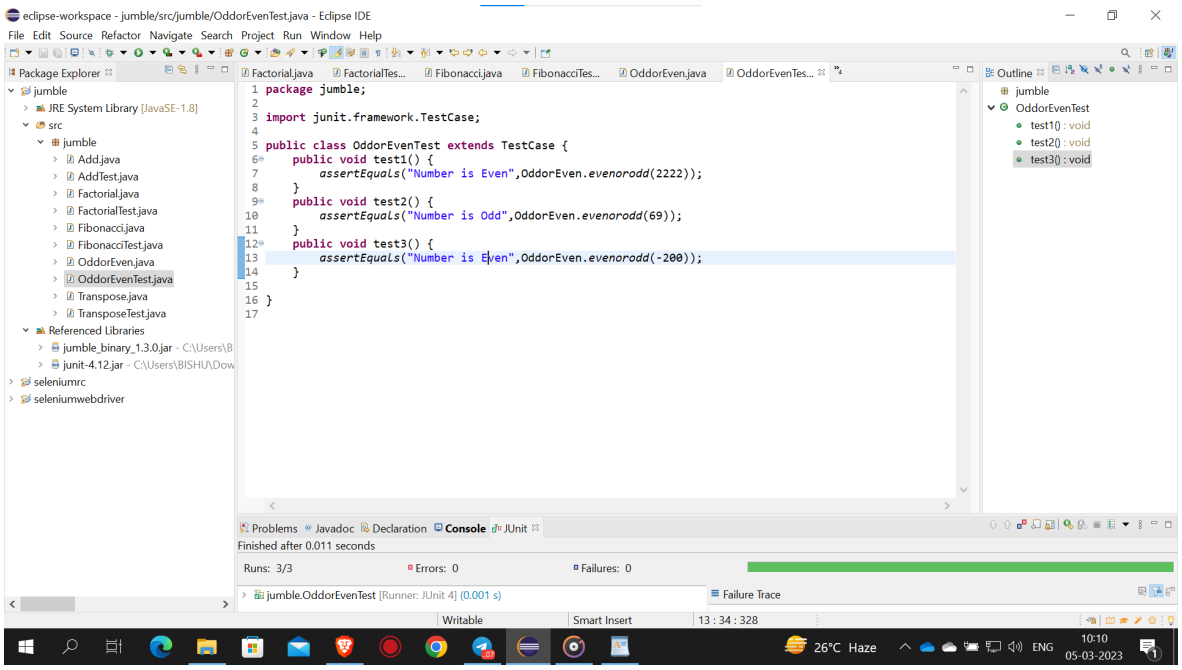

Figure 91: Jumble Test Case

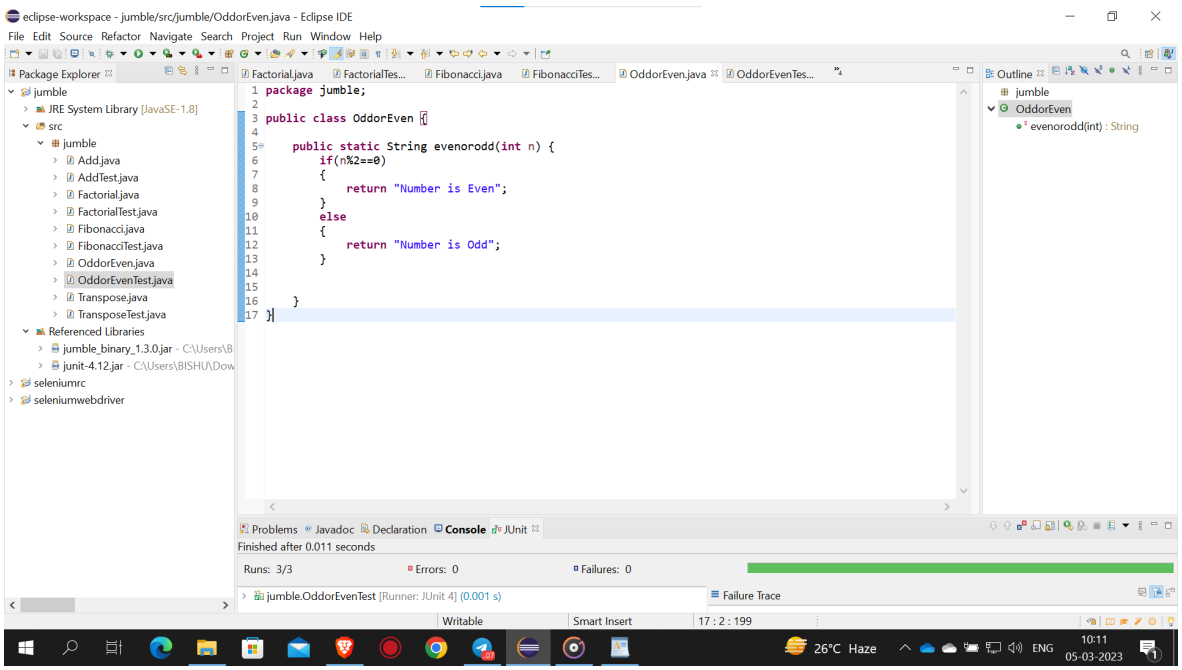

Figure 92: Odd or Even Code

7.10 Write a program for binary to hexadecimal conversion.

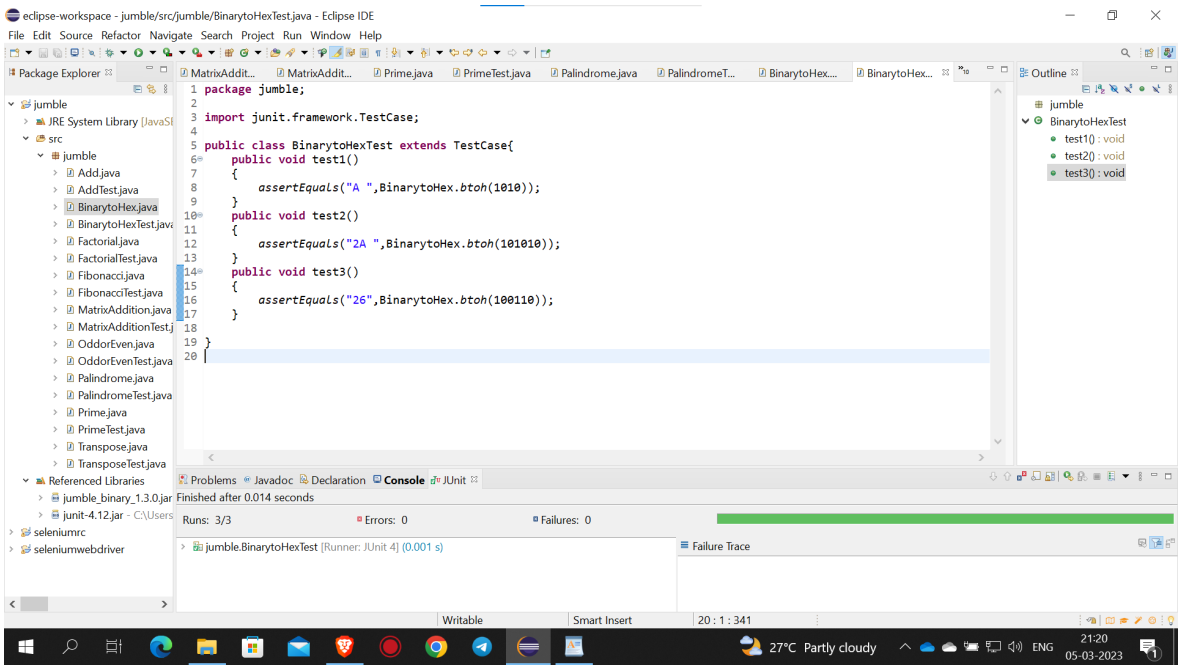

Figure 93: Jumble Test Case

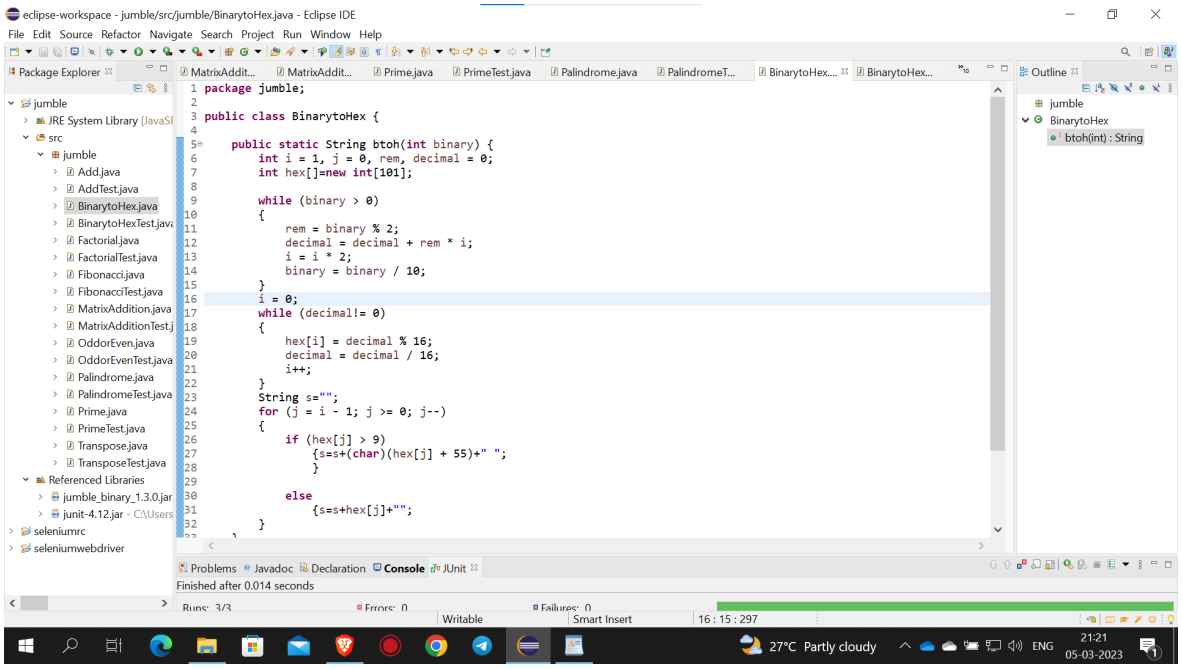

Figure 94: Binary to Hexadecimal Code

CS6474: Software Testing Laboratory 2023

JMETER

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8 JMeter

The Apache JMeter is pure Java open source software, which was first developed by Stefano Mazzocchi of the Apache Software Foundation, designed to load test functional behavior and measure performance. You can use JMeter to analyze and measure the performance of web application or a variety of services. Performance Testing means testing a web application against heavy load, multiple and concurrent user traffic. JMeter originally is used for testing Web Application or FTP application

How does JMeter perform tests?

- Creates a request and sends the request to the server
- Collects responses from the server and visualizes the details in a chart or graph
- Processes the response from the server
- Generates test results in several formats such as text, XML, JSON for the tester to analyze data

Advantages of JMeter

- Easy to use without extensive knowledge of programming. It has a user-friendly UI and one can also use CLI.
- Provides integration with Jenkins and reporting
- Easy installation on any operating system
- Key features like the Thread Group, helps to see whether software performance is good.
- Test IDE allows test recording from browsers or native applications
- Allows API testing, Database Testing, and MQ testing with ease
- When there's a high number of TPS, one can achieve more transactions per second given the hyper-limitations

Disadvantages of JMeter

- Automation is difficult with JMeter
- JMeter output reports are difficult to understand without training
- It doesn't support JavaScript and AJAX requests.
- Complex applications that use dynamic content or use JS to alter requests can be difficult to test using JMeter.
- It's difficult to get data from one place or to perform customizations.

8.1 NITRKL Stress Testing Using Constant Timer

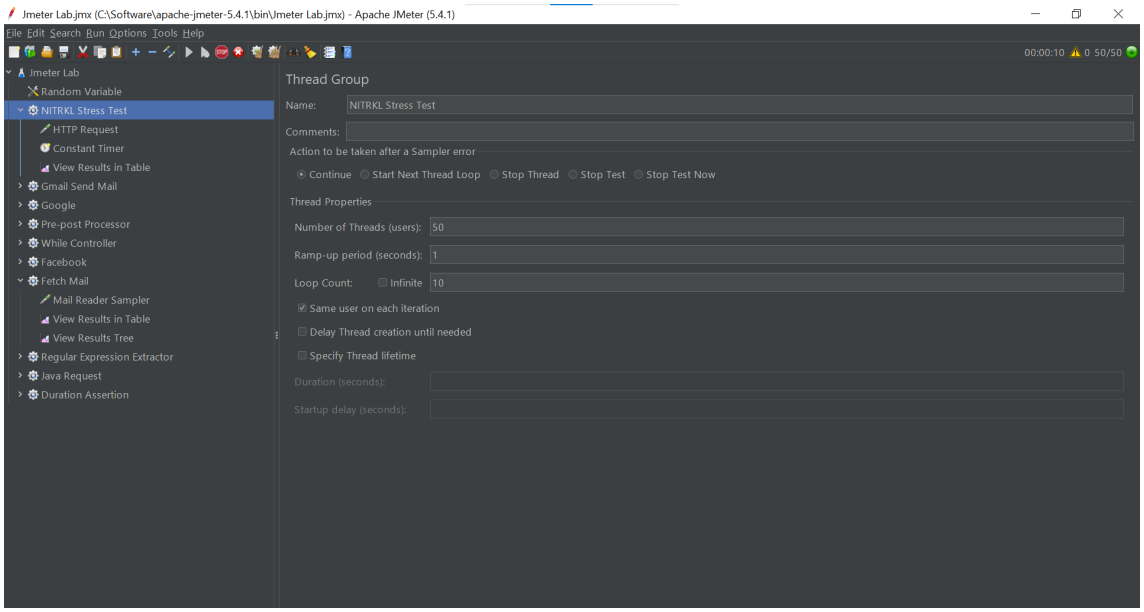

Figure 95:

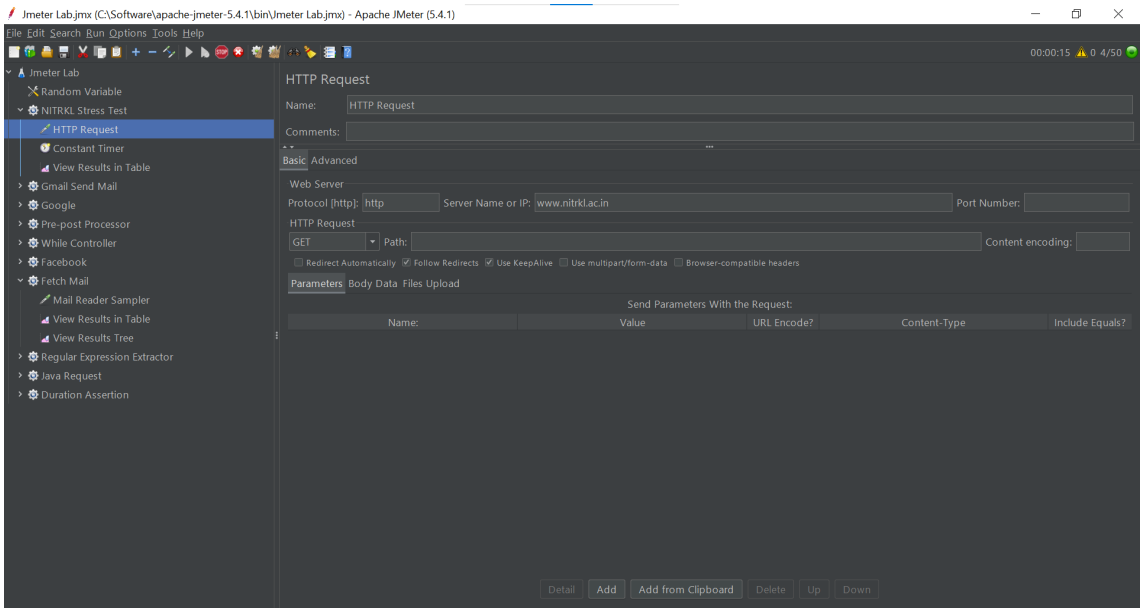

Figure 96:

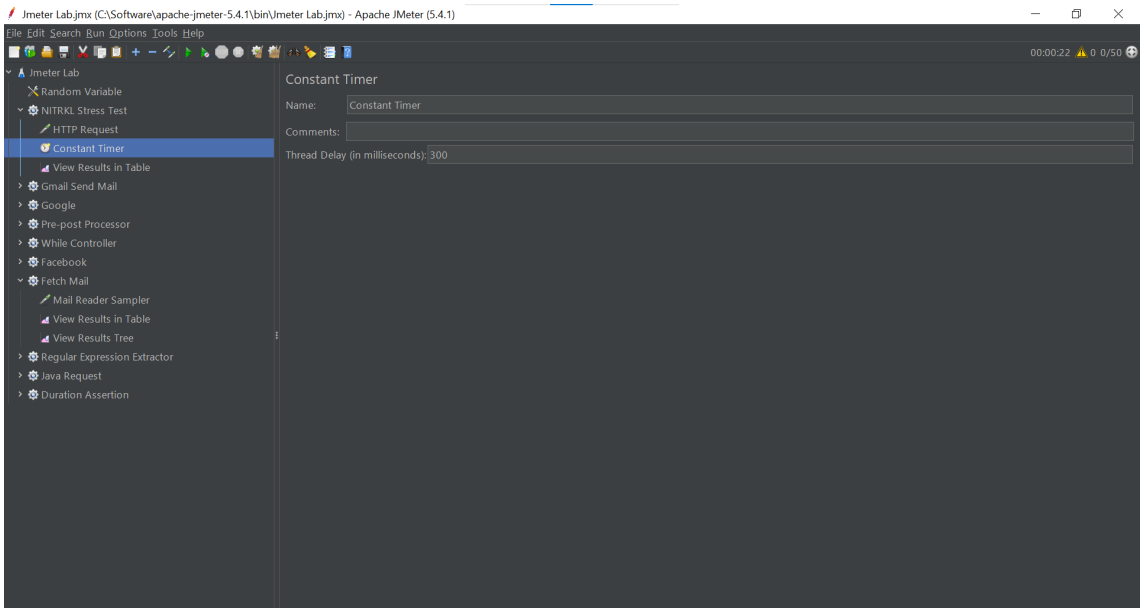

Figure 97:

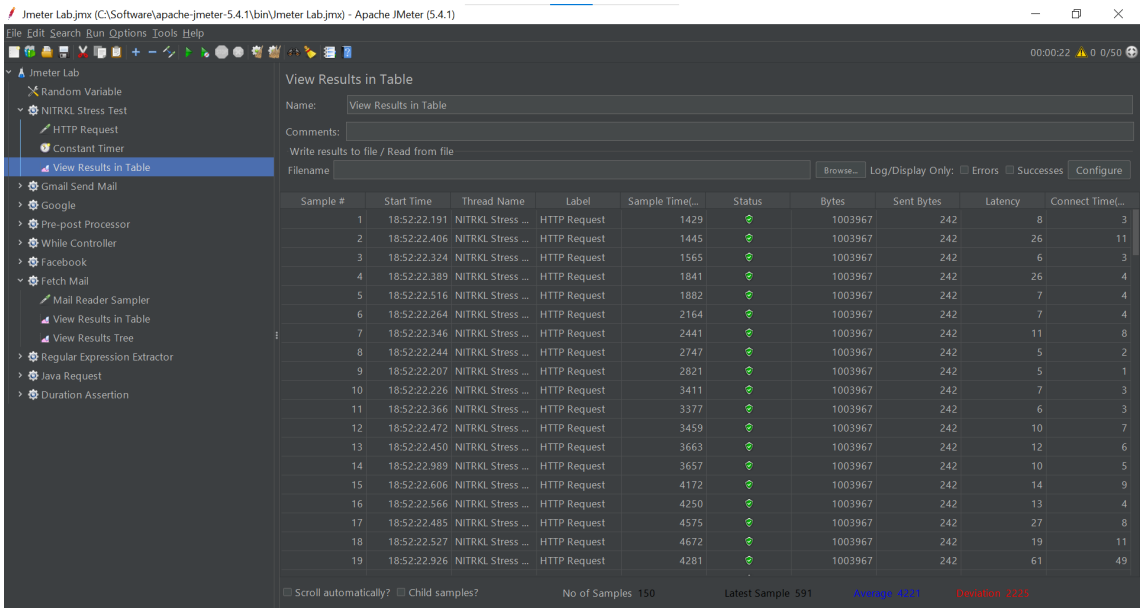

Figure 98:

8.2 Sending Mail to another mail using SMTP Sampler

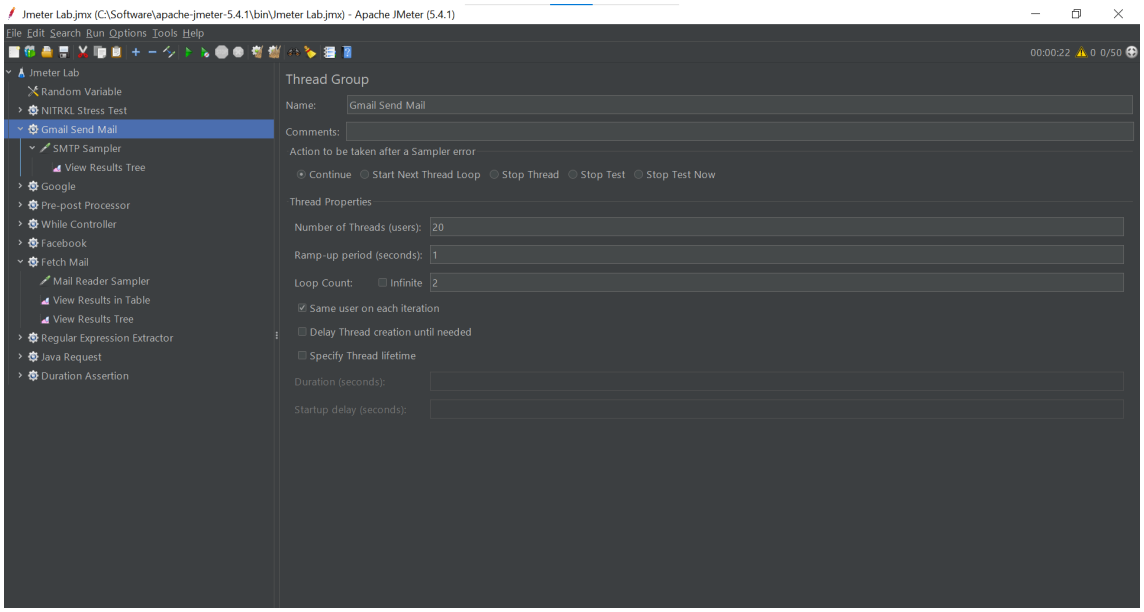

Figure 99:

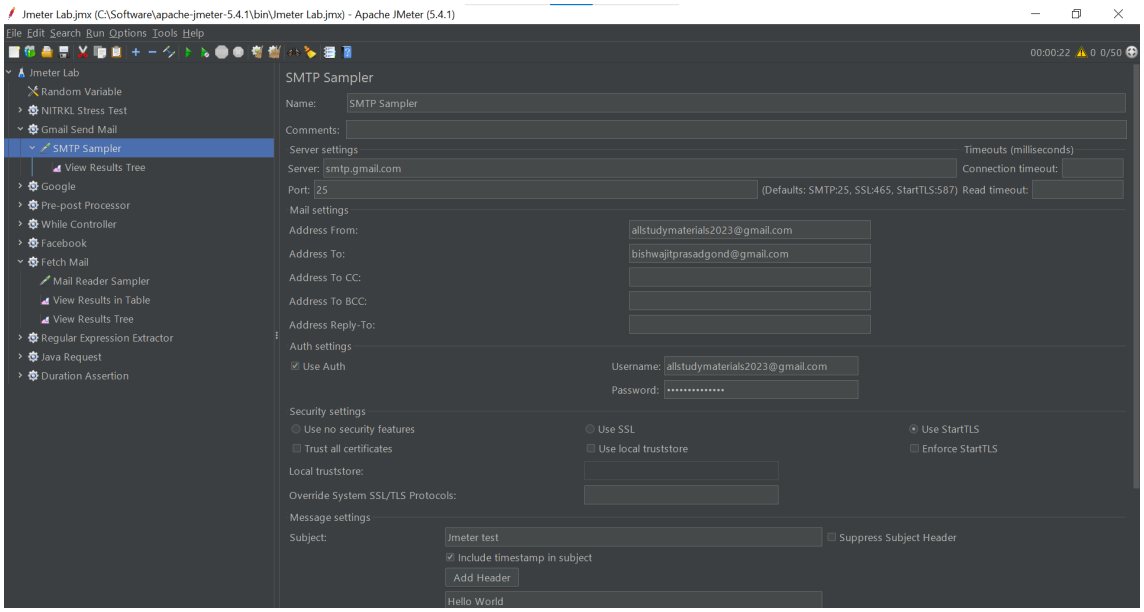

Figure 100:

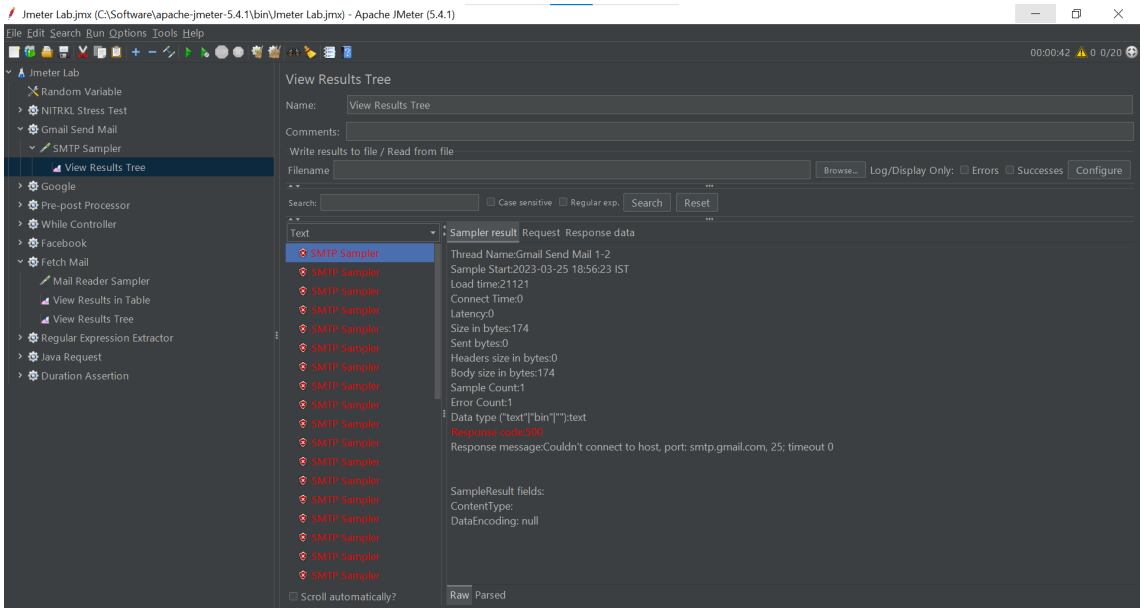
Jmeter Lab.jmx (C:\Software\apache-jmeter-5.4.1\bin\Jmeter Lab.jmx) - Apache JMeter (5.4.1)
File Edit Search Run Options Tools Help
00:00:42 0 0/20
Jmeter Lab
Random Variable
NITRKL Stress Test
Gmail Send Mail
SMTP Sampler
View Results Tree
Google
Pre-post Processor
While Controller
Facebook
Fetch Mail
Mail Reader Sampler
View Results in Table
View Results Tree
Regular Expression Extractor
Java Request
Duration Assertion
View Results Tree
Name: View Results Tree
Comments:
Write results to file / Read from file
Filename
Browse... Log/Display Only: Errors Successes Configure
Search: Case sensitive Regular exp. Search Reset
Text
SMTP Sampler
Scroll automatically?
Sampler result Request Response data
Thread Name:Gmail Send Mail 1-2
Sample Start:2023-03-25 18:56:23 IST
Load time:21121
Connect Time:0
Latency:0
Size in bytes:174
Sent bytes:0
Headers size in bytes:0
Body size in bytes:174
Sample Count:1
Error Count:1
Data type ("text"|"bin"|""):text
Response code:500
Response message:Couldn't connect to host, port: smtp.gmail.com, 25; timeout 0
SampleResult fields:
ContentType:
DataEncoding: null
Raw Parsed

Figure 101:

8.3 Using Loop Controller to Google.com

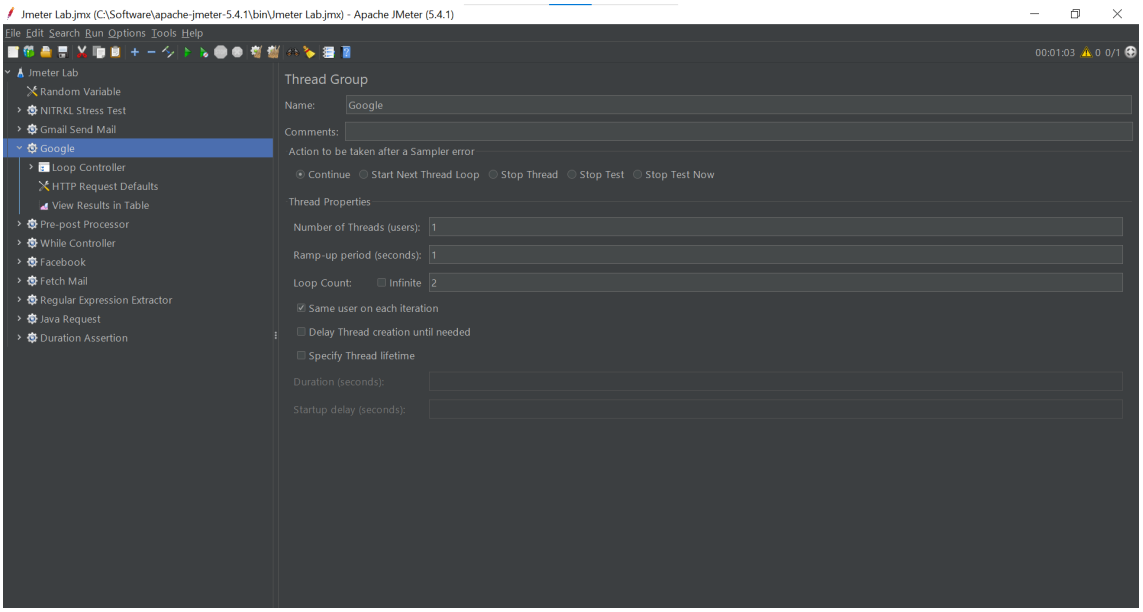

Figure 102:

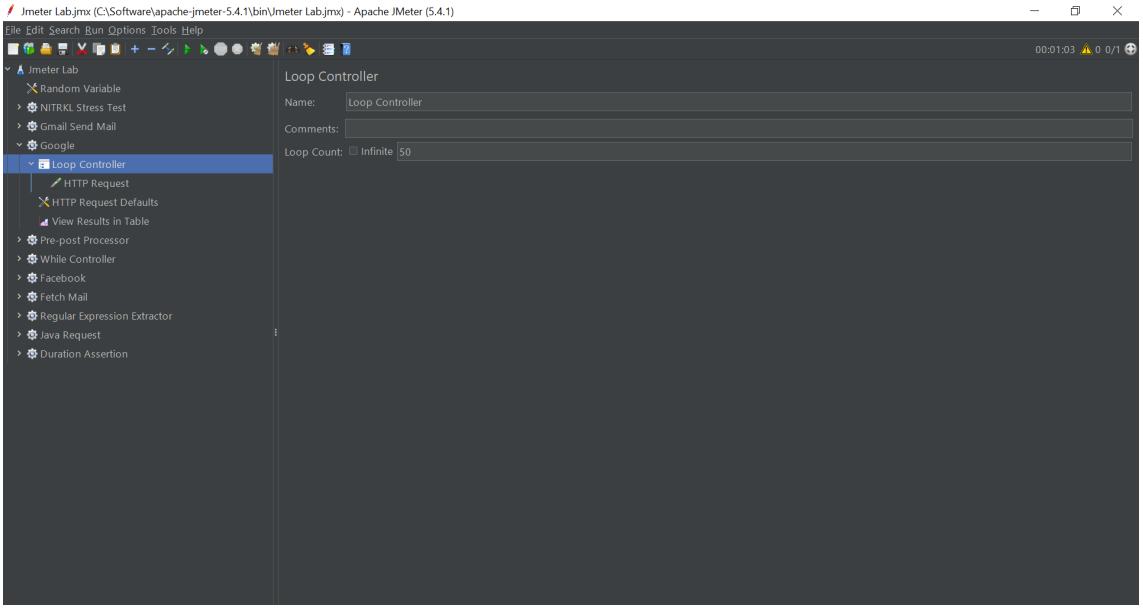

Figure 103:

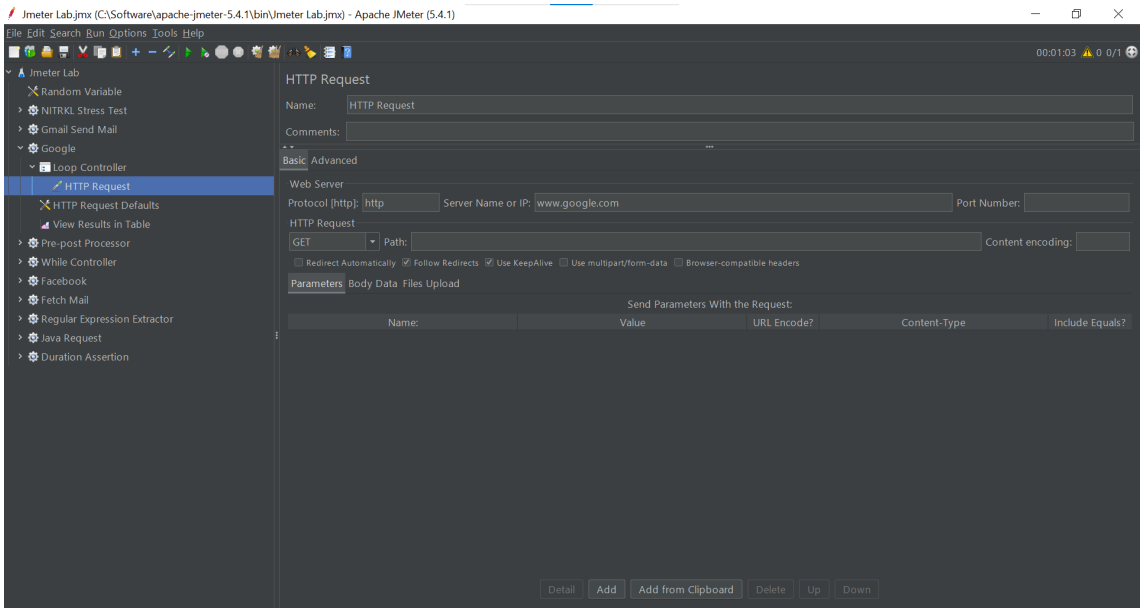

Figure 104:

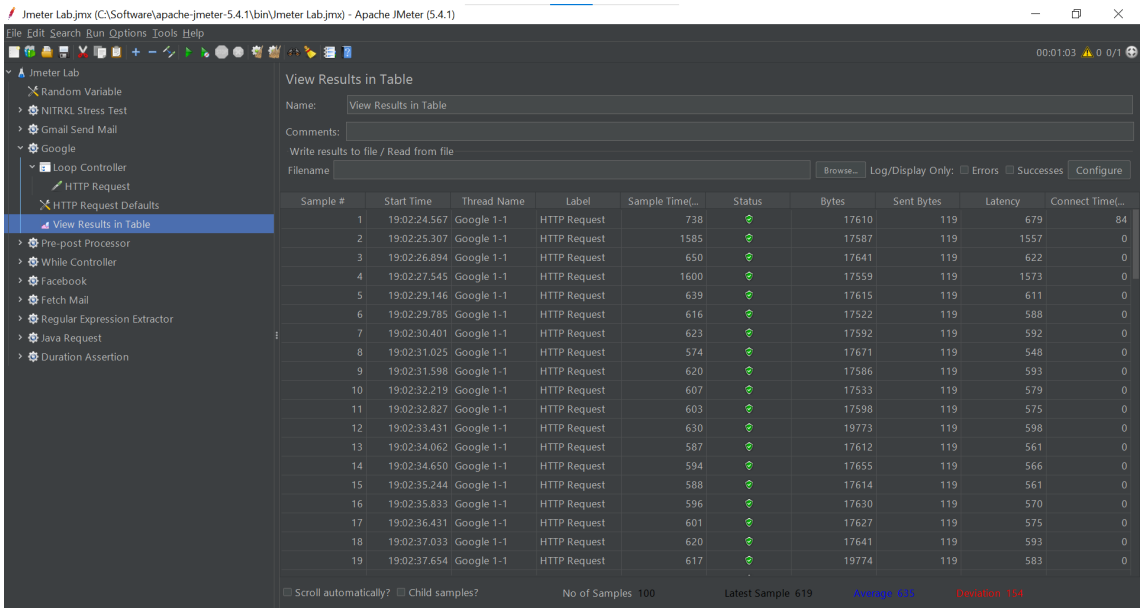

Figure 105:

8.4 Json Extractor

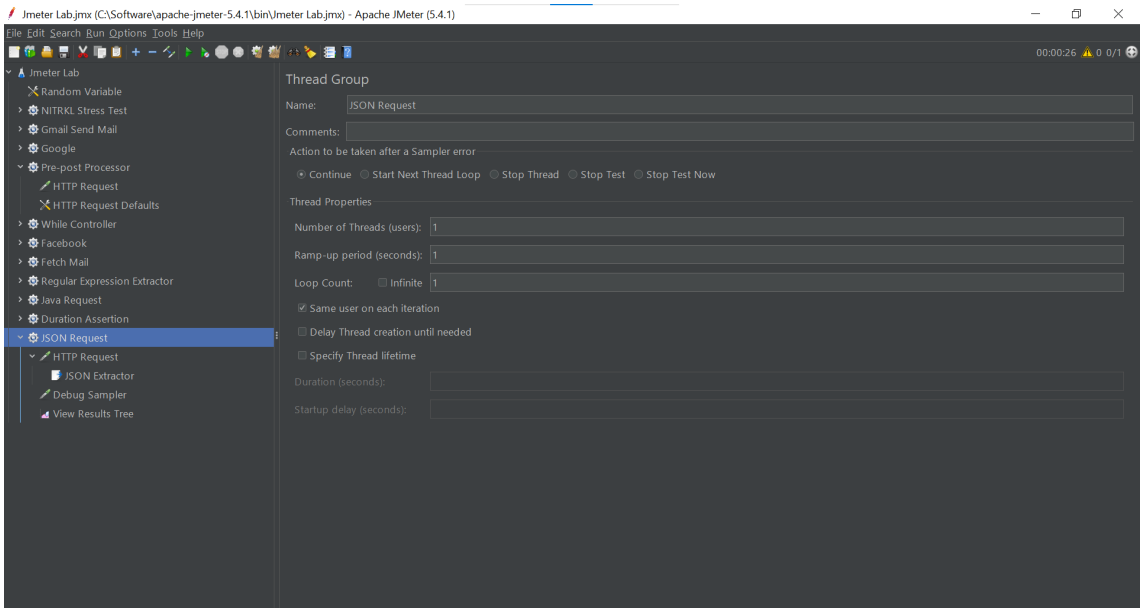

Figure 106:

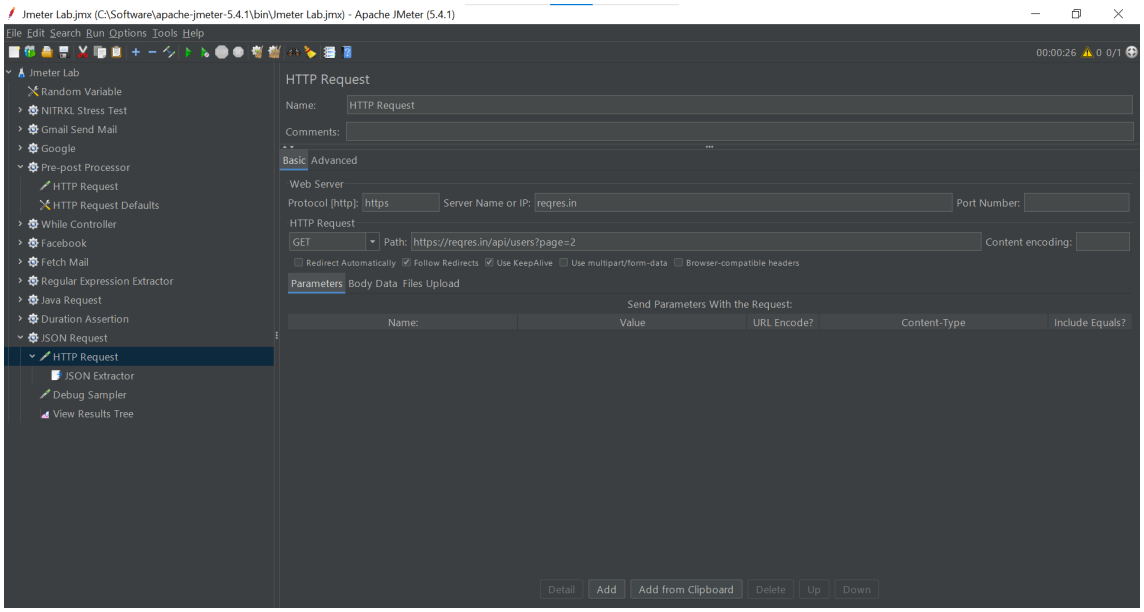

Figure 107:

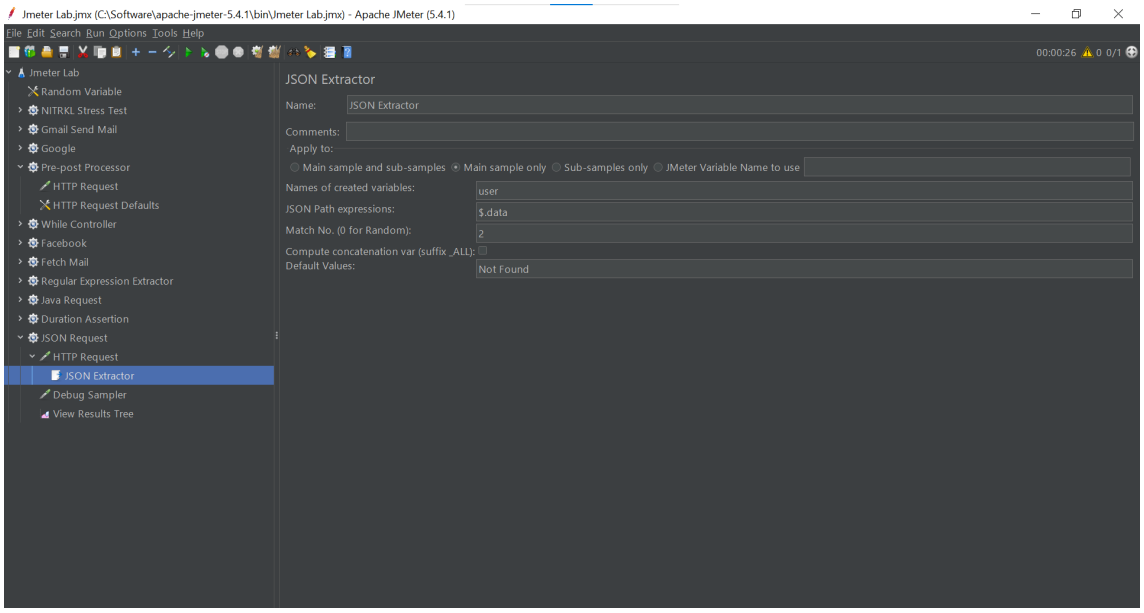

Figure 108:

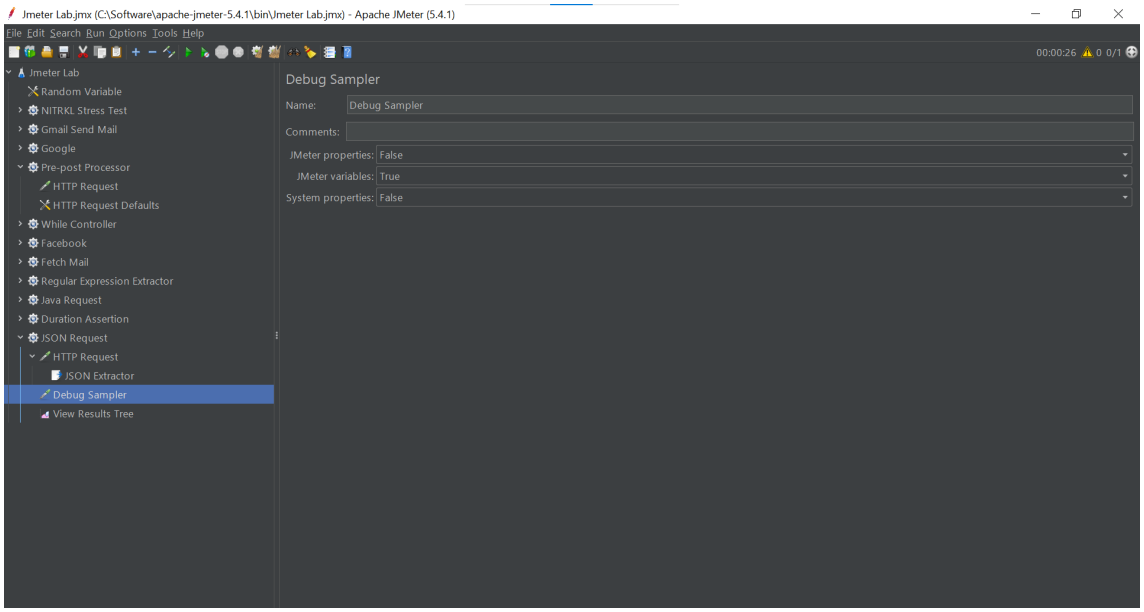

Figure 109:

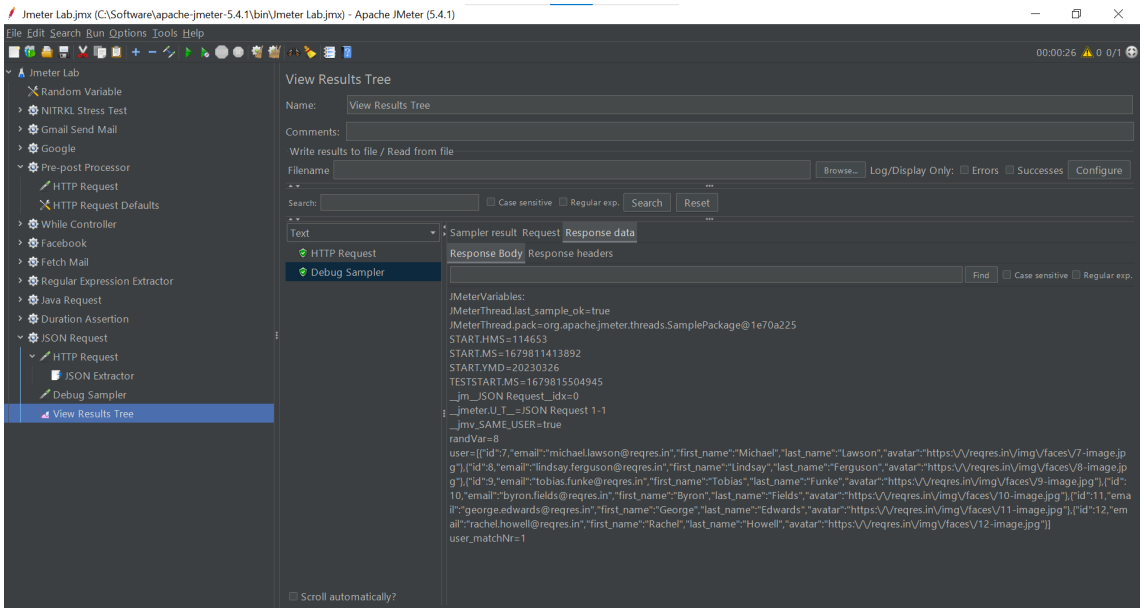
Jmeter Lab.jmx (C:\Software\apache-jmeter-5.4.1\bin\Jmeter Lab.jmx) - Apache JMeter (5.4.1)
File Edit Search Run Options Tools Help
00:00:26 0 0/1
Jmeter Lab
Random Variable
NITRKL Stress Test
Gmail Send Mail
Google
Pre-post Processor
HTTP Request
HTTP Request Defaults
While Controller
Facebook
Fetch Mail
Regular Expression Extractor
Java Request
Duration Assertion
JSON Request
HTTP Request
JSON Extractor
Debug Sampler
View Results Tree
View Results Tree
Name: View Results Tree
Comments:
Write results to file / Read from file
Filename
Browse... Log/Display Only: Errors Successes Configure
Search: Case sensitive Regular exp. Search Reset
Text
HTTP Request
Debug Sampler
Sampler result Request Response data
Response Body Response headers
Find Case sensitive Regular exp.
JMeterVariables:
JMeterThread.last_sample_ok=true
JMeterThread.pack=org.apache.jmeter.threads.SamplePackage@1e70a225
START.HMS=114653
START.MS=1679811413892
START.YMD=20230326
TESTSTART.MS=1679815504945
__jm__JSON Request__idx=0
__jmeter.U_T__=JSON Request 1-1
__jmv_SAME_USER=true
randVar=8
user=[{"id":7,"email":"michael.lawson@reqres.in","first_name":"Michael","last_name":"Lawson","avatar":"https:\/\/reqres.in\/img\/faces\/7-image.jpg"},{"id":8,"email":"lindsay.ferguson@reqres.in","first_name":"Lindsay","last_name":"Ferguson","avatar":"https:\/\/reqres.in\/img\/faces\/8-image.jpg"},{"id":9,"email":"tobias.funke@reqres.in","first_name":"Tobias","last_name":"Funke","avatar":"https:\/\/reqres.in\/img\/faces\/9-image.jpg"},{"id":10,"email":"byron.fields@reqres.in","first_name":"Byron","last_name":"Fields","avatar":"https:\/\/reqres.in\/img\/faces\/10-image.jpg"},{"id":11,"email":"george.edwards@reqres.in","first_name":"George","last_name":"Edwards","avatar":"https:\/\/reqres.in\/img\/faces\/11-image.jpg"},{"id":12,"email":"rachel.howell@reqres.in","first_name":"Rachel","last_name":"Howell","avatar":"https:\/\/reqres.in\/img\/faces\/12-image.jpg"}]
user_matchNr=1
Scroll automatically?

Figure 110:

8.5 While Controller

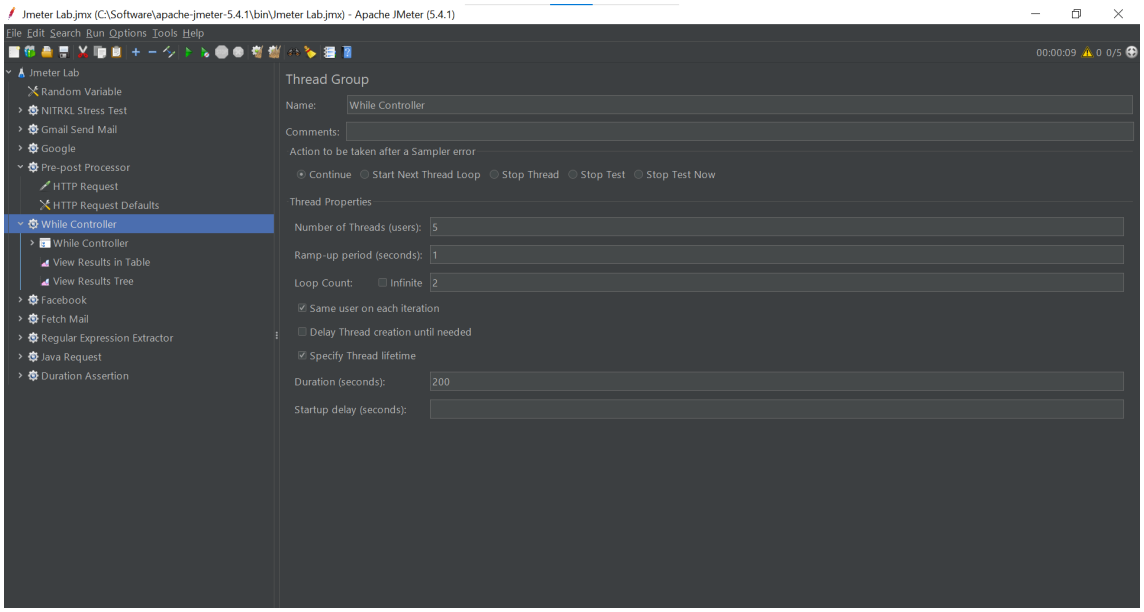

Figure 111:

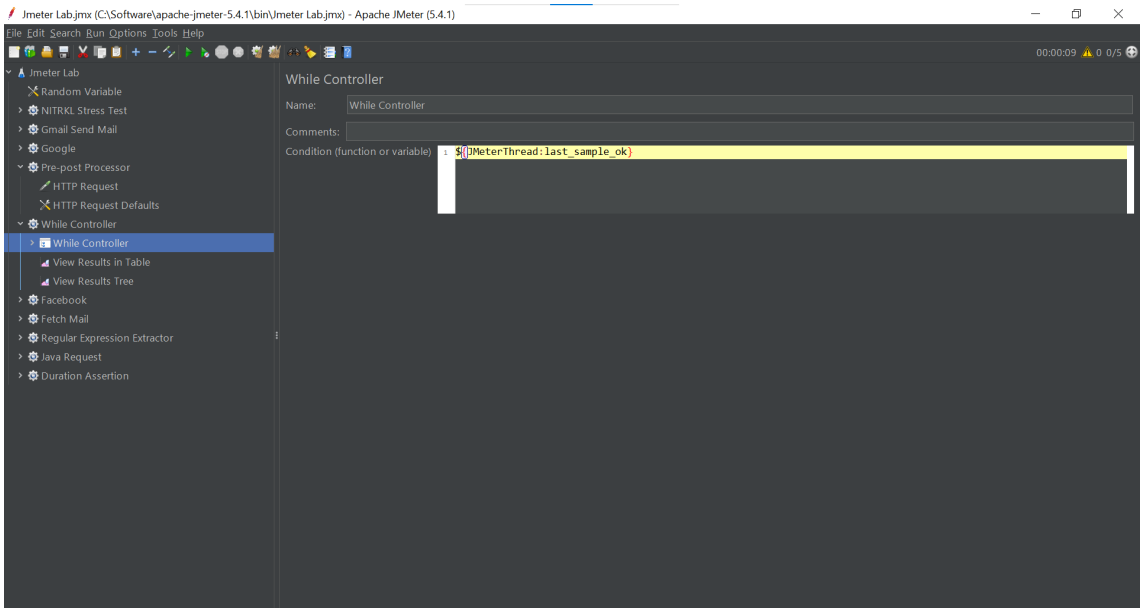

Figure 112:

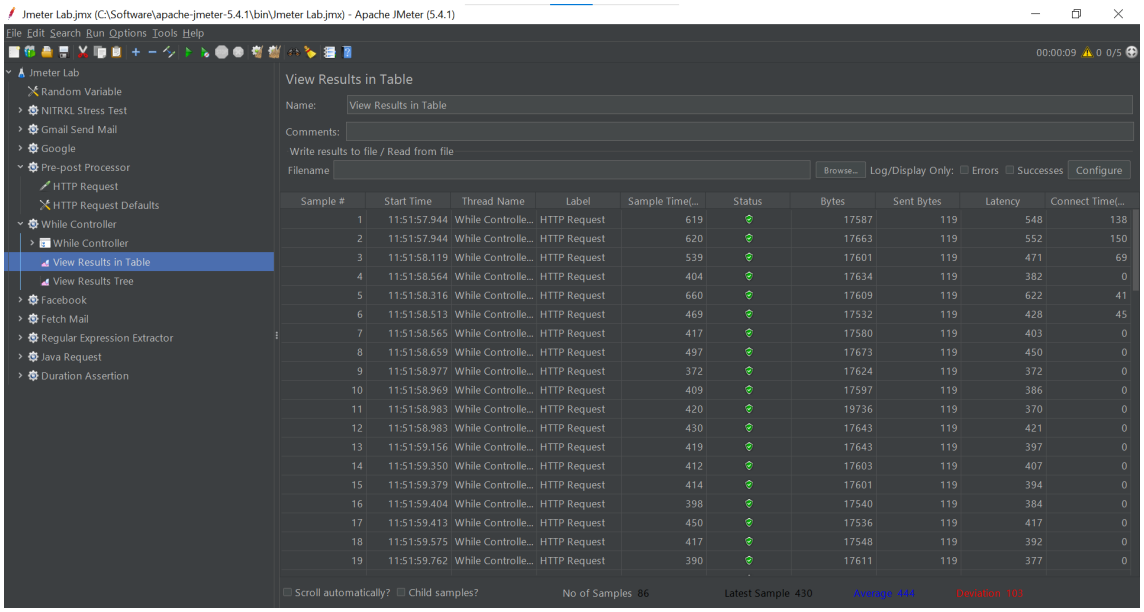

Figure 113:

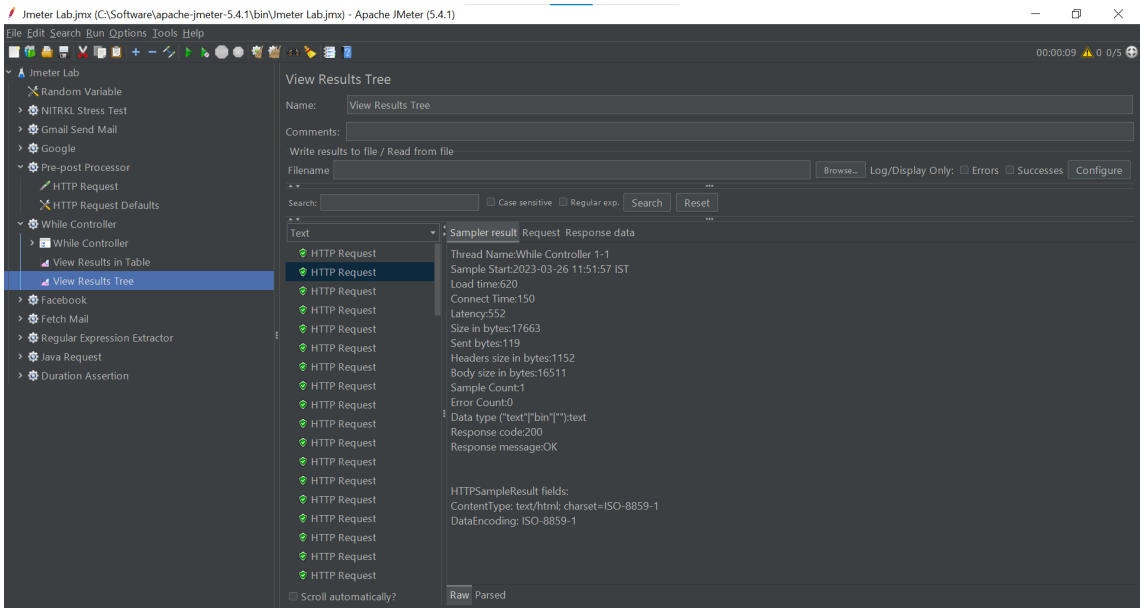

Figure 114:

8.6 Facebook

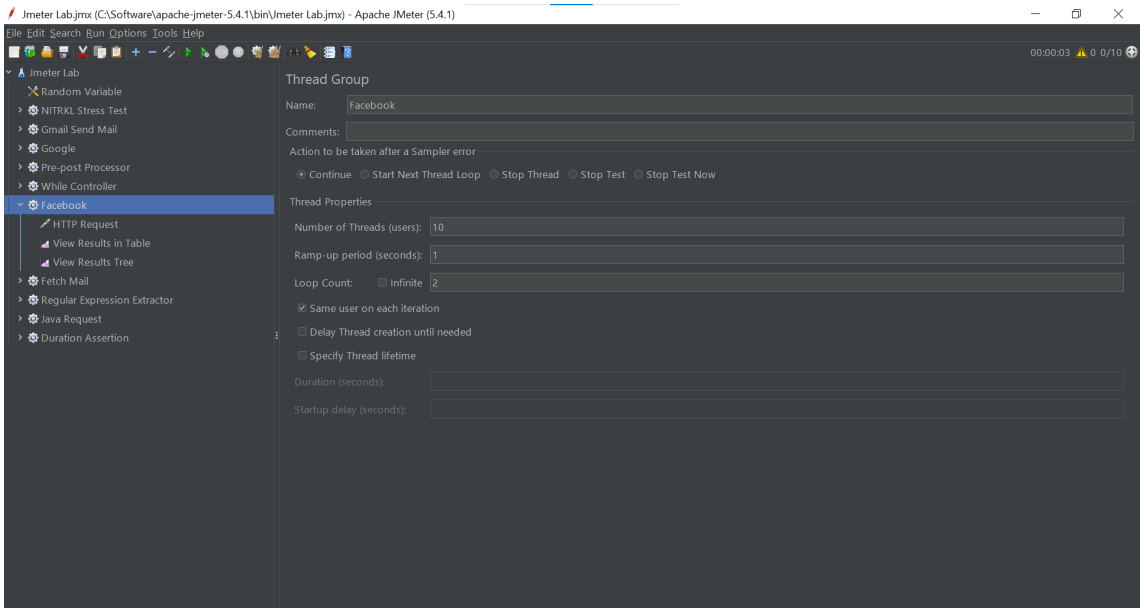

Figure 115:

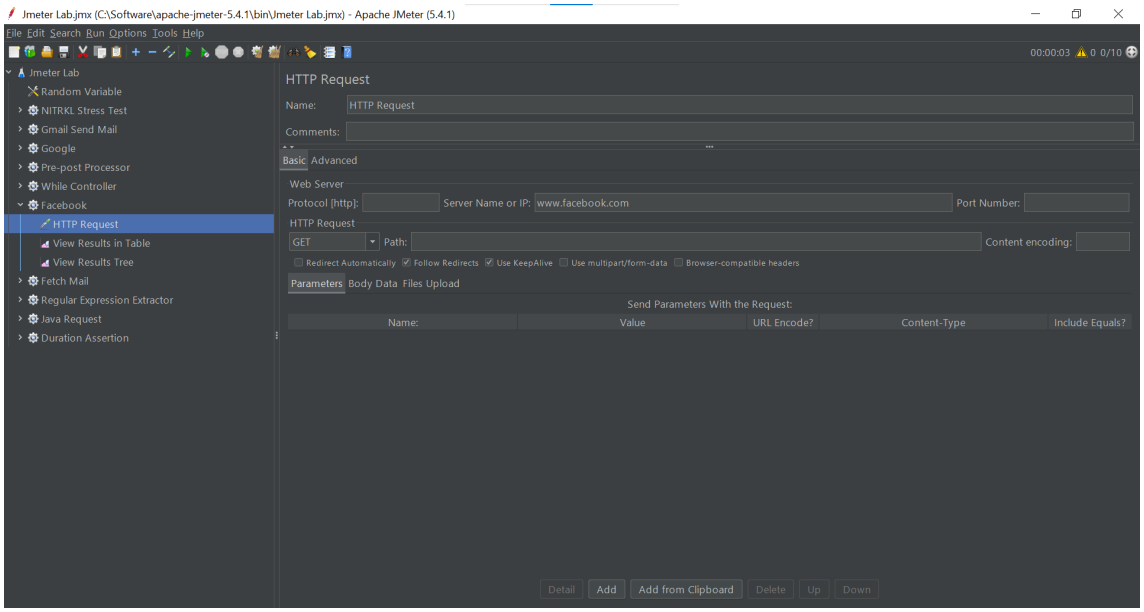

Figure 116:

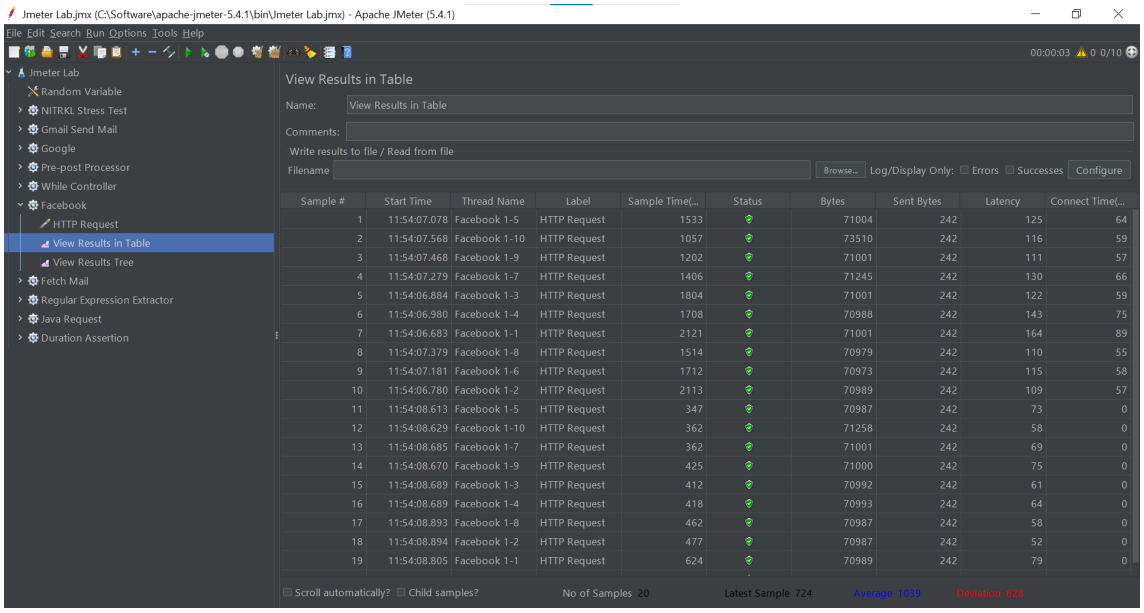

Figure 117:

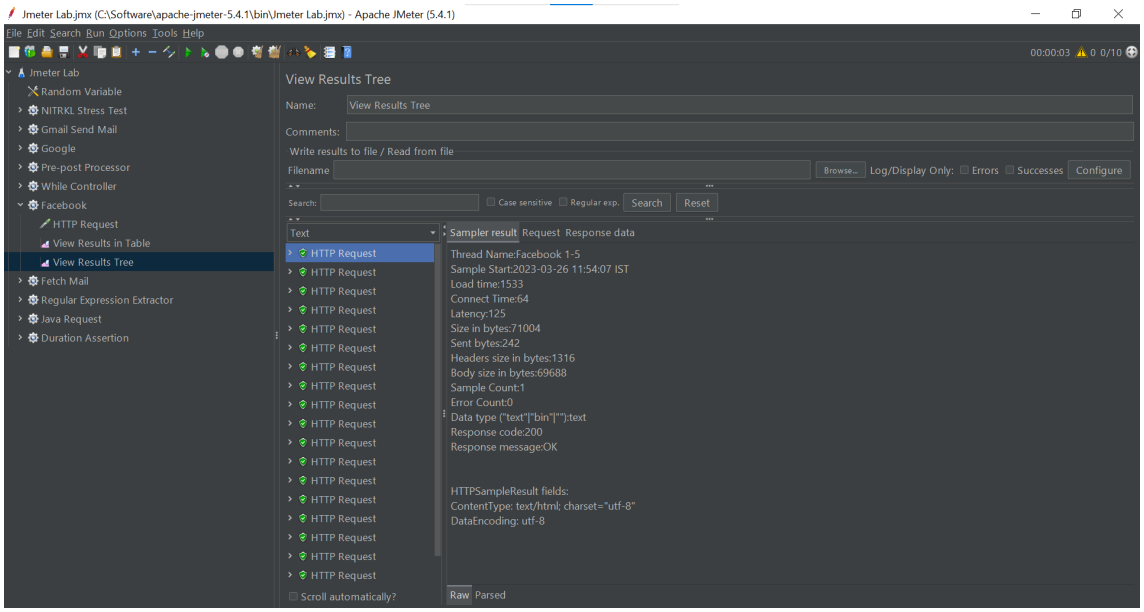

Figure 118:

8.7 Mail Reader Sampler

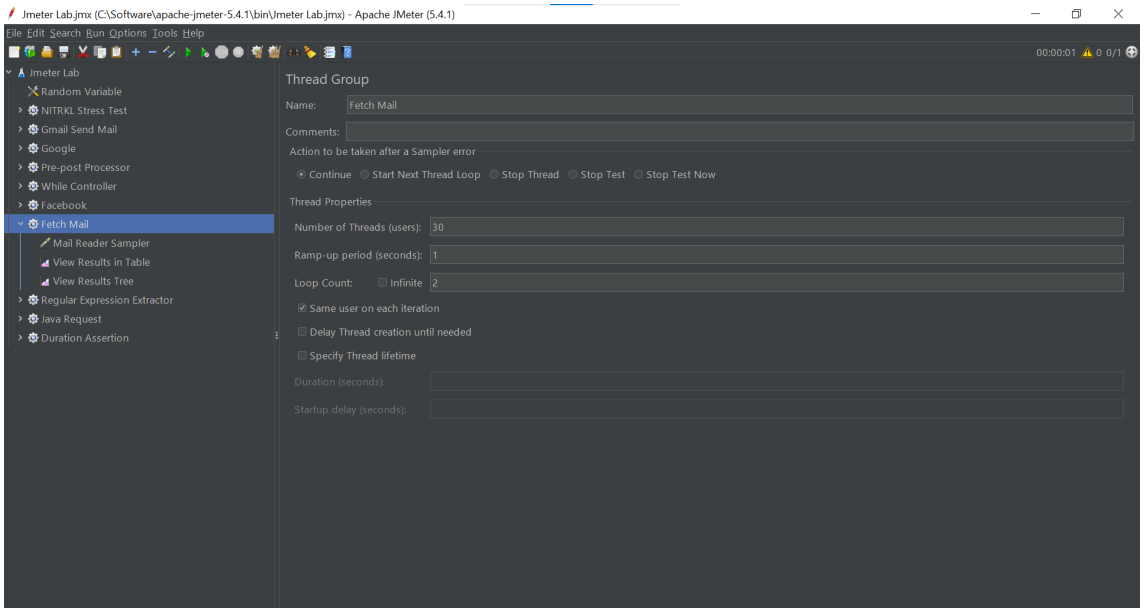

Figure 119:

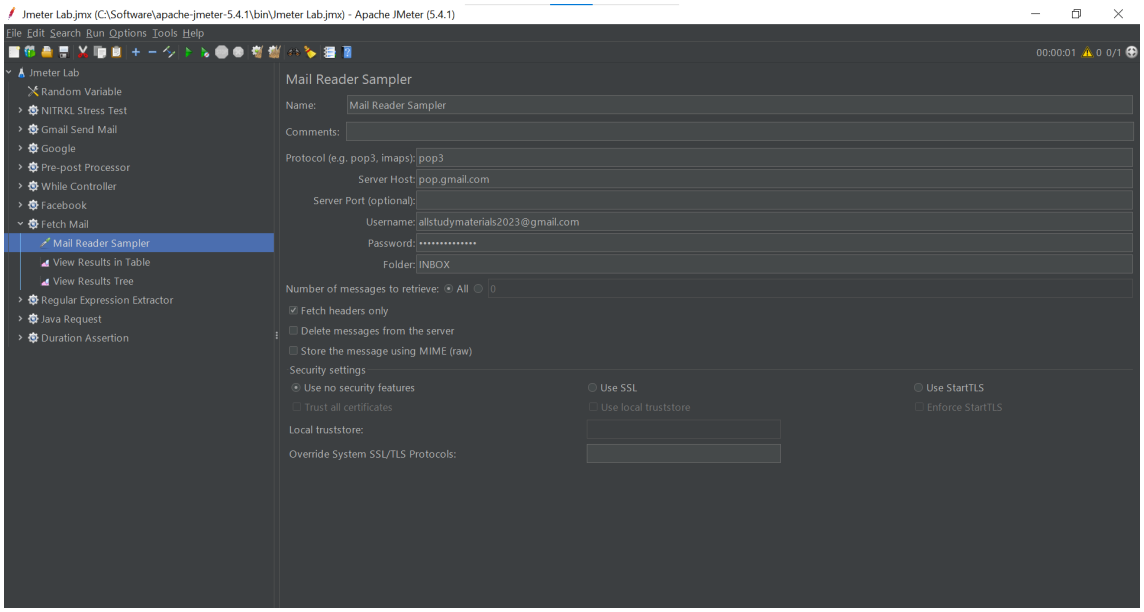

Figure 120:

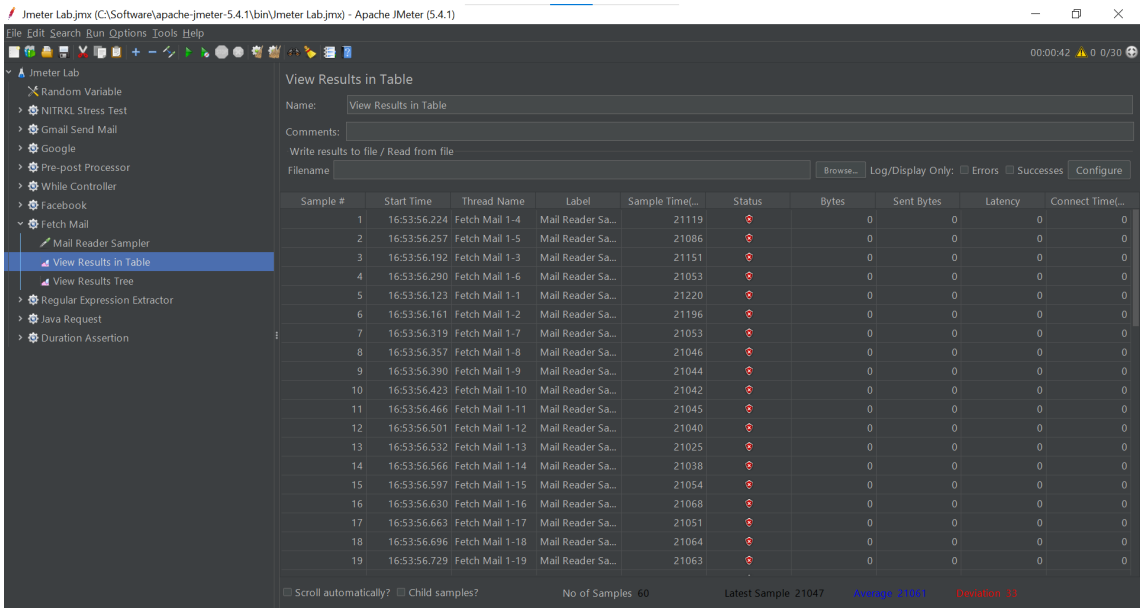

Figure 121:

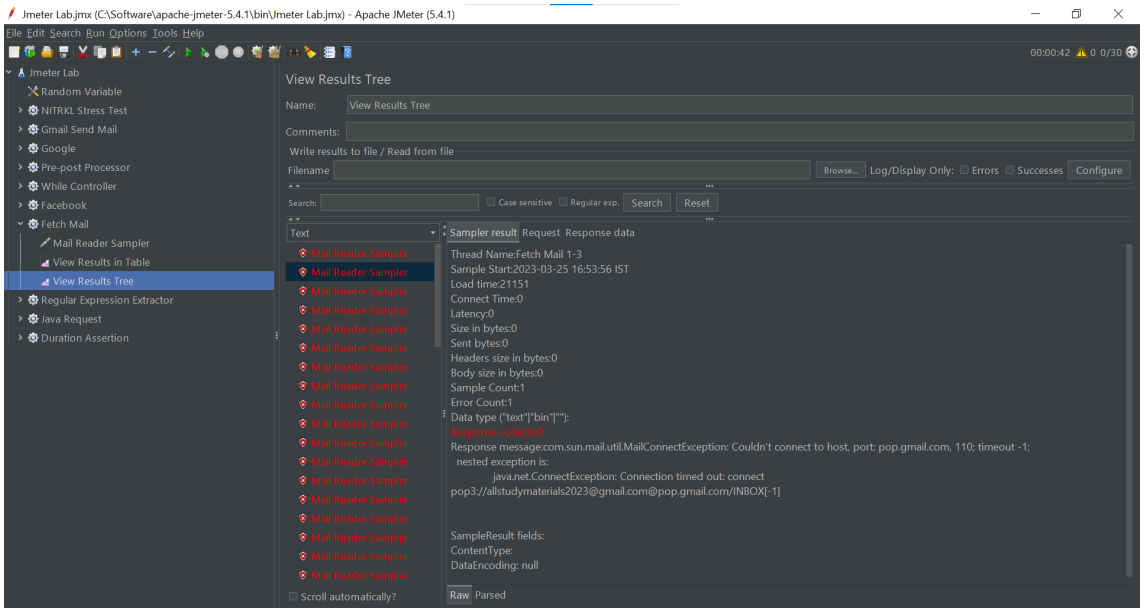

Figure 122:

8.8 Regular Expression Extractor

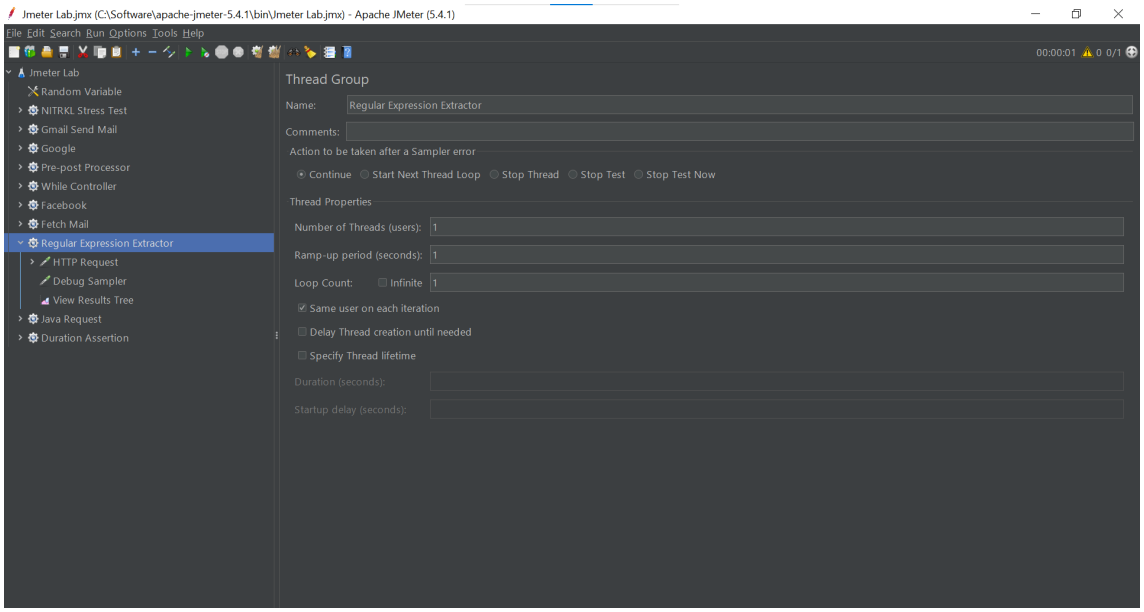

Figure 123:

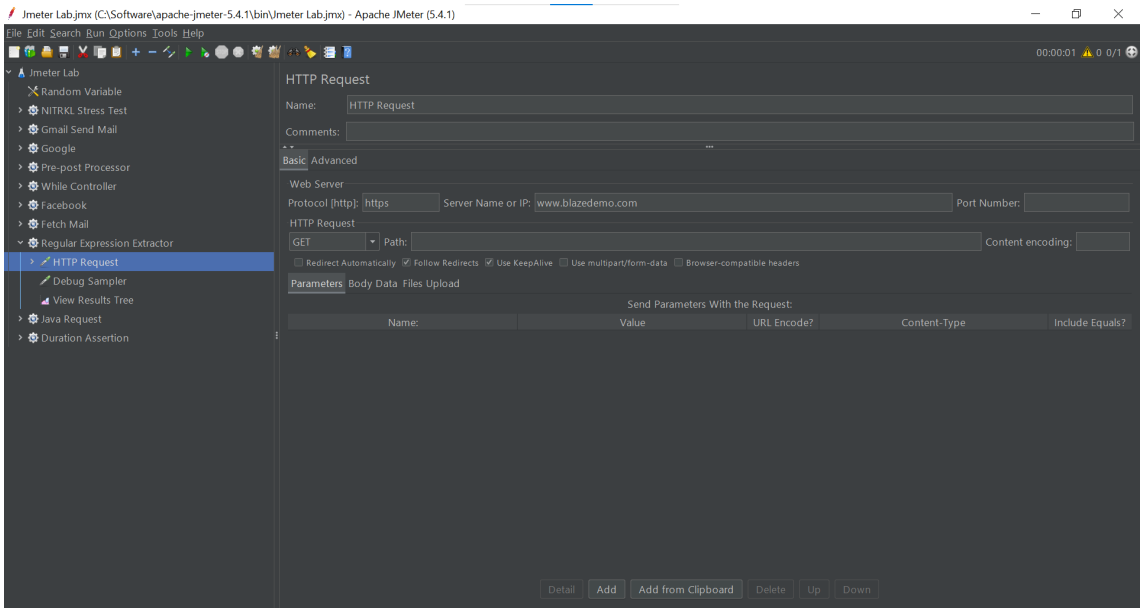

Figure 124:

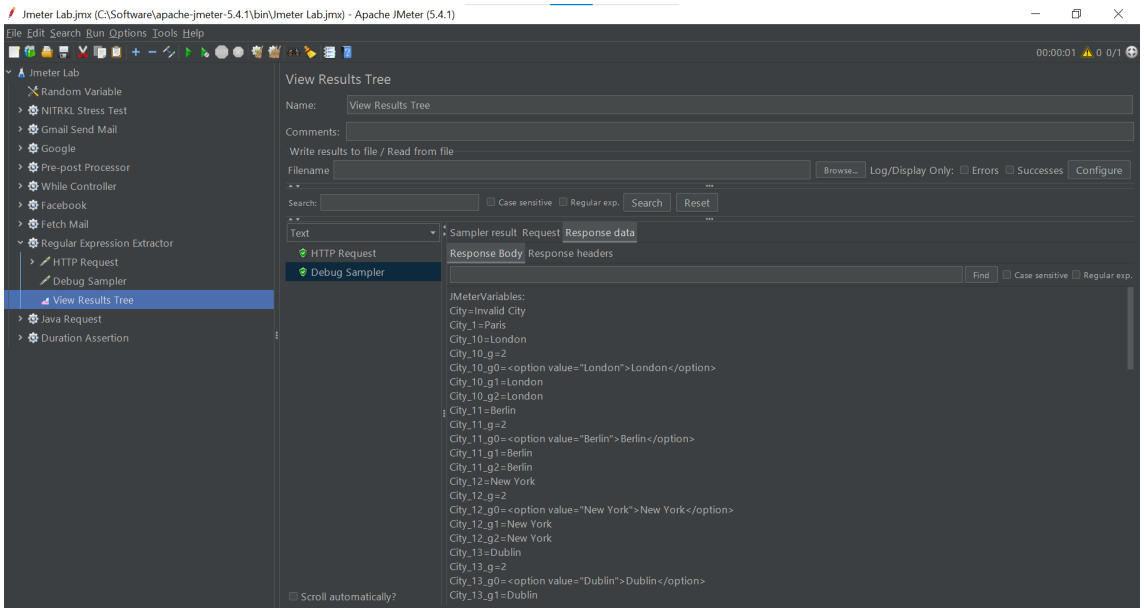
Jmeter Lab.jmx (C:\Software\apache-jmeter-5.4.1\bin\Jmeter Lab.jmx) - Apache JMeter (5.4.1)
File Edit Search Run Options Tools Help
00:00:01 0 0/1
Jmeter Lab
Random Variable
NITRKL Stress Test
Gmail Send Mail
Google
Pre-post Processor
While Controller
Facebook
Fetch Mail
Regular Expression Extractor
HTTP Request
Debug Sampler
View Results Tree
Java Request
Duration Assertion
View Results Tree
Name: View Results Tree
Comments:
Write results to file / Read from file
Filename
Browse... Log/Display Only: Errors Successes Configure
Search: Case sensitive Regular exp. Search Reset
Text
HTTP Request
Debug Sampler
Sampler result Request Response data
Response Body Response headers
Find Case sensitive Regular exp.
JMeterVariables:
City=Invalid City
City_1=Paris
City_10=London
City_10_g=2
City_10_g0=<option value="London">London</option>
City_10_g1=London
City_10_g2=London
City_11=Berlin
City_11_g=2
City_11_g0=<option value="Berlin">Berlin</option>
City_11_g1=Berlin
City_11_g2=Berlin
City_12=New York
City_12_g=2
City_12_g0=<option value="New York">New York</option>
City_12_g1=New York
City_12_g2=New York
City_13=Dublin
City_13_g=2
City_13_g0=<option value="Dublin">Dublin</option>
City_13_g1=Dublin
Scroll automatically?

Figure 125:

8.9 Java Request

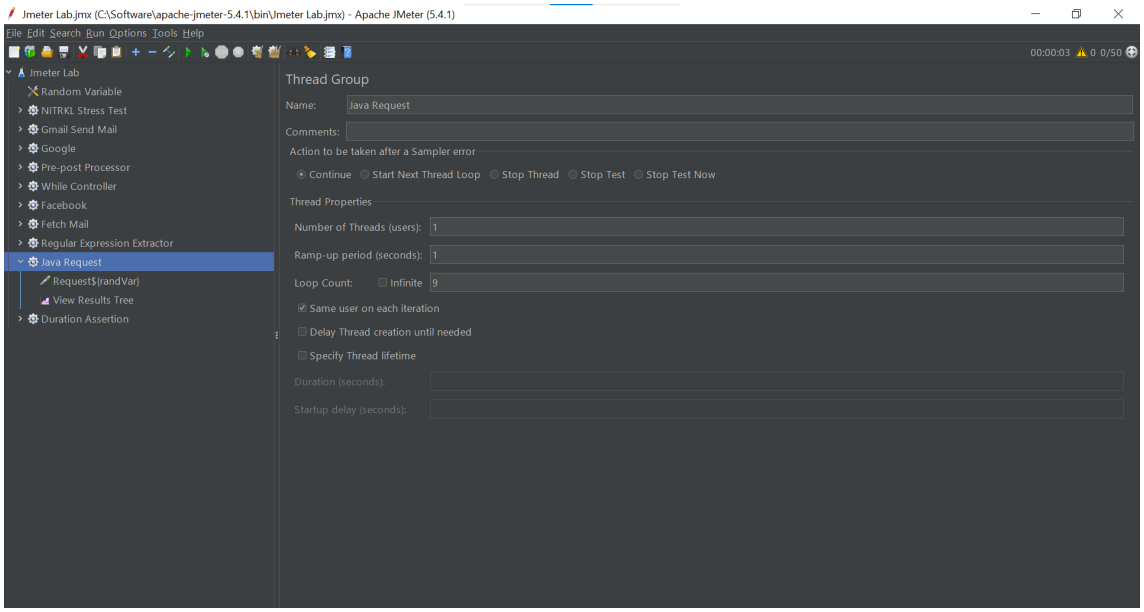

Figure 126:

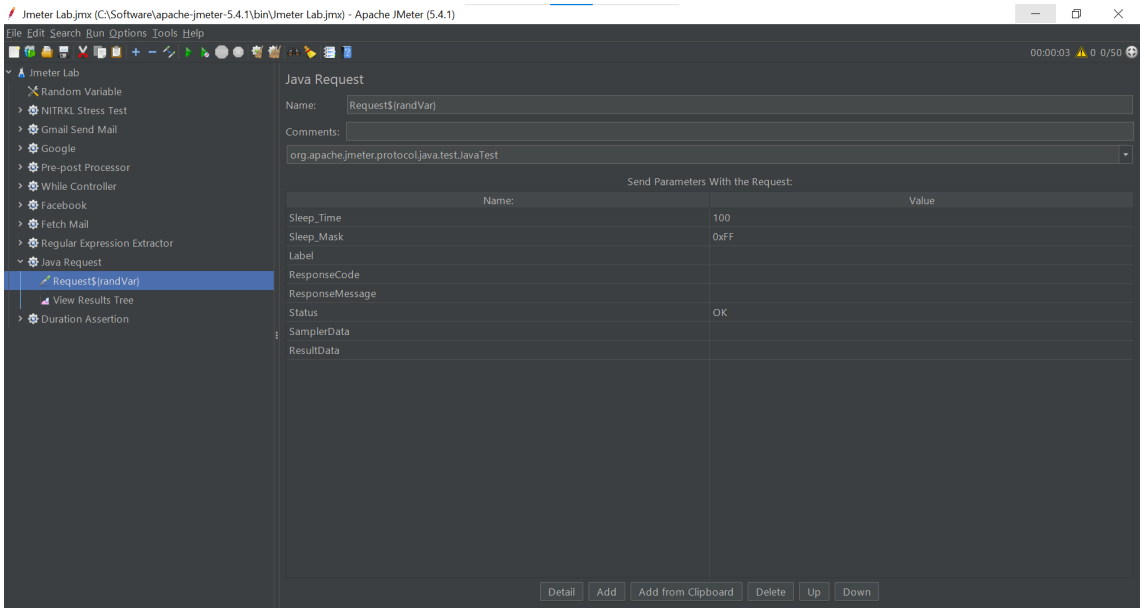

Figure 127:

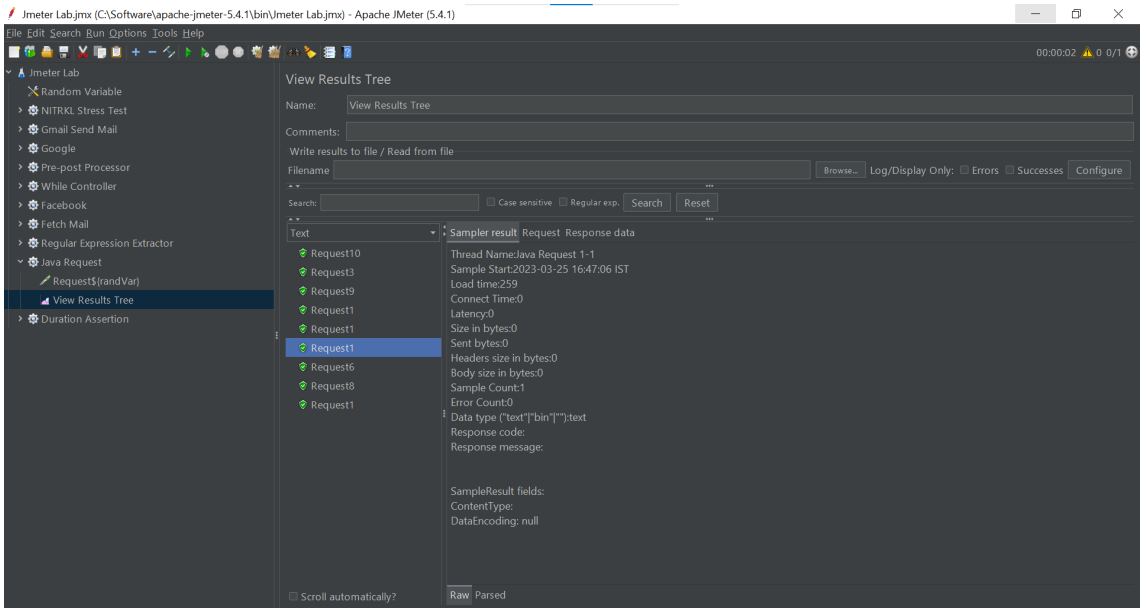
Jmeter Lab.jmx (C:\Software\apache-jmeter-5.4.1\bin\Jmeter Lab.jmx) - Apache JMeter (5.4.1)
File Edit Search Run Options Tools Help
00:00:02 0 0/1
Jmeter Lab
Random Variable
NITRKL Stress Test
Gmail Send Mail
Google
Pre-post Processor
While Controller
Facebook
Fetch Mail
Regular Expression Extractor
Java Request
Request${randVar}
View Results Tree
Duration Assertion
View Results Tree
Name: View Results Tree
Comments:
Write results to file / Read from file
Filename
Browse... Log/Display Only: Errors Successes Configure
Search: Case sensitive Regular exp. Search Reset
Text
Request10
Request3
Request9
Request1
Request1
Request1
Request6
Request8
Request1
Sampler result Request Response data
Thread Name:Java Request 1-1
Sample Start:2023-03-25 16:47:06 IST
Load time:259
Connect Time:0
Latency:0
Size in bytes:0
Sent bytes:0
Headers size in bytes:0
Body size in bytes:0
Sample Count:1
Error Count:0
Data type ("text"|"bin"|""):text
Response code:
Response message:
SampleResult fields:
ContentType:
DataEncoding: null
Scroll automatically?
Raw Parsed

Figure 128:

8.10 Duration Assertion

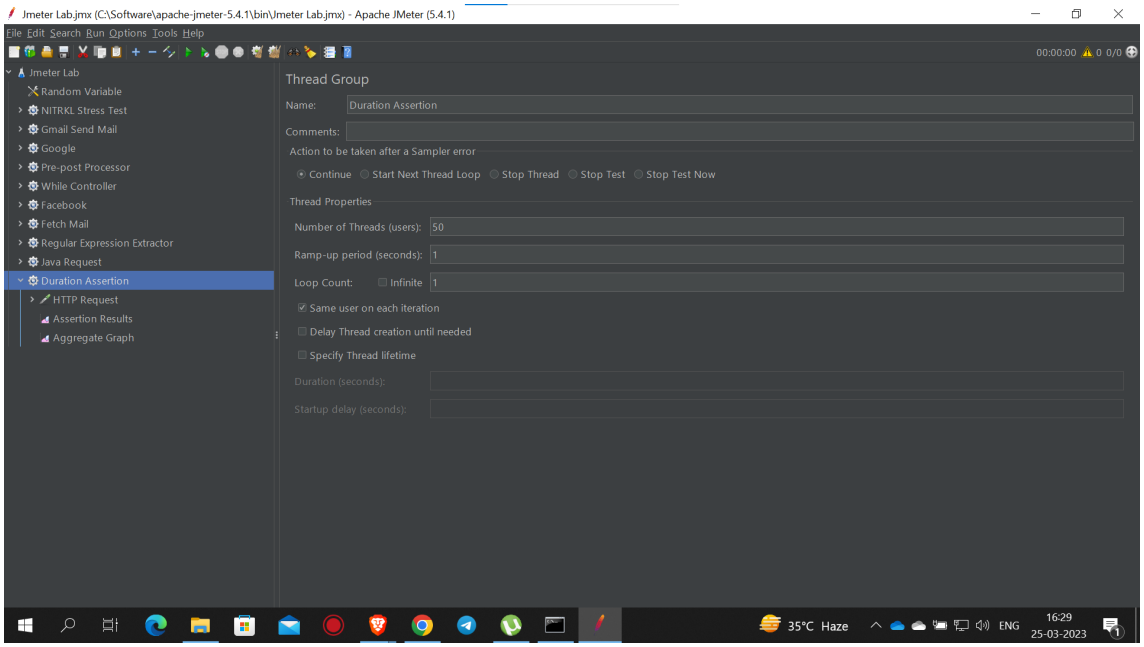

Figure 129: Thread Group

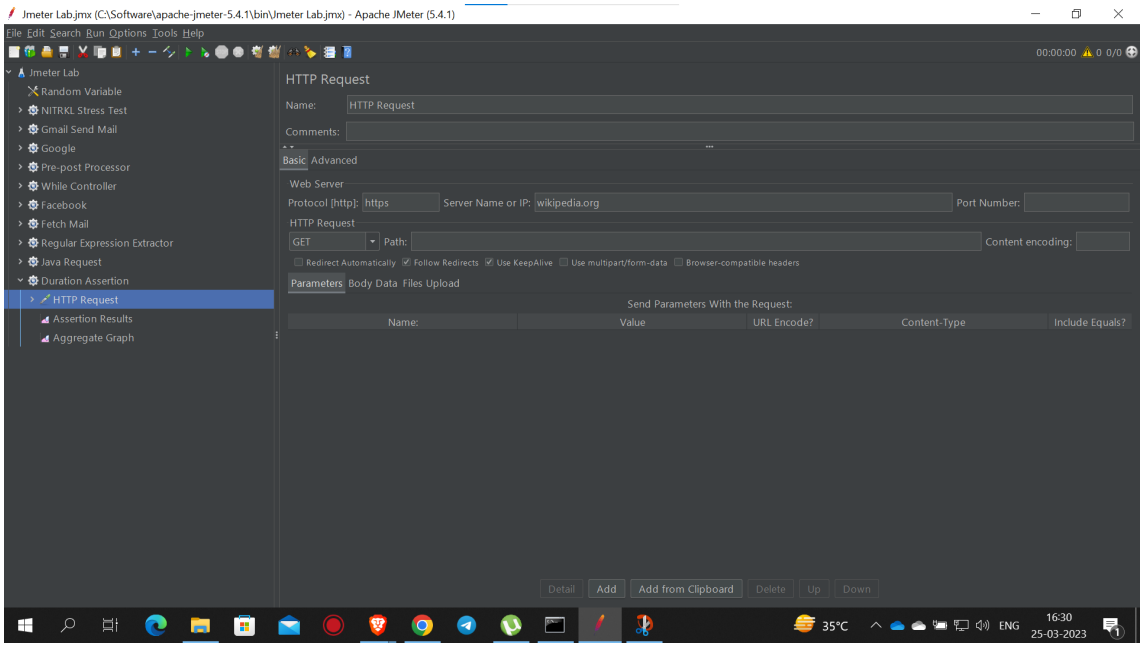

Figure 130: HTTP Request

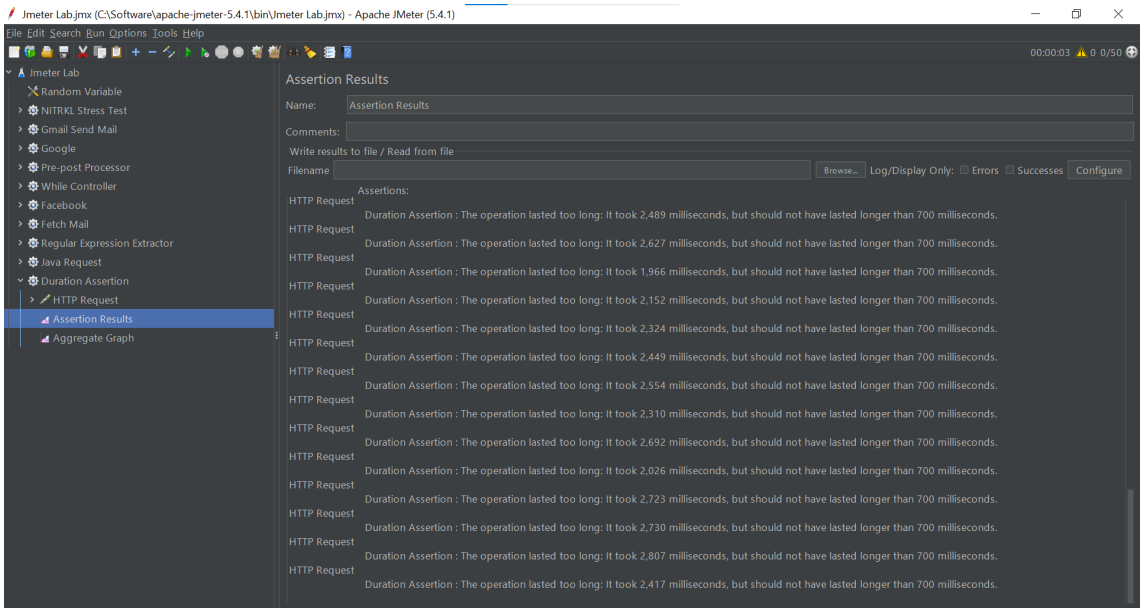

Figure 131: Assertion Results

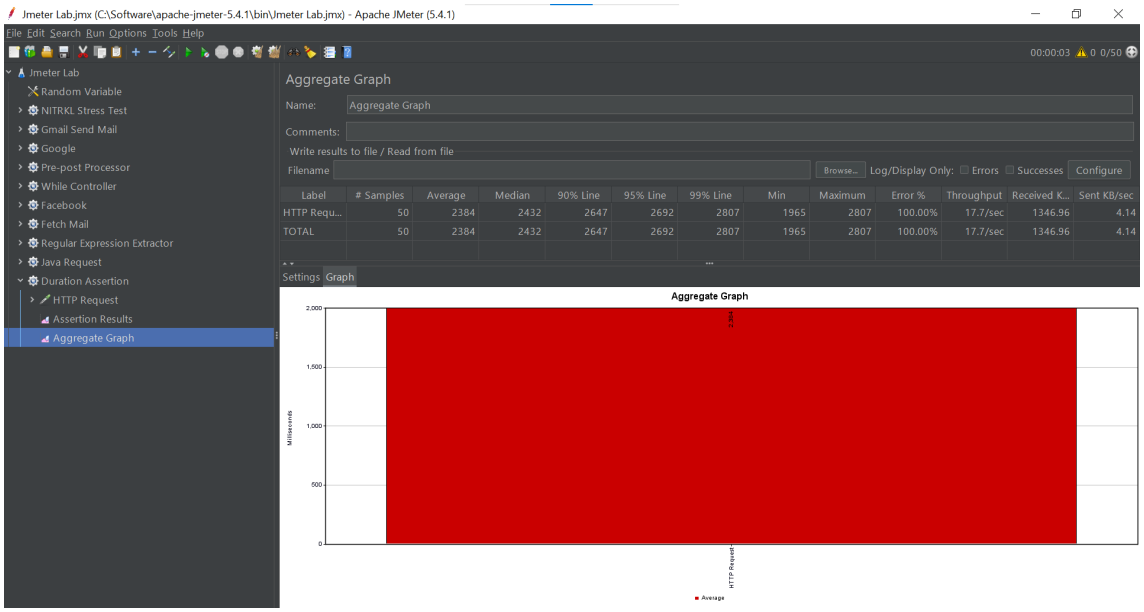

Figure 132: Graph

CS6474: Software Testing Laboratory 2023

FINDBUGS

Prepared by
BISHWAJIT PRASAD GOND
222CS3113

9 FindBugs

Findbugs scans for possible bugs in Java software. Each finding is reported as a warning, but not all of these warnings are necessarily defects, e.g. warnings referring to possible performance issues. The terms bug or bug pattern are used in a misleading way by Findbugs. A better way would be to talk just about warnings. In the following article, the term warning will be used. All warnings are classified in four ranks:
(i) scariest,
(ii) scary,
(iii) troubling and
(iv) of concern.
This is a hint to the developer about the possible impact/severity of the warnings. The current version reports 400 warnings in the nine categories:

Warnings List		
Category	Numbers	Samples
Correctness	142	Illegal format string
Bad practice	84	Confusing method names
Dodgy code	71	Useless control flow
Multithreaded Correctness	45	A thread was created using the default empty run method
Performance	27	Method concatenates strings using + in a loop
Malicious Code Vulnerability	15	Finalizer should be protected, not public
Security	11	Hardcoded constant database password
Experimental	3	Method may fail to clean up stream or resource
Internationalization	2	Consider using Locale parameterized version of invoked method

Installation of Eclipse Plug-In

The Eclipse plug-in work with Eclipse 3.x releases from 3.3. The plug-in runs under Java 1.5 or newer.

For Eclipse 4.2 (Juno) the next steps install the plug-in:

1. In Eclipse, click on Help — Install New Software and press Add button.
   - Insert Name: Findbugs
   - Insert URL: http://Findbugs.cs.umd.edu/eclipse
   - press OK button
2. You should see Findbugs in the list. Select the entry and press Next button.
3. You should see the Install Details without errors and press Next button.
4. Select the ”I accept the terms of the license agreement” option and click Finish button.
5. The plug-in is not digitally signed. Go ahead and install it anyway. (press OK button)
6. Click Yes to make Eclipse restart itself.

Test the below programs in FindBugs Tool

9.1 Write a program to generate a Factorial of numbers (where stack length should be at 3 (max)). The numbers should be 5, 3, 8, and 15.

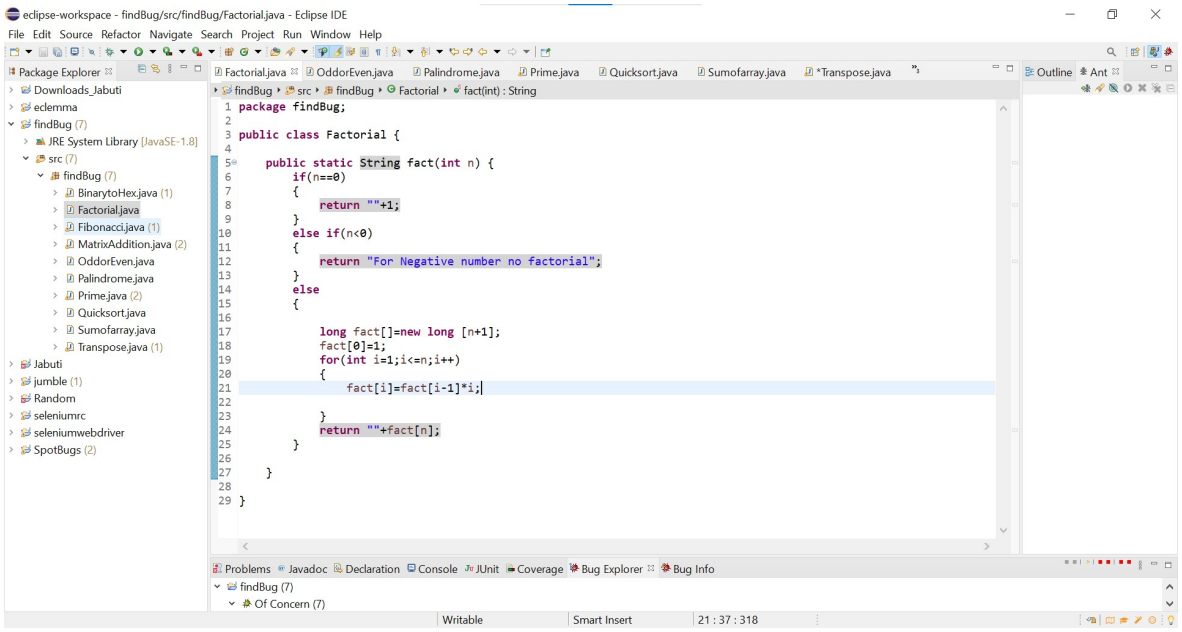

Figure 133: Findbug Screenshot

9.2 Write a program to generate Fibonacci numbers.

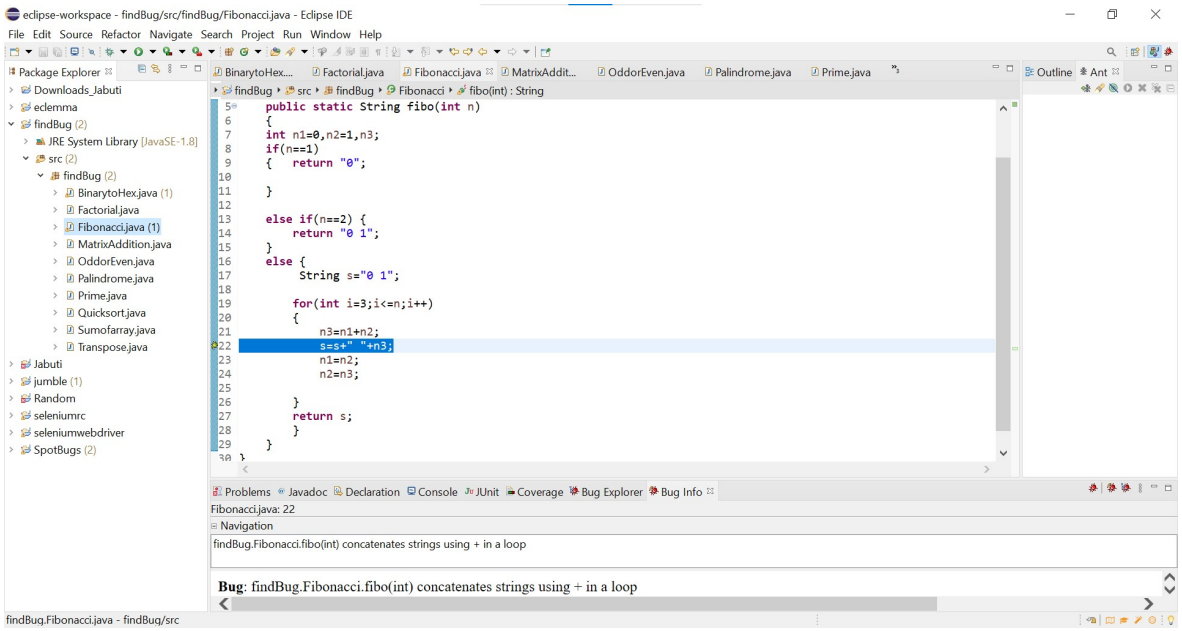

Figure 134: Findbug Screenshot

9.3 Write a program that performs sorting of a group of integer values using the quick sort technique.

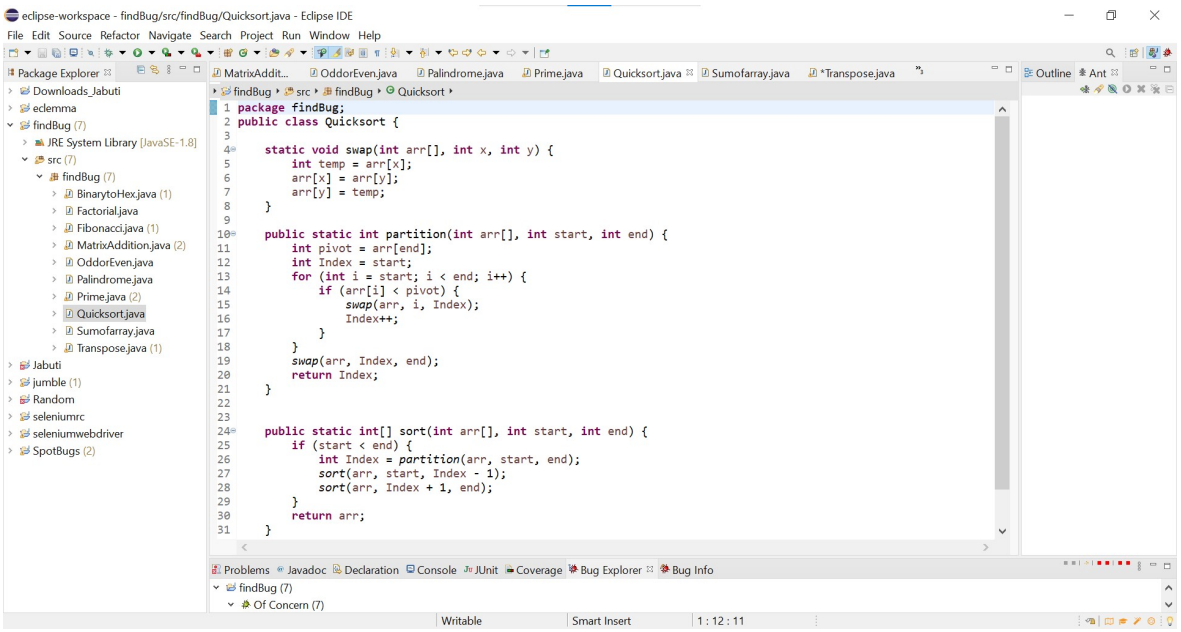

Figure 135: Findbug Screenshot

9.4 Write a program that accepts elements of a matrix and displays its transpose.

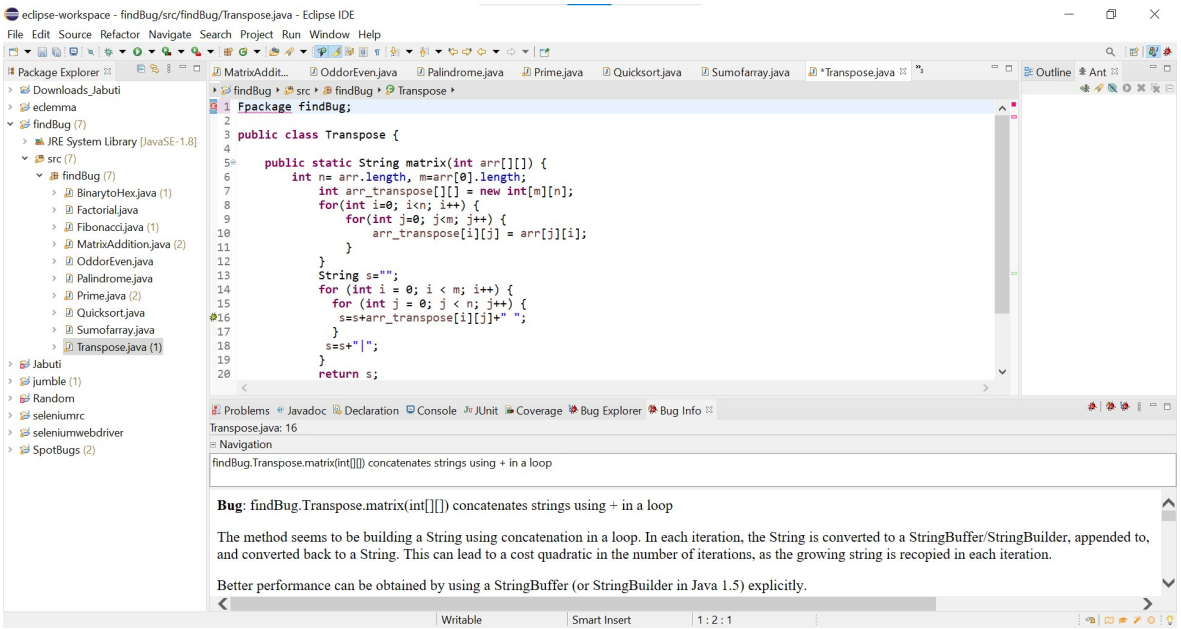

Figure 136: Findbug Screenshot

9.5 Write a program to add two matrices and display the sum matrix.

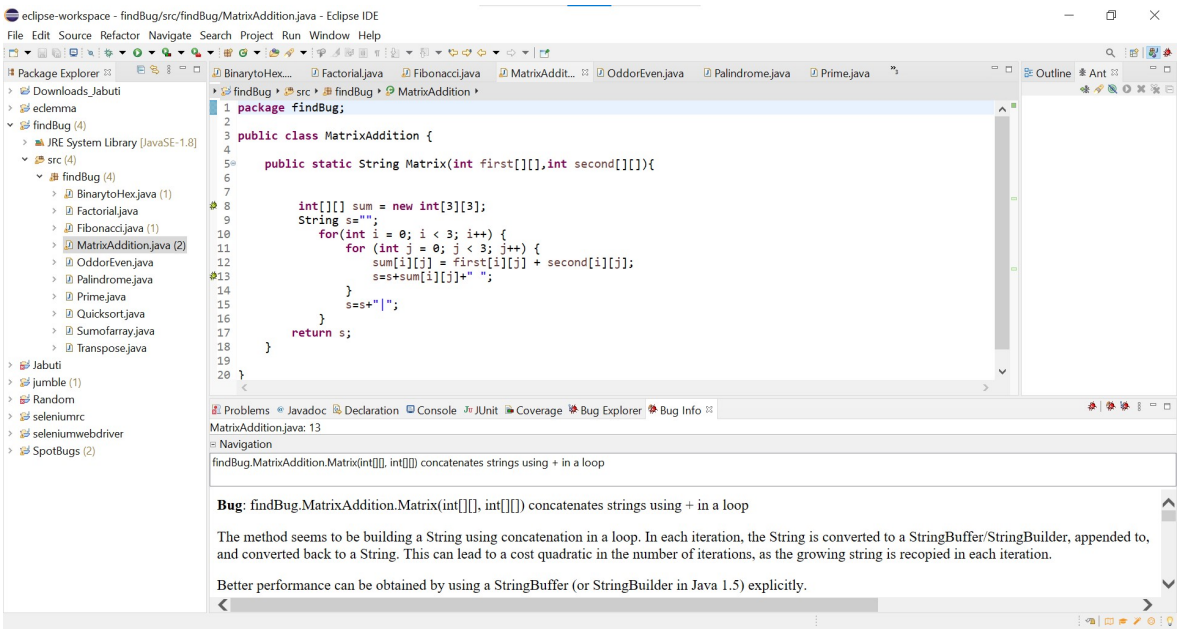

Figure 137: Findbug Screenshot

9.6 Write a program to Print Prime Numbers from 1 to 100 using Scanner Class and For Loop.

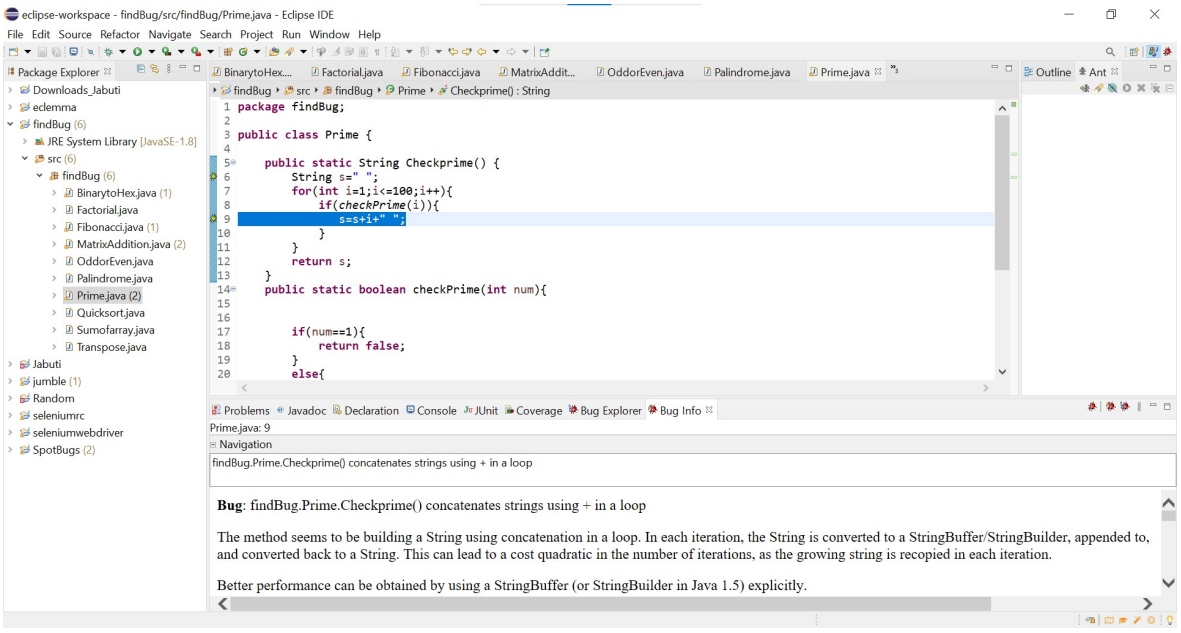

Figure 138: Findbug Screenshot

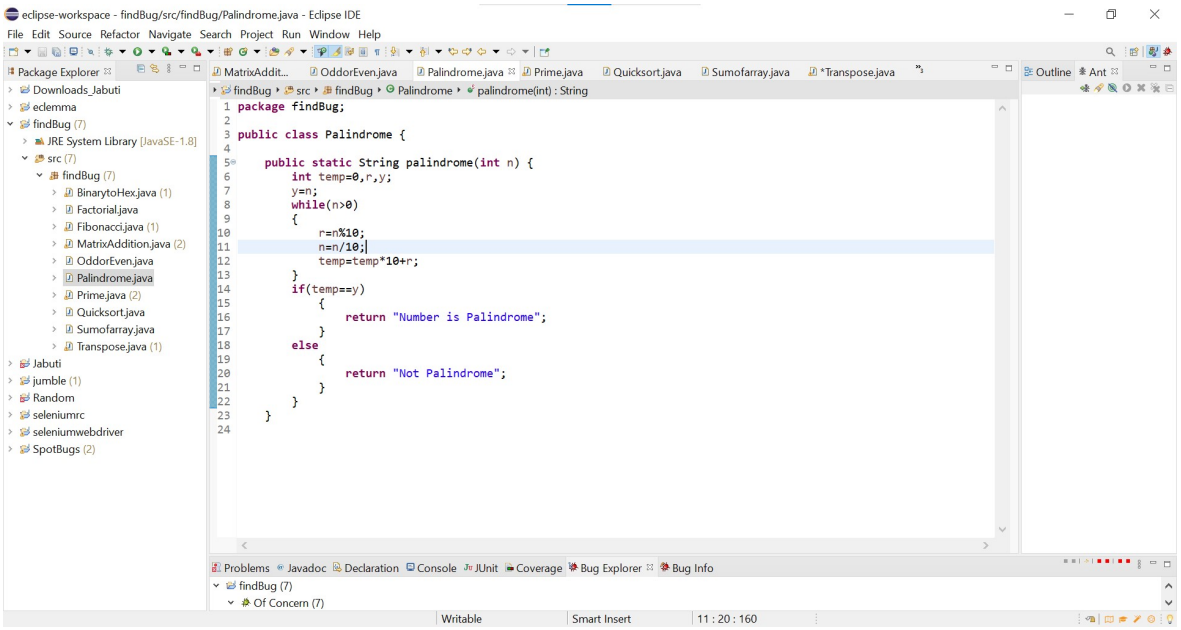

Figure 139: Findbug Screenshot

9.7 Write a program to generate a palindrome of numbers.

9.8 Write a program to find out the sum of two arrays.

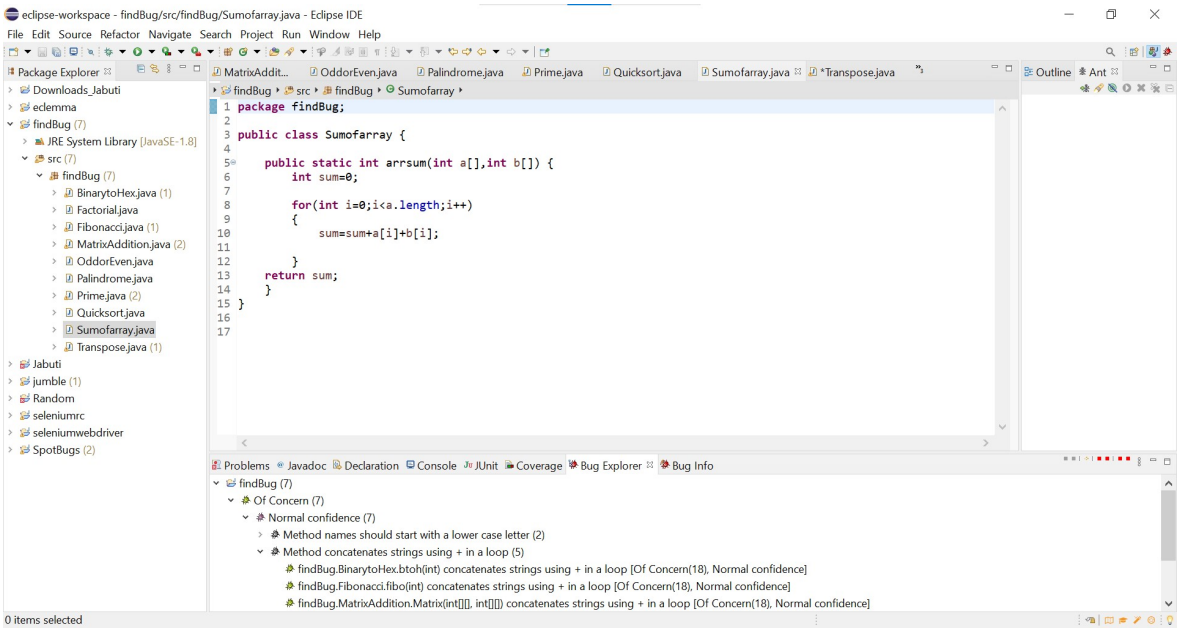

Figure 140: Findbug Screenshot

9.9 Write a program to check whether the number is even or odd.

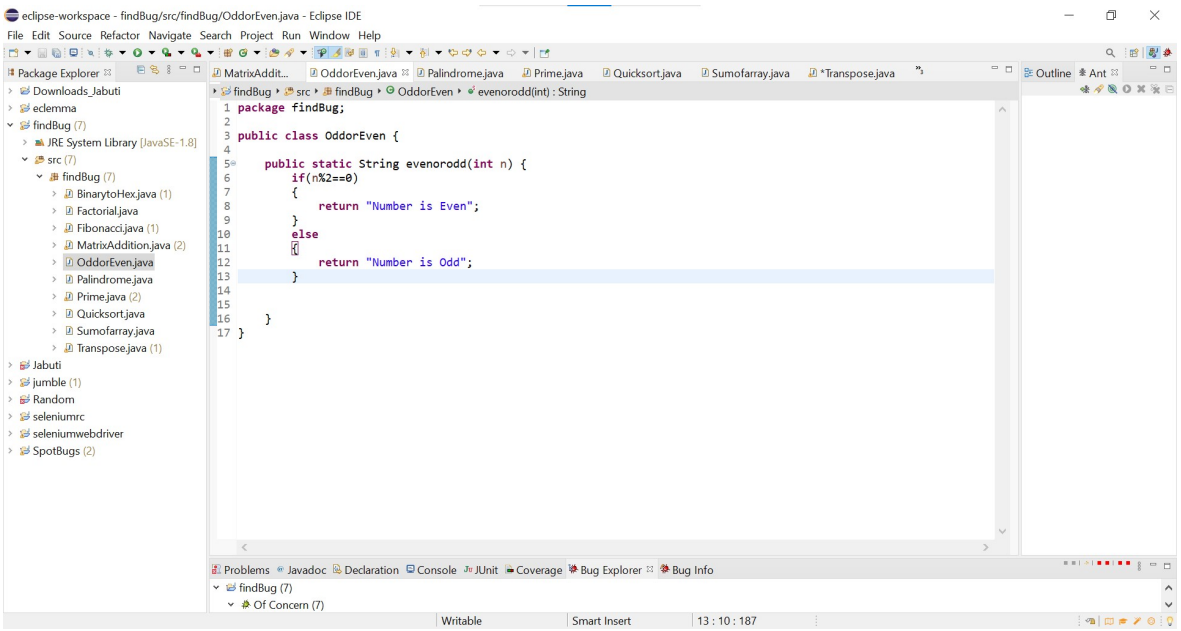

Figure 141: Findbug Screenshot

9.10 Write a program for binary to hexadecimal conversion.

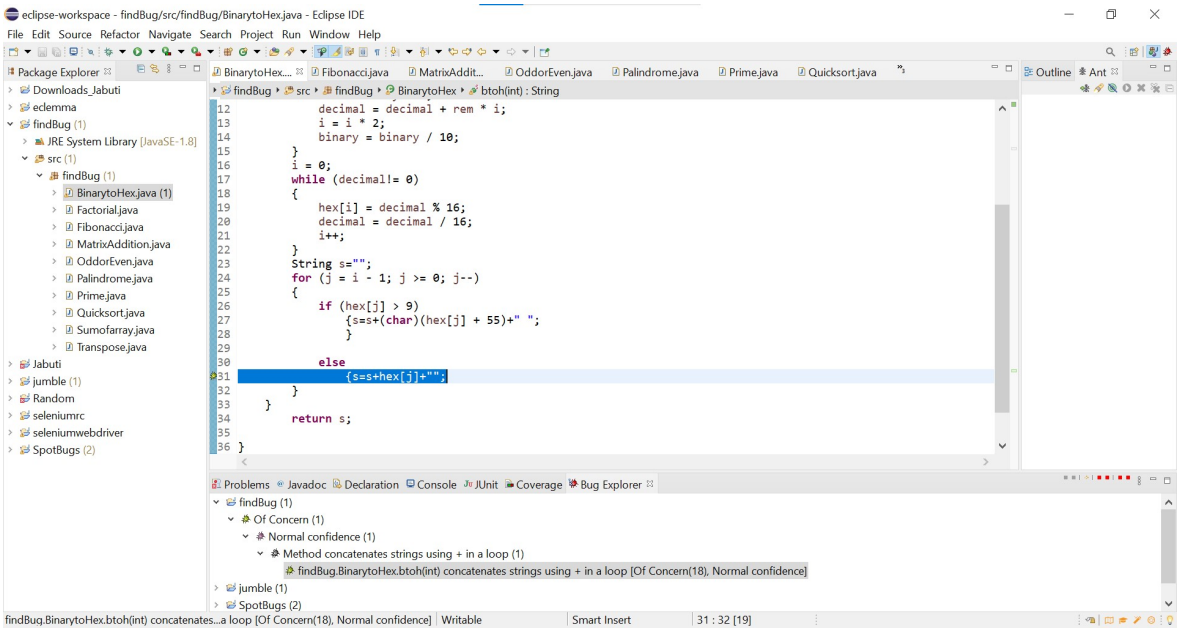

Figure 142: Findbug Screenshot

CS6474: Software Testing Laboratory 2023

PYTEST-COV

Prepared by
BISHWAJIT PRASAD GOND
222CS3113

10 Pytest-Cov

Pytest is a Python testing framework that originated from the PyPy project. It can be used to write various types of software tests, including unit tests, integration tests, end-to-end tests, and functional tests. Its features include parametrized testing, fixtures, and assert re-writing.

Pytest fixtures provide the contexts for tests by passing in parameter names in test cases; its parametrization eliminates duplicate code for testing multiple sets of input and output; and its rewritten assert statements provide detailed output for causes of failures.

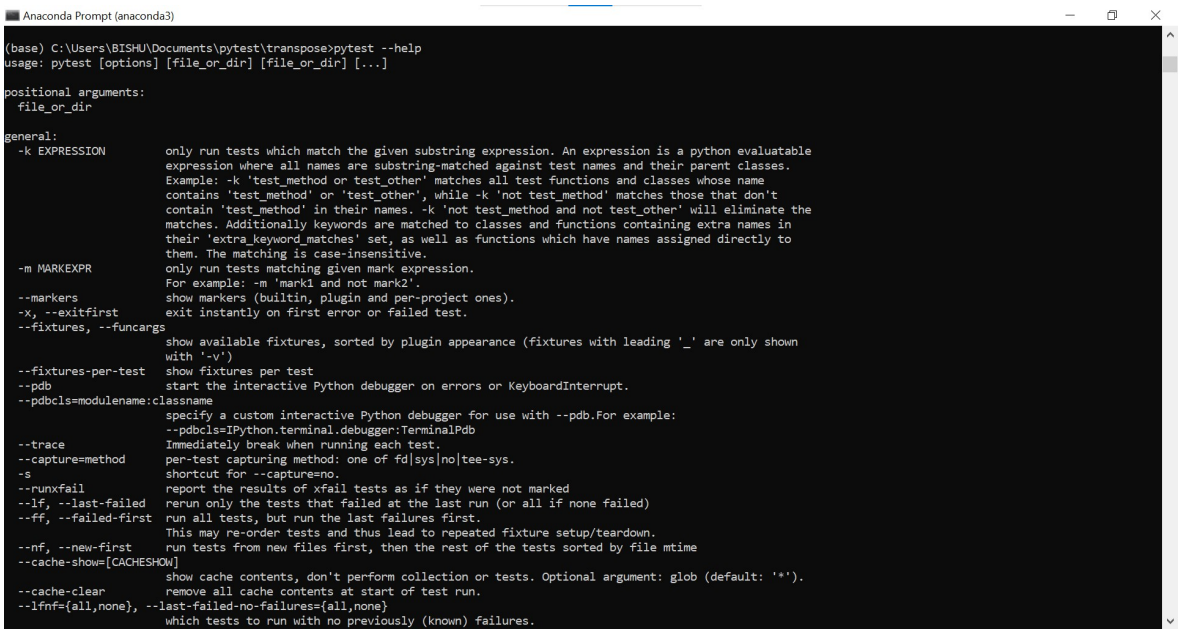

Figure 143: Pytest Options

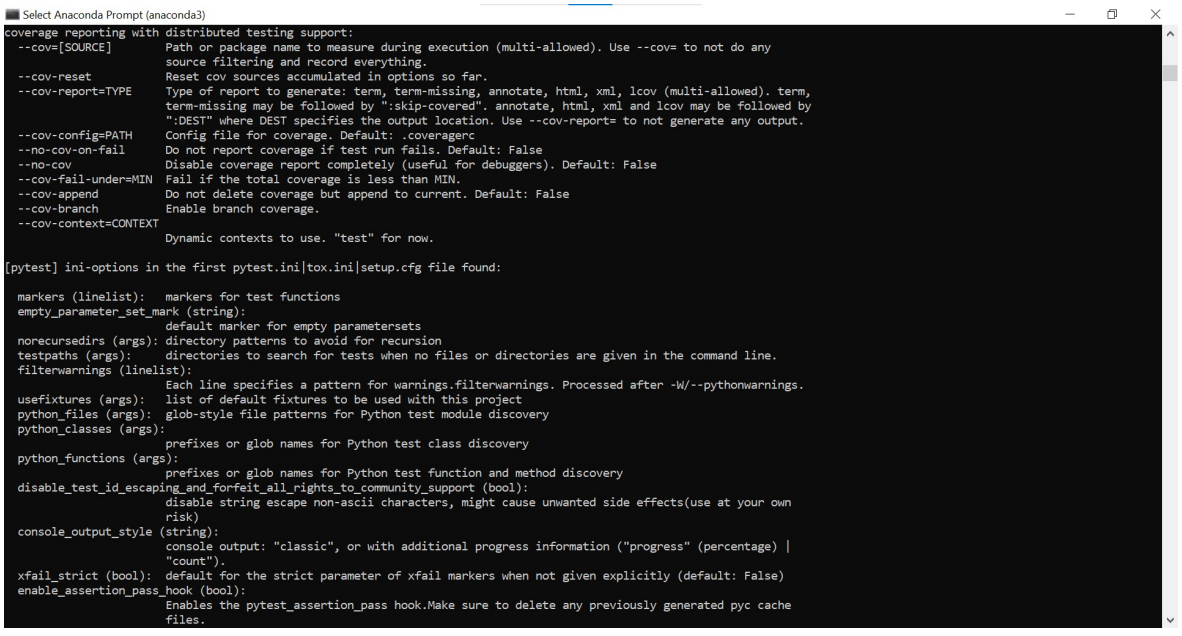

Figure 144: Pytest Options

Test the below programs in PyTest Tool

10.1 Write a program to generate a Factorial of numbers (where stack length should be at 3 (max)). The numbers should be 5, 3, 8, and 15.

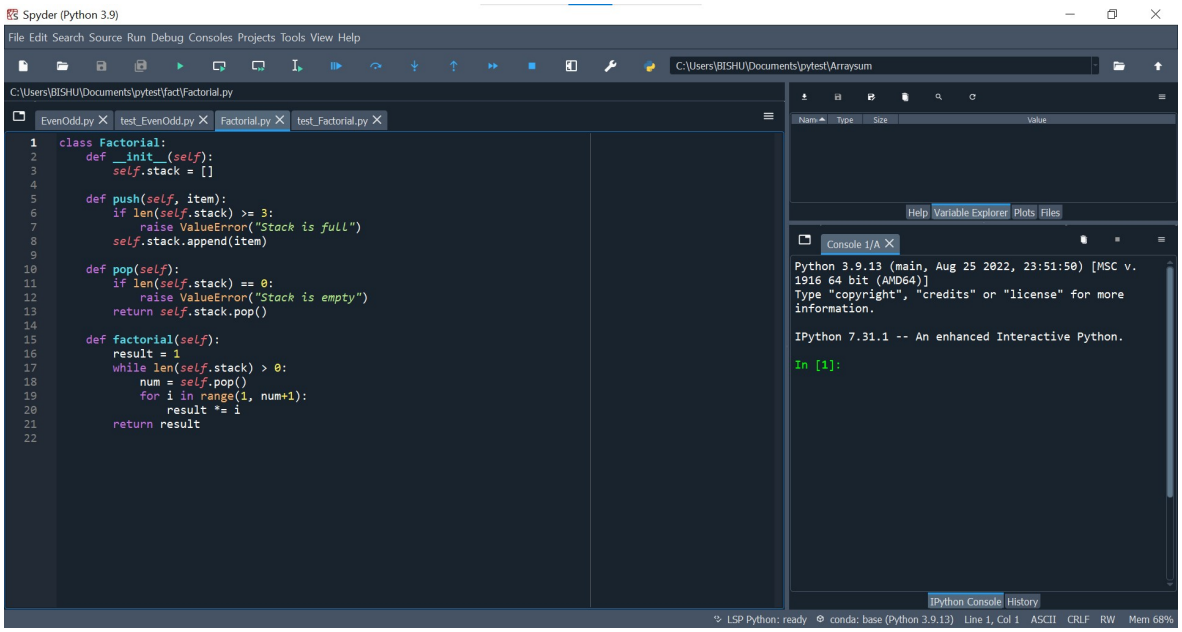

Figure 145: PyCOV Screenshot

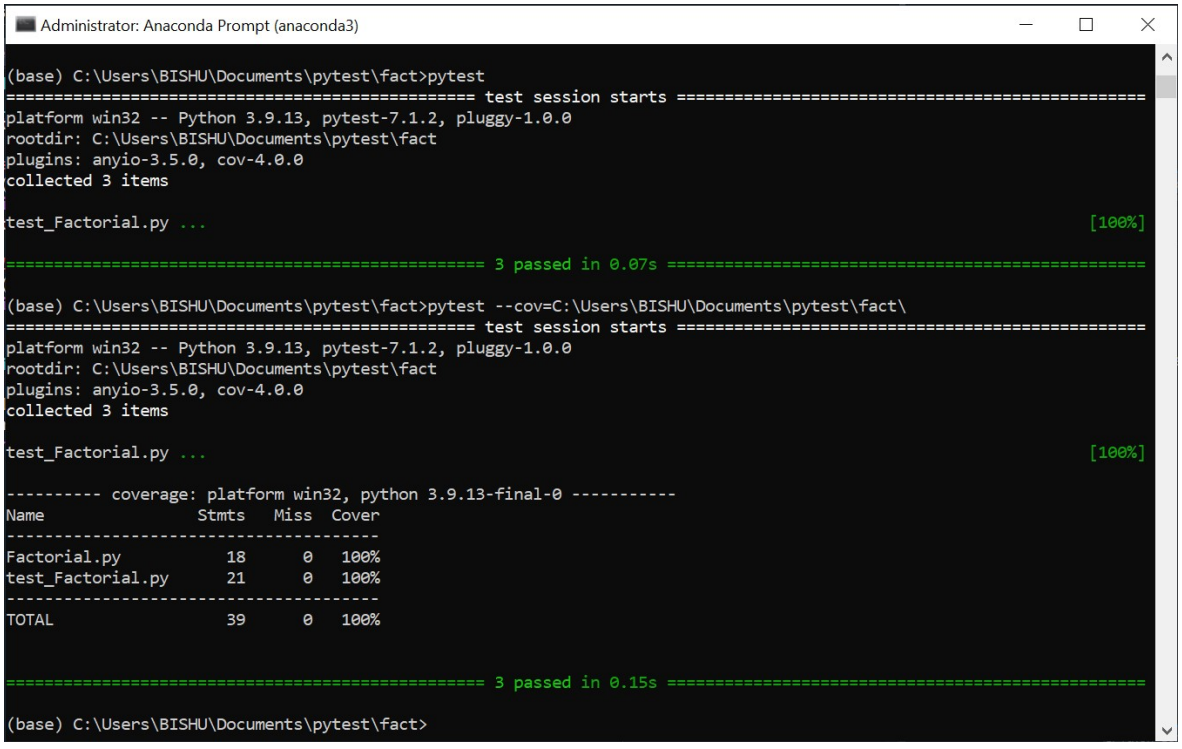

Figure 146: Factorial Code

10.2 Write a program to generate Fibonacci numbers.

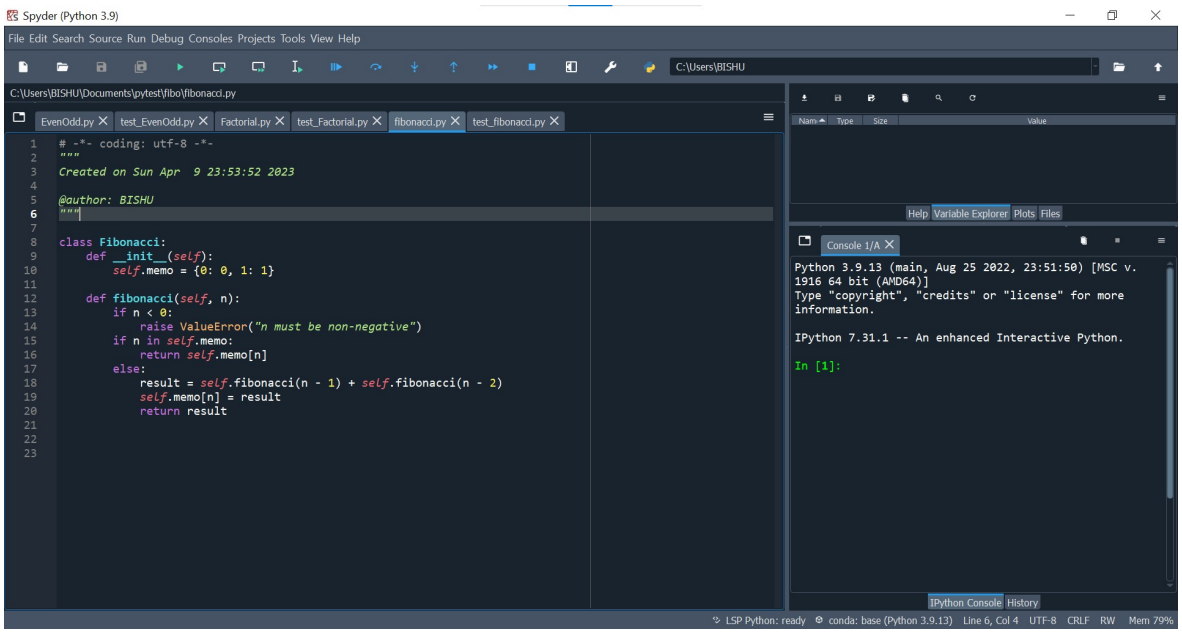

Figure 147: PyCOV Screenshot

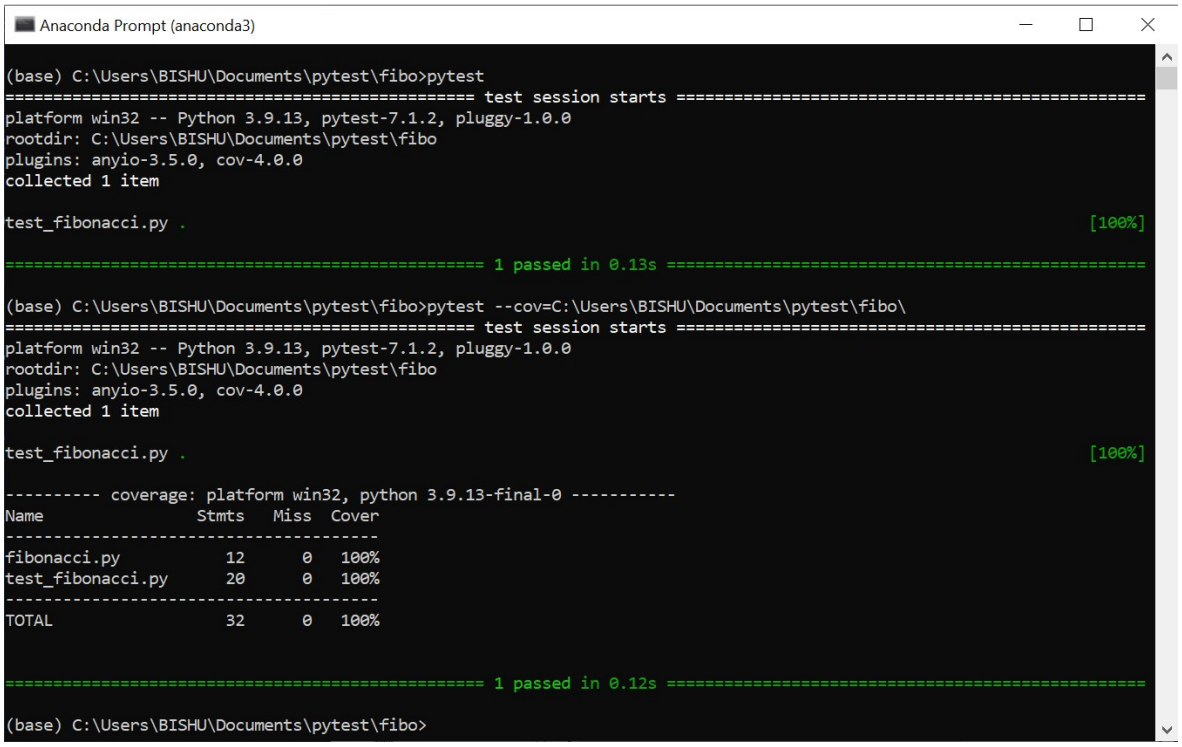

Figure 148: Fibonacci Code

10.3 Write a program that performs sorting of a group of integer values using the quick sort technique.

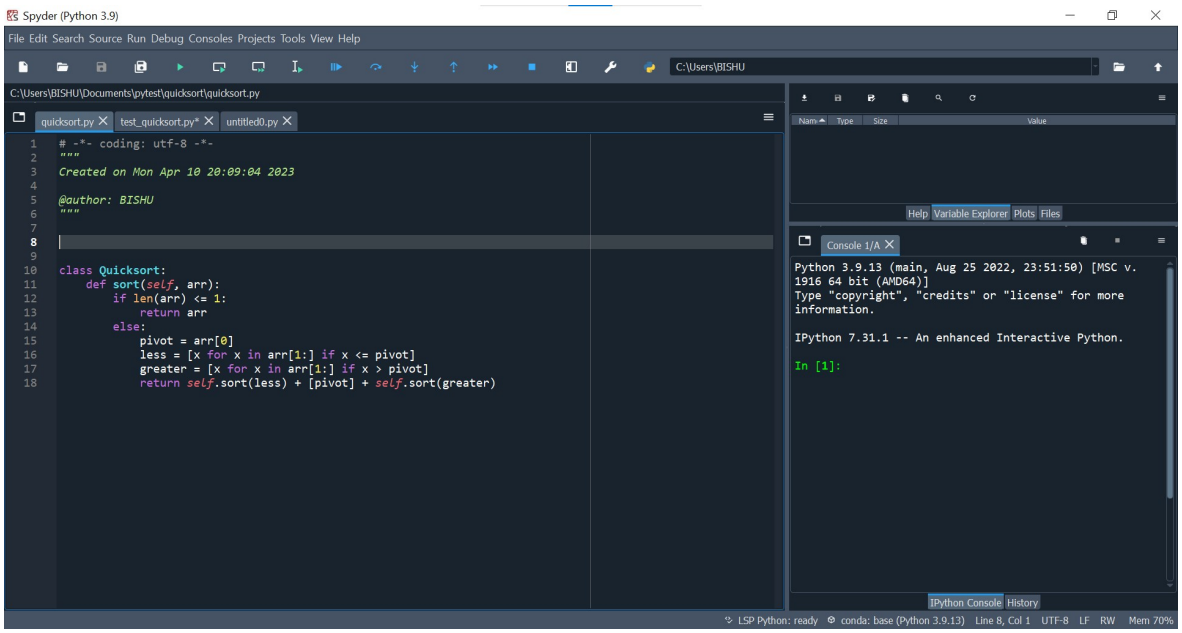

Figure 149: PyCOV Screenshot

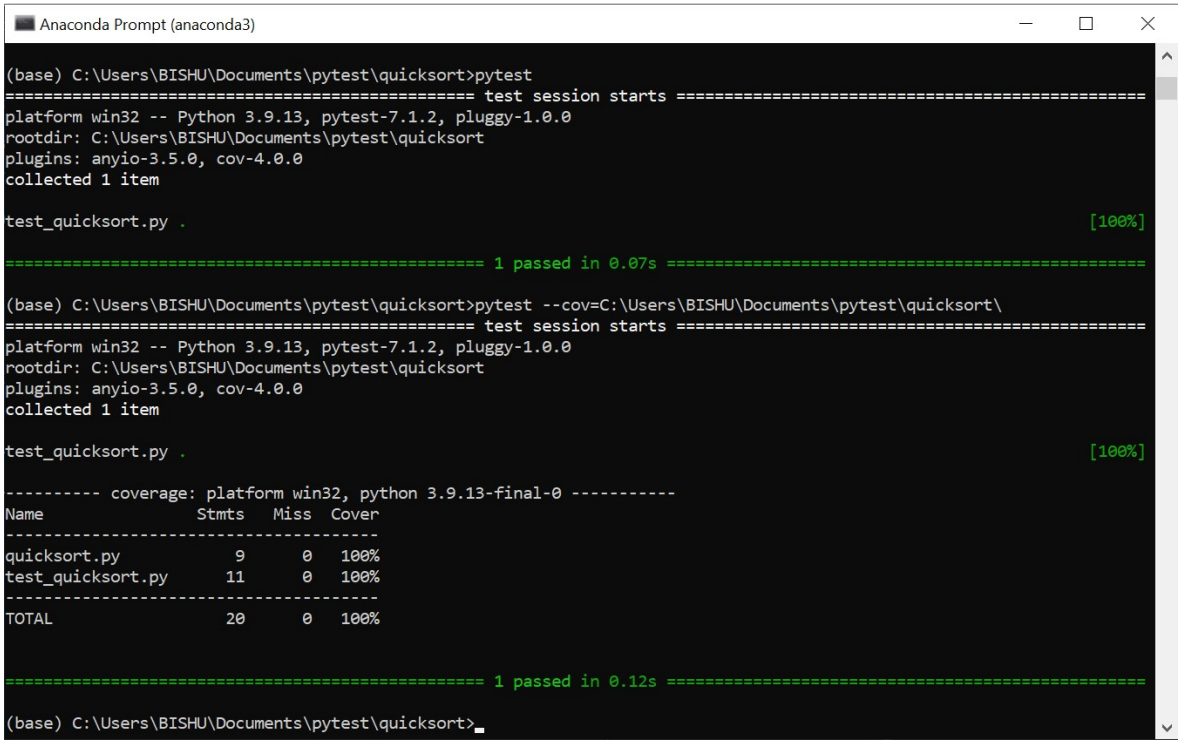

Figure 150: Quicksort Code

10.4 Write a program that accepts elements of a matrix and displays its transpose.

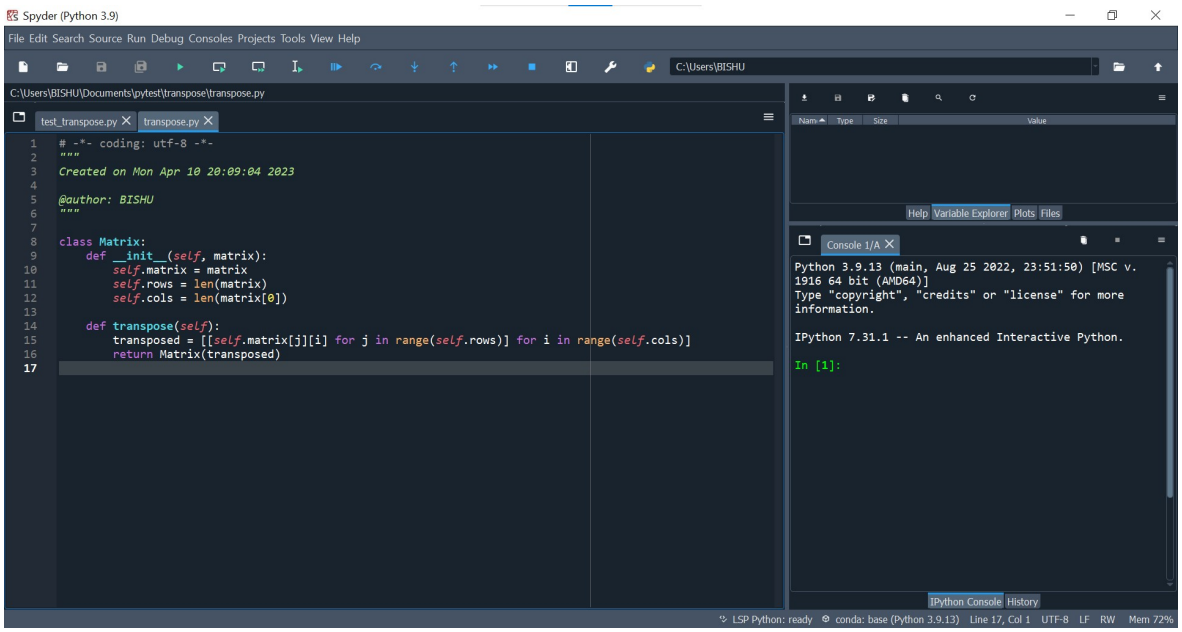

Figure 151: PyCOV Screenshot

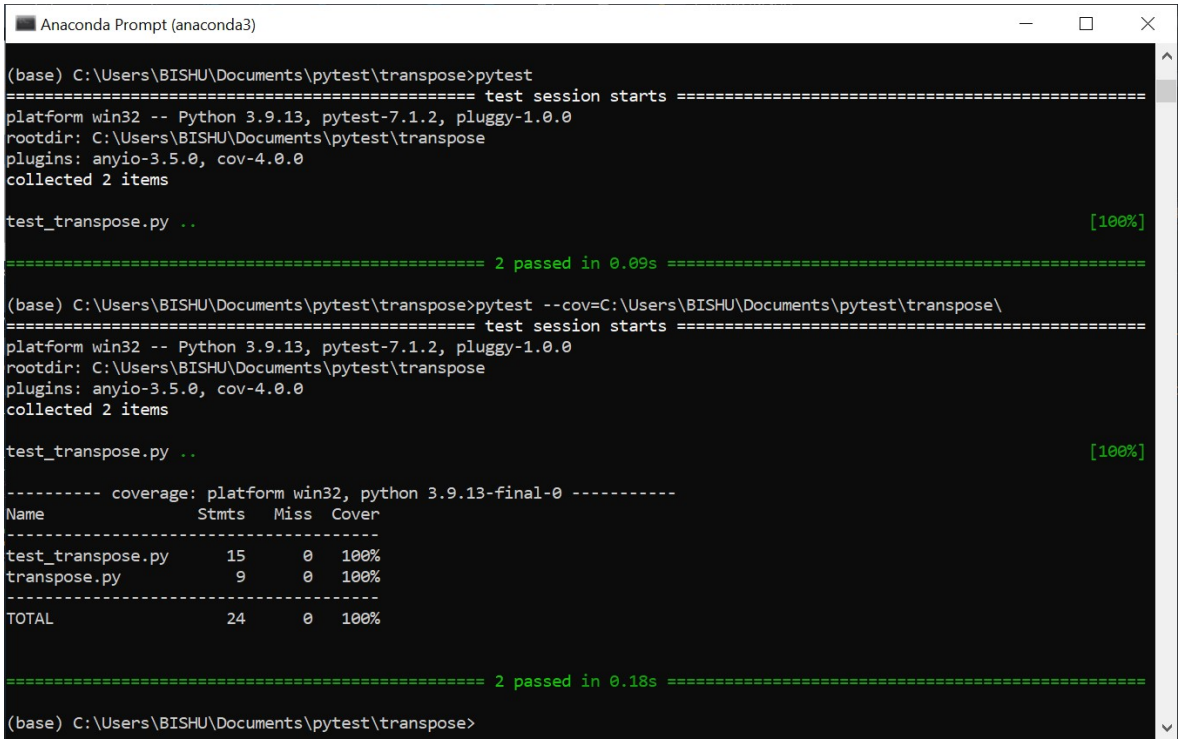

Figure 152: Matrix Transpose Code

10.5 Write a program to add two matrices and display the sum matrix.

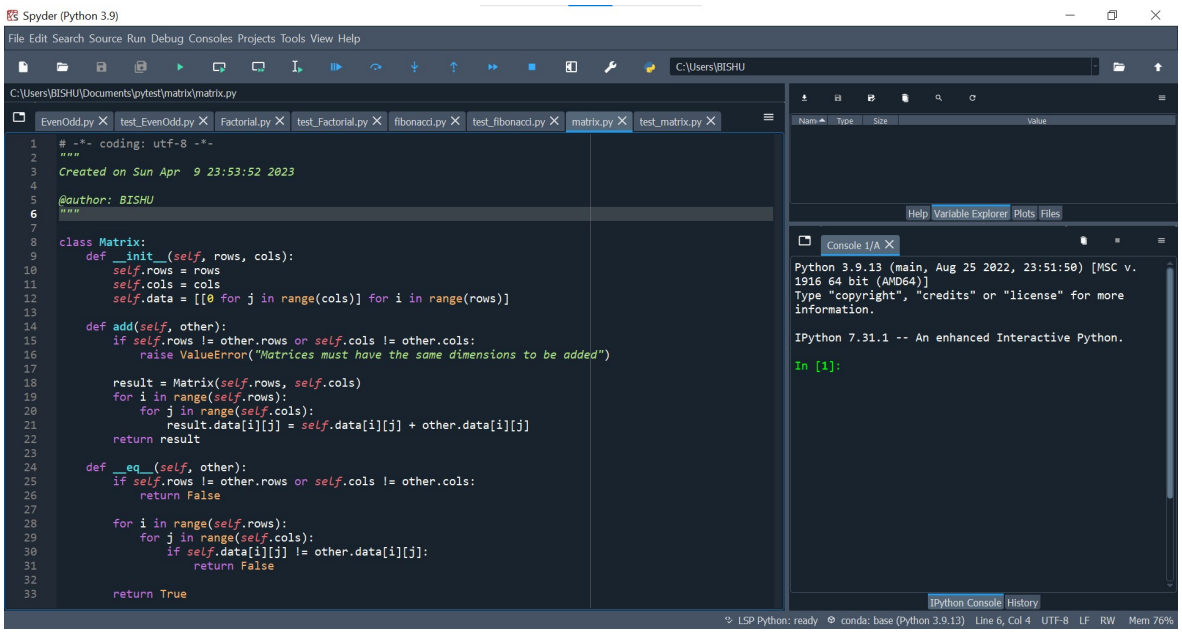

Figure 153: PyCOV Screenshot

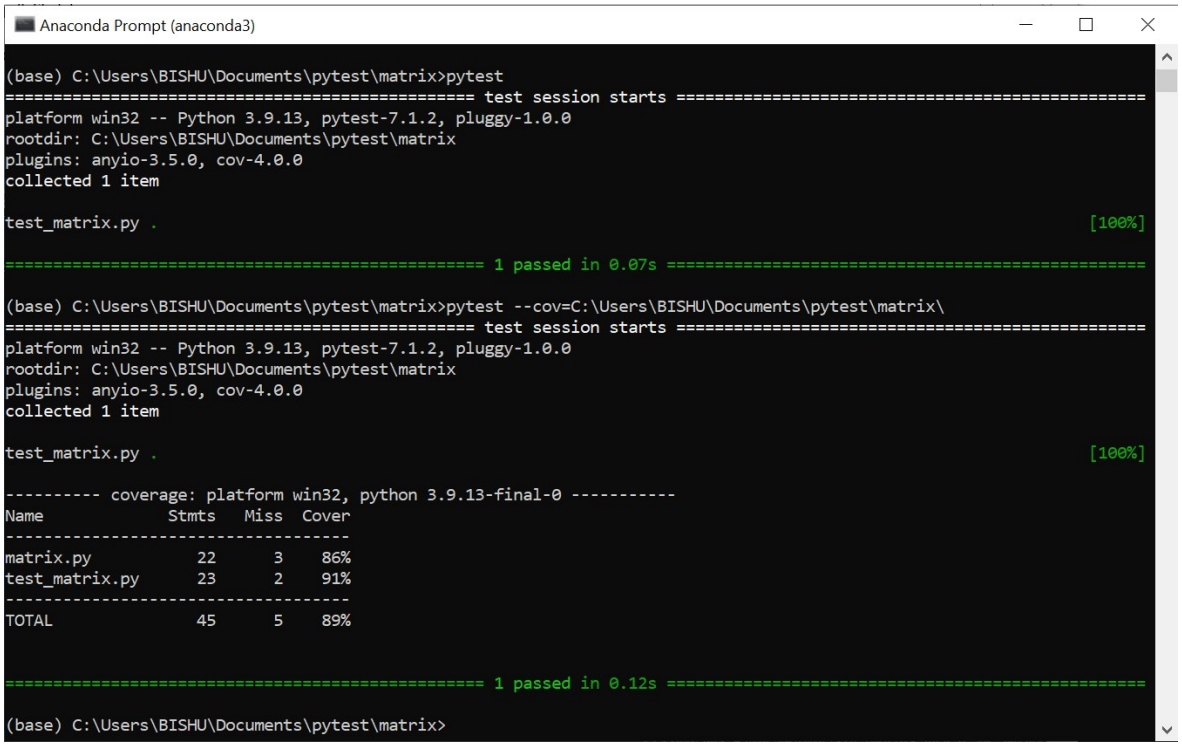

Figure 154: Matrix Addition Code

10.6 Write a program to Print Prime Numbers from 1 to 100 using Scanner Class and For Loop.

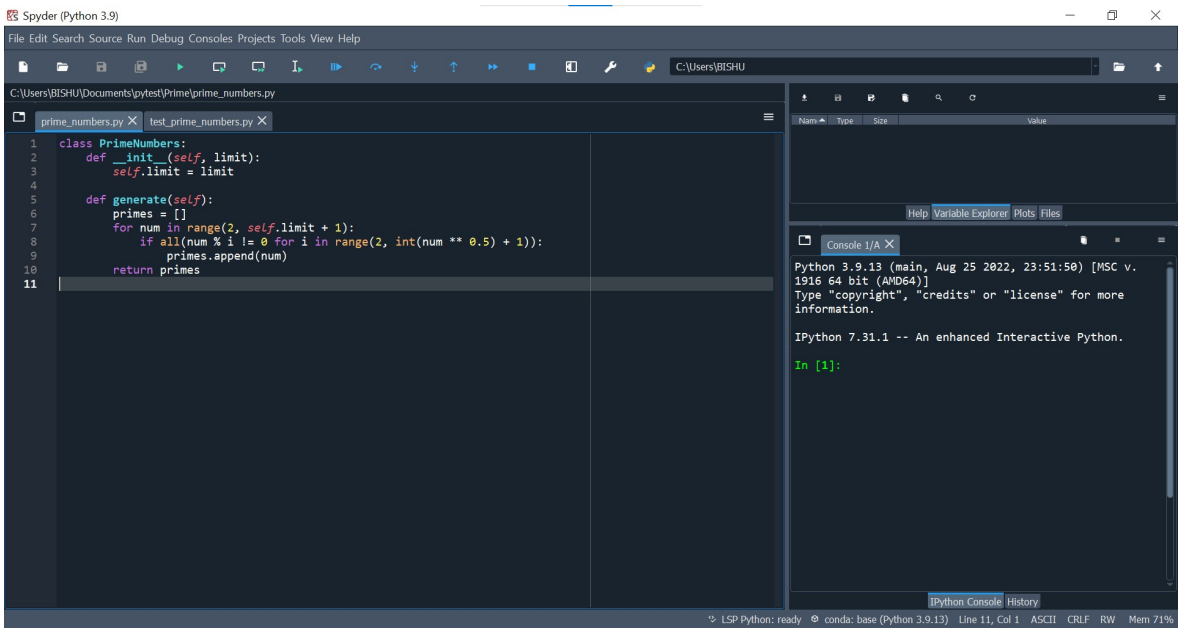

Figure 155: PyCOV Screenshot

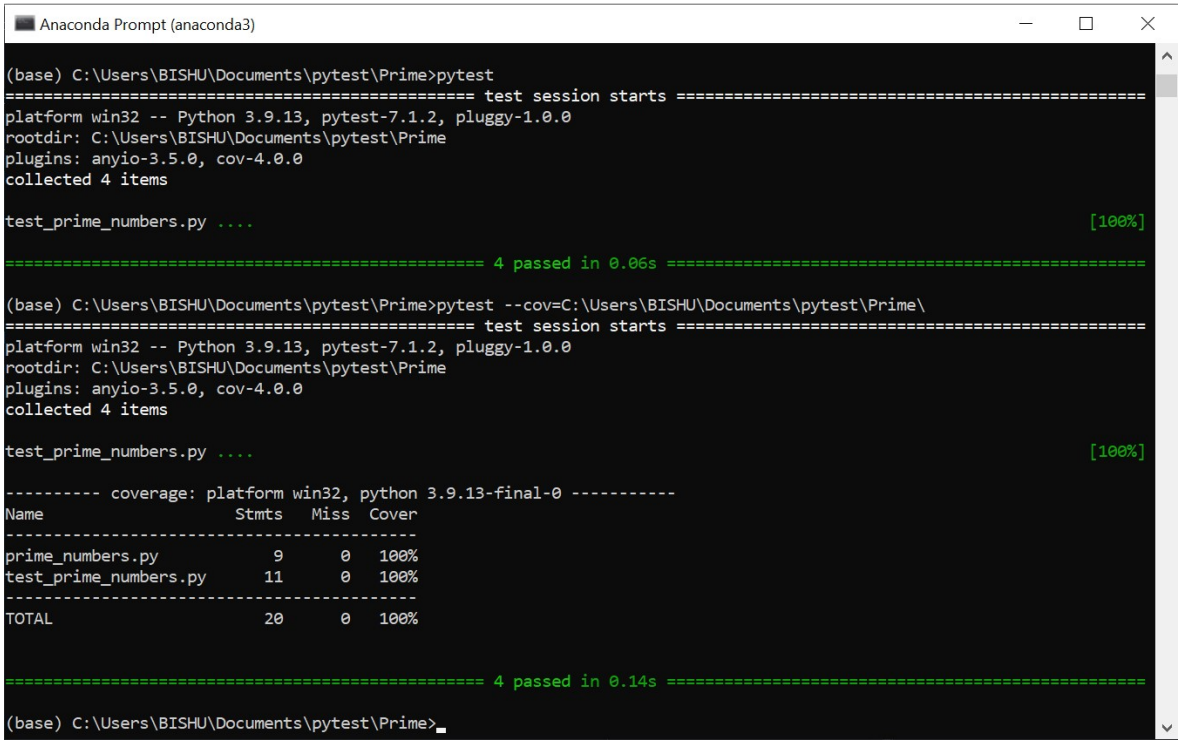

Figure 156: Prime Code

10.7 Write a program to generate a palindrome of numbers.

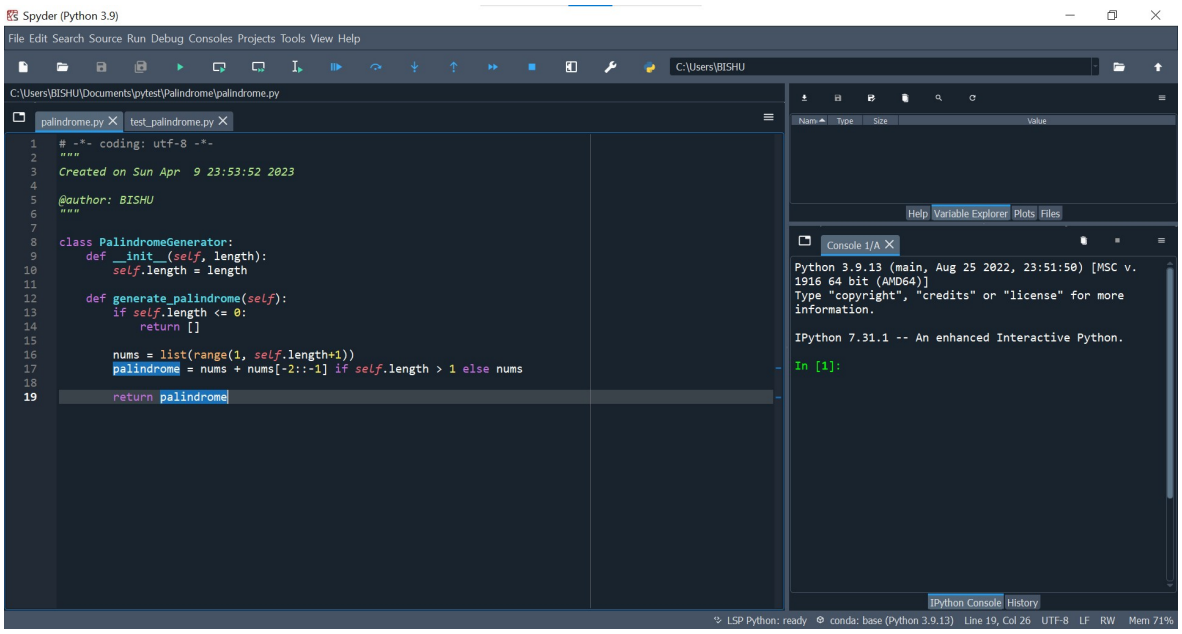

Figure 157: PyCOV Screenshot

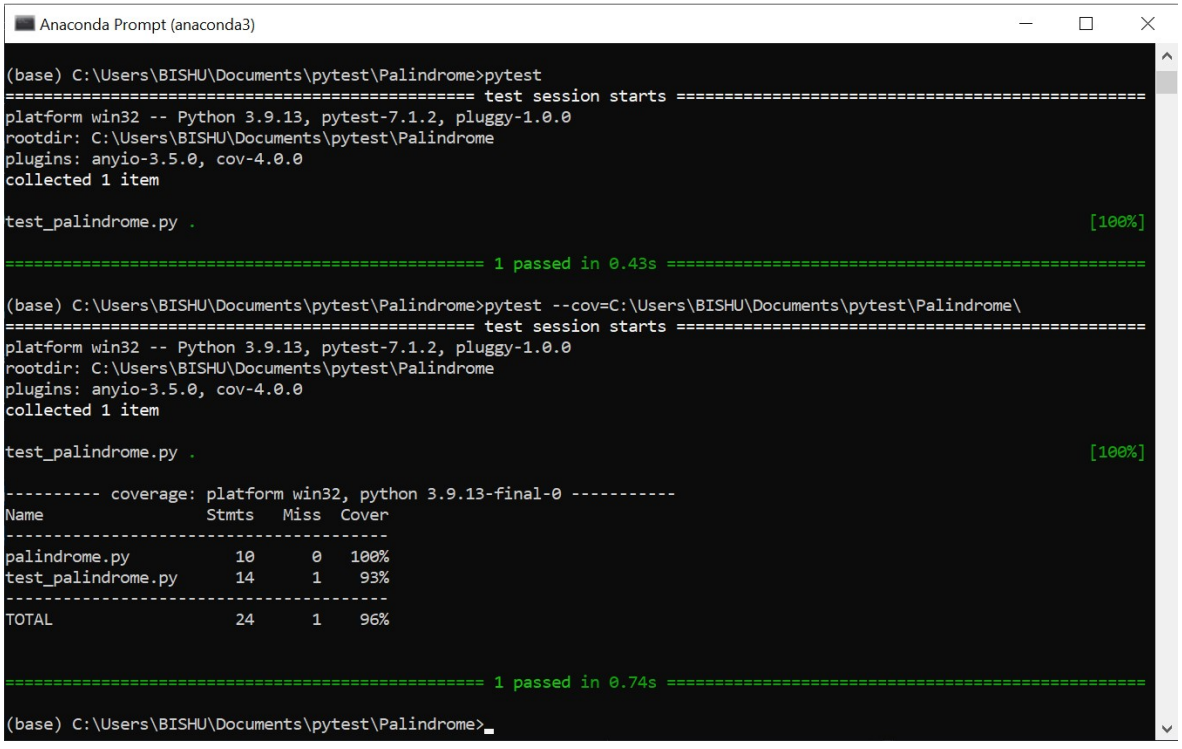

Figure 158: Palindrome Code

10.8 Write a program to find out the sum of two arrays.

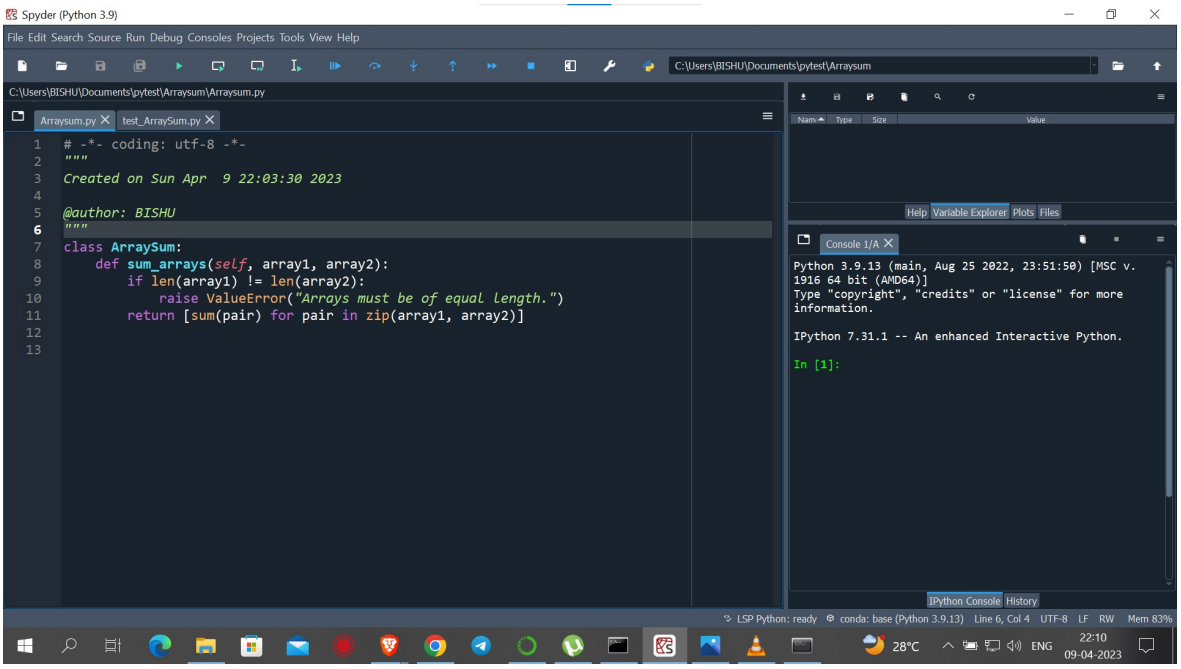

Figure 159: PyCOV Screenshot

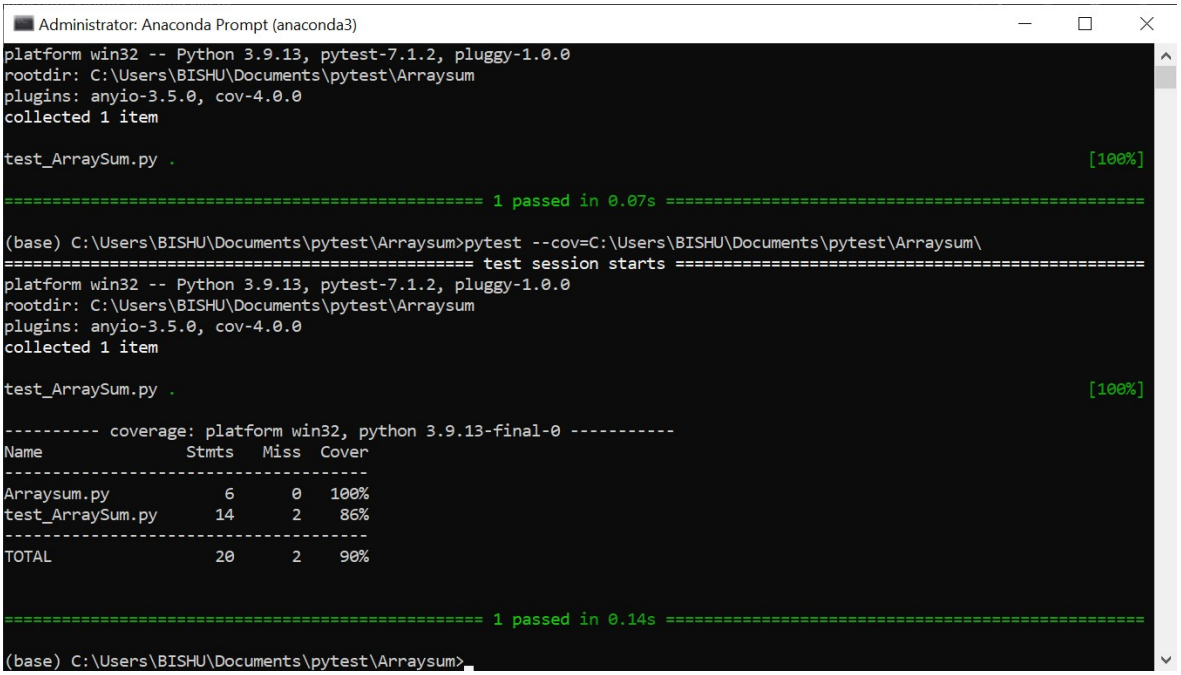

Figure 160: Sum of Array Code

10.9 Write a program to check whether the number is even or odd.

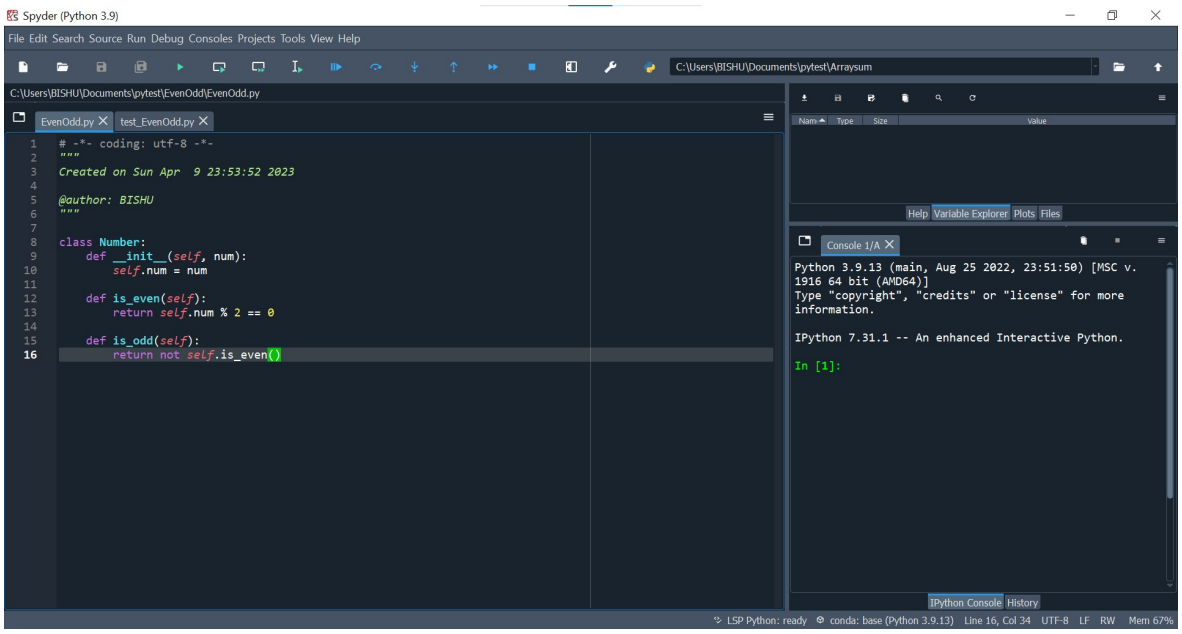

Figure 161: PyCOV Screenshot

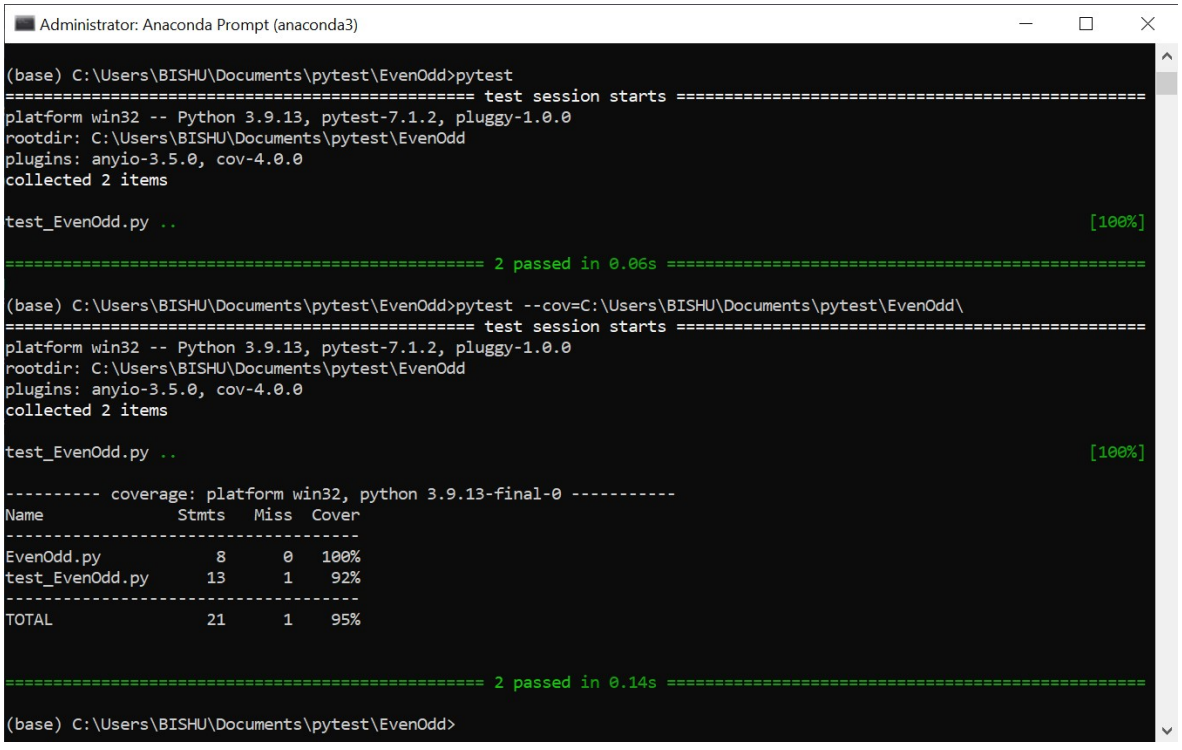

Figure 162: Odd or Even Code

10.10 Write a program for binary to hexadecimal conversion.

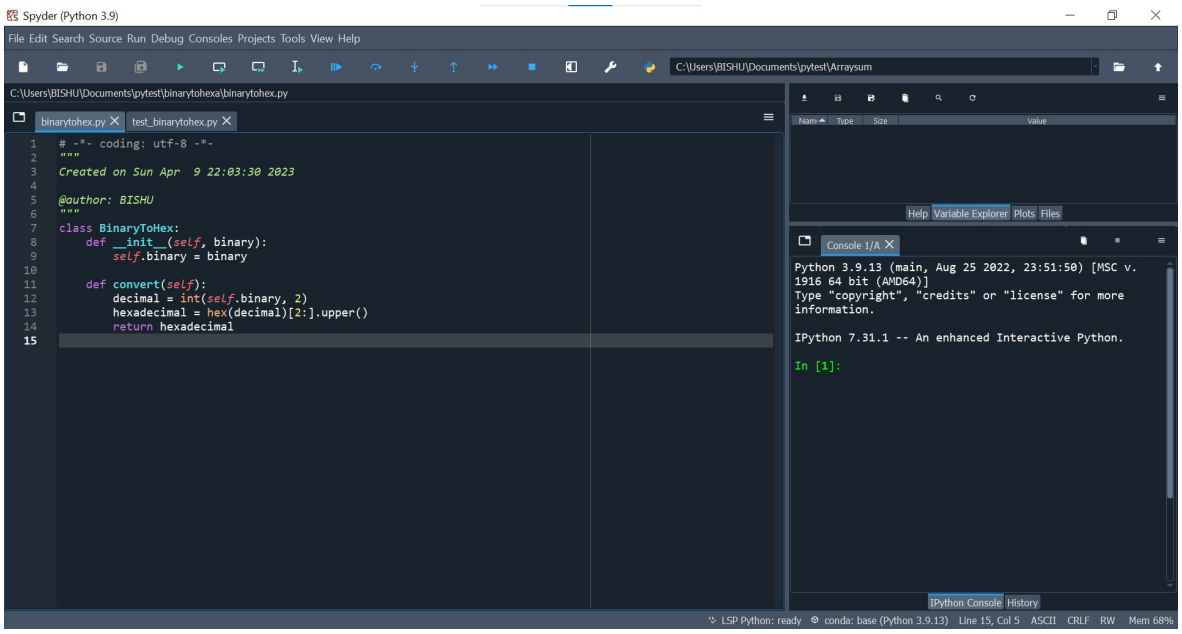

Figure 163: PyCOV Screenshot

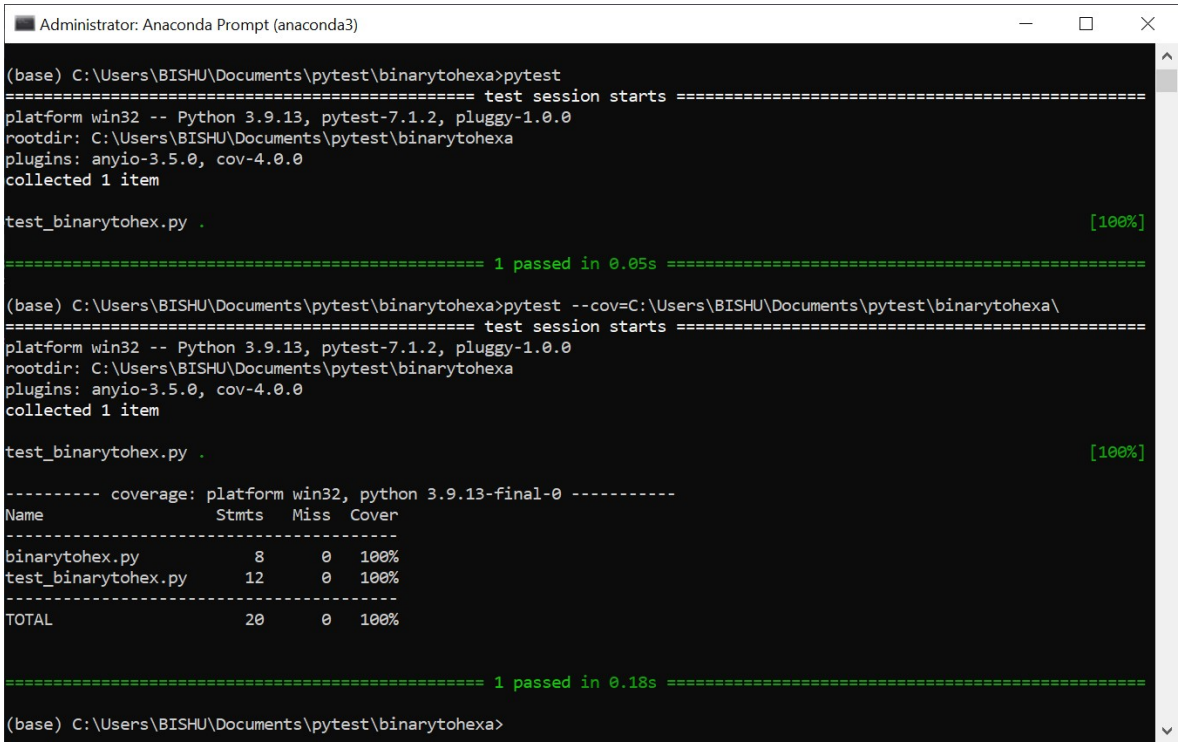

Figure 164: Binary to Hexadecimal Code

11 Previous Year Lab Exam Questions

1. Test page opening of Zimbra mail and perform login operation for Zimbra using Selenium IDE.
2. Test page opening of Zimbra mail and perform login operation for Zimbra using Selenium RC server.
3. Test page opening of Zimbra mail and perform login operation for Zimbra using Selenium Web-driver.
4. Write a specification for the annotations-Input.xml file given in samples of TCASES. Generate Test cases in Junit, reduce the test cases, and save results in HTML format.
5. Write a specification for the Tcases-Input.xml file given in samples of TCASES. Generate Test cases in Junit, reduce the test cases, and save results in HTML format.
6. Write a program for generating a Fibonacci number and generate test cases for the Junit framework and then test it using the Jumble tool and modify test cases to get a better mutation score.
7. Write a program to check whether two arrays are equal or not and generate test cases for it using the Junit framework and then test it using the Jumble tool and modify test cases to get better mutation score.
8. Write a program for binary to decimal conversion and generate test cases for the given program and find coverage achieved by your test cases using JaButi.
9. Write a program for checking whether the given no. is prime or not. Generate the test cases for the given program and find the coverage achieved by your test cases using Jabuti.
10. Write a program for a given number is palindrome or not and generate test cases using Jcute. Assemble the report also.
11. Write a program for checking whether the given string is palindrome or not and generate test cases using Jcute. Assemble the coverage report also.
12. Calculate the statement and branch coverage of individual modules in a calculator program using PyCov/Coverage.py
13. Calculate the statement and branch coverage of individual modules in a bubble sort program using PyCov/Coverage.py
14. Calculate the type and name of the bugs using findBugs for the calculator program and create a report for it in two types.
15. Calculate the type and name of the bugs using findBugs for a selection sort program and create a report for it in two types.
16. Create a script using Jmeter to record visiting any website and play it with 200 threads and 3 loops per thread and view the results using View Results Tree.
17. Create a JMeter Test Script to test the load on www.facebook.com with 300 users and 3 loops each.
18. Write a program to find the max element form array and generate test cases for it using the Junit framework and then calculate coverage using the Eclemma tool.
19. Write a program to find the second minimum element from the array and generate test cases for it using the Junit framework and then calculate coverage using the Eclemma tool.
20. Fuzz the image files available in the sample folder and find the number of faults using the Peach tool.

21. Using the Selenium webdriver, open an e-commerce website perform login operation, and add some items to your cart.
22. Create a JMeter Test script that will raise a warning when the response from the server gets longer by 2000 milliseconds.