CMPE287 – Software Quality Assurance and Testing

Deliverable #3 – Test Automation

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1. Introduction

Software testing has principally evolved into two overarching classifications: manual testing and automated testing. As the software industry has progressed, testing has transitioned naturally from a manual process to one that leverages automation in an evolutionary way.

Automated testing techniques utilize software tools to conduct evaluations on software systems. Implementing automated testing improves software quality by systematizing test data, capitalizing on test outcomes, and substituting human effort with specialized systems and appliances as part of quality control procedures.

As stated by Dr. Jerry Z. Gao in his published work, software test automation encompasses the focused efforts and initiatives that aim to replace manual engineering activities and processes in software testing with automated solutions that are executed through predefined systematic methodologies and structured techniques.

1.1 Test Automation Focuses

The primary purpose of automated testing is to ensure continuous evaluation of software as an integral component of the software delivery workflow, thereby providing instant feedback on a mobile application for food detection in this case. Over a short timeframe, automation facilitates attaining predefined benchmarks for software testing. Executing manual testing is fatiguing and consumes employee time and exertion.

Additionally, human errors may transpire over the course of manual testing. Certain error categories evade detection via manual testing. Test automation enables executing this evaluation more effectively and efficiently. Upon initial creation, automated tests can be quickly and easily generated. This can constitute an optimal approach for software with an extensive maintenance timeline.

1.2 Objectives

In automated testing, automation technologies are leveraged to execute tests and validate outputs against anticipated results rather than relying on manual human oversight. Automating the testing process can curtail evaluation timeframes and heighten productivity. By automating test operations, repetitive tasks that cannot viably

be performed manually are streamlined. Thus, test automation constitutes an integral component for enabling continuous testing practices.

1.3 Selected Tools

To test the functioning of our selected application, Socratic, we used the following tools.

AI Testing Tool:

Utilizing this AI testing tool, classification trees were constructed to structure input variables, contextual parameters, and output metrics. By permuting and pairing the nodes within these classification trees, test cases were systematically generated to enable thorough evaluation of application performance across a wide range of conditions. This facilitated comprehensive and methodical assessment across the solution space.

Appium:

A few platforms, including Android, IOS, and Windows, are tested using Appium, an open-source framework that allows engineers to automate testing.

Android Studio:

We used Android Studio to run the Android emulator on which we tested the test scripts.

2. AI Test Automation

2.1 AI Test Automation Strategy

Rather than relying on manual human execution, test sequences are automated utilizing various automation technologies. Performance assessments are

subsequently carried out to gauge the outcomes of these automated test runs. Implementing test automation serves to enhance software development productivity and compact the development timeline by minimizing manual efforts.

Test scripts are implemented by employing Appium web drivers within the Android studio environment to evaluate applications operating on emulators. In this framework, Appium serves as an intermediary layer connecting the application being executed on the emulator and the test script being run on Eclipse.

2.2 Test Automation Scenarios

The following are the 28 automation scenarios tested for the chosen AI-feature in our application.

Test Case ID	**1**
Test Topic	Algebra (Linear Equations)
Test Description	Lower Case
Test Case Input	12x + 10 = 4x + 26
Performed By	Sohan Leburu
Execution Date	1st December 2023
Expected Result	x = 2
Actual Result	x=2
Test Case Result	Pass

Test Case ID	**2**
Test Topic	Algebra (Linear Equations)
Test Description	Upper Case

Test Case Input	P + 3Q = 6 2P + 8Q = -12
Performed By	Sohan Leburu
Execution Date	1st December 2023
Expected Result	P=1, Q=5
Actual Result	-
Test Case Result	Fail

Test Case ID	**3**
Test Topic	Algebra (Linear Equations)
Test Description	Different Language
Test Case Input	2x=5 ని ax+by+c=0 రూపంలో వ్రాసి x విలువను కనుగొనండి
Performed By	Sohan Leburu
Execution Date	1st December 2023
Expected Result	x=5/2
Actual Result	-
Test Case Result	Fail

Test Case ID	**4**
Test Topic	Algebra (Linear Equations)
Test Description	Different Variables
Test Case Input	(2β + 5)/(β + 4) = 1

Performed By	Sohan Leburu
Execution Date	1st December 2023
Expected Result	β=-1
Actual Result	-
Test Case Result	Fail

Test Case ID	**5**
Test Topic	Algebra (Linear Equations)
Test Description	Mistake in the equation
Test Case Input	4x + ++8y + z = 2; x + 7y - --3z = -14; 2x —-- 3y + ++2z = 3
Performed By	Sohan Leburu
Execution Date	1st December 2023
Expected Result	-
Actual Result	-
Test Case Result	Pass

Test Case ID	**6**
Test Topic	Algebra (Linear Equations)
Test Description	Special chars as variables
Test Case Input	6# – 19 = 3# – 10
Performed By	Sohan Leburu

Execution Date	1st December 2023
Expected Result	-
Actual Result	-
Test Case Result	Pass

Test Case ID	**7**
Test Topic	Algebra (Linear Equations)
Test Description	Word Problem
Test Case Input	Joe and Steve are saving money. Joe starts with $110 and saves $8 per week. Steve starts with $8 and saves $20 per week. After how many weeks do they have the same amount of money?
Performed By	Sohan Leburu
Execution Date	1st December 2023
Expected Result	8 weeks
Actual Result	-
Test Case Result	Fail

Test Case ID	**8**
Test Topic	Algebra (Exponential Equations)
Test Description	Lower Case
Test Case Input	-216 = (-6)^(4x + 15)
Performed By	Saiteja Goruganthu

Execution Date	1st December 2023
Expected Result	x=-3
Actual Result	-
Test Case Result	Fail

Test Case ID	**9**
Test Topic	Algebra (Exponential Equations)
Test Description	Upper Case
Test Case Input	(1/243) = 3^-(2X+5)
Performed By	Saiteja Goruganthu
Execution Date	1st December 2023
Expected Result	X=0
Actual Result	-
Test Case Result	Fail

Test Case ID	**10**
Test Topic	Algebra (Exponential Equations)
Test Description	Different Language
Test Case Input	x = 1 మరియు y = 15 సంఖ్యల కోసం y=a(b^x) రూపంలో ఘాతాంక సమీకరణాన్ని వ్రాయండి
Performed By	Saiteja Goruganthu
Execution Date	1st December 2023

Expected Result	15=ab
Actual Result	-
Test Case Result	Fail

Test Case ID	**11**
Test Topic	Algebra (Exponential Equations)
Test Description	Different Variables
Test Case Input	(-1/2)^(α-1) = -8
Performed By	Saiteja Goruganthu
Execution Date	1st December 2023
Expected Result	α=-2
Actual Result	-
Test Case Result	Fail

Test Case ID	**12**
Test Topic	Algebra (Exponential Equations)
Test Description	Mistake in the equation
Test Case Input	(1/3)^(2x+++1) = 27
Performed By	Saiteja Goruganthu
Execution Date	1st December 2023
Expected Result	-

Actual Result	-
Test Case Result	Pass

Test Case ID	**13**
Test Topic	Algebra (Exponential Equations)
Test Description	Special Chars as Variables
Test Case Input	4^(-2#) = 1/64
Performed By	Saiteja Goruganthu
Execution Date	1st December 2023
Expected Result	-
Actual Result	-
Test Case Result	Pass

Test Case ID	**14**
Test Topic	Algebra (Exponential Equations)
Test Description	Word Problem
Test Case Input	Solve 3^x = 11 for x, giving the answer to three decimal places
Performed By	Saiteja Goruganthu
Execution Date	1st December 2023
Expected Result	x=2.183
Actual Result	-
Test Case Result	Fail

Test Case ID	**15**
Test Topic	Algebra (Polynomial Equations)
Test Description	Lower Case
Test Case Input	2x^4 - 2x^3 - 14x^2 + 2x + 12 = 0
Performed By	Harish Marepalli
Execution Date	1st December 2023
Expected Result	x=3\\x=1\\x=-1\\x=-2
Actual Result	x=3\\x=1\\x=-1\\x=-2
Test Case Result	Pass

Test Case ID	**16**
Test Topic	Algebra (Polynomial Equations)
Test Description	Upper Case
Test Case Input	X^3 - 1=0
Performed By	Harish Marepalli
Execution Date	1st December 2023
Expected Result	S={1, -1/2+isqrt3/2,-1/2-isqrt3/2}
Actual Result	S={1, -1/2+isqrt3/2,-1/2-isqrt3/2}
Test Case Result	Pass

Test Case ID	**17**
Test Topic	Algebra (Polynomial Equations)
Test Description	Different Language
Test Case Input	క్వాడ్రాటిక్ బహుపది kx^2-3x+1 సున్నాల మొత్తం 1, k కనుగొనండి
Performed By	Harish Marepalli
Execution Date	1st December 2023
Expected Result	K=9/4
Actual Result	-
Test Case Result	Fail

Test Case ID	**18**
Test Topic	Algebra (Polynomial Equations)
Test Description	Different Variables
Test Case Input	$(\alpha^2 - 7\alpha + 11)^{(\alpha^2 - 13\alpha + 42)} = 1$
Performed By	Harish Marepalli
Execution Date	1st December 2023
Expected Result	α=2,3,4,5,6,7
Actual Result	-
Test Case Result	Fail

Test Case ID	**19**
Test Topic	Algebra (Polynomial Equations)
Test Description	Mistake in the Equation
Test Case Input	x^2 ++ 2x - one = 0
Performed By	Harish Marepalli
Execution Date	1st December 2023
Expected Result	-
Actual Result	-
Test Case Result	Pass

Test Case ID	**20**
Test Topic	Algebra (Polynomial Equations)
Test Description	Special Chars as Variables
Test Case Input	&^2 - 3& + 2 = 0
Performed By	Harish Marepalli
Execution Date	1st December 2023
Expected Result	-
Actual Result	-
Test Case Result	Pass

Test Case ID	**21**
Test Topic	Algebra (Polynomial Equations)
Test Description	Word Problem
Test Case Input	Find the value of a, if x - a is a factor of x3 - ax2 + 2x + a - 1
Performed By	Harish Marepalli
Execution Date	1st December 2023
Expected Result	a=1/3
Actual Result	-
Test Case Result	Fail

Test Case ID	**22**
Test Topic	Algebra (Quadratic Equations)
Test Description	Lower Case
Test Case Input	-2x^2 - 7x - 3 = 0
Performed By	Sowjanya Bheemineni
Execution Date	1st December 2023
Expected Result	x=-\\frac{1}{2}\\\\x=-3
Actual Result	x=-\\frac{1}{2}\\\\x=-3
Test Case Result	Pass

Test Case ID	**23**
Test Topic	Algebra (Quadratic Equations)
Test Description	Upper Case
Test Case Input	0.5X^2 - 1.5X + 1.25 = 0
Performed By	Sowjanya Bheemineni
Execution Date	1st December 2023
Expected Result	X=1.5+0.5i, X=1.5-0.5i
Actual Result	-
Test Case Result	Fail

Test Case ID	**24**
Test Topic	Algebra (Quadratic Equations)
Test Description	Different Language
Test Case Input	x^2-4x-480 యొక్క మూలాలను కనుగొనండి
Performed By	Sowjanya Bheemineni
Execution Date	1st December 2023
Expected Result	x=24, x=-20
Actual Result	-
Test Case Result	Fail

Test Case ID	**25**
Test Topic	Algebra (Quadratic Equations)
Test Description	Different Variables
Test Case Input	1000α^2 - 2000α + 1000 = 0
Performed By	Sowjanya Bheemineni
Execution Date	1st December 2023
Expected Result	α=1
Actual Result	-
Test Case Result	Fail

Test Case ID	**26**
Test Topic	Algebra (Quadratic Equations)
Test Description	Mistake in the Equation
Test Case Input	0.25x2 +++ 0.5x ++ 0.25 = 0
Performed By	Sowjanya Bheemineni
Execution Date	1st December 2023
Expected Result	-
Actual Result	-
Test Case Result	Pass

Test Case ID	**27**
Test Topic	Algebra (Quadratic Equations)
Test Description	Mistake in the Equation
Test Case Input	x^2---4x++4=0
Performed By	Sowjanya Bheemineni
Execution Date	1st December 2023
Expected Result	-
Actual Result	x=2
Test Case Result	Fail

Test Case ID	**28**
Test Topic	Algebra (Quadratic Equations)
Test Description	Word Problem
Test Case Input	Find the roots of x^2+5x+6=0
Performed By	Sowjanya Bheemineni
Execution Date	1st December 2023
Expected Result	x=2, x=3
Actual Result	-
Test Case Result	Fail

2.3 Test Scripts

The following few snippets shows a glimpse of the test automation script:

socratictests/pom.xml | BaseClass.java | Tests.java | Constants.java

```java
package tests;

import org.openqa.selenium.remote.DesiredCapabilities;
public class BaseClass {

    AndroidDriver<MobileElement> driver;
    int passedCase = 0;
    int failedCase = 0;

    @BeforeTest
    public void setup() throws Exception
    {
        DesiredCapabilities caps = new DesiredCapabilities();
        caps.setCapability(MobileCapabilityType.PLATFORM_NAME, "android");
        caps.setCapability(MobileCapabilityType.PLATFORM_VERSION, "10.0");
        caps.setCapability(MobileCapabilityType.DEVICE_NAME, "Pixel4_API29");
        caps.setCapability(MobileCapabilityType.AUTOMATION_NAME, "UiAutomator2");


        URL url = new URL("http://127.0.0.1:4723/");

        driver = new AndroidDriver<MobileElement>(url, caps);
    }

    /*@Test
    public void testOne()
    {
        System.out.println("Completed");
    }*/

    @AfterTest
    public void teardown()
    {
        System.out.println("Total Test cases "+(passedCase+failedCase));
        System.out.println("Test cases passed "+passedCase);
        System.out.println("Test cases failed "+failedCase);
        driver.quit();
    }
}

```

socratictests/pom.xml | BaseClass.java | Tests.java | Constants.java

```java
package tests;

public class Constants {

    /*
     * Linear Equation Test Cases
     */
    //Linear-Lower Case
    public static final String linearInp1 = "12x + 10 = 4x + 26";
    public static final String linearOut1 = "x=2";

    //Linear-Upper Case
    public static final String linearInp2 = "P + 3Q = 6\n2P + 8Q = -12";
    public static final String linearOut2 = "P=1 , Q=5";

    //Linear-Different Language
    public static final String linearInp3 = "2x=5 ని ax+by+c=0 రూపంలో వ్రాసి x విలువను కనుగొనండి";
    public static final String linearOut3 = "No Answer";

    //Linear-Different Variables
    public static final String linearInp4 = "(2β + 5 )/( β + 4 ) = 1";
    public static final String linearOut4 = "β=-1";

    //Linear-Mistake in the Equation
    public static final String linearInp5 = "4x + ++8y + z = 2\nx + 7y - --3z = -14\n2x ~-- 3y + ++2z = 3";
    public static final String linearOut5 = "Q&A";

    //Linear-Using Special Characters as Variables
    public static final String linearInp6 = "6# - 19 = 3# - 10";
    public static final String linearOut6 = "Top match";

    //Linear-Word problem
    public static final String linearInp7 = "Joe and Steve are saving money. Joe starts with $110 and saves $8 pe
    public static final String linearOut7 = "8 weeks";


    /*
     * Quadratic Equation Test Cases
     */
    //Quadratic-Lower Case
    public static final String quadraticInp1 = "-2x^2 - 7x - 3 = 0";
    public static final String quadraticOut1 = "x=-\\frac{1}{2}\\\\x=-3";

```

socratictests/pom.xml | BaseClass.java | Tests.java | Constants.java

```java

    /*
     * Quadratic Equation Test Cases
     */
    //Quadratic-Lower Case
    public static final String quadraticInp1 = "-2x^2 - 7x - 3 = 0";
    public static final String quadraticOut1 = "x=-\\frac{1}{2}\\\\x=-3";

    //Quadratic-Upper Case
    public static final String quadraticInp2 = "0.5X^2 - 1.5X + 1.25 = 0";
    public static final String quadraticOut2 = "X=1.5+0.5i , X=1.5-0.5i";

    //Quadratic-Different Language
    public static final String quadraticInp3 = "x^2-4x-480 యొక్క మూలాలను కనుగొనండి";
    public static final String quadraticOut3 = "x=24, x=-20";

    //Quadratic-Different Variables
    public static final String quadraticInp4 = "1000α^2 - 2000α + 1000 = 0";
    public static final String quadraticOut4 = "α=1";

    //Quadratic-Mistake in the Equation
    public static final String quadraticInp5 = "0.25x2 +++ 0.5x ++ 0.25 = 0";
    public static final String quadraticOut5 = "More from the web";

    //Quadratic-Using Special Characters as Variables
    public static final String quadraticInp6 = "x^2---4x++4=0";
    public static final String quadraticOut6 = "More from the web";

    //Quadratic-Word problem
    public static final String quadraticInp7 = "Find the roots of x^2+5x+6=0";
    public static final String quadraticOut7 = "x=2, x=3";



    /*
     * Polynomial Equation Test Cases
     */
    //Polynomial-Lower Case
    public static final String polyInp1 = "2x^4 - 2x^3 - 14x^2 + 2x + 12 = 0";
    public static final String polyOut1 = "x=3\\\\x=1\\\\x=-1\\\\x=-2";

    //Polynomial-Upper Case
    public static final String polyInp2 = "X^3   1=0";
```

socratictests/pom.xml | BaseClass.java | Tests.java | Constants.java

```
81      //Polynomial-Different Language
82      public static final String polyInp3 = "క్వాడ్రాటిక్ బహుపది kx^2-3x+1 సున్నాల మొత్తం 1, k కనుగొనండి";
83      public static final String polyOut3 = "k=9/4";
84
85      //Polynomial-Different Variables
86      public static final String polyInp4 = "(α^2 - 7α + 11)^(α^2 - 13α + 42) = 1";
87      public static final String polyOut4 = "α=2,3,4,5,6,7";
88
89      //Polynomial-Mistake in the Equation
90      public static final String polyInp5 = "x^2 ++ 2x - one = 0";
91      public static final String polyOut5 = "Q&A";
92
93      //Polynomial-Using Special Characters as Variables
94      public static final String polyInp6 = "&^2 - 3& + 2 = 0";
95      public static final String polyOut6 = "More from the web";
96
97      //Polynomial-Word problem
98      public static final String polyInp7 = "Find the value of a, if x - a is a factor of x3 - ax2 + 2x + a - 1";
99      public static final String polyOut7 = "a=1/3";
100
101
102
103     /*
104      * Exponential Equation Test Cases
105      */
106     //Exponential-Lower Case
107     public static final String expoInp1 = "-216 = (-6)^(4x + 15)";
108     public static final String expoOut1 = "x=-3";
109
110     //Exponential-Upper Case
111     public static final String expoInp2 = "(1/243) = 3^-(2X+5)";
112     public static final String expoOut2 = "X=0";
113
114     //Exponential-Different Language
115     public static final String expoInp3 = "x = 1 మరియు y = 15 సంఖ్యల కోసం y=a(b^x) రూపంలో ఘాతాంక సమీకరణాన్ని వ్రాయండి";
116     public static final String expoOut3 = "15=ab";
117
118     //Exponential-Different Variables
119     public static final String expoInp4 = "(-1/2)^(α-1) = -8";
120     public static final String expoOut4 = "α=-2";
121
122     //Exponential-Mistake in the Equation
```

socratictests/pom.xml | BaseClass.java | Tests.java | Constants.java

```
1  package tests;
2
3  import java.io.File;
18
   Run All
19 public class Tests extends BaseClass {
20
21     @Test
22     //Linear-Lower Case
       Run | Debug
23     public void testLinear1()
24     {
25         driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
26         final String FOLDER_PATH = "output/";
27         try
28         {
29             //Open the app
30             MobileElement el1 = (MobileElement) driver.findElementByAccessibilityId("Socratic");
31             el1.click();
32             driver.manage().timeouts().implicitlyWait(15, TimeUnit.SECONDS);
33
34             //Type the question in text query
35             MobileElement el2 = (MobileElement) driver.findElementByAccessibilityId("Type a question");
36             el2.click();
37             driver.manage().timeouts().implicitlyWait(15, TimeUnit.SECONDS);
38             MobileElement el3 = (MobileElement) driver.findElementById("com.google.socratic:id/text_query");
39             el3.sendKeys(Constants.linearInp1);
40             driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
41             el3.click();
42             driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
43
44             //Click on send
45             HashMap<String,String> map = new HashMap();
46             map.put("action", "send");
47             driver.executeScript("mobile:performEditorAction", map);
48             WebDriverWait wait = new WebDriverWait(driver, 50);
49             wait.until(ExpectedConditions.visibilityOfElementLocated(By.className("android.widget.TextView")));
50             driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
51
52             //Get Output Data
53             List<String> outputData = new ArrayList();
54             List<MobileElement> text1 = driver.findElements(By.className("android.widget.TextView"));
55             File file1 = ((TakesScreenshot)driver).getScreenshotAs(OutputType.FILE);
```

socratictests/pom.xml | BaseClass.java | Tests.java | Constants.java

```
            driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);

            //Get Output Data
            List<String> outputData = new ArrayList();
            List<MobileElement> text1 = driver.findElements(By.className("android.widget.TextView"));
            File file1 = ((TakesScreenshot)driver).getScreenshotAs(OutputType.FILE);
            FileUtils.copyFile(file1, new File(FOLDER_PATH + "Linear_LowerCase" + ".jpg"));

            for (MobileElement ele : text1) {
                outputData.add(ele.getText());
            }
            System.out.println(outputData);

            //Check for passed or failed here by comparison
            if (outputData.size() >= 0) {
                System.out.println("App Input: " + Constants.linearInp1);
                System.out.println("App Output: " + outputData.get(10));
                System.out.println("Expected Output: "+Constants.linearOut1);
                if (outputData.get(10).trim().contains(Constants.linearOut1)) {
                    System.out.println("Linear Test Case 1: Passed");
                    System.out.println();
                    passedCase++;
                } else {
                    System.out.println("Linear Test Case 1: Failed");
                    System.out.println();
                    failedCase++;
                }
            }
        }
        catch (Exception e)
        {
            e.printStackTrace();
        }

        //Back to Home Screen
        driver.navigate().back();
        driver.navigate().back();
        driver.navigate().back();
        driver.navigate().back();
        driver.navigate().back();
        driver.navigate().back();
    }
```

socratictests/pom.xml | BaseClass.java | Tests.java | Constants.java

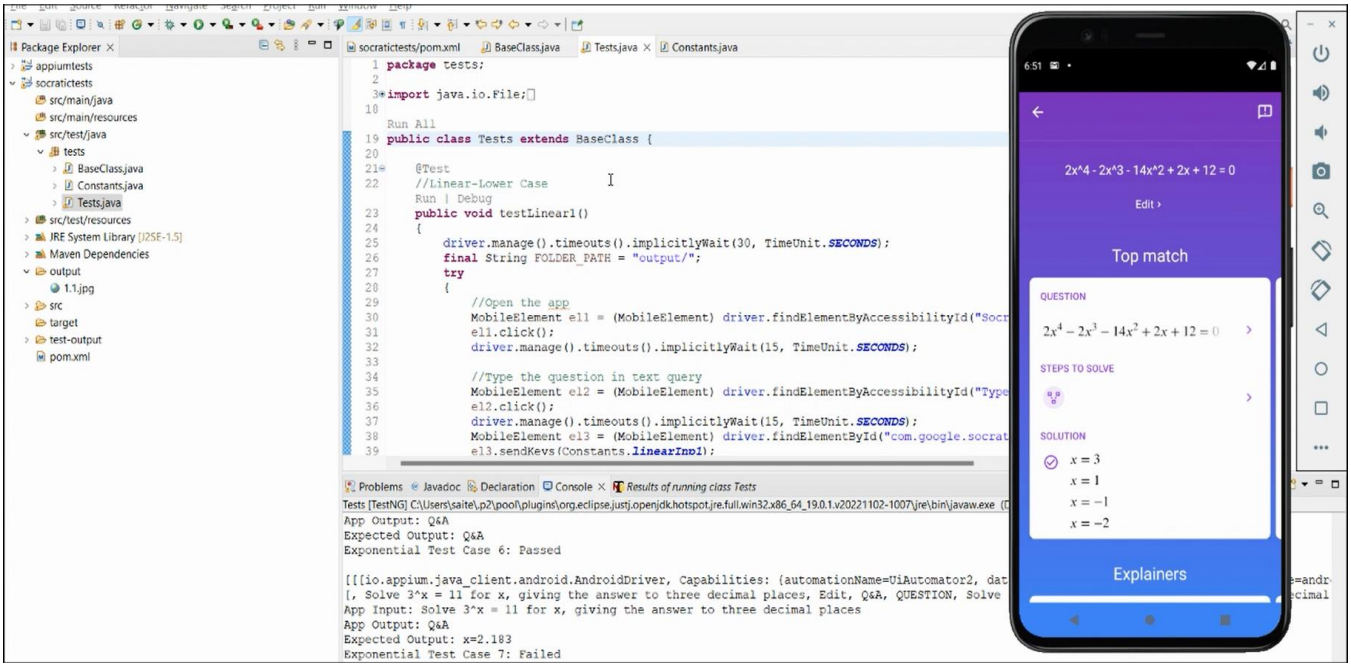
```
    @Test
    //Quadratic-Lower Case
    Run | Debug
    public void testquadratic1()
    {
        driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
        final String FOLDER_PATH = "output/";
        try
        {
            //Open the app
            MobileElement el1 = (MobileElement) driver.findElementByAccessibilityId("Socratic");
            el1.click();
            driver.manage().timeouts().implicitlyWait(15, TimeUnit.SECONDS);

            //Type the question in text query
            MobileElement el2 = (MobileElement) driver.findElementByAccessibilityId("Type a question");
            el2.click();
            driver.manage().timeouts().implicitlyWait(15, TimeUnit.SECONDS);
            MobileElement el3 = (MobileElement) driver.findElementById("com.google.socratic:id/text_query");
            el3.sendKeys(Constants.quadraticInp1);
            driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
            el3.click();
            driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);

            //Click on send
            HashMap<String,String> map = new HashMap();
            map.put("action", "send");
            driver.executeScript("mobile:performEditorAction", map);
            WebDriverWait wait = new WebDriverWait(driver, 50);
            wait.until(ExpectedConditions.visibilityOfElementLocated(By.className("android.widget.TextView")));
            driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);

            //Get Output Data
            List<String> outputData = new ArrayList();
            List<MobileElement> text1 = driver.findElements(By.className("android.widget.TextView"));
            File file1 = ((TakesScreenshot)driver).getScreenshotAs(OutputType.FILE);
            FileUtils.copyFile(file1, new File(FOLDER_PATH + "Quadratic_LowerCase" + ".jpg"));

            //System.out.println(text1);
            for (MobileElement ele : text1) {
                outputData.add(ele.getText());
            }
            System.out.println(outputData);
```

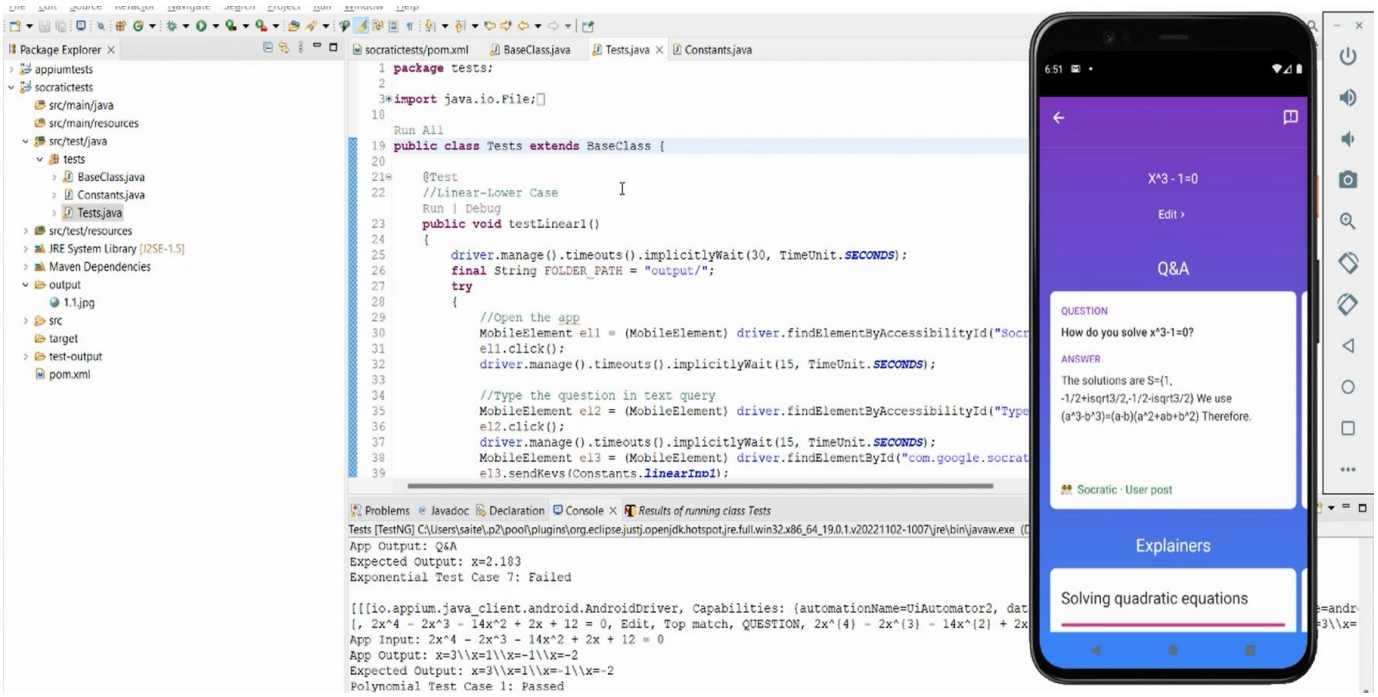
socratictests/pom.xml | BaseClass.java | Tests.java | Constants.java

```
1070    @Test
1071    //Polynomial-Lower Case
        Run | Debug
1072    public void testpoly1()
1073    {
1074        driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
1075        final String FOLDER_PATH = "output/";
1076        try
1077        {
1078            //Open the app
1079            MobileElement el1 = (MobileElement) driver.findElementByAccessibilityId("Socratic");
1080            el1.click();
1081            driver.manage().timeouts().implicitlyWait(15, TimeUnit.SECONDS);
1082
1083            //Type the question in text query
1084            MobileElement el2 = (MobileElement) driver.findElementByAccessibilityId("Type a question");
1085            el2.click();
1086            driver.manage().timeouts().implicitlyWait(15, TimeUnit.SECONDS);
1087            MobileElement el3 = (MobileElement) driver.findElementById("com.google.socratic:id/text_query");
1088            el3.sendKeys(Constants.polyInp1);
1089            driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
1090            el3.click();
1091            driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
1092
1093            //Click on send
1094            HashMap<String,String> map = new HashMap();
1095            map.put("action", "send");
1096            driver.executeScript("mobile:performEditorAction", map);
1097            WebDriverWait wait = new WebDriverWait(driver, 50);
1098            wait.until(ExpectedConditions.visibilityOfElementLocated(By.className("android.widget.TextView")));
1099            driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
1100
1101            //Get Output Data
1102            List<String> outputData = new ArrayList();
1103            List<MobileElement> text1 = driver.findElements(By.className("android.widget.TextView"));
1104            File file1 = ((TakesScreenshot)driver).getScreenshotAs(OutputType.FILE);
1105            FileUtils.copyFile(file1, new File(FOLDER_PATH + "Polynomial_LowerCase" + ".jpg"));
1106
1107            System.out.println(text1);
1108            for (MobileElement ele : text1) {
1109                outputData.add(ele.getText());
1110            }
1111            System.out.println(outputData);
```

socratictests/pom.xml | BaseClass.java | Tests.java | Constants.java

```
1596    @Test
1597    //Exponential-Lower Case
        Run | Debug
1598    public void testexpo1()
1599    {
1600        driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
1601        final String FOLDER_PATH = "output/";
1602        try
1603        {
1604            //Open the app
1605            MobileElement el1 = (MobileElement) driver.findElementByAccessibilityId("Socratic");
1606            el1.click();
1607            driver.manage().timeouts().implicitlyWait(15, TimeUnit.SECONDS);
1608
1609            //Type the question in text query
1610            MobileElement el2 = (MobileElement) driver.findElementByAccessibilityId("Type a question");
1611            el2.click();
1612            driver.manage().timeouts().implicitlyWait(15, TimeUnit.SECONDS);
1613            MobileElement el3 = (MobileElement) driver.findElementById("com.google.socratic:id/text_query");
1614            el3.sendKeys(Constants.expoInp1);
1615            driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
1616            el3.click();
1617            driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
1618
1619            //Click on send
1620            HashMap<String,String> map = new HashMap();
1621            map.put("action", "send");
1622            driver.executeScript("mobile:performEditorAction", map);
1623            WebDriverWait wait = new WebDriverWait(driver, 50);
1624            wait.until(ExpectedConditions.visibilityOfElementLocated(By.className("android.widget.TextView")));
1625            driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
1626
1627            //Get Output Data
1628            List<String> outputData = new ArrayList();
1629            List<MobileElement> text1 = driver.findElements(By.className("android.widget.TextView"));
1630            File file1 = ((TakesScreenshot)driver).getScreenshotAs(OutputType.FILE);
1631            FileUtils.copyFile(file1, new File(FOLDER_PATH + "Exponential_LowerCase" + ".jpg"));
1632
1633            System.out.println(text1);
1634            for (MobileElement ele : text1) {
1635                outputData.add(ele.getText());
1636            }
```


Package Explorer
appiumtests
socratictests
src/main/java
src/main/resources
src/test/java
tests
BaseClass.java
Constants.java
Tests.java
src/test/resources
JRE System Library [J2SE-1.5]
Maven Dependencies
output
1.1.jpg
src
target
test-output
pom.xml
socratictests/pom.xml
BaseClass.java
Tests.java
Constants.java
package tests;
import java.io.File;
Run All
public class Tests extends BaseClass {
@Test
//Linear-Lower Case
Run | Debug
public void testLinear1()
driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
final String FOLDER_PATH = "output/";
try
//Open the app
//Type the question in text query
Problems
Javadoc
Declaration
Console
Results of running class Tests
App Output: Q&A
Expected Output: Q&A
Exponential Test Case 6: Passed
App Input: Solve 3^x = 11 for x, giving the answer to three decimal places, Edit, Q&A, QUESTION, Solve
App Output: Q&A
Expected Output: x=2.183
Exponential Test Case 7: Failed
6:51
2x^4 - 2x^3 - 14x^2 + 2x + 12 = 0
Edit ›
Top match
QUESTION
STEPS TO SOLVE
SOLUTION
x = 3
x = 1
x = −1
x = −2
Explainers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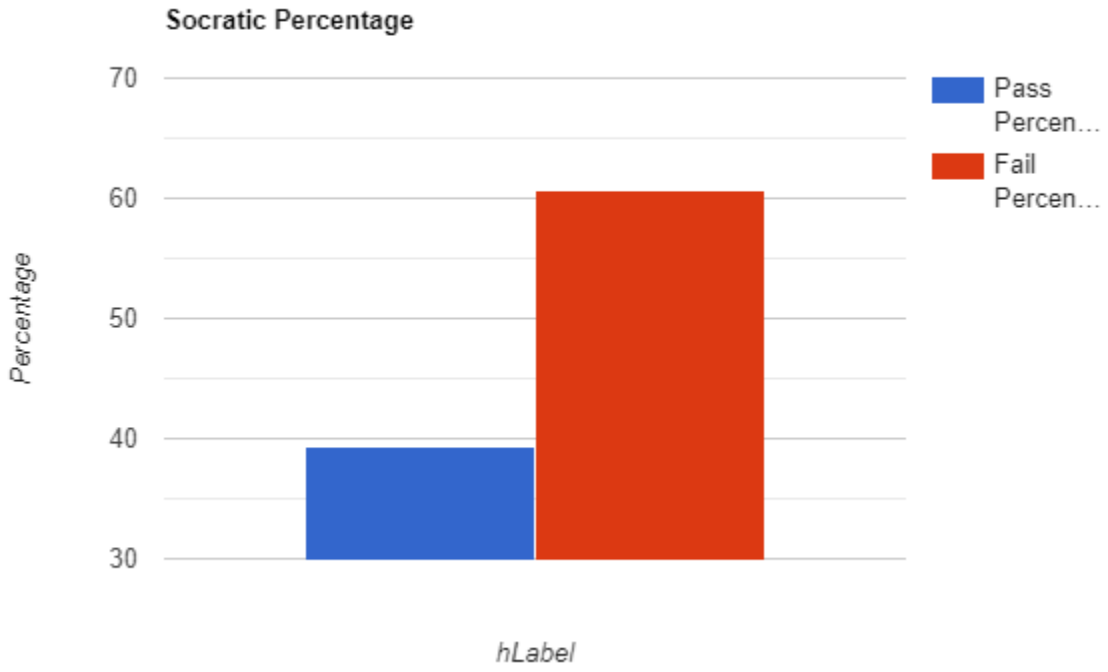
socratictests/pom.xml
BaseClass.java
Tests.java
Constants.java
package tests;
import java.io.File;
Run All
public class Tests extends BaseClass {
@Test
//Linear-Lower Case
Run | Debug
public void testLinear1()
driver.manage().timeouts().implicitlyWait(30, TimeUnit.SECONDS);
final String FOLDER_PATH = "output/";
try
//Open the app
//Type the question in text query
Problems
Javadoc
Declaration
Console
Results of running class Tests
App Output: Q&A
Expected Output: x=2.183
Exponential Test Case 7: Failed
App Input: 2x^4 - 2x^3 - 14x^2 + 2x + 12 = 0
App Output: x=3\\x=1\\x=-1\\x=-2
Expected Output: x=3\\x=1\\x=-1\\x=-2
Polynomial Test Case 1: Passed
6:51
X^3 - 1=0
Edit ›
Q&A
QUESTION
How do you solve x^3-1=0?
ANSWER
The solutions are S={1, -1/2+isqrt3/2,-1/2-isqrt3/2} We use (a^3-b^3)=(a-b)(a^2+ab+b^2) Therefore.
Socratic · User post
Explainers
Solving quadratic equations

3. AI Test Automation Comparative Results

3.1 Automation Test Results

Total Test Cases	28
No. of Passed Test Cases	11
No. of Failed Test Cases	17
Pass Percentage	39.28%



3.2 Comparative Test Complexity (Statistics)

	Manual Testing	Automation Testing
Test Cases	80	28
Test Case Design / Script	120 minutes	360 minutes
Test Data and Execution	200 minutes	10 minutes
Test Environment	250 minutes	360 minutes