Tutoring to Enhance Science Skills

SELENIUM – API – APPIUM – COURSE CONTENT for METLIFE

Tutoring Two: Learning to Make Data Tables

Contents

Sample Data for Data Tables

Use these data to create data tables following the Guidelines for Making a Data Table and Checklist for a Data Table.

Example 1: Pet Survey (GR 2–3)

Ms. Hubert's afterschool students took a survey of the 600 students at Morales Elementary School. Students were asked to select their favorite pet from a list of eight animals. Here are the results:

Lizard 25, Dog 250, Cat 115, Bird 50, Guinea pig 30, Hamster 45, Fish 75, Ferret 10

Example 2: Electromagnets—Increasing Coils (GR 3–5)

The following data were collected using an electromagnet with a 1.5 volt battery, a switch, a piece of #20 insulated wire, and a nail. Three trials were run. *Safety precautions in repeating this experiment include using safety goggles or safety spectacles and avoiding short circuits.*

Number of Coils	Number of Paperclips
5	3, 5, 4
10	7, 8, 6
15	11, 10, 12
20	15, 13, 14

Objective

To achieve Test Automation using Selenium – Java, API, Appium and designing a hybrid framework and BDD Framework from scratch with CI/CD pipeline.

Prerequisite

This course is intended for beginners or intermediate testers, leads who need to develop or improve automation techniques using Selenium, API, Appium and framework design from scratch. While previous testing tool knowledge is not required.

Example 3: pH of Substances (GR 5–10)

The following are pH values of common household substances taken by three different teams using pH probes. *Safety precautions in repeating this experiment include hooded ventilation, chemical splash safety goggles, gloves, and apron. Do not use bleach, ammonia, or strong acids with children.*

Lemon juice 2.4, 2.0, 2.2; Baking soda (1 Tbsp) in Water (1 cup) 8.4, 8.3, 8.7; Orange juice 3.5, 4.0, 3.4; Battery acid 1.0, 0.7, 0.5; Apples 3.0, 3.2, 3.5; Tomatoes 4.5, 4.2, 4.0; Bottled water 6.7, 7.0, 7.2; Milk of magnesia 10.5, 10.3, 10.6; Liquid hand soap 9.0, 10.0, 9.5; Vinegar 2.2, 2.9, 3.0; Household bleach 12.5, 12.5, 12.7; Milk 6.6, 6.5, 6.4; Household ammonia 11.5, 11.0, 11.5; Lye 13.0, 13.5, 13.4; and Sodium hydroxide 14.0, 14.0, 13.9; Anti-freeze 10.1, 10.9, 9.7; Windex 9.9, 10.2, 9.5; Liquid detergent 10.5, 10.0, 10.3; and Cola 3.0, 2.5, 3.2

Delivery Method

Focus will be on demonstrating the tool features and applying this on live web applications to ensure that the concepts are well understood. In addition to this, the participants are expected to write and execute scripts to build familiarity with the tool.

Lab Setup (Hardware & Software):

1. Laptop or Desktop machine with 8 GB RAM and with Windows OS

Teaching tip: *The pH scale is from 0 to 14. Have students make two data tables, one with the data as given and one with the pH scale 0 to 14 with the substances' average pH in rank order on the scale (Battery acid at the lower end and Sodium hydroxide at the upper end) or create a pH graphic organizer.*

2. Java installation - JDK 8 and above (https://www.oracle.com/in/java/technologies/javase/javase-jdk8-downloads.html)
3. [redacted]
4. IntelliJ IDEA (*Community*) - https://www.jetbrains.com/idea/download/#section=windows
5. Microsoft Office (any version is fine) (https://www.office.com/)
6. Open the network to download jars/ browsers from online during the session.
7. Maven Download (https://maven.apache.org/download.cgi)
8. GIT download (https://git-scm.com/download/win)
9. Jenkins Download (http://mirrors.jenkins.io/war-stable/latest/jenkins.war)
10. Postman (https://www.postman.com/downloads/)
11. Open network for downloading jars/drivers from internet.

1. Edge Browser/ Edge browser with IE compatibility mode will be used for the entire training. Other browsers will also be configured but main concentration will be on edge/edge with IE mode.
2. Azure pipeline integration
3. Handling downloaded PDF file using PDF Box
4. Parallel Automation (Already mentioned in the content)
5. Selenium Grid (Already mentioned in the content)
6. Handle **shadow DOM element** (Already mentioned in the content)
7. Headless browser (will be part of the session always)
8. Selenium 4.0 features (relative locators, Grid, Support for Chrome Debugging Protocol, Network API response, new tabs/windows, and few more will be included)
9. How to customize the download directory in Selenium Automation using IE compatibility browser.
10. Integration of Qtest with selenium

Core Java

Java OOPS Basics for Selenium

- Java Architecture
- Java first program basics
- Java program principles
- Classes and objects in Java
- Strings in Java
- Coding Basics
- Access Modifiers
- Encapsulation
- Inheritance Concepts

Example 4: Automobile Land Speed Records (GR 5-10)

In the first recorded automobile race in 1898, Count Gaston de Chasseloup-Laubat of Paris, France, drove 1 kilometer in 57 seconds for an average speed of 39.2 miles per hour (mph) or 63.1 kilometers per hour (kph). In 1904, Henry Ford drove his Ford Arrow across frozen Lake St. Clair, MI, at an average speed of 91.4 mph. Now, the North American Eagle is trying to break a land speed record of 800 mph. The Federation International de L'Automobile (FIA), the world's governing body for motor sport and land speed records, recorded the following land speed records. (Retrieved on February 5, 2006, from http://www.landspeed.com/lsrinfo.asp.)

407.447	Craig Breedlove	Spirit of America	GE J47	8/5/63
413.199	Tom Green	Wingfoot Express	WE J46	10/2/64
434.22	Art Arfons	Green Monster	GE J79	10/5/64
468.719	Craig Breedlove	Spirit of America	GE J79	10/13/64
526.277	Craig Breedlove	Spirit of America	GE J79	10/15/65
536.712	Art Arfons	Green Monster	GE J79	10/27/65
555.127	Craig Breedlove	Spirit of America, Sonic 1	GE J79	11/2/65
576.553	Art Arfons	Green Monster	GE J79	11/7/65
600.601	Craig Breedlove	Spirit of America, Sonic 1	GE J79	11/15/65
622.407	Gary Gabelich	Blue Flame	Rocket	10/23/70
633.468	Richard Noble	Thrust 2	RR RG 146	10/4/83
763.035	Andy Green	Thrust SSC	RR Spey	10/15/97

Example 5: Distance and Time (GR 8-10)

The following data were collected using a car with a water clock set to release a drop in a unit of time and a meter stick. The car rolled down an inclined plane. Three trials were run. Create a data table with an average distance column and an average velocity column, create an average distance-time graph, and draw the best-fit line or curve. Estimate the car's distance traveled and velocity at six drops of water. Describe the motion of the car. Is it going at a constant speed, accelerating, or decelerating? How do you know?

Time (drops of water)	Distance (cm)
1	10,11,9
2	29, 31, 30
3	59, 58, 61
4	102, 100, 98
5	122, 125, 127

- Compile and Runtime Polymorphism
- Practical usage of Inheritance
- Abstract Classes
- Interface Concepts
- Practical Usage of Interface
- Runtime Polymorphism
- Collections
- Exception Handling

Selenium

Selenium Introduction

- Selenium History
- Migrating to WebDriver latest Version
- Selenium 2.0 and 3.0 WebDriver Architecture
- Selenium IDE

Locator Techniques& Tools used

- Preview Browser Add-ons overview to identify elements
- Locator Techniques: XPath identification, CSS identification, Name, ID, ClassNames, Link Text,-Handling links
- XPath, CSS Validation using chrome and javascripts

Installations and Configurations with Java basics

- Java Installation
- Eclipse Installation, configuration
- Selenium Jars download/Configuration
- Brush up basic java concepts

Basic Concepts for first WebDriver program

- WebDriver Interface explanation and Invoking Browser
- Basic Methods of WebDriver
- How to run tests in Google Chrome, Firefox, Edge
- IE Mode in Edge browser

Techniques to automate Web UI

- Handle Dynamic dropdowns with WebDriver API
- Handling Static dropdowns with Select WebDriver API
- Handling Checkboxes with WebDriver API
- Handling Radio buttons with Customized XPath
- Handling Radio button dynamically- real time examples
- Synchronization – Implicit, Explicit and Fluent wait
- Types of Alerts present and Methods to handle them
- Handling Java Alerts using WebDriver API
- Web Elements Validation
- End to End Practice Exercise

Real Time Exercises (end to end Programming)

- Test Cases- Practice Exercise
- Exercise 1.1-Limiting WebDriver scope
- Getting Count of links in the pages, sections
- Testcases-Practice Exercise-2
- Exercise 2.1-Dynamic data in Websites
- Exercise 2.2-Dynamic Links Handling
- Exercise 2.3-Validations & checkpoints

ADVANCED WAYS-locating objects

- writing Customized XPath Using Attributes
- Writing customized XPath Using Tag names Traversing
- CSS Selectors locators

Techniques to automate ADVANCNED Web UI

- Handling Ajax/Mouse Interactions
- Handling java script actions
- Actions class-real time example
- Handling Multiple Windows
- Window Handle concepts-real time example
- Live Example on working with Child windows
- Handling ul li Tags in Selenium

- How to handle Frames?
- Frames Techniques-real time example

Practical problems and Methods to handle them with Selenium

- How to handle table Grids in webpage
- Techniques used for table grid-Real time example
- How to overcome Synchronization problems
- Maximizing window and deleting cookies
- Handling HTTPS certifications
- How to troubleshoot if it is not invoking in Firefox
- Killing the Process and Cookies using Selenium
- How to take Screenshots in Selenium

Handing dynamic pages using JavaScript

- How to handle forms using JavaScript.
- Techniques used for handling dynamic dropdown
- Validation of XPath and CSS using JavaScript
- Working with Calendar using JavaScript
- Getting video content using JavaScript
- Handling videos using JavaScript
- Handline svg elements/shadow DOM elements

AutoIT

- What is AutoIT?
- Download and Install
- Finding windows/ on screen Element with AutoIT
- Writing scripts in AutoIT
- Managing Operations in AutoIT

Data driving from Excel for feeding data

- what is Apace POI API & Download Instructions
- Excel API Methods explanation
- Program for Retrieving data from excel
- Program for Updating data back to excel

Framework Design 1: A hybrid framework will be designed from scratch.

MAVEN-Build Management Tool

- What is Build Management tool?
- Installing & configuring MAVEN
- Understanding POM.xml file
- Different MAVEN Commands to trigger framework

Framework Part -1 - TestNG

- Why TestNG and Its Advantages
- TestNG Installation and Setup in Eclipse
- TestNG Annotations Part
- Prioritizing the tests using TestNG
- Disabling Enabling the Test cases and putting Timeout
- Importance of TestNG xml file
- Including and excluding the Test cases from Execution with TestNG xml file
- Importance of Groups in TestNG
- Data driving Testing with TestNG
- Data Provider Annotation -Parameterizing Test cases
- Parameterizing from TestNG xml file
- Parallel running using testng.xml

Framework Part 2 - Page Object Model

- What is Page object model?
- Creating Page object Constructor in classes
- Practical Exercise explaining Page object Model

Framework Part 3 - Page Factory

- Creating Page Factory Project

Framework Part 4 – Reporting using TestNG, Extend Report

Excel Data Comparison

Framework Part -5 -Data driven Framework

- Why we should not hard code the data?
- How to write Global parameters with java code
- Data driving parameterization from Properties file
- How to deal with Reusable Components

Framework Part 7 – Keyword Driven

Framework Part 8 – Modular Driven, Hybrid

Framework Design 2: A BDD framework will be designed from scratch.

Cucumber – Behavior Driven Development

- Section 1: Introduction to BDD
  - Understand about Behavior driven approach
  - Why BDD is important for agile team
  - How BDD is more useful
  - Theory of Continuous Integration (CI): why is CI needed?

- Section 2: Cucumber BDD Basics
  - Getting started with Cucumber - Adding Jars
  - Adding Eclipse Cucumber Plugin
  - Creating a Feature File
  - Creating Step definition and runner files
  - Adding Multiple scenarios in a Feature
  - Adding Parameterization
  - Creating Multiple Features and Step files
  - Adding List and Data tables
  - Adding Background
- Section 3: Cucumber Options
  - Features, Glue and Monochrome
  - Adding Tags
  - Adding Hooks
  - Adding tagged Hooks
  - Pretty Format Feature
  - Publish Report
- Section 4: Cucumber with TestNG
  - Adding TestNG Runner

- Section 5: Cucumber Reporting
    - Generating Cucumber Reports
    - Integrating Cucumber Extent Report Plugin
- Section 6: Integrating Selenium WebDriver with Cucumber
    - Adding Selenium APIs
    - Creating the feature file
    - Creating automation steps
    - Fixing sync issues and adding validations
    - Adding screenshots in case of failure

API

API Automation using Rest Assured

- Prerequisite – Basic knowledge of Api testing
- What is Rest Assured?
- Step by step guide for the setup of Rest Assured.io
- Configure Eclipse with Rest-Assured
- First simple Rest Assured script
- HTTP Request and Response
- Script to fetch different parts of a response
- First Test with Rest-Assured | Making a simple Get request
- Validate Response Status Code, Header and Body using Rest-Assured
- Making a Post Request using Rest-Assured
- JSON Basics: What is JSON, JSONPath,
- How to query JSONPath
- Expressions in JSONPath
- Authentication and Authorization

- Creating more tests using Rest Assured
- Data driven testing
- Using Data Provider
- Using excel with data provider
- Sample Project and more Exercises
- Summary, Wrap Up.

GIT-Jenkins- CI Tool – Azure pipeline

- Introduction to Azure pipeline
- Azure DevOps Pipeline concepts
- GIT Setup
- Working with GIT
- Why Jenkins? and where it going to help us in Framework design?
- Installing & Configuring Jenkins
- Creating Jenkins project and integrating Existing Framework
- Running the Framework and Scheduling it from Jenkins

Cross Browser Testing with Selenium Grid

- How to execute Selenium Tests Remotely
- Grid Concepts & Architecture
- Configuring Hub and Node
- Registering Nodes with Hub Server
- Desired Capabilities-Grid Program
- Execution Selenium scripts in Remote Machine
- Code and Commands
- Modes - Standalone Mode, Classical Grid (Hub and Node), Fully Distributed (Router, Distributor, Session, and Node)

Appium

Appium Introduction

- Course Agenda
- Appium Features
- What makes Appium a future of mobile Automation
- Appium Internal Architecture

Appium Installation on WINDOWS for Android Automation

- Installing Android Studio
- Configuring System variables for both Android SDK
- Downloading Eclipse and Installing ADT Plugin
- New update on Installation
- Configuring ADT plugin settings in Eclipse
- Installing Appium Server and Jars
- Creating Eclipse project and Configuring Appium selenium jars
- Brush-up Java concepts

Appium Installation on MAC for IOS Automation

- What is XCode? Install XCode
- Validating IOS Simulator and Downloading Java
- Installing Eclipse IDE for MAC
- Downloading Appium/Selenium Jars

APPIUM first program

- Desired Capabilities concepts
- Invoking Android Virtual Device
- First Program explaining Mobile Capabilities
- Android Driver Invocation

Web APPS Automation

- Chrome Browser Configuration setup in Mobile
- Automating the Chrome Mobile Browser
- User Agent-Identifying objects in Mobile Browser
- Automating Mobile Specific Web Sites
- Exercise on Real Device-Mobile Browser Automation
- Troubleshooting the Real device to make recognize
- Testcase- Automating Udemy Mobile View Site
- Exercise 1.2 -Getting Xpaths from Mobile Browser
- Exercise-1.1 -Chrome Remote Debugging Technique
- Exercise-1.3 -Automating Udemy Site in Mobile Browser

Native APPS Automation

- Program on Invoking Apps

- UI Automator Tool to identify objects
- Automating app UI Using of ID, Xpath ClassNames
- Appium APIs for UI interaction
- Mobile Gestures Automation
- UI Selector class in handling Advanced API's
- Android Key Events Handling
- Procedure for downloading App in Emulator (Virtual devices)
- Automation on real devices
- Invoking App with package Activity
- Example on package name and Activity Invoking apps

Mobile Commands

- Android adb commands
- iOS Siri Commands
- Enabling wifi
- Enabling Bluetooth
- Launching settings screen
- Launching control center

Live Examples on Device APPS

- Music App- Testcases to Automate
- Practice Exercise-1 (Covers Mobile Gestures)
- Practice Exercise- 1.2 (Covers Core Appium API)
- Languages App- Testcases to Automate
- Practice Exercise 2.1- (Appium + Webdriver logic)
- Practice Exercise 2.2- (Android Key Events)
- ecommerce App-Installing app into Device
- Practice Exercise -3.1-Handling Image Banners
- Practice Exercise -3.2-Handling Scrollable Menu, Popups
- Practice Exercise -3.3-Handling checkboxes, Radio buttons, Dynamic Texts
- Sauce Labs or Browserstack Execution

Practical Problems and solutions with Mobile Browsers

- Problem - Description
- Identifying frames from Html view
- Element Hidden or Invisible-How to validate

- Writing Generic functions to Identify Frames/Windows
- Example Demonstrating Multiple Frames
- Handling Auto suggestive dropdown options
- Dynamic data loading- Exception Techniques

Hybrid APPS Automation

- Hybrid Apps features and ways to test them
- Views switching Mechanism
- Example on Hybrid App handling

Appium Server Automation

- Installing npm
- Setting up Appium server at npm
- Appium Server Config through code
- Dynamic port Config of server

Appium PCloudy/Browserstack/Sauce Lab Configuration (Anyone cloud Environment)

- Architecture of PCloudy/Browserstack
- Setting up Appium Driver
- What is Cloud Testing Lab?
- Available Solutions
- Executing Programs on Cloud devices
- Architecture of Browserstack
- Setting up Appium Driver
- Working with Cloud capabilities
- Inspect using cloud devices
- Parallel running using cloud environment

IOS Automation with Appium on MAC

- IOS Testing Introduction
- IOS App Download
- Desired Capabilities for invoking IOS Apps
- IOS Driver Invocation
- Running IOS first Automation Testcase
- How to Identify objects in IOS App- Appium Inspector
- Magic of Appium Inspector on IOS Apps

- Handling IOS Controls with Appium
- Practice Exercise on Switches -1
- Practice Exercise on Scrolling Cycles -2
- Practice Exercise on Scrolling wheels -2.1
- Handling IOS Alerts Buttons with Appium
- Practice Exercise on Alerts -3
- Safari Mobile Browser Automation configuration
- User agent to get Safari Browser objects
- Automate Picker Wheels (Dropdowns)
- Practice Exercise on Safari Mobile Browser