CSE- 322
Software Engineering Lab

Lab : 03

Introduction to Testing

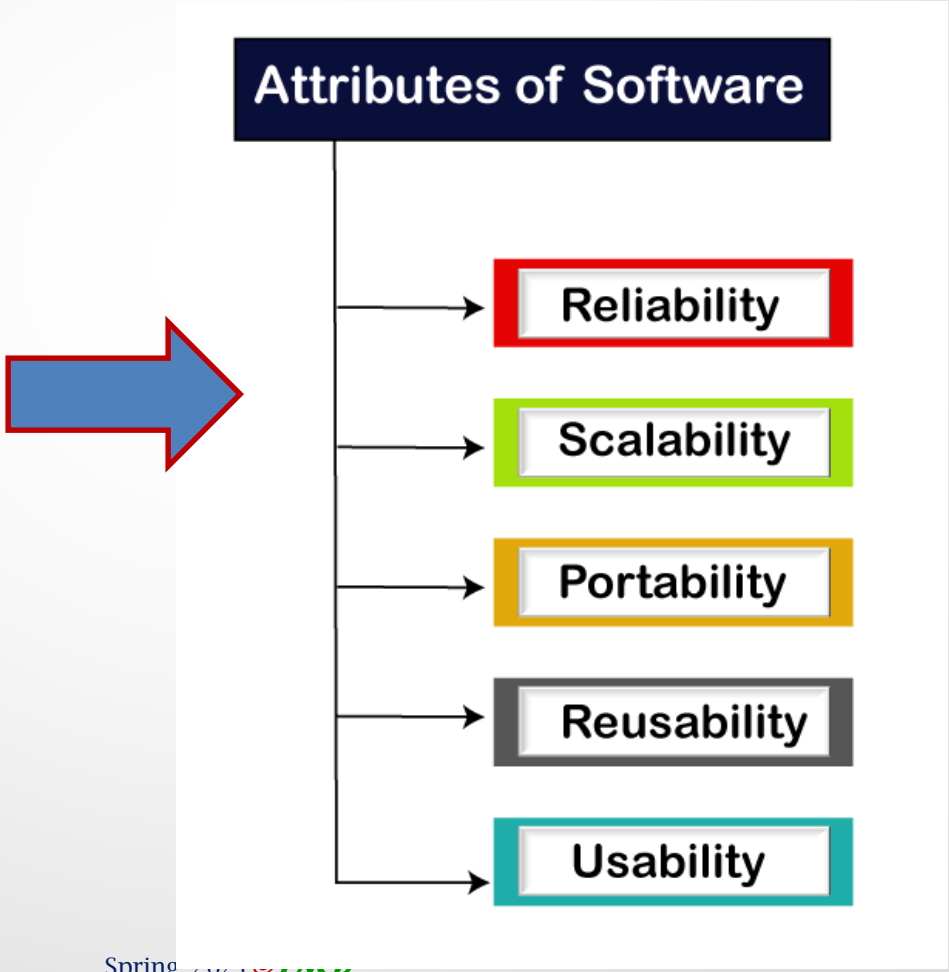
Fahad Ahmed

Lecturer, Dept. of CSE

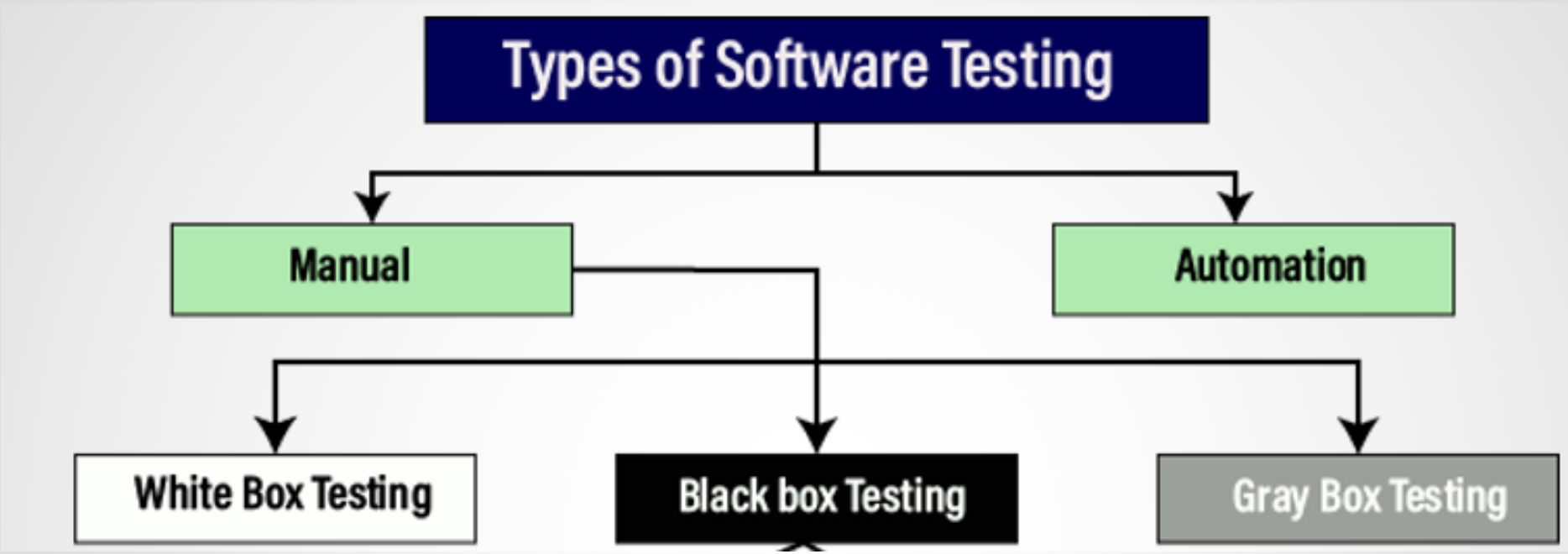
E-mail: fahadahmed@uap-bd.edu

Software testing

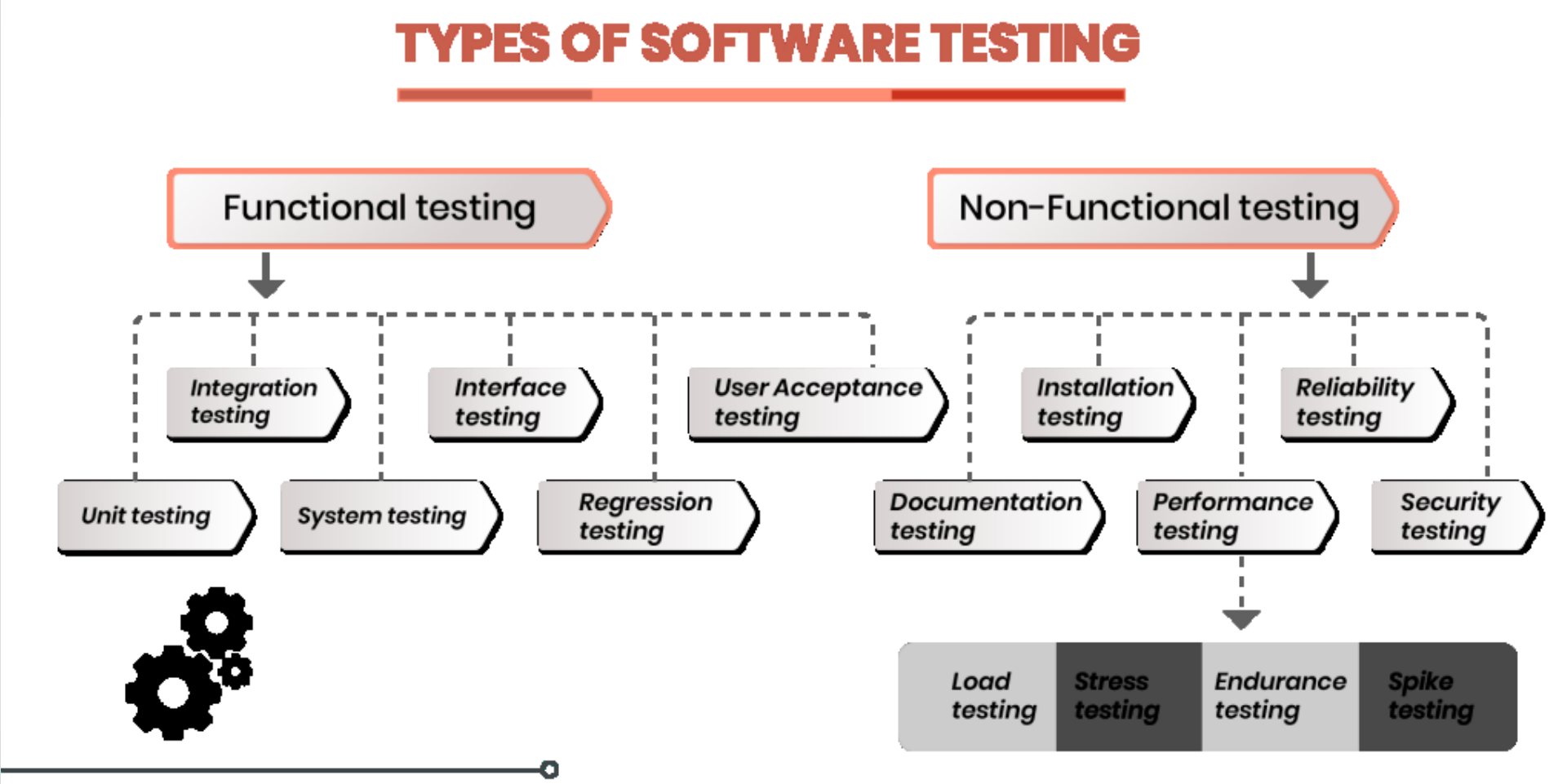
Software testing is a process of identifying the **correctness** of software by considering its all attributes (**Reliability, Scalability, Portability, Re-usability, Usability**) and evaluating the execution of software components to find the software bugs or errors or defects.



Software Testing



Software Testing



Manual testing

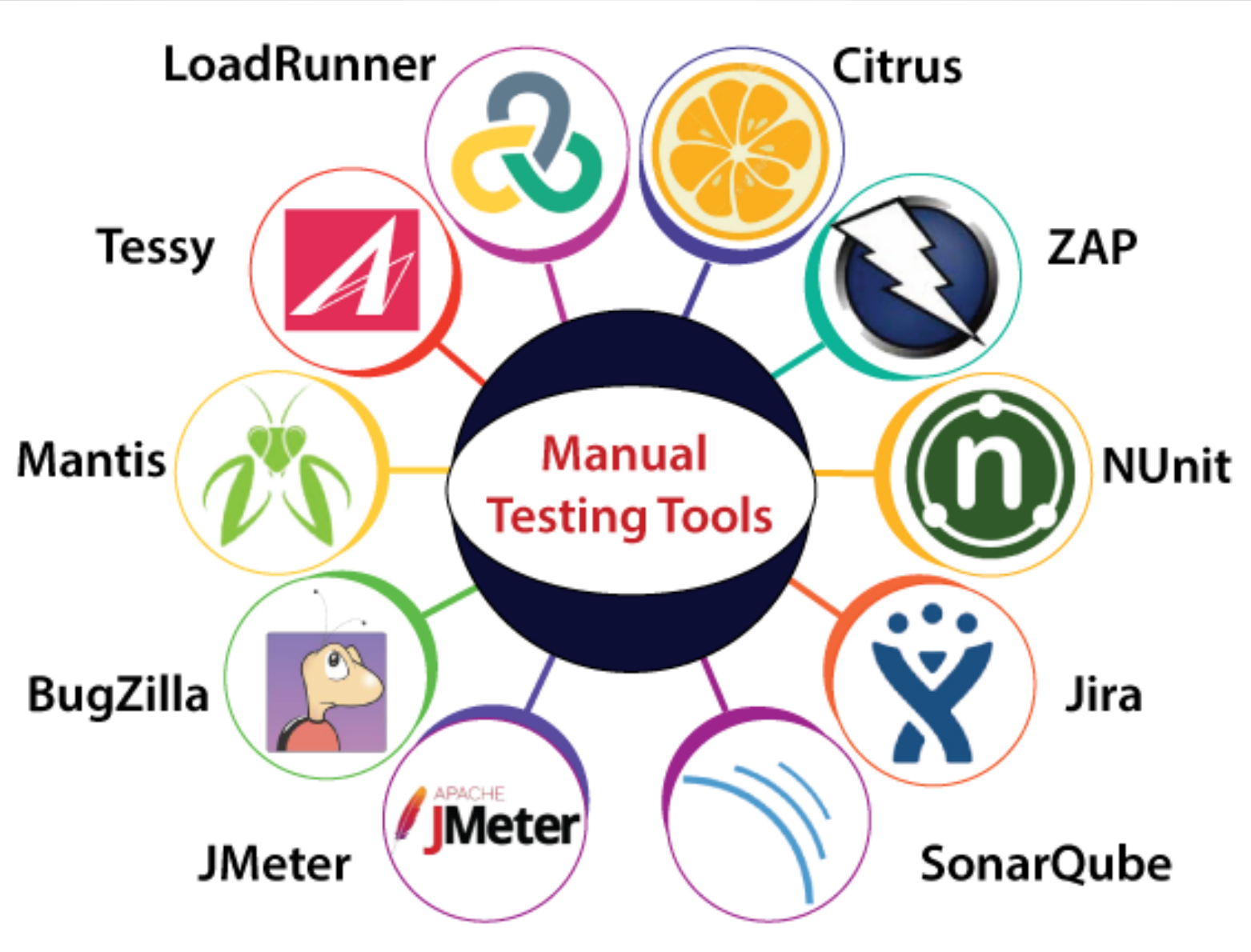
The process of checking the functionality of an application as per the customer needs **without taking any help of automation** tools is known as manual testing.

While performing the manual testing on any application, we do not need any specific knowledge of any testing tool, rather than have a proper understanding of the product so we can easily prepare the test document.

Manual testing can be further divided into three types of testing, which are as follows:

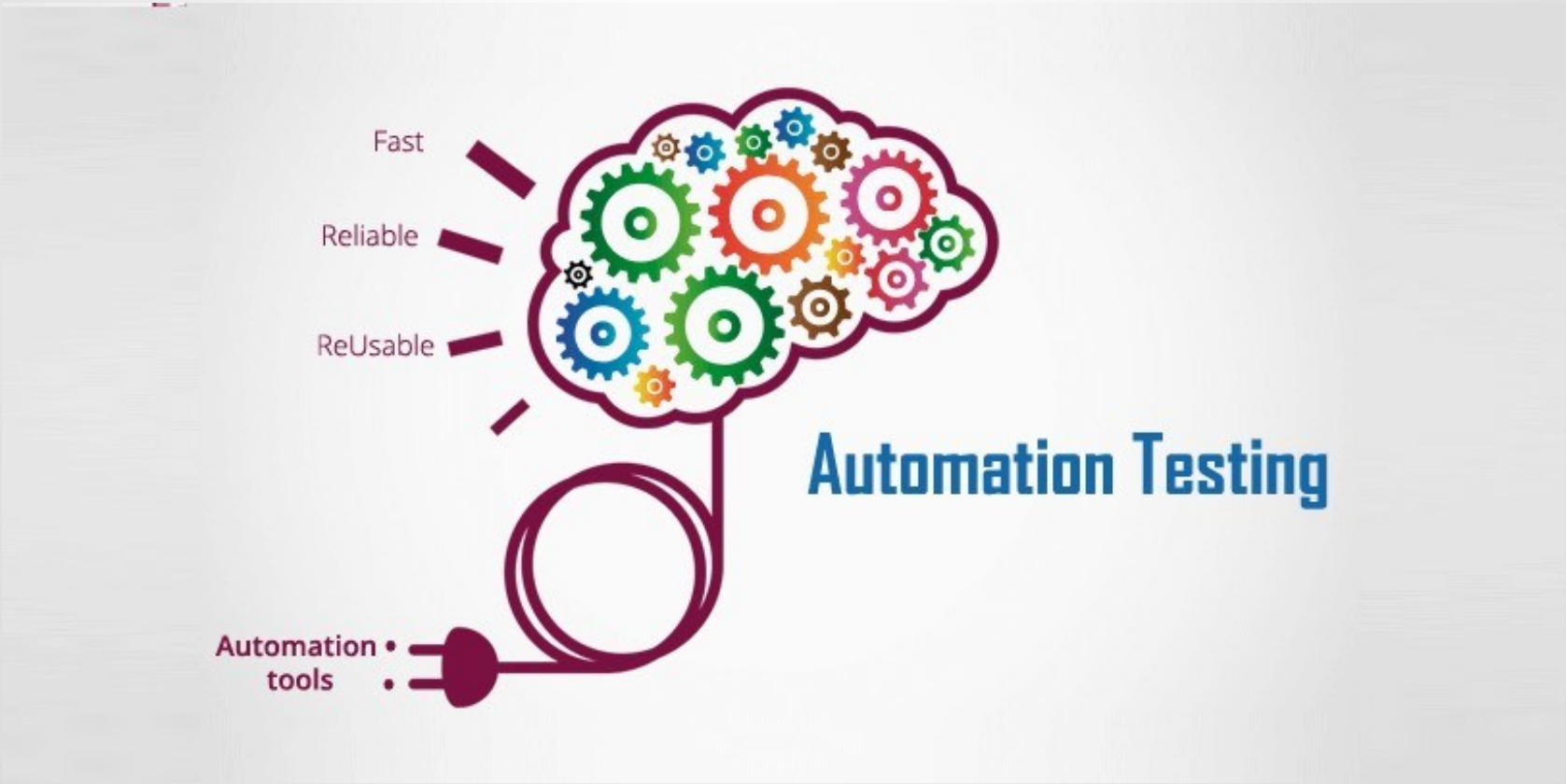
- **White box testing**
- **Black box testing**
- **Gray box testing**

Manual testing tools

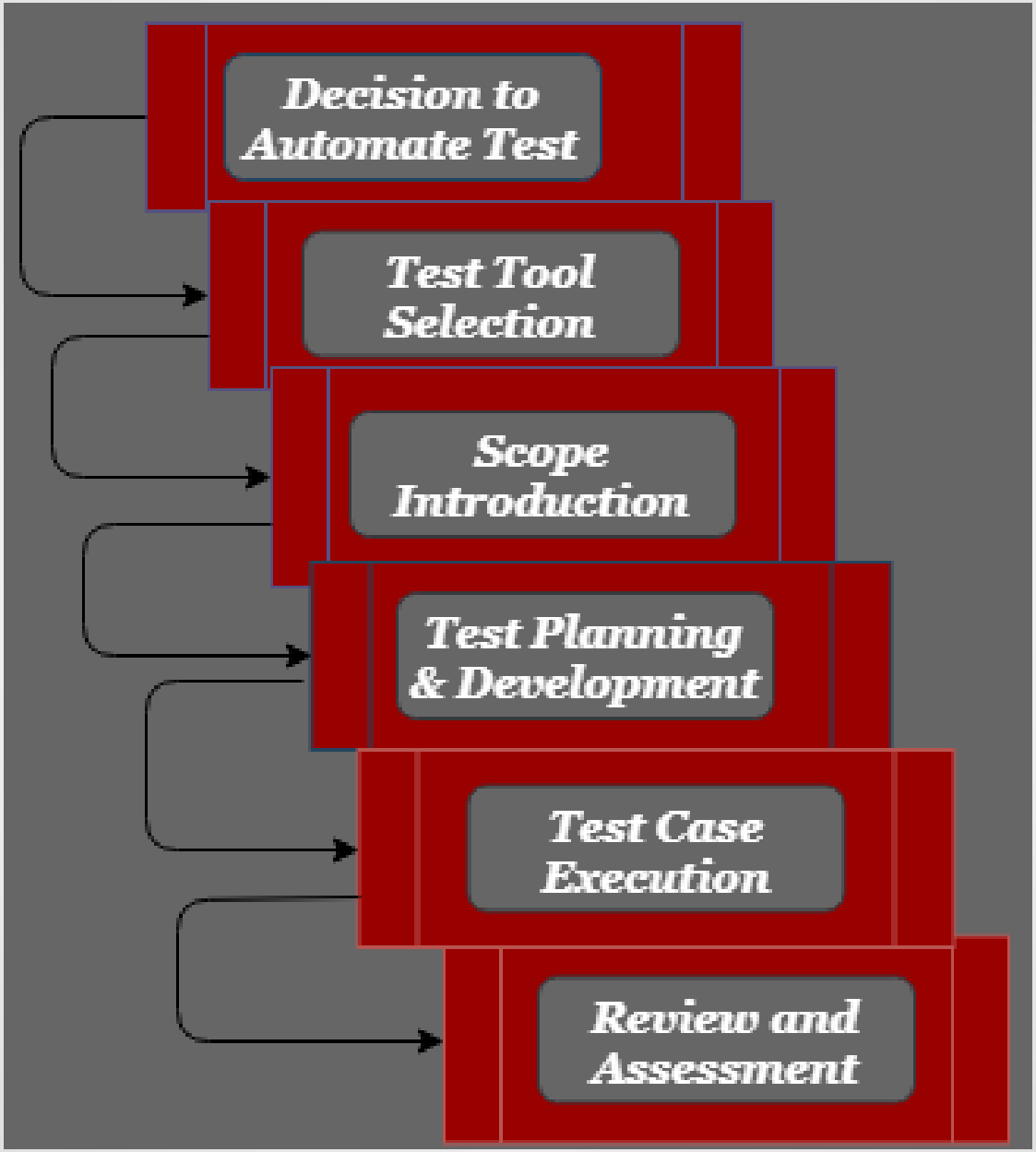


Automation testing

Automation testing is a process of converting any manual test cases into the test scripts with the help of automation tools, or any programming language is known as automation testing.



Life cycle of Automation Testing



Black box Testing

- **Black box testing** is a technique of software testing which examines the functionality of software **without peering into its internal structure or coding**.
- Black box testing is a method of software testing that **examines the functionality of an application**
- This method of test can be applied to virtually every level of software
- The tester is oblivious to the system architecture and does not have access to the source code

Black box testing

Black-box testing techniques:

Decision Table Technique	Decision Table Technique is a systematic approach where various input combinations and their respective system behavior are **captured in a tabular form.** It is appropriate for the functions that have a logical relationship between two and more than two inputs.
Boundary Value Technique	Boundary Value Technique is **used to test boundary values**, boundary values are those that contain the upper and lower limit of a variable. It tests, while entering boundary value whether the software is producing correct output or not.
State Transition Technique	State Transition Technique is used to capture the **behaviour of the software application when different input values are given to the same function**. This applies to those types of applications that provide the specific number of attempts to access the application.
All-pair Testing Technique	All-pair testing Technique is used **to test all the possible discrete combinations of values**. This combinational method is used for testing the application that uses checkbox input, radio button input, list box, text box, etc.

Black box testing

Black-box testing techniques:

Cause-Effect Technique	Cause-Effect Technique underlines the **relationship between a given result and all the factors affecting the result**. It is based on a collection of requirements.
Equivalence Partitioning Technique	Equivalence partitioning is a technique of software testing in **which input data divided into partitions of valid and invalid values**, and it is mandatory that all partitions must exhibit the same behavior.
Error Guessing Technique	Error guessing is a technique in which there is no specific method for identifying the error. It is based on the experience of the test analyst, where the tester uses **the experience to guess the problematic areas of the software**.
Use Case Technique	Use case Technique used to identify the test cases from the beginning to the end of the system as per the usage of the system. By using this technique, the test team creates a test scenario that can exercise the entire software based on the functionality of each function from start to end.

White Box Testing

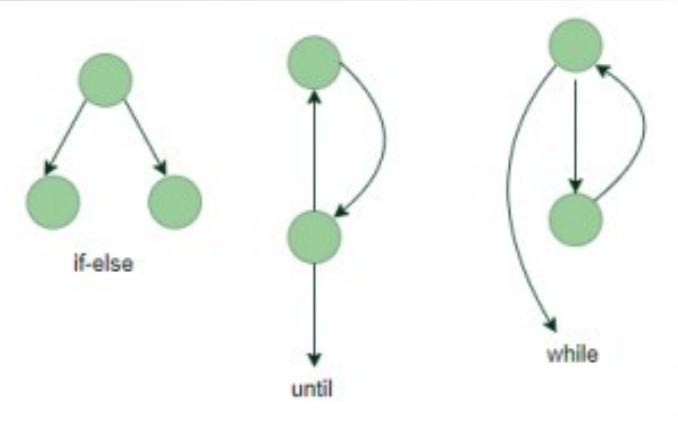
- **White box testing** is a method of testing software that **tests internal structures or working of an application**
- In white-box testing an internal perspective of the system , as well as programming skills, are used to design test cases
- It is also known as **clear box testing, glass box testing, transparent box testing, and structural testing**
- White box testing is the detailed investigation of internal logic and structure of the code
- In order to perform white box testing of an application , the tester needs to possess knowledge of the **internal working of the code**

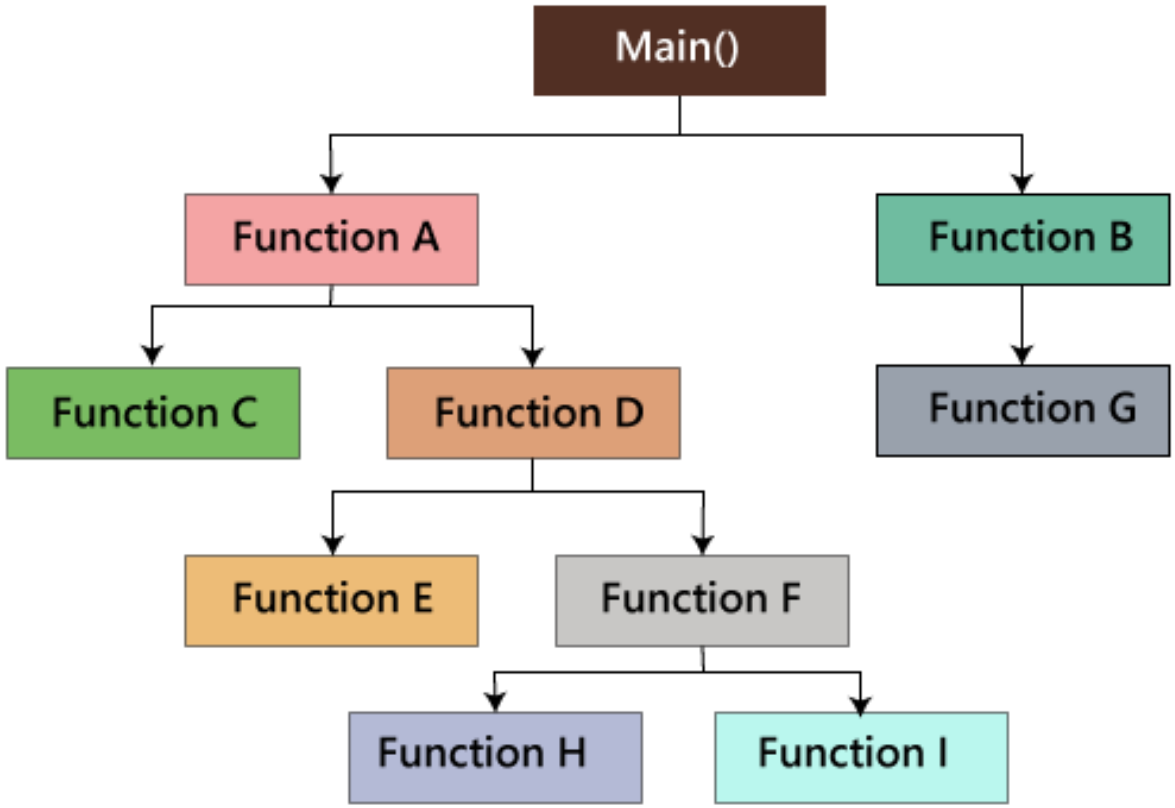
White Box Testing

White Box Testing techniques:

The white box testing contains various parts, which are as follows:

- Statement coverage
- Testing based on the memory (size) perspective
- Condition testing : **Multip**
- Basis Path test
- Flow graph notation
- Loop Testing



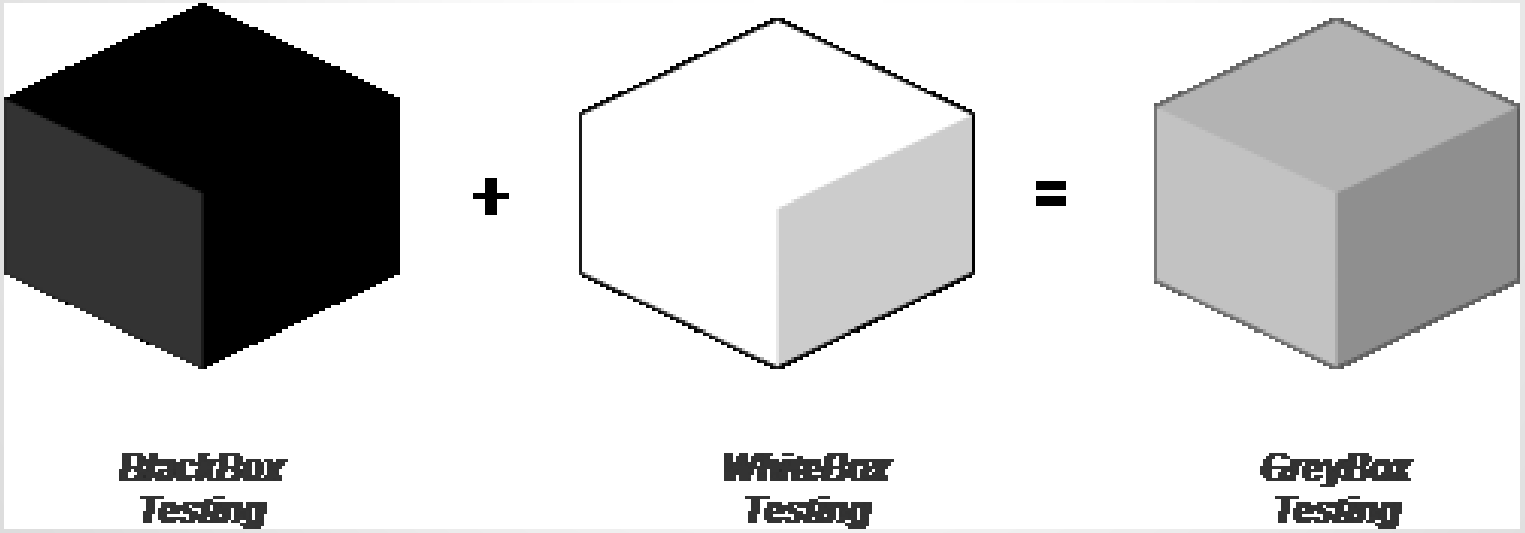


https://www.geeksforgeeks.org/software-engineering-white-box-testing/?ref=lbp

GreyBox Testing

Grey-box testing is a software testing method to test the software application with partial knowledge of the internal working structure.

It is a **combination of black box and white box testing** because it involves access to internal coding to design test cases as white box testing and testing practices are done at functionality level as black box testing.



GreyBox Testing

Gray Box Testing Techniques:

- Matrix Testing
- Pattern Testing
- Orthogonal Array Testing
- Regression Testing

https://www.geeksforgeeks.org/gray-box-testing-software-testing/?ref=rp

TEST CASE

What is a Test Case?

- A **TEST CASE** is a set of actions executed to verify a particular feature or functionality of your software application.

- A Test Case contains test steps, test data, precondition, post-condition developed for specific test scenario to verify any requirement.

- The test case includes specific variables or conditions, using which a testing engineer can compare expected and actual results to determine whether a software product is functioning as per the requirements of the customer.

TEST CASE

Typical Test Case Parameters:

- Test Case ID, name, date, portfolio
- Test Scenario
- Test Case Description
- Test Steps
- Prerequisite
- Test Data
- Expected Result
- Test Parameters
- Actual Result
- Environment Information
- Comments

Decision table approach

Derive test cases based on decision-table approach, execute the test cases and discuss the results : if-else block

For Example:

Design and develop a program in a language (C) of your choice to solve the triangle problem defined as follows : Accept three integers which are supposed to be the three sides of triangle and determine if the three values represent an equilateral triangle, isosceles triangle, scalene triangle, or they do not form a triangle at all.

Decision table approach

```
#include<stdio.h>
int main()
{
   int a,b,c;
   char istriangle;
   printf("enter 3 integers which are sides of triangle\n");
   scanf("%d%d%d",&a,&b,&c);

   printf("a=%d, b=%d, c=%d\n",a,b,c);


   if( a<b+c && b<a+c && c<a+b )
      istriangle='y';
   else
      istriangle ='n';


   if (istriangle=='y')
      if ((a==b) && (b==c))
         printf("equilateral triangle\n");
      else if ((a!=b) && (a!=c) && (b!=c))
         printf("scalene triangle\n");
      else
         printf("isosceles triangle\n");
   else
      printf("Not a triangle\n");

   return 0;
}
```

Task: Decision table approach

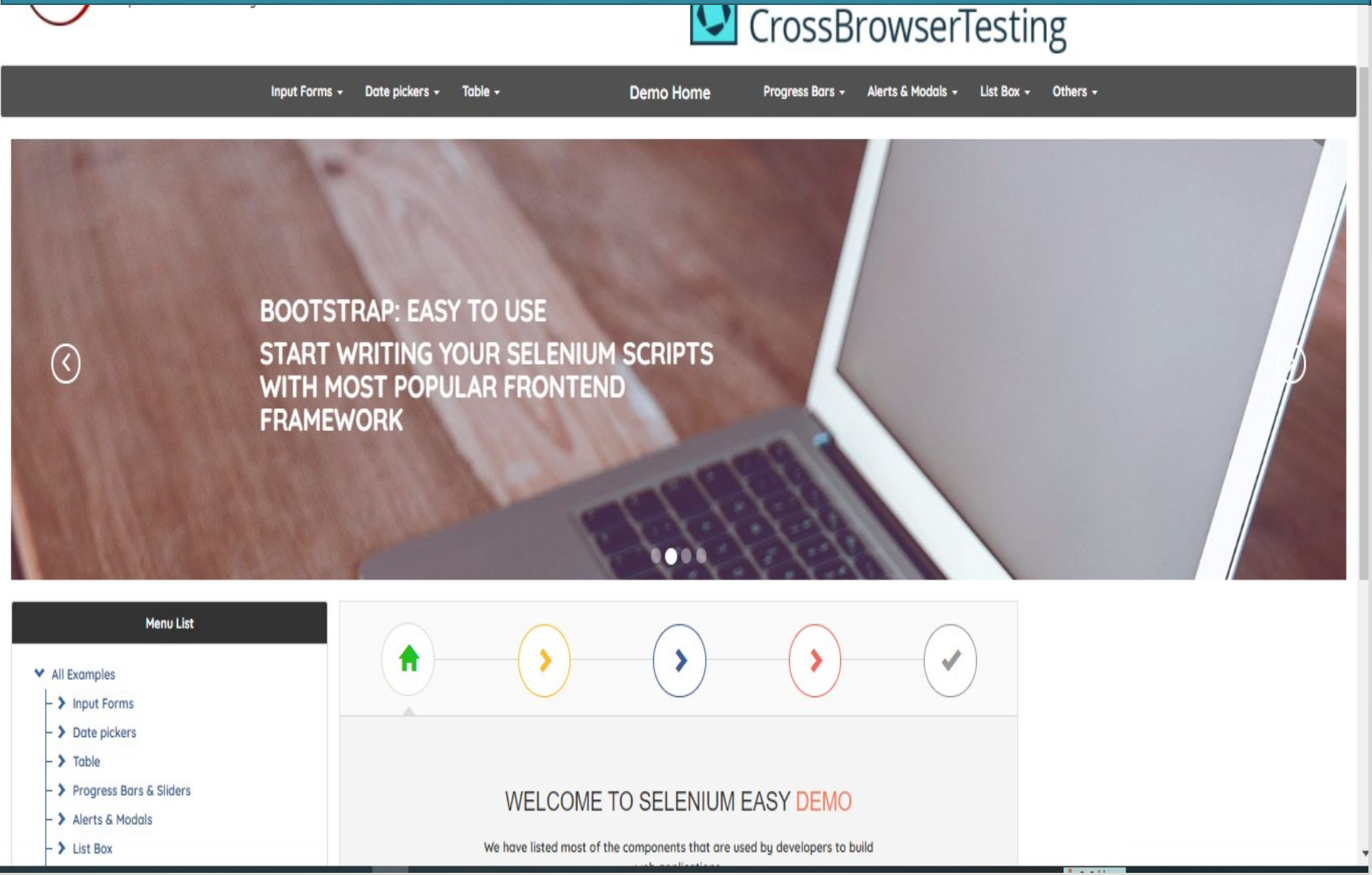
Derive test cases based on decision-table approach, execute the test cases and discuss the results : if-else block

Problem: Leap year program

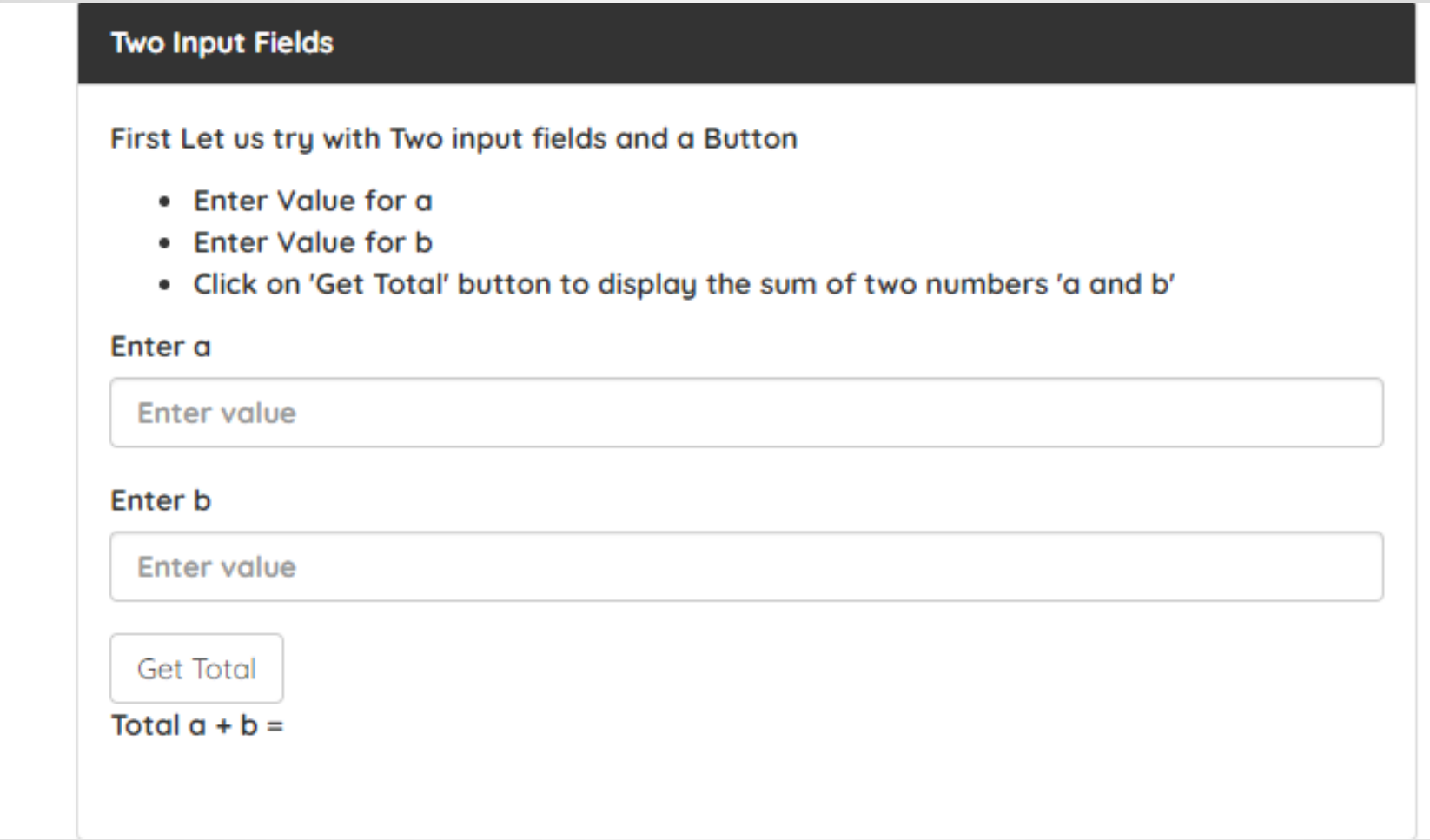
In test case design must include this following test case:

- divisible by 400
- divisible by 100 but not divisible by 400
- if not divisible by 100 but divisible by 4
- Not divisible by 4 or 100 or 400

Selenium



https://www.seleniumeasy.com/test/



https://www.seleniumeasy.com/test/

Selenium

Selenium is a powerful tool for controlling web browsers through programs and performing browser automation.

It is functional for all browsers, works on all major OS and its scripts are written in various languages i.e Python, Java, C#, etc, we will be working with Python.

We want to cover by using selenium

- Navigating web URL
- Click
- Type(Text)
- Read and Response
- Some basic functions … …

Limitations of Selenium

No support for desktop applications – Selenium does not support testing for desktop applications.

Open Source Forums – Since Selenium is open source software, one has to rely on community forums to get your technical issues resolved.

No support for REST and SOAP Platforms – We can't perform automation tests on web services like SOAP or REST using Selenium.

No Reporting capability – Selenium does not have any inbuilt reporting capability, one has to rely on plug-ins like JUnit and TestNG for test reports.

Image Testing – It is not possible to perform testing on images. One needs to integrate Selenium with Sikuli for image testing.

Check Selenium

```
C:\Users\Fahad Ahmed>pip list
Package    Version
---------- -------
pip        20.2.3
setuptools 49.2.1
WARNING: You are using pip version 20.2.3; however, version 21.0 is available.
You should consider upgrading via the 'c:\users\fahad ahmed\appdata\local\programs\python\python38\python.ex
-m pip install --upgrade pip' command.

C:\Users\Fahad Ahmed>
```

Install Selenium

Use pip to install the selenium package. Python 3.6 has pip available in the standard library. Using pip, you can install selenium like this:

pip install –U selenium

```
C:\Users\Fahad Ahmed>pip install -U selenium
Collecting selenium
  Downloading selenium-3.141.0-py2.py3-none-any.whl (904 kB)
     |████████████████████████████████| 904 kB 80 kB/s
Collecting urllib3
  Downloading urllib3-1.26.3-py2.py3-none-any.whl (137 kB)
     |████████████████████████████████| 137 kB 142 kB/s
Installing collected packages: urllib3, selenium
Successfully installed selenium-3.141.0 urllib3-1.26.3
WARNING: You are using pip version 20.2.3; however, version 21.0 is available.
You should consider upgrading via the 'c:\users\fahad ahmed\appdata\local\programs\python\python38\python.ex
-m pip install --upgrade pip' command.
```

Check Selenium

```
C:\Users\Fahad Ahmed>pip list
Package    Version
---------- -------
pip        20.2.3
selenium   3.141.0
setuptools 49.2.1
urllib3    1.26.3
WARNING: You are using pip version 20.2.3;
```

PyCharm

JetBrains PyCharm 2020.1 build 201.6668.115

Thanks to All