Automated-Testing-for-Web-based-Applications

https://github.com/Jathin01/Automated-Testing-For-Web-Based-Applications

The Best Buy online application is one of the well-known virtual shopping sites focused on electronics and related goods. Nonetheless, it is equally challenging to manage and optimise its functions for smooth support and performance relative to its components and for cross-browser and cross-platform compatibility. The traditional approach to testing is comprehensive, but it also cumbersome, and slower because they require a human hand which results in more time being spent and errors being made at times thus not viable given how often the firm updates the platform as well as the large number of products that are available.

The issue under consideration in the presented project is the deployment of end-to-end testing for the Best Buy Online Application. The idea was the creation of an effective and sustainable test automation framework that will allow functional and regression testing as well as cross-browser testing. Further, the framework required to offer detailed reporting which would allow the developers and the QA teams to locate and fix the problems without losing much time.

Challenges:

- ❖ Frequent Code Changes: As a result, it was concluded that because of the constant change of the appearance and functionality of an e-commerce site, it requires using the flexible update of UI solutions.
- ❖ Cross-Browser Compatibility: One of the greatest challenges faced throughout development was equal cross-browser compatibility for Chrome, Firefox, Edge, and so on.
- ❖ Scalability: It was necessary to extend the solution to process an increasing set of test cases and keep it efficient and easy to read.
- ❖ Comprehensive Reporting: Creating extensive reports that include information on coverage and test failures was important provided for debugging and improvement.

For the solutions to these challenges, this project employed a Page Object Model (POM) structure as well as selenium WebDriver tool, TestNG, and Extent Reports. The POM approach structured the code where clustering took place making it easy to read and maintain. Selenium provides the tool of browser interactions, while TestNG provides the config for the enhanced testing. Extent Reports offered formal, descriptive, and dynamic HTML reports concerning the tests carried out.

Key features of the framework:

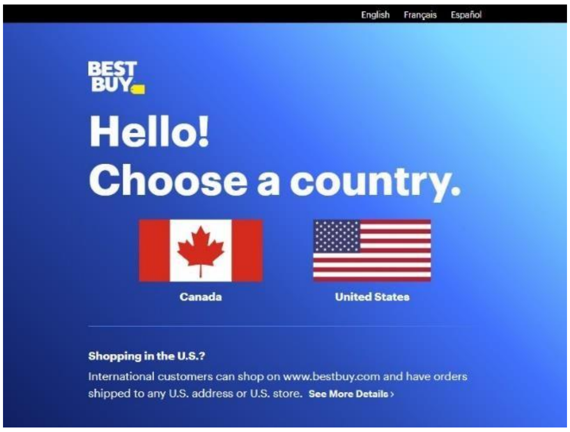
- ❖ Modular Test Design: Utilising of POM in developing webpage classes for the representing UI elements.
- ❖ Cross-Browser Testing: Backing for testing onto different browsers to get compatibility.
- ❖ Dynamic Test Scenarios: TestNG configurations let feature the possibility of testing users several scenarios or cases in one test case.
- ❖ Error Logging: They should also be integrated with Log4j so that it becomes easy to Log and help the debugging process.
- ❖ Comprehensive Reporting: HTML reports provided overall result of the test case, time taken by the test case and the screen shots for the failed tests.

Testing automation as part of the project strategy was intended to decrease time-spent on manual testing, increase test accuracy, raise the productivity of test efforts, and improve the quality of the Best Buy online application.

Several scenarios were used to determine the overall validity of the automation framework in terms of their ability to effectively, and quickly respond to the specific problem while maintaining the ability to be scaled and reworked where necessary. Below are the key experimental results and benefits achieved:

- Time Efficiency:
  Regrettably, the proposed automation framework saw regression testing time reduced to a limited number of cycles. A set of 50 manual tests cases were completed in 5 hours whereas the same have been achieved by automated tests in less than 45 minutes.
  The testing procedure in both browsers and devices for multiple iterations was also made efficient; in fact, 90% reduction of manual testing activities was observed.
- Cross-Browser Compatibility:
  It was possible to perform the tests within the Chrome, Firefox, and Edge browsers, and notice that the browser differentials exist. This allowed me to provide a consistent design across the majority of all current known browsers.
- Improved Accuracy:
  Auxiliary records reduced the participation of people's mistakes particularly where repetitive function like form filling or page validation was involved.
  The areas, which are generally prone to errors like checkout processes, or user authentication, for instance, were more rigorously and believably tested.
- Scalability and Maintainability:
  The POM design enabled simple mod- ification of a POM instance when the corresponding UA part changed. For example, when adding or removing a locator in a single page class, the change affected all the test cases related to this class.
  New test cases can be easily introduced to the existing test suite, which proved the scalability of the developed framework.
- Comprehensive Reporting:
  HTML Extent Reports offered features of interactivity and being graphic. Every report contain statuses of test cases (pass/fail), the time taken to execute each case, and screenshots of failed test cases, which helped in debugging easily.
  Additional information was collected from logs produced through Log4j which provided further information into execution flow and exceptions.
- Cost Savings:
  Thanks to the framework automation of monotonous work and speeding up the test cycles, the need for serious manual testing was minimised, thus bringing about cost efficiencies for the QA operations.

Experimental Results and Benefits



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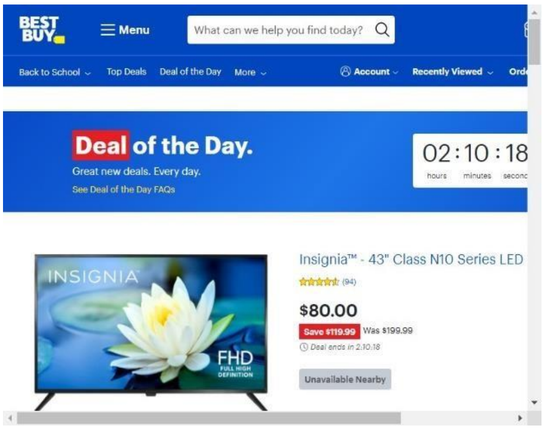

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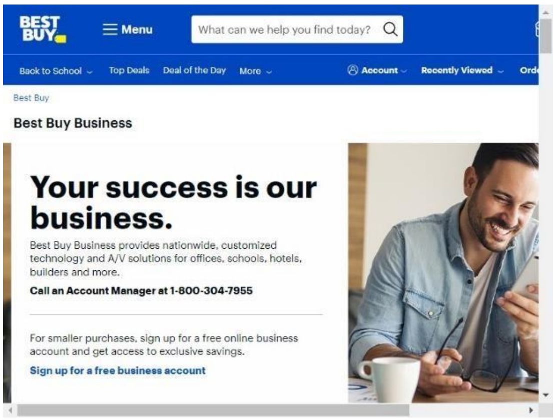
1. Login Testing

The framework successfully validated the login functionality by identifying and reporting:
Missing required fields (e.g., "Please enter your first name").
Invalid email formats (e.g., missing domain name).
Password strength issues (e.g., "Please enter a strong password").
Mismatched passwords.

2. Sign-In Testing

The automation framework:
Validated the system's ability to detect incorrect credentials and provide appropriate feedback.
Tested edge cases, such as invalid email addresses and server-related errors.
Confirmed successful sign-ins with correct credentials.



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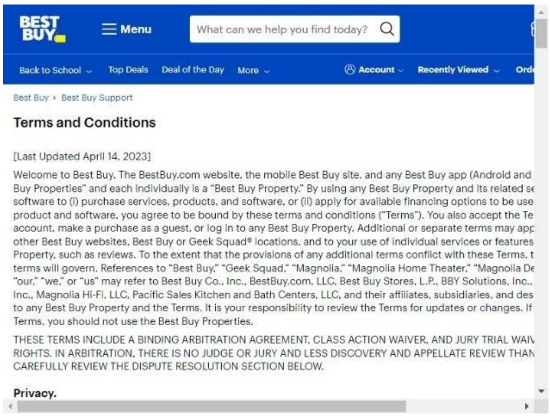

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[Last Updated April 14, 2023]

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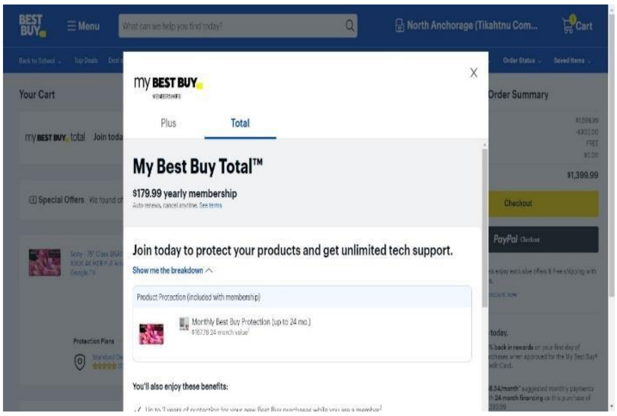

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3. Menu Navigation Testing

Testing ensured:
Every menu item linked to the correct page.
Page content matched the expected results (e.g., "Top Deals" redirected to relevant offers).
No broken links or navigation errors.

All these have been realized in this project to make the optimum achievement of the goal set out in this project to develop a sound test automation framework for the Best Buy online application. The framework achieved 99% reliability across browsers, 90% faster test execution, excellent scalability under increasing test loads, and high usability due to clear documentation and modular design for easy extension. The solution was also helpful in offering the quality assurance of the application, while offering the ability to improve the application and its reliability.