Applying Usability Testing Techniques to Landon Hotel Website

COMP 4110 Software Verification and Testing

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GitHub

https://github.com/muhammadfarazsohail/Selenium_Website_Testing.git

Picture source: http://www.nordic-leads.f

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1. ABSTRACT

Do you like to make reservations on Expedia, Booking.com, Airbnb or any particular hotel website? There's no right or wrong answer here. After all, your choice will depend largely on how much one of these websites functions the way you want. Usability is the main reason behind this. It is one of the software qualities that is usually taken for granted. This is because we only notice it when it is missing. We are usually satisfied with the usability of a website, unless we have to leave our comfort zone to adjust to the requirements of the website. Thus, usability is an invisible factor that only surfaces when something goes wrong. Nowadays, online reservation websites are the main tools for hotel bookings. The lack of published research concerning the usability of these websites indicates that hotel websites are being developed without fully considering the needs of, or feedback from, their users. This case study has tested the usability of a fictitious hotel website to suggest changes. It identifies common usability issues that companies who develop, or maintain, a hotel's website should address.

2. INTRODUTION

In this day and age, there are multiple applications made readily available for a certain task that requires a web application. So how do users choose between them all? Usability testing is the best tool we have in order to formulate an answer to that question. Online booking is the most popular way to publish and receive information about hotel accommodations. Airbnb alone has 150 million users, so it's evident that more and more people are looking for hotel accommodations online. However, there are not many published studies of usability testing on hotel websites. There are various methods to examine how users interact with the websites and to evaluate the acceptability of the reservation system performance.

Hotels must perform usability tests on their websites to ensure that their users can effectively and efficiently carry out the necessary tasks. Additionally, the users must be included in the development and testing of a hotel website. In our study, we tested the Landon Hotel website knowing that we could find some of the issues but not all of them. We also discuss some of the problems that we could find on the Landon hotel website without having a large budget.
Finally, this study confirms how website performance can be improved through usability testing. Thus, it is never too late to start testing your website. Finding some issues is better than not finding any and allowing these problems to persist.

3. KEY WORDS

- Usability Testing
- Performance Testing
- Hotjar
- Crazy Egg
- Usability Survey
- A/B Testing
- Selenium
- JMeter

4. GENERAL CONCEPTS

4.1 Usability Testing

The ability of a product to be used easily is what defines usability testing [3]. It's also a way of measuring a software's performance by letting real users test it. The participants are usually given a task to accomplish while their activities are tracked or recorded using specialised tools. In Usability Testing Essentials, Carol M. Barnum described usability testing as the "invisible" form of system testing [1]. This is since it is only needed when something goes wrong and is, otherwise, taken for granted.

4.2 Performance Testing

Performance testing is an important part of usability testing. The main objective of usability testing is to collect feedback on usability issues and then to correct them in order to satisfy the users. In order to tackle usability problems, usability testers need to use performance testing. For example, it is extremely important to monitor the response time of a website to ensure that users are not disappointed by having to wait longer to receive a reply from the site.

5. LITERATURE REVIEW

In Usability Testing Essentials, Carol M. Barnum mentioned the difference between traditional and modern usability testing methods. Traditionally, usability testing is a formal, time-consuming, and expensive process. This is because it requires specialized laboratories and heavily relied on usability testing experts. These people needed special education in psychology, human factors engineering, and cognitive science [1].

Usability testing required all of these experts because, well into the 1990s, it was seen as a research experiment rather than a part of the development process [1]. Thus, it was extremely expensive to conduct usability testing, as it required 30 to 50 participants. Therefore, not a lot of organizations considered doing usability testing.

In the early 1990s, Jackob Nielsen showed that a small number of people can be used to effectively conduct usability testing experiments [2]. This can be done if the team manages the ratio of benefits to costs. Their study showed that some testing is better than no testing, especially if testing is done with the intention of finding some errors and knowing, from the start, that you cannot find all of them[2]. Nielsen stated that each participant usability testing session should stop after the fifth observation, because after that s/he will start to see the same results recurrently [2].

Most of the literature we reviewed has shown that Hotjar and Crazy Egg are currently the most popular testing tools for usability. Usability parameters were measured by Hotjar. This was achieved by recording each user's activities during the sessions. It was also used to detect the time required for users to finish a task on a certain website. In order to monitor the number of clicks and moves the user needs to complete a task, the Hotjar Heatmaps feature was also used [1, 2, 3, 4]. Additionally, the comparison studies that were done on usability testing tools showed that Crazy Egg provided comprehendible and much more in-depth user's experience analysis reports [6, 7, 8, 9]. Crazy egg is wildly used for A/B testing, while Hotjar is used for collecting user's surveys.

Using these tools does not require a large testing budget, nor does it require professionals to conduct the experiments. However, the main roadblock testers encounter in usability testing is related to the research ethics and the participants capacity to provide informed consent [10].

6. PROBLEM STATEMENT

Our literature review revealed that, usability testing is usually overlooked due to a prevalent misconception that businesses have about the process. They believe it's expensive and can only be done by experts. Our study uses open-source and cost-effective testing tools to prove that the usability testing can be carried out within a budget.

7. APPROACH

Our initial objective was to test a real hotel website through the monitoring of user activities by means of Hotjar heatmaps and surveys. In addition, we planned to use Crazy Egg A/B testing during the experiment. However, due to time constraints, we were not able to obtain an approval for the Research Ethics and User's informed collection consent. This approval was needed to collect the feedback of participants.

Additionally, we could not find a real hotel website which would permit us to implement the code for Hotjar and Crazy Egg to it. This was due to Proprietary Matters. Thus, based on our experience in both configuration and functionality, we compared Hotjar and Crazy Egg tools. Then, we tested a hotel website that was designed for educational purposes(Landon Hotel: https://landonhotel.com/). We used tools that measure the performance and usability, such as Selenium and JMeter, without tracking the users .

8. HOTJAR VERSUS CRAZY EGG

Based on our experience and our reading about the tools, we will provide information on both products. We signed up and observed the environment and functionalities of both tools. They are mostly similar, but they have a few differences. Both track the user's activities and thus required the user's consent. Subscriptions are not very costly, and both are easy to use for individuals who have no past software testing experience. We are going to show you the two special features on both. These are the A/B test tools and surveys.

8.1 Hotjar and Crazy Egg comparison table

Hotjar	Crazy Egg
Free Forever plan for basic services	Free 30 days trial, then $28/Month
You can sign-up without credit card	You need a credit card to sign-up.
Not a lot of help regarding installation	Detailed step by step tutorial about installation
Widely used for business websites	Mostly used for educational websites
Does not do A/B testing	Does A/B testing
Provides user surveys.	Does not do user surveys.
Has Heatmaps and session recording features.	Has Heatmaps and session recording features.
Requires a short learning curve.	Easier to use and get familiar with
Upon canceling your account and unsubscribing from their mail list, we still received a lot of commercial emails from Hotjar.	After cancelling the free trial subscription, we did not receive any further emails from Crazy Egg.

8.2 Exploring Hotjar

In addition, we explored the features in which each tool specializes. Our experiment showed that both tools are easy to use for novice users. We started by signing up to Hotjar for free. Their basic plan can be free, forever.

Then, we navigated through the dashboard. The dashboard is user friendly, as you can see in figure 15.1(a) in the Appendix section. You can use Hotjar for user surveys, or to track their activities on your website. You can also record the user's sessions, if they consent to it.

Although the tool claims to be user friendly, there is an expected degree of prior knowledge on how to manipulate the initial code. Installation is not intuitive for a novice user. There was not a lot of guidance provided in this regard.

In this study we tried the process of creating a survey. The process of creating a new survey was very easy and intuitive. You can create a survey in the form of multiple-choice questions. Then, you can edit its appearance, location, and frequency.

First, you must enter the link to the website for which you are designing the survey, figure 15.1(b). After clicking on new survey, you enter the name and location of your survey, figure 15.1(c). After clicking next, you will see the Questions Bank. In the questions bank, you can enter your questions, ask the participants if they would like to be contacted, enter a thank you message and show your privacy policy to the participants, figure 15.1(d). Then, you can edit the appearance of your survey and select where it will appear on the page. There is an option to choose whether the survey will appear on all the pages that are being tracked by Hotjar, figure 15.1(e).

In addition, you can specify the survey's behaviors such as; when it will popup and the duration. Then, you can select the method for receiving the users' completed surveys. Finally, you will click on the button to create your survey, figure 15.1(f)(g)(h). You are still able to edit your survey from the dashboard, afterwards.

8.3 Exploring Crazy Egg

Similarly, we explored the A/B testing feature in Crazy Egg. The dashboard was user friendly, figure 15.1(i). You can sign-up using your google account, however, they will have access to your google analysis data.

Crazy Egg is widely used for A/B testing. This is where you provide the user with two versions of the same feature. Then, you can see which version is better in terms of how quickly the users can complete a specific task. You can also record the user's sessions. They have many tutorials and instruction manuals to make the testing process easy for novice users.

In our experiment, we showed two versions of the main page in the Landon Hotel website.
The first one is called the original design, also known as, design A or control, figure 15.1(j). You can create multiple variants and track how fast the user can complete a task on the website such as; booking a room or finding the hotel's contact information. Additionally, you can choose the view that you are doing the A/B testing on such as Desktop, Mobile or Tablet.

In version B, also known as variant, we removed the hotel picture from the top of the page to make the links more visible to the user. The changes can be done using the popup menus that show-up when you click on an item, figure 15.1(k). Basically, this tool does not require prior usability testing or coding experience. This makes the process more affordable and reachable for a large group of users.

9. CASE STUDY INTRODUCTIONS

In this paper we will be testing the Landon Hotel website which is a fictitious website created for the purpose of testing. We will use Selenium and JMeter to test the website. Initially, we were planning to compare the tools, but we have realized they are more valuable when targeting different testing aspects.

With Selenium we can focus on the buttons and links of the websites, and ensure they are functioning properly and that they take us where they need to. This is very important as users like a website where navigation is simple and concise.

With JMeter we will be focusing more on the performance and the response time of the website. Now, some of you might say this is performance testing and has nothing to do with

usability, but the efficiency of a website is significant to those who use it. The main reason a search engine like Google is on top is because of its speed. Hence, performance is key when it comes to the user experience.

10. EXPERIMENTAL SETUP AND METHODOLOGY SETUPS

10.1 Selenium

Selenium is a framework for testing web applications. It provides a playback tool for authoring functional tests without the need to learn a test scripting language. In this project we used Selenium Webdriver to test the website "landonhotel.com". We used Python and unit test framework of Python to test the various aspects of the website usability testing. We made different test cases based on different types of usable objects on the website.

Selenium is an automated web testing tool which can be used with various browsers and most of the commonly used languages. We made three (3) classes which handled various aspects of the test.

The main file is *main.py* which contains the main class and all test methods and function calls. Then, there is *page.py* which contains methods to be invoked for various elements of the page. The last file is *locator.py* which contains all the locations (xpath) and class names of the elements under consideration.

The test methods in *main.py* specified with the name of test are invoked by main method. Selenium uses webdriver to control various aspects of the website including elements, links, search bars and various other things.

We used chrome webdriver which invokes chrome browser to test the site under consideration. Selenium Webdriver uses various methods to access elements of the website, some popular locators are XPATH, CLASS_NAME, CSS_SELECTOR, LINK_TEXT, NAME and ID. We used XPATH and CLASS_NAME for most of our buttons and links.

We tested the site using python unit test framework which can detect if something did not work. It catches the exceptions automatically for the most part. The code can be found in our GitHub repository.

10.2 Performance Measures and Results Analysis for Selenium

Python unit tests framework is easy to use and works perfectly with selenium. Using python unit tests, we were able to test the navigation buttons and links on the website. When there was an issue the unit test gave the error and specified which line it couldn't execute. figure 15.2(a) shows that six (6) tests passed and one (1) test failed because there was a mistake in the twitter link on the page which did not match the link on the website. This gave us the clear idea of where to correct the errors. In figure 11.2(b), all the errors were gone when we corrected the link, and all the tests passed.

Finally, if the testcases executed normally, Selenium gave an "OK" message at the end, alongside the number of tests which it executed, as shown in figure 15.2(b). This helped ease our process of testing the website, and we were able to test all the buttons and links on landonhotel.com website.

10.3 JMeter

If a website is slow to load or function, then users will jump to the next best website. This is where JMeter comes in! Not only will we be able to automate user requests on a website, but we will also be able to set timers on certain tasks to give it a human feel. By ensuring a website functions and loads efficiently we can ensure the user's satisfaction.

In figure 15.3(a) we can see the Graphical User Interface (GUI) of JMeter and get an idea of how it works. From the test plan we can add thread groups that represent our users. We can add samplers to the thread groups, which represent the user's actions. Then, we need to have a listener, which has different types, depending on how we want to view the results of the test.

In figure 15.3(b) we can see a more organized test plan in the left tab. The results of a sample test of 20 visitors trying to access the website 20 times are recorded in a table with some very important information regarding the 800 requests. We can also view each individual request by adding a results tree listener. Using the JMeter, we will test the website's connection times and response latencies to ensure it satisfies the customers' needs.

10.4 Performance Measures and Results Analysis for JMeter

Using JMeter we were able to generate graphs to visualize the performance of the website over a period of time. This is crucial, as it helped us understand how the website functioned in different conditions. We simulated 50 users visiting the website 50 times versus 500 users visiting the site 50 times. Average Response Time was 183 milliseconds for the 50 users, while it was 1358 milliseconds for the 500 users.

If we look at figure 15.3(c), we can see a graph representing the response time for 50 users visiting the site 50 times. By looking at the summary report, we can see the average response time of the website was 155 milliseconds. However, the graph represents the average response time on the y-axis and time elapsed on the x-axis. This helps in visualizing the average time, as it is shown around 180 milliseconds on the graph.

In figure 15.3(d), we can see the results that represent the simulation of 500 users visit. We can see most repose times are near the average, but we have some very extreme cases. Those extreme cases represent displeased users. We can see how the average elapsed time drastically increased comparing to the simulation of 50 users visit. In this case it was 1358 milliseconds versus 183 milliseconds for the 50 users.

Landon website is a simple one-page site, so the result should be better with higher traffic. If it was a real hotel website during booking season it could face performance issues. What can we do to improve response time? In a site like the Landon hotel compressing image sizes is the best way to increase response time as they have many of them. For real time hotel website an optimization of the database can help ensure data is bring retrieved and stored quickly to enhance response time.

11. CONCLUSION

Usability testing is usually overlooked due to a prevalent misconception that businesses have about the process. They believe that it is costly and can only be done by persons with expertise. It was shown, in our paper, that this is not necessarily the case. Usability testing need not be an expensive process. We demonstrated that open-source usability testing tools can identify problems and suggest improvements for an online reservation system when combined with affordable user tracking tools.

The results of the simple and affordable usability testing experiment were invaluable, but not because major issues were detected. It demonstrated that, by using these affordable tools, you can find and easily fix problems that users often encounter when accessing online booking systems.

Our simple usability testing experiment can be done by novice users without prior usability testing or coding experience. This makes the process more affordable and reachable for a large group of users. Thus, it is never too late to start testing your website. In fact, finding some issues is better than not finding any and allowing these problems to persist.

12. FUTURE WORKS

We hope that we will be able to get the research ethics approval in the future. This will enable us to do usability testing using Hotjar and Crazy Egg. Both of these testing tools will help us to provide information about testing areas that will improve the users' experience while making their hotel reservations.

13. ACKNOWLEDGEMENT

We would like to thank Dr. Kobti for providing us with the idea for this study. We would also like to acknowledge the Computer Science Department at the University of Windsor for providing us with free access to Linked-in learning materials and journal articles made readily available online through library services.

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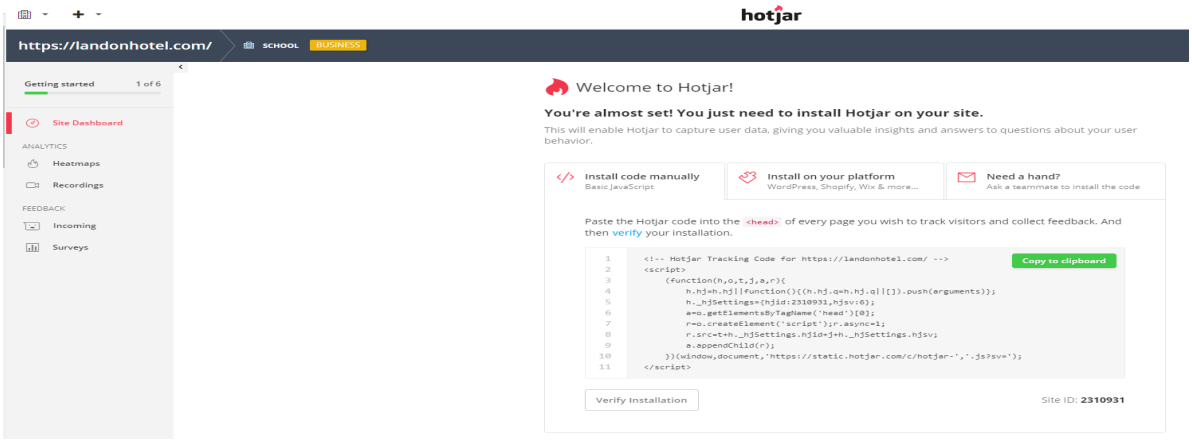
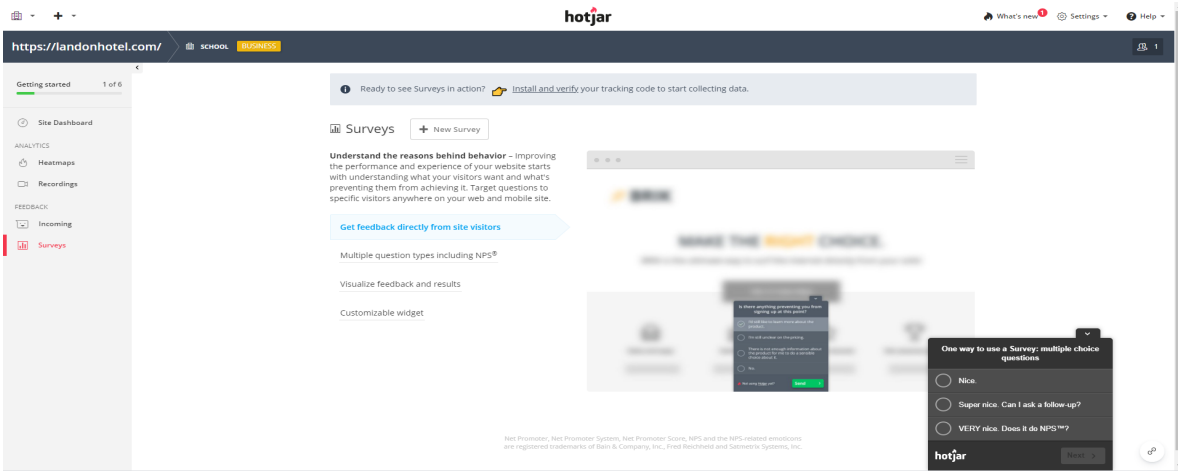
15. Appendix

15.1 Screenshots from Hotjar and Crazy Egg

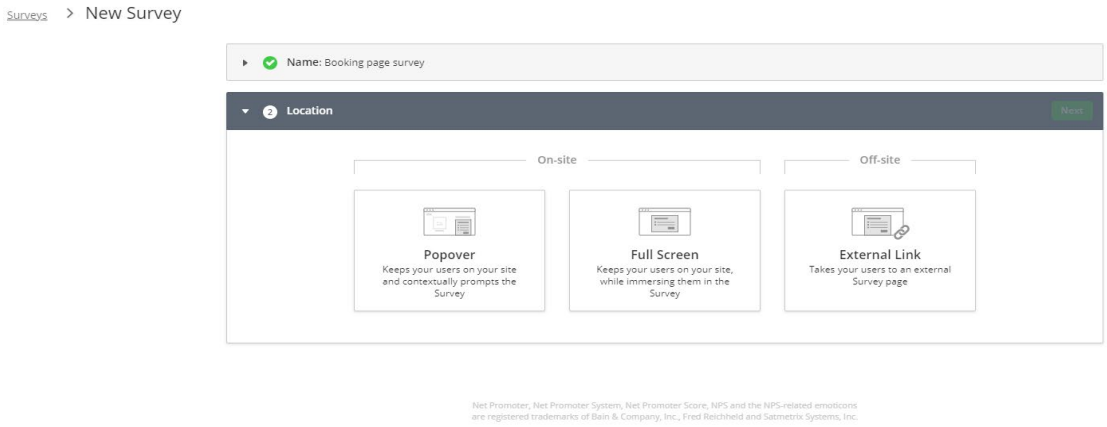
a. Hotjar’s Dashboard



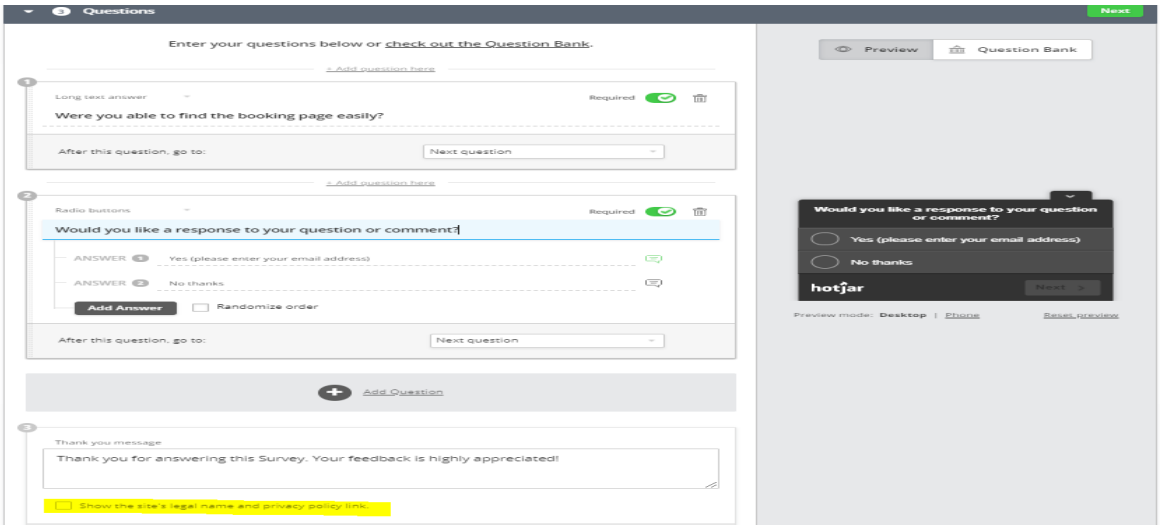
b. Hotjar’s Survey Main Page



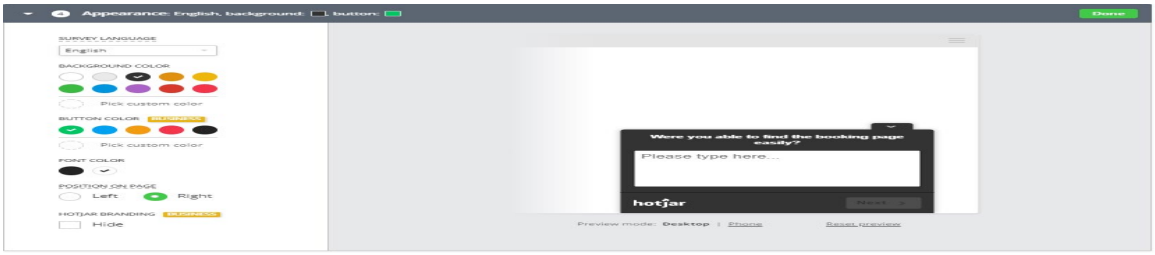
c. Choosing the Location of the Hotjar Survey

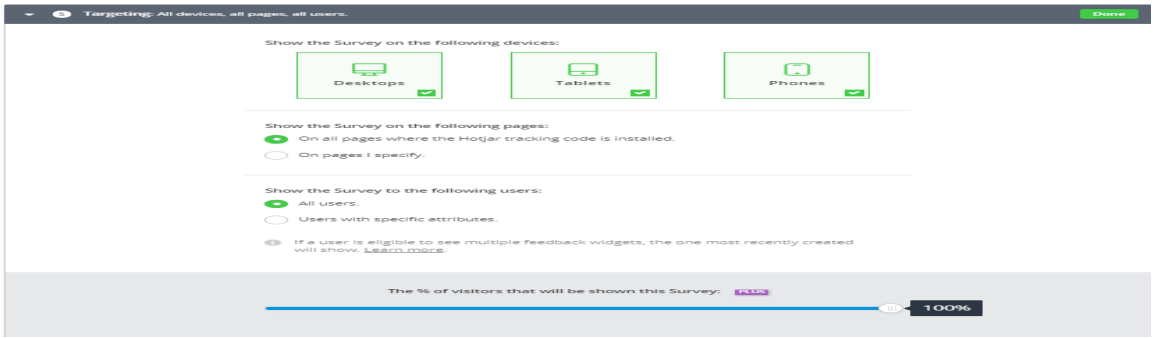


d. Hotjar's Survey Questions Bank

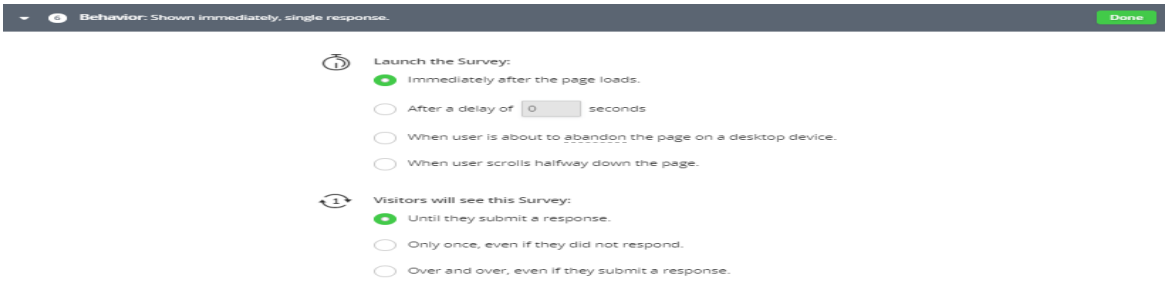


e. Editing Hotjar's Survey Appearance and Choosing the Location

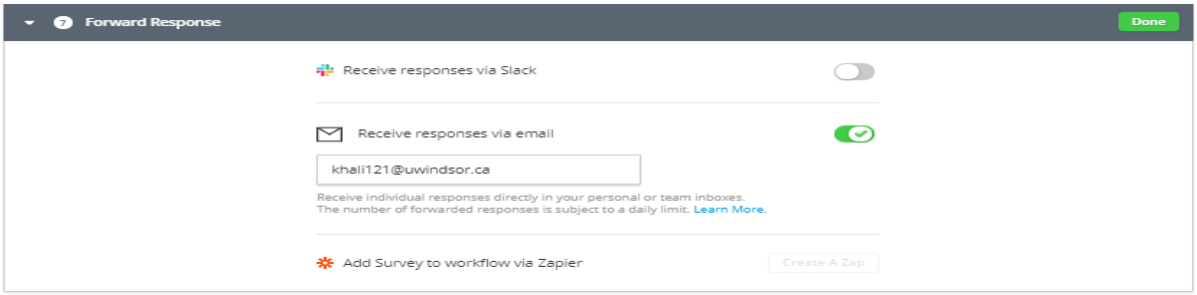




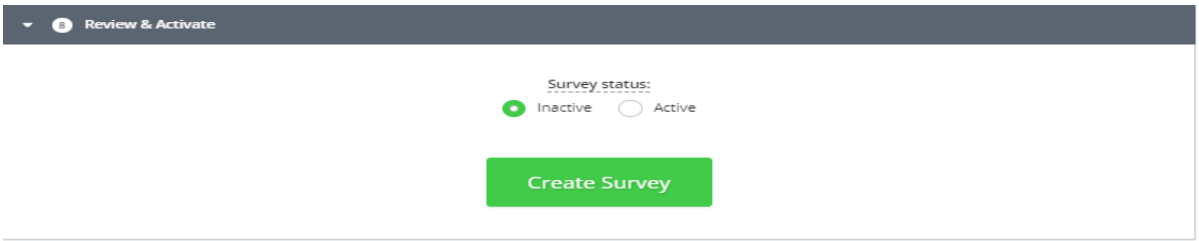
f. Selecting When and How Long the Survey will Appear



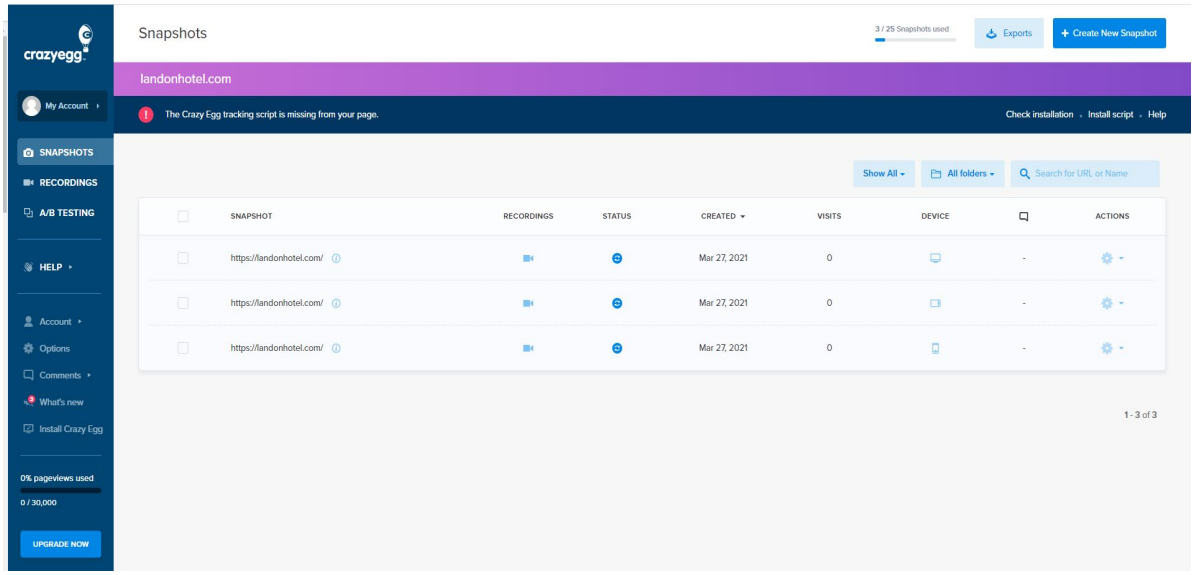
g. Selection a Method to Receive the Surveys



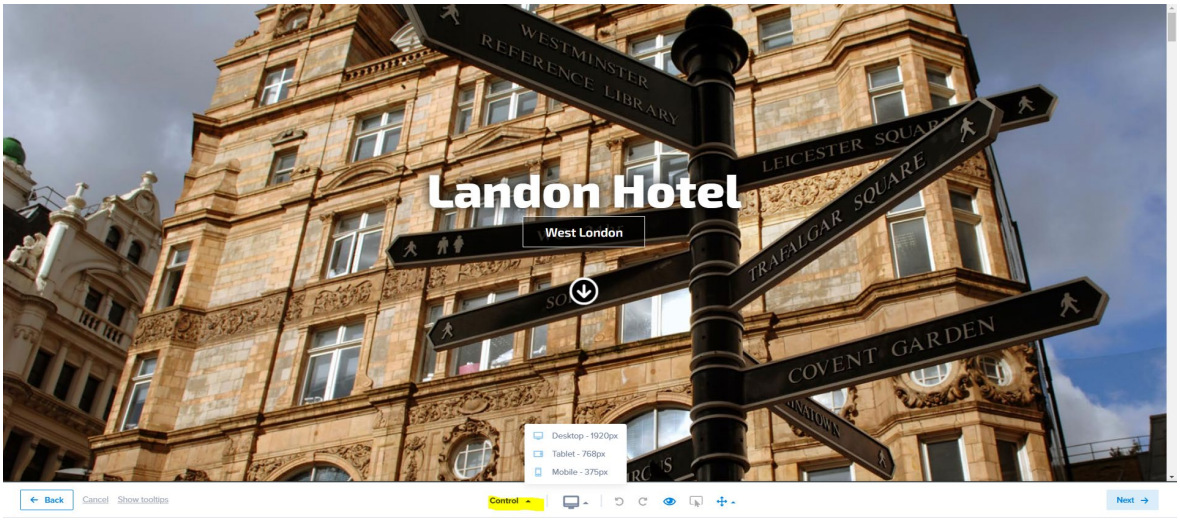
h. Creating the Survey



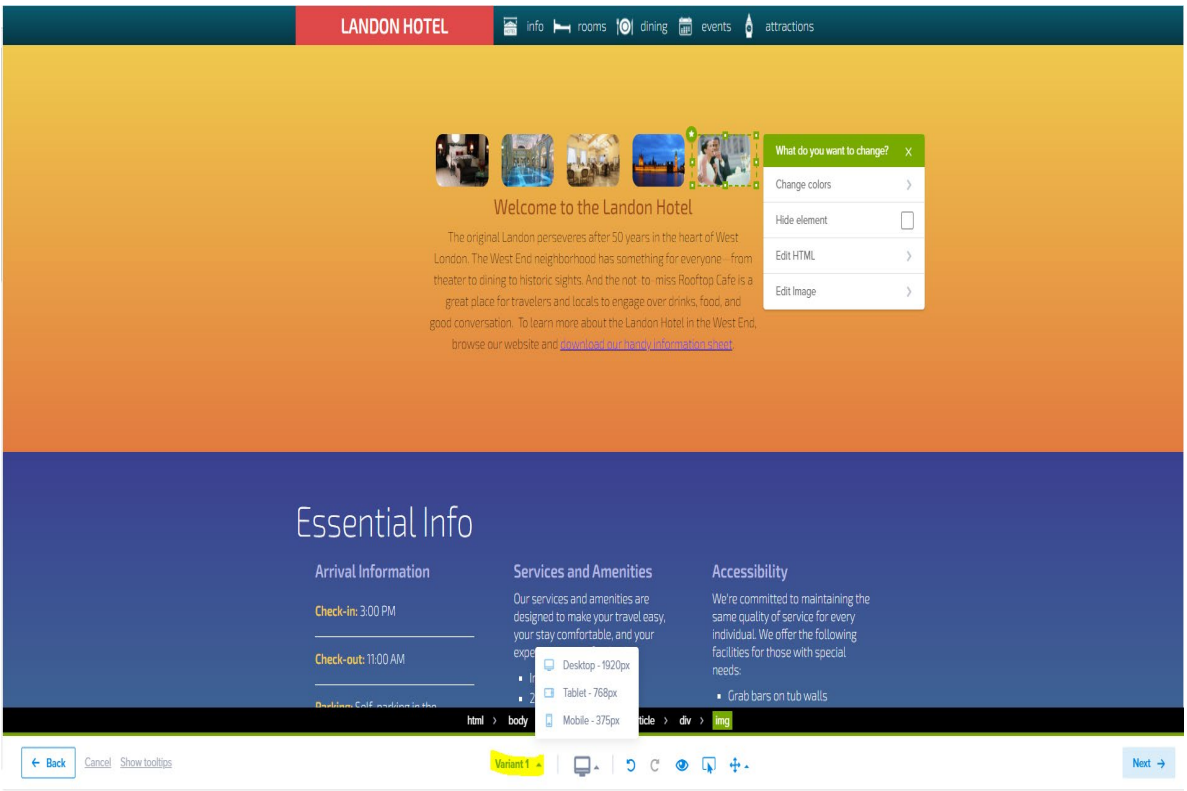
i. Crazy Egg Dashboard



j. Version A of Landon Hotel Website (original design)

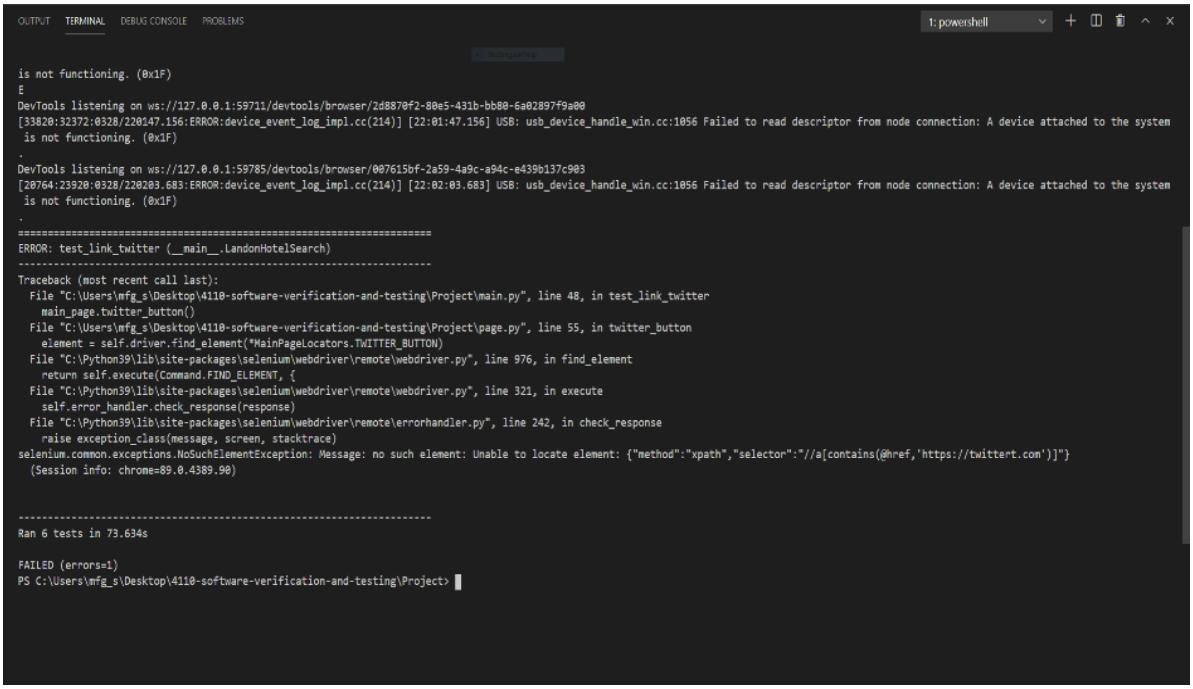


k. Version B of Landon Hotel Website (variant B)



15.2 Screenshots from Selenium Testing

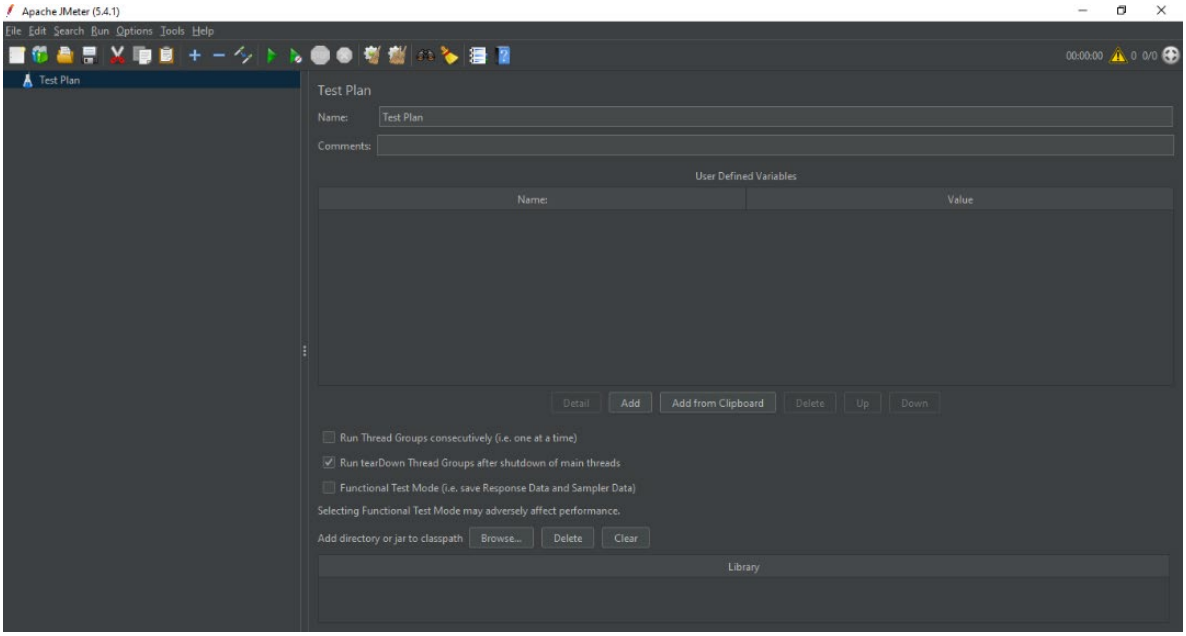
a. Testing Results Screen, Showing Six (6) Tests Passed and One (1) Failed



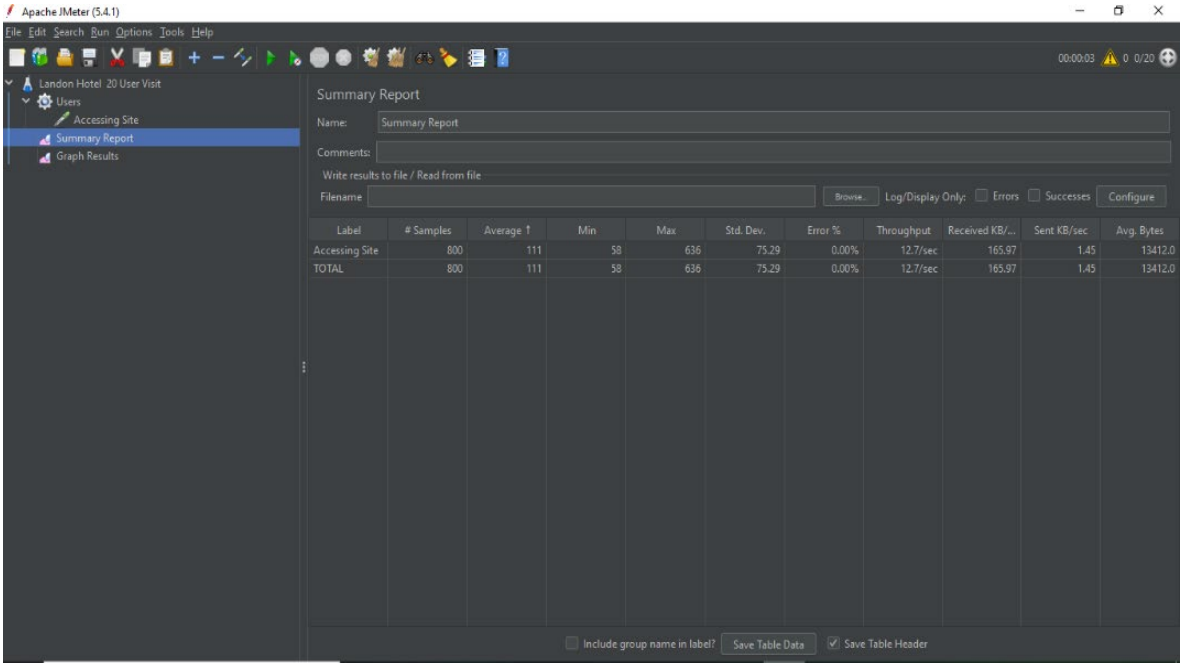
b. All tests passed After Fixing the Error

15.3 Screenshots from JMeter Testing

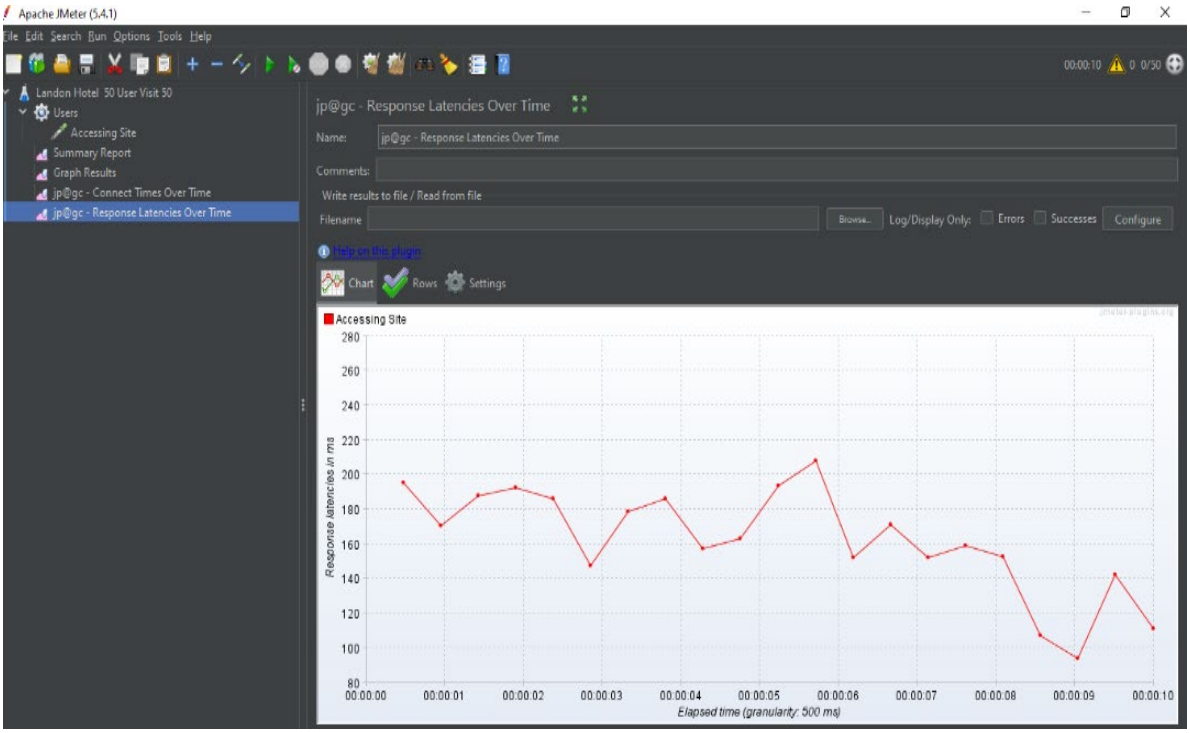
a. JMeter Graphical User Interface (GUI)



b. Results Table for Users Visits to the Landon Hotel Website



c. *Graph Representing the Response Time for 50 Users Visit*



d. *Graph Representing the Response Time for 500 Users Visit*