DEPARTMENT OF SOFTWARE ENGINEERING

Software Testing (SE-302)

DELHI TECHNOLOGICAL UNIVERSITY

(Formerly Delhi College of Engineering)

Testing Websites – Adobe and DTU

Final Report

SUBMITTED TO

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Commercial Website – ADOBE

We have chosen Adobe as our commercial website for testing. The link for the website is given here: https://www.adobe.com/in/

• Introduction to the Company

1. **Adobe Inc.** is an American multinational computer software company. It is incorporated in Delaware and headquartered in San Jose, California.

2. Adobe has historically specialized in software for the creation and publication of a wide range of content, including graphics, photography, illustration, animation, multimedia/video, motion pictures and print.

3. The company has expanded into digital marketing management software.

4. Adobe has millions of users worldwide. Flagship products include: Photoshop image editing software, Adobe Illustrator vector-based illustration software, Adobe Acrobat Acrobat Reader and the Portable Document Format (PDF).

5. The company also hosts tools primarily for audio-visual content creation, editing and publishing.

Here is a snapshot of the website :
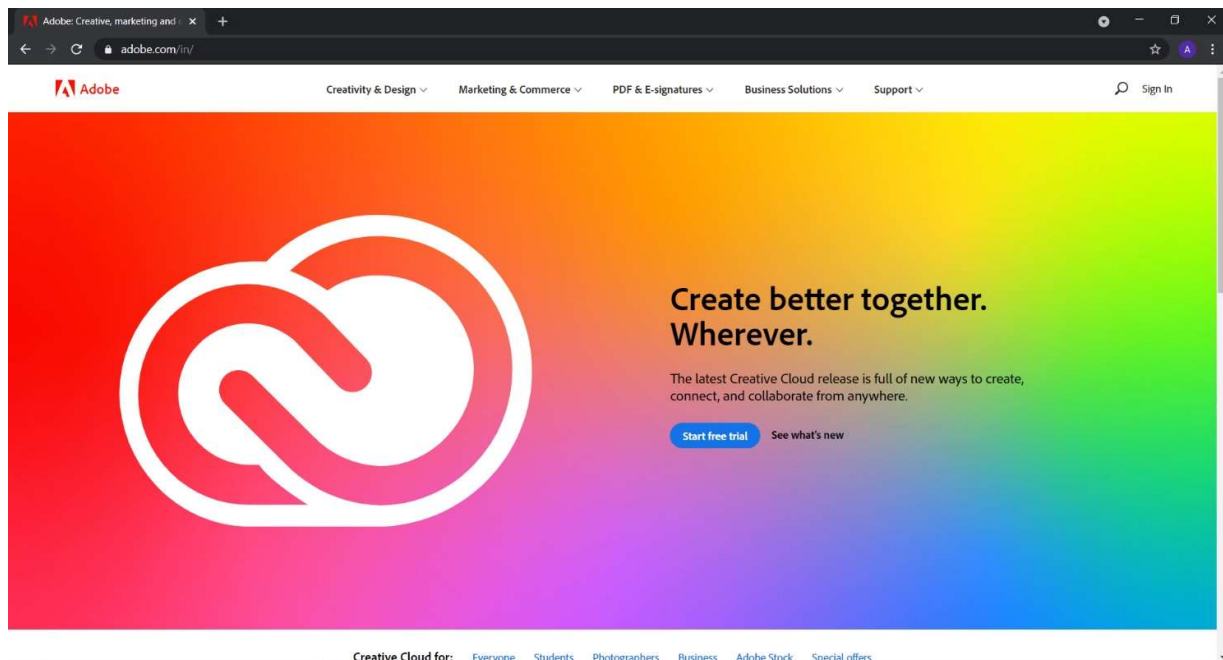
FUNCTIONAL TESTING

FUNCTIONAL TESTING is a type of software testing that validates the software system against the functional requirements/specifications. The purpose of Functional tests is to test each function of the software application, by providing appropriate input, verifying the output against the Functional requirements.

Functional testing mainly involves black box testing and it is not concerned about the source code of the application. The prime objective of Functional testing is checking the functionalities of the software system. It mainly concentrates on:

- **Mainline functions**: Testing the main functions of an application
- **Basic Usability**: It involves basic usability testing of the system. It checks whether a user can freely navigate through the screens without any difficulties.
- **Accessibility**: Checks the accessibility of the system for the user
- **Error Conditions**: Usage of testing techniques to check for error conditions. It checks whether suitable error messages are displayed.

We tested the following 10 functionalities of the Adobe website:

1. Registering into the website.
2. Browsing the software but not purchasing it.
3. Browsing the software with special offers.
4. Search the software with filters applied.
5. Login in to the website for purchasing a software.
6. Login into the website for purchasing 7-day free trial software.
7. Login into the website to contact Adobe customer service.
8. Contact Adobe customer service without login into the website.
9. Login in to the website to make Profile changes in edit profile section.
10. Login in to the website to delete the account.

Test cases ID	Test Scenario	Description (Steps followed)	Inputs	Expected output	Pass/Fail
TC01	Registering a user to the website.	Register on the website by filling up the register form.	Email address: ashish1234@gmail.com First name: Ashish Last name: Kumar Password: Hello123 DOB:15 Jan 2000	If the information entered by the user is valid, the user's information is successfully added into the database and he is successfully	Pass

				registered, otherwise an appropriate an error message is displayed.	
TC02	Browsing the software in the View all products section. but not purchasing it.	Search the software to decide which items to purchase.	Search string Input: Photoshop	List of all softwares searched are correctly displayed.	Pass
TC03	Browsing the software with special offers	Click on Special offer tag in View all product section	-	All the special offers are displayed.	Pass
TC04	Searching a software with filters applied.	Click on "Desktop" checkboxes to view only desktop softwares.	TYPES ☑ Desktop ☐ Mobile ☐ Web	List of all softwares with the selected filter are correctly displayed.	Pass
TC05	Login into the website for purchasing a software.	1. Login into the site.	Email address: ashish1234@gmail.com Password: Hello123	If all the information entered by the user is valid, and selected software stored in the database is available, then the software is purchased by the user after successful payment and database gets updated.	Pass
		2. Select software to be purchased and its plan (monthly or yearly).	Product: Photoshop Plan: Monthly		
		3. Choose the mode of payment.	Credit Card/Debit Card		
		4. Fill the necessary details and proceed to payment by clicking on "Place secure order" button.	Card number: 4563-1010-3567-8765 Security Code:365 Expiration Month: 01|Jan Expiration Year: 2022 First name: Ashish		

		5. Confirm the payment to successfully purchase the software.	Last name: Kumar PINCODE:110092 Country Region: India		
TC06	Login into the website for purchasing 7-day free trial software.	1. Login into the site. 2. Select software to be purchased and click on Free trial button. 3. Choose the mode of payment. 4. Fill the necessary details and proceed to free trial by clicking on "Start Free trial" button.	Email address: ashish1234@gmail.com Password: Hello123 Product: Photoshop Plan: 7-day free trial Mode of payment: Credit Card/Debit Card Card number: 4563-1010-3567-8765 Security Code:365 Expiration Month: 01|Jan Expiration Year: 2022 First name: Ashish Last name: Kumar PINCODE:110092 Country Region: India	If all the information entered by the user is valid, and selected software stored in the database is available, then the software is available for 7-day trial for user and database gets updated. However, after 7 days trial full price money got deducted from the bank.	Pass
TC07	Login into the website to contact Adobe customer service	1. Login into the site. 2. Go to Help center section which is mentioned in Header's part Support. 3. Click on Chat button to chat with Virtual assistant.	Email address: ashish1234@gmail.com Password: Hello123	When logged in to the site, user is not able to chat with virtual assistant. It shows the following error: "Welcome, User. Please contact your administrator for help".	Fail

TC08	Contact Adobe customer service without login into the website.	1. Go to Help center section which is mentioned in Header's part Support. 2. Click on Chat button to chat with Virtual assistant 3. Click on Get started button to chat with sales expertise for answers.	Input: string "Price of adobe After Effects"	Virtual assistant is not able to get the issue, it just keeps echoing "Can you describe the issue more specifically?" After sometime, the virtual assistant automatically connects to the customer service person.	Fail (when user is chatting with virtual assistant) Pass (when user is chatting with customer service person)
TC09	Login in to the website to make Profile changes in edit profile section.	In edit profile section, user can update his Profile photo, First name and Last name and also can change his account password. User is also able to add mobile number and secondary email address.	Email address: ashish1234@gmail.com Password: Hello123 Upload image: myphoto.jpg First name: Ashish Last name: Kumar Confirm your current password: Hello123 Enter your new password: School1234 Mobile number:9711783764 secondary email address: ashishk124@gmail.com	If the information entered by the user is valid, the user's information is successfully updated into the database at the same time.	Pass
TC10	Login in to the website to delete the account.	In edit profile section, user can delete his account by going to privacy section and then press on Delete Account button.	Email address: ashish1234@gmail.com Password: Hello123	Account is successfully deleted.	Pass

Findings of Functional Testing:

- The website satisfies all the basic functionalities that a product-based website must have.
- The website was able to perform the above tasks comfortably, but fails in some cases.
- The website lists out all the facilities that are offered by the adobe with images and features.
- There are separate columns and sections for important links and resources offered by the adobe.
- Once the user is registered and details are saved, there is no need to re-enter information to register again to access website as it is saved in the database.
- Changes made in edit profile are saved and reflected in the database at the same time.
- The database is updated whenever user purchased any software. Information like credit card/debit card details are saved to database for future use.
- Searching of software is also performing nicely. Also results are showing at the same time when user is using filter option, this indicates that extraction from database is very quick.

User Interface Testing

1. Navigation Testing

Navigation tests analyse how users navigate through the website or application, given a specific task or goal. The results help hone critical user flows, and improve information architecture.

By the help of Navigation Testing one can check the following set of objects in a website:

- All pages of your site are understandable and easy to use.
- Buttons, shapes, and fields are convenient for use.
- There is an access to the Main menu from all pages.

Broken Links using Selenium

We used an automated tool called Selenium to test the broken links in the website. Selenium is a portable framework for testing web applications. Selenium provides a playback tool for authoring functional tests without the need to learn a test scripting language.

Below is the python code used to find the broken links:

import requests

import urllib3

import pytest

```python
from requests. exceptions import MissingSchema, InvalidSchema, InvalidURL

from selenium import webdriver

from selenium.webdriver.common.by import By


broken_links = 0

valid_links = 0


urllib3.disable_warnings(urllib3.exceptions.InsecureRequestWarning)

driver = webdriver.Chrome(r'C:\Users\Ashish\Downloads\chromedriver_win32 (1)\chromedriver.exe')

driver.maximize_window()

driver.get('http://dtu.ac.in')

links = driver.find_elements(By.CSS_SELECTOR, "a")


for link in links:
    try:
        request = requests.head(link.get_attribute('href'), data ={'key':'value'})
        print("Status code of " + link.get_attribute('href') + " is " + str(request.status_code))
        if (request.status_code == 404):
            broken_links = (broken_links + 1)


    else:
            valid_links = (valid_links + 1)


    except requests.exceptions.RequestException as e:
        print("\nError:",e,"\n")


 print("Detection of broken links completed with " + str(broken_links) + " broken links and " + str(valid_links) + " valid links")
```

- Through selenium, a total of 87 valid links were tested and it was found that there were zero broken links having server code 404.


```
File    Edit    View    Insert    Cell    Kernel    Widgets    Help

+    ✂    ⧉    ❏    ↑    ↓    ▶ Run    ■    C    ⏩    Code    ▼    ⌨

Status code of https://www.adobe.com/pt/ is 200
Status code of https://www.adobe.com/ro/ is 200
Status code of https://www.adobe.com/sa_en/ is 200
Status code of https://www.adobe.com/ch_de/ is 200
Status code of https://www.adobe.com/si/ is 200
Status code of https://www.adobe.com/sk/ is 200
Status code of https://www.adobe.com/ch_fr/ is 200
Status code of https://www.adobe.com/fi/ is 200
Status code of https://www.adobe.com/se/ is 200
Status code of https://www.adobe.com/ch_it/ is 200
Status code of https://www.adobe.com/tr/ is 200
Status code of https://www.adobe.com/ae_en/ is 200
Status code of https://www.adobe.com/uk/ is 200
Status code of https://www.adobe.com/bg/ is 200
Status code of https://www.adobe.com/ru/ is 200
Status code of https://www.adobe.com/cis_ru/ is 200
Status code of https://www.adobe.com/ua/ is 200
Status code of https://www.adobe.com/ae_ar/ is 200
Status code of https://www.adobe.com/mena_ar/ is 200
Status code of https://www.adobe.com/il_he/ is 200
Status code of https://www.adobe.com/sa_ar/ is 200
Status code of https://www.adobe.com/au/ is 200
Status code of https://www.adobe.com/hk_en/ is 200
Status code of https://www.adobe.com/in/ is 200
Status code of https://www.adobe.com/nz/ is 200
Status code of https://www.adobe.com/sg/ is 200
Status code of https://www.adobe.com/sea/ is 200
Status code of https://www.adobe.com/th_en/ is 200
Status code of https://www.adobe.com/cn/ is 200
Status code of https://www.adobe.com/hk_zh/ is 200
Status code of https://www.adobe.com/tw/ is 200
Status code of https://www.adobe.com/jp/ is 200
Status code of https://www.adobe.com/kr/ is 200
Status code of https://www.adobe.com/in/# is 200


Detection of broken links completed with 0 broken links and 87 valid links
```

- However, by using third party web application,
  - (a) DeadLink Checker - https://www.deadlinkchecker.com/
  - (b) DrLinkCheck - https://www.drlinkcheck.com/
    we found the following broken links:

Broken links with server code 404:

- https://acrobat.adobe/es/eu
- https://acrobat.adobe.com/hr/hr/
- https://www.adobe.com/akam/11/384b3bf
- https://www.adobe.com/creativecloud/features.mp4
- https://www.adobe.com/ca_fr/offer-terms/cc-full-puf-special-offer.html
- https://www.adobe.com/supportservice/
- https://www.adobe.com/products/photoshop/selector
- https://www.adobe.com/events/executivecouncil
- https://www.adobe.com/*products/adobeconnect/enterprise/trial.html

2. <u>HTML and CSS Testing using W3C Validation Service</u>

HTML- 7 errors, 5 warning(s)
https://validator.w3.org/nu/?doc=https%3A%2F%2Fwww.adobe.com%2Fin%2F

CSS- 24 errors
https://jigsaw.w3.org/css-validator/validator?uri=www.adobe.com%2Fin&profile=css3svg&usermedium=all&warning=1&vextwarning=&lang=en

<u>Navigation testing test cases</u>

Test cases ID	Description	Inputs	Expected output	Remarks
TC01	Check all the header links on each web page	Link1- Creativity & Design Link2- Marketing & Commerce Link3-PDF & E-signatures Link4-Business Solution Link5-Support	Appropriate web page is opened with respect to each link. Appropriate horizontal and vertical scroll bars are present and the user can view the page contents properly.	Header contains following headings which in turn contains various links and all the links are working fine.
TC02	Check all the links which are mentioned in footer of each web page	Link1-Shop For Link2-For Business Link3-For Education Link4-For Mobile Link5-Experience Cloud Link6-Support Link7-Resources Link8-Adobe	Appropriate web page is opened with respect to each link.	Footer contains following headings which in turn contains various links and all the links are working fine.
TC03	Search for softwares in the View all products page.	Search string	The user is able to navigate across multiple search pages successfully.	When user provides string in search bar, then results are showed from which the user is able to view softwares.

TC04	Click on 'back' link present on each page.	-	The appropriate page is displayed.	-

3. <u>Form Based Testing</u>

There was a total of 3 forms present on the Adobe website. The forms were as follows:

1. Register form

2. Login form

3. Payment form

<u>Register Form</u>

Note: Since there were a lot of fields present in the forms, we have separate tables and test cases for each one of them.

Email validation

Testcases ID	Description	Inputs	Expected output	Remarks
TC01	Check the Email text field that has an Email address without @ symbol.	testgmail.com	It should show the validation message for valid email.	Error message is displayed – "please enter an email address".
TC02	Check the Email text field that has a random string instead of a real email.	abcd	It should show the validation message for valid email.	Error message is displayed – "please enter an email address".
TC03	Check the Email text field that has @ symbol written in words.	testAttherategmail.com	It should show the validation message for valid email.	Error message is displayed – "please enter an email address."
TC04	Check the Email text field that has a missing dot in the email address.	test@gmailcom	It should show the validation message for valid email.	Error message is displayed – "please enter an email address".
TC05	Check the Email text field that has a number instead of a real email.	12345	It should show the validation message for valid email.	Error message is displayed – "please enter an email address".
TC06	Check the Email text field that has blank spaces instead of a real email.	-	It should show the validation message for valid email.	Error message is displayed – "please enter an email address".
TC07	Verify that system generates a validation message when entering existing email address.	abc123@gmail.com test123@gmail.com	It should show the validation message for valid email.	Error message is displayed – "An account with this email address already exists."

Testcases ID	Description	Inputs	Expected output	Remarks
TC08	Check the invalid email (means that doesn't exist)	ashish12398@gmail.com aryan12378@gmail.com	email should not be accepted as a valid email address.	Green tick appears signalling that it's a valid email address. Register successfully.
TC09	Check the valid email that has @ as well as dot in it.	ashishkr737@gmail.com aryanbansal123@gmail.com	email should be accepted as a valid email address.	Green tick appears signalling that it's a valid email address. Register successfully.

First name validation

Testcases ID	Description	Inputs	Expected output	Remarks
TC01	Check the First name text field that has special characters	test# test%$ #$ %	It should not be accepted as valid first name.	Green tick appears signalling that it's a valid first name. Register successfully.
TC02	Check the First name text field that has numeric digits.	Test123 1234	It should not be accepted as valid first name.	Green tick appears signalling that it's a valid first name. Register successfully.
TC03	Verify that system generates a validation message when entering existing first name.	Ashish Aryan	First name should be accepted as a valid name.	Green tick appears signalling that it's a valid first name. Register successfully.

TC04	Check the First name text field that has name in uppercase or in lowercase.	test TEST ABC ABcd	First name should be accepted as a valid name.	Green tick appears signalling that it's a valid first name. Register successfully.
TC05	Check the First name text field that has name in different language apart from English.	आशीष आर्यन	First name should be accepted as a valid name.	Green tick appears signalling that it's a valid first name. Register successfully.
TC06	Check the First name text field that has blank spaces instead of a valid name.		It should show the validation message for valid first name.	Error message is displayed – "Please enter your first name."
TC07	Check the valid first name.	Ashish Aryan Test123 ABcd test%$	First name should be accepted as a valid name.	Green tick appears signalling that it's a valid first name. Register successfully.

Last name validation

Testcases ID	Description	Inputs	Expected output	Remarks
TC01	Check the Last name text field that has special characters	test# test%$ #$ %	It should not be accepted as valid last name.	Green tick appears signalling that it's a valid last name. Register successfully.

TC02	Check the Last name text field that has numeric digits.	Test123 1234	It should not be accepted as valid last name.	Green tick appears signalling that it's a valid last name. Register successfully.
TC03	Verify that system generates a validation message when entering existing Last name.	Ashish Aryan	Last name should be accepted as a valid name.	Green tick appears signalling that it's a valid last name. Register successfully.
TC04	Check the Last name text field that has name in uppercase or in lowercase.	test TEST ABC ABcd	Last name should be accepted as a valid name.	Green tick appears signalling that it's a valid last name. Register successfully.
TC05	Check the Last name text field that has name in different language apart from English.	आशीष आर्यन	Last name should be accepted as a valid name.	Green tick appears signalling that it's a valid last name. Register successfully.
TC06	Check the Last name text field that has blank spaces instead of a valid name.		It should show the validation message for valid last name.	Error message is displayed – "Please enter your last name."
TC07	Check the valid Last name.	Ashish Aryan Test123 ABcd test%$	Last name should be accepted as a valid name.	Green tick appears signalling that it's a valid last name. Register successfully.

Password validation

Testcases ID	Description	Inputs	Expected output	Remarks
TC01	Check the password limit when entered value length is less than minimum length.	test# abc123	It should not be accepted as valid password.	Error message is displayed – "should contain atleast 8 characters".
TC02	Check the Password field that has only numeric digits (doesn't contain any letters).	1234567890	It should not be accepted as valid password	Error message is displayed – "should contains both lower (a-z) and upper-case letters (A-Z)"
TC03	Check the Password field that has only special characters (doesn't contain any letters and numeric digits).	#$%^@#$%	It should not be accepted as valid password	Error message is displayed – "should contains both lower (a-z) and upper-case letters (A-Z)" and "should contains at least one number (0-9) or a symbol".
TC04	Check the Password field that has only letters (doesn't contain any numeric digit).	ABCDabcd asSHashu TesTinggg	Password should be accepted as a valid password.	Error message is displayed – "should contains at least one number (0-9) or a symbol".
TC05	Verify that system generates a validation message when entering Password that has name in it.	Ashish12345 Aryan4567	Password should be accepted as a valid password.	Error message is displayed – does not contain your name or email address.

TC06	Check the password field that has blank spaces.	-	It should show the validation message for valid password.	Error message is displayed – "Please enter a password."
TC07	Check the valid password.	Test12211 Abcd1234#$ ABcd@#123	Password should be accepted as a valid password.	Green tick appears signalling that it's a valid password. Register successfully.

Date of Birth validation

Testcases ID	Description	Inputs	Expected output	Remarks
TC01	Check the DOB field when user entered date and year contains decimal point.	Day: 1.2 year: 20.87	It should not be accepted as valid DOB.	Error message is displayed – "please enter your date of birth."
TC02	Check the DOB field when user entered Date and year below/beyond the valid range.	Day: 0 year: 2055 Day: 32 year: 0000 Day: -1 year: -1233	It should not be accepted as valid DOB.	Error message is displayed – "please enter your date of birth."
TC03	Check the DOB field when user tried to enter special characters any letters.	Day: Abc year: #@	It should not be accepted as valid DOB.	Special characters and letters are not accepted in DOB field.
TC04	Check the DOB field when user didn't provide date and year.		It should show the validation message for valid DOB.	Error message is displayed – "please enter your date of birth.

TC05	Check the DOB field when user choose date 31 for the months having 30 days.	Month: April Day: 31 Month: June Day: 31	It should not be accepted as valid DOB.	Error message is displayed – "please enter your date of birth."
TC06	Check the DOB field if it's not a leap year and day is greater than 28 for the month of February.	Month: February Day: 29 year: 2003	It should not be accepted as valid DOB.	Error message is displayed – "please enter your date of birth."
TC07	Check the DOB field if it's a leap year and day is greater than 29 for the month of February.	Month: February Day: 30 year: 2000	It should not be accepted as valid DOB.	Error message is displayed – "please enter your date of birth."
TC08	Check the DOB field if it's a leap year and day is less than equal to 29 for the month of February.	Month: February Day: 29 year: 2000	It should be accepted as valid DOB.	Green tick appears signalling that it's a valid DOB. Register successfully.
TC09	Check the valid DOB.	Month: January Day: 15 year: 2000 Month: May Day: 27 year: 1945	DOB should be accepted as a valid DOB.	Green tick appears signalling that it's a valid DOB. Register successfully.

Login Form

Email validation

Testcases ID	Description	Inputs	Expected output	Remarks
TC01	Check the Email text field that has an Email address without @ symbol.	testgmail.com	It should show the validation message for valid email.	Error message is displayed – "please enter an email address".
TC02	Check the Email text field that has a random string instead of a real email.	abcd	It should show the validation message for valid email.	Error message is displayed – "please enter an email address".
TC03	Check the Email text field that has @ symbol written in words.	testAttherategmail.com	It should show the validation message for valid email.	Error message is displayed – "please enter an email address."
TC04	Check the Email text field that has a missing dot in the email address.	test@gmailcom	It should show the validation message for valid email.	Error message is displayed – "please enter an email address".
TC05	Check the Email text field that has a number instead of a real email.	12345	It should show the validation message for valid email.	Error message is displayed – "please enter an email address".
TC06	Check the Email text field that has blank spaces (means user doesn't provide email).	-	It should show the validation message for valid email.	Error message is displayed – "please enter an email address".

Testcases ID	Description	Inputs	Expected output	Remarks
TC07	Check the invalid email which is not registered.	ashishkr73@gmail.com aryan123@gmail.com	email should not be accepted as a valid email address.	Error message is displayed – "We couldn't find an account with that email address."
TC08	Check the valid email which is registered.	ashishkr737@gmail.com aryan12378@gmail.com	email should be accepted as a valid email address.	Green tick appears signalling that it's a valid email address and proceeds to enter password.

Password validation

Testcases ID	Description	Inputs	Expected output	Remarks
TC01	Check the password limit when entered value length is less than minimum length.	test# abc123	It should not be accepted as valid password.	Error message is displayed – "That's an incorrect password. Try again."
TC02	Check the Password field that has only numeric digits (doesn't contain any letters).	12345	It should not be accepted as valid password	Error message is displayed – "That's an incorrect password. Try again."
TC03	Check the Password field that has only special characters (doesn't contain any letters and numeric digits).	#$%^@#$%	It should not be accepted as valid password	Error message is displayed – "That's an incorrect password. Try again."

TC04	Check the password field that has blank spaces.		It should show the validation message for valid password.	Error message is displayed – "That's an incorrect password. Try again.
TC05	Check the valid password.	Test12211 Abcd1234#$ ABcd@#123	Password should be accepted as a valid password.	Login successfully.

Payment Form

Credit/Debit Card Number validation

Testcases ID	Description	Inputs	Expected output	Remarks
TC01	Check the card number field when entered value length is greater than maximum length i.e. greater than 16	2345-1234-7896-2341-97	It should show the validation message for valid card number.	Error message is displayed – "Card number is incorrect".

TC02	Check the card number field when entered value length is less than minimum length i.e. less than 16	2345-1234	It should show the validation message for valid card number.	Error message is displayed – "Card number is incorrect".
TC03	Check the card number field when user tried to enter special characters or any letters.	Abcd @#abc	It should not be accepted as valid card number.	Special characters and letters are not accepted in card number field.
TC04	Check the card number field when user entered invalid card number (means that card doesn't exist in any bank)	5596-1234-8764-3196	It should show the validation message for valid card number.	Error message is displayed – "invalid card number".
TC05	Check the card number field that has blank spaces (means user doesn't provide Card number).		It should show the validation message for valid card number.	Error message is displayed – "Required field".
TC06	Check all the valid card number (means card exists).	4563-1010-3567-8765	Number should be accepted as a valid card number.	Green tick appears signaling that it's a valid card number.

Expiration Month validation

Testcases ID	Description	Inputs	Expected output	Remarks
TC01	Check the Expiration Month field when user enters invalid Expiration Month (means that is not associated with entered valid card number).	07 | July	It should not be proceed to payment.	Payment will not proceed.
TC02	Check the Expiration Month field when user enters wrong expiration month (means that month has been passed already).	02 | February Year : 2021	It should show the validation message for valid Expiration Month.	Error message is displayed – "Card is expired".
TC03	Check the Expiration Month field when user didn't provide month.		It should show the validation message for valid Expiration Month.	Error message is displayed – "Required field".
TC04	Check the valid Expiration Month field (means that is associated with entered valid card number).	05 | May	Month should be accepted as a valid Expiration Month.	Payment will proceed.

Expiration Year validation

Testcases ID	Description	Inputs	Expected output	Remarks
TC01	Check the Expiration Year field when user enters invalid Expiration year (means that is not associated with entered valid card number).	2021	It should not proceed to payment.	Payment will not proceed.
TC02	Check the Expiration Year field, when user didn't provide year.	-	It should show the validation message for valid Expiration year	Error message is displayed – "Required field".
TC03	Check the valid Expiration Year field (means that is associated with entered valid card number).	2023	Number should be accepted as a valid Expiration year.	Payment will proceed.

Security Code validation

Testcases ID	Description	Inputs	Expected output	Remarks
TC01	Check the Security Code field when entered value length is greater than maximum length i.e. greater than 3.	2345 12345	It should show the validation message for valid Security Code.	Error message is displayed – "Security Code is incorrect".

TC02	Check the Security Code field when entered value length is less than minimum length i.e. less than 3	23 1	It should show the validation message for valid Security Code.	Error message is displayed – "Security Code is incorrect".
TC03	Check the Security Code field when user tried to enter special characters or any letters.	Abcd @#abc	It should show the validation message for valid Security Code.	Error message is displayed – "Security Code is incorrect".
TC04	Check the Security Code field when user enters invalid Security Code (means that is not associated with entered valid card number).	123	It should not proceed to payment.	Payment will not proceed.
TC05	Check the Security Code field that has blank spaces (means user doesn't provide Security code).		It should show the validation message for valid Security Code.	Error message is displayed – "Required field".
TC06	Check the valid Security Code field (means that is associated with entered valid card number).	345 676	Number should be accepted as a valid Security Code.	Payment will proceed.

First name validation

Testcases ID	Description	Inputs	Expected output	Remarks
TC01	Check the First name text field that has special characters.	test# test%$ #$ %	It should not be accepted as valid first name.	Error message is displayed – "Name can't include special symbols."
TC02	Check the First name text field that has numeric digits.	1234	It should not be accepted as valid first name.	Error message is displayed – "Name can't include special symbols."
TC03	Check the First name text field that has name in uppercase or in lowercase.	test TEST ABC ABcd	First name should be accepted as a valid name.	It's a valid first name. Payment will proceed.
TC04	Check the First name text field that has name in different language apart from English.	आशीष आर्यन	First name should not be accepted as a valid name.	Error message is displayed – "Name can't include special symbols."
TC05	Check the First name text field that has blank spaces (means user doesn't provide name).		It should show the validation message for valid first name.	Error message is displayed – "Required field".
TC06	Check the invalid first name when user enters wrong first name (means that is not associated with entered	Ankit Anmol Shreya	It should not proceed to payment.	Payment will not proceed.

Testcases ID	Description	Inputs	Expected output	Remarks
	valid card number).			
TC07	Check the valid first name (means that is associated with entered valid card number).	Ashish Aryan	First name should be accepted as a valid name.	It's a valid first name. Payment will proceed.

Last name validation

Testcases ID	Description	Inputs	Expected output	Remarks
TC01	Check the Last name text field that has special characters	test# test%$ #$ %	It should not be accepted as valid Last name.	Error message is displayed – "Name can't include special symbols."
TC02	Check the Last name text field that has numeric digits.	1234	It should not be accepted as valid Last name.	Error message is displayed – "Name can't include special symbols."
TC03	Check the Last name text field that has name in uppercase or in lowercase.	test TEST ABC ABcd	Last name should be accepted as a valid name.	It's a valid Last name. Payment will proceed.
TC04	Check the Last name text field that has name in different language apart from English.	आशीष आर्यन	Last name should not be accepted as a valid name.	Error message is displayed – "Name can't include special symbols."

TC05	Check the Last name text field that has blank spaces (means user doesn't provide name).		It should show the validation message for valid Last name.	Error message is displayed – "Required field".
TC06	Check the invalid Last name when user enters wrong first name (means that is not associated with entered valid card number).	Ankit Anmol Shreya	It should not proceed to payment.	Payment will not proceed.
TC07	Check the valid Last name (means that is associated with entered valid card number). .	Ashish Aryan	Last name should be accepted as a valid name.	It's a valid Last name. Payment will proceed.

PIN Code validation

Testcases ID	Description	Inputs	Expected output	Remarks
TC01	Check the PIN Code field when entered value length is greater than maximum length i.e. greater than 6	11009212 27300213	It should show the validation message for valid PIN Code.	Error message is displayed – "PIN Code is incorrect".
TC02	Check the PIN Code field when entered value length is less than	2345 10034	It should show the validation	Error message is displayed –

			message for valid PIN Code.	"PIN Code is incorrect".
	minimum length i.e. less than 6			
TC03	Check the PIN Code field when user tried to enter special characters or any letters.	Abcd @#abc	It should show the validation message for valid PIN Code.	Error message is displayed – "PIN Code is incorrect".
TC04	Check the PIN Code field when user enters invalid PIN Code (means that is not associated with entered valid card number).	110006	It should not be proceed to payment.	Payment will not proceed.
TC05	Check the PIN Code field that has blank spaces (means user doesn't provide PIN code).		It should show the validation message for valid PIN Code.	Error message is displayed – "Required field".
TC06	Check the valid PIN Code field (means that is associated with entered valid card number).	110010 110092	PIN should be accepted as a valid PIN Code.	Payment will proceed.

Findings of Form Based Testing:

1. Most of the validity checks are working properly.

2. Some of the mandatory fields are not marked with asterisk or with some other sign. However, those are working properly.

3. While registering into the website, i.e. in the register form there are no validity checks for special characters in First & Last name field.

4. In the register form, the system doesn't check whether the email address entered is a valid and existing email. That means, there could be cases where the user email is accepted by the system, but that email doesn't even exist in real.

5. While registering into the website, in register form, there is no maximum length for the password attribute.

2) <u>User Interfaces Testing Checklist</u>

S.No.	Description	Yes/No/NA	Remarks
Hyperlinks			
1.	Are the links meaningful?	Yes	-
2.	Are there any broken links?	Yes	Broken link: https://acrobat.adobe/es/eu
3.	Do all internal links work correctly?	Yes	There are total 85 internal links present in site and each and every link is working properly.
4.	Do all external links work properly?	Yes	https://stock.adobe.com/in/?promoid=XB5KHPR7&mv=other This is the only external link present in the site and is working properly.
5.	Are all links to external sites in the website tested?	Yes	-
6.	Are images correctly hyperlinked?	Yes	This video hyperlink is not working correctly: https://www.adobe.com/creativecloud/features.mp4
7.	Can the user navigate using text only?	Yes	Every page in website has search feature.
8.	Are the hyperlinks' colours standard?	Yes	-
9.	Does the link bring the user to the correct web page?	Yes	-
10.	Does every hyperlink exist on the site map?	NA	-
Tables			
11.	Are the columns wide enough or the text wraps around the rows?	NA	Tables are not present in website.

12.	Are the row and columns headings of tables appropriate?	NA	Tables are not present in website.
13.	Are the complex tables broken down into simpler ones, wherever required?	NA	Tables are not present in website.
14.	Does the user have to scroll right constantly in order to see the contents in a table?	NA	Tables are not present in website.
15.	Are table captions meaningful?	NA	Tables are not present in website.
Frames			
16.	Is every frame associated with a title?	Yes	All frames have title that describes its content.
17.	Can the user resize the frame?	No	User cannot resize the frame. Although frames size is reduced automatically when user access the website in phone.
18.	Is the frame size appropriate?	Yes	-
19.	Does the horizontal and vertical scrollbar appear wherever required?	Yes	Scrollbar is available in every page whenever scroll is required.
20.	Does any frame handling mechanism exist for browsers that do not support frames?	NA	-
Forms			
21.	Are keyboard shortcuts provided for movement between different fields of forms?	Yes	-
22.	Does the tabbing feature traverse the appropriate fields in the correct sequence?	Yes	-
23.	Are the mandatory fields marked correctly?	Yes	It shows error whenever mandatory field is not filled.

24.	Are descriptive labels for all the fields provided?	Yes	-
25.	Is information formatted, wherever required (for example, date format may be in mm/dd/yyyy)	Yes	-
26.	Are error messages meaningful and appropriate?	Yes	Some error messages are meaningless, like if special characters are entered in email address field, it is showing error "please enter an email address" instead of special characters are not allowed.
27.	Does the size of the text fields give enough room for the user to type?	Yes	-
28.	Are fields used appropriately?	Yes	-
29.	Is any information asked more than once in the form? Is the user prevented from entering the same data multiple times?	No	-
30.	Does the form include a 'reset' button to clear its contents?	No	Register, Login and payment form doesn't have any RESET button.
Text fields, Buttons, List boxes, Check boxes			
31.	Do the text fields accept invalid characters and special characters?	Yes	First name, Last name, Security code field is accepting special characters.
32.	Can text be selected using shift + arrow key?	Yes	-
33.	Is the user able to select any combination of options in check boxes?	NA	Form doesn't contain any check boxes.
34.	Can the user select more than one option in radio buttons?	NA	Form doesn't contain any radio buttons.

35.	Does the button click trigger the required action?	Yes	-
36.	Can the user add text in the list boxes?	No	User can only select options from the list boxes.
37.	Can the user add text in the combo boxes?	No	User can only select options from the list boxes.
38.	Do the required commands and options exist in each menu?	NA	-
39.	Are abbreviations used in list boxes/buttons?	No	-
40.	Are the label names meaningful?	Yes	-
41.	Are mouse actions consistent across web pages?	Yes	-
42.	Is red colour used to highlight active items (many users are colour bind)?	Yes	Red colour is used if mandatory fields are not filled and also if some error is occurred in the text field.
43.	Is all the data inside the list/combo box listed in chronological order?	Yes	-
44.	Are validations checks for the fields present?	Yes	All fields have validation checks.
45.	Do fields with numeric values handle upper and lower range of values appropriately (BVA)?	Yes	Password, Card number and Security code field is handling BVA testing.
46.	Does the back-navigation button work as required?	Yes	-
47.	Do the text fields accept maximum permissible data?	Yes	-

S.No.	Description	Response	Remarks
48.	Can an alphanumeric character be entered in numeric fields?	Yes	Special characters are allowed to enter in security code field.
49.	Are the command buttons disabled when they are not in use?	Yes	-
50.	Are there any spelling or grammatical mistakes in captions or labels?	No	No such spelling or grammatical mistake was encountered while testing the website.

USABILITY TESTING

Usability Testing also known as User Experience (UX) Testing, is a testing method for measuring how easy and user-friendly a software application is. A small set of target end-users, use software application to expose usability defects. Usability testing mainly focuses on user's ease of using application, flexibility of application to handle controls and ability of application to meet its objectives. It helps in checking the following requirements:

1. Effectiveness
2. Completeness
3. Learnability
4. Clarity
5. Accuracy

We created the following Questionnaire for the purpose of Usability Testing for ADOBE website.

S.No.	Description	Response	Remarks
Introduction			
1.	Do all labels and hyperlinks display a meaningful title?	Yes	All the hyperlinks are appropriately labelled on the website.
2.	Does any internal or external link provide incorrect details?	No	-

3.	Are appropriate error messages displayed wherever required?	Yes	-
4.	Do you frequently encounter problems in the application or not?	Less	-
5.	At what points mistakes or difficulties were encountered?	Few broken links and problem faced in contact us section.	• Broken link: https://acrobat.adobe/es/eu • When user is logged in, he is not able to chat with customer service.
Efficiency			
6.	How easily are features and updates downloadable?	NA	-
7.	How easily are common tasks performed?	Very easy	-
8.	How frequently are errors encountered while navigating through the web application?	Very less	-
9.	Is the response time a cause of frustration?	No	-
10.	Are there any major flaws encountered while using the web application? If yes, state them.	No	-
11.	How many pages are accessed to complete a task?	3 to 4 on average	-
12.	How quickly does the web application recover from an error?	NA	-
Completeness			
13.	Are some features/topics missing from the web application? If yes, then specify.	Yes	Essential info. like Contact number or email address for raising any issue is not provided.

14.	Are any additional controls required?	No	-
15.	To what degree are you satisfied with the application?	High	-
16.	Are web pages well designed?	Yes	-
17.	Does the online help and documentation provide enough information?	No	Only few FAQ questions are answered in Help section.
Learnability			
18.	How easily is the user able to learn the features (buttons, clicks, hyperlinks) of the web page?	Very easy	-
19.	Are the links, menus and lists easily understandable?	Yes	-
20.	How often is the search feature used?	Less	Everything is presented in very good way, so searching is used quite less.
21.	How easy is it to return to the home page?	Very easy	By clicking on Adobe logo
22.	Are the symbols, icons and tables meaningful? If not, which are the problematic ones?	Yes	-
23.	Can the features be used without any help or assistance?	Yes	Those who don't know about these things as much may face problem to access features.
Clarity and accuracy of online and written documentation			
24.	Is the terminology well understood?	Yes	-
25.	How easily are the topics found in the online help?	Easily	Answers to some frequently issues are listed in different columns in help section.

26.	What is the most frequent reason for using online help?	Login, payment, account issues	-
27.	Are the topic contents sufficient in the help?	Less	Only few FAQ questions are answered in Help section.
28.	How frequently was the required topic found in the help?	Less	-
29.	How easily are you able to switch between online help and interface in order to complete a specific task?	Easily	We can easily chat with customer service person.
30.	Is online help useful when error messages are encountered?	Useful	-
31.	Do menus, lists, hyperlinks, tool bars and tables operate as stated?	Yes	Except few broken links- https://acrobat.adobe/es/eu
32.	Are the steps to compete a task correctly stated?	Yes	Steps to do payment, for registering, to view particular software, everything are labeled nicely.
33.	How helpful is the content related to topics?	Useful	Labels are provided for each topic. But information regarding software details is provided in less amount.
General			
34.	What are your suggestions for improving the web application?	- Provide more info about software. - Provide contact information. - Provide Add to Cart feature.	Only a few details and features about the software are mentioned. They should provide each and every information, details about the software in suitable amount, so that user easily get to understand the working and functions of the software and to judge whether it's going to be useful for the user or not.

			Essential info. like Contact number or email address for raising any issue should be provided so that if chatting with bot, doesn't help customer, then he can raise his issue through call or email. If user wants to purchase 3 or more softwares, then he needs to purchase them separately, but if Adobe provides cart option, then user is able to add all those softwares in cart and can purchase them at once, rather than purchasing them separately. So, they should provide the add to cart option as well for better convenience of customer.
35.	How easily is the information available in the various sections (such as 'about us', 'contact us')?	Very easily	-
36.	In context to other competitive applications, the given web application was found to be:	Very easy	-
37.	Would you like to use this web application frequently?	High	-
38.	Is correcting the mistakes easy or difficult?	Easy	If user did any mistake in form, then respective error is displayed and if user does mistake in making account, then site provides edit profile option to correct their mistakes. So, correcting the mistakes is easy. Also, if we make any mistake, then we can easily do chat with customer service person to solve the issue.

39.	Do you use menu options or shortcut keys?	Yes	-
40.	How will you overall rate the web application?	Very good, 8 out of 10	https://www.adobe.com/in/ is very good website. It is hard to detect any bug in it and everything is organized and displayed very nicely.

- **Findings and Suggestions of Usability Testing**

1. It is hard to detect any bug in the current Adobe website with respect to Usability testing. It gives the impression of a complete, efficient and reliable website.
2. The UI of the website is quite amazing. All the text, images, links and forms are displayed seamlessly.
3. There is no delay in loading the webpage signalling that the response time is very less.
4. The information available in all the sections are quite easy understandable and perfectly displayed.
5. The searching functionality is also very good and adds to the better usability of the website.
6. There could be some additional functionalities that we would like to suggest. For example –
   a. Add to cart option is missing. The user needs to individually pay for all the softwares that he/she wants to purchase.
   b. Only few details and features about the software are mentioned which is not enough to completely understand the software functionality.
7. The overall user experience of the web application is quite good.

CONFIGURATION AND COMPATIBILITY TESTING

Configuration Testing is a software testing technique in which the software application is tested with multiple combinations of software and hardware in order to evaluate the functional requirements and find out optimal configurations under which the software application works without any defects or flaws.

Compatibility Testing is a type of Software testing to check whether your software is capable of running on different hardware, operating systems, applications, network environments or mobile devices. Compatibility Testing is a type of Non-functional testing.

Browser's Compatibility Matrix

Manual Testing

Browsers		Google Chrome	Mozilla Firefox	Microsoft edge	Internet explorer	Safari
Audio		✓	✓	✓	✓	✓
Video		✓	✓	✓	✓	✓
Text		✓	✓	✓	✓	✓
Platforms	Windows 10 Windows 8 Windows 7 MacOS Android 8 Android 9 Android 10 Android 11	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓	✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
Form		✓	✓	✓	✓	✓

✓ represents site's elements is working properly in all above mentioned browsers

Configuration and Compatibility Testing Checklist

S.No.	Description	Response	Remarks
1.	Are Java source code/scripts, ActiveX controls, other scripts used by the application?	Yes	If we disable the JavaScript from the website, then site will not open.
2.	Is the application compatible with different peripherals (input and output devices)?	Yes	-
3.	Is the application compatible with different hardware configuration?	Yes	We tested the website in different OS like windows 10, windows 7 and macOS.

4.	Is the application compatible with different mobile phones?	Yes	We tested the website in different mobile phones like Samsung M31 & M51, Redmi note 5, iphone X
5.	Do text, graphics and animations display properly with browsers under test?	Yes	Everything is displayed same across different browsers.
6.	Are different printers compatible with various web browsers?	Yes	-
7.	Are web browsers compatible with various user interface items of the web application?	Yes	The site was opening in a proper way in each of the web browsers.
8.	Are cookies accepted by the web browsers?	Yes	Cookies are accepted by default in different browsers.
9.	Are different font sizes verified on different web browsers?	Yes	Font size is same across different browsers.
10.	Are the security tools being used?	Yes	Adobe site makes use of https protocol. Making it a secured website. Also, we cannot penetrate to their database, so they are using high level of security.

Automated Testing

We used PowerMapper tool to test the compatibility of the website.

Link to the whole report: https://try.powermapper.com/Demo/Report/21eee1a4-b30c-4f5d-b62d-b3b87216b873

The PowerMapper tool was able to identify 3 major and 2 minor issues in Internet explorer having version 11 or less.

SECURITY TESTING

Security Testing is a type of Software Testing that uncovers vulnerabilities of the system and determines that the data and resources of the system are protected from possible intruders. It ensures that the software system and application are free from any threats or risks that can cause a loss. Security testing of any system is focuses on finding all possible loopholes and weaknesses of the system which might result into the loss of information or repute of the organization.

The goal of security testing is to:
- To identify the threats in the system.
- To measure the potential vulnerabilities of the system.
- To help in detecting every possible security risk in the system.
- To help developers in fixing the security problems through coding.

We performed security testing using automated testing tools like **Immnuniweb** and **Pentest**.

The bargraph which is shown below was tested by pentest auomated tool. It indicates that adobe is at low risk. There are no high or medium risk ratings.

This is the overall summary of https://www.adobe.com/in Website Security Test using immuniweb testing tool.

https://www.immuniweb.com/websec/?id=uaGNoN6k

The key highlights of the testing are presented in the image below. The website received an overall 'A' grade signalling the website is quite secure from potential attacks.

Security Testing Checklist

S.No.	Description	Yes/No/NA	Remarks
Authentication, Access Control and Privacy			
1.	Are unauthorized users restricted from viewing private data?	Yes	-
2.	Is sensitive organization information restricted from public access?	Yes	-
3.	Are users aware of the privacy polices?	Yes	User can see privacy policy in bottom of every webpage.
4.	Are legal consequences of policies known to the user?	Yes	-
5.	Are authentication mechanisms adequate to prevent malicious intrusion to the application?	Yes	-
6.	Does the web application ask for login id and password?	Yes	It does have login option.
7.	Does the web server lock the users who try to access the website multiple times with invalid login ids/passwords?	Yes	After 10 unsuccessful attempts, the following error is displayed - "Your account is undergoing maintenance". So basically, a user is blocked after 10 unsuccessful attempts.
8.	Have you tested the combinations of invalid and valid login ids/passwords?	Yes	It only lets the user log in when all the entered fields match the details stored in the database.

9.	Is there any provision for forget/change password?	Yes	It does have forgot password and change password option.
10.	Are the levels of authentication defined?	No	-
Firewall			
11.	Does the firewall properly implement all the security policies of the company?	NA	No WAF (web application firewall) is detected while doing security testing.
12.	Are firewalls' adequacy tested?	NA	No WAF (web application firewall) is detected
13.	Is the security in charge aware of the known faults in the firewalls	NA	No WAF (web application firewall) is detected
14.	Is the location of the firewall effective?	NA	No WAF (web application firewall) is detected
15.	Is any penetration possible in the security boundaries created by a firewall?	NA	No WAF (web application firewall) is detected
Data Security			
16.	Are the data validations tested?	Yes	Validity Checks are present in all forms.
17.	Is sensitive information (such as password, credit card number) displayed in the text field while typing?	Yes	User can view entered password by clicking on eye button.

18.	Are privileges to access data enforced?	Yes	-
19.	Are file download permissions established and tested?	Yes	-
20.	Is sensitive and important data kept at secure locations?	Yes	-
Encryptions			
21.	Are encryption standards enforced?	Yes	But they are outdated and need to be updated to newer versions.
22.	Is there any procedure followed to identify what is to be encrypted?	No	-
23.	Is sensitive information (such as password, credit card number) encrypted?	Yes	-
24.	Is Security Socket Layer (SSL) used to provide encryption of sensitive elements?	Yes	-
25.	Does the enforcement of encryption standard affect the speed of the web page?	No	-
Virus			
26.	Are mechanisms used to identify and remove viruses?	NA	-
27.	Are anti-virus softwares scheduled for periodical updates?	NA	-
28.	Does the anti-virus software identify the unprotected sites?	NA	-
29.	Are viruses sent for analysis to the anti-virus software company?	NA	-
30.	Are users trained for virus prevention and recovery procedures?	NA	-
31.	Is the procedure for handling a virus attack adequate?	NA	-

32.	Are users alerted from downloading insecure items?	Yes	-
33.	Is legitimate anti-virus software installed on the client's machine?	No	-
34.	Is virus scan scheduled periodically?	NA	-
35.	Is spyware removal software installed and run periodically?	NA	-
Failure Management and Recovery			
36.	Are back-ups schedules at defined intervals?	No	-
37.	Does the recovery take a long time?	No	-
38.	In case of site crash, is there any provision to route to another server?	No	-
39.	Have recovery mechanisms been defined and tested?	NA	-
40.	Is any criteria followed to ensure the completion and correction of recovery procedures?	NA	-
General			
41.	Are any warning messages issued when the user enters or leaves the secured website?	Yes	-
42.	Is the user allowed to login with the same account from different machines (simultaneously)	Yes	Can log in from different devices with the same account at the same time.
43.	Are unauthorized external sites identified and screened out?	NA	-
44.	Can the previous page be accessed after signing out from the website?	No	-
45.	Is the user able to access restricted pages after the session is timed out?	No	User is not able to purchase software if he is not logged in to the site.

46.	Is auditing performed periodically in order to keep a record of all the operations?	NA	-
47.	Are all payment methods tested thoroughly?	Yes	-
48.	Are enough security mechanisms enforced, if customer registration is compulsory on your website?	Yes	-
49.	Does the application use digital signature to sign a file?	NA	-
50.	Does the source code reveal any critical information?	No	-

- **Findings of Security Testing:**

1. HTTP Content Security-Policy security header is missing.
   The Content-Security-Policy (CSP) header activates a protection mechanism implemented in web browsers which prevents exploitation of Cross-Site Scripting vulnerabilities (XSS). If the target application is vulnerable to XSS, lack of this header makes it easily exploitable by attackers.

2. No WAF (Web Application Firewall) is detected.
   They should implement a WAF to protect the website against common web attacks.

3. Website CMS (Content management system) or its components seems to be outdated.
   a. Site is built using React (version 16.14.0)
   b. The component is outdated. No known security vulnerabilities found. They should update to the most recent version 17.0.2.

4. SSL/TLS encryption seems to be present which provides data encryption.

5. HTTP X-XSS-Protection security header is missing
   The X-XSS-Protection HTTP header instructs the browser to stop loading web pages when they detect reflected Cross-Site Scripting (XSS) attacks. Lack of this header exposes application users to XSS attacks in case the web application contains such vulnerability.

6. The cookie has Secure and HttpOnly attributes set. Prevents browsers to send cookie over an insecure connection.

PERFORMANCE TESTING

Performance Testing is a software testing process used for testing the speed, response time, stability, reliability, scalability and resource usage of a software application under particular workload. The main purpose of performance testing is to identify and eliminate the performance bottlenecks in the software application. It is a subset of performance engineering and also known as "Perf Testing".

The focus of Performance Testing is checking a software program's

- Speed - Determines whether the application responds quickly.
- Scalability - Determines maximum user load the software application can handle.
- Stability - Determines if the application is stable under varying loads.

We used **Locust tool** to test performance of the website. Locust is an easy to use, scriptable and scalable performance testing tool. We also used **Apache JMeter** to perform automation testing on Adobe website.

The parameters set for conducting this test are:

1. Number of users per second is increasing gradually from 500, 1000, 2000, 3000, 4000 to 5000.
2. Number of users spawns per second is 100.

Following are the charts that are generated by Locust:
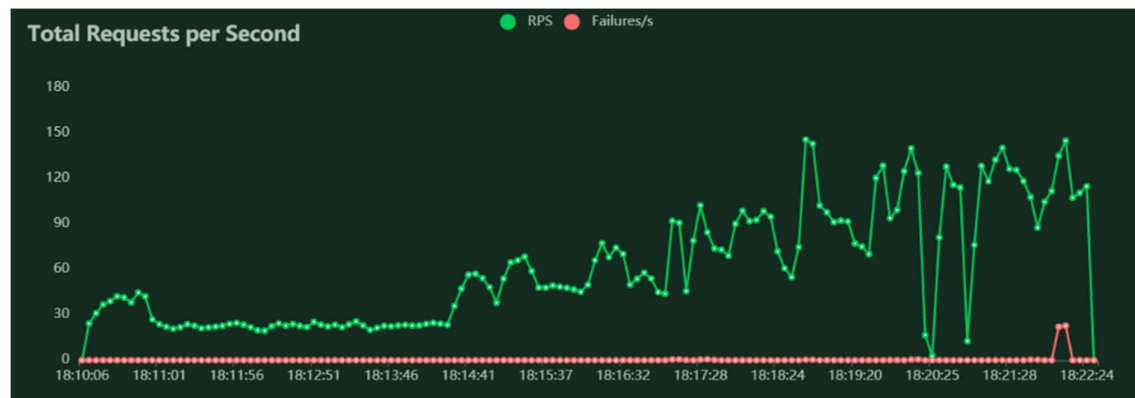
- The pie chart shows that **96.72%** of the HTTP requests made to the website are successful whereas **3.28%** leads to errors.

- The **threshold** for load testing was found to be **5000 users/sec**. After this is achieved, the website faults start increasing at a steep rate.

- The distribution of response times ranges is depicted below:

📊 **Response Time Overview**
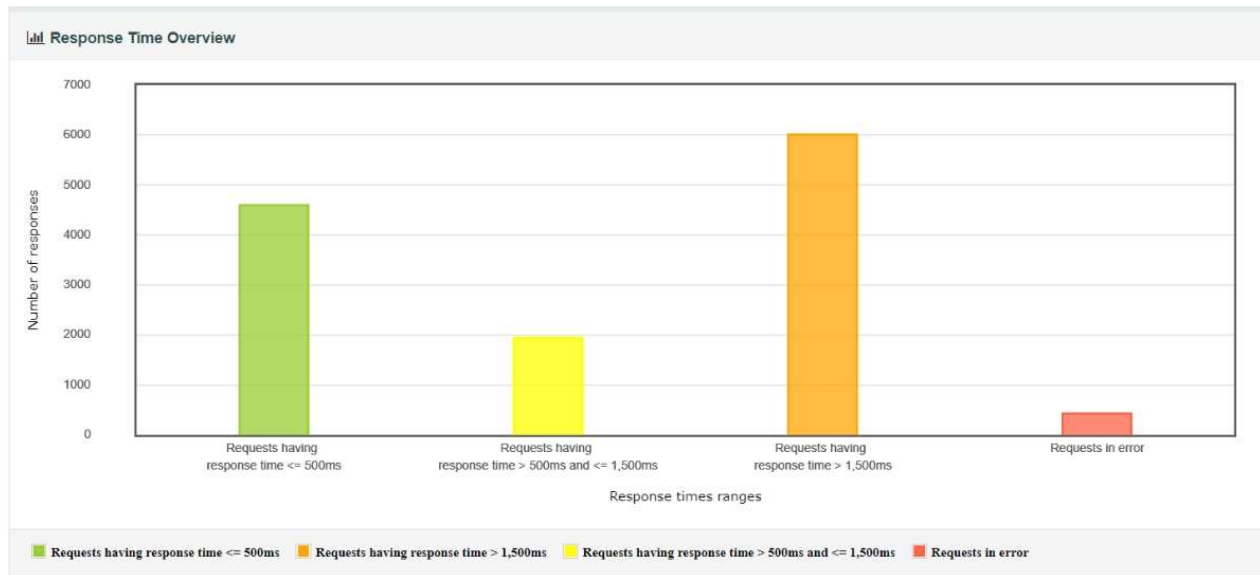
- The average Response time of adobe website is 10.57 seconds and maximum response time is 259.33 seconds (as stated in table below).

Statistics

Requests		Executions			Response Times (ms)							Throughput	Network (KB/sec)	
Label	#Samples	FAIL	Error %	Average	Min	Max	Median	90th pct	95th pct	99th pct		Transactions/s	Received	Sent
Total	12972	426	3.28%	10570.36	6	259333	1326.00	22304.00	43275.70	232942.36		50.02	4180.58	7.50
HTTP Request	4324	213	4.93%	15855.63	42	259333	4083.00	33241.50	67695.00	257981.75		16.67	2090.29	3.75
HTTP Request-0	4324	0	0.00%	731.15	6	98883	142.00	1319.50	2968.00	9248.25		18.19	3.00	2.10
HTTP Request-1	4324	213	4.93%	15124.30	29	259054	3391.00	31624.50	64553.50	256898.75		16.69	2089.83	1.83

Performance Testing Checklist

S. No.	Description	Yes/No/NA	Remarks
USERS			
1.	Have the maximum number of users been identified for the web application?	Yes	Threshold of adobe is 5000 users/second. At this rate, failure rate comes in existence.
2.	Is complexity of the system determined?	NA	-
3.	Are peak hours identified?	NA	-
4.	Is the duration of session of users analysed?	NA	-
5.	Have the type of users been identifies?	Yes	The application is targeted to users of all age but is used by a maximum of young to middle aged generation.
RESPONSE TIME			
6.	Is the response time calculated?	Yes	Avg response time is 10.57 seconds.
7.	Is the maximum response time determined?	Yes	Its 259.33 seconds
8.	Does the response time need the established threshold?	NA	-
9.	Are break points identified for planning load test?	NA	-
10.	Are the causes of crash at the break point identified?	NA	-
DATABASE			
11.	Is the maximum database capacity identified?	NA	-

12.	Are the past experiences with the database documented?	NA	-
13.	Is load sharing and balancing facility available?	NA	-
14.	Does the application read the database content correctly?	Yes	-
15.	Does the application write the database content correctly?	Yes	-
TOOLS			
16.	Are load testing tools identified?	Yes	Locust, Apache Jmeter is used for load testing.
17.	Are the employee trained?	NA	-
18.	Is the load testing tool compatible with the platform?	Yes	-
19.	Is external support available for the tool?	Yes	-
GENERAL			
20.	Are there any disk space limitation?	NA	-
21.	Are people with required skill sets available?	No	-
22.	Has the item and number of iterations required for testing being identified?	NA	-
23.	Are rules for concurrency control being followed?	NA	-
24.	Is the maximum wait time before failure determined?	NA	-
25.	Are memory requirements and disk space usage identified?	NA	-

DATABASE TESTING

Database Testing is important in software testing because it ensures the following things:
1. Data values and information received and stored into database are valid or not.
2. It helps to save data loss.
3. It saves aborted transaction data.
4. It ensures that there is no unauthorized access to the information.

NOTE: To perform database testing we took the manual approach as admin access was not present.

The following test cases were considered while doing the database testing on the Adobe testing:

- Searching a software in the View all products section.
- Searching an item with filters applied.
- Registering a user to the website.
- Login into the website.
- Changes in edit profile section.
- Purchasing a software on the website.

Test case ID	Description (Steps followed)	Inputs	Expected Output	Pass/Fail
Search a software in the View all products section.				
TC1	Search the software to decide which items to purchase.	Search string Input: Photoshop	List of all softwares searched are correctly displayed from the database that satisfy the search criteria selected by the user.	Pass
Searching a software with filters applied.				
TC2	Click on "Desktop" checkboxes to view only desktop softwares.	TYPES ☑ Desktop ☐ Mobile ☐ Web	List of all softwares with the selected filter are correctly displayed.	Pass
Registering a user to the website.				
TC3	Register on the website by filling up the form.	Email address: ashish1234@gmail.com First name: Ashish Last name: Kumar	If the information entered by the user is valid, the user's information	Pass

| | | Password: Hello123
DOB:15 Jan 2000 | is successfully added into the database and he is successfully registered, otherwise an appropriate an error message is displayed. | |

Login into the website and purchasing a software.

TC4.	Login into the site.	Email address: ashish1234@gmail.com Password: Hello123	If all the information entered by the user is valid, and selected software stored in the database is available, then the software is purchased by the user after successful payment and database gets updated.	Pass
	Select software to be purchased and its plan (monthly or yearly).	Product name: Photoshop Plan: Monthly		
	Choose the mode of payment.	Credit Card/Debit Card		
	1. Fill the necessary details and proceed to payment by clicking on "Place secure order" button.	Card number: 4563-1010-3567-8765 Security Code:365 Expiration Month: 01|Jan Expiration Year: 2022 First name: Ashish Last name: Kumar PINCODE:110092 Country Region: India		
	Confirm the payment to successfully purchase the software.	-		

Changes in edit profile section.

TC5.	In edit profile section, user can update his Profile photo, first name and last name and also can change his account password.	Upload image: myphoto.jpg First name: Ashish Last name: Kumar	If the information entered by the user is valid, the user's information is successfully updated into the	Pass

		Confirm your current password: Hello123 Enter your new password: School1234	database at the same time.	

Findings:

- The website was able to perform the above test cases comfortably, signifying a good database connection and suitable data retrieval methods.
- Once the user is registered and details are saved, there is no need to re-enter information to register again to access website as it is saved in the database.
- Once the user is registered, they can easily login using the credentials used at the time of registration.
- Changes made in edit profile are saved and reflected in the database at the same time.
- The database is updated whenever user purchased any software. Information like credit card/debit card details are saved to database for future use.
- Searching of software is also performing nicely. Also, results are showing at the same time when user is using filter option, this indicates that extraction from database is very quick.

Educational Website – DTU

We have chosen Delhi Technological University's website as our educational website for testing. The link for the website is given here: http://dtu.ac.in/

- ## Introduction to the Institution

  1. Delhi Technological University (DTU), formerly known as the Delhi College of Engineering (DCE) is a state university in New Delhi, India. It was established in 1941 as Delhi Polytechnic.
  2. DTU offers courses towards Bachelor of Technology (B.Tech), Bachelor of Technology (B.Tech Evening), Bachelor of Arts (Hons.) Economics, Bachelor of Design (B.Des), Master of Technology (MTech), Master of Science (MSc), Doctor of Philosophy (PhD), Master of Business Administration (M.B.A.) and Bachelor of Business Administration (B.B.A.).
  3. Among engineering colleges, Delhi Technological University was ranked 1st by Times Engineering Rankings 2020,[33] 9th by Outlook India in 2020.[34] It was ranked 9th among colleges by India Today in 2020.[30] The National Institutional Ranking Framework (NIRF) ranked it 36th in the engineering ranking of 2020.

Here is a snapshot of the DTU website:
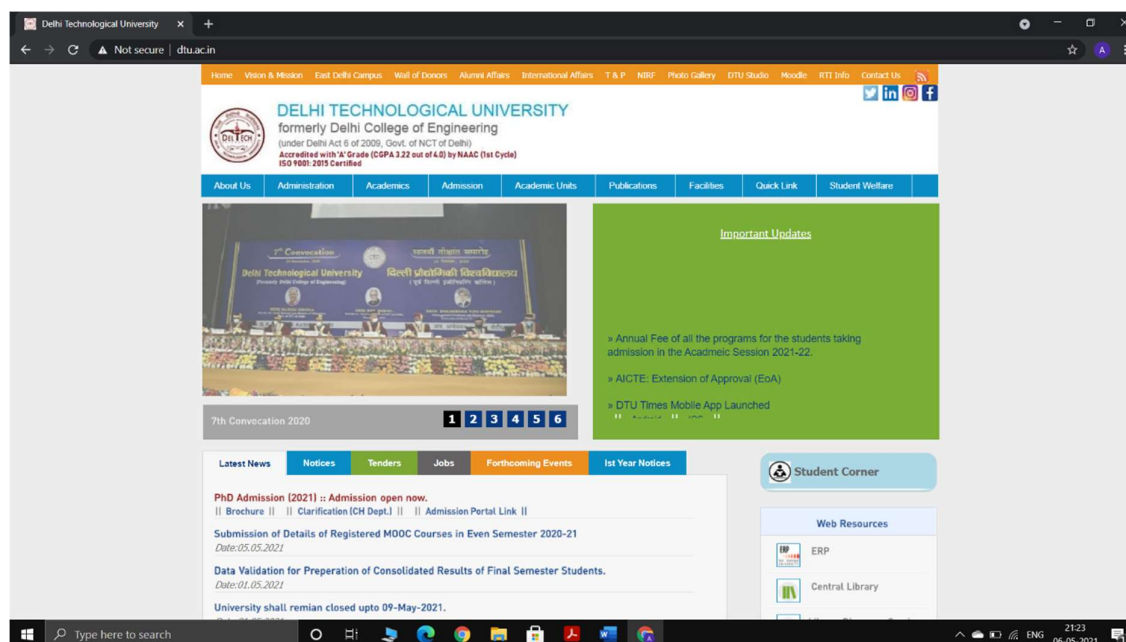
FUNCTIONAL TESTING

We identified the following functionalities for an institutional website like DTU:

1. Latest updates about Admission in different academic programs
2. Checking latest notices
3. Checking latest tenders
4. Checking latest jobs
5. Forthcoming Events
6. Information about DTU Administration
7. Information about academic departments
8. Publications
9. Facilities offered by DTU campus
10. Social Networking Handles of DTU
11. Links to all web resources of DTU

Test Cases ID	Test Scenario	Description (Steps followed)	Expected Output	Actual Output	Pass/Fail
TC01	Latest updates about Admission in different academic programs.	1. Click on the 'Admission' tab present on top of the website homepage. 2. Choose the required program.	All the latest news about the different academic programs must be visible to the user, with appropriate dates mentioned.	The updates are regularly updated on the website. The user is able to see all the updates about the required program.	Pass
TC02	Checking latest notices	1. Click on the 'Notices' tab present on the website homepage. 2. Scroll and search the required notice on the website. 3. Click on the particular notice to download it.	All the latest notices must be visible to the user, with appropriate dates of upload mentioned.	The notices section is well updated and all the required notices are present on the website.	Pass

TC03	Checking latest tenders	1. Click on the 'Tenders' tab present on the website homepage. 2. Scroll and search for the required notice on the website. 3. Click on the particular tender to download it.	All the latest tenders must be visible to the user, with appropriate dates of upload mentioned.	The tenders section is well updated and all the required tenders are present on the website.	Pass
TC04	Checking latest jobs	1. Click on the 'Jobs' tab present on the website homepage. 2. Scroll and search for the required job on the website. 3. Click on the particular job to download info about it.	All the latest jobs must be visible to the user, with appropriate dates of upload mentioned.	The Jobs section is well updated and all the required jobs are present on the website.	Pass
TC05	Forthcoming Events	1. Click on the 'Forthcoming Events' tab present on the website homepage. 2. Scroll and search for the required event on the website. 3. Click on the particular event to download info about it.	All the latest forthcoming events must be visible to the user, with appropriate dates of upload mentioned.	The Forthcoming Events section is well updated and all the required events are present on the website.	Pass

TC06	Information about DTU Administration	1. Click on the 'Administration' tab present on the website homepage. 2. Search for the administration post about which the user wants to know. 3. Click on the administration post to display its information.	Latest information about each and every administration person must be visible to the user.	The Administration section is well updated and all the required information is present on the website.	Pass
TC07	Information about academic departments	1. Click on the 'Academic Units' tab present on the website homepage. 2. Click on the 'Departments' tab present inside the Academic Units tab. 3. Search for the required department.	Latest information about each and every department must be visible to the user.	The information regarding various department s are well updated on the website. The readability of the content in some cases is not well formatted.	Pass
TC08	Publications	1. Click on the 'Publications' tab present on the website homepage. 2. Search for the required publication.	Latest information about each and every publication must be present on the website.	The Publication section is well updated and all the required information about each publication is present on the website.	Pass

TC09	Facilities offered by DTU campus	1. Click on the 'Facilities' tab present on the website homepage. 2. Search for the required facility from the given drop-down menu. 3. Click on the required facility about which you want to know.	Latest information about each and every facility like Library, Computer Centre, Hostels, Guest House etc. must be visible to the user.	The Facilities section is well updated and all the required information about each facility is present on the website.	Pass
TC10	Social Networking Handles of DTU	Click on the social networking sites images present on the top right corner of the website to open them.	The required social networking site handle must be opened and the contents must be properly visible.	The handles are linked correctly with their corresponding images on the website.	Pass
TC11	Links to all web resources of DTU	1. Search for the required web resource from the menu given on the website. 2. Click on the required web resource.	The user must be redirected to the appropriate web resource on which he/she clicks.	All the links are properly working and the user is redirected to the correct webpage.	Pass

Results and Findings of Functional Testing:

- The website satisfies all the basic functionalities that an educational website must have.
- The information on the website is well updated. All the sections, i.e. Notices, Tenders, Jobs, Forthcoming events, latest news about admission, and important updates of the university are updated regularly and the latest update is displayed appropriately on the website.
- All the information is filtered out with respect to the date on which the information is uploaded. It makes it easier for the user to search for the required information on the website.
- The website lists out all the facilities that are offered by the institution with images.
- There are separate columns for important links and resources offered by the institution. This makes the website a one-place-for-all help that is required by the user of the website.

USER INTERFACES TESTING

1. Navigation Testing

Broken Links using Selenium

Through selenium we checked a total of 606 total links. Out of which 11 links were found to be broken links having server code 404.

The 11 broken links are mentioned below:

1. http://dtu.ac.in/index.html
2. http://dtu.ac.in/Web/notice/2020/sep/file0934.pdf
3. http://dtu.ac.in/Web/notice/2020/sep/file0935.pdf
4. http://dtu.ac.in/Web/notice/2020/oct/file1020.pdf
5. http://dtu.ac.in/Web/Events/2020/sep/file0901.pdf
6. http://dtu.ac.in/Web/notice/2020/sep/file0929.jpg
7. http://dtu.ac.in/Web/tender/2020/oct/file1001.pdf
8. http://library.dce.edu
9. https://intaffairs.dtu.ac.in
10. http://bioinfoeworkshop.in/registration
11. http://moodle.dtu.ac.in

However, by using the following third party web applications,

      (a) DeadLink Checker - https://www.deadlinkchecker.com/
      (b) DrLinkCheck - https://www.drlinkcheck.com/

we found the following broken links:

https://www.deadlinkchecker.com/website-dead-link-checker.asp

1828 OK 172 failed

https://www.drlinkcheck.com/account/subscriptions/1/projects/1/overview

(stats below)

Broken Links Summary:

- A total of 1500 links were extracted from the DTU website. Out of these 1500 links, 49 links had the error status code 404 – Page Not Found.

- There were 17 links that had timeout error.

Total Links	
1,500	
Issue Types	
404 Not found	49
Timeout	17
5xx Server error	5
Host not found	5
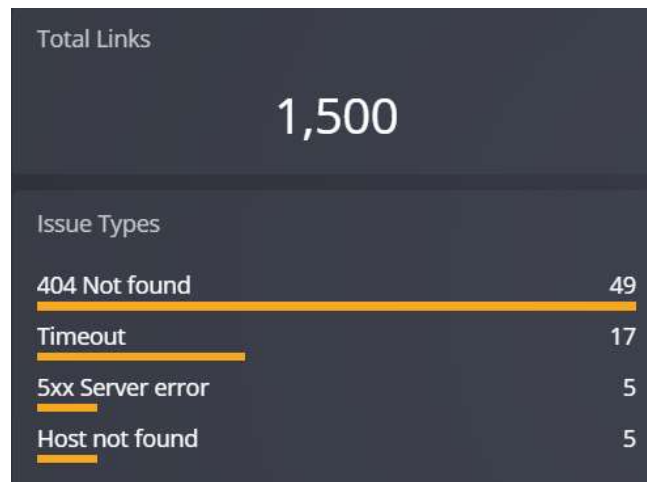
- There was a total of 76 links that had issues.
- The links of different types were checked during the broken links testing. A majority of them (1199) was href links.

Links with Issues	
76	
Link Types	
<a href>	1,199
CSS url()	100
<img src>	95
<script src>	49
<link rel=stylesheet>	42
Start URL	1
<frame src>	1
Other	13
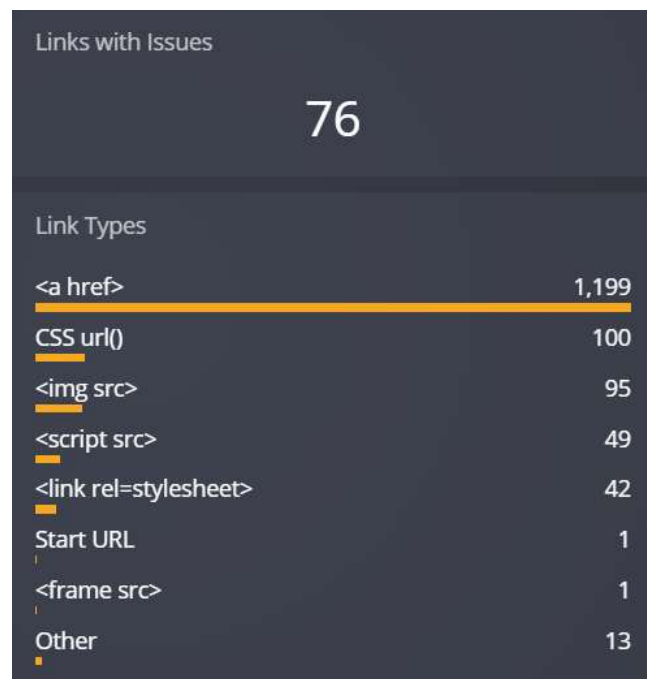
Some of the results snapshots are attached below:

Result	URL
404 Not found	http://alumniaffairs.dtu.ac.in/msgdean.html<a href> Linked from: http://alumniaffairs.dtu.ac.in/ and 10+ more
404 Not found	http://alumni.princeton.edu/pa-scripts/images/facebook.png<img src>OutboundRedirected Linked from: http://alumniaffairs.dtu.ac.in/ and 10+ more
404 Not found	http://alumniaffairs.dtu.ac.in/images/bg.jpgCSS url() Linked from: http://alumniaffairs.dtu.ac.in/alumnitest.css and 3 more
404 Not found	http://alumniaffairs.dtu.ac.in/images/search.pngCSS url() Linked from: http://alumniaffairs.dtu.ac.in/alumnitest.css
404 Not found	http://alumniaffairs.dtu.ac.in/images/leftnav_selectedicon.jpgCSS url() Linked from: http://alumniaffairs.dtu.ac.in/alumnitest.css
404 Not found	http://alumniaffairs.dtu.ac.in/images/button_login_box.pngCSS url() Linked from: http://alumniaffairs.dtu.ac.in/alumnitest.css
404 Not found	http://alumniaffairs.dtu.ac.in/images/alert.pngCSS url() Linked from: http://alumniaffairs.dtu.ac.in/alumnitest.css
404 Not found	http://alumniaffairs.dtu.ac.in/images/button_white_box.pngCSS url() Linked from: http://alumniaffairs.dtu.ac.in/alumnitest.css

Result	URL
404 Not found	http://www.dtu.ac.in/Web/notice/2020/oct/file1020.pdf\<a href\> Linked from: http://www.dtu.ac.in/
404 Not found	http://dtu.ac.in/Web/notice/2020/oct/file1001.pdf\<a href\> Linked from: http://dtu.ac.in/
404 Not found	http://www.dtu.ac.in/Web/notice/2020/oct/file1001.pdf\<a href\> Linked from: http://www.dtu.ac.in/
404 Not found	http://dtu.ac.in/Web/notice/2020/sep/file0935.pdf\<a href\> Linked from: http://dtu.ac.in/
404 Not found	http://www.dtu.ac.in/Web/notice/2020/sep/file0935.pdf\<a href\> Linked from: http://www.dtu.ac.in/
404 Not found	http://dtu.ac.in/Web/notice/2020/sep/file0934.pdf\<a href\> Linked from: http://dtu.ac.in/
404 Not found	http://www.dtu.ac.in/Web/notice/2020/sep/file0934.pdf\<a href\> Linked from: http://www.dtu.ac.in/

Timeout:

Timeout	http://www.samruddhi-india.com:81/images/login_img.gif\<img src\>Outbound Linked from: http://alumniaffairs.dtu.ac.in/form.php
Timeout	https://intaffairs.dtu.ac.in/ \<a href\>

	Linked from: http://dtu.ac.in/ and 1 more
Timeout	http://14.139.251.109/<a href>Outbound Linked from: http://library.dtu.ac.in/
Timeout	https://cumsdtu.in/student_dtu/login/login.jsp<a href>Outbound Linked from: http://dtu.ac.in/ and 1 more
Timeout	http://www.dtu.ac.in/Web/notice/2021/mar/file0340.pdf<a href> Linked from: http://www.dtu.ac.in/
Timeout	http://dtu.ac.in/Web/notice/2021/mar/file0342.pdf<a href> Linked from: http://dtu.ac.in/
Timeout	http://www.dtu.ac.in/Web/notice/2021/mar/file0339.pdf<a href> Linked from: http://www.dtu.ac.in/
Timeout	http://hostels.dtu.ac.in/app8/public/reallot.php<a href> Linked from: http://hostels.dtu.ac.in/
Timeout	http://dtu.ac.in/Web/notice/2021/mar/file0337.pdf<a href> Linked from: http://dtu.ac.in/
Timeout	http://www.dtu.ac.in/Web/notice/2021/mar/file0343.pdf<a href> Linked from: http://www.dtu.ac.in/
Timeout	http://dtu.ac.in/Web/notice/2021/mar/file0328.pdf<a href> Linked from: http://dtu.ac.in/

2. HTML and CSS Testing using W3C Validation Service

As part of White Box Testing, the HTML and CSS code of the website were tested using the W3C Validation Service tool. The following were the errors and warnings that were identified. The links to the entire report are also attached.

HTML- 804 Errors, 78 warning(s)
https://validator.w3.org/check?uri=http%3A%2F%2Fdtu.ac.in%2F&charset=%28detect+automatically%29&doctype=Inline&group=0

CSS- 4 errors, 7 warning(s)
https://jigsaw.w3.org/css-validator/validator?uri=http%3A%2F%2Fdtu.ac.in%2F&profile=css3svg&usermedium=all&warning=1&vextwarning=&lang=en

Navigation testing test cases for DTU

Test cases ID	Description	Inputs	Expected Output	Actual Output	Remarks
TC1	Check all the header links on each web page	Link1 - Homepage Link2 - Vision and Mission Link3 – East Delhi Campus Link4 – Wall of Donors Link5 – Alumni Affairs Link6 – International Affairs Link7 – T & P Link8 – NIRF Link9 – Photo Gallery Link10 – DTU Studio Link11 – Moodle	Appropriate web page is opened with respect to each link.	Appropriate web page is opened with respect to all the links except the following: International Affairs (Timeout Error) - https://intaffairs.dtu.ac.in/ Moodle (Database Connection Error) - http://moodle.dtu.ac.in/	Except two links mentioned, other links are working fine and the corresponding web pages are displayed with respect to each link.

		Link12 – RTI Info Link13 – Contact Us			
TC2	Check all the links on each web page to test the appearance of content on each web page.	Link1 - Homepage Link2 - Vision and Mission Link3 – East Delhi Campus Link4 – Wall of Donors Link5 – Alumni Affairs Link6 – International Affairs Link7 – T & P Link8 – NIRF Link9 – Photo Gallery Link10 – DTU Studio Link11 – Moodle Link12 – RTI Info Link13 – Contact Us	Appropriate horizontal and vertical scroll bars are present and the user can view the page contents properly.	Appropriate horizontal and vertical scroll bars are present and the user can view the page contents properly except for the following links which are not opening: International Affairs (Timeout Error) - https://intaffairs.dtu.ac.in/ Moodle (Database Connection Error) - http://moodle.dtu.ac.in/	Except two links mentioned, other links are working fine and the corresponding web pages are displayed with vertical and horizontal scroll bars, with respect to each link.
TC3	Check all the links to web resources section present on the website.	Link1 - ERP Link2 – Central Library Link3 – Library Discovery Service Link4 – Computer Centre Link5 – Examination and Result Link6 – IQAC	Appropriate web page is opened with respect to each link.	Appropriate web page is opened with respect to all the links.	The links for the Web Resources section are working perfectly.

		Link7 – Equal Opportunity Cell Link8 – CEFO Link9 – HRDC Link10 – DTU Times Link11 – Hostels			
TC4	Check all the links to Important Links section present on the website.	Link1 - NAAC Link2 – ISO 9001 Link3 – NBA Link4 – Mandatory Disclosure Link5 – MHRD-ICT Link6 – UGC Link7 – AICTE Link8 – DTTE Link9 – National Institute of Electronics and IT (NIELIT)	Appropriate web page is opened with respect to each link. Appropriate horizontal and vertical scroll bars are present and the user can view the page contents properly.	Appropriate web page is opened with respect to all the links. Appropriate horizontal and vertical scroll bars are present and the user can view the page contents properly.	The links for the Important Links section are working perfectly.
TC5	Check for 'back button' functionality on each page.	Clicking the 'back button' from each page to check whether it redirects to the previously opened page.	The back button should navigate the user to the previously opened page.	The user is redirected to the previously opened page from each web page.	The 'back button' functionality is perfectly working.

3. <u>User Interfaces Testing Checklist</u>

S.No.	Description	Yes/No/NA	Remarks
Hyperlinks			
1.	Are the links meaningful?	Yes	All the links present in the website are meaningful.
2.	Are there any broken links?	Yes	Some of the broken links: http://moodle.dtu.ac.in/ https://intaffairs.dtu.ac.in/ http://dtu.ac.in/Web/tender/2020/oct/file1001.pdf http://dtu.ac.in/Web/notice/2020/oct/file1020.pdf http://dtu.ac.in/Web/notice/2020/sep/file0934.pdf
3.	Do all internal links work correctly?	Yes	There are total 606 internal links present in site and each and almost all of them are working properly.
4.	Do all external links work properly?	Yes	-
5.	Are all links to external sites in the website tested?	Yes	-
6.	Are images correctly hyperlinked?	Yes	All the images tested are working perfectly.
7.	Can the user navigate using text only?	Yes	-
8.	Are the hyperlinks' colors standard?	No	There are some places in which there are no colors for hyperlinks.
9.	Does the link bring the user to the correct web page?	Yes	All the links navigate the user to the correct webpage.
10.	Does every hyperlink exist on the site map?	Yes	-
Tables			
11.	Are the columns wide enough or the text wraps around the rows?	Yes	-
12.	Are the row and columns headings of tables appropriate?	Yes	All the tables have appropriate names of rows and columns.

13.	Are the complex tables broken down into simpler ones, wherever required?	NA	No such table is present in the website.
14.	Does the user have to scroll right constantly in order to see the contents in a table?	Yes	-
15.	Are table captions meaningful?	Yes	All the table captions are apt.
Frames			
16.	Is every frame associated with a title?	Yes	All frames have title that describes its content.
17.	Can the user resize the frame?	No	User cannot resize the frame. Although frames size is reduced automatically when user access the website in phone.
18.	Is the frame size appropriate?	Yes	-
19.	Does the horizontal and vertical scrollbar appear wherever required?	Yes	Scrollbar is available in every page whenever scroll is required.
20.	Does any frame handling mechanism exist for browsers that do not support frames?	NA	-
Forms			
21.	Are keyboard shortcuts provided for movement between different fields of forms?	NA	No such form is present in the website.
22.	Does the tabbing feature traverse the appropriate fields in the correct sequence?	NA	No such form is present in the website.
23.	Are the mandatory fields marked correctly?	NA	No such form is present in the website.
24.	Are descriptive labels for all the fields provided?	NA	No such form is present in the website.
25.	Is information formatted, wherever required (for example, date format may be in mm/dd/yyyy)	NA	No such form is present in the website.

26.	Are error messages meaningful and appropriate?	NA	No such form is present in the website.
27.	Does the size of the text fields give enough room for the user to type?	NA	No such form is present in the website.
28.	Are fields used appropriately?	NA	No such form is present in the website.
29.	Is any information asked more than once in the form? Is the user prevented from entering the same data multiple times?	NA	No such form is present in the website.
30.	Does the form include a 'reset' button to clear its contents?	NA	No such form is present in the website.
Text fields, Buttons, List boxes, Check boxes			
31.	Do the text fields accept invalid characters and special characters?	Yes	Employee ID and password under the task assignment accepts special characters.
32.	Can text be selected using shift + arrow key?	Yes	-
33.	Is the user able to select any combination of options in check boxes?	NA	Form doesn't contain any check boxes.
34.	Can the user select more than one option in radio buttons?	NA	Form doesn't contain any radio buttons.
35.	Does the button click trigger the required action?	Yes	-
36.	Can the user add text in the list boxes?	NA	No such list box is available.
37.	Can the user add text in the combo boxes?	NA	No such combo box is available.
38.	Do the required commands and options exist in each menu?	Yes	-
39.	Are abbreviations used in list boxes/buttons?	NA	No such list box is available.

40.	Are the label names meaningful?	NA	No such list box is available.
41.	Are mouse actions consistent across web pages?	Yes	-
42.	Is red color used to highlight active items (many users are color bind)?	No	No such differentiation is there at many places inside the website.
43.	Is all the data inside the list/combo box listed in chronological order?	NA	No such list box is available.
44.	Are validations checks for the fields present?	NA	No such field is there.
45.	Do fields with numeric values handle upper and lower range of values appropriately (BVA)?	NA	-
46.	Does the back-navigation button work as required?	Yes	-
47.	Do the text fields accept maximum permissible data?	NA	-
48.	Can an alphanumeric character be entered in numeric fields?	NA	No such field is present in the website.
49.	Are the command buttons disabled when they are not in use?	Yes	-
50.	Are there any spelling or grammatical mistakes in captions or labels?	No	No such spelling or grammatical mistake was encountered while testing the website.

USABILITY TESTING

We created the following Questionnaire for the purpose of Usability Testing for DTU website. Since the testing required detailed and rigorous analysis of the website components, we filled the questionnaire ourselves, instead of asking different users to rate the website.

S.No.	Description	Response	Remarks
Introduction			
1.	Do all labels and hyperlinks display a meaningful title?	No	There are some links such as CSS Valid, XHTML Valid which makes no sense to the end user.
2.	Does any internal or external link provide incorrect details?	No	-
3.	Are appropriate error messages displayed wherever required?	Yes	-
4.	Do you frequently encounter problems in the application or not?	High	There are frequent performance and database issues encountered while testing the website.
5.	At what points mistakes or difficulties were encountered?	Few broken links and problem faced in 'Hostels' section.	• Some of the broken links: https://intaffairs.dtu.ac.in/ http://moodle.dtu.ac.in/ http://www.dtu.ac.in/Web/About/campuxsap.php http://dtu.ac.in/Web/tender/2020/oct/file1002.pdf • The hostel section was not working initially. • The feedback form for the hostels section is not available on the website.
Efficiency			
6.	How easily are features and updates downloadable?	Very Easy	It is very easy to download files from the site. Even the updates are easy to incorporate.

7.	How easily are common tasks performed?	Very easy	-
8.	How frequently are errors encountered while navigating through the web application?	High	There are navigation and performance issues present in the website. The pages get frozen after sometime of opening.
9.	Is the response time a cause of frustration?	Yes	It takes more than 5 second for the site to become responsive after opening.
10.	Are there any major flaws encountered while using the web application? If yes, state them.	No	-
11.	How many pages are accessed to complete a task?	1 to 2 on average	-
12.	How quickly does the web application recover from an error?	High	It takes a long time (several days) to recover from an issue.
Completeness			
13.	Are some features/topics missing from the web application? If yes, then specify.	No	-
14.	Are any additional controls required?	No	-
15.	To what degree are you satisfied with the application?	Less	-
16.	Are web pages well designed?	No	The UI can be improved a lot for the end user to get his/her work done more easily.
17.	Does the online help and documentation provide enough information?	NA	-
Learnability			
18.	How easily is the user able to learn the features (buttons, clicks, hyperlinks) of the web page?	Very easy	-

19.	Are the links, menus and lists easily understandable?	Yes	-
20.	How often is the search feature used?	NA	There is no search feature in the website. The user has to manually search the required document.
21.	How easy is it to return to the home page?	Very easy	By clicking on DTU logo
22.	Are the symbols, icons and tables meaningful? If not, which are the problematic ones?	Yes	-
23.	Can the features be used without any help or assistance?	Yes	-
Clarity and accuracy of online and written documentation			
24.	Is the terminology well understood?	Yes	-
25.	How easily are the topics found in the online help?	NA	There is no online help feature to assist the user in understanding the website.
26.	What is the most frequent reason for using online help?	NA	-
27.	Are the topic contents sufficient in the help?	NA	-
28.	How frequently was the required topic found in the help?	NA	-
29.	How easily are you able to switch between online help and interface in order to complete a specific task?	NA	-

30.	Is online help useful when error messages are encountered?	NA	-
31.	Do menus, lists, hyperlinks, tool bars and tables operate as stated?	Yes	All the hyperlinks are working as stated, except for the few broken links mentioned earlier.
32.	Are the steps to compete a task correctly stated?	Yes	-
33.	How helpful is the content related to topics?	NA	-
General			
34.	What are your suggestions for improving the web application?	The user interfaces should be made more attractive and responsive.	The site gives a very monotonous look and the user may feel frustrated after some point of time operating on the website.
		There should be a search feature made available.	The user has to manually search the document in a pool of documents which may become very hectic and time consuming.
		There is a lot of redundancy seen in the website.	There are many notices that are uploaded on multiple locations in the website.
		The user has to wait a lot to see all the 'Important Updates' as the scroll time is too high.	There should be a scroll option in the Important Updates section so that a user can view all the updates at the same time.

		The performance must be increased as there is a lot of lag encountered on opening the site.	The homepage itself takes more than 5 seconds to become responsive which may frustrate the user.
		The broken links should be fixed quickly.	Broken links are needed to be fixed in less time and should be given more priority.
35.	How easily is the information available in the various sections (such as 'about us', 'contact us')?	Very easily	These sections are well maintained and the information is readily available to the user.
36.	In context to other competitive applications, the given web application was found to be:	Less	-
37.	Would you like to use this web application frequently?	Less	The performance and UI make it difficult for the user to get his/her work done quickly.
38.	Is correcting the mistakes easy or difficult?	Easy	If user clicks at a wrong notice / service, he can easily go back to the previous page and continue doing his function.
39.	Do you use menu options or shortcut keys?	Menus	-
40.	How will you overall rate the web application?	Average, 7 out of 10	The DTU website needs improvement in its UI and performance measures. The tables are displayed in a monotonous manner with no search button feature. The user has to manually search everything on the website, making it hectic and time consuming at the same time.

<u>Findings and Suggestions of Usability Testing:</u>

1. The user interfaces should be made more attractive and responsive.
2. The site gives a very monotonous look and the user may feel frustrated after some point of time operating on the website.
3. Search feature is missing on the website. The user has to manually search the document in a pool of documents which may become very hectic and time consuming.
4. There is a lot of redundancy observed in the website. There are many notices that are uploaded on multiple throughout the website.
5. The user has to wait a lot to see all the 'Important Updates' as the scroll time is too high. Moreover, if the user hovers the mouse pointer over the section, the scrolling stops, making it impossible for the user to see the below updates.
6. There should be a scroll option in the Important Updates section so that a user can view all the updates at the same time.
7. The performance must be increased as there is a lot of lag encountered on opening the site. The homepage itself takes more than 5 seconds to become responsive which may frustrate the user.
8. The broken links should be fixed quickly. Broken links are needed to be fixed in less time and should be given more priority.

<u>CONFIGURATION AND COMPATIBILITY TESTING</u>

Configuration Testing is a software testing technique in which the software application is tested with multiple combinations of software and hardware in order to evaluate the functional requirements and find out optimal configurations under which the software application works without any defects or flaws.

Compatibility Testing is a type of Software testing to check whether your software is capable of running on different hardware, operating systems, applications, network environments or mobile devices. Compatibility Testing is a type of Non-functional testing.

We did both Manual and Automated testing for checking the configuration and compatibility of the DTU website. During the manual testing, though there were some minor issues found (for example: minor UI errors), still we concluded that the overall configuration and compatibility was manageable by the user and there were no major errors in the website.

Browser's Compatibility matrix

Manual Testing

Browsers	Google Chrome	Mozilla Firefox	Microsoft edge	Internet explorer	Safari
Audio	NA	NA	NA	NA	NA
Video	NA	NA	NA	NA	NA
Text	✓	✓	✓	✓	✓
Platforms Windows 10	✓	✓	✓	✓	✓
Windows 8	✓	✓	✓	✓	✓
Windows 7	✓	✓	✓	✓	✓
MacOS	✓	✓	✓	✓	✓
Android 8	✓	✓	✓	✓	✓
Android 9	✓	✓	✓	✓	✓
Android 10	✓	✓	✓	✓	✓
Android 11	✓	✓	✓	✓	✓
Form	✓	✓	✓	✓	✓

✓ represents site's elements is working properly in all above mentioned browsers

NA - represents that the particular field is not available on the site.

Configuration and Compatibility Testing Checklist

S.No.	Description	Response	Remarks
1.	Are Java source code/scripts, ActiveX controls, other scripts used by the application?	Yes	If we disable the JavaScript from the website, then site will not open.

2.	Is the application compatible with different peripherals (input and output devices)?	Yes	-
3.	Is the application compatible with different hardware configuration?	No	We tested the website in different OS like windows 10, windows 7 and macOS. Minor UI issues were found in the website.
4.	Is the application compatible with different mobile phones?	No	We tested the website in different mobile phones like Samsung M31 & M51, Redmi note 5 and iphone X. UI and performance issues were found in the website.
5.	Do text, graphics and animations display properly with browsers under test?	Yes	Everything is displayed same across different browsers.
6.	Are different printers compatible with various web browsers?	Yes	-
7.	Are web browsers compatible with various user interface items of the web application?	Yes	The site was opening in a proper way in each of the web browsers.
8.	Are cookies accepted by the web browsers?	Yes	Cookies are accepted by default in different browsers.
9.	Are different font sizes verified on different web browsers?	Yes	Font size is same across different browsers.
10.	Are the security tools being used?	No	DTU site makes use of **http protocol**, making it an unsecured website. Tools like Wireshark can easily monitor the web traffic and intercept important information without any encryption.

This is a snapshot of the Student Corner section of the DTU website taken by my Samsung M51 mobile phone using Chrome as web browser. The footer is not displayed properly (half of it is black and half white). Also, the page layout is not displayed

Automated Testing

The images below show the compatibility testing done using Powermapper tool. Minor layout and performance issues were found in the DTU website for all of the tested browsers.

Link to the report:

https://try.powermapper.com/Demo/Report/fa64fd31-e74f-4d77-9437-e56a7ed832f2

Browser	IE	Edge	Firefox	Safari	Opera	Chrome	iOS		Android	Key
Version	11	88	84	14	73	88	≤ 13	14	88	
Critical Issues	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	🔴 Missing content or functionality
Major Issues	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	⊘	🟠 Major layout or performance problems
Minor Issues	⊘	◐	◐	◐	◐	◐	◐	◐	◐	◐ Minor layout or performance problems

The issues found are listed here along with their priorities:

Priority 2

1 issues on 1 pages

◐ The CSS star filter no longer works in IE7 or later.

Internet Explorer ≥ 7 | 1 pages |

Properties inside the * html {} CSS hack are ignored by IE7 and later. Conditional comments are a fully supported, standards-compliant alternative.

http://dtu.ac.in/Web/CSS/ddsmoothmenu.css   Line 40 102

Priority 3

2 issues on 8 pages

▷ ◐ DirectX filters are not supported by IE10 or later.

Internet Explorer ≥ 10 | 1 pages |

▷ ◐ The doctype of this page triggers limited quirks mode in Chrome, IE, Firefox and most other browsers. This means pages may look different in different browsers.

Internet Explorer ≥ 6 Edge Firefox Safari Opera Chrome Android iPhone/iPad | 7 pages |

SECURITY TESTING

We performed security testing using automated testing tools like **Immnuniweb** and **Pentest**.

The bargraph which is shown below was tested by pentest auomated tool. It indicates that DTU website is at high risk. There are 1 each high and medium risk ratings along with 6 low level risks.

This is the overall summary of http://www.dtu.ac.in Website Security Test using Immuniweb tool.
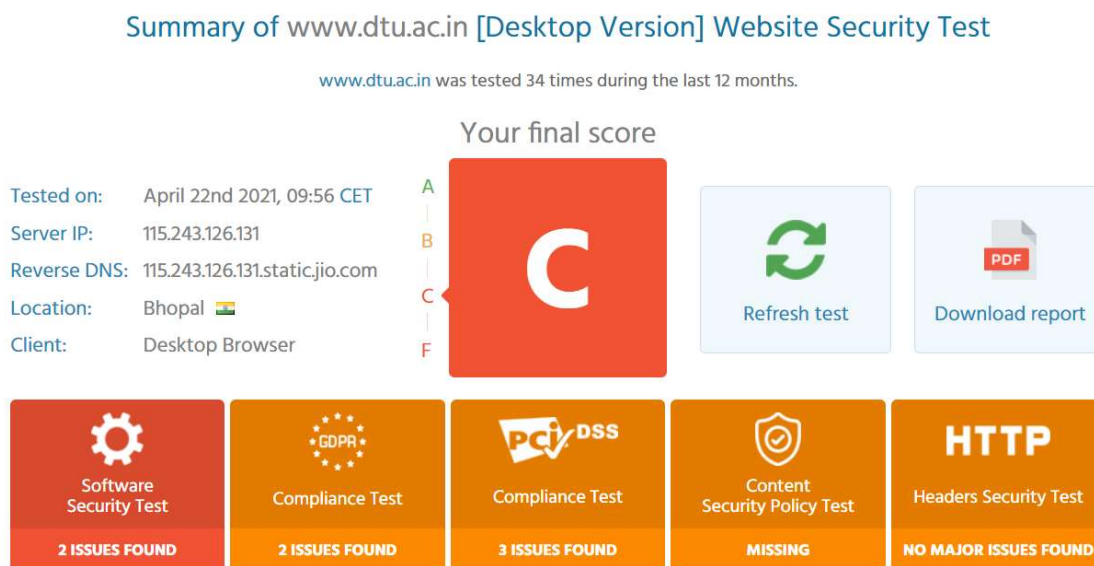
List of tests performed (17/17)

- ✔ Checking for website accessibility...
- ✔ Checking for secure communication...
- ✔ Checking for missing HTTP header - Content Security Policy...
- ✔ Checking for missing HTTP header - X-Frame-Options...
- ✔ Checking for missing HTTP header - X-XSS-Protection...
- ✔ Checking for missing HTTP header - X-Content-Type-Options...
- ✔ Checking for missing HTTP header - Referrer...
- ✔ Checking for website technologies...
- ✔ Checking for vulnerabilities of server-side software...
- ✔ Checking for client access policies...
- ✔ Checking for robots.txt file...
- ✔ Checking for use of untrusted certificates...
- ✔ Checking for domain too loose set for cookies...
- ✔ Checking for missing HTTP header - Strict-Transport-Security...
- ✔ Checking for Secure flag of cookie...
- ✔ Checking for directory listing...
- ✔ Checking for HttpOnly flag of cookie...

Security Testing Checklist

S.No.	Description	Yes/No/NA	Remarks
Authentication, Access Control and Privacy			
1.	Are unauthorized users restricted from viewing private data?	No	-
2.	Is sensitive organization information restricted from public access?	Yes	There is no sensitive organization information present on the website.
3.	Are users aware of the privacy polices?	No	-
4.	Are legal consequences of policies known to the user?	No	-
5.	Are authentication mechanisms adequate to prevent malicious intrusion to the application?	No	The website uses http protocol for communication, making it an unsecured

			website.
6.	Does the web application ask for login id and password?	Yes	It does have login option in the ERP.
7.	Does the web server lock the users who try to access the website multiple times with invalid login ids / passwords?	No	We have tried logging in to the website with wrong credentials multiple times, but still we are not blocked by the website.
8.	Have you tested the combinations of invalid and valid login ids/passwords?	Yes	It only lets the user log in when all the entered fields match the details stored in the database
9.	Is there any provision for forget/change password?	Yes	It does have forgot password and change password option.
10.	Are the levels of authentication defined?	No	-
Firewall			
11.	Does the firewall properly implement all the security policies of the company?	NA	No WAF (web application firewall) is detected while doing security testing.
12.	Are firewalls' adequacy tested?	NA	No WAF (web application firewall) is detected
13.	Is the security in charge aware of the known faults in the firewalls?	NA	No WAF (web application firewall) is detected
14.	Is the location of the firewall effective?	NA	No WAF (web application firewall) is detected
15.	Is any penetration possible in the security boundaries created by a firewall?	NA	No WAF (web application firewall) is detected
Data Security			
16.	Are the data validations tested?	NA	There are no forms present in the website.

17.	Is sensitive information (such as password, credit card number) displayed in the text field while typing?	NA	-
18.	Are privileges to access data enforced?	Yes	-
19.	Are file download permissions established and tested?	Yes	The files can be easily downloaded from the links provided on the site.
20.	Is sensitive and important data kept at secure locations?	Yes	-
Encryptions			
21.	Are encryption standards enforced?	NA	There are no such fields present in which encryption is needed.
22.	Is there any procedure followed to identify what is to be encrypted?	NA	-
23.	Is sensitive information (such as password, credit card number) encrypted?	NA	-
24.	Is Security Socket Layer (SSL) used to provide encryption of sensitive elements?	NA	-
25.	Does the enforcement of encryption standard affect the speed of the web page?	NA	-
Virus			
26.	Are mechanisms used to identify and remove viruses?	NA	-
27.	Are anti-virus software scheduled for periodical updates?	NA	-
28.	Does the anti-virus software identify the unprotected sites?	NA	-

29.	Are viruses sent for analysis to the anti-virus software company?	NA	-
30.	Are users trained for virus prevention and recovery procedures?	NA	-
31.	Is the procedure for handling a virus attack adequate?	NA	-
32.	Are users alerted from downloading insecure items?	No	We have tried downloading multiple documents, but haven't received any such warning.
33.	Is legitimate anti-virus software installed on the client's machine?	Yes	-
34.	Is virus scan scheduled periodically?	NA	-
35.	Is spyware removal software installed and run periodically?	NA	-
Failure Management and Recovery			
36.	Are back-ups schedules at defined intervals?	No	-
37.	Does the recovery take a long time?	Yes	Whenever there is a failure, it takes a lot of time for the site to be up and running again.
38.	In case of site crash, is there any provision to route to another server?	No	-
39.	Have recovery mechanisms been defined and tested?	No	-
40.	Is there any criteria followed to ensure the completion and correction of recovery procedures?	No	-
General			

41.	Are any warning messages issued when the user enters or leaves the website?	No	-
42.	Is the user allowed to login with the same account from different machines (simultaneously)	NA	The site doesn't have a login feature included in it.
43.	Are unauthorized external sites identified and screened out?	NA	-
44.	Can the previous page be accessed after signing out from the website?	NA	-
45.	Is the user able to access restricted pages after the session is timed out?	NA	-
46.	Is auditing performed periodically in order to keep a record of all the operations?	NA	-
47.	Are all payment methods tested thoroughly?	NA	There are no payment features included in the website.
48.	Are enough security mechanisms enforced, if customer registration is compulsory on your website?	NA	There is no registration feature provided on the website.
49.	Does the application use digital signature to sign a file?	No	There are no such files in which digital signature is required.
50.	Does the source code reveal any critical information?	No	We have checked the source code for sensitive information, but were unable to find any such information.

Findings of Security Testing:

1. Response headers do not include the HTTP Content-Security-Policy security header. The Content-Security-Policy (CSP) header activates a protection mechanism implemented in web browsers which prevents exploitation of Cross-Site Scripting vulnerabilities (XSS). If the target application is vulnerable to XSS, lack of this header makes it easily exploitable by attackers.

2. No   WAF   (web   application   firewall)   is   detected.
   The website should implement a WAF to protect the website against common web
   attacks.

3. Missing security header: Referrer-Policy
   The Referrer-Policy HTTP header controls how much referrer information the browser
   will send with each request originated from the current web application.
   For instance, if a user visits the web page "http://example.com/pricing/" and it clicks
   on a link from that page going to e.g. "https://www.google.com", the browser will send
   to Google the full originating URL in the Referer header, assuming the Referrer-Policy
   header is not set. The originating URL could be considered sensitive information and it
   could be used for user tracking.

4. **Communication is made over unsecure, unencrypted HTTP. An attacker could
   search for an appropriate exploit (or create one himself) for any of these
   vulnerabilities and use it to attack the system.**

   **We recently found out the DTU website got hacked by someone. It is for this
   reason only that the website is not secured and anyone can hack into it easily.**

5. HTTP X-XSS-Protection security header is missing

   The X-XSS-Protection HTTP header instructs the browser to stop loading web pages when they detect reflected Cross-Site Scripting (XSS) attacks. Lack of this header exposes application users to XSS attacks in case the web application contains such vulnerability.

6. Missing security header: X-Frame-Options

   Because the X-Frame-Options header is not sent by the server, an attacker could embed this website into an iframe of a third-party website. By manipulating the display attributes of the iframe, the attacker could trick the user into performing mouse clicks in the application, thus performing activities without user's consent (ex: delete user, subscribe to newsletter, etc). This is called a Clickjacking attack.

PERFORMANCE TESTING

We used **Locust tool** to test performance of the website. Locust is an easy to use, scriptable and scalable performance testing tool. We also used **Apache JMeter** to perform automated performance testing on the DTU website.

The parameters set for conducting this test are:

1. Number of users per second is increasing gradually from 200, 500, 700, 1000, 1500, 2000 to 3000.
2. Number of users spawns per second is 100.

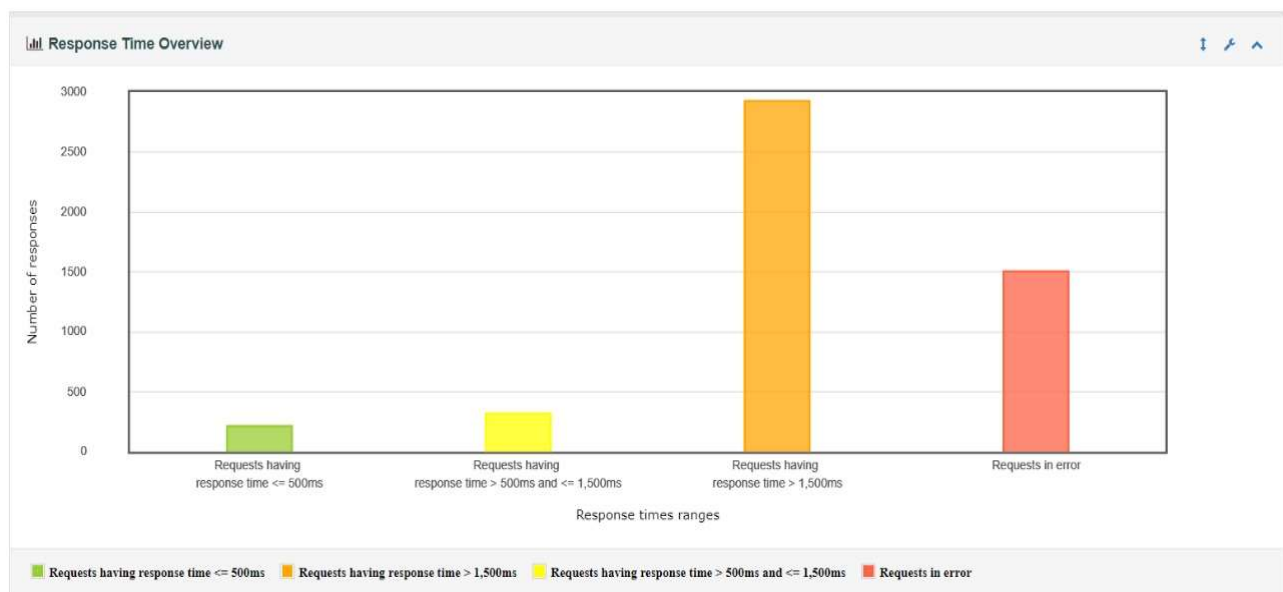Following are the graphs that are generated by Locust:
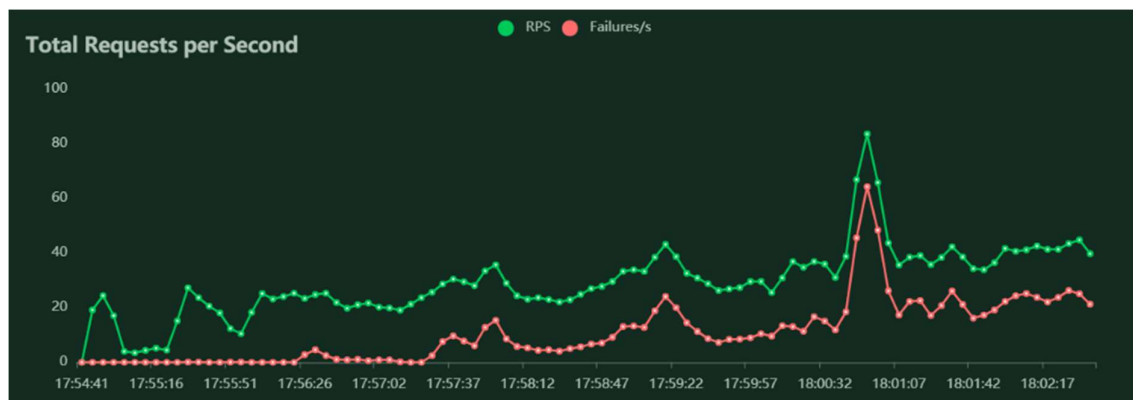
- The pie chart shows that **69.67%** of the HTPP requests made to the website are successful whereas **30.33%** leads to errors, which is undoubtedly a very high percentage.
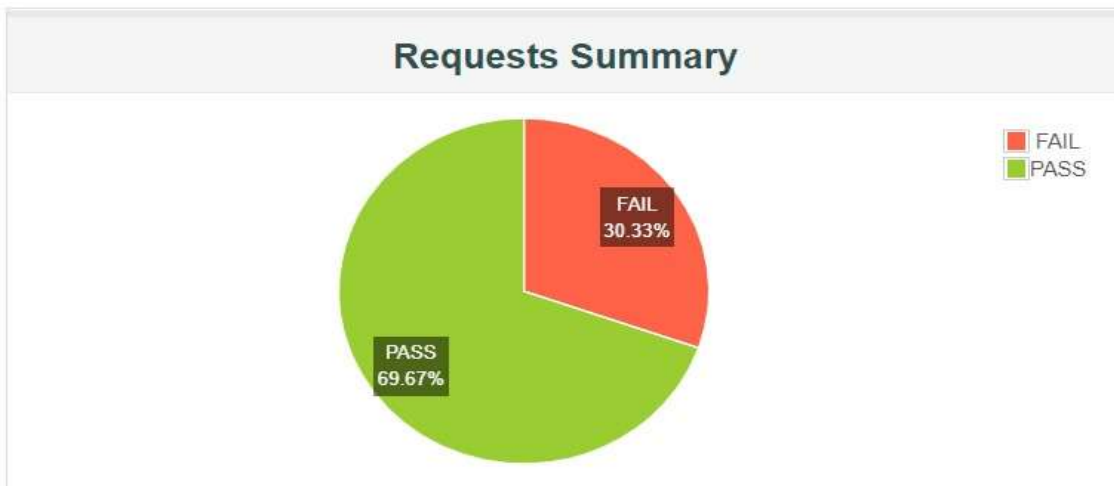
- The distribution of response times ranges is depicted below

- The average Response time of DTU website is 9.84 seconds and maximum response time is 333.69 seconds (as stated in table below). This is a reason for concern as the user would have to wait approx. 10 seconds in order to start browsing the website, which is quite frustrating and cumbersome.

Statistics

Requests	Executions			Response Times (ms)							Throughput	Network (KB/sec)	
Label	#Samples	FAIL	Error %	Average	Min	Max	Median	90th pct	95th pct	99th pct	Transactions/s	Received	Sent
Total	4962	1505	30.33%	9845.55	0	333069	5466.00	21050.00	28291.70	78828.80	14.88	1866.82	1.15
HTTP Request	4962	1505	30.33%	9845.55	0	333069	5466.00	21050.00	28291.70	78828.80	14.88	1866.82	1.15

Performance Testing Checklist

S. No.	Description	Yes/No/NA	Remarks
USERS			
1.	Have the maximum number of users been identified for the web application?	Yes	Threshold of DTU is 1500 users/second. At this rate, failure rate comes in existence.
2.	Is complexity of the system determined?	No	-
3.	Are peak hours identified?	Yes	The peak hours were from 12:00 pm and 5:00 pm. Maximum crashes were reported in this time period only.
4.	Is the duration of session of users analyzed?	Yes	On an average a user spends 10-15 minutes on the website.
5.	Have the type of users been identified?	Yes	The application is targeted to students and teachers.
RESPONSE TIME			
6.	Is the response time calculated?	Yes	Avg response time is 9.84 seconds

7.	Is the maximum response time determined?	Yes	Its 333.69 seconds.
8.	Does the response time need the established threshold?	No	-
9.	Are break points identified for planning load test?	No	-
10.	Are the causes of crash at the break point identified?	No	-
DATABASE			
11.	Is the maximum database capacity identified?	No	-
12.	Are the past experiences with the database documented?	No	-
13.	Is load sharing and balancing facility available?	NA	-
14.	Does the application read the database content correctly?	Yes	-
15.	Does the application write the database content correctly?	Yes	-
TOOLS			
16.	Are load testing tools identified?	Yes	Locust, Apache Jmeter is used for load testing.
17.	Are the employee trained?	Yes	We learnt and trained from the web resources available.
18.	Is the load testing tool compatible with the platform?	Yes	-
19.	Is external support available for the tool?	Yes	-
GENERAL			
20.	Are there any disk space limitation?	No	-

21.	Are people with required skill sets available?	Yes	-
22.	Has the item and number of iterations required for testing being identified?	Yes	-
23.	Are rules for concurrency control being followed?	Yes	The tool used for testing ensures concurrency control rules.
24.	Is the maximum wait time before failure determined?	Yes	It is approximately 10 seconds.
25.	Are memory requirements and disk space usage identified?	No	-

DATABASE TESTING

Database Testing is important in software testing because it ensures the following things:
1. Data values and information received and stored into database are valid or not.
2. It helps to save data loss.
3. It saves aborted transaction data.
4. It ensures that there is no unauthorized access to the information.

NOTE: To perform database testing we took the manual approach as admin access was not present.

The following test cases were formed to test the database retrieval and storage methods:

- Searching a notice in the 'Notices' section.
- Searching for archives notices/circulars/orders.
- Searching for an event in the 'Forthcoming Events' section.
- Giving a feedback for the hostel feedback form.
- Checking the Moodle option on the website homepage.
- Searching for a photo in the 'Photo Gallery' section.
- Checking the 'Student Corner' option.
- Searching a tender in the 'Tenders' section.
- Searching a job in the 'Jobs' section.
- Searching for an Update in the 'Important Updates' section.

Test case ID	Description (Steps followed)	Observed Output	Expected Output	Pass/Fail
Searching a notice in the 'Notices' section.				
TC1	1. Click on the 'Notices' Section of the website. 2. Scroll and search for the required notice.	List of all notices are correctly retrieved and displayed from the database.	List of all notices should be correctly retrieved and displayed from the database.	Pass
Searching for archives notices/circulars/orders.				
TC2	1. Click on the 'Notices' Section of the website. 2. Scroll down and click on the 'View All' button. 3. Scroll down again and click on the 'Archives' button. 4. Search the required archive notice/circular/order.	List of all notices / circulars /orders are correctly retrieved and displayed from the database.	List of all notices / circulars /orders should be correctly retrieved and displayed from the database.	Pass
Searching for an event in the 'Forthcoming Events' section.				
TC3	1. Click on the 'Forthcoming Events' Section of the website. 2. Scroll and search for the required notice.	List of all events are correctly retrieved and displayed from the database.	List of all events should be correctly retrieved and displayed from the database.	Pass
Giving a feedback for the hostel feedback form.				
TC4	1. Click on the 'Hostels' button from the Web Resources section of the website. 2. Click on the 'Feedback Form' button.	The form doesn't load with a http error 500. There is problem retrieving the form from the database.	The form must be retrieved from the database and responses must be stored in the database correctly.	Fail
Checking the 'moodle' option on the website homepage.				
TC5	1. Click on the Moodle link on the top of the website.	There is a database connection error and the page is not loading.	The moodle page should load properly and details should be retrieved from the database.	Fail

Searching for a photo in the 'Photo Gallery' section.				
TC6	1. Click on the 'Photo Gallery' button on the homepage. 2. Click on the event whose photos are to be viewed. 3. Scroll and search for the required image from the image database.	All the images are retrieved from the database and displayed properly.	The images should be retrieved from the database and displayed properly.	Pass
Checking the 'Student Corner' option.				
TC7	1. Click on the 'Students Corner' button from the Web Resources section of the website. 2. Search for the required notice.	List of all events are correctly retrieved and displayed from the database.	List of all events should be correctly retrieved and displayed from the database.	Pass
Searching a tender in the 'Tenders' section.				
TC8	1. Click on the 'Tenders' Section of the website. 2. Scroll and search for the required tender.	List of all tenders are correctly retrieved and displayed from the database.	List of all tenders should be correctly retrieved and displayed from the database.	Pass
Searching a Job in the 'Jobs' section.				
TC9	1. Click on the 'Jobs' Section of the website. 2. Scroll and search for the required job.	List of all jobs are correctly retrieved and displayed from the database.	List of all jobs should be correctly retrieved and displayed from the database.	Pass
Searching for an Update in the 'Important Updates' section.				
TC10	1. All the important updates are listed on the DTU website homepage. 2. Search for the required update. 3. Click the required update to open it.	List of all updates are correctly retrieved and displayed from the database.	List of all updates should be correctly retrieved and displayed from the database.	Pass

Findings:

- There were some errors found during the Database Testing of the DTU website.
- The feedback form for the Hostel facility is not working properly. There are errors in the database connection for that web page.
- The Moodle option given on the homepage of the website is not able to retrieve the database details.
- Other features like Notices, Tenders, Jobs, Latest News and Important Updates are working fine and the database connection is verified.
- The Student Corner is also working properly and the database details are retrieved quickly on opening the site.

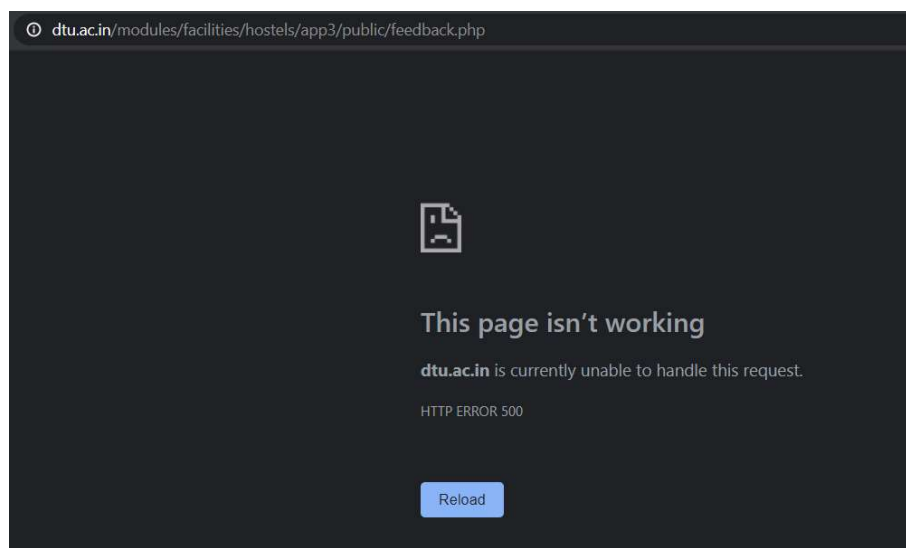Here are some corresponding snapshot proofs for the problems listed in the findings above:

Moodle Link:

http://moodle.dtu.ac.in/

Error: Database connection failed

It is possible that the database is overloaded or otherwise not running properly.

The site administrator should also check that the database details have been correctly specified in config.php

Hostel Feedback Form Link:

http://dtu.ac.in/modules/facilities/hostels/app3/public/feedback.php

ERRORS, SOLUTIONS and SUGGESTIONS

ADOBE

- There is **no Add to Cart** option. The user needs to individually pay for all the softwares that he/she wants to purchase.

- Only **few details and features** about the software are mentioned which is not enough to completely understand the software functionality.

- It should be ascertained that all the **broken links** on the website are working properly. If a broken link is found, them it should be rectified as soon as possible.

- While registering into the website, in register form there are **no validity checks** for special characters in **First & Last name** field. So, it needs to be validated.

- While registering into the website, in register form there are no validity checks for a valid email address means whether provided **email exists or not**. So, they must validate the email using some **API calls** to check whether email id existed or not.

- While user is trying to contact adobe for any issue (already logged in), user is **not able to chat with virtual assistant**. It is showing the error "Welcome, Ashish. Please contact your administrator for help "and when user clicks on contact admin console, then it is showing "We're sorry. You don't seem to have access to the Adobe Admin Console".
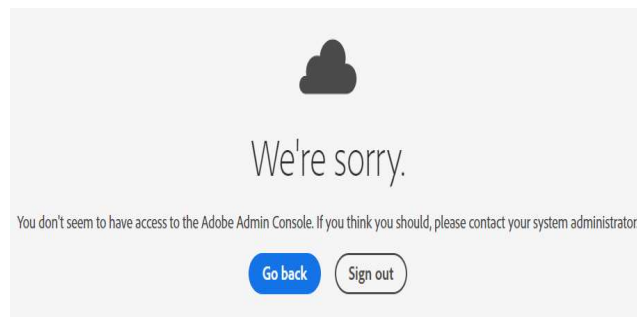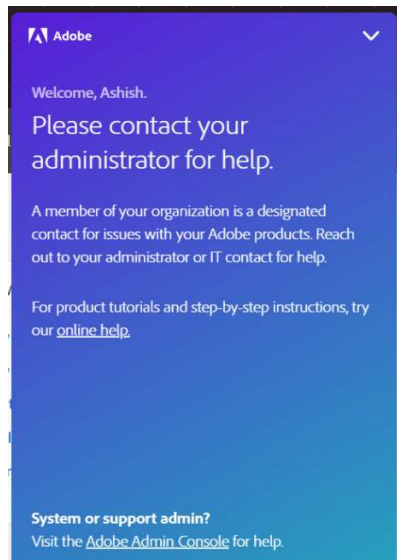
- While user is trying to contact adobe for any issue (without logged in), user is able to chat with virtual assistant, but virtual assistant is **not able to solve the issue**, it just keeps on echoing "Can you describe the issue more specifically?" and when it is not

able to get the issue, it automatically connects to customer service person. The Virtual Assistant must be trained properly to address the issue of the customer.

- Essential info. like **Contact number or email address** for raising any issue should be provided so that if chatting with bot, doesn't help customer, then he can raise his issue through call or email.

DTU

- The website must have a **search functionality** provided to search for the required information on the website. It is extremely **hectic and cumbersome** for a user to search for a particular document in the entire website.

- There should be a **Notification's Update** feature provided on the website. All the information updates should be added to the notifications panel, so that it becomes **easy and time-efficient** for the user to check for the latest news and updates.

- It should be ascertained that all the **broken links** on the website are working properly. If a broken link is found, for example – **International affairs, Moodle**, it should be rectified as soon as possible.

- In some sections of the website like the **Academic Departments** section, the **content is not formatted** properly. The readability of the webpage is an important factor which tells us about the quality of the website. It should be ensured that the contents of all the pages are displayed properly to the user.

- The **automated sliding feature** in the Important Updates section needs to be modified. A user cannot scroll the section, which makes it frustrating to wait for all the important updates to scroll automatically and slowly. Moreover, if the user hovers the mouse pointer over the section, the scrolling stops, making it impossible for the user to see the below updates.

- There should be a **scroll option** in the Important Updates section so that a user can view all the updates at the same time.

- We have found **database connection issues and errors** in various section of the website. Those should be given more priority and must be resolved within less time.

- There are **compatibility and configuration** issues found on some devices. The developers must ensure that they are coding the website for various devices and must use **MediaQuery** for the same.

- The **User Interfaces** should be made more attractive and responsive. The site gives a very monotonous look and the user may feel frustrated after some point of time operating on the website.

- There is a **lot of redundancy** seen in the website. There are many notices that are uploaded on multiple locations in the website.

- The **performance** must be improved as there is a lot of lag encountered on opening the site. The homepage itself takes more than **5 seconds** to become responsive which may frustrate the user.