INNOVATIVE PRODUCT DESIGN WORKSHOP

In House Summer Training (June 2017)

Project Name : Campus Portal Web Application
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__Acknowledgement__

This project is a result of tedious efforts of our group. However, it would not have been possible without the help and support of certain individuals and organisations. Therefore, we would like to extend our sincere thanks to all of them.

We are highly indebted to Ms. Manisha Kaushal for her guidance and constant supervision as well as for providing necessary information regarding the project & also for their support in completing the project. We express our sincerest gratitude towards her for the same.

We would like to express our gratitude towards University Institute of Engineering and Technology for providing us with the necessary facilities and technology required for the successful completion of this project.

<u>Abstract</u>

The Panjab University web application is an online portal that provide students of Panjab University access to the various features such as names and details of available courses, news, event updates and faculty profiles. Also, the application will allow the use of location based services such as locating the eateries, libraries, hostels, and departments within the premises and in the vicinity of the Panjab University. In addition of benefiting the students, the web app would also serve as a guide for visitors.

List Of Features

1. About
	1.1 Some General Information About Panjab University

2. Departments
	2.1 Departments tagged along with their location on a map

3. Courses
	3.1 List of courses offered
	3.2 Grouping by departments

4. Maps
	4.1 An embedded map of the university.
	4.2 Nearby locations to the user would be displayed to the user.
	4.3 Search tool to search from the indexed locations.
	4.4 Future proofing is done to add more locations to indexed list.

5. Eateries
	5.1 List of all eateries in the university tagged on a map.

6. Events
	6.1 List of all events that are taking place in the university.
	6.2 Clicking an item opens the link of the event.

7. News
	7.1 An embedded newspaper from Magboard

8. People Directory
	8.1 Directory of the people working the university
	8.2 Searching people by name
	8.3 Implemented by a SQL table having the columns Name,Phone and Designation.
	8.4 Future proofing is done to add more locations to indexed list.

9.Utilities

9.1 Utilities such as ATM's, Banks, Parkings, Dispensary .etc tagged on a map.

Feasibility Report

Product:

The problem at hand was developing a web application that would aid the students of Panjab University by enabling them to access the various features such as names and details of available courses, latest news, event updates and faculty profiles. Moreover, the application will allow the use of location based services such as locating the eateries, libraries, hostels, and departments within the premises and in the vicinity of the Panjab University. In addition of benefiting the students, the web app would also serve as a guide for visitors.

Technical Feasibility:

The web application is to be a standard web application that will use HTML5, CSS3, JavaScript and JQuery for front end development and MySQL and php for backend development.

Hosting php and using MySQL will require the availability of a server that supports MariaDB. MariaDB would be used to ensure backwards compatibility, enhanced speed and additional floss extensions(if need be).

A linux based server will serve as an appropriate platform for the server to be hosted.

The system must also provide a decent amount of storage space. Initially, about 500MB of space will suffice for the purpose of storing files, cache and cookies.

The system proposed above will be sufficient enough to fully support the functioning of the the web based application under development.

Economic Feasibility:

From an economic point of view, the project is extremely favourable as it uses mostly open source software.

Some of them are as follows:

1. MariaDB is an open source project registered under the GNU General Public License(version 2)
2. Linux is also open source software registered under the GNU General Public License and is therefore free to use.
3. XAMPP is an open source software registered under the GNU General Public License
4. PHPMyAdmin is an open source software registered under the GNU General Public License(version 2).

As mentioned above, the cost of creating the web application is virtually inexistent.
However, hosting and registering the domain will incur nominal costs.

1. A domain name registration may cost as low as Rs.99/month. However, more functional domain name registration services charge higher.
2. A Virtual Private Server:
A Virtual Private Server is a cheaper and more practical alternative to a physical server for the purposes of this project. The cost of a VPS begins at about 1000/month.

REQUIREMENT ANALYSIS AND SPECIFICATIONS

A basic knowledge of the following languages would be required in order to successfully implement the web application:-

For front end:

1. HTML5

   Compared to its predecessors, HTML5 makes coding easier and cleaner.
   HTML5 makes responsive web page design really simple and enables the development of responsive website that helps the user have the precise experience across devices. HTML5 also enables easy addition of audio, video and other file formats such as pdf without much effort. The language helps in cross browser compatibility and also ensures faster loading time for websites.

2. CSS3

   Cascading Style Sheets will be required to style the content of the HTMLs. It will allow us to separate the styling from the content and enable us to reuse the code.

3. JavaScript

   JavaScript will be required to make the page dynamic. It will enable the addition of animations and transitions.

4. JQuery

   Although JavaScript is fast and reliable, the syntax can be quite cluttered. To clean things up a bit, JQuery can be used. JQuery has crisper syntax and renders the same result.

For back end:

1. PHP

   The preprocessor hypertext will be required to interact among the pages and transfer data from one page to another. It will be especially useful in forms as well as entering and fetching data from the databases.

2. MySQL-MariaDB

   SQL will be required for database management. The web application will require to fetch data from databases for map markers, searches, faculty, etc. It will also be used to store and retrieve webmaster's login credentials.

System Administration and Security

3. Basic system administration skills

   System administration skills will be required for tasks like setting up the server and installing the necessary supporting software.

   3.1 The local server will be setup on a linux machine.
   3.2 XAMPP will be used to setup an apache server.
   3.3 PHPMyAdmin will be used to manage the SQL database

4. Basic understanding of penetration testing

   With people being increasingly informed in the basics of computer technologies, the desire to break systems for malicious intent or for pure joy is on the rise. People try to break websites with numerous attacks ranging from SQL injections to Cross-site scripting(XSS).

A basic understanding of penetration testing will enable the development of a website that is reasonably robust against basic attacks such as the two mentioned above.

The strings accepted as SQL queries must be escaped(eliminate dangerous characters).

DESIGN AND IMPLEMENTATION

PROJECT STRUCTURE

The project was divided into two parts : **common**, **modules.**

The **common** part consists of the files that are used in almost every file. These include common stylesheets, the navigation bar styling and javascripts.

The **module** part consists of features grouped all together. Each feature is a separate module. Files local to the feature are grouped together inside its folder.

The project structure in this form gave the following advantages :

1. Modularity was implemented, each feature was limited to only it's particular module.
2. Code Redundancy was reduced, as same files or pieces of code could be directly imported from their common sources.
3. Creation of a page template became easier. Thus work speed was increased on the front-end side.
4. Feature specific files were limited to their respective directories thus debugging became easier.

WEBSITE DESIGN:

1. HOMEPAGE :-

The homepage consists of a header showing the logo of Panjab University. Beneath the header is a Search Bar that searches in the Maps and the People Directory. The search input may be Places, Food Joints, Departments, Faculty Information (UIET).

Below the Search Bar is the Menu. As a consequence of responsive web design the menu is a grid of 3 X 3 icons for tablets and mobiles and a grid of 2 X 5 for desktops and laptops. The menu consists of a list of features of the website. Each item in the list is a button that has an icon and a heading. On clicking a button redirects to the webpage of the respective feature.

The menu consists of

i)   About
ii)   Courses
iii)   Departments
iv)   People
v)   Maps
vi)   Eateries
vii)   News
viii) Events
ix)   Utilities

Below the menu is a lower navigation bar. The lower navigation bar consists of two options.

i) Information about the team.
ii) Link to puchd.ac.in

At the bottom of the page is footer. The footer displays the team name.

Navigation Bar:

The navigation bar displays the heading of the page and has links that refer to the other features. The navigation bar is also responsive. For mobiles and tablets it displays a button at the top right corner on clicking which a drop down menu is displayed containing the links to other features. For larger screen sizes the navigation bar displays the feature links adjacent to each other horizontally stacked together to the right hand side. This navigation bar is common to all pages.

2. ABOUT

At the top of the page is a navigation bar. This page displays information about Panjab University. The page consists of a list of button-s displaying different headings for the information subparts. The information for this page was sourced from puchd.ac.in. On clicking a heading it's contents are displayed beneath it. On clicking the same heading again contents get hidden.

3. COURSES

At the top of the page is a navigation bar. This page displays information about the courses available at Panjab University. The page consists of a list of buttons displaying different headings for the type of course. The information for this page was sourced from puchd.ac.in. On clicking a heading the course list of that type is displayed beneath it. On clicking the same heading again contents get hidden.

4. DEPARTMENTS

At the top of the page is a navigation bar. This page displays a map containing markers at the locations of different departments. Clicking or hovering over a marker displays the title of the department. The map is fully navigable as to which

area of the university to show. The map can be navigated using a mouse or touch. There is an option to increase/decrease zoom of the map.

5. MAPS

At the top of the page is a navigation bar. Below the navigation bar is a search bar that can search a location in Panjab University. Beneath the search bar is a map of Panjab University. The map is fully navigable as to which area of the university to show. The map can be navigated using a mouse or touch. There is an option to increase/decrease zoom of the map. On searching a location in the search bar a list of results is displayed. On clicking an item in a list a new window appears that displays the location on the map with a marker.

6. PEOPLE

At the top of the page is a navigation bar. Below the navigation bar is a search bar that can search the details of a faculty member of Panjab University. Beneath the search bar is a table displaying the details i.e. Name, Contact Information, Department and Designation of the faculty members. Currently the information about faculty members is only limited to UIET.

7. NEWS

At the top of the page is a navigation bar. The page body consist of an embedded newspaper by Magboard UIET. The newspaper is embedded in a pdf form that is scrollable and can be resized.

8. EVENTS

At the top of the page is a navigation bar. The page body consist of a table displaying a list of events taking place at Panjab University. The event headings are hyperlinks that direct to the website of the event.

9. EATERIES

At the top of the page is a navigation bar. This page displays a map containing markers at the locations of different eateries. Clicking or hovering over a marker displays the name of the eatery. The map is fully navigable as to which area of the university to show. The map can be navigated using a mouse or touch. There is an option to increase/decrease zoom of the map.

10. UTILITIES

At the top of the page is a navigation bar. This page displays a map containing markers at the locations of different utilities such as parking, grounds, parks, halls .etc. Clicking or hovering over a marker displays the name of the utility. The map is fully navigable as to which area of the university to show. The map can be navigated using a mouse or touch. There is an option to increase/decrease zoom of the map.

<u>CODING</u>

The coding work for the project was divided into two parts :

Front End

    The front end was developed using four languages :

1. HTML
2. CSS
3. Javascript
4. Jquery

HTML:

    HTML stands for Hyper Text Markup Language and is primarily used for creating webpages.

    The webpages were created and linked together using HTML 5.

CSS:

    CSS stands for Cascading Style Sheets and is used for styling webpages. The webpages created using HTML do not have any inherent style of their own and look pretty basic. The styling to these webpages was added using CSS. The text, headings, buttons, navbar and tables all were decorated using CSS.

    The webpages were made responsive i.e. support for the different screen sizes using CSS so that the user experience stays consistent across all devices.

    The webpages change their apperances across different webpages but retain their basic structure.

JavaScript:

JavaScript was used in two forms :

      1. Google Maps JavaScript API V3 :

            All the maps containing modules were implemented using Maps JavaScript API V3.

            JavaScript was used to interact with objects that were made available in Google Maps JavaScript API.

      2. Others

            Apart from the API JavaScript was used to animate objects in the webpages. It was also used to add actions to buttons.

            The scripts execute after button click.

JQuery:

JQuery was clubbed along with Javascript as Jquery makes selection of DOM Objects easier than JavaScript. JQuery was used to initiate selection of DOM Objects in functions and then the control was passed to JavaScript.

Back End

PHP

PHP stands for Pre Processor Hypertext. PHP was the main backend language for this website. Retrieving data from databases using SQL and handling of form data was done through PHP.

SQL

SQL stands for Structured Query Language. SQL was used to handle databases i.e. creating and updating tables and queries.

TESTING AND DEBUGGING

Front-end:

TESTING

Testing for front end component involves three parts :

1. **HTML Testing :**
    All the links were opened and verified that they point to the corrrect webpage. The content on the web pages was checked for grammatical errors and spell check was done. All the HTML tags were checked if they were properly closed or not. Linters in code editors were used to hightlight errors in HTML syntax. All the linked files were checked so that their sources are proper and they're included as desired.

2. **CSS Testing :**
    For CSS testing it was checked that the classes and id's are properly named and defined. It was also checked the classes and id's are included in their respective tags in the HTML code. Syntax checking was done for all the files using a linter in the code editor.
    The testing for responsive web design was done using resizing the webpages according to different screen sizes. Some additional media queries were added for some screen sizes.

The CSS files were basically of two types :

    i)   Common:

            The common CSS files were used in all the modules. Their code was made responsive and was consistent across all platforms. All the web pages were open and checked so that the common CSS files included in them are working as expected.

    ii)   Module – Specific :

            The module specific CSS files were defined only for some specific modules. These files were checked by opening their modules.

3. JavaScript & JQuery Testing :

For testing of this section, first it was checked that all the scripts are properly defined. The functions in these scripts were executed again and their output was verified.
The syntax was verified using a linter.

Debugging

Debugging was mainly done by finding out the errors using a linter. The syntactical errors which were hightlighted were corrected.

For some errors related to Google Map JavaScript API help was sought from online resources such as Google Maps API Documentation and StackOverFlow.

Errors in JQuery and JavaScript were found out using the browser JavaScript Console.

For errors in CSS and HTML, the webpages were refreshed continuously so that they render appropriately. Online help was sought from W3Schools

Backend:

Once the program is written in their respective programming languages then the next step is testing and debugging in order to find the errors in the code such as syntax errors, semantic errors or runtime errors, for this purpose the testing part comes, in which the code is tested to check its proper working and functionality in all odd conditions. So that, when the code is deployed it requires least maintenance and with a minimal amount of work the page could be easily upgraded.

The testing can be done by implementing various stages such as:

1. Functionality testing: -
At this stage all the hyperlinks, database collections, etc are tested. To ensure proper linking. This testing was periodically performed by the members of the group.

2. Usability testing: -
This stage ensures that the website is easily is used and all the instructions are provided correctly and clearly. This was exercised by showing the web app to two unbiased users and their response was found satisfactory.

3. Compatibility testing:-
In the modern world, where internet is not exclusive to desktop systems, websites need to ensure cross platform compatibility and responsiveness. Therefore, at this stage compatibility of the web app with various browsers, operating systems and devices is tested. The compatibility of the web app was checked on Windows, Linux mint, Ubuntu.

Mobile testing was done using the "toggle responsive design" extension on Mozila Firefox.

4. Penetration testing:-

Before passing a SQL query, potentially dangerous characters such as {",'} were escaped from the string using the PHP function 'mysqli_real_escape_string()'. This was done to avert the risk of security threats such as SQL injection and XSS.

MAINTENANCE

Post development, maintenance is an integral part of the web development process. It is important because now-a- days within a small period of time the code becomes outdated and needs to be updated regularly. In short, maintenance is the process through which the content on the website is updated frequently and the bugs that are encountered are being handled.

The maintenance is mainly for future upgradation of site as in content or expanding the website by further adding pages; or we can say adding new features to the web project.

It can be done by various means as the project can be broadly divided into two parts : namely, dynamic and static part.

The data which is stored on the databases is the dynamic data and can be edited only by altering the data in the database.

The static data is the data which is directly available on the web pages (HTML files) it can be altered by directly editing the content on the html file.

The dynamic data on the web site can be maintained by adding, removing or editing content simply to the database through the admin login page on the website or on the server by using the tool 'phpmyadmin' for SQL database management system on the server.

The static content of the web project can be directly updated on the HTML file as this data is generally small thus can be easily handled

on the HTML file and as it does not require changes frequently, like the developer's info, about page and courses.

As the website includes maps which is supported by the google maps API when in future google adds new features to these maps those features can be added by small changes in the html pages and PHP statements. The maps need to be managed as they have various features like location of the places their databases containing longitude, latitudes and the names of the places. In the database used, new locations, whenever required can be added to the maps as they can be simply added by appending the data of the places on the existing MYSQL database of the maps.

The search engine also requires regular maintenance so as to improve the quality of the search of the page and to provide with the most relevant information to the user by the integrated search algorithm of the page. As the search filters the relevant information from the data on the different databases and finds the relevant results. The search needs to be upgraded regularly so that it always comes up with the results that are most relevant to the query requested by the user.

Maintenance is also required whenever new versions of the php, mysql and apache servers are released in order to keep the website up to date and enhance its functionality using the latest features of the same.

Screenshots

Jobs Undertaken

1. Pratik Joshi:
   a. Created HTML documents.
   b. Altered the htmls and PHPs to give them proper block structure increase modularity for styling.
   c. Styled documents using CSS and ensured the responsiveness of the website.
   d. Imported JavaScript for the google maps API.
   e. Altered the google maps api to pick custom markers stored in a SQL database.
   f. Created standard template for uniformity throughout the website.
   g. Debugging.

2. Shaswat Singh:
   a. Created HTML documents.
   b. Set up the local server using apache, a database management system(SQL/MariaDB) (via XAMPP)
   c. Created a database entry and retrieval system using PHP and SQL.
   d. Created a database of faculty details as well as map markers.
   e. Helped with styling and responsiveness of the website; created a navigation bar for the design template.
   f. Used JavaScript and JQuery for animations.
   g. Debugging (backend and front-end)

3. Shivank Bali:
   a. Created HTML documents.
   b. Created a global search, map search and profile search.
   c. Created a database entry and retrieval systems using PHP and SQL; linked several pages through PHP.
   d. Helped with creating faculty and map markers database
   e. Managed local server and supporting software.
   f. Use JavaScript and JQuery for search persistence and passing data between pages.
   g. Debugging

4. Sindhiya Arya:
   a. Created HTML documents.
   b. Designed the overall look and style of the website.
   c. Helped with styling using CSS.
   d. Altered the htmls and PHPs to give them proper block structure increase modularity for styling.
   e. Contributed in creating the uniform template for the website.
   f. Helped to make the site responsive across various devices.
   g. Debugging(front-end)

DAILY DIARY

Date	Tasks Accomplished
05/06/2017	Revised HTML,JavaScript
06/06/2017	Version Control using git, Started JQuery
07/06/2017	Completed jquery and javascript
08/06/2017	Completed css and php
09/06/2017	Started creating htmls and learnt mysql
13/06/2017	Started stylinig html files, Setup a local server on linux using xampp, setup MariaDB and MySQL
14/06/2017	Styled htmls , created a database entry system to create faculty database
15/06/2017	Started working on a responsive navigation bar and menu, started learning google jmaps api, Included a basic google map using iframe implementation and explored its customisation potential
19/06/2017	Decided to go with the more functional javascript version of the google maps api and started work on it, included search for the faculty database,started applying javascript Created faculty database, created more database entry and fetching systems using php and mysql
20/06/2017	Completed javascript maps implementation, started work on custom markers, created a database for locations of eateries,libraries,departments, etc
21/06/2017	Used the sql database to fetch the necessary map markers, included a global search, styled remaining documents