A DATA INTEGRATION AND OLAP APPLICATION: UNIVERSITY EXPLORATION TOOL FOR INTERNATIONAL STUDENTS

A Project

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by

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A DATA INTEGRATION AND OLAP APPLICATION: UNIVERSITY EXPLORATION TOOL FOR INTERNATIONAL STUDENTS

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__________________________________, Second Reader
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__________________________________
Date
Student: Purva Deshpande

I certify that this student has met the requirements for format contained in the University format manual, and that this project is suitable for shelving in the Library and credit is to be awarded for the project.

__________________________, Graduate Coordinator
Dr. Ying Jin

Date

Department of Computer Science
Abstract

of

A DATA INTEGRATION AND OLAP APPLICATION: UNIVERSITY EXPLORATION TOOL FOR INTERNATIONAL STUDENTS

by

Purva Deshpande

Education has become very important in today’s era. Every year number of students pursuing Higher Education is increasing and United State of America gives these students a good opportunity to pursue their dreams. Students are attracted to America as it provides best education in the world, but there is little they know about the universities, ranking, living condition in America. To research about universities students perform number of ways as researching on Google, posting questions on forums, getting help from consultancy, asking friends, seniors, family. These methods are slow and unreliable. A friend can give biased opinion about a university if he has been there or simply because he does not know other universities well. A consultancy can also give biased opinion regarding a university if they have a tie up with that university. Other sources like Google take long time to research and you only get partial information. There are websites which provide similar functionalities such as www.internationalstudent.com and US news, but they don’t have detailed information as orientation of university, acceptance rate and surrounding conditions of university. This motivated me to provide these international students a way to research about university’s academic & surrounding condition and make the decision accordingly.

This project is implemented using different techniques of data mining and data warehouse. It is based on datasets such as university, crime, transit, rent per room and weather which are
collected from government official websites. Some research was needed in order to complete the
dataset and start the project. The method used for data mining are data preprocessing, cleaning data
and for data warehouse, the methods are data integration, OLAP operation. Using WEKA tool, a
machine learning tool which is used for data mining and knowledge discovery, the data was
cleaned, unused fields were removed and dealt with missing attributes. Other than this, the missing
values were also manually researched and entered into datasets. To integrate all the datasets,
snowflake database schema was used creating fact table and dimension tables. This was done using
cube query of OLAP operation. This project is implemented using popular tier of LAMP (Linux
Apache MySQL and PHP), data integration and OLAP technology which made application more
dynamic and interactive.

In this project, user will be able to search universities on the basis of state, their GRE or
TOEFL score, orientation of university such as teaching or research and degree level. After
applying filters, result page will display all the universities satisfying search criteria where they can
add their favorite universities to wish list by logging in to application. The compare page shows all
universities they have added to wish list. On compare page, user can compare universities by
academic standing such as tuition fee, orientation, highest degree level and surrounding conditions
such as yearly weather report, crime rate, transit facilities and rent per room by clicking on the row
so that the popup will display all this information. There is Visas page where user can view non-
immigrant visa types and information regarding that. Finally, there is Forums page for students to
posts questions for fellow students. This project is enterprise level application which will be
applicable for all universities in the US but due to time limitation, the focus is on California
universities. The future work for this project can be extended to other states. Users of this project
will be international students applying for universities in the US. The objective
of this web application is to provide international students a guide to research about universities according to the degree level, tuition fees, ranking, climate conditions of area, average rent for rental houses, regional transits and crime statistics near the university area.

_______________________, Committee Chair
Dr. Meiliu Lu

_______________________
Date
ACKNOWLEDGEMENTS

I would like to thank Dr. Meiliu Lu for encouraging me and giving me guidance when needed. She has given me opportunity to work on interesting and useful project for future students. I have learnt a lot from her about data mining, data warehouse and right direction for doing Master’s project. I thank her for providing constant feedback on my work. I would also like to thank Dr. Scott Gordon for his guidance in this project. Lastly, I would like to thank my family for supporting and believing in me.
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Chapter 1
INTRODUCTION

In today’s era, the world has come closer. Travelling long distance has become so much easier. This gives students opportunity to apply to any university in the world and pursue education in diverse culture. Every region has different style of education that brings different values to students. And amongst all, US has succeeded to attract students from all over the world due to the quality of education, learning and research facility universities provide. Every year more than 20 million international students apply to US universities. Amongst them about 886,052\textsuperscript{[10]} undergraduate and graduate students come to US to pursue education. Around 4\% of all university students are international students. There has been 70\% increase in international students in US since 2000.

The foreign universities, to apply for international students are in abundance but students don’t have enough resource to research about universities. Every student has a specific criteria to find a university, not every student can afford a high ranked but costly university. Students want to make decision on basis of fee, research facilities, weather, and crime rate.
1.1 Problem Definition

The foreign universities to apply for international students are in abundance but students don’t have enough resource to research about universities. Every student has a specific criteria to find a university, not every student can afford a high ranked but costly university. Students want to make decision on basis of fee, research facilities, weather, and crime rate. The use cases for this project will be international students who wants to research about US universities and get all the information. The student will search university according to his criteria, he will then get all resulting universities that satisfied his criteria. He can then add his favorite universities into his wish list. Wish list is a list that stores all favorite universities of user and compares one or more. This way student can compare universities on different factors, decide how many and which universities he wants to apply for. Once he gets the acceptance from universities, he can remove other universities from the list, he did not receive acceptance letter for. At this point student has all his favorite universities he got acceptance from, but he further wants to narrow down to one university. So, he can narrow down the list by comparing other factors such as cost of living, crime rate, weather etc.
1.2 Methodology

As the project is based on data mining and data warehouse, the key feature was to use effective methodology to handle large amount of data. In this project, 5 datasets are used and some of them are for California based universities only. So, to handle such amount of data, ETL (Extract Transport Load), preprocessing, data integration and some OLAP operations are used. The datasets obtained were in form of csv files. The first process was to extract the data and transform into xls file, remove unused columns, skewed data, missing values. After repeating the process for all the datasets, the next process was to integrate all the datasets into database.

1.2.1 Data Integration

One of the important part in this project was preparing the data which includes finding the correct data and after obtaining performing ETL process then integrating all the datasets into one. First, the individual datasets are imported into MySQL database using import sql script and creating empty tables. Every table has city ID as all the information is based on area where the university is, therefore all the datasets are combined using the city ID. Creating fact table to keep the data combined in one table made the integration process better which was done by creating cube in OLAP.

1.2.2 OLAP Operation
OLAP operation is multidimensional Online Analytical Processing which is used to make complex calculations easier. There are many reasons to use OLAP like it helps users understand the project at high level, it can be used for knowledge discovery, or in the field of data warehouse. In this project, the OLAP operations are used for knowledge discovery and to get better idea understanding of data.

1.3 Web Technologies

The website is developed using technologies such as PHP server side, HTML/CSS, Javascript for frontend, MySQL for backend. System requirement is a Computer (Linux based, windows based or Mac based) with RAM more than 256MB, Hard disk of more than 80GB. Server requirement will be Database space of more than 50MB and disk space of more than 512MB.

Client Server Architecture

Figure 1.1: Client Server Architecture[8]
In web application, there is client visible, operated by user and a server not visible to user, not operated by user. So, the communication is done by making HTTP requests, these are done by Apache by using some of http requests, like get, post, put, delete, patch. When client makes a request it is done using http protocols and they get a response object in JSON or XML for depending on server. The server stores all the data in database and queries database as and when the data is needed. The response is the result set in form of table.

1.3.1 HTML/CSS

HTML/CSS are very popular languages used for web development. HTML is hypertext language used to create static web pages. CSS is cascading style sheet which is used to provide styling for web page and make it presentable. Html communicates with web server with the help of tags. <!DOCTYPE html> tag tell that the file is html. Basic html tags includes <html>, <head> which has titles, script files, <body> which has title and code to display content on webpage.

In CSS page, you can define style for specific components for eg. divisions, tables etc. There are various ways to define style for components, you can define style for all components like table or paragraph, you can specify id for one specific component and define style for that.

1.3.2 PHP
PHP is another popular language used for web development server side language to make pages more dynamic. To use PHP inside any html component you can use:

```php
<?php
<your code>
?>
```

You can use PHP to perform CRUD (Create, Retrieve, Update, Delete) operations in database. PHP is very easy to use. Using wamp made it easy to develop the project in local environment. Wamp is server for PHP and MySQL.

In PHP, there is a _SESSION variable which is used to store information through various pages.

```php
$_SESSION['login_user']
```

This code stores username of logged in person through various pages. It remembers which user is logged in and thus shows information of associated to that person. If the user logs out of the website, the session is destroyed by calling session_destroy().

### 1.3.3 Javascript

Javascript is used for validation and giving dynamic content to webpage. It is usually enclosed in `<script>` tag. If we want to validate email address or mobile number we can do it using javascript and define a function that checks format of email address or digits in a mobile number.

### 1.3.4 MySQL
The database connection is done using PHP as follows:

```php
$con=mysqli_connect("localhost","root","","university");
if (mysqli_connect_errno())
{
    echo "Failed to connect to MySQL: " .
    mysqli_connect_error();
}

$sql = "SELECT * from compare WHERE Login_user='$email' AND compare.Is_Deleted=0";
$query = mysqli_query($con, $sql);
A query is fired using sql sentence as above and then stored in a variable $sql.

`mysqli_query` is used to execute the sql query.

To loop through every element in the resultset of query we use:

```php
$w = mysqli_fetch_array($query)
<<?php echo $w['University']; ?>
```
To retrieve a specific value of a row, we perform above where ‘University’ is name of column. Echoing it with PHP displays the named value in your HTML component.

Chapter 2

REQUIREMENTS

2.1 Use Case

This is the use case diagram of the application. The diagrams helps to visualize the navigation and relation of pages from user point of view. In this project, there is only one user who is student. He can navigate to different pages as shown in Figure 2.1.

Figure 2.1: Use Case Diagram
2.1.1 Registration

There is registration page for new users to register on the site. The new user will have to enter his or her full name email address and password to register. After the user has entered this information, a link will be sent on their email address to confirm the email address is theirs. Once the email address is confirmed, you can simply login to the site from the next time you want to use the site. The flow diagram for the registration is as follows:

![Register Flow Diagram](image)

*Figure 2.2: Register Flow Diagram*

2.1.2 Login

This is the login page for existing users to enter the website and view the items they have saved. Students will enter their user name and password and if it’s matched with database, they will be taken to home page of the website. The flow diagram for the registration is as follows:
2.1.3 Home

This is the home page of the website where there is menu option to route other pages of the website and there is search box to search universities according to user requirements. Students can search universities by state, degree level, orientation, GRE/TOEFL requirement. Once that is entered, user will then be directed to search page.

2.1.4 Search

The search page will only be shown when user enters their requirements on the home page under search tab and clicks the search button. The search page will display all
the universities which are fulfilled by user requirement in tabular form. In the table in each row, there is also an option to add the university to compare/add to list page. When you click the button, university will be added to compare page list.

2.1.5 University Information

On this page, you can search for universities by the name. If you know the specific university then you can just search accordingly by going to initial of the university. All universities are listed alphabetically. Here, the additional information is there about the university as university contact details, web address and a link to directly apply to university. If you click on any row, a pop up will come and you can also see other information about university that you see on other pages.

![Figure 2.5: Universities A-Z Page Flow Diagram](image)

2.1.6 Visas

This page shows all the information about non-immigrant visa, information of all the visas. You can see which visa you will require to come to US for study purpose. This information is taken from official website of Bureau of Consular Affairs, U.S. Department of State.
2.1.7 Compare

Compare page will show all the universities that you have added to compare, from Search page and make a decision of which university you want to finalize. This page will display all the information about university like the highest degree level it offers, orientation, tuition fee, acceptance rate, weather, transit facility, crime rate, rent per room etc. You can also deleted the added universities from the table by clicking on – sign in the last column.

2.1.8 Forum

Students can ask their queries on this forum page. They can post questions regarding for example financial aids, or ask for help to choose between few universities you have shortlisted etc. to your fellow applicants. Students can reply to posted question and help others if they have some experience in it.

![Figure 2.6: Forum Flow Diagram](image-url)
### 2.2 Data Flow

Figure 2.3 shows how data flows through the program and helps to get better understanding of the application. The diagram depicts how user can go to different pages. The flow diagram includes data flow of each page.

*Figure 2.7: Data Flow Diagram (DFD)*
Chapter 3
DATASETS AND DATA PROCESSING

3.1 ETL (Extract Transform Load) Process of Dataset

ETL is most important process in data mining data warehousing project as the obtained data is in raw format, it needs to be processed in order to use it. There are three steps to process the data which are extract, transform and load. Each process is important to prepare the data for use. In extraction phase, we get the data from source system in whatever required format we want. In the next phase which is transform phase, we perform calculation or processing in data. This phase can be combined with cleaning, where you remove the non-required fields, handle missing attributes and perform required operations to prepare the data. In final phase, load, we load the prepared data into target database.

According to project requirements, there are datasets of universities, rent, transit, crime and weather. Most of the datasets were available on data.gov site and all the datasets are open source. The links are in the references.

3.1.1 Extract

The extraction of datasets are done from data.gov site. All the datasets were in form of csv files or xls files. The source of the files are listed in references.

Following is the description of each dataset used in this project. The description is in tabular form which has column and description of the column.
3.1.1.1 Universities Dataset

This dataset has information of universities like institute name, phone number, web address, geo location, highest degree offered etc. and other columns like GRE/TOEFL score, fee, orientation and acceptance rate is based on research as the data was not available for these fields. The dataset is from US Department of Education[1]. This dataset also had more columns which were no use for this project, so in preprocessing not required columns were removed.

<table>
<thead>
<tr>
<th>Column Names</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unit ID</td>
<td>Unique identification number of the institution</td>
</tr>
<tr>
<td>Instname</td>
<td>Institution name</td>
</tr>
<tr>
<td>Addr</td>
<td>Institution street address or post office box</td>
</tr>
<tr>
<td>City</td>
<td>City location of institution</td>
</tr>
<tr>
<td>Zip</td>
<td>ZIP code</td>
</tr>
<tr>
<td>STABBR</td>
<td>State abbreviation</td>
</tr>
<tr>
<td>Gentele</td>
<td>General information telephone number</td>
</tr>
<tr>
<td>Webaddr</td>
<td>Institution's internet website address</td>
</tr>
<tr>
<td>FaidURL</td>
<td>Financial aid office web (URL) address</td>
</tr>
<tr>
<td>AppURL</td>
<td>Web address (URL) on online application</td>
</tr>
<tr>
<td>HLOFFER</td>
<td>Highest level of offering</td>
</tr>
<tr>
<td></td>
<td>1. Postsecondary award, certificate or diploma of less than one academic year</td>
</tr>
<tr>
<td></td>
<td>2. Postsecondary award, certificate or diploma of at least one but less than two academic years</td>
</tr>
<tr>
<td></td>
<td>Description</td>
</tr>
<tr>
<td>----------------</td>
<td>---------------------------------------------------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>3.</td>
<td>Associate's degree</td>
</tr>
<tr>
<td>4.</td>
<td>Postsecondary award, certificate or diploma of at least two but less than four academic years</td>
</tr>
<tr>
<td>5.</td>
<td>Bachelor's degree</td>
</tr>
<tr>
<td>6.</td>
<td>Postbaccalaureate certificate</td>
</tr>
<tr>
<td>7.</td>
<td>Master's degree</td>
</tr>
<tr>
<td>8.</td>
<td>Post-master's certificate</td>
</tr>
<tr>
<td>9.</td>
<td>Doctor's degree</td>
</tr>
<tr>
<td>Longitude</td>
<td>Longitude: Based on the location of the school, the value of LONGITUD ranges from -170 to 171. The minus sign (-) indicates west of the prime meridian. It contains an explicit decimal point. The digits to the left of the decimal point represent the number of degrees from the prime meridian; the digits to the right of the decimal point represent the fraction of the next degree carried out to six decimal places.</td>
</tr>
<tr>
<td>Latitude</td>
<td>Latitude: Based on the location of the school, the value of LATICODE ranges from -14 to 71. It contains an explicit decimal point. The digits to the left of the decimal represent the number of degrees from the equator; the digits to the right of the decimal represent the fraction of the next degree carried out to six decimal places.</td>
</tr>
<tr>
<td>GRE</td>
<td>Minimum GRE score required by the university</td>
</tr>
<tr>
<td>SAT</td>
<td>Minimum SAT score required by university</td>
</tr>
<tr>
<td>TOEFL</td>
<td>Minimum TOEFL score required by the university</td>
</tr>
<tr>
<td>Fee</td>
<td>Approximate tuition fee per year</td>
</tr>
<tr>
<td>Orientation</td>
<td>Is the university teaching oriented or research oriented</td>
</tr>
<tr>
<td>Acceptance_rate</td>
<td>Acceptance rate of international students</td>
</tr>
</tbody>
</table>

Table 1: Description of Entities in Universities Dataset[1]
3.1.1.2 Crime Dataset

This crime dataset is from Federal Bureau of Investigation\(^3\) website. The dataset contained information of crimes state wise. The dataset also had detailed information regarding each offense category.

<table>
<thead>
<tr>
<th>Column Names</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
</tr>
<tr>
<td>Number of participant agencies</td>
</tr>
<tr>
<td>Population covered</td>
</tr>
<tr>
<td>Total offenses</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Offense category</th>
<th>Assault Offenses</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Homicide Offenses</td>
</tr>
<tr>
<td></td>
<td>Kidnapping/Abduction</td>
</tr>
<tr>
<td></td>
<td>Sex Offenses, Forcible</td>
</tr>
<tr>
<td></td>
<td>Sex offenses, non forcible</td>
</tr>
</tbody>
</table>

Table 2: Description of Entities of Crime Dataset\(^3\)

3.1.1.3 Transit Dataset

The transit information dataset is from Federal transit administration website\(^7\). The dataset consist of information of transit agencies state and county wise.

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Description</th>
</tr>
</thead>
</table>

3.1.1.4 Rent Dataset

This dataset is from Zillow open source dataset\textsuperscript{[5]}. The dataset has records for rent per room area wise which includes county, city, state.

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>State</td>
<td>Name of state</td>
</tr>
<tr>
<td>County</td>
<td>County Name</td>
</tr>
<tr>
<td>City</td>
<td>City</td>
</tr>
<tr>
<td>Zri</td>
<td>Rent per room in $</td>
</tr>
</tbody>
</table>

Table 4: Description of Entities of Rent Dataset\textsuperscript{[5]}

3.1.1.5 Weather Dataset

To get the current weather data NCDC’s Climate Data Online (CDO)\textsuperscript{[2]} has provided the dataset. There are different datasets for weather like hourly weather report, weekly, monthly, yearly etc. In this project yearly report is used as international students, while applying want to know what is the average temperature of that state.

<table>
<thead>
<tr>
<th>Column Name</th>
<th>Description</th>
</tr>
</thead>
</table>

Table 3: Description of Entities of Transit Dataset\textsuperscript{[7]}
<table>
<thead>
<tr>
<th>Annual high temperature</th>
<th>Highest temperature recorded in that year</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual low temperature</td>
<td>Lowest temperature recorded in that year</td>
</tr>
</tbody>
</table>

Table 5: Description of Entities of Weather Dataset[2]

### 3.1.2 Transform

The transformation phase is composed of preprocessing the data, designing and integrating the data. The datasets are converted to xls format to preprocess where missing values were handled, cleaning was done then the database design was done to prepare integration of data. After snowflake schema design, the datasets were integrated into one table using fact table. This really helped reducing joins and making operations less expensive when the data is big. Thus, it’s taking less time to retrieve the data. Finally, the data was transformed back to csv format.

#### 3.1.2.1 Preprocessing of the Dataset

Using data mining tool Weka preprocessing was done. The first step of preprocessing was to handle missing values. Next was to research on datasets and making a rough design to figure out which data/columns are required for the website and removed the unrequired columns.

#### 3.1.2.2 Database Schema Design

After preprocessing and cleaning the dataset, the next process was to design the database schema to import into database. The snowflake schema design is much easier to
work with and all the primary keys are in same table which reduced the number of joins required in the database. There are 6 databases and all have one primary key, in fact table, all foreign keys are combined to form one primary key. Following is the Snowflake database schema design:

![Snowflake Database Schema Design](image)

3.1.2.3 Data Integration

As discussed above, the database schema is snowflake which made the data integration easier. The data was integrated into same database and the relationship of foreign, primary key was done using city ID which connects all the datasets into one.
3.1.3 Load

The final phase of ETL process is loading. Now, the data is processed and ready to be loaded. The data was loaded into MySQL database using sql scripts. Creating different tables for each datasets and defining primary keys, data types of fields, imported the csv files.

3.1.3.1 Creating Tables and Importing Data

Created the indexes as designed in the Snowflake schema design in Figure 4.1.4 and then imported the datasets into database. The database table looks like following:
**University Table**

In this table, Unit_ID is primary key and State_ID is secondary key.

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Type</th>
<th>Collation</th>
<th>Attributes</th>
<th>Null</th>
<th>Default</th>
<th>Ext</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sr_No</td>
<td>int(11)</td>
<td></td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Unit_ID</td>
<td>int(11)</td>
<td></td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Inst_Name</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Address</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>State_ID</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>City_ID</td>
<td>varchar(11)</td>
<td>utf16_unicode_ci</td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Zip</td>
<td>int(11)</td>
<td></td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Telephone</td>
<td>int(15)</td>
<td></td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Fax</td>
<td>int(20)</td>
<td></td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Web_address</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Research_or_teaching</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Acceptance_rate</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Tuition_fee</td>
<td>int(11)</td>
<td></td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Min_gre</td>
<td>int(11)</td>
<td></td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Min_toefl</td>
<td>int(11)</td>
<td></td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>Acad_req_qualifled</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>Degree_offered</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>Yes</td>
<td>NULL</td>
<td></td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>New_Link</td>
<td>varchar(255)</td>
<td>ucs2_unicode_ci</td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>19</td>
<td>Longitude</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>20</td>
<td>Latitude</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>Weather</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Figure 3.2: SQL Structure of University Table*
Fact Table

As per our database schema design, there is a fact table which consists of foreign key of all the tables like Unit_ID, State_ID, R_PR and Transit_ID.

![SQL Structure of Fact Table](image)

Transit Table

Transit_ID is the primary key of transit table.
Rent Table

In rent table R_ID is the primary key.

Crime Table
The crime table is state wise data, so State_ID is primary key in crime table.

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Type</th>
<th>Collation</th>
<th>Attributes</th>
<th>Null</th>
<th>Default</th>
<th>Extra</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>State_ID</td>
<td>varchar(255)</td>
<td>latin1_swedish_ci</td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>State_Name</td>
<td>varchar(255)</td>
<td>utf8_unicode_ci</td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>No_of_part_Agencies</td>
<td>int(10)</td>
<td></td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Population_Covered</td>
<td>int(11)</td>
<td></td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Total_Offenses</td>
<td>varchar(10)</td>
<td>utf8_unicode_ci</td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Assault_Off</td>
<td>int(11)</td>
<td></td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Homicide_Off</td>
<td>int(11)</td>
<td></td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>Kidnaping</td>
<td>int(11)</td>
<td></td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Sex_Offenses_Forcible</td>
<td>int(11)</td>
<td></td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>Sex_Offenses_Nonforcible</td>
<td>int(20)</td>
<td></td>
<td>No</td>
<td>None</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 3.6: SQL Structure of Crime Table

**Compare Table**

The compare table is table to store information of student’s selected universities. It has id as auto incremental primary key.
Figure 3.7: SQL Structure of Compare Table

<table>
<thead>
<tr>
<th>#</th>
<th>Name</th>
<th>Type</th>
<th>Collation</th>
<th>Attributes</th>
<th>Null</th>
<th>Default</th>
<th>Extra</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>id</td>
<td>int(10)</td>
<td></td>
<td>No</td>
<td>None</td>
<td>None</td>
<td>AUTO_INCREMENT</td>
</tr>
<tr>
<td>2</td>
<td>Login_user</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>University</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>State_ID</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Degree</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>Research_Teaching_Oriented</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>7</td>
<td>Gre_Score</td>
<td>int(11)</td>
<td></td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>TOEFL_Score</td>
<td>int(11)</td>
<td></td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>Total_Offenses</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>R_FR</td>
<td>int(11)</td>
<td></td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>Agency_Name</td>
<td>varchar(255)</td>
<td>utf16_unicode_ci</td>
<td>No</td>
<td>None</td>
<td>None</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>Is_Deleted</td>
<td>tinyint(2)</td>
<td></td>
<td>No</td>
<td>0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

3.2 OLAP Operations

OLAP is typically used in projects based on data mining and data warehouse. OLAP operations in this project were used for two purposes which are knowledge discovery and data queries. Mostly it is used in places where large amount of data is involved, operation touch large amount of data but there is no frequent updates.

In OLAP, you define a cube which is used to store data in multidimensional form which is used to analyze or used in data warehouse project. The cube definition includes all the primary keys of tables as state_id, city_id, transit_id, crime_id, university_id.

3.3 Challenges with the Dataset
The university dataset was huge and thus it took time to preprocess the dataset. To handle missing values, data mining tool Weka was best fit and it took lot of time to replace missing values. After that there were cases where the missing data was not handled due to errors. So, they needed to be replaced manually.

There were some required columns as orientation of university, acceptance rate, tuition fee etc. which were not there. Hence, research was needed to find values of the fields, for California universities. The prototype for other states is also ready.
Chapter 4

IMPLEMENTATION

4.1 Design Implementation

The design implementation includes design details of all the pages from the project. All the pages from the website are listed below with details:
4.1.1 Login Page

This is login page of application. Login is not required to surf every page in the website. It is required only when you want to create and manage a wish list which is in compare page and on forum page where you can posts questions and reply to questions posted by others. To login to the application, you first have to register to the site. You can also reset the password if you forget the password. Once you are signed in, the application will remember your credentials and will show you results specific to you.
4.1.2 Register Page

This register page for new members. You have to provide some basic information like username, password and email address. After you click on Sign Up button, a confirmation link will be provided on email address you entered while registering. Only when you click on confirm link, your account will be activated. Once the account is activated, you can login to application and use all the features of the website.

![Register Page](image)

Figure 4.2: Register Page
4.1.3 Home Page

This is the Home page of the website. On the top there is navigation bar where you can see list of menus like Home, Universities, Compare, Visas and Forum. These are the links that will take you to different pages according to your input. This bar is header of the website which means you will see this information on every page you navigate. Similarly, there is footer of page which is displayed on every page at bottom of page. The home page has a search box where student can enter the search criteria. This is displayed in second screenshot below.

Figure 4.3: Home Page [Image ref. 12]
4.1.4 Home Page – Search Universities Box

This is part of home page. In the search box on the right, you can search universities on basis of state, degree level, orientation and test scores. You can search for any combination of these. After clicking on search button, you will be directed to search page which shows universities that satisfied you search criteria. On the left side, there is information about different pages on the website.

Figure 4.4: Home Page Search Box [Image ref. 13, 14, 15]
4.1.5 Result Page

This is page is displayed after you search for universities on Home page. This page will display information about universities as Name, State, Highest degree level, test scores. You can also add university to your wish list by clicking ‘Add To Compare’ button. When you click the button and university is added to compare page successfully, it will turn to Green from Red and below that a line will get displayed as ‘Added successfully’. There is also search input where you can enter any keyword and it will display data that is matched up with any field on that page. Finally, there is show dropdown which will show selected number of rows on the page.

![Figure 4.5: Result Page](image)
4.1.6 Universities A-Z Page

On this page, all the information of universities is displayed. Universities are gathered alphabetically. If you know a specific university, you can directly navigate to that letter and search the university alphabetically on the page or simply search on search input box on page. This page displays general information about universities like Name, address, Phone no, web address and application link. The application link will directly take to application page of the university. If you click on any row, a pop up will come which displays detailed information of the university as shown below.

![Figure 4.6: Universities Page](image-url)
4.1.7 Popup Page

This page pops up when you click on any row on the universities page. The universities page displays the general information about the university and this page displays the detailed information of university as test scores, acceptance rate, tuition fee and orientation. This information shows only for universities in California due to time constraint as this data was to be researched and found.

![Figure 4.7: Popup Page to Display Detailed Information about the University](image-url)
4.1.8 Compare Page

This page stores your wish list of universities. When you click on compare page, a login window will pop up, this page requires login. Once logged in, it will display all the universities you added, if not you can create a list. On Home page, provide the search criteria and a search result page will be displayed, click on Red plus button which adds that university to this page. The purpose of this page is to provide user ability to compare universities on basis of tuition fee, orientation, score requirement, living expense or surrounding conditions. If you want to remove university from list you can do it by clicking ‘-’ button in Delete column.
The purpose of this page is to display all the information about the immigrant visas. This information is taken from US Department of States websites\textsuperscript{[11]}. The page shows information about all the non-immigrant visa category.
4.1.10 Forum

This page is for students to interact with community, post questions, comment on other’s questions if you have any knowledge of it. The best way to get more information about a specific thing is to ask questions on forums. The community is very active and you
will get response within hours. Questions like financial aid, health insurance, which university is best for certain specification are very specific questions and you may not find satisfactory answer for these by surfing. Following are two snapshots of forum one is where you can post a question and one is where you can comment on a specific post.

Figure 4.10: Forum Posts
Figure 4.11: Forum Comments on Post
4.2 User Experience Design

To provide user ultimate experience and ease of use, user experience design and functionalities are included. We have seen number of websites which has good content but fail because of lack of user experience design in their website. These days user don’t have lot of time to spend on one particular website. They want to use features, functionalities to reduce their time and effort.

In this project, there are some designs and features included to increase usability and user experience. There is one line instruction on every page of what the page is about and how to use it, this way user will know how to use the website. For login, logout correct error messages are shown for users to understand what has gone wrong. There is fixed header and footer so that user can switch to any page when they want. The search page is on the home page as that is the most used feature and user don’t have to search for it on every page.

The features to make user experience better are, there is a search tab so that user can find any keyword in the whole result table. If a user is looking for specific detail he can just search with a keyword. Another useful feature is a dropdown in table where user can select number of rows they want to be displayed on the page. In addition to these, I have provided a universities page where all the universities from A-Z are listed. If a user knows specific university, he doesn’t have to follow the search process, he can go to universities A-Z page and click on university’s initial letter, and moreover he can search in search box name of university.
Chapter 5

CONCLUSION

This web application is developed for international students applying for US universities to pursue their education in all fields. It will help students to find information about all the universities in US and help them make their decision. Students can also find about weather, crime, rent and transit information of the area of the university. They ask questions to fellow students like which university offers XYZ specialization among following universities, about financial aid etc.

5.1 Learning Experience

My learning experience while developing this project was tremendous. I was able to gain practical experience working on real time project where you should think about scenarios where this website will be beneficial for users, thinking about user requirements, carefully designing the structure of website and database. I was able to learn about how to perform error handing and testing, thinking about all corner cases, which are equally important as web developing. Learning about data mining was also important part of my experience.

5.2 Future Scope

The future scope for this project will be to research about all universities in other states (other than California) about acceptance rate, orientation, SAT/GRE/TOEFL scores and tuition fees and use it in this website. The prototype is already available for all the states and some of the data is also available.
APPENDIX A: Source Code of Login Functionality

Login.php

```php
<?php
session_start();
include("config.php");

$email = $_POST['email'];
$password = $_POST['password'];
//exit;

$sql = "SELECT * FROM user WHERE email='".$email."' AND password='".$password."' AND com_code=1";
$result = mysql_query($con,$sql);
//echo $result;
//exit;
if($result->num_rows >0) {
    $row = mysql_fetch_array($result,MYSQLI_ASSOC);
    //session_register("email");

    $_SESSION['login_user'] = $row['email'];
    echo "Login successful";
    exit;
}
else 
    echo "Password incorrect";
    exit;

mysql_close($con);
?>
```

Logout.php

```php
<?php
session_start();
session_destroy();
echo '<script type="text/javascript">
    window.location = "index.php#reg-box";
</script>';
?>
```
<php
session_start();
include('config.php');
if(isset($_POST['submit']))
{
    if(preg_match('/^[a-zA-Z0-9-_]+@[a-zA-Z0-9-_]+\.[a-zA-Z0-9-_]+$/', $_POST['email']))
    {
        $email = $_POST['email'];
        $sql = "SELECT * FROM user WHERE email = '$email';"
        $result = mysqli_query($con, $sql) or die(mysqli_error());
        if(mysqli_num_rows($result) > 0)
        {
            $_SESSION['error']['email'] = "This Email is already used.";
        }
        else
        {
            $_SESSION['error']['email'] = "Your email is not valid.";
        }
    }
    else
    {
        echo 'script type="text/javascript">
            window.location = "signup.php";
        </script>
    exit;
    }
    else
    {
        $username =$_POST['username'];
        $email = $_POST['email'];
        $password = $_POST['password'];
        $con_code = md5(uniqid(rand()));
        $sql2 = "INSERT INTO user (username, email, password, con_code) VALUES ('$username', '$email', '$password', '$con_code');"
        $result2 = mysqli_query($con, $sql2) or die(mysqli_error());
        if($result2)
        {
            $to = $email;
            $subject = "Confirmation from choiceandbuy to $username";
            $header = "choiceandbuy: Confirmation from choiceandbuy";
            $message = "Please click the link below to verify and activate your account.rn<br>
            <a href='http://choiceandbuy.in/unii/confirm.php?passkey=$con_code'>r
            $sentmail = mail($to,$subject,$message,$header);
            if($sentmail)
            {
                $_SESSION['error2'] = "Your Confirmation link has been sent to your email address."
            }
            else
            {
                $_SESSION['error3'] = "Cannot send confirmation link to your e-mail address";
            }
        }
        else
        {
            echo 'script type="text/javascript">
                window.location = "signup.php";
            </script>
        }
    }
}
APPENDIX B: Source Code of Home Page

Index.php

```html
<!DOCTYPE html>
<html lang="en">
<head>
    <meta charset="UTF-8">
    <meta name="viewport" content="width=device-width, initial-scale=1.0">
    <meta http-equiv="X-UA-Compatible" content="ie=edge">
    <title>Find Your Dream University</title>
    <link rel="stylesheet" href="styles.css">
</head>
<body>
    <header>
        <nav>
            <ul>
                <li><a href="#">Home</a></li>
                <li><a href="#">About</a></li>
                <li><a href="#">Contact</a></li>
            </ul>
        </nav>
    </header>
    <main>
        <section class="carousel">
            <div class="item">
                <img src="images/slider1.jpg" alt="" />
                <h2>Find Your Dream University</h2>
                <p>We believe there is nothing more important than education.</p>
            </div>
            <!-- More items...
        </section>
        <section class="content">
            <div class="row">
                <div class="col-md-8">
                    <h3>Find out about</h3>
                    <p>University Information</p>
                    <p>University Address, Phone No, Min GRE, TOEFL Score Required, Teaching or Research Oriented Degree level.</p>
                </div>
                <div class="col-md-4">
                    <figure>
                        <img src="images/intro-1.jpg" alt="" />
                        <figcaption>Icon of education</figcaption>
                    </figure>
                    <figure>
                        <img src="images/intro-2.jpg" alt="" />
                        <figcaption>Icon of education</figcaption>
                    </figure>
                </div>
            </div>
        </section>
    </main>
</body>
</html>
```
if(isset($_SESSION['error2']))
{
    echo $_SESSION['error2'];
    unset ($_SESSION['error2']);
}
</div>
</div>
</div>
</div>
<header>
</header>
<script>
function newFunction()
{
    document.getElementById('reg-box').style.display = "none";
}

function forgetFunction()
{
    document.getElementById('sign-in').style.display = "none";
}

function forFunction()

var action= document.getElementById("action").value;
var email= document.getElementById("email").value;

$.ajax({
url: "forget.php",
type: 'POST',
data: {
    'email': email,
    'action': action
},
success: function(data)
{
    document.getElementById('err').innerHTML=data;
}
function newFunction()
{
    document.getElementById('reg-box').style.display = "none";
}

function forgetFunction()
{
    document.getElementById('sign-in').style.display = "none";
}

function forFunction()
{
    var action = document.getElementById("action").value;
    var email = document.getElementById("email").value;

    $.ajax({
        url: "forget.php",
        type: 'POST',
        data: {
            'email': email,
            'action': action
        },
        success: function(data)
        {
            document.getElementById('err').innerHTML = data;
        }
    });
}

function loginFunction()
{
    var email = document.getElementById("email1").value;
    var password = document.getElementById("password1").value;

    $.ajax({
        url: "login.php",
        type: 'POST',
        data: {
            'email': email,
            'password': password
        },
        success: function(data)
        {
            if (data.trim() == "Login succefull")
            {
                document.getElementById('error1').innerHTML = data;
                location.reload();
            }
            else
            {
                document.getElementById('error1').innerHTML = data;
            }
        }
    });
}
Search.php

```php
<?php
include('config.php');
include('header.php');

$state=mysql_real_escape_string($_POST['state']);
$degree=mysql_real_escape_string($_POST['degree']);
$orientation=mysql_real_escape_string($_POST['orientation']);
$gre_score=mysql_real_escape_string($_POST['gre_score']);
$toefl_score=mysql_real_escape_string($_POST['toefl_score']);

?>

<div class="kf_content_wrap">
  <div class="container">
    <div class="contt_wrap">
      <div class="row">
        <div class="col-md-12">
          <div class="widget">
            <div class="widget-header">
              <div class="additional-btn">
                <a href="#" class="icon-ccw-1"><i class="icon"></i></a>
                <a href="#" class="widget-toggle"><i class="icon-down-open-2"></i></a>
                <a href="#" class="widget-close"><i class="icon-cancel-3"></i></a>
              </div>
            </div>
            <div class="widget-content">
              <div id="error1"></div>
              <div class="table-responsive">
                <table id="example" class="table table-striped table-bordered" cellspacing="0" width="100%">
                  <thead>
                    <tr>
                      <th>University</th>
                      <th>State</th>
                      <th>Department</th>
                      <th>Research / Teaching Oriented</th>
                      <th>GRE Score</th>
                      <th>TOEFL Score</th>
                      <th>Add To Compare</th>
                    </tr>
                  </thead>
                  <tbody>
                    <tr>
                    </tr>
                  </tbody>
                </table>
              </div>
            </div>
          </div>
        </div>
      </div>
    </div>
  </div>
</div>
```
```php
$query = mysqli_query($con, $sql);

while($row = mysqli_fetch_array($query)) {
    // ... } 
</table>
```
APPENDIX C: Source Code of Universities A-Z Page

Universities.php
```php
$all = "SELECT * FROM universities WHERE Test_Rank LIKE '4%' ORDER BY Sr_No DESC";
$quote = mysql_query($sql,$conn));
while($row = mysql_fetch_array($query)) {
    
    <tr data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlick="testFunction="/\n    
    <td data-toggle="modal" data-target="#modal" onlik..."}" value="Apply New Function"><input type="submit" value="Apply New Function">"}"
```
```html
<script>
  function testFunction(Sr_No){
    var xmlhttp;
    if (window.XMLHttpRequest)
      { 
        xmlhttp=new XMLHttpRequest();
      }
    else
      {
        xmlhttp=new ActiveXObject("Microsoft.XMLHTTP");
      }
  xmlhttp.onreadystatechange=function()
      {
    if (xmlhttp.readyState==4 &amp; xmlhttp.status==200)
      {
        document.getElementById("popup").innerHTML=xmlhttp.responseText;
      }
  }
  xmlhttp.open("GET","popup.php?Sr_No="+Sr_No,true);
  xmlhttp.send();
}
  function myFunction(letter)
  {
    document.getElementById('unidata').style.display ="none";
    var xmlhttp;
    if (window.XMLHttpRequest)
      {
        xmlhttp=new XMLHttpRequest();
      }
    else
      {
        xmlhttp=new ActiveXObject("Microsoft.XMLHTTP");
      }
  xmlhttp.onreadystatechange=function()
      {
    if (xmlhttp.readyState==4 &amp; xmlhttp.status==200)
      {
        document.getElementById("second").innerHTML=xmlhttp.responseText;
      }
  }
  xmlhttp.open("GET","list.php?letter="+letter,true);
  xmlhttp.send();
}
</script>
</body>
</html>
```
APPENDIX D: Source Code of Visas Page

```
<?php
    include('header.php');

    echo '<div class="if_for_home">
        <div class="container">
            <div class="row">
                <div class="col-md-12">
                    <div class="if_for_home_logo">
                        <div class="if_for_home_heading">
                            Visas
                        </div>
                        <div class="if_for_home_search">
                            Search
                        </div>
                    </div>
                </div>
            </div>
        </div>
    </div>

    echo '<div class="content_wrap a {color:#888; font-weight:bold;}">
        <div class="container">
            <div class="row">
                <div class="col-md-12">
                    <div class="if_search_detail">
                        Directory of Visa Categories
                    </div>
                    <div class="if_search_detail">
                        <p>The purpose of your intended travel and other facts will determine what type of visa is required under U.S. immigration law. As a visa applicant, you will need to establish that you meet all requirements to receive the category of visa for which you are applying. When you apply at a U.S. embassy or consulate, a consular officer will determine based on law, whether you are eligible to receive a visa, and if so, which visa category is appropriate for you.</p>
                    </div>
                </div>
            </div>
        </div>
    </div>

    echo '<div class="table_wrap border">
        <table class="table">
            <thead>
                <tr>
                    <th>Purpose of Travel</th>
                    <th>Required: Before applying for visa</th>
                </tr>
            </thead>
            <tbody>
                <tr>
                    <td>ADC</td>
                    <td>Visa Category</td>
                </tr>
                <tr>
                    <td>Exchange Visitor</td>
                    <td>Visa Category</td>
                </tr>
            </tbody>
        </table>
    </div>

    include('footer.php');
```
<td><a href="https://travel.state.gov/content/visas/en/general/all-visa-categories.html">B-1</a></td>
<td>Business visitor</td>
</tr>
<tr>
<td>Anti-terrorist (AT) Visa</td>
<td>Must be accompanying a foreign national employer</td>
</tr>
<tr>
<td>Ambassador or foreign government official</td>
<td>Must be accompanying a foreign national employer</td>
</tr>
<tr>
<td>Employee of a designated international organization or NATO</td>
<td>G1-G5, NATO</td>
</tr>
<tr>
<td>Foreign military personnel stationed in the United States</td>
<td>SEVIS</td>
</tr>
</table>
<table>
<thead>
<tr>
<th>Type</th>
<th>Description</th>
<th>Reference Link</th>
</tr>
</thead>
<tbody>
<tr>
<td>H-1A</td>
<td>Foreign national with extraordinary ability in Sciences, Arts, Education, Business or Athletics</td>
<td><a href="https://travel.state.gov/content/visas/en/general/all-visa-categories.html">Travel State Department</a></td>
</tr>
<tr>
<td>H-1B</td>
<td>Free Trade Agreement (FTA) Professional: Chile, Singapore</td>
<td><a href="https://chile.usembassy.gov/h1b1-visa.html">Chile Embassy</a></td>
</tr>
<tr>
<td>H-1C</td>
<td>International cultural exchange visitor</td>
<td><a href="https://www.dol.gov">Department of Labor</a></td>
</tr>
<tr>
<td>L</td>
<td>Intra-company transferee</td>
<td><a href="https://travel.state.gov/content/visas/en/general/all-visa-categories.html">Travel State Department</a></td>
</tr>
<tr>
<td>L-1A</td>
<td>Medical treatment, visitor for</td>
<td></td>
</tr>
<tr>
<td>L-1B</td>
<td>Media, journalist</td>
<td></td>
</tr>
<tr>
<td>L-1C</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>L-2A</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>L-2B</td>
<td>N/A</td>
<td></td>
</tr>
<tr>
<td>TN/TD</td>
<td>NAFTA professional worker: Mexico, Canada</td>
<td><a href="https://travel.state.gov/content/visas/en/general/all-visa-categories.html">Travel State Department</a></td>
</tr>
<tr>
<td>PX</td>
<td>Performing athlete, artist, entertainer</td>
<td></td>
</tr>
<tr>
<td>H-1B</td>
<td>Physician</td>
<td><a href="https://travel.state.gov/content/visas/en/general/all-visa-categories.html">Travel State Department</a></td>
</tr>
<tr>
<td>H-1C</td>
<td>Professor, scholar, teacher [exchange visitor]</td>
<td></td>
</tr>
<tr>
<td>R</td>
<td>Religious worker</td>
<td></td>
</tr>
<tr>
<td>Specialty occupations in fields requiring highly specialized knowledge</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------------------</td>
<td>-------------------------------------------------</td>
<td></td>
</tr>
<tr>
<td>Student: academic, vocational</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary agricultural worker</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Temporary worker performing other services or labor of a temporary or seasonal nature.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Training in a program not primarily for employment</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treaty trader/treaty investor</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transiting the United States</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Victim of Criminal Activity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Victim of Human Trafficking</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| Men in blue |
|------------------|-------------------------------------------------|
| Treaty visitor |
| Temporary worker performing other services or labor of a temporary or seasonal nature. |
| Training in a program not primarily for employment |
| Victim of Criminal Activity |
| Victim of Human Trafficking |

| Women in white |
|------------------|-------------------------------------------------|
| Treaty visitor |
| Temporary worker performing other services or labor of a temporary or seasonal nature. |
| Training in a program not primarily for employment |
| Victim of Criminal Activity |
| Victim of Human Trafficking |

| Nonimmigrant (V) Visa for Spouse and Children of a Lawful Permanent Resident (LPR) |
| Renewals in the U.S. - A, G, and NATO Visas |
APPENDIX E: Source Code of Add to Compare Functionality

addToCompare.php

```php
<?php
session_start();
include('config.php');

$username=mysql_real_escape_string($con, $_POST['username']);
$password=mysql_real_escape_string($con, $_POST['password']);
$city=mysql_real_escape_string($con, $_POST['city']);
$state=mysql_real_escape_string($con, $_POST['state']);
$degree=mysql_real_escape_string($con, $_POST['degree']);
$teaching=mysql_real_escape_string($con, $_POST['teaching']);
$gre=$POST['gre'];
$toefl=$POST['toefl'];

$sql="SELECT crime,Total_Offenses,rent_case_of_dec_15,A PR,transit,Agency_Name FROM crime
WHERE crime.State_ID =".
$sql1 = mysql_query($con,$sql);
while($row = mysql_fetch_array($sql1))
{
    $Total_Offenses = $row['Total_Offenses'];
    $PR = $row['PR'];
    $Agency_Name = $row['Agency_Name'];
    if($Total_Offenses ="NULL")
    {
        $Total_Offenses = "N/A";
    }
    if($PR ="NULL")
    {
        $PR = "N/A";
    }
    if($Agency_Name ="NULL")
    {
        $Agency_Name = "N/A";
    }
}

$sql = "INSERT INTO compare (login_user,University,State_ID,Degree,Research_Teaching_Oriented,gre_Score,TOEFL_Score,Total_Offenses,PR,Agency_Name) VALUES ($username,'$university','$state','$degree','$teaching','$gre','$toefl','$Total_Offenses','$PR','$Agency_Name');

if (mysql_query($con,$sql)) {
    die('Error: ' . mysql_error($con));
}
?>
```
```php
<?php include("header.php");
include("config.php");
$sEmail = mysqli_real_escape_string($con,$_SESSION["login_user"]);?

<body>
    <div class="kf_inr_banner">
        <div class="container">
            <div class="row">
                <div class="col-md-12">
                    <div class="kf_inr_banner_des">
                        <div class="inr_banner_heading">
                            <h3>Compare</h3>
                        </div>
                        <div class="kf_inr_breadcrumb">
                            <ul>
                                <li><a href="#">Home</a></li>
                                <li><a href="#">Compare</a></li>
                            </ul>
                        </div>
                    </div>
                </div>
            </div>
        </div>
    </div>
</div>
</div>
</div>
</div>
</div>
<section>
    <div class="container">
        <div class="row">
            <div class="col-md-12">
                <div class="widget">
                    <div class="widget-header">
                        <div class="additional-btn">
                            <a href="#" class="hidden reload"><i class="icon-ccw-1"></i></a>
                            <a href="#" class="widget-toggle"><i class="icon-down-open-2"></i></a>
                            <a href="#" class="widget-close"><i class="icon-cancel-3"></i></a>
                        </div>
                    </div>
                    <div class="widget-content">
                        <!-- Content here -->
                    </div>
                </div>
            </div>
        </div>
    </div>
</section>
```
```php
$sql = "SELECT * FROM compare WHERE Login_user="$id" AND is_Deleted=0;"
$query = mysqli_query($con, $sql);
while($row = mysqli_fetch_array($query))
{
  ?
  <tr>
    <td><?php echo $row['university'];?>?></td>
    <td><?php echo $row['GPA_Score'];?>?></td>
    <td><?php echo $row['TOEFL_Score'];?>?></td>
    <td><?php echo $row['Research_Teaching_Oriented'];?>?></td>
    <td><?php echo $row['degree'];?>?></td>
    <td><?php echo $row['Total_Offenses'];?>?></td>
    <td><?php echo $row['Agency_Name'];?>?></td>
    <td data-toggle="modal" data-target="#<?php echo $row['id'];?>"><?php echo $row['id'];?>?</td>
  </tr>
}?
```
<table>
    <thead>
        <tr>
            <th>University</th>
            <th>GRE Score</th>
            <th>TOEFL Score</th>
            <th>Research Teaching Oriented</th>
            <th>Degree</th>
            <th>Total Offenses</th>
            <th>Agency Name</th>
        </tr>
    </thead>
    <tbody>
        <tr>
            <td>University A</td>
            <td>320</td>
            <td>100</td>
            <td>No</td>
            <td>MBA</td>
            <td>5</td>
            <td>Agency A</td>
        </tr>
        <!-- Add more rows as needed -->
    </tbody>
</table>
<?php include("footer.php");?>

<script>
  function newFunction(id)
  {
    var xmlhttp;
    if (window.XMLHttpRequest)
    {
      xmlhttp=new XMLHttpRequest();
    }
    else
    {
      xmlhttp=new ActiveXObject("Microsoft.XMLHTTP");
    }
    xmlhttp.onreadystatechange=function()
    {
      if (xmlhttp.readyState==4 && xmlhttp.status==200)
      {
      }
    }
    xmlhttp.open("GET","updateUni.php?id="+id,true);
    location.reload();
    xmlhttp.send();
  }
  $(document).ready(function() {
    $('#example').DataTable();
  });
  $('#drop').click( function () {
    oTable.fnDraw();
  });
</script>

Config.php (database connection)

<?php
  $con=mysql_connect("localhost","root","","university");
  if (mysql_connect_errno())
  {
    echo "Failed to connect to MySQL: ". mysql_connect_error();
  }
?>
Appenndix F: Source Code of Forum Page

Forum.php

```php
<?php include('header.php');
include('config.php');
$sum_rec_per_page=10;
if (isset($_GET['page'])) {
    $page = $_GET['page'];
} else {
    $page = 1;
}$active = "active";
$sql = "SELECT * FROM post_topic WHERE is_deleted = 0 ORDER BY createdDate DESC LIMIT $start_from, $sum_rec_per_page";
$query = mysql_query($conn, $sql);
if ($query == TRUE) {
    while($row = mysql_fetch_array($query)) {
        ...}
</div class="blog-page">
</div class="blog-page-wrap">
</div class="inner-content-holder">
</div class="row">
<!-- END OF PAGE TOP START -->
</div class="col-md-8">
</div class="blog-page-des">
</div class="blog-page">
</div class="inner-content-holder">
</div class="row">
<!-- END OF PAGE TOP START -->
</div class="col-md-8">
</div class="blog-page-des">
</div class="blog-page">
</div class="inner-content-holder">
</div class="row">
<!-- END OF PAGE TOP START -->
</div class="col-md-8">
</div class="blog-page-des">
</div class="blog-page">
</div class="inner-content-holder">
</div class="row">
<!-- END OF PAGE TOP START -->
</div class="col-md-8">
</div class="blog-page-des">
</div class="blog-page">
</div class="inner-content-holder">
</div class="row">
<!-- END OF PAGE TOP START -->
</div class="col-md-8">
</div class="blog-page-des">
</div class="blog-page">
</div class="inner-content-holder">
</div class="row">
<!-- END OF PAGE TOP START -->
</div class="col-md-8">
</div class="blog-page-des">
</div class="blog-page">
</div class="inner-content-holder">
</div class="row">
<!-- END OF PAGE TOP START -->
</div class="col-md-8">
</div class="blog-page-des">
</div class="blog-page">
</div class="inner-content-holder">
</div class="row">
<!-- END OF PAGE TOP START -->
```
71

```html
</div>
</div>

<!-- EDU BLOG PAGE END -->

<!-- EDU_SIDEBAR_WRAP START -->
<div class="col-md-3">
<div class="kf-sidebar">

<!-- EDU_SIDEBAR_SEARCH_WRAP START -->
<div class="widget widget-search">
<h2>Start Your Topic Now</h2>
<?php
    if(isset($_SESSION['login_user'])) {
        ?><form action="newtopic.php" method="post" class="form">
            <button class="btn btn-primary">Start New Topic</button>
        </form>
        <?php }
    else {
        ?><button class="btn btn-primary" onclick="displayHideBox(1);">Start New Topic</button>
        <?php }
    ?></div>
</div>
</div>
</div>

<!-- EDU_SIDEBAR_WRAP END -->
</div>

</div>
</div>

<?php include('footer.php');?>
</div>

<script src="js/jquery.timeago.js" type="text/javascript"></script>

//for Time Ago
jQuery(document).ready(function() {
    jQuery("abbr.timeago").timeago();
});
</script>
</body>
</html>
REFERENCES


