LEBANESE UNIVERSITY

FACULTY OF TECHNOLOGY

Department Communications and Computer Networks Engineering

Internship Report

Submitted by

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Together for Shehim

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Abstract

"Together for Shehim" is an association established in 2015 by a cadre of engineers, doctors, lawyers, and other successful people of Shehim, aiming to benefit Shehim village and the neighbor villages by its members' contributions, each through his/her major.

As unemployment rates are proliferating, having a solution to stop this elevation is a must. So Together for Shehim research committee suggested developing a platform that organizes employment, helps workers find a proper job, and recruiters hire the best candidate in the least time possible. As this project was what I worked on during my training course. My training at this association was web-development-based, over 14 weeks. During this time, I focused on the methodology of working on a project starting from collecting data and business requirements to the level of building a website and connecting it to a database which was also my responsibility to build it. At the beginning, it was required to do extensive research on Knowledge Management System and how it affected the world of employment. Then, I learned web-development languages HTML, PHP, CSS, SQL, and JavaScript, the importance of each one of them and how to implement them to build a basic interactive website. While I was learning, I was implementing these skills. And this process, learn by doing, resulted in a basic interactive website where a user can simply register to the platform, login to a home page that is specified depending on the type of user, then search for a candidate or job or post a job offer or a profile.

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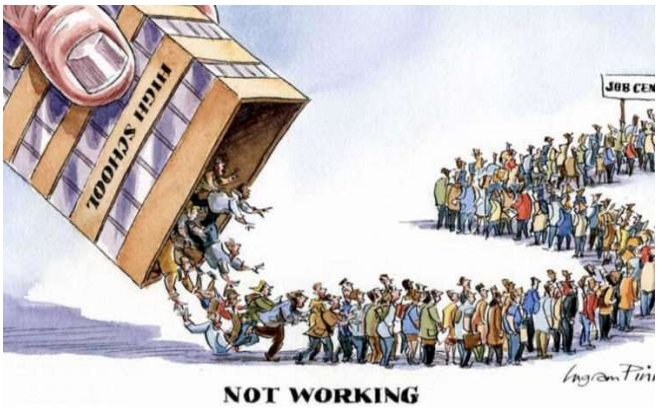
Chapter I: Introduction

Context:

Lebanon is suffering from a devastating cyclical and structural unemployment, mostly driven by major political, social and other issues that have hindered economic growth and job creation in the past few years, especially in years 2020 and 2021 due to Covid-19 pandemic. Another reason for the increasing rates of unemployment is the growing gap between the labor supply and demand in the market which is further aggravating the situation notably in terms of youth employment, inclusion and new skills in demand. As millions of foreign workers come every year to Lebanon to compete the Lebanese labor, by offering their services at a cheaper price. In addition to what is before, several Lebanese citizens refuse to work in the agricultural and industrial sectors. Nassib Ghobril, head of economic research at Byblos Bank argued that Lebanese citizens usually refuse to work in jobs such as agriculture or construction because of the poor wage compared to other jobs. They prefer to work in the service and banking sectors.

Thus, labor supply exceeds the demand causing this rapid increasement in unemployment rates.



Big number of graduates not finding jobs 1

Problematic and motivation:

Due to the rapid increase of unemployment rates, effective scientific-based solutions are a must to technically solve this issue which is affecting majorly the Lebanese economy. Then organizing the employment of Lebanese graduates and workers, so that everyone works in his proper position, will increase their productivity, improve the profits of Lebanese companies and institutions, as it will enhance the employees satisfaction of their workplaces which also affects their productivity rates. And this will consequently improve our deteriorating economy.

Objective:

Finally, the basic purpose is to acquire the most of the skills needed to be able to build a complete interactive website that have all the features could be needed and link it to a database to save the data entered using the created forms.

Reports Outline:

This report will cover different sections, starting from the “State of Art”, where a brief definition is provided of the acquired skills like the web development languages learned (HTML, CSS, and JavaScript), and this was after having making research of Knowledge Management Systems, and their importance especially in the world of employment. And these skills have been implemented as will be shown in the contribution section of this report which will be divided into parts depending on the topics worked on during this period. As the contribution section includes the project management section that gives a brief quick glimpse over the project’s plan and the way time was managed.

Chapter II: Who are "Together for Shehim "?

Together for Shehim *is an association established in 2015, whose members are a team of the most successful people in Shehim, who are dedicated to work for the benefit of the region.*

For every issue our village suffer from, they have a practical solution. They always suggest scientific-based solutions to many Lebanese issues. Like when the garbage crisis, stroked all Lebanese regions, they were working hard to spread the recycling awareness between the citizens and with the coordination with the UNDP they succeeded in practicing recycling and domestic garbage sorting, so that they succeeded to apply garbage sorting and recycling in several neighborhoods in Shehim and it was successful.

As they contribute in many events that gives advantage to the village with the coordination of other associations and UNDP. They always work on making events that puts light on the youth's talents. Moreover, they always take a direct role in shaping events where all Shehim people can participate to exhibit their products, or perform a show to introduce people more about the talents found in Shehim and give them the chance to be more popular. And we don't have to forget the unstoppable interesting training courses they always make to give the people a chance to learn new skills by the help of experts in the domain. An example about these sessions is the digital marketing training courses they lately prepared

Moreover, a cadre of the association, forming a research committee, always work to develop programs and applications for this purpose. Thus, thanks for their confidence, they gave me the chance to work with them, learn new skills on one of their suggested programs to solve the employment issue.

Chapter III: State of Art

In this chapter, a brief description of the acquired skills will be given, depending on the sources visited to learn and understand their concepts. Then, the way they will be implemented is understood, referring to their roles and their importance.

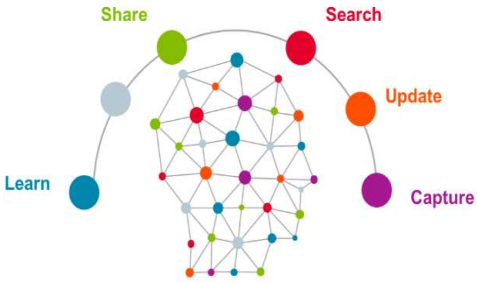
1. Knowledge Management Systems

a. What is Knowledge Management System and its types?

According to the Wall Street Journal, of the world's biggest companies, 84% of their resources are intangible or undocumented compared to 17% in 1985.[1]

Research shows that employees spend 26 days on average each year surfing resources (links, platforms, or books, etc. ...) in collecting data, which is valuable time that could be undoubtedly better invested. [2]

This failure to document and store knowledge results in wasted time, recreated solutions, lost productivity, repeated mistakes and the same questions answered repeatedly. In comparison, however, effective knowledge management has quantifiable benefits.



Today's fast-paced development requires **knowledge management systems** powered by **AI**. Lately, it proved to be an effective solution, required especially by the world of business, to improve productivity, to make workplaces more satisfying, and agencies' intellectual properties more secure. Using KMS allows knowledge to be always up-to-dated, discarding all outdated or irrelevant information, and manage access levels to data stored. Then by harnessing the most valuable data, employee expertise and knowledge, efficiency can be maximized and employees are empowered to improve their decision-making ability. It is able to integrate into workplaces, so that employees can access what they need of data stored wherever and whenever it is needed depending on their level of access. Thus, this will decrease the cost of time spent on the rediscovering of data.

Finally, talking about effective knowledge management requires deep understanding of types of knowledge so that data can be managed, accessed, and strategically distributed within these types of knowledge, where the latter can be divided into two categories. These 2 major parts are: the **tacit** and the **explicit** data.

What are these 2 types?

Tacit: is a difficult to write down knowledge. Then, it needs huge efforts to visualize or to transfer this type of invisible knowledge. It is a type of knowledge that resides in human brains only. As it is collected by ones' experience, imitation, or observation. Thus, it is highly individual, and impossible to formalize. But despite its difficulty it is still very important and plays a key role in the competition between companies, where about 90% of the knowledge in any organization is embedded and synthesized in tacit form [3].

Explicit: unlike tacit knowledge, it is knowledge that the owner can smoothly transmit to other employees or customers, and store it efficiently in databases, documents, or any drive. And human skills and knowledge can be turned into explicit knowledge the moment they are externalized, or formalized. Then this enhances decision making ability, minimize duplication efforts, as well as protection against loss of data.

How it evolved?

KMS was firstly promoted by several theorists since the 70s till the 90s where practitioners started supporting it as a scientific discipline after hiring Leif Edvinsson as the World's First Chief of Knowledge Office in Sweden. But when talking about the evolution of KMS we have to divide it into 3 generations:

Generation 1: it was primarily driven by IT, as a rise of tools was observed such as IBM's Lotus Notes where the focus was on information not knowledge. But after the Japanese authors "Nonaka" and "Takeuchi" advice in their book "Knowledge Creating Company" to the practitioners to focus on people rather than information SECI model was introduced. Then KM models were lately looking closely at the way knowledge is generated so that the process of generation and storage is easier.

Generation 2: this generation was people-focused and looked for a process that depend on the SECI model suggested by Nonaka to know how knowledge is generated, turned to be explicit and socialized in organizations.

Generation 3: after 10 years on the born of the second-generation KM was interestingly improved to be founded on going back to the basics. And this generation can be given the nickname C-Gen. Why?

Since it is based on 3 Cs words: Connectivity, Collaboration, and Co-creation.

b. The Process

KMS is a process of 7 steps:[4]

Step 1: It is the most important step where data is collected.

Step 2: Data is then organized by giving it the appropriate application so that this data is turned into information.

Step 3: This information is summarized and assimilated.

Step 4: After step 3 information is organized and analyzed.

Step 5: The synthesis of information occurs at this stage where information turns to be knowledge.

Step 6: Knowledge is grouped and identified into categories and groups.

Step 7: Knowledge at this stage can be used for decision-making.

c. Its Contribution to The World of Employment

Choosing and hiring new employees from a wide and heterogeneous range of candidates is very critical where it will consequently affect the success of the organizations which is hiring.

But this means high costs of time, and could not be precisely accurate, and unsuccessful job applicants often wish to receive a detailed explanation, or feedback about the flaws in their profiles. Thus, replacing hiring manually by automatic matching process between job offers, and candidate profiles proved to be an effective solution lowering the costs of the manually choosing.

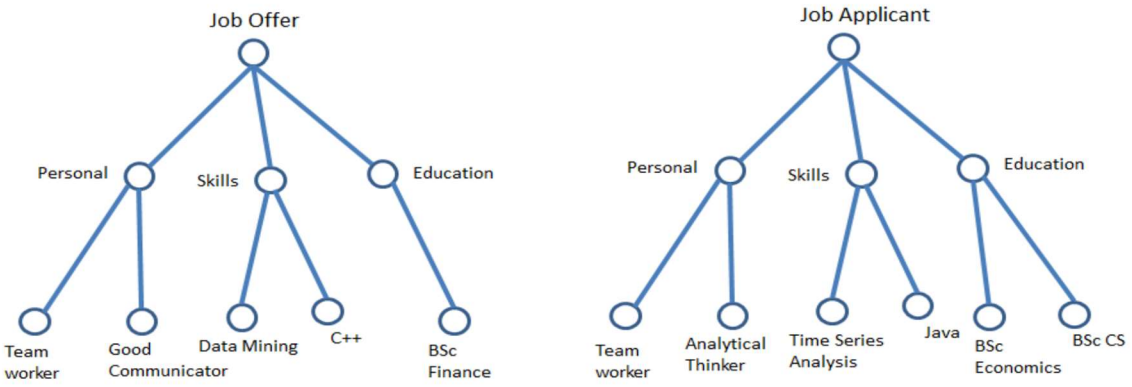


Figure 1- Matching between job offer and candidate profile

In the figure-1[5], we can notice a hierarchical process of comparison between a job offer and an application of one of the candidates. As we can see comparison is divided into categories (personal, skills, and education) specified by the boss of the company. And each category contains specific qualifications required for the vacant position.

Then when searching for the best matching candidate, an organized process should be followed. The qualifications of each category in job offer are searched for in the application. Thus, the application with the highest qualifications will win the place.

2. Database

As a definition, database is a collection of related data organized, stored, and can be electronically accessed from a computer system.

***DBMS** (database management system) is a software that interacts with users, applications, or even database itself to analyze data. Often the term "database" is used to refer to DBMS or an application associated with database.*

Moreover, computer scientists classify database-management systems according to the models they support, but Relational database became the most used since the 80s.

a. What are the functions of DBMS?

There are four main functional groups provided by DBMSs:

i. *Data definition:* A database allows to create tables for insertion of new data, drop tables, or even modify them to provide the best definition and organization of data stored.

ii. *Update:* The data previously inserted into a database table can be modified. New data could be entered, values could be changed, or it could be deleted.

iii. *Retrieval:* Data inserted to the database could be easily extracted in the same form as it is stored, or by an altered form after the combination of existing tables.

iv. *Administration:* Data recovery and backup is provided to ensure data safety and integrity. As DBMS can enforce a security system to ensure data privacy, and user security. Where security rules can specify which user can access the data in database, which items, and can do what type of operation (read, update, insert, or delete). Thus, this is essential when having a multiuser database.

b. How to design and model a database

Database design is one of the most important factors that contribute to better performance of an application. Then database is all about efficiently organizing data based on product future roadmap.

The output of a database design exercise is a data model. Where data model can be defined as a representation of all objects, entities, attributes, relationships, and constraints in the system. Usually, data model is created by an ER diagram, which stands for **entity relational diagram**. The latter can also be called **ERD diagram**, or **database diagram**.

And data modeling can be of two types, either logical, or physical. Where the logical data model abstracts away the implementational technicalities, unlike the physical data model which actually implement details in database. And this makes logical data model more consumable for the business.

Now let's see the steps of database design: [6]

Step 1: Gather Business Requirements

Talk to the business about their requirements. The more the effective is the conversation, the more it should result in enough information to start working on a conceptual data model (CDM).

Step 2: Understand Business Roadmap

Business, regularly, change their process all the time, which means changing workflows and data models. As an example, the taxi business was impacted by the COVID_19. Then, it needs to act preemptively to assure that the vehicle is disinfected every day. Where the driver wears a mask at all times, as that their hand sanitizer is always available in the cab. Then to capture all the information changes to two entities, drivers and vehicles would be required. Several Boolean flag fields need to be added to these entities to cater to this business use case.

Step 3: Identify Entities and Attributes

After gathering business requirements, information is used to identify entities along with the essential set of attributes. Then identify which attributes will act as identifiers in the entities. And these identifiers act as primary keys in the physical model. Data types can also be specified for all attributes in this step.

Step 4: Identify relationships

After identifying entities and attributes, Now the relationship between entities should be defined. then a type of the 4 relations between 2 entities should be chosen.

The 4 types of relation between 2 entities A and B are:

One-to -one→ one record in A corresponds to at most one record in B.

One -to -many→ one record in A corresponds to many records in B.

Many- to -one→ many records in A corresponds to at most one record in B.

Many-to-many→ many records in A corresponds to many records in B.

Step 5: Create a Logical ER- Diagram

After identifying entities, attributes, and relations between them, sketching the ER-Diagram is now possible.

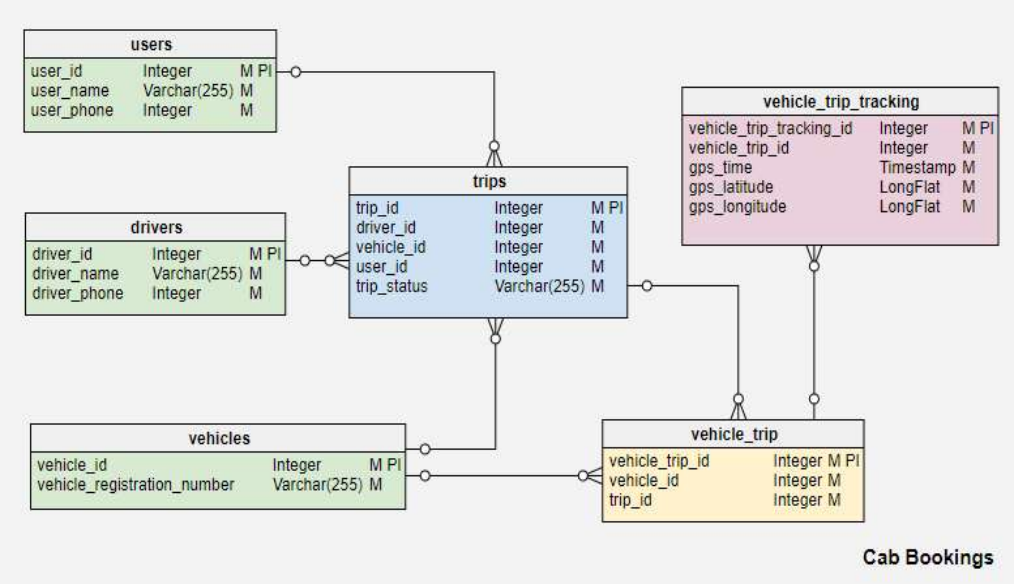


Figure 2- ER-Diagram of a cab company

In Figure 2, there are 6 entities “users”, “drivers”, “vehicles”, “trips”, “vehicle_trip”, and “vehicle_trip_tracking”, each having its own attributes, companied with its type, that defines it including an identifier, which is the primary key, that identifies each entity.

As we can notice the special type of link between entities. This form of link, which is used between all entities refers to a “0 to many “ relation between these entities. For example, a trip could use several vehicles but a vehicle could be used with no trips.

Step 6: Validate the Logical ER-diagram

Simple checks can be done: like name of entities, attributes, relationships, etc. and which of them should not be null and what have to be unique. Then make check on the primary keys and the constraints.

Step 7: Create a Physical ER-Diagram

Once logical diagram is created, now it is time to create the physical one. It is responsible to specify the DDL (data definition language) of the database since each one has its own DDL. And DDL is the implementations of nomenclature rules, data types, and constraints.

This conversion from logical to physical is done by database systems like MySQL, Oracle, Microsoft SQL Server, Amazon Redshift, and other several tools.

Step 8: Validate the Physical ER-Diagram

Just like the logical ER-diagram, the physical ER-Diagram needs to be validated with additional checks. Whether or not foreign keys exist, as well as the length of the name of tables and its columns.

Step 9: Fix Issues with the Physical ER-diagram

Adding all missing foreign keys where entities have been defined, adding the missing primary keys, and fix all the unsupported data types by this database.

Step 10: Generate the DDL Scripts for Developing the Model

Once modeling the ER-diagram is successful, then a deployable object can result. There are several convenient tools that can export the physical model to a ready-to-deploy SQL script. Examples of these tools are: Lucidchart, or VERTABELO.

3. PHP

PHP originally stood for Personal Home Page, but now stands for PHP Hypertext Processor[7]

It is a general-purpose scripting language used in Web Development designed by B Rasmus Lerdorf in 1994. But it first appeared in June 8,1995.

Php code is usually processed on a web server by a php interpreter to be executed. Then this executable interpreted code would form an HTTP response of any type of data, binary image data, HTML form, etc. And as reported by the, as of April 2021, "PHP is used by 79.2% of all the websites whose server-side programming language we know."

a. A Brief History:

Rasmus Lerdorf is a Danish-Canadian programmer he co-authored and inspired the PHP scripting language, authoring the first 2 versions and participating in the development of later versions

In 1994, Rasmus Lerdorf wrote several CGI (Common Gateway Interface) programs in C, which he used to maintain his personal homepage. These programs were extended to work with Web forms as well as, to communicate with databases. Then this implementation was called "Personal Home Page/Forms Interpreter" or "PHP/FI".
This implementation could be used to build simple, dynamic web applications.

Early PHP wasn't intended to be a new programming language, and grew organically, where Lerdorf noted with retrospect "I don't know how to stop it, there was never any intent to write a programming language [...] I have absolutely no idea how to write a programming language, I just kept adding the next logical step on the way."

But due to this organically development with the absence of any intention to design PHP function names were forced to be chosen to match lower-level libraries which PHP. In some cases, in some early versions, functions names were internally as hash functions.

b. PHP version used 7.3:

A new major PHP version was developed during 2014 and 2015, PHP 7[8]. And the numbering 7 was to prevent any confusion after the debate that happened between internal developers. This debate was caused by not releasing the PHP 6 Unicode, but still several articles and book titles referenced the PHP 6 name. thus a vote happened, and the result came as choosing PHP 7 a name for the new version.
This version was authorized by Dmitry Stogov, Xinchen Hui, and Nakita Popov. It involved major changes reaching 100% increase in performance. And some of these changes are: the conversion between float numbers and integers were changes (ex: infinity was changed to covert to zero), and the introduction of return type declaration for functions complementing the

existence of parameter type declaration where scalar types are supported (integer, float, string, and Boolean) in both declarations.

c. 8 reasons why php is important:

1. *Easy to learn and use:* One of the main reasons PHP became so commonplace is being relatively simple to get started with. Even without wide knowledge or experience in web development, it is possible to create a web page with a PHP file. Thus, it is considered the least barriers in comparison with other programming languages.

2. *Open source(free):* This property is so important for developers to get started with PHP. It is easily and quickly installed at zero-cost. As the wide range free accessible frameworks, such as Laravel, WordPress, CakePHP, and Symphony, etc.

3. *Versatile:* One of the major benefits of PHP is that it is a platform independent, meaning it can be used on Mac OS, Windows, Linux, and supports most web browsers like Google Chrome, Safari, Opera, and Internet Explorer, etc.

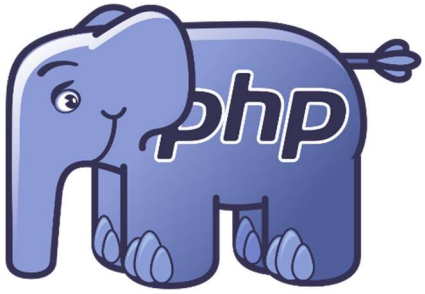
4. *Enjoys strong community support:* Because PHP is widely used, a veteran scripting language, there a exist a large loyal community base to support it. Tons of tutorials, FAQs, and tips are easily reached by new PHP developers. This encourages developers to continue pushing the boundaries.

5. *Fast and secure:* What does any organization need except to have a fast and secure website or application?

   PHP using its own memory and competes well on speed, especially the latest versions. In the past PHP security was questionable, though it is important to note that it is not more or less secure than any other programming language. But due to its widespread use and community support, nowadays there exist many tools and frameworks that help fix vulnerabilities and protect against cyberattacks.

6. *Well connected to database:* PHP facilitates a secure connection with almost any kind of database. This gives the developer the freedom to choose the database that best suit the application being bult.

7. *Tried and tested:* PHP language is now considered stable and trusted by developers. Why?
   Being around quarter -century is that PHP code has been put to the test in all real-life environments. Then, main bugs are found and fixed and we don't have to forget the tools been built overtime, making PHP development more secure, efficient, and effective.



8. *Having lots of legacy code:* It is not only PHP that have this property, but when existing websites have been written with PHP it becomes an important consideration.

d. Syntax:

The PHP interpreter only executes the code **within the delimiters**, and anything outside them is not processed. The most common delimiters are <?php to open and ?> to end the PHP section. But there exists a shortened delimiter which is <? But it is discouraged to be used since it is not supported and can be disabled by local PHP configuration. Thus, the purpose of these delimiters is just to separate the content PHP code from non-PHP like JavaScript and HTML.

Variables in PHP are prefixed with a dollar sign '$' and unlike other programming languages type is not specified. as these variables are case sensitive, and new lines are treated simply like whitespaces, and every statement is terminated with a semicolon ()

To create a **constant** using PHP, define function is used of syntax as shown in Figure 3 below:
define (name, value, case-insensitive)
name: specification of the constant's name
value: specification of the constant's value
case-insensitive: should the constant's name be case -insensitive, where it is by default ***false.***

Ex:

```
1  <!DOCTYPE html>
2  <html>
3  <body>
4
5  <?php
6  // case-insensitive constant name
7  define("GREETING", "Welcome to W3Schools.com!", true);
8  echo greeting;
9  ?>
10
11 </body>
12 </html>
```

Welcome to W3Schools.com!

Figure 3-example of defining a constant

e. Validation:

Another property for PHP is that you can apply validation on an HTML form by assigning the action of the form as PHP_SELF
With the **syntax:**

```
action="<?php echo htmlspecialchars($_SERVER["PHP_SELF"]); ?>"
```

Then, validation can be applied on all the html form inputs where the form reloads itself and validates all the conditions that should be applied. Thus, all data inputted via this validated form is accurately the required one to be stored lately in the database.

ex:

```php
<?php
// define variables and set to empty values
$nameErr = $emailErr = $genderErr = "";
$name = $email = $gender = "";

if ($_SERVER["REQUEST_METHOD"] == "POST") {
  if (empty($_POST["name"])) {
    $nameErr = "Name is required";
  } else {
    $name = test_input($_POST["name"]);
  }

  if (empty($_POST["email"])) {
    $emailErr = "Email is required";
  } else {
    $email = test_input($_POST["email"]);
  }

  if (empty($_POST["gender"])) {
    $genderErr = "Gender is required";
  } else {
    $gender = test_input($_POST["gender"]);
  }
}

function test_input($data) {
  $data = trim($data);
  $data = stripslashes($data);
  $data = htmlspecialchars($data);
  return $data;
}
?>
```

Figure 4- validation using PHP example

In the Figure 4 on the left, there is a simple example to show how validation can simply be applied on the forms

Let's assume that we have an HTML form with 3 required inputs name, email, and gender.
We define an error message variable for each field and assigned null. Then when the post request is set, a check is performed on each field. If the field is null, then an error message is echoed to inform the user that he forgot to fill one of the required fields.

As shown in the table in figure 5, below more validations can be applied on the forms. Where it is also possible to put restrictions on the names where only characters to be allowed, making sure the user enter his email with correct form with a '.' and '@', and that the user chooses one of the gender types

Name	***Required + must only contain characters and whitespace***
Email	***Required + Should contain @ and (.)***
Gender	***Required + Must select one***

Figure 5- Table showing some validation rules that can be applied on some input fields

4. HTML

Hypertext Markup Language *is a markup language, a language used to visually distinguish a document through its content, for documents that are designed to be displayed by Web Browsers. It can be enhanced by CSS and JavaScript.*

Thus, in the head of the HTML document a link attribute can link to external sheets

a. How it was developed?

In 1980, the physicist Tim Berner-Lee, a contractor, at CERN proposed and prototyped a system for CERN, a European Organization for Nuclear Research, for the employees to use and share documents. Berners-Lee specified HTML and wrote the browser and server software in late 1990. And the first publicly available description of HTML was in the late 1991 by Berner-Lee. And this publication contained 18 elements, 11 of them still exist in HTML 4.

Tim Berners-Lee in April 2009

And finally, HTML became a markup language where browsers use to interpret and compose, text, images, and other materials into visual or audible web pages, where default characteristics for every item of HTML markup are defined in the browser, and these characteristics can be enhanced by the web designers using CSS.

b. HTML versions timeline:

October 1991

HTML Tags, an informal CERN document listing 18 HTML tags, was first mentioned in public.

June 1992

First informal draft of the HTML

June 1993

Hypertext Markup Language was published by the IETF IIIR Working Group as an Internet Draft (a rough proposal for a standard). It was replaced by a second version one month later.

November 1994

First draft of HTML 2.0 was published by IETF itself, that finally led to the publication of RFC (request for comments) 1886 in November 1995.

January 2008

Html 5 was published as a working Draft. As it has abounded any attempts and has explicitly defined its own HTML serialization.

c. HTML Elements

HTML elements are building blocks of HTML pages and they are of 3 types:

1. *Normal Element*

That is defined by a start tag, content, and end tag in this form:
<tagname> Content </tagname>

Example:
In this example, figure 5, the tag b is responsible of making the text in between bold. Then the phrase "Hello World !" is bolded

```
1  <!DOCTYPE html>
2  <b>
3      <label>Hello World !
4
5      </label>
6  </b>
```

Hello World !

Figure 5- <b> tag effect on an HTML element

2. *Nested HTML Elements:*

HTML elements can contain other elements and be nested. As it is noticed that all HTML documents consist of nested HTML elements.

Example: As we can see in figure 6; *<html>, <body>, <h1>*

Let's take <html>

It is a root element and it defines the whole HTML document. It has a start tag <html> and end tag </html>. Then inside the <html> use the body tag <body>. And inside the <body> u can use the <h1> which specifies a heading, and also has start tag <h1> and end tag </h1>.

```
1  <!DOCTYPE html>
2  <html>
3  <body>
4
5  <h1>My First Heading</h1>
6
7
8  </body>
9  </html>
```

My First Heading

Figure 6- example of nested elements

3. *Void elements:*

It is the type of tag that doesn't contain a content; like the
 tag which defines a line break and it doesn't need an end tag.

Note:

Some elements execute normally even when skipping the end tag. But try not to skip it! Because sometimes unexpected errors and results may occur when skipping the end tag.

Also, we have to note that html is not case sensitive then <p> or <P> can work the same.

4. *HTML attributes:*

Id: it is used to identify the element for the stylesheet can alter its presentational properties.
Class: used to classify a group of elements where these elements have common properties.
Title: used to assign presentational properties to a particular element.

5. CSS

It is a language used to style HTML documents. It describes how HTML elements will be displayed. CSS is an acronym of **Cascading Style Sheet**. And the word cascading comes from the fact that CSS has a specified priority scheme which specifies which style rule will be applied in case of having several rules matching a single element within the HTML document.

a. Specificity

And this **specificity** refers to the relative various rules. Based on this specification, a simple selector has a specificity **1**, class selector has a specificity **1,0**, and ID selector has a specificity of **1,0,0**, the class selector of an attribute has specificity **0,0,1,1**, and an inline declared style="" has the highest priority **1,0,0,0**.

ex:

*As shown in figure 7 below; if **<style>** was declared in the head for element **"p"** and style was declared inline with tag <**p**> then the inline tag will override the one in style tag declared in the head because it has higher specificity.*

```
<!DOCTYPE html>
<html>
    <head>
        <meta charset="utf-8">
        <style>
            #xyz {color: blue;}
        </style>
    </head>
    <body>
        <p id="xyz" style="color: green;">To demonstrate specificity</p>
    </body>
</html>
```

Figure 7- *The sentence **"To demonstrate specificity"** will appear in green and not in blue.*

b. Inheritance

Another feature has to be considered when styling using CSS is **Inheritance**. It is a mechanism where properties are applied not only on a specified element, but also on its descendants. Descendants may inherit CSS property values from any ancestor enclosing them. In general, descendant elements inherit text-related properties, but their box-related properties are not inherited.

Properties that can be inherited are:	***Properties that cannot be inherited are:***
Color	*background*
Font	*Border*
letter-spacing	*Display*
line-height	*float and clear*
list-style	*height and width*
text-align	*Margin*
text-indent	*min and ma*
	x -height and -width
text-transform	*Outline*
visibility	*Overflow*
white-space	*Padding*
word-spacing	*Position*
	text-decoration
	vertical-align
	z-index

c. Selectors

They are attributes in the markup itself used to declare which part of the markup tags will be styled.

They can be divided into 5 categories:

Simple selectors: this category is when elements are selected based on their name, id or class. Where name is called by mentioning it. Class is called by mentioning the class name with a point predating it. And the ID is also called by mentioning the name with a hashtag sign predating the ID of the element.

Combinator selectors: is when selecting elements base on a specific relation between them.

Pseudo-class selectors: is when selecting elements based on a specific state.

Pseudo-elements selectors: is used when styling only a specific part of the element.

Attribute selectors: is used when selecting elements based on a specific attribute or value.

Note: when using the (*) it calls all HTML elements and applies the styling on them, in case they are not styled by a method with higher specificity.

6. What is wampserver64?

Wamp server 64, created by Romain Bourdon, is a windows web development environment that allows the creation of web applications with Apache web server, PHP programing language, and MySQL database. As its name is extracted from windows, Apache, MySQL, and php.

Also, it includes phpMyAdmin so that database can be easily managed. Once it is installed, it is possible to add as many Apache, MySQL, and php releases as required. And it has a tray icon to facilitate the management of settings and the server.

Apache can be considered the most important part of the WAMP package. Where it is responsible for running web server within Windows. By running a local Apache web server on a windows machine, a web developer can test webpages in a web browser without publishing them live on the internet.

Wamp includes MySQL, and PHP, which are both commonly used for creating **dynamic websites**. MySQL is a high-speed database, while PHP is a scripting language that can be used

1. *Another notable variant on other platforms:*

LAMP: for the Linux operating systems
MAMP: for the macOS operating systems
SAMP: for the Solaris operating system
WIMP: of similar package to WampServer but Apache is replaced by Window IIS.
XAMPP: X stands for 4 different operating systems XAMPP can work on. It also has Apache, MySQL, PHP, and Perl.

2. *Importance of WampServer:*

Then instead of installing and testing WordPress on your hosting account, simply u can download WampServer that provides a local host on your computer. It acts as a virtual server through which all WordPress's features can be tested without any consequences. It is localized and not connected to the web.

And don't forget the time saving property. Since no need to upload files to a site and still be able to develop in a safe and care-free environment.

3. *Its Weakness:*

Wamp proved to be efficient to develop millions of websites, but it has an issue that the developer should take into account when designing the database, where using camelCase, or upper case when naming the tables, or database will lead to a website crash when moving the code to Linux or BSD.

Chapter IV: **Contribution**

In this chapter, all the contributions will be discussed, showing the project plan followed, and how time was managed to accomplish the most of this project.

1. Five W

Who? Me, Rana Saab, a senior student of CCNE department at the faculty of technology, Lebanese University.

What? I worked on a project with the association "Together for Shehim". This project was a web-developed platform objected to organize employment with the approach of Knowledge Management Systems. I was responsible of learning how to develop the interfaces, and create a link between them. And these interfaces will also be linked to a database. This database was also my responsibility to design, develop and link it to the forms. So that, all the data inserted, and accounts created when registering in this platform will be stored in our database.

Where? I spent my internship working remotely from home.

When? My training period started on the 16th of August, and it ended on the 14th of November of the year 2021. It was a full-time internship.

Why? It is a must to have training periods so that all the acquired information would be effectively implemented. In addition, to the practical skills that are usually acquired in the workplace.

2. Functional Analysis

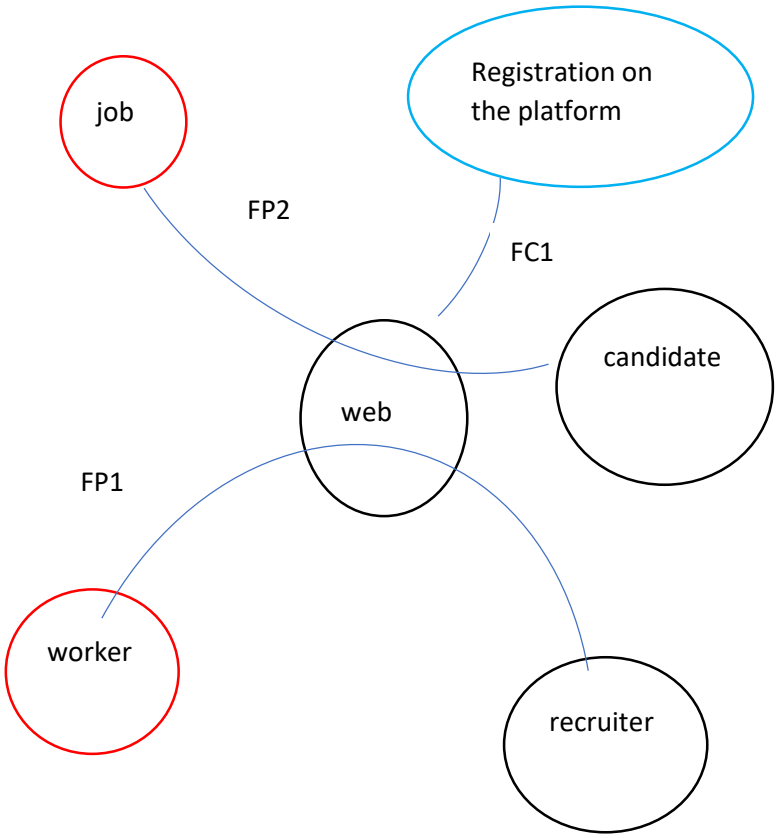


Figure 8- "Pieuvre" Diagram

In Figure 8:

FP1: first principal function; it is a link between the recruiter and the worker where the recruiter can hire the best worker at his company through this web product.

FP2: it is an another principle function; it shows the link between a job offer and the candidates also through the center the web product.

FC1: one of the constraint functions that exists is that neither the recruiter/boss nor the candidate can Login this platform without registration

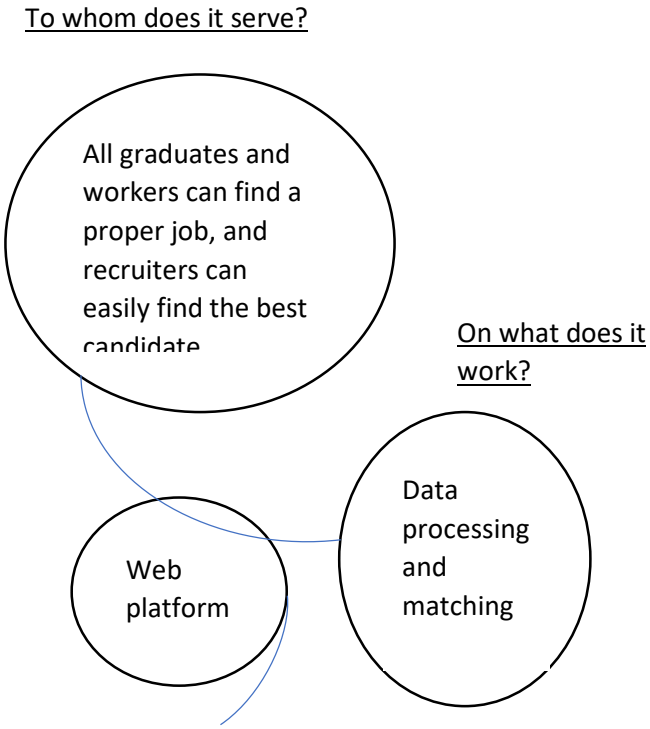


Figure 9- "Bête à Corne" diagram

In figure 9:

This web platform meets the need of our society. Employment will be efficiently organized by helping bosses and recruiters find the best matching candidate with less time and efforts. As it serves to help all graduates and workers find a proper job that meets their qualifications.

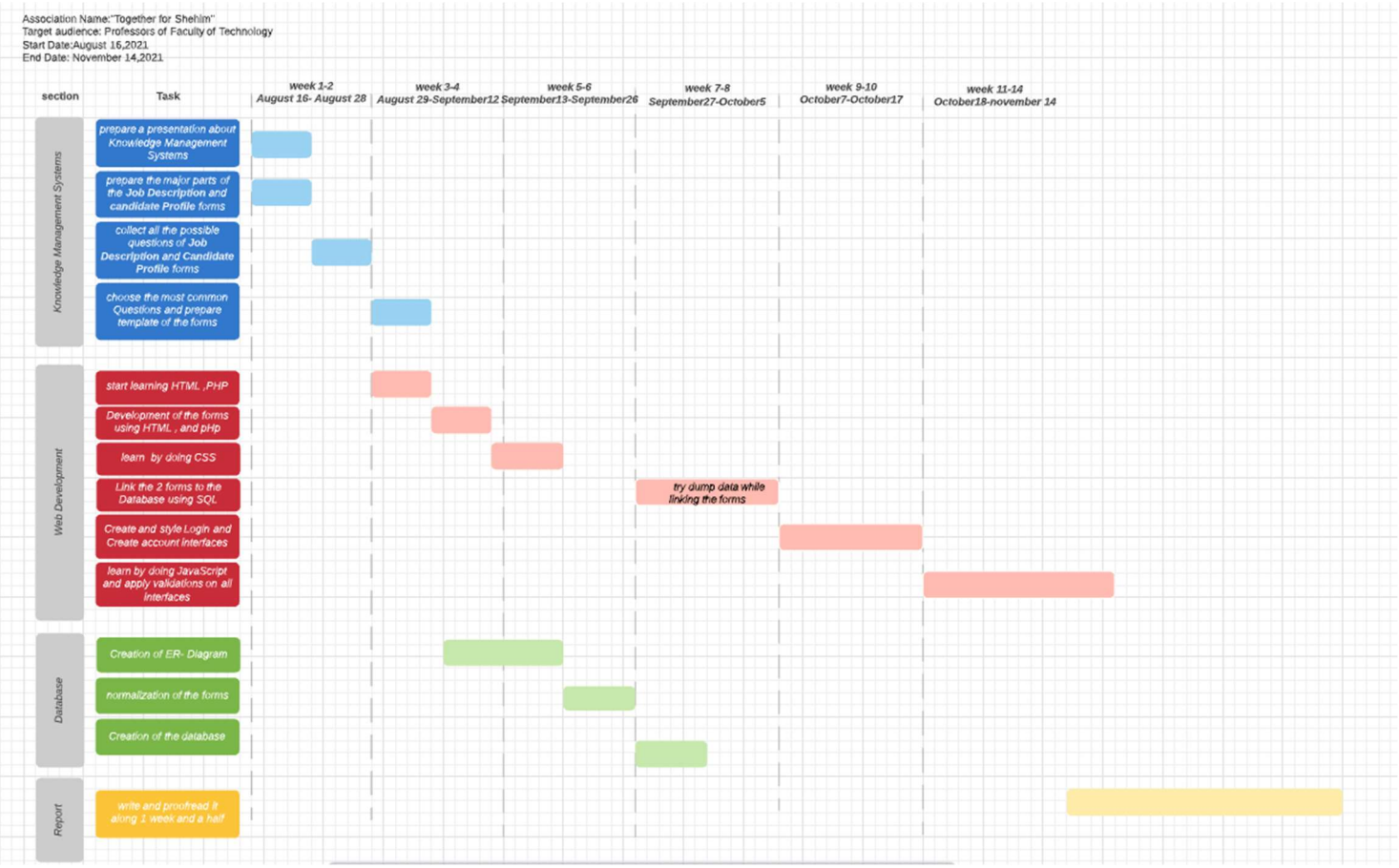


Figure 10- Gantt Diagram

This Gantt-diagram, shown in figure 10, shows how time was managed during the internship period. It is divided into 4 parts, each in a different color. And in each part, tasks are mentioned, showing the amount of time it took to accomplish them. Finally, at the end of this period, writing this report extended from the end of week 14 over a week and a half.

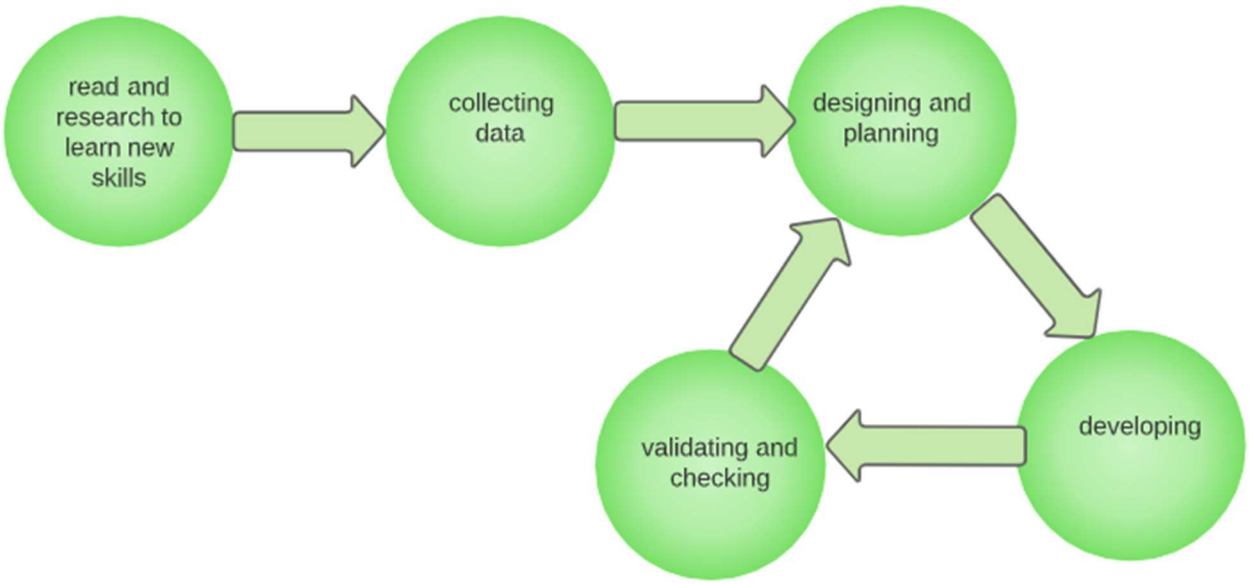


Figure 11- plan followed

The chart shown in figure 11, shows the plan followed during the internship period. First, I used to do extensive research about the skills I will use, how to use, and what it serves. Then, I collect the business requirements and data needed to design and plan, later on, the product I am working on. This design will be later on developed, and then validated. If there is an issue which is not working as design, the design will be rechecked and redesigned so that everything works properly.

3. Application of the acquired skills

a. Knowledge Management System Approach

At the beginning stage of internship, research was done about **Knowledge Management Systems**, their importance, role, and it was also required to dig deep how it would affect recruitment.

It took a whole week to surf the internet and then prepare a complete presentation about this topic.

The contribution in this part is composed of 3 major parts:

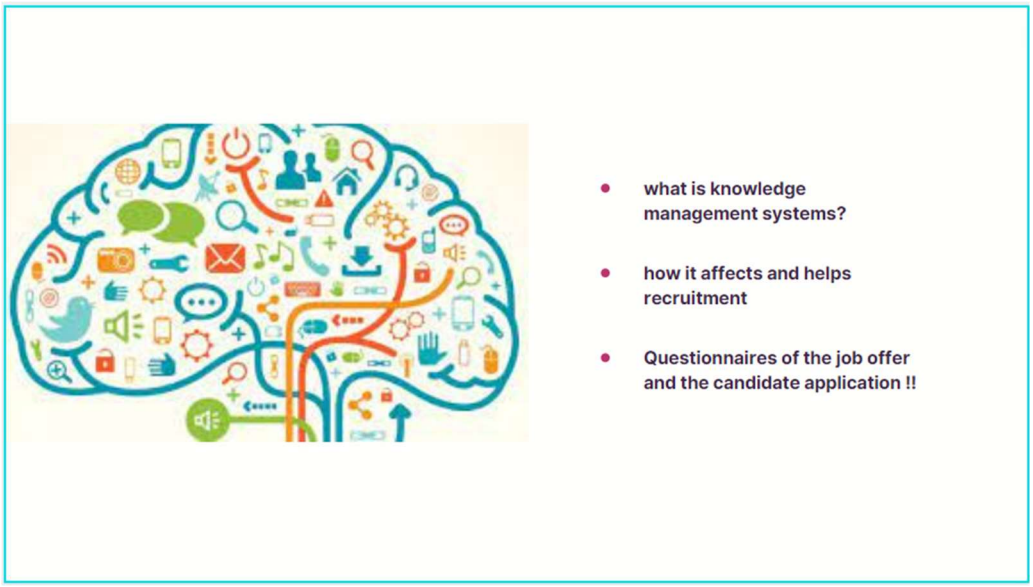
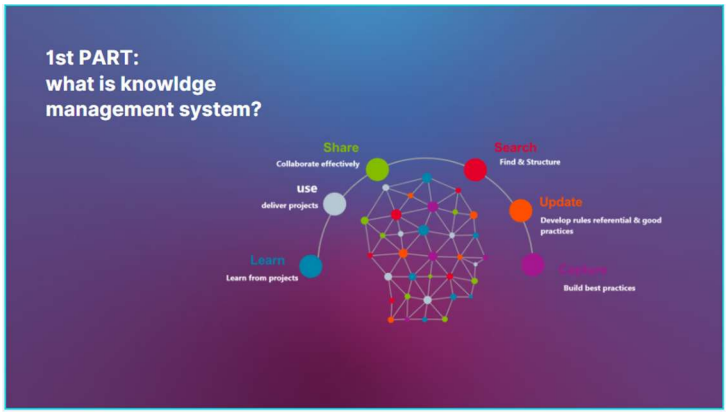


Figure 12 - Outline slide in the prepared presentation

1. *KMS general definition*



I started with a definition of Knowledge management, showing how it is integrated into our daily life showing the importance of this technology on our daily activity, and how it manages using a methodological process to transform data into a knowledge that can be effective to use when making big decisions.

Second, more details were given about the need of KMS, where and when do we need this technology. Examples on it is having several agencies that need to access the same shared folders without attacking the intellectual property of any agency or company. Then KMS can fit to be the best solution where it organizes this knowledge m, make it accessible by all companies, each with a specific level of access. And this is applicable on the level of employees within the same company.

Then, a brief description was given about types of knowledge, which is tacit and explicit.

Where tacit is an implicit knowledge that cannot be documented. It is stored in the humane memory, making it difficult to share, and impossible to restore in case of any loss.

While the explicit is completely the opposite of tacit. It is easily documented and shared. This makes it easy to record and restore in case of any loss.

Finally, the process, as shown in figure 13, which is formed of 7 steps as follows:

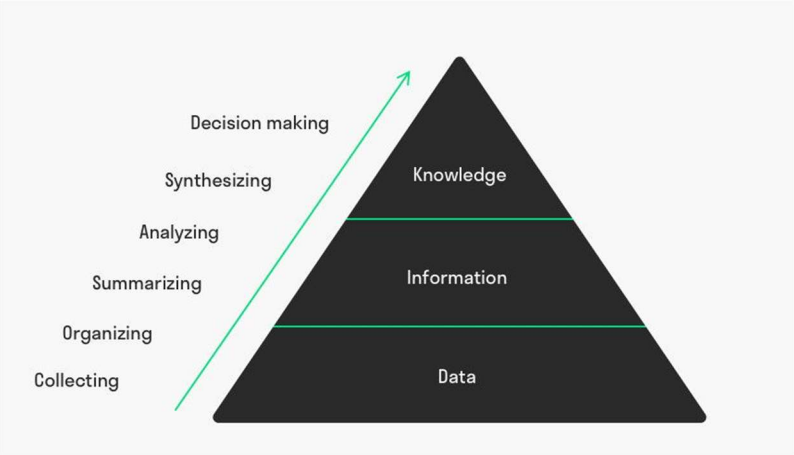


Figure 13- Process of KMS

<u>Step 1</u> is the step where data is collected only without any process. It is only stored.

<u>Step 2</u> is the step where data is transformed into information after organizing it.

<u>Step 3</u> is the step where the information is processed, summarized, and assimilated.

<u>Step 4</u> is data mining where information is analyzed.

<u>Step 5</u> is the responsible of synthesizing the information turning them to knowledge.

<u>Step 6</u> is when this information is grouped and identified into categories.

And finally <u>step</u> 7 where knowledge can be efficiently used to make decisions.

2. *KMS significant role in the world of employment.*

Being a recruiter puts you under pressure to choose the best candidate that will bring your company more success and achievements. This part of the presentation highlights the importance of knowledge management system in the recruitment field, the process, and including a conceptual representation of hiring management.

Selecting the best candidate manually of 100 of applicants is impossible to be accurate. It will cost time, and put a big risk that this candidate would not have the required potential that is needed. On the other hand, the unsuccessful applicants will wonder about the flaws in their application which prevented them from being hired.

Here comes the role of KMS, which will act as an automatic process that matches effectively between job offers and candidate profiles, to find at the end the best match.

But this process is not simple, and what complicates it the usage of free text. In 2003 a partial solution to this problem was usage of specified keywords, and controlled vocabulary. This process was developed along with years reaching year 2013. In 2013 it was improved by Kumaran and Sankar's approach where an expert system of 3 phases was developed.

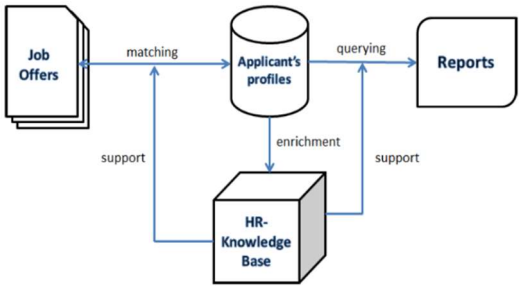
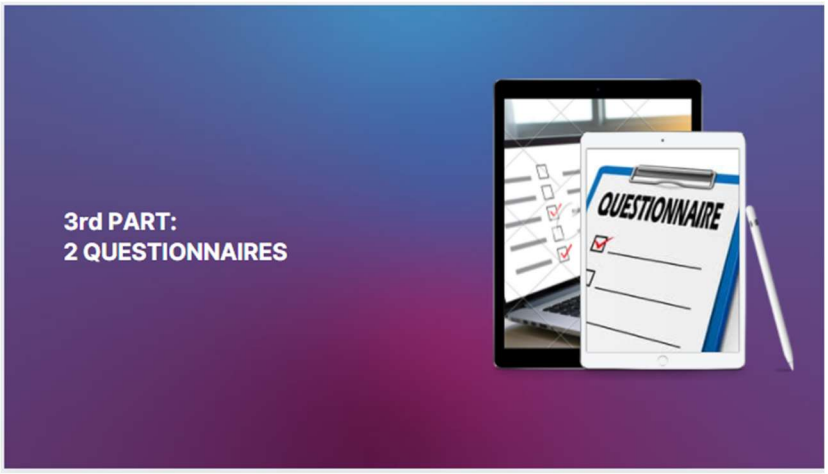


Figure 14- conceptual model of HR-management

In the figure 14 above, we can observe a scheme of the process where the matching jo offers and applicant profiles supported by the HR-knowledge base. Some queries are executed to select the best match. And the result of these queries is then reported.

3. *Forms for Jobs and candidate:*



JOB DESCRIPTION FORM:

name of the company and its domain of work:

This part is a must since no one can find the job offer if the name of the company wasn't specified, or its domain of work.

Post of work:

In this part the boss will need to specify the vacant position so that the applicant would know the position he /she will take if being hired, as well as, specifying the number of vacancies.

Candidate qualifications:

Each position requires specific qualifications in the domain of education, experience, and skills.

And these qualifications are specified by the recruiter where the best matching needs to have 95% and above match with the requirements for this position offer.

The basic salary:

Where most applicants care about the amount they will be paid, as some of them sometimes refuses to apply to several positions just because they would be paid if hired, less than what they expect. As in this part the boss will specify the kind of additives to the salary, he will offer this position in case additives will also be paid.

Working schedule:

It can be considered one of the most important parts. Why?

Simply because if the employee is not capable to work in a fulltime job for example. He can't finish his tasks in a part time. This will lead to unaccomplished tasks, leading to deterioration in productivity depriving the company of future successes.

CANDIDATE PROFILE FORM:

Personal information:

This part includes the name, telephone number, email address, and linked-in account. As it may contain the age, address, and any social media professional account on social media.

Reason behind choosing this company:

This part requires the applicant to write a small paragraph expressing his thoughts that were behind choosing this company. And this will show who is more serious about getting this job.

Skills:

This part includes the skills the skills acquired by this candidate which are authenticated by a certificate given from the origin.

Education and Experience:

In this part, the candidate will specify the educational degrees he /she has and in which domains.

And it will also include the number of years of experience if there is any, in what companies, and in which domains.

Working schedule and expected salary:

Is just as important to be here as its importance to be asked about in job offers forms.

b. Database Design and Development

In this period of internship, database was designed and developed following the reversed engineering method.

First from the layout of the form, the requirements were understood. It was easy then to specify the entities of our database after normalizing the forms. This was done after reading chapters 3 and 13 of "Fundamentals of Database Systems" number 5 in the references.

Form (idc, name, email, domain, address, telephone, contactperson, code_p, jobcodetitle, dep/branch, postingperiod, salary, transportalternative, overtime, insurance, other, nbdays/week, nbhrs/day, fulltime, parttime,descriptionparttime, description ,drivinglisence, id_edu, nameofdiploma, domain, GPA, id_cert, title, nameofcert, date, score, id_exp, nameofcompany, nbof years, domain, type, id_skills, name, domain, id_lan, name, level)

→1NF

Company (idc, name email, domain*, address, telephone, contact person)

Domain (id_domain, name)

companyPost(id_c*, code_p*, jobcodetitle, dep/branch, postingperiod, nbofvacancies, salary, transportalternative, overtime, insurance, other, nbdays/week, nbhrs/day, fulltime, parttime, description, drivinglicense, id_edu, nameofdiploma, domain*, GPA, id_cert, title, nameof_cert, date, score, id_exp, nameofcompany, nbyears, domain*, type, id_skills, name, domain*, id_lan, level)

Domain (id_domain, name)

Company (idc, name email, domain*, address, telephone, contact person)

Post (code_p*, posting period, jobcodetitle, nbofvacancies)

Companypost (id_c*, code_p*,description, dep/branch, salary, transportalternative, overtime, insurance, other, nbdays/week, nbhrs/day, fulltime, parttime)Qualifications (** description,)

Education (id_edu, nameofdiploma)

Requirementsedu (id_c*,code_p*, id_edu*, domain, GPA)

Certificates (id_cert*, nameof_cert, date)

Requirementscert (id_c*,code_p*, id_cert*, title, score)

Experience (id_exp, nameofcompany)

Requiredexp (id_c*, code_p*, id_exp*, nbyears, domain*, type)

Skills(id_skills, name)

Requiredskills(id_c*, code_p*, id_skills*, level)

→3NF

Domain (id_domain, name)

Company (idc, name email, domain*, address, telephone, contact person)

Schedule(id_sch, nbdays/week, nbhrs/day, fulltime ,parttime)

Companypost (id_c*,code_p*, description,dep/branch, salary, transportalternative, overtime, insurance, other, driving license ,id_sch*)

Requirementsedu (id_c*,code_p*, id_edu*, domain*, GPA)

Education (id_edu, nameofdiploma)

Requirementscert (id_c*,code_p*, id_cert*, title, score)

Certificates (id_c*, code_p*, id_cert*, nameof_cert, date)

Experience (id_exp, nameofcompany)

Requiredexp (id_c*, code_p*, id_exp*, nbyears, domain,type)

Skills(id_skills, name)

Requiredskills(id_c*, code_p*, id_skills*, level)

Figure 14.1-normalizing job description form

Form2 (id_p, name, title, nationality, email, telephone, address, linked_in, professional, age, drivinglicense, salary, transport alternative, overtime, insurance, others, nbdays/week, nbhrs/day, fulltime, parttime, id_edu, nameofdiploma,domain, GPA, id_cert, title, nameofcertificaes, date, score, id_exp, nameofcompany, nbyears, domain, type, id_s, nameofcompany, nbyears, domain, type, authors , title, type, editor, year, Doi, id_skills, name, domain, id_lan, name , level)

→1NF

Profile(id_p, name, title, nationality, email, telephone, address, linked_in, professional, age, drivinglicense ,salary, transportalternative, overtime, insurance, others, nbdays/week, nbhrs/day, fulltime, parttime)

education(id_p*, id_edu, nameofdiploma, domain*, GPA)

acquiredcert (id_p*, id_cert, nameofcertificates, title, date score)

experience (id_p*, id_exp, nameofcompany, nbyears, domain*, type)

seminar&workshops (id_p, id_s, nameofcompany, nbyears, domain*, type)

authors (id_a, name)

research papers (authors*, title, type, editor, year, DOI)

skills(id_p*,id_skills, name,domain*)

languages(id_lan, id_p*, name, level)

→2NF

Profile(id_p, name, title, nationality, email, telephone, address, linked_in, professional, age, drivinglicense ,salary, transportalternative, overtime, insurance, others, nbdays/week*, nbhrs/day*, fulltime, parttime)

Schedule(nbdays/week, nbhrs/day, fulltime, parttime)

education (id_edu, nameofdiploma)

acquirededu(id_p*, id_edu, domain*, GPA)

certificates(id_cert, nameofcertificates)

acquiredcert (id_p*, id_cert*, title, date score)

experience (id_exp, nameofcompany)

acquiredexperience (id_p*, id_exp*, nbyears, domain*, type)

acquiredseminar&workshops (id_p, id_s, nameofcompany, nbyears, domain*, type)

authors (id_a, name)

research papers (authors*, title, type, editor, year, DOI)

skills(id_s*,name)

acquiredskills(id_p*,id_s*, domain*)

languages(id_lan, name)

acquiredlanguages(id_lan*, id_p*, level)

→3NF

Same as 2NF

Figure 14.2- normalizing candidate profile form

1NF→is when making all elements to be atomic

2NF→is when all attributes depend on the primary key and that there's no partial functional dependencies.

And 3NF→ is making sure that there's no dependencies between any 2 attributes.

After designing the forms and specifying the data that is required to be filled in the data-base

Then, after normalizing the forms, as shown in figures14.1 and figure 14.2, it is now possible to draw the **Conceptual Data Model** of our database. with the help of Lucidchart tool it turned easier to sketch an organized professional CDM.

And the built ER-Diagram is the following:

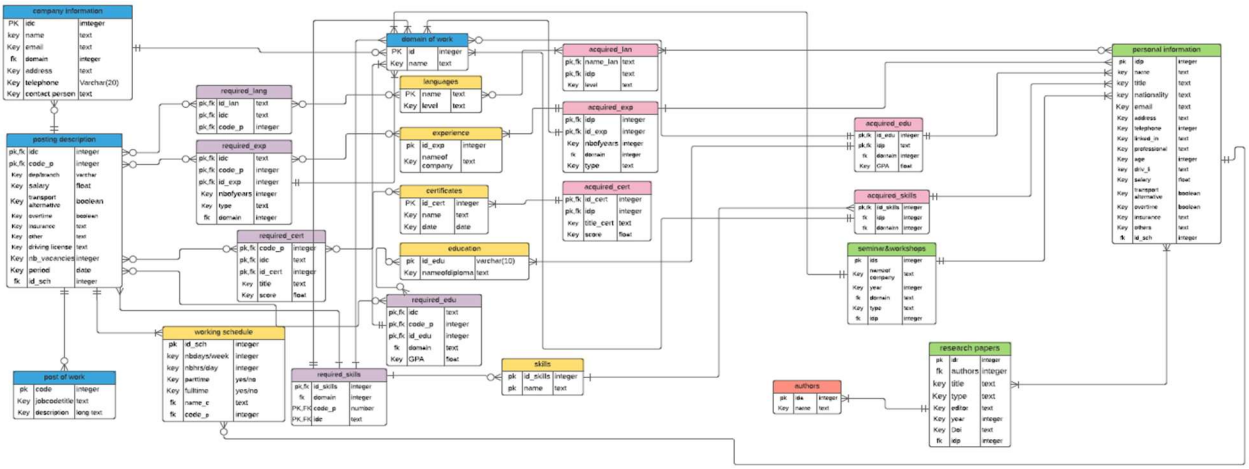


Figure 15- ER- Diagram

After the creation of ER-diagram, shown in figure 15, and then specifying the primary keys and foreign keys of the tables, developing our database became easier, and more accurate.

As the database was created using phpMyAdmin of the WampServer by importing the SQL code generated the SQL command used was

"CREATE table `table_name ` (att1 type, att2 type, att3 type, …. attn type, primary key(att or more depends on the table) , foreign key (att) references table_name (primary key of this table)).

Note: a table can have several foreign keys.

And my resulting database is in the following figure, figure 16:

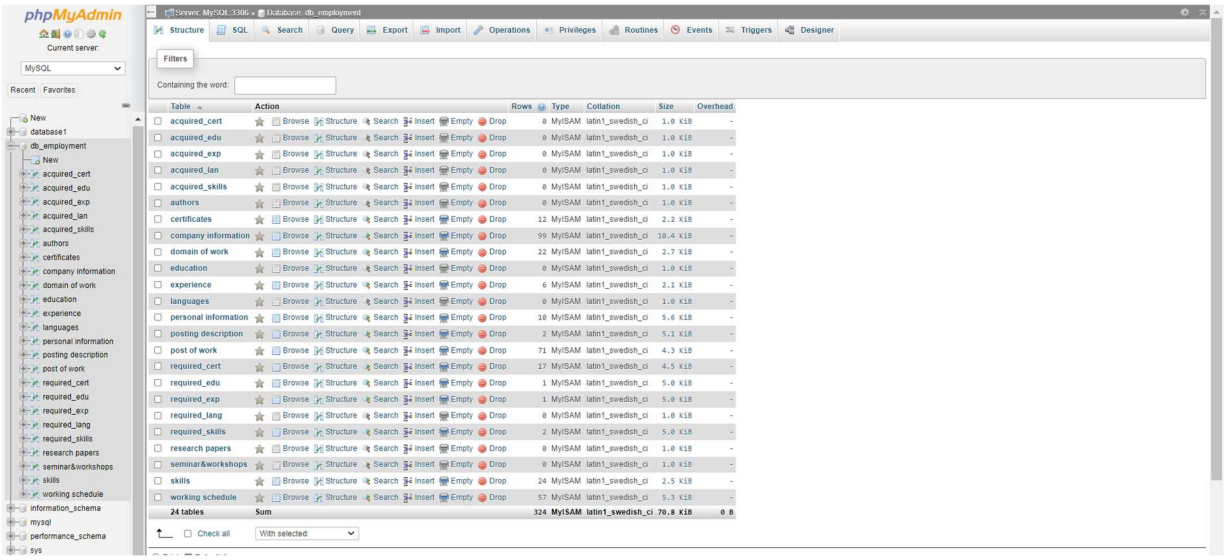


Figure 16- Database developed made up of 24 tables

My database was formed of 24 tables linked together using foreign keys. It was a result of a detailed process, of sketching, normalizing, and developing.

c. Platform Development

In this section the platform development will be presented.

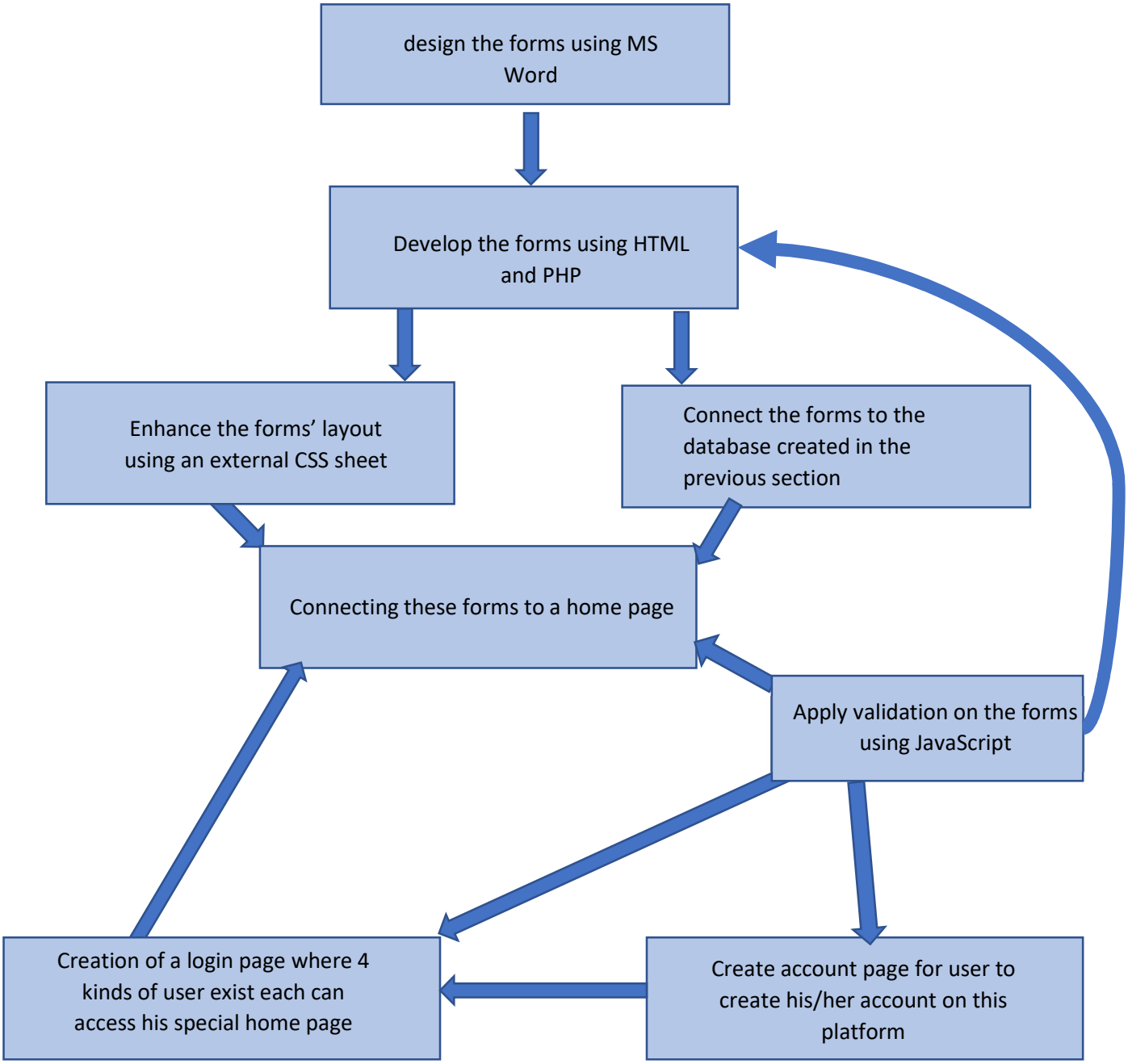


Figure 17- Plan followed to build the platform

As in figure 17:

After specifying the major parts of the questionnaires in the last part of the presentation, these parts are developed through the most frequent questions in such kind of forms. (UNCareer was visited to make sure the work is sticking to a global standard). These questions were organized and enhanced to be later on developed into a web form using HTML, PHP.

This is the developed forms, shown in figure 18.1 and 18.2 “Candidate Profile Form” and “Job description Form” using HTML tags

<label>, <input>, <fieldset>, and <table> with its children <tr>, <td>, and <th>.

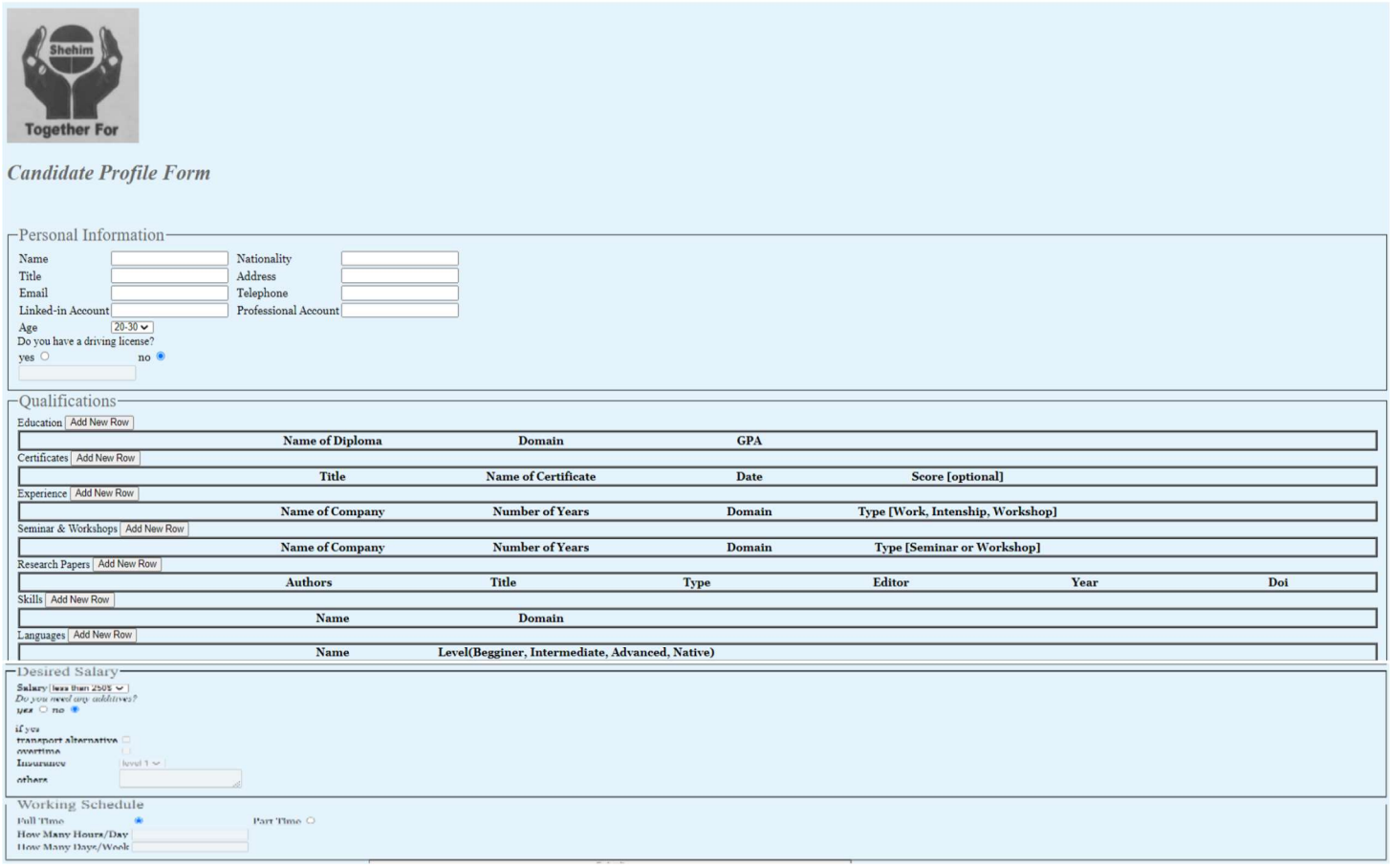


Figure 18.1 - Candidate Profile Form

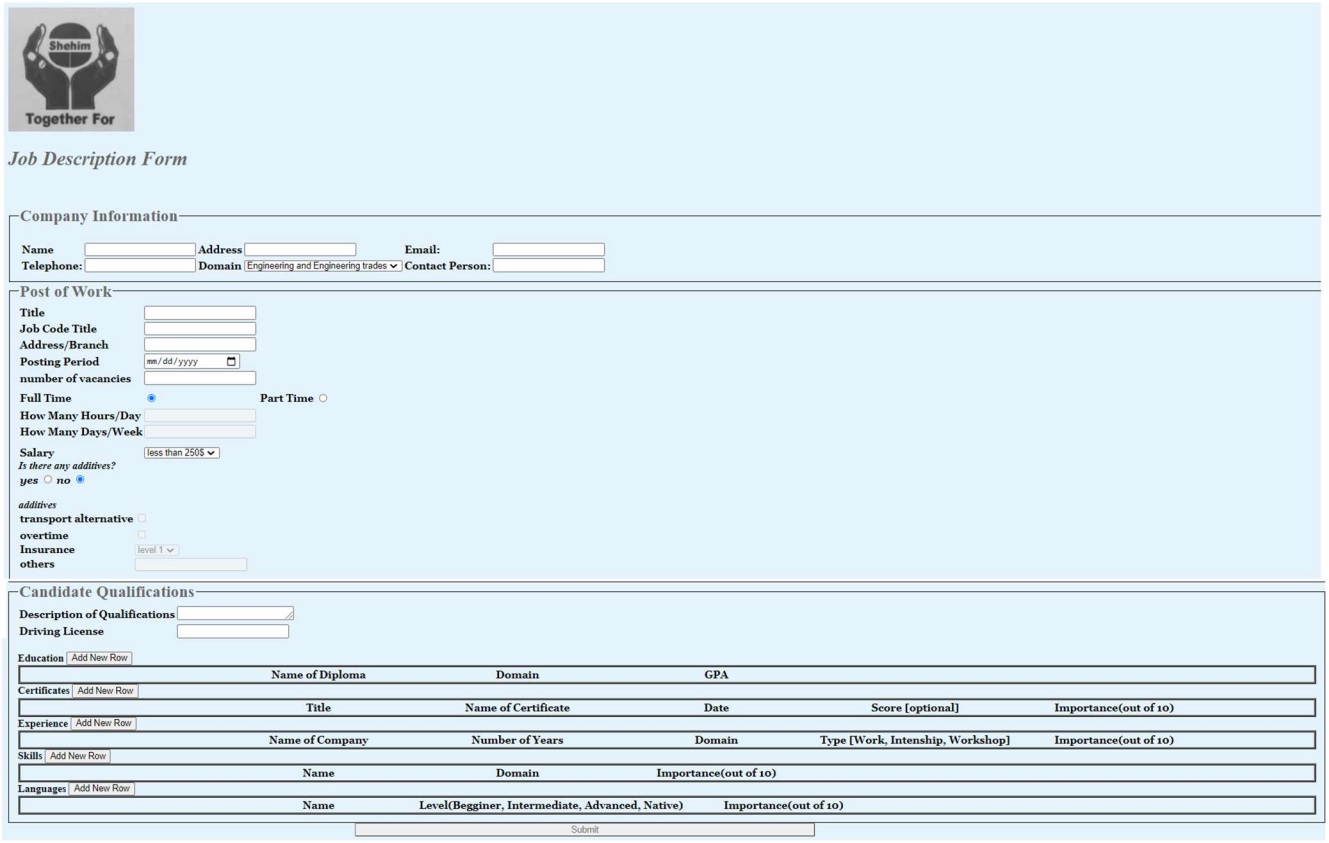


Figure 18.2 - Job Description Form

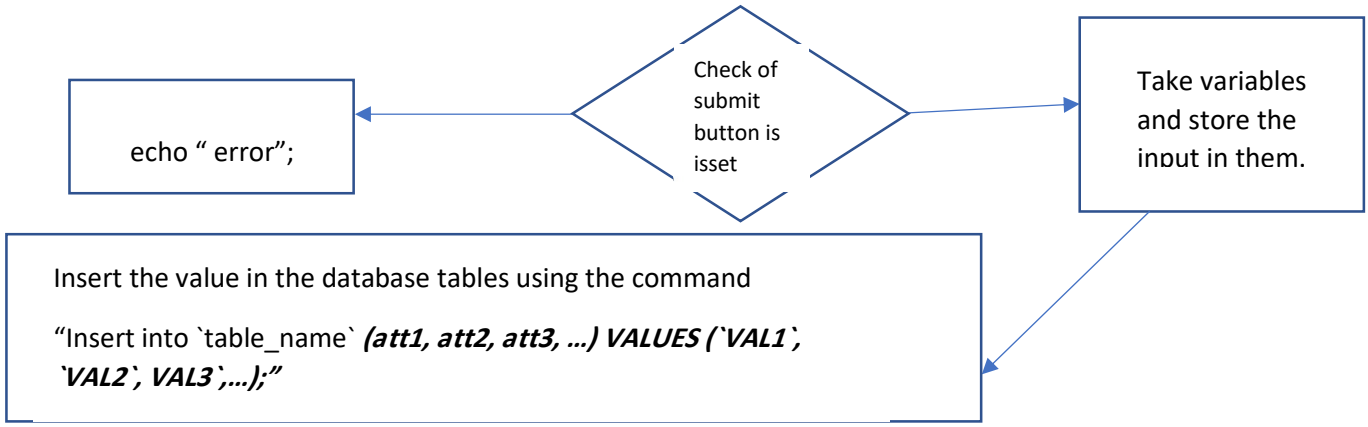
In case the user chose full time →the input boxes corresponding to the number of days, and the number of hours per day are disabled in both forms, this was done by JavaScript.

Also, JavaScript was used in creating tables with dynamic rows.

The styling of the page was done through an external CSS sheet. Where background color was added, legends font and color changed and some enhancements done on the submit button, such as using the hover function.

The connection to database is done through the php command

And before closing the php delimiter "?>"



The home page created→ if the administrator is logging in, he can access and see all the profiles and job offers.

In case a member of the association is logging in, then he/she can see all profiles and job offers without the access to modify any.

In case the candidate is logging in, he/she can modify only his profile and can only see the job offers in his domain.

In case the boss is logging in, he/she can modify only his offer and can only see the profiles in his domain.

These users' login to the home page through a login page, shown in figure 19.

Figure 19- Login Page

And in case the user has no account, he /she can create one by clicking the hyperlink which will take him to the create account interface that is shown in figure 20.

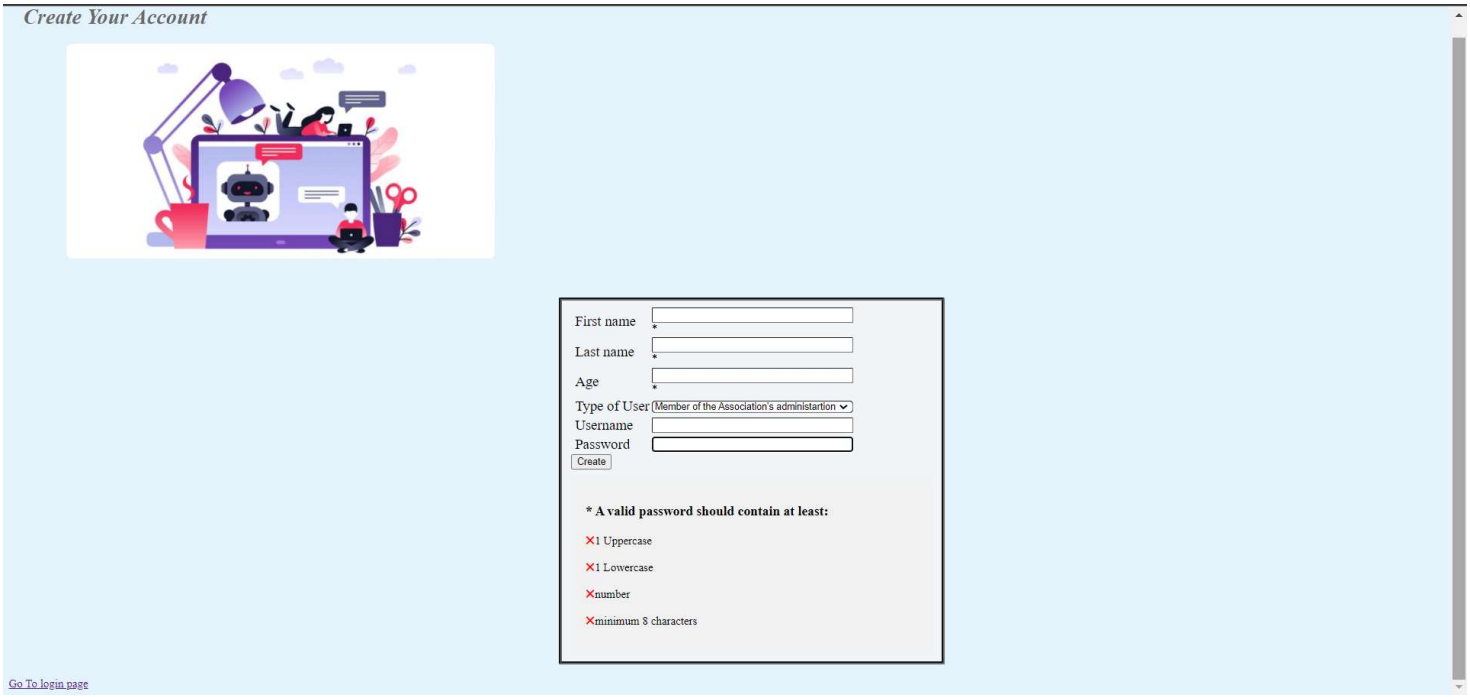


Figure 20- Create Account pages

Here in figure 20, when the password text input onclick function is called, this message appears to help the user enter a strong valid password. It should contain an uppercase, a lowercase, numbers, as well as its length should be at least 8 characters. And when each of the conditions becomes valid the X mark near the condition turns to be a check.

Chapter V: **Conclusion and Perspectives**

Web development has always been an interest of mine. I find it an intriguing subject to discover and develop skills for. Luckily, the internship I found at "Together for Shehim" guided me through that journey of exploration. The skills I picked up throughout this amazing experience will definitely remain in my arsenal for the rest of my professional career. This boost of web-developmental mindset is all I needed to pursue my ambitions in this sector of the subject. The hands-on method has increased my self-confidence immensely. Managing my time efficiently is one of the most necessary attributes I acquired. Another thing that caught my attention is the knowledge management system. The operation of organization that transfers and transforms data to knowledge is an astonishing, eye-opening, and mind-blowing system. My time spent in your association surely expanded my mind on all of the opportunities this field presents. I appreciate the effort put into teaching and guiding me throughout this whole process.

Finally, this project is not finished yet our platform's appearance could be enhanced to give it a professional one just like the UNCareer website. As it needs to be secured against hackers' attacks. As the final stage hasn't been accomplished which is data mining where the best match is automatically found through our platform.

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