Egyptian Monuments with Unique QR Code

Graduation Project is Submitted to Computer and Systems Engineering Department in Partial Fulfilment of the Requirements for the Degree of Bachelor of Computer and Systems Engineering

BY

Mariam Ahmed Sherif Mohamed

Haidy Essam Abdelzaher

Yara Mohamed Salah

Shrouk Tarek Mohamed

Mayada Ebrahim Gamal

SUPERVISED BY

Dr. Rasha Fathy Aly Mostafa

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Abstract

Tourism in Egypt is one of the most important sources of national income, with the annual dollar revenues it provides. So we decided that our project can serve tourism in a useful unique way. It's a website that displays information and history of a lot of tourist attractions and statues and the way to read these information is by scanning a generated QR code image of a certain statue that will open a specific page that contains text information about that scanned monument also the user will be able to listen to the text instead of reading it as well as viewing related statues to the statue he has already scanned and there is a 3D image about the scaned statue. Users will be able to choose which language they would like. There's an event page that users can book a ticket from and if there is someone who would like to create a certain event with his chosen unique image to be designed for the QR code.This website is deployed on a live website link in order to design the QR codes other than using a local host server.

Keywords

QR code, React js, Node.js, API, Machine Translate, Local server, Monuments, Statues

CHAPTER 1

INTRODUCTION

1.Introduction

In this project we are going to use QR code because it mostly used at this time, the QR code is an image of a certain statue when the user scans it, it will open a specific page that contains information about the whatever the user has scanned this spacific page contain text information about that scanned object also the user will be able to listen to the text instead of reading it. And we are going to build a website using react for frontend and Node.js plateform for backend to show this page. We also used machine translate that helped us to translate for many languages and the user will be able to choose which language they would prefer using.

1.1 Problem statement

It helps tourists to easily get information about each statue, listen to the text and translate it to the most suitable language for him. It is important for tourism because it is the most important sources of national income, with the annual dollar revenues it provides.

1.2 Objective

Our objective is to built a website using unique QR code to show data about each status, the data can be text, sound or a 3D model. Also show related pictures of the statues to the statue he has already scanned using keywords There is a page for showing available events that are done in the mueseum and the user can view these events and book a ticket and pay online. This project will be very effective in tourism and increase national income.

1.3 Motivation

We are very motivated to build this project for many reasons, which are the following:

- This project will serve the tourism in a useful unique way.
- A lot of status data is available on the internet, which will help us complete the project.
- At the end of this project, we expect to deliver a very unique system that can get information about each status.
- Our gain from this project will be a huge experience in different fields which are creating a full website, machine translate, QR code design, text to speech and 3D modelling of a statue and how we can connect them with our application.

1.4. Development Process

- First, we are going to use all the data-gathering techniques (e.g. web searching, Free database on the internet, go to museums) to gather real and trusted data about status.
- The second stage will be the most important part of our project, we will generate the unique QR code which is an image of the status using python.
- After that, we will built our website using react for frontend and Node.js platform for backend and connect the website with the QR.
- Then, add our features (Text to speech , machine translate and 3D modeling)
- Create an event page that makes the user create an event if he wants and send a request for the admin to accept the event or not and the tourist can book a ticket online for a certain event.

1.5 Literature Review

- In the near future accessing the internet with mobile devices will take an increasingly large scale. To accommodate to the needs of visitors, "Ion Borcea" Natural Sciences Museum Complex of Bacău was aligned with the new trend of modern technology, using an alternative to the classic guidance. Starting with the exhibition "Nature Protection" all exhibitions made by museum curators will have QR codes (Quick Response). This is a two-dimensional matrix code created in 1994 by Japanese company Denso Wave, which has a large capacity and is extremely easy to read. Through them, a real world can be connected to a location in the virtual world. With one scan, which takes less than a second, any smartphone owner can quickly get a very wide variety of information and services.

- A wave of QR codes began appearing in UK and US museums and galleries throughout the later 2000s, with early adopters including Pennsylvania's

- The Mattress Factory (2009) and Brooklyn Museum (2012). Adoption was low through the following decade, with Cuseum lamenting their terminal decline in The Life and Death of QR codes in Museums (2016).

- In country QRomania project started with a local pilot project named Culture and Vrancea National Heritage into online environment "Google Maps-QR". Started in January 2013 by the Potpourri Association of Focşani and the County Department for Culture and Vrancea National Heritage (who also provided the necessary information about the historical monuments that were installed plaques with QR codes), the project aims to provide greater visibility to the cultural points and patrimonial interest in Vrancea County by promoting their online

environment. QR code related to an object provides access to a page with links to: page in Romanian, English and French with information about the objective and the corresponding Google maps objective page.

- In May 2013, in the city of Sibiu started the project "Promotion of cultural heritage by QR Code" which proposes creating a system of tourist guidance and providing online information about cultural and touristic objectives from the city of Sibiu. Each objective in the system has a page with multilingual historical and cultural information, his location and other points of interest. Users can choose between several paths or custom theme and can send, about these, photos and impressions onto social networks. Following a study conducted on a sample of 24,000 people, 7,200 individuals have expressed interest in using mobile phone to access such a guidance system.

- The visitors of the National Museum of Natural History "Grigore Antipa" of Bucharest will be able to access, with effect from 1 November 2012, the information attached to parts of the permanent exhibition and using mobile phones (smartphones) in the Museo Tag project, conducted and funded by NFCExpert.ro. Through this program, the scientific information associated to the exhibits can be read using mobile phone systems through the use of QR and NFC systems (Near Field Communication). The museum aims through this project better accessibility of scientific information that, until now could only be read on the front of InfoTouch showcases and to attract teenagers and young people passionate about mobile phones and technologies in this field. Since November, information related to exhibits could be read simultaneously by multiple people, by displaying.

CHAPTER 2

ANALYSIS AND

REQUIRMENTS
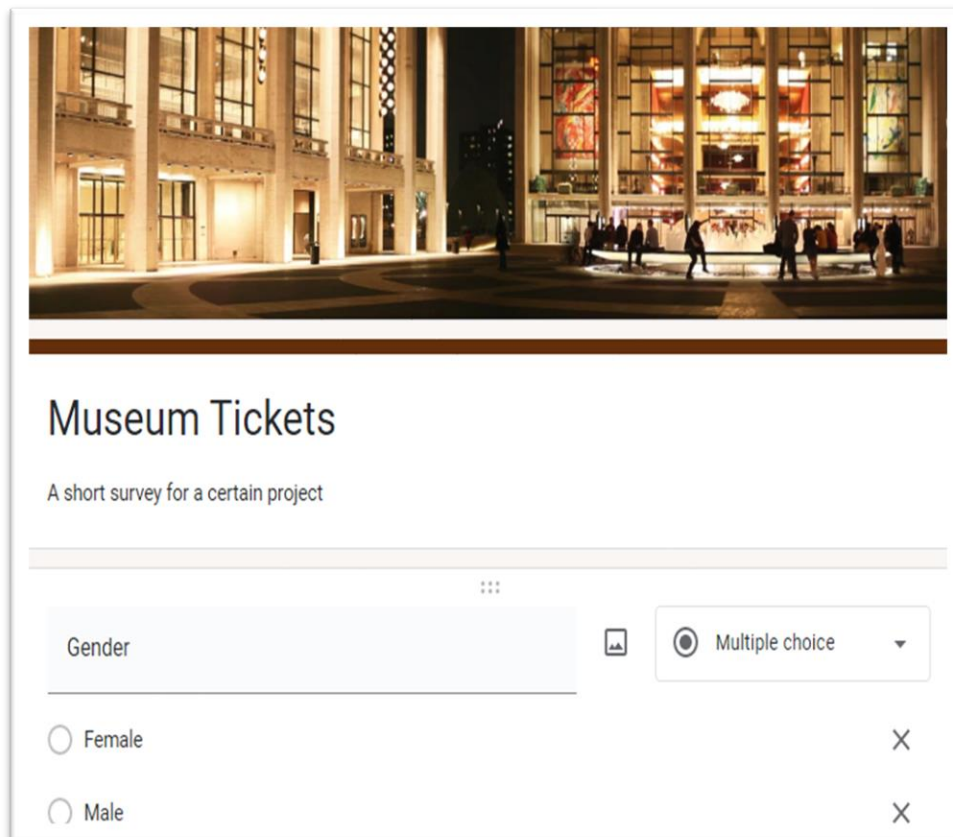
2.Analysis and Requirement

2.1 Analysis

In order to arrive at the specific requirements of our system, we wrote below, we did some steps to collect ideas and data about the proposed project, which are:

1. We did research about some systems serving the same goal as we mentioned in the literature review.
2. We did a small survey about if visitors will pay money to take photos for the monuments in the museum.

Figure 1 our survey

Figure 2 Remainder of our survey

Results of the survey:

Figure 3 Result1

Age

142 responses

- 15 or under
- 16-24
- 25-30
- 31 or above

81.7%

9.9%

7%

Figure 4 Result2

If you are visiting a museum and there's an additional ticket you can buy in order to take pictures using your mobile phone (range: 20-30 L.E).
Will you buy this ticket ?

142 responses

- Yes
- No

34.5%

65.5%
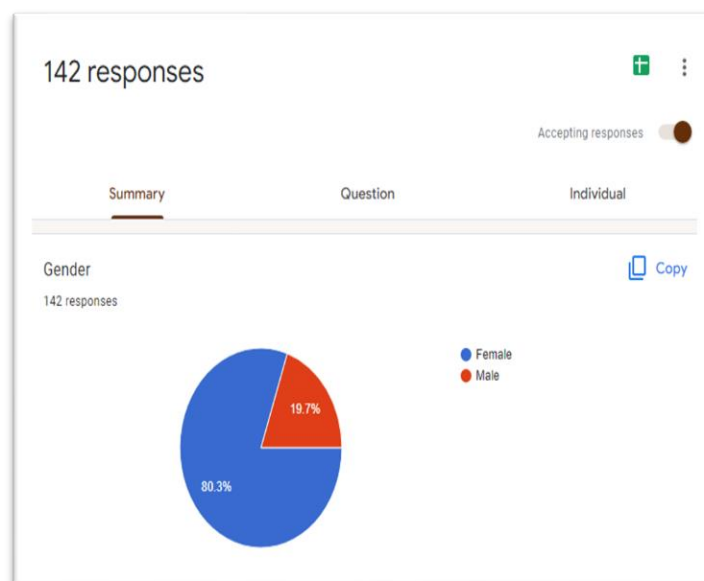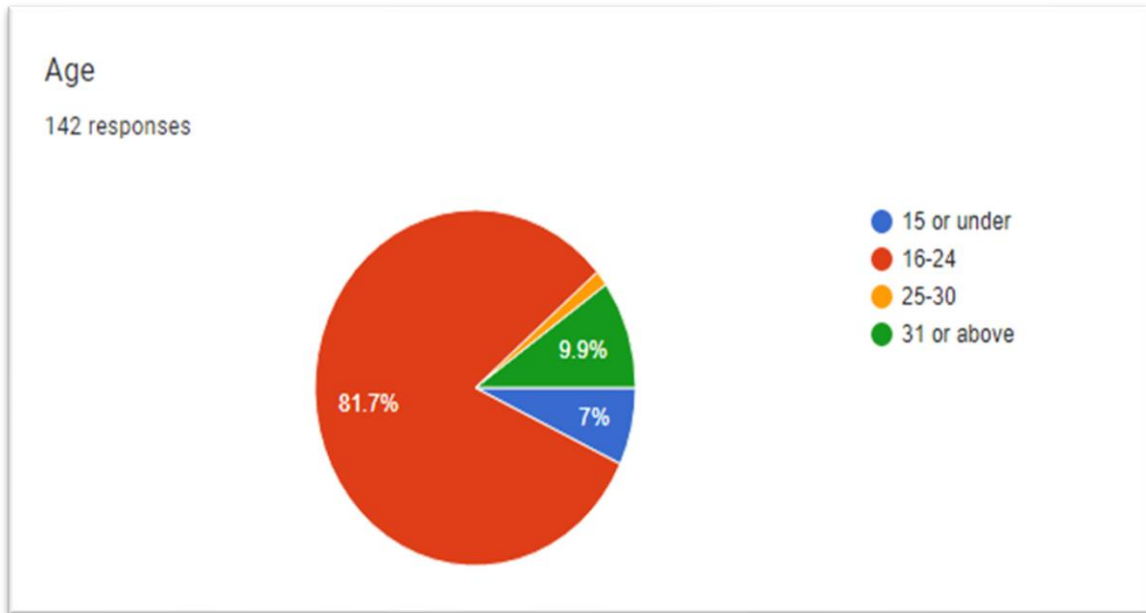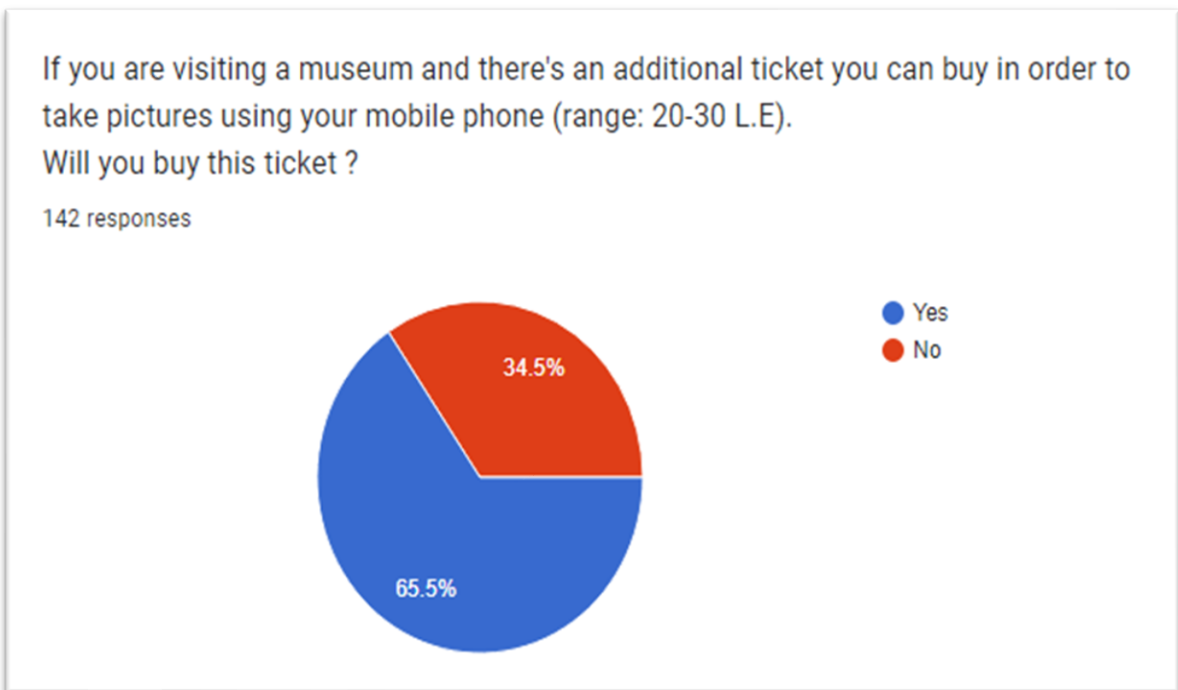
Figure 5 Result3

3. We compared between different QR's shape to choose the best shape.

Figure 6 QR Code1

Figure 7 QR Code2
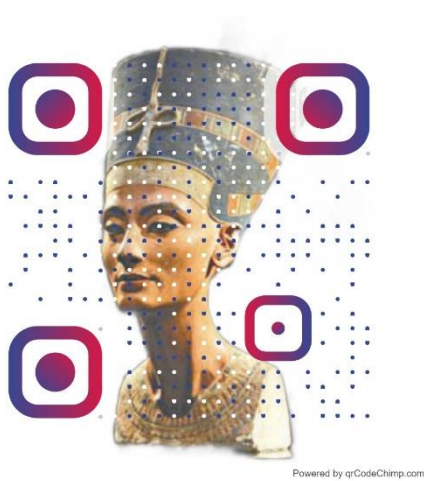
Figure 8 QR Code3
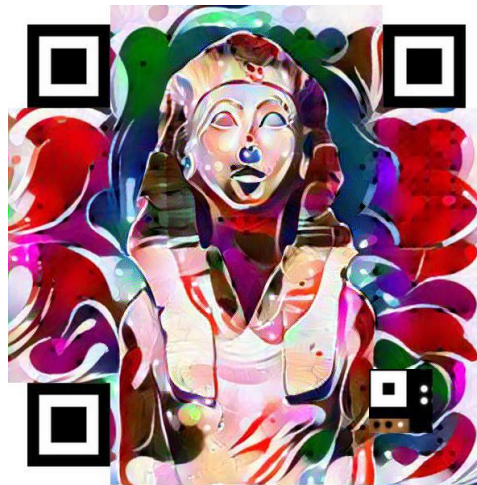
Figure 9 QR Code4

Figure 10 QR Code5

Figure 11 QR Code6

Figure 12 QR Code7

4. We did a lot discussions with our supervisor professor about the topic.
5. We build our website with the features that we will talk about it later.
6. We print QR code samples that we have designed.

2.2 System Requirements

Requirements can be divided into functional requirements and nonfunctional requirements.

2.2.1 Functional Requirements

REQ-x	Description
1.Generate QR for monument	The admin can generate a QR code containing monument's information. Then, display it between the monuments to visitors then they can scan it to get the information.
2.Scan QR	Visitors scan the QR code of the monument and then open the website to show the information about this monument.
3.Update data	Admin add data for each monument
4.Choose language	When the visitors open the website they can choose the language they want.
5.Choose text	The visitor choose the way that the information is displayed (here in text).

6.Choose audio	The visitor choose the way that the information is displayed (here in audio).
7.Show related statues	The visitor can see images about related statues (here in image).
8.Book a ticket	User can book a ticket for any event in event page
9.Create an event	User can create event and connect with admins
10-3D model	The visitor can see 3D model about related statues

2.2.2 Non-Functional Requirements

The categories of non-functional requirements given are Security, availability, maintainability, usability, and flexibility.

REQ-x	Description
1.Usability	The system is very easy to use for the user.

2.Portability	The system is a website, and anyone can visit it on his phone and use it from anywhere.
3.Reliability	The system doesn't fail, and all function of the system should work correctly.
4.Availability	The system is available for 24 hours
5.Security	The system provides a good level of privacy for all the data.

2.3 Functional requirements specification

2.3.1 System stakeholders

- Admin
- User

2.3.2 Actors and goals

1. Administrator

- The administrator will have overall control over the system
- Add all information about monuments in the system.
- Generate and print QR identity codes for monuments to visit the website.
- Manage database, access, and modify on it.

2. User

- Scan the QR code of monuments.
- Visit website to read the information about the monuments
- Book a ticket for events
- Ask for creating an event.

2.3.3 Use cases description

1. Generate QR code

- **Actor**: Admin.

- **Brief Description:** This use case describes how the admin generates a QR code for each monument.

- **Basic Flow:**

    1. Admin generate a QR codes.
    2. Admin add information about each monument in the database.

2. Scan QR code

- **Actor**: User.

- **Brief Description:** This use case describes how user scan the QR code by system.

- **Basic Flow:**

    1. User scan a QR codes.
    2. User choose the language he want.
    3. User choose the way to show the information (text, audio).
    4. Users can read related statues.

3. View website

- **Actor**: User.

- **Brief Description:** This use case describes how user visit the website.

- **Basic Flow:**

  1. User visit the website.

  2. User choose the language he want.

  3. User choose the way to show the information (text, audio).

  4. The system view list of monuments' information.

  5. User can read related statues.

4. Book event

- **Actor**: User.

- **Brief Description:** This use case describes how user book the website.

- **Basic Flow:**

1. Click on the "Book Now" button

2. The event details will appear on a new page.

3. Click on the "Get Ticket" button

4. Enter your information and click on "Book my tickets".

5. Click on the "Payment" button to complete your booking.

6. After inserting your credit card number click "Book Now" to buy you tickets.

5. Create an event

- **Actor**: User.

- **Brief Description:** This use case describes how user creates the website.

- **Basic Flow:**

1. Click on the "Contact Us" button
2. Fill out the information requested
3. Click on the "Submit" button to send your data to the database.
4. Your information will be securely stored, and the event organizers can access it and follow up with you to discuss the event details and answer any questions you may have by contacting you by email.

CHAPTER 3

SYSTEM DESIGN

3. Software Design

3.1 Use case Diagram
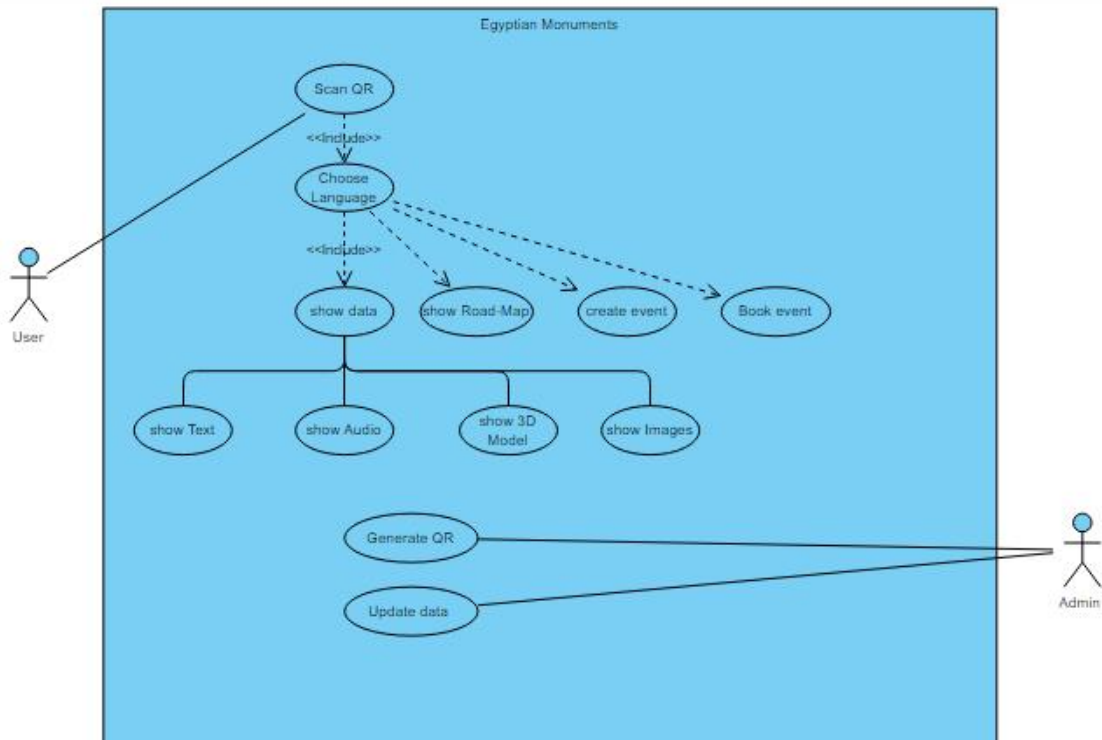
Figure 13 use case diagram

3.2 Class Diagram

Egyptian monuments

user
+Scan-QR()
+Choose-Language()
+Choose-Text()
+Choose-Audio()
+Show-Road-Map()
+Show-Images()
+Create-Event()
+Book-Ticket()
+Show-3D-Model()

admin
+Generate-QR()
+Update-Data()
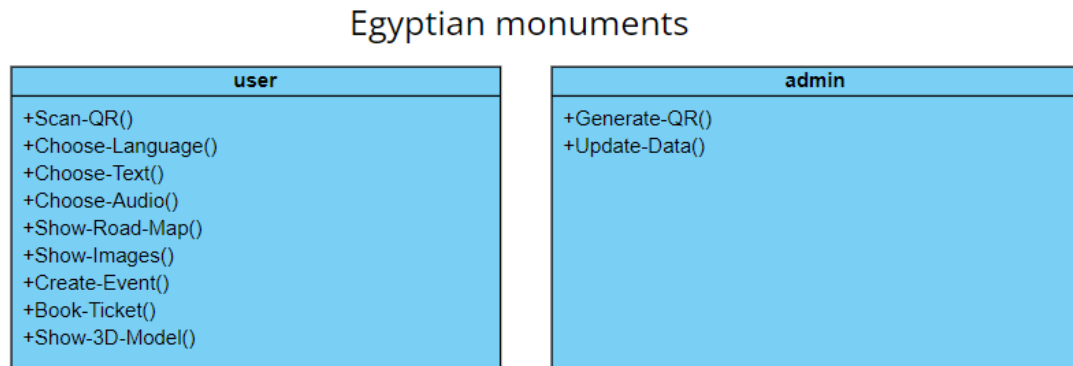
Figure 14 class diagram

3.3 Entity Relationship Diagram

Events
eventname : varchar
qrcodes : integer
price : integer
data : varchar
time : integer
picture : clob
email : varchar

Monuments
+ID : integer
Monument-Data : varchar

Booking
UserName : varchar
EmailAddress : varchar
Tickets : intfger
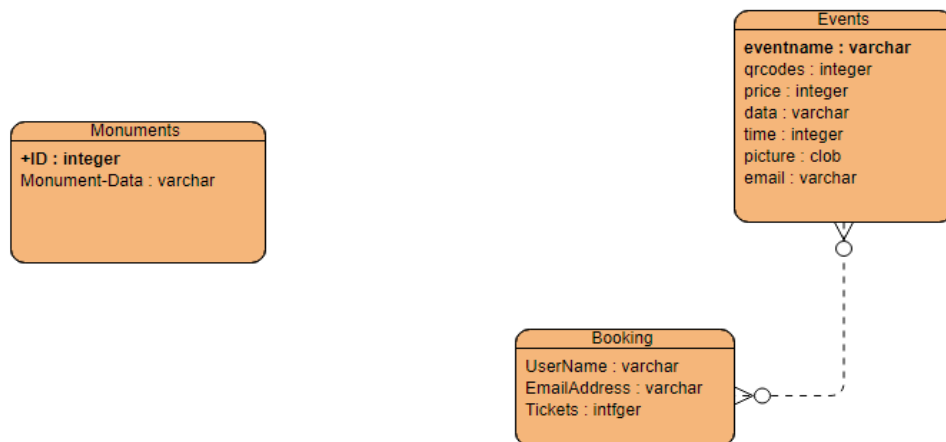
Figure 15 ER Diagram

3.4 Sequence Diagram

Egyptian monuments
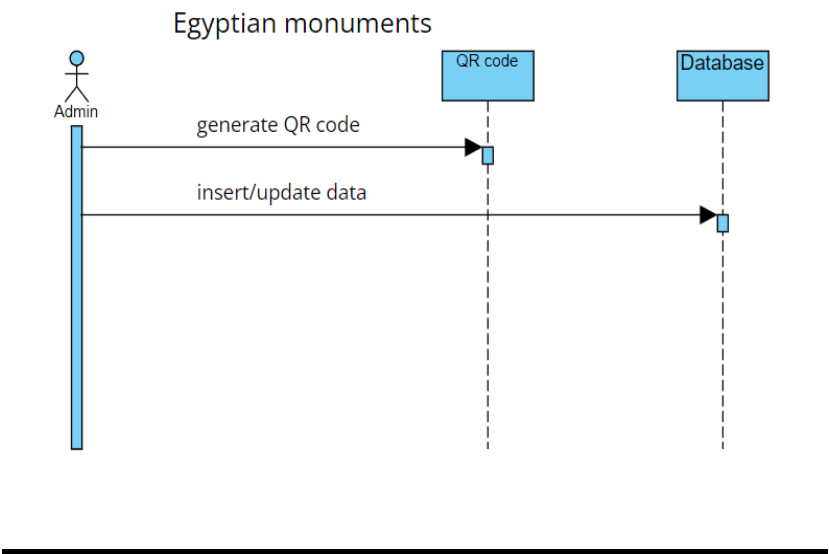
Figure 16 Sequence Diagram
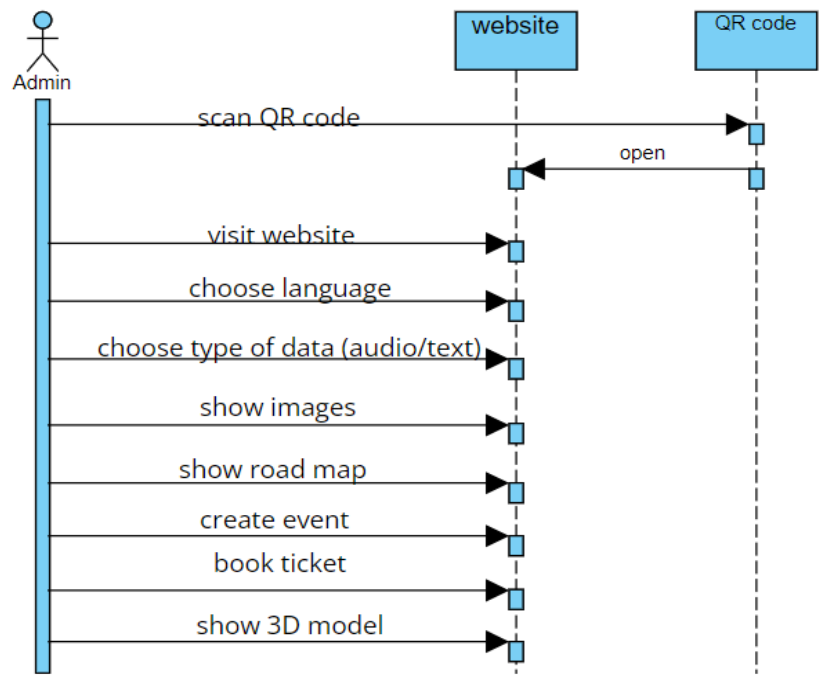
Figure 17 Sequence Diagram

3.5 System Block Diagram
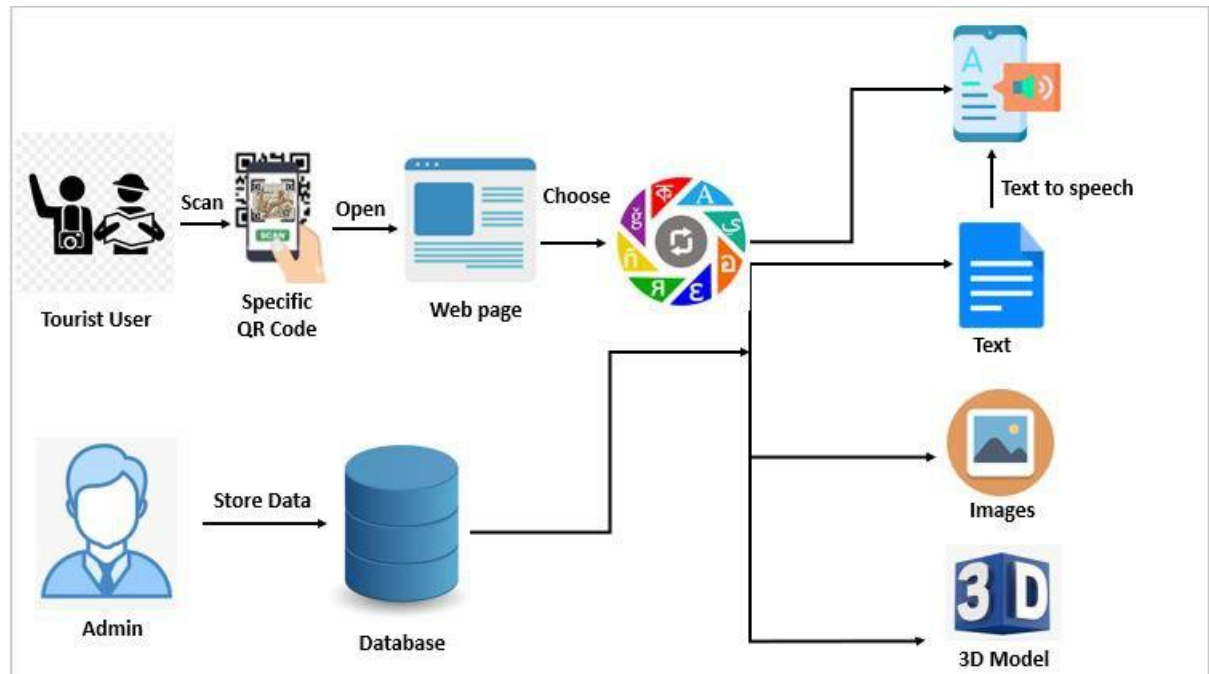
Figure 18 System Block Diagram

CHAPTER 4

DEVELOPMENT TOOLS & TECHNOLOGIES

4. Development tools & Technologies

4.1 Hardware Tools

Hardware	Description
Hardware	Description
Laptop	- Intel R Core i7-7200U CPU - RAM: 8 GB - OS: WINDOWS10 - GPU: NIVIDIA Geforce RTX 3050 - Used to develop the application.
Smart Mobile phone	- Android smart phone or IOS iPhone running. - Used to run the website - Used to scan QR code.
Portable USB drive	Used to store reports and projects.

4.2 Software Tools

4.2.1 Tools and IDEs

Visual Studio Code IDE

Visual Studio Code (famously known as **VS Code**) is a free open-source text editor by Microsoft. VS Code is available for Windows, Linux, and macOS. Although the editor is relatively lightweight, it includes some powerful features that have made VS Code one of the most popular development environment tools in recent times.

Features

VS Code supports a wide array of programming languages from Java, C++, and Python to CSS, Go, and Docker file. Moreover, VS Code allows you to add on and even create new extensions including code linters, debuggers, and cloud and web development support.

The VS Code user interface allows for a lot of interaction compared to other text editors. To simplify user experience, VS Code is divided into five main regions:

- The activity bar
- The side bar
- Editor groups
- The panel
- The status bar

The image below shows how these regions are displayed:
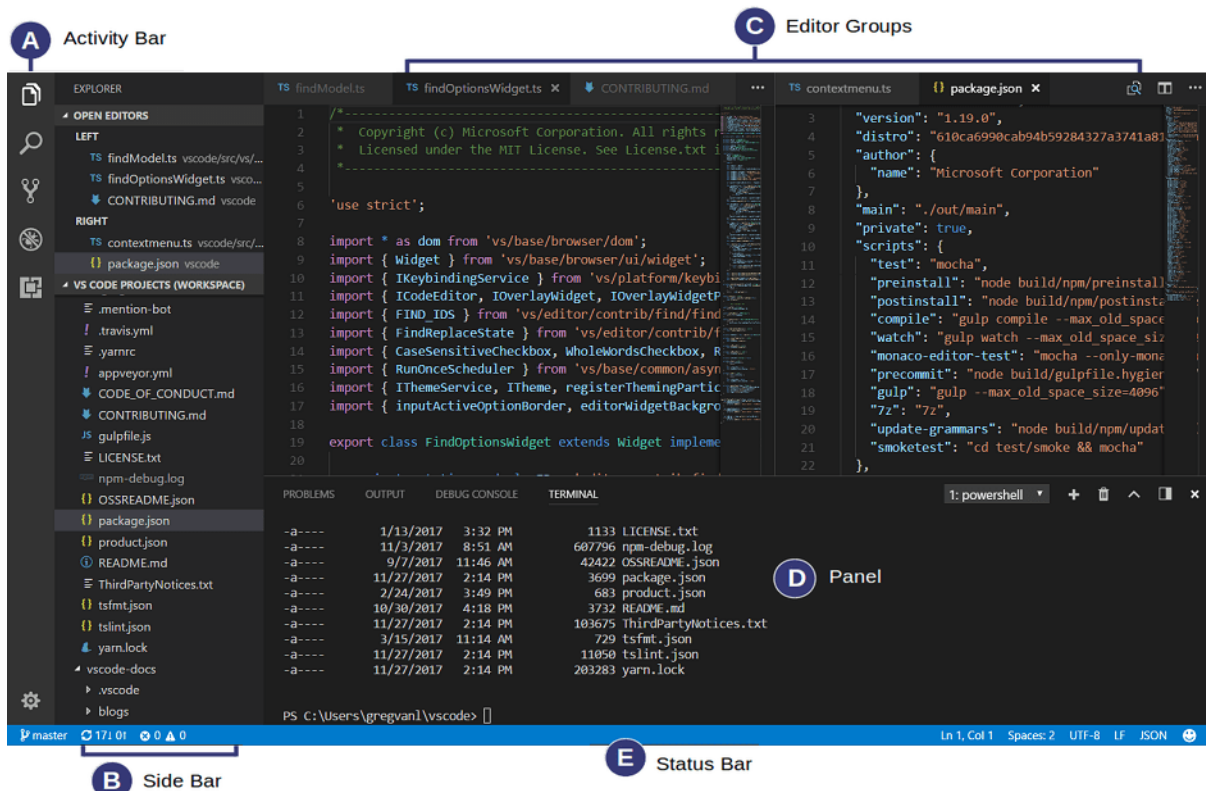
Figure 19 VS Code regions

4.2.2 Database

Node.js supports all kinds of databases no matter if it is a relational database or NoSQL database. However, NoSQL databases like MongoDb are the best fit with Node.js.

To access the database from Node.js, you first need to install drivers for the database you want to use and that depends whether we use relational or NoSQL database.

The following table lists important relational databases and respective drivers.

Relational Databases	Driver	NPM Command
MS SQL Server	mssql	npm install mssql
Oracle	oracledb	npm install oracledb
MySQL	MySQL	npm install mysql
PostgreSQL	pg	npm install pg
SQLite	node-sqlite3	npm install node-sqlite

The following table lists important NoSQL databases and respective drives.

NoSQL Databases	Driver	NPM Command
MongoDB	mongodb	npm install mongodb
Cassandra	cassandra-driver	npm install cassandra-driver
LevelDB	leveldb	npm install level levelup leveldown
RavenDB	ravendb	npm install ravendb
Neo4j	neo4j	npm install neo4j

The above database list is not limited. There are many other databases and drivers available to be used with Node.js. Also, there are many drivers available for each database. So, choose a driver carefully based on your need.

4.2.3 Programming Languages

1. HTML

HTML stands for **Hyper Text Markup Language**. It is a standard markup language for web page creation. It allows the creation and structure of sections, paragraphs, and links using HTML elements (the building blocks of a web page) such as tags and attributes.
HTML has a lot of use cases, namely:

- **Web development**. Developers use HTML code to design how a browser displays web page elements, such as text, hyperlinks, and media files.

- **Internet navigation**. Users can easily navigate and insert links between related pages and websites as HTML is heavily used to embed hyperlinks.

- **Web documentation**. HTML makes it possible to organize and format documents, similarly to Microsoft Word.

2. CSS

- **C**ascading **S**tyle **S**heets, fondly referred to as CSS, is a simple design language intended to simplify the process of making web pages presentable.

- CSS handles the look and feel part of a web page. Using CSS, you can control the color of the text, the style of fonts, the spacing between paragraphs, how columns

are sized and laid out, what background images or colors are used, layout designs, variations in display for different devices and screen sizes as well as a variety of other effects.

3. JavaScript

JavaScript is a scripting or programming language that allows you to implement complex features on web pages — every time a web page does more than just sit there and display static information for you to look at — displaying timely content updates, interactive maps, animated 2D/3D graphics, scrolling video jukeboxes, etc. — you can bet that JavaScript is probably involved. It is the third layer of the layer cake of standard web technologies, two of which (HTML and CSS).

Figure 20 React & Node. js

4. React JS

React JS is a JavaScript library used in web development to build interactive elements on websites. But we must be familiar with JavaScript or JavaScript libraries.

Why did we use React JS in our project?

React is a JavaScript library that specializes in helping developers build user interfaces, or UIs. In terms of websites and web applications, UIs are the collection of on-screen menus, search bars, buttons, and anything else someone interacts with to use a website or app.

Before React JS, developers were stuck building UIs by hand with "vanilla JavaScript" (developer speak for the raw JavaScript language on its own) or with less UI-focused React predecessors like jQuery that meant longer development times and plenty of opportunities for errors and bugs. So, in 2011, Facebook engineer Jordan Walke created React JS specifically to improve UI development.

5. Node JS

Node.js is an open-source JavaScript runtime environment that allows back-end developers to use JavaScript to create server-side applications and APIs.
It allows your front-end (i.e. React, Vue.js, even jQuery) developers to use the same programming language, JavaScript, as your backend developers. This allows for more cross-functional and agile development. Node.js usage is widespread and ongoing, and I highly recommend it for new development.

CHAPTER 5

QR CODE

5.QR code

5.1. QR definition

Figure 21 QR Code

A **QR code** (**quick response code**) is a type of <u>matrix barcode</u> (or two-dimensional barcode) invented in 1994 by the Japanese company <u>Denso Wave</u>. A barcode is a machine-readable optical label that can contain information about the item to which it is attached. In practice, QR codes often contain data for a locator, identifier, or <u>tracker</u> that points to a website or application. QR codes use four standardized encoding modes (numeric, alphanumeric, byte/binary, and <u>kanji</u>) to store data efficiently; extensions may also be used.

A normal QR code consists of black squares arranged in a square grid on a white background, including some <u>fiducial markers</u>, which can be read by an imaging device such as a camera, and processed using <u>Reed–Solomon error correction</u> until the image can be appropriately interpreted. The required data is then extracted from patterns that are present in both horizontal and vertical components of the image

5.1.1 Uses of QR :

QR codes have become common in consumer advertising. Typically, a <u>smartphone</u> is used as a QR code scanner, displaying the code and converting it to some useful form (such as a standard <u>URL</u> for a website). QR code has become a focus of advertising strategy, since it provides a way to access a brand's website more quickly than by manually entering a URL.

Some of the uses

1. Augmented reality

QR codes are used in some augmented reality systems to determine the positions of objects in 3-dimensional space.

2. Displaying multimedia contents

QR codes also used to direct users to specific multimedia content (such as videos, audios, images, documents and any type of content accessible from the web). This type of QR code is called "Multimedia QR code".

3. Mobile operating systems

QR codes can be used on various mobile device operating systems. iPhones running on iOS 11 and higher and some Android devices can natively scan QR codes without downloading an external app. The camera app is able to scan and display the kind of QR code (only on iPhone) along with the link (both on Android and iPhone). These devices support URL redirection, which allows QR codes to send metadata to existing applications on the device. Many paid or free apps are available with the ability to scan the codes and hard link to an external URL.

4. Virtual stores

QR codes have been used to establish "virtual stores", where a gallery of product information and QR codes is presented to the customer, e.g., on a train station wall. The customers scan the QR codes, and the products are delivered to their homes. This use started in South Korea, and Argentina, but is currently expanding globally. Walmart, Procter & Gamble and Woolworths have already adopted the Virtual Store concept.

5. QR code payment

QR codes can be used to store bank account information or credit card information, or they can be specifically designed to work with particular payment provider applications. There are several trial applications of QR code payments across the world. In developing countries like China, India and Bangladesh QR code payment is a very popular and convenient method of making payments. Since Alipay designed a QR code payment method in 2011, mobile payment has been quickly adopted in China. As of 2018, around 83% of all payments were made via mobile payment.

In November 2012, QR code payments were deployed on a larger scale in the Czech Republic when an open format for payment information exchange – a Short Payment Descriptor – was introduced and endorsed by the Czech Banking Association as the official local solution for QR payments. In 2013, the European Payment Council provided guidelines for the EPC QR code enabling SCT initiation within the Eurozone.

The e-payment system, Singapore Quick Response Code (SGQR), essentially merges various QR codes into one label which can be used by both parties in the payment system. This allows for various banking apps to facilitate payments between multiple customers and a merchant that displays the single QR code.

A single SDQR label contains e-payments and combines multiple payment options. Once consumers spot the SGQR label, they will be able to scan it and see which payment options the merchant accepts. The SGQR scheme is co-owned by MAS and IMDA.

6. Website login

QR codes can be used to log into websites: a QR code is shown on the login page on a computer screen, and when a registered user scans it with a verified smartphone, they will automatically be logged in. Authentication is performed by the smartphone which contacts the server. Google tested such a login method in January 2012.

5.2 QR Encoding

- Encoding

Each encoding mode is designed to create the shortest possible string of bits for the characters that are used in that mode. Each mode uses a different method for converting the input text into a string of bits.

Step 1: Choose the Error Correction Level

Before encoding the data, select an error correction level. As mentioned in the introduction, QR codes use Reed-Solomon error correction. This process creates error correction code words (bytes) based on the encoded data. A QR code reader can use these error correction bytes to determine if it did not read the data correctly, and the error correction code words can be used to correct those errors. There are four levels of error correction: L, M, Q, H. The following table lists the levels and their error correction capabilities.

Error Correction Level	Error Correction Capability
L	Recovers 7% of data
M	Recovers 15% of data
Q	Recovers 25% of data
H	Recovers 30% of data

Be aware that higher levels of error correction require more bytes, so the higher the error correction level, the larger the QR code will have to be.

Step 2: Determine the Smallest Version for the Data

The different sizes of QR codes are called versions. There are forty versions available. The smallest version is version 1, and is 21 pixels by 21 pixels in size. Version 2 is 25 pixels by 25 pixels. The largest version is version 40, and is 177 by 177 pixels in size. Each version is 4 pixels larger than the previous version.

Each version has a maximum capacity, depending on the mode in use. In addition, the error correction level restricts the capacity further. The character capacities table lists the capacities of all QR versions for a given encoding mode and error correction level.

How to Determine the Smallest Version?

At this point, count the number of characters to be encoded, and determine which is the smallest version that can contain that number of characters for the encoding mode and desired error correction level.

For example, the phrase HELLO WORLD has 11 characters. If encoding it with level Q error correction, the character capacities table says that a version 1 code using level Q error correction can contain 16 characters in alphanumeric mode, so version 1 is the smallest version that can contain this number of characters. If the phrase were longer than 16 characters, such as HELLO THERE WORLD (which is 17 characters) version 2 would be the smallest version.

Upper Limits

The highest capacity QR code is 40-L (version 40, error correction level L). Below is a table that lists the capacity of a 40-L QR code for the four encoding modes. This is the maximum possible number of characters that a single QR code can contain. Versions 40-M, 40-Q, and 40-H have lower capacity because they require more space for more error correction codewords. For a table of the capacities of all versions, please see the character capacities table.

Encoding Mode	Maximum number of characters a 40-L code can contain in that mode
Numeric	7089 characters
Alphanumeric	4296 characters
Byte	2953 characters
Kanji	1817 characters

Step 3: Add the Mode Indicator

Each encoding mode has a four-bit mode indicator that identifies it. The encoded data must start with the appropriate mode indicator that specifies the mode being used for the bits that come after it. The following table lists the mode indicators for each mode.

For example, if encoding HELLO WORLD in alphanumeric mode, the mode indicator is 0010.

Mode Name	Mode Indicator
Numeric Mode	0001
Alphanumeric Mode	0010
Byte Mode	0100
Kanji Mode	1000
ECI Mode	0111

Step 4: Add the Character Count Indicator

The character count indicator is a string of bits that represents the number of characters that are being encoded. The character count indicator must be placed

after the mode indicator. Furthermore, the character count indicator must be a certain number of bits long, depending on the QR version.

Count the number of characters in the original input text, then convert that number into binary. The length of the character count indicator depends on the encoding mode and the QR code version that will be in use. To make the binary string the appropriate length, pad it on the left with 0s.

The following lists contain the sizes of the character count indicators for each mode and version. For example, if encoding HELLO WORLD in a version 1 QR code in alphanumeric mode, the character count indicator must be 9 bits long. The character count of HELLO WORLD is 11. In binary, 11 is 1011. Pad it on the left to make it 9 bits long: 000001011. Put this after the mode indicator from step 3 to get the following bit string: 0010 000001011

- <u>Versions 1 through 9</u>

    Numeric mode: 10 bits

    Alphanumeric mode: 9 bits

    Byte mode: 8 bits

    Japanese mode: 8 bits

- <u>Versions 10 through 26</u>

  Numeric mode: 12 bits

  Alphanumeric mode: 11 bits

  Byte mode: 16

  Japanese mode: 10 bits

- <u>Versions 27 through 40</u>

  Numeric mode: 14 bits

  Alphanumeric mode: 13 bits

  Byte mode: 16 bits

  Japanese mode: 12 bits

5.3 Art-Coder

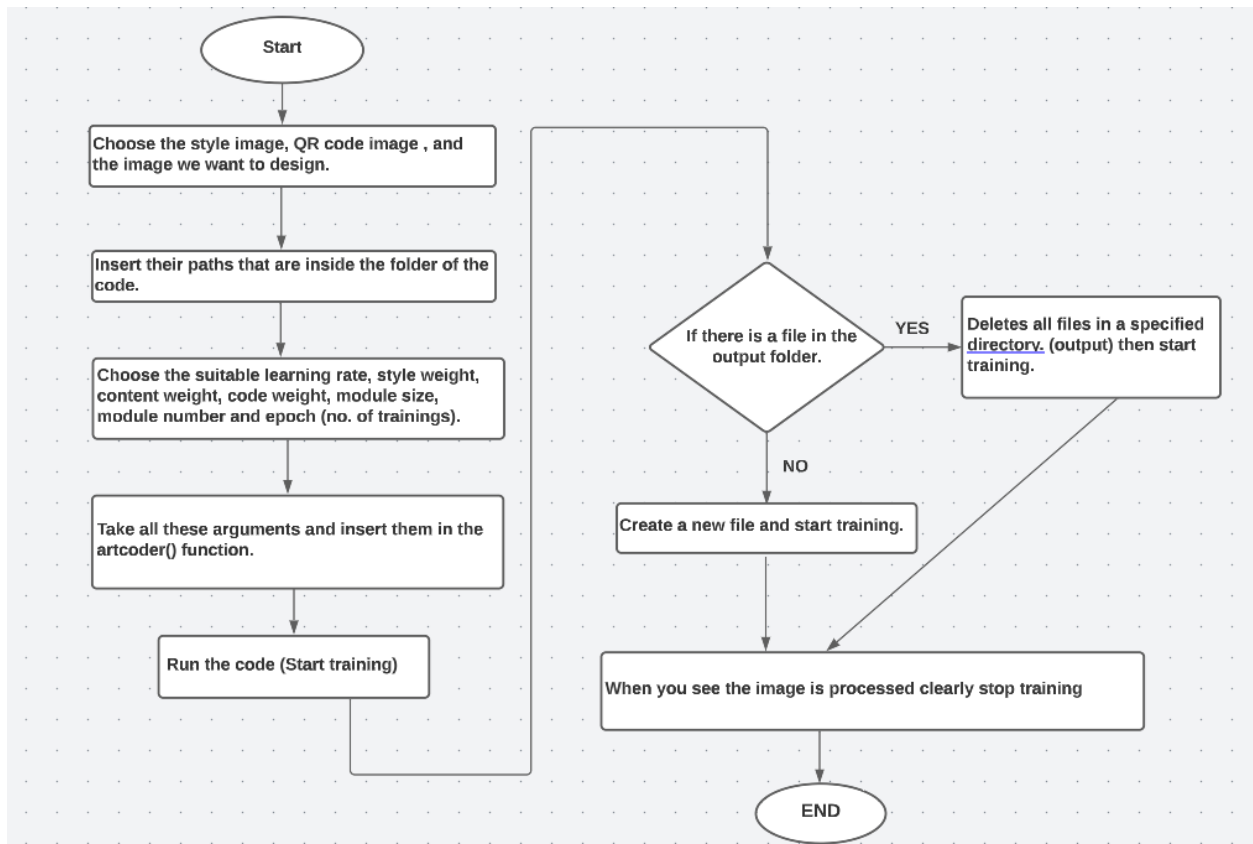Here is a flowchart to explain how the code works:

Figure 1 flowchart of ArtCoder

In our project we need to use different QR to catch the eyes, so we use algorithm to mix background to normal QR,

First step: make normal QR

There is different tools to make QR, and we choose one of them to generate QR and put on it URL.

Figure 2 normal QR code

Second step: prepare photo for statue

Figure 3 photo of statues

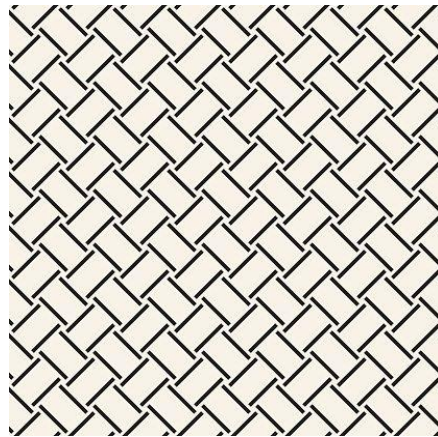### **Third step:** choose style to mix it with photo of statue

Figure 4 style photo

Fourth step: take the style , photo of status and QR code as input for the algorithm "Art-Coder " , setup the code by determine version of QR and fit code on it .and determine location of the output .

Result:

Figure 5 unique QR code

5.4 New samples of QR

Figure 6QR1

Figure 7QR2

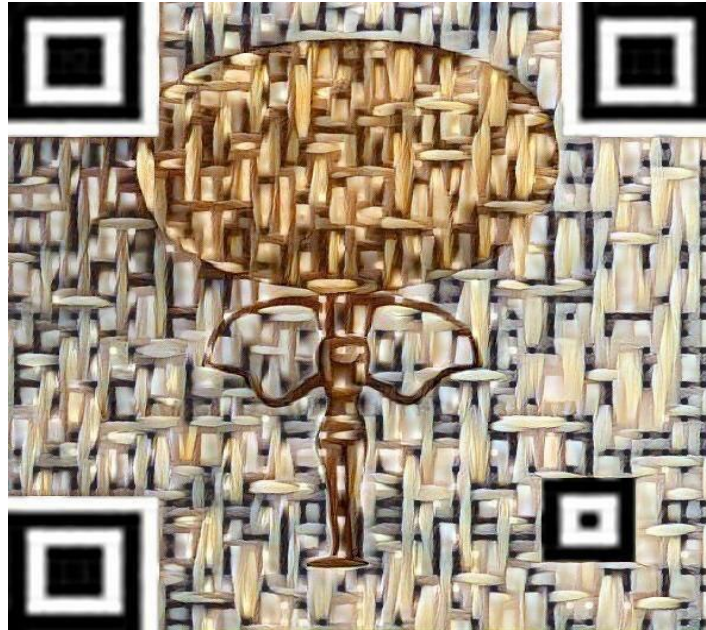
Figure 8QR3

Figure 9QR4

Figure 10QR5

Figure 11QR6

There was a problem that the images began to deform when combined with the style, and with the change of style, we got a better shapes

Figure 12unique QR code1

Figure 13 unique QR code2

Figure 14 unique QR code3

Figure 15 unique QR code4

CHAPTER 6

WEBSITE

6-Website

To design website, we pass through two stages, front end, back end, we will discuss in detail.

6.1 Front end

Front-end refers to the user interface and to anything that you see in a browser when view a website, Front-end developers design and construct the user experience elements on the web page including buttons, menus, pages, links, graphics and more. To design our front-end web server, we are using a combination of technologies such as Hypertext Mark-up Language (HTML), Cascading Style Sheet (CSS), Bootstrap, JavaScript (JS), jQuery.
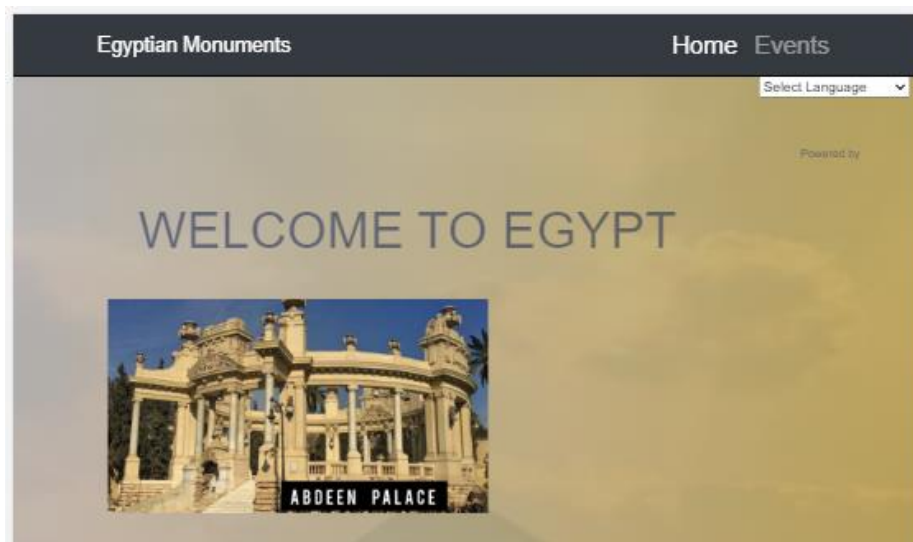
HTML

What is language html?

HTML is a markup language that defines the structure of your content. HTML consists of a series of element, which you use to enclose, or wrap, different parts of the content to make it appear a certain way or act a certain way. The enclosing tags can make a word or image hyperlink to somewhere else, can italicize words, can make the font bigger or smaller.

Example Explained to the element of HTML

1. The <html>element is the root element of an HTML page.
2. The <head>element contains meta information about the HTML page.
3. The <title> > element specifies a title for the HTML page (which is shown in the browser's title bar or in the page's tab).

4. The <body> element defines the document's body, and is a container for all the visible contents, such as headings, paragraphs, images, hyperlinks, tables, lists, etc.
5. The <h1> element defines a large heading.
6. The <p> element defines a paragraph.

In our website we are using HTML to write all text.

Figure 16 html

CSS

What is language CSS?

CSS (Cascading Style Sheets) is used to style and layout web pages for example, to alter the font, color, size, and spacing of your content, split it into multiple columns, or add animations and other decorative features. This module provides a gentle beginning to your path towards CSS mastery with the basics of how it works, what the syntax looks like, and how you can start using it to add styling

to HTML. In our web server we are using CSS to style and layout web pages and control in the font, color, and size.
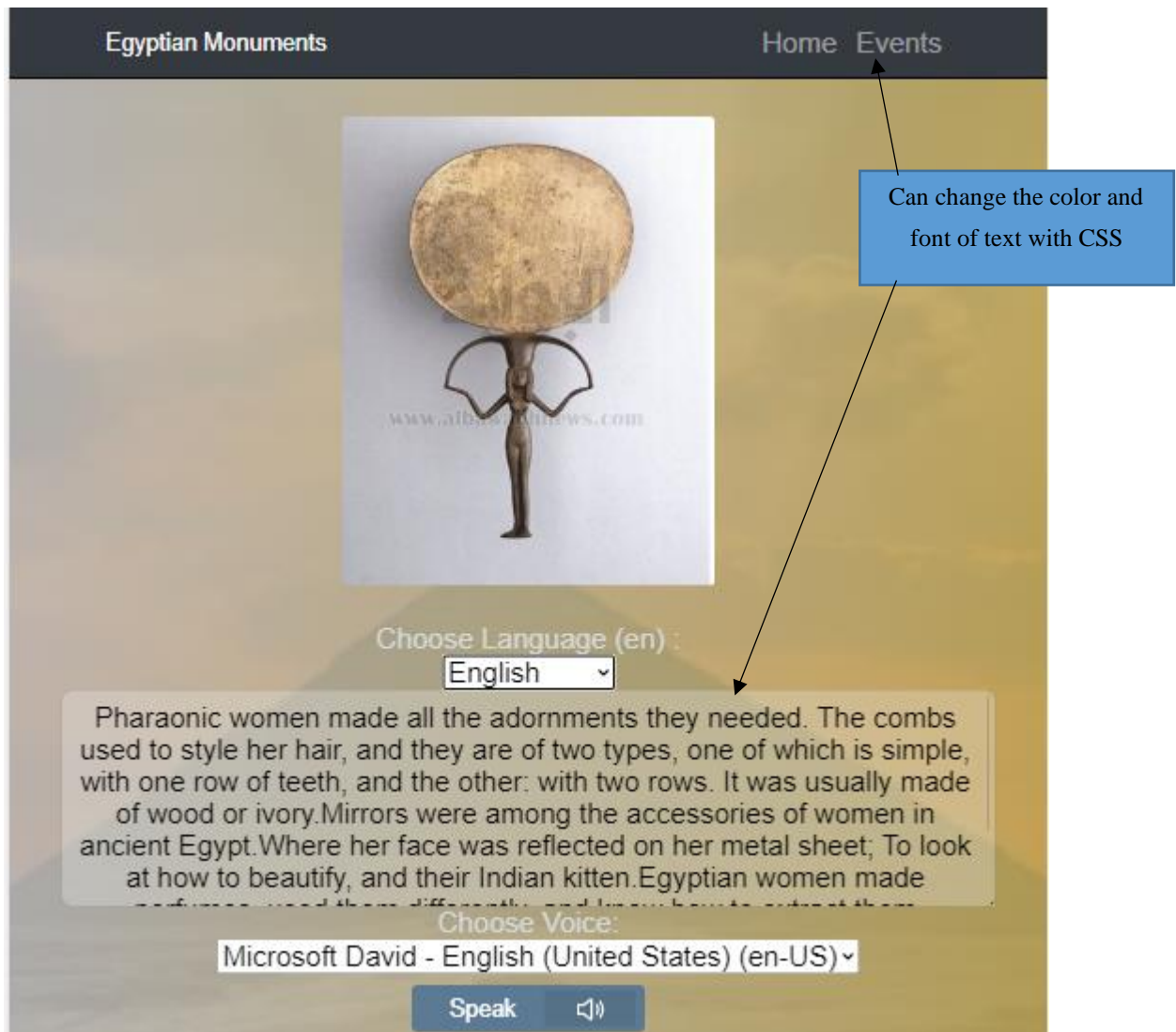

Can change the color and font of text with CSS

Figure 17 CSS

Bootstrap

What is Bootstrap?

Bootstrap is the most popular HTML, CSS, and JavaScript framework for developing a responsive and mobile friendly website, it is framework used for easier and faster web development. It includes HTML and CSS based design templates for typography, forms, buttons, tables, navigation, modals, image carousels and many others it can also use JavaScript plug-ins, it facilitates you to create responsive designs.

In our website, we use the bootstrap which have a lot of templates to build card as shown in Figure below, it was possible to use HTML and CSS to build this card, but it is more complex, and bootstrap make it easier.
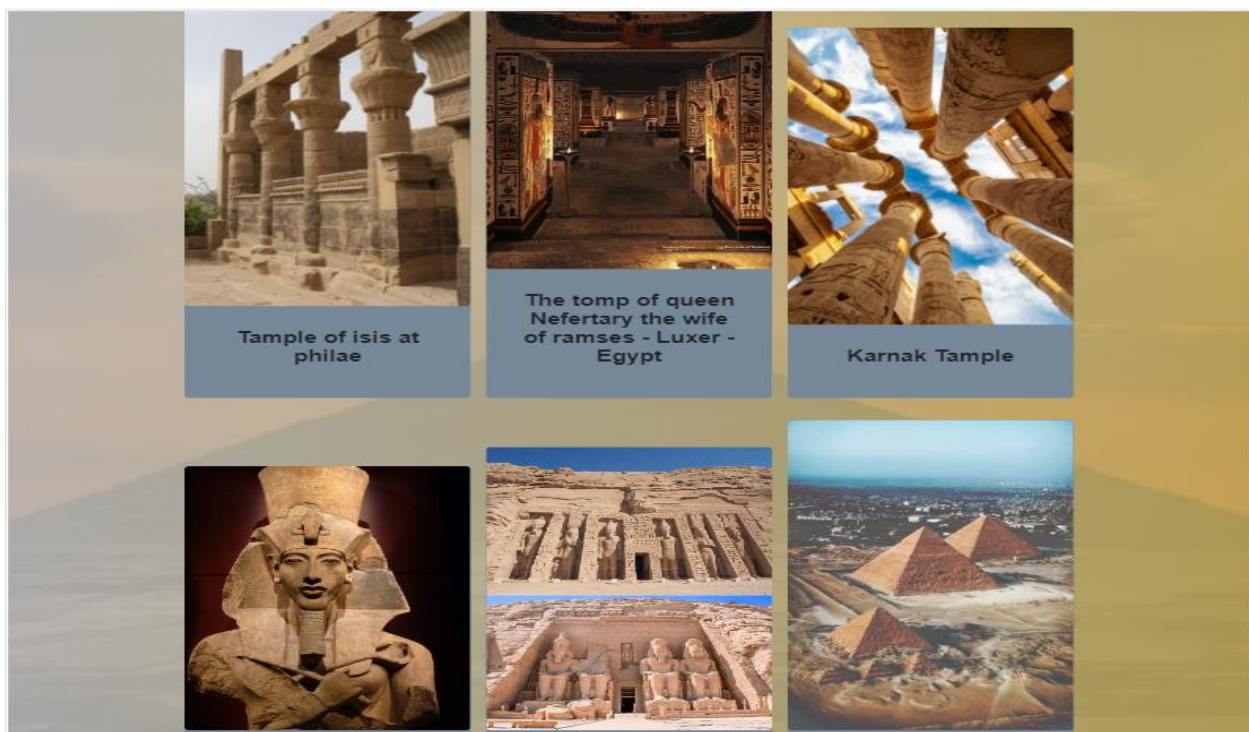

Figure 18 Cards of statues

JavaScript

What is JavaScript?

JavaScript is a lightweight, interpreted, object-oriented language with first-class functions, and is best known as the scripting language for Web pages, but it's used in many non-browser environments as well. It is a prototype-based, multi-paradigm scripting language that is dynamic, and supports object-oriented, imperative, and functional programming styles.

JavaScript runs on the client side of the web, which can be used to design or program how the web pages behave on the occurrence of an event. JavaScript is an easy to learn and powerful scripting language, widely used for controlling web page behavior.

In our web server, we use JavaScript to add photo which make the web server more beautiful, and JavaScript can make slider as shown in Figure below.
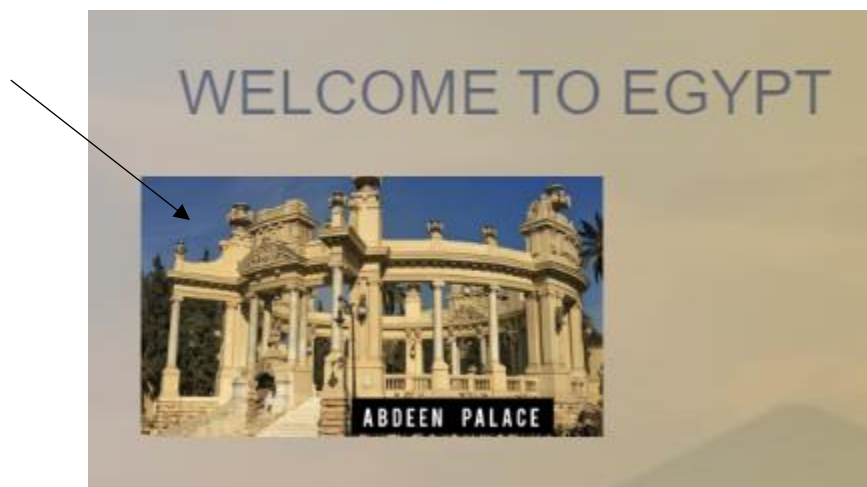
Figure 19 Slider

Details of the web server and the services that can user be able to use it.

6.2 Back end

In our project we used the Localhost server "phpMyAdmin" which is a widely used, web-based application that allows developers and administrators to manage MySQL and MariaDB databases with ease. phpMyAdmin provides a simple, user-friendly interface to carry out various database tasks, such as creating, deleting, and modifying databases, tables, and records. we accessed the phpMyAdmin console through the secure SSH tunnel you created, by browsing to http://127.0.0.1:8081/phpmyadmin. Log in to phpMyAdmin by using the following credentials: Username: root. Password: (empty).

Tables created for our project:

1) **Booking**: used to insert data of the user to book a ticket
   1.1) Username: the user must insert his name.
   1.2) Email address: for the admin can send him his QR code tickets.
   1.3) Tickets: the user inserts the number of tickets he wants to book.

2) **Events**: used to insert data to create a certain event.
   2.1) eventname: the user creates a name for the event.
   2.2) qrcodes: the number of QR codes the user wants to create.
   2.3) price: the user inserts a suitable price for the event.
   2.4) date: the user chooses the date for the event.
   2.5) time: the user chooses the suitable time for the event.
   2.6) picture: the user chooses the picture he wants to create the QR code with.
   2.7) email: inserts his email address so the admin can contact him to confirm his event and make it available on the website.

CHAPTER 7

FEATURES

7 : Features

7.1 Website Translate

When you come across a website page written in a language you don't understand, you can use the translation button on the page.

1. On the right of the web page, click Translate.
2. Click on your preferred language.
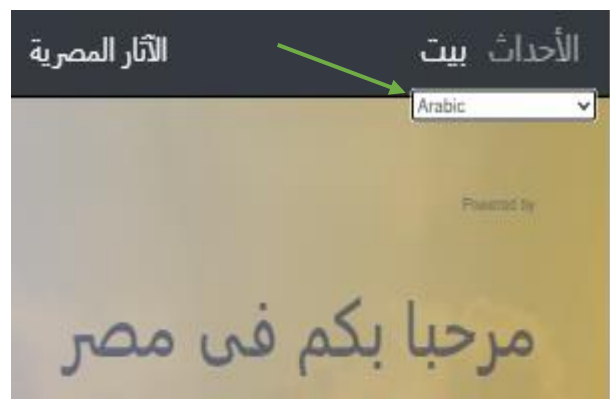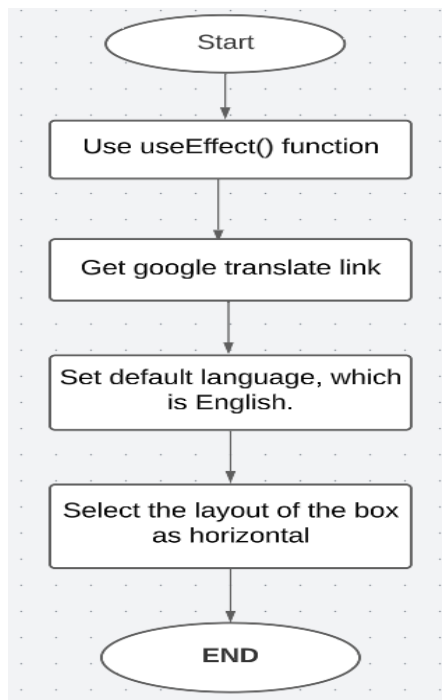3. Google will translate your current webpage.

Figure 20 translate.

7.1.1 Website Translate Flowchart

Figure 21 Home translate Flowchart

7.2 Monuments translate

We use API and axios library to build this feature.

When the user scan the QR code, will shows the his language to be able to read the data bout the monument
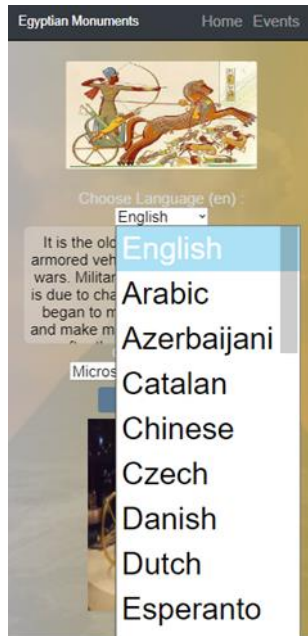

Figure 22monument translate.

7.2.1 API

7.2.1.1 What is an API

API stands for Application Programming Interface. In the context of APIs, the word Application refers to any software with a distinct function. Interface can be thought of as a contract of service between two applications. This contract defines how the two communicate with each other using requests and responses.

Their API documentation contains information on how developers are to structure those requests and responses.

7.2.1.2 How do APIs work?

API architecture is usually explained in terms of client and server. The application sending the request is called the client, and the application sending the response is called the server. So in the weather example, the bureau's weather database is the server, and the mobile app is the client.

There are four different ways that APIs can work depending on when and why they were created.

- SOAP APIs

These APIs use Simple Object Access Protocol. Client and server exchange messages using XML. This is a less flexible API that was more popular in the past.

- RPC APIs

These APIs are called Remote Procedure Calls. The client completes a function (or procedure) on the server, and the server sends the output back to the client.

- Websocket APIs

WebSocket API is another modern web API development that uses JSON objects to pass data. A WebSocket API supports two-way communication between client apps and the server. The server can send callback messages to connected clients, making it more efficient than REST API.

- REST APIs

These are the most popular and flexible APIs found on the web today. The client sends requests to the server as data. The server uses this client input to start internal functions and returns output data back to the client. Let's look at REST APIs in more detail below.

7.2.1.3 What is an API endpoint and why is it important ?

API endpoints are the final touchpoints in the API communication system. These include server URLs, services, and other specific digital locations from where information is sent and received between systems. API endpoints are critical to enterprises for two main reasons:

1. Security

API endpoints make the system vulnerable to attack. API monitoring is crucial for preventing misuse.

2. Performance

API endpoints, especially high traffic ones, can cause bottlenecks and affect system performance.

7.2.1 Axios Library

Axios is a Javascript library used to make HTTP requests from node.js or XMLHttpRequests from the browser that also supports the ES6 Promise API.
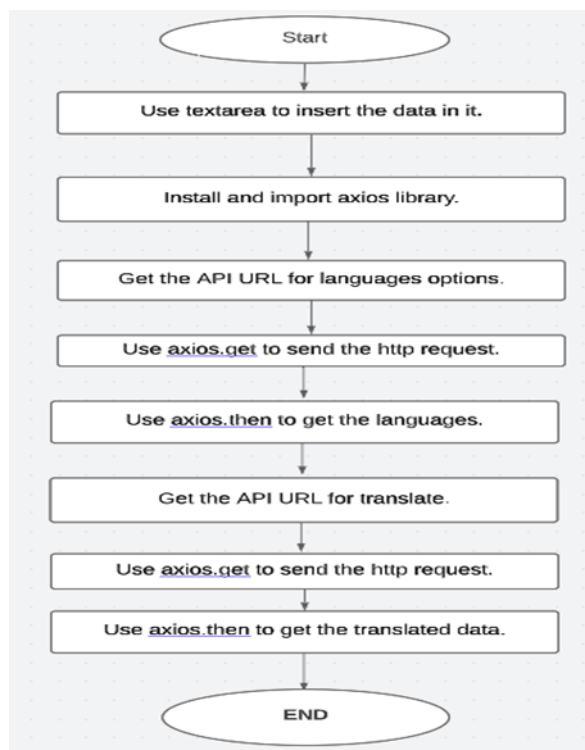
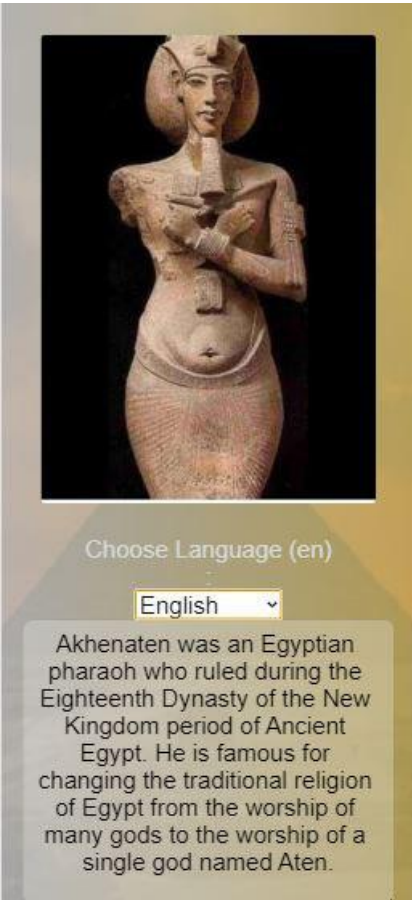- Flowchart

Figure 23 Axios library flowchart

Figure 24 Translate to English

Figure 25 Translate to French

7.2 Text to speech

Text to Speech in Multiple Languages

1. Choose a language.
2. Choose a voice. (Some languages only have one choice.)
3. Click the Speak button

Figure 26 Text to Speech

7.2.1 How does Text-to-speech work

As you might imagine, teaching a machine to speak is no easy task.

There are two main steps involved in turning text into speech:
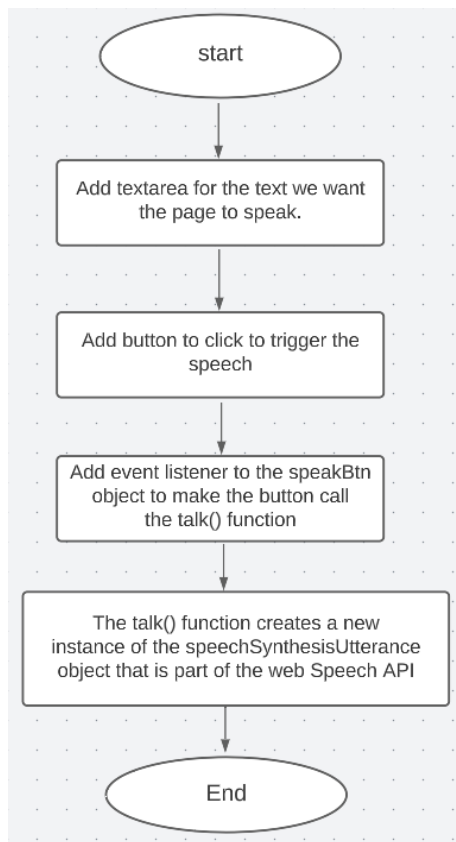
- Step one (Speak function)

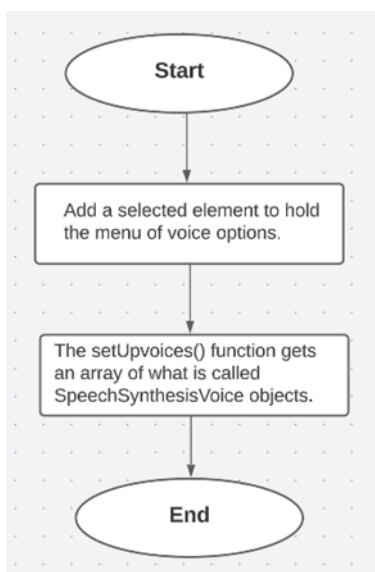*Figure 27 speak function.*

- Step Two (Menu of International voices)

Figure 28 international voices

7.3 Media screen

7.3.1 What is a Media Query?

Media query is a CSS technique introduced in CSS3.It uses the @media rule to include a block of CSS properties only if a certain condition is true.

- **Add a Breakpoint**

we made a web page with rows and columns, and it was responsive, but it did not look good on a small screen.
Media queries can help with that. We can add a breakpoint where certain parts of the design will behave differently on each side of the breakpoint.

- **Always Design for Mobile First**

Mobile First means designing for mobile before designing for desktop or any other device (This will make the page display faster on smaller devices).This means that we must make some changes in our CSS. Instead of changing styles when the width gets smaller than 768px, we should change the design when the width gets larger than 768px.
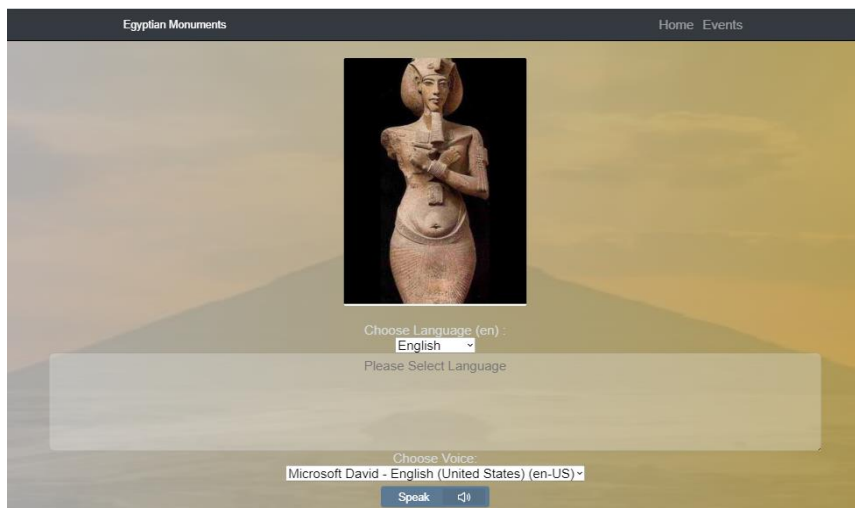
Use a media query to add a breakpoint at 768px.

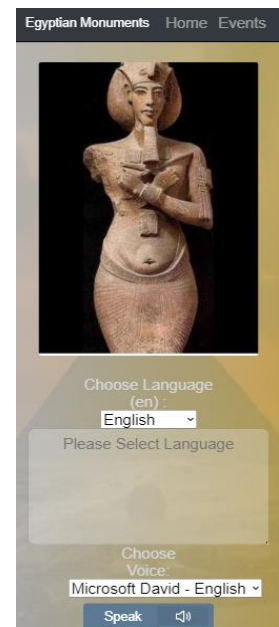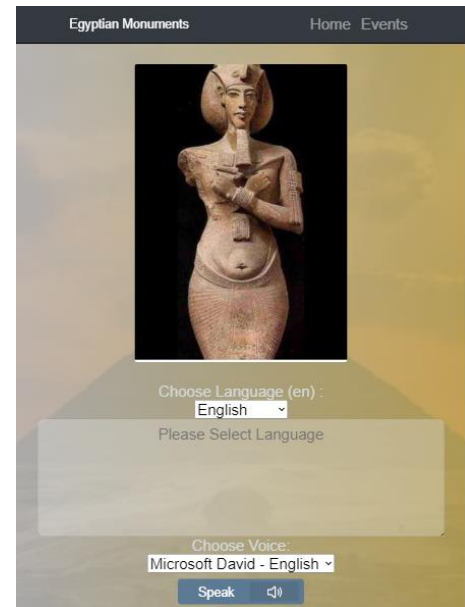*Figure29 Desktop screen (min-width: 768px)*

Figure 30mobile screen

- **Another Breakpoint**

You can add as many breakpoints as you like. We will also insert a breakpoint between tablets and mobile phones. We do this by adding one more media query (at 600px), and a set of new classes for devices larger than 600px (but smaller than 768px)

Figure 31 Tablet screen (min-width: 600px)

7.4 3D model for statues

We use three.js library to build this feature.

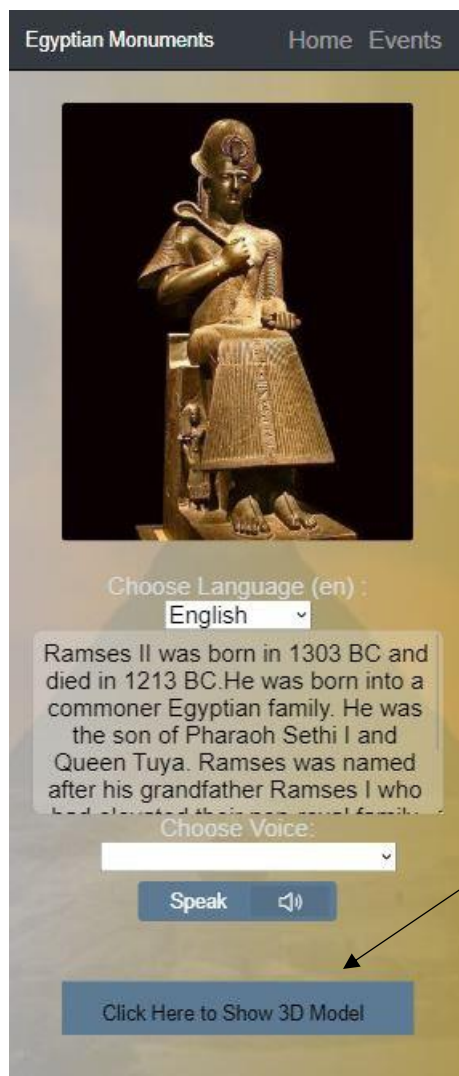This feature allow the user to see 3D model of statues of the same character of peroneus

Figure 32 3D page

7.4.1 Three.js library

Three.js is a JavaScript library that uses WebGL in an HTML5 canvas to render animations that alone are not possible to create in WebGL. This library is responsible for creating lighting effects, shadows, materials, textures, and 3D geometrical models, which are very hard to create in WebGL.

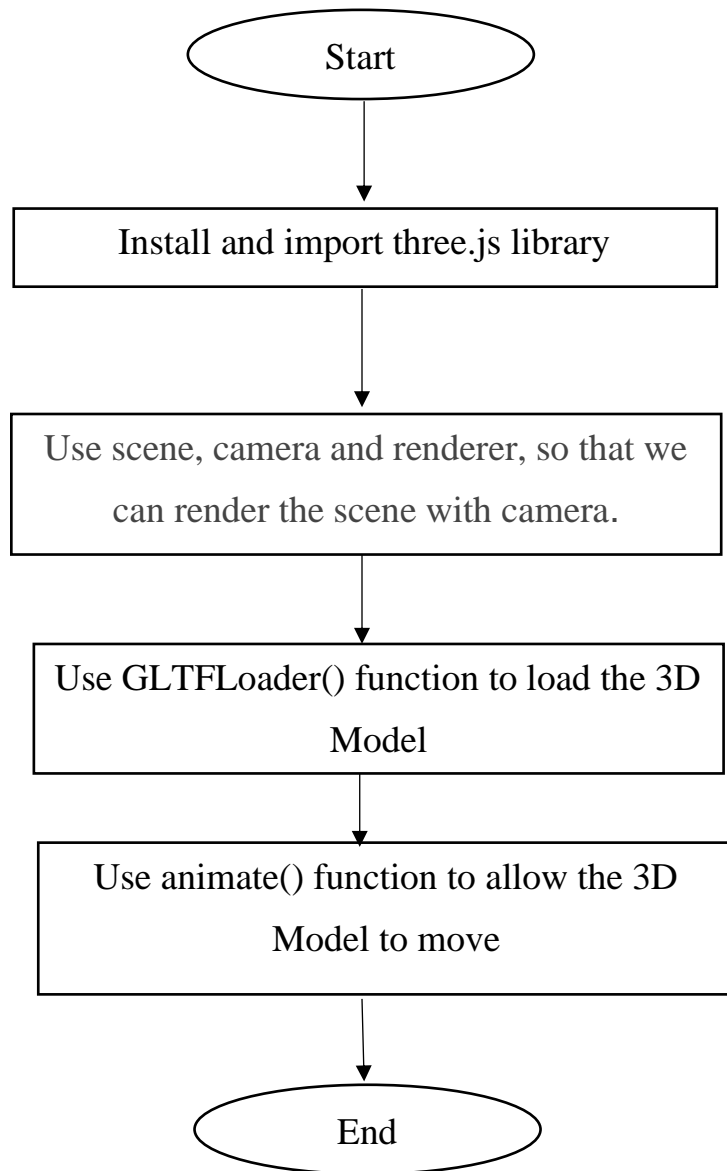Three.js includes the following features:

- Effects: Anaglyph, cross-eyed, and parallax barrier.
- Scenes: add and remove objects at run-time; fog
- Cameras: perspective and orthographic; controllers: trackball, FPS, path and more
- Animation: armatures, forward kinematics, inverse kinematics, morph, and keyframe
- Lights: ambient, direction, point, and spot lights; shadows: cast and receive
- Materials: Lambert, Phong, smooth shading, textures, and more
- Shaders: access to full OpenGL Shading Language (GLSL) capabilities: lens flare, depth pass, and extensive post-processing library
- Objects: meshes, particles, sprites, lines, ribbons, bones, and more - all with Level of detail
- Geometry: plane, cube, sphere, torus, 3D text, and more; modifiers: lathe, extrude, and tube
- Import/export: native serialization/deserialization via JSON, glTF, OBJ, USDZ, and more.
- Utilities: full set of time and 3D math functions including frustum, matrix, quaternion, UVs, and more

- Support: API documentation is under construction. A public forum and wiki is in full operation.
- Examples: Over 150 files of coding examples plus fonts, models, textures, sounds, and other support files
- Debugging: Stats.js WebGL Inspector,[1] Three.js Inspector
- Virtual and Augmented Reality via WebXR

Figure 33 3DModel

- 3D Model Flowchart

```
                    ┌─────────────┐
                    │    Start    │
                    └─────────────┘
                           │
                           ▼
        ┌──────────────────────────────────────┐
        │    Install and import three.js library │
        └──────────────────────────────────────┘
                           │
                           ▼
        ┌──────────────────────────────────────┐
        │  Use scene, camera and renderer, so that we │
        │      can render the scene with camera.  │
        └──────────────────────────────────────┘
                           │
                           ▼
        ┌──────────────────────────────────────┐
        │  Use GLTFLoader() function to load the 3D │
        │                  Model                   │
        └──────────────────────────────────────┘
                           │
                           ▼
        ┌──────────────────────────────────────┐
        │   Use animate() function to allow the 3D │
        │            Model to move                 │
        └──────────────────────────────────────┘
                           │
                           ▼
                    ┌─────────────┐
                    │     End     │
                    └─────────────┘
```
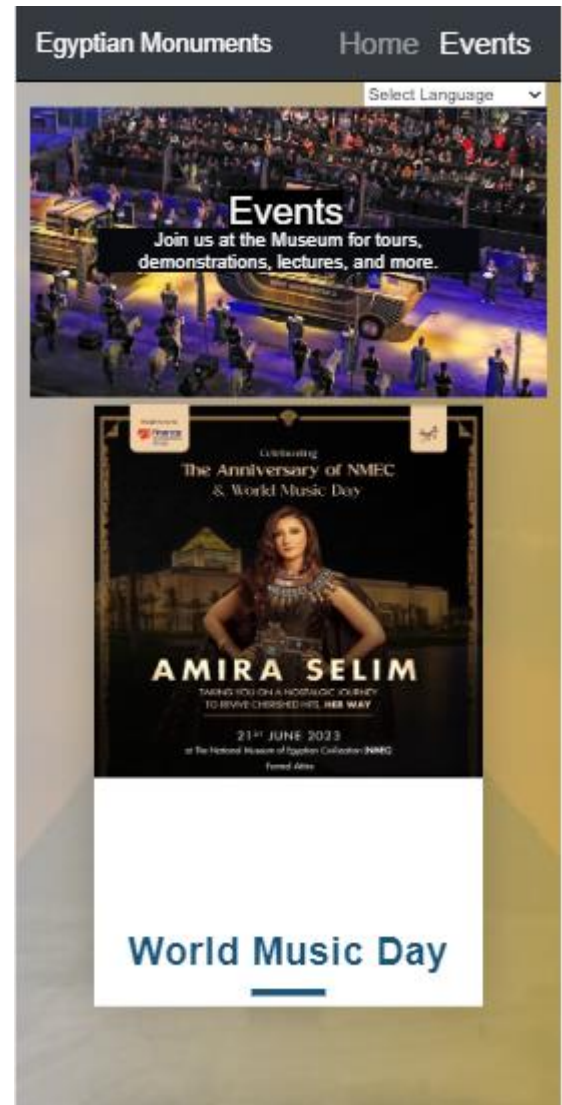
7.5 Event page

7.5.1 What is the event page?

An event page is a webpage that provides information about a specific event, such as a conference, concert, or festival. The purpose of an event page is to inform potential attendees about the event, provide details about the schedule, location, and ticketing information, and engage them to register or purchase tickets.

An event page typically includes a banner or hero image that showcases the event, a description of the event with its key features and benefits, a schedule of activities or sessions, a list of speakers or performers, a map or directions to the location, and a call to action (CTA) button or form that encourages attendees to register or purchase tickets.

Figure 34 event page

7.5.2 Event page in our website

The ability for an admin to create a unique QR code for an event is a powerful tool that can greatly streamline the ticketing process for visitors. By simply scanning the QR code with their smartphone, visitors can easily purchase tickets for the event directly from the event page, eliminating the need for physical tickets or long lines at the door. Additionally, the process of booking the event and paying for it can be made seamless and secure through the use of online payment systems, ensuring that visitors can purchase tickets quickly and easily.

Furthermore, the use of unique QR codes also provides an opportunity for individuals or organizations to create their own events and distribute tickets using their own unique QR code. This feature can encourage more people to create events and promote them more effectively, ultimately leading to more successful events and a more engaged community.

7.5.3 Step-by-Step Guide to make your event

If you want to make an event, the process can be made easy by clicking on the "Contact Us" button and filling out the information requested. This typically includes details such as your name, email address, phone number, and a brief description of the event you wish to organize. Once you have entered all the necessary information, you can click on the "Submit" button to send your data to the database. This ensures that your information is securely stored, and that the event organizers can access it and follow up with you to discuss the event details and answer any questions you may have. By simplifying the process of event planning and organization, individuals and organizations can more easily create successful events that engage and inspire their audiences.
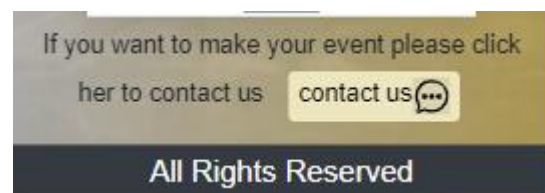

Figure 35contact us

Figure 36 create event

7.5.3 Step-by-Step Guide to book event

Booking an event is a straightforward process that can be done with just a few clicks. If you want to book an event, simply click on the "Book Now" button and the details of the event will appear in a new page. From there, you can click on the "Get Ticket" button and enter your information, such as your name, email address, and the number of tickets you want to purchase. Once you have entered all the necessary information, you can click on the "Book Now" button to complete your booking. This will reserve your spot at the event and ensure that you have the tickets you need to attend. By making the booking process simple and accessible, event organizers can encourage more people to attend their events, making them more successful and engaging for all attendees.
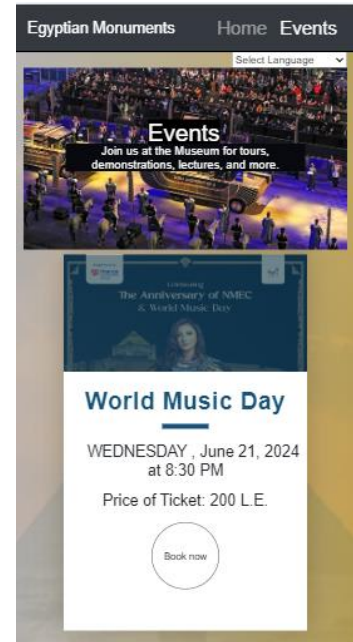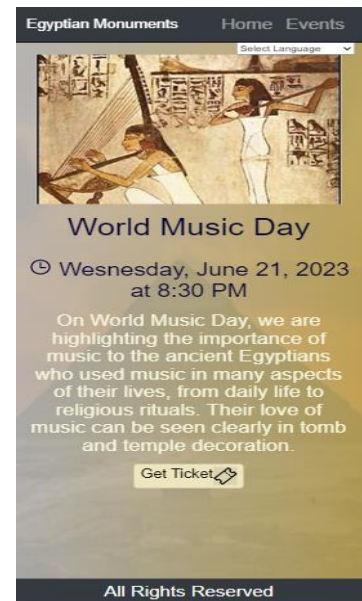

Figure 37event page2
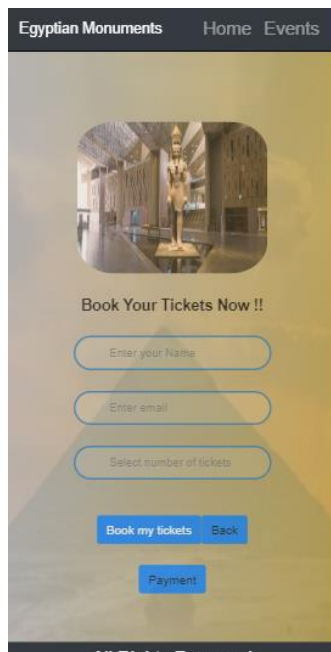

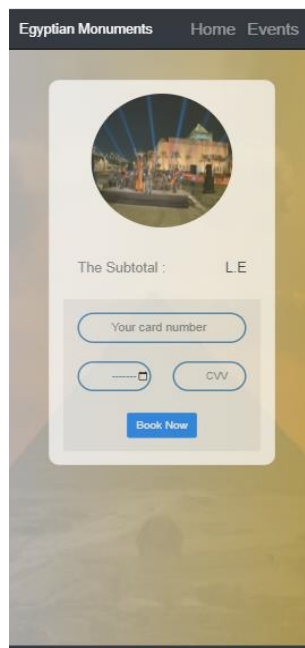*Figure 38data about the event*

Figure 39 Booking event

Figure 40 online paying

- Flowchart

Figure 41event page flowchart

# 7.6 Roadmap page

7.6.2 Map page in our website?

The map page of the museum on our website is a useful tool for visitors to navigate the main hall of the museum. The page displays a map of the hall, with detailed information about the various locations and exhibits throughout the space. When a visitor clicks on the location icon, a photo of the statue or exhibit in that location will appear, providing additional information and context for visitors. This feature can help visitors to better understand the exhibits and appreciate the museum's collection more fully. Once the visitor has finished viewing the photo, they can simply click on the close icon to return to the map and continue exploring the museum. By providing detailed information and

interactive features, the map page of the museum can enhance the visitor experience and encourage more people to visit the museum.

Figure 42 Roadmap

- Flowchart
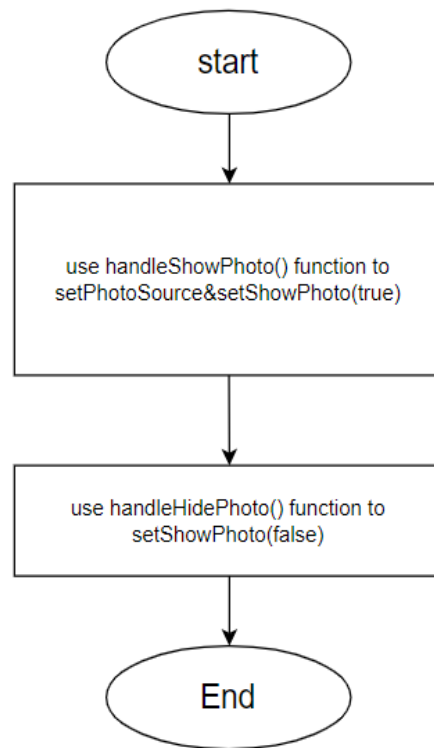
Figure 43 handle Show & Hide function

CHAPTER 8

UNIT TESTING

8.Unit Testing

A Type of testing used to test separate functions and components black box testing included equivalence partitioning and determining set boundaries. Test Cases:

Test case for creating an event:

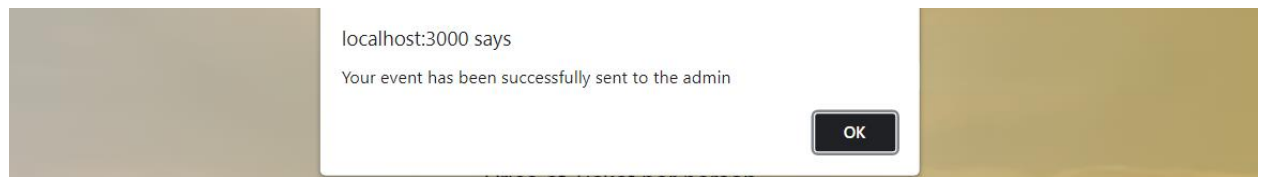| Test Case Number	Input Data	Expected Output
TC #1	Valid Data	The event will be saved and sent to the admin successfully.
TC #2	Invalid number of QR codes.	The textbox won't accept any input except numbers.
TC #3	Invalid email address	The textbox must have an "@" sign with a suitable email existing.
TC #4	Invalid image extension	The image must have a suitable extension.

Figure 65 event creation conformation

Test case for booking an event:

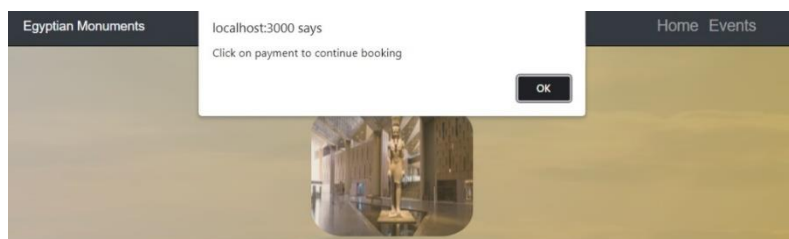| Test Case Number	Input Data	Expected Output
TC #1	Valid Data	The data will be saved and ready for the payment page.
TC #2	Invalid email address	The textbox must have an "@" sign with a suitable email existing.
TC #3	Invalid number of tickets	The number of tickets exceeds the number of tickets existing in the event.

Figure 66 Booking

Test case for payment for booking tickets:

Test Case Number	Input Data	Expected Output
TC #1	Valid Data	The data will be saved and the ticket will be booked.
TC #2	Invalid card number	The textbox won't accept any input except numbers.
TC #3	Invalid cvv	The textbox won't accept numbers more than 4.

Egyptian Monuments

localhost:3000 says
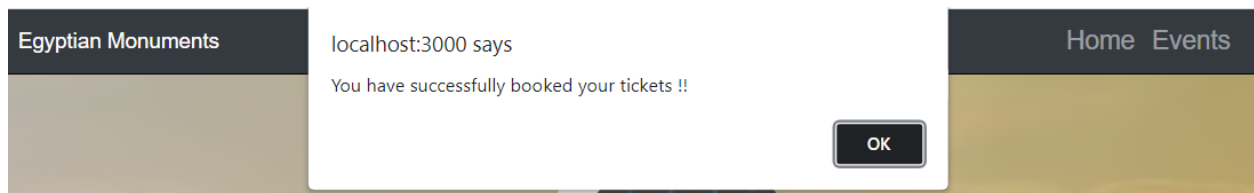
You have successfully booked your tickets !!

OK

Home Events

Figure 67 Book Confirmation

CHAPTER 9

FUTURE WORK & CONCLUSION

9 Future Work & Conclusion

9.1 Future Work

- Make dashboard panel for admin.
- Create more QR codes.
- Connect the database with the payment page for the user to book tickets.

9.2 Conclusion

In this project we serve the tourists and the tour guide, we built a unique QR code for each monument that the tourist will scan it and it open a page from a website we developed it by using react and node,js that have a text about the monument that the user scan its QR code, in this page the tourist can choose its language to understand the data, the tourist also can listen to the text by clicking on the "speak" button, in this page also there is multiple image about the monument.

Some monument of pharaohs have more than one statues, so that we design a 3D model for the statues of the same monument, this 3D model will appear when the tourist clicks on "click here to open 3D model" link.

In this website, we created an event page that allow the user to create an event, also the user can book a ticket easily online and the website will send his ticket automatically to his email.

References

- (PDF) QR CODES IMPLEMENTATION IN MUSEUM EXHIBITIONS (researchgate.net)

- http://www.dgt.uns.ac.rs/turizam/arhiva/vol_1804_2.pdf

- https://www.qrcodechimp.com/qr-codes-for-museums-and-exhibitions/

- https://cuseum.com/blog/life-death-of-qr-codes-in-museums

- https://books.google.com.eg/books?id=RRLmDwAAQBAJ&printsec=frontcover&dq=reactjs+pdf&hl=en&sa=X&ved=2ahUKEwjO8c6s3ez7AhWlTaQEHfQnC5IQ6AF6BAgFEAI#v=onepage&q&f=false

- https://books.google.com.eg/books?id=2w7_BOl1eL8C&q=html+pdf+book&dq=html+pdf+book&hl=en&sa=X&ved=2ahUKEwiFw4uK3-z7AhXnQaQEHa6HBqsQ6AF6BAgEEAI

- Polyglot: Text-To-Speech in Multiple Languages (codepen.io)

- https://stackblitz.com/edit/react-ts-yvxhjt?file=index.html,index.tsx,style.css,Hello.tsx

- https://transform.tools/typescript-to-javascript

- https://threejs.org/