
HTP
Web-based GIS for
Tourism in Hadhramaut
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1. INTRODUCTION

1.1. Background

Tourism is considered one of the most ancient people's occupations. Earlier people need to travel in order to survive. They had to move from one place to another, they searched for food, for place to live at, escaped from natural disasters, etc. Later traveling acquired another value.

Nowadays tourism is an important resource in any country in the world. It is one of important factors of the economy. Countries are racing into improving their tourism industries through all its shapes and faces. Some countries are even going to tourism education as a start, and then continue to include all other related aspects and supporting means such as transportation, food, hotel and lodging, natural parks, shopping …etc.

Hadhramaut is one of the most famous tourist destinations in the world; it is located in the Middle East, occupying the southwestern to southern end of the Arabian Peninsula. It is bordered by Saudi Arabia to the north, the Alarab Sea to the south, Shabwah to the west, and Al-mahrah to the east. It has a land area of 193,032 square kilometers and a population of approximately 3 million (2010). It is consists of 30 cities, and its capital is Mukalla. It is blessed with a fortune of historical sites and places all around it (Shibam City, Dawan Valley, Khailah, Sheher, Mukalla, etc), in addition to a nice unique beauty in the topography of its desert (AL-WADI), with the first skyscrapers in the world (Shibam City).

The development of tourism industry depends on visitors. The more visitors come, the more benefit is obtained. In order to increase amount of tourists, the promotion is the most important. The promotion will transfer tourism information to the tourist and make them awareness. There are many promotion ways, and Web-based GIS is a cheap and effective technology to promote tourism information for widespread of people with time constraint [1].

The Web changes everything, and GIS in not exception. Web GIS is an integration or combination between two technologies: Internet and geographic information system(s) or science (GIS). Web-based GIS has grown into a rapidly developing discipline since its inception in 1993. GIS has turned into a compelling Internet application that has prompted many people to take advantage of the web (Longley et al. 2005). The vast majority of Internet users use simple mapping or other spatially enabled applications over the Web at some point, through many are not aware of it. GIS has benefited greatly from the Internet paradigm of broad connectivity and the momentum that the Web has generated. The Web has unlocked the power of GIS, from offices laboratories. It has put GIS in the homes of millions and in the hands of billions, and made it usable across all industries, from government and business to education and research [2].

The internet has become an essential source of data for users of geographic data. Geographic data are important, as they are connected information to specific location on the earth. We may realize that geographic plays a very important role in everyday life. Many decisions we make are often influenced, determined or constrained by some aspect *of geography (Environmental Systems Research Institute, 1994).*

There are two categories for the use of Web-based GIS in tourism: public information and management. By using web-based GIS, the tourist can know geographic information about a place before they go there. They want to know where things are located, what amenities are available, what the climate is like, and be able to do site specific searches to find information. The other user is in management side. Management may be done by individual operators, a tourism group, or by local government. Management users want to query the system for where customers are coming from, their socio-economic backgrounds, and good potential locations for new tourism sites.

This project presented in this report starts from the user needs, to present the tourism object in geographic context on interactive tourist map supports planning for tourism, focusing on decision making and management using GIS technique and presenting the results on the Internet.

1.2. Objectives

The main goal of this project is to build a Web-based GIS information system that provides spatial and non-spatial data tourism information via Internet environment (Case study in Hadhramaut).

To achieve the goal of this project, several activities should be done. The first activity is design and building the tourism database. The second activity is building and developing Web-based GIS user interface to allow tourists to communicate with the whole system. The last activity is to construct the programming code to deal with Google map API.

2. LITERATURE REVIEW

2.1Geographic Information System (GIS)

The term geographic information system (GIS) is now used generically for any computer-based capability for the manipulation of geographical data. A GIS includes not only hardware and software, but also the special devices used to input maps and to create map products, together with the communication systems needed to link various elements [3]. The hardware and software functions of a GIS are as follow:

- Acquisition and verification
- Compilation
- Storage
- Updating and changing
- Management and exchange
- Manipulation
- Retrieval and presentation
- Analysis and combination

In GIS environment, there are two types of common data that should be taken into account, spatial data and non-spatial data *(United Nation 1996)*. Spatial data provides information about the feature referred to geometrical orientation, size, and relative position from other features *(United Nation 1996)*. None-spatial data is complementary information to spatial data, which provides some further information *(United Nation*

1996). A GIS is most often associated with a map view. A map, however, is only one of the following three ways you work with geographic data in a GIS.

- The Database View

  It is a unique kind of database of the world, a geographic database (geo-database). It is an Information System for Geography, Fundamentally, a GIS is based on a structured database that describes the world in geographic terms.

- The Map View

  It is a set of intelligent maps and other views that show features and feature relationships on the Earth's surface. Maps of the underlying geographic information can be constructed and used as windows into the database to support queries, analysis, and editing of the information. This is called geo-visualization.

- The Model View

  It is a set of information transformation tools that derive new geographic datasets from existing datasets.

2.2. The Related research work

2.2.1 Multimedia Tourism Information in Bakosurtanal

One project has been done to build computer software that has complete information about the tourism in East Java[1]. This project has been carried out and done by Atlas center in Bakosurtanal Indonesia. The main elements of the software were the pictures and video files that are working in Macromedia environment. The system also provides maps of tourism locations and elements but the maps were not interactive map.

This means that the maps cannot be clicked or queried which consequently led to the software to be not available to run in network environment. So the tourism information cannot be distributed easily.

2.2.2. **Web Tourism Information from East Java Tourism Department.**

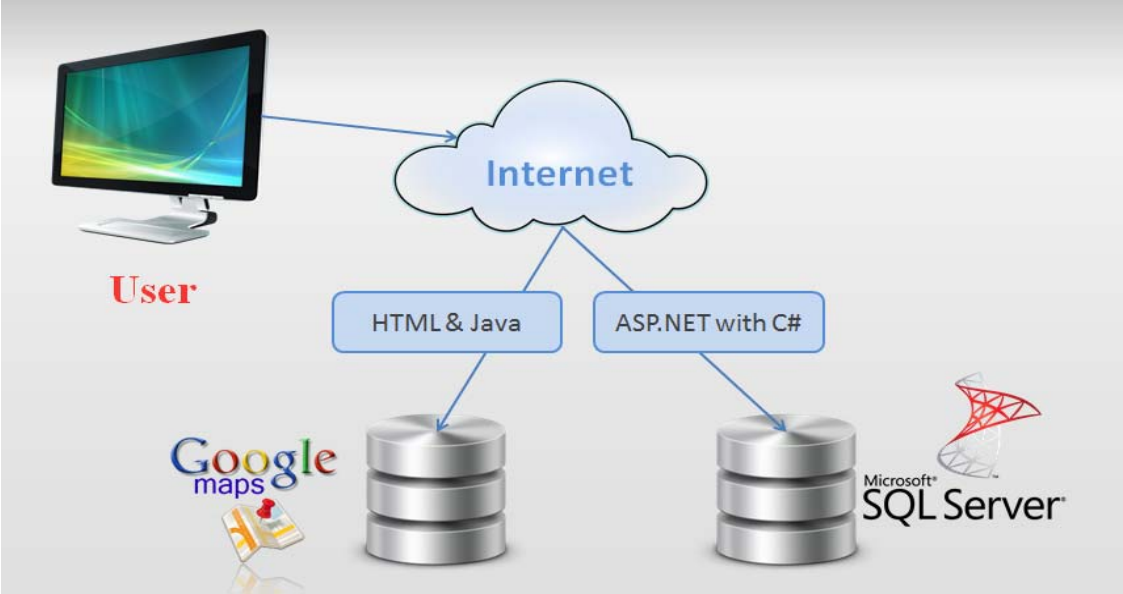
East Java Tourism department has developed a web site that provides tourism information of East Java. This web site provides tourism information in Internet environment so information can disseminate easily. But this web site is unable to show tourism information with the map of interested objects. The address of this web site is http://www.eastjava.com.

2.3. Web GIS Technology

Web GIS is a Geographic Information System distributed across a networked computer environment to integrate, communicate geographic information visually on the World Wide Web over the Internet.

2.3.1 Web-GIS Architecture

In the architectural system of Web GIS, this service is similar to the client/server architecture of the Web [2]. The geo-processing breaks down into a server-side and client-side task. A client typically is a Web browser. The server-side consists of a Web server and a Web GIS software programming. The client requests a map or some geo-processing over the Web from the remote server. The server translates the request into an internal code and invokes the GIS functions by passing on the request to the Web GIS software. The software returns the result that is reformatted for interpretation by the client browser application itself or with additional functionality from a plug-in or Java applet. The server then returns the result to the client for display, or sends data and analysis tools to the client for use on the client-side.



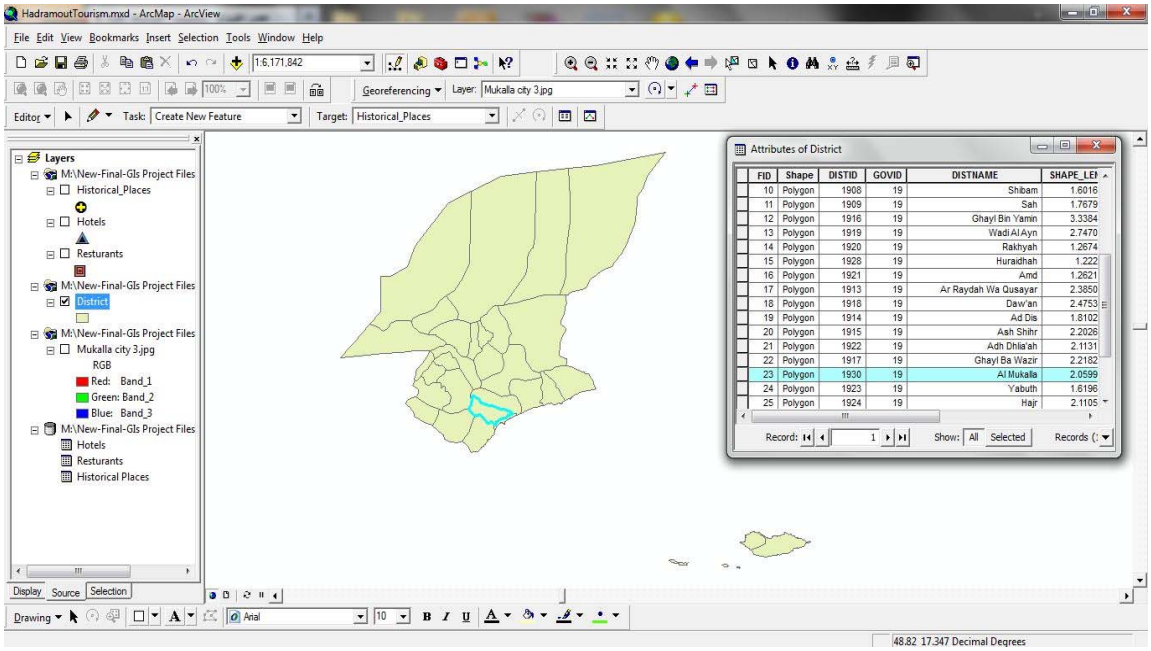
In our project the database will be one of the two options: the first option is the geo-database created by the ArcGIS or the mxd file. Since the mxd file cannot be published due the unavailability of ArcGIS server, we have used the second option that depends on Google map API services. The API code Google map will be written and linked with the ASP.net website pages. The map link will be available for every location; this code for this link will transfer the user to the map location of the Google map by using the two values of longitude and latitude.

3. RESEARCH METHODOLOGY

3.1 Time and Location of Study

This Project was started from October to December 2011 at KFUPM University. The location of study is Hadhramaut governorate – in Yemen. Hadhramaut governorate consists of 29 cities.

The location of study can be shown in figure 3.1.



There are significant number of historical Places in Hadramout governorate. Photographs of several historical and natural examples also can be seen in the figure 3.2.

3.2 Project Development Cycle

This Project was analyzed and designed based on Web-GIS Development cycles.

The Web GIS development cycle is described in terms of three major activities starting with the requirement analysis.

3.2.1 Requirement analysis phase

In this phase, we have started with analyzing the requirement for the project starting from identify the objective of the project and determining the requirement for the project. The required softwares need to build the project are identified in this phase. The the software that are used in order to build the project are list below:

1- The ArcGis Software

2- SQL server application for creating the database

3- ASP.Net for programming and developing the website

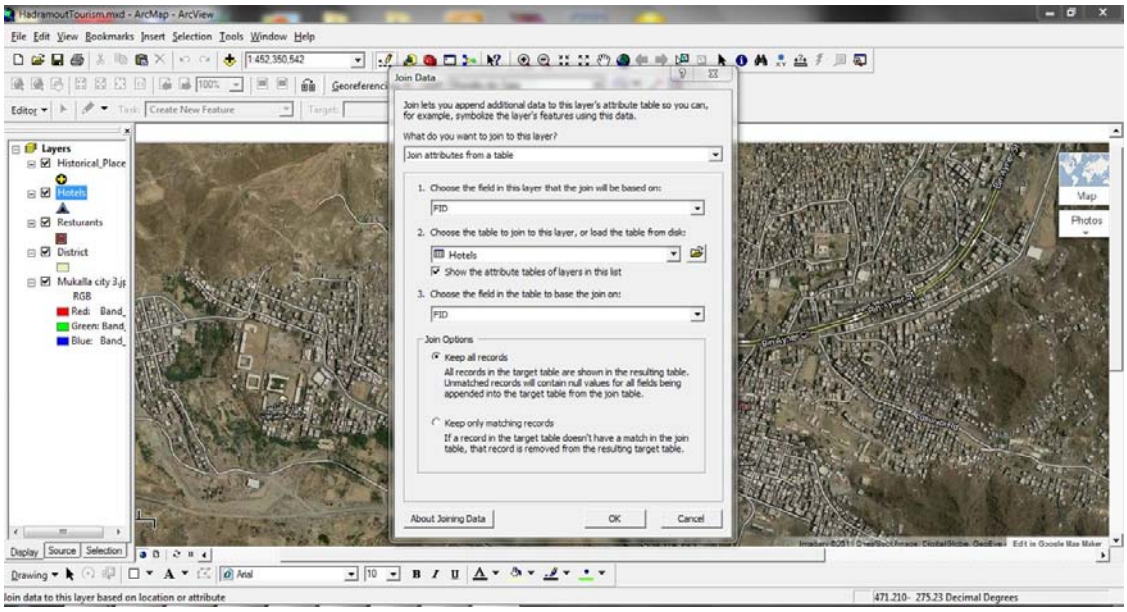
4- Google map saver (GMS) for creating maps for cities[

Data collection is also started in this phase. We have obtained for the shape file for hadramout governorate form http://www.mophp-ye.org[7] . The available data is just the shape file for hadramout governorate. As we need to use a map for the hadramout cititis that is not available, we have used one software provided by google maps called GMS(google map saver)[6] . By using GMS , we have obtained the maps for the all cities for hadramout in form of jpg file which is later need for adjusting the coordinates by applying the geo-referencing feature available in the Arcgis prgrams .

3.2.2 Designing Database and the geo-database

In this phase, we have starting to build or database for the all information that we collected about the cities , historical places , airports….etc. the data was available in paper format provided by Hadramut website committee[4]. We have converted the available data from the paper format to database format by using SQL server database. See Appendix 2, 3.

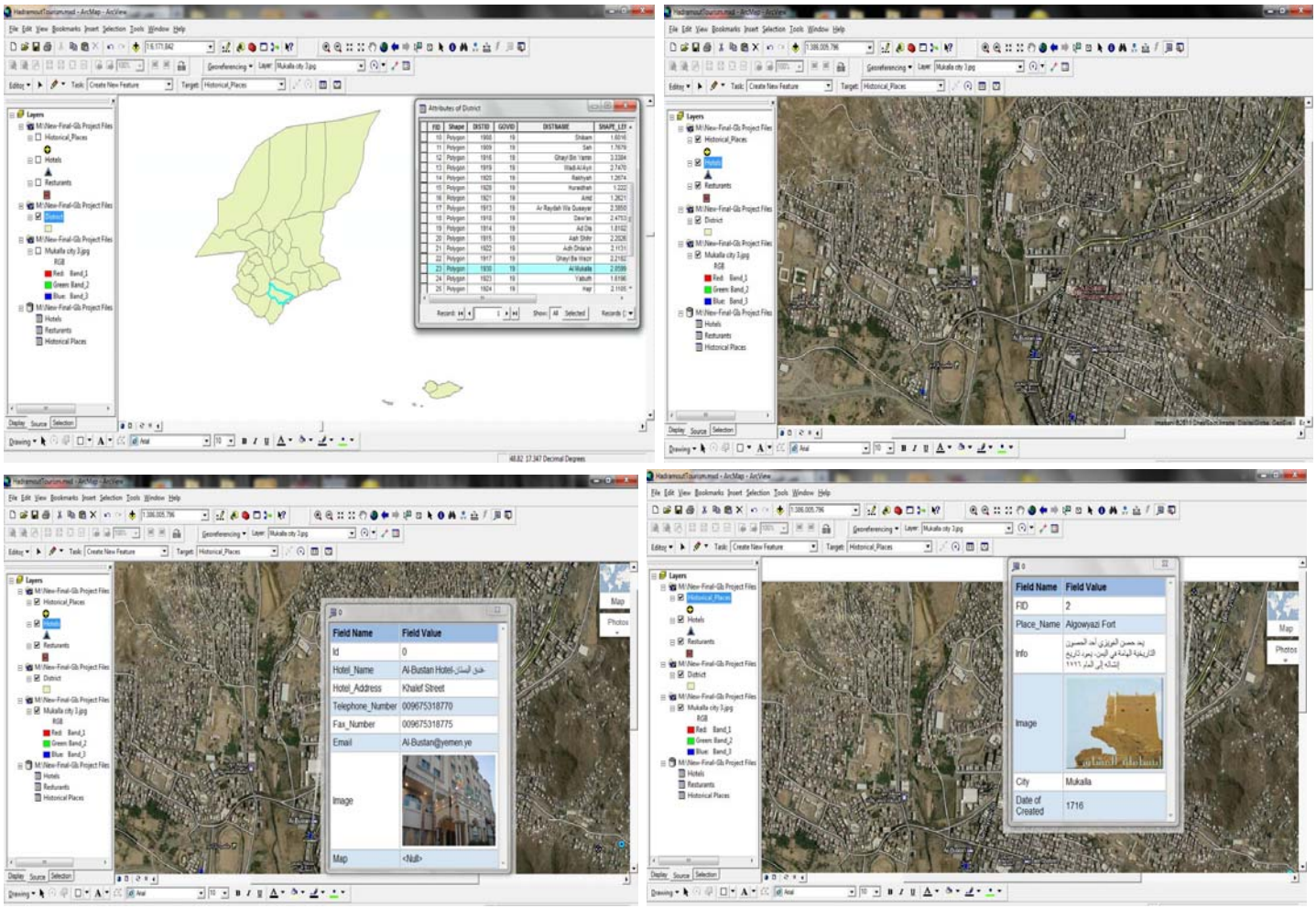
The created database has then used in ArcGIS to build the Geodatabase for the mxd file layers. Each layer in the ArcGIS has connected with the created Database through the Join features.



3.2.3 Implementation

In this phase, we have starting to design the website by using the ASP.net programing language. After building the websites, the created database is connected with the website to provide the information to the website. The information provides by the created website is consists of the information of the cities in hadramout, the hotels, historical places, car rentals, restaurants that are available in each city. We have added some programmatic features on the website such as ability to make a search location such as a hotel, historical place etc. The user can print the results in word or excel file format. Adding some records is also available in the website with condition that the user has administrator authority.

In the same time, the Arcgis mxd file has been created for each the city containing the layers such as the hotels, historical places and restaurants. The layers in the mxd file has created using the ArcCatalog . Each layer has joint with the database created using the join table options. Figure 3.2.3 shows the snapshot from the mxd file



3.2.4 Project testing

In the phase of project testing , that the customer come up with their own test Data input to get acceptable results and scenarios to rigorously test the system prior to deployment. The project has been testing first by inputting new data for cities and its related tourism information (not all data has entered during the database creating phase).

The website has working without any problem when we entering the data for more two cities. The search and getting maps also working perfectly. One advantage of the system is the scalability sine the database used is the SQL server database with ASP.net. The performance of the system is working good sine its working as a localhost server.

4. CONCLUSION AND RECOMMENDATION

4.1 Conclusion

Web-based GIS information system for tourism was designed and implemented with the real tourism data in Hadramout City . This system has been tested in Intranet environment but due some limitations for the Arcgis server and the cost of hosting a website and site Domain issues , the website is not tested in the internet environment. Our plan is to make the this project to be hosted in the official website for Hadramout (www.**hadhramaut**.info). The mxd file that also created in the project can be published if the Arcgic server is available . Since the website is created using ASP.net and SQL server , the performance of the system will be acceptable when it also runs in high speed Internet connection.

There are some important points related to this project:

- This system has been designed and implemented by integrating two technologies: Internet and Google maps. The key point for getting the map in the project is by identify the Longitude and Latitude for each location stored in the geodatabase. After the Longitude and Latitude for the certain location is obtained , the html code that we created links the website with the Google map with the certain location. For the GIS , as we mentioned the mxd file is created but it can't be published since it need for arcgis to be

working. GIS is good tool for dealing with spatial data. Therefore, by combining Internet technology and GIS technology to construct a new system called Web-based GIS, that can provides both services in spatial information and non-spatial information.

- The tourism map is generated by html code using Longitude and Latitude values . this code will create interactive interface map since the used map is the Google map itself .

When people serve and publish data on the Internet, other people can access and browse these data simultaneously. Because of this, GIS on the Web is an in precious method for reaching a vast audience. It offers to the tourist more exact and more meaningful information to meet their quality claims.

4.2. Recommendation

Several activities should be done for further work:

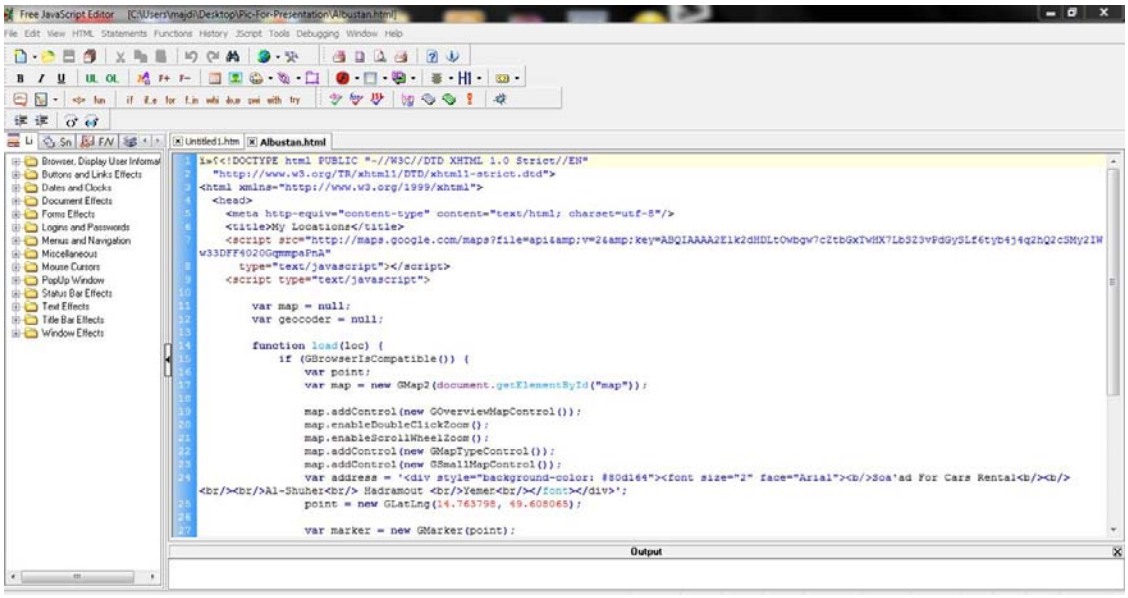
- To improve the completing of tourism data and locations for the all cities of hadramout. (all data are available in paper format and need to entering in the database.

- To improve the Publishing of GIS mxd layers by using Arcgis server and connected with the website instead of using the html code for linking with the google earth to build GIS-Web based project.

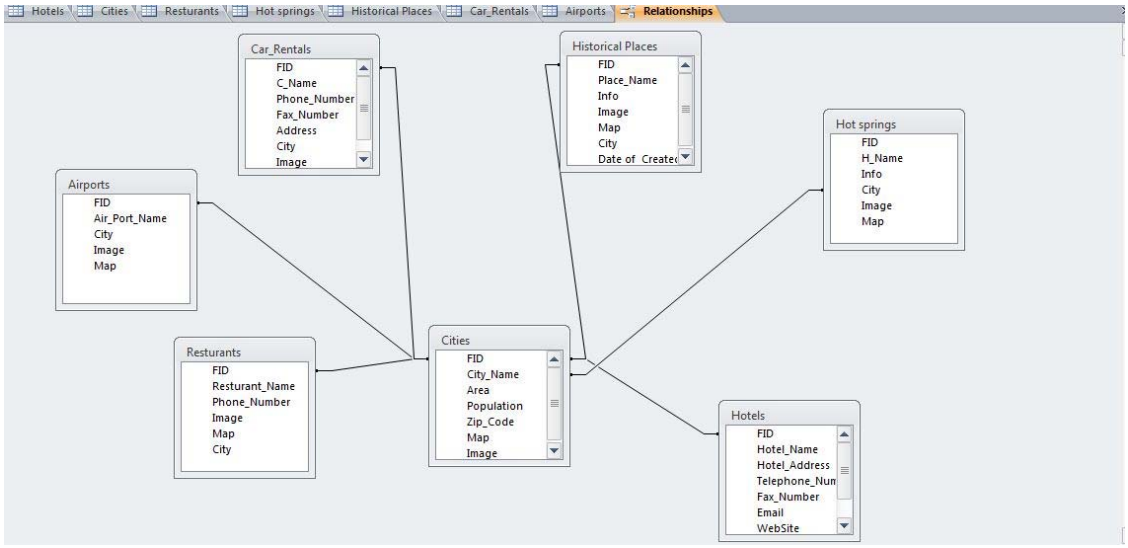
- To develop the capability of system, the features that allow updating the data without going to code level in programming code must be provided in system.

APPENDIX

Appendix 1: Code Structure for Google map API



Appendix 2: Structure of database tables with relationship

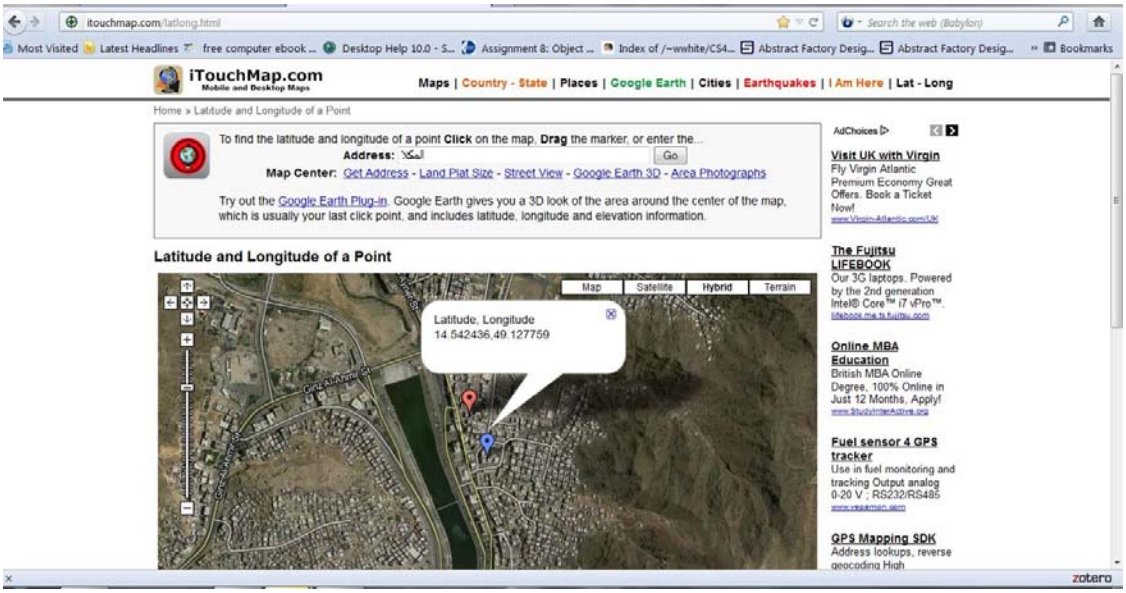


Appendix 3: Content of table Hotel for Mukalla city

Hotels | Cities | Resturants | Hot springs | Historical Places | Car_Rentals | Airports

FID	Hotel_Name	Hotel_Address	Telephone_N	Fax_Number	Email	WebSite	Image	City
4	Al-Bustan Hotel-البستان	Khalef Street	009675318770	009675318775	Al-Bustan@yemen.ye	albustan-mukalla.com	<img src="M:\Alb	Mukalla
1	Moj Hotel-فندق الموج	Mukalla Main Stree	009675334225	009675335244	Al-Bustan@yemen.ye	Mojhotel.com	<img src="M:\Mo	Mukalla
2	Rayboon city-ريبون سيتي	Fawa street	009675356889	009675356888	Raycity@yemen.ye	MukallaRayboon.com	<img src="D:\3.jp	Mukalla
3	Al-Cornish-فندق الكورنيش	Al-cornish street	009675325889	009675325758	Al-Cornish@yemen.ye	Alcornissh.com	<img src="D:\4.jp	Mukalla
0	Al-Ahgaff-فندق الاحقاف	Alghalila street, be	009675332554	009675365441	Al-Ahgaff@yemen.ye	Al-Ahgaff-hotel.com	<img src="D:\5.jp	Mukalla
5	Al-Khoor-فندق الخور	Alkhor Hotel	009675324584	009675325654	Al-Khor@yemen.ye	Al-Khor.info.ye	<img src="D:\6.jp	Mukalla

Appendix 4: Finding Latitude-and-Longitude for certain location using Itouchmap.com



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[2] Helali H (2001), Design and Implementation of a Web GIS for the city of Tehran, MSc thesis, Department of Geodesy and Geomatics Engineering K.N.Toosi University, Tehran, Iran

[3] O'Brien, J.A. 1999. Management Information Systems: *Managing Information Technology in Internet Worked Enterprise*. The McGraw-Hill Companies, Inc. New York.

[4] Homepage of Hadramout city available at www.Hadramout.info

[5] Homepage of Itouch map www.itouchmap.com

[6] Home page for google map saver availabe at www. http://google-maps-saver.en.softonic.com/.com

[7] Homepage for Yemen Ministry of public Health & Population availabe at www.mophp-ye.org/english/data.html