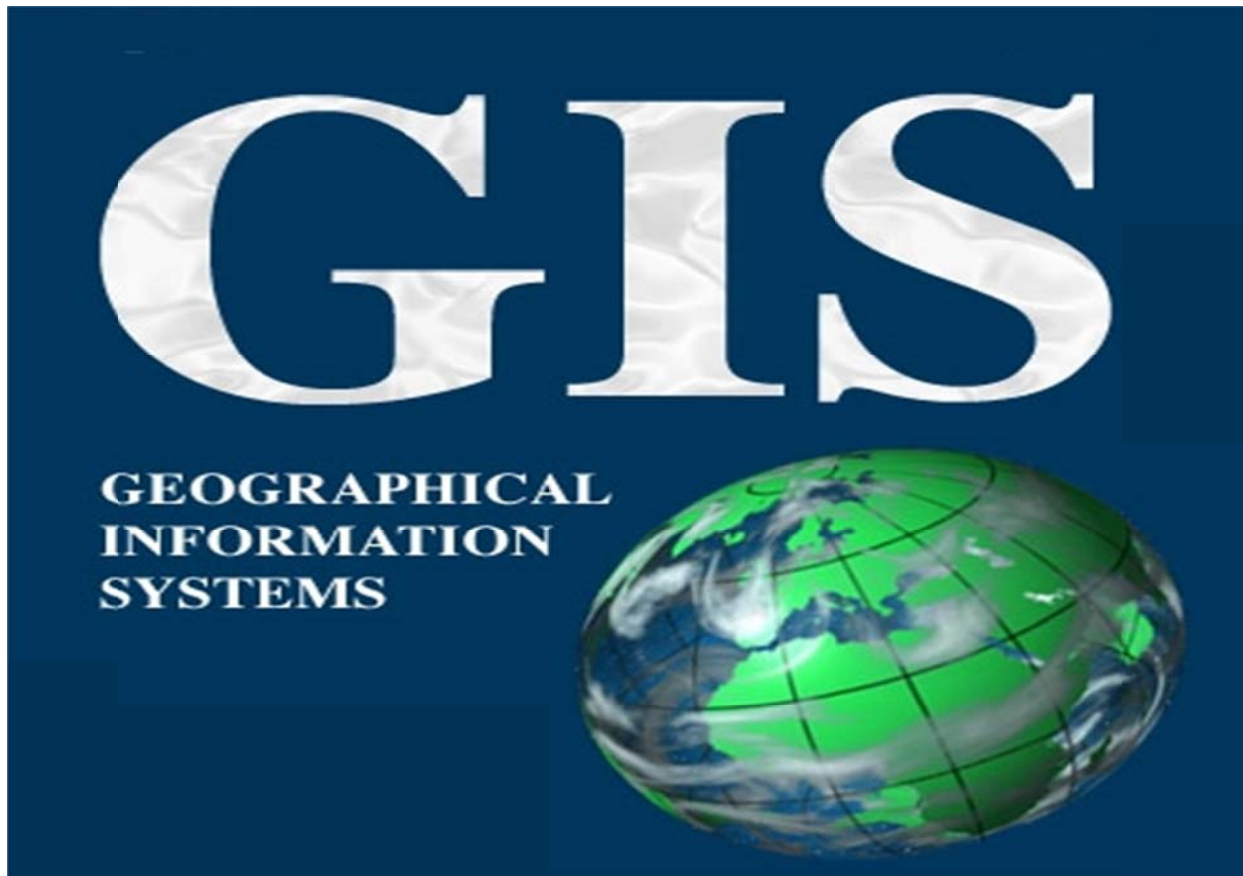جامعة الملك فهد للبترول والمعادن
King Fahd University of Petroleum & Minerals

CRP-514

Campus Web Map for KFUPM

Final Term Project Report

BY

Mohammad Alkaf **ID # 201001160**

Farid S. Binbeshr **ID # 201001900**

SUBMITTED TO

Instructor : Dr. Baqer Al-Ramadan

DATE JUN. 1, 2012

جامعة الملك فهد للبترول والمعادن
King Fahd University of Petroleum & Minerals

Table of Contents

Abstract

Geographic Information System (GIS) can be used in campus planning, accessibility, safety, and maintenance operations for a university. This report aims to produce an interactive campus web map of the academic buildings and their parks for King Fahd University of Petroleum and Minerals (KFUPM) using Geographic Information System (GIS) software.

1. Introduction

Geographical Information System (GIS) is a system of hardware and software that supports the capture, management, manipulation, analysis, and display of Geographic Information [1]. The use of Geographical Information System (GIS) and the internet has changed the way of the organizations that use geographic information. GIS is expanding into new industries. Local governments, businesses, utilities, and higher education institutes are some examples of industries that have started to implement GIS in daily job routines. University is considered one of these application areas [2]. Campus web Map tool use GIS and the internet to improve campus planning, accessibility, safety, and maintenance operations for a university.

A Geographical information system (GIS) is a powerful tool for better planning and management of the university campus due to easier and more illustrative information access, affluent functionality, and improved data processing [3].

The interactive campus web map can be used by students, employees, and visitors using an interface which will allow the user to query, for instance, buildings, rooms, streets, etc.

Since, there is only a fixed map for KFUPM campus, we are going to produce an interactive map for KFUPM campus. Our focus will be in the academic buildings of the university. The users from everywhere can easily access the needed building information through the general browsers, like Internet Explorer or Firefox.

2. Problem statement

KFUPM is considered as one of the best universities in the Middle East. However, there are some missing tools in the automated system of this university. Especially, the interactive map for the university is not available either for browsing or for planning and facilities management [4]. The interactive map is a web-based map that created by using GIS system. Also this interactive map could use for administrative purposes [5].

3. Purpose & Motivation

We are motivated by the fact that most of the well-known universities have an interactive campus map, which used to improve campus planning, accessibility, safety, and maintenance operations for a university. The purpose of this project is to produce an interactive campus web map of the academic buildings and their parks for King Fahd University of Petroleum and Minerals (KFUPM) using Geographic Information System (GIS) software.

4. Methodology

In this part of the report, we clarify the steps to produce the interactive campus web map of the academic buildings and their parks for King Fahd University of Petroleum and Minerals (KFUPM) using Geographic Information System (GIS) software. To do that, we need to do two steps. First, build the map which will be published. Second, publish the map using ArcGIS Server.

4.1. Building the Map

To build the map, we did the following procedures:

- Getting the Campus map of KFUPM.
- Editing the features (polygon and polyline) of the map using AutoCAD software.
- Collecting the data that are related to the Academic Buildings (polygon features).
- Creating the geodatabase for the data using ArcCatalog.
- Creating the layers (Academic Buildings and street) of the map.
- Displaying the map and getting information about map features using ArcMap.
- Changing the properties of the layers to be ready to publish.

5. Publishing the Map

To publish the map using ArcGIS tool, we should use ArcGIS server, but the problem is, ArcGIS server is not installed in the lab. However, we did not stand idly, and we are trying to use ArcGIS online server to publish our map. The problem that we faced with ArcGIS online server is the limitations of features number according to the layers.

To publish the map using ArcGIS online server, we did the following:

- Create ArcGIS free global account.
- Convert all layers to shape files.
- Upload your map as shape files

6. Resource and Information

In this project, we use ArcGIS (ArcMap, ArcCatalog, and ArcGIS Server) tool to do our project. We get our data and information from Housing and Office Services Department. Also, we depend on the internet to get information about how to build and publish maps using ArcGIS tool.

7. Literature Review

Nowadays interactive maps have been used in many systems using GIS (geographic information system). Internet and smart phones are the best explorer for these interactive maps because the wide spread of Internet and smart phones.

Web based campus information system has been built in KTU (Karadeniz Technical University). They build a database consisting of education, management components and topography, land use. They published the data on the internet using of ArcIMS program (ESRI Server Program). By using this system all university departments and all interested users can access KTU information data through web and retrieve the data efficiently [2].

The University of California, Davis (UC Davis) developed a geographic information system (GIS) to use for physical, environmental, and capital planning (PECP) of the campus [3].

KFUPM Land Use Map was built by using the GIS Based Digital Master Plan with Support Services Land Use Statistics. This master plan is a very good guide for future development of campus and its facilities. Also aligning the campus development with the University's educational Strategic Plan is one of the purposes of the master plan [6].

8. Case Study

8.1. Kainan University Campus Information Web

Kainan University Campus Information Web based on Web-GIS architecture is a website providing with the campus information. The application adopts Microsoft Access as the geodatabase platform for saving, maintaining and managing the data. In addition, it applies SuperWebGIS as the map server platform, which can publish

the statistic data and maps stored in the geodatabase as map services to the Internet as shown in Figure(1). The users from everywhere can easily access the needed campus information through the general browsers, like Internet Explorer or Firefox, without the need of installing any internet browser Plug-ins.
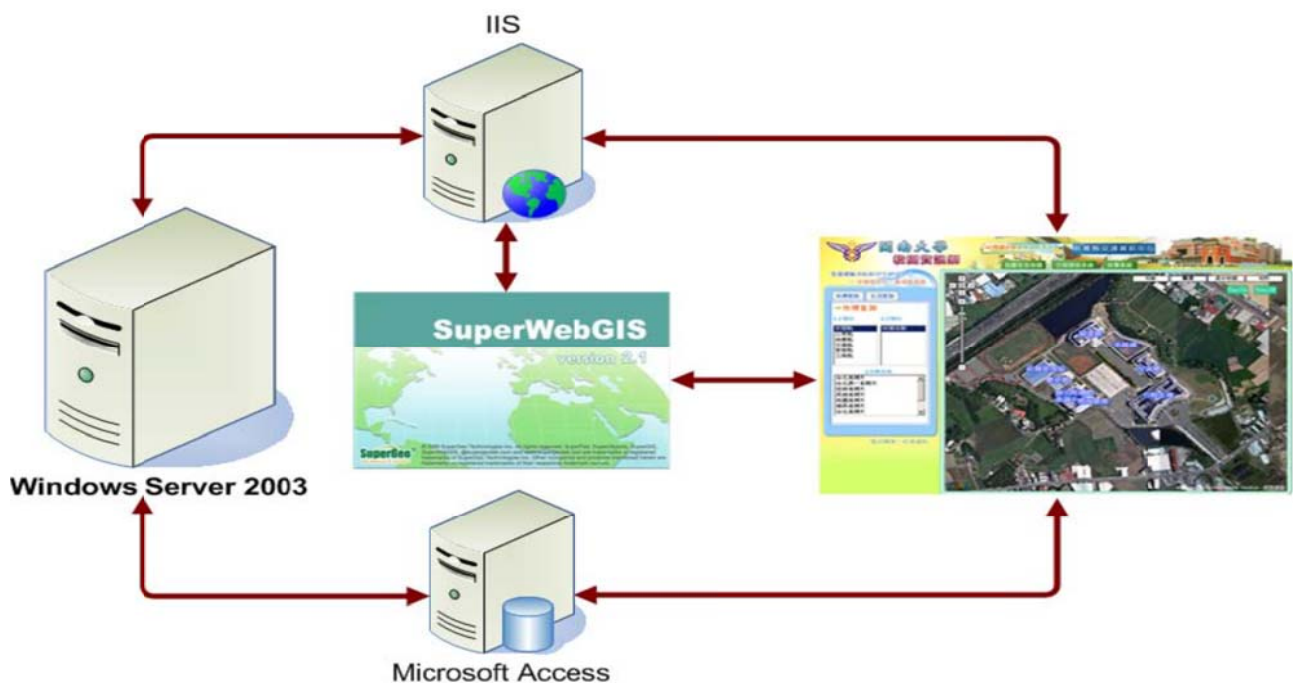

Figure (1): Kainan University Campus Information Web Architecture

Kainan University Campus Information Web, a website created by SuperWebGIS, plays as a platform for the university staff, students and the public to quickly understand the Kainan University campus with complete campus information.

Kainan University Campus Information Web provides three main sub-systems, Campus Life Map, Before-go System and Carpool System, to meet all users' needs.

The Web-GIS website integrates the related information about food, accommodation, traffic, recreation, etc., to help the school's staff and students quickly and easily understand the campus environment; also, it provides the excellent shop list for students for reference, like accommodation, which makes the campus life easier. Besides, Carpool System not only provides open and detailed carpool information to secure students' personal safety but also makes up for the weakness of the current school buses.

9. Discussion

In this part of the report, we illustrate the implementation of our project, which is divided into two parts: building the map, and publishing that map. The output of the process of building the map is shown in Figure (2). Whereas, the process of publishing the map is shown in Figure (3) and Figure (4). In Figure (3), we use Imagery base map of the academic buildings for KFUPM campus map. It is shown that, when a user clicks on a building, he will get information about that building as shown in Figure (3). Furthermore, the academic buildings for KFUPM campus map is published on Road base map as stated in Figure (4).

![King Fahd University of Petroleum & Minerals logo]

جامعة الملك فهد للبترول والمعادن
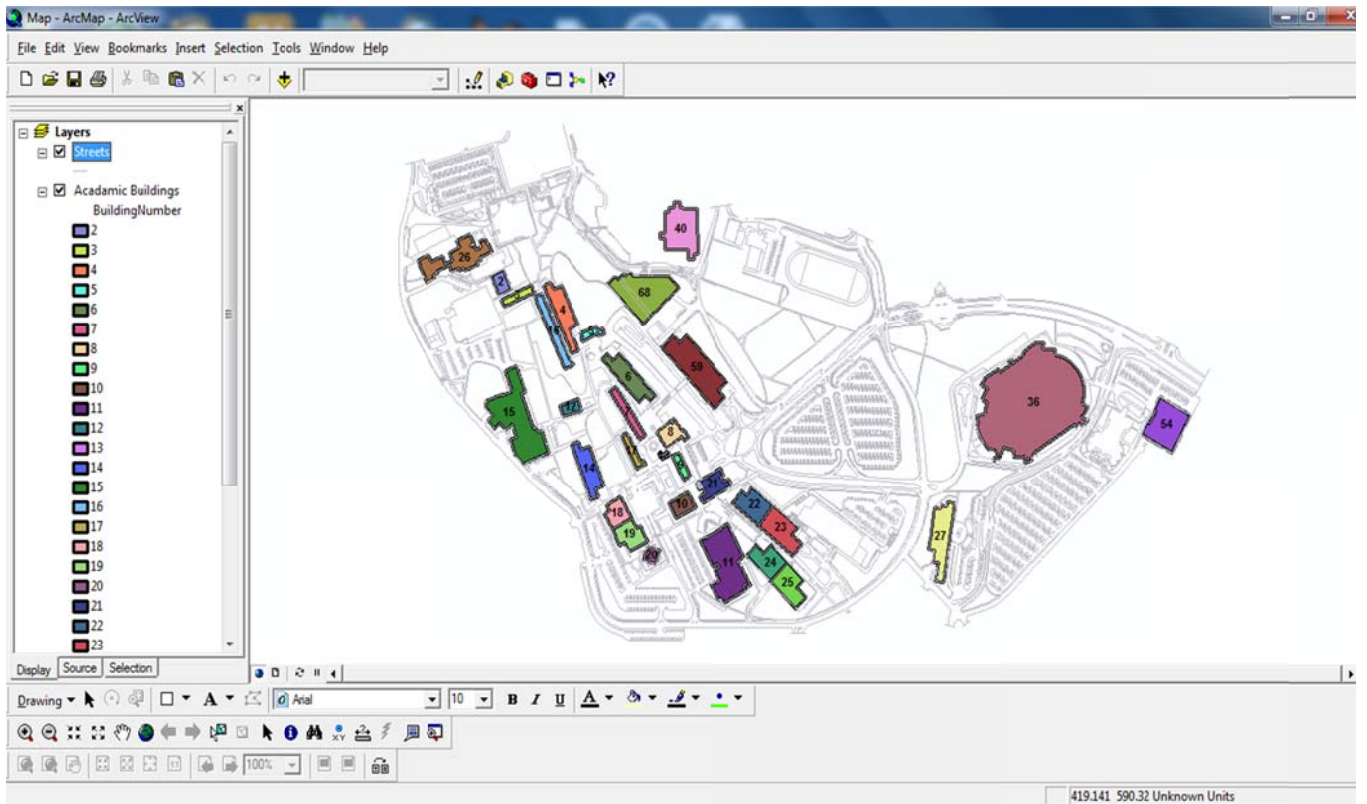**King Fahd University of Petroleum & Minerals**

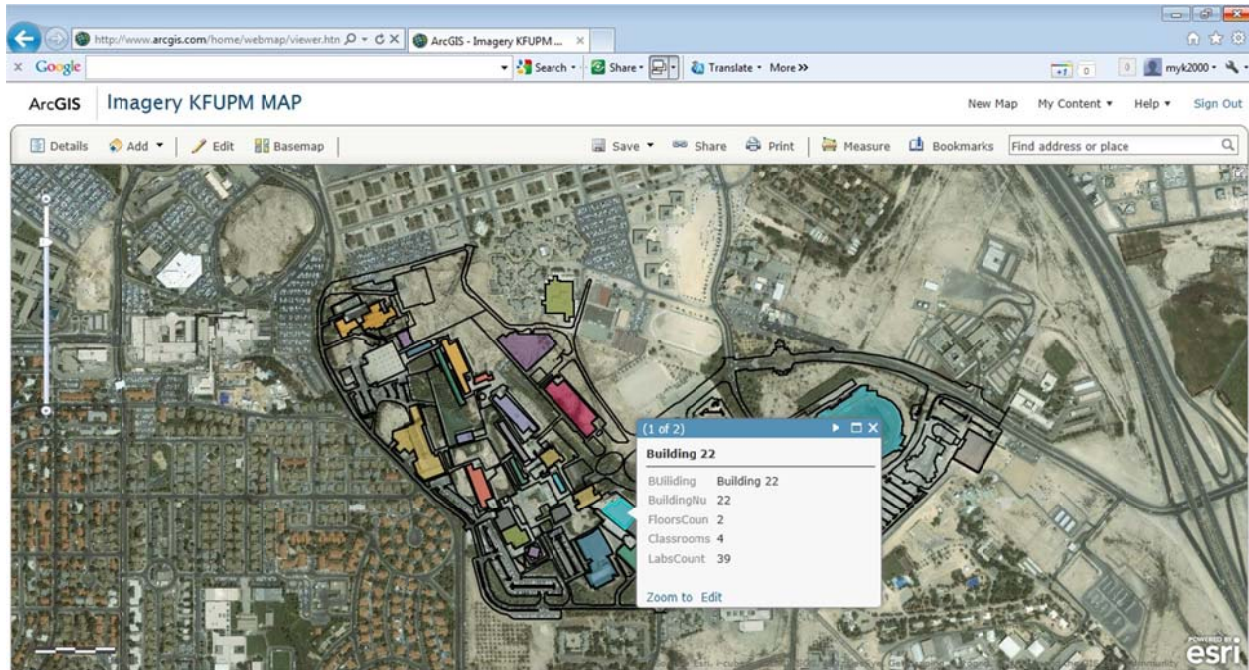Figure (2): KFUPM campus map of the academic building

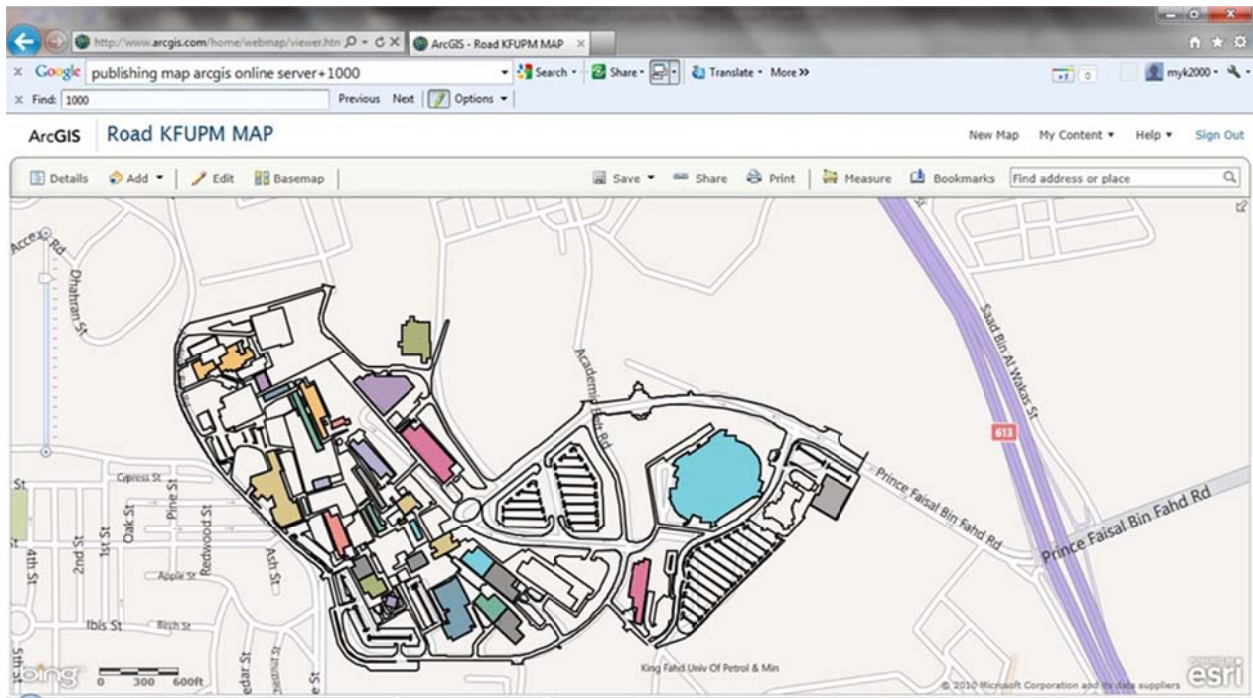Figure (3): Publish KFUPM campus map on Imagery base map.

Figure (4): Publish KFUPM campus map on Road base map.

10.   Conclusion

In conclusion, A Geographical information system (GIS) tool can contribute to build an interactive map of the university campus. The use of the interactive Campus Web map in KFUPM can ease the accessibility of buildings information for all users such as, new students, visitors, etc.

In future, we will use ArcGIS Server to avoid the limitations which we faced using ArcGIS online server. We plan to include the whole campus to the map, improve the interactive tools in the map by adding list to make the accessibility for features easier, and adding the search property for features.

References

1. B. Al-ramadan. "Introduction to GIS technology and its application," GIS@development, Middle East, 2005

2. Aydinoglu, A and Tahsin Yomralioglu, "Web Based Campus Information System," International Symposium on GIS, Istanbul-Turkey, September 23-23, 2002.

3. Boriana Deliiska, Maya Dencheva, Radoslav Milchev." Campus GIS Functionality and Interface," International Scientific Conference Computer Science, 2008

4. Bruce Boyd and Eric S. Rainbolt "GIS FOR UNIVERSITY CAMPUS PLANNING AND FACILITIES MANAGEMENT" Retrieved from http://proceedings.esri.com/library/userconf/proc98/proceed/TO750/PAP729/P729.HTM

5. Esri understanding our world ,"GIS for Higher Education" , Retrieved from http://www.esri.com/industries/university/business/administration.html

6. Adel S. Aldosary May 28, 2006; Infrastructure Planning The High-Tech Way-The King Fahd, University of Petroleum & Minerals GIS- Based Digital MasterPlan http://faculty.kfupm.edu.sa/CRP/asdosary/Download/Infrastructure Planning.pdf