



Development of a Geographic Position Visualization Tool of the H.O.U. Services and Facilities

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Summary

The subject

This undergraduate project deals with the development of a “Geographic Position Visualization Tool of the HOU Services and Facilities”. Simply put, it is about developing a Web 2.0, map based, mashup application, that would help HOU students, among others, to locate, get contact information and approaching directions on HOU privately owned facilities, situated in Patras, as well as other facilities used by HOU all over Greece.

The need

Anyone, who has ever attended or taught any courses at HOU, can easily understand the need for the existence of a tool such as the one developed in the frame of this undergraduate project.

HOU, based in Patras, uses a number of facilities in a few major Greek cities for holding the necessary student – teacher meetings and written examinations. Quite often, the number of students enrolled for a specific subject unit is so limited that classes are formed at only three or even fewer cities.

On the other hand, students come from every small place, all over Greece, and have to travel to those cities in order to attend class meetings and take written examinations. As a result, students are frequently faced with the difficulty of locating the hosting facilities in cities and



places that, very often, are completely unknown to them. Furthermore, the fact that most of these meetings are held during the weekends, combined with the fact that not all facilities used are universities or well known to the locals facilities, makes finding someone to assist harder.

Therefore, a tool that helps students, not only search for and locate a specific facility on the map, but gives them both text and map drawn printable approaching directions from well known, at least to locals, landmarks or other city places and buildings, may claim to be of use and assistance to them.

Technologies used

The application, in its entirety, has been created in the form of dynamic, PHP, web pages and is based on Google Maps. The main functionality and handling of the maps is achieved using the Google Maps JavaScript Application Programming Interface, while the Document Object Model is handled using JavaScript code. All application data are stored into a MySQL driven database using the InnoDB storage engine.

The user interface, consisting of a single PHP page, makes heavy use of Asynchronous JavaScript And XML (AJAX), for client-server communication and data exchange, in order to achieve map updating, sending search requests, getting search results as well as for carrying all other required tasks. Same holds true for the administrator interface, although it consists of more than a single page.

Value adding features

A few extra – value adding features – have been incorporated to the application developed, including:

- A student meetings and exams schedule search facility which allows HOU students to search for and get their full meetings and exams schedule by just entering their HOU registration number. Cities and facilities, included in the search results, are formatted as HTML links leading to respective city or facility being focused on the application map.
- A per study program statistics feature that yields city, student and class distribution both in tabular and graphical form – not publicly revealed and available through the administrator interface only.



Hosting web servers

The application (tool) developed under this undergraduate project is hosted and can be accessed by everyone on:

1. Student's web server at <http://www.akweb.gr/eap/pe/>, which is the home of the application, and on
2. Supervisor's web server at http://stefanakis_pc.hua.gr/andreas/pe/, where a copy of the application is maintained.

Conclusions drawn

Information has always been a valuable asset for its owner as well as of the people having access to it. On the other hand, information sharing has always had difficulties to overcome. Those difficulties, provided the owner wanted to give access to it, were mainly due to the geographical distribution of the people involved. Today, with the rapid development of the Internet and World Wide Web and given the low cost availability of ample user bandwidth, it has all changed.

Web 2.0, the new way of using the Web with all the more traditionally locally run applications moving to the Web, has quickly brought around numerous Web Services, many of which are being offered for free – at least for non-commercial use.

At the same time, with the domination, development, free distribution and use of a) PHP, as a dynamic web page development language, b) Apache HTTP Web Server, as a web page serving application and c) MySQL and other free DBMS, the development of various information providing applications and other mashups is only a matter of will and inspiration.

Furthermore, the use of AJAX for web page updating and client - server communications in general, combined with the bandwidth available, make today's web applications' speed of execution and responsiveness to users' actions near yesterday's desktop counterparts.

As far as development time of Web applications is concerned, Reusable Software Components can be of great assistance, while same holds true for other types of applications as well. A search on the Net can yield plenty of such components, which, quite often, are free – mostly the ones written in PHP or JavaScript. Even when there are no free components found, buying them should seriously be considered as there are multiple benefits in using them. Besides shortening development time, given the fact that they have been previously



debugged and used by others, their proper and error free functionality is almost surely guaranteed.

One of the most frequent obstacles, today's web developers are faced with and have to overcome, is the way the Document Object Model is realized in the various (graphical) web browsers. Although it seems impossible to secure proper running of inline code and precise page content appearance and positioning with all existing browsers, developers must pay due care in making sure their web pages are properly handled by the most popular browsers, while they may only hope for descent results with the other ones.

Web articles and forums are the places one will most likely find answers and solutions related to application development issues. Same holds true for most other information and is available to everyone thanks to the development of modern search engines.

Development of web services is so rapid, that attempts on writing relevant books run the risk of being rendered incomplete and not up-to-date before getting to the bookstores. The only up-to-date sources of information, concerning web services, seem to be their creators' web sites – being updated almost daily.

Project structure

Chapter 1 of this project, investigates and supports the need for such a tool and clarifies the targets the project is aiming at.

In Chapter 2, exiting web based systems and applications are explored and studied. The study shows that the US dominates in both commercial and non-commercial applications, while Greece participates with limited in number but interesting applications.

Required terms of Geodesy, absolutely necessary for understanding and using maps, with emphasis on Mercator projections and positioning methods on maps and the surface of the earth, are dealt with and studied in chapter 3.

Chapter 4, takes a quick look of the World Wide Web from the early visions of its creator, Tim Barners-Lee, and at a quick pace gets into and comments today's new aspects such as Web 2.0, Web Services and Mashups – part of which, the application developed under this undergraduate project is aiming to be.



A study and evaluation of the existing and freely available web based map platforms, for the purposes and use of this project, is conducted in the fifth chapter, resulting in the selection of Google Maps.

Functional and non-function requirements are recorded in the sixth chapter.

Chapter 7 refers to the sources, techniques and means that were used in collecting all data, transformed into information and, presented to the end users through the developed application.

In chapter 8, the model of prototyping, used in the development of this application, is briefly described and explained and reference is made to all software used in developing. The designing and creation of the application data base and web pages are also explained in this chapter.

Uploading of pages to a web server, beta testing and data insertion, along with web browser discrepancies and relevant difficulties are commented in chapter 9.

Conclusions are drawn and summarized in the tenth and final chapter of this undergraduate project.

Keywords: Mashup, Web 2.0, Google Maps, Google Maps API, JavaScript, AJAX.

Content: Text, drawings, tables, images / screen shots, UML diagrams, Entity-Relation (E-R) diagrams, KML code, PHP code, JavaScript code.