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New Product Development Portfolio Website

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New Product Development Portfolio Website

An Interactive Qualifying Project Report

submitted to the Faculty

of the

WORCESTER POLYTECHNIC INSTITUTE

in partial fulfillment of the requirements for the

Degree of Bachelor of Science

by

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Project Advisor

Abstract

The goal of this project is to create a website that enables users to analyze a new product portfolio. The website gives users the ability to input values for new products, such as price, volume, and development costs, and compare the effects of varying assumptions. The website will be used as a teaching tool in new product development courses.

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1 Introduction

The goal of this project was to develop an interactive website that enables users to quickly and intuitively gauge a product's potential success and compare it to other products within a new product portfolio. The final result of this IQP is the website itself, hosted on npdportfolio.com. It is expected to be modified and improved in the future. The purpose of this text is to explain the rationale for the selection of the software and explain its implementation. We will provide screenshots to illustrate the look and functionality of the software. The accompanying documentation includes the code we developed.

2 Literature Review

The web interface utilizes the PHP scripting language, a MySQL database, and Adobe Flex for its development and deployment. The following section gives an overview of the technologies involved.

2.1 *Website Technologies*

2.1.1 PHP

PHP is a scripting language that is used by interfaces to communicate with a mySQL database. Scripts are not considered programs as they do not run individually but rather run paired with another software system. In this case PHP runs paired with the mySQL software to connect, manipulate, input, and extract information from the database. It is also involved in a second pairing between it and the FLEX interface allowing for a dynamic web interface in which a user can view, add, and edit data for various purposes. One aspect of the PHP language is that it is insecure, and thus data being transmitted using PHP can be intercepted. Thus it is very important for sensitive information to be encrypted prior to implementing the PHP scripts. Nearly a third of all software insecurities are a result of the use of PHP. These are due to inexperienced developers not following good programming practices and sending poorly

encrypted data using PHP. The developer must implement front and back-end encryption and decryption.

2.1.2 MySQL

MySQL is a relational database management system (RDBMS). A RDBMS is a database management system (DBMS) which follows the relational model. A DBMS is a piece of software designed for the collecting, storing, arranging, and distribution of data. This data is stored in tables. RDBMS contain tables to store the data, and additional tables to store the relations between the data. MySQL is one of the leading RDBMS systems, and serves as a good back-end to store data. MySQL's pairing with PHP allows for simple interactions with the FLEX interface. This allows for an interface for users for inputting data and viewing results.

2.1.3 Adobe Flex

Adobe Flex was developed in response to problems with Flash. Developers found it difficult to program in Flash as it did not follow a standard programming feel as it was designed primarily for artistic applications. Developers wanted to develop rich internet applications (RIA) that were difficult to program in Flash, but also wanted the feel presented by Flash. Thus Adobe developed the Flex environment. It is built more on a programming model rather than an animation model as Flash was. It utilizes the MXML language and a series of prepackaged components familiar to program developers. It also allows for developers to create fluid RIAs in which a user doesn't need to change windows refresh or reload a page by utilizing a state design. This creates a fluid feel similar to that of desktop application as opposed to that of a website.

3 Proposed Methodology

3.1 Project Workplan

Phase 1 - A+B Term

- Learn Adobe Flex Framework
- Database Design
- Website construction

Phase 2 - C Term

- Finalize User Interface
- Implementation
- Documentation

3.2 Problems Encountered

3.2.1 Learning Adobe Flex

The first major hurdle was learning Adobe Flex. Both members of the project team were familiar with PHP and MySQL, but learning MXML (an XML based markup language used in Flex) was a considerably daunting task. The first weeks of the project were marked by Google searches for Flex examples and following Adobe Flex's online tutorials step by step:

<http://www.adobe.com/support/documentation/en/flex/> .

Just as with any programming language, we eventually overcame the learning curve and our initial slow development was replaced with a better understanding and development speed. The biggest help was definitely Adobe Flex's online resources, which proved crucial to learning MXML and to the project as a whole.

3.2.2 MySQL Insert Error

An error that caused almost a week of stalled development was the inclusion of two empty character spaces, or " ", when outputting from Flex's MXML to PHP for MySQL database insertion. When querying for a user created project, such as "Project A", nothing would show up in the datagrid even though we had in fact added the project. The problem was that within the actual database, "Project A" was entered as " Project A ", with a space both before and after the string.

4 System Requirements

4.1 Nonfunctional Requirements

4.1.1 Operational Requirements

The New Project Development (NPD) Portfolio website has several key operational requirements:

- Accessible to anyone with an internet connection.
- Each user's data is saved for future visits.
- Each user's data is password protected.
- It has to be easily amenable to future improvements and expansion.
- Use has to be intuitive and require minimal instructions.

4.1.2 Performance Requirements

The NPD Portfolio website needs to:

- Load the user interface
- Refresh data as the user inputs it.
- Fetch data from a MySQL database.

As a result, choosing the correct web hosting solution is of utmost importance. Ideally the website will update in near real-time speeds. For its highly acclaimed web hosting, we chose GoDaddy's domain registration and hosting services.

4.1.2.1 GoDaddy domain registration

When deciding a domain name, it is important to have a catchy, simple, and easily remembered website name. The first step of the domain registration process is checking the availability of a desired domain name, typically on the website where the domain purchase will be made. Since domain names are like virtual real estate, in that they can be bought or sold for as

little as \$7 or as much as several millions of dollars, many desired domain names are already taken.

While choosing an appropriate domain name for the New Product Development Portfolio website, we were able to break it down into a simple acronym, followed by ‘portfolio’ to yield www.npdportfolio.com. We decided to purchase the domain name only for a year, with plans for renewing the purchase. The result of our domain search is a simple, short, and easily remembered domain name that is relevant to the contents of the website.

4.1.2.2 GoDaddy hosting

Another crucial part of website creation and deployment is hosting. A website can be hosted on machines ranging from a weak laptop to a large supercomputer. In fact, almost any computer can host a website. However, hosting a website requires that the computer remain on at all times and has near 100% internet uptime. Luckily, an abundance of website hosting solutions has driven the cost of hosting down. We chose GoDaddy.com for our hosting as well, since bundling domain registration and hosting simplifies the overall website management process and simplifies payment options.

When choosing hosting, there are several options to consider. For one, the amount of traffic and bandwidth a website anticipates receiving will determine the hosting plan. A website that delivers streaming video to thousands of users will require large amounts of bandwidth. In our case, the server will be delivering minimal data consisting mostly of the graphical user interface driven by Adobe Flash. The actual user variable data will also require very little bandwidth.

When deciding a hosting plan, the last important step is deciding the server operating system platform and database applications available on the server. For instance, certain applications may run more efficiently on a Linux based server, while others may be more easily updated and maintained on a server running a Windows Server operating system. In addition, the server needs to have the required databases and languages installed in order to carry out the functions required by the website. The npdportfolio.com server is running a Windows Server operating system with PHP installed and ten available MySQL databases.

4.1.3 Security Requirements

The NPD Portfolio website will be used primarily by WPI faculty and students. However, the website will be viewable and usable by anyone with an internet connection and an up to date Adobe Flash player. As such, data integrity and password encryption are important.

The website employs MD5 password encryption, a widely used password encryption method. The MD5 encryption method algorithmically creates a 32 character hexadecimal number from an input of letters, words, and characters (i.e., the user's password). When the user inputs his password on the website login screen, it is encrypted and then compared with a value within the MySQL database to determine whether the password is correct. With this method, if the password being sent from the client to the server is retrieved by an outsider, they will only have the MD5 hash and not the password itself.

MD5 encryption is perfectly suited for basic security, but is by no means 'uncrackable'. Through methods of brute force calculations, MD5 can, in fact, be cracked. However, as password lengths increase and numbers and special characters are added, MD5 encrypted data becomes exponentially difficult to crack. In recent years, MD5 has been replaced as the de facto standard for internet security by SHA-1 and SHA-2 encryption. In January of 2009, VeriSign, an internet security company dealing with online certificates, switched from MD5 to SHA-1. VeriSign, however, deals with *highly* secure data. NPDPortfolio.com has no claims of reliability or validity in its data output or security (Verisign).

Despite recent migration trends to SHA-1 encryption, it is not warranted for the purposes of this project. MD5 encryption has proven a reliable encryption method for basic password security. In the event that NPDPortfolio.com expands or changes its liability for user information, security changes will certainly be made, most likely towards a more difficult implementation of SHA-1.

4.2 Feasibility Analysis

4.2.1 Technical Feasibility

Familiarity with the technology

As a project team with experience in Management Information Technologies and Computer Science, we have a diverse skill set in computer technologies. We are familiar with the

integration between the server side scripting language PHP and the relational database, MySQL. However, when starting the project, we had very little experience with another main component of NPDPortfolio.com: Adobe Flex and its MXML based language platform. As a result, the first few weeks of development were relatively slow when compared with the latter portion of development.

Project size

The user interface layout is not large or complex. However, the amount of dynamic information being generated by npdportfolio.com lends a great deal of complexity to the project. In addition, as mentioned in the previous section, the project team's lack of initial familiarity with key development tools and languages will add to project length.

Compatibility

NPDportfolio.com's Adobe Flex based Flash output requires installation of Adobe's most recent Flash version (9.0.115). Not only is installation of Flash quick, easy, and free, but it already has an 82% penetration in "Internet-enabled desktops in mature markets as well as a wide range of devices." This means that 82% of all internet users *already* have the required software to run NPDportfolio.com. Additionally, anyone wishing to use NPDportfolio.com but without the most recent version of Flash will be notified upon loading the site and given a link to download the necessary software.

5 High Level Design

5.1 User Interface

Design

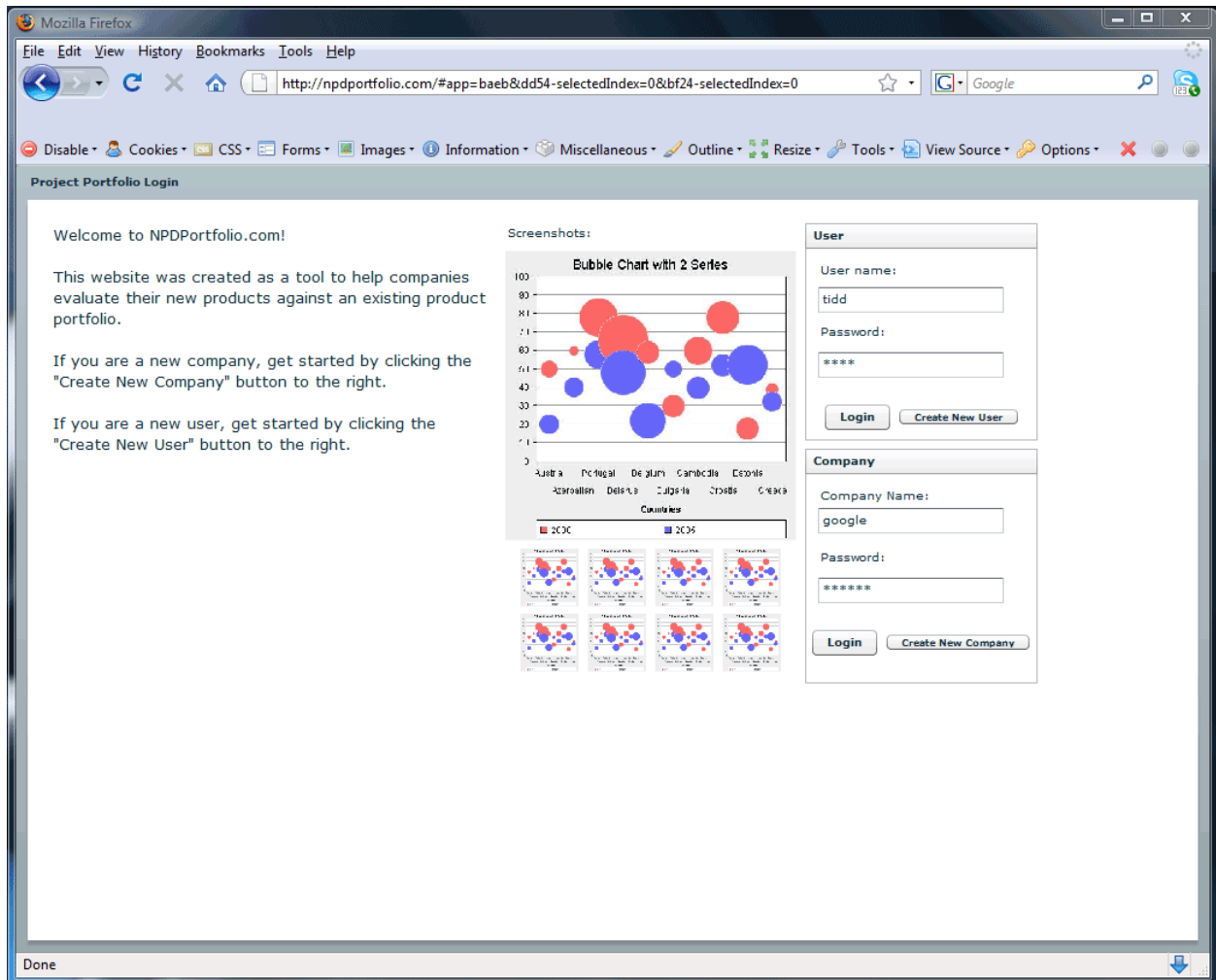


Figure 1 – Splash Screen

Splash Screen

On the splash screen or homepage, the user has the option of logging in as a user, creating a user, logging in as a company, and creating a company.

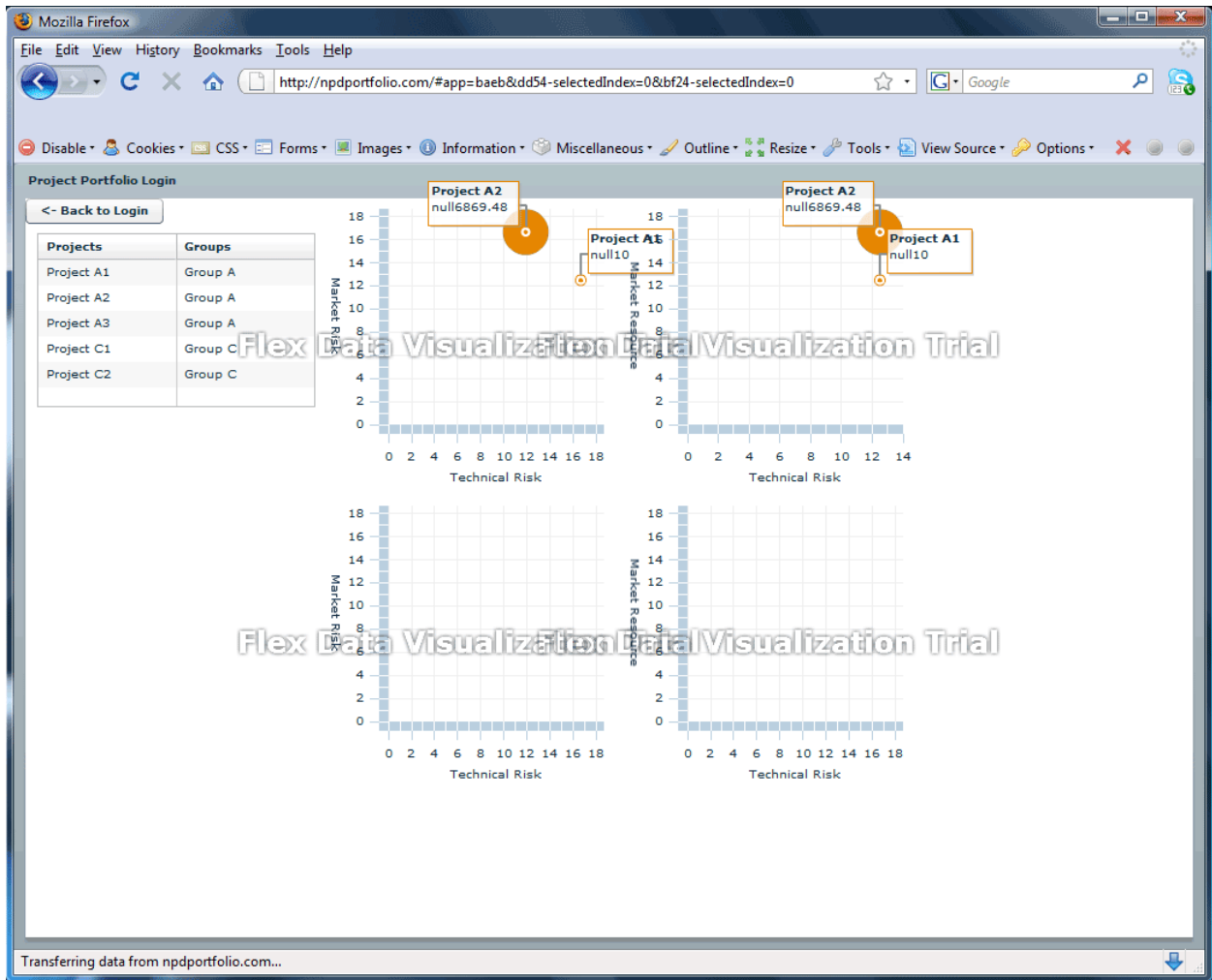


Figure 2 – User Logged in with Projects

User Logged in with Projects

In this screen, the user is able to click on projects in order to edit them and view circle graphs with the projects' collective data.

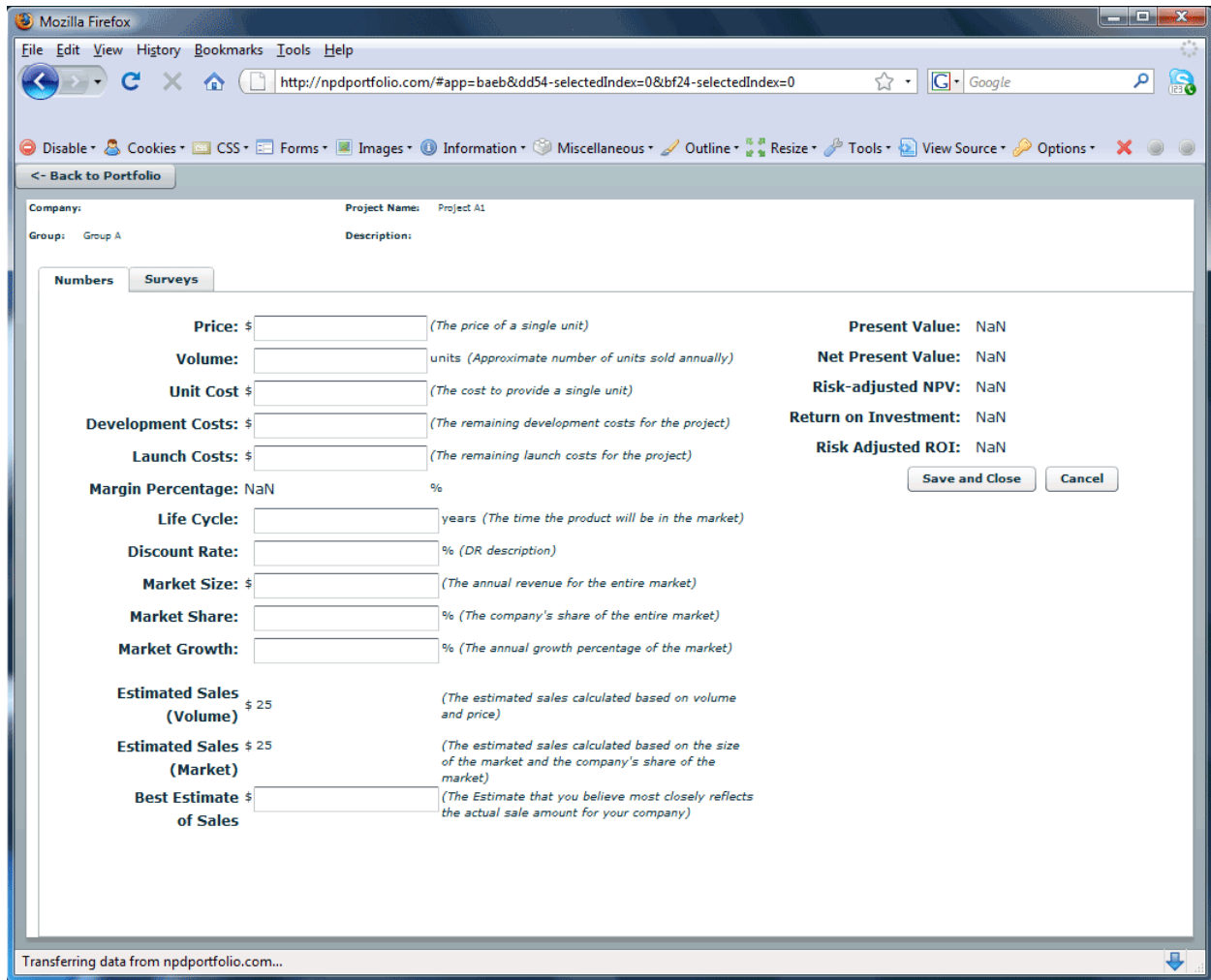


Figure 3 – User Project Edit Screen (Numbers)

User Project Edit Screen (Numbers)

On this page, the user can edit and save project information.

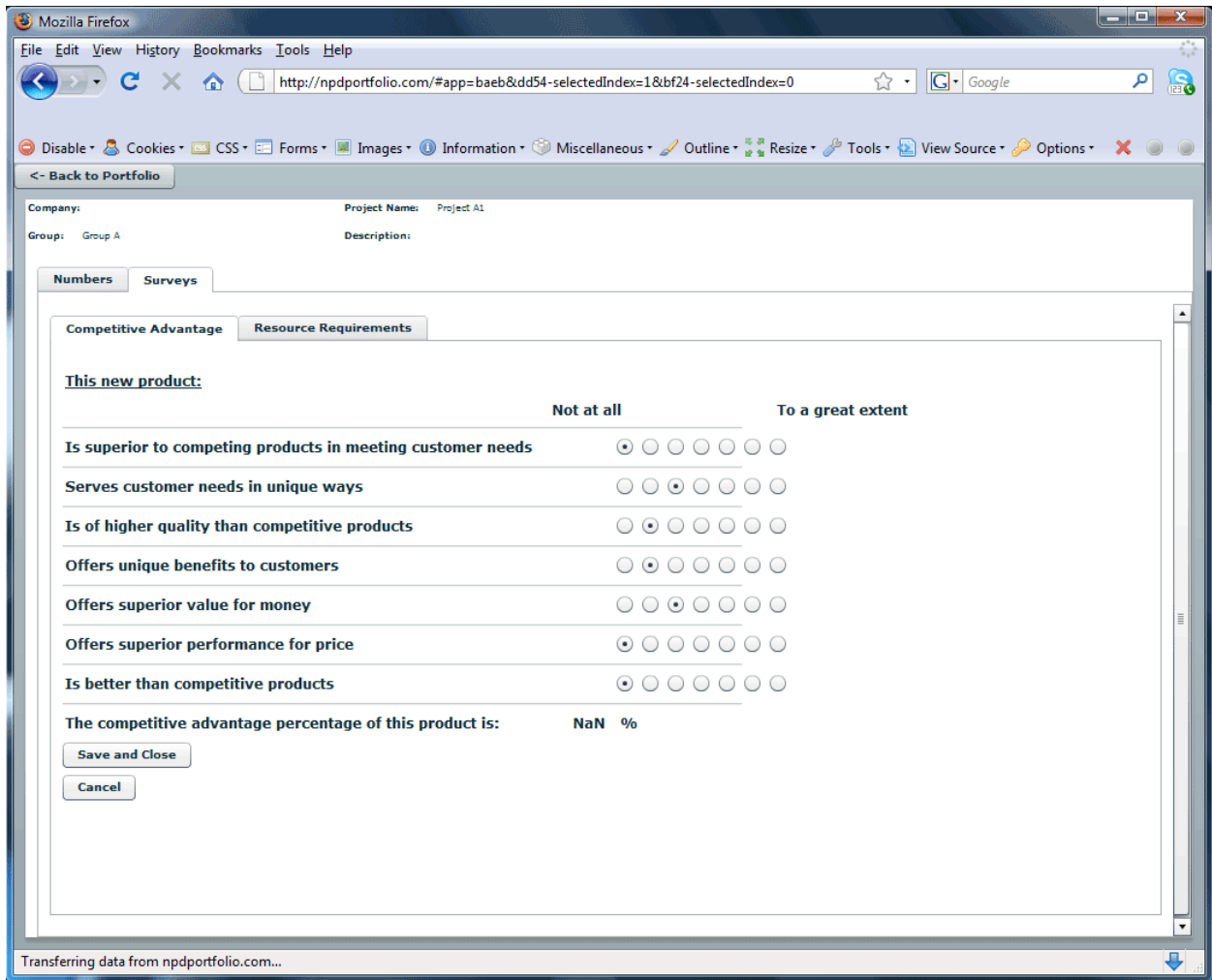


Figure 4 – User Project Edit Screen (Surveys)

User Project Edit Screen (Surveys)

On this page, the user can edit and save project survey information to compute competitive advantage and risk.

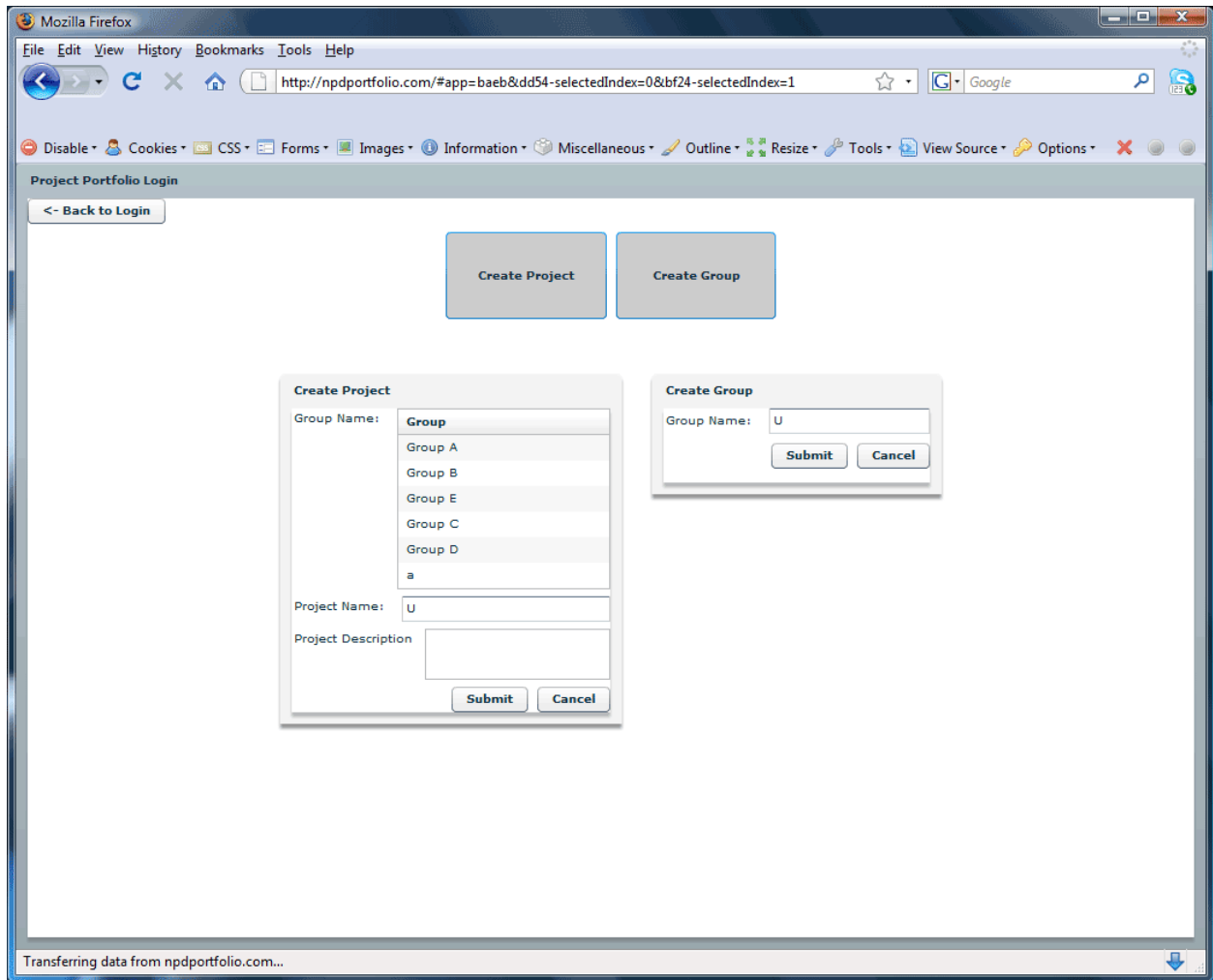


Figure 5 – Company Logged in

Company Logged in

On this page, users logged in as a company can create new groups and new projects within those groups.

5.2 Data Storage Design

5.2.1 MySQL Database – “IQPMain”

Table: users

Field	Type	Null	Default	Comments
<u>uID</u>	varchar(20)	No		User ID
uPass	varchar(100)	No		User Password
cID	varchar(20)	No		Company ID

Table 1 – MySQL ‘users’ table

Table: results

Field	Type	Null	Default	Comments
uID	varchar(20)	No		User ID
pID	varchar(20)	No		Project ID
npv	float(10,2)	Yes	<i>NULL</i>	Net Present Value
nnpv	float(10,2)	Yes	<i>NULL</i>	
rnpv	float(10,2)	Yes	<i>NULL</i>	Risk-Adjusted Net Present Value
rnnpv	float(10,2)	Yes	<i>NULL</i>	
roi	float(10,2)	Yes	<i>NULL</i>	Return on Investment
sales	float(10,2)	Yes	<i>NULL</i>	Sales
mresc	float(10,2)	Yes	<i>NULL</i>	
mrisk	float(10,2)	Yes	<i>NULL</i>	
trisk	float(10,2)	Yes	<i>NULL</i>	

Table 2 – MySQL ‘results’ table

Table: projects

Field	Type	Null	Default	Comments
pID	varchar(20)	No		Project ID
pDescription	varchar(100)	Yes	<i>NULL</i>	Project Description
uID	varchar(20)	Yes	<i>NULL</i>	User ID
gID	varchar(20)	No		Group ID
cID	varchar(20)	No		Company ID
N_price	float(10,2)	Yes	<i>NULL</i>	
N_volume	float(10,2)	Yes	<i>NULL</i>	
N_irr	float(10,2)	Yes	<i>NULL</i>	
N_pc	float(10,2)	Yes	<i>NULL</i>	
N_dc	float(10,2)	Yes	<i>NULL</i>	
N_lc	float(10,2)	Yes	<i>NULL</i>	
N_life	float(10,2)	Yes	<i>NULL</i>	
N_margin	float(10,2)	Yes	<i>NULL</i>	
N_size	float(10,2)	Yes	<i>NULL</i>	
N_growth	float(10,2)	Yes	<i>NULL</i>	
N_share	float(10,2)	Yes	<i>NULL</i>	
N_sales	float(10,2)	Yes	<i>NULL</i>	
N_eSales	float(10,2)	Yes	<i>NULL</i>	
S_C_1	float(10,2)	Yes	<i>NULL</i>	

S_C_2	float(10,2)	Yes	<i>NULL</i>
S_C_3	float(10,2)	Yes	<i>NULL</i>
S_C_4	float(10,2)	Yes	<i>NULL</i>
S_C_5	float(10,2)	Yes	<i>NULL</i>
S_C_6	float(10,2)	Yes	<i>NULL</i>
S_C_7	float(10,2)	Yes	<i>NULL</i>
S_R_1	float(10,2)	Yes	<i>NULL</i>
S_R_2	float(10,2)	Yes	<i>NULL</i>
S_R_3	float(10,2)	Yes	<i>NULL</i>
S_R_4	float(10,2)	Yes	<i>NULL</i>
S_R_5	float(10,2)	Yes	<i>NULL</i>
S_R_6	float(10,2)	Yes	<i>NULL</i>
S_R_7	float(10,2)	Yes	<i>NULL</i>
S_R_8	float(10,2)	Yes	<i>NULL</i>

Table 3 – MySQL ‘projects’ table

Table: groups

Field	Type	Null	Default	Comments
<u>gID</u>	varchar(20)	No		Group ID

cID	varchar(20)	No		Company ID
------------	-------------	----	--	------------

Table 4 – MySQL ‘groups’ table

Table: companies

Field	Type	Null	Default	Comments
<u>cID</u>	varchar(20)	No		
cPass	varchar(100)	No		

Table 5 – MySQL ‘companies’ table

Works Cited

Cooper, Robert G. Winning at new products. Perseus Books L.L.C., 1993.

Danneels, Erwin (2002), "The Dynamics of Product Innovation and Firm Competences," Strategic Management Journal, 23 (12): 1095-1121.

"VeriSign switches to new hash function to secure SSL certs - SC Magazine US." Security News and Security Product Reviews - SC Magazine US. 13 Apr. 2009.

6. Appendix

Appendix A - GoDaddy.com Domain Manual

The domain “npdportfolio.com” is registered with GoDaddy.com. The following steps show how to log in to GoDaddy.com and access the domain management screen where a user can then view or update domain information.

Step 1) Go to <http://www.godaddy.com>

Step 2) Log in to <http://www.godaddy.com> using the domain username/password.



Figure 6 – Step 2) Logging in to godaddy.com

Step 3) Select Domains -> My Domains

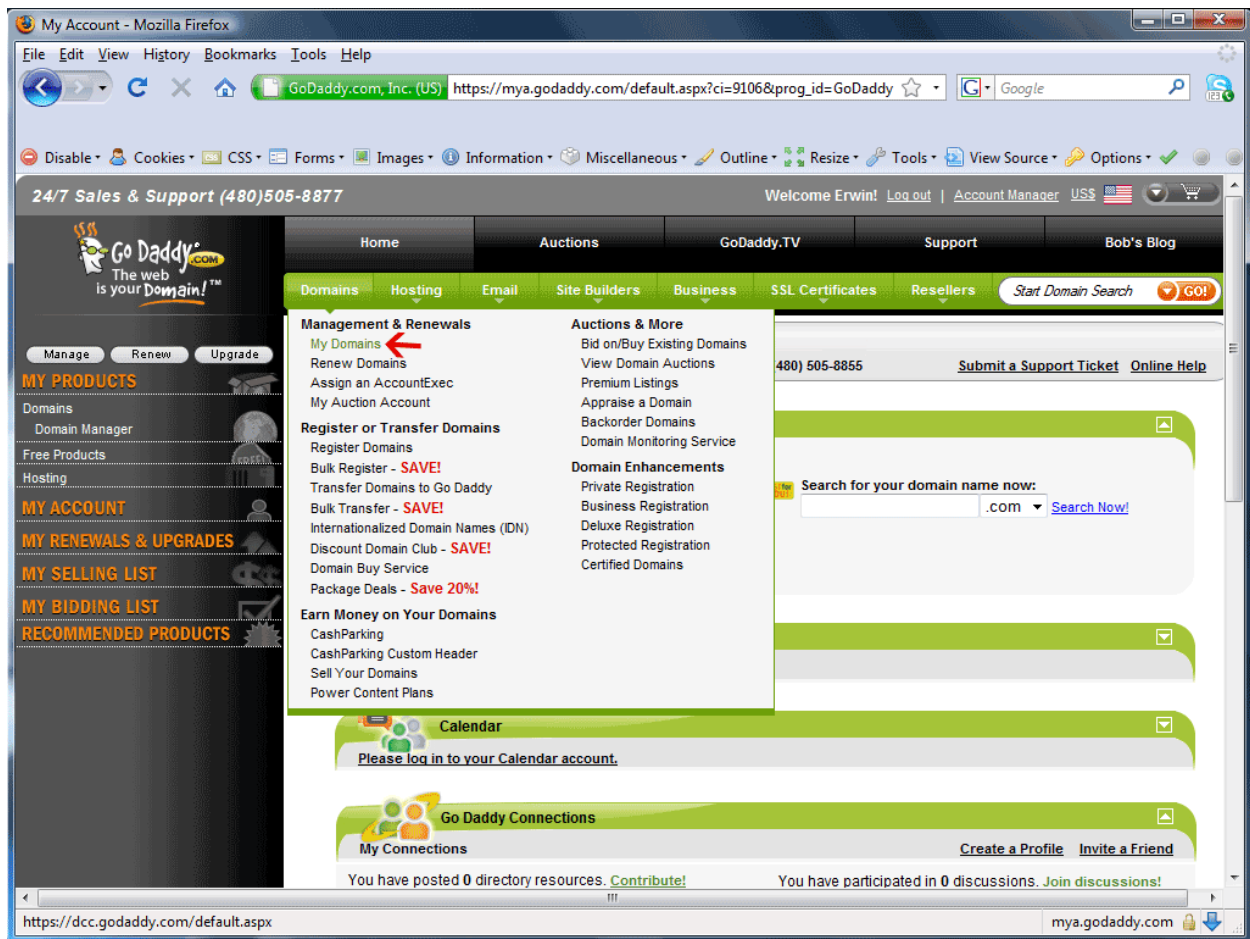


Figure 7 – Step 3) Selecting “My Domains”

Step 4) Select “NPDPORTFOLIO.COM” to access domain information

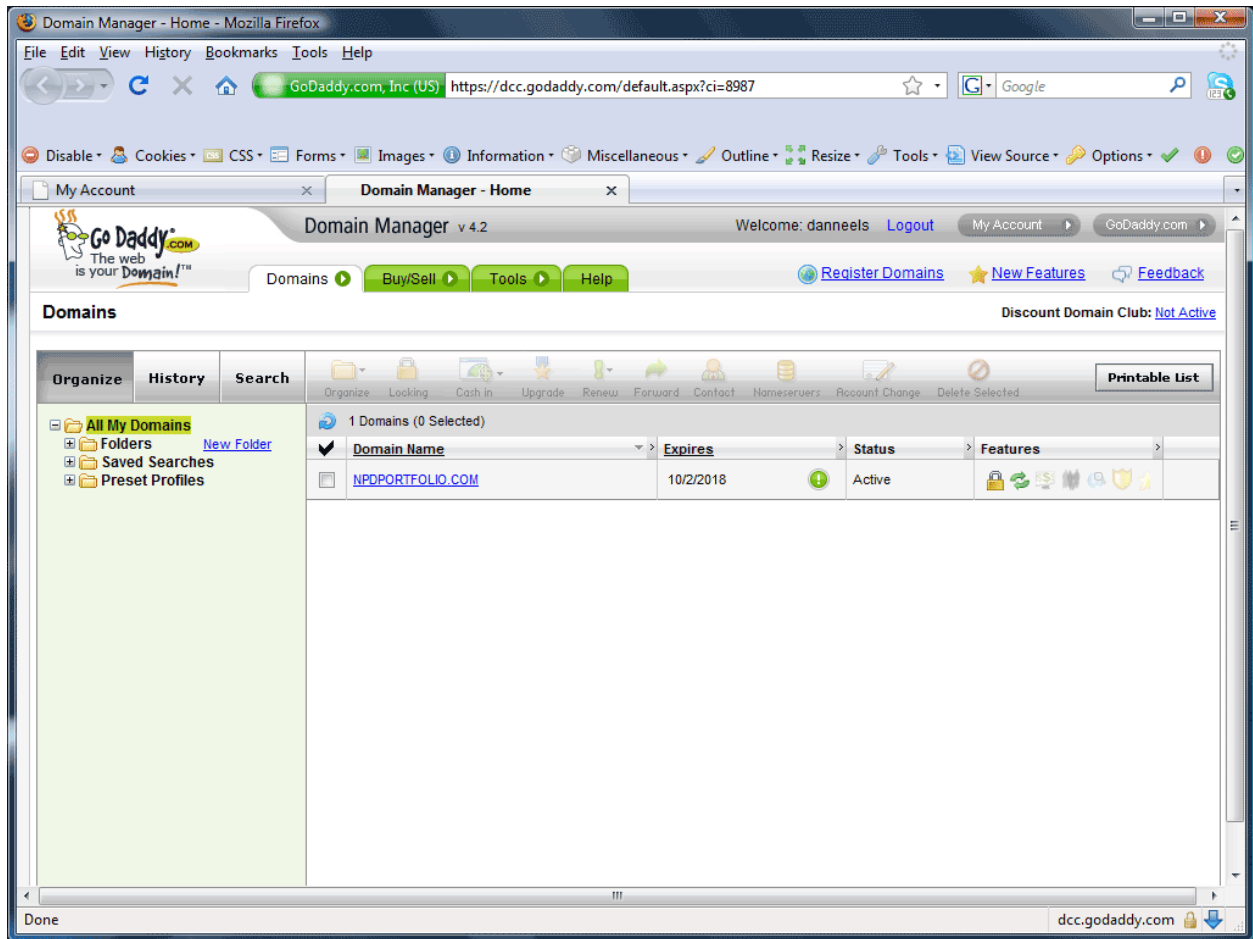


Figure 8 – Step 4) Selecting “NPDPORTOLIO.COM”

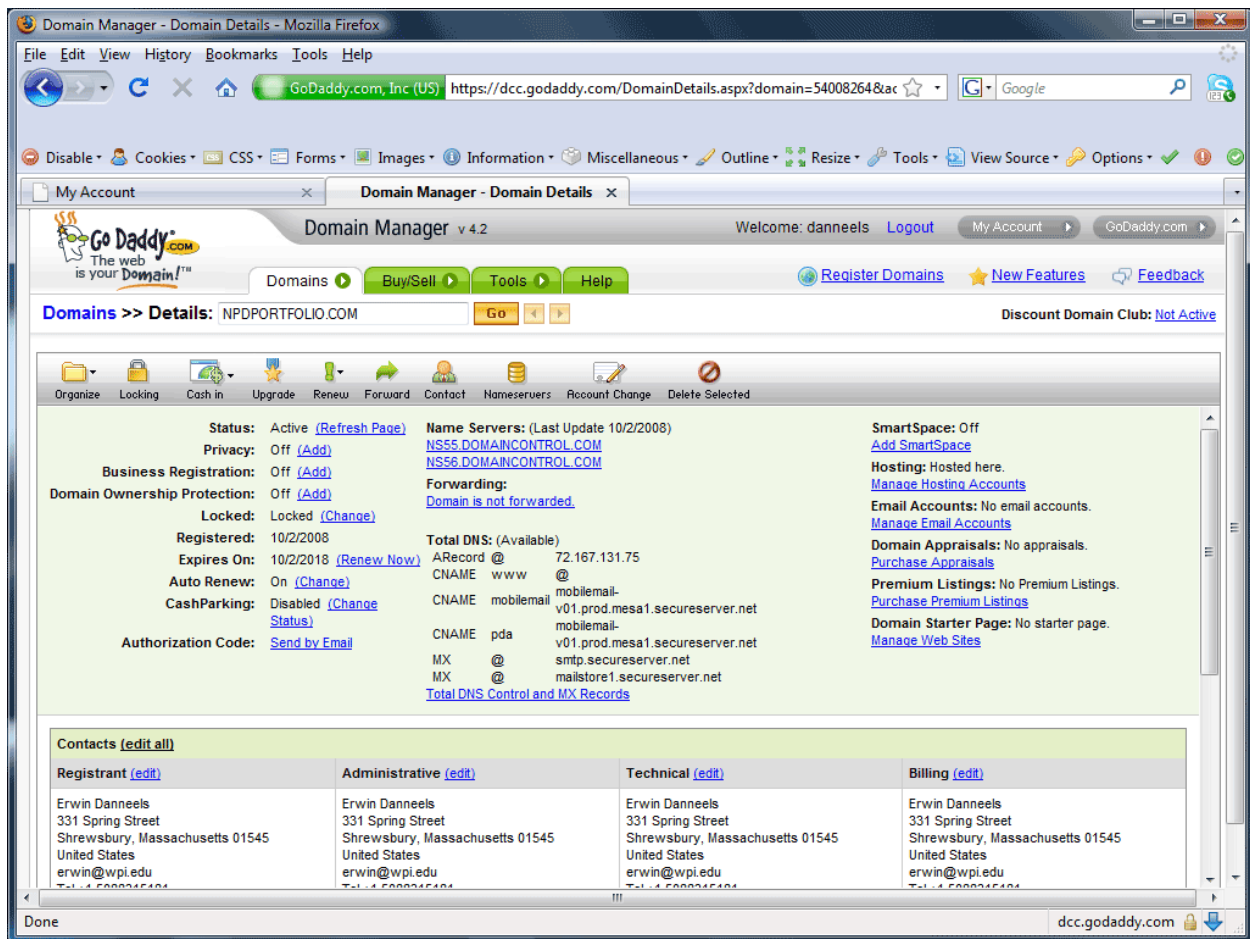


Figure 9 – Npdportfolio.com domain information

Appendix B - GoDaddy.com Hosting Manual

NPDportfolio.com is hosted by GoDaddy.com. The following steps and screenshots show how to access GoDaddy.com's file management (for Adobe Flex files and PHP scripts) and how to access the NPDPortfolio.com MySQL server.

Managing files

Step 1) After logging in to GoDaddy.com, select Hosting - > My Hosting Account.

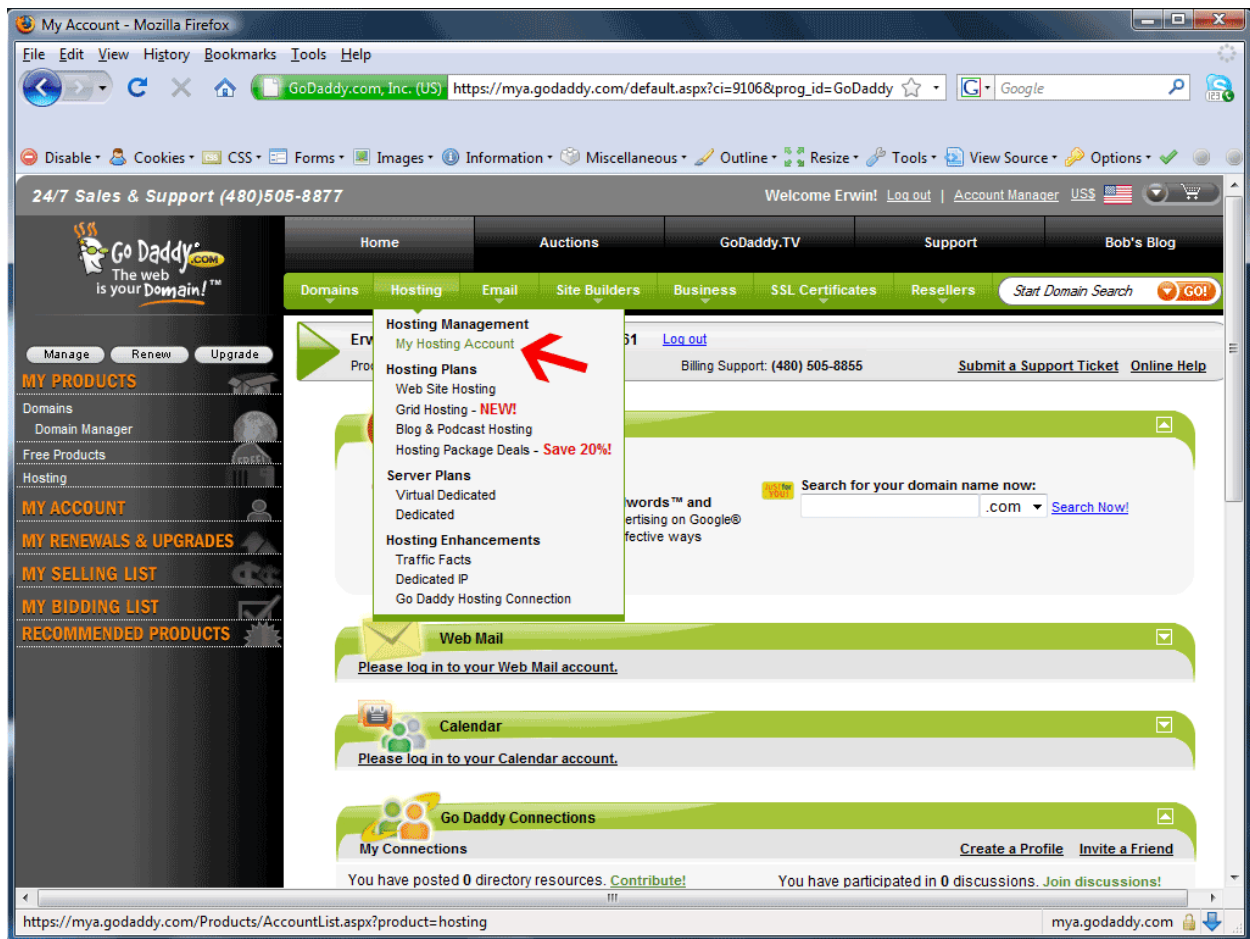


Figure 10 – Selecting “My Hosting Account”

Step 2) Select “Manage Account” for npdportfolio.com

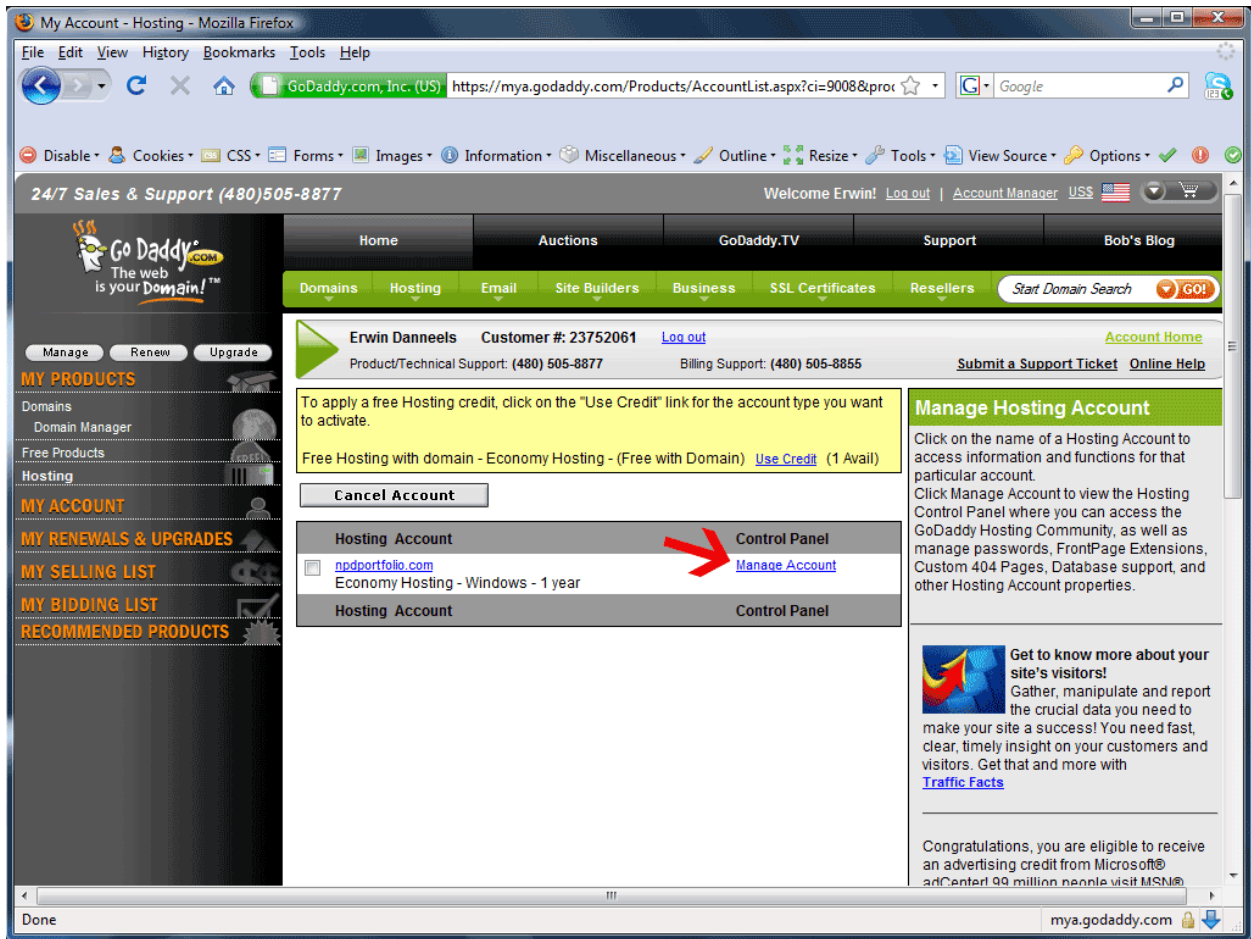


Figure 11 – Selecting “Manage Account”

Step 3) Select the “Your Files” button to access the files on npdportfolio.com

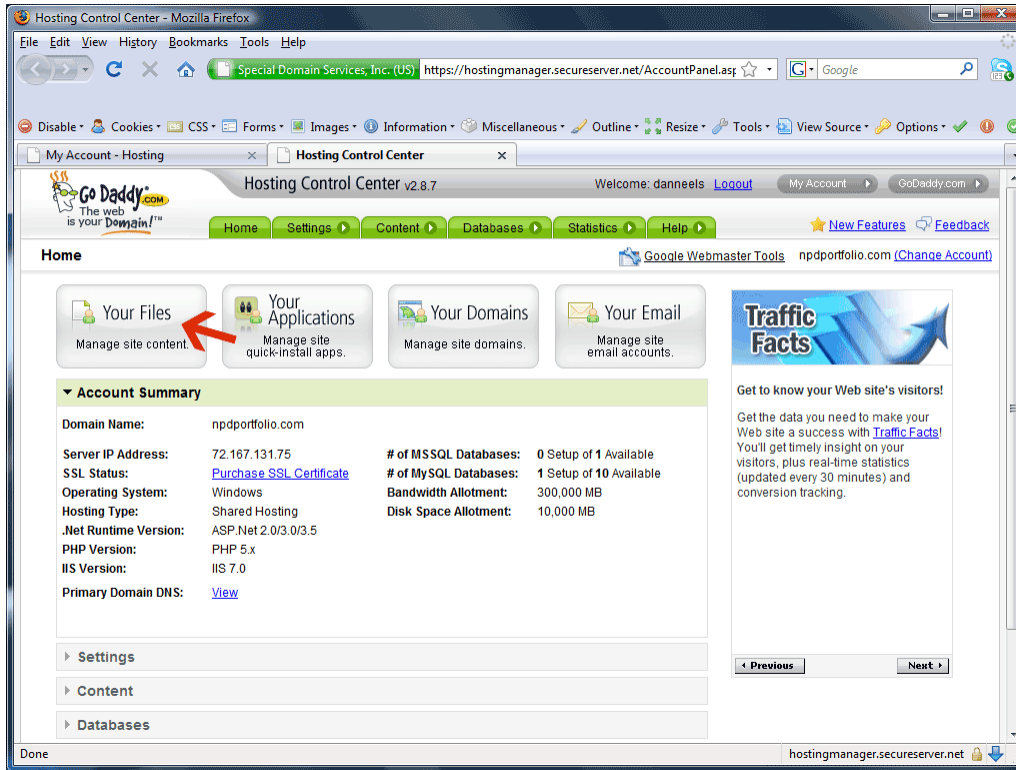


Figure 12 –Selecting “Your Files”

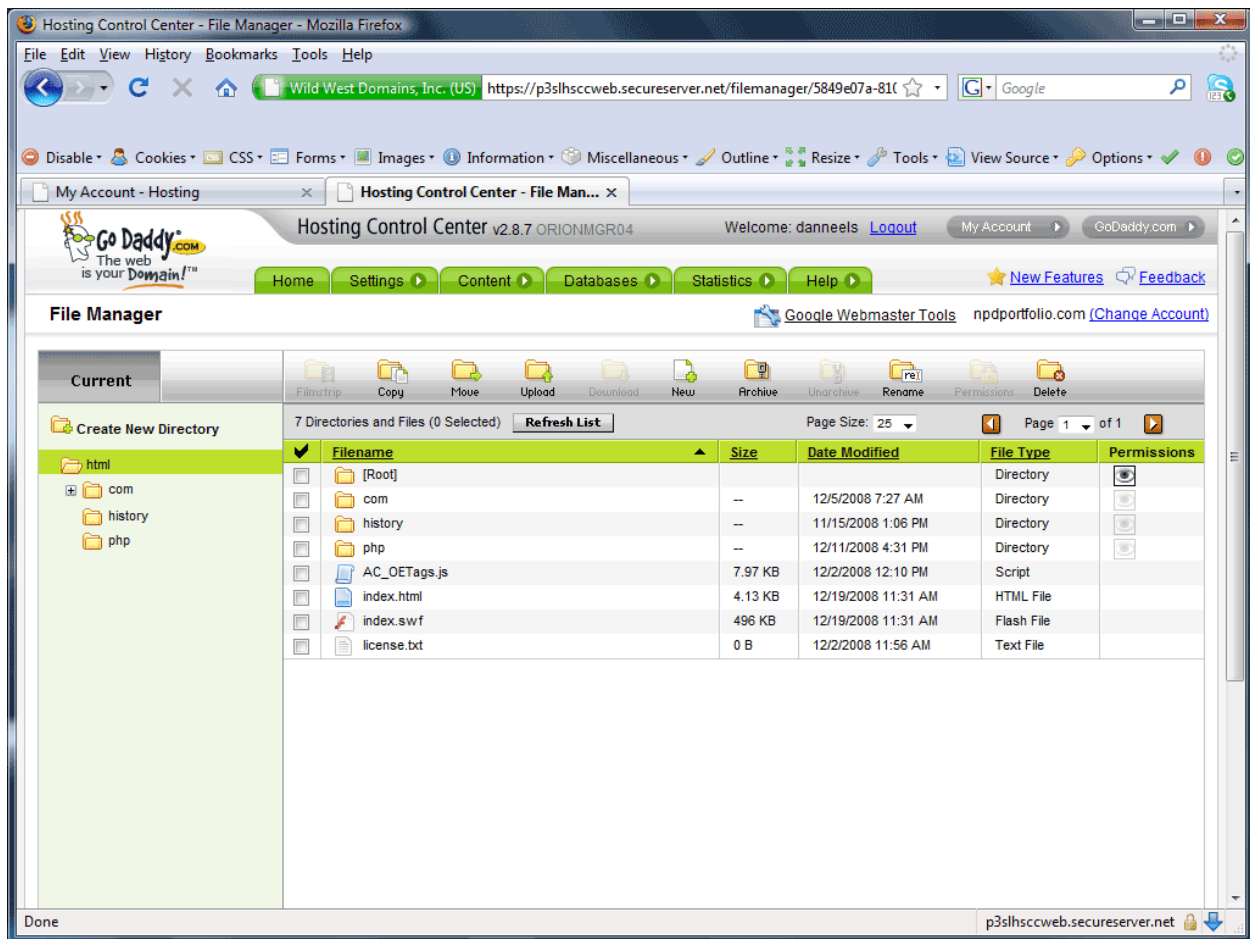


Figure 13 – GoDaddy.com File Manager displaying the site files and folders

Step 4) To edit a file, simply check the file and select the “Edit” option, seen in Figure 14.

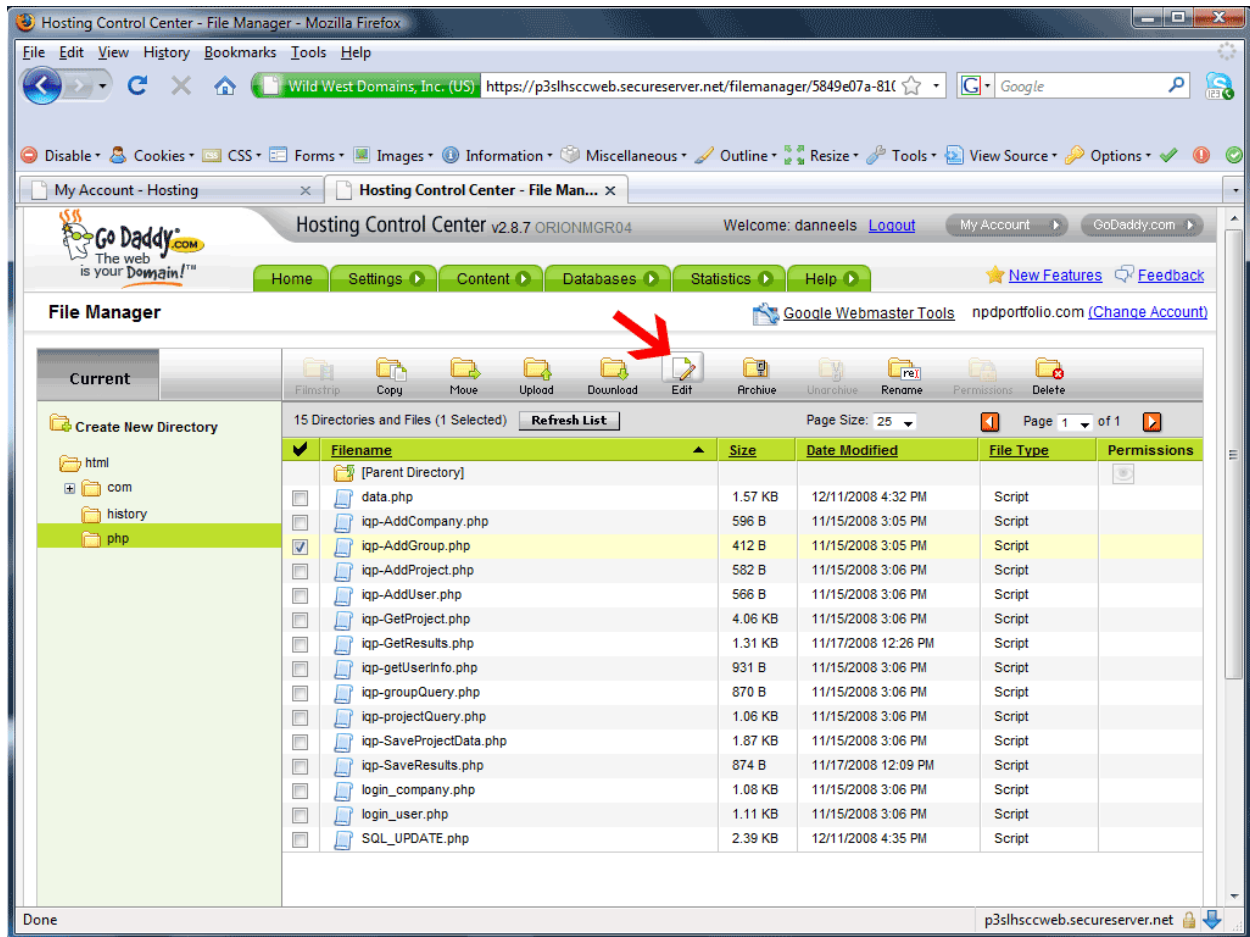


Figure 14 – Selecting “Edit” to edit a php file in the “php” folder.

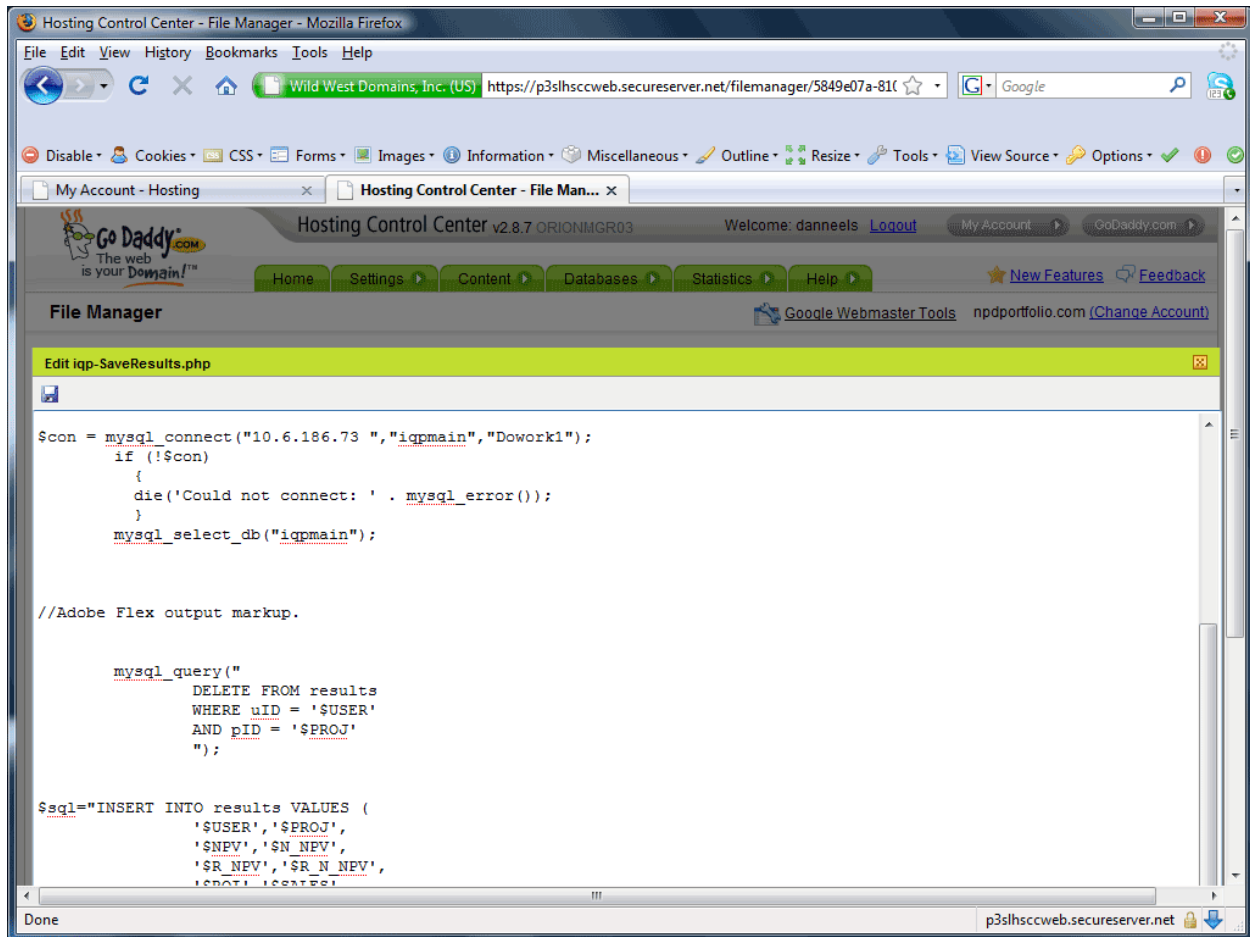


Figure 15 – The php script “iqp-SaveResults.php” in edit mode.

It is common practice to program locally, but the option of editing the php with GoDaddy.com’s user interface is still there.

Accessing the MySQL Database

Step 1) To access the MySQL database, first make sure you are logged in to GoDaddy.com with the correct username/password.

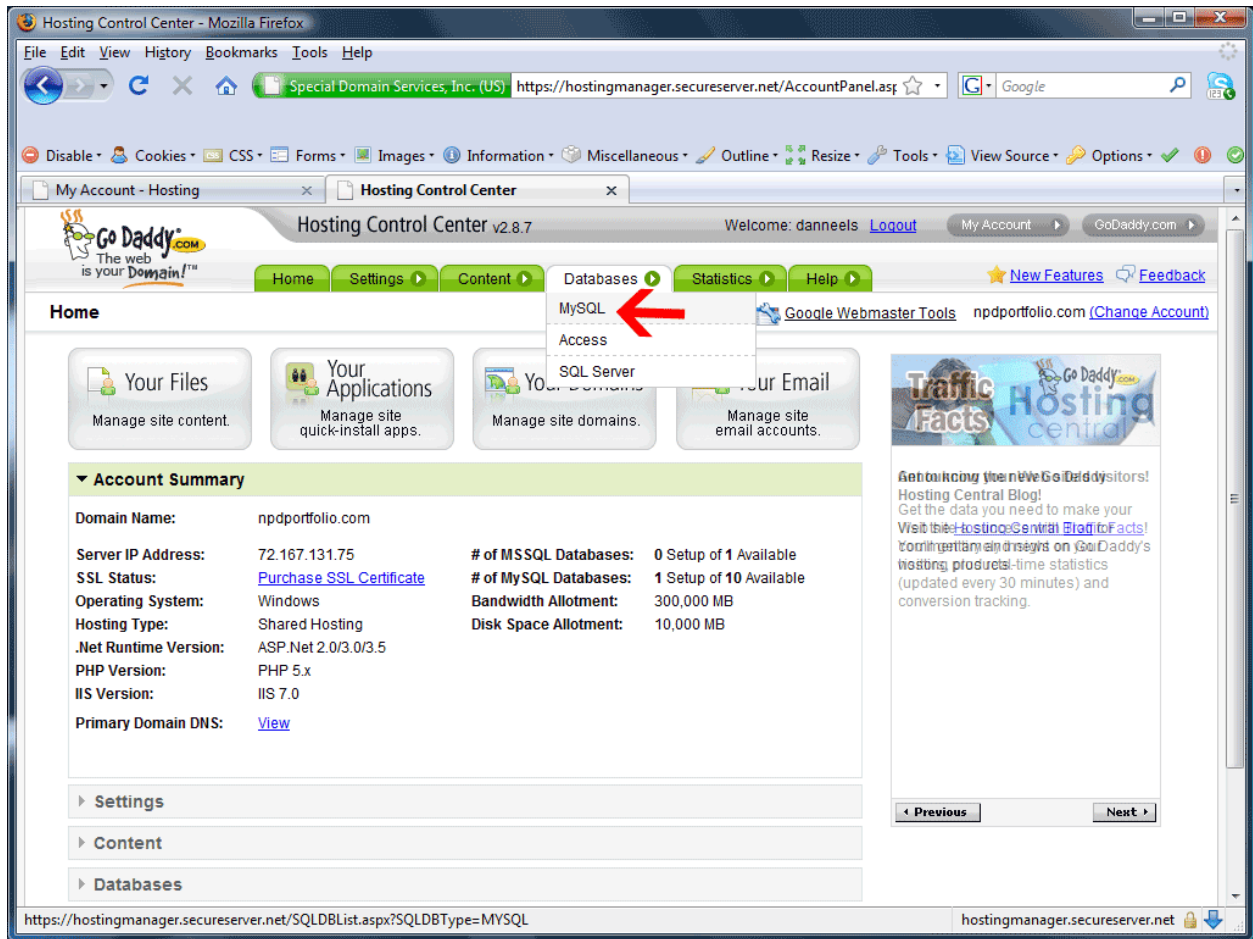


Figure 16 – Accessing the MySQL Database

Step 2) Click Databases → MySQL (as seen in Figure 16).

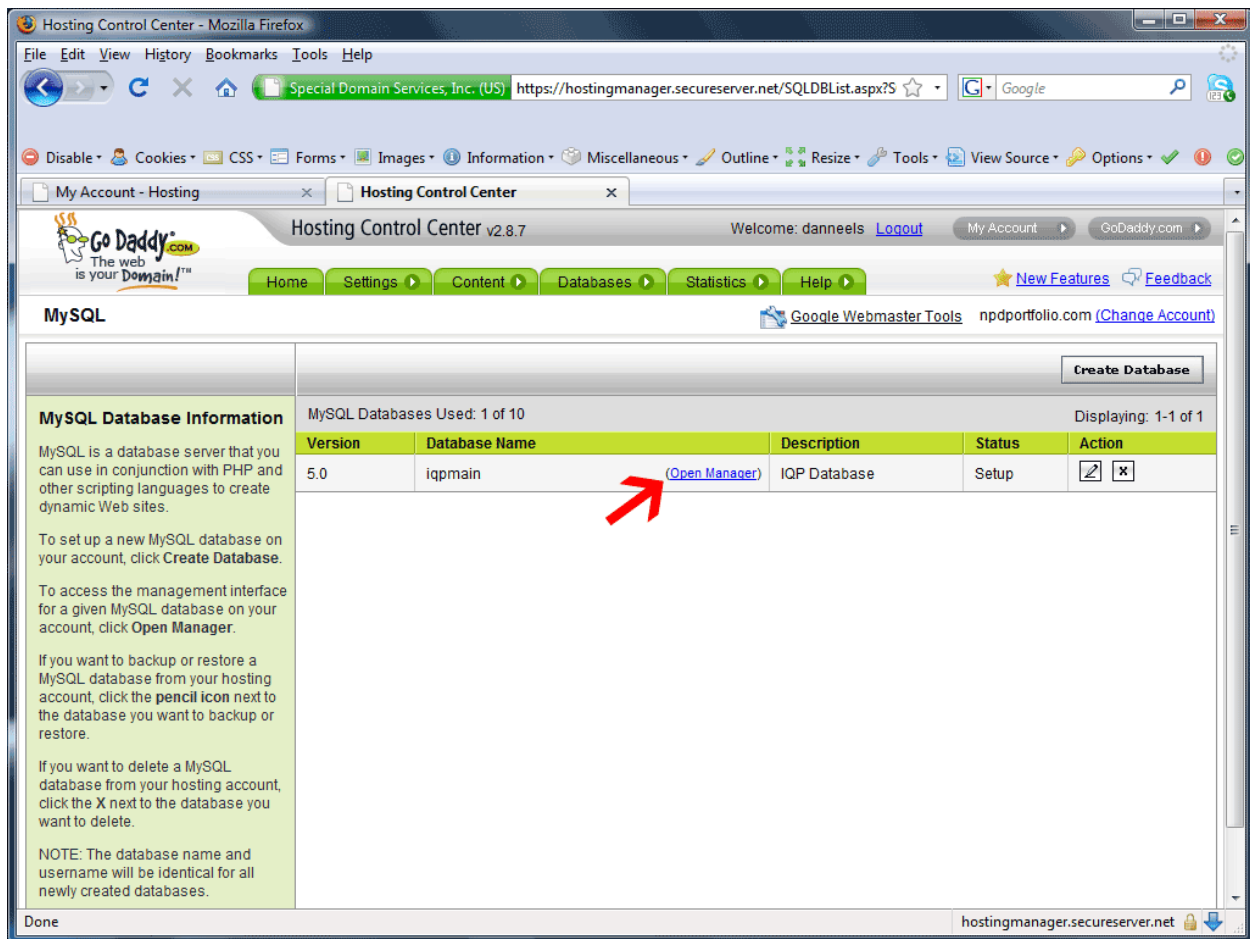


Figure 17 – Opening the MySQL Manager

Step 3) Click the “Open Manager” link (as seen in Figure 17)

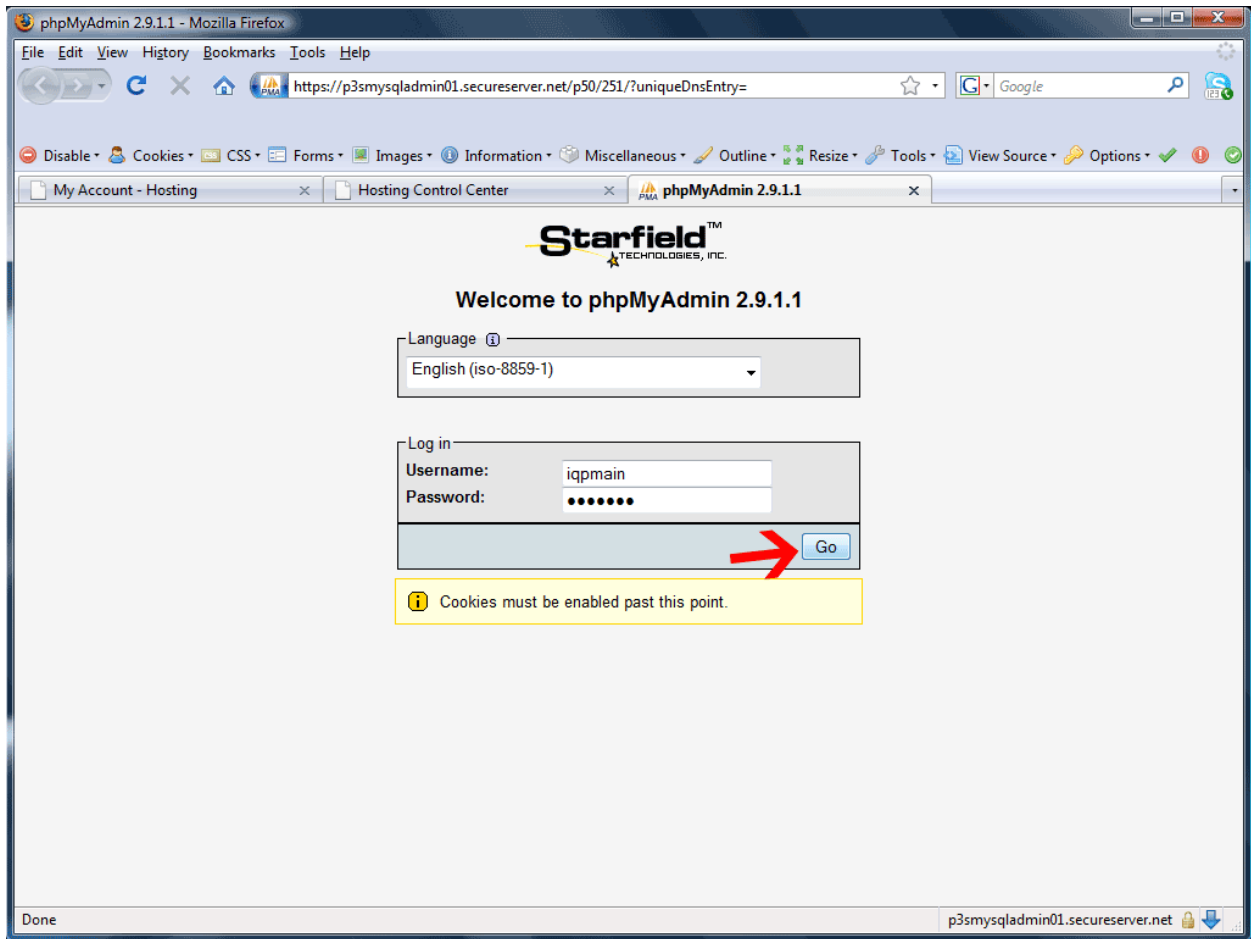


Figure 18 – Logging in to phpMyAdmin

Step 4) Enter the MySQL database username/password, then click “Go” (as seen in Figure 18).

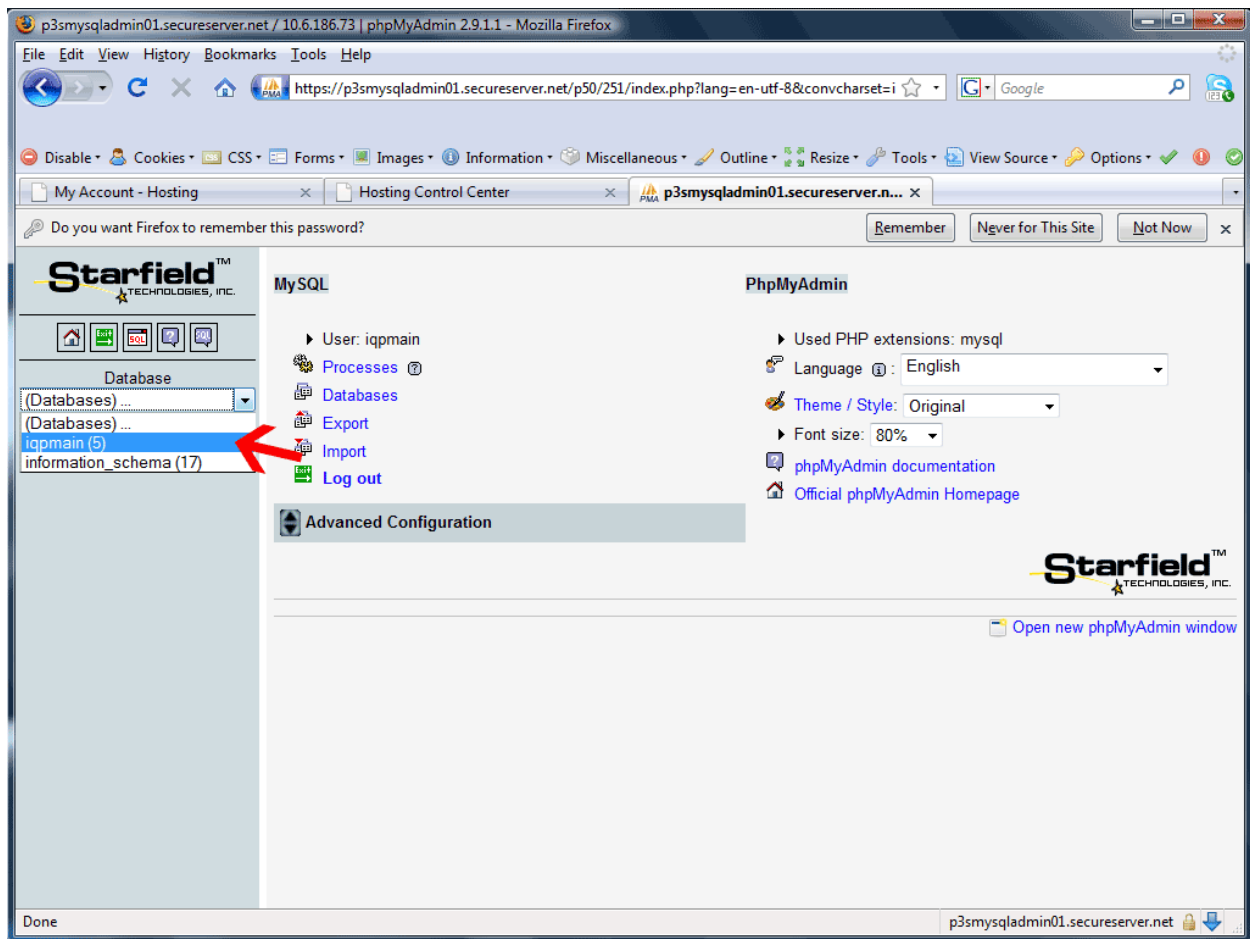


Figure 19 – Opening the ‘iqpmain’ database.

Step 5) Click on the ‘(Databases)...’ dropdown and select ‘iqpmain’ (as seen in Figure 19).

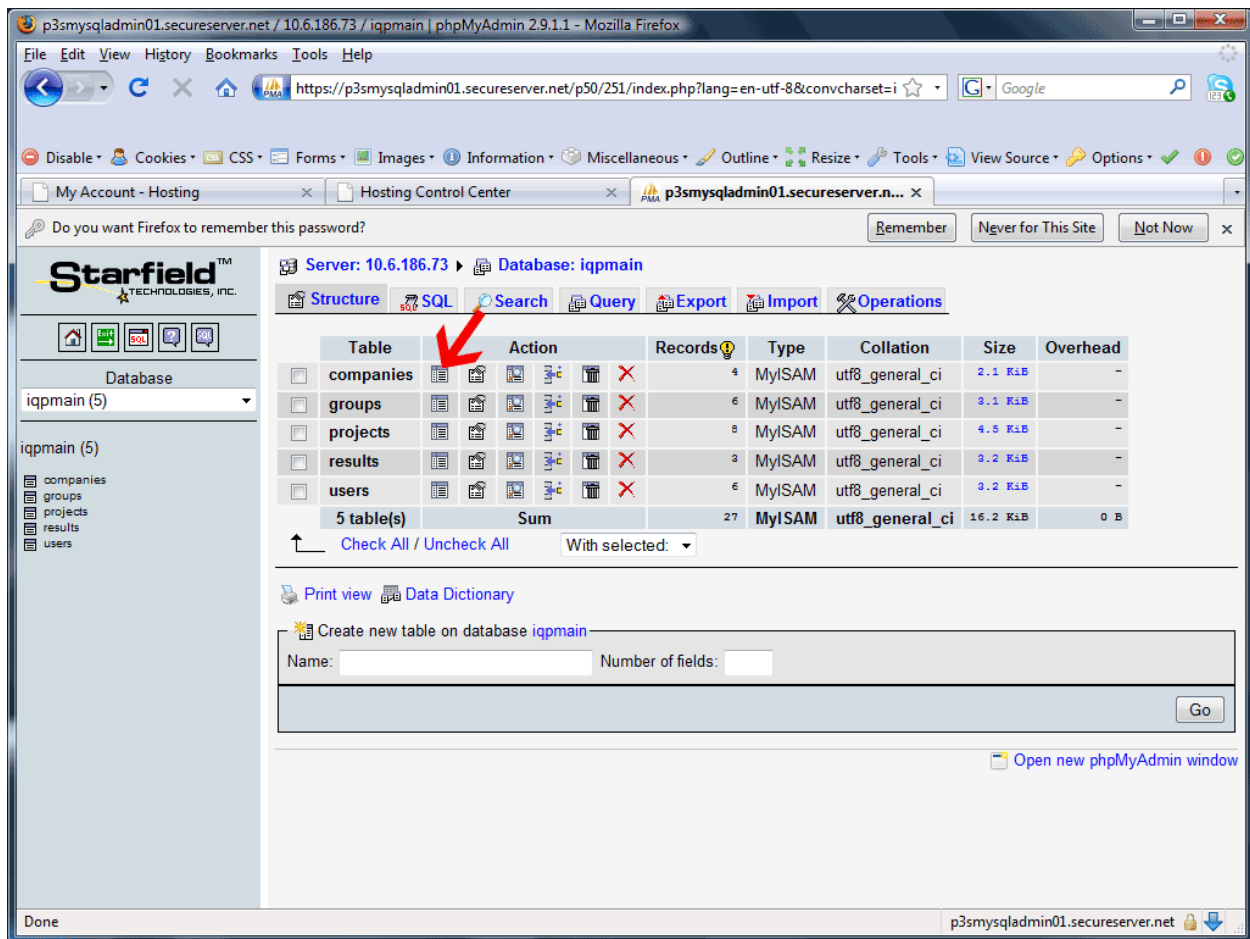


Figure 20 – Opening the ‘companies’ table

Step 6) To open individual tables, simply click the icon to the right of the table name (as seen in Figure 20).

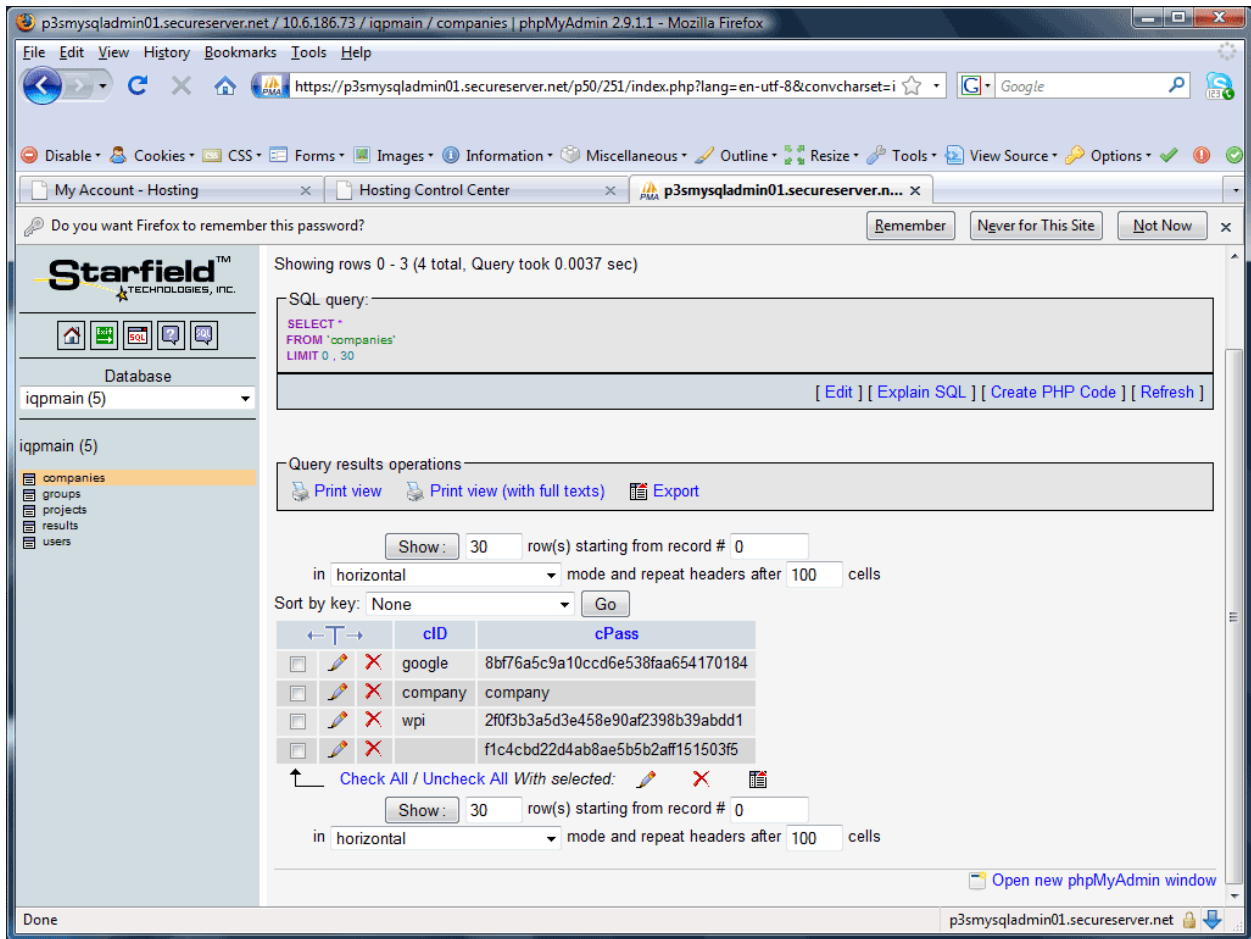


Figure 21 – Company Table View