

**DEVELOPING A WEB-BASED MARKETPLACE FOR
OUTSOURCING SOFTWARE-DEVELOPMENT
SERVICES.**

By

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(03/AS/092)

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DECLARATION BY CANDIDATE

I hereby declare that this dissertation does not incorporate any material previously submitted for any project without acknowledgement and to the best of my knowledge and belief this does not contain any material previously published in writing orally communicated by another person where due reference is made in the text.

The content described in this thesis was particularly implemented by me at Technology Exchange World (Pvt) Ltd and the Faculty of Applied Sciences under the supervision of Mr. Riffai Kariapper and Mr. Janaka Pushpa Kumara:

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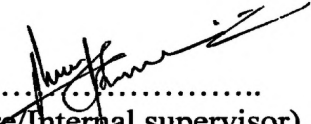

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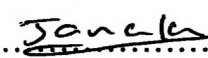
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ABSTRACT

Technology Exchange World (Pvt) Ltd, a professional software development organization was interested in introducing a marketplace for outsourcing software-development services that will facilitate freelancers thousands of outsourcing projects. Posting a project at this system lets the right professional or company to find freelancers and to bid for their work. This system builds a reputation for exceeding their customers' expectations and becomes an extremely cost effective way to outsource works.

The Waterfall model was used to develop the system. At the phase of Requirement Capturing and Analyzing most of the requirements of system were captured by discussing with the business application experts in Technology Exchange World (Pvt) Ltd according to the web-based system that they expected to be implemented. At the phase of System & Software Design, the requirement specifications were studied and system design was prepared. At this phase designing of user interfaces and database were carried out to meet the requirements in high level.

The user interfaces were designed with the scripting language PHP, HTML and style sheet language CSS. The database was designed in MySQL and all the functionalities were divided in modules/units. The system was first developed in small programs called units, which were integrated in the next phase and coding was carried out with PHP, AJAX technology and HTML. Each unit was tested for its functionality at the end of the phase Implementation & Unit testing to verify if the modules/units meet their requirement specifications. The WAMP web server was used to implement the system.

At the phase of Integration & System testing, system units were integrated into a complete system and tested to check if all modules/units coordinate between each other and the system as a whole behaves as per the specifications. The system was implemented to meet the requirements captured in the requirement analysis phase.

The usage of this system gives that service buyers can stretch their budget and save as much as over traditional outsourcing by reducing expenses, increasing efficiencies, aggressively growing business, and creating a sustainable competitive advantage.

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CHAPTER 1

INTRODUCTION

1.1 About Technology Exchange World (Pvt) Ltd:

Technology Exchange World (Pvt) Ltd is a professional software development organization mainly focusing on web based developments. Technology Exchange World (Pvt) Ltd is capable of offering various services and developments, initially web designing and development, maintenance of web sites, designing & development of computer based games, and designing of graphics. Their Vision is "to achieve prosperity through developing achievers". The company has grown rapidly over short time period because of their aggressive business approaches. Cost effective and timely delivery of services, better management are major objectives of Technology Exchange World (Pvt) to win customers confidence.

1.2 About the system:

The system can access as a service buyer or service provider. Therefore in development view system involved with service provider activities and service buyer activities. Therefore main functions and features of the system are;

User profile:

The service providers and service buyers are able to fill their profile details and the profiles can be edited at anytime by the profile creator.

Posting a project

Companies or individuals (Service Buyers) can post their project work with the job description and service buyers are allowed to bid for the projects with the charges and the duration to complete project.

Browsing bided service providers

Service buyers can browse bided service providers through the system.

Finding the developer and accepting the bid

Service buyers can select the developer and agree to a contract with the service providers they choose. Then an email is sent to all bidders, advising them that the

project have been awarded to another developer. The client and Developer enter into a contract that states the deliverables of the task, including due dates and the fees.

During the project

During a project in progress, client and developers collaborate online using an allocated workspace. They can upload and download files, send and receive messages and track the progress of projects in a centralised location.

1.3 Why it is important web-based marketplace for outsourcing

Software-development Services:

Out sourcing is the transfer of information systems development, operation or maintenance to an outside firm or person that provides these services for fee on a temporary or long term basis. Traditionally, firms outsourced IT tasks as a way of controlling costs and dealing with rapid technological changes. While those reasons are still valid, outsourcing has become part of an organization. The outsourcing trend has also affected software vendors, who have adjusted their marketing accordingly.

Therefore developing a web based marketplace for outsourcing software-development services will facilitate freelancers thousands of outsourcing projects.

1.4. Objectives:

1.4.1 Overall Objectives:

The system facilitates freelancers thousands of outsourcing projects to bid and provide their service. Also the service buyers have pool of candidates those who have their reputation through the system as well with their skills to select as their external service provider. Posting a project at this system lets the right professional or company to find freelancers for their projects.

1.4.2 Specific Objectives

- Literature survey about Software Engineering concepts and object oriented design
- Literature survey about PHP and SQL(structured query language) syntax
- Literature survey about AJAX, JavaScript and CSS and their usage.
- Developing a database in MySql.

CHAPTER 2

REVIEW OF LITRATURE

2.1 N-Tier Architecture:

N-tier architecture provides a model for developers to create a flexible and reusable application. By breaking up an application into tiers, developers only have to modify or add a specific layer, rather than have to rewrite the entire application over, if they decide to change technologies or scale down.

N-Tier architecture refers to the architecture of an application that has at least 3 "logical" layers -- or parts -- that are separate. Each layer interacts with only the layer directly below, and has specific function that it is responsible for.

The advantage of using N-Tier architecture is each layer can be located on physically different servers with only minor code changes. Hence they scale out and handle more server loads. And also, what each layer does internally is completely hidden to other layers and this makes it possible to change or update one layer without recompiling or modifying the other layers.

N-Tier application usually has three tiers and they are called the presentation tier, the business tier and the data tier.

Presentation Layer:

Presentation Layer is the layer which is responsible for displaying user interface and "driving" that interface using business tier classes and objects. This layer usually consists of a collection of HTML, or XHTML files, CSS definitions and JavaScript functions.

Business Tier

Business Tier is the layer which is responsible for accessing the data tier to retrieve, modify and delete data to and from the data tier and send the results to the presentation tier. This layer is also responsible for processing the data retrieved and sent to the presentation layer.

Data Tier

The data tier is generally the data in database, along with any data-centric logic like stored procedures. This can involve data stored in more than one database, or even more than one machine. Project has chosen to use MySQL database which doesn't support stored procedures. But lack of stored procedures does not mean that we're going to have SQL code splattered all over pages. Instead, our SQL had been encapsulated in classes whose methods had effectively emulated stored procedures.

2.2 How does the N-tier Architecture works:

N-tier architecture uses several "tiers" of computers (servers) to interpret requests and transfer data between one place and another. The 0th tier is at the source of the data. Each tier is completely independent of all the other tiers, except for those immediately above and below it. The nth tier only has to know how to handle a request from the n+1th tier, and how to forward that request onto the (n-1)th tier (if there is one), and handle the results of the request.

As an example if only have 2 (3 if the user application is considered as a tier) tiers, with one of them being the actual database, or the 0th tier. Using a 1st tier (or middle tier), allows the client to be completely independent of the database. The client simply sends a request to the 1st tier, which interprets it and puts it in a form the 0th tier will understand, and sends it on to the 0th tier. The 0th tier then sends the result back to the 1st tier, which interprets it and packages it up in way the client will understand, and then sends it on to the client. The middle tier(s) does not spend much time interpreting a request and sending it on (only a couple milliseconds), so adding middle

tier servers will not slow down the transfer (using a caching system in addition to the N-tier architecture actually speeds everything up).

2.3 How does Web Application works:

A web application is a collection of static and dynamic web pages. A *static web page* is one that does not change when a site visitor requests it and the web server sends the page to the requesting web browser without modifying it. A dynamic web page is modified by the server before it is sent to the requesting browser.

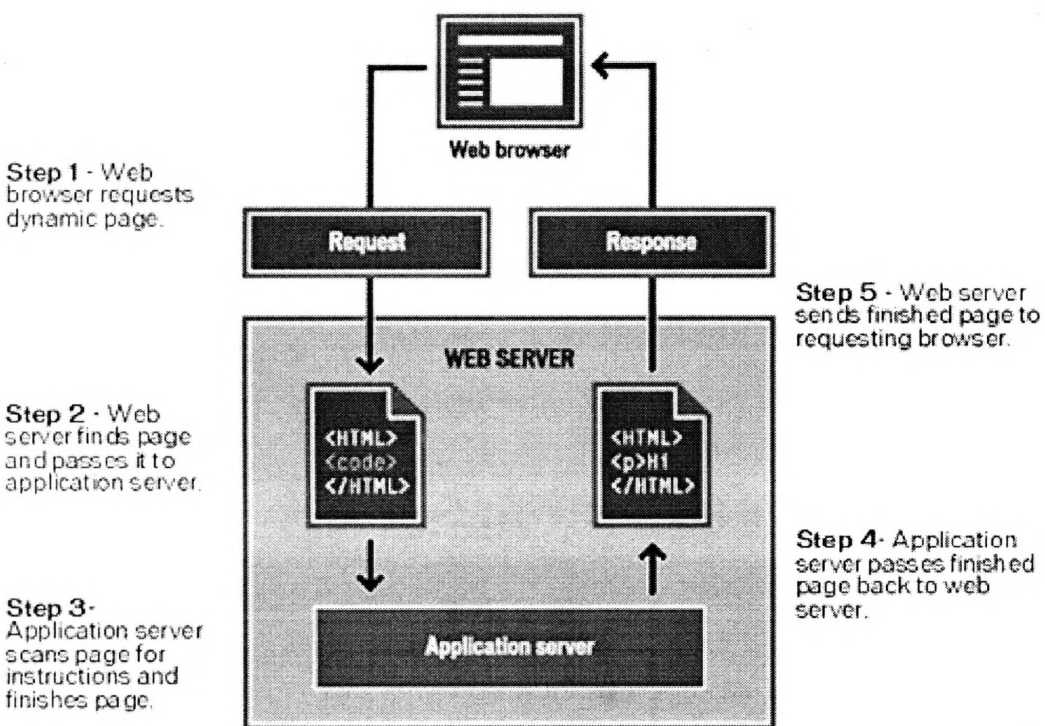


Figure: 2.1 How a web application work (Digitalvertebrae, (2006))

To build web applications, need the following:

- An application server that runs on your web server (or a web server that doubles as an application server, such as Microsoft PWS or IIS)
- If a database or database system (if want to use a database with application)
- A database driver that supports to database

2.3.1 Web Server

A web server is software that serves files in response to request from web browsers. A web server is sometimes called an HTTP server. Common web servers include IIS, Netscape Enterprise Server, iPlanet Web Server, and Apache HTTP Server.

2.3.2 Application Server

An application server is software that helps web server process web pages containing server-side scripts or tags.

Table 2.1 Application servers that use several server technology.

| Server technology | Application server |
|-------------------|---|
| ColdFusion | Macromedia ColdFusion MX |
| ASP.NET | Microsoft IIS 5 with .NET Framework |
| ASP | Microsoft IIS or PWS Sun Chili!Soft ASP |
| JSP | Macromedia JRun IBM WebSphere Apache Tomcat BEA WebLogic |
| PHP | PHP server |

2.3.3 Dynamic web pages:

The "**dynamic**" content on a web page can be changed in response to different contexts or conditions. There are two ways to create this kind of interactivity:

1. **Client-side scripting:**

Change interface behaviors *within* a specific web page, in response to mouse or keyboard actions or at specified timing events

Use presentation technology called rich interfaced pages.

- Client-side scripting languages like JavaScript or ActionScript
- Flash technologies

2. Server-side scripting:

Change the supplied page source *between* pages, adjusting the sequence or reload of the web pages or web content supplied to the browser.

- Use server-side languages such as PHP, Perl, ASP or ASP.NET, JSP, and other languages.

The result of either technique is described as **dynamic web page**.

2.3.4 Client /Server Technology

Client/Server architecture is an application design approach that results in the decomposition of an information system into a small number of server functions, executing on one or more hardware platforms, that provide commonly used services to a larger number of client functions, executing on one or more different but interconnected hardware platforms, that perform more narrowly defined work in reliance on the common services provided by the server functions.

2.4 PHP

2.4.1 Introduction to PHP

PHP stands for **H**ypertext **P**reprocessor and is a server side scripting language that is used in web-based applications. The PHP scripts are embedded in the web-pages , along with HTML , to create a robust web application that can generate dynamic content that is displayed to the user.

2.4.2 Features of PHP

PHP is usually

- Easier to use and implement
- Structure tends to be more flexible
- Open source software (OOS)
- Server-side scripting language
- Supports many database (MySQL, Informix, PostgreSQL, Generic ODBC, Oracle, Sybase etc.)
- Easy to learn and runs efficiently on the server side
- Compatible with almost all servers used today (Apache, IIS, etc.)

2.4.3 PHP Syntax

When a web browser on a client computer connects to a PHP page, the PHP scripts are executed and the results are returned to the browser, along with any HTML on that page. When the PHP preprocessor sees the opening tag, it switches from HTML mode to PHP mode. When it sees the closing tags, it switches back to HTML mode. Everything between the opening tag and closing tag is treated as PHP script.

```
<html>
<body>
  <?php

  ?>
</body>
</html>
```

2.5 What is Database?

A database is a separate application that stores a collection of data. Each database has one or more distinct APIs for creating, accessing, managing, searching, and replicating the data it holds.

2.5.1 MySQL

A database server (MySQL) is a program that can store large amounts of information in an organized format that's easily accessible through scripting languages like PHP. MySQL is the most popular open source database server. MySQL is a fast, easy-to-use RDBMS used being used for many small and big businesses. MySQL is developed, marketed, and supported by MySQL AB, which is a Swedish company. MySQL is becoming so popular because of many positive reasons.

The free MySQL Database is very often used with PHP. The MySQL Database Software is a client/server system which consists of a multi-threaded SQL server that supports different backends, several different client programs and libraries, administrative tools, and a wide range of application programming interfaces (APIs)

MySQL is developed, marketed, and supported by MySQL AB, which is a Swedish company. MySQL is becoming so popular because of many good features.

Features of MySQL:

- MySQL is a very powerful program in its own right. It handles a large subset of the functionality of the most expensive and powerful database packages.
- Uses a standard form of the well-known SQL data language.
- Works on many operating systems and with many languages including PHP, PERL, C, C++, JAVA etc.
- Works very quickly and well even with large data sets.
- Very friendly to PHP
- The most appreciated language for web development.
- MySQL supports large databases, up to 50 million rows or more in a table. The default file size limit for a table is 4GB, but you can increase this (if your operating system can handle it) to a theoretical limit of 8 million terabytes (TB).
- MySQL is customizable.

2.5.2 PHP with MySQL

The free MySQL Database is very often used with PHP. Using PHP and MySQL together becomes a natural choice because of many factors.

MySQL works very well in combination of various programming languages like PERL, C, C++, JAVA and PHP. Out of these languages, PHP is the most popular one because of its web application development capabilities. There are PHP functions that can use with MySQL have the following general format

mysql_function(value1, value2);

- PHP and MySQL open source software
- PHP and MySQL have community support
- PHP and MySQL are fast combination.

2.5.2.1 WAMP server:

WAMP server is Windows Apache MySQL PHP Server all bundled into one nice package. This package is great to test projects; It don't need to upload every time we need to test a change. We can test everything from our own Windows machine.

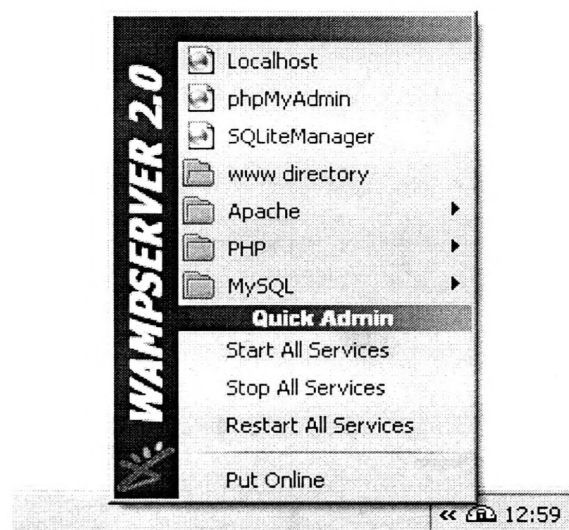


Figure 2.2 WAMP server.
(Bourdon R, (2004))

2.5.2.2 How to Connect to MySQL database

In order to work in a database in a PHP application should create a database connection

In PHP, this is done with the `mysql_connect ()` function.

```
mysql_connect (servername, username, password);
```

Most important parameters of the `mysql_connect()` function are

servername: Specifies the server to connect to.

username: Specifies the username to log in with

password: Specifies the password to log in with.

Opening connection:

```
<?php
$con = mysql_connect ("servername "," Username "," Password ");
if (!$con)
{
    die('Could not connect: ' . mysql_error());
}
mysql_close($con);
?>
```

2.6 HTML

Hyper Text Markup Language (HTML) is an SGML (Standard Generalized Markup Language) application conforming to Internal Standard ISO 8879, and is widely regarded as the standard publishing language of the World Wide Web.

2.7 CSS

CSS is a technology specification published by the W3C that is implemented in modern browsers, especially those browsers based on the Mozilla rendering engine, such as Chimera, Phoenix, Galeon and the Netscape 6 and 7 series. Cascade Styles

define how to display HTML elements. Styles are normally stored in Style Sheets and are normally saved in external .css files.

2.7.1 How to insert style sheet

External style sheet can be used to change the appearance of an entire Web site by changing one file. Each page should link to the style sheet using the <link> tag.

```
<head>
```

```
    <link rel="stylesheet" type="text/css" href="style.css" />
</head>
```

2.8 JavaScript

JavaScript is a Scripting language that is supported by all major browsers like Netscape and Internet Explorer.

2.9 AJAX

AJAX is an acronym for Asynchronous JavaScript And XML and is a technology that runs in your browser. It uses asynchronous data transfer (HTTP requests) between the browser and the web server and allows web pages to request certain information from the server instead of whole pages. When AJAX used with JavaScript, JavaScript can communicate directly with the server, using the JavaScript **XMLHttpRequest** object. With this object, your JavaScript can trade data with a web server, without reloading the page.

2.10 Software Engineering:

Software Engineering is an engineering discipline which is concerned with all aspects of software production. The Software Engineering subject uses a systematic approach towards developing any software project. Software Engineering includes planning and developing strategies, defining time-lines and following guidelines in order to ensure

the successful completion of particular phases, following predefined Software Development Life-Cycles, using documentation plans for follow-ups etc.

CHAPTER 3

SOFTWARE DEVELOPMENT PROCESS

3.1 Software Process:

The software process is the set of activities and associated results whose goal is the development or evolution of software.

There are four fundamental process activities which are common to all software processes.

Software Specification: The functionality of the software and its development constrains.

Software Development: Production of the software System.

Software validation: The software must be validated to ensure that it does what the customer wants.

Software evolution: The software must evolve to meet changing customer needs.

3.2 Software Process model:

Software process model is a simplified representation of a software process presented from a particular perspective.

Ex:- Workflow Perspective – Sequence of activities

3.3 Different Life Cycles Models:

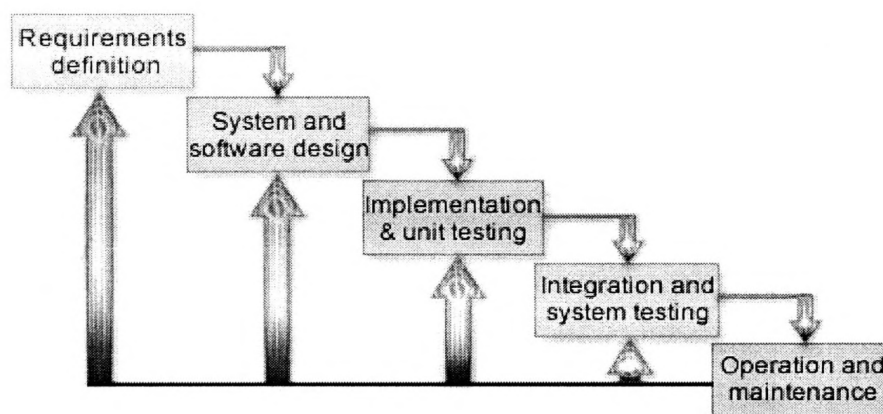
1. Traditional/Waterfall Software Development Model
2. Prototyping Life Cycle
3. Iterative Enhancement Life Cycle Model
4. Spiral Life Cycle Model
5. Object Oriented Methodology
6. Dynamic System Development Method

3.4 Why better Software Process model need:

Different organizations use different processes to produce the same type of product. Different types of product may be produced by an organization using different processes. However, some processes are more suitable than others for some type of application. If the wrong process is used, this will probably reduce the quality or the usefulness of the software product to be developed. Modifying software usually takes up more than 60% of total software costs. This percentage is increasing as more and more software is produced and has to be maintained. Designing software for change is therefore essential and better software process model should be selected.

3.5. System Development Life Cycle (SDLC) Model

This is also known as Classic Life Cycle Model (or) Linear Sequential Model (or) Waterfall Method. This waterfall model is an approach to a sequential development process that emphasizes completing a phase of the development before proceeding to the next phase. In this model development is seen as flowing steadily downwards (like a waterfall model) through the phases of conception, Initialization, Analysis, Design (Validation), Construction, Testing and maintenance. The first formal description of the waterfall model was stated in an article which was published in 1970 by Winston W. Royce (1929–1995).



Waterfall Model

Figure 3.1 Waterfall Model

In conjunction with certain phase completions, a baseline is established that “freezes” the products of the development at that point. If a need is identified to change these products, a formal change process is followed to make the change.

3.5.1 Reasons to select Waterfall Method

- Waterfall model provides a template into which methods for analysis, design, coding, testing and support can be placed.
- It remains a widely used procedural model for software engineering.
- Easy to explain to the user
- Helps to plan and schedule the project
- Verification at each stage ensures early detection of errors / misunderstanding

3.5.2 The disadvantage of the waterfall Method:

- Real project rarely follow the sequential flow that the model proposes. Although the waterfall model can accommodate iteration, it does so indirectly. As a result, change can cause confusion as the project team proceeds.
- The waterfall model stipulates that the requirements should be completely specified before the rest of the development can proceed.
- A working version of the program will not be available until late in the project time-span.

3.6 Prototyping Software Life Cycle Model:

In the Prototyping Software Life Cycle Model, instead of freezing the requirements before a design or coding can proceed, a throwaway prototype is built to understand the requirements. This prototype is developed based on the currently known requirements. Development of the prototype undergoes design, coding and testing phases. But each of these phases is not done very formally or thoroughly. By using this prototype, the client can get an “actual feel” of the system, since the interactions

with prototype can enable the client to better understand the requirements of the desired system.

The process model of the prototyping approach is shown in the figure below.

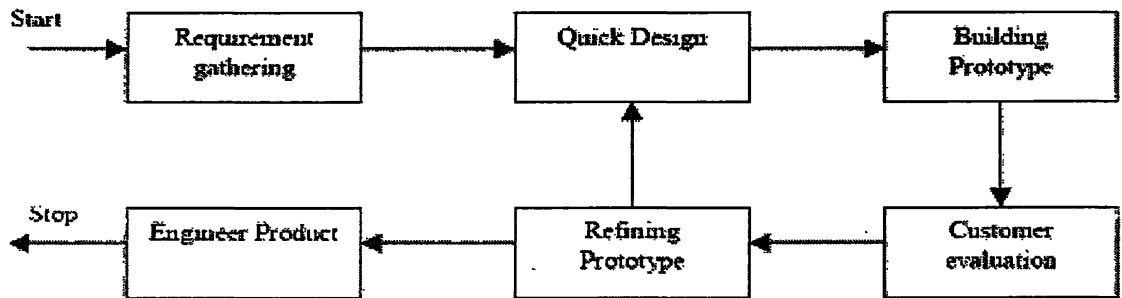


Figure 3.2 Prototyping model

3.7 Software Requirement Analysis

The process of establishing the services the system should provide and constrains under which it must operate is called requirement engineering process.

Some of the problems that arise during the requirements engineering process are result to failing to make a clear separation between these different levels of description to make this separation there are terms

1. Requirement definition:

Requirement definition is a statement in a natural language with diagrams, of what services the system is expected to provide and the constrains under which it must operate.

2. Requirement Specification:

Requirement specification is a structure document which sets out the system services in detail.

3. Software Specification:

A detailed software description which can serve as a basis for a design or implementation

3.8 Types of Requirement

1. User Requirements;

Statements in natural language plus diagrams of the services the system provides and its operational constraints

2. System Requirement;

A structured document setting out detailed descriptions of the system services.

3. Software Specification;

A detailed software description which can serve as a basis for a design or implementation.

3.9 The Requirement Engineering Process

The requirement engineering process is the set of activities that lead to the requirement definition and requirements specification. Other information, such as a report on the feasibility of the system and a software specification, may also be produced in this process. There are four principal stages in this process:

(1). Feasibility study:

An estimate is made of whether the identification user needs may be satisfied using current software and hardware technologies. The study will decide if the proposed

system will be cost-effective from a business point of view and if it can be developed given existing budgetary constraints. A feasibility study should be relatively cheap and quick.

(2). Requirement analysis:

This is the process of driving the system requirement through observation of existing systems, discussion with potential users and procurers, task analysis and so on. This may involve the development of one or more different system models.

(3).Requirement definition:

Requirement definition is the activity of translating the information gathered during the analysis activity into a document that defines a set of requirements. These should accurately reflect what the customer wants.

(4).Requirement specification:

A detailed and precise description of the system requirement is set out to act as a basis for a contact between client and software developer .The creation of this document is usually carried out in parallel with some high-level design .The design and requirement activities influence each other as they developed.

3.10 The Software Requirement Specification

System requirements are expected in a software requirements document. The software requirements document (sometimes called the software requirement specification or SRS) is the official statement of what is required of the system developers.

The requirement document includes the requirement definition and the requirement specification. In some cases, these may not be presented separately but integrated into a single description.

3.11 System analysis and Design

In the system analysis and design phase, the software development process, the software's overall structure and its nuances are defined. In terms of the client/server technology, the number of tiers needed for the package architecture, the database design and the data structure design are all defined in this phase. A software development model is thus created. Analysis and Design are very crucial in the whole development cycle. Any glitch in the design phase could be very expensive to solve in the later stage of the software development. Much care is taken during this phase. The logical system of the product is developed in this phase.

3.12 Code Generation

The design must be translated into a machine-readable form. The code generation step performs this task. If the design is performed in a detailed manner, code generation can be accomplished without much complication. Programming tools like compilers, interpreters, debuggers are used to generate the code. Different high level programming languages like C, C++, Pascal and Java are used for coding. With respect to the type of application, the right programming language is chosen.

3.13 Testing

Once the code is generated, the software program testing begins. Different testing methodologies are available to unravel the bugs that were committed during the previous phases. Different testing tools and methodologies are already available. Some companies build their own testing tools that are tailor made for their own development operations.

3.14 Maintenance

The software will definitely undergo changes once it is delivered to the customer. There can be many reasons for these changes. Change could happen because of some unexpected input values into the system. In addition, the changes in the system could directly affect the software operations. The software should be developed to accommodate changes that could happen during the post implementation period.

CHAPTER 4

REQUIREMENT ANALYSIS

4.1 REQUIREMENT CAPTURE:

A web-based marketplace for outsourcing software-development services facilitate freelancers thousands of outsourcing projects to identify requirements of the system should to be implemented

- Conducted formal meeting with business application experts in Technology exchange (Pvt) Ltd.
- Reviewed similar systems
- Study literature related to outsourcing business and trends

4.2 FUNCTIONAL REQUIREMENT:

There are two types of users in 'directfreelancers' as service providers and service buyers who can access the system get the service of it.

Table 4.1 Users Activities Table

| Potential Users | Activities and facilities involved with the system |
|-----------------|--|
| Service Buyers | <ul style="list-style-type: none"> ✓ Have provided online registration system. ✓ All service buyers are facilitates a user name and a password to log in to the system ✓ All registered service buyers can post their projects to 'directfreelancers' by filling all the required information about Project. ✓ The service buyers can search for service providers by searching service providers' profile. ✓ Service buyers can receive e-mail notification about bided service providers, no of bids received for the project if they needed. ✓ When a service provider is selected the project service buyer are allowed make final deal through system |

| | |
|-------------------|--|
| Service Providers | <ul style="list-style-type: none"> ✓ The Service providers also facilitated to join to the system with online registration ✓ Service buyers are allowed browse the projects in 'directfreelancers' ✓ Service buyers are allowed to bid the projects with their details. ✓ Service providers can receive mail notifications about newly posted projects to the system ✓ When service providers are selected to the system they can contact the service buyer of the project with messages. |
| Administrator | <ul style="list-style-type: none"> ✓ Administrator can login to the system with a user name and a Password. ✓ Administrator can add new users and post new projects to the system. ✓ Administrator can view bids for each project. ✓ Search projects. ✓ Select most suitable service provider for the each project |

4.2.1 Detailed functional requirement for Service buyers:

- The service buyers can register to the system by filling information fields in registration form and select a username and password to log in to system.
- After log in to the system can post project to the system by filing requirement fields in project.php
- The user registration information and project details are stored in database.
- Users can (buyers/providers) search projects using project details in database system.
- Service buyers can edit their profile including more information.
- These service buyers

4.2.2 Detailed functional requirement for Service providers:

- Any user that access the system as service provider can register to the system as free member or paid member
- Therefore service providers have to fill information to register to the system if they agree to Term's and services of directfreelancers
- The service providers can access the system as a free member or paid member
- Registered service providers can edit their profile details and manage their profiles.
- When the service providers are browsed through the system the details of the service providers' profiles can be viewed in the system.
- Service providers can browse projects in any project category (like PHP, Java...) and bid for the project by filling information including bid amount for the project, duration for the project to complete etc.
- Service providers can edit their profile by providing more detail like areas of expertise, experiences and allowing to attach document of any related also.

4.2.3 Work Area for Administrator:

- Administrator can log in to the system using the administrator password and user name.
- Administrator can register new user to the system by filling information of the user to the system
- New project can be post to the system by providing project details to the system.
- Administrator can search project in admin panel
- Also administrator is responsible for viewing all bids of each project.
- Administrator is responsible for selecting service providers for each project considering bids for a project.
- Check for any terms and condition violation of system by users
- Take actions for users who violate the term and condition of the system.

4.3 NON FUNCTIONAL REQUIREMENT:

Non-functional requirements specify constraints on the services or functions offered by the system such as timing constraints, constraints on the development process that can be used to judge the operation of a system, rather than specific behaviors.

- System must be provided user friendly environment.
- The system should be more reliable to user to attach their official and confidential document.
- Ability to browse project very easily.
- General users should not be allowed to access Administration module. Only administrator has the right to access Administration module.
- Some of information should not be shown to the general users of the system and only authorized users should be able to view this information.
- The message passing between service buyers and service providers allowed to limited condition.
- The contact information is not allowed send through system.
- Increasing system security (ex: user login)

CHAPTER 5

SYSTEM DESIGN AND IMPLEMENTATION

5.1 System Design:

System design is the process or art of defining the architecture, components, modules, interfaces, and data for a system to satisfy specified requirements. In software engineering, designing focuses on transforming requirements into implementable version of the software system.

5.2 Use Case Diagrams:

A Use case diagram is a graphical view of some or all of the actors, use cases, and their interactions identified for a system. Use cases represent the functionality provided by the system; that is, what capabilities will be provided to an actor by the system. The collection of use cases for a system constitutes all the defined ways the system may be used. Each system typically has a Main Use Case diagram, which is a picture of the system boundary (actors) and the major functionality provided by the system (use cases).

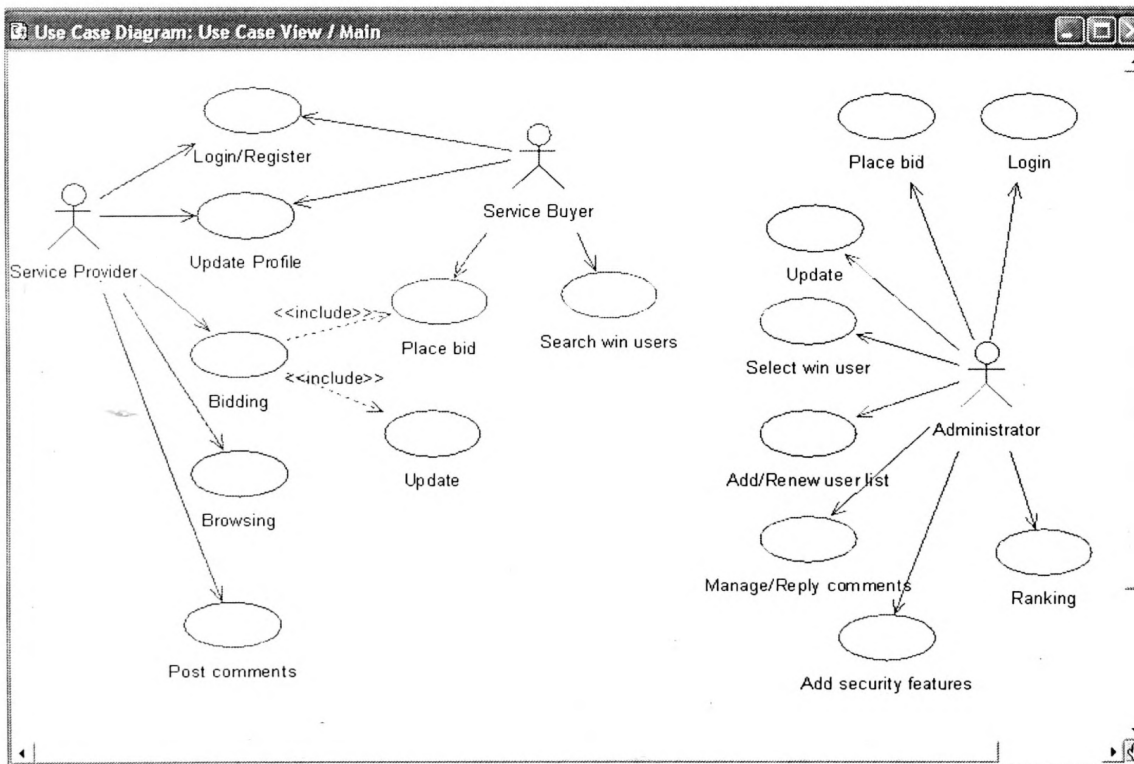


Figure 5.1 Use case diagram for the *directfreelancers* system

The use case diagram was designed according to the user requirements gathered. The use-case model consists of actors and use-cases. Actors represent the clients (customers) or any other software system. Use-cases represent the behavior of the system and the use-case description shows how the system interacts step-by-step with the actors. The use-cases function as a unifying thread throughout the system's development. A use case is a high-level piece of functionality that the system will provide. An actor is anyone or anything that interacts with the system being built. One of the major benefits of a Use Case diagrams is better communication about the system.

5.3 Class Diagram:

In the Unified Modeling Language (UML), a class diagram is a type of static structure diagram that describes the structure of a system by showing the system's classes, their attributes, and the relationships between the classes.

An object is any person, place, thing, concept, event, screen, or report applicable to your system. Objects both know things (they have attributes) and they do things (they have methods). A class is a representation of an object and, in many ways; it is simply a template from which objects are created.

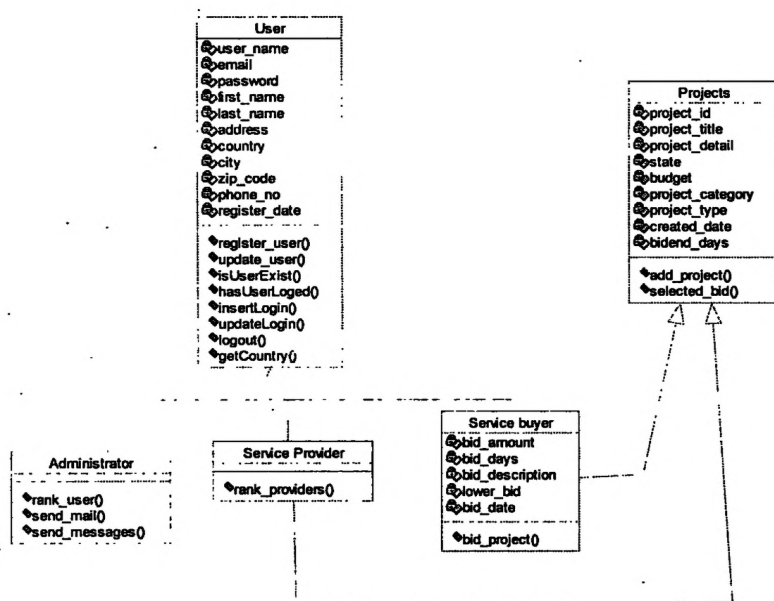
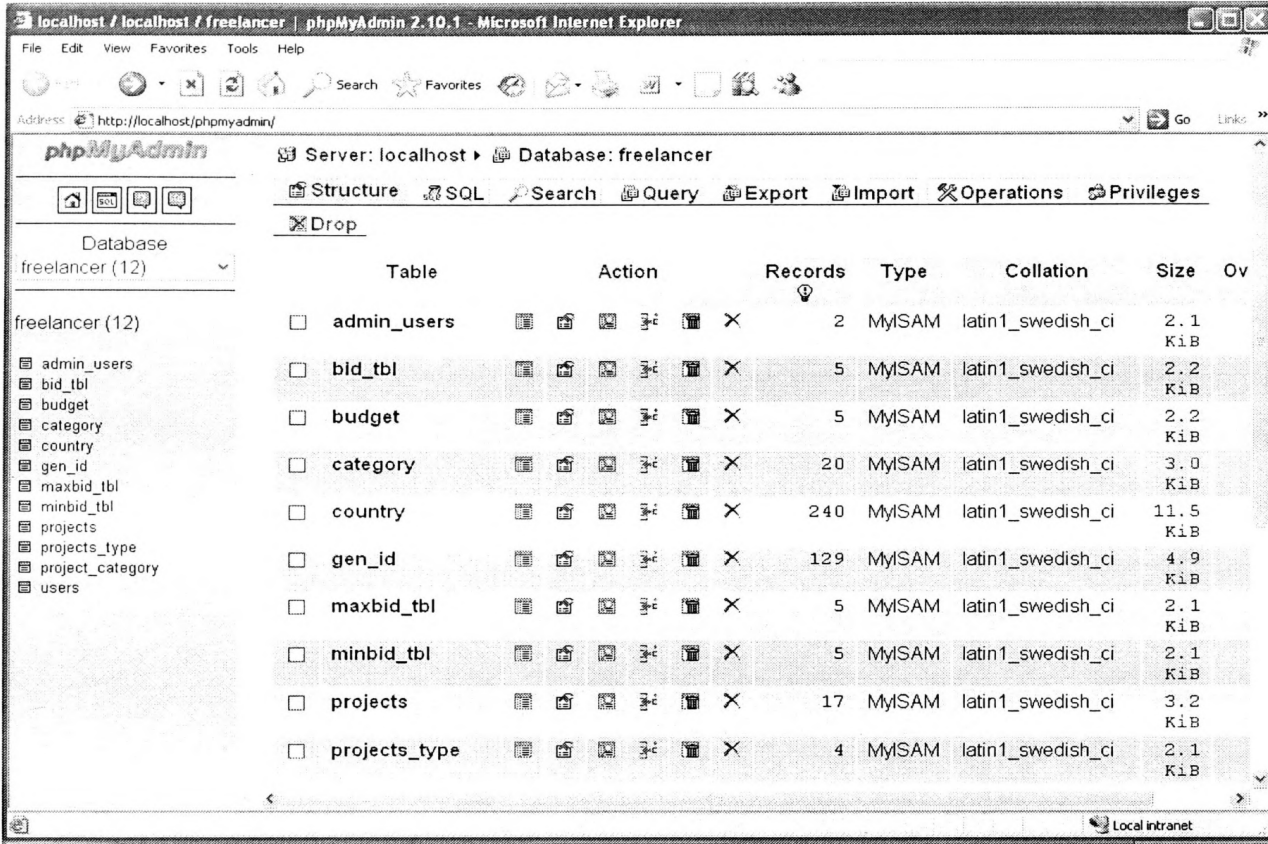


Figure 5.2 Class diagram for the *directfreelancers* system.

5.4 Database Designing:



The screenshot shows the phpMyAdmin interface for the 'freelancer' database. The main table lists the following tables:

| Table | Action | Records | Type | Collation | Size | Ov |
|---------------|---------|---------|--------|-------------------|----------|----|
| admin_users | [Icons] | 2 | MyISAM | latin1_swedish_ci | 2.1 KiB | |
| bid_tbl | [Icons] | 5 | MyISAM | latin1_swedish_ci | 2.2 KiB | |
| budget | [Icons] | 5 | MyISAM | latin1_swedish_ci | 2.2 KiB | |
| category | [Icons] | 20 | MyISAM | latin1_swedish_ci | 3.0 KiB | |
| country | [Icons] | 240 | MyISAM | latin1_swedish_ci | 11.5 KiB | |
| gen_id | [Icons] | 129 | MyISAM | latin1_swedish_ci | 4.9 KiB | |
| maxbid_tbl | [Icons] | 5 | MyISAM | latin1_swedish_ci | 2.1 KiB | |
| minbid_tbl | [Icons] | 5 | MyISAM | latin1_swedish_ci | 2.1 KiB | |
| projects | [Icons] | 17 | MyISAM | latin1_swedish_ci | 3.2 KiB | |
| projects_type | [Icons] | 4 | MyISAM | latin1_swedish_ci | 2.1 KiB | |

Figure 5.3 Database Design of the system in phpmyadmin

5.5 Prototyping:

The database was designed. Then the Prototypes of the system were implemented.

- First Preliminary design was done. A first prototype was created for the preliminary design.
- Second prototype was created to find certain answers for specific questions about the risky parts or uncertainty stages of the project
- The third prototype also evaluated in the same manner as was the previous prototype using fourfold procedure:
 - ✓ Evaluating the first prototype in terms of its strengths, weaknesses, and risks.
 - ✓ Defining the requirements of the second prototype
 - ✓ Planning and designing the second prototype

- ✓ Constructing and testing the second prototype

5.6 Coding and Implementation:

Implementation is the part of the process where software engineers actually program the code for the project. Therefore system was actually developed in implementation phase. The implementation plan establishes the schedule and needed resources. The implementation process can be considered as part of the design. In test-driven development, coding was preceded by generation of black-box test cases from the specifications, so that can validate as code. Software testing is an integral and important part of the software development process. This part of the process ensures that bugs are recognized as early as possible.

5.6.1 Coding

The system was implemented with scripting language PHP. The Coding was mainly carried out using PHP and HTML to design interfaces. Functionalities expected from the system were implemented to the system using PHP, AJAX. Structured Query Language (SQL) used to establish the connection between to the database.

Data in database was manipulated (Feed, Retrieve, store) with SQL. The database was implemented using MySQL. User Interfaces, links and images were implemented using, adobe Photoshop, and Macromedia Dreamweaver 8. CSS technology was used to create some graphics in some of the pages. All php and html pages were saved in C:\Wamp\www\project where the pages should be when working with phpmyadmin.

5.6.2 Implementation

5.6.2.1 Creating the direcrfreelancers Database

The database 'freelancers' was crated using phpmyadmin.

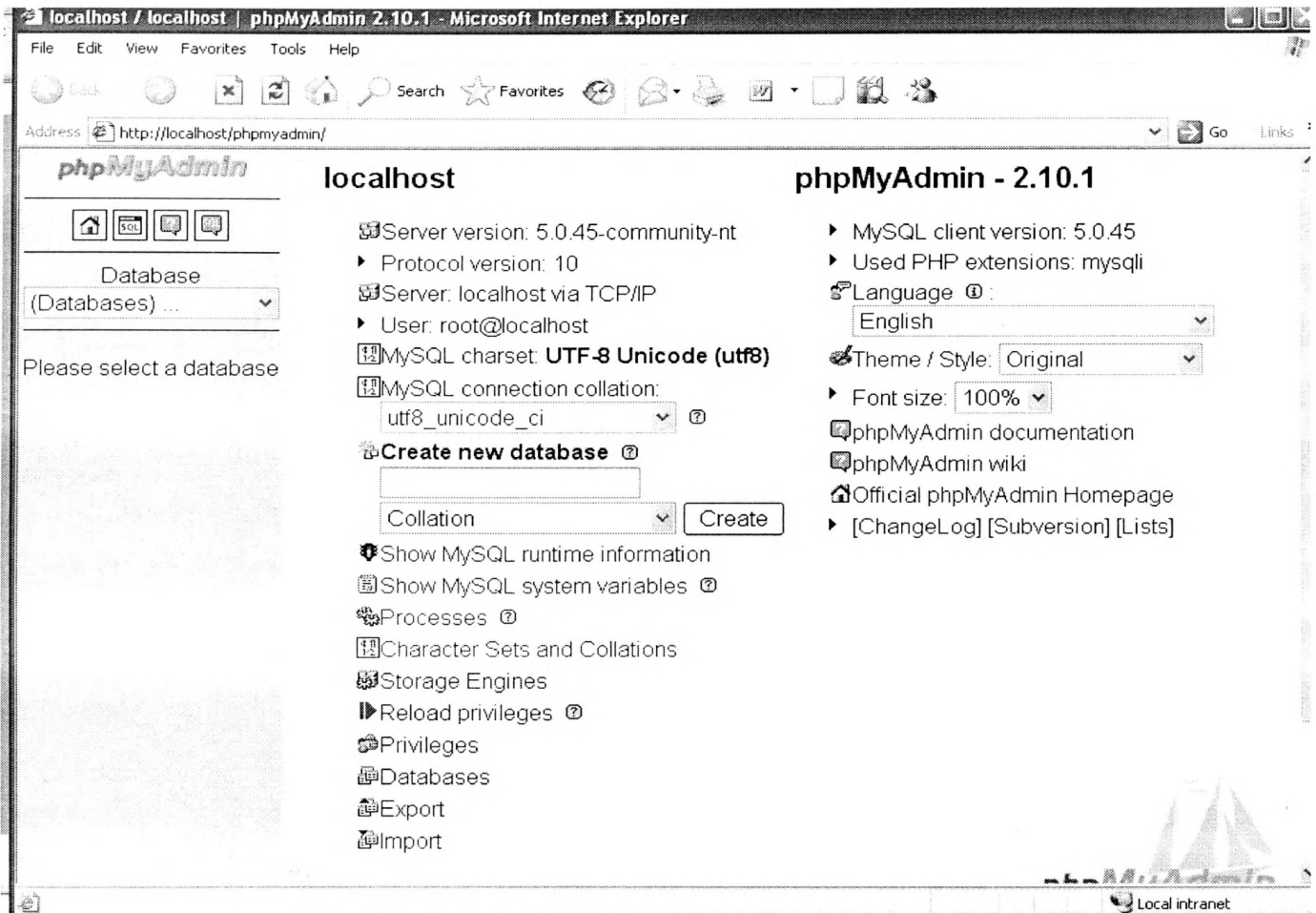


Figure 5.4 phpmyadmin interface to create the database

5.6.2.2 Creating table of the direcrfreelancers Database:

Tables of the database created by writing queries in phpmyadmin SQL runner

```
CREATE TABLE IF NOT EXISTS `users` (  
  `user_id` int(11) NOT NULL auto_increment,  
  `user_name` varchar(20) NOT NULL,  
  `password` varchar(20) NOT NULL,  
  `e-mail` varchar(25) NOT NULL,  
  `first_name` varchar(20) NOT NULL,  
  `last_name` varchar(20) NOT NULL,
```

```

`register_date` date NOT NULL,
`address` varchar(20) NOT NULL,
`city` varchar (20) NOT NULL,
`zip_code` varchar(6),
`country` varchar(20),
`phone` varchar (10),
`login` int(11) NOT NULL default '0',
PRIMARY KEY(`user_id`)
)ENGINE=MyISAM DEFAULT CHARSET=latin1 AUTO_INCREMENT=0 ;

```

5.6.2.3 Connecting to the direcrfreelancers Database:

A function was used to get the connection to the database where it need. That function declared in database.php page.

```

function get connection () {
    $link = mysql_pconnect ("localhost","root", "") or die ("Could not connect: “.
    mysql_error());

    mysql_select_db("freelancers", $link) or die ("Could not select database");

    return $link
}

```

When the data was retrieving in any page. database.php file is included to the system at the top of the page

```

<? php
require_once ('db/database.php');
?>

```

or

```

<? php
Include ('db/database.php');
?>

```

5.6.2.4 Inserting Data in to the tables:

Data insertion for any table was done using this insert function. The data insertion has done through the system and save the data to system.

```
function insert ($query)  
    {  
        $saved = FALSE;  
        $con_link = get_connection();  
        if ($con_link)  
        {  
        }  
        if(mysql_query($query))  
        {  
            $saved = TRUE;  
        }  
        mysql_close($con_link);  
        return $saved;  
    }  
}
```

5.6.2.5 Coding for Adding New user:

A New user is added to the system by defining object from 'User' class.

```
$us = new User ("");
```

The Using the object, function register_user () called and registration form values are send as parameters to the function. Then the new user's detail will save to database.

```

if ($us->register_user (      $_POST['user_name']
    ,$_POST['email'],$_POST['password'],$_POST['confirm_password']
    ,$_POST['firstname'],$_POST['lastname'],$_POST['address'],$_POST[
'country'],$_POST['city'],$_POST['zipcode'],$_POST['phone_no'],
    $register_date ) )

```

<? php

```

class User{

```

```

    var $user_name;
    var $email;
    var $password;
    var $confirm_password;
    var $first_name;
    var $last_name;
    var $address;
    var $country;
    var $city;
    var $zipcode;
    var $phone_no;
    var $register_date;

```

```

function User($user_name)

```

```

    {

```

```

        $rs =get_data("SELECT * FROM users WHERE user_name = '$user_name'");

```

```

        while($row=mysql_fetch_array($rs))

```

```

            {

```

```

                $this->user_name=$row['user_name'];

```

```

                $this->email=$row['e_mail'];

```

```

                $this->password=$row['password'];

```

```

                $this->first_name=$row['first_name'];

```

```

        $this->last_name=$row['last_name'];
        $this->address=$row['address'];
        $this->country=$row['country'];
        $this->city=$row['city'];
        $this->zipcode=$row['zip_code'];
        $this->phone_no=$row['phone'];
        $this->register_date=$row['register_date'];

    }
} // end constructor

```

```

function register_user( $user_name, $email, $password,$confirm_password,
        $first_name, $last_name,$address,$country,
        $city,$zipcode,$phone_no,$register_date)
    {
    }
// end register user

```

```

/* ===== update user ===== */

```

```

function update_user( $user_name,$email,$password,$confirm_password,
        $first_name, $last_name, $address,$country,$city,
        $zipcode,$phone_no,$register_date)
    {
    }
}// end register user

```

```

/* ===== checking user validation ===== */

```

```

function isUserExist($user_name,$password )
    {
    }

```

```
/*===== checking user is in database ===== */
```

```
function hasUserLoded( )
```

```
{
```

```
}
```

```
/*===== active user login ===== */
```

```
function insertLogin($session_id,$username)
```

```
{
```

```
}
```

```
function updateLogin($user_name)
```

```
{
```

```
}
```

```
/*===== active user login===== */
```

```
function logout($session_id,$username)
```

```
{
```

```
}
```

```
function getCountry($country_code)
```

```
{
```

```
}
```

```
} // end user
```

```
?>
```

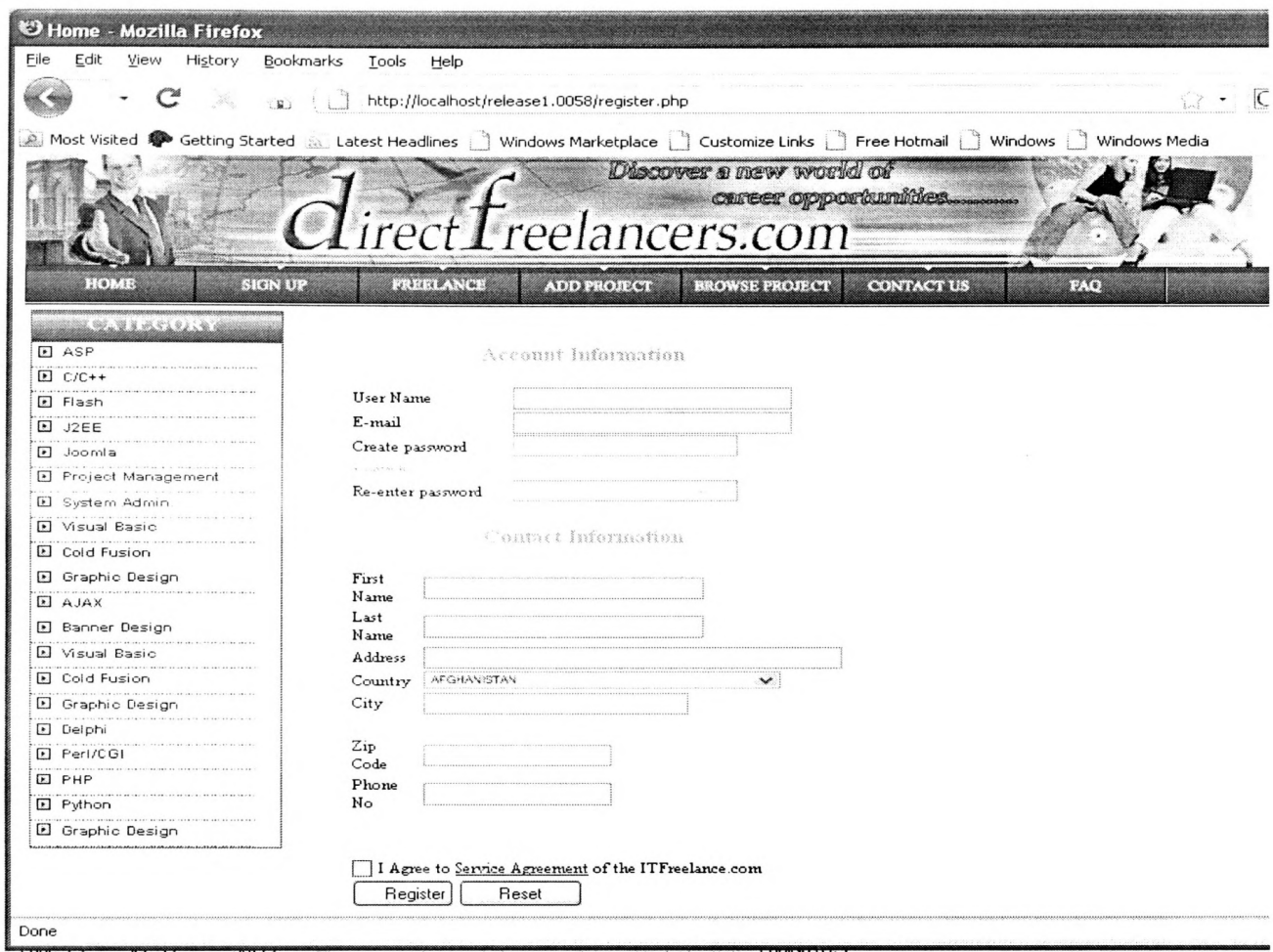


Figure 5.5 user registration form of the system.

5.6.2.6 Coding for Adding New project:

A New project is added to the system by defining object from 'Project' class. Then Project class function **add_project ()** called and project detail form values are send as parameters to the function. Then the new user's detail will save to database.

```
$pro= new Project ("");
```

```
if ($pro->add_project( $_POST['project_id'], $_POST['project_name'],
    $_POST['project_description'], $_POST['listvalue_state'],
    $_POST['listvalue_budget'], $_POST['cat_name'],
    $_POST['Project_type'], $create_date, $_POST['listvalue_biddays'] ))
```

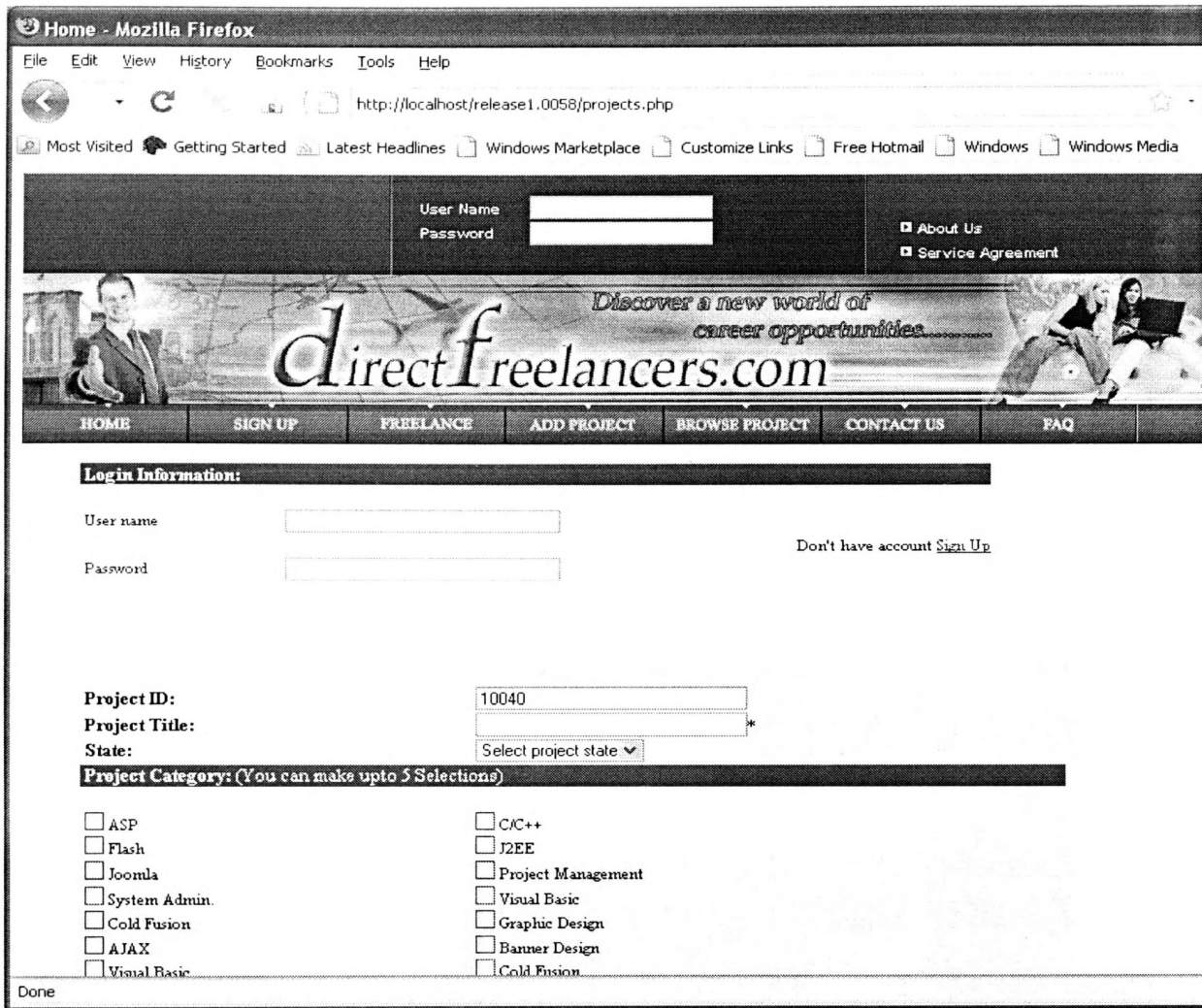



Figure 5.6 Add new project to the system.

5.6.2.7 Coding for Bidding for a project:

When a user bids those bidding information read and store in the database using another class Bid.

```

$bid = new Bid ("");
if($bid->bid_project( $pro_id, $_POST['user_name'],$_POST['password'],
$_POST['budget'],$_POST['biddays'],
$_POST['bid_description'],$_POST['notify_lowerbids'],
$bid_date) )
    { }

```

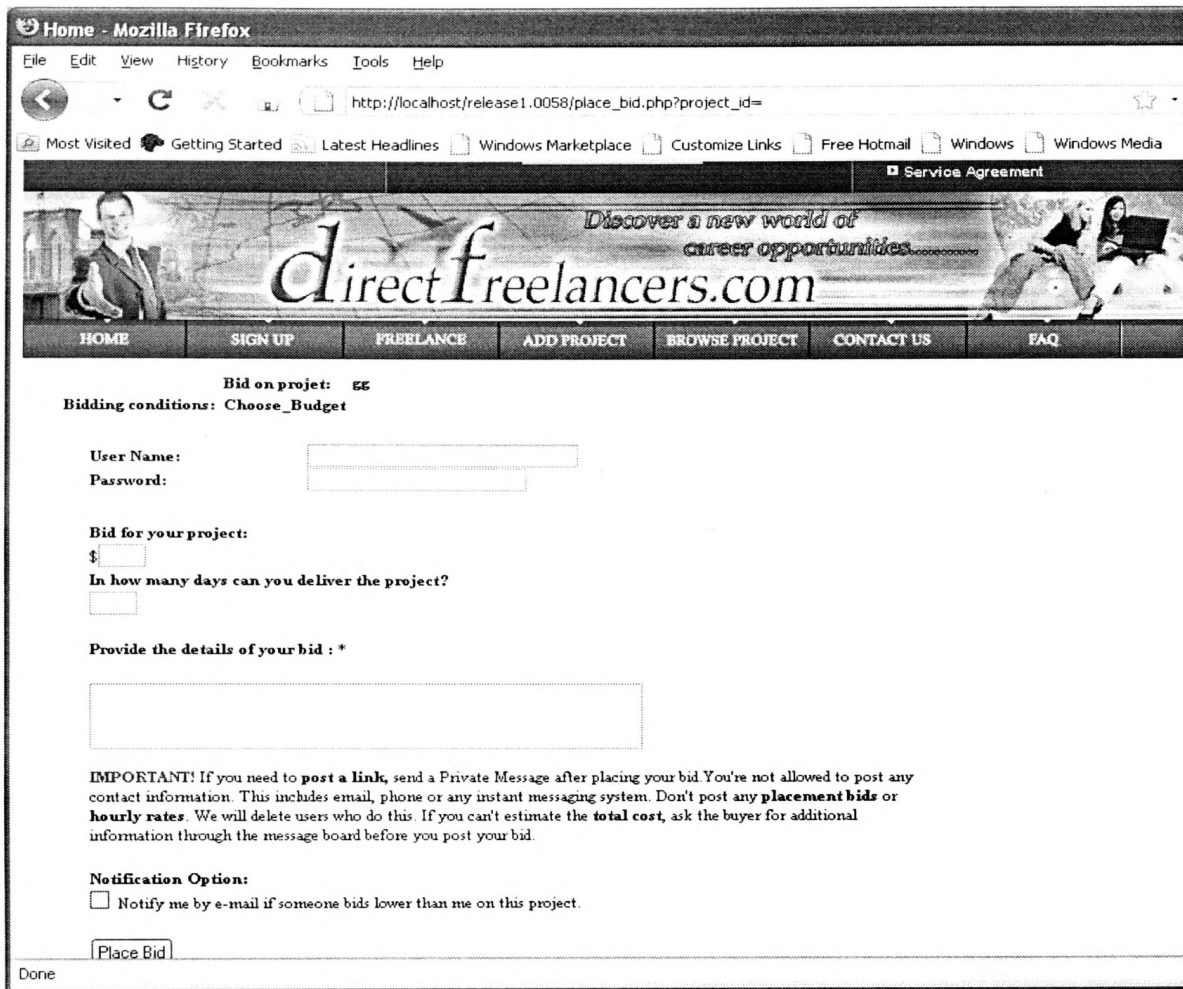


Figure 5.7 Place bid for a project in the system.

5.6.2.8 Coding for project searching in the directfreelancers

In coding the form values are sent to JavaScript function called **function sendRequest (frm, file)**

```
function sendRequest(frm, file)
{
var rnd982g = Math.random();
var str = "";
if(str = getForm(frm)) {
req.open('GET', file+'?' +str+'&rnd982g='+rnd982g);
req.onreadystatechange = handleResponse;
req.send(null);
}
return false;
}
```

```

function handleResponse()
{
    if(req.readyState == 4){
        var response = req.responseText;
        document.getElementById("searchresult").innerHTML = response;
    }
}

```

```

function getForm(fobj) {
    var str = "";
    var ft = "";
    var fv = "";
    var fn = "";
    var els = "";
    for(var i = 0;i < fobj.elements.length;i++) {
        els = fobj.elements[i];
        ft = els.title;
        fv = els.value;
        fn = els.name;
        switch(els.type) {
            case "text":
            case "hidden":
            case "password":
            case "textarea":
                // is it a required field?
                if(encodeURIComponent(ft) == "required" && encodeURIComponent(fv).length < 1) {
                    alert("'" + fn + "'" is a required field, please complete.');
```

els.focus();
 return false;
 }
 str += fn + "=" + encodeURIComponent(fv) + "&";
 break;
 case "checkbox":
 case "radio":
 if(els.checked) str += fn + "=" + encodeURIComponent(fv) + "&";
 break;
 case "select-one":
 str += fn + "=" +
 els.options[els.selectedIndex].value + "&";
 break;
 case "select-multiple":
 str += fn + "=" +
 els.options[els.selectedIndex].value + "&";
 break;
 } // switch
 } // for
 str = str.substr(0,(str.length - 1));

```
return str;
}
```

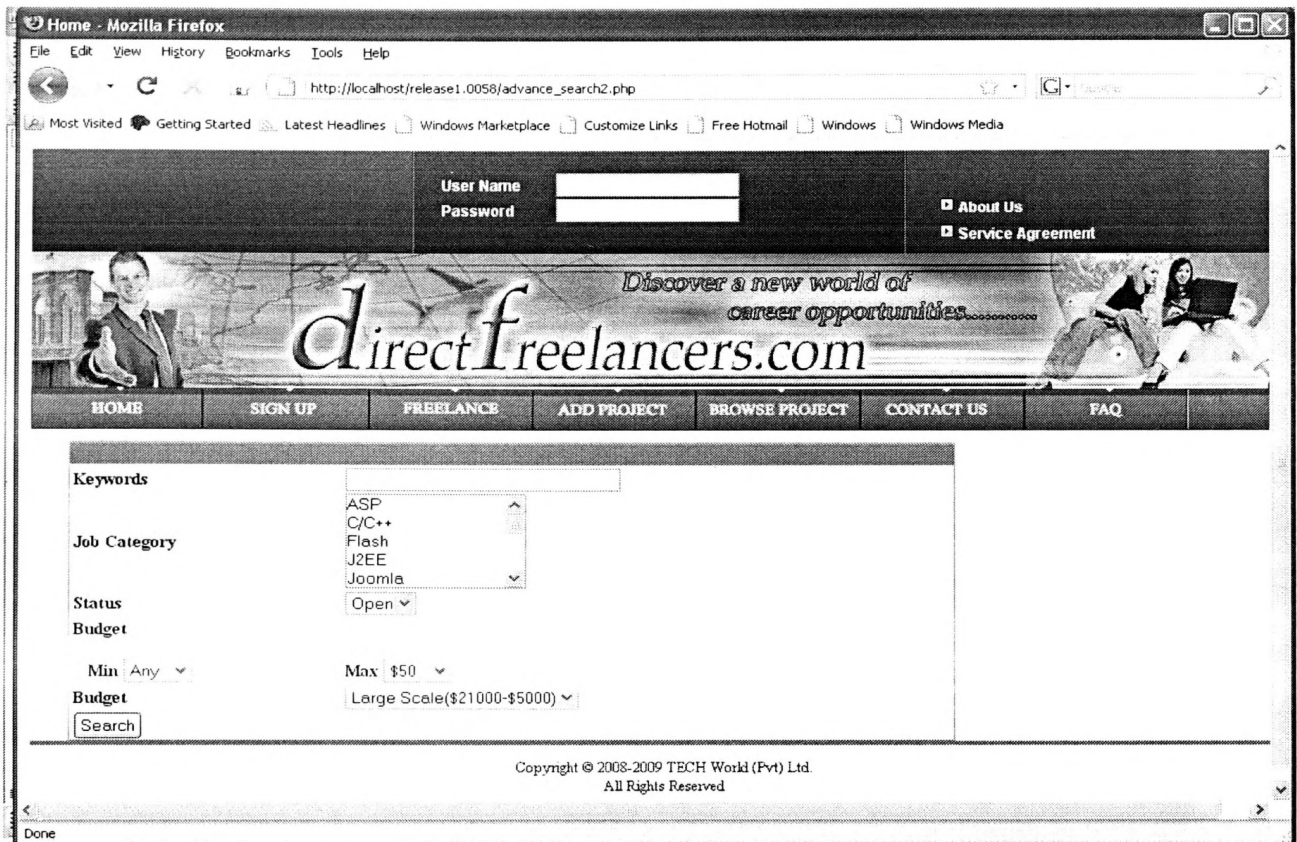


Figure 5.8 Advance searching for the projects.

CHAPTER 6

TESTING

6.1 System Validation:

Software verification and validation is intending to show that a system conforms to its specification and meets the requirement of the customer. Therefore system validation involves checking and review process and system testing.

6.2 Software testing:

A primary purpose for testing is to detect software failures so that defects may be uncovered and corrected. This is a non-trivial pursuit. Testing cannot establish that a product functions properly under all conditions but can only establish that it does not function properly under specific conditions. The scope of software testing often includes examination of code as well as execution of that code in various environments and conditions as well as examining the aspects of code

6.2.1 Unit testing

- At this stage each interfaces were tested individually in the WAMP web server.

There are many approaches to software testing.

6.2.2 Static Testing:

Reviews, walkthroughs or inspections are considered as static testing.

- ✓ Coding syntax was checked during implementation.
- ✓ Program structural flaws were checked.
- ✓ System units were checked.
- ✓ Checked for improper linkages between modules.

6.2.3 Dynamic Testing:

Executing programmed code with a given set of test cases is referred to as dynamic testing.

- ✓ Monitoring run-time behavior
- ✓ Automated test case generation
- ✓ Testing White Box Black Box
- ✓ Clean up ugly queries with views.
- ✓ Clean up ugly performance problems with indices

CHAPTER 7

DISCUSSION

The purpose of the web site is to develop a marketplace for outsourcing software-development services that will provide projects for freelancers. In order to process all the functions of the system it wanted to clearly understand about the outsourcing business concepts and trends. At the beginning, the business expertise of the Technology exchange world (Pvt) Ltd clearly stated basic scope of the system and they hope to run the project long termly as a service provided by the company. Therefore as a first stage basic narrowed requirements were selected. The development of the project started according to the waterfall method. After the basic stage of the project was developed, new requirement can be found for the next stage of development. Several prototypes were developed and then the client could get an "actual feel" of the system, since the interactions with prototype can enable the client.

In this project I had to work through the process of adding projects to the system and registering new user to the *directfreelancers*. Adding projects and adding user were implemented using classes. Then saving new user/project details, update and checking for user exist implemented as function of that class. The project searching of the system was implemented using PHP and AJAX technology. Since AJAX uses asynchronous data transfer (HTTP requests) between the browser and the web server, allowing web pages to request small bits of information from the server instead of whole pages searching was become more quick and user friendly. Administrator panel also was implemented to add new user, add new project, search projects and view the bids for projects.

This application can be partitioned into the three major components: user interface, application logic, and a database. The visible component of the application to a customer is the user interface. The other two components have no visibility to the customer and are hidden. In many cases the customer's mental model of the application is totally user-interface centric. So the interface should be more attractive and simple. Using HTML it is easy to craft user interfaces. In testing phase static analysis, dynamic analysis, and unit testing was done. After release the software and must keep the software up to date with changes in technology. In testing phase static

analysis, dynamic analysis, and unit testing was done. The system was tested in different browsers (Internet Explore, Mozilla Firfox) to view pages with suitable alignments.

The coding was done by using a server-side scripting language PHP which allows the developer to create secure Web pages that require users to enter a valid username and password before seeing the Web page content.

Building a dynamic environment that uses multiple pages can involve some duplication of code structures and can make a project more difficult to maintain as it grows. On the other hand, we will be able to hand on completed prototype to designers and page builders who can develop pages almost as they would with standard HTML pages.

CHAPTER 8

CONCLUSION AND RECOMMENDATION

Directfreelancers, the web-based marketplace for outsourcing software-development services has been introduced as long term running project in Technology Exchange World (Pvt) Ltd. The developed system has met the user requirements captured at the requirement capturing phase as the first stage of the total project.

The usage of this system gives that service buyers can stretch their budget and save as much as over traditional outsourcing by reducing expenses, increasing efficiencies, aggressively growing business, and creating a sustainable competitive advantage.

Continuous monitoring must be done in order to check whether the system meets its goals in the long run.

The system is consisted with several stages. Therefore other requirement that hope to implement in next stages has to be developed and implemented.

Following can be stated for the further enhanced of the system

1. Developing affiliate activity programs for the all users
2. Developing to space to report any violation of terms and conditions of service
3. Enhance the system notifications that send from the system.
4. Enhance the message board functions.
5. Defining project levels to add project to the system which have different benefits from the system.
6. Facilitating to renew the user membership.
7. Introducing for secure chat system
8. Implementing report violation to the administrator.

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APPENDIX

Appendix A Interface of the Home page



Appendix B Interface of Add new project



Appendix C Interface of the Register new user

The screenshot shows the registration page for directfreelancers.com. The browser address bar shows `http://localhost/release1.0061/register.php`. The page features a navigation menu with links: HOME, SIGN UP, FREELANCE, ADD PROJECT, BROWSE PROJECT, CONTACT US, FAQ, and LOG IN. A left sidebar lists various categories with checkboxes, including Delphi, JAVA, Cold Fusion, Visual Basic, Earned Design, AJAX, Graphic Design, Joomla, J2EE, Flash, C/C++, and ASP. The main content area is divided into two sections: "Account Information" and "Contact Information".

Account Information

User Name:
E-mail:
Create password:
Re-enter password:

Contact Information

First Name:
Last Name:
Address:
Country:
City:
Zip Code:

Appendix D Interface of the User Profile

The screenshot shows the user profile page for directfreelancers.com. The browser address bar shows `http://localhost/release1.0061/account_detail.php`. The navigation menu includes: HOME, MY PROFILE, FREELANCE, ADD PROJECT, BROWSE PROJECT, CONTACT US, FAQ, and LOG OUT. The user is logged in as "kubka".

MANAGE PROFILE

- Home
- Profile Info
- Edit Profile
- User Activity
- Project Activity
- Affiliate Activity
- Payment Transactions
- Messages

PROFILE INFO

Profile Info of kubka

USER PROFILE

User name: kubka
Name Company: dtdf
Country: BARBADOS
City: dtdf
Areas of expertise: dtdf
Average Pricing: dtdf
Profile: dtdf
Member since: 2009-01-07
Skills: dtdf

SERVICE BUYER ACTIVITY

Latest Open Projects: dtdf
Latest Closed Projects: dtdf

LATEST PROJECTS

- C# talented coder needed
- Perl Programmer - Parttime or Fulltime
- Tableless HTML & CSS files from PSD
- Real Estate web site Portals
- T-Shirt Graphic Design Designer
- Creative Web Designer for Corporate Site
- 3D animation films
- Sales representatives for IT solutions

Appendix E Interface of the Edit user profile

Home Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://localhost/release1.0061/change_profiledetail.php
Most Visited Getting Started Latest Headlines Customize Links Free Hotmail Windows Marketplace Windows Media Windows PHP VIDEO TUTORIAL...

Discover a new world of career opportunities.....
directfreelancers.com

HOME MY PROFILE FREELANCE ADD PROJECT BROWSE PROJECT CONTACT US FAQ LOG OUT

MANAGE PROFILE

- News
- Profile Info
- Edit Profile
- Browse Activity
- Provider Activity
- Affiliate Activity
- Payment Transactions
- Messaged to

EDIT USER PROFILE

First Name Last Name

Name/Company

Password Re-type Password

Address

Country

City

Phone No:

AREAS OF INTEREST / EXPERTISE

| | |
|---|--|
| <input type="checkbox"/> Delphi | <input type="checkbox"/> JAVA |
| <input type="checkbox"/> Cold Fusion | <input type="checkbox"/> Visual Basic |
| <input type="checkbox"/> Banner Design | <input type="checkbox"/> AJAX |
| <input type="checkbox"/> Graphic Design | <input type="checkbox"/> Cold Fusion |
| <input type="checkbox"/> Visual Basic | <input type="checkbox"/> System Admin. |

Done

Appendix F Interface of User Login

Home Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://localhost/release1.0061/user_login.php
Most Visited Getting Started Latest Headlines Customize Links Free Hotmail Windows Marketplace Windows Media Windows PHP VIDEO TUTORIAL...

Discover a new world of career opportunities.....
directfreelancers.com

HOME SIGN UP FREELANCE ADD PROJECT BROWSE PROJECT CONTACT US FAQ LOG IN

[Home](#) | [Register](#)

Login

User name

Password

Don't have an account? [Sign up](#)
Forgot your password? [Find it](#)

Important tips To Protect your Account

- Don't share your password with anyone
- Choose a strong password with capitals, numbers and minimal length 8 symbols
- Change password periodically
- It's recommended NOT to use the same password for accounts on other websites

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Done

Appendix G Interface of Project Searching

The screenshot shows the Mozilla Firefox browser window displaying the Direct Freelancers.com website. The address bar shows the URL `http://localhost/release1.0058/advance_search2.php`. The page features a navigation menu with links for HOME, SIGN UP, FREELANCE, ADD PROJECT, BROWSE PROJECT, CONTACT US, and FAQ. A search form is visible with the following fields:

- Keywords:** A text input field.
- Job Category:** A dropdown menu with options: ASP, C/C++, Flash, J2EE, Joomla.
- Status:** A dropdown menu with the option: Open.
- Budget:** A section with two dropdown menus: **Min:** Any, **Max:** \$50, and a **Budget** dropdown with the option: Large Scale(\$21000-\$5000).
- Search:** A button to submit the search.

At the bottom of the page, there is a copyright notice: Copyright © 2008-2009 TECH World (Pvt) Ltd. All Rights Reserved.

Appendix H Interface of Project Bidding

The screenshot shows the Mozilla Firefox browser window displaying the Direct Freelancers.com website. The address bar shows the URL `http://localhost/release1.0058/place_bid.php?project_id=`. The page features a navigation menu with links for HOME, SIGN UP, FREELANCE, ADD PROJECT, BROWSE PROJECT, CONTACT US, and FAQ. The bidding form includes the following fields and options:

- Bid on project:** A dropdown menu.
- Bidding conditions:** A dropdown menu with the option: Choose_Budget.
- User Name:** A text input field.
- Password:** A text input field.
- Bid for your project:** A text input field with a dollar sign (\$) symbol.
- In how many days can you deliver the project?:** A text input field.
- Provide the details of your bid : *** A large text area.
- IMPORTANT!** A warning message: "If you need to post a link, send a Private Message after placing your bid. You're not allowed to post any contact information. This includes email, phone or any instant messaging system. Don't post any placement bids or hourly rates. We will delete users who do this. If you can't estimate the total cost, ask the buyer for additional information through the message board before you post your bid."
- Notification Option:** A checkbox with the label: "Notify me by e-mail if someone bids lower than me on this project."
- Place Bid:** A button to submit the bid.

At the bottom of the page, there is a "Done" status bar.

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