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Olusola Sikiru Lawal

DESIGN AND IMPLEMENTATION OF “FOTOSACKS”

– An eCommerce Web Application for Donating
and Distributing Royalty Free Images

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- An e-Commerce Web Application for Donating and Distributing Royalty Free Images

E-commerce is huge. One of the most applicable usage of the internet, sometimes called the world wide web, is e-commerce use. It was projected that e-commerce sales would hit above US\$434billion per annum in the United States alone by the turn of the year 2014. During the same period, annual e-commerce sales in EU regions was predicted to eclipse US\$250 billion. These staggering figures excluded the e-commerce sales in other parts of the world. It is on record that in 2012, 56% of internet users ordered goods or services online, and 77% of users did research on goods or services or window shopped online.

This project centers on the development of an e-commerce web application for donating and distributing images by users. Users of the application are able to upload images as free donations while at the same time able to browse a catalog of images from other donors and download them for their personal use.

The Project is implemented in a 3-tier approach that involves: a backend database, a middle tier of Apache webserver/PHP, and the front-end client web-browser.

There exist a wide range of what an e-commerce web app can be, depending on what implementation technologies are involved. This project embraces Open Source technologies. The scripting language is PHP version 5.4.2 and the database application is MySQL version 5.5.7 in its core foundation, while HTML 5, CSS3, jQuery and Apache web server makes up the secondary technologies employed. Because users are required to pay a yearly/monthly subscription fees in order to access the site contents, the project therefore integrates Paypal as its payment solution provider.

This document discusses the whole process involved in the development of the web application, which provides image contents to, and source image contents from, paid subscribers, incorporating these primary features as; direct use of PHP, MySQL, HTML and Javascript, user accounts module, Admin features to add/remove user uploaded contents, Paypal payments processing solutions and few others.

As a database-driven e-commerce web application, this project enable users to register, pay subscription fee and gain Access to browse through an image gallery. The users are thereby able to download any number of photo image contents for their use. Registered users are also able to sign-in to the application with their username/email address and password. The upload module allows such registered users who may be professional or freelance photographers to upload photo images to the site as free donation.

The waterfall software development process model is used as the basis for the development tasks in the project.

KEYWORDS:

e-commerce, webservice, MySQL, PHP, Apache HTML, CSS, Paypal, Open source, web-browser, Javascript

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LIST OF ABBREVIATIONS (OR) SYMBOLS

ERD	Entity Relation Diagram
HTML	HTML, which stands for HyperText Markup Language, is the predominant markup language for web pages.
HTTPS	Hypertext Transfer Protocol Secure (HTTPS) is a combination of the Hypertext Transfer Protocol with the SSL/TLS protocol to provide encrypted communication and secure identification of a network web server.
IIS	Internet Information Service
MD5	Message Digest algorithm
SHA	Secure Hash Algorithm
SSL	Secure Socket Layer
TCP	Transfer Control Protocol
URL	Uniform Resource Locator. It is an address to a resource on the internet

1 INTRODUCTION

Greater number of business enterprises are looking beyond the traditional commerce to reposition their business for higher profit margin and increased volume of trade through the adoption of e-commerce. Statistics by Adobe CMO shows that in the United States alone, the 2nd quarter of the year 2013 marked the fifteenth consecutive quarters of positive profit growth in retail e-commerce sales, and the eleventh consecutive quarters of double-digit growth (Adobe CMO, 2015). It was argued that such trends in profit margins could be sustained and further increased by embracing the idea of no-cost development technologies (a.k.a Open source technologies) to develop e-commerce web application. When the costs of developing e-commerce application are cut-down or slashed through the use of these technologies, the profit margins and volume of sales for business enterprises would no doubt be boosted further.

This thesis discusses how such feat can be achieved. It designs and develop e-commerce web application using the so called no-cost development technologies that significantly lowers cost of developing e-commerce web application. With a reduced cost of developing e-commerce applications, greater number of enterprises, especially in the developing countries of the World, would be empowered to bring their businesses online which guarantees wider geographical reach, and thereby boosting volume of trades with improved profit margin for such enterprises . To achieve these, the designs and the development of the application in this thesis work make use of XAMPP with PHP, MySQL and Apache as the core of the technology.

An electronic web application can take many forms but in its general form, it must develop capacity to support interaction between parties involved in commercial transaction over the internet and at the same time manage all data exchanges involved. Management of such exchange must be in a secure and less vulnerable manner.

The traditional model of electronic commerce requires customers to browse a catalogue on a virtual store over the internet and select products of their choice. Items selected by the customer are collected in shopping cart which ultimately would be processed as an order at the checkout.

The next stage of the transaction is to finalize it. This requires that the customer does fill out a form to supply information regarding the shipping address, credit card information,

billing address and others. Usually, a summary of the transaction is collected and sent to the customer by email. (Livari et al 2002, 5-32.)

Several variants of this model of e-commerce are being developed today to suit individual business goals depending on items on offer and the class of customers targeted. This project is one of such variants, and the implementation is tailored to suit an online photographic image distribution store.

2 LITERATURE REVIEW

E-commerce means electronic transaction of business, where the process initiates and proceed to completion electronically, according to COM(1997, 75-157).

Choi et al (1997, 45-102) described e-commerce as commercial transaction system where consumers and firm are aided by computers and networking technologies.

According to Kalakota and Ngai et al (1999, 105-107) e-commerce is “sharing of information and process of buying and selling goods or services by electronic data transmission through internet”.

Principal concepts of e-commerce are Business to Business (B2B) where one business entity is selling to other business entity. Business to Consumer (B2C) describes a business entity selling goods or services to consumers. (David 2001, 137-149.)

An e-commerce site distinguishes itself from a traditional website in that in addition to information, an e-commerce site offers secure options to complete commercial transaction online. The traditional website offers information and purchasing options only. (Vivek and Rajiv 2000, 268.)

2.1 Global E-Commerce Usage

According to Zwass (1996, 89-122), e-commerce probably began in the 1960s inform of electronic data interchange. However, it was not until the 1990s that e-business emerged as a core feature of many enterprises, primarily via the world-wide-web (Melao 2008, 54-89).

According to UNTACD research (2006), the global adoption of e-commerce spiked in 2002 reaching 591 million users at end of that year.

Developed countries continue to witness unprecedented growth in the number of internet users, this rate of growth would constitute 50 percent of the World total in another half decade. In developing countries the figure is eight times lower.

The volume of e-commerce ranged between US\$1,408 billion – US\$3,878 billion in 2003, and by 2006 it rose to US\$12,837 billion.(UNTACD 2006.)

Some writers regarded e-business as the evolution of e-commerce through the buying and selling on the internet, they argue that e-business is a subset of e-commerce (Turban et al 2006, 129-156). Some other writers proclaim that, although related, these are two distinct concepts (Laudon and Traver 2008, 48-67), while another group inferred that both terms mean the same thing and can be used interchangeably (Schneider 2002, 183-201).

Business enterprise could approach electronic commerce in many different ways, depending on the specific business process that is being proposed to be conducted through the internet. Thus, several e-commerce profiles or approaches are possible. This leaves business enterprise to determine which profile or combination of profiles best suited their particular business strategies and objectives (Mendo and Fitzgerald 2005, 123-136)

Windrum and Berranger(2002, 12-43), suggest that the commercial benefits of e-commerce business revolves around these five areas, namely;

- An expanded geographical reach
- Cost benefits of improved efficiency in procurement and logistics process
- Enormous gains through improved customer management and communication
- Non-existence of the entry barriers for new market entrants
- Spin-offs from e-business technology creates development of new types of products and new business models.

2.2 Technologies of the E-commerce

An e-commerce website is built with same technologies as any other website. Most are either built on PHP or .NET technologies, with a backend database of either MySQL, SQL-server or any other relational database platform. Some of the common technologies used to build an e-commerce system are outline below as:

Server Side Language: PHP, java, JSP, ASP

Database: MySQL, MS Sql, and others

Front End: HTML, CSS, Javascript or some of its library (i.e jQuery, ajax) photoshop, illustrator, coral draw.

Frameworks: Magento, Woocommerce, Prestashop, Opencart

Payment gateway: Paypal, Payu, CCAvenue, Citrus, Stripe.

Hardware and Software

Web server is a hardware device used to host an e-commerce website. In its make-up, a web server is likened to a PC but with a faster processors and bigger memory. Web server can be run on a Windows or Linux operating systems and use webserver software to manage access attempts or requests to the website it is hosting. Such webserver software includes Microsoft's IIS that runs on Windows based web servers and Apache for Linux based web servers. These software run in the background and allow client browsers to access the pages that make up an e-commerce site, over a network.

When a customer wants to access an online shop, a browser software is used to load the pages of the webshop. Browser software is the application stored on client machines that allows users to access the internet. A browser rendered together on its window the html code, the CSS, images and information that is stored in a database associated with the website. Commonly used browser software are Internet Explorer (IE), Google Chrome, Safari, Mozilla Firefox etc.

The front-end of an e-commerce website is developed using web authoring tools such as Adobe Dreamweaver, Sublime Text, Notepad++ or any other packages. HTML files are created using these authoring tools. In web authoring packages such as Dreamweaver, the html files are linked together with a CSS file which defines the visual appearance of the site. Some authoring tools are more advanced, and can be used to author websites that connect to an integrated databases stored alongside them in a package. Example of such are Visual Studio .NET packages, XAMPP packages etc. Graphic design packages such as Adobe Photoshop are also available as part of web

authoring tools that can be used to design the skins and the user interface for a web application.

A database system is an integral part of an e-commerce web application. All the information about the products or services that are for sale on the webstore are stored in the database. In addition, the database stores the users or customers details. When customers visit, register or make a purchase on the webstore, the information such as passwords, items ordered, the payment details, shipping details phone numbers, email addresses etc, are stored in the connected database system. Programming the website for secure connection to the database is a priority in the designing an e-commerce website and technology such as PHP and MySQL are perfect for creating such secure communication between the website and the DBMS.

Anyone accessing an e-commerce or any other website through the internet will use TCP/IP. TCP is a wired connection between devices on the internet, and IP stands for internet protocol. Each device connected to the internet has a fully unique IP address and these devices are connected according to a rule known as protocol. A protocol is therefore a rule of how connections are set up between two devices over the internet.

Ports on devices with unique IP address allow them to connect to other devices on the internet. Normally, a device will have more than one port, and are able to assign different port for different purpose. A customer on a client machine with a valid IP address is able to access an e-commerce website by connecting to the web server that stores the e-commerce site over port 80. Port 25 is used when an e-mail exchange is required. (Keshav Infotech 2015.)

3 PROJECT DEVELOPMENT PROCESS

In broad terms, the project development process involve the creation of an information system together with all the essential variables as the key component. The life cycle of a project development process must begin with its creation, and ends with its retirement. Along this process, project development passes through different phases such as requirements, analysis, designs, coding or construction, validation or testing, development, operation and maintenance. According to Jirava (2004), the conventional life cycle of a project development process is perceived as the time frame spanning between the emergence of an idea through its implementation, and ends in its termination after going through all the intermediate phases in which its viability and usability are prioritized.

The development process of any project must be built with a specific goal and because of this goal specificity, every development process requires a guiding framework. Through such guiding framework, the progress of development along the stages of the life cycle, are configured, outlined and monitored.

All guiding frameworks must necessarily entail certain key components. However, the most crucial of them is the segmentation of the development process into phases. Each of these phases has a beginning and an end, deliverables and monitoring set of activities. Besides the crucial components that all frameworks must necessarily include, the methodology for a project development has many variety of approaches called models of system development lifecycle (SDLC). Among the most significant models of SDLC commonly deployed for project developments are:

Spiral model

V-Shaped model

Waterfalls model

Agile model

A brief look at each of these SDLC models would help to further understand the appropriateness of each to a specific project.

3.1 Waterfall Model

The waterfall model of SDLC, introduced in 1970 by Royce, is a step by step sequential description of software development lifecycle spanning seven different stages. These seven stages or phases are originally denoted as “System requirements, Software requirements, Analysis, Program design, Coding, Testing and Operations”. (Isaias and Issa, 2012.)

The waterfall model provide a useful set of guidelines for development of software products. This evolution is based on five key essential principles as:

Due to their invaluable feedback and resources limitation, it is essential to allow designers to be part of the process and make the program design comes first.

Extensive documentation of the design with its development process. This is crucial to facilitate performance assessment and management of development process.

The “do it twice principle” which postulates that the final version of the product should actually be the second version. The benefit is that all the stages have been executed thereby making it easier to pinpoint strengths and weaknesses, emphasizing the first and correct the latter.

The fourth is “the plan control and monitor testing” to test all aspect of the project possibly bringing on specialists that did not participate in the foregone stages of the process.

The fifth principle is “involve the customer”. Customer’s judgement, insight and commitment during development process is valuable to improve the potential for general acceptance of the developed product. (Royce 1970.)

The waterfall model is popular among developers and for that reason, it has evolved and adapted into many variations. One common trait to all known variations is that it is a sequential model, each of its phases must be totally completed before the next begins. Similarly to the flow of a waterfall, the development process is perceived to be continuously streaming downward throughout its identified stages. (Massey and Satao 2012.)

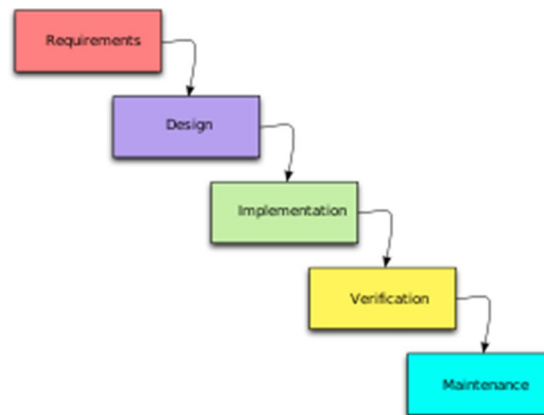


Figure 3.1 Waterfall model of SDLC

Waterfalls model is not very flexible and any changes request to the requirements of the system cannot be accommodated without a complete restart and overhaul of the development process for such changes to be taken into account (Balaji and Murugaiyan 2012).

3.2 The Spiral Model

The spiral model of SDLC introduces the concept of risk analysis which other models failed to take into account. System development process in this model consist of series of cycles or iterations. Identification of objectives and requirement of the prevailing stage begins each cycle followed by an analysis of alternatives and constraints. The process then highlights areas of uncertainty or risk that need to be taken into account during the succeeding stage, through simulation methods such as prototyping. Constant improvement of prototype to decrease risk are the hallmark of this process till the prototype becomes sufficiently robust and risk is reduced to acceptable level. When this cycle is completed, another cycle begins to create a new increment of the product. (Boehm 1988.)

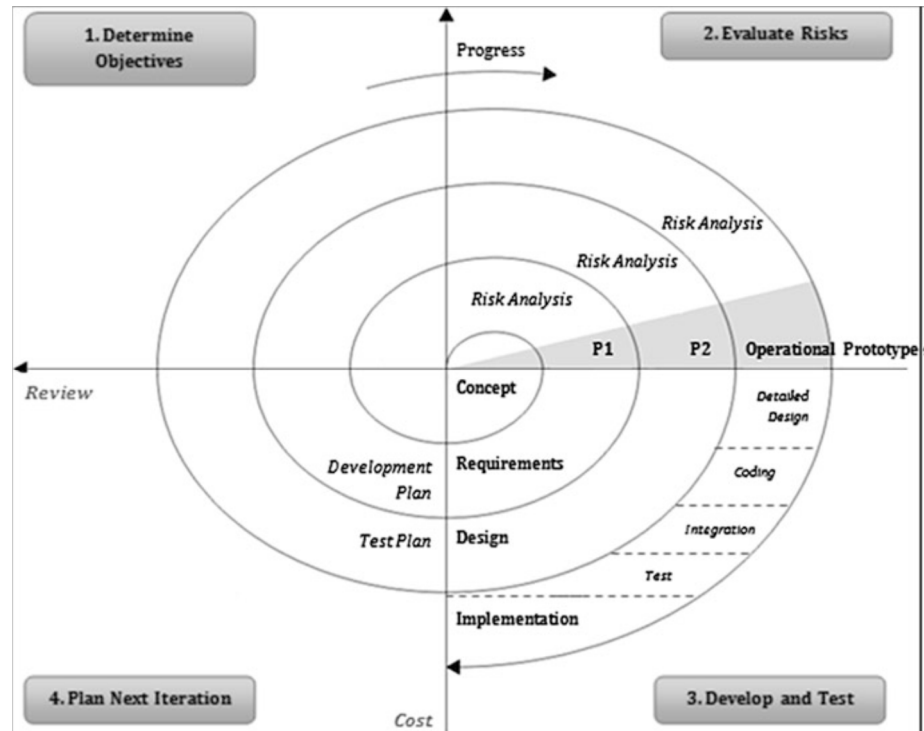


Fig 3.2: The spiral model of SDLC

The spirals or stages that made up this model take planning as the first step, moving then to the analysis of what the requirements are and subsequently calculating the uncertainty or risk. Thus, identifying risks together with the strategy for its management is considered as the centerpiece of this model. (Massey and Satao 2012.)

3.3 The V-Shaped Model

The V-model was presented in late 1980s as a variation over the waterfall model by Paul Rook. The V-lifecycle model emphasize existence of connection between each stages of development process and corresponding testing for that stage. Focusing on such relationship ensures that this lifecycle model provides adequate quality measurement and testing results on each stage. (Skidmore 2006.)

It enables each step to be implemented based on a detailed documentation from the previous step. This documentation enables the product to be checked and approved at each stage before proceeding to the next stage along the process (Balaji and Murugaiyan 2012). This model illustrate the importance of the relationship between development and testing task as its core objective. The model present potential to

increase the overall efficiency of the development process because eventual problems are detected and resolved early (Mathur and Malik 2010).

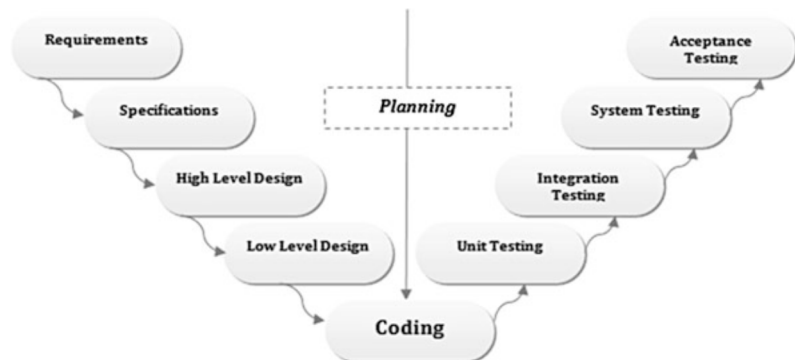


Fig. 3.3: The V-model of SDLC (Balaji and Murugaiyan, 2012)

The successive stages of V-model are similar to the classic waterfalls model starting off with the analysis of requirements and specification, through architectural designs and then to coding. The downward ladder discontinues from the coding stage to begin a parallel upward ladder structure that describes each of the testing stage. The testing stages begins with unit testing and ends with acceptance testing as the final stage of the process before the eventual release (Mathur and Malik 2010).

3.4 The Agile Model

Agile model is an alternative approach to the waterfall-like SDLC model, as it attempts to counter the lack of flexibility and rigidity of waterfall-like model. Since its inception in 2001, Agile lifecycle model have become increasingly popular.

The Agile development model consists of twelve guiding principles as outlined in a document known as Agile manifesto. According to Beck et al (2001), the principles on the manifesto are summed up thus:

- I. Customer satisfaction is the highest priority;
- II. Change in requirements is welcomed, no longer an obstacle;
- III. Software is delivered regularly in consecutive releases;
- IV. Motivated individuals are key to successful projects;
- V. Face-to-face conversation is paramount to successful collaboration;

- VI. Working software is the measure of the project's progress;
- VII. Sustainable development should be encouraged;
- VIII. Emphasis on technical and design quality;
- IX. Simplicity should be favored;
- X. Self-organizing teams are the best form of project development;
- XI. There should be regular discussions on team improvement

Sub variations of Agile model that follows these principles exists. Models such as Scrum and XP are some examples of these sub-variations. For any one sub-variations of Agile model, their development process follows a particular general path as outlined in the following four steps:

- I. *Project selection and approval*, where the scope, purpose and the requirements of the end product are established by a team which must include managers, developers and customers. The step also involve thorough analysis of methods and assessment of risks involved (Bhalero et al 2009).
- II. *Project initiation*, where a working team is provided with the project tools and the required environment, with the schedules and timeline firmly established (Amber 2009).
- III. Construction iterations, where a working version of software are released with successive increments by the developers to facilitate an extensive testing of each iteration.
- IV. The product release, where the final testing, final corrections and documentations are completed and the end-product released.

The agility in developing products at a great speed due to the models emphasis on collaboration and documentation is what sets apart the Agile SDLC model. (Executive brief 2008.)

3.5 Project Development Model

This project development process models the Waterfall software development process. One reason the waterfall model is so popular is that it serves as a conceptual basis for all other SDLC models. The models owns its strength to the fact that it outlines the generally accepted positive habits of software development, including accurate and detailed planning early in the project, quality documentation of the entire process, and

setting up a robust design concept before starting to code (Munassar and Govarddhan 2010).

Each phase of the model has specific deliverables which are processed and completed one at a time. The model also reinforces the notions 'define before designs' and 'designs before coding'. Such positive habits, prompted the adoption of the model for the development process of the project in this thesis work. In the waterfall model sometimes referred to as the classic life-cycle model, the development method is systematic and sequential. This means the process flows through in phases. The phases involved are as follows :

Requirement Specification

Designs

Implementation (a.k.a Construction or Coding)

Testing (a.k.a Verification or Validation)

Deployments and Maintenance

4 REQUIREMENTS AND ANALYSIS

For an e-commerce web application, the need for features that are user-friendly, and are less susceptible to hacking cannot be over-emphasized. Other features that enhance the usability of any e-commerce application are identified as follow (Chapman, 2014):

Ease of navigation between different pages of the site. This is crucial because visitors get easily irritated with a cumbersome system of page navigation.

Ease of items selection. Best practice is to wrap items image in a html anchor tag.

Consistent layout of pages and product information. This enhances the looks of the pages and the user's interaction with the pages.

Effective security notification. Users tend to be less irritated when they are fore-warned about an expiring session rather than getting locked out unexpectedly due to session time-out.

Minimal pop-up messages. Excessive pop-up messages could result in security breach and many browsers are designed to block them by default.

Organization of items in categories. This is a good practice that makes searching for particular product or item much more efficient. A simplified search process is quite appealing to the site visitors.

Conspicuous displays of links and buttons. This is another way to make visiting the site much appealing to the visitors and using coloured link and buttons is a great way to achieve this.

Feedback features. This is one way to learn exactly how the visitors to the site feels about the site. User's interaction experience with the site is an invaluable asset when planning for improvements and upgrades.

Secure data exchanges. Visitors or customers care so much about how their personal data are handled. It is therefore imperative that the design instil data-handling confidence in potential users of the web application. One way to achieve this is to display the type and level of data encryption deployed by the site.

Quick acknowledgement of completed orders. The order details of every transaction must be made available to the client in the form of an order acknowledgement in an email message or SMS.

For an e-commerce web application development project, major requirements identified specifically includes:

The HTML designs. It is the browser rendering parts of the application. Designing this part also means designing the users interface for the application.

The Database designs. For better results, database designs must be the product of a good ERD model, and therefore the starting point in the database designs would be from its ERD.

The scripting/coding. This marks the stage where the conceptual ideas and requirements are brought forth to reality through programming. It is at this stage that the behaviours and visual appearance of many of the identified requirements can be observed and tested.

Testing is an important requirement. The application need to be subjected to series of tests to be able to identify strengths and weaknesses so that the designer can have a basis for planning and future improvements activities.

The above listed items are the requirements before the site goes live on the web. There are further requirements which are specified for the site after going live on the web, these are:

Site maintenance. This is a continuous activities that needs to be sustained throughout the life-span of the application.

Site improvement and updating. This activities are usually dictataed by volume of traffic to the site, advancement in technologies, bugs and malware discoveries.

4.1 The Landing page

The site requires a landing page called index page. It is the welcome page from where the users find good information about the site , including the navigation tools and links to other pages. The users also get to registration page from here and registered users are able to sign in to their account from here. Other features of good landing page include links to contact the site administrator, link to privacy policy and entity that guarantees safe and secure transactions. (Chapman, 2014) All of these are made obvious to the site visitors. The Landing page has all of its features arranged in four simple sections to form a unique template for the other pages of the application. These sections are header, navigation bar, inner basic content and footer. This way, the application maintains site-wide uniformity with its landing page.

4.2 The Application's Database

The application requires a relational database to drive it. The objective is always to get the database designs right the first time because fixing database flaws has potential for greater complications than fixing any other aspect of the entire application. Two models of conceptual database designs are the data model and the process model.

The data model represents data, with its structures, to be stored in the database, while the process model involves how these data are processed. (Morrison M, 2002)

Good relational database design begins with developing its Entity-Relation Diagram (ERD). The ERD is simply a blueprint for the relational database. Figure 1 shows the ERD for this project, and from this, the relational model of the database is built.

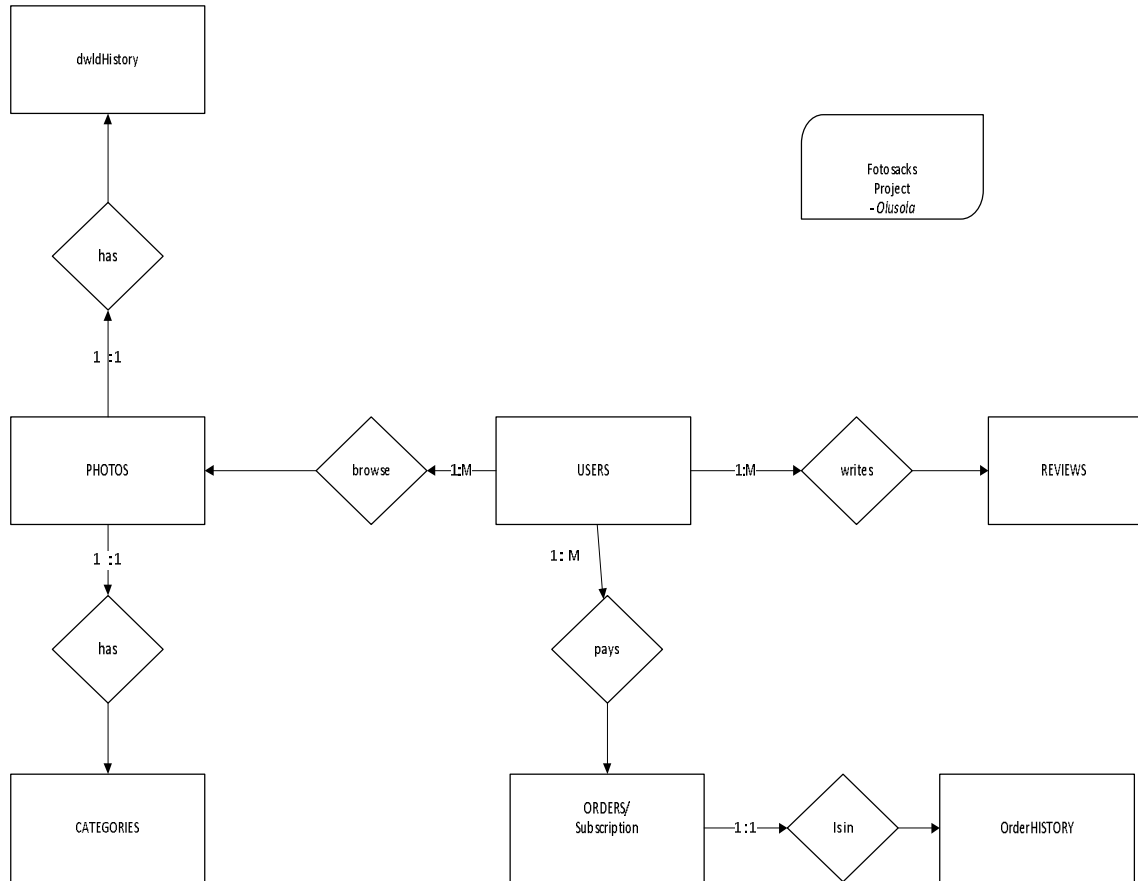


Figure 1. The Application's ERD as the blueprint for the project database designs.

In a *1:1* relationship between two entities X and Y, entity X matches exactly one record in entity Y, and each record in entity Y matches exactly one record in X. The *1:M* relationship describes a situation where each record in X matches zero or more records in Y while each record in Y matches exactly one record in X. The entities with *1:M* relationship are sometimes described as Associative entities. (Lauesen S, 2005)

In database development, the Relational database model are formed by transforming each of these entities into a database table. Such transformation is the basis for the project database table as presented in Appendix 1 (see the Appendix section).

Good database designs also requires normalizing the database. Normalization and performance enhancements of the database for this project follows these simple steps as:

- The use of smallest possible column type
- Fixed-length column use
- Use of default value for columns
- Non-storing of null values
- Column involved in WHERE and ORDER BY are indexed
- Column that allows NULL values are not indexed
- Length restrictions to indexes on variable-length columns.

From the standpoint of database designs, the main users of this web application fall into two categories namely the ordinary users and the super users.

The ordinary users are the registered users of the application and their major activities or interaction with the application include:

Ability to browse for images, ability to download images, ability to upload images, ability to write and read reviews and ability to view image download history

The super users are the administrators with higher privileges and permissions to access the application's back-end information. Major activities of the super users include:

Adding /removing images

Grading and Sanitizing users donated images

Grouping images into categories

General and site administration tasks

The users activities come under the functional requirements of the web application, and it is thereby specified with the use of the users use case diagram Figure 2 shows the users use case diagram of the application.

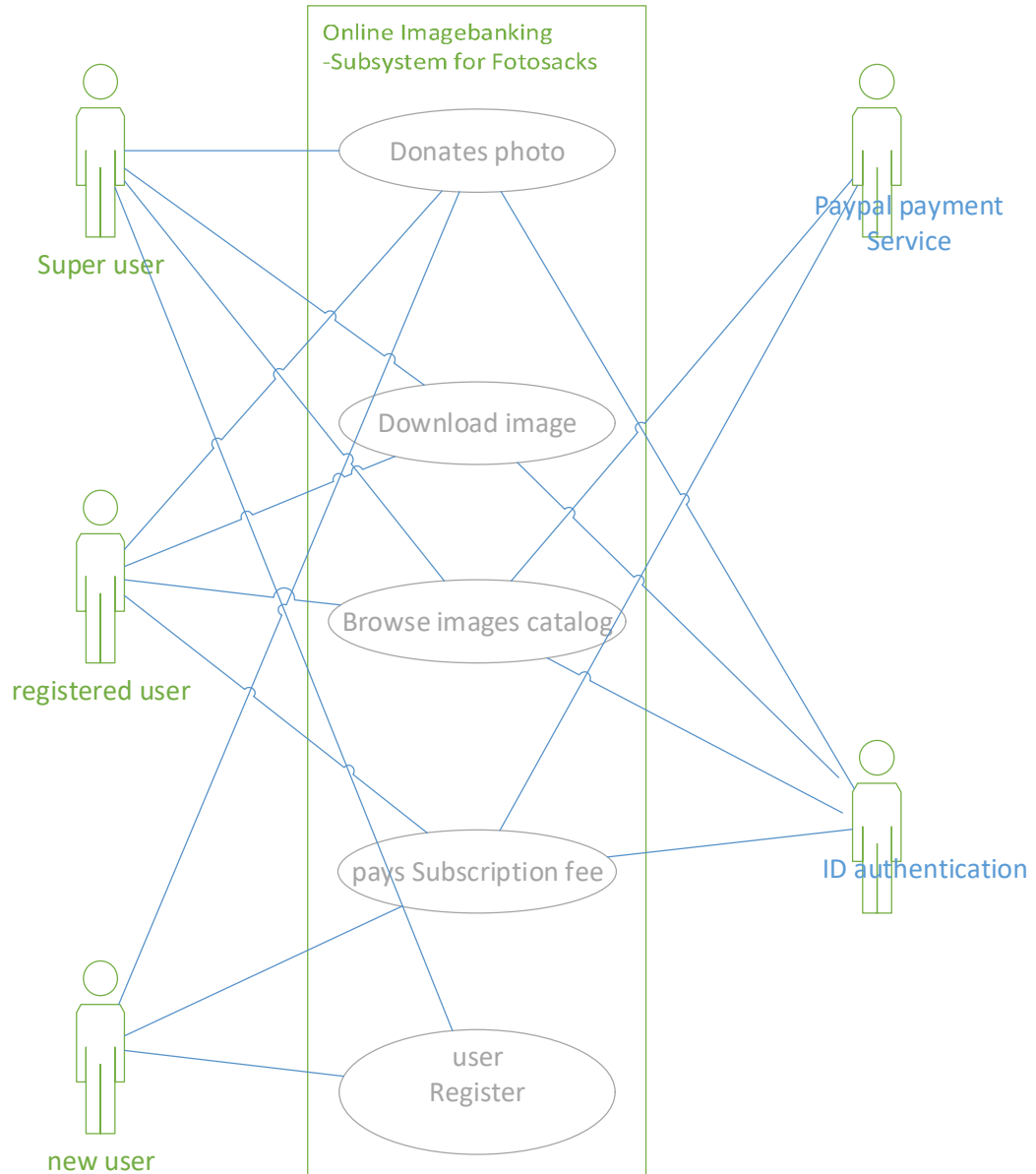


Figure 2. The Use Case diagram for the users of the application

The information content for the application which models how the data flows from one point (table) to another to provide the required information is presented with the help of a class diagram in Figure 3

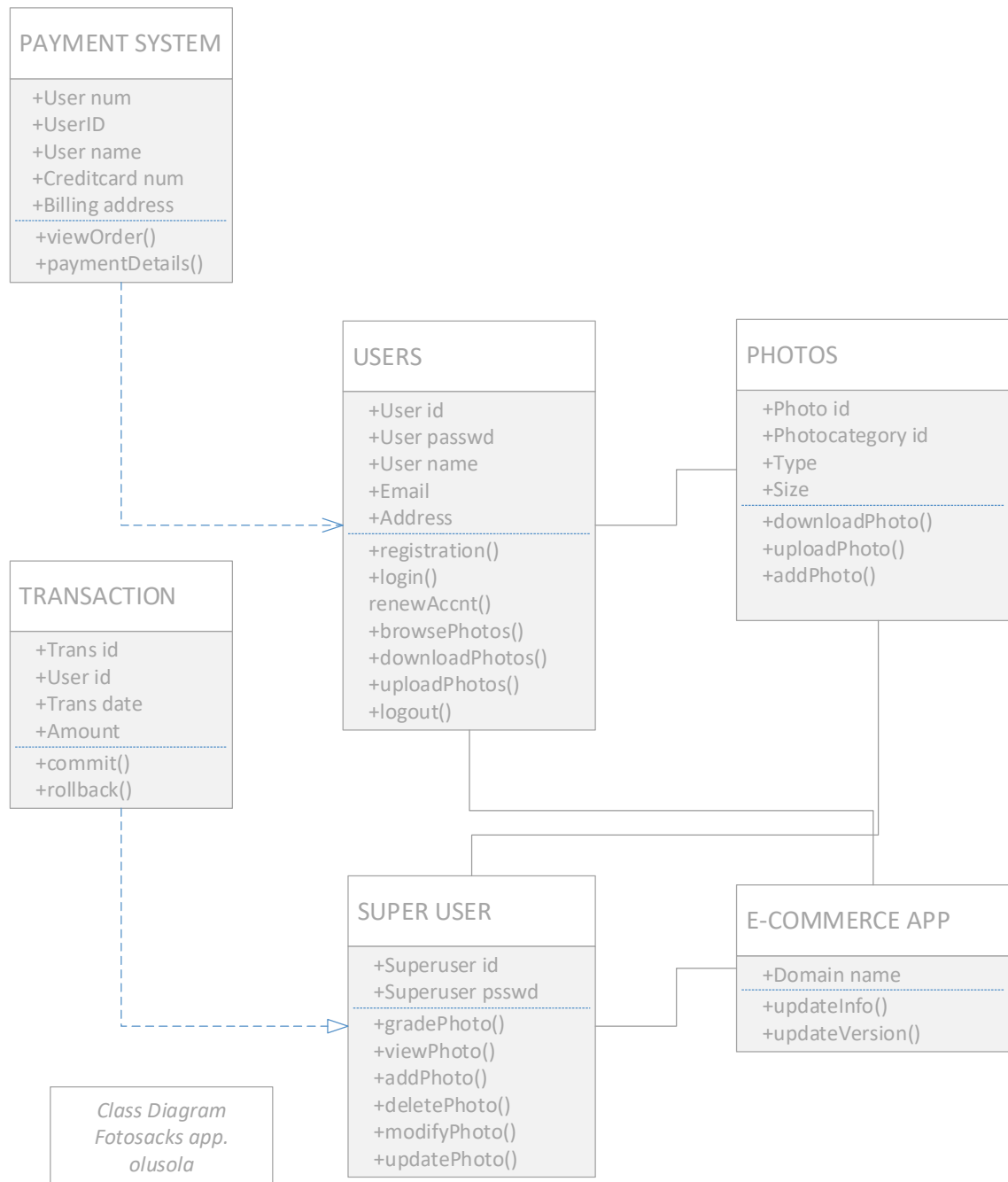


Figure 3. The Class diagram that depicts the flow of data within the application

Among the identifiable non-functional requirements of the application, as described in the list of Quality factors in IT Systems (Lauesen, 2005) includes usability, error recovery, maintainability, functionality, data reliability and security. Greater attention is focused on Security and usability. These two requirements formed the basis of all the activities in the designs phase of the project.

4.3 Web Host

Every web application requires hosting on a web host server for it to be accessible to the internet users. It is possible to develop the entire application using just personal computer with the right tools installed, but the most crucial aspect, for an e-commerce site, the availability to the general public, requires a web host.

A web host employs specialized server, which essentially is just another computer whose hardware and software are optimized for network usage, for hosting sites.

Web host differs in terms of the service oriented features they offered to the clients, the performance and quality of support available, and thirdly, the degree of control over the host's server granted to their client. Quality of these three attributes are directly dependent on price.

Some beneficial features to consider in choosing web host:

- Security features such as firewall, anti-virus protection etc
- Available client support programme
- Reliable and regular backup
- Mail server to send and receive emails
- PHP and MySQL features

The amount of control offered by the Web-hosting companies are reflected on their hosting plans which may be anything from free plans, shared plans, virtual private server (VPS) plan, to a dedicated plan otherwise called colocation(colo).

4.4 Payment System

One element that differentiate an e-commerce web site from a conventional website is the payment system. This system makes it possible to transfer purchasing money from the customer to the business or vice versa. (Kubilius N, 2000)

Payments system falls into two broad types namely; payment gateway and payment processor

4.4.1 Payments Gateway & Payments Processor

Payment gateway is real-time payment system that offers direct site integration. It is seamless with no third party involvement for the transaction to run to completion. This system is unique in that it automatically deposit the transaction monies into the specified merchant account directly. There are several payment gateways available today, and one of the best-known payment gateway is Authorize.net (<http://www.authorize.net/solutions/merchantsolutions/onlinemerchantaccount/>).

Payment processor is a delayed payment system characterized by a third-party site processing. This is a system whereby the payments by the customers, and the acceptance of same, are initiated and completed on the third-party site. The deposits into the business' bank account may not be automatic, this is why it is often referred to as delayed payment system. Example of this system is Google's checkout and Website payments (Standard option) by Paypal (www.paypal.com).

5 DESIGNS PHASE

The primary features of this application, which is intended to provide images content to its paid subscribers, composes of the followings:

- Use of PHP, MySQL and HTML to provide interaction between users and the application
- User accounts system
- Admin capabilities to add downloadable image contents
- Paypal for processing payments

The PHP works as the glue that binds together pretty much everything else, from database, users browsers, payments systems etc. The user accounts systems incorporates several units such as registration, login-logout, changing password, retrieving forgotten passwords. In addition to browsing images catalog and donating images, registered users have possibility to pay subscription fees using the payments system.

5.1 Database Structure

The database for the project comprises of five tables. The table structure together with information about their primary and foreign keys are as represented in Appendix 1 in the appendix section.

The photos table plus the category table represent the 'products' part of the application. The categories under which the images contents are grouped is stored in the category table. Every category contains one or more images but any single image only belongs to one category.

The images table stores data for each image content, and each image content has a title, a unique non-obvious name such as *bf15ea70978819cct319g7d*, and a description.

The users table stores information about the users of the application, the user account system is able to store the users firstname and lastname, their email address and passwords.

The application recognizes two type of users; ordinary users and super-users which are administrators. Therefore, an ENUM- column is defined for the users table to accommodate the type of users, with the default value on the ENUM-column set to ordinary users.

The application registers the administrator into the database as it does the ordinary members hence, the administrators are able to use the same login systems used by the non-admin users.

The date-expires column in the users table is a very important field that stores dates within which paid users account shall remain active . When an ordinary user pays subscription fees, an expiration date is set to a particular date depending on the subscription type. User whose account expired is still able to login into the application but would not be able to download any content, and will be notified of the need for account renewal.

Another equally important column of the users table stores the users password. The passwords are stored as a hash, as opposed to encryption. Encryption creates security vulnerability because it can be decrypted. Hashes always has uniform lengths that enables fixed length column declaration but less space is used when passwords are stored as binary data.

The subscription payments in the application is process through paypal. Each transaction that goes through paypal is stored as a record in the orders table. A record on this table matches exactly one user but one user can have one or more record.

5.2 Server Organization

The web root directory houses all the pages created for the application. It also holds all other subdirectories. These other subdirectoties include:

- PHP include scripts
- Javascripts
- CSS
- Media/images
- Admin

The sub-directory php-include holds those php scripts that can not execute alone but be included or loaded by other scripts for execution. Examples of the scripts that reside in this directory includes:

- Configuration script that defined the application's general behavior
- Login script that execute while logging in
- Form script that are functions used by every form
- Login form script that handles login form

Header and footer script that generates the HTML template for each page of the application.

5.3 Security

When building an e-commerce application, one of the most crucial aspect is security. Security of applications is measured on a spectrum. There are always the existence of bugs and by extension, security vulnerabilities in softwares, therefore, application security is never a binary entities. Findings about web application security vulnerabilities revealed that 71% of education, 58% of social networking and 51% of e-commerce websites, were exposed to serious vulnerability everyday of the year 2010 (WhiteHat Security, 2014).

The interplay of factors such as coding, software, environment and humans involvement, combined to move the security rating of an application up or down the spectrum.

There are different levels of security implementation for different types of application. A web application that displays weather information is at a different point on the security spectrum than the one that handles credit cards or a sensitive military data. Therefore the goal is always to implement the highest level of security that's appropriate for the application being developed.

5.4 Security Implementation

The security implementation goal is to strive to hit the appropriate mark on the security spectrum for this project. The is achived in overall under the following:

Security for customer

Hosting security

PHP and Web server security

Database security

5.4.1 Security for Customers

In practice, the PCI-DSS is the standard requirements for an e-commerce application designed to guarantee security for e-commerce customers. E-commerce applications are expected to be PCI compliance, that is, abiding by all the 12 requirements outlined in the PCI-DSS (Wright, 2011).

5.4.2 Hosting Security

Any hosting plans that include administrative level control over the server is naturally more secure because one is able to customize how the server runs. Therefore a dedicated hosting plan or VPS hosting plan guarantees better security than shared hosting plan.

5.4.3 PHP and Web Server Security

PHP is provided with wide range of settings and tuning to adjust how it runs. For enhanced secure settings that pre-empt security vulnerabilities, all settings and tuning are made on a global basis using:

- php.ini config file
- open_basedir setting

The combination of these two php provisions are used to limit the directories from which php can open files.

Handling of users password is a very important security aspect and PHP provide a better and more sophisticated means of hashing user's password with the `password_hash()`

function, than the common legacy hashing algorithm such as MD5, SHA or SHA1. User's password hashed using the *password_hash()* function cannot be decrypted. The *password_hash()* function can create a hash out of any piece of data, and no two different piece of data have the same hash. It is this hashed form of password rather than plain or the encrypted text that is stored in the database.

Validation of users input data is another measure that helps mitigate security breaches or attacks in this application. Unlike any other piece of data that a user might enter into a form field, email addresses are harder to validate using the regular expression method of validation because it adhere to a certain level of strict syntax. However, PHP provides a Filter extension component in the form of *filter_var()* function which gives an efficient and fail-safe means of validating email addresses as a form field input. This function takes in an email address as its first argument, with a constant representing a validation model as its second argument.

The Apache Web Server is optimized to pre-empt security vulnerabilities. Some of the steps taken to achieve enhanced security are (Wallen, 2014):

- Limiting request size using the Apache directive, *LimitRequestBody* that is placed within a directory tag. By default, *LimitRequestBody* is set to unlimited
- Disallow browsing outside document root using the Apache *DocumentRoot*'s directory entries inside the directory tag

5.5 Database Security

For an e-commerce application, the breach of any users information is a huge business liability. The MySQL's access privileges is the frontline security defense for application database. Customer of an e-commerce application will more probably require a MySQL user with SELECT privileges because searching and browsing catalog are just a simple SELECT queries. Only the admin users require the SELECT, INSERT, UPDATE and DELETE permissions. For enhanced security of the application database, the underlisted types of MySQL users with specified permissions are created.

- Public: SELECT
- Customer: SELECT, INSERT, UPDATE
- Admin: SELECT, INSERT,DELETE, UPDATE, DELETE

This approach protects the database from damaging attacks from any potential vulnerabilities that may exists in the application.

6 IMPLEMENTATION PHASE

The implementation phase is a costly exercise in terms of time resources and time management, because the phase involves coding and testing and re-coding based on each generated error messages at every point.

The tools or technologies employed at this phase of the project are:

- XAMPP: set-up locally on the project's window machine
- Sublime Text3: used as the text editor
- Adobe photoshop CS6: used as the photo editor
- PHP used as the scripting language

One of the very first task of this phase of project development is to develop the database tables using the SQL queries, create table statement, directly on the phpMyadmin interface of XAMPP.

Sample SQL create-table statement that creates the database tables in use by the application is shown in Appendix 2 (see the Appendix section).

After the completion of the database, the project development proceeded to building the application's index page, followed by creating the other pages of the application in turn.

6.1 Paypal Integration

Paypal is counted probably as one of the biggest payment solution provider. It comes across as a trusted name by the e-commerce users. In the United States, forty-six percent of retailers use Paypal for online transactions (Adobe CMO, 2013). More importantly, paypal solution saves the e-commerce business owners from the hazels of PCI compliances. Other advantages with this solution include:

- Fraud protection
- The basic payment option attracts zero monthly costs
- No setup fees charged

Paypal equally offers the following:

- Tax calculation
- Currency conversion
- Inventory management
- Ability to e-mail invoices
- Availability in 190 countries, with more than twenty different currencies
- View monthly reports
- Search through transaction history

Paypal has three primary payment solutions namely Paypal Payments Standard, Paypal Payments Advanced and Paypal Payment Pro.

Paypal payments Standard:

- Transaction initiates in the merchant's site and head off to paypal site to complete.
- Attracts no monthly fees
- Combination of paypal plus the merchant's business name appears on customer's credit card statement.

Paypal payment Pro:

- Transaction initiates and complete in the merchant's site.
- Pro option attracts a monthly payment fees.
- Offers possibility to customize fraud protection.
- Customer's credit card statement reads the merchant's business name only.

Paypal payment Advanced

- Customer does not leave the e-commerce site to complete the transaction.
- No possibility to customize fraud protection and checkout page.
- Lower monthly payment fee when compared with the Pro option.
- Customer's credit card statement carries both paypal and the merchant's business name.

Paypal HTML Button

The application developed in this project work makes use of the Paypal payment standard solution. This option relies on paypal's e-commerce specific tools to generate HTMLcode for an HTML button. The HTML button directs users to Paypal payment page when clicked. Some commonly available Paypal button types include:

Subscribe, appropriate for selling subscription.

Add to cart, appropriate for multiple items sales.

Buy now, appropriate for single item sales.

Donate, appropriate for accepting donations.

Sample HTML button code generated by Paypal for this project work is dropped inbetween an html form tag as shown below:

```
<form action=https://www.sandbox.paypal.com/cgi-bin/webscr method="post"
target="_top">
<input type="hidden" name="cmd" value="_s-xclick">
<input type="hidden" name="custom" value=" <?php echo $_SESSION['user_id']; ?>">
<input type="hidden" name="hosted_button_id" value="BV6B9KM7GTYJ2">
<input type="image" src="https://www.sandbox.paypal.com/en_US/i/btn/btn_subscribe_
LG.gif" border="0" name="submit" alt="PayPal - The safer, easier way to
payonline!">
</form>
```

6.2 Password Management

The application provides users with two different approaches for managing password. One is used to change an existing password. This becomes handy whenever a situation arises that warranted change of user's current password. In this case the user must remained logged in while changing the password. The other approach is for user to recover a forgotten password and the user is not required to be logged in to initiate the process. Recovering a forgotten password is achieved in two steps. The first step is when the application create a temporary password in response to a password recovery request

from a registered user, and send same to the user via the original email address used in registering the user's account. The temporary password is valid only for a period of twenty-four hours. If the user failed to logged in to the site with the provided temporary password before it expired, such user needs to repeat the password recovery process again (see Picture 9 & 10). The second step is to replace the temporary password with a new user's defined password by the user. The temporary password enables user to get logged in to their registered account and complete a password change forms (see Picture 4). Users desiring to change their existing password could do so by following this second step in the same way.

User's password cannot be decrypted and recovered because the application does not stores passwords in an encrypted format. Hence, the application generates new password in response to user's password reset request. One way the application does this is to employ the combine use of PHP functions `uniqid()`, `rand()`, `substr()` and MD5 hash algorithm. One such combination used in the application yielded a 32-characters long string that is made up of numbers and letters, and then a 12-characters long string is taken from the entire length starting from the eighth character. Sample functions combination used to achieve the said result is presented below:

```
$pass = substr( md5( uniqid( rand(), true)), 7, 12 );
```

7 TESTING

The testing tasks proceeded in parallel with the coding and development. The testing methodology adopted for this phase is unit testing. At the early stage of the phase, the testing are mostly carried out as dynamic browser testing. The written codes are progressively run to see how that particular section is working or rendered in the browser. Errors reporting and error handling are crucial to this stage, and correction are sought mostly through re-programming. Section errors are handled first before proceeding to another section.

At the latter stage, the testing phase of the application are conducted under these headings: Cross-browser testing, Functionality testing, Usability and Performance testing, Security testing.

Cross-browser test: major browsers used for the testing task are:

Mozilla Firefox 37.0.1

Google Chrome 41.0.2272.118m

Microsoft Internet Explorer (IE)

The major browser-related issues encountered while testing was the differences in the layout and page elements rendering across the three listed browsers. This problem was solved by tweaking the applied CSS style for the problematic page element. In other instances, certain browser specific scripts were introduced to style definition of element (such as shown below) to achieve a satisfactory cross-browser results.

`-moz-border-radius: 5px; (ie firefox browser-specific)`

`-webkit-border-radius: 5px; (ie chrome browser specific)`

Functionality test: functionality test on the landing page ensure that the links are all dynamic. The photos categories functions to render all photos associated with that categories when click. The page navigation links on the navigation bar were equally subjected to functionality testing of the landing page. Functionality testing was extended to the user's account registration page, this ensures that the application accept user's details in correct and pre-defined format. The capacity of the application to handle exceptions were checked. Login form and form submission functionality also give

satisfactory results when tested both as individual services in isolation and as integrated system.

Usability and Performance testing: with usability testing, the capacity of the application to restricts users based on users type is tested. All the access restrictions introduced to check user's type and status were observed and confirmed to be functioning as expected. The interaction of the pages of the application with the database through the SQL-query are observed to be working seamlessly. The performance testing aims to check the pageload behavior and responses of the application under stress, when many users are accessing the same page at the same time. This is also known as web stress testing. The web stress testing of this application was not thoroughly probed because the application was not yet hosted on any remote hosting server.

Security testing: with security testing, the ability of the application to protect users data and business assets are probed. The measures put in place during the design phase to thwart commonly known site attacks such as sql-injection and cross site scripting (XSS) attacks are also put to test. The application functionally recognizes only registered users, denied access to unregistered users and redirects accordingly, users whose subscription have expired.

7.1 Testing and Evaluation of Features on the Requirements Specification

Features requirements for the e-commerce web application were enumerated on the requirement section as ease of navigation, ease of items selection, consistent layout, effective security notifications among others. In this phase, the application is further tested to establish its conformity with the stated e-commerce application-specific requirements. Testing and evaluation of these features proceeded in these order:

- 1) Ease of Navigation between different pages: The navigation bar works great to facilitate smooth movement from the landing page to another page. For instance, one is able to get to the signup page from here. Same degree of smooth navigation is experienced when connecting from the application to the Paypal page for subscription payments (see Picture 1 in the Appendix section).
- 2) Consistent layout of the pages and items information: As can be observed from the screen shots in the Appendix section, the pages of the application exhibit similarity and consistency of layout and appearances.

- 3) Organization of items in categories: Browsing the image catalogue can only be accomplished using the categories links, and these links are displayed as part of the major sections of the landing page.
- 4) Ease of items selection: Each item on the image catalogue are depicted with their thumbnail image, which is wrapped in html anchor tag. Mouse-clicking on these thumbnail images works smooth to take users to the image downloading page for the full sized photo image (see Picture 8 in the Appendix section).
- 5) Conspicuous display of links and buttons: This feature is tested on mouse-over, and the application works well to give the link (any link) a unique deep-blue colouration on mouse-over (see Picture 1).
- 6) Effective security notification: The session control implementation for the application works smoothly and alerts user of impending session time-out in advance. This is triggered by period of inactivity.
- 7) Feedback feature: Each displayed photo items in the image catalogue has a user review link that enables users to write reviews or comments on the image item.
- 8) Secure data exchanges: The most important piece of users data required by the application is the user's credit card data. This data is not collected until the user is securely connected to the Paypal payment page, and the connection URL could be observed to change from http to https protocols. Similarly, a password changing and renewal exchange details with the users are implemented through an email messaging.
- 9) Quick acknowledgement of completed order: Orders acknowledgement are automated and instant. The application is able to send orders detail as an automated email to the user after every completed transaction.

8 DEPLOYMENT AND MAINTENANCE

After the satisfactory testing of the application on the local machine, efforts were made to remotely deploy the application on a third-party hosting server. This is the way to make it accessible to any internet user.

One of the nodes involved in system deployment includes the database server. This node is usually controlled and maintained by the hosting companies. There is also the application server node through which the administrator administers the application's database contents. The final node is the client. The clients are able to establish connection with the application via private networks using the internet browser application.

The topology of the physical components of system deployment as described above can be visualized with the aid of a deployment diagram as shown in Figure 4, the diagram shows the nodes and their relationships.

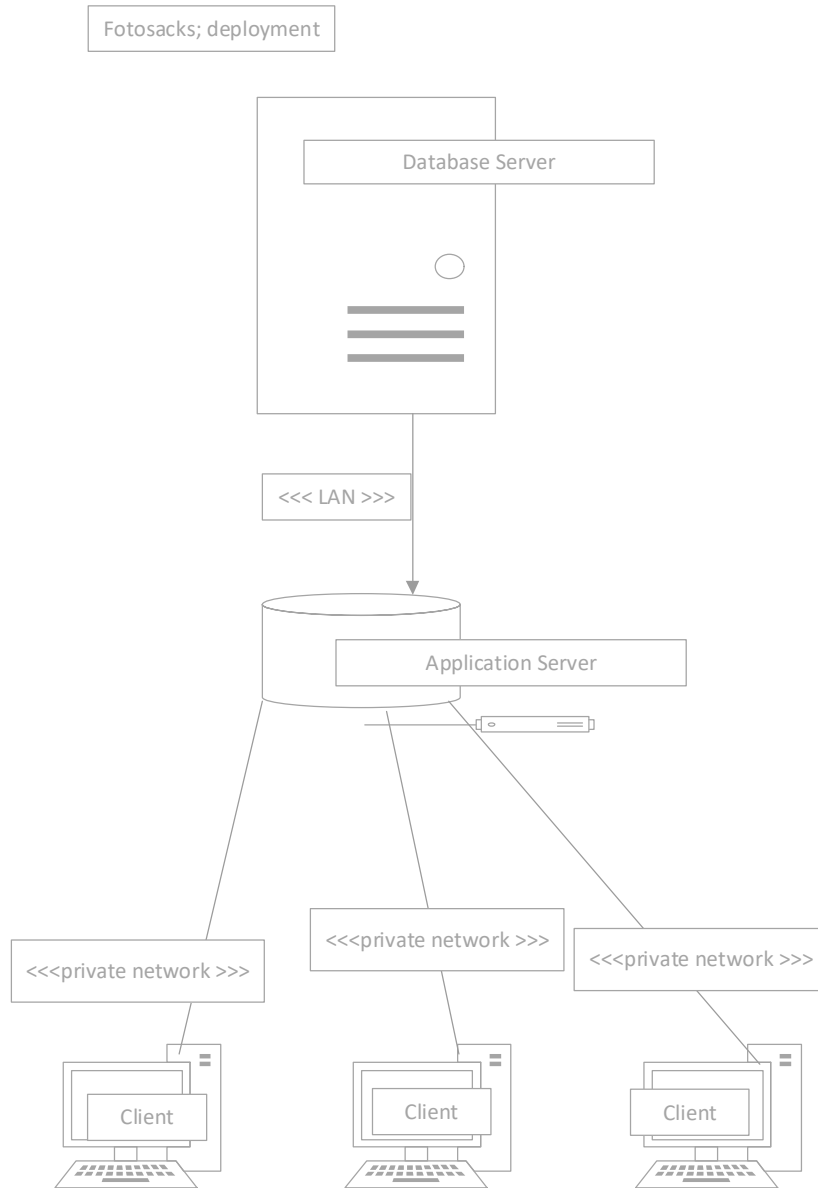


Figure 4. The nodes with their relationships in the system deployment.

9 PROJECT LIMITATIONS

The project has many inherent limitations due to the choice of project architecture. For example a procedural programming architecture is adopted for the project work. An object-oriented or modular approach could have provided a better reusable and more extendable features, but the procedural approach makes the development process much simpler to conceptualize by capturing how the program executes as the codes are being written and re-written. Furthermore, the use of Frameworks (there are tens of web-application Frameworks out there such as jquery, twitter bootstrap and many more) was deliberately avoided in the project work, though their use would no doubt enhance the looks and the feels of the application with possibly reduced lines of codes. However, the objective, among other things, is to maximize code writing skills, hence the easier and shorter frameworks approach was jettisoned.

Other identifiable limitations upon which future improvement of the application could be based are as listed below

Non-use of Javascript and Ajax for improved user-experience

Non-creation of separate Admin interface.

Non-provision of additional payments option (Paypal is the only payment solution used).

Non-implementation of SSL. SSL Certificates for e-commerce applications are available at a cost. It must be noted however that the commercial success of a web application such as this, leans heavily on SSL/HTTPS implementation. Consideration must be given to this for future improvement.

10 CONCLUSION

The application developed in this project provides capability for users to register, login and logout, pay or renew subscription, browse or download photo images, upload images as donation. Registered users are also able to recover their forgotten password.

Many of the technologies used in this project work are open source, therefore no expenses were incurred in any way. The combined use of the PHP, MySQL and Apache web server, with their built-in security provides added advantages in terms of simplicity, enhanced performance and scalability.

Furthermore, this application would scale-up successfully to any size using these same set of tools which are part of the so-called no-cost development technologies, this further underlines the potential of the application to bring higher profit margin.

The project work helps to develop an understanding of how to create an interactive e-commerce application with its associated implementation technologies. It has equally brought forth the understanding of how databases are developed by making use of different tables as components, and how the data in the tables are accessed, processed and passed on to the requesting browser application where it is displayed for user interaction.

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Appendix 1 Database Table

Table 1. Category table.

S/N	Name	Type	Description
1	Categories_id	int	Primary key
2	category	varchar	

Table 2. Photos table.

S/N	Name	Type	Description
1	photo_id	int	Primary key
2	categories_id	int	Foreign key
3	description	varchar	
4	stone_wal	varchar	Unique photo identifier
5	file_name	varchar	
6	size	varchar	
7	image_type	mime	
8	image_thumb	blob	Thumbnail of photo
9	thumb_height	int	
10	thumb_width	int	
11	date_created	timestamp	

Table 3. Users table.

S/N	Name	Type	Description
1	users_id	int	Primary key
2	user_type	varchar	
3	username	varchar	
4	email	varchar	
5	password	varchar	encrypted
6	first_name	varchar	
7	last_name	varchar	
8	date_created	timestamp	
9	date_expires	timestamp	
10	date_modified	timestamp	

Table 4. Orders table.

S/N	Name	Type	Description
1	<u>orders_id</u>	int	Primary key
2	users_id	int	Foreign key
3	transaction_id	varchar	Foreign key
4	payment_status	varchar	
5	payment_amount	varchar	
6	date_created	timestamp	

Table 5. OrderHistory table.

S/N	Name	Type	Description
1	history_id	int	Primary key
2	orders_id	int	Foreign key
3	users_id	int	Foreign key
4	transaction_id	varchar	
5	date_created	timestamp	

Table 6. DownloadHistory table.

S/N	Name	Type	Description
1	dwdHistory_id	int	Primary key
2	stone_wal	varchar	Foreign key
3	user_id	int	Foreign key
4	note	text	
5	date_downloaded	timestamp	

Table 7. Reviews table.

S/N	Name	Type	Description
1	reviews_id	int	Primary key
2	first_name	varchar	
3	last_name	varchar	
4	commentpost	text	
5	date_created	timestamp	

Appendix 2: Create-table SQL syntax.

```
CREATE TABLE `categories` (  
  `id` SMALLINT NOT NULL AUTO_INCREMENT,  
  `category` VARCHAR(255) NOT NULL,  
  PRIMARY KEY (`id`),  
  UNIQUE KEY `category` (`category`)  
) ENGINE=MyISAM DEFAULT CHARSET=utf8;
```

```
CREATE TABLE `orders` (  
  `id` INT UNSIGNED NOT NULL AUTO_INCREMENT,  
  `user_id` INT UNSIGNED DEFAULT NULL,  
  `transaction_id` VARCHAR(19) NOT NULL,  
  `payment_status` VARCHAR(15) NOT NULL,  
  `payment_amount` DECIMAL(6,2) UNSIGNED NOT NULL,  
  `payment_date_time` TIMESTAMP NOT NULL DEFAULT  
  CURRENT_TIMESTAMP,  
  PRIMARY KEY (`id`),  
  KEY `user_id` (`user_id`)  
) ENGINE=MyISAM DEFAULT CHARSET=utf8;
```

```
CREATE TABLE IF NOT EXISTS `users` (  
  `id` int(10) unsigned NOT NULL AUTO_INCREMENT,  
  `type` enum('member','admin') NOT NULL,
```

```

`username` varchar(30) NOT NULL,
`email` varchar(80) NOT NULL,
`pass` varbinary(32) DEFAULT NULL,
`first_name` varchar(20) NOT NULL,
`last_name` varchar(40) NOT NULL,
`date_expires` date NOT NULL,
`date_created`      timestamp      NOT      NULL      DEFAULT
CURRENT_TIMESTAMP,
`date_modified` timestamp NOT NULL DEFAULT '0000-00-00 00:00:00',
PRIMARY KEY (`id`),
UNIQUE KEY `username` (`username`),
UNIQUE KEY `email` (`email`)
) ENGINE=MyISAM DEFAULT CHARSET=utf8 AUTO_INCREMENT=1 ;

```

```

CREATE TABLE `photos` (
    `id` INT UNSIGNED NOT NULL AUTO_INCREMENT,
    `categories_id` SMALLINT UNSIGNED NOT NULL,
    `description` TINYTEXT NOT NULL,
    `stone_wal` CHAR(63) NOT NULL,
    `file_name` VARCHAR(100) NOT NULL,
    `size` MEDIUMINT UNSIGNED NOT NULL,
    `image_type` varchar(25) NOT NULL,
    `image_thumb` mediumblob NOT NULL,

```

```

`thumb_height` INT(5),

`thumb_width` INT(5),

`date_created` TIMESTAMP NOT NULL DEFAULT
CURRENT_TIMESTAMP,

PRIMARY KEY (`id`),

UNIQUE INDEX `tmp_name_UNIQUE` (`tmp_name` ASC),

INDEX `date_created` (`date_created` ASC),

INDEX `fk_photos_categories_idx` (`categories_id` ASC),

CONSTRAINT `fk_photos_categories`

        FOREIGN KEY (`categories_id`)

        REFERENCES `categories` (`id`)

        ON DELETE NO ACTION

        ON UPDATE NO ACTION

```

```

)ENGINE = InnoDB DEFAULT CHARSET=utf8;

```

```

CREATE TABLE IF NOT EXISTS `reviews` (

`reviews_id` int(10) unsigned NOT NULL AUTO_INCREMENT,

`first_name` varchar(20) NOT NULL,

`last_name` varchar(30) NOT NULL,

`commentpost` text NOT NULL,

`date_posted` timestamp NOT NULL DEFAULT CURRENT_TIMESTAMP,

PRIMARY KEY (`reviews_id`),

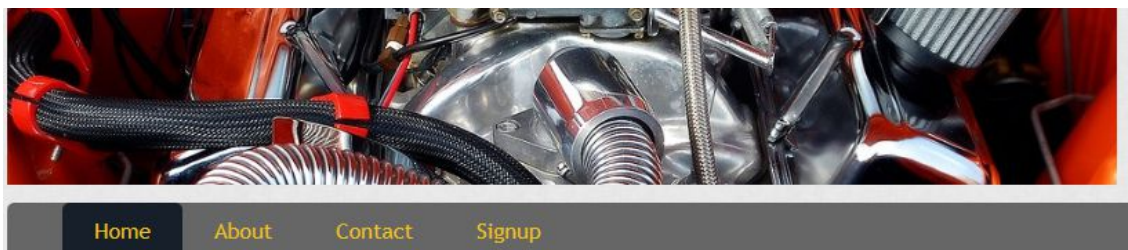
KEY `date_posted` (`date_posted`)

```

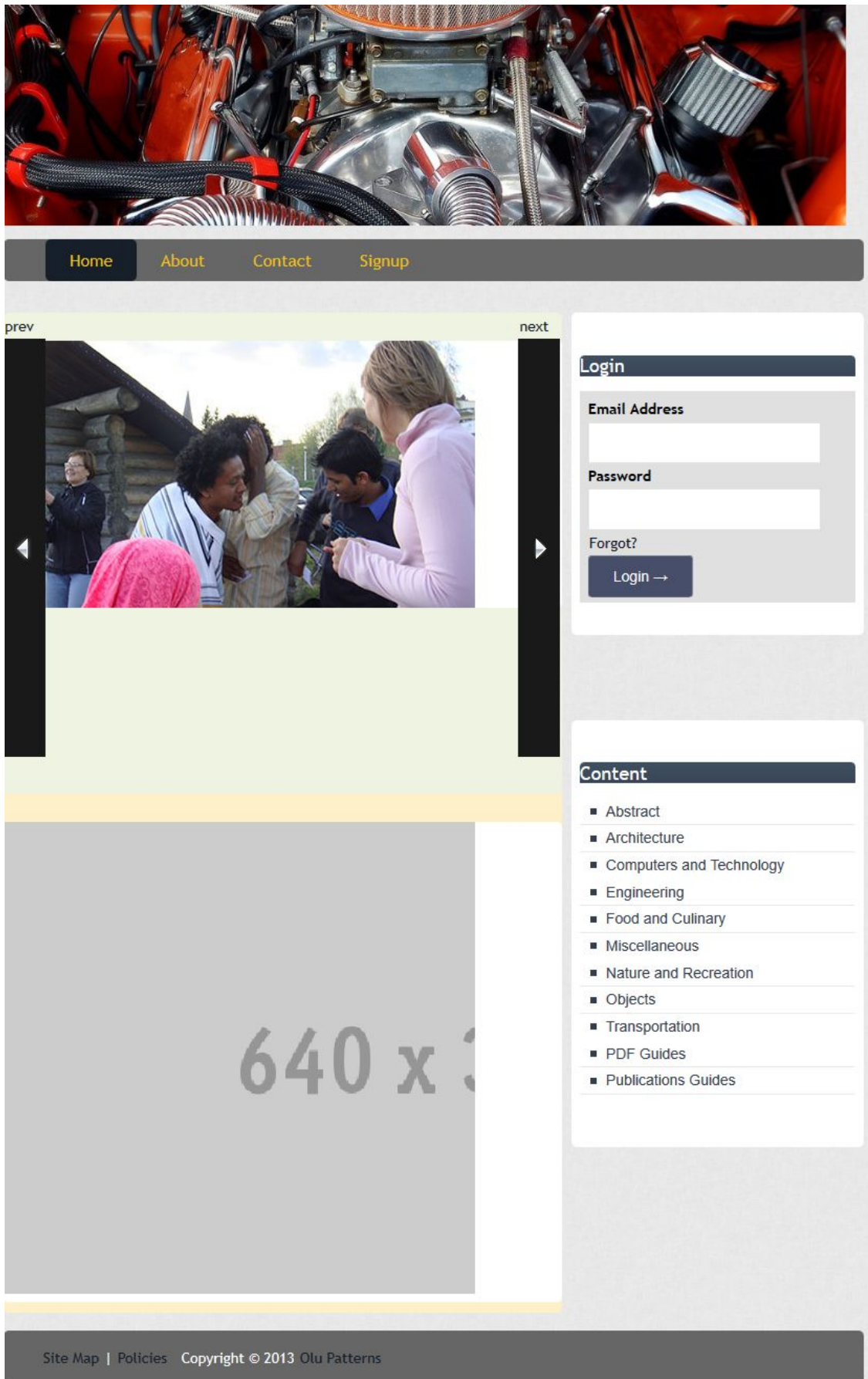
```
) ENGINE=InnoDB DEFAULT CHARSET=utf8 AUTO_INCREMENT=1 ;
```


```
CREATE TABLE IF NOT EXISTS `dwldhistory` (  
  `id` int(10) unsigned NOT NULL AUTO_INCREMENT,  
  `user_id` int(10) unsigned NOT NULL,  
  `item_id` int(10) unsigned DEFAULT NULL,  
  `date_created` timestamp NOT NULL DEFAULT CURRENT_TIMESTAMP,  
  PRIMARY KEY (`id`),  
  KEY `type` (`type`,`item_id`),  
) ENGINE=InnoDB DEFAULT CHARSET=utf8 AUTO_INCREMENT=1 ;
```


Appendix 3: Screenshot of Pages from the web application.



Picture 1. Screenshot of Navigation bar.





[Home](#)
[About](#)
[Contact](#)
[Signup](#)

Signup

***Required Field**

First Name*

Last Name*

Username*

Only letters and numbers are allowed.

Email Address*

Password*

6-20 characters long, atleast a lowercase,an uppercase letters, one number.

Confirm Password*

[Next →](#)

Manage Your Account

- Renew Account
- Change Password
- Favorites
- History
- Recommendations
- Logout

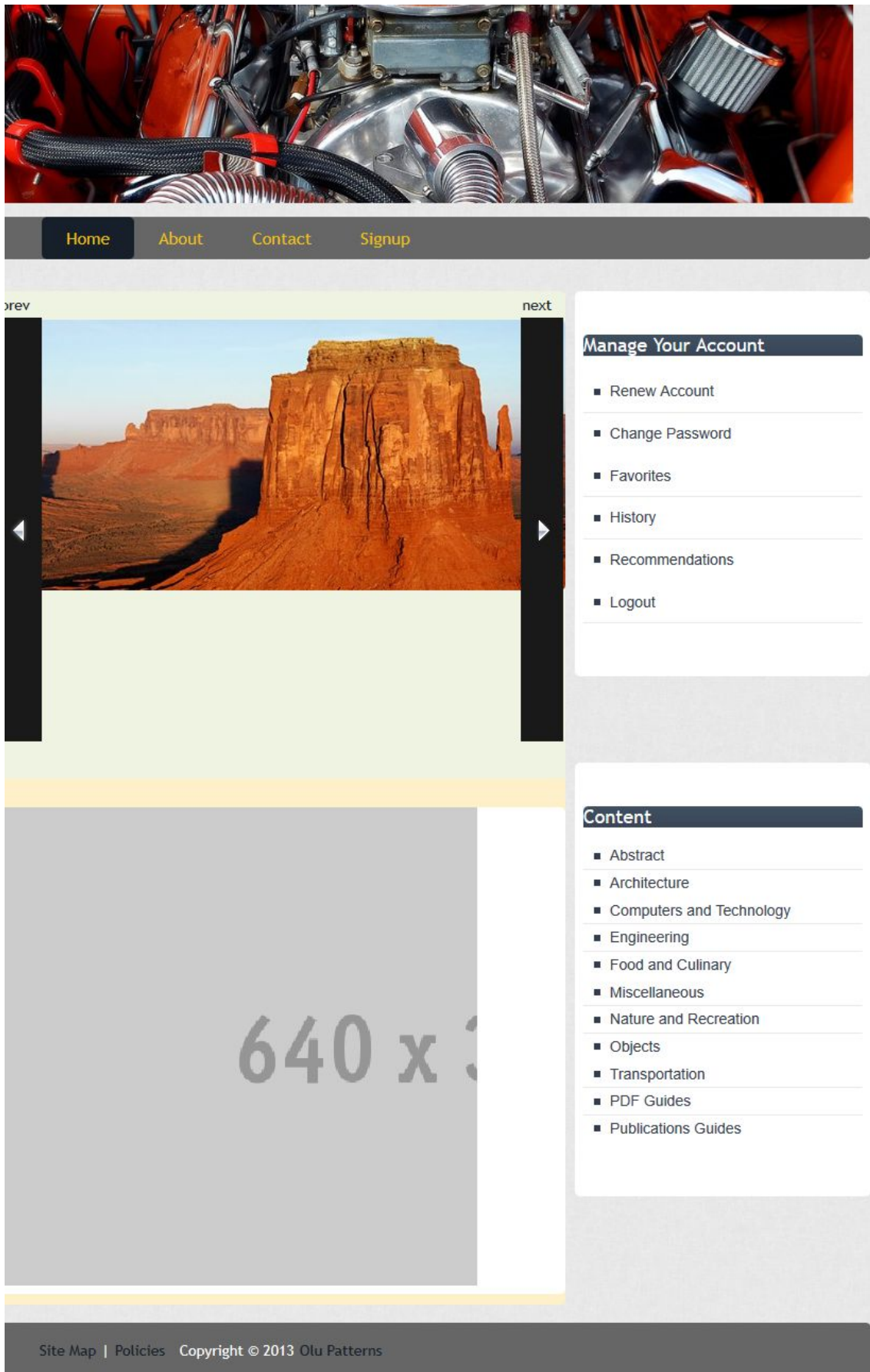
Administration

- Add Photo
- Add Page
- Add PDF
- Blah

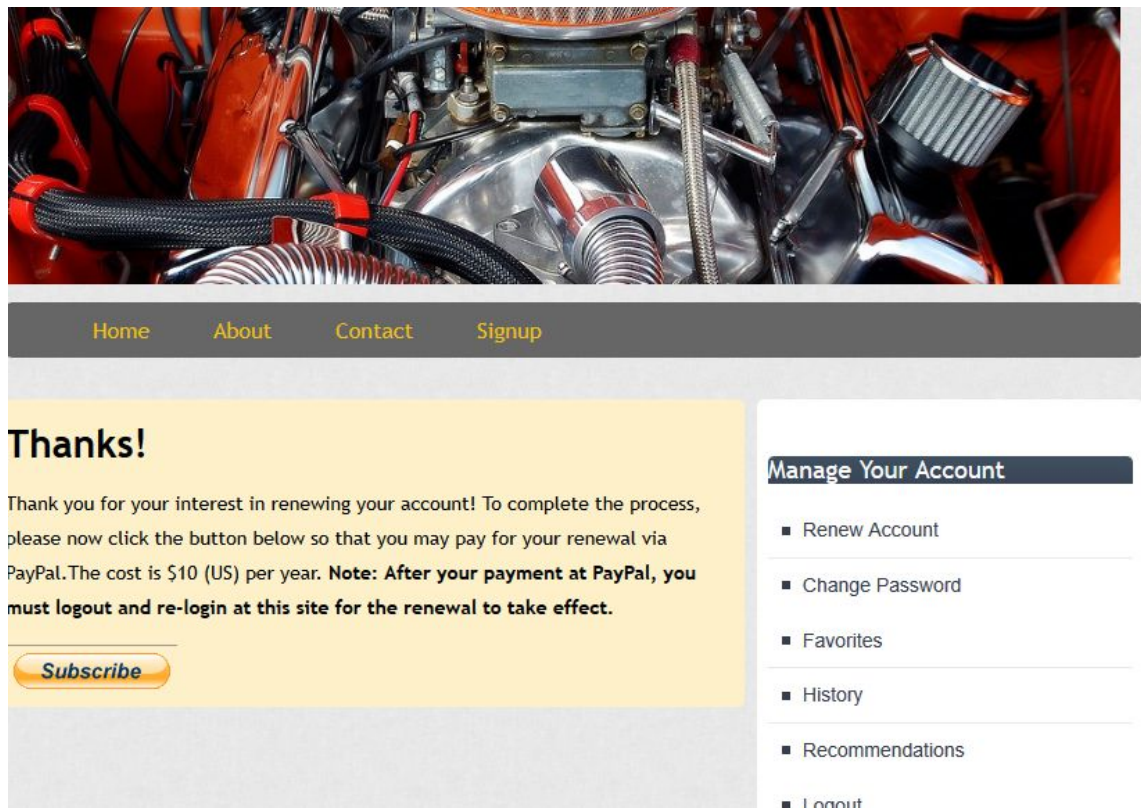
Content

- Abstract
- Architecture
- Computers and Technology
- Engineering
- Food and Culinary
- Miscellaneous
- Nature and Recreation
- Objects
- Transportation
- PDF Guides
- Publications Guides


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Picture 2. Landing page for a registered ordinary user.



Picture 3. Page redirection for users account renewal.



Home About Contact Signup

Change Your Password

Use the form below to change your password.

Current Password

New Password

Must be between 6 and 20 characters long, with at least one lowercase letter, one uppercase letter, and one number.

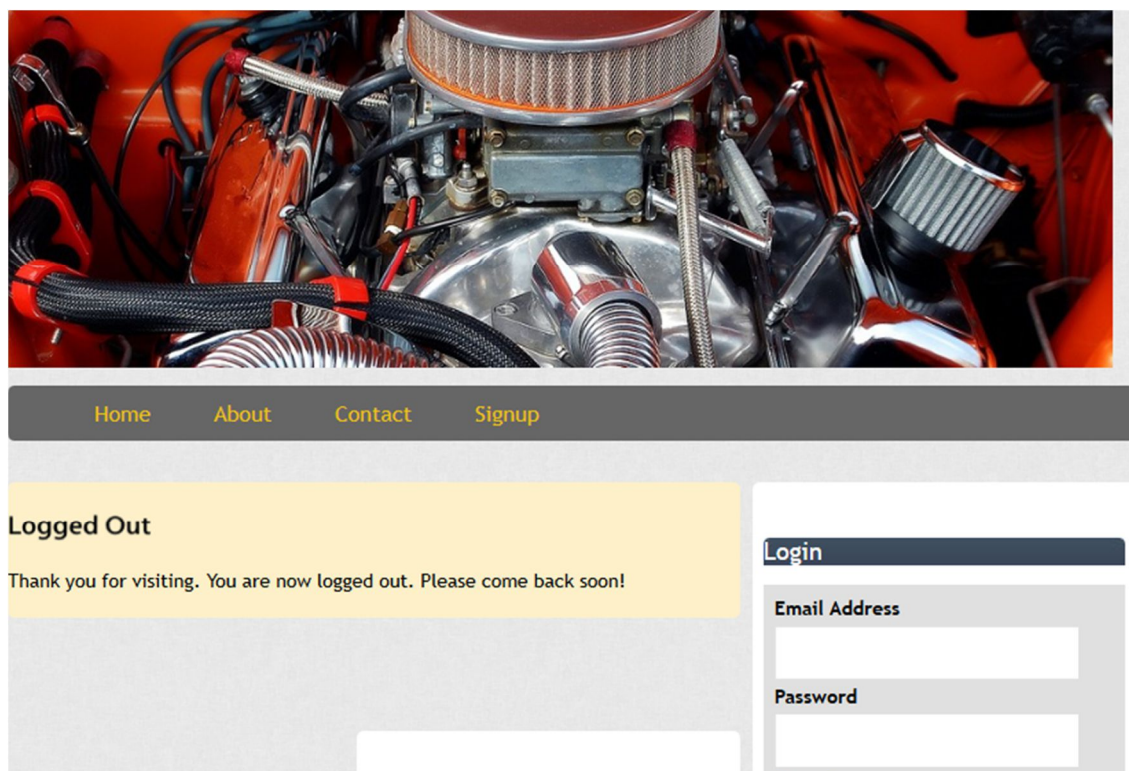
Confirm New Password

Change →

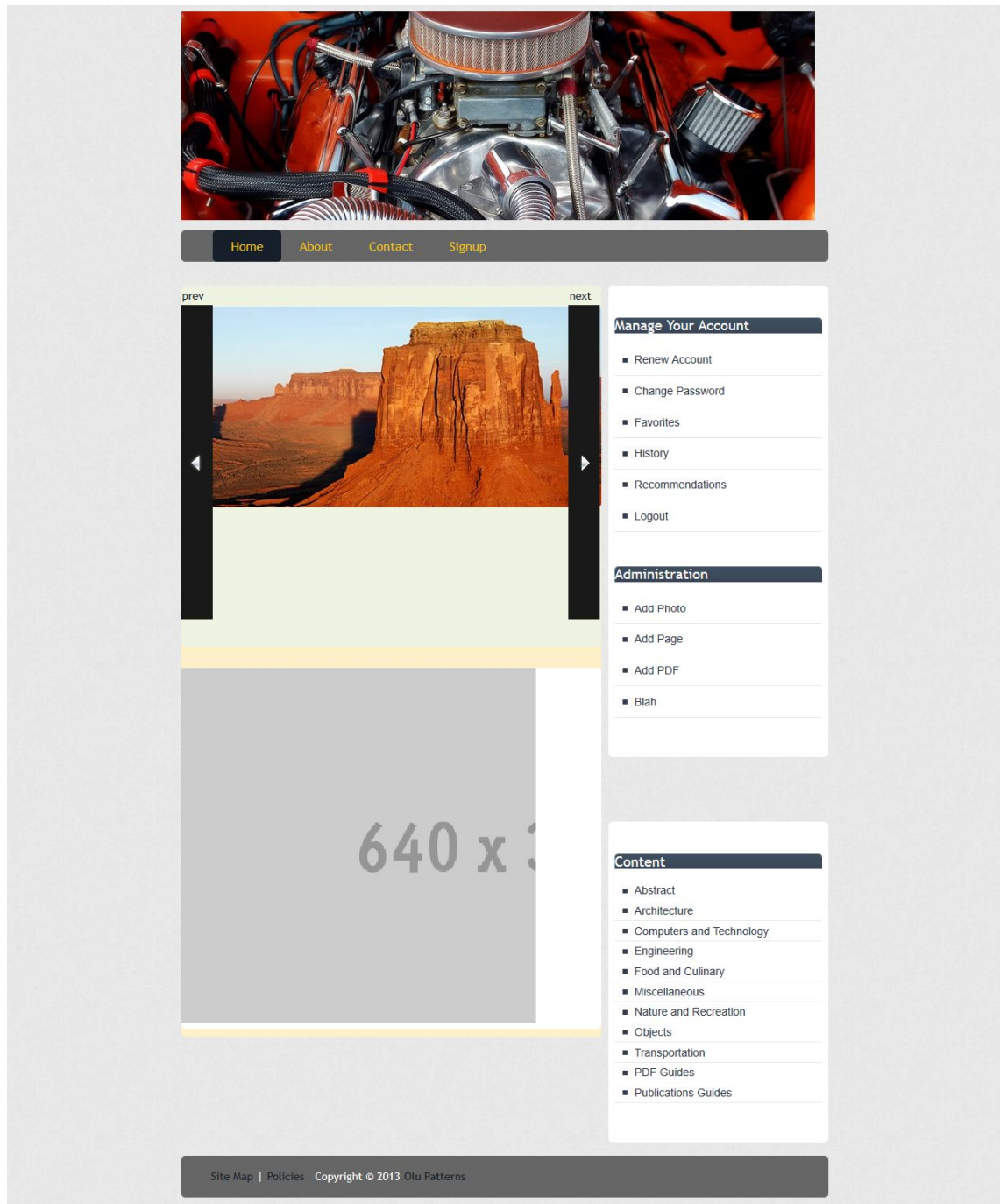
Manage Your Account

- Renew Account
- Change Password
- Favorites
- History
- Recommendations
- Logout


Picture 4. Password Changing by a registered user.



Picture 5. Page redirection for a logged out user.



Picture 6. Landing Page for an Admin user type.



Home About Contact Signup

Add an Image

Fill out the form to add a Photo image to the site:

Category

Select One

Description

Photo

Browse... No file selected. Only .jpg, .png or .gif type, 5MB Limit

Add photo →

Manage Your Account

- Renew Account
- Change Password
- Favorites
- History
- Recommendations
- Logout

Administration

- Add Photo
- Add Page
- Add PDF
- Blah

Picture 7. Back-end form used by an Admin users to load photo images.



Home About Contact Signup

Nature and Recreation

a8a9a8778ff88fd3d9c3f8382003a04c73d638a9.jpg
Reaching Out program Day at the Lake

d7ff5ef0be223b5df2b9b95a3a18cc2d4b4bd756.jpg
bright sunshine at the riverside.

f95675e65b06c241c7678aa646319af808581260.jpg
Scion is the newest to inherit all attributes of self driving machine.

f7538838b2f4b17779915a6536a8e480f2ea49c5.jpg
Formulae one track is never this filled with atate of the earth driving machine.

92f400a5f4bca70069a7d93ea949fa120e7235e5.jpg
The luxury is good, the final reach possible with riches.

c974d0cffee0aacc5e7a0e6ff5c69cf5441b264b.jpg
Arts etched in Technological feat with class.

9af5a19ced433deb4e3e773babc052d2cf82976.png
sail away in convoy, its the sweet way to see the old lake.

ee82488c8ce073188e59341cbac999f8acb73949..png
jet off to the old Lake resort, more time for fishing than ever.

Manage Your Account

- Renew Account
- Change Password
- Favorites
- History
- Recommendations
- Logout

Administration

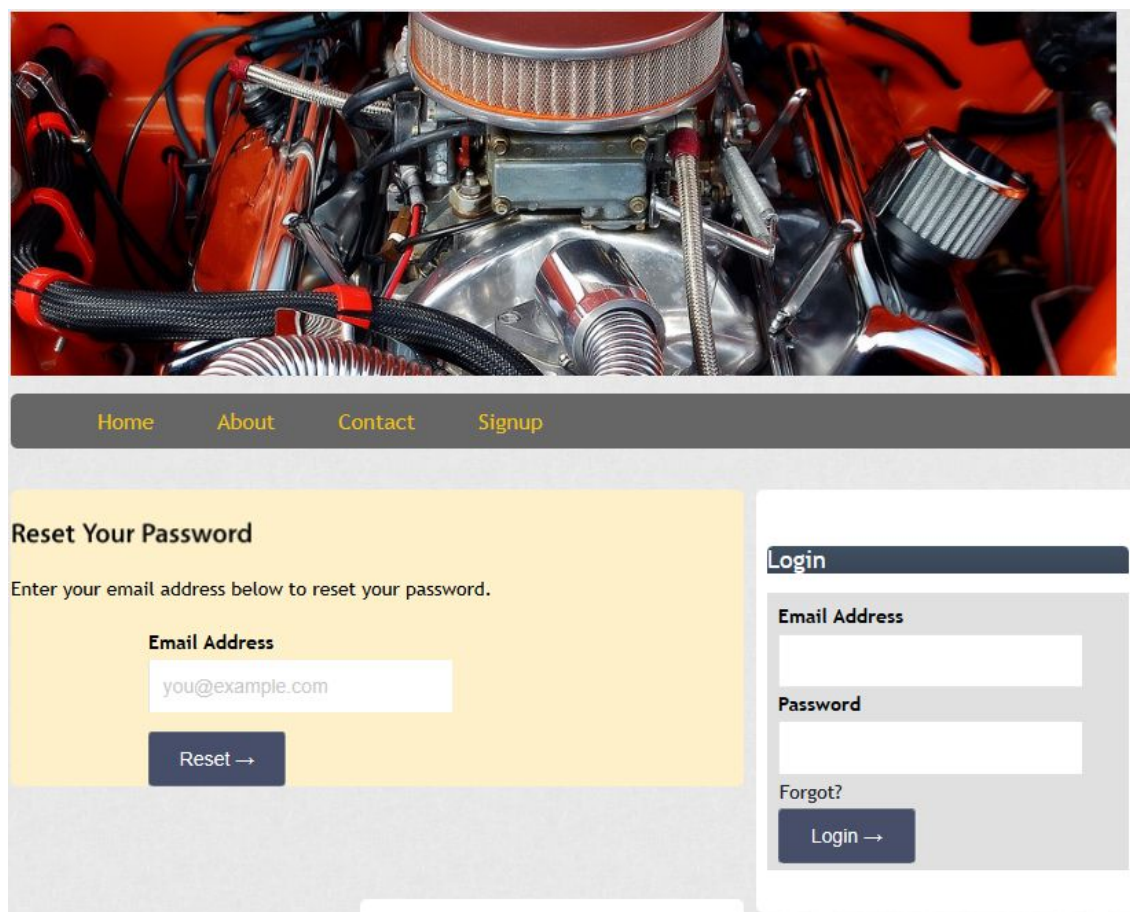
- Add Photo
- Add Page
- Add PDF
- Blah

Content

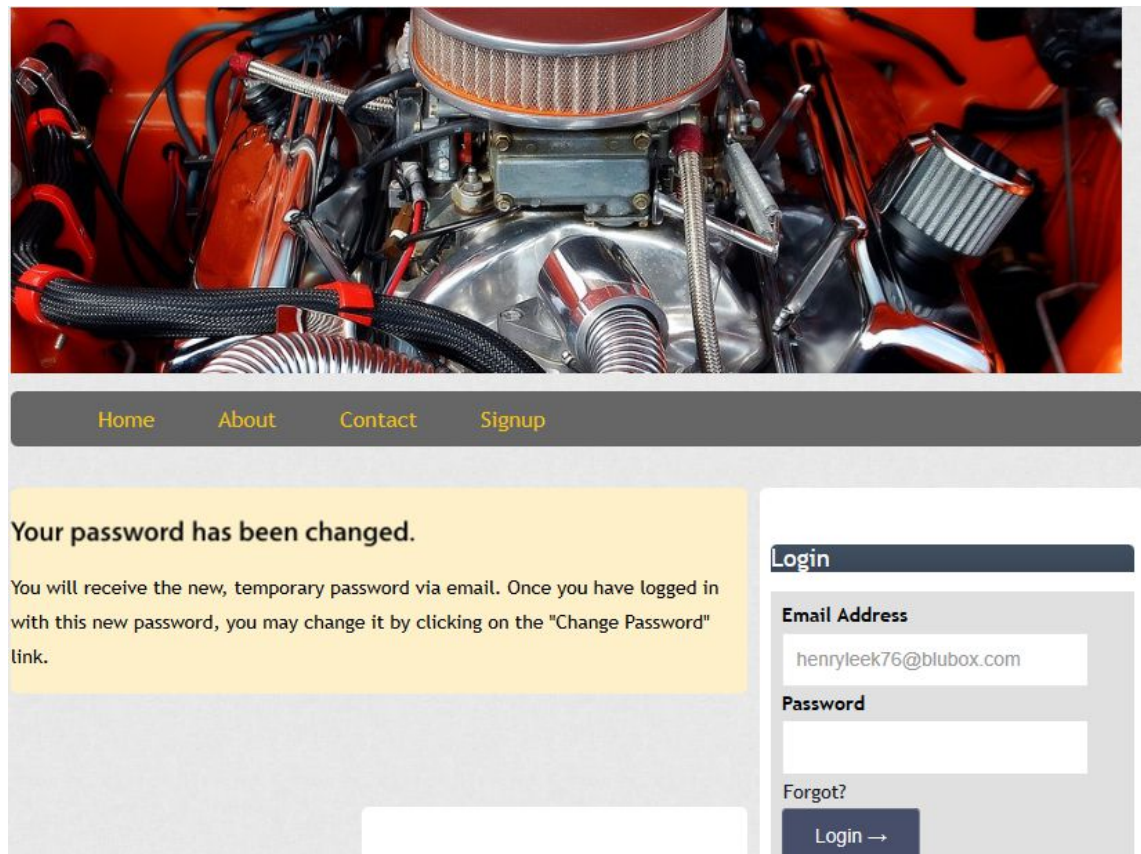
- Abstract
- Architecture
- Computers and Technology
- Engineering
- Food and Culinary
- Miscellaneous
- Nature and Recreation
- Objects
- Transportation
- PDF Guides
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Picture 8. Catalogue that displays photo image based on category.



Picture 9 : User's password reset form.



Picture 10 : User's temporary password sent via email address of the user.