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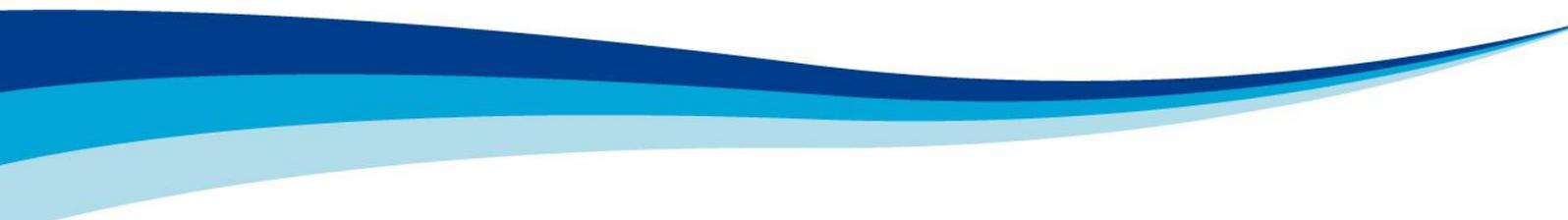
Specialization: Data Communication

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A WEB- BASED RESERVATION SYSTEM

– with PHP and MySQL



BACHELOR'S THESIS | ABSTRACT

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A WEB-BASED RESERVATION SYSTEM

The purpose of this Bachelors Thesis was to design and implement a Database system for Dise-Tech, a company that provides Audio and Lighting rental or hiring services for occasions such as conferences, exhibitions, and theatres. The Database will be integrated into the company's existing website.

Research into various Database and Web Design techniques led to this solution which will enable interactivity between users of the website and Dise-Tech. The user interface emphasizes usability and standardization with the use of HTML and CSS. The server side scripting is done in PHP and all data is stored in a MySQL-database.

The solution implemented ensured high and constant availability, and transaction processing with data integrity assured, meeting the most demanding performance expectations of a system.

This solution will enable the company to build conversations with its customers and develop a relationship with them. As the content of the site answers the questions asked by the customer's they will refer the company to other customers. Instead of artificially building back links, the company will build them naturally by engaging the customers.



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NOTATION

ASP	Active Server Pages
COBOL	Common Business Oriented Language
PHP	PHP: Hypertext Preprocessor
SQL	Structured Query Language
URL	Uniform Resource Locator
HTML	Hypertext Markup Language
PDO	PHP Data Objects
TCL	Tool Command Language
FTP	File Transfer Protocol
OSS	Open Source Software
DBMS	Database Management System
WAMP	Windows Apache MySQL PHP
HTTP	Hypertext Transfer Protocol

1. Introduction

Modern day businesses have become accessible virtually in any part of the world in the past few years. The Internet has allowed businesses to break through the geographical barriers by making them accessible in any country of the world to a potential customer through a website. A website is a collection of HTML and subordinate documents on the World Wide Web that are typically accessible from the same Uniform Resource Locator (URL) and residing on the same server, and form a coherent, usually interlinked whole.

Extensively, a discussion with Dise-Tech revealed that a static HTML site is available. This means that each web page is a separate document and there are no databases or external files that are drawn upon. This also means that the only way to edit this site is to go into each page and edit the HTML. The company decided it needs a dynamic website. This is a website that is written in more complex code such as PHP or ASP and has a greater degree of functionality. Each page of the site will be stored in a database or an external file. Using the static HTML site, potential customers had to call the company offices.

This thesis' purpose is to elevate a company's static HTML site into a more dynamic and interactive one. Not being just a representation of the company, this E-business solution will be a medium from which potential customers can acquire information and interact with Dise-Tech. The solution will employ the use of a combination of Apache, PHP and MySQL while using HTML as the user interfaces.

The project is divided into the following parts: e-business analysis, e-business and business size, a research into the company demanding the project, software tools, website automation, software architecture, project planning, database design, testing and accessing the database and project, project recommendations and conclusion.

In the first section, e-business is briefly analysed and some factors that influences the implementation of e-business as a solution in a company are also outlined. The next section takes a look at Dise-Tech, the company demanding the project and its current operation, and how the project will benefit the company when completed. In the third section, a brief history and description of the software tools are outlined. The fourth and fifth section outlines how the website will be automated with the use of the software

tools mentioned, and an architecture that will serve as a blueprint for the project. The planning phase outlines the different parts of the project and how the various parts will support each other to achieve the set goal. The database design considers the various tables that will make up the entire database and the key relations between them. Finally, a review of the project will influence some recommendations as to what can be done in the near future to implement a better system for Dise-Tech.

2. E-Business Analysis

Supported by the high adoption rates of the Internet among firms, organizational web presence is no longer exclusive to large companies or highly innovative firms in today's global business environment. Nonetheless, creating a website is the starting point for a firm to rip the benefits derived from using the Internet. Potentially the web can be used for a variety of purposes such as communicating internally and externally and for sharing data, searching of information on customers, suppliers and competitors, providing customer service and sales support, purchasing and selling products as well as services and collaborative working [1].

E-Business is the management of relationships, electronic data interchange, collaboration, communication and establishment of workflow processes with business partners, customers, employees, government and other business agents as long as these tasks or processes are performed by electronic means. Therefore, E-Business is a representation of the conduct of business activities on the Internet [1].

Corporate websites are employed to provide corporate or commercial information to customers, such as providing product-related information, prices, specifications, and terms of delivery and so on to business partners or other stake holders. Corporate information can provide insight into the background of the company, its financial statements, employment offers, quality certificates, etc. The corporate or commercial nature of the information goes beyond basic business information such as contact details. E-information could be the display on the Internet of product information to potential customers [1].

2.1 E-Communication

E-Communication is regarded as an E-Business dimension that facilitates two-way information exchange. Besides reducing costs normally incurred in traditional communication tools, it offers a unique opportunity to business agents both internally and externally. The technology facilitates the exchange of information, collaboration and the possibility to establish close relationships based on trust and mutual commitment. This technology is a great unifier, offering a way to integrate text,

graphics, sound and video. This exchange of information can vary from more structured tools such as feedback forms, to more open and interactive forms, such as the online chat feature [1].

2.2 E-business and business size

Very often an important factor for technology adoption has been the size of a business, meaning the size of the firm is strongly associated with its IT investment. With regards to E-business adoption, larger firms are more likely to adopt E-business. There are several levels of E-business adoptions, where larger businesses can allocate greater financial, technological and personnel resources to the development of an E-business initiative. E-business applications have been known to generate efficiency and external coordination through changes in intra or inter organizational integrative processes. Therefore, E-business improves operational performance, which in turn may give higher levels of financial result [1].

2.3 The company demanding the development project

Dise-Tech is an event partner that focuses on design, sale and rental of lighting and sound equipments in and around the Turku region since 2006. They design lighting and sound technologies for different space areas for different kinds of occasions including birthday parties, wedding ceremonies, corporate parties, disco, concerts, theatres, etc. Dise-Tech leases their equipment to customers at very moderate prices and provides flexible after-sale support services. It also has an arranged set of packages to fit various types of occasions, linked with different equipment types ranging from high, medium and low quality to fit the customer needs.

2.4 Present Operation

During its time of operation, Dise-Tech was negotiating and finalizing deals with potential customers through telephone and emails. This happens after a customer made contact to the company by phone after browsing the company's static website's

contact page, which advertized the company's phone numbers, email and postal addresses. No other data of the customer is kept after the business is finalized, and the company does not have the means of backtracking processes and information exchange during and after the negotiations.



Figure 1 The old web site of Dise-Tech

A dynamic and interactive website has been proposed, which will enable more interactivity between potential clients and the website. This will enable visitors to make reservations online by making a choice of a package and choosing a higher quality level using an online form. Information provided by the customer will then be stored in a database for future reference and processing.

3. Software Tools

This chapter introduces and describes the tools, technology and techniques used to implement the E-business solution to meet the needs of the company while minimizing cost, by using open source software (OSS).

Apache is recognized as one of the world's most popular open source Hypertext Transfer Protocol (HTTP) server software [3] which provides common language interface support for Python, Perl, Tool Command Language (TCL) and Hypertext Preprocessor (PHP) server side scripting languages. Apache, combined with PHP will play a key role in the Dise-Tech E-business solution. The server platform will run PHP scripts which will in turn query the database using PHP Data Objects (PDO). PDO provides a data-access abstraction layer, which means that, regardless of which database is used, the same functions can be used to issue queries and fetch data.

MySQL is used for the database, while the user interface is implemented in Cascading Style Sheets (CSS) in conjunction with Hypertext Markup Language (HTML).

3.1 Apache

The Apache HTTP server is a freely-available source code implementation of HTTP Web server released in February 1995 by Apache Software foundation. The project is a collaborative software development effort aimed at creating a robust, commercial-grade product capable of running on different platforms. It has gained popularity in the last decade and has remained a platform upon which individuals and institutions can build reliable systems both for experimental and mission-critical purposes.[3]

Apache is freely available on the main Apache website for downloading, including a binary build if one is interested in manipulating the source code or simply Apache if nothing is to be done with the source code. When running the downloaded file on a Windows operating system, for example, a user will be prompted to choose whether to run Apache as a service, that is running for all users, or run in a console window when you choose to start Apache with a shortcut. The installation also requires a server name, domain name and an administrative email account to be specified. By default, Apache is installed into the C:\Program Files\Apache Group\Apache directory, but this

can be changed into a directory of choice. An installation type is needed, to specify between a complete or custom installation. While a complete installation will install everything including source code if downloaded, a custom installation will not install any documentations or source code from the package.[3]

In this project, Apache is used in a state where it is bundled together with PHP and MySQL, running on a Windows operating system as a Windows Apache MySQL PHP (WAMP) server, therefore, it is configured as a local server for testing purposes. This will very much vary on a web hosting service provider's server which will constitute and implement all the necessary access and security measures to protect its server.

3.2 Hypertext Preprocessor (PHP)

Hypertext Processor (PHP) is an open-source general-purpose scripting language that is widely-used and especially suited for Web-development and can be embedded into HTML. The main goal of the language is to allow developers to quickly write web pages that are dynamically generated. The syntax of the language is similar to the C, Perl and Java programming languages but also contains syntax that is peculiar to PHP. The latest version is PHP 5 which has an object-oriented model that allows objects to be passed by reference. This is the main difference between PHP 5 and the other versions where objects are passed by value.[4]

3.3 SQL and Relational Database Model

A database is a collection of relational data. In the much earlier days proprietary languages written in COBOL (Common Business Oriented Language), C, and so on were used to manipulate respective database records. This is because relational databases did not have a set of commands to work with the data. In 1970, a researcher, E. F. Codd, working for IBM introduced the relational database model, which is a representation of database as a collection of tables with a relation with one another. The data is normally stored on a computer's hard disk electronically which humans cannot read or understand. An interface, database management system (DBMS), between the human operator and the database is, therefore, needed. The

DBMS allows the user to query the database by retrieving, updating, deleting old information and adding current information to the database. Another role played by the DBMS is maintaining data integrity by ensuring that the data entered into the database conforms to specified data types.[6]

3.4 Website Automation

Dise-Tech's system will run on a three tier architecture having a front end web server that will serve both static and dynamic content to a browser with the content statically or dynamically generated. A PHP platform is used for the middle dynamic content processing and generation level and the back end comprises both data set and database management system software what will manage and provide access to data.

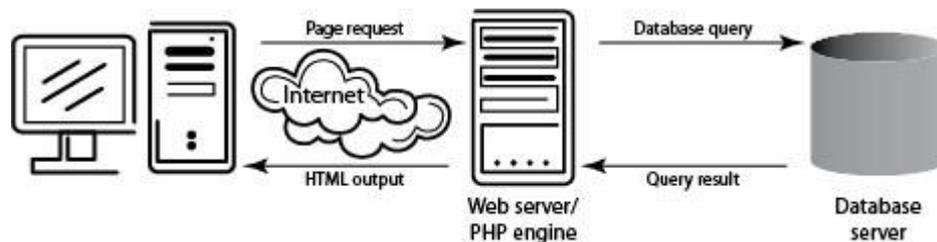


Figure 2. Three tier Demonstration[9]

When the web server receives a request from a browser sent by a user, the request is handed to the PHP engine running as a module inside the server. The PHP engine queries the database depending on the type of code and request, and builds an HTML output to be sent back to the user through the browser. Therefore, depending on the request received by the server from the browser, the content is controlled by the code in the page.

4. Software Architecture

Serving as the blueprint for the system and its development, the software architecture will define the work assignment that is carried out by the design and implementation. Primarily the architecture is the carrier of the system qualities such as performance, modifiability, and security, none of which is achievable without a unifying architectural vision. This is a stage needed in making sure that the approach, during designing will produce an acceptable system. The architecture holds the key to post-deployment system understanding, maintenance, and mining efforts. In short the architecture puts the whole concept together for all stake holders.[10]

4.1 Site Requirements of Dise-Tech

Dise-Tech's site requirements are used as the framework that will be used to develop the website. This takes into consideration the following site goals:

- The mission or purpose of Dise-Tech
- The short and long term goals of the website
- The intended audience
- A reason for them to come back to the site.

Dise-Tech required that the site will also address the needs of various kinds of users, including individuals, organizations, event organizers, vendors and competitors alike. On a scale of 0 to 100, it is required that the site will assist a potential client to do up to about 70 of its transaction on the website, by giving majority of the information the client requires and also taking some information as the customer fills out an enquiry form.

The company intends to capture an optimum size of the market share; therefore the site must address some major flaws in competitor websites. This includes giving a fair hand to potential clients to make some important choices during a visit to the site and also give expert advice and guidance on what the exact needs of the customer may be at the end of a successful transaction.

4.2 Site Content

The website is supposed to address the issues with content that will be put on the site to help the company achieve its set goals, this will include:

- The pieces of content needed on the site
- The functionality, considering
 - Graphics
 - Audio
 - Video and
 - Transaction.

This will help in streamlining the functionality of the site by defining how users will navigate throughout the site.

4.3 Site Structure

The company requires a well-defined site structure; this will make it easy to build a good navigation structure. The two together will make the designed page layout gel.

Dise-Tech required a site navigation that will enable users to easily move from one place to another without getting lost. This is done by keeping an optimum number of global navigation links of button appearing on every page of the site, enabling users to move quickly from one section to the other.

4.4 Design Principles

The design will be done professionally by ignoring personal likes and dislikes to create a satisfactory layout that attracts audience to the site, and also to ensure that a comfortable and user friendly interface is created.

4.5 Development Process

The first step in this process was information gathering, as it is the most important and involves having a solid understanding of the company and what its business goals and aspirations are and how the system can be used to achieve these goals. Some of the aspects that were considered were; the purpose of the site, what is hoped to be accomplished with the website, the target audience and the kind of information the target audience will be looking for on the site.

5. Planning for the project

A site map consisting of all the main topics and sub-topic areas where needed was put together. The site map was considered very essential as it served as a guide to the kind of content that will be on the site, and creates a consistent and easy to navigate system while keeping the end user in mind when designing. Fig 3 is a process diagram that gives an outline of the site.

A company that provides sound and lighting services wants to give a freehand to its prospective customers to make a choice of a package from a host of occasions as well as to provide the needed guidance to the less technical potential customers. The system allows customers to make a choice of a package as listed on the website.

The package will include sound and lighting equipments and other accessories for an occasion with a price tag. The occasion will outline the type, size, number of persons and size of the premises. The customer then has a choice to partially make a reservation online by filling an enquiry form online with the choice of package and other contact information.

Because this is a partial reservation, the information is sent to an administrator as a report. The administrator will react to the report by contacting the customer via telephone or email.

A more detailed discussion between the customer and the technical team can then be held to find out more specific details about the customer's choice of a package, what will be more appropriate to have in case a wrong choice of lighting or sound is made. To ensure a successful occasion the technical team will make suggestions as to what more is needed considering what has been discussed earlier including making the right choice of light and sound intensity for the occasion in discussion.

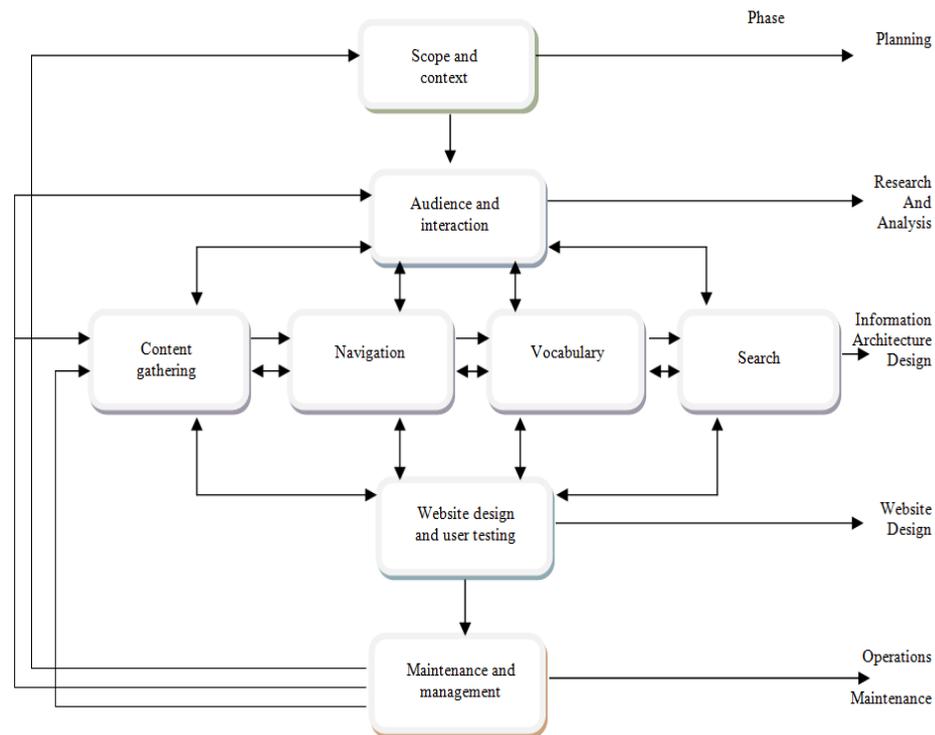


Figure 3. Process Diagram

Site Design

With the information gathered, the look and feel of the site was then determined considering the target audience as a key factor. The system is aimed at event organizers as well as individuals who will have a need for sound and lighting service, therefore, a dedicated page displays the products and services, and a form will allow users to make enquiries and further reservation is established.

The original company website as displayed in Fig.1 has a homepage, with the following buttons Etusivu, Tapahtumat, Tuotteet, Yhteystiedot and further links to these pages. An enquiry page is incorporated into the original site that displays products and services available and an HTML form that allows users to make enquiries. The form is linked to a PHP script that will connect to the company's database and the information populated to the enquiry table in the database.

6. Database Design

Dise-Tech's system is modeled into a database by deciding which tables to create, the columns contained in each table and the relationships between tables. The design is intended to yield efficient data entry, data retrievals and deletion, summarization and reporting, a database that will well formulate and behave predictably, and a self-documented database that will easily allow changes to be made to the database schema.

In the following design, six tables are considered:-

1. prod_type
2. products
3. reserv_item
4. enquiry
5. occasion
6. package.

The prod_type table or entity keeps quantity records of all the types of products. This table will enable the database to be populated with new data when a new product type is introduced or added to the database. The table has the 'type' attribute as its unique identifier or the primary key, which will identify all the types of products and quantity that are kept in the database.

6.1 Products

Many products can have the same prod_type and the products table has a many-to-one relationship with the prod_type table. A prod_code uniquely identifies a product which indicates that many products can be of the same product type and the total is kept in the prod_type table.

The products table keeps other information such as the manufacturer of the product, the date a product was purchased, the warranty assigned to the product and the state

in which the product is in when it was added to the database. This information is deemed very helpful to the company in knowing exactly what product is still in its stock or not before or after a reservation is made.

6.2 Occasion

Many types of products can be designated to many occasions. After the name of the occasion has been set, the occasion table assumes a standard possible size of the premises, the possible number of persons that can fit into that size, the price of the package as displayed on the website, and the quality of equipment that will be preferred at the occasion by the customer with the help of an enumerator that has three pre-set quality choices, high, medium and low quality.

A customer is allowed to make further amendments to the choices made during an enquiry session, where the customer has the chance to further request for more or less equipment based on the upcoming event. This is further discussed in greater detail when the administrator makes contact with the client after the enquiry form has been filled out.

6.3 Package

The package table consists of the quantity of each product type needed for an occasion as described in the occasion table. The table has the name of the occasion that is chosen by the client and the code of the product that will be needed to create a package. In short, the package table serves as a reference for a customer to begin a transaction.

6.4 Enquiry

On the enquiry page, a list of all the modeled occasions are displayed together with their package prices. This is intended to give a free hand to a prospective customer to

make an initial choice which might be subject to changes once the technical team has had further discussions with the customer.

The form holds fields for personal information needed for further contact and negotiations. It is compulsory for an occasion to be chosen at this point to enable the customer to move on to the next stage. Other needed details include the venue of the occasion, location, the number of persons attending irrespective of the package, and further comments that allows the client to mention other information.

UML that demonstrates the key relationships between the tables.

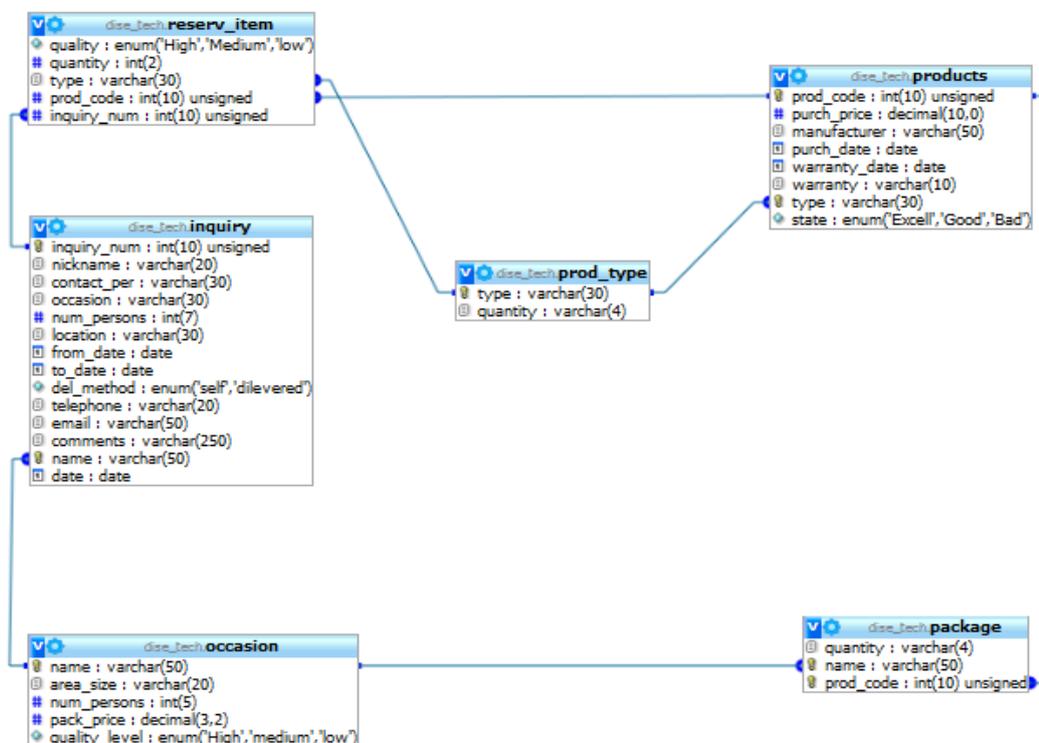


Figure 4. The database Schema Presented in UML

The following entity relational (ER) diagram explains the relations between the tables, the relationships between entities or tables and attributes or columns. The product_type table has a one-to-many relationship with the products table, making a the product_type table a parent to a child product table. A product_type has to be present before its product can be created.

There is a many-to-many relationship between a product table and the occasion table, where many products can be designated to many occasions until a reservation is made. A package is formed between the products and occasion tables by combining their respective unique identifiers. In the package table, a combination of prod_code as the primary key in the products table and name primary key in the occasion table together forms the a primary key in the package table. The two together will uniquely identify the a package.

The many-to-one relation between the products table and the reserve_items table indicates that many products can be assigned to the same reservation, and making the reserv_item entity a weak entity. Its existence depends very much on the prod_type and products tables. The reserv_item table has a fairly weak relation with the prod_type table.

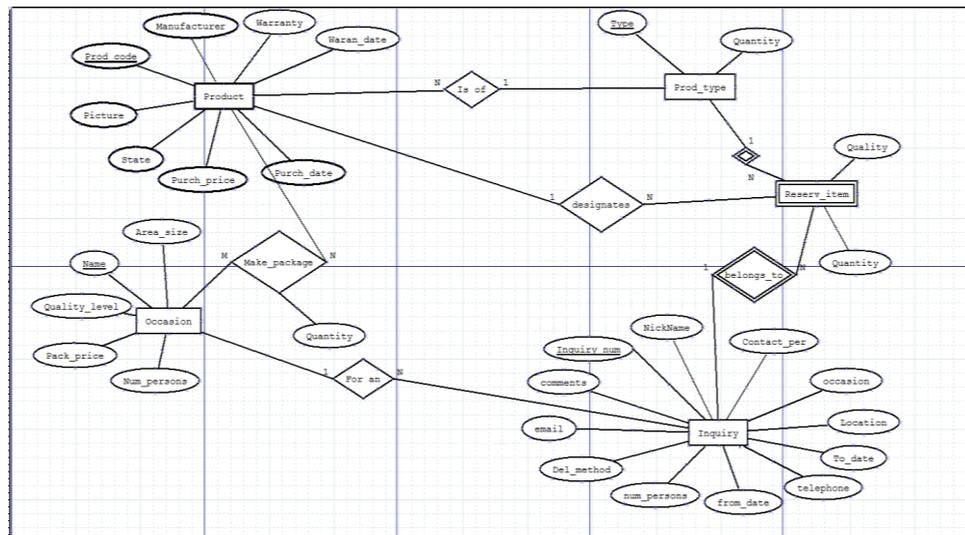


Figure 5. Entity Relational Diagram

A one-to-many relation exists between the the occasion table and an enquiry table, where an occasion can be selected in many inquiries. For a visitor of the website to succefully complete an enquiry form, he / she needs to make a choice on an occasion with a “name” attribute as shown in the ER. This is an important step in the enquiry session, because an administrator needs to have name of the occacion, and take note before a return contact is made to the client for next level of the transaction.

6.5 InnoDB of MySQL

The transactional properties of the database are facilitated by the InnoDB storage engine which has been incorporated in MySQL 5.5 version as the default storage engine. It provides the standard atomicity, consistency, isolation and durability (ACID) as the set of properties that guarantees that database transactions are reliably processed and also provides relationships.

In databases, a transaction is atomic and modifications must follow an all or nothing rule. An entire transaction is bound to fail and the database state will be left unchanged if one part of the transaction fails.

7. Service provider

After research, planning and designing, the entire work needed to be made available on the World Wide Web using a web hosting service provider.

7.1 Web hosting

A web hosting service is a type of service that allows a website owned by individuals and organizations to be made accessible via the World Wide Web. A Web Host is a company that provides space on a server it owns or lease for use by a client with a varying scope. The host may also provide an interface or control panel for managing the Web server. The most basic scope is web page and small-scale file hosting, where files can be uploaded via File Transfer Protocol (FTP) or a web interface.

7.2 Webol

Webol is a web hosting company that provides hosting service to individuals, companies and non-associations. The company ensures stable and efficient service, high speed connectivity, and excellent customer service and cheap prices. It is a company that also allows the free choice of a suffix to a client's domain name. eg. .com, .Net, .info etc. Their hosting service allows a client the choice of a domain name and variable amount of disk space at a fee with a minimum of one gigabit.

Usually, web hosts are likely to set user restrictions as a guide to the usage of their resources. The following are some restrictions for the versions of software that can be used.

Software versions:

- Apache
- MySQL 5
- PHP 5
- Safe mode off

- 128 MB memory limit
- Maximum size of 128 MB for data POST.

Some functions include `dl`, `shell_exec`, `exec`, `system`, `passthru`, `popen`, `set_time_limit`, `putenv`, `PHPinfo`, `proc_open`, `disk_total_space`, `disk_free_space`, `virtual`, `Apache_child_terminate`, `Apache_getenv`, `Apache_note`, `Apache_setenv`, `Apache_lookup_uri`, `Apache_get_modules`, `proc_close`, `proc_get_status`, `proc_terminate`, `proc_nice`, `openlog`, `virtualization` are prohibited on the server.

7.3 Safe mode

For troubleshooting security and stability issues in a software application, “safe mode” is a state at which a software application has been brought to a minimum configuration. When using a Windows operating system, one is forced to boot from safe mode when there is a serious system mishap. In PHP, the safe mode is a security feature that was designed to prevent hackers from using PHP scripts to execute commands at the operating system level. The PHP safe mode is an attempt to solve the shared-server security problem, and an extension, like `dl`, that loads a PHP extension given by a parameter `library` is already disabled when running in safe mode.

7.4 Test Connection to the Service Provider

It was necessary to test the connection to the service provider to know if there is a Domain Name Service (DNS) server installed. This will help resolve all host names into respective IP address that will be used during a PHP connection to the database server. A ping command of the service provider from a Windows command prompt displays the global IP address of the service provider. If an IP address is already known, it is also possible to verify the hostname by pinging the IP address with the `-a` option at the command prompt.

Figure 6. below shows a ping reply from `webo1.fi`, with the translation of the hostname into an IP address of `188.117.42.132`

```

C:\Users\Marony>ping -t webol.fi

Pinging webol.fi [188.117.42.132] with 32 bytes of data:
Reply from 188.117.42.132: bytes=32 time=4ms TTL=57

```

Figure 6. Ping response from the web server

When the same address is pinged with the `-a` option, it reverses the IP address into a hostname.

Ping `-a 188.117.42.132`

```

C:\Users\Marony>ping -t -a 188.117.42.132

Ping statistics for 188.117.42.132:
    Packets: Sent = 44, Received = 44, Lost = 0 (0% loss),
    Approximate round trip times in milli-seconds:
        Minimum = 4ms, Maximum = 6ms, Average = 4ms
Control-C
^C
C:\Users\Marony>ping -t -a 188.117.42.132

Pinging webol.fi [188.117.42.132] with 32 bytes of data:
Reply from 188.117.42.132: bytes=32 time=4ms TTL=57

```

Figure 7. Ping responses from the IP address

The resolutions must match the IP address to the hostname and vice versa in order to prove that the correct IP address been attained.

7.4 Creating Database and Tables

In creating the database, a local connection is made to the service providers' server and a database is created at the `mysql` prompt by issuing the `create database` command and specifying the database name.

```
mysql> CREATE DATABASE database_name
```

Figure 8. A screen shot of the create database command

Once the database is created, all the tables needed for the Dise-tech system are created under the database considering the transactional needs of the company as demonstrated earlier.

7.5 Connecting to the Database

The database is stored in a DBMS system on a web hotel, a PHP connection script is used to connect to the database, with the `mysql_connect()` function.

`$db_host` is the name of the server, `$db_user` and `$db_pass` specifies the username and password respectively. The `mysql_selectdb()` command is used to select the database preferred database from the system.

```
1 <?php
2 // test.php
3
4 $dbhost = ' '; // connection details
5 $dbuser = ' ';
6 $dbpass = ' ';
7
8 $conn = mysql_connect($dbhost, $dbuser, $dbpass) or die ('Error connecting to mysql');
9
10 $dbname = ' ';
11 mysql_select_db($dbname);
12
```

Figure 9. Sample PHP connection script

The open comers in Figure 8. will contain the connection details. During a connection, it is important to know if a connection attempt was successful. Therefore when the connection fails the 'die' part is executed.

When a connection is established, and a database is selected, it is then possible to select a table or more from the database using `mysql_query()` functions with a select statement and a specified table name. The connection is then closed using the `mysql_close()` function even though by default the connection is closed at end of the script.

```
11 mysql_select_db($dbname);
12
13 $result = mysql_query("SELECT * FROM table");
14
15 while($row = mysql_fetch_array($result)) {
16     foreach ($row as $field)
17     {
18         echo $field. " ";
19     }
20     echo "<br />";
21 }
22
23 mysql_close($conn);
24
25 ?>
```

Figure 10. Select script for an entire table

8. Test populating the Database

The parent tables containing the primary keys which are referenced by other foreign keys in dependent tables are populated first. Referential integrity is enforced among tables by establishing this relationship, and the database will check to see if there are any dependent tables with matching foreign keys when a row is deleted from a parent table. This action is specified to be taken on dependent rows when the foreign keys were created. The following figure shows the prod_type table filled with sample data.

type	quantity
Amplifiers	8
Bass_Guitar	5
Cable	36
Connectors	54
Drum_Sticks	28
Flute	12
Guns	20
Laser_Bulb	35
Lights	6
Mic_Stand	12
Mixer Board	5
Mobile_Mic	2
Tray	34
Trumpet	7
Whistle	8

Figure 11. prod_type with sample data

In short, the foreign key allows a declaration that an index in a table is related to an index in another table and allows a constraint to be placed on what may be done to the tables in the relationship. The dise_tech database contains a type column in the product table which is used to relate the type rows in the prod_type table.

products table

prod_code	purch_price	manufacturer	purch_date	warranty_date	warranty	type	state
1	9	Philips	2009-06-17	2012-06-17	Three year	Cable	Excell
2	5	JVC	2009-06-17	2012-06-17	Three year	Lights	Excell
3	3	Samsung	2009-06-17	2012-06-17	Three year	Connectors	Good
4	3	Sony	2009-06-17	2012-06-17	Three year	Mixer Board	Excell
5	3	Nokia	2009-06-17	2012-06-17	Three year	Amplifiers	Good
6	5	Nokia	2009-06-17	2012-06-17	Three Year	Whistle	Good
7	5	Nokia	2009-06-17	2012-06-17	Three Year	Drum_Sticks	Bad
8	200		0000-00-00	0000-00-00			
9	200		0000-00-00	0000-00-00			
10	5	Nokia	2009-06-17	2012-06-17	Three Year	Flute	Good
11	0		0000-00-00	0000-00-00			
12	0		0000-00-00	0000-00-00			

prod_type table

type	quantity
Amplifiers	8
Bass_Guitar	5
Cable	36
Connectors	54
Drum_Sticks	28
Flute	12
Guns	20
Laser_Bulb	35
Lights	6
Mic_Stand	12
Mixer Board	5
Mobile_Mic	2
Tray	34
Trumpet	7
Whistle	8

Figure 12. A row relation between the products and prod_type tables

Explicit relationships were setup during the table creation, an example is products.type is a foreign key for the prod_type.type column. This prevents a row from being entered

into the products table unless its type value is entered in the prod_type table. This means that the foreign key prevents entry of prod_codes for non existing prod_types, and will help in maintaining the consistency of the entries.

Accessing the Database Remotely

In order to access the database remotely from the DBMS, all the PHP scripts and HTML forms needs to be uploaded onto the web server. An FTP connection is required to upload all necessary files onto the web server by transferring the files from a local computer. This will allow copies of all the files to be kept on the remote server. The queries can now be displayed on an ordinary web browser on the Internet with the right correct addresses.



prod_code	purch_price	manufacturer	purch_date	warranty_date	warranty	type	state
1	6	Philips	2008-05-14	2011-05-14	3 years	Piano	Excell
2	8	Samsung	2008-04-04	2011-04-04	3 years	Sound Cables	Excell
3	8	Seimens	2009-01-18	2012-01-18	3 years	Mixer Boards	Good
4	9	Samsung	2006-05-10	2012-08-22	3 years	Microphones	Excell
5	2	Sony	2011-04-12	2011-04-30	4	Guitar	Good
6	7	Canon	2011-04-28	2014-04-23	6	Data Cable	Good
7	55	hkhk	2011-05-18	2011-05-19	hhh	Piano	Excell

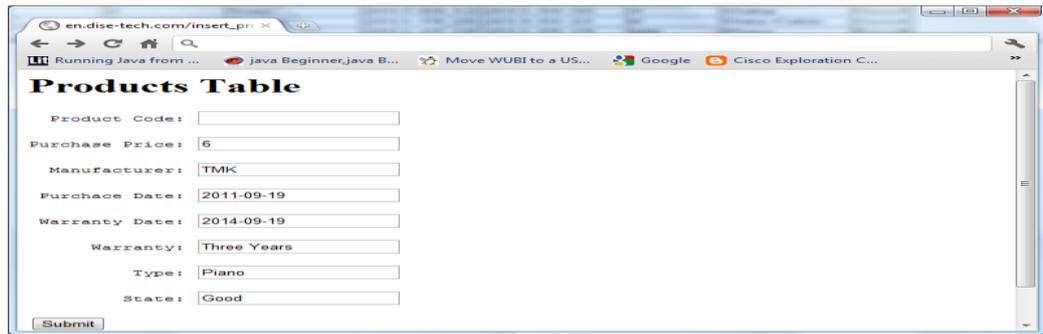
Figure 13. A display of data in the products table

A script that selects all products in the product_table is displayed in Figure 12. The table is accessed on a web browser.

Communicating with the Database

The purpose of the database is to keep records of all equipments and transactions of the company. This setup allows an administrator to insert or remove data from the database remotely using a web browser. When a new product(s) is acquired, an administrator can remotely access the database anywhere using a web browser provided there is an Internet connection available.

A new product data can be added to the database when its type and quantity are already filled into the prod_type table. Further, its purchase price, manufacturer etc. can also be filled out into the products table with the other known fields.



The screenshot shows a web browser window with the address bar displaying 'en.dise-tech.com/insert_pr...'. The page title is 'Products Table'. The form contains the following fields and values:

Product Code:	
Purchase Price:	6
Manufacturer:	TMK
Purchase Date:	2011-09-19
Warranty Date:	2014-09-19
Warranty:	Three Years
Type:	Piano
State:	Good

A 'Submit' button is located at the bottom left of the form.

Figure 14. Products form with sample data

The following Figure 14. demonstrates a successful insertion of the above data into the product_table with the values in the form.

9	6	TMK	2011-09-19	2014-09-19	Three Year	Piano	Good
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Figure 15. Row of data in the products table

9. Current Dise-Tech Website

The Dise-Tech website has been planned and refurbished in a manner to cater for its specific needs because of its concern to explore its business worldwide, as websites have become essential nowadays and part of every profession. The current website design depends solely upon the layout, structure and compilation of the company's content.

Currently the website links the home page to its enquiry pages, where a list of sample packages representing some occasions are displayed.

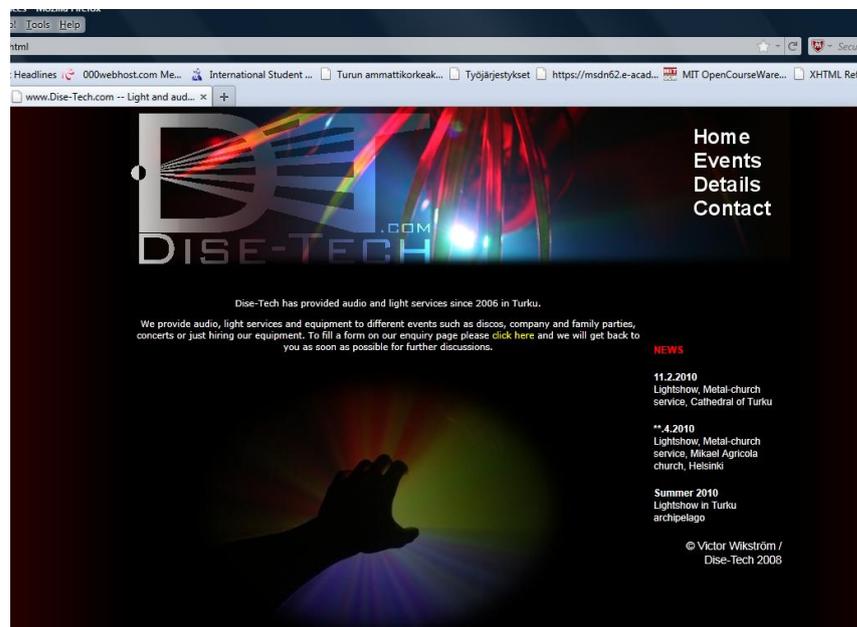


Figure 16. Dise-Tech home page with a yellow hyperlink to an enquiry page

This will serve as a beginning guide to a potential client in making an initial choice based on his or her upcoming event. The customer will then fill an enquiry form with some specific details including a choice of a package as displayed on the enquiry page.

9.1 Content Management

The database will be manually populated by a dedicated administrator, who will input all necessary data into the tables created, this will be done in one of two options available to the administrator. HTML forms linked with the required PHP scripts will enable the administrator to input data to the database using a web browser as and when required depending on the the situation, or a login into the database server and directly inputing data into the databsase. The PHP scripts will further process the requests and forward them to the database. The system is capable of checking for duplicate data entries as the parent tables require unique identifiers to indicate which data has already been entered.

9.2 Enquiry Form

The enquiry form is displayed on the enquiry page for customer usage. When a customer fills an enquiry form during a visit, the data is directly transferred into the database and an email alert is sent to an administrator to notify him/her. The form includes details such as name, telephone number, email address etc.

The screenshot shows a web browser window displaying the DisE-Tech website. The page has a dark theme with a colorful light effect in the background. The main content area contains an enquiry form with the following fields: Surname, Contact Reason, Occasion, Number of Persons, Location, Start Date, End Date, Delivery Method (set to 'Self'), Telephone, and Email Address. There is a 'NEWS' section at the bottom right with the date 11.2.2010 and the location Lightshow, Metal church service, Cathedral of Turku.

Figure 17. DisE-Tech Current Enquiry Page with a form for collecting data

Based on the details provided in the form, an administrator is able to make contact with a potential customer by phone or email to further discuss or close deal. He is also able to offer expert advice on what will suite best the customer needs depending on what will be discussed. When the submit button is clicked, the users' request is fulfilled by

running a PHP script linked to the form directly on the webserver and the table is populated into the database.

9.3 Product Reservation

Products in the database are meant to be reserved after a deal is finalized with a client. Once a deal has been sealed, the administrator is inclined to earmark products to the customer using the type of occasion and transaction details as a guide for making the reservation. The items are selected from the products table and sent to the reservation table awaiting delivery. During this period, these specific products will no longer be available and, therefore, cannot be reserved for the second time. Reserved items are unavailable in the database for the duration stated in the enquiry using the “from” date as the starting date and the “to” date as the end date.

When products are returned after an event, their condition is checked to see if they are still in the state they were when they left the company premises. This is done by crossing out a checklist. Passed items are then re-entered into the database, while further discussions are held with a client to resolve issues about a product that is deemed to have failed a return test.

10. Recommendations

Dise-Tech's website has a reflective style considering the choice of colors and outlook, which is very appreciated, especially for the products and services it provides, that needs to express a sense of liveliness, seriousness, reliability and all the characteristics implied by a reflective look.

However, the home page, maybe in its search for reflectiveness feels as if the products and services themselves remained hidden. The only direct references to them are the images of past events that Dise-Tech was present at, and a hyperlink to the enquiry pages that offers to tell the client a little more about the products and services available. The graphic style work with reference to the global links embedded into the main Dise-Tech logo, places some limitations on adding important buttons to the home page and on future upgrades. A separation of the two will give a better outlook to the logo which is supposed to give some kind of impression about the company, and allow the global buttons its required space on the home page.

As the main focus is to get a market share, it is important not to keep the customer waiting for too long to associate with some of the products available, therefore the needs to have a list of the very necessary items needed for most events to be mentioned on the homepage, and at a place where they are easily visible. Even though the contact information is well placed at the top of the contact page, the website will benefit from an image representing a telemarketer with a headset and a reassuring smile and adding an appeal such as questions, enquiries, orders etc.

In the near future Dise-Tech should incorporate and implement a login system to its web site to encourage potential customers to create a simple account to allow them to successfully interact with the site. This for instance will ward off visitors who might not necessarily want to conduct a genuine transaction. It will also add some level of security to the site and transactions between the company and its potential customers.

11. Conclusion

The main goal of this thesis was to provide a cost effective web-based reservation solution for Dise-Tech by using open source software to bridge the reservation gap between Dise-Tech and its potential customers. The thesis also makes recommendations incase the systems needs to be upgraded.

The implementation of the Dise-Tech reservation system defined a process of making a request for an equipment for an occasion by a customer and the allocation of an equipment to the customer by an administrator. The process requires interaction and information exchange between the customer and the system by filling out an enquiry form.

The Dise-Tech project focused on elevating its existing website from static to an interactive and functional system that will ensure availability, scalability and high performance. Accessibility and availability ensures that the system is accessible from multiple locations around the world, and perfoms creditably considering the time it takes for the web server respond to multiple requests. The system is also designed to scale to work for Dise-Tech's particular needs.

As an advantage, the solution provides an all party inclusiveness during and after a transaction as well as interactivity between the company and the outside world by offering expert technical advice to customers. The company seeks to receive direct and indirect referrals through the availability of its system and the provision of good after sales support.

The system is built using PHP, MySQL and HTML, which are free and available technologies which makes the solution cost effective. Futher modification to this solution will be minimal costwise, considering the fact that all software tools used in this project are free and easily available.

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