**INVENTORY MANAGEMENT SYSTEM**

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Thesis submitted to

**Bharati Vidyapeeth’s**

**college of engineering, Lavale**

For partial fulfilment of Bachelor’s degree

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**ABBREVIATION LIST**

GIS: Geographic Information System

IMD: India Meteorological Department

SI: Surface Instruments

IT: Information Technology

OSS: Open Source Software

FOSS: Free and Open Source Software

FOSS4G: Free and Open Source Software for Geoinformatics

HTTP: Hypertext Transfer Protocol

HTTPS: Secure Hypertext Transfer Protocol

URL: Uniform Resource Locators

FTP: File Transfer Protocol

WWW: World Wide Web

WMS: Web Map Service

WFS: Web Feature Service

DBMS: Database Management System

RDBMS: Relational Database Management System

HTML: Hyper Text Mark-up Language

CSS: Cascading Style Sheet

PHP: PHP Hypertext Pre-processor

SQL: Structured Query Language

AWS: Automatic Weather Stations

JSON: JavaScript Object Notation

PNG: Portable Network Graphics (image format)

JPEG: Joint Photographic Experts Group (image format)

AJAX: Asynchronous JavaScript and XML

**PREFACE**

Inventory management is an important aspect of any successful business. It is the process of overseeing and [controlling the flow of inventory](https://www.unleashedsoftware.com/blog/controlling-inventory.-how-hard-is-it-really) units a business uses in the production or manufacture of goods for sale or distribution. Inventories are usually made up of a combination of goods, raw materials and finished products, and effective management of these items is essential to ensure optimal stock levels and to maximize the earning potential of the company. It also allows a business to prevent or mitigate any inventory-associated losses. Inventory management software is used by businesses for various reasons: it can track the costs of inventory throughout the manufacture and sales process, tell businesses when to replenish stock, and allow them to track profits. It can also be used to forecast inventory levels and prices, as well as expected product demand.

Effective inventory management is important as not only is inventory one of the most valuable assets to a business; there is a direct link between inventory levels and company profits. Inventory represents an investment that is tied up until either the item is sold, or it is used in the production of another item that is sold. Businesses are reliant on having items in stock; otherwise customers will simply go to a competitor who can provide what they want.

However, holding inventory in stock is not without costs – storage, insurance and maintenance all must be considered. When it comes to replenishing stock levels, most management plans seek to strike a balance between having enough units when required, and ensuring supplies are not overstocked. This is why having an inventory management system can be advantageous.

**ABSTRACT**

The project has been developed to keep track of detail regarding the equipments. The current product is a window-based. To provide the basic services related to the Supply of the equipments to maintain their supply order details. The product will take care of all the supply orders. It is concern to keep the records of each Supply Order, which is received, from firm, supplying equipments.

After the completion of supply orders worksheet is maintained by department. The supply and liability to the current year is being prepared in this worksheet. First the details of the supply order for the current year is prepared at the end of the current year followed by the liability worksheet that is being carry forward.

Tools & Technologies used :

* Windows 10
* Brackets
* WAMP Server
* MySQL

**INTRODUCTION**

**IMD**:

The India Meteorological Department (IMD) is an agency of the [Ministry of Earth Sciences](https://en.wikipedia.org/wiki/Ministry_of_Earth_Sciences) of the [Government of India](https://en.wikipedia.org/wiki/Government_of_India). It is the principal agency responsible for [meteorological](https://en.wikipedia.org/wiki/Meteorological) observations, [weather forecasting](https://en.wikipedia.org/wiki/Weather_forecasting) and [seismology](https://en.wikipedia.org/wiki/Seismology). IMD is headquartered in [Delhi](https://en.wikipedia.org/wiki/Delhi) and operates hundreds of observation stations across [India](https://en.wikipedia.org/wiki/India) and [Antarctica](https://en.wikipedia.org/wiki/Antarctica). Regional offices are at [Mumbai](https://en.wikipedia.org/wiki/Mumbai), [Kolkata](https://en.wikipedia.org/wiki/Kolkata), [Nagpur](https://en.wikipedia.org/wiki/Nagpur) and [Pune](https://en.wikipedia.org/wiki/Pune).

IMD is also one of the six [Regional Specialised Meteorological Centres](https://en.wikipedia.org/wiki/Regional_Specialised_Meteorological_Centre) of the [World Meteorological Organization](https://en.wikipedia.org/wiki/World_Meteorological_Organization). It has the responsibility for forecasting, naming and distribution of warnings for [tropical cyclones](https://en.wikipedia.org/wiki/Tropical_cyclone) in the Northern Indian Ocean region, including the [Malacca Straits](https://en.wikipedia.org/wiki/Malacca_Straits), the [Bay of Bengal](https://en.wikipedia.org/wiki/Bay_of_Bengal), the [Arabian Sea](https://en.wikipedia.org/wiki/Arabian_Sea) and the [Persian Gulf](https://en.wikipedia.org/wiki/Persian_Gulf).

IMD is headed by the Director General of Meteorology, currently Dr. Mrutyunjay Mohapatra.  IMD has six Regional Meteorological Centres, each under a Deputy Director General.There are also Meteorological Centres in every state capital. Other IMD units such as Forecasting Offices, Agrometeorological Advisory Service Centers, Flood Meteorological Offices, Area Cyclone Warning Centers and Cyclone Warning Centers are usually co-located with various observatories or meteorological center.

RMC’s of The India Meteorological Department :

* Kolkata
* Mumbai
* Chennai
* Guwahati
* Nagpur
* Delhi

Website: [http://imd.gov.in](http://imd.gov.in/)

**INTRODUCTION TO INVENTORY MANAGEMENT**

**Inventory Management System:**

Inventory management system  is a  [system](https://en.wikipedia.org/wiki/Software_system) for tracking [inventory](https://en.wikipedia.org/wiki/Inventory) levels, orders, [sales](https://en.wikipedia.org/wiki/Sales) and deliveries. It can also be used in the [manufacturing](https://en.wikipedia.org/wiki/Manufacturing) industry to create a [work order](https://en.wikipedia.org/wiki/Work_order), [bill of materials](https://en.wikipedia.org/wiki/Bill_of_materials) and other production-related documents. Companies use inventory management system to avoid product [overstock](https://en.wikipedia.org/wiki/Overstock) and outages. It is a tool for organizing inventory [data](https://en.wikipedia.org/wiki/Data) that before was generally stored in hard-copy form or in [spreadsheets](https://en.wikipedia.org/wiki/Spreadsheet).

**Components of Inventory Management System:**

**Client Side Components:**

* JavaScript:

This is a client-side scripting language used by the browser engine to interpret the web page. JavaScript along with the use of HTML and CSS helps make a web page more responsive, that is the web environment in which JavaScript executes a program is dynamic. It provides a medium of interaction between the server and the client through the use of events. If client types some text in a text-box or clicks on a button on a web-page, an event is triggered and if there is code provided for each event, it is executed

* CSS:

CSS stands for Cascading Style Sheets which is used to define how HTML elements will be displayed. It is a style language used to define the way of presentation of the layout in a web page. Due to separation of the presentation and information, the same presentation styles can be reused in another webpage/s. The CSS can be either used in HTML page itself (Embedded) , or a link reference can be given in HTML page (External) or defined for particular element or attribute while coding in HTML itself (Internal).

* jQuery AJAX:

The jQuery is a library of JavaScript used to simplify the use of methods with an easy to use API which works across various browsers whereas AJAX is the scripting language which makes the communication between browser and server without refreshing the whole web-page. jQuery provides many AJAX methods to work with.

For the “AWS”, the requirement was to display 3 selection dropdown lists in which the data will be accessed from directly the database and based on selection, the database data is displayed in table format. In order to fulfil this requirement, the use of jQuery AJAX methods was used in the PHP files. (Internal)

* HTML:

HTML is the mark-up language used to display symbols and data on the WWW browser. The HTML file consists of various tags used to define the data. HTML provides a base for Web applications. The markup language along with combination of various mark-up and scripting languages make the UI more userfriendly and accessible. Currently the HTML5 version is the latest and this language is being used in the project as well. HTML5 provides many new functionalities making it more appealing to the developers.

**Server Side Components**

* Apache:

Apache is also quite well-known Web server or HTTP server. This web server allows to test and host the web applications. Apache can host small applications to the enterprise level applications. This web server is usually used in conjunction with Tomcat. The combination of both these servers allow developers to create web applications which are more interactive and dynamic in nature. These servers are fast, reliable and provide security to the data. These servers are a part of the WAMP server packages which allow the client server interaction on the same machine.

* PHP:

PHP (recursive acronym for PHP: Hypertext Pre-processor) is a widely-used open source general-purpose scripting language that is especially suited for web development and can be embedded into HTML. What distinguishes PHP from something like client-side JavaScript is that the code is executed on the server, generating HTML which is then sent to the client. The client would receive the results of running that script, but would not know what the underlying code was.

The following code snippet shows an example of the PHP code.

<!DOCTYPE html>  
<html>  
<body>  
  
<?php  
echo "My first PHP script!";  
?>  
  
</body>  
</html>

* SQL

**S**tructured **Q**uery **L**anguage or **SQL** is a standard Database language which is used to create, maintain and retrieve the data from relational databases like MySQL, Oracle, SQL Server, PostGre, etc. The recent ISO standard version of SQL is SQL:2019.

As the name suggests, it is used when we have structured data (in the form of tables). All databases that are not relational (or do not use fixed structure tables to store data) and therefore do not use SQL, are called NoSQL databases. Examples of NoSQL are MongoDB, DynamoDB, Cassandra, etc

**AIMS AND OBJECTIVES**

**Project Objectives:**

The main aim of the project is to create dynamic web maps and creation of their databases. These maps should be connected to their respective databases and any changes made in the databases should be reflected in the web maps immediately. Web maps should be accessible through their databases.

The main Objectives of the present research work are:

1. Learn fundamentals of web development with HTML, CSS and JavaScript.
2. Creation of interactive Data Tables which can be modified using Database stored using database management system (DBMS).
3. Creating dynamic dropdown lists where the data in the dropdown lists will be populated from the database and based on the selection of the dropdown lists, display the database tables’ data in table format.

**STUDY AREA**

The study area or the Area of Interest (AOI) for this project is was the existing website and the UI of the Surface Instruments (SI) Division, IMD Pune. The current or the existing website can be accessed at https://imdpune.gov.in

**History of IMD:**

In 1875, the Government of India established the India Meteorological Department so as to have the work of meteorology scattered over all the country be stored and utilised under one central authority. During the initial years the headquarters of IMD were at Calcutta till 1889, later the headquarters shifted from Shimla, to Pune (then Poona) to New Delhi.



Headquarters’ of IMD over the years

**History of SI:**

The Workshop of Surface Instrument Division, Pune was established way back in 1920 with the objective of inspection and maintenance of surface meteorological instruments installed at IMD observatories. Since 1947 IMD, Pune Workshop was fully equipped with several shop floors, ranging from foundry to packing units for manufacturing of all types of surface meteorological instruments (IMD website).

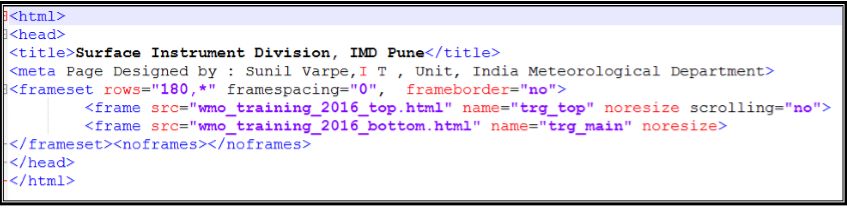
**Current Website UI:**

The structure or the User Interface (UI) of the current website of the Surface Instruments Division. uses the very old versions of HTML. Due to which the UI of this website does not support latest browser plugins and takes a lot of time to load the website in the browser. The current website of the SI Division of IMD Pune is best viewed in Internet Explorer.

The IMD’s official website has changed the UI of the website making it mandatory to change the existing UI of all its divisions throughout the country to achieve uniformity in the UI of the official website.

When studied the existing UI of the website, we found that all the data displayed on the website was typewritten in the HTML files which is static data, making the files large and consume enough storage capacity of the server.

Since all the data is static in nature, the new modifications in the data need to be done directly in the webpage since there is no database in the backend where the modifications can be done and then the database be connected with the webpage.



Snippet of code where a <frame> tag is used

Also, the structure of the website used the “<table>” tag and “<frame>” tag to define the major portions in the UI of the website making it difficult to update or modify the design of the UI.

The annexure at the end contains the screenshots of the current website and also the snippets of the code

**DATA COLLECTION**

Soft wares used:

The soft wares used for the data collection and processing:

1. Microsoft Excel:

This software is used for the purpose of creation of excel sheets. Which then imported in phpMyAdmin for Data visualisation and Test cases analysis.

1. WAMP:

WAMP is the most popular web server (after which comes Microsoft's IIS) available. The reasons behind its popularity, to name a few, are:

* 1. It is a free server package.
  2. The source code is visible to anyone and everyone, which basically enables anyone (who can rise up to the challenge) to adjust the code, optimize it, and fix errors and security holes. People can add new features and write new modules which makes it a good OSS option.
  3. This server can be used to host enterprise level projects or even school projects.
  4. The WAMP can work with both static and dynamic data.

This server is a software (or program) which has collection of packages that run in the background under an appropriate operating system, which supports multi-tasking, and provides services to other applications that connect to it, such as client web browsers.

1. MySQL:

MySQL is the most advanced open source database server. Three basic office productivity applications exist: word processors, spreadsheets, and databases. Word processors produce text documents critical to any business. Spreadsheets are used for financial calculations and analysis. Databases are used primarily for data storage and retrieval. You can use a word processor or spreadsheet to store small amounts of data. However, with large volumes of data or data that must be retrieved and updated frequently, databases are the best choice. Databases allow orderly data storage, rapid data retrieval, and complex data analysis.

**DATA ACQUISITION**

The main source for collection of data and information for the project is the official website of Surface Instruments Division, India Meteorological Department (IMD) . The website can be accessed from following URL: <http://www.imdpune.gov.in/surface_instruments/index.html>

The data on which the project is proceeded is available on the Surface Instrument department on the website. In this department, the Network portion consists of the entire data which is used for project purpose.

**TECHNOLOGIES USED**

* Hardware
* Processor : i3
* RAM : 4 GB
* Hard Disk : 20 GB
* Software
* Brackets
* Git
* WAMP Server
* Web Browser

**TESTING AND DEBUGGING**

Software testing is a critical element of the ultimate review of specification design and coding. Testing of software leads to the uncovering of errors in the software functional and performance requirements are met .Testing also provides a good indication of software reliability and software quality as a whole. The result of different phases of testing are evaluated and then compared with the expected results. If the errors are uncovered they are debugged and corrected. A strategy approach to software testing has the generic characteristics:

* Testing begins at the module level and works “outwards” towards the integration of the entire computer based system.
* Different testing techniques are appropriate at different points of time.
* Testing and debugging are different activities, but debugging must be accommodated in the testing strategy

Goals and Objectives

“Testing is a process of executing a program with the intent of finding an error”. A good test case is one that has a probability of finding an as yet undiscovered error. A successful test is one that uncovers an as yet undiscovered error. Our Objective is to design test processes that systematically uncover different classes of errors and do so with minimum amount of time and effort.

Statement of scope

A description of the scope of the software testing is developed. All the features to be tested are noted as follows. The basic principles that guides software testing are,

* All test cases should be traceable top customer requirements. The most severe defects from the customer’s point of view are those that cause the program to fail to meet its requirements.
* Test case should be planned long before testing begins. Testing plan can begin as soon as the requirement model is complete. Detailed definition of the test cases can begin as soon as the design is solidified. Therefore, the entire test can be planned before any code has been generated.
* Testing should begin “in the small” and progress towards “in the large”. The first test planned and executed generally focus on the individual modules. As testing progresses testing shifts focus in an attempt to find errors in integrating clusters of modules and ultimately in the entire system

Test Case

Before the project is released, it has to has pass through a test cases suit, so that the required functionality is met and previous functionality of the system is also not broken to do this, there is an existing test cases which checks for the previous functionality. New test cases are prepared and added to this existing test suit to check for the added functionality. Test case describes an input description and compare the observed output with expected output to know the outcome of the test case. If it is different, then, there is a failure and it must be identified.

**SCOPE AND LIMITATIONS**

Scope of the proposed System:

The proposed system provides the automated generation of LPP reference that includes the LPP Rate and the reference date. LPP is used at the time of Worksheet preparation along with the tender price, which helps to obtain the overall and annual escalation. Escalation is related to the number of months, calculated by the LPP reference date and the worksheet preparation date of the particular financial year.

The “Inventory Management System” software is being developed as an accurate and efficient system for the user . In this system the record of the each request details are preserved along with their transaction related to them. The system is also made secured as all the updation and transaction can be done by the authorized person .

Limitation of the Proposed System:

* Databased used is SQL Server and every database have a stack limit.
* Manual Errors at the time of entering the data can’t be check,only the validation required w.r.t proposed system is checked.

**CONCLUSION**

The objective of this project was to build a program for maintaining the details of all Supply Order .The system developed is able to meet all the basic requirements. It will provide the facility to the user so that they can keep tracks of all the equipments being supplied. The management of the Inventory will be also benefited by the proposed system, as it will automate the whole supply procedure, which will reduce the workload. The security of the system is also one of the prime concerns.

There is always a room for improvement in any software, however efficient the system may be. The important thing is that the system should be flexible enough for future modifications. The system has been factored into different modules to make system adapt to the further changes. Every effort has been made to cover all user requirements and make it user friendly.

* Goal achieved: The System is able provide the interface to the user so that he can replicate his desired data. .
* User friendliness: Though the most part of the system is supposed to act in the background, efforts have been made to make the foreground interaction with user as smooth as possible. Also the integration of the system with Inventory Management project has been kept in mind throughout the development phase.

**ANNEXURE**



