

Centralized ERP Application for Drinking Water Distribution and Maintenance Management

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Abstract

In today's world, efficient management of drinking water distribution is essential to ensure a sustainable and reliable supply of clean water to communities. The efficient management of drinking water distribution and maintenance is crucial for ensuring access to clean and safe drinking water. This comprehensive system aims to streamline the processes associated with water distribution, maintenance, and management across various units and regions. In this era of technological advancement, the implementation of a centralized Enterprise Resource Planning (ERP) system offers a comprehensive solution to streamline and optimize the processes associated with drinking water distribution across various units and maintenance activities. This survey paper aims to provide a comprehensive overview of the proposed project, discussing its objectives, significance, methodologies, expected outcomes, and potential challenges, components, and potential benefits of such a system, offering insights into its implementation and impact on water management.

Keywords: online shopping, clean drinking water, Progressive web Application, DigitalMarketing, Safe and Sanitation, User friendly, Enhancement of hygiene..

I. INTRODUCTION

Access to clean drinking water is a fundamental human right, and its efficient distribution and maintenance are essential for public health and well-being. Many small distributors and shops are packing and distributing mineral waters under various units and containers based on user requirements. Most of these business people are only using some manual entries for stock maintenance and water distribution as they cannot afford an ERP software to automate their process. Thus, we are planning to create a centralized ERP application to maintain the stocks and distribution history along with the mode of transport, payment cycles, customer maintenance etc which will help the micro business units to enhance their business in a better way. To design and develop a centralized ERP system that integrates all aspects of drinking water distribution and maintenance. To improve the efficiency, transparency, and accountability of water supply operations. To provide real-time monitoring and data analytics capabilities for informed decision-making. To enhance customer service by enabling easy reporting of issues and tracking resolution. To supply and securing of clean and sufficient drinking water for the population. To improvement of infrastructure for storage, transport and agricultural marketing. To improvement of physical health (supported by clean drinking water, access to sanitation, improved nourishment) and advancement of (environmental) education and self-help.

Ultimately, ERP integration contributes to sustainable and efficient water distribution, ensuring the availability of clean and safe drinking water to consumers.

II. LITERATURE REVIEW

Drinking water distribution management is a critical aspect of public health and infrastructure management. It encompasses the entire process, from sourcing water through treatment plants to its delivery to homes and businesses. Key components include water sources (e.g., reservoirs, wells), treatment facilities, pipes, pumps, and storage tanks. Strict adherence to quality and safety standards is crucial to ensure the water's potability. Real-time monitoring, maintenance, and response to emergencies are essential for efficient operations. Emerging technologies like IoT sensors and data analytics are increasingly used to improve monitoring and management. Sustainability and conservation efforts are also gaining prominence in modern water distribution strategies to address water scarcity and environmental concerns.

ERP systems are comprehensive software platforms that centralize and automate core functions like finance, human resources, manufacturing, inventory management, and more. They provide a unified database and user interface, allowing seamless data flow and collaboration across departments. ERP systems facilitate real-time data access and decisionmaking, improving overall operational efficiency. Common modules within ERP systems include accounting, procurement, CRM (Customer Relationship Management), and supply chain management.

ERP implementations often involve customization to match an organization's specific needs and industry requirements. These systems enable better resource allocation, cost control, and productivity enhancement, leading to improved competitiveness. Cloud-based ERP solutions have become increasingly popular, offering scalability and accessibility from anywhere. Challenges in ERP adoption include high initial costs, complex implementation, and resistance to change among employees. Modern ERP systems may incorporate advanced technologies like AI, machine learning, and IoT for enhanced functionality.

Water management organizations are increasingly adopting ERP systems to enhance their efficiency and effectiveness. ERP integration allows for the centralized management of critical data, such as water quality, supply, and infrastructure maintenance. It streamlines various functions, including billing, customer service, asset management, and regulatory compliance, within a single software platform.

III. System Architecture

Front-End Layer: The front-end layer handles the user interactions and presents information from the ERP system to users. It should include elements like responsive web design, user authentication, and interactive dashboards.

Back-End Layer: Application Server: This layer handles the business logic of the ERP system. It includes modules for order processing, inventory management, maintenance tracking, and more. Database: Store and manage data related to water distribution, inventory, user profiles, and maintenance records. Consider using a relational database or NoSQL database depending on your data requirements.

3.1 HTML

HTML stands for the hypertext markup language. It contains the links which allows the user to jump to other document. The HTML describes the structure of a web page and allows the user to create the pages. The pages can be viewed using the CSS. The basic elements present in the HTML are tags and attributes. The tags are used to start an HTML element which is usually enclosed by the angular brackets. The attributes provide additional information. The main advantage of using HTML is they are very user friendly and they are easily customizable. The main disadvantage is the code or the document cannot be printed. The HTML can be used in different applications like web page development, navigation of internet, provides offline support, and helps in development of gaming. The navigation of internet allows the user to navigate from one page to another page. The HTML pages can be made available even in offline mode without the access of the internet facilities. The gaming development provides a better experience. The basic HTML tags used in the documents are <html>, <head>, <body>. The <html> tag contains information about the header information. The <head> contains the information about the title related information. The <body> tag contains information about the heading, paragraph tag related contents.

3.2 CSS

CSS refers to the cascading style sheets. The CSS is mainly designed to make the web page in a presentable manner. The key advantages of using the CSS is able to create a web site, helps to become a better and attractive web designer, allows us to control the web. The CSS makes the web page to control the text, the style and the spacing between the paragraphs. The CSS allows the user to change the background colors and images, allows the user to change the design layouts. The main advantage of using the CSS is easy to learn. The presentation created using the CSS make more understandable. The basic of HTML and CSS is known technologies like java script and angular basics can be easily understood. CSS is used in many applications such as CSS save time, loads the pages faster, allows easy maintenance, and allows compatibility of the devices. The CSS once created we can reuse the same sheets in multiple HTML pages. The style can be defined for each HTML pages and the styles can be applied for each web page. When you are using the CSS tag there is no need to write the HTML tag attributes. The problem can be overcome by writing only one CSS rule of a tag. The CSS tag once created can be applied to all the occurrences in the tag. The CSS use only one CSS rule of a tag. The CSS tag once created can be applied to all the occurrences in the tag. The CSS use less code which makes the download very faster. CSS uses wide variety of attributes than HTML. The advantage is it provides a better look to the HTML page when compared to the usage of HTML attributes. Cascading style sheets allows the user to optimize the content for more than one type of devices. The HTML attributes usage are getting deprecated day by day, many user recommend the usage of CSS. The CSS can be used in all the HTML pages which makes even more compatible for the future user or browsers.

3.3 MY SQL DATABASE

MySQL database is a relational database management system. It stores the information in tables. The tables can be used to retrieve the information, access and maintain the data easier. MySQL is open database management system is a software which allows the user to modify the data according to the user needs. It is fast and reliable which in turn improves the performance. MySQL is a multithreaded database engine which allows the user to perform multiple tasks at the same time and allows multiple applications to run simultaneously. MySQL database is connected to the ODBC driver using the JSP connection. ODBC is mainly used for accessing the database applications. The ODBC contains certain library functions that implement the function supported by ODBC. The ODBC function call submits a SQL request. The SQL requests are further sent to the MySQL server and the result are processed. The results are finally sent back to the application. The drivers can modify the application request. Once the request is sent it conforms to the syntax supported by the MySQL. The concept of multithreading is an added advantage to the MySQL concept. MySQL allows multiple clients to access the data, perform read or write operations. MySQL uses thread concepts where the process shares the same thread space and executes individually.

3.4 VISUAL STUDIO

Visual studio allows the user to complete the entire development cycle in one place. Visual studio is a software editor tool. The tool is developed by the Microsoft for windows, Linux and MacOS. Visual studio supports the concept of debugging, syntax highlighting and code completion and code snippets. Visual studio is highly customizable. It allows the user to change the theme, keyboard shortcut and add additional functionality. The visual studio is free and open source software released under the MIT license. The basic steps involved in the development of Visual Studio, first install the visual studio. Once the download is completed save the installation time and disk space. The installation time and disk space allocation once completed, select the components needed. The components can be incremented any time when needed. The visual studio opens an IDE where the users will be able to learn the language. Visual studio brings together the concept of graphical design, compiler code and source control into one place. Select the area in which we need to develop or the area in which you are interested in learning. The step by step procedure is followed to understand the basic steps in the applications.

3.5 WEB PAGE PROGRAMMING

An e-commerce website contains a database which is used by both the client and the server side. The server side processing receives the request from the dynamic web page. The server side performs the necessary actions in order to create the pages. Once the pages are created it sends the pages to the client and display the content in the client's browser. The client side processing of data is done by the workstation present in the client side. The browser present in the client side executes the program that interacts directly with the database.

IV MODULE DESCRIPTION

LOGIN PAGE – The login page contains information about the products, login essentials and account creation.

SEARCH -- The search option is provided where the user can search the bottless using the bottless category or title

BOOKING DETAILS -- After the login completion the user can search for the water based on the several category and can navigate to different section and can add items to the cart.

CART – The cart contains the information about the description of the water. The description of the water contains the information about the name, category and finally the price.

BILLING DETAILS – Once the water is selected the user can pay using the credit or the debit card.

DATABASE -- Each user can login and logout and the sessions are saved in the database.

OUTPUT AND DISCUSSION

The following figure 4.1 represents the login page of the Centralized ERP Application for Drinking Water Distribution Under Various Units and Maintenance. The login page contains information about the products, login and create account. . The login page contains information about the username and password. Once the username and password are entered they are verified in the database. If the entered username and password are correct then the website will allow the user to enter and search for the bottles.

Figure 4.1 Login page



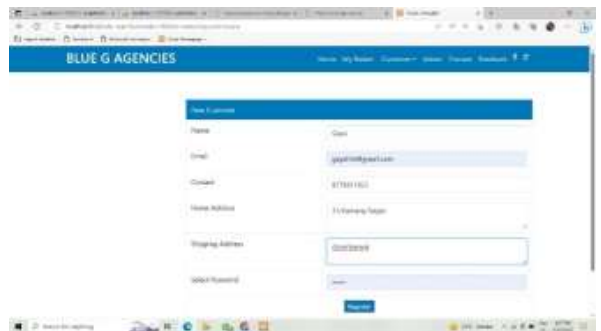
The following figure 4.2 represents the password updation page of the Centralized ERP application for drinking water distribution under various units and maintenance.

Figure 4.2 Update password page



The following figure 4.3 represents the account creation. The account creation contains information about the first name, last name, country. Once the login is created the list of bottles are viewed. The bottles are separated based on the category.

Figure 4.3 Customer Account creation



The following figure 4.4 represent the different catalogs of bottles. The Centralized ERP application for drinking water distribution under various units and maintenance makes the user even more comfortable by dividing the bottles into many categories based on liters.

Figure 4.4 Category of bottles

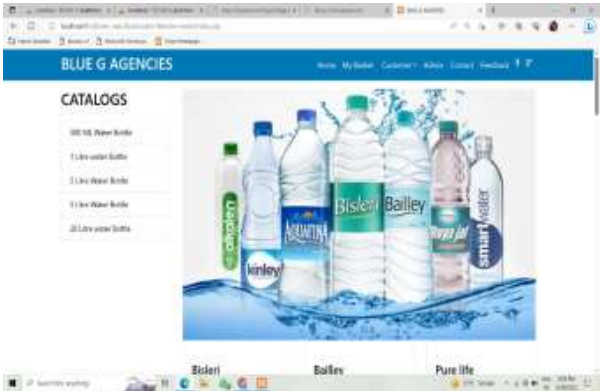


Figure 4.5 Contact desk



V CONCLUSION

The Centralized ERP application for drinking water distribution offers substantial benefits, including improved operational efficiency, enhanced data accuracy, real-time monitoring and analysis, cost reduction, and sustainable water management. Future trends and technologies like IoT integration, AI/ML, and blockchain hold significant potential for further enhancing the system's performance and effectiveness.

VI FUTURE TRENDS AND TECHNOLOGY

IoT Integration: IoT sensors: Deploying sensors in water distribution networks can provide real-time data on water quality, pressure, and consumption. **Remote monitoring:** IoT devices enable remote monitoring of infrastructure, helping detect leaks, faults, or anomalies promptly. **Predictive maintenance:** IoT data can facilitate predictive maintenance, reducing downtime and optimizing resource allocation. **Artificial Intelligence and Machine Learning:** **Anomaly detection:** Machine learning models can flag unusual patterns in water quality or distribution, aiding in early problem detection. **Chatbots and virtual assistants:** AI-powered chatbots can enhance customer service and provide real-time information to consumers

REFERENCES

[1] Operation and management of drinking water supply project in Rural regions of loess plateau Ling Fu, Hanhai Liu
 [2] Water supply management system using PHP and MySQL Anuj Kumar
 [3] Water quality prediction using machine learning methods Amir Hamzeh Haghiabi; Ali Heidar Nasrolahi; Abbas Parsaie
 [4] Water prediction and monitor-Grafiati
 [5] Water Supply and management Tzanakakis,Nikolaos Paranychianakis techniques -Vasileios
 [6] Water quality modeling and prediction of water supply-Xin Wang, Dongmei Liu and Zhe Tao
 [7] Water Supply and management Tzanakakis,Nikolaos Paranychianakis techniques -Vasileios
 [8] Smart Mobile Application for Water Supply Management in Urban Cities Sowmyaa.VR,Karthika.A,Soma Parthibha