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by Pasan Shiraj Sasmika Walanthi Liyanage

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Introduction and Background

Introduction

An extensive digital platform called the Online Medicine Ordering System was created to modernize and simplify the process of buying prescription drugs from a pharmacy. The goal of this system is to increase pharmacy operational efficiency while offering consumers a smooth and convenient experience.

Pharmacies are healthcare facilities that provide pharmaceutical services and medication distribution. Their main operations include preparing and administering prescription drugs, giving advice on medication use, conducting health screenings, administering vaccinations, and selling over-the-counter medications and health-related products. Pharmacies play a crucial role in ensuring patients receive the proper medications and guidance for their use.

Problem statement

The current pharmacy operations are primarily based on in-person interactions, which present several limitations and drawbacks:

- Customers' inconvenience:

Customers frequently have to make the trip to the pharmacy, stand in long lineups, and take their time looking for the necessary prescriptions. The elderly, the disabled, and people with long-term medical illnesses who need to take regular medicine may find this especially difficult.

- Restricted Access to Medicines:

Due to their small storage spaces, physical pharmacies could not always carry all of the necessary medications. Delays in getting essential prescriptions may result from this.

- High Risk of Human Error:

Handling prescriptions and administering medications are two manual operations in pharmacies that are prone to human error, which can have detrimental effects on one's health.

- Time-consuming Procedures:

Obtaining a prescription, buying medications, and remembering prescription regimens are all time-consuming procedures that take time for both patients and pharmacy employees.

- Health Risks:

Customers who visit pharmacies because they are ill or during pandemics are at risk for contracting infectious diseases and other illnesses.

Literature Review

Online Medicine Ordering Systems are revolutionizing the pharmaceutical industry, enhancing customer convenience and operational efficiency, and a literature review provides insights into their design and implementation.

- **E-Pharmacy Services: Current Practices and Future Perspectives**

Authors: B. K. Rana, S. T. Bhutani, and K. B. Taneja

The study explores the evolution of e-pharmacy services, highlighting their benefits like improved access, patient convenience, and better medication adherence. It also addresses challenges like regulatory compliance, data security, and the need for robust verification mechanisms to prevent counterfeit medications. Effective e-pharmacy systems integrate prescription management, real-time inventory tracking, secure payment gateways, and value-added services like virtual consultations.

- **Impact of COVID-19 on the Adoption of E-Pharmacy in India**

Authors: N. K. Sharma, P. Gupta, and R. Sharma

The COVID-19 pandemic has accelerated the adoption of e-pharmacy services in India, with lockdowns and social distancing measures increasing demand for contactless medication delivery. Successful e-pharmacy platforms prioritize user experience, timely delivery, and high

standards of care, proving they can replace traditional pharmacy visits while ensuring patient safety.

Proposed solution

Convenience and efficiency are powerful motivators for consumer behavior in today's fast-paced world. It's not an exception in the healthcare industry, especially with pharmacies. Purchasing medications from a physical pharmacy is a common aspect of traditional pharmacy operations, but it can be inconvenient and time-consuming. The pandemic of COVID-19 has also brought attention to the need for digital solutions to replace physical interactions for basic services.

Our software development business suggests building an online medication ordering system for a pharmacy as a way to solve these issues and enhance the general customer experience. Customers will be able to place online orders for medications and have them delivered right to their door. In addition, the system will offer extra features like online consultations with pharmacists, prescription management, and medicine reminders.

System Features and Capabilities

- **User Registration and Authentication:**
  - Secure user registration process with email verification.
  - Multiple login options for different user roles: Admin, Staff, and Customers.
  - Secure login with two-factor authentication.
- **Medicine Catalog and Search:**
  - Extensive catalog of medicines with detailed descriptions, usage instructions, and pricing.
  - Advanced search functionality to easily find specific medications.
  - Filtering options by category, brand, price range, and availability.
- **Online Ordering and Prescription Upload:**
  - Easy-to-use interface for selecting and ordering medicines.
  - Option to upload prescriptions directly through the platform.
  - Prescription verification process by licensed pharmacists.

- **Payment Gateway Integration:**
  - Multiple payment options including credit/debit cards, online banking, and digital wallets.
  - Secure and encrypted payment processing.
  - Option to save payment details for future transactions.
- **Order Tracking and Notifications:**
  - Real-time order tracking from placement to delivery.
  - Automated notifications for order confirmation, dispatch, and delivery status.
  - In-app notifications and email alerts for important updates.
- **Delivery Management:**
  - Integration with delivery services for timely and reliable delivery.
  - Delivery scheduling options for customers.
  - Contactless delivery options to ensure safety.
- **Prescription Management:**
  - Digital storage of customer prescriptions for easy reference and reorders.
  - Automated reminders for prescription renewals and medication refills.
  - Option for customers to consult with pharmacists online for prescription advice.
- **User Account Management:**
  - Profile management features for customers to update personal and medical information.
  - Order history and transaction records accessible through the user account.
  - Wishlist and saved items for future purchases.
- **Admin and Staff Dashboard:**
  - Comprehensive dashboard for administrators and staff to manage orders, inventory, and customer queries.
  - Inventory management system with real-time stock updates and low stock alerts.
  - Reporting and analytics tools to track sales, customer behavior, and operational performance.
- **Security and Compliance:**
  - Compliance with healthcare regulations and data protection laws.

- Encryption of sensitive data to ensure privacy and security.
- Regular security audits and updates to protect against cyber threats.

Justification for the Proposed System

The goal of the suggested Online Medicine Ordering System is to replace the existing system with one that is cutting edge, effective, and user-friendly. Customers can order drugs from home at any time, which provides increased convenience, especially for individuals with chronic diseases or mobility concerns. The system may interface with numerous warehouses and suppliers, guaranteeing a greater selection of medications and lowering the possibility of stockouts. Patient safety can be improved by automating the handling and dispensing of prescription drugs, which can lower human mistake rates. Streamlining the ordering, prescription management, and medication reminders processes will result in time efficiency. Reducing in-person pharmacy visits lowers exposure to health risks, particularly during pandemics or outbreaks. Prescription reminders, online consultations, and access to health information are examples of extra features that might increase the system's value to customers.

1.5 Functional requirements & Non-functional requirements of the system

➢ Functional Requirements

1. **User Registration and Authentication:**
   - Secure registration with email verification.
   - Login options for different user roles: Admin, Staff, and Customers.
   - Two-factor authentication for secure access.
2. **Medicine Catalog and Search:**
   - Detailed medicine catalog with descriptions and pricing.
   - Advanced search and filtering options.
3. **Online Ordering and Prescription Upload:**
   - User-friendly interface for medicine selection and ordering.
   - Prescription upload and verification by pharmacists.
4. **Payment Gateway Integration:**
   - Support for multiple payment options.
   - Secure payment processing.

5. **Order Tracking and Notifications:**
    - Real-time order tracking.
    - Automated notifications for order updates.
6. **Delivery Management:**
    - Integration with delivery services.
    - Scheduling and contactless delivery options.
7. **Prescription Management:**
    - Digital storage and management of prescriptions.
    - Automated prescription renewal reminders.
8. **User Account Management:**
    - Profile and personal information management.
    - Access to order history and transaction records.
9. **Admin and Staff Dashboard:**
    - Order and inventory management.
    - Reporting and analytics tools.
10. **Security and Compliance:**
    - Compliance with healthcare regulations.
    - Data encryption and regular security audits.

Non-Functional Requirements

Performance:

- The system should handle up to 10,000 concurrent users without performance degradation.
- Page load times should be under 2 seconds.

Reliability:

- The system should have 99.9% uptime.
- Backup and recovery processes should be in place to prevent data loss.

Scalability:

- The system should be able to scale horizontally to accommodate increased traffic.
- The architecture should support adding more servers as needed.

Usability:

- The user interface should be intuitive and easy to navigate.
- The system should provide accessible features for users with disabilities.

Security:

- Data should be encrypted at rest and in transit.
- Regular security audits should be conducted to identify and mitigate vulnerabilities.

Compliance:

- The system must comply with healthcare regulations such as HIPAA.
- Data protection measures should be in place to ensure user privacy.

Maintainability:

- The system should be modular to facilitate easy updates and maintenance.
- Documentation should be provided for all components of the system.

Availability:

- The system should be available 24/7.
- Downtime for maintenance should be minimal and scheduled during off-peak hours.

Software Development methodology

The Online Medicine Ordering System project will use the Agile Software Development Methodology due to its flexibility, iterative nature, and focus on customer collaboration. Cross-functional teams will collaborate to align the project with business objectives and user needs.

Regular feedback sessions will gather insights to make necessary adjustments. Agile allows for adaptive planning, allowing the team to respond to changing requirements effectively. A retrospective meeting after each sprint will reflect on successes and areas for improvement, ensuring continuous improvement in development practices and product quality.

Agile's iterative approach offers flexibility, adaptability, improved customer satisfaction, faster delivery, enhanced quality, and team collaboration. It involves stakeholders, ensuring the final product aligns with their needs and expectations. Regular testing and feedback loops help identify and fix issues early, resulting in higher quality. Agile promotes a collaborative work environment, enhancing communication and cooperation among team members.

Project Management

Feasibility study report - schedule, technical economic etc

The pharmacy management system project's viability and likelihood of success are assessed through a feasibility study. A number of issues, including schedule, technical, and economic aspects, are analysed.

Schedule Visibility

The schedule feasibility evaluates how feasible and realistic the project timeline is. It includes:

Establishing the Project Timeline: List all significant completion dates and deliverables.
Resource Allocation: Ascertain which resources are needed and schedule them in accordance with the project's schedule.
Risk management is the process of identifying any hazards that can affect the schedule and creating plans to mitigate them.
Gantt Chart: To visually depict the project schedule, including tasks, deadlines, and dependencies, create a Gantt chart.

Technical Visibility

The proposed system's technical viability is assessed to see if it can be supported by the infrastructure and technology available today. It consists of:

Technology Assessment: Identify the necessary technology stack (PHP, HTML, CSS, databases, etc.) and assess whether it satisfies the project specifications.

Technical Proficiency: Evaluate the project team's technical proficiency to make sure they can utilise the selected technology efficiently.
Verify that the new system has the ability to integrate with the infrastructure and other systems already in place.
Scalability and Performance: Assess the system's ability to accommodate changes in load and scale as necessary.

Economic Visibility

The project's cost-effectiveness is examined in the economic feasibility report. It consists of:

Cost-Benefit Analysis: Balance the anticipated advantages of the system against the expenses incurred in its development and implementation.
Create a thorough budget plan that accounts for training, maintenance, hardware, software, and development expenses.
Return on Investment (ROI): Determine the project's financial viability by computing the ROI.
financing Sources: Locate possible financing sources and make sure they have enough money to finish the project.

Requirement gathering - techniques-

Identification of stakeholder needs and expectations occurs during the crucial requirement collection phase. Typical methods include of:

Interview

Direct talks with stakeholders are conducted during interviews in order to learn all the specifics regarding their requirements and expectations.

Make a list of the subjects and questions you want to discuss in advance.
Execution: The Conduct the interview while paying close attention and taking notes.
Analysis: Examine and evaluate the answers to determine the most important requirements.
Below are some interview questions.

- What are the most frequent problems you run across when trying to manage pharmacy inventory?

- What challenges do you face with the way prescriptions are now processed?
- In what ways do you oversee medical records, and what problems have you encountered with the present setup?
- What are the main challenges you have when it comes to guaranteeing drug safety and adherence?
- What problems do you have with the way your existing system handles insurance claims and billing, and how effective is it?

Questionnaires

Forms that are structured and contain a list of questions intended to collect data from many different parties are called questionnaires.

Design: Craft succinct, unambiguous questions in both closed- and open-ended formats.
Distribution: Give questionnaires to the appropriate parties.
Gathering and Examining: Gather the answers and examine the information to find recurring themes and needs.

- How happy are you with your pharmacy's existing inventory management system, on a scale of 1 to 5?
- How frequently do prescription processing problems occur to you (e.g., incorrect medicine, incorrect dosage)?
- Which of the following problems with patient record management do you face? (Check all that relate.)

document reviews

In order to comprehend the present system and determine the needs for the new system, document reviews entail looking over the existing documentation.

Find Relevant Documents: Compile documentation including technical specs, procedure manuals, and business strategies.
Examine: Go over the documents carefully in order to obtain relevant information.
Write a summary of the results and point out any holes or extra needs.

site visits

During a site visit, people are engaged in their duties environment and the present system is seen in operation.

Planning: Arrange for trips to pertinent locations.
Observation: Keep an eye on how users interact with the present system and the workflow.
Interviews and Conversations: Talk with users to get their opinions and perspectives.
Documentation: Keep a record of your observations and conclusions for future review.

Resource identification

Identifying resources is figuring out what is required to finish the job successfully. This comprises:

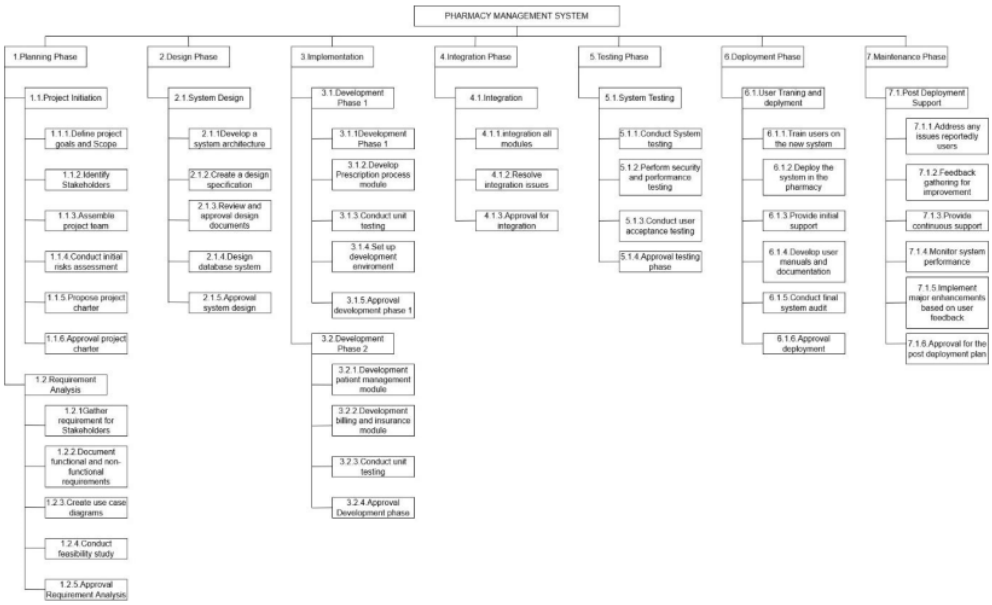
Human Resources: List the members of the project team and their positions (e.g., managers, developers, and testers).
Technology Resources: List the hardware, software, and tools needed for implementation and development.

Financial Resources: Calculate the total amount of money required to pay for the project.
Physical Resources: Determine what equipment or physical space the project will need.

Work breaks down structure -WBS

A Work Breakdown Structure (WBS) is a project's hierarchical breakdown into more manageable parts. It consists of:

Define Major Deliverables: List the important products and stages of the project.
Divide Deliverables: Break each deliverable down into more manageable tasks and subtasks.
Assign Tasks: Give team members assignments and stipulate due dates for accomplishment.
Construct a WBS Diagram: To show the project's dependencies and structure, create a visual depiction of the WBS.



Risk Analysis

Identifying any risks that could have an influence on the project and creating mitigation plans are the two main tasks of risk analysis. It consists of:

Determine every potential risk, including the financial, operational, and technical hazards.
Risk assessment involves determining each risk's impact and possibility.
Risk Mitigation: Create plans to lessen or eliminate hazards that have been identified.
Risk Monitoring: Throughout the project, keep an eye out for any hazards and make necessary adjustments to your mitigation plans.

Risk 1: Breach of Information Security and Privacy

Description: Security breaches and invasions of privacy may result from unauthorised access to private patient and pharmacy information.
Solution: Put strong security measures in place, including multi-factor authentication, data encryption, frequent security assessments, and adherence to pertinent data protection laws (including GDPR and HIPAA).

Risk 2: Problems with Integration with Current Systems
Description: discrepancies in data and operational inefficiencies may result from challenges integrating the new pharmaceutical management system with the current ones.
Solution: To detect and resolve possible problems early on, carry out extensive compatibility testing, use standardised APIs for integration, give employees proper training, and include stakeholders in the integrating process.

Risk 3: Low Adoption Rate and User Resistance
Description: Because they are accustomed to the previous system or are afraid of change, pharmacy employees may be reluctant to accept the new one.
Solution: To promote a smooth transition and increased adoption rates, involve customers early in the design manage, offer thorough training and support, highlight the advantages of the updated system, and quickly answer user complaints.

Estimated budget:

Budget Estimation

Software Cost			
Implementation	**Cost per unit**	**Quantity**	**Total (Rs)**
User licences for application software	Rs. 30000.00	1	Rs. 30,000.00
Database user licenses (PHP My admin- free)	–	–	–
Operating systems	Rs. 16000.00	5	Rs. 80,000.00
Total Software Cost			Rs. 110,000.00
Hardware Cost			

Computers (new or updated)	Rs. 500000.00	5	Rs. 2,500,000
Servers	Rs. 400000.00	8	Rs. 800000.00
Backup devices (portable HDD)	Rs. 20000.00	2	Rs. 40,000.00
			Rs. 3,340,000.00
Network Cost			
Broadband(unlimited)	Rs. 4000.00	4 months	Rs. 4,000.00
Total Network Cost			Rs.4,000.00
Other Cost			
Transportation Cost	Rs. 3000.00	130 Days	Rs.390,000.00
Food (per day)	Rs. 4000.00	130 Days	Rs. 520,000.00
Printing Cost	Rs. 6000.00	-	Rs. 6,000.00
Other	Rs. 50000.00	-	Rs. 50,000.00
			Rs.966,000.00
TOTAL			Rs.4,420,000.00

Gantt chart (screenshot or link)

System Development

WAMP Server

The WAMP Server is a Windows software stack that combines Apache, MySQL, and PHP for online applications. Apache is the main server for the Online Medicine Ordering System, handling HTTP requests and hosting the web application. MySQL stores user, order, medication, and transaction data, while PHP manages user input and creates dynamic web pages.

Git is a version control system for tracking source code changes, Composer is a PHP dependency manager for managing libraries and frameworks, and Node.js and npm for frontend dependencies.

Frontend - Tools

HTML, CSS, and JavaScript are essential technologies for building a web application's frontend. HTML structures content, CSS styles it, and JavaScript provides interactivity and dynamic behavior. CSS creates visually appealing web pages using techniques like Flexbox and Grid. JavaScript enhances user experience with interactive elements, form validations, and AJAX. Bootstrap, vue.js, and axios are front-end frameworks used for responsive web pages, user interfaces, and HTTP client.

Visual Studio Code is a robust code editor with extensions for HTML, CSS, JavaScript, and Vue.js development, while Browser Dev-Tools are built-in browser tools for debugging and optimizing frontend code.

Backend – Database

MySQL is chosen for its reliability, performance, and ease of use for the Online Medicine Ordering System. The database design includes tables for users, medicines, orders, prescriptions, and payments. SQL queries perform CRUD operations on the database. Object-Relational Mapping tools like Eloquent ORM help interact with the database intuitively. Laravel is used for backend development, while a RESTful API is exposed for frontend interaction. Development tools like Postman and PHP Unit ensure the backend code works as expected.

Discussion

Project team

	Responsibilities
Pasan Sasmika (Project Manager)	Supervising the project's implementation collaborating with teammates Making sure deadlines and benchmarks are reached Taking care of the finances and resources Speaking with interested parties
Heshani Senevirathna (Lead developer)	**Responsibilities** In charge of the development group Creating an Architecture for Systems

	ensuring best practices and high-quality code examining the code and merging the modules
Sanduni Nisansala (Ui/UX developer)	**Responsibilities** developing user interfaces Establishing procedures for user experience Testing the system with users and getting their input to make sure it is simple to use
Uvindu Anusara (Backend Developer)	**Responsibilities** Creating logic on the server side Connecting databases Maintaining Data Integrity and System Security Taking care of API integrations
Nimeshi Sathya (QA Tester)	**Responsibilities** inspecting the system for errors and problems Testing for security and performance Making sure the system satisfies quality requirements reporting problems and confirming solutions
Pawani Tharuka (Business Analysis)	**Responsibilities** Compiling and recording the specifications Examining operational procedures ensuring the system satisfies requirements for business Informing the development team of the needs

Stakeholders

Pharmacy Staff	**Responsibilities** supplying input on the usefulness of the system Taking part in training programmes for users Utilising the system on a daily basis Reporting problems or ideas for enhancement

Patient	**Responsibilities** interacting with the prescription and billing systems Giving user experience feedback ensuring the accuracy and timeliness of their data
Insurance Company	**Responsibilities** Expanding on the integration of billing and insurance ensuring prompt and accurate claim handling Providing comments regarding the billing system
Vendors	**Responsibilities** supplying the required software and hardware supplying upkeep and technical support ensuring prompt product and service delivery

Lesson Learned

The Online Medicine Ordering System project highlighted the importance of thorough requirement gathering, clear communication, agile development, appropriate technology selection, user experience, security, testing, training, collaboration, and adaptability. It was crucial to capture accurate requirements, use agile development methodology for iterative progress, and break down the project into manageable sprints. The system's success was facilitated by careful planning, stakeholder involvement, and documentation. The use of tools like WAMP server, Bootstrap, Vue.js, and Laravel was crucial for its successful implementation. User experience was also crucial, with intuitive design and easy navigation contributing to higher satisfaction. Data protection was crucial, with robust measures like encryption and secure authentication. Comprehensive testing, including unit tests and user acceptance tests, was essential for the system's reliability. Collaboration among cross-functional teams was vital for the project's success. Adaptability and continuous improvement

were key, allowing for adaptability to changing requirements, technology advancements, and market trends.

Conclusion and Recommendations

Conclusion

The Online Medicine Ordering System project is a significant step in the digital transformation of pharmacy operations. It enhances customer convenience, operational efficiency, and user satisfaction by enabling online medicine orders, automating processes like order management, inventory tracking, and prescription handling, and reducing manual errors. The system also implements robust security measures, adhering to healthcare regulations, and ensures the protection of sensitive customer data. The system's architecture allows for easy scalability and integration with third-party services, adapting to future needs and technological advancements. Continuous communication and feedback sessions with stakeholders have been crucial to the project's success, ensuring the system meets the expectations and requirements of pharmacy staff and customers, leading to high levels of satisfaction and acceptance.

Future recommendation

To continue enhancing the Online Medicine Ordering System, the following steps are recommended:

- Continuous Improvement: Regularly update the system based on user feedback and emerging trends in technology and healthcare.
- Expand Features: Introduce new features such as telemedicine consultations, personalized health advice, and advanced analytics for better decision-making.
- Broaden Reach: Extend the system’s availability to more pharmacies and regions, providing more customers with access to its benefits.
- Enhance Integration: Integrate with additional healthcare systems and providers to offer a more comprehensive health management solution.
- We can develop mobile application too.

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