S.VEERASAMY CHETTIAR COLLEGE OF ENGINEERING AND TECHNOLOGY

College Code—9526

Department of Computer Science and Engineering

TITLE :

Medical Inventory Management

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Team Size: 4

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MEDICAL INVENTORY MANAGEMENT

Introduction

The**MedicalInventoryManagementSystem**isasoftwaresolutiondesigned to efficiently manage and monitor medical supplies, equipment, and pharmaceuticals within healthcare facilities such as hospitals, clinics, and pharmacies. Managing medical inventory manually can lead to challenges such as stockouts, overstocking, expired medicines, and inaccurate record-keeping. This project aims to automate these processes, ensuring that healthcare providers always have the right materials available at the right time.By implementing this system, healthcare institutions can improve patient care, reduce operationalcosts, andmaintaincompliancewithhealthcareregulationsthrough accurate and timely inventory tracking.

Purpose of the Project

Theprimarypurposeofthe**MedicalInventoryManagementProject**isto**streamlinethe managementofmedicalresources** andensurethatsuppliesareefficientlytracked,stored, and replenished.

Specificobjectivesinclude:

- Toautomatetheprocessoftrackinginventorylevels,usage,andexpirydates.

- Toreducewastecausedbyexpiredorunusedmedicines.

- Toenablereal-timeaccesstostockinformationforfasterdecision-making.

- Toensuretimelyreorderingandrestockingbasedondemandandconsumptiontrends.

- Toenhanceaccountabilityandtransparencyininventoryhandling.

Key Features:

TheMedicalInventoryManagementSystemincludesseveralkeyfeaturesdesignedfor efficiency,accuracy,andeaseofuse:

1. **InventoryTracking:**
   Real-timemonitoringofavailablemedicines,equipment,andconsumables.

2. **AutomatedAlerts:**
   Notificationsforlowstocklevels,near-expiryitems,andpendingrestocks.

3. **Barcode/QRCodeIntegration:**
   Fastscanningandupdatingofinventorydatatoreducemanualentryerrors.

4. **UserManagement:**
   Role-basedaccesscontrolforadministrators,pharmacists,andstaff.

5. **SuppliersPurchaseManagement:**
   Recordandmanagesuppliers,purchaseorders,anddeliverydetails.

1. Phase Ideation

The**IdeationPhase**istheinitialstageoftheprojectwheretheconceptofthe MedicalInventoryManagementSystemisconceivedanddeveloped. Duringthisphase,theteamidentifiesthekeyproblemsfacedbyhealthcare institutions inmanaging medical supplies, such as:

- Manualtrackingleadingtoerrorsordataloss.
- Overstockingorshortageofessentialmedicines.
- Difficultyinmonitoringexpirydatesandsupplierdetails.
- Lackofreal-timeinformationanddelayeddecision-making.

Thegoalinthisphaseisto**generateideasandpotentialsolutions**thatcan overcomethesechallenges.Afterbrainstormingandresearch,theconceptofan automatedinventorymanagementsystemformedicalresourceswasselected. Thesystemaimstosimplifystockhandling,improveaccuracy,andensuretimely replenishment of supplies.

OutcomeofIdeationPhase:

Aclearprojectidea—todevelopa**MedicalInventoryManagementSystem** that automates stock tracking, reduces wastage, and improves healthcare supply efficiency.

MindMap Diagram

2. Project Planning Phase

Inthe**ProjectPlanningPhase**,theobjectives,scope,androadmapoftheproject aredefined.Thisphaseinvolvessettingtimelines,identifyingteamroles,selecting development tools, and planning the project workflow

- **Definingprojectscope:** Managingmedicines,medicalequipment, suppliers, and stock levels.

- **Timelinecreation:**Dividingtheprojectintomilestones(design, development, testing, deployment).

- **Resourceallocation:**Assigningtasksamongdevelopers,designers,and testers.

- **Technologystackselection:**Choosingsuitabletechnologiessuchas

  - Frontend:HTML,CSS,JavaScript(orReact)

  - Backend:Python(Django/Flask),PHP,orJava

  - Database:MySQLor Firebase

- **Riskanalysis:**Identifyingpotentialriskslikedatabreachesorinaccurate stock records, and planning preventive measures.

OutcomeofPlanningPhase:
Astructuredprojectplandetailingtheschedule,technologies,anddeliverables required for the successful completion of the Medical Inventory Management System.

FlowDiagram

DiagramType: TimelineorGanttChart
Purpose: Torepresentprojectschedulingandplanningtasks.

Structure:

ProjectPlanningTimeline	
Phase	Duration
Ideation	Week1

RequirementAnalysis	Week2–3
SystemDesign	Week4–5
Development	Week6–8
Testing	Week9–10
DeploymentCMaintenanceWeek11–12	

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3. Project Design Phase

The **DesignPhase** focusesontranslatingthefunctionalrequirementsintoaclear systemarchitectureandinterfacelayout.Inthisphase,both **systemdesign** (backend logic)and **userinterface(UI/UX)** designaredeveloped.

Keyactivitiesinclude:

- **SystemArchitectureDesign:**
  - DesigningmodulessuchasInventoryManagement,SupplierManagement, ExpiryTracking,andReporting.
  - Establishingdatabaseschemastohandledataefficiently.

- **UserInterfaceDesign:**
  - Creatingintuitivescreensforadding,viewing,andupdatingmedicalstock.
  - Designingdashboardsthatdisplaykeymetricssuchasavailablestock, low-stockalerts,andexpirywarnings.

- **DataFlowDiagrams(DFD)andERDiagrams:**
 - Visualizinghowdatamovesbetweensystemcomponents.

OutcomeofDesignPhase:
Acompleteblueprintofthesystem,includingarchitecturediagrams,database structure,andUImockupsthatguidethedevelopmentteam.
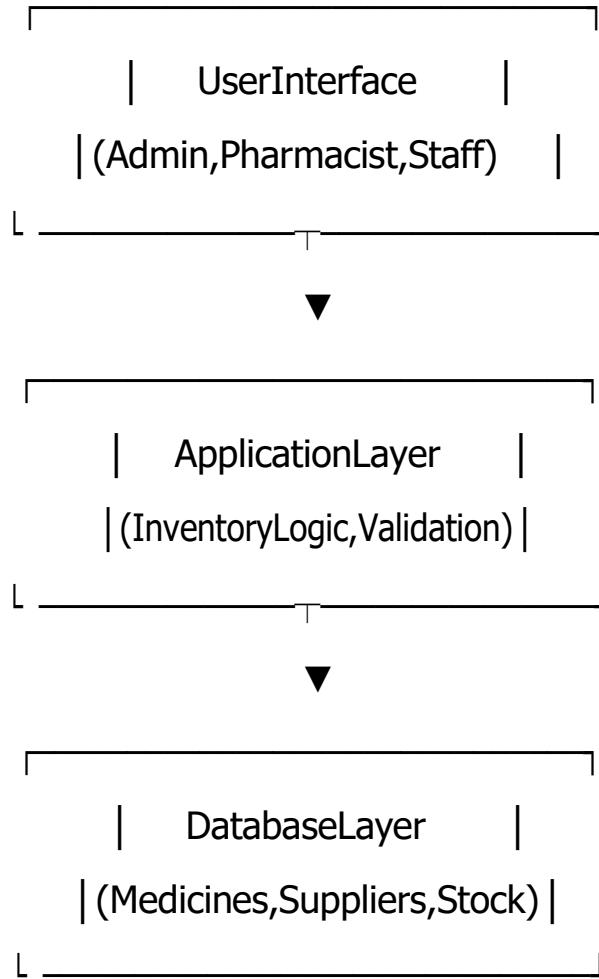
System Architecture Diagram:

DiagramType: BlockDiagram(SystemArchitecture)
Purpose: Toshowhowdifferentcomponentsofthesysteminteract.

Structure:

```
┌─────────────────────────────┐
│        UserInterface        │
│   (Admin,Pharmacist,Staff)  │
└──────────────┬──────────────┘
               ▼
┌─────────────────────────────┐
│        ApplicationLayer     │
│   (InventoryLogic,Validation)│
└──────────────┬──────────────┘
               ▼
┌─────────────────────────────┐
│        DatabaseLayer        │
│   (Medicines,Suppliers,Stock)│
└─────────────────────────────┘
```

4. Requirement Analysis

The **RequirementAnalysisPhase** involvesgathering,studying,anddocumentingall thefunctionalandnon-functionalrequirementsoftheproject. Thisensuresthatthefinalsystemmeetsuserexpectationsandbusinessneeds.

FunctionalRequirements:

- Thesystemshouldallowuserstoadd,update,anddeleteinventoryitems.

- Itshouldgeneratealertsforlowstockandexpiringmedicines.

- Itshouldmaintainsupplierdetailsandpurchasehistory.

- Itshouldgeneratereportsonstockusageandinventoryvalue.

Non-FunctionalRequirements:

- Thesystemshouldbesecureandprotectsensitivedata.

- Itshouldhaveauser-friendlyinterface.

- Itshouldsupportscalabilityforlargerdatavolumes.

- Thesystemshouldensureaccuracyandreliabilityofrecords.

OutcomeofRequirementAnalysis:
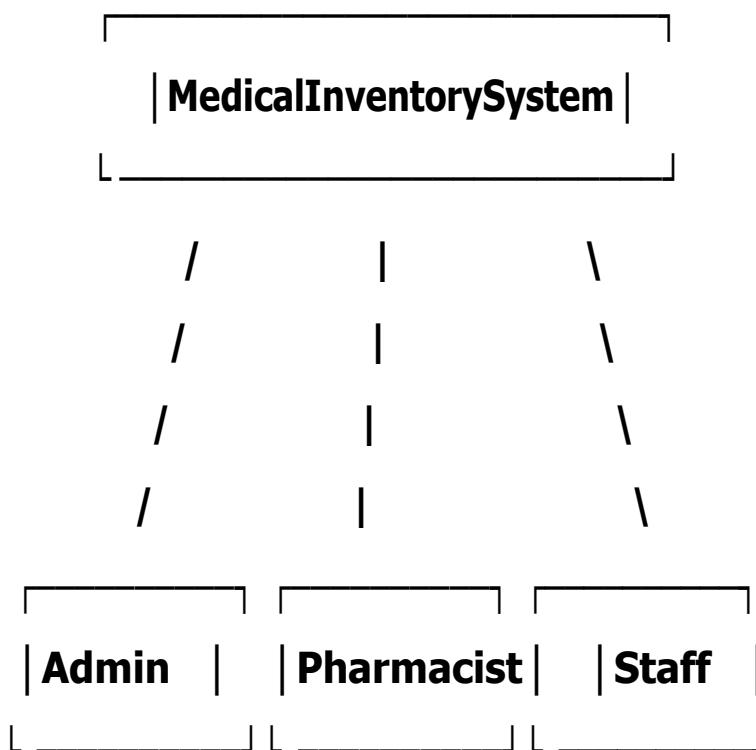
Aclearanddetailed**SoftwareRequirementsSpecification(SRS)**document
outliningsystemfunctionality,constraints,andperformanceexpectations.

UseCaseDiagram

DiagramType: UseCaseDiagram(UML)
Purpose: Toshowinteractionsbetweenusersandthesystem.

Structure:

```
         ┌──────────────────────┐
         │MedicalInventorySystem│
         └──────────────────────┘
              /        |        \
             /         |         \
            /          |          \
           /           |           \
    ┌───────────┐ ┌───────────┐ ┌──────────┐
    │Admin      │ │Pharmacist │ │Staff     │
    └───────────┘ └───────────┘ └──────────┘
```

UseCases:

- Add/Update/DeleteInventory

- TrackExpiryDates

- GenerateReports

- ManageSuppliers

- ViewStockLevels

5. Performance Testing

The **PerformanceTestingPhase** ensures that the Medical Inventory ManagementSystemfunctionsefficientlyunderexpectedworkloads. Thisphaseevaluatesthesystem's **speed, stability, and scalability** to ensure it can handle real-world scenarios.

Keytestingaspectsinclude:

- **LoadTesting:** Tocheckhowthesystemperformswhenmultipleusersaccessit simultaneously.
- **StressTesting:** Totestsystembehaviorunderheavydataloadsorunexpected conditions.
- **ResponseTimeMeasurement:** Toensurequickpageloadsanddatabase operations.
- **DatabasePerformance:** Toverifythatinventorysearches,updates,andreports generateefficiently.
- **ScalabilityTesting:** Toensurethesystemcanhandleincreaseddatavolumeas the hospital or pharmacy grows.

  OutcomeofPerformanceTesting:
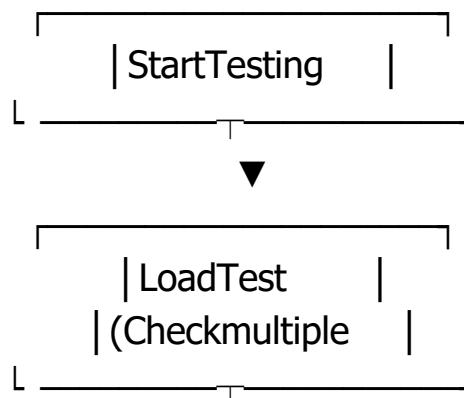
  Areliableandoptimizedsystemthatcanmanagelargemedicalinventories withoutlagorfailure,ensuringseamlessoperationsinrealhealthcare environments.
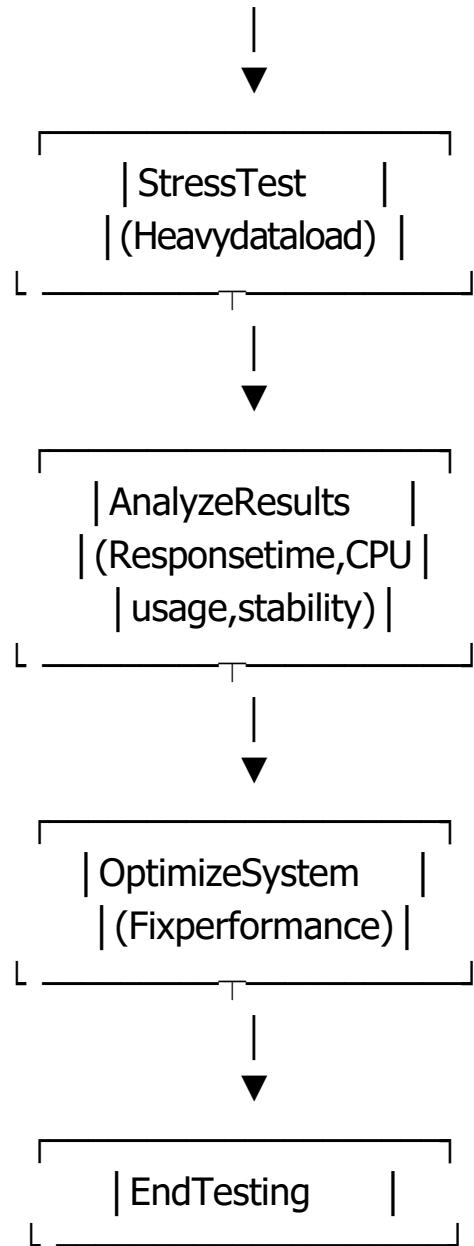
FlowDiagram

DiagramType: ProcessFlowDiagram
Purpose: Torepresentthestepsofperformancetesting.

Structure:

```
 ┌─────────────────────┐
 │StartTesting      │
 └──────────┬──────────┘
            ▼
 ┌─────────────────────┐
 │LoadTest          │
 │(Checkmultiple     │
 └──────────┬──────────┘
```

```
                        |
                        ▼
          ┌─────────────────────────┐
          │ StressTest         │
          │ (Heavydataload)    │
          └────────────┬────────────┘
                        │
                        ▼
          ┌─────────────────────────┐
          │ AnalyzeResults     │
          │ (Responsetime,CPU │
          │ usage,stability)   │
          └────────────┬────────────┘
                        │
                        ▼
          ┌─────────────────────────┐
          │ OptimizeSystem     │
          │ (Fixperformance)   │
          └────────────┬────────────┘
                        │
                        ▼
          ┌─────────────────────────┐
          │ EndTesting         │
          └─────────────────────────┘
```

Conclusion

TheMedicalInventoryManagementSystemisavitaltoolformodern healthcarefacilities,designedtostreamlinethemanagementofmedical suppliesefficientlyandaccurately.Byautomatinginventorytracking,monitoring stocklevels,andgeneratingtimelyalertsforloworexpireditems,thesystem minimizesmanualerrors,reduceswastage,andensuresthecontinuous availability of essential medicines and equipment.

_____ *Thank You* _____