**Functional Requirements**

**1.1 Inventory Management**

* Batch Item Addition
  + Administrators can log in to the system and navigate to the Inventory Management section.
  + Administrators can select the option to Add Items in Batch and upload a CSV or Excel template with details such as item name, quantity, and expiry date.
  + The system will validate the uploaded data for consistency (e.g., no negative quantities, valid expiry dates).
  + The inventory list will be updated, and the administrator will receive confirmation of the items added.
  + The system will monitor inventory levels and automatically generate notifications when any item’s stock falls below a predefined threshold or when the expiry date is approaching.
  + Notifications will be sent via email to the administrator.
  + The Administrator can take necessary actions, such as placing a new supply or removing expired stocks.
* Low Stock and Expiry Notifications
  + The system will monitor inventory levels and automatically generate notifications when any item’s stock falls below a predefined threshold or when the expiry date is approaching.
  + Notifications about items nearing expiration will be displayed in the footer of the interface, providing administrators with real-time, easily accessible reminders to manage inventory.
  + The administrator can take necessary actions, such as placing a new order or removing expired stock.
* Transaction and Audit Logs
* Every inventory transaction (e.g., adding new stock, updating quantities, and removing expired items) will be logged automatically.
* The log will capture details such as the user’s name, date/time of action, and type of transaction.
* Administrators can access and review the log for transparency and accountability.
* Log entries will be protected from alteration or deletion to maintain integrity.
* Yearly Report Generation
* At the end of each year, administrators can generate transaction reports summarizing inventory usage, organized by medication, month, and day, including details such as total usage per item, stock-outs, wastage due to expiry, and restocking patterns.
* These reports will be available for export in PDF or Excel format, ready for printing.
* Inventory Dashboard

Administrators will have access to the Inventory Dashboard, which will display key metrics such as:

* + Current stock levels.
  + Low-stock items and those near expiry.
  + Recent inventory transactions.

**2.2 Dengue Forecasting**

* SARIMAX Forecasting Model
* The system will gather historical health incident data (e.g., past dengue cases) and external factors (e.g., weather conditions) from internal or third-party sources.
* The SARIMAX model will analyze the data to identify trends and patterns in potential dengue outbreaks.
* The model will predict dengue cases based on seasonal patterns and external variables such as rainfall.
* Alerts will be triggered based on the predictions, recommending specific actions to prepare for potential outbreaks.

**2.3 Dental Appointment Scheduling**

* Student Portal for Booking Appointments
* Students will log in to the Dental Appointment Portal and select an available doctor and a time slot from the available options.
* The system will prevent double bookings by validating the appointment time and notifying students of any schedule changes in real-time.
* Appointment Management
* Clinic staff will have access to the Admin Dashboard, where they can manage appointments by rescheduling or canceling them as necessary.
* Appointment changes will trigger automatic notifications to students about any modifications.

**Non-Functional Requirements**

**2.1 Performance**

* Real-Time Response
* Data updates (e.g., appointment bookings, inventory changes) must reflect on all connected devices within 2 seconds to ensure real-time updates.
* System Scalability
* The system must handle up to 10,000 concurrent users without significant performance degradation.
* The system must remain stable and responsive during peak periods, such as during health emergencies or high-demand appointment scheduling.

**2.2 Security**

* Data Encryption
* All sensitive information, such as health records and inventory data, must be encrypted using 256-bit encryption during transmission and while stored in the database.
* Authentication
* Multi-factor authentication (MFA) will be required for clinic staff accessing sensitive data or performing critical actions, such as managing appointments or editing health records.
* Compliance with Privacy Regulations
* The system must comply with HIPAA (Health Insurance Portability and Accountability Act) for healthcare data security and GDPR (General Data Protection Regulation) for user privacy, particularly for international students.

**2.3 Reliability**

* Uptime Guarantee
* The system must maintain an uptime of 99.9%, ensuring availability during critical times, especially for dengue forecasting and dental appointment management.
* Backup System
* Data must be automatically backed up every 24 hours and stored securely for at least30 days to protect against data loss.

**2.4 Usability**

* User-Friendly Interface:
* The Patient Portal and Admin Dashboard must have a simple, intuitive interface to ensure easy navigation for both clinic staff and students.

**2.5 Maintainability**

* Modular Architecture
* The system should be built with a modular architecture, allowing easy updates and integration of new features, such as additional health services or updated forecasting models.
* Documentation
* Full technical documentation will be provided, including system architecture, API specifications, and user manuals for system maintenance and future upgrades.

**2.6 Privacy and Data Protection**

* Data Anonymization
  + Any health data used for forecasting or research will be anonymized to prevent identification of individuals.
* Consent Management
* The system should allow patients to provide or revoke consent for the use of their medical data in forecasting or research.

**2.7 Integration**

* Third-Party APIs:
* The system will seamlessly integrate with third-party services, such as GoogleCalendar for appointment scheduling and reminders.
* The system must handle API changes without disrupting the core functionality.