OPEN UNIVERSITY MALAYSIA

HUTECH
Đại học Công nghệ Tp.HCM

MID-TERM ASSIGNMENT REPORT

CBOP3103
OBJECT ORIENTED APPROACH
IN SOFTWARE DEVELOPMENT
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HUTECH

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Functional Requirements

1. Equipment Request/Reservation:

- Enable hospital staff to submit formal equipment requests through an intuitive online portal.
- Incorporate a status tracker to notify staff when equipment is reserved, pending approval, or approved.
- Allow prioritization of requests based on urgency to ensure critical needs are met promptly.

2. Borrowing Records:

- Maintain comprehensive logs of borrowed equipment, including the borrower's name, department, date borrowed, and expected return date.
- Implement an automatic reminder system to notify staff of upcoming return deadlines.
- Track the duration each piece of equipment is borrowed to monitor usage patterns and availability.

3. Damage Records:

- Record detailed information about damaged equipment, including the nature of the damage, date reported, and person responsible.
- Facilitate the uploading of images or videos of the damaged equipment for thorough documentation.
- Automatically generate reports to analyze common causes and frequency of equipment damage, aiding in preventive measures.

4. Disposal Records:

- Maintain detailed records of disposed equipment, including the date of disposal, reason for disposal, and method of disposal.
- Enable the generation of disposal certificates to ensure proper documentation for regulatory compliance.
- Track the entire lifecycle of equipment from acquisition to disposal to maintain accurate records.

5. Maintenance Scheduling:

- Schedule routine maintenance activities for each piece of equipment to ensure optimal performance.
- Send automatic reminders to relevant staff and vendors for upcoming maintenance tasks.
- Maintain a detailed log of past maintenance activities and any issues resolved to track equipment history.

6. Inventory Management:

- Maintain a comprehensive directory of vendors with contact details and services provided.
- Track service requests, including the type of service, date requested, and completion status.
- Implement a rating and feedback system for vendor services to monitor performance and ensure quality.

7. Report Generation:

- Generate detailed reports for monthly management meetings, including equipment usage statistics, maintenance records, and financial summaries.
- Customize report templates to fit various needs, such as annual audits or departmental reviews.
- Include visual aids like charts and graphs to enhance the clarity and impact of reports.

8. User Authentication:

- Implement multi-factor authentication to ensure secure access to the system.
- Assign different access levels based on roles, ensuring only authorized personnel can modify records.
- Maintain audit logs of all user activities to enhance security and accountability.

9. Notification System:

- Send alerts for overdue equipment returns, upcoming maintenance, and equipment availability.
- Allow users to customize notification preferences to suit their needs.
- Enable real-time notifications through email, SMS, or in-app alerts to keep users informed.

10. Search Functionality:

- Allow users to search for equipment records using various criteria such as equipment type, serial number, status, or department.
- Provide advanced search filters to narrow down results and improve search efficiency.
- Include a real-time inventory check feature to quickly find available equipment and streamline operations.

Non-Functional Requirements

1. Scalability:

- The system should be designed to easily scale and accommodate an increasing number of staff and equipment records. This includes the ability to handle higher data volumes and user loads without performance degradation.
- Implement a modular architecture that allows for the seamless addition of new features or modules as needed.
- Utilize cloud-based solutions to dynamically allocate resources based on demand, ensuring the system can grow with the organization.

2. Usability:

- Develop a user-friendly interface tailored to the needs of hospital staff, asset management, and maintenance personnel. This includes intuitive navigation, clear prompts, and accessible design.
- Provide comprehensive user training modules and detailed help documentation to assist users in effectively utilizing the system.
- Incorporate a feedback mechanism to gather user input and continuously improve the user experience.
- Ensure consistency in design and functionality across all user interfaces to reduce the learning curve and enhance usability.

3. Performance:

- Optimize the system to respond to user actions within 2 seconds, even under peak load conditions. This includes efficient coding practices and performance tuning.
- Ensure the system can handle at least 100 simultaneous users without experiencing performance issues.
- Implement real-time updates and processing for all transactions to provide immediate feedback and maintain system responsiveness.
- Use efficient database queries and indexing to minimize response times and improve overall system performance.

4. Security:

- Encrypt all sensitive data, including borrowing records and damage reports, both in transit and at rest, to protect against unauthorized access.
- Implement role-based access control to ensure that only authorized personnel can access sensitive information.
- Conduct regular security audits and penetration testing to identify and mitigate potential vulnerabilities.
- Stay up-to-date with the latest security best practices and technologies to protect the system from emerging threats.

5. Availability:

- Design the system to achieve 99.9% uptime, ensuring it is available for use at all times. This includes implementing high-availability solutions and failover mechanisms.
- Use redundant systems and infrastructure to ensure continuous operation in case of hardware or software failures.
- Set up real-time monitoring and alerting to quickly identify and address any system issues.
- Schedule regular maintenance during off-peak hours to minimize downtime and ensure system reliability.

6. Maintainability:

- Develop the system with clear modularity to facilitate easy updates and maintenance. This includes separating concerns and using well-defined interfaces between modules.
- Ensure the codebase and system architecture are well-documented to assist developers in understanding and maintaining the system.
- Implement version control and change management practices to track updates and changes to the system.
- Use automated testing to detect issues early and ensure the system remains stable and reliable.

7. Data Integrity:

- Ensure all records of equipment borrowing, damage, and maintenance are stored with high accuracy and integrity. This includes implementing validation checks and data consistency mechanisms.
- Use transaction management to ensure that all database operations are completed successfully and data remains consistent.
- Regularly audit data to identify and correct any discrepancies or errors.
- Implement backup and recovery procedures to protect data from loss or corruption.

8. Backup and Recovery:

- Perform regular automated backups of all critical data to ensure data can be restored in case of failure.
- Store backup data securely off-site to protect against physical damage or theft.
- Regularly verify and test backup integrity to ensure data can be successfully restored.
- Develop and document quick data recovery processes to minimize downtime and data loss in case of an incident.

9. Compliance:

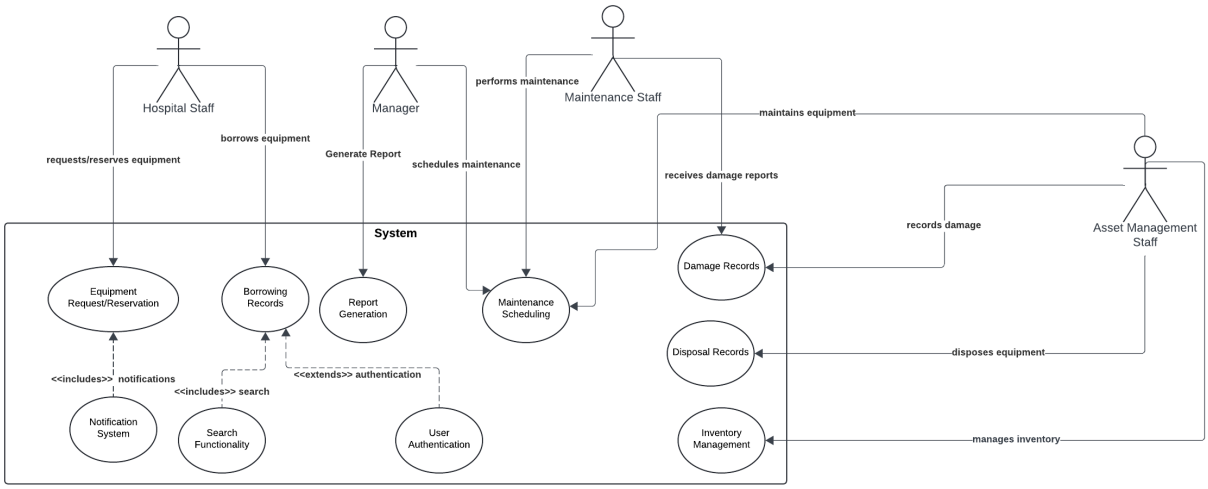
- Ensure the system complies with all relevant hospital regulations and standards for equipment management. This includes adhering to data privacy laws and healthcare

regulations such as the Health Insurance Portability and Accountability Act (HIPAA), if applicable.
- Conduct regular compliance audits and assessments to ensure ongoing adherence to regulatory requirements.
- Maintain detailed audit trails for all data access and modifications to support compliance and accountability.
- Stay informed about changes in regulations and update the system as needed to maintain compliance.

10. Extensibility:

- Design the system architecture to allow for future expansion and the addition of new features without major rework. This includes using modular design principles and well-defined interfaces.
- Ensure the system can integrate with other hospital systems, such as Electronic Health Records (EHR) and Inventory Management, through standardized data formats and APIs.
- Plan for scalability in both hardware and software to accommodate future growth and changes in requirements.
- Regularly review and update the system to incorporate new technologies and best practices, ensuring it remains flexible and adaptable to future needs.

Use Case Diagram:



Explanation of Use Case Relationships:

Actors/Roles:

- **Hospital Staff**: Requests and borrows equipment.
- **Manager**: Schedules maintenance and generates reports.
- **Asset Management Staff**: Manages the equipment, including damage reporting, disposal, and inventory management.
- **Maintenance Staff**: Performs maintenance and receives damage reports.

Use Cases:

- **Equipment Request/Reservation:** Hospital staff requests or reserves equipment.
- **Borrowing Records:** The system tracks the equipment borrowed by hospital staff.
- **Damage Records**: Asset management staff records any damage to equipment.
- **Disposal Records**: The system tracks when equipment is disposed of.
- **Maintenance Scheduling**: Managers schedule maintenance for equipment.
- **Inventory Management**: Asset management staff manages inventory details.
- **Report Generation**: Managers generate reports for meetings.
- **User Authentication**: Ensures only authorized users can access the system.

- **Notification System**: Sends notifications to hospital staff when requested equipment is available.
- **Search Functionality**: Allows searching for equipment in the system.

Relationships

1. **Include Relationships**:
   - Equipment Request/Reservation includes the Notification System.
   - Borrowing Records includes the Search Functionality.
2. **Extend Relationships**:
   - Borrowing Records extends User Authentication, meaning borrowing records functionality is only available after user authentication.