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IT Hardware Management System

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ABSTRACT :

The IT Hardware Management System (ITHMS) is a centralized asset management platform designed to streamline IT hardware tracking, maintenance scheduling, and security enforcement within an organization. The system automates inventory management, real-time monitoring, and predictive maintenance to ensure optimal hardware performance and lifecycle management. It provides a secure, role-based access control (RBAC) framework, ensuring only authorized personnel can modify or access sensitive asset data. The ITHMS architecture integrates Core PHP, MySQL, and web-based interfaces, offering seamless hardware allocation, issue tracking, and compliance enforcement. This research paper details the system design, key features, security mechanisms, and future enhancements of ITHMS, demonstrating its impact on reducing IT asset mismanagement, improving security compliance, and enhancing operational efficiency...

Keywords: IT asset management, hardware tracking, predictive maintenance, role-based access control, security compliance, automation, database management.

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1.0 INTRODUCTION:

With the increasing complexity of IT infrastructure and the growing reliance on digital assets, organizations face challenges in efficiently managing hardware resources. Traditional methods of IT asset management often rely on manual tracking, making it difficult to monitor hardware usage, schedule maintenance, and enforce security policies effectively.

The IT Hardware Management System (ITHMS) addresses these issues by offering an integrated platform that automates asset tracking, maintenance scheduling, and security compliance. The system allows users to monitor and manage assigned electronic items based on their designated roles, ensuring transparency and accountability. It is designed with three key user roles: Admin, responsible for managing inventory and assigning assets; Employee, who tracks assigned hardware and submits maintenance requests; and Coordinator, who oversees hardware allocations and approvals.

ITHMS includes predictive maintenance features that analyze usage trends and generate proactive maintenance alerts to minimize unexpected failures. The system also implements role-based access control (RBAC), ensuring that only authorized users can access or modify asset-related information. Unlike conventional asset management systems, ITHMS leverages automation, real-time monitoring, and compliance tracking to enhance operational efficiency and security.

2.0 Methodology:

The methodology followed in the development of the IT Hardware Management System (ITHMS) consisted of several structured phases:

** **Requirement Analysis** Identifying system needs through stakeholder interviews and studying existing asset management practices.

** **System Design** Creating the architecture, database schema, and defining role-based access control (RBAC) policies.

** **Development and Implementation** Building the system using Core PHP and MySQL, integrating user authentication and inventory tracking.

** **Testing and Validation** Conducting functional and security testing, including access control verification and data integrity checks.

** **Deployment and Maintenance** Implementing the system within the organization and ensuring ongoing monitoring and updates.

3.0 PROBLEM AND SOLUTION DESCRIPTION:

Managing IT hardware efficiently remains a challenge for many organizations, leading to issues such as asset mismanagement, unauthorized access, and untracked hardware allocations. Traditional asset management methods lack automation, making it difficult to monitor hardware usage, schedule maintenance, and enforce security policies effectively testing environment.

Problem Statement and Choice of Solution

Conventional IT asset tracking systems lack real-time monitoring, predictive maintenance, and role-based access control (RBAC), leading to inefficiencies in hardware lifecycle management. Organizations often struggle with hardware misallocation, delayed maintenance, and compliance violations:

The IT Hardware Management System (ITHMS) addresses these issues by:

1. Implementing a centralized platform for real-time asset tracking and maintenance scheduling.
2. Enforcing role-based access control (RBAC) and authentication mechanisms for security compliance.
3. Providing automated inventory updates, predictive maintenance alerts, and hardware usage reports.

4.0 APPLICATION DEVELOPMENT:

Software Development Process Model

The IT Hardware Management System (ITHMS) follows an **agile development approach**, enabling continuous improvements and feature enhancements based on user requirements. This ensures that **inventory tracking, maintenance scheduling, and security measures** evolve dynamically to meet organizational needs.

Technologies Used

1.Database Management: MySQL is used for structured storage of hardware inventory, user roles, and maintenance logs.

2.Backend Development: Core PHP powers the system, handling authentication, data processing, and asset management operations.

3.Frontend Interface: HTML, CSS, and JavaScript are used for building an interactive, user-friendly dashboard.

4.Security Implementation: Role-Based Access Control (RBAC) and multi-factor authentication (MFA) ensure restricted data access.

5.0 USE CASE FOR THE APPLICATION:

User Dashboard

The dashboard provides access to hardware inventory, asset assignments, and maintenance requests. Users can track the status of IT assets and receive real-time updates on maintenance schedules.

Asset Management and Tracking

Users can view assigned hardware, request repairs, and update asset status. The system maintains historical logs of asset usage, allowing for efficient monitoring and compliance tracking.

6.0 Findings and Analysis:

During the project, multiple inefficiencies in IT asset management were identified, including:

6.1 Unauthorized Asset Access

Tested Using SQL map and manual payload insertion.

Payload Used 1' OR '1'='1 –

Impact Allowed unauthorized database access, data retrieval, and potential administrative takeover.

Mitigation Implement prepared statements, input validation, and Web Application Firewall (WAF).

6.2 Inconsistent Hardware Tracking

Tested Using Simulated delayed asset updates and missing maintenance logs.

Payload Used <script> alert ('Hardware Update Missing') </script>`

Impact Resulted in outdated inventory data, missing maintenance schedules, and potential security loopholes in asset tracking.

Mitigation Implement real-time asset updates, automated logging mechanisms, and regular audit trails.

7.0 Proof of Findings (Screenshots) :

The following sections contain proof-of-concept (PoC) evidence for inefficiencies and security issues identified in the IT Hardware Management System (ITHMS) project.

7.1 Unauthorized Asset Access due to Weak Authentication

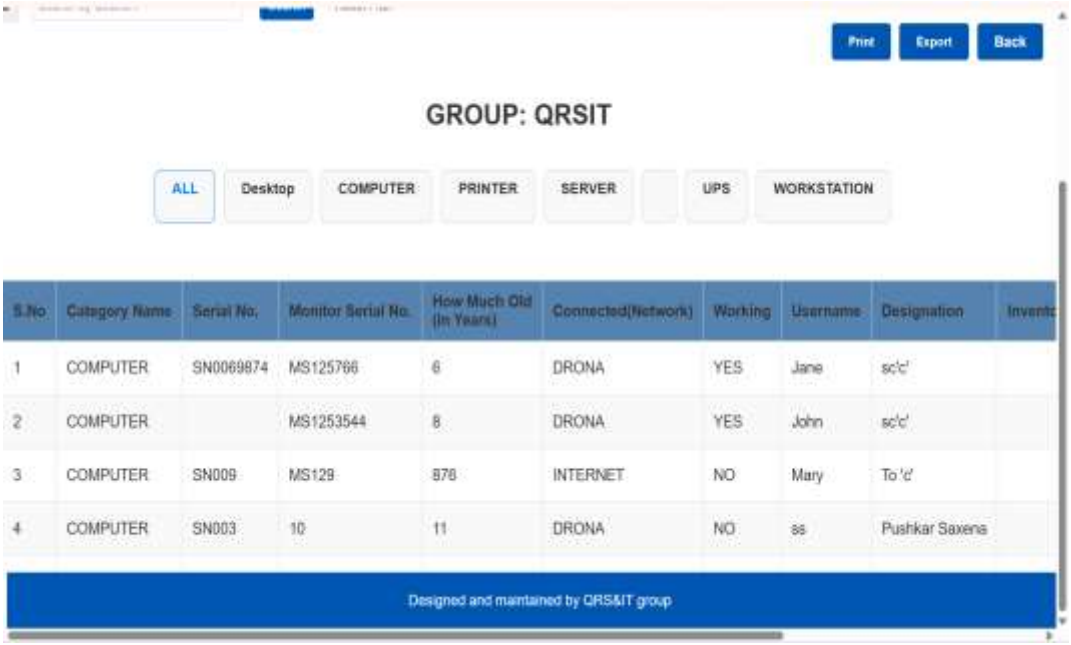
This screenshot will show the results of an unauthorized access attempt performed using credential stuffing and session hijacking techniques. The issue highlights how weak authentication measures allow attackers to gain access to IT asset records without proper authorization.

7.2 Role-Based Access Control (RBAC) Violations

This screenshot will highlight RBAC misconfigurations where employees or coordinators gained access to administrative functionalities without proper authorization. The issue demonstrates how weak permission handling and user privilege escalation can lead to unauthorized asset modifications, reassignments, or deletions.

7.3 Missing or Inconsistent Asset Maintenance Logs

This screenshot will showcase gaps in maintenance tracking, where scheduled maintenance records were missing, outdated, or duplicated. Such inconsistencies lead to hardware mismanagement, untracked repairs, and difficulty in auditing IT asset usage, affecting overall operational efficiency.



8.0 CONCLUSION:

The IT Hardware Management System (ITHMS) provides an efficient and automated approach to managing IT assets, ensuring real-time tracking, maintenance scheduling, and security compliance. By integrating role-based access control (RBAC), predictive maintenance, and automated asset logging, the system eliminates manual tracking inefficiencies and enhances the overall security of hardware resources.

ITHMS improves hardware lifecycle management by reducing downtime, preventing unauthorized modifications, and ensuring compliance with IT security policies. The system streamlines asset allocation, usage monitoring, and maintenance tracking, making IT asset management more secure, scalable, and efficient.

9.0 FUTURE WORK:

Future enhancements for the **IT Hardware Management System (ITHMS)** include:

- AI-based predictive maintenance to analyze hardware performance trends and anticipate failures before they occur.
- Cloud-based asset tracking for remote monitoring and centralized IT inventory management.
- Integration with security compliance frameworks to ensure automated auditing and regulatory adherence.

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