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ASSET MANAGEMENT SYSTEM

Rathana Sabapathy.S
Assistant Professor
Department Of Information Technology Panimalar Engineering College
Chennai, India
writesaba@gmail.com

Ugendar Raj Gajendran
Department Of Information Technology Panimalar Engineering College
Chennai, India ugendarraj2002@gmail.com

Syam Sai K G
Department Of Information Technology Panimalar Engineering College
Chennai, India
ssk152002@gmail.com

S.Yogeshwaran
Department Of Information Technology Panimalar
Engineering College
Chennai, India yogeshwaran1147@gmail.com

Abstract— **The inefficiency of asset management, loss and unauthorized usage, over- and underutilization of resources, difficulties with maintenance and services, complexity with compliance and reporting, error-prone processes, inaccurate data, and difficulties with scalabilityare all consequences of not having a centralized and automated system for tracking assets. Efficiently tracking assets via the use of QR code scanning technology is the main objective of the system. To facilitate efficient asset management and precise tracking, QR codes will be attached to every item. An intuitive interface will be provided via the web app for asset registration, information updates, and movement history tracking. Building an asset-tracking website in the cloud using the Django web framework is the proposed project here. Efficiently tracking assets via the use of QR code scanning technology is the main objective of the system. To facilitate efficient asset management and precise tracking,QR codes will be attached to every item. An intuitive interface will be provided via the web app for asset registration, information updates, and movement history tracking. With a cloud architecture, the system may be easily scaled up or down, with real-time updates and safe data storage for assets guaranteed. Safely storing the acquired asset data in the cloud enables easy access and scalability.Improving asset**

monitoring efficiency and enabling informed strategic planning will be made possible by combining Django's extensive features with Tableau analytics and QR code scanning capabilities.

***Index Terms*- QR-Code Generation, QR-Code Scanning, Django Dashboard, IoT-based asset management, IIOTCollaborations, asset maintenance, monitoring, tracking, report, and analysis.**

I. INTRODUCTION

The information technology (IT) industry in particular is facing unprecedented challenges in keeping up with the ever-changing digital world without efficient asset management. Assets, ranging from hardware components to software licenses, play a pivotal role in ensuring operational efficiency, cost-effectiveness, and regulatory compliance. However, the dynamic nature of IT environments coupled with the proliferation of diverse assets has exacerbated the challenges associated with theirmanagement. This paper delves into the intricacies of asset management systems within the IT sector, highlighting the pressing issues faced by organizations and proposing innovative solutions to mitigate these challenges. Through an exhaustive analysis of industry trends, best practices, and emerging technologies, we aim to provide valuable insights that can empower IT professionals and decision-makers to optimize asset management processes and maximize organizational performance. Multiple serious problems arise from the absence of an automated and centralized method for tracking assets:

Inefficient Asset Management:-

Organizations frequently encounter challenges when tryingto monitor assets manually or via decentralized systems, which may lead to data that are erroneous or out of current. The inefficiency causes assets to be lost, buy things twice, and not be used to their full potential.

Loss and Unauthorized Usage:-

Asset loss, theft, and unauthorized use are all made more likely in the lack of a reliable tracking system. Maintainingpeople responsible and preventing any abuse becomes more difficult in the absence of a transparent record of asset movement and utilization.

Resource Over-Allocation and Underutilization:-

Organizations run the risk of improperly allocating resources or failing to make full use of current assets if they do not have real-time insight on the availability and use of these assets. This inefficient distribution of resources may have a major influence on operating expenses and productivity.

Maintenance and Service Challenges:-

For assets to last and operate at their best, timely service and maintenance are essential. Unexpected downtime and repair expenses are common outcomes of disjointed systems that make it difficult to monitor service histories, maintenance schedules, and the timing of repairs.

Compliance and Reporting Complexity:-

Tracking, preserving, and reporting on assets is a regulatory must in many sectors. It is challenging to provide accurate and timely reports to regulatory organizations due to the lack of a consistent monitoring system, which hinders compliance efforts.

Data Accuracy and Error-Prone Processes:-

Inconsistencies, duplicate data, and inaccurate data input arecommon outcomes of paper-based systems. These mistakes have the potential to escalate into more serious issues, which in turn may affect decision-making and lead to uncertainty in asset management procedures.

Scalability Challenges:-

The difficulty of managing assets grows at an exponential rate with the size of businesses. More chaos and inefficiency in operations are the results of trying to expand traditional asset-tracking approaches.

II. EASE OF USE

A. User-friendly interface

A person without any technical knowledge may use the website because to the very user-friendly design that was created. In addition, translation tools and support for many regional languages may be included into the website in the future.

III. LITERATURE SURVEY

1. In 2020, Gupta, A., Sharma, S., and Singh, R. published a study on machine learning techniques for forecasting maintenance needs in asset management systems, aiming to boost productivity and decrease operational downtime.

2. Zhang, Y., Li, X., and wang, J. published a paper on Framework for Risk-based Asset Management in Power Systems in 2020. This Framework is designed to help power system operators and managers effectively assess and managethe risks associated with their assets. It may include methodologies for identifying, quantifying, and prioritizing risks, as well as decision-making tools for optimizing maintenance, repair, and replacement strategies.

3. A Multi-Objective Approach" by Li, W., Zhang, H., & Chen, G. (2020) likely presents methods to optimize spare parts inventory in asset management systems. It probably introduces

a multi-objective approach to balance inventory costs, stockouts, and system reliability, aiming to improve overall asset management efficiency.

4. The paper "Blockchain-Enabled Asset Management System for Supply Chain Traceability" by Wang, Q., Chen,L., & Zhang, H. (2021) likely discusses how blockchain technology can be used to create a transparent and secure system for tracking assets in supply chains. It probably coversthe design and implementation of such a system, showcasing its potential benefits such as improved traceability and reduced risks of fraud.

5. The Paper titled "Utilization of Data Analytics in Asset Management Systems for Predictive Maintenance" authored by Kim, E., Park, S., & Lee, H. (2020) presumably explores the application of data analytics techniques, such as machine learning and statistical methods, in the context of predictive maintenance for asset management systems. The

paper likely presents various instances and advantages of

predictive maintenance compared to conventional methods, to enhance operational efficiency and minimize downtime.The paper "Cloud-Based Asset Management System for Small and Medium Enterprises" by Kumar, S., Gupta, R., & Singh, A. (2020) introduces a cloud-based solution tailored for SMEs. It discusses how cloud technology offers cost-effective asset management options, including tracking, maintenance scheduling, and inventory handling. Practical examples may demonstrate its benefits in real-world SME scenarios.

IV. EXISTING SYSTEM

The following are instances of prominent asset management systems, along with the relevant literature and studies:

IBM Maximo

Maximo offers powerful features for monitoring assets from the moment they are acquired until they are finally disposed of. Asset details like as location, maintenance history, specs, and related paperwork may be centrally stored by organizations. Work orders may be efficiently created, assigned, tracked, and completed using the system. Optimizing asset performance and limiting downtime are made easier with its facilitation of preventive, predictive, and corrective maintenance actions.

Drawbacks

- Complexity and Learning Curve
- High Implementation and Licensing Costs
- Customization Challenges
- Resource Intensive

SAP Asset Intelligence Network

AIN allows for the centralized and standardized management of asset information, including technical specifications, maintenance methods, documentation, and collaboration amongst operators, service providers, and manufacturers. There are tools on the platform that can add correct and up-to-date information to asset records. Users get access to a large library of asset-related standards and material, which improves the accuracy and comprehensiveness of asset data.

Drawbacks

- Data Security and Privacy Concerns
- Customization and Flexibility Limitations
- Complexity and Learning Curve
- High Implementation and Licensing Costs

Oracle Enterprise Asset Management (EAM)

Acquiring, maintaining, and retiring assets are all covered by Oracle EAM. Organizations can maximize the value of their assets and enhance their performance with its help. Optimizing maintenance schedules and activities is made possible by Oracle EAM's usage of predictive analytics. Proactive maintenance helps reduce operating costs, improve asset dependability, and prolong asset life.

Drawbacks

- Cost of Ownership
- Customization and Flexibility Limitations
- Training and Skill Requirements
- High Implementation and Licensing Costs

Infor EAM (Enterprise Asset Management)

From initial purchase to ongoing maintenance and finally disposal or replacement, Infor EAM is there to support all stages of an asset's lifespan. As a result, businesses are able toimprove the efficiency and longevity of their assets. You can easily integrate Infor EAM with other corporate applications, third-party systems, and Internet of Things (IoT) devices thanks to its powerful integration features. The organization's data flows more freely and teamwork is easier as a result.

Drawbacks

- Cost of Ownership
- Customization and Flexibility Limitations
- Data Security and Privacy Concerns
- Maintenance Support

V. PROPOSED SYSTEM

An all-encompassing, computerized, and centralized asset monitoring system that makes use of cutting-edge technology like QR code scanning is essential for successfully tackling these issues. Organizations in a wide range of sectors will benefit from this system's enhanced asset management accuracy, efficiency, security, and compliance, which will lead to better use of resources, savings, and simplified operations. Using the Django web framework, this project suggests building an online platform for monitoring assets. Utilizing QR code scanning technology to effectively track assets is the main objective of the system. Each asset will be given a QR code, which will allow for precise tracking and simplified asset management. Asset registration, information updates, and movement history tracking will all be made easyusing the web application's user-friendly interface. The system will make use of a cloud architecture to provide easy access and scalability, guaranteeing safe storage of asset data and real-time changes. The acquired asset data will be safely stored in the cloud, making it easy to use and scale. Further, for the best asset management and decisions, it is helpful to analyze trends, use, and patterns of movement in detail. Improving asset monitoring efficiency and enabling informed strategic planning are both made possible by combining Django's comprehensive features with QR code scanning capabilities.

VI. METHODOLOGY

Asset management in the IT industry involves the systematic tracking, monitoring, and maintenance of physical and digital assets within an organization's infrastructure. The primary goal is to optimize the use of resources, ensure compliance, minimize loss or theft, and facilitate decision-making related to asset acquisition, allocation, and disposal. Here's an overview of the methodology behind an asset management system alongwith its features and associated documents.

Asset Identification and Classification

The first step involves identifying all assets within the organization, including hardware, software, licenses, and other IT resources. Assets are then classified based on various criteria such as type, ownership, location, and criticality.Asset Tracking and Inventory Management: A centralized database or asset repository is established to maintain detailed records of each asset, including its attributes, status, history, and associated documentation. Automated tools

such as barcode scanners, RFID tags, or asset tracking software are used to streamline inventory management and update asset information in real time.

Lifecycle Management

Assets undergo a lifecycle comprising acquisition, deployment, utilization, maintenance, and disposal phases. Lifecycle management involves monitoring asset performance, tracking warranty and support agreements, scheduling maintenance tasks, and retiring obsolete or redundant assets in a timely manner.

Compliance and Governance

Asset management systems enforce compliance with regulatory requirements, industry standards, and organizational policies governing asset usage, security, anddata protection. Regular audits and reporting mechanisms help ensure adherence to compliance standards and mitigate risks associated with non-compliance.Asset Procurement and Procurement Management: This aspect involves defining procurement workflows, evaluating vendor offerings, negotiating contracts, and managing purchase orders related to asset acquisition. Documenting procurement processes helps maintain transparency, control costs, and optimize procurement strategies.

Asset Security and Risk Management

Security measures such as access controls, encryption, and vulnerability assessments are implemented to safeguard assets against unauthorized access, data breaches, and cyber threats. Risk management practices help identify, assess, and mitigate risks associated with asset loss, theft, or damage.Integration and Interoperability: Asset management systems are often integrated with other IT management solutions such as service desk, inventory management, and configuration management databases (CMDBs) to facilitate data sharing, streamline workflows, and improve operational efficiency.

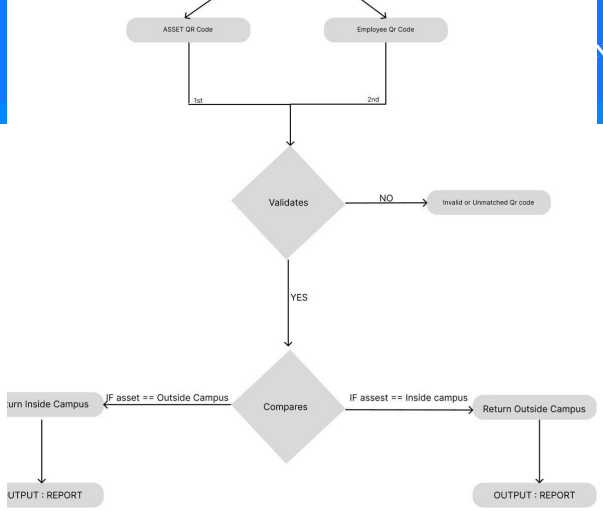


Fig (1) - Flow diagram of the execution of the System

The project necessitates the utilization of both assets as well as employees' QR codes in order to produce the output. Initially, the asset QR code is scanned, followed by the employee QR code. Subsequently, a validation check is conducted to determine if both codes are valid. An error message stating that the codes are incorrect or do not match is shown by the system if the validation fails. On the other side, if the validation passes, the system will compare the asset's state. If the asset is in use, it is reported as being outside the campus. On the other hand, if the asset is idle, itis reported as being inside the campus. All relevant detailsare stored in a dashboard, which displays the in-time and out-time of the asset. This information is used to track the device accessed by the employee, identify the user of the asset, and provide the current status of the asset.

VII. MODULE DESCRIPTION

As per the above architecture Azure psql server hosts a Postgres SQL server that is linked to a web application created using Django. The connections are established to port 5432 using global connection strings and the database user credentials. There are three different kinds of users that make up the web app:

Employees:

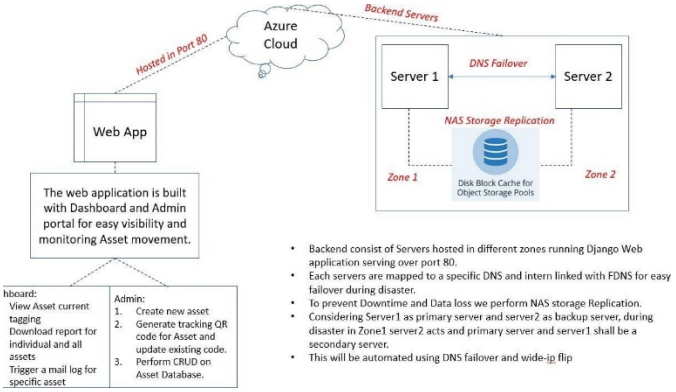
The individual who utilizes the online application to log in and inspect the asset, verify the data accuracy of the web application, and determine which devices are in use and which ones are not in order to optimize usage. Submit inaccurate information to the administrator by creating a correction request or ticket.

Admin:

The person responsible for processing employee requests to improve the web application's data accuracy via a personalized dashboard.

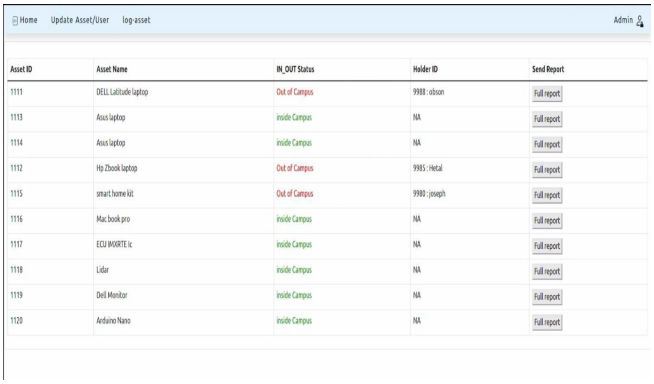
Guards:

The person responsible for ensuring that each and every employee check in and check out their assets by scanning the QR code in the Asset and ID card every time an asset is movedIN-OUT of office premises.



Fig(2)- Architecture Diagram

The online application incorporates a homepage for employees, an admin dashboard, and a check-in/check-out mechanism, all designed with these three types of users in mind.



Fig(3) - Home page

The homepage provides a comprehensive overview of all the assets, including their details and availability. Data propagation across the web is shown in the above figure.

AssetId

Represents the ID of each asset.

Asset Name

Represents corresponding asset Name.

IN_OUT_Status

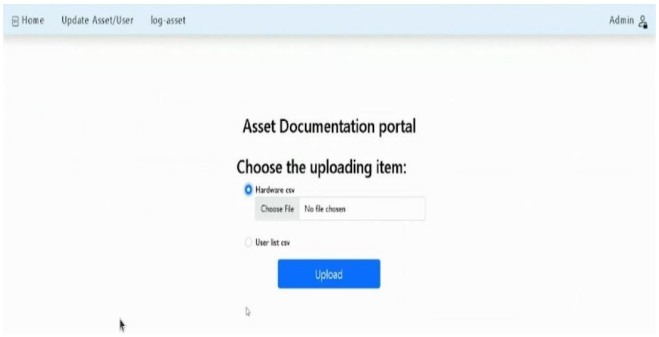
Indicates where the asset is at the moment, whether it's atthe office or with one of the coworkers.

Holder ID

In the event that the asset is deactivated, it stands in for theholder's identification.

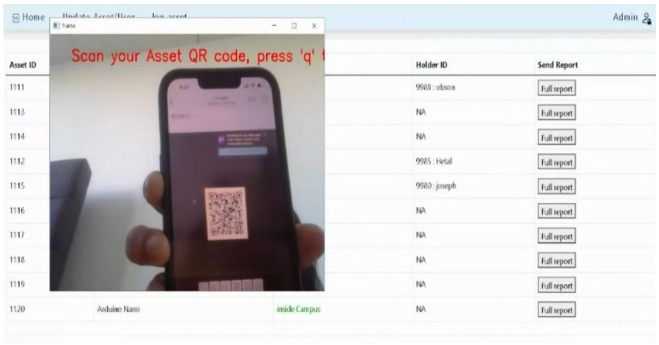
Send report

This field allows associates to see the asset log and, if necessary, download it. If necessary, the log will be delivered to the admin user's email account.



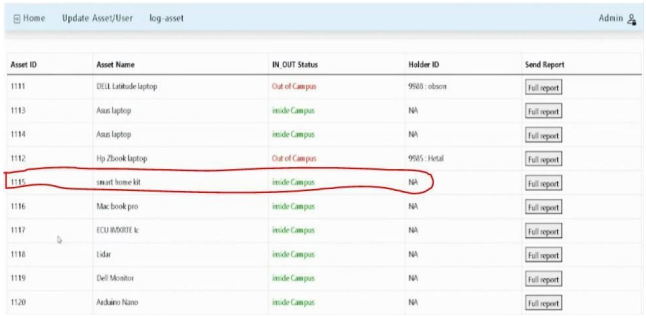
Fig(4) - Upload CSV

Admin users, such as HR and managers, may submit user and asset data in bulk using a specified CSV format using the "Update Asset/User" page. Data may be easily propagated into the backend database using this functionality.



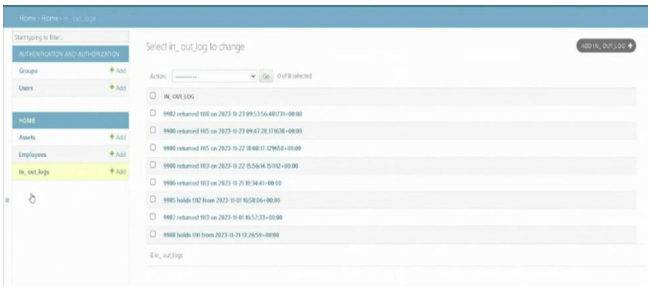
Fig(5) - Scan Asset Qrcode

Log-asset field allows guards to verify check-in and checkoutof assets when users/ Employees scan during their logging process. This works by implementing open-cv as a module and performing image processing to identify QR codes.



Fig(6) - Updated Home page after Qrcode scan

As shown in the attached screen captures, the Postgres SQL database will be instantaneously updated, and the employees will be able to check the revised information onthe home page.



Fig(7) - Admin Dashboard

The Admin Dashboard gives the ability to change and manage the backend database, as well as the ability to alter material based on employee demands in the event of a mismatch. By using Azure's fault management features, such as replication and zone-based server failover, the Postgres servers are rendered globally accessible. This enables us to assign a public DNS to each of the subservers, which are then replicated to ensure data consistency and uniqueness across all of the servers in the mesh network, which is deployed over several Azure disaster-proof zones. In the event of a failure or natural catastrophe, a switching mechanism will function, connecting all of these servers. Data loss may be mitigated in the event of a catastrophe by switching from a main server with read/write access to a secondary server with read-only access, and vice versa.

VIII. COMPONENTS

User Interface (UI):-

Users are able to engage with the asset management systemvia the user interface, which serves as the system's front end. Components include screens for asset registration, information updates, and log history.

QR Code Scanning Module:-

This component makes it easy to create and read QR codes for all of an asset's related information. I am in charge of registering assets and deciphering QR codes when they are detected.

Asset Database:-

The ability to save detailed information on all assets in one place. The data is stored securely and may be retrieved andupdated with ease.

Cloud Infrastructure:-

A cloud platform hosts the whole system, allowing for scalability, accessibility, and real-time upgrades. This system can handle different types of workloads and keeps data secure.

XI. SCOPE AND FUTURE ENHANCEMENT

Efficiently managing and monitoring organizational assets isa major difficulty for many sectors and organizations in today's fast-paced and unpredictable business climate.An all-encompassing, computerized, and centralized asset monitoring system that makes use of cutting-edge technology like QR code scanning is essential for successfully tackling these issues.Organizations in a wide range of sectors will benefit from this system's enhanced asset management accuracy, efficiency, security, and compliance, which will lead to better use of resources, savings, and simplified operations. The system will facilitate the identification, classification, and real-time tracking of all IT assets within the organization, including hardware, software, and licenses.It will support the entire lifecycle of assets, from acquisition to disposal, by managing maintenance schedules, warranty tracking, and retirement processes efficiently. Ensuring compliance with regulations and organizational policies, the system will implement security measures to protect assets from unauthorized access, data breaches, and other risks, while also providing audit trails for accountability.

X. CONCLUSION

In today's dynamic business environment, the need for efficient asset management has never been more critical. Problems including inefficiency, loss, illegal use, and compliance complications arise in the lack of a centralized and automated system. In response to these concerns, we provide a cutting-edge asset management system that makes use of QR code scanning technology. Built on top of the Django web framework, this cutting-edge system guarantees improved security, efficiency, and precision while monitoringassets. The system's flexibility is enhanced by the developments in the Software Development Life Cycle (SDLC), such as Agile methodology, DevOps practices, and the incorporation of AI. Django, Postgres SQL, Python, Nginx, Gunicorn, Azure cloud, and NAS storage replication are all components of the suggested technological design. Theultimate goal of this project is to facilitate better strategic decision-making and operational efficiency by facilitating thesmooth management of assets in the future. In addition to resolving existing issues, the proposed system represents a sea change in how assets are monitored and put to use, which is a huge step forward for asset management in organizations.

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