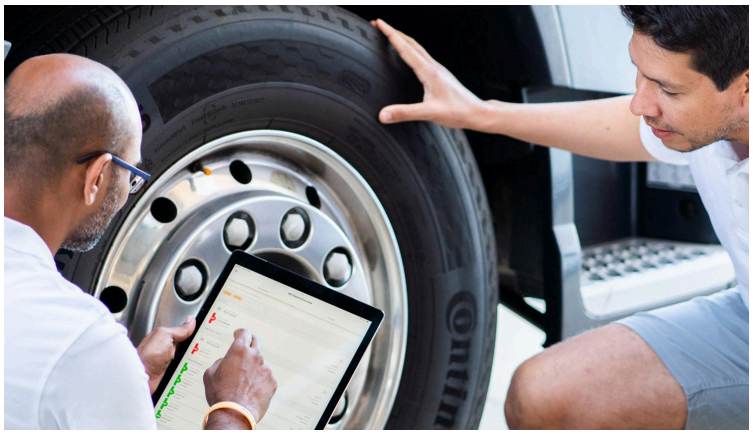
General Sir John Kotelawala Defence University
Faculty of Computing
Department of Computer Science

Project Proposal

TireOptiTrack
(Streamlining Tire Management for Pavara Traders and Services)

Digital Tire Management and Monitoring System



Group Project in Software Development - CS2993

By Group 11

Intake 40

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1. Introduction to the Organization

- Pavara Traders and Services specialize in the maintenance and repair of harbor vehicles and machinery, with a specific focus on their operations at SAGT in the Port of Colombo. Their expertise extends to the meticulous upkeep of a diverse fleet, including trucks, forklifts, and specialized machinery crucial for efficient harbor operations.
- Playing an integral role in ensuring the smooth flow of goods at SAGT, Pavara operates as a subcontractor, maintaining close collaboration with SAGT management entities. This collaborative approach allows them to align their services with harbor management standards, contributing directly to the seamless goods flow within the Port of Colombo.
- Committed to delivering quality services, Pavara is recognized as a key player in the maintenance and repair industry. Their prominence in the sector is a testament to their specialized services, reliability, and crucial contributions to the optimal functioning of harbor machinery..

2. Current System Overview

Manual Logbooks:

- Pavara relies on traditional, physical logbooks rather than digital systems or databases for managing tire-related information.

Crucial Details Recorded:

- The manual recording process involves capturing key details essential for tire management:
    - Tire Pressure: The air pressure within each tire.
    - Tread Depth Gauge Readings: Measurements of the depth of tire treads.
    - Kilometers Traveled: The distance covered by each vehicle or machinery.
    - Serial Numbers: Unique identifiers associated with each tire.

Association with Vehicles:

- Each piece of recorded information is intricately linked to specific vehicles and machinery within Pavara's care.

Physical Documentation:

- Instead of utilizing digital databases or software, the recorded details are physically documented on pages within the logbooks.

Changes and Rebounds:

- Any modifications, replacements, or rebounds of tires are manually noted within the same physical logbooks. This includes recording the date and details of the changes made.

This manual system, though traditional, presents challenges in terms of efficiency, accessibility, and scalability, highlighting the need for a more advanced tire management solution.

3. Problems and Limitations

Manual Data Entry Errors:

- The reliance on manual processes exposes the system to potential errors in tire-related data recording.
- Human errors during data entry may lead to inaccuracies in order quantities and other crucial information.

Time-Consuming Processes:

- The manual recording of tire-related data is inherently time-consuming.

Cumbersome Historical Data Retrieval:

- Retrieving historical tire data from manual records becomes a cumbersome task.
- Inefficiencies in accessing past data hinder efficient analysis, impacting decision-making processes.

Dependency on Paper-Based Records:

- The entire process relies heavily on paper-based records for tracking tire-related information.
- The dependency on physical documents introduces the potential for data loss, damage, or misplacement.

Limited Scalability:

- As the client company grows or expands its product offerings, the manual data collection process becomes increasingly difficult to scale efficiently.
- Adding more products or shops may exacerbate existing inefficiencies.

Data Accessibility Challenges:

- Storing data on paper or in isolated systems makes it challenging for the client company to access and analyze data quickly.
- Lack of real-time data accessibility hampers swift decision-making processes.

Lack of Transparency and Accountability:

- The manual process may lack transparency in data collection and accountability for errors.
- Difficulty in tracking who collected the data and when makes it challenging to resolve disputes or

discrepancies.

Inefficiency in Processes:

- The manual process is inefficient in terms of both time and resources.
- Missed opportunities for cost savings and improved operational efficiency may result from these inefficiencies.

Data Security Concerns:

- Paper-based systems are vulnerable to physical damage, loss, or theft.
- This vulnerability poses a risk of data security breaches, compromising sensitive information.

Impact on Customer Experience:

- Delays and inaccuracies in order processing can negatively impact the overall customer experience.
- Customers may receive incorrect orders or experience longer delivery times.

Limited Data Analysis Opportunities:

- Without a digital database and reporting system, the client company may miss valuable insights from order data.

4. Proposal of the New System

Digitized Data Entry:

- Digital system for tire-related data entry to reduce the risk of human errors.
- Introduce digital interfaces and tools that enable accurate and efficient recording of tire data.

Streamlined Processes:

- Develop streamlined processes for recording tire-related information, reducing the inherent time-consuming nature of manual recording.
- Utilize digital tools to expedite data entry and processing.

Digital Archives for Historical Data:

- Transition to a digital archival system for storing historical tire data.
- Implement a database that allows for easy retrieval and analysis of past tire-related information.

Digital Tracking and Management:

- Move away from paper-based records and adopt a digital tracking and management system for tire-related information.
- Ensure real-time updates and data synchronization for improved accessibility and accuracy.

Scalable Digital System:

- Develop a scalable digital system that accommodates the client company's growth and expansion.
- Ensure the system can efficiently handle an increased volume of products, shops, and data points.

Real-time Data Accessibility:

- Implement a digital database that provides real-time accessibility to tire-related data.
- Enable quick retrieval and analysis, facilitating swift decision-making processes.

Enhanced Transparency:

- Introduce transparency features in the digital system, tracking data collection activities and ensuring accountability.
- Implement digital signatures or timestamps to identify the origin and timing of data collection.

Optimized Processes:

- Streamline processes within the digital system to eliminate inefficiencies.
- Optimize workflows to enhance operational efficiency, reducing time and resource requirements.

Robust Data Security Measures:

- Implement robust security measures for the digital system, ensuring protection against data breaches.
- Use encryption, access controls, and regular audits to safeguard sensitive information.

Improved Customer Interaction:

- Enhance customer interaction through digital systems, providing accurate and timely information on order processing.
- Implement notification systems to keep customers informed and improve overall satisfaction.

Advanced Data Analysis Tools:

- Integrate advanced data analysis tools within the digital system to extract valuable insights.
- Utilize analytics for sales trends, demand forecasting, and inventory management.

Implementing these solutions will not only address the current problems and limitations but also pave the way for a more efficient, scalable, and secure tire management system for the client company.

5. Work Distribution

To ensure the effective development and implementation of the desktop-based Web Application for Tire Management, roles and responsibilities have been assigned to each team member based on their skills and expertise.

T. S. S. Thilakarathna (D / BSE / 23 / 0015):

- **Role:** UI/UX Designer
- **Responsibilities:**
    - Designing the user interface and experience tailored for desktop use.
    - Creating wireframes and prototypes for user testing.
    - Collaborating with the development team for a cohesive design.

R. M. J. Jayashan (D / BCE / 23 / 0009):

- **Role:** UI/UX Designer
- **Responsibilities:**
    - Designing the user interface and experience tailored for desktop use.
    - Creating wireframes and prototypes for user testing.
    - Collaborating with the development team for a cohesive design.

N. T. P. G. B. Upethra (D / BCS / 23 / 0021):

- **Role:** Database Administrator
- **Responsibilities:**
    - Design and management of the database structure.
    - Ensuring data integrity and security.
    - Collaborating with developers for efficient data handling.

B. U. Senanayaka (D / BCS / 23 / 0018):

- **Role:** Database Administrator
- **Responsibilities:**
    - Design and management of the database structure.
    - Ensuring data integrity and security.
    - Collaborating with developers for efficient data handling.

E. H. M. Diouf (6730):

- **Role:** Quality Assurance Tester
- **Responsibilities:**
    - Developing and executing test cases to ensure the software's functionality on desktop platforms.
    - Identifying and documenting bugs and issues.
    - Collaborating with developers to resolve identified problems.

This structured work distribution aims to optimize the team's collective skills, ensuring smooth collaboration and efficient progress throughout the various stages of the desktop-based Web Application development. Regular communication will be maintained to address any challenges and maintain project momentum.

6. Benefits of Implementation:

The implementation of the Tire Management Software is poised to bring about a significant transformation for Pavara Traders and Services. This advanced software solution is set to revolutionize the way the company manages tire-related data, promising a host of advantages that will positively impact their operational efficiency and overall business dynamics. By the implementation of this system, the client gets benefits as below.

Enhanced Accuracy and Efficiency:

- The software ensures an unparalleled level of accuracy in recording tire-related data, mitigating the risk of errors inherent in manual processes. This heightened accuracy is coupled with a newfound efficiency, streamlining formerly labor-intensive tasks and significantly reducing the time required for tire data management.

Real-time Monitoring for Proactive Maintenance:

- A cornerstone of the software's functionality lies in its real-time monitoring capabilities. This feature empowers Pavara to proactively address maintenance needs promptly, curbing potential issues before they escalate. The ability to monitor tire conditions in real-time represents a paradigm shift in Pavara's maintenance strategies.

Quick Retrieval of Historical Tire Data:

- Say goodbye to cumbersome historical data retrieval. The software introduces a digital archival system that allows for the swift retrieval of historical tire data. This not only expedites analysis processes but also facilitates informed decision-making based on a comprehensive understanding of past tire-related information.

Reduced Dependency on Manual Processes:

- By diminishing reliance on error-prone manual record-keeping, the software mitigates the risk of inaccuracies in tire-related information. This reduction in dependency is a crucial step towards a more reliable and secure tire data management system.

Enhanced Data Accessibility:

- Swift and secure access to tire-related data is a hallmark of the software. This feature empowers decision-makers with timely information, contributing to more informed choices in the day-to-day operations of Pavara Traders and Services.

Streamlined Workflows:

- A departure from cumbersome manual processes, the software streamlines tire data management workflows. This not only eliminates inefficiencies but also fosters a more cohesive and synchronized approach to tire-related information handling.

In essence, the Tire Management Software stands as a catalyst for positive change within Pavara Traders and Services, promising a future where tire data is managed with unprecedented accuracy, efficiency, and agility. The anticipated benefits extend beyond mere operational enhancements, shaping Pavara as an industry frontrunner in the realm of maintenance and repair solutions.

7. Hardware and Software Equipment:

Development Environment:

- **Hardware:**
  - Workstations with recommended specifications for developers with sufficient RAM and processing power.
  - Version control server (e.g., Git server) to manage source code repositories.
- **Software:**
  - Integrated Development Environment (IDE) such as IntelliJ IDEA for Java development.
  - Version control tools like Git for collaborative development.
  - Collaboration platforms (e.g., Slack, Microsoft Teams) for team communication.
  - Project management tools (e.g., Jira, Trello) for tracking tasks and milestones.

Database Management:

- **Hardware:**
  - Database server with ample storage and memory capacity.
- **Software:**
  - Relational Database Management System (RDBMS) like MySQL or PostgreSQL.
  - Database administration tools for monitoring and managing the database.

Server Infrastructure:

- **Hardware:**
  - Physical servers or cloud-based infrastructure for hosting the production system.
- **Software:**
  - Deployment tools (e.g., Docker, Kubernetes) for containerization and orchestration.
  - Web server software (e.g., Apache, Nginx) to handle HTTP requests.

Backup and Recovery:

- **Hardware:**
  - Backup storage devices.
- **Software:**
  - Automated backup solutions for databases and application data.

- Disaster recovery plans and procedures.

Monitoring and Logging:

- **Software:**
  - Monitoring tools (e.g., Prometheus, Grafana) for tracking system performance.
  - Logging tools (e.g., ELK stack - Elasticsearch, Logstash, Kibana) for analyzing application logs.

Development and Deployment Pipeline:

- **Software:**
  - Continuous Integration/Continuous Deployment (CI/CD) tools (e.g., Jenkins, GitLab CI).
  - Automated testing frameworks (e.g., JUnit, Jest) for ensuring code quality.

Documentation:

- **Software:**
  - Documentation tools for creating and maintaining project documentation.

Target Platform for Production:

- The production system should be designed to run seamlessly on Pavara's existing infrastructure, whether it is on-premises servers or a cloud platform.

- Consideration for scalability, load balancing, and high availability should be taken into account based on the anticipated usage of the Tire Management Software.

These hardware and software recommendations aim to provide a robust and secure environment for the development, deployment, and operation of the Tire Management Software. It's essential to tailor the infrastructure to Pavara's specific needs and consider future scalability requirements.

8. Cost/Benefit Study:

Licensing Fees:

- Investments in software licenses are crucial for the development and functionality of the Tire Management Software. This includes licenses for essential development tools, databases, and any third-party components that enhance the application's capabilities. Accurate budgeting for licensing fees ensures legal compliance and optimal use of software resources.

Infrastructure Setup:

- Creating the right technological environment is a fundamental aspect of the project. Costs associated with infrastructure setup cover the establishment of servers, deployment tools, and the necessary hardware and software framework. A robust infrastructure is the backbone of the application, ensuring stability, reliability, and scalability.

Cloud Server Expenses:

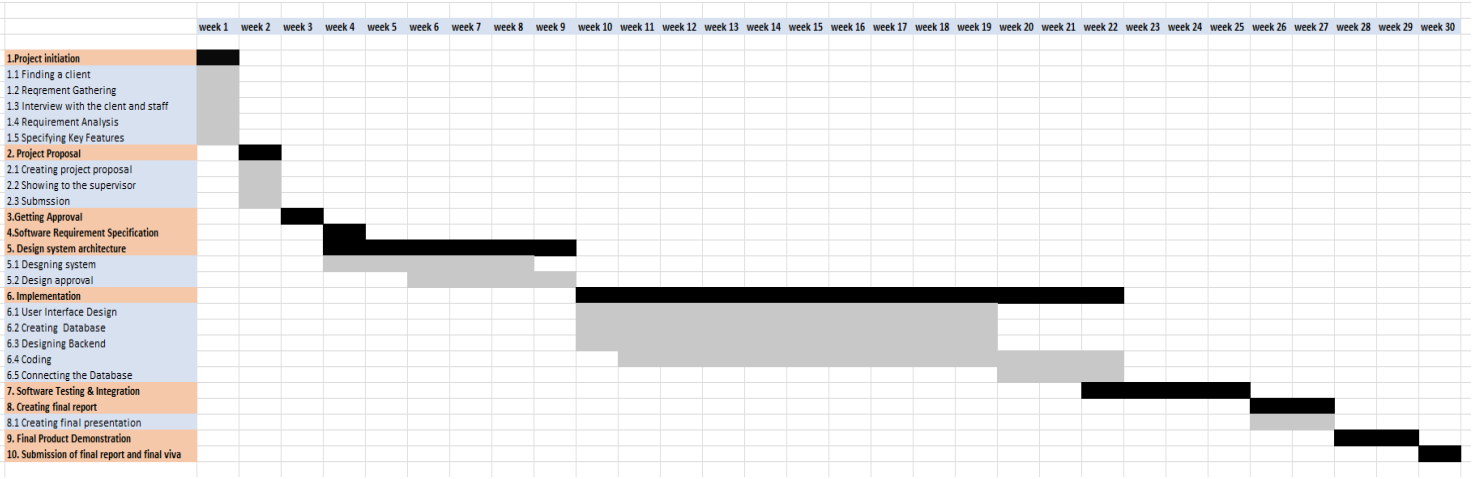
- Utilizing cloud servers offers flexibility, scalability, and accessibility. Cloud server expenses encompass monthly or annual payments, considering factors such as storage, bandwidth, and computing resources. This approach allows Pavara Traders and Services to efficiently manage data, provide seamless user experiences, and adapt to changing operational demands.

Miscellaneous Expenses:

- In any development project, unforeseen or miscellaneous expenses may arise. These could include unexpected software requirements, additional training needs, or unanticipated challenges during the development process. Allocating a budget for miscellaneous expenses ensures flexibility in adapting to evolving project dynamics without compromising quality.

These identified costs collectively form a comprehensive financial plan for the development and implementation of the Tire Management Software. Careful consideration and allocation of resources in these categories contribute to the success and sustainability of the project.

9. Gantt Chart:



10. Conclusion:

- Proposal Summary: This document presents a plan for developing a user-friendly Tire Management Software tailored for Pavara Traders and Services, accessible through the web.
- Purpose: The software targets the challenges of manual tire data handling, with the goal of improving accuracy and efficiency in tire management processes.
- Digital Transformation: The move to a digital platform offers benefits such as enhanced accessibility, real-time monitoring, and streamlined data management.
- Benefits: Anticipated advantages include improved tire management efficiency, operational effectiveness, and a shift towards innovative practices.
- Game-Changer: The web-based application is envisioned as a transformative tool, poised to revolutionize how Pavara manages tires and positions itself within the industry.
- Current Issues Resolution: Beyond resolving current challenges, the digital solution positions Pavara as an industry innovator in effective tire management within the maintenance and repair sector

11. Group Members

Group	Student Number	Student Name
11	6730	E. H. M. Diouf
	D / BSE / 23 / 0015	T. S. S. Thilakarathna
	D / BCE / 23 / 0009	R. M. J. Jayashan
	D / BCS / 23 / 0021	N. T. P. G. B. Upethra
	D / BCS / 23 / 0018	B. U. Senanayaka
Intake	**40**	