Project plan

Advancing Tire Procurement with Data Insights
Truck Support / Venlo

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PROJECT ASSIGNMENT

CONTEXT

TRUCK SUPPORT Venlo stands as your dependable ally for the upkeep and restoration of trucks and trailers, including damage repair. Alongside their specialized tire service, TIRE SUPPORT Venlo, they provide a comprehensive maintenance solution encompassing trucks, trailers, and tires.

The main problem is the lack of effective tools specifically designed for the analysis of truck tires,especially compared to the car tire sector, which benefits from advanced and diverse tools. This situation poses both a problem and an opportunity for Truck Support and its warehouse managers.

Currently, they face limitations due to the lack of a custom system that meets the unique needs oftruck tires. Current tire comparison market solutions largely focus on car tires and do not adequately cover truck tires, especially when it comes to historical price trends and an extensive range of supplier options. This gap in the market impacts Truck Support's ability to make informed and strategic decisions regarding tire purchasing, impacting operational efficiency and cost-effectiveness.

GOAL OF THE PROJECT

The primary goal of this project is to simplify the tire buying process for warehouse managers, making it more efficient and cost-effective. By providing a comprehensive comparison of suppliers and actionable buying advice, the software will help managers ensure they are purchasing high-quality tires at the best possible prices. This, in turn, will enhance their operational efficiency and contribute to overall cost savings for their warehouses.

THE ASSIGNMENT

The aim is to develop a straightforward software tool for warehouse managers, focusing on tire purchases. This tool simplifies the process of comparing tire prices and quality from various suppliers, ensuring users can find the best deals efficiently. It's designed for warehouse managers looking to optimize their purchasing strategy, save money, and maintain quality. The main challenge is creating a user-friendly application that provides up-to-date comparisons and integrates seamlessly with existing systems, making the procurement process smoother and more cost-effective.

SCOPE

The project includes:		The project does not include:	
1	Making a Markt research	1	The application will focus exclusively on tires and will not support the procurement of other types of goods or services.
2	Making Scalable application	2	It will not facilitate direct negotiations or transactions between warehouse managers and suppliers.
3	Develop Scraping bots	3	The application will focus on suppliers within a specific region or country and may not include global market data.

CONDITIONS OF THE PROJECT

- o   Research paper.
- o   Application Architecture
- o   A working application and with a demo
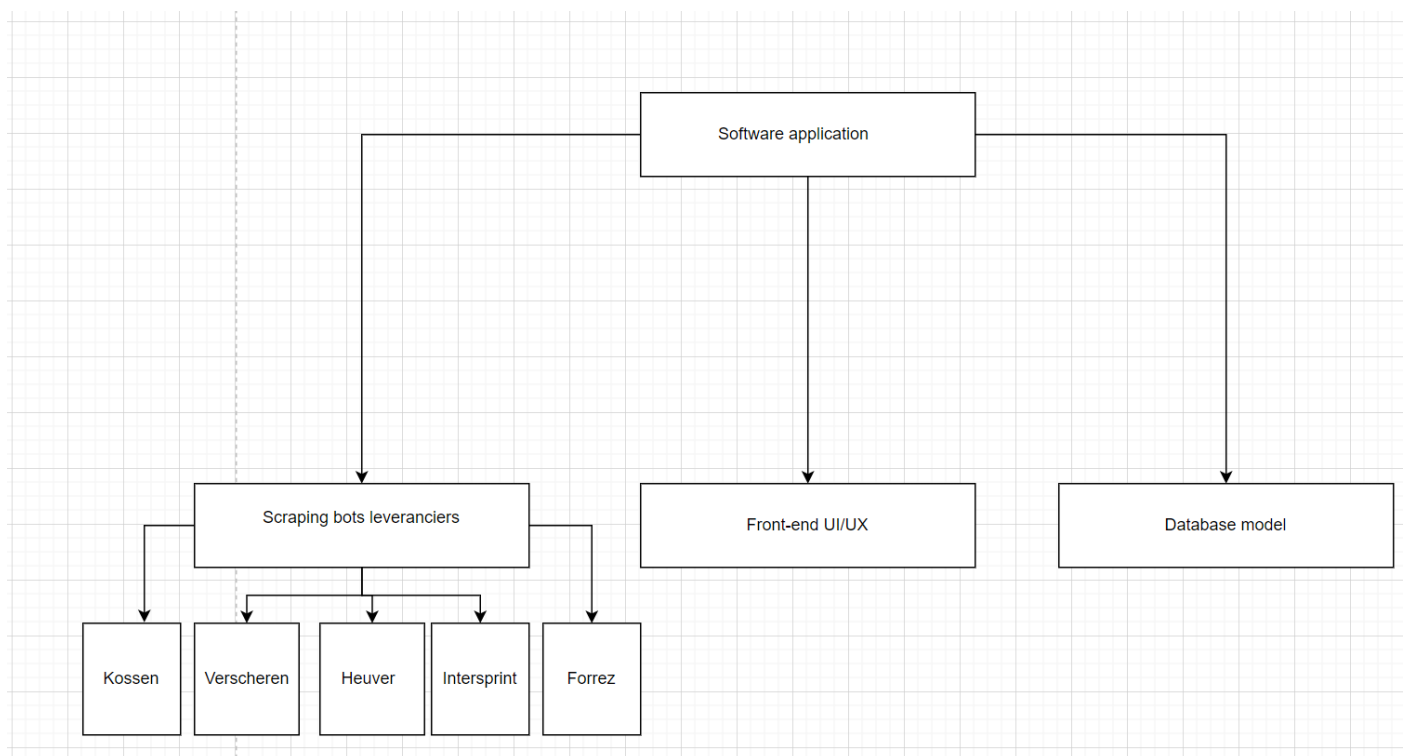- o   The possibility to ask for technical help when needed.

RESEARSH QUESTIONS

MAIN QUESTION

How can a comprehensive and user-friendly dashboard be developed to efficiently aggregate, display, and analyze truck tire price data from diverse sources, thereby facilitating cost-effective purchasing decisions for Truck Support Venlo?

SUB QUESTIONS

- o   What are the most effective methods for collecting truck tire price data from different sources, including websites, emails, and supplier databases, while ensuring data accuracy and timeliness?
- o   How can data integration challenges be overcome when dealing with various data formats and access restrictions from different tire suppliers?
- o   What web scraping techniques are most effective for extracting tire price data without compromising the quality and reliability of the data?
- o   In what situations is it legally and ethically permissible to scrape data, and how can these guidelines be applied when collecting tire price data?
- o   How can the overall architecture, including database design, be optimized to efficiently store and manage collected tire price data and ensure that the data can be retrieved quickly, and the system remains scalable?
- o   Which technologies and frameworks are best suited for developing an interactive and intuitive dashboard that meets the specific needs of Truck Support Venlo's warehouse managers?

APPROACH AND PLANNING

PROJECT MANAGEMENT AND DEVELOPMENT APPROACH

In managing and developing this project, I will adopt an Agile ScrumBan methodology. This approach combines the structured elements of Scrum with the flexibility of Kanban, allowing me to dynamically adapt my planning and execution processes to the evolving needs of the project. Below, I detail how the project phases align with my Agile ScrumBan approach:

Requirements Gathering and Continuous Refinement

Continuous Prioritization: At the heart of my Agile ScrumBan approach is the maintenance of a continuously prioritized Product Backlog. This backlog is my living document, evolving with the project as I gather requirements by engaging potential users and conducting market research. Understanding the needs and challenges of warehouse managers in purchasing tires will be my initial focus, with the flexibility to refine these requirements as I gain new insights.

Design and System Evolution

Flexible System Design: Design is an integral part of my iterative process, starting before the initial implementation cycle and continuously evolving. While I outline the system architecture, user interface, and other critical components early on, I remain open to redesigning elements based on user feedback and changing requirements. This phase is not fixed but evolves alongside my project, ensuring that my solution remains relevant and user centric.

Implementation in Cycles (Execution)

Iterative Development: My development process will proceed in cycles, akin to Scrum sprints but with the flexibility offered by Kanban to adjust the flow and priorities as needed. This allows for incremental building and refinement of functionalities, ensuring that my product development is both efficient and adaptable. Each cycle focuses on executing a set of prioritized tasks from the Product Backlog, with me dynamically responding to the project's needs.

Continuous Testing

Parallel Quality Assurance: Testing is an ongoing activity that runs in parallel with my development cycles. This continuous testing strategy ensures that any issues are identified and addressed promptly, maintaining the software's stability and functionality. It allows me to adapt quickly to any changes without compromising on quality.

Deployment and Feedback Loop

Staged Deployment and Iterative Improvement: The deployment of my software will be conducted in stages or as a complete release, depending on the feedback received and the project's readiness. This phased approach allows me to gather initial user feedback, which is crucial for the subsequent refinement of my product. The feedback loop is a critical component of my Agile ScrumBan methodology, informing further development and ensuring that my product meets the evolving needs of my users.

Project Management Tool: Notion

To support my Agile ScrumBan methodology, I will use Notion as my project management tool. Notion provides the versatility to organize my work, collaborate effectively, and maintain visibility across all tasks. Additionally, I will conduct weekly stand-ups to review achievements and plan for the upcoming week, ensuring I remain aligned and focused.

Sub question	Strategy	Products	Methods
What are the most effective methods for collecting truck tire price data from different sources, including websites, emails, and supplier databases, while ensuring data accuracy and timeliness?	• Library • Field	Library: 1- Literature study 2- Expert Interview Field: 1- Observation 2- Interview	I'm conducting a literature review to understand current methods and supplementing this with expert interviews. These experts have deep knowledge of data collection in the tire industry, and their insights will help shape our approach.
How can data integration challenges be overcome when dealing with various data formats and access restrictions from different tire suppliers?	• Library • Showroom	Library: 1- Analysis of Design Patterns Showroom: 1. Ethical Checks	By studying proven design patterns and performing compliance checks, I'm ensuring our data integration handles different formats and supplier restrictions while adhering to ethical standards.
What web scraping techniques are most effective for extracting tire price data without compromising the quality and reliability of the data?	• Library • Lab	Library: 1- SWOT Analysis Lab: 1- Data Analytics	A SWOT analysis will help select the right tools for web scraping, focusing on data quality and tool usability. It's crucial that the data we collect is reliable and the tools are easy to use.
In what situations is it legally and ethically permissible to scrape data, and how can these guidelines be applied when collecting tire price data?	• Field	Field 1- document analysis.	I'm developing a clear framework for web scraping that's legally sound and ethically responsible.
How can the overall architecture, including database design, be optimized to efficiently store and manage collected tire price data and ensure that the data can be retrieved quickly, and the system remains scalable?	• Workshop • Lab	Workshop: 1- IT Architecture Sketching 2- Prototyping	I will develop a prototype and discuss it with the stakeholders to determine the necessary data.
Which technologies and frameworks are best suited for developing an interactive and intuitive dashboard that meets the specific needs of Truck Support Venlo's warehouse managers?	• Field • Workshop	Field: 1- Stakeholder analysis Workshop: 1- Multi-criteria Decision Making	I'm reviewing various technologies to create a dashboard that's tailored to our warehouse managers' needs. By prioritizing requirements in workshops, I'm ensuring the final product is user-friendly and functional.

LEARNING OUTCOMES

LEARNING OUTCOME 1: PROFESSIONAL DUTIES

I will implement a comprehensive software development lifecycle for my application, ensuring it meets industry standards for quality, security, and reliability. I will also carry out peer reviews and use automated testing tools to ensure code quality.

LEARNING OUTCOME 2: SITUATION-ORIENTATION

I will conduct market analysis through stakeholder interviews to understand the current challenges in tire procurement. I will use this information to design application features that address these issues directly.

LEARNING OUTCOME 3: FUTURE-ORIENTED ORGANISATION

I will incorporate sustainable and ethical considerations into the application's design, recommending tires that last longer or are made from sustainable materials. I will consider the business benefits of adopting my solution, such as cost savings and supply chain improvements.

LEARNING OUTCOME 4: INVESTIGATIVE PROBLEM SOLVING

 I will identify and evaluate potential data sources for tire information for their reliability and completeness. Then, I will develop algorithms to analyse this data, providing actionable insights for users.

LEARNING OUTCOME 5: PERSONAL LEADERSHIP

I will set personal goals related to learning new technologies or methodologies critical to my project's success.

LEARNING OUTCOME 6: TARGETED INTERACTION

I will develop a plan for engaging stakeholders, identifying key partners such as tire suppliers and logistics companies. I will organize regular updates or presentations to collect feedback and ensure my project meets their needs.

DIVISION OF THE PROJECT

PLANNING

In the initial stage, I establish clear objectives and outline the necessary actions, budget, and resources. This ensures a structured approach moving forward.

RESEARCH AND ANALYSIS

Next, I examine current practices in tire purchasing to identify areas for improvement. This involves engaging with potential app users and investigating the latest technological solutions relevant to our objectives.

DEVELOPMENT

I proceed to create the application, prioritizing ease of use. Additionally, I develop a system for gathering and analysing tire-related data, incorporating advanced technology to offer purchasing recommendations.

TESTING

Prior to release, the app undergoes comprehensive testing to confirm its usability, security, and ability to manage extensive data effectively.

IMPLEMENTATION

The app is then integrated with existing warehouse management systems, and I ensure that user guides and support are readily available for a smooth transition.

EVALUATION AND MAINTENANCE

Following the launch, I commit to ongoing enhancements based on user feedback, performance analytics, and technological advancements, ensuring the app remains valuable and up-to-date.

TIME PLAN

Fase	Effort	Start	Ready
1 Domain understanding		20-02-2024	
2 Project Plan		01-03-2024	
3 Prototyping		18-03-2024	
4 Implementation		01-04-2024	
5 Deployment end Maintenance		20-05-2024	

TOOLS

DATABASE

Type: Relational

Requirement:

1- Open Source
2- Scalable
3- High performance'

Possible choices:

1- **MySQL**
2- **PostgreSQL**

BACKEND

Programming language : Python

Libraries:

1- Beautiful Soup
2- Scrapy
3- Selenium
4- PyQuery
5- Pandas

FRONTEND

Framework: React

AI- Implementation tool: Builder.io

CI/CD PIPELINE

GitLab CI/CD: Provides a well-integrated solution with GitLab's repository management system, offering a seamless experience for CI/CD pipelines within the GitLab ecosystem.

For this project, integrating Docker is not just a technological choice; it is a strategic move to improve our workflows around development, testing and deployment. By deploying Docker, we address one of the most common problems in software development: inconsistent environments between development, testing, and production. With Docker we containerize our application, which ensures a uniform environment that runs the same everywhere.

The Plan in Action

Containerization: I start by containerizing the frontend and backend. This involves writing Docker files that specify our environment and dependencies, followed by creating Docker images that we store in a secure registry.

Local Development: Docker will be a core part of our local development environments. As a result, we all work in environments that closely mimic the production environment, minimizing unexpected issues.

CI/CD Integration: Docker integrates into our CI/CD pipelines, allowing automated containerized testing. After each successful test, an updated Docker image is stored in our registry.

Easy Deployment: Our Dockerized app makes deployment a breeze, whether we use AWS ECS, Google Cloud Run or Azure Container Instances. This enables rapid rollout and ensures that we can scale up easily.

I'll incorporate a centralized web scraping bot within our project to automate the collection of supplier data weekly. This bot will be structured as a single Python project, housing individual scripts tailored to each supplier's website. Leveraging Docker and CI/CD pipelines, we ensure a scalable, manageable, and consistent execution environment.

Implementation

Python Project: A unified project contains scripts for each supplier, utilizing libraries like BeautifulSoup or Scrapy for scraping.

Configurable Scripts: Scripts are configured via external files or a database, detailing URLs, data fields, and selectors for flexibility.

Docker Integration:

Each bot is containerized with Docker, encapsulating its environment and dependencies. This ensures that the bot operates consistently across development, testing, and production environments.

Docker images are built for the scraping bot, versioned, and stored in a Docker registry.

CI/CD Pipeline:

Automated Deployment: Changes in the bot's code trigger the CI/CD pipeline, automatically building a new Docker image and deploying it.

Scheduled Execution: The pipeline schedules the bot to run weekly, utilizing tools like cron jobs within the Docker container or Kubernetes cron jobs for orchestration.

Maintenance and Scaling:

Logs and errors are captured systematically for monitoring and debugging.

New suppliers can be added by creating additional scripts and updating the configuration, without altering the existing infrastructure.
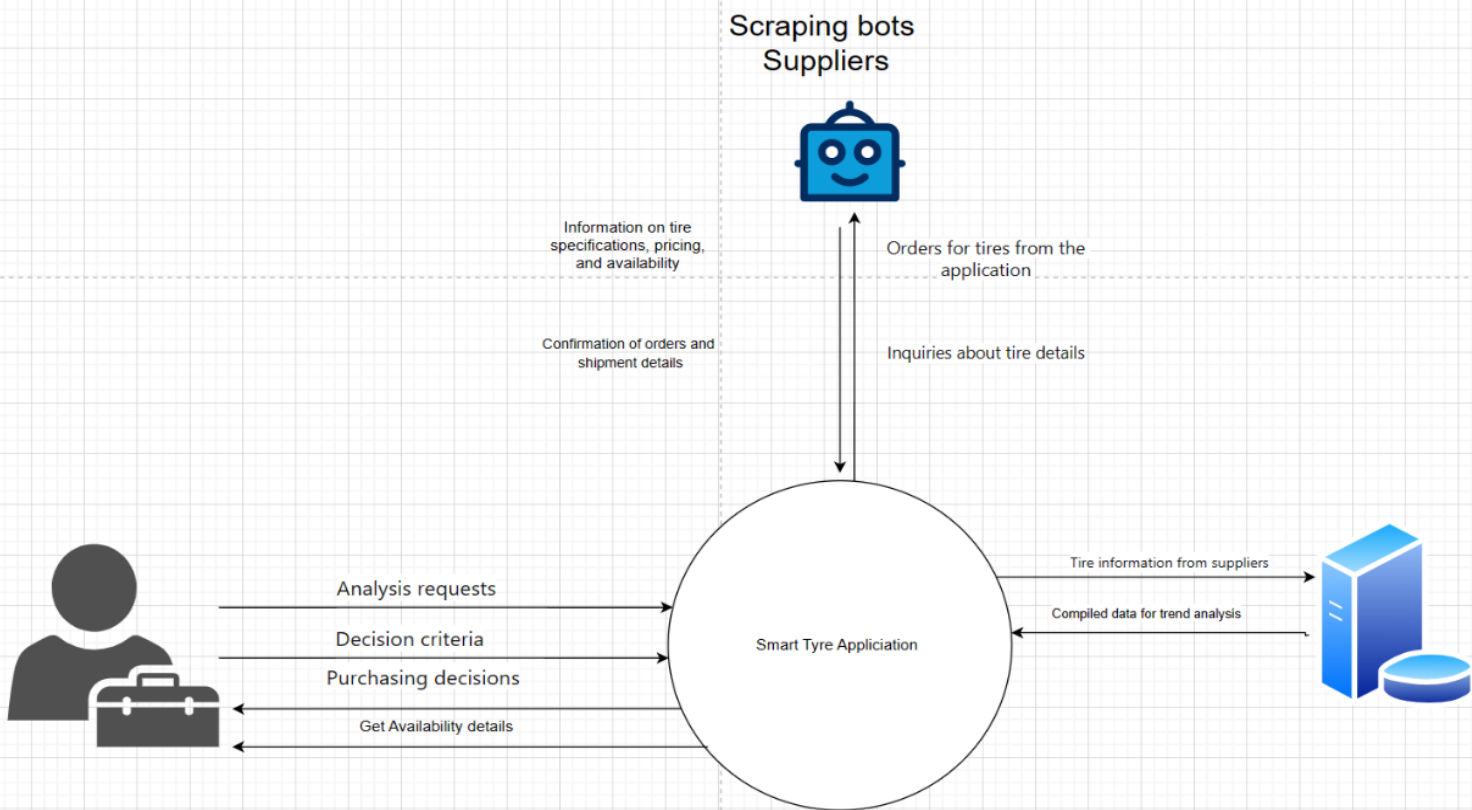
Advantages

Consistency: Docker ensures the bot runs the same in all environments.

Scalability: Easy to add new suppliers or adjust to website changes.

Efficiency: Centralized management simplifies updates and maintenance.

Scraping bots
Suppliers

Information on tire specifications, pricing, and availability

Orders for tires from the application

Confirmation of orders and shipment details

Inquiries about tire details

Analysis requests

Decision criteria

Purchasing decisions

Get Availability details

Smart Tyre Appliciation

Tire information from suppliers

Compiled data for trend analysis

COMMUNICATION

CONFIGURATIEMANAGEMENT

Name	Abbr.	Rol/taken	Availability
Ernst Jansen	*CEO*	*Company mentor*	*2 days a week* *Communication via work-email and WhatsApp*
Bas van de Meerakker	*Software*	*Technical mentor*	*1 day a week on Thursday* *Communication via work-email and WhatsApp*
Marcel Meesters	*Teacher and advisor*	*School mentor*	1 day a week Communication via work-email and Teams

RISKS AND FALL-BACK ACTIVITIES

Risico	Prevention activities included in plan	Fall-back Activities
1 Insufficient data	Looking in alternative data sources	
2 Poor (improper) data	Informing mentor of the data quality and working together towards a solution.	
3 Lack of technical help	Arrange regular meetings at certain times with an expert	