Farm Central

2023

PROJECT REPORT

Prepared For:

Farm Central

By Revali Reddy.st10084347.BCA3.Group2

123 Ocean Rd
Durban, South Africa

www.itsolutions.com

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Introduction

The performance optimization, agile approach, FDD, MVC architecture, DevOps, TOGAF, and Zachman Framework are highlighted in this report's summary of the software development process for the website. Through techniques like code optimization and database tuning, it highlights the value of effective website functioning and user experience. Iterative development is made possible by the agile methodology, and a rigorous procedure for delivering specific features is guaranteed by FDD. The report examines the integration of DevOps principles and the modular and maintainable MVC methodology. It also takes into account how TOGAF and the Zachman Framework can be used to create an efficient enterprise architecture. The Zachman Framework and TOGAF are two examples of industry-standard frameworks that are highlighted in this report as they offer assistance for coordinating the software development process with business objectives, enhancing effective communication, and supporting decision-making. The research concludes by presenting a technical solution for stock management that gives users access to real-time inventory updates.

Image: Wood|Bailey, Ben. "How to Start a Firewood Business in 5 Steps." Ventured, 8 Oct. 2020, ventured.com/how-to-start-a-firewood-business-5-steps/. Accessed 16 Apr. 2023.

Performance Optimization

1.

Performance optimization

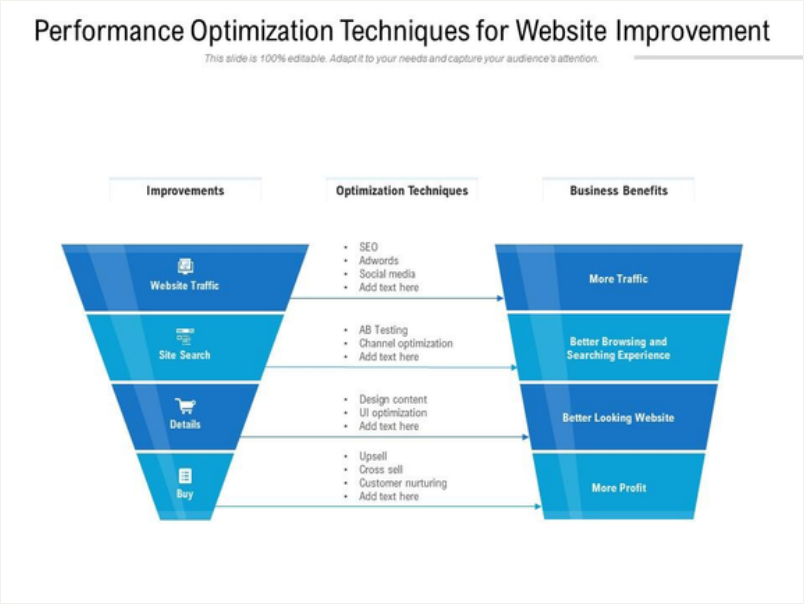
This describes the process of enhancing the speed, responsiveness, throughput, and resource usage of a system, software program, or process. It entails pinpointing and fixing performance bottlenecks, cutting latency, maximizing resource allocation, and raising system effectiveness as a whole (SearchSoftwareQuality ,n.d.).

Guidelines to optimize performance in the stock management website:

- **The exact performance measures that need improvements need to specified** such as response time, latency, throughput, or memory utilization, that needs improvement. This will assist in establishing specific objectives and gauging the success of the adjustments made.
- **Profiling tools need to be used to locate ineffective areas and performance bottlenecks** in the prototype. Profiling can be used to identify the sections of the code or system that are utilizing the most resources and degrading performance.
- Attention must be given to **streamlining the prototype's time-consuming or vital paths**. Usually, a considerable chunk of the execution time is spent in these locations. Search for scalable data structures, redundant calculations, and algorithmic enhancements to speed up operation and save time .**e.g.** This makes it possible for accountants to get and manipulate data more quickly, especially when working with huge datasets.
- The prototype's **input and output operations must be made as few as possible**. Minimizing disk I/O and network activities can boost speed because they are often slower than in-memory operations. Strategies like batch processing, caching, or leveraging in-memory databases should be considered.
- **Data structures and algorithms that are suitable** for the activities the prototype carries out and offer efficient operations **must be picked.** Use hash maps, sorted data structures, or appropriate data structures, for instance, to handle enormous datasets, speedy lookups, or efficient searching. Due to the decreased requirement for repeating calculations or database searches, reaction times are improved, and resource utilization is decreased. Memory can be utilized to cache function results, preventing the need for extra computations.

- **The memory the prototype uses needs to be optimized**. Deallocating resources when they are no longer required will help avoid memory leaks. To minimize memory allocation and deallocation overhead, memory pooling or object reuse strategies can be used.
- **Concurrency and parallelism to split the workload** among several threads or processes must be taken into consideration. Performance may be enhanced for autonomous work. When putting parallel or concurrent solutions into practice, be cautious of synchronization and potential race situation's **e.g.** The store manager will be happy that numerous threads can be formed to handle various steps of the process concurrently when processing consumer transactions.
- **A scalable software must be created** to handle rising workloads and user needs. To distribute the burden among several servers or resources, consider load balancing strategies. Design the program to be scalable either horizontally or vertically to meet changing user demands. **e.g.** using auto-scaling cloud infrastructure like Microsoft Azure helps guarantee the program can manage rising demand. This satisfies the head of marketing.
- **High-performance frameworks and libraries** must be utilized to carefully optimize the functions of the prototype handles. These libraries frequently include optimized algorithms and data structures, allowing improved performance without having to start from the beginning (Mckinley and Zorn (2002).
- The current prototype uses a database for interaction, hence improve how the database queries and data access patterns are used. **Utilize the proper indexes, query optimization methods, and caching systems** to speed up response times and lighten the strain on the database server (www.ibm.com, n.d.).
- **Conduct frequent iterations and performance testing**. With realistic workloads, evaluate the performance of your prototype. To ensure ongoing performance improvements, pinpoint areas that require additional optimization, make the appropriate adjustments, and repeat the testing process.
- **The hardware restrictions and target environment** of the environment in which the prototype will operate should be considered. Consider variables like CPU power, memory size, and network bandwidth. The performance of the prototype will improve if it is optimized to operate effectively within these limitations.
- **Collect user and stakeholder input** on the functionality of the product. Track customer happiness and experience levels. **e.g.** This can be accomplished using a variety of tools, including user feedback forms, usage data, and polls of customer satisfaction. User-reported performance problems should be actively addressed, and the software should be adjusted as necessary.
- **Decisions made** about performance, improvements made, and lessons learned **should all be documented.** To encourage continual progress and future performance enhancements, disseminate this knowledge throughout the development team and company.

(Parida et al. ,n.d.)



(Google.com, 2023)

Software development Methodology

2.

Methodologies

Software development paradigms provide solid methods for meeting customer goals and completing software projects successfully. These strategies offer the skills and techniques to efficiently achieve these objectives, whether it be accurate stock tracking, aesthetic appeal, effectiveness, or conformity with client expectations. Development teams can streamline their procedures, improve cooperation, and provide software solutions that promote customer happiness and corporate success by choosing and implementing the most appropriate approach (Synopsys Editorial Team ,2019).

Agile Methodology

Agile methodology promotes ongoing communication and improvement while dividing the project into phases. Teams go through a cycle of planning, carrying out, and assessing. The client's requirements for accuracy, visual attractiveness, efficiency, and the capacity to manage incoming and exiting merchandise, as well as correlate each item with the appropriate farmer, are fully addressed by the methodology, which is an agile approach combining Scrum and Kanban (Encora, n.d.).

Why is the Agile methodology appropriate for this development effort?

- Agile methodologies are recognized for their **flexibility in responding to change environments** and demands, which makes them perfect for projects with fluid requirements. This adaptability enables the team to address performance issues and enhancements fast, which ultimately improves accuracy, aesthetic appeal, efficiency, and stock tracking. **e.g.** Accountants can incorporate changes promptly.

(Google.com, 2023b)

- Agile approaches **encourage gradual and iterative development** and are excellent at adjusting to shifting client requirements. By using an iterative process, the team can quickly produce usable software, which makes it simpler to spot and fix any potential performance bottlenecks. The team may continuously upgrade crucial regions and optimize the software's overall performance by giving performance optimization priority within each iteration, precisely lining up with the client's desire for accuracy and efficiency . **e.g.,** This helps the head of marketing stay responsive to market demands.
- **Regular feedback loops** between the development team, stakeholders, and end users are encouraged by agile methodologies. Throughout the development process, the team can evaluate the software's efficacy and user happiness thanks to this ongoing feedback. The team can quickly discover performance-related issues and make the necessary adjustments by soliciting feedback frequently. This way, aesthetic appeal is ensured and the client's objectives are met. **e.g.** Store managers can actively participate in providing feedback throughout the development process.
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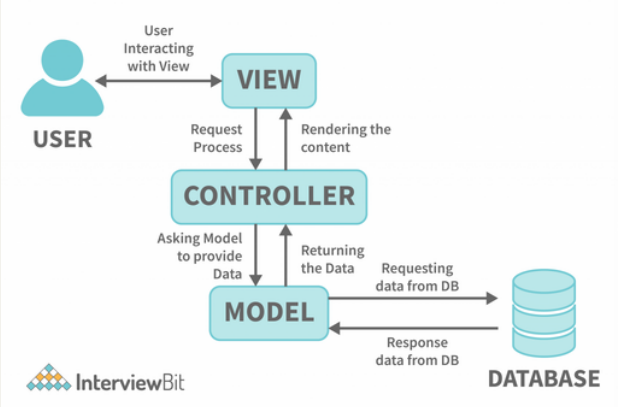
- Agile project management methodologies also place a high priority on **transparency and openness.** The progress of the project and any performance-related issues are clearly understood by all parties involved thanks to the use of task boards, burndown charts, and daily stand-up meetings. This openness makes it easier to communicate effectively, solve problems effectively, and make quick decisions about performance enhancement initiatives. It is possible to smoothly satisfy the client's requirements for aesthetic appeal and accurate stock tracking. **e.g.** This fosters trust between the client and business.
- **Continuous testing, quality control, and monitoring** are emphasized in agile methodologies. The team can spot and address performance issues early on and guarantee that the program maintains acceptable performance levels by integrating performance testing and monitoring into each iteration. This proactive method ensures effectiveness and precisely satisfies the client's requirements for precise stock tracking and overall performance.
- Agile approaches **encourage collaboration, innovation, and team problem-solving**. Finding, analyzing, and fixing performance-related problems successfully depends on the team members' different skills and knowledge. Each team member offers their knowledge, ensuring accuracy, aesthetic appeal, and effective stock tracking. (Brush and Silverthorne ,2022)

Model-View-Controller



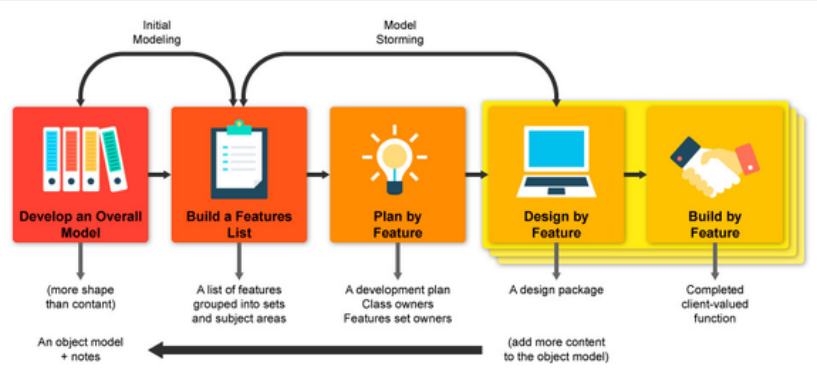
(Google.com, 2023b)

MVC, or model-view-controller, is an acronym. It is a style of software architecture that divides an application's concerns into three interdependent parts: the Model, the View, and the Controller. When creating user interfaces for desktop programs and web applications, the MVC design is frequently employed (tutorialspoint, 2019).

Why is the Model-View-Controller (MVC) appropriate for this development effort?

- ·The MVC paradigm **offers a distinct separation of concerns**, making it possible to accurately reflect the needs of the client. The program can be divided into separate parts (Model, View, and Controller) to guarantee the system's accuracy. Assuring accurate tracking of arriving and outgoing merchandise and the connection of each item with the appropriate farmer, the Model reflects the data and business logic. **e.g.,** This satisfies the accountant by implementing a robust data management system within the Model.
- ·In MVC, the View component **prioritizes aesthetics and the user experience**. It manages the presentation layer, enabling an aesthetically pleasing and user-friendly interface. This guarantees that the system satisfies the client's demands for aesthetic appeal. **e.g.,** The aesthetic appeal and relevant representations of marketing campaigns in the View can be guaranteed to the marketing director.
- ·MVC **encourages effective software application development and maintenance**. It is simpler to apply changes without affecting the entire system because to the independent creation and modification of each component made possible by the separation of concerns. As a result, the development process is effective, and updates are sent on schedule to solve any performance problems or new requirements. **e.g.,** The Model component allows the store manager to make changes to the discount policy without affecting other functionality.
- ·**Modularity and scalability are key components** of the MVC paradigm. The system can be easily expanded or altered to accommodate future developments by adhering to a clearly defined architecture. The system's effectiveness and flexibility to changing company needs are ensured by its scalability. **e.g.,** The Controller can be changed while the rest of the system is left unchanged if the customer wants to implement a different workflow approval process.
- **Data tracking and association are simpler** to accomplish with the Model-View-Controller design. The Model component, which manages data, makes sure that entering and outgoing stock is accurately tracked. The system can also quickly determine which farmer each item belongs to, giving the client the essential tracking capabilities. (Anushka ,2021)

Feature-Driven Development



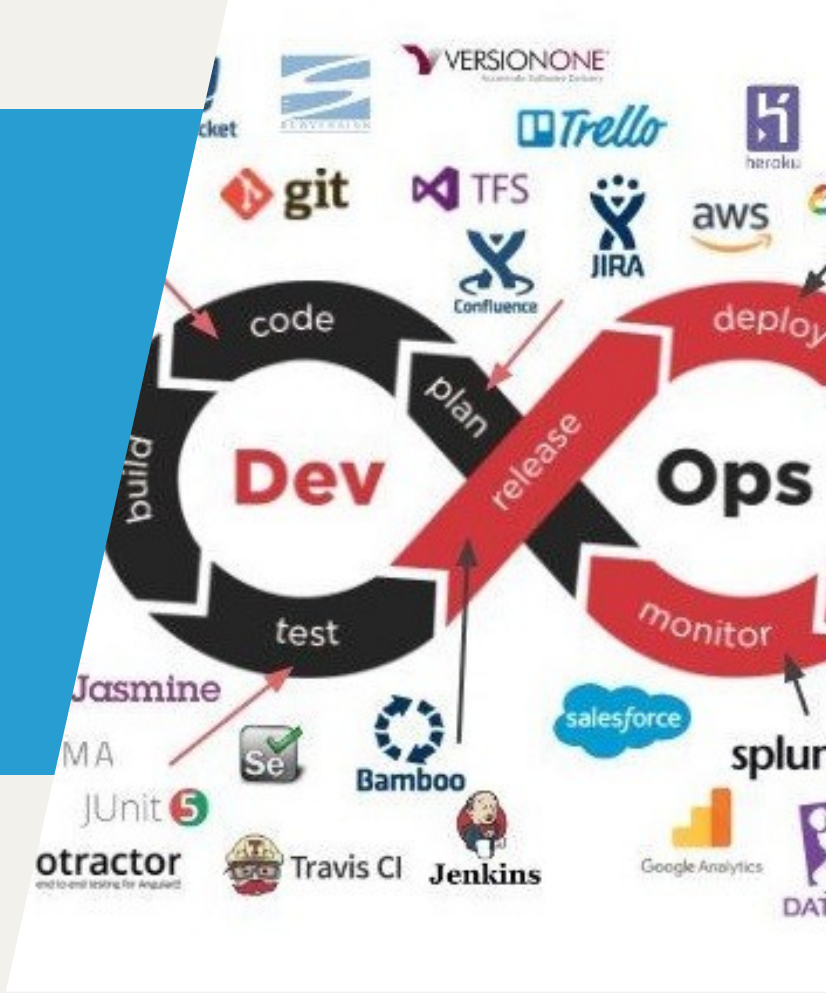
Google.com (2023b)

Feature-driven development is known as FDD. It is an incremental and iterative software development process that prioritizes giving users usable features or functionalities. FDD lays a significant emphasis on cooperation and creating business value while emphasizing a very visible and transparent development process (SearchSoftwareQuality ,n.d.).

Why is the Feature-Driven Development appropriate for this development effort?

- A **highly visible and transparent development process** is encouraged by FDD. FDD ensures a comprehensive grasp of the system's needs and functionality through its focus on thorough feature descriptions, collaborative modeling, and regular inspections. **e.g.,** the accountants requirement for accurate tracking of incoming and exiting merchandise, as well as linking each item with the appropriate farmer, is aligned with this emphasis on precision.
- The **iterative development of tangible features is emphasize**d by FDD. FDD helps the head of marketing ,for **example,** to give priority to aesthetic appeal inside each feature by segmenting the development process into manageable sections. FDD's collaborative design and development processes enable ongoing iteration and input, guaranteeing that the system's visual components live up to customer expectations.
- Through its iterative and incremental methodology, FDD **encourages an effective development process.** FDD makes ensuring that development efforts are focused on crucial functionality by focusing on delivering features that add value for the end customers. By minimizing superfluous effort, enabling timely delivery, and satisfying the store manager, for **example** ,need for an efficient system, this value-based priority promotes efficiency.
- The client's requirement to track arriving and outgoing stock and link each item to a certain farmer is well-aligned with FDD's focus on feature-driven development. FDD enables the **identification and prioritization of particular features** relevant to tracking and association by segmenting the development process into features. This focused strategy guarantees that the requisite tracking capabilities are provided, together with the development and testing of the necessary functionality.
- FDD **promotes productive team collaboration and communication** during the development process. It ensures that everyone involved understands the project goals, requirements, and progress through close teamwork. By addressing misunderstandings early on, this approach reduces the need for extra work. **For example**, regular feedback and communication sessions help coordinate the inventory management staff and farmers, ensuring the system meets their expectations. This teamwork focus creates a unified and efficient development environment, leading to improved project outcomes. (www.zentao.pm ,n.d.)

Implementing Dev Ops



3. DevOps

DevOps is recommended as it is a mix of organizational concepts, procedures, and tools known as DevOps makes it possible for a business to provide applications and services quickly. The entire software development lifecycle and the performance optimization process can both greatly profit from DevOps ideas. Agile approach and DevOps integration have grown to be a potent team. Agile's iterative methodology, customer-centricity, and adaptive nature are perfectly complemented by DevOps' focus on continuous integration, delivery, and collaboration. Combining these two methods improves not just the software development process but also productivity, excellence, and client satisfaction. Agile and DevOps work together to generate a dynamic synergy that enables teams to produce software swiftly, dependably, and with a persistent focus on continuous (improvementAmazon ,2019).

The Flow control and Benefits of using DevOps

1.Planning and Requirements gathering

- **Teams work together to define project goals, set priorities, and collect specifications** during the planning and requirements gathering phase of the DevOps process. Objectives are aligned and the project scope is defined in collaboration with stakeholders from many disciplines, including product owners, developers, operations engineers, and business analysts. This stage encourages team members to collaborate across functional lines and to develop a common vision. The project is well-planned and in line with the needs of the business because it establishes the framework for the entire DevOps process. (SearchITOperations ,n.d.)

2.Continuous integration

- A crucial aspect of the DevOps technique, made possible by the usage of Git, is the **collaboration and communication between teams** in charge of the creation and maintenance of software as well as between these groups and other stakeholders. DevOps and Git bring together developers, testers, system administrators, and performance engineers to create a culture of shared accountability and efficient communication. Teams can work together and monitor changes to the codebase using Git, which makes it possible to efficiently coordinate and synchronize work. Git's version control features make it possible to quickly identify performance-related problems and efficiently implement the required adjustments. By working together and utilizing Git, teams are able to take advantage of the insights from many stakeholders, **such as** accountants who may provide information on accounting needs, to make sure that performance improvement projects are well-planned and properly carried out .
- DevOps **promotes continuous integration and deployment**, enabling frequent and automatic distribution of software updates. This approach enables the team to rapidly implement performance optimizations as they are developed and evaluated. Automating the deployment process allows for the seamless introduction of performance enhancements into production systems, which saves time and efforts **.e.g.** The platform will always be updated with the newest improvements, and the head of marketing may be confident of that. DevOps procedures, which support Agile's incremental and iterative development methodology, enable continuous integration and delivery. By automating the build, test, and deployment processes, DevOps makes it possible for performance improvements to be quickly and easily incorporated into the program at regular intervals. This allows for frequent updates and the delivery of improved performance. (Atlassian ,2019)

3.Continuous Delivery

- **Performance optimization efforts are made more swift and effective** when Kanban and DevOps are coupled. Teams may efficiently track and prioritize tasks that are connected to performance by putting Kanban's visual management strategy into practice. The time between developing performance optimizations and receiving feedback is decreased because to the clear visualization of work items and their progress. Kanban is complemented by DevOps methods like automation and continuous integration that enable quick iterations and changes for performance enhancements. The agile nature of Kanban and DevOps emphasize the value of flexibility and responsiveness to changing market conditions, customer input, and demand changes. This combination enables teams to take advantage of innovative optimization opportunities and respond quickly to performance-related issues, leading to shorter and more effective optimization cycles (Merchant ,2016).

4.Infrastructure as Code(Iac)

- **Infrastructure as code approaches**, where infrastructure setup and configuration are stated and maintained through code, are promoted by DevOps and Docker. The repetition and standardization of production infrastructure and performance testing environments are made easier with this method. The danger of configuration-related performance issues is reduced by treating infrastructure as code, making it simpler to analyze and execute performance optimizations. By offering containerization technology, Docker plays a crucial part in this process by enabling the consistent and reliable deployment of infrastructure components. The usage of DevOps and Docker together allows the store manager **for example** to feel confident in the consistency and dependability of the infrastructure architecture. Code is used to specify and control infrastructure configuration and provisioning, enabling consistency, reproducibility, and scalability. Infrastructure component deployment and administration are automated by tools like Terraform and Ansible, which lowers manual error rates and makes it possible to treat infrastructure updates as code changes .

- **Scalable and long-lasting software solutions are encouraged** through the use of DevOps and Docker. As scalability and resilience are essential for maintaining acceptable performance under varying workloads, this combination is particularly helpful for performance improvement initiatives. The team can design for scalability, use Docker for containerization, and apply strategies like auto-scaling and load balancing by using DevOps processes. Because of this, the software can manage growing workloads without sacrificing performance. Robustness and scalability are essential, which is further emphasized by the connection of Agile techniques with DevOps. Agile teams may more effectively meet user requests because DevOps uses Docker to make sure the software can scale and adapt to various environments. (www.ibm.com ,n.d.)

5.Continuous Testing

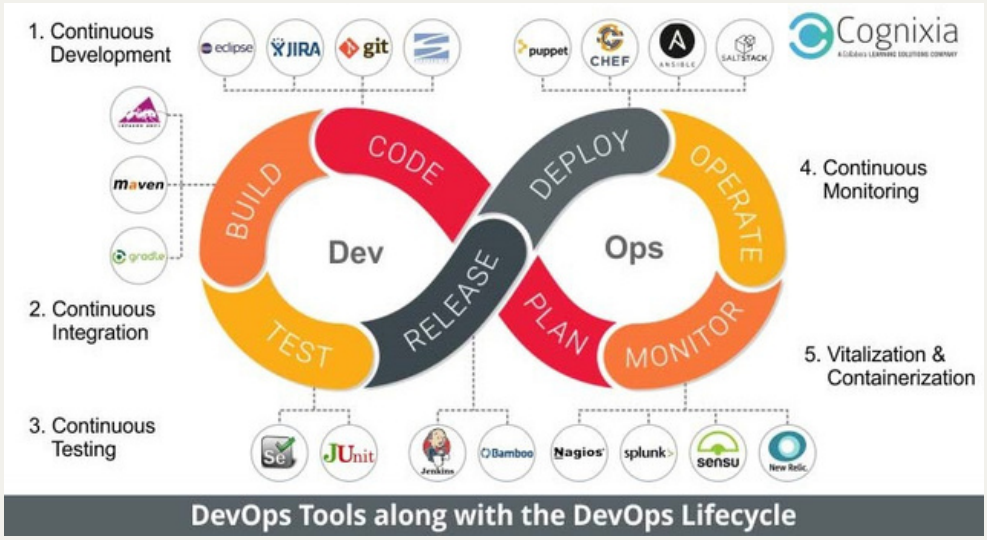
- **Automation and process orchestration for development, testing, and deployment**, including unit testing, are promoted by DevOps. Early detection of performance bottlenecks is made possible by the integration of automated performance testing, load testing, monitoring, and unit testing into the software development pipeline. This also ensures the dependability of the software. The team may spend more time evaluating performance data, spotting optimization opportunities, and putting improvements into practice by automating monotonous chores like unit testing. This fits with Agile's emphasis on work automation and simplification to increase productivity. The team can create dependable and consistent performance testing environments with the aid of DevOps, and via thorough unit testing, can deliver precise and repeatable performance assessments (www.xenonstack.com ,n.d.).

6.Continuous Monitoring and Feedback

- **DevOps promotes continuous software monitoring** in production environments. With the use of monitoring tools and methodologies, performance indicators, user experience, and system behavior can all be tracked in real-time. The team can refine and iterate on their plan in light of actual usage patterns and performance statistics thanks to continuous monitoring, which provides meaningful feedback on how well performance optimizations are functioning. **e.g.,** This allows the general client to have a clear understanding of the software's behavior and performance. DevOps promotes continuous software monitoring in working environments, providing users with real-time information on user experience and performance. This is in line with Agile's emphasis on constant feedback and improvement. By monitoring performance indicators and user feedback, the team may identify performance problems, validate the effectiveness of optimizations, and make data-driven decisions for additional improvements.
- Real-time insights on performance, user experience, and system behavior are provided through **ongoing monitoring** of the infrastructure and software that have been implemented. Monitoring tools gather information on metrics, logs, and events to enable proactive problem-solving and the detection of performance bottlenecks. Teams get immediate insights to create improvements, fix problems, and make data-driven decisions thanks to continuous feedback loops. (www.headspin.io ,n.d.)

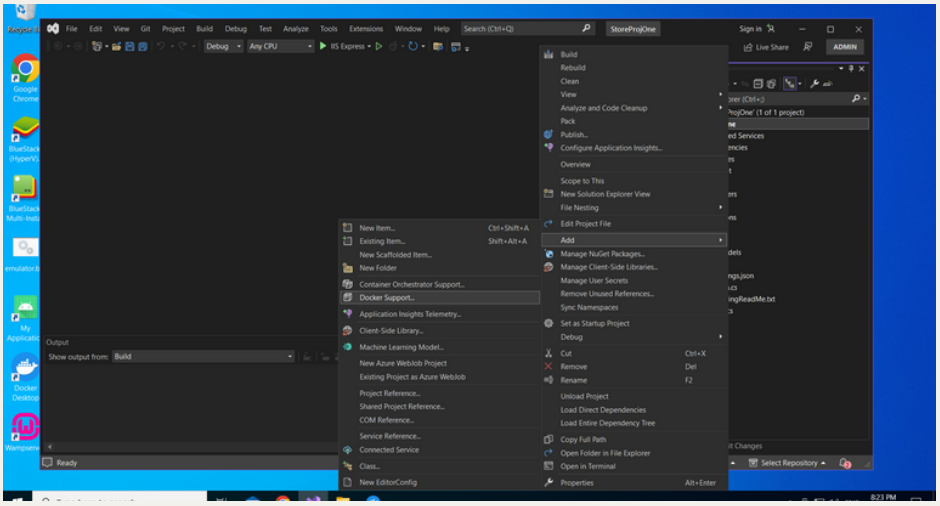
7.Continuous Improvements

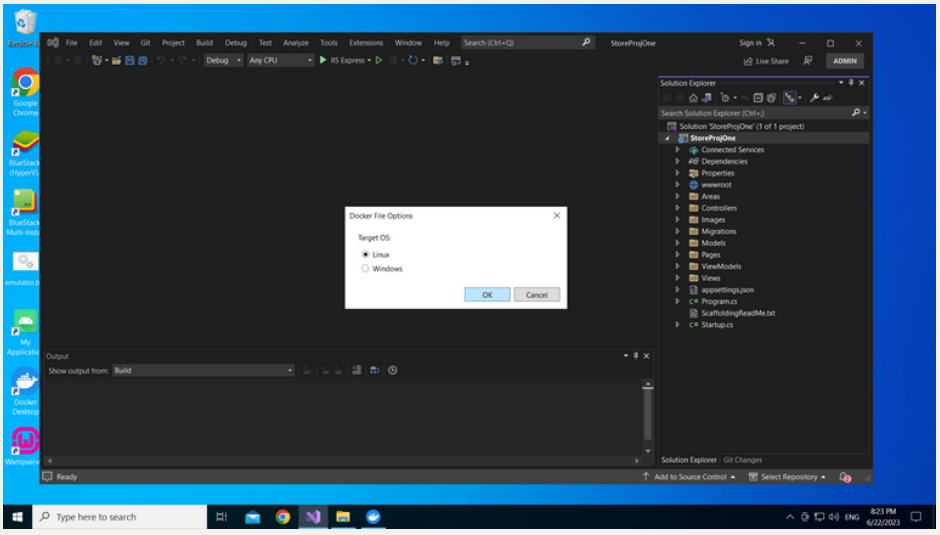
- A **culture of continuous improvement is promoted** by DevOps. Teams pinpoint improvement areas and put those improvements into practice through post-incident assessments, retrospectives, and performance analysis.. It entails routinely assessing and improving approaches, tools, and processes to raise effectiveness, output, and quality. Feedback, retrospectives, and data-driven insights gleaned from monitoring and user feedback fuel continuous improvement. Teams may enhance procedures, maximize performance, and adapt to changing requirements thanks to continuous improvement techniques like Kaizen, which promote a learning attitude. (www.tmap.net ,n.d.)

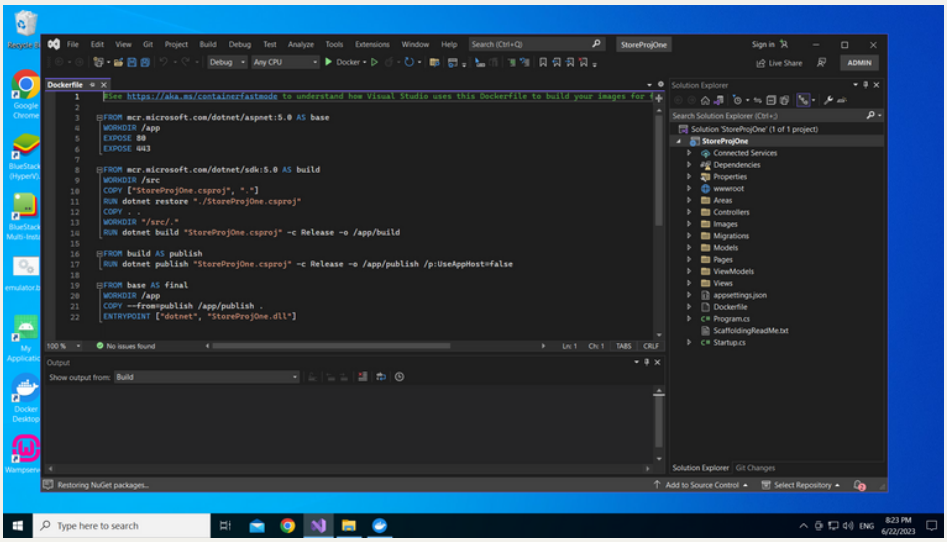


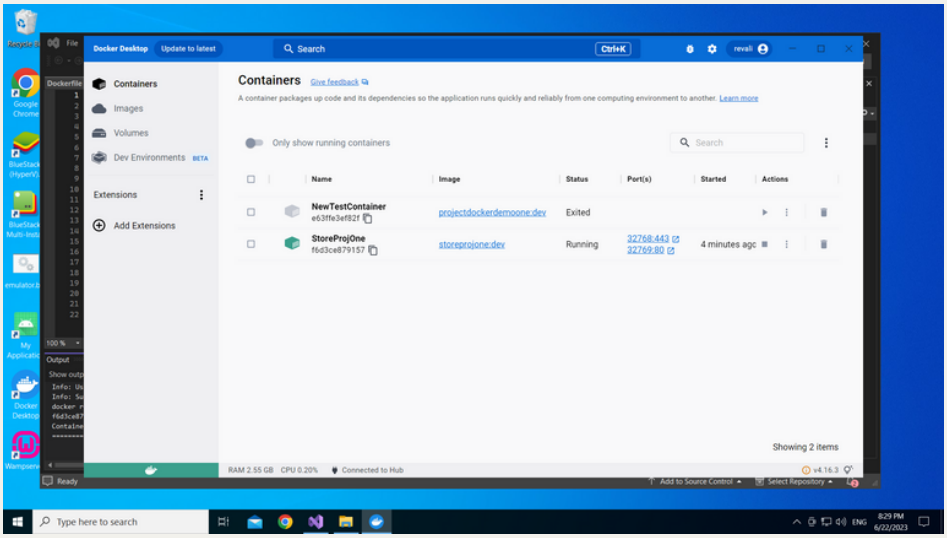
Google.com (2023b)

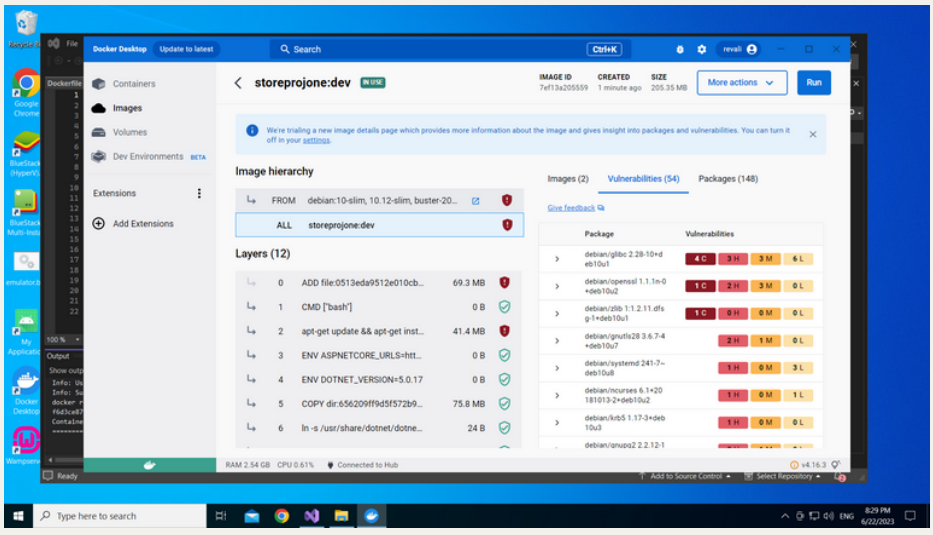
Screenshots of Stock Management website in Docker

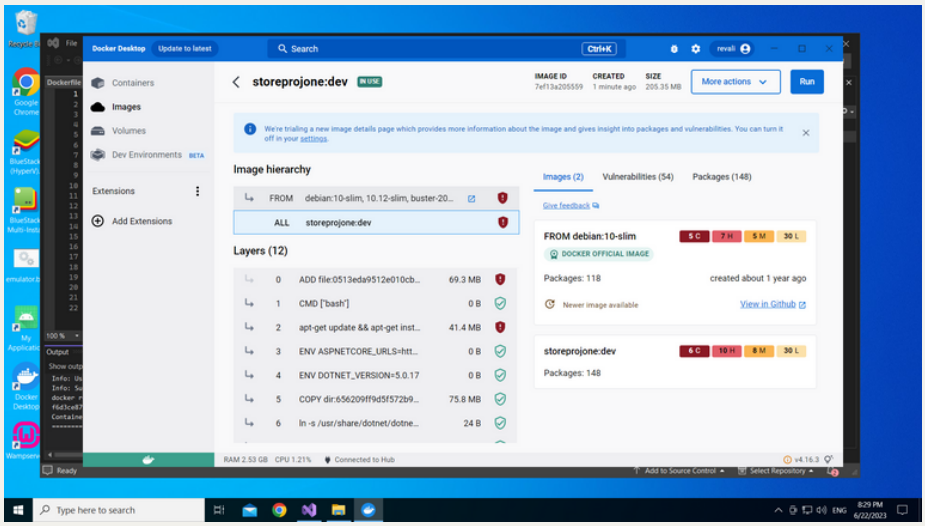


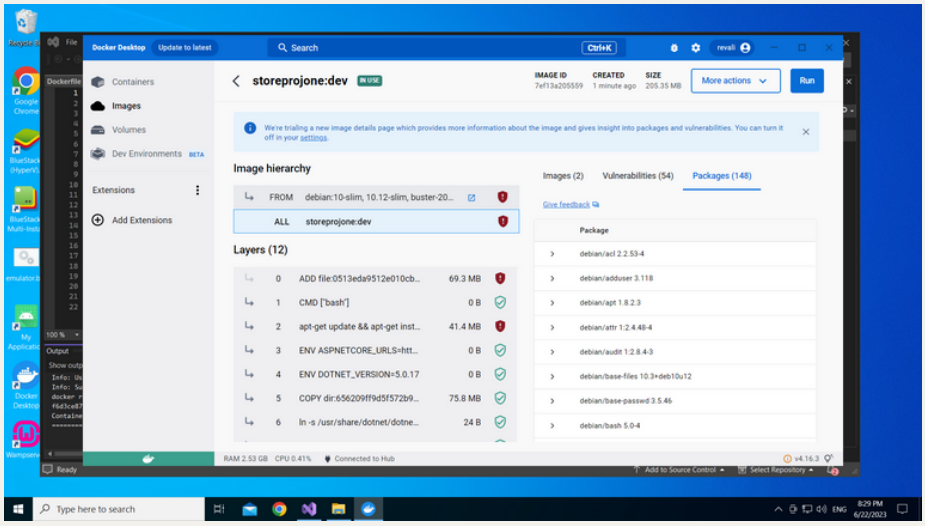









Docker Desktop
Update to latest
Search
Ctrl+K
Containers
Images
Volumes
Dev Environments BETA
Extensions
Add Extensions
storeprojone:dev
IN USE
IMAGE ID
CREATED
SIZE
More actions
Run
Image hierarchy
FROM debian:10-slim, 10.12-slim, buster-20...
ALL storeprojone:dev
Layers (12)
0 ADD file:0513eda9512e010cb... 69.3 MB
1 CMD ["bash"] 0 B
2 apt-get update && apt-get inst... 41.4 MB
3 ENV ASPNETCORE_URLS=htt... 0 B
4 ENV DOTNET_VERSION=5.0.17 0 B
5 COPY dir:656209ff9d5f572b9... 75.8 MB
6 ln -s /usr/share/dotnet/dotne... 24 B
Images (2)
Vulnerabilities (54)
Packages (148)
Give feedback
FROM debian:10-slim
DOCKER OFFICIAL IMAGE
Packages: 118
created about 1 year ago
Newer image available
View in Github
storeprojone:dev
Packages: 148
Ready
Type here to search


Docker Desktop
Update to latest
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Containers
Images
Volumes
Dev Environments BETA
Extensions
Add Extensions
storeprojone:dev
IN USE
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CREATED
SIZE
More actions
Run
Image hierarchy
FROM debian:10-slim, 10.12-slim, buster-20...
ALL storeprojone:dev
Layers (12)
0 ADD file:0513eda9512e010cb... 69.3 MB
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Images (2)
Vulnerabilities (54)
Packages (148)
Give feedback
Package
debian/acl 2.2.53-4
debian/adduser 3.118
debian/apt 1.8.2.3
debian/attr 1:2.4.48-4
debian/audit 1:2.8.4-3
debian/base-files 10.3+deb10u12
debian/base-passwd 3.5.46
debian/bash 5.0-4
Ready
Type here to search

Frameworks

4.

Framework recommendation

Software development frameworks offer a methodical strategy and set of instructions for creating software programs. Developers can take advantage of the foundation and predefined components provided by these frameworks to quicken the development process and guarantee best practices. They offer a standardized method for managing routine activities, structuring code, and integrating essential features like user interface design, database integration, and security. Developers can save time and effort by utilizing pre-existing solutions and concentrating on the unique requirements of their apps by employing software development frameworks. These frameworks frequently represent industry best practices, encourage code reuse, and make it easier for team members to work together. Overall, software development frameworks improve productivity, speed up the development process, and support the production of reliable, effective software (olawanletjoel ,2022).

ITIL Framework

Best practices for managing IT services are provided by the ITIL framework. If the software development effort is closely tied to IT service management and guidance is needed on managing operational aspects, such as incident management, problem management, and service level management, ITIL might be a valuable framework to use. It helps ensure that the program works smoothly and adheres to service level agreements (ManageEngine ,n.d.).

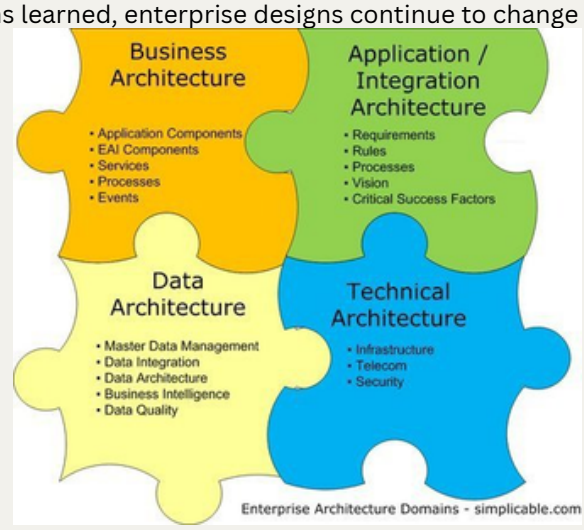
The Open Group Architecture Framework (TOGAF)

TOGAF is a popular framework for corporate architecture, offering a thorough approach to enterprise architecture. It covers requirements management, architecture design, governance, and stakeholder management. It provides a methodical approach and artifacts to guide architecture development and maintenance. TOGAF is widely acknowledged as an industry standard and offers a proven method for enterprise design. It provides access to a practitioner community, tools, and best practices (pubs.opengroup.org ,n.d.).

Benefits of TOGAF

- TOGAF framework **provides a comprehensive and systematic method** for developing and managing enterprise architectures. It lists several steps, processes, and deliverables that architects can use as a guide while they create their designs. The framework includes issues on the architectural vision, business architecture, data architecture, application architecture, technology architecture, and other subjects. This comprehensive approach ensures that the full span of the organization is taken into account when planning and making architectural decisions.
- TOGAF is designed to be **adaptable and flexible** to the needs of a certain organization. Businesses can choose and choose only the framework elements that are relevant to their scenario because to its modular nature, which it offers. Organizations can make sure that TOGAF is adopted in a useful and efficient way by tailoring it to their industry, size, culture, and existing procedures.
- TOGAF **promotes the use of an architecture repository** for the organization and preservation of architectural artifacts, models, and building blocks. The repository promotes reuse, consistency, and efficiency in architecture development projects by serving as a central knowledge source. It makes it possible for professionals to make the most of the tools at their disposal, share information, and keep an eye on changes, which enhances collaboration, documentation, and decision-making.
- TOGAF **offers guidelines for developing governance practices** that will ensure the successful creation and management of enterprise architectures. It provides a framework for establishing governance boards for architecture, clarifying duties, and enforcing adherence to architectural standards and principles. Because of this, organizations can ensure that architectural operations are in line with both strategic objectives and business objectives by maintaining monitoring and control over them.
- TOGAF is **designed to be compatible with modern methodologies and procedures**. It provides guidance on how to incorporate extra frameworks, norms, and procedures into the architecture creation process. By using this interface, enterprises may access the TOGAF framework and best practices while using their current tools, processes, and resources.
- TOGAF **emphasizes the importance of continuous improvement** in enterprise architecture. It promotes a progressive and iterative method of architectural innovation, allowing companies to enhance their ideas over time. Because of TOGAF's focus on feedback loops, architecture maturity assessments, and lessons learned, enterprise designs continue to change and are optimized.

(Simplilearn.com ,2013)



Procedure for putting selection options into practice and creating the appropriate models

1.Preliminary Phase:
The TOGAF process for developing enterprise architecture begins with the TOGAF Preliminary Phase. Establishing architecture principles, defining the project's scope, locating stakeholders, and allocating the appropriate resources are some of its main tasks. The project's scope establishes boundaries and constraints, stakeholders like farmers , store managers and accountants are identified and their roles are recognized, and necessary resources like finance and infrastructure are acquired. Architecture principles provide guides for decision-making. By laying the groundwork for following stages, this phase creates the framework for a successful architecture project (pubs.opengroup.org ,n.d.).

2.Phase A - Architecture Vision:
The TOGAF methodology's first step, called Architecture Vision, focuses on comprehending the drivers and commercial goals of a stock management website. In this phase, specific criteria are identified, as well as how the website will fulfill those objectives and the scope of the architecture work. The specific criteria for tracking incoming and exiting merchandise and connecting products with farmers would be identified. This phase lays the groundwork for further architectural development phases by coordinating the architecture vision with business goals (pubs.opengroup.org ,n.d.).

3.Phase B – Business Architecture:
Understanding and developing the information flows, business processes, and data models relevant to farmer associations and stock management are part of the business architecture phase. Analysis of current systems and databases for website integration is part of the process. Understanding information flows and business processes, creating business rules and data models, and determining integration needs are all included in this step. The foundation is laid at this stage for the creation of a reliable and effective website or system to track farmer data (pubs.opengroup.org ,n.d.).

4.Phase C - Information Systems Architecture:
Building the information systems required to support a stock management website is the goal of the information systems architecture phase. Analyzing existing databases and systems, identifying pertinent data entities such as stock items and farmer information, and developing user interfaces for data storage and display are all necessary steps in this process. Establishing technology standards and integration plans for seamless data exchange are also included in this phase. Designing an effective and efficient information systems architecture is the aim in order to make stock management operations (easierpubs.opengroup.org ,n.d.).

5.Phase D – Technology Architecture
The Information Systems Architecture is implemented during the Technology Architecture phase, which focuses on choosing the technology platforms and infrastructure. This involves selecting a server architecture, database management system, and web development framework. Private farmer and stock data are also protected by security measures. This phase results in a thorough Technology Architecture document that serves as a roadmap for the implementation and deployment phases that follow (pubs.opengroup.org ,n.d.).

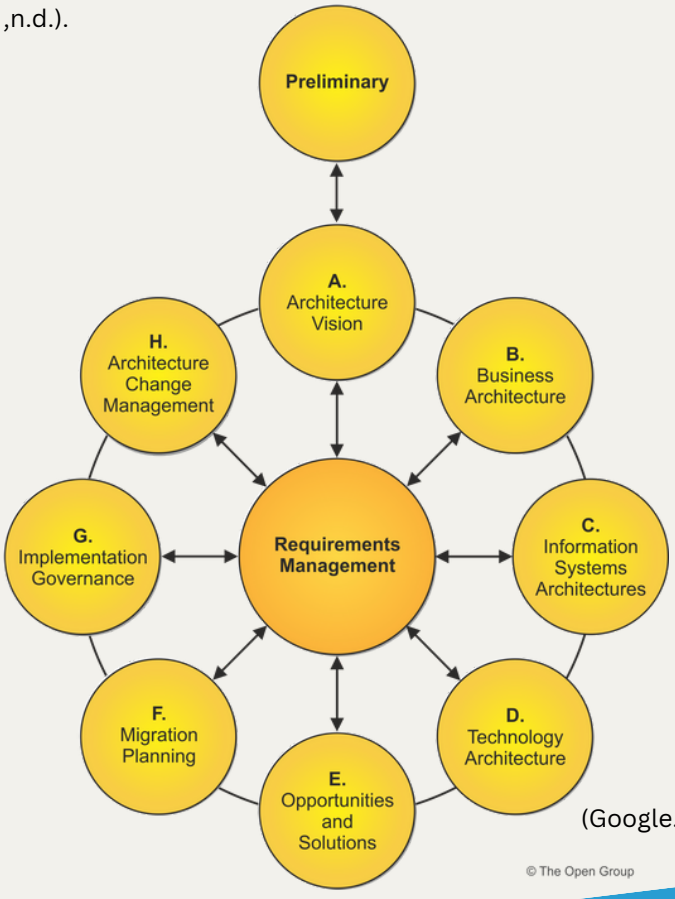
6.Phase E – Opportunities and Solutions:
In the Opportunities and Solutions phase, potential approaches to putting the stock management website into action would be investigated. Considerations including cost, scalability, and user experience would be considered while comparing various software solutions or development strategies. Creating a portfolio of change efforts during this phase would also entail integrating with farmer databases or putting barcode scanning to use for stock tracking (pubs.opengroup.org ,n.d.).

7.Phase F – Migration Planning:
The creation of a thorough implementation plan for the stock management website is part of the migration planning process. Prioritizing work, estimating resources and timelines, reducing risks, and planning for testing, launch, and data migration are all part of this process. The end result is a thorough Migration Plan document that serves as a roadmap for carrying out the migration process and guaranteeing a seamless switch to the new system (pubs.opengroup.org ,n.d.).

8.Phase G –Implementation Governance:
The stock management website's successful establishment is ensured by the Implementation Governance phase. It includes tracking project activity, dealing with issues and dangers, and advising the development team. Throughout the implementation phase, the emphasis is on making sure that architectural principles are followed and that business objectives are met. The result is efficient governance and control over the execution, which results in the delivery of a successful website (pubs.opengroup.org ,n.d.).

9.Phase H–Architecture Change Management:
The Architecture Change Management phase, which is concerned with the continuing management of changes to the architecture of the stock management website. It entails assessing suggested changes, updating the architecture documentation, assuring governance compliance, and managing the website's adaptability and long-term viability. The end result is an upgraded architecture that supports the website's efficacy throughout time and is in line with corporate objectives (pubs.opengroup.org ,n.d.).

10.Phase I–Requirements Management:
The requirements for the farmer association and stock management are gathered, assessed, prioritized, and managed throughout the requirements management phase. This guarantees that the website's development continues to be in line with stakeholder needs. To track requirements across architectural deliverables, requirements traceability has been built. The end result is a list of clearly stated and ranked requirements that serve as a roadmap for the development of the architecture's succeeding phases. Changes are adequately handled and communicated when requirements are managed effectively (pubs.opengroup.org ,n.d.).



(Google.com, 2023f)

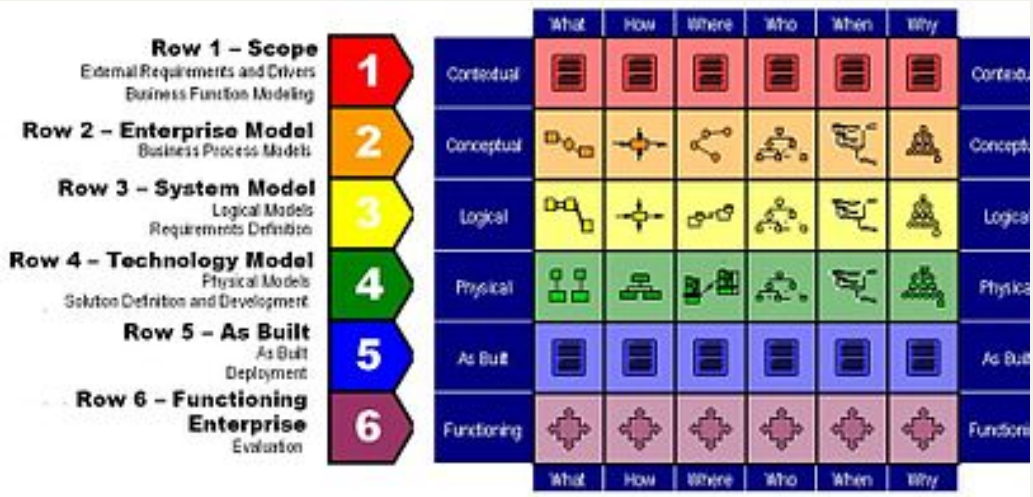
The Zachman Framework

The Zachman framework is an enterprise architecture tool that organizes and records different perspectives on a company's information systems. It facilitates stakeholder interaction and ensures coordination in the software development process. It provides a comprehensive and well-organized mechanism for compiling diverse perspectives on an enterprise's information systems, including business, data, function, networks, people, and time. The framework ensures a thorough grasp of enterprise architecture by addressing these factors (Visual Paradigm ,2019).

Benefits of The Zachman Framework

- The framework **provides a simple taxonomy** in the form of a matrix, where rows stand for stakeholder perspectives like those of the planner, owner, designer, and builder, and columns represent stakeholder perspectives.
- The Zachman Framework **offers a standard vocabulary and classification scheme** that facilitates straightforward communication and comprehension across all roles and departments within the company, allowing it to expand and adapt to different organizational sizes and complexity. Small, medium, and large businesses as well as a number of industries can use it. Organizations can tailor the framework's use to match their own needs while accommodating variations in processes, methods, and tools because to its versatility.
- The framework **emphasizes the importance of IT systems and business objectives** working together seamlessly. The Zachman Framework, which is based on business needs, data needs, system functionality, and technological capabilities, helps close the gap between business strategy and IT execution. It enables companies to align IT solutions with business goals and ensure that IT systems effectively support company operations.
- The Zachman Framework **promotes beneficial communication and collaboratio**n among the numerous parties involved in the design of organizational structures and information systems. It provides a uniform framework for discussing and documenting points of view, enabling stakeholders to understand one another's viewpoints and work together to come to a consensus regarding the enterprise architecture.
- ·The framework **places a strong emphasis on knowledge management** and enterprise architectural artifact documentation. The framework promotes knowledge exchange, reuse, and preservation by structuring the capture and organization of architectural information. As a result, organizational learning, consistency, and development activities in the future become more effective.

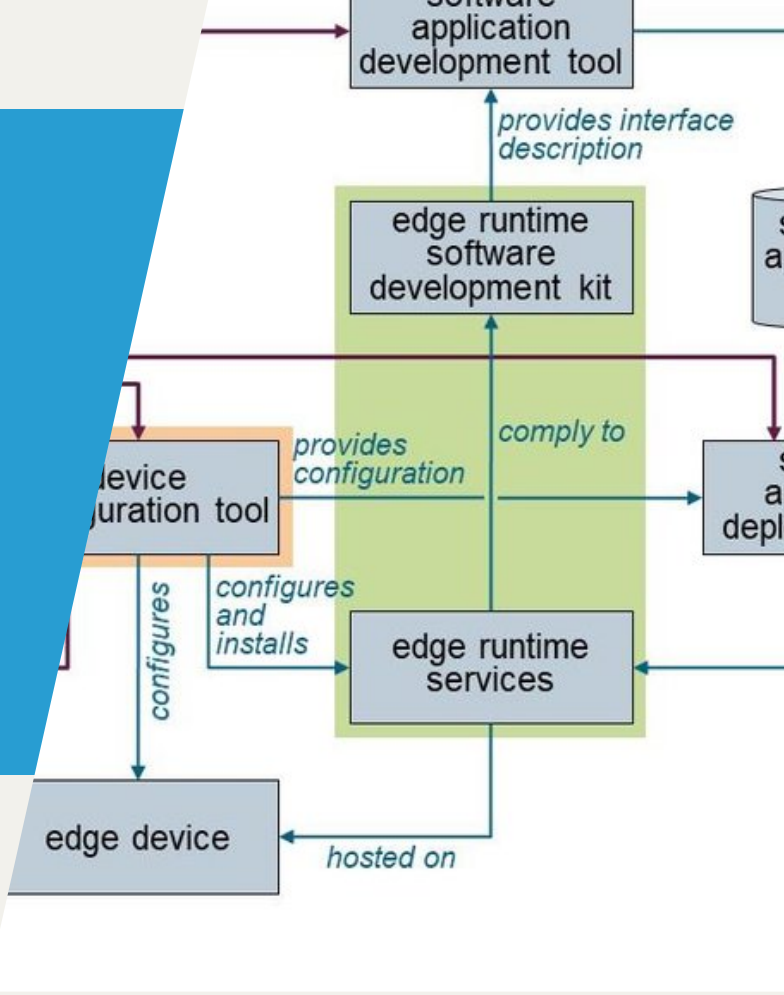
(eam-initiative.org ,n.d.)



Google.com (2023g)

	Data (What)	Function (How)	Network (Where)	People (Who)	Time (When)	Motivation (Why)
Planner	The public can purchase wood goods (oak, pine, and teak) at Farm Central. Customers make purchases, and then Farm Central staff can analyze the stock information. Farm stock data, which consists of information about incoming and outgoing stock and the association of each item with the corresponding farmer	Wood products will be sold and distributed by Farm Central. Once a customer has made an online purchase, they will sell and distribute these things by delivering them to the customer. Farm Central has internet sales channels for its goods. Employees at Farm Central will analyze the stock data. Planning activities, such as defining project tasks and deliverables.	South Africa	This includes project stakeholders who participate in the planning phase. The website allows users to buy things. Employees at Farm Central can view and analyze stock data on the website. The website will be used by Farm Central to sell goods and generate revenue.	The website should be operational on 23 June 2023	To streamline the stock management process and improve efficiency. Farm Central has to turn a profit. Customers can purchase these wood items for their preferred building applications, such as furniture or signs. For personnel to be capable of working on stock analysis
User	A customer purchasing goods from Farm Central's website. Employees of Farm Central examine stock data for all purchases using the Farm Central website. Farmer data, which contains information about the farmers and their association with each stock item.	Users can check the availability of an item, Users will checkout or place an order on the website.	www.woodstore.com on the site	Farm Central's clients ought to have access to the website in order to make purchases. To assess farmer stock data, Farm Central staff need have access to the website. A new user may be created by the administrator.	Anytime the site is live as of the 23 of June 2023	View/purchase wood items. Admin- tracking trends and usability Employees - efficiently track incoming and outgoing stock and manage farmer associations.

Technical Solution



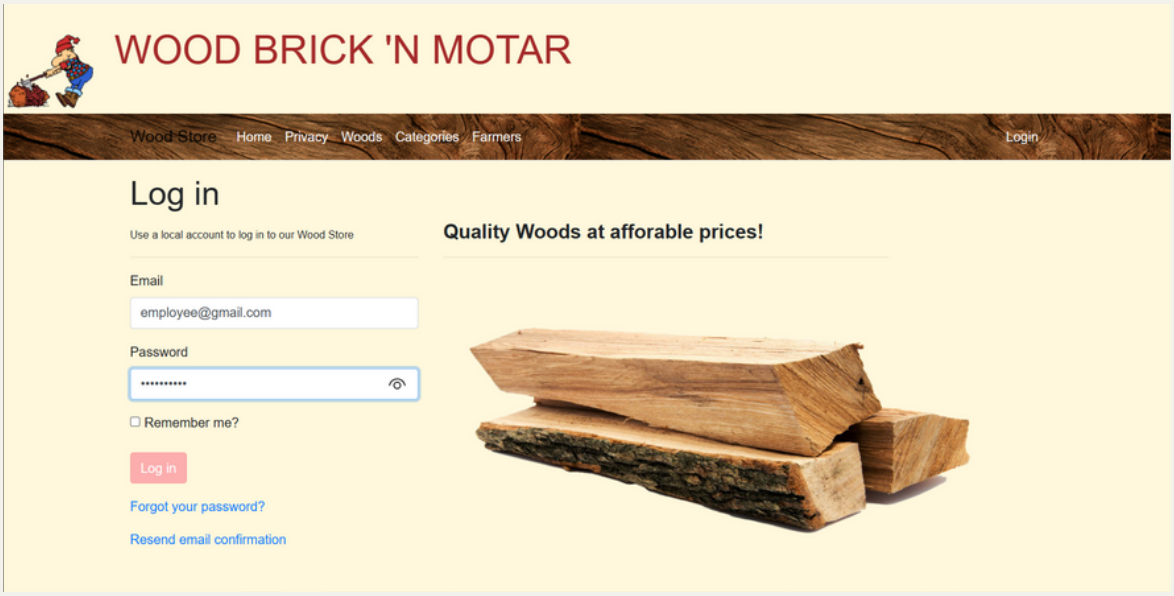
5. Introduction

The technical stock management website solution is intended to improve the stock tracking and optimization procedures for enterprises. Our website automates tedious chores, provides real-time visibility into inventories, and offers actionable insights thanks to its user-friendly interface and sophisticated functionality. It streamlines data synchronization, enhances team collaboration, and integrates seamlessly with existing systems. Take advantage of this innovative solution to get rid of errors, minimize costs, and stand out in the market.

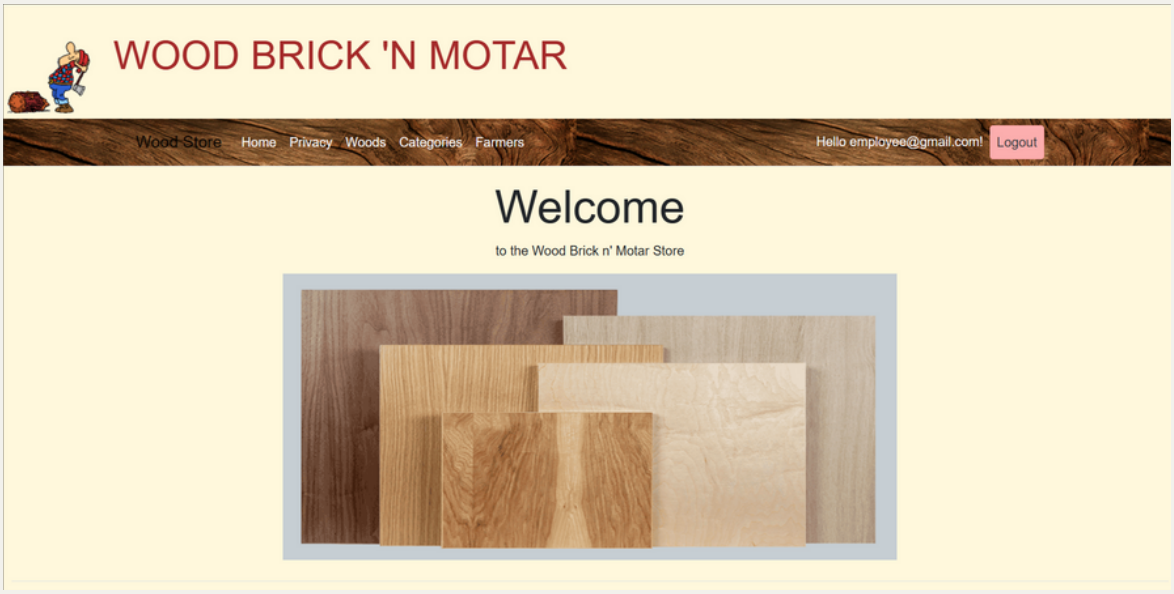
Improvements to the stock management prototype

- To make tracking incoming and outgoing stock easier, a QR code system will be used. By enabling users to scan things and update the stock information automatically, this can increase efficiency and accuracy.
- A feature for reporting and analytics will be created to give employees and farmers information about stock levels, product performance, sales trends, and other important indicators. Making data-driven judgments and streamlining stock management procedures can both benefit from this.
- A features for supplier management will be added to the functionalities. This would make it possible for the website to keep track of supplier data such contact information, prices, delivery schedules, and product catalogs.
- The stock management website will be designed with a mobile-responsive layout . This will make it simpler for consumers to manage stock while on the go because they can easily access the system from their cellphones or tablets.
- The website will be updated to allow users to be notified of various occurrences, such as low stock, order changes, impending expirations, or system-related messages, by turning on notifications and alerts. This ensures prompt actions and assists in informing users.
- To assist accountants in tracking stock-related costs, creating invoices, and managing financial transactions easier, integrate the stock management website with accounting systems or financial software.

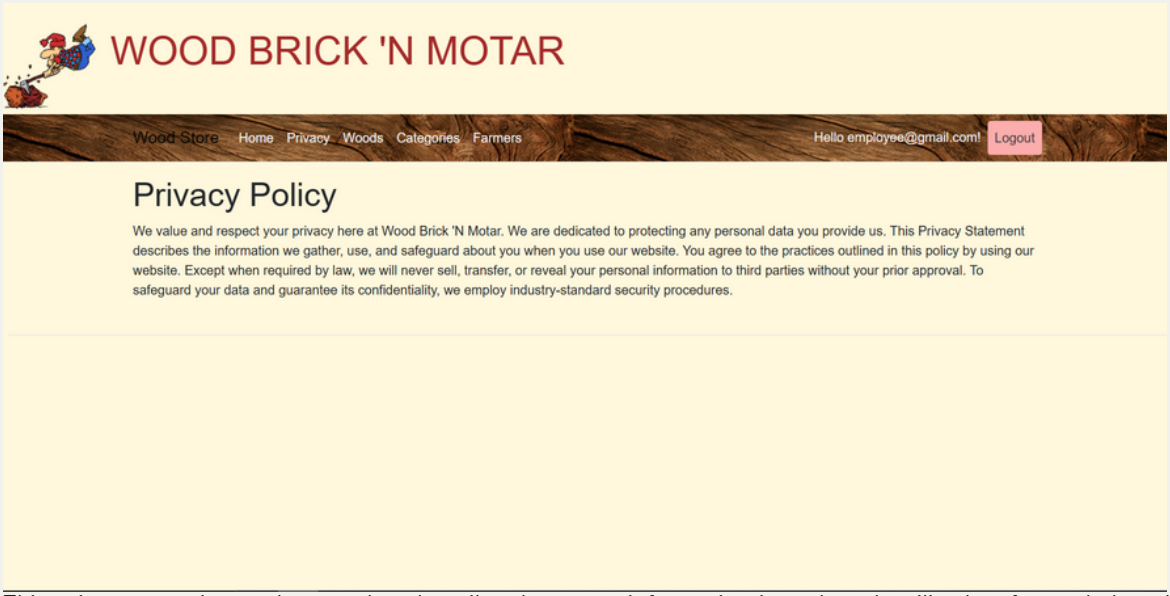
Employee POV



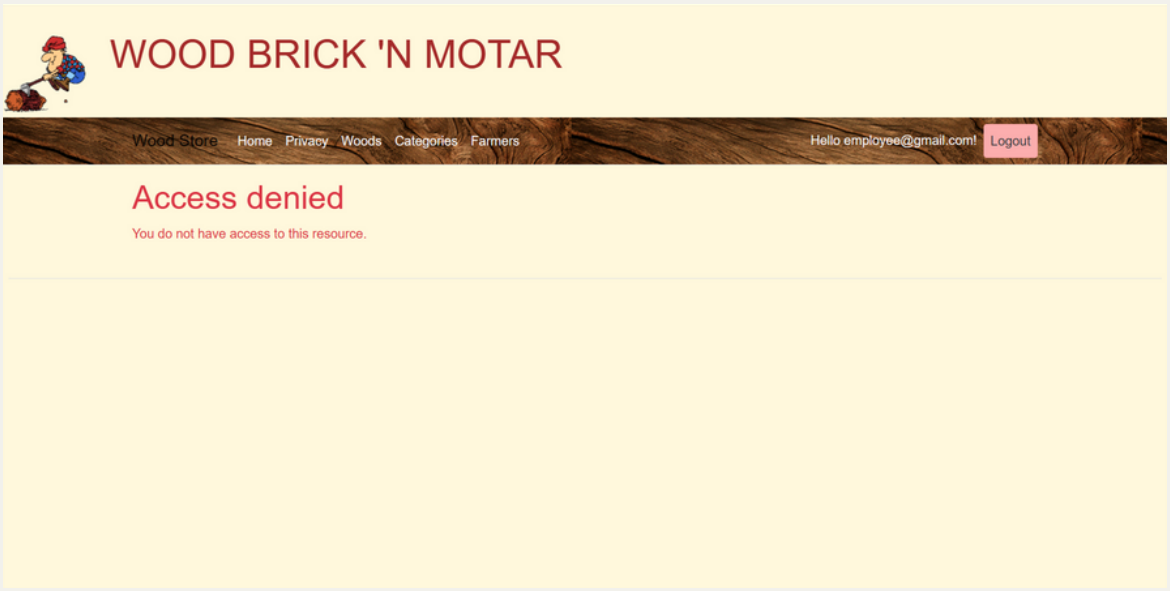
The normal function of a website login page is to act as a portal for users to access their accounts or obtain authorization for particular website features or content. The login page is displayed as the user's first interaction when they access the website. Two unique areas must be filled out on this login page ,"email" and "password." Users are asked to provide their registered email address in the email field, which serves as their unique identity on the website. Users enter their password for their email in the password area. The characters entered into the password are concealed as dots for security reasons. Users can proceed to log in by clicking on the red login button after entering the necessary data in the email and password fields. The process of authentication and validation is initiated by this button. The login system has features in place to detect errors and give the user feedback if the entered information is wrong. Displaying a warning or notice to the user that the information they have submitted is wrong is a typical tactic. The notification provides a succinct phrase like "Incorrect email or password." Here we see the employee logging in.



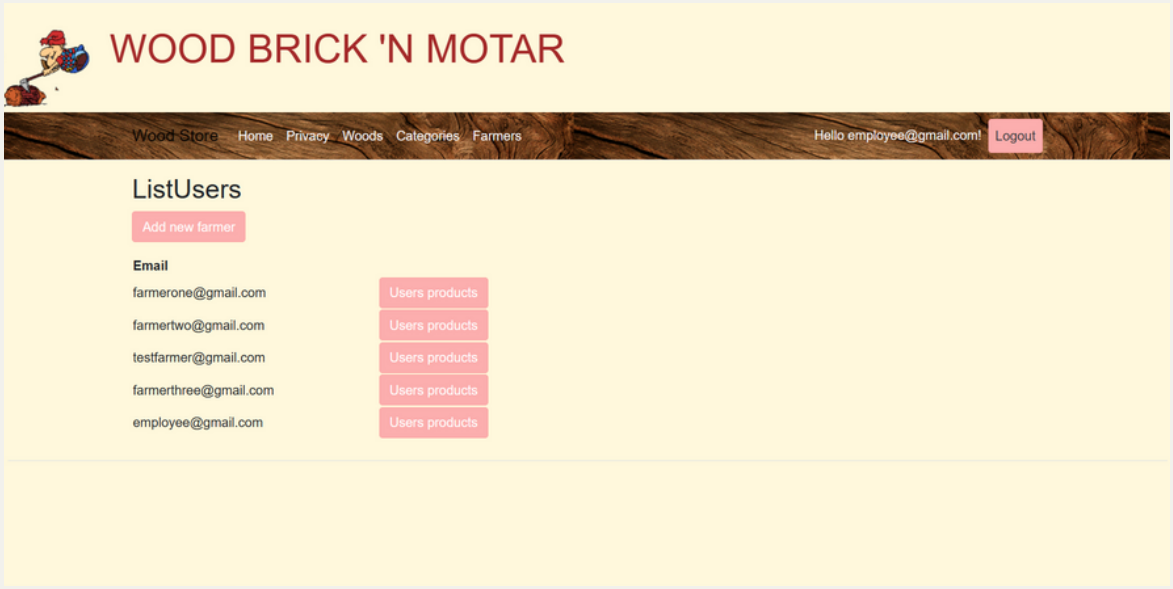
The website's home page acts as its primary landing page, giving users a summary of its content and navigational options. Users can access different pages of the website via the navigation bar, which is often found at the top of the main page. The "Home," "Privacy," "Woods," "Categories," "Farmers," are available pages in this website. Users can securely sign out of their accounts using the logout option. It is located in the top left corner of the user accounts. When a user selects the logout option, the logout procedure is launched.



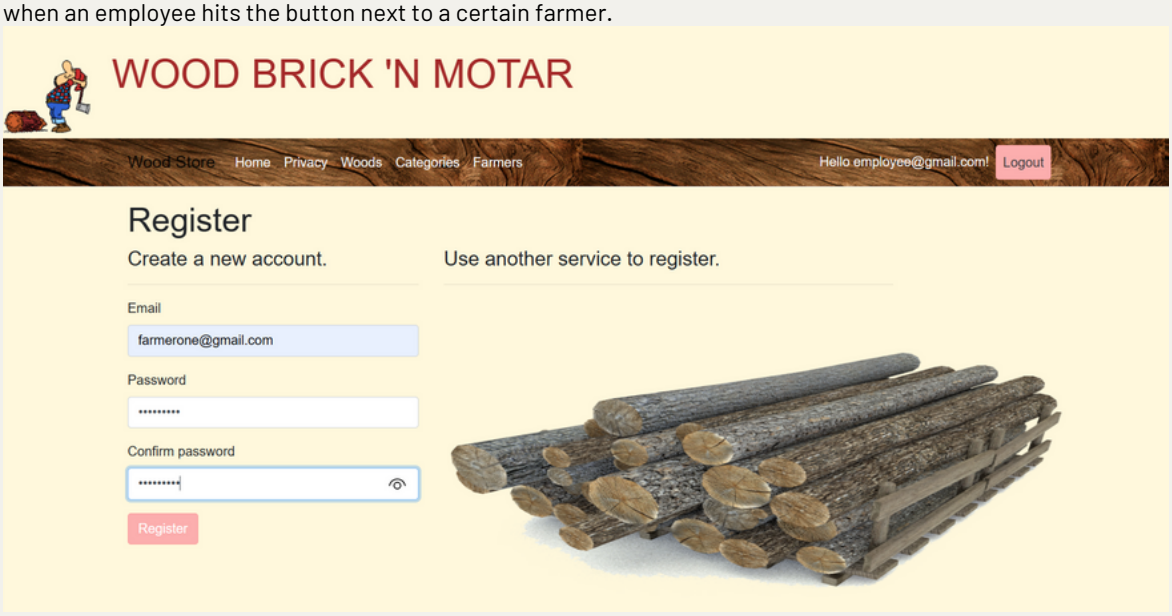
This privacy page is a web page that describes how user information is gathered, utilized, safeguarded, and shared on a website. The types of data gathered, the uses for which they are used, whether or not the data is shared with third parties, data security measures, user rights and choices, policy changes, and contact information for privacy-related questions have been covered. The privacy page's objectives are to educate users about their privacy rights and to be transparent about how the website handles user data.



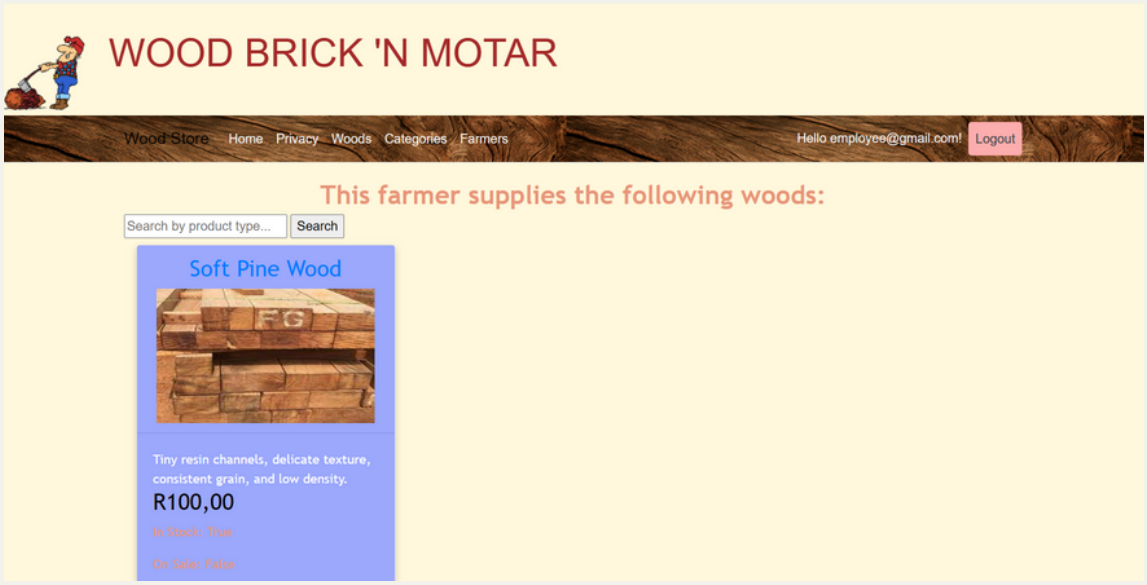
Areas of a website known as restricted pages are accessible only to particular users or user groups. An "access denied" warning appears when unauthorized individuals attempt to access these pages. This is accomplished through systems for user roles, permissions, and authentication. The goal is to safeguard functions and sensitive information.



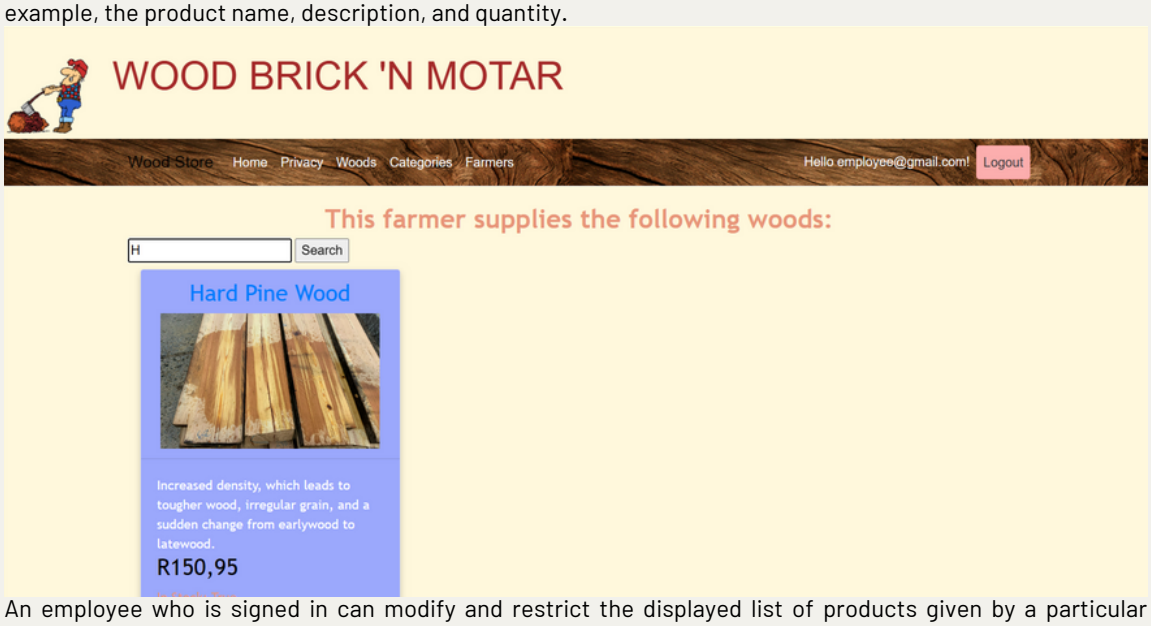
This webpage on the website is designated for employees logged in. This is the "Farmers" page. Its goal is to handle farmer accounts and the items that go along with them. There is a "Add new farmer" button on the "Farmers" page. This button starts a procedure to create a new farmer account when an employee clicks on it. All of the registered farmers in the database are listed on the "Farmers" page as well. This list gives a general overview of the current farmer accounts and their identifying details. Every farmer featured on the website has a "User products" button next to their name. A new page or segment featuring that farmer's items is displayed when an employee hits the button next to a certain farmer.



The website page provided is an employee registration page where they can create new farmer accounts. There is a "Add new farmer" button on the preceding page. This button starts the process of creating a new farmer account when an employee clicks on it. The worker enters the email address of the farmer. This acts as a special identification number and will be used to log in. The worker assigns the farmer's account a password. A password confirmation area is necessary to ensure correctness and prevent any mistakes when entering the password. After completing the relevant fields, the employee clicks "Submit" to continue creating the new farmer account. The online application launches a procedure to evaluate the entered data and create the new farmer account after the employee clicks the submit button. The system verifies that the password and its confirmation are same and that the email address has not previously been registered. The new farmer account details, including the email and password, are added to the database if the entered data successfully undergoes validation. The farmer can now use the supplied credentials to access their account in the future.

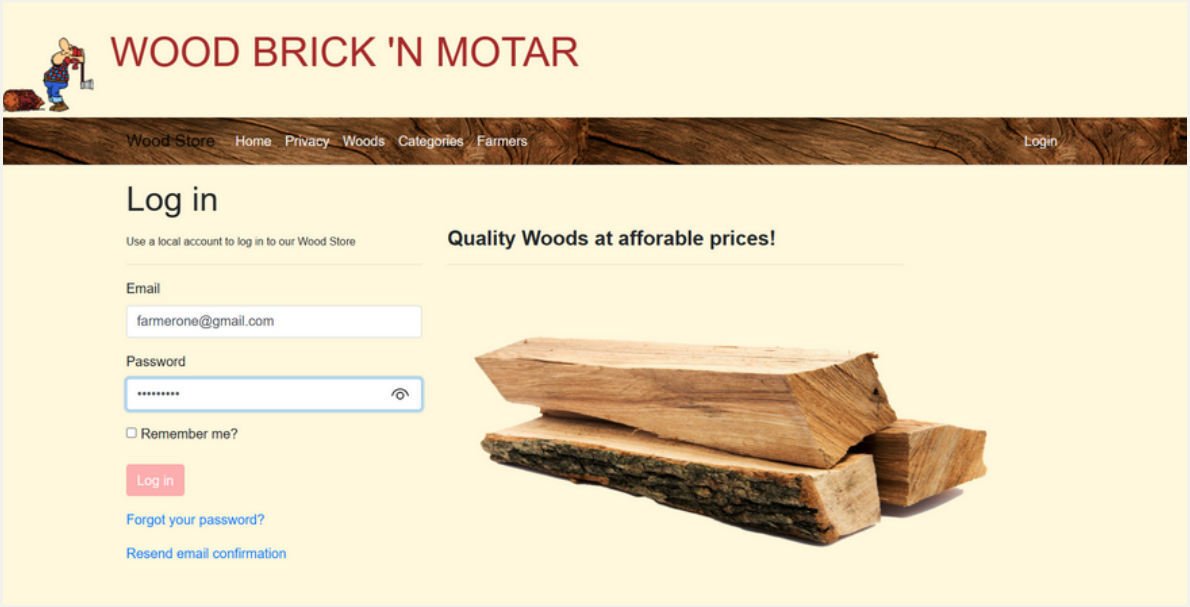


Employees can access and control the products connected to certain farmers on the aforementioned website. A list of farmers is shown on the previous page, which might be the "Farmers" page, along with any pertinent information. A "User products" button is connected to each farmer on the list. After selecting the "User products" button, a new page or section will emerge that is specifically designed to show the products entered by the chosen farmer. For the purpose of clearly presenting the product information, this page often uses a list structure. The employee has access to the specifics of each product linked to the chosen farmer. Depending on the particular needs of the system, these particulars could also comprise other information. For example, the product name, description, and quantity.

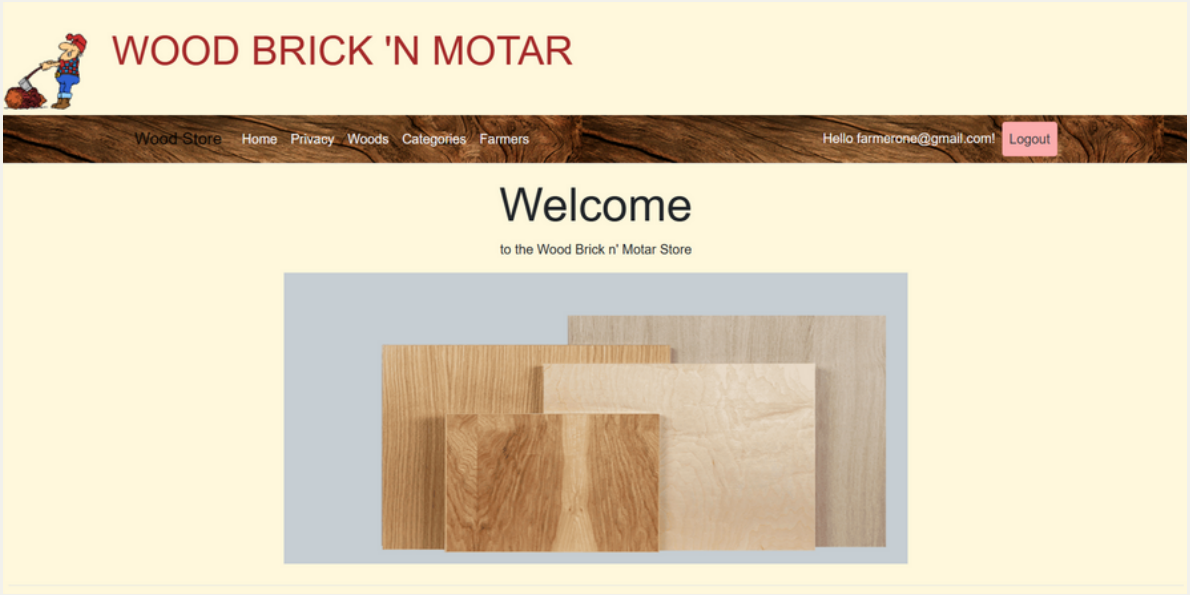


An employee who is signed in can modify and restrict the displayed list of products given by a particular farmer depending on the date range or product category using the search bar with filtering functionality on a web page. The employee can enter the desired start and end dates in the relevant areas if they wish to filter products based on a certain time frame. An input option is available in the search bar so that the employee can choose or enter the required product type.The employee initiates the filtering process by pressing a "Filter" or "Search" button connected to the search bar after inputting the pertinent filtering parameters. A new list of products given by the particular farmer that meet the defined filtering criteria is subsequently updated and shown on the website. Only items from the selected date range or of the selected product type will be displayed in the list. By enabling staff to easily locate and work with the appropriate subset of items given by a certain farmer, it improves efficiency and saves time and effort in product management and analysis.

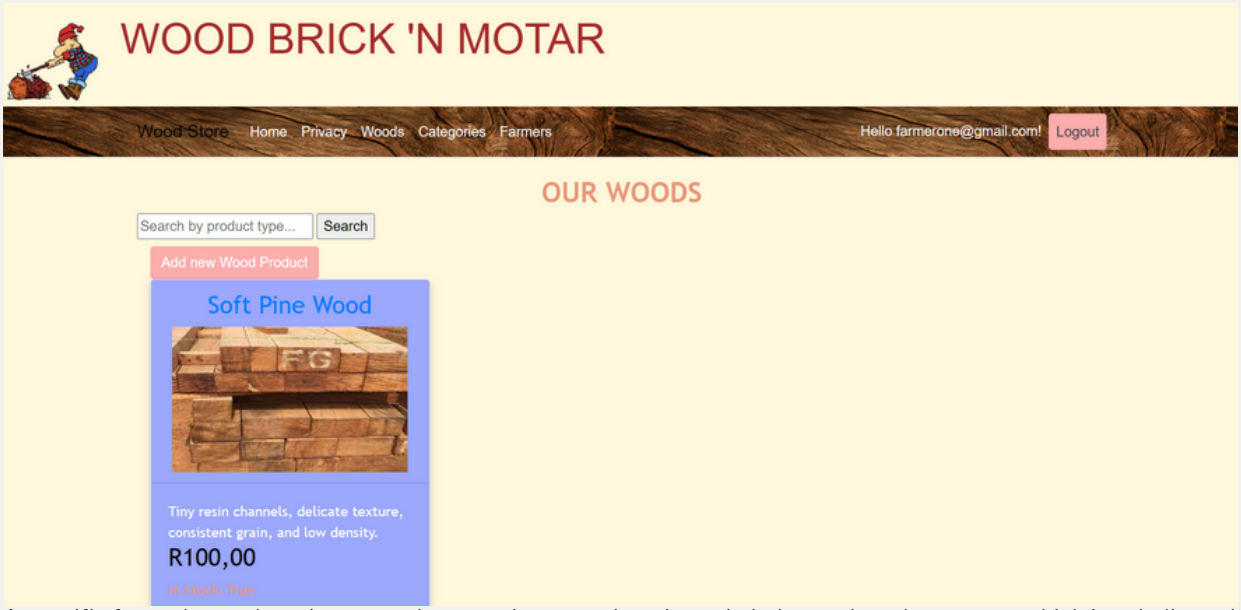
Farmers POV



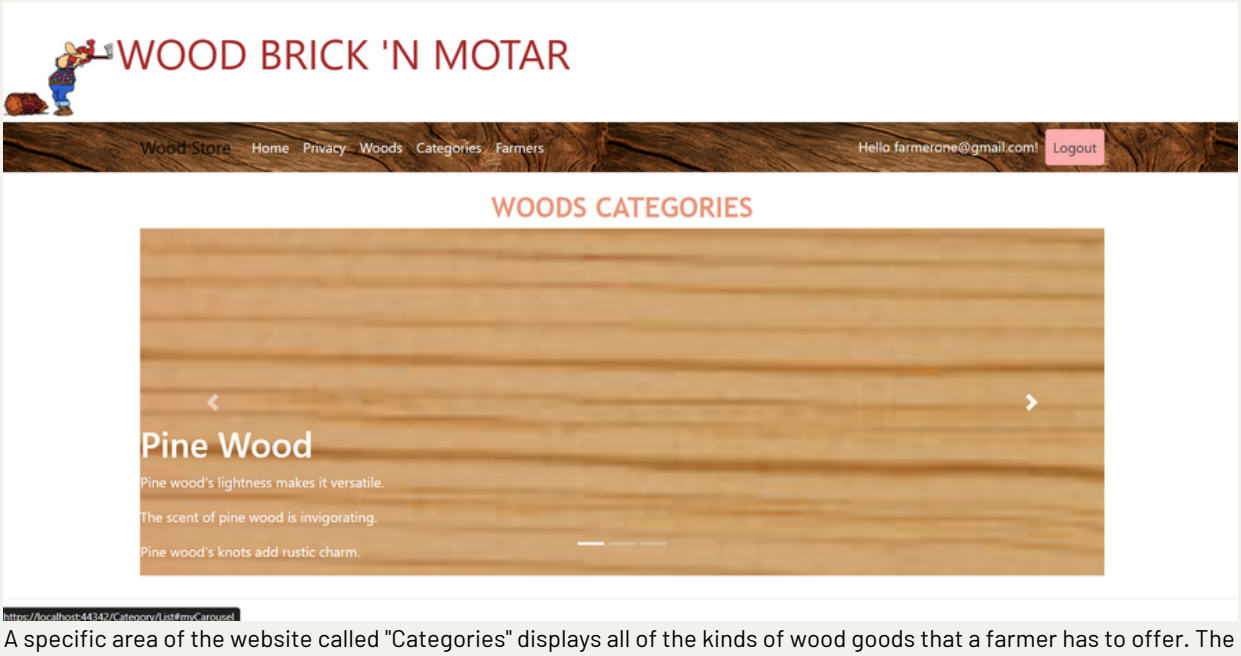
This login page's goal is to make sure that only farmers who have registered and whose credentials are current can access their accounts on the website. The page makes the login process easier and provides secure access to the farmer's unique information, services, or website features by requesting their email and password.



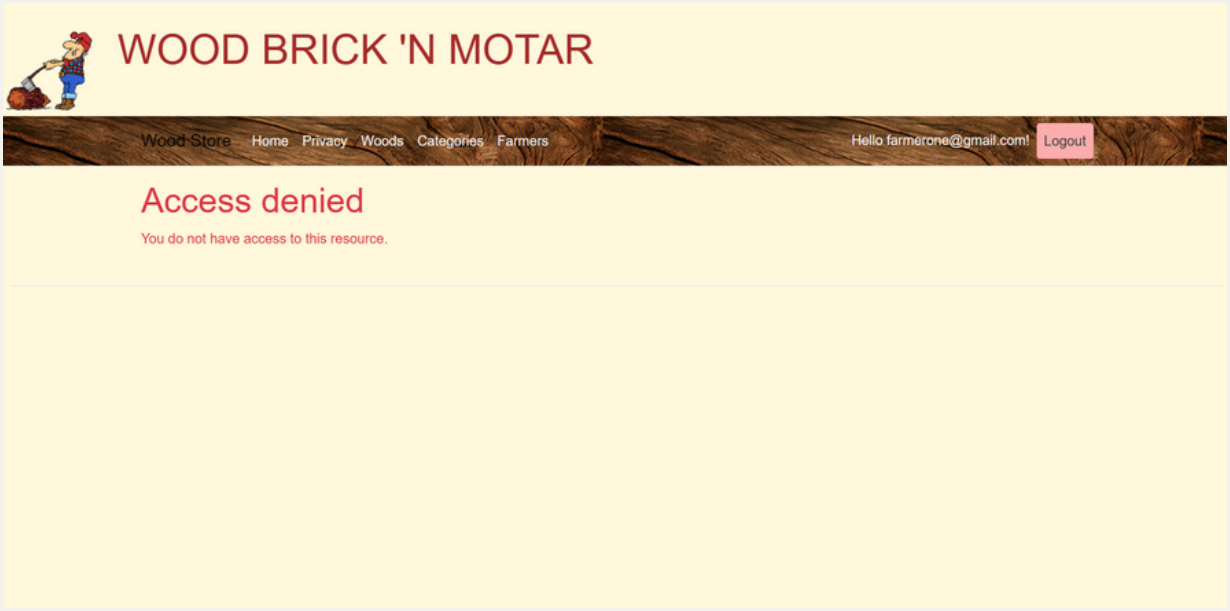
A logged-in farmer's home page acts as the main hub through which users may access numerous features, data, and functionality pertaining to their account and farming endeavors. To make it simple to access the website's various parts and functions, a navigation menu is available on the home page. "Home," "Privacy," "Woods," "Categories," and "Farmers," among other options, might be found on this menu.



A specific farmer's wood products are shown and managed on the website's wood products page, which is a dedicated component.Users can utilize the search filter on the wood products page to look for particular wood items using the product name. There is a noticeable "Add New Wood Product" button on the page for wood products. The farmer can add a new wood product to their inventory by clicking on this button. It starts a process that the farmer can use to input pertinent information about the new product. A detailed view of a particular wood item in the list can be accessed by clicking on it. Additional data about the wood product, such as the product description, dimensions, supplier information, or any other pertinent information, may be included in the detailed view.

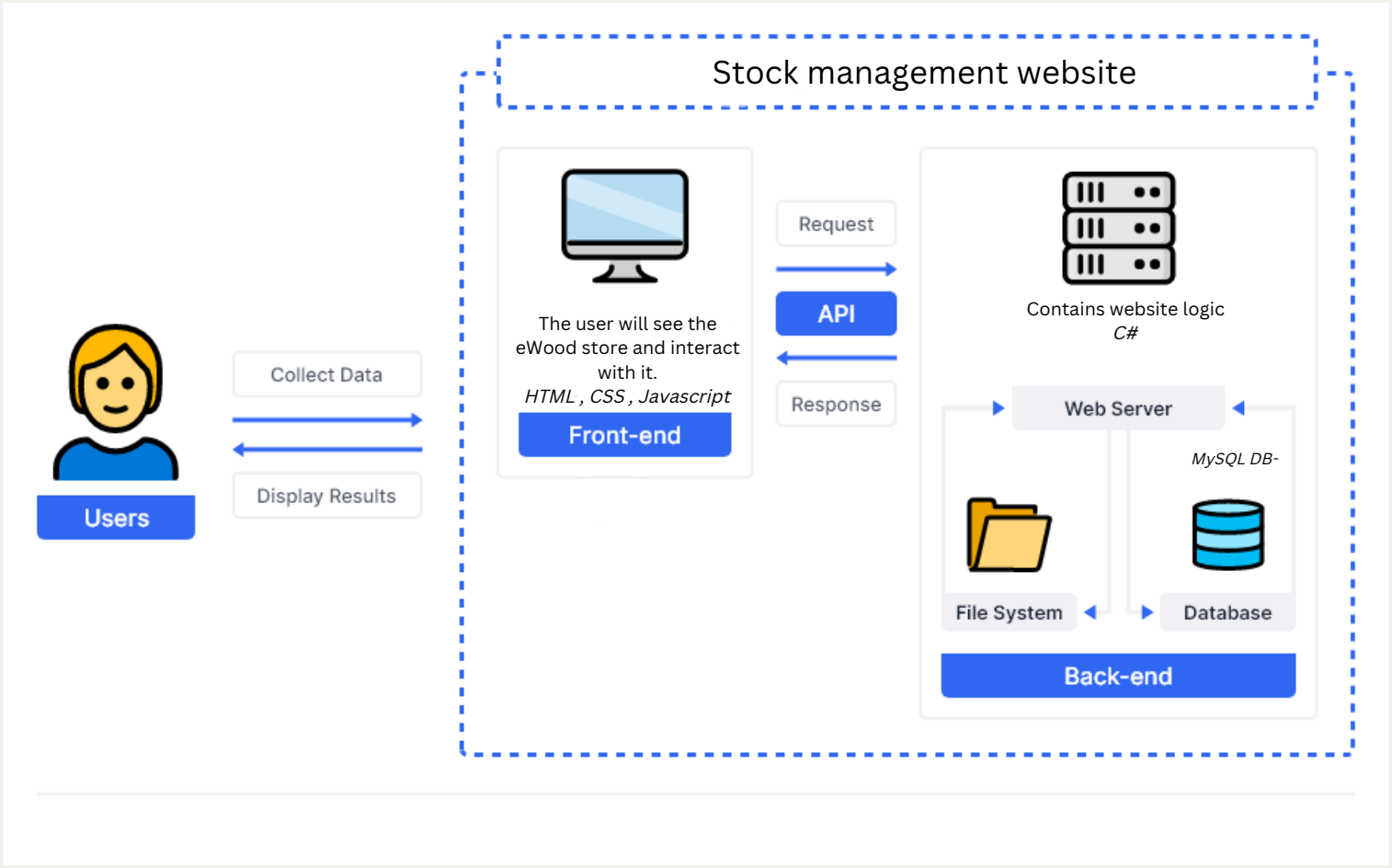


A specific area of the website called "Categories" displays all of the kinds of wood goods that a farmer has to offer. The "Categories" page makes use of a carousel, a dynamic component that highlights several categories of wood items. Users can scroll or explore among the different categories horizontally, one at a time, using the carousel. Each category of wood items has a description next to it on the carousel. This description offers pertinent details about the particular category of wood, such as its traits, applications, or any other facts that could aid the farmer in comprehending and differentiating the categories.On the "Categories" page's interactive carousel, the farmer can swipe horizontally on touch-enabled devices or click on navigation icons to move between the various categories. This makes it simple to explore the various wood product categories that are offered.



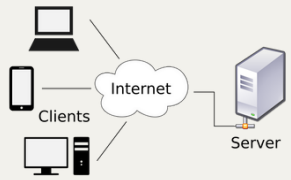
Farmers won't be able to view the "Farmers" page because only certain users or user roles are allowed access to it. Based on user roles or permissions, the website implements access control techniques that limit access to specific pages. It is configured to limit access to the "Farmers" page to a subset of users or user roles, such as workers.The website's access control system detects that the farmer's user role lacks the essential credentials to view that page when the farmer clicks on the "Farmers" page in an effort to access it. The website informs the farmer that they do not have permission to view the "Farmers" page by displaying a "Access Denied" message. If the farmer thinks they should have access, the message normally instructs them to get in touch with an administrator or apply for the necessary authorisation.

Client-server Website Architecture



Technical details for the Stock Mangement Website

Client-server archiecture



Programming languages

Database management

Security Measures

API's and intergrations

Server-Side Technologies

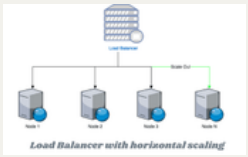
Responsive Design and measures

Performance Optimzation

Version Control and Deployment

Analytics and Monitoring

Scalability



Conclusion

With a focus on critical elements including performance optimization, agile methodology, FDD, MVC architecture, DevOps, TOGAF, and the Zachman Framework, this report concludes by offering a thorough overview of the software development process for a website. Techniques like database tuning and code optimization highlight the importance of having a responsive website and providing a seamless user experience. Iterative development is made possible by the agile methodology, and a methodical approach to feature delivery is ensured by FDD. The use of the modular, maintainable MVC design and the incorporation of DevOps principles improve communication and encourage timely software releases. Using industry-standard frameworks like TOGAF and the Zachman Framework can help with decision-making, allowing better communication, and aligning the development process with business objectives. Users are given access to real-time inventory updates thanks to the technical solution for safe stock management that is being offered. In summary, this report emphasizes the value of using these frameworks, processes, and practices to build a strong and user-friendly website.

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Thank You