D424 – Software Capstone

Task 2

Capstone Proposal Project Name:	Inventory Management Application Proposal
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Business Problem

The Customer

PurpleCat PC Store specializes in creating custom computer systems for individuals and businesses. Operating in a competitive market, they prioritize customer needs and aim to deliver high-quality, affordable custom computer systems. They operate as a small store in the PC customization market. The company is managed by a passionate owner who manages both daily operations and long-term plans. The mission of PurpleCat PC Store is to provide high-quality, affordable, custom computer systems that meet the unique needs and budgets of its clients.

As the business offers a wide range of customization options and services, tracking the availability of parts and finished products has become increasingly complex. Manual inventory management methods are no longer sufficient, leading to issues like stockouts, overstocking, and missed sales opportunities. The existing processes are time-consuming and prone to errors, impacting operational efficiency and customer satisfaction. In anticipation of further growth, PurpleCat PC Store recognizes the urgent need for an automated Inventory Management Software solution to effectively manage inventory and enhance the overall customer experience.

Short-Term Goals:

PurpleCat PC Store has several short-term goals to improve their operations. Firstly, they plan to enhance their order management system to ensure a more efficient process for customers. By doing so, they aim to increase customer satisfaction by ensuring that all custom PCs meet or even exceed customer expectations. Additionally, PurpleCat PC Store intends to transition from manual record-keeping to a robust IT solution. This will not only enhance their ability to serve customers but also enable them to effectively manage their inventory. By implementing this technology, they will be better equipped to handle their increasing customer base and optimize internal processes.

Long-Term Goals:

In the long term, PurpleCat PC Store aims to expand their market reach and diversify their product offerings. The company is dedicated to establishing itself as the premier destination for custom-built PCs by providing superior products and exceptional customer service.

The PurpleCat PC Store is aiming for significant growth in both their customer base and operations. To achieve this, they plan to expand their services and product line, with the goal of increasing their market share.

Business Case

The PurpleCat Pc Store is currently facing a significant challenge with their inventory tracking system. The current system has a limited ability to effectively monitor and keep track of product availability, causing uncertainty about stock levels. This makes it very hard for the staff to fulfill orders promptly and accurately. Assembling custom computers is a significant part of their business. PurpleCat PC Store struggles to link the various computer parts effectively. This difficulty means they sometimes face issues in ensuring that all the necessary components are available for customer requests. The manual inventory management method is error-prone, time-consuming, and does not provide a clear view of inventory. This can result in stockouts or overstocking, which can have negative implications for the business.

The proposed software application is a user-friendly, real-time inventory tracking system. It will offer features to customize products and parts tracking. An advanced feature of the system will be able to anticipate when specific parts might run low based on sales data and preventing stockouts. This application offers a centralized database for efficient inventory management, providing real-time updates for staff.

Fulfillment

The application focuses on being easy to use. It offers an intuitive interface accessible via web browsers or a special computer program. The interface features dashboards and menus for easy navigation, making it easy for all staff, whether they have experience or not.

The application will offer real-time inventory tracking. As products are purchased or new stock is received, it will be instantly updated in the system. Staff can search for specific items, view product details, and monitor current stock levels in an instant. This ensures that staff have access to the most accurate information, minimizing the risk of overstocking or stockouts.

PurpleCat PC Store will have the flexibility to customize the application according to their specific needs. This includes the ability to create custom categories, list components specific to custom computer builds, and manage individual items with ease. For assembling custom computers, the application allows the easy tracking of individual parts. Staff can link the necessary parts for each build, making it simpler to ensure that all required parts are in stock.

The system will utilize predictive analytics to anticipate when certain items may run low. It will provide suggestions for reordering quantities based on sales data. This feature helps in proactive inventory management, minimizing the risk of running out of popular products.

The system interfaces with the vendor management system for order history, vendor information, and procurement statuses. It maintains a centralized database for inventory-related information, storing product descriptions, part details, vendor information, and pricing data. All changes, additions, or deletions to the inventory will be instantly updated, offering real-time visibility to the staff.

Authorized staff will have unique login credentials to access the system. Their access to different parts of the system will be based on their specific roles in the store. This way, different staff members will have different levels of access to features and information.

The users can generate reports on specific product categories or parts to gain a deeper understanding of their inventory. These reports will provide insights into inventory levels, sales trends, and reorder suggestions.

SDLC Methodology

To support the development of the Inventory Management Software for PurpleCat PC Store, we have chosen the Agile software development life cycle methodology. The Agile methodology is well-suited for this project due to its iterative and flexible approach, which allows for changes to be made as the project progresses. PurpleCat PC Store operates in a competitive market, and the ability to adapt to changing customer needs and market trends is essential. Agile methodologies emphasize flexibility and rapid response to changes, with an emphasis on customer collaboration throughout the development process to ensure the software closely aligns with the customer's evolving needs. PurpleCat PC Store anticipates rapid growth and changes in their operations, and Agile's iterative approach will enable us to adapt to these changes effectively. Agile promotes the delivery of working software in small increments, ensuring that PurpleCat PC Store can realize the benefits of the software without waiting for a lengthy development cycle. Agile emphasizes continuous testing and validation, ensuring that the inventory management software effectively meets the client's needs.

Agile Methodology Phases

1. Planning and Requirements Gathering: During this phase, we will define the project scope and initial requirements. Customer collaboration ensures that the software product will meet the specific needs of PurpleCat PC Store.

2. Development: The project will be broken down into 1 to 2-week iterations and will focus on implementing specific features or functionalities. At the end of each iteration, PurpleCat PC Store reviews and provides feedback.

3. Testing and Quality Assurance: Testing is integrated into each iteration. Agile methodology emphasizes continuous testing, ensuring that the software is thoroughly checked

for quality at every stage of development. This aligns with the goal of delivering a high-quality inventory management application.

4. Implementation and Deployment: Once the software meets PurpleCat PC Store's requirements and passes acceptance testing, it will be deployed in a production environment. Deployment will be staged to ensure minimal disruption to the business.

5. Ongoing Maintenance and Enhancement: The Agile methodology involves continuously maintaining and enhancing a system based on real-world usage and feedback. We will continue to work with PurpleCat PC Store to address any issues, make improvements, and add new features as needed.

Deliverables

There are several deliverables associated with the Agile methodology used in this project.

Project Schedule: This detailed schedule will outline when each development iteration will begin and end, along with the specific goals for each iteration. For example, a Gantt chart detailing when each iteration begins and ends.

Software Prototypes: Functional prototypes of the software developed in each iteration. Prototypes allow clients to visualize the software's features and provide early feedback. For example, a working prototype of the inventory tracking system at the end of the first development iteration.

Incremental Software: At the end of each iteration, an increment of working software is delivered. For example, after the first iteration, a functional search feature that allows staff to find products in the inventory may be delivered.

User Stories: Detailed descriptions of features, including how they should function and how they will be tested. User stories explain how a feature will benefit the user. For example, a user story might describe how the inventory tracking feature should allow users to search for products and view stock levels.

User Documentation: User manuals, help guides, and documentation to assist end-users in understanding how to use the application. This may include tutorials, FAQs, and guides on various features. For example, a user guide explains how to search for products in the application.

Source Code: The source code of the application, which is continually developed and updated in each iteration. This includes code files, scripts, and configurations. The source code is stored in version control systems like GitLab.

Quality Assurance: Include test plans, test cases, and test reports as deliverables for each iteration. This will ensure that the software is thoroughly tested and meets quality standards.

Change Requests: Documentation of any changes or modifications to the project scope or requirements, as the project evolves based on client feedback. An example is a change request document that outlines the addition of a new feature based on client feedback.

Deployment Plan and Outcomes

The deployment of the Inventory Management Application will be carefully planned to minimize disruption to PurpleCat PC Store's daily operations. Given the nature of an Agile project, deployment occurs incrementally. The implementation is phased, and ongoing monitoring will take place.

Validation and Verification: Before each deployment phase, a comprehensive testing process will be executed to ensure the software aligns seamlessly with the client's requirements. This process encompasses unit testing, integration testing, user acceptance testing, and performance testing, providing assurance of quality and reliability.

User Training: Training sessions for store staff will be conducted as features become available. This ensures that all users are well-prepared to utilize the new inventory management system effectively. Training content will align with the delivered features and will be continually updated as new functionalities are introduced.

Ongoing Maintenance: After the initial deployment, our team will continue to provide support, addressing any issues or updates as required. This ensures the software operates smoothly within the client's production environment.

Scalability: The deployment plan will also address the scalability of the system to accommodate the anticipated growth of PurpleCat PC Store. As the store expands and adds more products and services, the application will be designed to scale accordingly, ensuring it remains responsive and efficient.

During the deployment phase, the following personnel and roles will be essential for a successful transition:

Project Manager: The Project Manager will oversee the deployment process, ensuring it aligns with the project's objectives and timeline, and the client's specific needs. They will coordinate with the deployment team and maintain ongoing communication with PurpleCat PC Store, ensuring user training aligns with the delivered features..

Developers: The developers are responsible for configuring, integrating, and deploying the application. They must complete configuration and integration for each increment before the deployment phase can begin.

Project Timeline

This timeline outlines the main phases of the project, their durations, and their dependencies. It's essential to note that this timeline is subject to change based on feedback, iterations, and evolving client needs, which is inherent to the Agile approach. The Agile methodology will ensure that the project remains adaptive to changes and client feedback, delivering an inventory management software solution meets the PurpleCat PC Store's requirements.

Phase	Milestone/Task	Deliverable	Description	Dates
Planning and Requirements Gathering	Task 1	Project initiation, requirements documented, and project plan.	Start the project with an initial meeting to gather requirements from PurpleCat PC Store and create a project plan.	10/1/2023 – 10/7/2023
Software Prototyping and Development	Task 2	Functional prototype of the inventory tracking system and initial software increment.	Begin the development process by creating a functional prototype of the inventory tracking system. Also, deliver the initial software increment, showcasing essential features.	10/8/2023 – 10/14/2023
Quality Assurance and Testing	Task 3	Comprehensive testing and software verification.	Conduct thorough testing, including user acceptance testing, to ensure the software aligns with requirements	10/15/2023 – 10/21/2023
User Training	Task 4	Train PurpleCat PC Store staff in the usage of the new system.	Conduct training sessions for store staff on using the new system	10/22/2023 – 10/28/2023

Quality Assurance	Task 5	Documentation updates, and issue resolution.	Continuous testing, addressing client feedback, and improving the software.	10/29/2023 – 11/4/2023
Final Testing and Complete Deployment	Task 6	Final Testing and Full Deployment	Test the entire software and execute a full deployment into the live environment.	11/5/2023 – 11/11/2023

Environments and Costs

Programming Environment

Hardware:

Each team member will have a workstation with a quad-core processor and a minimum of 16 GB of RAM. High-resolution displays for comfortable coding and design work. Sufficient storage space will be available for project files, code, and development tools. Basic networking equipment will be required for local development, including routers and switches.

Software:
- Backend Development: ava Spring Boot is the chosen framework for robust backend development, forming a solid foundation for application logic.
- Integrated Development Environments: Utilize IntelliJ IDEA for Java coding, debugging, and testing, along with Visual Studio Code for frontend development and collaborative work.
- Front-End Development Tools: Employ HTML, CSS, SCSS, JavaScript, and React to create a user-friendly and responsive interface.
- Database System: MySQL will be the chosen database system, providing a reliable and scalable database solution to store and manage data.
- Version Control and Collaboration: GitLab is the platform for source code management, enabling version control, collaboration, and project tracking.
- Web Server for Deployment: Heroku and Supabase are cloud-based deployment platforms offering scalability, reliability, and efficiency for hosting the PurpleCat PC Store application.

Environment Costs

- Workstations for Team Members:

  Each team member will have a workstation with a quad-core processor and a minimum of 16 GB of RAM. High-resolution displays are provided for comfortable coding and design work.

  Cost: The one-time setup cost for workstations and displays is estimated at $2,000 per team member.

- Local Development Networking Equipment:

  Basic networking equipment, including routers and switches, is required to support local development and testing.

  Cost: The one-time setup cost for networking equipment is estimated at $500.

- Integrated Development Environments (IDEs):

  Code editing and development will be done using Intellij IDEA and VS Code.

  Cost: Licensing costs for Intellij IDEA are estimated at $199/year per developer.

- Version Control System:

  Source code management will be handled using GitLab, which offers a free open-source version.

  Cost: Minimal costs for server hosting and maintenance are estimated at $100 per year.

- Web Server for Deployment:

  For deployment, we will consider options such as Heroku or Supabase. Costs may vary depending on usage.

  Cost: Estimated hosting and usage costs, specific to the chosen web server platform are approximately $1,000 per year.

Human Resource Requirements

The project is managed by a two-person team, with each member taking on multiple roles. This team comprises a Project Manager and a Developer. The estimated time and labor cost to complete the project are as follows:

- Project Manager:

  Estimated Time Allocation: Approximately 15 hours per week throughout the 6-week period.

Estimated Labor Cost: At a rate of $100 per hour, the total cost for project management for the 6-week duration is approximately $9,000.

- Developer:

Estimated Time Allocation: Approximately 20 hours per week throughout the 6-week period.

Estimated Labor Cost: At a rate of $100 per hour, the total cost for development for the 6-week duration is approximately $12,000.

The total labor cost is $21,000.

Validation and Verification

Validation and Verification Process:

Ensuring that the software application functions to meet the customer's needs is crucial in our project. We have established methods and testing procedures to guarantee the delivery of required functionality. The testing processes will be performed by different members of the development team.

- Unit Testing: This is the initial testing phase where individual units or components of the application are tested independently. Developers will be responsible for unit testing their code to verify that each part of the software functions as intended.

    The results of unit testing will be analyzed to identify and correct issues at the code level. Any discrepancies between expected and actual outcomes will be investigated and resolved.

- Integration Testing: Integration testing ensures that different software components interact seamlessly. Our development team will integrate various parts of the application in stages, and integration tests will be conducted at each step. Developers and the Project Manager will be involved in integration testing to validate the interactions between different components.

    Analysis of integration testing will focus on ensuring that different components work together without conflicts. The results will highlight integration issues or data flow problems.

- Functional Testing: To ensure the software application provides all required functionality, various tests will be conducted to verify that the system performs its intended functions. These tests will be carried out by the development team.

The analysis of functional testing results will determine if the software meets all specified requirements. Deviations will prompt further development or adjustments to align with customer needs.

- User Acceptance Testing (UAT): PurpleCat PC Store, the customer, will conduct UAT to validate that the application meets their specific needs and expectations. They will perform acceptance testing in a real-world environment, simulating how the software will be used in their daily operations. The customer, along with our Project Manager and Developer, will be actively involved in UAT.

  UAT results provided by the customer are the ultimate measure of whether the software meets customer needs. A successful UAT indicates that the software is ready for deployment.

- User Testing: PurpleCat PC Store employees will participate in the testing process, reporting issues, and providing feedback. This user feedback will be crucial for refining the software and making necessary improvements.

  Feedback provided by PurpleCat PC Store employees will be analyzed for any usability issues and suggestions for improvements. This input will be considered for further refinements.

- Performance Testing: The application's performance will be assessed to ensure it operates efficiently and can handle the expected workload. This will help identify and address potential bottlenecks and scalability issues.

  Performance test results will be analyzed to identify bottlenecks or issues related to the application's responsiveness and scalability. Improvements will be made based on the findings.

- Documentation Review: The quality and completeness of user documentation will be assessed. This includes user manuals, guides, FAQs, and other resources intended to assist end-users in understanding and effectively using the application. The development team will be responsible for ensuring that user documentation is comprehensive and accurate.

  The documentation will be assessed for completeness, clarity, and accuracy. Any shortcomings will be addressed to ensure that end-users can effectively utilize the software.