**D424 – Software Capstone**

**Task 2**



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# **Business Problem**

**The Customer**

PurpleCat PC Store is a business that prioritizes the needs of its customers, focusing on creating personalized computer systems for both individuals and businesses. The store operates in a competitive market, serving a wide range of customers with different needs and preferences. They operate as a small store in the PC customization market. The company is managed by a passionate owner who actively manages both daily operations and long-term strategic planning. The mission of PurpleCat PC Store is to deliver high-quality, affordable, customized computer systems that meet the unique needs and budgets of its clients. It provides not only hardware but also offers technical support, maintenance, repair, and installation services.

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 potential 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.

PurpleCat PC Store has set 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.

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. As a result, there is often uncertainty regarding which items are in stock and the exact quantities available. This uncertainty poses a challenge for the staff in fulfilling 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. Manual inventory management method is error-prone, time-consuming, and does not provide a comprehensive view of the inventory situation. This lack of accurate inventory information can ultimately lead to situations of stockouts or overstocking, which can have negative implications for the business.

The proposed software application will be a user-friendly, real-time inventory tracking system. It will offer features to customize product and part tracking. An advanced feature of the system will be predictive analytics. It will anticipate when specific parts might run low based on historical sales data and trends, and then suggest reorder quantities. This foresight will prevent stockouts and ensure items are replenished at the right time. This application will provide a centralized database to streamline inventory management, ensure consistency, and provide real-time updates for staff.

## **Fulfillment**

The application will be designed with simplicity and intuitiveness in mind. It will feature a clean and user-friendly graphical interface accessible through standard web browsers or a dedicated desktop client. The user interface will comprise visually appealing dashboards and easily navigable menus, ensuring that both experienced staff and newcomers can efficiently use the system.

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. This feature allows for precise monitoring of parts required for custom PC assembly. 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 historical sales data and trends. This feature helps in proactive inventory management, minimizing the risk of running out of popular products.

It will interface with the vendor management system to provide insights into order histories, vendor information, and procurement statuses. The application will feature a centralized database as the repository of all inventory-related information. This database will store 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.

All authorized staff members will have unique login credentials to access the system. Permissions can be tailored to their roles within the store, with different staff having varying levels of access to features and data.

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**

Considering the nature of your project, select a Software Development Life Cycle (SDLC) methodology that will be used to manage the project. Those may include…………. Be sure to describe the process you select first and why it’s a good fit. Then review the methodology phases and what part of the project will align with each. It is important to be clear about what is being proposed.

For the successful development of the Inventory Management Software for PurpleCat PC Store, we propose to utilize 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 dynamic and 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. Agile emphasizes customer collaboration throughout the development process, ensuring that the software closely aligns with the customer's evolving needs. PurpleCat PC Store anticipates rapid growth and changes in their operations. Agile's iterative approach will enable us to adapt to these changes effectively. Agile promotes the delivery of working software in small increments. This will allow PurpleCat PC Store to start realizing the benefits of the software sooner rather than waiting for a lengthy development cycle to complete. 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, gather initial requirements. Agile's focus on 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 iterations, typically 1 to 2 weeks in length. and will focus on implementing specific features or functionalities. At the end of each iteration, the owner from PurpleCat PC Store will have the opportunity to review and provide 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**

Provide information about what deliverables are related to your SDLC method. List and describe those deliverables. Also, include examples to help clarify what specific type of artifacts will qualify.

Deliverables

There are two main types of deliverables associated with the Agile methodology used in this project: project deliverables and product deliverables.

Project Deliverables

Project Schedule: This detailed schedule will outline when each development iteration will begin and end, along with the specific goals for each iteration.

*Example*: A Gantt chart detailing when each iteration begins and ends.

Test Plans: Detailed test plans will be provided for each iteration, specifying the testing objectives and criteria for success.

Release Plans: Plans outlining the deployment of the software to the production environment in phases, indicating which features will be deployed in each release.

*Example*: A release plan that specifies which parts of the inventory management software will be deployed during the first iteration.

Change Requests: Documentation of any changes or modifications to the project scope or requirements, as the project evolves based on client feedback.

*Example*: A change request document that outlines the addition of a new feature based on client feedback.

Requirements Traceability Matrix (RTM): This matrix will ensure that each requirement is linked to the corresponding functionality within the software. It will be updated continuously throughout the project to maintain alignment with evolving requirements.

Product Deliverables

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 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. A change request document that outlines the addition of a new feature based on client feedback.

# **Deployment Plan and Outcomes**

Explain how the project will be deployed. This has to do with how the software application will be put into the production environment, not how it will be created. So, consider the customer and timing required to meet its needs. When will validation and verification take place? What personnel will be part of the implementation and what roles will they serve?

The deployment of the Inventory Management Software 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: Prior to each deployment phase, a comprehensive testing process will be executed to guarantee that the software aligns seamlessly with the client's requirements. This process encompasses unit testing, integration testing, user acceptance testing, and performance testing, offering an assurance of quality and reliability.

User Training: As features become available, training sessions will be conducted for store staff. 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 that 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 that it aligns with the project's objectives and timeline, and the client's specific needs.They will coordinate with the deployment team and ongoing communication with PurpleCat PC Store and 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, ultimately delivering an inventory management software solution that perfectly meets the PurpleCat PC Store's requirements.

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| Phase | Milestone/Task | Deliverable | Description | Dates |
| *Planning and Requirements Gathering* | Task 1 | Project initiation, requirements documented, and project plan. | Commence project with an initial meeting and gathering of requirements from PurpleCat PC Store. 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 Deploymen | Rigorously 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 at least 16 GB of RAM. High-resolution displays for comfortable coding and design work. Adequate storage space for project files, code, and development tools. Basic networking equipment will be required for local development, including routers and switches.

Software:

* Backend Development: Java Spring Boot is a highly reliable and efficient framework utilized for backend development. It serves as a strong foundation for implementing application logic.
* Integrated Development Environments: IntelliJ IDEA: A Java integrated development environment (IDE) for streamlined coding, debugging, and testing. Visual Studio Code: A code editor for frontend development tasks and collaborative work.
* Front-End Development Tools: HTML, CSS, SCSS, JavaScript, and React. These technologies will be employed to create an intuitive and responsive user interface.
* Database System: MySQL will be the chosen database system, providing a reliable and scalable database solution to store and manage crucial data.
* Version Control and Collaboration: GitLab for source code management, facilitating version control, collaboration, and project tracking.
* Web Server for Deployment: Heroku and Supabase: Cloud-based deployment platforms that offer scalability, reliability, and efficiency for hosting the PurpleCat PC Store application.

## **Environment Costs**

Workstations for Team Members:

Each team member will be provided with a workstation featuring a quad-core processor and a minimum of 16 GB of RAM. High-resolution displays will be provided to facilitate comfortable coding and design work.s

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 performed using Intellij IDEA and VS Code.

Cost: Licensing costs for Intellij IDEA if required, 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, 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, approximately $1,000 per year.

## **Human Resource Requirements**

What is the time and cost for the labor to complete the application?

The project is managed by a two-person team, each member taking on multiple roles. This team comprises a Project Manager and a Developer. he estimated time and labor cost to complete the project are detailed 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 amount is $21,000.

*D.  Explain how the proposed software product will be tested by doing the following:*

*1.  Justify the methods for validating and verifying that the developed software product will meet customer needs.*

*2.  Explain how your test results will be analyzed.*

# **Validation and Verification**

Validation and Verification Process:

Ensuring that the software application functions effectively to meet the customer's needs is of utmost importance in our project. We have established a robust set of methods and testing procedures to guarantee the delivery of all 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 own 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.

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

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

**Functional Testing Analysis:** The functional testing results will be analyzed to determine if the software meets all specified requirements. Any deviations will trigger further development or adjustments to ensure alignment with customer needs.

User Acceptance Testing (UAT): The customer, PurpleCat PC Store, 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.

**User Acceptance Testing Analysis:** The 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 actively participate in the testing process, reporting issues, and providing feedback. This user feedback will be crucial for fine-tuning the software and making necessary improvements.

**User Testing Analysis:** The 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 software'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 Testing Analysis:** Performance test results will be analyzed to identify bottlenecks or issues related to the software'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.

**Documentation Review Analysis:** 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.