Portfolio Project

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Portfolio Project

As technology continues to evolve, there will be new systems put in place that utilize advanced technologies at every level in a company. This project focuses on the development of a Project Management API using Python and Blockchain Technology. We will create a user comprehensive and reliable tool for managing projects by leveraging the versatile programming capabilities of Python and the security of blockchain.

The following sections will define the steps from initial planning to final implementation and explore potential challenges along the way.

Project Overview

Project Name: Project Management API using Python and Blockchain Technology

Project Manager: Brady Chin

Start Date: January 1st, 2025

End Date: December 31st, 2025

Project Description: This projects will be a project management API using python and blockchain technology. This API will have secure and decentralized project management functionalities such as task tracking, resource management, and milestone tracking. Using blockchain technology provides security and verifiability.

Project Scope

In-scope items of this project include the development of the API using Python and the integration of blockchain technology. Task tracking, resource management, and milestone tracking will also be implemented. There will be an easy to understand user interface and the deployment will be on various cloud platforms.

Goal Alignment

The goal of this project will be to develop a secure and decentralized project management API using python and blockchain technology. The end product will be user-friendly and give users an enhanced project management tool to give them a competitive advantage.

Stakeholder Analysis

It is important to define the stakeholders of this project and understanding the key individuals, groups, and entities that will interact with and be impacted by the Project Management API (Project Management Institute, 2021). This analysis is crucial for ensuring that the system is designed to meet the needs and expectations of all stakeholders, from project managers and team members to customers and investors.

Table 1 shows the stakeholder engagement assessment matrix that defines each groups current engagement level and desired engagement level.

Table 1

Stakeholder engagement assessment matrix that defines stakeholders current (C) engagement level and desired (D) engagement level.

Stakeholder	Unaware	Resistant	Neutral	Supportive	Leading
Project Manager					C,D
Blockchain Engineers				C	D
Software Developers				C	D
Upper management			C		D
IT Security		C	D		
Investors	C			D	
Customers	C			D	

Unaware

- **Current stakeholders:** Investors, Customers
- **Reason:** At the development stage of the project, these are the stakeholders that would be unaware that the project exists. This is because the product is still at the early stages of development and has not yet been released to the public.
- **Action:** Once the project is ready to be showcased, customers and investors can be contacted and be given demonstrations on the features and functionality of the product. Once the product has been released, investors and customers will move to a supportive role.

Resistant

- **Current stakeholder:** IT Security
- **Reason:** Because blockchain technology is still relatively new technology, the IT security team may have concerns about how this product will cause security risks to the company.
- **Actions:** Schedule regular meetings with the IT security team and be clear on the features that are being implemented. If any concerns are raised, these will be addressed immediately.

Neutral

- **Current stakeholders:** Upper Management
- **Reason:** Upper management will continue to perform their duties but will not directly contribute to the projects progression at this stage. At this stage, there will be more focus on the design and development of the product.
- **Action:** Continue to involve upper management in the early stages and continue to get their feedback.

Supportive

- **Current stakeholders:** Blockchain Engineers, Software Developers

- **Reason:** Blockchain engineers and software developers will be responsible for the creation of the project. Once a clear direction of the project has been established, the engineers and developers will take on more of a leadership role.
- **Action:** Provide project requirements, deadlines, and goals to ensure that everyone is on the same page. Provide feedback as the project progresses.

Leading

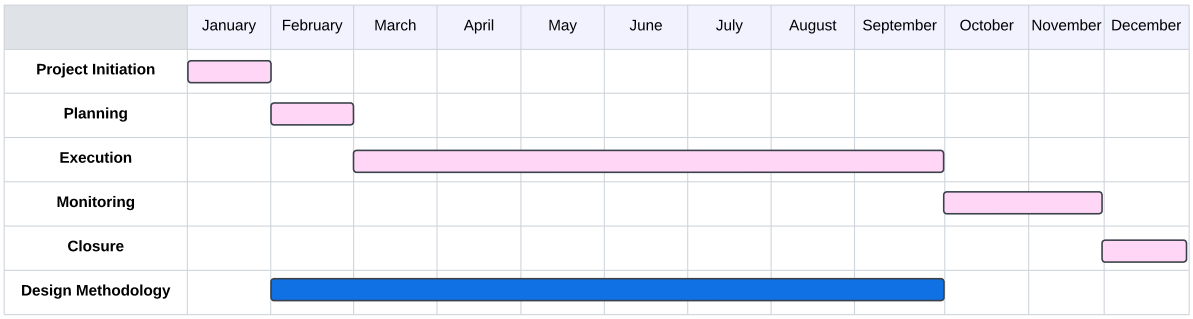
- **Current stakeholders:** Project Manager
- **Reason:** The project manager will need to take ownership and focus on the progression of the project. The project manager will need to assign roles and responsibilities to the necessary stakeholders.
- **Action:** Increase involvement to all stakeholders and ensure that all everyone understands communication channels. Ensure that proper procedures are taken depending on the diversity of the team.

Project Plan Timeline

The development of this project will take place over one year and consist of multiple phases. Figure 1 shows a gantt chart of the timeline of the project plan that is grouped into the work breakdown structure along with the design methodology phase.

Figure 1

Project plan and design methodology timeline.



Work Breakdown Structure

Creating a successful project management plan is important for the success of a project. The Work Breakdown Structure for the project that will act as a road map by breaking the project down into smaller, manageable components (Project Management Institute, 2019).

Project Initiation: The first phase is to define the project goals, objectives, and scope. For this project, we are to design and implement a project management API using Python and Blockchain Technology. We will have to define stakeholders such as software developers, blockchain engineers, and IT security teams.

Planning: The planning phase involves creating a project management plan. This is how the project will be executed, monitored, and controlled. This is the current phase we are at and creating this WBS helpful by breaking down the project into smaller, manageable steps.

Execution: During this phase, the plan should be defined and ready to execute. Teams will start working on their respective tasks and the design and development process will begin. Meetings will be regularly conducted to keep everyone updated and on the same page.

Monitoring: This phase will track the progress of the project and compare it to the project plan. Milestone and deadlines will be monitored. An important part of this phase would be risk management. All teams will report any potential risks that may arise and the team will develop mitigation strategies.

Closure: The closure phase will take place at the completion of all tasks and deliverables. The final project will be handed over to the customer and we will get final sign-offs. Post project meetings will be held to discuss lessons learned and allow the team to reflect on what could be improved for future projects.

Design Methodology

The design methodology is a subset of the project plan and is integrated into the overarching schedule. More specifically, it is integrated within the planning and execution phases as shown in Figure 1.

Having a structured approach to guide the development process is important to ensure the success of the project. Creating a design methodology will help make this process more smooth. The design methodology will consist of 5 phases: defining the problem, research, design and prototyping, testing, and implementation.

Defining Problem

- **Problem Statement:** Identify the need for a secure, decentralized project management API that leverages python and blockchain technology.
- **Stakeholders:** Project manager, blockchain engineers, software developers, upper management, IT security, quality control team, UI/UX designers, investors, customers.
- **Project features:** Task tracking, resource management, and milestone tracking

Research

- **Competitor analysis:** Research competitors products to identify issues, missing features, or potential risks.
- **Explore available resources:** Research python libraries and frameworks that can be implemented into this project. Determine the most suitable blockchain technologies.

Design and Prototyping

- **Conceptual design:** Define the structure of the project. Define process flow, databases, and blockchain integration.
- **Define architecture:** Choose python libraries, blockchain platform, database, and version control system.
- **Prototype:** Develop a prototype of the project with basic functionalities. This will include a basic user interface so that the user can interact with the API. This prototype can be loaded with “dummy” data to simulate the finished product.

Testing

- **Internal testing:** Have the quality team test the prototype and identify any issues. The IT team will perform security testing and ensure that there are no potential threats.

- **External testing:** Have potential users, such as investors or customers, test the prototypes functionality and ask to provide any feedback. This will consist of UI/UX design, usability, functionality, and any other feedback that the users experience.

Implementation

- **Finalize:** Finalize the API based on the feedback during the testing phase. This will consist of removing any unnecessary features and ensuring that all core features are implements and functioning properly. Documentation will also need to be created for future users.
- **Evaluation:** Once the final product is released, monitor the API by collecting real-world data and user feedback. Use this data and feedback to evaluate the performance, security, and scalability of the API and consider future enhancements.

Budget

The budget outlines the financial framework necessary for the successful development and implementation of the Project Management API. Table 2 provides an estimated breakdown of the estimated costs, including employee costs, development tools, infrastructure, and any miscellaneous costs that may arise.

Table 2

Estimated project budget.

	Monthly Cost	Details
Employee costs	$ 50,000	Salaries of managers, developers, blockchain experts, IT security
Development Tools	$ 5,000	Python libraries, blockchain platforms
Infrastructure	$ 10,000	Cloud hosting, database services, domain hosting
Equipment	$ 5,000	Employee computers, routers, storage devices
Misc	$ 2,000	Unexpected costs
Total	**$ 72,000**	

Resources

Defining the resources identifies the critical assets and tools required to execute the Project Management API. Table 3 defines the professionals and their roles within the project, detailing the expertise and collaboration needed for the successful development of this project.

Table 3

Team resources.

	Description
Project Manager	Oversees the project. Manages timeline and team communication
Blockchain Engineers	Integrate Python API with Blockchain
Software Developers	Develop Python API
Upper management	Oversees each team and ensure their departments are aligned
IT Security	Ensure that company and user security is not compromised
Quality Control Team	Test API and ensure product is meeting quality standards
UI/UX Designers	Design user interface

Table 4 outlines the software, hardware, and technical tools essential for developing and deploying the Project Management API.

Table 4

Technical resources.

	Description
Python Libraries	Necessary python libraries for software developers
Blockchain platform	Ethereum
Cloud Platform	Apple iCloud, Google Cloud, AWS for hosting
Version Control	GitHub
Employee laptops	Dell laptops

Risk Matrix

An important factor that must always be considered is risk management. This involves identifying cause and areas for potential risks then determining their likelihood and impact to the project (Colorado State University Global, 2024). Table 5 shows a risk matrix for the potential risks that may arise during the development of this project.

Table 5

Risk matrix.

		Impact		
		Low	**Medium**	**High**
Probability	**High**	**Time Constraints** Mitigation: Develop a realistic timeline, prioritize tasks.	**Security Vulnerabilities** Mitigation: Conduct thorough security audits.	**Data Privacy and Confidentiality** Mitigation: Implement encryption and access controls.
	Medium	**Resource Availability** Mitigation: Plan resource allocation early.	**Performance and Scalability Issues** Mitigation: Optimize code, conduct stress testing.	**Regulatory and Compliance Risks** Mitigation: Stay updated with regulations, consider legal consultation.
	Low	**Project Scope Creep** Mitigation: Define clear project scope, implement change management process.	**Integration Issues** Mitigation: Test integration in controlled environments, maintain clear documentation.	**Budget Overruns** Mitigation: Track expenses, include contingency funds for unexpected costs.

Data Privacy and Confidentiality

- **Potential to occur:** Blockchain's transparent nature can conflict with data privacy requirements. This will especially be the case since sensitive data will be involved like biometrics.
- **Fallout:** If sensitive data is lost of misused, this could result in customer distrust and could even lead to legal problems.

Regulator and Compliance Risks

- **Potential to occur:** Since blockchain is still a new technology, regulations may not be fully developed. There will be a risk of non-compliance if the project does not keep pace with these changes.
- **Fallout:** Non-compliance issues will lead to legal problems. This will result in restrictions to the API and may even cause the project to be shut down completely.

Budget Overruns

- **Potential to occur:** Since this project is new technology and complex, it may result in unforeseen challenges which will result in an increase in resources and time which will increase the cost of the project.
- **Fallout:** Increased cost causes financial strain and can lead to downsizing or completely eliminating features of the project.

Security Vulnerabilities

- **Potential to occur:** This project will involve users to use their biometrics and other sensitive information. For this reason, this API is susceptible to cyber attacks.
- **Fallout:** A security breach could lead to the loss of sensitive data and result is distrust from the users and potentially legal problems.

Performance and Scalability Issues

- **Potential to occur:** It is common to have bugs in high tech projects that use new technology. It is important to ensure that the API still operates under high loads and scales efficiently.

- **Fallout:** Poor performance and scalability issues can result in poor user experience. This will force redesigns that could be costly.

Integration Issues

- **Potential to occur:** As previously mentioned, blockchain is still new technology and therefore, it might not integrate will with existing python libraries.
- **Fallout:** Users may experience disruptions or features that do not work as expected leading to dissatisfaction and may cause users to move to competitor products instead.

Time Constraints

- **Potential to occur:** Tight timelines can cause a rush in the development of the project. If unexpected issues arise, this can delay the timeline further.
- **Fallout:** Rushed development can lead to bugs and incomplete features leading to poor user experience and potential security threats.

Resource Availability

- **Potential to occur:** With blockchain being a new technology, blockchain engineers with strong knowledge on the topic can be scarce. There also may be python tools and libraries that are in high demand or have limited availability.
- **Fallout:** Having a lack of resources causes workarounds and can slow down the development of the project and decrease the quality of the finished product.

Project Scope Creep

- **Potential to occur:** Stakeholders may request additional features as the development process progresses.
- **Fallout:** Change in the scope can result in an increased timeline and resources.

Change Requests

This project will use an Agile methodology to allow for changes to be made throughout the life span of the project (uCertify, 2024). As the project progresses, team members will notice that there may be areas that could be improved on or features that need to be added or removed. As a result, the following change request process is as follows:

1. **Submission:** A team members will submit a change request**.**
2. **Review:** The project manager will review the change request. Meetings will be held if needed to ensure that the team agrees with the change request and is able to carry out their responsibilities.
3. **Approval/Rejection:** After discussing with all team members, the project manager will determine if this is a viable change request and will approve or reject it.
4. **Implementation:** If the change request is approved, the project manager will make the necessary updates for the timeline, budget, and resources.

Conclusion

The design and implementation of a Project Management API using Python and Blockchain Technology represents a forward-thinking approach to modernizing project management practices. To successfully execute a project of this size, it will take careful planning and coordination of all stakeholders. This can be achieved by clearly defining the project plan, timeline, and phases from initial planning to final implementation. By integrating Python's powerful programming capabilities with the secure, decentralized nature of blockchain, this project aims to deliver a robust and transparent tool that enhances project oversight and efficiency.

References

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