Comprehensive Project Management Tool

Submitted in partial fulfillment of the requirements for the degree of

Bachelor of Technology

In

Computer Science and Engineering

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DECLARATION

I hereby declare that the thesis entitled "Comprehensive Project Management Tool" submitted by Shreema Gautam 20BCI0330 ,for the award of the degree of *Bachelor of Technology in Computer Science and Engineering with Information Security* to VIT is a record of bonafide work carried out by me under the supervision of Dr. Sabyasachi Kamila.

I further declare that the work reported in this thesis has not been submitted and will not be submitted, either in part or in full, for the award of any other degree or diploma in this institute or any other institute or university.

Place : Vellore

Date : 9/05/2024

Signature of the Candidate

CERTIFICATE

This is to certify that the thesis entitled "Comprehensive Project Management Tool" submitted by Shreema Gautam 20BCI0330 , **School of Computer Science and Engineering**, VIT, for the award of the degree of *Bachelor of Technology in Computer Science Engineering* with Information Security, is a record of bonafide work carried out by him / her under my supervision during the period, 01. 12. 2023 to 30.04.2024, as per the VIT code of academic and research ethics.

The contents of this report have not been submitted and will not be submitted either in part or in full, for the award of any other degree or diploma in this institute or any other institute or university. The thesis fulfills the requirements and regulations of the University and in my opinion meets the necessary standards for submission.

Place : Vellore

Date :

Skanda 9/5/24

Signature of the Guide

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EXECUTIVE SUMMARY

The proposed project introduces an innovative approach to managing project information within government teams by leveraging attribute-based access control mechanisms and blockchain technology. This model allows teams to regulate data sharing based on specific project attributes dynamically, ensuring controlled and organized information sharing.

Key Features:

Attribute-Based Access Control: Teams can manage access controls based on project attributes, enabling selective data sharing.

Dynamic Access Control: Access controls can be managed dynamically, allowing teams to share all or part of their project information based on defined attributes.

Data Management: The model enables effective management of previously shared project information and associated access controls, ensuring data sharing remains organized as projects evolve.

Blockchain Technology: The model operates on a blockchain-based system, decentralizing data management and ensuring secure, tamper-proof data transactions under the authority of the data owner.

Immutability and Security: Blockchain's immutability feature ensures stored project information remains unchanged and secure, reducing the risk of unauthorized data modification or hacking attacks.

Real-Life Applications:

Local Government: Enhances transparency in infrastructure development projects, reducing disputes and fostering trust.

National Government: Improves transparency and efficiency in large-scale public projects, mitigating risks and enhancing public confidence.

International Aid Projects: Ensures transparent fund utilization, accountability, and efficient project management in cross-border initiatives.

ABBREVIATIONS

The abbreviations used in the project document are as follows:

Acronym	Full Form	Description
HTML	Hypertext Markup Language	Language for creating web pages.
CSS	Cascading Style Sheets	Styles web pages, controlling their appearance.
Django	Django	Python web framework known for rapid development and clean design.
REST APIS	Representational State Transfer APIs	Interfaces for communication between software systems over HTTP.
Blockchain	Blockchain	Technology for secure, decentralized transaction recording.
Docker	Docker	Platform for developing, shipping, and running applications using containers.
POSTGRES	PostgreSQL	Open-source relational database management system.
Fig	Figure	Used to reference diagrams or illustrations.
Bootstrap	Bootstrap	Front-end framework for responsive and mobile-first web development.

1. INTRODUCTION

1.1 Objectives:

- Develop a project management tool tailored specifically for government teams, addressing their unique challenges and requirements.
- Implement attribute-based access control mechanisms to allow for granular control over data sharing, ensuring that sensitive project information is shared securely based on specific project attributes.
- Leverage blockchain technology to create a decentralized and tamper-proof system for data transactions, enhancing security, transparency, and data integrity.
- Design and develop a user-friendly interface that facilitates efficient project management, collaboration, and communication among team members and stakeholders.
- Enhance transparency, accountability, and efficiency in government projects by providing real-time access to accurate project information and metrics.

1.2 Motivation

- To address the inherent challenges faced by government teams in managing project information, including issues with data sharing, access control, security, and transparency.
- Improve the efficiency and effectiveness of project management processes by implementing dynamic access controls and ensuring that everyone has access to project information based on their roles and responsibilities.
- Foster trust, transparency, and accountability within government teams and among stakeholders by implementing advanced technologies such as blockchain.

1.3 Background

The background of the project stems from the recognized challenges within government teams when it comes to managing project information effectively. Traditional systems often rely on static access controls and centralized data management, leading to inefficiencies, delays, and potential security risks. Paper-based documentation further exacerbates these issues, hindering transparency and impeding collaboration among team members. Additionally, the lack of dynamic access controls can result in unauthorized access to sensitive project information, compromising data security.

Therefore, the project proposes a project management technology tool that uses attribute-based access control and blockchain technology. With the developed dynamic access controls, teams can restrict the editing of data based on the project parameters, which means that the information can only be entered by the staff members tasked with a certain project. The proposed blockchain technology will provide a decentralized and digital network for data movement, boosting the security, transparency and accuracy of the system. The project aims to improve the efficiency, transparency, and accountability of government projects by offering a secured system of managing project data.

2. PROJECT DESCRIPTION AND GOALS

2.1 Literature Review

Here we discuss some of the recent research papers related to our project.

S.No	Title	Conference/Journal	Overview	Limitations
1	Looking again at current practice in project management	Joyce Fortune, Diana White, Kam Jugdev, Derek Walker	The research paper utilizes electronic surveys to gather insights from 150 project management professionals in Australia, Canada, and the UK, providing a comparative analysis of current practices and historical trends.	-Electronic surveys may introduce bias by excluding those with limited digital access, potentially skewing project management practice representation. -Reliance on self-reported data may impact findings on method effectiveness across surveyed countries.
2	An exploratory study of project success with tools, software and methods	Kam Jugdev, David Perkins, Joyce Fortune, Diana White, Derek Walker	This paper explores correlations between project success factors, PM tools, and methods, primarily based on statistical analysis and findings from a 2011 international study	-The study's limitations stem from its reliance on correlations, lacking causation insight, a small sample size preventing multivariate analyses, and the absence of tool use examination by project phase.
3	Brief History Of Project Management	YOUNG HOON KWAK	The paper provides an overview of the evolution of project management, spanning from ancient civilizations to the present day, and highlights key periods and projects that shaped the discipline.	-Lack of detailed analysis, U.S.-centric focus, and the potential for improved thematic integration, visual aids, interdisciplinary connections, and a more extensive discussion of current trends and future prospects in project management.
4	Project Management	Anabela Tereso,	This research examines	-Potential response bias

	Practices in Private Organizations	Pedro Ribeiro, Gabriela Fernandes, Isabel Loureiro, and Mafalda Ferreira	project management practices in private organizations, emphasizing industry-specific benchmarks and practice adoption for tailored strategies. It explores relationships among the most used practices, contributing valuable insights for effective project management in the private sector.	in survey data, limited participant perspectives, and a focus on practice extent rather than nuanced effectiveness. -Findings may lack universal applicability due to diverse organizational contexts, and the study might not fully consider evolving industry trends or external factors influencing project management practices over time.
5	Software Project Management: Tools assessment, Comparison and suggestions for future development.	Muhammad Sajad & Muhammad Sadiq	This paper evaluates and compares popular software project management tools, like Primavera, MS Project, GanttProject, Redmine, BaseCamp, dotProject, and Assembla. It maps these tools against IEEE standards to predict their quality for future development, emphasizing the need for standardized criteria in tool selection and proposing guidelines for improving their quality in software engineering.	-Analyzing software project management tools against the IEEE standard reveals 27% new features, with only 63% adherence to standard features. -Recurring features like Issue tracking, Calendar view, Email notification, and task management lack detailed coverage. -The study is limited to cloud-based software.
6	Modern Project Management: Essential Skills and Techniques	Iman Attarzadeh Siew Hock Ow	This paper discusses the challenges in modern project management, emphasizing the need for understanding and applying appropriate methodologies. It explores the contrasts between traditional and modern project management skills, highlighting potential issues and manager reluctance to adopt new approaches,	-Current criteria lack flexibility, risking negative impacts if based on a single criterion. -Successful methodology adoption requires customization. Despite differences, all discussed methodologies share common tools, suggesting a combined approach for optimal

			aiming to provide insights into contemporary project management practices.	results.
7	Project Management Tools and Techniques (T&T) Usage in Building Sector Companies	Manoj Kumar	This research explores the usage of project management tools and techniques in the construction sector, particularly focusing on housing projects in Cartagena. It highlights a significant gap between the recognized global standards and methodologies in project management and their actual implementation in construction projects. The study involved surveying 22 project managers from key construction companies in Cartagena to assess their utilization of these tools and techniques.	- The research focuses primarily on the construction sector in Cartagena, limiting the generalizability of findings to other industries or regions. - The assessment of project success and failure is subjective and may vary based on individual perceptions of project managers surveyed.
8	Project segmentation—a tool for project management	Avraham Shtub	The suggested tool for project management, as described in the paper, is designed specifically for projects where the work content can be segmented into multiple subprojects or segments, with each segment requiring the same set of activities. This tool serves as the foundation for both a project scheduling model and a project control model, offering support in situations where traditional techniques like the Critical Path Method (CPM) and Program Evaluation and Review Technique (PERT) are not suitable.	- The tool may only be suitable for specific types of projects where the work can be segmented uniformly across multiple segments. Projects with highly diverse or unpredictable work requirements may not benefit from this approach. - The effectiveness of the tool may be limited when applied to large-scale projects with numerous interdependent tasks and complex workflows. Managing and coordinating multiple segments within such

				projects could become challenging.
9	Current practice in project management — an empirical study Author links open overlay panel	Diana White, Joyce Fortune	This paper reports findings from a survey of 995 Project Managers, aiming to understand their experiences in project management. Through a questionnaire, the survey collected data on recent projects, critical factors influencing outcomes, side-effects, and the use and effectiveness of project management methods. Results showed that respondents mainly used a few tools, like project management software and Gantt charts. Despite reported drawbacks, 41% of projects were considered completely successful, focusing on established metrics like timeliness, budget adherence, and meeting specifications.	- The 23.7% response rate may introduce bias, as non-respondents could have different perspectives or experiences. - Project success judgments were made by the Project Managers themselves, potentially subject to biases or overestimation. - The study focused on a specific set of success criteria, potentially overlooking other important dimensions of project success.
10	Project management: key tool for implementing strategy	Andrew Longman, James Mullins	Project success relies on essential conditions: a compelling business case, practicality, a supportive environment, benefits for teams, ongoing learning, and public recognition. Achieving success demands deliberate planning encompassing strategy, leadership, goals, processes, skills, systems, issue resolution, and structure. Embracing smarter project management enables organizations to tackle challenges effectively in today's project-driven	- The outlined conditions may not universally apply to every project or organization, as specific project requirements, organizational culture, and industry nuances can influence their relevance and effectiveness. - While the conditions are crucial for project success, implementing them effectively within an organization can pose challenges such as resistance to change, resource constraints, and conflicting priorities.

			landscape.	
11	Integrating system analysis and project management tools Author links open overlay panel	Roy Gelbard, Nava Pliskin, Israel Spiegler	This study presents a model that merges system analysis tools with project management tools to improve system building and management tasks in the Information System Life Cycle (ISLC). By converting Data Flow Diagrams (DFD) into Gantt and Pert diagrams, the feasibility and benefits of this integrated approach are shown through prototype experiments, aiding in project duration assessment and system performance evaluation for enhanced efficiency.	- The study focuses specifically on the integration of Data Flow Diagrams (DFD) with Gantt and Pert diagrams, potentially limiting the generalizability of findings to other types of system analysis objects and project management tools. - While the prototype demonstrates the feasibility of the proposed model, its real-world applicability and scalability may require further refinement and validation.
12	The Application of Project Management Standards and Success Factors to the Development of a Project Management Assessment Tool	Antonio G. Sanjuan, Thomas Froese	This paper develops a tool to assess construction project management practices, focusing on individual practices and their correlation with project outcomes. It integrates established project management standards like PMBOK, ICB, ISO 9000, and Prince2 into the tool and discusses theoretical foundations, methodologies for development, and application to specific project scenarios.	- The assessment tool may be limited in scope to specific construction projects and may not be universally applicable across all industries or project types. - The paper does not extensively discuss the validation process of the assessment tool, raising questions about its reliability and validity.
13	The effect of decision style on the use of a project management tool: an empirical laboratory study	Terry L. Fox, J. Wayne Spence	This paper presents findings from an empirical laboratory study examining the impact of decision-making styles on the use of Microsoft Project, a project management tool,	- The study involved project managers from only eight companies, which may not be representative of the broader population of

			by project managers from eight companies. The study highlights significant differences in how the tool is utilized based on the decision-making style of the project manager. Specifically, project managers with a more directive or analytical decision-making style outperformed those with a more conceptual or behavioral approach in tasks such as developing an initial project plan, both in terms of time taken and plan accuracy.	project managers. Additionally, the industries or sectors these companies belong to are not specified, which could affect the generalizability of the findings. - Conducting the study in a laboratory setting might not fully replicate the real-world complexities and dynamics of managing software development projects. This controlled environment may limit the applicability of the results to actual project management scenarios.
14	An Empirical Study on the use of Project Management Tools and Techniques across Project Life-Cycle and their Impact on Project Success	Peerasit Patanakul, Boonkiart Iewwongcharoen, and Dragan Milosevic	The authors conducted a large-sample study using surveys and statistical analyses to investigate the use of Project Management Tools and Techniques (PMTT) and their contribution to project success. They found evidence suggesting that certain PMTT should be used during specific phases of a project, and utilizing them in this manner contributes to project success.	- The study relies on survey data, which may be subject to biases such as self-reporting bias or respondent bias, potentially impacting the reliability of the findings. - The measurement of project success may vary across projects and stakeholders, leading to potential inconsistencies in evaluating the effectiveness of PMTT.
15	Project Complexity Assessment and Management Tool	Bac Dao, Sharareh Kermanshachi, Jennifer Shane, Stuart Anderson	The Project Complexity Assessment and Management (PCAM) Tool is an Excel-based tool that helps project teams identify, assess, and manage project complexity. It uses a "Complexity Measurement	- The weight factors derived from expert rankings may introduce subjectivity into the assessment process, potentially leading to biased results. - Effective utilization of

			Matrix" with statistically significant indicators and weight factors determined by expert rankings. The tool generates reports with project complexity levels, radar diagrams, and management strategies, aiding teams in developing flexible plans for different project stages and sizes.	the tool requires a certain level of proficiency in Excel and understanding of project complexity concepts, which may pose a barrier for some users. - While the tool helps in assessing and managing existing project complexities, its predictive capability for anticipating future complexities may be limited.
16	RESEARCH PROJECT MANAGEMENT AS THE MAIN TOOL OF INNOVATIVE MANAGEMENT	KORSAKOV M.N., SHICHIYAKH R.A., KIREEV V.S., BONDARCHU K.N.V., SHCHERBAK S.I., CHERNYAKOV O.V.N.	Research project management shapes state policies by driving scientific and technological advancements through large projects. Originally limited to technical fields, project management tools now cross various domains, aiding innovation in culture, science, education, healthcare, and business.	- Limited resources may constrain the implementation of research projects, leading to prioritization challenges and potential disparities in funding across different areas of research and development. - Rapid advancements in technology may render certain research projects obsolete before completion, necessitating continuous adaptation and flexibility in project management approaches.
17	DEVELOPMENT OF A PROJECT MANAGEMENT SOFTWARE TOOL: A DESIGN CASE	Jeremy C. Pittaway, Liang Chen, & J. Christopher Zimmer	The paper introduces JBPM, a Java-Based Project Management software tailored for project management courses, emphasizing its role in aiding student comprehension of project management concepts through planning, execution,	Acknowledging constraints in Version 1.0, the paper notes the absence of a delete function, designed to protect users but identified as a drawback; Version 2.0 aims to address this limitation and integrate advanced

2.2 Research Gap:

2.2.1. Limited Tool Effectiveness Assessment: Many studies (e.g., by Kam Jugdev et al.) focus on correlational analysis between project success factors, tools, and methods, but they lack causation insight and comprehensive tool effectiveness assessment. Our project management tool will incorporate robust assessment mechanisms to evaluate its effectiveness across different project phases, providing actionable insights for improving project outcomes.

2.2.2. Sector-Specific Focus: Studies like Anabela Tereso et al.'s research on project management practices in private organizations often have a sector-specific focus, leading to limited generalizability across industries. Our tool will offer adaptable features and strategies suitable for diverse organizational contexts, ensuring universal applicability and relevance across various sectors.

2.2.3. Subjective Project Success Evaluation: Many studies, such as those by Robert Pellerina et al., rely on subjective evaluations of project success, which may vary based on individual perceptions. Our tool will integrate objective performance metrics and standardized criteria for evaluating project success, facilitating more accurate and consistent assessments.

2.2.4. Inadequate Tool Selection Criteria: Existing studies, like the one by Muhammad Sajad & Muhammad Sadiq, highlight gaps in software project management tool adherence to standards and coverage of essential features. Our project management tool will prioritize adherence to industry standards, comprehensive feature coverage, and usability, ensuring an optimal selection criteria framework for tool evaluation and selection.

By addressing these gaps and limitations, our project management tool will offer a comprehensive and adaptable solution for modern project management challenges, facilitating improved decision-making, enhanced collaboration, and ultimately, greater project success across diverse organizational settings and industries.

2.3 Problem Statement

The proposed model outlines a structured process for managing project information within a blockchain-based system. Here's a detailed elaboration of each step in the model:

2.3.1. Creation of Project Information and Attributes

- The user, who is typically the team creator or project owner, begins by creating project information. This could include details such as efforts, status, deadline, related team, completed percentage and other relevant data.

- Alongside project information, the user defines task attributes. These attributes act as criteria or rules that govern access to the project information. For example, attributes could include project type, assigned to, status and due date.

2.3.2. Insertion into Project Information Pool

- Once the project information and attributes are defined, the user inserts this data into the project information pool. This pool serves as a centralized repository or database where all project-related information is stored securely within the blockchain network.

2.3.3. Verification Process

- Verification plays a crucial role in validating the authenticity and accuracy of project information within the blockchain network.

- When a verification request is initiated (often through services like Etherscan, which provide blockchain data analysis), verifiers perform checks to ensure that the project information meets predefined standards and criteria.

- The verification process may include verifying project milestones, budget allocations, compliance with regulations, or any other relevant factors. Based on this verification, the project information receives a rating or validation status.

2.3.4. Data User Interaction

- Data users, who require access to specific project information, interact with the system to retrieve relevant data sets.

- Using services like Infura (which provides access to Ethereum nodes), data users query the project information pool based on their criteria and access rights defined by project attributes.

- Only project information that the data user has legitimate access rights to will be displayed or accessible.

3. TECHNICAL SPECIFICATION

3.1 Requirements

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3.1.1 Functional Requirements

3.1.1.1. User Registration and Authentication
- Users should be able to register accounts securely.
- The system must authenticate users and manage user roles and permissions.

3.1.1.2. Project Information Creation
- Users (team creators or project owners) should be able to create project information.
- Project information includes attributes such as efforts, status, deadline, team name and other relevant information.

3.1.1.3. Attribute-Based Access Control (ABAC)
- Implement ABAC mechanisms to regulate access to project information based on defined attributes.

3.1.1.4. Project Information Pool Management
- Maintain a centralized project information pool within the blockchain network.
- Ensure data integrity, security, and immutability within the project information pool.

3.1.1.5. Data User Interaction
- Enable data users to query the project information pool based on specified criteria.
- Display project information that data users have legitimate access rights to.

3.1.2 Non-Functional Requirements:

3.1.2.1. **Security**
- Ensure robust security measures to protect project information and user data.
- Implement encryption, secure authentication protocols, and access controls.

3.1.2.2. Scalability

- Design the system to scale efficiently as the volume of project information and users increases.
- Scalability should not compromise system performance or data integrity.

3.1.2.3. Performance
- Maintain high system performance with minimal latency.
- Response times for user actions such as data retrieval, verification, and payment should be optimal.

3.1.2.4. Reliability
- Ensure system reliability and availability.
- Minimize downtime and disruptions to user access.

3.1.2.5. Usability
- Design a user-friendly interface for all system stakeholders (users, verifiers, and data contributors).
- Provide clear instructions, intuitive navigation, and informative feedback.

3.1.2.6. Compliance
- Adhere to relevant regulatory and compliance standards.
- Ensure data privacy, legal compliance, and ethical use of the system.

3.1.2.7. Auditability
- Enable auditing and logging functionalities for tracking system activities.
- Maintain an audit trail for transparency and accountability.

3.1.2.8. Interoperability
- Ensure interoperability with external systems or services such as Infura for blockchain interaction.
- Facilitate seamless data exchange and integration with third-party platforms.

3.2 **FEASIBILITY STUDY**

3.2.1 Technical Feasibility:

Blockchain Technology Suitability: Assess the compatibility and suitability of blockchain technology for implementing the proposed attribute-based access control (ABAC) mechanism and data management functionalities.

Scalability Considerations: Evaluate the technical infrastructure's ability to scale with increasing data volume, user base, and transaction throughput without compromising performance or security.

Interoperability: Ensure compatibility and interoperability with external systems or services such as Infura for blockchain interaction and data querying.

Security Measures: Implement robust security measures including encryption, authentication protocols, and access controls to protect sensitive project information and user data.

3.2.2 Economic Feasibility:

Development: Initial development costs for creating the project management tool, including software development, testing, and refinement.

Maintenance: Ongoing maintenance expenses for updates, bug fixes, and technical support.

Infrastructure: Investment in the necessary technological infrastructure to support the tool's operation, including servers, databases, and security measures.

Training: Training programs to familiarize government personnel with the tool's features and functionalities.

3.2.3 Social Feasibility

Stakeholder Analysis: In our endeavor to deploy the blockchain-based project management tool, we've conducted a comprehensive stakeholder analysis, identifying and analyzing key stakeholders involved in government projects. These include government teams responsible for project execution, project owners overseeing initiatives, verifiers ensuring compliance, data users relying on project data, and regulatory bodies setting guidelines. By understanding their interests, concerns, and potential impacts, we're better equipped to address their needs and foster collaboration.

- User Acceptance: User acceptance is paramount to the success of our project management tool. To gauge user acceptance and adoption potential, we've conducted extensive surveys, interviews, and usability testing with government personnel. Their feedback has been instrumental in refining the tool's features and ensuring it aligns with user needs and expectations. By prioritizing user experience, we aim to facilitate seamless integration into existing workflows and maximize user satisfaction.

  Ethical Considerations: As we navigate the implementation of our project management tool, we're mindful of ethical considerations surrounding data privacy, transparency, accountability, and fairness. We've implemented robust access control mechanisms to safeguard sensitive project information and uphold user privacy. Additionally, our token-based incentives are designed to promote fairness and equity, ensuring that rewards are distributed transparently based on merit and contribution.

  Impact Assessment: The social impact of our project management tool extends far beyond its technical capabilities. Through rigorous impact assessment, we've evaluated its implications on government transparency, project efficiency, data sharing culture, and trust among stakeholders. By fostering greater transparency and accountability, we empower stakeholders to make informed decisions and collaborate effectively. Moreover, our tool promotes a culture of data sharing, facilitating knowledge exchange and collaboration across government teams. Ultimately, we believe that our project management tool will not only streamline project execution but also contribute to a more transparent, efficient, and accountable government ecosystem.

3.3 **SYSTEM SPECIFICATION**

3.3.1 *Hardware Specification*

- Server Infrastructure: Deploy robust servers capable of handling blockchain transactions, data storage, and access control mechanisms efficiently.

- Blockchain Nodes: Set up blockchain nodes to participate in the distributed ledger network, ensuring redundancy and data integrity.

- Data Storage: Utilize scalable and secure storage solutions for storing project information, access controls, and transaction records.

- Network Infrastructure: Implement reliable networking equipment and protocols to facilitate seamless communication between system components and external services.

3.3.2 Software Specification

- Blockchain Platform: Ethereum for implementing the attribute-based access control (ABAC) mechanism and smart contracts.

- Smart Contracts: We will deploy smart contracts for managing access controls, token-based incentives, and data verification processes.

- Frontend Interface:Designed a user-friendly frontend interface using web technologies (HTML, CSS, JavaScript) for project creators, verifiers, data users, and administrators.

- Backend System:Built a robust backend system using frameworks (e.g., Node.js, Django) to handle business logic, data processing, and interaction with the blockchain network.

- API Integration: Integrate APIs such as Infura for blockchain interaction, (Etherscan) for verification, Django REST framework for rest apis to interact with nodes.

3.3.3 Standards and Policies

- Blockchain Standards: Adhere to industry standards and best practices for blockchain development, including smart contract security, token standards (e.g., ERC-20), and data encryption.

- Data Privacy Policies: Data privacy policies and compliance measures (e.g., GDPR, HIPAA) to protect user information and ensure regulatory compliance.

4. DESIGN APPROACH & DETAILS

Some desc about the section

4.1 System Architecture:

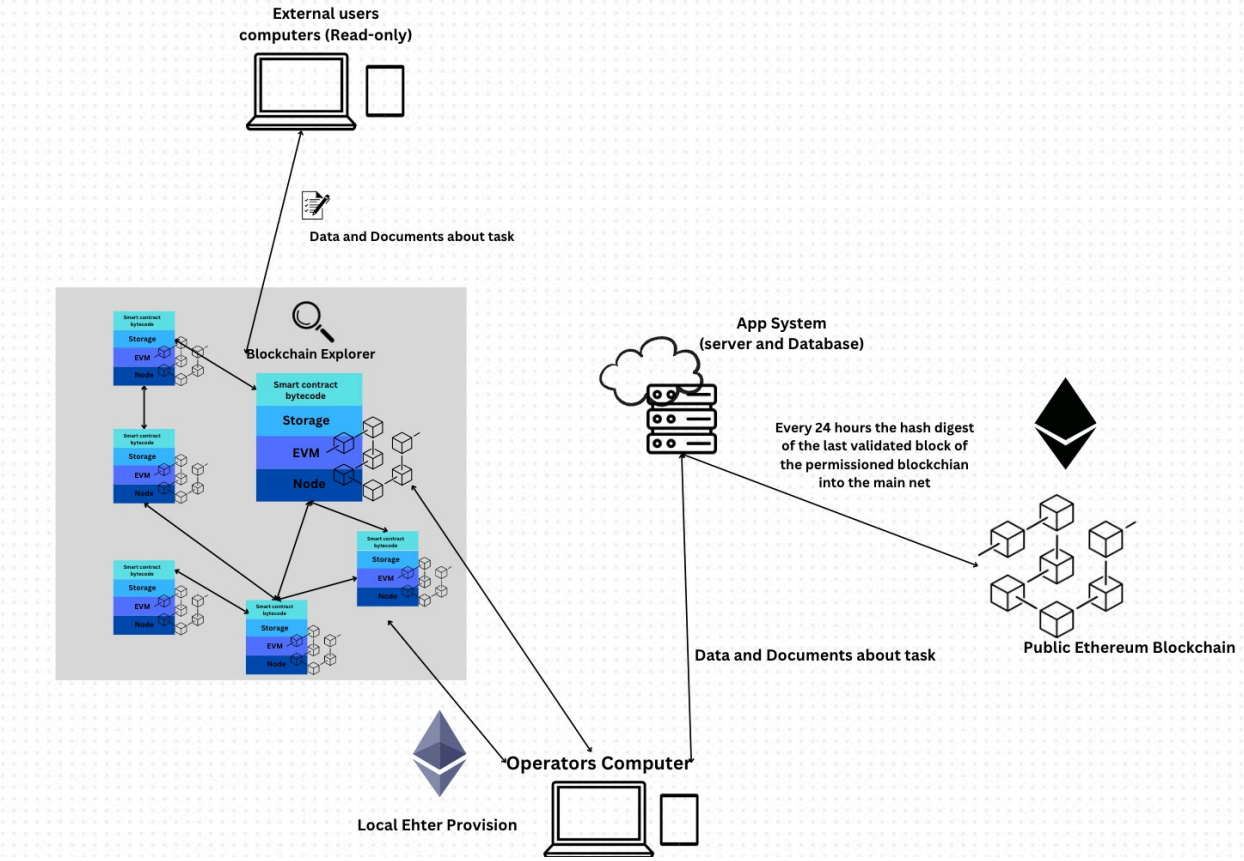

Fig i - Figure of System Architecture

- External Users (Computers) (Read-Only): These are computers used by external users to view data and documents related to tasks. They can only view information on the blockchain and cannot write to it.

- App System (Server and Database): This is the application system that interacts with the blockchain network. It stores data and documents related to tasks.

- Blockchain Explorer: This is a tool that allows users to view information on the blockchain, such as transaction history and block data.

- Storage: This is where the blockchain data is stored.

- EVM (Ethereum Virtual Machine): This is a software platform that executes smart contracts on the blockchain network.

- Operators Computer: This is the computer used by the operator of the blockchain network to manage the network.

- Local Ether Provision: This is where ether, the cryptocurrency used on the Ethereum blockchain network, is obtained.

- Public Ethereum Blockchain: This is a public blockchain network that the permissioned blockchain network interacts with. Every 24 hours, the hash digest of the last validated block of the permissioned blockchain is stored into the main net.

The system architecture shows a permissioned blockchain network that interacts with a public blockchain network. The permissioned blockchain network is a private network that only authorized users can access. The public blockchain network is a public network that anyone can access. The permissioned blockchain network stores data and documents related to tasks, and this data is hashed and stored on the public blockchain network every 24 hours. This allows for a verifiable record of the data on the permissioned blockchain network.

4.2 Design

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4.2.1 Data Flow Diagram

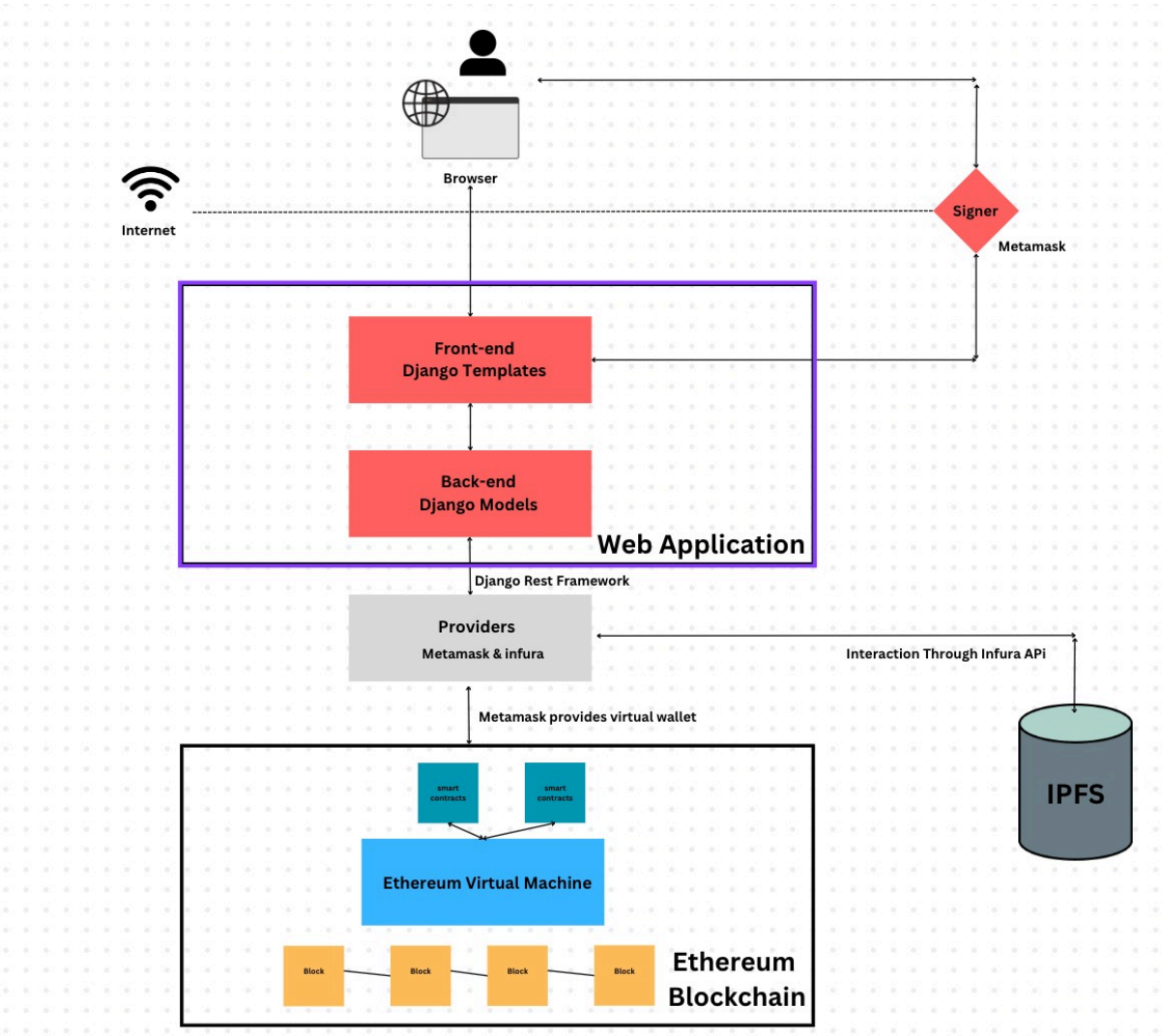


Fig ii - Figure of Data Flow

The data flow diagram showcases a web application designed to interact with a blockchain, specifically the Ethereum blockchain. Here's how it works:

- Users interact with the web application through a standard web browser.

- The web application itself has two main layers: a front-end built with Django Templates that displays information and collects user input, and a back-end built with Django Models and Frameworks that processes user interactions and communicates with the blockchain.

- To connect to the blockchain, the application utilizes Metamask, a popular cryptocurrency wallet extension. Metamask acts as a virtual wallet for users and allows them to sign transactions.

- Additionally, the application interacts with providers like Metamask and Infura. Infura acts as a dedicated node provider, facilitating communication with the Ethereum blockchain.

- The back-end communicates with Infura using its API to send and receive information.

- On the blockchain side, a smart contract resides on the Ethereum network. This smart contract handles the actual transactions, though the diagram doesn't specify the exact data being stored or retrieved.

- Finally, the Ethereum Virtual Machine (EVM) executes the code within the smart contract.

- The entire blockchain, including the smart contract and transaction data, is stored securely on the Ethereum network.

In essence, this web application uses Metamask and Infura to bridge the gap between user interaction and the blockchain. User actions trigger communication with the back-end, which then interacts with the blockchain through the providers to execute smart contract functionalities.

4.2.2 Class Diagram

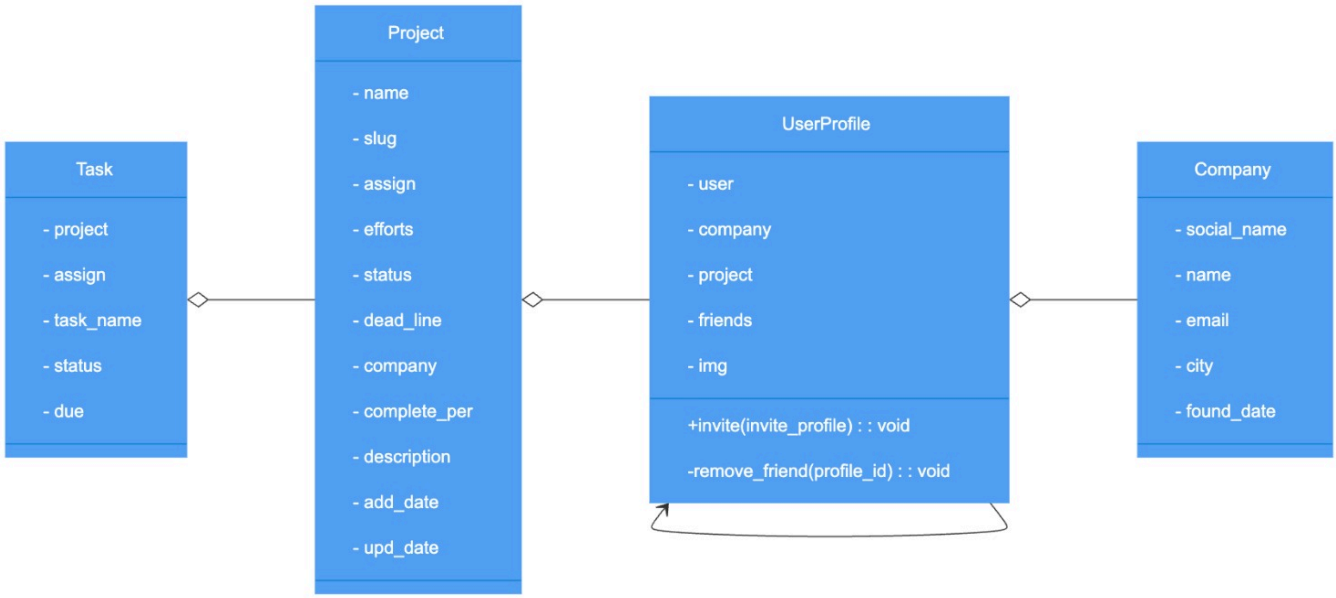


Fig iii - Figure of Class Diagram

This class diagram describes how projects, tasks, companies, and user profiles interact. Projects have details like name, description, and a company they belong to. Tasks are linked to specific projects and have details like status, due date, and effort required. A unique aspect is that tasks can be assigned to user profiles.

Company information includes name, social media presence, and location. User profiles hold information like a user (potentially referencing a separate user class), company affiliation, friend list, and profile picture. Interestingly, user profiles can invite others to the company and manage their friend list.

In summary, the diagram shows how projects are managed within companies, with tasks assigned to user profiles. It also highlights user profile functionality like inviting others and managing connections.

4.2.3 Sequence Diagram

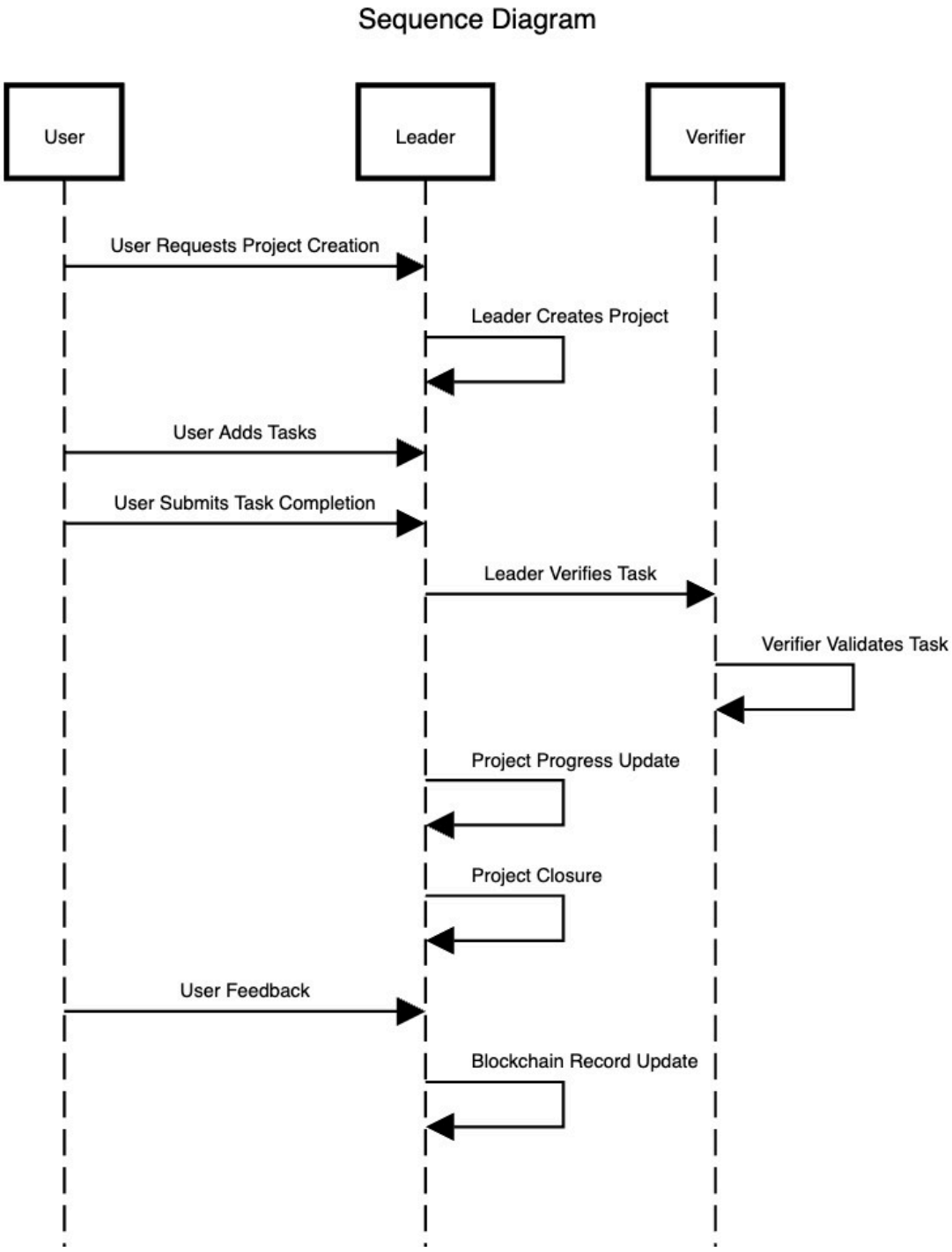


Fig iv - Figure of Sequence Diagram

The sequence diagram depicts a project creation process involving four participants: a user, a leader, a verifier, and a blockchain ledger. The process starts with the user requesting project creation. The leader creates the project and the user starts adding tasks. Once the user completes adding tasks, they submit them for approval.

The leader verifies the tasks and then they are presumably sent to an external verifier for final validation. Once both the leader and verifier approve the tasks, the project progress is updated and a closure process is initiated. The process ends with the user providing feedback and the project record being updated on a blockchain ledger.

4.3 Constraints

4.3.1. Technical Constraints

- Compatibility: The project management tool must be compatible with a variety of devices and operating systems to ensure widespread adoption.

- Scalability: The system should be scalable to accommodate increasing numbers of users, projects, and data transactions over time.

- Performance: The platform must deliver high performance to handle complex operations, data processing, and blockchain transactions efficiently.

- Security: Robust security measures are essential to protect sensitive project information, access controls, and token transactions from unauthorized access and cyber threats.

- Compliance: Adherence to regulatory requirements and industry standards (e.g., GDPR, smart contract security standards) is crucial for legal and ethical operation.

4.3.2. Economic Constraints:

- Cost-effectiveness: Development, deployment, and maintenance costs should be optimized to ensure the project's economic feasibility and sustainability.

- Resource Allocation: Efficient allocation of resources, including hardware infrastructure, software development resources, and operational costs, is necessary to manage budget constraints.

4.3.3. Social Constraints:

- User Adoption: User-friendliness and intuitive design are important factors to encourage user adoption and engagement within the platform.

- Trust and Transparency: Building trust among stakeholders, including project owners, verifiers, and data users, is essential for the success of the platform and its incentive mechanisms.

4.4 Alternatives

Some desc

4.4.1. Blockchain Platforms:

- Consider alternatives such as Ethereum, Hyperledger Fabric, or other blockchain platforms based on factors like scalability, consensus mechanisms, smart contract capabilities, and community support.

- Evaluate the trade-offs between public and private blockchains based on data privacy requirements and network governance considerations.

4.4.2. Smart Contract Design:

- Explore alternative smart contract architectures (e.g., multi-signature contracts, atomic swaps) to enhance security, reduce transaction costs, and improve overall system functionality.

- Investigate off-chain solutions (e.g., state channels, sidechains) for scalability and performance improvements while maintaining blockchain security.

4.4.3. User Interface and Experience:

- Consider alternative design frameworks, UX/UI patterns, and accessibility features to optimize user experience and simplify platform navigation for different user roles.

4.5 Trade-offs

4.5.1. Scalability vs. Decentralization:

- Trade-off between scalability (transaction throughput, network performance) and decentralization (node participation, consensus mechanisms) in blockchain design.

- Balancing scalability requirements with maintaining a decentralized network architecture to ensure data integrity and network resilience.

4.5.2. Security vs. Usability:

- Trade-off between stringent security measures (e.g., complex cryptographic algorithms, multi-factor authentication) and user-friendly interfaces to streamline user interactions and improve adoption rates.

- Finding a balance between robust security protocols and seamless user experience without compromising data security and privacy.

4.5.3. Cost vs. Performance:

- Trade-off between cost-effective solutions (e.g., cloud hosting, open-source software) and high-performance requirements (e.g., dedicated servers, optimized code) to achieve desired system performance within budget constraints.

- Evaluating the cost implications of implementing advanced features (e.g., tokenomics incentives) against the performance benefits they offer in enhancing platform functionality and user engagement.

5. SCHEDULE, TASKS AND MILESTONES

5.1 GANTT CHART

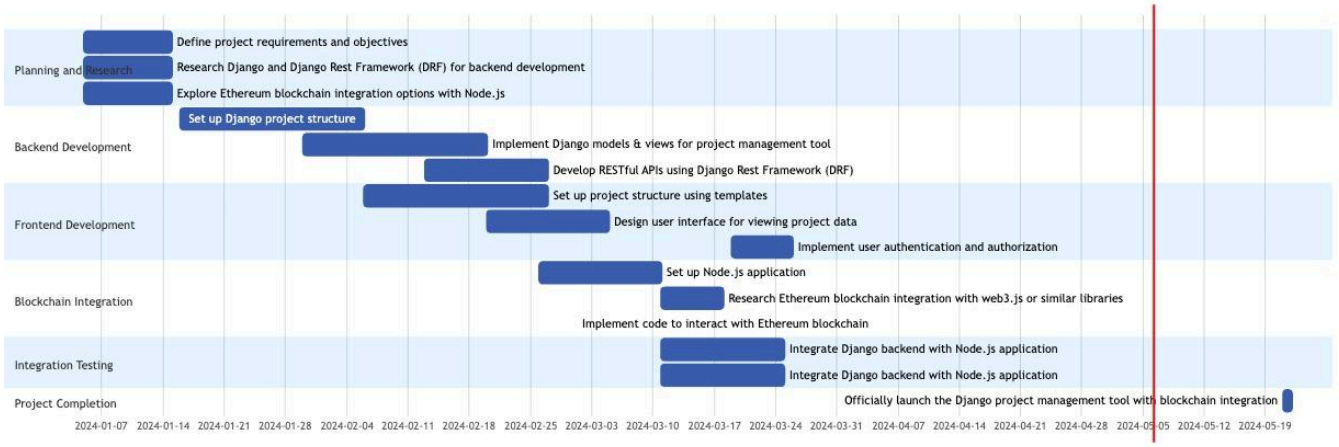


Fig v - Figure of Gantt Chart

The Gantt chart outlines the development phases for a Django project management tool with blockchain integration. The project is divided into stages, each visualized as a horizontal bar on the chart. The bar's length represents the stage's duration.

The stages encompass defining project goals, planning, backend development (including building the project structure, models, views, and APIs), frontend development (designing the user interface and implementing authentication), integrating blockchain technology (researching options, implementing interaction code, and integrating the Django backend with a Node.js application), integration testing, and project completion.

Timestamps are included to indicate the planned start and end dates for each stage. The red line shows the current trend

5.2 Modules Description

The module description for the Project management tool is as follow:

5.2.1 Dashboard:

- Registered Teams: This feature displays the registered teams.
- Registered User: It shows the number of users registered.
- Projects:It shows the number of projects.
- Tasks:It shows the number of tasks to complete a project.

5.2.2 Projects:

- New project: This helps the user to work on a new project.
- New Task: This helps the user to work on a new task.

5.3.3 Registration:

- Invites: This helps us to invite and add our friends/colleagues to a project or task.
- Login:This helps the user to login into the website.
- New Team:This feature helps a new team to access the features and collaborate with the staff.
- User Profile:This helps the user to view their profile.
- Registration Form:This lets the new user make an account and access the website.
- Friends:This feature helps to establish better teamwork and connect with new people.

5.3 Testing

1. Register Model:

```
from django.test import TestCase
from django.contrib.auth.models import User
from .models import Company, UserProfile, Invite


class CompanyTestCase(TestCase):
  def setUp(self):
    Company.objects.create(
      social_name="TestCompany", name="Test Company", email="test@test.com", city="Test
City", found_date="2024-01-01")


  def test_company_str(self):
    company = Company.objects.get(name="Test Company")
    self.assertEqual(str(company), "Test Company")


class UserProfileTestCase(TestCase):
  def setUp(self):
    user = User.objects.create_user(
      username="testuser", password="test123")
    company = Company.objects.create(
      social_name="TestCompany", name="Test Company", email="test@test.com", city="Test
City", found_date="2024-01-01")
    UserProfile.objects.create(user=user, company=company)


  def test_userprofile_str(self):
    userprofile = UserProfile.objects.get(user__username="testuser")
    self.assertEqual(str(userprofile), "testuser")


class InviteTestCase(TestCase):
  def setUp(self):
    user1 = User.objects.create_user(username="user1", password="test123")
    user2 = User.objects.create_user(username="user2", password="test123")
```

```
        userprofile1 = UserProfile.objects.create(user=user1)
        userprofile2 = UserProfile.objects.create(user=user2)
        Invite.objects.create(inviter=userprofile1, invited=userprofile2)


    def test_invite_str(self):
        invite = Invite.objects.get(inviter__user__username="user1")
        self.assertEqual(str(invite), "user1")
```

2. Project Model:

```
from django.test import TestCase
from django.contrib.auth.models import User
from .models import Project, Task

class ProjectTestCase(TestCase):
    def setUp(self):
        user = User.objects.create_user(username="testuser", password="test123")
        company = Company.objects.create(
            social_name="TestCompany", name="Test Company", email="test@test.com", city="Test
City", found_date="2024-01-01")
        Project.objects.create(name="Test Project", slug="test-project", company=company,
complete_per=50, dead_line="2024-01-01")

    def test_project_str(self):
        project = Project.objects.get(name="Test Project")
        self.assertEqual(str(project), "Test Project")

class TaskTestCase(TestCase):
    def setUp(self):
        user = User.objects.create_user(username="testuser", password="test123")
        company = Company.objects.create(
            social_name="TestCompany", name="Test Company", email="test@test.com", city="Test
City", found_date="2024-01-01")
        project = Project.objects.create(name="Test Project", slug="test-project",
company=company, complete_per=50, dead_line="2024-01-01")
        Task.objects.create(project=project, task_name="Test Task")
    def test_task_str(self):
        task = Task.objects.get(task_name="Test Task")
```

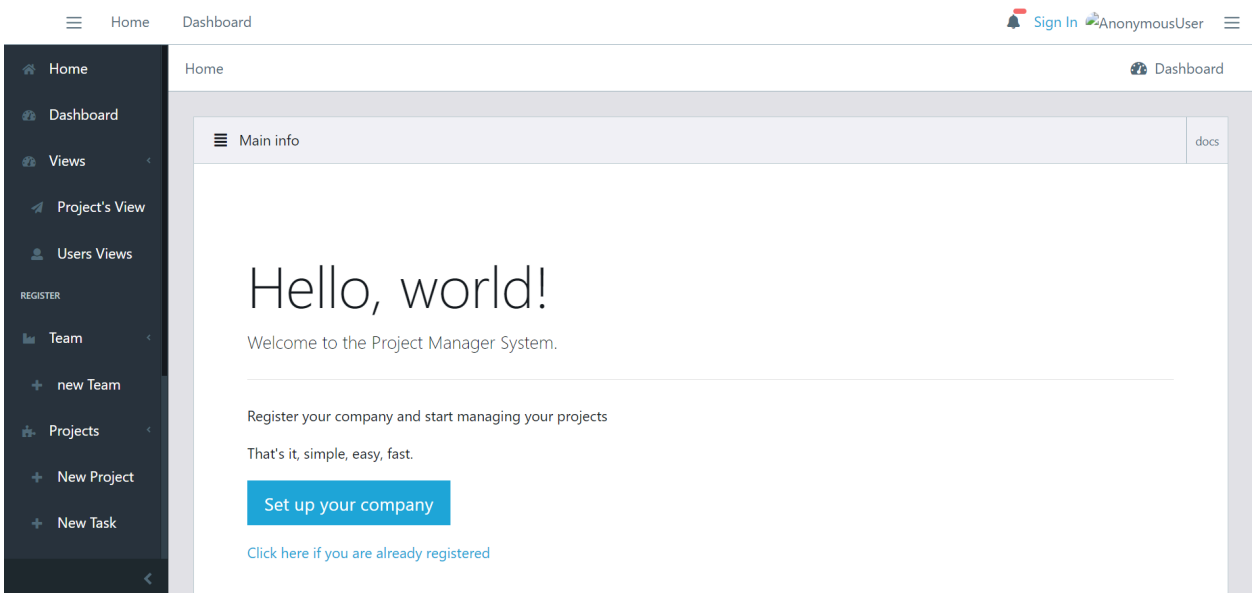
self.assertEqual(str(task), "Test Task")

Output:

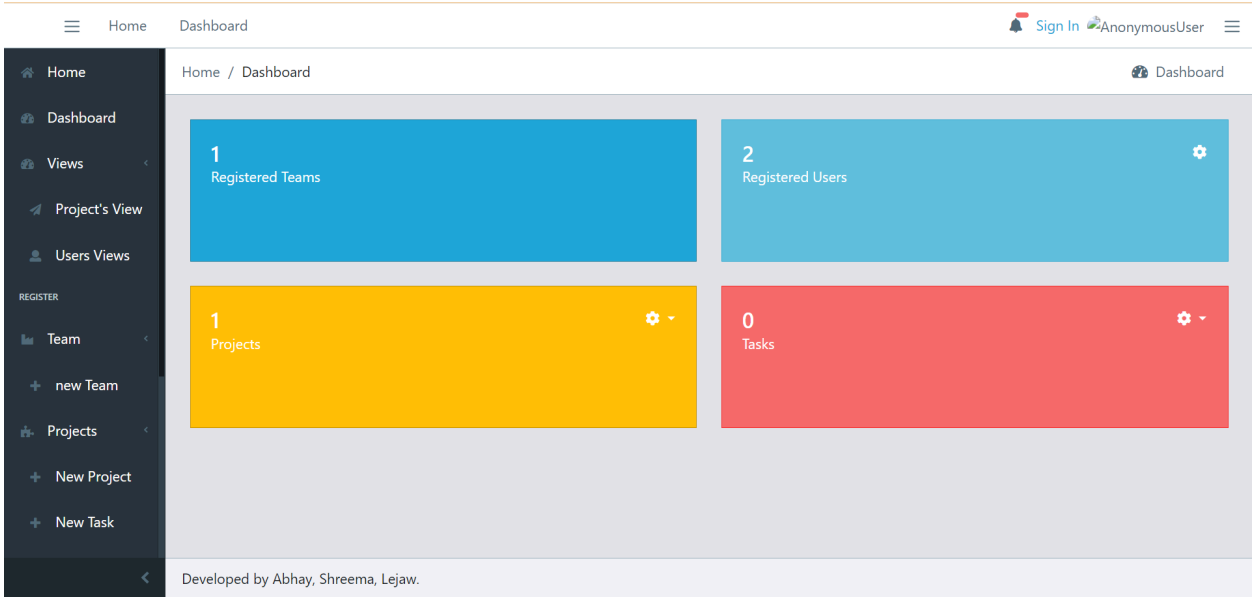
```
Creating test database for alias 'default'...
System check identified no issues (0 silenced).
...
----------------------------------------------------------------------
Ran 25 tests in 3.45s

OK
Destroying test database for alias 'default'...
```

Fig vi- Output for testing

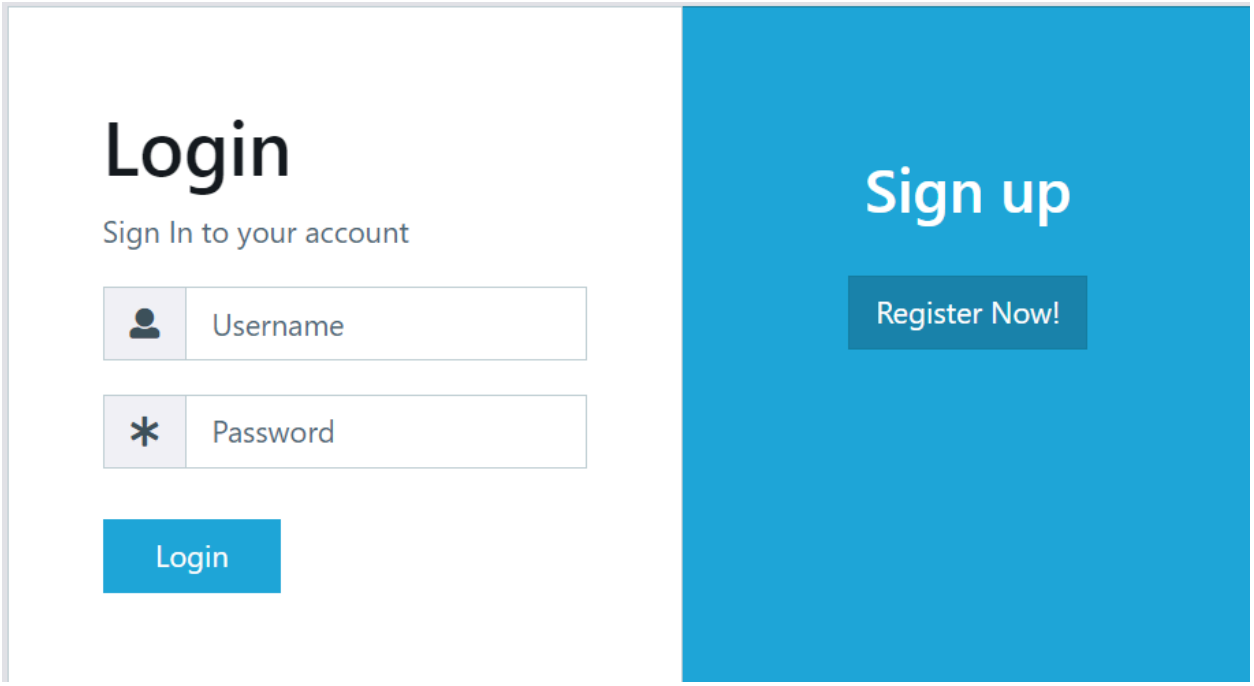
6. PROJECT DEMONSTRATION



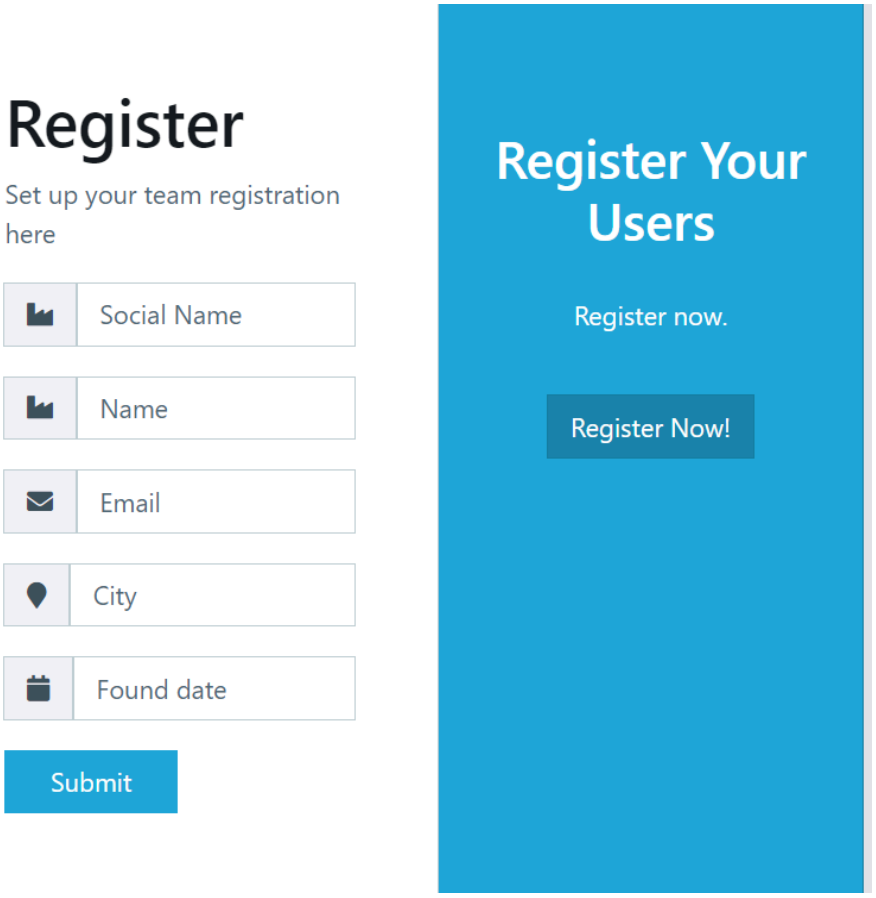
Screenshot 1- Landing Page



Screenshot 2- Dashboard



Screenshot 3- Login Page



Screenshot 5 - Registration Page

Deploying 3 smart contracts:

```
(myenv) truffle migrate
This version of µWS is not compatible with your Node.js build:

Error: Cannot find module '../binaries/uws_darwin_arm64_120.node'
Require stack:
- /opt/homebrew/lib/node_modules/truffle/node_modules/ganache/node_modules/@trufflesuite/uws-js-unofficial/src/uws.js
- /opt/homebrew/lib/node_modules/truffle/node_modules/ganache/dist/node/core.js
- /opt/homebrew/lib/node_modules/truffle/build/migrate.bundled.js
- /opt/homebrew/lib/node_modules/truffle/node_modules/original-require/index.js
- /opt/homebrew/lib/node_modules/truffle/build/cli.bundled.js
Falling back to a NodeJS implementation; performance may be degraded.


Compiling your contracts...
===========================
> Compiling ./contracts/Tasks.sol
> Artifacts written to /Users/abhayrathi/Desktop/Developer/capstone_proj/blockchain-node/build/contracts
> Compiled successfully using:
   - solc: 0.8.17+commit.8df45f5f.Emscripten.clang


Starting migrations...
======================
> Network name:    'development'
> Network id:      1714993518377
> Block gas limit: 30000000 (0x1c9c380)


2_deploy_contracts.js
=====================

   Deploying 'MyContract'
   ----------------------
   > transaction hash:    0x0e3a710ea3a8445dd0a2d1a74103cca65a74e0486a0ed211c6b9f688e9585354
   > Blocks: 0            Seconds: 0
   > contract address:    0xF4a1AB913584c48d5053F59D8CDBac7262a6D1a2
   > block number:        1
   > block timestamp:     1714993550
   > account:             0xB8FDA1dA990b40eC14D27C81e53a23C868842d96
   > balance:             999.999653323375
   > gas used:            102719 (0x1913f)
   > gas price:           3.375 gwei
   > value sent:          0 ETH
   > total cost:          0.000346676625 ETH
```

1. Task contract: This contract contains all the logic necessary to deploy information about the task in the ethereum node.

```
Deploying 'TaskManager'
-----------------------
> transaction hash:    0xdf25a146e6f69d4ff2ba81098479143f74d5f7299a2d34921e5535b4c62ff3ed
> Blocks: 0            Seconds: 0
> contract address:    0xC4705e06911c70a83647c243829Fdd9a46E4Ef4f
> block number:        3
> block timestamp:     1714993550
> account:             0xB8FDA1dA990b40eC14D27C81e53a23C868842d96
> balance:             999.995784960860075051
> gas used:            742840 (0xb55b8)
> gas price:           3.173531444 gwei
> value sent:          0 ETH
> total cost:          0.00235742609786096 ETH
```

2. Team contract: This contract will deploy all the information about the team into the blockchain.

```
Deploying 'Organization'
------------------------
> transaction hash:    0xe2c3de8013ac3b62a061de8e33e292738cf1a9019131fcd076c33058133db43d
> Blocks: 0            Seconds: 0
> contract address:    0xb3E4F93FcD42E87b0302bfBE450aEF707a0c9d12
> block number:        4
> block timestamp:     1714993550
> account:             0xB8FDA1dA990b40eC14D27C81e53a23C868842d96
> balance:             999.993764877568615265
> gas used:            653007 (0x9f6cf)
> gas price:           3.093509398 gwei
> value sent:          0 ETH
> total cost:          0.002020083291459786 ETH
```

3. User contract: Lastly this will deploy all the users involved in project along with their id in the blockchain.

```
Deploying 'UserManager'
-----------------------
> transaction hash:    0xbaf5ae8a403845e4802c892d18023bbfbc2b9f9c553e8b61b0bbbc01b1de859b
> Blocks: 0            Seconds: 0
> contract address:    0x727eF3Bfa134719600ca17E9c8d9B512922Aaa47
> block number:        5
> block timestamp:     1714993550
> account:             0xB8FDA1dA990b40eC14D27C81e53a23C868842d96
> balance:             999.991809910079972699
> gas used:            646794 (0x9de8a)
> gas price:           3.022550439 gwei
> value sent:          0 ETH
> total cost:          0.001954967488642566 ETH
```

Summary of all the contracts:

```
   > Saving artifacts
   -------------------------------------
   > Total cost:     0.008190089920027301 ETH

Summary
=======
> Total deployments:   5
> Final cost:          0.008190089920027301 ETH
```

COST ANALYSIS/RESULT & DISCUSSION

The proposed model for managing project information within government teams introduces several innovative features and addresses key challenges faced in data sharing and management.

Firstly, the incorporation of an attribute-based access control mechanism allows teams to regulate data sharing based on specific project attributes. This dynamic control enables teams to share only the necessary information, enhancing security and minimizing the risk of unauthorized access.

Additionally, the model provides effective management of shared project information over time, ensuring that data sharing remains organized and controlled as projects evolve. This capability is crucial for maintaining data integrity and preventing information sprawl.

The integration of an incentive mechanism incentivizes stakeholders to actively participate in sharing valuable project data. This promotes collaboration and ensures a more comprehensive and up-to-date information pool, benefiting the entire team.

The use of blockchain technology adds another layer of security and integrity to the model. By operating in a decentralized manner, the model eliminates the need for a central managing authority, providing greater control over data transactions and reducing the risk of tampering or censorship. The immutability feature inherent in blockchain technology further enhances security by ensuring that stored project information remains unchanged and secure.

The development process for a project management tool utilizing blockchain technology involves several steps, including identifying requirements, determining a suitable blockchain architecture, developing smart contracts, and continuous monitoring and maintenance. By following a structured approach and incorporating feedback from users, organizations can develop a robust project management tool that streamlines processes, enhances transparency, and improves overall efficiency.

Overall, the proposed model offers a comprehensive solution for managing project information within government teams, addressing key challenges and leveraging innovative technologies to enhance security, control, and collaboration.

Conclusion

The proposed model introduces an innovative approach to managing project information within government teams. It incorporates an attribute-based access control mechanism, allowing teams to regulate data sharing based on specific project attributes. This means that access controls can be managed dynamically, enabling teams to share either all or part of their project information based on the defined attributes. Furthermore, the model enables effective management of previously shared project information and its associated access controls, ensuring organized and controlled data sharing, even as projects evolve over time. To incentivize project owners to contribute information to the system, an incentive mechanism is integrated, motivating stakeholders to actively participate in sharing valuable project data, leading to a more comprehensive and up-to-date information pool. The blockchain-based nature of the model distinguishes it by operating in a decentralized manner, eliminating the need for a central managing authority. This decentralization ensures that all data transactions are under the authority of the data owner, providing greater control and security.

One of the significant advantages of this blockchain-based approach is that data sharing cannot be tampered with or censored without the explicit consent of the project owner. The immutability feature inherent in blockchain technology ensures that stored project information remains unchanged and secure, reducing the risk of data modification by unauthorized parties, such as hacking attacks. Overall, the proposed model offers a robust and secure solution for managing project information within government teams, providing dynamic access controls, incentivizing data contribution, and leveraging blockchain technology for enhanced security and integrity. To develop a project management tool utilizing blockchain technology, the initial step involves identifying specific requirements encompassing record-keeping, asset management, performance verification, reputation systems, and contract execution.

Following this, a suitable blockchain architecture is determined, considering factors such as permissioned or permissionless blockchain, consensus mechanisms, scalability, and security measures. Subsequently, smart contracts are developed to automate various aspects of project management, including defining agreements, automating payments, tracking milestones, and managing performance. Once the tool is implemented, continuous monitoring and maintenance are essential to ensure optimal performance, addressing any issues promptly and incorporating new features and improvements as necessary.

REFERENCES

1. Chadli, S.Y., Idri, A., Ros, J.N. et al. Software project management tools in global software development: a systematic mapping study. SpringerPlus 5, 2006 (2016). https://doi.org/10.1186/s40064-016-3670-7

2. https://www.academia.edu/6349446/Limited_Use_of_Project_Management_Tools_and_Techniques_Determining_and_Evaluating_the_Reasons

3. Robert Pellerin, Nathalie Perrier, Xavier Guillot, Pierre-Majorique Léger,Project Management Software Utilization and Project Performance,Procedia Technology,

4. Longman, A. and Mullins, J. (2004), "Project management: key tool for implementing strategy", Journal of Business Strategy, Vol. 25 No. 5, pp. 54-60.

5. https://www.irjmets.com/uploadedfiles/paper//issue_5_may_2022/22911/final/fin_irjmets1652621331.pdf (accessed in February 2024).

6. Diana White, Joyce Fortune, Current practice in project management — an empirical study, International Journal of Project Management, Volume 20, Issue 1, 2002

7. Roy Gelbard, Nava Pliskin, Israel Spiegler, Integrating system analysis and project management tools, International Journal of Project Management, Volume 20, Issue 6, 2002

8. Antonio G. Sanjuan, Thomas Froese, The Application of Project Management Standards and Success Factors to the Development of a Project Management Assessment Tool, Procedia - Social and Behavioral Sciences, Volume 74, 2013.

9. https://files.eric.ed.gov/fulltext/EJ1259105.pdf (accessed in February 2024).

10. https://dl.acm.org/doi/abs/10.1145/1066149.1066153 (accessed in February 2024).

11. https://www.sciencedirect.com/science/article/pii/S1877705816300303

12. https://elibrary.ru/item.asp?id=31060352 (accessed in February 2024).

13. Korsakov, M.N. & Shichiyakh, R.A. & Kireev, V.S. & Bondarchuk, N.V. & Shcherbakov, V.N.. (2017). Research project management as the main tool of innovative management. International Journal of Applied Business and Economic Research. 15. 1-11.

14. Kumar, Manoj, Project Management Tools and Techniques (T&T) Usage in Building Sector Companies (April 1, 2022). Available at SSRN: https://ssrn.com/abstract=4072539 or http://dx.doi.org/10.2139/ssrn.4072539

15. Fortune, Joyce & White, Diana & Jugdev, Kam & Walker, Derek. (2011). Looking again at current practice in project management. International Journal of Managing Projects in Business. 4. 553-572. 10.1108/17538371111164010.

16. Avraham Shtub, Project segmentation—a tool for project management, International Journal of Project Management, Volume 15, Issue 1,

17. Jugdev, Kam & Perkins, David & Fortune, Joyce & White, Diana & Walker, Derek. (2013). An exploratory study of project success with tools, software and methods. International Journal of Managing Projects in Business. 6. 534-551.

18. https://home.gwu.edu/~kwak/PM_History.pdf

19. Tereso, A., Ribeiro, P., Fernandes, G., Loureiro, I., & Ferreira, M. (2019). Project Management Practices in Private Organizations. Project Management Journal, 50(1), 6-22.

20. Sajad, Muhammad & Sadiq, Muhammad & Naveed, Khawar & Shahid Iqbal, Muhammad. (2016). Software Project Management: Tools assessment, Comparison and suggestions for future development. IJCSNS International Journal of Computer Science and Network Security.

21. Modern Project Management: Essential Skills and Techniques Iman Attarzadeh Siew Hock Ow, Department of Software Engineering

APPENDIX A - SAMPLE CODE

```
from django.shortcuts import render
from django.contrib.auth import login
from django.shortcuts import redirect
from projects.models import Task
from .models import UserProfile
from .models import Invite
from .forms import RegistrationForm
from .forms import CompanyRegistrationForm
from .forms import ProfilePictureForm
from rest_framework import generics
from .models import Company, Project

from .serializers import CompanySerializer, UserProfileSerializer, ProjectSerializer

# Create your views here.

class TeamsListAPIView(generics.ListAPIView):
  queryset = Company.objects.all()
  serializer_class = CompanySerializer

class UserProfileListAPIView(generics.ListAPIView):
  queryset = UserProfile.objects.all()
  serializer_class = UserProfileSerializer

class ProjectListAPIView(generics.ListAPIView):
  queryset = Project.objects.all()
  serializer_class = ProjectSerializer


def register(request):
  if request.method == 'POST':
      form = RegistrationForm(request.POST)
      context = {'form': form}
      if form.is_valid():
          user = form.save()
          created = True
          login(request, user, backend='django.contrib.auth.backends.ModelBackend')
```

```
            context = {'created': created}
            return render(request, 'reg_form.html', context)
        else:
            return render(request, 'reg_form.html', context)
    else:
        form = RegistrationForm()
        context = {
            'form': form,
        }
        return render(request, 'reg_form.html', context)

def usersView(request):
    users = UserProfile.objects.all()
    tasks = Task.objects.all()
    context = {
        'users': users,
        'tasks': tasks,
    }
    return render(request, 'users.html', context)

def user_view(request, profile_id):
    user = UserProfile.objects.get(id=profile_id)
    context = {
        'user_view': user,
    }
    return render(request, 'user.html', context)

def profile(request):
    if request.method == 'POST':
        img_form = ProfilePictureForm(request.POST, request.FILES)
        if img_form.is_valid():
            img_form.save()  # Save the form data
            updated = True
            context = {'img_form': img_form, 'updated': updated}
            return render(request, 'profile.html', context)
    else:
        img_form = ProfilePictureForm()


    context = {'img_form': img_form}
```

```
    return render(request, 'profile.html', context)

def newCompany(request):
    if request.method == 'POST':
        form = CompanyRegistrationForm(request.POST)
        context = {'form': form}
        if form.is_valid():
            form.save()
            created = True
            form = CompanyRegistrationForm()
            context = {
                'created': created,
                'form': form,
            }
            return render(request, 'new_company.html', context)
        else:
            return render(request, 'new_company.html', context)
    else:
        form = CompanyRegistrationForm()
        context = {
            'form': form,
        }
        return render(request, 'new_company.html', context)

def invites(request):
    return render(request, 'invites.html')

def invite(request, profile_id):
    profile_to_invite = UserProfile.objects.get(id=profile_id)
    logged_profile = get_active_profile(request)
    if not profile_to_invite in logged_profile.friends.all():
        logged_profile.invite(profile_to_invite)
    return redirect('core:index')

def deleteInvite(request, invite_id):
    logged_user = get_active_profile(request)
    logged_user.received_invites.get(id=invite_id).delete()
    return render(request, 'invites.html')

def acceptInvite(request, invite_id):
```

```
    invite = Invite.objects.get(id=invite_id)
    invite.accept()
    return redirect('register:invites')

def remove_friend(request, profile_id):
    user = get_active_profile(request)
    user.remove_friend(profile_id)
    return redirect('register:friends')

def get_active_profile(request):
    user_id = request.user.userprofile_set.values_list()[0][0]
    return UserProfile.objects.get(id=user_id)

def friends(request):
    if request.user.is_authenticated:
        user = get_active_profile(request)
        friends = user.friends.all()
        context = {
            'friends': friends,
        }
    else:
        users_prof = UserProfile.objects.all()
        context = {
            'users_prof': users_prof,
        }
    return render(request, 'friends.html', context)
```

Comprehensive Project Management Tool

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Dr. Sabyasachi Kamila | SCOPE

Introduction

Government initiatives often encounter issues such as corruption and inefficiency due to the inherent lack of transparency and accountability in existing systems. The current technology landscape presents several limitations like cost and memory constraints, necessitating the development of a novel solution leveraging blockchain technology for data security and transparency, complemented by AI for intelligent analysis. Presently, government project management is marked by disorderliness and susceptibility to errors and fraudulent activities. Our project management tool endeavors to revolutionize this scenario by utilizing blockchain for secure record-keeping and AI for proactive problem prediction and prevention. This holistic approach aims to streamline project execution, saving both time and money, while ensuring accuracy and adherence to protocols. Ultimately, the objective is to foster honesty, efficiency, and openness in projects, benefiting stakeholders across the board.

Motivation

The project aims to utilize blockchain and AI/ML technologies to modernize project management practices, addressing current deficiencies in transparency and efficiency. By leveraging blockchain, we aim to establish secure, tamper-proof project data, while AI/ML tools will enable predictive analytics for proactive issue identification and resource allocation. Ultimately, our goal is to enhance governance and sustainable development by equipping government teams with an advanced project management solution, leading to reduced corruption, streamlined processes, and increased public trust.

Scope of the Project

Local Government: Addressing delays, mismanagement, and corruption in local infrastructure projects and day-to-day tasks.

National Government: Enhancing transparency, preventing delays and making sure nothing is tampered.

International Aid Projects: Ensuring transparent fund utilization and accountability in cross-border projects.

Methodology

To create a project management tool incorporating blockchain, the first step is to define specific requirements, covering record-keeping, asset management, performance tracking, reputation systems, and contract execution. Next, a suitable blockchain architecture is selected, considering factors like permission levels, consensus mechanisms, scalability, and security. Smart contracts are then developed to automate various management tasks, such as defining agreements, processing payments, tracking milestones, and evaluating performance. Continuous monitoring and maintenance ensure optimal tool performance, addressing issues promptly and incorporating new features as needed.

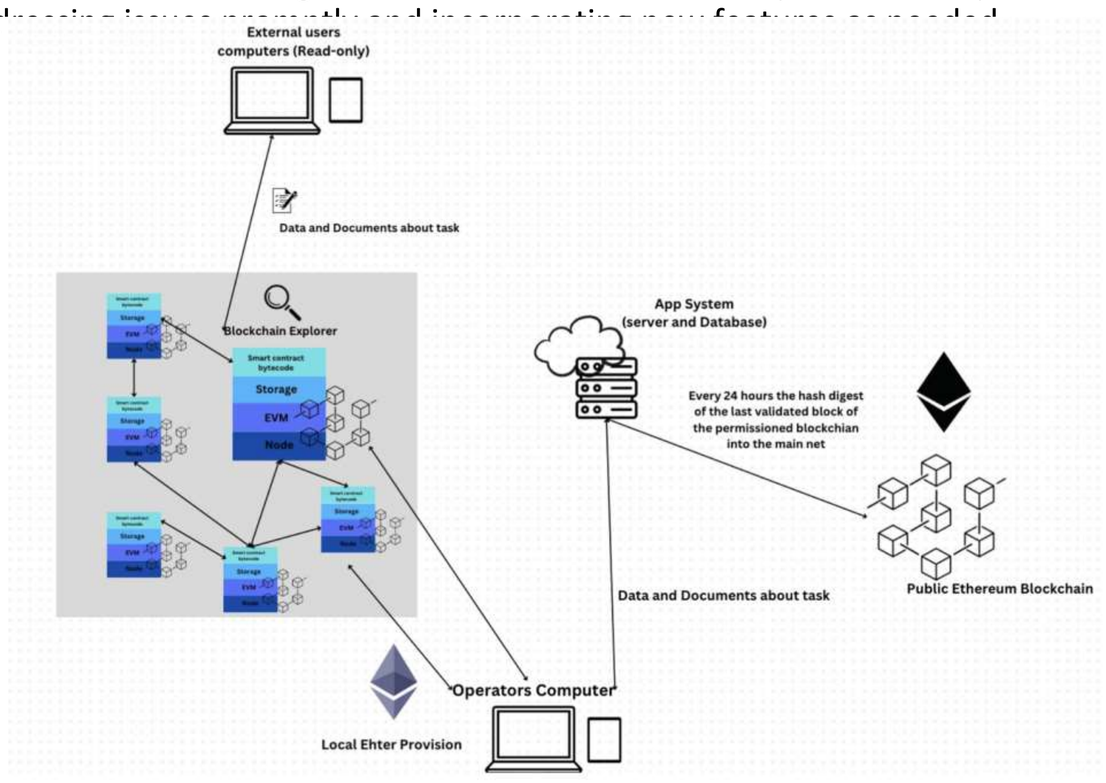


figure : system architecture

The project began with frontend development, focusing on crafting a user-friendly interface using HTML, CSS, and Bootstrap for smooth functionality and visual appeal. Backend development followed, utilizing Django for its data management capabilities and efficiency. Through careful structuring, the backend ensured secure user authentication, optimized data storage, and seamless API integration, laying a reliable foundation. Integration of blockchain-powered smart contracts automated agreements, enhancing security and transaction efficiency. Our development approach combined structured planning with agile iterations based on user feedback, allowing for efficient adaptation to evolving needs and standards.

This methodology enables organizations to develop a robust project management tool using blockchain, streamlining processes, enhancing transparency, and improving overall efficiency.

Results

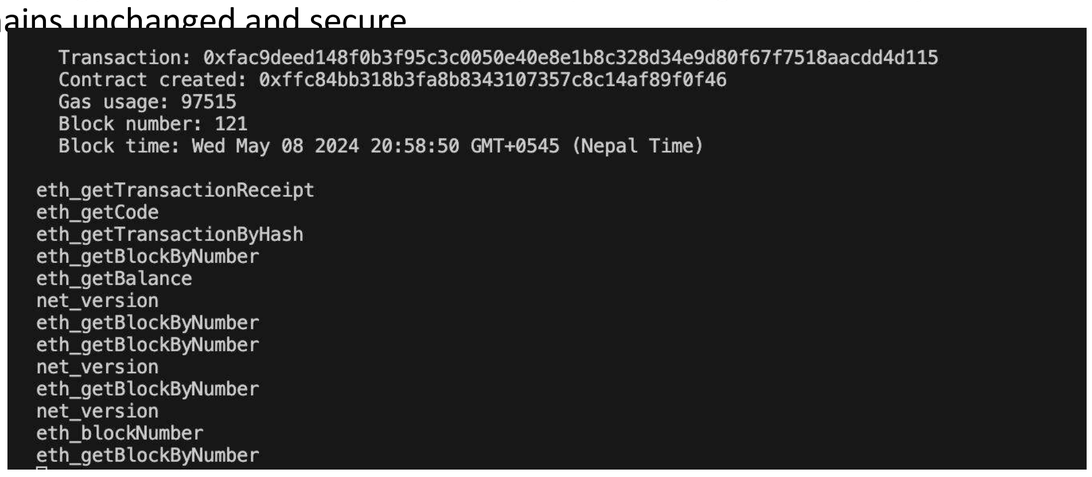
The proposed model for managing project information within government teams introduces several innovative features and tackles significant challenges encountered in data sharing and management.

Firstly, by incorporating an attribute-based access control mechanism, teams can regulate data sharing based on specific project attributes. This dynamic control ensures that only necessary information is shared, boosting security and minimizing unauthorized access risks.

Moreover, the model facilitates effective management of shared project information over time, ensuring organized and controlled data sharing as projects evolve. This capability is vital for preserving data integrity and preventing information overload.

Furthermore, the integration of an incentive mechanism encourages stakeholders to actively participate in sharing valuable project data, fostering collaboration and maintaining an updated information pool.

The utilization of blockchain technology adds an additional layer of security and integrity to the model. Operating in a decentralized manner eliminates the need for a central managing authority, providing better control over data transactions and reducing tampering risks. The immutability feature inherent in blockchain technology further enhances security by ensuring stored project information remains unchanged and secure.



The transaction details in the picture reflect the secure recording aspect of blockchain. The encrypted nature of the picture aligns with the data security offered by blockchain.

The development process for a project management tool using blockchain technology involves several steps, including identifying requirements, determining a suitable blockchain architecture, developing smart contracts, and continuous monitoring and maintenance. By following a structured approach and incorporating user feedback, organizations can create a robust project management tool that streamlines processes, boosts transparency, and enhances overall efficiency.

In summary, the proposed model offers a comprehensive solution for managing project information within government teams, addressing key challenges, and leveraging innovative technologies to enhance security, control, and collaboration.

Conclusion

Opacity poses a pervasive challenge in government project management, leading to distrust and inefficiency. This study proposes a blockchain-based approach to tackle this critical issue. Blockchain technology prevents data manipulation, ensuring transparency and accountability throughout the project lifecycle by establishing an immutable and secure database. This fosters public trust and encourages community engagement. Additionally, automated smart contracts streamline processes, reducing administrative burdens and delays, thereby expediting project completion within deadlines. This approach has the capacity to fundamentally transform the landscape of government project management, enhancing public service delivery, increasing efficiency, and reducing costs. Thus, blockchain's disruptive potential heralds a new era of successful, transparent, and efficient government administration.

References

1. Avraham Shtub, Project segmentation—a tool for project management, International Journal of Project Management, Volume 15, Issue 1,
2. Diana White, Joyce Fortune, Current practice in project management — an empirical study, International Journal of Project Management, Volume 20, Issue 1, 2002
3. Longman, A. and Mullins, J. (2004), "Project management: key tool for implementing strategy", Journal of Business Strategy, Vol. 25 No. 5, pp. 54-60.
4. Modern Project Management: Essential Skills and Techniques Iman Attarzadeh Siew Hock Ow, Department of Software Engineering
5. Robert Pellerin, Nathalie Perrier, Xavier Guillot, Pierre-Majorique Léger,Project Management Software Utilization and Project Performance,Procedia Technology
6. Tereso, A., Ribeiro, P., Fernandes, G., Loureiro, I., & Ferreira, M. (2019). Project Management Practices in Private Organizations. Project Management Journal, 50(1), 6-22.