



# **SOFTWARE ENGINEERING PROJECT**

## **WorkQuest (Project Proposal)**

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# **WorkQuest (Project Proposal)**

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## Abstract

## Acknowledgement

Put your acknowledgement paragraph here.

Atikarn Kruaykriangkrai  
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# Chapter 1

## Introduction

### 1.1 Background

Consequently, in collaborative work environments, balancing timely task completion with good teamwork can be challenging. If tasks are not distributed evenly or team members feel less involved, it may affect overall participation. Conventional task management software, like Trello, Asana, or Monday.com, excel at organizing workflows, but some teams may find them lacking in engagement and motivational features. Without engagement-driven elements, some teams may struggle with motivation, leading to uneven workload distribution or delays in task completion. This can sometimes lead to lower participation, procrastination, or an uneven workload, where some members take on more tasks while others contribute less.

As a result, managing tasks efficiently while keeping team members engaged remains a persistent challenge in collaborative work environments. This is where gamification becomes a solution.

Gamification has emerged as a promising approach to improving productivity by incorporating game mechanics into non-game environments. Research has shown that gamification can enhance user engagement and performance, with studies reporting a motivational increase of up to 48% in gamified work environments. Studies show that game-based motivation can increase task completion rates and enhance teamwork. Habitica and other gamified platforms offer strong individual motivation tools, but teams looking for collaborative engagement may need additional features. However, existing gamified task management systems, such as Habitica, focus primarily on individual productivity rather than team-based collaboration. This gap highlights the need for a group-oriented

gamified task management system that fosters engagement, accountability, and efficiency.

To address these challenges, this project introduces WorkQuest, a group task management system that integrates gamification through a boss fight mechanic with AI-driven performance, assessing each team member. In WorkQuest, teams collaborate to complete tasks, which directly influence a boss battle, adding a strategic and motivational layer to teamwork.

## 1.2 Problem Statement

The problem this research will address is that task management tools are not very exciting, making it difficult to keep teams motivated and working efficiently. Most tools feel dull and do not encourage teamwork, which can lead to delays, incomplete tasks, and poor-quality work. Without a fun and interactive way to manage tasks, teams may lose focus, miss deadlines, and struggle to work effectively.

Poorly managed tasks slow down projects, lower team performance, and make work feel boring. Gamification—bringing game-like elements into work—has become a popular way to boost motivation (Deterding et al., 2011). However, most gamified systems focus only on rewards without making the work itself enjoyable. This often creates short-term excitement that fades over time.

Current tools like Kanban boards help organize tasks but do not make them fun. WorkQuest aims to solve this problem by using AI to assesses performance on an individual basis by offering feedback on strengths and areas of improvement. Players earn points based on their contributions, consistency, and collaboration and can exchange them for special items, themes, or enhancements in future gameplay.

## 1.3 Solution Overview

WorkQuest is a collaboration task management solution that combines gamification and artificial intelligence-driven performance assess-

ment to address common issues with collaborative working systems. The platform aims to heighten team engagement, improve accountability, and streamline overall productivity via a mix of game mechanics and performance metrics.

At its core, WorkQuest uses a boss fight mechanism wherein the boss attack is achieved by completing the teams work together towards complete tasks that directly contribute to their advancement throughout a fight against a strong boss. With every task completed, the team gets closer to the victory, with an accompanying strategic and motivating atmosphere to work together.

As teams progress through the boss battle, they unlock rewards like achievement badges within the game and leader board become available Rewards both intrinsically extrinsic rewards, creating a sense of accomplishment and reinforcing positive team behaviors.

In addition, WorkQuest incorporates AI-driven performance evaluation, which assesses individual contributions and provides personalized feedback to each team member. This helps ensure accountability, highlights areas for improvement, locate areas for development, and promote a continuous cycle of feedback for personal and team growth.

With the inclusion of these features, WorkQuest not only helps solve the problem of disengaged team members, procrastination but it also offers a dynamic and engaging task management experience. It improves task completion rates, promotes teamwork and communication, and enhances overall motivation.

### 1.3.1 Features

1. **Boss Battle Workflow:** Transforms task management into an interactive boss battle where tasks determine the boss's strength and the team's progress affects the battle outcome.
  - (a) **Kanban Board:** Users organize tasks visually, where completing tasks weakens the boss while delays weakens player.

- (b) **Boss Mechanics:** The boss is created by calculating all tasks with their assigned importance weight. Users battle the boss by completing tasks.
- **Attack Boss:** When a task is completed, player deals damage to the boss based on time, importance, and quality (review).
  - **Boss Attack:** The boss strikes back if the task is completed late.
2. **Success Meter:** Performance evaluation and rewards encourage productivity by assessing individual contributions and providing feedback on strengths and weaknesses.
- (a) **Contribution Scoring and Personalize Feedback:** Users receive performance feedback based on task completion, consistency, and teamwork.
  - (b) **Reward System:** Earn points for achievements, which are displayed on the leaderboard, and earn achievement badges when milestones are reached.
  - (c) **Work Review:** Allows team members to review each other's work, providing constructive feedback and improving collaboration. Reviews contribute to performance scores and help identify areas for improvement.
3. **Flow Track:** Assists users by forecasting their likelihood of meeting deadlines based on work patterns.
- (a) **Progress Analysis:** Monitors past performance, task completion speed, and consistency to assess progress.

## 1.4 Target User

The target users of WorkQuest are students working on small group projects in a university or school setting. These users are looking for a gamified and engaging approach to manage tasks, track progress, and enhance collaboration in a team environment.

- **Demographics:** WorkQuest is primarily directed at students aged 15 to 30 who are working on small group projects in university or high school settings. These students are already familiar with digital tools for task management. They are looking for tools that will allow for more interactive and motivating group collaboration.
- **Skill Level:** The system is for users with basic technology skills. Those students who are comfortable with online platforms, such as Google Drive, Trello, or Microsoft Teams, will find WorkQuest easy to use. One does not require advanced technical knowledge for using this system, thereby allowing for a wider variety of users to access it.
- **Industry or Domain:** WorkQuest is particularly beneficial in academic environments, featuring work in small group projects such as university courses, high-school assignments, and extracurricular group projects. It is flexible for a variety of fields of study allowing for a fun and organized way to finish academic tasks.

## 1.5 Benefit

WorkQuest enhances group work and task completion by using gamification and AI-powered performance metrics. WorkQuest enables overcoming common challenges like disengagement, procrastination, and workload imbalance by the following benefits:

1. **Increased Engagement:** The boss fight feature adds task completion interaction and engagement in order to maintain teams in constant engagement.
2. **Increased Accountability:** With personalized performance review and contribution points, each member of the team is held responsible for their work. everyone is working proportionally,By assigning contribution points and offering tailored feedback, the system makes it clear who is meeting expectations and who may need improvement. This encourages team members to take ownership of their tasks, ensures equitable workload distribution, and reduces the likelihood of procrastination or shirking responsibilities.

3. **Continuous Growth and Improvement:** The feedback loop of performance based on AI ensures that every member receives tailor-made feedback regarding their strengths and weaknesses, empowering them to improve and grow continuously.
4. **Promotes Teamwork:** The game-like environment encourages teamwork and communication to successfully complete tasks.

## 1.6 Terminology

- **Gamification:** The use of game mechanics and principles in non-game contexts to engage users and solve problems.
- **Boss Fight Mechanism:** The central gamification feature in WorkQuest where completing tasks weakens a boss and progresses the team towards victory. Delays or unfinished tasks can strengthen the boss or cause penalties.
- **Kanban Board:** A visual task management tool that allows users to organize and prioritize tasks.
- **AI-driven Performance Evaluation:** A system that uses artificial intelligence to assess individual contributions and provide personalized feedback to users based on their task completion, consistency, and teamwork.
- **Reward System:** A feature that allows users to earn points for their performance, which can be exchanged for achievement badges.
- **Work Review:** A feature that allows team members to review and provide constructive feedback on each other's work, helping to foster collaboration and identify areas for improvement.
- **Flow Track:** A tool that tells the likelihood of a team meeting its deadlines based on past performance and current task completion patterns.

# Chapter 2

## Literature Review and Related Work

In this chapter, describe other solutions/research that address the same topic as your project. If you are working on a software project, create a list of alternative solutions and analyze them in the competitor analysis section. If you are working on a research project, describe your related work research in the literature review section.

### 2.1 Competitor Analysis

#### 1. Competitor Overview

##### (a) Trello

"Trello, shown in Figure 2.1, is a task management tool that uses boards, lists, and cards. It helps users organize tasks visually and move them through different stages. It is simple, flexible, and suitable for both teams and individuals."

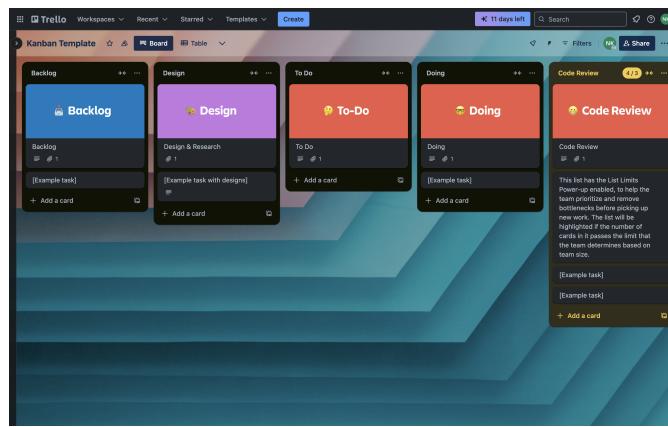


Figure 2.1: Trello

### (b) Asana

Asana is a tool for managing projects and tasks. Users can create task lists, set deadlines, and track progress. It supports different views like lists, boards, and timelines, making it useful for teams working on complex projects. An example of the application is shown in Figure 2.1.

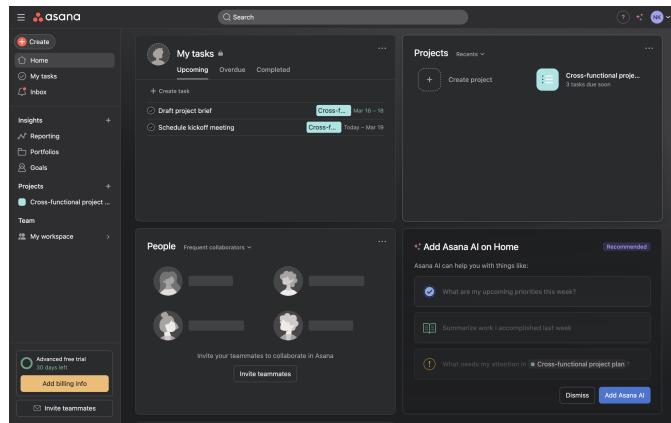


Figure 2.2: Asana

### (c) Monday.com

Monday.com is a work management tool that helps teams plan and track their work. It offers customizable workflows, automation, and visual dashboards, as shown in Figure 2.3. Teams can organize tasks in a way that fits their needs.

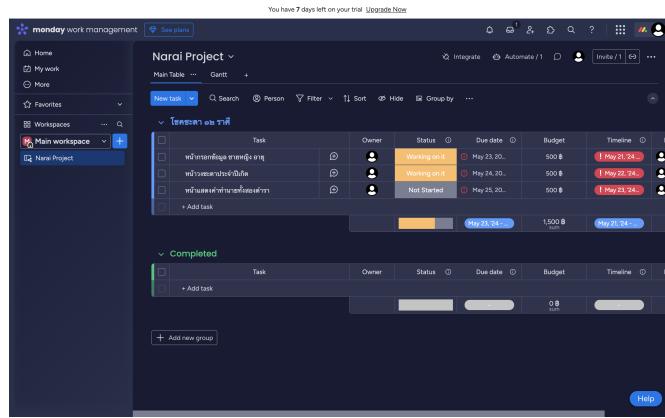


Figure 2.3: Monday.com

#### (d) Habitica

Habitica is a habit tracker that turns daily tasks into a game, as shown in Figure 2.4. Users complete tasks to earn rewards and level up. It makes productivity fun by using game elements to build good habits.

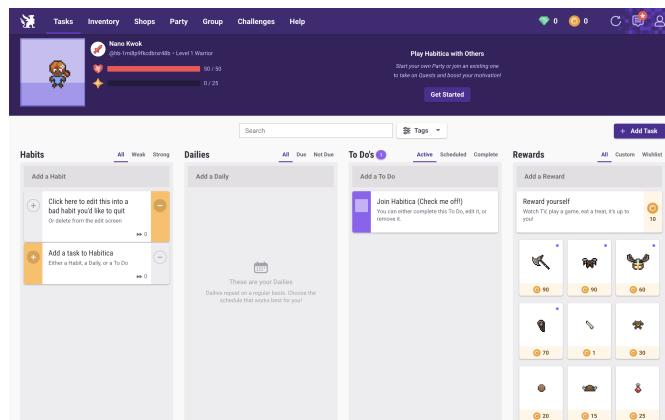


Figure 2.4: Habitica

#### (e) Fucumon

Fukumon is a gamified productivity app that gives rewards for completing tasks, as shown in Figure 2.5. It helps users stay motivated by making work feel more enjoyable and engaging.

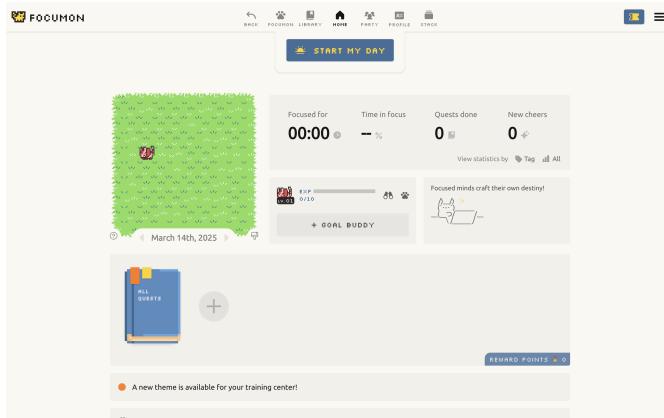


Figure 2.5: Fukumon

## 2. Product Feature Comparison

- **Compared to Trello, Asana, and Monday.com:** As shown in Table 2.1, these platforms provide strong task management features with different structures. Trello uses Kanban boards, Asana focuses on task lists, and Monday.com offers customizable workflows. They also support collaboration through shared tasks, comments, and dashboards. However, they do not include AI feedback, which could help users improve task planning and productivity. Additionally, while they allow some customization, their features mainly cater to structured project management.
- **Compared to Habitica and Fukumon:** Table 2.1 shows that Habitica and Fukumon take a different approach by focusing on individual task tracking. They organize tasks through checklists. However, they do not offer collaboration tools, or AI-based feedback. Users who require more structured project management alongside task tracking may look for additional features to help organize their work efficiently.
- **Task Organization and Customization:** From Table 2.1, it is clear that different platforms excel in different areas. Some focus on detailed task structures, while others prioritize flexibility in workflow management. Depending on user needs, a solution that supports task automation, collaboration, and personalized

workflows may provide a more adaptable approach to managing work efficiently.

Features	WorkQuest	Trello	Asana	Monday.com	Habitica	Fukumon
Task Management	Kanban boards, automation	Kanban boards	Task lists	Custom workflows	Daily tasks	To-do lists
Gamification	XP, rewards	No	No	No	RPG-style game	Rewards system
AI Feedback	Yes	No	No	No	No	No
Collaboration Task assignments	Chat, shared tasks	Boards, comments	Task assignments	Team dashboards	No	Shared tasks
Reward System	Leader board, badges	No	No	No	Coins, items	Points, achievements
Customization	Workflows, themes	Boards, labels	Templates	Dashboards	No	Task settings

Table 2.1: Feature Comparison Among Competitors

### 3. Product Marketing Comparison

#### (a) Social Media & Advertising

- Trello, Asana, and Monday.com focus on business users.
- Habitica and Fukumon highlight gamified motivation.
- WorkQuest focus on team engagement.

#### (b) Website & Brand Voice

- Trello and Asana promote workflow efficiency.
- Habitica and Fukumon market personal growth.
- WorkQuest focuses on gamified collaboration.

### 4. SWOT Analysis

#### (a) Strengths

- Unique gamified approach with AI feedback.
- Focuses on team collaboration.
- Engaging reward-based mechanics.

#### (b) Weaknesses

- New to the market.

- Requires user adaptation to gamification.

**(c) Opportunities**

- Increasing demand for gamified productivity.
- Schools and companies may find it useful.

**(d) Threats**

- Strong competition from established platforms.
- Users may hesitate to switch tools.

## 2.2 Literature Review

Task management plays an important role in work productivity, but many teams face challenges with staying engaged, avoiding procrastination, and improving collaboration. Traditional task management systems can sometimes feel rigid, which can lead to difficulties in maintaining motivation over time.

In response to these challenges, gamification has emerged as a promising strategy to enhance engagement and performance by integrating game-like elements—such as goals, rewards, competition, and collaboration—into workplace settings. Research consistently shows that gamification provides team members with a sense of autonomy, competence, and relatedness, thereby creating a fun and engaging work environment [1]. Moreover, practical advantages have been demonstrated across various performance metrics, supported by evidence from real-life case studies. [2]

WorkQuest introduces a unique approach to task management by integrating gamification elements—specifically "boss fight" mechanics—and AI performance evaluation. In this system, Users collaborate to complete tasks that weaken and ultimately defeat a boss, adding a layer of strategic engagement. AI-driven analysis provides personalized performance feedback, ensuring that users receive tailored insights to improve efficiency.

The application of gamification involves the use of goal-setting for direction, challenges to maintain interest, rewards to reinforce success,

and feedback to guide improvement. These elements work synergistically to keep participants engaged, boost performance, and align intrinsic and extrinsic motivations. [3]

Numerous studies have demonstrated the benefits of gamification in a variety of contexts. For example, research by Juho Hamari (2014) reviewed the impact of gamification across sectors and found that it consistently improves user engagement, productivity, and satisfaction by employing feedback loops, competition, and goal-setting as effective motivators. [4]

In the context of task management, gamification has been shown to improve productivity, collaboration, and task completion rates by transforming routine tasks into more engaging and motivating activities.

Moreover, gamification has been shown to promote teamwork and collaboration. Deterding et al. (2011) emphasize that gamified systems enhance group dynamics by incorporating features like team challenges, leaderboards, and shared rewards, which encourage users to collaborate, share knowledge, and work together toward common goals. This approach improves collective productivity and communication within organizations. [5]

We are gamifying a task management application using a boss fight mechanic to increase engagement. Boss fights in video games are pivotal moments designed to challenge players and heighten engagement. These encounters often require players to utilize all the skills and strategies they've acquired, serving as ultimate tests of their abilities. Successfully overcoming a boss fight provides a strong sense of accomplishment, reinforcing player motivation and progression [6].

In addition to enhancing motivation, boss fights create memorable emotional experiences by evoking feelings ranging from excitement and anticipation to frustration and relief. The atmosphere during boss encounters—shaped by music, sound effects, and visual design—further enhances immersion, making these battles feel more epic and impactful. [6]

Beyond entertainment, the concept of boss fights has also been explored in gamified learning environments. Research suggests that boss fights in educational settings can serve as powerful motivational tools,

encouraging students to apply their knowledge and problem-solving skills in high-stakes scenarios. By integrating boss fights into gamified learning, educators can create more engaging and rewarding experiences, similar to how video games challenge and reward players [7].

Not only traditional boss fights, but we also offer a boss collection feature that can further enhance engagement. Rewarding players for defeating bosses and introducing a rotational or exclusive collection system leverages FOMO (Fear of Missing Out) to drive participation. This approach has been successfully used in games like Fortnite and Animal Crossing to sustain player interest and encourage long-term engagement [8]. While some research highlights the potential risks of FOMO in gaming, including compulsive behaviors, when implemented responsibly, it serves as a powerful tool to keep players engaged and invested in the experience [9] [10].

While gamification serves as an essential engagement strategy, the integration of AI provides a complementary approach to enhance user experience through personalized feedback and performance evaluation. In WorkQuest, we integrate AI not only for gamification but also to provide personalized feedback to users. This helps individuals understand how they can improve and enables teams to assess overall performance. Unlike traditional evaluation methods, AI-driven systems analyze large datasets to measure individual contributions, track task efficiency, and offer tailored recommendations for improvement.

To effectively achieve these goals, we utilize multiple criteria for performance evaluation, including Work Speed Analysis, Strength Identification, Work Quality Evaluation, Teamwork Evaluation, Diligence Scoring, and Workload Tracking. Furthermore, we employ K-Means clustering to determine user roles, which is integrated with Q-learning to generate personalized feedback and task recommendations. By organizing users based on their performance patterns, this approach ensures that the feedback provided is accurate, targeted, and conducive to individual growth and team efficiency.

Building upon these evaluation criteria, recent advancements in AI, particularly in Natural Language Processing (NLP) and Machine Learning (ML), have enhanced transparency, fairness, and personalized

feedback mechanisms. For instance, NLP models like BERT are capable of contextual understanding, improving the quality of feedback provided to users. [11]

Moreover, techniques such as K-Means clustering and Reinforcement Learning (Q-learning) have proven effective in generating personalized task recommendations and role identification. For example, Q-learning-based differential evolution with K-Means clustering enhances clustering mechanisms for user segmentation, allowing for targeted feedback and improved collaboration. This approach is particularly useful in dynamic environments where user performance varies over time. [12]

However, in WorkQuest, performance evaluation is conducted only at the end of a project, ensuring a comprehensive assessment of contributions and outcomes. While AI enables real-time data analysis, the structured end-of-project assessment ensures that feedback is holistic and reflective of overall performance.

As organizations increasingly adopt AI-driven performance evaluation, balancing automation with human oversight will be essential to ensure fairness, adaptability, and long-term success in collaborative work environments.

Overall, the integration of gamification and AI-driven feedback mechanisms represents a promising evolution in task management. By combining these strategies effectively, it is possible to create engaging, efficient, and adaptable systems that enhance productivity and satisfaction across various contexts.

## Chapter 3

### Requirement Analysis

#### 3.1 Stakeholder Analysis

##### 3.1.1 Types of Stakeholders

displays the categorization of stakeholders based on their power and interest in the project, using a matrix format to identify key groups and their level of influence and involvement.

Type	Stakeholders
<b>Internal Stakeholders</b>	Development Team, University Students, Professors, Academic Institutions
<b>External Stakeholders</b>	Investors, Educational Technology Companies, Potential Business Partners, Secondary School Students, General Public

Table 3.1: Stakeholder Types

### 3.1.2 Stakeholder Importance

Table 3.2 displays the categorization of stakeholders based on their power and interest in the project, using a matrix format to identify key groups and their level of influence and involvement.

<b>Importance Level</b>	<b>Stakeholders</b>
High Power, High Interest	Development Team
High Power, Low Interest	Investors, Educational Technology Companies, Potential Business Partners
Low Power, High Interest	University Students, Professors, Academic Institutions, Secondary School Students
Low Power, Low Interest	General Public

Table 3.2: Stakeholder Importance Matrix

### 3.1.3 Stakeholder Analysis

Table 3.3 provides a detailed stakeholder analysis, categorizing stakeholders based on their power, interest, and influence on the project.

Name	Levels	Contact	Priorities	Impact	Strategy
Development Team	High Power, High Interest	Internal Communication	System development and maintenance	Directly responsible for project success	Daily meetings, teamwork
University Students	Low Power, High Interest	University Network	Effective learning tool	Key users, provide feedback	User feedback sessions, surveys
Professors and Academic Institutions	High Power, High Interest	Academic Channels	Integration with learning	Influence on adoption	Collaboration, academic research
Investors	High Power, Low Interest	Business Meetings	Financial return	Provides funding support	Reports, presentations
Educational Technology Companies	High Power, Low Interest	Industry Contacts	Potential partnerships	Resource and tech support	Discussions, collaborations
Potential Business Partners	High Power, Low Interest	Business Network	Business opportunities	Scaling and market expansion	Networking, agreements
Secondary School Students	Low Power, High Interest	Educational Outreach	Future user base	Potential adopters	Awareness campaigns, trials
General Public	Low Power, Low Interest	Public Media	Awareness	Indirect impact	Social media, marketing

Table 3.3: Stakeholder Analysis

## 3.2 User Stories

### 3.2.1 Boss Battle Workflow

- As a high school student, I want to see my team's progress in the boss battle, so that I can understand how much work is left.
- As a team leader, I want to assign tasks to my teammates, so that everyone has a clear responsibility.
- As a project manager, I want to view the team's task flow, so that I can ensure an even workload.
- As a team member, I want to move tasks on the Kanban board, so that I can visually track my work.

### 3.2.2 Success Meter

- As a university student, I want to see my individual performance score, so that I know how much I am contributing.
- As a team leader, I want to review my team's overall performance, so that I can encourage struggling members.
- As a team member, I want to receive performance feedback based on my completed tasks, so that I can improve my work.
- As a team member, I want to earn badges for achievements, so that I feel motivated to complete more tasks.
- As a team member, I want to see a leaderboard ranking, so that I can compare my contributions with my teammates.

### 3.2.3 Flow Track

- As a student, I want the system to estimate my risk of missing deadlines so that I can plan my time better.

### 3.2.4 Target Users' Needs

- As a student, I want an easy system, so that I don't waste time figuring it out.
- As a university student, I want a gamified task manager, so that group projects feel more engaging.
- As a high school student, I want a simple way to track group project tasks, so that I know what to do next.

## 3.3 Use Case Diagram

<TIP: Write a use case diagram for your project here. Refer to an article “What is a use case diagram?” by Lucidchart for help./>

## 3.4 Use Case Model

A use case is a detailed description of how a system interacts with an external entity (such as a user or another system) to accomplish a specific goal. Use cases provide a high-level view of the functionality of a system and help in capturing and documenting its requirements from the perspective of end users.

<TIP: Write use cases for your project here. Make sure to use the appropriate type of use case for each scenario (brief, casual, and fully-dressed use case)./>

## 3.5 User Interface Design

### 1. Home Page

As shown in Figure 3.1, this is the first page that the user lands on after logging in. It includes the user's profile, statistics, leaderboard, and their projects.

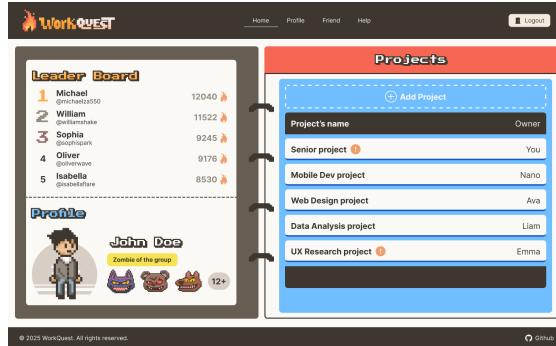


Figure 3.1: Home Page

### 2. Project Page

As shown in Figure 3.2, this is the page where the user manages their projects while fighting a boss. It features a Kanban board and a boss graphic.

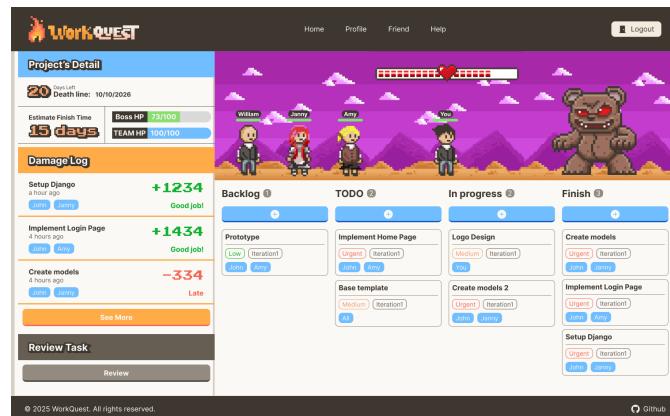


Figure 3.2: Project Page

### 3. Feedback Page

As shown in Figure 3.3, this page is displayed at the end of the project. It visualizes all of the user's statistics, including boss fight performance, personalized feedback, and suggestions.

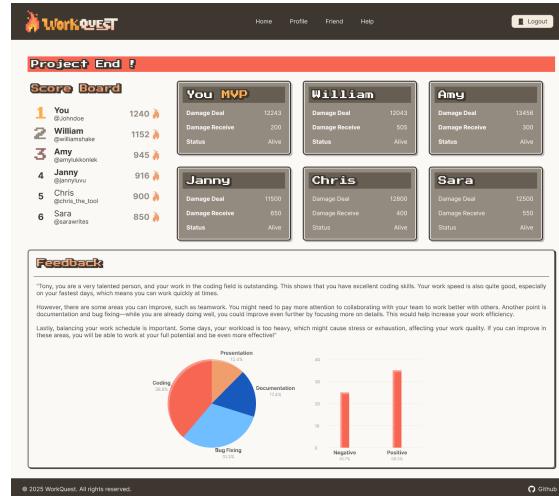


Figure 3.3: Feedback Page

### 4. Dashboard Page

As shown in Figure 3.4, this page shows your project statistics and progress, including a damage pie chart, estimated finish time, and a work speed time series.

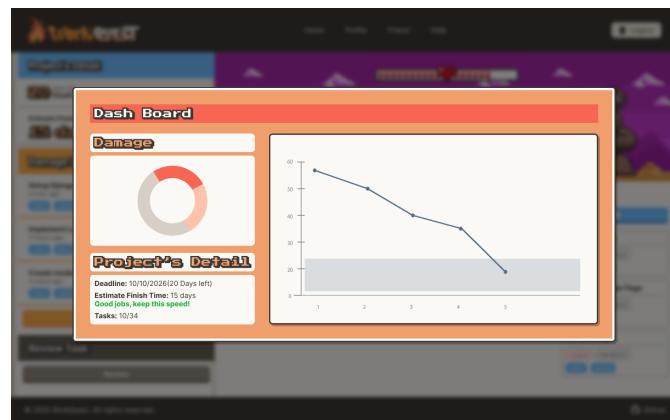


Figure 3.4: Dashboard Page

## Chapter 4

### Software Architecture Design

<TIP: Describe how you design your application using Unified Modelling Language (UML). There should be at least two diagrams that describe the software architecture. You may add additional or remove unnecessary diagrams. However, there needs to be a coherency between them at the end./>

#### 4.1 Domain Model

<TIP: Describe the business concept of your project. Showcase a domain model that captures the said concept./>

#### 4.2 Design Class Diagram

<TIP: Showcase a design class diagram for your project and explain how it works here. You can group classes into packages or layers to communicate your design better./>

#### 4.3 Sequence Diagram

<TIP: Sequence diagrams describe how the software runs at run-time. You do not have to create a sequence diagram for every scenario. However, there should be one for all the main ones./>

<ChatGPT: Creating a sequence diagram for every use case is not strictly necessary, but it can be a valuable tool in certain situations. Sequence diagrams are particularly useful for illustrating the interactions

between different components or objects in a system over time, showcasing the flow of messages or actions between them./>

## 4.4 Artificial Intelligence

WorkQuest's Personalized Feedback feature uses AI to analyze user activity, provide task-related insights, and offer feedback. It helps improve teamwork and efficiency by giving suggestions based on work patterns.

- **Work Speed Analysis**

*Input:* Task completion time, daily work speed trends

*Technique:* Time series analysis

*Output:* Estimates how much time each type of task takes, helping users manage workloads efficiently

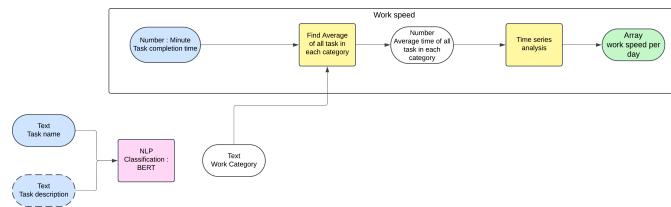


Figure 4.1: How the AI Component Analyzes Work Speed

- **Strength Identification**

*Input:* Task names and descriptions, Work category

*Technique:* NLP classification using BERT

*Output:* Identifies frequently performed tasks to highlight user strengths

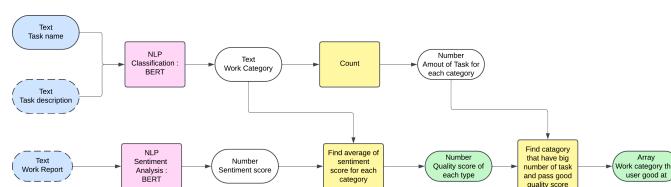


Figure 4.2: How the AI Component Identifies Strengths

- **Work Quality Evaluation**

*Input:* User-generated work reports and reviews

*Technique:* NLP sentiment analysis (RoBERTa)

*Output:* Determines whether feedback is positive or negative, influencing motivation and improvement areas



Figure 4.3: How the AI Component Evaluates Work Quality

- **Teamwork Evaluation**

*Input:* Number of assigned tasks, teamwork interactions

*Technique:* T-score normalization

*Output:* Measures collaboration levels to encourage balanced participation

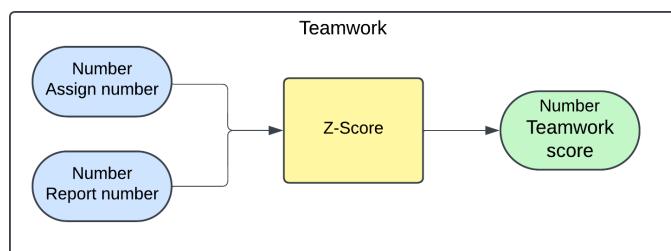


Figure 4.4: How the AI Component Evaluates Teamwork

- **Diligence Scoring**

*Input:* Task weight, difficulty level

*Technique:* T-score normalization

*Output:* Assesses consistency in handling complex or demanding tasks

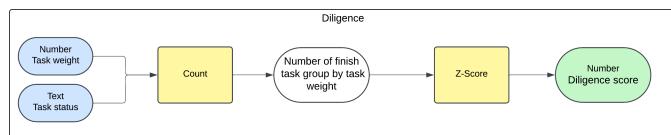


Figure 4.5: How the AI Component Evaluates Diligence

- **Workload Tracking**

*Input:* Work session start and end times

*Technique:* Time series analysis

*Output:* Evaluates work intensity and suggests workload balancing strategies

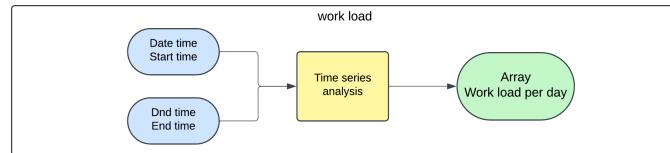


Figure 4.6: How the AI Component Tracks Workload

- **AI-Powered Suggestions**

*Technique:* Reinforcement learning (Q-learning)

*Output:*

- **Prioritization:** Recommends which tasks to focus on
- **Workload Optimization:** Suggests schedule adjustments to reduce overtime
- **Collaboration Enhancement:** Identifies opportunities to improve teamwork

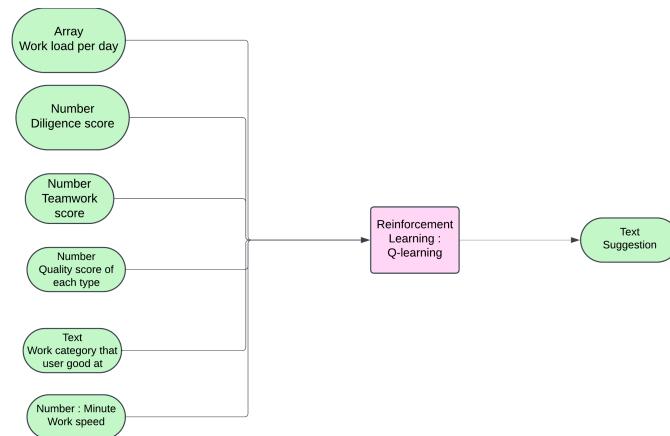


Figure 4.7: How the AI Component Gives Suggestion

- **Role Categorization**

*Input:* Work activity data from all users in the system

*Technique:* K-Means clustering

*Output:* Classifies users into roles based on work habits: **Final Step:** All analyzed outputs from the AI components are processed by OpenAI (GPT) to generate a clear, structured, and user-friendly feedback report.

#### 4.4.1 AI Techniques Used

- **Natural Language Processing (NLP)**

- \* **BERT** – Helps classify tasks and find user strengths.
- \* **Zero-shot Classification** – Sorts tasks into categories without needing pre-labeled data.
- \* **Sentiment Analysis (DistilBERT)** – Checks user feedback to understand their opinions.

- **Unsupervised Learning**

- \* **K-Means Clustering** – Effectively groups users based on performance similarity. As an unsupervised model, it does not require a training dataset.

- **Time Series Analysis**

- \* Tracks changes in work speed and task load over time.

- **T-score Normalization**

- \* Measures teamwork and effort by comparing user performance.

- **Reinforcement Learning (Q-learning)**

- \* Q-learning continuously learns from past actions and rewards, making it effective for task recommendations that improve over time. It can be applied to recommendation scenarios to deliver optimal results.

- **Generative AI (GPT-based Models)**

- \* GPT for generating natural language text, making it suitable for turning analytical outputs into understandable and personalized feedback.

#### 4.4.2 Example Usage

##### Input:

---

```
final_input = {
    "user_name": "Tony",
    "work_load_per_day": [5, 7, 4, 6, 8],
    "diligence_score": 85,
    "teamwork_score": 72,
    "quality_score_per_task": { "Coding": 5,
                                "Documentation": 2,
                                "Bug Fixing": 4 },
    "work_category_best": "Coding",
    "work_speed_per_day": [2.3, 2.5, 1.8, 2.1, 2.7],
    "role": "The Feedback Experts"
    "suggestion": "Try to adjust the work schedule to reduce the workload on certain days." }
```

Figure 4.8: Example input

##### Output:

Hey Tony, you're doing great, man! Your coding skills are solid, and you've got some seriously strong workdays where you're super fast. That shows you've got the ability to push through when needed. But there are a few things you can level up—teamwork, for example. If you focus a bit more on working smoothly with others, it'll make a big difference. Also, your documentation and bug fixing are already good, but tightening up the details could make things even sharper. And don't forget to balance your workload—some days are packed, and that could burn you out. If you manage that better, you'll be even more efficient and consistent. Keep crushing it!

##### Graphs:

1. **Pie Chart - Review:** Shows the proportion of positive and negative reviews to help understand general sentiment trends.
2. **Bar Chart - Strengths:** Displays tasks that users frequently perform and receive good feedback on, categorized by type. This highlights common areas of positive performance.

## 4.5 Algorithm

<TIP: Optional, If you are working on a research project that proposes a new algorithm, you can describe your algorithm here. It can be in the form of pseudocode or any diagram that you deem appropriate./>

# Chapter 5

## Software Development

### 5.1 Software Development Methodology

<TIP: Describe your software development methodology in this section. />

### 5.2 Technology Stack

<TIP: Describe your technology stack here. See the following example from ThaiProgrammer.org />

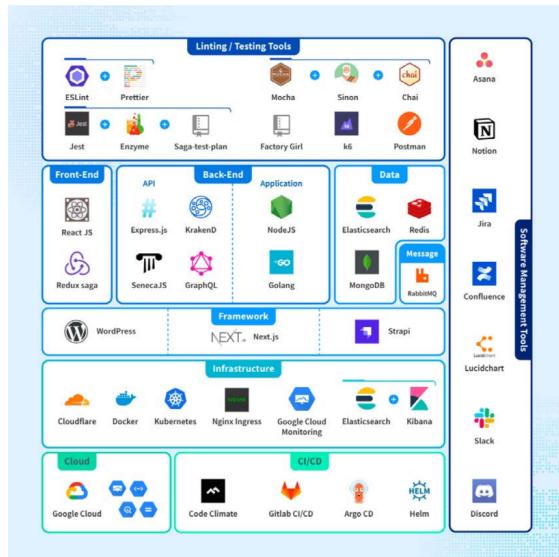


Figure 5.1: Example technology stack

### **5.3 Coding Standards**

<TIP: Describe your coding standard for this project here. />

### **5.4 Progress Tracking Report**

<TIP: Show that you have been working on this project overtime.  
It can be in the form of a burndown chart or a contribution graph from  
GitHub./>

## **Chapter 6**

### **Deliverable**

#### **6.1 Software Solution**

<TIP: Share a link to your Github repository. Showcase screenshots of the application and briefly describe each page here. />

#### **6.2 Test Report**

<TIP: Describe how you test your project. Place a test report here. If you use continuousintegration and deployment (CI/CD) tools, describe your CI/CD method here. />

## **Chapter 7**

### **Conclusion and Discussion**

<TIP: Discuss your work here. For example, you can discuss software patterns that you use in this project, software libraries, difficulties encountered during development, or any other topic. />

# **Reference**

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# **Appendix A**

## **Appendix A: Example**

<TIP: Put additional or supplementary information/data/figures in appendices. />

# **Appendix B**

## Appendix B: About $\text{\LaTeX}$

$\text{\LaTeX}$  (stylized as  $\text{\LaTeX}$ ) is a software system for typesetting documents.  $\text{\LaTeX}$  markup describes the content and layout of the document, as opposed to the formatted text found in WYSIWYG word processors like Google Docs, LibreOffice Writer, and Microsoft Word. The writer uses markup tagging conventions to define the general structure of a document, to stylize text throughout a document (such as bold and italics), and to add citations and cross-references.

$\text{\LaTeX}$  is widely used in academia for the communication and publication of scientific documents and technical note-taking in many fields, owing partially to its support for complex mathematical notation. It also has a prominent role in the preparation and publication of books and articles that contain complex multilingual materials, such as Arabic and Greek.

Overleaf has also provided a 30-minute guide on how you can get started on using  $\text{\LaTeX}$ . [13]