International Journal of Recent Development in Engineering and Technology
Website: www.ijrdet.com (ISSN 2347-6435(Online) Volume 15, Issue 01, January 2026)

ZCRUM: A Web-Based Agile Project Management System Using Kanban and Sprint Methodology

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***Abstract*-- ZCRUM is an online agile project management system based on applications like JIRA, which will help in the effective planning, and monitoring, and management of activities for software development. The project aims to implement agile and Scrum methods of working in projects by creating organizations, projects, and sprints and monitoring work activities on a Kanban board. The project aims to provide better team collaboration and efficiency through the effective monitoring and management of activities throughout the entire software development process.**

The software enables authentication and membership in organizations with secure access to protect the data of respective projects by ensuring it is not exposed to unauthorized members. Members can create various projects in an organization, assign sprints with start and end dates, and also handle issues related to a sprint. Every issue in the software is a representation of a bug or a task that contains information such as its name, description, priority, assignee, and status. Issues can also be transitioned through several stages of work, including Todo, In Progress, Review, and Done stages through a Kanban board.

***Keywords*-- Agile Project Management, Scrum, Kanban, Issue Tracking, Next.js, Prisma, PostgreSQL**

I. Introduction

In the rapidly developing software environment, the need for proper management of projects has raised the importance of managing projects effectively in order to develop quality products on time. Agile techniques like Scrum, Kanban, and so on are now the norms in the software industries because of their flexibility, iterative approach, and constant improvement techniques. JIRA, on the one hand, has found its applications in managing the above techniques, but the internal workings of such systems are best understood by implementing them.

ZCRUM is an agile project management system inspired by Jira, built to showcase the application of Agile principles in an environment that's as real-world software as can be. The goal is to organize the work into structured entities like organizations, projects, sprints, and issues, granting the team effective collaboration and visual tracking of progress. Using a Kanban board, it will give users real-time visibility over the status of any given task and manage workflows.

With the growing advancements in the software field, the demand for efficient management of projects has increased the importance of effective management of projects to produce qualitative results on time. Scrum, Kanban, or methods like that have now become the trend in the software sector because of the flexibility, iterative model, and constant improvement methods. Though JIRA is applied for the management of the above methods, the internal processing related to the above methods is better known by implementing the methods

II. Literature Survey

A literature survey is considered an important phase of the software project development life cycle, since it provides insight into existing systems, methodologies, and technologies related to the proposed project. It helps in identifying gaps, limitations, and challenges in the current solutions and brings into light the need for designing and developing a new system. The present section therefore provides a detailed study of the Agile methodologies and existing project management tools that influenced the design and development of the ZCRUM project.

III. Agile Software Development Methodology

Agile software development methodology implies an iterative and incremental but flexible, collaborative, customer feedback- oriented, continuous improvement-oriented approach. Unlike traditional models of development, like the Waterfall model, Agile allows requirements to evolve throughout a development cycle. Agile methodologies advocate frequent delivery of working software, close interaction among team members, and adaptability to changing requirements.

Agile development splits the work into small, manageable units that are completed in short development cycles, usually known as iterations or sprints. This approach improves the visibility of projects and allows for early identification of issues. Agile practices have been widely adopted in the software industry because of their effectiveness in managing complex projects and delivering high- quality software products.

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IV. Existing System

- Project management is a crucial task in guiding successful outcomes for software development projects, and Agile environments are not an exception. Additionally, it is important to note that in the past, software development teams used manual processes, including documents, spreadsheets, and emails, to manage their activities. These processes have certain drawbacks, and some of these include:
- To address such problems, a set of tools such as Jira, Trello, Asana, or GitHub Projects has been developed. Each has its own level of feature sets, such as issue and workflow management, and some include features for team collaboration and visualized workflow management. Of these, Jira is widely considered the most popular solution for managing PM tasks using the agile methodology, and it has excellent Scrum and Kanban board features as well. However, its level of customization makes it such that it is quite far from user-friendly, as well as its pricing and closed platform, making it less accessible.

V. Proposed System

In a bid to remedy these imperfections that are perceived in current systems, this paper proposes ZCRUM, a light but solid Agile Project Management System based upon Jira: a system that strives to be organized, scalable, and educative by integrating conceptual threads from Agile philosophy in a simplistic and clear fashion.

It has an organization-centric design. Users are divided into different units that belong to an organization, and different organizations can handle multiple projects independently. It is designed to make sure data is isolated with controlled access to data as if it is a real-world enterprise while being scaled and secured.

Within each project, the operations take place through sprints, which refer to time- boxed development cycles with clearly defined dates of initiation and completion. The system adopts this lifecycle of sprints using defined states such as Planned, Active, and Completed states for the sprints, which ensures only operations occur in active sprints and not without rules, as advocated in agile methodologies.

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System Architecture and Design

ZCRUM follows a modern client–server architecture.

Architecture Flow

User

↓

Web Browser

↓

Frontend (Next.js / React)

↓

Backend Logic (Next.js Server Actions)

↓

PrismaORM

↓

PostgreSQL Database (Neon)

Authentication Flow:

User → Clerk Authentication Service → Backend

This architecture ensures separation of concerns, secure data handling, and scalable performance.

VI. System Analysis And Requirement

Specification Functional Requirements

- User registration and login
- Organization creation and management
- Project creation within organizations
- Sprint creation, activation, and completion
- Issue creation, assignment, and prioritization
- Kanban board visualization
- Role-based access control

Non-Functional Requirements

- High availability and reliability
- Secure authentication
- Scalability for multiple users
- Fast response time
- User-friendlyinterf

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VII. Module Description User Module

Handles user authentication, session management, and access permissions using Clerk.

Organization Module

Manages organizations and controls user membership and roles.

Project Module

Allows administrators to create and manage projects under an organization.

Sprint Module

Implements Scrum-based sprint planning, activation, and completion.

VIII. Implementation And Results

ZCRUM is implemented using **Next.js** for both frontend and backend logic, **Prisma ORM** for database interaction, and **PostgreSQL** for data persistence. Clerk authentication ensures secure user and organization management.

Experimental usage demonstrates:

- Improved sprint tracking efficiency
- Better task visibility through Kanban boards
- Reduced manual effort in issue management
- Secure role-based access control

IX. Conclusion And Future Enhancements

This paper presented ZCRUM, a web-based Agile project management system integrating Scrum and Kanban methodologies. The system provides a secure, scalable, and user-friendly platform for managing projects, sprints, and issues.

Future Enhancements

- Advanced analytics and reporting dashboards
- Burndown and velocity charts
- Notification and activity logs
- CI/CD integration
- Mobile application support

ZCRUM serves as a strong foundation for Agile project management and future research.

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