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Agile Code Board: An Integrated Task, Planning, and Brainstorming Tool for Agile Teams

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Abstract: Agile methodologies are widely adopted in software development for their effectiveness in team coordination, iterative progress, and comprehensive project oversight. This study analyzes the Agile Code Board, a real-time project management platform designed to assist Agile teams in organizing and executing tasks throughout each sprint. The platform offers multiple workspaces with role-based access, enabling task tracking, immediate team collaboration, and sprint-level planning. Key features include a drag-and-drop Kanban board, a collaborative whiteboard, calendar integration for deadlines and milestones, a filterable task table, and a cross-team program board inspired by SAFe. Agile Code Board is built using Next.js and Hono, with Appwrite for authentication and Liveblocks for real-time collaboration. The system introduces mechanisms that facilitate efficient teamwork and project coordination. This research outlines the system architecture, development practices, and the ways in which the platform enhances Agile workflow management in collaborative environments.

Keywords: Agile Management; Project Collaboration; Real-Time Tools; Kanban Board; Program Board; Task Tracking.

1. Introduction

The increasing adoption of Agile methodologies in software development has fundamentally changed how teams organize and execute their work. As Agile practices become more prevalent, there is a growing need for tools that not only enable effective visualization and planning of tasks but also foster real-time collaboration among team members. Many development teams, however, encounter significant barriers when relying on traditional project management solutions, particularly during cross-team planning sessions and the execution of complex, multi-layered projects. While most modern project management tools offer a variety of tracking features, they often lack the capabilities necessary for live collaboration, clear Agile workflow visibility, and intuitive task management tailored to Agile frameworks. This gap has led to inefficiencies, fragmented communication, and a reliance on multiple disconnected tools to manage what should be a seamless Agile process.

In response to these challenges, Agile Code Board was developed as a comprehensive, web-based platform designed to unify project planning, team management, real-time task tracking, and collaborative brainstorming within a single solution. By combining interactive Kanban and program boards with time management tools and dynamic whiteboarding functionality, Agile Code Board seeks to enhance both productivity and communication within software development teams. Its modular and scalable architecture allows it to adapt to the evolving needs of Agile teams, whether managing small projects or coordinating across large, distributed groups. The platform is built using a modern technology stack: Next.js delivers a

responsive and visually engaging front-end, Hono serves as the backend framework, Appwrite secures user management and database operations, and Liveblocks powers real-time collaboration features such as synchronized whiteboards and presence indicators [1][2][3]. These technologies collectively ensure that Agile Code Board is both robust and adaptable [4], making it a practical choice for contemporary development environments [5].

A key motivation behind Agile Code Board is to provide a developer-centric collaboration platform that streamlines both the planning and execution phases of Agile projects. The platform offers a unified workspace where teams can create and manage projects, assign and track tasks, and collaborate in real time. This consolidation of essential Agile process elements not only strengthens team communication but also increases overall productivity and supports the end-to-end development lifecycle. Agile Code Board's features are designed to facilitate smooth interaction among all project components. For example, its Kanban task management system enables intuitive drag-and-drop movement of tasks through various workflow stages, while its program board offers a high-level view of multiple sprints and teams, complete with color-coded planning and dependency tracking. Additional features such as real-time ideation whiteboards, calendar and table views for scheduling, and automated task sorting further support the diverse needs of Agile teams.

Moreover, Agile Code Board incorporates role-based member management, allowing teams to invite members and assign specific roles such as Admin or Member, each with defined access levels and responsibilities. This attention to security and structured collaboration ensures that project data remains protected while enabling flexible team organization. By integrating these core features, Agile Code Board addresses the unique challenges faced by modern software development teams, offering a single, developer-friendly platform that promotes effective Agile collaboration and project management.

2. Related Work

The widespread adoption of Agile methodologies has led to the emergence of numerous project management tools, each aiming to enhance team productivity, accelerate delivery, and foster collaboration within software development environments [7][8][9]. Despite the popularity of platforms such as Jira, Trello, and Asana, these tools still exhibit notable limitations. In particular, they often lack robust real-time collaboration features, comprehensive cross-team planning capabilities, and integrated brainstorming tools—elements that are crucial for Agile teams working in fast-paced, dynamic settings [9][11][12]. Many existing solutions are also either too cumbersome for small teams or insufficiently adaptable to the evolving needs of modern software development practices [11][12]. Research on Agile tooling consistently highlights the importance of visual task management in supporting effective sprint planning and seamless team communication [9][12][14]. Combining Kanban-based task views, scheduling calendars, and role-based collaboration mechanisms has proven essential for optimizing team performance [12][13]. Recent studies also point to the benefits of real-time collaborative whiteboards and feature mapping, particularly for distributed teams, as these tools facilitate more effective planning and ideation [9][10][14]. However, widely used solutions like Miro and SAFe Program Boards tend to present information statically and do not fully support live, interactive collaboration [8][9]. Agile Code Board was developed to address these gaps by offering a unified, modular system that integrates sequential task management, immediate team interaction, sprint-level scheduling, and flexible workspace functionality [1][3][5][12]. Its design seeks to simplify workflow configuration while providing the visibility, adaptability, and interactive features required by contemporary development teams [1][5][11].

2.1 Existing Project Management Tools and Their Limitations

The current landscape of project management software is dominated by SaaS offerings such as Jira, Trello, and Asana. While these platforms provide a range of advanced features, project managers frequently encounter critical limitations that affect user engagement and overall project outcomes [11][12]. Most of these applications rely on static templates for task management and are often ill-equipped to accommodate teams that employ Agile methodologies [12][14]. Furthermore, inadequate role-based access control can complicate the assignment of permissions and responsibilities, making effective team management challenging [13]. Collaboration within these tools is typically restricted to basic features like file attachments and comment threads, which do not provide the consistency or depth required for projects with multiple dependencies or expanding teams [9][14]. Reporting features are generally limited, offering insufficient insights into team performance, project dependencies, or sprint progress [19]. Many advanced features are locked behind paywalls or usage limits, posing additional hurdles for startups and small teams [11][20]. Agile Code Board responds to these challenges by delivering dynamic Kanban boards, sophisticated access control, advanced task management, and real-time project analytics [1][3][5]. Its workspace system enhances collaboration by

allowing team members to visualize project relationships and monitor performance metrics, while competitive pricing ensures accessibility for teams of all sizes [11][20].

2.2 The Role of Mobile Platforms in Project Management

Mobility has become a cornerstone of modern project management, enabling team members to access and update tasks from virtually anywhere [18]. This is especially valuable for remote or distributed teams, as it helps maintain coordination and productivity across different locations [14]. The rise of mobile project management applications is closely linked to frameworks like Flutter, which allow developers to build cross-platform apps for both Android and iOS from a single codebase [18]. Agile Code Board Mobile leverages Flutter to deliver a consistent, high-quality user experience across devices, ensuring optimal UI design and API performance [18][20].

2.3 Integration of Real-Time Communication in Project Management

A persistent shortcoming of traditional project management tools is their lack of integrated real-time communication features for team members, managers, and stakeholders [9][10][14]. Asynchronous methods such as email and task comments often fall short in supporting the rapid decision-making required by Agile teams [10][14]. Research indicates that live communication tools—such as video conferencing, instant messaging, and collaborative workspaces—can dramatically improve both the speed and quality of team decisions [9][10][16]. Agile Code Board incorporates WebSocket technology to enable real-time data delivery, thus supporting agile decision-making and keeping team members aligned throughout the project lifecycle [3][10][14].

3. Proposed Work

Agile Code Board is designed as a dedicated collaboration platform with a modular component structure for agile project management. The system follows a client-server architecture, applying the separation of concerns principle to divide the application into frontend (client-side), backend (server-side), and storage database components. Each layer is intended to optimize performance and scalability while providing real-time collaboration features to support effective project tracking and maximize team productivity. For frontend development, Agile Code Board utilizes Next.js, leveraging its Server Side Rendering (SSR) and performance enhancements. The user interface integrates seamlessly with ShadCN UI components to deliver a modern, accessible experience. The fundamental design and development characteristics include dashboard-style navigation in a clean, responsive layout; role-based UI access where Admins have the most features, followed by Members and then Guests; and three primary component systems for managing tasks, projects, and workspaces within a dynamic interface. Real-time collaboration on brainstorm boards is enabled through Liveblocks integration, while Framer Motion and Tailwind CSS are used to ensure smooth transitions and a polished user experience. On the backend, the system uses Hono, a zero-configuration, high-performance web framework for building APIs. The backend exposes secure RESTful endpoints to the frontend, following RESTful architectural principles. Secure communication between client and server is achieved through HTTPS and token-based authentication provided by Appwrite. This modular design ensures that Agile Code Board serves as a purpose-built collaboration platform where users operate within defined roles to manage agile projects. The client-server structure—comprising frontend, backend, and database—maximizes performance, scalability, and real-time collaboration, supporting optimal project tracking and team productivity. The frontend, built with Next.js and compatible with all ShadCN UI elements, provides a contemporary and user-friendly interface. The backend, powered by Hono, delivers secure, high-performance RESTful APIs, with all client-server interactions protected by HTTPS and Appwrite token authentication.

4. Result and Discussion

4.1 Results

Agile Code Board integrates several core modules designed to deliver advanced collaboration features, project tracking capabilities, and real-time team interactions. These modules are specifically developed to overcome the limitations of traditional project management tools, ensuring they meet the requirements of developers, project managers, and team leads. The following paragraphs describe each major component in detail. The platform provides secure login options, allowing users to sign in using their email and password, or through Google and GitHub authentication via Appwrite. Within each workspace, users can be assigned either admin or member roles, which determine their level of access and privileges within the system.

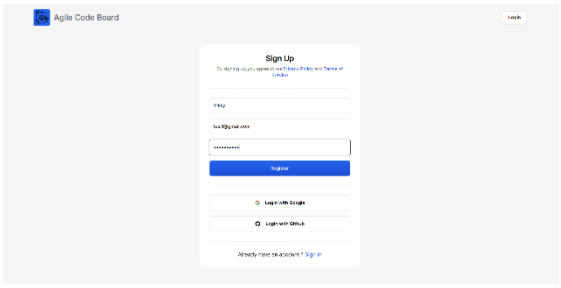

Figure 1. Login Screen

Key features include remote login and sign-up screens, as well as robust validation for email and password credentials. Users have the flexibility to create and manage multiple workspaces, each of which can be controlled independently and easily switched between. Every workspace contains its own projects, epics, and tasks, enabling teams to efficiently organize and track their work.

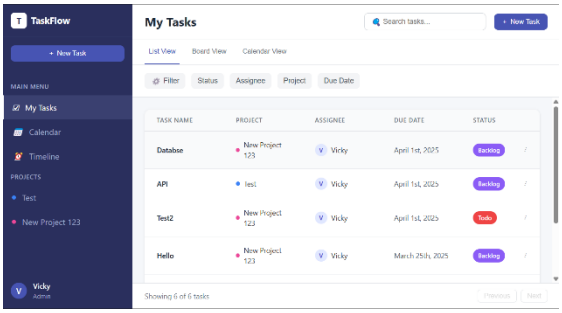

Figure 2. Dashboard Screen

Key features of this module include the ability to create new workspaces with custom names and images for easy identification, seamless switching between workspaces using dropdowns or sidebars, and support for project nesting based on workspace, which accommodates various organizational strategies such as client-based, departmental, or product-based setups. The task management module allows users to create, edit, filter, and delete tasks with ease. Tasks can be viewed in multiple formats, including Kanban Board, Calendar View, and Table View, all of which support assignment, deadline, and status selection.

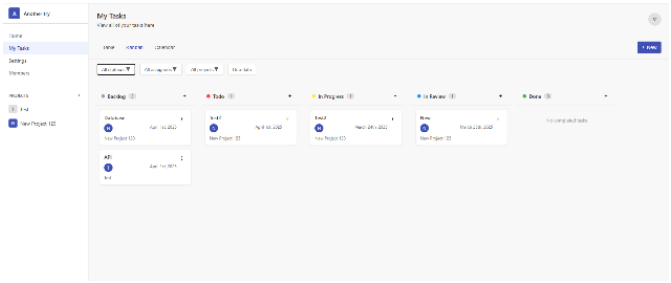

Figure 3. Kanban Board

Users can quickly add, update, or remove tasks, and view them as they progress through Kanban columns (To Do, In Progress, Done). Calendar View provides a visual timeline for better time management, while Table View offers a structured overview for sorting and full visibility. Advanced filtering and sorting options by status, assignee, project, and due date make task retrieval effortless. The program board leverages the SAFe methodology to visually display tasks and features, along with their dependencies and blockers, for each sprint across multiple teams.

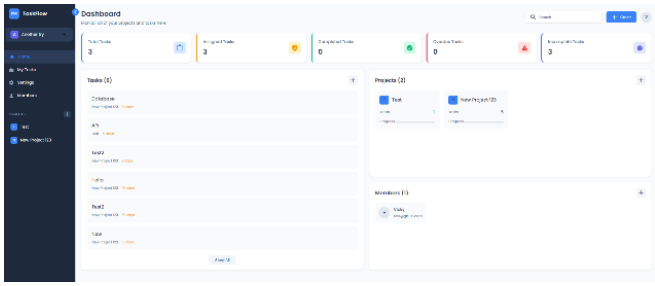

Figure 4. Program Dashboard

Its SAFe-inspired layout presents project features and tasks across teams and sprints, supporting the requirements of the Scaled Agile Framework. Sprint-wise breakdowns help teams monitor planned, ongoing, and completed work for every iteration, while dedicated lanes for each team streamline cross-team planning and coordination. Through Liveblocks integration, Agile Code Board offers a brainstorming tool that enables multiple users to work together simultaneously on whiteboards in real time. This functionality is ideal for sprint planning, wireframing, and backlog grooming sessions.

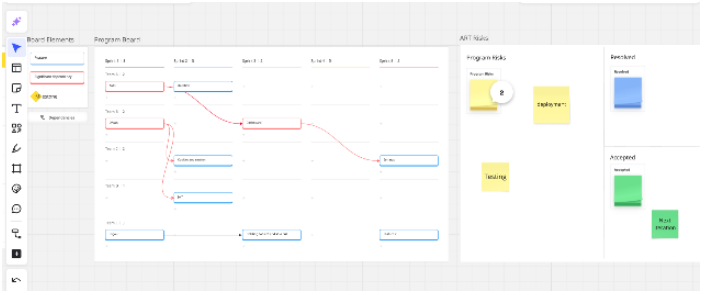

Figure 5. Brainstorming Feature

The platform provides an interactive whiteboard for drafting sticky notes, shapes, text, and drawings, making real-time idea generation seamless. All users can edit the board at once, with live cursor movements and user labels indicating active participants, ensuring updates are instantly visible to everyone without manual refreshing. Workspace administrators have comprehensive control over workspace settings, including renaming workspaces, updating images, and managing invite link accessibility. Admins can also make decisions regarding member promotions, demotions, or removals, while monitoring activity within the workspace.

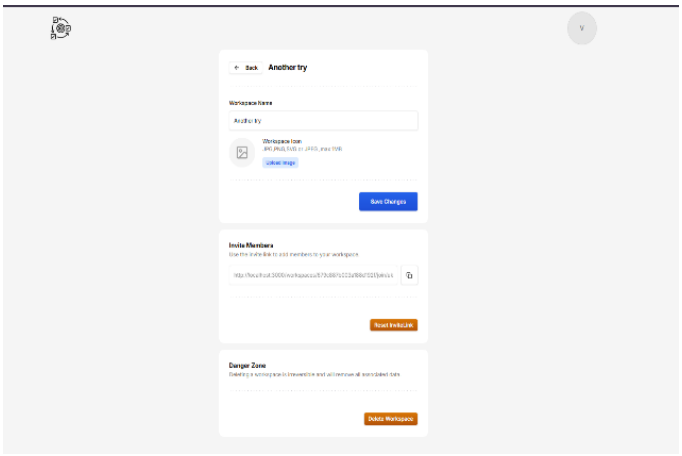

Figure 6. Settings and Members

Key features include editing workspace names and images for better branding and identification, generating secure invite links for new members, and role-based access to settings—where only admins can view and update workspace settings and manage member roles. The platform's notification system keeps users informed with status updates, project news, deadline reminders, and member invitation alerts, ensuring everyone stays up to date with the latest developments.

4.2 Discussion

The findings from this research indicate that Agile Code Board effectively addresses several critical pain points commonly encountered by modern software development teams. One of the platform's notable strengths lies in its secure and versatile authentication system, allowing users to sign in via email, Google, or GitHub. This approach aligns with best practices in role-based access control (RBAC), which is essential for maintaining robust security and proper data governance in web applications (Stevens, 2021) [13]. By distinguishing between admin and member roles, the platform ensures that access and privileges are appropriately managed, reducing the risk of unauthorized actions and supporting clear operational boundaries within teams. The ability to create and manage multiple independent workspaces further enhances the platform's adaptability to various organizational structures, whether client-based, departmental, or product-oriented. Patel and Zhou (2021) highlight that user experience in project management tools is significantly improved by intuitive navigation and customizable interfaces, such as naming and branding workspaces [11].

Agile Code Board's support for these features helps teams organize their workspaces in a way that mirrors real-world workflows, thereby increasing both efficiency and satisfaction. Task management is another area where Agile Code Board demonstrates considerable strength. The platform offers Kanban, Calendar, and Table views, each catering to different planning and tracking preferences. The use of Kanban boards, in particular, has been shown to enhance transparency and streamline task progression in agile teams (Li & Kumar, 2022) [12]. Calendar views assist with deadline management, while table views enable detailed sorting and filtering—capabilities that Green and Parker (2021) have identified as vital for supporting diverse team workflows and improving productivity [9].

A distinctive feature of Agile Code Board is its Program Board, which draws on the Scaled Agile Framework (SAFe) methodology (Leffingwell, 2020) [8]. This module enables teams to visualize dependencies and blockers across multiple sprints and teams—a necessity for organizations implementing agile at scale. By adopting SAFe-inspired layouts, the platform supports cross-team alignment and transparency, which are crucial for large-scale projects where coordination often becomes a significant challenge. Real-time collaboration is another area where Agile Code Board excels. The integration of Liveblocks allows multiple users to brainstorm and plan together on a digital whiteboard, supporting activities such as sprint planning, wireframing, and backlog grooming. As Tanaka (2020) and Verma & Malik (2023) discuss, real-time synchronization is key to effective communication and rapid decision-making, especially for distributed or remote teams [10][14]. The platform's live indicators and instant updates foster an engaging and interactive environment, ensuring that all participants remain informed and involved—qualities that Krishnan (2022) [18] identifies as essential for modern collaboration tools.

Administrative features are thoughtfully designed to provide workspace admins with comprehensive control over settings, member management, and access permissions. These capabilities help maintain order and security, echoing the recommendations of Stevens (2021) for effective RBAC implementation in collaborative platforms [13]. The notification system ensures that team members stay up to date with project developments, deadlines, and membership changes. According to Lopez and Tran (2021), timely notifications are critical for maintaining awareness and responsiveness in fast-paced, agile environments. Agile Code Board successfully integrates a suite of features that reflect current best practices and address the evolving needs of software development teams [19]. By drawing on established frameworks and recent studies, the platform not only enhances project visibility and coordination but also strengthens collaboration and user experience. These qualities position Agile Code Board as a valuable tool for organizations seeking to foster agility, transparency, and productivity in their project management processes.

5. Conclusion and Future Work

This research has detailed the end-to-end development process that culminated in the creation of Agile Code Board—an optimized collaborative platform designed to address the unique requirements of developers, project managers, and agile teams. Developed using Next.js, ShadCN, Appwrite, Hono, and Liveblocks, Agile Code Board facilitates task management, collaboration within workspaces, program-level planning, and real-time ideation. As a comprehensive solution for agile project tracking, it incorporates essential modules such as workspace and project management, task lifecycle handling, role-based access control, real-time brainstorming tools, and a Program Board inspired by the Scaled Agile Framework (SAFe), providing a robust foundation for agile processes. The platform offers multiple task views, including Kanban, Calendar, and Table, along with features such as deadline filters, task dependencies, and member management within each workspace. These capabilities collectively deliver a user-friendly and scalable collaboration experience. Early assessments conducted with development teams indicate that Agile Code Board provides an intuitive interface and robust functionality across its modules. The platform's modular design and secure backend systems enable seamless integration with third-party tools, supporting enterprise-level deployment and adaptability to diverse organizational needs.

Planned future enhancements for Agile Code Board aim to further advance its capabilities as an agile collaboration platform. Upcoming features include intelligent task assignment, optimal deadline recommendations, and duration estimations powered by artificial intelligence, utilizing team pattern analysis. Additional improvements will introduce advanced project progress visualization and sprint velocity views, integrating team workload distribution and performance metrics through interactive graphical interfaces. The system will also enable the creation of boards specifically for clients and stakeholders, displaying high-level progress metrics while concealing operational details to maintain confidentiality. Integration with popular tools such as GitHub, Slack, JIRA, and Google Calendar is planned to ensure seamless workflow continuity across platforms. Further enhancements will include multi-language support and a dark/light theme toggle to cater to diverse user preferences. Originally launched as a task management tool, Agile Code Board has evolved

into a comprehensive agile collaboration platform, designed to meet the demands of modern, distributed software development teams.

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