# **DevHub**

## A Next-Generation Learning Platform for Programming Enthusiasts



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# 1. Project Overview

DevHub is a web-based interactive learning platform that provides aspiring programmers, professional developers, and educational institutions with high-quality educational content. The platform offers features like AI-driven personalization, real-time collaboration, gamification, and project-based learning, enhancing the user learning experience.

**Key Objectives:**

* Deliver an intuitive and user-friendly learning platform.
* Implement real-world project-based learning modules.
* Ensure secure and scalable infrastructure.
* Foster engagement with interactive tools and gamification.

## **2. Project Scope**

### **In Scope:**

* Secure User Authentication (JWT, OAuth)
* Course Management System (CRUD Operations)
* Interactive Learning Modules (Quizzes, Coding Challenges)
* User Progress Tracking
* Performance Monitoring (CI/CD, Analytics)

### **Out of Scope:**

* Native Mobile App (Planned for future development)
* Multi-Language Support (Phase 2 implementation)

## **3. Development Gap Analysis**

### **Identified Gaps in Existing Platforms:**

* Limited interactive and project-based learning experiences.
* Poor user engagement and feedback mechanisms.
* Lack of personalized and adaptive learning paths.
* Inadequate real-time collaboration features for learners.

### **Tech School Solutions:**

* Real-time coding environments for hands-on practice.
* AI-driven personalized learning paths.
* User progress dashboards with detailed analytics.
* Interactive community support and collaborative tools.

## **4. Stakeholders**

### **Key Stakeholders:**

* Aspiring Developers & Advanced Learners
* Educational Institutions
* Instructors & Content Creators
* Platform Administrators

### **Methods to Gather Feedback:**

* Integrated Feedback Forms
* User Surveys & Community Forums
* Analytical Tools for Monitoring Engagement

## **5. Deliverables**

### **Primary Deliverables:**

* Fully Functional Learning Platform
* Secure User Authentication
* Course CRUD System
* Interactive Coding Environment
* User Analytics Dashboard
* CI/CD Pipeline for Deployment

### **Acceptance Criteria:**

* Users can register, log in, and track their progress.
* Interactive coding challenges and quizzes are functional.

System operates with 99.9% uptime and <2s load speed.

## **6. Project Methodology**

**Approach:** Agile Methodology (Scrum Framework)

**Why Agile?**

* Flexibility for changing requirements
* Continuous delivery through iterative sprints
* Regular feedback and improvement

# 7. Sprint Schedule

### **Sprint 1: Core Setup and UX Foundation (1 Week : Done)**

* Set up GitHub Repository and CI/CD with Parcel.
* Implement Responsive Landing Page with SEO Optimization.
* Design UX for User Journey (Sign-up to Dashboard).

### Problems Faced:

* Rushba Irshad: Faced issues integrating Parcel with CI/CD due to build conflicts.
* Fatima Shahid: Coordination issues in defining UX requirements and aligning with development.
* Muhammad Saad Khan: Delays in setting up the backend environment and database schema.

### **Sprint 2: User Authentication and Security (1 Week : Done)**

* Implement Sign-up & Login System (JWT).
* Add OAuth Integration for Third-Party Login.
* Secure User Data with Input Validation.

### Problems Faced:

* Rushba Irshad: Complexities managing JWT token expiration and refresh mechanisms.
* Fatima Shahid: UI glitches in handling multi-step authentication forms.
* Muhammad Saad Khan: Troubleshooting API authentication failures in testing environments.

### **Sprint 3: Course Management (1 Week : In Progress)**

* Implement CRUD for Courses.
* Connect APIs to the Frontend.
* Develop Course Listing Page with Filters.

### Problems Faced:

* Rushba Irshad: Difficulty in maintaining data integrity during bulk operations.
* Fatima Shahid: Design misalignment between course creation and course listing pages.
* Muhammad Saad Khan:API latency issues while handling large datasets.

### **Sprint 4: Course Engagement and Tracking (1 Week : To-Do)**

* Add User Progress Tracking and Notifications.
* Implement Course Reviews and Ratings.
* Build Email Notification System.

### **Sprint 5: Interactive Learning Modules (1 Week: To-Do)**

* Implement Real-time Coding Environments.
* Build Dynamic Quiz Interface.
* Add Personalized Learning Paths.

### **Sprint 6: User Analytics and Reporting (1 Week: To-Do)**

* Set up Analytics (Google Analytics, Heatmaps).
* Display User Insights Dashboard.
* Implement User Activity Logs.

### **Sprint 7: Optimization and Accessibility Testing (1 Week: In-BackLog)**

* Optimize Page Performance (Lazy Loading, Caching).
* Conduct Accessibility Testing (WCAG Compliance).
* Enhance Security Measures.

### **Sprint 8: Finalization, Deployment, and Marketing (1 Week: In-BackLog)**

* Final System Testing (Manual + Automated).
* Launch Platform with Marketing Campaign.
* Implement SEO Advanced (Schema Markup).

## **8. Features and Epics**

## **Feature 1: Secure User Authentication**

* Epic 1.1: Implement Sign-up & Login (JWT)
* Epic 1.2: Password Recovery System
* Epic 1.3: OAuth Integration

### **Feature 2: Course Management**

* Epic 2.1: Course Creation and Editing (CRUD)
* Epic 2.2: Course Listing Page with Filters
* Epic 2.3: User Progress Tracking

### **Feature 3: Interactive Learning Modules**

* Epic 3.1: Coding Challenges with Real-Time Execution
* Epic 3.2: Quiz System with Dynamic Question Bank
* Epic 3.3: Dashboard for User Insights

## **9. Testing Strategy**

### **Manual Testing:**

* UX and Accessibility Testing
* Functionality Validation (CRUD, Authentication)

### **Automated Testing:**

* Unit Testing (Jest, React Testing Library)
* API Testing (Postman, Mocha/Chai)
* CI/CD Validation (GitHub Actions)

## **10. Risk Management**

### **Identified Risks:**

* Scope Creep
* Data Breaches
* Missed Deadlines

### **Mitigation Plan:**

* Clear Deliverables for Each Sprint
* Secure Authentication (JWT & Input Validation)
* Regular Sprint Reviews & Retrospectives

## **11. Future Scope**

* Enhanced AI-Based Content
* Global Accessibility with Multi-Language Support
* Continuous Enhancements via User Feedback

## **12. Metrics & KPIs**

* User Growth: 500+ Users within 3 Months
* System Uptime: 99.9%
* Bug Resolution Time: <48 Hours
* Sprint Velocity: 20-25 Story Points/Sprint

## **13. Conclusion**

The DevHub project aims to deliver a cutting-edge educational platform for programming enthusiasts by utilizing agile methodologies, advanced technology stacks, and a user-centered design approach. Through continuous delivery and stakeholder engagement, the project ensures quality, scalability, and an enhanced learning experience.