



Homework 7

**PEPE (Project Elaborating Program with Extension)
Proposal**

Software Engineering Principle

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PEPE (Project Elaborating Program with Extension)

Requirements

User Requirements

Functional

- The software shall allow users to create, view, edit and delete desired projects.
- The software shall allow users to create tasks, assign them to team members and set deadlines.
- The software shall allow users to update their task status such as in progress, completed, etc.
- The software shall allow users to view project timeline in a Gantt Chart and draw diagrams in canvas.
- The software shall allow users to collaborate and receive notifications for task update.

Non-Functional

- The application shall save the diagrams into SVG or PNG format and paste into any kind of document file.
- The system shall be accessible through modern web browsers without requiring additional plugins.
- The user interface shall be intuitive and easy to navigate for both managers and team members for collaborative actions, including modifications of the charts and diagrams.
- The system shall ensure data consistency and prevent unauthorized access to project data.
- The application shall maintain availability during concurrent usage by multiple users.

System Requirements

Functional

- The system shall support storage and retrieval of project metadata and design artifacts (e.g., diagrams, timelines) using JSON fields in PostgreSQL.
- The system shall log application errors, security events, and system activity using Django's logging framework for monitoring and debugging.
- The system shall provide a frontend implemented using React with TypeScript, enabling dynamic rendering of project boards, tasks, and project views without full page reloads.
- The system shall expose RESTful APIs implemented using Django and Django REST Framework (DRF) to handle user authentication, project management, task assignment, and metadata retrieval.
- The system shall support real-time communication using Django Channels and WebSockets, allowing instant synchronization of task updates, assignments, mentions, and notifications across connected clients.

Non-Functional

- The system shall maintain low-latency real-time updates, with WebSocket message propagation handled via Django Channels backed by Redis as a message broker.
- The system shall secure all client-server communication using HTTPS and secure WebSocket protocols, with reverse proxy support provided by Nginx.
- The system shall be scalable to support multiple concurrent users by utilizing ASGI servers (e.g., Uvicorn/Daphne) and stateless backend services.
- The system shall ensure data integrity and transactional consistency through PostgreSQL ACID-compliant transactions.
- The Database shall be normalized to the fifth normal form (5NF) to prevent the INSERT and DELETE problem in the relational database.