

CollabTrack

Project: Design
COSC4320

Jonathan Onwusa, Uche Onwe, Michael Arodiogbu

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Abstract (100–150 words)

CollabTrack is a lightweight organizer for individuals and small teams to plan projects, manage tasks, and finish work on time. The MVP delivers secure user accounts, project spaces (personal or shared), and task management with due dates, priority, and status. A project-level activity log and comments keep decisions close to the work. The system is intentionally simple—Node.js + Express with EJS views and SQLite—to maximize reliability and speed of delivery this term, while preserving a clean migration path to React/PostgreSQL later. Optional reminders and email notifications are scoped as stretch features. The prototype demonstrates end-to-end flows from sign-up to project completion and emphasizes a “today-first” dashboard that highlights due and at-risk items. CollabTrack targets students and small clubs needing a fast, low-friction way to coordinate and complete tasks.

Introduction (≈300–500 words)

The goal of CollabTrack is to provide a focused alternative to heavyweight project suites by emphasizing task capture, deadlines, and progress visibility. Our primary users are students and small teams who need to organize deliverables without complex configuration. After completing the specification phase, we refined scope to ensure a demonstrable MVP: secure authentication; project creation (personal or shared by invite); tasks with title, description, assignee, due date, priority, and status; and a simple comments/activity log to reduce context switching.

Key changes since specification:

- Clarified the stack to **Node.js + Express + EJS + SQLite** for speed and stability; added an explicit repository/DAO layer to enable future migration to PostgreSQL and/or a React SPA without rewriting core business logic.
- Tightened usability goals: (1) capture a task in under 10 seconds, (2) surface “today” and overdue items on the dashboard, (3) keep decisions with tasks via comments/activity, and (4)

provide low-friction collaboration through invite-only sharing.

- Defined boundaries for stretch items (email reminders, calendar export) to avoid feature creep.
- Added testing and formatting expectations (Jest, Supertest, ESLint, Prettier) to support team collaboration and maintainability.

From a process perspective we will develop in small vertical slices—e.g., “create task” includes route, validation, DB persistence, view updates, and an activity-log entry—so that each increment is demo-ready. Risks include scope creep, auth/security mistakes, and under-designed data relationships. We mitigate these by enforcing a minimal feature set, hashing passwords with bcrypt, isolating JWT handling, and documenting DB constraints and access patterns early in this design.

This document details the architecture, program units, database schema, and the behavior of non-trivial operations through sequence diagrams. It also outlines the user interface snapshots required for the demo, team contributions, and the updated glossary.

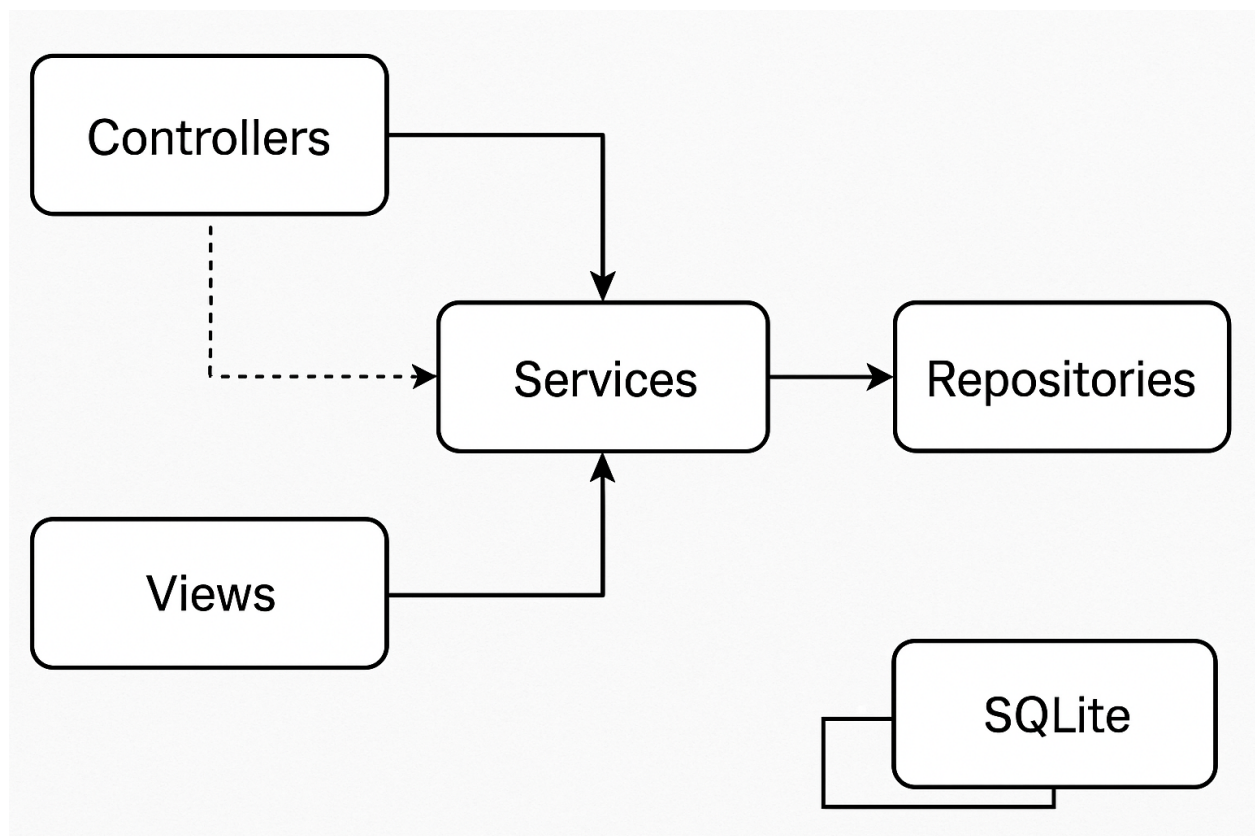
3. High-level and medium-level design

3.1 System-level architecture (pattern)

Pattern: Layered MVC on Express

- **Presentation (Views):** EJS templates render server-side HTML for auth, dashboard, projects, and tasks.

- **Controllers (Routes):** Express route handlers validate input, orchestrate services, and choose views or JSON responses.
- **Services (Domain logic):** Auth, Project, Task, Comment, Reminder encapsulate business rules and permissions.
- **Data Access (Repository/DAO):** SQLite queries are centralized so the DB can be swapped later without changing services.
- **Infrastructure:** JWT auth middleware, error handling, logging, optional schedulers (node-cron) and email (Nodemailer).



3.2 Program units (classes/modules)

Below are core units (at least 5 are required; we list 8). For each: purpose, key methods, notable constraints.

1. AuthService

- **Purpose:** Registration, login, JWT issuance/verification, password hashing.
- **Key methods:** `register(dto)`, `login(credentials)`, `verifyToken(token)`.
- **Constraints:** Passwords hashed with bcrypt; emails unique; tokens expire.

2. UserRepository

- **Purpose:** CRUD for users.
- **Key methods:** `create`, `findByEmail`, `findById`, `update`.
- **Constraints:** `email` unique; `created_at` immutable.

3. ProjectService

- **Purpose:** Create projects, manage membership, enforce access control.
- **Key methods:** `create`, `addMember(projectId, userId, role)`, `listForUser`.
- **Constraints:** Owners can invite; members read/write; private by default.

4. ProjectRepository

- **Purpose:** DB access for projects and membership.
- **Key methods:** `insertProject`, `insertMember`, `findById`, `findUserProjects`.

5. TaskService

- **Purpose:** CRUD tasks; status transitions; due-date and priority rules.
- **Key methods:** `create`, `update`, `changeStatus`, `assign`.
- **Constraints:** `due_date` optional; status in {todo, doing, done}; permission checks per membership.

6. TaskRepository

- **Purpose:** DB access for tasks.
- **Key methods:** `insert`, `update`, `findById`, `listByProject`.

7. CommentService

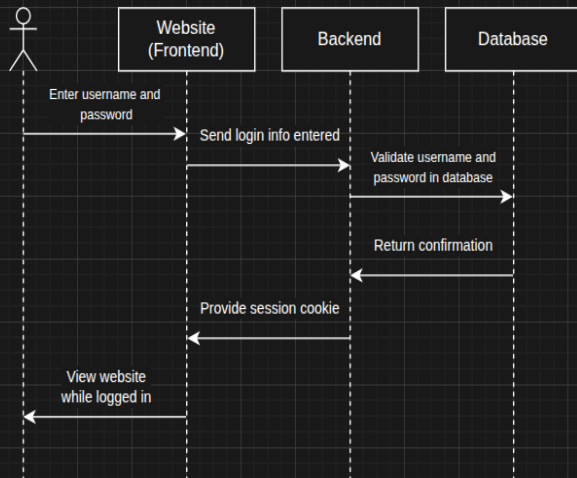
- **Purpose:** Add and fetch task/project comments; append activity log entries.
- **Key methods:** `addComment`, `listForTask`.
- **Constraints:** Sanitization; references valid task/project; retains author.

8. ActivityLogRepository

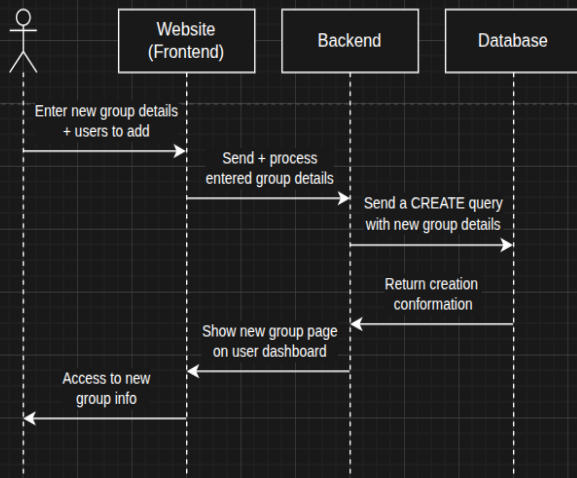
- **Purpose:** Append/read immutable activity entries.
- **Key methods:** `append(event)`, `listForProject`.
- **Constraints:** Append-only; timestamps required; event types enumerated.

Sequence Diagrams

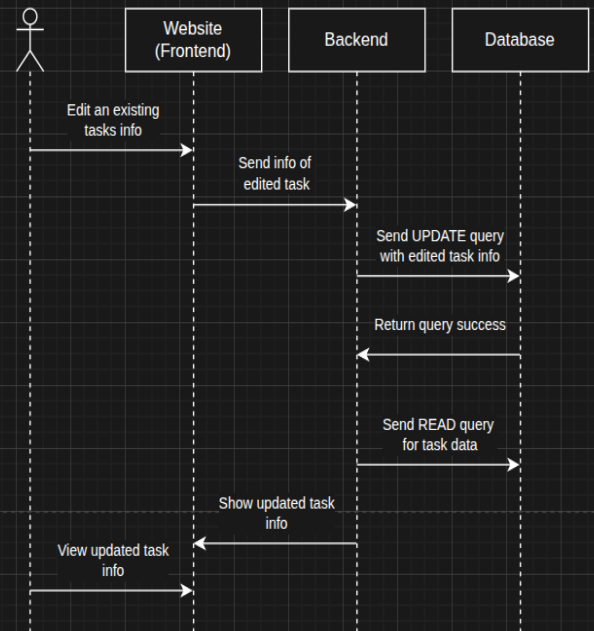
User Login



Group Creation



Task Updating



Database Tables

Users

①

user_id	username	passcode*	legal_first	legal_last	phone_number	email	age
----------------	----------	-----------	-------------	------------	--------------	-------	-----

User_Tasks

②

task_id	task_name	description	<u>owner_id</u>	due_date
----------------	-----------	-------------	-----------------	----------

Group_Tasks

③

task_id	<u>owner_id</u>	name	description	due_date
----------------	-----------------	------	-------------	----------

Groups

④

group_id	name	description	<u>owner_id</u>
-----------------	------	-------------	-----------------

Group_Members

⑤

<u>group_id</u>	<u>user_id</u>
-----------------	----------------

1. User Table

- *(passcode will be stored as a hash + salted value)
- Primary Key is "user_id"

2. User_Tasks

- Holds tasks that belong to a specific user
- Primary Key is "task_id"
- "owner_id" is a foreign key (Value will be equal to a user_id) value

3. Group_Tasks

- Holds tasks that belong to groups
- Primary Key is "task_id"
- "owner_id" is a foreign key (Value will be equal to a group_id value)

4. Groups

- Holds list of existing groups for the application
- Primary Key is "group_id"
- "owner_id" is a foreign key (Value will be equal to a user_id value)

5. Group_Members

- Bridge table
- 'group_id' and 'user_id' are foreign keys

User Interface

(UI images are shrunk to fit inside design document)

Login Page (Card)

The Login Page Card is a white rectangular form with a light gray border. At the top, it has a title 'Login' in bold. Below the title, there are two input fields. The first is labeled 'Username/Email Address' and contains the placeholder text 'Ex: Email@email.com'. The second is labeled 'Password' and contains the placeholder text 'Enter Password'. Below these fields is a green button labeled 'Login'. To the right of the form, there are three numbered circles with corresponding text: 1. User's account username (or Email), 2. Respective Account Password, and 3. Once clicked, form info gets sent to backend to start login sequence.

Login

Username/Email Address

Ex: Email@email.com

Password

Enter Password

Login

- 1 User's account username (or Email)
- 2 Respective Account Password
- 3 Once clicked, form info gets sent to backend to start login sequence

Account Creation Page (Card)

The Account Creation Page Card is a white rectangular form with a light gray border. At the top, it has a title 'Create an Account' in bold. Below the title, there are three input fields. The first is labeled 'Email Address' and contains the placeholder text 'Ex: Email@email.com'. The second is labeled 'Password' and contains the placeholder text 'Enter Password'. The third is labeled 'Confirm Password' and contains the placeholder text 'Enter Password'. Below these fields is a green button labeled 'Create Account'. To the right of the form, there are four numbered circles with corresponding text: 1. User enters a personal email address, 2. Password Input, 3. Second Password Input for confirmation, and 4. Once pressed, form info gets sent to backend.

Create an Account

Email Address

Ex: Email@email.com

Password

Enter Password

Confirm Password

Enter Password

Create Account

- 1 User enters a personal email address
- 2 Password Input
- 3 Second Password Input for confirmation
- 4 Once pressed, form info gets sent to backend

NavBar

The NavBar is a dark green horizontal bar. It contains five text labels: 'CollabTrack', 'HOME', 'GROUPS', 'ACCOUNT', and 'SETTINGS'. To the right of these labels is a white search bar with the placeholder text 'Search'. To the right of the search bar is a white button labeled 'Go'. To the right of the 'Go' button is a white circle containing the number '7'. Below the NavBar, there are seven numbered circles: 1, 2, 3, 4, 5, 6, and 7. A line connects circle 1 to circle 2.

CollabTrack HOME GROUPS ACCOUNT SETTINGS Search Go 7

- 1
- 2
- 3
- 4
- 5
- 6
- 7

1. CollabTrack Site Name (This is also a button that takes user to the HOME UI page)
2. Once clicked takes user to HOME UI page where users can see their task calendar
3. Once clicked takes user to GROUPS UI page where users can see info on groups they are in
4. Once clicked takes user to ACCOUNT UI page where users can see their account info
5. Once clicked takes user to SETTINGS UI page where users can change various preferences
6. Search bar (takes in text) that user input usernames/account info to look for other accounts
7. Once clicked takes user to search results page based on search query

Task Creation Page (Card)

New Task

Task Name ① Task Name

Name

Urgency ② Importance of task + Task Urgency (Options: High=2, Medium=1, Low=0)

High

Importance

High

Due Date

mm/dd/yyyy

③ Task duedate (mm-dd-yy format)

Task Description

Enter description...

④ Task description input (Text)

Create Task ⑤ Once clicked, it sends new task form info to backend for task creation sequence

Task Info (Card)

Task 1 ① Task Name

Urgency: High ② Task Urgency (Will show either 'High', 'Medium' or 'Low')

Importance: Low ③ Task Importance (Will show either 'High', 'Medium' or 'Low')

Due Date: 2025-10-20 ④ Task Duedate (yyyy-mm-dd)

Description:

⑤ Task Description (Text)

Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec finibus interdum vulputate. Ut dignissim leo nec semper tempus. Maecenas pretium turpis sed efficitur viverra. Mauris volutpat, nisl sit amet lacinia maximus, turpis dui gravida lectus, quis mollis lacus mi sit amet lectus. Ut finibus eget urna et tempor.

Group Info (Card)

Group 1 ① Group Name

Members:

② List of group member avatars (Will only show those in group)

Description:

③ Description of Group

④


View Chat **View Calendar** ⑤

4. Once the 'View Chat' button is clicked, it takes user to group chat room UI page

5. Once the 'View Calendar' button is clicked, it takes user to group calendar UI page

User Account Info (Card)

The card displays user information with the following elements and annotations:

- User 1** (1) User's username
-  (2) User's avatar picture
- Name:** John Doe (3) User's name
- Email:** johndoe@email.com (4) Account email
- About Me:** (5) Account description (Basic text)

Placeholder text for the description: Lorem ipsum dolor sit amet, consectetur adipiscing elit. Donec finibus interdum vulputate. Ut dignissim leo nec semper tempus. Maecenas pretium turpis sed efficitur viverra.

Account Settings (Card)

(More settings to potentially be added in the future)

The card displays account settings with the following elements and annotations:

- Account Settings**
- ☒ Private Account
- ☐ Show Phone Number on Account
- ☒ Enable Notifications
- Perferred Way of Notification:**
- ☐ Email ☐ Push Notification ☒ Text

Annotations:

- (1) Group of settings user can toggle (Blue=1, White=0)
- (2) Choice between three options (Single selection)

Member Contributions

Jonathan – Sequence Diagrams, Database Tables, UI Design and Snapshots. Worked on front-end and database design.

Michael - Built the frontend with EJS, HTML, and CSS; designed login, dashboard, and project/task pages; ensured usability and connected views to backend routes.

Uche - Built the backend logic with Node.js, and Front end UI design with bootstrap and Ejs. My part to work on is providing the snapshots of the UI.

Glossary Updates

No updates were made to the glossary.