

Project Management System

Arpit Vaghela
Ahmedabad University
arpitsinh.v@ahduni.edu.in
AU1841034

Kaushal Patil
Ahmedabad University
kaushal.p@ahduni.edu.in
AU1841040

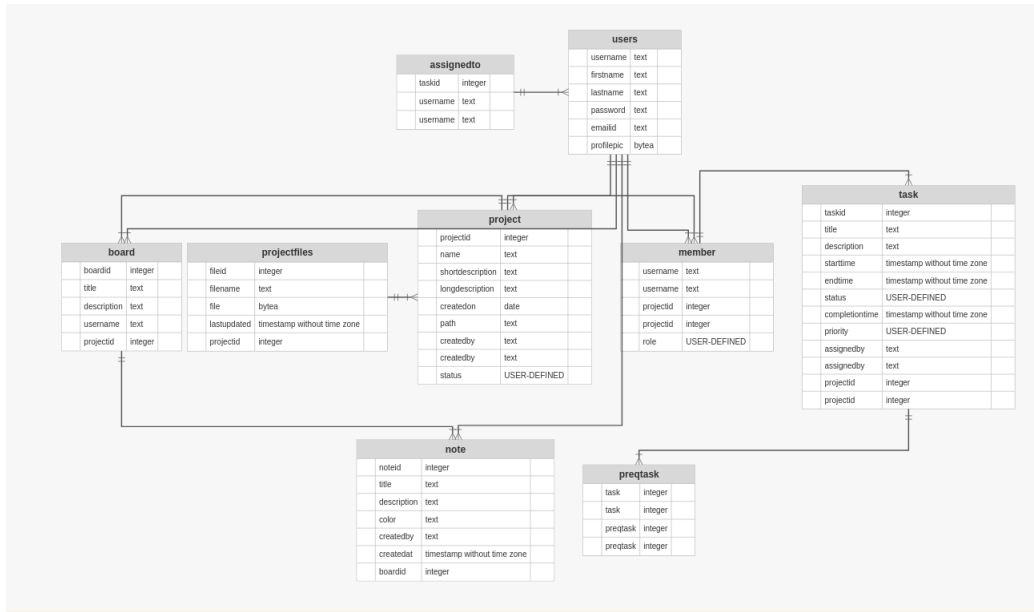
Dhruvil Dave
Ahmedabad University
dhruvil.d@ahduni.edu.in
AU1841003

Abstract

This is a project management system written using React.js for frontend, Flask and GraphQL for backend and PostgreSQL as database. This project was made as a part of subjects Database Management Systems (CSE250) and Database Management Systems Lab (CSE251). This project allows users to have an entire project management functionalities like creating projects, adding members, adding tasks, adding and managing boards, notes etc. in one place like the one provided by popular platforms like GitHub, GitLab etc.

To run the project, do the following steps:

I. ER DIAGRAM



II. TABLE DESIGN

TABLE I
USERS

Column	Type	Nullable	Default
username	text	not null	
firstname	text	not null	
lastname	text	not null	
password	text	not null	
emailid	text	not null	
profilepic	byte array		

1) Indexes:

- PRIMARY KEY (username)
- UNIQUE CONSTRAINT (emailid)

2) Check Constraints:

- emailid
- firstname
- lastname
- username

3) Referenced by:

- assignedto VI
- board VIII
- member III
- note IX
- project II

4) Triggers:

- add_board AFTER INSERT ON users FOR EACH ROW EXECUTE FUNCTION add_board()
- create_hash BEFORE INSERT OR UPDATE ON users FOR EACH ROW EXECUTE FUNCTION create_hash()

TABLE II
PROJECT

Column	Type	Nullable	Default
projectid	integer	not null	serial
name	text	not null	
shortdescription	text		
longdescription	text		
createdon	date		
path	text		
createdby	text		
status	enum(project_status)	not null	completed

- 1) Indexes:
 - a) PRIMARY KEY (projectid)
 - b) UNIQUE CONSTRAINT (name, createdby)
- 2) Foreign Key Constraints:
 - a) createdby REFERENCES users(username)
- 3) Check Constraints:
 - a) emailid
 - b) firstname
 - c) lastname
 - d) username
- 4) Referenced by:
 - a) board VIII
 - b) member III
 - c) projectfiles IV
- 5) Triggers:
 - a) add_board AFTER INSERT ON project FOR EACH ROW EXECUTE FUNCTION add_board()
 - b) add_leader AFTER INSERT ON project FOR EACH ROW EXECUTE FUNCTION add_leader()

TABLE III
MEMBER

Column	Type	Nullable	Default
username	text	not null	
projectid	integer	not null	
role	enum(role_type)		

- 1) Indexes:
 - a) PRIMARY KEY (username, projectid)
- 2) Foreign Key Constraints:
 - a) projectid REFERENCES users(projectid)
 - b) username REFERENCES users(username)
- 3) Referenced by:
 - a) task V
- 4) Triggers:
 - a) add_board AFTER INSERT ON project FOR EACH ROW EXECUTE FUNCTION add_board()
 - b) add_leader AFTER INSERT ON project FOR EACH ROW EXECUTE FUNCTION add_leader()

III. TRIGGERS

Here is a list of functions and triggers with their corresponding source codes

A. *create_hash*

This function is applied as a trigger which prevents storing the password in plain text form. Passwords should always be stored in encrypted form. The password entered will first be checked if it is minimum 8 characters long with 1 lowercase, 1 uppercase and 1 number character. Then it will be encrypted with blowfish algorithm with salt.

```
CREATE OR REPLACE FUNCTION create_hash ()
RETURNS TRIGGER AS $create_hash$
BEGIN
  --
  -- Store passwords securely
  -- password should have 1 lowercase, 1 uppercase letter, 1 number
```

TABLE IV
PROJECTFILES

Column	Type	Nullable	Default
fileid	integer	not null	serial
filename	text	not null	
file	byte array		
lastupdated	timestamp without time zone	not null	serial
projectid			

- 1) Indexes:
 - a) PRIMARY KEY (fileid)
- 2) Foreign Key Constraints:
 - a) projectid REFERENCES project(projectid)
- 3) Check Constraints:
 - a) filename
- 4) Triggers:
 - a) update_lastupdated_files BEFORE INSERT OR UPDATE ON projectfiles FOR EACH ROW EXECUTE FUNCTION update_lastupdated_files()

TABLE V
TASK

Column	Type	Nullable	Default
taskid	integer	not null	serial
title	text	not null	
description	text		
starttime	timestamp without time zone		now()
endtime	timestamp without time zone		
status	enum(status_type)		active
completiontime	timestamp without time zone		
priority	enum(priority_type)		normal
assignedby	text	not null	
projectid	integer	not null	

- 1) Indexes:
 - a) PRIMARY KEY (taskid)
 - b) UNIQUE CONSTRAINT (title, assignedby, project)
- 2) Foreign Key Constraints:
 - a) (assignedby, projectid) REFERENCES member(username, projectid)
- 3) Check Constraints:
 - a) starttime
- 4) Referenced by:
 - a) board VI
 - b) preqtask VII
- 5) Triggers:
 - a) add_task BEFORE INSERT OR UPDATE ON task FOR EACH ROW EXECUTE FUNCTION add_task()
 - b) chech_projectstatus AFTER INSERT OR UPDATE ON task FOR EACH ROW EXECUTE FUNCTION check_projectstatus()
 - c) update_status AFTER UPDATE ON task FOR EACH ROW EXECUTE FUNCTION update_status()

TABLE VI
ASSIGNEDTO

Column	Type	Nullable	Default
taskid	integer	not null	
username	text	not null	

- 1) Indexes:
 - a) PRIMARY KEY (taskid, username)
- 2) Foreign Key Constraints:
 - a) taskid REFERENCES task(projectid)
 - b) username REFERENCES users(username)

TABLE VII
PREQTASK

Column	Type	Nullable	Default
task	integer	not null	
preqtask	integer	not null	

- 1) Indexes:
 - a) PRIMARY KEY (task, preqtask)
- 2) Foreign Key Constraints:
 - a) task REFERENCES task(taskid)
 - b) preqtask REFERENCES task(taskid)
- 3) Triggers:
 - a) task_status_to_inactive AFTER INSERT OR UPDATE ON preqtask FOR EACH ROW EXECUTE FUNCTION change_statuson_preqtask()

TABLE VIII
BOARD

Column	Type	Nullable	Default
boardid	integer	not null	serial
title	text	not null	
description	text		
username	text		
projectid	integer		

- 1) Indexes:
 - a) PRIMARY KEY (boardid)
- 2) Foreign Key Constraints:
 - a) projectid REFERENCES project(projectid)
 - b) username REFERENCES users(username)
- 3) Referenced by:
 - a) note IX
- 4) Triggers:
 - a) check_board BEFORE INSERT ON board FOR EACH ROW EXECUTE FUNCTION check_board()

```
-- and be 8 to 72 characters long
--
IF NEW.password !~ ' (?(=[0-9])) ((?=[A-Za-z0-9]) (?.*[A-Z]) (?.*[a-z])) ^.{8,72}$'
THEN
    RAISE EXCEPTION 'Please enter a strong password';
ELSE
    NEW.password = crypt(NEW.password, gen_salt('bf'));
END IF;
RETURN NEW;
END;
```

TABLE IX
BOARD

Column	Type	Nullable	Default
noteid	integer	not null	serial
title	text	not null	
description	text		
color	text		
createdby	text	not null	
boardid	integer		

- 1) Indexes:
 - a) PRIMARY KEY (noteid)
 - b) UNIQUE CONSTRAINT (title, description)
- 2) Foreign Key Constraints:
 - a) boardid REFERENCES board(boardid)
 - b) createdby REFERENCES users(username)

```

$create_hash$
LANGUAGE plpgsql;

CREATE TRIGGER create_hash BEFORE INSERT OR UPDATE ON users FOR EACH ROW
    EXECUTE FUNCTION create_hash ();

```

B. add_board

This trigger is run to add a board each time a new project or a new user is added. This makes sure that each project and each user get a corresponding separate board.

```

CREATE OR REPLACE FUNCTION add_board ()
    RETURNS TRIGGER
    AS $$
BEGIN
    IF TG_TABLE_NAME = 'project' THEN
        INSERT INTO board (title, projectid)
            VALUES ('Project Board_' || NEW.projectid, NEW.projectid);
    END IF;
    IF TG_TABLE_NAME = 'users' THEN
        INSERT INTO board (title, username)
            VALUES ('User Board_' || NEW.username, NEW.username);
    END IF;
    RETURN NEW;
END
$$
LANGUAGE plpgsql;

CREATE TRIGGER add_board
    AFTER INSERT ON users
    FOR EACH ROW
    EXECUTE FUNCTION add_board ();

```

C. add_leader

This trigger is used to add creator of project to member table as a leader because the creator will automatically become a member as a leader of the project.

```

CREATE OR REPLACE FUNCTION add_leader ()
    RETURNS TRIGGER
    AS $add_leader$
BEGIN
    INSERT INTO member
        VALUES (NEW.createdby, NEW.projectid, 'leader');
    RETURN NEW;
END
$add_leader$
LANGUAGE plpgsql;

CREATE TRIGGER add_leader
    AFTER INSERT ON project
    FOR EACH ROW
    EXECUTE FUNCTION add_leader ();

```

D. update_lastupdated_files

This trigger automatically updates the lastupdated value in projectfiles

```

CREATE OR REPLACE FUNCTION update_lastupdated_files() RETURNS TRIGGER AS $$
BEGIN
    NEW.lastupdated = now();

```

```

        RETURN NEW;
END;
$$LANGUAGE plpgsql;

CREATE TRIGGER update_lastupdated_files BEFORE INSERT OR UPDATE ON projectfiles
    FOR EACH ROW EXECUTE FUNCTION update_lastupdated_files();

```

E. check_board

This checks if there exists atleast one of the username or projectid

```

CREATE OR REPLACE FUNCTION check_board ()
    RETURNS TRIGGER
    AS $$
BEGIN
    IF NEW.projectid IS NULL AND NEW.username IS NULL THEN
        RAISE exception 'one of username or project id is required';
        RETURN NULL;
    ELSE
        RETURN new;
    END IF;
END
$$
LANGUAGE plpgsql;

CREATE TRIGGER check_board
    BEFORE INSERT ON board
    FOR EACH ROW
    EXECUTE FUNCTION check_board ();

```

F. change_statuson_preqtask

On add or update preqtask set status of task to inactive if preqtask is not complete

```

CREATE FUNCTION change_statuson_preqtask () returns trigger
    AS $$
BEGIN
    if (select status from task where taskid = NEW.preqtask) != 'completed' then
        update task set status = 'inactive' where taskid = NEW.task;
    end if;
    return new;
END;
$$
LANGUAGE plpgsql;

create trigger task_status_to_inactive after insert or update on preqtask
    for each row execute function change_statuson_preqtask();

```

G. chk_task_assignedbyleader

Checks if task is assigned by leader else raise exception

```

CREATE OR REPLACE FUNCTION chk_task_assignedbyleader ()
    RETURNS TRIGGER
    AS $$
DECLARE
    myrole role_type;
BEGIN
    SELECT
        "role" INTO myrole
    FROM

```

```

        member
WHERE
    username = NEW.assignedby
    AND projectid = NEW.projectid;
IF myrole = 'leader' THEN
    RETURN NEW;
ELSE
    RAISE EXCEPTION 'member is not a leader';
    RETURN NULL;
END IF;
END
$$
LANGUAGE plpgsql;

```

```

CREATE TRIGGER chk_task_assignedbyleader
    BEFORE INSERT OR UPDATE ON task
    FOR EACH ROW
    EXECUTE PROCEDURE chk_task_assignedbyleader ();

```

H. update_task_status

Update status of depended task on change in a preqtask

```

CREATE OR REPLACE FUNCTION update_task_status ()
    RETURNS TRIGGER
    AS $$
DECLARE
    b boolean;
    r int;
    curl CURSOR (tid int) FOR SELECT task AS t FROM preqtask WHERE preqtask = tid;
BEGIN
IF TG_OP = 'DELETE' THEN
    raise notice 'here in delete old taskid %',OLD.taskid;
FOR r IN curl (OLD.taskid) LOOP
    select NOT EXISTS into b ( SELECT 1 FROM task
        WHERE taskid IN ( SELECT preqtask FROM preqtask
            WHERE task = r.t AND status != 'completed')));
        raise notice '% %',b,r.t;
        IF NOT EXISTS ( SELECT 1 FROM task
            WHERE taskid IN ( SELECT preqtask FROM preqtask
                WHERE task = r.t AND status != 'completed')) THEN
            UPDATE task SET status = 'active' WHERE taskid = r.t;
        END IF;
    END LOOP;
    RETURN OLD;
ELSIF NEW.status = 'completed' THEN
    FOR r IN curl (NEW.taskid) LOOP
        IF NOT EXISTS ( SELECT 1 FROM task
            WHERE taskid IN ( SELECT preqtask FROM preqtask
                WHERE task = r.t AND status != 'completed')) THEN
            UPDATE task SET status = 'active' WHERE taskid = r.t;
        END IF;
    END LOOP;
    RETURN NEW;
END
$$

```



```
LANGUAGE plpgsql;
```

```
CREATE TRIGGER update_task_status_afterupdate AFTER UPDATE ON task FOR EACH ROW  
EXECUTE FUNCTION update_task_status ();
```

```
CREATE TRIGGER update_task_status_beforedelate BEFORE DELETE ON task FOR EACH ROW  
EXECUTE FUNCTION update_task_status ();
```

1. check_projectstatus

Update project status to ongoing if there is a pending task

```
CREATE OR REPLACE FUNCTION check_projectstatus ()  
RETURNS TRIGGER  
AS $check_projectstatus$  
DECLARE  
    num_completed int;  
    num_total int;  
BEGIN  
    IF TG_OP = 'UPDATE' THEN  
        SELECT COUNT(*) INTO num_total  
        FROM task t  
        WHERE projectid = OLD.projectid;  
  
        SELECT COUNT(*) INTO num_completed  
        FROM task t  
        WHERE projectid = OLD.projectid AND status = 'completed';  
  
        IF num_total = num_completed THEN  
            UPDATE project  
            SET status = 'completed'  
            WHERE projectid = OLD.projectid;  
        ELSE  
            UPDATE project  
            SET status = 'ongoing'  
            WHERE projectid = OLD.projectid;  
        END IF;  
    ELSIF TG_OP = 'INSERT' THEN  
        SELECT COUNT(*) INTO num_total  
        FROM task t  
        WHERE projectid = NEW.projectid;  
  
        SELECT COUNT(*) INTO num_completed  
        FROM task t  
        WHERE projectid = NEW.projectid AND status = 'completed';  
  
        IF num_total = num_completed THEN  
            UPDATE project  
            SET status = 'completed'  
            WHERE projectid = NEW.projectid;  
        ELSE  
            UPDATE project  
            SET status = 'ongoing'  
            WHERE projectid = NEW.projectid;  
        END IF;  
    END IF;  
    RETURN new;
```

```
END;  
$check_projectstatus$  
LANGUAGE plpgsql;  
  
CREATE TRIGGER check_projectstatus  
  AFTER INSERT OR UPDATE ON task  
  FOR EACH ROW  
  EXECUTE FUNCTION check_projectstatus ();
```

IV. FUNCTIONS AND PROCEDURES

A. *My projects*

```
CREATE OR REPLACE FUNCTION myprojects (usr text, f text)
  RETURNS TABLE (
    pid int,
    projectname text,
    sd text,
    ld text,
    DOC date,
    projectpath text,
    OWNER text,
    members text[],
    roles text[]
  )
  AS $$
DECLARE
  r Record;
  curl CURSOR (usern text)
  FOR
    SELECT
      projectid AS pid
    FROM
      member
    WHERE
      username = usern;
BEGIN
  IF f IS NOT NULL THEN
    FOR r IN curl (usr)
    LOOP
      RETURN query
      SELECT
        projectid AS pid,
        name AS projectname,
        shortdescription AS sd,
        longdescription AS ld,
        createdon AS DOC,
        path AS projectpath,
        createdby AS OWNER,
        array_agg(username) AS members,
        array_agg(ROLE)::text[] AS roles
      FROM
        project
      NATURAL JOIN member
    WHERE
      projectid = r.pid
      AND status = f::project_status
    GROUP BY
      projectid;
    END LOOP;
  ELSE
    FOR r IN curl (usr)
    LOOP
      RETURN query
      SELECT
        projectid AS pid,
```

```

        name AS projectname,
        shortdescription AS sd,
        longdescription AS ld,
        createdon AS DOC,
        path AS projectpath,
        createdby AS OWNER,
        array_agg(username) AS members,
        array_agg(ROLE)::text[] AS roles
    FROM
        project
    NATURAL JOIN member
    WHERE
        projectid = r.pid
    GROUP BY
        projectid;
    END LOOP;
END IF;
RETURN;
END
$$
LANGUAGE plpgsql;

```

B. Get Project given pid and username

```

CREATE OR REPLACE FUNCTION getproject (text, int)
    RETURNS TABLE (
        pid int,
        projectname text,
        sd text,
        ld text,
        DOC date,
        projectpath text,
        OWNER text,
        members text[],
        roles text[]
    )
    AS $$
BEGIN
    IF NOT EXISTS (
        SELECT
            1
        FROM
            member
        WHERE
            username = $1
            AND projectid = $2) THEN
        RAISE exception 'user is not a member';
    ELSE
        RETURN QUERY
        SELECT
            projectid AS pid,
            name AS projectname,
            shortdescription AS sd,
            longdescription AS ld,
            createdon AS DOC,
            path AS projectpath,
            createdby AS OWNER,

```

```

        array_agg(username) AS members,
        array_agg(ROLE)::text[] AS roles
FROM
    project
NATURAL JOIN member
WHERE
    projectid = $2
GROUP BY
    projectid;
END IF;
RETURN;
END
$$
LANGUAGE plpgsql;

```

C. Get Project tasks

```

CREATE OR REPLACE FUNCTION project_task (text, int, text = NULL)
RETURNS TABLE (
    tid int,
    t text,
    des text,
    st timestamp,
    et timestamp,
    ct timestamp,
    s text,
    p text,
    pid int,
    BY text,
    assignedto text[],
    preqid int[]
)
AS $$
BEGIN
    IF (
        SELECT
            check_member ($1, $2)) THEN
        IF $3 IS NOT NULL THEN
            RETURN query
                SELECT
                    taskid,
                    title,
                    description,
                    starttime,
                    endtime,
                    completiontime,
                    status::text,
                    priority::text,
                    projectid,
                    assignedby,
                    array_agg(assignedto.username) AS assignedto,
                    array_agg(preqtask.preqtask) AS preqtask
                FROM (task
                    NATURAL JOIN assignedto)
                LEFT OUTER JOIN preqtask ON (assignedto.taskid = preqtask.task)
        WHERE
            projectid = $2

```

```

        AND status = $3::status_type
GROUP BY
    taskid;
ELSE
    RETURN query
    SELECT
        taskid,
        title,
        description,
        starttime,
        endtime,
        completiontime,
        status::text,
        priority::text,
        projectid,
        assignedby,
        array_agg(assignedto.username) AS assignedto,
        array_agg(preqtask.preqtask) AS preqtask
    FROM (task
        NATURAL JOIN assignedto)
    LEFT OUTER JOIN preqtask ON (assignedto.taskid = preqtask.task)
WHERE
    projectid = $2
GROUP BY
    taskid;
END IF;
ELSE
    RAISE exception 'user is not a member';
END IF;
RETURN;
END
$$
LANGUAGE plpgsql;

```

D. My task

```

CREATE OR REPLACE FUNCTION my_task (text, text = NULL)
    RETURNS TABLE (
        tid int,
        t text,
        des text,
        st timestamp,
        et timestamp,
        ct timestamp,
        s text,
        p text,
        pid int,
        BY text,
        assignedto text[],
        preqid int[]
    )
AS $$
BEGIN
    IF $2 IS NOT NULL THEN
        RETURN query
        SELECT
            taskid,

```

```

        title,
        description,
        starttime,
        endtime,
        completiontime,
        status::text,
        priority::text,
        projectid,
        assignedby,
        array_agg(assignedto.username) AS assignedto,
        array_agg(preqtask.preqtask) AS preqtask
    FROM (task
    NATURAL JOIN assignedto)
    LEFT OUTER JOIN preqtask ON (assignedto.taskid = preqtask.task)
WHERE
    assignedto.username = $1
    AND status = $2::status_type
GROUP BY
    taskid;
ELSE
    RETURN query
    SELECT
        taskid,
        title,
        description,
        starttime,
        endtime,
        completiontime,
        status::text,
        priority::text,
        projectid,
        assignedby,
        array_agg(assignedto.username) AS assignedto,
        array_agg(preqtask.preqtask) AS preqtask
    FROM (task
    NATURAL JOIN assignedto)
    LEFT OUTER JOIN preqtask ON (assignedto.taskid = preqtask.task)
WHERE
    assignedto.username = $1
GROUP BY
    taskid;
END IF;
RETURN;
END
$$
LANGUAGE plpgsql;

```

E. Project Report

```

CREATE OR REPLACE FUNCTION gen_project_report (pid integer)
    RETURNS TABLE (
        inactive int,
        active int,
        working int,
        completed int,
        completed_before int,
        completed_after int,

```

```

        total int
    )
    AS $$
DECLARE
    i int;
    a int;
    w int;
    c int;
    cb int;
    ca int;
    t int;
BEGIN

    if not exists (select 1 from project where projectid = pid) then raise exception 'Project does not exist';
    end if;

    SELECT
        COUNT(*) INTO t
    FROM
        task t
    WHERE
        t.projectid = pid;
    SELECT
        COUNT(*) INTO i
    FROM
        task t
    WHERE
        t.projectid = pid
        AND status = 'inactive';
    SELECT
        COUNT(*) INTO a
    FROM
        task t
    WHERE
        t.projectid = pid
        AND status = 'active';
    SELECT
        COUNT(*) INTO w
    FROM
        task t
    WHERE
        t.projectid = pid
        AND status = 'working';
    SELECT
        COUNT(*) INTO c
    FROM
        task t
    WHERE
        t.projectid = pid
        AND status = 'completed';
    SELECT
        COUNT(*) INTO cb
    FROM
        task t
    WHERE
        t.projectid = pid

```



```

        AND status = 'completed'
        AND completiontime <= endtime;
SELECT
    COUNT(*) INTO ca
FROM
    task t
WHERE
    t.projectid = pid
    AND status = 'completed'
    AND completiontime > endtime;

RETURN QUERY
SELECT
    i,a,w,c,cb,ca,t;
END;
$$
LANGUAGE plpgsql;

```

F. Project report with user

```

CREATE OR REPLACE FUNCTION gen_userwise_report (pid int)
    RETURNS TABLE (
        username text,
        inactive int,
        active int,
        working int,
        completed int,
        completed_before int,
        completed_after int,
        total int
    )
    AS $$
DECLARE
    cursor1 CURSOR (pidc int)
    FOR SELECT DISTINCT
        member.username
    FROM
        member
    WHERE
        projectid = pidc;

    i int;
    a int;
    w int;
    c int;
    cb int;
    ca int;
    t int;
BEGIN
    if not exists (select 1 from project where projectid = pid) then raise exception 'Project does not exist';
    end if;
    CREATE TEMP TABLE report (
        member text,
        inactive int,
        active int,
        working int,
        completed int,
        completed_before int,
        completed_after int,
        total int
    );

```

```

        completed_after int,
        total int
    );
FOR r IN cursor1 (pid)
LOOP
    SELECT COUNT(*) INTO t FROM task t WHERE t.taskid in
        (SELECT taskid FROM assignedto as a WHERE a.username = r.username)
        AND t.projectid = pid;

    SELECT COUNT(*) INTO i FROM task t WHERE t.taskid in
        (SELECT taskid FROM assignedto as a WHERE a.username = r.username)
        AND status = 'inactive' AND t.projectid = pid;

    SELECT COUNT(*) INTO a FROM task t WHERE t.taskid in
        (SELECT taskid FROM assignedto as a WHERE a.username = r.username)
        AND status = 'active' AND t.projectid = pid;

    SELECT COUNT(*) INTO w FROM task t WHERE t.taskid in
        (SELECT taskid FROM assignedto as a WHERE a.username = r.username)
        AND status = 'working' AND t.projectid = pid;

    SELECT COUNT(*) INTO c FROM task t WHERE t.taskid in
        (SELECT taskid FROM assignedto as a WHERE a.username = r.username)
        AND status = 'completed' AND t.projectid = pid;

    SELECT COUNT(*) INTO cb FROM task t WHERE t.taskid in
        (SELECT taskid FROM assignedto as a WHERE a.username = r.username)
        AND status = 'completed' AND completiontime <= endtime AND t.projectid = pid;

    SELECT COUNT(*) INTO ca FROM task t WHERE t.taskid in
        (SELECT taskid FROM assignedto as a WHERE a.username = r.username)
        AND status = 'completed' AND completiontime > endtime AND t.projectid = pid;

    INSERT INTO report
    VALUES (r.username,i,a,w,c,cb,ca,t);

END LOOP;

RETURN QUERY
SELECT
    *
FROM
    report;
DROP TABLE IF EXISTS report;
END;
$$
LANGUAGE plpgsql;

```

G. Function gen User report

```

CREATE OR REPLACE FUNCTION gen_user_report (uname text)
RETURNS TABLE (
    inactive int,
    active int,
    working int,
    completed int,
    completed_before int,

```

```

        completed_after int,
        total int
    )
    AS $$
DECLARE
    i int;
    a int;
    w int;
    c int;
    cb int;
    ca int;
    t int;
BEGIN

    if not exists (select 1 from users where username = uname) then raise exception '% user do
end if;
SELECT
    COUNT(*) INTO t
FROM
    task t
WHERE
    t.taskid in (
        SELECT
            taskid
        FROM
            assignedto
        WHERE
            username = uname);
SELECT
    COUNT(*) INTO i
FROM
    task t
WHERE
    t.taskid in (
        SELECT
            taskid
        FROM
            assignedto
        WHERE
            username = uname)
    AND status = 'inactive';
SELECT
    COUNT(*) INTO a
FROM
    task t
WHERE
    t.taskid in (
        SELECT
            taskid
        FROM
            assignedto
        WHERE
            username = uname)
    AND status = 'active';
SELECT
    COUNT(*) INTO w

```

```

FROM
    task t
WHERE
    t.taskid in (
        SELECT
            taskid
        FROM
            assignedto
        WHERE
            username = uname)
    AND status = 'working';
SELECT
    COUNT(*) INTO c
FROM
    task t
WHERE
    t.taskid in (
        SELECT
            taskid
        FROM
            assignedto
        WHERE
            username = uname)
    AND status = 'completed';
SELECT
    COUNT(*) INTO cb
FROM
    task t
WHERE
    t.taskid in (
        SELECT
            taskid
        FROM
            assignedto
        WHERE
            username = uname)
    AND status = 'completed'
    AND completiontime <= endtime;
SELECT
    COUNT(*) INTO ca
FROM
    task t
WHERE
    t.taskid in (
        SELECT
            taskid
        FROM
            assignedto
        WHERE
            username = uname)
    AND status = 'completed'
    AND completiontime > endtime;
RETURN QUERY
SELECT
    i,a,w,c,cb,ca,t;
END;
```

```
$$  
LANGUAGE plpgsql;
```

H. function daily analytics values

```
CREATE OR REPLACE FUNCTION daily_analytics(pid int, d0 date, d1 date)  
RETURNS TABLE("date" date, num_start int, num_comp int)  
AS $$  
DECLARE  
    num_start int;  
    num_comp int;  
BEGIN  
    DROP TABLE IF EXISTS temp;  
    CREATE TABLE IF NOT EXISTS temp("date" date, num int, num_c int);  
    IF d1 > d0 THEN  
        FOR i in 0..(d1 - d0) - 1 LOOP  
            SELECT COUNT(*) INTO num_start  
            FROM task  
            WHERE starttime >= d0 + i AND starttime < d0 + i + 1;  
  
            SELECT COUNT(*) INTO num_comp  
            FROM task  
            WHERE completiontime >= d0 + i AND completiontime < d0 + i + 1;  
  
            INSERT INTO temp  
            VALUES  
                (d0 + i, num_start, num_comp);  
        END LOOP;  
    END IF;  
  
    RETURN QUERY  
    SELECT *  
    FROM temp;  
END;  
$$ LANGUAGE plpgsql;
```

I. function cumulative analytics value

```
CREATE OR REPLACE FUNCTION daily_analytics(pid int, d0 date, d1 date)  
RETURNS TABLE("date" date, num_start int, num_comp int)  
AS $$  
DECLARE  
    num_start int;  
    num_comp int;  
BEGIN  
    DROP TABLE IF EXISTS temp;  
    CREATE TABLE IF NOT EXISTS temp("date" date, num int, num_c int);  
    IF d1 > d0 THEN  
        FOR i in 0..(d1 - d0) - 1 LOOP  
            SELECT COUNT(*) INTO num_start  
            FROM task  
            WHERE starttime >= d0 AND starttime < d0 + i + 1;  
  
            SELECT COUNT(*) INTO num_comp  
            FROM task  
            WHERE completiontime >= d0 AND completiontime < d0 + i + 1;  
  
            INSERT INTO temp
```

```

        VALUES
            (d0 + i, num_start, num_comp);
    END LOOP;
END IF;

RETURN QUERY
SELECT *
FROM temp;
END;
$$ LANGUAGE plpgsql;

```

J. Leader can remove other leaders but not the creator

```

CREATE OR REPLACE PROCEDURE edit_project (usr text, pid int, n text, sd text, ld text, p text,
)
    AS $$
DECLARE
    userrole text;
    mem text[];
    own text;
BEGIN
    SELECT
        ROLE INTO userrole
    FROM
        member
    WHERE
        username = usr
        AND projectid = pid;
    IF userrole = 'leader' THEN
        UPDATE
            project
        SET
            name = n,
            shortdescription = sd,
            longdescription = ld,
            path = p
        WHERE
            projectid = pid
        RETURNING
            createdby INTO own;
    ELSE
        RAISE EXCEPTION 'user is not a leader';
    END IF;

    if array_length(members, 1) > 0 then
    FOREACH mem slice 1 IN ARRAY members LOOP
        INSERT INTO member
            VALUES (mem[1]::text, pid, mem[2]::role_type);
    END LOOP;
    end if;
END
$$
LANGUAGE plpgsql;

```

K. Create project and add members

```

CREATE OR REPLACE PROCEDURE create_project (usr text, name text, sd text, ld text, path text,
)

```

```

    AS $$
DECLARE
    mem text[];
    pid int;
BEGIN
    INSERT INTO project (name, shortdescription, longdescription, createdon, path, createdby)
        VALUES (name, sd, ld, CURRENT_DATE, path, usr)
    RETURNING
        projectid INTO pid;
    IF array_length(members, 1) > 0 THEN
        FOREACH mem slice 1 IN ARRAY members LOOP
            INSERT INTO member
                VALUES (mem[1]::text, pid, mem[2]::role_type);
        END LOOP;
    END IF;
END
$$
LANGUAGE plpgsql;

```

L. Delete project only if the user doing it is a leader

```

CREATE PROCEDURE delete_project (usr text, pid int
)
    AS $$
BEGIN
    IF NOT EXISTS (
        SELECT
            1
        FROM
            project
        WHERE
            projectid = pid
            AND createdby = usr) THEN
        RAISE exception 'Project can only be deleted by the user who created it';
    ELSE
        DELETE FROM project
        WHERE projectid = pid;
    END IF;
END
$$
LANGUAGE plpgsql;

```

M. Authenticate the old password before adding the new one

```

CREATE PROCEDURE change_password (usr text, oldpswd text, newpswd text
)
    AS $$
DECLARE
    pswmatch boolean;
BEGIN
    SELECT
        (PASSWORD = crypt(oldpswd, PASSWORD)) INTO pswmatch
    FROM
        users
    WHERE
        username = usr;
    IF pswmatch AND newpswd !~ ' (?(=.*[0-9])) ((?=.*[A-Za-z0-9]) (?(=.*[A-Z]) (?(=.*[a-z])) ^.{8,72}
        UPDATE

```

```

        users
    SET
        PASSWORD = crypt(newpswd, gen_salt('bf'));
END IF;
END
$$
LANGUAGE plpgsql;

```

N. Delete member if user doing it is a leader and send error if member doesnot exist

```

CREATE OR REPLACE PROCEDURE delete_member (usrname text, mem text, pid int
)
    AS $$
BEGIN
    if not exists(select 1 from member where username = mem and projectid = pid) then
        raise exception '% is not a member',mem;
    end if;
    if (select createdby from project where projectid = pid) = mem then
        raise exception '% is the owner cannot be deleted',mem;
    end if;
    IF EXISTS (
        SELECT
            1
        FROM
            member
        WHERE
            username = usrname
            AND projectid = pid
            AND ROLE = 'leader') THEN

        DELETE FROM member
        WHERE username = mem
            AND projectid = pid;
    ELSE
        RAISE EXCEPTION '% is not a leader of the project', username;
    END IF;
END
$$
LANGUAGE plpgsql;

```

O. Add task with assigned to and prereq task values if user is a leader and members assigned to exists

```

CREATE OR REPLACE PROCEDURE add_task (assignedby text, assignedto text[], pid int, title text,
)
    AS $$
DECLARE
    tid int;
    m text;
    p int;
BEGIN
    st = now();
    INSERT INTO task (title, description, starttime, endtime, assignedby, projectid,priority)
        VALUES (title, description, st, et, assignedby, pid,pr::priority_type)
RETURNING
    taskid INTO tid;
    foreach m IN ARRAY assignedto LOOP
        IF NOT EXISTS (
            SELECT

```



```

        1
    FROM
        member
    WHERE
        username = m
        AND projectid = pid) THEN
        RAISE exception '% is not a member', m;
    END IF;
INSERT INTO assignedto
VALUES (tid, m);
END LOOP;
IF preqtaskid IS NOT NULL THEN
    foreach p IN ARRAY preqtaskid LOOP
        INSERT INTO preqtask
            VALUES (tid, p);
    END LOOP;
END IF;
END
$$
LANGUAGE plpgsql;

```

P. Update task if user is a leader and make changes in the assignedto and preqtask tables

```

CREATE OR REPLACE PROCEDURE edit_task (usr text, tid int, assignedto text[], t text, des text,
)
AS $$
DECLARE
    m text;
    pid int;
    p int;
BEGIN
    SELECT
        projectid INTO pid
    FROM
        task
    WHERE
        taskid = tid;
    IF NOT EXISTS (
        SELECT
            1
        FROM
            member
        WHERE
            username = usr
            AND projectid = pid
            AND ROLE = 'leader') THEN
        RAISE EXCEPTION '% user is not a leader', usr;
    END IF;
    UPDATE
        task
    SET
        title = t,
        description = des,
        starttime = st,
        endtime = et,
        priority = prior::priority_type,
        assignedby = usr

```

```

WHERE
    taskid = tid;
DELETE FROM assignedto
WHERE taskid = tid;
foreach m IN ARRAY assignedto LOOP
    IF NOT EXISTS (
        SELECT
            1
        FROM
            member
        WHERE
            username = m
            AND projectid = pid) THEN
        RAISE exception '% is not a member', m;
    END IF;
INSERT INTO assignedto
VALUES (tid, m);
END LOOP;
if array_length(preqtaskid, 1) > 0 then
    foreach p IN ARRAY preqtaskid LOOP
        INSERT INTO preqtask
        VALUES (p, tid);
    END LOOP;
end if;
END
$$
LANGUAGE plpgsql;

```

Q. Upload file add new file or replace existing if filename and projectid are same

```

create or replace procedure upload_file(text,int,bytea = Null) as $$
DECLARE
    fid int;
BEGIN
if exists(select 1 from projectfiles where filename = $1 and projectid = $2) then
    select fileid into fid from projectfiles where filename = $1 and projectid = $2;
    update projectfiles set filename = $1 , file = $3 where fileid = fid;
else
    insert into projectfiles (filename,file,projectid) values ($1,$3,$2);
end if;
END
$$ LANGUAGE plpgsql;

```

V. SCREENSHOTS

When user gets created, the password is stored as hash

```
[dhruvil@dd docs]$ psql -d pms
Password for user dhruvil:
Border style is 2.
psql (12.1)
Type "help" for help.

pms=# select * from users;
+-----+-----+-----+-----+-----+-----+
| username | firstname | lastname | password | emailid | profilepic |
+-----+-----+-----+-----+-----+-----+
(0 rows)

pms=# insert into users values ('arpit91', 'Arpit', 'Vaghela', 'Password1', 'arpit@gmail.com');
INSERT 0 1
pms=# select * from users;
+-----+-----+-----+-----+-----+-----+
| username | firstname | lastname | password | emailid | profilepic |
+-----+-----+-----+-----+-----+-----+
| arpit91 | Arpit | Vaghela | $2a$06$Xn8cjvzmAr.YR00xIqKT.M5gDa05n809gg01SMtqvBgjyvriFKB6 | arpit@gmail.com | |
+-----+-----+-----+-----+-----+-----+
(1 row)
```

New project also creates new board

```
pms=# insert into project(name, createdon, createdby) values ('Project1', now(), 'arpit91');
INSERT 0 1
pms=# select * from project;
+-----+-----+-----+-----+-----+-----+-----+-----+
| projectid | name | shortdescription | longdescription | createdon | path | createdby | status |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1 | Project1 | | | 2020-04-19 | | arpit91 | completed |
+-----+-----+-----+-----+-----+-----+-----+-----+
(1 row)

pms=# select * from board;
+-----+-----+-----+-----+-----+
| boardid | title | description | username | projectid |
+-----+-----+-----+-----+-----+
| 1 | User Board_arpit91 | | arpit91 | 1 |
| 2 | Project Board_1 | | | 1 |
+-----+-----+-----+-----+-----+
(2 rows)

pms=#
```

When new task gets created, status changes to ongoing from completed

```
pms=# insert into task(title, assignedby, projectid) values('task1', 'arpit91', 1);
INSERT 0 1
pms=# select * from project;
+-----+-----+-----+-----+-----+-----+-----+-----+
| projectid | name | shortdescription | longdescription | createdon | path | createdby | status |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1 | Project1 | | | 2020-04-19 | | arpit91 | ongoing |
+-----+-----+-----+-----+-----+-----+-----+-----+
(1 row)

pms=# select * from task;
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| taskid | title | description | starttime | endtime | status | completiontime | priority | assignedby | projectid |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| 1 | task1 | | 2020-04-19 23:53:55.441104 | | active | | normal | arpit91 | 1 |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
(1 row)

pms=# update task set status = 'completed' where taskid = 1;
UPDATE 1
pms=# select * from project;
+-----+-----+-----+-----+-----+-----+-----+-----+
| projectid | name | shortdescription | longdescription | createdon | path | createdby | status |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1 | Project1 | | | 2020-04-19 | | arpit91 | completed |
+-----+-----+-----+-----+-----+-----+-----+-----+
(1 row)

pms=# select * from task;
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| taskid | title | description | starttime | endtime | status | completiontime | priority | assignedby | projectid |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| 1 | task1 | | 2020-04-19 23:53:55.441104 | | completed | | normal | arpit91 | 1 |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
(1 row)

pms=#
```

New board for each project

```
pms=# select * from board;
+-----+-----+-----+-----+-----+
| boardid |      title      | description | username | projectid |
+-----+-----+-----+-----+-----+
|        1 | User Board_arpit91 |           | arpit91  |          |
+-----+-----+-----+-----+-----+
(1 row)
```

Other features will be shown practically