Dashboard development roadmap

we are planning to build a dashboard for projects, tasks, work reports and etc. management based on role + department (cause each department have their diff diff role and work management flow) how can we approach from scratch to end of development give me brief overview how can we manage and what would be the possibilities

Nice — this is a great product to build. Below is a compact, practical roadmap from idea → production, plus architecture patterns, data model examples, feature ideas and pitfalls. I'll keep it actionable so you can hand it to PMs/engineers and start slicing an MVP.

1) High-level approach (phases, not time)

- **Discovery** — interview stakeholders per department, capture role-specific workflows, must-have fields, compliance needs, reporting KPIs.
- **Define MVP** — smallest set that delivers value (projects, tasks, basic role-based access, reports export).
- **Design** — UX flows & component library, permission UI, templates per department.
- **Architecture & Data model** — pick DB, auth, integrations.
- **Implement** — backend APIs, frontend components, unit + integration tests.
- **Deploy & Monitor** — CI/CD, logs, error/usage monitoring, rollout by department.
- **Iterate** — add custom workflows, analytics, automation.

2) Core concepts / domain model (entities)

Keep the model generic but extensible:

- **Organization / Department**
  - id, name, settings (workflows, templates)
- **User**
  - id, name, email, department_id, role_ids, metadata
- **Role**
  - id, name, scope (global / dept), default permissions

- **Permissions / Policies**
  - CRUD on Projects/Tasks/Reports, special actions (approve, assign, escalate)
- **Project**
  - id, owner, department_id, metadata, status, tags
- **Task / Work Item**
  - id, project_id, assignee(s), type, status, priority, estimates, custom fields
- **Workflow / State Machine** (configurable per dept)
  - states, transitions, triggers, guards
- **Work Report / Timesheet / Log**
  - user_id, task_id, date, hours, description, attachments
- **Audit / Activity Log**
  - who, when, what changed
- **Attachment / Comment / Notification**

3) Authorization model (recommended)

Use **hybrid RBAC + ABAC**:

- **RBAC**: roles define baseline permissions (viewer, editor, manager).
- **ABAC**: attributes (department, project.owner, task.type) control fine-grained rules (e.g., QA role can move tasks only in QA dept).
- Support **scoped roles**: same role can have department scope.
- Admin UI to manage: roles, permission matrix, department-specific overrides.

4) Handling department-specific flows

- **Configurable Workflows** per department: edit states and who can transition.
- **Field templates**: allow department to add custom fields for tasks/reports.
- **Role mapping**: map department roles to global capabilities (so same “QA Lead” in QA vs BAU can have different perms).
- **Feature flags / toggles** so you can enable department-specific features without branching code.

5) UX patterns (what to build first)

- **Role-based dashboards**: quick KPIs, pending approvals, assigned items.
- **Project view**: summary, timeline, members, milestones.
- **Task board**: Kanban + list + calendar views toggle.
- **Work report**: log hours, generate PDF/export, manager approve/reject.
- **Admin panel**: users, roles, department settings, workflow editor.

- **Notifications center**: in-app + email + webhooks.

6) APIs & backend design (example endpoints)

- Auth: `POST /auth/login`, `POST /auth/refresh`, `GET /auth/me`
- Users: `GET /users`, `POST /users`, `PUT /users/:id`
- Projects: `GET /projects`, `POST /projects`, `GET /projects/:id`
- Tasks: `GET /projects/:id/tasks`, `POST /tasks`, `PATCH /tasks/:id`
- Reports: `GET /reports`, `POST /reports/:taskId`
- Admin: `GET /roles`, `PUT /roles/:id`, `GET /departments/:id/workflow`
  Implement **policy enforcement at API layer** (mid-tier) and again in UI to hide disabled actions.

7) Data storage / tech choices (suggestions & tradeoffs)

- **Relational (Postgres)** — good for strong data integrity, joins, reports. Use when you need transactions and complex queries.
- **Document DB (MongoDB)** — good for flexible custom fields per department. Use if schemas vary a lot.
- **Hybrid**: Postgres for core entities, ElasticSearch for search, Redis for caching/queues.
- **ORM/Tools**: Prisma (Postgres), TypeORM/NestJS, Mongoose (Mongo).

8) Infrastructure & scaling

- Stateless API servers (Node.js / NestJS / Django) behind load balancer.
- Background jobs with worker queue (BullMQ / RabbitMQ) for notifications, report generation, exports.
- File storage: S3-compatible for attachments.
- CI/CD pipelines for automated tests and deployments.
- Observability: Sentry for errors, Prometheus/Grafana for metrics, ELK or Loki for logs.

9) Reporting & analytics

- Basic: task counts, throughput, completion time, overdue tasks, billable hours.
- Advanced: build a metrics pipeline (events → OLAP store or data warehouse) for ad-hoc reports.
- Export: CSV / Excel / PDF and API endpoints for report automation.

10) Integrations & automation

- Slack/Teams notifications, email, calendar (iCal/Google Calendar), single-sign-on (SAML/OAuth).
- Webhooks for external automation.
- Automations engine: allow triggers like “when task moved to QA → assign reviewer”.

11) Security & compliance

- Strong auth: OAuth2 + refresh tokens, optional SSO (SAML/Google).
- Field-level access if necessary (sensitive fields).
- Audit trails for edits.
- Rate limiting, input validation, OWASP checks.
- Data retention policies (especially for reports).

12) Testing strategy

- Unit tests for business logic (RBAC/ABAC rules).
- E2E tests for critical flows (create project → create task → report).
- Contract tests for APIs (consumer-driven tests if multiple services).
- Load tests for peak usage (task bulk updates, export generation).

13) MVP feature checklist (minimal but useful)

- Multi-department org model + users import.
- Roles + permission matrix (basic RBAC).
- Projects CRUD, Tasks CRUD, assign/ comment/ attachments.
- Simple configurable workflow per department (2–3 states).
- Work report entry + export (CSV, PDF).
- Notifications (in-app + email).
- Admin UI for roles/departments and user management.
- Audit log and basic analytics dashboard.

14) Advanced/optional features (post-MVP)

- Per-department advanced workflow engine.
- Templates for projects/tasks by department.
- SLA/escalation automation.
- Gantt/timeline views and dependency management.
- Mobile app or PWA.

- AI-assist: auto-assign, summarize reports.

15) Example DB schema (short)

Projects:

```json
{
  "id":"uuid",
  "name":"Website Revamp",
  "department_id":"dept_1",
  "owner_id":"user_12",
  "status":"active",
  "meta": {"budget":50000}
}
```

Tasks:

```json
{
  "id":"uuid",
  "project_id":"proj_1",
  "title":"Design landing",
  "type":"design",
  "status":"in_review",
  "assignees":["user_5"],
  "custom_fields": {"browser_support":"all"}
}
```

RolePermission:

```scss
(role_id, resource, action, allowed, scope)
```

16) Common pitfalls & tradeoffs

- **Over-customizing early**: trying to support every department’s nuance pre-MVP will delay launch. Ship common primitives + templates.
- **Permissions complexity**: hard to debug; build admin UI with simulation (preview a user’s effective permissions).

- **Schema sprawl**: custom fields everywhere become hard to query—consider a hybrid approach (core fields relational + JSON for extras).
- **Workflow edge-cases**: model transitions and approvals explicitly; add testing for each transition.

17) Monitoring success — KPIs to track

- Time-to-complete tasks (by dept/role)
- Tasks overdue rate
- Adoption: active users per dept
- Report submission rate
- Workflow bottlenecks (where tasks pile up)

18) Next practical steps (concrete)

1. Run workshops with 2–3 departments, capture workflows & required reports.
2. Define MVP scope based on impact (use the checklist above).
3. Create UI wireframes for dashboard, task board, admin panel.
4. Define core DB schema and auth model (RBAC + ABAC plan).
5. Build a vertical slice: auth → project → task → report → notifications. Ship that as the first internal release.

If you want, I can:

- Draft a concrete **MVP backlog** (user stories) for sprint-ready tickets.
- Sketch a **roles × permission matrix** template for your admin UI.
- Produce a minimal **ER diagram** (visual) or **sample Postgres schema**.

Which one should I generate next?

yes

Nice — I took that “yes” as permission to deliver all three: (A) an actionable MVP backlog (sprint-ready user stories), (B) a roles × permissions matrix template with examples you can paste into an admin UI, and (C) a compact Postgres-ready ER/schema + example `CREATE TABLE` snippets for the core domain. All targeted to a projects/tasks/work-reports dashboard with per-department custom flows.

A — MVP backlog (prioritized user stories)

Epics first, then prioritized stories (M = must-have, S = should-have, C = could-have).

Epic: Authentication & Org Setup

1. M: As an admin, I can create an organization and departments so structure exists.
    - Acceptance: dept list visible in admin.
2. M: As a user, I can sign up / log in with email+password and see my department dashboard.
3. M: As an admin, I can invite users & assign them to a department and role.

Epic: Roles & Permissions
4. M: As an admin, I can create/edit roles and set baseline permissions (CRUD) for resources.
5. S: As an admin, I can define department-scoped roles (same role, different scope).

Epic: Projects
6. M: As a user, I can create a project in my department and assign an owner.
7. M: As a user, I can view project summary (members, status, recent activity).

Epic: Tasks (work items)
8. M: As a user, I can create tasks under a project with title, description, assignees, priority, due date.
9. M: As a user, I can update task status and leave comments/attachments.
10. M: As a manager, I can bulk-assign tasks and change priorities.
11. S: As a user, I can view tasks in Kanban and list view; switch views.

Epic: Work Reports / Timesheets
12. M: As a user, I can log hours against a task (date, hours, description).
13. M: As a manager, I can approve/reject submitted timesheets.
14. S: As a user, I can export my timesheet to CSV/PDF.

Epic: Workflow & Department Customization
15. S: As an admin, I can configure the workflow (states + allowed transitions) per department.
16. C: As an admin, I can add custom fields for tasks per department.

Epic: Notifications & Activity
17. M: As a user, I receive in-app notifications for assignments and approvals.

18. S: As an admin, I can add webhooks for external integrations.

Epic: Reporting & Analytics

19. S: As a manager, I can view basic KPIs: open tasks, overdue, avg completion time.
20. C: As an admin, I can download department-level reports.

Epic: Admin + Audit

21. M: As an admin, I can view activity logs (who changed what and when).
22. S: As an admin, I can simulate a user (preview effective permissions).

B — Roles × Permission Matrix (template + example)

Use this grid in your admin UI. Columns = resources/actions; rows = roles. Values = Y / N / Scoped.

Role (scope)	Projects: CRUD	Tasks: Create	Tasks: Assign	Tasks: Transition	Reports: Submit	Rep App
Global Admin (global)	Y	Y	Y	Y	Y	
Dept Manager (scoped to dept)	Y	Y	Y	Y	Y	
Team Lead (dept)	Y (own)	Y	Y (own team)	Y (allowed transitions)	Y	
Contributor (dept)	N	Y	N	N (can move limited states)	Y	
Viewer (dept)	R	N	N	N	R	
QA Lead (QA dept)	Y (project view)	Y	Y	Y (move to QA/Done)	Y	

Notes:

- Use three permission dimensions: action, resource, scope (global, dept, project, owner).
- In UI, show an “effective permission preview” for a selected user (evaluates role + attributes).

C — Compact ER / Postgres schema + sample CREATEs

Design goals: core relational model for reporting + JSONB for department-specific custom fields.

Entities: `organizations`, `departments`, `users`, `roles`, `user_roles`, `projects`, `tasks`, `task_custom_fields` (JSONB column on tasks), `work_reports`, `workflows`, `workflow_states`, `workflow_transitions`, `attachments`, `activity_logs`, `role_permissions`.

Below are compact `CREATE TABLE` examples (trimmed for clarity).

```sql
-- Organizations & Departments
CREATE TABLE organizations (
  id uuid PRIMARY KEY DEFAULT gen_random_uuid(),
  name text NOT NULL,
  created_at timestamptz DEFAULT now()
);

CREATE TABLE departments (
  id uuid PRIMARY KEY DEFAULT gen_random_uuid(),
  org_id uuid REFERENCES organizations(id) ON DELETE CASCADE,
  name text NOT NULL,
  settings jsonb DEFAULT '{}'  -- department-specific settings (templates/workflow defaults)
);

-- Users, Roles, mapping
CREATE TABLE users (
  id uuid PRIMARY KEY DEFAULT gen_random_uuid(),
  org_id uuid REFERENCES organizations(id),
  department_id uuid REFERENCES departments(id),
  email text UNIQUE NOT NULL,
  name text,
  password_hash text,
  is_active boolean DEFAULT true,
  meta jsonb DEFAULT '{}',
  created_at timestamptz DEFAULT now()
);

CREATE TABLE roles (
  id uuid PRIMARY KEY DEFAULT gen_random_uuid(),
  org_id uuid REFERENCES organizations(id),
  name text NOT NULL,
  description text,
  is_system boolean DEFAULT false
);

CREATE TABLE user_roles (
  user_id uuid REFERENCES users(id) ON DELETE CASCADE,
  role_id uuid REFERENCES roles(id) ON DELETE CASCADE,
  scope jsonb DEFAULT '{}' , -- e.g. {"department_id":"..."} or {"project_id":"..."}
  PRIMARY KEY (user_id, role_id)
);

-- Role permissions (RBAC baseline)
CREATE TABLE role_permissions (
  id uuid PRIMARY KEY DEFAULT gen_random_uuid(),
  role_id uuid REFERENCES roles(id) ON DELETE CASCADE,
  resource text NOT NULL,   -- e.g. "project", "task", "report"
  action text NOT NULL,     -- e.g. "create","read","update","delete","transition","approve"
  allowed boolean DEFAULT true,
  constraints jsonb DEFAULT '{}'  -- ABAC constraints, e.g. {"department":"QA"}
);

-- Projects & Tasks
CREATE TABLE projects (
  id uuid PRIMARY KEY DEFAULT gen_random_uuid(),
  org_id uuid REFERENCES organizations(id),
  department_id uuid REFERENCES departments(id),
  name text NOT NULL,
  owner_id uuid REFERENCES users(id),
  status text DEFAULT 'active',
  meta jsonb DEFAULT '{}',
  created_at timestamptz DEFAULT now()
);
```

```
CREATE TABLE tasks (
  id uuid PRIMARY KEY DEFAULT gen_random_uuid(),
  project_id uuid REFERENCES projects(id) ON DELETE CASCADE,
  title text NOT NULL,
  description text,
  type text,
  status text,
  priority integer DEFAULT 3,
  assignees uuid[] DEFAULT '{}',   -- array of user ids
  estimate_hours numeric,
  due_date date,
  custom_fields jsonb DEFAULT '{}', -- dept-specific fields
  created_by uuid REFERENCES users(id),
  created_at timestamptz DEFAULT now(),
  updated_at timestamptz DEFAULT now()
);

-- Work Reports / Timesheets
CREATE TABLE work_reports (
  id uuid PRIMARY KEY DEFAULT gen_random_uuid(),
  task_id uuid REFERENCES tasks(id),
  user_id uuid REFERENCES users(id),
  date date NOT NULL,
  hours numeric NOT NULL,
  description text,
  status text DEFAULT 'submitted', -- submitted, approved, rejected
  manager_id uuid, -- who approved/rejected
  meta jsonb DEFAULT '{}',
  created_at timestamptz DEFAULT now()
);

-- Workflows (config)
CREATE TABLE workflows (
  id uuid PRIMARY KEY DEFAULT gen_random_uuid(),
  department_id uuid REFERENCES departments(id),
  name text,
  config jsonb NOT NULL -- alternative: normalized states/transitions below
);

-- Activity logs
CREATE TABLE activity_logs (
  id uuid PRIMARY KEY DEFAULT gen_random_uuid(),
  org_id uuid,
  user_id uuid,
  entity_type text,
  entity_id uuid,
  action text,
  changes jsonb,
  created_at timestamptz DEFAULT now()
);

-- Attachments
CREATE TABLE attachments (
  id uuid PRIMARY KEY DEFAULT gen_random_uuid(),
  entity_type text,
  entity_id uuid,
  filename text,
  storage_path text,
  uploaded_by uuid REFERENCES users(id),
  created_at timestamptz DEFAULT now()
);
```

Implementation notes:

- Use `jsonb` for `custom_fields` and `meta`; index with GIN for queries on common keys.
- For efficient search, create an Elastic / pg_trgm index on `tasks.title` + `description`.
- Use `assignees` as `uuid[]` for quick reads; if you need complex assignment history, model a `task_assignments` table.
- For policy checks, evaluate `role_permissions` + `user_roles.scope` + `department settings` at API layer.

Practical next steps (pick a vertical slice)

I can next produce any of the following in-depth, pick one (or say “do all”):

1. A sprint-ready backlog with ~20 tickets split into 2-week sprints (acceptance criteria + estimates).
2. Full roles × permission matrix export (CSV/JSON) and an admin UI mock (how to edit & preview effective permissions).

3. A visual ER diagram (SVG/PNG) and a complete SQL schema (all tables + indexes + sample seed data).
4. Starter repo scaffold: Express/Nest + Postgres (Prisma) + React + Tailwind with the auth + projects slice implemented.

Which one should I generate now? If you want, I'll start implementing the vertical slice `auth → project → task → report` with API routes and React components (I can scaffold code).

give me ER as an image

Done — I generated the ER diagram image for the schema and saved it here:

Download the ER diagram (PNG)

If you want a different format (SVG/PDF), a version with more/less detail, or a diagram split into modules (auth, projects/tasks, reporting), tell me which and I'll generate it next.

A sprint-ready backlog with ~20 tickets split into 2-week sprints (acceptance criteria + estimates).

Full roles × permission matrix export (CSV/JSON) and an admin UI mock (how to edit & preview effective permissions).

Great — here you go. I gave you:

1. A sprint-ready backlog: ~20 tickets split into four 2-week sprints (each ticket has a short description, acceptance criteria, and an estimate in story points + approximate hours).
2. A full Roles × Permission matrix exported in CSV and JSON that you can paste into your admin UI or seed your DB with.
3. A compact admin-UI mock/spec describing how to edit permissions, scopes, ABAC constraints and how to preview/simulate effective permissions.

1 — Sprint-ready backlog (4 sprints × 2 weeks each, ~20 tickets)

Notes on estimates: I use story points (1 = ~4 hrs, 2 = ~1/2 day, 3 = ~1 day, 5 = ~3 days, 8 = ~1 week). Adjust to your team's velocity.

Sprint 1 (Weeks 1–2) — Core auth + org model + basic projects

S1-01 — Auth: Email/password login & signup

- **Description:** Implement authentication (signup, login, refresh token, /auth/me).
- **Acceptance Criteria:** users can sign up & login; JWT refresh works; `/auth/me` returns user + dept. Errors handled (401/400).
- **Estimate:** 5 pts (~3 days)

S1-02 — Organization & Department CRUD (admin)

- **Description:** Create org + department models and admin endpoints. Admin UI to create department.
- **Acceptance Criteria:** Admin can create/edit/delete departments; departments appear in user creation form. DB seeded sample org/depts.
- **Estimate:** 3 pts (~1.5 days)

S1-03 — User management: invite + assign to department & role

- **Description:** Admin can invite user by email, set department and assign initial role. Invite link flow (simple).
- **Acceptance Criteria:** Invite email (or placeholder) triggers; invited user creates account and is assigned department/role.
- **Estimate:** 5 pts (~3 days)

S1-04 — Project CRUD (basic)

- **Description:** Projects model + endpoints + minimal UI to create/view projects. Project linked to department & owner.
- **Acceptance Criteria:** Create project with name/owner/department; list & view project detail page.
- **Estimate:** 3 pts (~1.5 days)

Sprint 2 (Weeks 3–4) — Tasks, assignees, attachments, RBAC baseline

S2-01 — Tasks CRUD + assignment

- **Description:** Create tasks under projects with assignees, priority, due date.
- **Acceptance Criteria:** Create/edit/delete tasks; assignees stored; task list/query by project.
- **Estimate:** 5 pts (~3 days)

S2-02 — Attachments & comments (file upload)

- **Description:** File upload to S3-compatible storage, attach to tasks; comments model.
- **Acceptance Criteria:** Attach files to a task; file metadata stored; comments created & displayed.
- **Estimate:** 5 pts (~3 days)

S2-03 — RBAC baseline (roles + role_permissions API)

- **Description:** Implement roles table + role_permissions and enforcement middleware on APIs. Simple RBAC UI for admin to assign role to user.
- **Acceptance Criteria:** API denies forbidden actions; admin can assign roles; role permissions enforced on create/update/delete.
- **Estimate:** 5 pts (~3 days)

S2-04 — Activity logs (audit)

- **Description:** Record create/update/delete actions for projects/tasks/reports.
- **Acceptance Criteria:** Audit entries are written for key actions and available in admin UI with filters.
- **Estimate:** 3 pts (~1.5 days)

Sprint 3 (Weeks 5–6) — Work reports, approvals, workflow basics

S3-01 — Work reports / timesheet entry

- **Description:** Users can log hours per task (date, hours, description).
- **Acceptance Criteria:** Create work report; list and filter by user/date/project/task. Hours sum displayed.
- **Estimate:** 5 pts (~3 days)

S3-02 — Manager approval flow for work reports

- **Description:** Managers can approve/reject reports; notifications on status change.

- **Acceptance Criteria:** Approve/reject endpoints; report status changes; email/in-app notification triggered.
- **Estimate:** 5 pts (~3 days)

S3-03 — Configurable per-department workflow (simple)

- **Description:** Allow admin to set workflow states (e.g., To Do → In Progress → In Review → Done) per department and allowed transitions mapping for roles.
- **Acceptance Criteria:** Admin UI to edit states/transitions; tasks respect allowed transitions; API enforces transition rules.
- **Estimate:** 8 pts (~1 week)

S3-04 — Notifications (in-app)

- **Description:** Simple in-app notification center for assignment and approvals.
- **Acceptance Criteria:** Notifications created and listed; unread count shown in header; mark-as-read works.
- **Estimate:** 3 pts (~1.5 days)

Sprint 4 (Weeks 7–8) — Admin tools, exports, UX improvements

S4-01 — Permissions UI: role editor & matrix

- **Description:** Full admin UI to edit role permissions and set scoped roles (dept/project).
- **Acceptance Criteria:** Admin can toggle actions per resource; save persists role_permissions; scope selector available.
- **Estimate:** 5 pts (~3 days)

S4-02 — Effective permission preview & simulation

- **Description:** UI to pick a user and preview effective permissions (role union + ABAC). Include “simulate user” button.
- **Acceptance Criteria:** Admin selects user, sees computed permissions with reason (role X grants Y, constraint Z blocks). Simulation toggles to test changes.
- **Estimate:** 5 pts (~3 days)

S4-03 — Export: CSV / PDF exports for reports & timesheets

- **Description:** Export CSV/XLSX for timesheets and a simple PDF summary for a project.
- **Acceptance Criteria:** Export button generates file; file includes requested date range and user filters.

- **Estimate:** 5 pts (~3 days)

S4-04 — Improve search & task board (kanban)

- **Description:** Task board UI with drag/drop transitions (respect workflow rules) + search across tasks.
- **Acceptance Criteria:** Dragging columns invokes transition API and respects workflow permissions; search returns expected results with pagination.
- **Estimate:** 8 pts (~1 week)

Optional follow-ons (post-MVP)

- SSO (SAML/OIDC), advanced analytics / OLAP pipeline, SLA escalations, template library, complex ABAC rule builder.

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2 — Roles × Permission Matrix export

Below are two formats you can copy/paste or import. The matrix covers resources and actions commonly needed in your app.

CSV (comma-separated)

Save as `role_permissions_matrix.csv`.

```csv
role,scope,resource,action,allowed,constraint
Global Admin,global,organization,create,true,
Global Admin,global,organization,read,true,
Global Admin,global,organization,update,true,
Global Admin,global,department,create,true,
Global Admin,global,department,read,true,
Global Admin,global,user,manage,true,
Global Admin,global,role,manage,true,
Global Admin,global,project,create,true,
Global Admin,global,project,read,true,
Global Admin,global,project,update,true,
Global Admin,global,project,delete,true,
Global Admin,global,task,create,true,
Global Admin,global,task,read,true,
Global Admin,global,task,update,true,
Global Admin,global,task,delete,true,
Global Admin,global,task,assign,true,
Global Admin,global,task,transition,true,
Global Admin,global,report,submit,true,
Global Admin,global,report,approve,true,
Global Admin,global,attachment,upload,true,
Org Admin,org,department,read,true,
Org Admin,org,user,manage,true,
Org Admin,org,project,create,true,
Org Admin,org,project,read,true,
Org Admin,org,project,update,true,
Dept Manager,department,project,create,true,{"department_scope":"own"}
Dept Manager,department,project,read,true,{"department_scope":"own"}
Dept Manager,department,project,update,true,{"department_scope":"own"}
Dept Manager,department,task,create,true,{"department_scope":"own"}
Dept Manager,department,task,read,true,{"department_scope":"own"}
Dept Manager,department,task,update,true,{"department_scope":"own"}
Dept Manager,department,task,assign,true,{"department_scope":"own"}
Dept Manager,department,report,approve,true,{"department_scope":"own"}
Team Lead,department,task,create,true,{"team_members":"true"}
Team Lead,department,task,read,true,{"team_members":"true"}
Team Lead,department,task,update,true,{"team_members":"true"}
Team Lead,department,task,assign,true,{"team_members":"true"}
Contributor,department,task,create,true,{"department_scope":"own"}
Contributor,department,task,read,true,{"department_scope":"own"}
Contributor,department,report,submit,true,{"user_id":"self"}
Viewer,department,project,read,true,{"department_scope":"own"}
Viewer,department,task,read,true,{"department_scope":"own"}
QA Lead,department,task,transition,true,{"allowed_states":"to_qa,qa_review,done"}
QA Lead,department,task,assign,true,{"department_scope":"QA"}
```

> Tip: your `constraint` column can be a JSON blob interpreted by your ABAC evaluator. Keep it simple initially (department_id or owner filters).

JSON (array of permission objects)

Save as `role_permissions.json`.

```json
```

```
[
  {"role":"Global
Admin","scope":"global","resource":"organization","action":"create","allowed":true},
  {"role":"Global
Admin","scope":"global","resource":"organization","action":"read","allowed":true},
  {"role":"Global Admin","scope":"global","resource":"user","action":"manage","allowed":true},
  {"role":"Global
Admin","scope":"global","resource":"project","action":"create","allowed":true},
  {"role":"Global
Admin","scope":"global","resource":"task","action":"transition","allowed":true},
  {"role":"Global
Admin","scope":"global","resource":"report","action":"approve","allowed":true},
  {"role":"Org Admin","scope":"org","resource":"user","action":"manage","allowed":true},
  {"role":"Dept
Manager","scope":"department","resource":"project","action":"create","allowed":true,"constraint
{"department_scope":"own"}},
  {"role":"Dept
Manager","scope":"department","resource":"task","action":"assign","allowed":true,"constraint":
{"department_scope":"own"}},
  {"role":"Team
Lead","scope":"department","resource":"task","action":"assign","allowed":true,"constraint":
{"team_members":"true"}},

{"role":"Contributor","scope":"department","resource":"report","action":"submit","allowed":true,
{"user_id":"self"}},

{"role":"Viewer","scope":"department","resource":"project","action":"read","allowed":true,"constr
{"department_scope":"own"}},
  {"role":"QA
Lead","scope":"department","resource":"task","action":"transition","allowed":true,"constraint":
{"allowed_states":["to_qa","qa_review","done"]}}
]
```

---

3 — Admin UI mock & interaction spec (how to edit & preview effective permissions)

Below is a compact but actionable UI spec you can pass to a frontend developer.

Layout (single screen)

- **Header:** page title “Permissions & Roles” + global search.
- **Left column (30%)** — Roles list:
  - Searchable list of roles. Each row shows role name, scope (global/org/department), and quick action menu (edit, clone, delete).
  - “+ New Role” button at top.
- **Right column (70%)** — Role editor / permission matrix (when a role is selected):
  - **Top bar:** Role name input, scope selector (global / org / department). Save / Cancel.
  - **Permission Matrix:** table where rows = resources (Organization, Department, User, Role, Project, Task, Report, Workflow, Attachment) and columns = actions (Create, Read, Update, Delete, Assign, Transition, Approve, Manage Users). Each cell = checkbox (tri-state maybe) or dropdown: Allowed / Denied / Conditional.
  - **Conditional drawer:** when “Conditional” chosen, open a pane to define constraints (ABAC). UI components:
    - Dropdown: attribute (department_id, owner_id, user_id, project_id, custom tag)
    - Operator: equals / in / contains / not
    - Value input (text or dropdown)
    - Logical groups (AND/OR)
    - Preview sample JSON of constraint and “Test constraint” to run sample evaluation (see effective preview).
  - **Scope mapping:** If role scope = department, show multi-select to choose departments.
  - **Save / Clone / Delete** actions.

Effective Permission Preview (right-side modal / bottom panel)

- **“Preview / Simulate” button** visible on top-right of Role Editor.
- Two modes:
  1. **User Preview:** pick a real user from dropdown (auto-fill their roles). The system computes effective permissions by: merging role permissions, applying constraints, and showing final allowed/denied for each resource+action.
  2. **Simulation:** pick hypothetical role changes (e.g., toggle a checkbox) and click “Simulate” — shows diff between current effective permissions and simulated one.

- **Display:** a grouped list per resource showing allowed actions with small badges explaining why (e.g., “Allowed — via Dept Manager (dept_id=...): task.assign”). When blocked, show reason (e.g., “Denied — constraint department_id mismatch”).
- **Audit trace:** for each permission show the policy line(s) that contributed: role, constraint, scope. Helpful for debugging.

Extra features & UX details

- **Import / Export**: Buttons to export CSV/JSON (structures above) and import. Validate file and show preview changes before apply.
- **Bulk apply**: apply a permission change to multiple roles or to all roles in a department.
- **Role cloning**: copy role + permissions for quick setup.
- **Permission simulator URL**: create a shareable simulation link for safe review.
- **Accessibility:** keyboard navigation for matrix, tooltips on truncated JSON constraints.
- **Testing hooks:** “Run policy test” to run sample scenarios (JSON input with user attributes) and show evaluation result.
- **Performance:** Lazy-load the matrix (only visible resources), server computes effective permissions (caches results for preview requests for 30s).

Example workflows (how admin would use it)

1. **Add QA Lead**
   - Admin clicks “+ New Role” → name “QA Lead”, scope = department → selects QA dept.
   - In matrix, tick Task: Transition = Conditional. Open drawer → attribute = `allowed_states`, operator = in, value = `["to_qa","qa_review","done"]`. Save.
2. **Preview for user**
   - Click “Preview / Simulate” → choose user Priya → UI shows Priya’s effective permissions with the reason: “QA Lead (dept=QA) allows task.transition to qa_review.”
3. **Simulate an escalation**
   - In matrix, toggle `report.approve` on for Dept Manager, click Simulate with sample user → shows that this change would allow them to approve. Approve change if desired.

What I'm handing you (copy/paste friendly)

- Sprint backlog above is ready to break into tickets in JIRA/Trello/Linear. If you want, I can convert each ticket into a Markdown per-ticket template with description, acceptance criteria, test steps, and Jira-friendly fields.
- The CSV/JSON permission exports are copy/paste ready. Use them to seed DB or import into your Admin UI.
- The UI mock is an actionable spec for frontend engineers — I can convert it into a simple Figma wireframe or a React mock with Tailwind if you want.

Would you like me to:

- Export each sprint ticket as individual Markdown files (I can generate them here), **or**
- Generate a Figma-style wireframe for the Admin UI, **or**
- Scaffold the frontend Role Editor React component (Tailwind) and backend policy evaluation endpoint?

Pick one and I'll produce it next.

what is KPIs?

Great question — KPIs = **Key Performance Indicators**. They're measurable values that tell you how well something important is performing. For your projects/tasks/work-reports dashboard, KPIs help teams, managers and stakeholders quickly see whether work is on track, where bottlenecks are, and whether processes are improving.

Quick definition

KPI (Key Performance Indicator) — a quantifiable measure that reflects the performance of a process, team, or system against a goal.

Good KPIs are **SMART**: Specific, Measurable, Achievable, Relevant, Time-bound.

Why KPIs matter for your dashboard

- Focus attention on what matters (on-time delivery, throughput, utilization).
- Help prioritize improvements (where to add resources, automate, or change workflow).

- Provide objective signals for escalations and stakeholder updates.
- Allow tracking of trends over time (are process changes helping?).

KPI categories & examples (pick what fits your org)

Projects

- **Project Completion Rate** — % of projects completed in a time window.
- **On-time Project Delivery Rate** — % projects delivered by planned end date.
- **Project Health Score** — composite (milestones met, budget burn, risk flags).

Tasks / Flow

- **Throughput** — number of tasks completed per day/week.
- **Cycle Time (or Lead Time)** — average time from task start → done.
- **Average Time in State** — time tasks spend in specific workflow states (e.g., In Review).
- **Overdue Rate** — % tasks past due date.
- **Blocked Rate / Escalations** — % tasks marked blocked / escalated.

Work Reports / Timesheets

- **Timesheet Submission Rate** — % users who submitted timesheets on time.
- **Billable Utilization** — billable hours / available hours (for services orgs).
- **Approval Turnaround** — avg time for manager to approve/reject a report.

People / Productivity

- **Tasks per Assignee (throughput per person)** — completed tasks per person / period.
- **Rework Rate** — % tasks reopened or sent back after review.
- **Workload Balance** — distribution of open tasks per team member (std dev or Gini).

Concrete KPI list you can start with (good for MVP)

1. Tasks completed per week (throughput)
2. Average cycle time (days) for tasks → provides trend of efficiency
3. % overdue tasks (health signal)
4. Timesheet submission rate (compliance)
5. Approval turnaround time for timesheets (process lag)
6. Projects on-time delivery % (project-level SLA)
7. % tasks blocked > X hours (bottleneck signal)

8. Average number of open tasks per user (workload)

Example SQL snippets (Postgres) — adapt column/table names

Average cycle time (in hours) for tasks that moved from `started_at` to `done_at`:

```sql
SELECT
  AVG(EXTRACT(EPOCH FROM (done_at - started_at)) / 3600) AS avg_cycle_hours
FROM tasks
WHERE done_at IS NOT NULL
  AND started_at IS NOT NULL
  AND done_at >= now() - INTERVAL '30 days';
```

Throughput (tasks completed per week):

```sql
SELECT date_trunc('week', done_at) AS week, count(*) AS completed
FROM tasks
WHERE done_at IS NOT NULL
GROUP BY 1
ORDER BY 1 DESC
LIMIT 12;
```

% Overdue tasks (current snapshot):

```sql
WITH total AS (
  SELECT count(*) AS cnt FROM tasks WHERE status != 'done'
),
overdue AS (
  SELECT count(*) AS cnt FROM tasks WHERE status != 'done' AND due_date < current_date
)
SELECT (overdue.cnt::numeric / total.cnt) * 100 AS pct_overdue
FROM total, overdue;
```

Timesheet submission rate for last week:

```sql
```

```
WITH expected AS (
  SELECT user_id, date_trunc('day', gs.day) AS day
  FROM users
  CROSS JOIN generate_series(current_date - interval '6 days', current_date, interval '1 day') AS gs(day)
  WHERE users.is_active = true
),
submitted AS (
  SELECT DISTINCT user_id, date FROM work_reports WHERE date >= current_date - interval '6 days'
)
SELECT
  (COUNT(submitted.user_id)::decimal / COUNT(expected.user_id)) * 100 AS submission_pct
FROM expected
LEFT JOIN submitted USING (user_id, date);
```

Visualization widgets & recommended displays

- **Line chart** — throughput over time, avg cycle time trend.
- **Bar chart** — tasks by state, broken down by department.
- **Gauge / KPI card** — % on-time delivery, timesheet submission rate (with target line).
- **Heatmap / Calendar** — daily activity or submissions.
- **Table with conditional coloring** — projects with health status, overdue tasks.
- **Distribution / Boxplot** — cycle time distribution to spot outliers.

Targets, frequency & alerts

- Set realistic targets per KPI (e.g., timesheet submission ⩾ 95% by Monday 10:00).
- Refresh cadence: real-time for notifications/assignments, hourly for work metrics, daily for summary KPIs.
- Alert rules: e.g., if % overdue tasks > 20% for the dept for 3 days → notify manager; or if average cycle time increases by 30% week-over-week.

Implementation considerations

- **Event sourcing** vs. snapshot: store transitions (`state_changed_at`) to compute accurate time-in-state.
- Keep canonical timestamps: `created_at`, `started_at`, `done_at`, `last_state_change_at`.

- For custom fields per department, standardize the KPI-relevant fields so they remain queryable (or sync to OLAP).
- Use aggregates/rollups for large datasets (daily aggregates) to keep dashboard fast. Consider a data warehouse for historical analytics.

Common pitfalls

- Too many KPIs → noise. Focus on 5–8 leading indicators first.
- Wrong incentives — make sure KPIs don't encourage gaming (e.g., measuring only # tasks closed might encourage tiny low-value tasks).
- Not contextualizing — always show denominator and sample size (e.g., throughput per 10 active users).

Want me to:

- Propose **targets** and alert thresholds for the 8 MVP KPIs?
- Generate a **dashboard wireframe** (layout) with these KPI cards and SQL/data mappings?
- Create Prometheus/Grafana metric names & alert rules for real-time monitoring?

Which one next?

can be implement RBAC and ABAC model both at same time ?

Short answer: **Yes — and it's the recommended approach for real-world systems.** Use **RBAC** for coarse-grained, easy-to-manage permissions (who *can* do broad classes of actions) and **ABAC** for fine-grained, contextual rules (when and where those actions are allowed). Together they give clarity, scalability, and the fine control departments often need.

How a hybrid (RBAC + ABAC) architecture typically looks

1. **RBAC (baseline)** — Roles give a baseline allow/deny for resources & actions (e.g., `Dept Manager` → `task.assign = true`). Easy to manage, audit, and reason about.

2. **ABAC (policy layer)** — Attribute-based constraints augment/limit those role grants by evaluating runtime attributes (user.department, task.department, task.owner, time-of-day, tags, project.budget, etc.).
3. **Enforcement flow** — Evaluate RBAC first (collect candidate grants from roles), then apply ABAC constraints to each candidate (or evaluate ABAC policies first if you prefer). Always apply explicit **deny** rules with highest precedence.

Typical decision/evaluation algorithm (recommended)

1. Gather user roles (from `user_roles` and any scoped roles).
2. Collect role-based permissions (union of role_permissions for requested resource+action).
3. If any **explicit deny** exists for user/resource/action → DENY.
4. For each **allow** entry, evaluate its ABAC constraint (if present):
   - If constraint satisfied → ALLOW.
   - If none satisfied → DENY.
5. If no allow found → DENY (deny-by-default).

Where to enforce

- **API layer (middleware)** — primary enforcement for server-side operations.
- **UI layer** — hide/disable UI actions for better UX (but never rely on it for security).
- **DB / Row-level security** — optional: use DB row policies (e.g., Postgres RLS) for extra protection.
- **Policy engine service** (OPA/Casbin) — for complex, centralized policy evaluation.

Storage & schema patterns (practical)

- Keep RBAC in tables: `roles`, `user_roles`, `role_permissions(resource, action, allowed, constraints_jsonb)`. (You already have these.)
- Store ABAC policies either:
  - inline as `constraints` JSONB on `role_permissions`, or
  - as separate `policies` table that is evaluated with a policy language (Rego/DSL) for complex rules.
- Example constraint JSON you can store:

```json
{
  "type": "and",
  "clauses": [
    {"attr": "resource.department_id", "op": "eq", "value": "user.department_id"},
    {"attr": "action", "op": "in", "value": ["create","update"]}
  ]
}
```

Example rules (concrete)

- **RBAC:** `Dept Manager` — `task.assign = true` (scope: department)
- **ABAC constraint:** only if `task.department_id == user.department_id`
- **RBAC:** `Contributor` — `report.submit = true`
- **ABAC constraint:** only if `work_report.user_id == user.id` (i.e., self only)
- **RBAC+ABAC:** `QA Lead` — `task.transition = true` with allowed target-states `["qa_review","done"]`

Example Node.js middleware (pseudo)

```js
async function authorize(user, resource, action, resourceAttrs) {
  // 1. gather role permissions
  const rolePerms = await db.getRolePermissionsForUser(user.id, resource, action);
  // 2. if explicit deny exists -> deny
  if (rolePerms.some(p => p.allowed === false)) return false;
  // 3. check allows with constraints
  for (const p of rolePerms.filter(p => p.allowed)) {
    if (!p.constraints) return true; // no constraint -> allowed
    if (evaluateConstraint(p.constraints, {user, resourceAttrs, action})) return true;
  }
  // 4. fallback deny
  return false;
}
```

Use a small evaluator for JSON constraints or plug in OPA / Casbin for richer logic.

Tools & libs to consider

- **Casbin** — supports RBAC and ABAC patterns; has adapters for many languages. Good if you want built-in policy evaluation.
- **Open Policy Agent (OPA)** — policy-as-code (Rego); great for complex policies and central policy management.

- **Permify** / policy engines — hosted/managed options (if you want SaaS).
  Pick Casbin if you want embedded, OPA if you want a decoupled policy server and expressive DSL.

UI / Admin UX considerations

- Admin should be able to: create roles, toggle resource/action cells, add conditional constraints (visual builder that produces JSON/Rego).
- Provide a **Permission Simulator**: pick a user + resource + attributes → show why an action is allowed/denied (trace of matching rules). This dramatically reduces mistakes and support tickets.

Performance & caching

- Cache computed *effective permissions* per user (or per user+resource type) for short TTL (30s–5min), invalidating on role/permission changes.
- Index role & permission tables (by role_id, resource, action).
- For high scale, pre-compute grants for common resource classes and use a fast policy eval engine.

Testing & auditing

- Unit tests for policy evaluator (happy & unhappy paths).
- Policy test cases (example scenarios) for each ABAC rule.
- Audit logs for policy decisions — store (user, resource, action, decision, matched_policies) for debugging.

Pitfalls to avoid

- Overuse ABAC for everything — it becomes hard to reason about and debug. Use RBAC for the broad strokes and ABAC for exceptions.
- Allowing conflicting rules with no precedence — always implement explicit deny precedence.
- No simulation & visibility — admins must be able to preview effective permissions.

Migration strategy (if adding to existing RBAC)

1. Start with RBAC enforcement only (no ABAC).
2. Add ABAC constraints as optional fields on `role_permissions`. Enforce constraints for new/targeted rules first.

3. Gradually migrate/convert special-case RBAC rules into ABAC policies where needed.
4. Add simulator & audit before enabling broad ABAC changes.

If you want I can:

- produce a **mini policy language** suggestion (JSON DSL) and sample evaluator code,
- generate a **Casbin policy example** and quick setup steps for Node.js, or
- create mockups for the **Permission Simulator UI** and constraint-builder.

Which one should I produce next?

Uploaded image

now i want projects management module detailed explained approaches how to maintain Assign to Qa, revert from QA, today, yesterday etc, filters data from backend and using status and more possible management of project

for reference i attached the ss

Nice screenshot — thanks, that helps a ton. Below I'll give a compact, practical guide for designing a **Projects Management** module that supports the flows you mentioned (Assign→QA, Revert from QA, Today/Yesterday/etc filters), plus the backend & UI patterns, APIs, DB/query recipes, status/workflow ideas, RBAC considerations, and useful extras (bulk actions, audits, notifications). You can use this as a spec for frontend & backend work.

1) High-level approach (one-paragraph)

Model each **Project** as a top-level entity and expose both project-level status and task-level workflows. For QA flows, either 1) treat QA as a project-level state (`In QA`) or 2) model QA as a dedicated subtask/phase (recommended if QA can be partial or per-component). Implement a configurable state machine (per department if needed) and enforce transitions server-side. Provide server-side filtering (date ranges like today/yesterday) with paginated endpoints and a clear RBAC layer that controls who can assign/transition projects.

2) Data model (key fields)

Use the schema you already have with these important fields:

Projects (important columns)

- `id`, `code`, `name`, `department_id`, `status` (enum text), `platform`, `frequency`
- `owner_id` (POC), `pm_id`, `tl_id`, `developer_ids` (uuid[]), `qa_ids` (uuid[])
- `created_at`, `updated_at`, `start_date`, `end_date`, `due_date`
- `meta jsonb` (extra attributes)
- `current_phase` (optional: detailed phase like implementation/module name)

Task / Subtask (recommended)

- `id, project_id, type ('dev', 'qa'), title, status, assignee_id, created_by, started_at, done_at, comments_count, attachments, custom_fields jsonb`

Workflow & transitions (configurable)

- `workflow_id, department_id, states[], transitions[]`
- Keep a `project_history` / `activity_logs` record for every status change: `{user_id, from, to, reason, comment, timestamp}`

3) Status model / suggested statuses

Project-level statuses:

- `new`, `planned`, `in_development`, `in_qa`, `qa_rejected`, `completed`, `on_hold`, `bau` (or BAU)

  Task/subtask statuses (more granular):
- `todo`, `in_progress`, `in_review`, `in_qa`, `qa_passed`, `qa_failed`, `done`, `blocked`

4) Assign to QA — two approaches (choose based on your needs)

A) Simple (project-level) — quick to implement

- Developer marks project `in_qa` using API `POST /projects/:id/transition` { to: "in_qa", comment }.

- System records history and notifies QA users.
- QA users pick up project and change status to `qa_passed` or `qa_rejected`.

B) Recommended (subtask/phase-based) — more flexible

- Create a QA subtask(s): `POST /tasks` with `type='qa'`, `assignees=qa_team`.
- Developer marks development tasks as done; system auto-creates QA tasks or a QA checklist.
- QA assignees work on QA subtask; when all QA subtasks are done → update project status to `completed`.
  Advantages: partial QA, multiple QA owners, per-component QA tracking, better metrics (cycle time per phase), easier reverts.

5) Revert from QA (best practice)

- Always require a **reason/comment**. Use `POST /projects/:id/transition` with `{ to: "in_development", from: "in_qa", reason: "Failed test XYZ", revert_subtasks: [..] }`.
- Create activity log: who reverted, timestamp, comment.
- Optionally auto-generate a developer task or reopen specific dev subtask and assign to original owner or TL.
- Track `rework_count` metrics for KPIs.

6) Backend filtering for "Today / Yesterday / This Week / Last Week / This Month / Date"

Implement server-side filters in the projects listing endpoint. Example endpoint:

`GET /projects?status=in_development&date_range=today&page=1&pageSize=20&search=flipkart&department=BAU`

Date filter interpretations (SQL examples, Postgres):

- Today:

```sql
WHERE date(created_at) = current_date
```

- Yesterday:

```sql
```

```
WHERE date(created_at) = current_date - INTERVAL '1 day'
```

- This week (ISO week starting Monday):

```sql
WHERE date_trunc('week', created_at) = date_trunc('week', current_date)
```

- Last week:

```sql
WHERE date_trunc('week', created_at) = date_trunc('week', current_date - interval '1 week')
```

- This month:

```sql
WHERE date_trunc('month', created_at) = date_trunc('month', current_date)
```

- Arbitrary date range:

```sql
WHERE created_at >= '2025-09-01' AND created_at < '2025-09-20'
```

If filtering on `updated_at` or `start_date` / `due_date` , use the same expressions.

7) Query & API implementation patterns

- Use server-side pagination (cursor or offset). Prefer *cursor* (stable ordering by `created_at, id`).
- Accept filter params: `status` , `department` , `assignee` , `role` , `date_range` (enum or start/end), `search` , `pageSize` , `sortBy` .
- Build DB where-clauses dynamically on backend. Example pseudo (Node/Knex style):

```js
const q = db('projects').select('*');
if (filters.status) q.where('status', filters.status);
if (filters.department) q.where('department_id', filters.department);
if (filters.search) q.whereILike('name', `%${filters.search}%`);
if (filters.dateRange === 'today') q.whereRaw('date(created_at) = current_date');
q.orderBy(filters.sortBy || 'updated_at', 'desc').limit(pageSize).offset((page-1)*pageSize);
```

- Return total count OR use cursor `next_cursor` for infinite scroll.

8) UI ideas for the screenshot layout

- Top quick filters: `Projects, Today, Tomorrow, Yesterday, This Week, Last Week, Next Week, This Month, Next Month, Last Month, Date` — map each to a date_range param.
- Tabs below: `All | New | Under Development | BAU | Completed` — map to `status` filter.
- Table columns editable inline for some (Status drop-down, POC select), but transitions must call transition API.
- Right-side actions: `+ Create Project`, `Export (PDF/Excel/CSV)`, `Search`.
- Row actions: `View | Edit | Assign QA | Revert QA | Logs` — show modal for assign/revert with required inputs.
- For `Assign to QA` button: open modal with QA assignees dropdown, ETA, checklist options, and optional attachments.

9) RBAC & permissions

- Only certain roles (Team Lead, PM, Dept Manager) can `assign to QA` or `revert`.
- Enforce server-side: use your RBAC+ABAC flow to check `authorize(user, 'project', 'transition', {from, to, project})`.
- UI hides actions that user can't perform but still rely on server verification.

10) Notifications & automations

- Notify QA team via in-app + email + optional Slack webhook when assigned to QA.
- Send escalation reminders if QA not started in `X` hours.
- Automate creation of QA task(s) after developer marks dev tasks done.

11) Audit trail & history

- Every transition writes `activity_logs` with `{user_id, from, to, comment, timestamp}`.
- Provide `View History` modal showing timeline, who changed what, diffs, and links to related tasks.

12) Bulk operations

- Bulk assign to QA (select multiple rows → action).
- Bulk change status (e.g., mark many projects `BAU`).
- Use background job for heavy operations (queue + progress feedback).

13) Indexing & performance

- Index columns used in filters: `status`, `department_id`, `created_at`, `updated_at`, `due_date`.
- GIN index for `meta jsonb` if you query custom fields.
- Full-text index or `pg_trgm` on `name, code, description` for search.
- Pagination: prefer cursor queries for large datasets.

14) Concurrency & consistency

- Use optimistic locking: `version` column or `updated_at` check when applying transitions to avoid lost updates.
- Consider DB transaction for compound operations (transition + create QA tasks + create notifications).

15) Example API endpoints (minimal)

- `GET /projects` — list (filters & pagination)
- `GET /projects/:id` — project detail + tasks + history
- `POST /projects` — create
- `PUT /projects/:id` — update basic fields
- `POST /projects/:id/transition` — body `{ to: "in_qa", reason?, assignTo?: [userIds], checklists?: [...] }`
- `POST /projects/:id/revert` — body `{ to: "in_development", reason, reopenTasks?: [taskIds] }` (can be same as transition)
- `POST /tasks` — create subtask (type='qa')
- `GET /projects/export?format=csv&status=completed` — export

16) KPIs & reports you'll get from this

- QA pass rate (first pass)
- Average time in QA (time_in_state metrics)
- Rework count (reverts per project)
- Throughput by day/week (completed projects/tasks)
- Overdue projects & SLA breaches

17) Acceptance criteria checklist (for developer handoff)

- ☐ Server endpoint supports filters shown in UI and returns paginated results.
- ☐ `Assign to QA` creates QA task(s) (if chosen) and sets project status (if chosen).
- ☐ `Revert from QA` requires comment and reopens specified task(s).
- ☐ Activity log written for every status transition.
- ☐ UI hides disabled actions; server verifies permissions.
- ☐ Notifications created on assign and status changes.
- ☐ Date filters (`today`, `yesterday`, `this week`, etc.) behave correctly.
- ☐ Bulk assign/change status supported with queue and progress feedback.
- ☐ Tests for policy/permission checks and transition rules.

18) Edge cases & tips

- Partial QA: support multiple QA subtasks and let project be `in_qa` until all QA subtasks are done.
- Race condition: two users trying to assign/revert — use optimistic locking.
- Long-running QA: add SLA timers & auto-escalate.
- Attachment-heavy workflows: store files in S3 and keep only metadata in DB to avoid large row sizes.

If you want, next I can:

- generate the exact SQL query builder function (Node/Knex or Prisma) that maps UI filters to DB queries; **or**
- produce the `POST /projects/:id/transition` API spec (request/response + validation + sample code) and a sample React modal for Assign to QA / Revert actions; **or**
- design the “Project History” modal UI mock and the payload shape for activity logs.

Which one should I generate now?