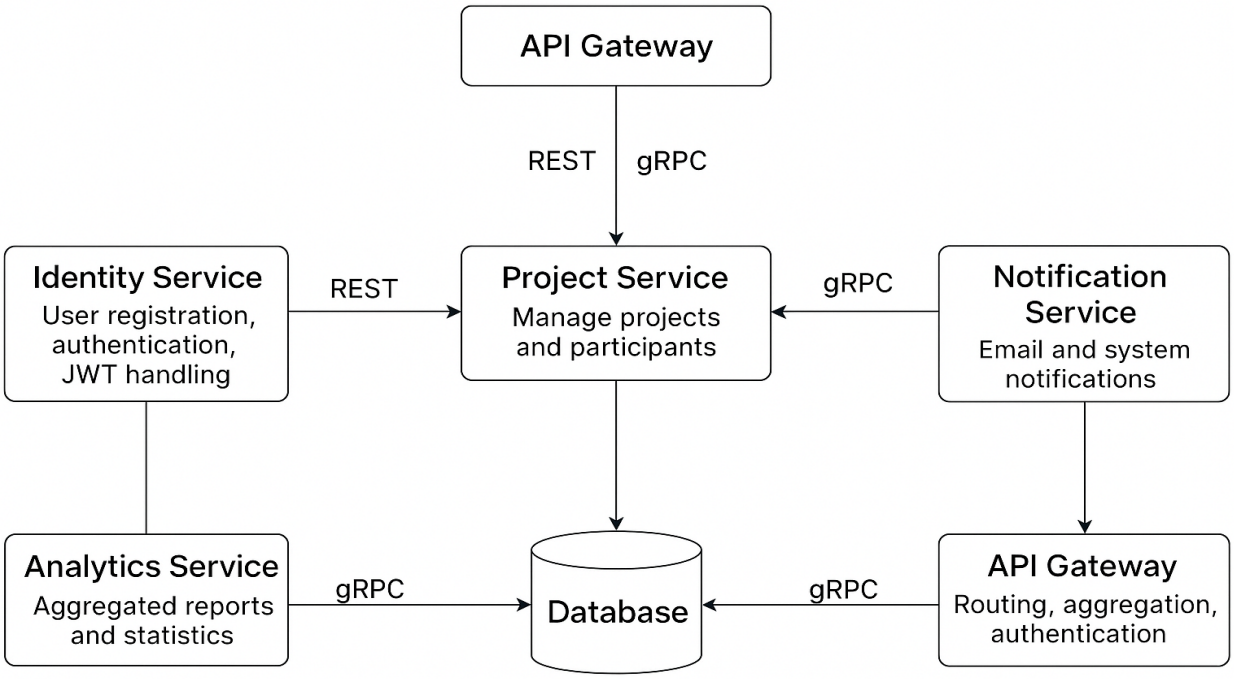
Task Management System (TMS)

Software Design Specification – Microservices Architecture & Service Interactions

System Architecture Diagram



Inter-Service Communication Matrix

From Service	To Service	Protocol	Purpose
Project Service	Notification Service	gRPC	Send notifications when a project is creat
Project Service	Analytics Service	gRPC	Update project metrics and participant st
Task Service	Notification Service	gRPC	Notify users when tasks are assigned or
Task Service	Analytics Service	gRPC	Report completed tasks and performance
Identity Service	API Gateway	REST	Validate JWT tokens and manage user s
Frontend	API Gateway	REST	Access all system functionalities via a un

Detailed Microservice Interaction Flows

1. Project Creation Flow:

• Frontend → API Gateway (REST): Request to create a project.
• API Gateway → Project Service (REST): Validates and stores the new project.
• Project Service → Notification Service (gRPC): Sends notifications to participants.
• Project Service → Analytics Service (gRPC): Updates system statistics.

2. Task Assignment Flow:
• Frontend → API Gateway (REST): Assign a user to a task.
• API Gateway → Task Service (REST): Updates assignment.
• Task Service → Notification Service (gRPC): Notifies the assigned user.
• Task Service → Analytics Service (gRPC): Updates task distribution metrics.

3. Authentication Flow:
• Frontend → API Gateway (REST): Login request with credentials.
• API Gateway → Identity Service (REST): Authenticates and returns JWT.
• API Gateway: Uses JWT to authorize subsequent user actions.

4. Notification Delivery Flow:
• Project or Task Service → Notification Service (gRPC): Sends event data.
• Notification Service: Dispatches emails or system alerts.
• Notification Service → Analytics Service (gRPC): Logs notification metrics.

5. Analytics Update Flow:
• Task/Project Services → Analytics Service (gRPC): Transmit metrics.
• Analytics Service: Aggregates data and provides reports via API Gateway.

Example User Stories

User Story 1 – Project Creation

As a project manager, I want to create a new project so that I can organize tasks for my team.

Flow:

1. User (Frontend) → API Gateway: POST /projects
2. API Gateway → Project Service (REST): Create project
3. Project Service → Notification Service (gRPC): Notify team members
4. Project Service → Analytics Service (gRPC): Update statistics

User Story 2 – Task Assignment

As a manager, I want to assign a task to a specific user to track responsibility.

Flow:

1. User (Frontend) → API Gateway: POST /tasks/assign
2. API Gateway → Task Service (REST): Assign task
3. Task Service → Notification Service (gRPC): Notify assigned user
4. Task Service → Analytics Service (gRPC): Update metrics

User Story 3 – Task Completion

As a user, I want to mark a task as completed so that progress is visible in the project.

Flow:

1. User (Frontend) → API Gateway: PATCH /tasks/{id}/status
2. API Gateway → Task Service (REST): Update task status
3. Task Service → Notification Service (gRPC): Notify manager
4. Task Service → Analytics Service (gRPC): Update project statistics