Introduction

This document describes a technical design for the backend API for a real-time messaging application (similar to Slack). This API manages authentication, authorization, workspaces, channels, messages, attachments with a system that saves the files in a service like S3 and allows for a centralized notification system.

Key Objectives

- Provide a scure and scalable RESTful API.
- Provide a communication service and a centralized notification service for clients.
- Allow a real-time communication with the use of a WebSocket service.
- Manage attachment storage with a decoupled service like S3.

Use cases

Use Case 1: Team Channel Communication

Scenario: A software development team needs to discuss the progress of a sprint in a dedicated channel.

Flow:

1. A team member posts an update in the #development channel.
2. Other members comment and react to the message.
3. A thread is created to discuss a specific task without interrupting the general conversation.
4. The team receives notifications for new messages and relevant mentions.

Use Case 2: Direct Messages Between Employees

Scenario: A graphic designer needs to ask a developer for clarification about a specific functionality.

Flow:

1. The designer searches for the developer on the platform and sends a direct message.
2. The developer receives a notification and replies.
3. If necessary, they can escalate the conversation to a video call within the platform.

Use Case 3: Notifications and Mentions

Scenario: A manager mentions an employee in a message to request an update.

Flow:

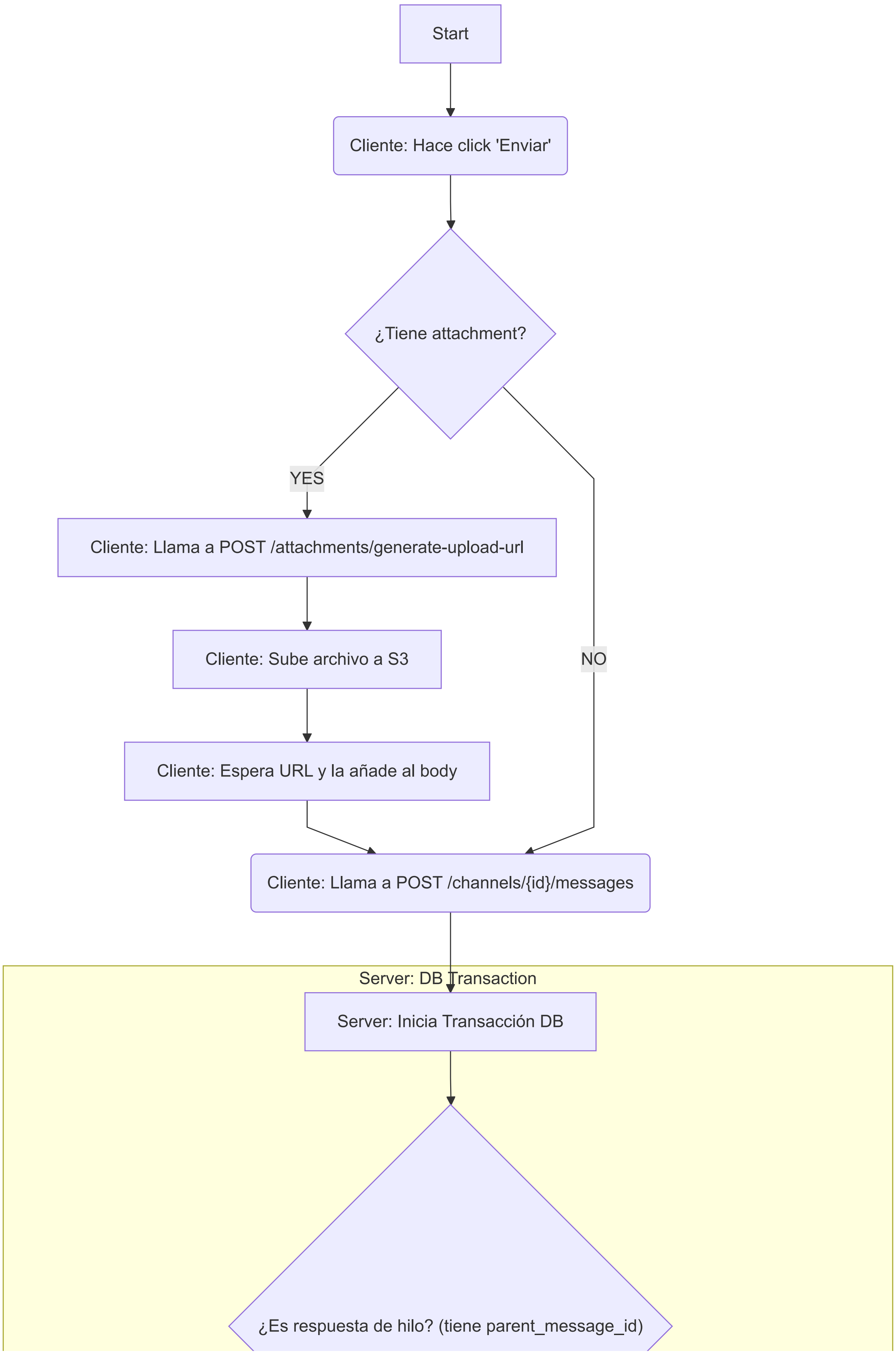
1. The manager writes a message in the #projects channel and mentions the employee with @name.
2. The employee receives a notification in their app.
3. The employee replies in the message thread.
4. The manager and other team members can follow and respond to the conversation as needed.

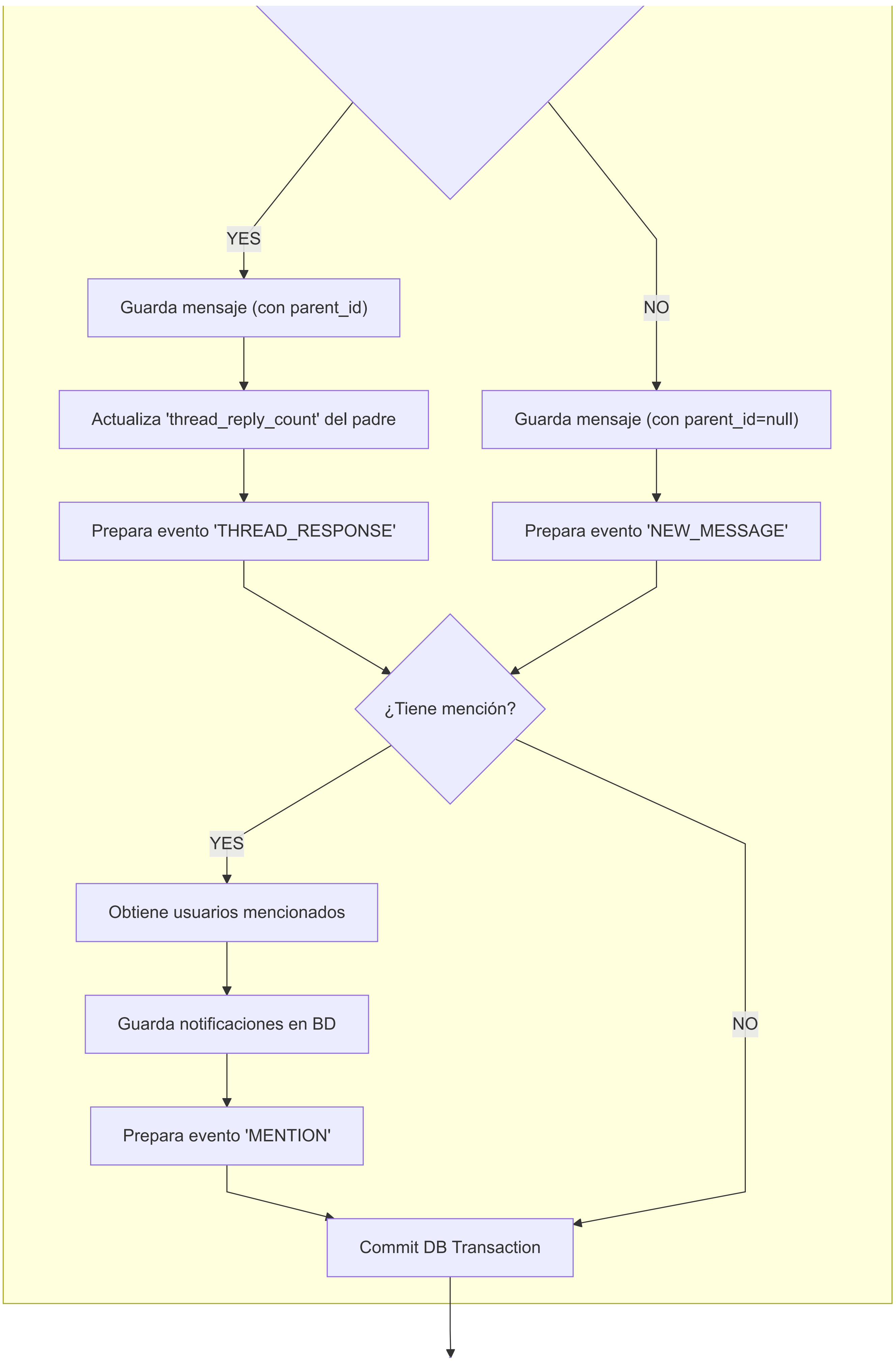
High level solution

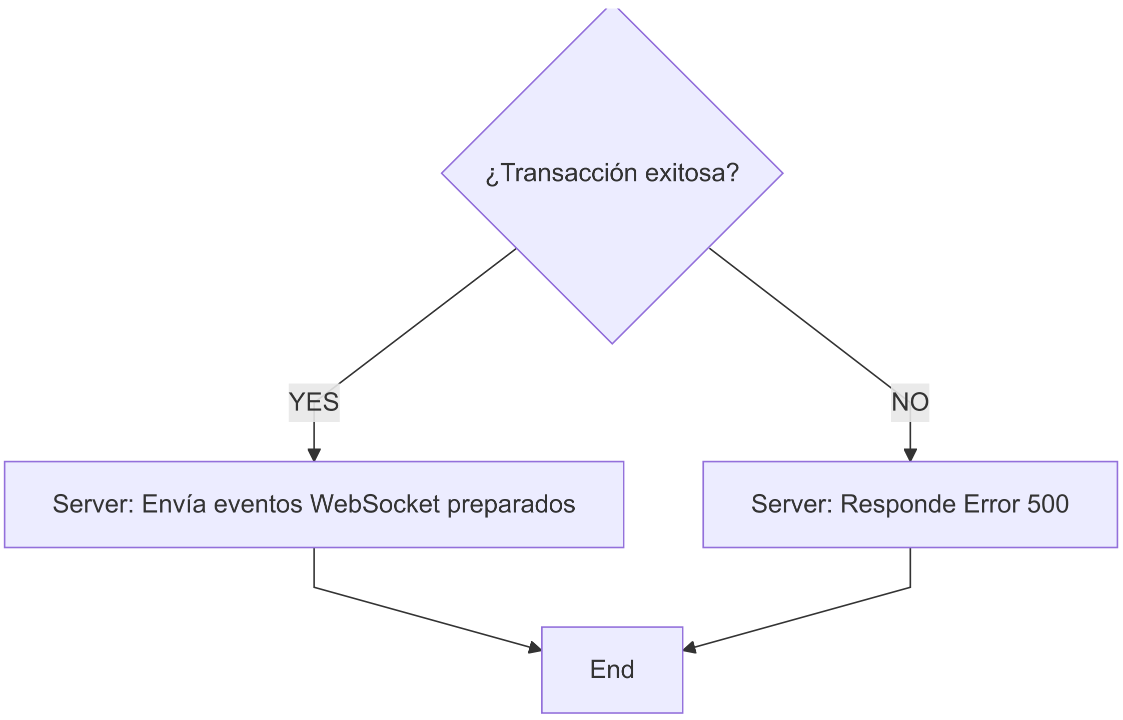
I propose a monolithic RESTful API, built using PHP/Laravel and PostgreSQL. It will use JWT Tokens for a secure and fast authentication, managing passwords with Bcrypt, and will implement a WebSocket service for real-time events.

Flow diagram

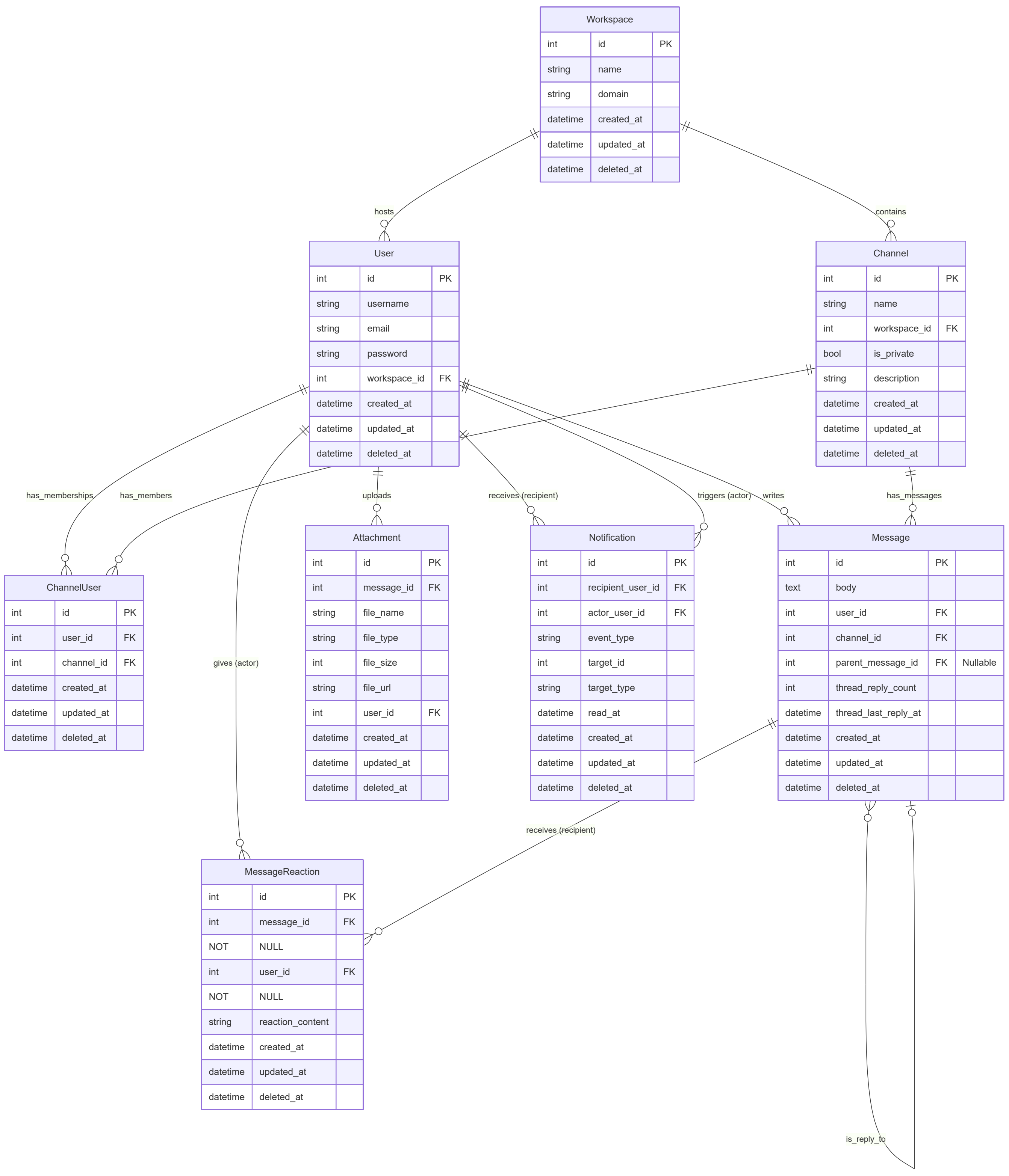
NEW MESSAGE


Start
Cliente: Hace click 'Enviar'
¿Tiene attachment?
YES
NO
Cliente: Llama a POST /attachments/generate-upload-url
Cliente: Sube archivo a S3
Cliente: Espera URL y la añade al body
Cliente: Llama a POST /channels/{id}/messages
Server: DB Transaction
Server: Inicia Transacción DB
¿Es respuesta de hilo? (tiene parent_message_id)


YES
NO
Guarda mensaje (con parent_id)
Actualiza 'thread_reply_count' del padre
Prepara evento 'THREAD_RESPONSE'
Guarda mensaje (con parent_id=null)
Prepara evento 'NEW_MESSAGE'
¿Tiene mención?
YES
NO
Obtiene usuarios mencionados
Guarda notificaciones en BD
Prepara evento 'MENTION'
Commit DB Transaction


¿Transacción exitosa?
YES
NO
Server: Envía eventos WebSocket preparados
Server: Responde Error 500
End

Entity diagram



Workspace

int	id	PK
string	name	
string	domain	
datetime	created_at	
datetime	updated_at	
datetime	deleted_at	

User

int	id	PK
string	username	
string	email	
string	password	
int	workspace_id	FK
datetime	created_at	
datetime	updated_at	
datetime	deleted_at	

Channel

int	id	PK
string	name	
int	workspace_id	FK
bool	is_private	
string	description	
datetime	created_at	
datetime	updated_at	
datetime	deleted_at	

ChannelUser

int	id	PK
int	user_id	FK
int	channel_id	FK
datetime	created_at	
datetime	updated_at	
datetime	deleted_at	

Attachment

int	id	PK
int	message_id	FK
string	file_name	
string	file_type	
int	file_size	
string	file_url	
int	user_id	FK
datetime	created_at	
datetime	updated_at	
datetime	deleted_at	

Notification

int	id	PK
int	recipient_user_id	FK
int	actor_user_id	FK
string	event_type	
int	target_id	
string	target_type	
datetime	read_at	
datetime	created_at	
datetime	updated_at	
datetime	deleted_at	

Message

int	id	PK	
text	body		
int	user_id	FK	
int	channel_id	FK	
int	parent_message_id	FK	Nullable
int	thread_reply_count		
datetime	thread_last_reply_at		
datetime	created_at		
datetime	updated_at		
datetime	deleted_at		

MessageReaction

int	id	PK
int	message_id	FK
NOT	NULL	
int	user_id	FK
NOT	NULL	
string	reaction_content	
datetime	created_at	
datetime	updated_at	
datetime	deleted_at	

Epics and Tasks

- EPIC: Authentication and user management
  Task1: Implement endpoint `POST /register/` with validations and password hashing using Bcrypt.
  Task2: Implement logic to create tokens using JWT with a secret_key
  Task3: Implement login logic, returning a JWT.
  Task4: Implement middleware for JWT verification and authorization for requested services.

Task5: Implement endpoint `GET /users/{me}` to get the authenticated user's profile.
Task6: Implement endpoint `PUT /users/{me}` to allow a user to update their own data.

- EPIC: Workspace Management
  Task1: Implement endpoint `POST /wokspaces` to create workspaces.
  Task2: Implement endpoint `PUT /workspaces/{workspace_id}` to update a workspace.
  Task3: Implement endpoint `GET /workspaces` to list all the workspaces.
  Task4: Implement endpoint `GET /workspaces/{wokspace_id}` to get specific workspace.
  Task5: Implement endpoint `DELETE /workspaces/id` to delete a workspace.
  Task6: Implement endpoint `POST /workspaces/{workspace_id}/members` to add a member to a workspace.
  Task7: Implement endpoint `GET /workspaces/{workspace_id}/members` to list all members in a workspace.
  Task8: Implement endpoint `DELETE /workspaces/{workspace_id}/members` to remove a user from the workspace.
- EPIC: Channel Management
  Task1: Implement endpoint `POST /workspaces/{workspace_id}/channels` to create a channel in a workspace.
  Task2: Implement endpoints `POST /channels/{channel_id}/members` and `DELETE /channels/{channel_id}/members/{user_id}` to add and remove members to/from a channel.
  Task3: Implement endpoint `GET /workspaces/{workspace_id}/channels` to list all the channels in a workspace.
  Task4: Implement endpoint `GET /channels/{channel_id}` to get a specific channel.
  Task5: Implement endpoint `PUT /channels/{channel_id}` to update a channel.
  Task6: Implement endpoint `DELETE /channels/{channel_id}` to delete a channel.
- EPIC: Message Management

  Task1: Implement thread logic using the`parent_message_id` attribute (to identify thread responses), and the `thread_reply_count` and `thread_last_reply_at` (for efficient thread management).
  Task2: Implement endpoint `POST /channels/{channel_id}/messages` to send new messages (Note: THis logic must handle the attachments first using the `POST /attachments/generate-upload-url` service to obtain a pre-signed url for the request body).
  Task3: Implement logic to publish events in the WebSocket to notify clients.
  Task4: Implement endpoint `GET /channels/{channel_id}/messages` to get all the messages from a channel.
    Subtask: Implement pagination for the messages (eg: `?limit=50&cursor=timestamp`).
  Task5: Implement endpoint `GET /messages/{message_id}/replies` to get all replies for a specific message.
  Task6: Implement endpoint `PUT /messages/{message_id}` to update a message.
  Task7: Implement endpoint `DELETE /messages/{messaage_id}` to delete a message.
  Task8: Implement endpoint `POST /dms/users/{user_id}/messages` to send direct messages.
    Subtask: The service logic must check if a DM channel already exists between the two users. If not, it must create one before saving the message.
  Task9: Implement endpoint `GET /dms/users/{user_id}/messages` to get the message history with a specific user.
  Task10: Implement endpoint `GET /dms` to list all of the authenticated user's direct message conversations.

- EPIC: Notification Management
  Task1: Implement endpoints `POST /channels/{channelId}/messages` and `PUT /messages/{message_id}` to detect `@mention`.
  Task2: When a mention is detected, create a new notification record in the database.
  Task2: Implement endpoint `GET /notifications` to get all notifications from the authenticated user (sorted and filtered).
  Task3: Implement endpoint `PUT /notifications/{notification_id}` to mark a notification as read (by setting the `read_at` attribute).
  Task5: Implement logic to publish a WebSocket event to the client when a notification is created.
- EPIC: Attachment management
  Task1: Implement endpoint `POST /attachments/generate-upload-url` to create a pre-signed URL uploading files directly to a service like `AWS S3` (This allows the client to upload the file, which then provides the final file URL needed for the message).
- EPIC: Message reactions management
  Task1: Implement endpoint `POST /messages/{message_id}/reactions` to add a reaction to a message (e.g., an ASCII character, emoji, or custom icon).
  Task2: Implement endpoint `DELETE:/message/{message_id}/reactions/{reaction_id}` to delete a specific reaction (Note: The reaction to be removed should be identified in the request body).
  Task3: Implement endpoint `GET /messages/{message_id}/reactions` to list all the reaction on a message.
  Task4: Implement logic to publish a WebSocket event to notify the client when a reaction has been added or removed.

Upgrades

. Advanced search.
. Status (Online/Offline/Busy/Out of office).
. Add rol for "guest" users with limited permissions for workspace access.