Opik Integration in FretCoach

Workspace: `padmanabhan-r-7119` **Projects:** `FretCoach` | `FretCoach-Hub`

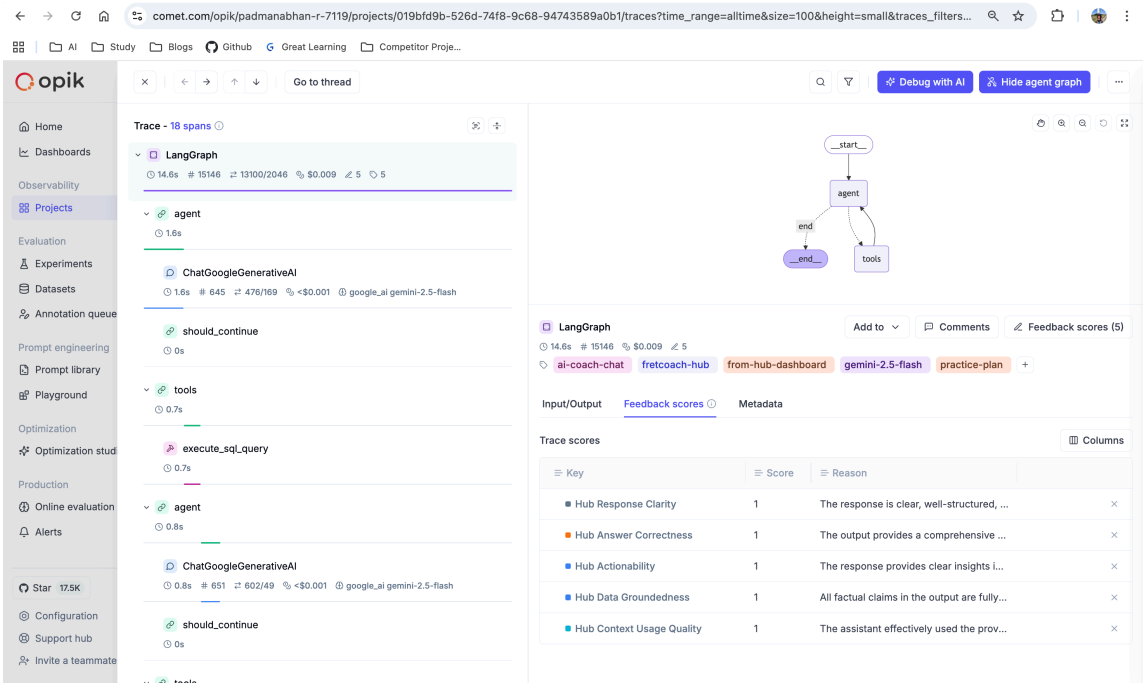
Features Implemented

1. Traces with Metadata and Tags

All LLM calls are logged as traces in Opik with structured tags for filtering and organization.

Hub Coach Chats:

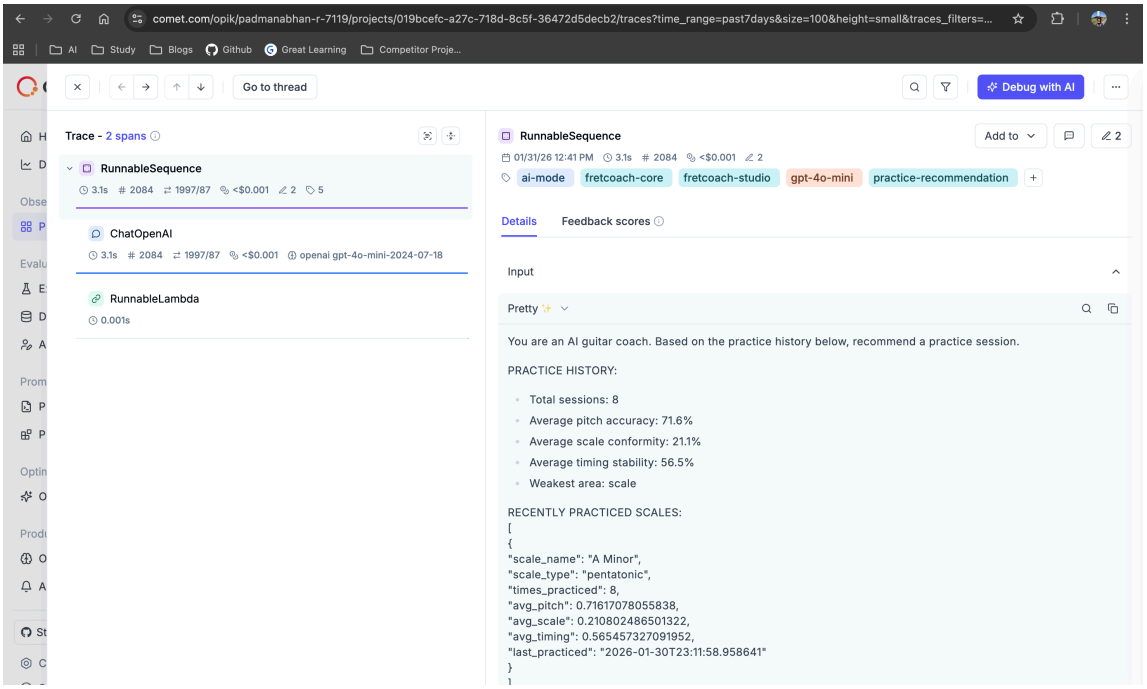
- Tags: `ai-coach-chat`, `fretcoach-hub`, `from-hub-dashboard`, `gemini-2.5-flash`, `practice-plan`
- Tracks AI coach conversations in the web dashboard



Hub coach chat traces with proper tags in Opik dashboard

AI Mode (Practice Recommendations):

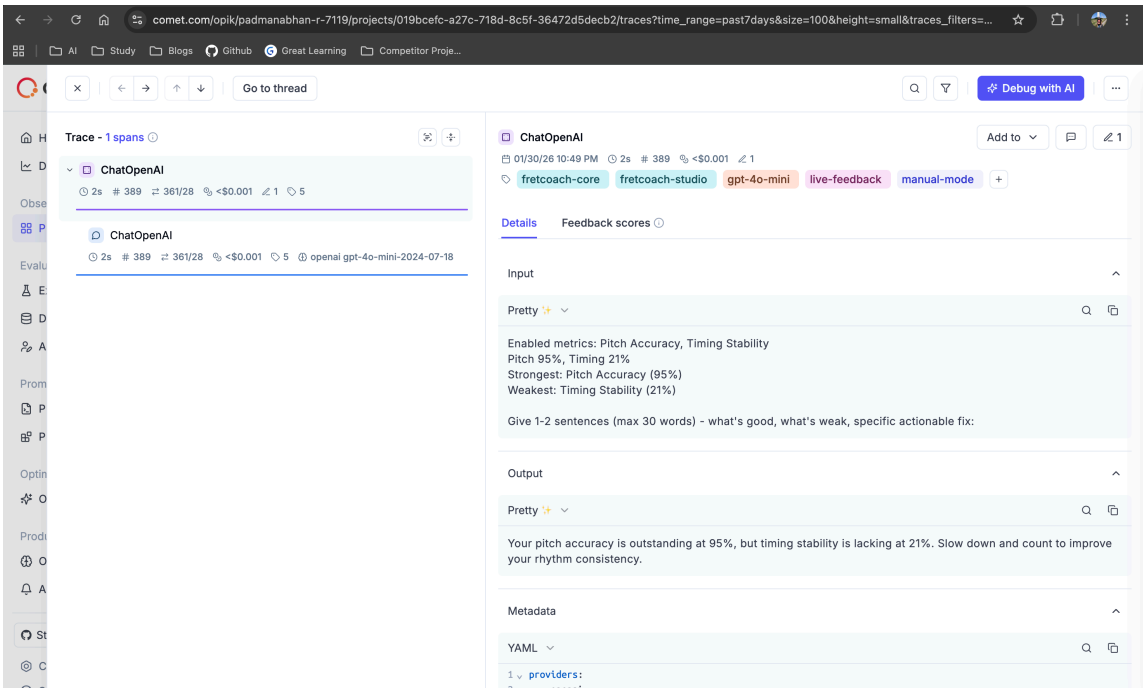
- Tags: `fretcoach-core`, `gpt-4o-mini`, `ai-mode`, `fretcoach-studio`, `practice-recommendation`
- Tracks personalized practice recommendations



AI mode practice recommendation traces

Live AI Feedback in Session:

- Tags: `fretcoach-core` , `gpt-4o-mini` , `ai-mode` , `fretcoach-studio` , `live-feedback`
- Tracks real-time coaching feedback during practice



Live AI feedback traces during practice sessions

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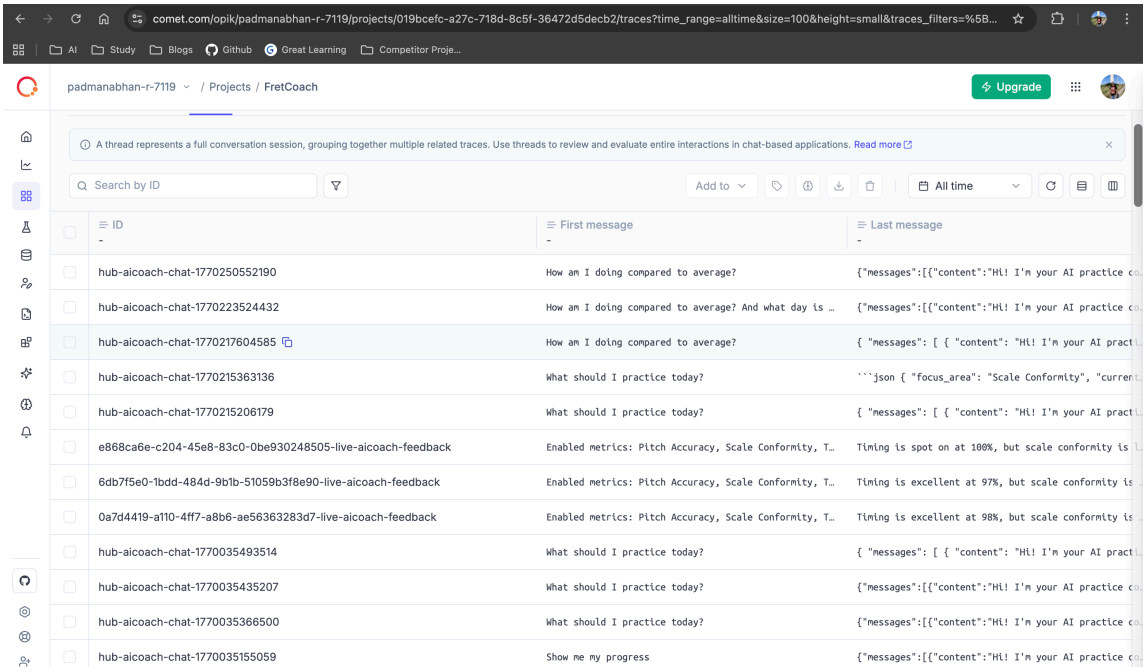
2. Thread Management

Structured `thread_id` to group related LLM calls and maintain conversation context.

Thread Naming Conventions:

- **Hub Coach:** `hub-{user_id}` - Groups all coach chat messages for a user
- **AI Mode:** `{deployment}-ai-mode-{practice_id}` - Maintains thread across recommendations
- **Live Feedback:** `{session_id}-live-aicoach-feedback` - Groups feedback within a practice session



Thread IDs grouping related traces in Opik

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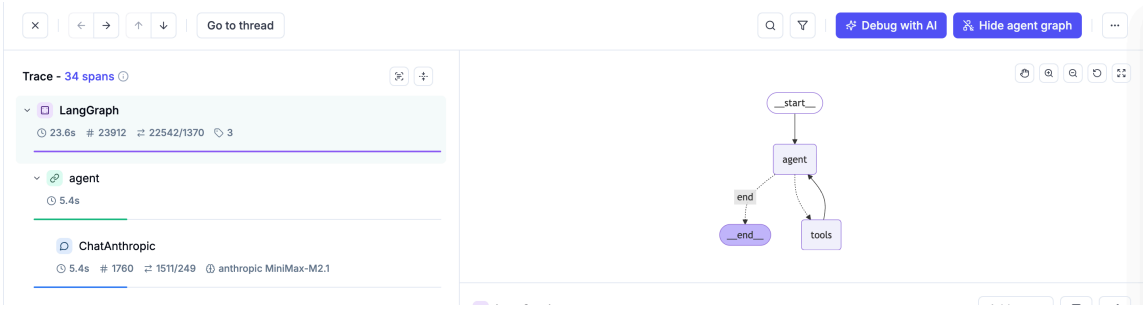
3. Agent Graph Visualization

LangGraph execution flows visualized in Opik using `workflow.get_graph(xray=True)`.

Shows complete agent reasoning path: agent → tool calls (`execute_sql_query` , `get_database_schema`) → decision nodes → response.



LangGraph agent execution flow in Opik

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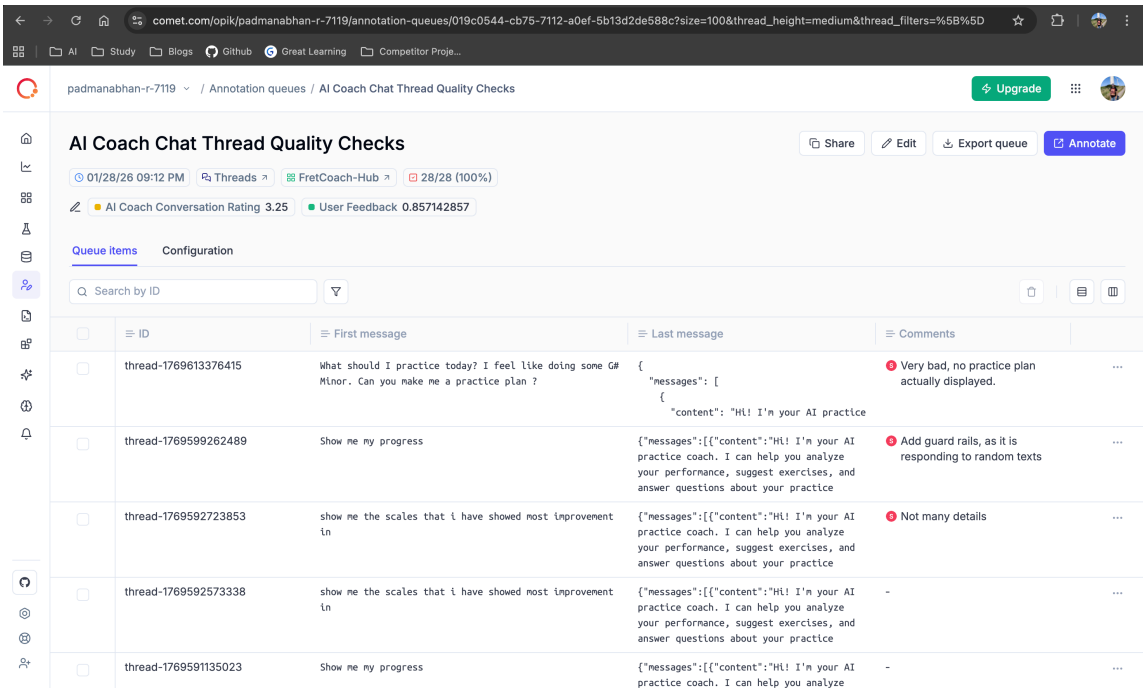
4. Annotation Queues

Used annotation queues for human-in-the-loop evaluation of agent outputs.

Implementation:

- Custom feedback definitions for LLM output quality
- Manual review and rating using custom criteria
- Structured feedback collection for agent improvements



Annotation queue with reviewed LLM outputs

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5. Datasets and Prompts

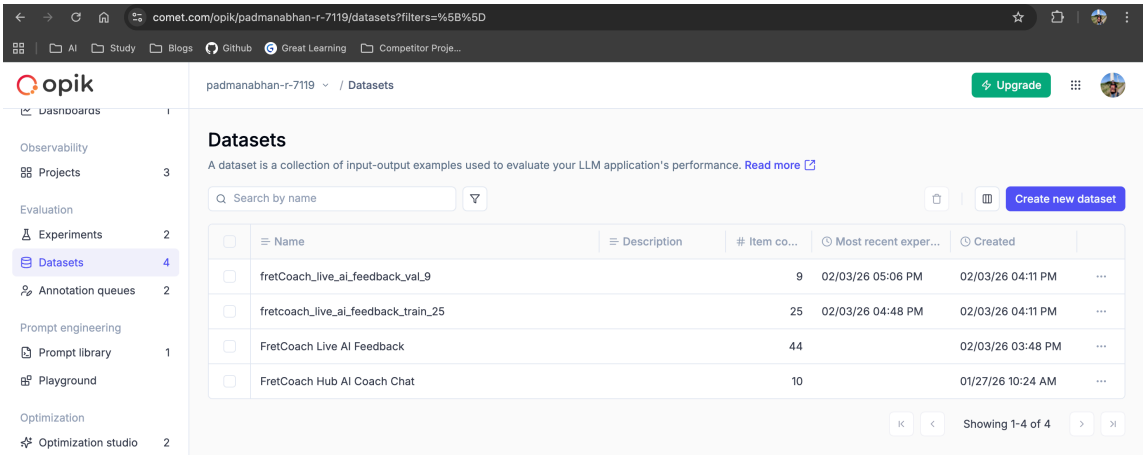
Created datasets and prompts for reproducible experiments and evaluations.

Datasets:

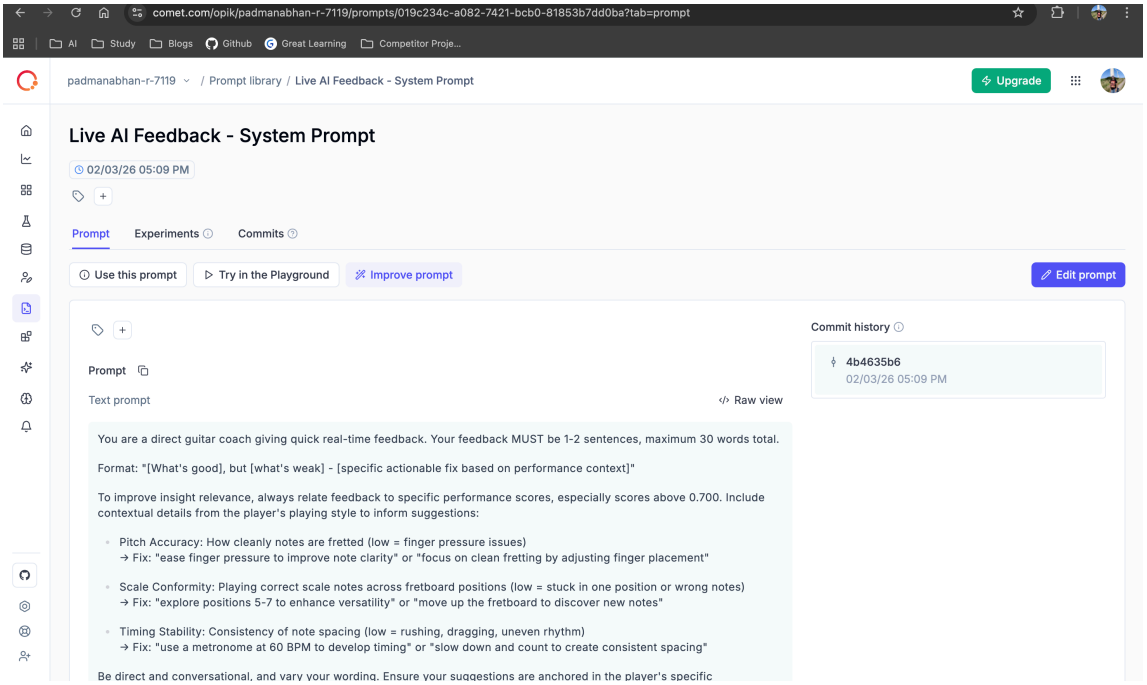
- Curated test cases from real user sessions
- Used across experiment runs for consistent testing

Prompts:

- Version-controlled coaching prompt templates
- Used in playground for rapid iteration



Datasets created for experiment runs



Saved prompts

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6. Experiments and Custom Metrics

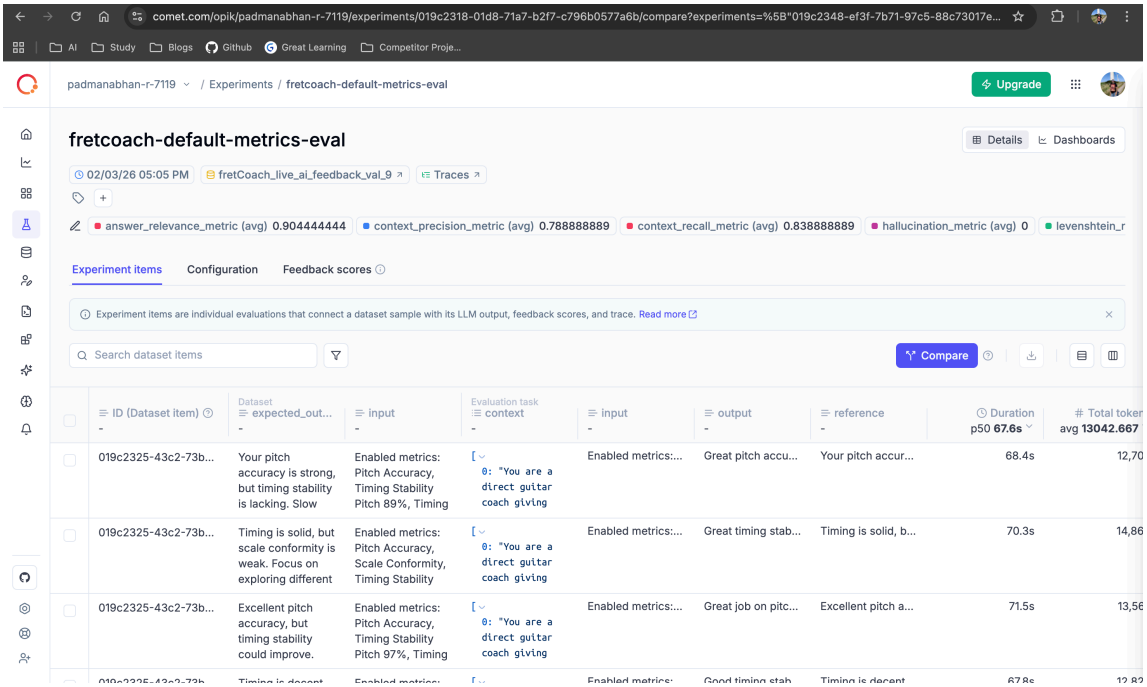
Evaluated LLM performance using both default Opik metrics and custom-created metrics.

Default Metrics:

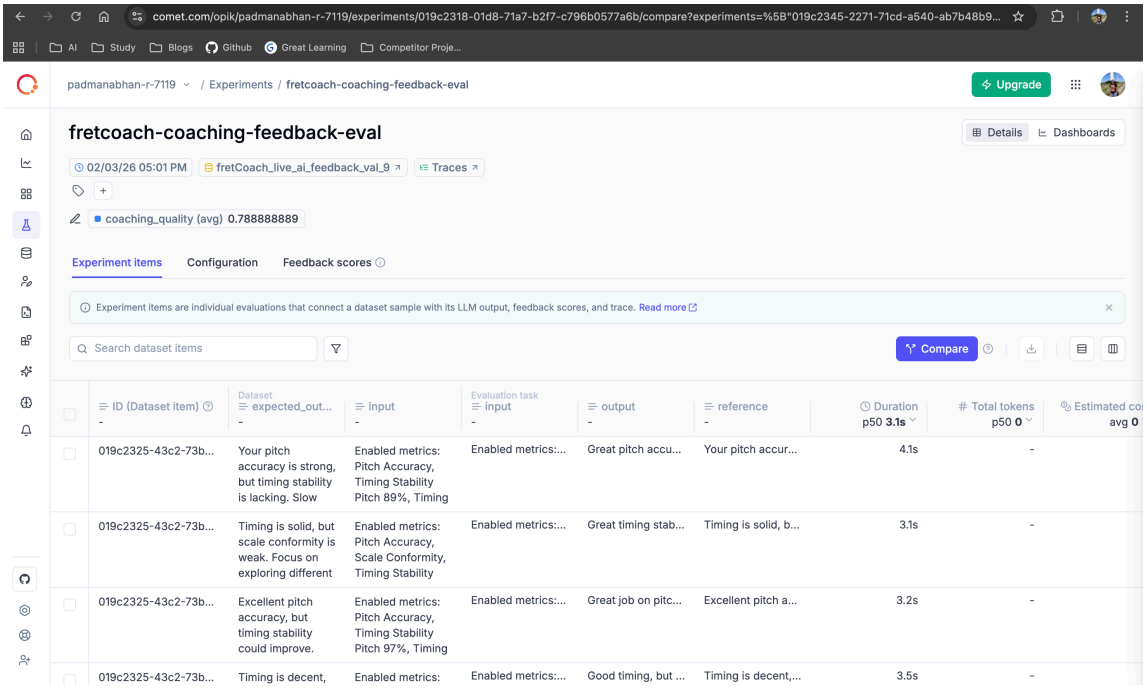
- Opik's built-in evaluation metrics for response quality

Custom Metrics:

- Domain-specific metrics tailored to guitar coaching context
- Measures coaching quality and relevance



Experiments with default Opik metrics



Experiments with custom metric

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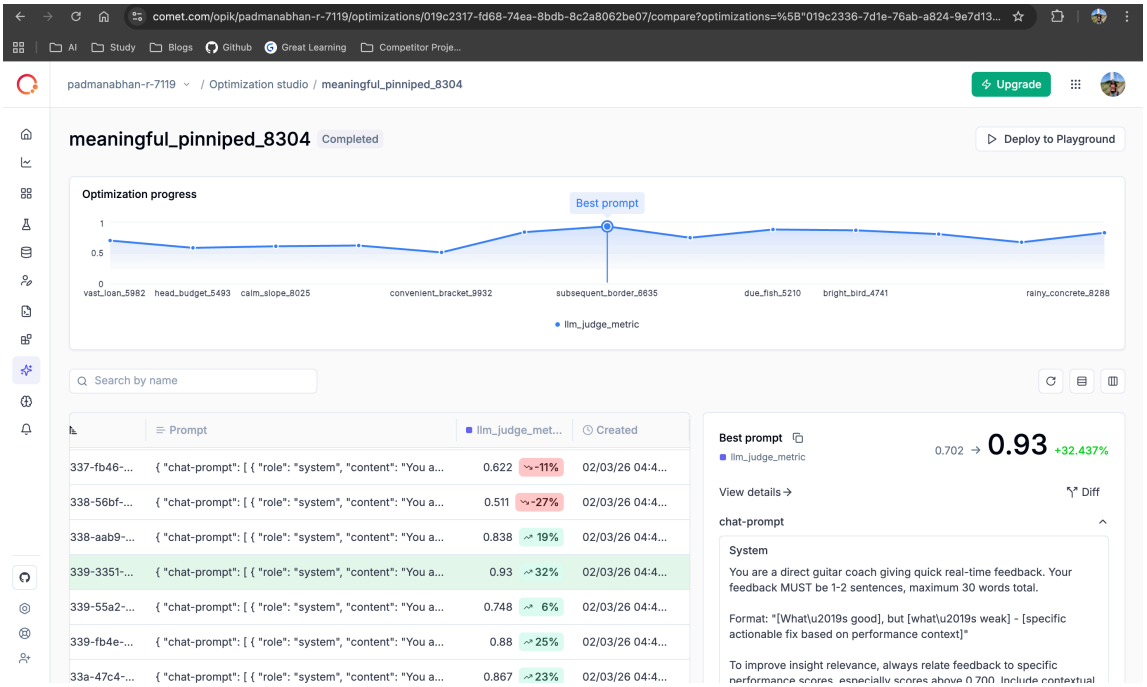
7. Optimization Studio

Used Optimization Studio with HRPO (Hierarchical Reflective Prompt Optimizer) to improve the prompt used in the live feedback module.

Results:

- **32% increase** in `llm_judge_metric` custom metric
- Improved coaching feedback quality
- Optimized for better real-time guidance



Optimization Studio results for live feedback prompt

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8. OpikAssist for Token Usage Optimization

Used OpikAssist to analyze traces and optimize token usage for hub coach chats.

Problem Identified:

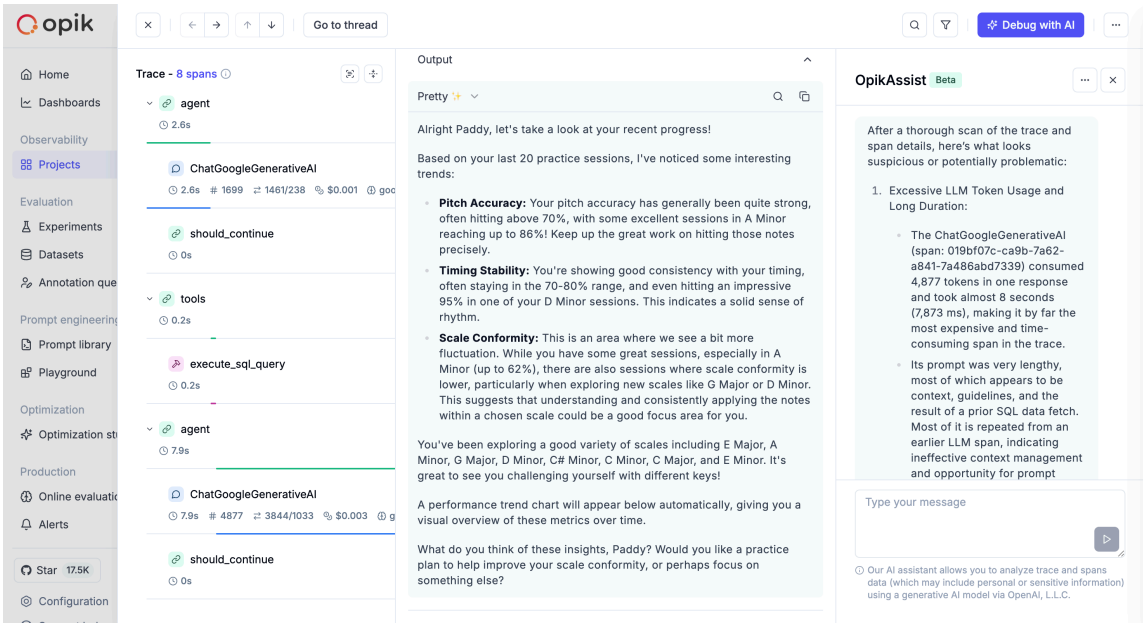
- Excessive token usage (4,877 tokens) and long duration (7,873 ms)
- Lengthy prompts with redundant context and full SQL data

Actions Taken:

- Refined system and user prompts based on OpikAssist suggestions
- Streamlined SQL result formatting to essential data only
- Removed redundant context and consolidated guidelines

Results:

- Significant token usage reduction
- Improved response latency
- Better cost-performance ratio



OpikAssist analyzing trace for token usage optimization

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9. Project-Specific Configurations

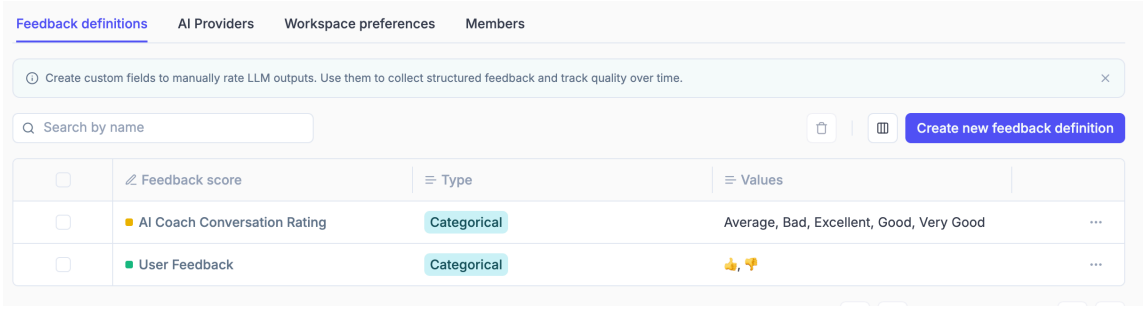
Configured custom feedback definitions and AI providers for comprehensive evaluation.

Feedback Definitions:

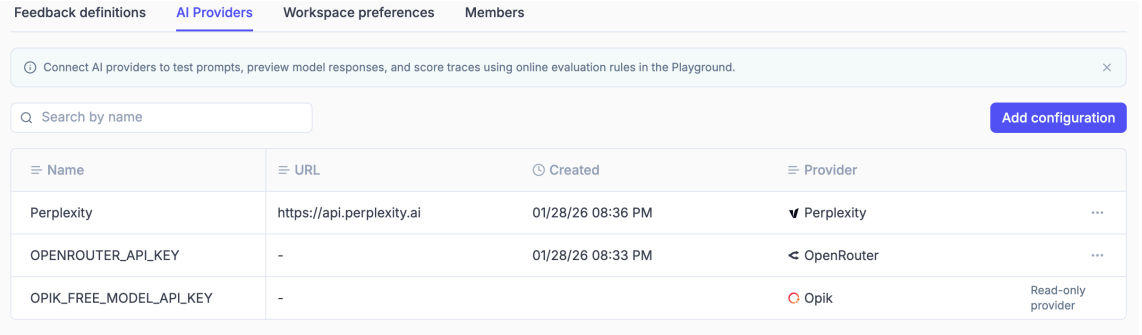
- Custom fields for manual LLM output rating
- Human-in-the-loop feedback on traces
- Categorical ratings: "AI Coach Conversation Rating" and "User Feedback"

AI Providers:

- Perplexity's Sonar Pro for automated evaluations
- OpenRouter models for diverse evaluation perspectives
- Enhanced evaluation capabilities beyond default Opik models



Custom feedback definitions for manual trace ratings



Custom AI providers configured for automated evaluations

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10. Online Evaluation

Configured **11 online evaluation rules** to automatically score production traces using LLM-as-a-Judge metrics.

Purpose:

- Real-time quality monitoring of AI responses in production
- Automatic evaluation without manual review
- Early detection of performance degradation or quality issues

Rules Overview:

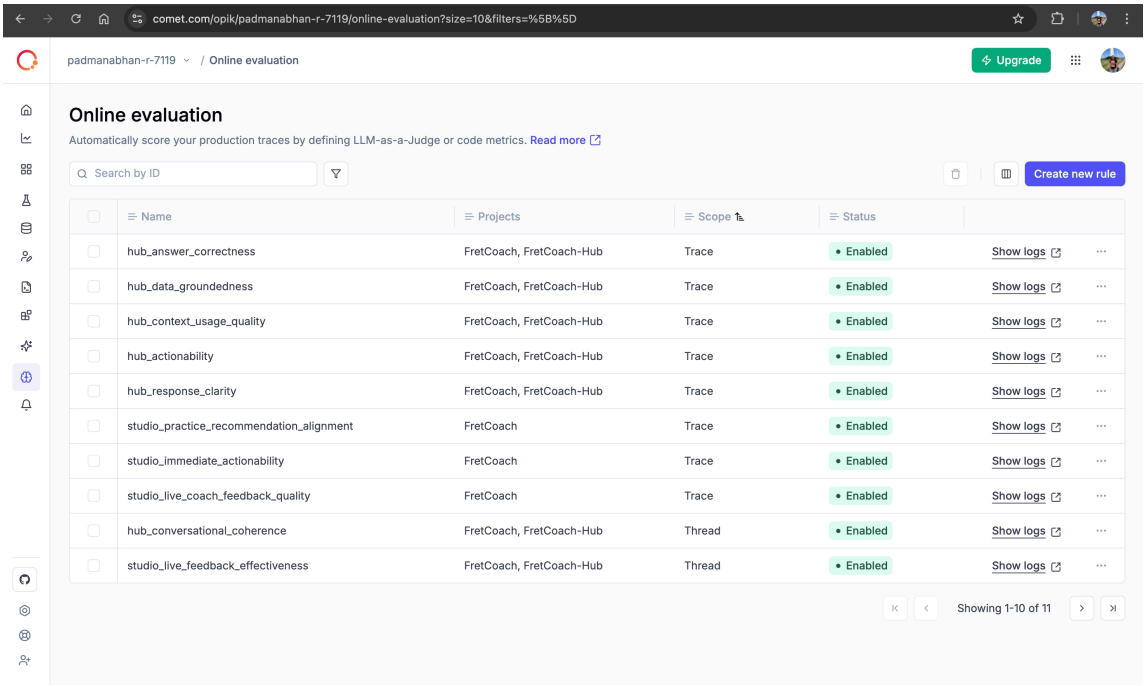
Hub Coach (7 rules):

1. `hub_answer_correctness` - Validates factual accuracy
2. `hub_data_groundedness` - Ensures grounding in database context
3. `hub_context_usage_quality` - Checks effective use of retrieved data
4. `hub_actionability` - Measures actionable guidance
5. `hub_response_clarity` - Evaluates readability
6. `hub_conversational_coherence` - Tracks conversation flow (thread-level)
7. `hub_user_frustration_score` - Detects user frustration (thread-level)

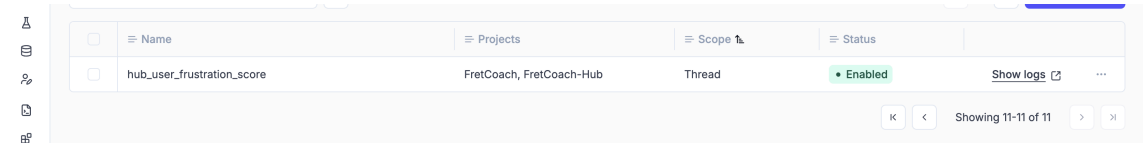
Studio AI Mode (4 rules):

8. `studio_practice_recommendation_alignment` - Validates goal alignment
9. `studio_immediate_actionability` - Ensures executable recommendations
10. `studio_live_coach_feedback_quality` - Measures real-time coaching quality
11. `studio_live_feedback_effectiveness` - Tracks session improvement (thread-level)

📖 **View complete rule prompts and variable mappings →**



Online evaluation rules dashboard (1-10 of 11)



Online evaluation rules dashboard (11 of 11)

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11. Production Dashboard

A real-time dashboard monitoring key AI quality metrics across FretCoach's Studio and Hub applications.

📊 **View Live Dashboard**

Dashboard Structure:

The dashboard displays 7 core metrics organized by application:

🎸 FretCoach - Studio and Portable (Core Functionality)

Evaluates practice recommendations and real-time coaching effectiveness.

Metric	Range	What the Score Means
🎧 **Live Coach Feedback Quality**	**1 – 4**	`1` = Bad, `2` = Good, `3` = Very Good, `4` = Excellent
📐 **Practice Recommendation Alignment**	**0.0 – 1.0**	`1.0` = Aligned with the player's weaknesses; `0.0` = No alignment

⚡ **Practice Recommendation - Immediate Actionability**	**0.0 – 1.0**	`1.0` = Recommendation fully actionable; `0.0` = Not actionable

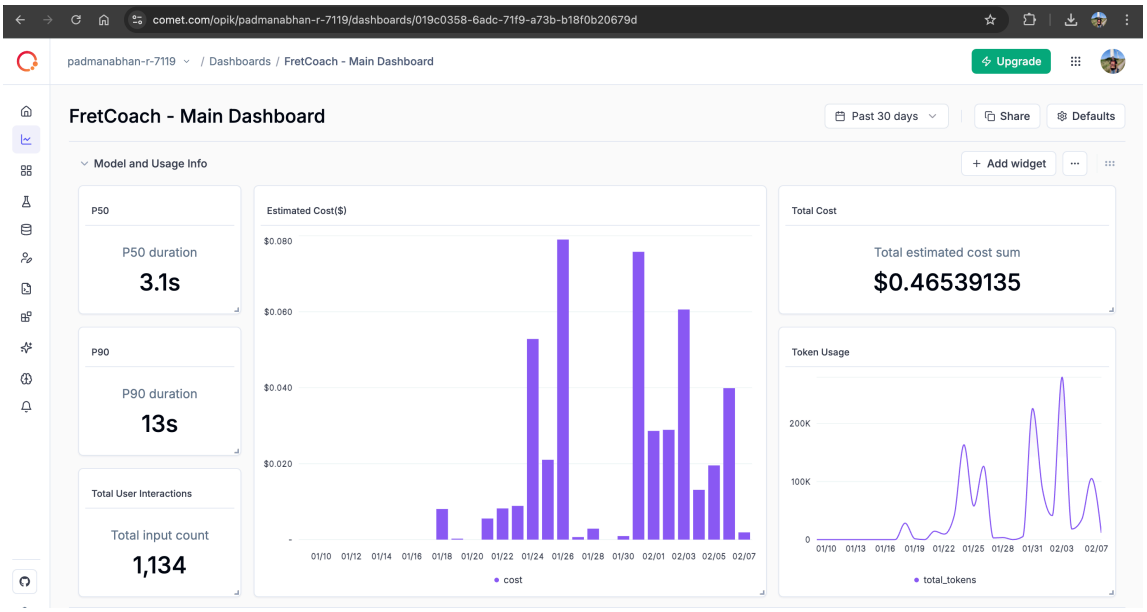
🧠 **FretCoach Hub (Web)**

Measures how well the Hub understands, answers, and guides users.

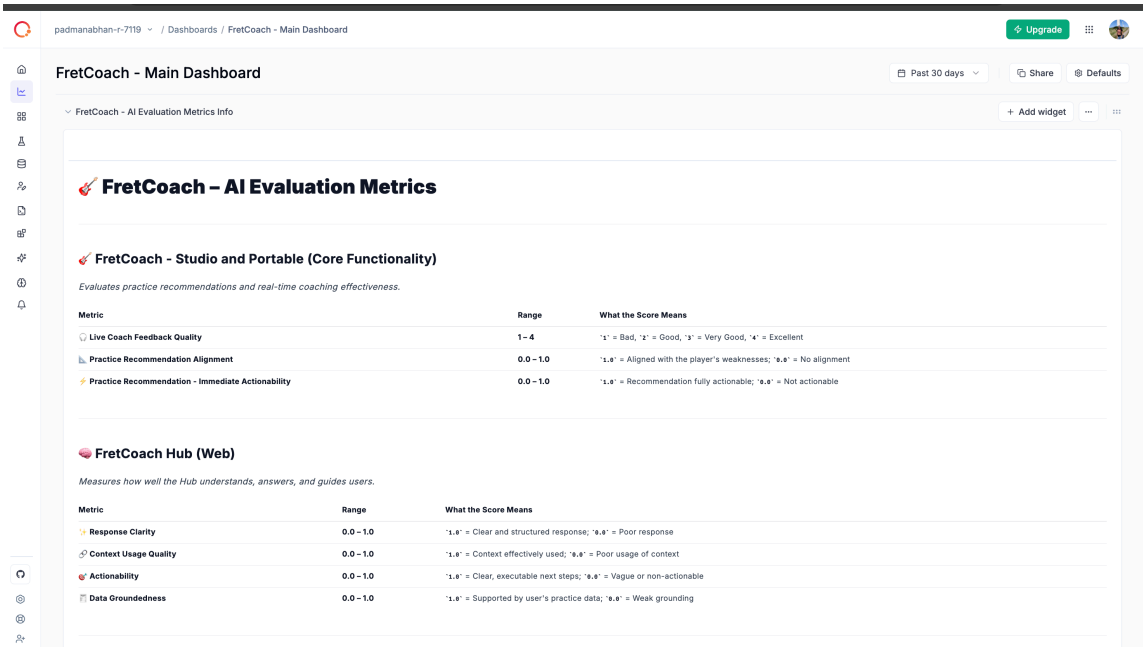
Metric	Range	What the Score Means
✨ **Response Clarity**	**0.0 – 1.0**	`1.0` = Clear and structured response; `0.0` = Poor response
🔗 **Context Usage Quality**	**0.0 – 1.0**	`1.0` = Context effectively used; `0.0` = Poor usage of context
🎯 **Actionability**	**0.0 – 1.0**	`1.0` = Clear, executable next steps; `0.0` = Vague or non-actionable
📑 **Data Groundedness**	**0.0 – 1.0**	`1.0` = Supported by user's practice data; `0.0` = Weak grounding

Features:

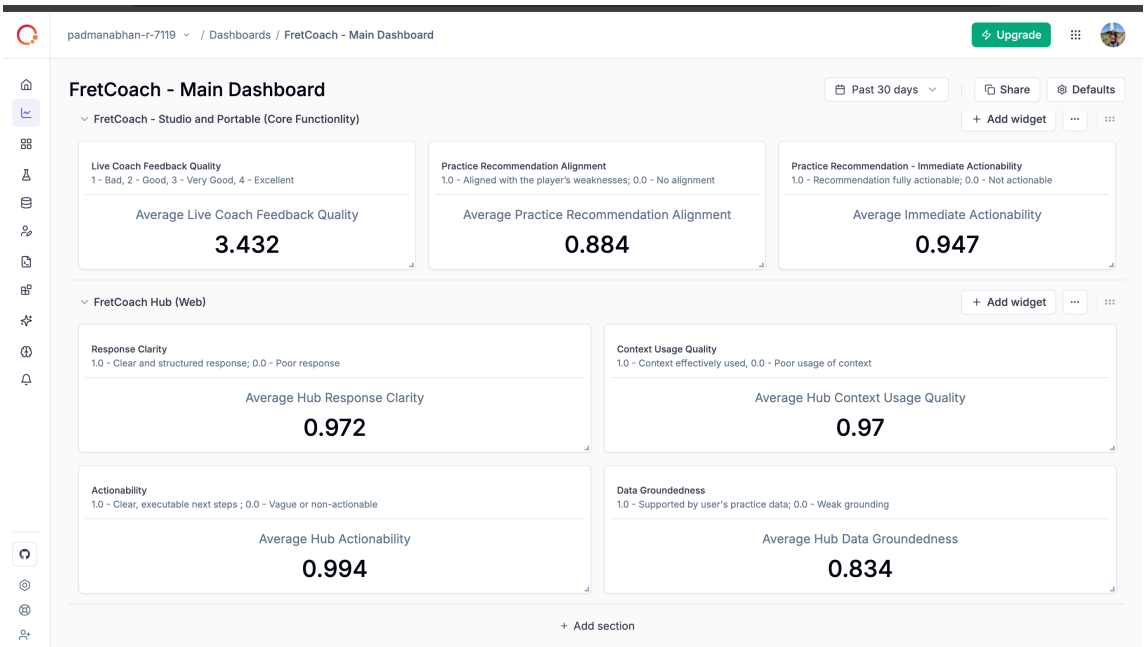
- Real-time metric averages calculated from production traces
- Automatic updates as new LLM calls are evaluated
- Clear visibility into AI quality across different use cases
- Easy identification of performance degradation



Dashboard overview - Model and usage statistics



AI Evaluation Metrics documentation embedded in dashboard



Live production dashboard with real-time AI quality metrics

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12. Alerts & Notifications

Configured Slack alerts to proactively monitor AI quality and system health in production.

Setup:

- Created a dedicated Slack channel: `#opik-alerts`
- Integrated Opik with Slack using webhook configuration

- Configured alerts for critical metrics and system errors

Alert Types:

1. Trace Errors Threshold

- **Trigger:** When trace error count exceeds 10 in the last 30 minutes
- **Purpose:** Detect system failures or integration issues

2. Feedback Score Thresholds

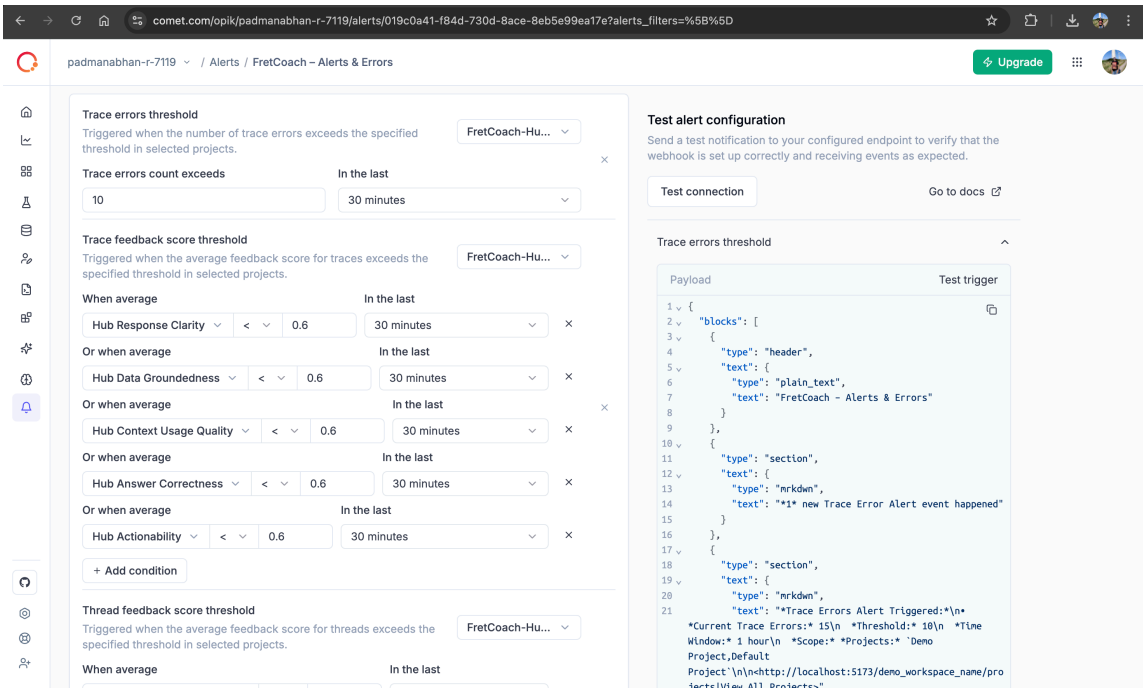
- **Trigger:** When average metric scores fall below 0.6 in the last 30 minutes
- **Monitored Metrics:**
  - Hub Response Clarity < 0.6
  - Hub Data Groundedness < 0.6
  - Hub Context Usage Quality < 0.6
  - Hub Answer Correctness < 0.6
  - Hub Actionability < 0.6
- **Purpose:** Early detection of AI quality degradation

3. Latency Alerts

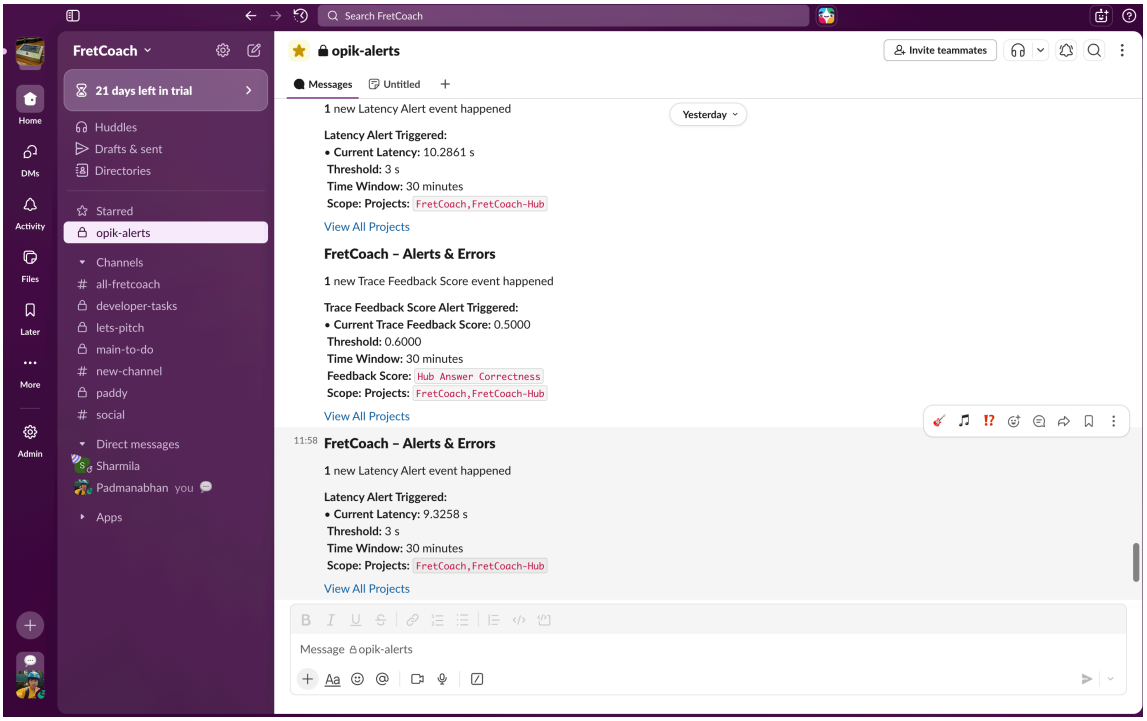
- **Trigger:** When average latency exceeds 3 seconds in the last 30 minutes
- **Purpose:** Monitor response time performance and identify slowdowns

Benefits:

- Proactive issue detection before users report problems
- Real-time visibility into production AI quality
- Team-wide awareness through Slack notifications
- Quick response to quality degradation or system errors



Alert configuration in Opik dashboard



Real-time alerts delivered to Slack #opik-alerts channel