

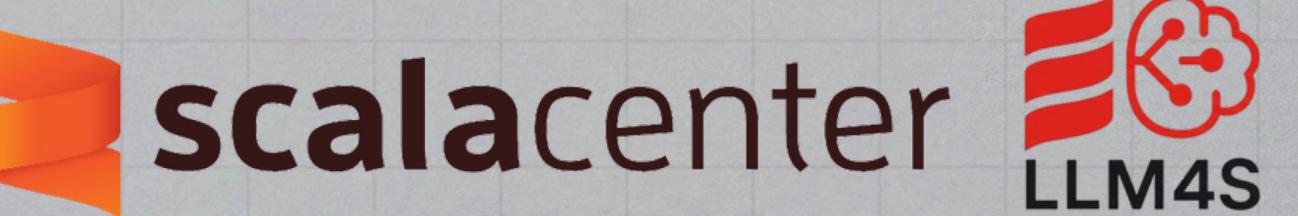


Google Summer of Code

GSOC 2025

LIGHTNING TALK

presented by Shubham Vishwakarma



Who Am I?

- Hi, I'm ***Shubham Vishwakarma*** from Mumbai, India
Final-year CSE student at SPIT with a Management minor at SPJIMR
- Currently an Open Source Contributor with ***Scala Center*** (GSoC 2025)
- My journey with Scala began not in a classroom, but through ***Daniel Ciocirlan's Rock the JVM courses***, which made me fall in love with the language.
- That curiosity led me to the ***Scala community***
Welcoming, supportive, and always pushing me to grow.



Shubham Vishwakarma

India 

Discovering *GSOC* & Scala Center

- I came across ***GSOC*** with ***Scala Center*** and found the LLM4S project ; the perfect blend of Scala and AI.
- Reaching out and connecting with my mentors ***Kannupriya Kalra*** and ***Rory Graves*** made the journey real & their guidance shaped my direction.
- The challenge was clear: LLM apps are hard to ***debug***, ***observe***, and scale ***reliably***.
- Our mission set: make Scala a first-class citizen in AI tooling, rooted in ***type-safety*** and ***functional programming principles***.



Rory Graves



Kannupriya Kalra

From First Trace to Full Demo: My Contributions

- **Tracing Support (PR #77, #119):**
 - Added execution flow tracking, spans, and timing.
 - Integrated Langfuse for developer-friendly traces.
- **Type-Safe Tracing (PR #165):**
 - Rebuilt with sealed traits & composable backends.
 - Ensured reliability and backward compatibility.
- **Demo & Multi-Backend (PR #184):**
 - Built a calculator agent for sequential tool-use.
 - Showcased tracing with Console, Lang fuse, and NoOp.



Why It Matters : The Impact

- **Visibility Unlocked** : Developers can now trace every LLM call
- **Type-Safe Reliability** : Sealed traits & composable backends remove fragile logging
- **Real-World Proof** : Demo agent + multi-backend tracing shows it works in practice .
- **Future-Ready** : Establishes the base for memory, multi-agent orchestration, and Scala-first AI systems.

```
=====
LLM COMPLETION
=====
Timestamp: 2025-06-19T06:44:44.454993600Z

Model: openai/gpt-4o-mini
Completion ID: gen-1750315479-FQF7Gsq9uL5iA7bAIj7x
Created: 1750315479

--- Response ---
Content: Arrr, trainin' a parrot be a fine adventure, matey! Here be some tips to help ye on yer quest:

1. **Start with Simple Words**: Begin with easy words or phrases, like "Ahoy!" or "Polly wants a cracker!" Repeat 'em oft

2. **Use Positive Reinforcement**: Reward yer feathered friend with treats or ...

--- Token Usage ---
Prompt Tokens: 64
Completion Tokens: 294
Total Tokens: 358
Estimated Cost: $0.009460 USD (approx.)
```

Image : Print Trace Example

LLM4S Tracing Architecture – High-Level Detailed View

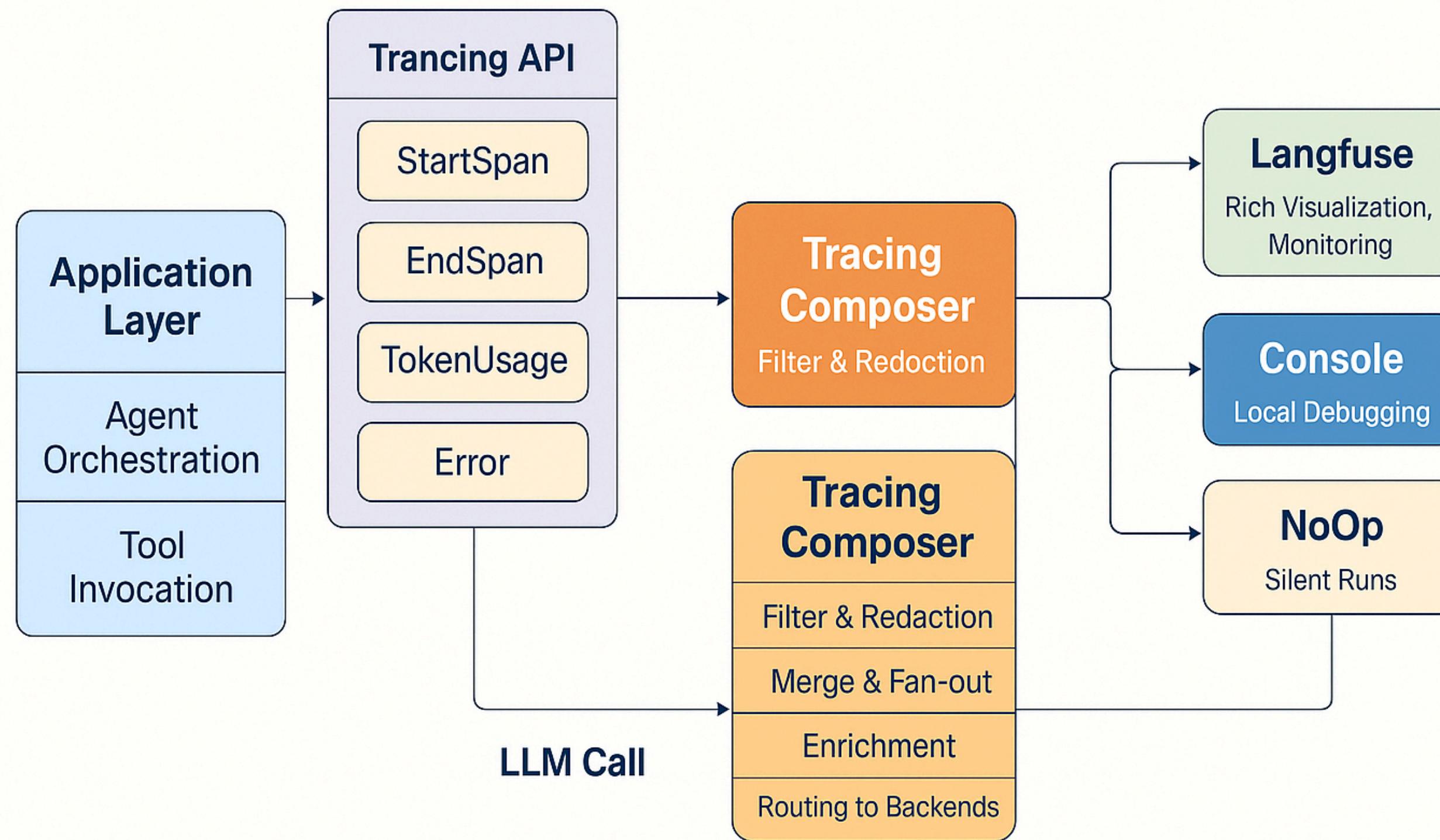


Image : LLM4S Tracing Architecture

Langfuse v3.96.2

scala-test Hobby / my-llm-test

Trace d1fbe86e-0353-446c-ba9b-72d31e713003

Tracing

Traces Observations

Search... IDs / Names Past 1 month

	Timestamp ▼	Name	Input
☐	2025-08-09 00:32:17	LLM4S Agent Run	How
☐	2025-08-09 00:30:45	LLM4S Agent Run	Please
☐	2025-08-09 00:26:31	LLM4S Agent Run	Please
☐	2025-08-09 00:23:24	LLM4S Agent Run	Please
☐	2025-08-09 00:18:38	LLM4S Agent Run	system
☐	2025-08-09 00:15:12	UserMessage 3	{"cont
☐	2025-08-09 00:15:12	AssistantMessage 4	{"cont
☐	2025-08-09 00:15:12	AssistantMessage 2	{"cont
☐	2025-08-09 00:15:12	UserMessage 1	{"cont
☐	2025-08-09 00:15:12	SystemMessage 0	{"cont
☐	2025-08-09 00:11:21	LLM4S Agent Run	Please
☐	2025-08-09 00:05:00	LLM4S Agent Run	Please
☐	2025-08-09 00:05:00	LLM4S Agent Run	{"statu
☐	2025-08-08 23:50:15	System Message	You a

Search (ty) Timeline

LLM4S Agent Run

0.00s

- System Message 0
- User Input 1
- User Input 3
- LLM Generation 4
- LLM Generation 2

Env: default

Preview

Formatted JSON

So hoist the sails and get ready to train yer parrot with love and patience! Arrr!"

"assistant"

Output

Path	Value
content	<p>"Ahoy, matey! Trainin' a parrot be a fine adventure! Here be some tips fer ya:</p> <ol style="list-style-type: none"> **Be Consistent**: Use the same words and phrases every time ye interact with yer feathered friend. Consistency be key! **Positive Reinforcement**: Reward the parrot with treats, praise, or affection when it does somethin' ye want it to do. This'll encourage good behavior! **Short Sessions**: Keep yer trainin' sessions short and sweet. Parrots have short attention spans, so 5 to 10 minutes be ideal! **Patience, Aye**: Remember, training a parrot takes time. Be patient and don't get frustrated if they don't catch on right away. **Use a Variety of Sounds**: Parrots love to mimic sounds. Use different tones and sounds to keep 'em engaged and interested. **Social Interaction**: Spend time with yer parrot. They

Image : Langfuse Tracing Example

Beyond Tracing: The Next Chapter for LLM4S

- **Memory & State:**

- Hybrid memory: short-term, episodic, semantic.

- Forgetting via decay, summarization, compression.

- Backed by Redis / RocksDB / vector DB.

- **Multi-Agent Systems:**

- DAG-based planner with retries & fallbacks.

- Pub-sub signals for safe agent coordination.

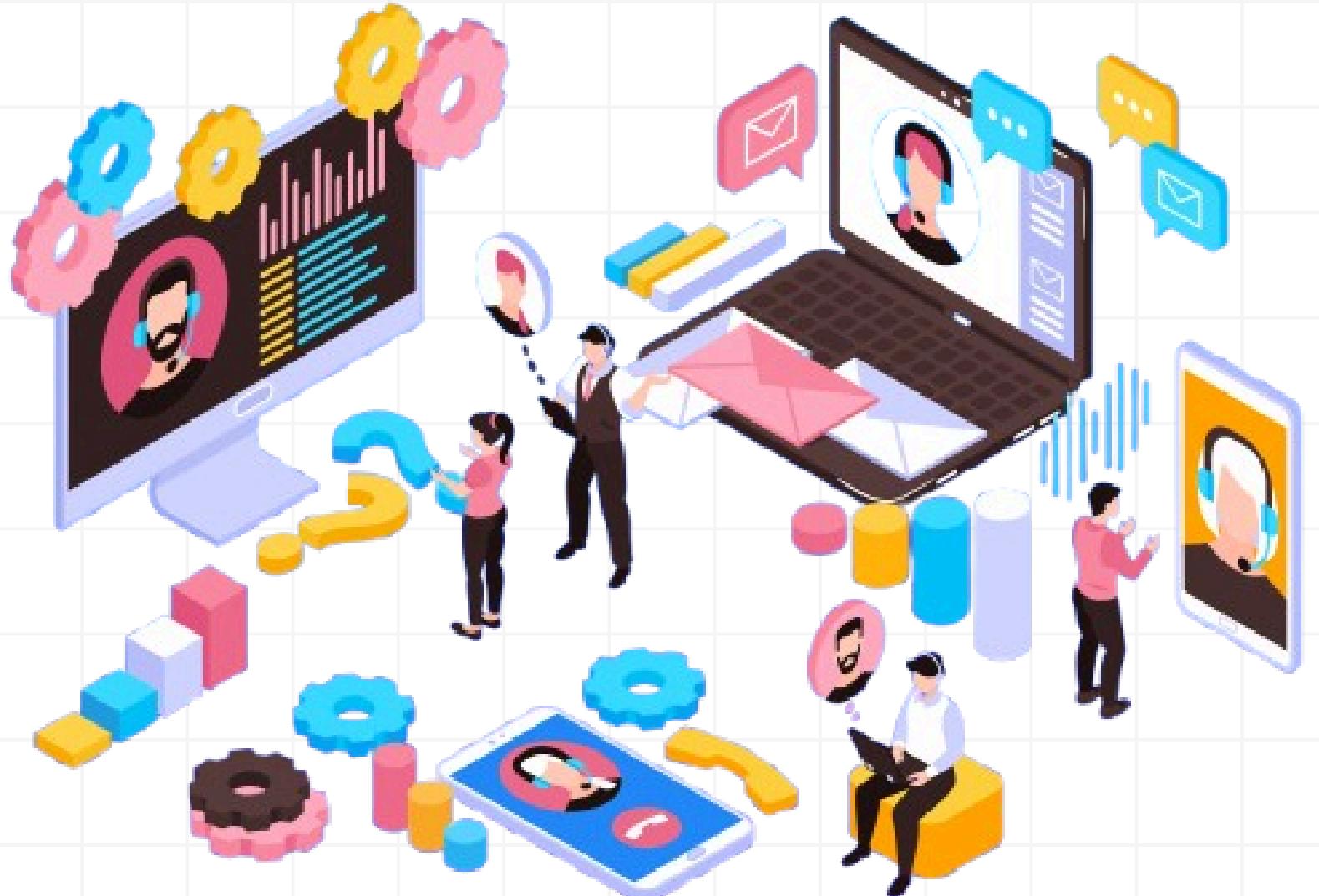
- Scala-native, type-safe orchestration.

- **Typed Prompt DSL:**

- Scala DSL for chaining LLMs, retrievers, tools.

- Cats-effect & typed streams for compositability.

- Compile-time safety, no “stringly-typed” prompts.



A Real Use Case : Meeting Minutes Generator

- Input: Zoom / Google Meet transcript (*raw text*).
- Output:
 - Concise summary of discussion
 - Action items with owners & deadlines
 - Sentiment analysis of conversation flow
- Why LLM4S?
 - Streaming summaries (real-time insights as the meeting runs)
 - Guardrails via JSON schema → `{summary: String, actions: [Action]}`
 - Full traceability → every step tracked with spans/events



THANK YOU

- From learner to contributor → grateful for this journey with Scala.
- Heartfelt thanks to my mentors Kannupriya Kalra, Rory Graves & Dmitry Mamonov, and the Scala Center.
- ❤️ To the Scala community for being supportive, curious, and inspiring.



Connect with me :)