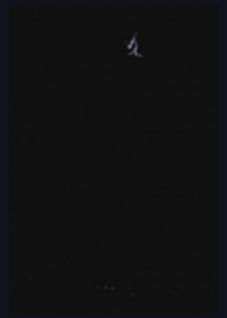
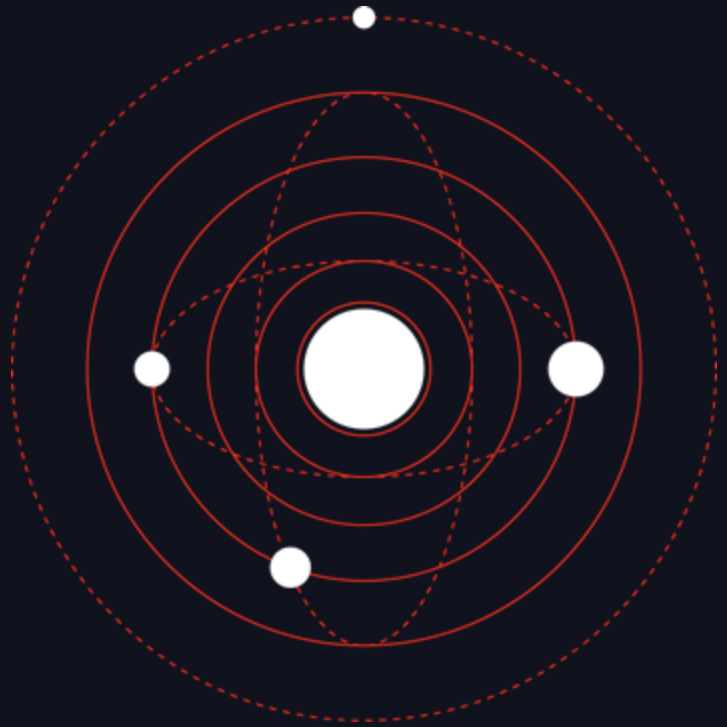
TECH SUMMIT





THREAD ZEPPELIN

An intelligent multi-threaded function-level code profiler

Project Owner: Robert Altmiller, RSA

Presenter: Kayla Grieme, Sr. Solutions Architect

Code Contributors: Alan Reese, RSA and Divyank Jain, RSA

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TODAY'S PROFILER PROBLEMS

Analyzing large code bases for optimization opportunities can be a tedious and time-consuming process

Line-by-line runtime output ➡ Difficult to interpret; Slow execution

50-60% overhead to run ➡ High costs; Inefficient

Output is **not prescriptive** with too much detail ➡ Not actionable; Slow time to value

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Introducing... *Thread Zeppelin*

Embark on a journey with *Thread Zeppelin*, where we leverage the power of Spark to unravel the "Whole Lotta Love" hidden in your codebase.

- ➔ **Function level metrics** for faster identification of problem code
- ➔ Leverages easy-to-use profiling **decorator**
- ➔ Reduced overhead with **function level profiling**
- ➔ Flexible and efficient output stored in **Delta**, with a **compressed version** of the original source code
- ➔ Prescriptive AI-assisted **optimization guidance** and **code** provided using **DBRX**

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Thread Zeppelin – Current State

Databricks on Databricks

- Profiler accessible **today** via Github for Bricksters & customers
- Battle-tested on a large ERP customer's code base which identified optimizations that led to an **83% reduction in workflow runtime.**
  - Runtime **Before** Optimizations = **3.3 hours** to complete for 5 customers.
  - Runtime **After** Optimizations = **1/2 hour** to complete for 5 customers.
- Projected benefit for 3000 onboarded customers:
  - Total Workflow **Daily** Hours Saved With Optimization = **150 hours saved**
  - Total Workflow **Monthly** Hours Saved With Optimization = **4,500 hours saved**

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Thread Zeppelin – Actionable Output

in Delta Lake

- ➔ **Thread level identifiers:** ingestion_date, thread_id, process_id, unique_app_id
- ➔ **Class/Function runtime:** class_name, function_name, execution_time, start_time, end_time
- ➔ **Resource consumption:** memory_usage, cpu_usage, recursion_limit
- ➔ **Attributes:** arguments, keyword_arguments, return_value
- ➔ **Memory-efficient object code:** source_code_compressed, source_code_md5_hash

```
code is running in databricks....
```

Table

	ingestion_date	thread_id	process_id	unique_app_id	class_name	function_name	execution_time	start_time	end_time	
10	2024-09-05 21:10:29	139905204221504	7028	xxxxxxxxxxxx	Packager	clean_bundle()	16.618201	2024-09-05 21:10:12.375579	2024-09-05 21:10:28.993780	0
11	2024-09-05 21:10:09	139907463598720	7028	xxxxxxxxxxxx	JobBundler	start_and_wait_bundle_jobs()	13.032840	2024-09-05 21:09:55.184393	2024-09-05 21:10:08.217233	1
12	2024-09-05 21:09:55	139907463598720	7028	xxxxxxxxxxxx	JobBundler	add_bundle()	12.573318	2024-09-05 21:09:41.607485	2024-09-05 21:09:54.180803	0
13	2024-09-05 21:14:21	139907463598720	7028	xxxxxxxxxxxx	Installer	load_demo_cluster()	12.079351	2024-09-05 21:14:08.445860	2024-09-05 21:14:20.525211	5
14	2024-09-05 21:17:12	139907463598720	7028	xxxxxxxxxxxx	InstallerReport	display_install_result()	7.020407	2024-09-05 21:17:04.927202	2024-09-05 21:17:11.947608	0
15	2024-09-05 21:09:50	139907463598720	7028	xxxxxxxxxxxx	JobBundler	reset_staging_repo()	6.430449	2024-09-05 21:09:42.609207	2024-09-05 21:09:49.039656	0
16	2024-09-05 21:14:01	139907463598720	7028	xxxxxxxxxxxx	Installer	get_demo_conf()	5.143853	2024-09-05 21:13:55.362172	2024-09-05 21:14:00.506025	0
17	2024-09-05 21:13:51	139907463598720	7028	xxxxxxxxxxxx	Installer	cluster_is_serverless()	5.096056	2024-09-05 21:13:45.016361	2024-09-05 21:13:50.112416	0
18	2024-09-05 21:10:02	139907463598720	7028	xxxxxxxxxxxx	JobBundler	create_or_update_bundle_jobs()	5.013854	2024-09-05 21:09:56.186044	2024-09-05 21:10:01.199898	1
19	2024-09-05 21:14:07	139907463598720	7028	xxxxxxxxxxxx	InstallerReport	display_install_info()	5.012233	2024-09-05 21:14:01.509456	2024-09-05 21:14:06.521688	0
20	2024-09-05 21:14:52	139907463598720	7028	xxxxxxxxxxxx	Installer	get_or_create_endpoint()	4.464724	2024-09-05 21:14:46.602878	2024-09-05 21:14:51.067602	0

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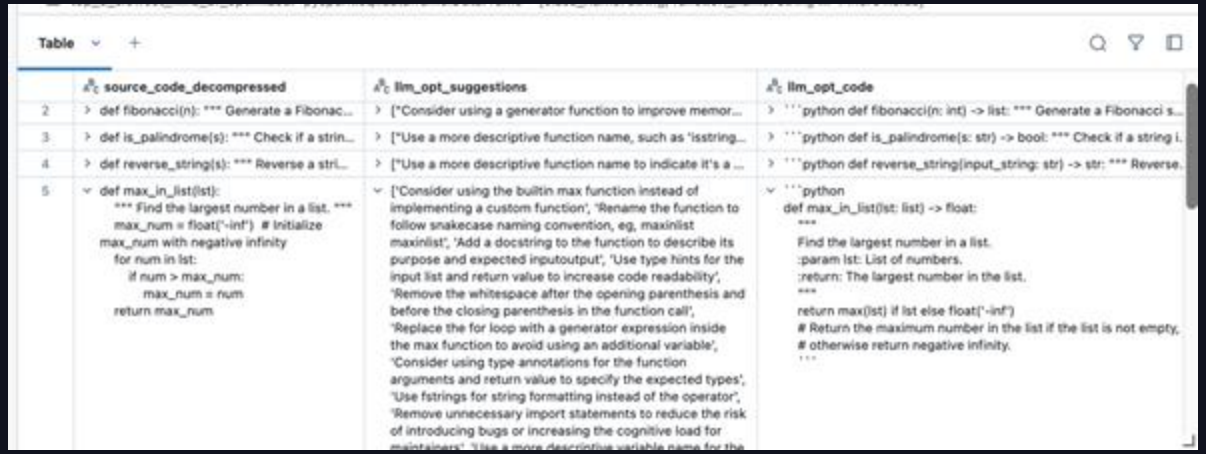
Thread Zeppelin – Prescriptive Guidance

AI-assisted features

- ➔ Function source code is integrated with our very own DBRX
- ➔ Includes additional columns:
  - Function optimization **potential indicator (high, med, low)**: string
  - LLM **suggestions** for optimization techniques: list
  - LLM **optimized function code snippet**: string



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Thread Zeppelin – Expansion Opportunities

Enable customization and make more accessible to BI users

- Integrate function source code with Model Serving Endpoint & extend metrics
  - Include additional columns such as:
    - LLM optimized function code run status
    - Estimated runtime reduction for each optimized function/class
  - Swap out with another Foundation model or custom/fine-tuned model
  - Integrate with Databricks Assistant API & System Tables
- Integrate output Delta table into an AI/BI Genie Space and Dashboard providing:
  - Quick Analysis
  - Immediate Prescriptive Action
  - Additional DBSQL $DBU Consumption
- Package into SQL function with simple input parameters

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Let’s watch THREAD ZEPPELIN in action!

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