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COSCon'25
第十届中国开源年会

众智开源 | Open Source, Open Intelligence

# Velox, 模块化计算引擎库在Meta的应用

Velox, Composable Compute Engine at Meta

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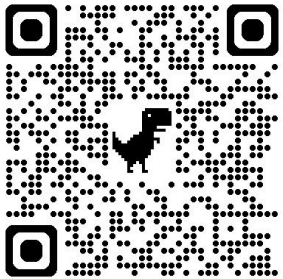

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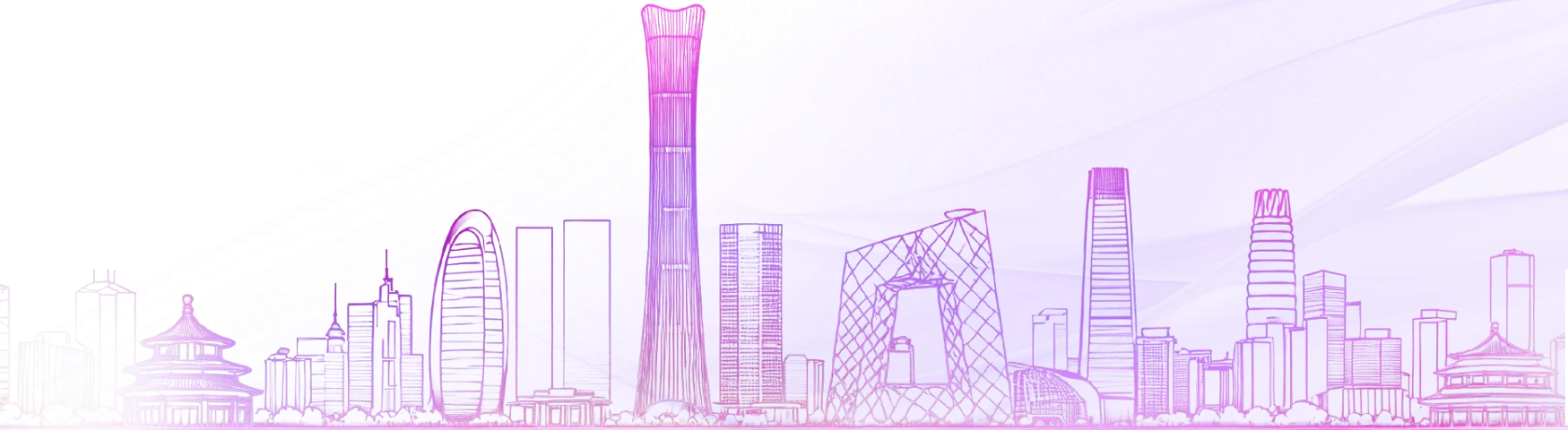
# PART 01 Motivation



# User Workload Variety

Transactional

Analytics

Realtime

Monitoring

Graph

ML

...?

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# Engine Specialization

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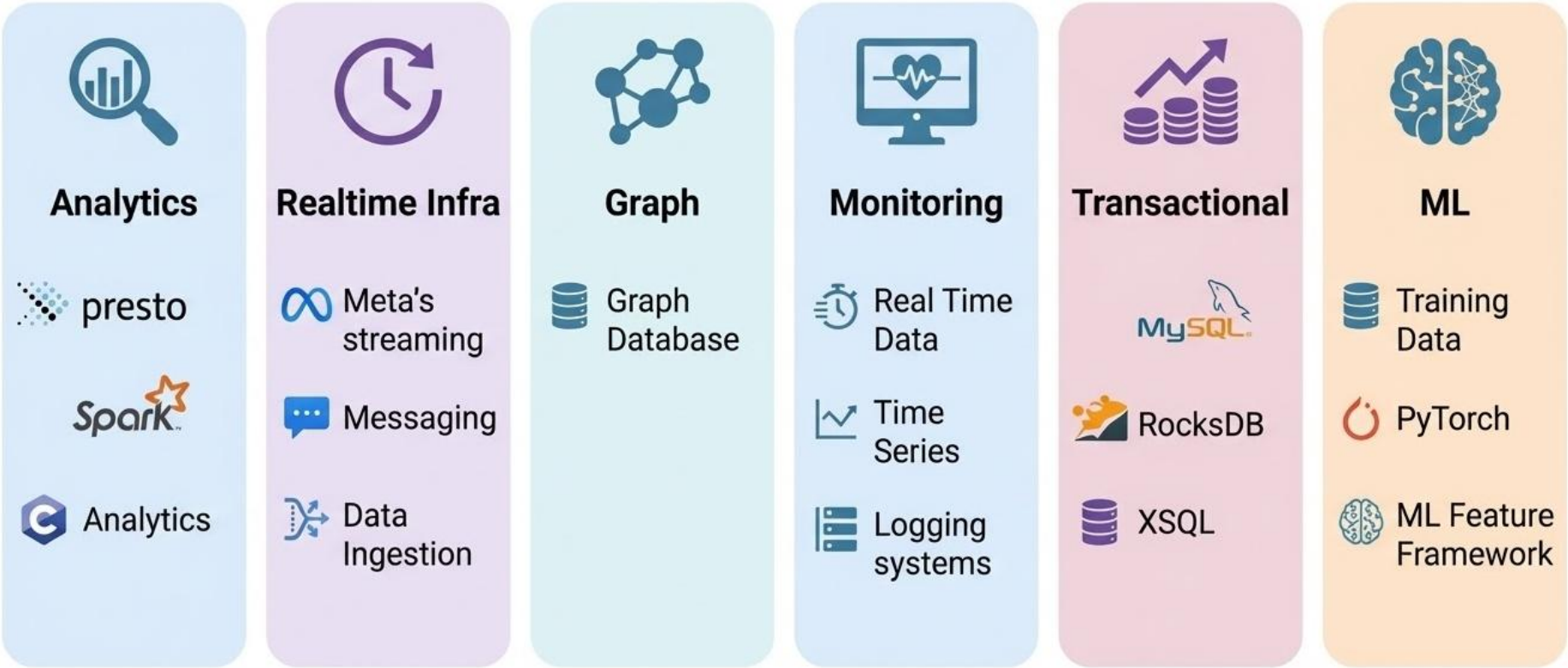
"One size does not fit all"



# Engine Specialization

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- Very limited reusability.
- Duplicates efforts and forces engineers to reinvent the wheel.
- Hard to maintain and enhance.
  - Where do we optimize?
- Exposes inconsistencies to end-users.
- Hurts our capacity to move fast and innovate.

# Through the Looking Glass

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Different, but not really...

| | Presto | Spark | DPP | XStream |
|---|---|---|---|---|
| **Language Frontend** | *Presto SQL* | *HQL / DataSet API* | *Koski DataFrame* | *UPM* |
| **IR** | *Presto IR* | *Spark IR* | *Koski IR* | *UPM IR* |
| **Optimizer** | *Presto Optimizer* | *Catalyst* | *Koski Optimizer* | *XStream Optimizer* |
| **Execution Runtime** | *Presto Runtime* | *Spark Runtime* | *DPP* | *XStream Runtime* |
| **Execution Engine** | *Presto* | *Spark* | *Koski* | *XStream Codegen* |

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All very similar!

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# PART 02 The Velox Library

# Velox Engine Library

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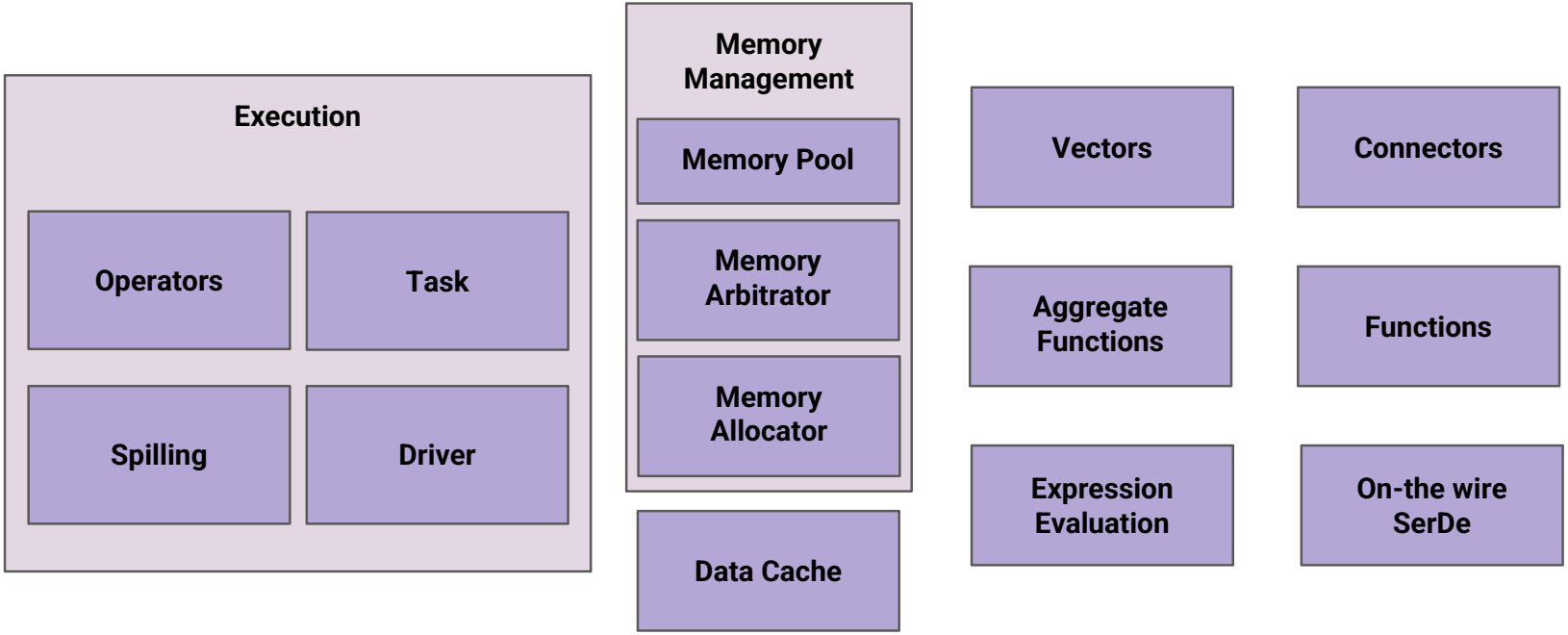

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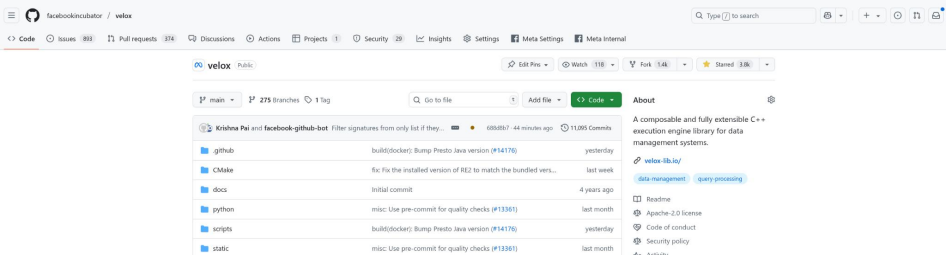
# PART 03 Open Source

# Velox - Open Source

- Publicly announced [in Oct'22](https://engineering.fb.com/2022/08/31/open-source/velox/)
  - https://engineering.fb.com/2022/08/31/open-source/velox/
- Available in github:
  - https://github.com/facebookincubator/velox
- Fast growing open source community
  - +250 developers
  - Meta, IBM, Intel, Voltron Data, Microsoft, Google, ...




# VeloxCon China 2025

- Chinese communities have made tremendous contributions to Velox.
- VeloxCon China to bring the communities closer together

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Engineering at Meta

Open Source | Platforms | Infrastructure Systems | Physical Infrastructure | Video Engineering & AR/VR

POSTED ON AUGUST 31, 2022 TO DATA INFRASTRUCTURE, OPEN SOURCE

## Introducing Velox: An open source unified execution engine

# 重要 Open Source 消息将会在 VeloxCon China 2025 公布

Important Open Source news will be announced at VeloxCon China 2025

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# PART 04 Applications of Velox

# Use Cases - Real Time Infrastructure

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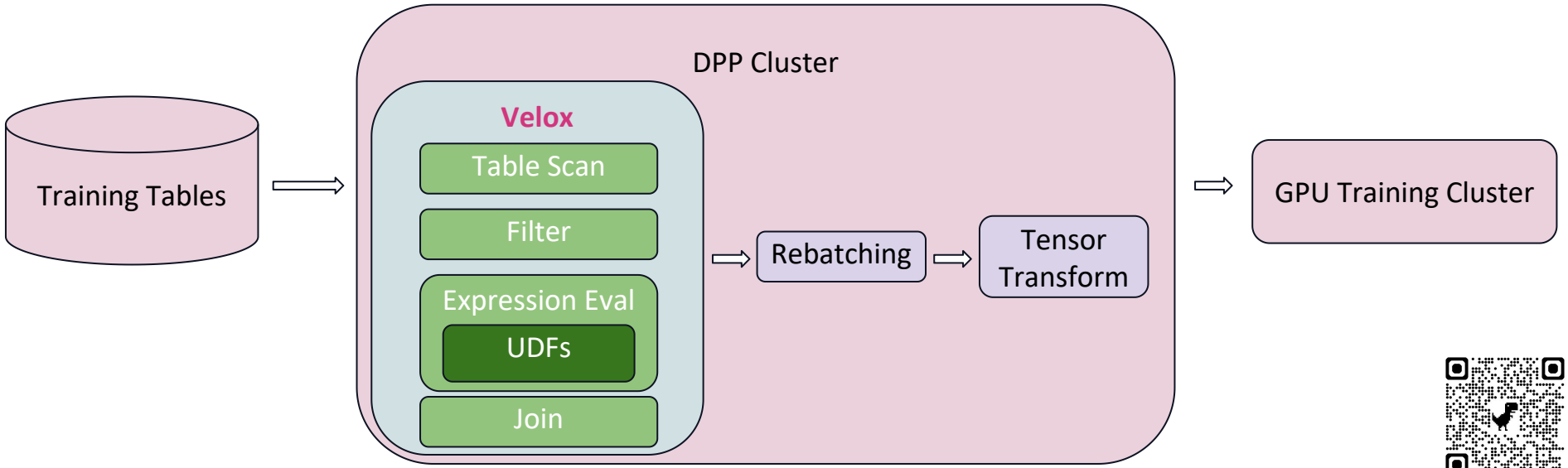
- First integrations:
  - **Meta's XStream - Streaming System**
    - Runs entirely on Velox today.
  - **Meta's ETL Ingestion System**
    - data warehouse and database ingestion.
  - **Meta's Messaging System**

# Use Cases - DPP

- DPP - Data Pre-Proc (Training data loading):
  - DPP today built on Koski
  - **Veloski** => Koski with Velox as eval.
  - Ongoing work; handful of initial models in prod using Veloski.



# Use Cases: Presto -> Prestissimo

- Prestissimo: Presto with a Velox-based worker.
  - Same JVM coordinator.
  - Worker is C++ only (Velox).
  - Supports Vector Search
- Transparent to users - same PrestoSQL semantic.
- **3-10x** efficiency gains (depending on workload).
- Almost 100% rollout to different Presto flavors (Streaming Shuffle):
- OSS: available on IBM's watsonX.data cloud.

# Use Cases - Presto-on-Spark -> Native-Presto-on-Spark

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- New architecture for Presto-on-Spark
  - Same Presto-on-Spark frontend
  - Executor of modified Spark JVM with sidecar Prestissimo worker (Velox).
  - Supports Vector Search
- Transparent to users - same PrestoSQL semantic.
- **2x** efficiency gains.
- 10% already in production.
- OSS: code available on prestodb + velox

# Use Cases - PySpark/Velox

- PySpark -> **PySpark/Velox:**
  - Architecture overview
    - Python frontend to build Velox plan;
    - Spark scheduling to coordinate work distribution;
    - Velox backend for high efficiency compute
  - Already in prod; limited query shapes.
  - Focused on AI customers.

# Use Cases - Apache Gluten

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- **Apache Gluten:** transparent to users
  - Ongoing work at Meta
  - Available at Google, Microsoft, IBM, and Alibaba clouds.

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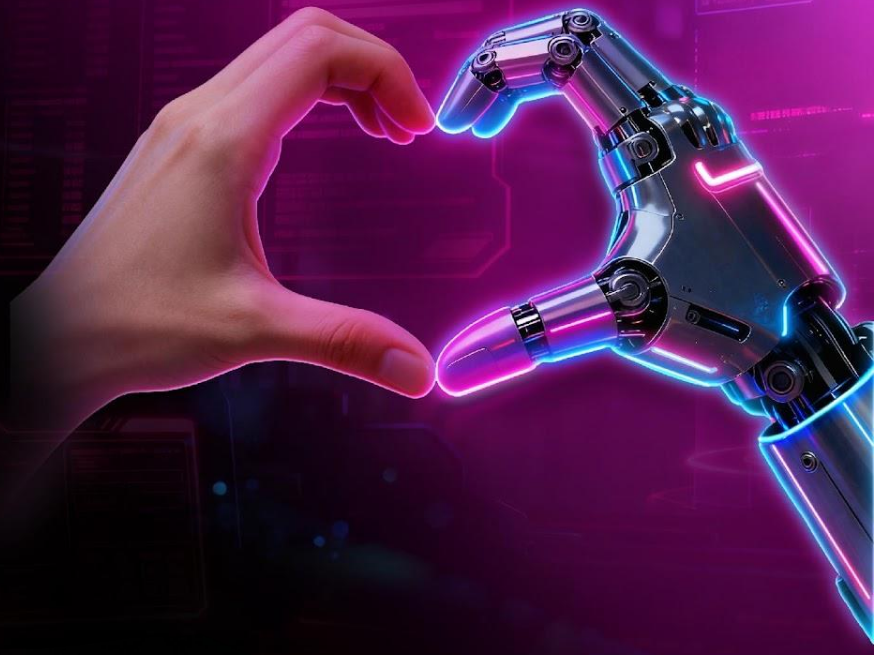
# Thanks



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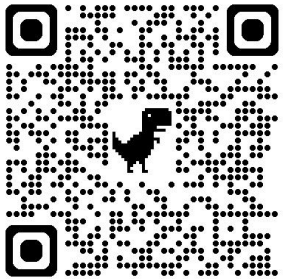

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