Center for
Geographic Analysis

Harvard University

Interacting with National Water Model (NWM) Predictions

Devika Kakkar & Aaron Williams

April 26, 2018

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Geographic Analysis

Harvard University

Speed and Interactivity: How We Visualized the National Water Model (NWM) Predictions

April 25, 2018

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slides: https://speakerdeck.com/mapd

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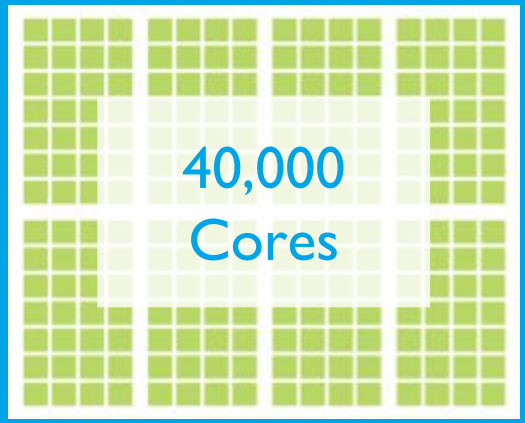
Core Density Makes a Huge Difference

CPU Processing

20 Cores

GPU Processing

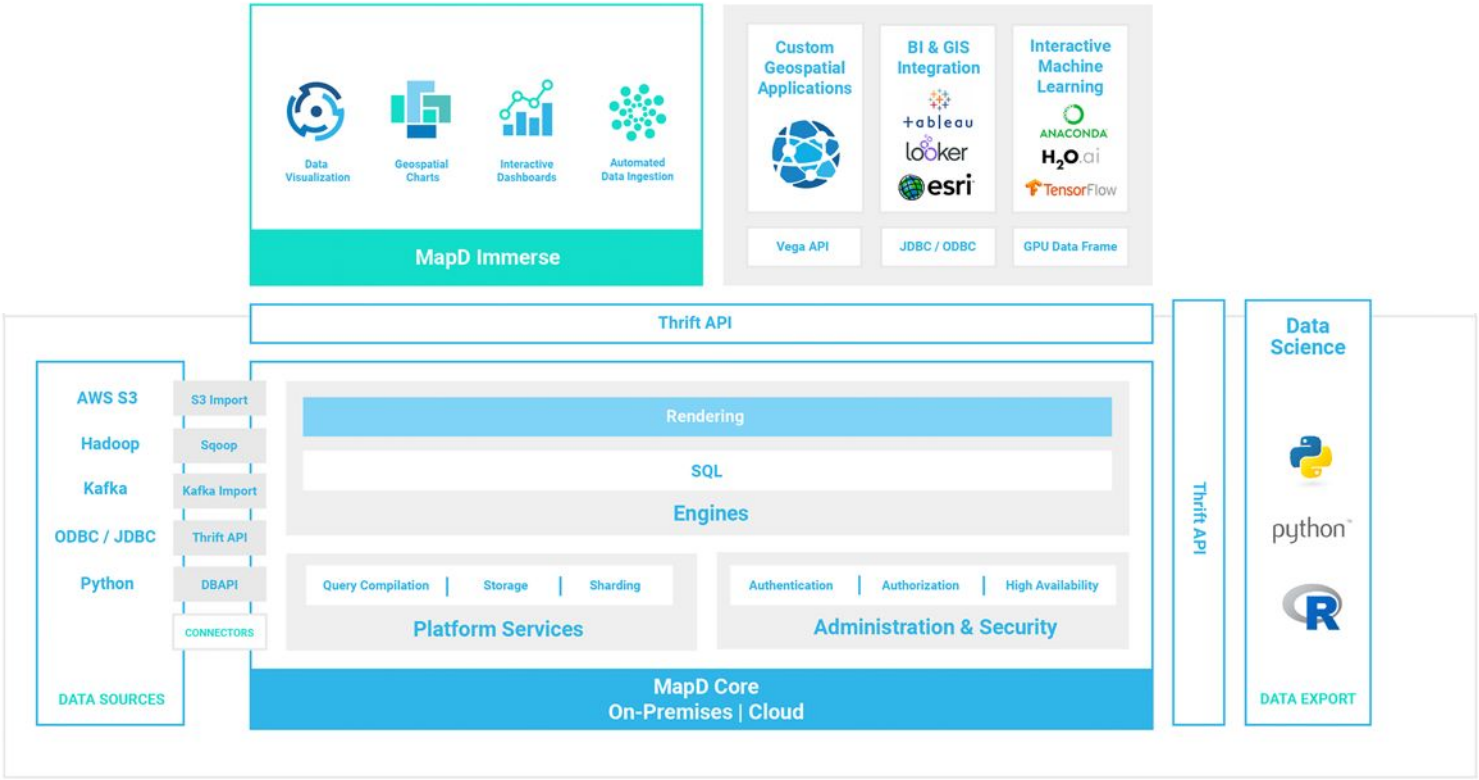


	Latency	Throughput
CPU	1 ns per task	(1 task/ns) x (20 cores) = 20 tasks/ns
GPU	10 ns per task	(0.1 task per ns) x (40,000 cores) = 4,000 task per ns

Latency: Time to do a task. | Throughput: Number of tasks per unit time.

*fictitious example

MapD is the analytics platform created for GPUs



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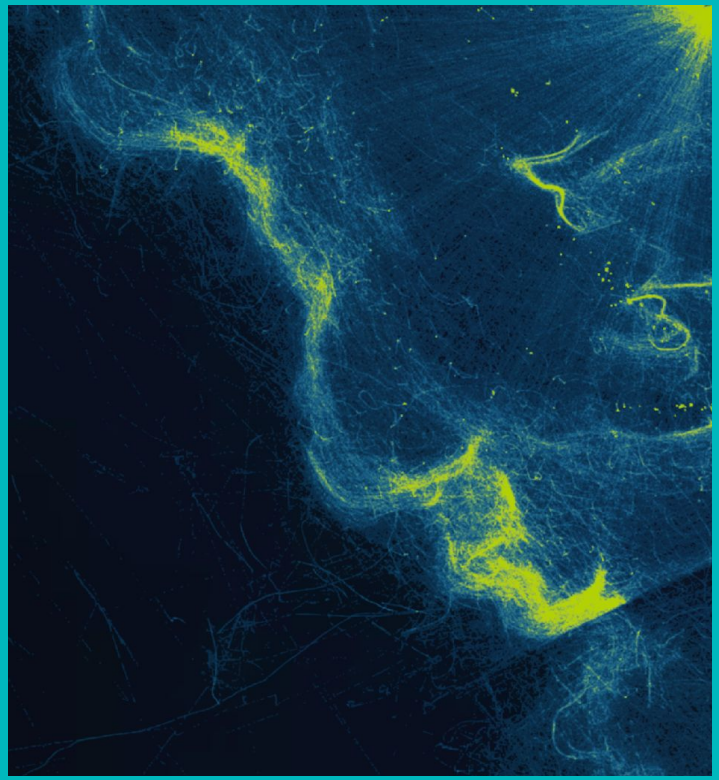

DEMO TIME!

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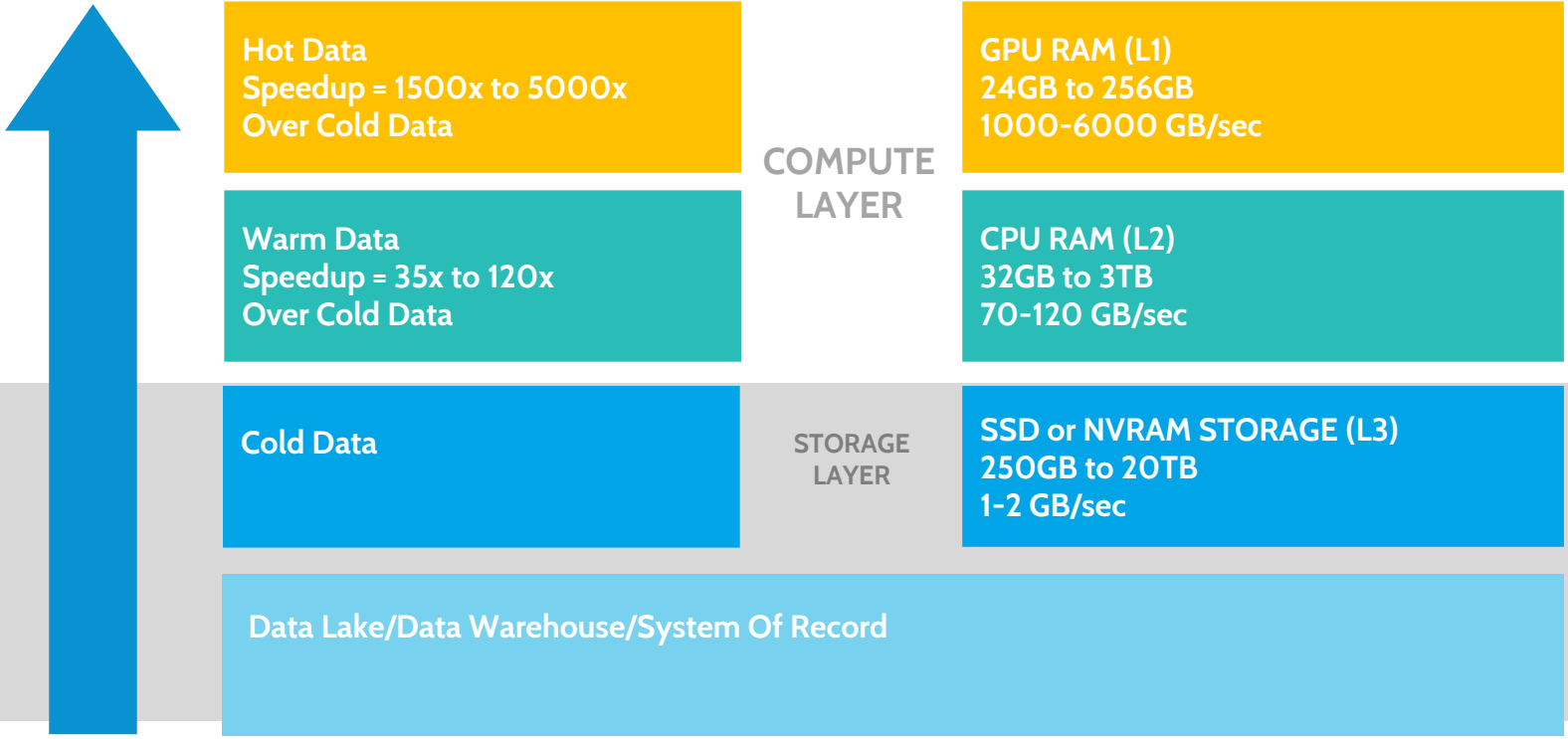
Advanced memory management

Three-tier caching to GPU RAM for speed and to SSDs for persistent storage



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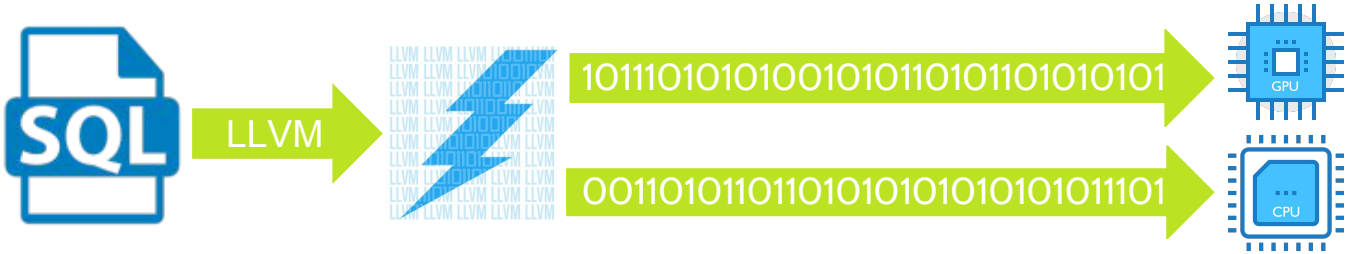
Query Compilation with LLVM

Traditional DBs can be highly inefficient

- each operator in SQL treated as a separate function
- incurs tremendous overhead and prevents vectorization

MapD compiles queries w/LLVM to create one custom function

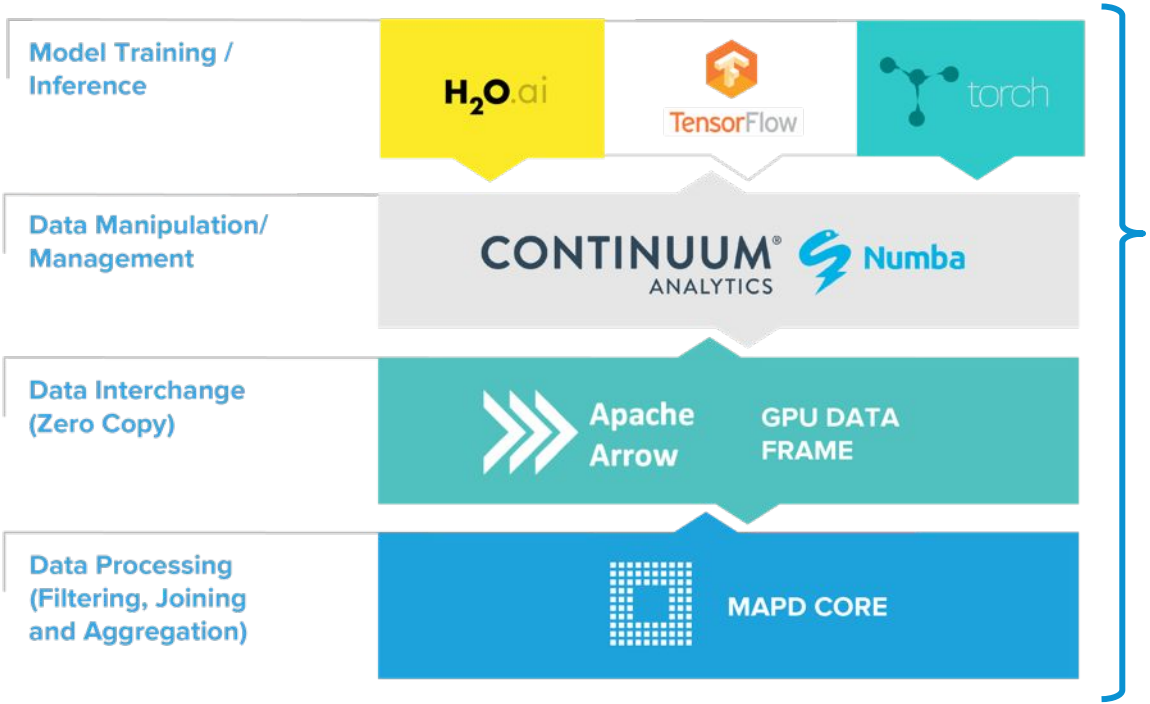
- Queries run at speeds approaching hand-written functions
- LLVM enables generic targeting of different architectures (GPUs, X86, ARM, etc).
- Code can be generated to run query on CPU and GPU simultaneously



The GPU Open Analytics Initiative

Creating common data frameworks to accelerate data science on GPUs

GPU OPEN ANALYTICS INITIATIVE



jupyter

/mapd/pymapd
/gpuopenanalytics/pygdf

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Coming Soon

Geospatial Data Types and Functions

- Early access available now

LIDAR Data

- Working with Michael Flaxman (Geodesign Technologies)
- An open dataset from the state of Florida with several billion points

Open Source MapD Core Working Group Forming at FOSS4G

- New features coming soon to the open source SQL engine
- If you're interested in participating, talk with the MapD team

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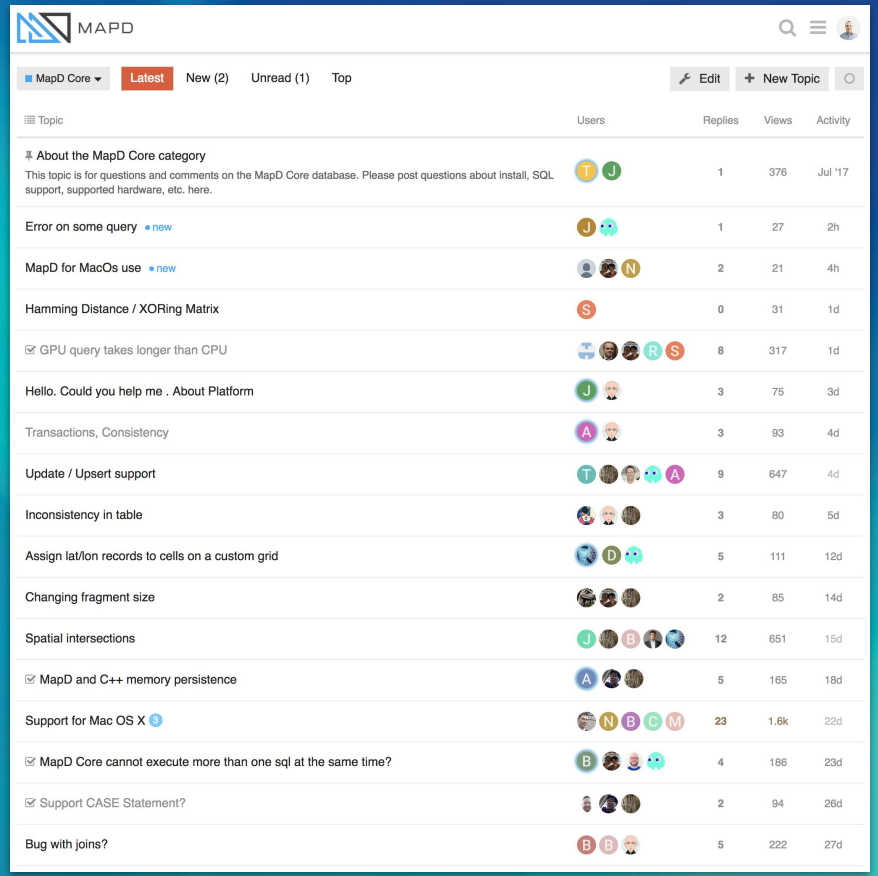

Next Steps

- **mapd.com/demos**
  Play with our demos
- **mapd.cloud**
  Get a MapD instance in less than 60 seconds
- **mapd.com/platform/download-community/**
  Download the Community Edition
- **community.mapd.com**
  Ask questions and share your experiences

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Thank you!
Any questions?

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