HAWQ Architecture

Alexey Grishchenko

HighLoad++

Who I am

Enterprise Architect @ Pivotal

- 7 years in data processing
- 5 years of experience with MPP
- 4 years with Hadoop
- Using HAWQ since the first internal Beta
- Responsible for designing most of the EMEA HAWQ and Greenplum implementations
- Spark contributor
- http://0x0fff.com

Agenda

- What is HAWQ

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- Why you need it

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- HAWQ Design
- Query execution example
- Competitive solutions

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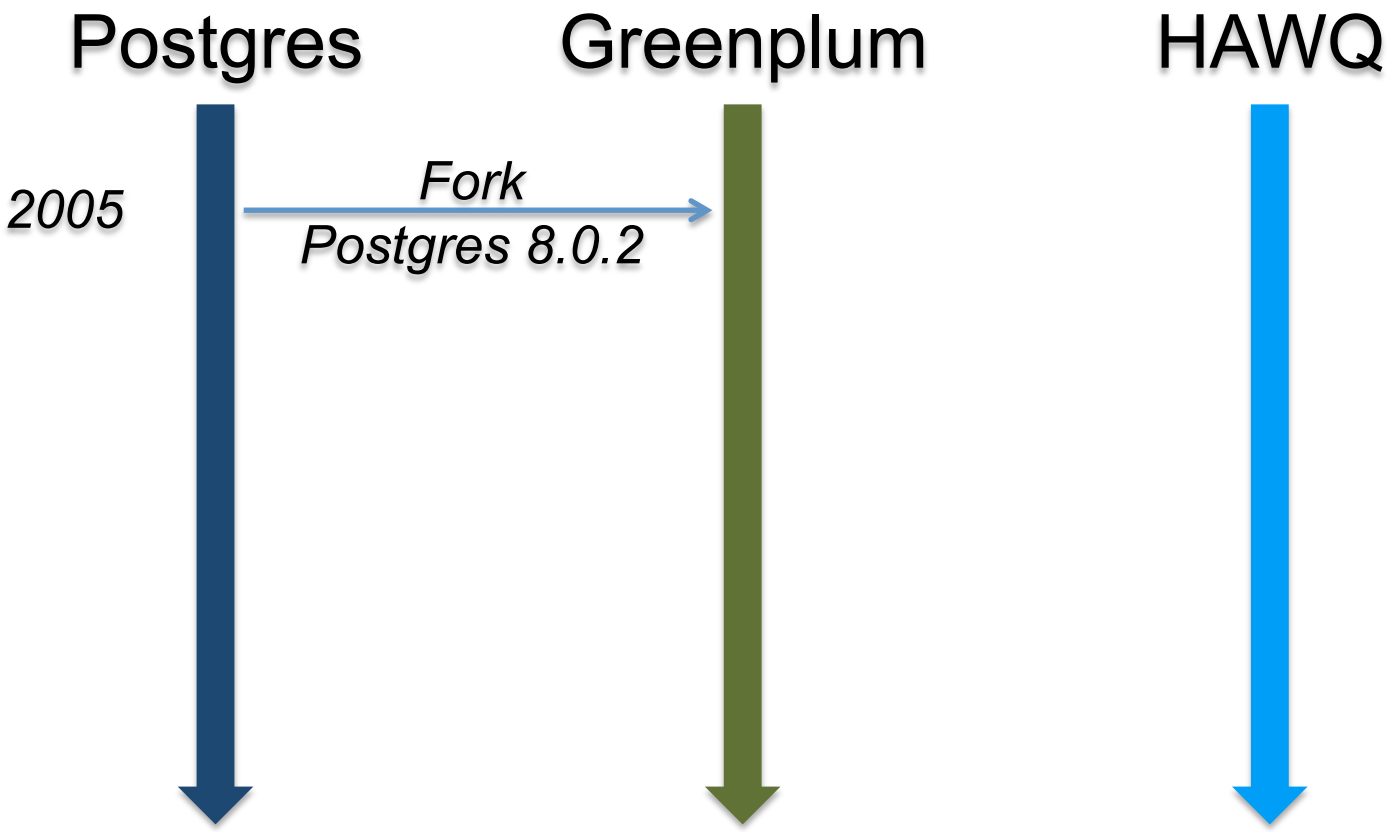

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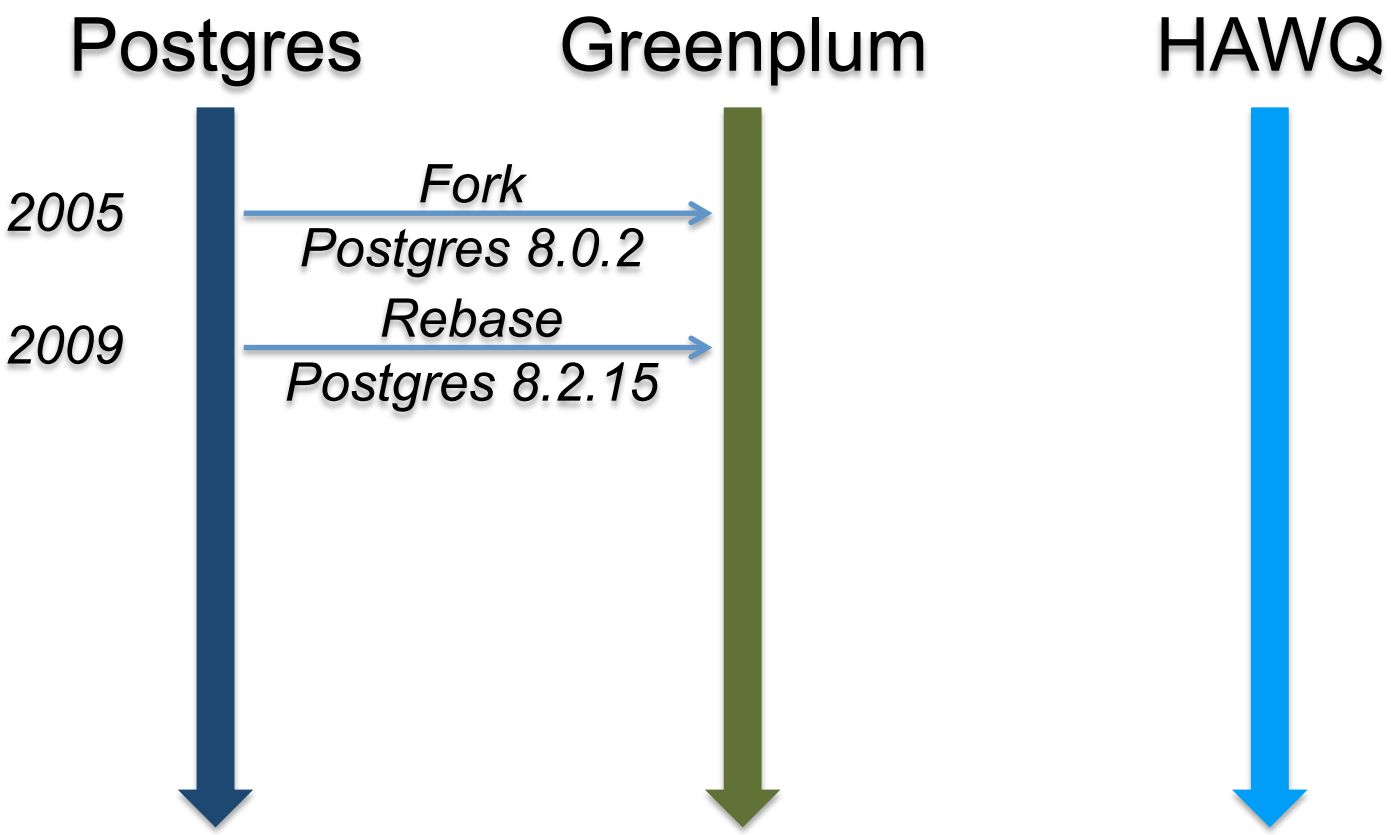

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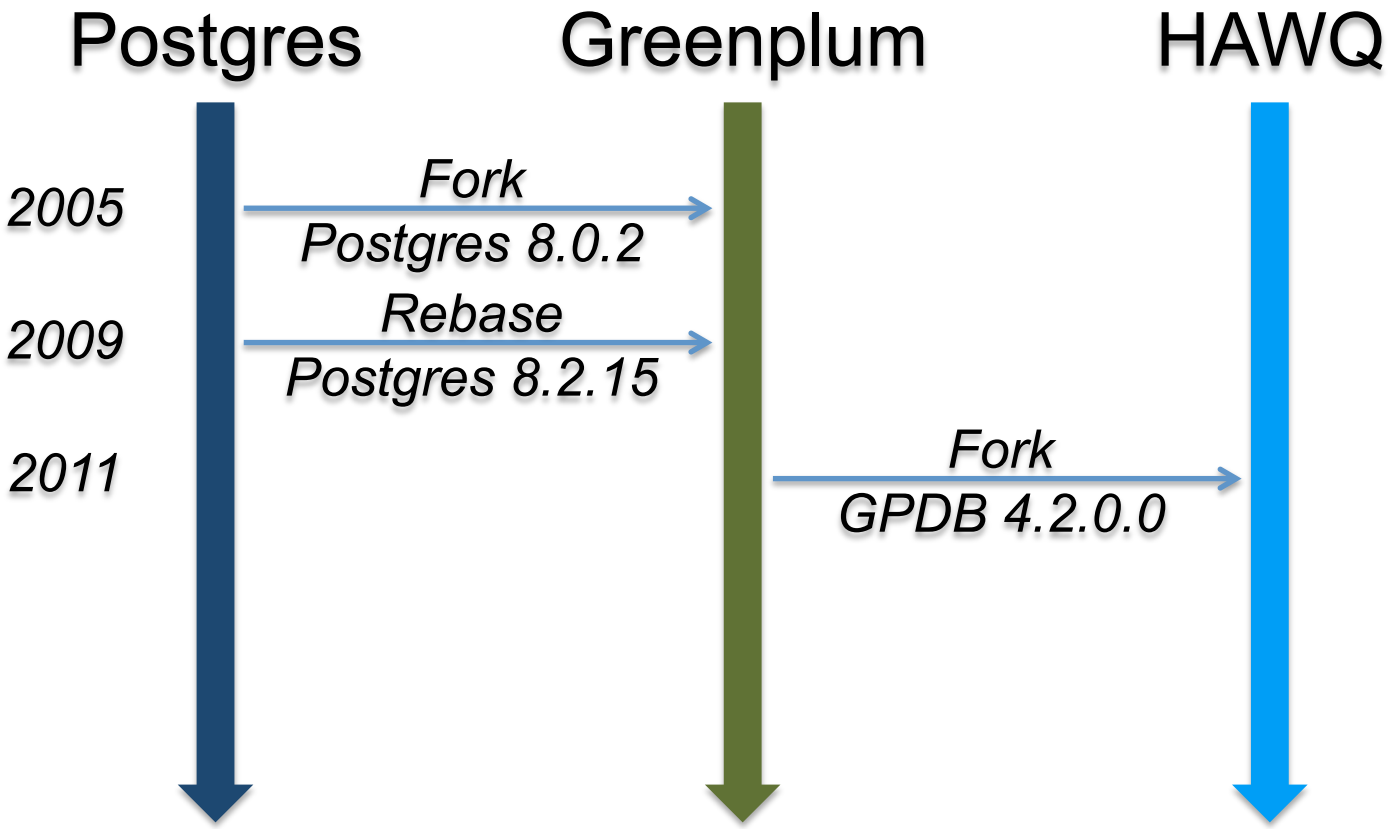

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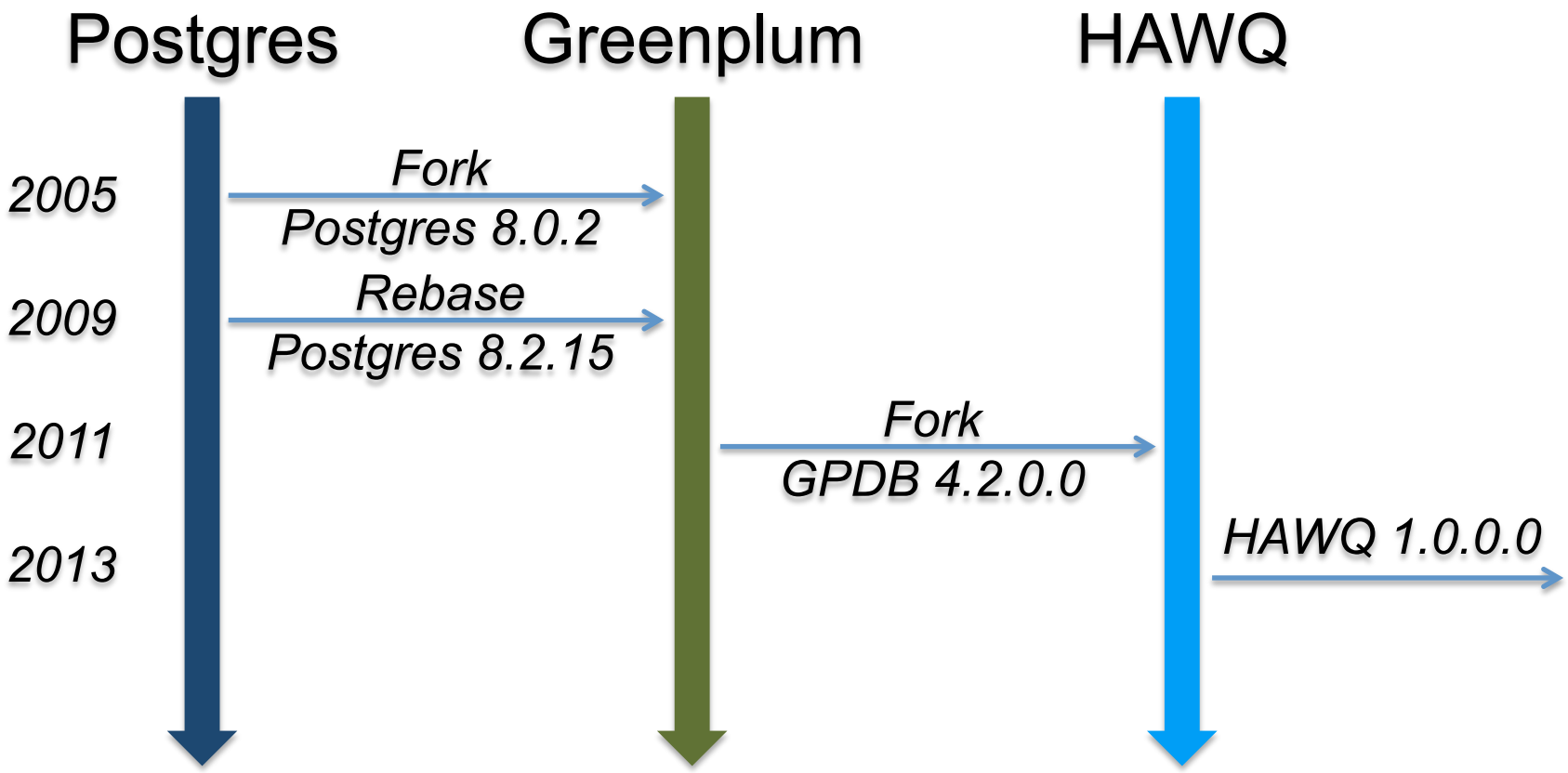

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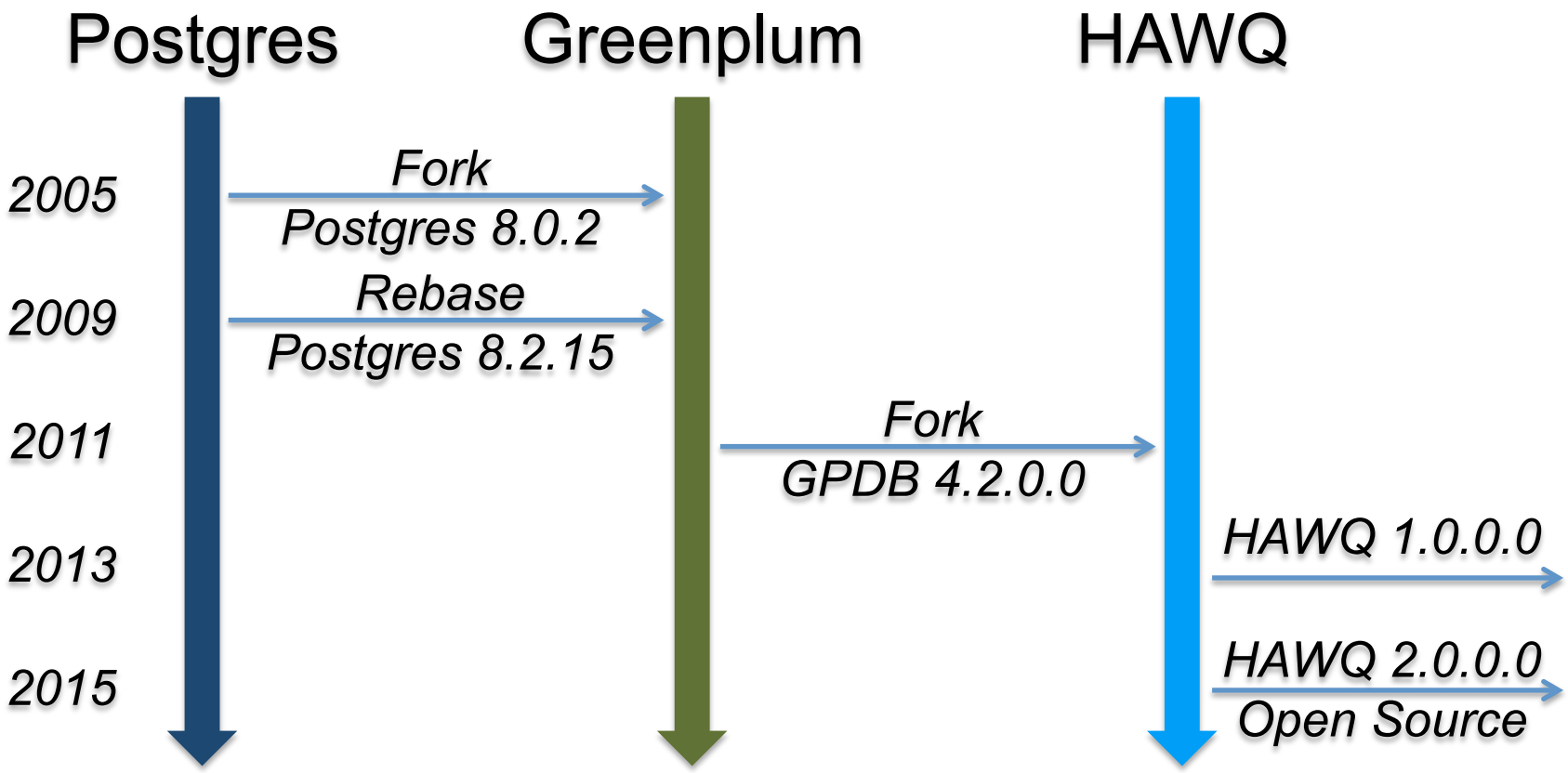

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  - More than 10 of them in EMEA

Apache HAWQ

- Apache HAWQ (incubating) from 09’2015
  - http://hawq.incubator.apache.org
  - https://github.com/apache/incubator-hawq
- What’s in Open Source
  - Sources of HAWQ 2.0 alpha
  - HAWQ 2.0 beta is planned for 2015’Q4
  - HAWQ 2.0 GA is planned for 2016’Q1
- *Community is yet young – come and join!*

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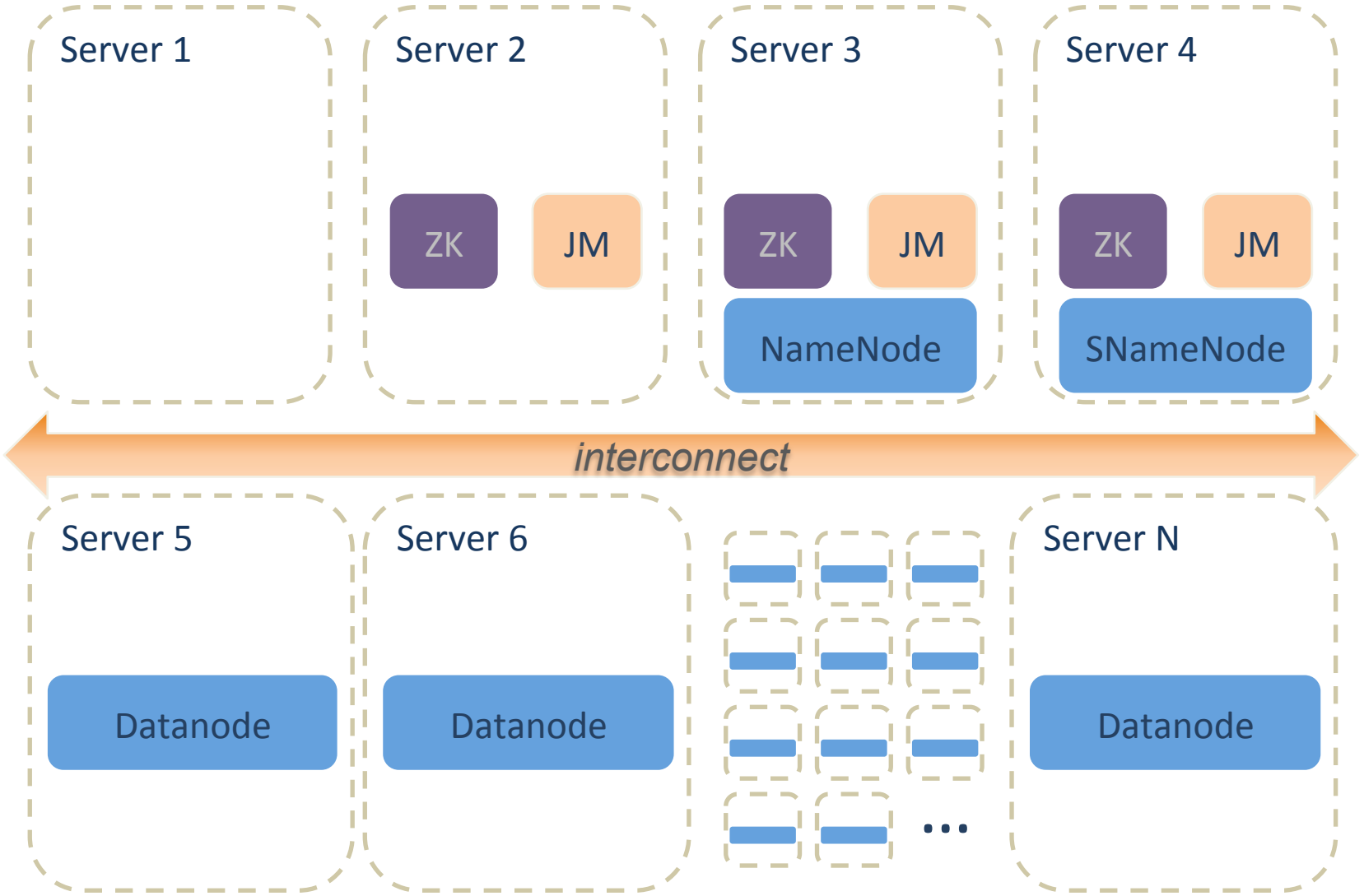
- Good performance
  - How many times the data would hit the HDD during a single Hive query?

HAWQ Cluster



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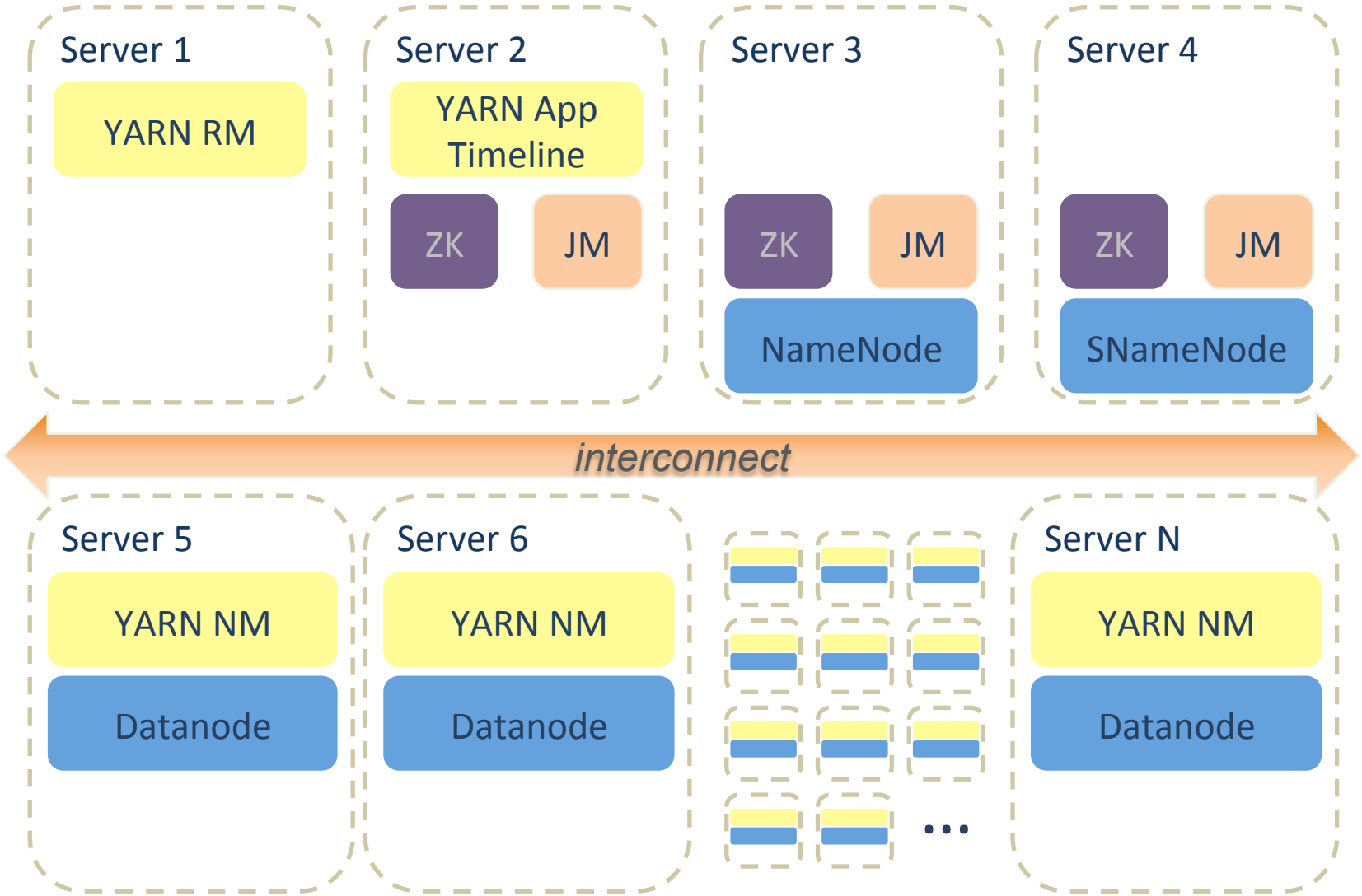

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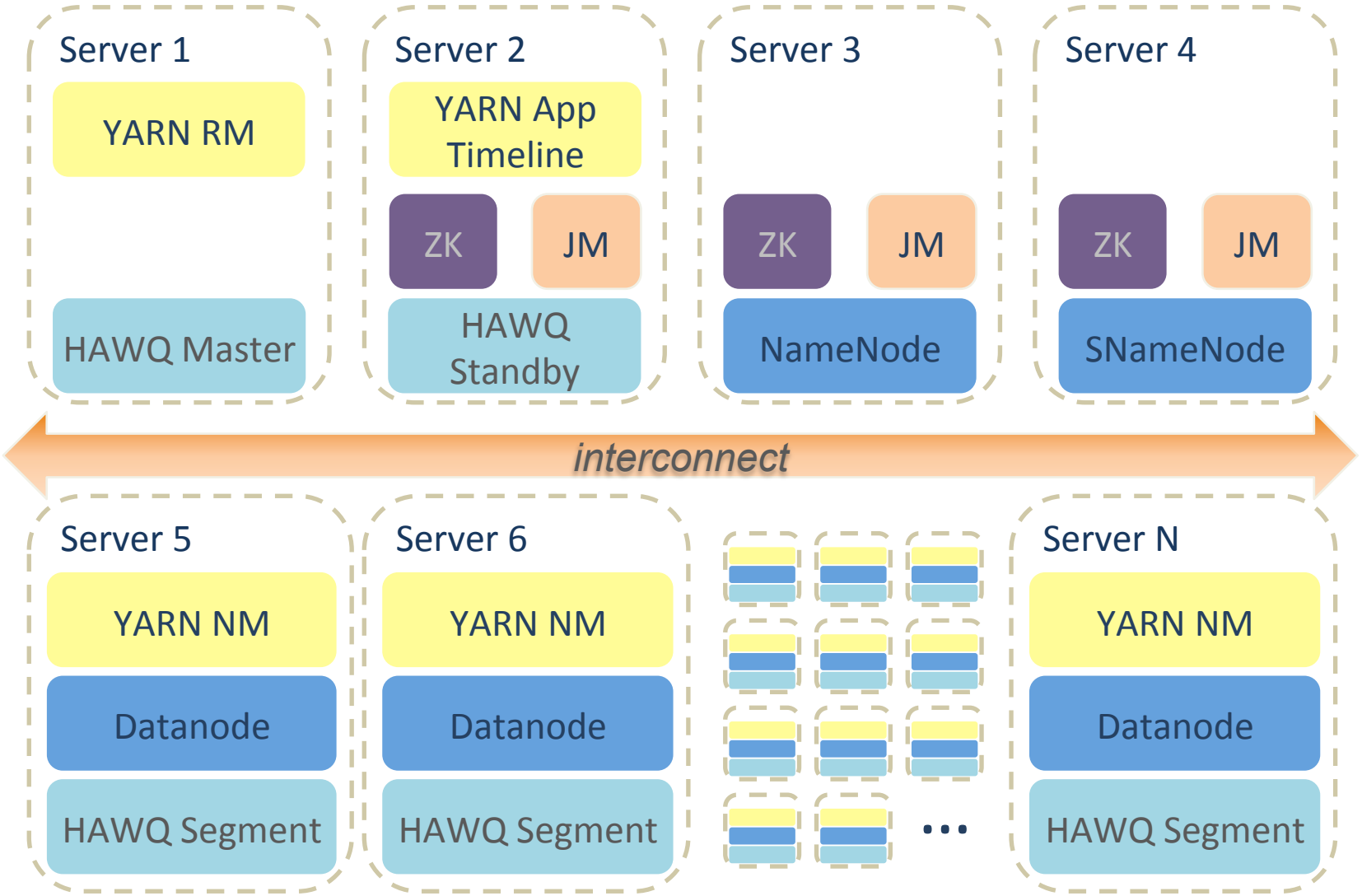
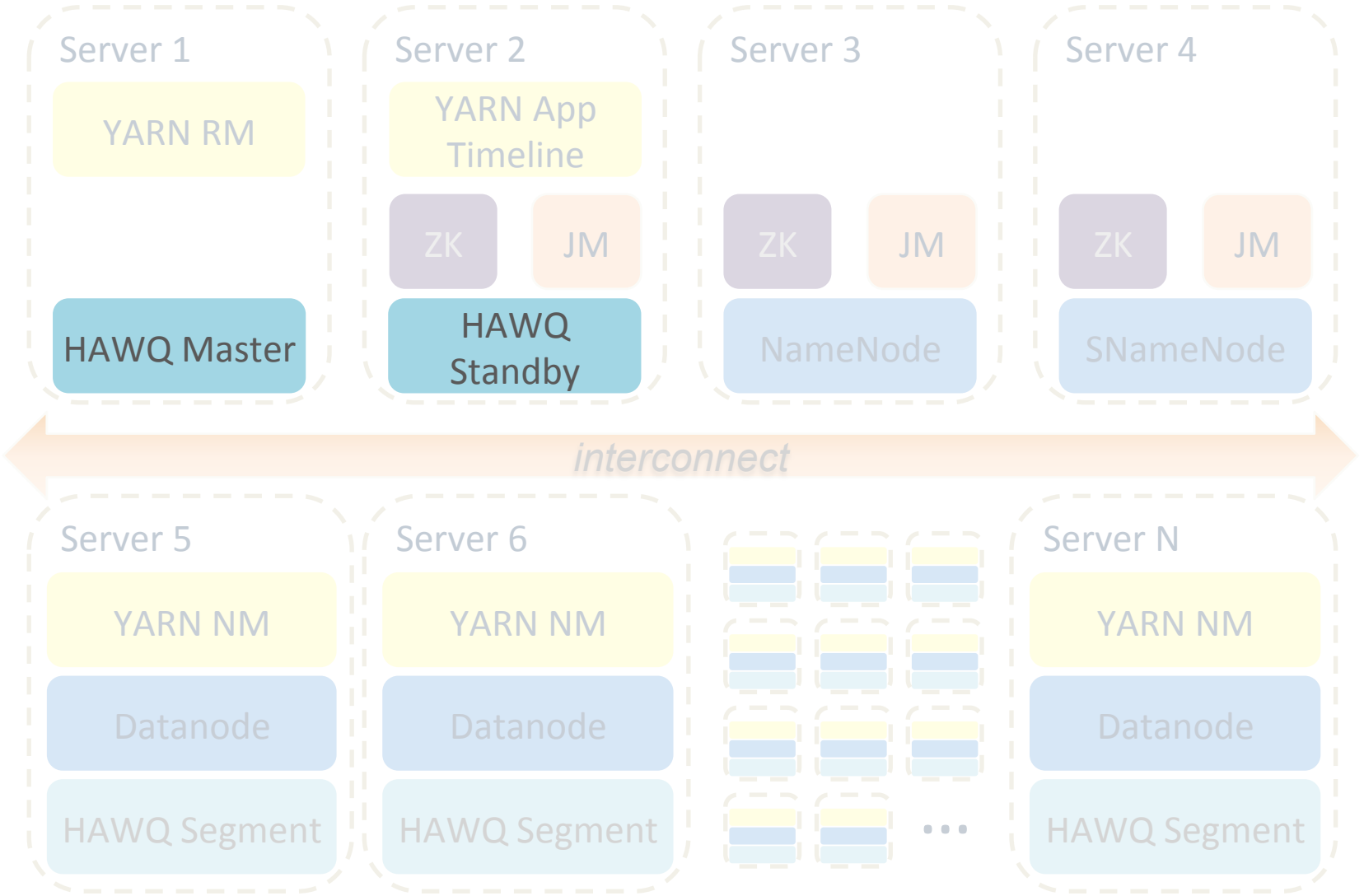


Master Servers



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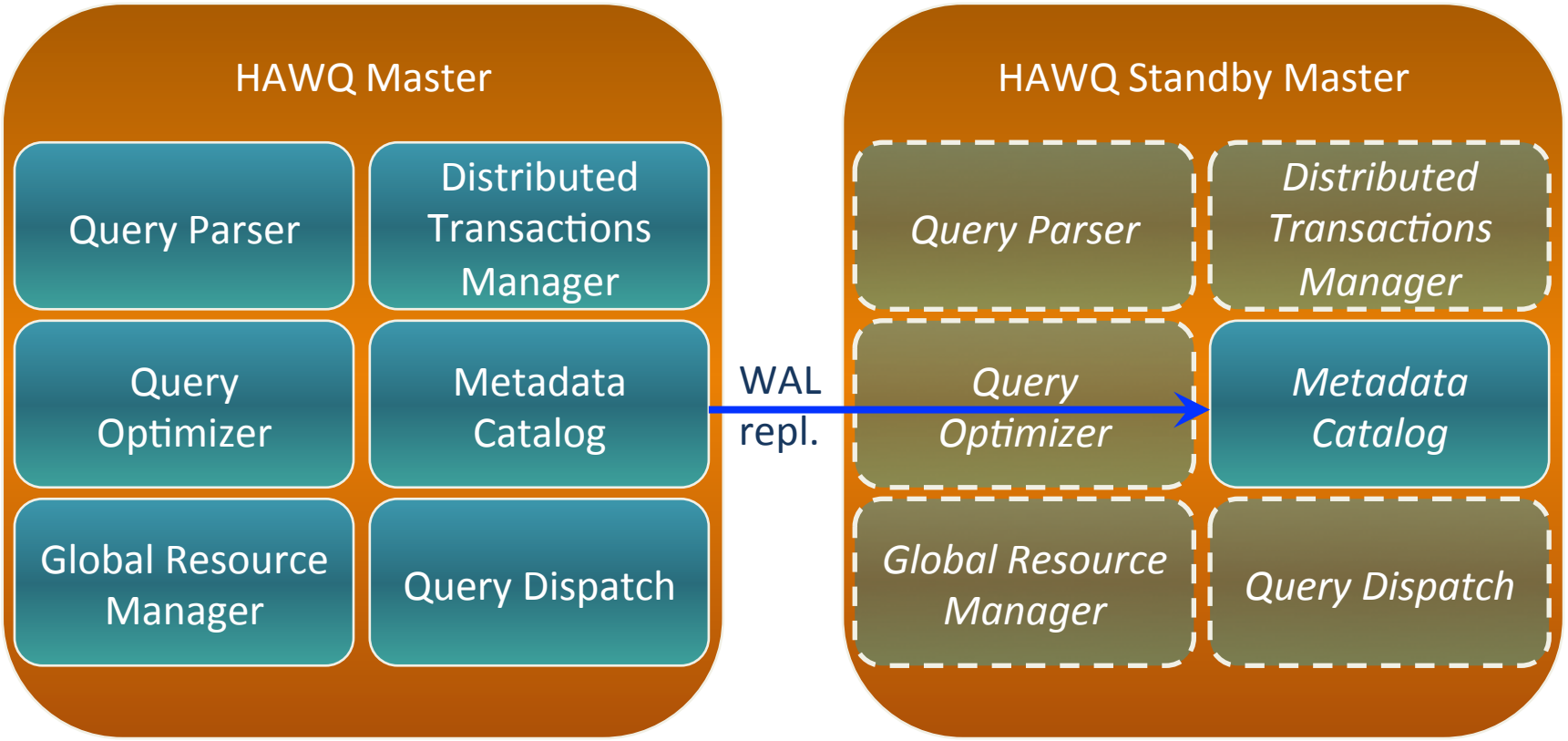

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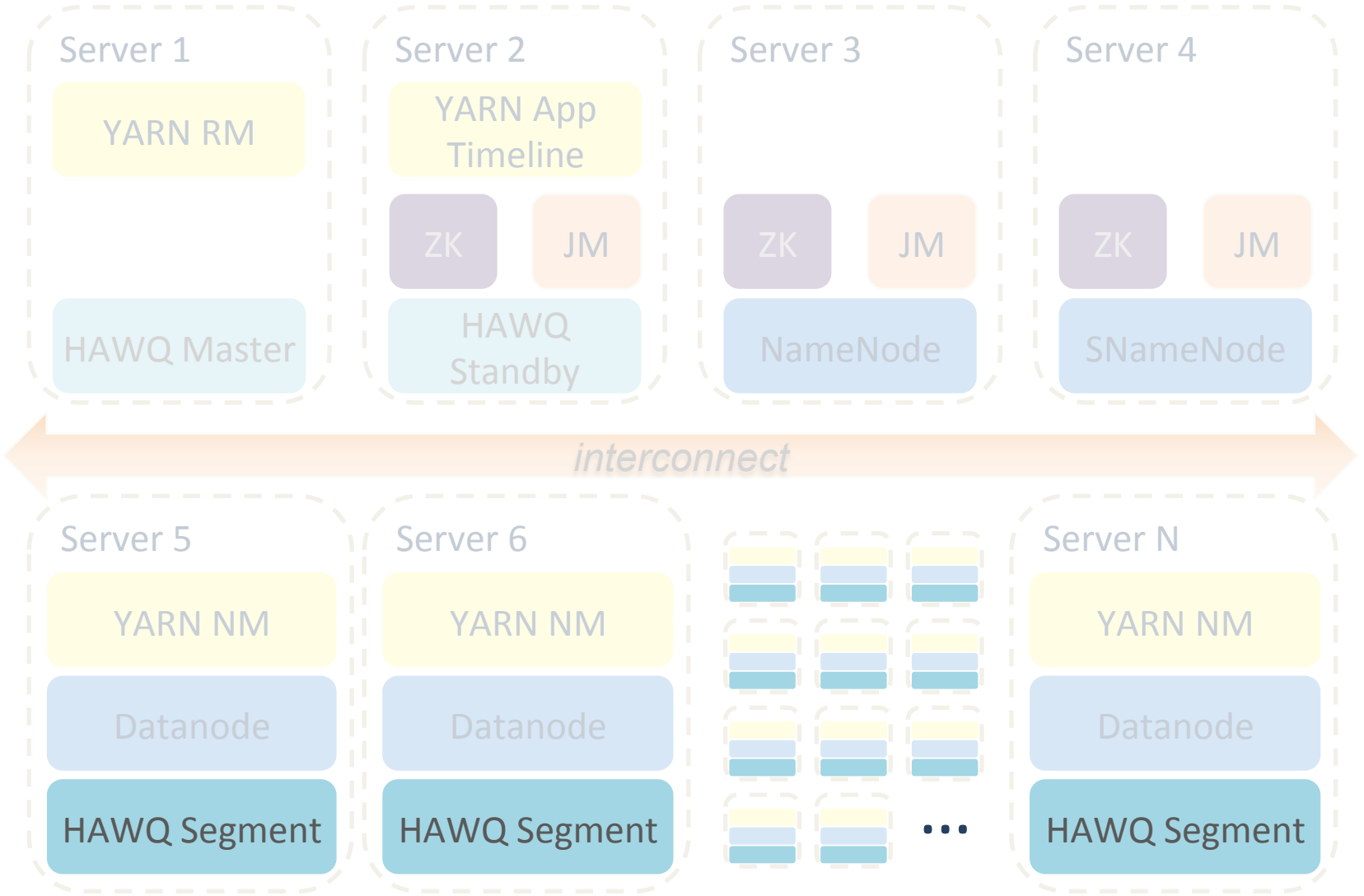

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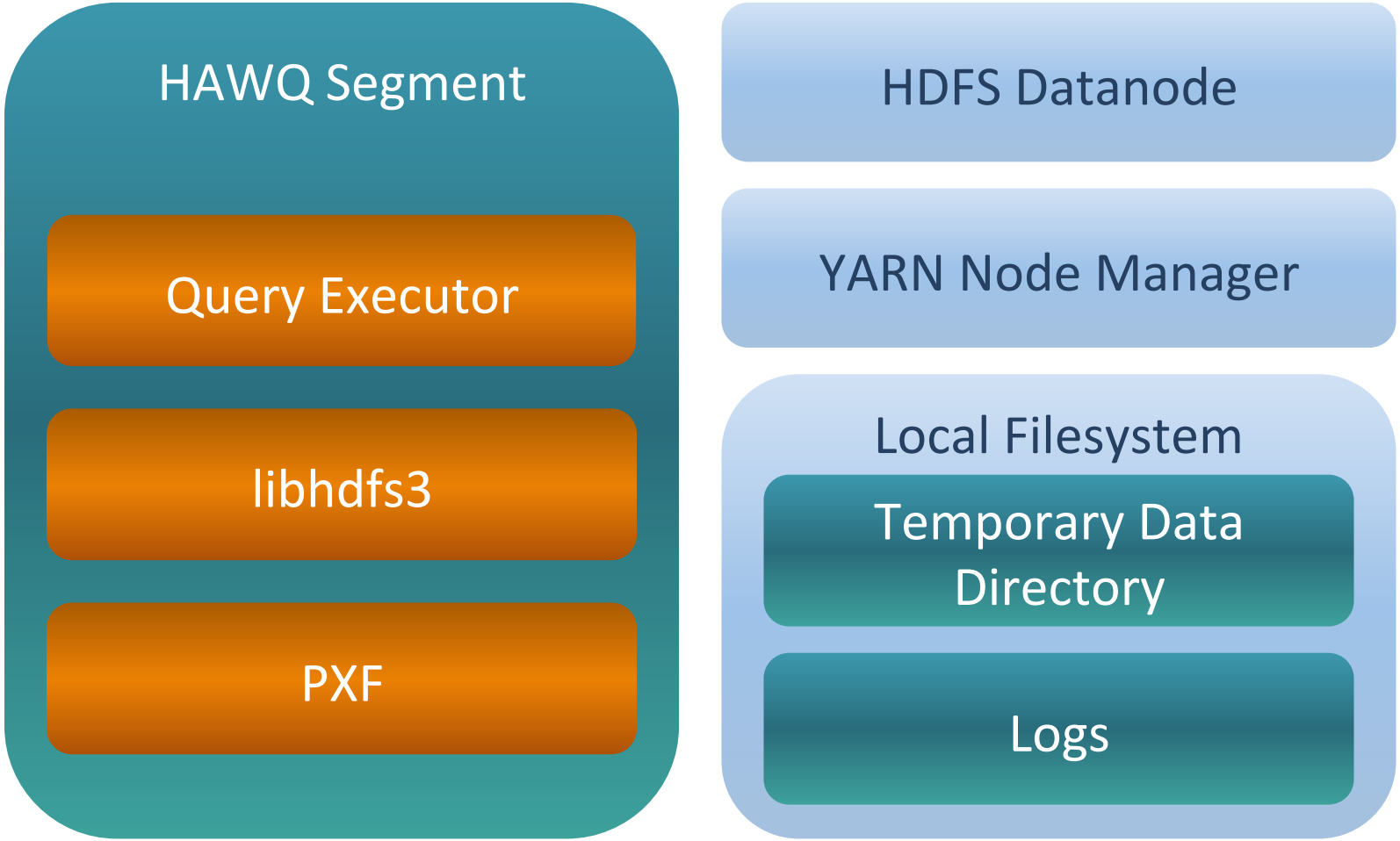

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  - Average width of the field in bytes

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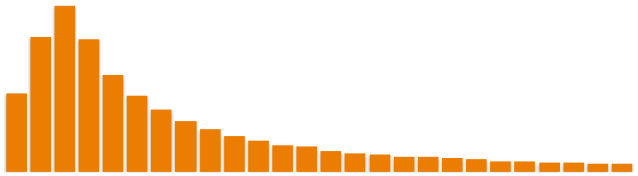

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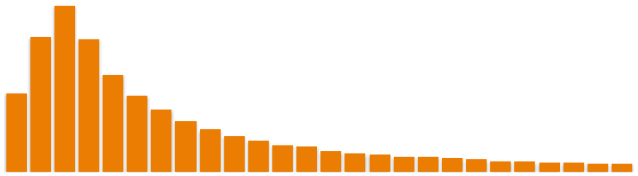

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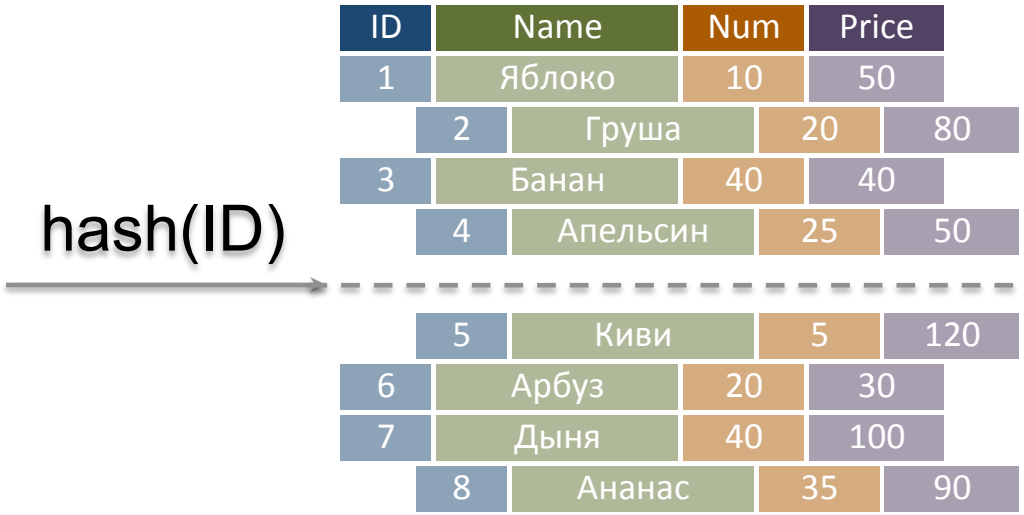

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- Stored procedures
  - PL/pgSQL, PL/Java, PL/Python, PL/Perl, PL/R

Query Optimizer

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  - Planner – evolved from the Postgres query optimizer
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- Optimizer hints work just like in Postgres
  - Enable/disable specific operation
  - Change the cost estimations for basic actions

Storage Formats

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  - Minimal time to retrieve subset of columns
  - etc.

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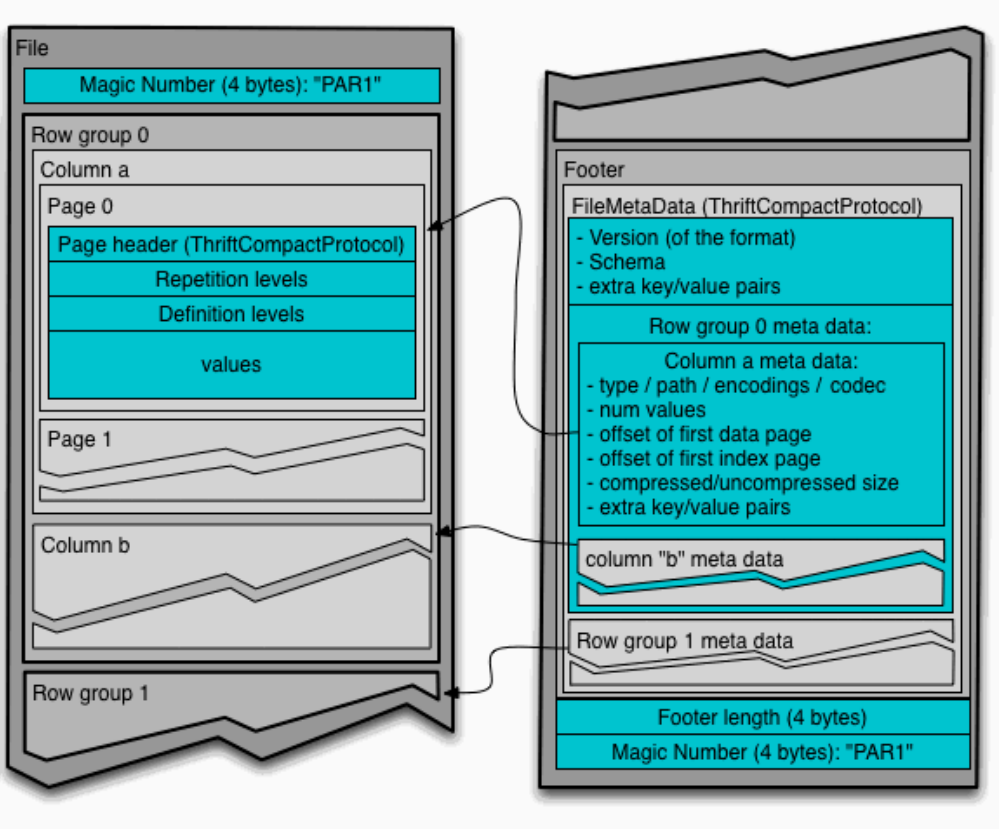

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  - The size of “row group” and page size can be set for each table separately

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  - You can control the parallelism of each query

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- Can be set up for user or group

External Data

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  - Framework for external data access
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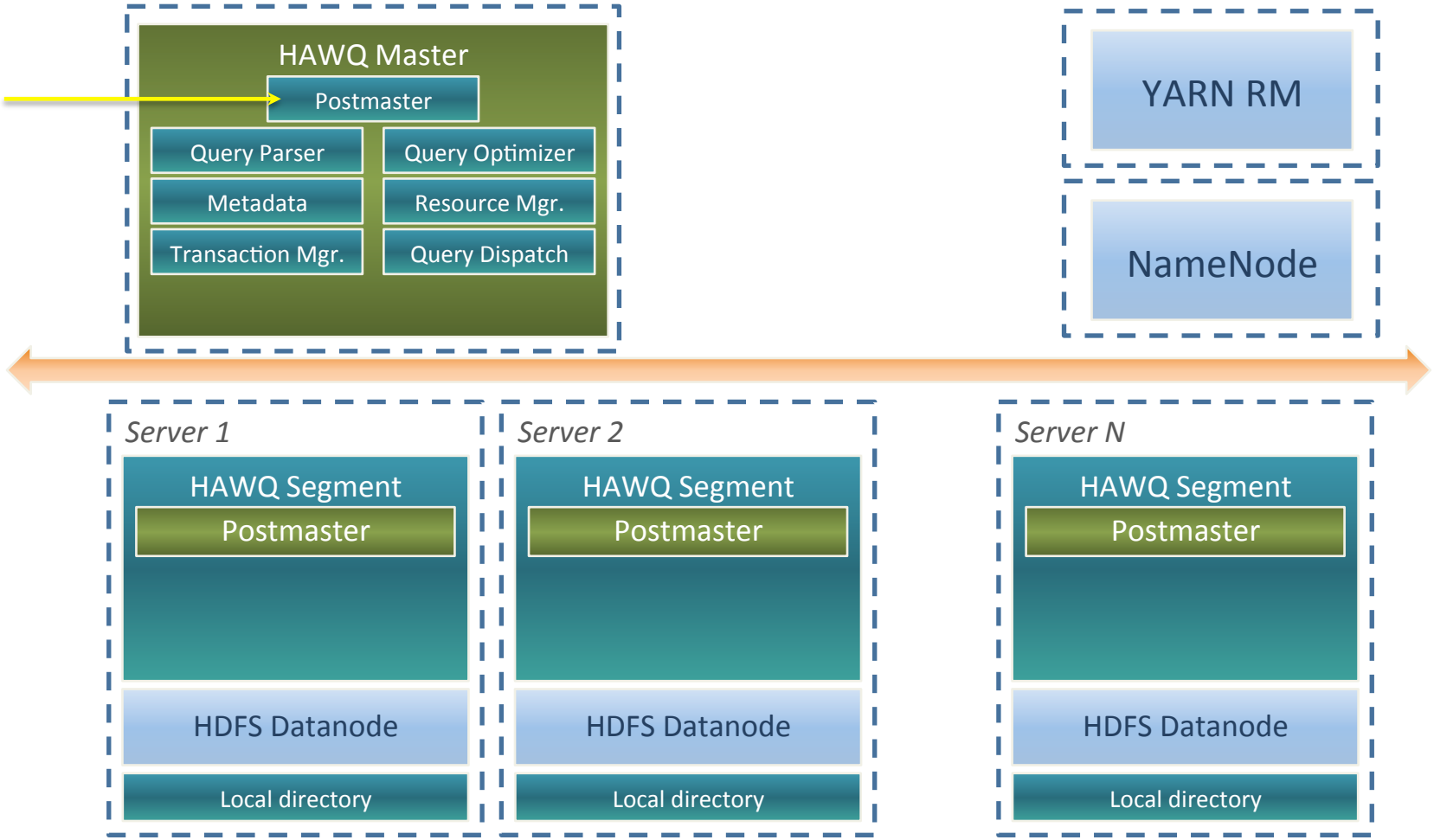
- HCatalog
  - HAWQ can query tables from HCatalog the same way as HAWQ native tables

Query Example



Plan | Resource | Prepare | Execute | Result | Cleanup

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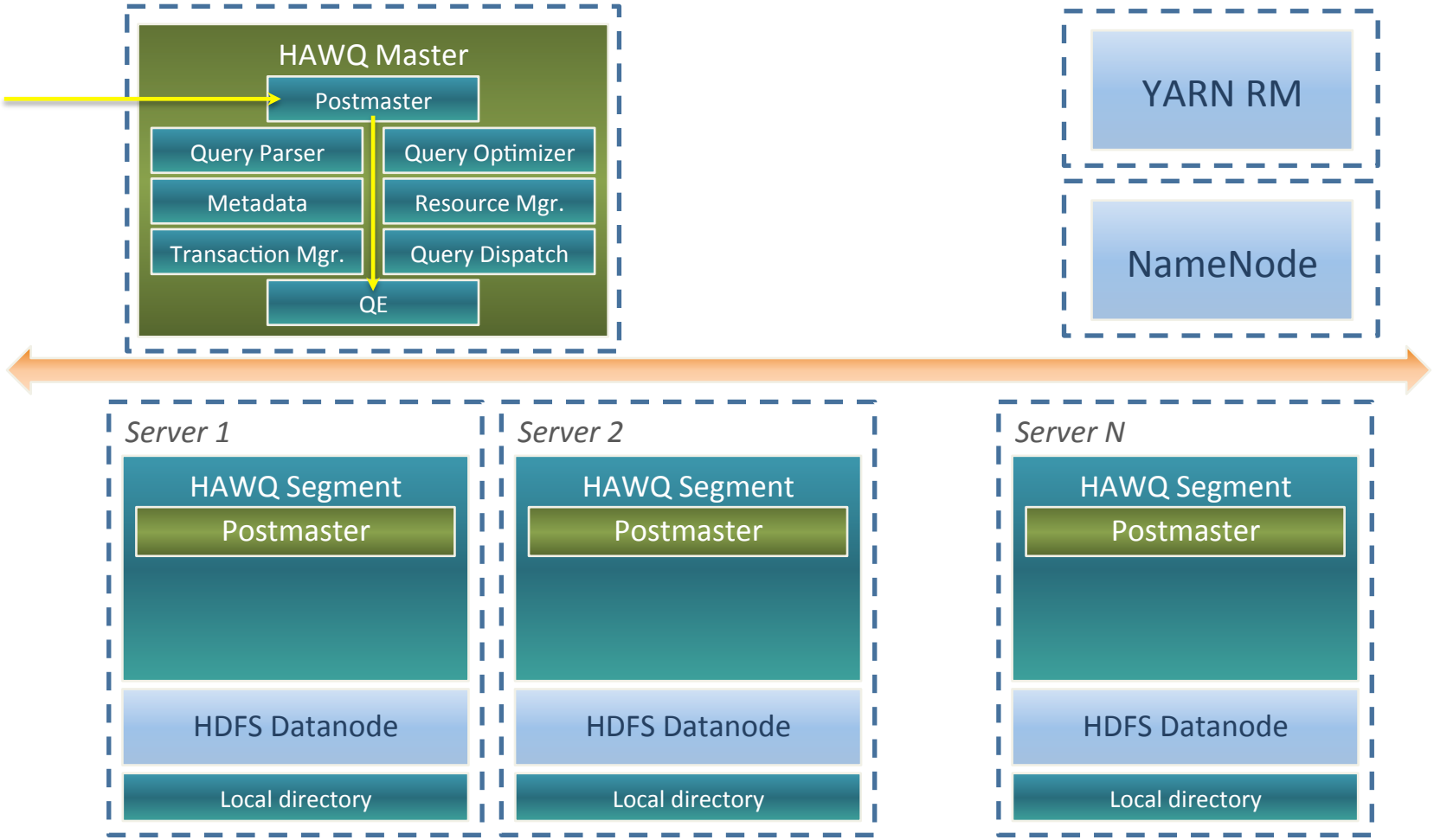

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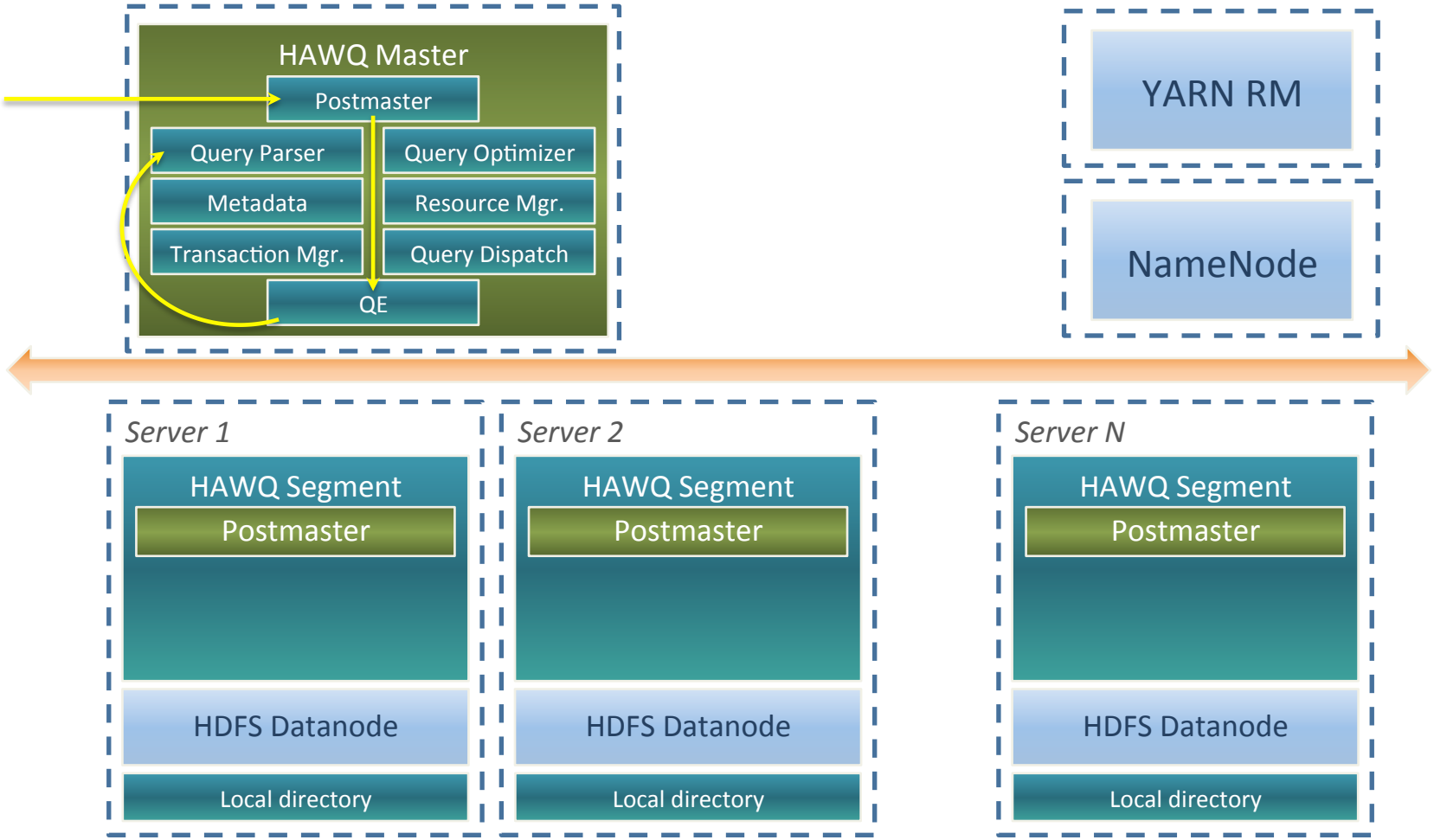

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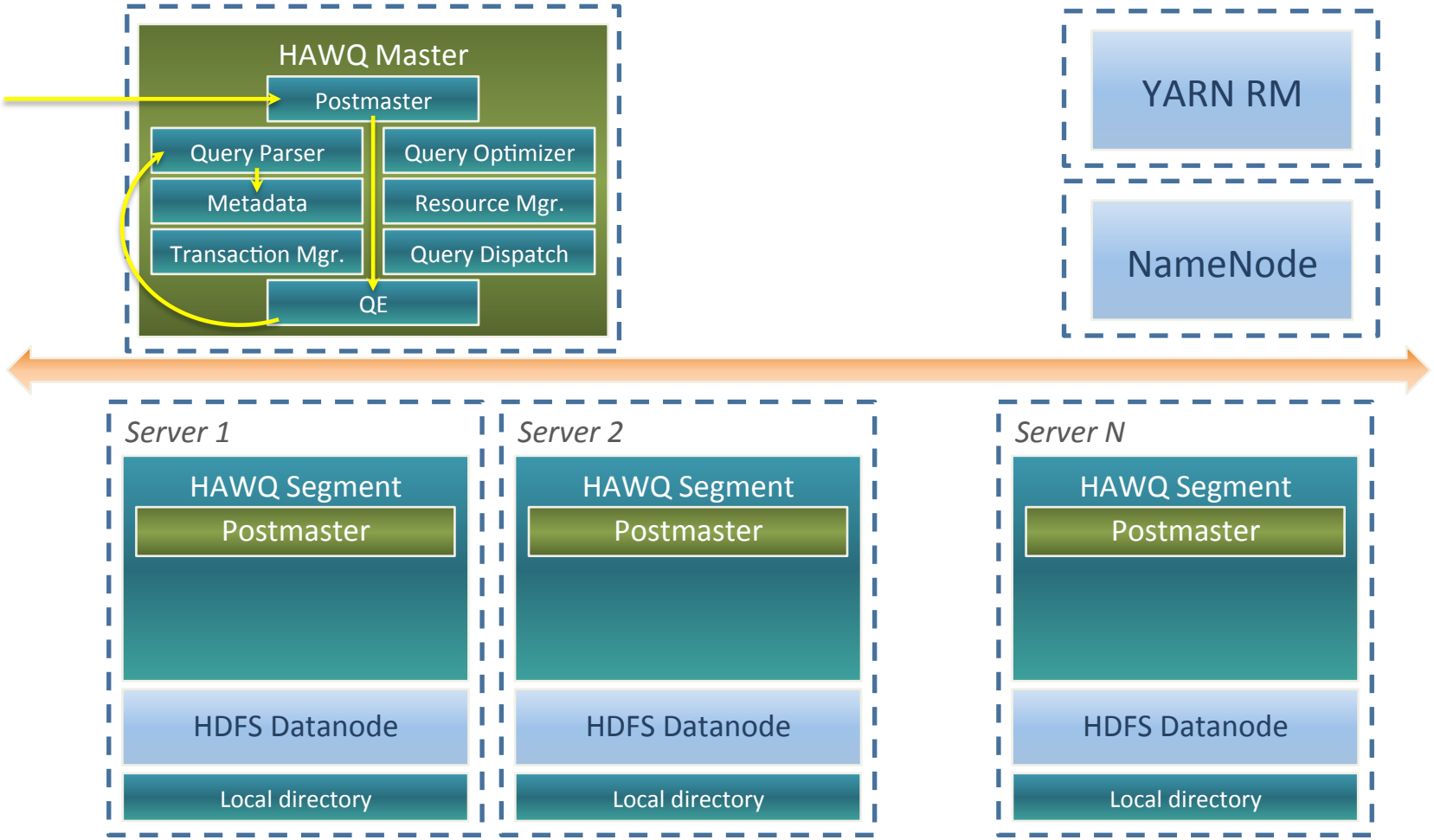

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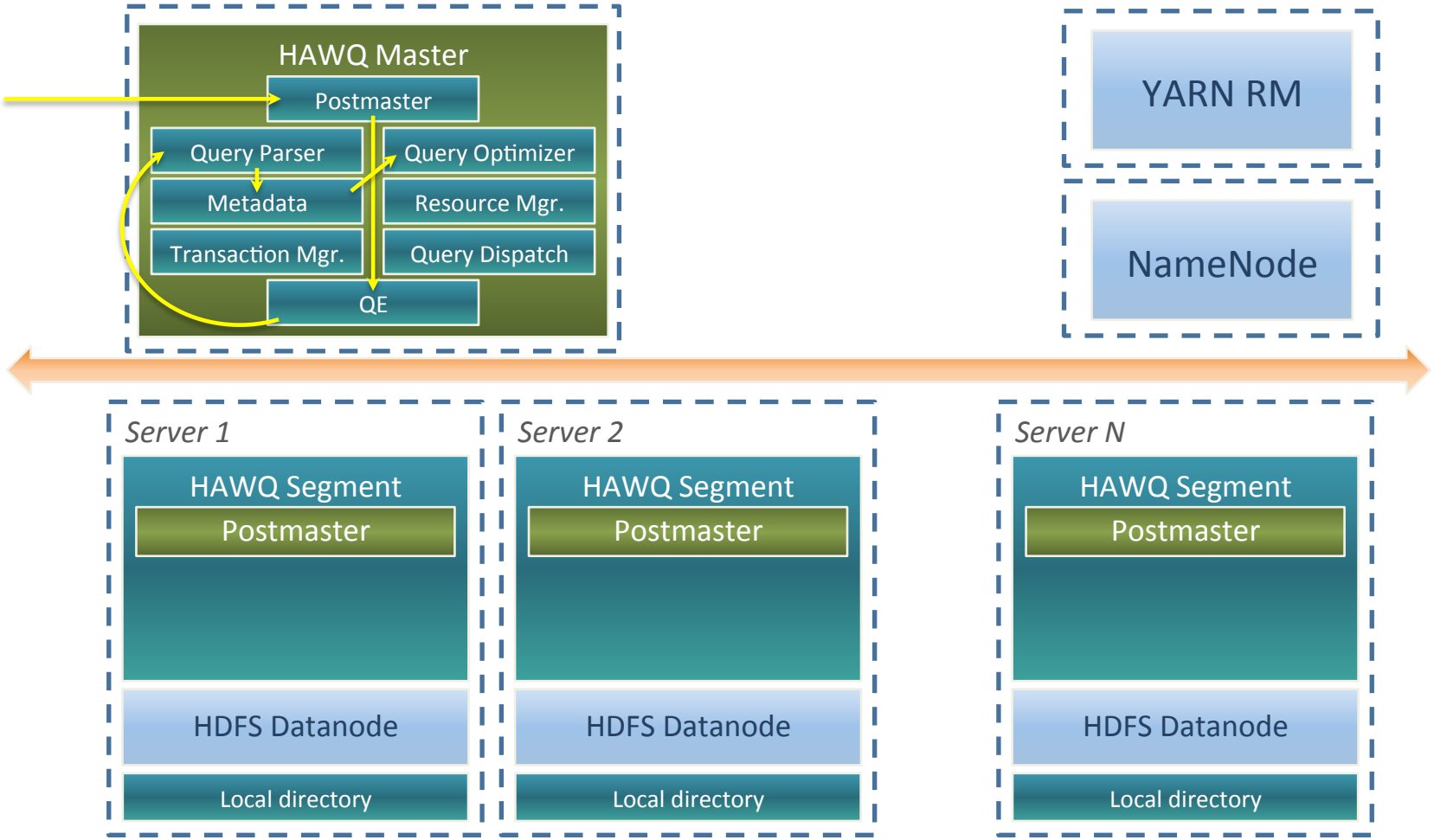

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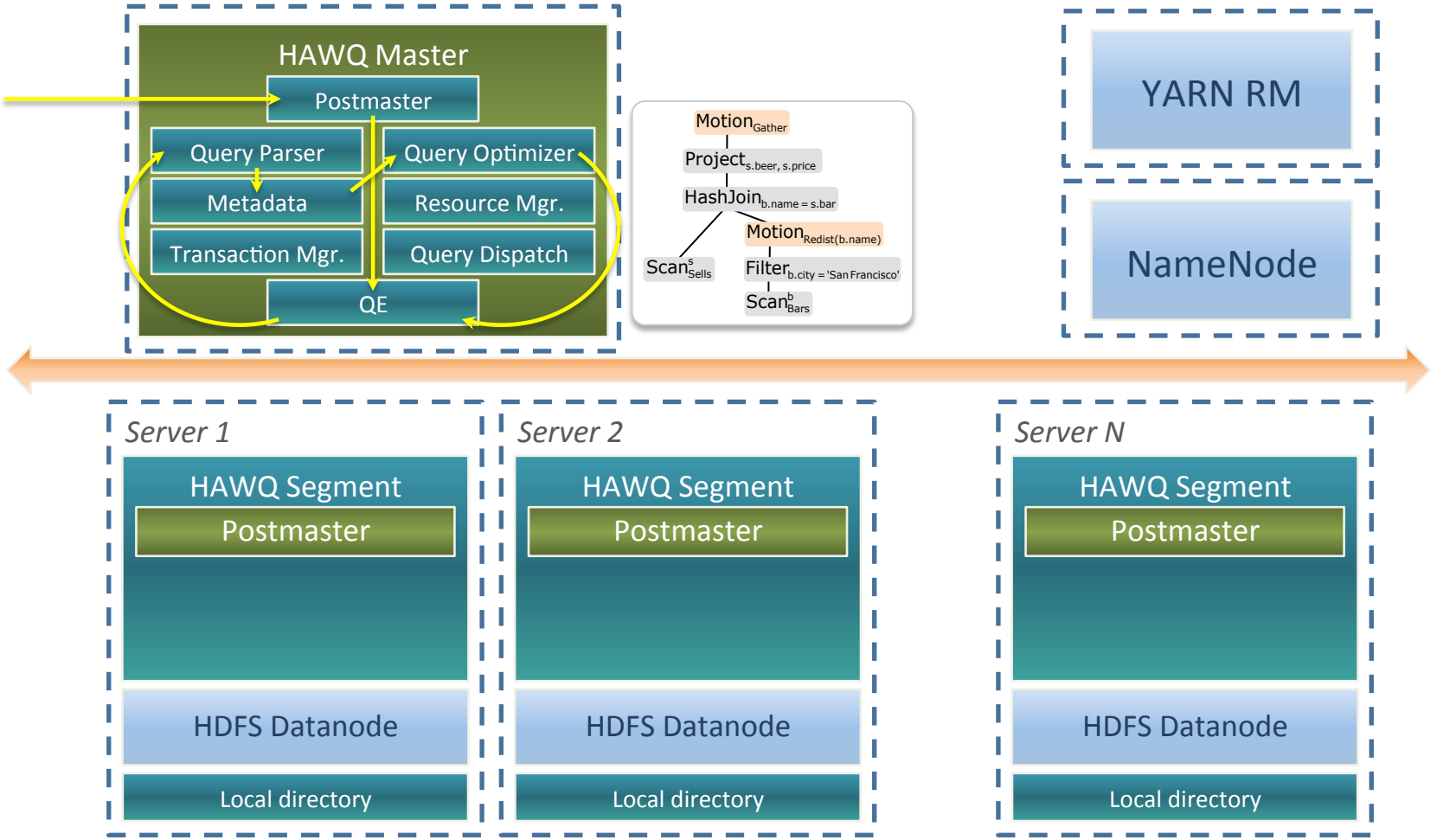

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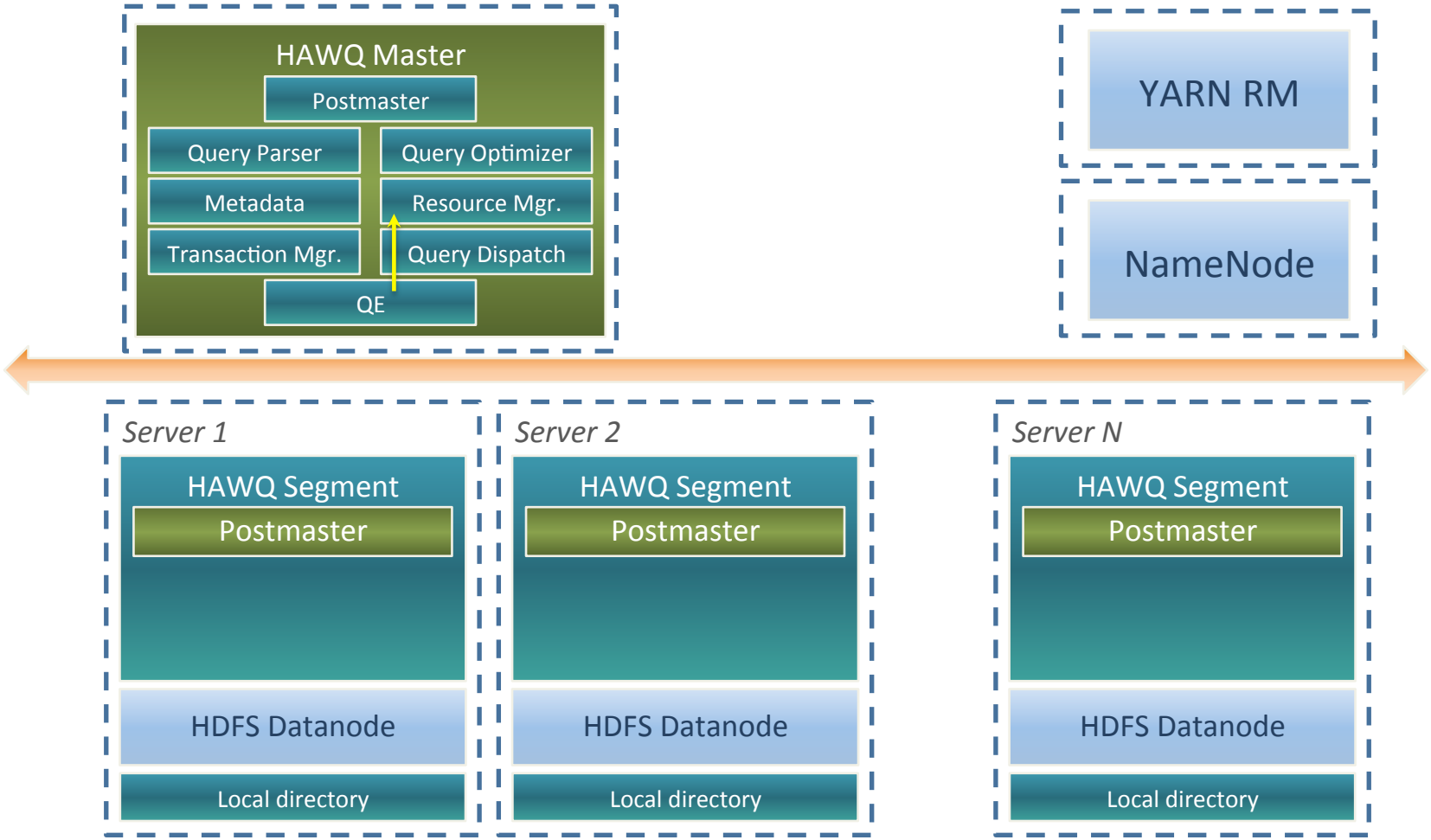

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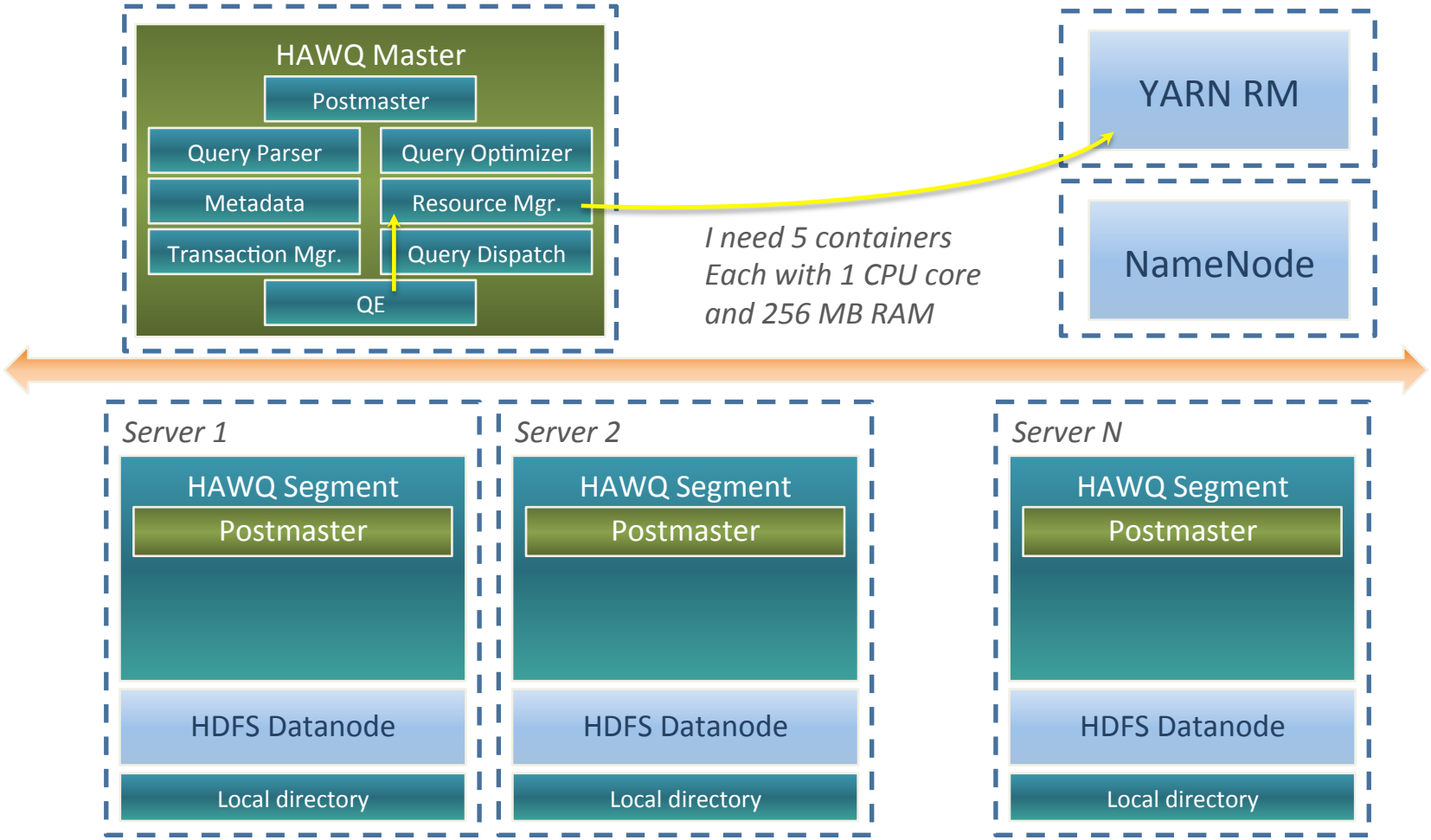

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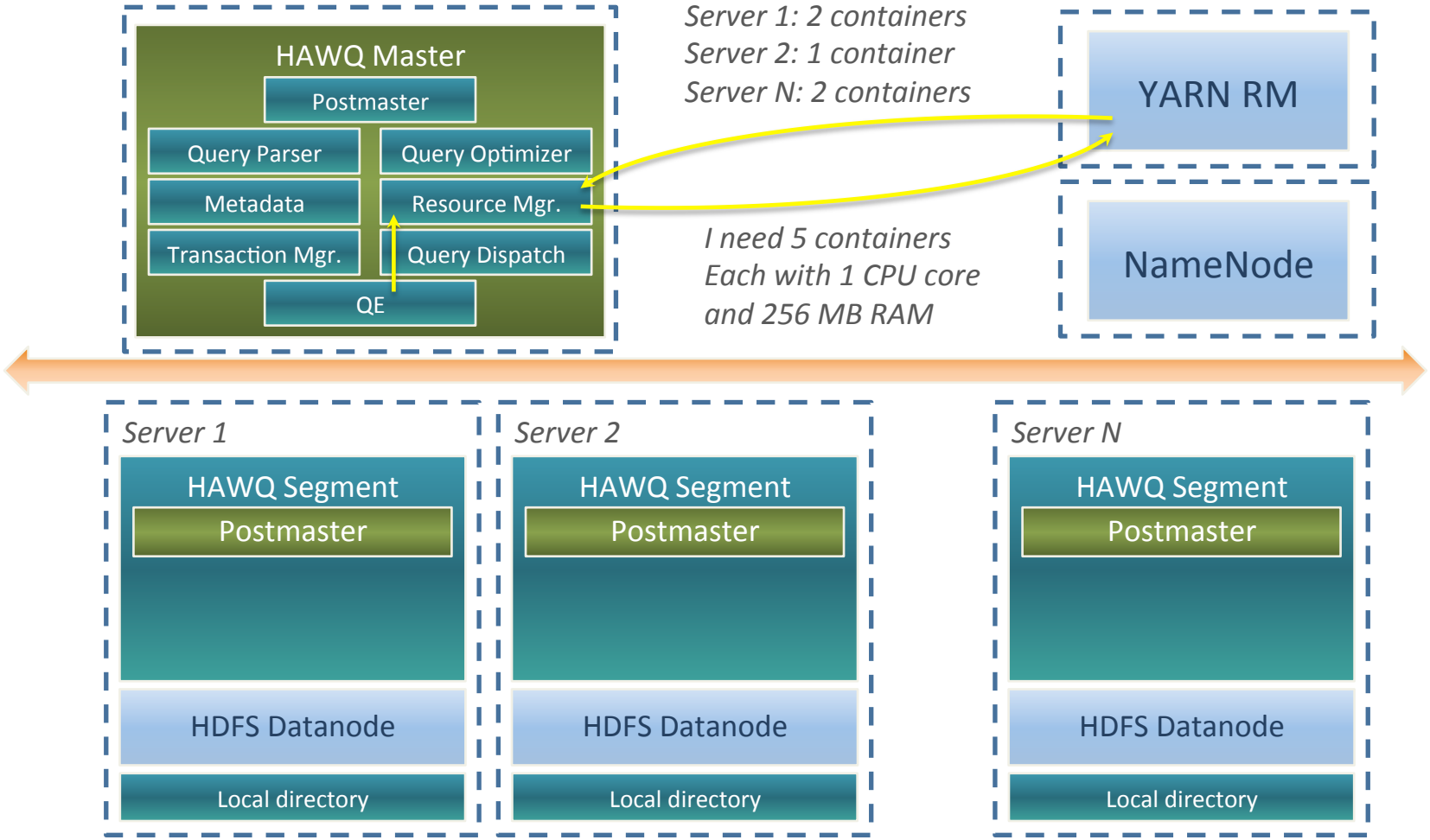

Plan | Resource | Prepare | Execute | Result | Cleanup

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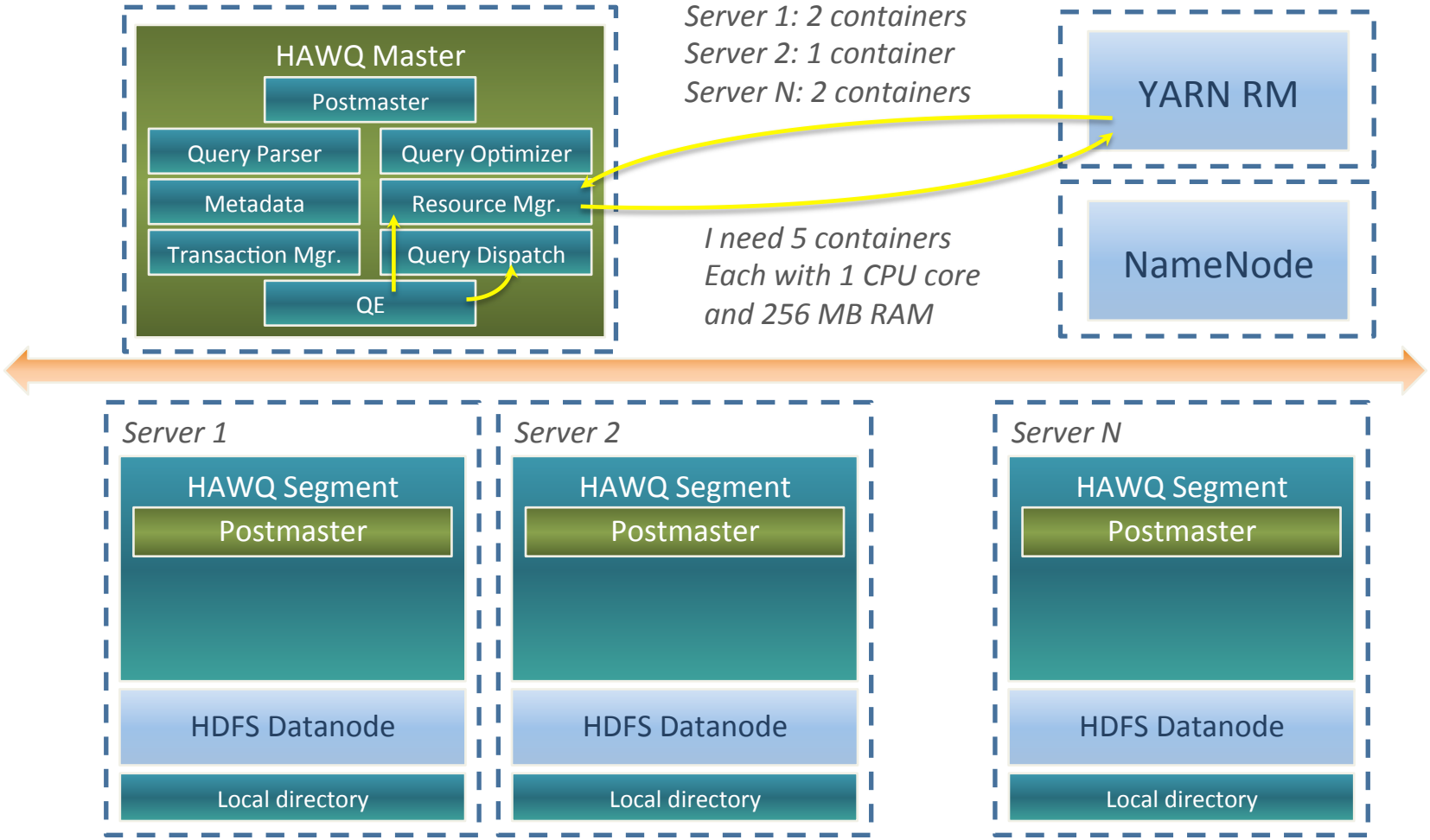

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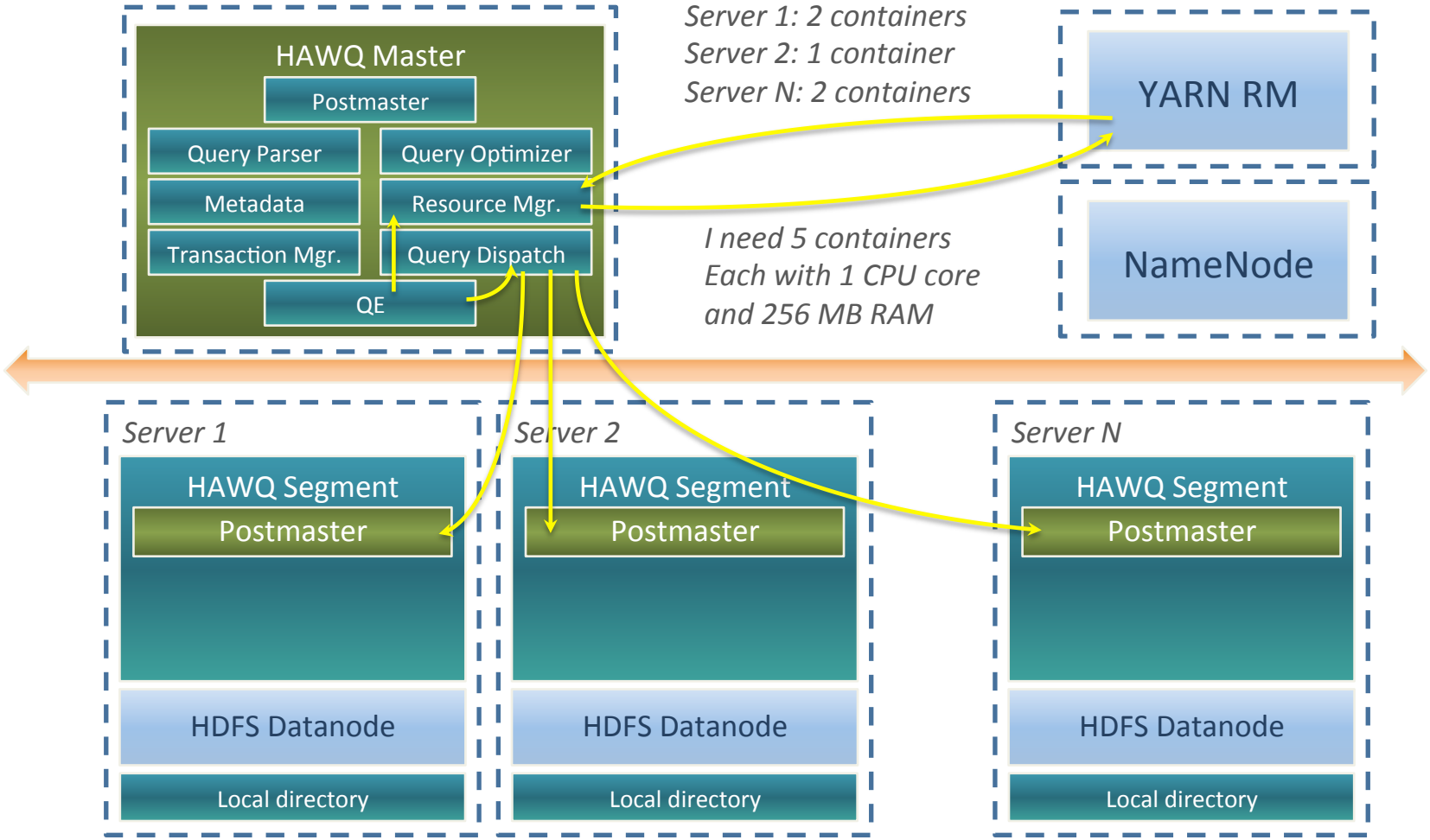

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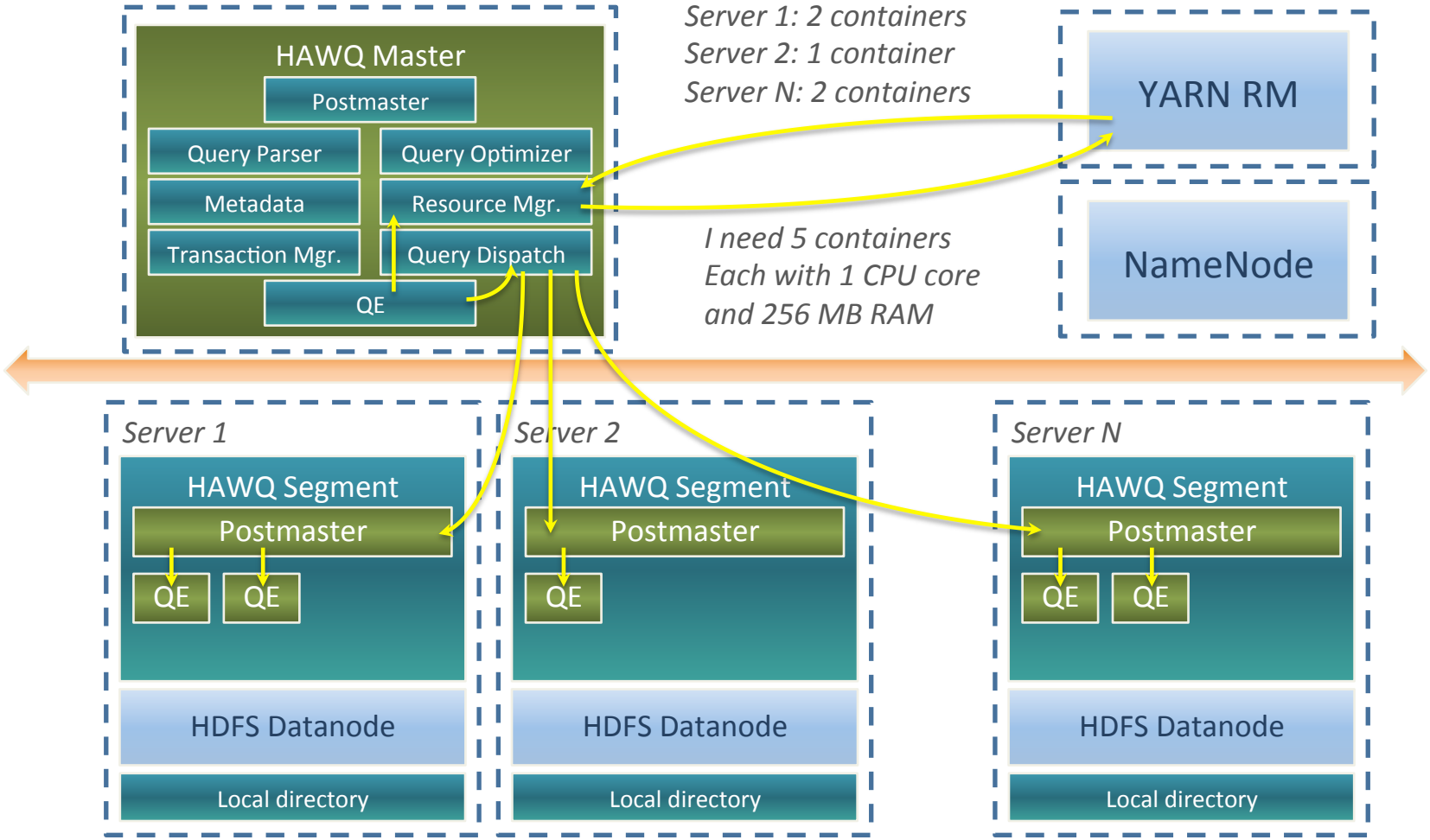

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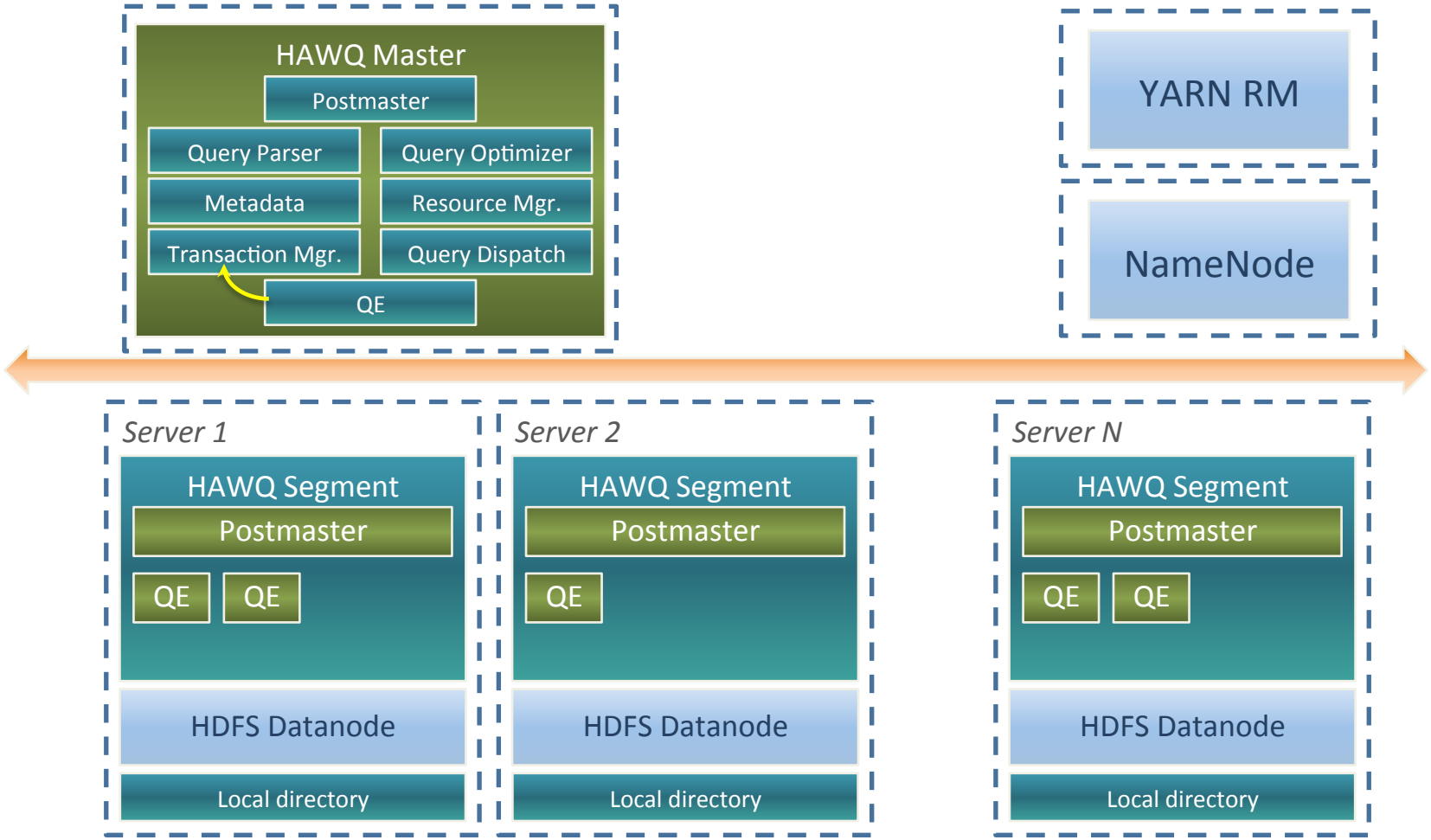

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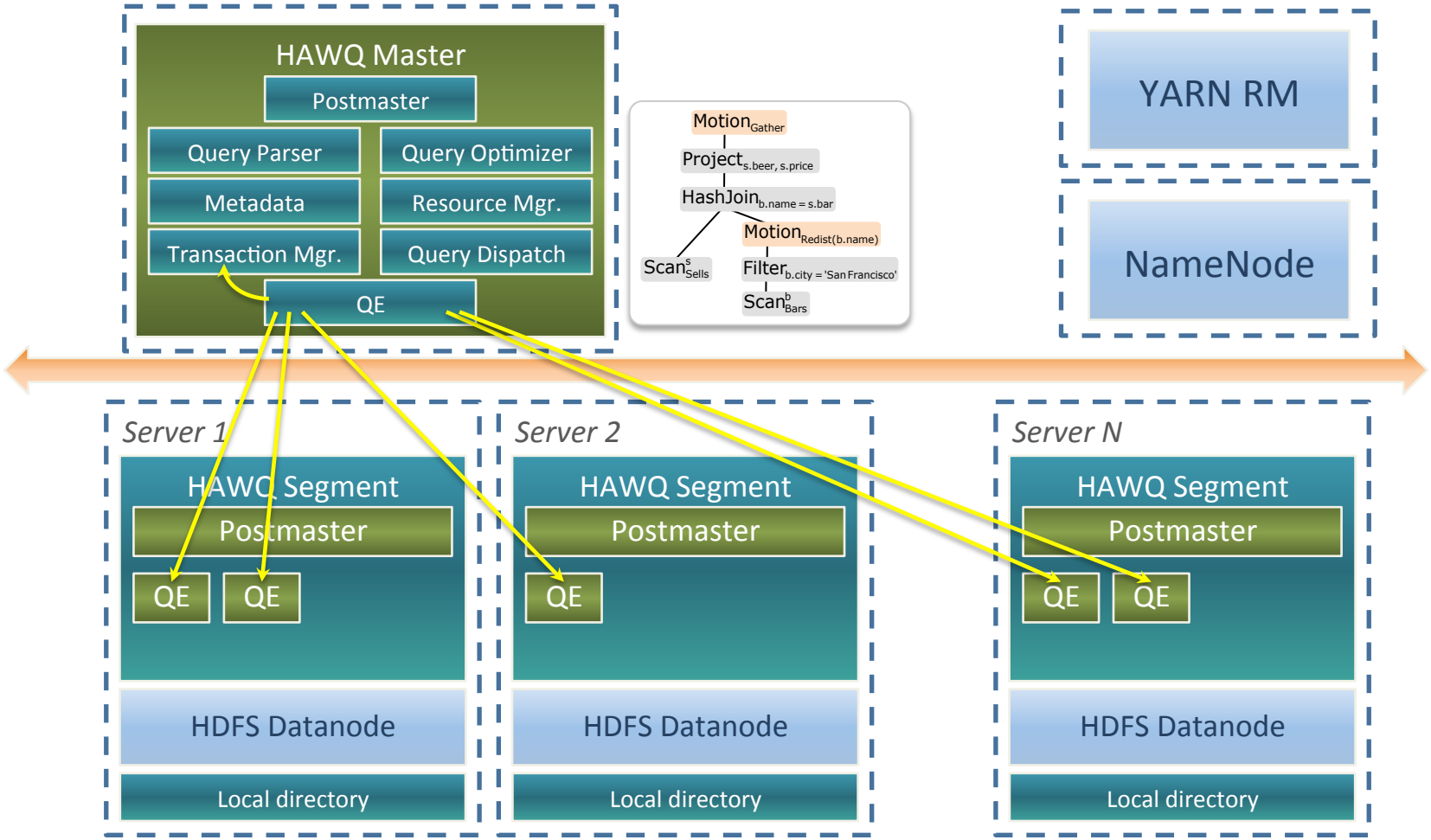

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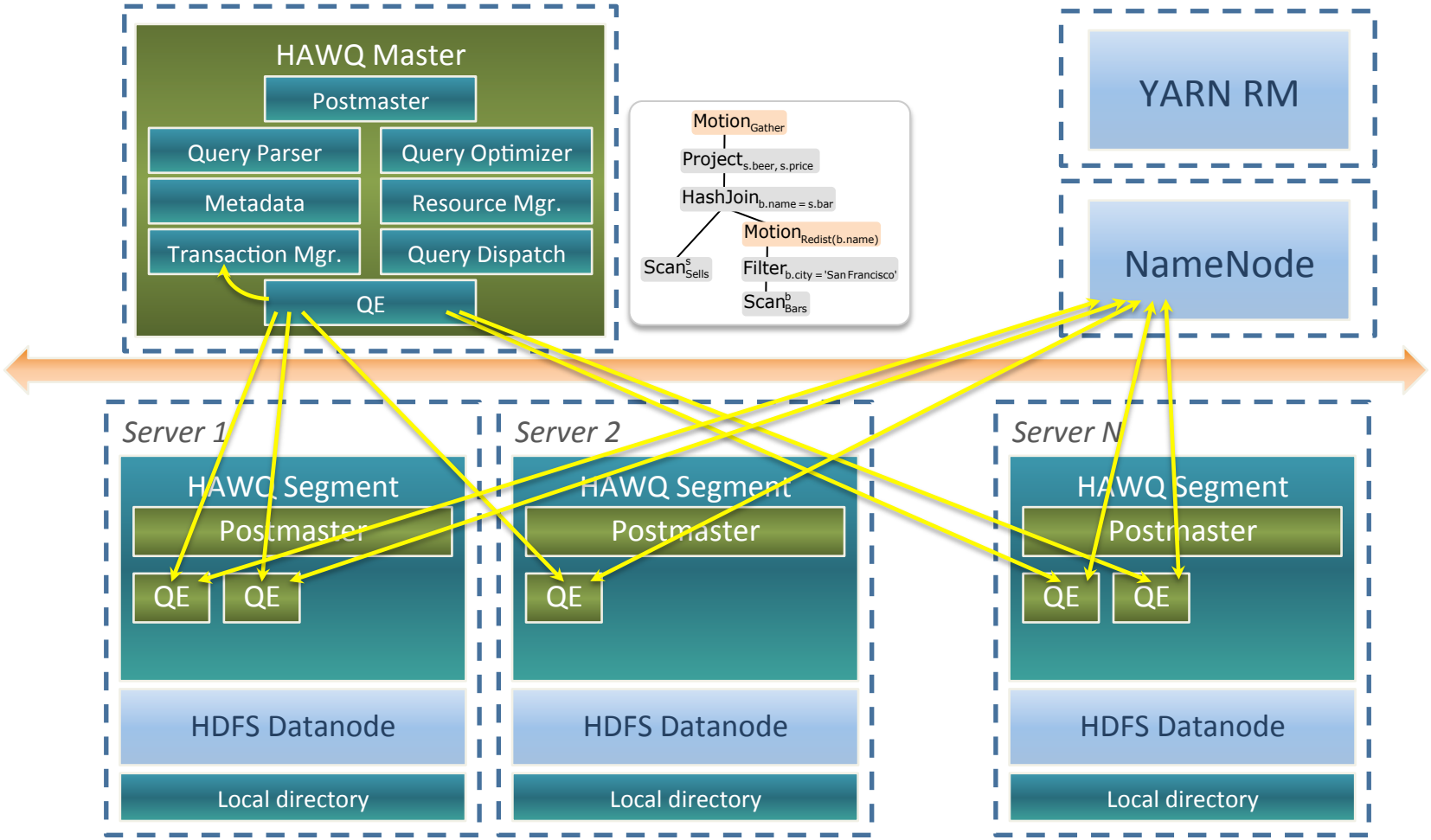

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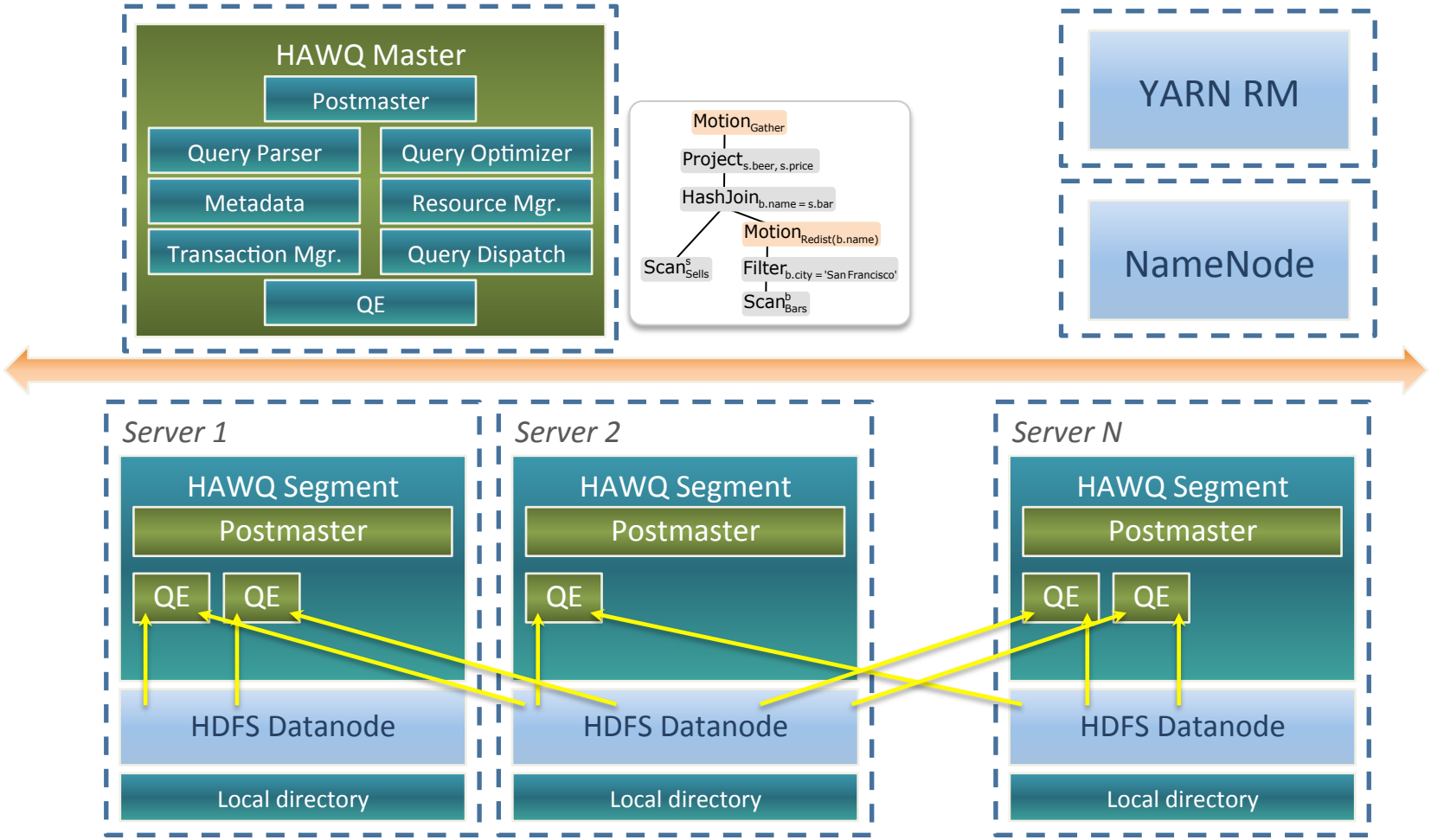

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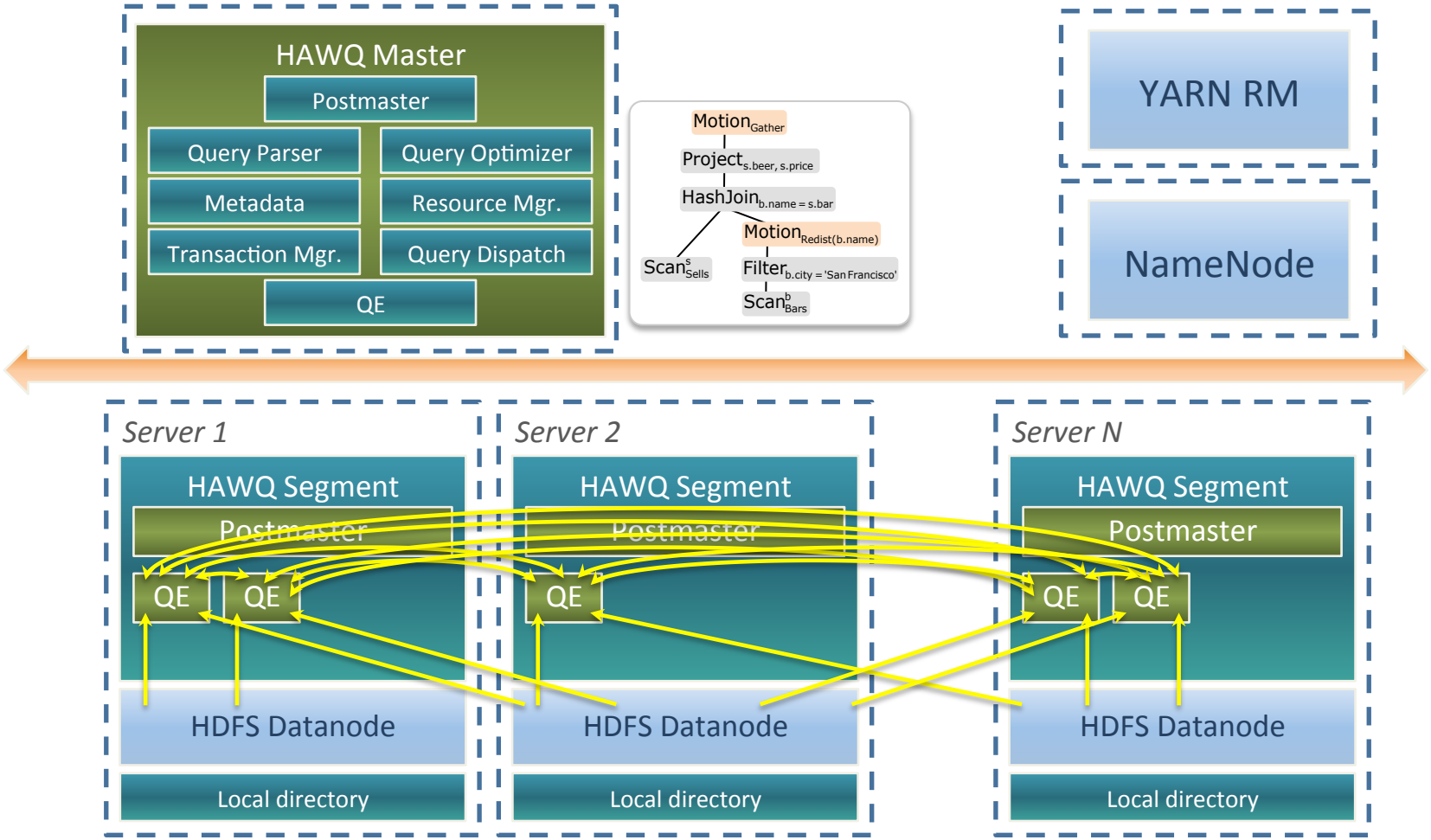

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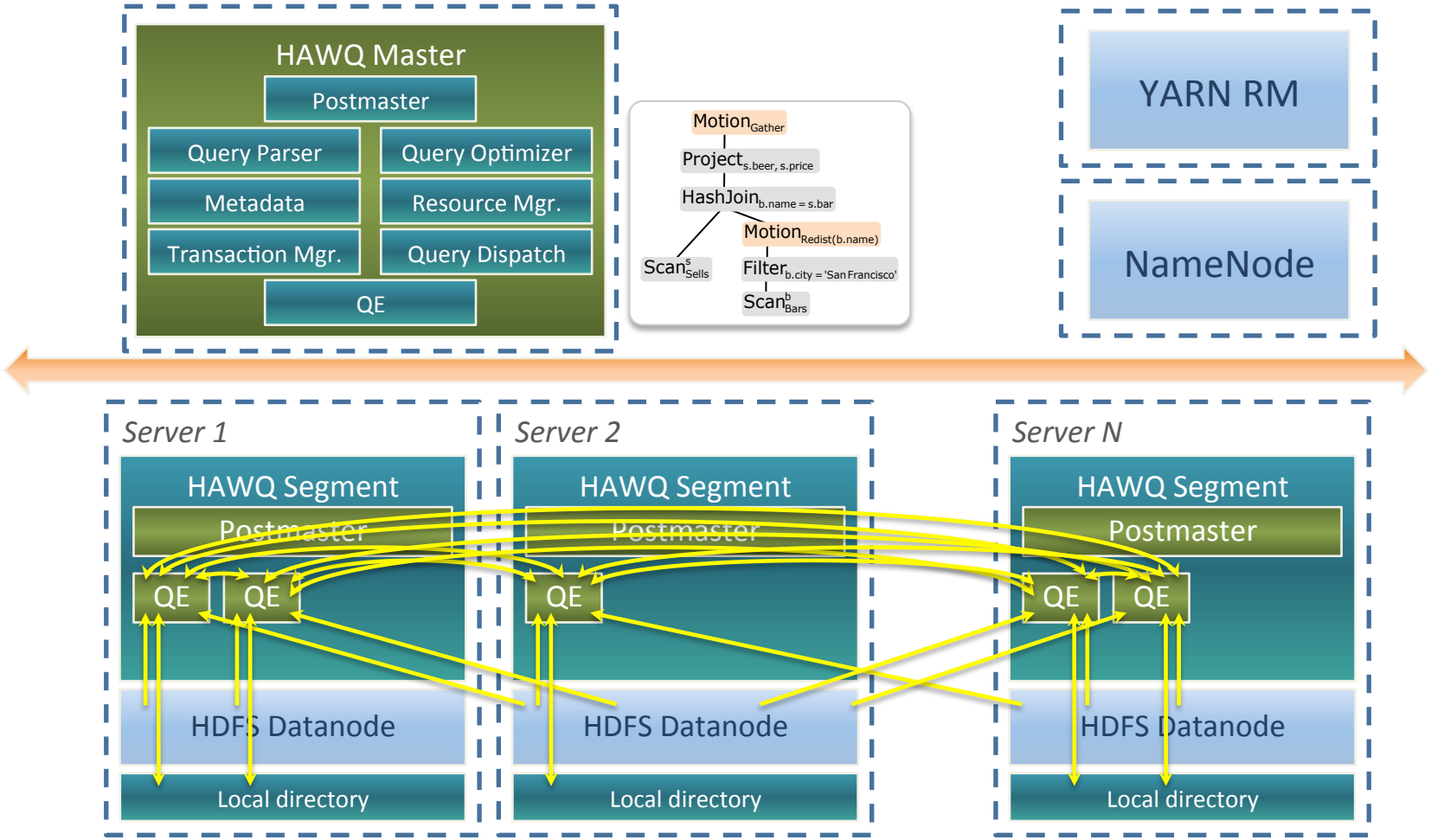

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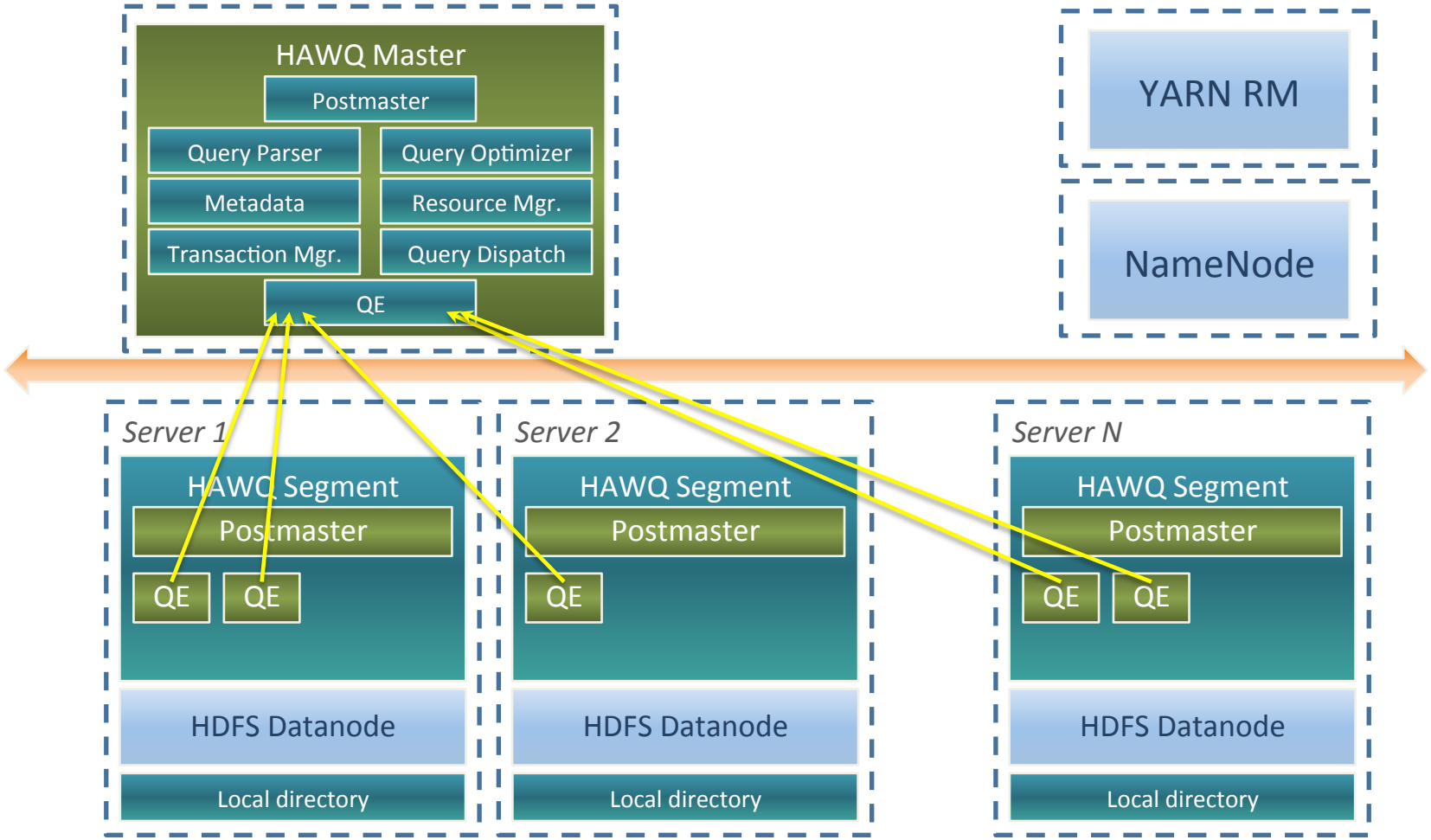

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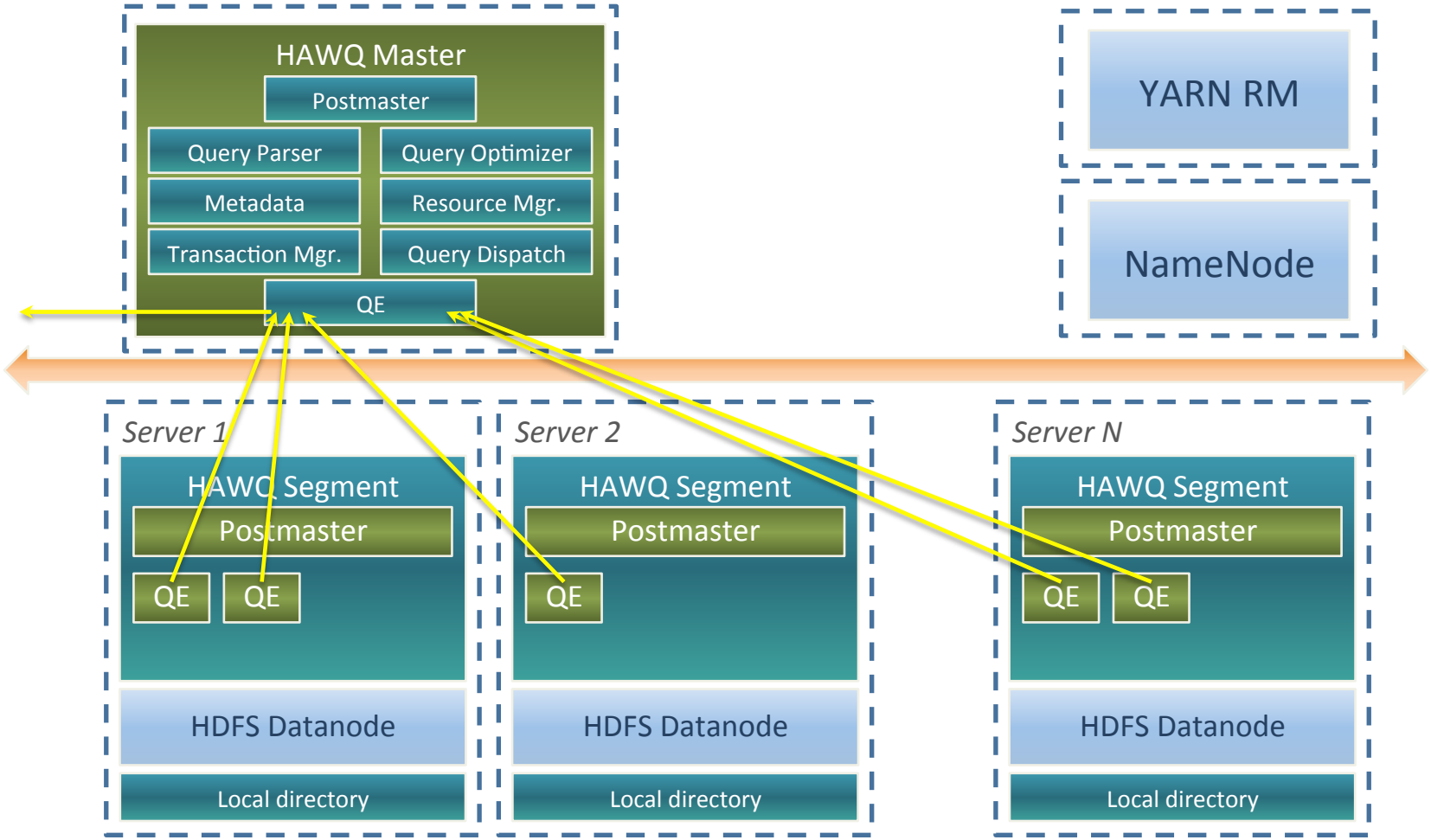

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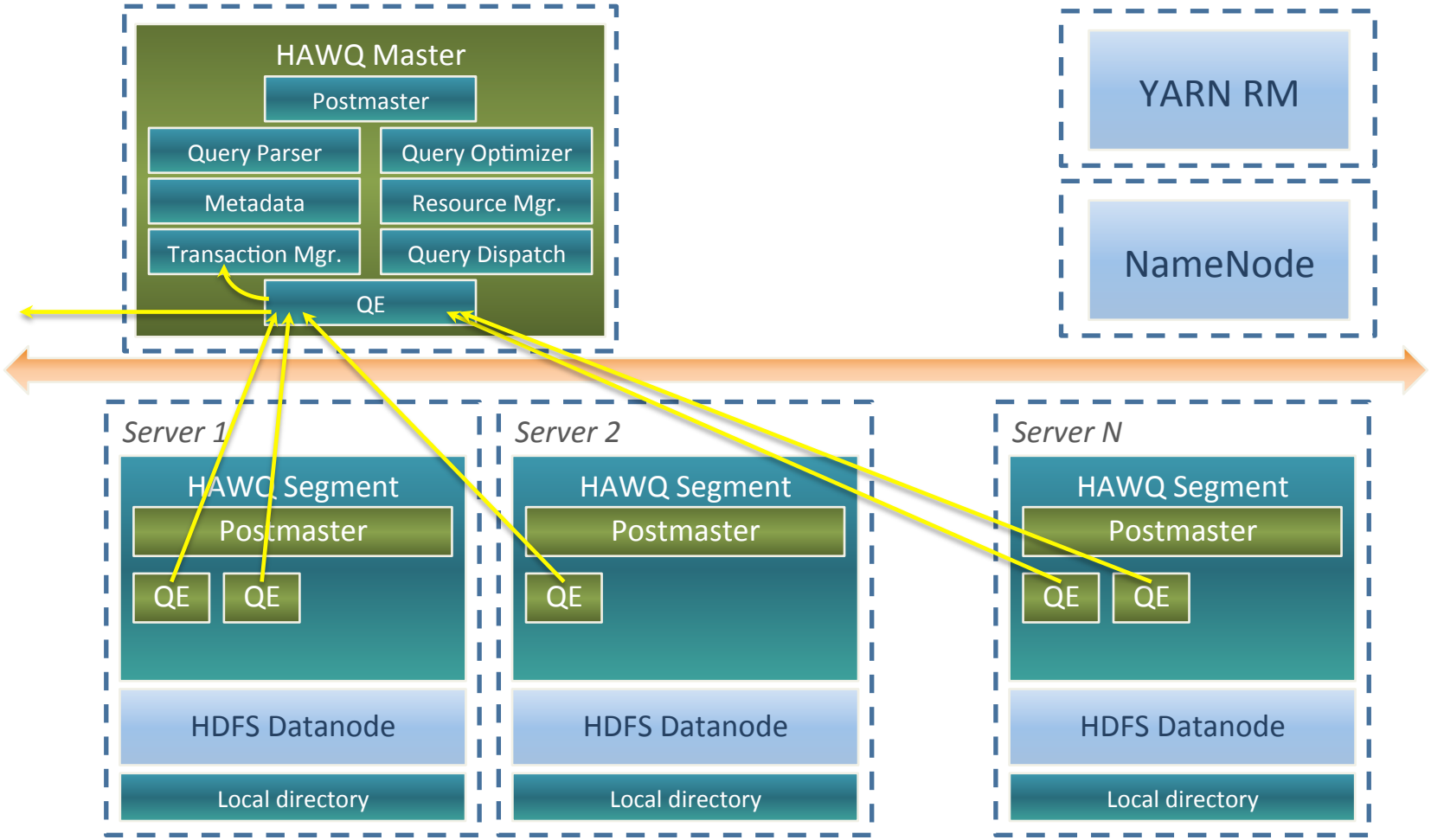

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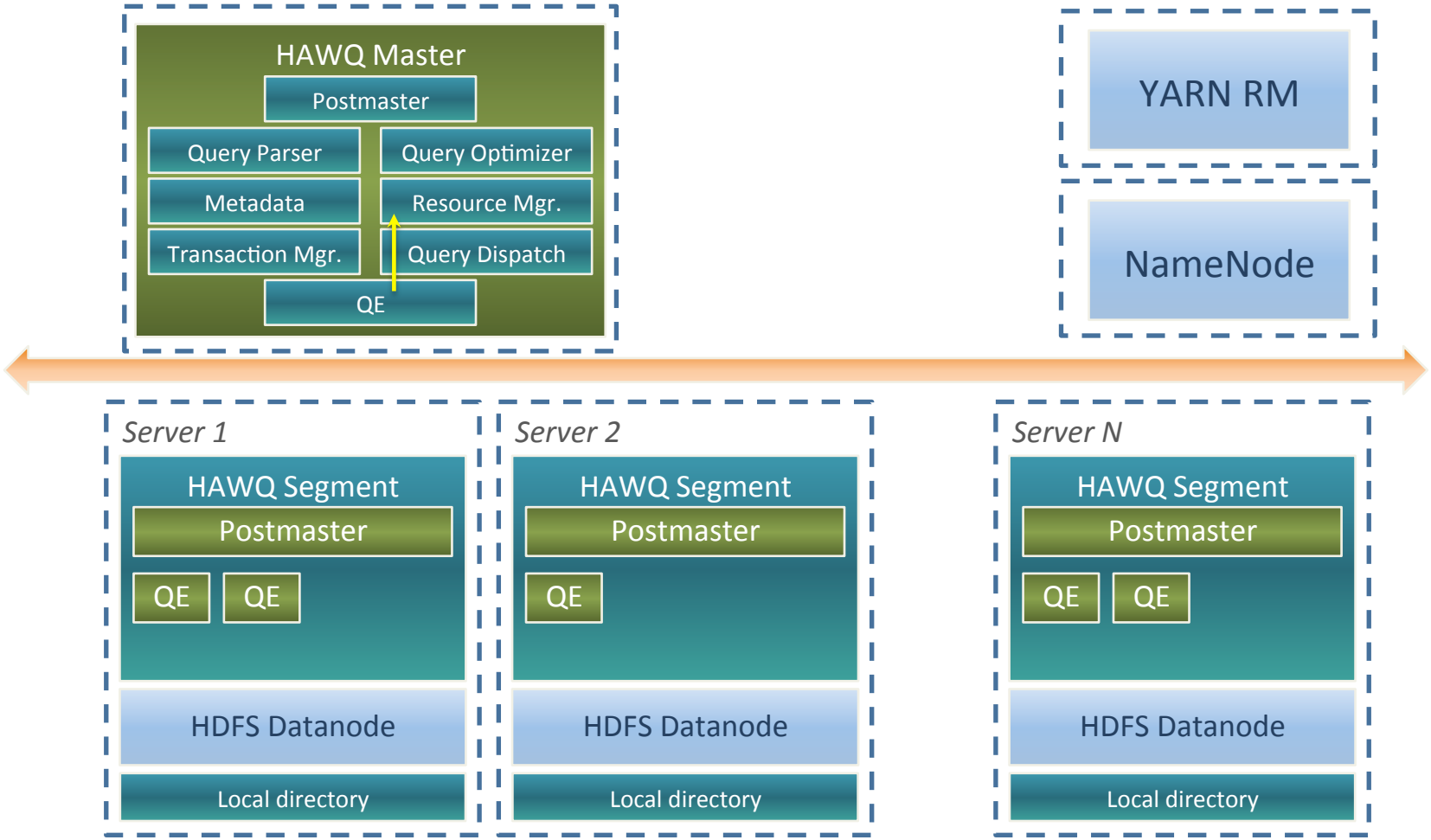

Plan → Resource → Prepare → Execute → Result → Cleanup

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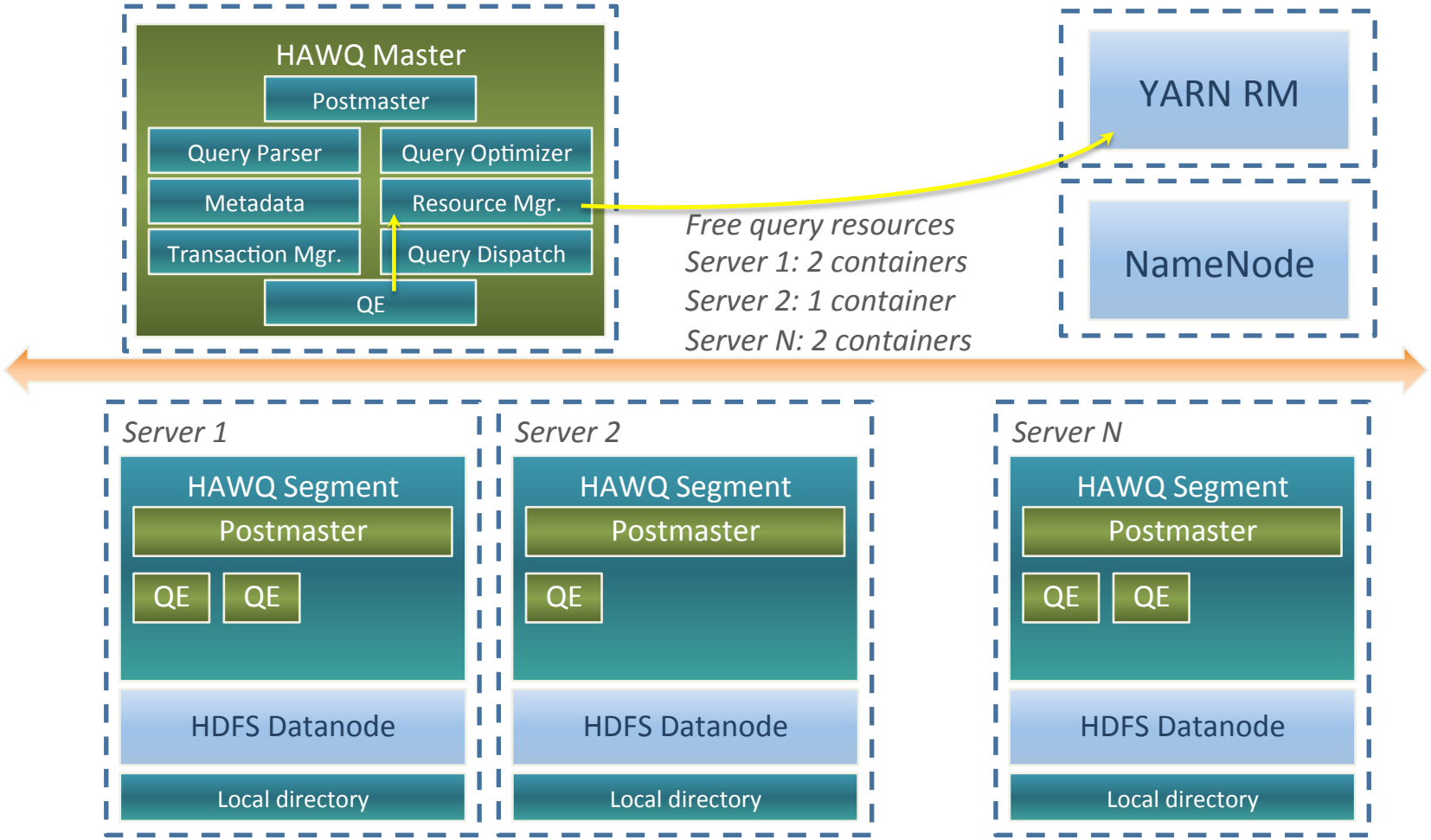

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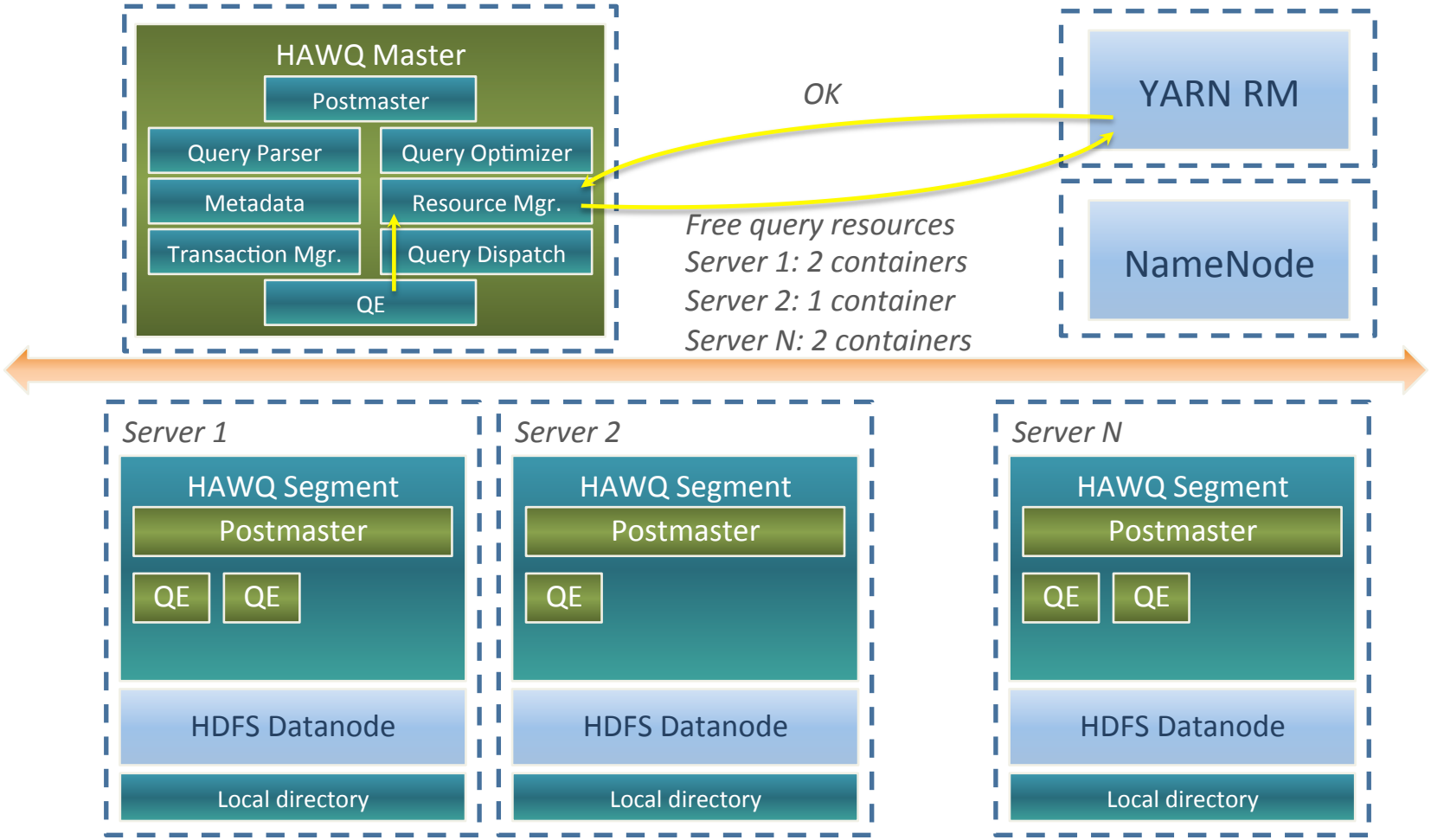

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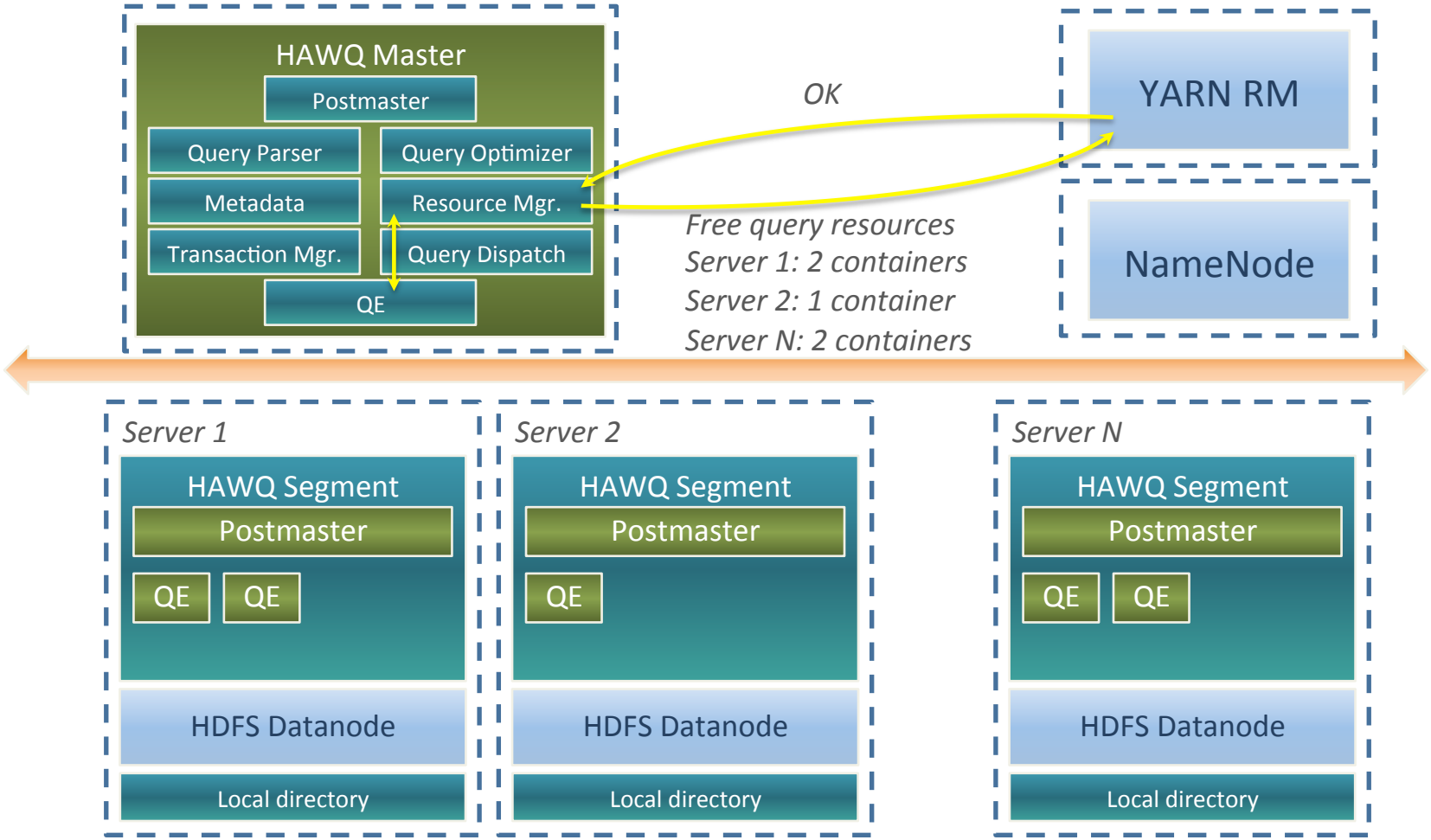

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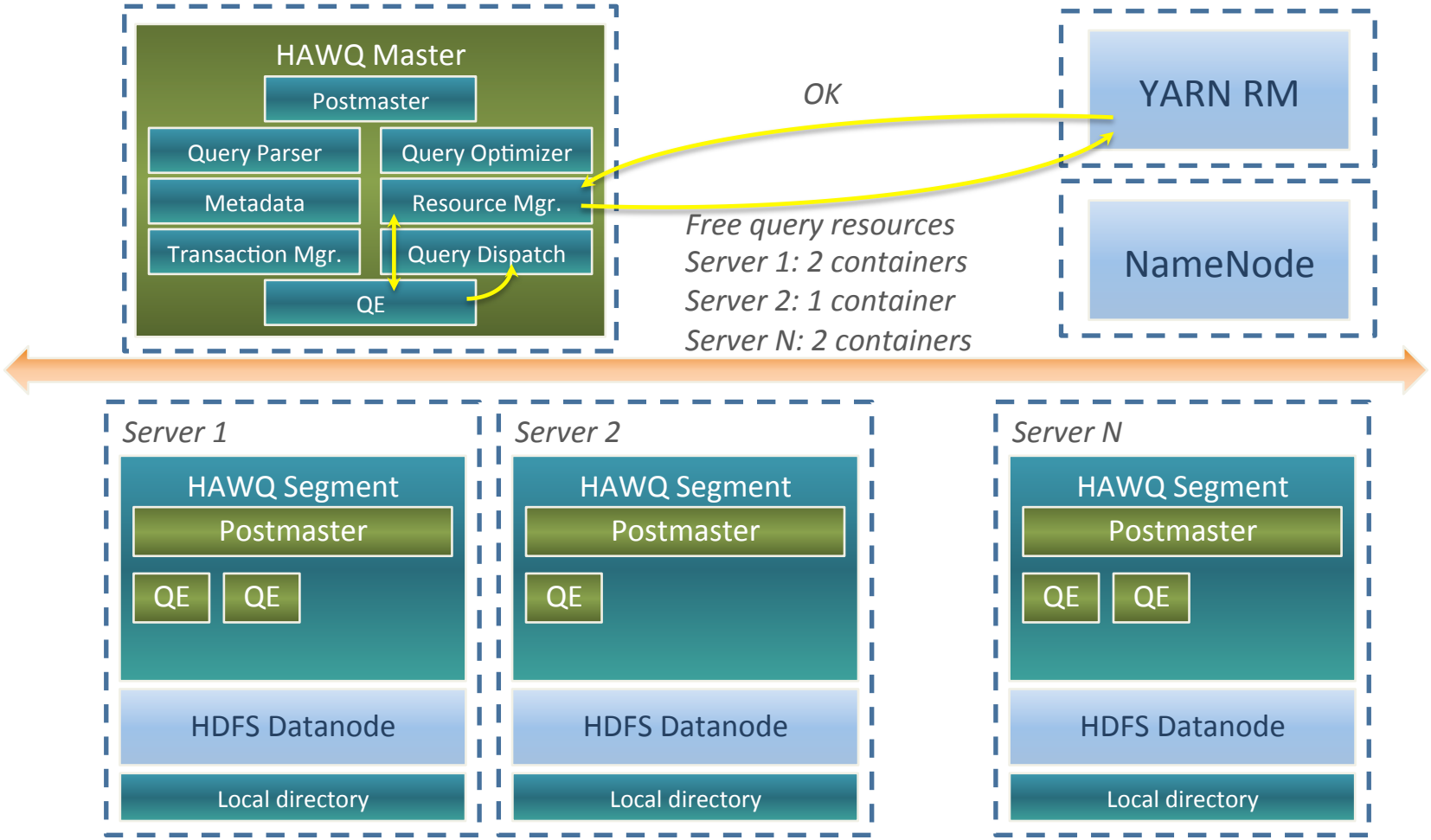

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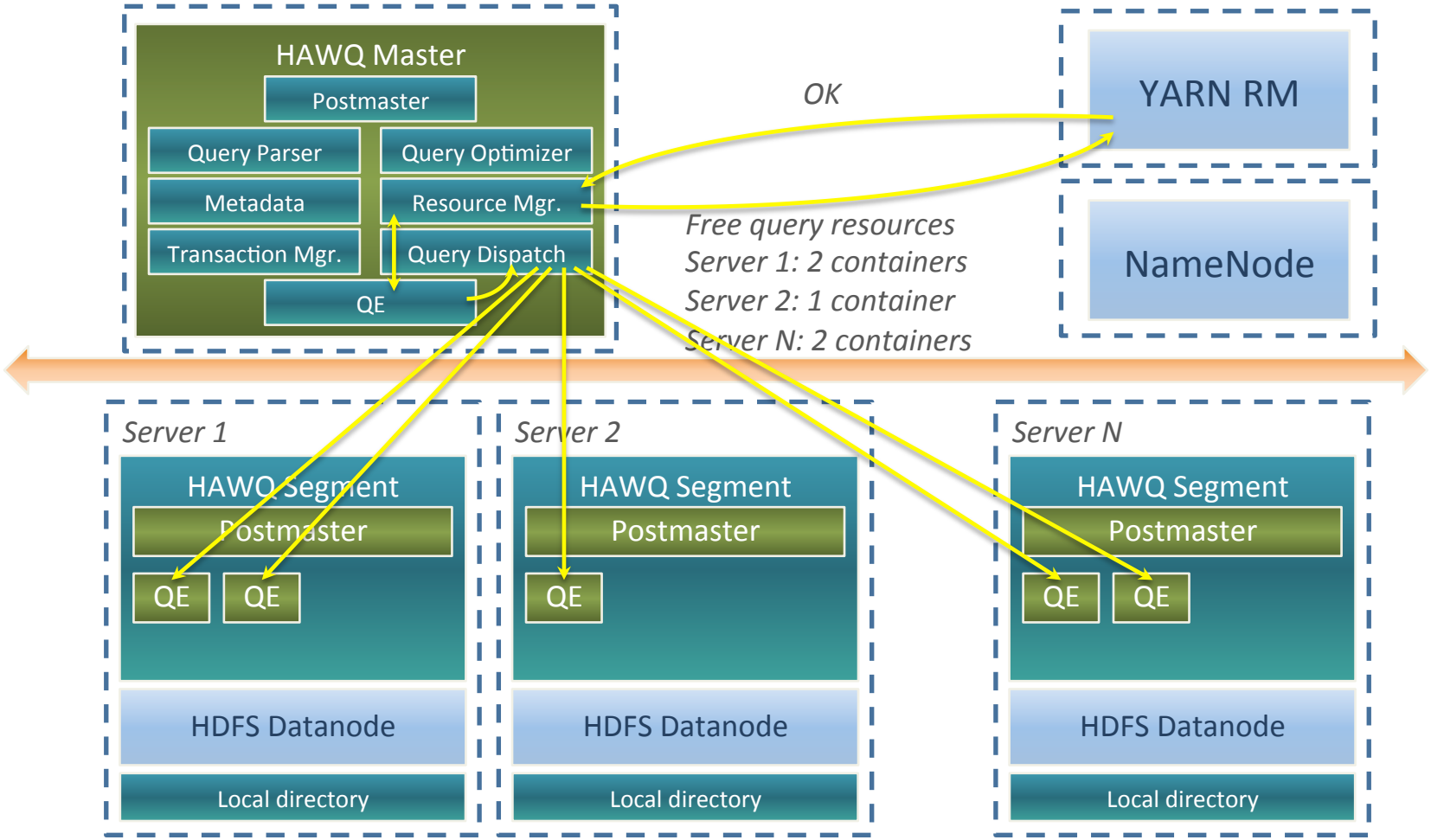

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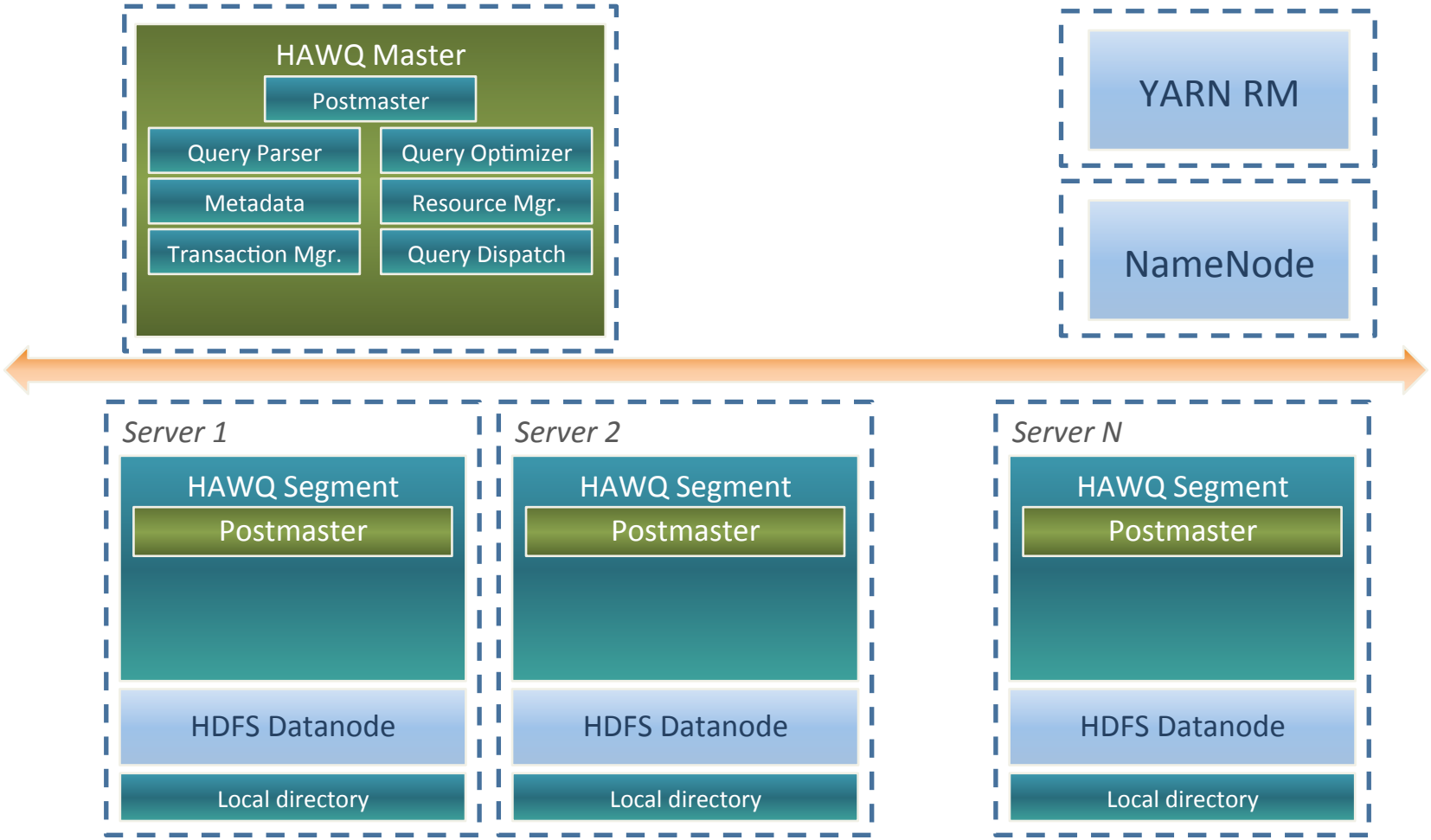

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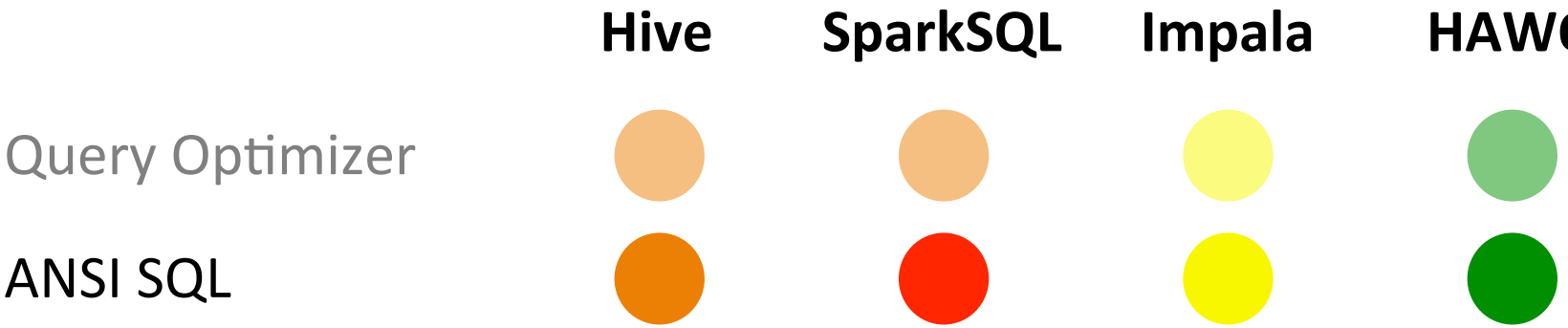
- Query parallelism can be easily tuned

Competitive Solutions

	Hive	SparkSQL	Impala	HAWQ
Query Optimizer				

Competitive Solutions



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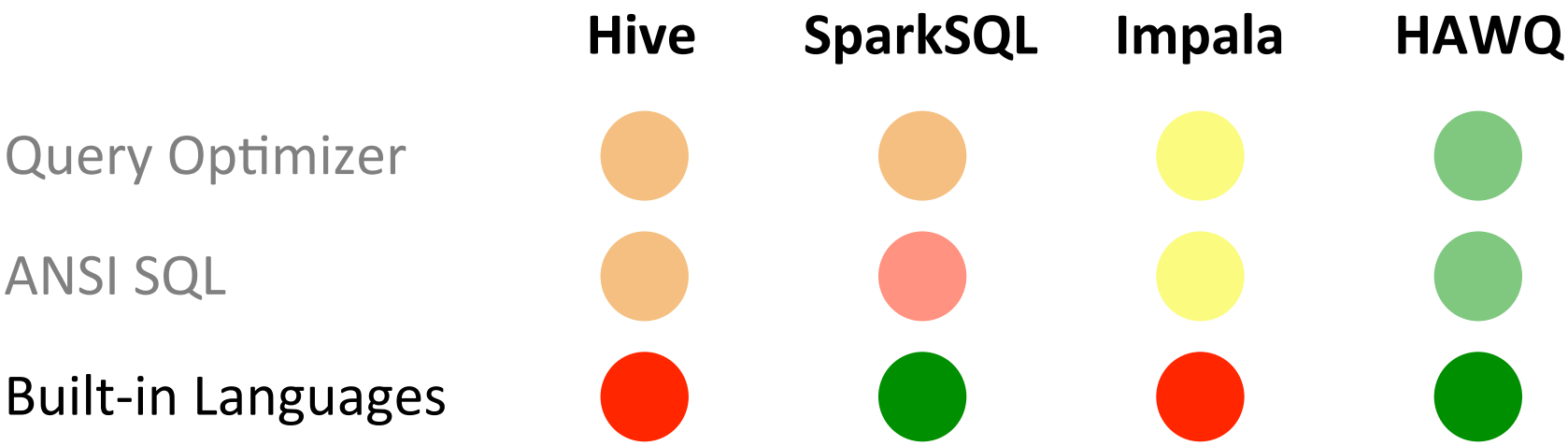

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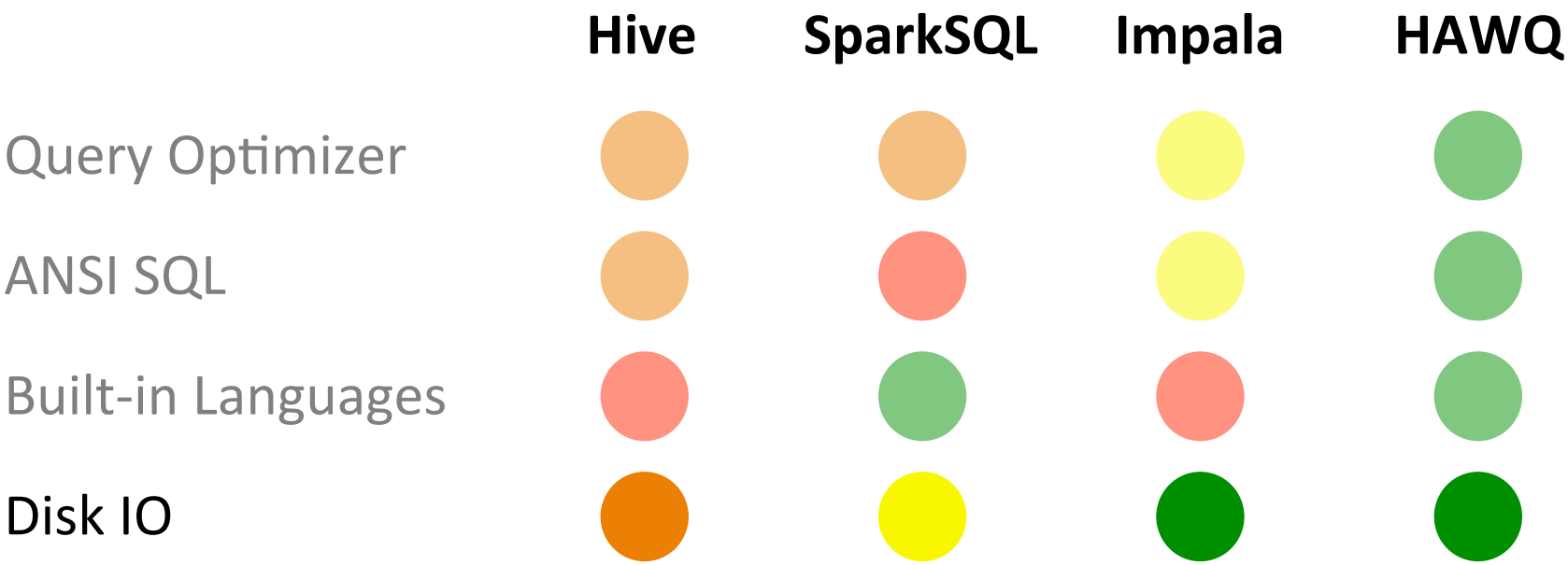

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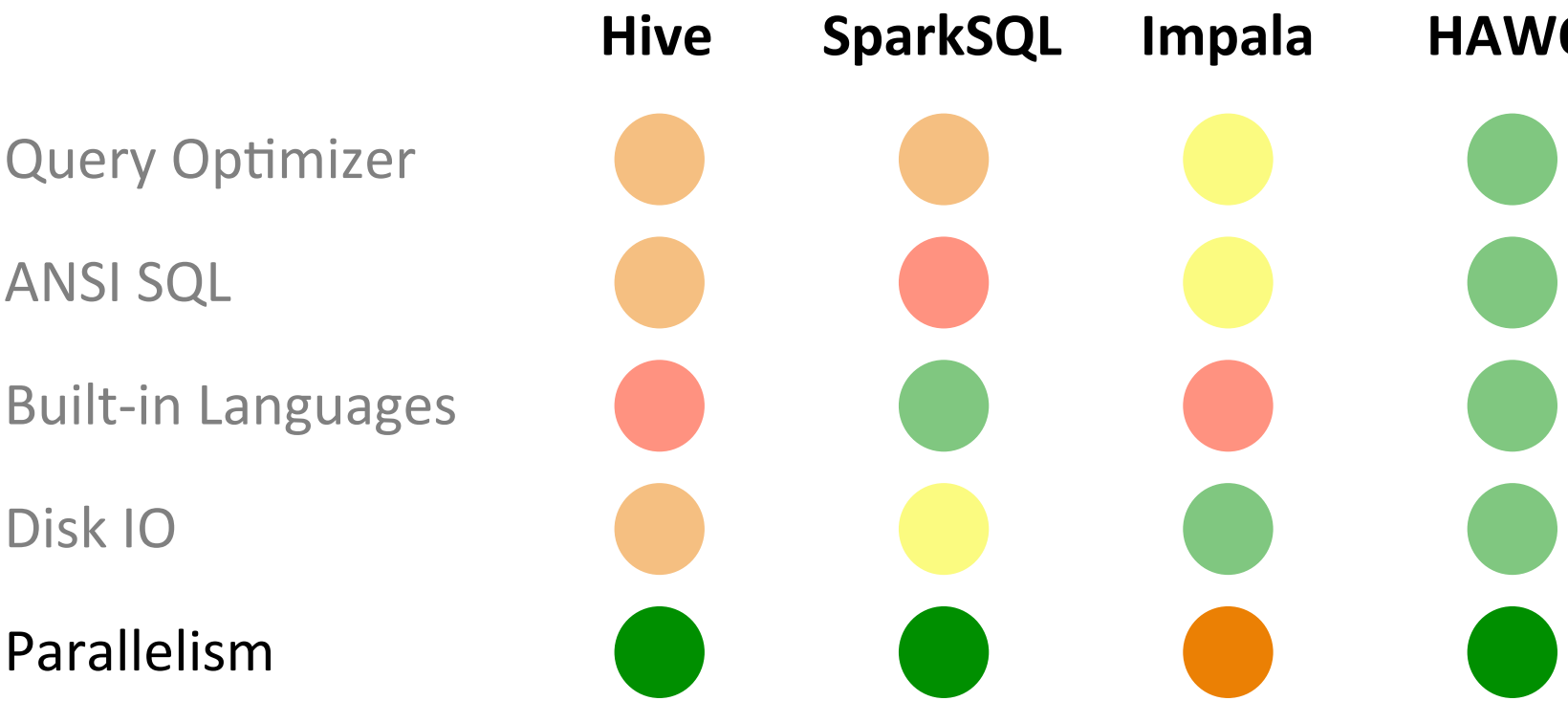

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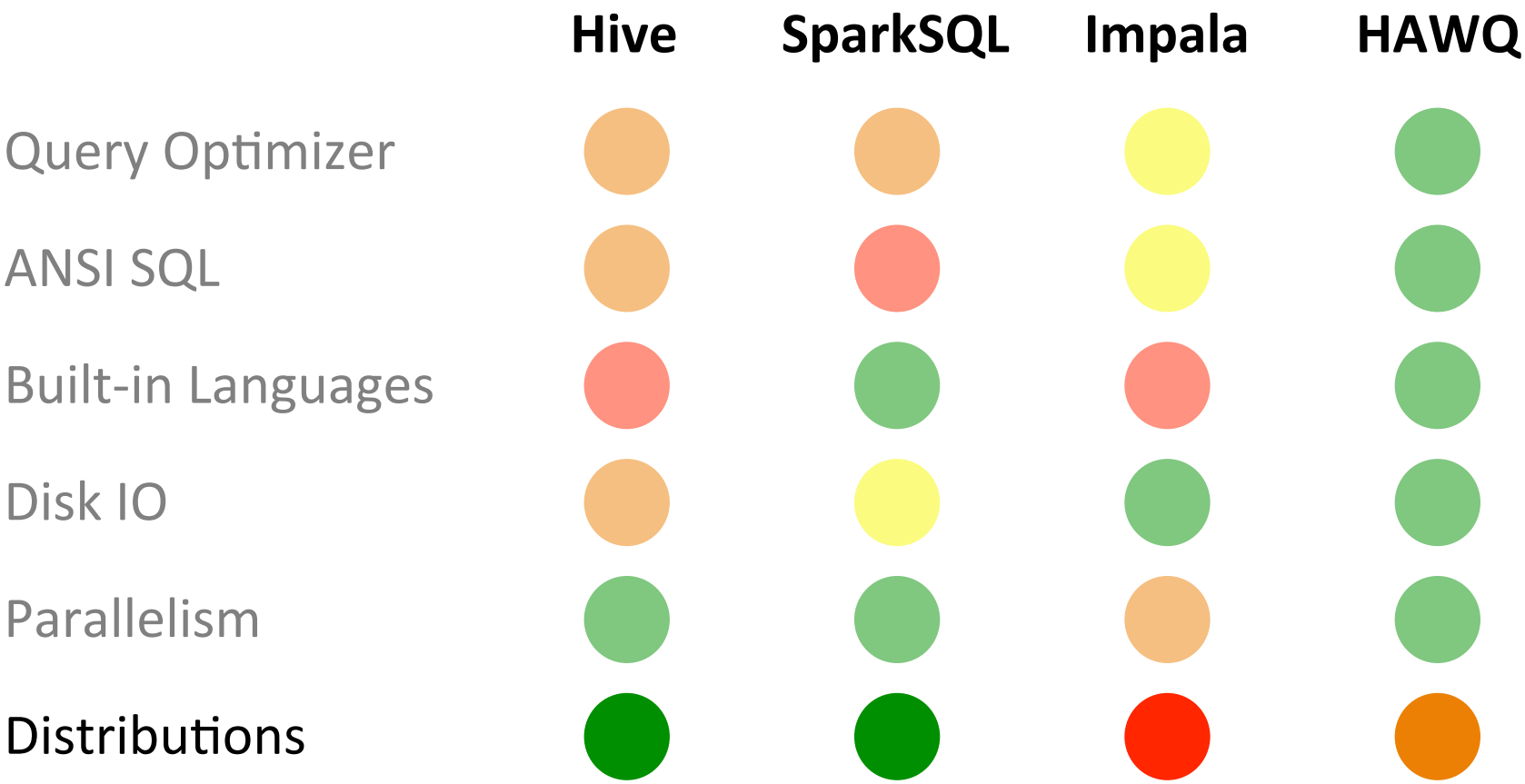

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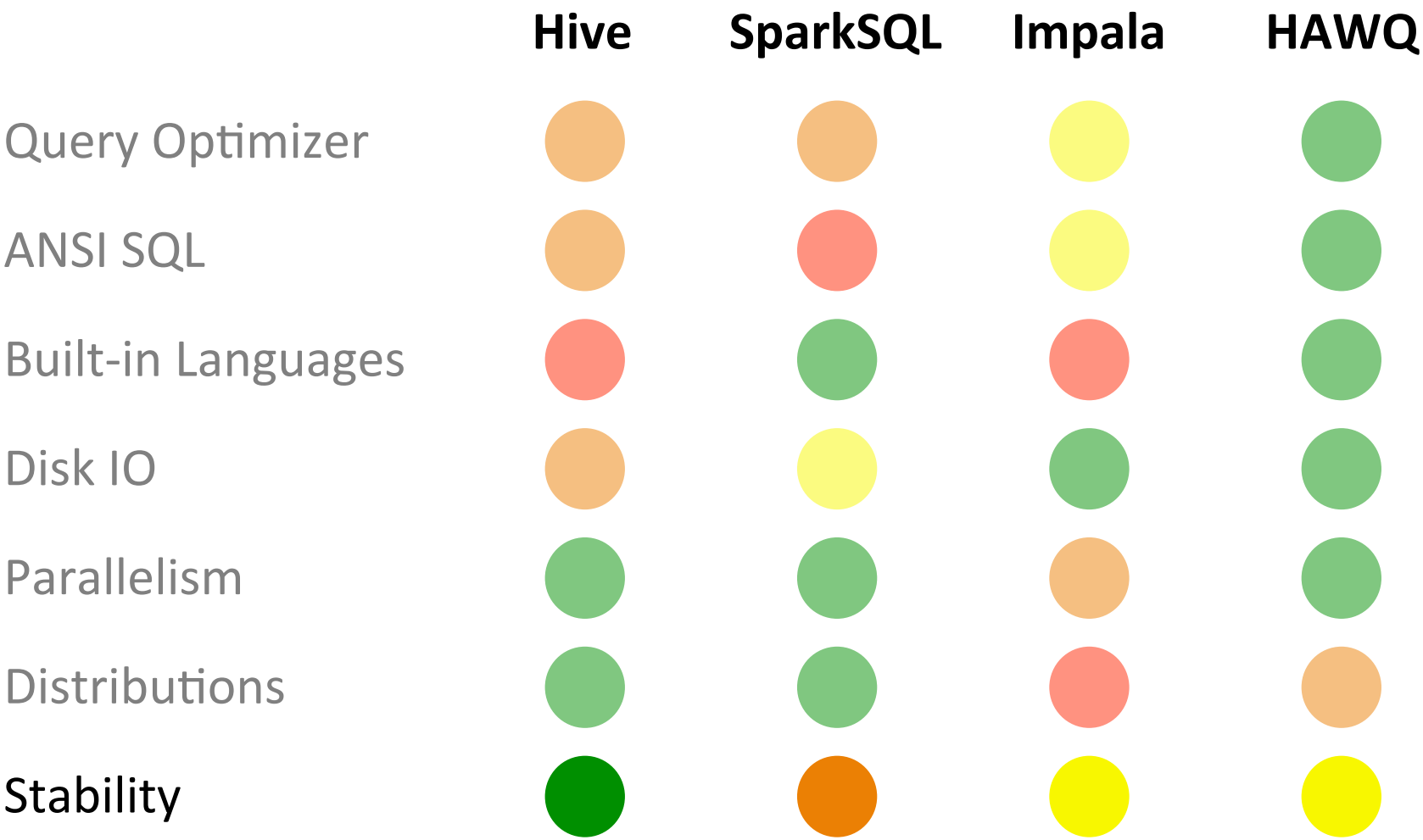

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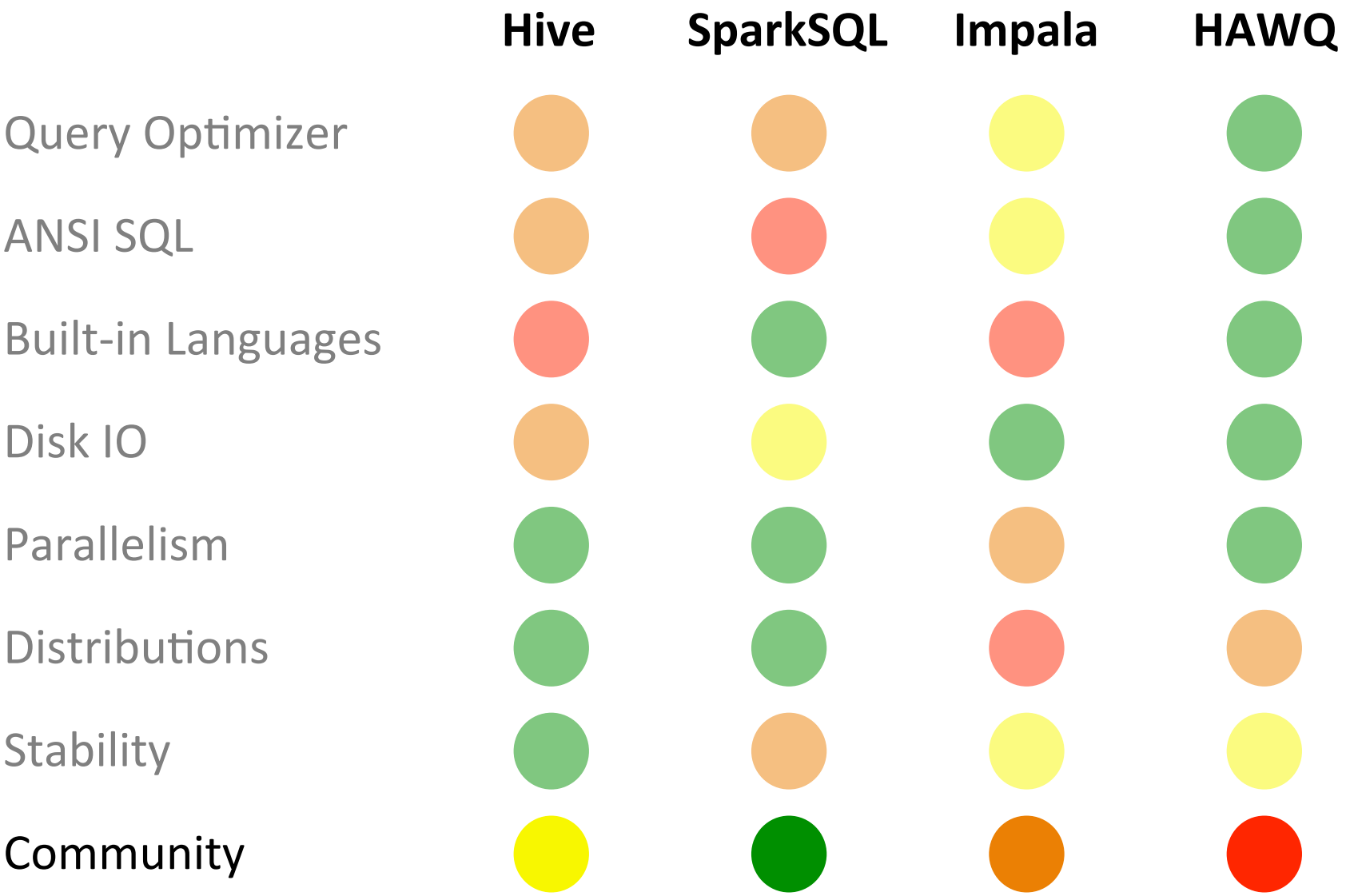

Roadmap

- AWS and S3 integration

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- AWS and S3 integration
- Mesos integration
- Better Ambari integration
- Cloudera, MapR and IBM Hadoop distributions native support
- *Make the SQL-on-Hadoop engine ever!*

Summary

- Modern SQL-on-Hadoop engine
- For structured data processing and analysis
- Combines the best techniques of competitive solutions
- Just released to the open source
- Community is very young

Join our community and contribute!

Questions

Apache HAWQ

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dev@hawq.incubator.apache.org

user@hawq.incubator.apache.org

Reach me on http://0x0fff.com