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DevLive

Level Up

MySQL Summit

Developing Applications with MySQL HeatWave Natively in AWS

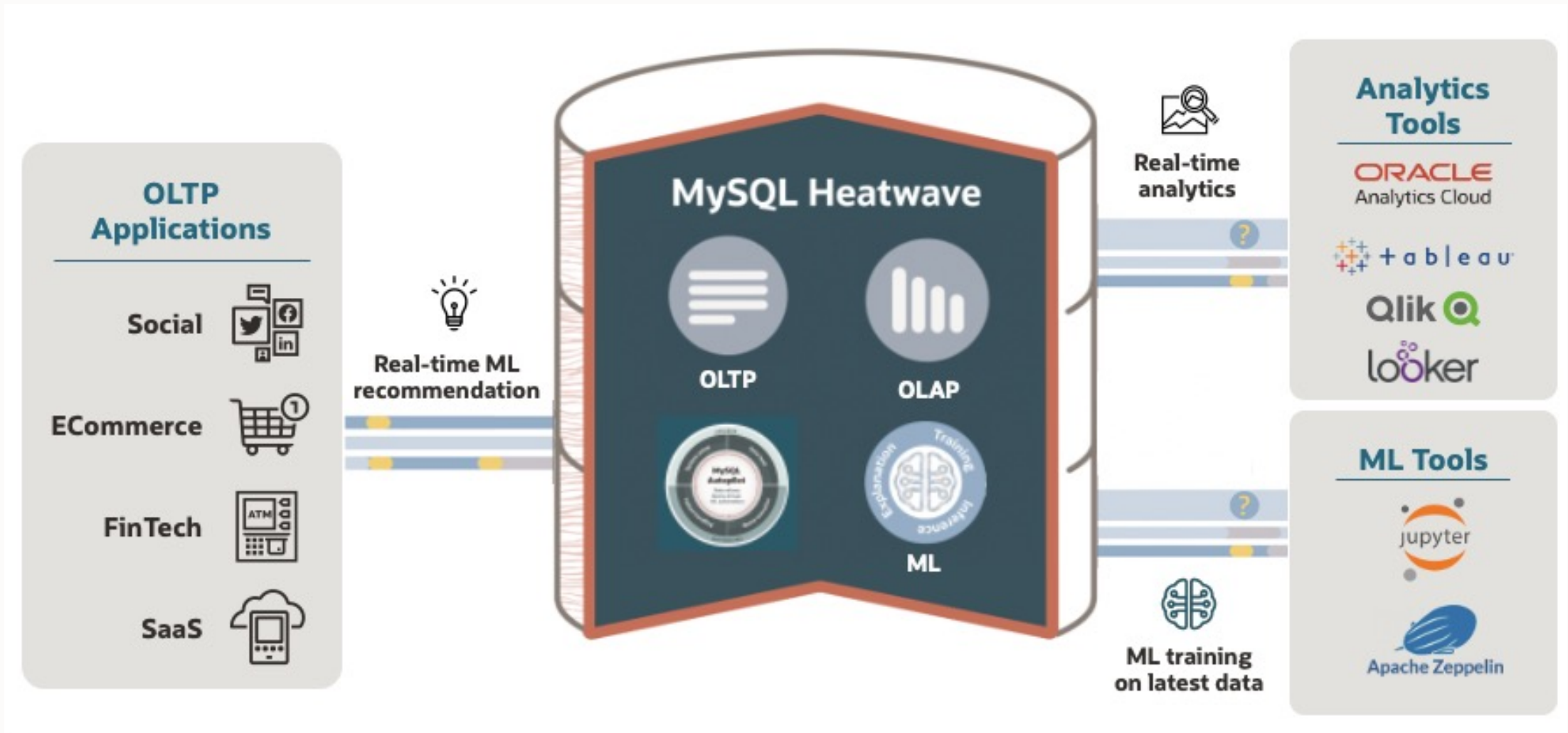
Mandy Pang

Senior Principal Product Manager

Oracle



MySQL HeatWave – single database for OLTP, OLAP, ML



MySQL HeatWave Customer Momentum



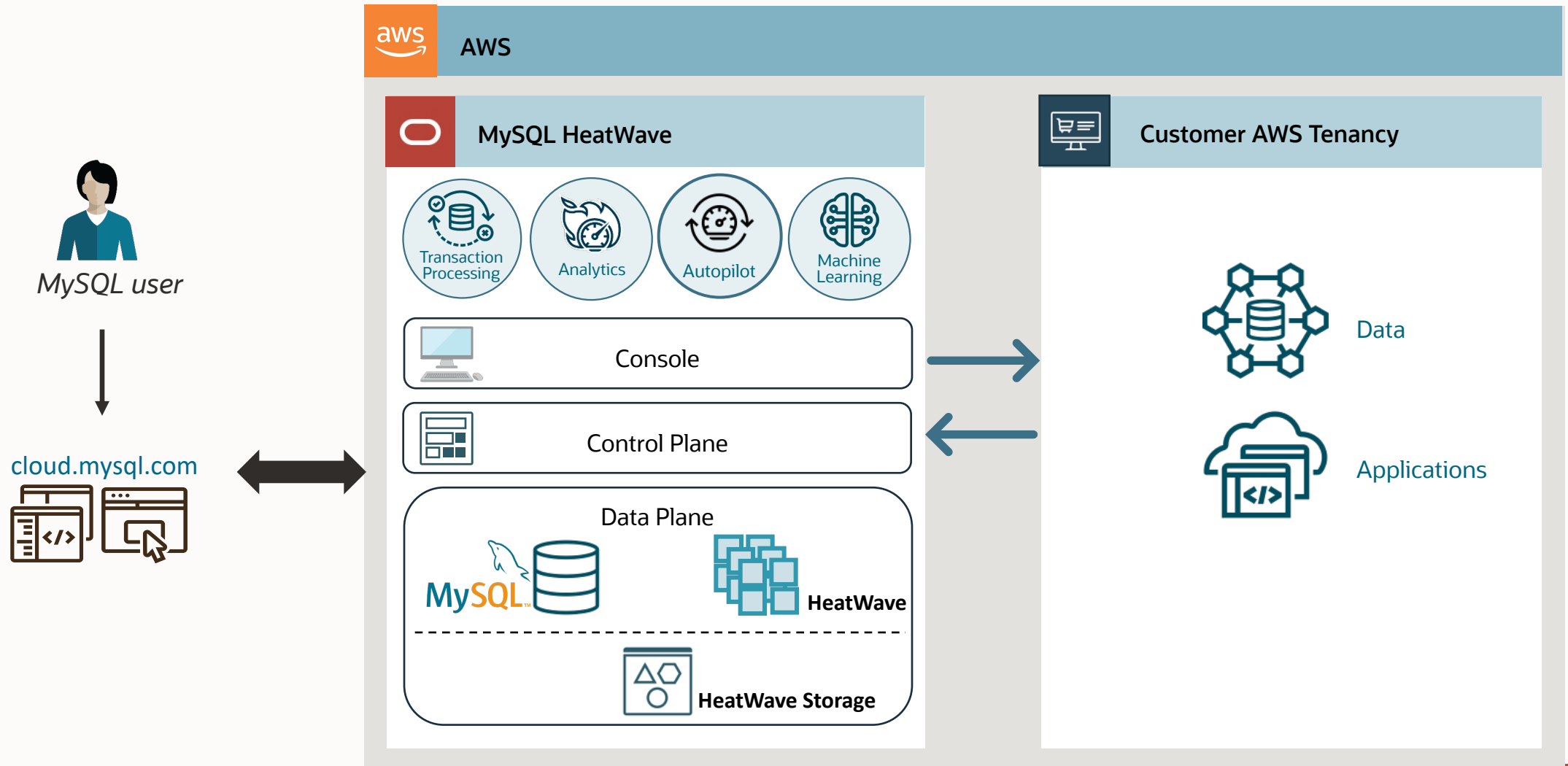
Many customers migrating from other clouds

1. High data egress cost of AWS
2. High latency to access database outside of AWS
3. Compliance issues
4. Integrated with other AWS services



MySQL HeatWave on AWS

Console, Control plane, Data plane run natively in AWS



MySQL HeatWave on AWS

One database for OLTP, OLAP, ML natively on AWS



Fully Managed

Automates Common Tasks

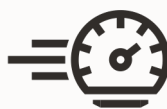
- Provisioning
- Patching
- Upgrades
- Backups



One Database

Single Database for OLTP and OLAP

- Eliminates ETL
- Real-time analytics
- Improves security
- No changes to MySQL applications



Unmatched Performance

Best Price Performance on AWS

- 20x faster analytics
- 25x faster ML
- Up to 10x better OLTP throughput



HeatWave ML

In-database Machine Learning

- Build ML models
- Train ML models
- Tune ML models
- Explain ML models



MySQL Autopilot

ML Based Automation

- Auto provisioning
- Auto parallel load
- Auto data placement
- Auto shape prediction



MySQL HeatWave Console

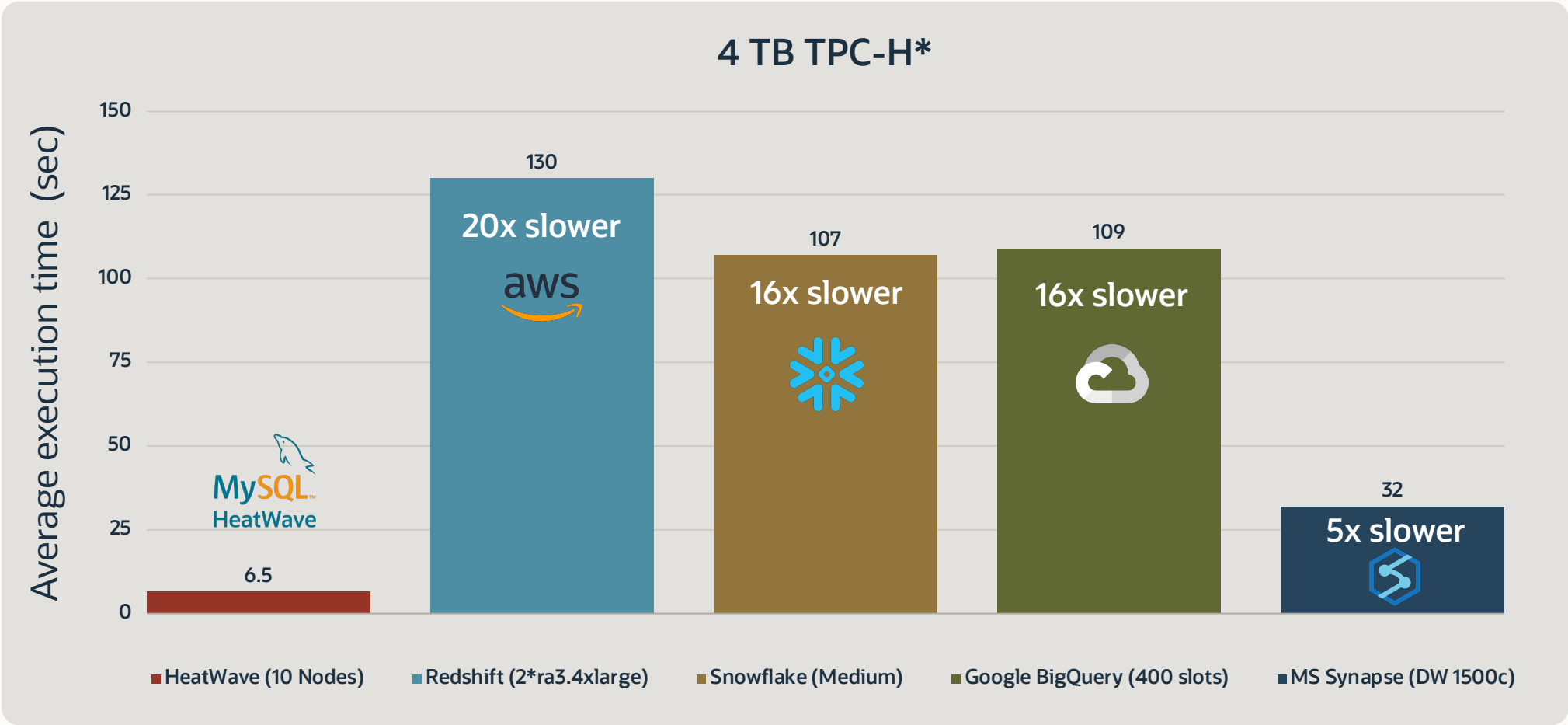
Interactive Query UI and Data Management

Monitoring

HeatWave ML

MySQL Autopilot

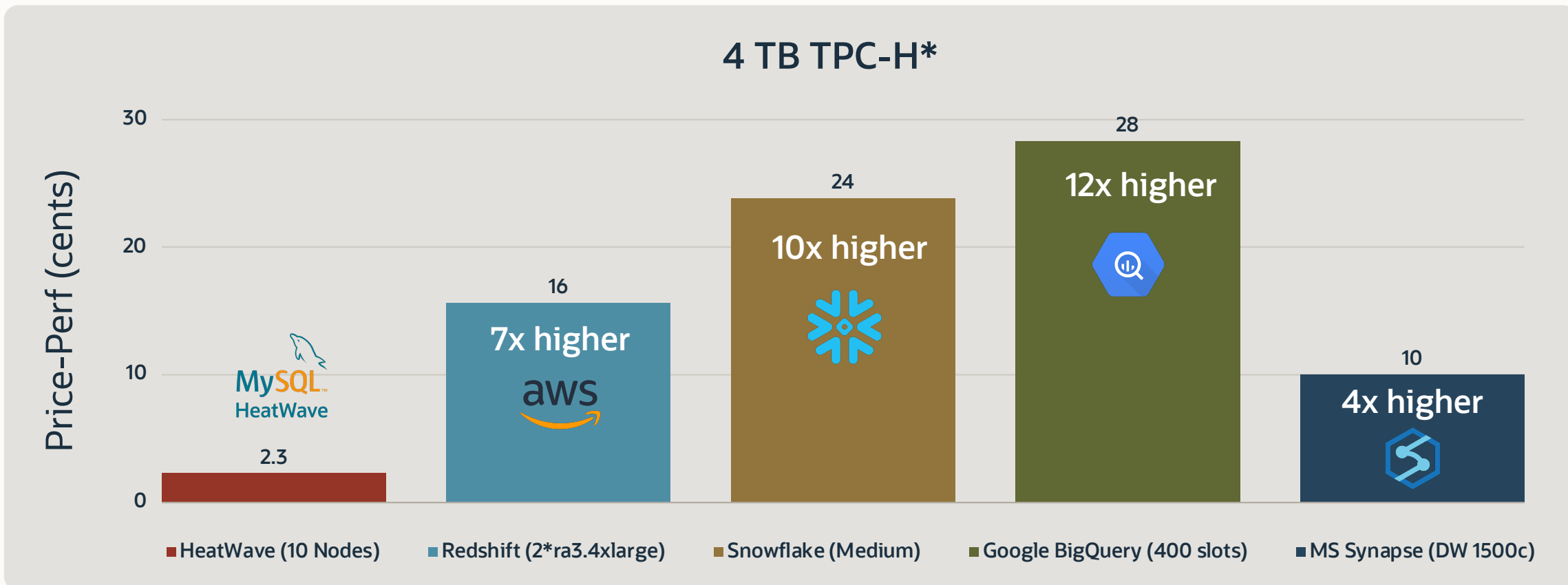
MySQL HeatWave on AWS is faster than Redshift, Snowflake, BigQuery, Synapse



*Benchmark queries are derived from the TPC-H benchmarks, but results are not comparable to published TPC-H benchmark results since these do not comply with the TPC-H specifications.



Better price performance compared to competitors



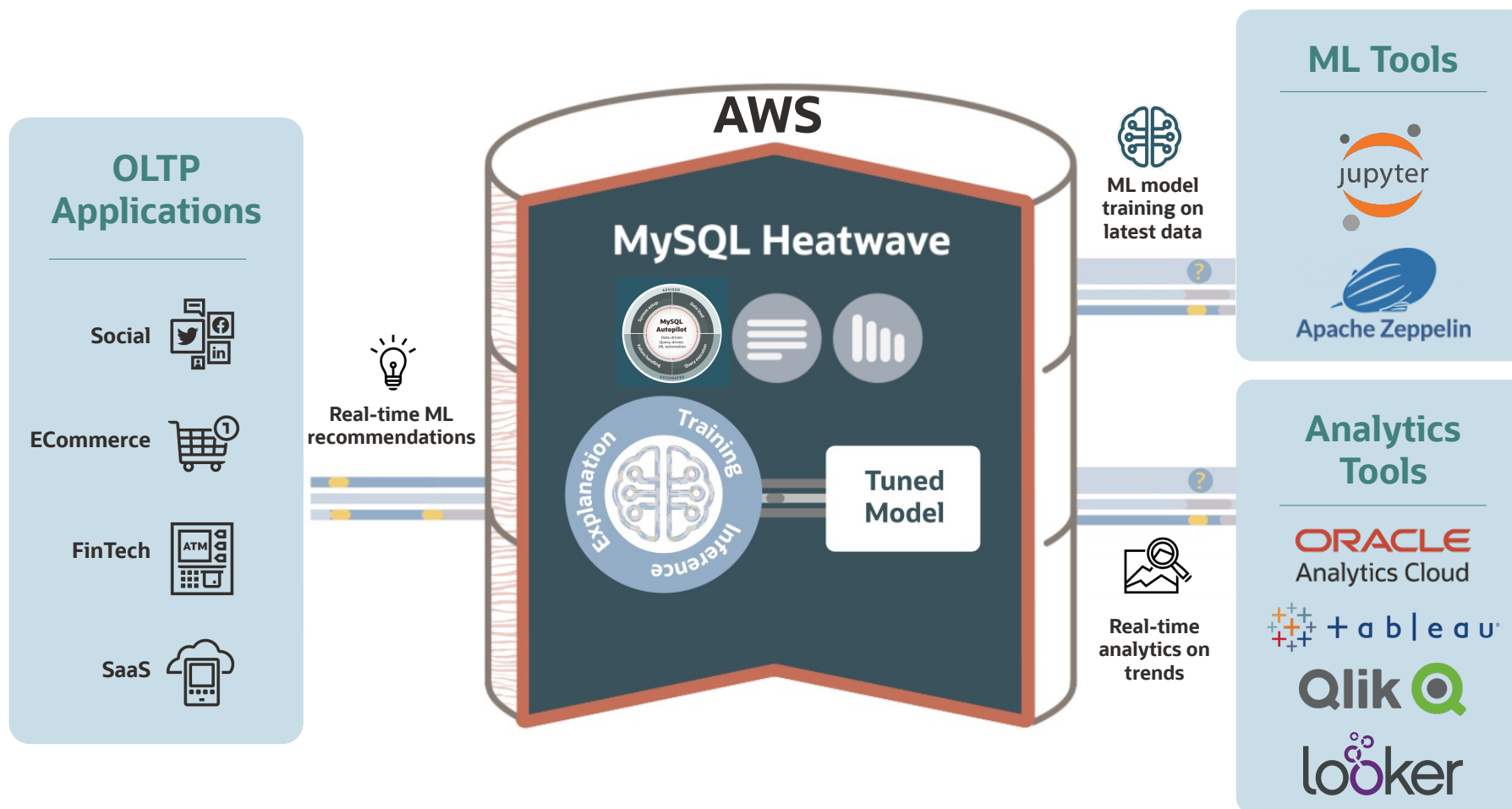
- Only compute costs are considered above
- Pricing for Redshift is based on 1-year reserved instance, paid upfront. For Snowflake is based on **standard edition**
- Pricing for Google BigQuery is based on monthly flat rate commitment. For Azure Synapse is based on 1-year reserved pricing

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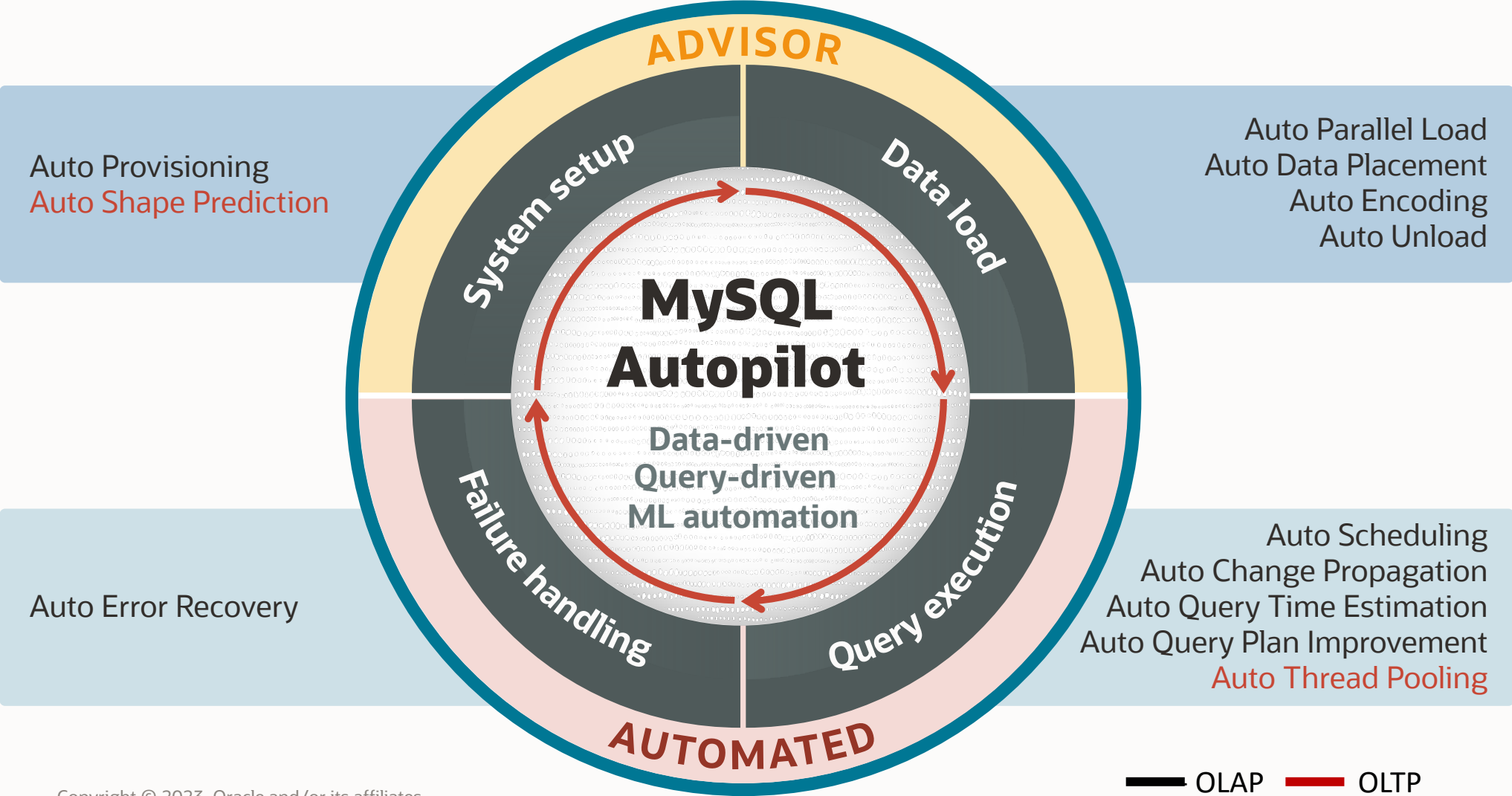
MySQL HeatWave on AWS: In database machine learning

25x faster than Redshift ML



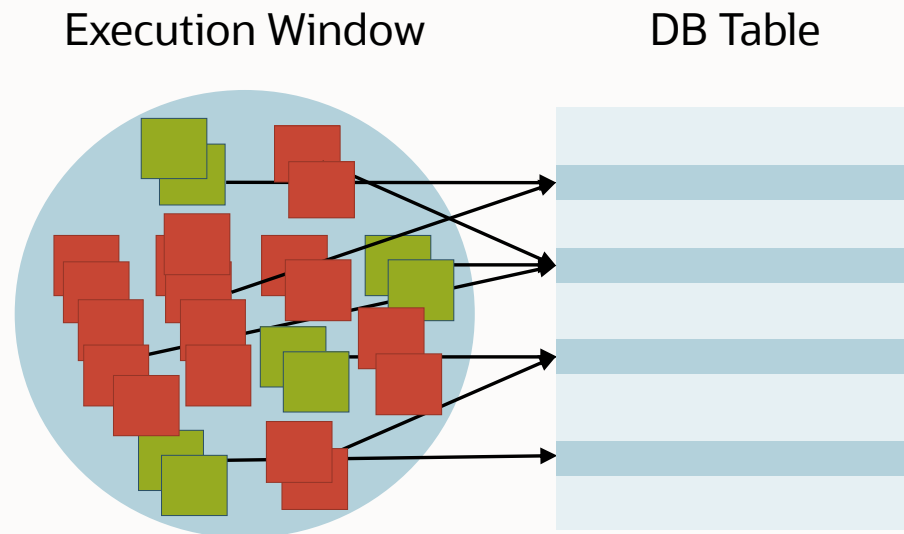
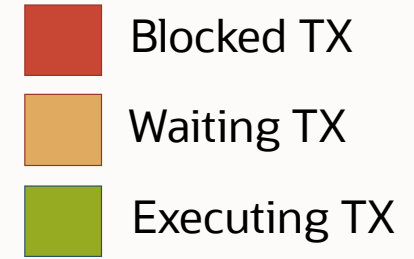
MySQL Autopilot: machine learning-powered automation

Enhanced for OLTP workload

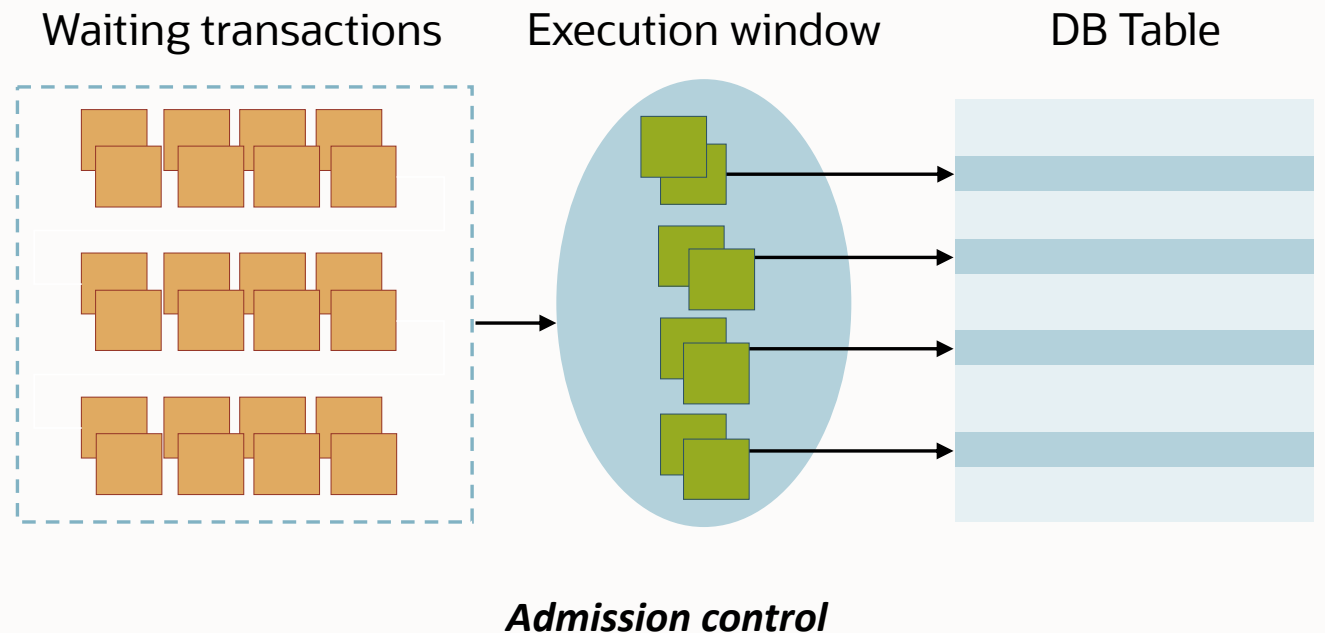


Auto thread pooling

Workload aware admission control



✗ Blocked TXs create resource contention on executing TXs

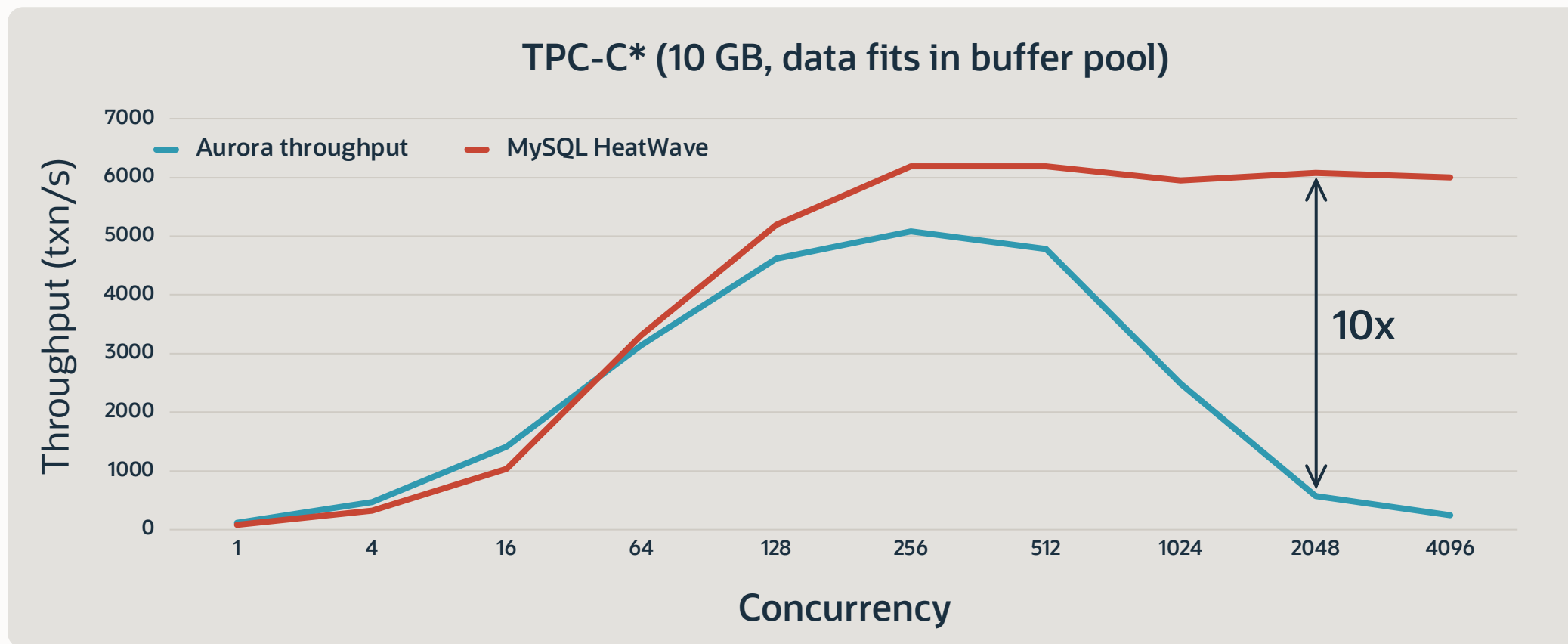


✓ Allowing fewer TXs reduces resource contention



MySQL HeatWave has up to 10x better throughput than Aurora for OLTP

Auto thread pooling



Higher throughput

Sustained performance

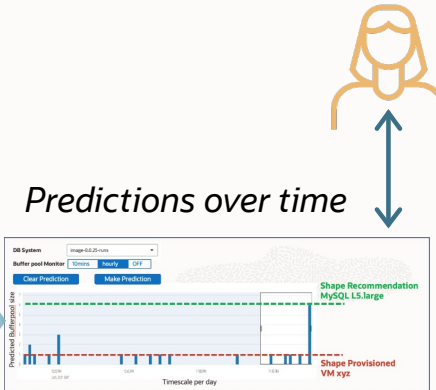
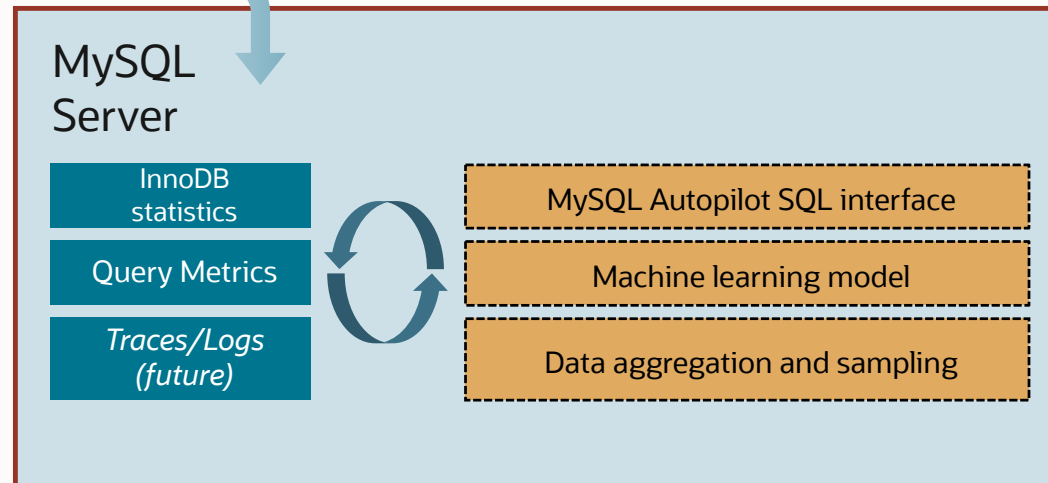
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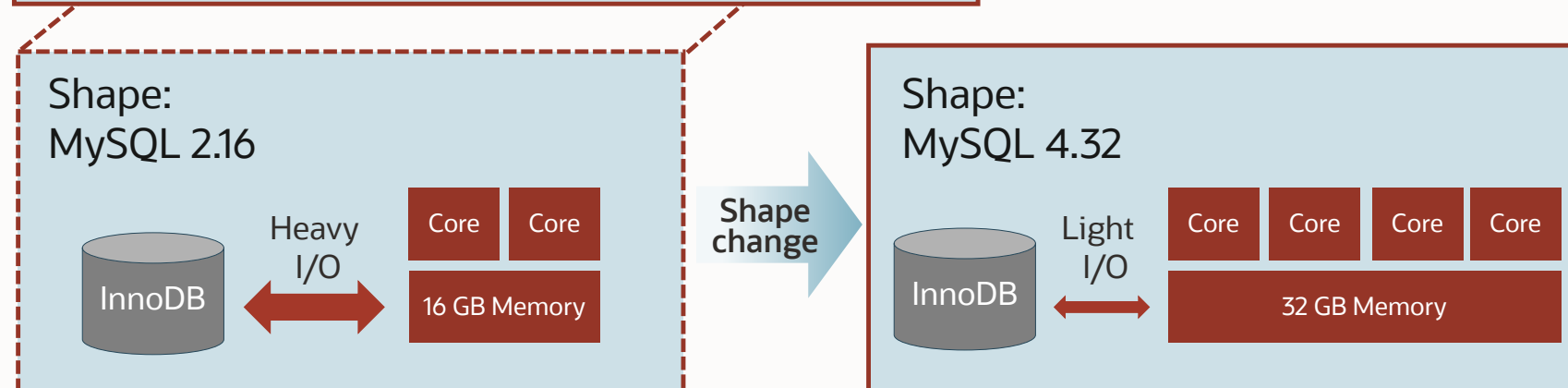
Auto Shape Detection

Determines the optimal instance type

Workload



- New statistics
- Intelligent sampling
- ML models inside the server
- Periodic prediction



Auto shape prediction for best OLTP performance

Benchmark	BP Size (GB)	Buffer pool Hit Rate	Shape	Outcome
Twitter	5	89%	S	UPSIZE
Epinions	5	94%	S	UPSIZE
Smallbank	5	95%	S	UPSIZE
Sysbench TPC-C	5	93%	S	UPSIZE
Twitter	48	100%	L	DOWNSIZE
YCSB	48	100%	L	DOWNSIZE
Smallbank	48	100%	L	DOWNSIZE
Sysbench TPC-C	48	100%	L	DOWNSIZE



Shape	Throughput Improvement	Buffer pool Hit Rate
L	6.2x	100%
L	2x	99.6%
L	1.5x	100%
L	1.8x	99.4%
M	1.02x	100%
M	1.04x	100%
M	0.98x	99.2%
M	0.96x	100%

S : MySQL.2.16GB
M : MySQL.4.32GB
L : MySQL.8.64GB



MySQL HeatWave has security differentiators compared to Aurora

MySQL masking, de-identification, asymmetric encryption support

Masking

- String - ArtXXXnt, XXthurDeXX
- Payment Card – Strict and Relaxed
- Random String Generation
- Random Numeric Ranges
- Random Formated (email, Payment Card, SSN)

Instance Based SQL Firewall

- Blocks unknown SQL Statements

Immediate Security Patches (CPUs)

- Aurora security patches lag by several months

Asymmetric Encryption

- Key generation
- Encryption/decryption
- Signature/verification
- Digest creation

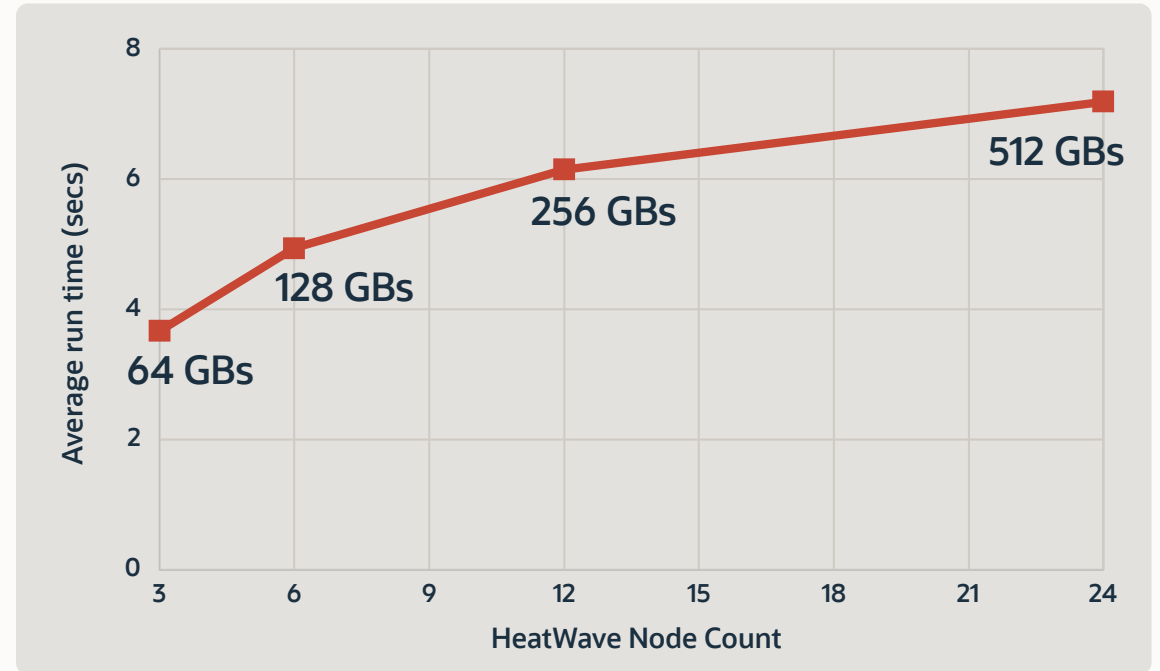
Strictly Admin Privileges

- Better security via limiting abilities
- Power users separate port

Support for small HeatWave shape

16GB shape to reduce cost

- Many OLTP databases are small
- Use HeatWave for small data sizes
- Introducing 16 GB HeatWave shape



Small HeatWave shape also scales well



Product Demo



MySQL HeatWave on AWS customers

“MySQL HeatWave on AWS **simplifies our data platform** with a consolidated database for both transaction processing and analytics. We have seen **60-90X faster complex queries compared to AWS RDS and Aurora** that helps us to generate **real-time analytics** for targeted, multichannel campaigns. We now have **greater scalability to onboard more data and new clients of any size** without increasing IT administration.”

Thomas Henz
CEO



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“MySQL HeatWave on AWS has **139X faster complex queries compared to AWS RDS** that gives us a great opportunity to **simplify our data infrastructure for both OLTP and OLAP with sub second response time**. Also, the web console is easy to configure and provides us the **visibility to workload related performance metrics with interactive reporting**. MySQL HeatWave is a great fit for our for Microservices and Cloud Native product roadmap to deliver superior experience and performance for our customers.”

Anish Kumar
Associate VP



MySQL HeatWave on AWS customers

“MySQL HeatWave on AWS has **50X faster complex queries compared to AWS RDS** that provides us **real-time insights** to accelerate application development that helps us **improve patients’ lives**”.

Kyle Yang
Assistant Manager

BIONIME

“MySQL HeatWave on AWS is an excellent solution for us as a small team. Having **one database for both OLTP and OLAP workloads with 6X better performance compared to AWS RDS** delivers **real-time insights** that helps us to continually enhance our iQueue platform, **improve the user experience, and reduce complexity** and administrative overhead for our team.”

AJAYA LOYA
Senior Engineering Manager

 **LeanTaaS**

MySQL HeatWave on AWS customers

“MySQL HeatWave on AWS is a **game changer**. We were pleasantly surprised with the ease of use and performance with **10-30X faster queries without complicated database tuning** and performance improvement, using a similar database configuration. With a **single database for OLTP and OLAP workloads** for large volume of data sets, we **no longer need index creation and maintenance** which **accelerates time to value for our clients**.”

Wenjin Zhou, PhD
CTO



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“We found Oracle MySQL HeatWave on AWS **improved query performance by 15X with no changes to our application** compared to using MariaDB on AWS RDS. **With MariaDB for analytics along with Tableau for visualization, we had been experiencing multiple outages** because of the volume of data and patches impacting the SQL query performance. The performance gains from MySQL HeatWave gave our business confidence to **expand and bring more offerings to the market**.”

Ajay Arora
CTO



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Learn more about MySQL HeatWave

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Thank you!

