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EXTREME DATA PROCESSOR

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MySQL®

G2M
RESEARCH

Supercharging Your MySQL Deployment: Performance, Scalability, and Efficiency

March 21, 2023

Webinar Agenda

10:00-10:02	Ground Rules and Webinar Topic Introduction (G2M Research)
10:03-10:05	Introduction – Why Accelerating MySQL Important? (Mike Heumann, G2M Research)
10:06-10:20	Introducing the Fastest Accelerator for MySQL – *Pliops XDP* (Grant Jacobson, Pliops)
10:21-10:30	MySQL Acceleration from the Oracle Perspective (Adam Rice, Oracle)
10:31-10:40	AMD EPYC for Oracle MySQL (Dilip Ramachandran, AMD)
10:41-10:54	Panel Discussions and Audience Surveys
10:55-11:00	Q&A / Wrap-Up

G2M Webinar Ground Rules

G2M Research will record this webinar

➔ We will send a link to the recording and a PDF of the slides for the webinar to all registrants approximately 2 days after webinar

You are strongly encouraged to ask questions

➔ Please use the Zoom Q&A feature to submit your questions; we will go through all questions at the end of the session

We will conduct some audience surveys during the webinar

➔ Please answer using the Zoom survey tool (and all answers are anonymous, so no one will know how you answered)

Thanks!

Why is Accelerating MySQL Important?

- MySQL is one of the most widely-used relational database management systems (RDBMSs) across a range of use cases
- Oracle has extended MySQL for use in HA solutions, which needs high performance
- Storage performance has a huge impact on the overall database solutions' performance, even in systems utilizing flash storage
- More transactions per second also helps to lower overall TCO while improving productivity and economics
- Acceleration can also help to reduce flash wear, extending the life of the underlying storage system

Why is Accelerating MySQL Important?

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Panelists

Grant Jacobson
Sr. Director, Alliances
www.pliops.com

Dilip Ramachandran
Sr. Director, Product Marketing
www.amd.com

Adam Rice
MySQL Alliances & Channels Manager
www.oracle.com

Mike Heumann
Principal Analyst
www.g2minc.com

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Grant Jacobson

Sr. Director, Alliances

www.pliops.com

Pliops Extreme Data Processor (XDP)

- PCIe server add-in card
- A specialized data processor with unique data-shaping technology
- Works in any server and with any SSD
- Enables:
  - accelerated database performance
  - increased user and data density
  - scaling application workloads
  - with built-in data protection
- Eliminates inefficiencies to unlock technical value to do more with less

PLiOPS EXTREME DATA PROCESSOR

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2.75x More Oracle MySQL Queries, Faster! -- With Pliops XDP on AMD EPYC Servers

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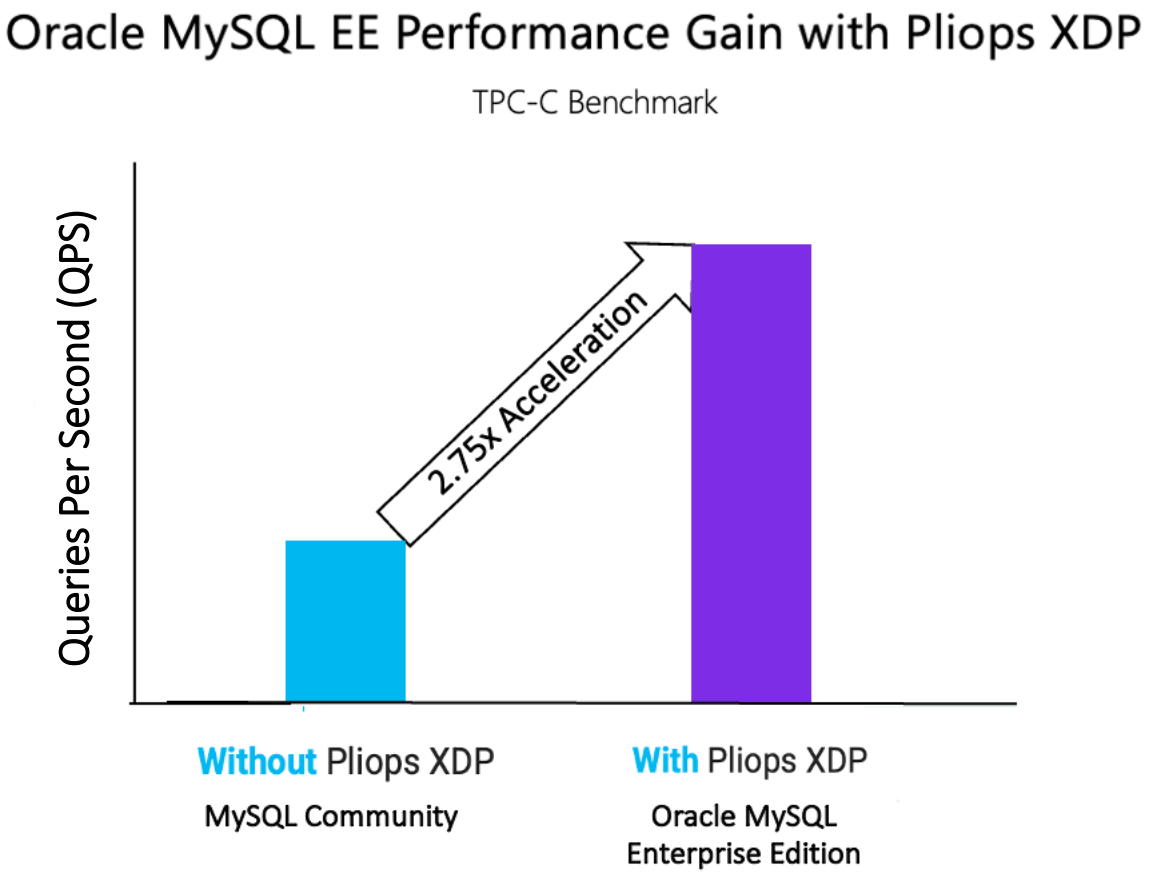


- 2.75x faster performance with your same MySQL EE license!
- Scale up – double your database instances
  double the number of users
- Cost reduce your MySQL setup to do a lot more, faster.

AMD

CPU: 2 x AMD EPYC 7543 (32-Core Processor)

Server: Dell PowerEdge R7525

Memory: 500GB

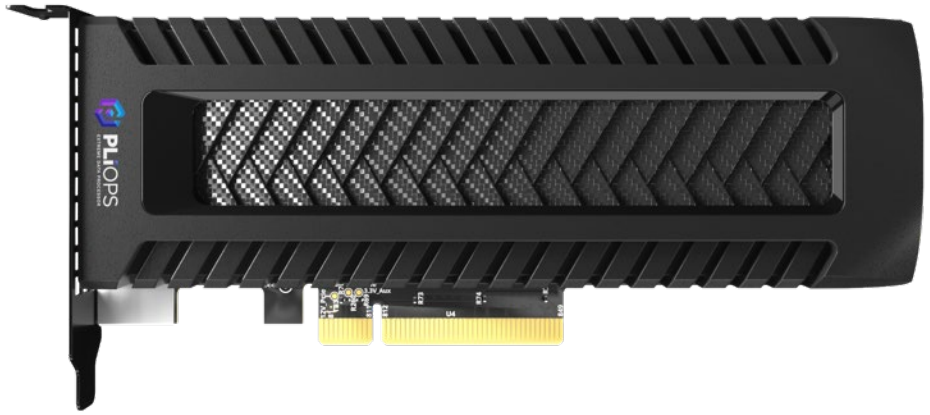
Strorage: 4 NVMe 3.84TB SSDs

OS: Red Hat Linux 8.5

PLIOPS EXTREME DATA PROCESSOR

The Power of Pliops XDP

Performance	Accelerated TPS / QPS
Reliability	Integrated HW RAID 5
Capacity	Up to 6x more
Efficiency	Lower TCO



PLiOPS
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Pliops XDP Feature Capabilities

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XDP Data Services

XDP-*AccelDB*

Best-In-Class Universal Database & Storage Software Accelerator

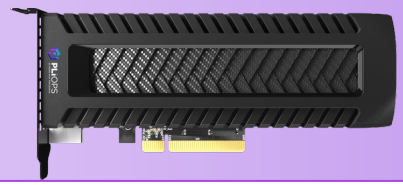
XDP-*RAIDplus*

Best-In-Class Data Integrity and RAID+ Solution for NVMe SSDs

XDP-*AccelKV*

World's 1st HW Key-Value Accelerator for Real Time Analytics and ML Training

Pliops - Data Services Acceleration Platform



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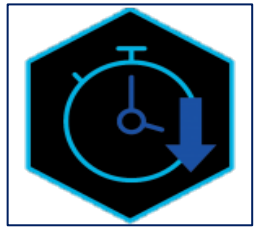
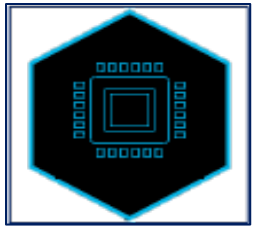
Pliops XDP-AccelDB

Pliops XDP-AccelDB Data Service is the Best-In-Class Database Accelerator

2.5x
Higher Throughput



8x
Latency Reduction



30%
Better CPU Utilization

6X
Better Capacity Expansion

Pliops XDP-RAIDplus

Best-In-Class Data Integrity and RAID Solution for NVMe SSDs

Overcomes the limitations of conventional RAID controllers while accelerating application performance and unlocking capacity for enterprise SSDs.

12x

Faster Than Traditional RAID

5x

Faster Rebuild, Increased Uptime

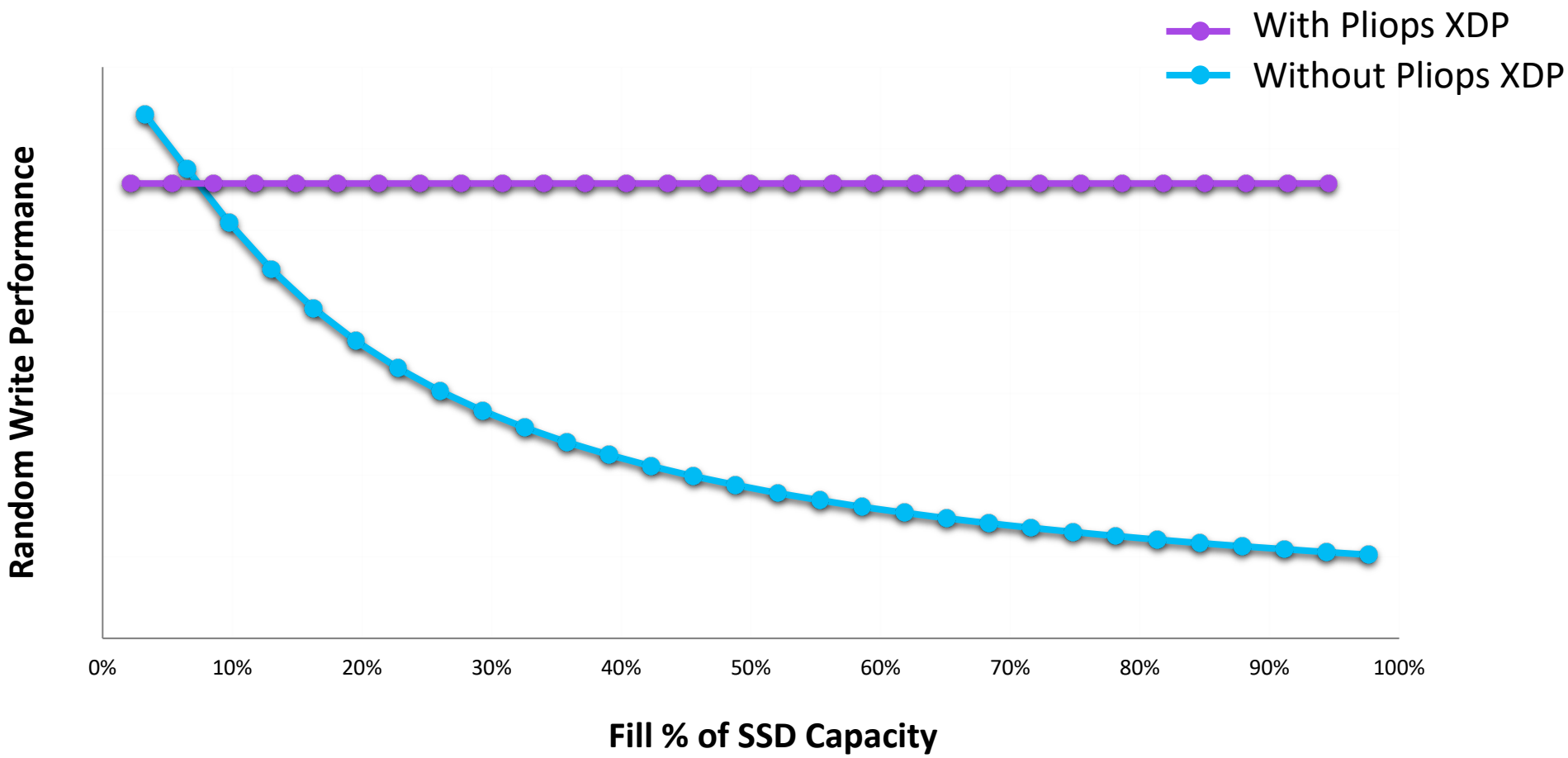
18x

Better SSD Endurance, Lower Cost

6x

Higher Capacity, Improved Scale & TCO

XDP Delivers Ultra-Consistent MySQL Database Performance Even with Full Drives



Improved Productivity & Database Experience -- with fastest SSD Rebuild Times

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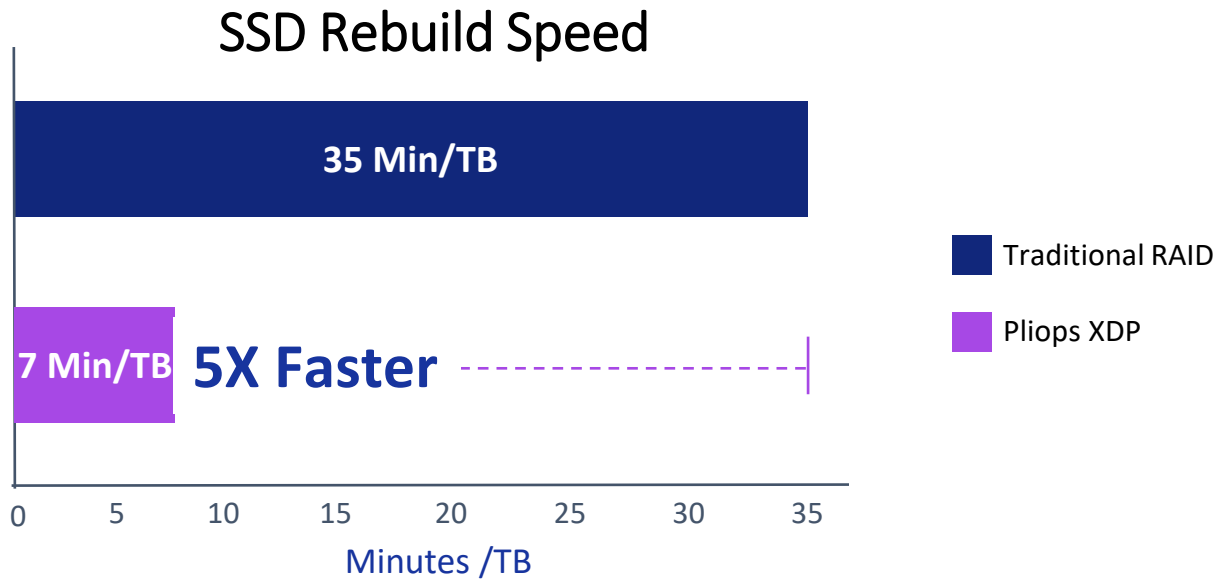
5x

Faster

SSD
Rebuild Times



- Minimal Impact on QoS with Pliops During Rebuild
- Enables Higher Density Storage Due to Faster Rebuilds

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Solution is Available Today!

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Contact:

- Your Oracle MySQL sales representative
- Your Insight or preferred reseller
- Pliops (sales@pliops.com)

Current promotion running at Insight:

Buy Oracle Enterprise Edition - get $500 discount on Pliops XDP

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Adam Rice

MySQL Alliances &
Channel Manager

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Acceleration with Pliops

- Adam Rice, MySQL Alliances
- adam.rice@oracle.com

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Larry Ellison on MySQL

The world's two most popular databases are the Oracle Autonomous Database and Oracle MySQL"… and while our Oracle Database business as measured by revenue currently dwarfs our MySQL database business—that is about to change because the latest version of Oracle MySQL has been upgraded to include a revolutionary new ultra-high-performance parallel processing query engine called HeatWave.

We built a product, MySQL HeatWave, which is different than earlier versions of MySQL .
MySQL HeatWave is good at both transaction processing and query processing. So MySQL HeatWave doesn't simply replace Aurora. It replaces both Aurora and Redshift or it replaces both Aurora and Snowflake because MySQL HeatWave does transaction processing very well, replacing Aurora.

…the cost performance benefits of moving to MySQL HeatWave are extraordinary.

Larry Ellison, Chairman, CTO, Oracle

MySQL is the #1 Open Source Database

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DB-ENGINES

Rank Apr 2022	Rank Mar 2022	Rank Apr 2021	DBMS	Database Model	Apr 2022
1.	1.	1.	Oracle	Relational, Multi-model	1254.82
2.	2.	2.	MySQL	Relational, Multi-model	1204.16
3.	3.	3.	Microsoft SQL Server	Relational, Multi-model	938.46
4.	4.	4.	PostgreSQL	Relational, Multi-model	614.46
5.	5.	5.	MongoDB	Document, Multi-model	483.38

MySQL in the Market

70% of Oracle customers are using MySQL – *even higher in Fortune 500 accounts*

Large opportunity **within Oracle install base**

70% of enterprises will increase their IT spending on open source through 2025 (Gartner)*

Open source databases in the cloud are growing faster than any other databases

* Source: https://www.zdnet.com/article/2022-technology-trend-review-part-one-open-source-cloud-blockchain/

MySQL Editions: Features

Features		MySQL Editions	
	Community (Free)	Enterprise	CGE
Oracle Premier Support		X	X
MySQL Features			
MySQL Database Server	X	X	X
MySQL Connectors	X	X	X
MySQL Replication	X	X	X
MySQL Partitioning	X	X	X
MySQL Document Store	X	X	X
MySQL Router	X	X	X
MySQL Workbench	X	X	X
Oracle Enterprise Manager for MySQL		X	X
MySQL Enterprise Monitor		X	X
MySQL Enterprise Backup		X	X
MySQL Enterprise Security		X	X
MySQL Enterprise Authentication		X	X
MySQL Enterprise Scalability – Thread Pool		X	X
MySQL Enterprise Transparent Data Encryption (TDE)		X	X
MySQL Enterprise Encryption		X	X
MySQL Enterprise Masking and De-identification		X	X
MySQL Enterprise Firewall		X	X
MySQL Enterprise Audit		X	X
MySQL Enterprise High Availability		X	X
MySQL Cluster Manager			X

MySQL Enterprise Edition includes a comprehensive set of advanced security features, management tools, bug fixes, technical support, and legal protections to achieve the highest levels of MySQL scalability, security, reliability, and uptime.

It reduces the risk, cost, time to market, and complexity in developing, deploying, and managing business-critical MySQL applications while achieving stringent regulatory compliance such as GDPR, SOX, HIPPA, PCI, etc.

Please check: http://www.mysql.com/products/ for full comparison table

Innovative enterprises across many industries run MySQL

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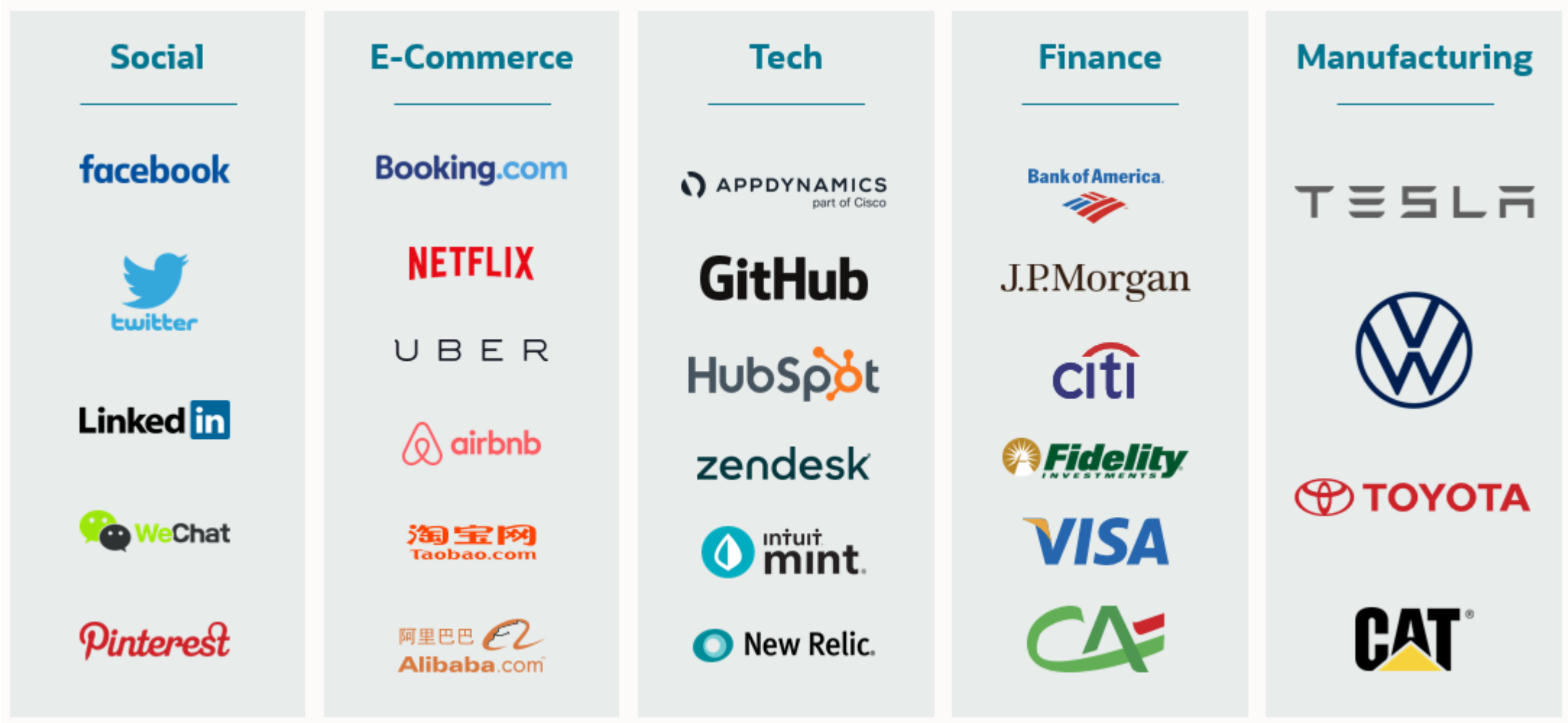


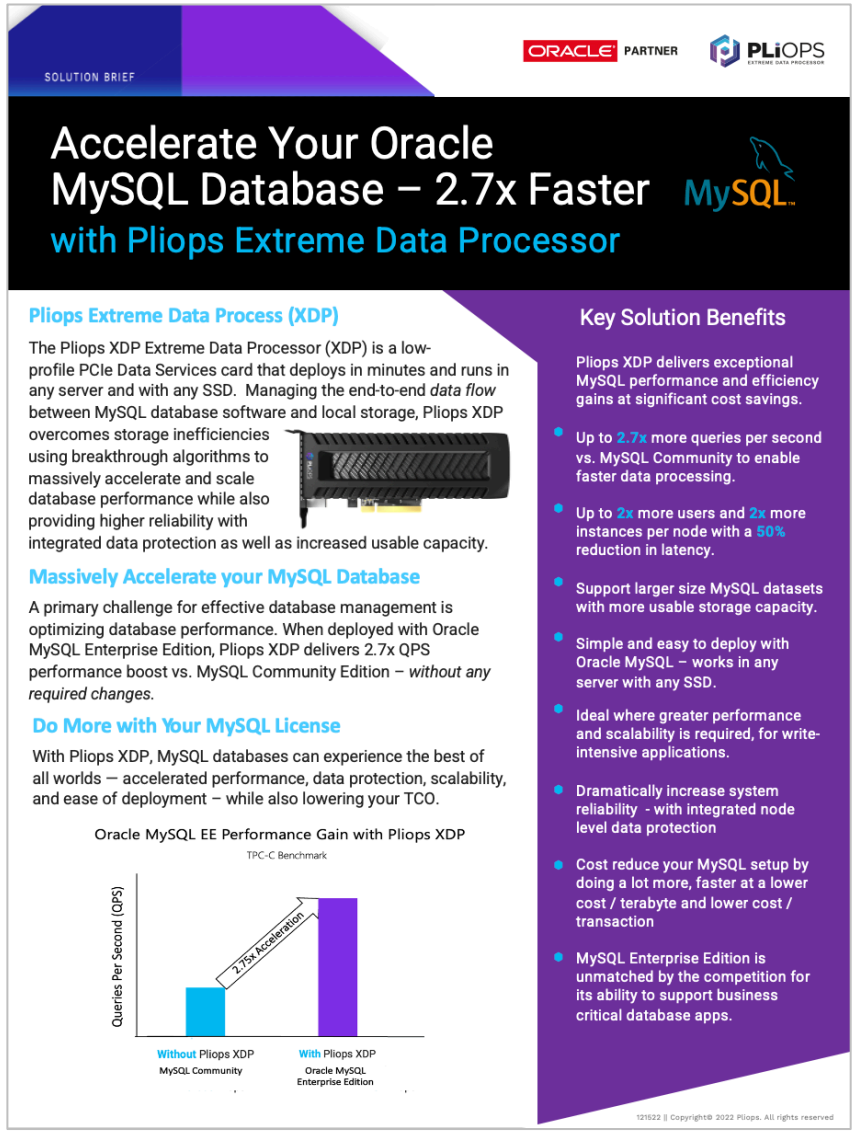
Solution Benefits

Upgrade to MySQL EE

Add Pliops XDP to MySQL EE

- Ideal for greater performance and scalability
  - 2.7x more queries
  - 2x more users

Run on AMD EPYC Servers



SOLUTION BRIEF

ORACLE PARTNER PLIOPS

Accelerate Your Oracle MySQL Database – 2.7x Faster

with Pliops Extreme Data Processor

MySQL

Pliops Extreme Data Process (XDP)

The Pliops XDP Extreme Data Processor (XDP) is a low-profile PCIe Data Services card that deploys in minutes and runs in any server and with any SSD. Managing the end-to-end *data flow* between MySQL database software and local storage, Pliops XDP overcomes storage inefficiencies using breakthrough algorithms to massively accelerate and scale database performance while also providing higher reliability with integrated data protection as well as increased usable capacity.

Massively Accelerate your MySQL Database

A primary challenge for effective database management is optimizing database performance. When deployed with Oracle MySQL Enterprise Edition, Pliops XDP delivers 2.7x QPS performance boost vs. MySQL Community Edition – *without any required changes.*

Do More with Your MySQL License

With Pliops XDP, MySQL databases can experience the best of all worlds – accelerated performance, data protection, scalability, and ease of deployment – while also lowering your TCO.

Oracle MySQL EE Performance Gain with Pliops XDP

TPC-C Benchmark

Key Solution Benefits

Pliops XDP delivers exceptional MySQL performance and efficiency gains at significant cost savings.

- Up to 2.7x more queries per second vs. MySQL Community to enable faster data processing.
- Up to 2x more users and 2x more instances per node with a 50% reduction in latency.
- Support larger size MySQL datasets with more usable storage capacity.
- Simple and easy to deploy with Oracle MySQL – works in any server with any SSD.
- Ideal where greater performance and scalability is required, for write-intensive applications.
- Dramatically increase system reliability - with integrated node level data protection
- Cost reduce your MySQL setup by doing a lot more, faster at a lower cost / terabyte and lower cost / transaction
- MySQL Enterprise Edition is unmatched by the competition for its ability to support business critical database apps.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Dilip Ramachandran

Sr. Director, Product Marketing

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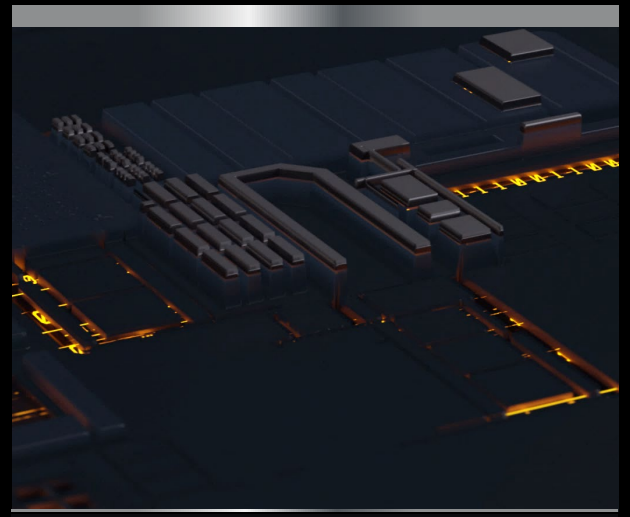
ENTERPRISE CHALLENGES

IT Infrastructure

Data Management



Insatiable Compute

Security Threats

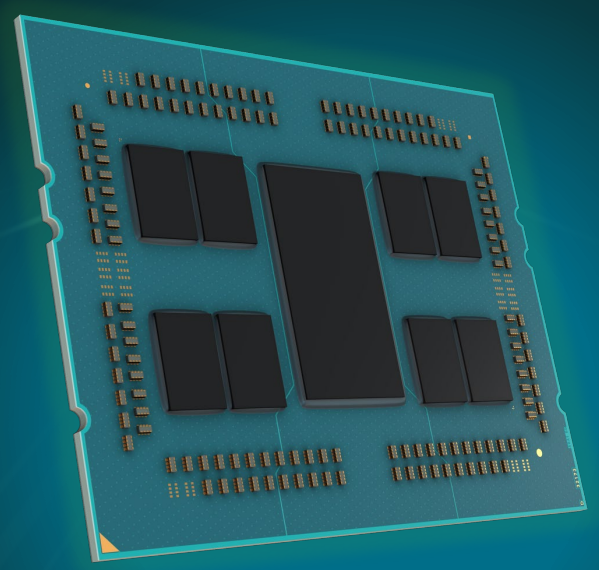
ACCELERATING ENTERPRISE VALUE WITH 3RD GEN AMD EPYC™ CPUs

HIGHEST PERFORMANCE. BEST TCO. FASTEST TIME TO VALUE.

Hyperconverged Infrastructure | Relational Databases | Data Analytics

See amd.com/en/claims/epyc#faq-MLNTCO-001, MLN-016

AMD EPYC™ 7003 PROCESSORS



64 “Zen3” Cores

No New Hardware – Drop-in Compatible with 2nd Gen EPYC™ Platforms *(BIOS update required)*

Enhanced Security Features

Supports 4, 6 or 8 Memory Channels Configs

Enhanced Memory Performance with:

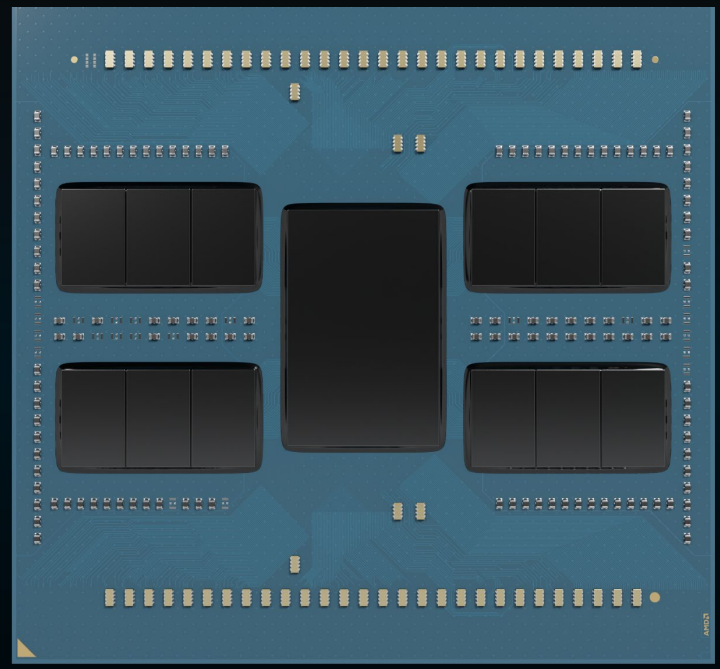
Infinity Fabric™ and Memory Clock Synchronized

Largest Available x86 L3 Cache – Up to 32MB / core

4TH GEN AMD EPYC ™ CPU
EXTENDING COMPUTE LEADERSHIP

Extending Compute Leadership

- Leadership Socket and Per-Core Performance
  Up to 96 “Zen 4” Cores in 5nm
- Leadership Memory Bandwidth and Capacity
  12 Channels DDR5
- Next Generation I/O
  Up to 160 Lanes of PCIe® Gen 5 (2P) |
  Memory Expansion with CXL™
- Advances in Confidential Computing
  ~2X SEV-SNP Guests | Direct and CXL Attached Memory Encryption

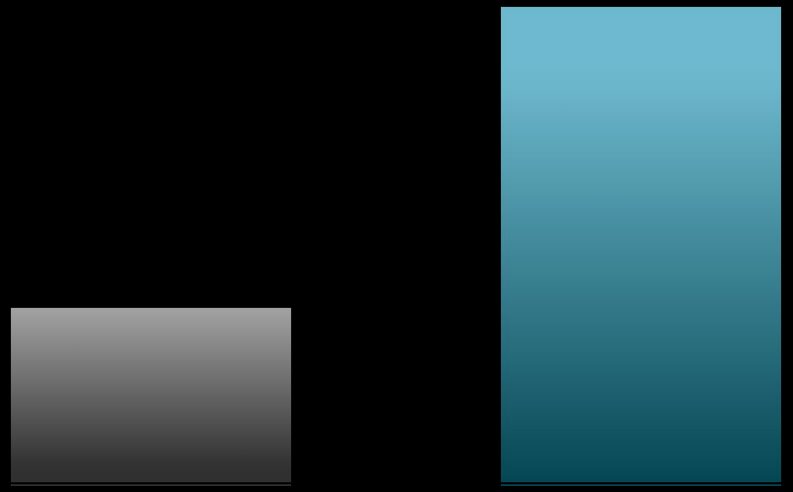


Faster Business Insights

DECISION SUPPORT WORKLOAD DERIVED FROM TPC BENCHMARK™ H WITH MYSQL™

~2.7x

Decision support queries



2P 3rd Gen Xeon™ Platinum 8380

10 Containers of 8 cores each

2P 4th Gen AMD EPYC™ 9654

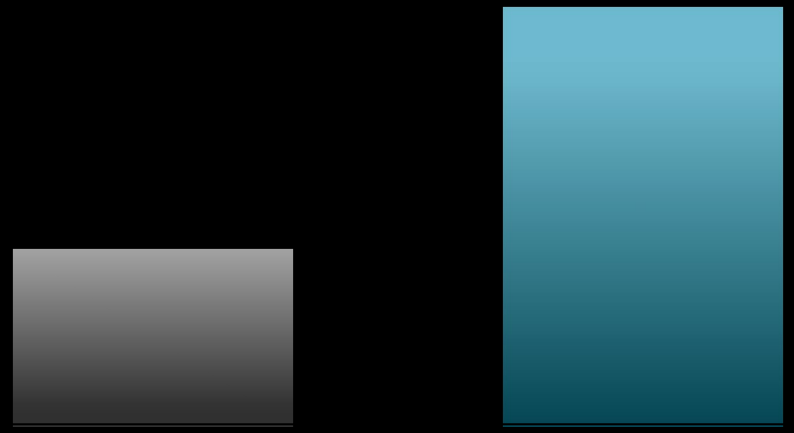
24 Containers of 8 cores each

More Customer Transactions

TRANSACTION PROCESSING WORKLOAD DERIVED FROM TPC BENCHMARK™ C WITH MYSQL™

~2.4x

Online business transactions



2P 3rd Gen Xeon™ Platinum 8380

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2P 4th Gen AMD EPYC™ 9654

24 Containers of 8 cores each

Results may vary. As of 11/10/2022, see endnotes: SP5-070, -071.

PLATFORMS

Atos · ASRock · ASUS · Cisco · DELL Technologies · Foxconn · GIGABYTE · H3C · Hewlett Packard Enterprise

Inventec · Lenovo · MiTAC · MSI · QCT · Supermicro · TYAN · wiwynn · Wistron

INSTANCES

aws · Alibaba Cloud · Microsoft Azure · Google Cloud · IBM Cloud · Oracle Cloud · Tencent Cloud

SOLUTIONS

Altair · anjuna · Ansys · BEAMR · Broadcom · cadence · Canonical · casa systems · ceph · citrix · Cloudera · Couchbase

Dassault Systèmes · DataStax · docker · elastic · esi get it right · Excelero · FreeBSD · hadoop · JMA · Juniper Networks · Kioxia · MariaDB · Mavenir

MemSQL · Mentor A Siemens Business · Micron · Microsoft SQL Server · mongoDB · MySQL · NetScout · Nokia · Nutanix · Oracle · PLiOPS Extreme Data Processor

PostgreSQL · Quobyte · Radisys · Red Hat · redislabs · Robin · Samsung · Siemens · SK hynix · splunk> · StorMagic · SUSE

Synopsys · TigerGraph · Transwarp · Velocix · Vertica · Weka · vmware · Western Digital · Xilinx

AMD EPYC

THE BEST GETS BETTER

EVEN

300+ WORLD RECORDS AND *STILL* COUNTING

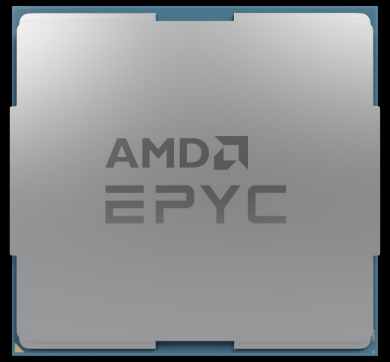
BUSINESS APPS

8 ERM/SCM Business

48 Enterprise server-side Java®

18 Enterprise Energy Efficiency

4 FinTech



DATA MANAGEMENT & ANALYTICS

16 Business Intelligence

6 Structured Database Management

2 Unstructured Analytics Database

9 AI Platform/Text & Media Analytics

INFRASTRUCTURE/HCI/SDI

23 Cloud and Virtualization

15 Integer Performance/General Purpose

8 Integer/General-Purpose Energy Efficiency

3 VM Energy Efficiency

ENGINEERING/TECHNICAL

73 Massively Parallel applications

37 Modeling & Simulation

16 Floating Point Compute Intensive apps

12 HPC Energy Efficiency

CONTENT APPS

5 Rendering

DIGITAL SERVICES

1 Social Networking BI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ENDNOTES

MLNTCO-001: The Bare Metal TCO (total cost of ownership) Estimator solution compares the selected AMD EPYC™ and Intel® Xeon® CPU based server solutions required to deliver a TOTAL_PERFORMANCE of 25000 unit of integer performance based on published the SPECrate®2017_int_base scores for Intel and AMD measured estimated scores for AMD EPYC™ 7003. This analysis is based on tool VERSION: 02/20/2021 v0.9982. This estimation reflects a 4 year time frame. This analysis compares a 2 CPU AMD EPYC™ EPYC_7763 powered server with a measured estimated SPECrate®2017_int_base score of 802; compared to a 2 CPU Intel Xeon Gold_6258R based server with a SPECrate®2017_int_base score of 397, https://spec.org/cpu2017/results/res2020q3/cpu2017-20200915-23981.pdf. Both AMD EPYC™ and Intel based servers use the same estimated cost for the following elements of the analysis: server chassis size of 2RU at a cost of $2500 per chassis; internal storage $380; physical servers managed per admin: 30; fully burdened cost per admin $110500; server rack size of 42; space allowance per rack of 27 sq feet; monthly cost of data center space $20 per sq foot; cost per kW for power $0.12; power drop per rack of 12kW; and a PUE (power usage effectiveness of 2).The AMD EPYC™ powered solution estimates are: 32 2P AMD EPYC™ 7763 powered total servers at a hardware only acquisition cost of $19232 per server, which includes total system memory of 768GB, which is 6GB of memory / core and a total system memory cost of $3072; internal storage cost of $380. The total AMD EPYC™ hardware acquisition cost for this solution is $615424. Each server draws ~611kWhr per month. For the 4 years of this AMD EPYC™ powered solution analysis the: total solution power cost is ~$225240 which includes the PUE factor; the total admin cost is ~$471468, and the total real estate cost is ~$77760. The total 4 year TCO estimate for the AMD solution is $1389892.The Intel based solution estimates are: 63 2P Xeon Gold 6258R based total servers at a hardware only acquisition cost of $12316 per server, which includes total system memory of 384GB, which is 6.9GB of memory / core and a total system memory cost of $1536; internal storage cost of $380. The total Intel hardware acquisition cost for this solution is $775908. Each server draws ~476kWhr per month. For the 4 years of this Intel based solution analysis the: total solution power cost is $345460 which includes the PUE factor; the total admin cost is ~$928200, and the total real estate cost is ~$103680. The total 4 year TCO estimate for the Intel solution is $2153248.Delivering 25000 of estimated SPECrate®2017_int_base performance, produces the following estimated results: the AMD Specify EPYC™ solution requires 49% fewer servers [1-(AMD server count / Intel server count)]; 25% less space [1-(AMD rack count / Intel rack count)]; 35% less power [1-(AMD power cost / Intel power cost)]; providing a 35% lower 4 year TCO [1-(AMD TCO / Intel TCO)].AMD processor pricing based on 1KU price as of February 2021. Intel® Xeon® Scalable processor data and pricing from https://ark.intel.com as of September 2020. All pricing is in USD. Results shown here are estimates and actual results may vary. Product and company names are for informational purposes only and may be trademarks of their respective owners. SPECrate® scores as of 02/20/2021. AMD Specify EPYC™ performance numbers based on AMD internal estimates and are subject to change based on actual results. SPEC®, SPECrate® and SPEC CPU® are registered trademarks of the Standard Performance Evaluation Corporation. See www.spec.org for more information. AMD Specify EPYC™ performance numbers based on AMD measured internal estimates and are subject to change based on actual results. Results generated by the AMD EPYC™ BARE METAL SERVER TCO ESTIMATION TOOL, VERSION: 02/20/2021 v0.9982.

MLN-016: Results as of 01/28/2021 using SPECrate®2017_int_base. The AMD EPYC™ 7763 a measured estimated score of 798 is higher than the current highest 2P server with an AMD EPYC™ 7H12 and a score of 717, https://spec.org/cpu2017/results/res2020q2/cpu2017-20200525-22554.pdf. OEM published score(s) for 3rd Gen AMD EPYC™ may vary. SPEC®, SPECrate® and SPEC CPU® are registered trademarks of the Standard Performance Evaluation Corporation. See www.spec.org for more information.

SP5-070: MySQL® 8.0.17 DSS comparison based on AMD measured median scores on 2P 96-core EPYC 9654 compared to 2P 40-core Xeon Platinum 8380 running virtualized HammerDB TPROC-H SF1 (KVM Hypervisor Virtualization server environment with 4 streams, 4 virtual units, calculating throughput with 4 streams x 22 queries x 3600 divided by the slowest VU completion time in seconds) as of 11/10/2022. Configurations: 2x AMD EPYC 9654 (~126,980 TPROC-H tpm) vs. 2x Xeon Platinum 8380 (~47452 TPROC-H queries/hour) for ~2.68x the tpm performance.

SP5-071: MySQL® 8.0.17 OLTP comparison based on AMD measured median scores on 2P 96-core EPYC 9654 compared to 2P 40-core Xeon Platinum 8380 running virtualized HammerDB TPROC-C (KVM Hypervisor Virtualization server environment with 400 WH and 64 users) as of 11/10/2022. Configurations: 2x AMD EPYC 9654 (~126,980 TPROC-C tpm/~531,183 NOPM) vs. 2x Xeon Platinum 8380 (~47452 TPROC-C tpm/~224,126 NOPM) for ~2.37x the tpm/NOPM performance.

Panel Discussion

Audience Survey Question #1

How widespread is the use of MySQL in your organization (select one answer)?

- Critical – It is essential to our business model: 0%
- Very Important – It enables a wide variety of capabilities: 40%
- Important – It provides a competitive edge for us: 0%
- Nice-to-Have – Easy to use: 0%
- Not that important – Various databases could work: 0%
- Don’t know/no opinion: 60%

Panel Question #1

What new capabilities does an accelerated MySQL database enable for businesses?

- Adam Rice (Oracle)
- Dilip Ramachandran (AMD)
- Grant Jacobson (Pliops)

Audience Survey Question #2

When considering MySQL acceleration technology, how would your organization typically purchase/acquire this technology? (select ALL that apply):

- We would purchase it from the same system integrator that sets up the MySQL instance: 0%
- We would listen strongly to Oracle about which technology to use: 17%
- We would buy the acceleration technology separately through whatever channels the technology vendor sells it through: 17%
- Don’t know/no opinion: 67%

Panel Question #2

What are some of the best practices or things to avoid when accelerating MySQL instances in production environments?

- Adam Rice (Oracle)
- Dilip Ramachandran (AMD)
- Grant Jacobson (Pliops)

Audience Q&A

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