Engineering Database Hardware and Software Together

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ABSTRACT

Since its inception, Oracle's database software primarily ran on customer configured off-the-shelf hardware. A decade ago, the architecture of conventional systems started to become a bottleneck and Oracle developed the Oracle Exadata Database Machine to optimize the full hardware and software stack for database workloads. Exadata is based on a scale-out architecture of database servers and storage servers that optimizes both OLTP and Analytic workloads while hosting hundreds of databases simultaneously on the same system. By using database specific protocols for storage and networking we bypass limitations imposed by conventional network and storage layers. Exadata is now deployed at thousands of Enterprises including 4 of the 5 largest banks, telecoms, and retailers for varied workloads such as interbank funds transfers, e-commerce, ERP, Cloud SaaS applications, and petabyte data warehouses.

Five years ago, Oracle initiated a project to extend our database stack beyond software and systems and into the architecture of the microprocessor itself. The goal of this effort is to dramatically improve the performance, reliability and cost effectiveness of a new generation of database machines. The new SPARC M7 processor is the first step. The M7 is an extraordinarily fast conventional processor with 32-cores per socket and an extremely high bandwidth memory system. Added to its conventional processing capabilities are 32 custom on-chip database co-processors that run database searches at full memory bandwidth rates, and decompress data in real-time to increase memory bandwidth and capacity. Further, the M7 implements innovative fine-grained memory protection to secure sensitive business data.

In the presentation we will describe how Oracle's engineering teams integrate software and hardware at all levels to achieve breakthrough performance, reliability, and security for the database and rest of the modern data processing stack.

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Speaker Biography

As Senior Vice President of Systems Technology at Oracle, Juan Loaiza is in charge of developing the mission-critical capabilities of Oracle Database, including data and transaction management, high availability, performance, in-memory processing, enterprise replication, and Oracle Exadata. Mr. Loaiza joined the Oracle Database development organization in 1988.

Mr. Loaiza holds BS and MS degrees in computer science from the Massachusetts Institute of Technology.

1. REFERENCES

[1] `http://www.oracle.com/goto/vldb2015`.