White Paper

Cloud Service Providers
Workload Characterization

Collaborating to Optimize Hardware for Real-World Workloads

Intel and Salesforce worked together to better understand the characteristics of production workloads and build a fine-tuned hardware platform.

Executive Overview

Collaboration between Intel and Salesforce engineers is enabling Salesforce to better understand their workloads and computing environment. With an understanding based on a proxy workload, along with the latest Intel technologies, Salesforce can choose optimized combination of hardware and software. Doing so results in reliable, scalable, and workload-optimized workload performance that can meet or exceed customer expectations.

Introduction

Salesforce is a global leader in providing customer relationship management (CRM) solutions, helping companies work together from anywhere in the digital age. Salesforce infrastructure teams worked with Intel to build a proxy workload with characteristics that match its production workload behavior. This proxy workload helped Salesforce to choose next-generation hardware.

Choosing the proper hardware and software is the key to achieving maximum end-customer satisfaction. But there are many factors to consider (see Figure 1) when deciding what hardware and configurations are best for a workload.

Business requirements relate to balancing deployment time, keeping intellectual property secure, regulatory requirements concerning security and data control that may exist in a particular industry, and total cost of ownership (TCO). Even TCO is complex, requiring a clear understanding and evaluation of workload needs and all the costs associated with a particular solution.

Technical characteristics relate to specific performance requirements, which can be internal (such as response time in a factory) or external (response time for a customer transaction); security (again); data storage requirements (including capacity, latency, and cost of storage); and integration between systems.

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Figure 1. Key considerations for deciding what hardware and configuration to use for a particular workload.

Benefits of Collaborating to Create a Proxy Workload

Intel has a unique combination of regular contributions to open-source projects, deep expertise across the hardware and software stack, and proven results in delivering customer performance optimizations. Salesforce and Intel have a longstanding relationship, with a history of deep technical engagement with Intel engineers. Therefore, it made sense for Salesforce to turn to Intel for help to develop a proxy workload that closely represented its production workload. Defining an accurate proxy workload offers several benefits, all of which can be crucial differentiators in the highly competitive software-as-a-service (SaaS) market:

- Help choose the optimal new on-premises platform configurations and select the optimal cloud instance types.
- Anticipate production experiences, optimize characteristics, and lower risk of production capacity and performance incidents.
- Accelerate hardware qualification cycles and quickly take advantage of the latest technology and innovations.
- Improve capacity and performance analysis.
- Optimize existing server platforms.

The joint effort, spanning three years, focused on the database (DB) proxy workload. Intel engineers worked closely with the Salesforce engineering team and lead architect to understand the Salesforce environment and design a viable proxy workload. The engineering teams coordinated efforts on running both industry-standard benchmarks and the proxy workload to compare how 3rd Generation Intel® Xeon® Scalable processors performed versus previous-generation Intel® processors. Testing took advantage of a suite of Intel® platform tools, such as Intel® VTune™ Profiler and Intel® oneAPI toolkits. These tools enable companies like Salesforce to quickly identify, analyze, and fix performance bottlenecks that are constraining the potential of their hardware investments.

By developing a proxy workload, Salesforce was able to explore SKU selection and validation and perform accurate performance analysis without any dependency on early hardware availability or sensitive customer data. Intel engineers assisted with SKU recommendations and performed the workload testing. Ongoing continuous improvement on the proxy workload means that performance and capacity data are available at almost the same time new technology is generally available, helping to shorten the decision-making time.

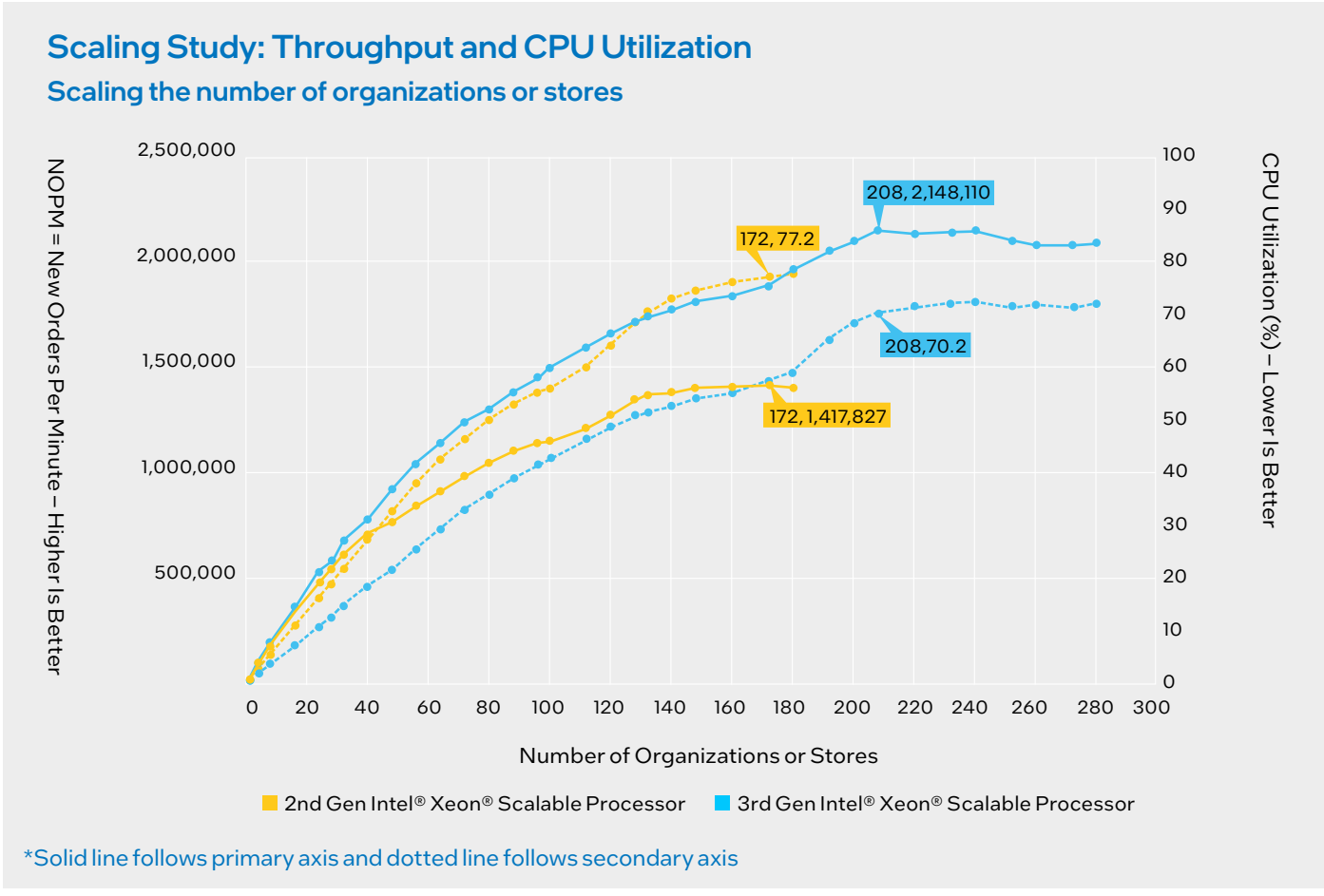

Figure 2. Upgrading to 3rd Gen Intel® Xeon® Scalable processors provides up to a 53 percent performance gain on raw input, compared to the previous generation of processors.

Results and Next Steps

The coordinated effort ultimately confirmed that a server equipped with 3rd Gen Intel Xeon Scalable processors, specifically the Intel Xeon Platinum processors for the DB tier's pod architecture, delivers the required performance for Salesforce's production environment. Salesforce has found that the proxy workload aligns almost exactly to the production workload performance (within ~5 percent), providing a far more accurate prediction for workload behavior than provided by the industry-standard benchmarks.

The selection of "right-sized" Intel Xeon Scalable processors, combined with improved predictability of performance in production environments, reduces the time required for hardware qualification from a year down to a couple of months. Salesforce estimates that building a new architecture based on 3rd Gen Intel Xeon Scalable processors can reduce pod cost by over 30 percent by adopting the highly dense, best chipset in advance while optimizing the gear-ratio of the entire stack. Time is money, and accurately adopting the correct architecture is the key outcome of cost savings with improved performance and security. Salesforce will also be able to explain why creating the right proxy workload is important versus simply using an industry-standard benchmark like SPECint.

Collaborating to modify the TPC-C benchmark to simulate Salesforce production workload patterns ultimately helps Salesforce choose the ideal configuration for its architecture to stay ahead in the SaaS world, with a highly secure platform, and to deliver additional performance and capacity gains over time. Intel also benefits from the Salesforce proxy workload collaboration. Insights gained during such projects can be used to improve future generations of Intel® architecture, further improving the performance of production workloads for a wide variety of customers in many industries.

Based on the success of the DB proxy workload, Salesforce is expanding the joint proxy workload effort to additional on-premises environments (such as compute and search) and may also use it for sizing its next-generation public cloud instances. Figure 2 shows testing results from the DB proxy.

A Closer Look at the Intel® Xeon® Platinum 8380 Processor

With 40 cores, a base frequency of 2.30 GHz, and 60 MB of cache, the Intel Xeon Platinum 8380 processor is well suited for data-intensive workloads like databases. It has a max turbo frequency of 3.4 GHz, eight memory channels, and offers advanced features such as Intel® Deep Learning Boost (Intel® DL Boost).

Conclusion

A modern cloud strategy requires a combination of optimized hardware and software that can deliver the performance customers expect. Data centers and clouds powered by Intel® technologies deliver reliable, scalable, workload-optimized performance across enterprise applications. By engaging in deep collaboration with Intel engineers, companies like Salesforce can better understand their workloads and computing environments. The latest Intel technologies for the cloud help optimize performance and maximize resource utilization. At the same time, co-innovation with Intel can lead to faster technology adoption, significant cost savings, and an overall better end-customer experience. Specialized platforms and other tools from Intel are available to help customers like Salesforce build, deploy, and manage their workloads and their entire cloud environment.

Spotlight on Salesforce

Salesforce, a global customer relationship management (CRM) leader, empowers companies of every size and industry to digitally transform and create a 360° view of their customers.

In 1999, Salesforce launched a CRM system with a groundbreaking twist. All the software and critical customer data would be hosted on the Internet and made available as a subscription service. This pioneering "software as a service," or SaaS, model quickly spread across the technology industry.

With the increasing digital transformation of companies worldwide, more than 150,000 companies, both large and small, are growing their businesses with Salesforce. The firm employs over 50,000 employees—and has been one of Fortune's 100 Best Companies to Work For for twelve years in a row.

Learn More

- **Intel® Xeon® Scalable processors**
- **Salesforce.com**
- **Intel® oneAPI**

Find the solution that is right for your organization. Contact your Intel representative or visit **Intel.com/cloud**.

[1] Results provided by Salesforce and were based on its internal tests, as of November 2021. Please contact Salesforce for further details.

Performance varies by use, configuration and other factors. Learn more at intel.com/PerformanceIndex.

Performance results are based on testing by Intel as of dates shown in configurations and may not reflect all publicly available security updates. See configuration disclosures for details. No product or component can be absolutely secure.

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