WHITE PAPER

Intel® Xeon® and Intel® Xeon® Scalable Processor Family
Financial Services

Unparalleled Performance, Agility and Security for NSE

The latest Intel® Xeon® processor platform provides new levels of platform convergence and capabilities, and helps boost performance for NSE's mission-critical applications

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Sankarson Banerjee
Chief Technology Officer-Projects, National Stock Exchange

Executive Summary

India is one of the top growing economies in the world with the country witnessing a rapid wave of economic growth. Playing a pivotal role in this growth are the financial markets, which form the backbone of the country's economy. The stock market, being an integral part of the financial markets, is one of the key factors that is accelerating the financial growth of the nation.

The National Stock Exchange ("NSE"), as the leading stock exchange in India, has been a key pillar of the Indian stock market, and has been one of the key players in driving the economic growth of the country. NSE is an innovation-focused organization and has been deeply investing in technology to provide the best trading experience to its customers. Over the years, with volatile markets and complex regulations placing ever-higher demands on trading, risk management and other platforms, and business volumes increasing exponentially, the need for efficient utilization of technology has grown significantly for NSE.

Intel has been supporting NSE in their constant endeavour to accelerate innovation and deliver the best experience for their customers. The Intel® Xeon® and Intel® Xeon® Scalable processor family is enabling NSE answer the challenge of keeping up with their rapidly growing business. By churning through more computations in less time, these processors are enabling NSE make smarter and faster decisions in high-volume scenarios where every microsecond matters.

Continuing Innovation

NSE is the leading stock exchange in India[1] and NSE's technology compares with the top exchanges in the world. In fact, NSE is the fourth largest stock exchange in the world by equity trading volume[1] and is ranked as the largest stock exchange in India in terms of total and average daily turnover for equity shares every year since 1995[2]. "Millions of transactions take place each day in the exchange, so it is a highly massive volume environment, and we have to ensure lot of reliability in this space. And we have to ensure that our customers get the best experience possible," says Sujoy Das, AVP, Principal Architect, NSE.

As part of their constant endeavour to create a new standard in customer experience and create a deeper and stronger relationship with their customers, NSE was the first exchange in the country to provide a modern, fully automated screen-based electronic trading system that offered easy trading facility to investors spread across the length and breadth of the country. "NSE has been purely an electronic exchange right from the beginning - the earliest purely electronic exchange in the world - and almost all of what we offer to our customers are in some form digital," says Sankarson Banerjee, Chief Technology Officer-Projects, NSE.

"Since NSE is an electronic exchange, IT plays a key role, we are primarily driven by technology. A good chunk of our expenditure and people are driven by IT, which is the core of everything that NSE does," Sankarson further adds.

Trusted Collaboration with Intel

Intel and NSE have been working together for many years, with NSE leveraging Intel® technologies and platforms to drive their IT infrastructure and trading platform. And Intel® Xeon® processors have been key to delivering the performance and reliability that NSE needed. "We are working with our customers like NSE to bring the best solution and enable them to provide the edge with Intel® technology," says Sachin Nagpal, Director Sales, ISG, Intel – Asia Pacific and Japan.

Underlining the collaboration with Intel, Sujoy says, "We have been engaging with Intel for quite some time, and Intel has constantly given us thorough guidance on how to tune the performance of our systems, optimize our hardware, drive software integration as well as the do's and don'ts in the software delivery lifecycle. We have benefited a lot from our engagement with Intel, and we have been constantly upgrading all our systems to Intel's hardware for getting better performance and reliability."

Reiterating this, Sankarson says, "When NSE started, we were using a number of proprietary technologies, but over the years we have moved almost entirely to Intel® Xeon®, most of our servers are Intel® Xeon® based, and the few that are not, we are in the process of phasing out, so at some point of time, we will become purely Intel. It's been very critical to us, it offers us performance and price benefits, so it has been a core part of our applications."

Addressing Challenges of Rapidly Growing Volumes

A main concern that NSE faces is to keep up with the growing volumes of their business, which has grown quite dramatically as India's economy continues to expand significantly.

"We have two challenges, one is to make sure that we pack a larger amount of processing power into the same physical area, to grow upwards, make things faster, handle more volumes... on top of that, one big challenge is thermal efficiency, power is always a limitation for us, it is expensive, it is restricted, so in the past, every once in a while we have seen growth being hampered by power availability," says Sankarson.

NSE has been able to address these challenges through strong collaboration with Intel. "Intel has provided us with a good deal of support and newer processors that innovated on various ways to increase capacity out of the same boxes," says Sankarson.

"Intel innovations have really helped us. We have been able to pack in a lot more into our data centers, use less power, achieve a smaller footprint, and therefore we have been able to grow at the speed that we want, and we have been able to keep up with our volume and performance requirement," Sankarson further adds emphasizing on how Intel enabled them in meeting their performance and energy efficiency needs.

Taking a Major Leap Forward

As applications and workloads running on their system became more intensive, NSE really needed to boost the throughput capacity of the system to support these applications and workloads. And in keeping with its commitment to invest in innovative technology and make it work more effectively to boost its trading system, NSE decided to implement the latest Intel® Xeon® Scalable processor platform on a pilot basis for their inline trade risk management system - Parallel Risk Monitoring System ("PRISM")* - which has a huge computing requirement and is a mission-critical system for NSE.

Emphasizing on the importance of scaling their mission-critical platform based on their changing business needs, Sankarson says, "When we first heard about the Intel® Xeon® Scalable processor, we were quite interested in it because it seems to offer quite a few innovations that we thought we could take advantage of. So, we decided to test it out, we have been adopting it, trying it out in one of our most intensive parts – the risk management system for real-time risk assessment, and we have seen very promising results, we have seen a tentative 20% improvement^ in performance, which is quite an achievement, given that our risk system already runs at extremely aggressive performance numbers."

PRISM PERFORMANCE TEST#

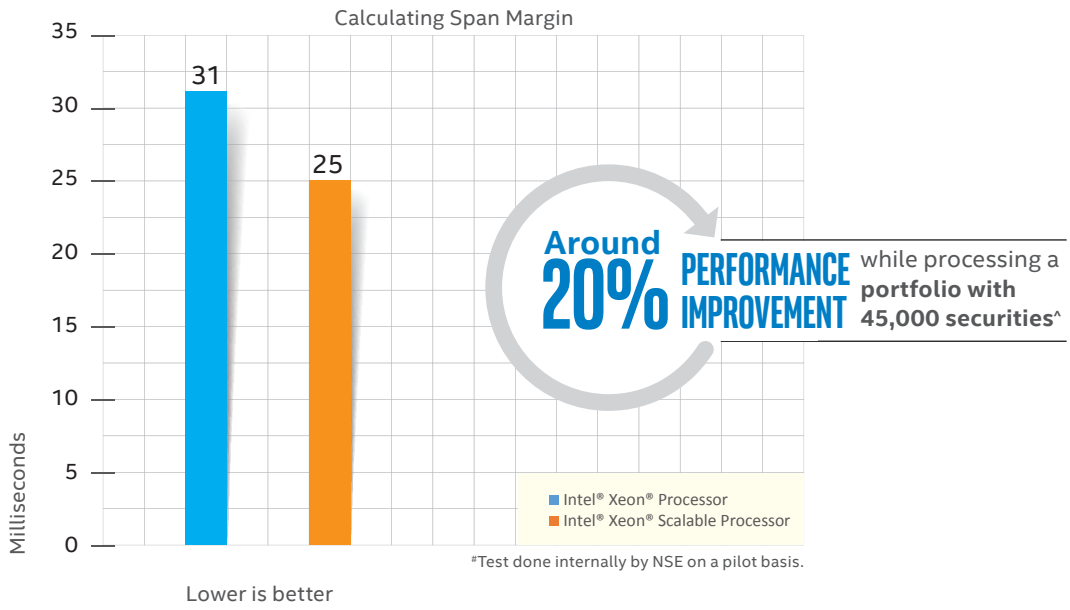
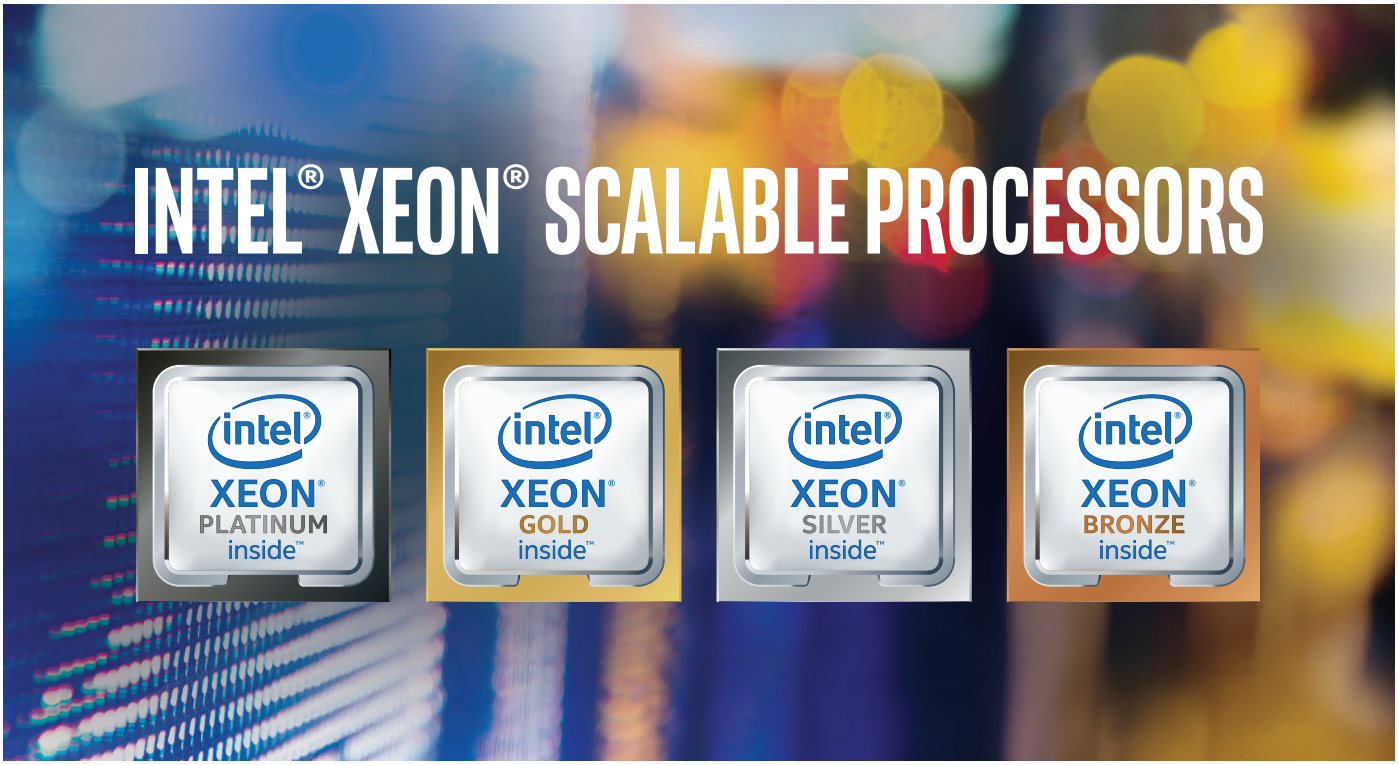


Figure 1: Preliminary performance test on PRISM



New Foundation for Secure, Agile and High-Performance Data Centers

The Intel® Xeon® Scalable platform provides the foundation for a powerful data center platform that creates an evolutionary leap in agility and scalability. Disruptive by design, this innovative processor sets a new level of platform convergence and capabilities. The Intel® Xeon® Scalable processor family provides higher per-core performance, delivering high performance and scalability for nearly linear application scaling efficiency, and greater memory bandwidth and capacity to accelerate in-memory operations. Driving across the advantage of this latest Intel's processor, Sachin says, "The Intel® Xeon® Scalable processor family is a great asset to drive innovation in the financial industry."

Along with performance benefits, the Intel® Xeon® Scalable processor family brings unprecedented feature enhancements that are critical for financial companies like NSE to transform their IT infrastructure and accelerate their business growth. "The latest Intel® Xeon® Scalable processor has quite a few interesting features - better inter-process communication delivery and fault-tolerant features," says Sujoy.

"One feature we have been following with a great deal of interest is the Intel® Run Sure Technology. We have an extremely mission-critical trading application, and trading applications can't afford to lose even one trade or even a second of delay or a second of data loss, it's a big deal for us. Intel® Run Sure offers us this high scalability, high availability within a mission critical application," Sankarson further adds.

> "The Intel® Xeon® Scalable processor family is a great asset to drive innovation in the financial industry. We are working with our customers like NSE to bring the best solution and enable them to provide the edge with Intel® technology."

Sachin Nagpal

Director Sales, ISG,
Intel – Asia Pacific and Japan

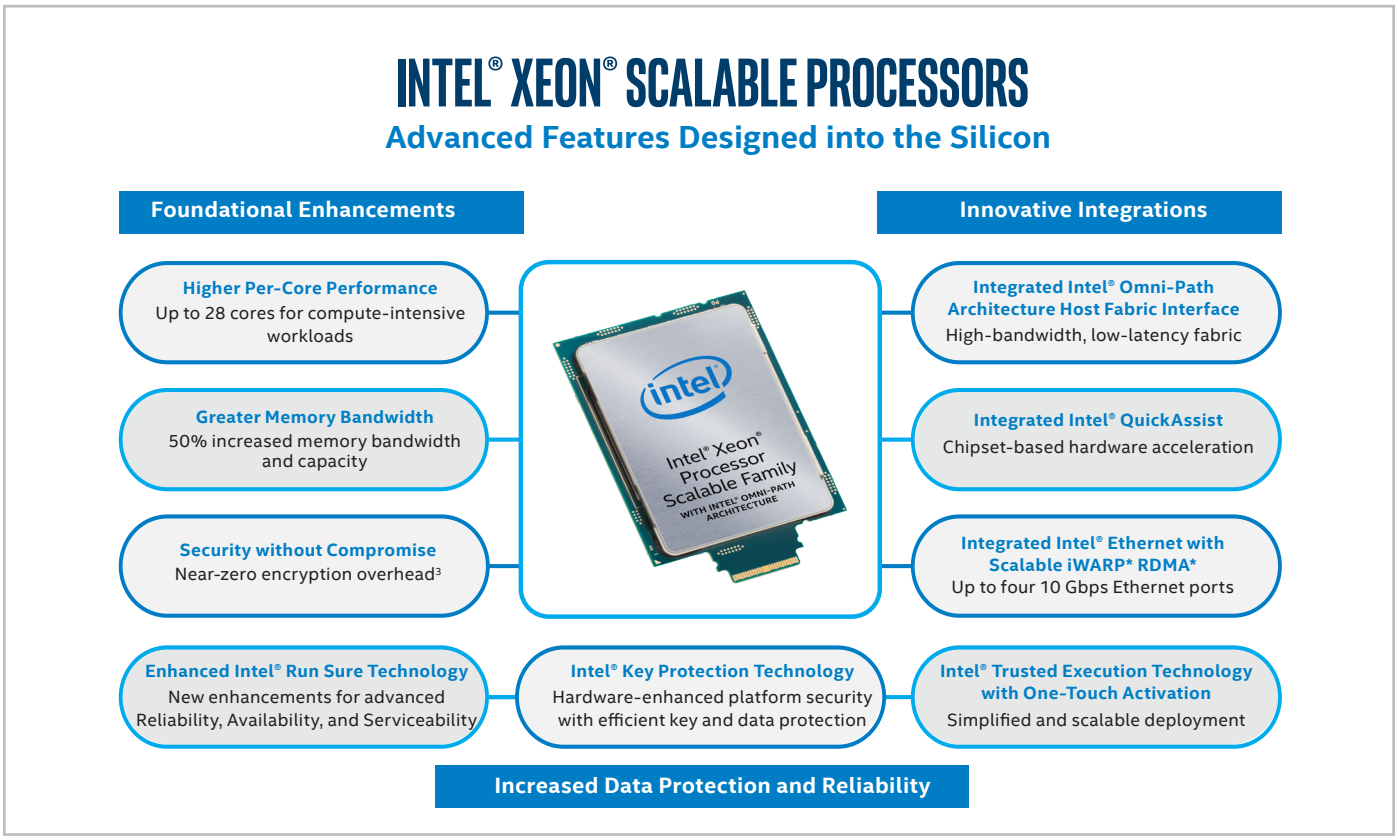


Figure 2: Key features and capabilities of Intel® Xeon® Scalable processors

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Sujoy Das
AVP, Principal Architect,
National Stock Exchange

Going Ahead

NSE has been leveraging Intel® technologies for years to drive their IT infrastructure and trading platform. And with the pilot implementation of the Intel® Xeon® Scalable processor on their risk management system providing great initial results, NSE and Intel look to continue the strong collaboration to address critical business and technology challenges, and drive more success in the future.

"Technology challenges keep growing as the volumes keep going up, and the delivery also has to be as reliable as possible. So, we continuously want to upgrade our infrastructure as well as software technologies.
The Intel® Xeon® Scalable processor has the potential of giving us the performance that we require to meet all our challenges. So, we need to evaluate the hardware in a better manner to get a grip on whether our applications can be moved on to this platforms in the future. And also, we will continue to engage with Intel to see how our various challenges can be met," signs off Sujoy.

The views presented by NSE's executives in the white paper are independent views, and do not in any way represent the views of Intel.

Intel technologies' features and benefits depend on system configuration and may require enabled hardware, software or service activation. Performance varies depending on system configuration. No computer system can be absolutely secure. Check with your system manufacturer or retailer or learn more at intel.com.

^Based on NSE's internal testing data.

1. According to World Federation of Exchanges (WFE), 2015.
2. Based on annual reports of SEBI.
3. BigBench, Near Zero encryption overhead: BigBench query Runtime/second. Testing done by Intel. BASELINE: Platform 8168, NODES 1 Mgmt + 6 Workers, Make Intel Corporation, Model S2600WFD, Form Factor 2U, Processor Intel® Xeon® Platinum 8168, Base Clock 2.70 GHz, Cores per socket 24, Hyper-Threading Enabled, NUMA mode Enabled, RAM 384 GB DDR4, RAM Type 12x 32 GB DDR4, OS Drive Intel® SSD DC S3710 Series (800 GB, 2.5 in SATA 6Gb/s, 20nm, MLC), Data Drives 8x – Seagate Enterprise 2.5 HDD ST2000NX0403 2 TB, Intel® SSD DC P3520 Series (2.0TB), Temp Drive DC 3520 2 TB, NIC Intel X722 10 GBE – Dual Port, Hadoop Cloudera 5.11, Benchmark TPCx-BB 1.2, Operating System CentOS Linux release 7.3.1611 (Core); HDFS encryption turned OFF. vs. NEW: Platform 8168, NODES 1 Mgmt + 6 Workers, Make Intel Corporation, Model S2600WFD, Form Factor 2U, Processor Intel® Xeon® Platinum 8168, Base Clock 2.70 GHz, Cores per socket 24, Hyper-Threading Enabled, NUMA mode Enabled, RAM 384 GB DDR4, RAM Type 12x 32 GB DDR4, OS Drive Intel® SSD DC S3710 Series (800 GB, 2.5 in SATA 6 Gb/s, 20nm, MLC), Data Drives 8x – Seagate Enterprise 2.5 HDD ST2000NX0403 2 TB, Intel® SSD DC P3520 Series (2.0 TB), Temp Drive DC 3520 2 TB, NIC Intel X722 10 GBE – Dual Port, Hadoop Cloudera 5.11, Benchmark TPCx-BB 1.2, Operating System CentOS Linux release 7.3.1611 (Core); HDFS encryption turned ON.