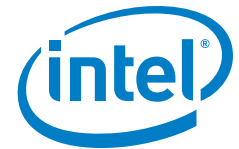


SOLUTION BRIEF

Intel® Xeon® Processor E5-2600 v4 Product Family
Financial Services



Fidessa Increases Trade Speed by up to 24 Percent¹

“Execution performance is critical for our customers, and to our success.”

—Jonathan Purcell

Development Manager for Server Infrastructure, Fidessa

Fidessa provides trading, investment and information solutions for the world's financial community. \$20 trillion of transactions flow across its network each year, and 85% of the world's tier 1 financial institutions use Fidessa.

Fidessa



Fidessa's XTP Operator Console shows the latency percentiles for time to market and the round-trip.

For traders, time is critical. Their algorithms are reacting to market events in microseconds. If they decide to make a trade and the market moves, they risk missing out on the price, or sometimes even risk losing the deal entirely. At the same time, there's a huge amount of complexity to deal with: exchanges use different message protocols. Many companies end up with numerous gateways and in-house systems to place their trades across the markets, all of which need to be maintained and updated. The trader may be using multiple layers of chained algorithms, including (in no particular order): benchmark, prop, spreader, execution tactics, synthetic order, and smart order routing.

Fidessa solves these problems with its Electronic Execution platform, Fidessa XTP*. Companies that use the service can send a message to Fidessa in the standard Financial Information eXchange (FIX) format. Fidessa validates risks and persists the order; Fidessa processes the order through all applicable algorithms; Fidessa converts the order into the format for the exchange and routes the message to carry out the trade. The service offers consistent low latency performance,

and allows customers to monitor the performance of their orders. “For this simple flow performance is critical for our customers, and it's critical for us,” says Jonathan Purcell, Fidessa's development manager for server infrastructure. “Our customers sell the service on to their clients. Unless the performance is right, they won't use the system.”

Fidessa measures latency from when a FIX message is received to the point where a native message is sent to the exchange. Network switch transfer latencies are harder to measure, and require some special network capture hardware. They are in any case on the sub-microsecond (billionths of a second) scale and account for a tiny amount of the time a transaction takes.

Fidessa must deliver a consistently reliable low latency service that scales from this simple direct market access (DMA) flow to comprehensive support for complex execution. “The time when business is most critical is when the markets are most busy,” says Purcell. “That's why we need to ensure we perform consistently.” Typical approaches to consistent performance won't work. Low-latency systems of this class are closer to a real-time system.

“We can’t rely on the Linux kernel scheduling us when it thinks we need to do work, we must be running uninterrupted all the time,” says Purcell.

Fidessa XTP is provided as a hosted service from Fidessa’s network of data centers worldwide. The platform uses paired synchronous servers to ensure Fidessa can recover the system state in the event of a crash. Customers might have between 30 and 50 servers dedicated to handling their trades worldwide, and Fidessa has an estate of 8,000 servers worldwide delivering a wide range of services for financial traders.

Fidessa XTP is based on HPE ProLiant* DL360 servers. “For XTP it’s a bespoke set-up. The hardware, operating system version and configuration all are tightly specified by development,” says Purcell. “For this application, we go through the process of testing which CPUs work best, what memory we should have in the box and so on.”

Fidessa evaluated overclocked and water-cooled servers but opted instead for a reliable enterprise class system that can be deployed in all of its 30 data centers. “Fidessa focuses on both stability and performance. For this reason we do not currently work with customized hardware,” says Purcell.

Following its tests, Fidessa has chosen the Intel® Xeon® processor E5-2600 v4 product family for Fidessa XTP, in a two-socket configuration. The company was already using the previous generation of the processor for its other services. “You’ve got to test,” says Purcell. “We were going to buy the Intel® Xeon® processor E5-2600 v3 product family, which we knew and understood. Without an ability to test, we couldn’t have decided to switch to v4 with confidence.”

The company ran its own microbenchmark¹, which writes and reads records to the high performance in-memory database at the core of Fidessa XTP. Intel gave Fidessa access to an Intel Xeon processor E5-2697

v3 and an Intel Xeon processor E5-2697 v4 for testing. The two tests run were a linear scan, where every record is scanned until the required record is found; and a scan using a key, which uses an index to look up the required record. This benchmark is a single thread performance test, so it’s unaffected by the increased core count in the newer processor. Fidessa’s own research showed that the linear scan improved by 11.5 percent¹ (enabling over 13 million operations per second), and the scan using a key was 15.5 percent¹ faster (at over 5 million operations per second) on the new processor (see Table 1).

“We weren’t surprised to see an improvement,” says Purcell. “But the size of it was a surprise! It’s unusual to see a performance gain like that in a single threaded test. Some customers want to know why we use our own database, so we need those times to be as impressive as possible. For this benchmark, the performance of the memory subsystem is critical.”

The v4 processor offers a higher memory bandwidth and up to 55MB of last-level cache per socket. It supports up to four channels of DDR4 memory, up to 3TB per socket in 2-socket configuration, and up to 2,400 megatransfers per second DDR4 memory speed. To ensure low latency, Fidessa uses an in-memory database so the performance of the memory can have a significant impact on the database performance, which

in turn contributes to the application performance.

Fidessa ran tests including DMA and smart order routing. This includes validation, persistence, risk and normalization as well as the smart order routing algorithm. An additional test was run where a third-party risk algorithm was integrated against the system using a parallelized interface. This feature supports brokers who also want to use their own risk inline.¹ These tests were run comparing the Intel Xeon processor E5-2697 v4 with the previous generation (see Table 2). A simulator was used for the exchange and the third-party risk elements of the test. To conduct the test, Fidessa sent 10,000 orders through the test system and plotted the times taken to place an order (the time to market); the time to place an order including the third-party risk simulation; and the time taken to place the order, receive an acknowledgment and send the acknowledgment to the client (the round trip time).

Fidessa considers the median and the 95th/99th percentile to be the most useful metrics as they expose outliers. The company’s own application test showed that performance increased by six percent¹ for smart order time to market, and 10 percent¹ for the round trip. The round trip time for direct market access increased by 11 percent¹, and both tests were 24 percent¹ faster with the third-party risk element included.

	Intel® Xeon® Processor E5-2697 v4	Intel® Xeon® Processor E5-2697 v3	Increase in operations	Percentage gain
Linear Scan	13,047,314	11,700,088	1,347,226	11.5
Scan using key	5,066,002	4,382,933	683,069	15.5

Table 1: Fidessa’s microbenchmark data for database reads. Units are operations per second. Single threaded performance.

“In our experience, the Intel Xeon processors just keep getting better and keep getting faster,” says John Murphy, senior architect, Fidessa. “When we’re trying to tune our software and work out how to make it faster, we have an evidence driven approach. The best thing about the Intel Xeon processors is that the performance counters in the CPU enable us to see where we’re spending time now and what we’re spending time doing. It really clears the mist.”

For customers looking to place trades, performance gains can translate into money. “Time to market is critical because you decide to trade at a certain point based on the current price,” says Purcell. “You don’t want the market to move while you’re making your trade. When companies relinquish control of managing trades themselves, they need to know that our service will work well, even when markets are busy and volumes are high, and that’s why the performance must be consistently good.”

Learn More

- Fidessa: www.fidessa.com
<http://www.fidessa.com/products/sell-side-solutions/electronic-execution>
- Intel Xeon processor E5-2600 v4 product family:
<http://www.intel.com/content/www/us/en/processors/xeon/xeon-processor-e5-family.html>
- HPE ProLiant Servers:
<https://www.hpe.com/us/en/product-catalog/servers/proliant-servers.html>

Type of test	Time to Market	Third-party risk	Round Trip time
Direct Market access (median) improvement	0%	24%	11%
Smart order router (median) improvement	6%	24%	10%

Table 2: Performance improvements from Fidessa's own tests comparing the Intel Xeon Processor E5-2697 v4 to the previous version.



¹ Software and workloads used in performance tests may have been optimized for performance only on Intel microprocessors. Performance tests, such as SYSmark and MobileMark, are measured using specific computer systems, components, software, operations and functions. Any change to any of those factors may cause the results to vary. You should consult other information and performance tests to assist you in fully evaluating your contemplated purchases, including the performance of that product when combined with other products. For more information go to www.intel.com/performance

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Configuration information for Fidessa's tests: HPE ProLiant DL360 with Intel Xeon Processor E5-2697W v3 with 128GB RAM and DDR4-2133; compared to HPE ProLiant DL360 with Intel Xeon Processor E5-2697W v4 with 128GB RAM and DDR4-2400. The software was Fidessa's EE platform 2016-08 release, running on RedHat Enterprise Linux* 6.7.

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