Competing to Win in Financial Services

AWS High Performance Computing Powered by Intel® Xeon® Processors Accelerates Innovation for Banks, Investment Firms, Insurance Companies, and More

Financial Services Move to the Cloud

According to Deloitte, 2018 will be a pivotal year for the financial services industry. To cope with the highly dynamic nature of the marketplace, banks, insurers, and other financial institutions must become more strategically focused, technologically modern, and operationally agile.[i]

While many organizations have cloud initiatives, the next few years will see a massive shift to cloud-based computing. In a recent survey, 52 percent of asset management CEOs believe that cloud computing will be strategically important to their organizations.[ii] For financial services companies, making this strategic shift will require working through the complexities of their environment.

Scaling On-Premises Platforms

Insurance companies, investment firms, and retail banks alike face highly volatile markets, more stringent regulatory regimes, and increased competition. Whether the need is for risk calculations, stress testing, portfolio optimization, or predictive modeling, financial organizations rely heavily on software running on high performance computing (HPC) platforms to inform better decision-making.

As HPC workloads proliferate, institutions come up against scalability limitations of on-premises infrastructures. Analysts and actuaries become frustrated by long processing times, while their business counterparts lack the insights needed to make effective and timely decisions.

Business executives are increasingly reluctant to pour additional funding into on-premises infrastructures. Instead, many augment or even replace their existing grids with cloud-based high performance computing from Amazon Web Services (AWS) running on Intel® Xeon® Scalable processors. Xeon is a common technology platform for most companies, which enables seamless scaling of their current data center environment to take advantage of, and plan migrations to, the AWS HPC platform. Customers get the performance and reliability they've come to expect in their on-premises hardware with the scalability of the cloud, along with pay-as-you go-pricing and hardware upgrades at the click of a button.

Characteristics of Financial Workloads

Since the first automated teller machine in 1969, the financial services industry has been willing to adopt new technologies early. That tendency continues: A recent survey of investment banks found that 63 percent were planning to use high performance computing in their upcoming initiatives.[iii]

Compute-intensive calculations are nothing new in the industry; however, today's calculations are far more demanding for several reasons.

- Data sets are getting larger and more disparate, and the varieties of data are proliferating.

- Increasingly complex trading strategies and more feature-rich products require extensive back-testing with larger volumes of historical data.

- Risk calculations involve more granular risk factors and a wider range of scenarios.

- The time scale for decisions is rapidly shrinking, putting pressure on analysts to get results more quickly than ever before.

Financial workloads have unique characteristics that drive infrastructure needs, including large and disparate data sets, resource sharing (for example, raw market feeds used by multiple internal groups), period or scheduled tasks (for example, risk analysis using historical data), and non-interactive, long-running jobs. Unlike other types of HPC workloads, these runs are usually optimized for overall throughput and can tolerate moderate latency.[iv]

Grid Computing Use Cases

As financial institutions respond to increased regulatory requirements and intense competitive pressures, high performance computing is becoming a necessity in more and more use cases in financial services. For example:

Capital management: Tests such as Comprehensive Capital Analysis and Review (CCAR), Solvency II, and Fundamental Review of the Trading Book (FRTB) require organizations to undergo and withstand capital stress testing.

Risk management: Portfolio simulation and scenario testing allow portfolio managers to identify market, credit, and liquidity risks; highlight optimization opportunities; and model the impact of hypothetical changes.

Contract pricing and valuation: Financial managers determine pricing for products such as derivatives and variable annuities using stochastic models that rely on Monte Carlo simulation methods.

Product and strategy development: Developing new financial products requires extensive back-testing using large volumes of historical data, market simulations, and actuarial risk modeling and hedging.

Increasing Compliance Burdens

Financial institutions have seen a steady increase in the number of regulations related to money laundering, credit card payments, consumer protection, and capital requirements. While financial institutions have taken steps to enhance their compliance programs, this continues to be an area of focus for both the industry and regulators.

Regulatory and market fluctuations require flexible, secure compute capabilities. Limited on-premises capacity leads to long run times, simulation backlogs, and inadequate risk calculations. On-premises platforms often lack the scale and agility to fully support these needs. And it's not just about capacity— many big data analytics programs require high-performance file systems, GPUs, and flash storage, which are costly additions to a traditional data center.

FinTech as a Market Disruptor

No discussion of the industry would be complete without acknowledging the disruptive role of FinTech. Mostly cloud-native startups, FinTech companies leverage the latest technologies to create a better customer experience in segments such as retail banking, payments, insurance, and investing.[v] **A good example is Robinhood, a mobile device app that allows users to trade securities without fees.**

Despite the FinTech buzz, established institutions hold some advantages, such as decades of institutional knowledge, regulatory barriers to entry, and established, loyal customer bases.[vi] Still, the industry is taking note: According to PwC, 88 percent of incumbents in the financial industry are concerned about losing revenue to innovators.[vii]

In response, organizations are investing in innovation and accelerating the pace of new service rollouts while maintaining industry compliance and security standards. These competition-driven initiatives increase the usage of compute-heavy processes such as risk computations, mortgage simulations, and portfolio optimization. As on-premises platforms run short on capacity, **companies are looking to cloud-based HPC resources to fill the gap and keep the product pipeline operating at full speed.**

With this background, let's examine the need for HPC in three key solutions spaces: **retail banking, capital markets, and insurance**.

HPC for Banking

Banks need accurate credit-risk assessments to optimize their return on products such as credit cards, mortgages, and lines of credit in a highly competitive marketplace. Mathematical calculations form the basis for revenue-generating trading strategies. Stress testing and other regulatory activities add to the processing load that is straining on-premises platforms.

Many banks see cloud-based HPC on AWS as an attractive alternative to upgrading their on-premises architectures. Not only do they avoid large capital expenditures, they also gain access on a pay-per-use basis to virtually unlimited EC2 instances powered by the latest generation of Intel® Xeon® processors.

The move to HPC on AWS with Intel Xeon technology allows banks to:

- **Scale application and workloads,** while easing deployment complexity through a common Intel architecture environment.

- **Benefit from application optimizations** enabled for Intel architecture.

- **Test new applications and features in less time,** at lower cost, and speed time to market.

- **Scale machine learning models** from proof of concept to production in an efficient manner.

- **Execute stress tests** such as CCAR and FRTB 17 in a timely way.

- **Spin up a proof of concept in days or hours,** and if it doesn't work, shut it down and only pay for what you used.

New facility using HPC on AWS helps Fannie Mae respond with agility to rapidly changing market conditions

Fannie Mae's on-premises HPC facility no longer met their growing business needs.

By migrating large modeling runs to HPC on AWS with Intel Xeon technology, the company has cut the time to simulate 20 million mortgages by 75 percent.

Fannie Mae plans to migrate all major financial modeling applications to AWS by the end of 2018.

See the video presentation

HPC for Insurance

The insurance industry faces disruptive forces, from new market entrants to unconventional models such as usage-based insurance. These changes are forcing incumbents and newcomers alike to compete aggressively with innovative products offering more aggressive returns. In addition, historically low interest rates—while improving recently—put pressure on product offerings and reserving calculations.

Complex risk calculations are key to decision-making in insurance. Legacy on-premises infrastructures struggle to keep up and may take days or even weeks for compute-intense portfolio risk runs, which limits the ability to try alternative projections. Adding hardware to on-premises infrastructures is impractical, since the need is only present a few weeks out of the quarter.

As a result, many insurance companies are turning to HPC on AWS with Intel® Xeon® technology which allows them to:

- **Benefit from powerful application optimizations** enabled for Intel architecture without rework or retesting.

- **Shorten portfolio risk calculations** to allow remodeling and refactoring in hours, not weeks.

- **Speed the time spent on calculations** needed for financial close end-of-quarter processing, and to meet the requirements of Solvency II and other principles-based reserving requirements.

- **Support the opportunity to modernize financial reporting infrastructure**, in part to respond to International Financial Reporting Standard (IFRS) 17.

- **Improve catastrophe modeling capabilities** to guide decisions about risk exposure, underwriting rules, product mix, and reserving.

Talanx gains agility and scale with HPC on AWS

talanx.

Talanx was experiencing bottlenecks when it ran time-sensitive simulations for Solvency Capital Requirements and Minimum Capital Requirements needed for quarterly and annual company reports.

Seeking more scalability and agility, Talanx migrated its HPC workloads to 550 Amazon EC2 instances.

By moving to AWS, Talanx reduced calculation time by 75 percent and achieved €8 million in annual savings.

HPC for Capital Markets

Success in the capital markets arena depends on compute-heavy software applications. For many investment firms, their on-premises resources are reaching their limits in both capacity and flexibility. They want to achieve more agility and scalability without costly rip-and-replace initiatives.

Cloud-based HPC on AWS offers a cost-effective alternative. Companies can burst peak loads to the AWS cloud and download results to their on-premises platform, paying only for the resources they use. Some organizations are even decommissioning their expensive mainframes in favor of cloud-based resources. By doing so, they realize significant savings and increase their elastic compute power without disrupting core production processes.

When investment organizations take full advantage of HPC on AWS with Intel® Xeon® technology they gain the ability to:

- **Scale application and workloads**, while easing deployment complexity through a common Intel architecture environment.

- **Model more complex global economic scenarios** involving multiple currencies and wider time horizons.

- **Extract insights** from terabytes of historical data using statistical modeling.

- **Develop and test new trading scenarios**, back-testing with a deeper and wider set of data.

- **Provide additional quantitative modeling** for their researchers to improve risk and trading algorithms, improving the efficacy of their trading strategies.

Morningstar expands security management capabilities fiftyfold

MORNINGSTAR®

Morningstar's internal infrastructure had become a bottleneck for risk modeling calculations—only one simulation could run at a time.

By moving their HPC software to AWS, Morningstar can now run their risk models 4,000 times faster, in hours instead of months, and manage 50 times as many securities.

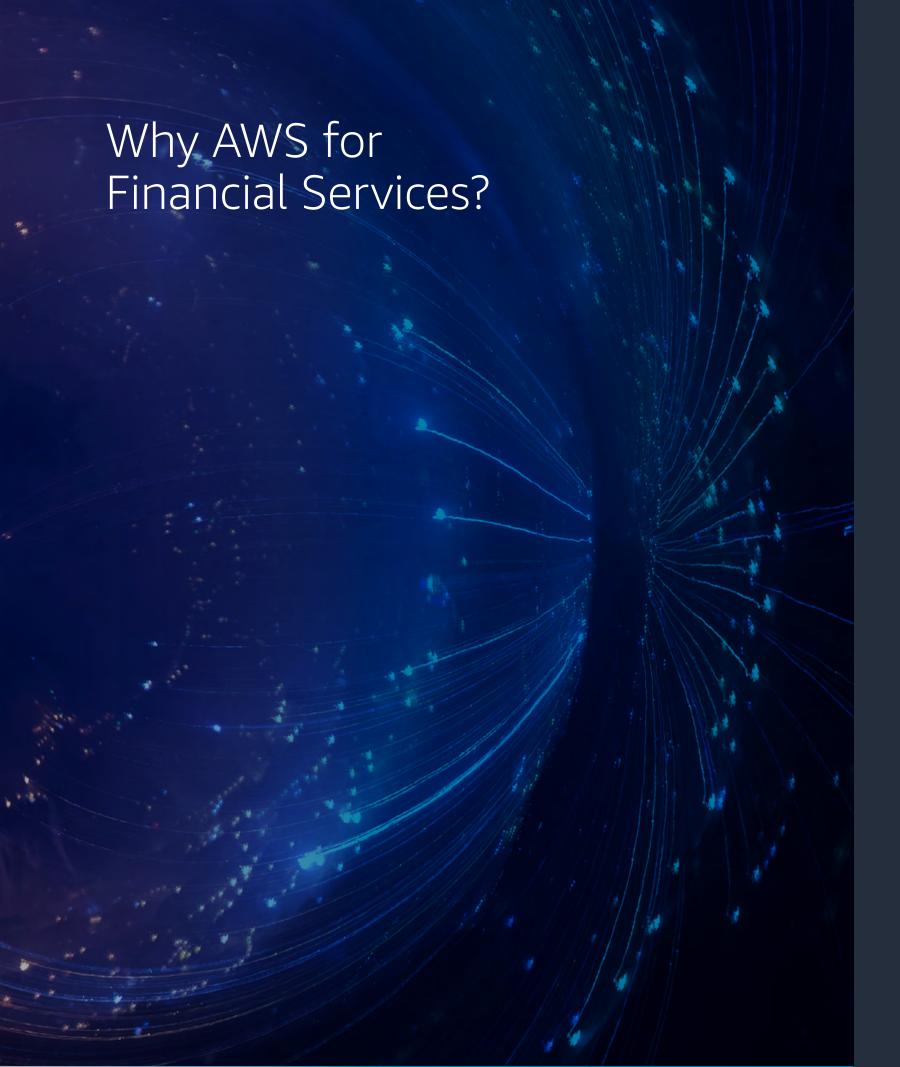# AWS and Intel Drive HPC Success in Financial Services

Together, AWS and Intel offer a broad and deep set of leading compute, networking, storage, cloud orchestration, and visualization technologies that are ideal for financial services use cases. Business analysts and data scientists use HPC on AWS with Intel® Xeon® technology to power actuarial calculations, determine capital requirements, model risk scenarios, price products, and perform other critical business operations.

With AWS and Intel, companies can access virtually unlimited resources using a pay-as-you-go pricing model, avoiding time-consuming and costly upgrades to on-premises architectures. Moving compute-intensive workloads out of the data center delivers increased speed, scalability, and cost savings.

Amazon EC2 instances are powered by Intel Xeon processors built to Amazon's specifications. Intel Xeon processors are the technological foundation for both the enterprise and cloud, bringing predictable performance, application and workload portability, scalability, and security for on-premises and off-premises deployments.

AWS customers can choose from a range of compute instances with optional features such as data encryption for enhanced security (AES-NI) and a faster processor clock rate for peak loads (Intel Turbo Boost Technology). They can also improve application performance with Intel AVX-512 running natively in Amazon EC2 instances. AWS instances powered by Intel Xeon processors provide the ultimate application agility and portability, allowing customers to take advantage of the many optimizations based on the Intel architecture.

Why AWS for Financial Services?

Financial organizations are turning to HPC on AWS with Intel® Xeon® technology to take advantage of:

- Virtually unlimited compute and storage resources.

- Serverless and other compute options.

- A variety of pricing structures for cost optimization and lower TCO.

- Enhanced security and compliance.

- Big data capabilities for analysis and business intelligence.

- Automation for scaling and elasticity in provisioning resources.

- Access to infrastructure in minutes, for faster time to results.

Getting Started
with HPC on AWS

Getting started with AWS is easy. You can set up an account with just a few clicks without any up-front commitment.

To learn more about how AWS and Intel are working together to meet the needs of banks, insurance companies, and investment firms, visit www.aws.amazon.com/hpc or www.aws.amazon.com/intel.

Start experimenting with AWS today with a sample project or tutorial, gain deeper insight through whitepapers and videos, or find a partner to get hands-on guidance. Try it now.

i   "2018 Banking Outlook: Accelerating the transformation," Deloitte Center for Financial Services, 2017.

ii   155 asset management CEOs interviewed for PwC's 18th Annual Global CEO Survey: A marketplace without boundaries? Responding to disruption (www.pwc.com/ceosurvey)

iii   https://www.gft.com/int/en/index/company/newsroom/press-releases/2018/investment-banks-welcome-public-cloud-adoption-for-innovation-first-not-cost-reduction/

iv   Financial Services Grid Computing on Amazon Web Services, January 2016.

v   https://www.marshall.usc.edu/blog/how-fintech-disrupting-financial-services

vi   Ibid.

vii   https://www.pwc.com/jg/en/publications/pwc-global-fintech-report-17.3.17-final.pdf