Accurate, on-time risk prediction
HPE Vertica Analytics Platform
Analyze risk data in less time

Following the 2008 credit crisis, financial services institutions (FSIs) faced an expanded array of regulatory and compliance mandates, with risk becoming the most important area of scrutiny. The issue wasn’t just solvency, but also commitments made to the customers that regulatory agencies were now determined to protect more vigorously. To survive, most FSIs attempted to maintain their growth plans, although some collapsed in the effort.

Amid these changes, FSIs require an accurate view of their Value at Risk (VaR) position at any one point in time the requirement to comply with regulations and grow organically. According to Investopedia, “VaR is a statistical technique used to measure and quantify the level of financial risk within a firm or investment portfolio over a specific time frame.” Essentially, VaR is about the potential default risk of any party that an FSI does business with.

To understand and provide a comprehensive, aggregated view of a bank’s risk position at any point in time, FSI quantitative analysts must be able to analyze risk data and publish it to regulators. Before it can be published, however, analysts have to prepare the data, run queries, perform statistical analysis, and fix any issues with the data. This data preparation process and statistical analysis can take weeks, which can delay required publishing of the risk report to regulators on time. Fast data analysis is also necessary to find any counterparties with anomalies, which then calls for a rerun of the analysis for those anomalies.

To address these challenges, more and more FSIs are relying on the HPE Vertica Analytics Platform for VaR analysis. Purpose-built to perform fast, near-real-time analytics on Big Data, the Analytics Platform is making it possible for financial institutions to get accurate, on-time risk prediction data when they need it.

Investopedia.com/terms/v/var.asp
Definition of VaR
Converse with your data

FSI quantitative analysts look at risk data coming in from trading platforms and many other systems. Their job is to understand the data and provide a comprehensive, aggregated view of the FSI’s risk position at any point in time. They typically employ a “back testing” process for credit that involves going back in time to verify that the FSI’s models are accurately predicting the realized values that the analysts have observed. The models are also used for forecasting profit and loss, or the FSI’s exposure.

Risk models are validated by verifying that the forecasted value is within a statistically valid range compared with the actual losses. This model validation is conducted for several regulators on a monthly basis, with some differences in reporting for each regulator. With multiple counterparties for each transaction, millions of transactions, and several regulators to report to, forecasting can lead to billions of values for all the counterparties. Generating daily, weekly, and monthly reports for regulators involves massive, automated Big Data analytics across all the counterparties, covering requirements for all the regulators. This process produces a large number of statistical values, and quantitative analysts must ensure that these values are in the expected ranges, whether they are different from the last sets of values, and so on.

If analysts find specific areas of interest during their analysis, they have to switch from automated querying to ad hoc analysis. Although the business logic for ad hoc and automated queries is the same, the ad hoc queries tend to change the input data.

Because answers to ad hoc queries lead to further questions, quantitative analysts are constantly looking to refine their queries and get more granular analysis. Because the continuous ad hoc query process is more akin to an actual conversation, and to avoid any interruption to the analysts’ thought process, you ideally need a solution that can provide near-real-time query responses from a Big Data analytics platform.
Blazing-fast analytics with the HPE Vertica Analytics Platform

The HPE Vertica Analytics Platform is a perfect fit for handling FSI VaR analysis, designed specifically for organizations of any size to monetize data at hyper-speed and on a massive scale. HPE Vertica customers have reported performance improvements of 50X to 1,000X over their legacy solutions, and with a much lower total cost of ownership.2

Here’s what makes the HPE Vertica Analytics Platform fast:

- **Column-oriented storage**: Designed to increase speed of analytics queries.
- **Projections**: Optimized collections of table columns enables you to easily find answers to your questions.
- **Database Designer**: Creates customized projections automatically based on the questions you ask, eliminating the need to create a schema manually and saving you time.
- **Scale-out Massively Parallel Processing (MPP) architecture**: Processes your queries over multiple processors, enabling linear scalability and high availability over industry-standard, cost-effective hardware.

Ingest massive volumes of financial data

The HPE Vertica Analytics Platform decreases the need to batch load data, and lets you trickle load data throughout the day, while providing real-time latency to analysts. There are no indexes to build or materialized views to refresh. Data is trickle-loaded into Write-Optimized Store (WOS)—a fully queryable, in-memory store—and over time moved over to Read-Optimized Store (ROS), on disk. The migration and access to data across the WOS and ROS is completely transparent to the analyst and managed automatically by the Tuple Mover. Data from both the WOS and ROS are also automatically combined whenever necessary in any queries. Trickle and WOS loading enables ingestion of massive amounts of financial data.

Integrate disparate data for fast loading and exploration

Need to integrate data coming in from disparate systems into a single view? HPE Vertica Flex Tables gives you the power to quickly and easily load, explore, analyze, and monetize rapidly growing forms of semi-structured and structured data.

Further improve query speed with live aggregate projections

Fast risk analysis prior to intraday trading, mortgage approvals, loan guarantees, and other financial transactions is a necessity. For a financial services institution handling one of these transactions, just a few minutes could mean the difference in millions of dollars. The Live Aggregate Projections feature in HPE Vertica speeds up the queries that rely on aggregate functions. These aggregates are calculated and updated as the data loads, and the Database Designer automatically creates and updates the existing projections, bringing you even faster answers to your queries.

Deliver advanced predictive analytics

Advanced predictive analytics is necessary to provide insight from financial data such as forecasting profit or loss, VaR on transactions, trades, loans, and more. HPE Vertica offers in-database predictive analytics algorithms; this eliminates the need to move data to an external analytical tool to perform predictive analysis and helps ensure the security of your data. These predictive models can also be applied on newly arriving data, which is streamed into the database for real-time scoring. Best of all, you can use simple SQL queries and your existing BI tool to gain access to faster prediction results and make timely business decisions.

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2 Based on an HPE internal study.
FSI VaR use cases and challenges

Financial services companies have successfully used Big Data risk analytics for:

• **Portfolios analysis:** Determine the risk of loss on investment portfolios. In the financial industry, a difference of minutes vs. seconds for a transaction can lead to a differential of millions of dollars. As portfolios and data sets get larger, it becomes harder to perform analytics with traditional data warehouses.

• **Financial reporting and controls:** Generate intraday, end-of-the-day, weekly, and monthly reports for regulators on trades and transactions.

• **Computing regulatory capital:** Regulatory capital is defined as, "The standardized requirements in place for banks and other depository institutions, which determines how much liquidity is required to be held for a certain level of assets through regulatory agencies such as the Bank for International Settlements, Federal Deposit Insurance Corporation, or Federal Reserve Board.\(^3\)" Computing regulatory capital has become a priority recently due to new regulations such as Basel III in Europe, and other similar regulations around the world, which require compliance by global FSI companies.

Here are a few examples of use cases that require a Big Data analytics platform:

• Manage a massive volume of data ingestion while simultaneously providing near-real-time querying capabilities.

• Integrate data from disparate sources and in different formats into a single view.

• Reduce security risk by minimizing data transfer across multiple platforms. For example, integrated support for R and Python is essential to avoid transferring data to another platform for statistical analysis.
Financial services VaR case study: A technology solutions and consulting services provider to institutional capital market companies

A leading technology solutions and consulting services provider to numerous Wall Street firms in the field of analytics and risk modeling, embeds the HPE Vertica Analytics Platform into its software solutions to help financial services institutions manage many types of financial instruments used to predict prices and valuation in securities. Their technology has helped clients uncover greater value by quickly answering business intelligence questions related to valuations and risk models involving large sets of data.

In today’s financial services institutions, risk assessment is recognized as not only a business imperative, but also as a stress test against international banking regulations, such as Basel III. Basel III, along with other regulations, requires financial businesses to look at not just past information, but also into the future. In addition to these compliance mandates, back-office compliance is also an issue.

Working with the HPE Vertica embedded platform customers can separate algorithmic work from development work. In this way, customers can have their own data scientists design the algorithmic definitions, and rely on the analytics engine for scripting and the ability to very quickly build queries right into the system.

Analyzing large sets of mortgage data
One of their customers, a hedge fund manager, needed to analyze large sets of mortgage data for portfolio monitoring and predictive analysis. Before the implementation, the fund received regular updates from external data providers such as Fannie Mae, Freddie Mac, CoreLogic, and Moody’s. They were using an existing third-party analytics solution that had created a bottleneck. It took days, and often weeks, to extract, transform, load, and map the data before it was available for use. Their need to identify alpha-generating ideas, ahead of competitors, was getting increasingly difficult.
The inability to slice and dice the data was another big challenge impeding efficient risk analytics. The entire team banked upon a few sophisticated programmers running custom programs and batch scripts for any analysis. The proprietary models were ported and fed into the data engine to drive analytics, causing long delays. In addition, lack of any process standardization led to data inconsistencies with no way to repeat a particular analysis.

To address these challenges, the fund chose the Big Data analytics platform for structured finance built on HPE Vertica. With the new solution in place, the investment team had a unified platform that allowed them to seamlessly integrate multiple data sources. With an intuitive visual query builder interface and automatic SQL/XML generation, users were able to build ad hoc queries on the fly. Complex data analyses, restricted to quantitative researchers in the past, were being performed by even portfolio managers, investment strategists, and credit analysts without any programming.

The biggest impact of the rollout was a tremendous jump in productivity. The HPE Vertica powered analytics BI tool saved critical man-hours, allowing users to focus on data analyses rather than data administration. The entire solution came at a fraction of the existing costs, considerably reducing the TCO.

With the analytics BI tool, the fund continuously added additional data sets to their infrastructure, empowering users to expand the breadth and depth of their analyses. Models built in R were directly integrated into analytics BI tool, shared with other users, and run on the full data universe—rather than only on a subset. As a result, researchers rapidly constructed new models sharing valuable insights with traders giving them a competitive edge in the market.

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