

# Hybrid Cloud: A Way Forward for Risk Analytics Computation

## Abstract

Cloud adoption for financial risk computation is at a nascent stage in the banking and financial services industry. However, there is definite and increasing interest in assessing suitability for cloud adoption and if found appropriate, migration to cloud. While the trend is clear, the industry is grappling to identify the right adoption approach, which becomes incrementally challenging given the unique needs and considerations related with risk management departments of banks and financial institutions.

This paper highlights the need to look at cloud as a suitable option for risk computation, the current stage of the banking and financial services industry, some key aspects that must be considered before embarking on adoption and the way forward. While focused on banks, the various aspects covered in the paper are equally applicable to non-banking financial institutions such as investment firms, clearing houses, depositories and so on.

## Financial Risk Computation: Assessing the Challenges

Calculating financial risk measures in banks and financial institutions is one of the more computation intensive tasks and requires significant infrastructure in terms of hardware capacity. Performing Monte Carlo simulations to ascertain distribution of loss for various areas like market risk, counterparty risk and credit risk, calculating aggregation of loss, and arriving at total loss at any given node in the bank's multiple hierarchies are compute-intensive tasks. In addition, these tasks have to be completed everyday within a stipulated timeframe according to operational level agreements (OLA) between risk and other departments such as regulatory and senior management reporting departments.

Risk management becomes significantly critical during times of market stress, which in turn increases ad hoc computation needs related with 'what-if' scenario analyses. Along with routine tasks, this puts great pressure on the on-premise risk computation infrastructure.

To address these challenges and handle the surge in computation requirements, banks have typically adopted two approaches. Some banks have opted to maintain sufficient infrastructure to handle the demands of potential extreme cases as well as business-as-usual while ensuring OLA adherence. As a result, banks incur huge fixed cost in maintaining excess hardware capacity that is rarely utilized. Maintaining dedicated hardware for compute-intensive calculations such as quarterly risk calculations related to internal and regulatory stress testing also adds to the total fixed cost.

In the second approach, the banks restrict the number of ad hoc requests that can be handled during a day to ensure OLA compliance instead of maintaining excess infrastructure capacity. However, this approach comes with the disadvantage of constraining business use of the system when it may be most needed.

Going forward, the Fundamental Review of the Trading Book (FRTB), the new market risk regime, Large Exposure Framework (LEF) and Single Counterparty Credit Limit (SCCL) regulations to manage concentration risk will significantly increase computation requirements as these regulations mandate the use of voluminous data to compute new risk measures.

More banks are trying to get approvals for the internal model method to measure counterparty risk. This, coupled with the push to create complete strategic platforms covering all risk areas will only increase computation requirements. To overcome these challenges related to financial risk computations and to better manage risk, banks are increasingly opting for cloud models.

## Key Considerations for Moving to the Cloud

While cloud models provide scalability, before embarking on implementation, banks must consider certain aspects like lead time to meet requirements, system configuration as per requirements, access controls, and level of control over data and infrastructure. Other key aspects that must be kept in mind include:

**Cost:** Flexibility comes at a price – at higher utilization (see Figure 1), the cost of compute instances in the cloud will increase compared with on-premise. Our experience in enabling cloud migrations for various global clients indicates that continuous usage of cloud over a period of time will cost more than maintaining on-premise compute infrastructure. Hence, a judicious decision has to be taken while transferring workloads from on-premise infrastructure to the public or private cloud.

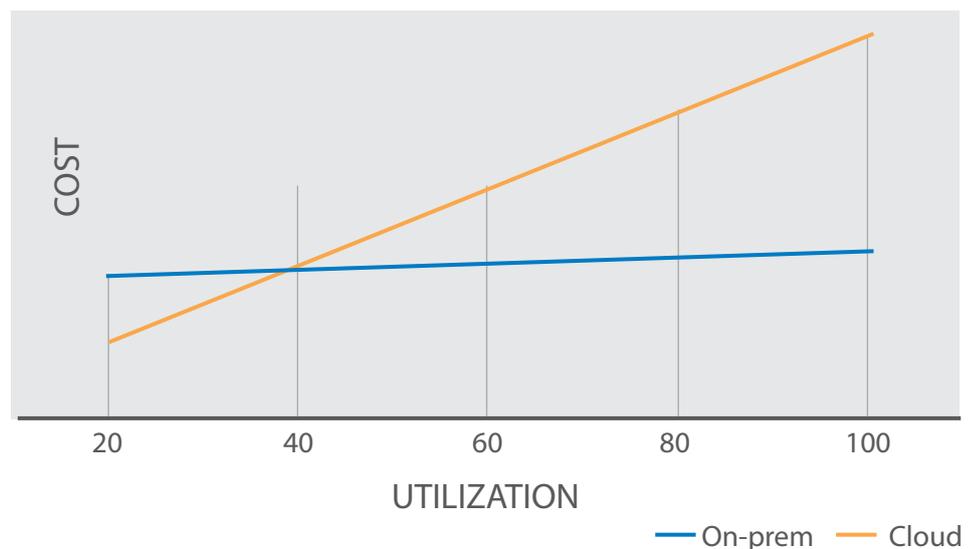


Figure 1: Cost Comparison of On-premise and Cloud Models

**Data security:** Ensuring the security of sensitive information such as customer and proprietary trade data is another key aspect that must be taken into consideration. While information stored on the cloud (data-at-rest) is more secure, transfer of information (data-in-motion) is a major security concern. Despite public cloud offering advantages such as large hardware elasticity and faster technology upgrades by the cloud vendor, security will be a major factor in banks' decision to opt for a public or private cloud.

**Regulatory compliance:** Financial service organizations are subject to regulatory restrictions that require them to maintain data centers within national or regional boundaries. The choice of cloud provider will also depend on whether the provider has centers in the required geographies.

## The Way Forward: An Automated and Intelligent Cloud Framework

An intelligent mechanism that can automatically burst the computation to the cloud, when peak load is reached, will securely provide compute scalability and flexibility and benefit the users. We believe that a hybrid cloud model underpinned by artificial intelligence technologies will give banks better control over data from the regulatory compliance perspective, avoid vendor lock-in and, enable use of public or private cloud in an automated, intelligent and cost-effective way. The hybrid cloud framework must have the capability to intelligently decide whether a workload is to be executed on-premise or on the public or private cloud based on set policies and specific pre-configured parameters.

The main benefits of a hybrid-cloud model adoption include reduction in total cost of operations by moving from a capex to opex model to address the surge requirements within OLA timelines and faster hardware provisioning. In addition, it helps enhance business performance and overall efficiency, security and environment consistency through containerization. A hybrid model also prevents vendor lock-in as only surge workloads move to a private or public cloud. While the benefits are immense, the banks must opt for a meticulous adoption approach centered on some key aspects:

- Perform as-is environment analysis by gathering data on the existing state of business applications and on-premise infrastructure.
- Prepare a detailed inventory based on application characteristics, security and regulatory requirements, licensing policy, workflow complexity, containerization of application environment and so on.



- Define metrics of utilization for on-premise infrastructure, OLA requirements of workloads, and periodic surge-compute-capacity requirements.
- Evaluate cloud partners based on the compatibility of their offerings with the bank's application portfolio.
- Run proofs of concept for the applications to be migrated with different cloud offerings to identify the right cloud partner.

## In a Nutshell

Financial institutions operate in a constantly changing risk landscape characterized by disruptive technologies, new fintech players, and emerging regulatory demands. To flexibly scale resources to meet the evolving demands of the risk management function, banks must consider moving to a hybrid cloud model that enables rapid provisioning of IT resources in a cost effective manner. Cloud migration, however, will come with its own set of challenges. A seamless migration may require banks to partner with a service provider after a well-rounded market analysis and detailed evaluation of cloud offerings available in the market.

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