Accelerated Market Risk

High speed, scalable and modular risk processing pipeline

INTRODUCTION

The amount of market risk assumed by banks has important impact the proportion of their capital ratios, hence this level of exposure is a critical aspect in the banking business, and an area that is tightly regulated worldwide.

Banks are immersed in an **important transformation process** – this represents an especially good opportunity to provide them with a radical new technology based on Xilinx most advanced hardware and software stack to help them undertake this task.

Market risk management (MRM) is a pipeline composed of a set of clearly defined activities:

Data Ingestion → Valuation Engines → Aggregation → Display

As a first demonstrator for a Xilinx based MRM solution we have implemented the calculation of **Value at Risk** (**VaR**) , which measures the potential loss in value of a risky asset or portfolio over a defined period for a given confidence interval.

- 15x improvement in speed vs current solutions
- Leverage most advanced Xilinx Vitis™ acceleration stack
- Extensible and pluggable as a modular building block

KEY BENEFITS

- **Accelerate the calculations** for options, equity and bonds providing a significant improvement vs current CPU based solutions.

- Provide an **extensible and flexible test bed for Xilinx® Vitis**™ framework and libraries, and a showcase of **fintech capabilities**.

- Provide a **modular solution architecture** that can be flexibly deployed in on premise and cloud Xilinx-enabled platforms.

SOLUTION OVERVIEW

This platform will deploy computationally intensive quantitative risk management mechanisms such as **variance-covariance**, **Monte Carlo**, and others to calculate various risk metrics such as **VaR** and ES, etc.
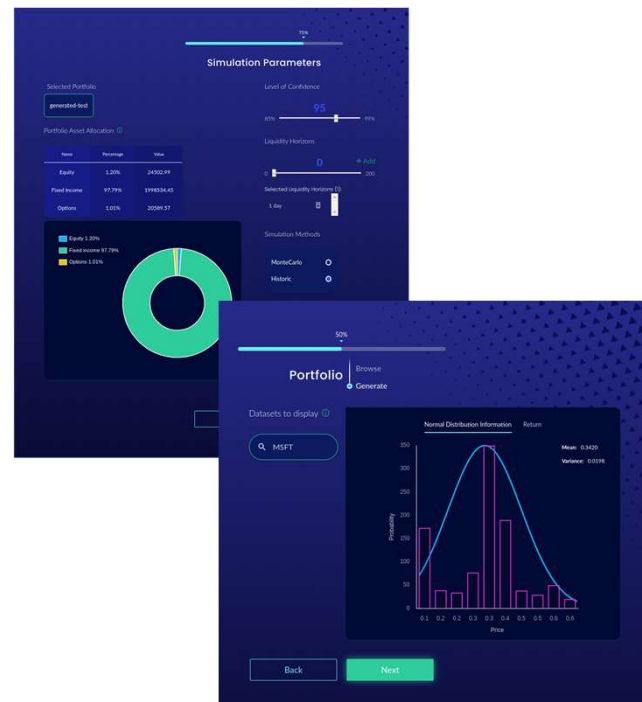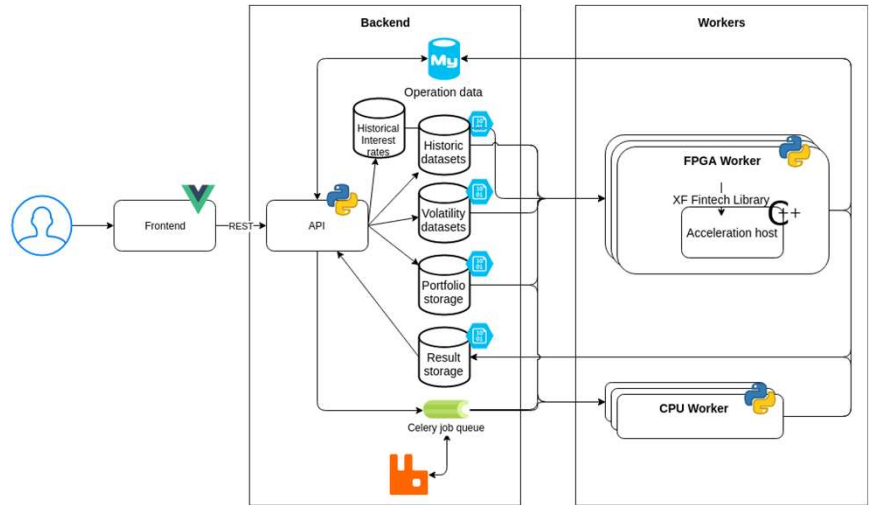
The platform will include three stages, and associated building blocks:

- a **data loading component** which prepares the data to be processed

- an **analytics component** which performs the calculations

- a **front-end application** to show the results of calculations and acceleration metrics in a user-friendly manner.

Adaptable. Intelligent.

SOLUTION DETAILS

- The platform includes **re-usable user interface components** to be able to configure data set ingestion, load imposed on the analytics stage, and presentation of results for demo purposes.

- As the main objective of this platform is present is to visually support FPGA-based acceleration capabilities within the market risk management context, the data sets fed into the analytics stage will be a **mix of real market data, and synthetically generated data**.

- **Runtime architecture** is split between GUI and control execution API, which is implemented as a **lightweight service-based application**, and the **processing pipelines** (workers) which are managed using an event queue.

- The solution has been tested both in **on premises hardware** with **Alveo™ U200 Cards**, and **cloud based infrastructure** including **Nimbix** and **AWS**.

- **Modular integration architecture** enable both **scalability in deployment** and **simplicity of integration** with customer infrastructures for testing with real production data.

RESULTS

- From the testing performed so far, the acceleration of VaR portfolio calculation provides **15x** baseline improvement vs traditional solutions.

- Current testing of Monte Carlo calculations for generation of simulated portfolios using Vitis new fintech libraries suggest very promising improvements in calculation acceleration.

As a summary, Market Risk Management can benefit greatly from the implementation of adaptive acceleration technologies from Xilinx.

A hybrid acceleration strategy is a must, since core calculations can benefit from leveraging low level acceleration techniques, but a great improvement can be achieved by re-using existing high level building blocks from Vitis.

TAKE THE NEXT STEP

Learn more about Xilinx Alveo accelerator cards
Learn more about NTT Disruption: https://disruption.global.ntt/
Reach out to NTT Disruption – helloxilinx@nttdisruption.com

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