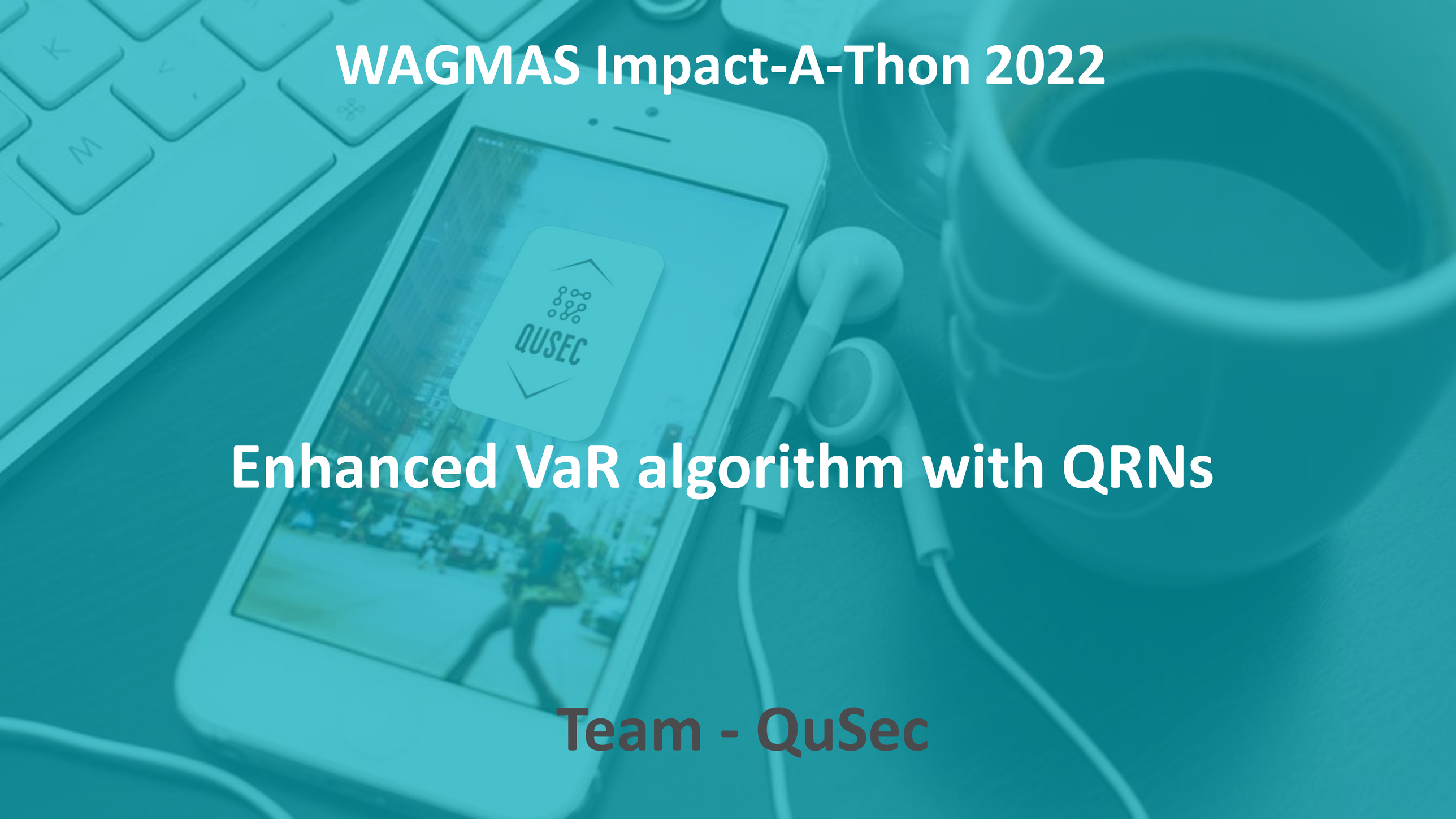
WAGMAS Impact-A-Thon 2022



Enhanced VaR algorithm with QRNs

Team - QuSec

OVERVIEW

What is VaR?

- **Value at risk (VaR)** is a statistic that **quantifies** the extent of **possible financial losses** within a firm, portfolio, or position over a specific time frame

- This metric is commonly **used by investment and commercial banks** to determine the extent and probabilities of potential losses in their institutional portfolios.

- Risk managers use VaR to measure and control the level of risk exposure.

- One can apply VaR calculations to specific positions or whole portfolios or use them to measure firm-wide risk exposure.

- One approach to calculate VaR is to conduct a **Monte Carlo simulation** which uses Random numbers

OVERVIEW

What is QRNs?

- **Quantum Random Numbers** (**QRNs**) are random numbers generated with a high source of entropy using unique properties of quantum physics.

- It provides maximum random number quality and trust under given circumstances of the applications

- **QuSec offers true nature randomness** by utilizing the quantum properties of light

OBJECTIVE

VaR calculation using QRNs

- Our approach is to replace the Pseudo Random Numbers (PRNs) with Quantum Random Numbers (provided by QuSec) in the Monte Carlo simulation and achieve better performance in calculating VaR

What Is a Monte Carlo Simulation?

- Used to model the probability of different outcomes in a process that cannot easily be predicted due to the intervention of random variables

- Technique used to understand the impact of risk and uncertainty in prediction and forecasting models

- Integral part in calculating VaR

IMPLEMENTATION

Value at Risk calculation by QuSec

VALUE AT RISK USING MONTE CARLO METHOD

ASSET 1

AAPL

(Hint: NASDAQ Code)

ASSET 2

NVDA

(Hint: NASDAQ Code)

ASSET 1 PERCENTILE

60

ASSET 2 PERCENTILE

40

TIME(DAYS)

250

PORTFOLIO AMOUNT

10000

SUBMIT

CLEAR

RESULT

VAR

US$ 12254

ABSOLUTE LOSS

US$ 6042

PERCENTILE

60

https://www.qusecinc.com/#/dashboard/financialsimulation

QUSEC

IMPLEMENTATION

VaR calculation on QuSec platform

- The implementation on QuSec platform computes the Value at Risk for TWO financial assets (NADAQ listed stocks) by taking their respective allocation and time.

- The Backend computation is implemented in Python which does the following:
  - Downloads the past price information of the stocks using Yahoo finance API
  - Downloads Quantum Random Numbers from QuSec library
  - Computes Value at Risk using Monte-Carlo method
  - Outputs the result in form of Risk-o-meter

- The python code implementation part is uploaded in the Git

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QUSEC

Thank You

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