



PRESENTS

GenQ

HACKATHON

WORLD TOUR 2025

Singapore

WELCOME TO



**GenQ Hackathon
Sandbox and
Hardware Session**

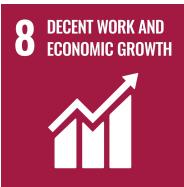
**Carlos Kuchkovsky,
Dr. Tobias Denzler,
Lisa Schroeder**

14 October 2025

GenQ Hackathon Series Singapore

24-26 October 2025 in Singapore

**Developing Solutions
for the SDGs with Quantum**



**120 Scientists, Entrepreneurs,
& Quantum Experts**



High Level Agenda

24-26 October 2025 DBS Asia X in Singapore

FRIDAY

16:00 - Doors Open
17:00 - Opening Ceremony
18:00 - Challenge presentations
19:30 - Sandbox explanation
20:00 - Dinner
21:00 - Team matching & registrations
22:00 - Hacking begins
23:59 - Midnight snack

SATURDAY

08:00 - Breakfast
09:00 - Input Session
11:00 - Input Session
12:00 - Lunch
13:00 - Fun Activity
15:00 - Mentor Feedback
17:00 - Input Session
19:30 - Dinner
22:00 - Input Session
23:59 - Midnight snack

SUNDAY

08:00 - Breakfast
09:00 - Pitch Session
10:00 - Feedback
12:00 - Lunch
13:00 - Touchpoint
13:30 - Pitch to Jury
15:30 - Touchpoint
16:00 - 10 Finalists pitch
17:00 - Winner announcement
17:30 - Reception & Party
19:00 - End of Event

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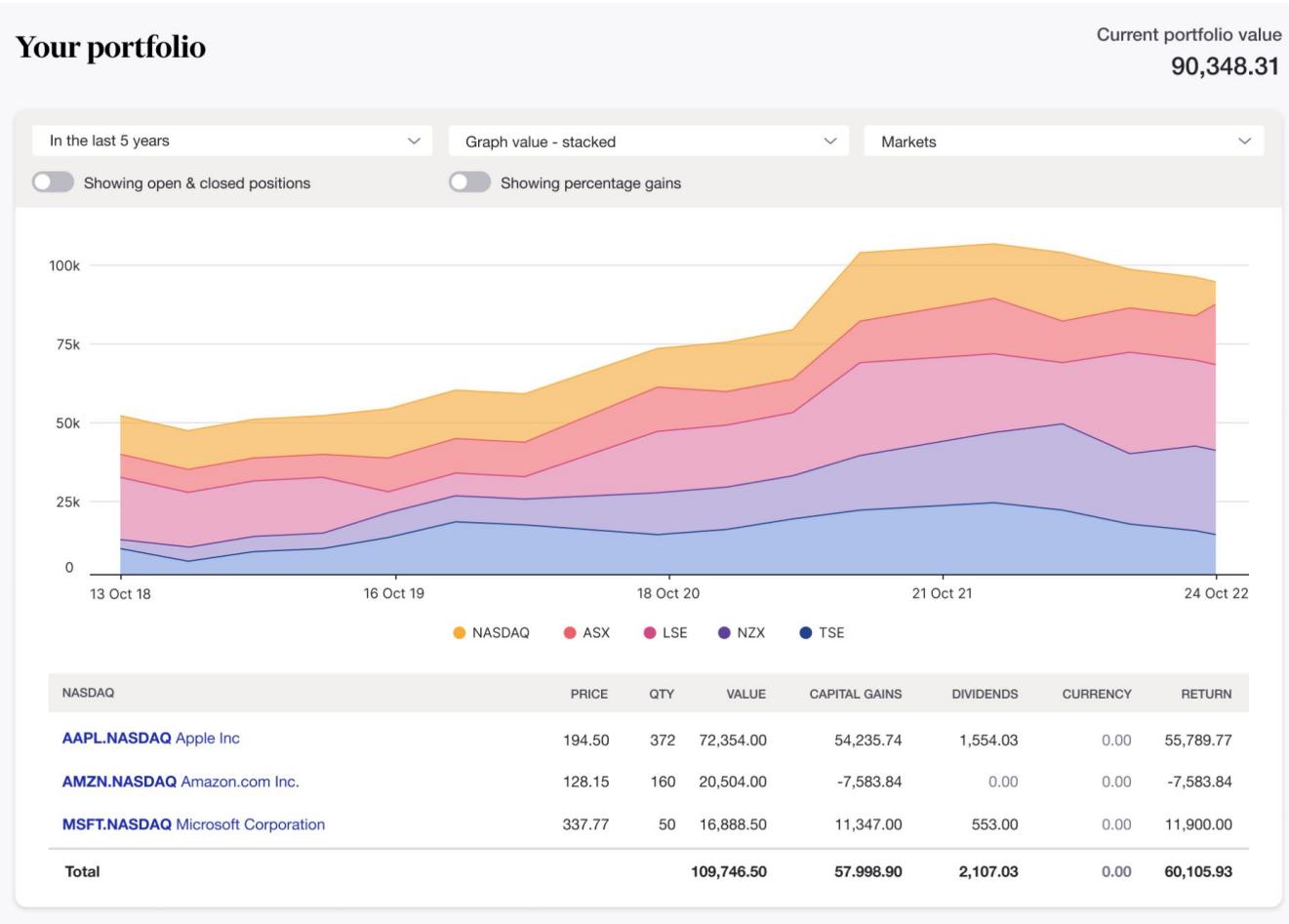
Counterparty Credit Risk





Counterparty Credit Risk

Your portfolio



Potential future Exposure (PFE)

$$V(\tau) = \sum_{i=0}^n w_i f_i(S_i(\tau))$$

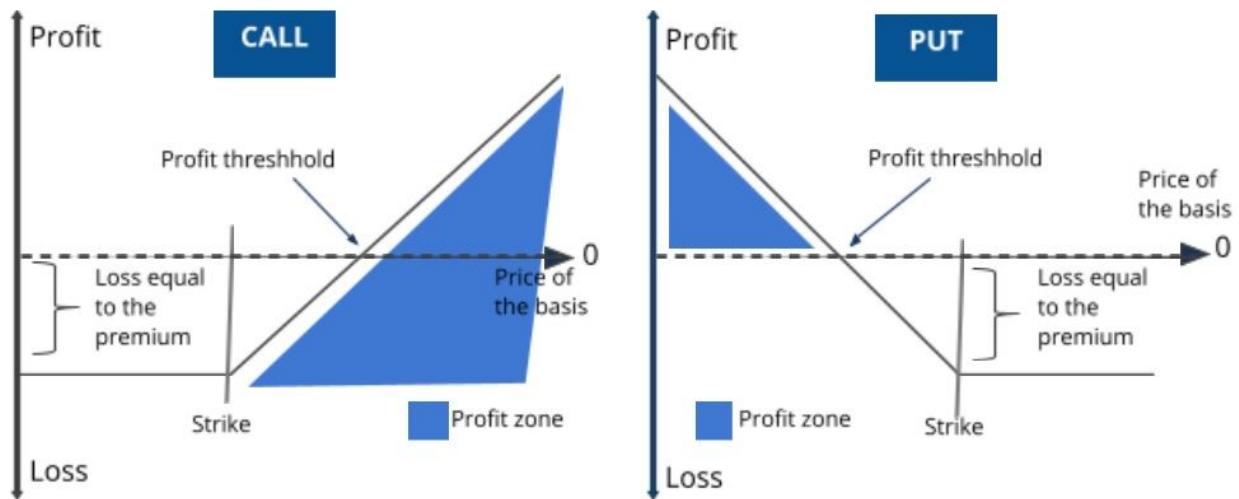
$$PFE_\alpha(\tau) = \inf\{y \mid P(E(\tau) \leq y) \geq \alpha\}$$

$$E(\tau) = \max(V(\tau), 0)$$



Counterparty Credit Risk

EUROPEAN OPTIONS



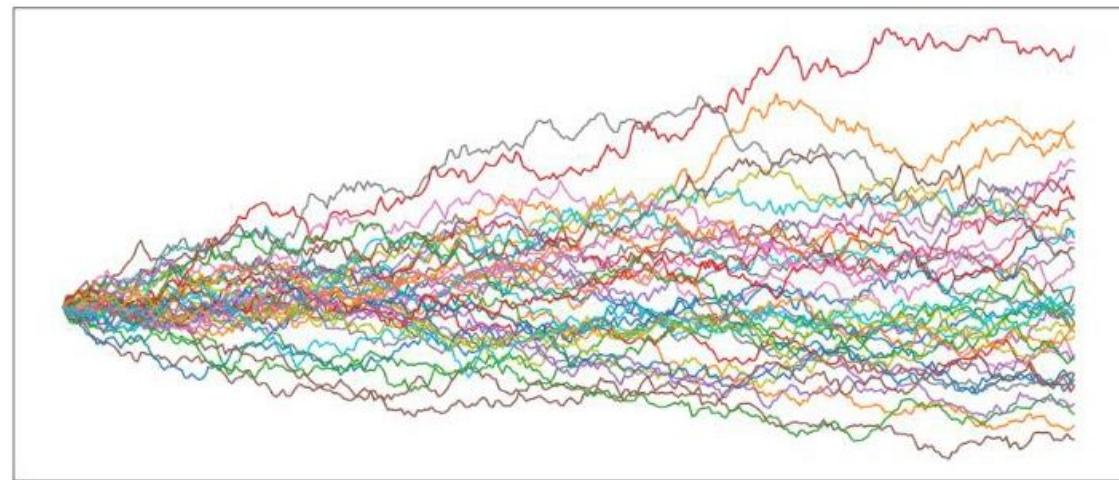
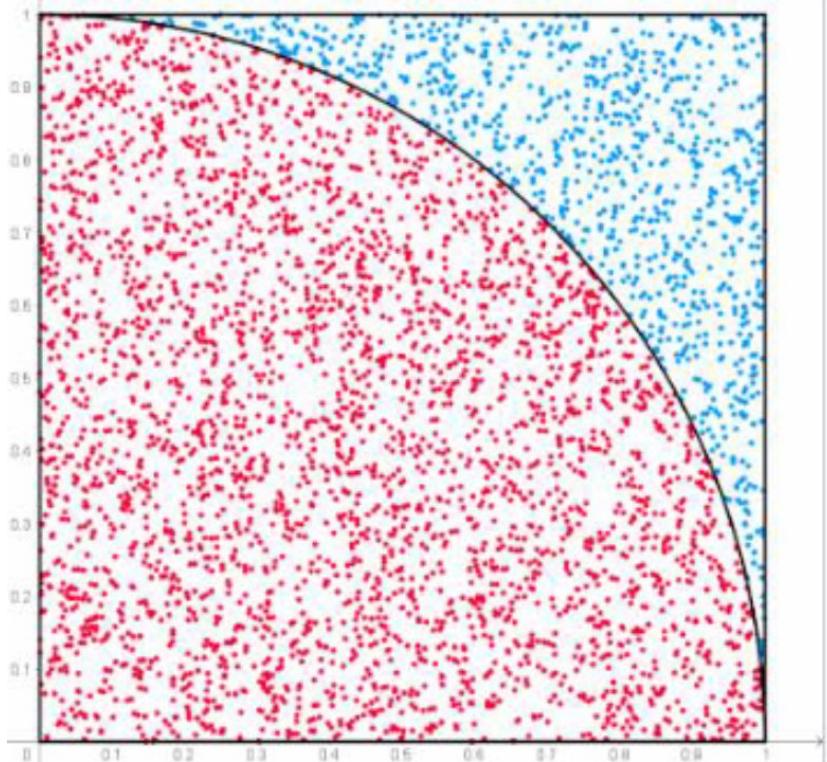
$f(\tau) = \max\{(S - K)\}$, for a call option

$f(\tau) = \min\{(K - S)\}$, for a put option



Counterparty Credit Risk

Monte Carlo Methods

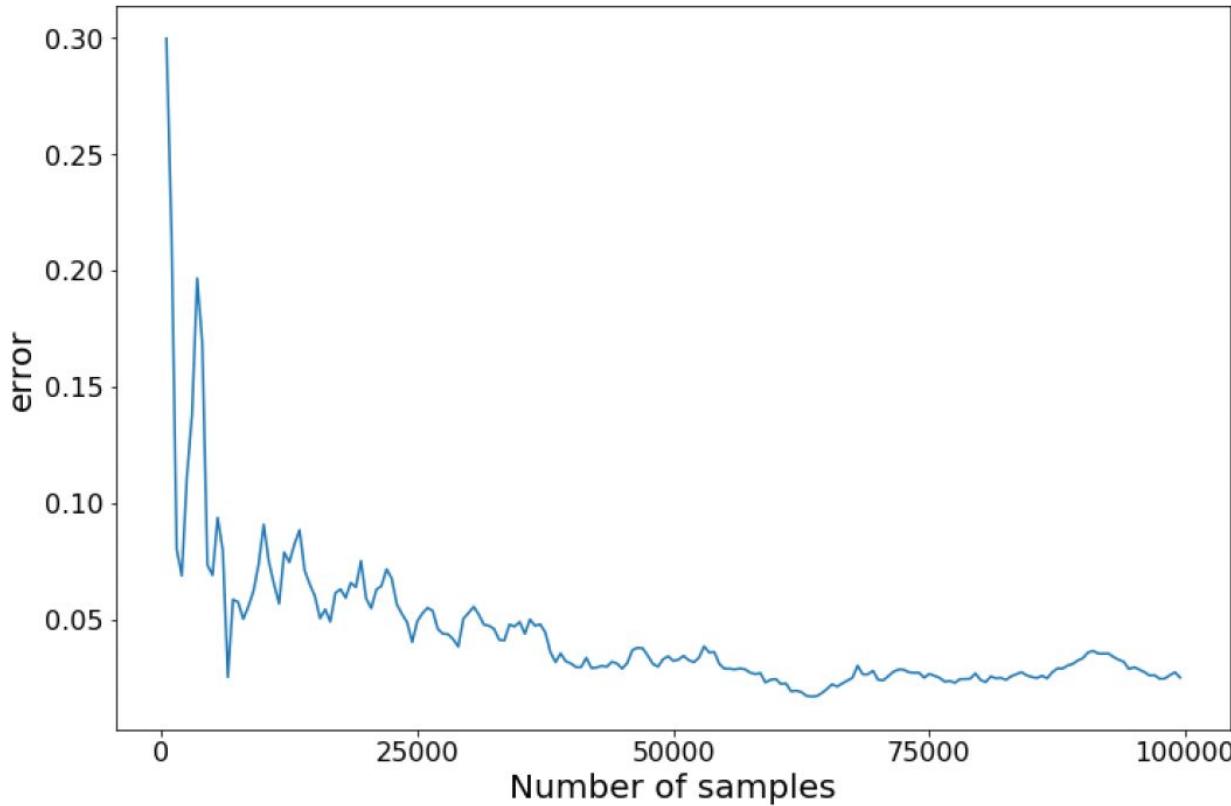


$$E[f(X)] \approx \frac{1}{n} \sum_{i=1}^n f(x_i)$$



Counterparty Credit Risk

Monte Carlo Error

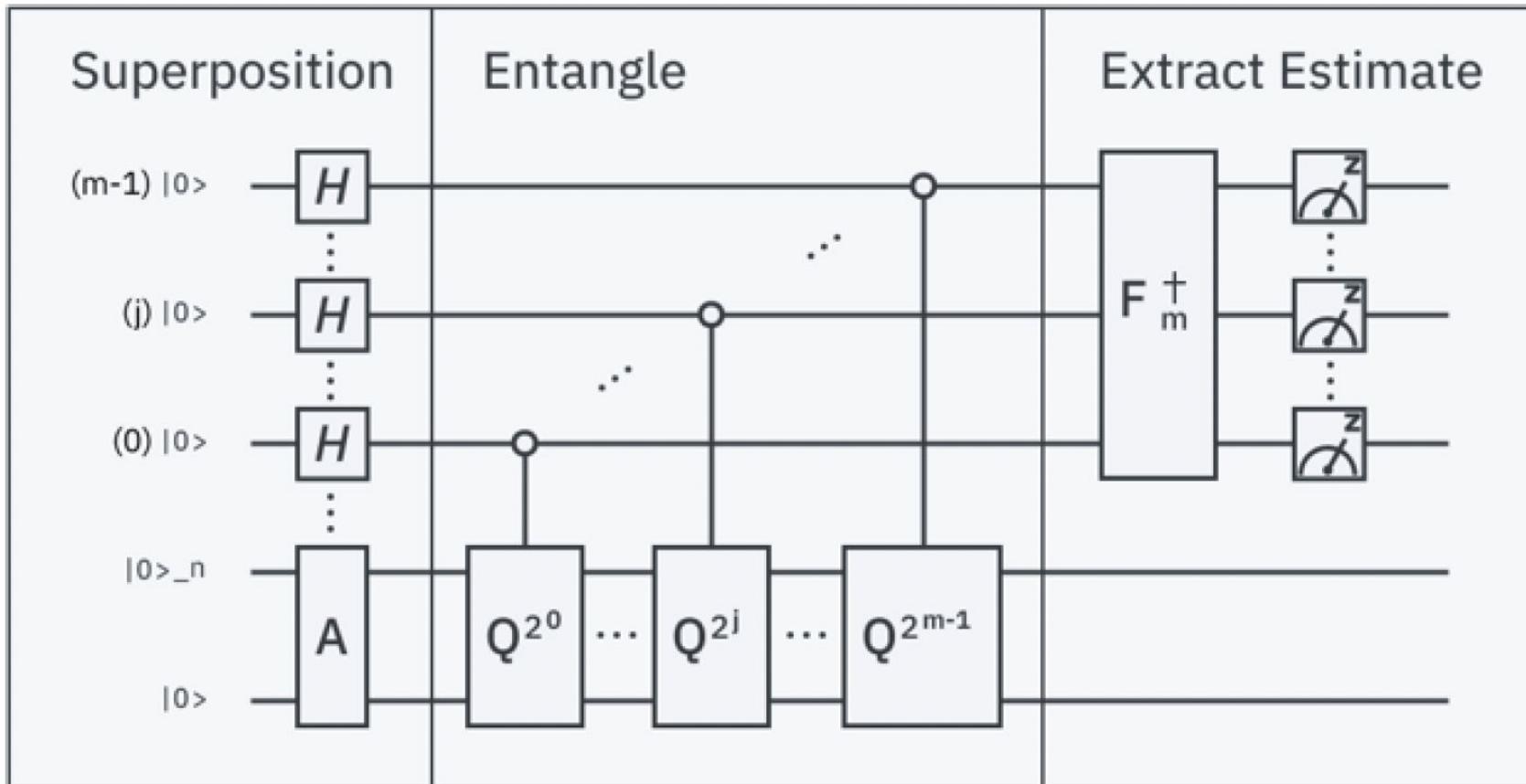


$$\varepsilon = O(1/\sqrt{n})$$



Counterparty Credit Risk

Quantum Monte Carlo - Quantum Amplitude Estimation



$$\epsilon = O\left(\frac{1}{n}\right)$$



Fraud Detection



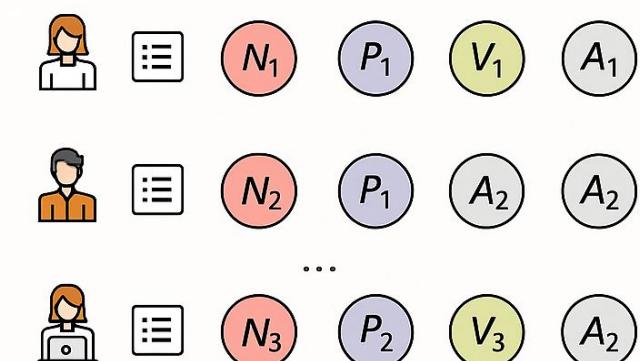
IQM DBS

QAIventures

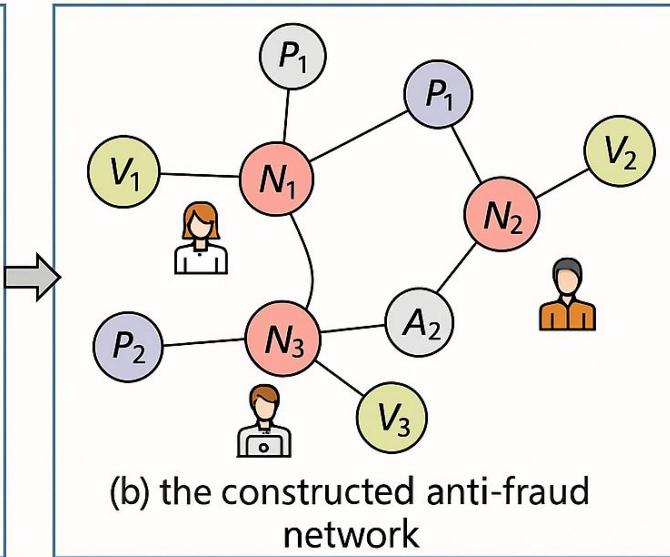


Fraud Detection

Network Graph on Historical Applications



(a) the original submitted loan appli-



(b) the constructed anti-fraud
network

N APPLICATION NUMBER
 V VEHICLE

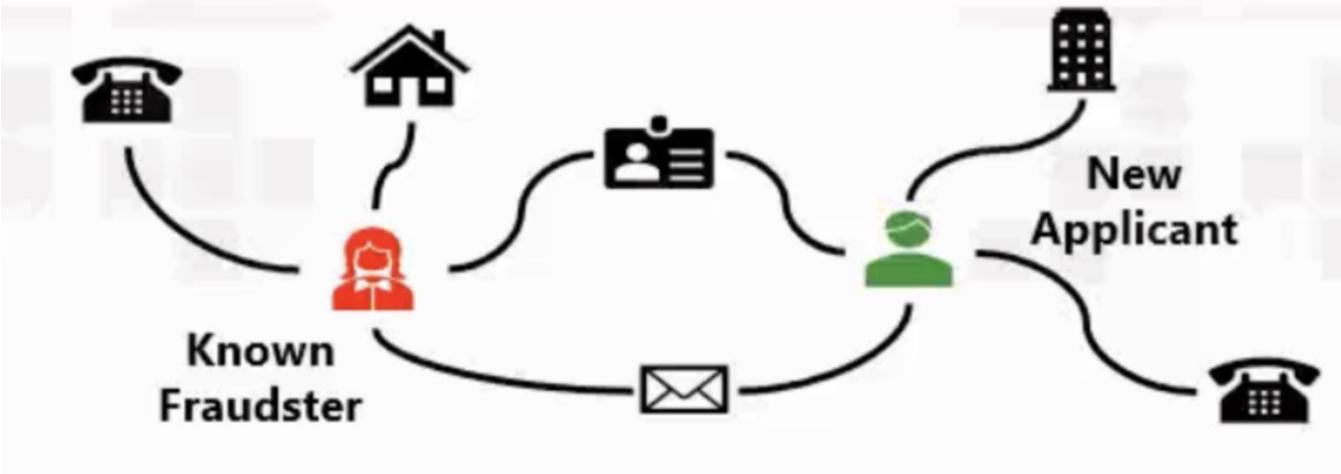
P PHONE

A ADDRESS



Fraud Detection

New application linked to known fraudster



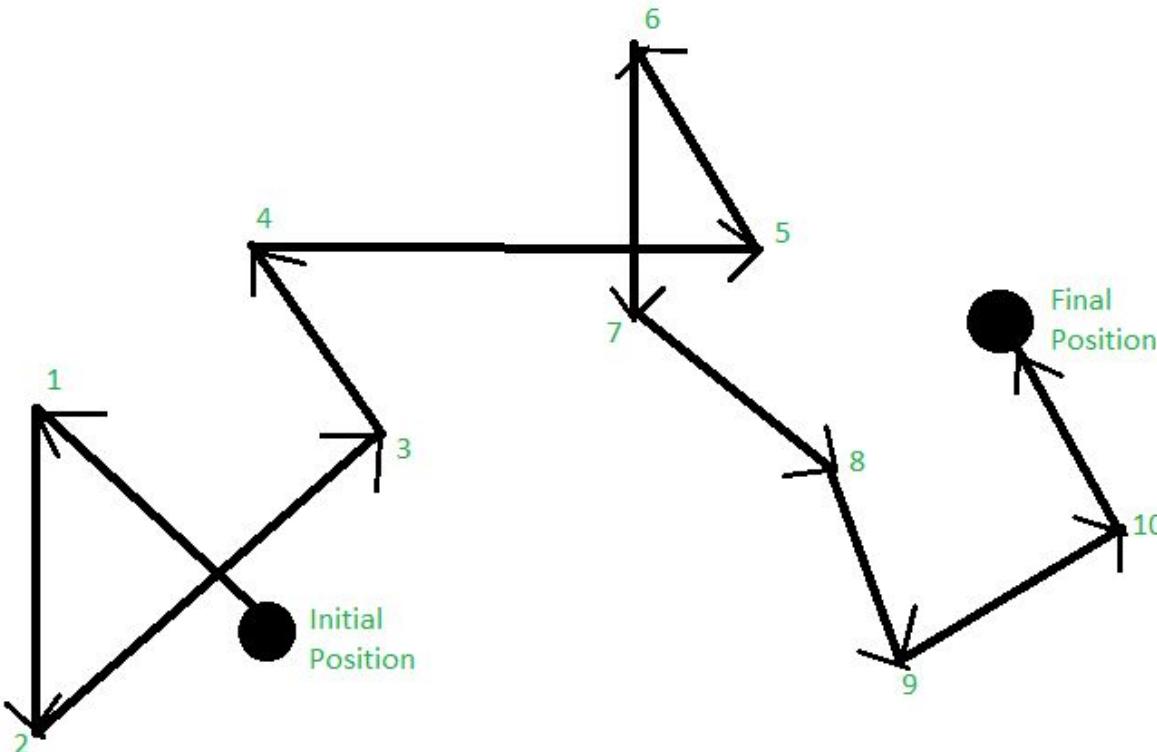
Iterative Search:

Identify if path exists from historical fraud to new applications



Fraud Detection

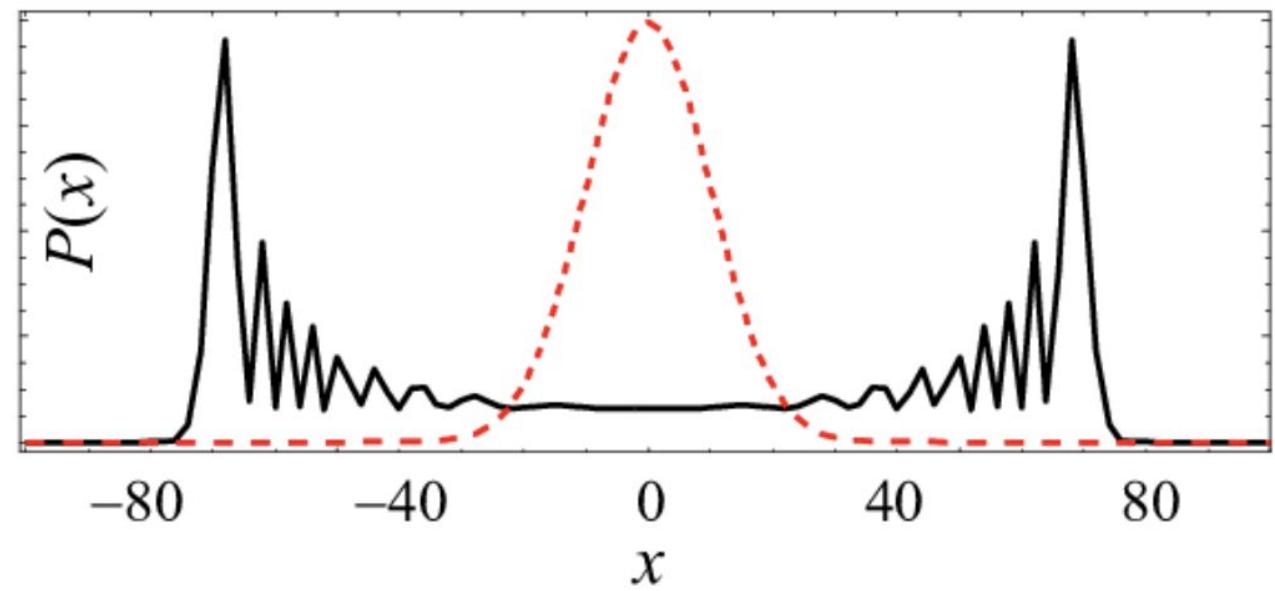
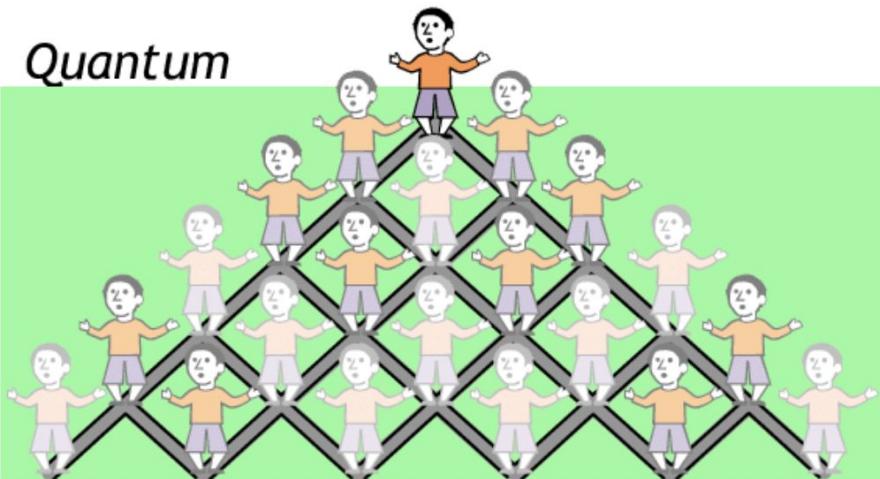
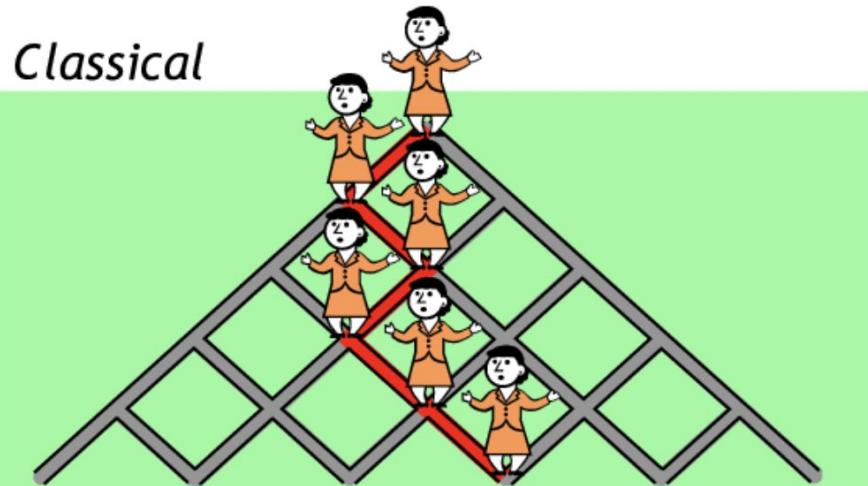
Random walk to find connection to fraudulent nodes



Problem: Fraudulent subnetworks are often tightly interconnected



Fraud Detection





Portfolio Optimization



QUANTINUUM



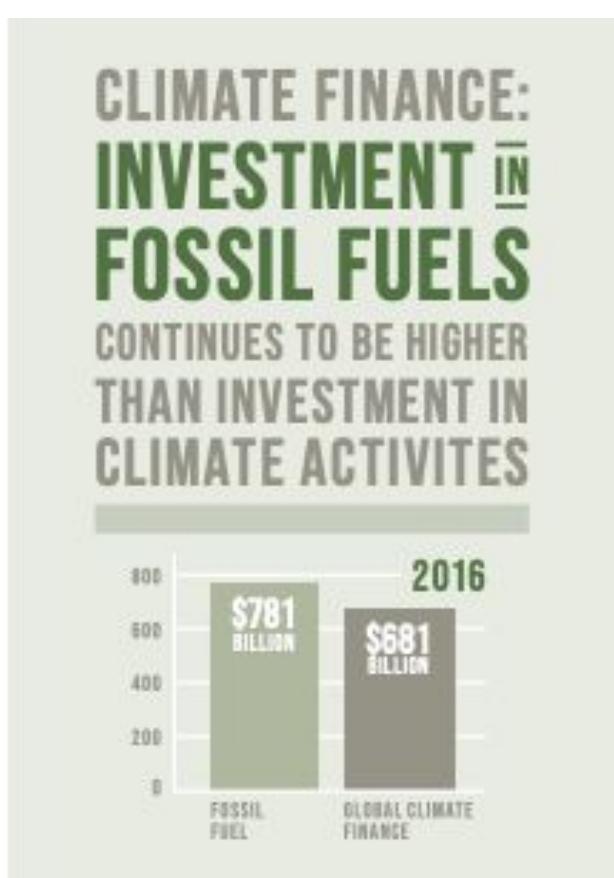
QCentroid



QAI ventures



Portfolio Optimization





Portfolio Optimization

3 pillars of ESG



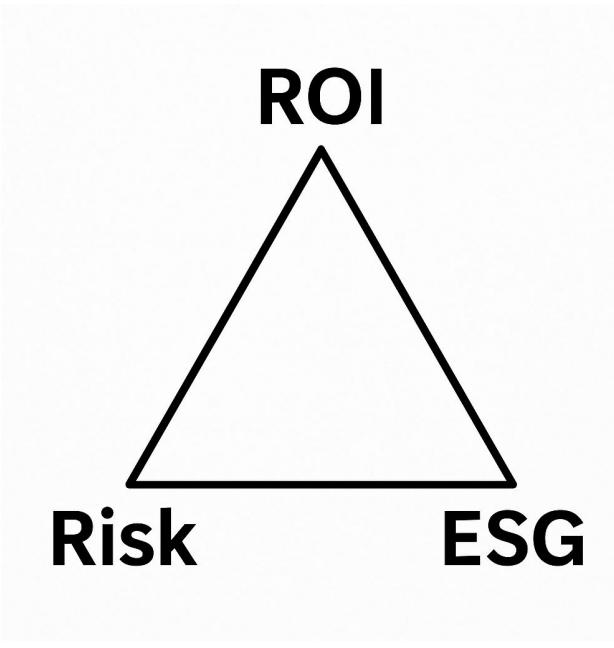
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Portfolio Optimization

$$\begin{aligned} \min_{\mathbf{w}} \quad & \mathbf{w}^\top \Sigma \mathbf{w} - q \mu^\top \mathbf{w} \\ \text{s.t.} \quad & \mu^\top \mathbf{w} \geq R_t, \\ & \sum_{i=1}^n w_i = 1, \\ & w_i \geq 0 \quad \forall i, \end{aligned}$$



Expected return: $\mu_i = E[r_i]$

Return covariance matrix:

$$\Sigma_{ij} = \text{Cov}(r_i, r_j) = E[(r_i - \mu_i)(r_j - \mu_j)]$$

Possible approaches:

- Variational quantum algorithms, such as QAOA or VQE
- Variants of other quantum optimisation algorithms, including quantum-inspired algorithms



QCentroid Platform

The Sandbox



Development workflow

1. Choose the Use case
2. Familiarize with the data format and datasets
3. Check the sample solver in the IDE
4. Modify the solver to add your algorithm
5. Execute locally within the IDE
6. Push the solver source code to the Git repository
7. Pull the new solver code into the platform
8. Run jobs that use your solver



The Sandbox

The execution platform

The screenshot shows the GenQ execution platform interface. On the left is a dark sidebar with the GenQ logo and navigation links: Dashboard, Jobs, Use cases (selected), My use cases, Catalog, Solvers, Datasets, Providers, and Reports. Below the sidebar is a footer with the QCentroid logo and the text "Powered by QCentroid".

The main area is titled "Use cases" and displays a search bar with "Use cases in your organization" and a "Search & filter" button. It lists several use cases:

- Responsible Investment** ([quantum-climate-finance](#))
Scaling Climate Finance Investment through Quantum-Enhanced Portfolio Management
- Snowploughing Routes** ([snowploughing-routes](#))
Snowploughing routes

A modal window is open for the "Responsible Investment" use case, showing its details:

- Use case: Responsible Investment** ([quantum-climate-finance](#))
- Business description**: In today's evolving financial landscape, there is a growing need for investors (individuals, professionals, financial institutions, and various other bodies) to align their investment strategies with **sustainable practices**. Climate finance, addressing **SDG 13 (Climate Action)**, is key to mobilizing the **\$100 billion annually** required to combat climate change. To support these efforts, investors need accurate, data-driven insights into companies' sustainability strategies, especially focusing on their **environmental impact** within **ESG scores** (Environmental, Social, Governance). This data and information will help align **financial returns** with positive sustainability outcomes.
- Challenge Overview**: Participants are tasked with developing a **quantum-enhanced portfolio management solution** that utilizes **ESG scores**, with a primary focus on the **environmental dimension (E)**. This will empower investors—ranging from **retail investors** to **institutional bodies** like **banks, pension funds, family offices, and national funds**—to make better-informed investment decisions that support **climate finance** and broader **ESG goals**.
- Problem Statement**: The challenge includes creating a project that:
 - Proposes a **business idea** with a clear **business plan** and sustainable (climate finance) **impact projection**.
 - Implements a **quantum algorithm** to enhance **portfolio management** using current **ESG scores**, with potential extensions to include future projections of **companies' sustainability performance**.These tools will enable the mobilization of investments from a diverse range of actors, maximizing both **financial returns** and **sustainability-driven impact**—accelerating the flow of capital into **climate finance solutions**.
- Use Case Details**: Can quantum technology provide faster, more precise insights that analyze large datasets, helping investors direct capital towards companies with strong environmental performance?



Key features

See the use cases
Choose and understand the use case:

- Description
- Deliverables
- Key variables
- Key components
- Functional criteria

Check the data format
Download de datasets
Describe your solver
Execute in the platform



The Sandbox

The development environment

A screenshot of the QCentroid development environment. On the left is a file browser with a search bar and a list of files: app.ipynb, app.py, main.py, README.md, and input.json. The main area shows four tabs: README.md, app.py (which is currently selected), main.py, and requirements.txt. The app.py tab contains the following Python code:

```
1 ##### THIS FILE WILL BE REPLACED #####
2
3 input_file_name = "input.json"
4
5 ##### DO NOT TOUCH FROM HERE #####
6
7
8 # Input data Loader. Container will get data from here
9
10 import json
11 import warnings
12 warnings.filterwarnings('ignore')
13 #warnings.filterwarnings('ignore', category=DeprecationWarning)
14 with open(input_file_name) as f:
15     dic = json.load(f)
16
17 # Optional extra parameters
18
19 if "extra_arguments" in dic:
20     extra_arguments = dic['extra_arguments']
21 else:
22     extra_arguments = {}
23
24 if "solver_params" in dic:
25     solver_params = dic['solver_params']
26 else:
27     solver_params = {}
28
29
30 import main
```

At the bottom, there are status indicators: Simple, 0, \$, 1, Python, Ln 11, Col 12, Spaces: 4, app.py, 2, and a bell icon.

Key features

Integrated Sandbox environment for solvers implementation in Jupyter Notebooks.



The Sandbox

The documentation pages

QCentroid Docs

Using the Platform >
Using the API and SDK >

Introduction

In this article we will go through the process of Hackathon.

The process of creating a new solver involves the following steps:

1. Choose the Use case
2. Implement the solver using the solver template
3. Track the solver source code in a Git repository
4. Pull the new solver code into the platform
5. Run jobs that use your solver

Pre-requisites

First, there are some **pre-requisites** you need to meet:

Some **development tools** installed:

- Python
- Pip
- Git
- virtualenv

GenQ
powered by QAIventures

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Introduction
Pre-requisites
1. Choose the Use Case and familiarize yourself with the

4. Pull the new solver code

Now that you have your solver source code tracked in a repository, you can **Pull and build** it into the platform to be able to run jobs with it.

Go to the **Repository** details page via the left-side menu, and click the **Pull** button next to your solver.

Status	Branch/Tag	Updated by	Started on	Ended on	Details
1. Finished	main	Me	25 Aug 2024, 13:19	25 Aug 2024, 13:19	Successfully cloned. Python v3.11. Commit: d4921833473
2. Finished	main	Me	25 Aug 2024, 11:55	25 Aug 2024, 11:56	Successfully cloned. Python v3.11. Commit: c392f4b (c392f4b45ff08)

Below, you can check the pulls history. Just wait until this process is shown as **Finished** and make sure the **commit** pulled is the one that you just pushed to the Git server.

Now, your solver is ready to run jobs in the platform.

5. Run your solver in the platform

The last step will be to run the solver that you just created in the platform.

With QCentroid's **no-code** executions feature, you can launch jobs directly from the platform dashboard.



A photograph of the DBS Asia X building, featuring a curved glass facade and a lush green roof garden. The building is set against a blue sky with some clouds. In the foreground, there are several trees and bushes. A white rectangular overlay contains the text.

**See you next Friday at 3.00pm
at DBS Asia X**

**1 Fusionopolis Vw, Level 7,
Singapore 138577**

QAI Ventures Team at Singapore Hackathon



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Director



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Head Science &
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Lisa Schroeder

Accelerator Director



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Program Manager



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Managing Director