QAIventures

PRESENTS

GenQ HACKATHON WORLD TOUR 2025

Singapore

WELCOME TO

GenQ

GenQ Hackathon Sandbox and Hardware Session

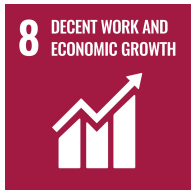
Carlos Kuchkovsky,
Dr. Tobias Denzler,
Lisa Schroeder

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

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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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NATIONAL QUANTUM OFFICE SINGAPORE

CQT CENTRE FOR QUANTUM TECHNOLOGIES SINGAPORE

NATIONAL QUANTUM COMPUTING HUB SINGAPORE

NUS National University of Singapore | Centre for Quantitative Finance Faculty of Science

SQAI SOCIETY OF ALGORITHMIC INTELLIGENCE

SGINNOVATE

SUTD SINGAPORE UNIVERSITY OF TECHNOLOGY AND DESIGN

SMU SINGAPORE MANAGEMENT UNIVERSITY

SWITCH SINGAPORE WEEK OF INNOVATION & TECHNOLOGY

IPOS INTELLECTUAL PROPERTY OFFICE OF SINGAPORE

8 DECENT WORK AND ECONOMIC GROWTH

Counterparty Credit Risk

DBS

IONQ

Microsoft

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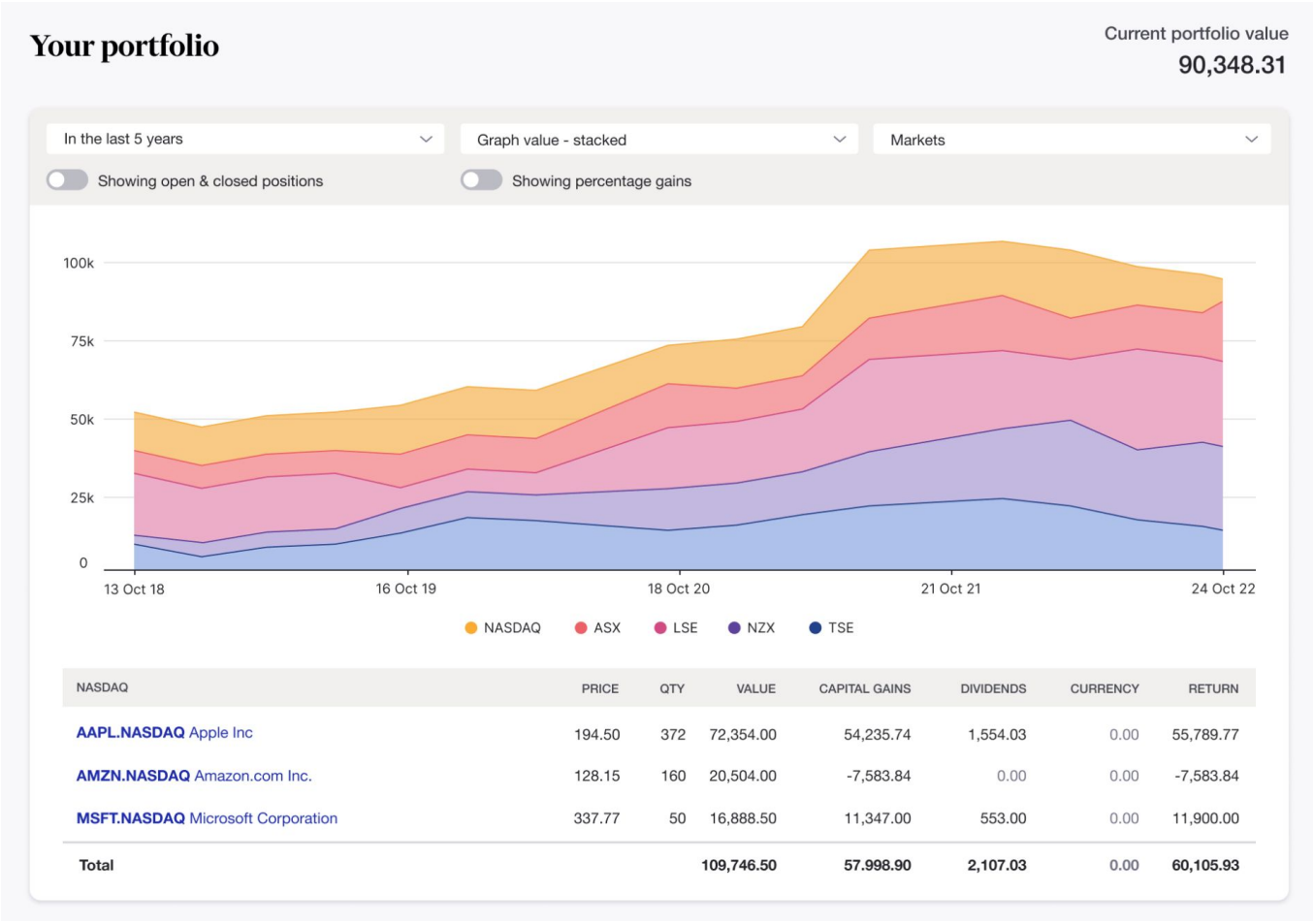
8 DECENT WORK AND ECONOMIC GROWTH

Counterparty Credit Risk



NASDAQ	PRICE	QTY	VALUE	CAPITAL GAINS	DIVIDENDS	CURRENCY	RETURN
AAPL.NASDAQ Apple Inc	194.50	372	72,354.00	54,235.74	1,554.03	0.00	55,789.77
AMZN.NASDAQ Amazon.com Inc.	128.15	160	20,504.00	-7,583.84	0.00	0.00	-7,583.84
MSFT.NASDAQ Microsoft Corporation	337.77	50	16,888.50	11,347.00	553.00	0.00	11,900.00
Total			**109,746.50**	**57.998.90**	**2,107.03**	0.00	**60,105.93**

Potential future Exposure (PFE)

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

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

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

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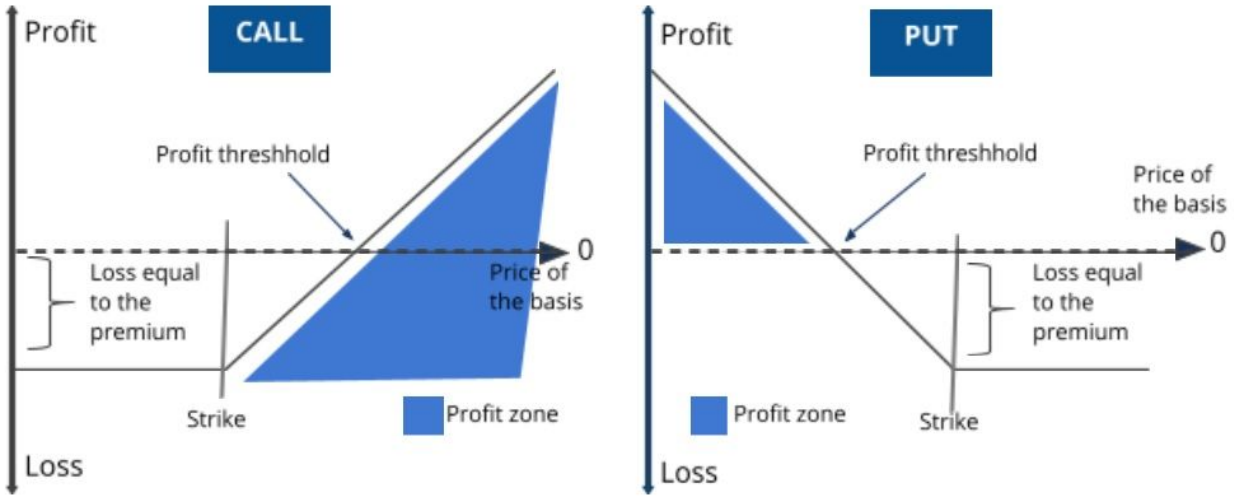
Counterparty Credit Risk

EUROPEAN OPTIONS



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

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

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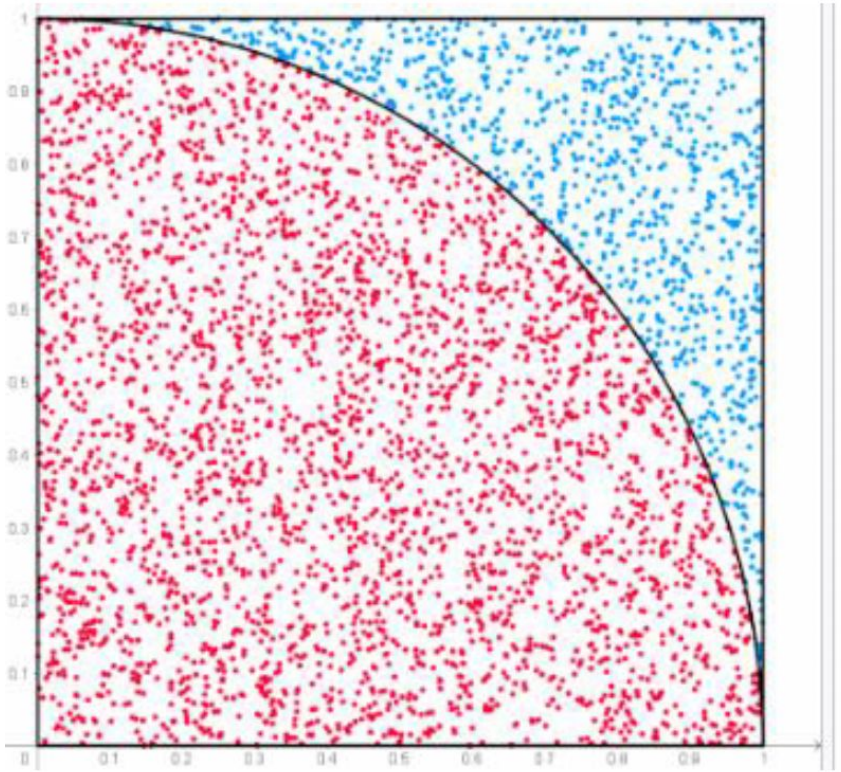
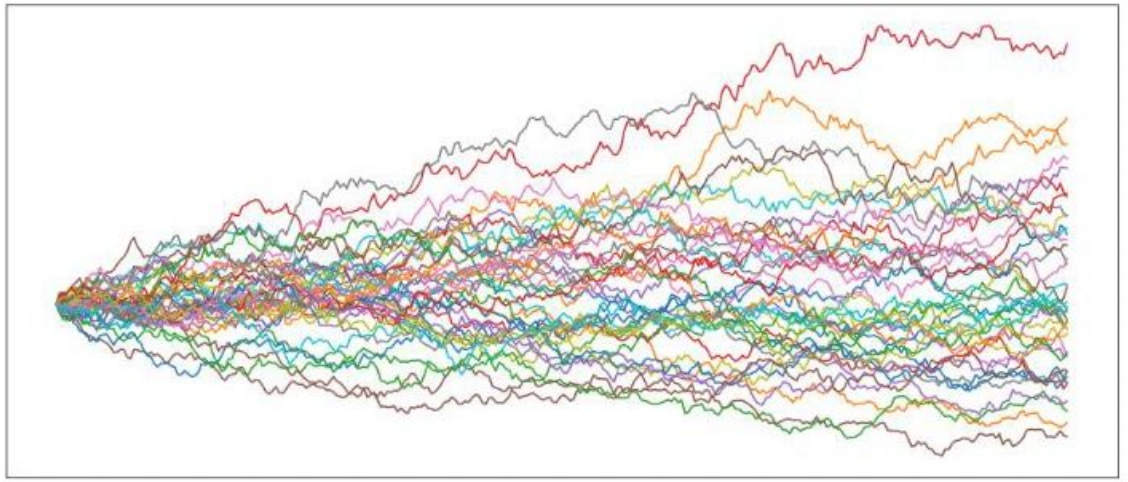
Counterparty Credit Risk

Monte Carlo Methods





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

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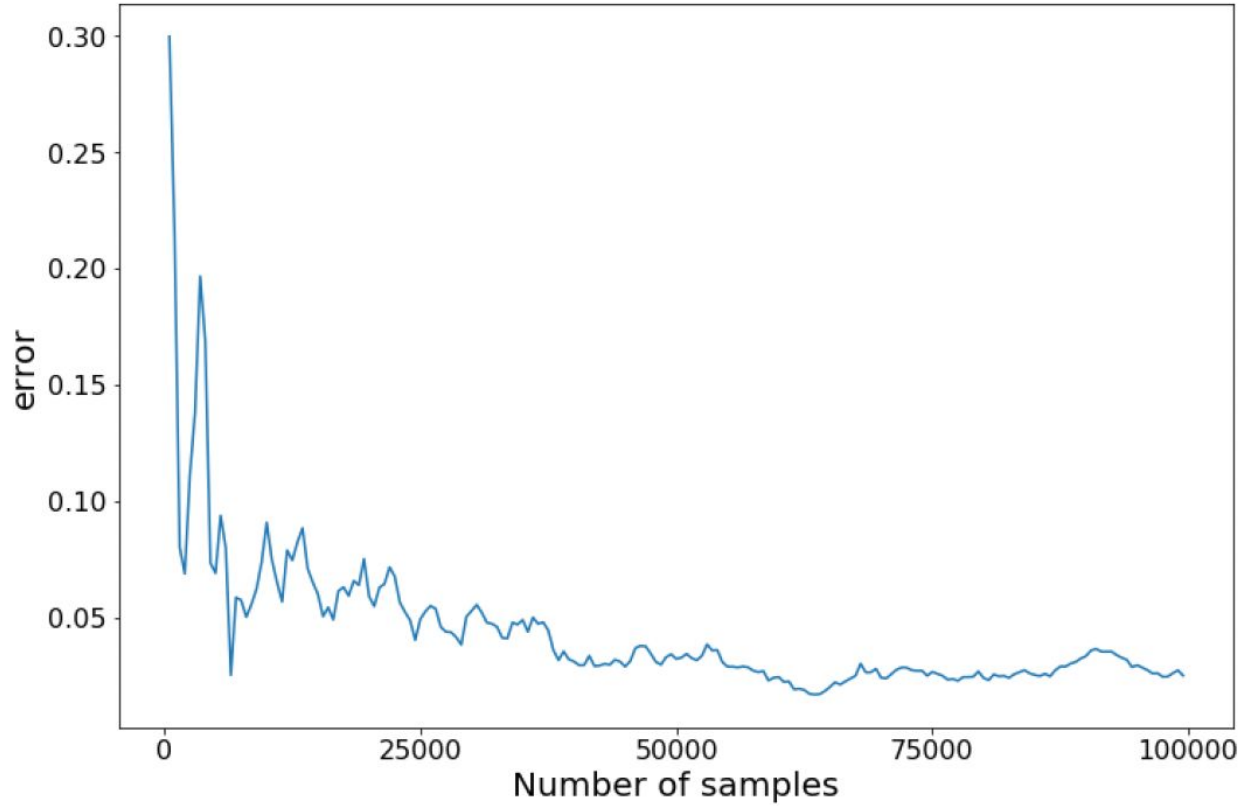
Counterparty Credit Risk

Monte Carlo Error



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

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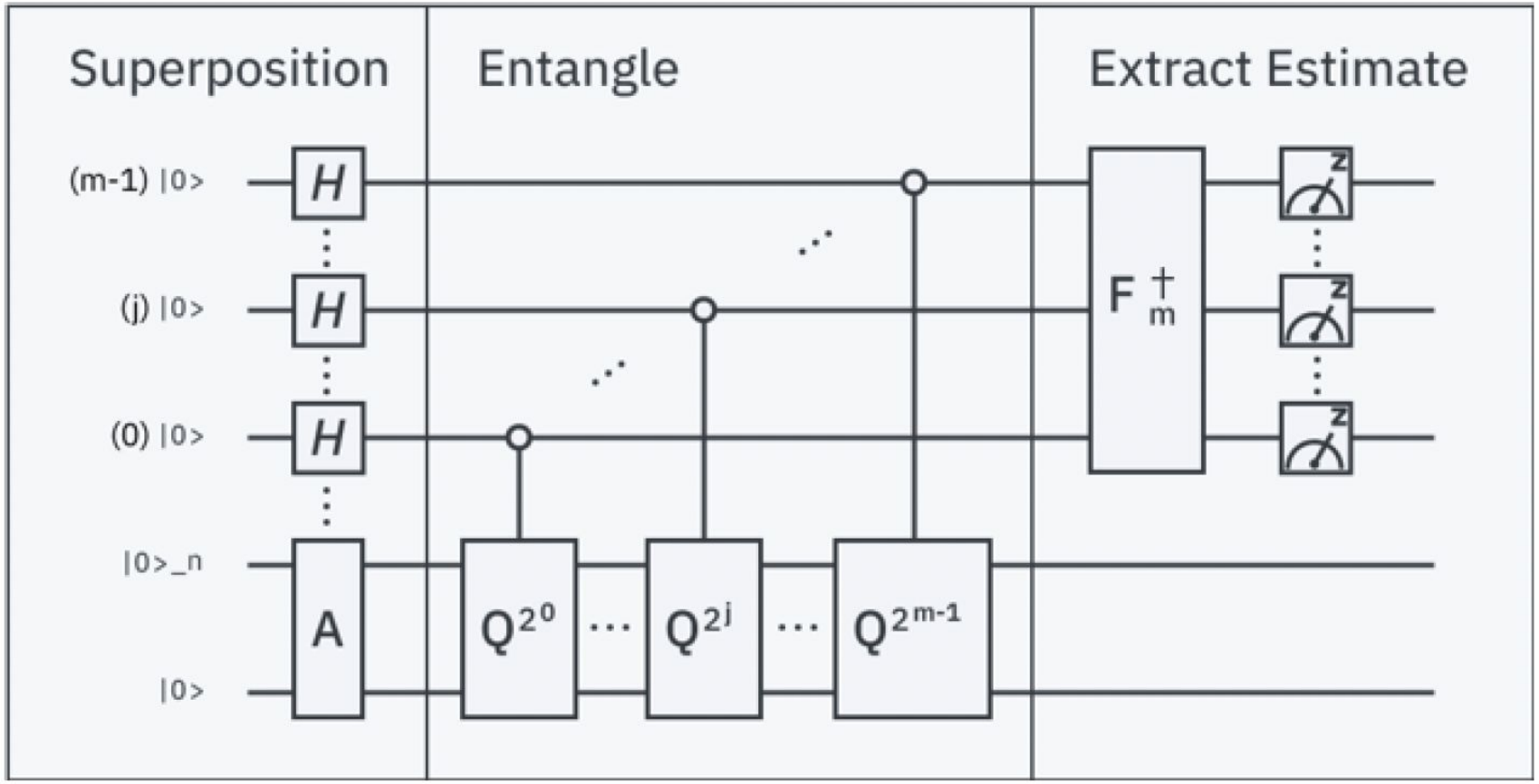
Counterparty Credit Risk

Quantum Monte Carlo - Quantum Amplitude Estimation



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

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Fraud Detection

IQM DBS

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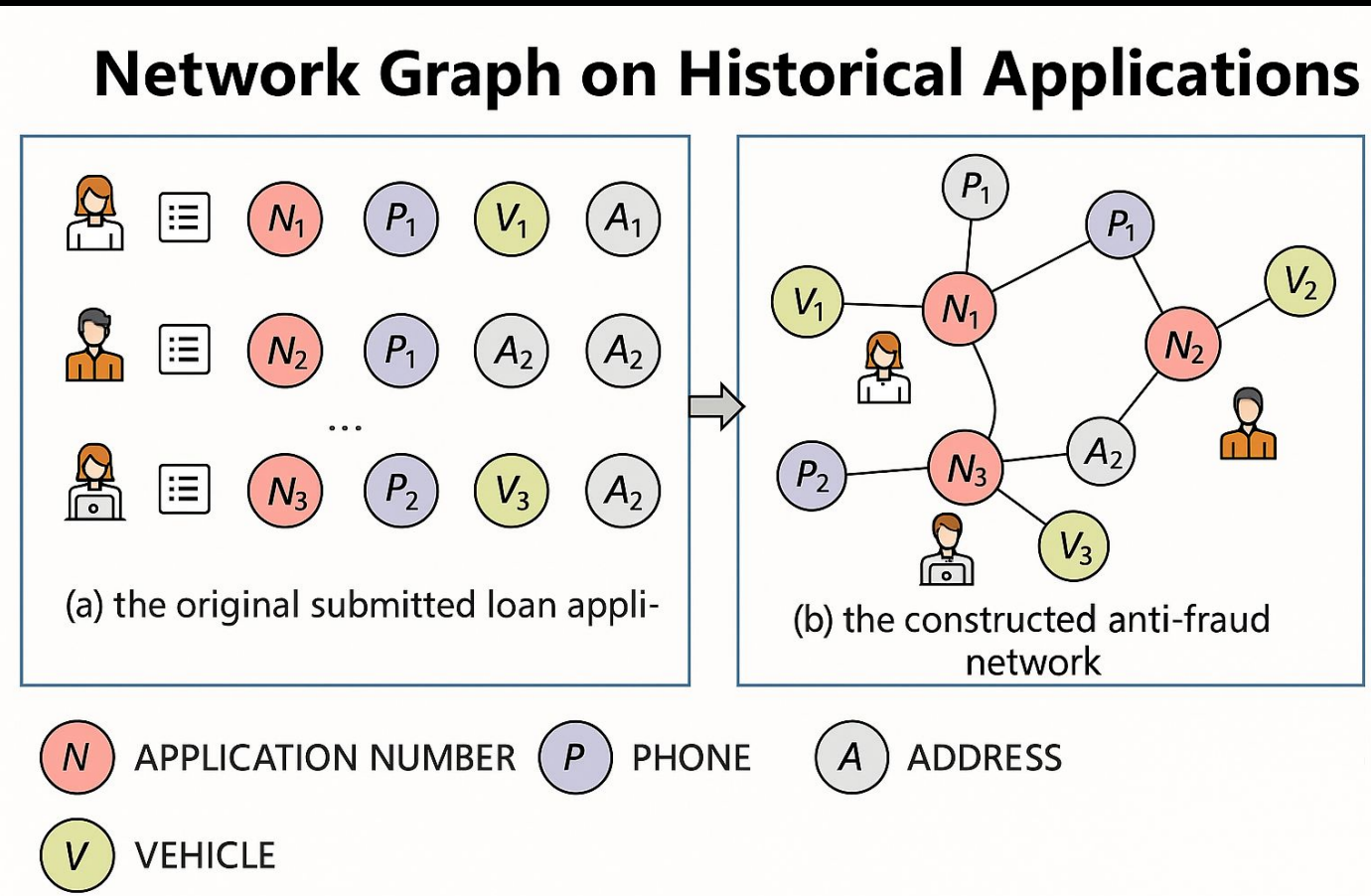
Fraud Detection



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Fraud Detection

Iterative Search:
Identify if path exists from historical fraud to new applications

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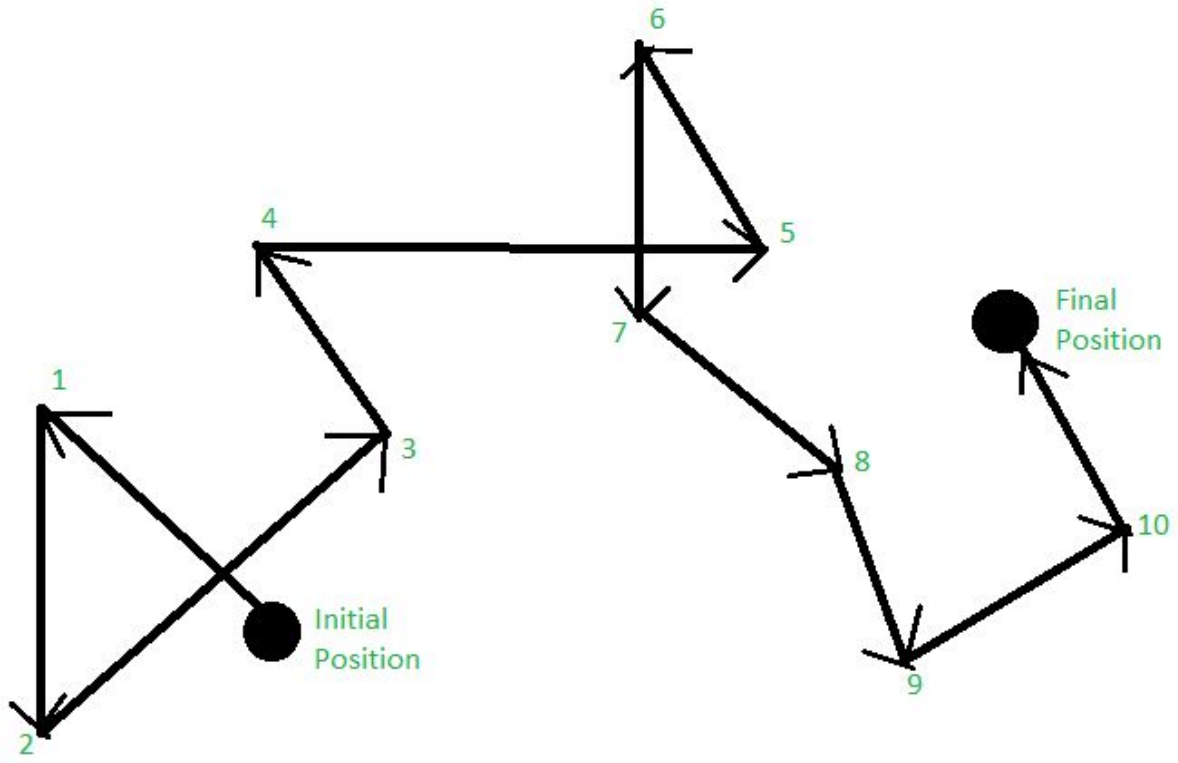
Fraud Detection

Random walk to find connection to fraudulent nodes



Problem: Fraudulent subnetworks are often tightly interconnected

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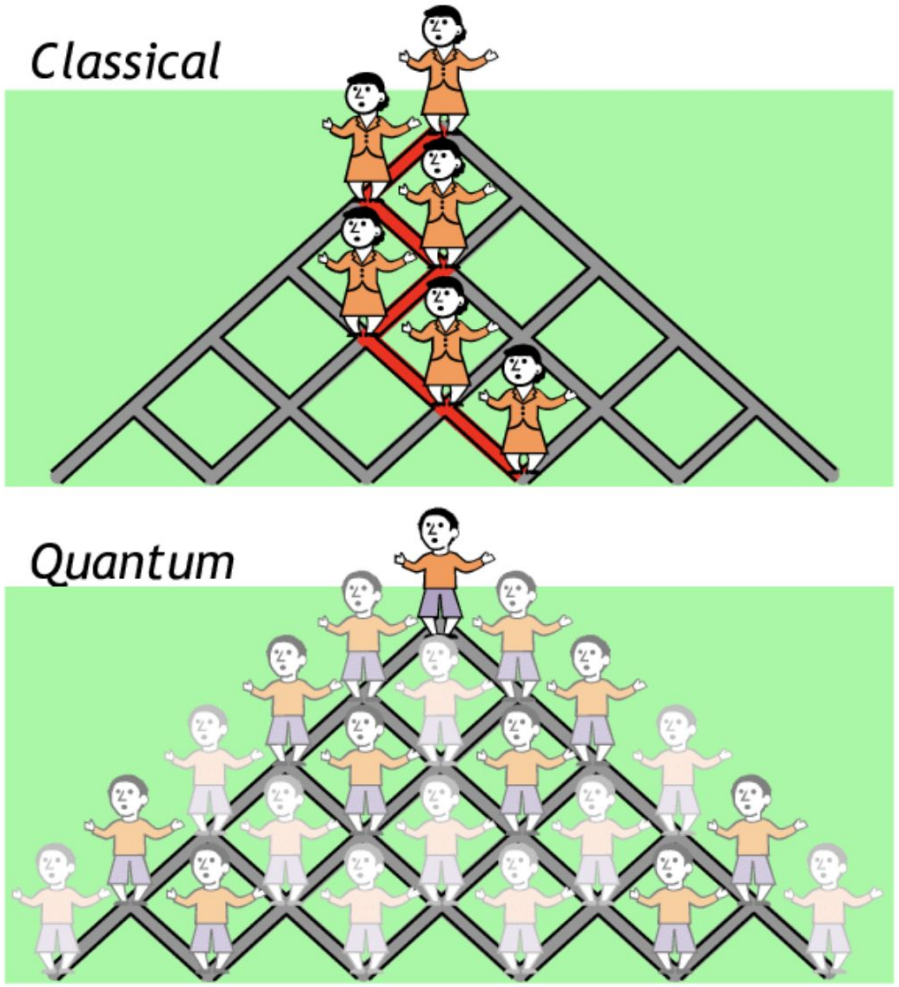
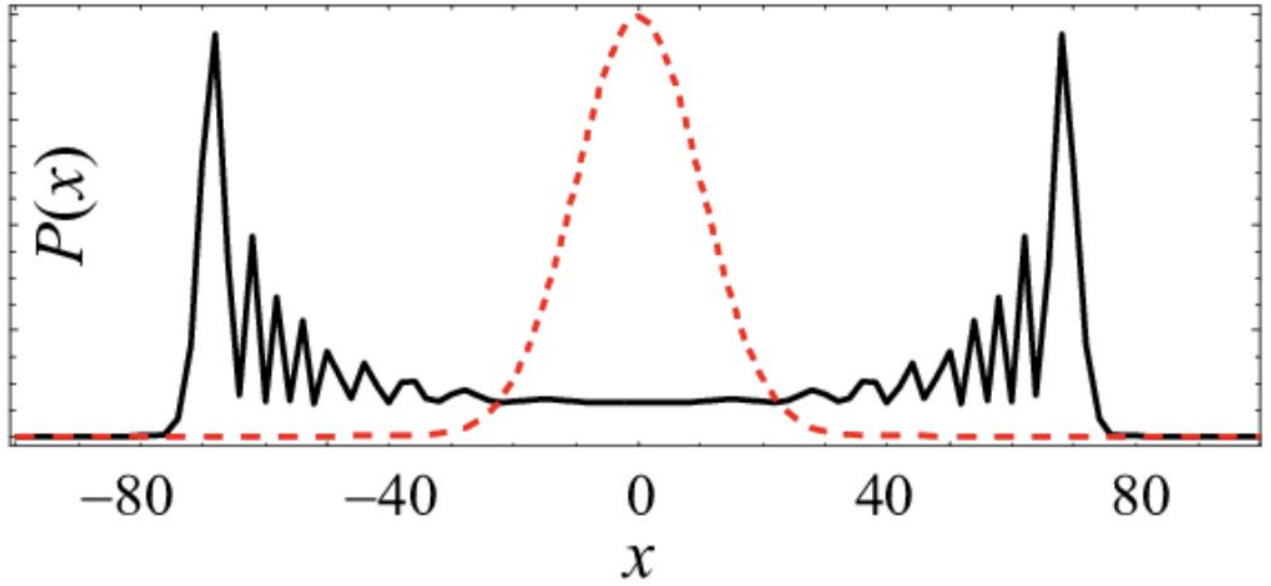
Fraud Detection





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Portfolio Optimization

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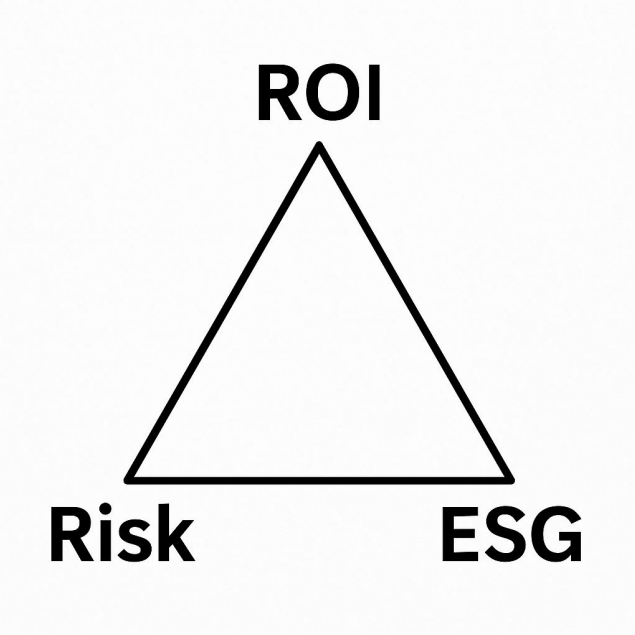
Portfolio Optimization

$$\min_{\mathbf{w}} \ \mathbf{w}^\top \Sigma \mathbf{w} - q\,\mu^\top \mathbf{w}$$

$$\text{s.t.} \quad \mu^\top \mathbf{w} \geq R_t,$$

$$\sum_{i=1}^{n} w_i = 1,$$

$$w_i \geq 0 \quad \forall i,$$



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

Return covariance matrix:

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

Possible approaches:

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

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QCentroid Platform

The Sandbox

QCentroid

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

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The Sandbox

The execution platform

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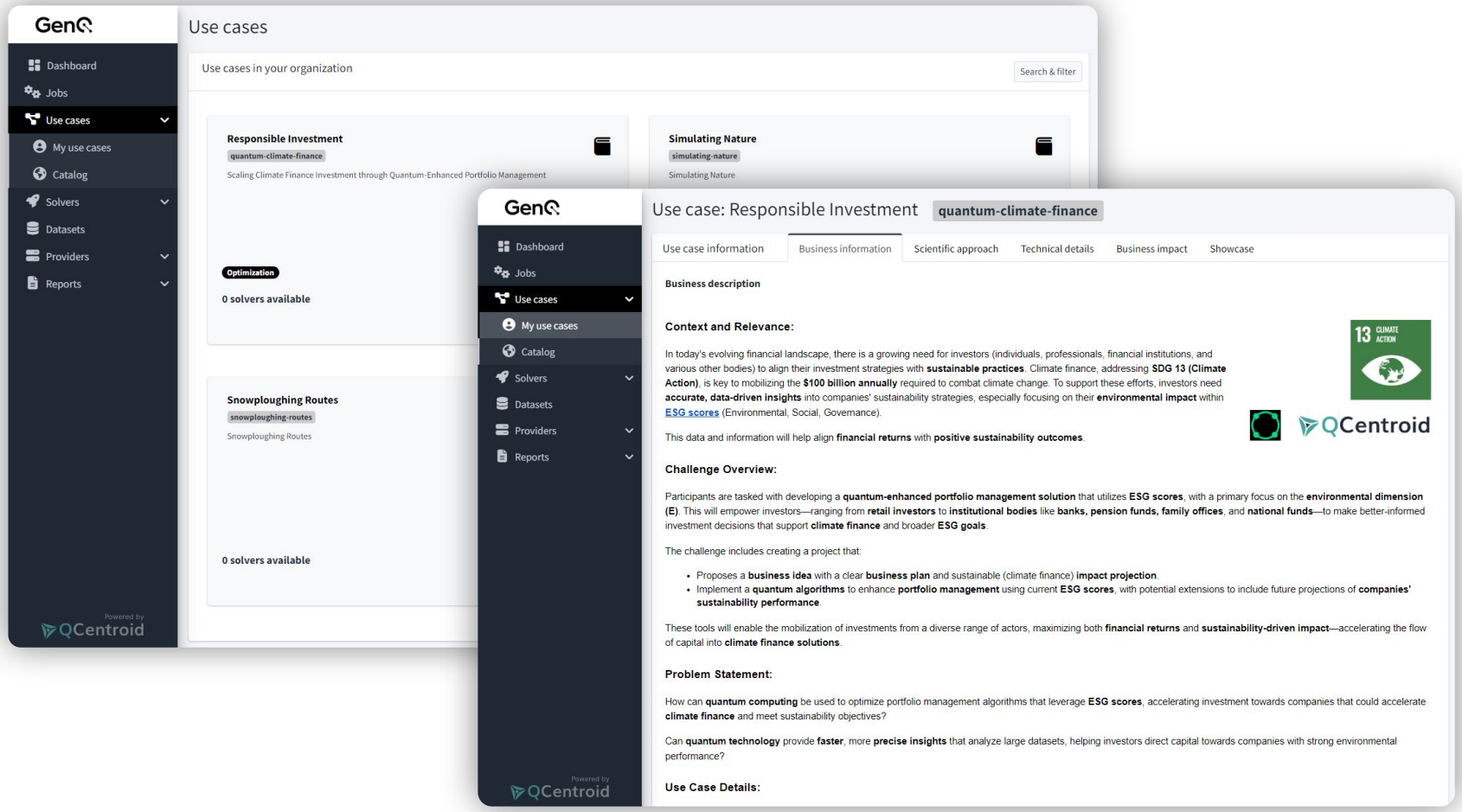

Key features

See the use cases
Choose and understand the use case:

- Description
- Deliverables
- Key variables
- Key componentes
- Functional criteria

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

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The Sandbox

The development environment

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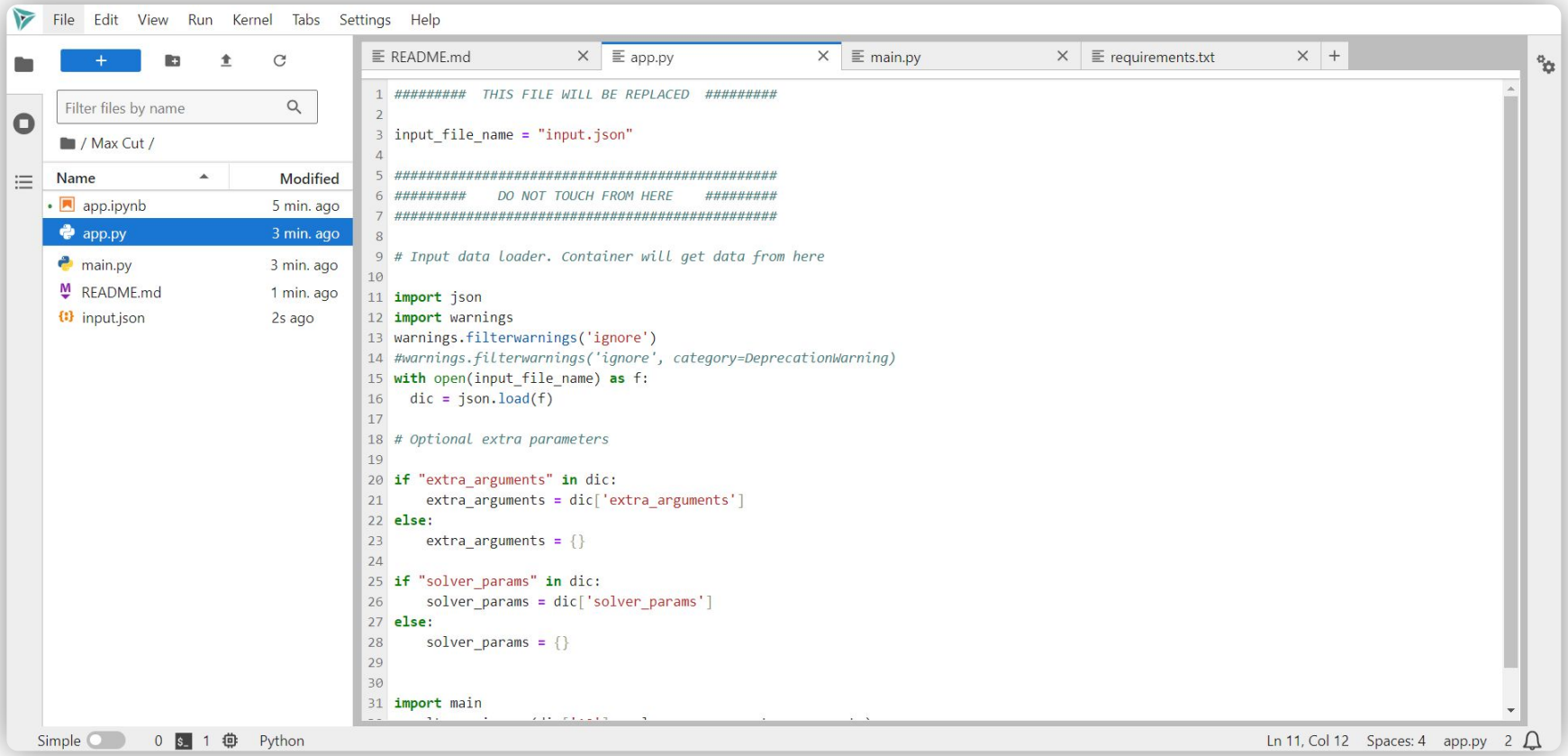

Key features

Integrated Sandbox environment for solvers implementation in Jupyter Notebooks.

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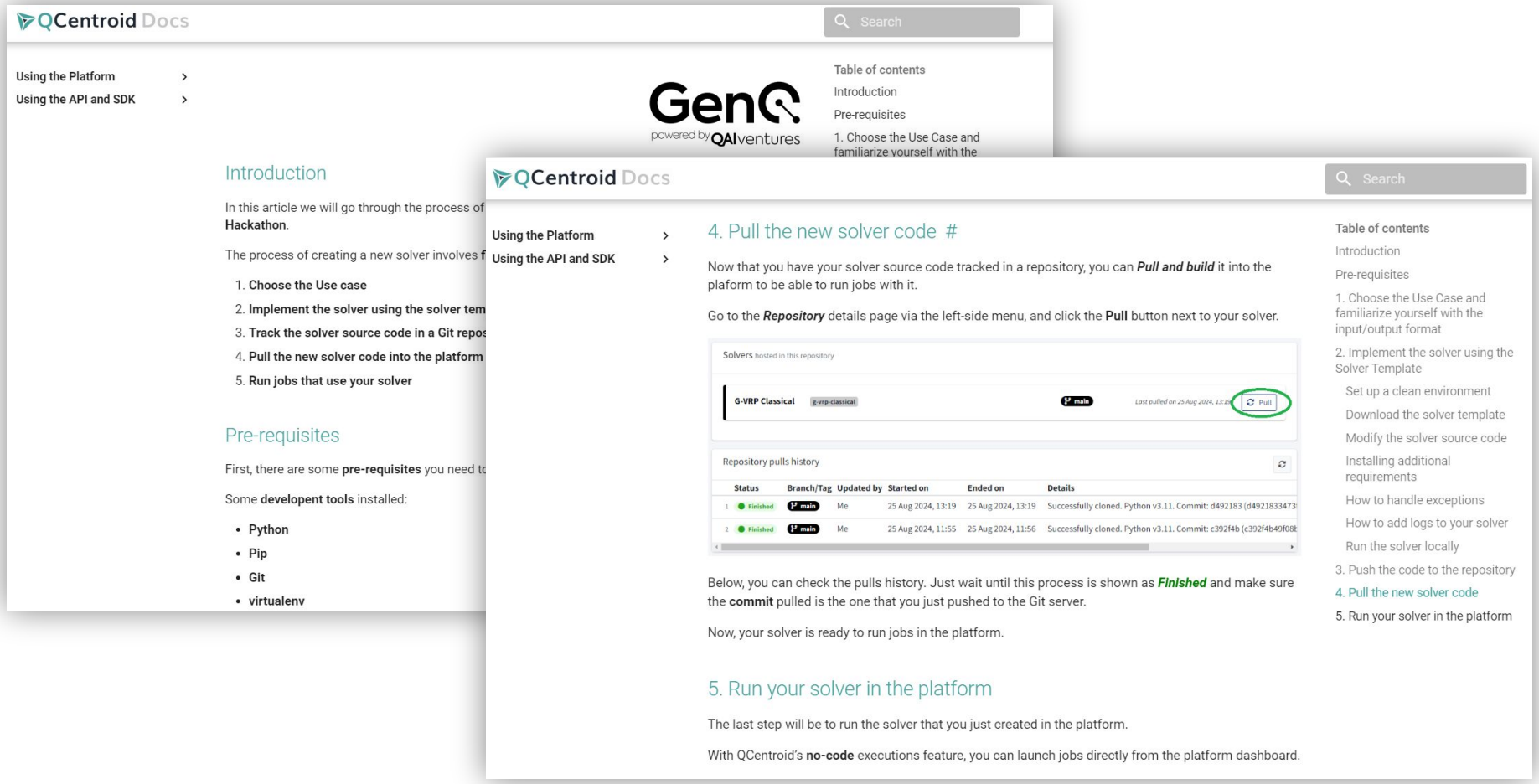
The Sandbox

The documentation pages




See you next Friday at 3.00pm
at DBS Asia X
1 Fusionopolis Vw, Level 7,
Singapore 138577
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QAI Ventures Team at Singapore Hackathon

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