

Single Day Event

qPar – HPC Orchestration and Control Tower

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Agenda:

- Data and Drug Development
- Quantitative Systems Pharmacology (QSP)
- Problem Statement
- Our Solution – **qPar HPC Orchestration & Control Tower**
- Key Outcomes
- Conclusion



Data and Drug Development

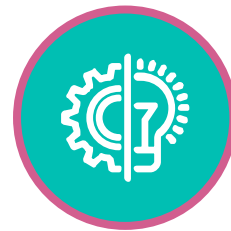
In today's fast-paced drug development environment, data is produced at an exponential rate.



Efficient **extraction of knowledge** from the data to support **development** is becoming a cornerstone of success.

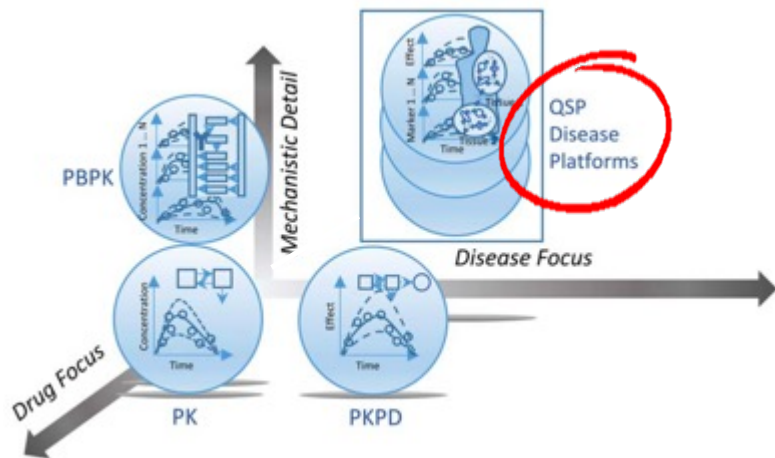


Model-informed drug development specifically aims to extract this knowledge, **identify knowledge gaps**, and **quantify** the degree of **uncertainty** associated with it.



Armed with this knowledge, you can make **enlightened decisions** on the next steps of your drug development program.

Quantitative Systems Pharmacology (QSP)



A quantitative framework to support translational drug discovery and development by integrating knowledge on biochemical, biological, physiological, pharmacological, and clinical systems.

$$\text{Quantitative, Mechanistic biology} + \text{Pharmacology} = \text{QSP}$$



RxDataScience Solution - qPar HPC Orchestration & Control Tower

Key Business Questions - *How can we identify the treatment pathway, dosage and drug effectiveness on a specific patient population? How can we reduce the lead time from “model development to completion of simulations” that allows for faster discovery of drugs?*

qParTM — Orchestration & Control Tower^{*}

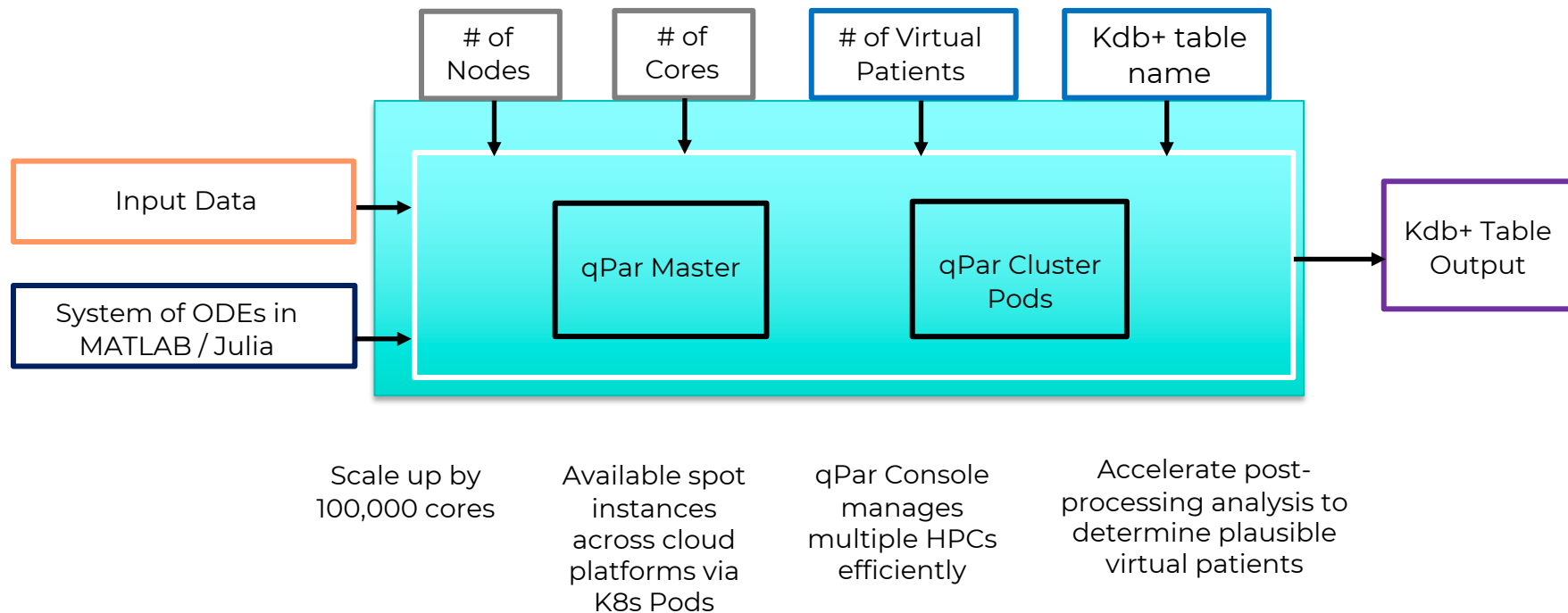
The qPar Solution, powered by Kdb+ supports extreme HPC capabilities (~100,000 cores in parallel and runs millions of model simulations required for therapeutic areas like Immuno-oncology)

- ✓ Scalable
- ✓ Hyper language support for model in any software
- ✓ Performance and optimization of the lead time from model development to completion of simulations
- ✓ Meets the specific requirements of the scientific community

^{*} Data on File



qPar – From the Scientist's Perspective





qPar – Simulation Monitoring and Instrumentation

← ↻ 🏠 🔒 https://qpar-master.syneoshealth.com/controlTower/qParRun 🔍 🔊 ☆ 🌐 ⚙️ 🔄 📄 ☆ 📌 📱 ...

qPar™ Orchestration & Control Tower **Home** **qPar Run** Terminal Administration Tools 🌙 AP

✕ + New Simulation 🔌 Launch Instances

Simulation Ports Nodes Cores Jobs Tasks

S no	User	Instance	No of instance	Cost	Nvps	Simrunsize	Task type	Job name	Table name
3	Aruna				3	3	Medium Task	IOSHAruna	IO_Model
4	Aruna				3	3	Medium Task	IOSHAruna	IO_Model
5	Aruna				3	3	Medium Task	IOSHAruna	IO_Model
6	Aruna				3	3	Medium Task	IOSHAruna	IO_Model
7	Aruna				3	3	Medium Task	IOSHAruna	IO_Model
8	Aruna				3	3	Medium Task	IOSHAruna	IO_Model
9	Aruna				2	2	Medium Task	IOSHAruna	IO_Model

Columns



Key Outcomes - qPar HPC Orchestration & Control Tower



Support

Rendered 24/7 support for Scientists to run simulations across 5 TAs



Scalability

Ability to scale up more than 100,000 cores and run simulations in parallel



Cost Efficiency

Capable of running simulations using Spot instances across different Cloud platforms



Multi Language

Scientists can run ODE Solvers across different coding languages like MATLAB, Python & Julia



Reliability

qPar Platform success rate of the simulation results is 99.99%



Auto Shutdown

Ability to shut down machines when not in use for more than 300 seconds



Stability

Ability to run across cloud platforms & even when 100,000 cores run in parallel



I/O Operations

Faster IO powered by Kdb+ compared to traditional cloud databases



Key Outcomes - qPar HPC Orchestration & Control Tower

The KX logo, consisting of the letters "KX" in a bold, black, sans-serif font, enclosed within a teal rounded square border.

KX

I/O Operations *

Faster IO powered by Kdb+
compared to traditional cloud
databases

q is 10 times faster than other COLSTORE (and 100 times faster than ROWSTORE).
q has much lower overhead(10-1000 times faster) and much less RAM use (10 times).
q scales better. q uses ssd and dsk better. (better locality)



qPar – HPC Orchestration Admin Console

qPar™ Console

Syneos Health

RData Science



Server Name	Instance Id	Instance Type	Instance Status	Availability Zone	Expenses	
Dev Test Server	i-0agsdakusdh	t2.micro	 Running	us-east-1	 \$200	Start
Prod Immuno Oncology	i-8asdjhgs7	t2.micro	 Running	us-east-1	 \$250	Start
Prod Immuno Science	i-7aysdg53	t2.micro	 Running	us-east-1	 \$400	Start
Prod Cardio Vascular	i-6ysd553hhs7	t2.micro	 Running	us-east-1	 \$300	Start
Prod Hematology	i-86asdasdas	t2.micro	 Running	us-east-1	 \$600	Start

Audit Logs

User Name	Start Time	End Time	Expenses Incurred
Lindsay Walton	2023-08-23T10:22:46.984Z	2023-08-23T10:22:46.984Z	\$400
Lindsay Walton	2023-08-23T10:22:46.984Z	2023-08-23T10:22:46.984Z	\$500

Thank you



**The Global Healthcare
Data Science Community**

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