

The Race to Combat a Pandemic

Accelerating Vaccine and Treatment Development

“Oracle Cloud technologies enabled us to dramatically speed up our ability to analyze the COVID-19 virus and use this information to design the vaccine candidate.”

— Nikolai Petrovsky, Professor, Flinders University

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The Race to Combat a Pandemic

Novel Virus Launches Surprise Attack

Outpacing the COVID-19 Pandemic

In early 2000, Professor Nikolai Petrovsky and Flinders University researchers answered the battle cry for the ongoing SARS pandemic with an innovative vaccine development approach to combat the viral enemy.

Fast forward to January 2020, when the novel SARS-CoV-2 virus took the world by surprise and began to storm across the globe. Governments worldwide knew that without a vaccine or effective anti-viral treatment to fight this new foe, their healthcare systems would quickly become overburdened. The world went on lockdown.

Grounded in their knowledge from the SARS epidemic in 2000, Professor Petrovsky's team quickly recognized that SARS-CoV-2 could become a pandemic. If they wanted any hope of defeating fast-moving COVID-19, they would need to push the boundaries of vaccine candidate development and significantly accelerate the process. Using their unique vaccine development approach and powered by Oracle Cloud, Professor Petrovsky and the Flinders University research team entered the global race to beat the COVID-19 pandemic.



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Accelerating Vaccine and Treatment Candidates

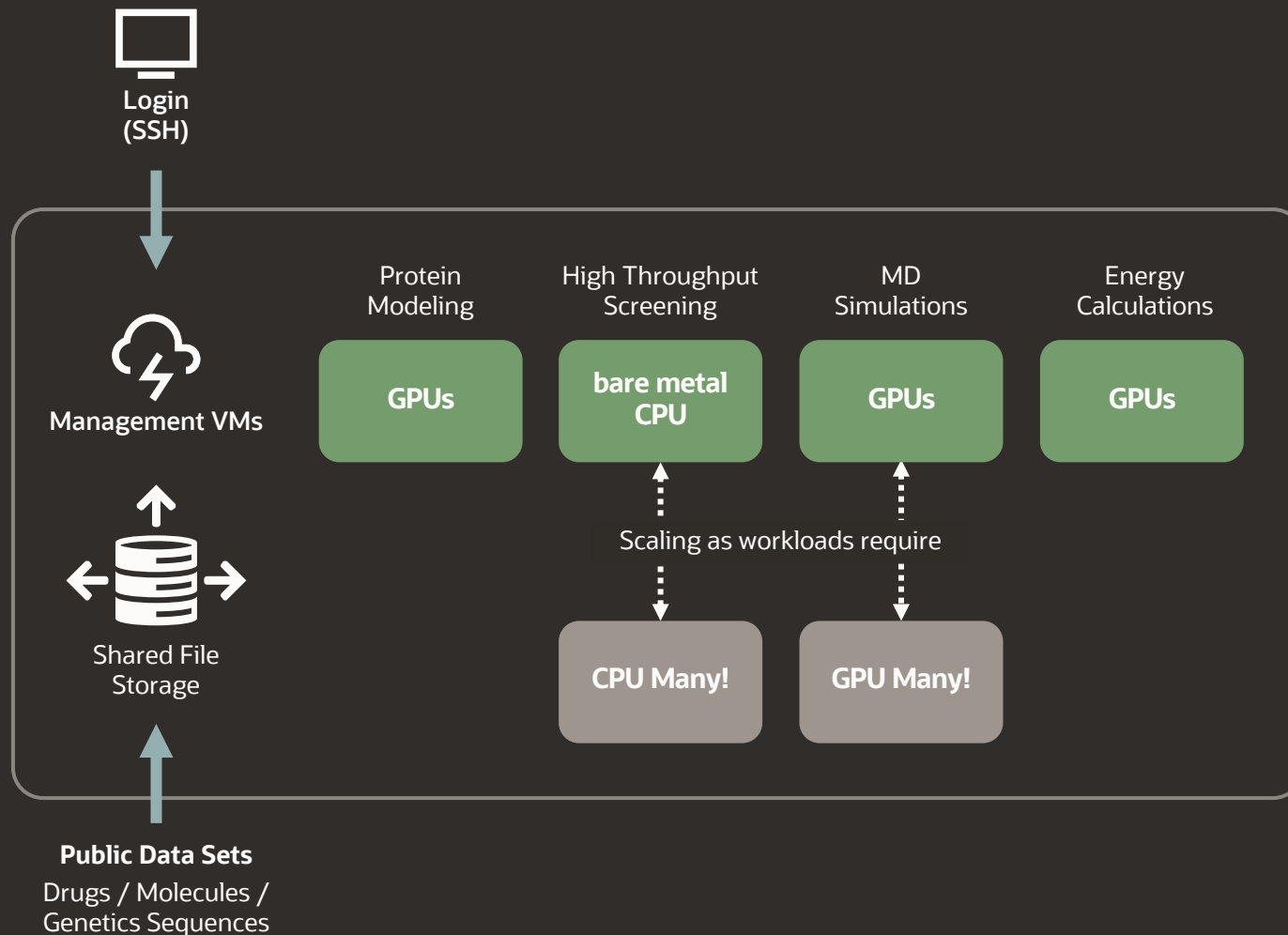


- Flinders University researchers wanted to accelerate the development of a COVID-19 vaccine candidate and the discovery of multiple therapeutic treatments against different drug targets.
- They imagined developing a COVID-19 vaccine candidate in weeks, rather than years, by using the virus' genetic sequence to build homology models of SARS-CoV-2 and computationally simulate the interaction of the spike protein with human ACE2 receptors.
- They endeavored to screen hundreds of thousands of drug compounds against several drug targets to quickly short-list therapeutic candidates for efficacy against the virus.
- The limited availability of on-premise supercomputers impeded the research team's ability to do time-critical research. Oracle Cloud gave them the immediate access they needed, and even accelerated their ability to analyze the virus. The result? They were able to design a vaccine candidate and identify therapeutic options faster than previously thought possible.

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Accelerated Vaccine and Treatment Discoveries Powered by Oracle Cloud Infrastructure

Oracle Cloud Architecture – Flinders University



Cloud Resources

- Latest bare metal servers for CPU-intensive high-throughput drug docking pipelines.
- Latest GPU servers for complex molecular dynamics (MD) simulations and protein modeling.
- High performance shared file system for distributed results storage and hosting of large data sets.

Outcomes

- High performance computing for modeling and simulations of SARS-CoV-2 spike protein fast-tracked vaccine candidate design and testing.
- Vaccine candidate development times reduced to **weeks**, ahead of animal and human trials.
- Over 100,000 drug compounds screened for efficacy in treating COVID-19.
- Cloud technology allowed immediate access to computational resources and easy scaling to include partner universities.