



Accelerating breakthroughs in precision medicine

The University of British Columbia's Personalized Medicine Initiative can analyze complex clinical data and uncover new medical insights with a powerful solution for big data analysis and management

Researchers at the University of British Columbia's Personalized Medicine Initiative (PMI) don't just want to discover new ways to treat diseases such as diabetes and cancer — they want to use data analytics to completely end those diseases.

Through a spinoff company, Molecular You Corporation (MYCo), PMI is engaged in the Molecular You Pathfinder project, which provides precise, next-generation molecular profiling to better identify health risks and options for prevention, treatment and monitoring for a target of 20,000 individuals. The project gives participants a molecular understanding of themselves, and it provides scientists with new information they can use to detect disease risk and initiate early intervention. "Our sense is that the majority of chronic diseases are caused by genetic or environmental factors," says Rob Fraser, the COO of PMI and co-founder of MYCo. "The only way to determine that is to use multivariate analyses to get a clear idea of what's

going on in the individuals with those diseases."

However, performing such analyses requires powerful big data technology, which MYCo did not have. "With a traditional database system, it becomes cost-prohibitive to add more data," Fraser says. "Yet the ability to add more data is imperative because we want to add patients' clinical information over the span of the program." MYCo also needed rigorous security capabilities, to ensure the protection of patient privacy. To address these challenges, MYCo sought a big data management solution.

Choosing a powerful PHEMI and Dell big data management solution

MYCo initially considered solutions from several technology vendors before choosing a solution from PHEMI, a big data warehouse solution provider. "PHEMI was a motivated and extremely responsive group that is very interested in what we are doing, and the PHEMI solution met all our needs today and for the long term," says Fraser.

"Eventually, we think we will be able to use our insights to make amazing breakthroughs that will help a lot of people. We will have a huge opportunity to tackle diseases and, hopefully, pick them off one by one."

*Rob Fraser,
COO of the Personalized Medicine Initiative and Co-founder of MYCo*

Customer profile



Company	Personalized Medicine Initiative, University of British Columbia
Industry	Healthcare
Country	Canada
Website	personalizedmedicineinitiative.ca

Business need

The Personalized Medicine Initiative needed to securely store personal data from its precision medicine program employing next-generation molecular profiling to better identify health risks treatments.

Solution

The organization implemented a big data management solution, based on PHEMI software and powered by Dell PowerEdge servers, to give researchers and physicians secure access to clinical and "omics" data sets.

Benefits

- Enables insights that can lead to breakthroughs in diabetes and cancer treatment
- Performs comprehensive analysis of health and molecular biological data
- Helps determine safe, effective treatments
- Keeps personal health information private
- Scales to support unlimited future clinical and omics data sets

Solutions at a glance

- Big Data
- Servers

MYCo implemented the PHEMI Central Big Data Warehouse, which collects, stores and manages clinical data and data related to “omics” — the study of the technologies, roles, relationships and actions of molecular biology making up DNA, proteins and metabolites. PHEMI Central integrates with the Hadoop open-source big data platform and scales economically to help MYCo efficiently collect and analyze this clinical and omics data. The solution also uses a Zero Trust Data framework, giving MYCo full control over who can access specific clinical data.

PHEMI chose to build the solution on Dell hardware, because of Dell’s leadership in healthcare and life sciences, and the ability to satisfy PHEMI’s performance requirements. PHEMI deployed a front-end management node running PHEMI Central, based on a Dell PowerEdge R320 server, as well as three master nodes running Hadoop management processes, also based on an R320 server. PHEMI deployed an additional four data nodes running Accumulo and Hadoop data processes, based on Dell PowerEdge R720xd servers. The servers are connected with a Dell Networking N4032F 10GbE switch. PHEMI worked with Dell Deployment Services, which recommended the PowerEdge R720xd for Hadoop data node implementation.

Combining and analyzing complex clinical data sets

MYCo uses the PHEMI and Dell solution to conduct a Molecular You study called Pathfinder. In the study, researchers conduct a full phenotype test on all participants, using bone scans, cognitive tests and clinical lab tests. Researchers also collect blood and urine samples and study circulating proteins in participants’ blood to get a full molecular profile.



MYCo analyzes this omics and phenotype data, and then deposits it into the PHEMI big data warehouse. “We can combine and analyze very complex and diverse data sets to find out the true status of individuals’ health using the PHEMI and Dell solution,” says Fraser.

Finding new ways to treat and prevent disease

MYCo will be able to use its new solution to find new insights into the causes of diseases such as diabetes and cancer. “We need to analyze all molecular components, and we can do that more easily with the PHEMI and Dell solution,” says Fraser. “Eventually, we think we will be able to use our insights to make amazing breakthroughs that will help a lot of people. We will have a huge opportunity to tackle diseases and, hopefully, pick them off one by one.”

Gauging how individuals respond to prescription drugs

MYCo is also using its new solution to engage in pharmacogenomics, the study of how genes affect a person’s response to drugs. For example, PMI is working with the British Columbia Ministry of Health to access public data sets to examine prescription outcomes. “We hope to take 50 years of patient data, including drugs that have been prescribed and hospitalization information, and pull all that data into the PHEMI system,” says Fraser. “We can then compare prescribing practices with outcomes and individual omics profiles through big data analysis because of the PHEMI software and powerful Dell hardware behind it.”

Protecting the privacy of participants, scaling to support big data analysis

With PHEMI Central, consent, data sharing agreements and privacy policies can be automatically enforced within the system, and MYCo can protect Molecular You participants’ privacy by providing different views for different researchers. “PHEMI has built-in access controls that maintain individual privacy,

Products & Services

Services

Dell Deployment Services

Hardware

Dell Networking N4032F switches

Dell PowerEdge R320 rack servers

Dell PowerEdge R720xd rack servers

which is a necessity for us,” says Fraser. “It’s a very flexible and secure research platform.”

PMI and MYCo now have a platform that will scale easily as the amount of clinical data in PHEMI Central expands. “Having the infinite capacity in the system will be greatly beneficial as we continue pulling in new clinical data sets in the future,” says Fraser.

Enabling collaboration between researchers, clinicians and physicians

Because of the flexibility and security of the PHEMI system, MYCo researchers can easily collaborate with clinicians and physicians. “Our goal is to hand physicians something that anyone could understand, which they can use to interact with a patient and make critical decisions,” Fraser says.

Although MYCo is still at the early stages of its clinical research, it has high expectations for the future. “Our sense is that precision medicine is a tsunami that keeps growing, and our goal is to be surfing at the top of that wave,” says Fraser. “This is an exciting time, and we are confident the analysis we get through the PHEMI and Dell solution will be a game-changer. Physicians can use this kind of analysis to help people in ways they never previously thought possible.”

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