

Personal Peptides Speeds Genomic Analytics with Optimized AWS Infrastructure

Challenges:

*Secure, compliant HPC framework
to bring solution to market*

- Personal Peptides needed commercial, high performance solutions to process big data at massive scale.
- Meeting HIPAA requirements and enabling Personal Peptides to control and protect client information along the supply chain was essential.
- Maintaining competitive advantage through efficient use of computing resources was imperative in the competitive field of biometrics.
- Managing hardware would not be a viable option; the company needs to remain agile, manage periodic spikes in demand and rely on a self-managing infrastructure.

HPC Cloud Computing

Personal Peptides sequences the genome of individuals aiming to manage cancers using immunotherapies. The company's ImmunoDiet™ program is a nutrigenomic test that provides oncologists and nutritionists with the information required to create a customized nutrition plan to improve the outcomes of cancer patients.

Cancer can mutate to mimic certain proteins found in food, and consuming these foods has the potential to suppress the cancer immune system. Similarly, a strategy to avoid foods that may damage the cancer-specific immune system can help boost an ongoing immune system response against cancer. The challenge is that research shows DNA in each individual's cancer is very different. Treatments must be customized for each person. Personal Peptides enables

health and nutrition providers to counsel patients to manage their diets according to the individual DNA of their cancer with the aim of improving their outcomes.

Solution:

High Performance, Scalable Infrastructure

To accomplish this, the DNA must be sequenced, analyzed and compared against other large data sets, requiring massive amounts of computing resources in order to return information within a reasonable timeframe. While the data analytics could be performed in academic centers where high performance super computers were available for research, the only viable commercial solution was public cloud resources from Amazon Web Services, relying on their HIPAA compliant services to maintain patient privacy. Even with AWS's inherent high scalability, computations were estimated to take too long. While the time estimate had been reduced to decades, that was simply still too long.

Cracking the Genomics Big Data Challenge

Jahan S. Khalili Ph.D., founder of Personal Peptides and a recognized leader in the field of nutrigenomics had developed the methodology needed to deliver the ImmunoDiet™, but was struggling to find the expertise that would be required to properly architect an AWS environment that could manage his HPC requirements, let alone fit his need for an efficient, self-managing system.

After finding that a company specializing in providing infrastructure to the biometric

ImmunoDiet™ 
Personal Peptides

Life Sciences

Profile

Founded in Houston, Texas, Personal Peptides is the first company to develop a nutrigenomic tool for cancer patients, designed to improve their cancer specific immune system. By bridging the gap between the human immune system and personal genomics, Personal Peptides aims to provide individuals with the tools to sculpt their own immune repertoires.

www.personalpeptides.com;
www.immunodiet.com

Case Study

HPC for Life Sciences Analytics

AWS infrastructure to power massively parallel compute cluster, NoSQL and indexing

industry was unable to provide a solution, Dr. Khalili engaged Flux7. Flux7's full stack knowledge and deep application and infrastructure knowledge meant a solution that met all of Personal Peptides' requirements could be readily built. The application architecture included compute clusters for machine learning models, scalable task queues, search indexers and auto-scaling workers. The requirements of these applications, as well as the business requirements, needed to be carefully mapped and an AWS architecture was configured to meet those needs.

Dr. Khalili noted that "Flux7 had a unique way of looking at the challenge that I did not find from other vendors. They were able to rearchitect the entire system and use their partnership with Amazon Web Services to strategically work through any technical or business issues that arose."

Preserving the Document Chain

Personal Peptides' client DNA samples are provided to Illumina, a well-regarded DNA sequencer. Illumina's BaseSpace tool allows researchers to upload massive data sets directly to the cloud for analysis and to store the results long-term with Amazon Glacier. Because of this, the patient's data never has to leave the secure, compliant environment of AWS, providing an additional level of data protection along the document chain.

Self-managed, Near Limitless Infrastructure

Personal Peptides is now able to create a viable product and bring it to market in a way that meets the needs of their customers. By using a massively parallel compute cluster, NoSQL and indexing within Amazon Web Services, Personal Peptides is able to conduct genomic analysis and produce recommendations within a viable timeframe and cost.

The final solution uses a combination of enterprise grade messaging from RabbitMQ, the Celery pre-commerce platform, MongoDB and a proprietary mix of Amazon's web services to ensure security, privacy and scalability.

"Without the strategic use of AWS capabilities, we would not have had the resources to produce a commercially viable product," Dr. Khalili said. "Flux7's deep knowledge of architecture and of AWS has helped us achieve an infrastructure that we'll be able to maintain ourselves and which will grow with our business."

"Flux7 solved a problem in the field of genomics in the process of building our infrastructure. As the data is increasingly becoming available, one of the real business advantages is solving the problem of how to manage analytics at scale. When each patient brings such a large amount of data, it is not long before there is a serious scalability challenge."

– Dr. Jahan Khalili

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Austin-based Flux7 is a team of IT experts helping businesses realize and optimize the benefits of technology by using DevOps processes and full-stack expertise. Flux7's team delivers specialist development skills, architecture, and operations knowledge, accelerating an IT team's progress toward achieving business agility using best practices in continuous delivery and integration. Through a unique blend of services and products, Flux7 provides high-quality solutions that directly address the challenges faced by CIOs and IT teams to achieve short-term results with long-term benefits. With decades of combined industry experience, best-practices and industry benchmarks, our team is committed to creating sustainable, reliable solutions. For more information about Flux7, visit flux7.com or email info@flux7.com.

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