



ADVANCING BONE AND CANCER RESEARCH

Accelerating Bioinformatics Analysis Using BioTeam's Galaxy Appliance

THE STEIN / LIAN LABORATORY

The Stein/Lian Laboratory is intensely involved in bone and cancer biology research that is heavily dependent upon bioinformatics analysis. They generate hundreds of GBs of data in a month, expanding to TBs of raw sequencing data and analysis results. The university computing clusters and Galaxy Main could not efficiently support their research in a timely fashion. When the lab switched to BioTeam's Galaxy Appliance for bioinformatics analysis, the pace of research accelerated as they could reliably process data ten times faster than before.

"It's all about time. It would have taken six months before to do what I can do now in two weeks. And it's not only faster; I can consider more factors in the analysis and the essential research improves"

– JONATHAN GORDON, PH.D., ASSISTANT PROFESSOR, UVM



Left to right: Principle Investigators Janet Stein and Jane Lian, Assistant Professor Jonathan Gordon PhD, Principle Investigator Gary Stein, and Bioinformaticist, Joseph Boyd.

decades. They discovered the first osteoblast - essential transcription factor Cbfa1/Runx2 for bone formation as a binding protein to the bone-specific osteocalcin gene. Using the Galaxy Appliance, they regularly perform Runx2-ChIP Seq analyses in many different cell types.

THE CHALLENGE

As the Stein / Lian Laboratory's research has expanded, so has the amount of data that their research generates. Samples may be analyzed multiple times in the context of different experiments, further increasing their data analysis and storage needs. When the work was done on



AT A GLANCE

Located at the University of Vermont Larner College of Medicine, the Stein/Lian Laboratory uses a variety of cutting-edge cellular, molecular, biochemical and genetic approaches to study bone biology and cancer biology. The lab makes heavy use of BioTeam's Galaxy Appliance to perform bioinformatics analysis to derive insights which will ultimately inform decisions around clinical trials and therapeutic strategies.

"We've improved our research times by a factor of 10."

– JONATHAN GORDON, PH.D.
ASSISTANT PROFESSOR, UVM

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a university computing cluster, the system didn't have sufficient memory, which led to regular job failures. The lab also struggled with Galaxy Main, given the volume and frequency of their data analysis needs. Transferring TBs of data to the Galaxy Main server and waiting for their jobs in the queue were two major bottlenecks in their research. That sent the lab team looking for an alternative option.

A SINGLE PLATFORM, MULTIPLE SOLUTIONS

Based on a recommendation from the Vermont Genetics Network, the Lab staff looked at BioTeam's Galaxy Appliance. They saw immediate advantages and soon made the decision to move ahead with their first BioTeam Appliance purchase.

When the Stein/Lian Lab had been using the university computer cluster for their research, all data had to be processed by a single individual with command line skills. Now, multiple users are enabled by the Galaxy Appliance. This frees up the few bioinformatics resources to focus on advancing scientific discoveries. Because the Galaxy Appliance is also an open system, the Lab staff are putting it to multiple uses by installing additional toolsets like RStudio, Shiny web applications, and other internally developed analysis tools. The Galaxy Appliance continues to help with their science as the pace of their research grows.

IMMEDIATE BENEFITS

The BioTeam Galaxy Appliance, along with flexible support from BioTeam, has provided the Stein/Lian Lab with multiple benefits including:

- Ability to scale the size and number of analyses
- Enabling biologists to perform analysis
- Speeding up time to results of their analysis
- Teaching bioinformatics techniques to students

Time is the biggest reward that the Stein/Lian Laboratory has gained from the BioTeam Galaxy Appliance. "We now do routine analysis in 2-3 days that used to take a month," said Joe Boyd. Because more data is processed in a shorter time, research proceeds at a faster pace, which has an impact on treatments that can save lives.

"The Galaxy Appliance means we can process more data and take much less time to do it. Now, when our files are returned from the sequencing facility, our turnaround is a couple of days. Before we waited a week to access the data and once we began analyzing we were waiting in queues. Then, as often as 50% of the time the job would fail and we'd have to start all over."

– JONATHAN GORDON, PH.D.
ASSISTANT PROFESSOR, UVM

AN OPEN EDUCATION PLATFORM

The Galaxy Appliance is also an education platform being used to train Graduate students in bioinformatics. With no previous bioinformatics background, students can use pull-down menus, the web interface, and drag and drop to work on their projects directly. Biologists without a computational background can process and analyze their data using Galaxy. As users become more proficient in informatics and start to need more flexibility than Galaxy provides, they can seamlessly switch to using the command-line on the Appliance.

"The Galaxy Appliance is helping us educate a new generation of scientists. It's made a big difference in their ability to easily complete complex tasks, like, generate heat maps, and to interrogate their data more deeply."

– JANE LIAN, PH.D.
PROFESSOR, BIOCHEMISTRY UVM



Learn more at: bioteam.net/products/galaxy-appliance

ABOUT BIOTEAM

BioTeam is a high-performance consulting practice dedicated to delivering both objective and technology agnostic solutions to life science researchers. We utilize the right technologies, customized to our clients unique needs, enabling them to reach their scientific objectives.