

Virginia Bioinformatics Institute scientists use Bright Cluster Manager to achieve optimal results with their Hybrid-Architecture HPC resources

CASE STUDY

“Bright Cluster Manager plays an essential role in our success serving our customers. With Bright, we deliver reliable compute services rapidly, with minimal disruption. This allows us to keep our operating expenses at a minimum.”

— Kevin Shinpaugh,
Director of Information
Technology and High
Performance Computing at
VBI

The Customer

The Virginia Bioinformatics Institute’s (VBI) mission is to provide informatics and integrated analytics that will aid in advancing human health, well-being, and security. Research computing is supported by an IT department that has deployed HPC resources to assist their cutting-edge work. Research scientists from VBI and around the world access the center’s resources, and they expect the highest level of service in running jobs to support their research. The VBI resource allows researchers to address problems at the forefront of genomics, proteomics, and the effects of pandemics and epidemics on human society and networks.

One of their most recent projects involved the Ebola epidemic in West Africa. Epidemiology software, developed in-house by the Network Dynamics and Simulation Science Laboratory (NDSSL), was utilized to develop models that helped policymakers respond rapidly to the situation and provide much needed support to medical professionals. This is but one example of the many vital projects running at any given time at the institute. As researchers attempt to advance the frontiers of knowledge in the Life Sciences, compute-intensive workloads are business-as-usual for VBI.

VBI employs more than 250 people who:

- Build and use tools to model complex networks comprised of people and infrastructure. These tools inform policy makers regarding the impact of significant events. Because the spread of infectious diseases can be projected by the tools, risk can be quantified and mitigation strategies evaluated.
- Engage in large-scale informatics to identify genetic cancer markers, plant pathogens, and to improve world food sources through development of hardier and more nutritious crops.
- Train the scientists of tomorrow through its award-winning Kids’ Tech University, and through its undergraduate and graduate study programs.

The Challenge

VBI needed to purchase a powerful compute engine capable of handling very large datasets in memory, using hardware that meets the particular demands of large-scale informatics research. VBI needed a system that could be adapted easily and quickly to handle a wide variety of applications in VBI’s existing infrastructure. Further, due to staffing constraints, the system needed to be manageable by only two full-time equivalent systems administrators.

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Virginia Bioinformatics Institute

The Solution

The institute built Shadowfax, a powerful hybrid compute cluster comprised of Dell™ PowerEdge™ R and C series servers, NVIDIA Tesla™ GPGPUs, and Convey FPGA systems. Mellanox and Intel/QLogic InfiniBand switches provide high-speed connections between the servers and the storage. The solution is designed to deliver compute resources that meet the application needs of VBI—especially the resource-intensive applications used by NDSSL.

VBI built and tested Shadowfax with Bright Cluster Manager—Advanced Edition in less than five days. Now that it's operational, VBI uses Bright to provision, schedule, monitor, and manage the clustered environment for HPC. Bright's single solution and integrated approach means that only two full-time employees are needed to manage this hybrid-architecture resource. Bright eliminates the need for management toolkit synchronization, scripting, and other remedial tasks.

VBI system administrators have complete visibility of the entire cluster via an intuitive GUI, including the ability to drill down on details of each component. Bright's comprehensive health checks sideline problem components before they fail and then alert system administrators of the issue. Compute jobs flow smoothly while system administrators now focus on other priorities. Bright's user portal enables VBI researchers to monitor the status of their jobs, saving even more system administrator time.

The Results

Cost savings: Bright fulfilled VBI's requirement to manage this large, complex cluster serving diverse requirements without bringing on additional headcount. Only one employee is needed to keep the system running smoothly—meeting all users' expectation while providing time to work on other projects.

“My job would become very difficult if we stopped using Bright Cluster Manager. Bright makes managing our complex system intuitive and easy—so I can focus on keeping the consumers of our HPC services productive.”

— Bill Marmagas,
Senior Systems Engineer at
VBI

Time savings: With Bright, the time required to provision, schedule, monitor, and manage is reduced, allowing end users to focus on other priorities and projects.

Complex cluster; simple management: The complete view of all cluster components, including compute nodes, GPGPUs, FPGAs, interconnects, and storage via Bright's intuitive GUI, keeps system administrators in full control of this complex cluster, without the need to peruse endless lines of status updates. Real-time views, drill-downs, or historical analysis are displayed graphically with a mouse click.

Rapid redeployment: Bright's image-based provisioning enables VBI administrators to reconfigure Shadowfax in seconds to meet the specific needs of specialized applications. No downtime or intervention required.

Maximum system throughput: Bright's comprehensive health checks quickly identify problem nodes before each job is run, automatically sidelining them and alerting the VBI system administrators. System-related job crashes are virtually eliminated, saving time and increasing productivity.