

# Putting the Research First

With a drive to grow and make High Performance Computing (HPC) more accessible, Queen's University Belfast and Ulster University have collaborated to form a Tier 2 Supercomputing facility and Research Software Engineering (RSE) program that will drive research into health, the environment, and quality of life improvements for years to come.



“Through the collaboration with Ulster University we intend to increasingly develop specialist HPC workflows incorporating machine-learning and artificial intelligence frameworks. These novel research topics require deep interaction with our end user base. Our mission is to enable and train the next generation of researchers in these exciting new research domains. By collaborating with Alces Flight we can manage the change that comes with new ideas efficiently and effectively.”

Vaughan Purnell, Research Computing Manager,  
Queen's University Belfast

## Customer Profile



<b>Company</b>	Northern Ireland HPC
<b>Industry</b>	Education & Research
<b>Country</b>	Northern Ireland
<b>Website</b>	<a href="http://www.ni-hpc.ac.uk">www.ni-hpc.ac.uk</a>

## Business Need

The Research Computing teams at Queen's University Belfast and Ulster University are working together to form the Northern Ireland HPC (NI-HPC) initiative, securing £2.1 million in funding from EPSRC. Building on successful local HPC facilities, six exemplar research areas have been identified, some relatively new to HPC and strategically important to the UK. To achieve these aims the Universities required a partner who could strengthen their ability to manage change and ensure timely delivery of the solution.

## Solution

Queen's University Belfast and Ulster University chose Alces Flight for their ability to build a scalable HPC service using a range of vendor products, and effectively centralise and manage these resources as a unified solution. This capability allowed the teams to expand their focus into stronger user engagement, enabling dedicated Research Software Engineer (RSE) resources to more effectively support researchers.

## Benefits

- Centralized management of the complete HPC solution portfolio.
- Total transparency in the status and use of their HPC solution.
- Ability to deploy products from multiple vendors to achieve research aims.
- Capability to expand focus to stronger user engagement by strategic assignment of systems management to the Alces Flight team.

## Solution at a glance

- On-premise HPC cluster (HPE and DellEMC hardware)
- Managed HPC Services
- Operational Monitoring & Reporting
- Software application management

The Research Computing teams at Queen’s University Belfast and Ulster University are collaborating to form NI-HPC, focusing on six exemplar areas in the HPC community, including; neuroscience, advanced chemistry, innovative drug delivery, precision medicine, metabolomics and hydrogen safety. Balancing the demands of these dynamic research areas requires the team to rely on strong foundations in the underlying infrastructure.

The staff at Queen’s University Belfast and Ulster University, through their EPSRC grant, are growing their solution and RSE portfolio intelligently in order to meet the changing needs of their new user base.

“Our students and researchers drive our technological advancement both here at Queen’s and at Ulster,” explains Vaughan Purnell, Research Computing Manager, of Queen’s University Belfast. “When we came together to plan how we would tackle these new fields, we knew we would need the best platform for our research and an end user model built on RSE engagement. Our aim is to educate users today on the systems available, while keeping an eye to the user and system requirements of tomorrow - all without sacrificing quality or time-to-science.”

The NI-HPC ‘Kelvin2’ cluster is built through partnership with Alces Flight, and features capabilities including 128-core AMD EPYC2 and Intel AVX512 equipped compute nodes, Nvidia V100 GPUs, a Mellanox 100Gb Infiniband low-latency interconnect and more than 6PB of storage capacity organised into different feature tiers. With a focus on emerging HPC fields requiring increased RSE end-user engagement, collaborating on managing the environment was key to ensure project success.

#### Building with the user first

“Coming into the Research Computing team as a graduate of Queen’s I knew first-hand what the user experience is like,” says James McGroarty, RSE for NI-HPC; “Now that we are able to bring in collaborative research it’s important we grow our user base intelligently. By having solution and change management services provided by Alces Flight the RSE team can focus on the users, analyse and improve their workflows, and easily plan future changes to help our solution to continuously meet our researchers’ requirements.”

#### Ready for flight

The team at Alces provide a managed HPC cluster service for the Kelvin cluster, leveraging a standardised Alces Flight environment to help reduce day-to-day management costs and manage change effectively. By centralising all system operations in the Alces Flight Center tool, customers can centralise and develop HPC knowledge for the Research Computing and RSE teams.

“We worked with Queen’s and Ulster to integrate this latest hardware upgrade into the existing HPC service successfully adopted at the University,” explains Wil Mayers, Technical Consultant for Alces Flight; “Our goal is to transparently bring new capabilities and capacity online without major upheaval, minimising the impact to users and providing strong foundations to build on. The Research Computing and RSE teams have the power to develop and optimise new workflows, safe in the knowledge that their infrastructure is being taken care of. Now these teams can focus on adding value to the users and researcher communities that matter most to the NI-HPC initiatives.”

“Using Flight for Managed Environments shows us how researchers use our resources, enabling us to make stronger provisioning decisions for the future. For me this means I can focus entirely on ensuring our end users have optimised, efficient workloads that can be easily replicated.”

James McGroarty,  
Research Software Engineer (RSE)  
Queen’s University Belfast

#### Products & Providers

##### Products

Flight for Bare-metal HPC

Flight for Managed Environments

Alces Flight Center

##### Technology Providers

Dell EMC

Hewlett Packard Enterprise (HPE)

##### Systems Aggregators (SA)

Roc Technologies (Esteem Systems)