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# Data Centre Design and High Performance Computing

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High Performance Computing (HPC) requires next generation cooling deployment and increased power per rack. Yet, many traditional data centres cannot provide this service, even at a medium density, without supplementary cooling and support infrastructure or a compromise to the original data centre design.

Darren Watkins, Managing Director, VIRTUS Data Centres

**T**echnology advances like Internet of Things (IoT) and Big Data have brought about a revolution within the IT world and beyond. From smart devices and connected communities, to digital businesses managing connections, devices and workflows, the applications are diverse and ground-breaking. All things digital generate massive amounts of data, and its impact is being felt all the way along the technology supply chain, causing many data centre managers to turn towards High Performance Computing (HPC) to help cope with this influx of data.

### The benefits and challenges of HPC

HPC aggregates computing power to deliver a much higher performance than standalone systems can provide. Once seen as the reserve of the mega corporation, the benefits are now acknowledged as wide-ranging - helping to maximize productivity and efficiency, increase available power density and the physical footprint computing power of the data centre. HPC requires data centres to adopt High Density and

Ultra High Density innovation strategies. However, not all facilities have the capability. Even data centres that were built as recently as a few years ago were only designed to have a uniform energy distribution of around two to four kilowatts (kW) per IT rack – far below the 15kW per rack which Gartner recently defined as “High Density capability”. This 15KW figure is being revised upwards all the time with some HPC platforms now requiring performance way in excess of this – often referred to as Ultra High Density.

Providers that are working to upgrade legacy data centres for Ultra High Density are facing a tricky task – although the concept is straightforward, it involves a lot more than simply main-lining more electricity into the building. It is essential that before a data centre can support this requirement it needs to have a robust and fit-for-purpose infrastructure in place. High Performance Compute not only requires increased quantities of power per cabinet, but also next generation cooling capabilities, which are extremely difficult to retrofit.





### Choosing the right partner

Only data centres that have been built from the ground up with HPC in mind will be able to do so cost-effectively. If HPC has been designed “in” from the beginning, it provides the ability to support the next generation of businesses IT infrastructure – optimizing the data centre footprint required and the overall associated costs.

On-ramping to the cloud is another key consideration when picking the right provider – the most effective data centre providers make it easy to connect public and private clouds to deliver HPC.

For example, at VIRTUS Data Centres, we provide on-ramp to cloud services, so customers have direct

access to multiple clouds that can provide complementary compute and storage solutions necessary to maximize the HPC solution. We have also made the investment of fully diverse multi sub-duct networks providing near-infinite bandwidth for the huge volumes of data that are absorbed and generated by these HPC solutions.

But the technology alone is not enough. To manage HPC environments, you need a High Performance team; people who have been there, seen it and done it. At VIRTUS we are proud to support the Joint Information Systems Committee (JISC) Framework, which comprises 22 of the UK’s largest universities and research institutions. JISC entrusts us with a range of HPC solutions from different manufacturers and some



of the most powerful high performance super compute solutions in the UK.

Low latency is often another major factor so data centre location becomes increasingly important. Being near the main fibre routes that support the UK and Global telecoms carriers that transit from US to Europe via the M4 corridor is essential and gives easy access to cross connect to a multitude of public clouds. Other important considerations are reliability, scalability and uninterrupted service.

### What does success look like?

Having looked at the benefits of HPC and how to choose the right provider, the University of Bristol provides a good example of how it can make a real difference to operations.

For over a decade the University of Bristol has been contributing to world-leading and life changing scientific research using HPC, having invested over £16 million research data storage. Working with OCF, Lenovo, DDN and IBM, VIRTUS helped supply a new supercomputer named BlueCrystal 4 (BC4).

The Blue Crystal supercomputer facility played a pivotal part in a €1.8 million study into Ebola, looking at the speed of virus evolution, and the corresponding effect on vaccines, diagnostics and treatment. BlueCrystal4 allowed the team to examine how the virus evolved over the previous year, informing public health policy in key areas such as diagnostic testing, vaccine deployment and experimental treatment options – vital in helping the EU's fight against the disease.

But, of course, none of this success would have been possible without the underlying infrastructure – the

data centre which processes, stores and analyses the vast amounts of data required to make it run.

### In conclusion

Large scale IT infrastructure investments made by colocation and cloud providers, has made HPC more accessible than ever. At VIRTUS, all our solutions are tailored to our customers and no two deployments are the same. In the case of our multiple HPC customers, we work with them to create the perfect environment for their solution, whilst our highly advanced cooling already provides the foundation, meaning our facilities are ready for supercompute and HPC needs.

Organizations looking for HPC must choose their provider wisely, and look for a partner who has the setup in place to truly help deliver on their HPC vision now and in the future.



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*Darren began his career as a graduate Military Officer in the RAF before moving into the commercial sector. He brings over 20 years experience in telecommunications and managed services gained at BT, MFS Worldcom, Level3 Communications, Attenda and COLT.*

*He joined the VIRTUS (<https://virtusdatacentres.com>) team from euNetworks where he was Head of Sales for the UK, leading market changing deals with a number of large financial institutions and media agencies, and growing the company's expertise in low latency trading.*

*Additionally, he sits on the board of one of the industry's most innovative Mobile Media Advertising companies, Odyssey Mobile Interaction, and is interested in all new developments in this sector. Darren has an honours degree in Electronic*