

Expected DiRAC Services 2019/2020

The DiRAC resources available for the 11th RAC period 2019/2020 can at present only be estimated as we are currently in the process of upgrading each of the 3 DiRAC services. The final specifications of the new systems will be fixed once the procurements have completed and this document will be updated as soon as they are available. We hope to be in a position to confirm the final specifications in early September 2018

Data Intensive Service

The Data Intensive Service is jointly hosted by the Universities of Cambridge and Leicester. The current services are

Data [Intensive@Cambridge](#) 2018

DiRAC has a 13% share in CPU time of the CSD3 petascale HPC platform (Peta4 & Wilkes2), hosted at Cambridge University.

Peta4

The Peta4 system provides 1.5 petaflops of compute capability:

- 342 C6320p node Intel KNL Cluster (Intel Xeon Phi CPU 7210 @1.30Ghz) with 96GB of RAM per node – offering a total of 768 Skylake nodes each with 2 x Intel Xeon Skylake 6142 processors, 2.6GHz 16-core (32 cores per node, with:-
 - 384 nodes with 192 GB memory
 - 384 nodes with 384 GB memory
- The HPC interconnect is Intel OmniPath in 2:1 blocking
- The storage consists of 750 TB of disk offering a Lustre parallel filesystem and 750 GB of Tape.

The Wilkes2 system provides 1.19 petaflops of compute capability:

- 360 NVIDIA GPU cluster with four NVIDIA Tesla P100 GPUs, in 90 Dell EMC server nodes, each with 96GB memory connected by Mellanox EDR Infiniband, providing 1.19 petaflops of computational performance.

The DiRAC-2.5y upgrade to be completed by the end of 2018 is expected to provide an additional compute capacity of approximately 12,500 x86_64 cpu cores, each with 6 Gbyte of RAM.

For RAC 2019 – 2020 the Cambridge Data Intensive system is offering

- **a total of approximately 15,700 x86_64 cores most with 6 Gbyte of RAM/core offering a peak of 138M physical core hours per year.**

- **KNL nodes:** 13% of 342 nodes, offering 13% of a peak of 2,995,920 physical KNL nodes hours per year.
- **GPU hours:** 13% of 1440 GPU processors, offering 13% of a peak of 12.614 M physical GPU hours per year.

For more information email [Cambridge Support](#)

Data [Intensive@Leicester](#) July 2018

Data Intensive 2.5x

The DI system has two login nodes, Mellanox EDR interconnect in a 2:1 blocking setup and 3PB Lustre storage.

Main Cluster

- 136 dual-socket nodes with Intel Xeon Skylake 6140, two FMA AVX512, 2.3GHz; 36 cores, 192 GB RAM. 4896 cores in total.

Large-Memory

- 1 x 6TB server with 144 cores X6154@ 3.0GHz base
- 3 x 1.5TB server with 36 cores X6140@ 2.3GHz base

The DI System at Leicester is designed to offer fast, responsive I/O.

The total storage available to both systems is in excess of 1PB.

The **DiRAC-2.5y** upgrade is expected to be complete by the end of 2018 will provide an additional compute capacity of approximately 12,500 x86_64 cpu cores, each with 5.3 Gbyte of RAM.

For RAC 2019 – 2020 the Leicester Data Intensive system is offering

- **A total of approximately 11,700 x86_64 cores each with 5.3 GB of RAM offering a peak of 102M physical core hours per year.**
- **A minimum of 144 cores on 6 TB memory system, offering 1.26M physical core hours per year.**
- **A minimum of 3 systems each with 1.5 Tbyte of RAM offering 946,080 physical core hours per year.**

Further information is available on the [web page](#) or by emailing [Leicester support](#).

Extreme Scaling Service July 2018

The Extreme Scaling Service is hosted by the University of Edinburgh. DiRAC Extreme Scaling (also known as Tesseract) is available to industry, commerce and academic researchers. General information on Tesseract, as well as the User Guide, is available [here](#).

- 4116 Intel Xeon Skylake processors, 844 nodes, 12 cores per socket, two sockets per node, FMA AVX512, 2.2GHz base, 3.0Ghz turbo, 96GB RAM.
- 2.4PB lustre storage and Hypercube OPA interconnect.
- This system is configured for good to excellent strong scaling and vectorised codes and has High Performance I/O and Interconnect.

It is expected that the DiRAC-2.5y procurement, which will be completed by the end of 2018, will double the performance of the system.

For RAC 2019-2020, it is expected that there would be approximately 40,000 x86_64 cores, offering in excess of 355M physical core hours per year.

Further information on the Extreme Scaling Service is available by emailing [DiRAC Support](#).

Memory Intensive Service

The Memory Intensive Service is hosted by the University of Durham at the [Institute for Computational Cosmology](#) (ICC).

Memory Intensive 2.5x

- 2 x 1.5TB login nodes with 5120 Intel Xeon Skylake processors, 1FMA AVX512, 2.2GHz, 28 cores.
- 147 compute nodes, each with 768 GB of RAM and 2 x X5120 2.2Ghz per node, offering a total of 4116 cores.
- The system is connected via Mellanox EDR in a 2:1 blocking configuration, offers 333TB of fast I/O scratch space (185 GB/sec peak read/write) and 1PB of Data space on Lustre.

Memory Intensive 2 (Formerly “Data Centric”)

- 8192 cores over the two clusters COSMA5 and COSMA6. The nodes offer 128GB of memory per node and are connected via a Mellanox FDR 10 2:1 Blocking Infiniband fabric.
- The IB fabric to a Lustre filesystem, with the I/O performance for both being 10-11GB/s write and 5-6GB/s read

It is expected that the DiRAC-2.5y procurement, which will be completed by the end of 2018, will add at least another 4200 cores each with 27 Gbyte of RAM.

For RAC 2019-2020, it is expected that there would be approximately

- **8,400 x86_64 cores, offering a total of 220 Tbyte of RAM in excess of 73M physical core hours per year.**
- **8,192 SandyBridge cores, offering a total of 65 Tbyte of RAM and in excess of 71M physical core hours per year.**

For further information on the Memory Intensive Service, please see the [DiRAC@Durham](https://www.cosma.dur.ac.uk/home) webpages <https://www.cosma.dur.ac.uk/home>