DiRAC Resource Allocation Committee Facility Time Opportunity (RAC16)

Guidance notes for Applicants

Closing date: Thursday 14th September 2023 16:00 UK time

These guidance notes are supplementary to the information provided on the [UKRI Funding Finder](#). Applicants are strongly encouraged to fully read these guidance notes and the information on the [UKRI Funding Finder](#) as there is a new submission process.

Contents

1. Introduction

1.1. The DiRAC (Distributed Research utilizing Advanced Computing) facility is the STFC national HPC resource for the UK theory and modelling communities in astronomy and cosmology, astrophysics, solar system physics, particle astrophysics, particle physics and nuclear physics. This document explains the process for the allocation of computing resources on the DiRAC HPC services for the facility time opportunity (RAC16).

1.2. A table to show the availability of resources for RAC16 is provided at Annex 1.
A summary of the DiRAC-3 hardware is available at Annex 2.
Information on the HPC services that DiRAC offers can be found on the DiRAC website.

1.3. The DiRAC Resource Allocation Committee (RAC) was established to oversee the allocation of computing resources for DiRAC project proposals. The RAC issues one facility time opportunity (call) per year. The membership of the RAC is available at https://dirac.ac.uk/resource-allocation-committee/. To maximise the quality of the scientific output of DiRAC, the allocation of time will be determined via robust, transparent peer review. The RAC has two sub-panels, one for Particle Physics and Nuclear Theory and one for Astronomy and Cosmology, which will consider the proposals within their respective remits. A meeting of the RAC attended by representatives from both Sub-Panels will determine the overall allocation of DiRAC time across the whole portfolio of proposals.

2. Important information: Changes to submission process, closing date, and how to apply

2.1. The closing date is **Thursday 14th September 2023 16:00 UK time**.

2.2. Successful awards will be scheduled to begin on 1st April 2024. Later start dates can be requested.

2.3. This year, there is a new submission process as follows:

1. **Scientific proposals for Short and Thematic projects** must be submitted using The new UKRI Funding Service (TFS) – the replacement for JeS. This will cover the information which in previous facility time opportunities (calls) would have been provided as part of the scientific application form, scientific case for support, and the project management and data management plans which were submitted as separate attachments via email to STFC. Applicants are no longer required to submit documents via email to STFC; any documents sent to STFC via email will not be accepted. Proposals must be submitted by the closing date of Thursday 14th September 2023 16:00 UK time. The system will close at this time and it will not be possible to submit after this deadline. Please see the UKRI Funding Finder for full details including the link to begin your application.

2. A **technical proposal form for Short and Thematic projects** must be completed and sent directly to DiRAC via email: dirac-support@epcc.ed.ac.uk by the closing

date of Thursday 14th September 2023 16:00 UK time. The technical form can be found on the UKRI Funding Finder. Please submit the form as a Word document. Applicants may discuss their request with the DiRAC RSE Team in advance of submitting a technical case by emailing DiRAC support (dirac-support@epcc.ed.ac.uk) and adding the heading 'RAC 16 technical enquiry' into the subject of the email.

Proposals will not be accepted unless both a scientific application has been submitted via the UKRI Funding Service and a technical application has been submitted to DiRAC.

3. Applicants requesting **Research Software Engineer (RSE) support** must complete the RSE application form and send it directly to DiRAC via email: dirac-support@epcc.ed.ac.uk by the closing date of Thursday 14th September 2023 16:00 UK. Time. The RSE application form and guidance can be found on the UKRI Funding Finder. Please submit the form as a Word document. Applicants are strongly encouraged to discuss RSE requests with the RSE team in advance of the closing date.

2.4. Please refer to the UKRI Funding Finder for full instructions on how to submit proposals.

2.5. Applicants are encouraged to visit the UKRI website to see full information regarding The new Funding Service including videos to show how to use the system.

2.6. Applicants should ensure they are aware of and follow any internal institutional deadlines that may be in place for the submission of their proposal. These deadlines may be similar to those for standard JeS grant applications and it is the applicant's responsibility to confirm this, as they may be significantly earlier than the STFC submission deadline of Thursday 14th September 2023 16:00 UK time**.**

2.7. **Discretionary and Seedcorn** proposals can be submitted (directly to DiRAC) at any time and these allocations can start at any time.

3. Enquiries

3.1. All of the information related to this facility time opportunity can be found on the UKRI Funding Finder.   Enquiries should be directed as follows:
- RAC process and remit: STFC Swindon Office DiRACRAC@stfc.ac.uk
- Technical questions: dirac-support@epcc.ed.ac.uk
- Direct allocations or discretionary requests: DiRAC Director, Prof Mark Wilkinson (miw6@leicester.ac.uk)
- UKRI Funding Service: Email: support@funding-service.ukri.org
  (The team aims to respond to emails within 2 working days).
  Phone: 01793 547490
  Phone lines are open:
  Monday to Thursday 8:30am to 5:00pm
  Friday 8:30am to 4:30pm

4. Equality, Diversity and Inclusion

4.1. In line with the UK Research and Innovation Diversity Principles, STFC expects that equality and diversity is embedded at all levels and in all aspects of research practice. We are committed to supporting the research community in the diverse ways a research career can be built with our investments. This includes career breaks, support for people with caring responsibilities, flexible working and alternative working patterns. With this in mind, we welcome applications from academics who job share, have a part-time contract, need flexible working arrangements or those currently committed to other longer, large existing grants. Please see our [Equality and Diversity webpages](#).

4.2. As part of our commitment to Equality, Diversity and Inclusion (EDI), applicants are asked to address some specific questions related to EDI. Please see the questions within the [UKRI Funding Finder](#) for full details. The Panel will not be able to assess or score proposals based on the information provided and the content of answers, but by addressing these questions this should encourage applicants to think more carefully about these issues if they are not already. STFC and the RAC will not be able to take any action or investigate any individuals if there are any unsatisfactory answers, but STFC could go back to the applicant and request further clarification or a strengthened commitment, but proposals will not be penalised as this is not part of the formal assessment criteria.

5. Impact of Covid-19 Pandemic

5.1. UKRI recognises that the COVID-19 pandemic has caused major interruptions and disruptions across our communities and are committed to ensuring that individual applicants and their wider team, including partners and networks, are not penalised for any disruption to their career(s) such as breaks and delays, disruptive working patterns and conditions, the loss of on-going work, and role changes that may have been caused by the pandemic.

5.2. Reviewers and Panel Members will be advised to consider the unequal impacts of the impact that COVID-19 related disruption might have had on the track record and career development of those individuals included in the proposal and will be asked to consider the capability of the applicant and their wider team to deliver the research they are proposing. Where disruptions have occurred applicants can highlight this within their application, if they wish, but there is no requirement to detail the specific circumstances that caused the disruption.

5.3. UKRI acknowledges that it is a challenge for applicants to determine the future impacts of COVID-19 while the pandemic continues to evolve. Applications should be based on the information available at the point of submission and, if applicable, the known application specific impacts of COVID-19 should be accounted for. Where known impacts have occurred, these should be highlighted in the application, including the assumptions/information at the point of submission. There is no need to include contingency plans for the potential impacts of COVID-19.

5.4. Reviewers will receive instructions to assume that changes that arise from the COVID-19 pandemic, post-submission, will be resolved and complications related to COVID-19 should not affect their scores.

5.5. Where an application is successful, any changes in circumstances that affect the proposal will be managed as a post-award issue.

6. Eligibility

6.1. Each proposal must identify a Project Lead (formerly known as Principal Investigator, please note there has been a change in terminology – please see UKRI website for full details) who has overall responsibility for the delivery of the proposed research and will act as the point of contact for all STFC, DiRAC and RAC communications.

6.2. In line with STFC's research grant conditions the Project Lead must be either
a) resident in the UK, or
b) be employed by an overseas Research Organisation approved by STFC as eligible to apply for research grant funding.

6.3. The STFC eligibility criteria can be found on the STFC website. STFC welcomes applications from Early Careers Researchers, including Postdocs and PhD students, who are eligible to be Project Lead on a DiRAC RAC award as long as they satisfy the eligibility criteria except for the requirement to be an academic member of staff (lecturer or equivalent), or hold a fellowship.

6.4. It is acceptable to be a Project Lead or Project co-Lead (formerly Co-Investigator) on a RAC proposal and be a Project Lead or Project co-Lead on a different RAC proposal at the same or another RAC facility time opportunity (call). Applicants must specify the amount of time they spend on each proposal/allocation and demonstrate how they will manage conflicting responsibilities.

6.5. STFC welcomes proposals that represent the UK's contribution to an International Research Programme. However, it is expected the proposed research programme will enhance the UK's research outputs. If any projects are heavily led by international collaborators full reasons for this must be provided. If applicants are aware of any restrictions on their ability to acknowledge the use of DiRAC resources in their publications, for example because of rules within an international collaboration, they should indicate these in their proposal. (Note that this will not affect the assessment of the proposal but will ensure that appropriate reporting mechanisms can be agreed with the PI if the proposal is successful).

6.6. Please note that if applicants hold an existing STFC Consolidated Grant this does not automatically guarantee that they will be allocated computing time on DiRAC facilities.

7. Proposal Types

7.1. The categories of proposals considered in this facility time opportunity are:

- Short Projects

- Thematic Projects
- Research Software Engineer Support (for requests of 3 months or more)
- Discretionary and Seedcorn proposals may be submitted at any time.

7.2. **Short Projects**
A Short Project is a self-contained research problem typically lasting 3-6 months, up to a maximum of 12 months. This includes proposals intended to develop exploratory study by users new to HPC or to DiRAC. No single application may request more than 80% of the RAC available time on any individual machine within a given year (please see Annex 1). Requests above this will not be considered by the RAC.

7.3. **Thematic Projects**
A Thematic Project is a clearly defined research programme of outstanding scientific merit which requires significant HPC resources over a period longer than 12 months and up to 36 months duration. The proposed research should be world-leading, with the expectation of making step changes in knowledge through the use of DiRAC resources. Applicants must demonstrate a track record of the productive use of HPC. Thematic projects must be centred on a singular scientific theme but can contain a small number of sub-projects and activities as long as they are clearly linked and must be within the same scientific theme, rather than a collection of different projects across multiple scientific themes.

7.4. Thematic projects with significantly disparate scientific themes are advised to submit separate proposals. Applicants should consider the range of material contained within submissions as very large proposals can have a detrimental effect on the peer review system due to lack of detail and insufficient justification of resources, and the need for Reviewer diversity. No single application may request more than 80% of the RAC available time on any individual machine within a given year (please see Annex 1). Requests above this will not be considered by the RAC.

7.5. Thematic proposals can span multiple Research Organisations/Institutes and can consist of a number of Institutions or groups working on a large project /activity.

7.6. **Discretionary / Seedcorn proposals**
These are very small allocations of DiRAC resource (up to 100,000 x86 core hours or 1,000 GPU hours or 1,000 KNL node hours) for projects that fall into the following categories:

- Scientifically outstanding projects where DiRAC resources could enable a breakthrough to be made but where the impact of the research would be lost if the project were submitted according to the scheduled facility time opportunities.
- Very small projects where the researcher is not already a member of an existing Short Project or Thematic Project.

Discretionary / Seedcorn applications cannot be used to uplift existing project activities. Proposals may be submitted at any time and should be sent directly to DiRAC: dirac-support@epcc.ed.ac.uk
Information on how to submit a Seedcorn proposal can be found on the DiRAC

website.

7.7. Research Software Engineering (RSE) Support

Applications can be made for support from the DiRAC Research Software Engineering (RSE) team to help improve and develop software for the DiRAC community. Applicants must complete the RSE request form and should refer to the specific RSE guidance notes, available on the UKRI Funding Finder. Applications for RSE support must be sent via email directly to DiRAC dirac-support@epcc.ed.ac.uk by **Thursday 14th September 2023, 16:00 UK time**. Your application will be forwarded to a member of the DiRAC RSE team for technical evaluation. This will then be forwarded to the RAC for their consideration and applicants will be notified of the outcome following the RAC Main Panel meeting in March 2024.

A RAC award of RSE effort to a DiRAC project will enable the employment of a Research Software Engineer (RSE) to work specifically on the relevant software to enable new features or improve the performance of the code. Examples of this could be:

- Implementation of algorithmic improvements within an existing code in a portable manner
- Improving the scalability of software on higher core counts in a portable manner
- Improving a code to enhance sustainability and maintainability
- Improvements to code that allow new science to be carried out on current and future DiRAC services
- The integration of new algorithms/functionality into a code;
- Porting and optimising a code to run efficiently on current and future DiRAC services
- Code development to take a code from a Tier-2 (Regional) or local university cluster to DiRAC level bringing new communities onto DiRAC

Applicants should note that RSE support is technical in nature and is not research support. In particular, RSE effort is not meant to be a replacement for PDRA/Post-grad student activity. The construction of a piece of scientifically valid code is the project's responsibility and is not the role of RSE support. If the initial review process identifies activities which are deemed to be out of scope, the Project Lead will be contacted to discuss the appropriateness of DiRAC RSE effort for the required work prior to the proposal being considered by the RAC.

We expect applications to be for 3 to 12 months of effort in most cases. If you require shorter amounts of RSE time (for example to help profile or port an application), these are available to all funded DiRAC projects; please contact the DiRAC helpdesk: dirac-support@epcc.ed.ac.uk with your request. (Note that RSE time is finite and we cannot guarantee to support every such request).

8. Assessment criteria

8.1. Proposals will be assessed according to the following criteria below. Please see the UKRI Funding Finder for full details of the questions applicants will be asked to address and what the assessors are looking for in the answers.

a) Vision and Approach (total weighting 40%)
b) Applicant and team capability to deliver (total weighting 10%)

c) Resources and justification (total weighting 5%)

d) Project Management Plan (total weighting 10%)

e) Data Management Plan, with reference to the [STFC Data Management policy](#) (total weighting 10%)

f) Technical assessment by the DiRAC RSE Team of the technical application (total weighting 20%):

- Appropriateness of the proposed architecture/machine selection
- Efficiency of resource usage and how well code(s) vectorise

g) RAC Additional Scoring considerations (Panel assessment only – total weighting 5%):

1. Alignment of the proposal with the facility time opportunity guidelines
2. Full and effective usage of previous DiRAC allocations (not applicable to applicants who have not had a previous DiRAC allocation). Reasons for any under usage of previous DiRAC allocations will be taken into consideration.
3. Timely submission of interim and final reports of any previous DiRAC allocation (not applicable to applicants who have not had a previous DiRAC allocation).

Please note that applicants will not be penalised if they cannot meet the criteria in bullet points 2 (full and effective use of previous allocations) and 3 (timely submission of reports) due to technical problems, Covid-19 related reasons, or other personal circumstances such as caring responsibilities, illness, bereavement, or periods of special leave for example.

9. Assessment process

9.1. Discretionary / Seedcorn Proposals

Discretionary and Seedcorn proposals can be submitted direct to DiRAC dirac-support@epcc.ed.ac.uk at any time. They will be reviewed by the Chairs of the Sub-Panels and will not be sent out to external Reviewers. Applicants will be notified of the outcome as soon as possible, usually within one week.

9.2. Research Software Engineer (RSE) Proposals

The DiRAC RSE Team will carry out a technical assessment of the RSE proposals which will be shared with the applicants for information. RSE proposals will not be sent to external Reviewers. The RSE proposals will be discussed at the appropriate Sub-Panel meeting and at the RAC Main Panel meeting where the final outcome of the proposals will be agreed. If the Panel has any questions regarding the RSE proposal, these will be sent to the applicants so the applicants may respond.

9.3. Short Proposals and Thematic Proposals

Short and Thematic proposals will be assessed by the relevant Sub-Panel.
We will invite external experts (Reviewers) to review proposals independently, against the specified criteria. External Reviewers will be selected by the Panel. The number of Reviewers will depend on the amount of resource being requested, as shown in the table below. If applicants are requesting both CPU and GPU resources, the number of Reviewers will be set based on the highest level of resource they are applying for; for example, an applicant wishing to apply for 51M CPUh and 20k GPUh will have their proposal sent to 5 Reviewers. For Thematic Proposals, at least one of the external Reviewers should be a non-UK based Reviewer. Applicants are not invited to select their own Reviewers, nor are applicants permitted to specify names of Reviewers they do not want their proposal to be reviewed by.

Number of External Reviewers		
Level of resource requested		**Number of External Reviewers**
CPUh	**GPUh**	
<=5M CPUh	<=50k GPUh	2
>5M CPUh but <=15M CPUh	>50k GPUh but <=150k GPUh	3
>15M CPUh but <=50M CPUh	>150k GPUh but <=500k GPUh	4
>50M CPUh	>500k GPUh but <=1.5M GPUh	5
>150M CPUh	>1.5M GPUh	5

9.4. Applicants will be given an opportunity to respond in writing to Reviewers' comments. It is strongly recommended that applicants make use of this opportunity. This process will happen via The UKRI Funding Service (TFS).

9.5. If the Panel has any questions regarding the written proposal, these will also be sent to the applicants at the same time as the Reviewer's comments are shared with applicants so the applicants may respond. The questions from Panel exercise will be coordinated via secure email.

9.6. For both Short and Thematic Proposals a member of the DiRAC RSE Team will be asked to provide a technical assessment of the proposal and provide a score on the technical case. The Technical case is solely completed by the DiRAC RSE Team and will not be shared with the external Reviewers. External Reviewers will only see the information entered into the application on TFS.

9.7. Each proposal will be considered at a meeting of the relevant Sub-Panel. At the meeting, the Sub-Panel will provide an assessment of the proposal, taking into consideration the Reviewers reports and the applicant's response to the Reviewers reports. At this meeting an overall ranked list of the proposals will be produced.

9.8. Following the Sub-Panel meetings, a further meeting of the RAC (the Main Panel Meeting) will be convened which will include selected members from each Sub-Panel. At this meeting the resources to be assigned to each proposal will be agreed. Applicants will be notified of the outcome for their proposal and provided with feedback as soon as possible after the RAC meeting.

The Panels will meet on the following dates:

The Astronomy and Cosmology Sub-Panel and the Particle Physics and Nuclear Theory Sub-Panel will meet in January/February 2024 to review proposals.
The RAC Preliminary Meeting will be held in February 2024.

The Main RAC Panel meeting will be held in February / March 2024 where the final allocations will be decided.

STFC will make the final funding decision.

Find out more about [STFC's assessment process](#).

10.   General guidance and important points to note:

10.1. No single application may request more than 80% of the available time on any individual machine within a given year (please see Annex 1).

10.2. Existing Thematic Projects wishing to apply for more computing time due to additional resources becoming available at DiRAC can submit using the following methods:

- Applications with scientific themes distinct from the existing award can be submitted as a separate proposal.
- Applications building on the same scientific theme as an existing award should apply as a new project, and this new award would then replace any existing compute award. **PIs requesting for a revised or updated thematic project must justify this request fully; the RAC will take into account all currently active projects which are based on a comparable science case.**

10.3. Proposals should be focused on scientifically coherent themes and should contain sufficient technical and scientific detail. It should be noted that proposals with greater numbers of themes will generally result in poor coverage and potentially weaker reviews. In these cases it is advised that applicants submit multiple proposals.

10.4. Proposals should include adequate detail to justify the requested allocation and should be written in a way that is accessible to the RAC Panel, who may not be an expert in the given field (this especially applies to Thematic proposals).

10.5. Please note that the resources requested in the scientific case should match those requested in the technical case.

10.6. DiRAC resources are divided into four allocation periods per year, starting 1st April, 1st July, 1st October and 1st January. Successful applicants will be advised of the total amount of resources they have been allocated and the periods within which the allocations must be used. Resources must be used in the allocation period to which they were assigned; they cannot be carried over to the next allocation period. For Thematic awards the first year allocation will be fixed and subsequent years are subject to change. The allocations for each period will be shown in the DiRAC SAFE system. Applicants are required to specify the resource usage profile within the technical application form. Significant deviations from uniform profiles may be requested with adequate justification, but it is not guaranteed that they can be accommodated.

10.7. It is possible to request a delay to the start date of a project. This should be specified in the application (start dates must be on the first day of a month).

11.   Code Efficiency

11.1. The aim of the RAC process is to maximise the output of high quality research by the DiRAC facility. Scientific excellence will be the primary driver for allocation decisions and the RAC will balance 'time to science' against reasonable requirements on the operational efficiency of approved projects and simulation codes. It is recognised that the cutting-edge and novel nature of research across the DiRAC community means that many DiRAC codes are under active development and may not be as efficient or scalable as more mature codes. Further, results obtained in a timely manner with a sub-optimal code will often have greater impact than results delayed by extended periods of code optimisation work. However, while it is recognised that new HPC users, or users of new codes, may not have sufficient resources or experience to provide full details of code efficiency, applicants will be required to demonstrate that their operational plan is as efficient as possible and that the architecture requested is the most appropriate for the work.

11.2. In cases of similarly ranked proposals, applicants who demonstrate more efficient use of DiRAC resources either in terms of actual code efficiency or more efficient operational strategies will be given preference.

12.   Requesting exclusive use of a DiRAC system

12.1. Some projects may include (or may consist entirely of) sub-projects which require usage of an entire DiRAC machine, or significant fraction of a machine, for a period of longer than two days. This mode of use must be explicitly justified in the proposal, and a detailed timeline for the sub-project must be included. The technical assessment of such sub-projects will include an assessment of the efficiency of machine use.

12.2. If the request is approved, a fixed start date for the sub-project exclusive usage will be agreed to enable re-scheduling of other users to other machines during the period of unavailability. Time lost due to failure to meet the approved start deadline will not be compensated.

12.3. No more than two DiRAC machines will be operating in this mode at any one time. Where this mode of operation directly impacts on another project (for example due to technical requirements which mean it cannot be moved to another machine) it may be necessary to sub-divide periods of exclusive use or reserve a fraction of the cores for other projects. In cases where multiple project proposals with overlapping scientific goals are received, if appropriate the RAC may invite the applicants to consider merging their proposals.

13.   Project Reporting

13.1. **Please note:** the project reporting exercise is currently being reviewed therefore the information in sections 13.2, 13.3 and 13.4 may be subject to change. Further information will be available in due course.

13.2. All projects (Thematic, Short and Seedcorn) will be required to submit reports at the end of the project describing the use of the computing allocation, use of the storage allocation, progress against objectives, achievements and publications. In addition

Thematic Projects will be required to complete annual progress reports. Report templates will be provided and you will be notified when the reports are due.

13.3. The annual progress report for Thematic Projects will be assessed by the appropriate RAC sub-panel against the original peer-reviewed milestones. Confirmation of resource allocations to a Thematic Project in subsequent allocation periods will be conditional on the approval of their progress report. The report should include explicit justification for any significant deviations from the science proposed in the original work plan, and any delays should be accounted for. Thematic Projects which are deemed not to be progressing satisfactorily may have their allocations in subsequent allocation periods reduced and/or may be required to submit interim reports at six month intervals. The RAC may solicit expert Reviewers' reports in cases where scientifically significant changes to the original milestones for a Thematic Project are proposed in the annual report.

13.4. Failure to submit a satisfactory project annual report or project final report will result in subsequent proposals from the group being marked down (see paragraph 10.1, section d).

14.   Storage Policy

14.1. Please note the following information regarding the DiRAC Storage Policy:

Quota - an amount of disk that you cannot exceed.

Allocation - an amount of disk that you are guaranteed to have access to.

/home - this will be small and have quotas applied of, say, 10GB. This is for storing code, key input files, etc. but is not a working space.

/scratch, /work or /data (depending on the system) - this is the main working area and is not usually backed up. It is left to the users to manage their data within the limits of any set quotas.

Archive: This is tape storage. Applicants must specify what data products they wish to have backed up to tape. Note that DiRAC is not currently able to provide long-term data storage/curation.

Note that not all DiRAC sites have all categories of storage types described above available and the naming may vary. DiRAC will endeavour to assign storage aligned to the categories requested but this may not be technically possible.

Annex 1: Availability of DiRAC systems for RAC 16

DiRAC Service	DiRAC system	CPU/GPU type	Resources Available			UNITS
			Year 1 (Q2 2024-Q1 2025)	Year 2 (Q2 2025-Q1 2026)	Year 3 (Q2 2026-Q1 2027)	
Data Intensive Service - Cambridge	CSD3_CPU	Intel cascade lake / Intel icelake	77.17*	98.68*	189.33*	Mcore-h
	CSD3_GPU	Nvidia A100	0.018	0.11	0.19	MGPU-h
Data Intensive Service - Leicester	DIaL	Intel skylake	81.56	58.89	100.92	Mcore-h
	DIaL-3	AMD Rome	132.02	158.82	179.40	Mcore-h
	SuperDome (6 TB RAM)	Intel skylake	1.26	1.01	1.01	Mcore-h
	3 Fat nodes (1.5TB RAM)	Intel skylake	0.95	0.76	0.76	Mcore-h
Extreme Scaling Service - Edinburgh	Tursa_GPU	Nvidia A100	3.20	4.53	4.93	MGPU-h
	Tursa_CPU	AMD Rome	5.73	5.38	5.38	Mcore-h
Memory Intensive Service - Durham	Cosma7 (16 GB/core)	Intel skylake	28.10	73.30	74.72	Mcore-h
	Cosma8 (7.8 GB/core)	AMD Rome	232.23	384.83	402.58	Mcore-h
	2 Fat nodes (4 TB RAM)	AMD Rome	1.91	1.52	1.52	Mcore-h

* figures across all CSD3_CPU systems listed

Year 1 = 1st April 2024 (Q2) – 31st March 2025 (Q1)
Year 2 = 1st April 2025 (Q2) – 31st March 2026 (Q1)
Year 3 = 1st April 2026 (Q2) – 31st March 2027 (Q1)

Annex 2: Summary of DiRAC-3 hardware

Service	CPU nodes	GPU nodes	Fat nodes	Network	Storage
Data Intensive – Cambridge	268 nodes each with: ○ 2x 38-core Intel Icelake CPUs ○ 512 or 256 GB RAM **Total: 20,368 cores**	27 nodes each with: ○ 4x A100-80GB Nvidia GPUs ○ 1TB RAM ○ 2x 64-core AMD Milan CPUs **Total: 108 GPUs**	N/A	3:1-blocking, 200Gb/s	3.5 PB disk
Data Intensive – Leicester	200 nodes each with: ○ 2x 64-core AMD Rome CPUs ○ 512 TB RAM **Total: 25,600 cores**	N/A	N/A	3:1-blocking, 200Gb/s	4 PB disk
Extreme Scaling – Edinburgh	6 nodes, each with: ○ 2x AMD Rome CPUs ○ 256 GB RAM **Total: 768 cores**	176 nodes, each with: ○ 4x A100-40GB Nvidia GPUs ○ 2x AMD Rome CPUs ○ 1 TB RAM **Total: 704 GPUs**	N/A	Non-blocking, 200Gb/s	6 PB disk
Memory Intensive – Durham	528 nodes each with: ○ 2x 64-core AMD Rome CPUs ○ 1 TB RAM **Total: 67,584 cores**	N/A	2x 4TB with AMD CPUs	Non-blocking, 200Gb/s	10 PB disk; 20 PB tape; 1.1 PB SSD (checkpointing)