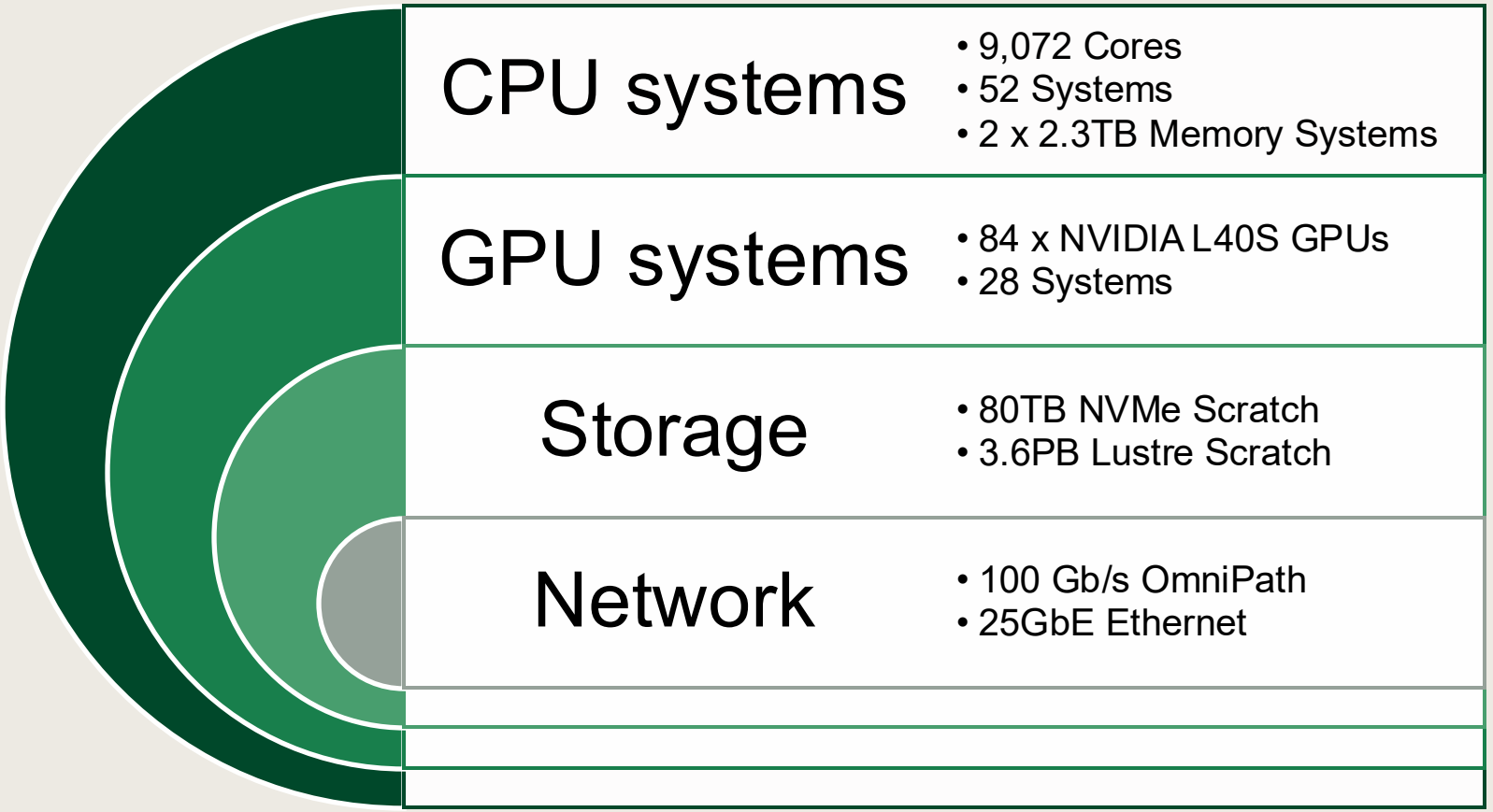

UNIVERSITY OF LEEDS
AIRE
HPC Cluster

Overview of Aire



ARC3 -> AIRE	
CPU Cores	1.5x
Memory Bandwidth	6x
Max High Memory	3x
GPU Flops	28x
Scratch Storage	4.5x
NVMe Scratch	New 80TB
Low Latency Network	1.8x

Technical Details – Aire

CPU nodes (52)
- Dell R6625 servers
- AMD Dual 84 core 2.2GHz (9634 Genoa-X)
  - **9,072 cores** total
- 768GB DDR5-4800 Memory
- Dual 480GB M2 drives

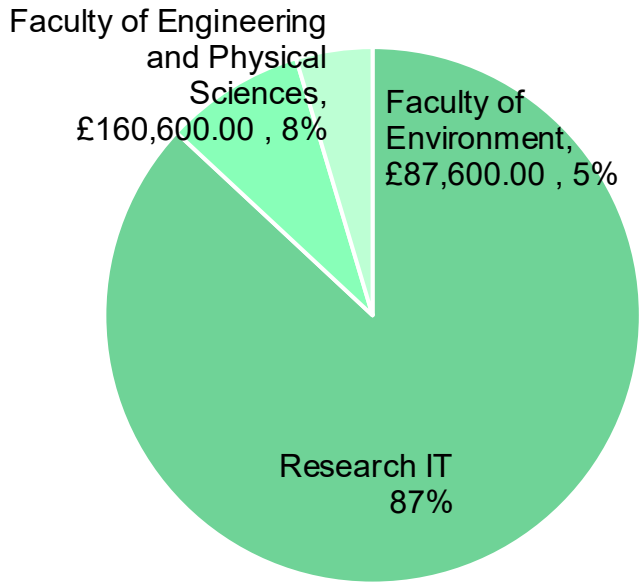
High memory nodes (2)
- 2.3TB DDR5-4800 Memory

GPU nodes (28)
- Dell R7615 servers
- 3 x NVIDIA L40S 48GB GPUs (PCIe)
  - **84 GPU cards** total
- AMD 24 core 2.9GHz (9254 Genoa-X)
- 256GB DDR5-4800 Memory
- Dual 480GB M2 drives

Storage
- NEW - 80TB NVMe Lustre Scratch System
- 3.6PB Lustre Scratch

Other nodes
- Login Nodes (4)
- Management Nodes (2)

Funding
- £1.9m hardware spend
- Faculty of Engineering and Physical Sciences
  - 11 GPU nodes
- Faculty of Environment
  - 6 GPU Nodes



Aire – Timeline & Plan

9th September 2024

- ARC3 capacity reduced by 50%
- Installation of 50% AIRE systems and infrastructure
- Users continue to work on ARC3 (50%) and ARC4

October to November 2024

- Migration of all users on to AIRE (50%) & SLURM scheduler
- ARC3 shutdown; remaining AIRE systems installed

End of December 2024

- ARC4 systems integrated into Aire SLURM environment
- ARC3 & ARC4 data deleted unless it has been transferred to AIRE

Help to migrate to Aire and SLURM will be available from the RSE team throughout the migration

Contact us at: rcteam@leeds.ac.uk, https://arc.leeds.ac.uk/ & https://it.leeds.ac.uk/it

Welcome to Aire

AUTHOR
Research Computing @ Leeds

Thank you for volunteering your time and expertise to test out the new Aire HPC system. This document lays out some basic guidance for using the system, in addition to setting expectations: both in terms of what to expect from the system, and what would be useful for us for you to test.

1 What to expect from the system

When you will access Aire, you will note that the system is very vanilla for the moment: we are still configuring storage, modules, and other system details, in response to feedback from our different iterations of testers. This is why your feedback is so important!

1.1 Learning from the past

We are using the setup of the new system as a fresh start, where we can avoid reproducing inefficient/sub-optimal issues that were present on ARC, such as:

- Inefficient storage usage (misuse of home directories and lustre filesystem)
- Misuse of login nodes and other unfair usage
- Poor optimisation for reserved periods (for teaching, workshops etc.)

> **Important:** Solutions from ARC3/ARC4 may not be replicated, and previous agreements are not guaranteed. Many custom configurations/set-ups were allowed on ARC due to the limitations of the system: we want to be able to support your research without non-reproducible workflows.

1.2 Temporary test accounts

While our main goal during this test period is to configure the system for wider use across the University, we also hope that you have the opportunity to use this new system for research, and that your testing is useful for you and produces robust research results.

With that in mind, please remember that while we encourage you to use the system for research at this time, the system is **in a testing phase and should be considered at risk**.

We may have to:

- reconfigure storage locations, access routes, log-in processes;
- reformat storage (including your home directory and lustre);
- reset your account once the system goes live to all University users.

Please ensure that any results, environment details etc. are backed up elsewhere.

1.3 Minimal software stack

As we are still configuring the module system and the software installation process, the available software stack is very limited. We have specifically chosen users who have indicated that they use one of the currently available languages/compilers/modules (for example, Python).

We are populating this software stack steadily; however, please be aware that many modules will not be available when you first begin to use the system. Please be patient and use the available software for initial testing.

Part of the testing process includes installation and configuration of software for various needs; your feedback is very valuable, especially if you run into any configuration errors.

1.4 External company collaboration

Aire is provided by an external vendor.

- We are currently testing workflows, including software installation, to ensure smooth operation as the user base grows.

2 Your role as testers

In this section, we will lay out some of our expectations from you as testers of the Aire system.

We hope that as testers, you are able to:

- Help refine the system for long term use;
- Provide feedback and insights to address challenges;
- Support new testers joining later in the process.

2.1 What can you run to test the system?

It is essential that our testing covers a wide range of job types and configurations, including:

- Single core jobs
- Multi-core jobs
    - Single node
    - Multi-node
- Batch submission scripts:
    - Single job
    - Task arrays
- Interactive sessions
- Saving output
- Transferring files on/off
- Disk/flash storage

Please let us know if there are any hurdles you encounter, if any part of the documentation is difficult to understand, or if you need further guidance. Please keep note of what type of jobs you have run, and if they ran smoothly or if you encountered any issues.

2.2 Rules and regulations

As we mentioned above, Aire provides us with a fresh start without the “bad behaviour” seen on ARC. Oftentimes, unfair usage of the system was simply down to not understanding how to use the system *fairly and responsibly*. To this end, we are trying to provide more detailed guidance on storage etc., and also to provide clear rules and regulations on usage of the system. We will discuss our documentation in more detail in the next section.

> **Ensure you read our rules and regulations**
> Read our guidelines on Aire Docs.
>
> This is a work in progress and feedback is appreciated.

3 Finding information

The main source of information for using the Aire system is the under-construction Aire Docs.

Note that this documentation website is a work in progress: * We are adding content as needed, incrementally; * We are modifying guidance as we change configurations.

Visit Aire Docs to find out more.

3.1 Teams and email

Some information (such as access/login instructions) cannot be added to the publicly facing Aire Docs website.

- This information will be shared with you via email or Teams
- Once the system is finalised and out of testing, this information will be added to the IT Website (requiring login).

4 Accessing Aire

Please read through this entire section before you attempt to log on to Aire, including the subsection on first-time login. Please note that entering either your University or Aire password incorrectly will lead to a temporary locking of your account.

Before you can access Aire, you will be sent your Aire username and a temporary password which you will need to use the first time you log on to Aire.

4.1 Access routes

Remember that as this is a testing period, the official and supported access routes may change.

4.1.1 Remote access via `rash`

Aire can be accessed via the rash system (please see the knowledge base article on remote ssh access via rash for information on using rash):

```
ssh username@login1.aire.leeds.ac.uk -J username@rash.leeds.ac.uk
```

replacing `username` with the Aire account username provided to you by the Research Computing team.

Note that in order to use the `rash` jump-host you will need to both enter your University account password, and complete a Duo security check.

4.1.2 Access via a University machine

Aire can also be access via a wired machine on campus. For example, if logged on to ARC 4, you can then use:

```
ssh username@login1.aire.leeds.ac.uk
```

If you are using the campus Eduroam network, you will need to access via rash.

4.2 First-time logon

When you first log on to Aire, you will need to use your temporary password and immediately set a new password.

1. Connect via ssh to `login1.aire.leeds.ac.uk`
2. Enter your Aire username and temporary password
3. On your first successful login, you will be asked to change your password, and will be prompted to confirm your current password. Enter your temporary password provided by Research Computing again.
4. Type in a new secure password when prompted.
5. Confirm this new password by typing it in again.

You will now be logged out of Aire. You can log in again, this time using your new private password.

Here is the full log on process:

> **First-time log-on**
> **1.** Use the following command from your terminal:
>
> ```
> ssh username@login1.aire.leeds.ac.uk -J username@rash.leeds.ac.uk
> ```
>
> **2.** The first set of authentication is for rash, so you'll need to use your **usual University username and password, and Duo** to authenticate.
>
> ```
> username@rash.leeds.ac.uk's password: |
>
> Duo two-factor login for username@leeds.ac.uk
>
> Enter a passcode or select one of the following options:
>
>  1. Duo Push to +XXX XX XXX 1234
>  2. SMS passcodes to +XXX XX XXX 1234 (next code starts with: 4)
>
> Passcode or option (1-2):
> ```
>
> **3.** The second round of authentication is for Aire: use your username and your **temporary password**.

```
Success. Logging you in...
username@login1.aire.leeds.ac.uk's password: |
```

4. On your first successful login, you will be asked to change your password, and will be prompted to confirm your current password. Enter your temporary password provided by Research Computing again.

5. Type in a new secure password when prompted. Confirm it by retyping.

5 Overview of Aire

For the most up-to-date information and guidance on the Aire system, please see the Aire documentation.

5.1 Storage systems

The directory structure and storage options on Aire are different to ARC: please take some time to read through our documentation and to explore the file system once you are logged in.

Aire Docs Storage Overview

5.2 Loading modules

Available modules on the system can be seen with the following command:

```
module avail
```

In order to load a module (such as Miniforge for Python):

```
module load miniforge
```

5.3 Writing job scripts

While the new Aire system uses Slurm in place of SGE, the queuing system is very similar at point of use.

Please see our documentation on job types in our documentation.

6 Conclusion

We are very grateful for the time you are giving to use the new HPC system, and we hope that you have a productive and enjoyable time putting this new system to the test.

Please remember:

- Current accounts are for the test phase; configurations (e.g. quotas, access routes) may change
- New accounts may be required when the system goes live for all users
- The system is being tested and should be considered “at risk”

We want you to…

- Help refine the system for long-term use
- Provide feedback and insights to address challenges

6.1 Contacting us

Please contact us via the Microsoft Teams channel set up for Aire early access; we will add you to this when we set up your user account.

Logging on to Aire

In order to log in to the Aire HPC platform, you need an Aire account. This is separate from your ARC account.

> **Note**
>
> As an early-access tester, you will need your Aire account username (`username`) and a one-time-password (OTP) to connect to AIre. These will have been sent to you by a member of the Research Computing team.
> In the future, we will be rolling out an Aire account application form for new users, and will link your University of Leeds accounts to streamline login. However, during this test period, we are providing test users with accounts manually. These accounts are separate from your University account and do not use the same password.

When you access Aire for the first time, you will have to change your OTP to a secure password of your choosing.

Routes to access Aire

Aire can be accessed remotely via the rash gateway, or can be connected to via a machine on campus (on the University network).

Remote access via rash

Aire can be accessed via the rash system (please see the knowledge base article on remote ssh access via rash for information on using rash):

```
ssh username@login1.aire.leeds.ac.uk -J username@rash.leeds.ac.uk
```

replacing `username` with the Aire account username provided to you by the Research Computing team.

Access via a University machine

Aire can also be access via a machine on campus. For example, if logged on to ARC 4, you can then use:

```
ssh username@login1.aire.leeds.ac.uk
```

First time log on password configuration

When you first log on to Aire, you will need to use your OTP and immediately set a new password.

1. Connect via ssh to `login1.aire.leeds.ac.uk`
2. Enter your Aire username and OTP
3. On your first successful login, you will be asked to change your password, and will be prompted to confirm your current password. Enter your OTP provided by Research Computing again.
4. Type in a new secure password when prompted.
5. Confirm this new password by typing it in again.

You will now be logged out of Aire. You can log in again, this time using your new provate password.

Please see the knowledge base article on remote ssh access via rash to learn more about configuring your ssh connections, such as increasing the automatic time-out time etc.