

# Getting Started with DAS-5

*A practical short introduction for new users*

## What is DAS-5 and why using it?

DAS-5 (The Distributed ASCI Supercomputer 5) is a wide-area computer system used for research in parallel, distributed, grid and cloud computing, as well as large-scale multimedia analysis.

At VU, the DAS-5 cluster consists of 68 dual 8-core nodes (2.4 GHz, 64 GB RAM). The nodes are connected with InfiniBand and Gigabit Ethernet.

It allows you to run experiments on multi-core and multi-node systems, test parallel software, and access resources at scale.

## Connecting to DAS-5

### Prerequisites

- A valid VUNetID (your university account)
- A DAS-5 Login which gives access to the filesystem and compute nodes → please contact [Chiara](#) to receive your credentials
- An SSH client

Access to DAS-5 is normally a two-step process, but this is only required when you are *outside* the VU network. Because the cluster is protected from the public internet, you must first log in to a secure **gateway server** at VU. Once connected to this gateway, you can continue to login the DAS-5 node.

#### 1. Connect to the VU gateway (only if outside the VU network):

```
ssh <VUNetID>@ssh.data.vu.nl
```

#### 2. Connect to the DAS-5 login node (we will provide the username):

```
ssh <username>@fs0.das5.cs.vu.nl
```

### SSH configuration for a one-command login

Normally, connecting to DAS-5 requires the two separate commands: first logging in to the VU gateway (if you are outside the VU network), and then connecting from there to the DAS-5 login node. This quickly becomes repetitive, especially if you log in many times a day for the experiments. To simplify this process, you can configure SSH on your *local* machine so that a single command (`ssh das5`) automatically handles the gateway step for you. This is done by editing (or creating) the file `$HOME/.ssh/config` and adding the following entries:

```
host vu-gateway
  HostName ssh.data.vu.nl
  User <VUNetID>

host das5
  HostName fs0.das5.cs.vu.nl
  User <username>
  ProxyJump vu-gateway
```

With this setup, SSH knows that whenever you connect to `das5`, it should first pass through the VU gateway using your VUNetID, and then log you in to DAS-5 with the username that we will provide to you.

From then on, you can simply type:

```
ssh das5
```

and SSH will take care of the two-step connection automatically.

## Passwordless authentication

Instead of typing your password every time you connect, you can set up an **SSH key pair**. This will let you log in securely and conveniently.

### 1. Create a key pair on your laptop

Check if you already have a key in `~/.ssh/` (usually called `id_rsa` and `id_rsa.pub`). If not, create one with:

```
ssh-keygen -t rsa
```

You can accept the default location (`~/.ssh/id_rsa`). When asked for a passphrase, just press Enter twice to leave it empty (so you won't be prompted each time).

### 2. Copy the public key to the VU gateway (if outside VU network)

```
scp ~/.ssh/id_rsa.pub <VUNetID>@ssh.data.vu.nl:
```

Then log in to the gateway and append it to the authorized keys:

```
cat id_rsa.pub >> ~/.ssh/authorized_keys
```

### 3. Copy the public key to DAS-5

```
scp ~/.ssh/id_rsa.pub das5:
```

On DAS-5, append it to your authorized keys:

```
cat id_rsa.pub >> ~/.ssh/authorized_keys
```

### 4. Test the connection

Now you can log in directly:

```
ssh das5
```

It should no longer ask for your password.

## File transfer

Often you will need to move data, code, or results between your own computer and DAS-5. This can be done using `scp` (for copying individual files) or `sftp` (for browsing directories and uploading/downloading multiple files).

```
# Copy a file to DAS-5
scp -o ProxyJump=vu-gateway local.file das5:~/

# Interactive file transfer (browse, upload, download)
sftp -o ProxyJump=vu-gateway das5
```

## Using DAS-5: The Slurm scheduler

The computations on DAS-5 are managed by **Slurm**, a workload manager and job scheduler. This means you should *not* run heavy programs directly on the login node. Instead, you describe the resources you need (such as CPUs, memory, GPUs, and maximum runtime) and let Slurm place your job on one of the available compute nodes. This ensures that the cluster is shared fairly and efficiently among all users.

### Core concepts

- **Partition:** a queue or group of nodes with similar properties (for example, a GPU partition for GPU-equipped nodes).
- **Job:** a request to Slurm that specifies which resources you need and what program you want to run.
- **Job step:** a unit of work within a job (often one program instance or one parallel execution step).

## Everyday commands

Here are the most common commands you will use with Slurm:

```
# Show available partitions/nodes and their status
sinfo

# Submit a batch job using a script
sbatch my_job.slurm

# Check the status of your jobs
squeue -u $USER

# Cancel a job
scancel <jobid>
```

## Minimal batch script

Batch jobs are submitted via small scripts that describe the job and then launch your program. Here is a simple example:

```
#!/bin/bash
#SBATCH --job-name=demo           # A name for your job
#SBATCH --output=demo_%j.out      # Output file (%j = job ID)
#SBATCH --ntasks=1               # Number of tasks (processes) to run
#SBATCH --time=00:10:00          # Maximum runtime (hh:mm:ss)
#SBATCH --partition=short        # Partition/queue to use

echo "Hello from SLURM job running on node $(hostname)"
```

When you submit this script with `sbatch`, Slurm places the job in the queue, finds a suitable node, and runs it there. The results are written to two files in the directory where you submitted the job:

- `demo_<jobid>.out` – contains anything your program prints to the terminal (standard output)
- `demo_<jobid>.err` – contains the error messages if something goes wrong (standard error)

You can check the contents of these files with `cat demo_<jobid>.out` or `cat demo_<jobid>.err`.

## Best practices

- Test your code locally before running it on DAS-5
- Never run heavy computations on the login node — always use Slurm

## Useful links

- DAS-5 home: <https://www.cs.vu.nl/das5/home.shtml>
- Slurm documentation: <https://slurm.schedmd.com>
- HPC Wiki (general tips): [https://hpc-wiki.info/hpc/HPC\\_Wiki](https://hpc-wiki.info/hpc/HPC_Wiki)