

Fair-share

SCITAS machines use the SLURM workload manager in order to schedule users' jobs. In particular, SLURM arbitrates the jobs' queue contention by using a fair-share algorithm in order to prioritize jobs and ensure that the users' usage matches their share as much as possible. In particular, SCITAS clusters use a particular flavor of the fair-share algorithm called fair-tree.

In order to check their priority, the Sshare command is available on any SCITAS cluster. A typical output will be as follow:

```
$ Sshare
Account      User Raw Shares Norm Shares   Raw Usage  Norm Usage Effectv Usage  FairShare  Level
FS
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scitas-ge          1 0.007752    1376 0.000003 0.000005          1468.763590
scitas-ge aubort 1 0.043478 0 0.000000 0.000000 0.290000 inf
scitas-ge clemenco 1 0.043478 0 0.000000 0.000000 0.290000 inf
scitas-ge cubuk 1 0.043478 0 0.000000 0.000000 0.290000 inf
scitas-ge culpo 1 0.043478 0 0.000000 0.000000 0.290000 inf
scitas-ge degiorgi 1 0.043478 0 0.000000 0.000000 0.290000 inf
scitas-ge eroche 1 0.043478 344 0.000001 0.250000 0.253333 0.173913
scitas-ge nvarini 1 0.043478 0 0.000000 0.000000 0.290000 inf
scitas-ge qubit 1 0.043478 351 0.000001 0.255072 0.250000 0.170455
scitas-ge rezzonic 1 0.043478 681 0.000001 0.494928 0.246667 0.087848
scitas-ge richart 1 0.043478 0 0.000000 0.000000 0.290000 inf
scitas-ge rmsilva 1 0.043478 0 0.000000 0.000000 0.290000 inf
scitas-ge sue 1 0.043478 0 0.000000 0.000000 0.290000 inf
scitas-ge topf 1 0.043478 0 0.000000 0.000000 0.290000 inf
```

The value used to decide the priority of a job is the "Level FS". The higher the Level FS, the higher the priority. Level FS is the ratio of "Norm Shares" and "Effectv Usage" values, therefore a Level FS of less than 1 represents an overconsumption and more than 1 represents an underconsuming.

In this formula, the "Norm Shares" is the percentage of the cluster which is allocated to the account whereas "Effectv Usage" augments the normalized usage (the users' raw usage normalized to the total number of cpu-seconds of all jobs run) to account for usage from sibling accounts for usage from sibling accounts. Within a group all users have equal weight and so 1 share each.

More informations about SLURM, fair-share and fair-tree can be found here:

<https://slurm.schedmd.com/overview.html>

https://slurm.schedmd.com/priority_multifactor.html

https://slurm.schedmd.com/fair_tree.html

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