

Computing Facilities

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Description

1. Objectives

The computing facilities of the Department are mainly made up from a cluster of computers installed in the premises of the Department. The access to the cluster is regulated by a queuing system which define the framework for aggregate use (clustering).

2. Resources

CPU - standard computing

- This part of the cluster is made up of 15 compute nodes/hosts. Each node has at least two quad-core processors. Ten nodes are responsibility of the [Department of Mathematics](#) and five at the [Department of General Psychology](#). This is the hardware list:

Node	CPU	RAM	#Cores	Connectivity	LocalStorage
hpblade01	4 x Eight-Core Intel(R) Xeon(R) CPU E5-4640 0 @ 2.40GHz	256GB	32	Infiniband/Ethernet	200GB
hpblade04	2 x Intel(R) Xeon(R) CPU E5520 @ 2.27GHz	32GB	8	Infiniband/Ethernet	50GB
hpblade05	2 x Intel(R) Xeon(R) CPU E5520 @ 2.27GHz	32GB	8	Infiniband/Ethernet	50GB
hpblade06	2 x Intel(R) Xeon(R) CPU E5520 @ 2.27GHz	32GB	8	Infiniband/Ethernet	50GB
hpblade07	2 x Intel(R) Xeon(R) CPU X5650 @ 2.67GHz	64GB	12	Infiniband/Ethernet	50GB
hpblade08	2 x Intel(R) Xeon(R) CPU X5650 @ 2.67GHz	96GB	12	Infiniband/Ethernet	50GB
hpblade11	2 x Intel(R) Quad Core Xeon(R) CPU X5460 3.16GHz	16GB	8	Infiniband/Ethernet	50GB
hpblade12	2 x Intel(R) Xeon(R) CPU E5520 @ 2.27GHz	32GB	8	Infiniband/Ethernet	50GB
hpblade13	2 x Intel(R) Xeon(R) CPU E5520 @ 2.27GHz	32GB	8	Infiniband/Ethernet	50GB
hpblade14	2 x Quad-Core AMD Opteron(tm) Processor 2378	64GB	8	Infiniband/Ethernet	20GB
hpblade15	2 x Intel(R) Xeon(R) CPU E5520 @ 2.27GHz	32GB	8	Infiniband/Ethernet	50GB
hpblade16	2 x Intel(R) Xeon(R) CPU E5-2680 0 @ 2.70GHz	256GB	16	Infiniband/Ethernet	150GB
dellsrv0	2 x Intel(R) Xeon(R) CPU E5-2650 v3 @ 2.30GHz	160GB	20	Ethernet 10GB	200GB
dellsrv1	2 x Intel(R) Xeon(R) CPU E5-2650 v3 @ 2.30GHz	160GB	20	Ethernet 10GB	200GB
dellsrv2	2 x Intel(R) Xeon(R) CPU E5-2650 v3 @ 2.30GHz	160GB	20	Ethernet 10GB	200GB

dellsrv3	2 x Intel(R) Xeon(R) CPU E5-2650 v3 @ 2.30GHz	160GB	20	Ethernet 10GB	200GB
dellsrv4	2 x Intel(R) Xeon(R) CPU E5-2650 v3 @ 2.30GHz	160GB	20	Ethernet 10GB	200GB
dellsrv5	2 x Intel(R) Xeon(R) CPU E5-2650 v3 @ 2.30GHz	160GB	20	Ethernet 10GB	200GB
dellsrv6	2 x Intel(R) Xeon(R) CPU E5-2650 v3 @ 2.30GHz	160GB	20	Ethernet 10GB	200GB

There are 276 usable cores. The field '**Storage**' of the table describes the amount of disk space available locally for every node for temporary storage of the intermediate results of the computations.

- **labsrv0**: a workstation DELL with two processors quad-core "Intel(R) Xeon(R) E5345" at 2.33GHz and 16Gbyte di RAM that is the 'access point' to the cluster. On this machine the users can edit, compile and submit programs.

GPU - CUDA computing

- This part of the cluster is made up of 4 compute nodes/hosts. The four nodes has two eight-core processors and two NVidia K20 GPU, one NVidia V100 GPU and one NVidia TITAN Xp GPU . This is the hardware list:

Node	CPU	GPU	RAM	#Cores	Connectivity	LocalStorage
gpu03	2 x Intel(R) Xeon(R) CPU E5-2670 0 @ 2.60GHz	1 x NVidia K20	128GB	16	Infiniband/Ethernet	500GB
gpu04	2 x Intel(R) Xeon(R) CPU E5-2670 0 @ 2.60GHz	1 x NVidia K20	128GB	16	Infiniband/Ethernet	500GB
dellcuda0	2 x Intel(R) Xeon(R) CPU E5-2630L v3 @ 1.80GHz	1 x Nvidia V100	192GB	16	Ethernet 10GB	200GB
dellcuda1	2 x Intel(R) Xeon(R) CPU E5-2630L v3 @ 1.80GHz	1 x Nvidia TITAN Xp	192GB	16	Ethernet 10GB	200GB

There are 32 cpu-cores and 4 gpu. As previously the field '**Storage**' of the table describes the amount of disk space available locally for every node for temporary storage of the intermediate results of the computations.

- **labsrv8**: a workstation with a "Intel(R) Xeon(R) E2620" at 2.00GHz, 16Gbyte di RAM and a GPU Nvidia Titan. This host is the second 'access point' to the cluster. On this machine the users can edit, compile and submit programs. The workstation is dedicated to the CUDA/GPU developing

Storage

How stated before every node has an average of 50Gb of local disk space, other storage can be accessed via the network.

The cluster and the workstation are equipped with '[Infiniband](#)' or '[Ethernet at 10 GB](#)' connection for every node. A standard '[Ethernet](#)' is also available. the table below describes the various storage unit with the 'mount directory' that has to be used for the access:

Generic Name	Size (TB)	Availability	Mount directory	Connection
Home	9	All users	/home	Ethernet 10GB

Storage	20	All users (on request)	/storage	Ethernet 10GB / Infiniband
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To allow maximum flexibility are not imposed disk quotas. The generic user then has the right to use all available space where it has the permissions but it is also its responsibility free it when no longer necessary. Requests for access to `storage`, must be sent to `servizio.calcolo at math.unipd.it`.

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