

Hardware Overview

The Anselm cluster consists of 209 computational nodes named cn[1-209] of which 180 are regular compute nodes, 23 GPU Kepler K20 accelerated nodes, 4 MIC Xeon Phi 5110 accelerated nodes and 2 fat nodes. Each node is a powerful x86-64 computer, equipped with 16 cores (two eight-core Intel Sandy Bridge processors), at least 64GB RAM, and local hard drive. The user access to the Anselm cluster is provided by two login nodes login[1,2]. The nodes are interlinked by high speed InfiniBand and Ethernet networks. All nodes share 320TB /home disk storage to store the user files. The 146TB shared /scratch storage is available for the scratch data.

The Fat nodes are equipped with large amount (512GB) of memory. Virtualization infrastructure provides resources to run long term servers and services in virtual mode. Fat nodes and virtual servers may access 45 TB of dedicated block storage. Accelerated nodes, fat nodes, and virtualization infrastructure are available upon request made by a PI.

Schematic representation of the Anselm cluster. Each box represents a node (computer) or storage capacity:

User-oriented infrastructure Storage Management infrastructure — login1
login2 dm1 —

Rack 01, Switch isw5

— |—|—|— ————— ————— ————— ————— cn186 cn187 cn188 cn189 cn181
cn182 cn183 cn184 cn185 ——— |—|—|— ————— ————— —————

Rack 01, Switch isw4

cn29 cn30 cn31 cn32 cn33 cn34 cn35 cn36 cn19 cn20 cn21 cn22 cn23 cn24 cn25
cn26 cn27 cn28

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Lustre FS

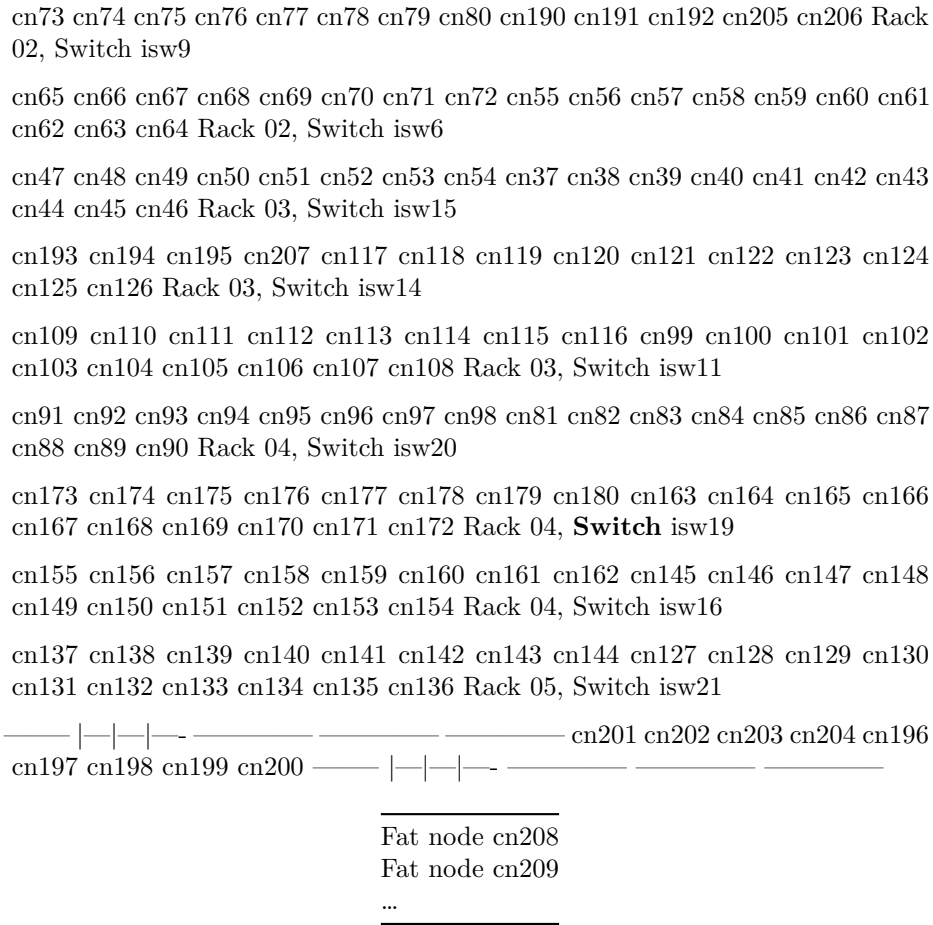
/home320TB

| |Lustre FS

/scratch146TB |

Management nodes Block storage 45 TB Virtualization infrastructure servers ...
Srv node Srv node Srv node ... Rack 01, Switch isw0

cn11 cn12 cn13 cn14 cn15 cn16 cn17 cn18 cn1 cn2 cn3 cn4 cn5 cn6 cn7 cn8 cn9
cn10 Rack 02, Switch isw10



The cluster compute nodes cn[1-207] are organized within 13 chassis.

There are four types of compute nodes:

- 180 compute nodes without the accelerator
- 23 compute nodes with GPU accelerator - equipped with NVIDIA Tesla Kepler K20
- 4 compute nodes with MIC accelerator - equipped with Intel Xeon Phi 5110P
- 2 fat nodes - equipped with 512GB RAM and two 100GB SSD drives

More about Compute nodes.

GPU and accelerated nodes are available upon request, see the Resources Allocation Policy.

All these nodes are interconnected by fast InfiniBand class="WYSIWYG_LINK">QDR network and Ethernet network. More about the Network. Every chassis

provides Infiniband switch, marked **isw**, connecting all nodes in the chassis, as well as connecting the chassis to the upper level switches.

All nodes share 360TB /home disk storage to store user files. The 146TB shared /scratch storage is available for the scratch data. These file systems are provided by Lustre parallel file system. There is also local disk storage available on all compute nodes /lscratch. [More about

Storage](storage.html).

The user access to the Anselm cluster is provided by two login nodes login1, login2, and data mover node dm1. More about accessing cluster.

The parameters are summarized in the following tables:

In general **Primary purpose High Performance Computing Architecture of compute nodes x86-64 Operating system Linux Compute nodes Totally 209 Processor cores 16 (2x8 cores) RAM min. 64 GB, min. 4 GB per core Local disk drive yes - usually 500 GB Compute network InfiniBand QDR, fully non-blocking, fat-tree w/o accelerator 180, cn[1-180] GPU accelerated 23, cn[181-203] MIC accelerated 4, cn[204-207] Fat compute nodes 2, cn[208-209]**
In total Total theoretical peak performance (Rpeak) 94 Tflop/s Total max. LINPACK performance (Rmax) 73 Tflop/s Total amount of RAM 15.136 TB

Node	Processor	Memory	Accelerator	w/o accelerator	2x
Intel Sandy Bridge E5-2665, 2.4GHz	64GB	-	GPU accelerated	2x Intel Sandy Bridge E5-2470, 2.3GHz	96GB
NVIDIA Kepler K20	MIC accelerated	2x Intel Sandy Bridge E5-2470, 2.3GHz	96GB	Intel Xeon Phi P5110	Fat compute node
2x Intel Sandy Bridge E5-2665, 2.4GHz	512GB	-			

For more details please refer to the Compute nodes, Storage, and Network.