# SuperMUC – LRZ's new 3 PetaFlop/s System

SuperMUC is the contribution of the Gauss Centre for Supercomputing (GCS) to the Partnership for Advanced Computing in Europe (PRACE). Scientists in Bavaria, Germany and Europe can have access to this Peta-Flop/s system, which will run a large set of applications and uses standard x86-ISA processors without additional accelerator cards. It consists of a two level system structure (island, system) based on Infiniband technology. Its new, revolutionary form of warm water cooling was developed by IBM. Active components like processors and memory are directly cooled with water that can have an inlet temperature of up to 40 degrees Celsius which promises to cut the energy consumption of the system.

SuperMUC with water-cooled node

System	Thin Node IBM System x iDataPlex Intel Sandy Bridge EP	Fat Node IBM System x Intel Westmere EX
Number of Islands	18	1
Nodes per Island	512	205
Processors per Node	2	4
Cores per Processor	8	10
Cores per Node	16	40
Nodes per Island	512	205
Number of cores	147,456	8200
Nominal Peak Performance [PFlop/s]	3.2	0.078
Linpack Performance (turbo/nominal) [PFlop/s]	2.9* / 2.58	0.065
Total size of memory [TByte]	288	52
Memory per Core [GByte]	2	6.4
Size of shared Memory per node [GByte]	32	256

* Turbo mode can be sustained because of liquid cooling
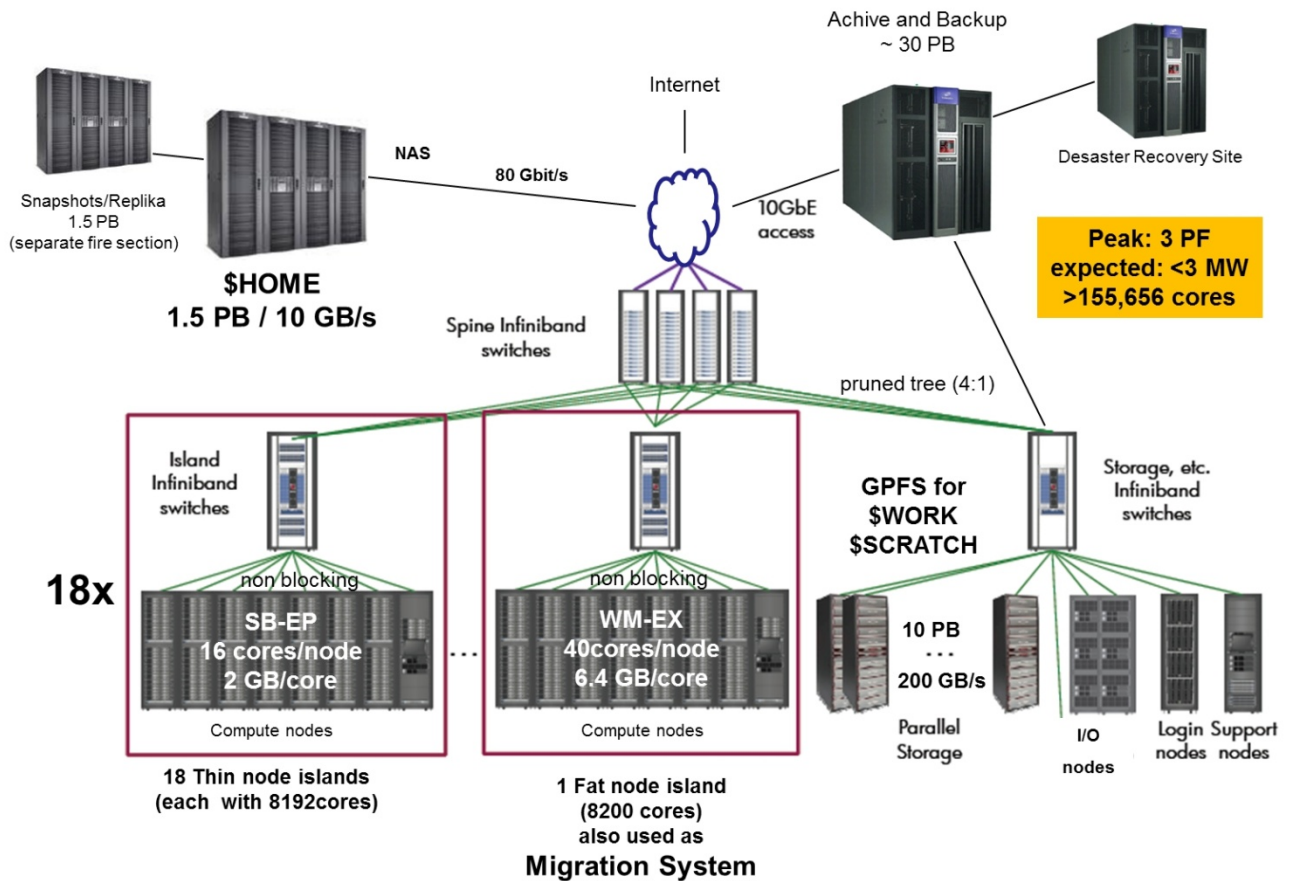
Schematic view of the components of SuperMUC

	Thin Node Islands	Fat Node Island	Migration system
Expected electrical power consumption of total system [MW]	< 3		< 0.21
Network Technology	Infiniband FDR10		Infiniband QDR
Intra-Island Topology	non-blocking Tree		non-blocking Tree
Inter-Island Tolopogy	Pruned Tree 4:1		n.a.
Bisection bandwidth of Interconnect [TByte/s]	35.6		n.a.
Filesystem for SCRATCH and WORK	IBM GPFS		NetApp NAS
File System for HOME	NetApp NAS		NetApp NAS
Size of parallel storage [Pbyte]	10		n.a.
Size of NAS user storage [PByte]	2 (+ 2 for replication)		1
Aggregated bandwidth to/from GPFS [GByte/s]	200		n.a.
Aggregated bandwidth to/from NAS storage [GByte/s]	11		n.a.
Login Servers for users	6		2
Service and management Servers	12		4
Batchsystem	IBM Loadleveler		
Archive and Backup Software	IBM TSM		
Planed Capacity of Archive and Backup Storage [PByte]	> 30		