

System attributes	ALCF Now	NERSC Now	OLCF Now	NERSC Pre-Exascale	ALCF Pre-Exascale	OLCF Exascale	ALCF Exascale
Name (Planned) Installation	Theta 2016	Cori 2016	Summit 2017-2018	Perlmutter (2021-2022)	Polaris (2021)	Frontier (2021-2022)	Aurora (2022-2023)
System peak	> 15.6 PF	> 30 PF	200 PF	> 140 PF	35 – 45PF	>1.5 EF	≥ 2 EF DP sustained
Peak Power (MW)	< 2.1	< 3.7	10	6	< 2	29	≤ 60
Total system memory	847 TB DDR4 + 70 TB HBM + 7.5 TB GPU memory	1.2 PB DDR4 + High Bandwidth Memory (HBM) + 1.5PB persistent memory	2.4 PB DDR4 + 0.4 PB HBM + 7.4 PB persistent memory	2.03 PB DDR4 + 327 TB HBM	> 250 TB	4.6 PB DDR4 +4.6 PB HBM2e + 36 PB persistent memory	> 10 PB
Node performance (TF)	2.7 TF (KNL node) and 166.4 TF (GPU node)	> 3	43	> 70 (GPU) > 4 (CPU)	> 70 TF	TBD	> 130
Node processors	Intel Xeon Phi 7320 64-core CPUs (KNL) and GPU nodes with 8 NVIDIA A100 GPUs coupled with 2 AMD EPYC 64-core CPUs	Intel Knights Landing many core CPUs; Intel Haswell CPUs	2 IBM Power9 CPUs + 6 Nvidia Volta GPUs	CPU only nodes: AMD EPYC Milan CPUs; CPU-GPU nodes: AMD EPYC Milan with NVIDIA A100 GPUs	1 CPU; 4 GPUs	1 HPC and AI optimized AMD EPYC CPU and 4 AMD Radeon Instinct GPUs	2 Intel Xeon Sapphire Rapids and 6 Xe Ponte Vecchio GPUs
System size (nodes)	4,392 KNL nodes and 24 DGX-A100 nodes	9, 688 KNL nodes; 2,388 Haswell nodes	4608 nodes	1,792 (GPU) 3,072 (CPU)	> 500	> 9,000 nodes	> 9,000 nodes
CPU-GPU Interconnect	NVLINK on GPU nodes	N/A	NVLINK Coherent memory across node	PCIe		AMD Infinity Fabric Coherent memory across the node	Unified memory architecture, RAMBO
Node-to-node interconnect	Aries (KNL nodes) and HDR200 (GPU nodes)	Aries	Dual Rail EDR-IB	HPE Slingshot	HPE Slingshot NIC	HPE Slingshot	HPE Slingshot
File System	200 PB, 1.3 TB/s Lustre 10 PB, 210 GB/s Lustre	28 PB, 744 GB/s Lustre	250 PB, 2.5 TB/s GPFS	35 PB All Flash, Lustre	N/A	695 PB + 10 PB Flash performance tier, Lustre	≥ 230 PB, ≥ 25 TB/s DAOS

ASCR Computing Upgrades At-a-Glance
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