

| 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) | Polaris (2021) | Frontier (2021-2022) | Aurora (2022-2023) |
| System peak | > 15.6 PF | > 30 PF | 200 PF | > 120PF | 35 – 45PF | >1.5 EF | ≥ 1 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 PB DDR4 + High Bandwidth Memory (HBM) + 1.5PB persistent memory | 2.4 PB DDR4 + 0.4 PB HBM + 7.4 PB persistent memory | 1.92 PB DDR4 + 240TB 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 CPU in data partition | 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 | 9,300 nodes 1,900 nodes in data partition | 4608 nodes | 1,536 (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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