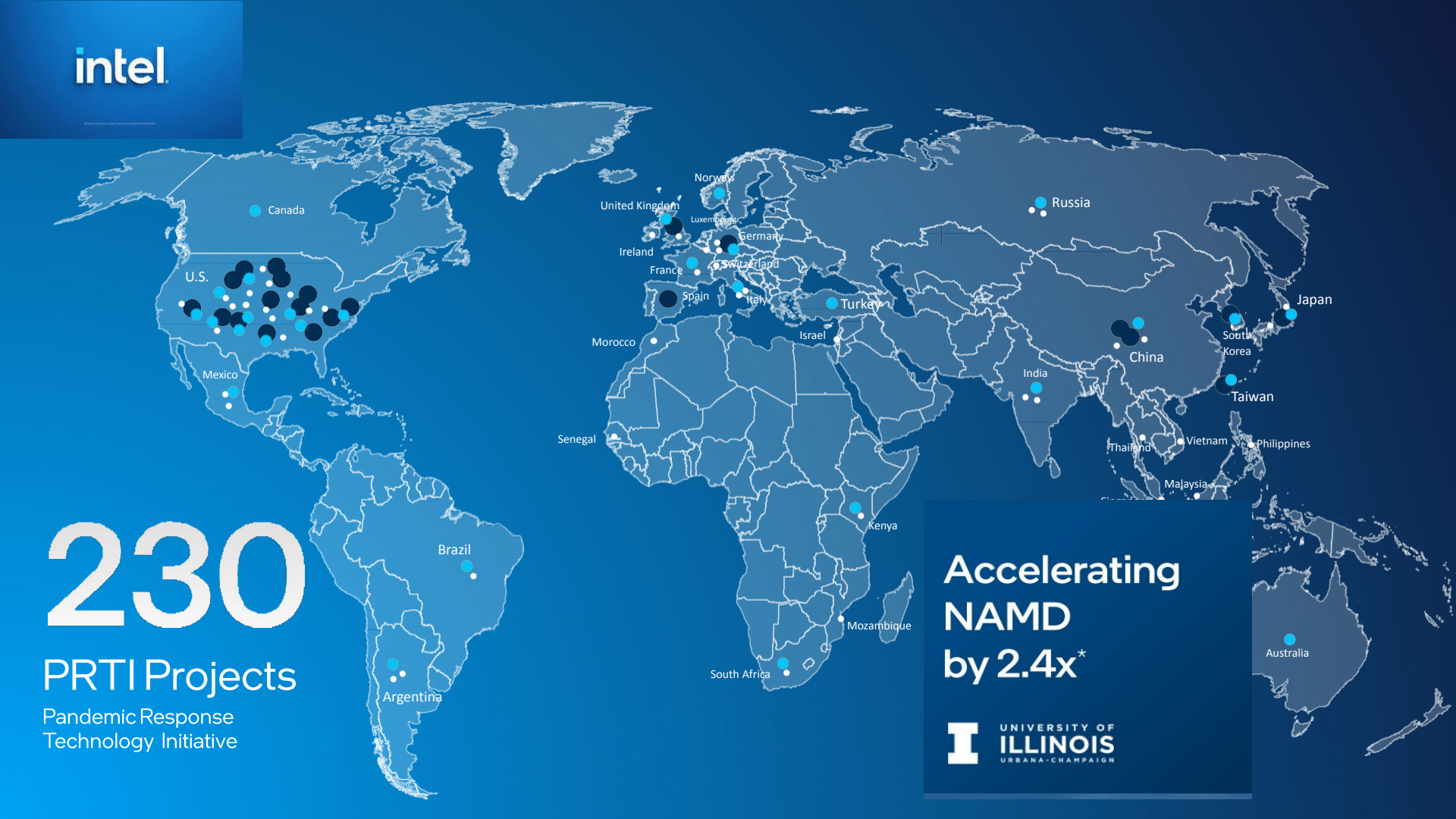
Supercomputing for All

Accelerating Indigenous Supercomputing

SEETHA – Director , APAC & JAPAN , HPC ,Intel.


intel
Canada
U.S.
Mexico
Brazil
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Italy
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Senegal
Turkey
Israel
Russia
China
India
Japan
South Korea
Taiwan
Vietnam
Thailand
Philippines
Malaysia
Kenya
Mozambique
South Africa
Australia
230
PRTI Projects
Pandemic Response Technology Initiative
Accelerating NAMD by 2.4x*
UNIVERSITY OF ILLINOIS URBANA-CHAMPAIGN

intel

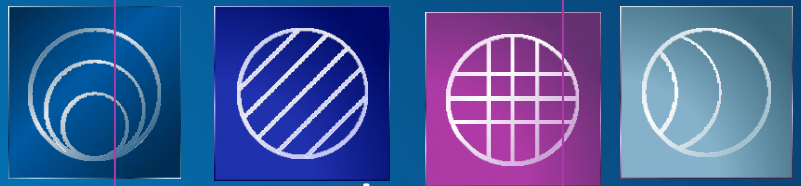
Supercomputing Foundations

Performance	To meet the most complex computing challenges
Open	Open hardware platforms and Open software standards for ease of developers and partners
Scale	Deliver leading edge process & packaging innovations to HPC with scale through Intel IDM 2.0 strategy

Solving the Entire Workload

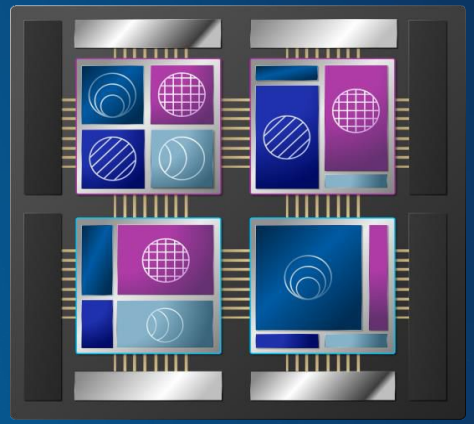
Performance

Scalar Vector Matrix Spatial



Today

Tomorrow



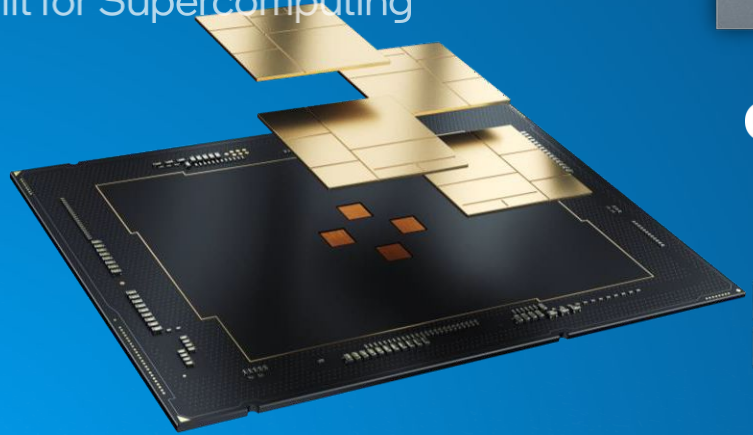
Future

intel

Next Gen Xeon®

Processors

Built for Supercomputing



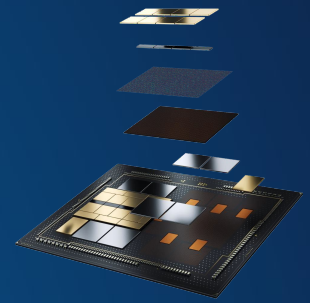
Performance Cores	Advanced Matrix Extensions	Integrated Acceleration Engines	Compute
HBM	>100MB Shared LLC	Optane™ & DDR5	Memory
CXL Compute Express Link 1.1	PCIe Gen 5	UPI 2.0 Improved Multi socket Scaling	I/O
EMIB	Multi-Tile	Logically Monolithic	Technology

intel

Ponte Vecchio

Xe HPC based GPU

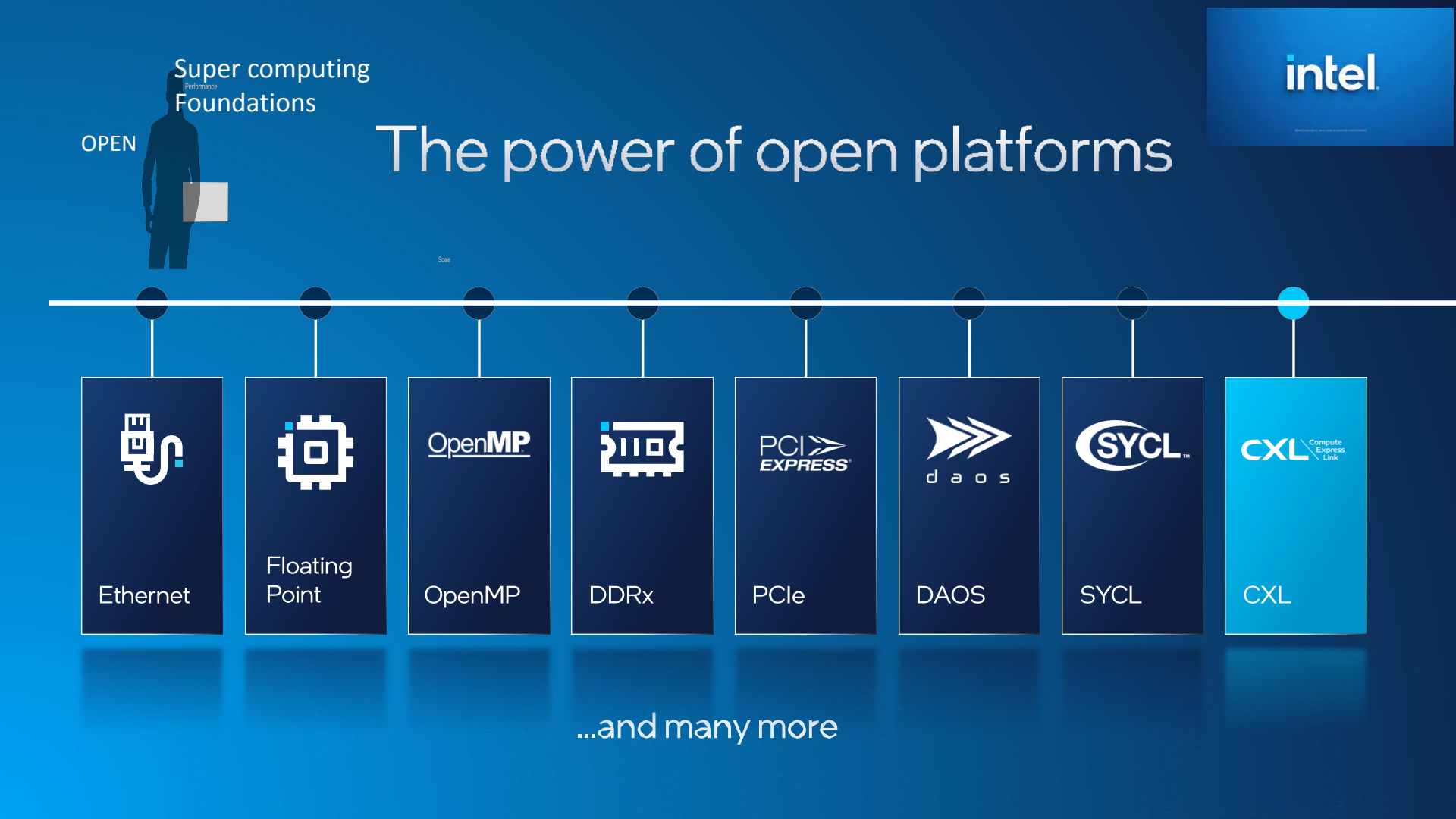
Compute	Up to 128 Ray tracing Units	Highest Compute Density socket & node	128 Xe Cores
Memory	Up to 64MB L1 in 2 Stacks	Up to 408MB L2 Cache in 2 Stacks	HBM2e
I/O	Up to 8 Fully Connected GPUs cache	PCIe Gen 5	Xe Link High Speed Coherent Unified Fabric
Technology	EMIB	Foveros	Intel 7 TSMC N5 TSMC N7



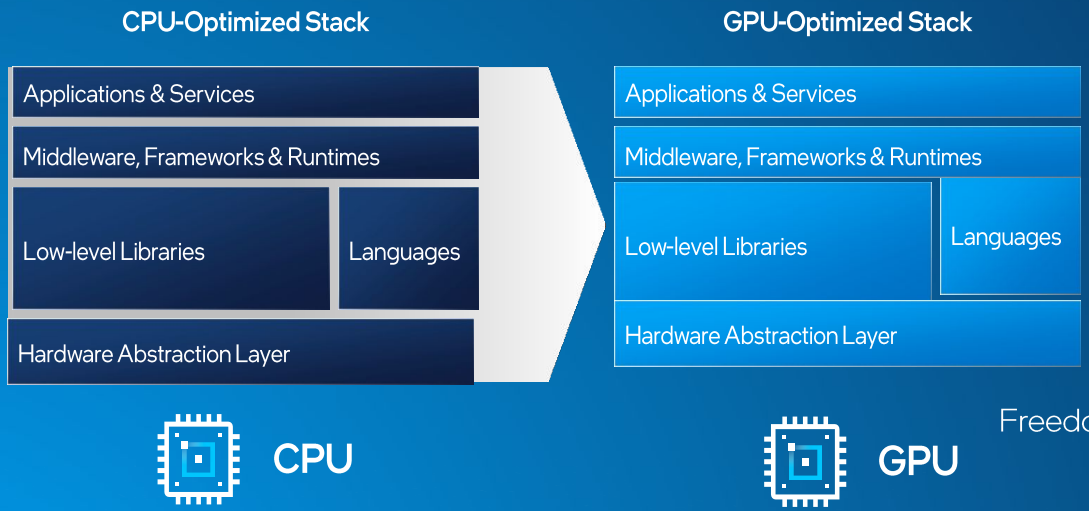
Ponte Vecchio OAM

Ponte Vecchio x4 Subsystem with Xe Links +2S Next Gen Xeon Processors

Ponte Vecchio x4 Subsystem with Xe Links


Super computing
Foundations
OPEN
Performance
Scale
intel
The power of open platforms
Ethernet
Floating Point
OpenMP
DDRx
PCIe
DAOS
SYCL
CXL
...and many more

Extending your HPC Installed base



oneAPI

Open, Standards-Based Unified Software Stack

Freedom from proprietary programming models

Full performance from the hardware

Peace of mind for developers

intel

Supercomputing for All

Accelerating Indian Supercomputing Plans

Intel India – R&D Commitment for 20 Years

Cutting edge design & innovation

Core + SOC	GPU	IP	Software	Platform	Process Technology	Artificial Intelligence	Connectivity

Addressing global Needs

Cloud	Computing	Autonomous Driving/ IOT	4G/5G	AR/ VR

Ecosystem Engagements

Academia + Research	Govt & Policy engagements	Enabling Manufacturing	Maker Lab	Skill Development

US $5 Billion investment and growing…

intel

ng India's HPC Capability & Capacity

Strategic National

- **NSM Technology partner** for building Indigenous HPC Systems.
- **1st ICTAI with NITI & TIFR** for Applied Research in AI
- **Enabled TATA-CRL**: World's 4th fastest HPC at affordable price.

Building Blocks for Indigenous

- Enabling strong **ecosystem for compute, platform, SW & design**
- **Enabling** capabilities for Server & Server Class **System Mfg.**

Build strong HPC developer

- **Application optimization and Scaling work shops**, COEs, etc >> $5M USD + Investments
- Enabling **ISVs & Startups**
- Hackathons and HPC contests

a strong partner for India's HPC SELF RELIANCE GOAL FROM the beginning ..

INDIA SUPER COMPUTING

Executing

National Supercomputing Mission

India

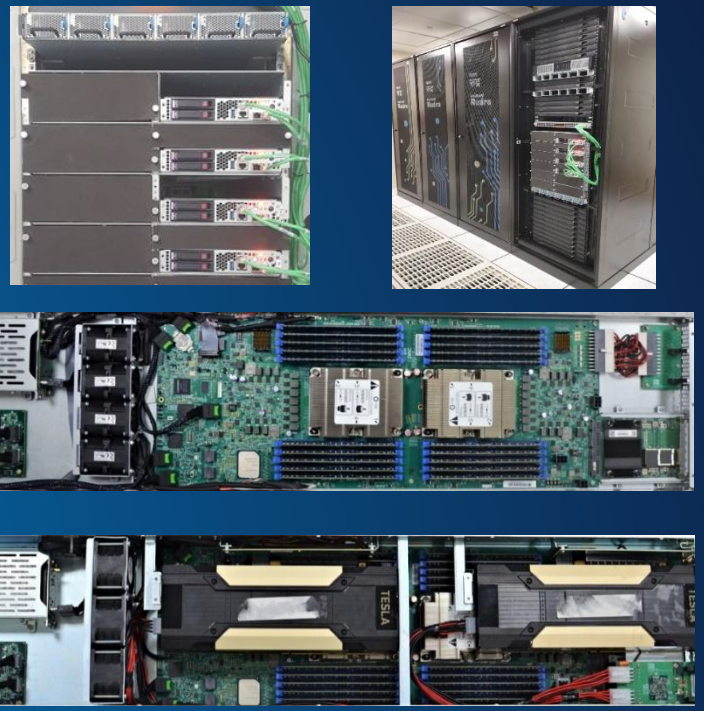
NSM
NATIONAL SUPERCOMPUTING MISSION

Saga of Intel and C-DAC Decades of collaboration

- **i960 - RAID Controller**
- **Arjuna and Krishna Chip Set for X86 Desk tops – C-DAC,TVM**
- **i860 - Vector accelerator for Transputers & SPARC**
- **i486 - 4 way SMP C-DAC and Univ. of Bremen**
- **Solaris Bewolf cluster with X86**
- **IMSL Library Porting on i860**
- **C compiler for i860**

NSM Association - Rudra Serve - HPC STACK

- C-DAC's indigenous Server Platform design – a step towards ATMANIRBHAR BHARAT
- Complete control over Firmware and hardware design – Secure server
- Very dense, space saving, ½ width 1U/2U design
- Application porting and optimization

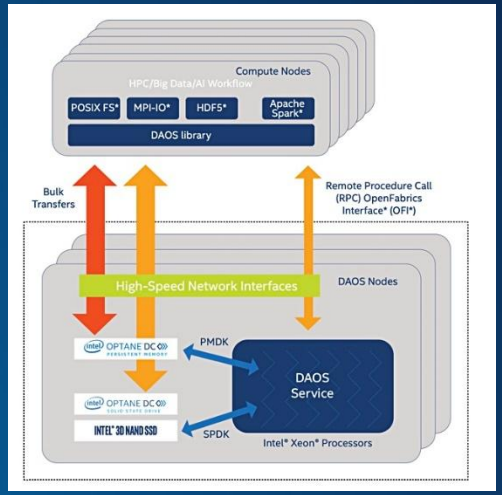


Rudra Server Images

C-DAC & Intel Accelerating Indigenous SC Continued - Plans

SPR & SPR-HBM

DAOS



oneAPI

Open, Standards-Based
Unified Software Stack

Freedom from proprietary programming models

Supercomputing Foundations

Performance

Open

Scale

IDM 2.0

Flexibility to deliver to the needs of Supercomputing

Internal Factory Network

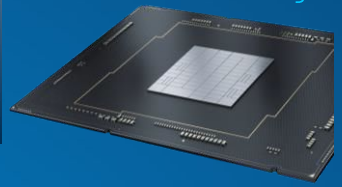
External Foundry

intel foundry services

Intel Foundry

Performance

3rd Gen
Intel Xeon Scalable
Real world WL Advantage



Next Gen Xeon
Multi Tile, HBM 2e & next Gen Scalability

Open

oneAPI

New Centers of Excellence

Exascale For Europe

SIPEARL
The Silicon Pearl

intel

Scale

Supercomputing for All

IDM 2.0
Internal Fab, External Foundry & IFS

Thank You

Executing Exascale in Europe

SIPEARL
The Silicon Pearl

SIPEARL
The Silicon Pearl
+
intel

Executing Exascale JAPAN

FUGAKU SUPER COMPUTER

oneAPI

Open, Standards-Based Unified Software Stack

Freedom from proprietary programming models

Full performance from the hardware

Peace of mind for developers

Executing Exascale

OVER 2 Exaflops

America

>54,000

Ponte Vecchio

>18,000

Next Gen Xeon Processors

Notices and Disclaimers

Performance varies by use, configuration and other factors. Learn more at www.Intel.com/PerformanceIndex.

Performance results are based on testing as of dates shown in configurations and may not reflect all publicly available updates. See backup for configuration details. No product or component can be absolutely secure.

Your costs and results may vary.

Intel does not control or audit third-party data. You should consult other sources to evaluate accuracy.

Intel technologies may require enabled hardware, software or service activation.

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Configuration Details: Generational Performance, page 16 (1 of 2)

For the following applications (8280 vs 8380): NAMD, LAMMPS, RELION, GROMACS, Monte Carlo, Black-Scholes, Binomial, LS- Dyna, Fluent, OpenFOAM, RADIOSS, Converge, Numeca, WRF: See [108] at www.intel.com/3gen-xeon-config. Results may vary.

Ansys Mechanical: Intel 8280; Config Date: 1/21/2021; Platform: Wolf Pass; CPU Details: 2 CPUs per node; Stepping: 6; 28c @ 2.7Ghz; # CPU Sockets: 2; # CPU Cores: 28; CPU Base Frequency: 2.7 GHz; CPU Max Frequency: 4.0 GHz; CPU Base TDP: 205 W; RAM: 192GB, 12x16GB 2933MHz DDR4, Micron 18ASF2G72PDZ-2G9E1; Hard Drive: 480GB Model: ATA INTEL SSDSC2KG48 (scsi); Cluster File System: OPA based Lustre; BIOS: SE5C620.86B.02.01.0012.070720200218; BIOS Settings: HT=on TURBO=ON; Microcode: 0x4002f01; Intel Management: 04.01.04.381; BMC: 2.48. Operating System: CentOS Linux 8.3.2011; Kernel: 4.18.0-240.1.1.el8_3.crt1.x86_64; OFED stack: OPA 10.10.3.1.1, Lustre 2.10.8-default.App Version: 2021 R1; Data collected: 2/2/2021; Build notes: Hyper-Threading Enabled, Turbo Enabled, Intel FORTRAN Compiler 19.0.0; Intel C/C++ Compiler 19.0.0; Intel Math Kernel Library 2020.0.0; Intel MPI Library 2018 Update 3; One thread per core, 52ppn. Intel 8380; Config Date: 1/21/2021; Platform: Coyote Pass; CPU Details: 2 CPUs per node; Stepping: 6; 40c @ 2.3Ghz; # CPU Sockets: 2; # CPU Cores: 40; CPU Base Frequency: 2.3 GHz; CPU Max Frequency: 2.3 GHz; CPU Base TDP: 250 W; RAM: 256GB 16*16GB 3200MT/s DDR4, Hynix HMA82GR7CJR8N-XN; Hard Drive: SSDSC2KG96 960GB; Cluster File System: HDR based Lustre; BIOS: SE5C6200.86B.2021.D40.2103100308; BIOS Settings: HT=on TURBO=ON; Microcode: 0x8d055260; Intel Management: 04.04.03.249; BMC: 2.66; Operating System: CentOS Linux release 8.3.2011; Kernel: 4.18.0-240.1.1.el8_3.crt1.x86_64; OFED stack: Mellanox mlnx-5.1-2.5.8.0-default. App Version: 2021 R1; Data collected: 4/8/2021; Build notes: Intel(R) FORTRAN Compiler 19.0.0; Intel(R) C/C++ Compiler 19.0.0; Intel(R) Math Kernel Library 2020.0.0; Intel(R) MPI Library 2018 Update; cores: 80ppn. Tested by Intel as of October 2021.

Simulia Abaqus/Explicit: Intel Xeon Platinum 8380/2/6 (40c) ; 2.3/2.1/1.8 . RAM 256GB 16*16GB 3200MT/s DDR4, Hynix HMA82GR7CJR8N-XN; SSDSC2KG96 960GB; HDR based Lustre; BIOS SE5C6200.86B.0020.P23.2103261309; HT=ON; TURBO=ON; Microcode 0xd000270; Intel Management Engine: 04.04.04.053; BMC 2.78; OFED stack Mellanox mlnx-5.1-2.5.8.0-default. Intel Xeon Platinum 8280L 2/6 (2.7GHz) 2.7/2.2/1.8. RAM 192GB, 12x16GB 2933MHz DDR4, Hynix HMA82GR7CJR8N-WM; hard drive 480GB Model: ATA INTEL SSDSC2KG48 (scsi); OPA based Lustre; BIOS SE5C620.86B.02.01.0012.070720200218; HT=ON; TURBO=ON; Microcode 0x4002f01. Abaqus2021HF4. MKL 2020 Update 2. Tested by Intel as of October 2021.

Simulia Abaqus/Standard: Intel Xeon Platinum 8380/2/6 (40c) ; 2.3/2.1/1.8 . RAM 256GB 16*16GB 3200MT/s DDR4, Hynix HMA82GR7CJR8N-XN; SSDSC2KG96 960GB; HDR based Lustre; BIOS SE5C6200.86B.0020.P23.2103261309; HT=ON; TURBO=ON; Microcode 0xd000270; Intel Management Engine: 04.04.04.053; BMC 2.78; OFED stack Mellanox mlnx-5.1-2.5.8.0-default. Intel Xeon Platinum 8280L 2/6 (2.7GHz) 2.7/2.2/1.8. RAM 192GB, 12x16GB 2933MHz DDR4, Hynix HMA82GR7CJR8N-WM; hard drive 480GB Model: ATA INTEL SSDSC2KG48 (scsi); OPA based Lustre; BIOS SE5C620.86B.02.01.0012.070720200218; HT=ON; TURBO=ON; Microcode 0x4002f01. Abaqus2021HF4. MKL 2020 Update 2. Tested by Intel as of October 2021.

Brightskies Reverse Time Migration: Intel Xeon Platinum 8280L CPU @ 2.70GHz: Platform/Motherboard: S2600WFD (Wolf Pass) J46732-801; BIOS: SE5C620.86B.0X.02.0001.051420190324; RAM: 12x16GB (192GB) DDR4 2666; OS: Ubuntu 20.04.3 LTS; Kernel: 5.4.0-89-generic; Microcode: 0x5003102. Intel Xeon Platinum 8380 CPU @ 2.30GHz: Platform/Motherboard: M50CYP2SB2U (Coyote Pass) K88091-301; BIOS: SE5C6200.86B.0022.D64.2105220049; RAM: 16x32GB (512GB) DDR4 3200; OS: Ubuntu 20.04.3 LTS; Kernel: 5.4.0-89-generic; Microcode: 0xd0002b1. Application version 4.0.0. Build: Intel® oneAPI 2021.4. CBS = x (best score). Tested by Intel as of October 2021.

Configuration Details: Generational Performance, page 16 (2 of 2)

GATK whole genome sequencing:

- Config 1: Test by Intel as of 11/14/2019. 1 application node and 4 compute nodes. Application node configuration: 2x Intel Xeon Gold 6252 processor (24 cores, 2.10 GHz); 1x Intel® Server Board S2600WFT; 192 GB (12x 16 GB DDR4 2666 MHz, 1DC); 1x 960 GB Intel® SSD D3-S4510 Series (2.5 in SATA 6 Gb/s, 3D2,TLC); 1x 1.6 TB Intel® SSD DC P4610 Series (2.5 in PCIe 3.1 x4, 3D2, TLC); Microcode: 0x500002c, BIOS: SE5C620.86B.02.01.0009.092820190230; CentOS Linux Installation ISO (minimal or full) 7.7 build 1910; Intel® Cluster Runtimes 2019.4;Intel® Cluster Checker 2019.3.5; Intel® Select HPC Solution for RPM packages for EL7 2018.0;OpenHPC 1.3.8. 4x compute nodes configuration: 2x Intel Xeon Gold 6252 processor (24 cores, 2.10 GHz); 1x Intel Server Board S2600WFT; 384 GB (12x 32 GB DDR4 2933MHz); 1x 960 GB Intel SSD D3-S4510 Series (2.5 in SATA 6 Gb/s, 3D2, TLC); 1x 1.6 TB Intel SSD DC P4610 Series (2.5 in PCIe 3.1 x4, 3D2, TLC); Network devices: 1x Intel® C620 Series Chipset Ethernet Connection; Intel® Ethernet Adapter X722 onboard 10 GbE; Microcode: 0x500002c, BIOS: SE5C620.86B.02.01.0009.092820190230; 1x distributed 10 GB Lustre 2.10 ZFS system, 6 OST, 3 OSS, Lnet Router with single 10 GB link for all I/O traffic clients to Lustre servers plus 1X 1.6 TB Intel SSD DC P4610 Series (2.5 in PCIe 3.1 x4, 3D2,TLC).

- Config 2: Test by Intel as of 8/8/2021. 1 front-end node and 4 compute nodes, all using Intel® Server Board M50CYP2SB-003; Front-end node configuration: 2x Intel® Xeon® Gold 6348 processor (28 cores) 2.90 GHz, Intel® Hyper-Threading Technology = ON, Intel® Turbo Boost Technology = ON, total memory 256 GB (16 slots/16 GB/3200 MHz); BIOS version: 22D08; BMC 2.66, SDR 0.31, CPLD 3p0; uCode: 0x0b000280; CentOS Linux installation ISO (minimal or full) 8 build 2011; storage – boot drive 1x Intel® SSD P4610 1.6 TB (3D NAND PCIe 3.1 x4, 3D1, TLC); high-performance network: 1x Intel® Ethernet Converged Network Adapter X550-T2, model X550T2. Compute node configuration: 2x Intel Xeon Gold 6348 processor (28 cores @2.60 GHz,) Intel Hyper-Threading Technology = ON, Intel Turbo Boost Technology = ON, total memory 512 GB (16 slots/32 GB/3200 MHz); BIOS version: 22D08; BMC 2.66, SDR 0.31, CPLD 3p0; uCode: 0x0b000280; storage – Scratch drive: 1x Intel SSD P4610 1.6 TB (3D NAND PCIe 3.1 x4, 3D1, TLC); high-performance network: 1x Intel Ethernet Converged Network Adapter X550-T2 (10 GbE), model X550T2.

EDA front end and back end (7 workloads): Xeon 6248R (24 cores): 3.0GHz/4.0GHz/3.6GHz; HDD 2x 1.2TB SAS; BIOS 3.3-IN001, 02/12/2020; OS SLES12 SP5; kernel 4.12.14-122.7-default. Turbo enabled, Hyperthreading disabled. Xeon 6342 (24 cores): 2.8GHz/3.5GHz/3.3GHz; HDD 2x 2.4TB SAS; BIOS 1.0-IN001, 03/12/2021; OS SLES12 SP5; kernel 4.12.14-122.60-default. Turbo enabled, Hyperthreading disabled. Tested by Intel as of April 2021.

Footnotes for page 16

1. Xeon 8380 vs Xeon 8280
2. Xeon 6348 vs Xeon 6252
3. Xeon 6342 vs 6248R

Configuration Details: Competitive Performance, slide 17 (1 of 2)

Binomial Options: 2S Xeon® Platinum 8380 (40C, 2.3GHz, 270W): Intel "Coyote Pass"; 256GB, 16x16GB 3200MHz DDR4; CentOS Linux 8.3.2011, 4.18.0-240.1.1.el8_3.crt1.x86_64, SE5C6200.86B.0021.D40.2101090208, 0x261. App Version: v1.0; Build notes: Tools: Intel C Compiler 2020u4, Intel Threading Building Blocks ; threads/core: 2; Turbo: used; Build knobs: - O3 -xCORE-AVX512 -qopt-zmm-usage=high -fimf-domain-exclusion=31 -fimf-accuracy-bits=11 -no-prec-div -no-prec-sqrt. 2S AMD EPYC 7763 (64C, 2.45GHz, 280W): GIGABYTE R282- Z92 server; 512GB, 16x32GB 3200MHz DDR4; NPS4, CTDP=280W, Determinism=Power; Red Hat Enterprise Linux 8.3, 4.18, ucode 0xa001114. App Version: v1.0; Build notes: Tools: Intel C Compiler 2020u4, Intel Threading Building Blocks ; threads/core: 2; Turbo: used; Build knobs: -O3 -march=core-avx2 -fimf-domain-exclusion=31 -fimf-accuracy-bits=11 -no-prec-div -no- prec-sqrt. Workloads tested by Intel and results as of May 2021.

Monte Carlo: See [37] at www.intel.com/3gen-xeon-config. Results may vary.

MatLogica Provided Vector Accelerator Library XVA pricing benchmark: 2S Intel® Xeon® Platinum 8380 @ 2.30GHz 40 cores on Intel platform with 512 GB DDR4 memory (8(1DPC)/32GB/SK Hynix/1.2v/3200 MT/s), HT on, Turbo on, CentOS Linux 8.4, internal Bios SE5C6200.86B.0020.P23.2103261309 Release Date: 03/16/2021, CentOS Linux release 8.4.2105, Metalogical Libraries AADC-demo-2021-10-01-cd0737f-M9s6, Run Instructions: taskset -c $EXEFILE $CONFIG $INPUT file (for Intel® XEON® avx512 CONFIG=512 used), export OMP_NUM_THREAD=1, 2 thread/core, optimized with AVX512 and Metalogical AADC libraries, test by Intel on 10/14/2021. 2S AMD EPYC™ 7763 @ 2.45GHz 64-Core Processor on GIGABYTE R282-Z92-00 with 512 GB DDR4 memory (8(1DPC)/32GB/SK Hynix/1.2v/3200 MT/s), HT on, Turbo on, Bios: GIGABYTE M07 Release Date: 09/03/2021, CentOS Linux release 8.4.2105, Metalogical Libraries AADC-demo-2021-10-01-cd0737f-M9s6, Run Instructions: taskset -c $EXEFILE $CONFIG $INPUT file (for AMD EPYC avx2 CONFIG=256 used), export OMP_NUM_THREAD=1, 2 threads/core, optimized with AVX2 and Metalogical AADC libraries, test by Intel on 10/14/2021.

Quantifi Credit Option Pricing AI Inference: 2S Intel Xeon 8380 CPU @ 2.30 GHz (40 cores/processor), Turbo ON, HT ON. 512GB DDR4-3200. CentOS Linux Version 8. BIOS Version: SE5C6200.86B.0022.D08.2103221623. BIOS Release Date: 03/22/2021. 2S AMD EPYC 7763 @ 2.45 GHz (64 cores/processor). Turbo ON, HT ON. 512GB DDR4-3200. CentOS Linux Version 8. BIOS Version: M06. BIOS Release Date: 07/10/2021. Tested by Intel. Libraries: python 3.8.11, intel-tensorflow 2.6.0. Turbo=ON. All platforms: python Quantifi_Inference.py. 2 threads/core (all platforms). Tested by Intel as of 10-12-2021.

Quantum ESPRESSO AUSURF112, PSIWAT: 2S Xeon® Platinum 8380 (40C, 2.3GHz, 270W): Intel "Coyote Pass"; 256GB, 16x16GB 3200MHz DDR4; CentOS Linux 8.3.2011, 4.18.0-240.1.1.el8_3.crt1.x86_64, SE5C6200.86B.0021.D40.2101090208, 0x261. App Version: 6.3; Build notes: Tools: Intel Fortran Compiler 2021.2, Intel MKL 2021.2, Intel MPI 2021.2, ELPA 2020.11; threads/core: 2; Turbo: used; Build knobs: -O2 -align array64byte -threads -heap-arrays 4096 -xCORE-AVX512 -qopt-zmm-usage=high -fp-model fast=2 -complex-limited-range - assume byterecl –qopenmp. 2S AMD EPYC 7763 (64C, 2.45GHz, 280W): GIGABYTE R282-Z92 server; 512GB, 16x32GB 3200MHz DDR4; NPS4, CTDP=280W, Determinism=Power; Red Hat Enterprise Linux 8.3, 4.18, ucode 0xa001114.. App Version: 6.3; Build notes: Tools: Intel Fortran Compiler 2021.2, Intel MKL 2021.2, Intel MPI 2021.2, ELPA 2020.11; threads/core: 2; Turbo: used; Build knobs: -O2 -align array64byte -threads -heap-arrays 4096 -march=core-avx2 -fp-model fast=2 -complex-limited-range -assume byterecl –qopenmp. Workloads tested by Intel and results as of May 2021.

BWA-MEM2 on Intel Xeon vs AMD EPYC: 2S Intel® Xeon® Platinum 8380 (40C, 2.3GHz, 270W). Intel "Coyote Pass" - 256GB, 16x16GB 3200MHz DDR4; CentOS Linux release 8.4.2105, 4.18.0-240.22.1.el8_3.crt4.x86_64, ucode 0xd000270. 2S AMD EPYC 7763 (64C, 2.45GHz, 280W): GIGABYTE R282-Z92 server - 512GB; 16x32GB 3200MHz DDR4; CentOS Linux release 8.4.2105, 4.18.0-240.22.1.el8_3.crt4.x86_64, ucode 0xa00111d; NPS=1 yields best performance for EPYC. Baseline code: BWA-MEM, v0.7.17; optimized code (OpenOmics): BWA-MEM2, v2.2.1. Datasets used: Reference sequence: version GRCh38; Read dataset: 10M reads from SRR7733443 (151bp each) and HG004 (250bp each). Tested by Intel as of September 2021.

Configuration Details: Competitive Performance, slide 17 (2 of 2)

LAMMPS (Polyethylene, Stillinger-Weber, Tersoff, Water):): 2S Xeon® Platinum 8380 (40C, 2.3GHz, 270W): Intel "Coyote Pass"; 256GB, 16x16GB 3200MHz DDR4; CentOS Linux 8.3.2011, 4.18.0-240.1.1.el8_3.crt1.x86_64, SE5C6200.86B.0021.D40.2101090208, 0x261. App Version: v2020-10-29; Build notes: Tools: Intel MKL 2020u4, Intel C Compiler 2020u4, Intel Threading Building Blocks 2020u4, Intel MPI 2019u8; threads/core: 2; Turbo: used; Build knobs: -O3 -ip -xCORE-AVX512 -qopt-zmm-usage=high. 2S AMD EPYC 7763 (64C, 2.45GHz, 280W): GIGABYTE R282-Z92 server; 512GB, 16x32GB 3200MHz DDR4; NPS4, CTDP=280W, Determinism=Power; Red Hat Enterprise Linux 8.3, 4.18, ucode 0xa001114. App Version: v2020-10-29; Build notes: Tools: Intel MKL 2020u4, Intel C Compiler 2020u4, Intel Threading Building Blocks 2020u4, Intel MPI 2019u8; threads/core: 2; Turbo: used; Build knobs: -O3 - ip -march=core-avx2. Workloads tested by Intel and results as of May 2021.

NAMD: See [36] at www.intel.com/3gen-xeon-config. Results may vary.

RELION: See [38] at www.intel.com/3gen-xeon-config. Results may vary.

Ansys Mechanical 2021 R2 on Endeavor (HDR Fabric): 21% improvement across all SP cases (V21sp-1, V21sp-2, V21sp-3, V21sp-4). Intel® Xeon® Platinum 8358 Processor (32 cores, 48M Cache, 2.60 GHz). RAM 256 GB, 16*16GB 3200 MT/s DDR4, Hynix HMA82GR7CJR8N-XN. HDR based Lustre. BIOS SE5C6200.86B.0020.P23.2103261309. BIOS settings HT=on, Turbo Boost ON, SNC 2. Microcode 0xd000270. Intel Management Engine 04.04.04.053. BMC 2.78. Cent OS 8.4.2105. Kernel 4.18.0-240.22.1.el8_3.crt2.x86_64. OFED stack Mellanox mlnx-5.1-2.5.8.0- default. AMD EPYC™ 7543 (32 cores, Total L3 Cache 256MB, 2.8 GHz base clock). RAM 256 GB, 16*16GB 3200 MT/s DDR4, SK Hynix HMA82GR7CJR8N-XN. 240GB ATA Intel SSDSC2KB24. HDR based Lustre. BIOS Ver 2.1 Rev 5.22. Default settings, Multi-threading on, Boost on. NPS4 . Microcode 0xa00111d. BMC 3.1. Cent OS 8.4.2105. Kernel 4.18.0-240.22.1.el8_3.crt2.x86_64. OFED stack Mellanox mlnx-5.1-2.5.8.0- default. Intel MPI 2019u9 used throughout. 2018u3 used where needed. Intel MKL used for Intel platforms: Intel(R) Math Kernel Library Version 2020.0.0 Product Build 20191122. AMD BLIS used for AMD platforms. Intel Compiler Version: 2019.0.0. Intel(R) FORTRAN Compiler Version 19.0.0 (Build: 20190206). Intel(R) C/C++ Compiler Version 19.0.0 (Build: 20190206). Tested by Intel as of October 2021.