Developing Multiarchitecture, High-Performance Computing Applications

Take your HPC, enterprise, AI, and cloud applications to the max—with fast, scalable, and portable parallel code.

Intel® oneAPI Base Toolkit together with the Intel® HPC Toolkit create a comprehensive suite of development tools that make it fast and easy to build modern code. You can obtain all possible performance out of the newest Intel® processors in high performance computing (HPC) platforms. Combining the core set of tools from the Intel oneAPI Base Toolkit and adding HPC-focused tools simplifies creating code with the latest techniques in vectorization, multithreading, memory optimization, accelerator offloading, and cluster compute. Intel® Xeon® Scalable processors and supported GPUs with standard programming languages, parallel programing models, and integrated development environments (IDEs).

Who needs it?

- C++ with SYCL, C, Fortran, Python, OpenMP, and MPI software developers and architects building HPC, enterprise, AI, and cloud solutions.
- Developers looking to maximize their software's performance and flexibility to support multiple architectures across current and future Intel® platforms.
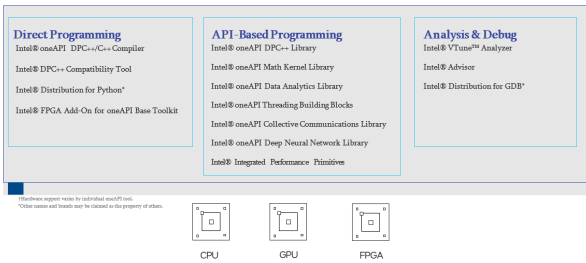
What it does

- **Creates fast parallel code.** Boosts application performance that scales on current and future Intel platforms with industry-leading compilers, performance libraries, performance profilers, code, and cluster analysis tools.
- **Builds code faster.** Simplifies the process of creating fast, scalable, and reliable parallel code.
- **Benefits from Priority Support:** Connect directly to Intel's engineers for confidential, quick answers to technical questions; get access to — and support for — older versions of the products; and receive updates for a year.

Highlights

Choose single node or multinode.

The Intel oneAPI HPC Toolkit provides all the tools you need to target across architectures, whether you're running the applications on shared or distributed memory systems. The target platforms for development and deployment can range from a workstation to a multinode cluster, requiring different support efforts. Choose the product that best fits your use model :

- **Intel oneAPI Base and HPC Toolkit single node:** Target platform of shared memory systems including PCs, laptops, or workstations.
- **Intel oneAPI Base and HPC Toolkit multinode:** Target platform of shared memory systems such as PCs, laptops, workstations, or high-performance compute clusters

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Direct Programming	API-Based Programming	Analysis & Debug
Intel® oneAPI DPC++/C++ Compiler	Intel® oneAPI DPC++ Library	Intel® VTune™ Analyzer
Intel® DPC++ Compatibility Tool	Intel® oneAPI Math Kernel Library	Intel® Advisor
Intel® Distribution for Python*	Intel® oneAPI Data Analytics Library	Intel® Distribution for GDB*
Intel® FPGA Add-On for oneAPI Base Toolkit	Intel® oneAPI Threading Building Blocks	
	Intel® oneAPI Collective Communications Library	
	Intel® oneAPI Deep Neural Network Library	
	Intel® Integrated Performance Primitives	

†Hardware support varies by individual oneAPI tool.
*Other names and brands may be claimed as the property of others.

CPU   GPU   FPGA

Powerful tools for cross-architecture high performance computing

Building, analyzing, and scaling for high performance computing to get maximum performance from your compute platforms is challenging. The Intel oneAPI Base and HPC Toolkit delivers on performance from standards-driven compilers and performance libraries, finds opportunities for optimization or use of accelerators through analysis tools, and keeps high-performance clusters running optimally.

Tools to build.

- Improve performance with a simple recompile using industry-leading, standards-driven C++ and Fortran compilers.
- Simplify adding parallelism with built-in, intuitive, parallel models and vectorization support.
- Drop in advanced libraries optimized for the latest hardware.
- Accelerate diverse HPC to AI workloads with high-performance Python, powered by native performance libraries, in an integrated distribution package.

Tools to analyze.

- Advanced performance profiler to tune application performance of the CPU, threading, memory, and storage.
- Vectorization and threading adviser to optimize vectorization and quickly prototype threading designs.
- Memory and thread debugger to find memory errors and intermittent threading errors efficiently.

Tools to scale

- Accelerate applications' performance on Intel® architecture-based clusters with multiple fabric flexibility.
- Profile MPI applications to quickly find bottlenecks, achieving high performance for parallel cluster applications.
- Verify that cluster components continue working together throughout the cluster life cycle.

What you get

- **Intel® oneAPI DPC++/C++ Compiler:** A standards-based CPU, GPU, and FPGA compiler supporting C++, C, SYCL, and OpenMP that leverages well-proven LLVM compiler technology and Intel's history of compiler leadership for performance. Experience seamless compatibility with popular compilers, development environments, and operating systems.

- **Intel® Fortran Compiler:** A standards-based CPU and GPU compiler supporting Fortran and OpenMP. Leverages well-proven LLVM compiler technology and Intel's history of compiler leadership for performance. Experience seamless compatibility with popular compilers, development environments, and operating systems.

- **Intel® Fortran Compiler Classic:** A standards-based Fortran compiler supporting OpenMP focused on CPU development. Take advantage of more cores and built-in technologies in platforms based on Intel CPU architectures. Experience seamless compatibility with popular compilers, development environments, and operating systems.

- **Intel® Inspector:** Locate and debug threading, memory, and persistent memory errors early in the design cycle to avoid costly errors later.

- **Intel® MPI Library:** Deliver flexible, efficient, scalable cluster messaging on Intel® architecture.

- **Intel® Trace Analyzer and Collector:** Understand MPI application behavior across its full runtime.

- **Intel® oneAPI DPC++ Library:** Speed up data parallel workloads with these key productivity algorithms and functions.

- **Intel® oneAPI Threading Building Blocks:** Simplify parallelism with this advanced threading and memory-management template library.

- **Intel® oneAPI Math Kernel Library:** Accelerate math-processing routines including matrix algebra, fast Fourier transforms (FFT), and vector math.

- **Intel® oneAPI Data Analytics Library:** Boost machine learning and data analytics performance.

- **Intel® Advisor:** Design code for efficient vectorization, threading, and offloading to accelerators.

- **Intel® Distribution for Python:** Achieve fast math-intensive workload performance without code changes for data science and machine learning problems.

- **Intel® DPC++ Compatibility Tool:** Migrate legacy CUDA code to a multiplatform program in DPC++ code with this assistant.

- **Intel® Integrated Performance Primitives:** Speed performance of imaging, signal processing, data compression, cryptography, and more.

- **Intel® VTune™ Profiler:** Find and optimize performance bottlenecks across CPU, GPU, and FPGA systems.

- **Intel® Distribution of GDB*:** Enables deep, system-wide debug of DPC++, C, C++, and Fortran code.

- **Intel® FPGA Add-on for oneAPI Base Toolkit (optional):** Use reconfigurable FPGA hardware to accelerate data-centric workloads.

Priority Support

Every paid version of Intel® oneAPI Base and HPC Toolkit automatically includes Priority Support at our [Online Service Center](#) for a timespan that starts at purchase, typically one year.

You get:

- **Direct and private interaction with Intel's support engineers,** including the ability to submit confidential support requests.
- **Accelerated response time** for toolkit-related technical questions and other product needs
- **Ability to influence product features and quality.**
- **Priority Support** for escalated defects
- **Free download access** to all new product updates and continued access to older versions of the product
- **Access to a vast library** of self-help documentation that builds off decades of experience in creating high- performance code.
- **Additional services** at reduced cost, including on-site or online training and consultation by Intel technical consulting engineers

Get started.

➢ Learn More about **[Intel® oneAPI Base and HPC Toolkit ›](#)**

➢ Get the **[Intel® oneAPI Base and HPC Toolkit with Priority Support ›](#)**

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Software and workloads used in performance tests may have been optimized for performance only on Intel® microprocessors.

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

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