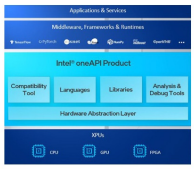

oneAPI IP Authoring and Intel Quartus Prime Software User Guide

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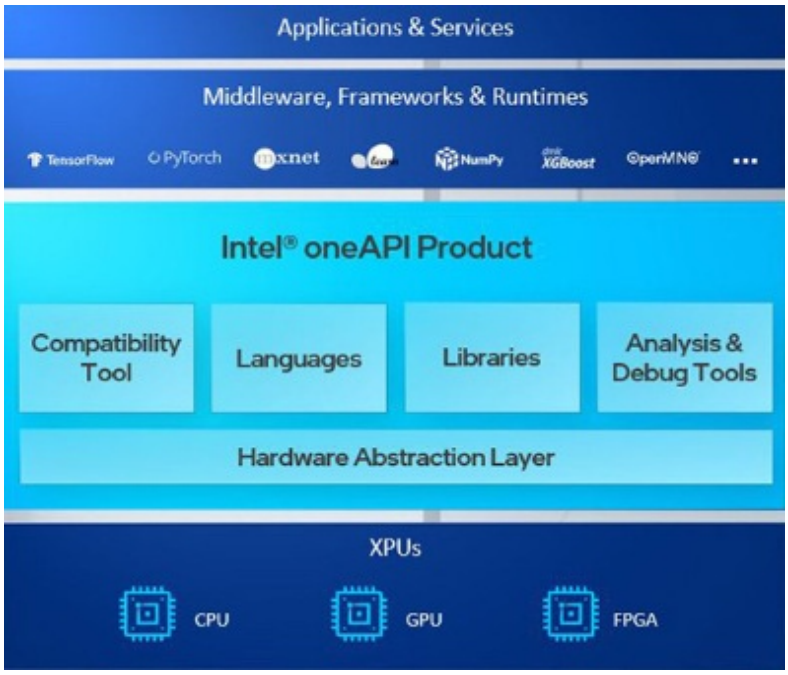
oneAPI IP Authoring and Intel Quartus Prime Software



Product Information

The product is an IP Authoring Development Environment that allows users to develop and author IP components using Intel oneAPI Base Toolkit and Intel Quartus Prime. It provides a full development environment for creating IP components.

Product Usage Instructions

Prerequisites

The following hardware and software requirements need to be met before installing and using the IP Authoring Development Environment:

Hardware Requirements

The hardware requirements for the IP Authoring Development Environment are as follows:

- A typical development environment requires between 80-179 GB of disk space.
- Device support requires an additional 3-36 GB of disk space, depending on the device family.
- The Intel Quartus Prime Pro Edition installer might need up to 134 GB of additional temporary disk space.
- The Intel oneAPI Base Toolkit installer might need up to 6 GB of additional temporary disk storage.

For detailed hardware requirements, including specific disk space requirements, please refer to the documentation provided by Intel Quartus Prime Pro Edition and Intel oneAPI Base Toolkit.

Operating System Requirements

The operating system requirements for the IP Authoring Development Environment are not specified in the given text extract. Please refer to the documentation provided by Intel Quartus Prime Pro Edition and Intel oneAPI Base Toolkit for detailed operating system requirements.

Installing the IP Authoring Development Environment

Refer to the documentation provided by Intel Quartus Prime Pro Edition and Intel oneAPI Base Toolkit for detailed instructions on installing the IP Authoring Development Environment. For specific instructions on getting started with oneAPI IP Authoring and archives, please refer to section A of the documentation. For the document revision history of getting started with oneAPI IP Authoring, please refer to section B of the documentation.

Getting Started with oneAPI IP Authoring and Intel® Quartus® Prime Pro Edition Software

With the Intel® oneAPI Base Toolkit and Intel Quartus® Prime software, you can speed up the development of your IP components by developing your components as SYCL kernels using C++. Use the Intel oneAPI DPC++/C++ Compiler (provided with the Intel oneAPI Base Toolkit) to generate RTL code for your IP component, and integrate that component into your design with Intel Quartus Prime tools. Getting Started with oneAPI IP Authoring and Intel Quartus Prime describes how to configure your Intel oneAPI DPC++/C++ Compiler development environment so that it can be launched from Intel Quartus Prime software.

Prerequisites

The full development environment for authoring IP components with Intel oneAPI Base Toolkit and Intel Quartus Prime software consists of the following software products:

- Python* 3.8 or later.

  The IP authoring development environment was validated with Python 3.8.
- Intel Quartus Prime Pro Edition Version 22.4
- Intel oneAPI Base Toolkit Version 2023.0
- One of the following simulation tools:
  - Siemens* EDA Questa* Advanced Simulator Version 2021.4
  - Questa-Intel FPGA Edition Version 2022.2
- [Windows* only] Visual Studio* Version 2017 or later
- Visual Studio Code

This publication attempts to summarize the prerequisites for the full development environment. For details of prerequisites for each component in the development environment, refer to the product documentation for each product.

Related Information

- Intel Quartus Prime Pro Edition Release Notes
- Intel FPGA Software Installation and Licensing
- Intel Quartus Prime Software User Guides
- Intel oneAPI Base Toolkit Documentation
- FPGA Workflows on Third-Party IDEs for Intel oneAPI Toolkits
- Using Visual Studio Code with Intel oneAPI Toolkits User Guide
- Visual Studio product family documentation
- Visual Studio Code documentation

Hardware Requirements

The requirements in this section attempt to summarize the hardware requirements for each software package required for a full development environment for authoring IP components with Intel oneAPI Base Toolkit and Intel Quartus Prime. For detailed requirements, refer to the documentation for each software package.

Disk Space Requirements

A typical development environment for authoring IP components requires between 80-179 GB of disk space(1). The disk space required depends on the FPGA device support you want and your operating system. The space requirements can broken down as follows:

- A minimal installation of the Intel Quartus Prime Pro Edition software without device support requires between 29-36 GB of disk space, depending on the operating system.
  Device support requires an additional 3-36 GB of disk space, depending on the device family. Device support for all devices that an IP authoring development environment can target requires approximately 77 GB of disk space.
  The Intel Quartus Prime Pro Edition installer might need up to 134 GB of additional temporary disk space for the download and decompression of the installation package TAR file.
  For details about Intel Quartus Prime Pro Edition disk space requirements, refer to the download page for Intel Quartus Prime Pro Edition Design Software:
  - Linux: **https://www.intel.com/content/www/us/en/software-kit/746666/**
  - Windows: **https://www.intel.com/content/www/us/en/software-kit/746667/**
- Questa-Intel FPGA Edition requires approximately 29 GB of disk space.
  For Siemens EDA Questa Advanced Simulator disk space requirements, refer to your documentation from Siemens EDA.
- The minimum required installation of the Intel oneAPI Base Toolkit requires approximately to 6 GB of disk space.
  The Intel oneAPI Base Toolkit installer might need up to 6 GB of additional temporary disk storage to manage the download and intermediate installation files.
  A full installation of the Intel oneAPI Base Toolkit requires up to 24 GB of disk space.
  For details about the Intel oneAPI Base Toolkit disk space requirements, refer to Intel oneAPI Base Toolkit System Requirements
- Visual Studio Code requires less than 500 MB of disk space. For details, refer to Requirements for Visual Studio Code.

(1) This estimate does not include disk space required for Python.

- A typical Visual Studio installation with a C++ workload suitable for working with the Intel oneAPI Base Toolkit and Intel Quartus Prime requires approximately 12 GB of disk space.
  For details, refer to the systems requirements page for your version of Visual Studio:
  - Visual Studio 2022 Product Family System Requirements
  - Visual Studio 2019 Product Family System Requirements
  - Visual Studio 2017 Product Family System Requirements

Memory Requirements
The memory requirements for your development environment are driven by the FPGA devices that you want to target:
Maximum Physical RAM Requirements

Target FPGA Device	Maximum Physical RAM Requirement
Intel Agilex™	64 GB
Intel Arria® 10	48 GB
Intel Stratix® 10	64 GB

Virtual Memory Requirements

Configure your system to provide additional virtual memory equal to the recommended physical RAM. This additional virtual memory effectively doubles the total effective memory available to process your design.

For details of the memory requirements for your device or devices, refer to the Intel Quartus Prime Pro Edition Software and Device Support Release Notes.

Operating System Requirements

The requirements in this section attempt to summarize the operating system requirements from each software package required for a full development environment for authoring IP components with Intel oneAPI Base Toolkit and Intel Quartus Prime. For detailed requirements, refer to the documentation for each software package.

Supported Operating Systems

The Intel oneAPI Base Toolkit and Intel Quartus Prime support different sets of operating systems. The following operating systems are supported by both:

- Red Hat* Enterprise Linux* 8.4
- Red Hat Enterprise Linux 8.6
- SUSE* Linux Enterprise Server 15 SP3
- Ubuntu* 18.04 LTS
- Ubuntu 20.04 LTS
- Ubuntu 22.04 LTS
- Microsoft* Windows 10 (Version 1607 or later, Version 1809 or later is recommended)
- Microsoft Windows 11
- Microsoft Windows Server* 2016
- Microsoft Windows Server 2019

Additional Linux* Operating System Requirements

- The oneAPI FPGA samples are provided as CMake projects and require CMake to build them. In some cases, pkg-config is necessary to locate libraries that are required to complete a build.
- Also, the Intel compilers use existing GNU build toolchains to provide a complete C/C++ development environment. If your distribution of Linux* does not include the complete suite of GNU development tools, install them.
- For more details, refer to “Configure Your FPGA System” in Get Started with the Intel oneAPI Base Toolkit for Linux.

Additional Visual Studio Requirements

- The oneAPI FPGA samples are provided as CMake projects, you might need to add some additional Visual Studio C++ development workloads as part of your Visual Studio installation.
- For more details, refer to “Configure Your System” in Get Started with the Intel oneAPI Base Toolkit for Windows.

Related Information

- Get Started with the Intel oneAPI Base Toolkit for Linux
- Get Started with the Intel oneAPI Base Toolkit for Windows

Installing the IP Authoring Development Environment

The recommended IP authoring development environment includes Intel oneAPI Base Toolkit, Intel Quartus Prime, and Visual Studio Code (sometimes referred to as “VS Code”). On Microsoft Windows platforms, Microsoft Visual Studio is also required.
Install the software for your IP authoring environment in the following order:

1. Confirm that you are running Python 3.8 or later by running the following command from a command prompt: python –version
2. Install and license the Intel Quartus Prime Pro Edition software according to the instructions in Intel FPGA Software Installation and Licensing.
3. [Windows only] Install Microsoft Visual Studio. Ensure that you install one of the following workloads to ensure that CMake is on your system:
    - Desktop development with C++
    - Linux development with C++
4. [Windows only] Ensure that Microsoft Visual Studio is not running before moving on to the next step.
   If Visual Studio is running when you complete the next step, the Intel oneAPI Base Toolkit installer cannot install the oneAPI plug-ins for Visual Studio.
5. Install and configure the Intel oneAPI Base Toolkit with at least the following components:
    - Intel Distribution for GDB
    - Intel oneAPI DPC++ Library
    - Intel oneAPI Threading Building Blocks
    - Intel oneAPI DPC++/C++ Compiler
    - Intel VTune™ Profiler

      For instructions, review the following publications:
    - Intel oneAPI Toolkits Installation Guide for Linux OS
    - Intel oneAPI Toolkits Installation Guide for Windows
6. Install Visual Studio Code according to one of the following instructions:
    - Visual Studio Code on Linux
    - Visual Studio Code on Windows
7. Install the Intel oneAPI Visual Studio Code extensions according to the instructions in Using Visual Studio Code with Intel oneAPI Toolkits User Guide.

After installing and configuring these components, you can do the following tasks

- Explore FPGA design examples through the Sample Browser for Intel oneAPI Toolkit. To find the FPGA design examples, open the Sample Browser and select C++ ➤ Get Started ➤ oneAPI Direct Programming ➤ DPC++ FPGA.
- [Linux only] Launch your IP development environment in Visual Studio Code from the Intel Quartus Prime Tools menu (Tools ➤ Intel oneAPI DPC++/C++ Compiler ➤ Launch VS Code for DPC++/C++ Development.

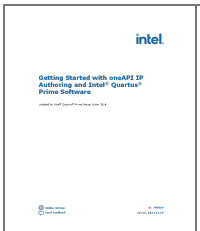
A. Getting Started with oneAPI IP Authoring and Archives

For the latest and previous versions of this guide, refer to Getting Started with oneAPI IP Authoring and Archives. If a software version is not listed, the guide for the previous software version applies.

B. Document Revision History for Getting Started with oneAPI IP Authoring and

Document Version	Intel Quartus Prime Version	Changes
2022.12.19	22.4	Initial release.

Documents / Resources

	intel oneAPI IP Authoring and Intel Quartus Prime Software [pdf] User Guide oneAPI IP Authoring and Intel Quartus Prime Software, Authoring and Intel Quartus Prime Software, Quartus Prime Software, Prime Software, Software

References

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- Running Visual Studio Code on Linux
- Running Visual Studio Code on Windows
- Requirements for Visual Studio Code
- Visual Studio product family documentation | Microsoft Learn
- Visual Studio 2017 System Requirements | Microsoft Learn
- Visual Studio 2019 System Requirements | Microsoft Learn
- Visual Studio 2022 System Requirements | Microsoft Learn
- Get Started with the Intel® oneAPI Base Toolkit for Linux*
- Configure Your FPGA System
- Get Started with the Intel® oneAPI Base Toolkit for Windows*
- Configure Your System
- Intel® oneAPI Toolkits and Components Installation Guide for Linux* OS
- Intel® oneAPI Toolkits and Components Installation Guide for Windows*
- Using Visual Studio Code* to Develop Intel® oneAPI Applications
- Intel® oneAPI Base Toolkit System Requirements

- FPGA Workflows on Third-Party IDEs for Intel® oneAPI Toolkits
- Intel® oneAPI Base Toolkit Documentation
- 1. Answers to Top FAQs
- 1. Intel® Quartus® Prime Pro Edition Version 23.1 Software and Device...
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- 1. Getting Started with oneAPI IP Authoring and Intel® Quartus® Prime...
- Intel ISO 9001:2015 Registrations
- Intel® Quartus® Prime Pro Edition Design Software Version 22.3 for Linux
- Intel® Quartus® Prime Pro Edition Design Software Version 22.3 for Windows
- Intel® Quartus® Prime Software User Guides