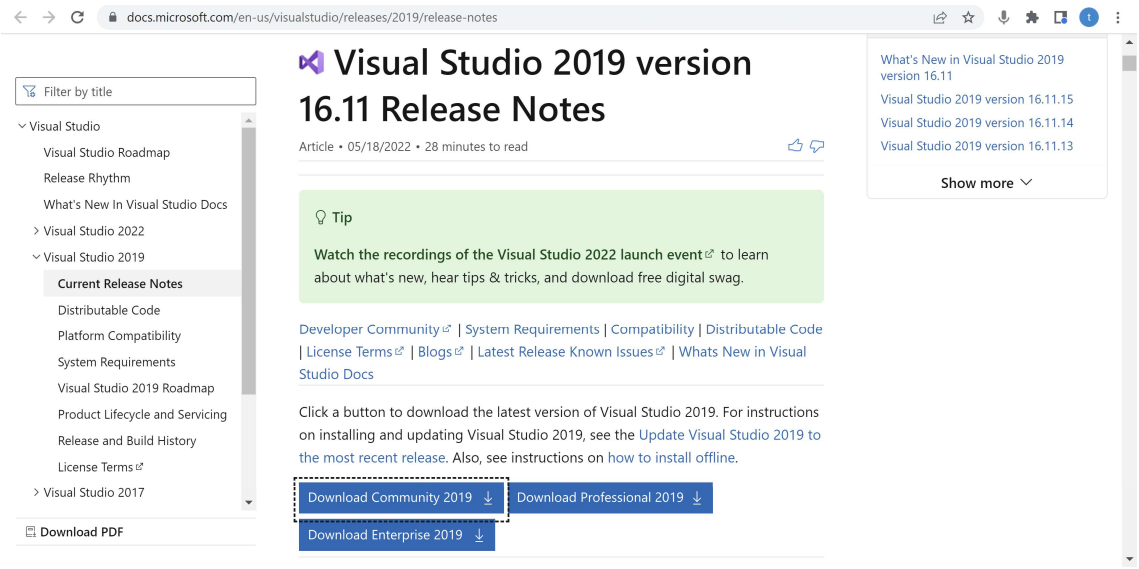
# Compilation of PHITS using the free Intel Fortran compiler (OneAPI toolkits)

## Phase I: Install Visual Studio IDE (integrated development environment)

I-1

Search “visual studio” or go to https://visualstudio.microsoft.com/




I-2

Download “Visual Studio Community 2019”

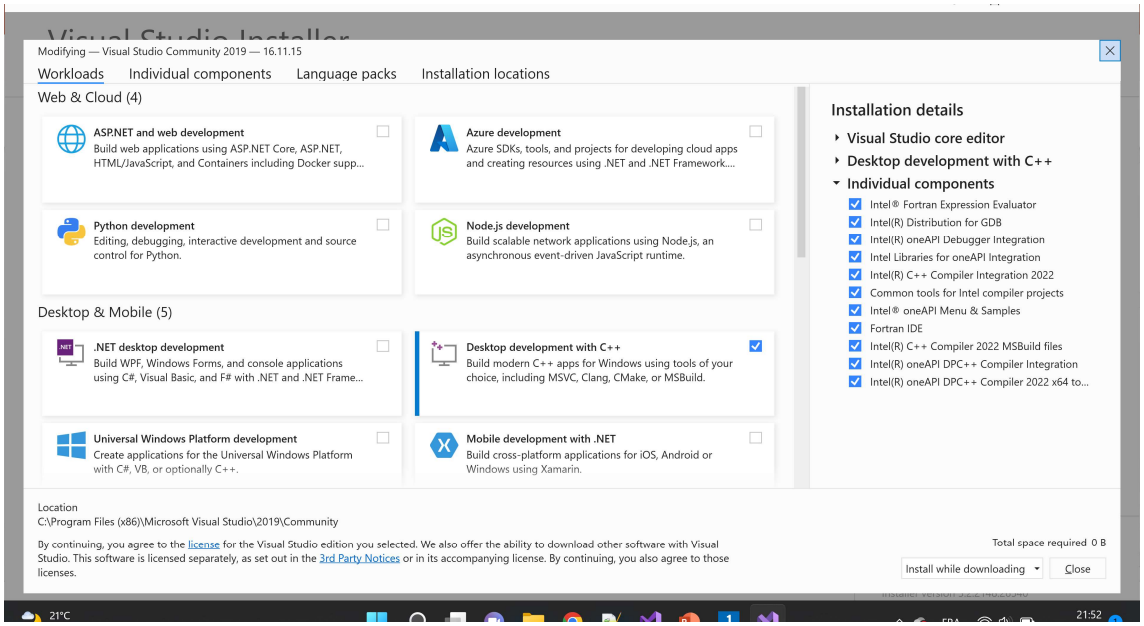
Note : In April 2022, OneAPI and Visual Studio Community/professional/enterprise 2022 are incompatible. Please don’t select 2022 unless the latest OneAPI solves this compatibility problem.

I-3

Install “Visual Studio Community 2019” using the downloaded installer.

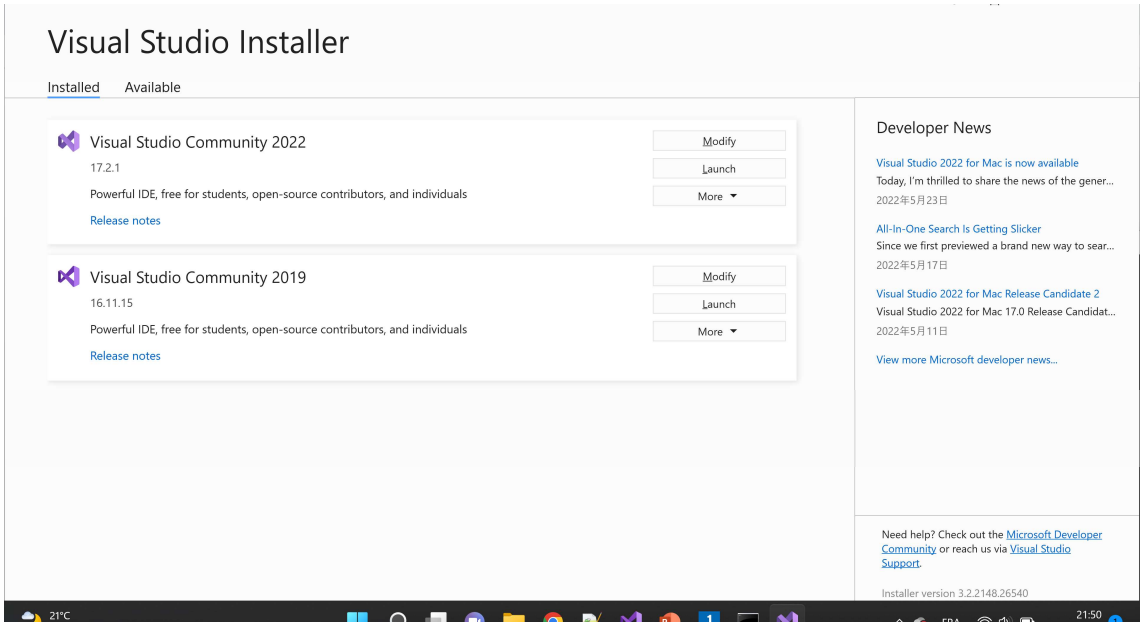
In the window below, please tick “Desktop development with C++”. It says C++ while PHITS is Fortran, but this is OK.

Then click the right bottom button to start installation.




I-4

After installation, by launching the installer again, one can see if Visual Studio has been really installed. You will see “Visual Studio Community 2019” installed.



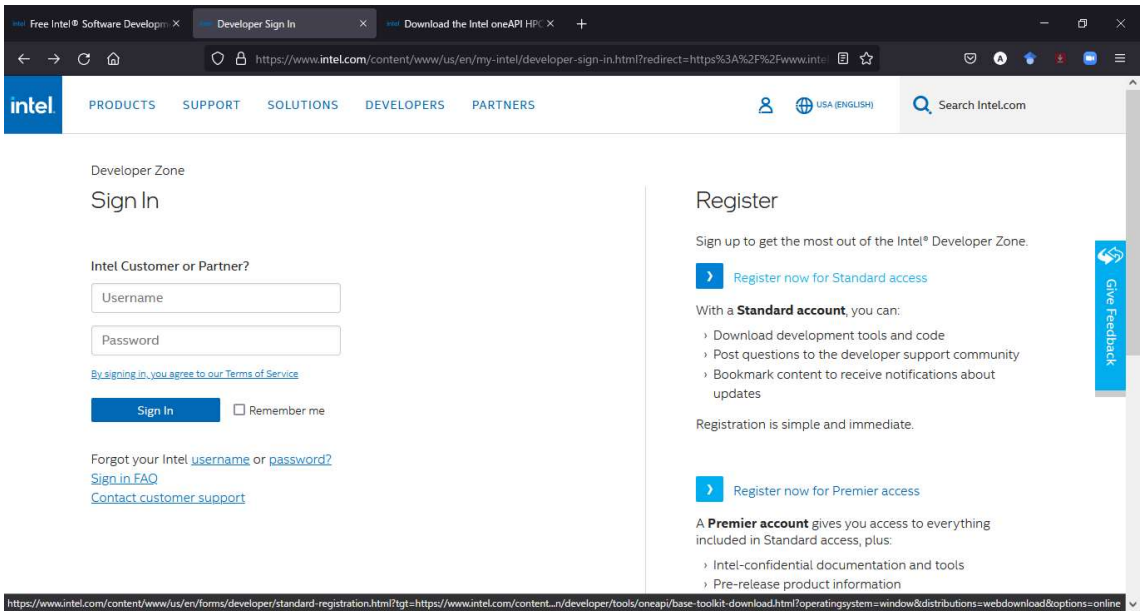
Phase II: Install OneAPI (Fortran compiler and its associated libraries)

II-0,

Sign up in the Intel Developer Zone

https://www.intel.com/content/www/us/en/my-intel/developer-sign-in.html?redirect=https://www.intel.com/content/www/us/en/developer/overview.html

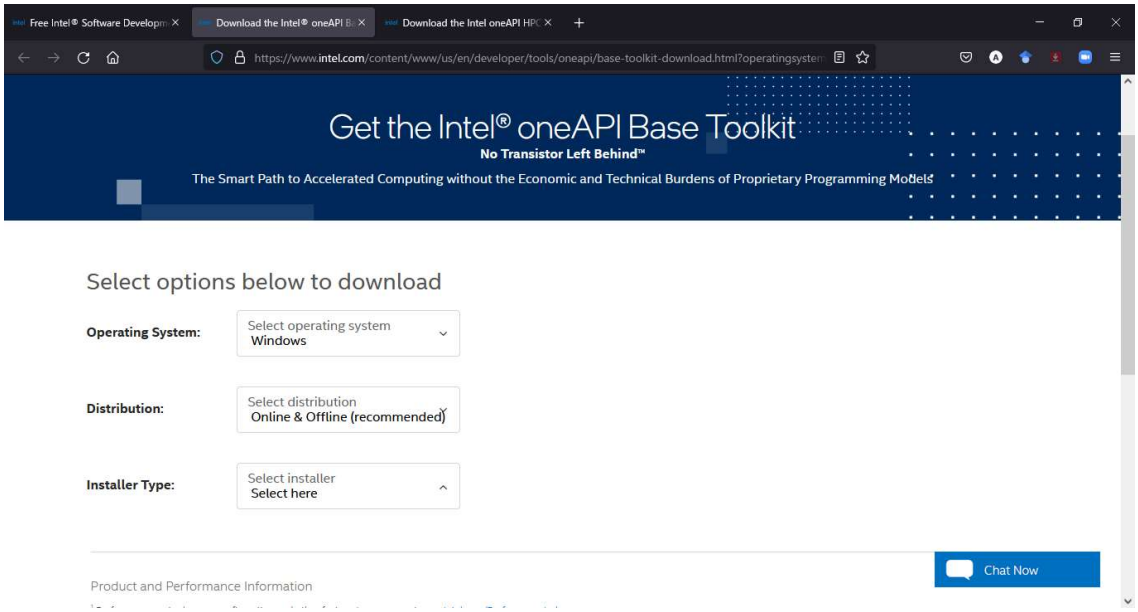
Please keep logged in throughout the processes below.




II-1

Search “OneAPI BaseToolKit download” or go to

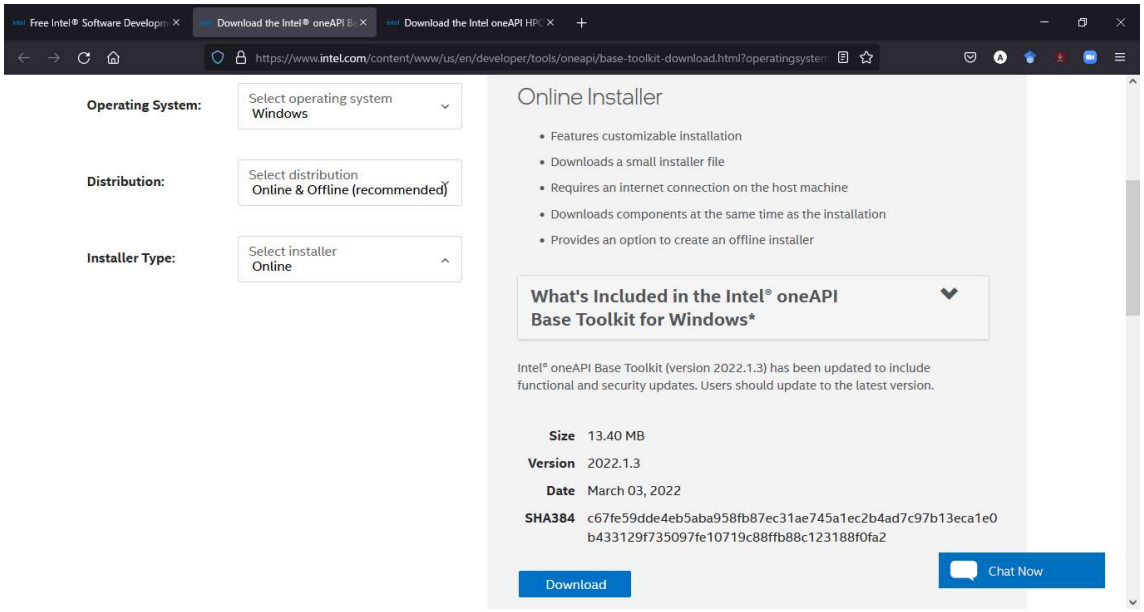
https://www.intel.com/content/www/us/en/developer/tools/oneapi/base-toolkit-download.html




II-2

Select your OS, Online & Offline, and Online

(If you fail the installation owing to network access instability, please consider choosing Offline )



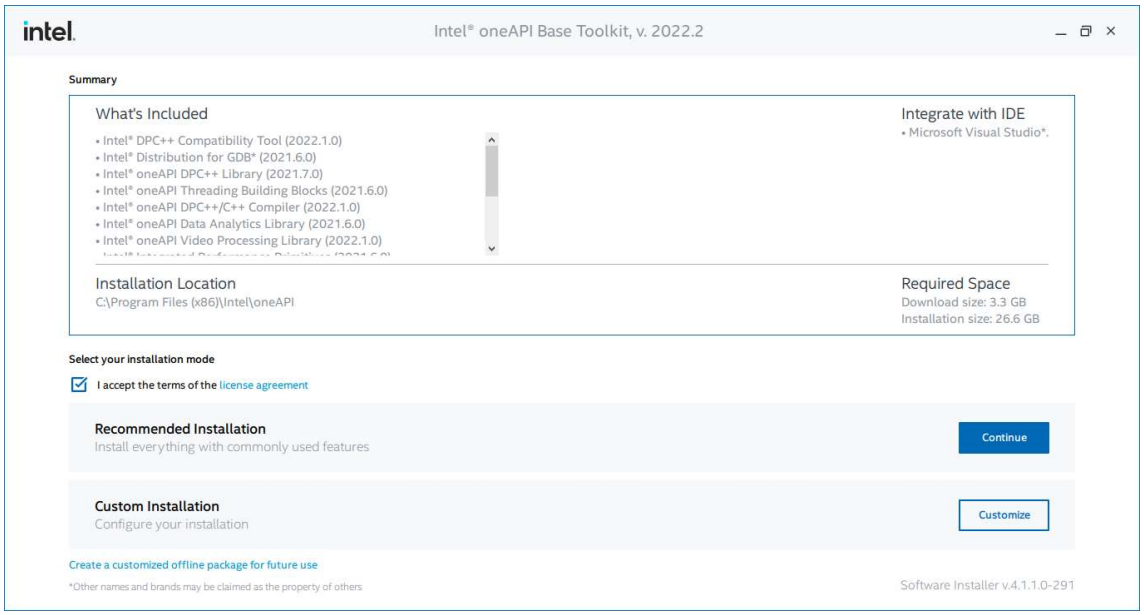

II-3

Launch the downloaded installer. Following popup window will show up.



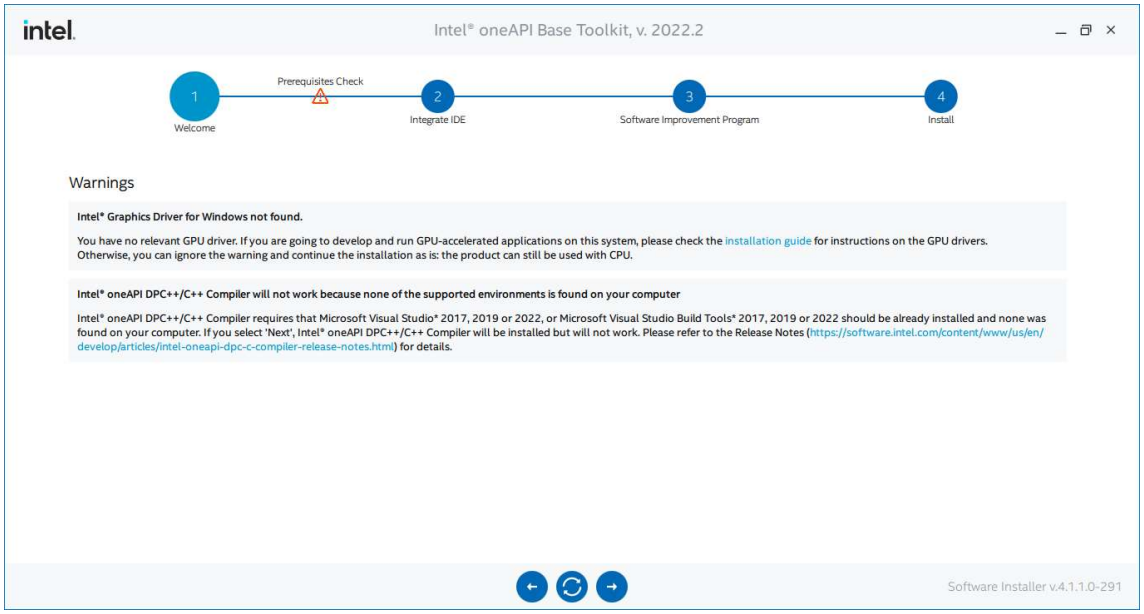
II-4

Tick “I accept the terms of the license agreements” and click “continue” of “Recommended Installation” on the right.



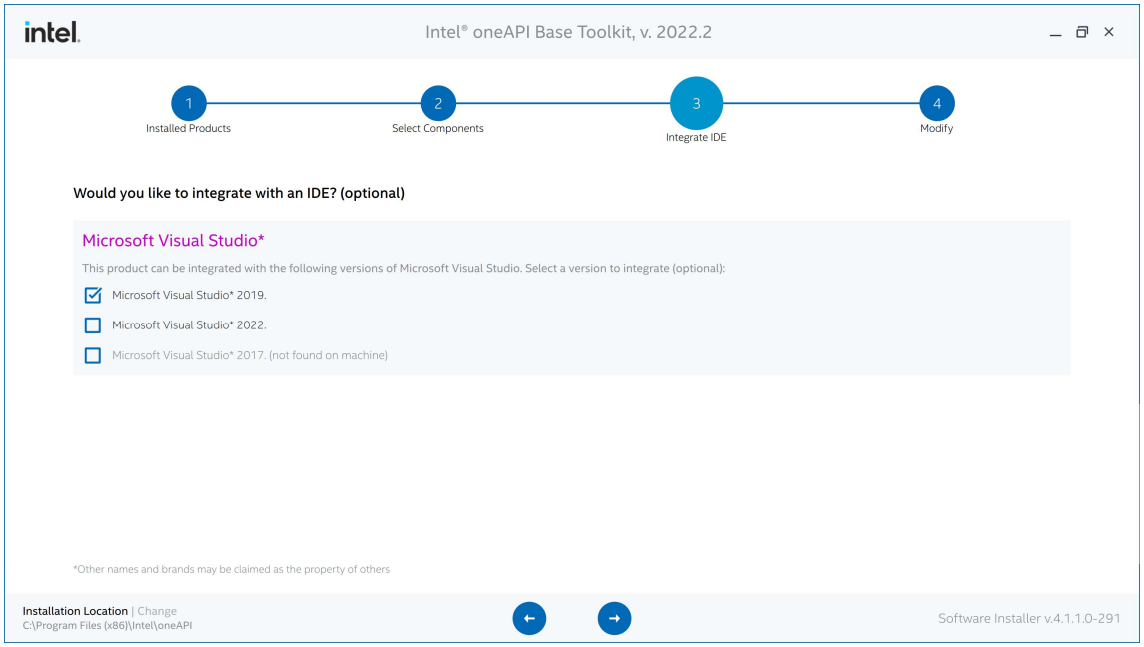

II-5

If you see a warning message below, something is wrong with Visual Studio installation. Please go back to Phase I.



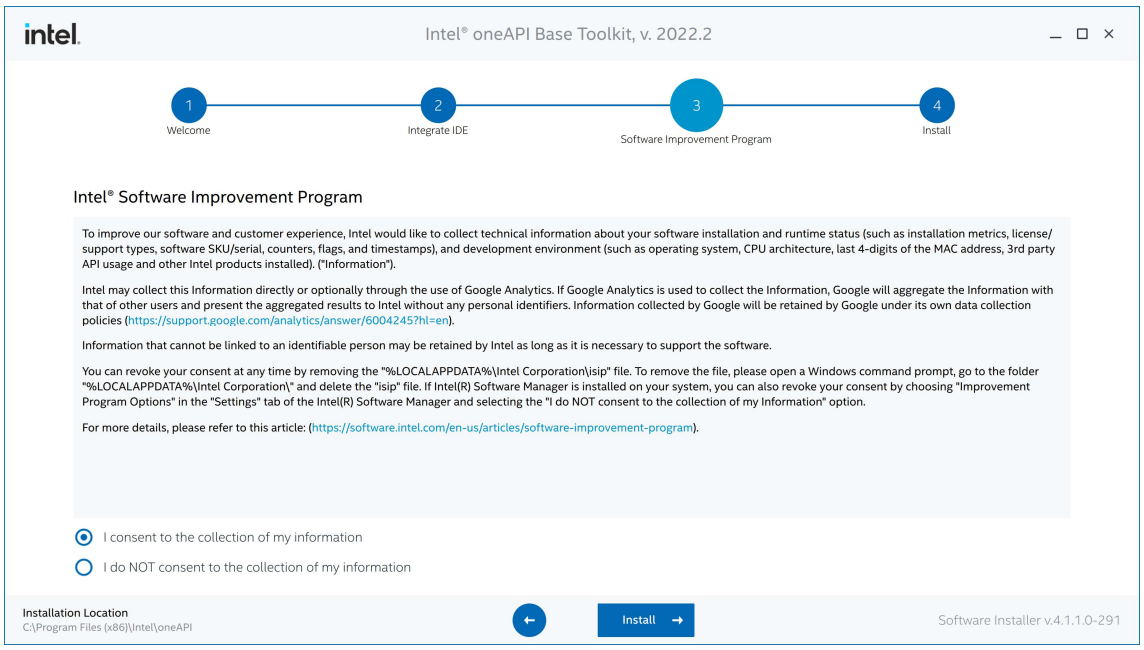

II-6

Tick Microsoft Visual Studio* 2019 and click right arrow button on the bottom.



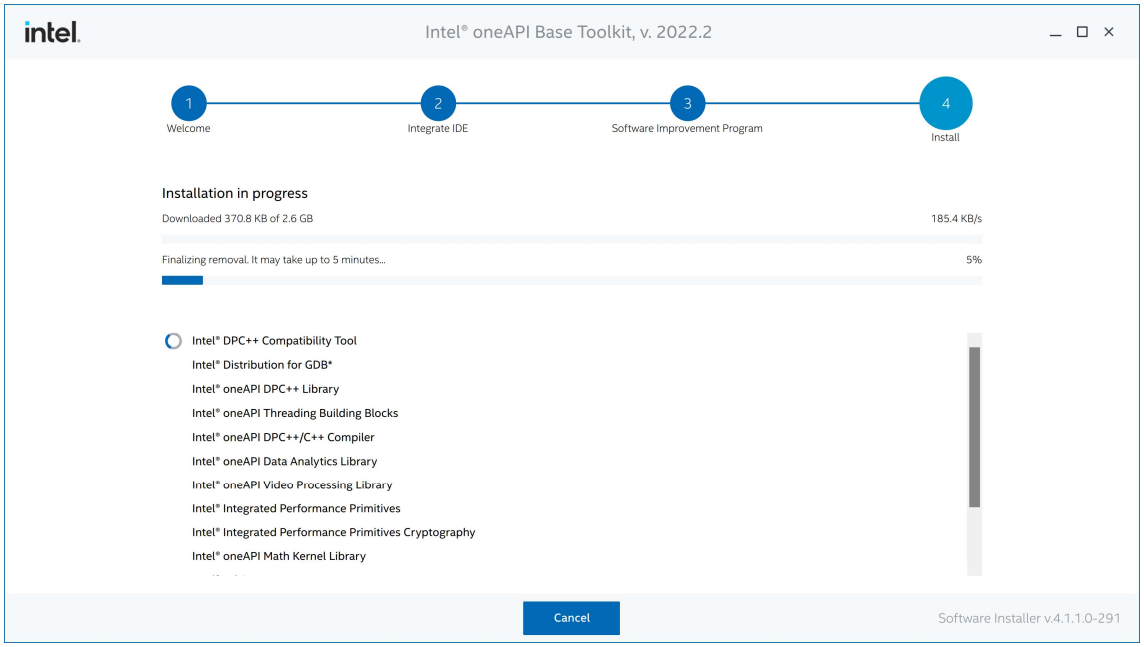

II-7

Tick whichever you prefer and click “Install” button.



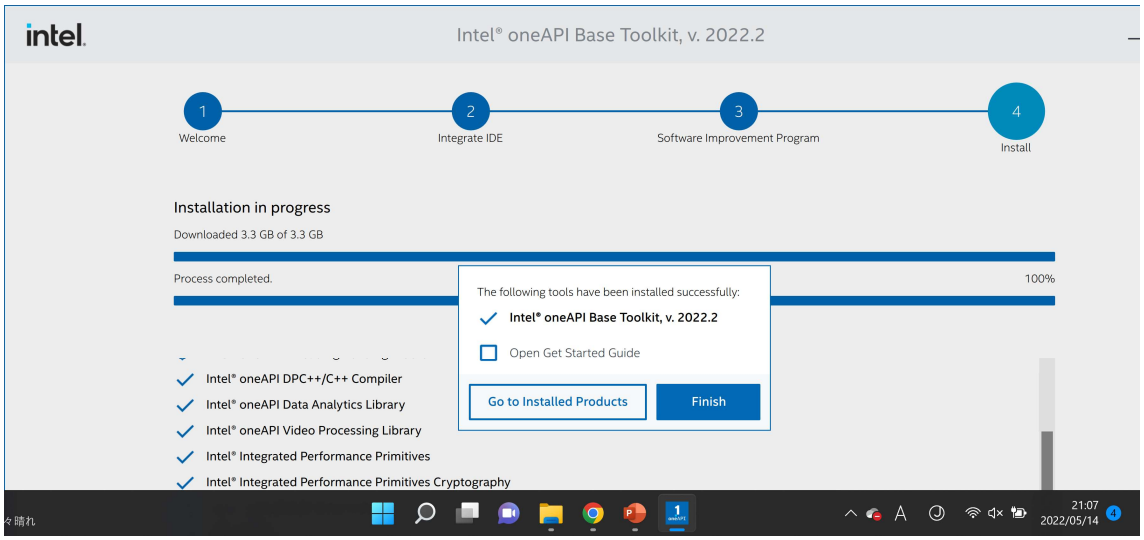

II-8

Wait until the progress bars reach the right edges.




II-9

When installation ends, click “Finish” of the popup window.

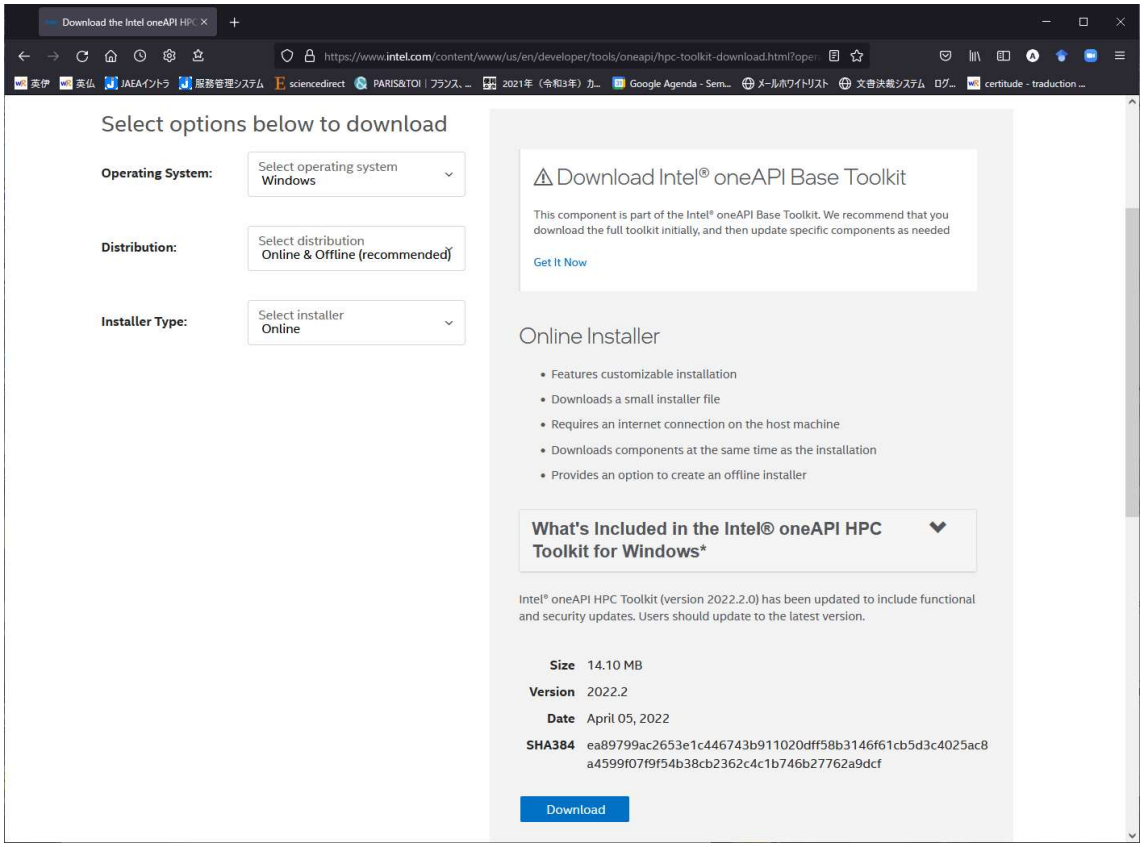


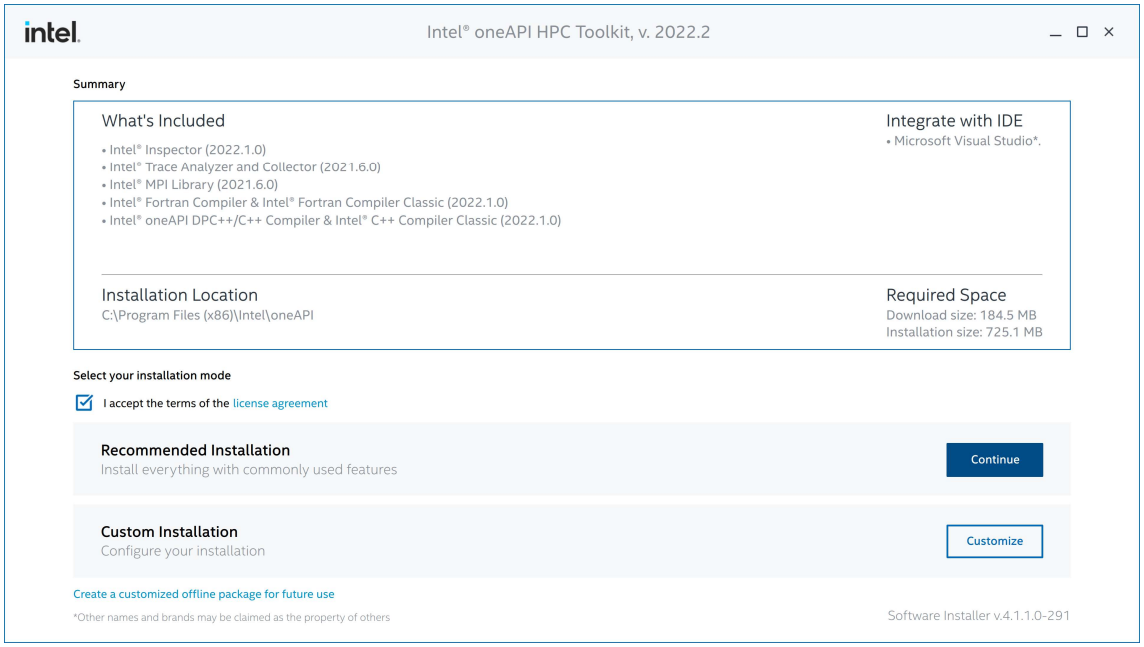
II-10

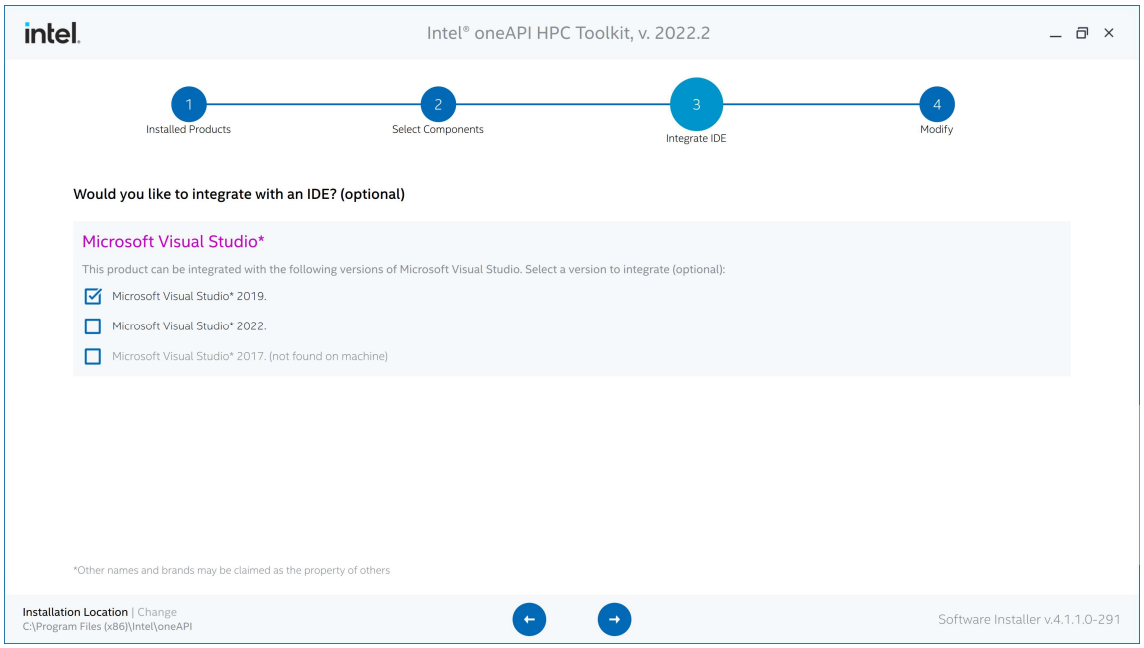
Search “OneAPI HPCToolKit download” or go to https://www.intel.com/content/www/us/en/developer/tools/oneapi/hpc-toolkit-download.html

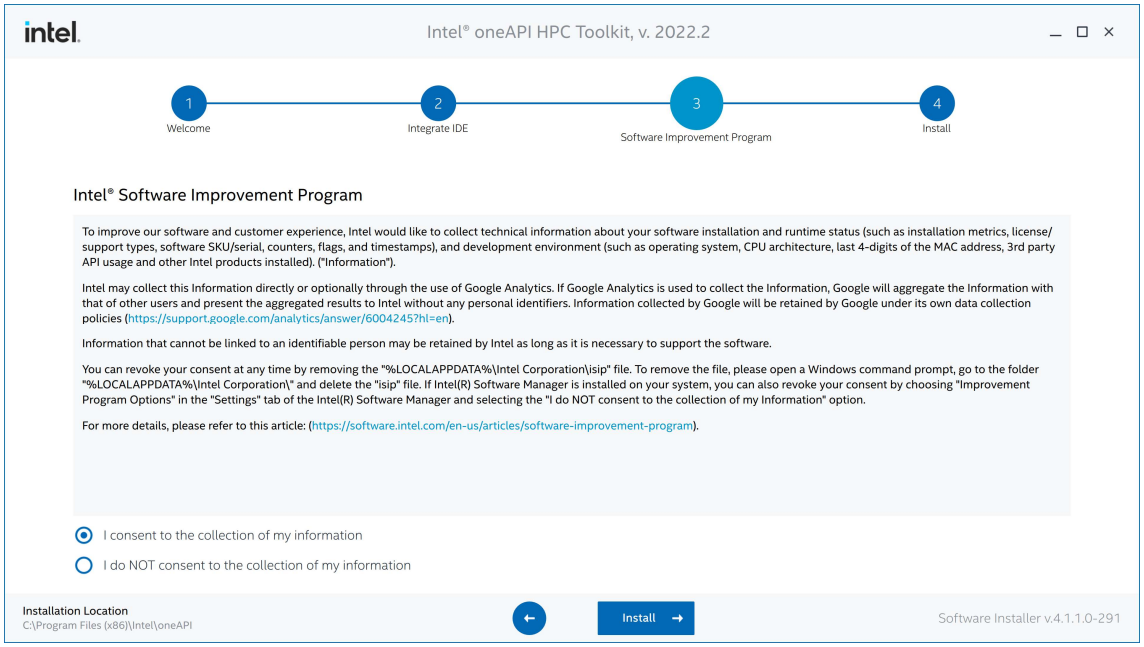
II-11

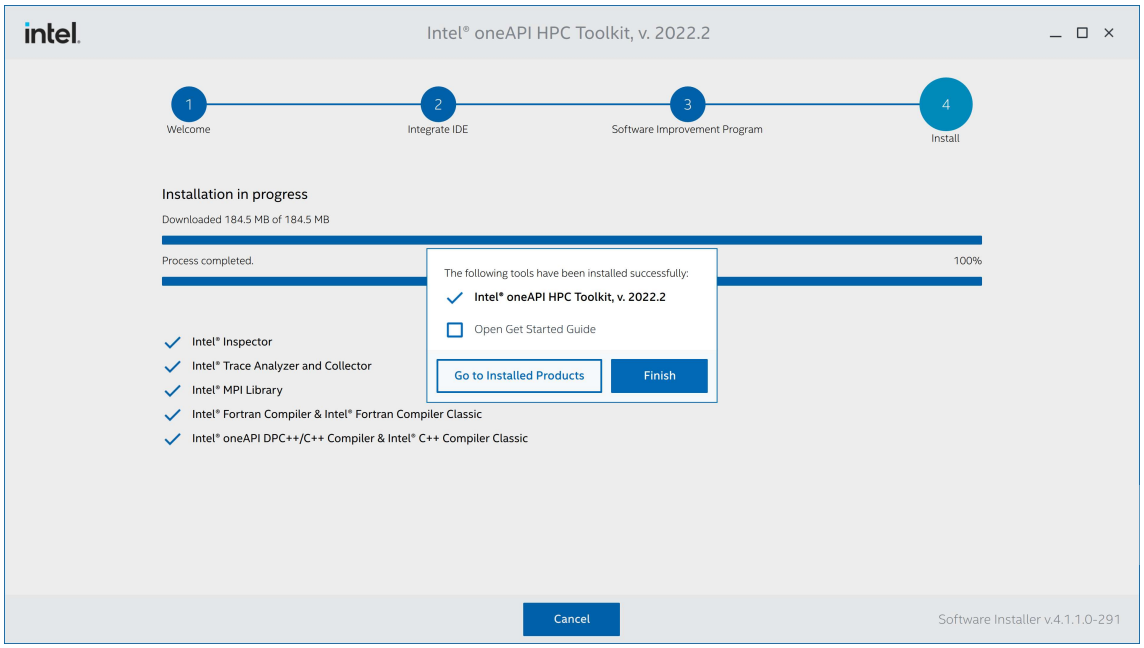
Do the same as BaseToolkit explained above. Below are screenshots during HPCToolKit installation.




intel
Intel® oneAPI HPC Toolkit, v. 2022.2
Summary
What's Included
• Intel® Inspector (2022.1.0)
• Intel® Trace Analyzer and Collector (2021.6.0)
• Intel® MPI Library (2021.6.0)
• Intel® Fortran Compiler & Intel® Fortran Compiler Classic (2022.1.0)
• Intel® oneAPI DPC++/C++ Compiler & Intel® C++ Compiler Classic (2022.1.0)
Integrate with IDE
• Microsoft Visual Studio*.
Installation Location
C:\Program Files (x86)\Intel\oneAPI
Required Space
Download size: 184.5 MB
Installation size: 725.1 MB
Select your installation mode
I accept the terms of the license agreement
Recommended Installation
Install everything with commonly used features
Continue
Custom Installation
Configure your installation
Customize
Create a customized offline package for future use
*Other names and brands may be claimed as the property of others
Software Installer v.4.1.1.0-291


intel
Intel® oneAPI HPC Toolkit, v. 2022.2
1
Installed Products
2
Select Components
3
Integrate IDE
4
Modify
Would you like to integrate with an IDE? (optional)
Microsoft Visual Studio*
This product can be integrated with the following versions of Microsoft Visual Studio. Select a version to integrate (optional):
Microsoft Visual Studio* 2019.
Microsoft Visual Studio* 2022.
Microsoft Visual Studio* 2017. (not found on machine)
*Other names and brands may be claimed as the property of others
Installation Location | Change
C:\Program Files (x86)\Intel\oneAPI
Software Installer v.4.1.1.0-291

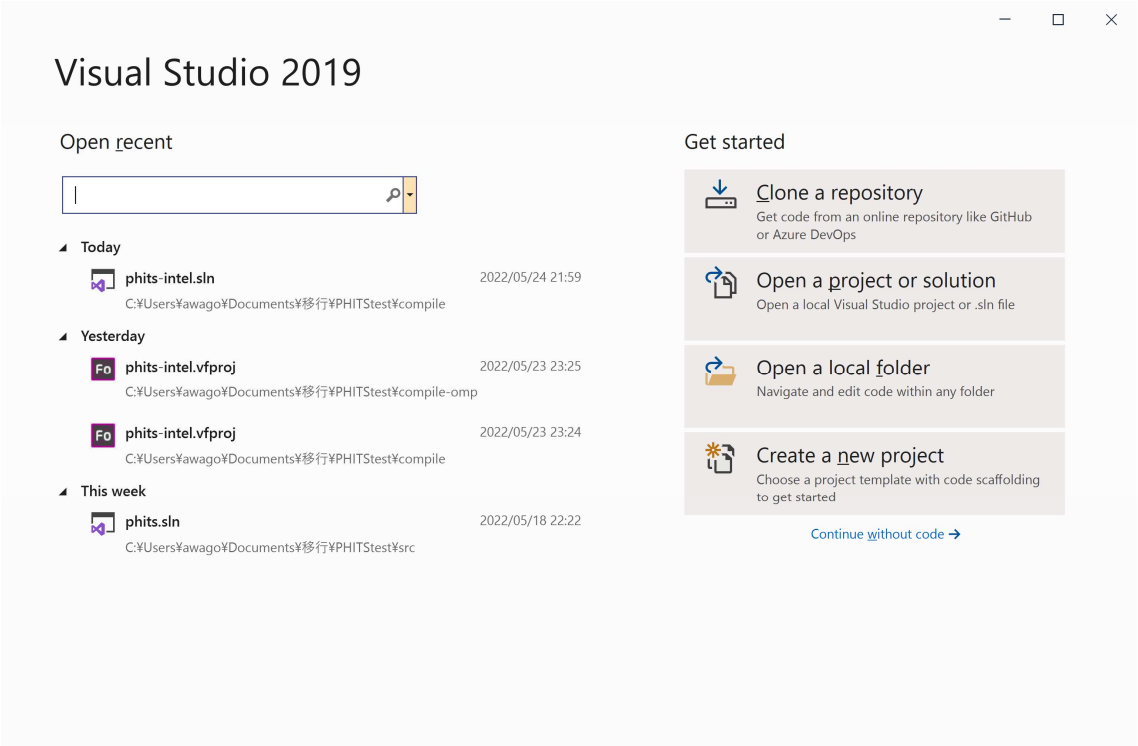

intel
Intel® oneAPI HPC Toolkit, v. 2022.2
1
Welcome
2
Integrate IDE
3
Software Improvement Program
4
Install
Intel® Software Improvement Program
To improve our software and customer experience, Intel would like to collect technical information about your software installation and runtime status (such as installation metrics, license/support types, software SKU/serial, counters, flags, and timestamps), and development environment (such as operating system, CPU architecture, last 4-digits of the MAC address, 3rd party API usage and other Intel products installed). ("Information").
Intel may collect this Information directly or optionally through the use of Google Analytics. If Google Analytics is used to collect the Information, Google will aggregate the Information with that of other users and present the aggregated results to Intel without any personal identifiers. Information collected by Google will be retained by Google under its own data collection policies (https://support.google.com/analytics/answer/6004245?hl=en).
Information that cannot be linked to an identifiable person may be retained by Intel as long as it is necessary to support the software.
You can revoke your consent at any time by removing the "%LOCALAPPDATA%\Intel Corporation\isip" file. To remove the file, please open a Windows command prompt, go to the folder "%LOCALAPPDATA%\Intel Corporation\" and delete the "isip" file. If Intel(R) Software Manager is installed on your system, you can also revoke your consent by choosing "Improvement Program Options" in the "Settings" tab of the Intel(R) Software Manager and selecting the "I do NOT consent to the collection of my Information" option.
For more details, please refer to this article: (https://software.intel.com/en-us/articles/software-improvement-program).
I consent to the collection of my information
I do NOT consent to the collection of my information
Installation Location
C:\Program Files (x86)\Intel\oneAPI
Install
Software Installer v.4.1.1.0-291


intel
Intel® oneAPI HPC Toolkit, v. 2022.2
1
Welcome
2
Integrate IDE
3
Software Improvement Program
4
Install
Installation in progress
Downloaded 184.5 MB of 184.5 MB
Process completed.
100%
The following tools have been installed successfully:
Intel® oneAPI HPC Toolkit, v. 2022.2
Open Get Started Guide
Go to Installed Products
Finish
Intel® Inspector
Intel® Trace Analyzer and Collector
Intel® MPI Library
Intel® Fortran Compiler & Intel® Fortran Compiler Classic
Intel® oneAPI DPC++/C++ Compiler & Intel® C++ Compiler Classic
Cancel
Software Installer v.4.1.1.0-291

## Phase III: Compile PHITS

III-1

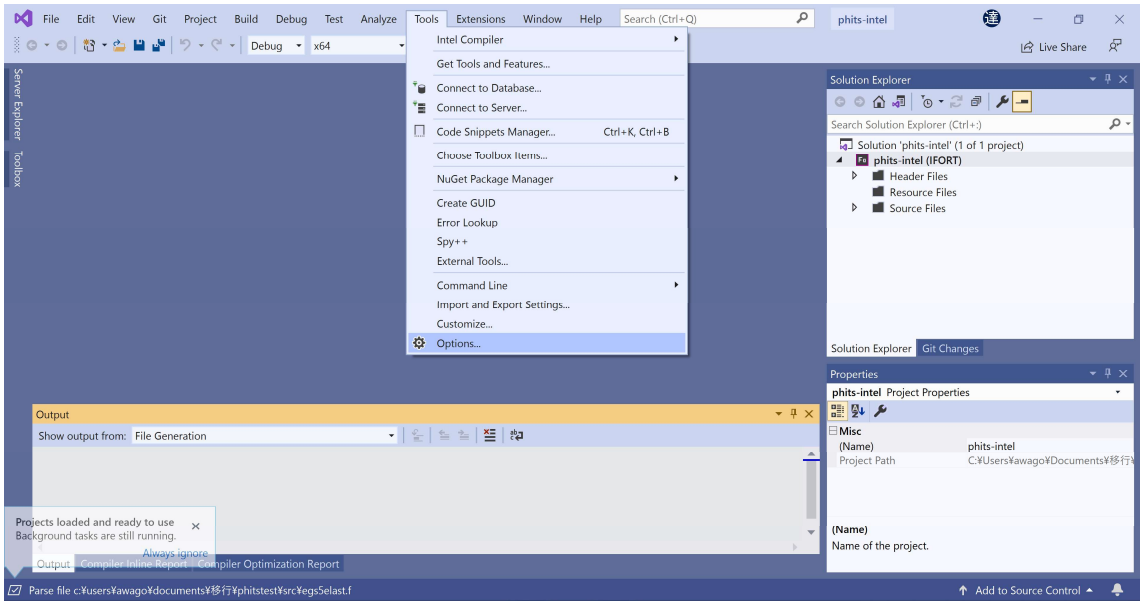
Launch Visual Studio

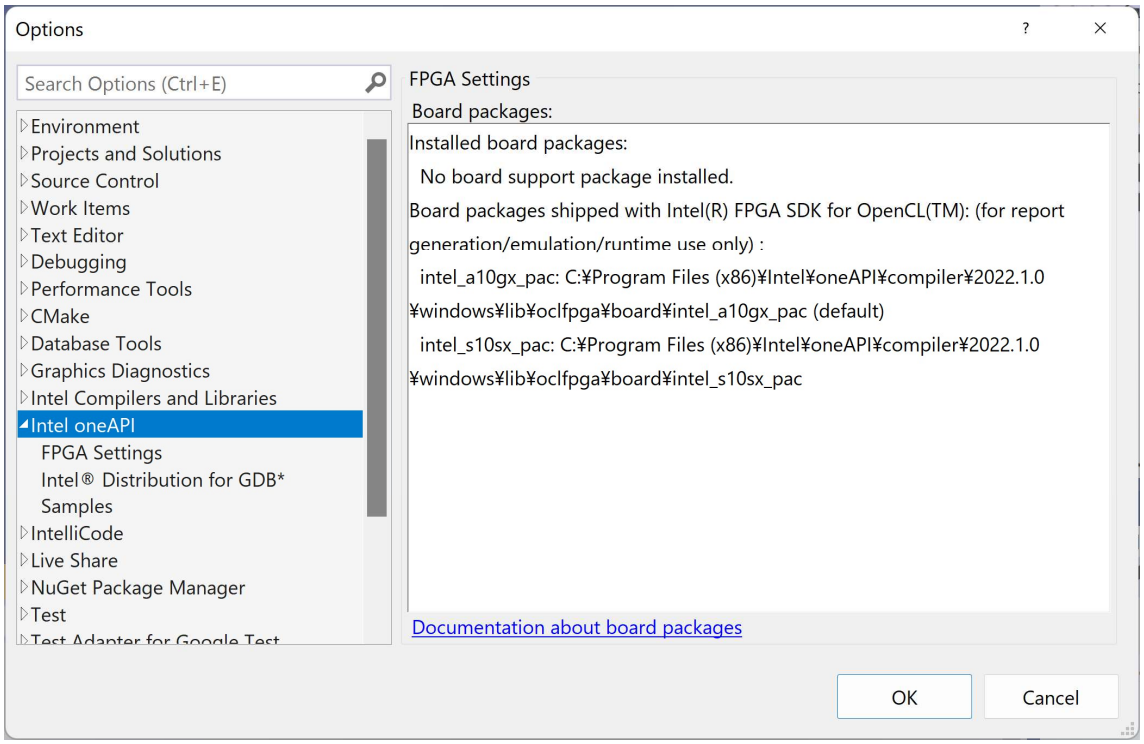



III-2

From “Open a project or solution”, open /phits/bin/phits-intel.vfproj

If you cannot select it, please make sure that Intel oneAPI appears in Menu Bar>Tool>Options. If not, oneAPI installation was not successful or you installed Visual Studio 2022.



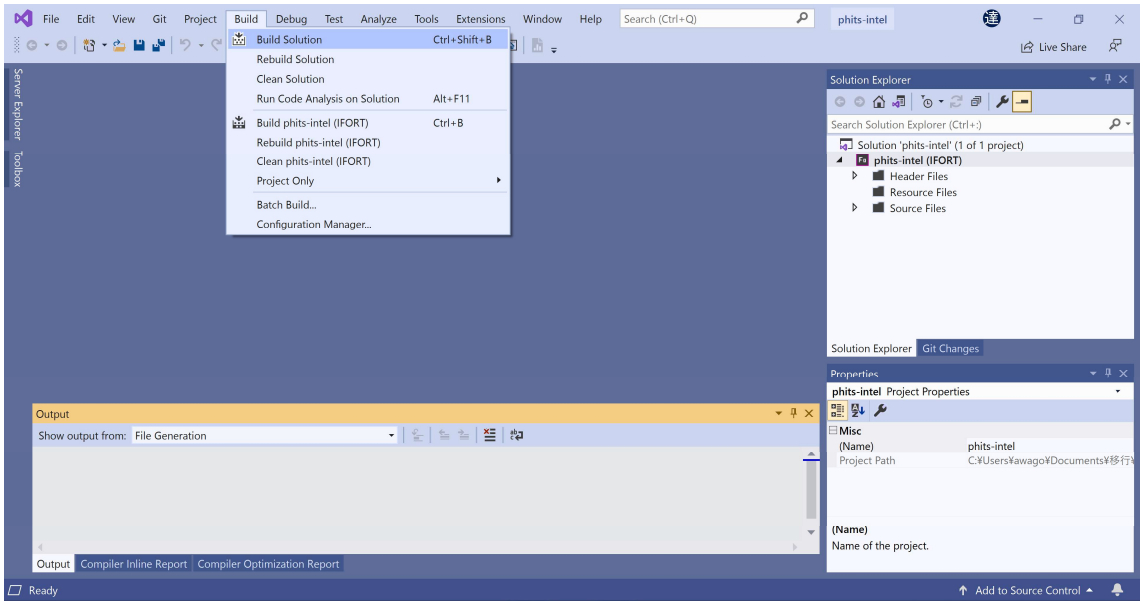




III-3

Create an executable file by

Build > Build Solution

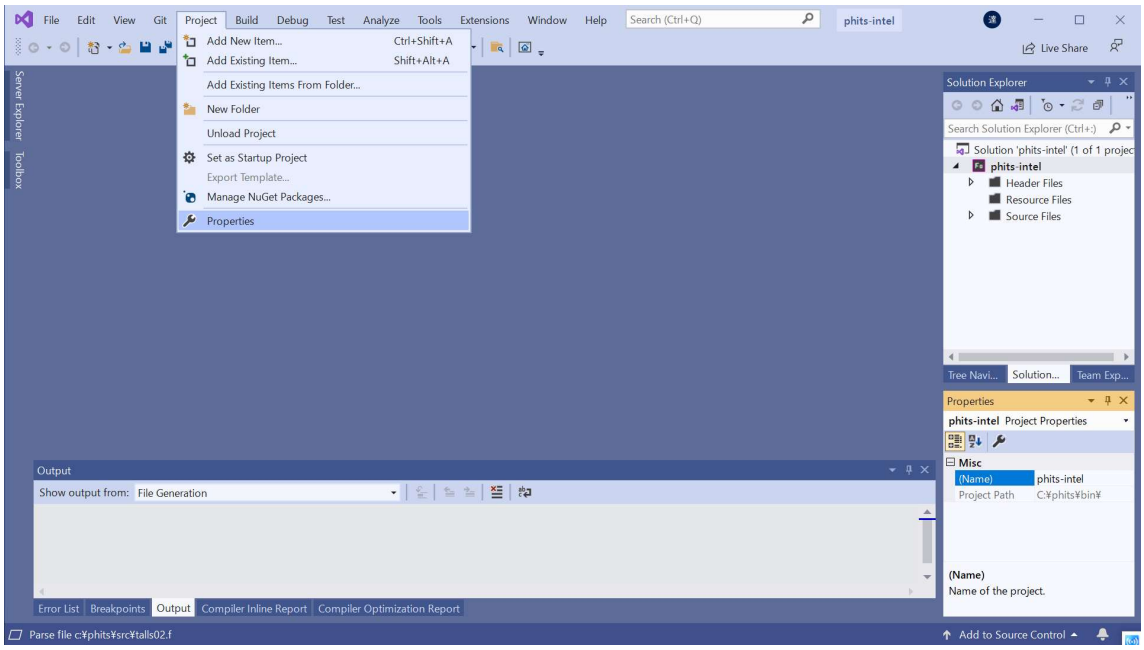
In Windows, please see “Execute via Command Prompt” in the manual on how to launch the executable file.

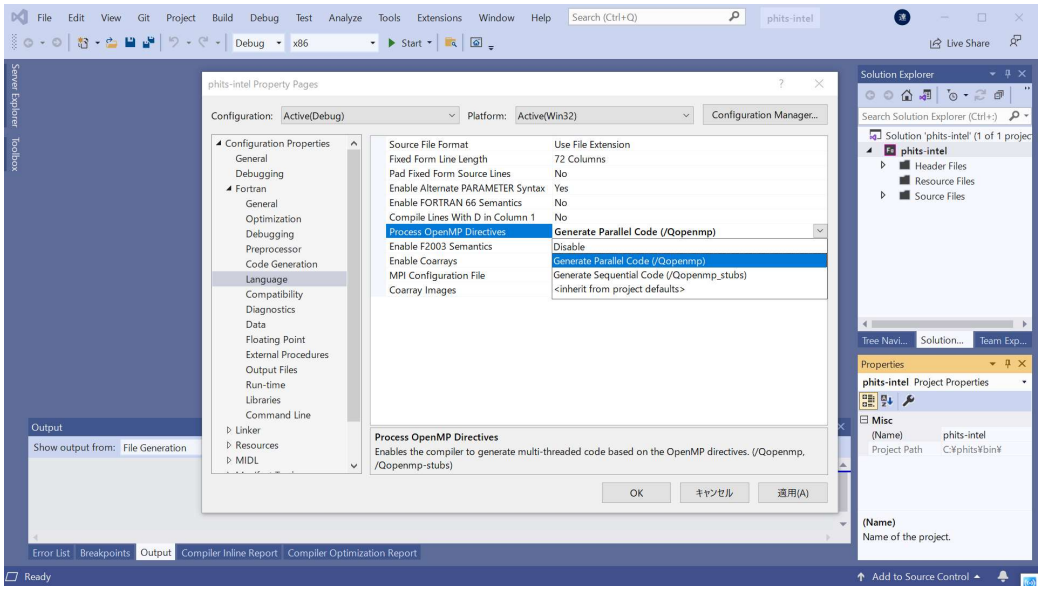



III-3’

To use OpenMP, activate “Qopenmp” option from

Menu bar > Project > Properties > Fortran > Language > Process OpenMP directives > Generate Parallel code






III-3’’

III-3’’-1

To use MPI, you need to

- Install MS-MPI (not explained in this manual. Please search “MS-MPI install”)
- Configure the Build of Visual Studio

To configure the Build of Visual Studio, close Visual Studio and open phits¥bin¥phits-intel.vfproj with a text editor (e.g. notepad++). Then replace a line

<File RelativePath="..¥src¥mpi-non.f"/>

with

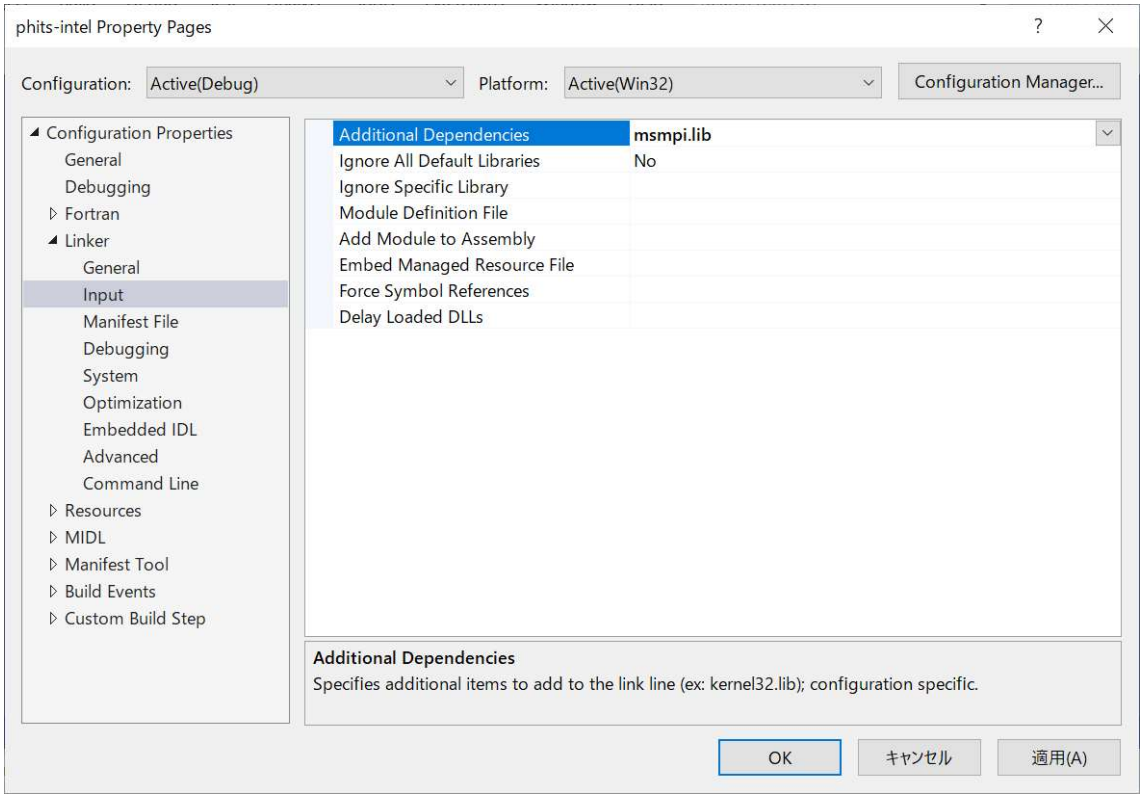
<File RelativePath="..¥src¥mpi-win.f"/>

and save, open phits¥bin¥phits-intel.vfproj with Visual Studio again.

III-3’’-2

Add a library file `msmpi.lib`

Menu bar > Project > Properties > Linker > Input > Additional dependencies


phits-intel Property Pages
Configuration: Active(Debug)
Platform: Active(Win32)
Configuration Manager...
Configuration Properties
General
Debugging
Fortran
Linker
General
Input
Manifest File
Debugging
System
Optimization
Embedded IDL
Advanced
Command Line
Resources
MIDL
Manifest Tool
Build Events
Custom Build Step
Additional Dependencies
msmpi.lib
Ignore All Default Libraries
No
Ignore Specific Library
Module Definition File
Add Module to Assembly
Embed Managed Resource File
Force Symbol References
Delay Loaded DLLs
Additional Dependencies
Specifies additional items to add to the link line (ex: kernel32.lib); configuration specific.
OK
キャンセル
適用(A)

III-3’’-3