

一、在官网

<https://software.intel.com/content/www/us/en/develop/tools/oneapi/components/onemkl.html>

下载 linux 系统版本的两个安装包：

1. Intel® oneAPI Base Toolkit
2. Intel® oneAPI HPC Toolkit

下载过程示意图如下：

The screenshot shows the Intel oneAPI website interface. At the top, there are navigation links: "Documentation & Code Samples", "Specifications", and "Help". Below this, the page is divided into sections. On the left, under "What's New", there is text about Data Parallel C++ (DPC++) APIs and a link "Learn about Data Parallel C++". On the right, under "What You Need", there are two bullet points: "The Intel® oneAPI Math Kernel Library (oneMKL) is available as part of the Intel® oneAPI Base Toolkit." and "Using oneMKL with Intel® MPI library or Intel® Fortran Compilers requires the Intel® oneAPI HPC Toolkit." Below these bullet points, there are two links: "Explore the Intel® oneAPI Base Toolkit" and "Explore the Intel® oneAPI HPC Toolkit", both of which are circled in red. Below the "What You Need" section, there is a large section titled "Download the Toolkit" with a "Get It Now" button, also circled in red. At the bottom, there is a section titled "Select options below to download" with three dropdown menus: "Operating System" (set to Linux), "Distribution" (set to Web & Local (recommended)), and "Installer Type" (set to Local). To the right of these dropdowns, there is a section titled "Local Installer" with two bullet points: "Includes all tools in the toolkit" and "Recommended for host machines with poor or no internet connection". Below this, there is a section titled "What's Included in the Intel oneAPI Base Toolkit for Linux*" with a dropdown arrow. Below this section, there is text: "Download size: 3.43 GB", "Version: 2021.3", and "Date: June 24, 2021". At the bottom right, there is a blue "Download" button.

二、安装 l_BaseKit_p_2021.3.0.3219_offline

1. 界面提示安装方法: `sudo sh l_BaseKit_p_2021.3.0.3219_offline`
2. 命令行(非界面)提示安装方法教程:

<https://software.intel.com/content/www/us/en/develop/documentation/installation-guide-for-intel-oneapi-toolkits-linux/top/installation/install-with-command-line.html#install-with-command-line>

3. 命令为: `sudo sh l_BaseKit_p_2021.3.0.3219_offline.sh -a --silent --list-products`
4. 安装成功会显示如下图的信息，如果显示 failed 则重启计算机再尝试安装。

```
yuanjianlong@DESKTOP-NNDIC9P: /mnt/d/softwarePackages
yuanjianlong@DESKTOP-NNDIC9P: $ cd /mnt/d/softwarePackages/
yuanjianlong@DESKTOP-NNDIC9P:/mnt/d/softwarePackages$ sudo sh ./1_BaseKit_p_2021.3.0.3219_offline.sh -s -a --silent --eula accept
[sudo] password for yuanjianlong:
QStandardPaths: XDG_RUNTIME_DIR not set, defaulting to '/tmp/runtime-root'
Checking system requirements...
Done.
Wait while the installer is preparing...
Done.
Launching the installer...
QStandardPaths: XDG_RUNTIME_DIR not set, defaulting to '/tmp/runtime-root'
XDG Util package is not installed
Intel® VTune(TM) Profiler requires XDG Utils for graphical user interface, it can be installed with <br/> <b>sudo apt-get install xdg-u
tile </b> on Ubuntu / Debian <br/><b>sudo zypper install xdg-utils </b> on SUSE <br/><b>sudo dnf install xdg-utils </b> on CentOS / RHE
L / Fedora
Intel® Graphics Compute Runtime for OpenCL™ not found.
You have no relevant GPU driver. If you are going to develop and run GPU-accelerated applications on this system, please check the <a h
ref="https://software.intel.com/content/www/us/en/develop/documentation/installation-guide-for-intel-oneapi-toolkits-linux/top/install-
intel-gpu-drivers.html">installation guide</a> for instructions on the GPU drivers.<br/>Otherwise, you can ignore the warning and conti
nue the installation as is: the product can still be used with CPU.
Start installation flow...
Installed Location: /opt/intel/oneapi
Installation has successfully completed
Log file: /opt/intel/oneapi/logs/installer.install.intel.oneapi.lin.basekit.product,v=2021.3.0-3219.2021.09.10.15.48.04.842595.log
yuanjianlong@DESKTOP-NNDIC9P:/mnt/d/softwarePackages$
```

三、安装 l_HPCKit_p_2021.3.0.3230_offline.sh

1. 界面提示安装方法: `sudo sh l_HPCKit_p_2021.3.0.3230_offline.sh`
2. 命令行(非界面)提示安装方法教程:
<https://software.intel.com/content/www/us/en/develop/documentation/installation-guide-for-intel-oneapi-toolkits-linux/top/installation/install-with-command-line.html#install-with-command-line>
3. 命令为: `sudo sh ./l_HPCKit_p_2021.3.0.3230_offline.sh -s -a --silent --eula accept`
4. 安装成功会显示如下信息, 如果显示 failed 则重启计算机再尝试安装。

```
yuanjianlong@DESKTOP-NNDIC9P:/mnt/d/softwarePackages$ sudo sh ./l_HPCKit_p_2021.3.0.3230_offline.sh -s -a --silent --eula accept
QStandardPaths: XDG_RUNTIME_DIR not set, defaulting to '/tmp/runtime-root'
Checking system requirements...
Done.
Wait while the installer is preparing...
Done.
Launching the installer...
QStandardPaths: XDG_RUNTIME_DIR not set, defaulting to '/tmp/runtime-root'
Start installation flow...
Installed Location: /opt/intel/oneapi
Installation has successfully completed
Log file: /opt/intel/oneapi/logs/installer.install.intel.oneapi.lin.hpckit.product,v=2021.3.0-3230.2021.09.10.16.03.56.561029.log
yuanjianlong@DESKTOP-NNDIC9P:/mnt/d/softwarePackages$
```

四、设置环境变量

`source ./opt/intel/oneapi/setvars.sh`

显示如下信息:

```
yuanjianlong@DESKTOP-NNDIC9P:/$ source ./opt/intel/oneapi/setvars.sh

:: initializing oneAPI environment ...
-bash: BASH_VERSION = 4.4.20(1)-release
:: advisor -- latest
:: ccl -- latest
:: clik -- latest
:: compiler -- latest
:: dal -- latest
:: debugger -- latest
:: dev-utilities -- latest
:: drunl -- latest
:: dpcpp-ct -- latest
:: dpl -- latest
:: inspector -- latest
:: intelpython -- latest
:: ipp -- latest
:: ippcp -- latest
:: itac -- latest
:: mkl -- latest
:: mpi -- latest
:: tbb -- latest
:: vpl -- latest
:: vtune -- latest
:: oneAPI environment initialized ::
```

五、检查是否安装成功

1. 在终端输入 mpirun，显示：

```
yuanjianlong@DESKTOP-NNCIC9P:/$ mpirun
Usage: ./mpixec [global opts] [local opts for exec1] [exec1] [exec1 args] : [local opts for exec2] [exec2] [exec2 args] : ...
Global options (passed to all executables):

  Global environment options:
    -env (name) (value)          environment variable name and value
    -envlist (env1,env2,...)     environment variable list to pass
    -envnone                     do not pass any environment variables
    -envval                       pass all environment variables not managed
                                by the launcher (default)

  Other global options:
    -f (name)                   file containing the host names
    -hosts (host list)          comma separated host list

Local options (passed to individual executables):

  Other local options:
    -n/-np (value)             number of processes
    (exec_name) (args)         executable name and arguments

Hydra specific options (treated as global):

  Launch options:
    -launcher                   launcher to use (ssh slurm rsh ll sge pbsdsh pdsh srun lsf blaunch qssh fork)
    -launcher-exec              executable to use to launch processes
    -enable-x/-disable-x       enable or disable X forwarding

  Resource management kernel options:
    -rmk                        resource management kernel to use (slurm ll lsf sge pbs cobalt)

  Processor topology options:
    -bind-to                    process binding
    -map-by                     process mapping
    -membind                    memory binding policy

  Other Hydra options:
    -verbose                    verbose mode
    -info                       build information
    -print-all-exitcodes       print exit codes of all processes
    -ppn                        processes per node
    -prepend-rank               prepend rank to output
    -prepend-pattern            prepend pattern to output
    -outfile-pattern            direct stdout to file
    -errfile-pattern            direct stderr to file
    -nameserver                 name server information (host:port format)
    -disable-auto-cleanup       don't cleanup processes on error
    -disable-hostname-propagation let MPICH auto-detect the hostname
    -localhost                  local hostname for the launching node
    -usize                      universe size (SYSTEM, INFINITE, <value>)

Intel(R) MPI Library specific options:

  <option> -help                show help message for the specific option

  Global options:
    -aps                        Intel(R) Application Performance Snapshot profile
    -mps                        Intel(R) Application Performance Snapshot profile (MPI, OpenMP only)
    -gtool                      tool and rank set
    -gtoolfile                  file containing tool and rank set
    -hosts-group (groups of hosts) allows to set node ranges (like in Slurm* Workload Manager)

  Other Hydra options:
    -iface                      network interface to use
    -s <spec>                   redirect stdin to all or 1,2 or 2-4,6 MPI processes (0 by default)
    -silent-abort               do not print abort warning message
    -nolocal                    avoid running the application processes on the node where mpiexec.hydra started
    -tune (binary file)         defines the name of binary tuning file
    -print-rank-map             print rank mapping

Intel(R) MPI Library, Version 2021.3 Build 20210601 (id: 6f90181f1)
Copyright 2003-2021 Intel Corporation.
```

2. 在终端输入：ifort -v

```
yuanjianlong@DESKTOP-NNCIC9P:/$ ifort -v
ifort version 2021.3.0
yuanjianlong@DESKTOP-NNCIC9P:/$
```

六、常见问题

1. 问题：在新终端上无法执行 mpirun

推测原因：环境变量设置不正确

解决方案：

1) 在终端输入：vi ~/.bashrc

2) 在底部加上环境变量语句:

```
export INTEL_PATH=/opt/intel/oneapi/mpi/2021.3.0
```

```
export PATH=$PATH:$INTEL_PATH/bin
```

3) 保存并退出 ~/.bashrc

4) 环境变量生效, 执行:

```
source ~/.bashrc
```

```
mpicc
```

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