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Compilers

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Intel Compiler

The theory group has a five user floating license for Intel Parallel Studio.

The current version is **XE20, update 4**. All available versions are :

- XE20, update 4
- XE20, update 2
- XE20, update 1
- XE20
- XE19, update 5
- XE19, update 4
- XE19, update 3
- XE19, update 2
- XE19, update 1
- XE19
- XE18, update 4
- XE18, update 3
- XE18, update 2
- XE18, update 1
- XE18
- XE17, update 8
- XE17, update 7
- XE17, update 6
- XE17, update 5
- XE17, update 4
- XE17, update 2
- XE17,
- XE16, update 4,
- XE16,

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- XE15, update 6,
- XE15, update 3,
- XE15, update 2,
- XE14, and
- XE13 update 4

of Parallel or Cluster Studio, and XE12 update 4 of Composer XE.

Setting up the compiler environment

To use Intel Parallel Studio, set the environment for a terminal window.

Note, the commands for XE14 and up initialize not only the compilers but also the Intel Trace Analyzer, Intel MPI, Inspector XE, VTune(TM) Amplifier XE, and Advisor XE.

Initialize Intel Parallel Studio using the following script, e.g. in your `.profile`:

```
VERSION=XE20u4
INITPATH=parallel_studio_xe_2020
INITSCRIPT=psxevars.sh
. /sw/linux/intel/${VERSION}/${INITPATH}/${INITSCRIPT}
```

Listing 1: Initialization script for Intel Parallel Studio

For other versions of Intel Parallel Studio replace the variable in the script with the values of the desired version's row in the table below:

- Setting up XE12 update 2 (replace "intel64" with "ia32" if you are using a 32-bit platform)

```
. /sw/linux/intel/XE12u2/bin/compilervars.sh intel64
```

Using the compilers

The commands to start the compilers are:

- `icpc` for the C++ compiler
- `icc` for the C compiler
- `ifort` for the FORTRAN compiler

To get help, append the `-help` option or precede with the *man(1)* command.

Compiler documentation

You can find more documentation here:

- Intel Online Documentation
  - Intel® Software Documentation Library
  - Intel Parallel Studio XE — Get Started
- XE20, update 4

Table 1: Initialization variables and values for Intel Parallel Studio

Compiler version	VERSION	INITPATH	INITSCRIPT
XE20 update 4	XE20u4	parallel_studio_xe_2020	psxevars.sh
XE20 update 2	XE20u2	parallel_studio_xe_2020	psxevars.sh
XE20 update 1	XE20u1	parallel_studio_xe_2020	psxevars.sh
XE20	XE20	parallel_studio_xe_2020	psxevars.sh
XE19 update 5	XE19u5	parallel_studio_xe_2019	psxevars.sh
XE19 update 4	XE19u4	parallel_studio_xe_2019	psxevars.sh
XE19 update 3	XE19u3	parallel_studio_xe_2019	psxevars.sh
XE19 update 2	XE19u2	parallel_studio_xe_2019	psxevars.sh
XE19 update 1	XE19u1	parallel_studio_xe_2019	psxevars.sh
XE19	XE19	parallel_studio_xe_2019	psxevars.sh
XE18 update 4	XE18u4	parallel_studio_xe_2018	psxevars.sh
XE18 update 3	XE18u3	parallel_studio_xe_2018	psxevars.sh
XE18 update 2	XE18u2	parallel_studio_xe_2018	psxevars.sh
XE18 update 1	XE18u1	parallel_studio_xe_2018	psxevars.sh
XE18	XE18	parallel_studio_xe_2018	psxevars.sh
XE17 update 8	XE17u8	parallel_studio_xe_2017	psxevars.sh
XE17 update 7	XE17u7	parallel_studio_xe_2017	psxevars.sh
XE17 update 6	XE17u6	parallel_studio_xe_2017	psxevars.sh
XE17 update 5	XE17u5	parallel_studio_xe_2017	psxevars.sh
XE17 update 4	XE17u4	parallel_studio_xe_2017	psxevars.sh
XE17 update 2	XE17u2	parallel_studio_xe_2017.2.050	psxevars.sh
XE17 update 1	XE17u1	parallel_studio_xe_2017.1.043	psxevars.sh
XE17	XE17	parallel_studio_xe_2017.0.035	psxevars.sh
XE16 update 4	XE16u4	parallel_studio_xe_2016.4.072	psxevars.sh
XE16	XE16	parallel_studio_xe_2016.0.047	psxevars.sh
XE15 update 6	XE15u6	parallel_studio_xe_2015	psxevars.sh
XE15 update 3	XE15u3	parallel_studio_xe_2015	psxevars.sh
XE15 update 2	XE15u2	parallel_studio_xe_2015	psxevars.sh
XE13 update 4	XE13u4	ics/2013.1.039	ictvars.sh

    - /sw/linux/intel/XE20u4/documentation_2020/en/ps2020/getstart_clus.htm
- XE20, update 2
    - /sw/linux/intel/XE20u2/documentation_2020/en/ps2020/getstart_clus.htm
- XE20, update 1
    - /sw/linux/intel/XE20u1/documentation_2020/en/ps2020/getstart_clus.htm
- XE20
    - /sw/linux/intel/XE20/documentation_2020/en/ps2020/getstart_clus.htm
- XE19, update 5
    - /sw/linux/intel/XE19u5/documentation_2019/en/ps2019/getstart_clus.htm
- XE19, update 4
    - /sw/linux/intel/XE19u4/documentation_2019/en/ps2019/getstart_clus.htm
- XE19, update 3
    - /sw/linux/intel/XE19u3/documentation_2019/en/ps2019/getstart_clus.htm
- XE19, update 2
    - /sw/linux/intel/XE19u2/documentation_2019/en/ps2019/getstart_clus.htm
- XE19, update 1
    - /sw/linux/intel/XE19u1/documentation_2019/en/ps2019/getstart_clus.htm
- XE19
    - /sw/linux/intel/XE19/documentation_2019/en/ps2019/getstart_clus.htm
- XE18, update 4
    - /sw/linux/intel/XE18u4/documentation_2018/en/ps2018/getstart_clus_l.htm
- XE18, update 3
    - /sw/linux/intel/XE18u3/documentation_2018/en/ps2018/getstart_clus_l.htm
- XE18, update 2
    - /sw/linux/intel/XE18u2/documentation_2018/en/ps2018/getstart_clus_l.htm
- XE18, update 1
    - /sw/linux/intel/XE18u1/documentation_2018/en/ps2018/getstart_clus_l.htm
- XE18
    - /sw/linux/intel/XE18/documentation_2018/en/ps2018/getstart_clus_l.htm
- XE17, update 8
    - /sw/linux/intel/XE17u8/documentation_2017/en/ps2017/getstart_clus_l.htm
- XE17, update 7
    - /sw/linux/intel/XE17u7/documentation_2017/en/ps2017/getstart_clus_l.htm
- XE17, update 6
    - /sw/linux/intel/XE17u6/documentation_2017/en/ps2017/getstart_clus_l.htm
- XE17, update 5
    - /sw/linux/intel/XE17u5/documentation_2017/en/ps2017/getstart_clus_l.htm
- XE17, update 4
    - /sw/linux/intel/XE17u4/documentation_2017/en/ps2017/getstart_clus_l.htm
- XE17, update 2
    - /sw/linux/intel/XE17u2/documentation_2017/en/ps2017/getstart_clus_l.htm
- XE17, update 1
    - /sw/linux/intel/XE17u1/documentation_2017/en/ps2017/getstart_clus_l.htm
- XE17
    - /sw/linux/intel/XE17/documentation_2017/en/ps2017/getstart_clus_l.htm

- XE16, update 4
  - /sw/linux/intel/XE16u4/documentation_2016/en/ps2016/getstart_clus_l.htm
- XE16
  - /sw/linux/intel/XE16/documentation_2016/en/ps2016/getstart_clus_l.htm
- XE15, update 6
  - /sw/linux/intel/XE15u6/parallel_studio_xe_2015/Documentation/en_US/cluster_edition/Doc_Ind
- XE15, update 3
  - /sw/linux/intel/XE15u3/parallel_studio_xe_2015/Documentation/en_US/cluster_edition/Doc_Ind
- XE15, update 2
  - /sw/linux/intel/XE15u2/parallel_studio_xe_2015/Documentation/en_US/cluster_edition/Doc_Ind
- XE14
  - C/C++: /sw/linux/intel/XE14/composerxe/Documentation/en_US/get_started_lc.htm
  - Fortran: /sw/linux/intel/XE14/composerxe/Documentation/en_US/get_started_lf.htm
  - Math Kernel Library: /sw/linux/intel/XE14/composerxe/Documentation/en_US/mkl/get_started.html
  - Integrated Performance Primitives: /sw/linux/intel/XE14/composerxe/Documentation/en_US/ipp/get_
  - Threaded Building Blocks: /sw/linux/intel/XE14/composerxe/Documentation/en_US/tbb/get_started
- XE13, update 4
  - C/C++: /sw/linux/intel/XE13u4/Documentation/en_US/get_started_lc.htm
  - Fortran: /sw/linux/intel/XE13u4/Documentation/en_US/get_started_lf.htm
- XE13
  - C/C++: /sw/linux/intel/XE13u2/Documentation/en_US/get_started_lc.htm
  - Fortran: /sw/linux/intel/XE13u2/Documentation/en_US/get_started_lf.htm
  - Intel Trace Analyzer: /sw/linux/intel/XE13u2/Doc_Index.html
- XE12
  - /sw/linux/intel/XE12u2/composerxe-2011.2.137/Documentation/en_US/documentation_c.htm
  - /sw/linux/intel/XE12u2/composerxe-2011.2.137/Documentation/en_US/documentation_f.htm

Intel Trace Analyzer (XE <= 13.4)

Use the Intel® Trace Analyzer and Collector to understand the MPI application behavior, quickly find bottlenecks and achieve high performance for parallel cluster applications.

Note: For Parallel Studio XE15 and up you initialize the trace analyzer by setting up the compiler environment.

To simplify the use of the Intel Trace Analyzer and Collector, set up its environment in your shell by using the provided scripts.

- Using bash/ksh/sh:

```
. /sw/linux/intel/XE13u4/itac/8.1.2.033/bin/itacvars.sh
```

- Using legacy csh/tcsh:

```
source  /sw/linux/intel/XE13u4/itac/8.1.2.033/bin/itacvars.csh
```

For more information see Intel® Trace Analyzer and Collector - Documentation

Intel MPI Library (XE 13.4)

- Using bash/ksh/sh:

```
. /sw/linux/intel/XE13u4/impi/4.1.1.036/bin64/mpivars.sh
```

- Using legacy csh/tcsh

```
source /sw/linux/intel/XE13u4/impi/4.1.1.036/bin64/mpivars.csh
```

For more information see Intel® MPI Library - Documentation

Portland Group Compiler

Note: We don't license the Portland Group Compiler anymore. Apparently it hasn't been missed since at least 2014.

The existing license includes use of the accelerator compiler. You can use it from the group's Linux machines; up to 5 users can compile at the same time.

To use the 64-bit PGI compilers and tools:

Community Version 19.10 on Debina Linux 10

You can put the following script in your `.profile`. Please adjust the `set_pgi` call to your preferred compiler version.

```
# call with values of 19.10
set_d10pgi()
{
  PGI=/sw/linux/pgi/$1-d10; export PGI
  MANPATH=$MANPATH:$PGI/linux86-64/$1/man; export MANPATH
  LM_LICENSE_FILE=$PGI/license.dat; export LM_LICENSE_FILE
  PATH=$PGI/linux86-64/$1/bin:$PATH; export PATH
}

set_d10pgi 19.10
```

Listing 2: Initialization script for the PGI compilers on Debian Linux

Version 14.10 and 14.9 on Debian Linux 9

You can put the following script in your `.profile`. Please adjust the `set_pgi` call to your preferred compiler version.

```
# call with values of 14.9 or 14.10
set_pgi()
{
  PGI=/sw/linux/pgi/$1-debian; export PGI
  MANPATH=$MANPATH:$PGI/linux86-64/$1/man; export MANPATH
  LM_LICENSE_FILE=$PGI/license.dat; export LM_LICENSE_FILE
  PATH=$PGI/linux86-64/$1/bin:$PATH; export PATH

}

set_pgi 14.10
```

Listing 3: Initialization script for the PGI compilers on Debian Linux

Version 11.10, 12.10, 13.7, 13.8, 13.10, or 14.9

You can put the following script in your `.profile`. Please adjust the `set_pgi` call to your preferred compiler version.

```
# call with values of 11.10, 12.10, 13.7, 13.8, 13.10. or 14.9
set_pgi()
{
  PGI=/sw/linux/pgi/$1; export PGI
  MANPATH=$MANPATH:$PGI/linux86-64/$1/man; export MANPATH
  LM_LICENSE_FILE=$PGI/license.dat; export LM_LICENSE_FILE
  PATH=$PGI/linux86-64/$1/bin:$PATH; export PATH

}

set_pgi 13.10
```

Listing 4: Initialization script for the PGI compilers on SUSE Linux

Note, when using this code, you can use the other versions by simply calling e.g. `set_pgi 12.10` on the command line. Then your environment is set to use version 12.10 of the PGI compilers.

Version 10.9

You can put the following script in your `.profile`.

```
PGI=/sw/linux/pgi-10.9; export PGI
MANPATH=$MANPATH:$PGI/linux86-64/10.9/man; export MANPATH
LM_LICENSE_FILE=$PGI/license.dat; export LM_LICENSE_FILE
PATH=$PGI/linux86-64/10.9/bin:$PATH; export PATH
```

Listing 5: Initialization script for PGI 10.9 on SUSE Linux

You can find a more documentation on the Portland group web site: www.pgroup.com

Notes on compiling

Note: Do **not** modify or set `LD_LIBRARY_PATH` in your `.bashrc`, `.profile` or other shell initialization files.

Note: Try to *never* use the `LD_LIBRARY_PATH` variable, if possible. See `https://enchildfone.wordpress.com/2010/03/23/a-description-of-rpath-origin-ld_library_path-and-portable-linux-binaries/` for hints on how to avoid the variable.