



Intel® Distribution for Python*

2024 Update 1 Release

Release Notes

19 March 2024

Version History/Revision History

Date	Revision	Description
19 March 2024	1.0	Release Notes for the Intel® Distribution for Python* 2024 Update 1 Release

Intended Audience

The target audience for the release notes are software developers and end users of the Intel® Distribution for Python* 2024 Update 1 release.

Customer Support

For technical support, including answers to questions not addressed in this document, visit the technical support forum at <https://software.intel.com/en-us/forums/intel-distribution-for-python> or email Intel Corporation at scripting@intel.com.

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1 Introduction

The Python* programming language is an open-source programming language with increasing adoption by developers across many application domains and a large ecosystem of available free packages. In particular, the packages commonly used for numerical and scientific computation, called the [SciPy](#) stack, are very popular and heavily used.

Intel® Distribution for Python* is a binary distribution of Python interpreter and commonly used packages for computation and data intensive domains, such as scientific and engineering computing, big data, and data science. The product supports Python 3.9 for Windows and Linux. The product simplifies Python installation by providing packages in a binary form so that everything is pre-configured and no compilation tools are needed, as well as contains all the dependences for running on popular OS platforms. Python packages have been accelerated with Intel® Performance Libraries, including [Intel® Math Kernel Library \(Intel® MKL\)](#), [Intel® Threading Building Blocks \(Intel® TBB\)](#), [Intel® Integrated Performance Primitives \(Intel® IPP\)](#), and [Intel® Data Analytics Acceleration Library \(Intel® DAAL\)](#). The packages have been optimized to take advantage of parallelism through the use of vectorization, multi-threading and multi-processing, as well as through the use of optimized communication across multiple nodes.

This document provides system requirements, installation instructions, and lists issues and limitations.

To learn more about this product, see:

- New features in the [New in this Release](#) section below, or in the product help.
- Reference documentation in the [Related Documentation](#) section below
- Installation instructions in the [Installing this Release](#) section below

2 New in this Release

2.1 Intel® Distribution for Python 2024 Update 1 Release

The following are new features for the release:

- Significant improvements for **Data Parallel Extensions for Python**
 - **Data Parallel Controls - dpctl**
 - The library is now **100% conformant with core Python Array API 2022.12 spec**
 - The following **new features** added:
 - Reduction Functions: min, max, prod, logsumexp, reduce_hypot
 - Statistical Functions: mean, std, var
 - Sorting Functions: sort, argsort
 - Set Functions: unique_values, unique_counts, unique_inverse, unique_all
 - Elementwise Functions: clip, cbirt, rsqrt, exp2, copysign, reciprocal

- Linear Algebra Functions: matmul, vecdot, tensordot
- In-Place Elementwise Operations:
 - Dedicated support for in-place Python operators (+=, -=, *=, /=, ^=, &&=, ||=, ^^=, <<=, >>=, %=) on usm_ndarray Python type
- **Performance enhancements** and **bug fixes**
- The library now **supports NVidia* devices**. Follow [GitHub instructions](#) how to compile dpctl for CUDA devices.
- **Data Parallel Extension for NumPy* - dnp**
 - **New features** added:
 - Linear Algebra Functions: slogdet, solve
 - Manipulation
Functions: broadcast_arrays, can_cast, column_stack, row_stack, dstack, vstack, tile
 - Mathematical
Functions: clip, logaddexp, logsumexp, positive, reduce_hypot
 - Statistical
Functions: nanargmax, nanargmin, nanmax, nanmin, nanmean, nanstd, nanvar
 - Type Relating Functions: finfo, iinfo
 - **Extended support for keyword arguments:**
 - Array Creation
Functions: diag, diagflat, geomspace, linspace, logspace, identity, tril, vander
 - Counting Functions: count_nonzero
 - Indexing Functions: indices, put_along_axis, take_along_axis
 - Linear Algebra Functions: cholesky, det, dot, inv, matmul, qr, svd
 - Manipulation
Functions: atleast_1d, atleast_2d, atleast_3d, astype, concatenate, stack, ravel, repeat
 - Mathematical
Functions: absolute, abs, angle, reciprocal, cbrt, rsqrt, copysign, diff, exp, exp2, expm1, fmax, fmin, maximum, minimum, hypot, log10, log1p, log2, prod, nanprod
 - Searching Functions: argmax, argmin
 - Sorting Functions: argsort, sort
 - Statistical
Functions: average, max, min, amax, amin, mean, nansum, ptp, std, var
 - **Bug fixes** and **performance improvements** (elementwise and linear algebra functions)
- **Data Parallel Extension for Numba* - numba-dpex**
 - **Added support for Numba 0.59**. Minimum required Numba version is 0.58
 - **New features in kernel API** that enable greater control of device execution:
 - **Atomic Fetch**
Operations: fetch_add, fetch_sub, fetch_min, fetch_max, fetch_and, fetch_or, fetch_xor.

- **Atomic Load, Store, Exchange**
Operations: `atomic_load`, `atomic_store`, `atomic_exchange`
- **Atomic Compare-Exchange Operation:** `atomic_compare_exchange`.
- **New indexing classes**, `Item` and `NdItem`, which allow to express different levels of parallelism. All indexing functions are supported with these new classes.
 - **NOTE:** Old indexing functions have been deprecated!
- Added **support for group_barrier functions**, fixing code generation issues in the existing barrier function.
 - **Performance and other enhancements:**
 - Significantly **improved kernel launch times**.
 - **Kernel functions can now be submitted asynchronously** to execution queues.
 - **Kernel functions are now callable from inside `dpjit` functions**.
- Version updates of conda packages

The full list of provided packages is in [Release Content](#).

3 System Requirements

The Intel® Distribution for Python* supports the Intel® 64 architecture. For a complete explanation of this architecture name please read the following article:

[Intel® Architecture Platform Terminology for Development Tools](#).

The lists below pertain only to the system requirements necessary to support application development with Intel® Distribution for Python*. If you are using Cython*, please review the documentation for your compiler (GCC*, Microsoft Visual Studio*, or Intel® Compiler) to determine the minimum hardware and software requirements.

Minimum System Requirements

- A system based on an Intel® 64 architecture processor supporting the Intel® Streaming SIMD Extensions 4.2 (Intel® SSE4.2) instructions (or compatible non-Intel® processor).
NOTE:
 - Incompatible or proprietary instructions in non-Intel® processors may cause the analysis capabilities of this product to function incorrectly. Any attempt to analyze code not supported by Intel® processors may lead to failures in this product.
 - For the best experience, a multi-core or multiprocessor system is recommended.
- About 4GB free disk space for all product features and all architectures

Note: Intel® Distribution for Python* is expected to work on many more Linux distributions as well. Let us know if you have trouble with the distribution you use.

Hardware Requirements

- GPU:
 - 6th Gen Intel® Core™ processor or higher
 - Intel® Iris® Plus Graphics
 - Intel® Iris® Xe Graphics
 - Intel® Iris® Xe Max Graphics
 - Intel® Iris® Graphics
 - Intel® Iris® Pro Graphics
- CPU:
 - Intel Atom® Processors
 - Intel® Core™ Processor Family
 - Intel® Xeon® Processor Family
 - Intel® Xeon® Scalable Performance Processor Family

Apple M1* hardware is currently not supported

Windows Intel® Graphics Driver

To install the driver follow the directions in the article appropriate for your device:

- Intel® Iris® Xe MAX (DG1) and 10th-13th Gen Intel® Core™ Processor Graphics
 - <https://www.intel.com/content/www/us/en/download/19344/intel-graphics-windows-dch-drivers.html>
- Intel® Arc™ A-Series Graphics (DG2)
 - <https://www.intel.com/content/www/us/en/download/726609/intel-arc-graphics-windows-dch-driver.html>
- Intel® Data Center GPU Flex Series (ATS-M)
 - <https://registrationcenter.intel.com/en/products/subscription/956/>

Contact your OEM representative for access to the Intel Registration Center.

Linux General Purpose Intel GPUs (GPGPU) Driver

For all Intel GPUs, see this article, <https://dgpu-docs.intel.com/>, and follow the directions for your device.

Software Requirements

These OS distributions are tested by Intel or known to work; other distributions may or may not work and are not recommended. If you have questions, access the [Intel Community Forums](#) when you need assistance. If you have Commercial Support, create a support ticket.

Operating Systems:

- 64-bit Linux*: Ubuntu* 20.04, 22.04 (CPU & GPU)
- 64-bit Windows* Pro & Enterprise 10 (CPU & GPU), 11 (GPU only)
 - Using Microsoft's Windows Subsystem for Linux 2 (WSL2) in Windows 10, you can install the native Linux distribution of Intel oneAPI toolkits and libraries on Windows for CPU and GPU workflows. Details [here](#)
- Windows* Server 2019, 2022 (CPU & GPU)
- Red Hat Enterprise Linux 8, 9 (CPU & GPU)
- Fedora 36, 37 (CPU only)
- SUSE Linux Enterprise 15 SP3, 15 SP4 (CPU & GPU)

External Dependencies

For **Windows***: None

For **Linux***: None

4 Installation

Installing this Release

The Intel® Distribution for Python* is compatible with the Conda* package management tool. All modules included in the distribution are initially installed into the root Conda* environment. A virtual environment is also created.

The following commands can be used to install the distribution from your command line:

```
# Linux installation (Interactive)
bash ~/intelpython3.sh

# Linux installation (CLI)
bash ~/intelpython3.sh -b -u -p ~/intelpython3 # (Linux CLI installation)

# Windows installation (Interactive)
intelpython3.exe

# Windows installation (CLI)
start /wait intelpython3.exe /S /RegisterPython=0 /D=%LOCALAPPDATA%\intelpython3
```


Documentation for installing can also be found in the following link:

<https://www.intel.com/content/www/us/en/developer/articles/technical/get-started-with-intel-distribution-for-python.html>

Changing, Updating, or Removing the Product

To update your python root environment, use the conda commands listed following the next paragraph. All releases, including updates, will create a *virtual environment* in `<installdir>/intelpython/releases/` containing all new release content.

Intel® Distribution for Python* removal: On **Windows*** or **Linux***: Delete the installation directory and remove additions to your PATH.

You can also use the Conda* package management tool to update individual modules. You can find the Conda* tool in the bin directory on Linux* or in the Scripts directory on Windows*. Use these commands to do the following with the Conda* tool:

- To install a new module: `conda install <module name>`
- To update an existing module: `conda update <module name>`
- To remove an existing module: `conda remove <module name>`

5 Release Content

Intel® Distribution for Python* packages (New*, Updated**)

Name	Version	Platform
<code>_libgcc_mutex</code>	0.1	Linux
<code>_openmp_mutex</code>	4.5*	Linux
<code>asn1crypto</code>	1.5.1	Windows
<code>brotli</code>	1.1.0**	Linux, Windows
<code>brotli-bin</code>	1.1.0**	Linux, Windows
<code>brotli-python</code>	1.1.0**	Linux, Windows
<code>brotlipy</code>	0.7.0	Linux, Windows
<code>bzip2</code>	1.0.8	Linux, Windows
<code>c-ares</code>	1.26.0**	Linux, Windows
<code>ca-certificates</code>	2024.2.2**	Linux, Windows
<code>certifi</code>	2024.2.2**	Linux, Windows
<code>ffi</code>	1.16.1**	Linux, Windows
<code>charset</code>	5.2.0**	Linux, Windows
<code>charset-normalizer</code>	3.3.1**	Linux, Windows

colorama	0.4.6	Linux,Windows
common_cmplr_lib_rt	2024.0.0**	Linux,Windows
conda	23.3.1	Linux,Windows
conda-package-handling	2.2.0**	Linux,Windows
conda-package-streaming	0.9.0**	Linux,Windows
cryptography	42.0.4**	Linux,Windows
cycler	0.12.1	Linux,Windows
cython	3.0.8**	Linux,Windows
daal4py	2024.1.0**	Linux,Windows
dal	2024.1.0**	Linux,Windows
dpcpp_cpp_rt	2024.1.0**	Linux,Windows
dpcpp_llvm_spirv*	2024.1.0	Linux,Windows
dpctl	0.16.0**	Linux,Windows
dpnp	0.14.0**	Linux,Windows
fortran_rt	2024.1.0**	Linux,Windows
freetype	2.12.1	Linux,Windows
funcsigs	1.0.2	Linux,Windows
future	0.18.3	Linux,Windows
gtest	1.14.0	Linux
icc_rt	2024.0.0**	Linux,Windows
icu	73.2	Linux
idna	3.6	Linux,Windows
impi_rt	2021.12.0**	Linux,Windows
intel-fortran-rt	2024.1.0**	Linux,Windows
intel-opencl-rt	2024.1.0**	Linux,Windows
intel-openmp	2024.1.0**	Linux,Windows
intelpython	2024.1.0**	Linux,Windows
ipp	2021.11.0**	Linux,Windows
joblib	1.3.2**	Linux,Windows
jsonpatch	1.33**	Linux,Windows
jsonpointer	2.4**	Linux,Windows
kiwisolver	1.4.5	Linux,Windows
level-zero	1.16.0**	Linux
libabseil	20240116.1**	Linux,Windows
libarchive	3.6.2	Linux,Windows
libbrotlicommon	1.1.0**	Linux,Windows
libbrotlidec	1.1.0**	Linux,Windows
libbrotlienc	1.1.0**	Linux,Windows
libevent	2.1.12	Linux,Windows
libffi	3.4.2	Linux,Windows
libgcc-ng	13.2.0**	Linux
libgfortran-ng	13.2.0**	Linux
libgfortran5	13.2.0**	Linux

libgomp	13.2.0**	Linux
libiconv	1.17	Linux,Windows
libllvm14	14.0.6	Linux,Windows
libnsl	2.0.1**	Linux
libpng	1.6.42**	Linux,Windows
libprotobuf	4.25.2**	Linux,Windows
libsqlite	3.45.1**	Linux,Windows
libstdcxx-ng	13.2.0*	Linux
libuuid	2.38.1	Linux,Windows
libxml2	2.12.5**	Linux,Windows
libzlib	1.2.13*	Linux,Windows
llvm	14.0.6	Linux,Windows
llvm-spirv	14.0.0	Linux,Windows
llvmlite	0.42.0	Linux,Windows
lz4-c	1.9.4	Linux,Windows
lzo	2.10	Linux,Windows
menuinst	1.4.19	Windows
mkl	2024.1.0**	Linux,Windows
mkl-dpcpp	2024.1.0**	Linux,Windows
mkl-service	2.4.0	Linux,Windows
mkl_fft	1.3.8**	Linux,Windows
mkl_random	1.2.4**	Linux,Windows
mkl_umath	0.1.1	Linux,Windows
ncurses	6.4	Linux
numba	0.59.0**	Linux,Windows
numba-dpex	0.22.1**	Linux,Windows
numpy	1.26.4**	Linux,Windows
numpy-base	1.26.4**	Linux,Windows
onemkl-sycl-blas	2024.1.0*	Linux,Windows
onemkl-sycl-datafitting	2024.1.0*	Linux,Windows
onemkl-sycl-dft	2024.1.0*	Linux,Windows
onemkl-sycl-rng	2024.1.0*	Linux,Windows
onemkl-sycl-rng	2024.1.0*	Linux,Windows
onemkl-sycl-sparse	2024.1.0*	Linux,Windows
onemkl-sycl-stats	2024.1.0*	Linux,Windows
onemkl-sycl-vm	2024.1.0*	Linux,Windows
opencl_rt	2024.1.0**	Linux,Windows
openssl	3.2.1**	Linux,Windows
packaging	23.2	Linux,Windows
pip	24.0.0**	Linux,Windows
platformdirs	4.2.0**	Linux,Windows
pluggy	1.4.0**	Linux,Windows
pooch	1.8.0**	Linux,Windows

pycosat	0.6.6	Linux,Windows
pycparser	2.21	Linux,Windows
pyeditline	2.0.1	Linux,Windows
pyopenssl	24.0.0**	Linux,Windows
pyarsing	3.1.1**	Linux,Windows
pysocks	1.7.1	Linux,Windows
python	3.9.18	Linux,Windows
python-dateutil	2.8.2	Linux,Windows
python-libarchive-c	4.0	Linux,Windows
python_abi	3.9	Linux,Windows
pytz	2024.1**	Linux,Windows
pywin32	306	Windows
pyyaml	6.0.1	Linux,Windows
readline	8.2	Linux
requests	2.31.0	Linux,Windows
ruamel_yaml	0.17.40	Linux,Windows
ruamel.yaml.clib	0.2.8**	Linux,Windows
scikit-learn	1.4.0**	Linux,Windows
scikit-learn-intelex	2024.1.0**	Linux,Windows
scipy	1.10.1	Linux,Windows
setuptools	69.1.0**	Linux,Windows
six	1.16.0	Linux,Windows
smp	0.1.5	Linux
snappy	1.1.0	Linux,Windows
spirv-tools	2023.2	Linux
sqlite	3.40.1**	Linux,Windows
tbb	2021.12.0**	Linux,Windows
tbb4py	2021.12.0**	Linux,Windows
threadpoolctl	3.3.0**	Linux,Windows
tk	8.6.13**	Linux,Windows
toolz	0.12.0	Linux,Windows
tqdm	4.66.2**	Linux,Windows
typing-extensions	4.9.0**	Linux,Windows
tzdata	2024a	Linux,Windows
ucrt	10.0.22621.0	Windows
urllib3	2.0.7	Linux,Windows
vc	14.3	Windows
vc14_runtime	14.36.32532	Windows
vs2015_runtime	14.36.32532	Windows
wheel	0.41.3**	Linux,Windows
wincertstore	0.2	Windows
win_inet_pton	1.1.0	Windows
xgboost	1.7.3**	Linux

xz	5.2.6	Linux, Windows
yaml	0.2.5	Linux, Windows
zlib	1.2.13	Linux, Windows
zstandard	0.21.0**	Linux, Windows
zstd	1.5.5**	Linux, Windows

The installation package contains all the necessary native libraries required by the packages.

6 Known Issues

Please refer to the **Known Issues** in the **Resources** of the document that is available online:

<https://www.intel.com/content/www/us/en/developer/articles/troubleshooting/python-known-issues.html>

Intel® Distribution for Python, version 2024.1 does not include the latest functional and security updates. Intel® Distribution for Python, Version 2024.2 is targeted to be released in June 2024 and will include additional functional and security updates. Customers should update to the latest version as it becomes available.

7 Related Documentation

Name	Documentation
arrow-cpp	https://github.com/apache/arrow
asn1crypto	https://github.com/wbond/asn1crypto
bzip2	http://www.bzip.org/docs.html
certifi	https://certifi.io
cfffi	http://cfffi.readthedocs.org
chardet	https://github.com/chardet/chardet
conda	http://conda.pydata.org/docs/
conda-package-handling	https://github.com/conda/conda-package-handling
conda-package-streaming	https://github.com/conda/conda-package-streaming
cryptography	https://cryptography.io
cycler	http://matplotlib.org/cycler/
cython	http://cython.org/#documentation
dpctl	https://github.com/IntelPython/dpctl
dnpnp	https://github.com/IntelPython/dnpnp
freetype	http://freetype.sourceforge.net/freetype2/documentation.html
funcsigs	http://funcsigs.readthedocs.org/en/latest/
idna	https://github.com/kjd/idna
intel-openmp	http://software.intel.com
ipp	http://software.intel.com/en-us/articles/intel-ipp/
joblib	https://joblib.readthedocs.io/en/latest/
kiwisolver	https://kiwisolver.readthedocs.io/en/latest/
libarchive	http://www.libarchive.org/
libffi	http://sourceware.org/libffi/
libiconv	https://www.gnu.org/software/libiconv/
libpng	http://www.libpng.org/pub/png/libpng.html
llvmlite	https://github.com/numba/llvmlite
lz4-c	https://www.lz4.org
lzo	http://www.oberhumer.com/opensource/lzo/

matplotlib	http://matplotlib.org/contents.html#
menuinst	https://pypi.python.org/pypi/menuinst/
mkl	http://software.intel.com/en-us/articles/intel-mkl/
mkl_fft	http://github.com/IntelPython/mkl_fft
mkl_random	http://github.com/IntelPython/mkl_random
mpi4py	http://mpi4py.readthedocs.org/
numba	http://numba.pydata.org/
numexpr	https://github.com/pydata/numexpr/wiki/Numexpr-Users-Guide
numpy	http://numpy.scipy.org/
openssl	http://www.openssl.org/
pandas	http://pandas.pydata.org/pandas-docs/stable/
pip	https://pip.pypa.io/en/stable/
pyarrow	https://github.com/apache/arrow
pycosat	https://github.com/ContinuumIO/pycosat
pycparser	https://github.com/eliben/pycparser
pyopenssl	https://pyopenssl.readthedocs.org/en/stable/
pyparsing	http://pyparsing.wikispaces.com/Documentation
pysocks	https://github.com/Anorov/PySocks
python	https://www.python.org/doc/versions/
python-dateutil	https://dateutil.readthedocs.org/en/latest/
python-libarchive-c	https://github.com/Changaco/python-libarchive-c
pytz	http://pytz.sourceforge.net/
pywin32	https://github.com/mhammond/pywin32
pyyaml	http://pyyaml.org/
requests	http://docs.python-requests.org/
ruamel_yaml	https://bitbucket.org/ruamel/yaml
scikit-learn	http://scikit-learn.org/stable/
scipy	https://projects.scipy.org/stackspec.html
setuptools	http://pythonhosted.org/setuptools/
six	http://pythonhosted.org/six/
smp	https://github.com/IntelPython/smp
snappy	https://github.com/google/snappy
sqlite	http://www.sqlite.org/docs.html
tbb	http://www.threadingbuildingblocks.org
tcl	http://www.tcl.tk/doc/
thrift-cpp	https://github.com/apache/thrift
tk	http://www.tcl.tk/doc/
toolz	https://toolz.readthedocs.io/en/latest/
tqdm	https://pypi.python.org/pypi/tqdm
urllib3	https://urllib3.readthedocs.io/
vc	https://github.com/conda/conda/wiki/VC-features

vs2015_runtime	http://www.microsoft.com
wheel	http://wheel.readthedocs.org/en/latest/
win_inet_pton	https://github.com/hickeroar/win_inet_pton
wincertstore	https://bitbucket.org/tiran/wincertstore
xgboost	https://github.com/dmlc/xgboost
xz	http://tukaani.org/xz/
yaml	http://yaml.org/
zstandard	https://github.com/indygreg/python-zstandard
zlib	http://zlib.net/manual.html

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