INTEL® COMPILERS 2020 ROADMAP - TECHNOLOGY PREVIEW APRIL 2019

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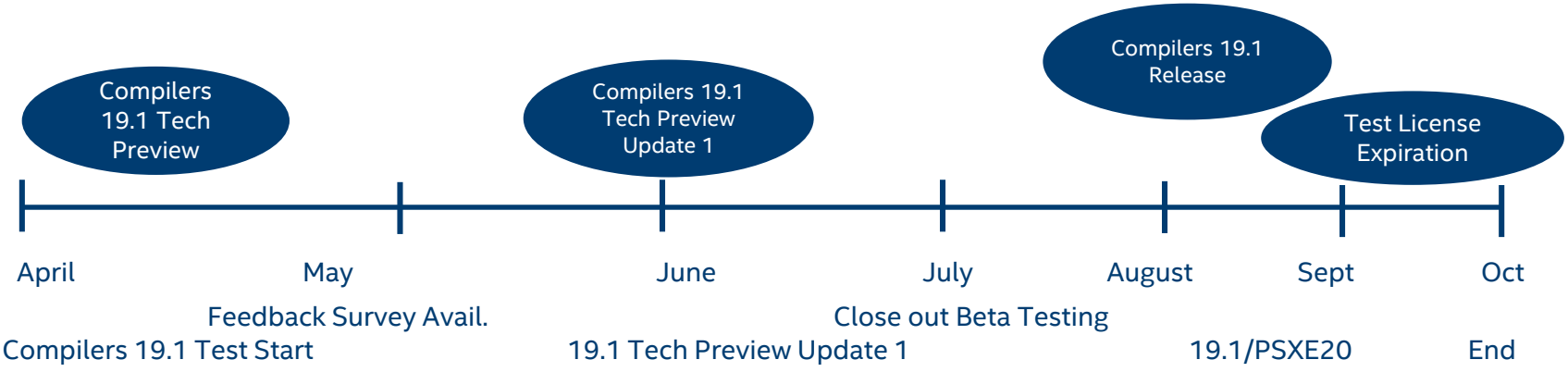
PSXE 2020 Compilers v19.1 Tech Preview Details

- The next compiler version is **v19.1** BUT the package is Intel® Parallel Studio XE **2020**
  - A little confusing, apologies
- Compilers Tech Preview
  - Fortran v19.1: Broad customer testing for new Fortran features.
    1. A TON of new F2018 Standards features (Coarray Atomic, IEEE instrinsics, F18 Standards checking and compliance with –stand f18 see Backup slide)
  - C++: No broad public announcement
    - No major new features in ICC
    - Mostly bug fixes
- Feedback: End of Tech Preview Survey sent in early May, 2 weeks for user feedback

2019 Compilers Roadmap & Tech Preview Details

- 12 week testing program available for Tech Preview
- Compilers Tech Preview Features
  - Fortran v19.1: A TON of new F2018 Standards features (Coarray Atomic, Coarray CO_* routines, IEEE intrinsics, F18 Standards checking and compliance with –stand f18)
  - C++: No new features in ICC.



Timeline

- Target is 12 weeks for testing
- ~Mid-April Intel® Compilers v19.1 Technology Preview test start
- ~+1 Month later, open up the Survey for feedback
- ~Mid-June Update 1 releases (check for fixes, last chance for testing before final product drops)
- ~Mid July, close out testing
- End Q2/early Q3 Product Launch Intel Parallel Studio XE 2020 containing v19.1.0 compilers
- ~Mid October the test license expires

V19.1 Compiler OS Support - Windows

- Windows 10
- Windows Server 2019
- Windows Server 2016 (1607)
- Visual Studios Supported
  - Visual Studio 2017 w/ Windows SDK 10, VS2017 Build Tools w/ Windows SDK 10
  - Visual Studio 2019 w/ Windows SDK 10, VS2019 Build Tools w/Windows SDK 10
    - (Tech Preview Update 1 first support), no initial support in first Tech Preview release

Intel Visual Fortran Compiler Visual Studio Integration - Same as above VS IDEs

** Notes:

- No longer supplying VS Shell with Intel Visual Fortran,
- Support for VS 2015 dropped – Will not integrate into any VS older than 2017

V19.1 Compiler OS Support - Linux

Latest/Upcoming

- RHEL 7.5, RHEL8, expected Q2/Q3 2019
- SLES 15 to be released July 2019
- Fedora 28, Fedora 30 expected Q4 2018
- Ubuntu 18.04 LTS, 18.10, 19.04 expected Q2 2019
- Debian 9 released June 2017
- Amazon Linux
- Intel Clear Linux

NOTES: Distros based on above, ex CentOS OpenSuse, should work

Newer GCCs required, need to move to more modern Linux distros for 2020

V19.1 Compiler OS Support - macOS

macOS 10.14 Mojave, Xcode 10

Later in 2019 macOS 11.x, Xcode 11

* Starting with macOS 11, 32-bit no longer supported (per Apple support)

Questions?

- How do I sign up?
  - Watch Intel's Fortran User Forums
  - Once the Tech Preview opens ~April 9-15th:
    - Register to get a license (special license needed)
    - https://software.seek.intel.com/compilers-2020-preview
  - OTHER QUESTIONS?

Send email to ron.green@intel.com

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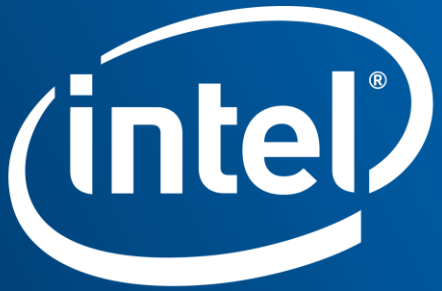

Software

BACKUP

What is a Technology Preview

- Like a Beta but …
  - In the Tech Preview package, **Only the Compilers will be new**
  - Less emails for you, the customer
  - Little/no questions to get the test license and download the package
  - Post-test Survey questions will also be short and simple
  - Will use our normal “Beta” processes
    - “Beta” license to obtain access
    - Intel Registration Center for downloading
    - Intel Online Service Center and User Forums to report bugs/issues

Fortran New Features – Big List

F2015: Implement SELECT RANK construct
F2015: An F2015 compiler is required to diagnose use of non-standard intrinsic procedures and modules, or non-standard intrinsics from standard modules
F2008/F2015: Transformational functions defined in ISO_C_BINDING, IEEE_ARITHMETIC, and IEEE_EXCEPTIONS are allowed in specification expressions
F2015: Issue warning that labeled DO loops are now obsolescent
F2015: The arithmetic IF statement has been deleted
F2015: COMMON, EQUIVALENCE, and BLOCK DATA are now obsolescent
F2015: Non block DO construct is a deleted feature
F2015: The SIZE= specifier can now be used with advancing input
F2015: The value assigned by the RECL= specifier in an INQUIRE statement now standardized
F2015: D, E, EN, and ES edit descriptors can have a field width of zero, analogous to the F edit descriptor
F2015: The exponent width e in a data edit descriptor may be zero, analogous to a field width of zero
F2015: Floating-point formatted input accepts hexadecimal-significand numbers conforming to ISO/IEC/IEEE 60559:2011
F2015: Implement the new EX edit descriptor
F2015: Reference to intrinsic CMPLX with a complex actual argument no keyword is needed for the KIND argument.
F2015: The arguments to the SIGN function may be of different kinds
F2015: A GENERIC statement can now be used to declare generic interfaces
F2015: IMPLICIT NONE (EXTERNAL | TYPE)
F2015: Specific names for intrinsic procedures are obsolescent
F2015: Implement new ATOMIC intrinsics
F2015: Implement coarray collective intrinsic procedures
F2015: Locality of variable in DO CONCURRENT can be declared on the DO CONCURRENT statement
F2018: Add optional ROUND argument to the IEEE_RINT function F2018: Implement the IEEE_NEXT_DOWN and IEEE_NEXT_UP intrinsic module functions
F2018: Add the IEEE_AWAY rounding mode
F2018: Implement the IEEE_FMA (fused mulitply-add function
F2018: Implement the IEEE_SIGNBIT intrinsic module function
F2018: Add optional RADIX argument to the IEEE_GET_ROUNDING_MODE and IEEE_SET_ROUNDING_MODE functions
F2015: Implement IEEE_MAX|MIN_NUM[_MAG] intrinsics
F2015: SUBNORMAL is now synonymous with DENORMAL
F2015: Implement IEEE_QUIET|SIGNALING_COMPARE where COMPARE is EQ, GE, GT, LE, LT, or NE.
F2015: Values for POS= and SIZE= in and INQUIRE statement for pending asynchronous operations have been standardized
F2015: add STAT arguments to ATOMIC_DEFINE and ATOMIC_REF, STAT and ERRMSG to MOVE_ALLOC and CRITICAL construct, and STAT= to image selectors

C++ New Features

- C++17 COMPLETE! Moving towards C++20
- C++20 features consteval and constexpr virtual functions coming Update1

```
consteval int sqr(int n) {
 return n*n;
 }

 constexpr int r = sqr(100); // OK

int x = 100;
int r2 = sqr(x);   // Error: Call does not produce a constant
```

```
consteval int f() { return 42; }
consteval auto g() { return f; }
consteval int h(int (*p)() = g()) { return p(); }
constexpr int r = h(); // OK

 constexpr auto e = g(); // ill-formed:
                         // a pointer to an immediate
                         // function is
                         // not a permitted result
                         // of a constant expression
```

Cascade Lake Compiler Support

- What's new: VNNI, Vector Neural Network Instructions
  - Designed for convolutional neural network (NN) based algorithms
- Compiler support via intrinsics and in-line assembly
  - Useful for creators of NN libraries, kernels (MKL-DNN for example)
  - .../include/icc/zmmintrin.h v19 and later compilers
- NO compiler auto-generation of VNNI instructions
  - No way to recognize high-level algorithms and translate to VNNI
- -x and –ax cascadelake compiler options for tuning (no –m option)
  - Same as –xskylake-avx512 –qopt-zmm-usage=high