

Creating  
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Driving a New Era of Accelerated Computing  
Intel® Fortran Compiler Solution in 2022

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# Our Fortran Solution 2022





# Our Fortran Solution - Compilers

***Intel® Fortran Compiler Classic ( ifort )***

Best-In-Class Fortran language features  
and performance for CPU ***today!***

***Intel® Fortran Compiler ( ifx )***

Driving a new era in accelerated computing!

Our Fortran compiler solution for Intel GPU offload

Committed to overall Best-in-Class Fortran ***for 2023 release***

Because you need advanced Fortran language features and the  
absolute best performance for your applications on Intel solutions

***We deliver***

***CHOICE! Continuity! Features! Performance!***

# Our Fortran Solution – Compilers Details

- Two separate compilers. Same Intel Fortran Frontend (FFE). Both compilers in all packages. *CHOICE! Continuity!*
- **ifort** - Intel Fortran parser/analyzer + Intel optimizer/code generation
  - CPU only classic compiler. **NO OFFLOAD TO GPU**
  - Full F2018 support, best performance: *Features! Performance!*
  - Named “**Intel® Fortran Compiler Classic**”
- **ifx** – Intel Fortran parser/analyzer + LLVM optimizer and code generation (with Intel enhancements)
  - Supports OpenMP Offload to Intel GPUs *Features!*
  - F2003/2008 excluding Parameterized Derived Types & Coarrays
  - Binary compatible with DPCPP, ICX, ICC, IFORT
  - Named “**Intel® Fortran Compiler**”

# A Fortran Solution – Complementary Compilers

- IFX is not a replacement for IFORT in 2022
- IFX provides outstanding OpenMP 5.x acceleration to Intel GPU
- IFORT is the best in class Fortran 2018 compiler for CPU
- Binary compatibility means you get the best of both
- Together you get the best Fortran SOLUTION for xPU in 2022

# Intel® Compilers – Target & Packaging

Intel Compiler	Driver	Target*	OpenMP CPU Support	OpenMP Offload Support
Intel® Fortran Compiler Classic	<i>ifort</i>	CPU	Yes	No
Intel® Fortran Compiler	<i>ifx</i>	CPU, GPU	Yes	Yes
Intel® C++ Compiler Classic	<i>icc</i>	CPU	Yes	No
Intel® oneAPI DPC++/C++ Compiler	<i>dpcpp</i>	CPU, GPU, FPGA	Yes	Yes and No*
	<i>icx</i>	CPU GPU	Yes	Yes

*Compilers are Binary Compatible and Linkable!*

# Intel Compilers Roadmap Q1 2022

Compiler	XPU Support	Compiler Status/Maturity Schedule													Use Recommendation		
		2021				2022				2023				2024			
		Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1			
Intel® C++ Compiler Classic	CPU	Production Quality								Legacy Product Support (LPS)					<ul style="list-style-type: none"> <li>Not recommend for new projects</li> <li>Start migration now</li> </ul>		
Intel® oneAPI DPC++/C++ Compiler	CPU	Production Quality													<ul style="list-style-type: none"> <li>Use for all new projects</li> </ul>		
	GPU	Production Quality															
	FPGA	Production Quality															
Intel® Fortran Compiler Classic	CPU	Production Quality											**	<ul style="list-style-type: none"> <li>Continued Best-in-Class Fortran compiler for CPU throughout 2022</li> <li>** deprecation (see following slides)</li> </ul>			
Intel® Fortran Compiler	CPU	Beta Quality			Production Quality								Est Feature/Perf Parity with Classic				<ul style="list-style-type: none"> <li>Driving a new era in accelerated computing throughout 2022.</li> <li>◆ Feature and average performance parity to IFORT by the end of 2022</li> </ul>
	GPU	Beta Quality			Production Quality												

CPU = Intel® Xeon® and Core™ processors  
 GPU = Intel® Integrated and discrete GPU's  
 FPGA = Intel® FPGA's (Stratix and Arria)

◆ *IFX not "a replacement" for IFORT in 2022*

# Our Fortran Solutions – Definition of Production

- The Intel® Fortran Compiler v2022 (IFX) is *Production Quality*.  
*What does this mean?*
- **Production Quality** indicates that the compiler has passed our key performance metrics and validations and is ready for use. As always, language and compiler features will be continued to be developed and optimized and delivered in future releases.
  - IFX provides production quality Fortran OpenMP 5.x offload support
  - IFORT provides best in class Fortran 2018 for CPU
  - Binary compatibility provides a complete Fortran Solution for xPU
- Most important is for the customer to provide feedback to Intel on any technical issues that arise from the compilers so that they may be addressed accordingly.



# Our Fortran Solutions – Definition of Deprecation

“Deprecation” similar to Language Standards definition:

- The act or process of marking the feature or product as obsolete, to discourage its use and warn users that it *\*may\** be phased out in the future, but not removing the capability immediately, so as to allow for continued compatibility for a period of time.

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# IFX 2022

Status of features and performance in  
Intel® oneAPI 2022.x Products

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# IFX: Driving a New Era in Accelerated Computing

The Intel® Fortran Compiler (IFX) is driving a new era of accelerated computing across XPU architectures (CPU, GPU). IFX is our Fortran compiler going forward

- Supports OpenMP\* 5.x Standards to enable GPU offload from Fortran
  - ***No need to call C/C++ or proprietary APIs for GPU acceleration!***
  - ***An open, portable Standard to maintain your software investment***
- Same Fortran parser/analyzer (front end) you know and love from IFORT
  - Supports legacy DEC extensions and most of F03/F08\* (see next slide)
  - The majority of IFORT compiler directives and options you have used for years. And Microsoft Visual Studio\* integration for Windows\*
- HOWEVER ... IFX still in development throughout 2022 with the goal to reach IFORT feature & ***general***\* performance parity by the end of 2022.

***\* average performance of many apps, but not every app***

# IFX Status Intel® oneAPI 2022.1.x

OpenMP 5.0 and 5.1 majority subset support (see Reference slides)

Compiles code up to 33% faster than IFORT!

Complete Fortran 2003 and Fortran 2008 Standard features EXCEPT

- Fortran 2003 parameterized derived types, Fortran 2008 coarrays
- Fortran 2018 features coming

Performance: IFX may or may not match performance of ifort compiled applications. Improvements coming with each Update release

*Each Update will provide more Fortran Language & OpenMP features AND performance improvement. Stay up to date!*

# Which Compiler is For YOU?

- I am excited to try accelerating my Fortran code with Intel GPUs and don't want to call C/C++ or DPC++. *Answer: The Intel® Fortran Compiler (IFX)*
- I am excited about the OpenMP 5.0/5.1 GPU Offload features and can't wait to try them! *Answer: The Intel® Fortran Compiler (IFX)*
- I want to test your latest Fortran compiler, understanding it is in development: *Answer: The Intel® Fortran Compiler (IFX)*
- I need the absolute best CPU performance for my performance critical applications today: *Answer: The Intel® Fortran Compiler Classic (IFORT)*
- I need advanced Fortran Language features today: *Answer: IFORT*

*Don't forget, you don't have to pick just one since IFX and IFORT are binary compatible. You can build your CPU host objects with IFORT and your OpenMP GPU Offload objects with IFX and link with IFX.*



# Support for Compilers IFORT and IFX



- Summary: Same support model we have used for years:
- Current version fully supported
- 2 previous versions supported but only the last Update release to that version
- AND available but unsupported - next older version, last Update only, provided for download on Intel® Registration Center but not supported
- This means ...
  - IFORT will continue to be supported per our usual model.
  - We will ensure you have Fortran compiler solutions that are Best-in-Class
  - <https://www.intel.com/content/www/us/en/developer/articles/release-notes/intel-parallel-studio-xe-supported-and-unsupported-product-versions.html>

# IFX OpenMP Features and Support



IFX Fortran Language &  
OpenMP Features Support

<https://www.intel.com/content/www/us/en/developer/articles/technical/fortran-language-and-openmp-features-in-ifx.html>



# Porting Guide, ifort to ifx

Kept up to date with tips and techniques to help you move from ifort to ifx

<https://www.intel.com/content/www/us/en/developer/articles/guide/porting-guide-for-ifort-to-ifx.html>





Questions?

Thank You for Attending!



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