

# Setting Up MPI + Fortran Compiler in Visual Studio

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## 1. Prerequisites

- **Install Visual Studio:**

- Download and install the *Community Edition* - Free of cost or higher.
- Include the **Desktop Development with C++** workload during installation. (See Ref-1 to know why)

- **Install Intel oneAPI Base Toolkit:**

- Base tool kit includes the fortran/C/C++ compiler and MPI and many more.
- Install **Intel Fortran Compiler (ifx)** and **Intel MPI Library**.
- Verify that `mpiifx.bat` is available in the  
C:\Program Files (x86)\Intel\oneAPI\mpi\latest\bin\mpiifx.bat.

- **Set Environment Variables:**

- Add the following paths to your system's PATH:

```
C:\Program Files (x86)\Intel\oneAPI\compiler\latest\windows\bin  
C:\Program Files (x86)\Intel\oneAPI\mpi\latest\bin
```

- Run the environment initialization script:

```
"C:\Program Files (x86)\Intel\oneAPI\setvars.bat"
```

## 2. Configuring Visual Studio

### Fortran Compiler Settings

- **Include Path:**

- Navigate to **Fortran** → **General** → **Additional Include Directories**.

- Add:

```
C:\Program Files (x86)\Intel\oneAPI\mpi\latest\include
```

## Linker Settings

- **Library Directory:**

- Navigate to **Linker** → **General** → **Additional Library Directories**.
- Add:

```
C:\Program Files (x86)\Intel\oneAPI\mpi\latest\lib
```

- **Dependencies:**

- Navigate to **Linker** → **Input** → **Additional Dependencies**.
- Add:

```
impi.lib; impicxx.lib; libmpi_ilp64.lib
```

## 3. Debugging MPI Programs

- **Set Debugging Command:**

- Navigate to **Configuration Properties** → **Debugging**.
- Update the following:

**Command:**

```
C:\Program Files (x86)\Intel\oneAPI\mpi\latest\bin\mpiexec.exe
```

**Command Arguments:**

```
-n 4 "$(TargetPath)"
```

**Working Directory:**

```
$(TargetDir)
```

## 4. Command-Line Compilation

### Using mpiifx.bat

```
"C:\Program Files (x86)\Intel\oneAPI\mpi\latest\bin\mpiifx.bat"  
mpi_test.f90 -o mpi_test.exe
```

## Manual Compilation with ifx

```
ifx mpi_test.f90 -o mpi_test.exe -I"C:\Program Files  
(x86)\Intel\oneAPI\mpi\latest\include" -L"C:\Program Files  
(x86)\Intel\oneAPI\mpi\latest\lib" -limpi
```

## Running the Executable

Use `mpiexec` to run the compiled executable:

```
mpiexec -n 4 mpi_test.exe
```

## 5. Troubleshooting

Issue	Cause	Fix
<code>mpiifx</code> is not recognized	Missing or incorrect PATH	Add C:\Program Files (x86)\Intel\oneAPI\mpi\latest\bin to PATH.
<code>mpiexec</code> is not an EXE file	Incorrect Debugging Command	Set <code>mpiexec.exe</code> in <b>Debugging</b> → <b>Command</b> .
Missing <code>impi.lib</code>	Library path not set	Add C:\Program Files (x86)\Intel\oneAPI\mpi\latest\lib to <b>Linker</b> → <b>General</b> → <b>Additional Library Directories</b> .