# An ATOS library to improve compilers intrinsic functions

## bullxLIB version 1.1

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## Bull Solution integration

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# 1. INTRODUCTION

bullxLIB is a tool which could be used to optimize some compilers intrinsic calls.

These tools provide an optimal version of the following functions:

- In the library libbullxMATH :
  - __powr8i4 : this call raise a real*8 to an integer exponent
  - exp : exponential
  - cos : cosinus
  - sin : sinus
  - log : logarithm

This tool has been developped to improve the performance of your application developped in FORTRAN. In this document we will explain how to use this library in a FORTRAN code.

This library has been compiled for AVX2 instructions.

# 2. HOW TO USE BULLXLIB

## 2.1. Intrinsic functions

### 2.1.1. __powr8i4

If your application use a lot of power fonction to raise a real to an integer exponent, the function profiling will show you that your are using a function called : __powr8i4.
To use the optimal version of this function provided by bullxLIB, it is not necessary to modify your source code, you have just to add the path to the libbullxMATH.so library during the link phase of your compilation (see section 2.2).

### 2.1.2. exp

To use the optimal version of exp function, you should replace the classic call of exp by **b_exp** in your source code and add **include « bullxMATH.h »** at the beginning of your routine.
To compile this new version of your application, you must specify the path to bullxLIB/include directory to compile this routine and add the path to the libbullxMATH.so library during the link phase of your compilation (see section 2.2).

### 2.1.1. cos

To use the optimal version of cos function, you should replace the classic call of cos by **b_cos** in your source code and add **include « bullxMATH.h »** at the beginning of your routine.
To compile this new version of your application, you must specify the path to bullxLIB/include directory to compile this routine and add the path to the libbullxMATH.so library during the link phase of your compilation (see section 2.2).

### 2.1.1. sin

To use the optimal version of sin function, you should replace the classic call of sin by **b_sin** in your source code and add **include « bullxMATH.h »** at the beginning of your routine.
To compile this new version of your application, you must specify the path to bullxLIB/include directory to compile this routine and add the path to the libbullxMATH.so library during the link phase of your compilation (see section 2.2).

### 2.1.1. log

To use the optimal version of log function, you should replace the classic call of log by **b_log** in your source code and add **include « bullxMATH.h »** at the beginning of your routine.

To compile this new version of your application, you must specify the path to bullxLIB/include directory to compile this routine and add the path to the libbullxMATH.so library during the link phase of your compilation (see section 2.2).

## 2.2. Re-compile your application

To use bullxLIB, you must re-compile your application by adding :

- -I<path to bullxLIB directory>/bullxLIB/include : for each file which are using bullxLIB functions
- <path to bullxLIB directory>/bullxLIB/lib/libbullxMATH.so at the end of the link command just after all others libraries.

For example, you should obtain something like

```
mpif90 -c -I<path_to_bullxLIB_directory>/bullxLIB/include -O2 file.f90
mpif90 -o mybin *.o -lyourlib
<path_to_bullxLIB>/bullxLIB/lib/libbullxMATH.so
```

## 2.1. bullxLIB directory

The bullxLIB directory is composed by 3 sub-directories:

- **doc** : which contains this document
- **include** : where you can find all necessary interfaces for each functions optimized by bullxLIB
- **lib** : with bullxLIB libraries

```
bullxLIB
    doc
       bullxLIB.1.1.pdf
    include
       bullxMATH.h
    lib
       libbullxMATH.so
```