

# CMake and parallelism

Victor Eijkhout

Fall 2023



# MPI



MPI has a module:

```
find_package( MPI )  
target_include_directories(  
    ${PROJECT_NAME} PUBLIC  
    ${MPI_C_INCLUDE_DIRS} )  
target_link_libraries(  
    ${PROJECT_NAME} PUBLIC  
    ${MPI_C_LIBRARIES} )
```



```
find_package( MPI )
target_include_directories(
    ${PROJECT_NAME} PUBLIC
    ${MPI_CXX_INCLUDE_DIRS} )
target_link_libraries(
    ${PROJECT_NAME} PUBLIC
    ${MPI_CXX_LIBRARIES} )
```



```
find_package( MPI )
target_include_directories(
    ${PROJECT_NAME} PUBLIC
    ${MPI_INCLUDE_DIRS} )
target_link_directories(
    ${PROJECT_NAME} PUBLIC
    ${MPI_LIBRARY_DIRS} )
target_link_libraries(
    ${PROJECT_NAME} PUBLIC
    ${MPI_Fortran_LIBRARIES} )
```



```
if( MPI_Fortran_HAVE_F08_MODULE )  
else()  
    message( FATAL_ERROR "No f08 module for this MPI" )  
endif()
```



```
find_package( mpl REQUIRED )  
target_include_directories(  
    ${PROJECT_NAME} PUBLIC  
    ${CMAKE_CURRENT_SOURCE_DIR}  
    mpl::mpl )  
target_link_libraries(  
    ${PROJECT_NAME} PUBLIC  
    mpl::mpl )
```



# OpenMP





```
find_package(OpenMP)  
target_link_libraries(  
    ${PROJECT_NAME}  
    PUBLIC OpenMP::OpenMP_C )
```



```
find_package(OpenMP)
if(OpenMP_CXX_FOUND)
else()
    message( FATAL_ERROR "Could not find OpenMP" )
endif()
target_link_libraries(
    ${PROJECT_NAME}
    PUBLIC OpenMP::OpenMP_CXX )
```



```
enable_language(Fortran)  
find_package(OpenMP)  
target_link_libraries(  
    ${PROJECT_NAME}  
    PUBLIC OpenMP::OpenMP_Fortran )
```



# TBB



```
find_package(TBB REQUIRED)  
target_link_libraries( ${PROJECT_NAME} PUBLIC TBB::tbb)
```



# Other



```
find_package(Kokkos REQUIRED)  
target_link_libraries(myTarget Kokkos::kokkos)
```

Either set `CMAKE_PREFIX_PATH` or add

```
-DKokkos_ROOT=<Kokkos Install Directory>/lib64/cmake/Kokkos
```

Maybe:

```
-DCMAKE_CXX_COMPILER=<Kokkos Install Directory>/bin/  
  nvcc_wrapper
```

See <https://kokkos.org/kokkos-core-wiki/ProgrammingGuide/Compiling.html>

