TACC

CMake and parallelism

Victor Eijkhout

Fall 2023

MPI

MPI from C

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} )
```

MPI from C++

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

MPI from Fortran90

```
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} )
```


MPI from Fortran2008

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

MPL

```
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

OpenMP from C

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

OpenMP from 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 )
```


OpenMP from Fortran

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


TBB

TBB

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