Common Problems in Compilation

Hao Deng

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1 Introduction

In this paper, we will discuss the common problems during compilation and how to fix them.

2 No g++

If you haven't install g++, you may encounter the following problem:

```
(base) mako@DESKTOP-4LIQIC9:~$ bash run.sh
   The CXX compiler identification is unknown
-- The C compiler identification is GNU 11.4.0
CMake Error at CMakeLists.txt:23 (project):
  No CMAKE_CXX_COMPILER could be found.

  Tell CMake where to find the compiler by setting either the environment
  variable "CXX" or the CMake cache entry CMAKE_CXX_COMPILER to the full path
  to the compiler, or to the compiler name if it is in the PATH.


-- Detecting C compiler ABI info
-- Detecting C compiler ABI info - done
-- Check for working C compiler: /usr/bin/cc - skipped
-- Detecting C compile features
-- Detecting C compile features - done
-- Configuring incomplete, errors occurred!
See also "/home/mako/build/CMakeFiles/CMakeOutput.log".
See also "/home/mako/build/CMakeFiles/CMakeError.log".
ninja: error: loading 'build.ninja': No such file or directory
```

To solve this, install g++ by running: `sudo apt install g++`.

3   No libopenmpi-dev

If you haven't install libopenmpi-dev, you may encounter the following problem:

```
-- Using third party subdirectory Eigen.
-- Setting Python to /home/mako/miniconda3/bin/python
-- Setting Python's include dir to /home/mako/miniconda3/include/python3.11 from sysconfig
-- Setting Python's library to /home/mako/miniconda3/lib/python3.11
-- Found PythonInterp: /home/mako/miniconda3/bin/python (found suitable version "3.11.5", minimum required is "3.0")
-- Found PythonLibs: /home/mako/miniconda3/lib/python3.11 (found suitable version "3.11.5", minimum required is "3.0")
-- Found NumPy: /home/mako/miniconda3/lib/python3.11/site-packages/numpy/core/include (found version "1.26.2")
-- NumPy ver. 1.26.2 found (include: /home/mako/miniconda3/lib/python3.11/site-packages/numpy/core/include)
-- Using third_party/pybind11.
-- pybind11 include dirs: /home/mako/pytorch/cmake/../third_party/pybind11/include
CMake Error in /home/mako/build/CMakeFiles/CMakeTmp/CMakeLists.txt:
  Imported target "MPI::MPI_C" includes non-existent path

    "/usr/lib/x86_64-linux-gnu/openmpi/include"

  in its INTERFACE_INCLUDE_DIRECTORIES.  Possible reasons include:

  * The path was deleted, renamed, or moved to another location.

  * An install or uninstall procedure did not complete successfully.

  * The installation package was faulty and references files it does not
  provide.


CMake Error at /usr/share/cmake-3.22/Modules/FindMPI.cmake:1264 (try_compile):
  Failed to generate test project build system.
Call Stack (most recent call first):
  /usr/share/cmake-3.22/Modules/FindMPI.cmake:1315 (_MPI_try_staged_settings)
  /usr/share/cmake-3.22/Modules/FindMPI.cmake:1638 (_MPI_check_lang_works)
  cmake/Dependencies.cmake:1138 (find_package)
  CMakeLists.txt:738 (include)


-- Configuring incomplete, errors occurred!
See also "/home/mako/build/CMakeFiles/CMakeOutput.log".
See also "/home/mako/build/CMakeFiles/CMakeError.log".
ninja: error: loading 'build.ninja': No such file or directory
```

To solve this, install libopenmpi-dev by running: `sudo apt install libopenmpi-dev.`

4 No typing_extensions

If you haven't install typing_extensions, you may encounter the following problem:

```
-- Performing Test HAS_WERROR_FORMAT - Success
-- Performing Test HAS_WDEPRECATED
-- Performing Test HAS_WDEPRECATED - Success
-- Looking for backtrace
-- Looking for backtrace - found
-- backtrace facility detected in default set of libraries
-- Found Backtrace: /usr/include
-- don't use NUMA
Traceback (most recent call last):
  File "<frozen runpy>", line 198, in _run_module_as_main
  File "<frozen runpy>", line 88, in _run_code
  File "/pytorch/torchgen/gen.py", line 24, in <module>
    import torchgen.api.dispatcher as dispatcher
  File "/pytorch/torchgen/api/dispatcher.py", line 4, in <module>
    from torchgen.api import cpp
  File "/pytorch/torchgen/api/cpp.py", line 4, in <module>
    from torchgen.api.types import (
  File "/pytorch/torchgen/api/types/__init__.py", line 1, in <module>
    from .types import *
  File "/pytorch/torchgen/api/types/types.py", line 18, in <module>
    from torchgen.model import BaseTy, ScalarType
  File "/pytorch/torchgen/model.py", line 9, in <module>
    from torchgen.utils import assert_never, NamespaceHelper, OrderedSet
  File "/pytorch/torchgen/utils.py", line 29, in <module>
    from typing_extensions import Self
ModuleNotFoundError: No module named 'typing_extensions'
CMake Error at cmake/Codegen.cmake:197 (message):
  Failed to get generated_headers list
Call Stack (most recent call first):
  caffe2/CMakeLists.txt:2 (include)


-- Configuring incomplete, errors occurred!
See also "/build/CMakeFiles/CMakeOutput.log".
See also "/build/CMakeFiles/CMakeError.log".
ninja: error: loading 'build.ninja': No such file or directory
(base) root@708fce111679:/#
```

To solve this, install typing_extensions by running: `pip install typing_extensions`.

5   Memory Exhausted

```
(base) root@708fce111679:/build# ninja install
[40/891] Building CXX object caffe2/CMakeFiles/torch_cpu.dir/__/aten/src/ATen/Operators_1.cpp.o
FAILED: caffe2/CMakeFiles/torch_cpu.dir/__/aten/src/ATen/Operators_1.cpp.o
/usr/bin/c++ -DAT_PER_OPERATOR_HEADERS -DCAFFE2_BUILD_MAIN_LIB -DCPUINFO_SUPPORTED_PLATFORM=1 -DFMT_HEADER_ONLY=1 -DHAVE_MALLOC_USABLE_SIZE=1 -DHAVE_MMAP=1 -DHAVE_SHM_OPEN=1 -DHAVE_SHM_UNLINK=1 -DMINIZ_DISABLE_ZIP_READ
ER_CRC32_CHECKS -DONNXIFI_ENABLE_EXT=1 -DONNX_ML=1 -DONNX_NAMESPACE=onnx_torch -DUSE_C10D_GLOO -DUSE_DISTRIBUTED -DUSE_EXTERNAL_MZCRC -DUSE_RPC -DUSE_TENSORPIPE -D_FILE_OFFSET_BITS=64 -Dtorch_cpu_EXPORTS -Iaten/src -I/
pytorch/aten/src -I. -I/pytorch -I/pytorch/third_party/onnx -Ithird_party/onnx -I/pytorch/third_party/foxi -Ithird_party/foxi -I/pytorch/torch/csrc/api -I/pytorch/torch/csrc/api/include -I/pytorch/caffe2/aten/src/TH -I
caffe2/aten/src/TH -Icaffe2/aten/src -Icaffe2/../aten/src -I/pytorch/torch/csrc -I/pytorch/third_party/miniz-2.1.0 -I/pytorch/third_party/kineto/libkineto/include -I/pytorch/aten/src/ATen/.. -I/pytorch/c10/.. -I/pytorc
h/third_party/cpuinfo/include -I/pytorch/third_party/ittapi/src/ittnotify -I/pytorch/third_party/FP16/include -I/pytorch/third_party/tensorpipe -Ithird_party/tensorpipe -I/pytorch/third_party/tensorpipe/third_party/lib
nop/include -I/pytorch/third_party/fmt/include -I/pytorch/third_party/flatbuffers/include -isystem third_party/gloo -isystem /pytorch/cmake/../third_party/gloo -isystem /pytorch/cmake/../third_party/tensorpipe/third_pa
rty/libuv/include -isystem /pytorch/third_party/protobuf/src -isystem /pytorch/third_party/ittapi/include -isystem /pytorch/cmake/../third_party/eigen -isystem include -D_GLIBCXX_USE_CXX11_ABI=1 -fvisibility-inlines-hi
dden -DSYMBOLICATE_MOBILE_DEBUG_HANDLE -O2 -fPIC -Wall -Wextra -Werror=return-type -Werror=non-virtual-dtor -Werror=bool-operation -Wnarrowing -Wno-missing-field-initializers -Wno-type-limits -Wno-array-bounds -Wno-unk
nown-pragmas -Wno-unused-parameter -Wno-unused-function -Wno-unused-result -Wno-strict-overflow -Wno-strict-aliasing -Wno-stringop-overflow -Wsuggest-override -Wno-psabi -Wno-error=pedantic -Wno-error=old-style-cast -W
no-missing-braces -fdiagnostics-color=always -faligned-new -Wno-unused-but-set-variable -Wno-maybe-uninitialized -fno-math-errno -fno-trapping-math -Werror=format -Wno-stringop-overflow -DHAVE_AVX2_CPU_DEFINITION -g -f
no-omit-frame-pointer -O0 -fPIC -DTORCH_USE_LIBUV -DCAFFE2_USE_GLOO -Wall -Wextra -Wdeprecated -Wno-unused-parameter -Wno-unused-function -Wno-missing-field-initializers -Wno-unknown-pragmas -Wno-type-limits -Wno-array
-bounds -Wno-strict-overflow -Wno-strict-aliasing -Wno-maybe-uninitialized -fvisibility=hidden -pthread -fopenmp -std=gnu++17 -MD -MT caffe2/CMakeFiles/torch_cpu.dir/__/aten/src/ATen/Operators_1.cpp.o -MF caffe2/CMakeF
iles/torch_cpu.dir/__/aten/src/ATen/Operators_1.cpp.o.d -o caffe2/CMakeFiles/torch_cpu.dir/__/aten/src/ATen/Operators_1.cpp.o -c aten/src/ATen/Operators_1.cpp
c++: fatal error: Killed signal terminated program cc1plus
compilation terminated.
[42/891] Building CXX object caffe2/CMakeFiles/torch_cpu.dir/__/aten/src/ATen/Operators_2.cpp.o
FAILED: caffe2/CMakeFiles/torch_cpu.dir/__/aten/src/ATen/Operators_2.cpp.o
/usr/bin/c++ -DAT_PER_OPERATOR_HEADERS -DCAFFE2_BUILD_MAIN_LIB -DCPUINFO_SUPPORTED_PLATFORM=1 -DFMT_HEADER_ONLY=1 -DHAVE_MALLOC_USABLE_SIZE=1 -DHAVE_MMAP=1 -DHAVE_SHM_OPEN=1 -DHAVE_SHM_UNLINK=1 -DMINIZ_DISABLE_ZIP_READ
ER_CRC32_CHECKS -DONNXIFI_ENABLE_EXT=1 -DONNX_ML=1 -DONNX_NAMESPACE=onnx_torch -DUSE_C10D_GLOO -DUSE_DISTRIBUTED -DUSE_EXTERNAL_MZCRC -DUSE_RPC -DUSE_TENSORPIPE -D_FILE_OFFSET_BITS=64 -Dtorch_cpu_EXPORTS -Iaten/src -I/
pytorch/aten/src -I. -I/pytorch -I/pytorch/third_party/onnx -Ithird_party/onnx -I/pytorch/third_party/foxi -Ithird_party/foxi -I/pytorch/torch/csrc/api -I/pytorch/torch/csrc/api/include -I/pytorch/caffe2/aten/src/TH -I
caffe2/aten/src/TH -Icaffe2/aten/src -Icaffe2/../aten/src -I/pytorch/torch/csrc -I/pytorch/third_party/miniz-2.1.0 -I/pytorch/third_party/kineto/libkineto/include -I/pytorch/aten/src/ATen/.. -I/pytorch/c10/.. -I/pytorc
h/third_party/cpuinfo/include -I/pytorch/third_party/ittapi/src/ittnotify -I/pytorch/third_party/FP16/include -I/pytorch/third_party/tensorpipe -Ithird_party/tensorpipe -I/pytorch/third_party/tensorpipe/third_party/lib
nop/include -I/pytorch/third_party/fmt/include -I/pytorch/third_party/flatbuffers/include -isystem third_party/gloo -isystem /pytorch/cmake/../third_party/gloo -isystem /pytorch/cmake/../third_party/tensorpipe/third_pa
rty/libuv/include -isystem /pytorch/third_party/protobuf/src -isystem /pytorch/third_party/ittapi/include -isystem /pytorch/cmake/../third_party/eigen -isystem include -D_GLIBCXX_USE_CXX11_ABI=1 -fvisibility-inlines-hi
dden -DSYMBOLICATE_MOBILE_DEBUG_HANDLE -O2 -fPIC -Wall -Wextra -Werror=return-type -Werror=non-virtual-dtor -Werror=bool-operation -Wnarrowing -Wno-missing-field-initializers -Wno-type-limits -Wno-array-bounds -Wno-unk
nown-pragmas -Wno-unused-parameter -Wno-unused-function -Wno-unused-result -Wno-strict-overflow -Wno-strict-aliasing -Wno-stringop-overflow -Wsuggest-override -Wno-psabi -Wno-error=pedantic -Wno-error=old-style-cast -W
no-missing-braces -fdiagnostics-color=always -faligned-new -Wno-unused-but-set-variable -Wno-maybe-uninitialized -fno-math-errno -fno-trapping-math -Werror=format -Wno-stringop-overflow -DHAVE_AVX2_CPU_DEFINITION -g -f
no-omit-frame-pointer -O0 -fPIC -DTORCH_USE_LIBUV -DCAFFE2_USE_GLOO -Wall -Wextra -Wdeprecated -Wno-unused-parameter -Wno-unused-function -Wno-missing-field-initializers -Wno-unknown-pragmas -Wno-type-limits -Wno-array
-bounds -Wno-strict-overflow -Wno-strict-aliasing -Wno-maybe-uninitialized -fvisibility=hidden -pthread -fopenmp -std=gnu++17 -MD -MT caffe2/CMakeFiles/torch_cpu.dir/__/aten/src/ATen/Operators_2.cpp.o -MF caffe2/CMakeF
iles/torch_cpu.dir/__/aten/src/ATen/Operators_2.cpp.o.d -o caffe2/CMakeFiles/torch_cpu.dir/__/aten/src/ATen/Operators_2.cpp.o -c aten/src/ATen/Operators_2.cpp
c++: fatal error: Killed signal terminated program cc1plus
compilation terminated.
[44/891] Building CXX object caffe2/CMakeFiles/torch_cpu.dir/__/aten/src/ATen/RegisterCompositeImplicitAutograd.cpp.o
FAILED: caffe2/CMakeFiles/torch_cpu.dir/__/aten/src/ATen/RegisterCompositeImplicitAutograd.cpp.o
/usr/bin/c++ -DAT_PER_OPERATOR_HEADERS -DCAFFE2_BUILD_MAIN_LIB -DCPUINFO_SUPPORTED_PLATFORM=1 -DFMT_HEADER_ONLY=1 -DHAVE_MALLOC_USABLE_SIZE=1 -DHAVE_MMAP=1 -DHAVE_SHM_OPEN=1 -DHAVE_SHM_UNLINK=1 -DMINIZ_DISABLE_ZIP_READ
ER_CRC32_CHECKS -DONNXIFI_ENABLE_EXT=1 -DONNX_ML=1 -DONNX_NAMESPACE=onnx_torch -DUSE_C10D_GLOO -DUSE_DISTRIBUTED -DUSE_EXTERNAL_MZCRC -DUSE_RPC -DUSE_TENSORPIPE -D_FILE_OFFSET_BITS=64 -Dtorch_cpu_EXPORTS -Iaten/src -I/
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caffe2/aten/src/TH -Icaffe2/aten/src -Icaffe2/../aten/src -I/pytorch/torch/csrc -I/pytorch/third_party/miniz-2.1.0 -I/pytorch/third_party/kineto/libkineto/include -I/pytorch/aten/src/ATen/.. -I/pytorch/c10/.. -I/pytorc
h/third_party/cpuinfo/include -I/pytorch/third_party/ittapi/src/ittnotify -I/pytorch/third_party/FP16/include -I/pytorch/third_party/tensorpipe -Ithird_party/tensorpipe -I/pytorch/third_party/tensorpipe/third_party/lib
nop/include -I/pytorch/third_party/fmt/include -I/pytorch/third_party/flatbuffers/include -isystem third_party/gloo -isystem /pytorch/cmake/../third_party/gloo -isystem /pytorch/cmake/../third_party/tensorpipe/third_pa
rty/libuv/include -isystem /pytorch/third_party/protobuf/src -isystem /pytorch/third_party/ittapi/include -isystem /pytorch/cmake/../third_party/eigen -isystem include -D_GLIBCXX_USE_CXX11_ABI=1 -fvisibility-inlines-hi
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no-missing-braces -fdiagnostics-color=always -faligned-new -Wno-unused-but-set-variable -Wno-maybe-uninitialized -fno-math-errno -fno-trapping-math -Werror=format -Wno-stringop-overflow -DHAVE_AVX2_CPU_DEFINITION -g -f
no-omit-frame-pointer -O0 -fPIC -DTORCH_USE_LIBUV -DCAFFE2_USE_GLOO -Wall -Wextra -Wdeprecated -Wno-unused-parameter -Wno-unused-function -Wno-missing-field-initializers -Wno-unknown-pragmas -Wno-type-limits -Wno-array
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pp.o -MF caffe2/CMakeFiles/torch_cpu.dir/__/aten/src/ATen/RegisterCompositeImplicitAutograd.cpp.o.d -o caffe2/CMakeFiles/torch_cpu.dir/__/aten/src/ATen/RegisterCompositeImplicitAutograd.cpp.o -c aten/src/ATen/RegisterC
ompositeImplicitAutograd.cpp
c++: fatal error: Killed signal terminated program cc1plus
compilation terminated.
```

This is the most common problem during compilation because it requires a huge amount of memory.

To solve this this problem, increase your RAM and reduce the applications running in the background.

Compiling on my machine requires 14 GB RAM resource given to WSL2.

To incrase the RAM limit of WSL2, create a file called ".wslconfig" in the directory `C:\C:\Users\<Your_User_Name>\` with following content:

```
[wsl2]
memory = 14GB
```

If you can't increase your RAM, trying to continue compiling from the breakpoint by running: `ninja install` in the directory "build". Repeat this command if the compilation fails again.