1주차_ MacOS 환경에서 Microsoft seal 설치

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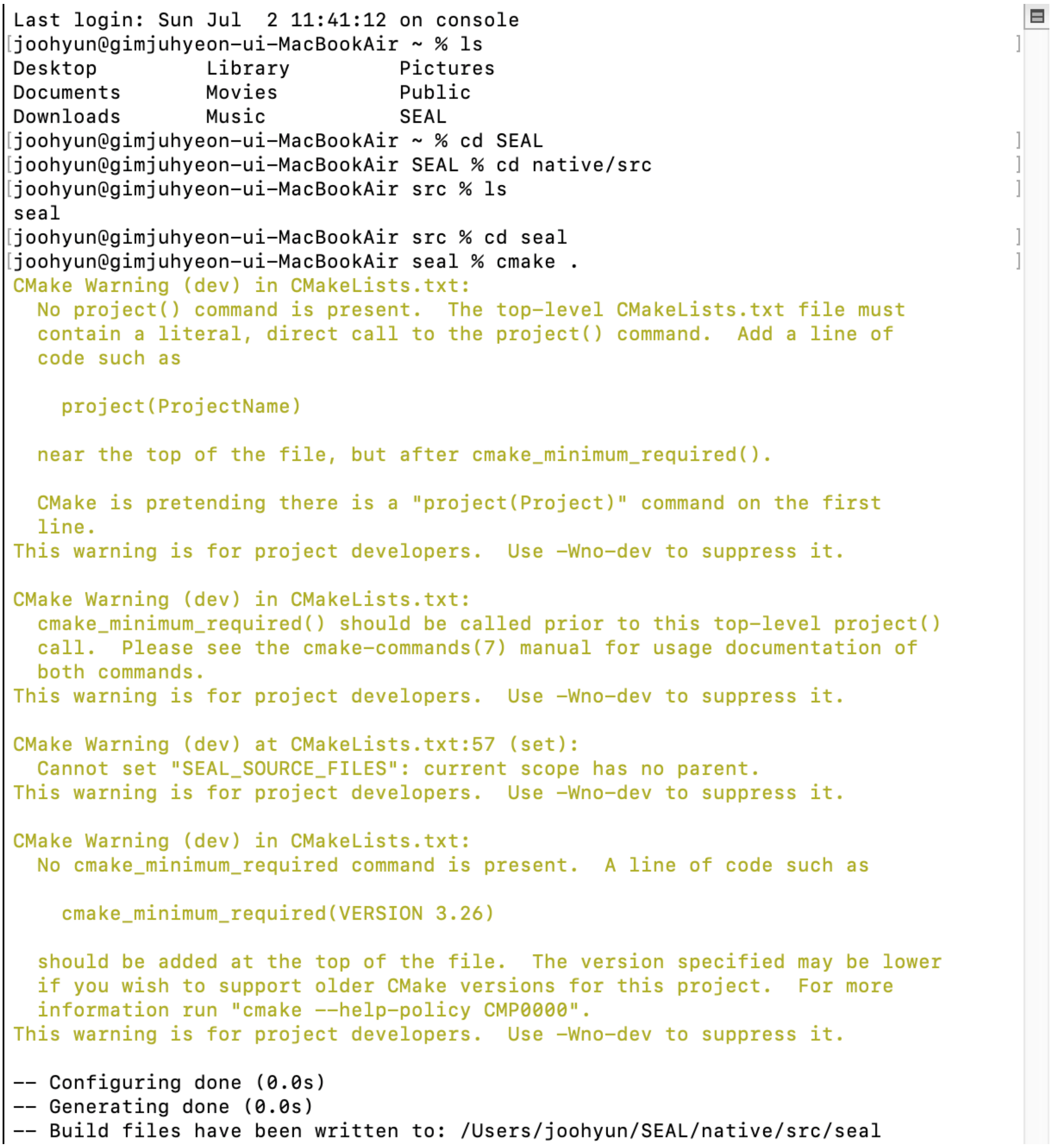
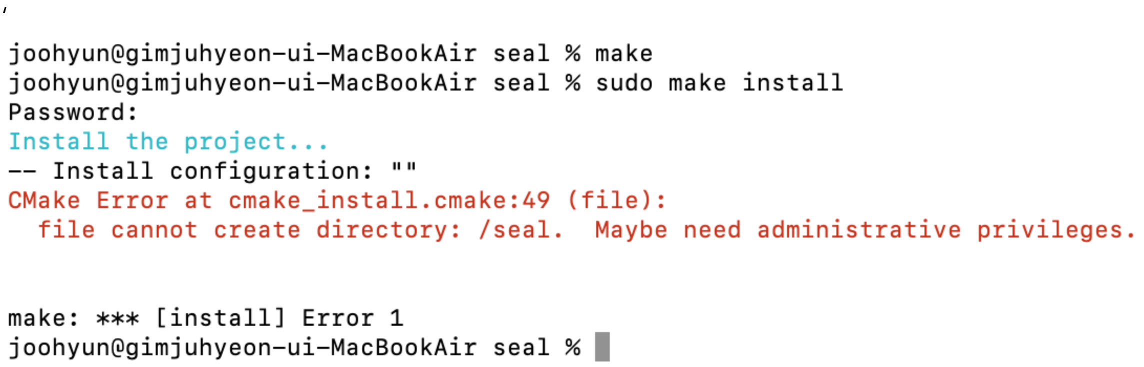
https://github.com/microsoft/SEAL#linking-with-microsoft-seal-through-cmake
git clone을 이용해 위 링크의 오픈소스를 클론한 후 진행했습니다.

[sudo make install 오류 해결]



```
Last login: Sun Jul  2 11:41:12 on console
[joohyun@gimjuhyeon-ui-MacBookAir ~ % ls
Desktop          Library          Pictures
Documents        Movies           Public
Downloads        Music            SEAL
[joohyun@gimjuhyeon-ui-MacBookAir ~ % cd SEAL
[joohyun@gimjuhyeon-ui-MacBookAir SEAL % cd native/src
[joohyun@gimjuhyeon-ui-MacBookAir src % ls
seal
[joohyun@gimjuhyeon-ui-MacBookAir src % cd seal
[joohyun@gimjuhyeon-ui-MacBookAir seal % cmake .
CMake Warning (dev) in CMakeLists.txt:
  No project() command is present.  The top-level CMakeLists.txt file must
  contain a literal, direct call to the project() command.  Add a line of
  code such as

    project(ProjectName)

  near the top of the file, but after cmake_minimum_required().

  CMake is pretending there is a "project(Project)" command on the first
  line.
This warning is for project developers.  Use -Wno-dev to suppress it.

CMake Warning (dev) in CMakeLists.txt:
  cmake_minimum_required() should be called prior to this top-level project()
  call.  Please see the cmake-commands(7) manual for usage documentation of
  both commands.
This warning is for project developers.  Use -Wno-dev to suppress it.

CMake Warning (dev) at CMakeLists.txt:57 (set):
  Cannot set "SEAL_SOURCE_FILES": current scope has no parent.
This warning is for project developers.  Use -Wno-dev to suppress it.

CMake Warning (dev) in CMakeLists.txt:
  No cmake_minimum_required command is present.  A line of code such as

    cmake_minimum_required(VERSION 3.26)

  should be added at the top of the file.  The version specified may be lower
  if you wish to support older CMake versions for this project.  For more
  information run "cmake --help-policy CMP0000".
This warning is for project developers.  Use -Wno-dev to suppress it.

-- Configuring done (0.0s)
-- Generating done (0.0s)
-- Build files have been written to: /Users/joohyun/SEAL/native/src/seal
```



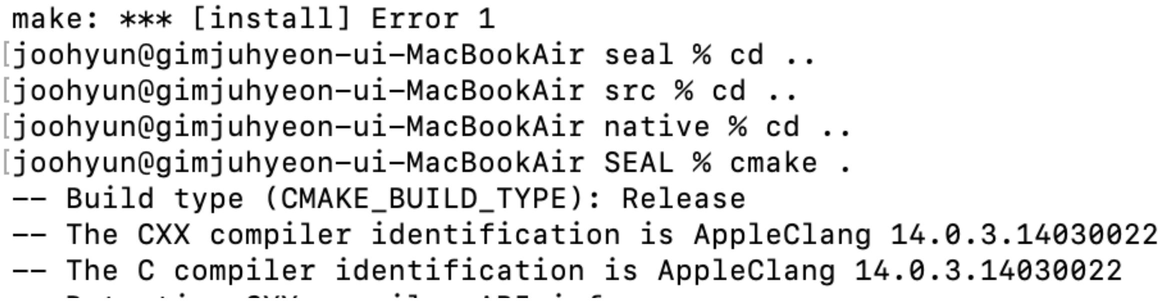
```
joohyun@gimjuhyeon-ui-MacBookAir seal % make
joohyun@gimjuhyeon-ui-MacBookAir seal % sudo make install
Password:
Install the project...
-- Install configuration: ""
CMake Error at cmake_install.cmake:49 (file):
  file cannot create directory: /seal.  Maybe need administrative privileges.


make: *** [install] Error 1
joohyun@gimjuhyeon-ui-MacBookAir seal %
```

sudo make install 명령어를 실행했더니 위와같은 오류가 발생했습니다.

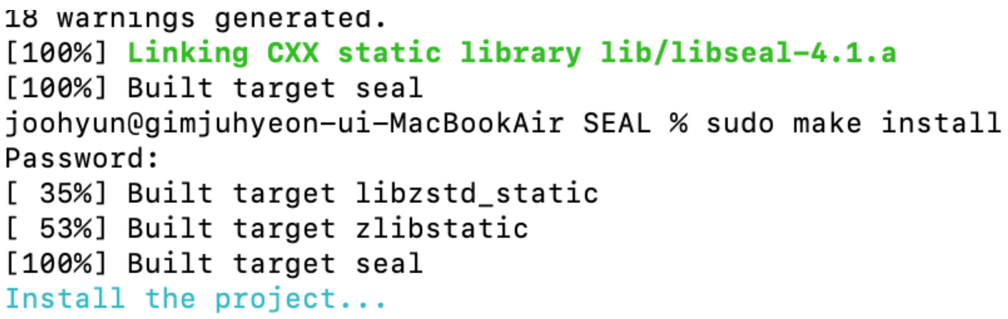
위의 오류는 "file cannot create directory: /seal"라는 메시지로, 관리자 권한이 필요한 디렉토리에 접근하려고 하기 때문에 발생한 것입니다.

Seal에서 명령어를 수행하는 것이 문제인 것이라 판단되어 이를 해결하기 위해

상위 디렉토리인 SEAL 디렉토리로 이동하여 cmake .부터 다시 실행하였습니다.



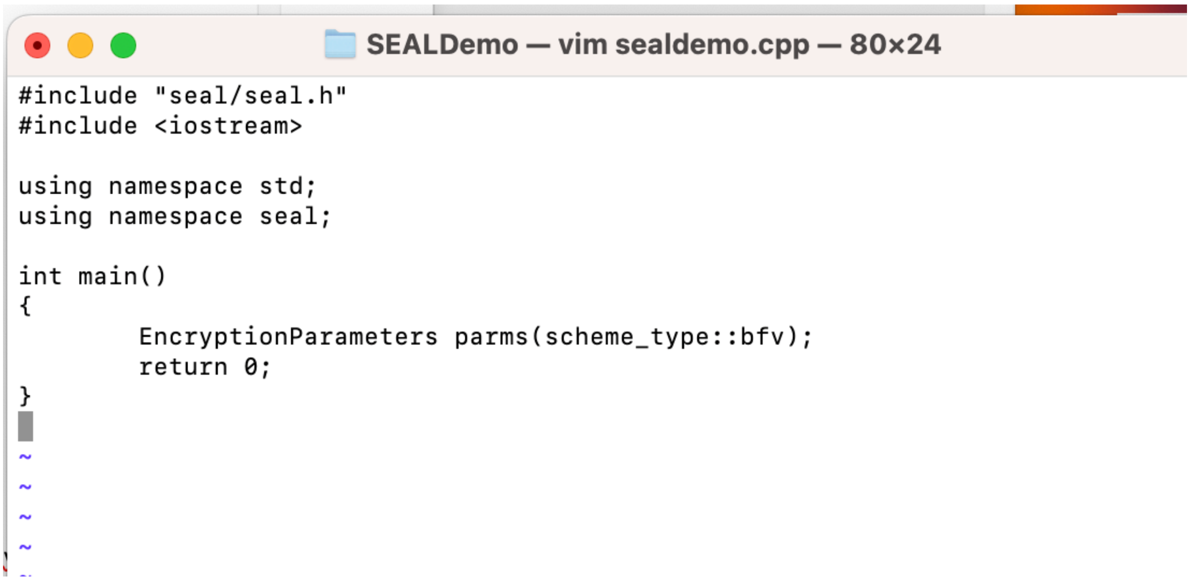
```
 make: *** [install] Error 1
[joohyun@gimjuhyeon-ui-MacBookAir seal % cd ..
[joohyun@gimjuhyeon-ui-MacBookAir src % cd ..
[joohyun@gimjuhyeon-ui-MacBookAir native % cd ..
[joohyun@gimjuhyeon-ui-MacBookAir SEAL % cmake .
 -- Build type (CMAKE_BUILD_TYPE): Release
 -- The CXX compiler identification is AppleClang 14.0.3.14030022
 -- The C compiler identification is AppleClang 14.0.3.14030022
```



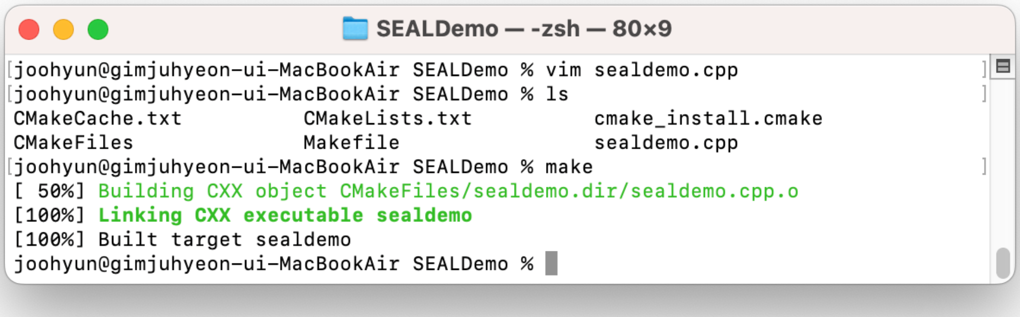
```
18 warnings generated.
[100%] Linking CXX static library lib/libseal-4.1.a
[100%] Built target seal
joohyun@gimjuhyeon-ui-MacBookAir SEAL % sudo make install
Password:
[ 35%] Built target libzstd_static
[ 53%] Built target zlibstatic
[100%] Built target seal
Install the project...
```

이후에 sudo make install을 입력했더니 오류 없이 잘 실행되었습니다.

예시로 sealdemo.cpp 코드를 작성한 후 make 명령어를 실행한 결과



```
#include "seal/seal.h"
#include <iostream>

using namespace std;
using namespace seal;

int main()
{
        EncryptionParameters parms(scheme_type::bfv);
        return 0;
}

~
~
~
~
```



```
[joohyun@gimjuhyeon-ui-MacBookAir SEALDemo % vim sealdemo.cpp
[joohyun@gimjuhyeon-ui-MacBookAir SEALDemo % ls
 CMakeCache.txt          CMakeLists.txt          cmake_install.cmake
 CMakeFiles              Makefile                sealdemo.cpp
[joohyun@gimjuhyeon-ui-MacBookAir SEALDemo % make
 [ 50%] Building CXX object CMakeFiles/sealdemo.dir/sealdemo.cpp.o
 [100%] Linking CXX executable sealdemo
 [100%] Built target sealdemo
 joohyun@gimjuhyeon-ui-MacBookAir SEALDemo % 
```

예시로 sealdemo.cpp 코드를 작성한 후 make 명령어를 실행한 모습입니다.

MacOS 환경에에서 Seal이 잘 연결된 것을 확인할 수 있었습니다.