

# Assignment 3 Write Up

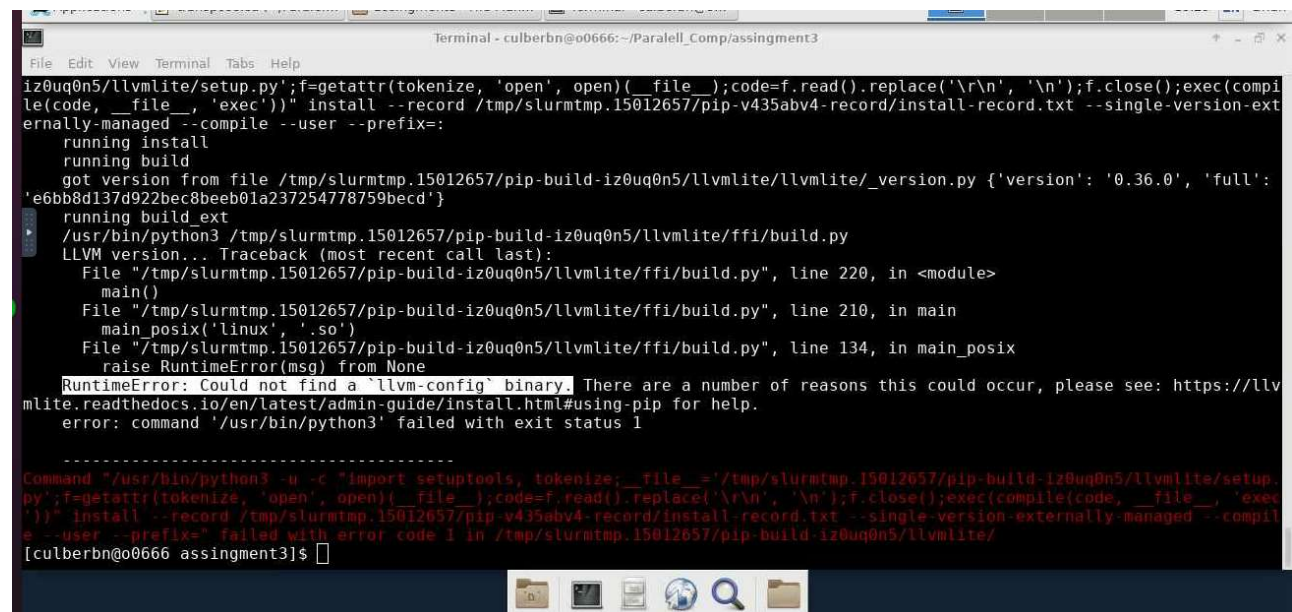
Wednesday, September 29, 2021 3:33 PM

For this assignment getting the blocked version wasn't too bad to figure out. All you had to do was get the individual point you worked on and transposed it. Overall the first version had significant improvement over the serial and parallel per row versions. For the shared memory version, I decided to share the variable out and in across all the threads and set the variable out once it was finished. This had an increase in time to complete but very slight increase.

This assignment also showed me that my GPU may not be compatible with Cuda. This could have been the cause of the errors in the last assignment.

```
2 errors detected in the compilation of /tmp/slurmtmp.15012657/pip-build-iz0uq0n5/llvmlite/llvmlite/_version.py {'version': '0.36.0', 'full': 'e6bb8d137d922bec8beeb01a237254778759becd'}
[culberbn@o0666 assingment3]$ nvcc transpose.cu
[culberbn@o0666 assingment3]$ ./a.out
transpose_serial: 123.418 ms.
Verifying ...Success
transpose_parallel_per_row: 1.69443 ms.
Verifying ...Success
64:1
transpose_parallel_per_element_tiled 16x16: 0.02048 ms.
Verifying ...Success
64:1
transpose_parallel_per_element_tiled_shared 16x16: 0.020736 ms.
Verifying ...Success
[culberbn@o0666 assingment3]$
```

For the extra credit I did design the input array for the transpose function. Unfortunately I could not run it on the OSC because I could not install Numba with pip. It gives the following error:



```
File Edit View Terminal Tabs Help
Terminal - culberbn@o0666:~/Paralell_Comp/assingment3
iz0uq0n5/llvmlite/setup.py';f=getattr(tokenize, 'open', open)(__file__);code=f.read().replace('\r\n', '\n');f.close();exec(compile(code, __file__, 'exec'))" install --record /tmp/slurmtmp.15012657/pip-v435abv4-record/install-record.txt --single-version-externally-managed --compile --user --prefix=:
running install
running build
got version from file /tmp/slurmtmp.15012657/pip-build-iz0uq0n5/llvmlite/llvmlite/_version.py {'version': '0.36.0', 'full': 'e6bb8d137d922bec8beeb01a237254778759becd'}
running build_ext
/usr/bin/python3 /tmp/slurmtmp.15012657/pip-build-iz0uq0n5/llvmlite/ffi/build.py
LLVM version... Traceback (most recent call last):
  File "/tmp/slurmtmp.15012657/pip-build-iz0uq0n5/llvmlite/ffi/build.py", line 220, in <module>
    main()
  File "/tmp/slurmtmp.15012657/pip-build-iz0uq0n5/llvmlite/ffi/build.py", line 210, in main
    main_posix('linux', '.so')
  File "/tmp/slurmtmp.15012657/pip-build-iz0uq0n5/llvmlite/ffi/build.py", line 134, in main_posix
    raise RuntimeError(msg) from None
RuntimeError: Could not find a 'llvm-config' binary. There are a number of reasons this could occur, please see: https://llvmlite.readthedocs.io/en/latest/admin-guide/install.html#using-pip for help.
error: command '/usr/bin/python3' failed with exit status 1

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Command "/usr/bin/python3 -u -c 'import setuptools, tokenize;__file__='/tmp/slurmtmp.15012657/pip-build-iz0uq0n5/llvmlite/setup.py';f=getattr(tokenize, 'open', open)(__file__);code=f.read().replace('\r\n', '\n');f.close();exec(compile(code, __file__, 'exec'))" install --record /tmp/slurmtmp.15012657/pip-v435abv4-record/install-record.txt --single-version-externally-managed --compile --user --prefix=" failed with error code 1 in /tmp/slurmtmp.15012657/pip-build-iz0uq0n5/llvmlite/
[culberbn@o0666 assingment3]$
```

From what I am seeing from this, it can't find the binary for the build for Numba. After looking this up I found this GitHub help page which found the same issue and discuss it. The problem was solved with upgrading pip to version 19.0 and up. This is the pip version on my OSC

```
[culberbn@o0666 assingment3]$ pip3 --version  
pip 9.0.3 from /usr/lib/python3.6/site-packages (python 3.6)  
[culberbn@o0666 assingment3]$
```

After finding this out I can only get as far on my local machine that is not Cuda compatible. Therefore I cannot complete the extra credit.