

Hands-on: Measure memory bandwidth

- Choose either C/C++ (`c` and `ctrad`) or Fortran (`fortran`). Both of them are fine, as well.

C/C++

How to execute

1. Edit a job script

- Before trying this hands-on, you need to do `00_stream` to compile STREAM.
- We have three working directories, `c/fj_zfill`, `c/fj`, and `ctrad/fj_zfill`. Under each of directories, you can find:
 - `run.sh`: a script to execute STREAM
 - `task.sh`: a job script to run STREAM with different kinds of settings
- Edit `BINDIR` variable in `run.sh` before the execution. You need to write your installed location of STREAM binary (e.g., `stream.exe`) there.

2. Run program

- You can run the program either:

```
## Here is an example of c/fj_zfill.  
## To run as a batch job  
$ cd c/fj_zfill  
$ pjsub task.sh  
## Or, to run in an interactive job  
$ cd c/fj_zfill  
$ bash task.sh
```

- Each of the cases in the Exercises will be completed within 3-4 minutes.
 - For safety, we set the job elapsed time in the job scripts is 6 minutes.

Exercises A

- E1: Check `task.sh` in `c/fj_zfill`, for example. You can find that the number of OpenMP threads varies from 1 to 48 via `NTHREADS` variable.
- E2: Run the STREAM benchmark (`stream.exe`) in `c/fj_zfill`, `c/fj`, and `ctrad/fj_zfill`. Check the results in `Best Rate (MB/s)` of functions `Add` and `Triad` in 48 threads.
- E3: Compare the measurement results to the peak performance of memory bandwidth in A64FX.

Fortran

How to execute

1. Edit a job script

- Before trying this hands-on, you need to do `00_stream` to compile STREAM.
- We have two working directories, `fortran/fj_zfill` and `fortran/fj`. Under each of directories, you can find:
 - `run.sh` : a script to execute STREAM
 - `task.sh`: a job script to run STREAM with different kinds of settings
- Edit `BINDIR` variable in `run.sh` before the execution. You need to write your installed location of STREAM binary (e.g., `stream.exe`) there.

2. Run program

- You can run the program either:

```
## Here is an example of fortran/fj_zfill.  
## To run as a batch job  
$ cd fortran/fj_zfill  
$ pjsub task.sh  
## Or, to run in an interactive job  
$ cd fortran/fj_zfill  
$ bash task.sh
```

- Each of the cases in the Exercises will be completed within 3-4 minutes.
 - For safety, we set the job elapsed time in the job scripts is 6 minutes.

Exercises A

- E1: Check `task.sh` in `fortran/fj_zfill`, for example. You can find that the number of OpenMP threads varies from 1 to 48 via `NTHREADS` variable.
- E2: Run the STREAM benchmark (`stream.exe`) in `fortran/fj_zfill/` and `fortran/fj/`. Check the results in `Rate (MB/s)` of functions `Add` and `Triad` in 48 threads.
- E3: Compare the measurement results to the peak performance of memory bandwidth in A64FX.