

# GPU Programming with Directives

## Overview



# Reusing this material



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## Partners



THE UNIVERSITY  
*of* EDINBURGH





- UK National Supercomputer Service
  - managed by UKRI/EP SRC
  - to be housed, operated and supported by EPCC
  - hardware Supplied by Cray
- Training provided by the ARCHER2 Computational Science and Engineering (CSE) support team
  - 60 days per year at various locations
  - free to all academics



## Key ARCHER2 Resources

- Upcoming courses
  - <http://www.archer2.ac.uk/training/>
- Material from past courses
  - <https://www.archer2.ac.uk/training/materials/>
- Virtual tutorials (online)
  - <https://www.archer2.ac.uk/training/online/>
- Documentation
  - <https://www.archer2.ac.uk/documentation/>





Who are we?



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## Other Resources



- Please fill in the feedback form!
  - <https://www.archer2.ac.uk/training/feedback/>
- General enquiries about ARCHER go to the helpdesk
  - [support@archer2.ac.uk](mailto:support@archer2.ac.uk)
- EPCC runs one-year taught postgraduate masters courses
  - ***MSc in HPC*** and ***MSc in HPC with Data Science***
  - awarded by the University of Edinburgh since 2001
  - scholarships available
  - <http://www.epcc.ed.ac.uk/msc/>



# Access to ARCHER2



- Your ARCHER2 `ta192` project accounts
  - Small amount of budget
  - `ta192` project accounts allow us to use a reservation to access dedicated compute nodes and get our jobs to run more quickly
  - Other ARCHER2 accounts can be used – use the short queue for quicker job turnaround
- Accounts will be closed a few weeks after access ends
  - all files etc. will be deleted
  - take copies of all your work beforehand!
- Course materials (slides, exercises etc) available from ARCHER2 website
  - archived on ARCHER2 web pages for future reference





# Code of Conduct



<https://www.archer2.ac.uk/training/code-of-conduct/>

- We expect all course trainers and attendees to:
  - Use welcoming and inclusive language
  - Be respectful of different viewpoints and experiences
  - Gracefully accept constructive criticism
  - Focus on what is best for the community
  - Show courtesy and respect towards other community members
- See web page for full details and incident reporting form



# Timetable

## Day 1

09.00-10.00 Lectures: Overview, GPU programming APIs

10.00-11.00 Lecture: GPU Architecture

11.00-11.30 Break

11.30-12.00 Lecture: Introduction to OpenMP

12.30-13.30 Lunch

13.30-14.15 Practical

14.15-15.15 Lecture: Introduction to OpenMP - data movement

15.15-15.45 Break

15.45-17.00 Practical

## Day 2

09.00-10.00 Lecture: Advanced Topics

10.00-11.00 Practical

11.00-11.30 Break

11.30-12.30 Lecture: Performance

12.30-13.30 Lunch

13.30-14.15 Practical

14.15-15.00 Lecture: OpenACC

15.00-15.30 Break

15.30-16.00 Practical/ wrap up

1600 Close

# Lecture notes etc.



Go to the ARCHER2 site at <https://www.archer2.ac.uk/> and follow the links to this course under the Training tab



## Practical exercises source code



To download the source code for the practical exercises, make sure you are in your **work** directory on ARCHER2, then use the following command :

```
cp /work/z19/shared/GPUdir/*.tar .
```



## Reservation ID



Both days: **Q2697758**

Use:

```
sbatch --reservation=Q2697758 jobscript
```

and

```
#SBATCH -qos=reservation
```

in the script.





I hope you enjoy the course



- ... and *please ask questions!*

