

INF3380 Exercise Set 2

Exercise 1

Write a simple C program that illustrates the speed advantages of reading and writing binary data files, compared with using ASCII data files.

Exercise 2

Write a simple C program that compares the following handcoded copy operation between two arrays

```
for (i=0; i<n; i++) b[i]=a[i]
```

with using the standard `memcpy` function.

Exercise 3

Implement an explicit solver of the 3D heat equation

$$\frac{\partial u}{\partial t} = \kappa \left(\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} + \frac{\partial^2 u}{\partial z^2} \right)$$

in the unit cube, where κ is a constant. You should use two 3D arrays `u[i][j][k]` and `u_prev[i][j][k]` which both have an underlying contiguous storage layout.

Exercise 4

What is the actual FLOPS rate achieved by your 3D solver above?