

AMS 148 HW 3

2.1.4) Map? This problem is similar to a map in the sense that we want to apply the same function to each element of the list of MotoGP Racers. This function $\Phi(x)$ places element x into its sorted location.

2.2.1) This code snippet does two patterns. The line of code:

```
out[i] = pi * in[i];
```

represents a Map pattern. The next line of code:

```
out[i + j * 128] = in[j + i * 128];
```

represents a Transpose pattern, since $\text{out}[j][i] = \text{in}[i][j]$.

4.1) HIP Matrix-Vector Product

Serial Matrix-Vector Product time for $n = 16$ is 5e-06ms

Serial Matrix-Vector Product time for $n = 128$ is 0.000175ms

Serial Matrix-Vector Product time for $n = 1024$ is 0.008963ms

Serial Matrix-Vector Product time for $n = 2048$ is 0.029215ms

Error for $n = 65536$

HIP Matrix-Vector Product with Shared Memory

Shared Memory Matrix-Vector Multiplication time for $N = 16$ is 0.009184ms

Shared Memory Matrix-Vector Multiplication time for $N = 128$ is 0.00304ms

Shared Memory Matrix-Vector Multiplication time for $N = 1024$ is 0.002048ms

Shared Memory Matrix-Vector Multiplication time for $N = 2048$ is 0.00512ms

Error for $n = 65536$

4.2) HIP Matrix-Transpose

Naive Matrix Transpose Multiplication time for $N = 16$ is 1ms

Naive Matrix Transpose Multiplication time for $N = 128$ is 1ms

Naive Matrix Transpose Multiplication time for $N = 1024$ is 1ms

Naive Matrix Transpose Multiplication time for $N = 2048$ is 1ms

Error for $n = 65536$

Shared Memory Matrix-Vector Multiplication time for $N = 16$ is 0.009248ms

Shared Memory Matrix-Vector Multiplication time for $N = 128$ is 0.002048ms

Shared Memory Matrix-Vector Multiplication time for $N = 1024$ is 0.002368ms

Shared Memory Matrix-Vector Multiplication time for $N = 2048$ is 0.002528ms

Error for $n = 65536$