[MI3.04a] Advanced Programming for HPC

Report OpenMP

Labwork 1

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- Input and outputs images

(a) Original Image

(b) Without OpenMP

(c) With OpenMP

Figure 1: Labwork 1 input and outputs

- How you implement the conversion?

  - Simply add the pragma command (since every pixel is independent)

```
void Labwork::labwork1_OpenMP() {
    int pixelCount = inputImage->width * inputImage->height;
    outputImage = static_cast<char *>(malloc(pixelCount * 3));
    // do something here

    for (int j = 0; j < 100; j++) {     // let's do it 100 times, otherwise it's too fast!
        # pragma omp parallel for
        for (int i = 0; i < pixelCount; i++) {
            outputImage[i * 3] = (char) (((int) inputImage->buffer[i * 3] +
                                          (int) inputImage->buffer[i * 3 + 1] +
                                          (int) inputImage->buffer[i * 3 + 2]) / 3);
            outputImage[i * 3 + 1] = outputImage[i * 3];
            outputImage[i * 3 + 2] = outputImage[i * 3];
        }
    }
}
```

- What's the speedup?

  - labwork 1 CPU ellapsed 264.6 ms

  - labwork 1 ellapsed 6.4 ms (Default)

  - labwork 1 ellapsed 36.8 ms (With OpenMP modified)

  → Look like 9-10 times faster!

- Try experimenting with different OpenMP parameters

  - Team size

  - **static / dynamic**

  - Graph [Runtime on cloud.jpeg image with 800x600]

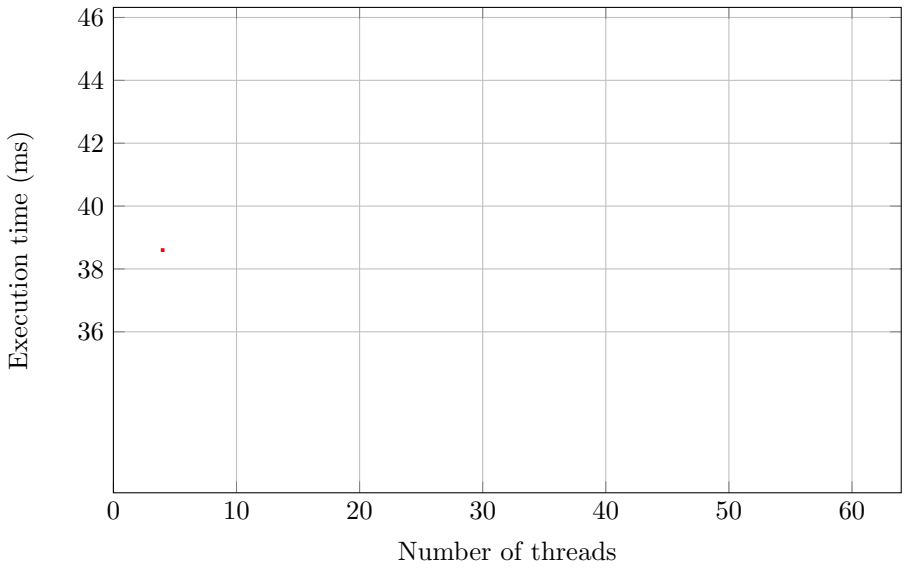

Figure 2: OpenMP graph