Jewitt_Ally_A9

Ally Jewitt

2023-03-14

Load libraries

```
library(doParallel)
```

```
## Loading required package: foreach
```

```
## Loading required package: iterators
```

```
## Loading required package: parallel
```

```
library(parallel)
library(foreach)
```

Number of cores

```
detectCores()
```

```
## [1] 4
```

There are 4 cores in my system.

Standard for loop

```
mean <- numeric(4000)

start1 <- Sys.time()

for (i in 1:4000) {
  sample <- rnorm(100000, mean=10, sd=3)
  mean[i] <- mean(sample)
}

finish1 <- Sys.time()

time_serial <- finish1 - start1
print(paste0("Time elapsed: ", time_serial, " seconds"))
```

```
## [1] "Time elapsed: 29.851448059082 seconds"
```

Theoretical time

Theoretically, the parallel run-time should be equivalent to the serial run-time, divided by the number of cores in my computer:

```
SerialTime<-13.4488620758057
Comp_Core<- 4

time_theoretical<-SerialTime/Comp_Core
print(paste0("Theoretical time: ", time_theoretical, " seconds"))
```

```
## [1] "Theoretical time: 3.36221551895142 seconds"
```

Parallel loop

```
Cores <- parallel::makeCluster(detectCores())
doParallel::registerDoParallel(Cores)

start2 <- Sys.time()

means<- foreach(i = 1:4000, .combine = c) %dopar% {
  numbers <- rnorm(100000, mean = 10, sd = 3)
  mean(numbers)
}

parallel::stopCluster(Cores)

finish2 <- Sys.time()

time_parallel <- finish2 - start2
print(paste0("Time elapsed: ", time_parallel, " seconds"))
```

```
## [1] "Time elapsed: 13.8635609149933 seconds"
```

Compare run times

The actual run time of the parallel loop is 13.7 seconds, which is faster than the serial loop, 30.4 seconds, but slower than the theoretical, 3.4 seconds.

The theoretical is shorter than the actual run-time of the parallel program because it represents the minimum amount of time that the system needs to run the loop. This is often a bit slower in actual time because of other factors such as contention for resources.