

Problem 1

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Environment

- **Processor:** Intel(R) Core(TM) i7-1065G7 CPU @ 1.30GHz 1.50 GHz
- **Number of cores:** 4
- **RAM:** 16.0GB
- **OS:** Window 11 (64 bit)

Tables and graphs

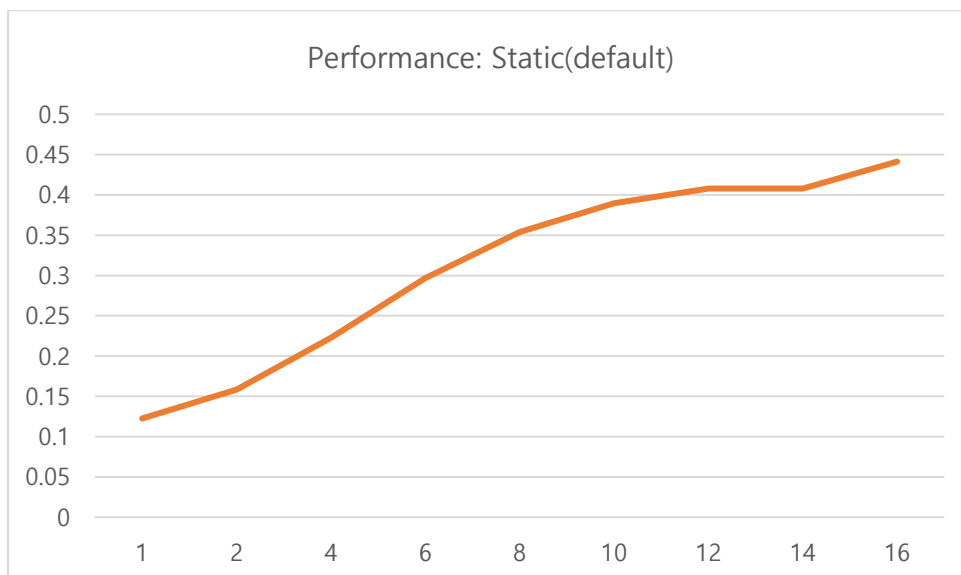
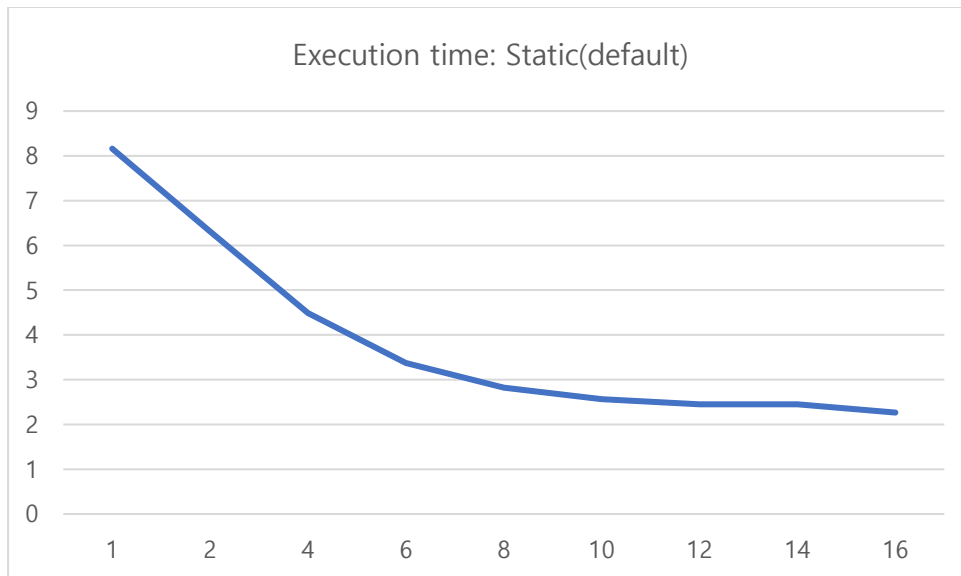
Execution time

exec time	chunk size	1	2	4	6	8	10	12	14	16
static	default	8.161215	6.313102	4.489625	3.37138	2.82432	2.566279	2.452443	2.451247	2.266
dynamic	default	8.280857	4.654672	2.903793	2.379482	2.042366	2.034973	2.02814	1.977186	1.967277
static	10	7.938462	4.757136	2.980703	2.950029	2.349023	2.203987	2.125187	2.119345	2.076638
dynamic	10	8.392224	4.652983	2.998122	2.400914	2.148778	2.082325	2.080283	1.997079	1.948382

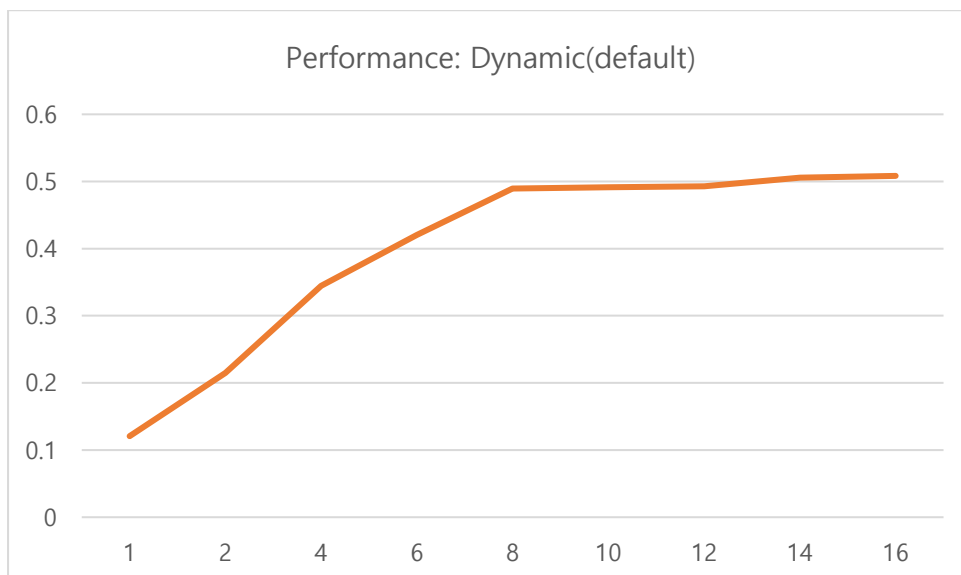
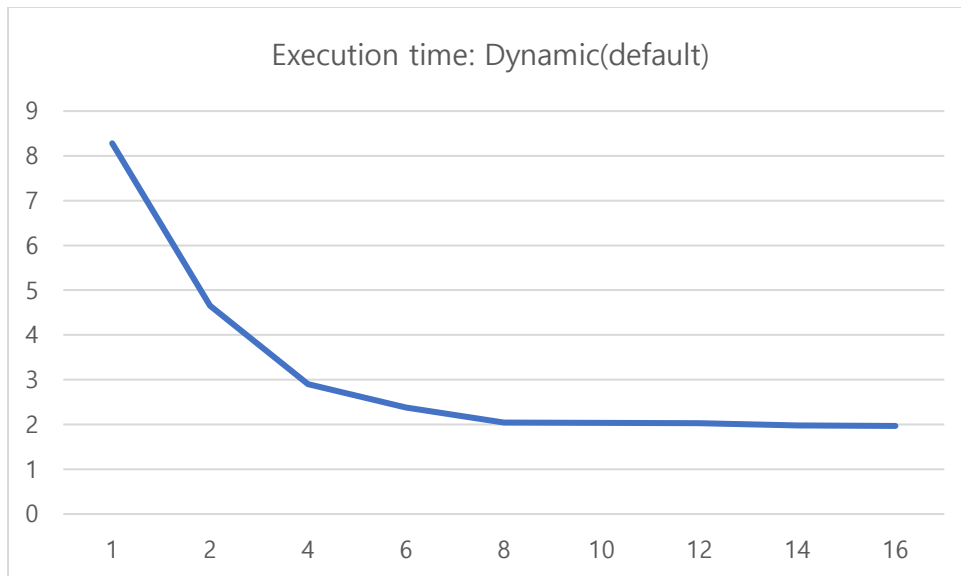
Performance

performance	chunk size	1	2	4	6	8	10	12	14	16
static	default	0.122531	0.158401	0.222736	0.296614	0.354068	0.389669	0.407757	0.407956	0.441306
dynamic	default	0.12076	0.214838	0.344377	0.42026	0.489628	0.491407	0.493063	0.505769	0.508317
static	10	0.125969	0.210211	0.335491	0.33898	0.425709	0.453723	0.470547	0.471844	0.481548
dynamic	10	0.119158	0.214916	0.333542	0.416508	0.465381	0.480232	0.480704	0.500731	0.513246

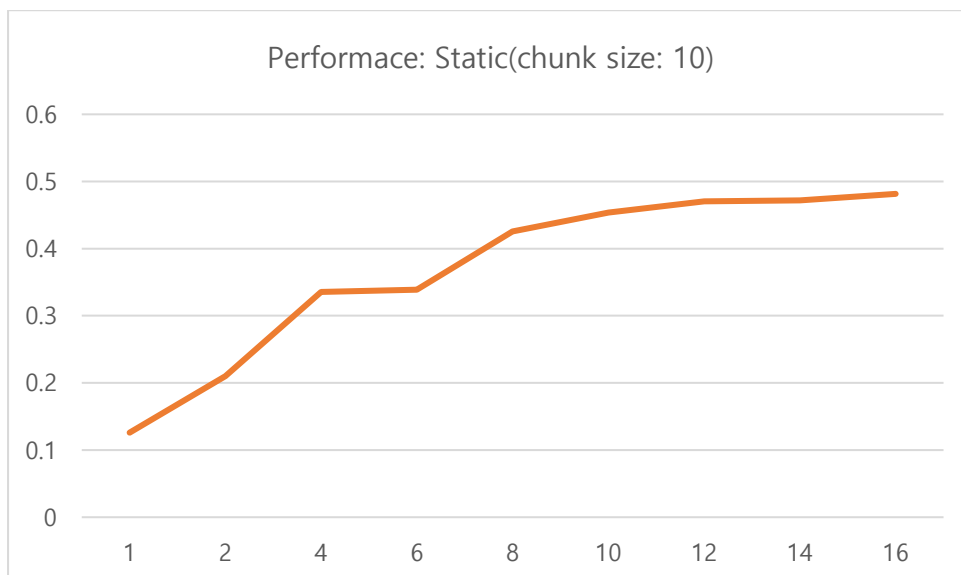
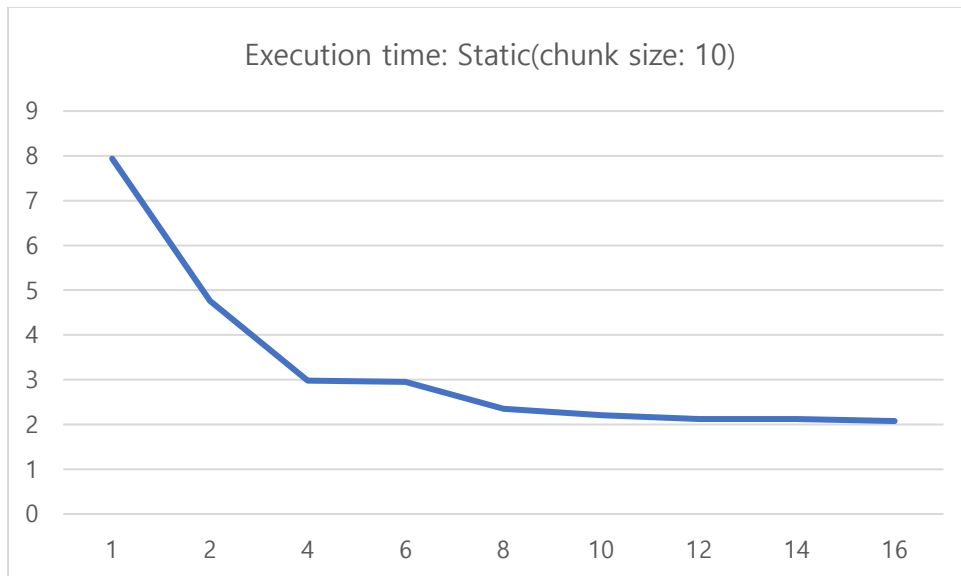
Static(default)



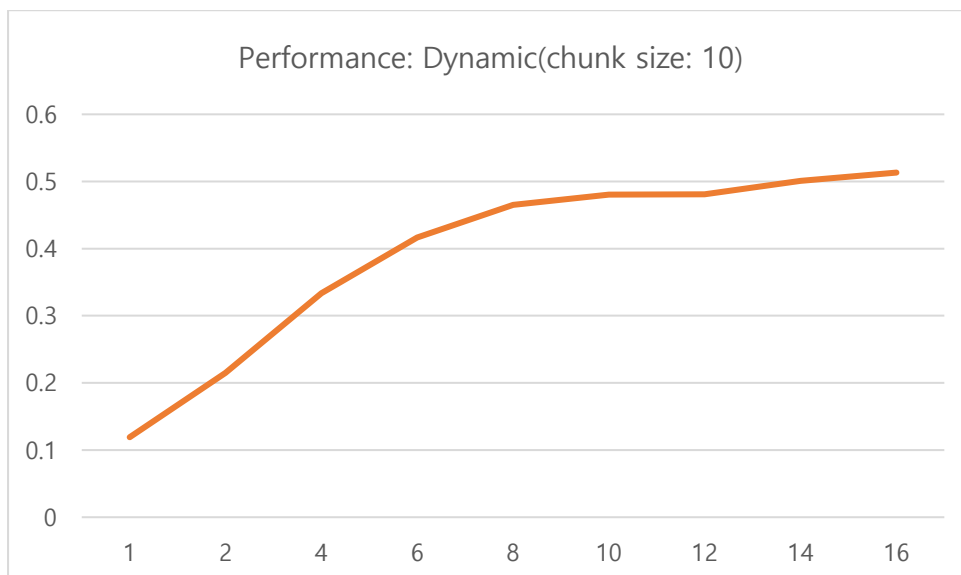
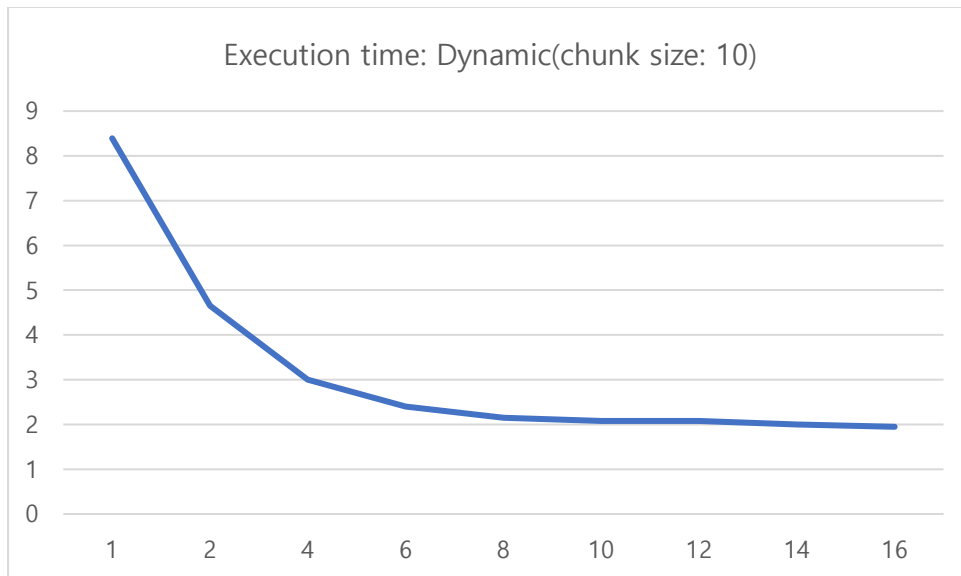
Dynamic(default)



Static(chunk size: 10)



Dynamic(chunk size: 10)



Explanation / Analysis

When the chunk size was set to default, static scheduling's performance increased from 0.12 to 0.44, as the number of threads increased. In the case of dynamic scheduling, it showed similar performance to static, but when the performance increased more rapidly and the number of threads exceeded 10, adding threads did not improve significantly.

```
<< Static, default >>  
Execution time: 3.066331 ms  
Number of prime numbers 17984  
Number of threads: 10
```

```
<< Dynamic, default >>  
Execution time: 2.093392 ms  
Number of prime numbers 17984  
Number of threads: 10
```

When the chunk size is set to 10, static scheduling performs slightly better than the value given as default. In the case of the default value, the chunk size is designated as 'loop_count/thread_count', resulting in a performance difference between threads. This is because the larger the number, it is difficult to calculate whether it is a prime number or not. Therefore, threads with high numbers take longer than other threads.

```
<< Static, chunk size 10 >>  
Execution time: 2.299150 ms  
Number of prime numbers 17984  
Number of threads: 10
```

```
<< Dynamic, chunk size 10 >>  
Execution time: 2.048639 ms  
Number of prime numbers 17984  
Number of threads: 10
```

In dynamic scheduling, it can also be seen that setting the chunk size to 10 is a little better than giving default for the same reason as static.