

## Long Project 5: RMQ

### 1. Hybrid approach

Below are the results for Hybrid approach with Pre-processing time and query time separately.

#### a) Pre-processing time

Size	Time(usec)	Space
10M	2903	85 MB / 256 MB
100M	18883	811 MB / 1354 MB
200M	35941	1612 MB / 2314 MB
500M	105676	4013 MB / 4076 MB
800M	OOM	OOM

#### b) Query time

Size	Time(usec)	Space
10M	3012	86 MB / 256 MB
100M	5300	811 MB / 1354 MB
200M	96929	1612 MB / 2314 MB
500M	112857	4013 MB / 4076 MB
800M	OOM	OOM

### 2. Fischer-Heun algorithm

Below are the results for Fischer-Heun algorithm for RMQ problem with pre-processing and query time separately.

#### a) Pre-processing time

Size	Time(usec)	Space
10M	23320	421 MB / 928 MB
100M	177028	2935 MB / 4076 MB
200M	OOM	OOM

#### b) Query time

Size	Time(usec)	Space
10M	9481	421 MB / 928 MB
100M	63978	2935 MB / 4076 MB
200M	OOM	OOM

After observing the results, we found that the hybrid approach performs better than Fischer-Huen for both pre-processing and query time.

For Query time, Hybrid approach performs better as Fischer is unable to achieve  $O(1)$  for large inputs.