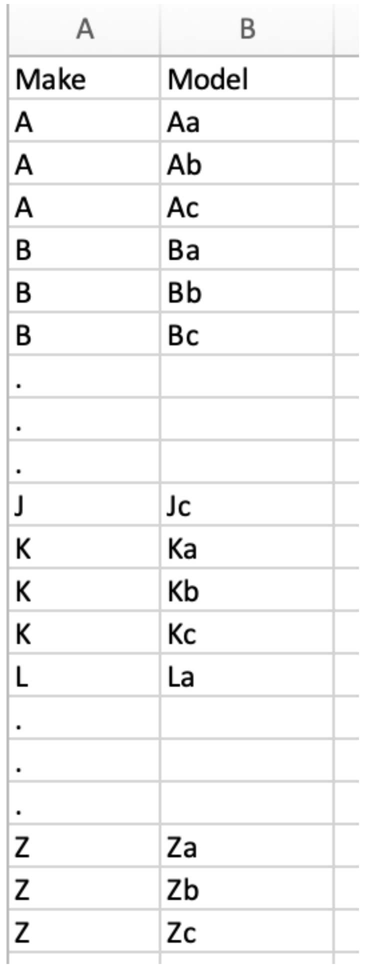
WASHINGTON STATE UNIVERSITY

CPTS 223: Advanced Data Structure in C/C++

Introduction: why advanced data structure?

First impression in daily life

- Find a correct car wiper blade rom a size chart book



A	B
Make	Model
A	Aa
A	Ab
A	Ac
B	Ba
B	Bb
B	Bc
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J	Jc
K	Ka
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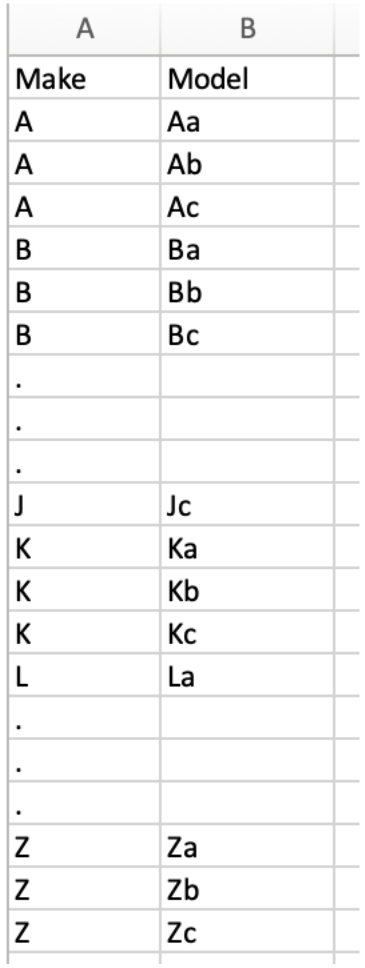

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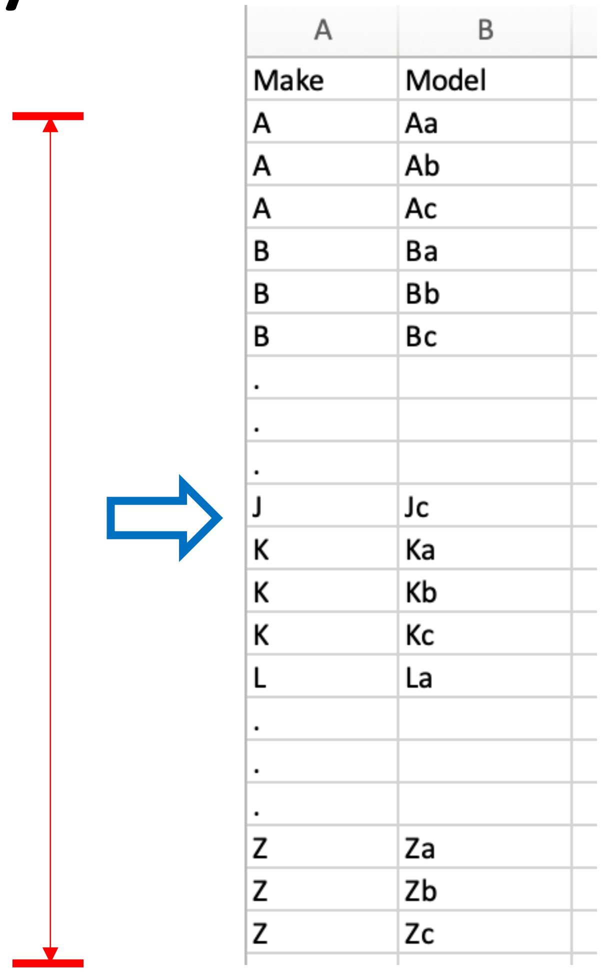

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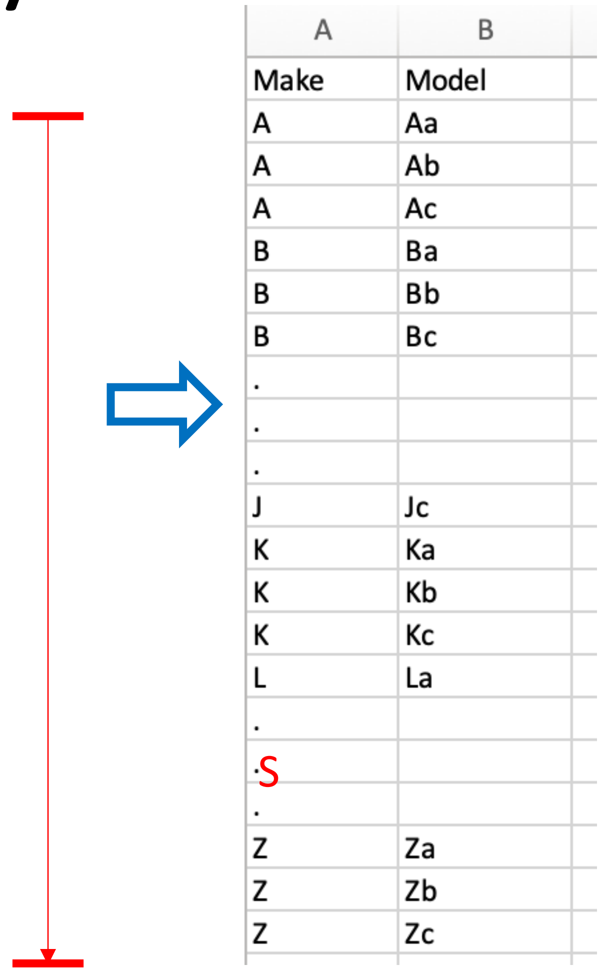

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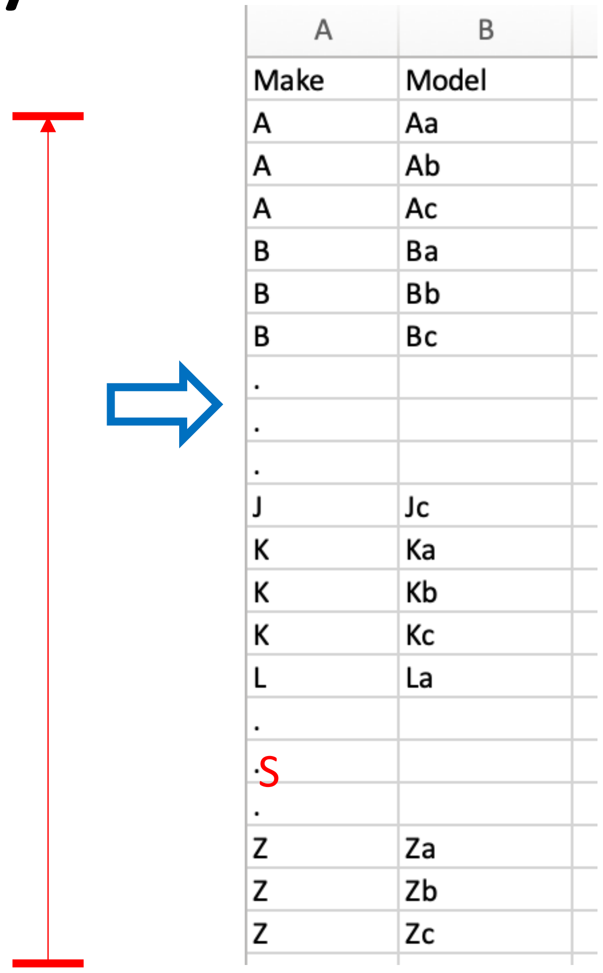

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    - If queried Make < K → query next one in latter section
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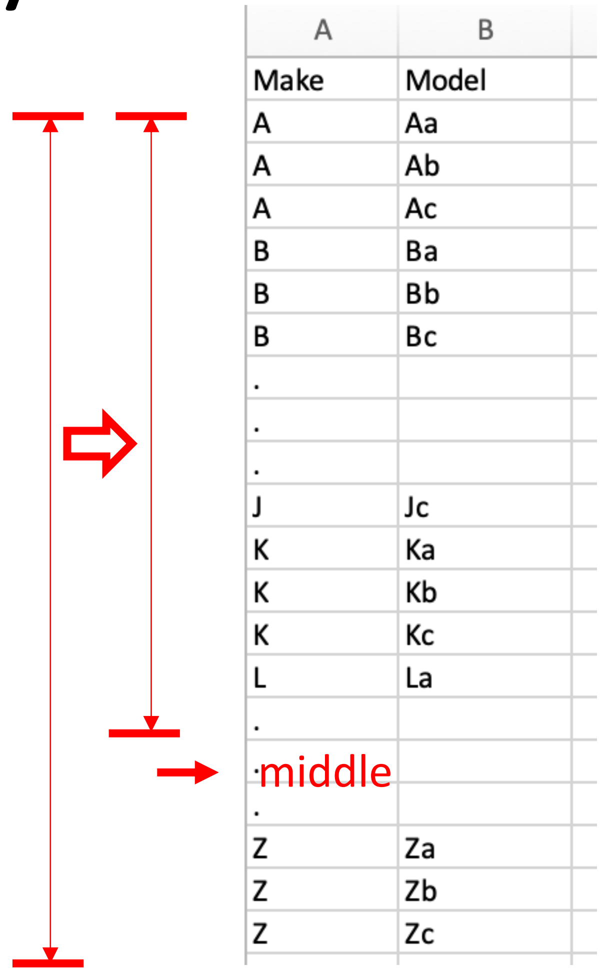

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- Which one is the best? Why?

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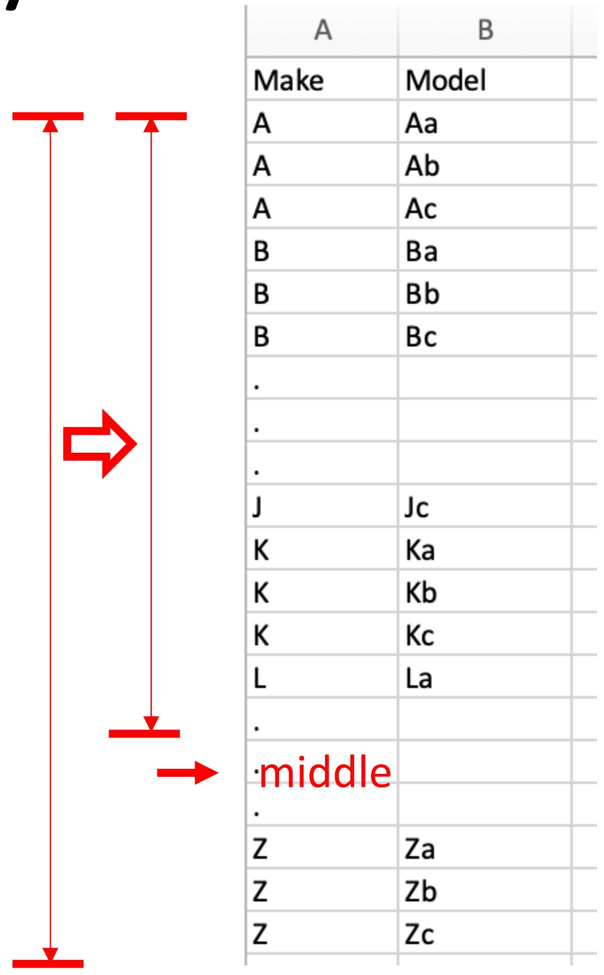

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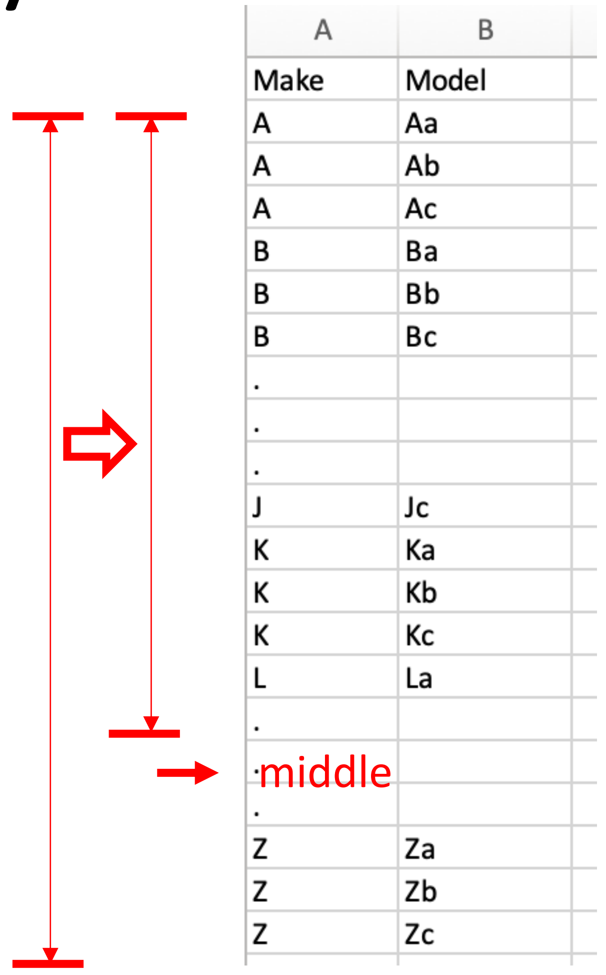

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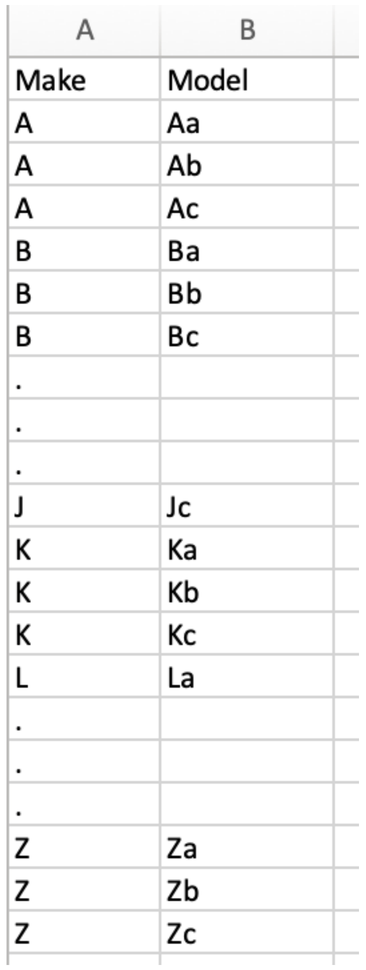

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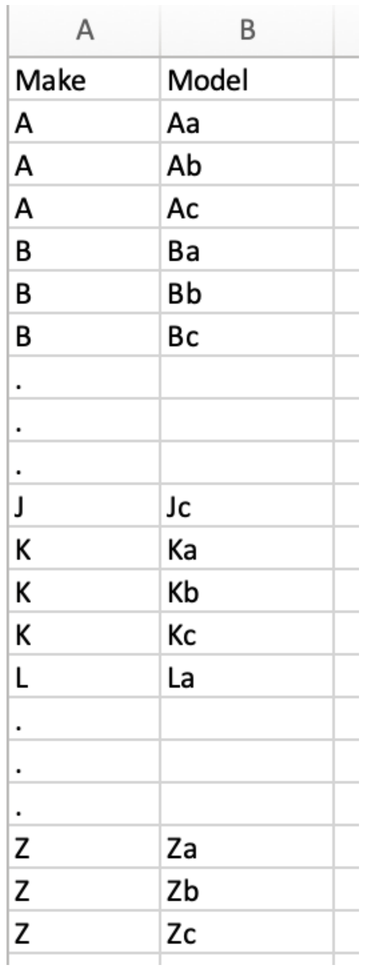

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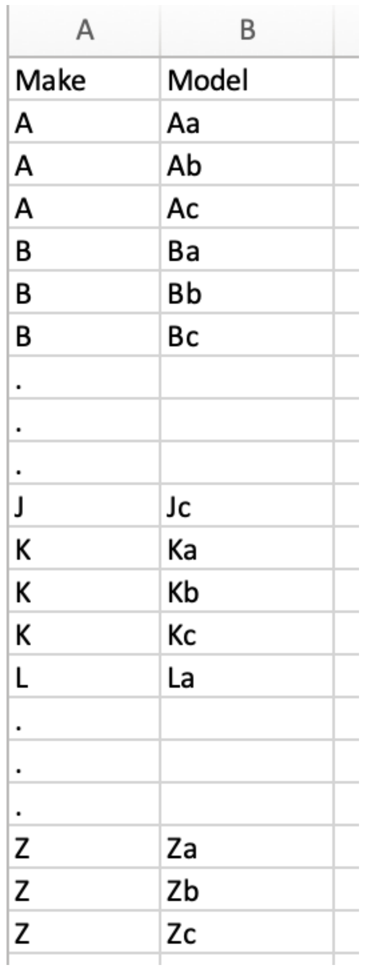

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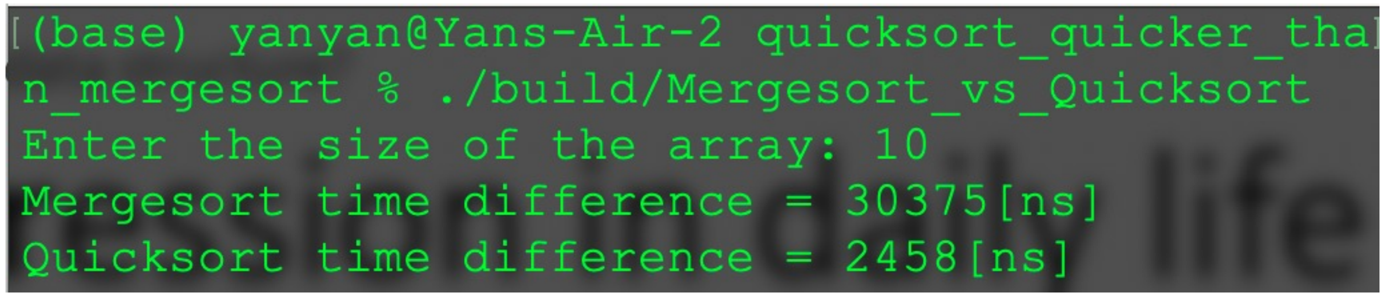

```
[(base) yanyan@Yans-Air-2 quicksort_quicker_tha]
n_mergesort % ./build/Mergesort_vs_Quicksort
Enter the size of the array: 10
Mergesort time difference = 30375[ns]
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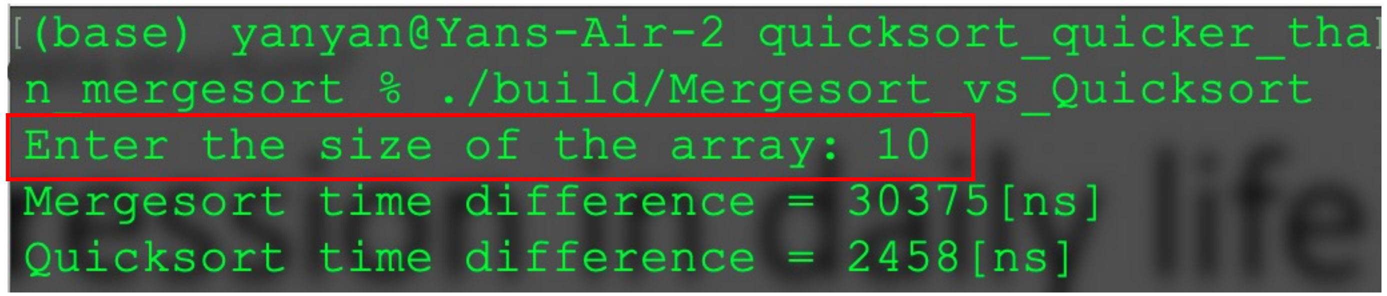

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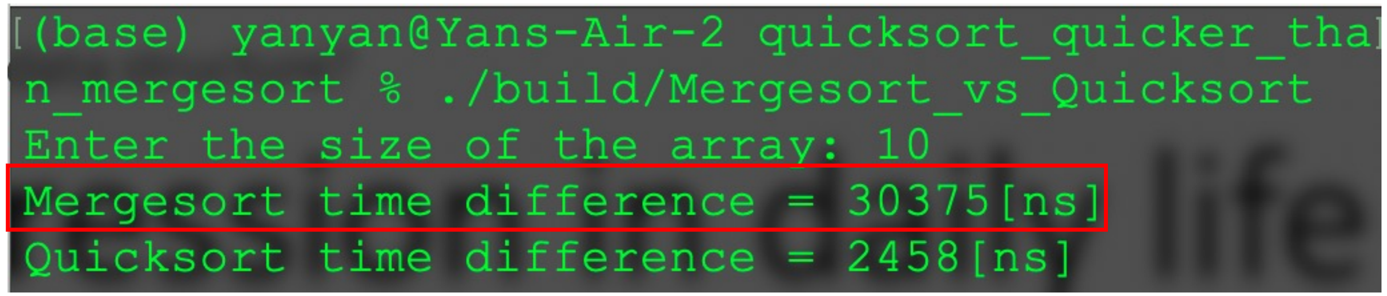

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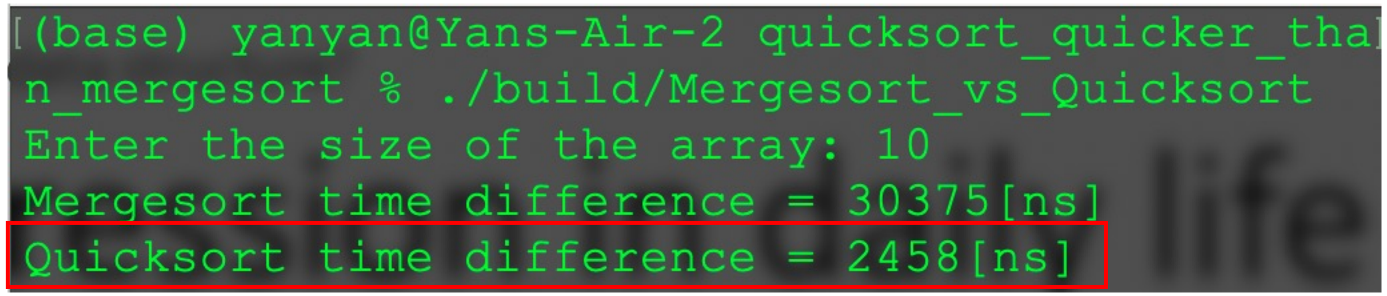

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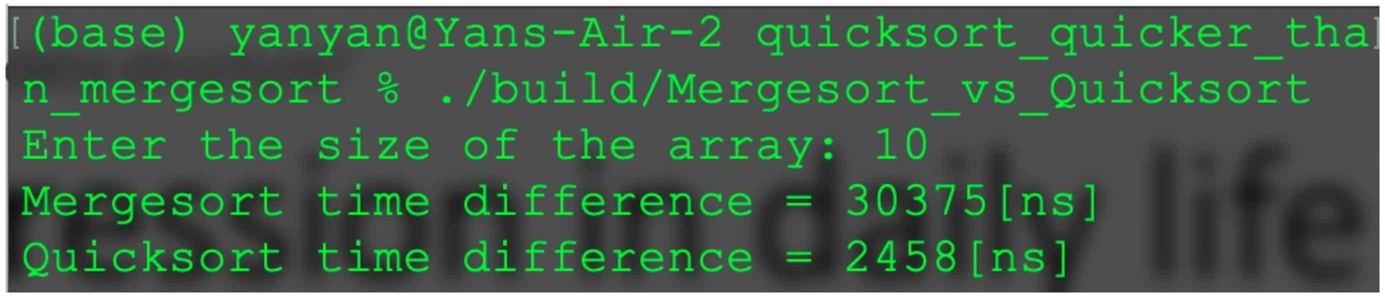

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  - Conclusion: Quicksort is better than Mergesort?

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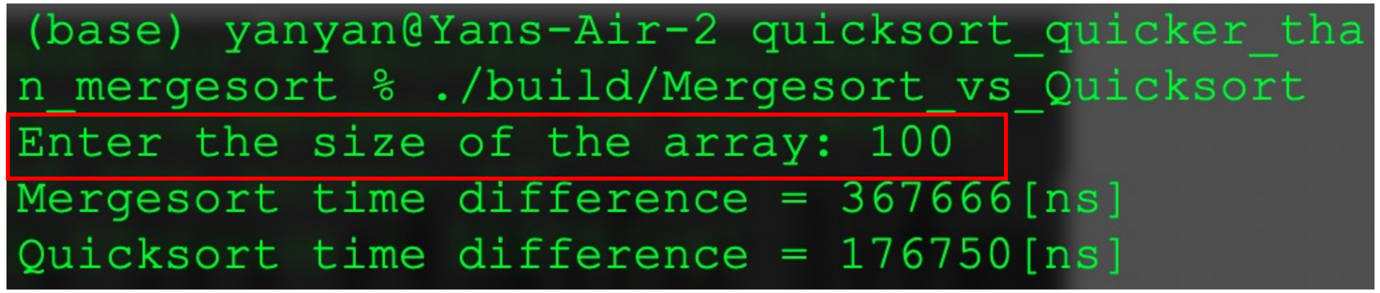
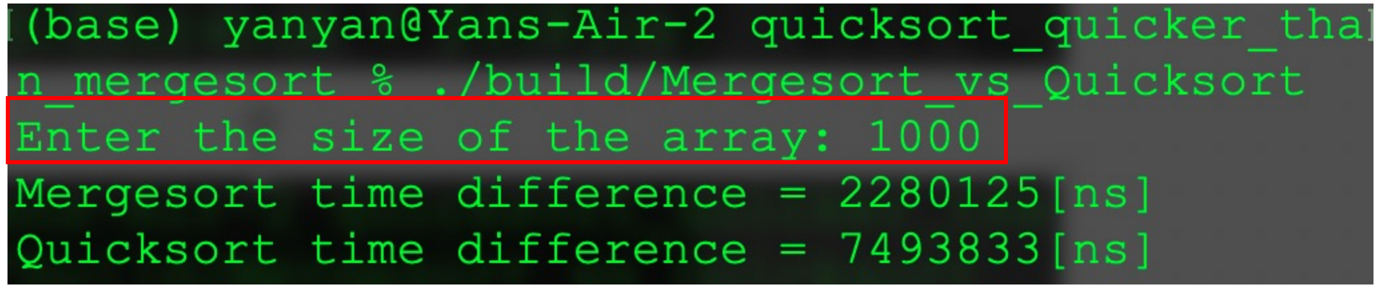


```
(base) yanyan@Yans-Air-2 quicksort_quicker_tha
n_mergesort % ./build/Mergesort_vs_Quicksort
Enter the size of the array: 100
Mergesort time difference = 367666[ns]
Quicksort time difference = 176750[ns]
```



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(base) yanyan@Yans-Air-2 quicksort_quicker_tha
n_mergesort % ./build/Mergesort_vs_Quicksort
Enter the size of the array: 1000
Mergesort time difference = 2280125[ns]
Quicksort time difference = 7493833[ns]
```

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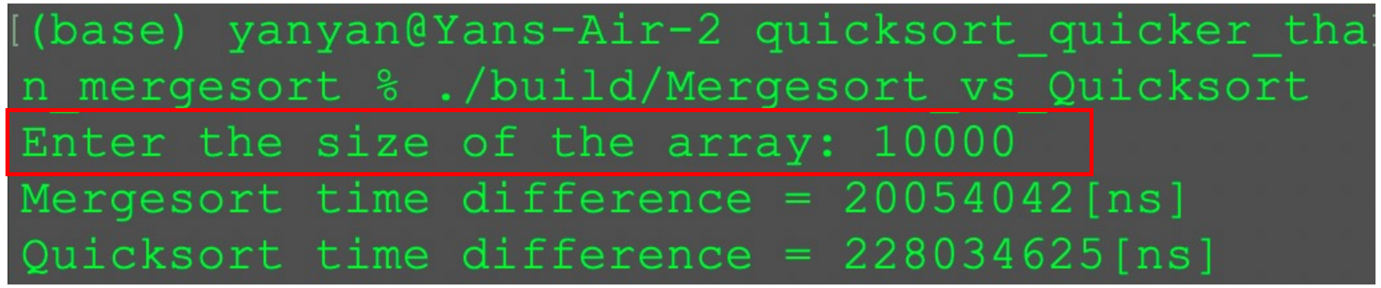

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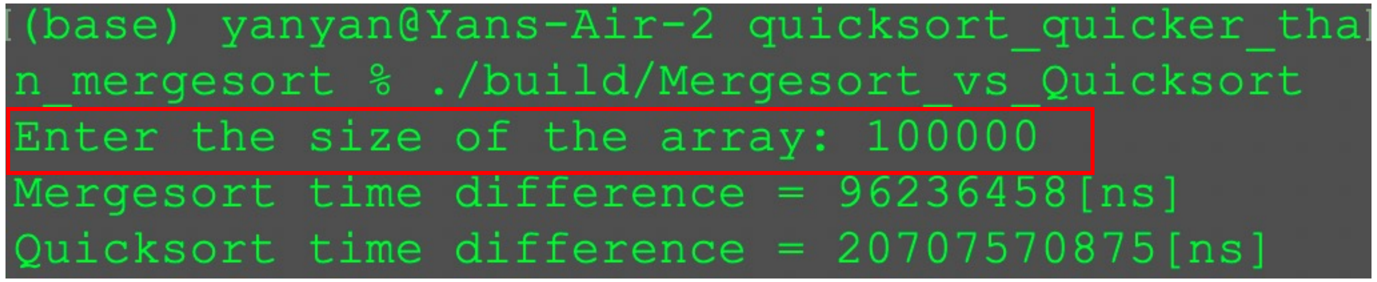
[(base) yanyan@Yans-Air-2 quicksort_quicker_tha
n_mergesort % ./build/Mergesort_vs_Quicksort
Enter the size of the array: 10000
Mergesort time difference = 20054042[ns]
Quicksort time difference = 228034625[ns]
```



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n_mergesort % ./build/Mergesort_vs_Quicksort
Enter the size of the array: 100000
Mergesort time difference = 96236458[ns]
Quicksort time difference = 20707570875[ns]
```

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Running time (in ns)

n (input size)	**Mergesort**	**Quicksort**
10	30375	2458
100	367666	176750
1000	2280125	7493833
10000	20054042	96236458
100000	96236458	20707570875

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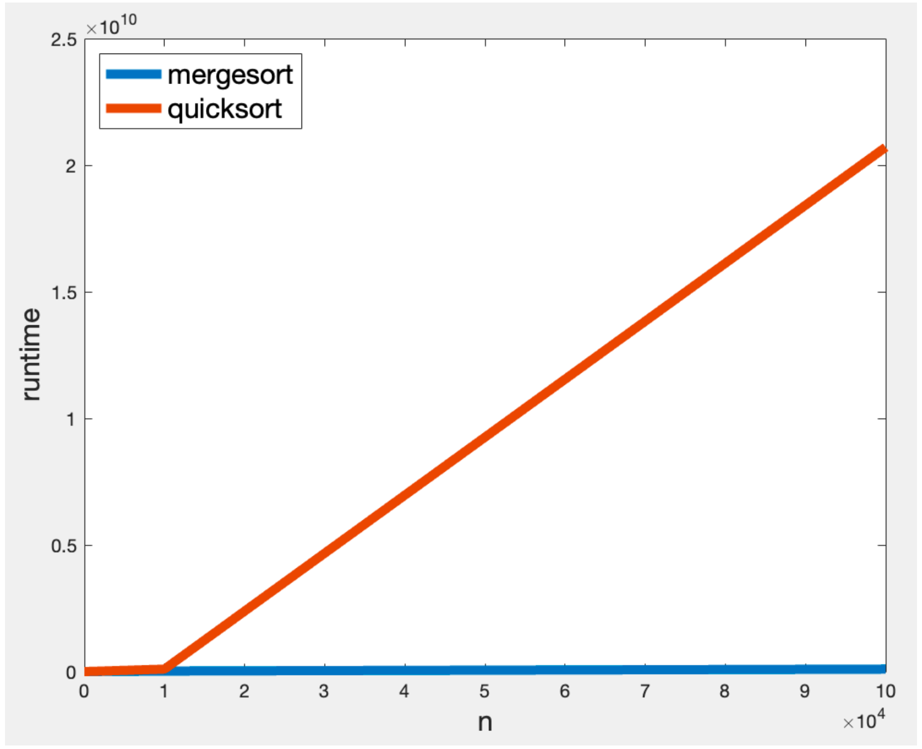

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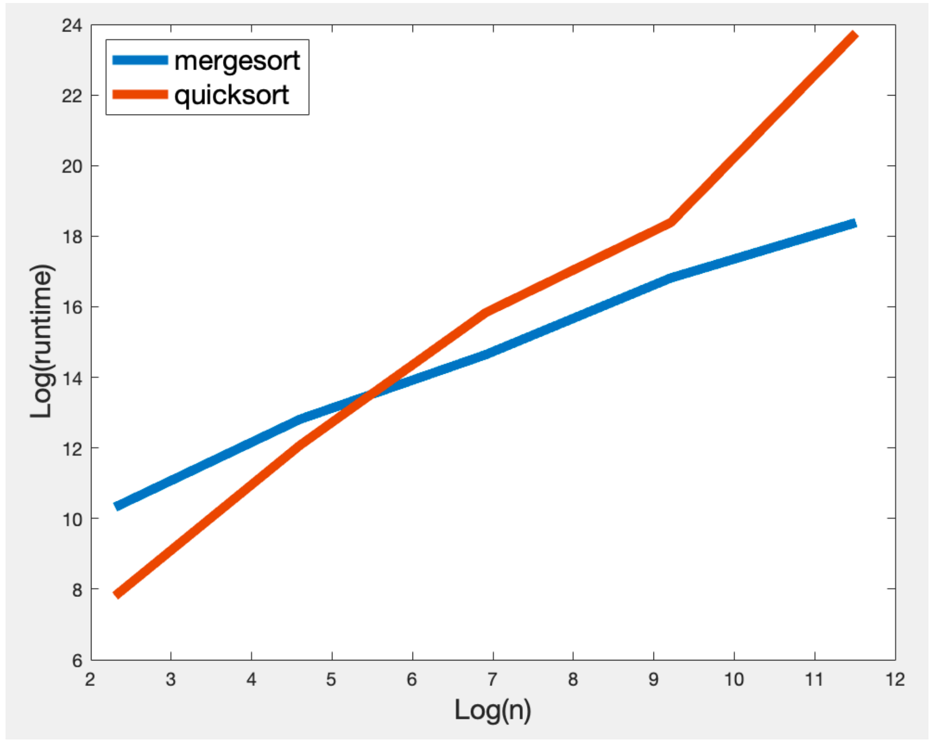

- Is it possible to have a comparison benchmark?