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Kelas : IF-48-11

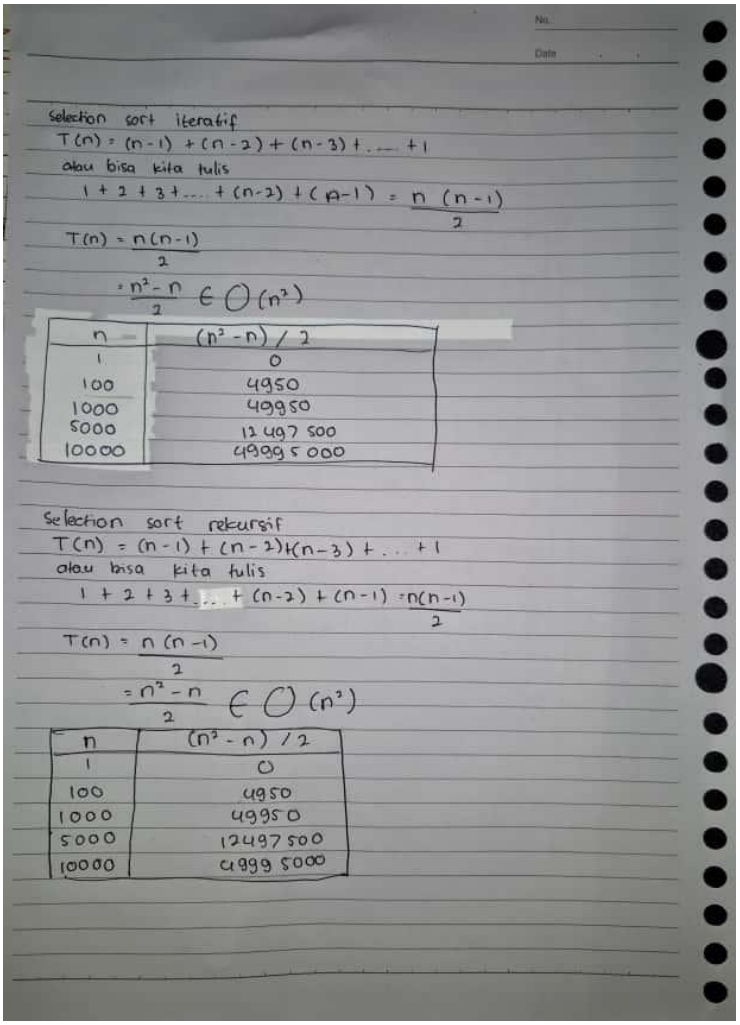
1. Selection Sort Iteratif

```
14  void selectionSortIteratif(int arr[], int n) {
15      operasiIteratif = 0;
16
17      for (int i = 0; i < n - 1; i++) {
18          int minIdx = i;
19          operasiIteratif++;
20
21          for (int j = i + 1; j < n; j++) {
22              operasiIteratif++;
23              if (arr[j] < arr[minIdx]) {
24                  minIdx = j;
25                  operasiIteratif++;
26              }
27          }
28
29          // Swap
30          if (minIdx != i) {
31              int temp = arr[i];
32              arr[i] = arr[minIdx];
33              arr[minIdx] = temp;
34              operasiIteratif += 3;
35          }
36      }
37  }
```

2. Selection Sort Rekursif

```
50  void selectionSortRekursif(int arr[], int n, int index = 0) {
51      if (index == n - 1) {
52          return;
53      }
54
55      operasiRekursif++;
56      int minIdx = findMinIndex(arr, index, n - 1);
57
58      // Swap
59      if (minIdx != index) {
60          int temp = arr[index];
61          arr[index] = arr[minIdx];
62          arr[minIdx] = temp;
63          operasiRekursif += 3;
64      }
65
66      selectionSortRekursif(arr, n, index + 1);
67  }
```

3. Analisis Kompleksitas waktu dari kedua algoritma tersebut



Selection sort iteratif

$T(n) = (n-1) + (n-2) + (n-3) + \dots + 1$

atau bisa kita tulis

$1 + 2 + 3 + \dots + (n-2) + (n-1) = \frac{n(n-1)}{2}$

$T(n) = \frac{n(n-1)}{2}$

$= \frac{n^2 - n}{2} \in O(n^2)$

n	$(n^2 - n) / 2$
1	0
100	4950
1000	49950
5000	12 497 500
10000	49995 000

Selection sort rekursif

$T(n) = (n-1) + (n-2) + (n-3) + \dots + 1$

atau bisa kita tulis

$1 + 2 + 3 + \dots + (n-2) + (n-1) = \frac{n(n-1)}{2}$

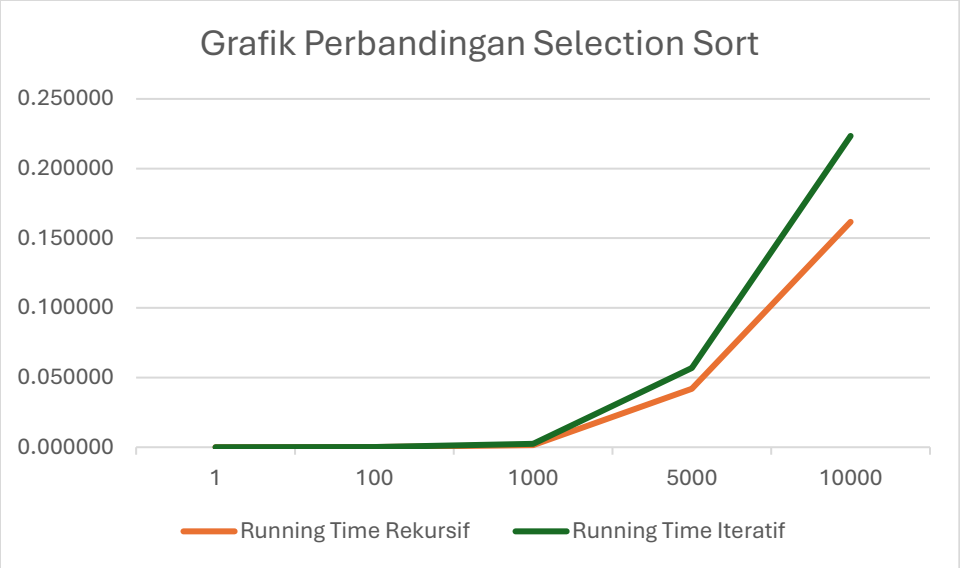
$T(n) = \frac{n(n-1)}{2}$

$= \frac{n^2 - n}{2} \in O(n^2)$

n	$(n^2 - n) / 2$
1	0
100	4950
1000	49950
5000	12497500
10000	49995000

4. Uji running time dari kedua algoritma tersebut untuk ukuran masukan n= 1, 10, 20,..., 10000, buatlah grafiknya

Jumlah Elemen Array	Running Time Rekursif	Running Time Iteratif
1	0.000000	0.000000
100	0.000016	0.000010
1000	0.001456	0.000929
5000	0.041944	0.014879
10000	0.161753	0.061659


Grafik Perbandingan Selection Sort
0.250000
0.200000
0.150000
0.100000
0.050000
0.000000
1
100
1000
5000
10000
Running Time Rekursif
Running Time Iteratif