Nama : Afina Putri Dayanti

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Jurusan : Sistem Informasi

Mata Kuliah : Algorithms and Programming

17, 3, 15, 10, 14, 9, 12, 4, 5, 2, 16, 7, 19, 11, 14, 8

Keterangan gambar:

* Data yang dicetak tebal adalah data yang sudah pada posisinya
* Data yang berwarna merah : bandingkan data, jika data[J-1] > data [J] maka tukar posisinya

1. Bubble Sort

Keterangan gambar:

* Data yang dicetak tebal adalah data yang sudah pada posisinya
* Data yang berwarna merah : bandingkan data, jika data[J-1] > data [J] maka tukar posisinya

Pola pergerakan elemen 1

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 2 | 16 | 7 | 19 | 11 | 14 | 8 |
| 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 2 | 16 | 7 | 19 | 11 | 8 | 14 |
| 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 2 | 16 | 7 | 19 | 8 | 11 | 14 |
| 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 2 | 16 | 7 | 8 | 19 | 11 | 14 |
| 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 2 | 16 | 7 | 8 | 19 | 11 | 14 |
| 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 2 | 7 | 16 | 8 | 19 | 11 | 14 |
| 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 2 | 7 | 16 | 8 | 19 | 11 | 14 |
| 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 2 | 5 | 7 | 16 | 8 | 19 | 11 | 14 |
| 17 | 3 | 15 | 10 | 14 | 9 | 12 | 2 | 4 | 5 | 7 | 16 | 8 | 19 | 11 | 14 |
| 17 | 3 | 15 | 10 | 14 | 9 | 2 | 12 | 4 | 5 | 7 | 16 | 8 | 19 | 11 | 14 |
| 17 | 3 | 15 | 10 | 14 | 2 | 9 | 12 | 4 | 5 | 7 | 16 | 8 | 19 | 11 | 14 |
| 17 | 3 | 15 | 10 | 2 | 14 | 9 | 12 | 4 | 5 | 7 | 16 | 8 | 19 | 11 | 14 |
| 17 | 3 | 15 | 2 | 10 | 14 | 9 | 12 | 4 | 5 | 7 | 16 | 8 | 19 | 11 | 14 |
| 17 | 3 | 2 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 7 | 16 | 8 | 19 | 11 | 14 |
| 17 | 2 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 7 | 16 | 8 | 19 | 11 | 14 |
| 2 | 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 7 | 16 | 8 | 19 | 11 | 14 |

Pola pergerakan elemen 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2** | 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 7 | 16 | 8 | 19 | 11 | 14 |
| **2** | 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 7 | 16 | 8 | 19 | 11 | 14 |
| **2** | 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 7 | 16 | 8 | 11 | 19 | 14 |
| **2** | 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 7 | 16 | 8 | 11 | 19 | 14 |
| **2** | 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 7 | 8 | 16 | 11 | 19 | 14 |
| **2** | 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 7 | 8 | 16 | 11 | 19 | 14 |
| **2** | 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 7 | 8 | 16 | 11 | 19 | 14 |
| **2** | 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 7 | 8 | 16 | 11 | 19 | 14 |
| **2** | 17 | 3 | 15 | 10 | 14 | 9 | 4 | 12 | 5 | 7 | 8 | 16 | 11 | 19 | 14 |
| **2** | 17 | 3 | 15 | 10 | 14 | 4 | 9 | 12 | 5 | 7 | 8 | 16 | 11 | 19 | 14 |
| **2** | 17 | 3 | 15 | 10 | 4 | 14 | 9 | 12 | 5 | 7 | 8 | 16 | 11 | 19 | 14 |
| **2** | 17 | 3 | 15 | 4 | 10 | 14 | 9 | 12 | 5 | 7 | 8 | 16 | 11 | 19 | 14 |
| **2** | 17 | 3 | 4 | 15 | 10 | 14 | 9 | 12 | 5 | 7 | 8 | 16 | 11 | 19 | 14 |
| **2** | 17 | 3 | 4 | 15 | 10 | 14 | 9 | 12 | 5 | 7 | 8 | 16 | 11 | 19 | 14 |
| **2** | 3 | 17 | 4 | 15 | 10 | 14 | 9 | 12 | 5 | 7 | 8 | 16 | 11 | 19 | 14 |

Pola pergerakan elemen 3

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2** | **3** | 17 | 4 | 15 | 10 | 14 | 9 | 12 | 5 | 7 | 8 | 16 | 11 | 19 | 14 |
| **2** | **3** | 17 | 4 | 15 | 10 | 14 | 9 | 12 | 5 | 7 | 8 | 16 | 11 | 14 | 19 |
| **2** | **3** | 17 | 4 | 15 | 10 | 14 | 9 | 12 | 5 | 7 | 8 | 16 | 11 | 14 | 19 |
| **2** | **3** | 17 | 4 | 15 | 10 | 14 | 9 | 12 | 5 | 7 | 8 | 11 | 16 | 14 | 19 |
| **2** | **3** | 17 | 4 | 15 | 10 | 14 | 9 | 12 | 5 | 7 | 8 | 11 | 16 | 14 | 19 |
| **2** | **3** | 17 | 4 | 15 | 10 | 14 | 9 | 12 | 5 | 7 | 8 | 11 | 16 | 14 | 19 |
| **2** | **3** | 17 | 4 | 15 | 10 | 14 | 9 | 12 | 5 | 7 | 8 | 11 | 16 | 14 | 19 |
| **2** | **3** | 17 | 4 | 15 | 10 | 14 | 9 | 5 | 12 | 7 | 8 | 11 | 16 | 14 | 19 |
| **2** | **3** | 17 | 4 | 15 | 10 | 14 | 9 | 5 | 12 | 7 | 8 | 11 | 16 | 14 | 19 |
| **2** | **3** | 17 | 4 | 15 | 10 | 9 | 14 | 5 | 12 | 7 | 8 | 11 | 16 | 14 | 19 |
| **2** | **3** | 17 | 4 | 15 | 9 | 10 | 14 | 5 | 12 | 7 | 8 | 11 | 16 | 14 | 19 |
| **2** | **3** | 17 | 4 | 9 | 15 | 10 | 14 | 5 | 12 | 7 | 8 | 11 | 16 | 14 | 19 |
| **2** | **3** | 17 | 4 | 9 | 15 | 10 | 14 | 5 | 12 | 7 | 8 | 11 | 16 | 14 | 19 |
| **2** | **3** | 4 | 17 | 9 | 15 | 10 | 14 | 5 | 12 | 7 | 8 | 11 | 16 | 14 | 19 |

Pola pergerakan elemen 4

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2** | **3** | **4** | 17 | 9 | 15 | 10 | 14 | 5 | 12 | 7 | 8 | 11 | 16 | 14 | 19 |
| **2** | **3** | **4** | 17 | 9 | 15 | 10 | 14 | 5 | 12 | 7 | 8 | 11 | 16 | 14 | 19 |
| **2** | **3** | **4** | 17 | 9 | 15 | 10 | 14 | 5 | 12 | 7 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | 17 | 9 | 15 | 10 | 14 | 5 | 12 | 7 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | 17 | 9 | 15 | 10 | 14 | 5 | 12 | 7 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | 17 | 9 | 15 | 10 | 14 | 5 | 12 | 7 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | 17 | 9 | 15 | 10 | 14 | 5 | 7 | 12 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | 17 | 9 | 15 | 10 | 14 | 5 | 7 | 12 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | 17 | 9 | 15 | 10 | 5 | 14 | 7 | 12 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | 17 | 9 | 15 | 5 | 10 | 14 | 7 | 12 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | 17 | 9 | 5 | 15 | 10 | 14 | 7 | 12 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | 17 | 5 | 9 | 15 | 10 | 14 | 7 | 12 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | 5 | 17 | 9 | 15 | 10 | 14 | 7 | 12 | 8 | 11 | 14 | 16 | 19 |

Pola pergerakan elemen 5

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2** | **3** | **4** | **5** | 17 | 9 | 15 | 10 | 14 | 7 | 12 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | 17 | 9 | 15 | 10 | 14 | 7 | 12 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | 17 | 9 | 15 | 10 | 14 | 7 | 12 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | 17 | 9 | 15 | 10 | 14 | 7 | 12 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | 17 | 9 | 15 | 10 | 14 | 7 | 12 | 8 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | 17 | 9 | 15 | 10 | 14 | 7 | 8 | 12 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | 17 | 9 | 15 | 10 | 14 | 7 | 8 | 12 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | 17 | 9 | 15 | 10 | 7 | 14 | 8 | 12 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | 17 | 9 | 15 | 7 | 10 | 14 | 8 | 12 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | 17 | 9 | 7 | 15 | 10 | 14 | 8 | 12 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | 17 | 7 | 9 | 15 | 10 | 14 | 8 | 12 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | 7 | 17 | 9 | 15 | 10 | 14 | 8 | 12 | 11 | 14 | 16 | 19 |

Pola pergerakan elemen 6

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2** | **3** | **4** | **5** | **7** | 17 | 9 | 15 | 10 | 14 | 8 | 12 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | 17 | 9 | 15 | 10 | 14 | 8 | 12 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | 17 | 9 | 15 | 10 | 14 | 8 | 12 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | 17 | 9 | 15 | 10 | 14 | 8 | 12 | 11 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | 17 | 9 | 15 | 10 | 14 | 8 | 11 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | 17 | 9 | 15 | 10 | 14 | 8 | 11 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | 17 | 9 | 15 | 10 | 8 | 14 | 11 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | 17 | 9 | 15 | 8 | 10 | 14 | 11 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | 17 | 9 | 8 | 15 | 10 | 14 | 11 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | 17 | 8 | 9 | 15 | 10 | 14 | 11 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | 8 | 17 | 9 | 15 | 10 | 14 | 11 | 12 | 14 | 16 | 19 |

Pola pergerakan elemen 7

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2** | **3** | **4** | **5** | **7** | **8** | 17 | 9 | 15 | 10 | 14 | 11 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | 17 | 9 | 15 | 10 | 14 | 11 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | 17 | 9 | 15 | 10 | 14 | 11 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | 17 | 9 | 15 | 10 | 14 | 11 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | 17 | 9 | 15 | 10 | 14 | 11 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | 17 | 9 | 15 | 10 | 11 | 14 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | 17 | 9 | 15 | 10 | 11 | 14 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | 17 | 9 | 10 | 15 | 11 | 14 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | 17 | 9 | 10 | 15 | 11 | 14 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | 9 | 17 | 10 | 15 | 11 | 14 | 12 | 14 | 16 | 19 |

Pola pergerakan elemen 8

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | 17 | 10 | 15 | 11 | 14 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | 17 | 10 | 15 | 11 | 14 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | 17 | 10 | 15 | 11 | 14 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | 17 | 10 | 15 | 11 | 14 | 12 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | 17 | 10 | 15 | 11 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | 17 | 10 | 15 | 11 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | 17 | 10 | 11 | 15 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | 17 | 10 | 15 | 11 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | 10 | 17 | 15 | 11 | 12 | 14 | 14 | 16 | 19 |

Pola pergerakan element 9

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | 17 | 15 | 11 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | 17 | 15 | 11 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | 17 | 15 | 11 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | 17 | 15 | 11 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | 17 | 15 | 11 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | 17 | 15 | 11 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | 17 | 11 | 15 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | 11 | 17 | 15 | 12 | 14 | 14 | 16 | 19 |

Pola pergerakan element 10

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | 17 | 15 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | 17 | 15 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | 17 | 15 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | 17 | 15 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | 17 | 15 | 12 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | 17 | 12 | 15 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | 12 | 17 | 15 | 14 | 14 | 16 | 19 |

Pola pergerakan element 11

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | 17 | 15 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | 17 | 15 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | 17 | 15 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | 17 | 15 | 14 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | 17 | 14 | 15 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | 14 | 17 | 15 | 14 | 16 | 19 |

Pola pergerakan element 12

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | 17 | 15 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | 17 | 15 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | 17 | 15 | 14 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | 17 | 14 | 15 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | 14 | 17 | 15 | 16 | 19 |

Pola pergerakan element 13

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | **14** | 17 | 15 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | **14** | 17 | 15 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | **14** | 17 | 15 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | **14** | 15 | 17 | 16 | 19 |

Pola pergerakan element 14

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | **14** | **15** | 17 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | **14** | **15** | 17 | 16 | 19 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | **14** | **15** | **16** | **17** | **19** |

1. Selection Sort

Keterangan gambar:

* Data yang dicetak tebal adalah data yang sudah pada posisinya
* Data yang berwarna merah : tukar data

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 2 | 16 | 7 | 19 | 11 | 14 | 8 |
| **2** | **3** | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 17 | 16 | 7 | 19 | 11 | 14 | 8 |
| **2** | **3** | **4** | 10 | 14 | 9 | 12 | 15 | 5 | 17 | 16 | 7 | 19 | 11 | 14 | 8 |
| **2** | **3** | **4** | **5** | 14 | 9 | 12 | 15 | 10 | 17 | 16 | 7 | 19 | 11 | 14 | 8 |
| **2** | **3** | **4** | **5** | **7** | 9 | 12 | 15 | 10 | 17 | 16 | 14 | 19 | 11 | 14 | 8 |
| **2** | **3** | **4** | **5** | **7** | **8** | 12 | 15 | 10 | 17 | 16 | 14 | 19 | 11 | 14 | 9 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | 15 | 10 | 17 | 16 | 14 | 19 | 11 | 14 | 12 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | 15 | 17 | 16 | 14 | 19 | 11 | 14 | 12 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | 17 | 16 | 14 | 19 | 15 | 14 | 12 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | 16 | 14 | 19 | 15 | 14 | 17 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | 16 | 19 | 15 | 14 | 17 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | **14** | 19 | 15 | 16 | 17 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | **14** | **15** | 19 | 16 | 17 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | **14** | **15** | 16 | 19 | 17 |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | **14** | **15** | **16** | **17** | **19** |

1. Insertion Sort

Keterangan gambar:

* Data yang dicetak tebal adalah data yang sudah pada posisinya
* : jika data [i+1] <data[i], geser data[i] ke [i+1] lalu sisipkan data[i+1] ke posisi [i]

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 17 | 3 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 2 | 16 | 7 | 19 | 11 | 14 | 8 |
|  | | | | | | | | | | | | | | | |
| 3 | 17 | 15 | 10 | 14 | 9 | 12 | 4 | 5 | 2 | 16 | 7 | 19 | 11 | 14 | 8 |
|  | | | | | | | | | | | | | | | |
| 3 | 15 | 17 | 10 | 14 | 9 | 12 | 4 | 5 | 2 | 16 | 7 | 19 | 11 | 14 | 8 |
|  | | | | | | | | | | | | | | | |
| 3 | 10 | 15 | 17 | 14 | 9 | 12 | 4 | 5 | 2 | 16 | 7 | 19 | 11 | 14 | 8 |
|  | | | | | | | | | | | | | | | |
| 3 | 10 | 14 | 15 | 17 | 9 | 12 | 4 | 5 | 2 | 16 | 7 | 19 | 11 | 14 | 8 |
|  | | | | | | | | | | | | | | | |
| 3 | 9 | 10 | 14 | 15 | 17 | 12 | 4 | 5 | 2 | 16 | 7 | 19 | 11 | 14 | 8 |
|  | | | | | | | | | | | | | | | |
| 3 | 9 | 10 | 12 | 14 | 15 | 17 | 4 | 5 | 2 | 16 | 7 | 19 | 11 | 14 | 8 |
|  | | | | | | | | | | | | | | | |
| 3 | 4 | 9 | 10 | 12 | 14 | 15 | 17 | 5 | 2 | 16 | 7 | 19 | 11 | 14 | 8 |
|  | | | | | | | | | | | | | | | |
| 3 | 4 | 5 | 9 | 10 | 12 | 14 | 15 | 17 | 2 | 16 | 7 | 19 | 11 | 14 | 8 |
|  | | | | | | | | | | | | | | | |
| **2** | **3** | **4** | **5** | 9 | 10 | 12 | 14 | 15 | 17 | 16 | 7 | 19 | 11 | 14 | 8 |
|  | | | | | | | | | | | | | | | |
| **2** | **3** | **4** | **5** | 9 | 10 | 12 | 14 | 15 | 16 | 17 | 7 | 19 | 11 | 14 | 8 |
|  | | | | | | | | | | | | | | | |
| **2** | **3** | **4** | **5** | **7** | 9 | 10 | 12 | 14 | 15 | 16 | 17 | 19 | 11 | 14 | 8 |
|  | | | | | | | | | | | | | | | |
| **2** | **3** | **4** | **5** | **7** | 9 | 10 | 11 | 12 | 14 | 15 | 16 | 17 | 19 | 14 | 8 |
|  | | | | | | | | | | | | | | | |
| **2** | **3** | **4** | **5** | **7** | 9 | 10 | 11 | 12 | 14 | 14 | 15 | 16 | 17 | 19 | 8 |
|  | | | | | | | | | | | | | | | |
| **2** | **3** | **4** | **5** | **7** | **8** | **9** | **10** | **11** | **12** | **14** | **14** | **15** | **16** | **17** | **19** |

1. Merge Sort

Keterangan gambar:

* Data yang dicetak tebal adalah data yang sudah pada posisinya
* : bandingkan data, jika data[J-1] > data [J] maka tukar posisinya

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Key : | 17 |  | 3 |  | 15 |  | 10 |  | 14 |  | 9 |  | 12 |  | 4 |  | 5 |  | 2 |  | 16 |  | 7 |  | 19 |  | 11 |  | 14 |  | 8 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Key : | 17 |  | 3 |  | 15 |  | 10 |  | 14 |  | 9 |  | 12 |  | 4 |  | 5 |  | 2 |  | 16 |  | 7 |  | 19 |  | 11 |  | 14 |  | 8 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Key : | 17 |  | 3 |  | 15 |  | 10 |  | 14 |  | 9 |  | 12 |  | 4 |  | 5 |  | 2 |  | 16 |  | 7 |  | 19 |  | 11 |  | 14 |  | 8 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Key : | 17 |  | 3 |  | 15 |  | 10 |  | 14 |  | 9 |  | 12 |  | 4 |  | 5 |  | 2 |  | 16 |  | 7 |  | 19 |  | 11 |  | 14 |  | 8 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Key : | 3 |  | 17 |  | 10 |  | 15 |  | 9 |  | 14 |  | 4 |  | 12 |  | 5 |  | 2 |  | 16 |  | 7 |  | 19 |  | 11 |  | 14 |  | 8 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Key : | 3 |  | 10 |  | 15 |  | 17 |  | 4 |  | 9 |  | 12 |  | 14 |  | 5 |  | 2 |  | 16 |  | 7 |  | 19 |  | 11 |  | 14 |  | 8 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Key : | 3 |  | 4 |  | 9 |  | 10 |  | 12 |  | 14 |  | 15 |  | 17 |  | 5 |  | 2 |  | 16 |  | 7 |  | 19 |  | 11 |  | 14 |  | 8 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Key : | 3 |  | 4 |  | 9 |  | 10 |  | 12 |  | 14 |  | 15 |  | 17 |  | 5 |  | 2 |  | 16 |  | 7 |  | 19 |  | 11 |  | 14 |  | 8 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Key : | 3 |  | 4 |  | 9 |  | 10 |  | 12 |  | 14 |  | 15 |  | 17 |  | 5 |  | 2 |  | 16 |  | 7 |  | 19 |  | 11 |  | 14 |  | 8 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Key : | 3 |  | 4 |  | 9 |  | 10 |  | 12 |  | 14 |  | 15 |  | 17 |  | 5 |  | 2 |  | 16 |  | 7 |  | 19 |  | 11 |  | 14 |  | 8 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Key : | 3 |  | 4 |  | 9 |  | 10 |  | 12 |  | 14 |  | 15 |  | 17 |  | 2 |  | 5 |  | 7 |  | 16 |  | 11 |  | 19 |  | 8 |  | 14 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Key : | 3 |  | 4 |  | 9 |  | 10 |  | 12 |  | 14 |  | 15 |  | 17 |  | 2 |  | 5 |  | 7 |  | 16 |  | 8 |  | 11 |  | 14 |  | 19 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Key : | 3 |  | 4 |  | 9 |  | 10 |  | 12 |  | 14 |  | 15 |  | 17 |  | 2 |  | 5 |  | 7 |  | 8 |  | 11 |  | 14 |  | 16 |  | 19 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Key : | **2** |  | **3** |  | **4** |  | **5** |  | **7** |  | **8** |  | **9** |  | **10** |  | **11** |  | **12** |  | **14** |  | **14** |  | **15** |  | **16** |  | **17** |  | **19** |

1. Quick Sort

Keterangan gambar:

* Data yang dicetak tebal adalah data yang sudah pada posisinya
* Data yang berwarna hijau adalah pivot
* Data yang berwarna merah adalah data[i] yang dibandingkan dengan pivot

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Step 1 : choose a pivot | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 |  | 3 |  | 15 |  | 10 |  | 14 |  | 9 |  | 12 |  | 4 |  | 5 |  | 2 |  | 16 |  | 7 |  | 19 |  | 11 |  | 14 |  | 8 |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Step 2 : lasser values go to the left, greater values to to the right | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 17 |  | 3 |  | 15 |  | 10 |  | 14 |  | 9 |  | 12 |  | 4 |  | 5 |  | 2 |  | 16 |  | 7 |  | 19 |  | 11 |  | 8 |  | 14 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 17 |  | 3 |  | 15 |  | 10 |  | 14 |  | 9 |  | 12 |  | 4 |  | 5 |  | 2 |  | 16 |  | 7 |  | 19 |  | 8 |  | 11 |  | 14 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 17 |  | 3 |  | 15 |  | 10 |  | 14 |  | 9 |  | 12 |  | 4 |  | 5 |  | 2 |  | 16 |  | 7 |  | 8 |  | 19 |  | 11 |  | 14 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 17 |  | 3 |  | 15 |  | 10 |  | 14 |  | 9 |  | 12 |  | 4 |  | 5 |  | 2 |  | 7 |  | 8 |  | 16 |  | 19 |  | 11 |  | 14 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 17 |  | 3 |  | 15 |  | 10 |  | 14 |  | 9 |  | 4 |  | 5 |  | 2 |  | 7 |  | 8 |  | 12 |  | 16 |  | 19 |  | 11 |  | 14 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 17 |  | 3 |  | 15 |  | 10 |  | 14 |  | 4 |  | 5 |  | 2 |  | 7 |  | 8 |  | 9 |  | 12 |  | 16 |  | 19 |  | 11 |  | 14 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 17 |  | 3 |  | 15 |  | 10 |  | 4 |  | 5 |  | 2 |  | 7 |  | 8 |  | 14 |  | 9 |  | 12 |  | 16 |  | 19 |  | 11 |  | 14 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 17 |  | 3 |  | 15 |  | 4 |  | 5 |  | 2 |  | 7 |  | 8 |  | 10 |  | 14 |  | 9 |  | 12 |  | 16 |  | 19 |  | 11 |  | 14 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 17 |  | 3 |  | 4 |  | 5 |  | 2 |  | 7 |  | 8 |  | 15 |  | 10 |  | 14 |  | 9 |  | 12 |  | 16 |  | 19 |  | 11 |  | 14 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 |  | 4 |  | 5 |  | 2 |  | 7 |  | 8 |  | 17 |  | 15 |  | 10 |  | 14 |  | 9 |  | 12 |  | 16 |  | 19 |  | 11 |  | 14 |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Step 3 : repeat step 1 with the two sublist | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 3 |  | 4 |  | 5 |  | 2 |  | 7 |  | **8** |  | 17 |  | 15 |  | 10 |  | 14 |  | 9 |  | 12 |  | 16 |  | 19 |  | 11 |  | 14 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 |  | 4 |  | 5 |  | 2 |  | **7** |  | **8** |  | 17 |  | 15 |  | 10 |  | 14 |  | 9 |  | 12 |  | 16 |  | 11 |  | 14 |  | 19 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 |  | 4 |  | 2 |  | 5 |  | **7** |  | **8** |  | 17 |  | 15 |  | 10 |  | 14 |  | 9 |  | 12 |  | 11 |  | 14 |  | 16 |  | 19 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 3 |  | 2 |  | 4 |  | 5 |  | **7** |  | **8** |  | 17 |  | 15 |  | 10 |  | 9 |  | 12 |  | 11 |  | 14 |  | 14 |  | 16 |  | 19 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| 2 |  | 3 |  | 4 |  | 5 |  | **7** |  | **8** |  | 17 |  | 10 |  | 9 |  | 12 |  | 11 |  | 14 |  | 14 |  | 15 |  | 16 |  | 19 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **2** |  | **3** |  | **4** |  | **5** |  | **7** |  | **8** |  | 10 |  | 9 |  | 12 |  | 11 |  | 14 |  | 14 |  | 15 |  | 17 |  | 16 |  | 19 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **2** |  | **3** |  | **4** |  | **5** |  | **7** |  | **8** |  | 10 |  | 9 |  | 12 |  | 11 |  | **14** |  | 14 |  | 15 |  | 17 |  | 16 |  | 19 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **2** |  | **3** |  | **4** |  | **5** |  | **7** |  | **8** |  | 10 |  | 9 |  | 12 |  | 11 |  | **14** |  | 14 |  | 15 |  | 17 |  | 16 |  | 19 |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **2** |  | **3** |  | **4** |  | **5** |  | **7** |  | **8** |  | 10 |  | 9 |  | 11 |  | 12 |  | **14** |  | 14 |  | 15 |  | 17 |  | 16 |  | **19** |
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| **2** |  | **3** |  | **4** |  | **5** |  | **7** |  | **8** |  | 10 |  | 9 |  | **11** |  | **12** |  | **14** |  | 14 |  | 15 |  | 16 |  | 17 |  | **19** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **2** |  | **3** |  | **4** |  | **5** |  | **7** |  | **8** |  | **9** |  | **10** |  | **11** |  | **12** |  | **14** |  | **14** |  | **15** |  | **16** |  | **17** |  | **19** |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **2** |  | **3** |  | **4** |  | **5** |  | **7** |  | **8** |  | **9** |  | **10** |  | **11** |  | **12** |  | **14** |  | **14** |  | **15** |  | **16** |  | **17** |  | **19** |