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CS 3000

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Chapter 2 Written

2.1-1 Using Figure 2.2 as a model, illustrate the operation of INSERSTION-SORT on the array A = < 31, 41, 59, 26, 41, 58 >.

a)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 31 | 41 | 59 | 26 | 41 | 58 |

b)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 31 | 41 | 59 | 26 | 41 | 58 |

c)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 31 | 41 | 59 | 26 | 41 | 58 |

d)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 26 | 31 | 41 | 59 | 41 | 58 |

e)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 26 | 31 | 41 | 41 | 59 | 58 |

f)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| 26 | 31 | 41 | 41 | 58 | 59 |

2.2-1 Express the function n^3/1000 – 100n^2-100n +3 in terms of -notatoin.

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2.2-4 How can we modify almost any algorithm to have a good best-case running time?

Sort the data before we run the algorithm in a particular way that best organizes the data for that particular problem.

2.3-1 Using Figure 2.4 as a model, illustrate the operation of merge sort on the array

A = < 3, 41, 52, 26, 38, 57, 9, 49 >

Sorted Sequence

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| 3 | 9 | 26 | 38 | 41 | 49 | 52 | 57 |

|  |  |  |  |
| --- | --- | --- | --- |
| 9 | 38 | 49 | 57 |

|  |  |  |  |
| --- | --- | --- | --- |
| 3 | 26 | 41 | 52 |

merge

|  |  |
| --- | --- |
| 38 | 57 |

merge merge

|  |  |
| --- | --- |
| 3 | 41 |

|  |  |
| --- | --- |
| 9 | 49 |

|  |  |
| --- | --- |
| 26 | 52 |

merge merge merge merge

|  |
| --- |
| 3 |

|  |
| --- |
| 41 |

|  |
| --- |
| 52 |

|  |
| --- |
| 26 |

|  |
| --- |
| 38 |

|  |
| --- |
| 57 |

|  |
| --- |
| 9 |

|  |
| --- |
| 49 |

Initial sequence

2.3-6 Observe that the while loop of lines 5-7 of the INSERTION-SORT procedure in Section 2.1 uses a linear search to scan (backward) through the sored subarray A[1..j-1]. Can we use a binary search (see Exercise 2.3-5) instead to improve the overall worst-case running time of insertion sort to ?