Aurelio-Ceejay Guiking

Dr. Wolfgang Bein

CS 302 - 1003

21 April 2018

Assignment 10

1. Slowsort sorts for n numbers. Whenever slowsort is called less than n numbers, the statement is already true. Therefore, the algorithm works.

Picture:

Step 1: Whole Array

|  |
| --- |
|  |

Step 2: Halved Array, sort first half, then second half

|  |  |
| --- | --- |
|  |  |

Step 3: Sorted array

|  |
| --- |
|  |

The whole point of the algorithm is sorting by halving until it’s sorted.

1. Run the algorithm for different n, where the vector a is defined as follows:

Sample run where n=20:

Given array:

1 869 457 196 993 79 630 731 31 963 288 351 933 12 788 564 118 1000 146 524

Sorted array:

1 12 31 79 118 146 196 288 351 457 524 564 630 731 788 869 933 963 993 100

3. n= 10

1|869|457|196|993|79|630|731|31|963|

now exchanging element 1 and 2

1|457|869|196|993|79|630|731|31|963|

now exchanging element 2 and 3

1|457|196|869|993|79|630|731|31|963|

now exchanging element 1 and 2

1|196|457|869|993|79|630|731|31|963|

now exchanging element 7 and 8

1|196|457|869|993|79|630|31|731|963|

now exchanging element 6 and 7

1|196|457|869|993|79|31|630|731|963|

now exchanging element 5 and 6

1|196|457|869|993|31|79|630|731|963|

now exchanging element 4 and 9

1|196|457|869|963|31|79|630|731|993|

now exchanging element 4 and 8

1|196|457|869|731|31|79|630|963|993|

now exchanging element 4 and 5

1|196|457|869|31|731|79|630|963|993|

now exchanging element 5 and 7

1|196|457|869|31|630|79|731|963|993|

now exchanging element 5 and 6

1|196|457|869|31|79|630|731|963|993|

now exchanging element 3 and 7

1|196|457|731|31|79|630|869|963|993|

now exchanging element 3 and 6

1|196|457|630|31|79|731|869|963|993|

now exchanging element 3 and 4

1|196|457|31|630|79|731|869|963|993|

now exchanging element 4 and 5

1|196|457|31|79|630|731|869|963|993|

now exchanging element 2 and 4

1|196|79|31|457|630|731|869|963|993|

now exchanging element 2 and 3

1|196|31|79|457|630|731|869|963|993|

now exchanging element 1 and 3

1|79|31|196|457|630|731|869|963|993|

now exchanging element 1 and 2

1|31|79|196|457|630|731|869|963|993|

4.

n = 20

comparisons = 933

real 0m0.016s

n = 40

comparisons = 17194

real 0m0.014s

n = 60

comparisons = 119,941

real 0m0.024s

n = 200

comparisons = 114,006,565

real 0m3.425s

6. t(n) ~= A n^(Blog\_2(n))

n = 20

comparisons = 933

933 = A \* 20^(B log\_2(20))

B = 40

When B=40

A = 1.558556e-221

n = 40

comparisons = 17194

17194 = A \* 40^(B log\_2(40))

B = 20

When B = 60

A = 5.181021e-167

n = 60

comparisons = 119,941

119941 = A \* 60^(B log\_2(60))

B = 15

When B = 15

A = 3.37905e-151

n = 200

comparisons = 114,006,565

114006565 = A \* 200^(B log\_2(200))

B = 5

When B = 5

A = 1.2978305e-80