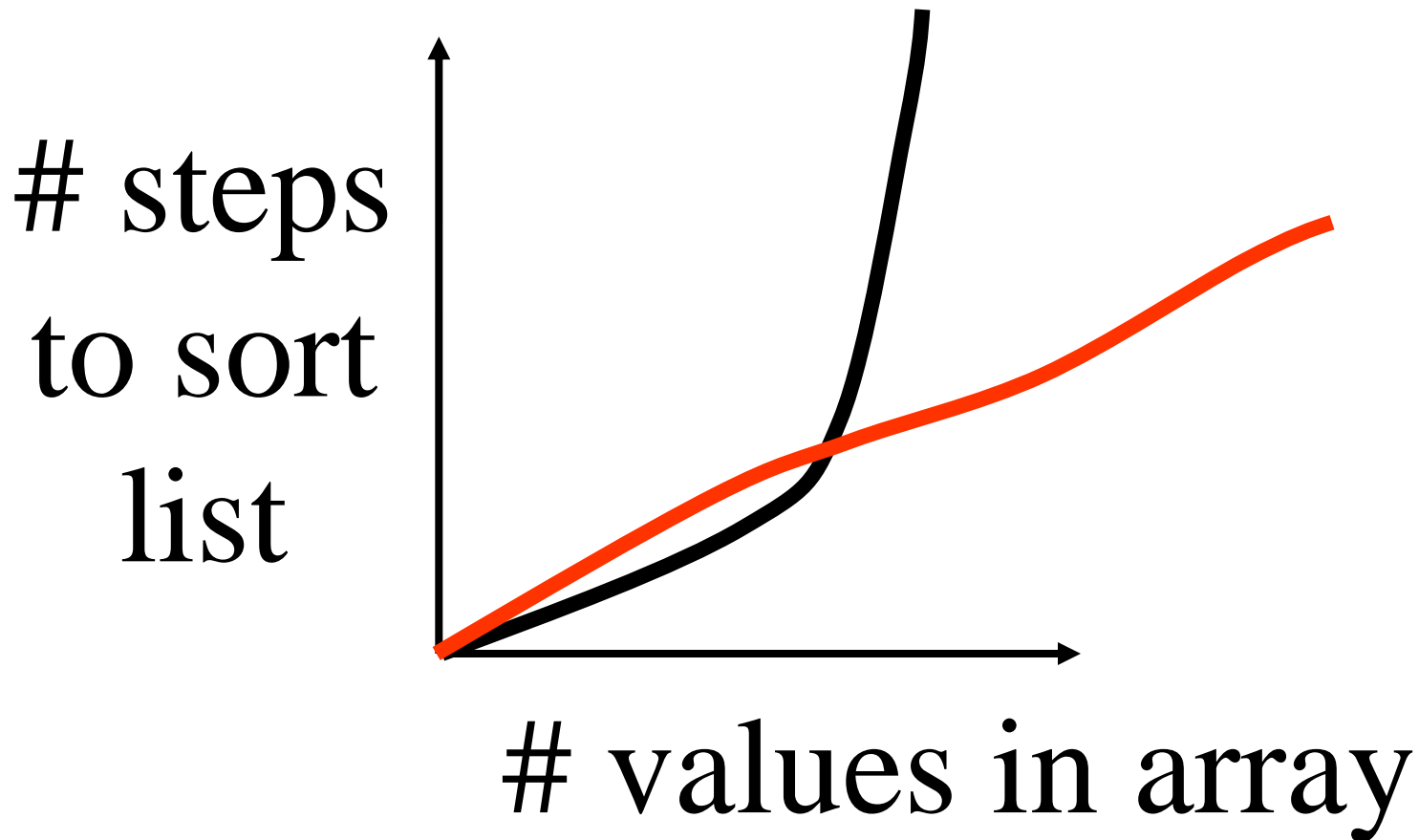


Step Into Java: Merge Sort and More...

Mr. Neat
Java

Quadratic sorting algorithms are nice but...



Merge Sort Pseudo Code

```
void mergeSort(int A[], int first, int last)  
{  
    // find middle index of A  
    // sort the first half of A  
    // sort the second half of A  
    // merge the first and second halves of A  
}
```

An Example: nonrecursive MergeSort

12	7	3	11	2	8	5	17	1	6
----	---	---	----	---	---	---	----	---	---

split

12	7	3	11	2
----	---	---	----	---

8	5	17	1	6
---	---	----	---	---

order

2	3	7	11	12
---	---	---	----	----

1	5	6	8	17
---	---	---	---	----

merge

1	2	3	5	6	7	8	11	12	17
---	---	---	---	---	---	---	----	----	----

Pseudo Code for Merge

- A) List A is done, get value from List B**
- B) List B is done, get value from List A**
- C) Neither is done, if List A[i] < B[k],
then get value from List A**
- D) Neither is done, if List B[k] <= List A[i]
then get value from List B**

Recursive MergeSort

Recursive

Merge Sort Pseudo Code

```
void mergeSort(int A[], int first, int last)  
{  
    if(sublist has only one value)  
        do nothing  
    else if(sublist has two values)  
        sort it if necessary  
    else  
        find midpoint of current sublist  
        call mergeSort and process left sublist  
        call mergeSort and process right sublist  
        merge left and right sublists  
}
```

How About an Example:

12	7	3	11	2	8	5	17	1	6
----	---	---	----	---	---	---	----	---	---

divide

12	7	3	11	2
----	---	---	----	---

divide

12	7	3
----	---	---

divide

12	7
----	---

How About an Example:

order

7	12
---	----

do nothing

3

merge

3	7	12
---	---	----

do right

11	2
----	---

order

2	11
---	----

merge

2	3	7	11	12
---	---	---	----	----

How About an Example:

do right

8	5	17	1	6
---	---	----	---	---

divide

8	5	17
---	---	----

divide

8	5
---	---

order

5	8
---	---

do left

17

do nothing

17

How About an Example:

merge

5	8	17
---	---	----

do left

1	6
---	---

order

1	6
---	---

merge

1	5	6	8	17
---	---	---	---	----

merge

1	2	3	5	6	7	8	11	12	17
---	---	---	---	---	---	---	----	----	----

Recursive Merge Sort Solution

(see handout)

Why put things in order?

Consider a sequential search
of an unordered array.....

How long would it take to find
a value?

Consider a sequential search
of an ordered array.....

How long would it take to find
a value?

Split in Half, split in half,

.....

split in half....

Kevork '04

How about a book?

How many steps would it
take to find page 81 in
your English book?

This is called a binary search...the list **MUST** be in order.

Order of Recursive
Merge...what does the
graph look like?

Quadratic sorting algorithms are nice but...

