Analysis of Algorithms Pt. 2: Mergesort

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Mergesort: Basic Idea

MergeSort Pseudocode

```
def mergesort ( array, left, right)
    if ( left >= right):
        return
    if (left + 1 == right):
        if lst[left] > lst[right]:
            swap(lst, left, right)
        return
    else
        mid = (left + right)//2
        mergesort(array, left, mid)
        mergesort(array, mid+1, right)
        merge(array, left, mid, right)
```

Merge Procedure

```
def merge(array, left, mid, right):
    i = left
    j = mid + 1
    tmp_store = []
    while (i <= mid and j <= right):
        if (array[i] < array[j]):
            append array[i] to tmp_store
            i = i + 1
        else:
            append array[j] to tmp_store
            j = j + 1
    if i < mid:
        Copy remainder of first part to tmp_store
    if j < right:
        Copy remainder of second part to tmp_store

    copy back from tmp_store into array[left..right]
```

Example : Merge

Merge Procedure Correctness Argument

Running Time of Merge Procedure

Mergesort correctness argument

```
def merge(array, left, mid, right):
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    tmp_store = []
    while (i <= mid and j <= right):
        if (array[i] < array[j]):
            append array[i] to tmp_store
            i = i + 1
        else:
            append array[j] to tmp_store
            j = j + 1
    if i < mid:
        Copy remainder of first part to tmp_store
    if j < right:
        Copy remainder of second part to tmp_store

    copy back from tmp_store into array[left..right]
```

Mergesort Running Time