

CSCI 241

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Recursion: Executing Recursive Methods

Goals

Understand how recursive methods are **executed**.

Why are we talking about recursion, I thought we were sorting things?

```
mergeSort(A, start, end):  
    if (end - start < 2):  
        return  
    mid = (end + start) / 2  
    mergeSort(A, start, mid)  
    mergeSort(A, mid, end)  
    merge(A, start, mid, end)
```

How do we **execute**
recursive methods?

How do we **execute**
non-recursive methods?

```
x = max(1, 3)  
=> 3
```

How do we **execute**
non-recursive methods?

```
x = max(1, 3)  
      3
```

The function call is replaced by its return value.

How do we **execute** recursive methods?

```
/** return n!; pre: n >= 0 */  
fact(n):  
    if n == 0:  
        return 1  
    return n * fact(n - 1)
```

fact(3)

=> 3 * **fact**(2)

 => 2 * **fact**(1)

 => 1 * **fact**(0)

 => 1

How do we **execute** recursive methods?

```
/** return n!; pre: n >= 0 */  
fact(n):  
    if n == 0:  
        return 1  
    return n * fact(n - 1)
```

fact(3)

=> 3 * **fact**(2)

 => 2 * **fact**(1)

 => 1 * **fact**(0)

 1

How do we **execute** recursive methods?

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/** return n!; pre: n >= 0 */  
fact(n):  
    if n == 0:  
        return 1  
    return n * fact(n - 1)
```

fact(3)

=> 3 * **fact**(2)

 => 2 * **fact**(1)

 => 1 * 1

How do we **execute** recursive methods?

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/** return n!; pre: n >= 0 */  
fact(n):  
    if n == 0:  
        return 1  
    return n * fact(n - 1)
```

fact(3)

=> 3 * **fact**(2)

=> 2 * **fact**(1)

1

How do we **execute** recursive methods?

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/** return n!; pre: n >= 0 */  
fact(n):  
    if n == 0:  
        return 1  
    return n * fact(n - 1)
```

fact(3)

=> 3 * **fact**(2)
 2

How do we **execute** recursive methods?

```
/** return n!; pre: n >= 0 */  
fact(n):  
    if n == 0:  
        return 1  
    return n * fact(n - 1)
```

fact(3)

=> 6