# CS302 - Data Structures

## *using C++*

Topic: Recursion with Arrays

Kostas Alexis

# Recursive Processing - Arrays

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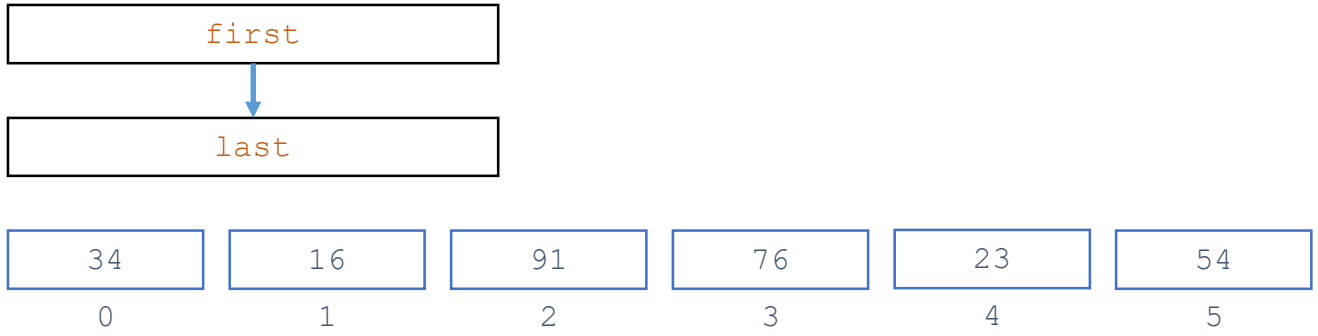

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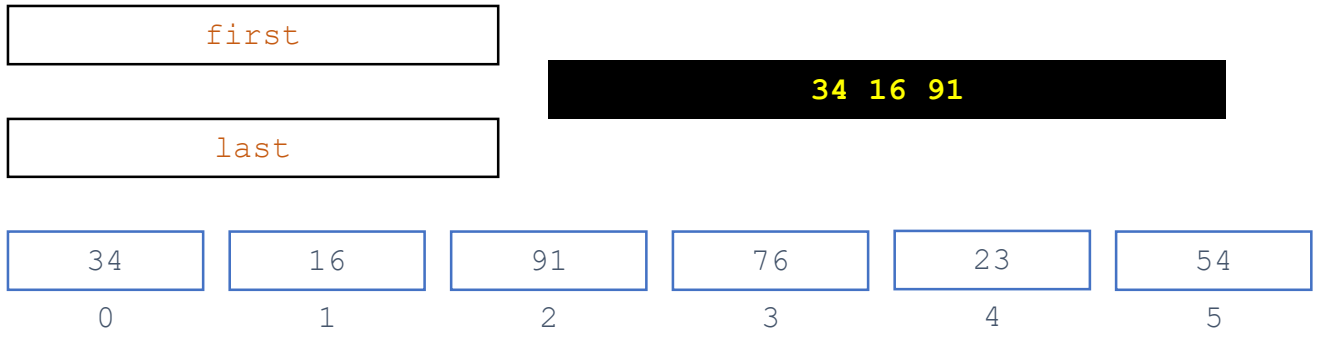


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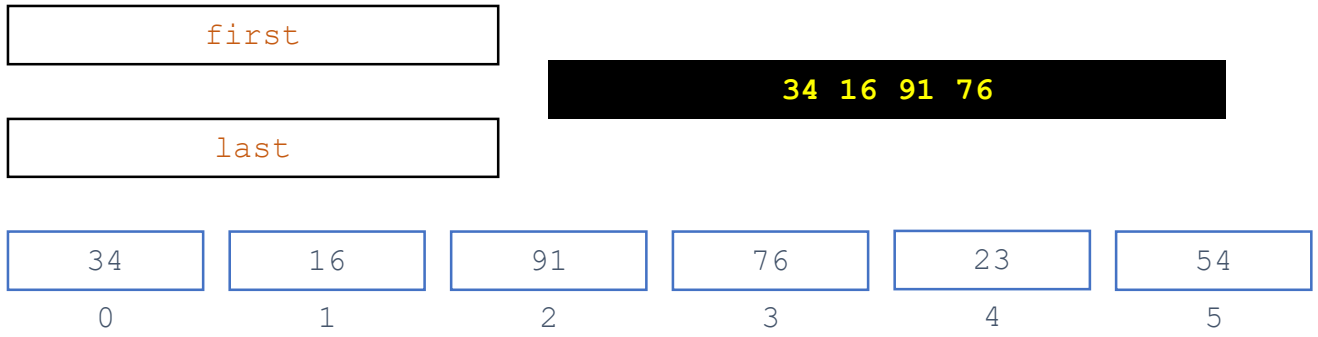


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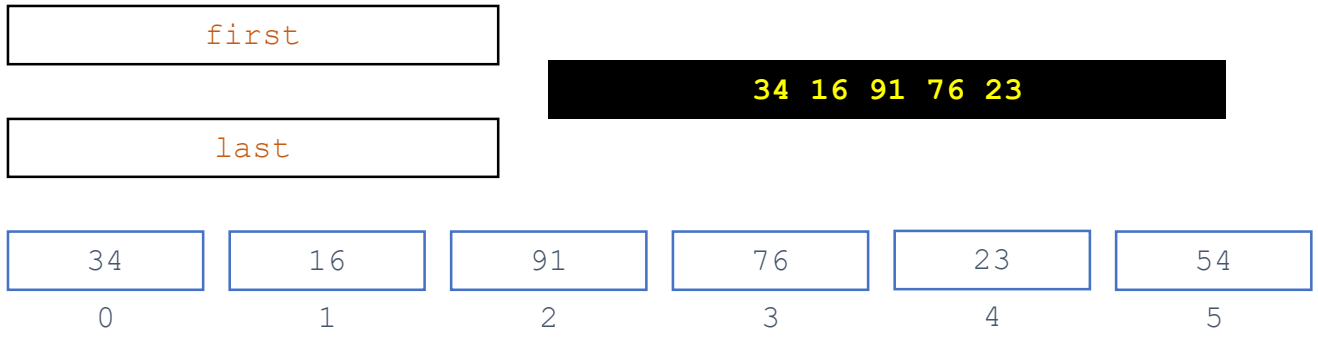


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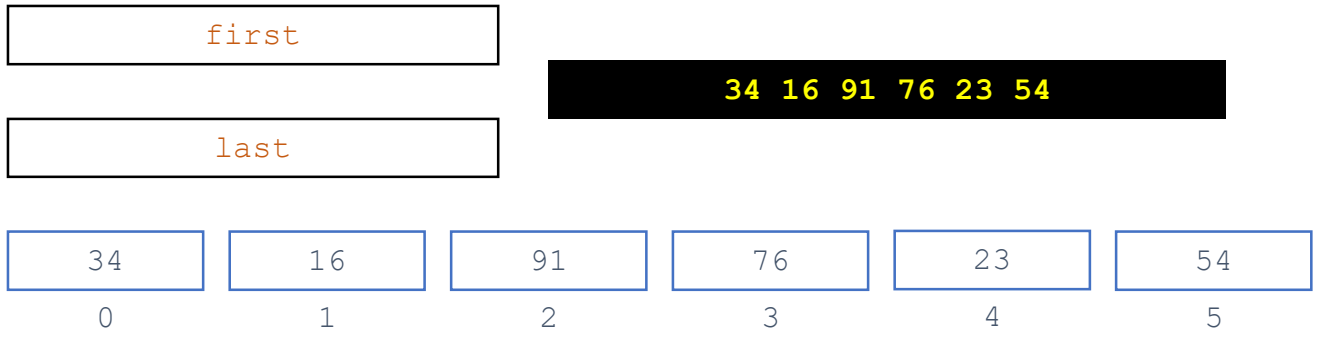


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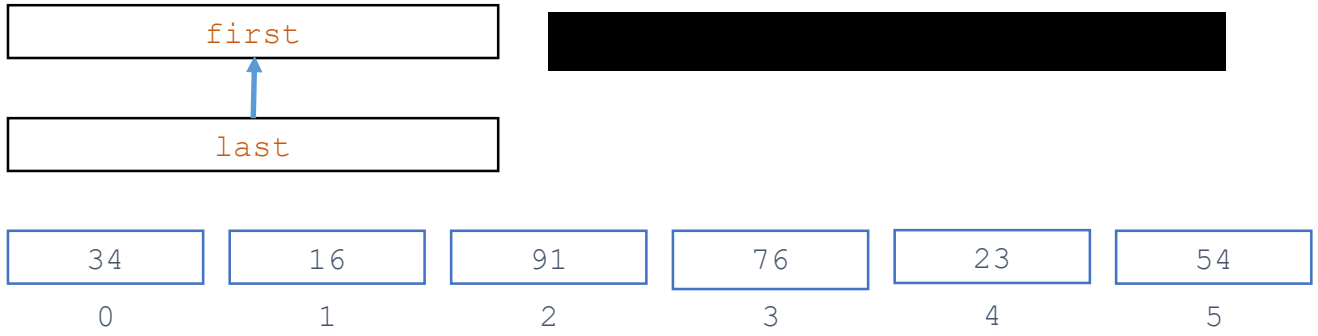


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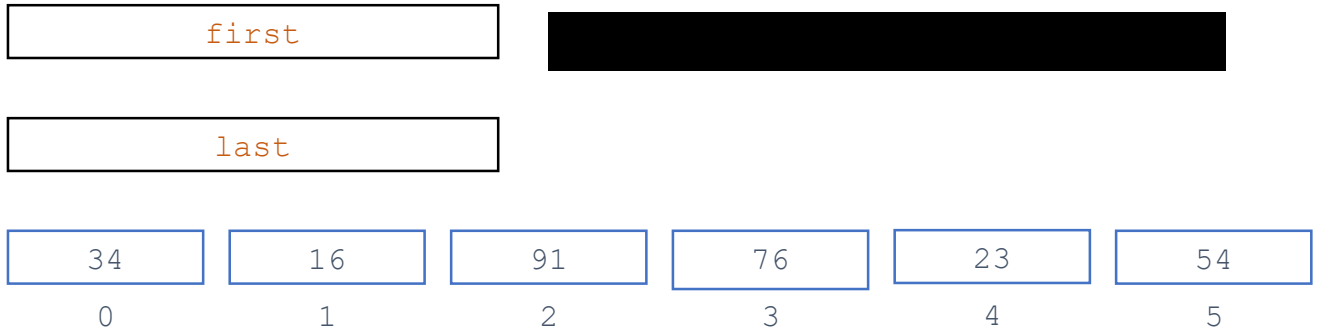


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Recursive call prior to display command

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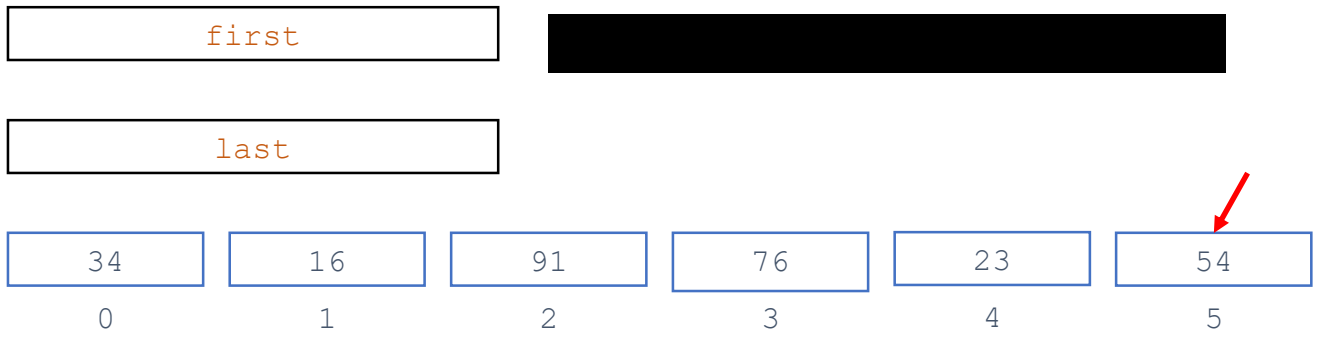


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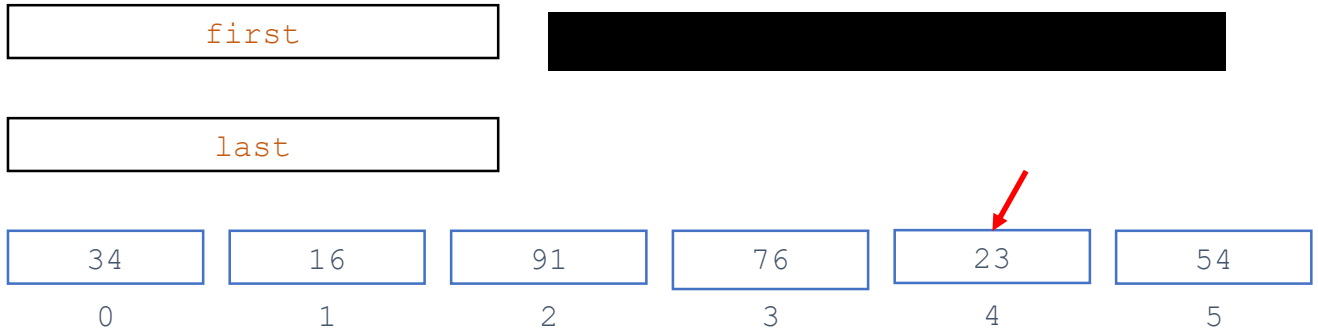


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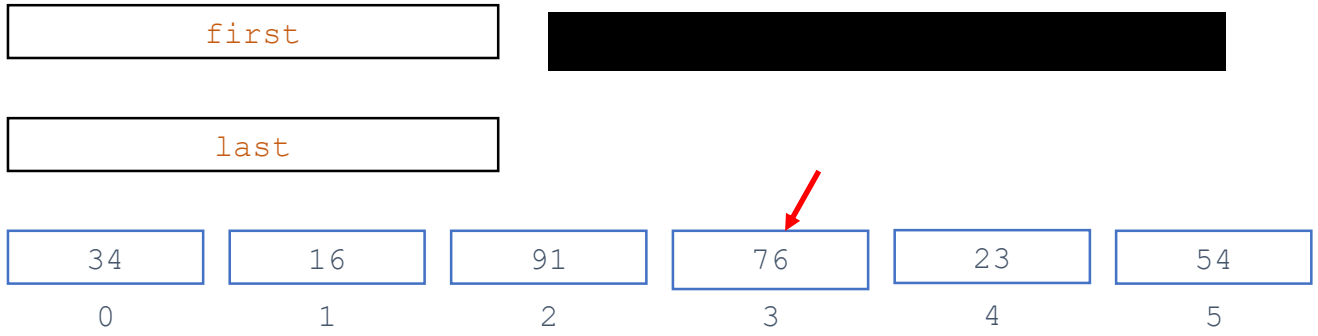


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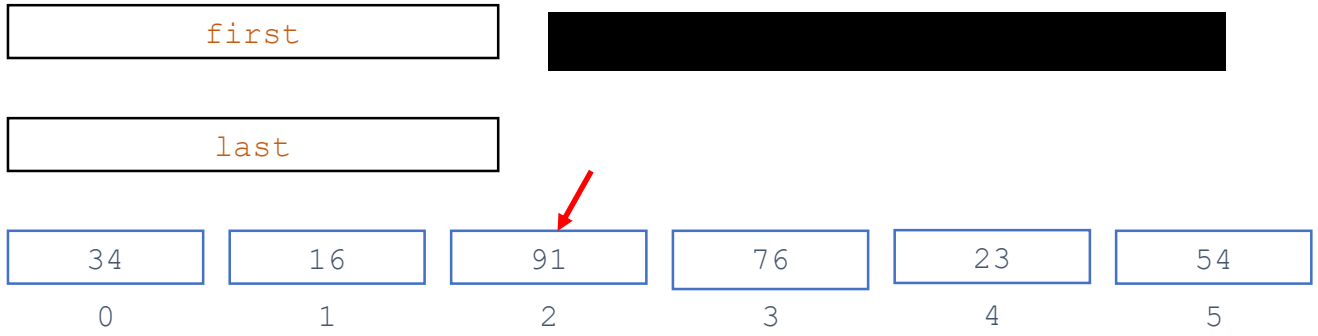


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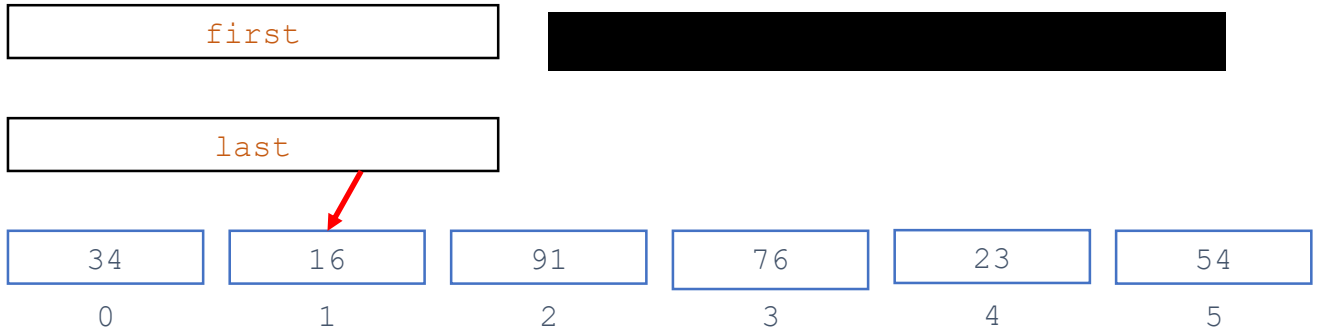


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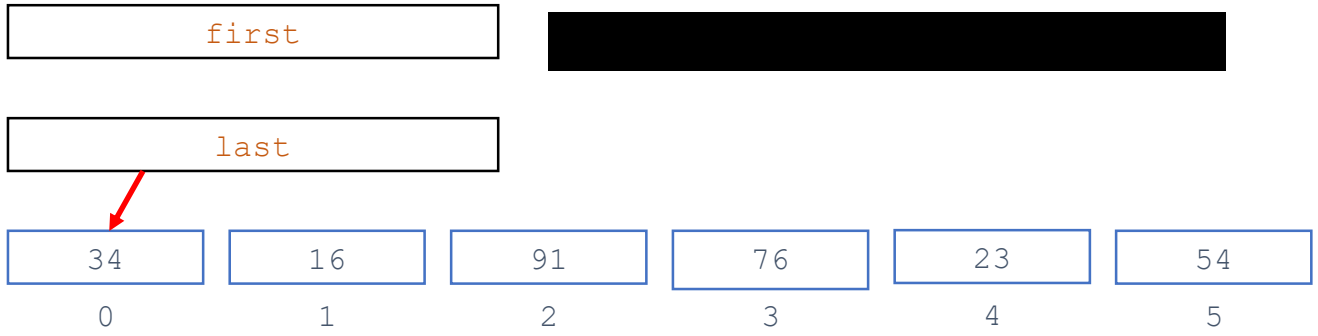


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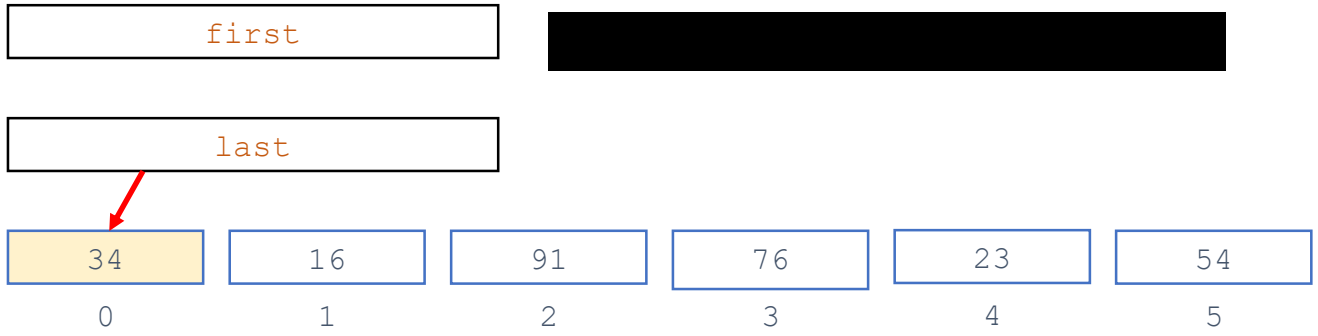


**Base case reached**

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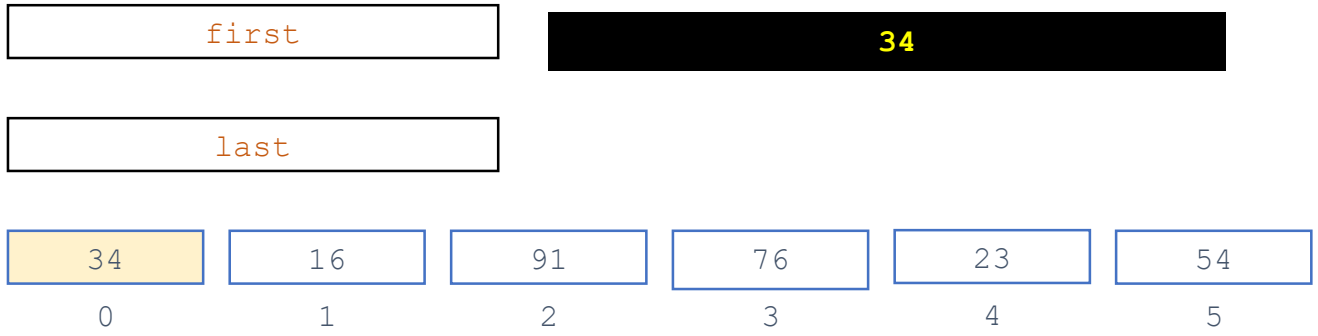


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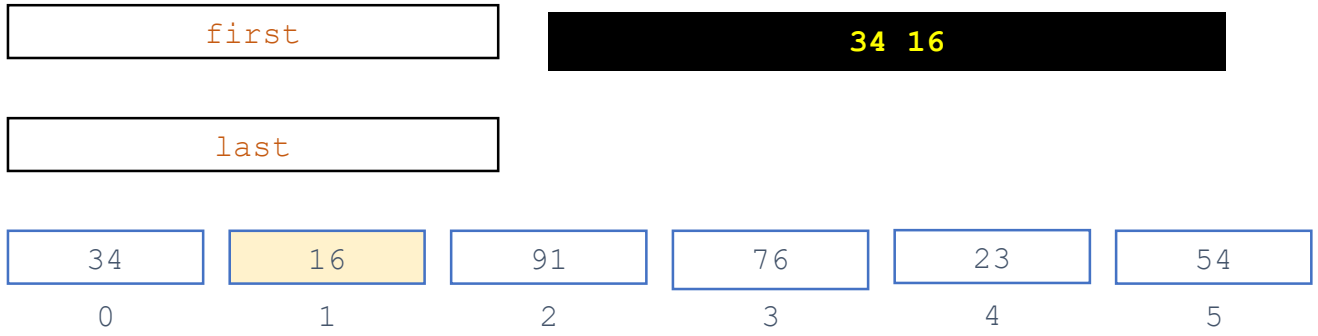


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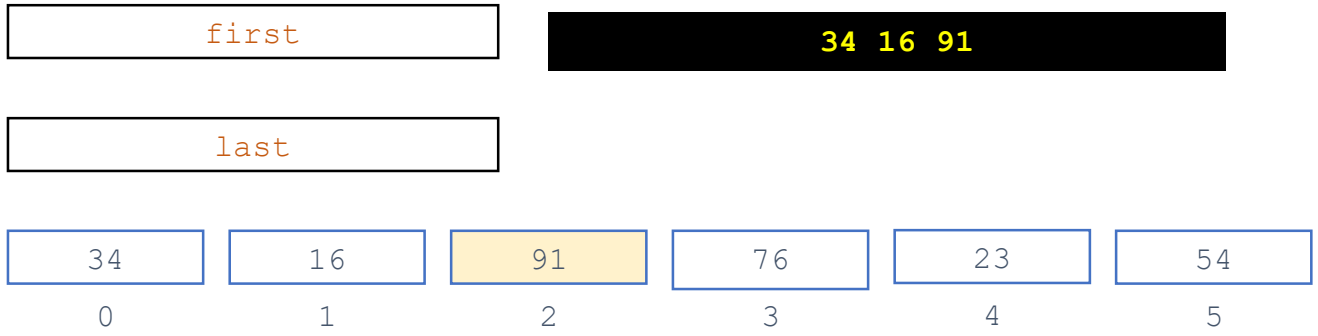


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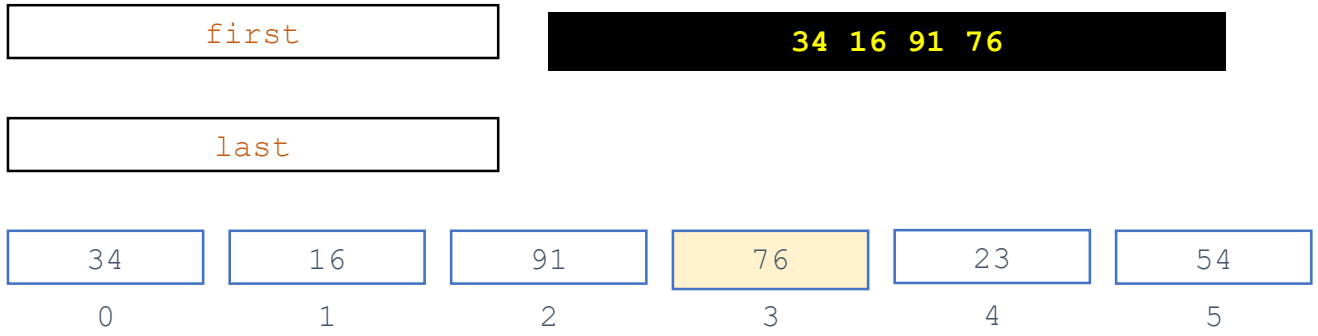


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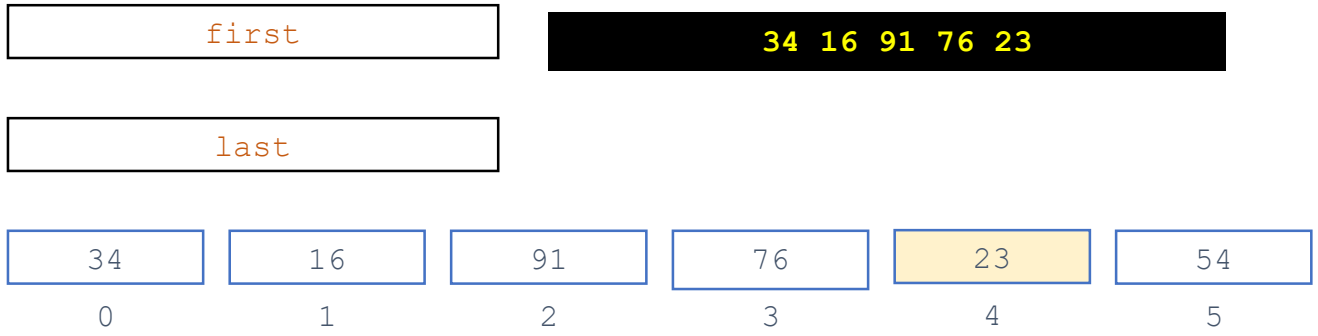


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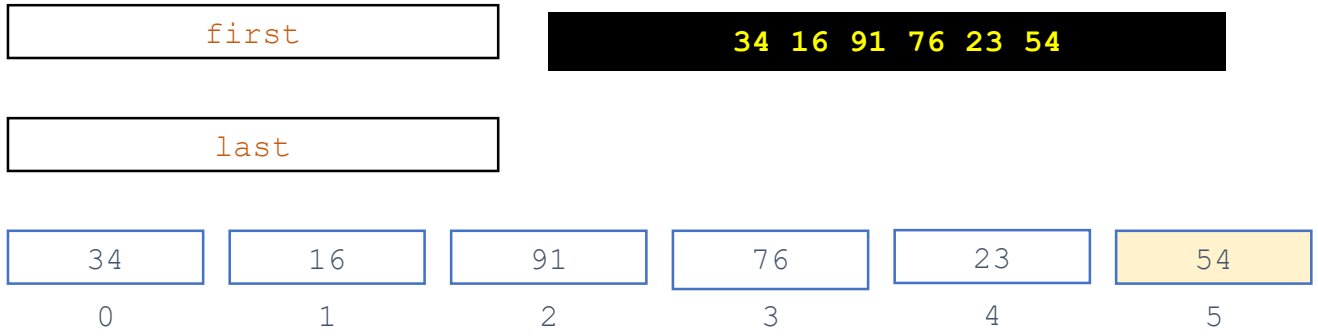


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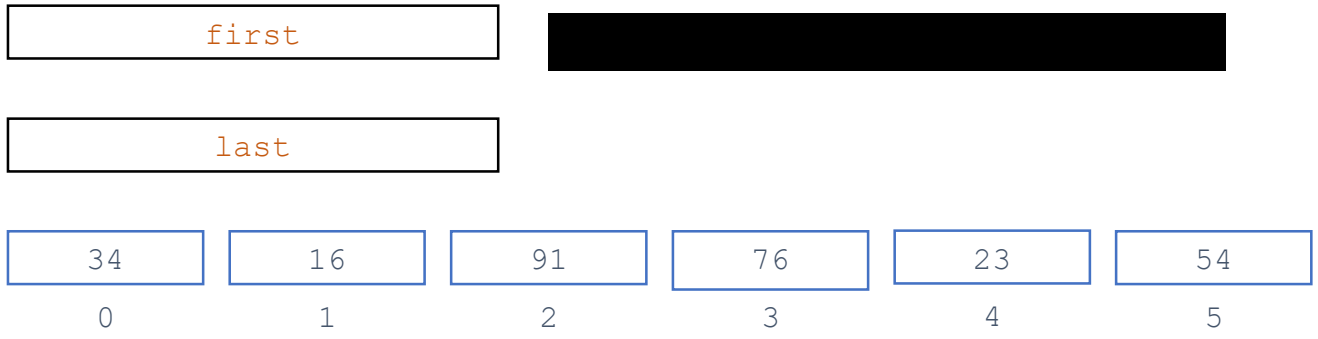
# Recursive Processing - Arrays

- **Recursively displaying elements stored in an array**
  - Start with first element
  - Start with last element
  - Divide the array in half

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// Divide the array in half
void displayArray(int myArray[], int first, int last)
{
     if (first == last)
          std::cout <<myArray[first] << " ";
     else
     {
          int mid = (first + last)/2;
          displayArray(myArray, first, mid);
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{
     if (first <= last)
     {
          displayArray(myArray, first, last-1);
          std::cout << myArray[last] << " ";
     } // end if
} // end displayArray
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```
// Divide the array in half
void displayArray(int myArray[], int first, int last)
{
     if (first == last)
          std::cout <<myArray[first] << " ";
     else
     {
          int mid = (first + last)/2;
          displayArray(myArray, first, mid);
          displayArray(myArray, mid + 1, last);
     } // end if
} // end displayArray
```

**two calls**

# Recursive Processing - Arrays

- **Recursively displaying elements stored in an array**
  - Start with first element
  - Start with last element
  - Divide the array in half


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// Start with myArray[first]
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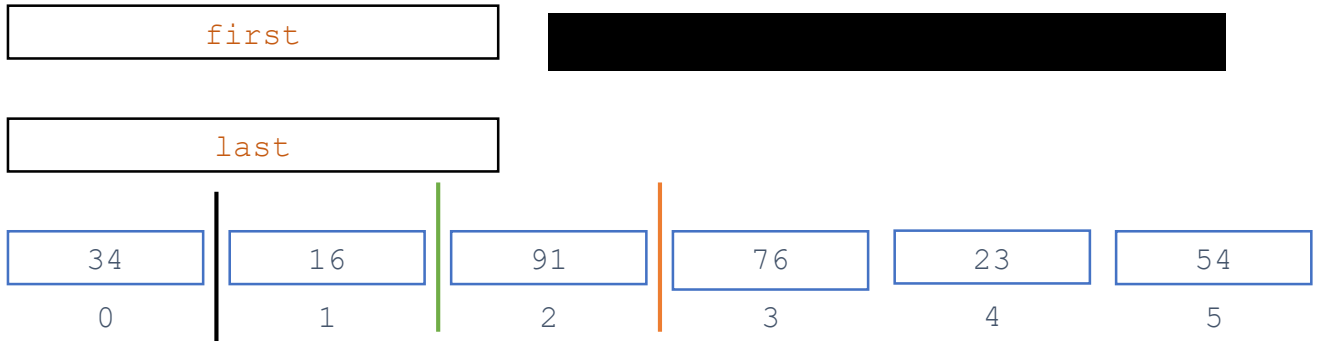


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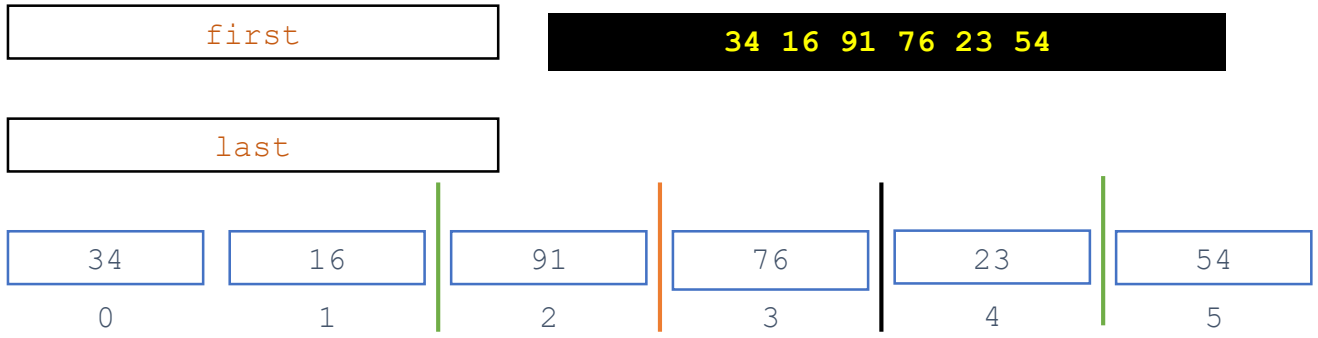


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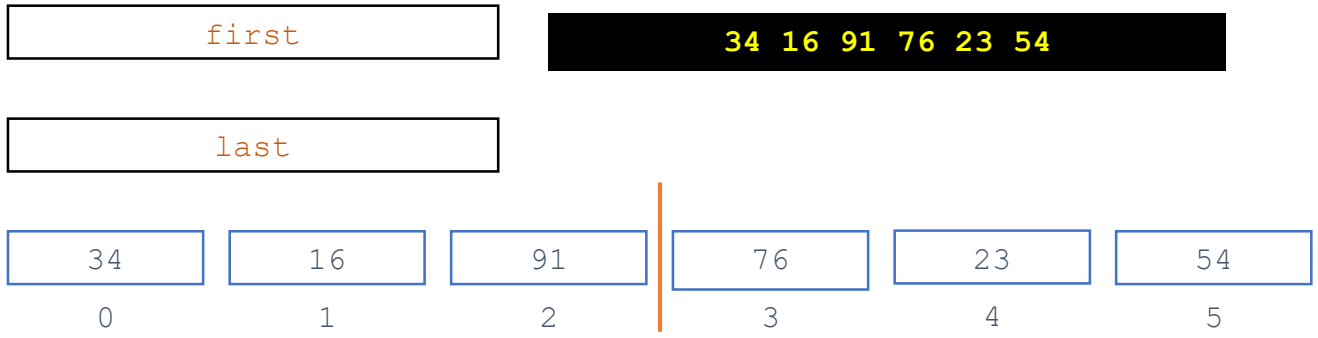


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Implicit base case

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void displayArray(int myArray[], int first, int last)
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     if (first == last)
          std::cout <<myArray[first] << " ";
     else
     {
          int mid = (first + last)/2;
          displayArray(myArray, first, mid);
          displayArray(myArray, mid + 1, last);
     } // end if
} // end displayArray
```

explicit base case

# Thank you