C# and Microsoft .NET

Collections

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Last time…

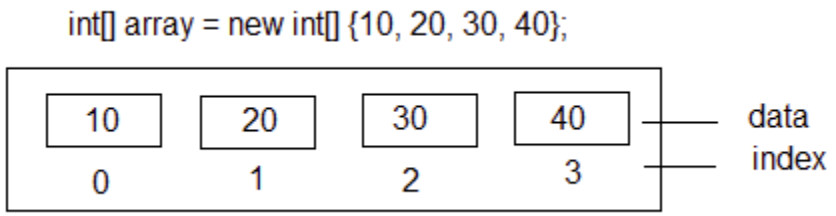
- Conditional statements
- Loops (not really)
  - Break and continue
  - Infinite cycles
- Methods
- Recursion (not really)

Arrays

- What is an array

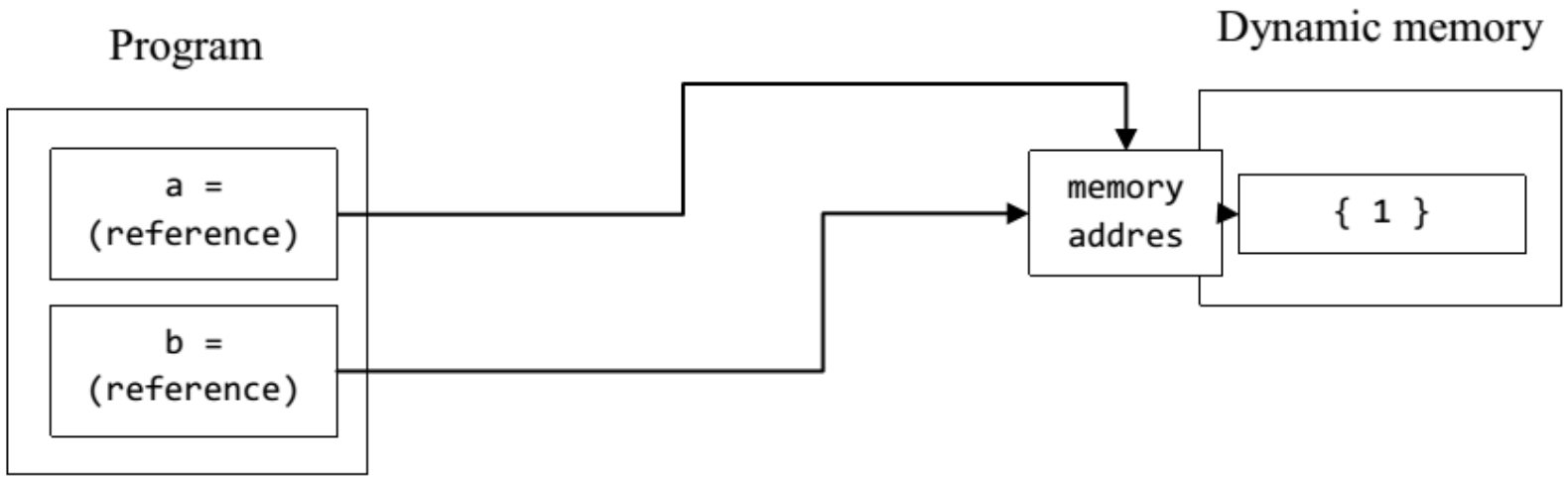
  typeName[] arrayName = new typeName[size];
- Initialization

  typeName[] arrayName = { value1, value2, … }



Reference Types and Arrays

- Value types and reference types
- The array variable stores a pointer to a memory address
- Copying an array value
  - Modifying a copied array and observing the results



Multidimensional Arrays

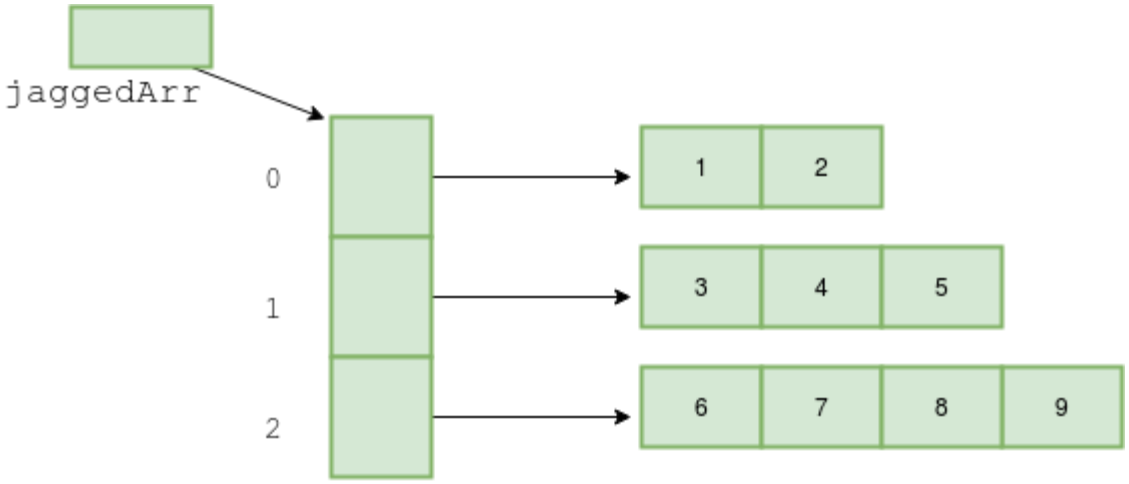
- Multidimensional arrays: Arrays that support more than one dimension
- 2-dimensional arrays are called matrix
- Defining a 2-dimensional array
  - DataType[,] variableName = new data_type[size, size];
    variable_name[index, index] = value; variable_name[index, index];
  - int[,] arr2 = //new int[3, 3]
    {
      {101, 102, 103},
      {201, 202, 203},
      {301, 302, 303}
    };

	Col 1	Col 2	Col 3	Col 4
Row 1	0, 0	0, 1	0, 2	0, 3
Row 2	1, 0	1, 1	1, 2	1, 3
Row 3	2, 0	2, 1	2, 2	2, 3
Row 4	3, 0	3, 1	3, 2	3, 3

Jagged arrays

- Jagged arrays: Arrays that have arrays in them
- Defining a jagged array

```
DataType[][] jaggedArray = new DataType[size][];
jaggedArray[0] = new int[5];
jaggedArray[1] = new int[4];
jaggedArray[2] = new int[2];
jaggedArray [index1][ index2] = value;
jaggedArray[index1][index2];
int[][] jaggedArray2 = //new int[][]
{
  new int[] {1,3,5,7,9},
  new int[] {0,2,4,6},
  new int[] {11,22}
};
```



Data Structures and Algorithms

- Algorithm

  "… a process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer"

- *Data Structures*

  "…data structure** is a **data** organization, management and storage format that enables efficient access and modification. More precisely, a **data structure** is a collection of **data**values, the relationships among them, and the functions or operations that can be applied to the **data"

Array List

- ArrayList vs Array
- Dynamic Size
- Interface
  - Add(…)
  - Insert(…)
  - RemoveAt(…)
  - Clear(…)
  - Count
- Object Type…

Stack

- Last In First Out (LIFO)
- Elements are Objects
- Interface
  - Push(…)
  - Peek(…)
  - Pop(…)
  - Count

Queue

- First In First Out (FIFO)
- Elements are Objects
- Interface
  - Enqueue(…)
  - Dequeue(…)
  - Peek(…)
  - Count

Hashtable

- Hash?!?
- Keys and values
- Elements are Objects
- Interface
  - Add(…)
  - Remove(…)
  - ContainsKey(…)
  - ContainsValue(…)
  - variableName[key] (retrieves the value for a given key)
  - Count


Questions?