INTRODUCTION TO PROGRAMMING

USING C#

Lecture 5: Data Structures

CONTENTS:

- What’s data structures.
- Why we need data structures.
- Real life examples.
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WHAT'S DATA STRUCTURES

From Wikipedia

A **data structure** is a particular way of organizing and storing data in a computer so that it can be accessed and modified 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

WHY WE NEED DATA STRUCTURES

- **Organizing related data in single unit.**
- **A good representation of data**
- **Easy to talk about**

REAL LIFE EXAMPLES

- **Supermarket casher queue.**
- **Dictionary and phonebook.**
- **Google maps.**
- **…**

ARRAYS

A fixed-size collection of data of same type.

ARRAYS

```
int[] values = new int[] { 10, 3, 5, 70 };

values[0] = 11;

int x = values[1] + values[2];
```

LISTS

A collection of data of same type that you can add or remove from.

LISTS

```
List<int> values = new List<int>();

values.Add(10);
values.Add(5);
values.Add(0);

values[0] = 11;
```

QUEUES

A collection of data items where the first item inserted is the first item to be removed.

QUEUES

```
Queue<int> values = new Queue<int>();

values.Enqueue(10);
values.Enqueue(5);
values.Enqueue(0);

int x = values.Dequeue(); // x=10 and values now has 5 and 0
```

STACKS

A collection of data items where the last item inserted is the first item to be removed.

STACKS

```
Stack<int> values = new Stack<int>();

values.Push(10);
values.Push(5);
values.Push(0);

int x = values.Pop(); // x=0 and values now has 10 and 5
```

DEMO

NEXT

- **The file system.**