Module 1 Day 7

Collections, Part 1

Arrays

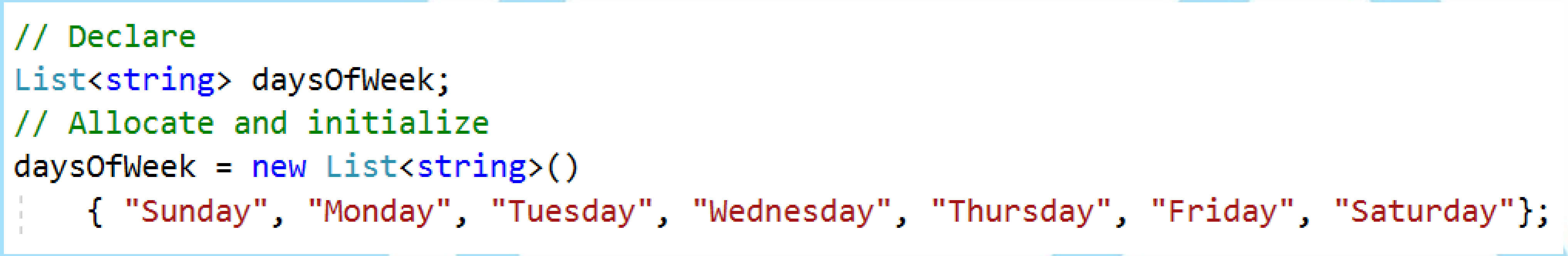
- A group of similarly typed items
- Elements are accessed by an integer index
- Fixed in size once created

Collection Classes

- Defined in the System.Collections.Generic namespace
  - A namespace is just an organization mechanism with a hierarchical naming structure
- List: an Array on steroids
- Stack: a last-in, first-out collection
- Queue: a first-in, first-out collection
- … and many more, some of which we will cover tomorrow…
  - and some of which you will investigate on your own

List

- The collection most like an array
  - But it can shrink and grow!
- To create, like any other variable:
  - Declare, Allocate (Instantiate), Initialize



```
// Declare
List<string> daysOfWeek;
// Allocate and initialize
daysOfWeek = new List<string>()
    { "Sunday", "Monday", "Tuesday", "Wednesday", "Thursday", "Friday", "Saturday"};
```

- <T> syntax is called a "generic", and ANY type (T) can be placed there
- List<int>, List<double>, List<Car>
- You can even do a list of lists! (but we'll spare you that)

Let's Code

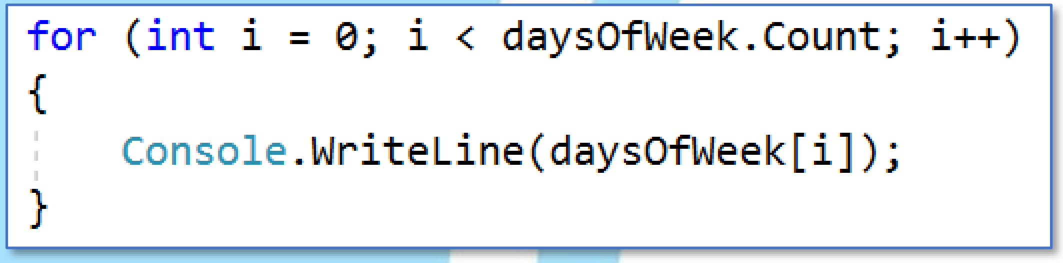
List Methods

- Access elements using listName[index] syntax, just like arrays
- Add elements
    - listName.Add(elementToAdd)
        - elementToAdd must be of the appropriate type
    - listName.Insert(index, elementToAdd)
    - listName.AddRange(elementsToAdd[])
- Remove elements
    - listName.Remove(elementToRemove)
        - Removes the first occurrence where (listElement == elementToRemove)
    - listName.RemoveAt(index)

Let's Code

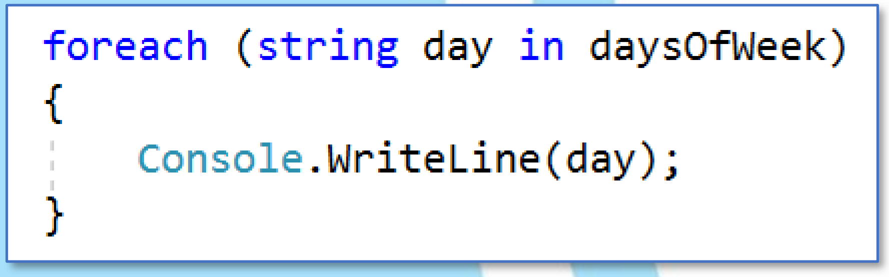
Iterating a List

- The number of elements is called Count
- Since [index] works, we can iterate as usual



```
for (int i = 0; i < daysOfWeek.Count; i++)
{
    Console.WriteLine(daysOfWeek[i]);
}
```

- But there is another way … foreach



```
foreach (string day in daysOfWeek)
{
    Console.WriteLine(day);
}
```

- So, when to use foreach?

Let’s Code

Stack

- Last-in, First-out
- Methods
  - Push
  - Pop
  - Peek
- Foreach
- NO index access!
- NO initializer

```
Stack<int> stack = new Stack<int>();
stack.Push(1);
stack.Push(2);
stack.Push(3);
```

```
while (stack.Count > 0)
{
    int i = stack.Pop();
    Console.WriteLine(i);
}
```

```
foreach (int i in stack)
{
    Console.WriteLine(i);
}
```

Driveway parking, Undo, Browser Back

Let's Code

Queue

- First-in, First-out
- Methods
  - Enqueue
  - Dequeue
  - Peek
- Foreach
- NO index access!
- NO initializer

```
Queue<int> queue = new Queue<int>();
queue.Enqueue(1);
queue.Enqueue(2);
queue.Enqueue(3);
```

```
while (queue.Count > 0)
{
    int i = queue.Dequeue();
    Console.WriteLine(i);
}
```

Store checkout, Print queue

Let's Code