III. Collections, Delegates, Events

Contents

1. Collections

C# Sample code available on http://online.ase.ro – "StandardCollections" Sample

Assignment

1. Create a new project with the name "StandardCollections"

1.1.ArrayList

2. Add the following method in the "Program" class and call it from the Main method

```
private static void ArrayListExample()
{
      var words = new ArrayList();
      words.Add("melon");
      words.Add("avocado");
      string first = (string)words[0];

      //int first = (int)words[0];
}
```

1.2. List<T>

3. Add the following method in the "Program" class and call it from the Main method

```
private static void ListExample()
{
      // New string-typed list
      var words = new List<string>();
      words.Add("melon");
      words.Add("avocado");
      words.AddRange(new[] { "banana", "plum" });
```

```
        // Insert at start
        words.Insert(0, "lemon");

        // Insert at start
        words.InsertRange(0, new[] { "peach", "nashi" });
        words.Remove("melon");

        // Remove the 4th element
        words.RemoveAt(3);

        // Remove first 2 elements
        words.RemoveRange(0, 2);

        // Remove all strings starting in 'n':
        words.RemoveAll(x => x.StartsWith("n"));

        for (var i=0; i<words.Count; i++)
        {
                Console.WriteLine(words[i]);
        }

        foreach (var word in words)
        {
                Console.WriteLine(word);
        }
}
```

4. Add the following “Person” class

```
internal class Person
{
        #region Properties
        public string Name { get; set; }
        public int Age { get; set; }
        #endregion

        public Person(string name, int age)
        {
                Name = name;
                Age = age;
        }
}
```

5. Add the following method in the “Program” class and call it from the Main method

```
private static void ListPersonExample()
{
        var personList = new List<Person>();

        var rnd = new Random();
        for (var i = 0; i < 10; i++)
        {
                personList.Add(new Person("Persoana " + i, rnd.Next(100)));
        }

        //Which interface is needed for Array.Sort(personList)

        foreach (var p in personList) //equivalent to foreach (var p in personList)
                Console.WriteLine(p);
}
```

1.3. Queues, Stacks, and Sets

- Queue , Stack<T>, LinkedList<T>
- SortedList<TKey, TValue> and many others: link

1.4. Custom Collections

C# Sample code available on http://online.ase.ro – "CustomCollections" Sample

Assignment

1. Add the following "PersonCollection" class

```
internal class PersonCollection :IEnumerable<Person>
{
	private Person[] _personArray;

	public Person this[int index]
	{
		get { return _personArray[index]; }
		set { _personArray[index] = value; }
	}

	public int Length
	{
		get { return _personArray.Length; }
	}

	public PersonCollection()
	{
		_personArray = new []
		{
			new Person("name1", 1),
			new Person("name2", 2),
			new Person("name3", 3)
		};
	}

	public IEnumerator<Person> GetEnumerator()
	{
		return new PersonEnumerator(this);
	}

	IEnumerator IEnumerable.GetEnumerator()
	{
		return GetEnumerator();
	}
}
```

2. Add the following "PersonEnumerator" class

```
internal class PersonEnumerator : IEnumerator<Person>
{
	private int _nIndex;
	private PersonCollection _personCollection;

	public PersonEnumerator(PersonCollection personCollection)
	{
		_personCollection = personCollection;
		_nIndex = -1;
	}
```

```
        public bool MoveNext()
        {
                _nIndex++;
                return _nIndex < _personCollection.Length;
        }

        public void Reset()
        {
                _nIndex = -1;
        }

        public Person Current
        {
                get { return _personCollection[_nIndex]; }
        }

        object IEnumerator.Current
        {
                get { return Current; }
        }

        public void Dispose()
        {

        }
```

3. Add the following method in the "Program" class and call it from the Main method

```
private static void PersonCollectionExample()
{
        var personList = new PersonCollection();

        foreach (var p in personList)
                Console.WriteLine(p);
}
```

2. Delegates

C# Sample code available on http://online.ase.ro – "Delegates" Sample

Assignment

1. Create a new project with the name "Delegates"

```
 // This delegate can point to any method, taking two integers and returning an
integer.
public delegate int BinaryOp(int x, int y);

//
public class SimpleMath
{
        public static int Add(int x, int y)
        { return x + y; }
        public static int Subtract(int x, int y)
        { return x - y; }
}

internal class Program
{
        private static void Main()
        {
```

```
            Console.WriteLine("***** Delegate Example *****\n");

            //Definire si instantiere delegat
            BinaryOp b = new BinaryOp(SimpleMath.Add);
            //BinaryOp b = new BinaryOp(SimpleMath.Subtract));
            //b += new BinaryOp(SimpleMath.Subtract);

            //Apel prin delegat
            Console.WriteLine("10 + 10 is {0}", b(10, 10));
            Console.ReadLine();
      }
}
```

3. Events

3.1. Custom Events

C# Sample code available on http://online.ase.ro – "EventsPropertyTrigger" Sample

Assignment

1. Create a new project with the name "EventsPropertyTrigger"

```
public delegate void PriceChangedHandler(decimal oldPrice, decimal newPrice);

internal class Stock
{
      private string _symbol;
      private decimal _price;

      public Stock(string symbol)
      {
            _symbol = symbol;
      }

      public event PriceChangedHandler PriceChanged;

      public decimal Price
      {
            get { return _price; }
            set
            {
                  if (_price == value) return; // Exit if nothing has changed
                  decimal oldPrice = _price;
                  _price = value;
                  if (PriceChanged != null) // If invocation list not
                        PriceChanged(oldPrice, _price); // empty, fire event.
            }
      }
}

internal class Program
{
      private static void Main()
      {
            var stock = new Stock("MSFT");
            stock.PriceChanged += Stock_PriceChanged;
            stock.Price = 30;
            stock.Price = 60;
            stock.Price = 90;
      }
```

```
        private static void Stock_PriceChanged(decimal oldPrice, decimal newPrice)
        {
            Console.WriteLine("MSFT: {0} {1}", oldPrice, newPrice);
        }
}
```

3.2. Standard Event Pattern

C# Sample code available on http://online.ase.ro – "EventsPropertyTriggerEventArgs" Sample

Assignment

1. Create a new project with the name "EventsPropertyTriggerEventArgs"

```
public class PriceChangedEventArgs : EventArgs
{
        public readonly decimal LastPrice;
        public readonly decimal NewPrice;
        public PriceChangedEventArgs(decimal lastPrice, decimal newPrice)
        {
            LastPrice = lastPrice;
            NewPrice = newPrice;
        }
}

public class Stock
{
        private string _symbol;
        private decimal _price;

        public Stock(string symbol)
        {
            _symbol = symbol;
        }

        public event EventHandler<PriceChangedEventArgs> PriceChanged;
        protected virtual void OnPriceChanged(PriceChangedEventArgs e)
        {
            if (PriceChanged != null) PriceChanged(this, e);
        }
        public decimal Price
        {
            get { return _price; }
            set
            {
                if (_price == value) return;
                decimal oldPrice = _price;
                _price = value;

                OnPriceChanged(new PriceChangedEventArgs(oldPrice, _price));
            }
        }
}

internal class Program
{
        private static void Main()
        {
            var stock = new Stock("MSFT");
            stock.PriceChanged += Stock_PriceChanged1; ;
            stock.Price = 30;
            stock.Price = 60;
```

```
            stock.Price = 90;
        }

        private static void Stock_PriceChanged1(object sender, PriceChangedEventArgs e)
        {
            Console.WriteLine("MSFT: {0} {1}", e.LastPrice, e.NewPrice);
        }
}
```

More event samples available on http://online.ase.ro