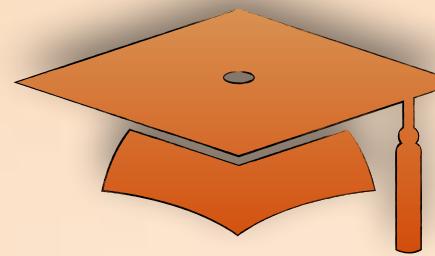


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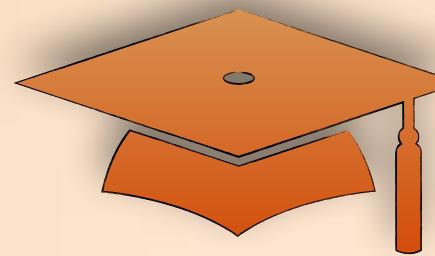
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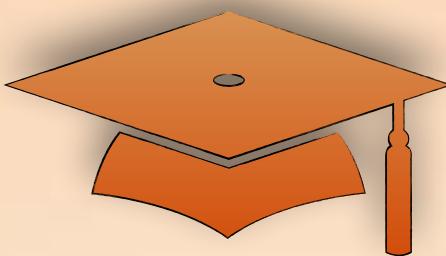
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# Advanced C# Part 2

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## Collections

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# Collections

---

**Collection is a group of related objects.**

Collections

Arrays

Collections

Generic

Non-generic

- ✓ Collections provide a more flexible way to work with groups of objects
- ✓ Collections are enhancement to the arrays.

# Collections

---

Non-generic

---

**Each element can represent a value of a different type**

---

**Elements can be added or removed at runtime**

---

**The size is not fixed**

---

**System.Collections**

---

**Easier to write code**

# Collections

---

## Generic

---

Allows defining a class or method with type as a parameter.

---

Use it if your collection contains elements of only one data type.

---

Enforces type safety, which means that no other data type can be added to it.

---

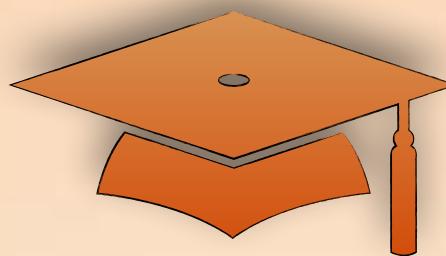
`System.Collections.Generic`

---

A little bit harder to write code

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---

## Non-generic : ArrayList

---



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# ArrayList

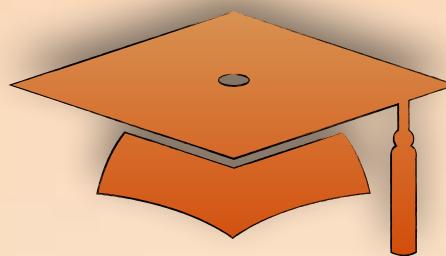
---

*It is an alternative to an arrays, with some enhancement features.*

- ✓ *Stores elements of any datatype.*
- ✓ *Resizes automatically as you add or remove elements.*
- ✓ *Elements can be null or duplicated.*

# Advanced C# Part 2

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## Non-generic : HashTable

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# HashTable

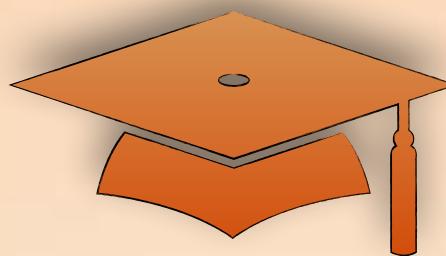
---

*Represents a collection of key-and-value pairs that are organized based on the hash code of the key.*

- ✓ *Stores key-value pairs of any datatype*
- ✓ *Key must be unique and cannot be null.*
- ✓ *Value can be null or duplicate.*
- ✓ *Value can be of any type.*

# Advanced C# Part 2

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## Non-generic : SortedList

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# SortedList

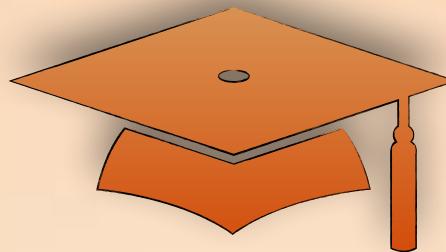
---

*Represents a collection of key-and-value pairs that are sorted by the keys.*

- ✓ *There is generic and non-generic SortedList.*
- ✓ *Stores the key-value pairs in ascending order of the key.*
- ✓ *Key must be unique and cannot be null.*
- ✓ *Value can be null or duplicate.*
- ✓ *Value can be of any type.*

# Advanced C# Part 2

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## Non-generic : Stacks

---



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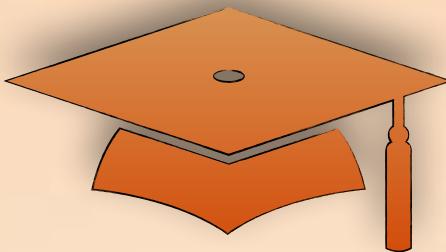
# Stacks

*Stack represents a last-in first-out (LIFO) collection of object.*



# Advanced C# Part 2

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## Non-generic : Queues

---



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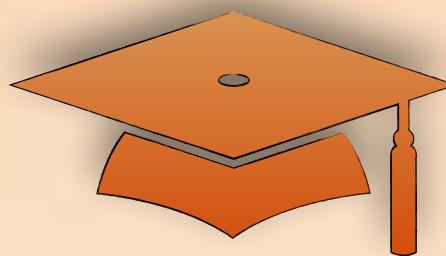
# Queues

*Queue represents a first-in first-out (FIFO) collection of object.*



# Advanced C# Part 2

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---

## Non-generic : BitArray

---



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# BitArray

---

*Represent a compact array of bit values, which are represented as Booleans.*

---

1	0	1	1	0	0	0	1
---	---	---	---	---	---	---	---

---

# BitArray

---

AND

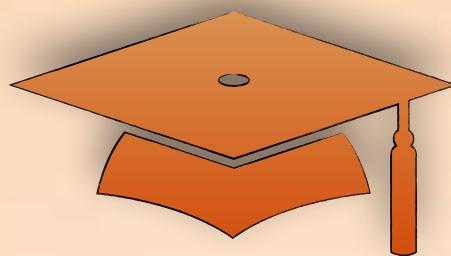
0	0	0
0	1	0
1	0	0
1	1	1

OR

0	0	0
0	1	1
1	0	1
1	1	1

# Advanced C# Part 2

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## Animals and trainers exercise

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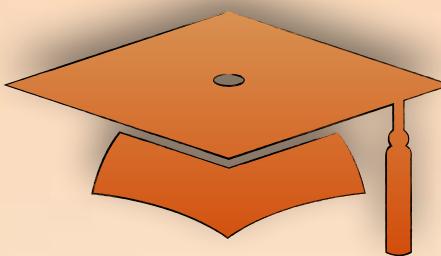
# Animals and trainers exercise

---

- ✓ *Create struct called Animals and another one called Trainers.*
- ✓ *Animals struct should contain one variable called name and property with the same name.*
- ✓ *Animals struct should contain two methods SayHi() and Feed().*
- ✓ *Trainers struct should contain one variable called trainerName and property with same name.*
- ✓ *Trainers struct should contain one method called SayHi().*
- ✓ *Create 3 instances of Animals struct and one of Trainers.*
- ✓ *Create 1 ArrayList and add the 3 animals to the list.*
- ✓ *Loop through the list with the different animals and call the SayHi() method.*
- ✓ *Now add the trainer instance to the list.*
- ✓ *Loop through the list which now contains different structs (Animals and Trainers)*

# Advanced C# Part 2

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## Generic : List<T>

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# List<T>

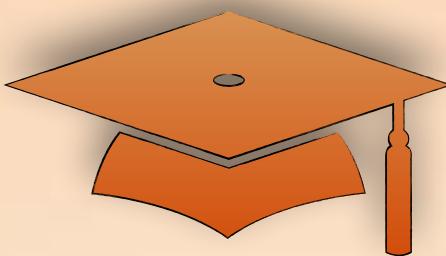
---

*List<T> collection is the same as an ArrayList except that List<T> is a generic collection*

- ✓ *Stores elements of the specified type.*
- ✓ *It grows and shrinks automatically.*
- ✓ *Can store multiple null and duplicate elements.*
- ✓ *Can be accessed using indexer, for loop or foreach statement.*
- ✓ *It is ideal for storing and retrieving large number of elements.*

# Advanced C# Part 2

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## Generic : Dictionary

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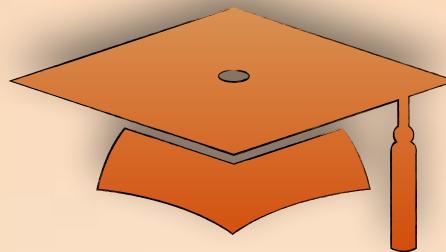
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# Advanced C# Part 2

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## Generic : SortedList

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# Generic : SortedList

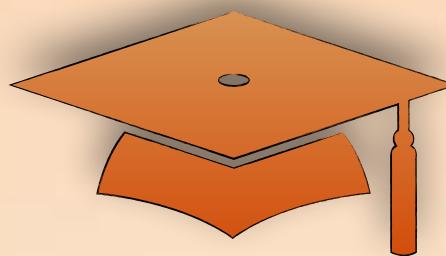
---

*Represents a collection of key-value pairs that are sorted in ascending order of key.*

- ✓ *There is generic and non-generic SortedList.*
- ✓ *The key must be unique and cannot be null*
- ✓ *The value can be null or duplicate.*
- ✓ *Generic SortedList stores keys and values of specified data types.*

# Advanced C# Part 2

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## Generic : SortedDictionary

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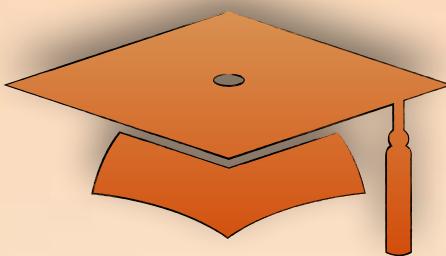
# Generic : SortedDictionary

---

- ✓ SortedList uses less memory than SortedDictionary.
- ✓ SortedDictionary has faster insertion and removal operations for unsorted data.
- ✓ If the list is populated all at once from sorted data, SortedList is faster than SortedDictionary

# Advanced C# Part 2

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## Generic : Stacks

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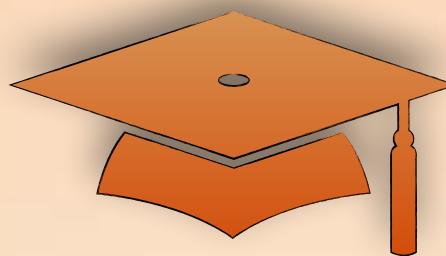
# Stacks

*Stack represents a last-in first-out (LIFO) collection of objects.*



# Advanced C# Part 2

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## Generic : Queues

---



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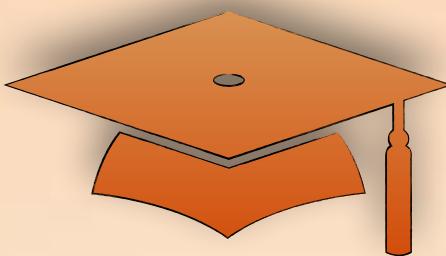
# Queues

*Queue represents a first-in first-out (FIFO) collection of objects.*



# Advanced C# Part 2

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## KeyValuePair

---



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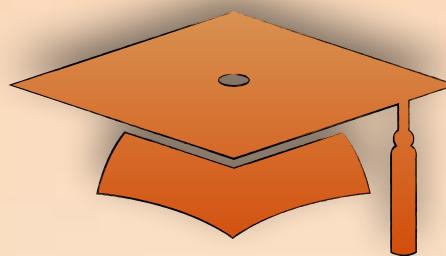
# KeyValuePair

---

*KeyValuePair stores two values together. It is a single generic struct*

# Advanced C# Part 2

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## NameValueCollection

---



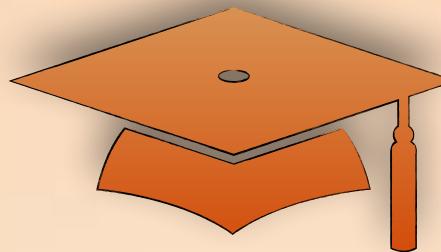
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# Advanced C# Part 2

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## List of animals exercise

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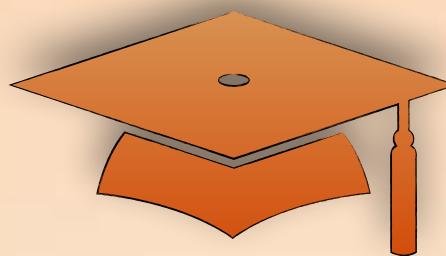
# List of animals exercise

---

- ✓ *Create a class called Animals.*
- ✓ *Animals class should contain one variable called name and property with the same name.*
- ✓ *Animals class should contain two methods SayHi() and Feed().*
- ✓ *Create 3 instances of Animals class.*
- ✓ *Create a list and add the 3 animals to the list.*
- ✓ *Loop through the list with the different animals and call the SayHi() method.*

# Advanced C# Part 2

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## Generic classes

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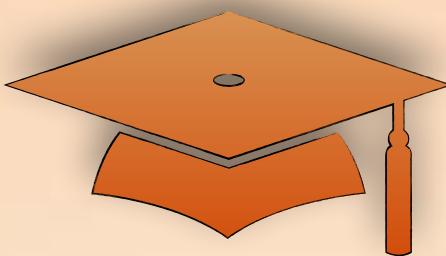
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## Generics exercise

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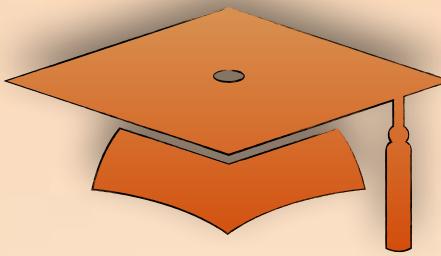
# Generics exercise

---

- ✓ *Create class called movies*
- ✓ *Contains movie name, director, rate, release date*
- ✓ *use rate as a double and float, and release date as date time and int (year only).*
- ✓ *Create instances of any movie with many volumes (Lord of the rings , Dark knight..etc).*
- ✓ *Start adding the information about each movie.*
- ✓ *Create two lists and add the different movies volumes to each list.*

# Advanced C# Part 2

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## Tuples

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# Tuples

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*A tuple is a data structure that has a specific number and sequence of elements*

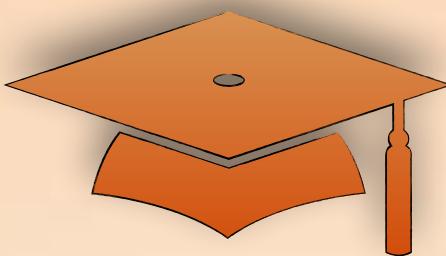
*For example a person's income*

<i>John</i>	<i>50,000</i>	<i>60,000</i>	<i>70,000</i>
<i>person</i>	<i>income</i>	<i>income</i>	<i>income</i>
	<i>2017</i>	<i>2016</i>	<i>2015</i>

*.NET Framework directly supports tuples with one to seven elements.  
But can create tuples of eight or more elements by nesting tuple objects.*

# Advanced C# Part 2

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## Nested tuples

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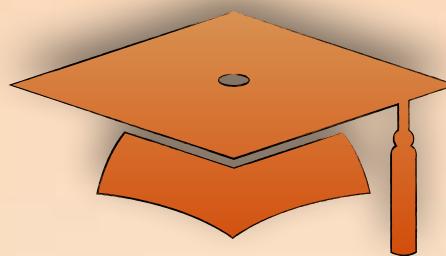
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# Advanced C# Part 2

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## Tuples with methods

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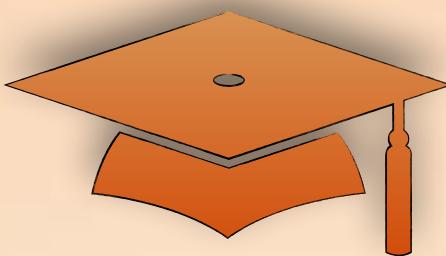
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## Tuples exercise

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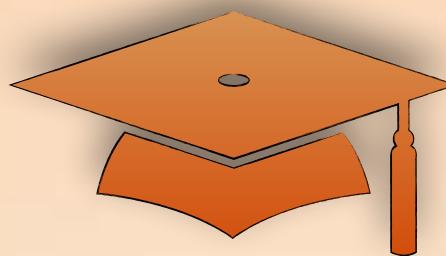
# Tuples exercise

---

- ✓ *Create a list of tuples.*
- ✓ *The tuple consists of employee number, first name, last name, hire date.*
- ✓ *Display the content of the list.*
- ✓ *Sort the list and display the content again.*
- ✓ *Sort it in a descending order and display it.*
- ✓ *Relax and enjoy what you just did :)*

# Advanced C# Part 2

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## Assignments(11, 12, 13, 14, 15)

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# Assignments

---

## Assignment No.11: (Add and remove methods for list of tuples)

- Create a list of tuples of players (playerNo, playerName, playerGoals).
- Create an add method to add items to list passing to it the tuple values.
- Create an overloaded add method to do the previous task but with an index to insert at.
- Create a remove method to remove item at specific index at the list

# Assignments

---

## Assignment No.12: (Enhancement of movies exercise (generic exercise))

- Create enum for genres.
- Create a generic list property of genres.
- Fill the necessary information for each series of movies
- Create a generic method to accept the movie class instance and display the movie info.

### Output

Movies name : Batman Begins

Movie rate : 8.3

Release date : 2005

Director : Christopher Nolan

Genres : Action Drama Thriller

# Assignments

---

## Assignment No.13: (Tuple in tuple in tuple)

- Create a tuple inside a tuple inside a tuple.
- Access the tuple in the third level.

# Assignments

---

## Assignment No.14: (Enhancement of value tuples exercise )

- Create enum for clubs.
- Create enum for countries.
- Assign each player to a country and a club (player can be assigned to many clubs)

### Output

Player no : 7

Player name : Ronaldo

Player goals : 55

Country : Portugal

Clubs : ManchesterUnited RealMadrid

# Assignments

---

## Assignment No.15: (List of employees)

- Create a class called Employees.
- Employees class consist of id, first name, last name, salary, age and list of appraisals.
- Create a list of 12 different employees with different information.