(T19)討論 DictionaryTKey、TValue、KeyValuePairTKey、TValue
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(T19)討論 DictionaryTKey、TValue、KeyValuePairTKey、TValue

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0. Summary

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1. New Project
1.1. Create New Project : Sample

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2. Sample : Program.cs

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0. Summary

A Dictionary<TKey, TValue> is a collection of KeyValuePair<TKey, TValue>
and from System.Collections.Generic namespace.
TKey must be unique so using Tkey can get its pair TValue quickly.

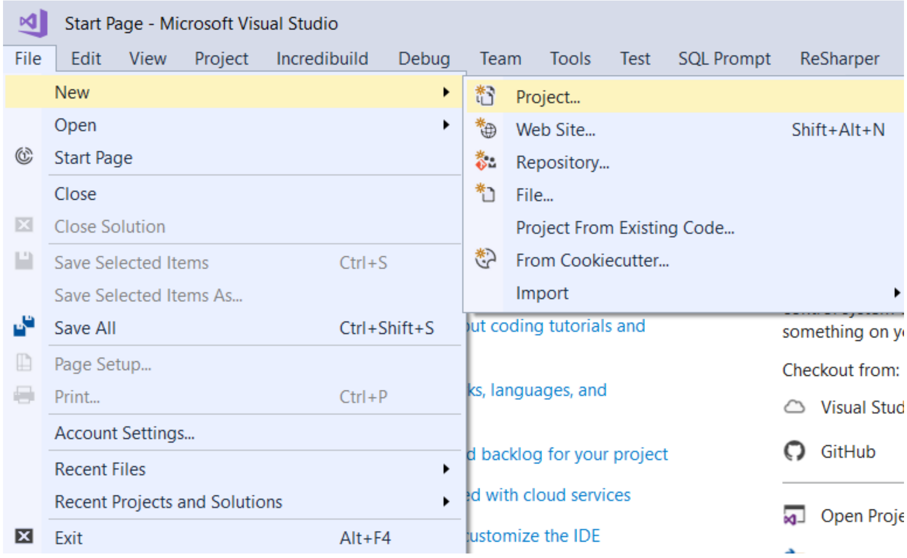
1. New Project

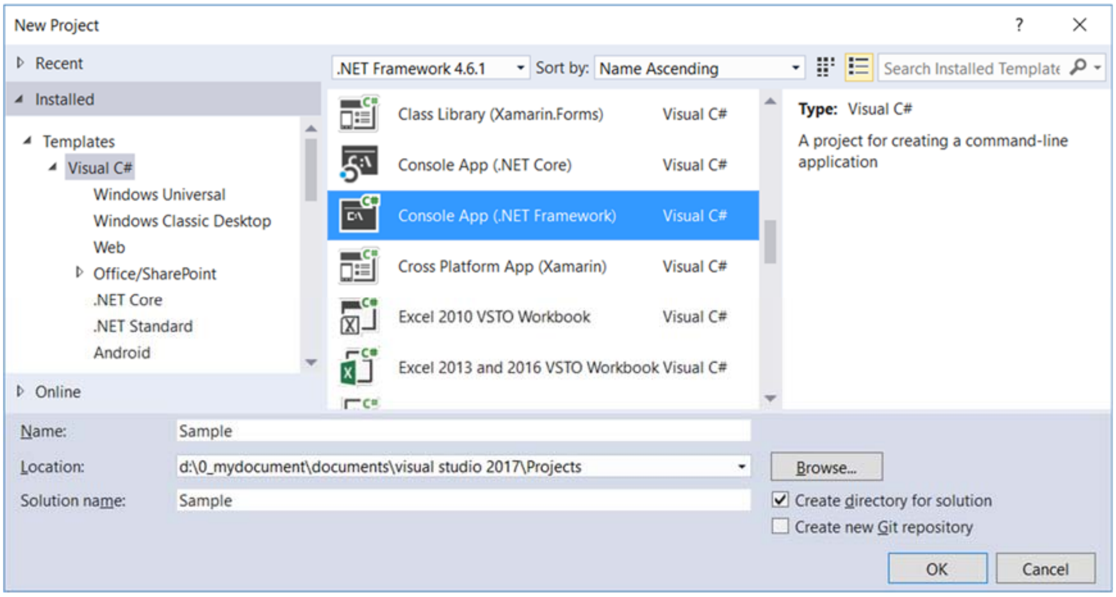
1.1. Create New Project : Sample

File --> New --> Project... -->

Visual C# --> **Console App (.Net Framework)** -->

Name: **Sample**

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Sort by: Name Ascending
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Excel 2010 VSTO Workbook Visual C#
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Browse...
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Type: Visual C#

A project for creating a command-line application

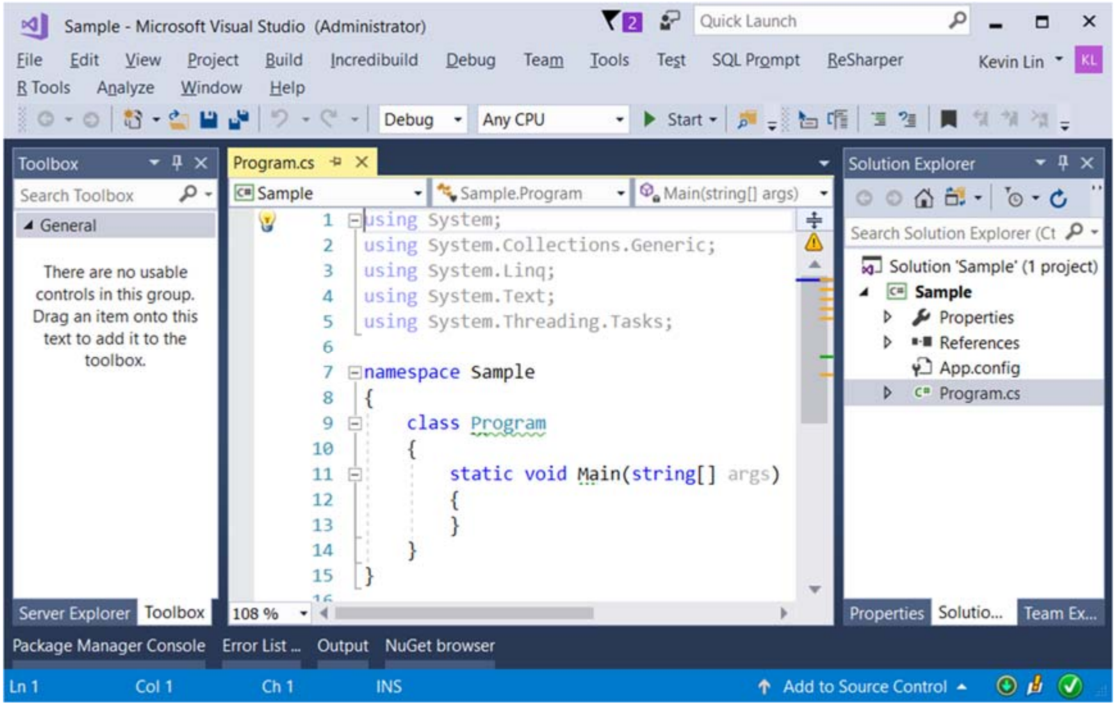
Name: Sample

Location: d:\0_mydocument\documents\visual studio 2017\Projects

Solution name: Sample

☑ Create directory for solution

□ Create new Git repository


Sample - Microsoft Visual Studio (Administrator)
Quick Launch
File Edit View Project Build Incredibuild Debug Team Tools Test SQL Prompt ReSharper Kevin Lin
R Tools Analyze Window Help
Debug
Any CPU
Start
Toolbox
Search Toolbox
General
There are no usable controls in this group. Drag an item onto this text to add it to the toolbox.
Program.cs
Sample
Sample.Program
Main(string[] args)
Solution Explorer
Search Solution Explorer (Ct
Solution 'Sample' (1 project)
Sample
Properties
References
App.config
Program.cs
Server Explorer Toolbox
108 %
Properties Solutio... Team Ex...
Package Manager Console Error List ... Output NuGet browser
Ln 1 Col 1 Ch 1 INS
Add to Source Control

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;

namespace Sample
{
    class Program
    {
        static void Main(string[] args)
        {
        }
    }
}
```

==

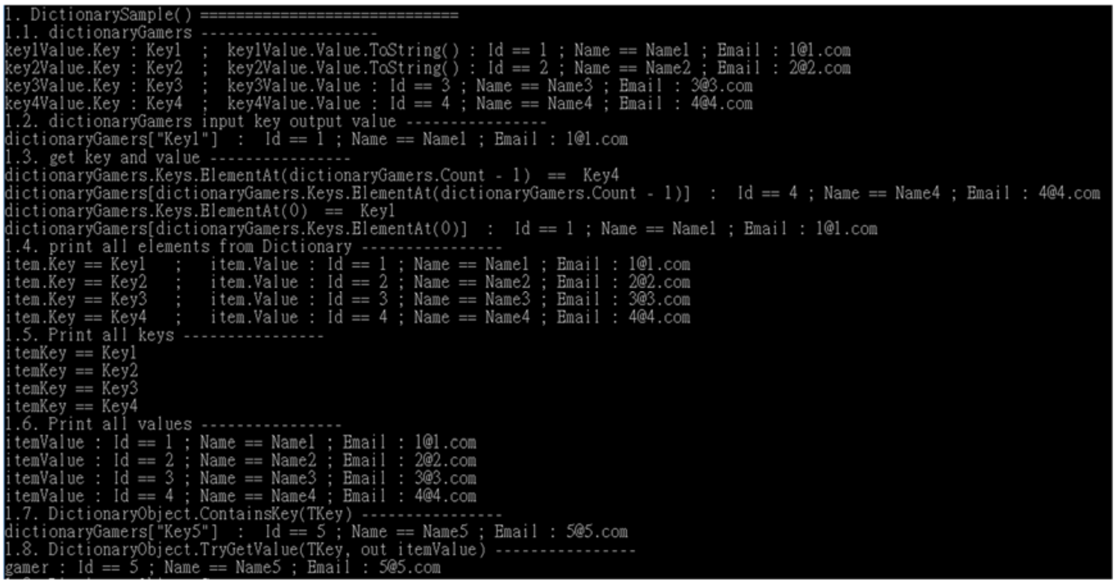
2. Sample : Program.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using OnLineGame;
namespace Sample
{
    class Program
     {
        static void Main(string[] args)
         {
            // 1. ----------------------------------------------------
    Console.WriteLine("1. DictionarySample() =============================");
    DictionarySample();
    Console.ReadLine();
}
// 1. ---------------------------------------------
static void DictionarySample()
{
    // 1.0. ---------------------------------------------
    //Create Dictionary<TKey, TValue>
    //A Dictionary<TKey, TValue> is a collection of KeyValuePair<TKey, TValue>
    //and from System.Collections.Generic namespace.
    //TKey must be unique so using Tkey can get its pair TValue quickly.
    //In this case, TKey is string type, TValue is Gamer Type.
    Dictionary<string, Gamer> dictionaryGamers = new Dictionary<string, Gamer>
    {
        {"Key1", new Gamer {Id = 1, Name = "Name1", Email = "1@1.com"}},
        {"Key2", new Gamer {Id = 2, Name = "Name2", Email = "2@2.com"}}
    };
    dictionaryGamers.Add("Key3", new Gamer { Id = 3, Name = "Name3", Email = "3@3.com" });
    dictionaryGamers.Add("Key4", new Gamer { Id = 4, Name = "Name4", Email = "4@4.com" });
    // 1.1. ---------------------------------------------
    //print key and value
    Console.WriteLine("1.1. dictionaryGamers --------------------");
    KeyValuePair<string, Gamer> key1Value =
        dictionaryGamers.FirstOrDefault(g => g.Key == "Key1");
    Gamer gamer1 = dictionaryGamers.FirstOrDefault(g => g.Key == "Key1").Value;
    KeyValuePair<string, Gamer> key2Value =
        dictionaryGamers.FirstOrDefault(x => x.Key == "Key2");
    KeyValuePair<string, Gamer> key3Value =
        dictionaryGamers.FirstOrDefault(x => x.Key == "Key3");
    KeyValuePair<string, Gamer> key4Value =
        dictionaryGamers.FirstOrDefault(x => x.Key == "Key4");
    Console.WriteLine($"key1Value.Key : {key1Value.Key}  ;  " +
                      $"key1Value.Value.ToString() : {key1Value.Value.ToString()}");
    Console.WriteLine($"key2Value.Key : {key2Value.Key}  ;  " +
                      $"key2Value.Value.ToString() : {key2Value.Value.ToString()}");
    Console.WriteLine($"key3Value.Key : {key3Value.Key}  ;  " +
                      $"key3Value.Value : {key3Value.Value}");
    Console.WriteLine($"key4Value.Key : {key4Value.Key}  ;  " +
                      $"key4Value.Value : {key4Value.Value}");
    //1.1.dictionaryGamers--------------------
    //key1Value.Key : Key1; key1Value.Value.ToString() : Id == 1; Name == Name1; Email: 1@1.com
    //key2Value.Key : Key2; key2Value.Value.ToString() : Id == 2; Name == Name2; Email: 2@2.com
    //key3Value.Key : Key3; key3Value.Value : Id == 3; Name == Name3; Email: 3@3.com
    //key4Value.Key : Key4; key4Value.Value : Id == 4; Name == Name4; Email: 4@4.com
    // 1.2. ---------------------------------------------
    //ObjectDictionary[TKey] == TValue
    Console.WriteLine("1.2. dictionaryGamers input key output value ----------------");
    Gamer key1Gamer = dictionaryGamers["Key1"];
    Console.WriteLine("dictionaryGamers[\"Key1\"]  :  {0}", key1Gamer);
    //1.2. dictionaryGamers input key output value ----------------
    //dictionaryGamers["Key1"]  :  Id == 1; Name == Name1; Email: 1@1.com
```

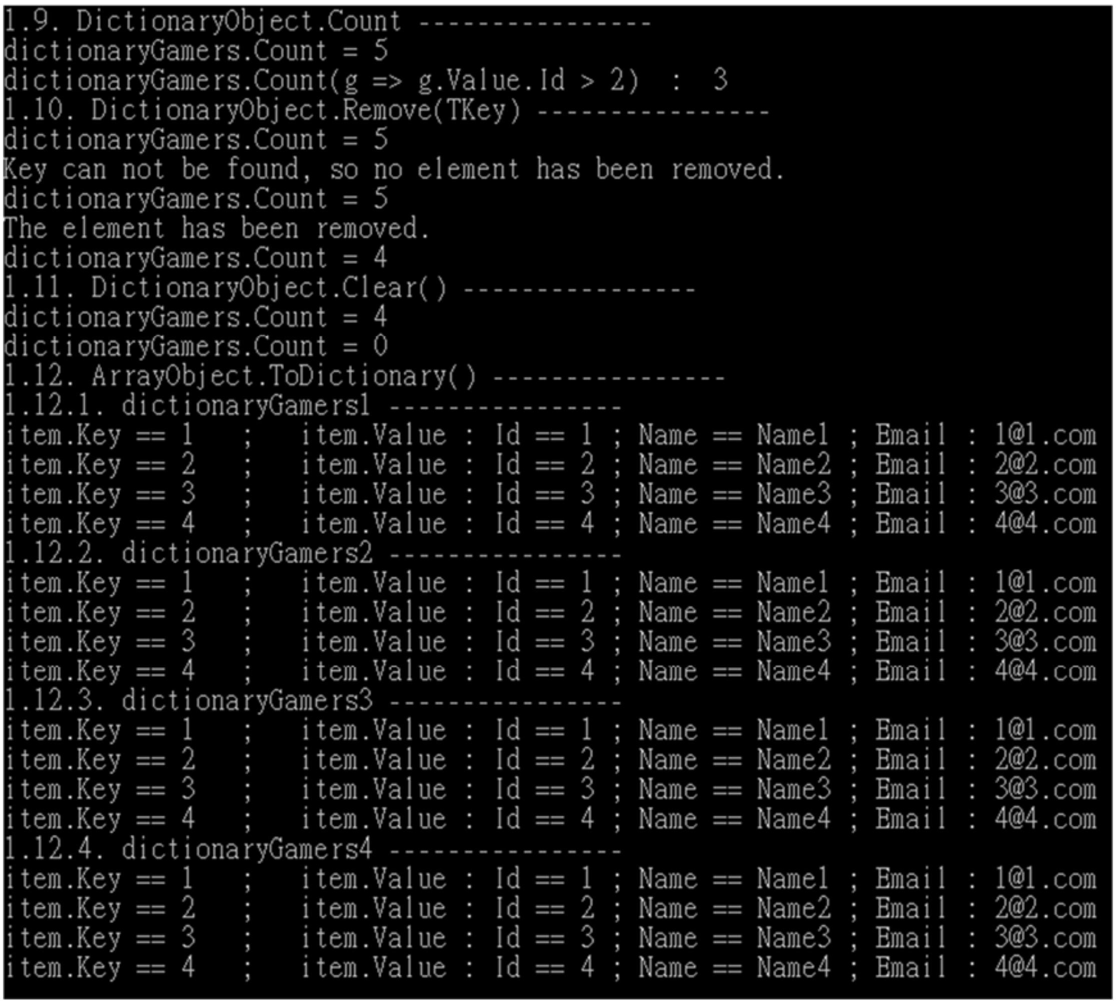
```
          // 1.3. ------------------------------------------------
            //TKey keyItem = ObjectDictionary.Keys.ElementAt(intIndex);
            //TValue valueItem = ObjectDictionary[ObjectDictionary.Keys.ElementAt(intIndex)];
            Console.WriteLine("1.3. get key and value ----------------");
            string lastItem = dictionaryGamers.Keys.ElementAt(dictionaryGamers.Count - 1);
            Console.WriteLine($"dictionaryGamers.Keys.ElementAt(dictionaryGamers.Count -
1)  ==  {lastItem}");  // Key, "Key4"
            Console.WriteLine($"dictionaryGamers[dictionaryGamers.Keys.ElementAt(dictionaryGamers.Count -
1)]  :  " +
                              $"{dictionaryGamers[lastItem]}");
            // Value, (Id == 4 ; Name == Name04 ; Email : 4@4.com)
            //1.3. get key and value ----------------
            //dictionaryGamers.Keys.ElementAt(dictionaryGamers.Count - 1)  ==  Key4
            //dictionaryGamers[dictionaryGamers.Keys.ElementAt(dictionaryGamers.Count - 1)]  :  Id == 4 ;
Name == Name4 ; Email : 4@4.com
            string fitstItem = dictionaryGamers.Keys.ElementAt(0);
            Console.WriteLine($"dictionaryGamers.Keys.ElementAt(0)  ==  {fitstItem}");  // Key, "Key1"
            Console.WriteLine($"dictionaryGamers[dictionaryGamers.Keys.ElementAt(0)]  :  " +
                              $"{dictionaryGamers[fitstItem]}");   // Value, (Id == 1 ; Name == Name01 ;
Email : 1@1.com)
            //dictionaryGamers.Keys.ElementAt(0)  ==  Key1
            //dictionaryGamers[dictionaryGamers.Keys.ElementAt(0)]  :  Id == 1 ; Name == Name1 ;
Email : 1@1.com
            // 1.4. ------------------------------------------------
            //Print all elements from Dictionary
            Console.WriteLine("1.4. print all elements from Dictionary ----------------");
            foreach (KeyValuePair<string, Gamer> item in dictionaryGamers)
            {
                Console.WriteLine($"item.Key == {item.Key}   ;   item.Value : {item.Value}");
            }
            //1.4.print all elements from Dictionary ----------------
            //item.Key == Key1   ; item.Value : Id == 1; Name == Name1; Email: 1@1.com
            //item.Key == Key2   ; item.Value : Id == 2; Name == Name2; Email: 2@2.com
            //item.Key == Key3   ; item.Value : Id == 3; Name == Name3; Email: 3@3.com
            //item.Key == Key4   ; item.Value : Id == 4; Name == Name4; Email: 4@4.com
            // 1.5. ------------------------------------------------
            //Print all keys
            Console.WriteLine("1.5. Print all keys ----------------");
            foreach (string itemKey in dictionaryGamers.Keys)
            {
                Console.WriteLine($"itemKey == {itemKey}");
            }
            //1.5.Print all keys ----------------
            //itemKey == Key1
            //itemKey == Key2
            //itemKey == Key3
            //itemKey == Key4


           // 1.6. ------------------------------------------------
            //Print all Values
            Console.WriteLine("1.6. Print all values ----------------");
            foreach (Gamer itemValue in dictionaryGamers.Values)
            {
                Console.WriteLine($"itemValue : {itemValue}");
            }
            //1.6.Print all values ----------------
            //itemValue : Id == 1; Name == Name1; Email: 1@1.com
            //itemValue : Id == 2; Name == Name2; Email: 2@2.com
            //itemValue : Id == 3; Name == Name3; Email: 3@3.com
            //itemValue : Id == 4; Name == Name4; Email: 4@4.com
            // 1.7. ------------------------------------------------
            //DictionaryObject.ContainsKey(TKey)
            //TKey must be unique,
            //so better to check if the TKey is already existed before adding new item.
            Console.WriteLine("1.7. DictionaryObject.ContainsKey(TKey) ----------------");
            if (!dictionaryGamers.ContainsKey("Key5"))
            {
                dictionaryGamers.Add("Key5", new Gamer
                {
                    Id = 5,
                    Name = "Name5",
                    Email = "5@5.com"
                });
            }
            // if the key does not exist, then throw KeyNotFoundException.
            Console.WriteLine(
                dictionaryGamers.ContainsKey("Key5") ?
                $"dictionaryGamers[\"Key5\"]  :  {dictionaryGamers["Key5"]}" :
                "Key does not exist in the dictionary");
            //1.7.DictionaryObject.ContainsKey(TKey)----------------
            //dictionaryGamers["Key5"]  :  Id == 5; Name == Name5; Email: 5@5.com
            // 1.8. ------------------------------------------------
            //DictionaryObject.TryGetValue(TKey, out itemValue)
            //TryGetValue() will try to get the value from the dictionary.
            //return false if it fails.
            ////E.g.
            ////TValue itemValue;
            ////bool getValueByKey = DictionaryObject.TryGetValue(TKey, out itemValue);
            Console.WriteLine("1.8. DictionaryObject.TryGetValue(TKey, out itemValue) ----------------");
            Gamer gamer;
            Console.WriteLine(
                dictionaryGamers.TryGetValue("Key5", out gamer) ?
                $"gamer : {gamer}" :
                "Value is not found by the key");
            //1.8.DictionaryObject.TryGetValue(TKey, out itemValue)----------------
            //gamer: Id == 5; Name == Name5; Email: 5@5.com


           // 1.9. ------------------------------------------------
            //DictionaryObject.Count  return the number of item in the DictionaryObject.
            Console.WriteLine("1.9. DictionaryObject.Count ----------------");
            Console.WriteLine($"dictionaryGamers.Count = {dictionaryGamers.Count}");
            // using LINQ extension methods to find Id > 2
            Console.WriteLine($"dictionaryGamers.Count(g => g.Value.Id > 2)  :  {dictionaryGamers.Count(g
=> g.Value.Id > 2)}");
            //1.9.DictionaryObject.Count----------------
            //dictionaryGamers.Count = 5
```

```
//dictionaryGamers.Count(g => g.Value.Id > 2)  :  3
// 1.10. -----------------------------------------------
//DictionaryObject.Remove(TKey) will remove the element with TKey
//return false if it fails.
Console.WriteLine("1.10. DictionaryObject.Remove(TKey) ----------------");
Console.WriteLine($"dictionaryGamers.Count = {dictionaryGamers.Count}");
Console.WriteLine(dictionaryGamers.Remove("Key") ?
    "The element has been removed." :
    "Key can not be found, so no element has been removed.");
Console.WriteLine($"dictionaryGamers.Count = {dictionaryGamers.Count}");
Console.WriteLine(dictionaryGamers.Remove("Key5") ?
    "The element has been removed." :
    "Key can not be found, so no element has been removed.");
Console.WriteLine($"dictionaryGamers.Count = {dictionaryGamers.Count}");
//1.10.DictionaryObject.Remove(TKey)----------------
//dictionaryGamers.Count = 5
//Key can not be found, so no element has been removed.
//dictionaryGamers.Count = 5
//The element has been removed.
//dictionaryGamers.Count = 4
// 1.11. -----------------------------------------------
// DictionaryObject.Clear() remove all elements from the Dictionary.
Console.WriteLine("1.11. DictionaryObject.Clear() ----------------");
Console.WriteLine($"dictionaryGamers.Count = {dictionaryGamers.Count}");
dictionaryGamers.Clear();
Console.WriteLine($"dictionaryGamers.Count = {dictionaryGamers.Count}");


// 1.12. -----------------------------------------------
// ArrayObject.ToDictionary() will convert array to dictionary.
Console.WriteLine("1.12. ArrayObject.ToDictionary() ----------------");
Gamer[] customersArr = {
    new Gamer {Id = 1, Name = "Name1", Email = "1@1.com"},
    new Gamer {Id = 2, Name = "Name2", Email = "2@2.com"},
    new Gamer {Id = 3, Name = "Name3", Email = "3@3.com" },
    new Gamer {Id = 4, Name = "Name4", Email = "4@4.com" }
};
Console.WriteLine("1.12.1. dictionaryGamers1 ----------------");
//ArrayObject.ToDictionary() will convert array to dictionary.
//In this case, Key is Id, Value is Gamer Object.
Dictionary<int, Gamer> dictionaryGamers1 =
     customersArr.ToDictionary(gamerItem => gamerItem.Id, gamerItem => gamerItem);
foreach (KeyValuePair<int, Gamer> item in dictionaryGamers1)
{
    Console.WriteLine($"item.Key == {item.Key}   ;   item.Value : {item.Value}");
}
//1.12.1.dictionaryGamers1----------------
//item.Key == 1; item.Value : Id == 1; Name == Name1; Email: 1@1.com
//item.Key == 2; item.Value : Id == 2; Name == Name2; Email: 2@2.com
//item.Key == 3; item.Value : Id == 3; Name == Name3; Email: 3@3.com
//item.Key == 4; item.Value : Id == 4; Name == Name4; Email: 4@4.com
Console.WriteLine("1.12.2. dictionaryGamers2 ----------------");
//ArrayObject.ToDictionary() will convert array to dictionary.
//In this case, Key is Id, Value is Gamer Object.
```

```
            Dictionary<int, Gamer> dictionaryGamers2 =
                customersArr.ToDictionary(gamerItem => gamerItem.Id);
            foreach (KeyValuePair<int, Gamer> item in dictionaryGamers1)
            {
                Console.WriteLine($"item.Key == {item.Key}   ;   item.Value : {item.Value}");
            }
            //1.12.2.dictionaryGamers2----------------
            //item.Key == 1; item.Value : Id == 1; Name == Name1; Email: 1@1.com
            //item.Key == 2; item.Value : Id == 2; Name == Name2; Email: 2@2.com
            //item.Key == 3; item.Value : Id == 3; Name == Name3; Email: 3@3.com
            //item.Key == 4; item.Value : Id == 4; Name == Name4; Email: 4@4.com
            Console.WriteLine("1.12.3. dictionaryGamers3 ----------------");
            //In this case, Key is Id, Value is Gamer Object.
            Dictionary<int, Gamer> dictionaryGamers3 = new Dictionary<int, Gamer>();
            foreach (Gamer gamerItem in customersArr)
            {
                dictionaryGamers3.Add(gamerItem.Id, gamerItem);
            }
            foreach (KeyValuePair<int, Gamer> item in dictionaryGamers1)
            {
                Console.WriteLine($"item.Key == {item.Key}   ;   item.Value : {item.Value}");
            }
            //1.12.3.dictionaryGamers3----------------
            //item.Key == 1; item.Value : Id == 1; Name == Name1; Email: 1@1.com
            //item.Key == 2; item.Value : Id == 2; Name == Name2; Email: 2@2.com
            //item.Key == 3; item.Value : Id == 3; Name == Name3; Email: 3@3.com
            //item.Key == 4; item.Value : Id == 4; Name == Name4; Email: 4@4.com
            Console.WriteLine("1.12.4. dictionaryGamers4 ----------------");
            //In this case, Key is Id, Value is Gamer Object.
            Dictionary<int, Gamer> dictionaryGamers4 = new Dictionary<int, Gamer>();
            for (int index = 0; index < customersArr.Length; index++)
            {
                Gamer gamerItem = customersArr[index];
                dictionaryGamers4.Add(gamerItem.Id, gamerItem);
            }
            foreach (KeyValuePair<int, Gamer> item in dictionaryGamers1)
            {
                Console.WriteLine($"item.Key == {item.Key}   ;   item.Value : {item.Value}");
            }
            //1.12.4.dictionaryGamers4----------------
            //item.Key == 1; item.Value : Id == 1; Name == Name1; Email: 1@1.com
            //item.Key == 2; item.Value : Id == 2; Name == Name2; Email: 2@2.com
            //item.Key == 3; item.Value : Id == 3; Name == Name3; Email: 3@3.com
            //item.Key == 4; item.Value : Id == 4; Name == Name4; Email: 4@4.com
        }
    }
}
namespace OnLineGame
{
    // 1. ---------------------------------------------
    public class Gamer
    {
        public int Id { get; set; }
        public string Name { get; set; }
        public string Email { get; set; }
        public override string ToString()
        {
            return $"Id == {Id} ; Name == {Name} ; Email : {Email}";
        }
    }
}
```



```
1. DictionarySample() ==============================
1.1. dictionaryGamers -------------------
key1Value.Key : Key1  ;  key1Value.Value.ToString() : Id == 1 ; Name == Name1 ; Email : 1@1.com
key2Value.Key : Key2  ;  key2Value.Value.ToString() : Id == 2 ; Name == Name2 ; Email : 2@2.com
key3Value.Key : Key3  ;  key3Value.Value : Id == 3 ; Name == Name3 ; Email : 3@3.com
key4Value.Key : Key4  ;  key4Value.Value : Id == 4 ; Name == Name4 ; Email : 4@4.com
1.2. dictionaryGamers input key output value ----------------
dictionaryGamers["Key1"]  :  Id == 1 ; Name == Name1 ; Email : 1@1.com
1.3. get key and value ----------------
dictionaryGamers.Keys.ElementAt(dictionaryGamers.Count - 1)  ==  Key4
dictionaryGamers[dictionaryGamers.Keys.ElementAt(dictionaryGamers.Count - 1)]  :  Id == 4 ; Name == Name4 ; Email : 4@4.com
dictionaryGamers.Keys.ElementAt(0)  ==  Key1
dictionaryGamers[dictionaryGamers.Keys.ElementAt(0)]  :  Id == 1 ; Name == Name1 ; Email : 1@1.com
1.4. print all elements from Dictionary ----------------
item.Key == Key1   ;   item.Value : Id == 1 ; Name == Name1 ; Email : 1@1.com
item.Key == Key2   ;   item.Value : Id == 2 ; Name == Name2 ; Email : 2@2.com
item.Key == Key3   ;   item.Value : Id == 3 ; Name == Name3 ; Email : 3@3.com
item.Key == Key4   ;   item.Value : Id == 4 ; Name == Name4 ; Email : 4@4.com
1.5. Print all keys ----------------
itemKey == Key1
itemKey == Key2
itemKey == Key3
itemKey == Key4
1.6. Print all values ----------------
itemValue : Id == 1 ; Name == Name1 ; Email : 1@1.com
itemValue : Id == 2 ; Name == Name2 ; Email : 2@2.com
itemValue : Id == 3 ; Name == Name3 ; Email : 3@3.com
itemValue : Id == 4 ; Name == Name4 ; Email : 4@4.com
1.7. DictionaryObject.ContainsKey(TKey) ----------------
dictionaryGamers["Key5"]  :  Id == 5 ; Name == Name5 ; Email : 5@5.com
1.8. DictionaryObject.TryGetValue(TKey, out itemValue) ----------------
gamer : Id == 5 ; Name == Name5 ; Email : 5@5.com
```



```
1.9. DictionaryObject.Count ----------------
dictionaryGamers.Count = 5
dictionaryGamers.Count(g => g.Value.Id > 2)  :  3
1.10. DictionaryObject.Remove(TKey) ----------------
dictionaryGamers.Count = 5
Key can not be found, so no element has been removed.
dictionaryGamers.Count = 5
The element has been removed.
dictionaryGamers.Count = 4
1.11. DictionaryObject.Clear() ----------------
dictionaryGamers.Count = 4
dictionaryGamers.Count = 0
1.12. ArrayObject.ToDictionary() ----------------
1.12.1. dictionaryGamers1 ----------------
item.Key == 1   ;   item.Value : Id == 1 ; Name == Name1 ; Email : 1@1.com
item.Key == 2   ;   item.Value : Id == 2 ; Name == Name2 ; Email : 2@2.com
item.Key == 3   ;   item.Value : Id == 3 ; Name == Name3 ; Email : 3@3.com
item.Key == 4   ;   item.Value : Id == 4 ; Name == Name4 ; Email : 4@4.com
1.12.2. dictionaryGamers2 ----------------
item.Key == 1   ;   item.Value : Id == 1 ; Name == Name1 ; Email : 1@1.com
item.Key == 2   ;   item.Value : Id == 2 ; Name == Name2 ; Email : 2@2.com
item.Key == 3   ;   item.Value : Id == 3 ; Name == Name3 ; Email : 3@3.com
item.Key == 4   ;   item.Value : Id == 4 ; Name == Name4 ; Email : 4@4.com
1.12.3. dictionaryGamers3 ----------------
item.Key == 1   ;   item.Value : Id == 1 ; Name == Name1 ; Email : 1@1.com
item.Key == 2   ;   item.Value : Id == 2 ; Name == Name2 ; Email : 2@2.com
item.Key == 3   ;   item.Value : Id == 3 ; Name == Name3 ; Email : 3@3.com
item.Key == 4   ;   item.Value : Id == 4 ; Name == Name4 ; Email : 4@4.com
1.12.4. dictionaryGamers4 ----------------
item.Key == 1   ;   item.Value : Id == 1 ; Name == Name1 ; Email : 1@1.com
item.Key == 2   ;   item.Value : Id == 2 ; Name == Name2 ; Email : 2@2.com
item.Key == 3   ;   item.Value : Id == 3 ; Name == Name3 ; Email : 3@3.com
item.Key == 4   ;   item.Value : Id == 4 ; Name == Name4 ; Email : 4@4.com
```