(T23)討論 LinqToXml 的 CRUD(Create、Read、Update、Delete)
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0. Summary

* XML and Reflection。
  * 通常軟體 會把 使用者的設定，儲存在 XML，
XML 通常會包括要讀取的 DLL 名稱，要使用的 class 名稱，要使用的 property 名稱...etc，
然後軟體讀取 XML 裡面的設定，使用 Reflection 將 XML 裡面的字串，
動態讀取 DLL 並且動態去執行一些 method。
  * 要做到這點，首先你必須要對 Linq to XML 非常的了解，
T023_LinqToXml_LinqQueryLet_CreateXml_QueryXml_XmlAdd_XmlUpdate_XmlRemove，
這個 tutorial 是討論 要如何 使用 C#產生 XML，
並且要如何使用 linq 語法 query XML 或是 update/delete/insert xml element
  * T024_XmlToXml_XmlToHtml_XmlToCsv，
這個 tutorial 更絕了，假設某客戶給你一個 XML，
你要如何轉成你公司使用的格式呢?該 tutorial 討論了如何用 C#的 linq to xml，
把 XML 轉成 CSV，或是轉成 HTML 或是轉成另一個格式的 XML。
  * T025_XMLValidation_XSD，這個 tutorial 也很猛，
假設你客戶要求你給他 XML，在上一個 tutoral 你已經學會如何 把 XML 轉換成 另一個格式的 XML，
但是你之後想要寫 test code，所以你要驗證你的 XML 的格式有沒有符合客戶要求，
於是你需要客製化 XSD 來規定 XML 的格式。XSD 上面就是一堆 XML 格式定義，
只要 XML 有符合該定義，validation 之後就會 pass。就代表有符合客戶需求的 XML。
  * C# 課程，T014_ReflectionAndLateBinding，
該 tutorial 介紹了 Reflection 的用法，應用方面的話是，通常你的軟體 讀取 XML 裡面的設定，
使用 Reflection 將 XML 裡面的字串，動態讀取 DLL 並且動態去執行一些 method。
  * C# 課程 ，T015_CustomizedAttributesAndReflection，這個 tutorial 討論客製化 attribute，
應用方面是，搭配 Reflection 和 XML 後，可以讓你寫的 code 可以用客製化，

比如說你的 XML 明確規定 指讀取啥啥 attribute 的 class，透過 reflection 動態讀取。

1.
using "Let" keyword can declare xElement variable in linq query and store "Name" value
E.g.

```
//// 3.1. .Descendants(\"Gamer\") ---------------------------------------
//Console.WriteLine("3.1. .Descendants(\"Gamer\") ------------ ");
//IEnumerable<string> names =
//    from gamer in XDocument
//        .Load(@"C:\Xmls\Gamers1.xml")   //load xml
//        .Descendants("Gamer")   // find all "Gamer" Descendants
//    where (int)gamer.Element("Score") > 4900    // filter "Gamer" by "Score".
//    orderby (int)gamer.Element("Score") descending  // descending orderby "Score".
//    let xElement = gamer.Element("Name")    //declare xElement variable in
linq  query and store "Name" value
//    where xElement != null  //string can be null, if "Name" is not null
//    select xElement.Value;  // project to the "Name" value.
//foreach (string name in names)
//{
//    Console.WriteLine(name);
//}
```

==========

1. System.Xml.Linq : Linq to XML

```
<?xml version="1.0" encoding="utf-8" standalone="yes"?>
<!--Linq to XML-->
<Gamers>
  <Gamer Id="1">
    <Name>Name1 ABC</Name>
    <Gender>Male</Gender>
    <Score>5000</Score>
  </Gamer>
  <Gamer Id="2">
    <Name>Name2 ABCDE</Name>
    <Gender>Female</Gender>
    <Score>4500</Score>
  </Gamer>
  <Gamer Id="3">
    <Name>Name3 EFGH</Name>
    <Gender>Male</Gender>
    <Score>6500</Score>
  </Gamer>
  <Gamer Id="4">
    <Name>Name4 HIJKLMN</Name>
    <Gender>Female</Gender>
    <Score>4500</Score>
  </Gamer>
</Gamers>
```

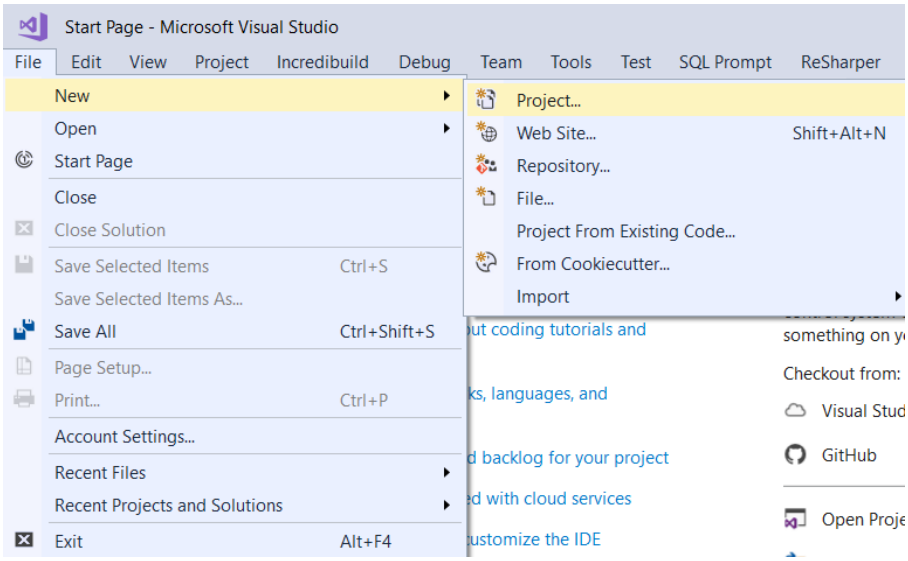
XDeclaration
XComment
XAttribute
XElement

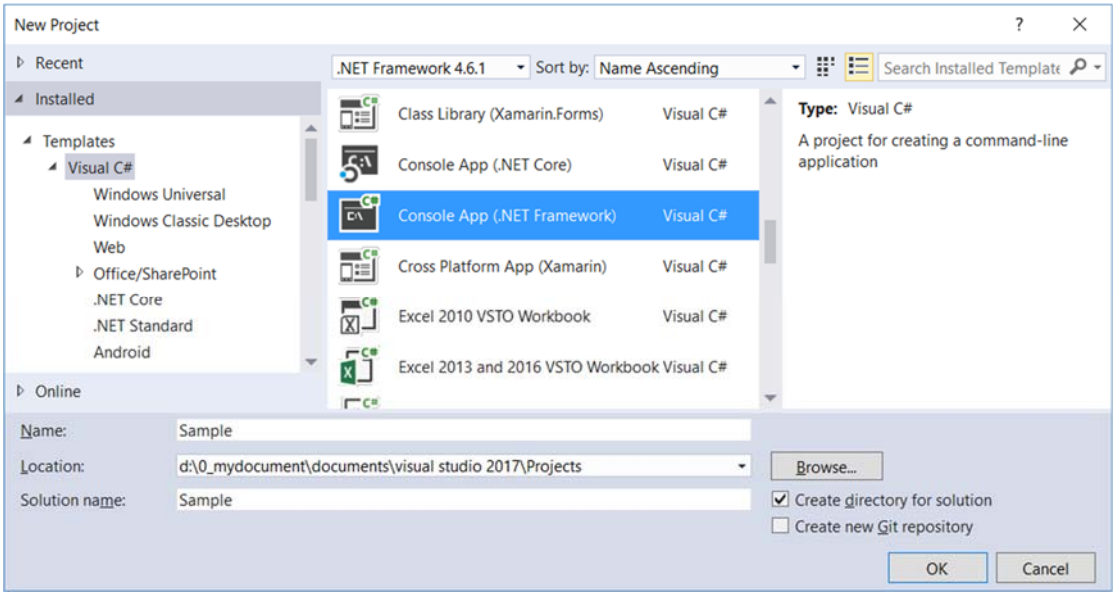
2. Console App

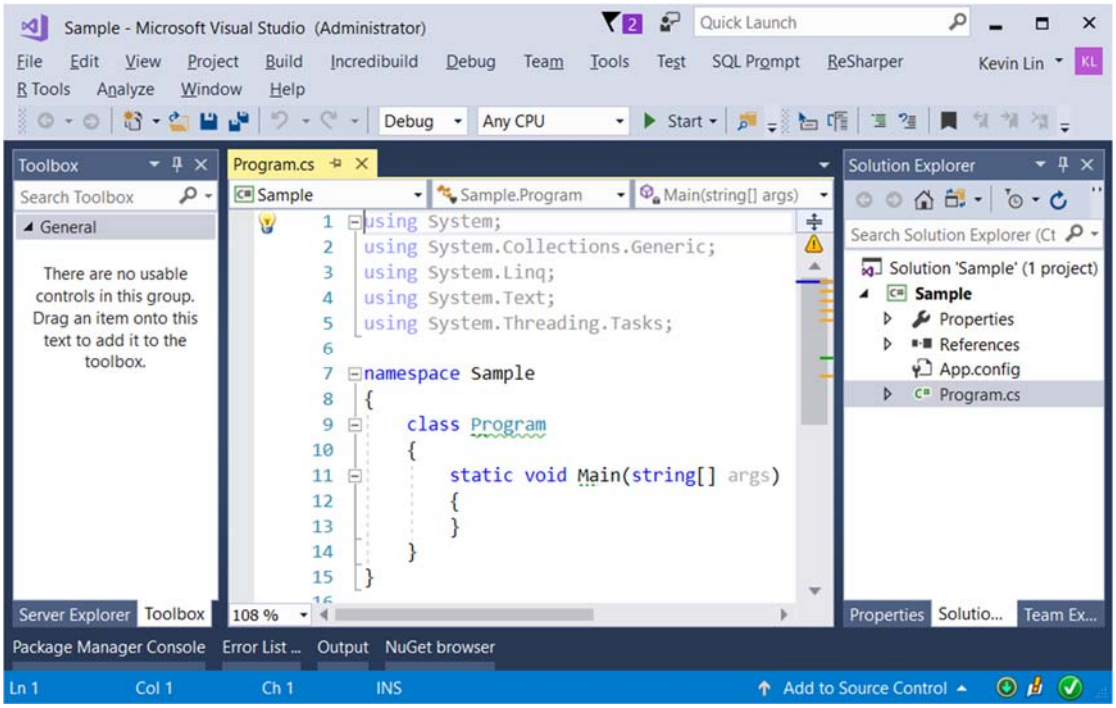
File --> New --> Project... -->

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

Name: **Sample**


Start Page - Microsoft Visual Studio
File Edit View Project Incredibuild Debug Team Tools Test SQL Prompt ReSharper
New
Open
Start Page
Close
Close Solution
Save Selected Items Ctrl+S
Save Selected Items As...
Save All Ctrl+Shift+S
Page Setup...
Print... Ctrl+P
Account Settings...
Recent Files
Recent Projects and Solutions
Exit Alt+F4
Project...
Web Site... Shift+Alt+N
Repository...
File...
Project From Existing Code...
From Cookiecutter...
Import
Checkout from:
Visual Stud
GitHub
Open Proje


New Project
Recent
Installed
Templates
Visual C#
Windows Universal
Windows Classic Desktop
Web
Office/SharePoint
.NET Core
.NET Standard
Android
Online
.NET Framework 4.6.1
Sort by: Name Ascending
Search Installed Template
Class Library (Xamarin.Forms) Visual C#
Console App (.NET Core) Visual C#
Console App (.NET Framework) Visual C#
Cross Platform App (Xamarin) Visual C#
Excel 2010 VSTO Workbook Visual C#
Excel 2013 and 2016 VSTO Workbook Visual C#
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
Browse...
Create directory for solution
Create new Git repository
OK
Cancel



2.1. Program.cs

```
using System;
using System.Collections.Generic;
using System.Linq;
using System.Xml.Linq;
using OnlineGamer;
namespace Sample
{
    internal class Program
    {
        private static void Main(string[] args)
        {
            // 1. ============================
            //CreateXml();
            Console.WriteLine("1. CreateXml() ==================== ");
            CreateXml();
            // 2. ============================
            //CreateXml2();
            Console.WriteLine("2. CreateXml2() ==================== ");
            CreateXml2();
            // 3. ============================
            //QueryXml();
            Console.WriteLine("3. QueryXml() ==================== ");
            QueryXml();
            // 4. ============================
            //XmlInsert();
            Console.WriteLine("4. XmlInsert() ==================== ");
            XmlInsert();
            // 5. ============================
            //XmlUpdate();
            Console.WriteLine("5. XmlUpdate() ==================== ");
            XmlUpdate();
            // 6. ============================
```

```
        //XmlUpdateComment();
        Console.WriteLine("6. XmlUpdateComment() ==================== ");
        XmlUpdateComment();
        // 7. ============================
        //XmlRemoveAllComment();
        Console.WriteLine("7. XmlRemoveAllComment() ==================== ");
        XmlRemoveAllComment();
        // 8. ============================
        //XmlRemove();
        Console.WriteLine("8. XmlRemove() ==================== ");
        XmlRemove();
        // 9. ============================
        //XmlRemoveAll();
        Console.WriteLine("9. XmlRemoveAll() ==================== ");
        XmlRemoveAll();
        Console.ReadLine();
    }


// 1. ============================
    //CreateXml();
    private static void CreateXml()
    {
        var xDocument = new XDocument(
            new XDeclaration("1.0", "utf-8", "yes"),
            new XComment("Linq to XML"),
            new XElement("Gamers",
                new XElement("Gamer", new XAttribute("Id", 1),
                    new XElement("Name", "Name1 ABC"),
                    new XElement("Gender", "Male"),
                    new XElement("Score", 5000)),
                new XElement("Gamer", new XAttribute("Id", 2),
                    new XElement("Name", "Name2 ABCDE"),
                    new XElement("Gender", "Female"),
                    new XElement("Score", 4500)),
                new XElement("Gamer", new XAttribute("Id", 3),
                    new XElement("Name", "Name3 EFGH"),
                    new XElement("Gender", "Male"),
                    new XElement("Score", 6500)),
                new XElement("Gamer", new XAttribute("Id", 4),
                    new XElement("Name", "Name4 HIJKLMN"),
                    new XElement("Gender", "Female"),
                    new XElement("Score", 4500))));
        xDocument.Save(@"C:\Xmls\Gamers1.xml");
    }
    //<?xml version = "1.0" encoding="utf-8" standalone="yes"?>
    //<!--Linq to XML-->
    //<Gamers>
    //  <Gamer Id = "1" >
    //    < Name > Name1 ABC</Name>
    //    <Gender>Male</Gender>
    //    <Score>5000</Score>
    //  </Gamer>
    //  <Gamer Id = "2" >
```

```
//    < Name > Name2 ABCDE</Name>
//    <Gender>Female</Gender>
//    <Score>4500</Score>
//  </Gamer>
//  <Gamer Id = "3" >
//    < Name > Name3 EFGH</Name>
//    <Gender>Male</Gender>
//    <Score>6500</Score>
//  </Gamer>
//  <Gamer Id = "4" >
//    < Name > Name4 HIJKLMN</Name>
//    <Gender>Female</Gender>
//    <Score>4500</Score>
//  </Gamer>
//</Gamer>


// 2. ============================
 //CreateXml2();
 private static void CreateXml2()
 {
     List<Gamer> gamersList = GamerHelper.GetAllGamers();
     var xDocument = new XDocument(
         new XDeclaration("1.0", "utf-8", "yes"),
         new XComment("Linq to XML"),
         new XElement("Gamers",
             from gamer in gamersList
             select new XElement("Gamer", new XAttribute("Id", gamer.Id),
                 new XElement("Name", gamer.Name),
                 new XElement("Gender", gamer.Gender),
                 new XElement("Score", gamer.Score))
          ));
     //SaveOptions.DisableFormatting will disable formatting the XML document
     //The following xml will be stored in one single line.
      xDocument.Save(@"C:\Xmls\Gamers2.xml", SaveOptions.DisableFormatting);
 }
 //<?xml version = "1.0" encoding="utf-8" standalone="yes"?>
 //<!--Linq to XML-->
 //<Gamers>
 //  <Gamer Id = "1" >
 //    < Name > Name1 ABC</Name>
 //    <Gender>Male</Gender>
 //    <Score>5000</Score>
 //  </Gamer>
 //  <Gamer Id = "2" >
 //    < Name > Name2 ABCDE</Name>
 //    <Gender>Female</Gender>
 //    <Score>4500</Score>
 //  </Gamer>
 //  <Gamer Id = "3" >
 //    < Name > Name3 EFGH</Name>
 //    <Gender>Male</Gender>
 //    <Score>6500</Score>
```

```
        //  </Gamer>
        //  <Gamer Id = "4" >
        //    < Name > Name4 HIJKLMN</Name>
        //    <Gender>Female</Gender>
        //    <Score>4500</Score>
        //  </Gamer>
        //</Gamer>



       // 3. ============================
        //QueryXml();
        private static void QueryXml()
        {
            // 3.1. .Descendants(\"Gamer\") ----------------------------------------
            //.Descendants("Gamer") - Can search any element.
            Console.WriteLine("3.1. .Descendants(\"Gamer\") ------------ ");
            IEnumerable<string> names =
                from gamer in XDocument
                     .Load(@"C:\Xmls\Gamers1.xml")   //load xml
                     .Descendants("Gamer")   // find all "Gamer" Descendants
                where (int)gamer.Element("Score") > 4900    // filter "Gamer" by "Score".
                orderby (int)gamer.Element("Score") descending  // descending orderby "Score".
                let xElement = gamer.Element("Name")    //declare xElement variable in linq query and store
"Name" value
                where xElement != null  //string can be null, if "Name" is not null
                select xElement.Value;  // project to the "Name" value.
            foreach (string name in names)
            {
                Console.WriteLine(name);
            }
            //Name3 EFGH
            //Name1 ABC
            // 3.2. .Descendants(\"Gamer\") ----------------------------------------
            //.Elements("Gamers").Elements("Gamer")... - "Elements" can only search from outside to inside
sequentially.
            Console.WriteLine("3.2. .Descendants(\"Gamer\") ------------ ");
            IEnumerable<string> names2 =
                from gamer in XDocument
                     .Load(@"C:\Xmls\Gamers1.xml")   //load xml
                     .Elements("Gamers")   // find all "Gamers" elements
                     .Elements("Gamer")  // find all "Gamer" elements from the "Gamers" element
                where (int)gamer.Element("Score") > 4900    // filter "Gamer" by "Score".
                orderby (int)gamer.Element("Score") descending  // descending orderby "Score".
                let xElement = gamer.Element("Name")    //declare xElement variable and store "Name" value
                where xElement != null  //string can be null, if "Name" is not null
                select xElement.Value;  // project to the "Name" value.
            foreach (string name in names2)
            {
                Console.WriteLine(name);
            }
            //Name3 EFGH
            //Name1 ABC
        }
```

```
// 4. ============================
 //XmlInsert();
 static void XmlInsert()
 {
     // 1,2,3,4
     XDocument xDocument = XDocument.Load(@"C:\Xmls\Gamers1.xml");
     XElement xElement = xDocument.Element("Gamers");
     // 4.1. Add ------------------------------------------
     Console.WriteLine("4.1. Add ---------------------- ");
     //if (xElement != null)
     //    xElement.Add(
     xElement?.Add(
         new XElement("Gamer", new XAttribute("Id", 5),
             new XElement("Name", "Name5 NOP"),
             new XElement("Gender", "Male"),
             new XElement("Score", 3000)
         ));
     xDocument.Save(@"C:\Xmls\Gamers1.xml");
     // 1,2,3,4,5
     // 4.2. AddFirst ------------------------------------------
     Console.WriteLine("4.2. AddFirst ---------------------- ");
     //if (xElement != null)
     //    xElement.AddFirst(
     xElement?.AddFirst(
         new XElement("Gamer", new XAttribute("Id", 6),
             new XElement("Name", "Name6 PQRSTUVW"),
             new XElement("Gender", "Male"),
             new XElement("Score", 4000)
         ));
     xDocument.Save(@"C:\Xmls\Gamers1.xml");
     // 6,1,2,3,4,5
     // 4.3. AddBeforeSelf ------------------------------------------
     Console.WriteLine("4.3. AddBeforeSelf ---------------------- ");
     //XElement xElement = xDocument.Element("Gamers");
     if (xElement != null)
     {
         XElement firstOrDefault = xElement.Elements("Gamer").FirstOrDefault(x =>
         {
             // FirstOrDefault take Func<XElement, bool> predicate as parameter.
             //This anonymous method need to return a bool.
             XAttribute xAttribute = x.Attribute("Id");
             return xAttribute != null && xAttribute.Value == "3"; //it is a string, not int
         });
         //if (firstOrDefault != null)
         //    firstOrDefault.AddBeforeSelf(
         firstOrDefault?.AddBeforeSelf(
             new XElement("Gamer", new XAttribute("Id", 7),
                 new XElement("Name", "Name7 XYZ"),
                 new XElement("Gender", "Male"),
                 new XElement("Score", 4500)));
     }
     xDocument.Save(@"C:\Xmls\Gamers1.xml");
     // 6,1,2,7,3,4,5
     // 4.4. AddAfterSelf ------------------------------------------
```

```
    Console.WriteLine("4.4. AddAfterSelf -------------------- ");
    //XElement xElement = xDocument.Element("Gamers");
    if (xElement != null)
    {
        XElement firstOrDefault = xElement.Elements("Gamer").FirstOrDefault(x =>
        {
            // FirstOrDefault take Func<XElement, bool> predicate as parameter.
            //This anonymous method need to return a bool.
            XAttribute xAttribute = x.Attribute("Id");
            return xAttribute != null && xAttribute.Value == "3"; //it is a string, not int
        });
        //if (firstOrDefault != null)
        //    firstOrDefault.AddAfterSelf(
        firstOrDefault?.AddAfterSelf(
            new XElement("Gamer", new XAttribute("Id", 8),
                new XElement("Name", "Name8 ZABD"),
                new XElement("Gender", "Male"),
                new XElement("Score", 4500)));
    }
    xDocument.Save(@"C:\Xmls\Gamers1.xml");
    // 6,1,2,7,3,8,4,5
}


// 5. ============================
//XmlUpdate();
static void XmlUpdate()
{
    XDocument xDocument = XDocument.Load(@"C:\Xmls\Gamers1.xml");
    XElement xElement = xDocument.Element("Gamers");
    // 5.1. SetElementValue ---------------------------------------------
    Console.WriteLine("5.1. SetElementValue ------------------------- ");
    // if (xElement != null){
    //    XElement firstOrDefault = xElement.Elements("Gamer")....
    XElement firstOrDefault = xElement?.Elements("Gamer")
        .Where(x =>
        {
            XAttribute xAttribute = x.Attribute("Id");
            return xAttribute != null && xAttribute.Value == "5";   //it is a string, not int
        }).FirstOrDefault();
    //if (firstOrDefault != null)
    //    firstOrDefault.SetElementValue("Score", 5555);
    firstOrDefault?.SetElementValue("Score", 5555);
    xDocument.Save(@"C:\Xmls\Gamers1.xml");
    //Get Id==5 Gamer, and update its Score to 5555.
    // 5.2. SetValue ---------------------------------------------
    Console.WriteLine("5.2. SetValue ------------------------- ");
    // if (xElement != null){
    //    XElement firstOrDefault = xElement.Elements("Gamer")....
    XElement firstOrDefault2 = xElement?.Elements("Gamer")
        .Where(x =>
        {
            XAttribute xAttribute = x.Attribute("Id");
            return xAttribute != null && xAttribute.Value == "4";   //it is a string, not int
        })
        .Select(x => x.Element("Score")).FirstOrDefault();
```

```
    //if (firstOrDefault2 != null)
    //    firstOrDefault2?.SetValue(4444);
     firstOrDefault2?.SetValue(4444);
     xDocument.Save(@"C:\Xmls\Gamers1.xml");
    //Get Id==4 Gamer, and update its Score to 4444.
 }
 // 6. ============================
 //XmlUpdateComment();
 static void XmlUpdateComment()
 {
    XDocument xDocument = XDocument.Load(@"C:\Xmls\Gamers1.xml");
    //Update the first comment
    //Nodes() returns the collections of child nodes
    //OfType<XComment> filters the collection and returns only XComment type object.
    XComment firstOrDefault =
        xDocument.Nodes().OfType<XComment>().FirstOrDefault();
    if (firstOrDefault != null)
        firstOrDefault.Value += "_New";
     xDocument.Save(@"C:\Xmls\Gamers1.xml");
 }
 // 7. ============================
 //XmlRemoveAllComment();
 static void XmlRemoveAllComment()
 {
    XDocument xDocument = XDocument.Load(@"C:\Xmls\Gamers1.xml");
    //Remove all xml comments
    //Nodes() returns the collections of child nodes
    //OfType<XComment> filters the collection and returns only XComment type object.
     xDocument.Nodes().OfType<XComment>().Remove();
     xDocument.Save(@"C:\Xmls\Gamers1.xml");
 }


// 8. ============================
 //XmlRemove();
 static void XmlRemove()
 {
    XDocument xDocument = XDocument.Load(@"C:\Xmls\Gamers1.xml");
    //Get the Id==5 Gamer and then remove it.
    //if (xDocument.Root != null)
    //    xDocument.Root.Elements().Where(x =>
     xDocument.Root?.Elements().Where(x =>
     {
        XAttribute xAttribute = x.Attribute("Id");
        return xAttribute != null && xAttribute.Value == "5";   //it is a string, not int
     }).Remove();
     xDocument.Save(@"C:\Xmls\Gamers1.xml");
 }
 // 9. ============================
 //XmlRemoveAll();
 static void XmlRemoveAll()
 {
    XDocument xDocument = XDocument.Load(@"C:\Xmls\Gamers1.xml");
    //Get the all Gamers and then remove them.
    //Remove All elements
    //if (xDocument.Root != null)
    //    xDocument.Root.Elements().Remove();
```

```
            xDocument.Root?.Elements().Remove();
            xDocument.Save(@"C:\Xmls\Gamers1.xml");
        }
    }
}
namespace OnlineGamer
{
    // 2. ============================
    public class Gamer
    {
        public int Id { get; set; }
        public string Name { get; set; }
        public string Gender { get; set; }
        public int Score { get; set; }
        public override string ToString()
        {
            return $"Id=={Id},Name=={Name},Gender=={Gender},Score=={Score}";
        }
    }
    public class GamerHelper
    {
        public static List<Gamer> GetAllGamers()
        {
            return new List<Gamer>
            {
                new Gamer {Id = 1, Name = "Name1 ABC", Gender = "Male", Score = 5000},
                new Gamer {Id = 2, Name = "Name2 ABCDE", Gender = "Female", Score = 4500},
                new Gamer {Id = 3, Name = "Name3 EFGH", Gender = "Male", Score = 6500},
                new Gamer {Id = 4, Name = "Name4 HIJKLMN", Gender = "Female", Score = 4500}
            };
        }
    }
}
```