(T25)討論 LinqToXml 的 Validation，用 Xsd 來驗證 XmlFormat
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(T25)討論 LinqToXml 的 Validation，用 Xsd 來驗證 XmlFormat
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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.
Gamers.xsd
Complex Type
Reference:
https://www.w3schools.com/xml/schema_complex.asp
https://msdn.microsoft.com/en-us/library/system.xml.schema.xmlschemaset(v=vs.110).aspx
1.1.
A complex element is an XML element that contains other elements and/or attributes.
We can define a complex element in an XML Schema two different ways.
1.2.
In this case, Gamer is a complex type.
If you use the method described above.
//`<xsd:element name="Gamers">`
the root element must be "**Gamers**".
The "**Gamers**" contains several "**Gamer**",
and only the "**Gamers**" and "**Gamer**" element can use the specified **complex** type.
1.3.
Note that the child elements, "**Id**", "**Name**", "**Gender**", and "**Score**",
are **surrounded** by the <**sequence**> indicator.
This means that the child elements must appear
in the **same order** as they are declared.
1.4.
//`<xsd:element name="Gamer" minOccurs="2" maxOccurs="4">`
It means "Gamers" must contain at least 2 "Gamer" and
must not contain more than 4 "Gamer" elements.
1.5.
//`<xsd:element name="Id" minOccurs="1" maxOccurs="1"/>`
It means "Gamer" can only contain 1 "Id" element.

2.
Bookstore.xsd
Complex Type
Reference:
https://www.w3schools.com/xml/schema_complex.asp

https://www.w3schools.com/xml/schema_simple_attributes.asp
https://msdn.microsoft.com/en-us/library/system.xml.schema.xmlschemaset(v=vs.110).aspx
2.1.
A complex element is an XML element that contains other elements and/or attributes.
We can define a complex element in an XML Schema two different ways.
2.2.

```
//<xsd:element name="title" type="xsd:string"/>
//<xsd:element name="bookstore" type="bookstoreType"/>
```

XML Schema has a lot of built-in data types. The most common types are:
xs:string, xs:decimal, xs:integer, xs:boolean, xs:date, and xs:time
In addition, you may use self define type.
In this case, self define type is "**bookstoreType**"
2.3.

```
//<xsd:element name="bookstore" type="bookstoreType"/>
...
//<xsd:complexType name="bookstoreType">
//   <xsd:sequence minOccurs="2" maxOccurs="unbounded">
//     <xsd:element name="book"  type="bookType"/>
//   </xsd:sequence>
//</xsd:complexType>
```

In this case, "**bookstore**" is a complex type.
The "**bookstore**" element can have a self define "**type**" attribute
that refers to the **name** of the **complex type**

```
//<xsd:sequence minOccurs="2" maxOccurs="unbounded">
```

Note that the child elements, "**book**"
are **surrounded** by the <**sequence**> indicator.
This means that the child elements must appear
in the **same order** as they are declared.

```
//minOccurs="2" maxOccurs="unbounded"
```

means this "**bookstoreType**" can contain
minim 2 "**book**" elements,
and the maximum number of elements is "**unbounded**"
2.4.

```
//<xsd:element name="book"  type="bookType"/>
...
//<xsd:complexType name="bookType">
//     <xsd:sequence>
//       <xsd:element name="title" type="xsd:string"/>
//       <xsd:element name="author" type="authorName"/>
//       <xsd:element name="price"  type="xsd:decimal"/>
//     </xsd:sequence>
//     <xsd:attribute name="genre" type="xsd:string" use="optional"/>
//     <xsd:attribute name="lang" use="optional">
//       <xsd:simpleType>
//         <xsd:restriction base="xsd:string">
//           <xsd:pattern value="EnglishUK|EnglishUSA"/>
//         </xsd:restriction>
//       </xsd:simpleType>
//     </xsd:attribute>
//</xsd:complexType>
```

In this case, "**bookType**" is a complex type.
The "**bookType**" element can have a self-define "**type**" attribute
that refers to the **name** of the **complex type**

```
//<xsd:sequence>....
```

Note that the child elements, "**title**", "**author**"and "**price**",
are **surrounded** by the <**sequence**> indicator.
This means that the child elements must appear
in the **same order** as they are declared.

```
//<xsd:attribute name="genre" type="xsd:string" use="optional"/>
```

The "**attribute**" is after "**sequence**" and
surrounded by the `<xsd:complexType name="bookType">` indicator.
That means to declare the **bookType** can contain these **attributes**.
In this case, "**genre**" is an attribute of "**bookType**",
and the datatype must be a **string**.
"**optional**" means this attribute is optional.

```
//      <xsd:attribute name="lang" use="optional">
//        <xsd:simpleType>
//          <xsd:restriction base="xsd:string">
//            <xsd:pattern value="EnglishUK|EnglishUSA"/>
//          </xsd:restriction>
//        </xsd:simpleType>
//      </xsd:attribute>
```

In this case, "**lang**" is an attribute of "**bookType**",
and the datatype must be **string**.
In addition, the value must be **EnglishUK** or **EnglishUSA**
"**optional**" means this attribute is optional.

==========

1. XML Schema Definition Language (XSD)

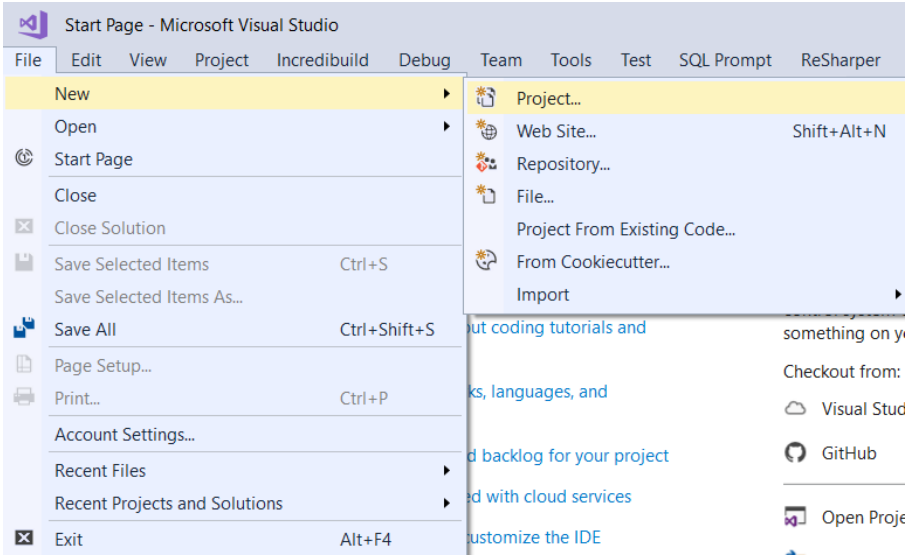
An XSD (XML Schema Definition Language) file defines the structure of the XML file.

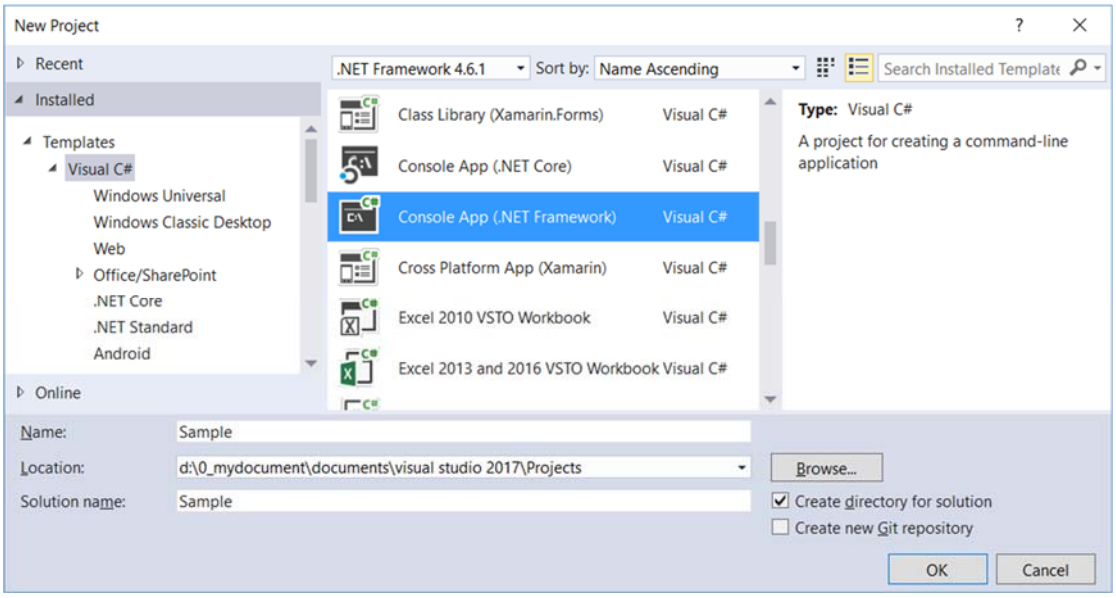
2. Console App

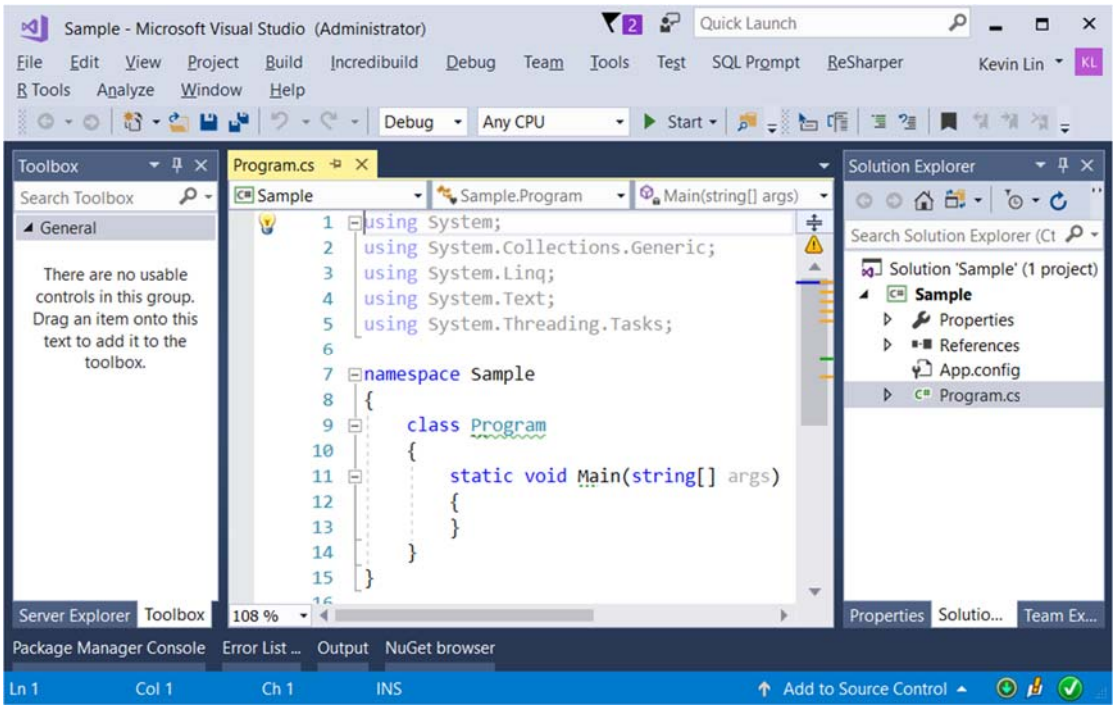
File --> New --> Project... -->

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

Name: **Sample**

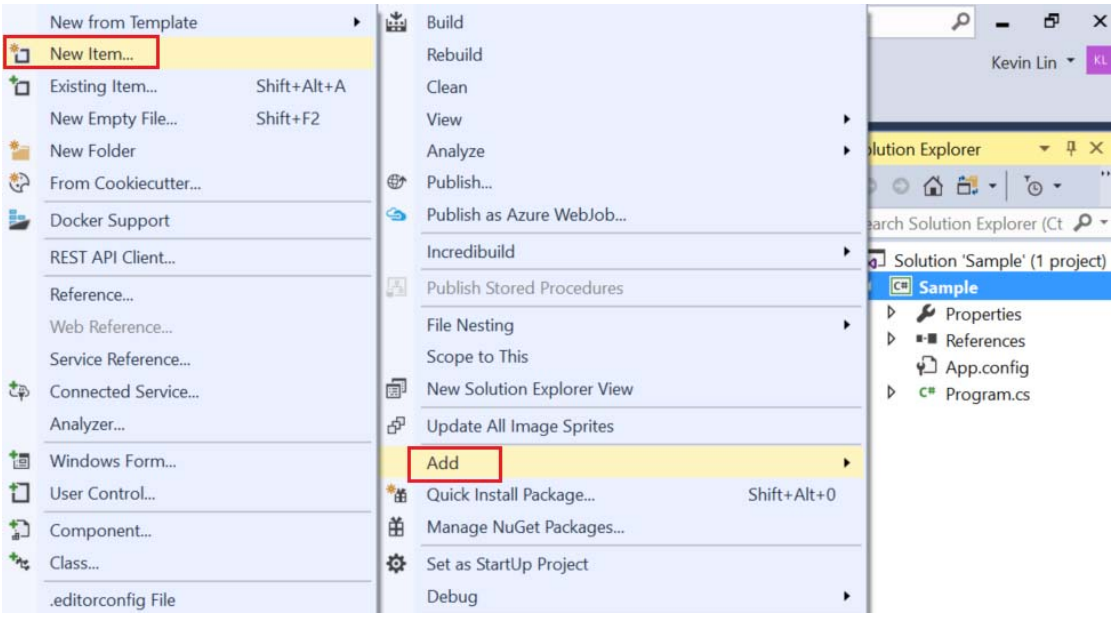

Start Page - Microsoft Visual Studio
File Edit View Project Incredibuild Debug Team Tools Test SQL Prompt ReSharper
New
Open
Start Page
Close
Close Solution
Save Selected Items Ctrl+S
Save Selected Items As...
Save All Ctrl+Shift+S
Page Setup...
Print... Ctrl+P
Account Settings...
Recent Files
Recent 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

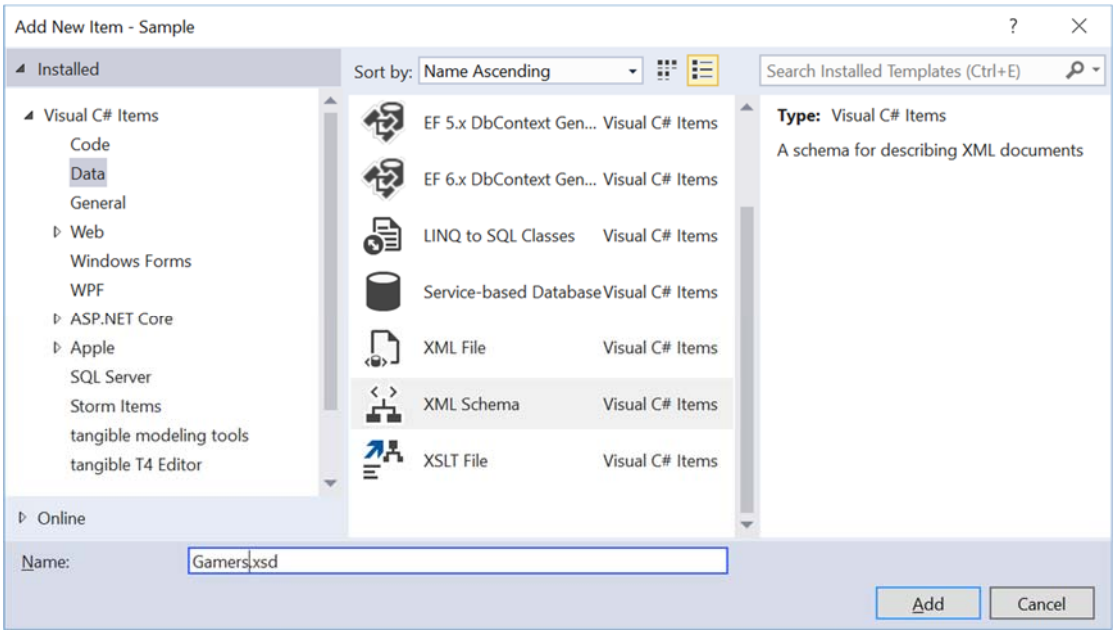

New Project
Recent
Installed
Templates
Visual C#
Windows Universal
Windows Classic Desktop
Web
Office/SharePoint
.NET Core
.NET Standard
Android
Online
.NET Framework 4.6.1
Sort by: Name Ascending
Search Installed Template
Class Library (Xamarin.Forms) Visual C#
Console App (.NET Core) Visual C#
Console 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

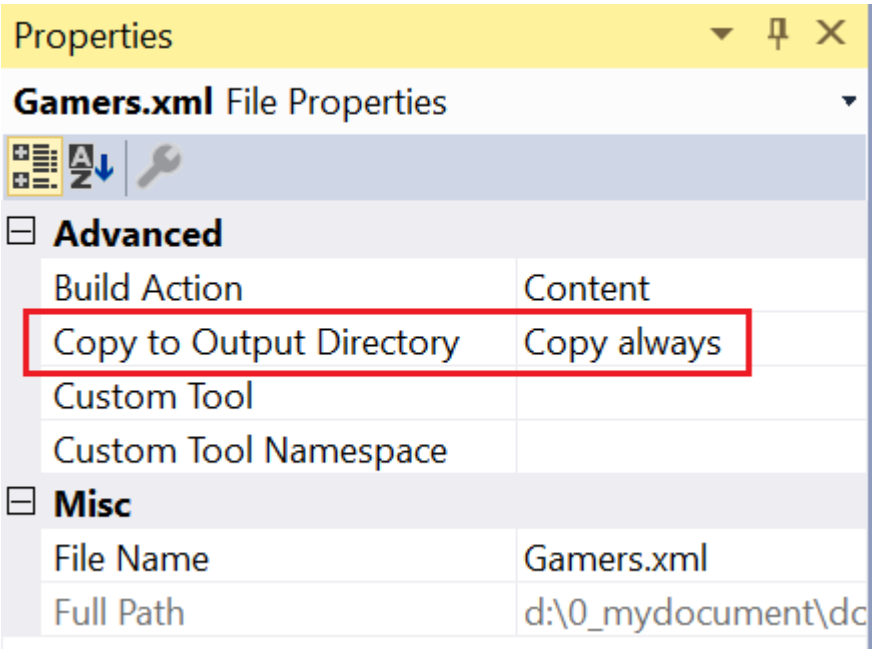

Sample - Microsoft Visual Studio (Administrator)
Quick Launch
File Edit View Project Build Incredibuild Debug Team Tools Test SQL Prompt ReSharper
R Tools Analyze Window Help
Kevin Lin
Debug
Any CPU
Start
Toolbox
Search Toolbox
General
There are no usable controls in this group. Drag an item onto this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

2.1. Gamers XSD

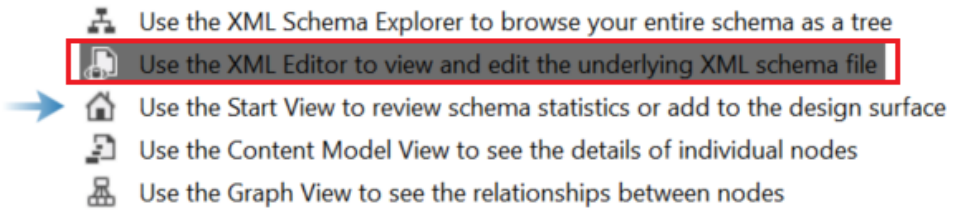
Project Name --> Right Click --> Add --> New Item
--> **Xml Schema**
--> Name:
Gamers.xsd
-->
Use the XML Editor to view and edit the underlying XML schema file
-->
Modify the properties
Copy to Output Directory : Copy Always
it means copy this xml to bin/debug







Visualize nodes in your XML schema set by dragging them from the XML Schema Explorer onto the design surface.



Schema Set Details:

1	Schema Documents	
0	Global Elements	add
0	Global Attributes	add
0	Global Complex Types	add
0	Global Simple Types	add
0	Global Model Groups	add
0	Global Attribute Groups	add
	Likely Root Elements	add

```xml
<?xml version="1.0" encoding="utf-8"?>
<xs:schema id="Sample"
    targetNamespace="http://tempuri.org/Sample.xsd"
    elementFormDefault="qualified"
    xmlns="http://tempuri.org/Sample.xsd"
    xmlns:mstns="http://tempuri.org/Sample.xsd"
    xmlns:xs="http://www.w3.org/2001/XMLSchema"
>
</xs:schema>
```

```xml
<?xml version="1.0" encoding="utf-8"?>
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema">
  <xsd:element name="Gamers">
    <xsd:complexType>
      <xsd:sequence>
        <xsd:element name="Gamer" minOccurs="2" maxOccurs="4">
          <xsd:complexType>
            <xsd:sequence>
              <xsd:element name="Id" minOccurs="1" maxOccurs="1"/>
              <xsd:element name="Name" minOccurs="1" maxOccurs="1"/>
              <xsd:element name="Gender" minOccurs="1" maxOccurs="1"/>
              <xsd:element name="Score" minOccurs="1" maxOccurs="1"/>
            </xsd:sequence>
          </xsd:complexType>
        </xsd:element>
      </xsd:sequence>
    </xsd:complexType>
  </xsd:element>
</xsd:schema>
```

1.
Gamers.xsd
Complex Type
Reference:
https://www.w3schools.com/xml/schema_complex.asp
https://msdn.microsoft.com/en-us/library/system.xml.schema.xmlschemaset(v=vs.110).aspx
1.1.
A complex element is an XML element that contains other elements and/or attributes.
We can define a complex element in an XML Schema two different ways.
1.2.
In this case, Gamer is a complex type.
If you use the method described above.
//`<xsd:element name="Gamers">`
the root element must be "**Gamers**".
The "**Gamers**" contains several "**Gamer**",
and only the "**Gamers**" and "**Gamer**" element can use the specified **complex** type.
1.3.
Note that the child elements, "**Id**", "**Name**", "**Gender**", and "**Score**",
are **surrounded** by the <**sequence**> indicator.
This means that the child elements must appear
in the **same order** as they are declared.

1.4.

//<xsd:element name="Gamer" minOccurs="2" maxOccurs="4">

It means "Gamers" must contain at least 2 "Gamer" and must not contain more than 4 "Gamer" elements.

1.5.

//<xsd:element name="Id" minOccurs="1" maxOccurs="1"/>

It means "Gamer" can only contain 1 "Id" element.

2.2. Gamers XML

2.2.1. Gamers.xml

Project Name --> Right Click --> Add --> New Item

--> **XML File**

--> Name:

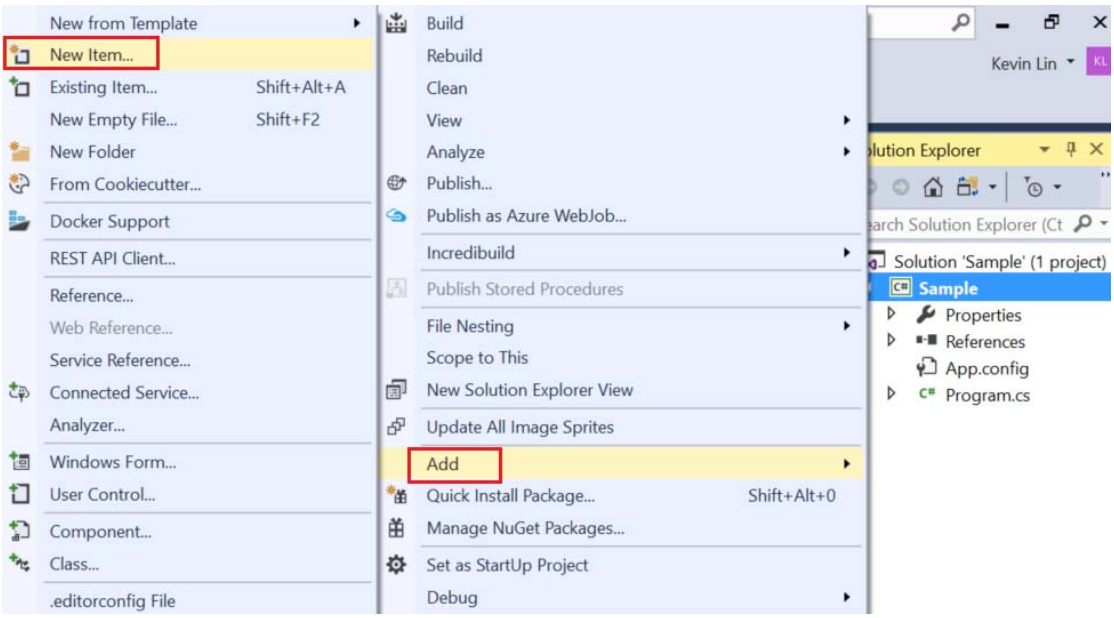
Gamer.xml

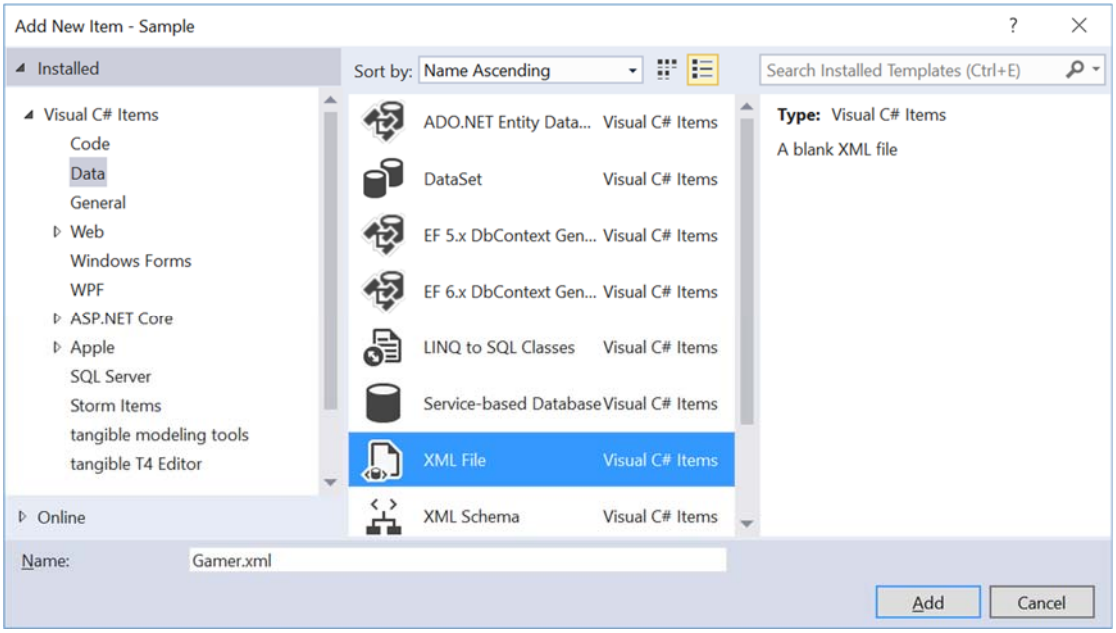
-->

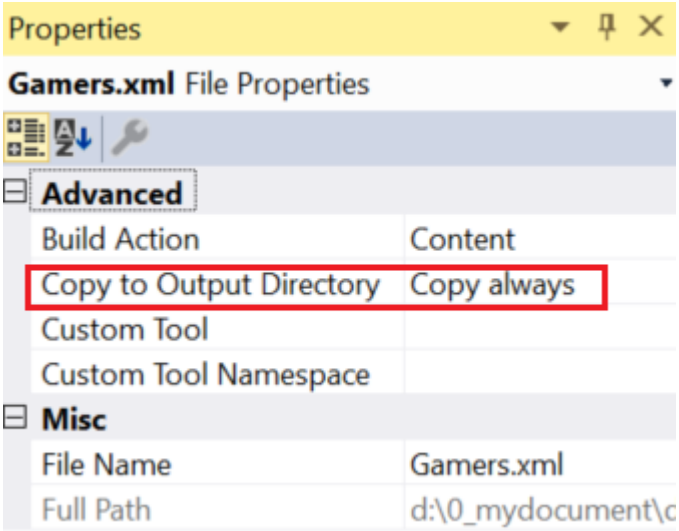
Modify the properties

Copy to Output Directory : Copy Always

it means copy this xml to bin/debug








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

```
</Gamers>
```

2.2.2. Gamers2.xml

More than 4 Gamers

```xml
<?xml version="1.0" encoding="utf-8" ?>
<Gamers>
  <Gamer>
    <Id>1</Id>
    <Name>Name1 ABC</Name>
    <Gender>Male</Gender>
    <Score>5000</Score>
  </Gamer>
  <Gamer>
    <Id>2</Id>
    <Name>Name2 ABCDE</Name>
    <Gender>Female</Gender>
    <Score>4500</Score>
  </Gamer>
  <Gamer>
    <Id>3</Id>
    <Name>Name3 EFGH</Name>
    <Gender>Male</Gender>
    <Score>6500</Score>
  </Gamer>
  <Gamer>
    <Id>4</Id>
    <Name>Name4 HIJKLMN</Name>
    <Gender>Female</Gender>
    <Score>4500</Score>
  </Gamer>
  <Gamer>
    <Id>5</Id>
    <Name>Name5 OPQ</Name>
    <Gender>Male</Gender>
    <Score>6500</Score>
  </Gamer>
</Gamers>
```

2.2.3. Gamers3.xml

Less than 2 Gamers

```xml
<?xml version="1.0" encoding="utf-8" ?>
<Gamers>
  <Gamer>
    <Id>1</Id>
    <Name>Name1 ABC</Name>
    <Gender>Male</Gender>
    <Score>5000</Score>
  </Gamer>
</Gamers>
```

2.2.4. Gamers4.xml

The Score and Id is not in the right position.

```
<?xml version="1.0" encoding="utf-8" ?>
<Gamers>
  <Gamer>
    <Id>1</Id>
    <Name>Name1 ABC</Name>
    <Gender>Male</Gender>
    <Score>5000</Score>
  </Gamer>
  <Gamer>
    <Id>2</Id>
    <Name>Name2 ABCDE</Name>
    <Gender>Female</Gender>
    <Score>4500</Score>
  </Gamer>
  <Gamer>
    <Score>6500</Score>
    <Id>3</Id>
    <Name>Name3 EFGH</Name>
    <Gender>Male</Gender>
  </Gamer>
</Gamers>
```

2.3. BookStore XSD

```
<xsd:schema xmlns:xsd="http://www.w3.org/2001/XMLSchema"
    xmlns="urn:bookstore-schema"
    elementFormDefault="qualified"
    targetNamespace="urn:bookstore-schema">
  <xsd:element name="bookstore" type="bookstoreType"/>
  <xsd:complexType name="bookstoreType">
    <xsd:sequence minOccurs="2" maxOccurs="unbounded">
      <xsd:element name="book"  type="bookType"/>
    </xsd:sequence>
  </xsd:complexType>
  <xsd:complexType name="bookType">
    <xsd:sequence>
      <xsd:element name="title" type="xsd:string"/>
      <xsd:element name="author" type="authorName"/>
      <xsd:element name="price"  type="xsd:decimal"/>
    </xsd:sequence>
    <xsd:attribute name="genre" type="xsd:string" use="optional"/>
    <xsd:attribute name="lang" use="optional">
      <xsd:simpleType>
        <xsd:restriction base="xsd:string">
          <xsd:pattern value="EnglishUK|EnglishUSA"/>
        </xsd:restriction>
      </xsd:simpleType>
    </xsd:attribute>
  </xsd:complexType>
  <xsd:complexType name="authorName">
    <xsd:sequence>
      <xsd:element name="first-name"  type="xsd:string"/>
```

```
      <xsd:element name="last-name" type="xsd:string"/>
    </xsd:sequence>
  </xsd:complexType>
</xsd:schema>
```

2.
Bookstore.xsd
Complex Type
Reference:
https://www.w3schools.com/xml/schema_complex.asp
https://www.w3schools.com/xml/schema_simple_attributes.asp
https://msdn.microsoft.com/en-us/library/system.xml.schema.xmlschemaset(v=vs.110).aspx
2.1.
A complex element is an XML element that contains other elements and/or attributes.
We can define a complex element in an XML Schema two different ways.
2.2.

```
//<xsd:element name="title" type="xsd:string"/>
//<xsd:element name="bookstore" type="bookstoreType"/>
```

XML Schema has a lot of built-in data types. The most common types are:
xs:string, xs:decimal, xs:integer, xs:boolean, xs:date, and xs:time
In addition, you may use self define type.
In this case, self define type is "**bookstoreType**"
2.3.

```
//<xsd:element name="bookstore" type="bookstoreType"/>
...
//<xsd:complexType name="bookstoreType">
//   <xsd:sequence minOccurs="2" maxOccurs="unbounded">
//     <xsd:element name="book"  type="bookType"/>
//   </xsd:sequence>
//</xsd:complexType>
```

In this case, "**bookstore**" is a complex type.
The "**bookstore**" element can have a self define "**type**" attribute
that refers to the **name** of the **complex type**

```
//<xsd:sequence minOccurs="2" maxOccurs="unbounded">
```

Note that the child elements, "**book**"
are **surrounded** by the <**sequence**> indicator.
This means that the child elements must appear
in the **same order** as they are declared.

```
//minOccurs="2" maxOccurs="unbounded"
```

means this "**bookstoreType**" can contain
minim 2 "**book**" elements,
and the maximum number of elements is "**unbounded**"
2.4.

```
//<xsd:element name="book"  type="bookType"/>
...
//<xsd:complexType name="bookType">
//      <xsd:sequence>
//        <xsd:element name="title" type="xsd:string"/>
//        <xsd:element name="author" type="authorName"/>
//        <xsd:element name="price"  type="xsd:decimal"/>
//      </xsd:sequence>
//      <xsd:attribute name="genre" type="xsd:string" use="optional"/>
//      <xsd:attribute name="lang" use="optional">
//        <xsd:simpleType>
```

```
//          <xsd:restriction base="xsd:string">
//            <xsd:pattern value="EnglishUK|EnglishUSA"/>
//          </xsd:restriction>
//        </xsd:simpleType>
//      </xsd:attribute>
//</xsd:complexType>
```

In this case, "**bookType**" is a complex type.
The "**bookType**" element can have a self define "**type**" attribute
that refers to the **name** of the **complex type**

```
//<xsd:sequence>....
```

Note that the child elements, "**title**", "**author**"and "**price**",
are **surrounded** by the <**sequence**> indicator.
This means that the child elements must appear
in the **same order** as they are declared.

```
//<xsd:attribute name="genre" type="xsd:string" use="optional"/>
```

The "**attribute**" is after "**sequence**" and
surrounded by the `<xsd:complexType name="bookType">` indicator.
That means declare the **bookType** can contain these **attributes**.
In this case, "**genre**" is an attribute of "**bookType**",
and the datatype must be **string**.
"**optional**" means this attribute is optional.

```
//      <xsd:attribute name="lang" use="optional">
//        <xsd:simpleType>
//          <xsd:restriction base="xsd:string">
//            <xsd:pattern value="EnglishUK|EnglishUSA"/>
//          </xsd:restriction>
//        </xsd:simpleType>
//      </xsd:attribute>
```

In this case, "**lang**" is an attribute of "**bookType**",
and the datatype must be **string**.
In addition, the value must be **EnglishUK** or **EnglishUSA**
"**optional**" means this attribute is optional.

2.4. BookStore XML

2.4.1. Bookstore.xml

genre and lang attributes can be in any order.

```
<?xml version='1.0'?>
<bookstore xmlns="urn:bookstore-schema">
  <book genre="novel" lang="EnglishUK">
    <title>Book1</title>
    <author>
      <first-name>Name1</first-name>
      <last-name>ABC</last-name>
    </author>
    <price>11.99</price>
  </book>
  <book lang="EnglishUSA" genre="novel">
```

```
    <title>Book2</title>
    <author>
      <first-name>Name2</first-name>
      <last-name>EFGHI</last-name>
    </author>
    <price>9.99</price>
  </book>
</bookstore>
```

2.4.2. Bookstore2.xml

The first book has no title and no price.

```
<?xml version='1.0'?>
<bookstore xmlns="urn:bookstore-schema">
  <book>
    <author>
      <first-name>Name1</first-name>
      <last-name>ABC</last-name>
    </author>
  </book>
  <book lang="EnglishUSA" genre="novel">
    <title>Book2</title>
    <author>
      <first-name>Name2</first-name>
      <last-name>EFGHI</last-name>
    </author>
    <price>9.99</price>
  </book>
</bookstore>
```

2.4.3. Bookstore3.xml

The last book author has no first name and last name.

```
<?xml version='1.0'?>
<bookstore xmlns="urn:bookstore-schema">
  <book genre="novel">
    <title>Book1</title>
    <author>
      <first-name>Name1</first-name>
      <last-name>ABC</last-name>
    </author>
    <price>11.99</price>
  </book>
  <book genre="philosophy">
    <title>Book2</title>
    <author>
      <name>Name2</name>
    </author>
    <price>9.99</price>
  </book>
</bookstore>
```

2.4.4. Bookstore4.xml

The bookStore must contain at least 2 books

```xml
<?xml version='1.0'?>
<bookstore xmlns="urn:bookstore-schema">
  <book genre="novel" lang="EnglishUK">
    <title>Book1</title>
    <author>
      <first-name>Name1</first-name>
      <last-name>ABC</last-name>
    </author>
    <price>11.99</price>
  </book>
</bookstore>
```

2.4.5. Bookstore5.xml

The lang must be EnglishUK or EnglishUSA

```xml
<?xml version='1.0'?>
<bookstore xmlns="urn:bookstore-schema">
  <book genre="novel" lang="EnglishUK">
    <title>Book1</title>
    <author>
      <first-name>Name1</first-name>
      <last-name>ABC</last-name>
    </author>
    <price>11.99</price>
  </book>
  <book lang="Japanese" genre="novel">
    <title>Book2</title>
    <author>
      <first-name>Name2</first-name>
      <last-name>EFGHI</last-name>
    </author>
    <price>9.99</price>
  </book>
</bookstore>
```

2.4.6. Bookstore6.xml

The last book sub-elements must be in right order.

```xml
<?xml version='1.0'?>
<bookstore xmlns="urn:bookstore-schema">
  <book genre="novel" lang="EnglishUK">
    <title>Book1</title>
    <author>
      <first-name>Name1</first-name>
      <last-name>ABC</last-name>
    </author>
    <price>11.99</price>
  </book>
  <book lang="EnglishUSA" genre="novel">
    <price>9.99</price>
    <title>Book2</title>
    <author>
      <first-name>Name2</first-name>
      <last-name>EFGHI</last-name>
    </author>
  </book>
```

```
</bookstore>
```

2.5. Program.cs

```
using System;
using System.Xml.Linq;
using System.Xml.Schema;
namespace Sample
{
    class Program
    {
        static void Main(string[] args)
        {
            string xsdPathGamers = @"Gamers.xsd"; //load from bin/debug
            string xsdPathBookstore = @"Bookstore.xsd"; //load from bin/debug
            // 1. ====================================
            // Test Gamers.xml by Gamers.xsd
            Console.WriteLine("1. Test Gamers.xml by Gamers.xsd ================= ");
             XmlValidateByXsd(xsdPathGamers, @"Gamers.xml");
            // xsdPath==Gamers.xsd,xmlPath==Gamers.xml,validation==Passed
            // 2. ====================================
            // Test Gamers2.xml by Gamers.xsd
            Console.WriteLine("2. Test Gamers2.xml by Gamers.xsd ================= ");
             XmlValidateByXsd(xsdPathGamers, @"Gamers2.xml");
            Console.WriteLine("Fail because more than 4 Gamers");
            // The element 'Gamers' has invalid child element 'Gamer'.
            // xsdPath==Gamers.xsd,xmlPath==Gamers2.xml,validation==Failed
            // Fail because more than 4 Gamers

            // 3. ====================================
            // Test Gamers3.xml by Gamers.xsd
            Console.WriteLine("3. Test Gamers3.xml by Gamers.xsd ================= ");
             XmlValidateByXsd(xsdPathGamers, @"Gamers3.xml");
            Console.WriteLine("Fail because less than 2 Gamers");
            // The element 'Gamers' has incomplete content. List of possible elements expected: 'Gamer'.
            // xsdPath==Gamers.xsd,xmlPath==Gamers3.xml,validation==Failed
            // Fail because less than 2 Gamers
            // 4. ====================================
            // Test Gamers4.xml by Gamers.xsd
            Console.WriteLine("4. Test Gamers4.xml by Gamers.xsd ================= ");
             XmlValidateByXsd(xsdPathGamers, @"Gamers4.xml");
            Console.WriteLine("The Score and Id is not in the right position.");
            // 4. Test Gamers4.xml by Gamers.xsd =================
            // The element 'Gamer' has invalid child element 'Score'. List of possible elements expected:
'Id'.
            // xsdPath==Gamers.xsd,xmlPath==Gamers4.xml,validation==Failed
            // The Score and Id is not in the right position.
            // 5. ====================================
            // Test Bookstore.xml by Bookstore.xsd
            Console.WriteLine("5. Test Bookstore.xml by Bookstore.xsd ================= ");
             XmlValidateByXsd(xsdPathBookstore, @"Bookstore.xml");
            Console.WriteLine("Genere and lang attributes can be in any order.");
```

```
            // xsdPath==Bookstore.xsd,xmlPath==Bookstore.xml,validation==Passed
            // Genere and lang attributes can be in any order.

            // 6. ====================================
            // Test Bookstore2.xml by Bookstore.xsd
            Console.WriteLine("6. Test Bookstore2.xml by Bookstore.xsd ================= ");
             XmlValidateByXsd(xsdPathBookstore, @"Bookstore2.xml");
            Console.WriteLine("The first book has no title and no price.");
            // The element 'book' in namespace 'urn:bookstore-schema' has invalid child element 'author'
in namespace 'urn:bookstore-schema'. List of possible elements expected: 'title' in namespace
'urn:bookstore-schema'.
            // xsdPath==Bookstore.xsd,xmlPath==Bookstore2.xml,validation==Failed
            // The first book has no title and no price.

            // 7. ====================================
            // Test Bookstore3.xml by Bookstore.xsd
            Console.WriteLine("7. Test Bookstore3.xml by Bookstore.xsd ================= ");
             XmlValidateByXsd(xsdPathBookstore, @"Bookstore3.xml");
            Console.WriteLine("The last book author has no first name and last name.");
            // The element 'author' in namespace 'urn:bookstore-schema' has invalid child element 'name'
in namespace 'urn:bookstore-schema'. List of possible elements expected: 'first-name' in namespace
'urn:bookstore-schema'.
            // xsdPath==Bookstore.xsd,xmlPath==Bookstore3.xml,validation==Failed
            // The last book author has no first name and last name.

            // 8. ====================================
            // Test Bookstore4.xml by Bookstore.xsd
            Console.WriteLine("8. Test Bookstore4.xml by Bookstore.xsd ================= ");
             XmlValidateByXsd(xsdPathBookstore, @"Bookstore4.xml");
            Console.WriteLine("The bookStore must contain at least 2 books");
            // The element 'bookstore' in namespace 'urn:bookstore-schema' has incomplete content. List of
possible elements expected: 'book' in namespace 'urn:bookstore-schema'.
            // xsdPath==Bookstore.xsd,xmlPath==Bookstore4.xml,validation==Failed
            // The bookStore must contain at least 2 books

            // 9. ====================================
            // Test Bookstore5.xml by Bookstore.xsd
            Console.WriteLine("9. Test Bookstore5.xml by Bookstore.xsd ================= ");
             XmlValidateByXsd(xsdPathBookstore, @"Bookstore5.xml");
            Console.WriteLine("The lang must be EnglishUK or EnglishUSA");
            // The 'lang' attribute is invalid - The value 'Japanese' is invalid according to its datatype
'String' - The Pattern constraint failed.
            // xsdPath==Bookstore.xsd,xmlPath==Bookstore5.xml,validation==Failed
            // The lang must be EnglishUK or EnglishUSA

            // 10. ====================================
            // Test Bookstore6.xml by Bookstore.xsd
            Console.WriteLine("10. Test Bookstore6.xml by Bookstore.xsd ================= ");
             XmlValidateByXsd(xsdPathBookstore, @"Bookstore6.xml");
            Console.WriteLine("The last book sub-elements must be in right order.");
            // The element 'book' in namespace 'urn:bookstore-schema' has invalid child element 'price' in
namespace 'urn:bookstore-schema'. List of possible elements expected: 'title' in namespace
'urn:bookstore-schema'.
            // xsdPath==Bookstore.xsd,xmlPath==Bookstore6.xml,validation==Failed
            // The last book sub-elements must be in right order.
            Console.ReadLine();
```

```
        }
        private static void XmlValidateByXsd(string xsdPath, string xmlPath)
        {
            //Load xsd
            XmlSchemaSet xmlSchemaSet = new XmlSchemaSet();
            xmlSchemaSet.Add(null, xsdPath);
            //Load xml
            XDocument xmlDocument = XDocument.Load(xmlPath);
            //Validate Error
            bool validationErrors = false;
            xmlDocument.Validate(xmlSchemaSet, (sender, eventArgs) =>
            {
                Console.WriteLine(eventArgs.Message);
                validationErrors = true;
            });
            // if xmlDocument does NOT pass the validation of xmlSchemaSet,
            // then it will run the anonymous methods.
            string validationStr = validationErrors? "Failed": "Passed";
            Console.WriteLine($"xsdPath={{xsdPath},xmlPath={{xmlPath},validation={{validationStr}");
        }
    }
}
```