Mansoura University
Faculty of Computers and Information Sciences
Department of Computer Science
First Semester- 2020-2021

# [CS412P] Distributed Systems

## Grade: Forth grade

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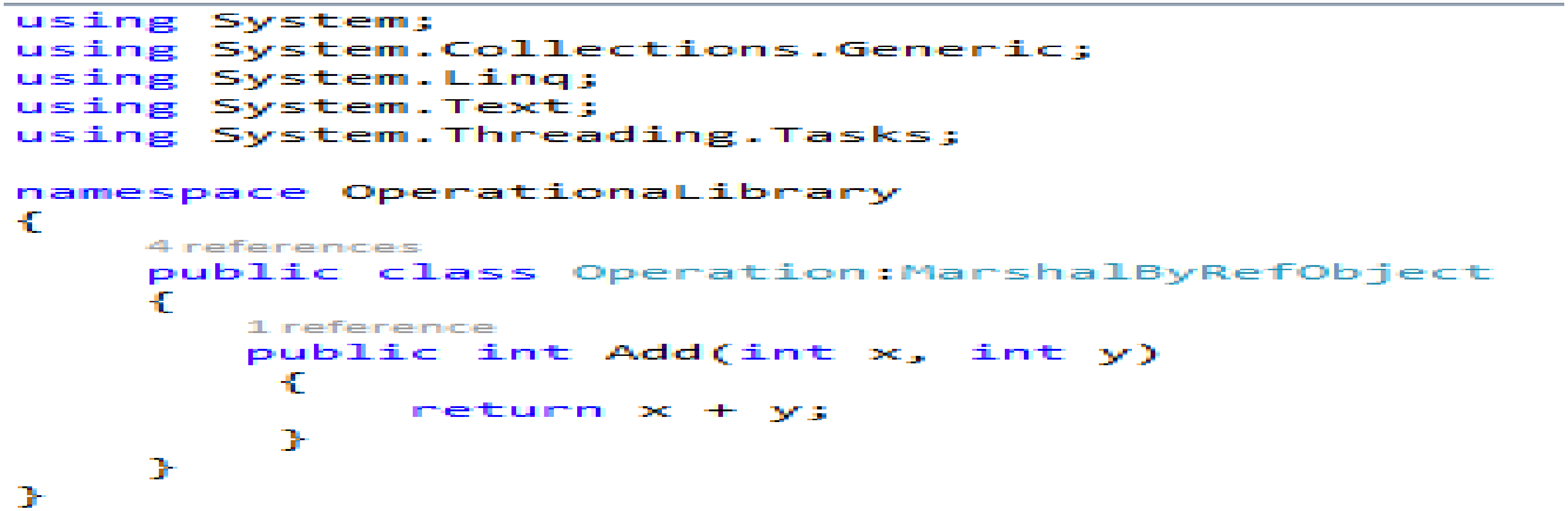
# REMOTE METHOD INVOCATION

- How to implement remoting in .NET framework?
- Create a remotable object.
- Create a server to expose  the remotable object.
- Create a client to use the remotable object.

# REMOTE METHOD INVOCATION

- **Create a new C# class library project. Add a class called OperationalLibrary and put in the following code. Add a reference to System.Runtime.Remoting in the project .**

- Step 1:Create a remotable object.



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

namespace OperationalLibrary
{
    4 references
    public class Operation:MarshalByRefObject
    {
        1 reference
        public int Add(int x, int y)
         {
             return x + y;
         }
    }
}
```

# REMOTE METHOD INVOCATION

- Step 2:Create a server to expose the remotable object.

We first create an instance of the channel, and then register it for use by clients at a specific port. The service can be registered as `WellKnownObjectMode.SingleCall`,
which results in a new instance of the object for each client, or as `WellKnownObjectMode.Singleton`, which results in one instance of the object used for all clients.

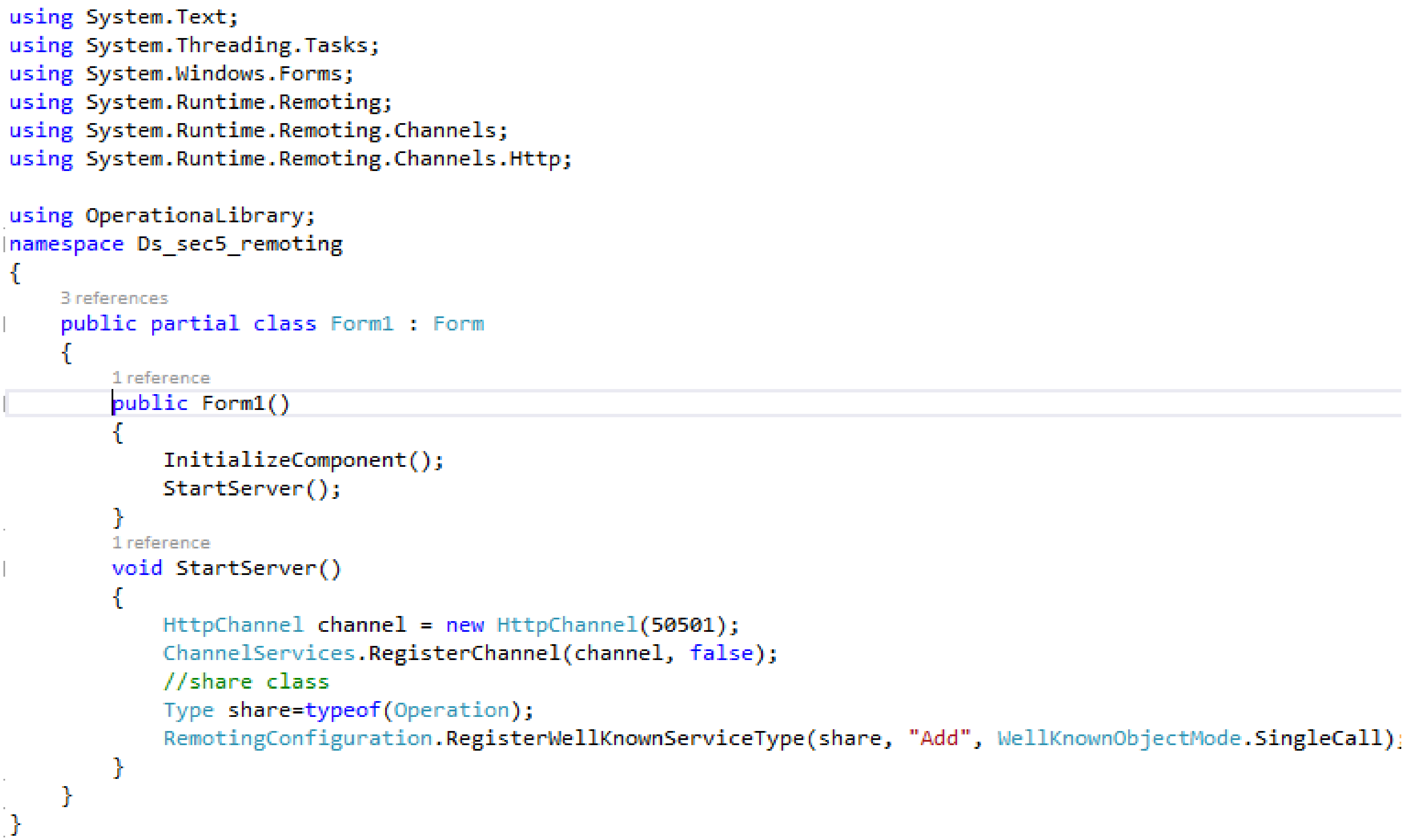
# REMOTE METHOD INVOCATION

Step 2:Create a server to expose  the remotable object.

- Create a new C# Windows Application project. Add a Windows Form called Server, and paste in the following code. Add a reference to :
- System.Runtime.Remoting;
- System.Runtime.Remoting.Channels;
- System.Runtime.Remoting.Channels.Http;

in the project, otherwise the httpChannel will not be found..

# REMOTE METHOD INVOCATION



```
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using System.Runtime.Remoting;
using System.Runtime.Remoting.Channels;
using System.Runtime.Remoting.Channels.Http;

using OperationalLibrary;
namespace Ds_sec5_remoting
{
    3 references
    public partial class Form1 : Form
    {
        1 reference
        public Form1()
        {
            InitializeComponent();
            StartServer();
        }
        1 reference
        void StartServer()
        {
            HttpChannel channel = new HttpChannel(50501);
            ChannelServices.RegisterChannel(channel, false);
            //share class
            Type share=typeof(Operation);
            RemotingConfiguration.RegisterWellKnownServiceType(share, "Add", WellKnownObjectMode.SingleCall);
        }
    }
}
```

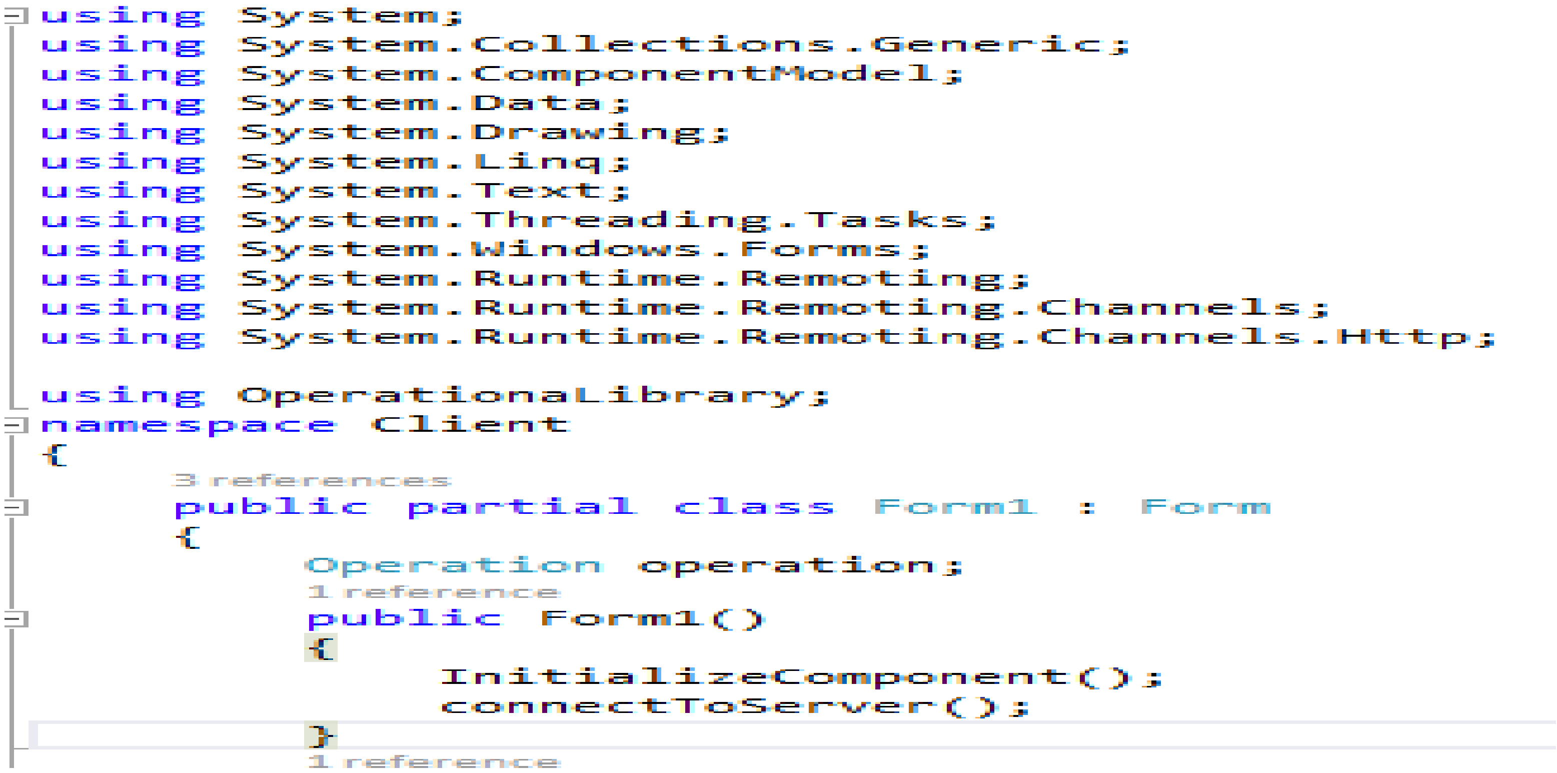
# REMOTE METHOD INVOCATION

Step 3: Create a client to use the remotable object.

The client will be very simple. It will connect to the server, create an instance of the object using the server, and then execute the ADD method. Create a new C# Windows Application project. Add a Windows Form called Cleint, and paste in the following code.

# REMOTE METHOD INVOCATION

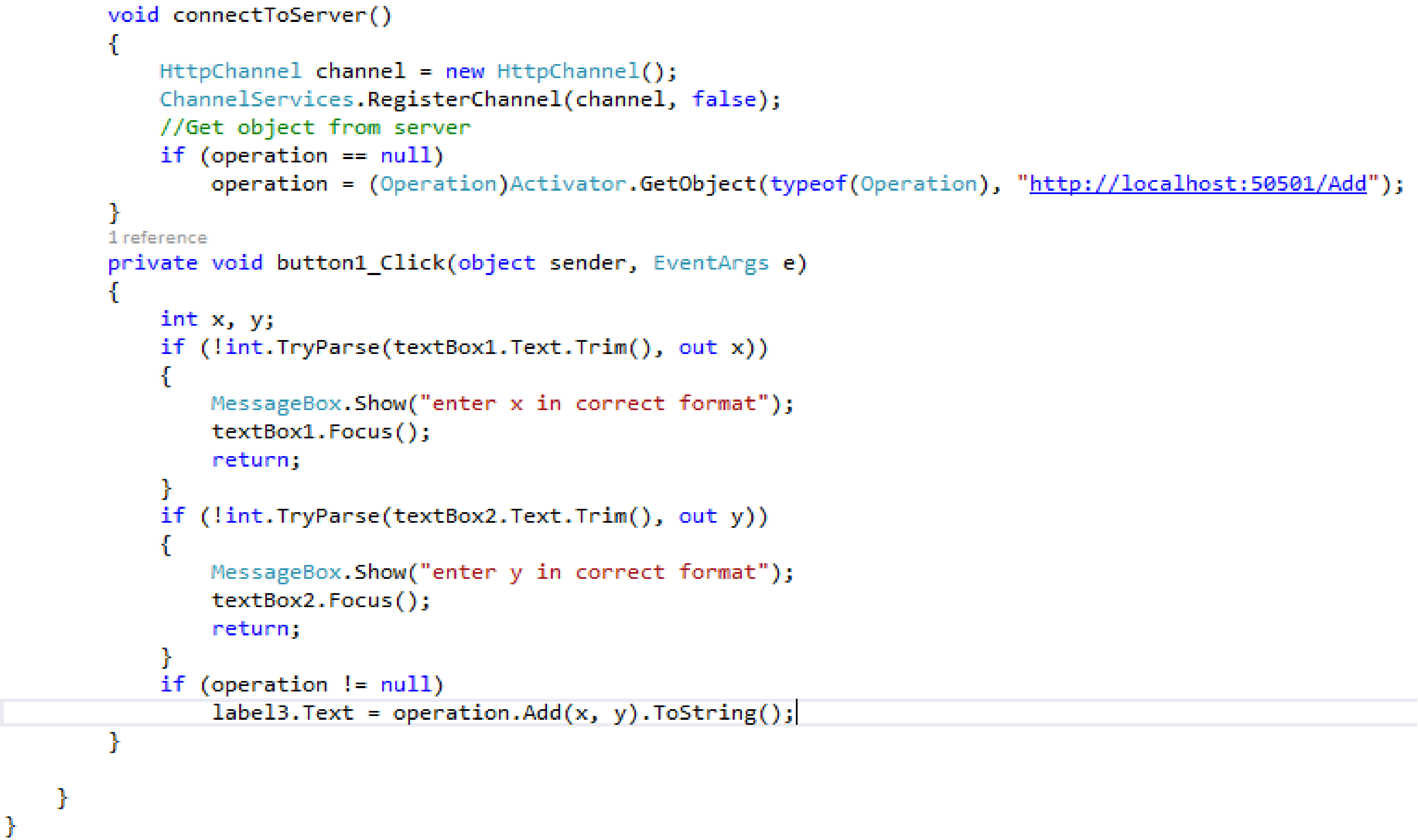
Step 3: Create a client to use the remotable object.



```
using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Data;
using System.Drawing;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using System.Windows.Forms;
using System.Runtime.Remoting;
using System.Runtime.Remoting.Channels;
using System.Runtime.Remoting.Channels.Http;

using OperationalLibrary;
namespace Client
{
    3 references
    public partial class Form1 : Form
    {
        Operation operation;
        1 reference
        public Form1()
        {
            InitializeComponent();
            connectToServer();
        }
        1 reference
```

# REMOTE METHOD INVOCATION



```
        void connectToServer()
        {
            HttpChannel channel = new HttpChannel();
            ChannelServices.RegisterChannel(channel, false);
            //Get object from server
            if (operation == null)
                operation = (Operation)Activator.GetObject(typeof(Operation), "http://localhost:50501/Add");
        }
        1 reference
        private void button1_Click(object sender, EventArgs e)
        {
            int x, y;
            if (!int.TryParse(textBox1.Text.Trim(), out x))
            {
                MessageBox.Show("enter x in correct format");
                textBox1.Focus();
                return;
            }
            if (!int.TryParse(textBox2.Text.Trim(), out y))
            {
                MessageBox.Show("enter y in correct format");
                textBox2.Focus();
                return;
            }
            if (operation != null)
                label3.Text = operation.Add(x, y).ToString();
        }

    }
}
```

# REMOTE METHOD INVOCATION

Thanks