XAM151

Cross Platform SOAP-based Web Services

- Lecture will begin shortly
- Download class materials from university.xamarin.com

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Objectives

1. Working with SOAP services

Working with SOAP services

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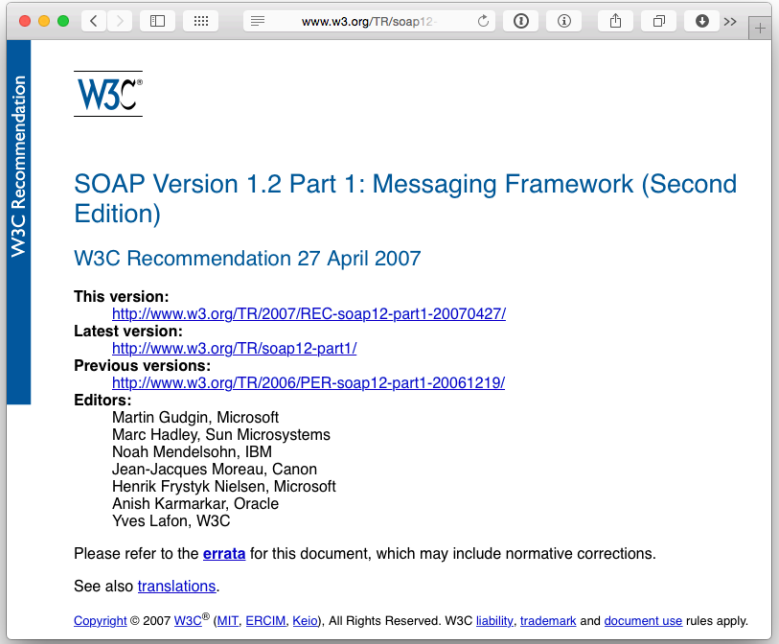
Tasks

1. What is SOAP and WCF?
2. Creating a WCF Client
3. Connecting to a SOAP service
4. Execute service methods

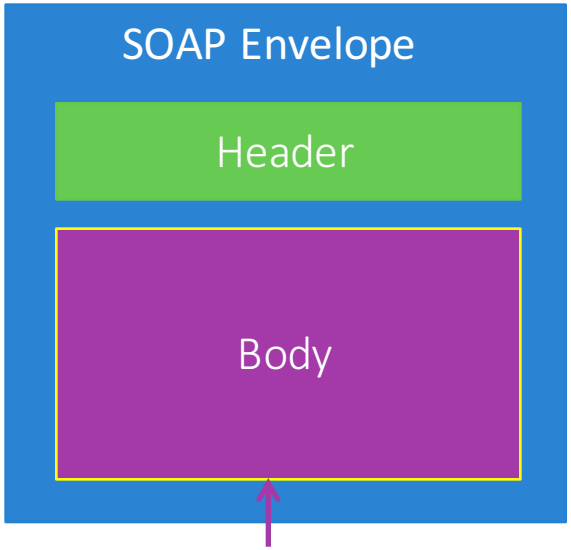
What is SOAP?

- SOAP is a RPC-based specification standard for web services which defines:
  - discovery
  - data format + transfer
  - security
  - data reliability
  - …



SOAP specification

- SOAP has a defined XML structure, referred to as the SOAP Envelope
- Variety of additional specifications available to define various aspects of communication which plug into this structure
  - referred to as WS-*
  - not widely supported on all platforms



SOAP uses HTTP **POST** to call services; the API and parameters are passed in the message body

Comparing REST and SOAP

	REST	SOAP
Standardized	No	Yes (WS-*)
Transport	HTTP	HTTP, FTP, Pipes, MSMQ etc.
Data Format	any, prefer JSON	XML
Reach	Excellent	Good
Development tools	Basic	Good
Flexibility	Flexible	Rigid
Scalability	Excellent	Reasonable
Security	HTTPS	WS-Security
Operations	Stateless	Often statefull

What is WCF?

- Windows Communication Foundation is a highly configurable and flexible .NET library for building distributed, service-oriented applications
- Original vision was to be the "kitchen sink" of communication, but it's flexibility has made it moderately complicated to use

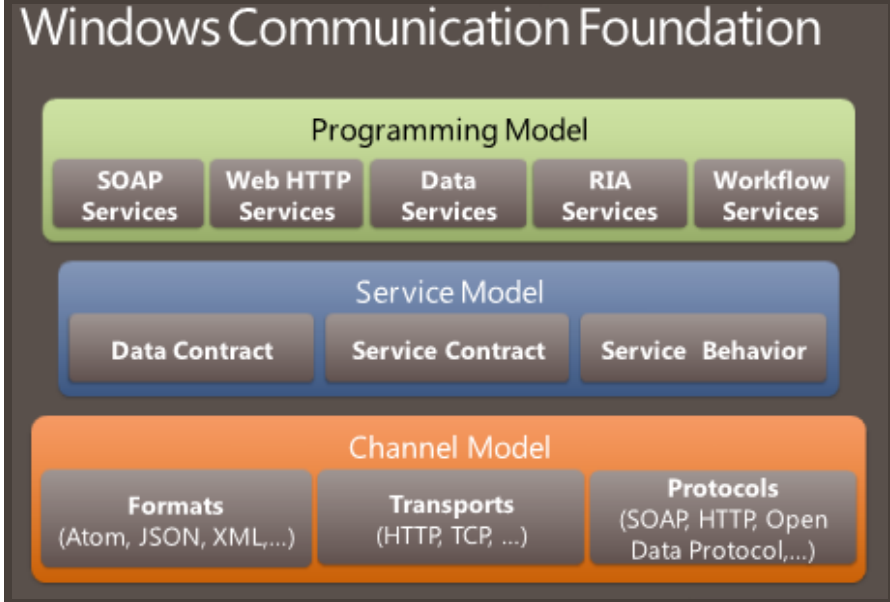
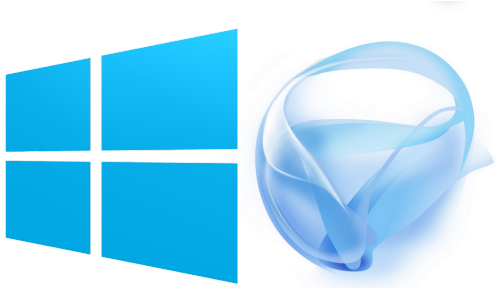


image from msdn.microsoft.com

Using WCF with Xamarin

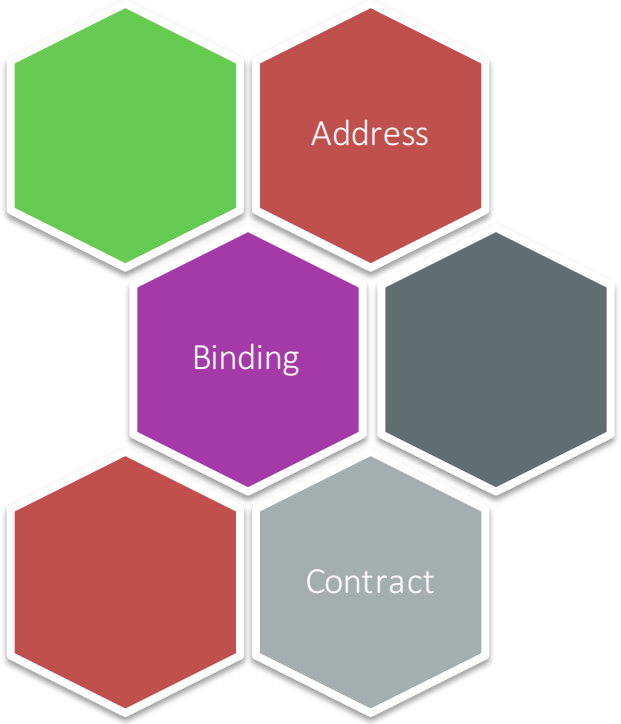
- Adding WCF client-side support to a mobile application today requires a Windows machine with Visual Studio or the **Silverlight SDK**



WCF Endpoints

- Communication with WCF Services is performed over *endpoints* which define the **address**, **binding**, and **contract** that is exposed

- Client and service must agree on these three pieces of information, sometimes called the "ABCs" of WCF



Address

- Service address defines the *location* of the service with two pieces of information

```
http://itunes.apple.com/movies
```

```
net.tcp://23.75.234.144:5544
```

```
https://services.xamarin.com/account
```

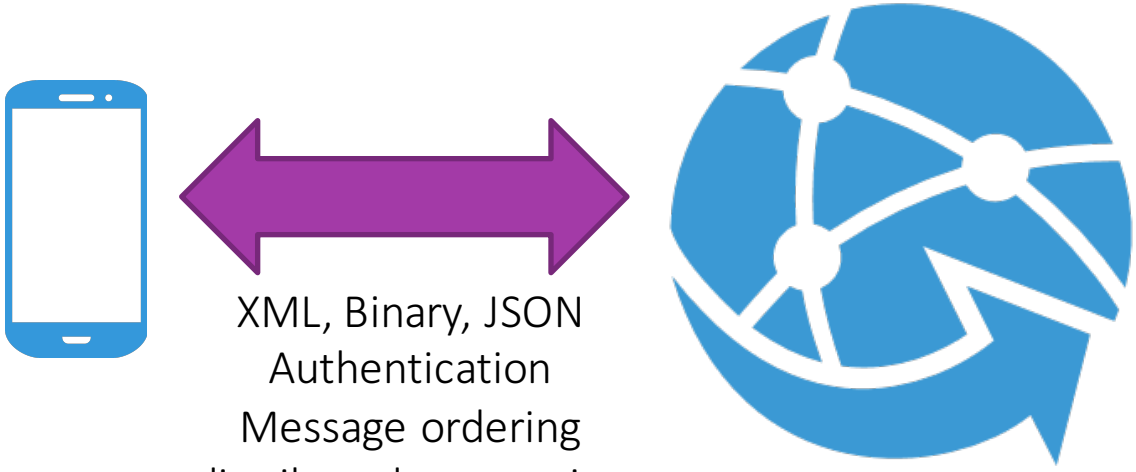
Protocol used to access it

Address where it is hosted

Mobile applications can only utilize HTTP(s)-based addresses

Binding

- Selected **binding** determines how the client and service will communicate and what parts of the SOAP specifications are used



WCF includes pre-defined bindings for various scenarios but mobile apps only have access to a small subset of the defined bindings – that may change in the future

Contract

- The WCF **contract** defines what the service *can do* and is most often modeled as an interface which is shared by the client and service

```
[ServiceContract(Namespace = "http://services.xamarin.com/xamu")]
public interface ICourseCatalog
{

    ...


}
```

`ServiceContract` indicates that this is a contract definition; namespace must match service expectation as it is coded into the SOAP envelope

Contract

- The WCF **contract** defines what the service *can do* and is most often modeled as an interface which is shared by the client and service

```
[ServiceContract(Namespace = "http://services.xamarin.com/xamu")]
public interface ICourseCatalog
{
    [OperationContract]
    Course GetCourseById(int id);
    [OperationContract]
    IList<Course> GetAll();
    [OperationContract]
    void ScheduleCourse(int id, DateTime scheduledDate);
}
```

OperationContract indicates that this is a specific API that can be called

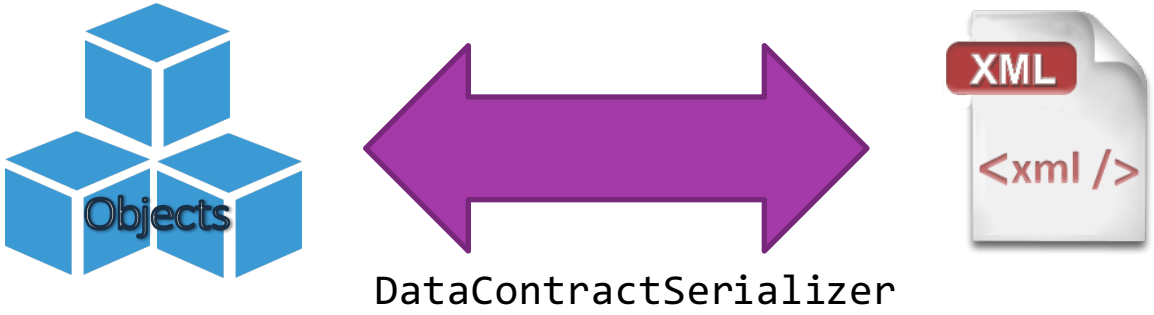
Serialization with SOAP + WCF

- SOAP must serialize the data passed to and from each API
- Serialization format is tied to the *binding*, preferred format for most bindings is **XML + XSD**

```
<?xml version="1.0"
    encoding="utf-16"?>
<Course xmlns="http://...">
  <Description>
    ...
  </Description>
  <Id>
    ...
  </Id>
  <Name>
    ...
  </Name>
</Course>
```

What is DataContractSerializer?

- WCF uses **`DataContractSerializer`** to convert objects into XML and vice-versa



This is the *default serializer*; however WCF is quite extensible and one of those extensibility points is in changing how data is serialized by supplying a different serializer

Controlling the serialization

- Attributes used to map an object and its members to an XSD schema

Objects to be serialized must be marked with the **DataContract** attribute

Fields to be serialized must be marked with the **DataMember** attribute

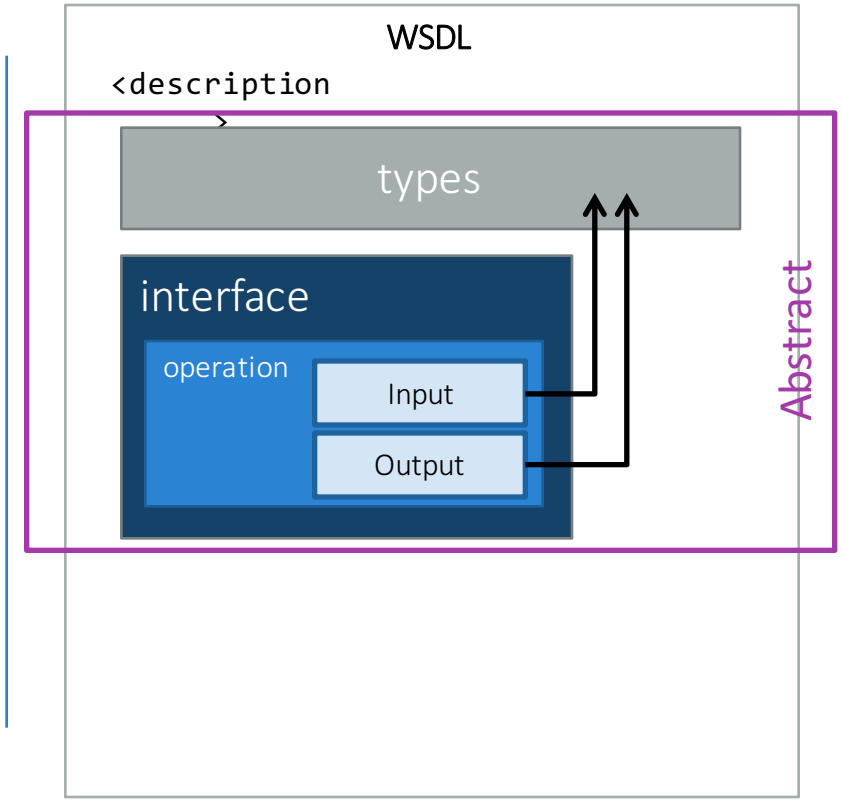
```
[DataContract(Namespace="urn:xamarin.com")]
public class Course
{
    [DataMember(Name="key")]
    public int Id { get; set; }

    [DataMember]
    public string Name { get; set; }

    [DataMember(IsRequired = false)]
    public string Description { get; set; }
}
```

Modern versions of **DataContractSerializer** do not require these attributes and will instead serialize all public properties, but being explicit is a good practice

What is WSDL?

- Web Service Description Language (WSDL) is an XML document that provides the technical description for interacting with a specific a web service

- Tools generate the contracts and necessary WCF binding code directly from WSDL documents



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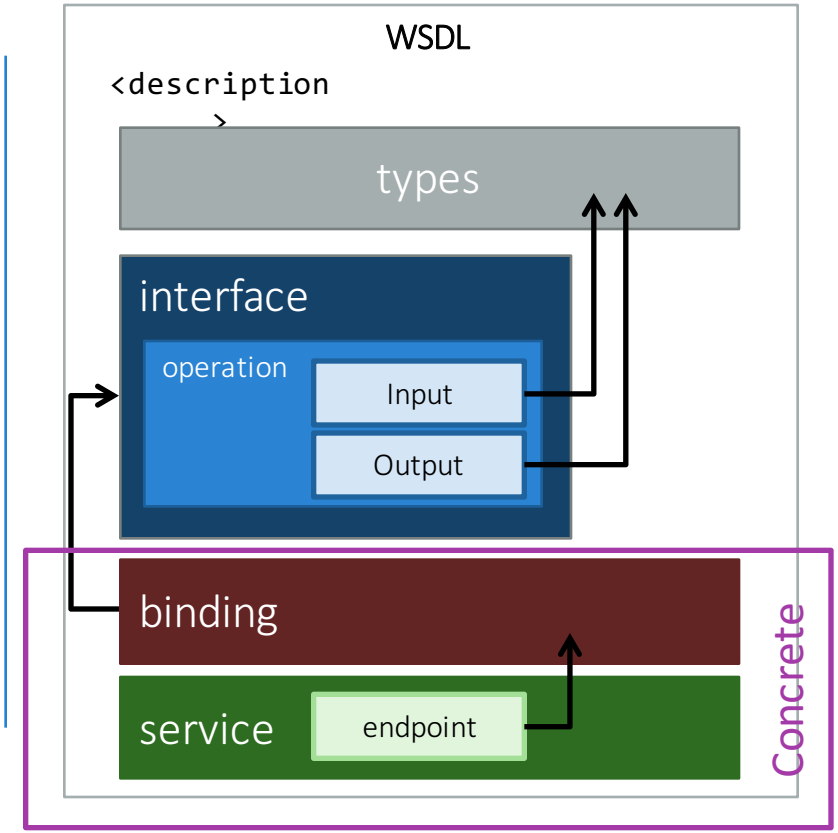
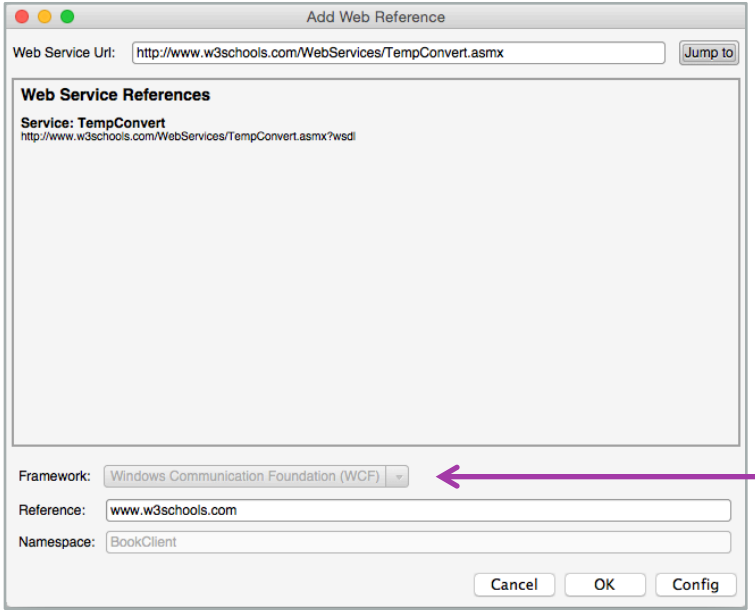


Generating the contracts

- Visual Studio and Xamarin Studio both have an "Add Web Reference" dialog which is commonly used to process WSDL



It even supports WCF …

Generating the contracts

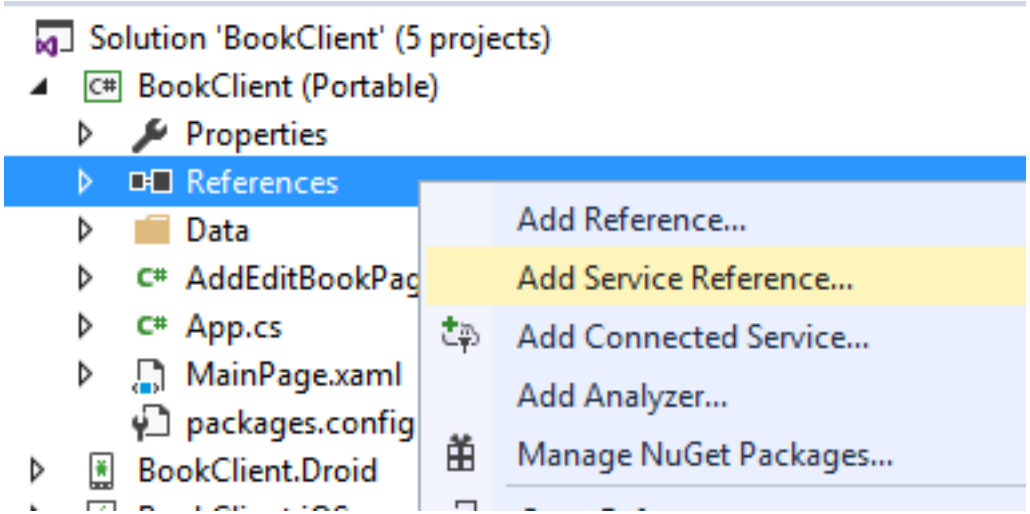
- Vis[illegible]nd Xamarin Studio both have an "Add Web Reference" dialog
  [illegible]used to process WSDL

This feature is for the full desktop version of .NET and Mono and will not generate code that is compatible with your mobile apps – do not use this approach

It even supports WCF …

Generating the contracts

- Can use the **Add Service Reference** on the **References** folder in a PCL, as long as the PCL does *not* support Windows Phone 8.1 (WinRT)



Generating the contracts

- Silverlight SDK ships with a command line tool which is used to generate all the client access code from a **WSDL file**

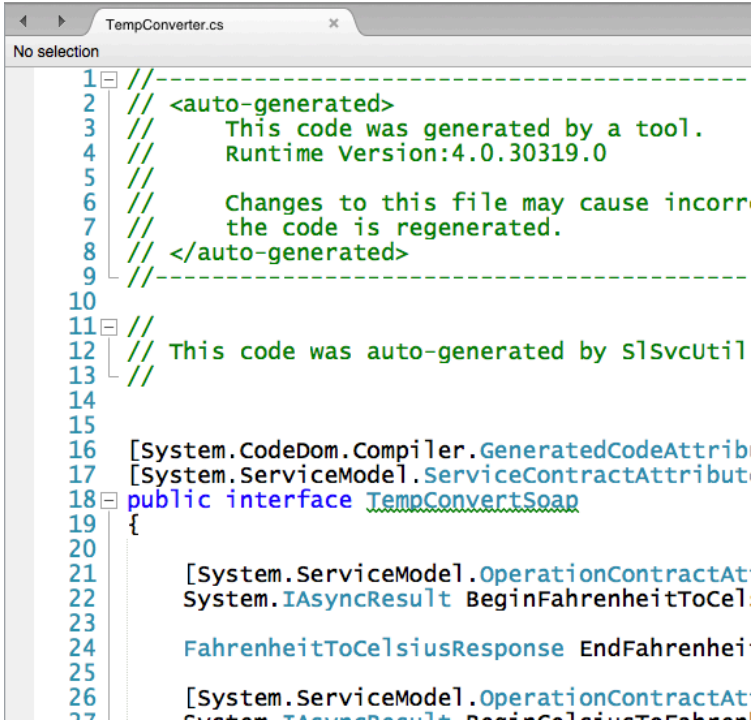
```
C:\Program Files (x86)\Microsoft SDKs\Silverlight\v5.0\Tools\SLSvcUtil.exe
```

```
C:\> SLSvcUtil /noConfig http://www.w3schools.com/WebServices/TempConvert.asmx

Microsoft (R) Silverlight Service Model Proxy Generation Tool
[Microsoft (R) Silverlight SDK, Version 5.0.61118.0]
Copyright (c) Microsoft Corporation.  All rights reserved.

Attempting to download metadata from 'http://www.w3schools.com/WebServices/TempConvert.asmx' using W
S-Metadata Exchange or DISCO.

Generating files...
C:\Users\Mark\Desktop\TempConvert.cs
```

Caution: There is also a desktop utility **`SVCUtil.exe`** but it generates desktop based code which will not run properly on the mobile platform today

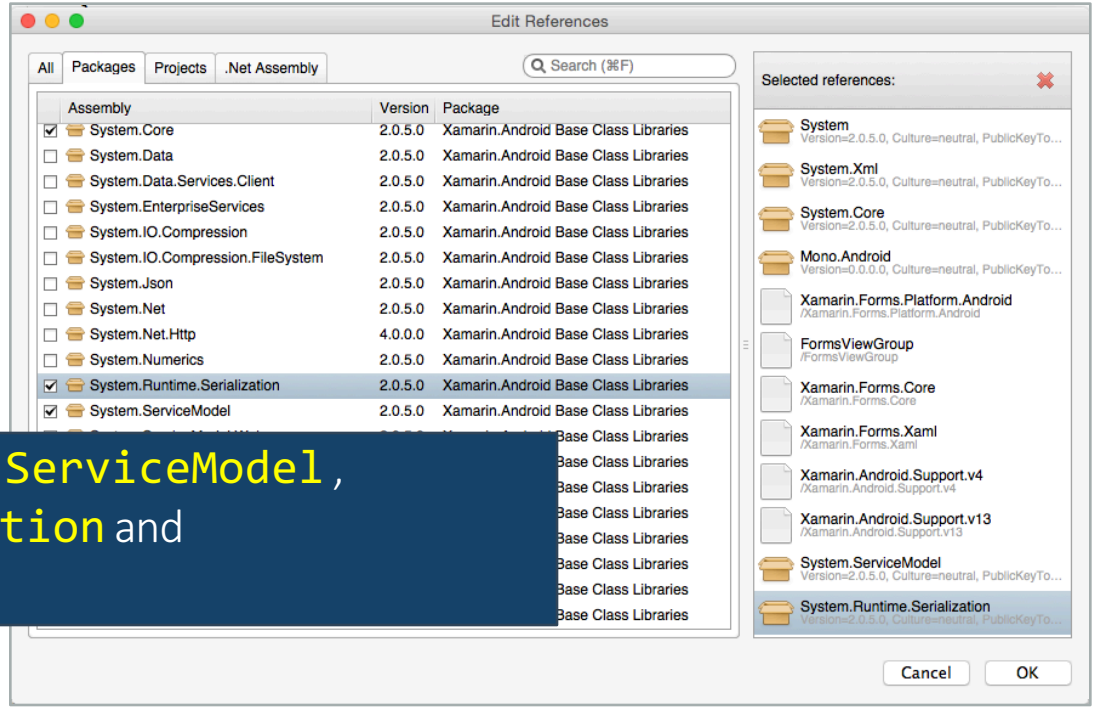
What gets generated?

- Tool processes the WSDL and generates a single C# source file with all the necessary contracts and a proxy class used to invoke the operations on the web service



Reminder: add WCF references

- When using `SLSVCUtil` to generate the proxy source file, you must also manually add the DLL references to support WCF



Must add references to `System.ServiceModel`, `System.Runtime.Serialization` and `System.ServiceModel.Web`

Calling the web service

- Tools generate a web *proxy* which exposes asynchronous RPC-style methods representing the operations on the web service

```
var client = new TempConvertSoapClient(
          new BasicHttpBinding(BasicHttpSecurityMode.None),
          new EndpointAddress(
             "http://www.w3schools.com/WebServices/TempConvert.asmx"));

client.FahrenhCelsiusCompleted += (sender, e) => {
     Devi                                  () => label.Text = e.Result);
};

client.Fa                                  );
```

Must provide binding and address to proxy constructor

Calling the web service

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```
var client = new TempConvertSoapCl
        new BasicHttpBinding(Basi
        new EndpointAddress("http                    ices/Tem
pConvert.asmx"));

client.FahrenheitToCelsiusCompleted += (sender, e) => {
    Device.BeginInvokeOnMainThread(() => label.Text = e.Result);
};

client.FahrenheitToCelsiusAsync("75");
```

Async methods use event model, wire up to **Completed** event

Calling the web service

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```
var client = new TempConvertSoapClient(
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        new EndpointAddress("http://www.w3schools.com/WebServices/TempConvert.asmx"));

client.FahrenheitToCelsiusCompleted += (sender, e) => {
    Device.BeginInvokeOnMainThread(() => label.Text = e.Result);
};

client.FahrenheitToCelsiusAsync("75");
```

.. and then call method

Calling the web service

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```
var client = new TempConvertSoapClient(
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client.FahrenheitToCelsiusCompleted += (sender, e) => {
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};

client.FahrenheitToCelsiusAsync("75");
```
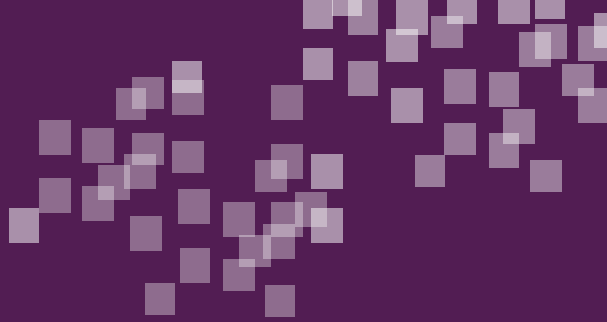

Completed callback occurs with status + response on background thread



Individual Exercise

Calling a SOAP Book Service

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Summary

1. What is SOAP and WCF?
2. Creating a WCF Client
3. Connecting to a SOAP service
4. Execute service methods

Thank You!

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