From Mobile and Through the Cloud to AutoCAD® Civil 3D®

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Class Summary

How collect coordinate points using Mobile with GPS enabled devices running Android or iOS, then store and merge those at the Cloud to finally generate Civil 3D objects, like surfaces, alignments or parcels.

The case study will use Android phone equipped GPS and camera, using Windows Azure as cloud service to generate AutoCAD Civil 3D Cogo points.

Learning Objectives

At the end of this class, you will be able to:

1. Understand cloud development with mobile and desktop
2. Create, set-up and deploy a website on Azure cloud service
3. Configure, develop and install Android application
4. Connect Civil 3D to webservice (cloud) with .NET API

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Overview

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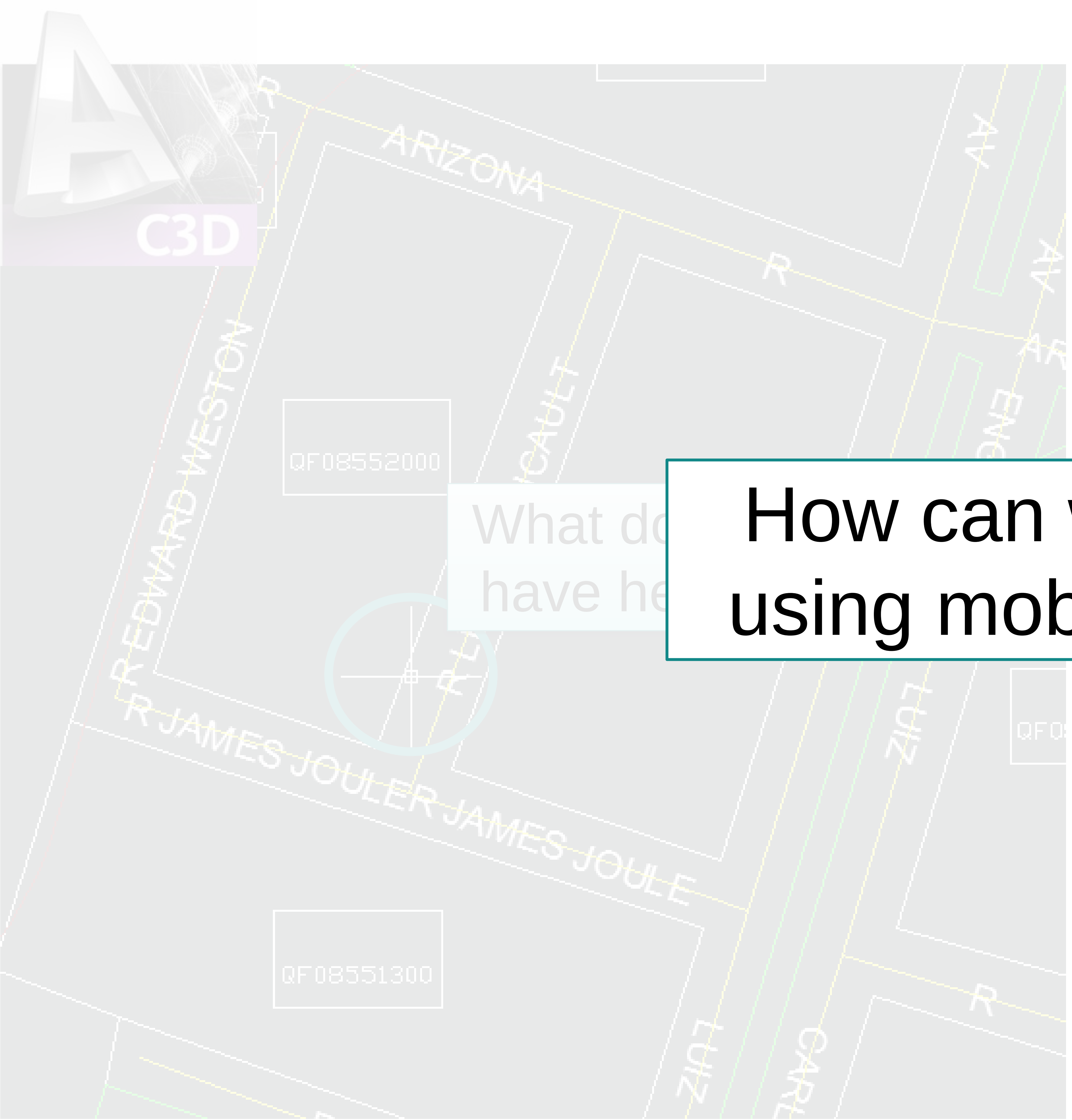
Flow of Information (Motivation)



How can we collect that data using mobile GPS & camera?

No Parking Zone sign

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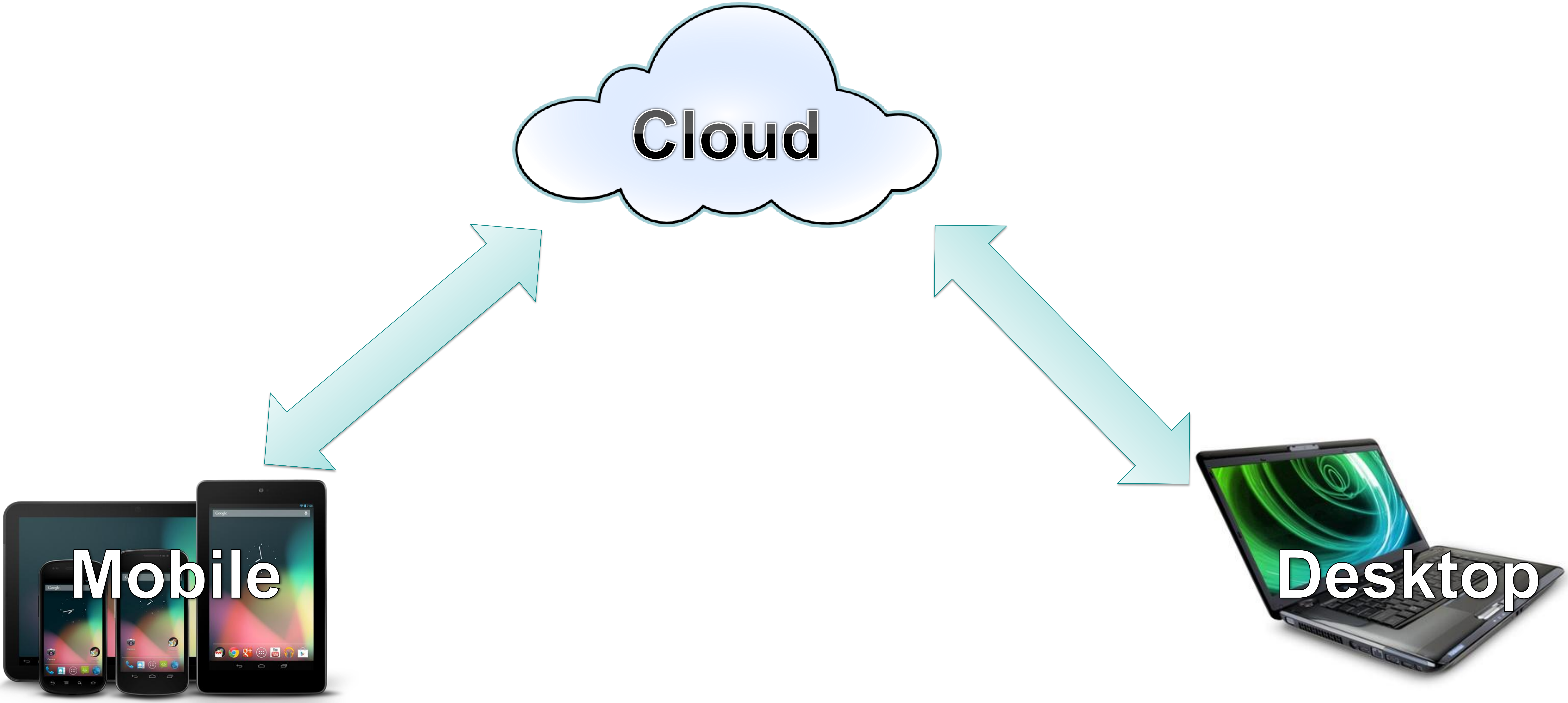
Proposed Arquitecture



Cloud

Mobile

Desktop

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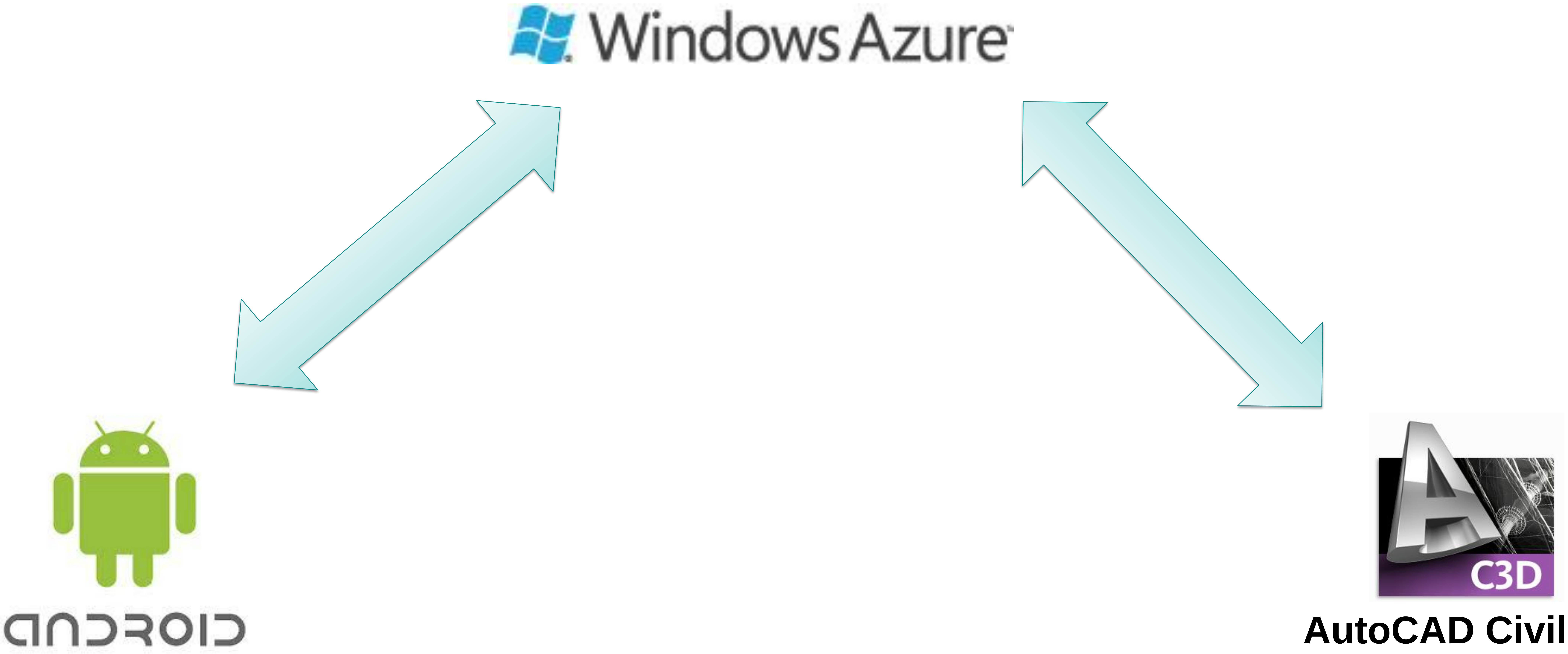
Players (Case Study)



AutoCAD Civil 3D

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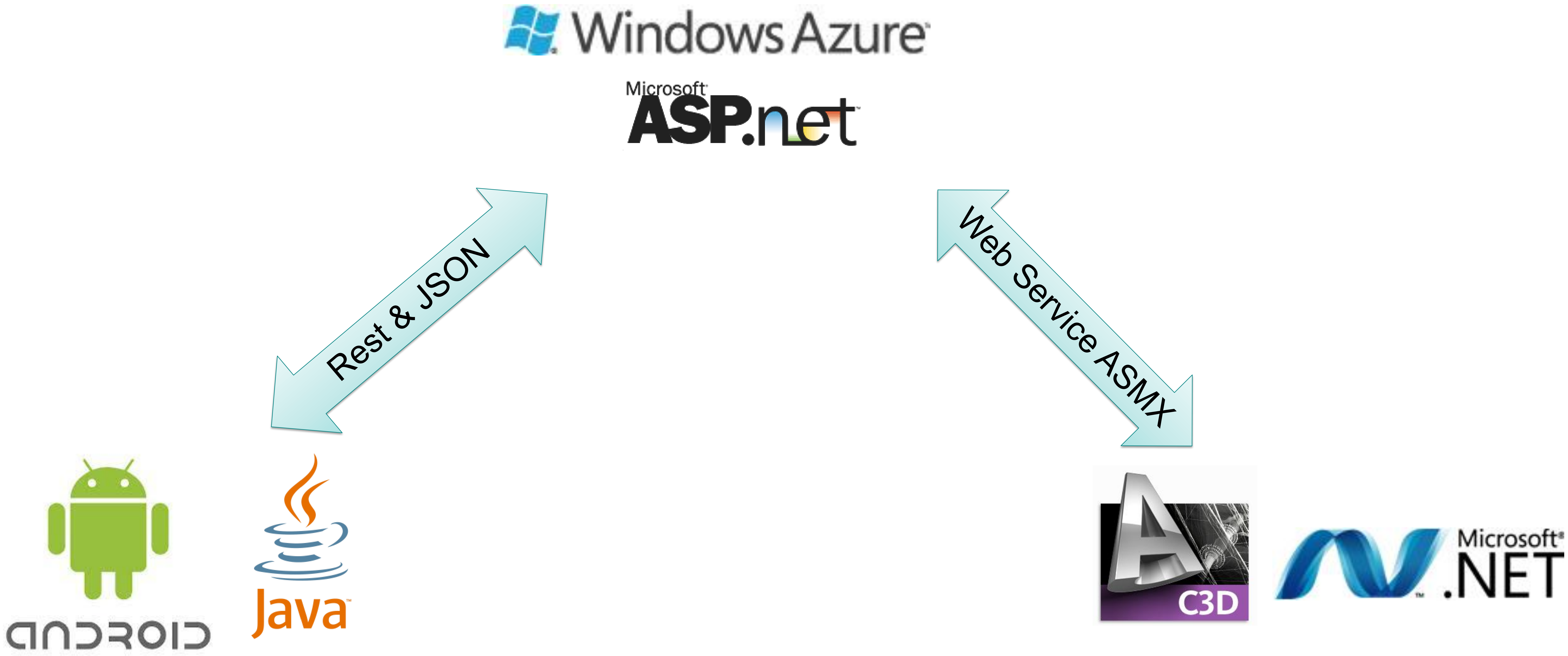
Technology (Case Study)



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The Cloud (Windows Azure)

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Overview Windows Azure

- Website, SQL data, Storage, Virtual Machines

- SDK for development with Visual Studio (link)

- Start as low as $10/month, on demand plans
  - Test with a 3 month trial period
  - See more at http://www.windowsazure.com
  - September/2012

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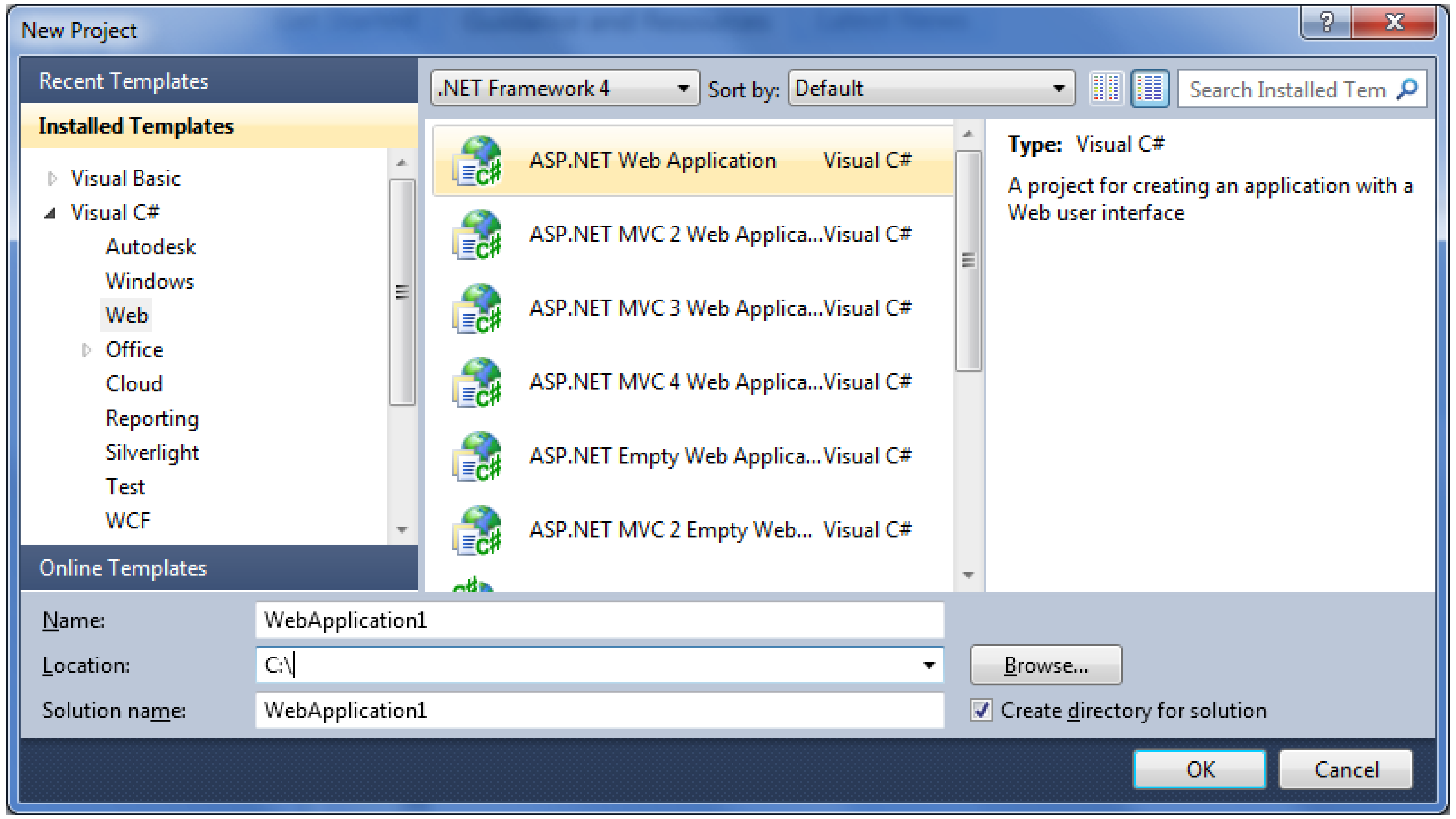
Overview Web Development

- ASP.NET based development
  - Same language skills of Autodesk APIs with VB.NET/C#
  - Full support for databases (e.g. SQL Server)

- Fully supported for local development and deployment on the cloud

- SDK for Windows Azure (link)
  - (Really) Quick deployment
  - Good tutorials (link)



.NET Framework 4

Sort by: Default

Type: Visual C#

A project for creating an application with a Web user interface

Name: WebApplication1

Location: C:\

Solution name: WebApplication1

☑ Create directory for solution

New Project
Recent Templates
Installed Templates
Visual Basic
Visual C#
Autodesk
Windows
Web
Office
Cloud
Reporting
Silverlight
Test
WCF
Online Templates
Search Installed Tem
ASP.NET Web Application Visual C#
ASP.NET MVC 2 Web Applica... Visual C#
ASP.NET MVC 3 Web Applica... Visual C#
ASP.NET MVC 4 Web Applica... Visual C#
ASP.NET Empty Web Applica... Visual C#
ASP.NET MVC 2 Empty Web... Visual C#
Browse...
OK
Cancel

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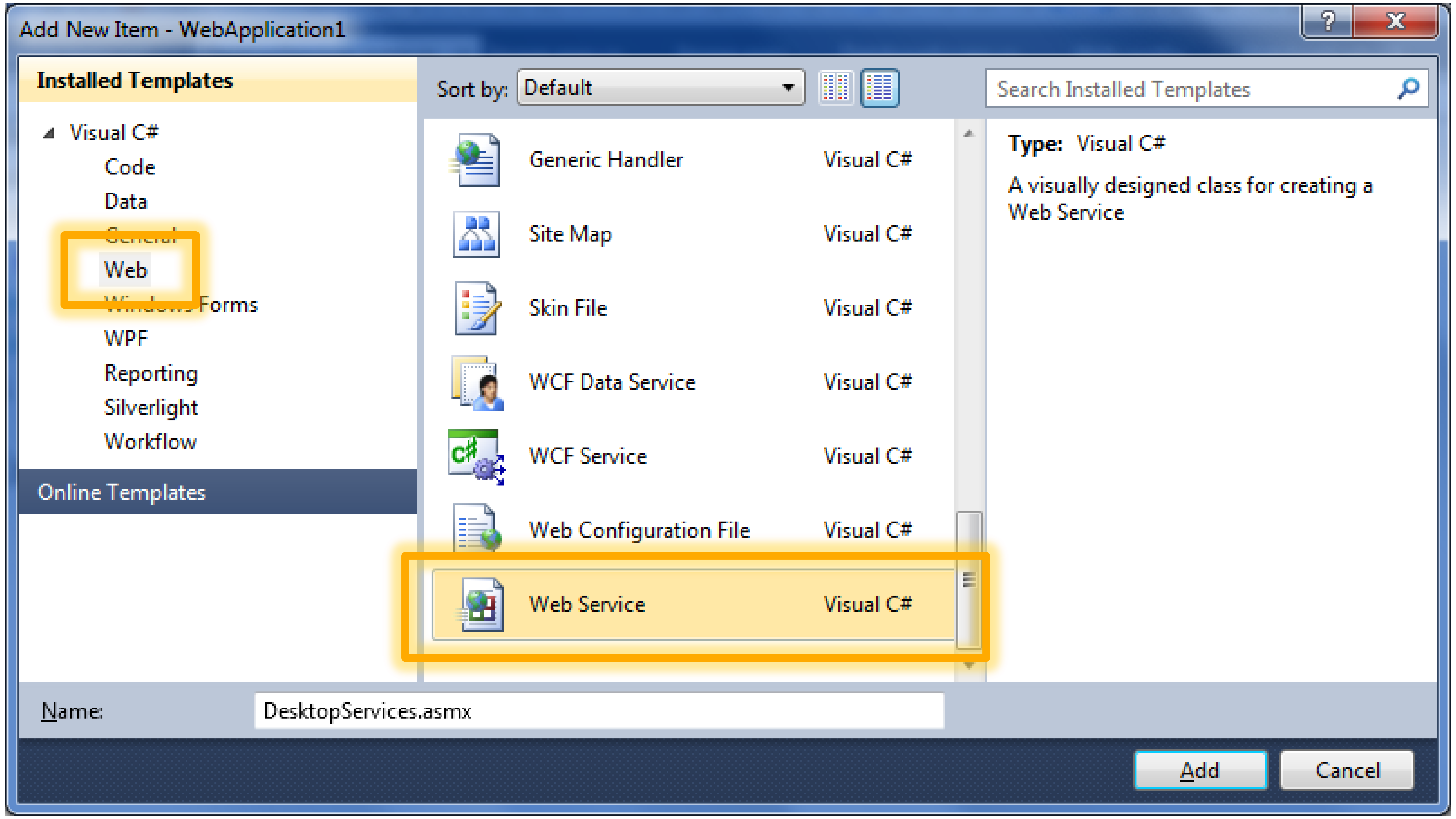
Web Services for Desktop Access

- Simply create a .asmx service

- No special requirement
  - On this level, bandwidth is not a concern

- Can return custom data

```
[WebMethod]
public PointData[] GetPointData()
{
}
```



Add New Item - WebApplication1

Sort by: Default

Type: Visual C#

A visually designed class for creating a Web Service

Name: DesktopServices.asmx

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Web Services for Mobile Access

- Prefer a lighter connection protocol: bandwidth is related to battery use

- ASP.NET return XML based on SOAP, extra bandwidth required

- Alternatively, consider:
  - REST (*REpresentational State Transfer*) based on HTTP requests (link)
  - Return data with JSON (*JavaScript Object Notation*) format (link)

```
[WebMethod]
[ScriptMethod(ResponseFormat = ResponseFormat.Json)]
public string PostData()
{
}
```

→ Return *string* is required for JSON

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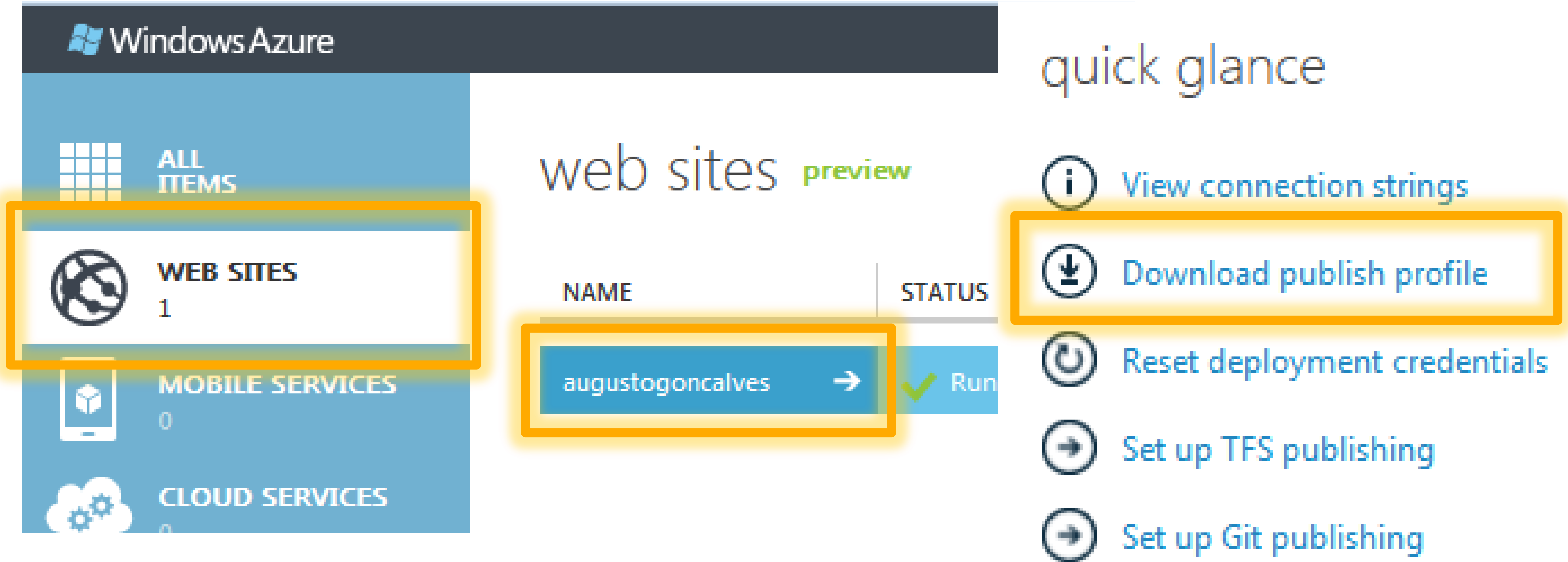
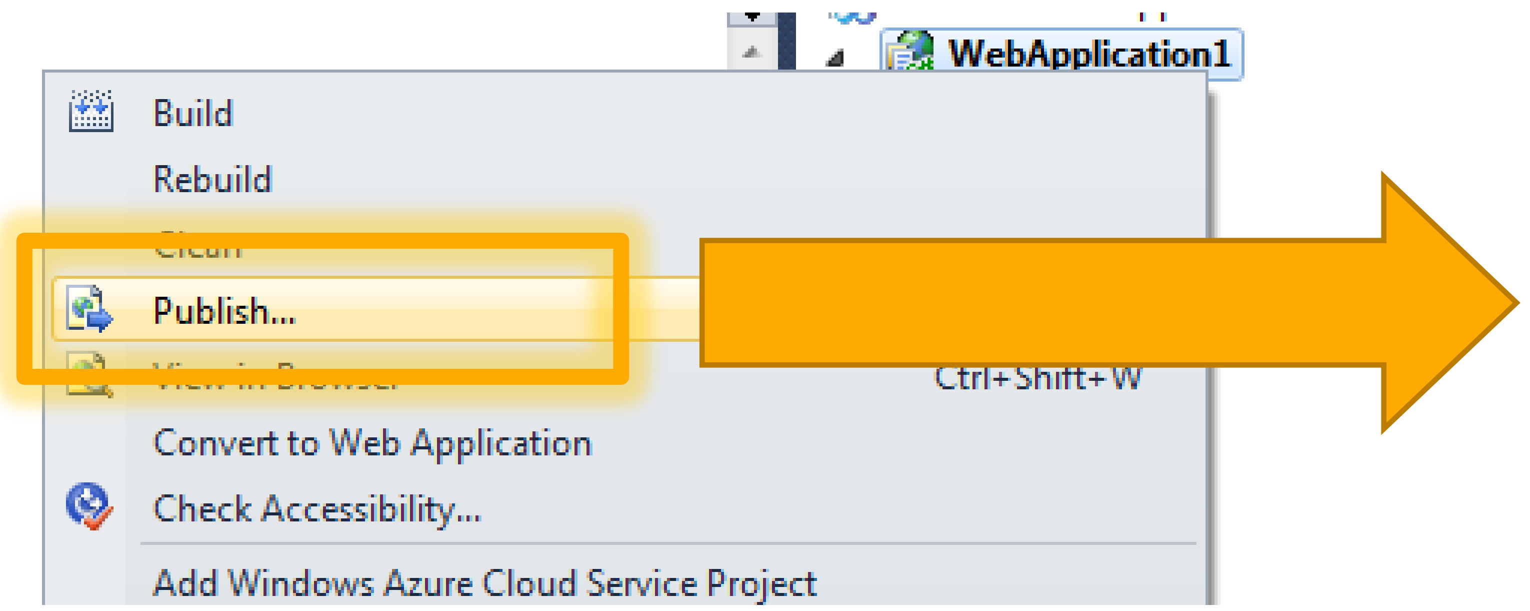
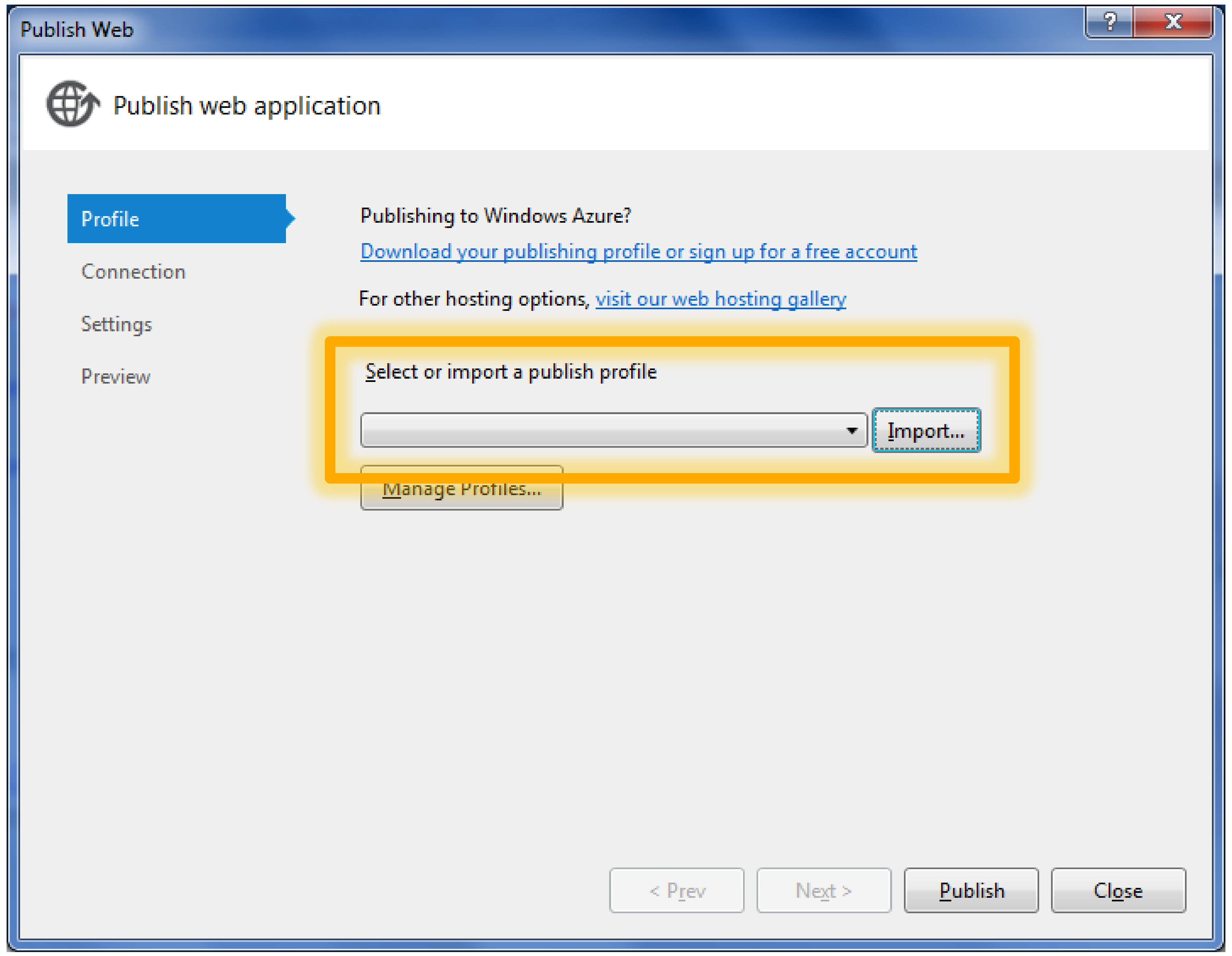
Deployment on Windows Azure

- Download publish settings from Azure account manager



- Publish using the settings




Publish Web
Publish web application
Profile
Connection
Settings
Preview
Publishing to Windows Azure?
Download your publishing profile or sign up for a free account
For other hosting options, visit our web hosting gallery
Select or import a publish profile
Import...
Manage Profiles...
< Prev
Next >
Publish
Close

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Demonstration

- Required
  - Visual Studio 2010
  - Windows Azure account
    - Web and Database features enabled
  - Extra: Geography data-type
    - Feature Pack with CLR Types for SQL Server 2010 (link)

- Windows Azure supports .NET 4.0 and SQL Server 2010 (September/2012)

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The Mobile (Android)

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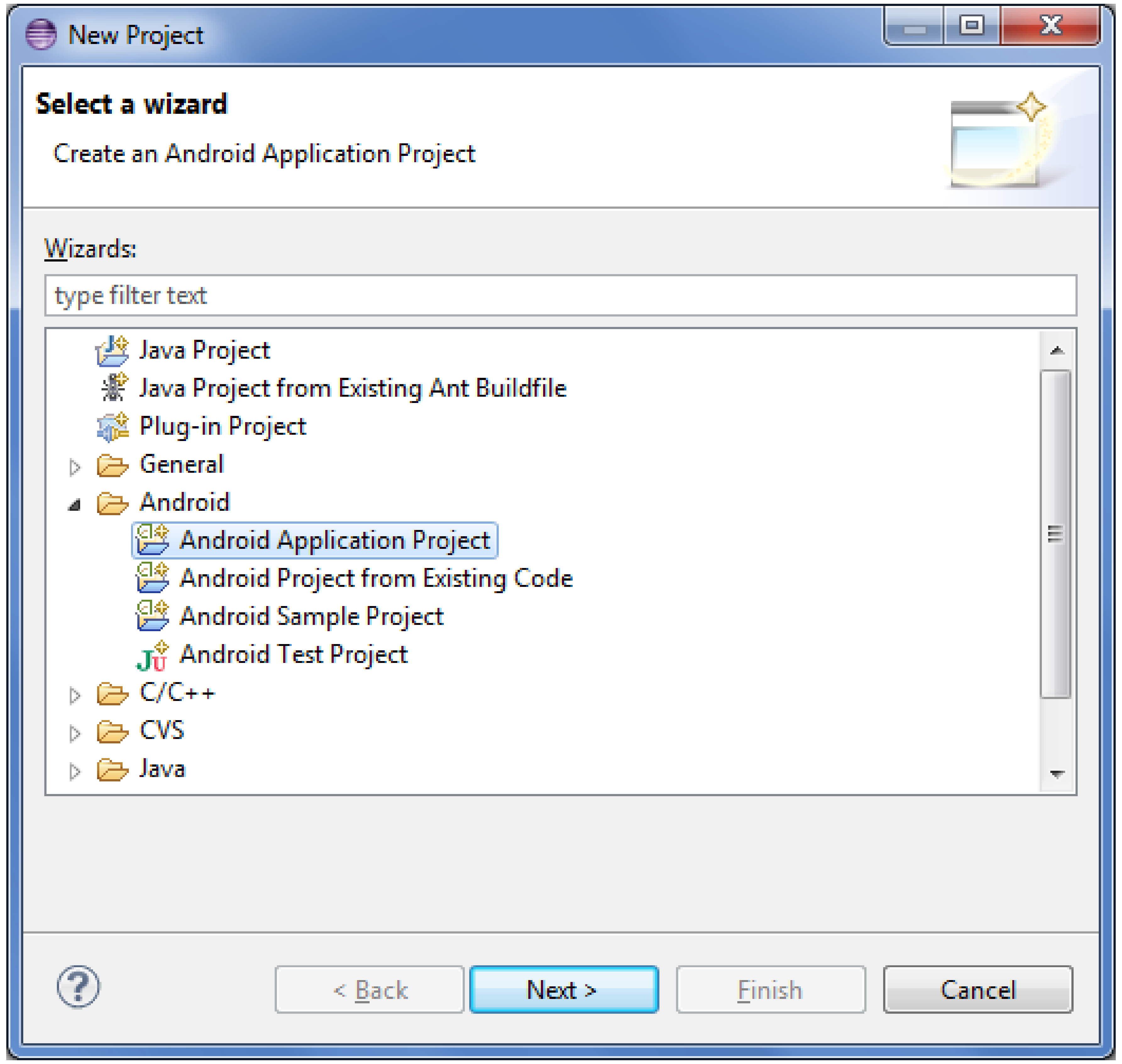
Overview Android Development

- Java based with custom Android JRE (Java Runtime Environment)

- Extreme version dependent
  - Android 2.2 (API 8) → 95%+ devices (September, 2012)

- Integrated with Eclipse
  - Easy SDK setup (Templates, Emulator, Drivers)



New Project

Select a wizard

Create an Android Application Project

Wizards:

type filter text

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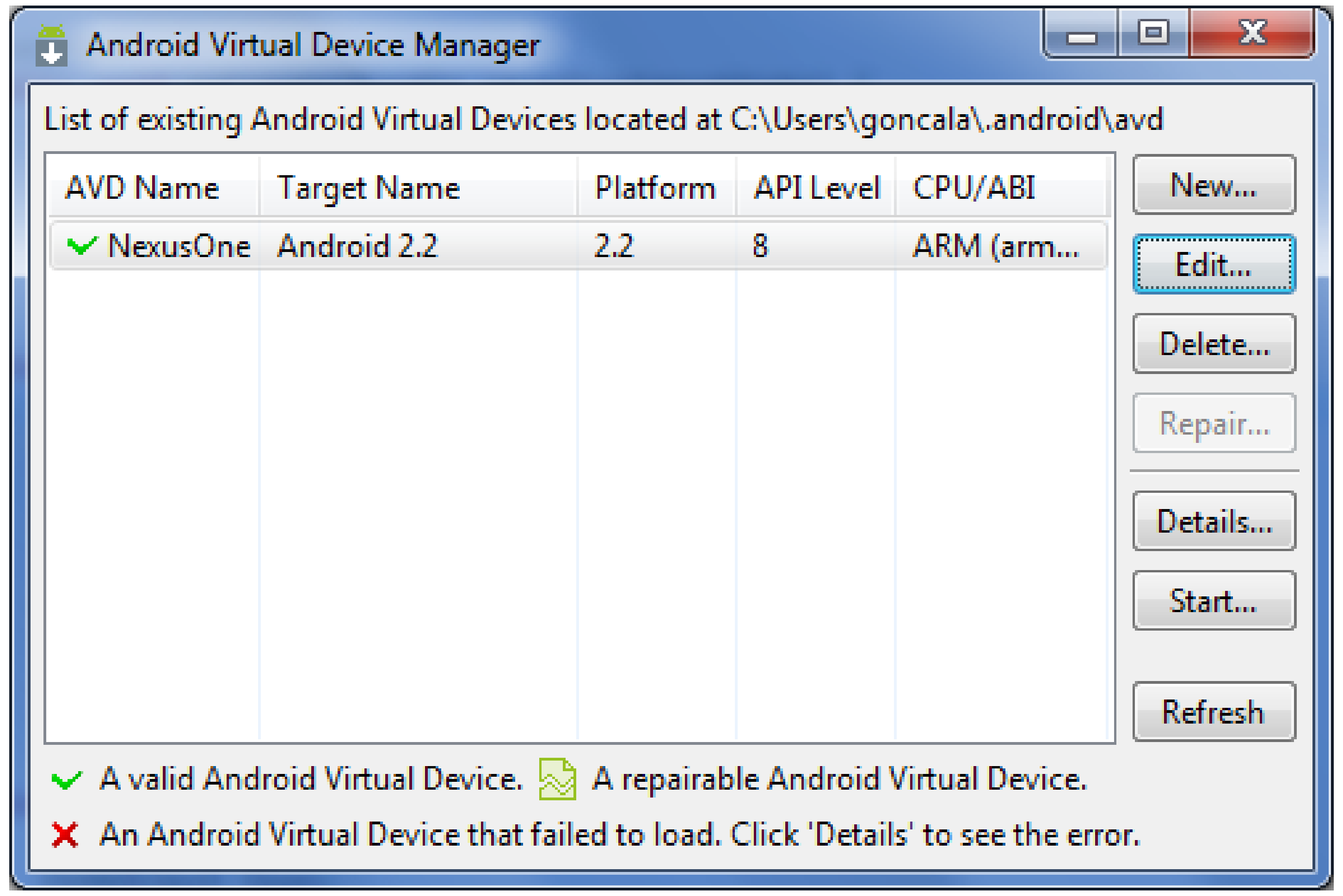
Set-up the environment

- With emulator or phone device (USB cable required)
  - Build SDCard (.iso) with [SDK]\tools\mksdcard.exe



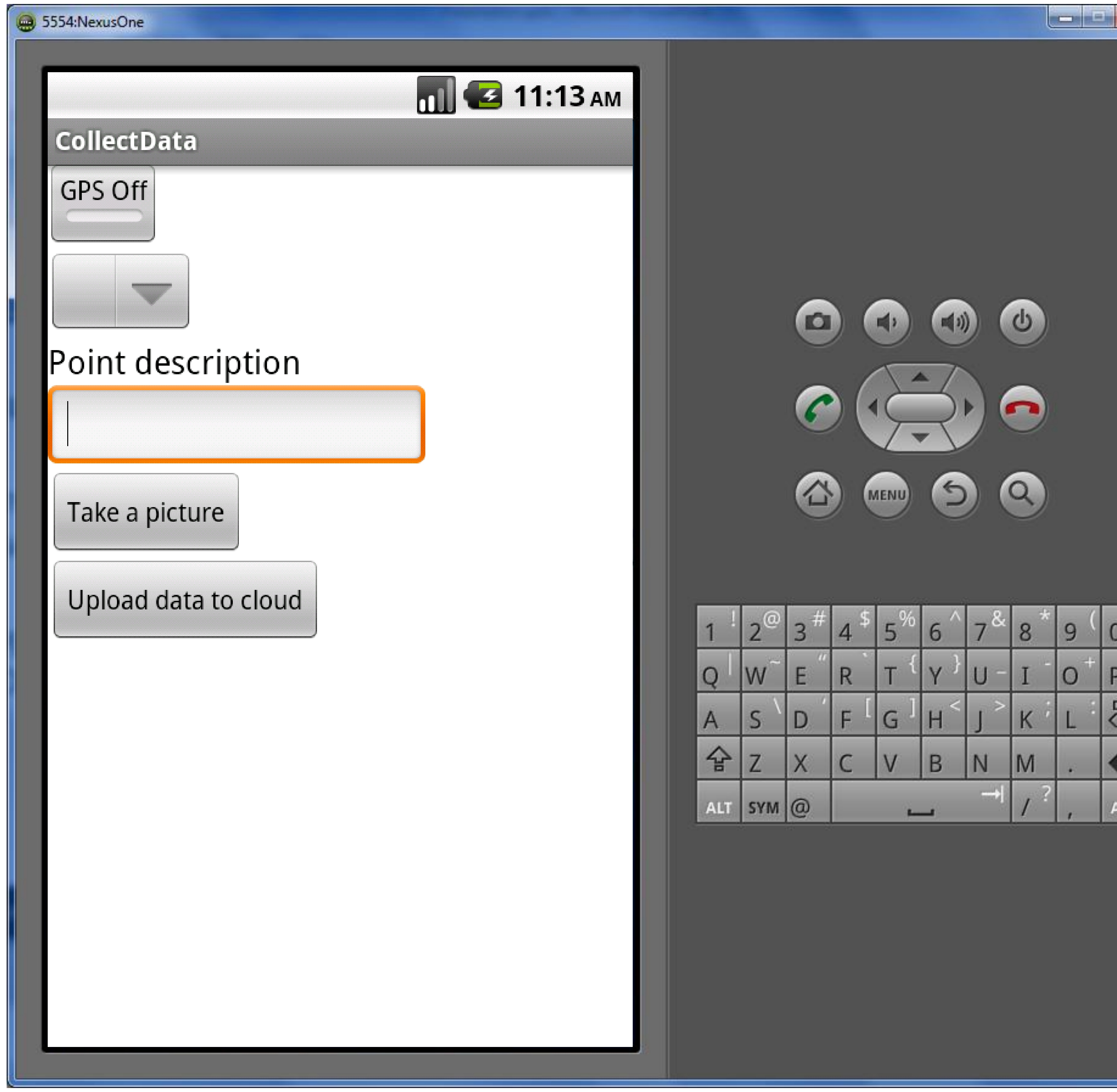
Android Virtual Device Manager

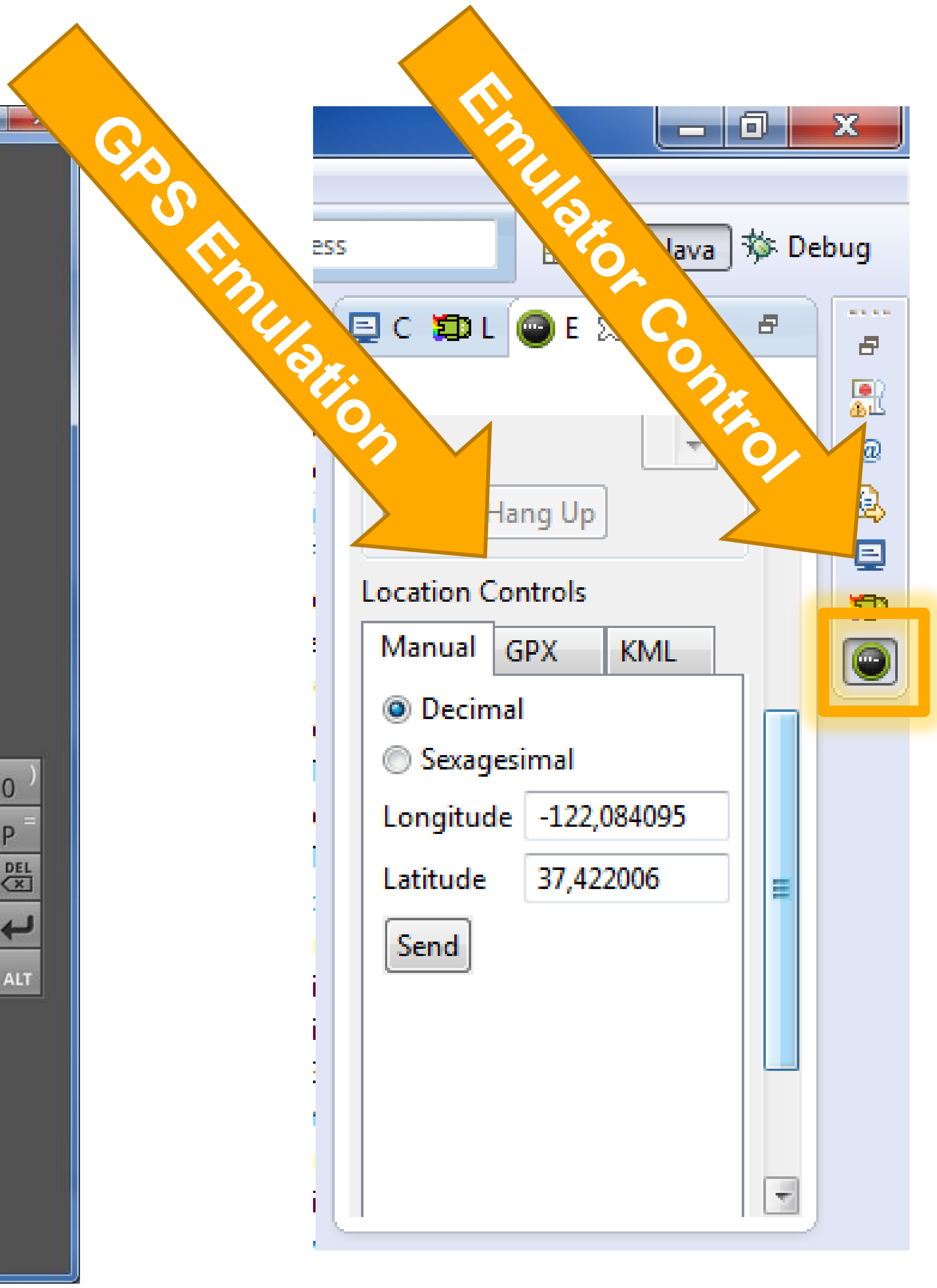
List of existing Android Virtual Devices located at C:\Users\goncala\.android\avd

AVD Name	Target Name	Platform	API Level	CPU/ABI
✓ NexusOne	Android 2.2	2.2	8	ARM (arm...

✓ A valid Android Virtual Device. A repairable Android Virtual Device.

✕ An Android Virtual Device that failed to load. Click 'Details' to see the error.





GPS Emulation

Emulator Control

Location Controls

● Decimal

○ Sexagesimal

Longitude -122,084095

Latitude 37,422006

- Debug works fine

- Integrated to Eclipse

General development tips

- Special attention to permissions (under manifest XML)

- Custom class extends Activity

- GPS require custom class
  - **LocationListener**, look for **onLocationChanged** method trigger

- Camera start a built-in activity
  - Call **startActivityForResult** and wait for result at **onActivityResult** callback
  - Emulator camera only on API 14 SDK ☹

- When connecting to localhost, use 10.0.2.2 instead

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Demonstration

- Required
  - Android SDK (link)
  - Eclipse IDE (link)
  - Java Development Kit (link)
  - Android phone & cable or emulator (SDK) with:
    - GPS (when debugging on device, go outside or close to a window ☺)
    - Camera (device only)
    - Data plan (for outdoor GPS positioning)

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In the field

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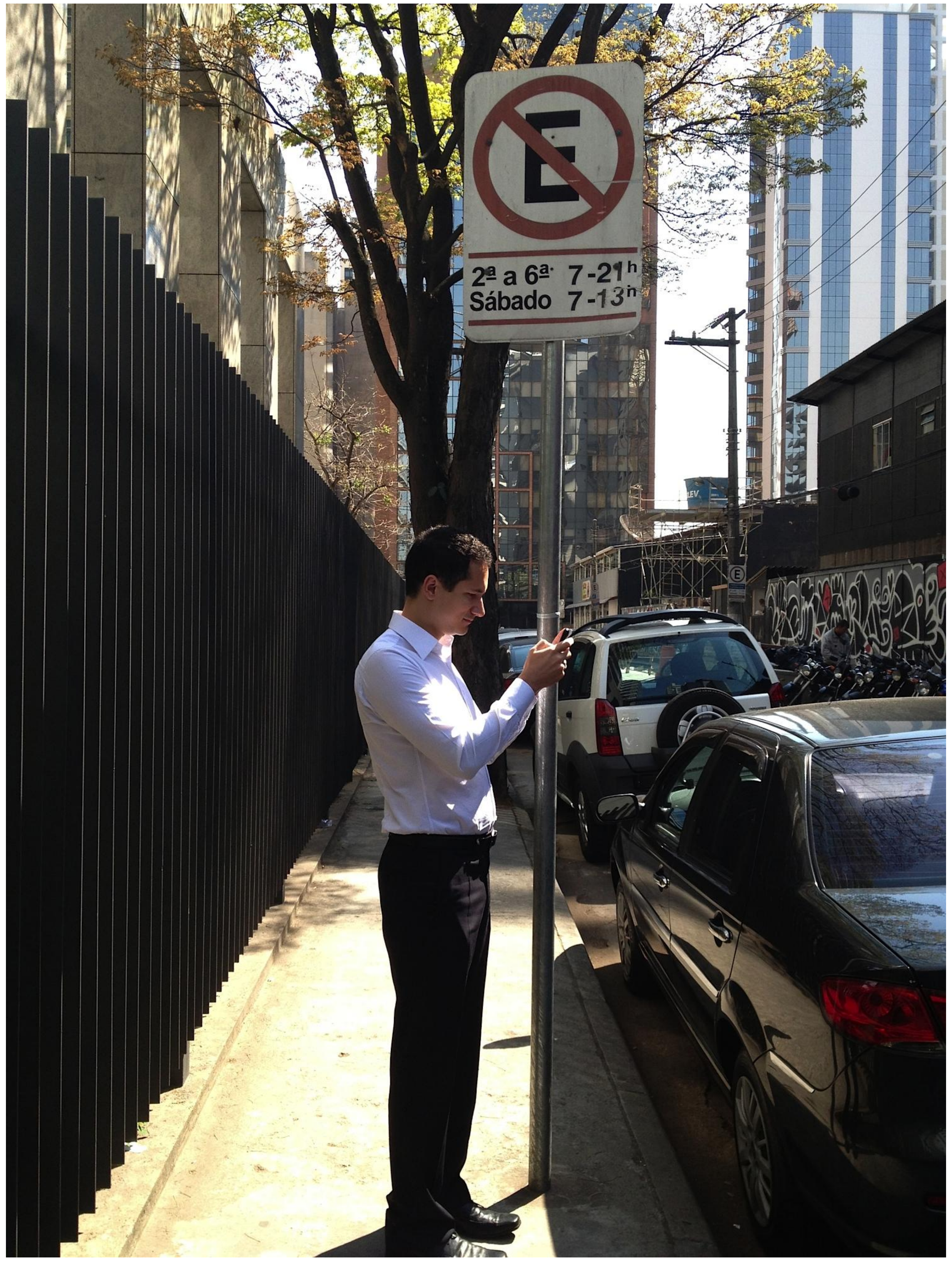
Collect data

- Take a picture

- Upload to the cloud
  (GPS is captured here)



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The Desktop (AutoCAD Civil 3D)

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Overview Civil 3D Development

- .NET based development with APIs
  - Create new DLLs and custom commands

- No special requirement, except a internet connection (Cloud access)

- AutoCAD & Civil 3D API trainings at Developer Center (link)

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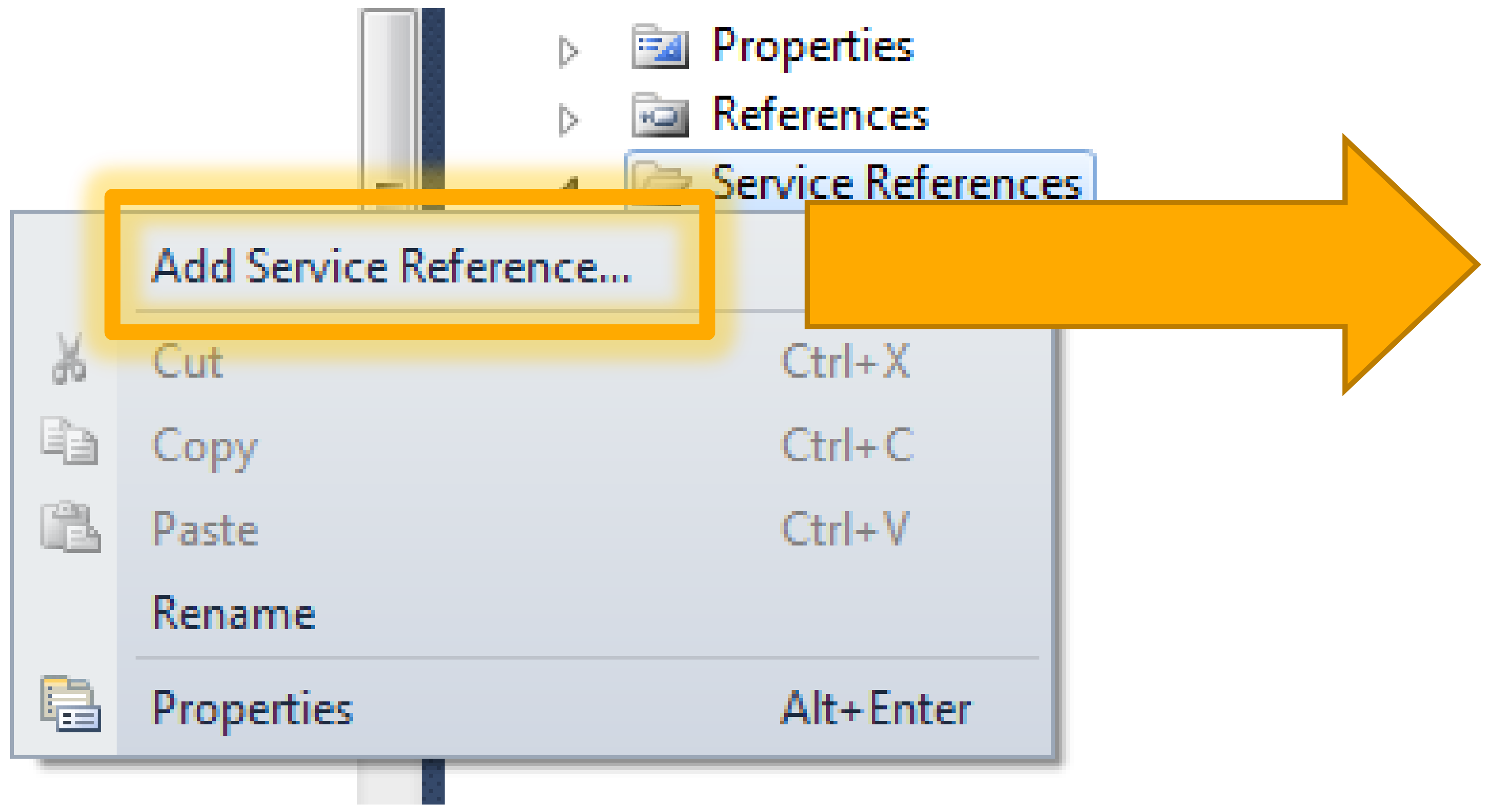
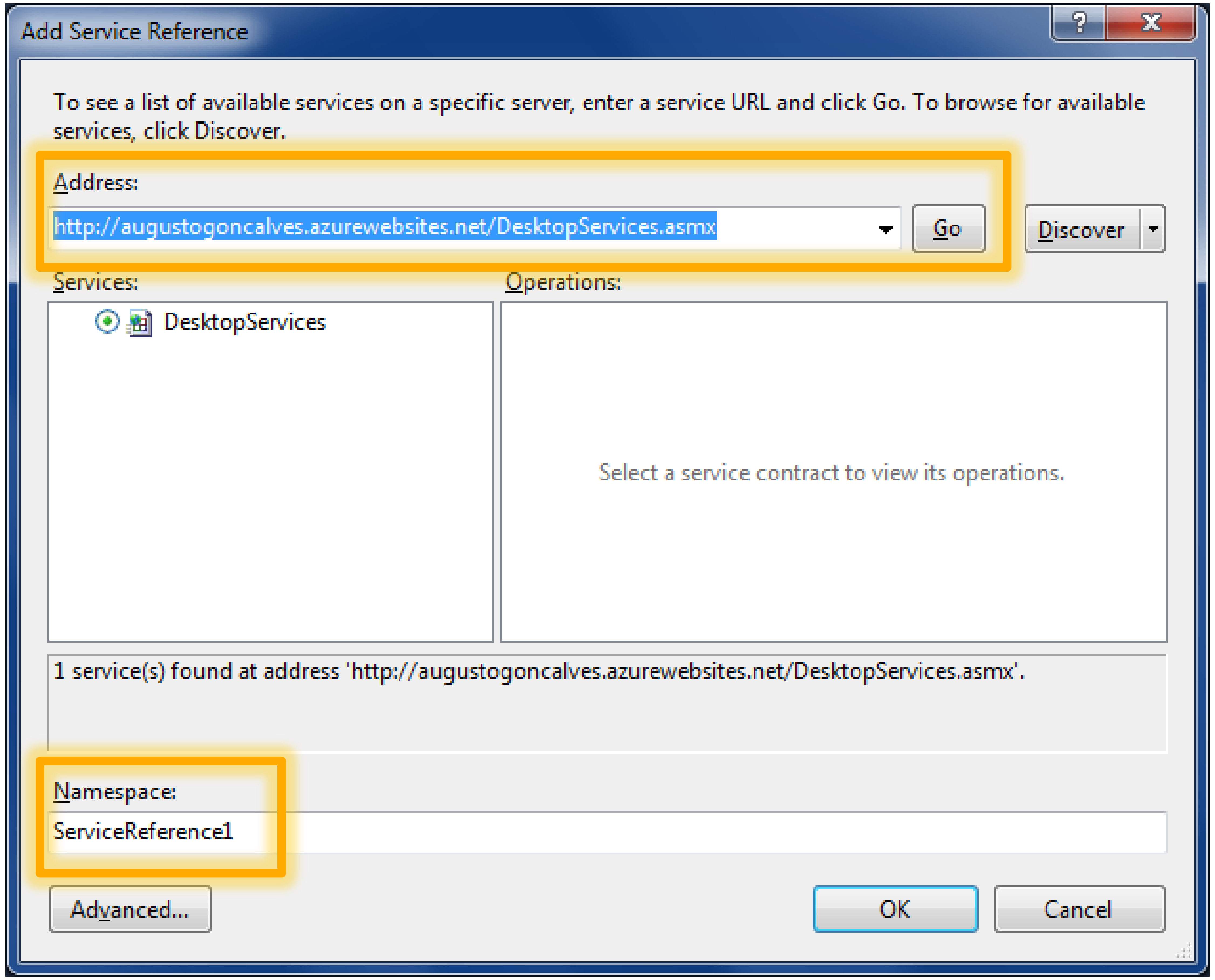
Accessing Web Services

- Configuration under app.config
  - Temporary solution: copy the content to AutoCAD config file





To see a list of available services on a specific server, enter a service URL and click Go. To browse for available services, click Discover.

Address: http://augustogoncalves.azurewebsites.net/DesktopServices.asmx

1 service(s) found at address 'http://augustogoncalves.azurewebsites.net/DesktopServices.asmx'.

Namespace: ServiceReference1

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Demonstration

- Required
  - AutoCAD Civil 3D 2013
    - Geo-referenced drawing
    - OSGeo DLL references for coordinate conversion
  - Visual Studio 2010 (.NET 4.0)

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Thank you

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