

Xamarin

<https://www.udemy.com/complete-xamarin-developer-course-ios-and-android/learn/v4/overview>

5/19

These notes at

https://drive.google.com/open?id=1thMVqj_X0JsEFS2sg-KsF1PT-abqG9WKpbspK8sQpd8

My Android phone is a GT-I8200 Android version 4.2.2 Jelly Bean API 17, c 2012

My PC is an Acer Spin 7

My Mac is a 2009 Macbook which can run up to 10.13.3 and thus up to Xcode 9.4 (not Xcode 10 or later)

NB

SORT OF WORKING-ISH SETUP (21/5/19)

2009 Mac: Mac VS 2019 with XCode 9.4, with only Xamarin.iOS 12.4 not 12.8.0.2, and iOS project linker set to 'Link SDK Framework Only'

Spin 7 PC: VS 2017 with connect to Mac using Xamarin.iOS 12.4 (see above), and iOS project linker set to 'Link SDK Framework Only'

1-1

Intro

Test Cloud available

Platform: Classic || Forms

2-2

Why

2-3

Classic

share 75% code

Use native libraries

Forms

1 project

share 100% code

Classic: If interacting with other apps, if using native APIs, if customising UI > sharing code

Forms: Prioritising code sharing

2-4

Demo/explanation of app to be written in course (travel and delivery)

2-5

Xamarin requirements

Windows would need network connection to a Mac device with iOS SDK

<https://docs.microsoft.com/en-us/xamarin/ios/get-started/installation/windows/connecting-to-mac/>

....or (if no Mac on network) possible alternative:

Xamarin Live Player (XLP) run on Android/iOS device, without cables (in beta, 2019)

Rent <https://www.macincloud.com/> PAYG \$1/hour static IP but no admin/root access unless dedicated server (\$50/month)

NB .ipa iOS App store <-> Package file zipped archive for .app package file

<https://en.wikipedia.org/wiki/.ipa>

Xamarin Live Player??

<https://docs.microsoft.com/en-us/xamarin/tools/live-player/install?tabs=windows>

VS/Tools/Options/Xamarin/Other:Enable Xamarin Live Player

For Android device, download on device from

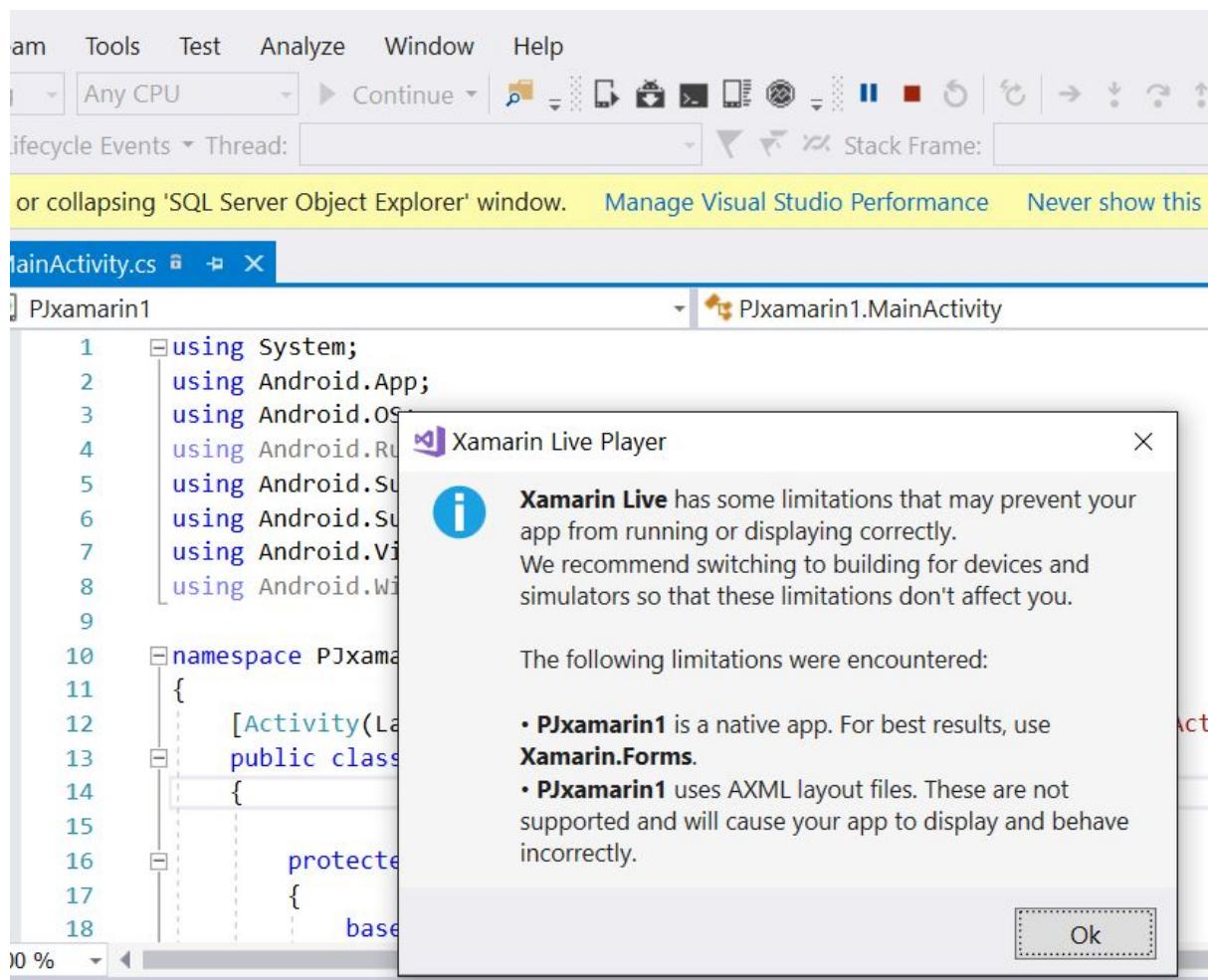
<https://rink.hockeyapp.net/recruit/56baa77dcff04fada2a6716522d19bbe>

NB Ensure **Settings/(More)/Security/Unknown Sources** : ticked

<https://www.androidcentral.com/unknown-sources>

('Unknown Sources' via *Settings*, before Oreo 4.10 Aug 2017 from whereon they're like permissions dialogue)

Xamarin Live Player not running all that well on my Android device



2-6

Installing XCode on Mac

(My case was more complicated as I couldn't install the latest version as 10.13.3 too outdated.)

2-7

Installing VS on Mac

2-8

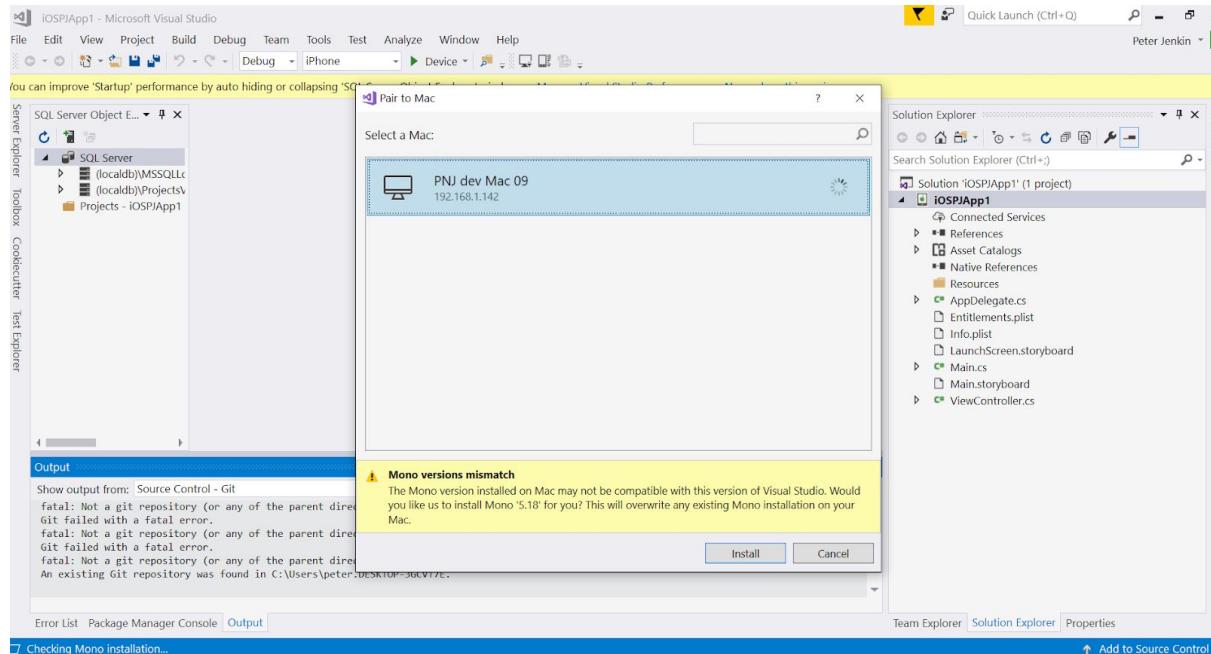
2-9

Connection between VS and a Mac

<https://docs.microsoft.com/en-us/xamarin/ios/get-started/installation/windows/connecting-to-mac/>

System Preferences/Sharing/Remote Login: All users

Seen on PC via bog-standard home Wifi connection:



MacOS's Mono used for building/running GUI

<https://www.monoproject.com/docs/about-mono/supported-platforms/macos/>

Installed new Mono, followed by warning:



Will try - this could mess up things (may require higher XCode than my Mac can run)

...

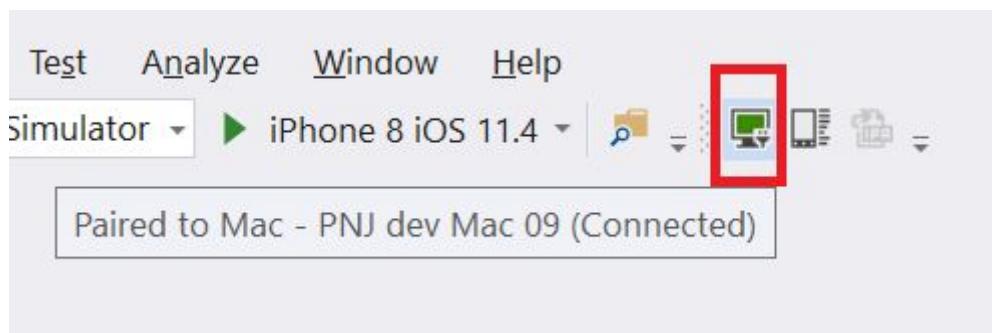
Installed.

Connect button

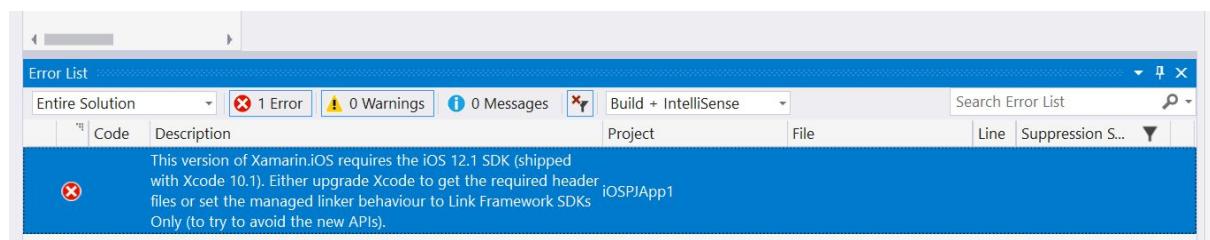
"Allow connection?" dialogue on Mac screen

"An unexpected error occurred while checking the SSH configuration of 'PNJ dev Mac 09' username"

<https://docs.microsoft.com/en-us/xamarin/ios/get-started/installation/windows/connecting-to-mac/troubleshooting>



Green pairing/connection icon ?



This version of Xamarin.iOS requires the iOS12.1 SDK (shipped with XCode 10.1 ... which my Mac cannot run.

Command line iOS12.1 ?

NB command line tools for XCode can be installed (see screenshot below), including an XCode 10.1 for macOS 10.13. This may include iOS SDK of 12 or greater ???.

To see the command line version of iOS SDK :

```
peterjenkin@PNJ-dev-Mac-09: ~ $ xcodebuild -showsdk
```

<https://stackoverflow.com/a/19377753/11365317>

d'oh!

peterjenkin@PNJ-dev-Mac-09: ~ \$ xcodebuild -showsdk

`xcode-select: error: tool 'xcodebuild' requires Xcode, but active developer directory '/Library/Developer/CommandLineTools' is a command line tools instance`

To enable the XCode command line tools : **sudo xcode-select -s**

<https://github.com/meteor/meteor/issues/7905#issuecomment-265836312>

```
peterjenkin@PNJ-dev-Mac-09: ~ $ sudo xcode-select -s
```

/Applications/Xcode.app/Contents/Developer

Password:

peterjenkin@PNJ-dev-Mac-09: ~ \$ **xcodebuild -showsdk**s

iOS SDKs:

iOS 11.4 -sdk iphoneos11.4

emulator SDKs:

Simulator - 10

macOS SDKs:

macOS 10.13 *-sdk macosx10.13*

tvOS SDKs:

tvOS 11.4 *-sdk appletvos11.4*

tvOS Simulator SDKs:

Simulator - tvOS 11.4 *-sdk appletvsimulator11.4*

watchOS SDKs:

watchOS 4.3 *-sdk watchos4.3*

watchOS Simulator SDKs:

Simulator - watchOS 4.3 *-sdk watchsimulator4.3*

From <https://developer.apple.com/downloads/more> , choose the Xcode Command Line Tools for Xcode 10.1 for macOS 10.13 - I might be able to run this on 10.13.3 and this might include iOS SDK 12.1.

Description	Release Date
+ Command Line Tools (macOS 10.14) for Xcode 10.2.1	Apr 17, 2019
+ Swift 5 Runtime Support for Command Line Tools	Mar 25, 2019
+ Command Line Tools (macOS 10.14) for Xcode 10.2	Mar 25, 2019
- Command Line Tools (macOS 10.13) for Xcode 10.1	Nov 2, 2018

NB for XCode 10.1 but for macOS 10.13

To check Xcode command line tools installed,

However, the version numbers of the iOS SDK are still the same (less than 12.1):

peterjenkin@PNJ-dev-Mac-09: ~ \$ xcodebuild -showsdk

iOS SDKs:

iOS 11.4 *-sdk iphoneos11.4*

iOS Simulator SDKs:

Simulator - iOS 11.4 *-sdk iphonesimulator11.4*

macOS SDKs:

macOS 10.13	-sdk macosx10.13
-------------	------------------

tvOS SDKs:

tvOS 11.4	-sdk appletvos11.4
-----------	--------------------

tvOS Simulator SDKs:

Simulator - tvOS 11.4	-sdk appletvsimulator11.4
-----------------------	---------------------------

watchOS SDKs:

watchOS 4.3	-sdk watchos4.3
-------------	-----------------

watchOS Simulator SDKs:

Simulator - watchOS 4.3	-sdk watchsimulator4.3
-------------------------	------------------------

NB **caffeinate** command to keep Mac from sleeping which could disrupt download

<https://apple.stackexchange.com/a/143652>

xcode-select -p may actually show current path of XCode command line tools

<https://stackoverflow.com/a/40008480/11365317>

XCode command line tools usually in Library/Developer/CommandLineTools but this would depend on use of **xcode-select**

Xcode-select to manage different installations of XCode

<http://iosdevelopertips.com/xcode/xcode-select-managing-multiple-versions-of-xcode.html>

<https://macops.ca/developer-binaries-on-os-x-xcode-select-and-xcrun/>

<http://osxdaily.com/2014/02/12/install-command-line-tools-mac-os-x/>

<https://medium.com/@hacknicity/working-with-multiple-versions-of-xcode-e331c01aa6bc>

TODO: see whether possible to have separate Xcode command line tool installation in different path (maybe xcode-select) with iOS 12.1 for 10.13 and use this as iOS SDK path in VS settings.

.....

Gave up on getting iOS 12.1 SDK onto my old Mac

VS/Project/Properties/iOS Build/Linker Behaviour:Link Framework SDKs only

(not 'Link All' (default) and not 'Don't Link')

Mtouch - used when building - 'Link All' will optimise somewhat .

Build Options (eg only to Framework SDKs) :

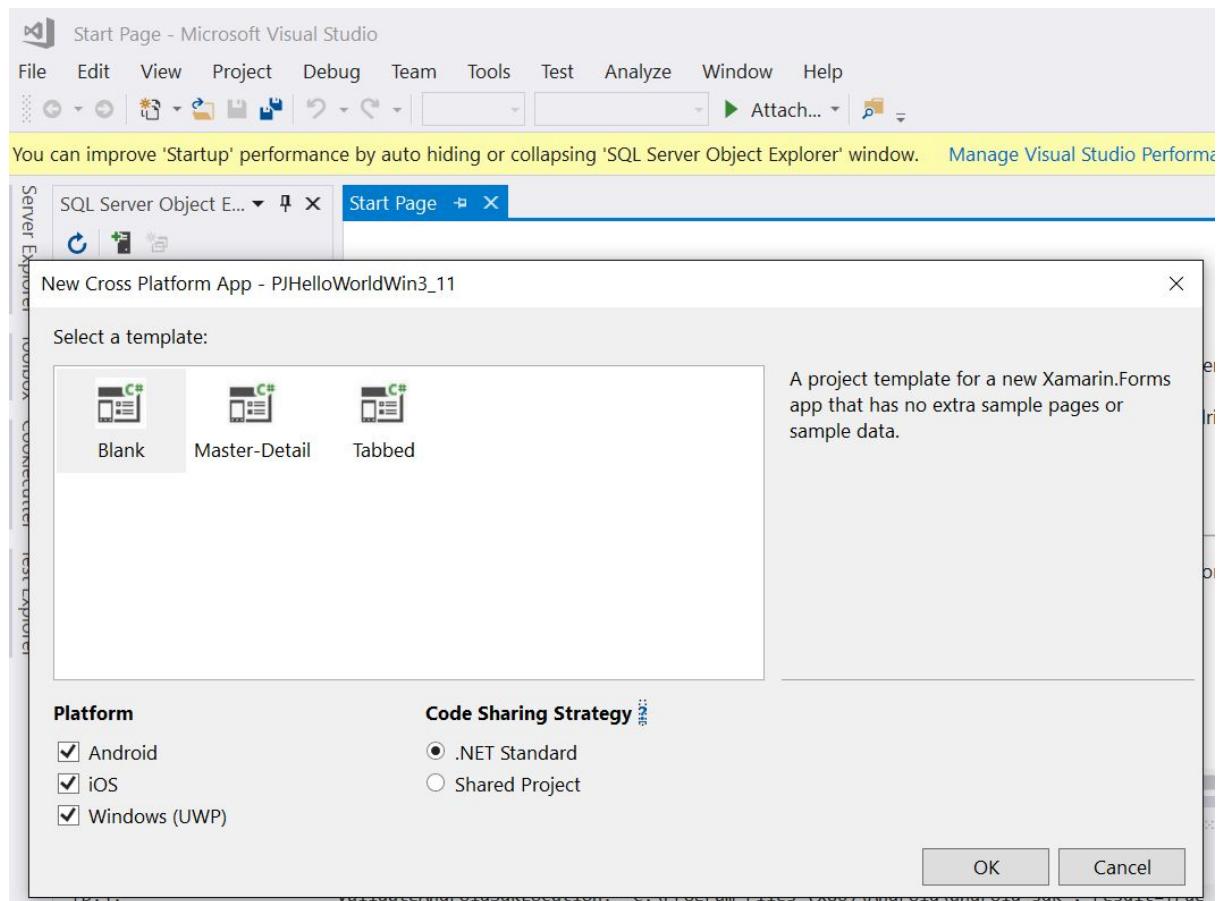
<https://www.c-sharpcorner.com/blogs/xamarinios-build-options>

Shared Projects - resources included inside project: shared code can be in platform specific branches(eg iOS, Android); but ... no single output which to share & refactorings of inactive platform may not take effect

Portable Class Libraries (PCL) - will produce portable assembly dll referenced to project: refactoring will update all references & good for sharing the assembly dll with other developers in a team (most important), but ... no platform specific references can be made, and because only 1 platform may be selected on starting new project (eg iOS) only a subset of .NET framework (appropriate to that platform) will be available.

The choice in VS 2017 will appear in new project 2nd dialogue, under 'Code Sharing Strategy'

<https://docs.microsoft.com/en-gb/xamarin/cross-platform/app-fundamentals/code-sharing>,



May be absent from VS 2019 onward, ie PCL Portable Class Library is the default in VS 2019 (hence no option).

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Shared Project vs .NET Standard Libraries (Mac VS only)

Shared Project - all resources inside project (all files), can be branched (to specific platforms eg iOS, Android)

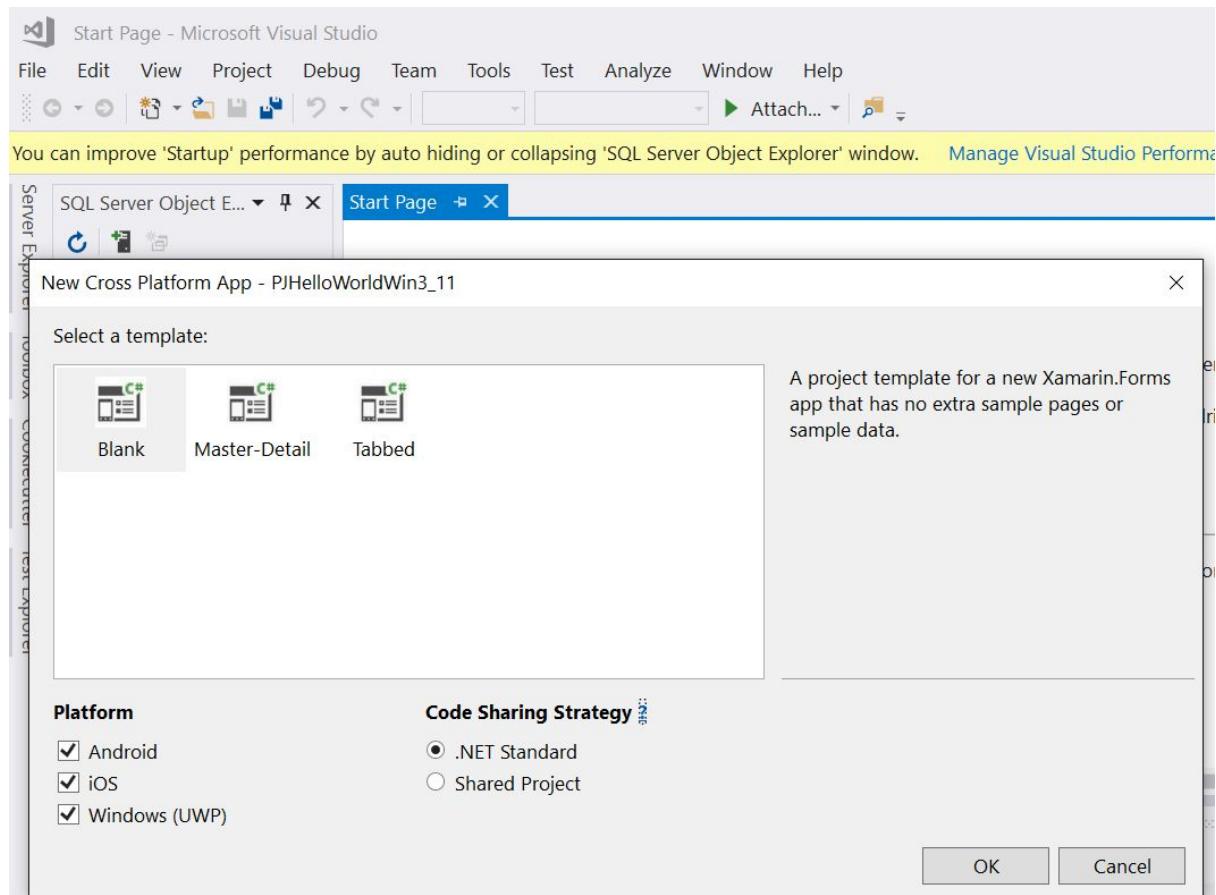
.NET Standard Libraries - will reference a portable assembly of the .NET Standard project (all into a .dll file), can be more documentation/forum posts, easier to share the dll assembly (most important)

See 3-10 re Shared Project cs Portable Class Libraries

3-12

Hello World app

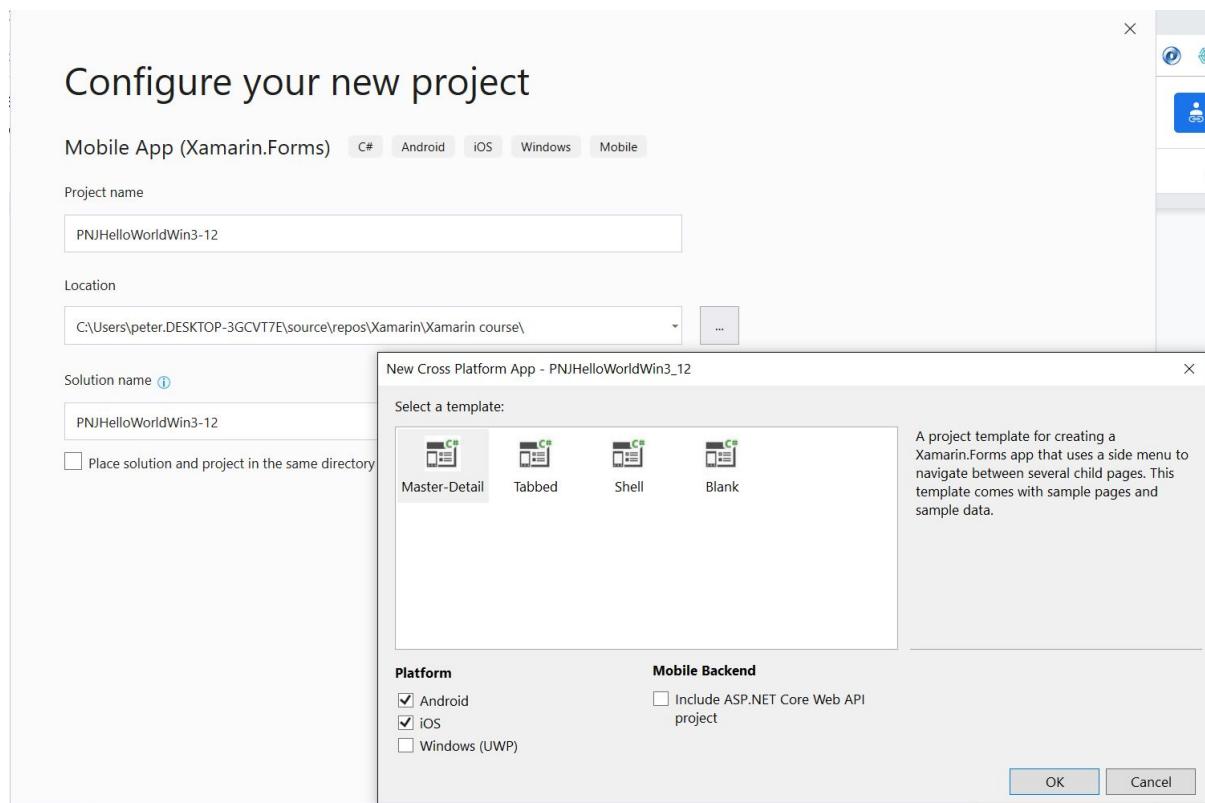
Type 'xamarin' in search box and choose 'Mobile App (Xamarin.Forms)' (also in *Visual C#/Cross-Platform*)



NB hyphens-in-name converted to _underscore

Using Blank at first to help understand contents of project. Platforms can be selected/deselected.

Generated: 1 solution (.sln) with n + 1 projects (folder with, inter alia, .csproj).



NB I uninstalled VS 2017 and installed VS 2019 here.

After VS 2019 install, once more on trying to pair/connect, insufficient version of Xamarin.iOS for VS 2019 to be compatible. Opted to allow installation on Mac (from PC) of Xamarin.iOS 12.8.02 (fingers crossed).

Severity	Code Description	Project File	Line	Suppression State
Error	<i>The Xcode version installed on the Mac (9.4) is not compatible with this version of Visual Studio. This may cause unexpected warnings or errors when building and deploying iOS projects. Please install Xcode '10.2' or visit the documentation to learn more.</i>			

0

MainPage.xaml (not MainPage.xaml.cs) a good starting point.

<< at bottom-left to expand the designer pane

NB *Developer Mode* in *Update & Security* in Windows settings.

On Build, 'Failed to create JavaType ...'

https://developercommunity.visualstudio.com/content/problem/521034/failed-to-create-javaty_peinfo.html

Path was too long (cf similar problem with Android Studio) so perhaps use from C:\ (absurd problem - use symbolic links maybe???)

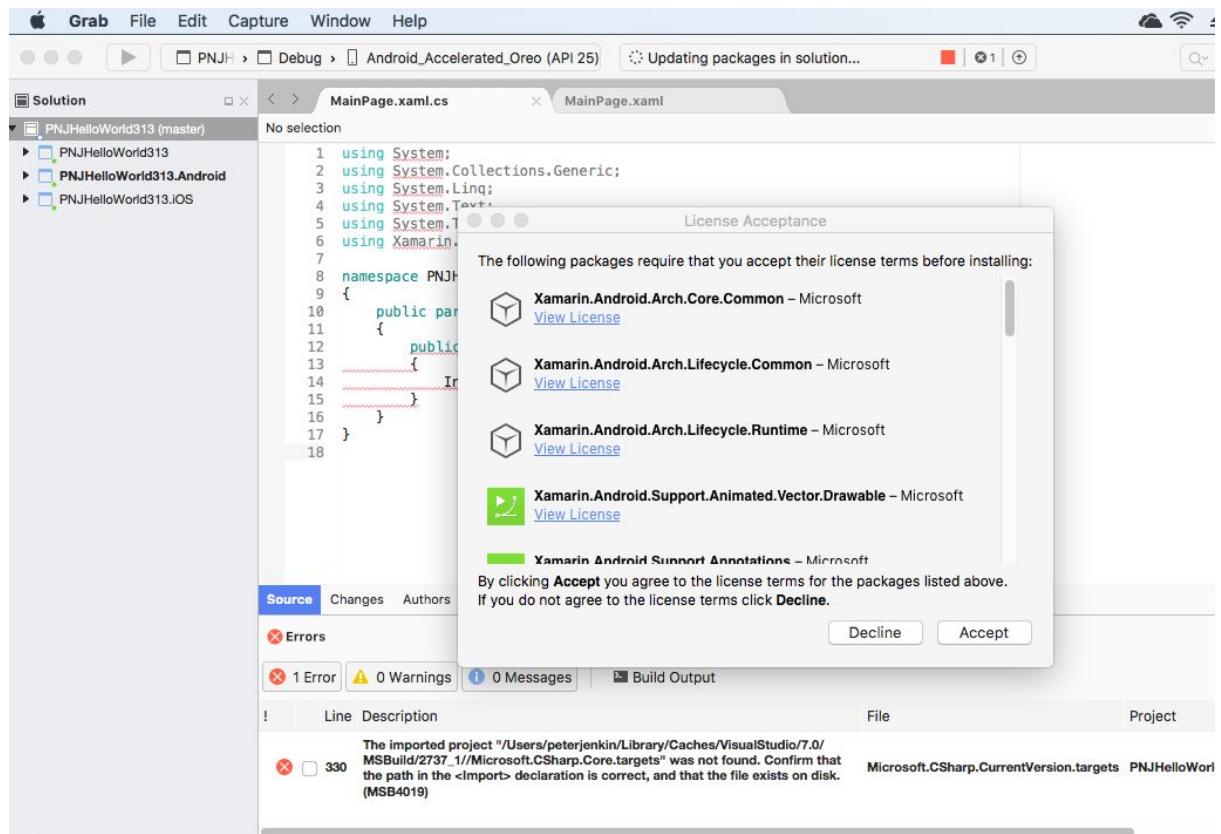
Mac VS (2017)

2017 installed on my Mac (though 2019 available from April 2019, but this may not work well with my old Mac which can't run Xcode 10).

As per Windows VS.

Select option 'Use .NET Standard' in new project dialogue

(21/5/19) Mac VS 2017 - using System - The type or namespace System could not be found:
Project/'Update NuGet Packages'



build Error 'The imported project Was not found' MSB4019

VS 2017 File/'Check for updates' but this is including Xamarin.iOS 12.8.0.2 which won't work with PC VS 2017 - might have to load this too and unload in favour of 12.4 later :-(ugg

Installed all 8 suggested Mac VS 2017 updates, including to Mono Mac. Mac VS 2017 updated to VS 2019 - in a demo project *deletethis* I had to right-click the iOS project, go to iOS Build and then set Linker to 'Link SDK Framework Only' (as usual) to get the iOS to build (successfully).

Warnings re Xcode 9.4.1 being too low for Xamarin.iOS 12.8.02 - as it happened, anyway PC VS 2017 complained about version of Xamarin.IOS 12.8.02 being incompatible with PC VS 2017 - so I took the option (on PC) to over-install (on Mac) Xamarin.iOS 12.4 instead....

NB

SORT OF WORKING-ISH SETUP (21/5/19)

2009 Mac: Mac VS 2019 with XCode 9.4, with only Xamarin.iOS 12.4 not 12.8.0.2, and iOS project linker set to 'Link SDK Framework Only'

Spin 7 PC: VS 2017 with connect to Mac using Xamarin.iOS 12.4 (see above), and iOS project linker set to ‘Link SDK Framework Only’

Installed VS 2019 but wouldn't work with the Mac's Xcode 9.4 version.

Reinstalled VS 2017 as well, and had to re-install (from PC VS 2017) an older 12.4 (from 12.8.0.2 for VS 2019) version of Xamarin.iOS on the Mac - this wouldn't work until Project/iOS Build/Linker Behaviour set to ‘Link Framework SDKs Only’ - then build of iOS project worked in VS 2017.

Might have to work on VS 2017 and try flipping to VS 2019 occasionally to see newer features.

VS 2017 & VS 2019 solutions/projects compatible (apparently).

3-14

Structure of generated projects

n+1 projects (1 per platform, plus master project)

MainPage.xaml - main view (would be displayed if project run immediately) - containing markup and also a class definition:

```
<?xml version="1.0" encoding="utf-8" ?>
<ContentPage xmlns="http://xamarin.com/schemas/2014/forms"
    xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
    xmlns:local="clr-namespace:deletethis"
    x:Class="deletethis.MainPage">

    <StackLayout>
        <!-- Place new controls here -->
        <Label Text="Welcome to Xamarin.Forms!" 
            HorizontalOptions="Center"
            VerticalOptions="CenterAndExpand" />
    </StackLayout>

</ContentPage>
```

In **MainPage.xaml.cs** also there is a class definition:

```
public partial class MainPage : ContentPage
```

... because **partial** can be multiply redefined in different files.

App.xaml and **App.xaml.cs** are entry points -

```
<?xml version="1.0" encoding="utf-8" ?>
```

```

<Application xmlns="http://xamarin.com/schemas/2014/forms"
    xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
    x:Class="deletethis.App">
<Application.Resources>

</Application.Resources>
</Application>

```

App.xaml cannot be rendered but can be used to **set resources** (eg colours, styles)

App.xaml.cs will contain code to start the app

namespace deletethis

{

```

public partial class App : Application

public App()
{
    InitializeComponent();

    MainPage = new MainPage();
}

```

Dependencies, containing NuGet packages.

Packages for 3rd party code in Android and iOS

Main Activity in Android app is entry point - calling constructor .

LoadApplication(new App());

AppDelegate in iOS app is its entry point - also calling constructor

LoadApplication(new App());

Diagram needed.

Main App in MainPage.xaml is call to constructor in MainPage.xaml.cs .

Both iOS and Android **References** will reference the main app class (HelloWord, deletethis &c) so that's how they will both use the common code there.

eXtensible Application Markup Language (XAML)

<https://docs.microsoft.com/en-us/dotnet/framework/wpf/advanced/xaml-overview-wpf>

https://en.wikipedia.org/wiki/Extensible_Application_Markup_Language

3-15

XAML introduction

NB MainPage class inheriting from ContentPage class

ContentPage -> StackLayout - containing eg. Label

NB for Label, *VerticalOptions="CenterAndExpand"* so as to fill container before centreing, else would only centre in small space taken up (vertically) - however, just '*Center*' may be preferable for a compact stack of elements.

Stack Layout to stack elements *vertically* 1-after-another, rather than allowing them all to occupy the same space (with only 1 visible)

<https://docs.microsoft.com/en-us/xamarin/xamarin-forms/user-interface/layouts/stack-layout>
<https://docs.microsoft.com/en-us/dotnet/api/xamarin.forms.stacklayout?view=xamarin-forms>

```
<StackLayout Margin="16,16,16,0">
    <!-- Margin single value applied to all sides; if 2, 1st vertical 2nd horizontal margins; if 4,
left,top,right,bottom -->
    <!-- Place new controls here -->
    <Label Text="Welcome to Xamarin.Forms!" 
        HorizontalOptions="Center"
        VerticalOptions="Center" /> <!-- was CenterAndExpand vertically, squashing other
elements out -->
    <Entry Placeholder="Write your name please" />
    <Button Text="Click to say Hello !"
        Clicked="Button_Clicked"/>
</StackLayout>
```

F12 to get to event handler code (if required)

3-16

Code in button click event handler

Handle_Clicked in VS2019; Button_Clicked in VS2017?

In XAML:

```
<Entry x:Name="nameEntry" Placeholder="Write your name please" />
And then in MainPage.xaml.cs
```

NB x: XAML field modifier

<https://docs.microsoft.com/en-us/xamarin/xamarin-forms/xaml/field-modifiers>

NB for ‘Show All Files’ button in Solution Explorer, a *project*, not *solution*, must be selected

Show All Files - in **obj/MainPage.xaml.g.cs** will be another (.g for auto-generated - objects with properties such as XML/XML fields) *partial* class for MainPage (cf 3-11) - will contain members for any XAML-defined elements (eg Entry with x:name="userName")
XAML -> **obj/MainPage.xaml.g.cs** -> MainPage.xaml.cs MainPage::Button_Clicked(&c &c

```
{
    public partial class MainPage : ContentPage
    {
        public MainPage()
        {
            InitializeComponent();
        }

        private void Button_Clicked(object sender, EventArgs e)
```

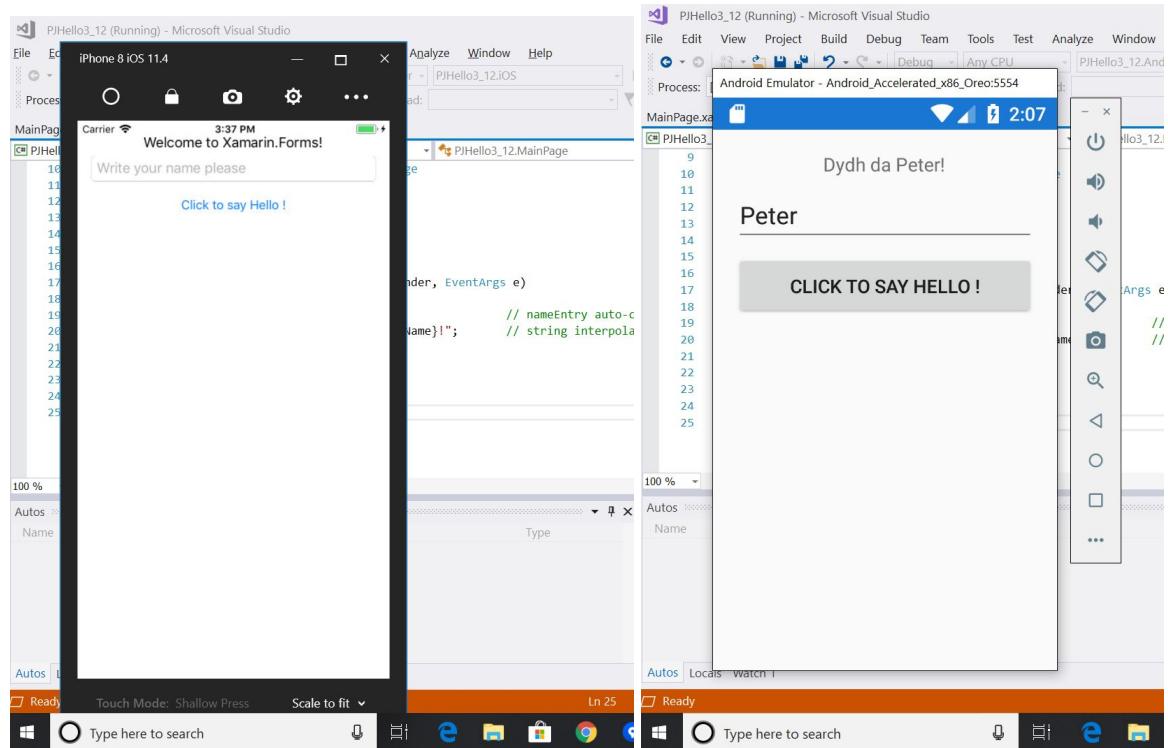
```

    {
        string userName = nameEntry.Text;           // nameEntry auto-completed after
XAML declaration
        string greeting = $"Dydh da {userName}!";   // string interpolation
        greetingLabel.Text = greeting;
    }
}
}

```

3-17

Android emulator took about 3 minutes to start up first time - similar for iPhone emulator - both might need stopping and starting a couple of times at first



3-19

Xamarin Device Manager (for Android APIs after 26)

Emulation of Oreo / 8.0 (API 26) or higher no longer supported by Google but supported by Microsoft Xamarin Device Manager Tools/Android/Android SDK Manager

Tools tab/ version 26 or higher required for installation of 'Xamarin Device Manager' (for later APIs) - click Apply to install if needed

(No option for 'Xamarin Device Manager' in installer as at 5/19)

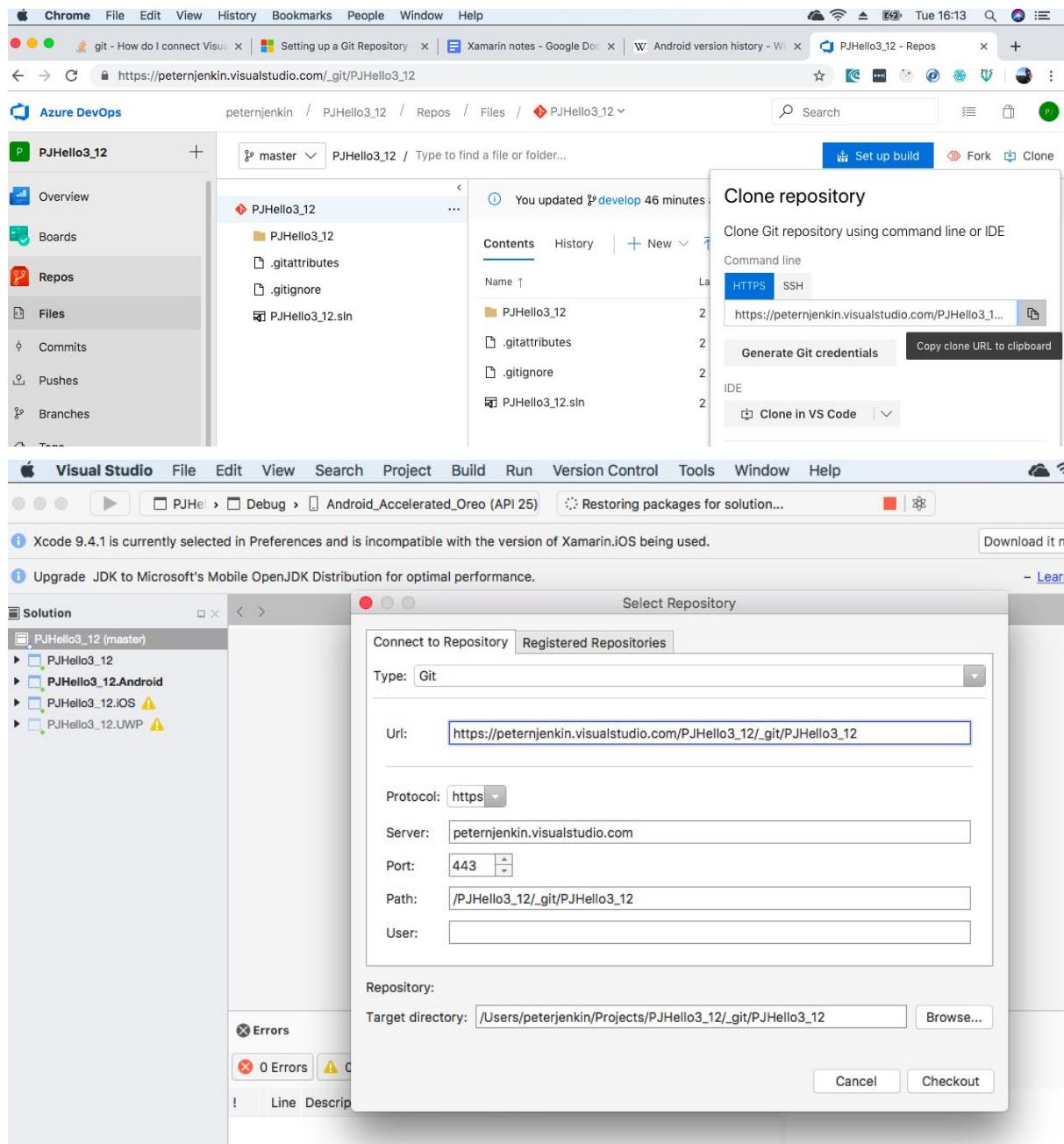
3-20

Running on an iOS simulator

Connecting to Azure Dev Ops (Microsoft Team Services as was)

<https://stackoverflow.com/a/52340854/11365317>

<https://docs.microsoft.com/en-us/visualstudio/mac/set-up-git-repository?view=vsmac-2019#checkout-an-existing-repository>



Use *Version Control/Manage Branches and Remotes/Remote Sources/ ‘track in local branch’* to make new local branch (eg ‘develop’) if necessary. Then *Version Control/Manage Branches and Remotes/Branches/‘Switch to branch’* to use this branch in Mac VS.

3-21

Remote iOS emulator on Windows

(see screen shot above)

NB Touch screen can be used with emulator

3-22

Debugging Xamarin apps

4-23

.NET Standard Project

- PCL (an older version of) ~= .NET Standard Project
- Uniformity of API over different platforms; enables bespoke portable library writing to work on any .NET; superseding conditional compilation (ie compilation per-platform)
- PCL is somewhat platform-constricted (relying on intersections of platforms rather than curated API), and focussed on Microsoft platforms
- Some auto-complete snippets may not be ready in the IDEs as yet
- Some NuGet packages already written for .NET Standard instead of PCL (may need to use older, PCL version at times)

PCL == .NET Standard (nearlyabout)

<https://www.infoq.com/news/2017/10/dotnet-core-standard-difference/>

<https://docs.microsoft.com/en-us/dotnet/standard/net-standard>

4-24

By first defining name of an element/control using a field modifier x: ---, event handler is named accordingly

```
<Button x:Name="LoginButton"  
       Text="Log in"  
       Clicked="LoginButton_Clicked"  
       />  
(leading to autocompleted)  
private void LoginButton_Clicked(object sender, EventArgs e)  
{
```

NB Whack-Whack extension to have a terminal window from VS

<http://hermit.no/adding-a-terminal-window-to-visual-studio-2017/>

Tools/Updates and Extensions - Online

4-25

Email keyboard, placeholders and password hiding

```
<Entry x:Name="email"  
       Placeholder="Email address"  
       Keyboard="Email"/>  
<Entry x:Name="password"  
       Placeholder="Password"  
       IsPassword="True"/>  
<Button x:Name="LoginButton"
```

```
Text="Log in"  
Clicked="LoginButton_Clicked"
```

4-26

Form Previewer

View/OtherWindows/Xamarin Form Previewer - Or just use << at bottom-right
Save time to check changes, rather than re-running (can preview iOS also if Mac connected)
This will be in Design Mode (can be detected at run time)
<https://docs.microsoft.com/en-us/xamarin/xamarin-forms/xaml/xaml-previewer/?pivots=windows>

NB: push to all remotes at once (eg to Azure Dev Ops and to Github, having added remote origins (distinctly named) for both

<https://stackoverflow.com/questions/5785549/able-to-push-to-all-git-remotes-with-the-one-command>

<https://stackoverflow.com/a/18674313/11365317>

In Linux/UNIX: git remote | xargs -L1 git push --all

<https://five.agency/powershell-tips-for-bash-users/>

NB however, xargs not in DOS or posh - use \${} to loop instead and \${_} to get piped variable?

Working in posh:

`git remote | %{git push ${_} --all}`

<https://git-scm.com/book/en/v2/Git-Basics-Git-Aliases>

If writing git alias with external command (eg posh or bash), start (quoted) command string with ! exclamation mark.

Also use powershell.exe if necessary with nested single/double quotes

<https://stackoverflow.com/q/43659060/11365317>

```
git config --global alias.pushall "!powershell.exe -command 'git remote | %{git push ${_} --all}'"
```

(NB not curly smart-quote apostrophes)

to make

`git pushall`

This `git pushall` from git alias NOT WORKING fully AT MO - ONLY DOING 2nd VSTS/Azure DevOps push, not 1st to github henceforth push all branches to all remotes.

(Check config, if a friendly non-vi editor has been configured, with `git config --edit --global`)

(TODO: also possible using git config to set up a static list of remotes and push to them all as 'origin')

4-27

Margins added

Margins can displace other elements and affect centreing.

4-28

Login logic

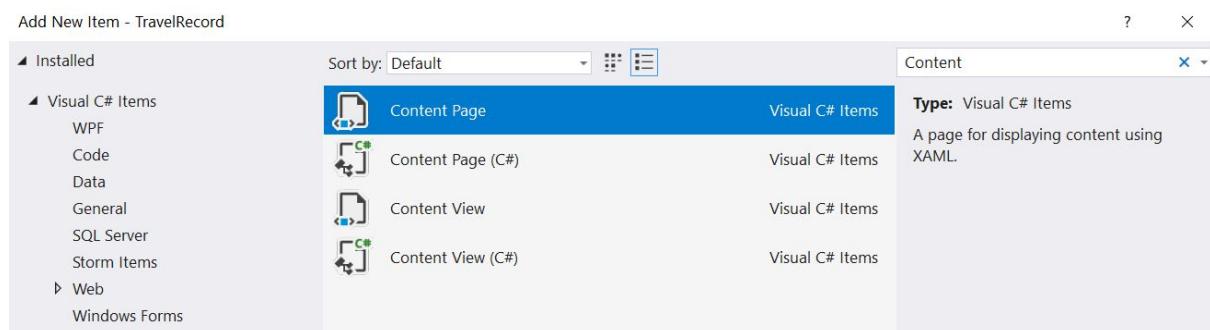
Discussing if/else

4-29

Adding navigation page, navigating thereto & changing entry point

In Solution Explorer, go to Travel Record (may be listed as 'Portable') main project (the one making the dll for other platforms to use). Rt-click **Add/New Item/ Content Page** (for 1 xaml & 1 cs file)

Blue <> icon both xaml and cs files - c# icon for only cs file



Added a HomePage.xaml & .xaml.cs

Content property of a Container can have a default property - so ContentPage.Content not completely necessary.

Navigation.pushAsync Cf iOS Segue (6-41) & Android Intent (36).

In MainPage.xaml.cs

```
private void LoginButton_Clicked(object sender, EventArgs e)
{
    //string password = password.Text;
    //string password = password.Text;
    bool isEmpty = string.IsNullOrEmpty(email.Text);
    bool isPasswordEmpty =
    string.IsNullOrEmpty(password.Text);

    if (isEmpty || isPasswordEmpty)
    {
```

```

        }
    else
    {
        Navigation.PushAsync(new HomePage()); // cf
segue & - will allow back navigation too
    }
}

```

And then in App.xaml.cs , change the entry point (page) to the new navigation page.

```

public partial class App : Application
{
    public App()
    {
        InitializeComponent();

        // MainPage = new MainPage();
        MainPage = new NavigationPage(new MainPage()); // default entry point changed
    }
}

```

NB no back button in iOS so back navigation v important there.

4-30

Tabbed Page

In Solution Explorer, go to Travel Record (may be listed as ‘Portable’) main project (the one making the dll for other platforms to use). Rt-click **Add/New Item/ Content Page** (for 1 xaml & 1 cs file) - name this HistoryPage.

Do likewise for 2 more page sets: MapPage and ProfilePage.

(Edit the text in the boilerplate XAML to say ‘Welcome to History/Map/Profile/7c page!’)

Common Language Runtime (clr) XML namespace eg

xmlns:local="clr-namespace:TravelRecord"

<https://docs.microsoft.com/en-us/xamarin/xamarin-forms/xaml/namespaces#declaring-namespaces-for-types>

Looking for classes declared in CLR.

xmlns:local="clr-namespace:TravelRecord"

```

<?xml version="1.0" encoding="utf-8" ?>
<!-- manually changed to TabbedPage from ContentPage - NB must also change class to inherit from TabbedPage instead of ContentPage -->
<TabbedPage xmlns="http://xamarin.com/schemas/2014/forms"
             xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
             xmlns:local="clr-namespace:TravelRecord"

```

```

x:Class="TravelRecord.HomePage">

<local:HistoryPage Title="History"/>

<local:MapPage Title="Map" />

<local:ProfilePage Title="Profile" />

</TabbedPage>

<!--<ContentPage.Content>-->
<!--boilerplate - not needed-->
<!-- xmlns:local to defined namespace, which can then be named &c -->

```

4-31

Tab bar items

Added a tab bar item in HomePage.xaml

```

<TabbedPage xmlns="http://xamarin.com/schemas/2014/forms"

xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
    xmlns:local="clr-namespace:TravelRecord"
    x:Class="TravelRecord.HomePage">

<TabbedPage.ToolbarItems>
    <ToolbarItem x:Name="AddToolbarItem" Text="Add"
        Clicked="AddToolbarItem_Clicked"/>
</TabbedPage.ToolbarItems>

<local:HistoryPage Title="History"/>
...
```

and a click handler, in HomePage.xaml.cs

```

private void AddToolbarItem_Clicked(object sender,
EventArgs e)
{
    Navigation.PushAsync(new NewTravelPage()); // segue over to new-travel page
}
```

4-32

XAML resources

In MainPage.xaml,

```

<ContentPage.Resources>
    <ResourceDictionary>
        <Color x:Key="greenishColour">#22DD22</Color> <!-- change once, here,
to affect all instances-->
    </ResourceDictionary>
```

And in elements e.g.:

```

<Entry x:Name="email"
    Placeholder="Email address"
```

```

Keyboard="Email"
TextColor="{StaticResource greenishColour}"/>

```

However, better to define styles in **App.xaml** file...

```

<?xml version="1.0" encoding="utf-8" ?>
<Application xmlns="http://xamarin.com/schemas/2014/forms"
    xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
    x:Class="TravelRecord.App">
    <Application.Resources>      <!-- ready made Application.Resources element-->
        <!-- <ContentPage.Resources>-->
        <ResourceDictionary>
            <Color x:Key="greenishColour">#22DD22</Color>
            <!-- change once, here, to affect all instances-->
        </ResourceDictionary>
        <!-- </ContentPage.Resources> -->
    </Application.Resources>
</Application>

```

4-33

Implicit XAML styles

If no name specified for a style, he'll be applied for any element of the type targetted.

```

<Application.Resources>      <!-- ready made Application.Resources element-->

    <ResourceDictionary>
        <Color x:Key="eveningishColour">#22DD22</Color>      <!-- NB good not
to give styles colour names, in case colour tweaked later -->
        <Color x:Key="wheatileColour">#BBFECC</Color>
        <!-- change once, here, to affect all instances-->
        <Style TargetType="Button">
            <Setter Property="BackgroundColor" Value="{StaticResource
eveningishColour}"/>
            <Setter Property="TextColor" Value="{StaticResource
wheatileColour}"/>
        </Style>
    </ResourceDictionary>
</Application.Resources>

```

4-34

Explicit XAML styles

All this in **App.xaml**

Give style a Key to target specified elements - in App.xaml:

```

<Application.Resources>      <!-- ready made Application.Resources element-->
    <ResourceDictionary>
        <Color x:Key="eveningishColour">#22DD22</Color>      <!-- NB good not
to give styles colour names, in case colour tweaked later -->
        <Color x:Key="wheatileColour">#BBFECC</Color>
        <!-- change once, here, to affect all instances-->

```

```

<Style x:Key="normalButton" TargetType="Button">
    <Setter Property="BackgroundColor" Value="{StaticResource eveningishColour}"/>
    <Setter Property="TextColor" Value="{StaticResource wheatleColour}"/>
</Style>
</ResourceDictionary>
</Application.Resources>

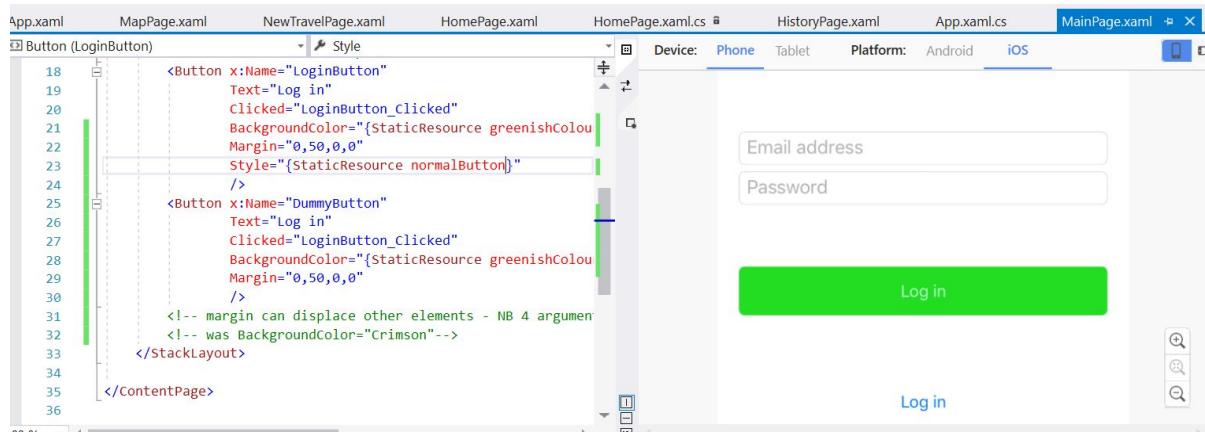
```

And in eg MainPage.xaml

```

<Button x:Name="LoginButton"
        Text="Log in"
        Clicked="LoginButton_Clicked"
        BackgroundColor="{StaticResource greenishColour}"
        Margin="0,50,0,0"
        Style="{StaticResource normalButton}"
        />

```



Chapter 5 on C# basics

6-48

Adding SQLite

Use *Tools/NuGet Package Manager/Manage NuGet Packages for Solution... (Browse)* to select **sqlite-net-pcl** (SQLite for Portable Class Library to use with Xamarin forms) - **add to all projects** (n+1)

6-49

New App constructor

Set location (platform-specific) of SQLite db

App.xaml.cs App() constructor - add another constructor with parameter to set SQLite db location

Type 'ctor' and tab twice in VS to get a constructor snippet

<https://docs.microsoft.com/en-us/visualstudio/ide/visual-csharp-code-snippets?view=vs-2019>

Add a class member:

```
public static string DatabaseLocation { get; set; } = string.Empty;
```

And an additional constructor:

```
public App(string databaseLocation)
{
    InitializeComponent();

    MainPage = new NavigationPage(new MainPage());           // default entry
    point changed

    DatabaseLocation = databaseLocation;

}
```

In each platform, in MainActivity.cs in OnCreate, modify the call to LoadApplication(taking a new'd up App to specify the SQLite db location) for Android, or from AppDelegate class for iOS.

6-50

Database Paths

In MainActivity.cs in OnCreate, modify the call to LoadApplication(taking a new'd up App to specify the SQLite db location) for Android, or from AppDelegate class for iOS.

Android

'Environment' is an ambiguous reference between Android.OS.Environment and System.Environment.

Use **System.Environment** (Alt+Enter to resolve)

In MainActivity.cs OnCreate

```
// define the location of the db in terms of path
string dbName = "travel_db.sqlite";
string folderPath =
System.Environment.GetFolderPath(System.Environment.SpecialFolder.Personal);
string fullPath = System.IO.Path.Combine(folderPath, dbName);

LoadApplication(new App(fullPath));
```

iOS

In AppDelegate FinishedLaunching

```
// define the location of the db in terms of path
string dbName = "travel_db.sqlite";
string folderPath =
System.IO.Path.Combine(System.Environment.GetFolderPath(System.Environment.SpecialF
older.Personal), "..", "Library");
```

```

        string fullPath = System.IO.Path.Combine(folderPath, dbName);
        // NB don't use Personal folder, for iOS (no save there allowed),
instead use Library of Personal's parent's directory

        LoadApplication(new App(fullPath));

        return base.FinishedLaunching(app, options);
    }
}

```

6-51

SQLite database model

Classes to define tables in db

Add a folder 'Model' to root/portable project.

Add a class within Model folder for table (eg 'Post') and change its access from default (private) to **public**.

Add properties for fields (including ID)

```

public int Id { get; set; }
public string ExperienceDescription { get; set; }

```

(Cf Android notes 51 et seq)

6-52

SQLite attributes

Declare primary key - use *PrimaryKey*, *AutoIncrement* attributes (Alt+Enter to resolve)

```

using SQLite;
using System;
using System.Collections.Generic;
using System.Text;

namespace TravelRecord.Model
{
    public class Post
    {
        [PrimaryKey, AutoIncrement]
        public int Id { get; set; }

        [MaxLength(250)]
        public string ExperienceDescription { get; set; }
    }
}

```

6-53

Inserting into db

In **NewTravelPage.xaml.cs**

```
using TravelRecord.Model;           // use Model defined by us earlier in 6-51
```

```

using SQLite;

private void SaveToolbarItem_Clicked(object sender, EventArgs e)
{
    // insert Post record into db
    Post post = new Post()
    {
        ExperienceDescription = experienceDescriptionEntry.Text
        // Id set automatically
    };
    // NB initialising the new instance's members thus in a
terminated-block

    SQLiteConnection conn = new SQLiteConnection(App.DatabaseLocation);
    // use db location class member defined earlier in 6-49

    conn.CreateTable<Post>();

    int numRows = conn.Insert(post); // type can also be used
automatically to deduce to which table to insert

    conn.Close(); // close the connection as well

    if (numRows > 0)
    {
        // diagnostic alert
        DisplayAlert("Success", "Record successfully inserted", "OK");
    }
    else
    {
        DisplayAlert("Failure", "No record inserted", "OK");
    }
}

```

6-54

Reading from db

Need to re-read from db each time navigating back to a page showing data

Overridable method for ContentPage - base.OnAppearing

Eg for **HistoryPage.xaml.cs**, implement **OnAppearing** (type **override** then scroll through auto-complete to find the method)

```

// Implementing OnAppearing so as to refresh the data on the page whenever
navigated back-to
protected override void OnAppearing()
{
    base.OnAppearing();

    SQLiteConnection conn = new SQLiteConnection(App.DatabaseLocation);
    // use previously established location

```

```

        conn.CreateTable<Post>();                                // create table (only)
if non-existent
    var posts = conn.Table<Post>().ToList();                  // get list of Post
objects (ie records)

        conn.Close();                                         // NB remembering to
close connection!
    }
}

```

6-55

IDisposable interface and 'using' statement

By 'Go to Definition' SQLiteConnection implementing IDisposable

public class SQLiteConnection : IDisposable

A 'using' statement (not 'using' directive) with a block will be like using an instance of the class where it has implemented IDisposable

<https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/using>

Dispose method of SQLiteConnection will then be automatically called at the end of the block.

E.g.

```

protected override void OnAppearing()
{
    base.OnAppearing();

    using (SQLiteConnection conn = new
SQLiteConnection(App.DatabaseLocation))      // use previously established location
        // Since SQLiteConnection (qv) is implementing IDisposable, we can,
with a 'using' statement,
        // safely leave out connection.Close call as Dispose will be
automatically called
    {
        conn.CreateTable<Post>();                                // create table
(only) if non-existent
        var posts = conn.Table<Post>().ToList();                  // get list of Post
objects (ie records)

        // conn.Close();                                         // NB
remembering to close connection! - not needed if 'using' SQLiteConnection
    }    // end of 'using' statement block
}

```

6-56

Data Binding

Good diagrams in this 6-56 lecture.

6-57

ListView

```
protected override void OnAppearing()
```

```

{
    base.OnAppearing();

    using (SQLiteConnection conn = new
SQLiteConnection(App.DatabaseLocation))      // use previously established location
        // Since SQLiteConnection (qv) is implementing IDisposable, we can,
with a 'using' statement,
        // safely leave out connection.Close call as Dispose will be
automatically called
    {
        conn.CreateTable<Post>();                      // create table
(only) if non-existent
        var posts = conn.Table<Post>().ToList();          // get list of Post
objects (ie records)

        postListView.ItemsSource = posts;                // set data context
of ListView in xaml file (binding specified in xaml)

        // conn.Close();                                // NB
remembering to close connection! - not needed if 'using' SQLiteConnection
    }      // end of 'using' statement block
}

```

And, in corresponding xaml file:

```

<?xml version="1.0" encoding="utf-8" ?>
<ContentPage xmlns="http://xamarin.com/schemas/2014/forms"
    xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
    x:Class="TravelRecord.HistoryPage">
<ContentPage.Content>
    <ListView x:Name="postListView">
        <!-- source set in the C# file -->
        <ListView.ItemTemplate>
            <DataTemplate>
                <TextCell Text="{Binding ExperienceDescription}"/>
            </DataTemplate>
        </ListView.ItemTemplate>
    </ListView>
</ContentPage.Content>

</ContentPage>

```

Going from the previously defined (6-51) class in the Model directory:

```

namespace TravelRecord.Model
{
    public class Post
    {
        [PrimaryKey, AutoIncrement]
        public int Id { get; set; }

        [MaxLength(250)]
        public string ExperienceDescription { get; set; }
    }
}

```

```
}
```

6-58

Updating & Deleting from table in db

Item selected auto-complete handler

Root (portable) Project/Add New Item/Forms/Forms ContentPage XAML

Root project -

NB renaming a class (even with rt-click, rename) can mess-up the event-handler autocomplete (caused 'Ensure Event failed' alert in VS).

```
<?xml version="1.0" encoding="utf-8" ?>
<ContentPage xmlns="http://xamarin.com/schemas/2014/forms"
    xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
    x:Class="TravelRecord.HistoryPage">
    <ContentPage.Content>
        <ListView x:Name="postListView"
            ItemSelected="PostListView_ItemSelected">
            <!-- source set in the C# file -->
            <ListView.ItemTemplate>
                <DataTemplate>
                    <TextCell Text="{Binding ExperienceDescription}" />
                </DataTemplate>
            </ListView.ItemTemplate>
        </ListView>
    </ContentPage.Content>
```

```
</ContentPage>
```

PostDetail.xaml

```
<?xml version="1.0" encoding="utf-8" ?>
<ContentPage xmlns="http://xamarin.com/schemas/2014/forms"
    xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
    x:Class="TravelRecord.PostDetail">
    <StackLayout>
        <Entry x:Name="experienceDescriptionLabel"/>
        <Button Text="Update"
            x:Name="updateButton"
            Clicked="UpdateButton_Clicked"
            />
        <Button Text="Delete"
            x:Name="deleteButton"
            Clicked="DeleteButton_Clicked"
            />
```

```
</StackLayout>
```

```
</ContentPage>
```

PostDetail.xaml.cs

```
using SQLite;
using System;
```

```

using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using TravelRecord.Model;
using Xamarin.Forms;
using Xamarin.Forms.Xaml;

namespace TravelRecord
{
    // class for updating details of individual TravelRecord Post records
    [XamlCompilation(XamlCompilationOptions.Compile)]
    public partial class PostDetail : ContentPage
    {
        Post selectedPost;                                // class member to track the
record's data

        // public PostDetail ()
        public PostDetail (Post selectedPost)           // amend detail page
constructor to take a record of the table in question (to populate class member)
        {
            InitializeComponent ();

            // initialise the text entry box wth existing data
            this.selectedPost = selectedPost;
            experienceDescriptionLabel.Text = selectedPost.ExperienceDescription;
        }

        // set data to whatever is in (ahem, not actually a label)
        private void UpdateButton_Clicked(object sender, EventArgs e)
        {
            selectedPost.ExperienceDescription = experienceDescriptionLabel.Text;
            using (SQLiteConnection conn = new
SQLiteConnection(App.DatabaseLocation))      // use previously established location

// Since SQLiteConnection (qv) is implementing IDisposable, we can, with a 'using'
statement,

// safely leave out connection.Close call as Dispose will be automatically called
        {
            int numRows = conn.Update(selectedPost);
// Update record - primary key ID used by system to identify record

            if (numRows > 0)
            {
                // diagnostic alert
                DisplayAlert("Success", "Record successfully updated", "OK");
            }
            else
            {
                DisplayAlert("Failure", "No record updated", "OK");
            }
        }
    }
}

```

```

        }

    private void DeleteButton_Clicked(object sender, EventArgs e)
    {
        using (SQLiteConnection conn = new
SQLiteConnection(App.DatabaseLocation)) // use previously established location

// Since SQLiteConnection (qv) is implementing IDisposable, we can, with a 'using'
statement,

// safely leave out connection.Close call as Dispose will be automatically called
{
    int numRows = conn.Delete(selectedPost);
// Delete record - primary key ID used by system to identify record

    if (numRows > 0)
    {
        // diagnostic alert
        DisplayAlert("Success", "Record successfully deleted", "OK");
    }
    else
    {
        DisplayAlert("Failure", "No record deleted", "OK");
    }
}

/*
 * NB renaming a class (even with rt-click, rename) can mess-up the
event-handler autocomplete
 * (caused 'Ensure Event failed' alert in VS).
*/
}
}

```

cf 11-92 (using Azure)

Feeling really angry. Fumingly angry. Keen to Feeling sorry to have not damaged people in retaliation for their crimes against people. Bastards.

7-59

Maps - iOS project

NuGet xamarin.forms.maps - may be UnifiedMaps or similar

Find the Init call in FinishedLaunching. After Init, add call to:

```
Xamarin.FormsMaps.Init(); // for old, superseded maps package
```

Info.plist (Mac VS) - Advanced/Source (Windows VS) - rt-click/Open With... Generic Plist Editor

Add properties:

Location Always Usage Description: To show your location on the map

Location When In Use Usage Description: “ ”

If in XML source of Info.plist, find the <key> for **NSLocationAlwaysUsageDescription** &c, and in following <string> element, add the prompt to user (eg To show your location on the map).

NB Xamarin.Forms.Maps was not found by typing this in NuGet browse box. Also, Xamarin.Forms.Maps latest stable version would not install - errors shown (downgrade to older version found) - had to select & install older version indicated.

(cf Swift notes 12-91 &c)

7-60

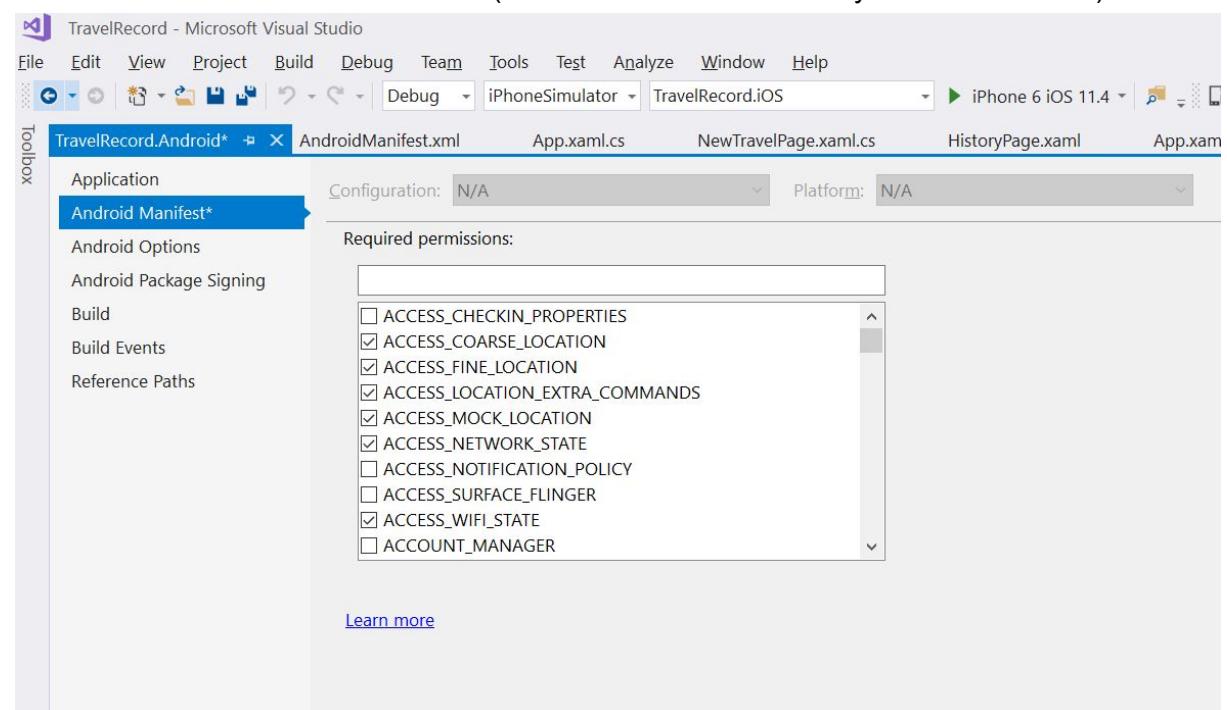
Maps - Android project

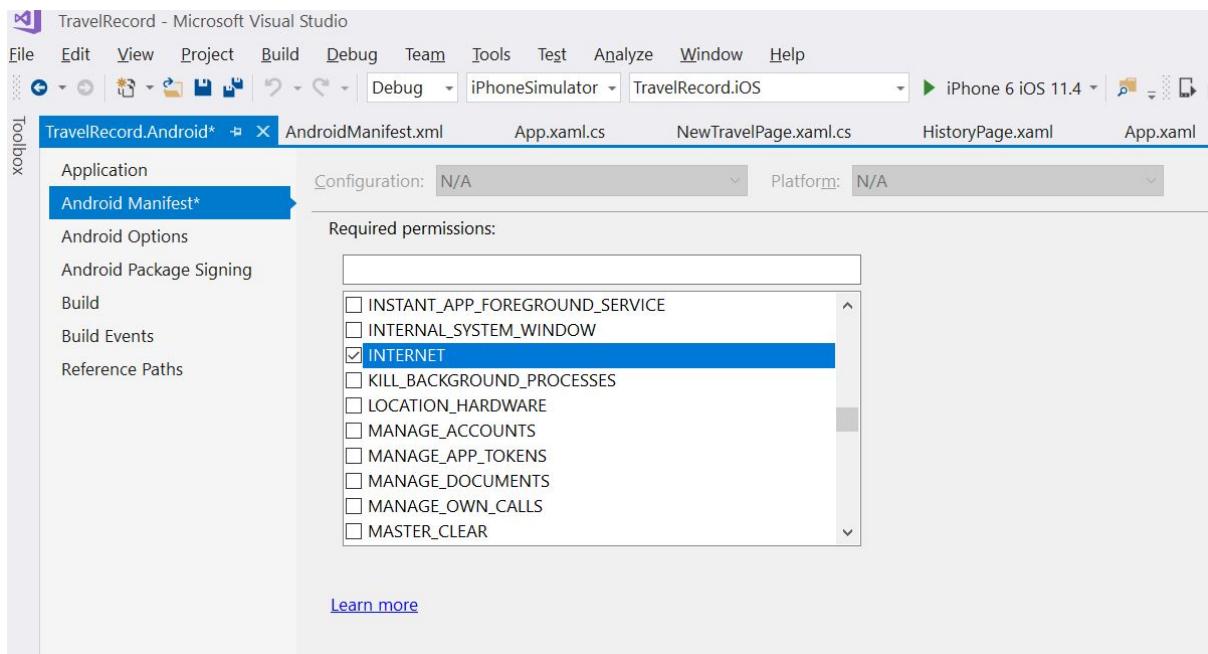
In MainActivity.cs, after Init, add:

```
Xamarin.FormsMaps.Init(this, savedInstanceState); // Initialise  
maps, specifying activity & bundle - AndroidManifest.xml must be edited
```

(Mac VS) folder **Properties/AndroidManifest.xml** (Win VS) - that, or project/rt-click Properties & go to page *AndroidManifest*

ACCESS_COARSE_LOCATION	(approximate location)
ACCESS_FINE_LOCATION	(more exact location)
ACCESS_LOCATION_EXTRA_COMMANDS	
ACCESS_MOCK_LOCATION	
ACCESS_NETWORK_STATE	(useful for locating via cellular)
ACCESS_WIFI_STATE	(useful for locating)
INTERNET	(for internet access - NB way down the A-Z list)





Resulting in `AndroidManifest.xml` like so:

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    android:versionCode="1" android:versionName="1.0" package="com.companyname.TravelRecord"
    android:installLocation="auto">
    <uses-sdk android:minSdkVersion="21" android:targetSdkVersion="27" />
    <uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION" />
    <uses-permission android:name="android.permission.ACCESS_FINE_LOCATION" />
    <uses-permission android:name="android.permission.ACCESS_NETWORK_STATE" />
    <uses-permission android:name="android.permission.ACCESS_WIFI_STATE" />
    <uses-permission android:name="android.permission.ACCESS_LOCATION_EXTRA_COMMANDS"
/>
    <uses-permission android:name="android.permission.ACCESS_MOCK_LOCATION" />
    <uses-permission android:name="android.permission.INTERNET" />
    <application android:label="TravelRecord.Android"></application>
</manifest>
```

Must also, to display a map, go to **Google Console for Developers** and **Enable Maps SDK for Android** then declare a new project and, for this project, get an API key for to use the Google mapping API with an Android app.

<https://console.developers.google.com>

The screenshot shows the Google API Library interface. At the top, there are two tabs: "Xamarin notes - Google Docs" and "API Library - PicasaQuery - Goog". The URL in the address bar is <https://console.developers.google.com/apis/library?project=picasaquery>. A red box highlights the "PicasaQuery" dropdown menu in the top navigation bar. Below the navigation, a banner says "Drop down for projects". The main area is titled "Welcome to the API Library" with the sub-instruction "The API Library has documentation, links and a smart search experience.". A search bar at the top right contains the placeholder "Search for APIs & Services". On the left, there's a sidebar titled "Filter by" with sections for "VISIBILITY" (Public 234, Private 3) and "CATEGORY" (Advertising 11, Analytics 1). The main content area displays "Maps" services, showing two items: "Maps SDK for Android" (Google) and "Maps SDK for iOS" (Google). Both items have a small icon, a name, and a brief description.

This screenshot shows the "Select a project" dialog box overlaid on the API Library interface. The dialog has a header "Select a project" with a "NEW PROJECT" button. It features a search bar labeled "Search projects and folders" with a magnifying glass icon. Below the search bar are tabs for "RECENT" and "ALL". A table lists one project: "PicasaQuery" (ID: picasaquery), which is currently selected, indicated by a blue checkmark icon. The background of the dialog is semi-transparent, allowing the API Library interface to be seen behind it.

Xamarin notes - Google Docs New Project – Google API Console

https://console.developers.google.com/projectcreate?previousPage=%2Fapis%

Your free trial is waiting: activate now to get \$300 credit to explore Google Cloud products. [Learn more](#)

Google APIs

New Project

You have 5 projects remaining in your quota. Request an increase or delete projects. [Learn more](#)

[MANAGE QUOTAS](#)

Project name *
Travel Record App [?](#)

Project ID: travel-record-app-241609. It cannot be changed later. [EDIT](#)

Location *
 No organisation [BROWSE](#)

Parent organisation or folder

CREATE **CANCEL**

Xamarin notes - Google Docs APIs & Services - Travel Record App

https://console.developers.google.com/apis/library/maps-android-backend.googleapis.com?id=01d8

Your free trial is waiting: activate now to get \$300 credit to explore Google Cloud products. [Learn more](#)

Google APIs

Travel Record App

API Library

Maps SDK for Android
Google

Maps for your native Android app.

ENABLE

The screenshot shows the Google Cloud Platform API credentials page for the 'Maps SDK for Android'. On the left, there's a sidebar with 'Google Maps' and links for Overview, APIs, Metrics, and Support. The main area has tabs for Metrics, Quotas, and Credentials. A modal window titled 'API key created' is open, showing the generated API key: AIzaSyV41QtccJazFHhp7oRr0540_aF4j5xS6I. Below the key, there's a warning to 'Restrict your key to prevent unauthorised use in production.' At the bottom of the modal are 'CLOSE' and 'RESTRICT KEY' buttons.

Restrict Key if wanted to avoid some tuss from using same to avoid paying \$oogle.

The screenshot shows the 'Restrict and rename...' page for an API key. The left sidebar has 'APIs & Services' and 'Credentials' selected. The main area has a 'Restrict usage to your Android apps' section with an 'ADD AN ITEM' button. Below it is an 'API restrictions' section with two radio button options: 'Don't restrict key' (selected) and 'Restrict key'. To the right, there are sections for 'Debug certificate fingerprint' (with examples for Linux/macOS and Windows), 'Release certificate fingerprint' (with an example for Linux/macOS), and instructions to replace placeholders in the command-line examples.

Copy API key (password) and use this in a `<meta-data>` tag in the `<application>` element of `AndroidManifest.xml`

```
<?xml version="1.0" encoding="utf-8"?>
```

```

<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    android:versionCode="1" android:versionName="1.0" package="com.companyname.TravelRecord"
    android:installLocation="auto">
    <uses-sdk android:minSdkVersion="21" android:targetSdkVersion="27" />
    <uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION" />
    <uses-permission android:name="android.permission.ACCESS_FINE_LOCATION" />
    <uses-permission android:name="android.permission.ACCESS_NETWORK_STATE" />
    <uses-permission android:name="android.permission.ACCESS_WIFI_STATE" />
    <uses-permission android:name="android.permission.ACCESS_LOCATION_EXTRA_COMMANDS"
/>
    <uses-permission android:name="android.permission.ACCESS_MOCK_LOCATION" />
    <uses-permission android:name="android.permission.INTERNET" />
    <!-- within application element boilerplate, add Google Map API key -->
    <application android:label="TravelRecord.Android">
        <meta-data android:name="com.google.android.maps.v2.API_KEY"
            android:value="AIzaSyDV41QtccjazFHhp7oRr054D_af4j5xS6I" />
    </application>
</manifest>

```

7-61

Displaying maps from XAML (using the portable project)

On MapPage.xaml

```

<?xml version="1.0" encoding="utf-8" ?>
<ContentPage xmlns="http://xamarin.com/schemas/2014/forms"
    xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"

    xmlns:maps="clr-namespace:Xamarin.Forms.Maps;assembly=Xamarin.Forms.Maps"
    x:Class="TravelRecord.MapPage">
    <!-- Map XML namespace (Xamarin.Forms.Maps) added -->
    <maps:Map x:Name="locationsMap"
        HorizontalOptions="FillAndExpand"
        VerticalOptions="FillAndExpand"
        MapType="Hybrid"/>
    <!-- Display a map from the NuGet installed package Xamarin.Forms.Maps -->
</ContentPage>
... and a map was displayed.

```

7-62

Displaying the user's location

NB Plugin.Permissions as package from NuGet will help with permissions difficulties with Android 6 onwards. Current Activity plugin also installed at same time with this.
In MainActivity.cs and Info.plist (as per 7-59, adding '**Privacy-Calendars Usage**', '**Privacy - Bluetooth Peripheral Usage Description**'), edit (3 steps) to use the Plugin.Permissions plugin:

```

protected override void OnCreate(Bundle savedInstanceState)
{
    TabLayoutResource = Resource.Layout.Tabbar;
    ToolbarResource = Resource.Layout.Toolbar;

    base.OnCreate(savedInstanceState);
    global::Xamarin.Forms.Forms.Init(this, savedInstanceState);
    Xamarin.FormsMaps.Init(this, savedInstanceState);           // Initialise
maps, specifying activity & bundle - AndroidManifest.xml must be edited

```

```

        // boilerplate instantiation of

LoadApplication(new App());                                // boilerplate instantiation of

        // use Plugin.Permissions (step 2 of 3 for Plugin.Permissions
permissions plugin)
Plugin.CurrentActivity.CrossCurrentActivity.Current.Init(this,
savedInstanceState);// Initialise permissions, specifying activity & bundle -
AndroidManifest.xml must be edited
        // step 3 of 3 for Plugin.Permissions - in Info.plist, add
'Privacy-Calendars Usage', 'Privacy - Bluetooth Peripheral Usage Description'

...
// use Plugin.Permissions (step 1 of 3 for Plugin.Permissions permissions
plugin)
public override void OnRequestPermissionsResult(int requestCode, string[]
permissions, [GeneratedEnum] Permission[] grantResults)
{
}

PermissionsImplementation.Current.OnRequestPermissionsResult(requestCode,
permissions, grantResults);
    base.OnRequestPermissionsResult(requestCode, permissions,
grantResults);
}

```

In MapPage.xaml.cs also add code to handle user response to permissions requests:

```

// all of this just to use a Plugin.Permissions so as to get around some
Android 6+ problem?? 7-62
// NB usings required: using Plugin.Permissions;using
Plugin.Permissions.Abstractions;
// step to handle permissions
private async void GetPermissions()          // not sure if this is right
(await/async?) aha! NB x await below
{
    try
    {
        var status = await
CrossPermissions.Current.CheckPermissionStatusAsync(Permission.LocationWhenInUse);
        // NB different effect of
Plugin.Permissions.Abstractions.Permission with different .Location... according to
platform iOS or Android

        if (status != PermissionStatus.Granted)
        {

            if (await
CrossPermissions.Current.ShouldShowRequestPermissionRationaleAsync(Permission.LocationWhenInUse))
            {
                await DisplayAlert("Need your location", "We need to access
your location", "Ok");
            }
        }
    }
}

```

```

        var results = await
CrossPermissions.Current.RequestPermissionsAsync(Permission.LocationWhenInUse);
        if (results.ContainsKey(Permission.LocationWhenInUse))
            status = results[Permission.LocationWhenInUse];      // could put this in a block?

        if (status == PermissionStatus.Granted)
        {
            locationsMap.IsShowingUser = true;
        }
        else
        {
            await DisplayAlert("Need your location", "We need to access
your location", "Ok");
        }
    }
    catch (Exception e)
    {
        await DisplayAlert("Error", e.Message, "Ok");
    }
}
/* what a load of *****s 7-62 */

```

Can use the Xam.Plugin.Geolocator (I didn't).

<https://github.com/jamesmontemagno/GeolocatorPlugin>

NB iPhone map doesn't show a go-to-location icon as does Android map.

NB Had to **restart iOS simulator** (using power button icon) to stop simulator hanging (rotating circle of dots pacifier ad nauseum).

7-63

Changes of user location

Making map (for both iOS and Android) responsive to user's location, and change of location.

Aha! Use the Xam.Plugin.Geolocator

<https://github.com/jamesmontemagno/GeolocatorPlugin>

(showed a readme.txt for setup instructions as a file in the VS IDE)

```

4
5 ## EXTREMELY IMPORTANT SETUP
6 Please follow the guide to properly setup the Geolocator inside of your application:
7
8 https://jamesmontemagno.github.io/GeolocatorPlugin/GettingStarted.html
9
10 Additionally, see the permission setup below for Android to ensure everything is configured correct.
11
12 ## Additional Android Permission Setup
13
14 This plugin uses the [Current Activity Plugin](https://github.com/jamesmontemagno/CurrentActivityPlugin/blob/master/README.md) to get ac
15
16 ```csharp
17 CrosscurrentActivity.Current.Activity.Init(this, bundle);
18 ```
19
20 It is highly recommended that you use a custom Application that are outlined in the Current Activity Plugin Documentation](https://github.com/jamesmontemagno/CurrentActivityPlugin/blob/master/README.md)
21
22 ## Android specific in your BaseActivity or MainActivity (for Xamarin.Forms) add this code:

```

locationsMap.IsShowingUser somewhat superseded by Xam.Plugin.Geolocator, which will also give direct access to coordinates (where locationsMap is the XAML element for namespace `xmlns:maps="clr-namespace:Xamarin.Forms.Maps"`)

NB with plugin, may need to clean and rebuild even if errors showing, to get access to methods.

8-64

Exploring the Foursquare API

<https://developer.foursquare.com/>

Various APIs including Pilgrims (location-based) and Places database (not API)

(Places API) <https://developer.foursquare.com/places-api> with various endpoints

<https://developer.foursquare.com/docs> - dozens of endpoints

<https://developer.foursquare.com/docs/api/endpoints> eg search, trending, similar,...

'Search for venues' endpoint <https://developer.foursquare.com/docs/api/venues/search> -

User or userless authentication

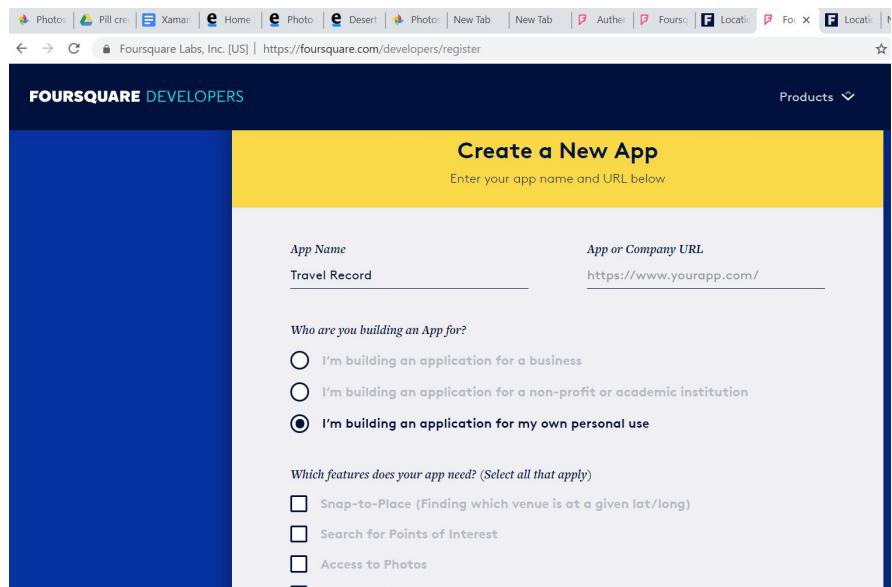
API Explorer page for Places API:

<https://foursquare.com/developers/explore#req=venues%2Fsearch%3Fll%3D40.7484%2C-3.9857>

Userless authentication: **Userless Auth**

To make a userless request, specify your consumer key's Client ID and Secret instead of an auth token in the request URL.

https://api.foursquare.com/v2/venues/search?ll=40.7,-74&client_id=CLIENT_ID&client_secret=CLIENT_SECRET&v=YYYYMMDD



Sandbox Account

- 950 Regular Calls / Day
- 50 Premium Calls / Day
- 1 Photo per Venue
- 1 Tip per Venue

Looking for more calls or content?
Click below:

[Upgrade Now](#)

My Apps

Travel Record

[ICONS AND IMAGES](#) [STATS](#) [RESET OR DELETE APP](#)

Client ID
G1JNW5Z5HBYZTY1OKGP2CKQMQMA12IIISBFRUGKANPBMRDJT1

Client Secret
3DKYDIHFHVJGM3PNBMPUDCNKU3LPL0BFKSLB3FZRBGCNYAA

8-65

Creating URL for REST request

Made folder 'Helpers' and therein class 'Constants' using developer console values.

```
namespace TravelRecord.Helpers
{
    public class Constants
    {
        public const string VENUE_SEARCH =
"https://api.foursquare.com/v2/venues/search?ll={0},{1}&client_id={2}&client_secret
={3}&v={4}";

        //
        https://api.foursquare.com/v2/venues/search?ll=40.7,-74&client_id=CLIENT_ID&client_
secret=CLIENT_SECRET&v=YYYYMMDD from
https://developer.foursquare.com/docs/api/configuration/authentication
```

```

    // Use String.Format presently 8-65

    public const string CLIENT_ID =
"G1JNW5Z5HBYZTY1OKGP2CKQMQMA12I1ISBFRUGKANPBMRDJTI";      // ought not to be
uploading these to online public repo, but hey nvmd
    public const string CLIENT_SECRET =
"3DKYDIHFHVJGM3PNBMPPUDCNKU3LPL0BFKSLB3FZRBGCNYAA";
        // From FourSquare API developer console, having used 'Create App' (in
8-64)

    }
}

```

Made new class 'Venue' in Model - started by adding formatting of URL string. At this time, just returning a string of a result of a search.

```

using System;
using TravelRecord.Helpers;      // We defined Constants class in here 8-65

namespace TravelRecord.Model
{
    public class Venue
    {
        public static string GenerateURL(double latitude, double longitude)
        {
            string url = String.Format(Constants.venue_SEARCH, latitude, longitude,
Constants.CLIENT_ID, Constants.CLIENT_SECRET, DateTime.Now.ToString("yyyyMMdd"));

            return url;
        }
    }
}

```

8-66

Preparing projects

Add **Microsoft.Net.Http** via NuGet to Portable/main project *only* (to make HTTP requests).
Add **Newtonsoft.Json** to *all* projects in solution (to process JSON HTTP responses).

NB Throughout the projects, **OnAppearing** is overridden *a lot* - this is called whenever the user d'navigate to the page.

8-67

Making HTTP Get requests

Make new folder ‘Logic’ and therein new *public* class ‘VenueLogic’. Presently this will handle only an unserialised FourSquare API request’s response, as a string.

```
using System;
using System.Collections.Generic;
using System.Net.Http;
using System.Text;
using System.Threading.Tasks;
using TravelRecord.Model; // need this to get to our Venue class

namespace TravelRecord.Logic
{
    public class VenueLogic
    {
        public async static Task <List<Venue>> GetVenues(double latitude, double longitude) // return a list of Venues, for a given location
        {
            // had to be static as 'await' used below, and had to be Task<> as returning non-void in an async
            List<Venue> venues = new List<Venue>();

            var url = Venue.GenerateURL(latitude, longitude);

            using (HttpClient client = new HttpClient())
            {
                var response = await client.GetAsync(url);
                var json = await response.Content.ReadAsStringAsync();
            }

            return venues;
        }
    }
}
```

Example JSON from FourSquare API ‘search’ endpoint json

```
{"meta": {"code": 200, "requestId": "\5ce965fd4c1f6753b756af3c"}, "response": {"venues": [{"id": "\50719db5e4b01a359989fe0d", "name": "Carn Brea Castle", "location": {"lat": 50.222266, "lng": -5.2448}, "labeledLatLngs": [{"label": "display", "lat": 50.22266, "lng": -5.2448}], "distance": 715, "cc": "GB", "country": "United Kingdom", "formattedAddress": ["United Kingdom"], "categories": [{"id": "\4deefb944765f83613cdba6e", "name": "Historic Site", "pluralName": "Historic Sites", "shortName": "Historic Site", "icon": {"prefix": "https://ss3.4sqi.net/img/categories_v2/arts_entertainment/historicsite", "suffix": ".png"}, "primary": true}, {"referralId": "v-1558799869", "hasPerk": false, "id": "\4ba7e6f0f964a5203dbd39e3", "name": "Krowji", "location": {"lat": 50.23153385866606, "lng": -5.239017027297102}, "labeledLatLngs": [{"label": "display", "lat": 50.23153385866606, "lng": -5.239017027297102}], "distance": 510, "cc": "GB", "country": "United Kingdom", "formattedAddress": ["United Kingdom"], "categories": [{"id": "\4bf58d8d48988d130941735", "name": "Building", "pluralName": "Buildings", "shortName": "Building", "icon": {"prefix": "https://ss3.4sqi.net/img/categories_v2/building/default_", "suffix": ".png"}, "primary": true}]}
```

Use magnifying glass icon from *Quick Watch* and choose ‘*Text Vizualizer*’. Copy text directly.

Paste code into window of <http://jsonutils.com> and leave *Classes* radio button to ‘C#’. Copy and paste directly from QuickWatch’s Text Visualiser - otherwise the JSONUtils site can be finicky, even with JSON evaluating as ok elsewhere.

Contribute!

Like Json Utils? Want to expand it? Fix bugs? Now Open Source and accepting pull-requests! [The Sauce](#)

Language of classes to generate

C# VB.Net Javascript SQL Table Java PHP TypeScript

Add Namespace Pascal Case

Class Name
Example

Property Attributes
None

JSON Text or URL

```
    "meta": {"code": 200}, "requestId": "5ce965fd4c11675b756af3c"}, "response": {"venues": [{"id": "50719db5e4b01a359989fe0d", "name": "Carn Brea Castle", "location": {"lat": 50.222266, "lng": -5.2448}, "labeledLatLngs": [{"label": "display", "lat": 50.222266, "lng": -5.2448}], "formattedAddress": "715 ccl", "country": "United Kingdom", "formattedAddress": "715 ccl", "country": "United Kingdom"}, {"categories": [{"id": "4deeefb944765f83613cdbe6", "name": "Historic Site", "pluralName": "Historic Sites", "shortName": "Historic Site", "icon": {"prefix": "https://ss3.sqis.net/img/categories_v2/arts_entertainment/historicite_\\suffix\\", "png": "primary"}, "referrals": [{"id": "50719db5e4b01a359989fe0d", "name": "Carn Brea Castle", "category": "Historic Site"}]}]}
```

Submit

Classes representing the data will be shown in the page below, in selected (C#) syntax.

```

28     public string state { get; set; }
29     public string crossStreet { get; set; }
30   }
31
32   public class Icon
33   {
34     public string prefix { get; set; }
35     public string suffix { get; set; }
36   }
37
38   public class Category
39   {
40     public string id { get; set; }
41     public string name { get; set; }
42     public string pluralName { get; set; }
43     public string shortName { get; set; }
44     public Icon icon { get; set; }
45     public bool primary { get; set; }
46   }
47
48   public class Venue
49   {
50     public string id { get; set; }
51     public string name { get; set; }
52     public Location location { get; set; }
53     public IList<Category> categories { get; set; }
54     public string referralId { get; set; }
55     public bool hasPerk { get; set; }
56   }
57
58   public class Response
59   {
60     public IList<Venue> venues { get; set; }
61     public bool confident { get; set; }
62   }
63
64   public class Example
65   {
66     public Meta meta { get; set; }
67     public Response response { get; set; }
68   }

```

Classes such as Venue, Category, Response &c from the endpoint data can be seen.

(1) Copy the code from the page's classes' code. (2) Paste into the VS editor.

NB There is a class called Venue in the pasted classes as well as the one previously defined in 8-65.

Paste, in this case, into class Venue.cs file, next to the existing Venue class. Also, change the existing non-pasted Venue class name to VenueRoot (do this manually, as using rt-click & Rename would also rename the pasted-in Venue class, which we don't want). NB This was complicated by the lecturer's choice of class names (ie duplicated) - try to not get confused by Venue and VenueRoot difference.

(Determine which classes are needed.)

See the *Example* class included by JsonUtils in amongst the classes, in which are members of the *Response* and *Meta* classes, also included by JsonUtils. Add member properties of *Meta* and *Response* to the desired root class. *Meta* and *Response* will contain data from the deserialized JSON response data.

This will give suitable C# types, to which to deserialize the JSON.

E.g.

```

using System;
using System.Collections.Generic;
using TravelRecord.Helpers;      // We defined Constants class in here 8-65

namespace TravelRecord.Model
{
    public class VenueRoot
    {
        public Meta meta { get; set; }           // this member pasted in from
                                                // Example class - will contain deserialised response data
        public Response response { get; set; }      // this member pasted in from
                                                // Example - will contain deserialised response data
    }
}

```

```

public static string GenerateURL(double latitude, double longitude)
{
    string url = String.Format(Constants.VENUE_SEARCH, latitude, longitude,
    Constants.CLIENT_ID, Constants.CLIENT_SECRET, DateTime.Now.ToString("yyyyMMdd"));

    return url;
}

// All classes below pasted from http://jsonutils.com following processing of JSON data
from FourSquire API Search endpoint

public class Meta
{
    public int code { get; set; }
    public string requestId { get; set; }
}

// Used inside VenueRoot

public class LabeledLatLng
{
    public string label { get; set; }
    public double lat { get; set; }
    public double lng { get; set; }
}

public class Location
{
    public double lat { get; set; }
    public double lng { get; set; }
    public IList<LabeledLatLng> labeledLatLngs { get; set; }
    public int distance { get; set; }
    public string cc { get; set; }
    public string country { get; set; }
    public IList<string> formattedAddress { get; set; }
    public string address { get; set; }
    public string postalCode { get; set; }
    public string neighborhood { get; set; }
    public string city { get; set; }
    public string state { get; set; }
    public string crossStreet { get; set; }
}

public class Icon
{
    public string prefix { get; set; }
    public string suffix { get; set; }
}

public class Category
{
    public string id { get; set; }
    public string name { get; set; }
    public string pluralName { get; set; }
    public string shortName { get; set; }
    public Icon icon { get; set; }
    public bool primary { get; set; }
}

public class Venue

```

```

    {
        public string id { get; set; }
        public string name { get; set; }
        public Location location { get; set; }
        public IList<Category> categories { get; set; }
        public string referralId { get; set; }
        public bool hasPerk { get; set; }
    }

    public class Response
    {
        public IList<Venue> venues { get; set; }
        /* public bool confident { get; set; } */ // not needed
    }
    /*
    public class Example
    {
        public Meta meta { get; set; }
        public Response response { get; set; }
    }
    // not needed - this is an example from JsonUtil of how to use pasted classes - properties
meta & response pasted inside Venue root
*/
}

}

```

And so on and so on, pasted from <http://jsonutils.com> and edited to suit this case (ie make sure to include the *Meta* and *Response* type members in the 'root' class).

8-69

Deserializing JSON strings into C# objects

```

using Newtonsoft.Json;
using System;
using System.Collections.Generic;
using System.Net.Http;
using System.Text;
using System.Threading.Tasks;
using TravelRecord.Model;                                // need this to get to our Venue class

namespace TravelRecord.Logic
{
    public class VenueLogic
    {
        public async static Task <List<Venue>> GetVenues(double latitude, double
longitude)          // return a list of Venues, for a given location
        {
            // had to be static as 'await' used below, and had to be Task<> as
returning non-void in an async
            List<Venue> venues = new List<Venue>();

```

```

        var url = VenueRoot.GenerateURL(latitude, longitude);

        using (HttpClient client = new HttpClient())
        {
            var response = await client.GetAsync(url);
            var json = await response.Content.ReadAsStringAsync();

            var venueRoot = JsonConvert.DeserializeObject<VenueRoot>(json);
            // Use Newtonsoft JSON plugin to deserialize await'd json response

            venues = venueRoot.response.venues as List<Venue>;           // here
will be a list of Venue objects
        }

        return venues;
    }
}
}

```

8-70

Custom cells

ListView with a custom cell (huge definition) in NewTravelPage.xaml

```

<?xml version="1.0" encoding="utf-8" ?>
<ContentPage xmlns="http://xamarin.com/schemas/2014/forms"
              xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
              x:Class="TravelRecord.NewTravelPage">
    <ContentPage.ToolbarItems>
        <ToolbarItem Name="SaveToolbarItem" Text="Save"
                     Clicked="SaveToolbarItem_Clicked"/>
    </ContentPage.ToolbarItems>

    <ContentPage.Content>
        <StackLayout>
            <Label Text="Welcome to the New Travel Page!">
                <VerticalOptions>CenterAndExpand</VerticalOptions>
                <HorizontalOptions>CenterAndExpand</HorizontalOptions>
            </Label>
            <Entry x:Name="experienceDescriptionEntry">
                <Placeholder>Write your experience</Placeholder>
            </Entry>
            <!-- Custom cell 8-70 -->
            <ListView x:Name="venueListView">
                <HorizontalOptions>FillAndExpand</HorizontalOptions>
                <Margin>20, 0</Margin>      <!-- no top/bottom margin -->
                <ListView.ItemTemplate>
                    <DataTemplate>
                        <ViewCell>
                            <!-- Template for custom cell defined in here -->
                            <Grid>

```

```

<!-- 2x2 grid -->
<Grid.ColumnDefinitions>
    <!-- Width can be *, Auto or a number -->
    <ColumnDefinition Width="*"/>
    <ColumnDefinition Width="Auto"/>
</Grid.ColumnDefinitions>
<Grid.RowDefinitions>
    <RowDefinition Height="*"/>
    <RowDefinition Height="*"/>
</Grid.RowDefinitions>

<Label Text="{Binding name}"
       FontAttributes="Bold"/>
<!-- Zero indexed-->
<Label Grid.Row="1"
       TextColor="ForestGreen"
       Text="{Binding location.address}"/>
<Label Grid.Column="1"
       Text="{Binding location.distance,
StringFormat='{0} metres'}"/>
<!-- No bottom-right element ie Row=1 & Column=1
-->
<!-- use location member of Venue class from
Venue.cs for location -->
<!-- ItemsSource set in cs file OnAppearing -->

        </Grid>
    </ViewCell>
</DataTemplate>
</ListView.ItemTemplate>
</ListView>
</StackLayout>
</ContentPage.Content>
</ContentPage>
... its ItemSource being set in NewTravelPage.xaml.cs OnAppearing method:
    // override here - this called whenever page loaded by new user
    protected async override void OnAppearing()
    {
        base.OnAppearing();

        var locator = CrossGeolocator.Current;
        var position = await locator.GetPositionAsync();

        var venues = await VenueLogic.GetVenues(position.Latitude,
position.Longitude);
        venueListView.ItemsSource = venues;
    }

```

Venue data saved from deserialized API response to local posts db.

```
private void SaveToolbarItem_Clicked(object sender, EventArgs e)
{
    try
    {
        var selectedVenue = venueListView.SelectedItem as Venue;      // get
        clicked Venue as object of Venue class

        var firstCategory = selectedVenue.categories.FirstOrDefault(); // get
        // approved, safe, way of getting first of zero to many categories of venue

        // insert Post record into db
        Post post = new Post()
        {
            ExperienceDescription = experienceDescriptionEntry.Text,
            // use new text entry box value for description (otherwise use
            deserialised JSON data fields from API response
            // Id set automatically
            // CategoryId = selectedVenue.categories[0].id;           // just
            get first category - not safe way though
            CategoryId = firstCategory.id,
            CategoryName = selectedVenue.location.address,
            Address = selectedVenue.location.address,
            Latitude = selectedVenue.location.lat,
            Longitude = selectedVenue.location.lng,
            Distance = selectedVenue.location.distance,
            VenueName = selectedVenue.name

        };          // NB initialising the new instance's members thus in a
        terminated-block

        using (SQLiteConnection conn = new
        SQLiteConnection(App.DatabaseLocation))
        // Use db location class member defined earlier in 6-49
        // Since SQLiteConnection (qv) is implementing IDisposable, we can,
        with a 'using' statement,
        // safely leave out connection.Close call as Dispose will be
        automatically called
        {
            conn.CreateTable<Post>();

            int numRows = conn.Insert(post); // type can also be used
            automatically to deduce to which table to insert

            // conn.Close();           // close the connection as well - not
            needed if 'using' SQLiteConnection

            if (numRows > 0)
            {
                // diagnostic alert
                DisplayAlert("Success", "Record successfully inserted",
                "OK");
            }
            else
        }
    }
}
```

```

        {
            DisplayAlert("Failure", "No record inserted", "OK");
        }
    } // end of 'using' statement block
}
catch (NullReferenceException nre) // e.g. in case there's no
category (null)
{
}

}
catch (Exception ex) // for more general exceptions that
specifically null exceptions
{
}

}
}

```

NB mysterious red wiggly line errors in VS (not found, &c) may disappear on a rebuild.

8-72

Displaying pins on a map

Map pin placed on adding record, with stopping of listening adjusted

```

protected async override void OnAppearing() // had to be
made async as await for StartListeningAsync added (7-63)
{
    base.OnAppearing();

    if (hasLocationPermission)
    {
        var locator = CrossGeolocator.Current;

        locator.PositionChanged += Locator_PositionChanged; // NB
pressed TAB after '+=' to get event handler in auto-complete
        // Add event handler to PositionChanged event (using += operator)
        await locator.StartListeningAsync(TimeSpan.Zero, 100);
        // Minimum time (n/a), minimum distance (100 metres) for change -
could include heading and other settings
        // By default, to conserve battery, device won't be listening for
location changes - make un listen here
    }

    GetLocation(); // call bespoke geolocating method

    using (SQLiteConnection conn = new
SQLiteConnection(App.DatabaseLocation)) // use previously established location
        // Since SQLiteConnection (qv) is implementing IDisposable, we can,
with a 'using' statement,
        // safely leave out connection.Close call as Dispose will be
automatically called

```

```

    {
        conn.CreateTable<Post>();                                // create table
    (only) if non-existent
        var posts = conn.Table<Post>().ToList();                // get list of Post
    objects (ie records)

        DisplayInMap(posts);                                    // NB having typed
    a call, in VS CTRL+. will generate a signature
    }    // end of 'using' statement block
}

// bespoke method to loop through all posts
private void DisplayInMap(List<Post> posts)
{
    // throw new NotImplementedException();                      // boilerplate
    foreach(var post in posts)
    {
        try
        {
            var position = new Xamarin.Forms.Maps.Position(post.Latitude,
post.Longitude);      // shift map Position to record's lat/lng

            var pin = new Xamarin.Forms.Maps.Pin()
            // could have used namespace but this d'illustrate where
stuff's from
            {
                // initialise the map
pin's details / parameters
                Type = PinType.SavedPin,                         // type could be
SearchResult, Generic &c
                Position = position,
                Label = post.VenueName,
                Address = post.Address
            };

            locationsMap.Pins.Add(pin);
        }
        catch (NullReferenceException nre)
        {

        }
        catch (Exception e)
        {

        }
    }
}

protected async override void OnDisappearing()                  // 7-63 adjusted
in 8-72

```

```

{
    base.OnDisappearing();

    await CrossGeolocator.Current.StopListeningAsync();
    // turn off location detection to save battery
    CrossGeolocator.Current.PositionChanged == Locator_PositionChanged;
    // unsubscribe from event handler added in OnAppearing (NB using '==' operator)
}

```

NB having typed a call, in VS CTRL+. will generate a signature

9-73

Displaying shared images

Icons & images usually best platform-specific, but shared-platform images are sometimes useful.

In the **portable**/root project, make a new folder ‘Assets’. Within *Assets*, a new folder ‘*Images*’.

Drag image(s) to *Images* folder - once there, rt-click on image and in Properties dialogue, set ‘Build Action’ to ‘*Embedded resource*’.

Add `<Image>` element to *xaml* and specify a `x:Name`.

In **constructor** of page’s code-behind **xaml.cs**, refer to assembly and set source of *named* image element.

```

<StackLayout VerticalOptions="Center"
             Margin="20,0,20,0"> <!-- L,T,R,B -->
    <Image x:Name="iconImage"
           Aspect="AspectFit"
           HorizontalOptions="FillAndExpand"
           HeightRequest="150"
           Margin="0,0,0,50"/>

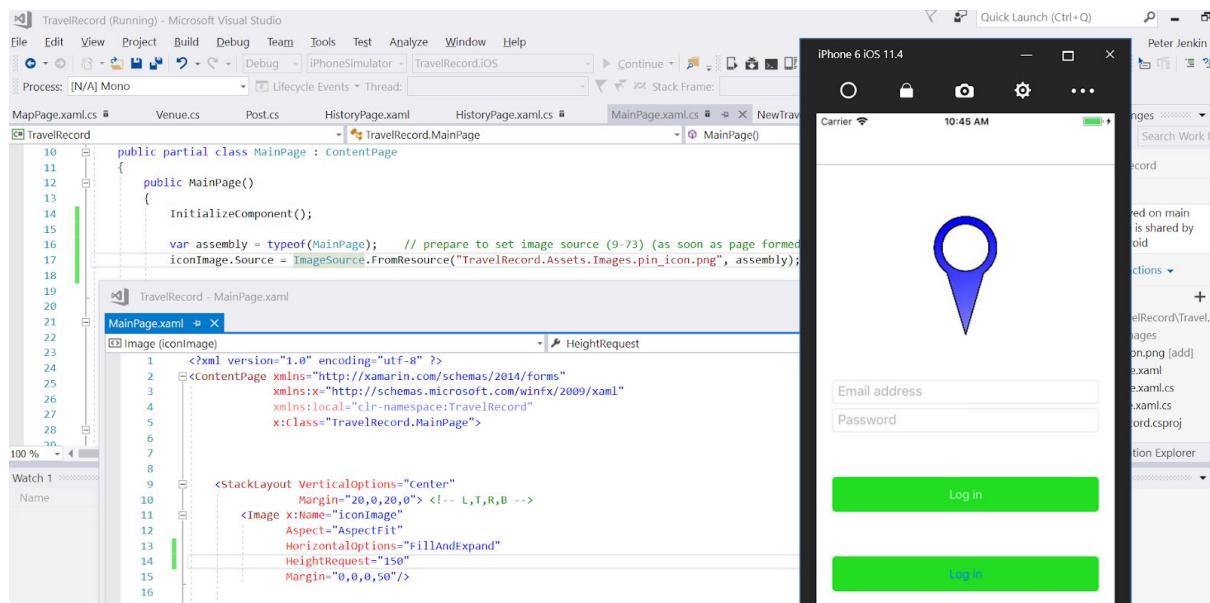
    .....

    public MainPage()
    {
        InitializeComponent();

        var assembly = typeof(MainPage);      // prepare to set image source
(9-73) (as soon as page formed)
        iconImage.Source =
        ImageSource.FromResource("TravelRecord.Assets.Images.pin_icon.png", assembly);

    }

```



This error caused for me by line xaml.cs referring to Image element in xaml:

<https://www.c-sharpcorner.com/blogs/the-resolvelibraryprojectimports-task-failed-unexpected-ly>

9-74

Android images

Android Asset Studio

<https://romannurik.github.io/AndroidAssetStudio/>

Action bar/tab icon generator -

Import or select icons (use Search entry box to help) and download zip file(s).

Unzip downloaded zip files for icons.

Content of downloaded files, for supported resolutions, will be:

C:.

```

└── res
    ├── drawable-hdpi
    ├── drawable-mdpi
    ├── drawable-xhdpi
    ├── drawable-xxhdpi
    └── drawable-xxxhdpi

```

<https://iconhandbook.co.uk/reference/chart/android/>

=====

Pixel Densities

Android icons require five separate sizes for different screen pixel densities. Icons for lower resolution are created automatically from the baseline.

mdpi (Baseline): 160 dpi 1x

hdpi: 240 dpi 1.5x

xhdpi: 320 dpi 2x

xxhdpi: 480 dpi 3x
xxxhdpi: 640 dpi 4x
Sizes (px) Format and naming Notes
Launcher icons
48 × 48 (mdpi)
72 × 72 (hdpi)
96 × 96 (xhdpi)
144 × 144 (xxhdpi)
192 × 192 (xxxhdpi)
512 × 512 (Google Play store) .png

Three-dimensional, front view, with a slight perspective as if viewed from above, so that users perceive some depth.

Action bar, Dialog & Tab icons

24 × 24 area in 32 × 32 (mdpi)
36 × 36 area in 48 × 48 (hdpi)
48 × 48 area in 64 × 64 (xhdpi)
72 × 72 area in 96 × 96 (xxhdpi)
96 × 96 area in 128 × 128 (xxxhdpi) .png

These icons are used in the action bar menu. The first number is the size of the icon area, and the second is file size.

Small Contextual Icons

16 × 16 (mdpi)
24 × 24 (hdpi)
32 × 32 (xhdpi)
48 × 48 (xxhdpi)
64 × 64 (xxxhdpi)
.png

Small icons are used to surface actions and/or provide status for specific items. For example, in the Gmail app, each message has a star icon that marks the message as important.

Notification icons

22 × 22 area in 24 × 24 (mdpi)
33 × 33 area in 36 × 36 (hdpi)
44 × 44 area in 48 × 48 (xhdpi)
66 × 66 area in 72 × 72 (xxhdpi)
88 × 88 area in 96 × 96 (xxxhdpi)
.png

These are used to represent application notifications in the status bar. They should be flat (no gradients), white and face-on perspective

=====

1 download for each type of page (eg map, user, home &c)

For use in-app, use **hdpi** - drag these images from downloaded Asset Studio folders into the Android project's **Resources/drawable-hdpi** folder. Ditto for xhdpi, xxhdpi, xxxhdpi and into the **Drawable** folder, the **mdpi**.

Build Action property value for each image must be 'Android resource'.

NB drag & drop must be done in Visual Studio, not File Explorer, to import to the project properly.

This can be a very tedious process.

(File names from Android Asset Studio will be similar to *ic_action_add_circle.png*, *ic_action_home.png* &c in each resolution's folder.

Cf Notes: Android 67 & iOS/Swift 19-190

NB Re: Unable to search for words in a pdf document

1. Open up **PDF** file in Adobe Reader.
2. Go to the top menu bar and click *Edit* then *Preferences*.
3. When the *Preferences* box opens, select the **Search** category on the left.
4. When in the **Search** category look to the bottom and click on the *Purge Cache Contents* box/button.

9-75

iOS images

Icons8 for iOS icons

<https://icons8.com/>

Resolutions required: 25x25, 50x50, 75x75 (actually 24, 48, 96 - choose Material-Filled style, not iOS style)

Choice of formats: PNG, SVG, EPS, PDF

Choose PNG

Change names so that 2x and 3x appended for bigger sizes (6,7,8Plus and iPhone 10 using highest resolutions 3x) *myimage*, *myimage@2x*, *myimage@3x*

Cf 20-160

NB TODO image sets in the Asset Catalogue for iOS projects -

<https://docs.microsoft.com/en-us/xamarin/ios/app-fundamentals/images-icons/displaying-an-image?tabs=windows#adding-images-to-an-asset-catalog-image-set>

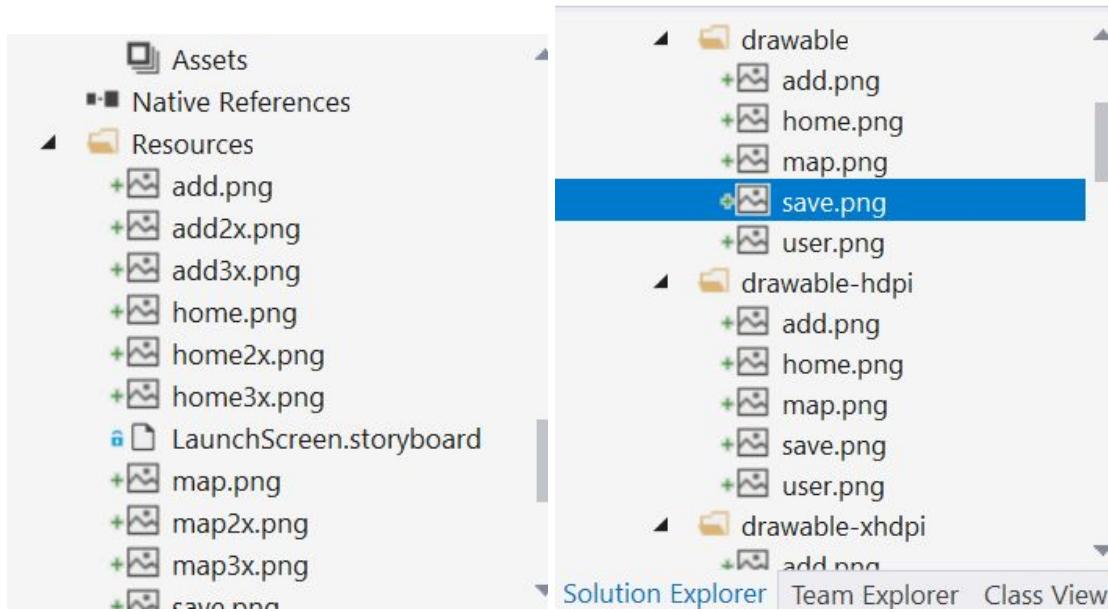
When renamed, drag & drop image/icon file (normal, 2x and 2x) into *Resources* folder in iOS project.

'Build Type' property for each image must be '*Bundle resources*'.

9-76

Displaying platform-specific images

In Android project, in all of the *Resources/drawable...* folders change downloaded filenames from such as *ic_action_home.png* to match the basic, 1x name in the iOS *Resources* folder, eg to *home.png*. This can be done in VS (or if you feel like it, in File Explorer, command line, &c).



This can be a very tedious process.

In the TabbedPage XAML , for example **HomePage.xaml** , for each **<ToolbarItem>** and for each element within the **<TabbedPage>** , and on any other pages, set **Icon** attribute:

```
<?xml version="1.0" encoding="utf-8" ?>
<!-- manually changed to TabbedPage from ContentPage - NB must also change class to
inherit from TabbedPage instead of ContentPage -->
<TabbedPage xmlns="http://xamarin.com/schemas/2014/forms"
    xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
    xmlns:local="clr-namespace:TravelRecord"
    x:Class="TravelRecord.HomePage">
    <TabbedPage.ToolbarItems>
        <ToolbarItem x:Name="AddToolbarItem" Text="Add"
            Icon="add.png"
            Clicked="AddToolbarItem_Clicked"/>
    </TabbedPage.ToolbarItems>

    <local:HistoryPage Title="History"
        Icon="home.png"/>

    <local:MapPage Title="Map"
        Icon="map.png"/>
```

```

<local:ProfilePage Title="Profile"
    Icon="user.png"/>

</TabbedPage>

```

Also, in this case, in another page, NewTravelPage.xaml where the toolbar is in use:

```

<?xml version="1.0" encoding="utf-8" ?>
<ContentPage xmlns="http://xamarin.com/schemas/2014/forms"
    xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
    x:Class="TravelRecord.NewTravelPage">
    <ContentPage.ToolbarItems>
        <ToolbarItem Name="SaveToolbarItem" Text="Save"
            Clicked="SaveToolbarItem_Clicked"
            Icon="save.png"/>
    </ContentPage.ToolbarItems>

    <ContentPage.Content>
        <StackLayout>
            <Label Text="Welcome to the New Travel Page!">

```

Text will be displayed, still, on Tabs, but text will be no longer displayed on toolbar.
iOS colour can replaced by colour of theme.

NB TODO: Error thrown on Main.cs on startup if Geolocator not sending location

10-77

LINQ - Profile page

```

var postTable = conn.Table<Post>().ToList(); // count posts in db
postCountLabel.Text = postTable.Count.ToString(); // set text to number of posts

```

10-78

LINQ - 'Distinct' - select unique values from a list

Extension method added by LINQ to TableQuery type to use that method as a static method.
C# used with LINQ to define queries (a la SQL).

```

var postTable = conn.Table<Post>().ToList(); // count posts in db

var categories = (from p in postTable
    orderby p?.CategoryId
    select p?.CategoryName ?? "No category
given") .Distinct().ToList();

```

```

        // don't show duplicated category name values (null conditional and
        coalescing added by PNJ)

        Dictionary<string, int> categoriesCount;           // make key/value
        dictionary of tally counts of categories

```

NB LINQ code: (1) in columns, (2) lower case.

10-79

Linq - 'Where' - filtering a list

'Where' LINQ statement used to filter in order to count only certain records.

```

        Dictionary<string, int> categoriesCount = new Dictionary<string,
        int>();           // make key/value dictionary of tally counts of categories

        foreach(var category in categories)
        {
            var count = (from post in postTable
                         where post.CategoryName == category
                         select post).ToList().Count;      // LINQ used to
count

            categoriesCount.Add(category, count);
        }

        postCountLabel.Text = postTable.Count.ToString();           // set
text to number of posts

```

10-80

ListViews and Dictionaries

A ListView in XAML is populated by values from a dictionary, which is populated by a loop and a LINQ statement.

List of category counts by binding cell elements text to key and to value of dictionary data

Also, Lambda syntax with LINQ as an alternative code pattern.

```

using SQLite;
using System;
using System.Collections.Generic;
using System.Linq;
using System.Text;
using System.Threading.Tasks;
using TravelRecord.Model;
using Xamarin.Forms;
using Xamarin.Forms.Xaml;

```

```

namespace TravelRecord
{
    [XamlCompilation(XamlCompilationOptions.Compile)]
    public partial class ProfilePage : ContentPage
    {
        public ProfilePage ()
        {
            InitializeComponent ();
        }

        protected override void OnAppearing()
        {
            base.OnAppearing();

            using (SQLiteConnection conn = new
SQLiteConnection(App.DatabaseLocation))          // use database location static
variable of App class
            {
                var postTable = conn.Table<Post>().ToList();           // count posts in db

                var categories = (from p in postTable
                                orderby p?.CategoryId
                                select p?.CategoryName ?? "No category
given").Distinct().ToList();
                    // Don't show duplicated category name values (null conditional and
coalescing added by PNJ)

                    // Alternative syntax (arrow/anonymous/lambda syntax) - NB 'select'
in LINQ to get 'CategoryName' string not whole record
                    var categoriesLambda = postTable.OrderBy(p =>
p?.CategoryId).Select(p=>p?.CategoryName).Distinct().ToList();

Dictionary<string, int> categoriesCount = new Dictionary<string,
int>();          // make key/value dictionary of tally counts of categories

foreach(var category in categories)
{
    var count = (from post in postTable
                where post.CategoryName == category
                select post).ToList().Count;           // LINQ
used to count

    // Alternative arrow/anonymous/lambda syntax 10-80
    var countLambda = postTable.Where(p => p.CategoryName ==
category).ToList().Count;

    // categoriesCount.Add(category, count);           // add dictionary entry
    categoriesCount.Add(category, countLambda);
// add dictionary entry
}

```

```

        categoriesListView.ItemsSource = categoriesCount;           // link
listview to query results (binding of data declared in xaml)

        postCountLabel.Text = postTable.Count.ToString();          // set
text to number of posts
    }
}
}
}

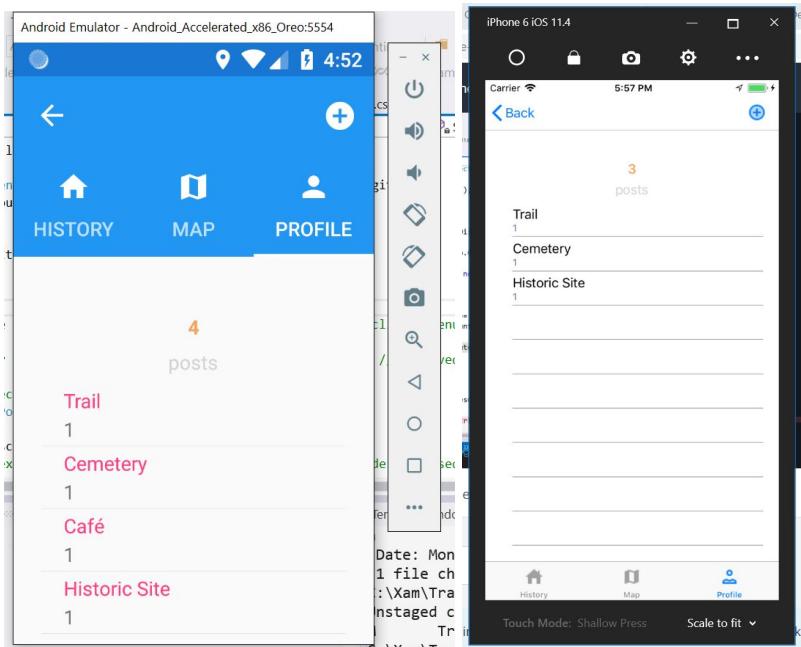
```

With xaml:

```

.....
<ContentPage.Content>
    <StackLayout Margin="20,40,20,0">
        <Label x:Name="postCountLabel"
            HorizontalOptions="Center"
            VerticalOptions="Center"
            TextColor="SandyBrown"
            FontAttributes="Bold"/>
        <Label Text="posts"
            HorizontalOptions="Center"
            TextColor="LightGray"/>
        <ListView x:Name="categoriesListView">
            <ListView.ItemTemplate>
                <DataTemplate>
                    <TextCell Text="{Binding Path=Key}"
                        Detail="{Binding Path=Value}">
                    </TextCell>
                </DataTemplate>
            </ListView.ItemTemplate>
        </ListView>
    .....

```



Azure

11-81

Azure App Service

Cloud database to supersede using local database (SQLite).

<https://azure.microsoft.com/en-gb/services/app-service/>

<https://docs.microsoft.com/en-us/azure/app-service/>

Push notifications, Enterprise single sign-in using Active Directory (OAuth2?), Integration with social media, Appscan for work offline(?), **Easy tables** for db

<https://www.andrewhoebling.com/Blog/Post/intro-to-azure-mobile-app-services>

<http://www.jameybaumgardt.com/microsoft-azure-portal>

11-82

Azure Subscription

Free account sign-up - 12 months, 30 days free/service, \$200/£150 credit

<https://portal.azure.com/> - dashboard

Each section/resource management view from dashboard is called a 'blade'

11-83

Creating the App Service

Click on + 'Create a Resource'

Xamarin | azure ai | Advisor | Azure | Intro to | Billing | Azure | <https://portal.azure.com/#create/hub>

Microsoft Azure Search resources, services, and docs

Create a resource Home > New > Mobile App

Mobile App Microsoft

 **Mobile App** Microsoft

Create **Save for later**

Accelerate your mobile app development with this turnkey way to structure storage, notifications. With native and cross-platform SDKs for iOS, Android, Windows, and F flexible REST API, Mobile Apps empowers you to build connected applications for ar experience across devices.

- Integrate with SQL, Oracle, SAP, MongoDB, and more.
- Make your app work offline and sync.
- Connect to on-premises data.
- Leverage enterprise single sign-on with Active Directory.
- Integrate with social providers like Facebook, Twitter, and Google.
- Broadcast push notifications across platforms, with customer segmentation.
- Gain insights with mobile analytics.
- Auto-scale to millions of devices.

Home | Dashboard | All services | FAVORITES | Function App | SQL databases | Azure Cosmos DB | Virtual machines | Load balancers | Storage accounts | Virtual networks | Azure Active Directory | Monitor

The screenshot shows the Microsoft Azure portal interface. The left sidebar contains a 'FAVORITES' section with links to Function App, SQL databases, Azure Cosmos DB, Virtual machines, Load balancers, Storage accounts, Virtual networks, Azure Active Directory, Monitor, Advisor, Security Center, Cost Management + Bill..., and Help + support. The main panel is titled 'Mobile App' and shows the creation process for a new app named 'travelrecord-pnj'. The form includes fields for 'App name' (travelrecord-pnj.azurewebsites.net), 'Subscription' (Free Trial), 'Resource Group' (Create new, travelrecord-pnj), and 'App Service plan/Location' (ServicePlan80ae10cd-b5af(Central US)). Below the form, there are sections for 'Application Insights' (travelrecord-pnj) and 'Automation options'. At the bottom are 'Create' and 'Automation options' buttons.

Resource Group for organising projects.

Application Insights - for telemetry, diagnostics,

<https://docs.microsoft.com/en-us/azure/azure-monitor/app/app-insights-overview>

Application Insights can be turned OFF - switch from ENABLE to **DISABLE**

Xamarin - Google Docs | Advisor | Azure / | Intro to | Billing | Azure / | travelrecord-pnj - Application Insights | Search resources, services, and docs | Microsoft | How Azure works | + | - | https://portal.azure.com/#create/Microsoft.Zumo

Microsoft Azure

Create a resource

Home

Dashboard

All services

FAVORITES

Function App

SQL databases

Azure Cosmos DB

Virtual machines

Load balancers

Storage accounts

Virtual networks

Azure Active Directory

Monitor

Advisor

Security Center

Cost Management + Bill...

Help + support

travelrecord-pnj - Application Insights

Application Insights site extensions

Collect application monitoring data using Application Insights site extension

Enable Disable

Link to an Application Insights resource

Your app will be connected to an auto-created Application Insights resource: travelrecord-pnj. Instrumentation key will be added to App Settings. This will overwrite any instrumentation key defined in your code.

Change your resource

Create new resource

New resource name: travelrecord-pnj

Select existing resource

Search to find more resources

East US

South Central US

North Europe

West Europe

Southeast Asia

West US 2

UK South

Canada Central

Central India

Japan East

Australia East

Korea Central

France Central

East US 2

East Asia

East US 2

Apply

App Service Plan

Xamarin - Google Docs | Advisor | Azure / | Intro to | Billing | Azure / | New App | Microsoft | How Azure works | + | - | https://portal.azure.com/#create/Microsoft.Zumo

Microsoft Azure

Create a resource

Home

Dashboard

All services

FAVORITES

Function App

SQL databases

Azure Cosmos DB

Virtual machines

Load balancers

Storage accounts

Virtual networks

Azure Active Directory

Monitor

Advisor

Security Center

Cost Management + Bill...

Help + support

File App

App Service plan

Select a plan for the web app

name: record-pnj

.azurewebsites.net

description: trial

Source Group: record-pnj

Service plan/Location: ServicePlan80ae10cd-b5af(Central US)

Application Insights: travelrecord-pnj

Create new

ServicePlan80ae10cd-b5af(S1) (New)

Central US

New Plan

New App Service Plan

Create a plan for the web app

* App Service plan: TravelRecordAppServicePlan

* Location: Central US

* Pricing tier: S1 Standard

OK

Microsoft Azure | Search resources, services, and docs

Home > New > Mobile App > Mobile App > App Service plan > New App Service Plan >

Create a resource

- Home
- Dashboard
- All services
- Favorites**
 - Function App
 - SQL databases
 - Azure Cosmos DB
 - Virtual machines
 - Load balancers
 - Storage accounts
 - Virtual networks
 - Azure Active Directory
 - Monitor
 - Advisor
 - Security Center
 - Cost Management + Bill...
 - Help + support

Recommended pricing tiers

F1	D1	B1
Shared infrastructure 1 GB memory 60 minutes/day compute Free	Shared infrastructure 1 GB memory 240 minutes/day compute 7.14 GBP/Month (Estimated)	100 total ACU 1.75 GB memory A-Series compute equivalent 41.52 GBP/Month (Estimated)

Included hardware

- Azure Compute Units (ACU)
- Memory
- Storage

See additional options

Apply

Microsoft Azure | Search resources, services, and docs

Home > New > Mobile App > App Service plan > New App Service Plan

New App Service Plan

Create a plan for the web app

App Service plan

Select a plan for the web app

File App

App Service plan

An App Service plan is the container for your app. The App Service plan settings will determine the location, features, cost and compute resources associated with your app.

Create new

ServicePlan80ae10cd-b5af(S1) (New)
Central US

New Plan

*** App Service plan**: TravelRecordAppServicePlan

*** Location**: Central US

*** Pricing tier**: F1 Free

OK

1Gb, shared, 60 min/day for free

Xamarin | G azure a| Advisor | Azure P | Intro to |

← → C https://portal.azure.com/#create/Microsoft.Zumo

Microsoft Azure

Home > New > Mobile App > Mobile App

Create a resource Home Dashboard All services FAVORITES Function App SQL databases Azure Cosmos DB Virtual machines Load balancers Storage accounts Virtual networks Azure Active Directory Monitor Advisor Security Center Cost Management + Bill... Help + support

Mobile App Create

* App name travelrecord-pnj .azurewebsites.net

* Subscription Free Trial

* Resource Group Create new Use existing travelrecord-pnj

* App Service plan/Location TravelRecordAppServicePlan(Cen...)

Application Insights Disabled

Create Automation options

Automation Options:

```

1  {
2   "resources": [
3     {
4       "apiVersion": "2016-03-01",
5       "name": "[parameters('name')]",
6       "type": "Microsoft.Web/sites",
7       "properties": {
8         "name": "[parameters('name')]",
9         "siteConfig": {
10           "appSettings": []
11         },
12         "serverFarmId": "[concat('/subscriptions/', parameters('subscriptionId'), '/resourcegroups/', parameters('serverFarmResourceGroup'), '/providers/Microsoft.Web/serverFarms/', parameters('hostingPlanName'))]",
13         "hostingEnvironment": "[parameters('hostingEnvironment')]"
14       },
15       "location": "[parameters('location')]",
16       "tags": {}
17     }
18   ]
19 }

```

Setting-up of Mobile App Service may take a minute or two (pacifier visible at top of dashboard).

NAME	TYPE	RESOURCE GROUP	LOCATION	SUBSCRIPTION
TravelRecordAppServicePlan	App Service plan	travelrecord-pnj	Central US	Free Trial
travelrecord-pnj	App Service	travelrecord-pnj	Central US	Free Trial

The Mobile App service in the dashboard (seen from 'All resources')

The screenshot shows the Microsoft Azure portal interface. The left sidebar is titled 'Microsoft Azure' and includes a 'FAVORITES' section with links to Home, Dashboard, All services, and other resources like App Services, Function App, SQL databases, etc. The main content area is titled 'travelrecord-pnj' under 'App Service'. It displays various settings and metrics for the app service, such as Resource group (travelrecord-pnj), Status (Running), Location (Central US), Subscription (Free Trial), and Deployment (Quickstart, Deployment slots, Deployment Center). On the right, there are sections for 'Diagnose and solve problems', 'Application Insights', and 'App Service Advisor'.

11-84 Easy tables

The screenshot shows the 'Create SQL Database' wizard in the Microsoft Azure portal. The left sidebar is identical to the previous screenshot. The main form has a warning message: 'Changing basic options may reset selections you have made. Please review all options prior to creating the database.' It asks to select a subscription (Free Trial) and a resource group (travelrecord-pnj). The 'DATABASE DETAILS' section requires entering a database name and selecting a server. A note says 'The value should not be empty.' There is also a question about using a SQL elastic pool. At the bottom, there are 'Review + create' and 'Next : Additional settings >' buttons, along with a link to download a template for automation.

(1) '+ Create a resource'/Databases/SQL Database

Add a new server

Eg name: Server: travelrecord-server.database.windows.net, db: travelrecord-db, travelrecord-pnj; admin: pnj; password: Passw0rd

DTU - Database Transaction Units -

<https://docs.microsoft.com/en-us/azure/sql-database/sql-database-service-tiers-dtu>

(2) Azure Dashboard/Resources/[my app service]/Configuration/**Add a connection string**

Name of connection string must be '**MS_TableConnectionString**'. Type (since a SQL database was formed just now) must be '**SQL Azure**'.
(Untick Deployment Slot Setting.)

Connection String (Value) of the the form:

```
Data Source=tcp:{your_SQLServer},{port};Initial Catalog={your_catalogue};User ID={your_username};Password={your_password}
```

- {your_SQLServer} Name of the server, this can be found in the overview page for your database and is usually in the form of "server_name.database.windows.net".
- {port} usually 1433.
- {your_catalogue} Name of the database.
- {your_username} User name to access your database.
- {your_password} Password to access your database.

```
Data Source=tcp:travelrecord-server.database.windows.net,1433;Initial Catalog=travelrecord-db;User ID=pnj@travelrecord-pnj-db;Password=Passw0rd
```

```
Data Source=tcp:travelrecord-server.database.windows.net,1433;Initial Catalog=travelrecord-db;User ID=pnj@travelrecord-server;Password=Passw0rd
```

But - go to database via 'All Resources' and go down to 'Connection Strings' on left - can copy from here!

```
jdbc:sqlserver://travelrecord-pnj.database.windows.net:1433;database=travelrecord-pnj-db;user=adminpnj@travelrecord-pnj;password={your_password_here};encrypt=true;trustServerCertificate=false;hostNameInCertificate=*.database.windows.net;loginTimeout=30;
```

But... **NB !!** from this page, any other tab than ADO (e.g. JDBC) will have details of the form of the user credential - pretty much user@database - this must be included as such in the User ID section of the Connection String

NB Add another non-admin user later

NB REMEMBER TO SAVE!!

<https://azure.github.io/AppService/update/2019/02/26/Changes-to-data-connections-UX.html>

In App Service, go down to **Mobile/Easy Tables** - should say 'Need to configure Easy Tables'

Connection String (step 1 here) should have been already set in Configuration of App Service (see above)

Microsoft Azure

Home > All resources > travelrecord-pnj - Easy tables > Easy Tables

Easy Tables

Easy Tables is not supported on your current App Service app. Please initialize your App Service app for Easy Tables support.

Connect a database

1

Click here to learn how to connect to a database

2

Initialize your App Service app to use Easy Tables. Note that this will overwrite your existing site contents.

I acknowledge that this will overwrite all site contents.

Create TodoItem table

Click on 'CreateTodoItem table'

Didn't actually need to create a new firewall

Rule Name	Start IP	End IP
ClientIPAddress_2019-5-28...	86.130.227.23	86.130.227.23

NB Double check passwords (and all strings)! Easy to miss out case or symbol.

Xamarin notes - Google Docs | travelrecord-db - Microsoft Azure | All resources

← → C https://portal.azure.com/#@peternjenkingmail.onmicrosoft.com/

Microsoft Azure

Search resources, services & more

Home > travelrecord-pnj - Easy tables > Add a table

Create a resource

Home

Dashboard

All services

FAVORITES

All resources

Resource groups

App Services

Function App

SQL databases

Azure Cosmos DB

Virtual machines

Load balancers

Storage accounts

Virtual networks

Azure Active Directory

Monitor

Advisor

Add a table

* Name: Post ✓

Insert permission: Allow anonymous access ▾

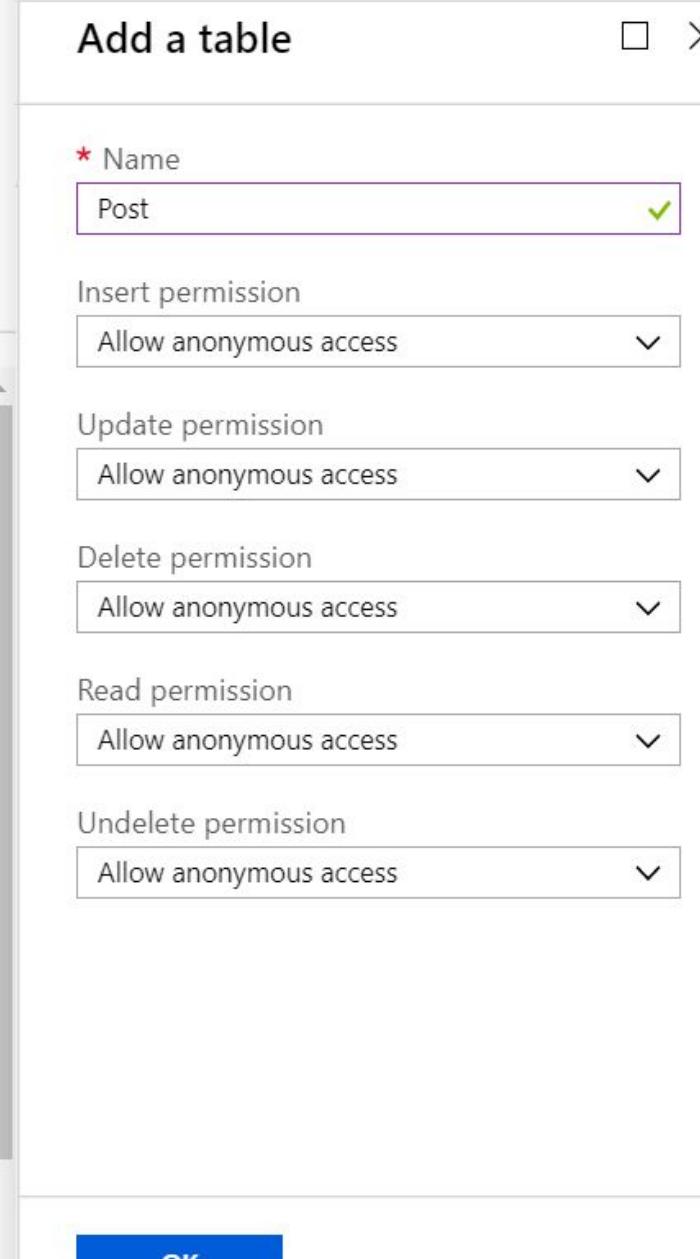
Update permission: Allow anonymous access ▾

Delete permission: Allow anonymous access ▾

Read permission: Allow anonymous access ▾

Undelete permission: Allow anonymous access ▾

OK



NB **Table name** must be the same as the **class name** in the Model (eg **Post** class in **Model/Post.cs**, so **Post** table). This is a bit like ORM or code-first, as the table and any fields correctly declared in code will be formed in the Azure db.

Older free tier of SQL Server?

<https://renouncedthoughts.wordpress.com/2018/12/11/free-32-mb-sql-database-from-microsoft-azure/>

£3.72 per month for basic (2GB,)

11-85

Connecting to the App Service

Via NuGet, add to all projects in the solution the package **Microsoft.Azure.Mobile.Client** - version **3.1.0** is/was safely stable (latest version is incompatible with default Xamarin forms template ur no?).

In Azure App Service blade (for this travel record app), go to **Deployment/Quickstart**

Quickstart not working for Xamarin ?? No option for Xamarin seen available in App Service
Try Copying/adapting code from video in **App.xaml.cs** :

```
namespace TravelRecord
{
    public partial class App : Application
    {
        public static string DatabaseLocation { get; set; } = string.Empty;

        // Azure code
        public static MobileServiceClient MobileService = new
MobileServiceClient("https://travelrecord-pnj.azurewebsites.net");
    }
}
```

NB MobileService is extremely important for processing data through the cloud (see on).

11-86

The Register page

A page for registration of users.

Add new page (rt-click/New Item/Content Page xaml+cs) to *portable*/root project(ie library/dll) '*RegisterPage*'

Copy/paste StackLayout from MainPage to RegisterPage

For all, in portable project in **App.xaml.cs** (see above)

```
// Azure code
public static MobileServiceClient MobileService = new
MobileServiceClient("https://travelrecord-pnj.azurewebsites.net");
```

For Android, in **MainActivity::OnCreate**

```
// Azure code 11-86
CurrentPlatform.Init();
```

For iOS

```
// Azure code 11-86
CurrentPlatform.Init();
```

All using the plugin **Microsoft.Azure.Mobile.Client - version 3.1.0** for compatibility according to video

```
using Microsoft.WindowsAzure.MobileServices;
```

11-87

Inserting into a Cloud database

In the Azure portal, in the **App Service** blade, go to **Easy Tables** and make a new table called 'User' as per the class name. This is a bit like ORM or code-first, as the table and any fields correctly declared in code will be formed in the Azure db.

```
public class User
{
    public Guid Id { get; set; }           // Azure ID column holding alphanumeric values

    public string Email { get; set; }

    public string Password { get; set; }
```

The screenshot shows the Microsoft Azure portal interface. The URL in the address bar is <https://portal.azure.com/#@peternjenkingmail.onmicrosoft.com/resource/subscriptions/b7420d0d-b40a-41>. The main content area displays the 'User (1 record)' page under the 'travelrecord-pnj - Easy tables' section. The left sidebar includes links for 'Create a resource', 'Home', 'Dashboard', 'All services', 'FAVORITES', 'All resources', and 'Resource groups'. The top navigation bar has tabs for 'Xam', 'User', 'Easy', 'This', 'Quick', 'Create', 'New', and 'Easy'. The 'User' tab is active. The 'User (1 record)' page has a table with columns: ID, CREAT..., UPDA..., VERSI..., DELET..., EMAIL, and PASS... . A single record is listed: ID is 5a90853..., CREAT... is 2019-05-..., UPDA... is 2019-05-..., VERSI... is AAAAAA..., DELET... is false, EMAIL is pnj, and PASS... is qwerty.

```
private async void RegisterButton_Clicked(object sender, EventArgs e)
{
    if (password.Text == confirmPasswordEntry.Text)
    {
        // register the user
        // register the user
        User user = new User()
    }
}
```

```

        Email = email.Text,
        Password = password.Text
    };

    await App.MobileService.GetTable<User>().InsertAsync(user);
}
else
{
    await DisplayAlert("Error", "Passwords don't match", "OK");
}
}
}

```

NB I didn't have to pre-define any fields in the Azure (easy)table, only in the class.

NB soft delete in use on Azure hence '*Deleted*' field.

NB if for Android (or UWP) - but not iOS - a deploy (but not build) error '**could not locate packages.config**' should be seen, e.g. Could not locate C:\Xam\DeliveriesApp\DeliveriesApp\packages.config. Ensure that this project has Microsoft.Bcl.Build installed and packages.config is located next to the project file.

Edit the portable project's .csproj thus:

```

<Project Sdk="Microsoft.NET.Sdk">

<PropertyGroup>
    <TargetFramework>netstandard2.0</TargetFramework>

<SkipValidatePackageReferences>true</SkipValidatePackageReferences>
</PropertyGroup>

```

<https://github.com/NuGet/Home/issues/2913#issuecomment-239181431>

NB some time after this, more up-to-date versions of packages may have been installed, rather than definitely compatible older versions (compatibility issues? Eg Azure/Xamarin?).

11-88

Reading from a Cloud database

A Where statement applied to Azure db table query (to check cloud-stored credentials) ; also changed Id property of User to GUID to match Azure ID value type.

```

private async void LoginButton_Clicked(object sender, EventArgs e)
{
    //string password = password.Text;
    //string password = password.Text;
    bool isEmpty = string.IsNullOrEmpty(email.Text);
    bool isPasswordEmpty = string.IsNullOrEmpty(password.Text);

    if (isEmpty || isPasswordEmpty)

```

```

    }

    else           // if password check worth doing
    {

        // Retrieve the User table from the Azure db, but only the specific
user's record, if existent
        var user = (await App.MobileService.GetTable<User>().Where(usr =>
usr.Email == email.Text).ToListAsync()).FirstOrDefault();

        if (user != null)
        {
            if (user.Password == password.Text)
            {
                await Navigation.PushAsync(new HomePage());           // cf
segue & intent - will allow back navigation too via navigation bar on screen
            }
            else
            {
                await DisplayAlert("Error", "Email or password are
incorrect", "OK");
            }
        }
        else
        {
            await DisplayAlert("Error", "There was an error while logging
you in", "OK");
        }
    }
}

```

11-89

Inserting with a Foreign Key

User Id as foreign key in Post table; Post Id also as Guid; code to write to Post on Azure instead of local SQLite. Meaning that all users' posts as well as all users' login credentials will be stored in the cloud.

```
private async void SaveToolbarItem_Clicked(object sender, EventArgs e)
{
    try
    {
        var selectedVenue = venueListView.SelectedItem as Venue;      // get
        clicked Venue as object of Venue class

        var firstCategory = selectedVenue.categories.FirstOrDefault();
        // approved, safe, way of getting first of zero to many categories of venue

        // insert Post record into db
        Post post = new Post()
        {
            ...
        }
    }
}
```

```

        ExperienceDescription = experienceDescriptionEntry.Text,
        // use new text entry box value for description (otherwise use
deserialised JSON data fields from API response)
        // Id set automatically
        // CategoryId = selectedVenue.categories[0].id;           // just
get first category - not safe way though
        CategoryId = firstCategory?.id,
// PNP null conditional operator
        CategoryName = firstCategory?.name ?? "No category name given",
// PNP null conditional & coalescing operators
        Address = selectedVenue.location.address,
        Latitude = selectedVenue.location.lat,
        Longitude = selectedVenue.location.lng,
        Distance = selectedVenue.location.distance,
        VenueName = selectedVenue.name,
        UserId = App.user.Id                                // set
the app's current user to Azure-cloud-stored ID
    };          // NB initialising the new instance's members thus in a
terminated-block

// No longer using SQLite after switching to Azure in 11-89

        // insert record to Azure db Posts table (having already gotten foreign
key for ID from User table)
        await App.MobileService.GetTable<Post>().InsertAsync(post);
        await DisplayAlert("Success", "Record successfully inserted", "OK");

    }
    catch (NullReferenceException nre)           // e.g. in case there's no
category (null)
    {
        DisplayAlert("Failure", "No record inserted", "OK");
    }
    catch (Exception ex)                      // for more general exceptions that
specifically null exceptions
    {
        DisplayAlert("Failure", "No record inserted", "OK");
    }
}
}

```

NB Guid type must have 32 digits 4byte-2byte-2byte-2byte-6byte.

<https://docs.microsoft.com/en-us/dynamics-nav/guid-data-type>

Had to delete all int-type records from local db before changing Post Id type to Guid string, to avoid runtime errors.

11-90

Reading filtered data

Filter the query so that each user will see only their own posts.

```
var posts = await App.MobileService.GetTable<Post>().Where(p =>
p.UserId == App.user.Id).ToListAsync();
```

"Microsoft.WindowsAzure.MobileServices.MobileServiceInvalidOperationException: ')' or operator expected" (at index 16)

// Be very cautious using Guids viz strings - Guids can mess things up (perhaps with Azure lambda expressions for sure)

Use string for Azure ID type (not Guid, and not int).

11-91

Multiple devices

Continuing to use app from emulator even when not running.

Cloud-hosted data seen on both emulated devices simultaneously.

11-92

Updating and deleting from Azure

Use ListView click event (previously set up in 6-58) in PostDetails, and, inter alia:

```

    await App.MobileService.GetTable<Post>().UpdateAsync(selectedPost);

And

try
{
    // Delete record from Azure db Posts table

    await App.MobileService.GetTable<Post>().DeleteAsync(selectedPost);
    await DisplayAlert("Success", "Record successfully deleted", "OK");
}

catch (NullReferenceException nre)           // e.g. in case there's no
category (null)
{
    await DisplayAlert("Failure", "No record deleted", "OK");
}

catch (Exception ex)                      // for more general exceptions that
specifically null exceptions
{
    await DisplayAlert("Failure", "No record deleted", "OK");
}

```

NB soft-delete in Azure (easy)table, so records will still be 'there' in table except with 'DELETED' set to True.

MVVM

12-93

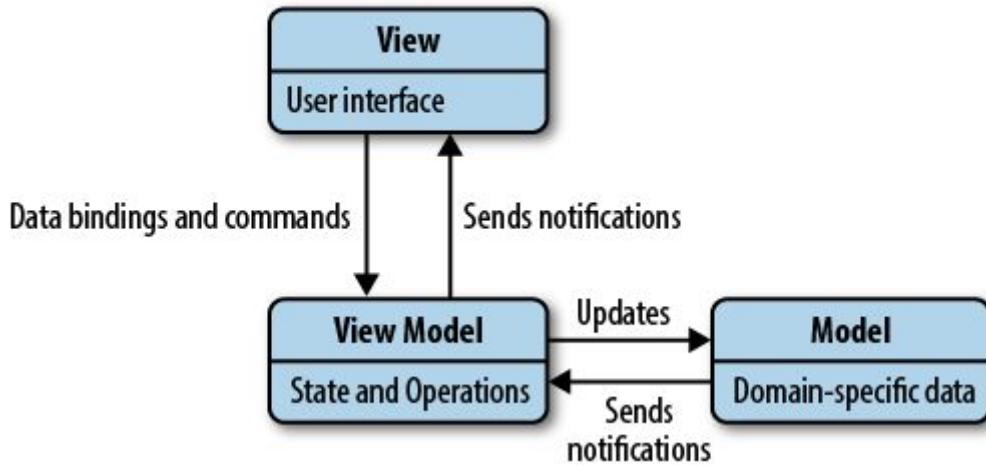
Introduction to MVVM

MVVM - **M**odel; **V**iew; **V**iew-**M**odel

(Similar to **M**odel-**V**iew-**P**resentation**M**odel)

Separation of concerns; easier code re-use; division of develop & design work

MVVM



<https://www.oreilly.com/library/view/learning-javascript-design/9781449334840/ch10s06.html>

Data binding essential

Model : Data model, business logic & validation logic (domain ie real-world specific)

View : Layout of what is shown - only limited code-behind (only enough logic to show data) - uses bindings to get data from View-Model

View-Model : The logic for the view - intermediary between View and Model

12-94

The Model

Since logic should be in the Model, all class logic and database logic should be in the Model part of the code, not in the Views' code-behind cs.

Refactoring of logic and methods into classes in the Model (folder) eg Post, User, Venue.

E.g. Post.Read, Post.Insert, User.Login, Venue.GetVenues

E.g.

```
/// <summary>
/// Read list of posts (for a user recorded in the App object)
///
/// Refactored here for MVVM
/// </summary>
/// <returns></returns>
public static async Task<List<Post>> Read()
{
    var posts = await App.MobileService.GetTable<Post>().Where(p => p.UserId == App.user.Id).ToListAsync(); // get posts filtered by user - from Azure cloud db
    return posts;
}
```

12-95

Challenge - improving the Model

Refactoring of logic and methods into classes in the Model (folder) eg Post, User.

E.g. User.Register

12-96

The View-Model

View-Model per se non-existent in solution at this point in time.

Currently, many event handlers in code-behind - aiming to move event-handling functionality into View-Model instead of in View. Also for handling not-quite-right cases. Also to convert data into more convenient forms. Data binding must be implemented more fully (see on).
(discussion)

12-97

The INotifyPropertyChanged interface

For improved data binding, **INotifyPropertyChanged** implemented in classes

Binding 1-Way: **View** updated with changed values from the **Model (DEFAULT)**

Binding 2-Way: **Model** stays updated with values from the **View (&v-v)**

Binding 1-Way **to source**: Model updated with values from the **View (only)**

Model d'implement **INotifyPropertyChanged**; changes (**set**) to property d'trigger events; bound properties d'respond to events.

Bindings can be on individual properties (?TODO cf 12-99).

(discussion)

12-98

Implementing the INotifyPropertyChanged interface

Post class to implement **INotifyPropertyChanged**

Ctrl+./Alt+Enter to implement

```
public event PropertyChangedEventHandler PropertyChanged;           // this bit
auto-completed from CTRL+. - use OnPropertyChanged (qv) to affect 'set' methods
```

And, completed by hand:

```
/// <summary>
/// Handler for PropertyChanged
/// Hand-written
/// </summary>
/// <param name="propertyName"></param>
private void OnPropertyChanged(string propertyName)           // added by
hand to work with altered 'set' methods, for INotifyPropertyChanged
{
    PropertyChanged(this, new PropertyChangedEventArgs(propertyName));  //
NB INotifyPropertyChanged implementation
    // 'this' is the 'sender' parameter - propertyName from
OnPropertyChanged value hand-added to set method of full property
}
```

And each property altered, for example:

```
// propfull TAB TAB to snippet a full property definition (viz prop TAB TAB  
for syntactic sugar version) - NB set method defined boilerplate  
// NB Upper Case for public prop, lower case for private prop  
private string id;  
  
public string Id  
{  
    get { return id; }  
    set {  
        id = value;  
        OnPropertyChanged("Id");           // manually defined  
        OnPropertyChanged for each property required  
    }  
}
```

Full property declaration implemented in class - propfull TAB TAB - and setter altered by hand to include OnPropertyChanged event

The private variable is a 'backing field'

<https://docs.microsoft.com/en-us/dotnet/csharp/programming-guide/classes-and-structs/fields>

<https://stackoverflow.com/questions/7434308/what-is-diff-between-prop-and-full-property>

?? <https://forums.xamarin.com/discussion/42525/icommand-canexecute-not-called> ?

<https://forums.xamarin.com/discussion/149989/command-canexecute-bug> ?

12-99

Binding context

In XAML, must bind the properties whose setters altered for INotifyPropertyChanged
Ensure that x:Name given to container (eg StackLayout) - then specify Binding Context in code (in constructor of page code-behind xaml.cs).

Default Mode is 1-way binding; need to change this to 2-way in XAML in Text attribute for each property/element.

Binding set in elements in NewTravelPage and Register page, code-behind altered to set Binding Context

E.g. in XAML:

```
<?xml version="1.0" encoding="utf-8" ?>  
<ContentPage xmlns="http://xamarin.com/schemas/2014/forms"  
            xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"  
            x:Class="TravelRecord.RegisterPage">  
    <ContentPage.Content>  
        <StackLayout VerticalOptions="Center"  
                   x:Name="containerStackLayout">
```

```

        Margin="20,0,20,0">
<!-- L,T,R,B -->
<!-- Binding context set in page constructor -->
<Entry x:Name="email"
       Text="{Binding Email, Mode=TwoWay}"
       Placeholder="Email address"
       Keyboard="Email"
       TextColor="{StaticResource eveningishColour}"/>
<Entry x:Name="password"
       Text="{Binding Password, Mode=TwoWay}"
       Placeholder="Password"
       IsPassword="True"
       TextColor="{StaticResource wheatleColour}"/>
```

And in xaml.cs

```

public partial class RegisterPage : ContentPage
{
    User user; // for use with both
    BindingContext and for login to App

    public RegisterPage()
    {
        InitializeComponent();

        user = new User();
        containerStackLayout.BindingContext = user; // set Binding context
        of User for XAML elements
    }
}
```

12-100

The ICommand interface

ICommand interface will allow movement of code for event handlers to **ViewModel**. ViewModel class with an Execute member can replace event handlers - CanExecute optional evaluations can be made, and a command can be assigned.

Eg Login page/class will implement ICommand and individual field/properties/elements are susceptible to CanExecute evaluation.

(discussion)

12-101

Implementing ICommand

To portable/root project, add folder '**ViewModel**' and therein add folder '**Commands**'.

Inside folder '**Commands**' add a class, (make scope **public** - leave default (private) called **NavigationCommand** - have this implement **ICommand**. CTRL+. To implement members (x3) - cf code.

Add a new class in folder *ViewModel* called '**HomeVM**' - make scope **public** , add a **public** member of type *NavigationCommand* (qv above) called *NavCommand*, and in constructor instantiate *NavCommand*, and below constructor add a new method for *Navigate()*.
HomeVM is added as member property of *NavigationCommand*, and instantiated via its constructor parameter. Reciprocally, **HomeVM**'s constructor will add *NavigationCommand* as a member.

(NB ctor TAB TAB)

```
using System;
using System.Collections.Generic;
using System.Text;
using TravelRecord.ViewModel.Commands;

namespace TravelRecord.ViewModel
{
    public class HomeVM
    {
        public NavigationCommand NavCommand { get; set; } // our own ICommand
implementation 12-101, made a property also, thus bindable in XAML 12-102

        public HomeVM()
        {
            NavCommand = new NavigationCommand(this);
        }

        // hand-written bespoke method for navigating via ICommand implementation
NavigationCommand
        public void Navigate()
        {

        }
    }
}

using System;
using System.Collections.Generic;
using System.Text;
using System.Windows.Input;

namespace TravelRecord.ViewModel.Commands
{
    public class NavigationCommand : ICommand
    {
        public event EventHandler CanExecuteChanged; // boilerplate
        public HomeVM HomeViewModel { get; set; } // use our hand-written
ViewModel class

        public NavigationCommand(HomeVM homeVM)
        {
            HomeViewModel = homeVM;
        }

        public bool CanExecute(object parameter)
        {
            //throw new NotImplementedException();
        }
    }
}
```

```

        return true;                                // no checks needed in this case
    }

    public void Execute(object parameter)
    {
        // throw new NotImplementedException();
        // functionality to be defined in ViewModel (cf HomeVM in ViewModel folder)
        HomeViewModel.Navigate();
    }
}
}

```

12-102

Binding commands

Command instead of Click handler on new post:

HomePage.xaml.cs

```

public partial class HomePage : TabbedPage
{
    HomeVM viewModel;                                // ViewModel ready for use 12-102

    public HomePage ()
    {
        InitializeComponent ();

        viewModel = new HomeVM();          // instantiate ViewModel
        BindingContext = viewModel;        // make instantiated ViewModel
available to XAML in page (via Command attribute)
    }
}

```

HomePage.xaml

```

<?xml version="1.0" encoding="utf-8" ?>
<!-- manually changed to TabbedPage from ContentPage - NB must also change class to
inherit from TabbedPage instead of ContentPage -->
<TabbedPage xmlns="http://xamarin.com/schemas/2014/forms"
             xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
             xmlns:local="clr-namespace:TravelRecord"
             x:Class="TravelRecord.HomePage">

    <TabbedPage.ToolbarItems>
        <ToolbarItem x:Name="AddToolbarItem" Text="Add"
                     Icon="add.png"
                     Command="{Binding NavCommand}"/>
    
```

```
<!-- Took out Clicked="AddToolbarItem_Clicked" for Command= while  
refactoring for ICommand/MVVM 12-102-->
```

Modifying HomeVM.cs

```
// hand-written bespoke method for navigating via ICommand implementation  
NavigationCommand  
public async void Navigate()  
{  
    await App.Current.MainPage.Navigation.PushAsync(new NewTravelPage());  
// go to a new Travel Page (back in navigation menu will also work)  
}
```

NB Beware: a property (with get & set) which is not **public** explicitly will not work with *Binding* in xaml.

Best practice is thus: to have navigation functionality in a class eg Navgate in HomeVM.cs.

12-103

Command parameters

To folder *ViewModel* , add new class '**MainVM**' - a ViewModel for the main page - make **public** and add a property **User** of type *User*, and a property **LoginCommand** of type *LoginCommand* (see on) - make this **public** and with **{get; set;}** so as to be a Binding property.

To folder *ViewModel/Commands*, add a class **LoginCommand** and make it **public** and implementing *ICommand* and CTRL+. To implement the necessary interface members. Add a **public** property **ViewModel** of type **MainVM** , with a **{get; set;}**.

These 2 classes to have each other as public members (set in constructors).

Cf code (lots of code).

```
public partial class MainPage : ContentPage  
{  
  
    MainVM viewModel; // added in 12-103 for ViewModel  
    refactoring  
  
    public MainPage()  
    {  
        InitializeComponent();  
  
        var assembly = typeof(MainPage); // prepare to set image source  
        (9-73) (as soon as page formed)  
        iconImage.Source =  
        ImageSource.FromResource("TravelRecord.Assets.Images.pin_icon.png", assembly);  
  
        viewModel = new MainVM();  
        BindingContext = viewModel;
```

}

CanExecute handy for avoiding spurious calls to db - activated on each change - *literally every keypress on an Entry* - related buttons also greyed out.

Jumped around changing things again & again in this (to show MVVM). Refactoring for Commands fairly gruelling.

12-104

Replacing events - challenge (part 1)

What would have helped here would have been the diagram from 12-93 but adapted to this specific solution, so we had a better idea of what was going on.

Moving code from code-behind xaml.cs into xyzCommand classes and xyzVM (ViewModel) classes.

Not a 1:1 of VM & Commands

Steps:

Registerdsjkjhsdkjhfskj

Make public & implement ICommand

References in constructor to VM in Command, and vice versa

Hand-write OnPropertyChanged for INotifyPropertyChanged (ie ViewModels)

Hand-write ViewModels' logic methods (eg Register, Add, Delete &c)

Needs instance of ViewModel in xaml.cs, and this as BindingContext

Commands: implement ICommand, handle CanExecute (should execute?) & Execute logic

ViewModels: implement INotifyPropertyChanged, handle navigation

Make just about everything **public**.

NB In xaml, both **Command** and, for use with CanExecute and sometimes with Execute (see code) **CommandParameter**.

NB order of statements in **set** method for properties in VM important to avoid loops - must be like so:

```
public string Email
{
    get { return email; }
    set
    {
        email = value;
        User = new User()
        {
            Email = this.Email,
        }
    }
}
```

```

        Password = this.Password,
        ConfirmPassword = this.ConfirmPassword
    };
    OnPropertyChanged("Email");           // OnPropertyChanged event fired *last*
}
}

```

Eg

RegisterCommand.cs (in ViewModel/Command)

```

using System;
using System.Collections.Generic;
using System.Text;
using System.Windows.Input;
using TravelRecord.Model;

namespace TravelRecord.ViewModel.Commands
{
    public class RegisterCommand : ICommand
    {
        private RegisterVM viewModel;           // this ViewModel reference member
private here

        public event EventHandler CanExecuteChanged;

        public RegisterCommand(RegisterVM viewModel)
        {
            this.viewModel = viewModel;
        }

        public bool CanExecute(object parameter)
        {
            // throw new NotImplementedException();
            User user = (User)parameter;

            if (user == null)
            {
                return false;
            }

            if (user.Password == user.ConfirmPassword)
            {
                if (string.IsNullOrEmpty(user.Email) ||
string.IsNullOrEmpty(user.Password))
                {
                    return false;
                }
                // else
                return true;           // valid-looking credentials so go ahead and
try

            }
            // else
            return false;
        }

        public void Execute(object parameter)
        {
            // throw new NotImplementedException();
        }
    }
}

```

```

        User user = (User)parameter;           // as ViewModel has Register
method, will be receiving from parameter of command, hence cast of User here - cf
RegisterVM::Register
    User.Register(user);                  // go ahead and register this user
}
}
}

```

In RegisterNavigationCommand (in ViewModels/Commands)

```

using System;
using System.Collections.Generic;
using System.Text;
using System.Windows.Input;

namespace TravelRecord.ViewModel.Commands
{
    public class RegisterNavigationCommand : ICommand
    {
        private MainVM viewModel;           // this one private - use in
constructor only
        public event EventHandler CanExecuteChanged;

        public RegisterNavigationCommand(MainVM viewModel)           // this command to use
the Main view model - handy for Execute/Navigate
        {
            this.viewModel = viewModel;
        }

        public bool CanExecute(object parameter)
        {
            // throw new NotImplementedException();
            return true;
        }

        public void Execute(object parameter)
        {
            // throw new NotImplementedException();
            viewModel.Navigate();           // use our ViewModel's Navigate
method to show the registration screen page
        }
    }
}

```

In RegisterVM (in ViewModels)

```

using System;
using System.Collections.Generic;
using System.ComponentModel;
using System.Text;
using TravelRecord.Model;
using TravelRecord.ViewModel.Commands;

namespace TravelRecord.ViewModel
{
    public class RegisterVM : INotifyPropertyChanged
    {
        private string email;

```

```

public string Email
{
    get { return email; }
    set
    {
        // NB order of statements in set method in VM important to avoid loops -
must be like so:
        email = value;
        User = new User()
        {
            Email = this.Email,
            Password = this.Password,
            ConfirmPassword = this.ConfirmPassword
        };
        OnPropertyChanged("Email");           // OnPropertyChanged event fired *last*
    }
}

private string password;

public string Password
{
    get { return password; }
    set {
        password = value;
        User = new User()
// resetting User each time to ensure that input to the page is written into Model
        {
            Email = this.Email,
            Password = this.Password,
            ConfirmPassword = this.ConfirmPassword
        };
        OnPropertyChanged("Password");
    }
}

private string confirmPassword;

public string ConfirmPassword
{
    get { return confirmPassword; }
    set {
        confirmPassword = value;
        User = new User()
        {
            Email = this.Email,
            Password = this.Password,
            ConfirmPassword = this.ConfirmPassword
        };
        OnPropertyChanged("ConfirmPassword");
    }
}

private User user;

public User User
{
    get { return user; }
    set {
        user = value;
/*
        User = new User()
        {

```

```

        Email = this.Email,
        Password = this.Password,
        ConfirmPassword = this.ConfirmPassword
    } ;
*/
// the above re-re-setting User is not needed as this is the User member's own 'set' method
!
        OnPropertyChanged("User");
    }
}

public RegisterCommand RegisterCommand { get; set; }

public event PropertyChangedEventHandler PropertyChanged;           // implemented by
CTRL.

public RegisterVM()      // NB to set up Register Command for this ViewModel when
this VM is set up firstly
{
    RegisterCommand = new RegisterCommand(this);                // cf
RegisterCommand::Execute
}

// hand-written
private void OnPropertyChanged(string propertyName)
{
    PropertyChanged(this, new PropertyChangedEventArgs(propertyName));
}

// hand-written
public void Register(User user)
{   // code copied in from Clicked event handler 12-104

    /* if (password.Text == confirmPasswordEntry.Text) // - must be same to have
gotten here
    {
        User.Register(user);
    }
    else
    {
        await DisplayAlert("Error", "Passwords don't match", "OK");
    }
*/
    User.Register(user);
}
}
}
}

```

In the start of RegisterPage.xaml.cs

```

namespace TravelRecord
{
    [XamlCompilation(XamlCompilationOptions.Compile)]
    public partial class RegisterPage : ContentPage
    {
        //User user;                                         // for use with both
BindingContext and for login to App
    }
}

```

```

    // supposedly User not needed as of 12-204 (short lived or what? this is a bit
nuts) as User inside viewModel RegisterVM
    RegisterVM viewModel;

    public RegisterPage()
    {
        InitializeComponent();

        // user = new User();
        // containerStackLayout.BindingContext = user;      // set Binding context of
User for XAML elements
        // supposedly User not needed as of 12-204 (short lived or what? this is a bit
nuts) as User inside viewModel RegisterVM

        viewModel = new RegisterVM();
        BindingContext = viewModel;                         // BindingContext of XAML
page is this ViewModel
    }

```

In RegisterPage.xaml:

```

<?xml version="1.0" encoding="utf-8" ?>
<ContentPage xmlns="http://xamarin.com/schemas/2014/forms"
    xmlns:x="http://schemas.microsoft.com/winfx/2009/xaml"
    x:Class="TravelRecord.RegisterPage">
    <ContentPage.Content>
        <StackLayout VerticalOptions="Center"
            x:Name="containerStackLayout"
            Margin="20,0,20,0">
            <!-- L,T,R,B -->
            <!-- Binding context set in page constructor -->
            <Entry x:Name="email"
                Text="{Binding Email, Mode=TwoWay}"
                Placeholder="Email address"
                Keyboard="Email"
                TextColor="{StaticResource eveningishColour}"/>
            <Entry x:Name="password"
                Text="{Binding Password, Mode=TwoWay}"
                Placeholder="Password"
                IsPassword="True"
                TextColor="{StaticResource wheatleColour}"/>
            <Entry x:Name="confirmPasswordEntry"
                Text="{Binding ConfirmPassword, Mode=TwoWay}"
                Placeholder="Confirm Password"
                IsPassword="True"
                TextColor="{StaticResource wheatleColour}"/>
            <Button x:Name="registerButton"
                Text="Register"
                BackgroundColor="{StaticResource eveningishColour}"
                Margin="0,50,0,0"
                Command="{Binding RegisterCommand}"
                CommandParameter="{Binding User}"
                Style="{StaticResource normalButton}"
            />

```

12-105

Replacing events - challenge (part 2)

Here we go again.

Still more problematic to refactor NewTravel item clicked - selectedVenue is crucial - need a Venue object now within the Post object.

Now that Venue is within Post object set as BindingContext:

```
<ListView x:Name="venueListView"
          SelectedItem="{Binding Venue, Mode=TwoWay}"
          HorizontalOptions="FillAndExpand"
          Margin="20, 0"> <!-- no top/bottom margin -->
    <ListView.ItemTemplate>
        ...
    </ListView.ItemTemplate>
```

Button permanently seeming disabled after initial CanExecute - can't get Binding PostCommand to fire CanExecute again after text entered, so a bodge for now:

```
public partial class NewTravelPage : ContentPage
{
    //Post post;                                // for use within NewTravelPage and for BindingContext of elements in page
    // post superseded as BindingContext in 12-105

    NewTravelVM viewModel;

    public bool AllowSaveButton = false;           // workaround?bodge? - trying to get save Binding PostCommand
    button in NewTravelCommand working ok - shouldn't need this

    public NewTravelPage()
    {
        InitializeComponent();

        // post = new Post();
        //containerStackLayout.BindingContext = post;
        // post superseded as BindingContext in 12-105

        viewModel = new NewTravelVM();
        BindingContext = viewModel;
        // NB BindingContext (viewModel) now for entire page, not just for StackLayout...
        // ... - must now set Binding of StackLayout only to Post (property of ViewModel) in XAML (qv) 12-105
        AllowSaveButton = true;                      // set bodge/workaround flag for disabled (no CanExecute?) button - 12-105
```

And in xaml,

```
<ToolbarItem Name="SaveToolbarItem" Text="Save"
             Command="{Binding PostCommand}"
             CommandParameter="{Binding Post}"
             IsEnabled="{Binding AllowSaveButton}"
             Icon="save.png"/>
    <!--
        Command="{Binding PostCommand}"
        CommandParameter="{Binding Post}"/> -->
    <!-- Clicked="SaveToolbarItem_Clicked" superseded by Binding Command -->
```

```
<!-- This not working for me at mo, save button permanently disabled after initial  
CanExecute, hence IsEnabled and variable in code-behind constructor -->
```

Took some lowster. TODO find out why the non-un-disable-ing save button happened? (Why CanExecute not run again by PostCommand when Experience Description changed?) Go back and ask?

NB

```
[JsonIgnore]           // from Newtonsoft.Json - to avoid error in Azure as doesn't like  
objects  
    public Venue Venue  
    {  
        get { return venue; }  
        set {  
            venue = value;  
            // NB the order here  
            var firstCategory = venue.categories?.FirstOrDefault();           // approved,  
safe, way of getting first of zero to many categories of venue  
....
```

Refactoring....

12-106

Flex layout

FlexLayout horizontal by default.

Direction = Column, ColumnReverse, Row, RowReverse.
AlignItems = Center will centre all items in FlexLayout (would need individual items' alignment in StackLayout).

An attribute of FlexLayout.AlignSelf="Start" on a contained element would left-align.

FlexLayout.AlignSelf="Stretch" will fill available space with element's boundary
JustifyContent = "SpaceAround" to fill up, evenly spaced in FlexLayout (cf justify)
SpaceBetween will set equal spaces between
SpaceEvenly will do similar

E.g <ScrollView> containing

```
<FlexLayout>  
<Frame>  
</Frame>  
</FlexLayout>
```

NB phone wih 'notch' at top - eg iPhone 10, 10S, 10R, ... to keep below 'notch':

```
Xamarin.Forms.PlatformConfiguration.iOSSpecific.Page.SetUseSafeArea(this, true);
```

12-107

The IValueConverter

Model's form of data may not be exactly that needed by the View.

Class d'implement IValueConverter - Convert method will then cast the Model data to that needed by the view - ConvertBack will cast View data to that needed by Model.

E.g. Convert DateTime as "Less than 2 hours ago" string.

E.g. Convert boolean flag isLoggedIn in Model to 'Visibility,Collapsed' in View
Model data and setup d'remain the same, as do View data and setup.

12-108

Implementing the IValue converter

Aim: The day on which the records in the Post table were added.

CREATEDAT column in Azure (easy) table - needing a corresponding property new-created in the Post class in Models. This is a bit like ORM or code-first, as the table and any fields correctly declared in code will be formed/correspond to those in the Azure db.

```
// to correspond to CREATEDAT field in Azure db table 12-108
private DateTimeOffset dateOffset;

public DateTimeOffset CREATEDAT
{
    get { return dateOffset; }
    set {
        dateOffset = value;
        OnPropertyChanged("CREATEDAT"); // fire off a good old
onpropertychanged event
    }
}
```

And in xaml add a Detail attribute, only to display standard short-format date/time:

Add a new folder in ViewModel 'Converters' and therein a new class 'DateTimeToStringConverter' , made **public** and implementing : **IValueConverter**.
(Alt+Enter for using and Ctrl+. for interface methods)

```
using System;
using System.Collections.Generic;
using System.Globalization;
using System.Text;
using Xamarin.Forms;

namespace TravelRecord.ViewModel.Converters
{
    public class DateTimeToStringConverter : IValueConverter
    {
        // logic for conversion between Model (or ViewModel) and View in here
        // NB the 'object' types here
        public object Convert(object value, Type targetType, object parameter, CultureInfo culture)
        {
            // throw new NotImplementedException();
            string timeAgo = string.Empty;

            DateTimeOffset dateTime = (DateTimeOffset)value;
            DateTimeOffset now = DateTimeOffset.Now;
```

```

        var difference = now - dateDateTime;

        if (difference.TotalDays > 1)
        {
            timeAgo = $"{dateDateTime:d}";
        }
        else
        {
            if (difference.TotalSeconds < 60)
                timeAgo = $"{Math.Round(difference.TotalSeconds)} seconds ago";
            if (difference.TotalMinutes < 60)
                timeAgo = $"{Math.Round(difference.TotalMinutes)} minutes ago";      // rounding with Math.Round
            if (difference.TotalHours < 24)
                timeAgo = $"{difference.TotalHours:0} hours ago";                      // rounding with format :0
        }

        // Otherwise, if neither more than a day nor less than a day ago...
        timeAgo = "Yesterday";

        return timeAgo;
    }

    return timeAgo;
}

public object ConvertBack(object value, Type targetType, object parameter,
CultureInfo culture)
{
    // throw new NotImplementedException();
    // Quite often ConvertBack is not used (from the View back to the Model)
    return DateTimeOffset.Now;           // No particular use for this as yet
}
}
}

```

12-109

The ObservableCollection<T> class

ObservableCollection of T - NB not an interface - a List which is aware of changes - useful for MVVM (Binding).

Whenever insertions or deletions are made, this'll trigger events which can be used to update View /VM/Model.

A class will inherit from ObservableCollection<T> (class must be already implementing INotifyCollectionChanged) - a Binding Source is defined - changes to UI will be handled.

Eg. List populating elements in View - changed in List (eg a List element added, another deleted) are reflected in View.

TODO: what similarity is there with Observables in Angular (& other js libraries)?

12-110

Using the ObservableCollection<T>

Class inside ViewModel folder added, called '*HistoryVM*', made **public** and with a **public ObservableCollection<Post>** Posts.

Reference the HistoryVM in the xaml.cs class for the page, and in the constructor make an instance of this the BindingContext.

Ctrl+. will generate a method even in a different class if non-existent at time typed. Eg
UpdatePosts

TODO: Select Item in History via a Command in HistoryVM ?

12-111

Xamarin Forms wrap up

Summary discussion

TODO: Select Item in History via a Command in HistoryVM ?

12-112

Using fast renderers

Renderer first, then control (e.g. Button). Fast Renderers have no renderer - just the native element/control.

In NuGet package manager, check version of **Xamarin.Forms** package. If less than version 2.4 , updating will be necessary to use Fast Renderers.

<https://docs.microsoft.com/en-us/xamarin/xamarin-forms/internals/fast-renderers>

"From Xamarin.Forms 4.0 onwards, all applications targeting

FormsAppCompatActivity will use these fast renderers by default. "

Used to be, as first line before Init in FInishedLaunching in AppDelegate for iOS:

```
global::Xamarin.Forms.Forms.SetFlags("FastRenderers_Experimental"); // 12-112 Fast  
Renderers
```

And same in MainActivity::OnCreate before Init for Android.

12-113

Using layout compression

Some elements will show at any one time; some won't. A StackLayout (eg. uncoloured grid, view, label), especially if elements are hidden until an event, will have some elements not showing. Layout compression will show only relevant, visible elements.

E.g. MainPage.xaml has a StackLayout for layout, but it has no colours, &c, so might as well not be rendered per se.

```
<StackLayout VerticalOptions="Center"  
            CompressedLayout.IsHeadless="True"
```

<https://docs.microsoft.com/en-us/xamarin/xamarin-forms/user-interface/layouts/layout-compression>

Necessary to manually add this (where possible) to StackLayout (TODO:??) - best used with hidden elements and long uncoloured StackLayouts.

12-114

Permissions

Newer devices have different permissions regimes (eg allowing rescinding/revoking a certain permission on some basis).

<https://support.google.com/googleplay/answer/6270602?hl=en-GB>

<https://developer.android.com/guide/topics/permissions/overview>

Android 6+: Settings/Security&Location/Location/App-level permissions

iOS: Settings/Privacy/Location/Location Services

Plugin.Permissions must be installed to all projects. In addition, the **Android** project must have, installed, the **Plugin.CurrentActivity** package. (Same as 7-61?)

In Android MainActivity, override OnRequestPermissionsResult

It can be worthwhile to check again for permissions to do relevant things therefore, and ask again, and change permission on-the-fly immediately before trying to execute code to do with those things.

If *MainApplication.cs* (with ::OnActivityCreated et al, assigning CrossCurrentActivity.Current.Activity) not made automatically in Android Project, alternatively in OnCreate of MainActivity:

CrossCurrentActivity.Current.Activity = this; // for Permissions 12-114

And in a page involving location-finding:

```
protected async override void OnAppearing()
{
    base.OnAppearing();
    try
    {
        var status = await
CrossPermissions.Current.CheckPermissionStatusAsync(Plugin.Permissions.Abstractions.Permission.Location);
        // Check whether (location) permission granted or not
        if (status != PermissionStatus.Granted)
        {
            // If not yet granted by user, try asking for permission to use
location
            if (await
CrossPermissions.Current.ShouldShowRequestPermissionRationaleAsync(Permission.Location))
            {
                await DisplayAlert("Need permission", "The app will need to access
your location", "Ok");
            }

            var results = await
CrossPermissions.Current.RequestPermissionsAsync(Permission.Location);
            // Try again, to see whether permissions *now* granted
            if (results.ContainsKey(Permission.Location))
            {

```

```

        status = results[Permission.Location];           // update in case
permission was granted just now
    }
}
if (status == PermissionStatus.Granted)
{
    try
    {
        var locator = CrossGeolocator.Current;
        var position = await locator.GetPositionAsync();

        var venues = await VenueLogic.GetVenues(position.Latitude,
position.Longitude);
        venueListView.ItemsSource = venues;
    }
    catch (Exception exc)
    {
        await DisplayAlert("Problem/Error", exc.Message, "Ok");
    }
}
else
{
    await DisplayAlert("No permission", "App cannot proceed and get nearby
features because you did not grant permission to access your location", "Ok");
}
}
catch(Exception ex)
{
}
}

```

12-115

ListView interactivity

ListView: **ContextActions** (a la rt-click context-menus) for swipe-right (iOS) or press-&-hold (Android), with press-able option displayed; **IsPullToRefreshEnabled="True"** and pull-down to refresh a list

For ContextActions, to delete:

```

<TextCell Text="{Binding
ExperienceDescription}">
    Detail="{Binding CREATEDAT, Converter={StaticResource
converter}}">
        <TextCell.ContextActions>
            <MenuItem Text="Delete"
Clicked="MenuItem_Clicked"
CommandParameter="{Binding}"
IsDestructive="True"/>
            <!-- could be a Command rather than click event handler
- can still use CommandParameter 12-115 -->
            <!-- IsDestructive will show as red-background in iOS
-->
        </TextCell.ContextActions>
    </TextCell>
// TODO could convert this to a Command for VM to make MVVM 12-115

```

```

private void MenuItem_Clicked(object sender, EventArgs e)
{
    var post = (Post) ((MenuItem)sender).CommandParameter;           // NB in XAML
MenuItem, CommandParameter="{Binding}" - NB also chained casting
viewModel.DeletePost(post);

    viewModel.UpdatePosts();                                         // update
ViewModel's list of posts after this deletion
}

...
public async void DeletePost(Post post)
{
    await Post.Delete(post);
}

...
public static async Task<bool> Delete(Post post)
{
    // NB Task<bool> as flag returned to show how things went
    try
    {
        await App.MobileService.GetTable<Post>().DeleteAsync(post);
// delete post - from Azure cloud db
        return true;
    }
    catch (Exception)
    {
        return false;
    }
}

```

For **IsPullToRefreshEnabled**, . **RefreshCommand** attribute and code could (should) be used
- also an event handler **Refreshing** could be used (as here).
IsRefreshing flag clearing should await any **async** task so as to not be premature (while
refreshing a pacifier will rotate at top of screen &c).

```

<ListView x:Name="postListView"
          IsPullToRefreshEnabled="True"
          Refreshing="PostListView_Refreshing"
          ItemsSource="{Binding Posts}"
          ItemSelected="PostListView_ItemSelected"

// pull down to refresh - TODO implement as MVVM using RefreshCommand instead
of Refreshing event in XAML
private async void PostListView_Refreshing(object sender, EventArgs e)
{
    await viewModel.UpdatePosts();                                // update the (historical)
list of posts - need to make this async Task
    postListView.IsRefreshing = false;                            // clear flag to show
refreshing is now over (need to have an async Task above)
}
}

```

```
}
```

12-116

Preparing offline database sync

SQLite db on device used while device offline - sync'd (to Azure cloud db) when internet access available once more.

For SQLite and sync'ing - package **Microsoft.Azure.Mobile.Client.SQLiteStore** via NuGet - might have to install only version 3.1.0 to match **Microsoft.Azure.Mobile.Client** (in 11-85).

Various initialisation code eg

```
public static IMobileServiceSyncTable<Post> postsTable;  
...  
var store = new MobileServiceSQLiteStore(databaseLocation);           //  
Re-used, declare local db for sync'ing 12-116  
  
store.DefineTable<Post>();                                         // instantiate  
SQLite table (for offline/sync'ing) ready for use  
  
MobileService.SyncContext.InitializeAsync(store);      // initialise ready  
for sync'ing later  
  
postsTable = MobileService.GetSyncTable<Post>();          // NB  
Get*Sync*Table not just GetTable
```

12-117

Performing offline database sync

In folder *Helpers*, new class **AzureAppHelper**, make **public**

Line `#define OFFLINESYNC_ENABLED` must be at top of class.

```
#define OFFLINESYNC_ENABLED  
using Microsoft.WindowsAzure.MobileServices;  
using Microsoft.WindowsAzure.MobileServices.Sync;  
using System;  
using System.Collections.Generic;  
using System.Text;  
using System.Threading.Tasks;  
  
namespace TravelRecord.Helpers  
{  
    // TODO should really be called AzureAppServiceHelper - re Azure App Service  
    public class AzureAppHelper  
    {  
        public static async Task SyncAsync()  
        {
```

```

    IReadOnlyCollection<MobileServiceTableOperationError> syncErrors = null;
// to hold any errors arising
    try
    {
        await App.MobileService.SyncContext.PushAsync(); // push any
changes from local to cloud (organised by package Microsoft.WindowsAzure.MobileServices)

        await App.postsTable.PullAsync("userPosts", ""); // pull (to,
and using member table) from cloud, to synchronise
        // queryId:userPosts
    }
    catch (MobileServicePushFailedException mspfe)
    {
        if (mspfe.PushResult != null)
        {
            syncErrors = mspfe.PushResult.Errors;
// record any errors
        }
    }
    catch (Exception exc)
    {
        await App.Current.MainPage.DisplayAlert("Error", exc.Message, "Ok");
    }

    if (syncErrors != null)
    {
        foreach (var error in syncErrors)
        {
            // if an error in the copy, revert to the Azure server's copy (check
Result not null)
            if (error.OperationKind == MobileServiceTableOperationKind.Update &&
error.Result != null)
            {
                await error.CancelAndUpdateItemAsync(error.Result);
            }
            else
            {
                // if not an update error (e.g. if local data suddenly missing),
discard any local changes
                await error.CancelAndDiscardItemAsync();
            }
        }
    }
}
}

```

Having initialised, might as well sync/push from local-to-cloud straight from the get-go in case anything in the local table.

https://en.wikipedia.org/wiki/Helper_class

12-118

Implementing and testing offline sync

That sync'ing feeling.

Identify where it'd make sense to start sync'ing (eg on opening, or refresh, or user's request).

In this case, in *HistoryPage.xaml.cs* (of user 'posts'), *OnAppearing* (as soon as page opened) and on Refresh (all as *PullAsync*); also in Post class in Model for Insert and Delete (both *PushAsync*) and Read (*PullAsync*).

```
public static async Task<List<Post>> Read()
{
    var posts = await App.postsTable.Where(p => p.UserId ==
App.user.Id).ToListAsync();      // get posts filtered by user - from Azure cloud db
    // Read here done via local sync-linked db table (via which from Azure
    // cloud at the mo)

    return posts;
}
public static async void Insert(Post post)
{
// insert post - to Azure cloud db
    await App.postsTable.InsertAsync(post);           // insert post - to
sync-linked local table and thence to Azure cloud db
    await App.MobileService.SyncContext.PushAsync();   // push-sync db
}

public static async Task<bool> Delete(Post post)
{
    // NB Task<bool> as flag returned to show how things went - Tasks can't
be of void return type anyway
    try
    {
// delete post - from Azure cloud db
        await App.postsTable.DeleteAsync(post);         // delete post
- to sync-linked local table and thence to Azure cloud db
        await App.MobileService.SyncContext.PushAsync(); // push-sync db

        return true;
    }
}
```

<https://stackoverflow.com/questions/4008627/how-to-put-an-android-emulator-into-offline-mode>

WIFI:

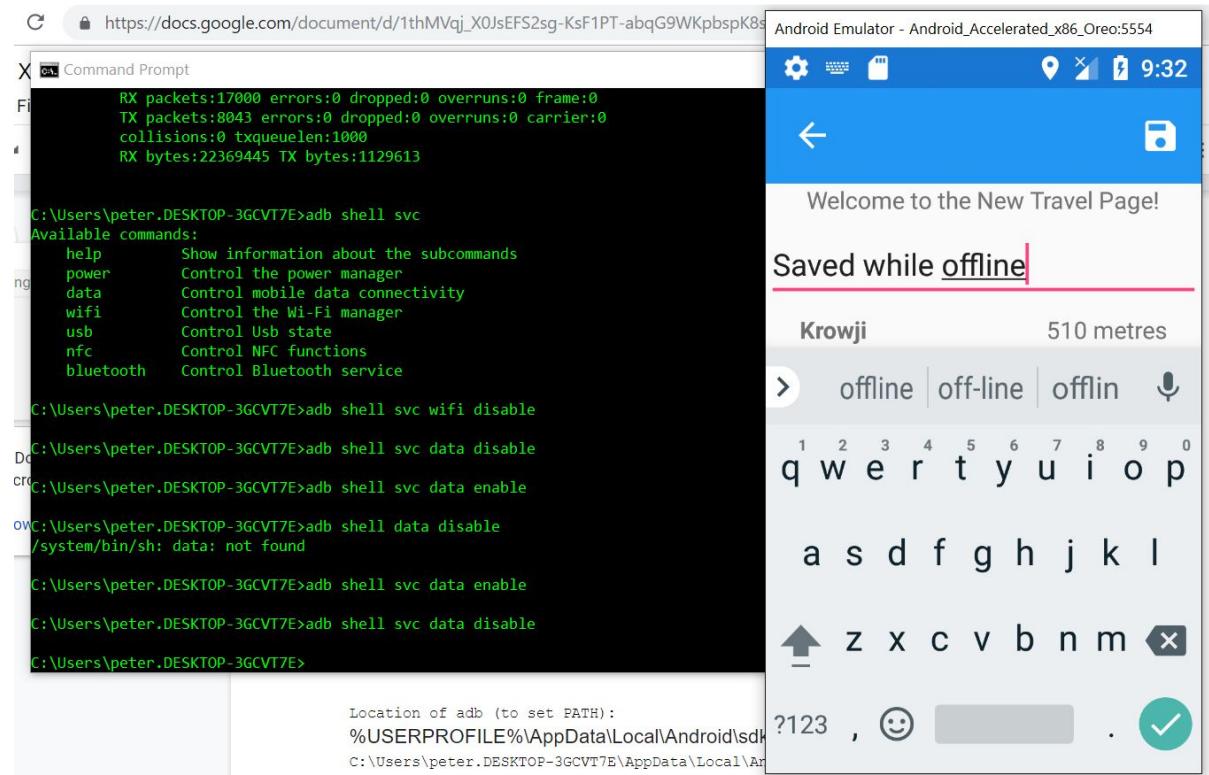
```
$ adb shell svc wifi enable $ adb shell svc wifi disable
```

MOBILE DATA:

```
$ adb shell svc data enable $ adb shell svc data disable
```

Location of adb (to set PATH):

```
%USERPROFILE%\AppData\Local\Android\sdk\platform-tools  
C:\Users\peter\Desktop-3GCVT7E\AppData\Local\Android\Sdk\platform-tools  
?? ~/Library/Android/sdk/platform-tools ??
```



<https://stackoverflow.com/questions/5663480/ios-simulator-offline-mode>
<https://developer.apple.com/download/more/?=for%20Xcode> Additional tools /
In 'Hardware' - Network Link Conditioner (install on Mac) -

App possibly wonky but observed to save a record offline and then upload this record when back online (and list refreshed?).

Merged develop in master from just before starting to work on offline sync'ing
<https://www.hacksparrow.com/how-to-merge-a-specific-commit-in-git.html>

13-119

Selecting an image

Add package **Xam.Plugin.Media** - providing access to native photograph & other media facilities of devices -

13-120

Permissions for Photo Access

In AndroidManifest.xml

```
<uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE">
<uses-permission android:name="android.permission.READ_EXTERNAL_STORAGE">
(Via dialogue)
```

Plugin.Permissions should be present (add manually if not)

In MainActivity::OnCreate, override as per following:

```
// as per https://forums.xamarin.com/discussion/comment/343777/#Comment_343777 and
// https://www.udemy.com/complete-xamarin-developer-course-ios-and-android/learn/lecture/93309
// 50#questions/7073406
    public override void OnRequestPermissionsResult(int requestCode, string[]
permissions, [GeneratedEnum] Permission[] grantResults)
    {

Plugin.Permissions.PermissionsImplementation.Current.OnRequestPermissionsResult(requestCode
, permissions, grantResults);
        base.OnRequestPermissionsResult(requestCode, permissions, grantResults);
    }
```

And in OnCreate

```
CrossCurrentActivity.Current.Init(this, savedInstanceState); // after Xamarin.Forms init
```

AndroidManifest in Visual Studio - Win VS dialogue or Properties/AndroidManifest.xml

<https://docs.microsoft.com/en-us/xamarin/android/platform/android-manifest>

```
<uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE" />
<uses-permission android:name="android.permission.READ_EXTERNAL_STORAGE" />
<application android:label="ImageCloud13.Android">
<provider android:name="${applicationId}.fileprovider"
            android:authorities="ImageUploader.fileprovider"
            android:exported="false"
            android:grantUriPermissions="true">
<meta-data android:name="android.support.FILE_PROVIDER_PATHS"
            android:resource="@xml/file_paths"></meta-data>
</provider>
</application>
```

Above are new fileprovider resource defined in Manifest - to add files' paths add a new folder in Android project /Resources folder called '**xml**' - inside this folder add an xml file (Visual c#/Data) - called 'file_paths'.

```
<?xml version="1.0" encoding="utf-8" ?>
<paths xmlns:android="http://schemas.android.com/apk/res/android">
    <external-files-paths name="my_images" path="Pictures" />
    <external-files-paths name="my_movies" path="Movies" />
    <!-- These paths are apparently folders within the Android OS -->
</paths>
```

<https://developer.android.com/guide/topics/manifest/provider-element> (in manifest xml)

E.g. fileprovider

<https://developer.android.com/reference/android/support/v4/content/FileProvider>

Viz in c# <https://developer.android.com/guide/topics/providers/content-provider-creating> A content provider manages access to a central repository of data.

Cf 7-60

iOS requirements are to edit the Info.plist. In this use case, '*Privacy - Photo Library Usage Description*'(as only reading) . ('Open with' and 'Generic Plist Editor' are recommended for editing.)

13-121

Creating an Azure Storage Service

Azure Storage account in this case more cost-effective and suitable than using an SQL database. *Storage account for blob file table &c*

'New resource' - **Storage Account** - will need a unique name eg '*pnj13imagestorage*' - Account Kind will include 'storagev1', 'storagev2' and '**blob storage**' (blob suitable for file uploads)

<https://www.petri.com/azure-launches-archive-storage-account-v2>

Performance should be 'Standard'.

Replication options including 'RA-GRS Read-Access Geo-Redundant Storage', 'GRS Geo-Redundant Storage', "", and 'LRS Locally-Redundant Storage'. RA-GRS default. 'Access tier' can be 'cool' or '**hot**' (default).

Thus is instantiated a storage area for blos on Azure. NB 'Access Keys' in left-hand controls for storage service.

NB pin blade to Azure portal dashboard by clicking the drawing pin icon.

13-122

Preparing the (Xamarin) project

Add package **WindowsAzure.Storage** via NuGet to the whole Xamarin solution (every project therein).

In the Azure portal, go to new Storage Service (eg '*pnj13imagestorage*'), (No longer in Settings as per video) - click on service 'Blobs' and from there a new Container - give this a name to recall in code (eg *imagecontainer*), and Set Public Access Level to allow anonymous read access to containers and blobs (so that no log-in is required). All container and blob data can be read by anonymous request. Clients can enumerate blobs within the container by anonymous request, but cannot enumerate containers within the storage account.

The screenshot shows two side-by-side Azure Storage account management pages. On the left, the main storage account page for 'pnj13imagestorage' is displayed, showing details like Resource group (travelrecord-prj), Status (Primary: Available, Secondary: Available), Location (Central US, East US 2), Subscription (Free Trial), and a 'Blobs' service section. On the right, a modal dialog titled 'pnj13imagestorage - Blobs' is open, specifically the 'New container' section. It contains fields for 'Name' (set to 'imagecontainer') and 'Public access level' (set to 'Container (anonymous read access for containers and blobs)'). A note below states: 'All container and blob data can be read by anonymous request. Clients can enumerate blobs within the container by anonymous request, but cannot enumerate containers within the storage account.' At the bottom of the dialog are 'OK' and 'Cancel' buttons.

13-123

Uploading an Image (to Service Storage on Azure cloud)

Use a Connection String from Access Keys for Storage Service

The screenshot shows the 'Access keys' page for the storage account 'pnj13imagestorage'. The page includes a brief description of access keys, a note about regenerating keys, and a table listing two access keys: 'key1' and 'key2'. Each key has a copy icon next to its value. Below each key is a 'Connection string' field containing the full connection string for that key. The 'key1' connection string is: DefaultEndpointsProtocol=https;AccountName=pnj13imagestorage;AccountKey=ba8GZs7NHqLK1FEFFTbG+GOLnURNpXQfKv2LxrV9QpFcXkmJtDWVfXlFHa65sExaGDOe7+9b0tVY5y9+m6Ke2w==. The 'key2' connection string is: DefaultEndpointsProtocol=https;AccountName=pnj13imagestorage;AccountKey=pWKJKMgsvsHYxEpA8XaCmYa8n5GerNBtSg3dqhNZLgcmOGt6c9jmCR03w0N9vLu/rzHsiuWimCWKBIESXCJRA==.

(This is left unsecure in these notes but then also unsecure in online repo. TODO: lookup services for securing this.)

```
// bespoke method (by Ctrl+. from code)
private async void UploadImage(Stream stream)
{
    // ought to be a Task, returning something?

    // throw new NotImplementedException();
    var account =
CloudStorageAccount.Parse("DefaultEndpointsProtocol=https;AccountName=pnj13imagestorage;Acc
ountKey=ba8GZs7NHqLK1FEFFTbG+GOLnURNpXQfKv2LxrV9QpFcXkmJtDWVfXlFHa65sExaGDOe7+9b0tVY5y9+m6K
e2w==;EndpointSuffix=core.windows.net");
```

```

// Connection String from Access Keys for Storage Service blade in Azure Portal
try
{
    var client = account.CreateCloudBlobClient();
    var container = client.GetContainerReference("imagecontainer");      // refer to name of container
    await container.CreateIfNotExistsAsync();

    var someUniqueName = Guid.NewGuid().ToString();
    var blockBlob = container.GetBlockBlobReference($"{someUniqueName}.jpg");
    // would normally pass in filename or ID of record - hard-coded for jpg at mo

    // Initialise possibly-newly-made container's blob by uploading a string, file, &c - in this case, the actual file blob to upload
    await blockBlob.UploadFromStreamAsync(stream);

    string url = blockBlob.Uri.OriginalString;
    await DisplayAlert("Image Upload URL", "Image Upload URL is " + url, "Ok");
}
catch (Exception ex)
{
    await DisplayAlert("Error uploading", ex.Message, "OK");
}
}

```

14-124

Xamarin Forms vs Xamarin Classic (Native)

Forms(Xamarin.Forms): @ 99% code shared, UI shared - *use case: code share > custom UI*
 Classic/Native: @75% shared, NOT UI shared - *use case: custom UI > code share eg maps, GPS, bio-ID*

Thus more duplication of effort/time with Native/Classic.

14-125

Creating a Native project - Windows

(1) In VS 2017, Native/Classic must create each project manually 1-at-a-time.

Shared project: .NET Standard , Class Library - on **solution** in Solution Explorer, rt-click & 'Add New Project...'

iOS project: iPhone & iPad, iOS App (Xamarin) - name as shared project (solution), but with '.iOS' appended - generally *Single View App* (will have storyboard with UI controller), *Universal* (vs iPhone or iPad only) & a *Minimum iOS Version* (eg 12.2 max).

Android project: Android, Android App (Xamarin) - name as shared project (solution), but with '.Droid' appended - generally *Single View App* (for to get both content_main.axml and activity_main.axml (only one in Blank) in Resources/Layout) & a *Minimum Android Version* (eg 5.0 Lollipop max, or 4.2 Jelly Bean for older phone). (NB **do not ever call a Xamarin app WhateverApp.Android - always WhateverApp.Droid - cf 25-177** - else namespaces such as **Android**.Support &c will be affected and there will be build errors of the "type or

namespace name ‘Support’ does not exist variety - almost unfixable, so always **.Droid**).
Prefixing instances thus - `global::Android.Support.v4....` - inline may also work out ok.

NB .NET Standard project will have 1 class ('Class1' by default) & no interface code - cf MyClass from Mac VS (126)

NB If needing to remove a project, can rt-click & 'Unload Project' - this wil at least remove lines relating to the project from .sln file but may leave the project folder & sub-folders intact - 'Remove Project' will leave in-situ (a) a line in the .sln file referring to project (can be deleted) and the folder & contained files (can be deleted).

(2) For the Android and iOS projects, rt-click on folder *References* and '*Add a Reference*' - select '*Projects*' and tick box to include the root .NET Standard project (common to both iOS and Android projects - both can now use code from this root project).

For Android,(i) *RelativeLayout* ???? obsolete - *LinearLayout* should be used instead, although *CoordinatorLayout* is default - use *RelativeLayout* in *content_main* (ii) *content_main.axml* and *activity_main.axml* may be included in Single View app - **content_main** is the one to alter to affect UI.

Build solution so that design views will work ok.

14-126

Creating a Native project - Mac

New Project - **Blank Native App (iOS, Android)** - *Shared Code* should be (2019) 'Portable Class Library' - NB new portable/root project will have only a MyClass.cs class (cf Windows .NET Standard class 125); no *MainPage.xaml and so on because there is *no portable interface with a Native app* - only Native interfaces in their respective projects

1 AXML file for every view required

14-127

AXML Designer for Android

NB **Main.axml** more or less same as **activity_main.axml**. Main.axml usually from Mac VS, activity_main.axml and content_main.axml from Win VS.

<https://github.com/MicrosoftDocs/xamarin-docs/issues/1300>

<https://stackoverflow.com/questions/50980975/c-xamarin-android-main-axml-replaced-by-activity-main-axml-and-content-main-ax>

<https://stackoverflow.com/questions/16160146/difference-between-main-xml-and-activity-main-xml>

AXML only for Android.

<https://docs.microsoft.com/en-us/xamarin/android/app-fundamentals/resources-in-android/android-resource-basics?tabs=windows>

14-128

AXML source code

CoordinatorLayout:

<https://medium.com/martinomburajr/android-design-coordinator-layout-1-an-introduction-10a1b91ded28>

In Content_main.xaml, can change to

14-129

Android Activity

14-130

The iOS Storyboard

14-131

The ViewController

In case 32 bits version required: go to properties/iOS Build : Supported Architecture = x86

15 Android

15-132

Apps to Build

2 apps - (1) delivery app (2) delivery person's app

15-133

Delivery App Login Page - Android -

For email, drag in Plain text but

NB Possible Xamarin/Visual Studio (VS) problems:

- **No tools in toolbox** - right-click on 'bar' of Toolbox and from context menu select 'Show All' <https://stackoverflow.com/a/48881138/11365317>
- **No emulator for Android** (just a 'play' button with 'Start' caption) - Get an emulator running using AVD Manager, leave running 'a while' then quit VS and restart - hopefully running emulator will be captioned beside 'play' button.

- Tools added to content_main piling all in 1 place - (i) change RelativeLayout to LinearLayout (ii) change layout_width and _height to "fill parent" not match_parent/content and (iii) add an attribute android:orientation="vertical"

```
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:orientation="vertical"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent"
```

- No 'email' or 'password' type text, only 'Plain text' in toolbox - select the dragged in text box, open Properties (on rhs of screen under Solution Explorer &c), under '**InputType**' - alphabetically or under Main/Input Format category - select '**textEmailAddress**' or '**textPassword**' android:inputType="textEmailAddress".
PS Found ': E-mail' and 'Password' in Toolbox under **TextFields - attributes for android:inputType already set**.
- No intellisense** - try clean/rebuild and/or VS restart.

```
<LinearLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:orientation="vertical"
    android:layout_width="fill_parent"
    android:layout_height="fill_parent"
    app:layout_behavior="@string/appbar_scrolling_view_behavior"
    tools:showIn="@layout/activity_main">
    <EditText
        android:inputType="textEmailAddress"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:id="@+id/emailEditText"
        android:hint="Email Address" />
    ...
    protected override void OnCreate(Bundle savedInstanceState)
    {
        base.OnCreate(savedInstanceState);
        SetContentView(Resource.Layout.activity_main);

        Android.Support.V7.Widget.Toolbar toolbar =
        FindViewById<Android.Support.V7.Widget.Toolbar>(Resource.Id.toolbar);
        SetSupportActionBar(toolbar);

        FloatingActionButton fab = FindViewById<FloatingActionButton>(Resource.Id.fab);
        fab.Click += FabOnClick;
        // Leave-be all this boilerplate stuff for now - I dont want to risk breaking
        anything

        emailEditText = FindViewById<EditText>(Resource.Id.emailEditText);
        passwordEditText = FindViewById<EditText>(Resource.Id.passwordEditText);
        signInButton = FindViewById<Button>(Resource.Id.signinButton);
        registerButton = FindViewById<Button>(Resource.Id.registerButton);
        // NB v similar to Java code for Android
```

```

        signInButton.Click += SignInButton_Click;           // NB autocomplete after
'+='
        registerButton.Click += RegisterButton_Click;
    }

    private void RegisterButton_Click(object sender, EventArgs e)
    {
        // throw new NotImplementedException();
    }

    private void SignInButton_Click(object sender, EventArgs e)
    {
        // throw new NotImplementedException();
    }

protected override void OnCreate(Bundle savedInstanceState)
{
    base.OnCreate(savedInstanceState);
    SetContentView(Resource.Layout.activity_main);

    Android.Support.V7.Widget.Toolbar toolbar =
FindViewById<Android.Support.V7.Widget.Toolbar>(Resource.Id.toolbar);
    SetSupportActionBar(toolbar);

    FloatingActionButton fab = FindViewById<FloatingActionButton>(Resource.Id.fab);
    fab.Click += FabOnClick;
    // Leave-be all this boilerplate stuff for now - I dont want to risk breaking
anything

    emailEditText = FindViewById<EditText>(Resource.Id.emailEditText);
    passwordEditText = FindViewById<EditText>(Resource.Id.passwordEditText);
    signInButton = FindViewById<Button>(Resource.Id.signinButton);
    registerButton = FindViewById<Button>(Resource.Id.registerButton);
    // NB v similar to Java code for Android

    signInButton.Click += SignInButton_Click;           // NB autocomplete after
'+='
    registerButton.Click += RegisterButton_Click;
}

private void RegisterButton_Click(object sender, EventArgs e)
{
    // throw new NotImplementedException();
}

private void SignInButton_Click(object sender, EventArgs e)
{
    // throw new NotImplementedException();
}

```

Less to do, for Android, with regard to horizontal-resizing per device (responsive) than for iOS - so more fiddly with iOS.

15-134

Delivery App Login Page - Android - Creating a new activity ('Register new user' screen)

Droid/Resources/layout - next to existing .axml file(s), rt-click on *layout* folder, *Add New Item* : **Android Layout** - call this *Register (.axml)*. Add 3 texts (1 x email, 2x password (one for confirming)) and a button. Edit hints, IDs and text. Register screen now made in axml, but no matching activity yet, so...

Rt-click on Droid project - *Add/New Item* : [filter for Android items] - *Activity* - name this *RegisterActivity (.cs)*. Class RegisterActivity produced already subclassing/inheriting from Activity. Unlike in Droid app main class's OnCreate, content is not set by default - need to do this by hand in this RegisterActivity's **OnCreate** :

```
public class RegisterActivity : Activity
{
    EditText emailEditText, passwordEditText, confirmPasswordEditText;           // private,
    so camel case
    Button registerButton;

    protected override void OnCreate(Bundle savedInstanceState)
    {
        base.OnCreate(savedInstanceState);

        // Create your application here

        SetContentView(Resource.Layout.Register);           // (value of a dot-notation'd
        resource is actually an integer constant eg 2130837508)

        emailEditText = FindViewById<EditText>(Resource.Id.registerEmailEditText);
        passwordEditText =
        FindViewById<EditText>(Resource.Id.registerPasswordEditText);
        confirmPasswordEditText =
        FindViewById<EditText>(Resource.Id.registerConfirmPasswordEditText);
        registerButton = FindViewById<Button>(Resource.Id.registerUserButton);

        // ... and sort out an event handler
        registerButton.Click += RegisterButton_Click;
    }
}
```

NB TODO - could do with using resources for hints such as "Password please" instead of plain strings.

15-135

Delivery App 'Login' Page - Android - Intents (for navigating from main page to Register page)

```
private void RegisterButton_Click(object sender, EventArgs e)
{
    // throw new NotImplementedException();
    var intent = new Intent(this, typeof(RegisterActivity));           // intent
    for navigating to Register Activity/page
    StartActivity(intent);
}
```

(Back button present for Android (not for iOS tho).)

15-136

Delivery App Login Page - Android - Passing Values through Intents

Pass email address over from main page to Register page (in case already added in main page by user).

Alter the intent - use **PutExtra** (has 24 possible overloads - eg booleans, Bundles, arrays of these &c &c - NB specific Get methods to match eg Intent.GetStringExtra in OnCreate of receiving Activity).

```
private void RegisterButton_Click(object sender, EventArgs e)
{
    // throw new NotImplementedException();
    var intent = new Intent(this, typeof(RegisterActivity)); // intent for
navigating to Register Activity/page
    intent.PutExtra("email",emailEditText.Text); // pass any email
entry data which may've been typed
    StartActivity(intent); // catch PutExtra'd
data in GetStringExtra in OnCreate of RegisterActivity
}
```

.. In receiving RegisterActivity::OnCreate

```
string email = Intent.GetStringExtra("email"); // receive PutExtra'd data
emailEditText.Text = email; // write any data which
may've been typed in previous screen
```

TODO: cf Android & iOS notes x???

16 iOS

16-137

Delivery App Login Page - iOS - Login Page

On *Main.storyboard* drag in *TextFields* (for email address & password) - give a Name to each, delete 'Text' and add appropriate *Placeholder* text. For email address, change *Text Field/KeyboardType* to '*Email Address*'. For the password, under '*Return Key*' section, tick box '*Secure Text Entry*'. Drag in Button for 'Sign In', change text and text colour to predefined white, and background to some blue-ish colour under '*Interaction*' then *Background/Custom*.

Right-hand-side to dashed boundary line in designer but slightly off the edge of the screen?

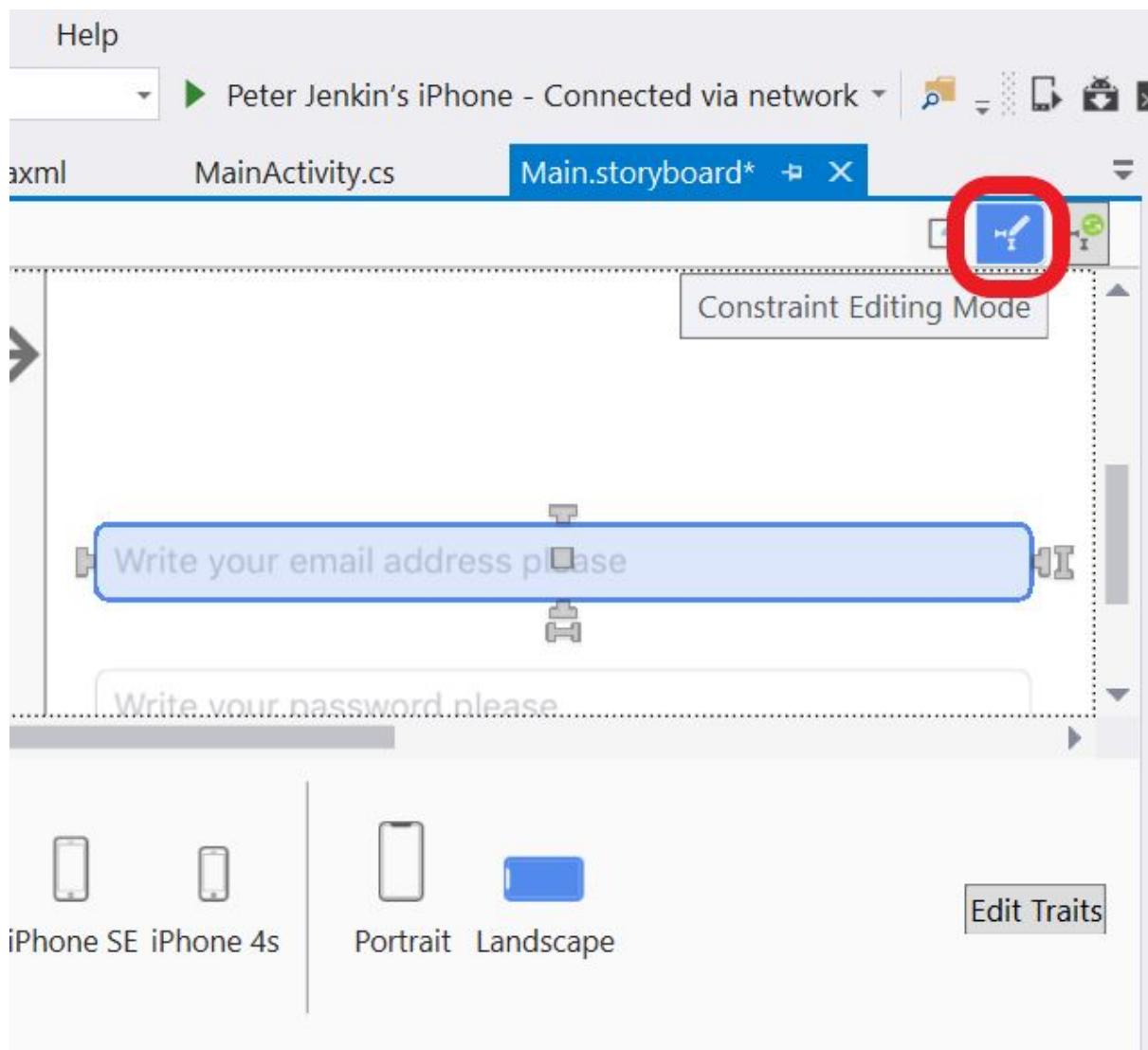
Use various devices in iOS design screen to see whether portrait or landscape mode will behave ok with the controls added.

16-138

Delivery App Login Page - iOS - Adding Constraints

Add constraints to improve device-responsiveness.

Instead of double-clicking on control to show constraints tools (as per video), click 'Constraint Editing Mode' button at top-right.

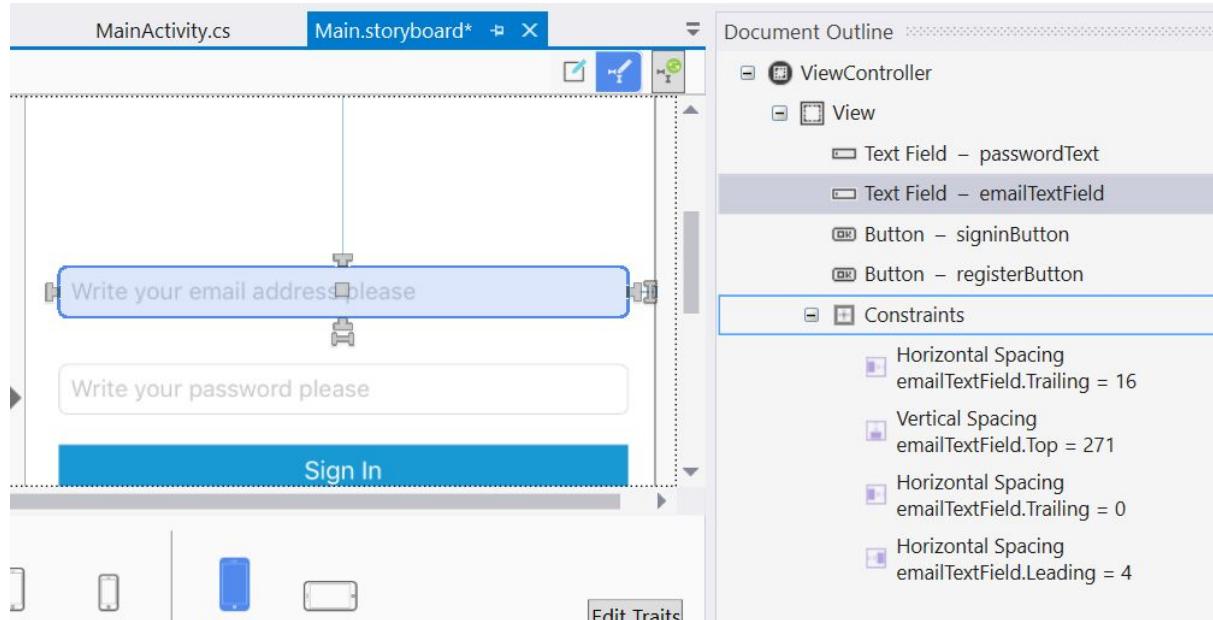


In Constraint Editing Mode, drag centre square to guideline (eg dashed centre vertical line) to centre control on form. Drag pins up/down or left/right to space-off from other controls.

<https://docs.microsoft.com/en-us/xamarin/ios/user-interface/designer/designer-auto-layout>

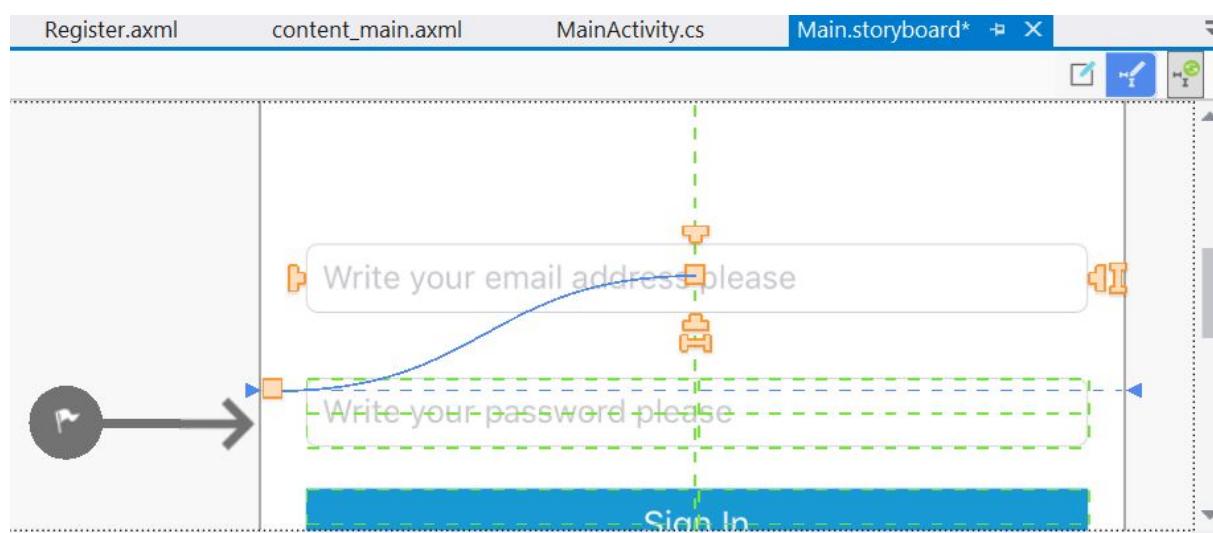
NB VS: View/Other Windows/**Document Outline** - drag this window onto/behind Solution Explorer/Team Explorer &c - can see objects on page, and their constraints.

Constraints is cussed. Time consuming & fiddly.

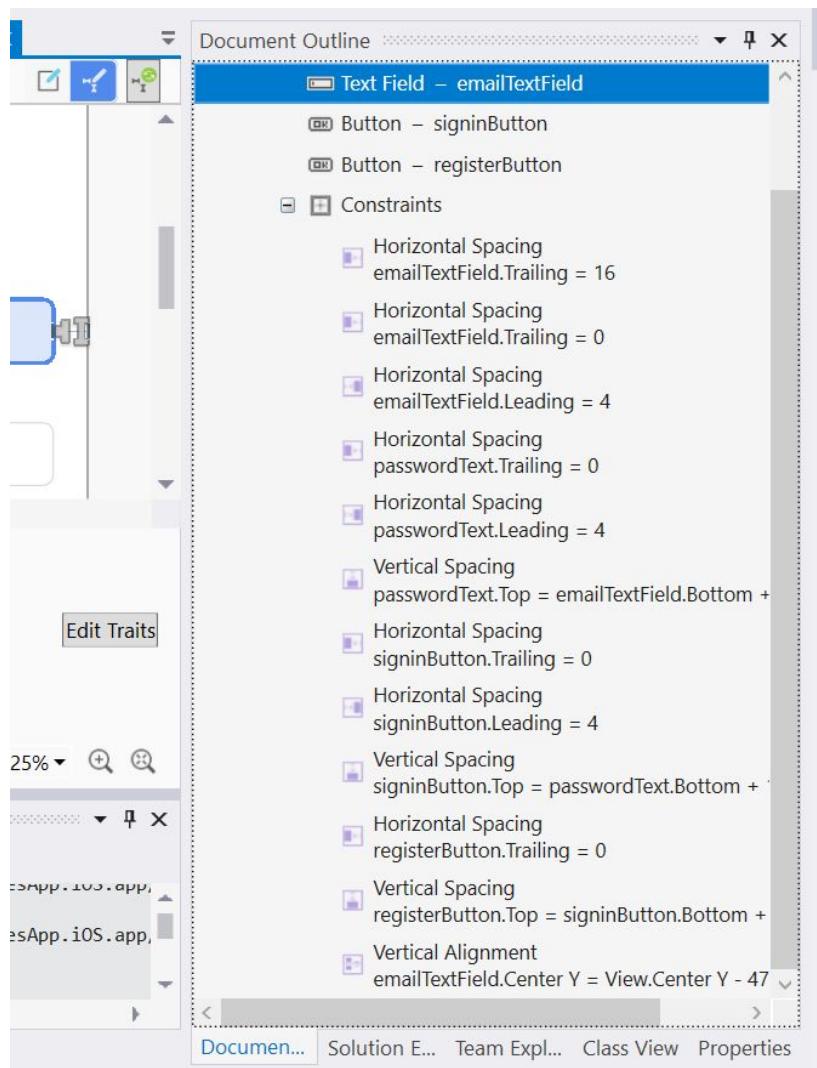


Add constraints slowly & use triangle at bottom-right to use suggested constraints for a control or to erase all of its constraints & start again.

Above constraints worked to keep control centred and width of screen in both landscape and portrait formats (but text too low in landscape). Instead change vertical constraint of email field to centre of screen.



Resulting constraints:



(Come find out, need to remove the duplicated ... Trailing=16 constraint as was conflicting with the Trailing=0 (in landscape?))
... for:

Write your email address please

Write your password please

Sign In

Register

No SIM

13:51

setFlash

Write your email address please

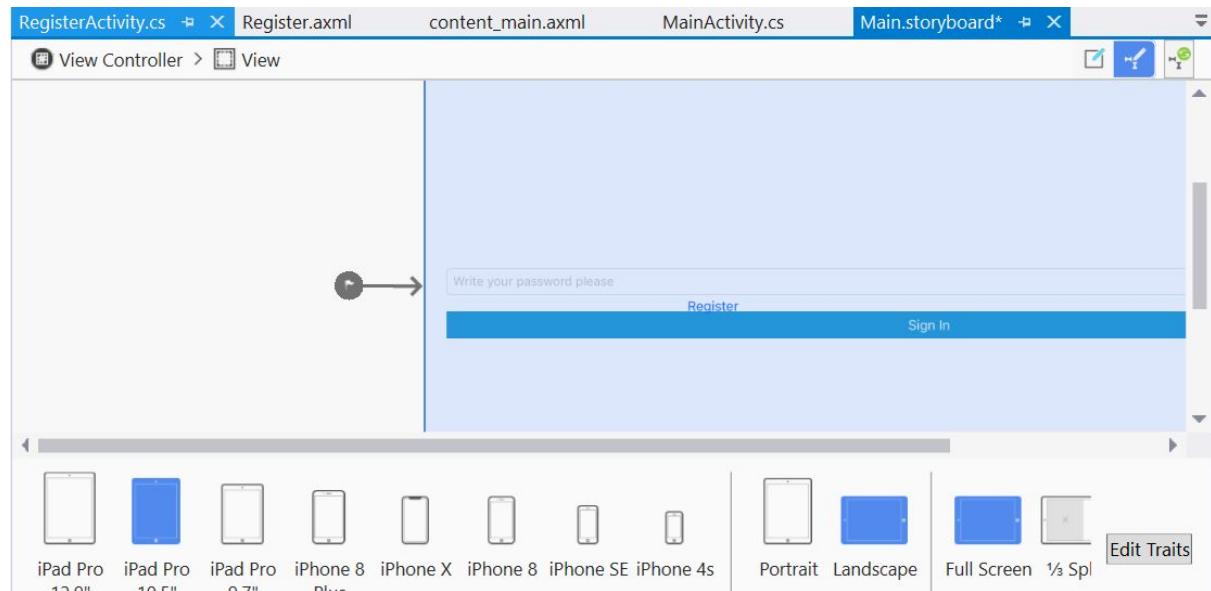
Write your password please

Sign In

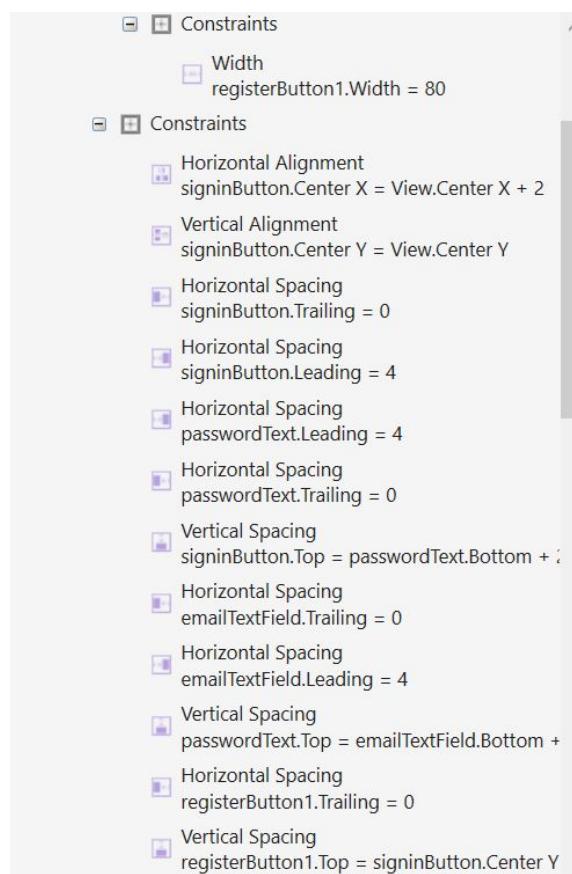
Register

Give up for the minute. Keep fettling. Later.

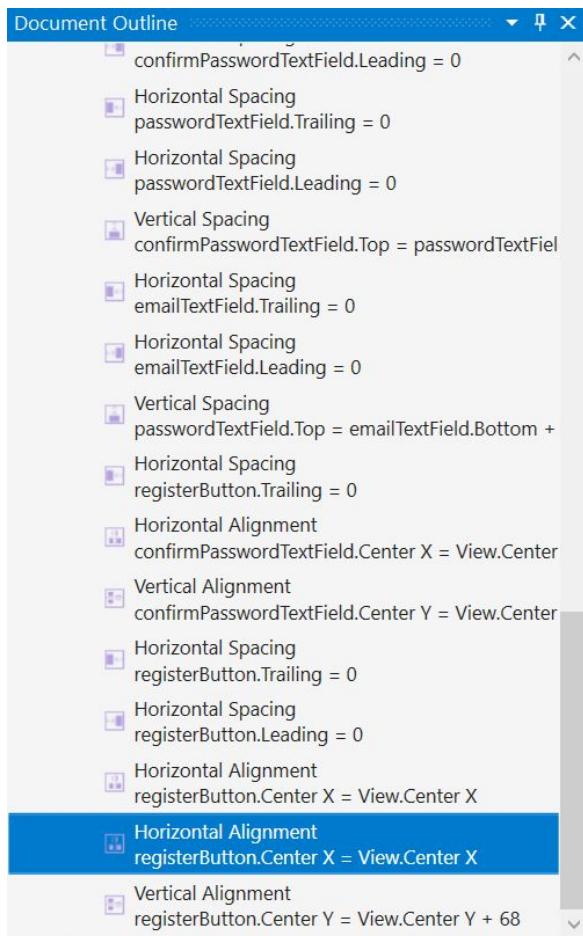
Things messed up on iPad



Eventually OK - apparently for all sizes in both Portrait and Landscape - constraints for main ViewController:



And for Register ViewController:



NB For non-stacked controls (eg the smaller '*Register*' button), try to pin its constraints to page spacing constraints, not using other controls, eg space off from the side of the page and from its centre pin constraint to the horizontal centre line of the page, not from any other controls.

Needing more practice (as was with XCode constraints).

16-139

Delivery App Login Page - iOS - ViewController

Various iOS ViewController (Page VC, Table VC, Split VC, View VC, ...)

Drag View VC to right of main view in Storyboard.

Drag in text field to new View VC - (i) drag to dashed vertical border line on left, and so that dashed centreing line d'appear horizontally across the View. (ii) Drag size of text field to dashed vertical line on right. (iii) From square in middle, drag to horizontal & vertical dashed lines in view to centre horizontally & vertically. (iv) Drag constraint handles on left & right side to vertical dashed lines on each side.

Properties of controls can be edited, but not names - as no connection to a class (no code-behind) has yet been defined. *ViewController.designer.cs* file has a ViewController class - properties therein will have been automatically boiler-plated, eg:

```
partial class ViewController
{
    [Outlet]
    [GeneratedCode ("iOS Designer", "1.0")]
    UIKit.UITextField emailTextField { get; set; }
```

As yet, no class of this kind for the new ViewController - no VC associated with the view, so no way of declaring properties (says video, enigmatically but with supreme self-satisfaction). All we have to do

Select the storyboard's ViewController and, *at the bottom-left of the VC, select the ViewController icon to access the VC object* - then, in its Properties, in **Identity/Class** enter the name of the class to build - eg *RegisterViewController* - this class will be built automatically in *RegisterViewController.designer.cs* in the iOS project. Hereon, any *names of controls*, when added, will cause the property to appear in the *RegisterViewController.designer.cs* class. (This is the code-behind class called-for by the IDE when trying to change controls' names.)

```
partial class RegisterViewController
{
    [Outlet]
    [GeneratedCode ("iOS Designer", "1.0")]
    UIKit.UITextField confirmPasswordTextField { get; set; }

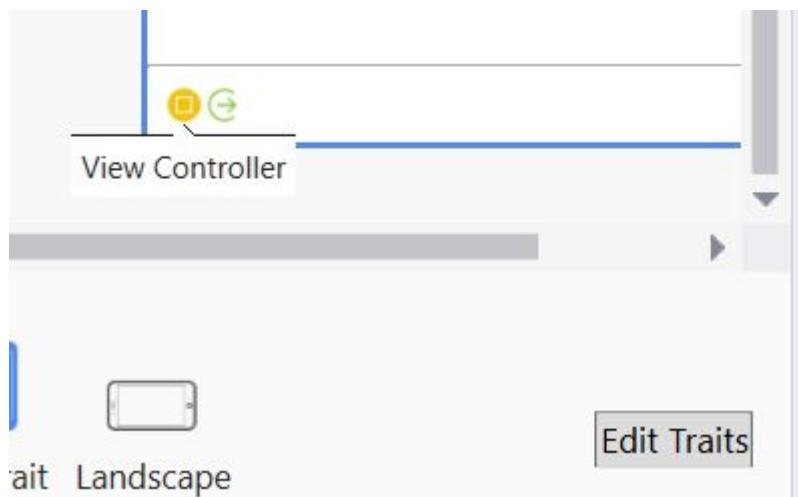
    [Outlet]
    [GeneratedCode ("iOS Designer", "1.0")]
    UIKit.UITextField emailTextField { get; set; }
```

NB In practice, make the code-behind ViewController class appear *first*, *then* start altering properties of controls on that View Controller.

*

<https://forums.xamarin.com/discussion/19284/runtime-error-detected-parent-view-controller-needs-a-code-behind>

NB always take care, when editing VC in storyboard, first to select VC's *bottom-left* button, like so:



16-140

Delivery App 'Login' Page - iOS - UINavigationController

2 alterations here: 1) segue from Register button on main page to Register page, and 2) make a navigation controller the entry point of the app.

1) To move from main page to Register page - in storyboard, Ctrl+Click on 'Register' button and drag a line to Register VC - select '**Show**' from actions in context menu.

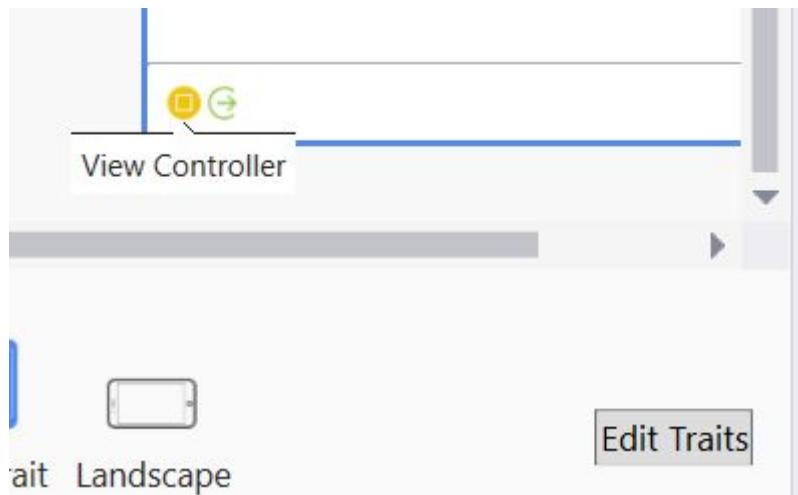
2) Additionally, a UINavigationController will give a navigation bar at the top of the iOS page so as to enable back-navigation & so forth.

From toolbox, drag into storyboard a UINavigationController. (A TableView Controller will come with the Navigation Controller - delete that ViewController in this case.)

To make the UINavigationController the entry point of the app, drag UINavigationController to the left of the main VC (currently starting). Then drag the arrow from the left of the main VC instead to the left of the UINavigationController. (Properties of UINavigationController - *ViewController/Title/Is Initial ViewController* can be ticked.)

Ctrl+Click on (now 1st) ViewController and drag a line to the main VC - select '**Root**' from actions in context menu. This'll start the app off with a navigation controller, with nice back buttons in iOS.

NB always take care, when editing VC in storyboard, first to select VC's *bottom-left* button, like so:



On clicking segue button - error - found in try/catch as: [<RegisterViewController 0x100a3c880> setValue:forUndefinedKey:]: this class is not key value coding-compliant for the key storyboard.

Had to delete RegisterViewController (think I might have messed up things by not selecting the bottom-right VC button) then re-write then eventually worked ok. phew

TODO: cf iOS

16-141

Delivery App Login Page - iOS - Segues

Any text (eg email address) entered on the login page should be sent to the (cf PutExtra/GetExtra 15-135 & 136)

In properties (click on segue in storyboard), '*Identifier*' for segue can be used to distinguish origin of segue at destination - e.g. *registerSegue*. Open destination ViewController, e.g. *RegisterViewController.designer.cs*, add a member ready to receive any data sent along with segue eg

```
public string emailData; // to receive data from email text field
via a segue - public to be accessible from origin VC
```

In the origin ViewController e.g. *ViewController*,

```
// NB type 'override' + intellisense will help
public override void PrepareForSegue(UIStoryboardSegue segue, NSObject sender)
{
    base.PrepareForSegue(segue, sender);
    // This code is specifically for the register segue
    if (segue.Identifier == "registerSegue") // segue Identifier set by
storyboard & properties
    {
        var destinationViewController = segue.DestinationViewController as
RegisterViewController;
        destinationViewController.emailData = emailTextField.Text;
    }
}
```

Back in destination VC eg RegisterViewController , override ViewDidLoad to make use of the passed-over email address data (if any) to populate the corresponding control on the Register page:

```
public override void ViewDidLoad()
{
    base.ViewDidLoad();

    emailTextField.Text = emailData;           // use data passed from segue

    registerButton.TouchUpInside += RegisterButton_TouchUpInside;      // add a handler for the event and manually define this
    // NB += and TAB will suggest a handler method name and automatically add a boilerplate signature for that method
}
```

NB use of += with TAB to generate boilerplate for an iOS event handler method

17 Azure App Service

17-142

Creating Another Azure App Service

After portal's "Create a Resource", "Web App" ...

... no longer "Mobile App" ... this is no longer available ...

NB As of 20/6/19 make an **App Service** by making a **Web App** (can be .NET or Node.js - whichever for the mo) . Easy Tables can still be made from this **Web App** -

<https://github.com/MicrosoftDocs/azure-docs/issues/33592#issuecomment-503950235>

Go down to Easy Tables (cf 11-84)

(2) '+ Create a resource'/Databases/SQL Database

Add a new server

Eg name: Server: travelrecord-server.database.windows.net, db:

pnj-deliveryapp,travelrecord-pnj; admin: pnj; password: Passw0rd

£3.72

Use existing server (travelrecord-server) - use its admin login and password (as above - pnj & Passw0rd)

DTU - Database Transaction Units -

<https://docs.microsoft.com/en-us/azure/sql-database/sql-database-service-tiers-dtu>

(2) Azure Dashboard/Resources/[my app service]/Configuration/**Add a connection string**

Add a connection string to the server and the db thereon for the Web App just now declared, that is - pnj-deliveryapp

Beware that I called (stupidly) the corresponding database pnjdeliveryapp (same, just with no hyphen - this caused some delay due to wrong value in connection string (1 hyphen out))
Name of connection string must be '**MS_TableConnectionString**'. **Type** (since a SQL database was formed just now) must be '**SQL Azure**.
(Untick *Deployment Slot Setting*.)

Connection String (Value) of the form:

```
Data Source=tcp:{your_SQLServer},{port};Initial Catalog={your_catalogue};User ID={your_username};Password={your_password}
```

- {your_SQLServer} Name of the server, this can be found in the overview page for your database and is usually in the form of "server_name.database.windows.net".
- {port} usually 1433.
- {your_catalogue} Name of the database.
- {your_username} User name to access your database.
- {your_password} Password to access your database.

```
Data Source=tcp:travelrecord-server.database.windows.net,1433;Initial Catalog=travelrecord-db;User ID=pnj@travelrecord-pnj-db;Password=Passw0rd
```

```
Data Source=tcp:travelrecord-server.database.windows.net,1433;Initial Catalog=travelrecord-db;User ID=pnj@travelrecord-server;Password=Passw0rd
```

So, in this case,

```
Data Source=tcp:travelrecord-server.database.windows.net,1433;Initial Catalog=pnjdeliveryapp;User ID=pnj@travelrecord-server;Password=Passw0rd
```

But - go to database via '*All Resources*' and go down to '*Connection Strings*' on left - to get relevant details correctly, can copy from here!

```
jdbc:sqlserver://travelrecord-pnj.database.windows.net:1433;database=travelrecord-pnj-db;user=adminpnj@travelrecord-pnj;password={your_password_here};encrypt=true;trustServerCertificate=false;hostNameInCertificate=*.database.windows.net;LoginTimeout=30;
```

But... NB !! from this page, any other tab than ADO (e.g. JDBC) will have details of the form of the user credential - pretty much user@database - this must be included as such in the User ID section of the Connection String

NB Add another non-admin user later

NB REMEMBER TO SAVE!!

<https://azure.github.io/AppService/update/2019/02/26/Changes-to-data-connections-UX.html>

Configure **Easy Tables** from the App Service (a Mobile or Web App Service) - In **App Service**, go down to **Mobile/Easy Tables** - should say 'Need to configure Easy Tables'

Connection String (step 1 here) should have been already set in Configuration of App Service (see above)

BEWARE confusingly-similarly named App Service and server and database! When in less of a rush, and head in better state, adopt a clear standard for these (e.g. _db, _server, _service).

<https://docs.microsoft.com/en-us/azure/app-service-mobile/app-service-mobile-android-get-started>

No need to do “Quickstart - Which development stack? (ASP.NET, Java, Node.js, PHP, Python, &c)” for backend initialisation?

cf 11-81 et seq

17-143

Connecting to the App Service

Add NuGet packages: **Microsoft.Azure.Mobile.Client - version 3.1.0** for compatibility (cf 11-85 & 12-116)

To *iOS project*, (with using Microsoft.WindowsAzure.MobileServices) in **AppDelegate**:

```
public static MobileServiceClient MobileService = new  
MobileServiceClient("https://pnj-deliveryapp.azurewebsites.net"); // static  
variable for Azure access - copy from Overview of (Web) App Service in Azure portal
```

Ditto, exactly (with using - see below) to *Droid project MainActivity*:

```
public static MobileServiceClient MobileService = new  
MobileServiceClient("https://pnj-deliveryapp.azurewebsites.net"); // static  
variable for Azure access - copy from Overview of (Web) App Service in Azure portal
```

Weird though - Microsoft.Azure.MobileServiceClient was installing via NuGet to a path DeliveriesApp.Droid/DeliveriesApp.Droid.csproj - unlike PCL and iOS projects.

Will this go wrong with other NuGet packages likewise?

So much that can go arbitrarily wrong, unreasonable for one person to solve all of these problems, far too much to be comfortable, I am fond of useful puzzle solving but this is making me sad :-(.....

Stomach feeling terrible, making me dizzy.

NUnit added via NuGet despite anomalous path as a test for whether visible from Droid project - seemingly added in Droid project *References* and visible this time in `using` statements.

I found `<ProjectReference Include="..\DeliveriesApp\DeliveriesApp.csproj">` in Droid project's .csproj but this didn't seem to alter the NuGet path.

<https://docs.microsoft.com/en-us/nuget/consume-packages/configuring-nuget-behavior>

<https://docs.microsoft.com/en-us/nuget/consume-packages/package-references-in-project-files>

.csproj.user holding details such as emulator name.

Still feeling ill.

17-144

Creating a Table and its Class

Add a table in Azure, not by the database itself, but (since connection string has been set up) via the **App Service/Easy Tables** - add a table 'User'

Then first to Droid project, add a class 'User' (same name) to Droid project - make this class **public**. Add 3 properties, for the 3 fields: string Id, string Email & string Password.

Ditto for the iOS project - add a class 'User' (same name) to Droid project - make this class **public**. Add 3 properties, for the 3 fields: string Id, string Email & string Password.

NB these fields/properties have only been manually defined for User in the class, not via the Azure portal.

17-145

Inserting into a Table

For Droid project in Register button:

```
private async void RegisterButton_Click(object sender, EventArgs e)
{
    if (!string.IsNullOrEmpty(passwordEditText.Text))
    {
        if (passwordEditText.Text == confirmPasswordEditText.Text)
        {
            var user = new User()
            {
                Email = emailEditText.Text,
                Password = passwordEditText.Text,
            };

            await MainActivity.MobileService.GetTable<User>().InsertAsync(user);
            // insert record to Azure db table
            Toast.MakeText(this, "User record successfully added",
ToastLength.Long).Show();
            return;
        }
        Toast.MakeText(this, "Passwords don't match", ToastLength.Long).Show();
    }
    Toast.MakeText(this, "Password must be entered", ToastLength.Long).Show();
}
```

For iOS, copy/paste and alter (more complicated UIAlerts instead of toasts, and different control names for example) - (NB use the += TAB to add click event handler if not already present):

```
private async void RegisterButton_TouchUpInside(object sender, EventArgs e)
{
    // throw new NotImplementedException();
    if (!string.IsNullOrEmpty(passwordTextField.Text))
    {
        if (passwordTextField.Text == confirmPasswordTextField.Text)
        {
```

```
        var user = new User()
    {
        Email = emailTextField.Text,
        Password = passwordTextField.Text,
    };

    await AppDelegate.MobileService.GetTable<User>().InsertAsync(user);
// insert record to Azure db table

        var alert = UIAlertController.Create("Success", "User record successfully
added", UIAlertControllerStyle.Alert);

        alert.AddAction(UIAlertAction.Create("OK", UIAlertActionStyle.Default,
null));

        PresentViewController(alert, true, null);

        return;
    }
}
```

And in AppDelegate::FinishedLaunching:

```
        public override bool FinishedLaunching(UIApplication application, NSDictionary launchOptions)
    {
        // Override point for customization after application launch.
        // If not required for your application you can safely delete this method
        CurrentPlatform.Init();           // Needed for Azure db access 17-145 11:00
        return true;
    }
}
```

Also as it happened some fiddling required to correctly reinstate event handler and segues.
NB event handlers best added for iOS with `+=` operator in `ViewDidLoad` - rather than with
IDE double click.

Wireless deploy/debugging of Android added at this time with:

```
C:\Users\peter.DESKTOP-3GCVT7E>adb tcpip 5555
error: no devices/emulators found

(USB plugged-in)

C:\Users\peter.DESKTOP-3GCVT7E>adb connect
adb.exe: usage: adb connect <host>[:<port>]

C:\Users\peter.DESKTOP-3GCVT7E>adb tcpip 5555
(USB un-plugged)

C:\Users\peter.DESKTOP-3GCVT7E>adb connect 192.168.1.68
connected to 192.168.1.68:5555

C:\Users\peter.DESKTOP-3GCVT7E>adb connect 192.168.1.68
already connected to 192.168.1.68:5555
```

Use LINQ to query Azure db table User and branch according to whether or not a record matching login details is found.

For Android project:

```
private async void SignInButton_Click(object sender, EventArgs e)
{
    // throw new NotImplementedException();
    var email = emailEditText.Text;
    var password = passwordEditText.Text;

    if (string.IsNullOrEmpty(email) || string.IsNullOrEmpty(password))
    {
        Toast.MakeText(this, "Both email and password must be entered",
        ToastLength.Long).Show();
    }
    else
    {
        var user = (await MobileService.GetTable<User>().Where(u => u.Email ==
email).ToListAsync()).FirstOrDefault(); // null if no user in list
        if (user?.Password == password) // null conditional operator by PNJ
        {
            Toast.MakeText(this, "Login successful", ToastLength.Long).Show();
            // navigate to home page
        }
        else
        {
            Toast.MakeText(this, "Incorrect user name or password",
            ToastLength.Long).Show();
            // navigate away if needed
        }
    }
}
```

And for iOS project:

```
private async void SigninButton_TouchUpInside(object sender, EventArgs e)
{
    // throw new NotImplementedException();
    var email = emailTextField.Text;
    var password = passwordTextField.Text;
    UIAlertController alert = null; // no Toast in iOS!

    if (string.IsNullOrEmpty(email) || string.IsNullOrEmpty(password))
    {
        alert = UIAlertController.Create("Login incomplete", "Both email and password
must be entered", UIAlertControllerStyle.Alert);
        alert.AddAction(UIAlertAction.Create("OK", UIAlertActionStyle.Default, null));
        PresentViewController(alert, true, null);
    }
    else
    {
        var user = (await AppDelegate.MobileService.GetTable<User>().Where(u =>
u.Email == email).ToListAsync()).FirstOrDefault(); // null if no user in list
        if (user.Password == password)
        {
            //Toast.MakeText(this, "Login successful", ToastLength.Long).Show();
            alert = UIAlertController.Create("Successful", "Welcome",
            UIAlertControllerStyle.Alert);
            alert.AddAction(UIAlertAction.Create("Thanks",
            UIAlertActionStyle.Default, null));
            PresentViewController(alert, true, null);
        }
    }
}
```

```

        // navigate to home page
    }
    else
    {
        // Toast.MakeText(this, "Incorrect user name or password",
ToastLength.Long).Show();
        alert = UIAlertController.Create("Failure", "Email or password is
incorrect", UIAlertControllerStyle.Alert);
        alert.AddAction(UIAlertAction.Create("OK", UIAlertActionStyle.Default,
null));
        PresentViewController(alert, true, null);
        // navigate away if needed
    }
}

```

NB I found that I had to add `PresentViewController(alert, true, null);` after `alert.AddAction(UIAlertAction.Create("OK", UIAlertActionStyle.Default, null));` in order for the alert to actually show up on iOS - 'retrofit' this where needed!

<https://forums.xamarin.com/discussion/140298/uialertcontroller-not-showing>

18 Sharing Code (Refactoring to reduce duplication of code in native projects)

18-147

The PCL (Portable Class Library)

Refactoring to combine login and registration code in classic/native - use PCL project (aka DeliveriesApp project in other projects' References) - ie the DLL file resulting from the PCL project.

Cf 14-125

18-148

Reusing 'Login' Functionality (in PCL, to reduce duplication in native projects)

Code moved from native to portable/PCL library (for DLL):

- 1) **public** User class in Model folder
- 2) MobileServiceClient - to a AzureHelper public class
- 3) Login logic - to a Login **public** async Task method of User class

User class:

```

using System;
using System.Collections.Generic;
using System.Text;

namespace DeliveriesApp.Model
{
    class User
    {
        public string Id { get; set; }
        public string Email { get; set; }
        public string Password { get; set; }

        public static async Task<bool> Login(string email, string password)
        {
            bool result = false;

```

```

        if (string.IsNullOrEmpty(email) || string.IsNullOrEmpty(password))
        {
            // alert = UIAlertController.Create("Login incomplete", "Both email and
password must be entered", UIAlertControllerStyle.Alert);
            // alert.AddAction(UIAlertAction.Create("OK", UIAlertActionStyle.Default,
null));
            // PresentViewController(alert, true, null);    //
https://forums.xamarin.com/discussion/140298/uialertcontroller-not-showing
            result = false;
        }
        else
        {
            var user = (await AzureHelper.MobileService.GetTable<User>().Where(u =>
u.Email == email).ToListAsync()).FirstOrDefault();      // null if no user in list
            if (user?.Password == password)      // PNJ null conditional added
            {
                //Toast.MakeText(this, "Login successful", ToastLength.Long).Show();
                // alert = UIAlertController.Create("Successful", "Welcome",
UIAlertControllerStyle.Alert);
                // alert.AddAction(UIAlertAction.Create("Thanks",
UIAlertActionStyle.Default, null));
                // PresentViewController(alert, true, null);      //
PresentViewController to make alert show up

                result = true;

                // navigate to home page
            }
            else
            {
                // Toast.MakeText(this, "Incorrect user name or password",
ToastLength.Long).Show();
                // alert = UIAlertController.Create("Failure", "Email or password is
incorrect", UIAlertControllerStyle.Alert);
                // alert.AddAction(UIAlertAction.Create("OK",
UIAlertActionStyle.Default, null));
                // PresentViewController(alert, true, null);

                result = false;

                // navigate away if needed
            }
        }
    }

    return result;
}
}

```

For iOS:

```
private async void SigninButton_TouchUpInside(object sender, EventArgs e)
{
    // throw new NotImplementedException();
    var email = emailTextField.Text;
    var password = passwordTextField.Text;
    UIAlertController alert = null;      // no Toast in iOS!
```

```

        var result = await User().Login(email, password);

        if(result)
        {
            alert = UIAlertController.Create("Successful", "Welcome",
UIAlertControllerStyle.Alert);
        }
        else
        {
            alert = UIAlertController.Create("Failure", "Email or password is
incorrect", UIAlertControllerStyle.Alert);
        }

        alert.AddAction(UIAlertAction.Create("OK", UIAlertActionStyle.Default, null));

        PresentViewController(alert, true, null);
    }
}

```

For Android,

```

private async void SignInButton_Click(object sender, EventArgs e)
{
    // throw new NotImplementedException();
    var email = emailEditText.Text;
    var password = passwordEditText.Text;

    var result = await User.Login(email, password);

    if (result)
    {
        Toast.MakeText(this, "Logged in - Welcome", ToastLength.Long).Show();
    }
    else
    {
        Toast.MakeText(this, "Unsuccessful Login - try again",
ToastLength.Long).Show();
    }
}

```

18-149

Reusing ‘Register’ Functionality

Refactored into Register method in portable project’s public User class.

18-150

Read Tables

Before all that, add 2 tables in Azure via the AppService’s EasyTables : ‘**Delivery**’ and ‘**DeliveryPerson**’.

To portable project’s Model folder, add 2 **public** classes : ‘**Delivery**’ and ‘**DeliveryPerson**’.
(Code-first)

```

public class DeliveryPerson
{

    public string Id { get; set; }

    public static async Task<DeliveryPerson> GetDeliveryPerson(string id)
    {
        DeliveryPerson person = new DeliveryPerson();
    }
}

```

```

        person = (await AzureHelper.MobileService.GetTable<DeliveryPerson>().Where(dp
=> dp.Id == id).ToListAsync()).FirstOrDefault();
        // NB pattern for single instances (eg an individual person) - brackets and
() .FirstOrDefault

        return person;
    }
}
class DeliveryPerson
{

    public string Id { get; set; }

    public static async Task<DeliveryPerson> GetDeliveryPerson(string id)
    {
        DeliveryPerson person = new DeliveryPerson();

        person = (await AzureHelper.MobileService.GetTable<DeliveryPerson>().Where(dp
=> dp.Id == id).ToListAsync()).FirstOrDefault();
        // NB pattern for single instances (eg an individual person) - brackets and
() .FirstOrDefault

        return person;
    }
}

```

The screenshot shows the Azure portal interface for an App Service named "pnj-deliveryapp". The "Easy tables" blade is open, displaying a table structure. The table has a single column labeled "NAME" with three entries: "User", "Delivery", and "DeliveryPerson". At the top of the blade, there is a search bar labeled "Search (Ctrl+/" and an "Add" button. To the left of the main content area, there is a sidebar with various links: "Clone App", "Console", "Advanced Tools", "App Service Editor (Preview)", "Performance test", "Resource explorer", and "Extensions".

18-151

Intro to Generics

Discussion - 1 generic method which will work with any number of classes - type safety (List returned will always contain an object of that type)

List<T> - T may become int or string

NB Type can be inferred when the generic method is called with an object/ an instance of a class as an argument.

ref keyword may be used -

<https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/ref>

<https://www.geeksforgeeks.org/difference-between-ref-and-out-keywords-in-c-sharp/>

Generic class since C# 2.0 <https://www.geeksforgeeks.org/c-sharp-generics-introduction/>
<https://docs.microsoft.com/en-us/dotnet/csharp/programming-guide/generics/>
<https://www.c-sharpcorner.com/UploadFile/84c85b/using-generics-with-C-Sharp/>

18-152

Inserting to any Table (with 1 method, type safe, by using generic)

Generic Insert method in AzureHelper as not restricted to any particular class/type (any can use, hence in AzureHelper). Cf 12-117

```
// generic task - for any class - so in AzureHelper
//public static Task<bool> Insert<T>(ref T objectToInsert)
// public static async Task <bool> Insert<T>(ref T objectToInsert) // async
methods cannot have ref in or out parameters, so drop ref
public static async Task<bool> Insert<T>(T objectToInsert)
{
    try
    {
        await MobileService.GetTable<T>().InsertAsync(objectToInsert);
        return true;
    }
    catch (Exception)
    {
        return false;
    }
}
```

In User::Register, replace call to Azure's type-specific GetTable with the generic Insert instead:

```
...
//await AzureHelper.MobileService.GetTable<User>().InsertAsync(user);
// insert record to Azure db table

// Use AzureHelper's bespoke generic method instead to write (in this
case a record to User table) 18-152
//AzureHelper.Insert<User>(ref user);      // actually type (User)
inferred from object instance (user)
//AzureHelper.Insert(ref user); // ref not used
AzureHelper.Insert(user);           // type still inferred
```

In this case a generic method to Insert has been added to AzureHelper and then used in the User::Register method to insert (*in this case a User to User table*).

NB pattern of generic method:

```
SomeMethod<T>(T objectToDoSomethingWith)
{
    await service.GetThing<T>
```

... and then elsewhere call the generic method with an instance, from whose own type the type involved in this call will be inferred.

....

```
SomeMethod (myExampleInstance) ;
```

(Nice & simple.) (For a change?)

19-TabsLayout - Android

19-153

Preparing Android Project to use TabLayout

Fragments to be used - 2 parts to view: 1 for fragments, 1 for tabs.

TODO of Android notes ???

Firstly, make app compatible for older APIs App Compat Android Support Library

Xamarin.Android.support.v7.AppCompat

NB Components (as in video) are OBSOLETE -----

Component to be used to allow backward-compatibility

Components similar to References, but provided by Xamarin directly (not via NuGet in first instance)

Rt-Click on Components in project, '*Get More Components...*',

-----OBSOLETE - Components deprecated, **use NuGet instead** with

Xamarin.Android.support.v7.AppCompat - NB only to portable and Droid project at this stage (not iOS yet - error on install attempt) - v 24 in video, v 25.3.1 for Droid as of June 2019

<https://www.udemy.com/complete-xamarin-developer-course-ios-and-android/learn/lecture/8438078#questions/3403510>

Error when trying NuGet install of AppCompat to Droid project:

<https://redth.codes/how-to-fix-the-dreaded-version-conflict-nuget-error-in-your-xamarin-android-projects/>

"Version conflict detected for Xamarin.Android.Support.Compat. Install/reference

Xamarin.Android.Support.Compat 28.0.0.1 directly to project DeliveriesApp.Droid to resolve this issue."

Try adding (AppCompat version 27):

```
<PackageReference Include="Xamarin.Android.Support.Compat" Version="27.0.2" />
```

to the .csproj file directly, after other <PackageReference ... elements.

(May be concern over which version to support which Target API version (properties of Droid project))

... and further, to use *AppCompat* (-ibility), in **AndroidManifest.xml**, in <application ... element, change title and change theme thus:

```
android:theme="@style/Theme.AppCompat">
```

TODO: why the theme attribute for appcompat?

TODO: theme not working as Title still visible at top?

19-154

Using the TabLayout- Android

In Resources/Layout add a new Android Layout - (to be the new main page of the application) - called in this case **Tabs.axml**. Add to the LinearLayout:

```
<android.support.design.widget.TabLayout
    android:id="@+id/mainTabLayout"
    android:layout_height="wrap_content"
    android:layout_width="match_parent">
    <android.support.design.widget.TabItem
        android:text="Deliveries"/>
    <android.support.design.widget.TabItem
        android:text="Delivered"/>
    <android.support.design.widget.TabItem
        android:text="Profile"/>
</android.support.design.widget.TabLayout>
```

... to make up 3 tabs.

Then add to the Droid project a new item/Activity called TabsActivity:

```
protected override void OnCreate(Bundle savedInstanceState)
{
    base.OnCreate(savedInstanceState);

    // Create your application here
    // ok! :-) This activity will be to do with our Tabs layout (ie the new
main page)
    SetContentView(Resource.Layout.Tabs);
}
```

... and a couple of lines to establish an intent (to our TabsActivity layout 19-153) in the logging-in MainActivity:

```
private async void SignInButton_Click(object sender, EventArgs e)
{
    // throw new NotImplementedException();
    var email = emailEditText.Text;
    var password = passwordEditText.Text;

    var result = await User.Login(email, password);

    if (result)
    {
        Toast.MakeText(this, "Logged in - Welcome",
ToastLength.Long).Show();
        Intent intent = new Intent(this, typeof(TabsActivity));
        StartActivity(intent); // go to new 'main'
page (with tabs)
    }
}
```

Which d'move the user to the tabbed layout once they're logged in.

19-155

Navigating between Fragments-Android

(1) Need to change spacing between fragments within their container, (2) make layout for each of the 3 fragments (Deliveries, Delivered and Profile), and their c# controllers, (3) in Tabs activity, define content of container.

In Tabs.axml,

```
<FrameLayout
    android:id="@+id/contentFrame"
    android:layout_width="match_parent"
    android:height="wrap_content"
    /> <!-- FrameLayout as container: height determined by how many entries in
Deliveries/Delivered/Profile -->
```

In Resources/layout, a new Android Layout '*Deliveries.axml*' - ditto for 'Delivered' and 'Profile'. These are the 3 views for the 3 fragments.

The fragments are made in the Droid project root, same as for a normal Activity - Rt-click on project, Add Item and select '**Fragment**' - name this one 'DeliveriesFragment'.

NB Fragments will inherit from Fragment (not Activity) and in addition to *OnCreate* will also have an *OnCreateView* method (with a commented-out boilerplate inflate line).

(1)NB in order to maintain backward compatibility, access the Fragment parent/sub-class from the AppCompat support library (default is from *Android.App.Fragment*). (2)

Un-comment and amend the REMmed-out inflate method:

```
public class DeliveriesFragment : Android.Support.V4.App.Fragment           // derive from
support v4 for backward-compatibility
{
    public override void OnCreate(Bundle savedInstanceState)
    {
        base.OnCreate(savedInstanceState);

        // Create your fragment here
    }

    public override View OnCreateView(LayoutInflater inflater, ViewGroup container,
Bundle savedInstanceState)
    {
        // Use this to return your custom view for this Fragment
        return inflater.Inflate(Resource.Layout.Deliveries, container, false);
        // Un-comment & amend the above auto-commented boilerplate to inflate our
Deliveries fragment layout

        return base.OnCreateView(inflater, container, savedInstanceState);
    }
}
```

Likewise for 'DeliveredFragment' and 'ProfileFragment'.

NB position (ie 1st tabItem, 2nd TabItem, ...), instead of id, needed for determining which tab was selected. Thus in 19-155 no ids defined for Tab Items.

Change TabsActivity parent class and add handler and a private method (D-R-Y)

```
//public class TabsActivity : Activity
public class TabsActivity : FragmentActivity           // must be a
FragmentActivity for navigation - SupportFragmentManager
...

protected override void OnCreate(Bundle savedInstanceState)
{
    base.OnCreate(savedInstanceState);

    // Create your application here
    // ok! :-) This activity will be to do with our Tabs layout (ie the new main
page)
```

```

        SetContentView(Resource.Layout.Tabs);

        tabLayout = this.FindViewById<TabLayout>(Resource.Id.mainTabLayout); // get
our tab by id defined as android:id="@+id/mainTabLayout"
        tabLayout.TabSelected += TabLayout_TabSelected; // +=
then TAB for auto-complete of event handler

        FragmentNavigate(new DeliveriesFragment()); // in effect, make Deliveries
the default fragment on startup
    }

    private void TabLayout_TabSelected(object sender, TabLayout.TabSelectedEventArgs e)
{
    //throw new NotImplementedException();
    // NB position (ie 1st tabItem, 2nd TabItem, ...), instead of id, needed for
determining which tab was selected. Thus in 19-155 no ids defined for Tab Items.
    switch(e.Tab.Position)
    {
        case 0:
            FragmentNavigate(new DeliveriesFragment());
            break;
        case 1:
            FragmentNavigate(new DeliveredFragment());
            break;
        case 2:
            FragmentNavigate(new ProfileFragment());
            break;
    }
}

/// bespoke DRY method for navigating to selected fragment layout
private void FragmentNavigate(Android.Support.V4.App.Fragment fragment)
{
    var transaction = SupportFragmentManager.BeginTransaction(); // could reset,
replace, remove &c fragments
    transaction.Replace(Resource.Id.contentFrame, fragment);
    transaction.Commit();
}

```

TODO: cf inflate in iOS/Swift & Android in notes

Error Caused by: *java.lang.ClassCastException:
android.support.design.widget.Snackbar\$SnackbarLayout cannot be cast to
android.widget.ImageView* - Clean project & rebuild
<https://stackoverflow.com/q/11191040/11365317>

19-156

Prevent Back-Navigation-Android

Once logged in, to stop user from navigating back out again to the log-in page.

Use the Android stack of activities activated (the *back stack* - 'back' for back navigation e.g.)
- remove the log-in page activity from this stack to prevent back navigation thereto, by calling
Finish() for the MainActivity (thereby removing MainActivity from the back stack).

In *MainActivity*, in logging-in code for *SignInButton_Click*:

```
var result = await User.Login(email, password);

if (result)
{
    Toast.MakeText(this, "Logged in - Welcome", ToastLength.Long).Show();
    Intent intent = new Intent(this, typeof(TabsActivity));
    StartActivity(intent); // go to new 'main' page (with
tabs)
    Finish();
    // Finish this activity, so as to be no longer available on the stack, and
thus un-navigable-to
}
```

<https://developer.android.com/guide/components/activities/tasks-and-back-stack>

<https://stuff.mit.edu/afs/sipb/project/android/docs/guide/components/tasks-and-back-stack.html>

TODO: launchMode (in *AndroidManifest*) & similar

19-157

Toolbar Navigation

A button in a toolbar, in a menu, moving the user's view to a 'new delivery' page.

Boilerplate d'include 1 item 'Search' as an action in a menu element but
showAsAction="Always" so will be outside menu actually.

Add or use a folder *Resources/menu* - in this folder add a New Item/ (*Android*) *Menu*

'*tabsMenu.xml*' - in this, edit the boilerplate XML to amend:

```
<menu xmlns:android="http://schemas.android.com/apk/res/android"
      xmlns:app="http://schemas.android.com/apk/res-auto">
    <!-- namespace added as per 19-157 http://schemas.android.com/apk/res-auto (using
support) -->

    <item android:id="@+id/action_add"
          app:showAsAction="always"
          android:text="Add"
          android:icon="@mipmap/ic_action_add_circle_outline"
        />

    <!-- 7:45 19-157 actually using support libraries ur no? no error shown here -->
```

From **Android Asset Studio** <https://romannurik.github.io/AndroidAssetStudio/> select page
Action bar/tab icon generator

<https://romannurik.github.io/AndroidAssetStudio/icons-actionbar.html> and type in 'add' (e.g.)
in search bar to get add icons - select a plus + image - download & locally extract this file
(with its several folders for different resolutions: hdpi & so forth). Drag into the respective
folders in the Droid project - these may be *Resource/drawable-hdpi* et al, or if absent, may
only be *Resource/mipmap-hdpi* et al. Reference this name in the menu item element e.g.
android:icon="@mipmap/ic_action_add_circle_outline.png"

Add ‘*NewDelivery*’ layout to Resources/layout - also to project add new item/Activity ‘*NewDeliveryActivity*’. In ‘*NewDeliveryActivity*’ , add
SetContentView(Resource.Layout.NewDelivery);

Add a toolbar in the main layout page *Tabs.axml*, above (i.e. before) TabLayout:

```
<android.support.v7.widget.Toolbar  
    android:id="@+id/tabsToolbar"  
    android:layout_height="wrap_content"  
    android:layout_width="match_parent"  
/>
```

And in *TabsActivity.cs* class:

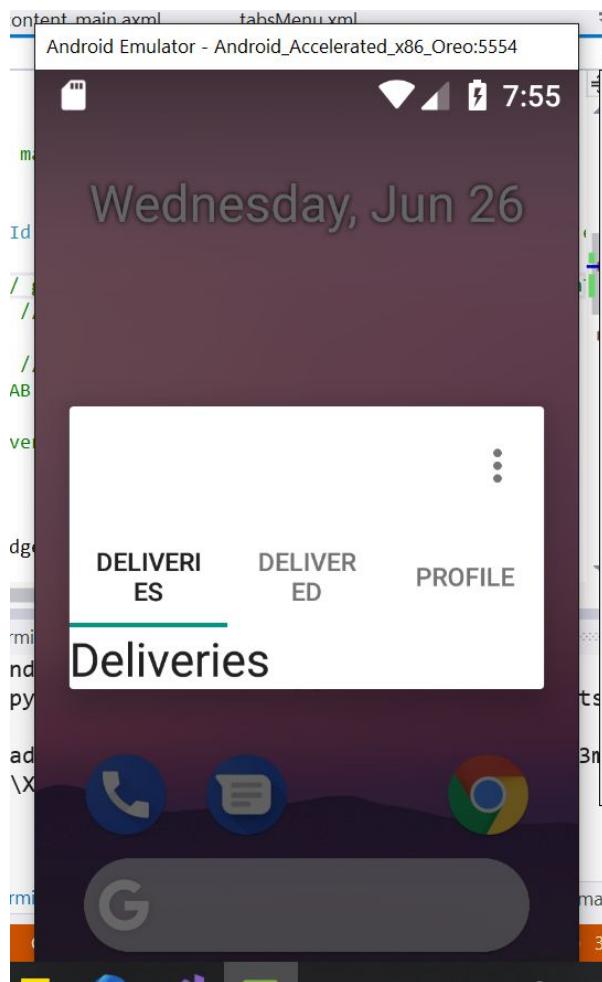
```
Android.Support.V7.Widget.Toolbar tabsToolbar;           // otherwise from  
Android.Widget.Toolbar by default - would be different types  
...  
    tabsToolbar =  
FindViewById<Android.Support.V7.Widget.Toolbar>(Resource.Id.tabsToolbar);           //  
use the id defined in the element in Tabs.axml  
    tabsToolbar.InflateMenu(Resource.Menu.tabsMenu);  
// use resource defined  
    tabsToolbar.MenuItemClick += TabsToolbar_MenuItemClick;           // += and  
TAB to subscribe with handler method
```

Regarding

if (e.Item.ItemId == Resource.Id.action_add)
in *TabsActivity.cs* at 19-157 11:00 - there was no *action_add* in *Resource.Id* for me - :-o - I
followed [the SO answer here](#) and, as well as Eduardo's suggestion of "Android Resource" as
the *tabsMenu.xml* file's *Build Action* value, also "**MSBuild:UpdateGeneratedFiles**" as value
for **Custom Tool** property then made *Resource.Id.action_add* available.

NB Error “*Android.Views.InflateException: Binary XML file line #1: Binary XML file line #1:
Error inflating class android.support.design.widget.Toolbar*” can result from using wrong
names for resources eg <android.support.design.widget.Toolbar... instead of
<android.support.v7.widget.Toolbar

<https://stackoverflow.com/questions/37818902/diff-between-commits-in-visual-studio-2015-using-git>

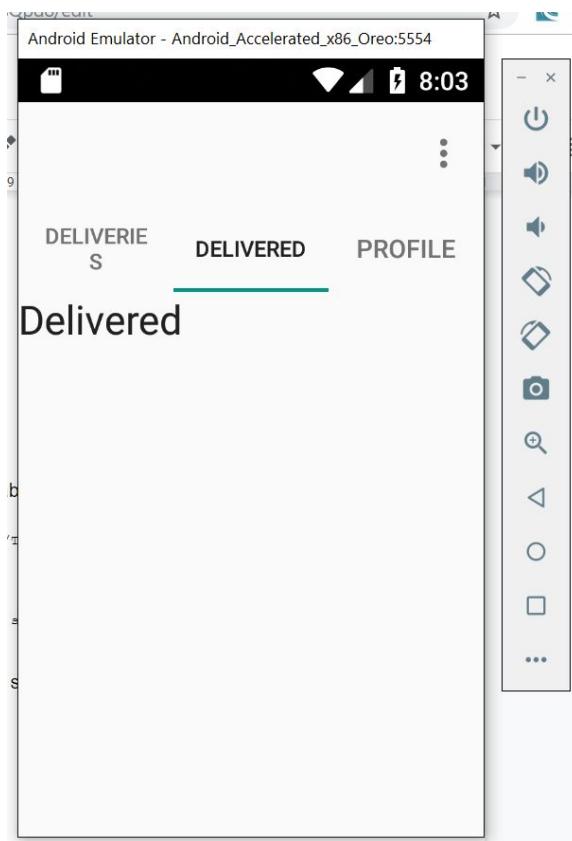


Had been using a style in Android Manifest which (above) made app only size of the layout's content:

```
<style name="Theme.PNJNoBarOrTitle" parent="@style/Theme.AppCompat.Light.Dialog">
    <item name="windowActionBar">false</item>
    <item name="windowNoTitle">true</item>
</style>
<!-- Don't use this as will make app visible only as small window shrunk onto fragment
19-157 --&gt;</pre>
```

Went back instead to using another style which (not sure why: TODO) worked ok (though still not with navigation bar):

```
<!-- Base application theme. -->
<style name="AppTheme" parent="Theme.AppCompat.Light.DarkActionBar">
    <!-- Customize your theme here. -->
    <item name="colorPrimary">@color/colorPrimary</item>
    <item name="colorPrimaryDark">@color/colorPrimaryDark</item>
    <item name="colorAccent">@color/colorAccent</item>
    <!-- PNJ copy/pasted re action bar & window w/o title -->
    <item name="windowActionBar">false</item>
    <item name="windowNoTitle">true</item>
</style>
```



19-158

Inserting Deliveries-Android

To enable insertion of new delivery records, add an EditText and a Button to the **NewDelivery** layout. In *Delivery* class (code-first), add properties/fields:

```
public class Delivery
{
    public string Id { get; set; }

    public string Name { get; set; }

    public double OriginLatitude { get; set; }

    public double OriginLongitude { get; set; }

    public double DestinationLatitude { get; set; }

    public double DestinationLongitude { get; set; }

    /// <summary>
    /// Status variable (could use an enum here)
    /// 0 = awaiting delivery person
    /// 1 = being delivered
    /// 2 = delivered
    /// </summary>
    public int Status { get; set; }

    public static async Task<bool> InsertDelivery(Delivery delivery)
    {
        return await AzureHelper.Insert<Delivery>(delivery);           // use bespoke
generic method from helper to insert a new delivery record
    }
}
```

And in NewDelivery.cs:

```
public class NewDeliveryActivity : AppCompatActivity
{
    Button saveNewDeliveryButton;
    EditText packageNameEditText;

    protected override void OnCreate(Bundle savedInstanceState)
    {
        base.OnCreate(savedInstanceState);

        // Create your application here

        SetContentView(Resource.Layout.NewDelivery);

        saveNewDeliveryButton =
FindViewById<Button>(Resource.Id.saveNewDeliveryButton);
        packageNameEditText = FindViewById<EditText>(Resource.Id.packageNameEditText);

        saveNewDeliveryButton.Click += SaveNewDeliveryButton_Click;
    }

    private async void SaveNewDeliveryButton_Click(object sender, EventArgs e)
    {
        //throw new NotImplementedException();

        Delivery delivery = new Delivery()
        {
            Name = packageNameEditText.Text,
            Status = 0
        };

        await Delivery.InsertDelivery(delivery);
    }
}
```

This will suffice (without any further navigation though) to add a record to the Azure db table Delivery.

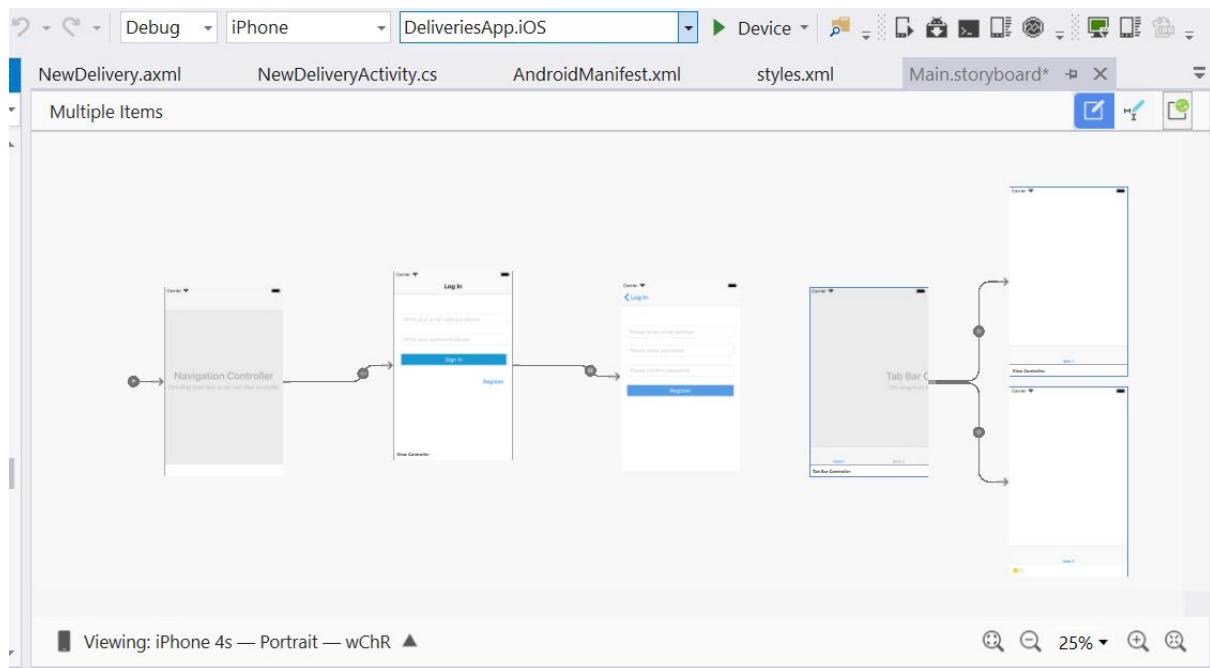
20-TabsLayout-iOS

20-159

The TabBarController-iOS

As soon as user is logged-in/signed-in, they should see a choice of tabs (Deliveries, Delivered & Profile).

Drag in a **TabBarController** to right of storyboard.



NB Item1, Item2 at bottom of TabController-attached ViewControllers.

Drag in storyboard using bottom of ViewController.

Ctrl-drag segue ‘Show’ from ‘Sign-In’ button to *TabBarController*. Set the *Identifier* property of the segue to ‘**loginSegue**’.

(Need to identify segue in logging-in view ViewController and also check whether segue should be executed - so override *ShouldPerformSegue*.)

In *ViewController.cs*, first, add variable and set true when logged-in:

```
bool hasLoggedIn = false;           // private, hence camel case
...
    if(result)
    {
        hasLoggedIn = true;
        alert = UIAlertController.Create("Successful", "Welcome",
UIAlertControllerStyle.Alert);

    }
    else
    {
        alert = UIAlertController.Create("Failure", "Email or password is
incorrect", UIAlertControllerStyle.Alert);
    }

    PerformSegue("loginSegue", this);      // workaround login segue logic
execution (alongside ShouldPerformSegue)
```

And :

```
public override bool ShouldPerformSegue(string segueIdentifier, NSObject
sender)
{
    //return base.ShouldPerformSegue(segueIdentifier, sender);

    if (segueIdentifier == "loginSegue")
```

```

{
    return hasLoggedIn;
}

return true;           // any other segue than a loginSegue, go right
ahead and segue (20-159)

// Hard-coded segue identifier string - could fetch or parameterise
this?
}

```

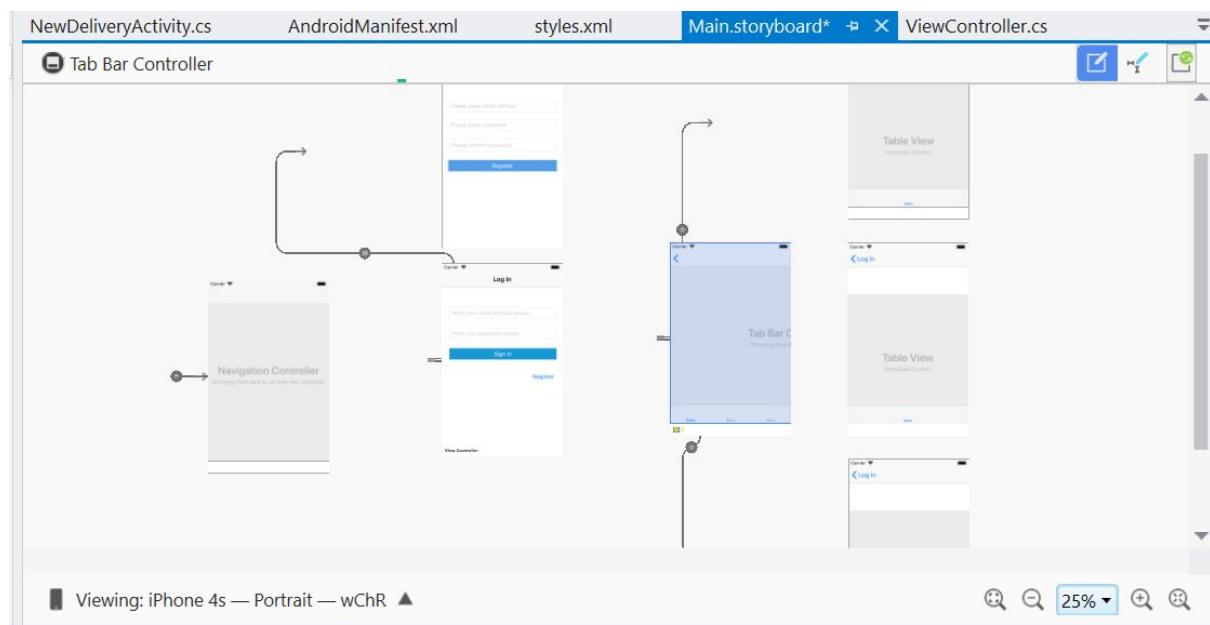
(Switching between ViewControllers instead of fragments. Simpler to add tabs in iOS.)
 TODO: notes on tabs in iOS notes???

20-160

Adding One View per Tab-iOS

TabController comes by default with 2 ViewControllers ('Item1', 'Item2') - delete these to start tabbed views afresh.

TableViewController ideal for lists - drag TableViewController to right of TabController, then Ctrl-drag from TableViewController to TableViewController, select 'Relationship - Tab'. Do this for as many times as there are tabs (3: Deliveries, Delivered & Profile).



Select first TableViewController **by the button/bar at the bottom-left** and in its properties, go to Class and type in the class name, '*DeliveriesViewController*' - the file '*DeliveriesViewController.cs*' will appear in the iOS project. Ditto for the other (2) tabs' TabViewControllers; '*DeliveredViewController*' & '*DeliveredViewController.cs*'; and '*ProfileViewController*' & '*ProfileViewController.cs*'.

(Functionality from inheritance `ProfileViewController : UITableViewController` useful in this case - presenting a list.)

Select the sample 'Item' in each *TableViewController* and change the property Title to suit the case (e.g. 'Deliveries', 'Delivered' & 'Profile').

If icons are wanted, for display, visit <https://icons8.com/> e.g. for free images for iOS - search for an image(s) (e.g. truck, tick mark) and download 3 of each in different sizes for use in iOS : 1 at 30x30, 1 (2x) at 60x60, 1 (3x) at 90x90. Change names of downloaded files to e.g. profile.png, profile@2x.png & profile@3x.png .

Cf 9-75

NB some images may be infilled in iOS, so just a splat of pixels on screen.

20-161

Prevent Back-Navigation-iOS

iOS navigation controller will segues back & forth. Hide the back button therefore to prevent back-navigation - NB back button is in each *TableViewController* - tab and tab navigation inherited from tab controller, so hide in *TabBarController*.

No .cs class file as yet for *TabBarController* so select the *TabBarController* **by the button in the bottom left of the TabBarController** in the storyboard and then in its Class property, enter '*MainTabBarController*' so that file '*MainTabBarController.cs*' is made in the iOS project. Therein:

```
public partial class MainTabBarController : UITabBarController
{
    public MainTabBarController (IntPtr handle) : base (handle)
    {
    }

    public override void ViewDidAppear (bool animated)
    {
        base.ViewDidAppear (animated);

        // Hide the back button to prevent back-navigation just after logging-in
        // (straightaway, w/o animation)

        NavigationItem.SetHidesBackButton (true, false);
    }
}
```

20-162

TheBarButtonItem-iOS

Providing a title bar/toolbar item button for adding a new delivery item record.

There will currently be no toolbar atop any *TableViewController*. Where to add this toolbar? As with hiding the *TableViewController*s' back buttons, the toolbar will have to be added to their parent *TabBarController*.

Drag a **NavigationItem** to the *TabBarController* (a Title will now appear hereon within the *TabBarController*).

A control specifically for navigation bars, the **Bar Button Item** should then be dragged into the *TabBarController*'s navigation bar - set its identifier to a preset 'Add'. (Preset iOS identifiers easier than Android's downloaded images.)

To add the page for new delivery records;

Drag a new ViewController (for a new page for entering new delivery records). Ctrl-drag from the *Bar Button Item 'Add'* to this new ViewController & select segue action ‘Show’. Click on the button at the bottom-left of the ViewController and then in its Class property, set the value ‘*NewDeliveryViewController*’ to have a file made called, ‘*NewDeliveryViewController.cs*’. Drag a **Navigation Item** (as with the *TabBarController*) into this *ViewController* (change *Title* if wished).

Next, drag a **Bar Button Icon** into this new navigation bar and change its identifier to ‘Save’ and its Name ‘*saveBarButtonltem*’.

Drag in a Text Field and constrain both ends and its top (using constraint view) - set its Name to ‘*newPackageNameTextField*’ and Text to ‘New package name’.

21-Lists-Android

21-163

The ListFragment-Android

Could use a ListView (eg to display deliveries) but a bit overcomplicated here perhaps. Instead, change base class - inherit from **ListFragment** instead of from Fragment. (OnCreateView then not needed as ListFragments d'incorporate a ListView - good for displaying lists e.g. of deliveries).

```
//public class DeliveriesFragment : Android.Support.V4.App.Fragment      //
derive from support v4 for backward-compatibility
    public class DeliveriesFragment : Android.Support.V4.App.ListFragment      //
ListFragment so as to populate TableView; derive from support v4 for
backward-compatibility
```

21-164

The ListAdapter-Android

NB all the model logic is in portable project Models.

In Delivery.cs, modify / add methods to use Status (0, 1 or 2 for awaiting, delivering or delivered) so that:

```
public static async Task<List<Delivery>> GetDeliveries()
{
    List<Delivery> deliveries = new List<Delivery>();

    //deliveries = await
AzureHelper.MobileService.GetTable<Delivery>().ToListAsync();

    // Get only certain deliveries - where Status is not 2 (delivered already)

    deliveries = await AzureHelper.MobileService.GetTable<Delivery>().Where(d =>
d.Status != 2).ToListAsync();

    return deliveries;
}

public static async Task<List<Delivery>> GetDelivered()
{
```

```

        List<Delivery> deliveries = new List<Delivery>();

        //deliveries = await
AzureHelper.MobileService.GetTable<Delivery>().ToListAsync();

        // Get only certain deliveries - where Status is 2 (delivered already)

        deliveries = await AzureHelper.MobileService.GetTable<Delivery>().Where(d =>
d.Status == 2).ToListAsync();

        return deliveries;
    }
}

```

<https://medium.com/@Sudhagar/android-array-adapters-what-most-of-the-tutorials-don-t-tell-you-90f898fb54a2>

And in the fragment classes, *DeliveriesFragment.cs* & *DeliveredFragment.cs* &c:

```

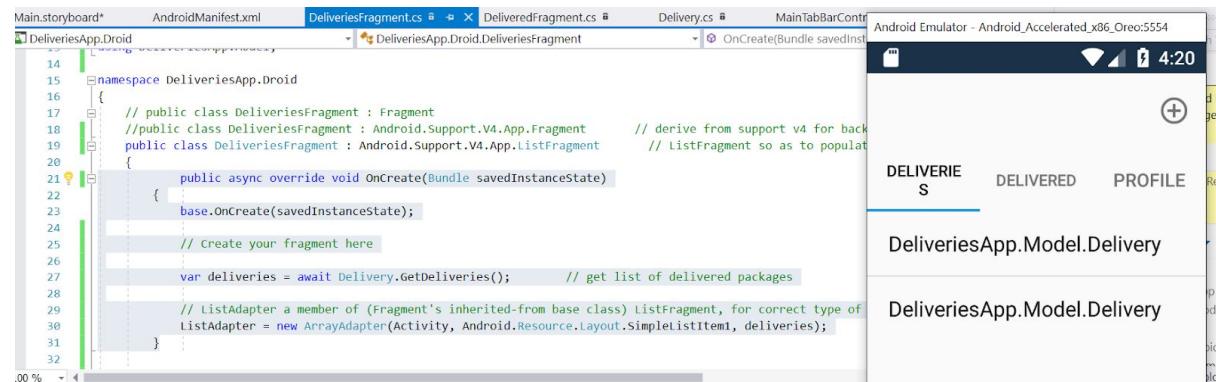
public async override void OnCreate(Bundle savedInstanceState)
{
    base.OnCreate(savedInstanceState);

    // Create your fragment here

    var deliveries = await Delivery.GetDeliveries();           // get list of
delivered packages

    // ListAdapter a member of (Fragment's inherited-from base class) ListFragment,
for correct type of list resource to display
   ListAdapter = new ArrayAdapter(Activity,
Android.Resource.Layout.SimpleListItem1, deliveries);
}

```

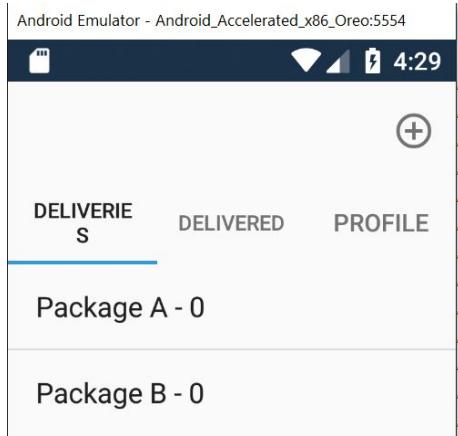


Showing .ToString default method showing classname not data in List - could appear as 'error' - a solution is to **public override ToString** for method for *Delivery* class to provide instead suitable text for list display. In *Delivery.cs* :

```

public override string ToString()
{
    // return base.ToString();
    return $"{Name} - {Status}";
}

```



21-165

Using a Custom Adapter-Android

An improvement on the basic text method in 21-164, to show data in a list in a more user-friendly format.

In Resources/Layout, make a new Android Layout '*DeliveryCell*' (for use as a customised row in *Delivered.axml* or *Deliveries.axml* list layouts) -

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
    android:orientation="vertical"
    android:layout_width="match_parent"
    android:layout_height="match_parent">
    <TextView
        android:text="Medium Text"
        android:textAppearance="?android:attr/textAppearanceMedium"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:minWidth="25px"
        android:minHeight="25px"
        android:id="@+id/deliveryNameTextView" />
    <TextView
        android:text="Small Text"
        android:textAppearance="?android:attr/textAppearanceSmall"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:id="@+id/deliveryStatusTextView" />
</LinearLayout>
```

Rt-click on Android project, *Add New Item*, of type **Adapter** - name '*DeliveriesAdapter.cs*' and, using holder object and GetView properties combined with controls in the bespoke cell, amend boilerplate code like so:

```
...
class DeliveryAdapter : BaseAdapter
{
    Context context;
    List<Delivery> deliveries; // for use with multiple Delivery records

    //public DeliveryAdapter(Context context)
    public DeliveryAdapter(Context context, List<Delivery> deliveries) // constructor modified to take our data of interest
    {
```

```

        this.context = context;

        this.deliveries = deliveries;
    }

    ...

    public override View GetView(int position, View convertView, ViewGroup parent)
    {
        var view = convertView;
        DeliveryAdapterViewHolder holder = null;

        if (view != null)
            holder = view.Tag as DeliveryAdapterViewHolder;

        if (holder == null)
        {
            holder = new DeliveryAdapterViewHolder();
            var inflater =
context.GetSystemService(Context.LayoutInflaterService).JavaCast<LayoutInflater>();
            //replace with your item and your holder items
            //comment back in
            //view = inflater.Inflate(Resource.Layout.item, parent, false);

            // Adapt the REMmed-out boilerplate to make use of our bespoke DeliveryCell
            // in ListView's inflation
            view = inflater.Inflate(Resource.Layout.DeliveryCell, parent, false);

            // set the holder's properties (see its modified definition below) to our
            // text fields' values
            holder.Name =
view.FindViewById<TextView>(Resource.Id.deliveryNameTextView);
            holder.Status =
view.FindViewById<TextView>(Resource.Id.deliveryStatusTextView);

            //holder.Title = view.FindViewById<TextView>(Resource.Id.text);
            view.Tag = holder;
        }

        //fill in your items
        //holder.Title.Text = "new text here";
        var delivery = deliveries[position];           // 'position' from signature of
        Adapter - ie for every cell, ....
        holder.Name.Text = delivery.Name;           // set the name property of the
        adapter for the bespoke cell's text field
        switch (delivery.Status)
        {
            case 0:
                holder.Status.Text = "Awaiting delivery person";
                break;
            case 1:
                holder.Status.Text = "Out for delivery";
                break;
            case 2:
                holder.Status.Text = "Already delivered";
                break;
            default:
                holder.Status.Text = "Delivery status unknown";
                break;
        }

        return view;
    }
}

```

```

//Fill in count here, currently 0
// (sic) count :-/ in boilerplate
/// <summary>
/// return number of yet-to-deliver items
/// </summary>
public override int Count
{
    get
    {
        // return 0;
        return deliveries.Count;
    }
}

class DeliveryAdapterViewHolder : Java.Lang.Object
{
    //Your adapter views to re-use
    //public TextView Title { get; set; }

    // Amend boilerplate holder properties for use in our GetView (to match fields in
    // our bespoke DeliveryCell)
    public TextView Name { get; set; }
    public TextView Status { get; set; }

}

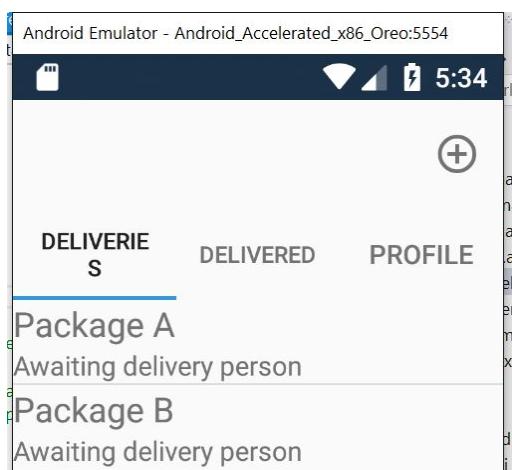
```

And finally, now call our new custom adapter **DeliveryAdapter** (instead of ArrayAdapter) from **DeliveriesFragment.cs**:

```

...
        // ListAdapter a member of (Fragment's inherited-from base class) ListFragment,
        for correct type of list resource to display
        //ListAdapter = new ArrayAdapter(Activity,
        Android.Resource.Layout.SimpleListItem1, deliveries);
        ListAdapter = new DeliveryAdapter(Activity, deliveries);           // use the
        custom Adapter

```



TODO: cf Android notes x-x ???

Thus an Adapter is used to build up a customised list, together with a layout as a bespoke custom cell (used by the custom adapter once for each row).

Resource.Id.deliveryNameTextView not found - Just in case

[Peter](#) · Lecture 165 · a minute ago

Just in case anyone else at 'Using a Custom Adapter' 21-165 8:00 finds that Visual Studio can't find *Resource.Id.deliveryNameTextView*, a quick fix may be to right-click the *DeliveryCell.axml* resource file, then:

- (1) set "Android Resource" as the value for the file's *Build Action* property, also
- (2) set "**MSBuild:UpdateGeneratedFiles**" as value for **Custom Tool** property

- as per [the SO answer here](#).

22-Lists-iOS

22-166

The UITableViewController-iOS

iOS UITableViewController sort of comparable in function to Android ListFragment.

TableViewController will contain a TableView (only) - 1 element by default - a

TableViewCell - its default style being 'Custom' (could be Basic|Subtitle|Left/RightDetail).

TableViewCell class as base class will hand down useful members.

In DeliveriesViewController (cf 20-160) add a list of Delivery data objects as a member of the class and populate that member in ViewDidLoad:

```
public partial class DeliveriesViewController : UITableViewController
{
    List<Delivery> deliveries;

    public DeliveriesViewController (IntPtr handle) : base (handle)
    {
    }

    // staple - override ViewDidLoad & therein load up members with data
    public override async void ViewDidLoad()
    {
        base.ViewDidLoad();

        deliveries = await Delivery.GetDeliveries();
        TableView.ReloadData();           // after new data, refresh table (this method
available because subclassing UI*Table*viewController)
    }
}
```

22-167

The TableCell-iOS

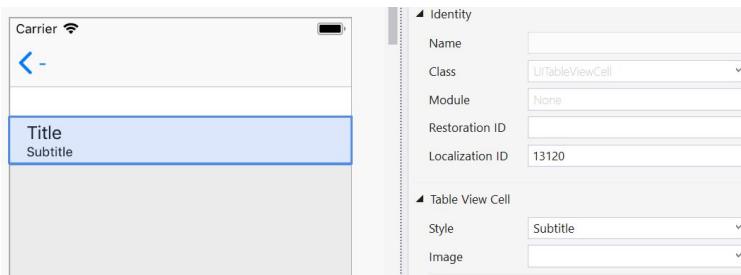
Populating the tables with delivery data.

TableViewController will contain a TableView (only) - 1 element by default - a

TableViewCell - its default style being 'Custom' (could be Basic|Subtitle|Left/RightDetail).

Click Basic to see 'Title' rendered in this style, and so on.

In this case use subtitle:



Now to populate with fields' data (Delivery : Name and Status). Set the cell's **Identifier** property to '*deliveryCell*'.

In *DeliveriesViewController*, override *RowsInSection*

NB Only 1 section in this app's case. Otherwise evaluate which section then calculate #rows.

In *DeliveriesViewController*:

```
// NB The 2 basic overrides for iOS cell population in TableViews: RowsInSection &
GetCell

public override nint RowsInSection(UITableView tableView, nint section)
{
    // return base.RowsInSection(tableView, section);           // boilerplate

    // Xamarin weirdness - code bouncing around this line & nulls for deliveries
    variable from Delivery.GetDeliveries
    return deliveries?.Count ?? 0;           // as many rows as there are delivery
    records; Return 0 if 'deliveries' is null

    //           return deliveries.Count;           // as many rows as there are delivery
    records

    // NB Only 1 section in this app's case. Otherwise evaluate which section then
    calculate #rows.
}

public override UITableViewCell GetCell(UITableView tableView, NSIndexPath indexPath)
{
    var cell = tableView.DequeueReusableCell("deliveryCell");           // recycle this 1
    or more cells when fallen out of sight - Identifier value of cell in TableViewController

    var delivery = deliveries[indexPath.Row];                         // get this row's
    data for the cell

    cellTextLabel.Text = delivery.Name;

    // cf DeliveriesAdaptor in Android
    switch (delivery.Status)
    {
        case 0:
            cell.DetailTextLabel.Text = "Awaiting delivery person";
            break;
    }
}
```

```

        case 1:
            cell.DetailTextLabel.Text = "Out for delivery";
            break;
        case 2:
            cell.DetailTextLabel.Text = "Already delivered";
            break;
        default:
            cell.DetailTextLabel.Text = "Delivery status unknown";
            break;
    }

    // DetailTextLabel available because TableView cell style is 'Subtitle'

    return cell;

    //return base.GetCell(tableView, indexPath);

}

```

Ditto for other tableViewControllers (eg 'deliveredCell' *Identifier* property for *Delivered*, &c) - override: RowsInSection & GetCell , ... as above.

Error on logging in: Unable to cast object of type 'System.RuntimeType' to type 'Mono.Debugger.Soft.TypeMirror'.

Problem c 23 in DeliveriesViewController - GetDeliveries 'Expression not supported.'

[Peter](#) · 4 minutes ago

Hi Eduardo and Fatima,

I've had a similar error I think, at the logging-in stage: **Unable to cast object of type 'System.RuntimeType' to type 'Mono.Debugger.Soft.TypeMirror'.**

I'm not sure of the cause (Google searching did not yield any successfully answered questions on the error message), but tracked this problem down to within *DeliveriesViewController*. After amending

```

public override nint RowsInSection(UITableView tableView, nint section)
{
    return deliveries.Count;      // line in video 22-167 - as many rows as
there are delivery records
}

```

to

```

public override nint RowsInSection(UITableView tableView, nint section)
{
    return deliveries?.Count ?? 0;      // as many rows as there are
delivery records; Return 0 if 'deliveries' is null
}

```

the app seemed to be working.

Debugging with breakpoints in *DeliveriesViewController*::*ViewDidLoad* , the value of *deliveries* member variable did not seem to be being set as might be expected. I'm afraid that I don't understand whether this behaviour was intended or not.

(I'm coding on a PC paired with a 2009 Macbook, perhaps this combination may have contributed?). Yet *another* buggy bit cracked, hopefully! Best regards, good fortune to all.

TODO cf iOS/Swift notes on custom cells &c x-x ???

22-168

Using a Custom Cell-iOS

Using a custom style for table/list cells instead of presets (eg Subtitle, Title, Right/Left &c) - eg a cell with 3 (not 2) fields - Package name, delivery status AND coordinates.

For all TableViewControllers requiring custom cells:-

Change *TableViewController*'s cell Style to 'Custom'.

Set the cell's Class property to e.g. *DeliveryTableViewCell.cs* - this will make a file *DeliveryTableViewCell.cs* in the iOS project. Failure to do this will cause a warning when trying to edit child label properties about the 'parent cell needing a code-behind' (the code-behind is that class file).

Drag **labels** into the cell (check in Document Outline) - change their Name eg nameLabel, statusLabel and their text to make things easier. Manoeuvre them. This is likely to be a bit fiddly - there's no room to swing a cat in a cell. In constraint view of the storyboard, add a constraint (no more than is necessary) to the edge of the cell, say. Watch out for red constraint warnings and check the bottom-right of the parent ViewController for triangle warnings re constraint problems in cell.

In *DeliveryTableViewCell_designer.cs* the labels are instantiated as members, tho' **private** by default (see below).

NB go into *DeliveryTableViewCell.designer.cs* and make each label field (Name, Status, Coordinates) **public** in scope

```
partial class DeliveredTableViewCell
{
    [Outlet]
    [GeneratedCode ("iOS Designer", "1.0")]
    //UIKit.UILabel coordinatesLabel { get; set; }
    public UIKit.UILabel coordinatesLabel { get; set; }      // scope of labels
set to public
...
```

NB Because the designer fields code is auto-generated, these may become overwritten in the future as *private* again (i.e. without *public*) leading to '*xyz inaccessible due to scope*' errors for variables. This will require going back and re-adding **public** modifier as and when necessary.

In each ViewController's class, e.g. in *DeliveriesViewController*, in *GetCell*, cast the reusable cell as the custom cell type, e.g. *DeliveryTableViewCell*.

Amend statements to use the custom cell members (made public in *DeliveryTableViewCell_designer.cs*).

Document Outline very useful here, for placing fiddly controls into fiddly small areas.
If controls should stray outside Content View in Document Outline, they should be placed back within the , else they will not appear in the _designer e.g.
DeliveryTableViewCell_designer.cs file and cannot be accessed easily.

Reference the cell and its (public) members in overridden **DeliveriesViewController::GetCell**

```
public override UITableViewCell GetCell(UITableView tableView, NSIndexPath indexPath)
{
    //var cell = tableView.DequeueReusableCell("deliveryCell");      // recycle this
    // 1 or more cells when fallen out of sight - Identifier value of cell in TableViewController
    var cell = tableView.DequeueReusableCell("deliveryCell") as
    DeliveryTableViewCell;      // recycle this 1 or more cells when fallen out of sight -
    //Identifier value of cell in TableViewController - cast as custom cell type

    var deliveryValue = deliveries[indexPath.Row];                  // get this
    // row's data for the cell

    //cellTextLabel.Text = deliveryValue.Name;
    cell.nameLabel.Text = deliveryValue.Name;
    cell.coordinatesLabel.Text = $"{deliveryValue.DestinationLatitude},
{deliveryValue.DestinationLongitude}";

    // cf DeliveriesAdaptor in Android
    switch (deliveryValue.Status)
    {
        case 0:
            //cell.DetailTextLabel.Text = "Awaiting delivery person";
            cell.statusLabel.Text = "Awaiting delivery person";
            break;
        case 1:
            //cell.DetailTextLabel.Text = "Out for delivery";
            cell.statusLabel.Text = "Out for delivery";
            break;
        case 2:
            //cell.DetailTextLabel.Text = "Already delivered";
            cell.statusLabel.Text = "Already delivered";
            break;
        default:
            //cell.DetailTextLabel.Text = "Delivery status unknown";
            cell.statusLabel.Text = "Delivery status unknown";
            break;
    }

    // DetailTextLabel was available because TableView cell style is 'Subtitle'

    return cell;
}
```

Also, to make the cell height potentially more capacious and comfortable, in this
ViewController override **GetHeightForRow**, setting return value to suitable pixel size.

```
// Make the cell height enough to hold labels comfortably
public override nfloat GetHeightForRow(UITableView tableView, NSIndexPath indexPath)
{
    // return base.GetHeightForRow(tableView, indexPath);
```

```

        return 60;           // 60 pixels apparently sufficient in this case
    }
}

```

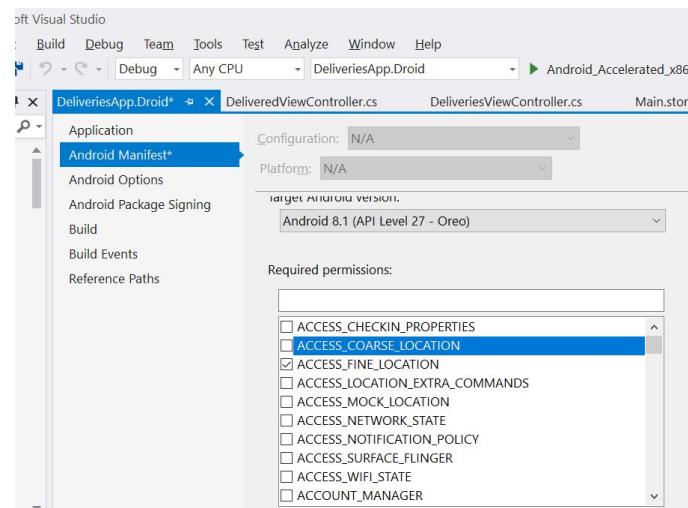
23-Maps-Android

23-169

Preparing the Project to use Maps- Android

Add permissions to use maps - open project properties or edit AndroidManifest.xml - in Android Manifest/**RequiredPermissions** : ACCESS_COARSE_LOCATION (e.g. city location using cell towers not GPS, or ACCESS_FINE_LOCATION eg GPS).

ACCESS_FINE_LOCATION in this case, since specific address are involved.



<https://forums.xamarin.com/discussion/3737/so-where-is-androidmanifest-xml>

(AndroidManifest.xml ‘visible’ with AssemblyInfo.cs in Properties ‘folder’ in Solution Explorer)

Now... Add NuGet package **Xamarin.GooglePlayServices.Maps** to

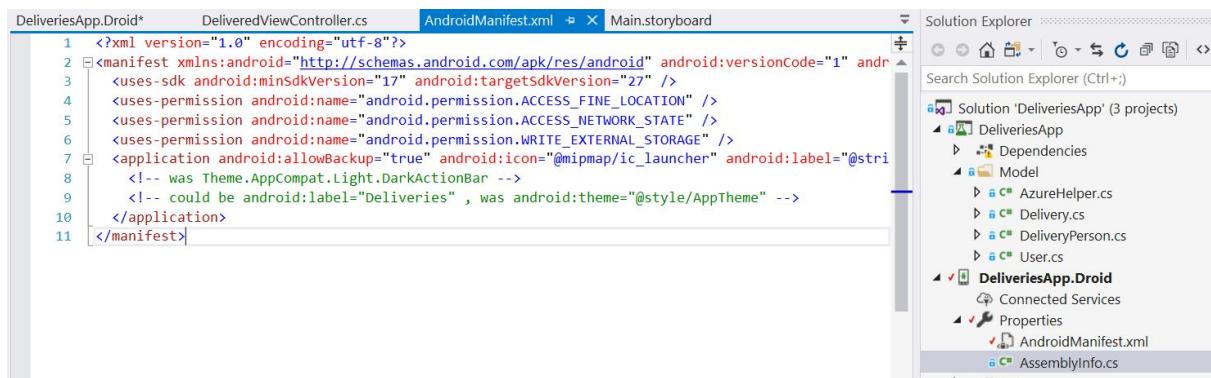
Video said to use version 29.0.0 - only available versions on 27/6/19 60.11421.1 and 42.1021.1 -

Tried 42.1021.1 - this gave error ‘*Version conflict detected for Xamarin.Android.Support.Core.UI. Install/reference Xamarin.Android.Support.Core.UI 27.0.2.1 directly to project*’ - could have fixed this by editing csproj directly with
<PackageReference Include="Xamarin.Android.Support.Core.UI" Version="27.0.2.1" />

to the .csproj file directly, after other <PackageReference ... elements. (As in 19-153.) However, tried (the latest) **Xamarin.GooglePlayServices.Maps** version 60.1142.1 This installed to Android project OK.

Then.... Back to Project Properties/**Required Permissions** - **ACCESS_NETWORK_STATE** should (to decide whether to try to download map - done behind the scenes by package) also be enabled (as well as **ACCESS_FINE_LOCATION**) also **WRITE_EXTERNAL_STORAGE** (to store map data if downloaded).

**(ACCESS_FINE_LOCATION , ACCESS_NETWORK_STATE ,
WRITE_EXTERNAL_STORAGE And more....)**



Downloaded from the *Resources* section of the video lecture was a Blue-Peter here's-one-I-made-earlier `AndroidManifest.xml` file written by and uploaded by the course author, like so:

```

<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    android:versionName="4.5"
    package="com.xamarin.docs.android.mapsandlocationdemo2"
    android:versionCode="6">
    <uses-sdk android:minSdkVersion="14" android:targetSdkVersion="17" />
    <!-- Google Maps for Android v2 requires OpenGL ES v2 -->
    <uses-feature android:glEsVersion="0x00020000" android:required="true" />
    <!-- We need to be able to download map tiles and access Google Play Services-->
    <uses-permission android:name="android.permission.INTERNET" />
    <!-- Allow the application to access Google web-based services. -->
    <uses-permission
        android:name="com.google.android.providers.gsf.permission.READ_GSERVICES" />
    <!-- Google Maps for Android v2 will cache map tiles on external storage -->
    <uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE" />
    <!-- Google Maps for Android v2 needs this permission so that it may check the connection state as it must download data -->
    <uses-permission android:name="android.permission.ACCESS_NETWORK_STATE" />
    <!-- Permission to receive remote notifications from Google Play Services -->
    <!-- Notice here that we have the package name of our application as a prefix on the permissions. -->
    <uses-permission android:name="PACKAGE_NAME.permission.MAPS_RECEIVE" />
    <permission android:name="PACKAGE_NAME.permission.MAPS_RECEIVE"
        android:protectionLevel="signature" />
    <!-- These are optional, but recommended. They will allow Maps to use the My Location provider. -->
    <uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION" />
    <uses-permission android:name="android.permission.ACCESS_FINE_LOCATION" />
    <application android:label="@string/app_name">
        <!-- Put your Google Maps V2 API Key here. -->
        <meta-data android:name="com.google.android.maps.v2.API_KEY"
            android:value="YOUR_API_KEY" />
    </application>
</manifest>

```

```

<meta-data android:name="com.google.android.gms.version"
    android:value="@integer/google_play_services_version" />
</application>
</manifest>

```

The permission lines and Google API & gms key lines were pasted into our own AndroidManifest. The permission.MAPS_RECEIVE lines were placed at the end of the file, and the string 'PACKAGE_NAME' was replaced with the name of the app package, eg 'deliveriesapp'.

As in *AndroidManifest.xml* element <manifest ...

```
package="DeliveriesApp.Droid.DeliveriesApp.Droid" ... />
```

Or https://forums.xamarin.com/discussion/comment/144230/#Comment_144230

<https://docs.microsoft.com/en-us/xamarin/android/platform/maps-and-location/maps/maps-api>

23-170

Obtaining the Google Maps API key-Android

From <https://console.developers.google.com/apis/> - **New Project** - DeliveriesApp - go to API Library and click **Enable** for *Google Maps SDK for Android : (Android API)* - *Create Credentials* - API key as prompted (AIzaSyAUpxpJCVYZUU7T7arHxjsrJ2gragtJAj0)

Cf 7-60

23-171

Displaying Maps-Android

In Resources/layout open *NewDelivery.axml*.

At the bottom of *NewDelivery.axml*, add:

```

<fragment
    class="com.google.android.gms.maps.MapFragment"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:id="@+id/mapFragment" />

```

Then go to corresponding code-behind, *NewDeliveryActivity.cs* and declare/define/use the *MapFragment*:

```

public class NewDeliveryActivity : AppCompatActivity, IOnMapReadyCallback           // 
IOnMapReadyCallback needed for .GetMapAsync
{
    ...

    Button saveNewDeliveryButton;
    EditText packageNameEditText;
    MapFragment mapFragment;

    protected override void OnCreate(Bundle savedInstanceState)
    {
        base.OnCreate(savedInstanceState);

        // Create your application here

```

```

        SetContentView(Resource.Layout.NewDelivery);

        saveNewDeliveryButton =
FindViewById<Button>(Resource.Id.saveNewDeliveryButton);
        packageNameEditText = FindViewById<EditText>(Resource.Id.packageNameEditText);
        mapFragment =
FragmentManager.FindFragmentById<MapFragment>(Resource.Id.mapFragment); // Activity.FragmentManager; fragment ID set in axml element
        mapFragment.GetMapAsync(this); // activity must implement IOnMapReadyCallback -
NB not await'd since a Java object handled by Java, not C#
        saveNewDeliveryButton.Click += SaveNewDeliveryButton_Click;
    }

    private async void SaveNewDeliveryButton_Click(object sender, EventArgs e)
    {
        //throw new NotImplementedException();

        Delivery delivery = new Delivery()
        {
            Name = packageNameEditText.Text,
            Status = 0
        };

        await Delivery.InsertDelivery(delivery);
    }

    // Must implement this OnMapReady method (even if empty) for IOnMapReadyCallback
interface
    public void OnMapReady(GoogleMap googleMap)
    {

}

```

23-172

Location and Pins-Android

```

public class NewDeliveryActivity : AppCompatActivity, IOnMapReadyCallback,
ILocationListener // IOnMapReadyCallback needed for .GetMapAsync, ILocationListener
for .RequestLocationUpdates

{

    Button saveNewDeliveryButton;
    EditText packageNameEditText;
    MapFragment mapFragment;
    double latitude, longitude;
    LocationManager locationManager;
    ...

    protected override void OnCreate(Bundle savedInstanceState)
    ...

    locationManager = GetSystemService(Context.LocationService) as LocationManager;
    string provider = LocationManager.GpsProvider; // choose (NetworkProvider,
PassiveProvider,...) GPS for highest accuracy for addresses

```

```

        if (locationManager.IsProviderEnabled(provider))      // check whether GPS provider
actually available (e.g. device may not even have GPS)
    {
        locationManager.RequestLocationUpdates(provider, 5000, 1000, this);          //
keep getting, not just a single fix, at 5s intervals, if 1km or more moved - d'need
ILocationListener interface
    }
}

```

On auto-fix for interface inheritance, '*Implement Interface*' to get boilerplate of necessary implementations.

The whole NewDeliveryActivity.cs:

```

public class NewDeliveryActivity : AppCompatActivity, IOnMapReadyCallback,
ILocationListener          // IOnMapReadyCallback needed for .GetMapAsync, ILocationListener
for .RequestLocationUpdates
{

    Button saveNewDeliveryButton;
    EditText packageNameEditText;
    MapFragment mapFragment;
    double latitude, longitude;
    LocationManager locationManager;    // must be initialised from service

    protected override void OnCreate(Bundle savedInstanceState)
    {
        base.OnCreate(savedInstanceState);

        // Create your application here

        SetContentView(Resource.Layout.NewDelivery);

        saveNewDeliveryButton =
FindViewById<Button>(Resource.Id.saveNewDeliveryButton);
        packageNameEditText = FindViewById<EditText>(Resource.Id.packageNameEditText);
        mapFragment =
FragmentManager.FindFragmentById<MapFragment>(Resource.Id.mapFragment);    //
Activity.FragmentManager; fragment ID set in axml element
        // mapFragment.GetMapAsync(this); // in OnLocationChanged now - activity must
implement IOnMapReadyCallback - NB not await'd since a Java object handled by Java, not C#
        saveNewDeliveryButton.Click += SaveNewDeliveryButton_Click;

    }

    // When *activity* is paused/in background, stop running location updates
    protected override void OnPause()
    {
        base.OnPause();
        locationManager.RemoveUpdates(this);           // stop updating when activity in
the background
    }

    // Every time *activity* is resumed, get hold of the location provider again if
possible
    protected override void OnResume()
    {
        base.OnResume();
    }
}

```

```

        locationManager = GetSystemService(Context.LocationService) as LocationManager;
// initialise locationManager using system
        string provider = LocationManager.GpsProvider;           // choose (NetworkProvider,
PassiveProvider,...) GPS for highest accuracy for addresses

        if (locationManager.IsProviderEnabled(provider))      // check whether GPS provider
actually available (e.g. device may not even have GPS)
        {
            locationManager.RequestLocationUpdates(provider, 5000, 1000, this);      //
keep getting, not just a single fix, at 5s intervals, if 1km or more moved - d'need
ILocationListener interface
        }
    }

    private async void SaveNewDeliveryButton_Click(object sender, EventArgs e)
    {
        //throw new NotImplementedException();

        Delivery delivery = new Delivery()
        {
            Name = packageNameEditText.Text,
            Status = 0
        };

        await Delivery.InsertDelivery(delivery);
    }

    // Must implement this OnMapReady method for IOnMapReadyCallback interface
    // Set a marker using the device GPS, to show the user's location (for parcel address)
    public void OnMapReady(GoogleMap googleMap)
    {
        MarkerOptions marker = new MarkerOptions();
        marker.SetPosition(new LatLng(latitude, longitude));
        markerSetTitle("Your own location");
        googleMap.AddMarker(marker);
    }

    public void OnLocationChanged(Location location)
    {
        //throw new NotImplementedException();

        latitude = location.Latitude;
        longitude = location.Longitude;

        mapFragment.GetMapAsync(this); // activity must implement IOnMapReadyCallback -
NB not await'd since a Java object handled by Java, not C#
    }

    public void OnProviderDisabled(string provider)
    {
        //throw new NotImplementedException();
    }

    public void OnProviderEnabled(string provider)
    {
        //throw new NotImplementedException();
    }

    public void OnStatusChanged(string provider, [GeneratedEnum] Availability status,
Bundle extras)
    {
        //throw new NotImplementedException();
    }

```

```
}
```

23-173

Running on Android device

Error on deploying to device ‘Failure

INSTALL_PARSE_FAILED_MANIFEST_MALFORMED]’ can be due to e.g. upper case in attributes of AndroidManifest.xml elements, which is not allowed, so eg ‘*deliveriesapp*’ not ‘*Deliveriesapp*’.

Amended code according to Q&A as `Android.Gms.Maps.MapFragment.Map` is no longer available in 2019 version.

<https://www.udemy.com/complete-xamarin-developer-course-ios-and-android/learn/lecture/8438130#questions/6303278>

Also, `NewDeliveryActivity.cs` class global member variables

```
GoogleMap originMap, destinationMap; // since Map member is absent from  
MapFragment in 2019
```

With an additional new **public** class, `MyMap` - but this was causing `Java.lang` null pointer exception so used simpler class member variables for `GoogleMap` objects (from which to get Target & thus lat/lng):

<https://blog.ostebaronen.dk/2013/09/how-to-implement-intptr-handle-and.html>

<https://developers.google.com/android/reference/com/google/android/gms/maps/OnMapReadyCallback>

[https://developers.google.com/android/reference/com/google/android/gms/maps/MapFragment.html#getMapAsync\(com.google.android.gms.maps.OnMapReadyCallback\)](https://developers.google.com/android/reference/com/google/android/gms/maps/MapFragment.html#getMapAsync(com.google.android.gms.maps.OnMapReadyCallback))

<https://forums.xamarin.com/discussion/36628/ionmapreadycallback-usage-in-a-non-activity-class>

<https://stackoverflow.com/a/31068873/11365317>

FWIW, of Eduardo's 2 suggested workarounds, the simpler workaround worked for me (i.e. new class member variables `originMap` and `destinationMap`; and those members' values being set in the `OnMapReady` method).

However the other workaround involving `MyMap` class, I could not get to work. Putting on breakpoints, it was seen that some time after program execution left `OnResume`, a `java.lang.NullPointerException` exception occurred, which I failed to debug further, and the app crashed.

A breakpoint was put in *MyMap::Handled*, which was hit and the method executed, but the *MyMap::OnMapReady* implementation was never executed.

I think that I followed the code in Eduardo's answers in this Q&A.

On the other hand, personally, since the workaround with class members worked ok, that was enough for me.

With respect though, perhaps 'tis time for this section of the course, which is kind of a finale, to be updated to reflect the loss of *Android.Gms.Maps.MapFragment.Map*.

The MyMap class method only worked where the NewDeliveryActivity no longer implemented *IOnMapReadyCallback* and calling *originMapFragment.GetMapAsync(this);* - instead calling *originMapFragment.GetMapAsync(originMap);* (ditto for destination) and instead relying on MyMap's *OnMapReady* .

24-Maps-iOS

24-174

Displaying Maps-iOS

Drag labels and 2 **MapView**s onto the NewDelivery ViewController in storyboard - Usual hideous struggle with constraints. Did not use centre-of screen this time, stuck with constraints to other controls & made them work, just about - checked on various devices/orientations.

Used lowest pin constraints - 'make width same as' another control -

Right-click on **Info.plist** in Solution Explorer, **Open With ...** , try *XML Text Editor* -

```
31  </array>
32  <key>UISupportedInterfaceOrientations</key>
33  <array>
34    <string>UIInterfaceOrientationPortrait</string>
35    <string>UIInterfaceOrientationLandscapeLeft</string>
36    <string>UIInterfaceOrientationLandscapeRight</string>
37  </array>
38  <key>UISupportedInterfaceOrientations~ipad</key>
39  <array>
40    <string>UIInterfaceOrientationPortrait</string>
41    <string>UIInterfaceOrientationPortraitUpsideDown</string>
42    <string>UIInterfaceOrientationLandscapeLeft</string>
43    <string>UIInterfaceOrientationLandscapeRight</string>
44  </array>
45  <key>XSAppIconAssets</key>
46  <string>Assets.xcassets/AppIcon.appiconset</string>
47 </dict>
48 </plist>
```

Define a key and a string to within the *<dict>* dictionary to define a required permission. Could use, *<key>NSLocationAlwaysUsageDescription</key>* but don't here (save on batteries instead). Put key/value as:

```
<key>NSLocationWhenInUseUsageDescription</key>
<string>We need to access your location to improve the app's
performance.</string>
```

NB there's no error checking or intellisense here, so get this exactly correct.

Ensure that all fields in *DeliveryTableViewCell_.designer.cs* and for *DeliveredTableViewCell_.designer.cs* are **public** eg:

```
namespace DeliveriesApp.iOS
{
    [Register ("DeliveryTableViewCell")]
    partial class DeliveryTableViewCell
    {
        [Outlet]
        [GeneratedCode ("iOS Designer", "1.0")]
        public UIKit.UILabel coordinatesLabel { get; set; }

        [Outlet]
        [GeneratedCode ("iOS Designer", "1.0")]
        public UIKit.UILabel nameLabel { get; set; }

        [Outlet]
        [GeneratedCode ("iOS Designer", "1.0")]
        public UIKit.UILabel statusLabel { get; set; }
    }
}
```

Cf 7-59

24-175

Location and Pins in iOS

For the *NewDeliveryViewController.cs* page, ie for user adding/defining a new delivery to be made, use Core Location Manager (*CLLocationManager*) and the Location permissions to centre the map(s) on the device's current location:

```
public partial class NewDeliveryViewController : UIViewController
{
    // An iOS Location service / location manager cf Android LocationManager
    CLLocationManager locationManager;

    public NewDeliveryViewController (IntPtr handle) : base (handle)
    {
    }

    public override void ViewDidLoad()
    {
        base.ViewDidLoad();

        locationManager = new CLLocationManager();

        locationManager.RequestWhenInUseAuthorization();
        originMapView.ShowsUserLocation = true;
        destinationMapView.ShowsUserLocation = true;

        originMapView.DidUpdateUserLocation += OriginMapView_DidUpdateUserLocation;
        // += and TAB for boilerplate event handling code
        destinationMapView.DidUpdateUserLocation +=
        DestinationMapView_DidUpdateUserLocation;

        originMapView.DidFailToLocateUser += OriginMapView_DidFailToLocateUser;
    }
}
```

```

        saveBarButton.Clicked += SaveBarButton_Clicked;           // use += and TAB to
boilerplate subscription to event handler
        // NB event on a Bar Button Item is Clicked; whereas on a normal Button this
TouchUpInside
    }

private void OriginMapView_DidFailToLocateUser(object sender, NSErrorEventArgs e)
{
    // throw new NotImplementedException();
}

private void DestinationMapView_DidUpdateUserLocation(object sender,
MapKit.MKUserLocationEventArgs e)
{
    // throw new NotImplementedException();

    // Check whether location set to something
    if (originMapView.UserLocation != null)
    {
        var coordinates = originMapView.UserLocation.Coordinate;           // get
center
        var span = new MapKit.MKCoordinateSpan(0.15,0.15);                  // how many
degrees of lat/lng to show inside the span
        originMapView.Region = new MapKit.MKCoordinateRegion(coordinates, span);

        originMapView.RemoveAnnotations();          // clear all annotations from
previous operations from location/map updates
        originMapView.AddAnnotation(new MKPointAnnotation()
        {
            Coordinate = coordinates,
            Title = "Your location"
        });
    }
}

private void OriginMapView_DidUpdateUserLocation(object sender,
MapKit.MKUserLocationEventArgs e)
{
    // throw new NotImplementedException();

    // Check whether location set to something
    if (destinationMapView.UserLocation != null)
    {
        var coordinates = destinationMapView.UserLocation.Coordinate;      // get
center
        var span = new MapKit.MKCoordinateSpan(0.15, 0.15);                 // how
many degrees of lat/lng to show inside the span
        destinationMapView.Region = new MapKit.MKCoordinateRegion(coordinates,
span);

        destinationMapView.RemoveAnnotations();          // clear all annotations from
previous operations from location/map updates
        destinationMapView.AddAnnotation(new MKPointAnnotation()
        {
            Coordinate = coordinates,
            Title = "Your location"
        });
    }
}

```

Core Location Manager for Core Location services:

<https://developer.apple.com/documentation/corelocation/cllocationmanager>

24-176

Getting the Center of the Map-iOS

The last lap! Hooray! :) Adding the coordinates to saved record.

```
private async void SaveBarButton_Clicked(object sender, EventArgs e)
{
    // throw new NotImplementedException();

    var origin = originMapView.CenterCoordinate;
    var destination = destinationMapView.CenterCoordinate;

    Delivery delivery = new Delivery()
    {
        Name = newPackageNameTextField.Text,
        Status = 0,
        OriginLatitude = origin.Latitude,
        OriginLongitude = origin.Longitude,
        DestinationLatitude = destination.Latitude,
        DestinationLongitude = destination.Longitude,
    };
}
```

25-The Delivery Person's App

25-177

The Layout for the New App

To add a separate app in same domain (thus keeping much logic reused in portable PCL project) - for the delivery person, rather than consignor:

- To solution, add *New Project ... Blank App (Android)/Android App (Xamarin)* - name this *DeliveryPersonApp.Droid* as Single View App and set minimum API level to 4.2 (to work with my old phone). (NB **do not ever call a Xamarin app WhateverApp.Android - always WhateverApp.Droid - cf 14-125** - else namespaces such as *Android.Support &c* will be affected and there will be build errors of the “*type or namespace name ‘Support’ does not exist*” variety - almost unfixable, so always *.Droid*). Prefixing instances thus - *global::Android.Support.V4....* - inline may also work out ok.
- To solution, add *New Project ... iOS App (Xamarin)* - name this *DeliveryPersonApp.iOS* as Universal, Single View App and set minimum iOS version left as default (hopefully) - currently 12.2.
- To Android project, rt-click References, Add Reference and tick on box for *DeliveriesApp*, the portable PCL project.
- To iOS project, rt-click References, Add Reference and tick on box for *DeliveriesApp*, the portable PCL project.

There may be spurious build errors shown in the VS console - restart, clean, rebuild &c.

TODO cf 15-xyz?

FROM HEREON, ALL NOTES ARE PERTAINING TO DeliveryPersonApp

For Android:

To DeliverPersonApp Android project add new layout Register.axml (*to Resources/layout*) and RegisterActivity.cs (*to Android project*) in which:

```
SetContentView(Resource.Layout.Register);           // use newly defined layout  
resource for registering user
```

Do same (layout & activity) for Pickup screen.

Do same (layout & activity) for Deliver screen.

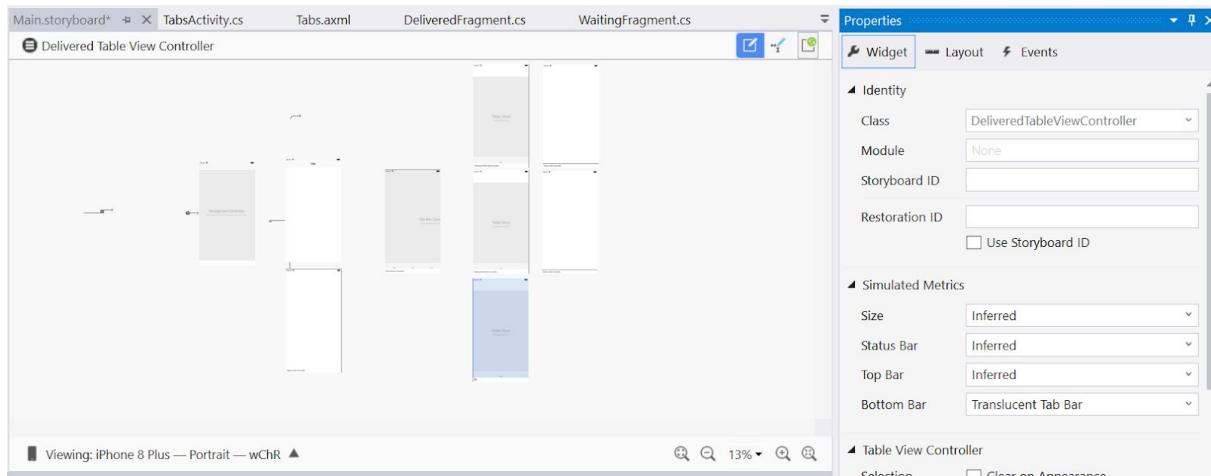
Do same (layout & activity) for Tabs screen (to hold the following three fragments).

Add three fragments (to Android project), representing tabs representing different states of delivery: *DeliveringFragment*, *WaitingFragment*, *DeliveredFragment*. If these are to be for Lists, change their inheritance to e.g.: public class DeliveringFragment :
Android.Support.V4.App.ListFragment

For iOS:

Drag into storyboard a UINavigationController (delete its default UITableViewController and UITableView included) to left of initial ViewController and Ctrl-drag from UINavigationController to starting default ViewController to make the relationship 'root'. Drag the 'entry point' arrow & line from the initial default ViewController to the UINavigationController to make that the starting screen. Leave the initial ViewController's default Class property as 'ViewController'. Drag in also a ViewController for the Register layout (put beneath initial ViewController). To right of initial ViewController drag in a TabBarController (with three default tabs). Set the property Class name to '*MainTabBarController*' (to have VS make this file). Delete (!) each of the three default Tabs of the TabBarController (cf 20-160). Instead, drag in 3 new TableViewControllers. Ctrl-drag from the TabBarController to TableViewController thrice, establishing a relationship of 'Tab' between TabBarController and the new TableViewControllers (ie table VCs are its tabs). Set the property Class names of these to '*DeliveringTableViewController*', '*WaitingTableViewController*' and '*DeliveredTableViewController*' (to have VS make these files). After the the first tabbed TableViewController () add a new ViewController (this will be for more detailed *Pickup* view). Set the property Class name to '*PickupViewController*' (to have VS make this file).

After the the second tabbed TableViewController add a new ViewController (this will be for *Deliver* view). Set the property Class name to '*DeliverViewController*' (to have VS make this file).



NB when setting view controller properties, **ensure to first click the ViewController's selection button at the bottom-left.**

25-178

UI & Navigation Challenge - Part 1 of 3

Android:

NB **main_content** is the starting layout and replacing default *RelativeLayout* with *LinearLayout* with **android:orientation="vertical"** is sanity-saving.

Add text fields & buttons, alter text and IDs to suit.

Using NuGet package manager, add *Xamarin.GooglePlayServices.Maps* v 60.1142.1 to Droid project (cf 23-169).

Rt-click project properties, in *Android Manifest* scroll down to *Required Permissions* and declare **ACCESS_FINE_LOCATION** and **ACCESS_NETWORK_STATE** and **INTERNET** and **WRITE_EXTERNAL_STORAGE** (cf 23-169) In fact, instead of just these (why didn't he say so earlier?), in **Properties/AndroidManifest.xml** use the downloaded list:

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    android:versionName="4.5"
    package="com.xamarin.docs.android.mapsandlocationdemo2"
    android:versionCode="6">

    <uses-sdk android:minSdkVersion="14" android:targetSdkVersion="17" />

    <!-- Google Maps for Android v2 requires OpenGL ES v2 -->
    <uses-feature android:glEsVersion="0x00020000" android:required="true" />

    <!-- We need to be able to download map tiles and access Google Play Services-->
    <uses-permission android:name="android.permission.INTERNET" />

    <!-- Allow the application to access Google web-based services. -->
    <uses-permission android:name="com.google.android.providers.gsf.permission.READ_GSERVICES"
/>

    <!-- Google Maps for Android v2 will cache map tiles on external storage -->
    <uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE" />
```

```

<!-- Google Maps for Android v2 needs this permission so that it may check the connection
state as it must download data -->
<uses-permission android:name="android.permission.ACCESS_NETWORK_STATE" />

<!-- Permission to receive remote notifications from Google Play Services -->
<!-- Notice here that we have the package name of our application as a prefix on the
permissions. -->
<uses-permission android:name="PACKAGE_NAME.permission.MAPS_RECEIVE" />
<permission android:name="PACKAGE_NAME.permission.MAPS_RECEIVE"
android:protectionLevel="signature" />

<!-- These are optional, but recommended. They will allow Maps to use the My Location
provider. -->
<uses-permission android:name="android.permission.ACCESS_COARSE_LOCATION" />
<uses-permission android:name="android.permission.ACCESS_FINE_LOCATION" />

<application android:label="@string/app_name">
    <!-- Put your Google Maps V2 API Key here. -->
    <meta-data android:name="com.google.android.maps.v2.API_KEY"
    android:value="YOUR_API_KEY" />
    <meta-data android:name="com.google.android.gms.version"
    android:value="@integer/google_play_services_version" />
</application>
</manifest>

```

With `deliverypersonapp` for `PACKAGE_NAME` and `AlzaSyAUpxpJCVYZUU7T7arHxjsrJ2gragtJAj0` for `API_KEY`.

Add a fragment in the axml code for the maps e.g.:

```

<fragment
    class="com.google.android.gms.maps.MapFragment"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    android:id="@+id/pickupMapFragment" />

```

To get the Tabs set-up, try Add NuGet package for AppCompat V7 -
`Xamarin.Android.Support.Compat` -

Should this fail, try adding (AppCompat version 27):

```
<PackageReference Include="Xamarin.Android.Support.Compat" Version="27.0.2" />
```

to the .csproj file directly, after other `<PackageReference ...>` elements.

And reference these *AppCompat (support)* controls in the axml:

```

<android.support.design.widget.TabLayout
    android:layout_width="wrap_content"
    android:layout_height="match_parent">
    android:id="@+id/mainTabLayout">
        <android.support.design.widget.TabItem
            android:text="Delivering" />
        <android.support.design.widget.TabItem
            android:text="Waiting" />
        <android.support.design.widget.TabItem
            android:text="Delivered" />
</android.support.design.widget.TabLayout>

<FrameLayout

```

```

        android:id="@+id/contentFrame"
    android:layout_width="match_parent"
        android:layout_height="wrap_content">
    />
```

Change the **TabsActivity.cs** class with the page housing the tabs to inherit from **Android.Support.V4.App.FragmentActivity** instead of **Activity**,

Reference the TabLayout, += TAB an event handler and in the event handler, write a switch to handle tab positions - write a private method also for similar outcomes of rendering to keep code DRY and with concerns separated (functional).

```

public class TabsActivity : Android.Support.V4.App.FragmentActivity      // backward-compatible
{
    TabLayout tabLayout;

    protected override void OnCreate(Bundle savedInstanceState)
    {
        base.OnCreate(savedInstanceState);

        // Create your application here
        SetContentView(Resource.Layout.Tabs);           // use our own layout - to contain
        tabs for displaying Delivered, Delivering & Waiting fragments

        tabLayout = FindViewById<TabLayout>(Resource.Id.mainTabLayout);
        tabLayout.TabSelected += TabLayout_TabSelected;    // += TAB for boilerplate
        event handler

        TabNavigation(new DeliveringFragment());          // delivering tab set to be the
        initial view
    }

    // Keep things DRY and separated concerns
    private void TabLayout_TabSelected(object sender, TabLayout.TabSelectedEventArgs e)
    {
        // throw new NotImplementedException();
        switch(e.Tab.Position)
        {
            case 0:
                TabNavigation(new DeliveringFragment());          // argument must be a
                ListFragment
                break;
            case 1:
                TabNavigation(new WaitingFragment());           // argument must be a
                ListFragment
                break;
            case 2:
                TabNavigation(new DeliveredFragment());          // argument must be a
                ListFragment
                break;
            default:
                TabNavigation(new DeliveringFragment());          // delivering tab set to
                be the initial view
                break;
        }
    }
}
```

Set an AppCompat theme, so as to see tabs (?), to the Manifest in the <application... element.

```
        android:theme="@style/Theme.AppCompat"
```

In the activity classes for the detailed views containing maps, declare a MapFragment mapFragment member, in OnCreate refer to the axml fragments e.g.:

```
        mapFragment =  
FragmentManager.FindFragmentById<MapFragment>(Resource.Id.deliverMapFragment);
```

Reference buttons and add event handlers in the activities (to start activities according to clicks).

iOS:

25-179

UI & Navigation Challenge - Part 2 of 3

To detect which list item has been clicked, public override **OnListItemClick** (of inherited ListFragment)

Use PutExtra to pass parameters (e.g. lat/lng - cf 15-136, 16-141)

```
// override this, with List<Delivery> member (deliveries) to make use of  
ListFragment's clickability  
    public override void OnListItemClick(ListView l, View v, int position, long  
id)  
    {  
        base.OnListItemClick(l, v, position, id);  
  
        var selectedDelivery = deliveries[position];      // reference the  
user-selected delivery list item  
  
        Intent intent = new Intent(Activity, typeof(DeliverActivity));  
// make an intent to move to a DeliverActivity page, for to show the delivery (as  
in ListFragment not Activity, for context use Activity property of ListFragment  
(this))  
        intent.PutExtra("latitude", selectedDelivery.DestinationLatitude);  
        intent.PutExtra("longitude", selectedDelivery.DestinationLongitude);  
// pass over lat/lng to next activity  
  
        StartActivity(intent);  
// go to next activity  
    }
```

25-180

UI & Navigation Challenge - Part 3 of 3

At last getting the hang of constraints GUI. Try anchoring one control first to the centre-line of the screen (using control's centre square anchor), then constrain other controls to that one. Check on other devices/orientations.

- Controls & constraints for main initial ViewController (& reference in class code and +=TAB handlers).
- Controls & constraints for register ViewController (& reference in class code and +=TAB handlers).
- Ctrl+drag from main initial ViewController Register button to Register ViewController, to make a segue - give segue property *Identifier* value ‘registerSegue’.
- Ctrl+drag from main initial ViewController Sign In button to MainTabBarController, to make a segue - give segue property *Identifier* value ‘tabSegue’.
- In MainTabBarController class, override ViewDidAppear

```
public override void ViewDidAppear(bool animated)
{
    base.ViewDidAppear(animated);

    NavigationItem.SetHidesBackButton(true, false); // immediately hide
back button, so's to prevent navigation back outside to sign-in page
}
```

- Make a not-exactly-custom (as in 22-168) but just title+subtitle (2 fields) cell (as in 22-167) in the tabbed TableViewControllers by setting *TableViewCellStyle* to ‘Subtitle’ - set Identifier to deliveringCell, waitingCell, &c.
- Ctrl+drag **from cell** in DeliveringTableViewController to DeliverViewController (for a detailed view of delivery person’s pickup requirements by clicking list item cell) to make a segue - set *Identifier* property of segue to ‘deliverSegue’.
- Ctrl+drag **from cell** in WaitingTableViewController to PickupViewController (for a detailed view of delivery person’s pickup requirements by clicking list item cell) to make a segue - set *Identifier* property of segue to ‘pickupSegue’.

NB if difficulties selecting segues, to set Identifier property, (1) click ‘Exit’ button - 2nd button at bottom left of selected viewController, (2) go to Document Outline tab and select the segue from there before using Properties tab.

- Drag in a **MapView** to the Pickup and Delivery ViewControllers - make this fit the entire view, including constraints relative to but beyond/outside the margins, actually filling the screen. Set *Name* property of the MapView to e.g. ‘deliveryMapView’.
- Put a `public Delivery delivery;` member in each of Pickup and Delivery ViewControllers -
- Put a `List<Delivery> deliveries;` member in the DeliveringTableViewController and override `ViewDidLoad` and in that initialise `deliveries = new List<Delivery>();`. Override `PrepareForSegue` (cf 16-141):

```
public override void PrepareForSegue(UIStoryboardSegue segue, NSObject sender)
{
    if (segue.Identifier == "deliverSegue")
    {
        var selectedRow = TableView.IndexPathForSelectedRow; // v
important - get selected row index value (0,...)
        var destinationViewController = segue.DestinationViewController as
DeliverViewController;
        destinationViewController.delivery = deliveries[selectedRow.Row]; // use
the index to fetch selected data and prime upcoming ViewController
        // May have additional sections, but in this case only 1
    }
    base.PrepareForSegue(segue, sender);
}
```

- Likewise, put a `List<Delivery> deliveries;` member in the `DeliveringTableViewController` and override `ViewDidLoad` and in that initialise

```
deliveries = new List<Delivery>();. Override PrepareForSegue:
public override void PrepareForSegue(UIStoryboardSegue segue, NSObject sender)
{
    if (segue.Identifier == "pickupSegue")
    {
        var selectedRow = TableView.IndexPathForSelectedRow; // v
important - get selected row index value (0,...)
        var destinationViewController = segue.DestinationViewController as
PickupViewController;
        destinationViewController.delivery = deliveries[selectedRow.Row]; // use
the index to fetch selected data and prime upcoming ViewController
        // May have additional sections, but in this case only 1
    }
    base.PrepareForSegue(segue, sender);
}
```

25-181

Updating Deliveries

Add `DeliveryPersonId` to `Delivery.cs` class.

Ensure properties `Id`, `Email` and `Password` in `DeliveryPerson.cs` class.

Copy & paste `Login` and `Register` methods from `User` class to `DeliveryPerson` class. TODO Could refactor with generic method (cf 18-151). Amend pasted code from `user/User` to `deliveryPerson/DeliveryPerson`.

In `Delivery` class, copy/paste/modify `GetDelivered` to `GetBeingDelivered` - change LINQ filter to where status is 1 and `deliverpersonId` is as in parameter in method call.

```
public static async Task<List<Delivery>> GetBeingDelivered(string deliveryPersonId)
{
    List<Delivery> deliveries = new List<Delivery>();

    //deliveries = await
AzureHelper.MobileService.GetTable<Delivery>().ToListAsync();

    // Get only certain deliveries - where Status is 1 (being delivered) and where
delivery person is the one identified

    deliveries = await AzureHelper.MobileService.GetTable<Delivery>().Where(d =>
d.Status == 1 && d.DeliveryPersonId == deliveryPersonId).ToListAsync();

    return deliveries;
}
```

Also, for packages waiting pickup by delivery person, another method copy/paste/amend to `status` value of 0:

```
public static async Task<List<Delivery>> GetWaiting()
{
    List<Delivery> deliveries = new List<Delivery>();

    //deliveries = await
AzureHelper.MobileService.GetTable<Delivery>().ToListAsync();

    // Get only certain deliveries - where Status is 0 (waiting for pickup by
delivery person)
```

```

        deliveries = await AzureHelper.MobileService.GetTable<Delivery>().Where(d =>
d.Status == 0).ToListAsync();

        return deliveries;
    }
}

```

Also add to Delivery class, at last, methods to record package being picked up, and package having been delivered:

```

/// <summary>
/// Change status to show package picked up, and record by which deliveryperson
/// </summary>
/// <param name="deliveryPerson"></param>
/// <returns>True if successful</returns>
public static async Task<bool> MarkAsPickedUp(Delivery delivery, string
deliveryPersonId)
{
    try
    {
        delivery.Status = 1;                                // interesting no rollback
here
        delivery.DeliveryPersonId = deliveryPersonId;      // interesting no rollback
here
        await AzureHelper.MobileService.GetTable<Delivery>().UpdateAsync(delivery);
        // Update the Azure database using our bespoke AzureHelper with generic
method (as written in 18-151) 25-181
        return true;
    }
    catch (Exception exc)
    {
        return false;
    }
}

/// <summary>
/// Change status to show package delivered
/// </summary>
/// <param name="deliveryPerson"></param>
/// <returns>True if successful</returns>
public static async Task<bool> MarkAsDelivered(Delivery delivery)
{
    try
    {
        delivery.Status = 2;                                // interesting no rollback
here
        await AzureHelper.MobileService.GetTable<Delivery>().UpdateAsync(delivery);
        // Update the Azure database using our bespoke AzureHelper with generic
method (as written in 18-151) 25-181
        return true;
    }
    catch (Exception exc)
    {
        return false;
    }
}

```

25-182

Implementing Functionality challenge - part 1 of 2

SignIn and Login button clicks for the MainActivity:

..... More of the same (am I tired?)

NB In designer screen for Android, if error, “*Custom controls disabled. There was an internal issue with the rendering process*”, and controls cannot be dragged/dropped, try switching designer preview *Theme* to “*Default Theme*”. Controls may then be draggable again. TODO: why??

Really annoyed that E Rosas in this code-along is needlessly jumping back and forth, adding bits here, bits there, then changing them, then going back to an earlier location and adding more bits there.... Ad nauseum. Maybe a dozen revisits for any given class. Why not add all of the members & values in a certain class/layout in 1 go? Could be to demonstrate gradual MVP improvement, but not likely. This d'seem as if the lecture is deliberately designed to confuse & delay students.

25-183

Implementing Functionality challenge - part 2 of 2

More of the same bouncing back-and-forth around the code.

Interesting & instructive errors though.

NB Error Could not locate
C:\Xam\DeliveriesApp\DeliveriesApp\packages.config. Ensure that this project has Microsoft.Bcl.Build installed and packages.config is located next to the project file.
DeliveriesApp.Droid

<SkipValidatePackageReferences>true</SkipValidatePackageReferences> in .csproj in first <PropertyGroup> element as per 11-87.

<https://stackoverflow.com/a/37685482/11365317>

Do this for all of the projects' csproj files.

NB Error “*Could not link assemblies. Reason: Error while processing references of 'DeliveryPersonApp.iOS, Version=0.0.0.0, Culture=neutral, PublicKeyToken=null'*”
DeliveryPersonApp.iOS”

<https://forums.xamarin.com/discussion/137228/build-error-mt2001-could-not-link-assemblies-reason-error-while-processing-references>

“Adding `-v -v -v -v` to “Additional mtouch arguments” in the project iOS Build settings” rt-click iOS Project/Properties/iOS Build - scroll down to ‘Additional mtouch arguments’.

E.g. `-v -v -v -v` for mtouch , additional info in compiler Visual Studio console Output:

```
2> --- inner exception
2> Mono.Cecil.AssemblyResolutionException: Failed to resolve assembly: 'Microsoft.WindowsAzure.Mobile,
Version=3.1.0.0, Culture=neutral, PublicKeyToken=31bf3856ad364e35' ---> Mono.Cecil.AssemblyResolutionException: Failed
to resolve assembly: 'Microsoft.WindowsAzure.Mobile, Version=3.1.0.0, Culture=neutral, PublicKeyToken=31bf3856ad364e35'
2>   at Mono.Cecil.BaseAssemblyResolver.Resolve (Mono.Cecil.AssemblyNameReference name,
Mono.Cecil.ReaderParameters parameters) [0x000ff] in
```

```

/Users/builder/jenkins/workspace/xamarin-macios/xamarin-macios/external/mono/external/cecil/Mono.Cecil/BaseAssemblyRes
olver.cs:172
2> at Mono.Linker.AssemblyResolver.Resolve (Mono.Cecil.AssemblyNameReference name, Mono.Cecil.ReaderParameters
parameters) [0x00071] in
/Users/builder/jenkins/workspace/xamarin-macios/xamarin-macios/external/mono/external/linker/linker/Linker/AssemblyResolve
r.cs:80
2> at Mono.Linker.LinkContext.Resolve (Mono.Cecil.IMetadataScope scope) [0x00009] in
/Users/builder/jenkins/workspace/xamarin-macios/xamarin-macios/external/mono/external/linker/linker/Linker/LinkContext.cs:21
5
2> at Mono.Linker.LinkContext.Resolve (Mono.Cecil.IMetadataScope scope) [0x00033] in
/Users/builder/jenkins/workspace/xamarin-macios/xamarin-macios/external/mono/external/linker/linker/Linker/LinkContext.cs:22
3

```

Uninstalled then re-installed (via NuGet) **Microsoft.Azure.Mobile.Client** for the DeliveryPersonApp iOS only, the Microsoft.Azure.Mobile.Client package - again an error but different complaint in Output this time:

```

2> --- inner exception
2> Mono.Cecil.AssemblyResolutionException: Failed to resolve assembly: 'Newtonsoft.Json, Version=6.0.0.0,
Culture=neutral, PublicKeyToken=30ad4fe6b2a6aeed'
2> at Mono.Cecil.BaseAssemblyResolver.Resolve (Mono.Cecil.AssemblyNameReference name,
Mono.Cecil.ReaderParameters parameters) [0x000ff] in
/Users/builder/jenkins/workspace/xamarin-macios/xamarin-macios/external/mono/external/cecil/Mono.Cecil/BaseAssemblyRes
olver.cs:172

```

However, even with NO NuGet packages, still getting the “*Could not link assemblies*.

Reason: Error while processing references of 'DeliveryPersonApp.iOS, Version=0.0.0.0,
*Culture=neutral, PublicKeyToken=null' DeliveryPersonApp.iOS” error, with the mtouch
-v -v -v output giving the same sort of error message.*

https://forums.xamarin.com/discussion/comment/360434/#Comment_360434 - also there's a *packages.config* in that very same project which was going wrong with contents:

```

<?xml version="1.0" encoding="utf-8"?>
<packages>
    <package id="Microsoft.Azure.Mobile.Client" version="3.1.0"
targetFramework="xamarinios10" />
    <package id="Microsoft.Bcl" version="1.1.10" targetFramework="xamarinios10" />
    <package id="Microsoft.Bcl.Build" version="1.0.21" targetFramework="xamarinios10" />
    <package id="Microsoft.Net.Http" version="2.2.29" targetFramework="xamarinios10" />
    <package id="Microsoft.NETCore.Platforms" version="1.1.0" targetFramework="xamarinios10" />
    <package id="NETStandard.Library" version="2.0.0" targetFramework="xamarinios10" />
    <package id="Newtonsoft.Json" version="6.0.4" targetFramework="xamarinios10" />
    <package id="NUnit" version="3.12.0" targetFramework="xamarinios10" />
</packages>

```

Whose contents perhaps could be changed to the .csproj file (didn't do this).

Removed references and attempted to reinstate by hand (using F12 and Alt+ENTER) - error seemed to disappear - hope I got the right references (sometimes choice between Xamarin and Mono) -

<https://docs.microsoft.com/en-us/dotnet/api/system.codedom.compiler.generatedcodeattribute?view=netframework-4.8>

System reference took care of most of the (205) errors.
I don't know why this error occurred.

NB v interesting -

mtouch to turn .NET executable into iOS application bundle (for simulator or deployment)

<https://docs.microsoft.com/en-us/xamarin/ios/deploy-test/mtouch>

Xamarin.iOS.Common.targets file has elements - TODO

NB use of jenkins - maybe: on Mac user called build using jenkins - TODO

/Users/builder/jenkins/workspace/xamarin-macios/

NB Logs - in Win VS 2017, **Help/Xamarin/Open Logs.../**

TODO

<https://docs.microsoft.com/en-us/xamarin/cross-platform/troubleshooting/questions/version-logs>

Logcat for Android from VS - Device Log tool or View > Other Windows > Device Log

Or Tools > Android > Device Log -

<https://docs.microsoft.com/en-us/xamarin/android/deploy-test/debugging/android-debug-log?tabs=windows>

<https://www.c-sharpcorner.com/article/xamarin-forms-errors-in-visual-studio-app-center/>

Exception at UIApplication.Main now

Not set to an instance

```
" at DeliveryPersonApp.iOS.ViewController..ctor (System.IntPtr handle) [0x0001b] in C:\\Xam\\DeliveriesApp\\DeliveryPersonApp.iOS\\ViewController.cs:15 \\n at (wrapper managed-to-native) System.Reflection.MonoCMethod.InternalInvoke(System.Reflection.MonoCMethod,object,object[],System.Exception&)\n at System.Reflection.MonoCMethod.InternalInvoke (System.Object obj, System.Object[] parameters, System.Boolean wrapExceptions) [0x00005] in /Library/Frameworks/Xamarin.iOS.framework/Versions/12.4.0.64/src/Xamarin.iOS/mcs/classcorlib/System.Reflection/MonoMethod.cs:667 "
```

signInButton and other controls on ViewController are null (why????)

A button's event handler subscribed-to/subscription in ViewController constructor, not overridden ViewDidLoad - big mistake - moved button's +=TAB to ViewDidLoad.

Hi all,

Hopefully this'll help, to be clear, at 16:30 in 25-183 you need to drag in a "*Navigation Item*" and then drag a "*Bar Button Item*" into that, as in .

First add a *Navigation Item*, then set its *Back Button* property to a space character ‘ ‘ then drag onto the *Navigation Item* a *Button Bar Item*.

NB to avoid *Back Button* in a *Navigation Item* being hidden by a *Button Bar Item*, set the *Navigation Item*'s *Back Button* property to a space character ‘ ‘, not blank.

Screen shots on iPhone 6 Home + on/off as per Android - use
<https://www.icloud.com/#photos> iCloud to retrieve them easily

COMMIT MESSAGE

Corrected XML extra > before />, changed Microsoft.Azure.Mobile.Client to v 3.1.0 as per 11-85, added <SkipValidatePackageReferences>true</SkipValidatePackageReferences> in .csproj for package.config errors,

<https://forums.xamarin.com/discussion/128322/i-cant-deploy-ios-app-to-simulator-or-my-iphone>

https://forums.xamarin.com/discussion/comment/335780/#Comment_335780

“Tools => options => Projects and Solutions => Build and Run. Modify your build output and logfile to detailed”

NB error/problem when iOS versions no longer ran on iPhone (though Android ran ok) - no error messages, VS console just said “Successfully connected” after a half-second, and so on - just didn’t start. I didn’t succeed in doing anything to fix the problem, seemingly after a few restarts (and checking that iOS deploy to iPhone did indeed work ok with another solution/project), the iOS deploy started to work again.

Things are harder to fix when you’re tired!

25-184

Displaying Maps and Getting Directions

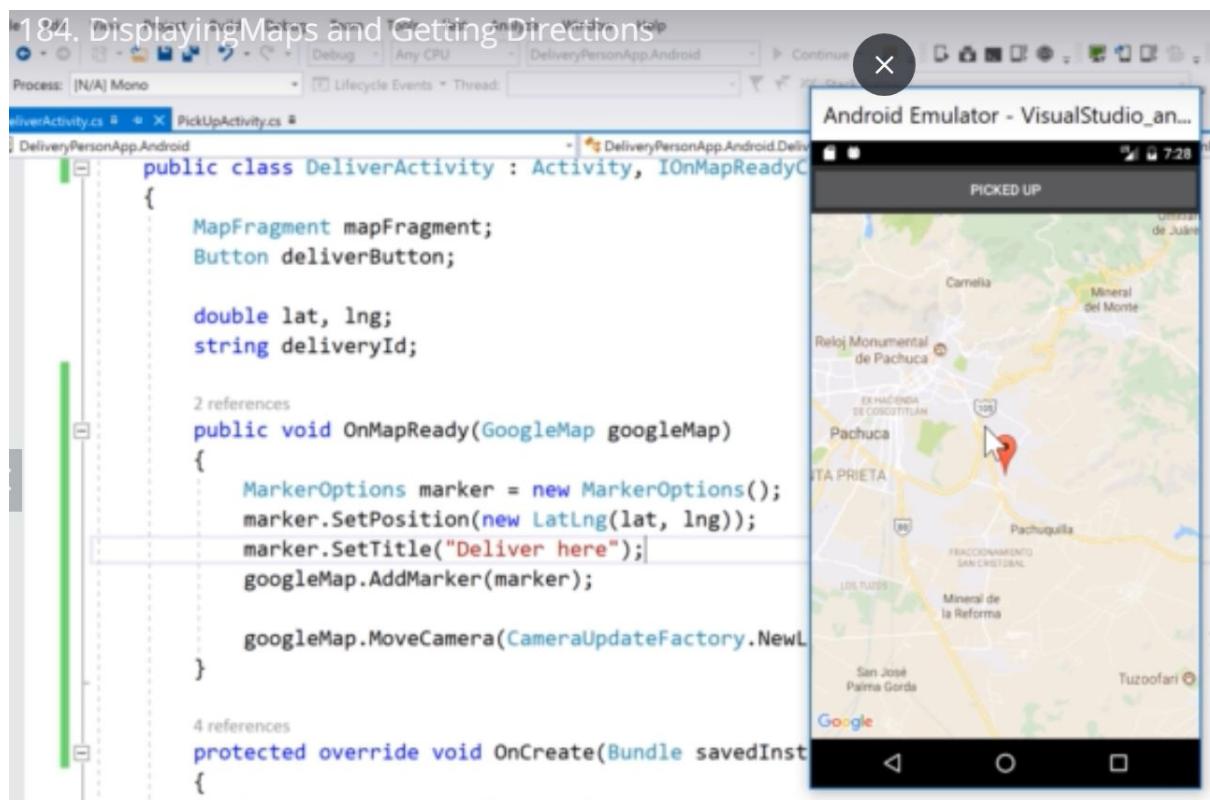
See 23-169 et seq for maps.

(Enable Android API in Google developer console, get credential, add permission in Info.plist , &c)

TODO Could we use the same Google Developer project as the DeliveryApp for DeliveryPersonApp, to save on using up the free projects quota?

I have tried this.....

E Rosas would appear to be near Pachuca - Cornish connection!!



NB V important (to avoid Azure Mobile crashing iOS app at start) -

Microsoft.Azure.MobileServices. **CurrentPlatform.Init();** - for iOS, in *AppDelegate.cs*:

```
public override bool FinishedLaunching(UIApplication application, NSDictionary launchOptions)
{
    // Override point for customization after application launch.
    // If not required for your application you can safely delete this
method
```

```
    CurrentPlatform.Init(); // v important - must include this line for
Azure Mobile to avoid crash at start - 25-184
```

```
    return true;
}
```

NB First add a *Navigation Item*, then set its *Back Button* property to a space character ‘ ‘ then drag onto the *Navigation Item* a *Button Bar* item. Otherwise the back button will be hidden in the view on the app, which is not nice.

NB to avoid *Back Button* in a *Navigation Item* being hidden by a *Button Bar* item, set the *Navigation Item*’s *Back Button* property to a space character ‘ ‘, not blank.

NB errors similar to “**Unable to cast object of type 'System.RuntimeType' to type 'Mono.Debugger.Soft.TypeMirror'**” can occur where initialisation of an iOS *ViewController* has not been done properly e.g. the *ViewDidLoad* override has not been implemented, or has the wrong code (eg code which should have been in *ViewDidAppear*, or some similar slip).

Adding directions/navigation to iOS MapView (already present in Google Map View for Android) - drag in **Toolbar** to MapView - 1 item already included in Toolbar (the item is a bar button); set its name e.g. 'navigateBarButtonItem' and Title e.g. 'Get Directions' NB these need not be unique and can be same Name in different MapViews' Toolbars - in code-behind, add event handler and code:

```
public override void ViewDidLoad()
{
    base.ViewDidLoad();

    pickupBarButtonItem.Clicked += PickupBarButtonItem_Clicked;

    navigateBarButtonItem.Clicked += NavigateBarButtonItem_Clicked;

    PrepareMap();
}

private void NavigateBarButtonItem_Clicked(object sender, EventArgs e)
{
    // throw new NotImplementedException();

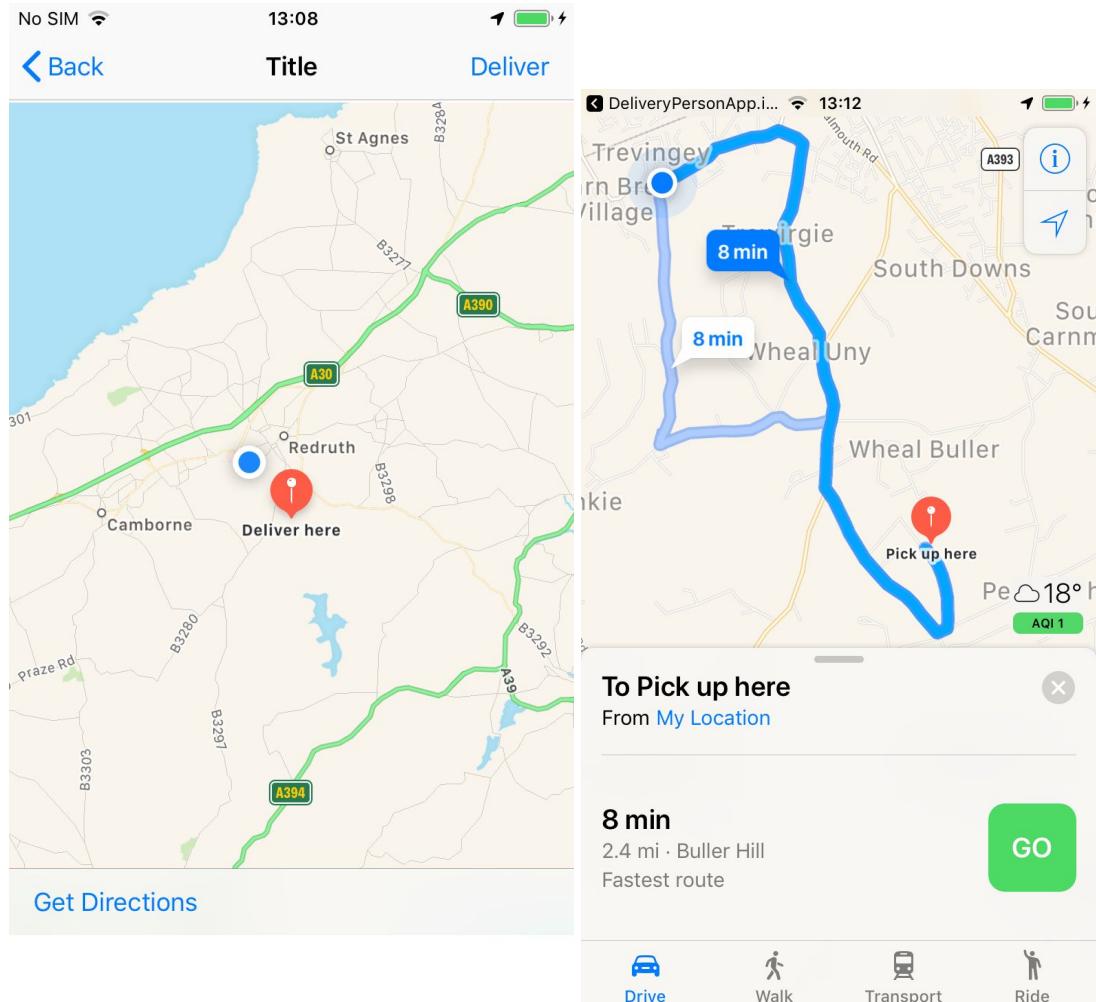
    // Add directions capability

    var coordinates = new CLLocationCoordinate2D(delivery.OriginLatitude,
delivery.OriginLongitude);

    var mapItem = new MKMapItem(new MKPlacemark(coordinates));

    mapItem.Name = "Pick up here";

    mapItem.OpenInMaps();
}
```



NB default very small back-button at top left of directions screens.

DeliveryPersonApp.i...

26-Platform-Specific Functionality (authentication methods & API updates)

26-185

Biometric Authentication-iOS

Face ID on iPhone 10 - hence 'Biometrics' -

Use NSUserDefaults specifically on iOS to persist data on whether or not logged-in, and as whom.

```
private async void SignInButton_TouchUpInside(object sender, EventArgs e)
{
    // throw new NotImplementedException();
```

```

        bool success = CheckLogin();
        var something = 0;

        if (success)           // if previously logged-in to server (according to device
UserDefaults data)
        {
            BiometricsAuth();          // check local biometrics authentication
        }
        else
        {
            // If not recorded on device as having logged-in to server
            ServerLogin();          // check credentials on server db
        }
    }

    /// <summary>
    /// Method to log in users by querying Azure db
    /// </summary>
    private async void ServerLogin()
    {
        deliveryPersonId = await DeliveryPerson.Login(emailTextField.Text,
passwordTextField.Text);

        if (string.IsNullOrEmpty(deliveryPersonId))
        {
            BiometricsAuth();          // bespoke method here
        }
        else
        {
            NSUserDefaults.StandardUserDefaults.SetString(deliveryPersonId,
"deliveryPersonId");
            NSUserDefaults.StandardUserDefaults.Synchronize();           // save/synchronise the log-in data
            hasLoggedIn = true;
            PerformSegue("tabSegue", this); // once signed-in, navigate to TabsActivity
with Delivered/Waiting &c tabs
        }
    }

    /// <summary>
    /// Bespoke method to use touch ID (or iPhone 10 FaceID)
    /// </summary>
    private void BiometricsAuth()
    {
        // throw new NotImplementedException();

        NSError error;

        var context = new LAContext();           // LA Local Authentication - must declare
a context for authentication (d'tell us about device capabilities &c)
        if (context.CanEvaluatePolicy(LAPolicy.DeviceOwnerAuthenticationWithBiometrics,
out error)) // can current device use biometrics?
        {
            // NB Local Authentication MUST be performed on the app's main thread
https://developer.apple.com/documentation/localauthentication/logging\_a\_user\_into\_your\_app\_with\_face\_id\_or\_touch\_id
            // Anonymous function defined for local authentication, which must be async
to await EvaluatePolicyAsync
            InvokeOnMainThread(async () =>
            {

```

```

        var result = await
context.EvaluatePolicyAsync(LAPolicy.DeviceOwnerAuthenticationWithBiometrics, "Login");

        if (result.Item1)          // if on-device local biometric authentication
has OK'd the user (get tuple's Item1
https://docs.microsoft.com/en-us/dotnet/api/system.tuple-1.item1?view=netframework-4.8)
{
    hasLoggedIn = true;
    PerformSegue("tabSegue", this); // once signed-in, navigate to
TabsActivity with Delivered/Waiting &c tabs
}
else
{
    ServerLogin(); // if user not OK'd biometrically, check
credentials on server
}
});

}
else
{
    // If biometric local authentication not available, check credentials on
server db
    ServerLogin();
}
}

/// <summary>
/// Check whether a person is logged in according to iOS device's UserDefaults
persistent data
/// </summary>
/// <returns></returns>
private bool CheckLogin()
{
    // throw new NotImplementedException();

    bool hasId = false;

    deliveryPersonId =
NSUserDefaults.StandardUserDefaults.StringForKey("deliveryPersonId");
    // Look up the iOS UserDefaults persistent memory (login will have been saved
therein if used) of id - if any

    if (!string.IsNullOrEmpty(deliveryPersonId))
    {
        hasId = true;
    }

    return hasId;
}

```

NB `out` parameter - cf `ref` parameter with generic methods 18-151 - pointer passed to same memory location so that (in this case) the same (local) variable `error` will have the same values after being processed by `CanEvaluatePolicy`.

<https://csharp-station.com/ref-parameters-vs-out-parameters>

<https://docs.microsoft.com/en-us/dotnet/csharp/language-reference/keywords/out-parameter-modifier>

Local Authentication must be on the app's main thread

https://developer.apple.com/documentation/localauthentication/logging_a_user_into_your_app_with_face_id_or_touch_id

NB this is ***Local*** Authentication - using the device's biometrics person-checking abilities **locally on the device** so that a call to the Azure is not (need not be) made.

Just press Sign-In (after logging-in via server on the device at least once) with blank

credentials - a dialogue should pop-up asking for permission to use fingerprints.

Maybe not working at first (on device) but worked certainly after breakpoints intensively applied to examine around `success` variable.

In iOS simulator : Hardware/Touch ID/**Enrolled** - '*Matching Touch*'/'*Non Matching Touch*' options.

cf Swift/iOS notes on UserDefaults 6-37 & 7-59

NB - NS prefix on Coco classes : **NeXTSTEP**

<https://stackoverflow.com/questions/473758/what-does-the-ns-prefix-mean>

<https://en.wikipedia.org/wiki/NeXTSTEP>

26-186

Biometric Authentication with FaceID-iOS

iPhone 10, 10S, 10R, 10Smax iPad Pro

In Info.plist

```
<key>NSFaceIDUsageDescription</key>
<string>We need to use biometrics to make signing-in easier</string>
```

In iOS simulator : Hardware/Face ID/**Enrolled** - '*Matching Touch*'/'*Non Matching Touch*' options.

26-187

Biometric Authentication - Android

Edit `Properties/AndroidManifest.xml` to add `<uses-permission`

`android:name="android.permission.USE_FINGERPRINT" />`

or rt-click `project/AndroidManifest:RequiredPermissions` - **USE_FINGERPRINT** set.

FingerPrint Manager only available from API 23 (6.0 Marshmallow). Backward compatibility - in **Support.v4.Hardware.Fingerprint.FingerprintManagerCompat** -

Cf Android notes 66 - Shared Preferences

Android device/emulator: Android OS app for *Settings/Security/Fingerprint* - setup (setup PIN, then when prompted by the app for a fingerprint, on emulator goto ... (*More*) then *Fingerprint*) to register/enroll a fingerprint - keep clicking/holding the emulator's 'TOUCH THE SENSOR' button on & off - weird ! - but this has actually worked!

<https://stackoverflow.com/a/45181265/11365317> Checking code for biometric authentication (fingerprint) on Android can then proceed.

Sign in via server once at first, then try signing-in with blank credentials

Couldn't get this to work

Crashing

<https://stackoverflow.com/questions/43855538/handle-must-be-valid-exception-xamarin>

<https://stackoverflow.com/questions/51839750/xamarin-android-system-argumentexception-handle-must-be-valid-parameter-name>

```
Error : On           var preferencesEditor = preferences.Edit();  
// so as to save preferences, for recording the login name
```

Xamarin, Android: "System.ArgumentException: Handle must be valid.
Parameter name: instance"

Not sure, might get this to work by adding another call to assign class member

```
preferences = PreferenceManager.GetDefaultSharedPreferences(this);  
Just before var preferencesEditor = preferences.Edit();
```

TODO: Similar to <https://stackoverflow.com/q/51839750/11365317> and <https://stackoverflow.com/q/43855538/11365317>

26-188

Haptic Feedback - iOS

3 types of haptic feedback on iOS:

1. Impact feedback - collision on screen
 2. Selection feedback - picking items (implemented by default on picker control)
 3. Notification feedback

Haptic capabilities on iPhone 7 et seq.

<https://developer.apple.com/design/human-interface-guidelines/ios/user-interaction/feedback/>

<https://medium.com/@sdrzn/make-your-ios-app-feel-better-a-comprehensive-guide-over-taptic-engine-and-haptic-feedback-724dec425f10>

<https://medium.com/@abhimuralidharan/how-to-add-haptic-feedback-using-taptic-engine-in-ios-swift-424f1ed80665>

26-189

App Shortcuts - Android

Android 7.1 / API 25 - shortcuts can be added, in launcher or App Drawer - long press to get menu of shortcuts - jumping straight to a certain action.

If emulating, ensure, in Android SDK Manager (from button in VS or AS), that API level API 25/7.1.1 is installed on the Xamarin installation's computer.

If a new emulator is needed, In VS, Android Emulator Manager (AVD Android Virtual Device Manager) button or in Tools/Android/Android Emulator Manager to make a new virtual device for the emulator - set the Tager to the required API level (e.g. 7.1.1 / 25 for app shortcuts). NB (see Swift/Android notes) x86 emulator can be accelerated/faster (or just runnable).

Default **main launcher** is the MainActivity.cs activity.

```
namespace DeliveryPersonApp.Droid
{
    [Activity(Label = "@string/app_name", Theme = "@style/AppTheme.NoActionBar",
MainLauncher = true)]
    public class MainActivity : AppCompatActivity
    ...
}
```

Another line can be added to declare the existence of shortcuts in app (defined in an xml file in a path off of the **Resources** folder), and where they're to:

```
[Activity(Label = "@string/app_name", Theme = "@style/AppTheme.NoActionBar",
MainLauncher = true)]
[MetaData ("android.app.shortcuts", Resource = "@xml/shortcuts")]
public class MainActivity : AppCompatActivity
{
    ...
}
```

Thus, **shortcuts.xml** in Resources/xml in this case. Manually add a folder and file to match this.

Within, declare a **shortcuts** element with namespace (xmlns) defined:

```
<?xml version="1.0" encoding="utf-8" ?>
<shortcuts xmlns:android="http://schemas.android.com/apk/res/android">
    <shortcut
        android:shortcutId="registerShortcut"
        android:enabled="true"
        android:shortcutShortLabel="Register"
        android:shortcutLongLabel="Register new user">
        <intent
            android:targetClass="DeliveryPersonApp.Droid.DeliveryPersonApp.Droid.MainActivity"
            android:targetPackage="DeliveryPersonApp.Droid.DeliveryPersonApp.Droid"
            android:action="android.intent.action.VIEW"
            android.data="register"/>
        <categories android:name="android.shortcut.conversation" />

        <!-- NB capability of navigating *back* to not-yet-visited login (from shortcut
        Register) by using targetClass attribute -->
    </shortcut>
</shortcuts>
```

Name can be set in attribute in MainActivity (same value as in shortcut' intent element).

```
[Activity(Label = "@string/app_name", Theme = "@style/AppTheme.NoActionBar",
MainLauncher = true, Name = "MainActivity", Exported = true)]
```

```
[MetaData ("android.app.shortcuts", Resource = "@xml/shortcuts")]
```

Rt-click Project and from *AndroidManifest* copy the value of **Package name** e.g.

DeliveryPersonApp.Droid.DeliveryPersonApp.Droid - use this in the `intent` in `shortcuts.xml`, in the `targetClass` attribute pasted immediately before the class name (ie `packagename.classname` e.g.

DeliveryPersonApp.Droid.DeliveryPersonApp.Droid.MainActivity) and likewise in the **Name** value of the attribute in the cs file. The `packagename` can also just be used as-is in the `targetPackage` attribute.

NB strings must be defined in `Resources/values/Strings.xml` -

NB the `action` attribute -

NB similar to intents' `PutExtra` and `GetExtra` methods - `data` attribute in `intent` element. Used in e.g. if (`Intent.Data.LastPathSegment == "register"`)

E.g. to check inside any intent which may be opening an activity.

Category element also.

```
if (!string.IsNullOrEmpty(Intent?.Data?.LastPathSegment)) // check for
shortcut intent - check url/route
{
    if (Intent.Data.LastPathSegment == "register")
    {
        // If shortcut opened this activity via an intent, do the same as as if
        Register button clicked
        StartActivity(typeof(RegisterActivity));
    }
}
```

Exported = true value in attribute in *MainActivity.cs* to indicate that an intent is used to specify an activity as a shortcut from a class (eg *MainActivity* as a shortcut from ?? class).

<https://developer.android.com/guide/topics/ui/shortcuts>

NB Error: “Attempt to invoke virtual method on a null object reference”

Updated NuGet packages for AppCompat i.e. *Xamarin.Android.Support.Design* and *Xamarin.Android.Support.Compat* to v 28.0.0.1 . (Clue from

<https://forums.xamarin.com/discussion/42959/getting-nullpointerexception-with-appcompatactivity-after-june-2nd-update>) Worked ok!

Long-press on launcher (i.e. page with loads of icons) icon and a little popup with the shortcut name (e.g. “Register”) d’appear - click on this to go direct to shortcut action (e.g. Register) and, if so set up, back to some other specified activity/page.

26-190

Updating Android Projects to Oreo - Android

1. Updating SDK via SDK Manager dialogue - SDK tools and build tools - by version and API level
2. Rt-click on project and set Application/Target and Android Manifest/Minimum Android version

3. Apply Updates to NuGet packages

26-191

Updating iOS Projects to iOS 11 - iOS

VS: Tools/Updates and Extensions

NB iOS 11 Titles - titles become smaller when scrolling down & away/bigger when scrolling up towards un - to finish with small title and back button

```
// In ViewController requiring iOS titles  
NavigationBar.PrefersLargeTitles = true;  
  
// in another VC  
NavigationItem.LargeTitleDisplayMode = UINavigationItemLargeTitleDisplayMode.Never;
```

In **Info.plist** Application tab, Deployment Target will list a series of iOS version numbers.

E.g. 10 would cover nearly all iOS devices in late 2010s.

For iOS 11, must be for 64 bit architectures - rt-click iOS project/iOS Build - *Supported Architectures*, set value to **x86_64** and tick box for '*Perform all 32-bit float operations as 64-bit*'.

27- Publishing to the App Stores

27-192

Preparing the Android Project

(No coding in section 27)

<https://docs.microsoft.com/en-us/xamarin/android/deploy-test/release-prep/?tabs=windows>

"Deploying the app to the simulator in release mode instead of in debug mode should generate an APK in your project's folder."

- Rt-click project - Android Manifest/**Version Number | Version Name** :
- Reduce size of APK - Android Options (Android Build on Mac) - **Linking : SDK Assemblies Only** (cf working with older XCode in Xamarin set-up)
- Change configuration from Debug to Release (in menu at top) - NB *Debugging Options/Enable Developer instrumentation (debugging and profiling)* will be un-ticked (turned off).
- **Enable ProGuard** - Java code will be obfuscated/compressed.
- Advanced Android Options - consider un-ticking all except eg armeabi-v7a
- Set an Application icon - Android Asset Studio - **Launcher icon generator** - <https://romannurik.github.io/AndroidAssetStudio/> - place downloaded unzipped images into folders (mipmap at various resolutions) & set icon in project options

Restrict all APIs e.g. Google API credentials <https://console.developers.google.com>

https://cloud.google.com/docs/authentication/api-keys?hl=en-GB&visit_id=636983454692256029-1324142895&rd=1

needed (1) package name , (2) SHA1 from keystore (for Windows in "C:\Users\peter.DESKTOP-3GCVT7E\AppData\Local\Xamarin\Mono for Android" - copy this folder path (and type in "debug.keystore" later) ; Mac ~/Share &c) - open cmd or console and hopefully jdk is on the machine's PATH for in the jdk folder is keytool.exe - e.g. **keytool -list -v -keystore**

"C:\Users\peter\Desktop-3GCVT7E\AppData\Local\Xamarin\Mono for Android\debug.keystore" - when prompted, enter the default password which is 'android'. E.g.

```
C:\Users\peter\Desktop-3GCVT7E\AppData\Local\Xamarin\Mono for Android>keytool -v -list  
-keystore "C:\Users\peter\Desktop-3GCVT7E\AppData\Local\Xamarin\Mono for  
Android\debug.keystore"  
Picked up _JAVA_OPTIONS: -Xmx512M  
Enter keystore password:  
Keystore type: jks  
Keystore provider: SUN  
  
Your keystore contains 1 entry  
  
Alias name: androiddebugkey  
Creation date: 15-Apr-2019  
Entry type: PrivateKeyEntry  
Certificate chain length: 1  
Certificate[1]:  
Owner: CN=Android Debug, O=Android, C=US  
Issuer: CN=Android Debug, O=Android, C=US  
Serial number: 41062387  
Valid from: Mon Apr 15 19:43:38 BST 2019 until: Wed Apr 07 19:43:38 BST 2049  
Certificate fingerprints:  
MD5: 0F:53:7F:2C:E8:42:8A:42:C5:7E:9A:54:3D:29:BA:AF  
SHA1: 47:50:1F:AA:10:CD:62:07:68:AF:1D:5D:BE:4E:13:EA:61:CB:FC:68  
SHA256:  
08:A0:70:82:34:29:65:DB:7A:D8:A8:4B:F1:C1:F9:19:04:A8:56:1E:78:61:D5:55:B8:B9:FB:F5:9D:34:F  
1:B7  
Signature algorithm name: SHA256withRSA  
Subject Public Key Algorithm: 2048-bit RSA key  
Version: 3  
  
Extensions:  
  
#1: ObjectId: 2.5.29.14 Criticality=false  
SubjectKeyIdentifier [  
KeyIdentifier [  
0000: CC 30 9D 21 1B C2 DC 1F   ED 9A 53 54 6E EC E5 99  .0.!.....STn...  
0010: 9B 16 71 C6                           ..q.  
]  
]  
  
*****  
*****  
  
Warning:  
The JKS keystore uses a proprietary format. It is recommended to migrate to PKCS12 which is  
an industry standard format using "keytool -importkeystore -srckeystore  
C:\Users\peter\Desktop-3GCVT7E\AppData\Local\Xamarin\Mono for Android\debug.keystore  
-destkeystore C:\Users\peter\Desktop-3GCVT7E\AppData\Local\Xamarin\Mono for  
Android\debug.keystore -deststoretype pkcs12".
```

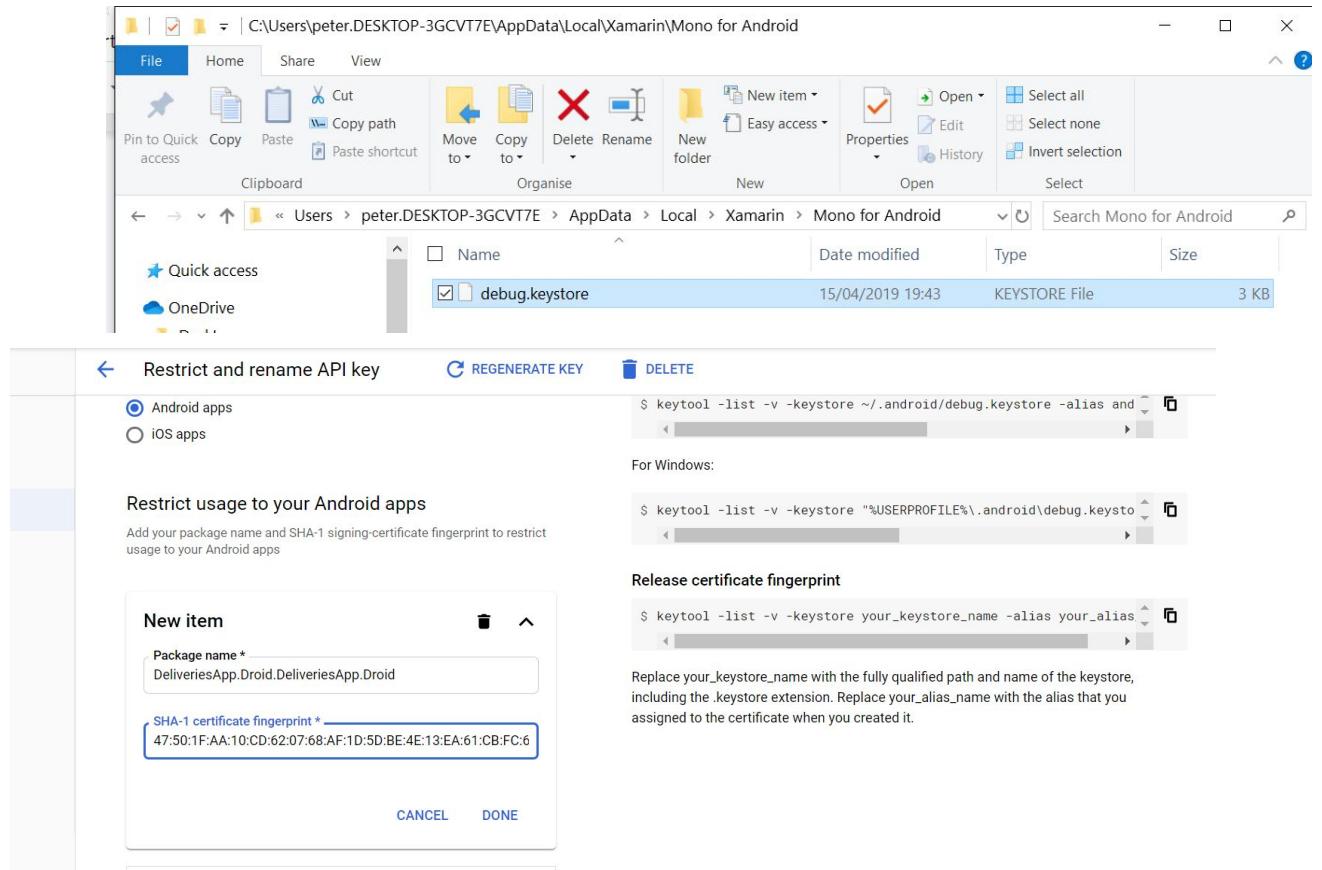
C:\Users\peter\Desktop-3GCVT7E\AppData\Local\Xamarin\Mono for Android>

From the *Certificate Fingerprints* section, retrieve the SHA1 value e.g.

SHA1:

47:50:1F:AA:10:CD:62:07:68:AF:1D:5D:BE:4E:13:EA:61:CB:FC:68 - the package name can be

found in the field/text entry Package Name in rt-clicking the Droid project and selecting the Android Manifest page. Select API e.g. Google Map SDK, Application Restrictions to 'Android', Add an Item and in the text boxes for the item, enter Package Name and SHA1 'fingerprint' into



NB **Mipmap** “**Multum in parvo**” map (“*much in little*”) <https://en.wikipedia.org/wiki/Mipmap> - pyramid of similar images at different sizes (sort of interleaving, and wavelets)

27-193

Generating APK

Select project, VS menu Build/Archive... (ensure in Release configuration)

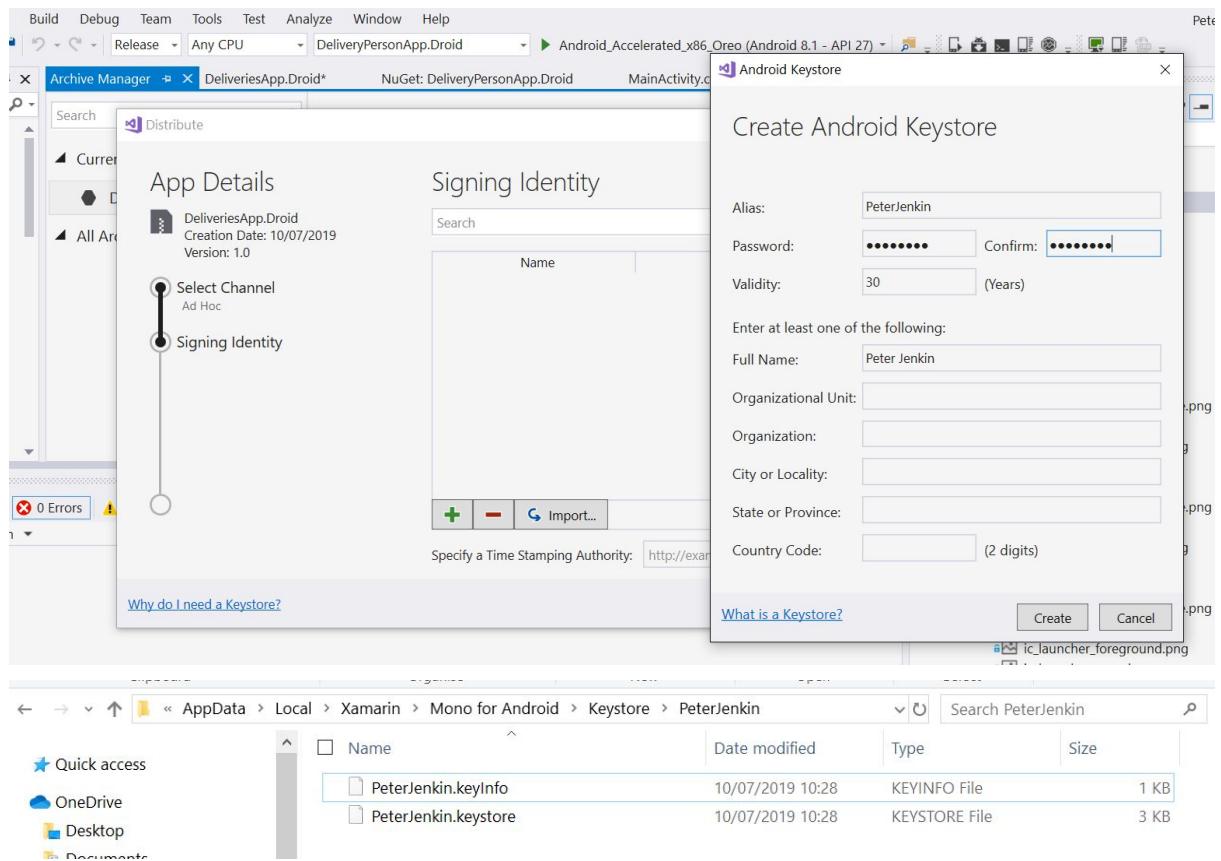
Distribute

Ad Hoc or Google Play

Click ‘+’ and a new certificate will be produced - set details for a new Android Keystore

Select this new certificate and click Save As... to save the apk in desired location on machine.

(For use in deployment, the keystore made for this distribution will be in something like C:\Users\peter.DESKTOP-3GCVT7E\AppData\Local\Xamarin\Mono for Android\Keystore\PeterJenkin)



27-194

Publishing your Android Application

Google Play Developer Console: <https://play.google.com/apps/publish/signup/>

(Main 1 of several app market places - registration is \$25)

From 'All Applications', 'Create An Application' - add a description, graphics, hi-res image (web_hi_res_512 as made by Android Asset Studio) also a 1024x500 pixel image. More can be added optionally. *Type, category and content* (a questionnaire re purchase, age &c) must be set

'Device Catalog' to manually upload APK (for Production, Beta or Alpha); different release details can be entered (what's new)

'Privacy Policy' can be a PDF document with legal details on user privacy.

A pricing and availability (by country) section.

Adverts - contained within app or not.

Agree to Google Play legal T&C

Add Release button

'Start Rollout to Production' - app will thereafter be reviewed and a notification will be sent by Google App Store on the decision and date if released.

27-195

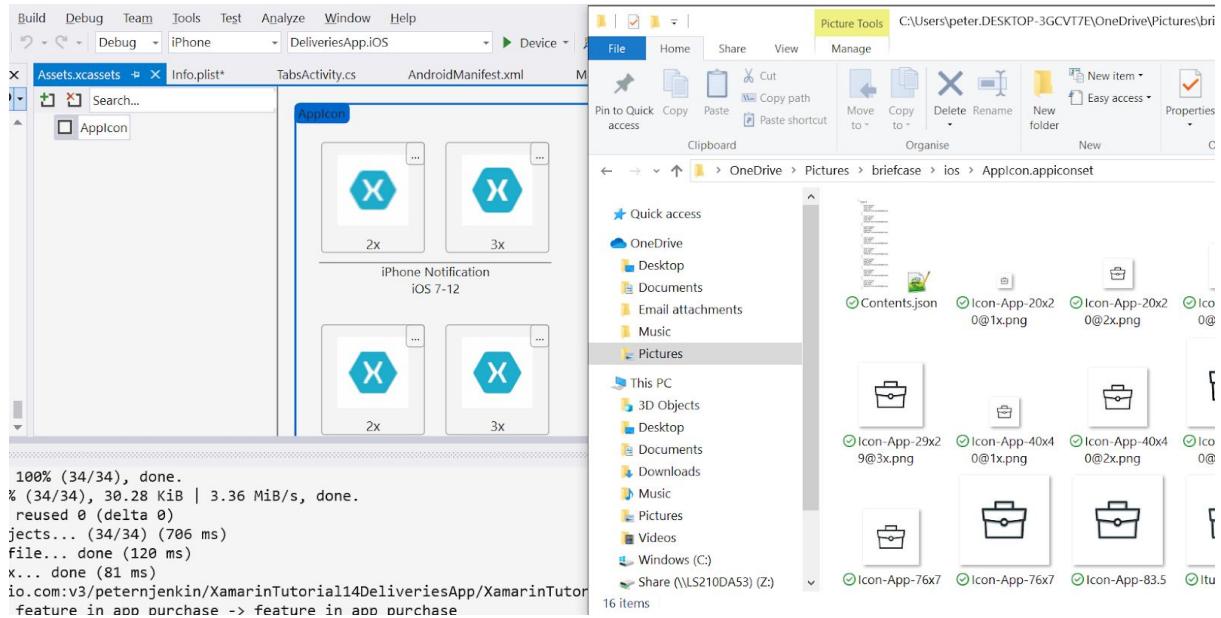
Preparing the iOS Project

To generate IPA to be sent to Apple for review.

In VS, open **Info.plist** - Application tab

Bundle Identifier - (v important) - reverse of domain name e.g. com.guidebookplus.fittyapp

In *Info.plist* see the **Visual Assets** tab: for **App Icons**, like value is Source: **AppIcons** - cf in VS in *AssetCatalogs/Images* or *AssetCatalogs/Assets* & view *AppIcon* -
 Use MakeAppIcon, with 1 file, to make a launcher icon <https://makeappicon.com/> - go through options and download the file - an iOS folder will contain *Icon-App-20x20*, *Icon-App-20x20@2x*, *Icon-App-20x20@3x* and so on. Set the icons in *Info.plist* GUI.



TODO: cf Swift notes 17-162 &c

27-196

Generating IPA-iOS

MUST BE DONE ON A MAC - TO GENERATE A CERTIFICATE (FOR SIGNING A PROVISIONING PROFILE).

Certificate production (using keychain) will require a Mac - used for a Provisioning Profile.

Go to developer account <https://developer.apple.com/account> - goto **Certificates, IDs and Profiles / Identifiers** - App IDs - (changed from time of video) - click '+' to make a new Identifier (options: **App ID**, Services IDs, Pass Type IDs, iCloud Containers, App Groups, Merchant IDs &c)

NAME	IDENTIFIER	PLATFORM
CY- Extender	CY-9A186B06-62D9-11E9-9850-58B035A27AE8.com.cydia.Extender	iOS
CY- Extender VPN	CY-9B89FC5C-62D9-11E9-85F5-58B035A27AE8.com.cydia.Extender.VPN	iOS
CY- uncOver	CY-2F7204FA-62DA-11E9-BE2A-58B035A27AE8.science.xnu.undecimus	iOS
XC com peternjenkin -Gag-layout-project	com.peternjenkin.-Gag-layout-project	iOS

← → C https://developer.apple.com/account/resources/identifiers/add/bundleId

Apple Developer

Certificates, Identifiers & Profiles

< All Identifiers

Register a New Identifier

App IDs

Register an App ID to enable your app to access available services and identify your app in a provisioning profile. You can enable app services when you create an App ID or modify these settings later.

Services IDs

For each website that uses Sign In with Apple, register a services identifier (Services ID), configure your domain and return URL, and create an associated private key.

Use the *Bundle Identifier* set in the Info.plist (27-195)

Bundle ID can be either Explicit eg com.guidebookplus.fittyapp or a wildcard - must be the same. NB using wildcard here can stop use of in-app purchase, and maybe other features. Also here tick Apple Services - in this case, none.

← → C https://developer.apple.com/account/resources/identifiers/bundleId/add/

Apple Developer

Peter Jenkin ▾
Peter Jenkin - 3TVT39HT56

Certificates, Identifiers & Profiles

< All Identifiers

Register an App ID

[Back](#) [Continue](#)

Platform

iOS, tvOS, watchOS macOS

App ID Prefix

3TVT39HT56 (Team ID)

Description

Deliveries App

Bundle ID Explicit Wildcard

com.guidebookplus.DeliveriesApp

You cannot use special characters such as @, &, *, :, "

We recommend using a reverse-domain name style string (i.e., com.domainname.appname). It cannot contain an asterisk (*).

Click 'Register' to see App Id registered among list of others.

← → C https://developer.apple.com/account/resources/identifiers/list

Apple Developer

Peter Jenkin ▾
Peter Jenkin - 3TVT39HT56

Certificates, Identifiers & Profiles

Certificates

Identifiers +

App IDs ▾

Identifiers

Devices

Profiles

Keys

More

NAME ▾	IDENTIFIER	PLATFORM
CY- Extender	CY-9A186B06-62D9-11E9-9850-58B035A27AE8.com.cydia.Extender	iOS
CY- Extender VPN	CY-9B89FC5C-62D9-11E9-85F5-58B035A27AE8.com.cydia.Extender.VPN	iOS
CY- unc0ver	CY-2F7204FA-62DA-11E9-BE2A-58B035A27AE8.science.xnu.undecimus	iOS
Deliveries application	com.guidebookplus.DeliveriesApp	iOS

MAC NOW NEEDED HEREON - TO GENERATE A CERTIFICATE (FOR SIGNING A PROVISIONING PROFILE). THIS WILL REQUIRE KEYCHAIN AND XCODE (BOTH BEING ONLY ON MAC).

Click on **Certificates** - from the list of certificates click '+' for a new certificate - in this case, since this is sort-of for App Store production and my Mac cannot run higher than XCode 9.4, select '*iOS Distribution - App Store and Ad Hoc*' .

NAME	IDENTIFIER	PLATFORM
CY- Extender	CY-9A186B06-62D9-11E9-9850-58B035A27AE8.com.cydia.Extender	iOS
CY- Extender VPN	CY-9B89FC5C-62D9-11E9-85F5-58B035A27AE8.com.cydia.Extender.VPN	iOS
CY- uncOver	CY-2F7204FA-62DA-11E9-BE2A-58B035A27AE8.science.xnu.undecimus	iOS
XC com.peternjenkin -Gag-layout-project	com.peternjenkin.-Gag-layout-project	iOS

Create a New Certificate

Software

- Apple Development**
Sign development versions of your iOS, macOS, tvOS, and watchOS apps. For use in Xcode 11 or later.
- Apple Distribution**
Sign your apps for submission to the App Store or for Ad Hoc distribution. For use with Xcode 11 or later.
- iOS App Development**
Sign development versions of your iOS app.
- iOS Distribution (App Store and Ad Hoc)**
Sign your iOS app for submission to the App Store or for Ad Hoc distribution.
- Mac Development**
Sign development versions of your Mac app.
- Mac App Distribution**
This certificate is used to code sign your app and configure a Distribution Provisioning Profile for submission to the Mac App Store.
- Mac Installer Distribution**

At

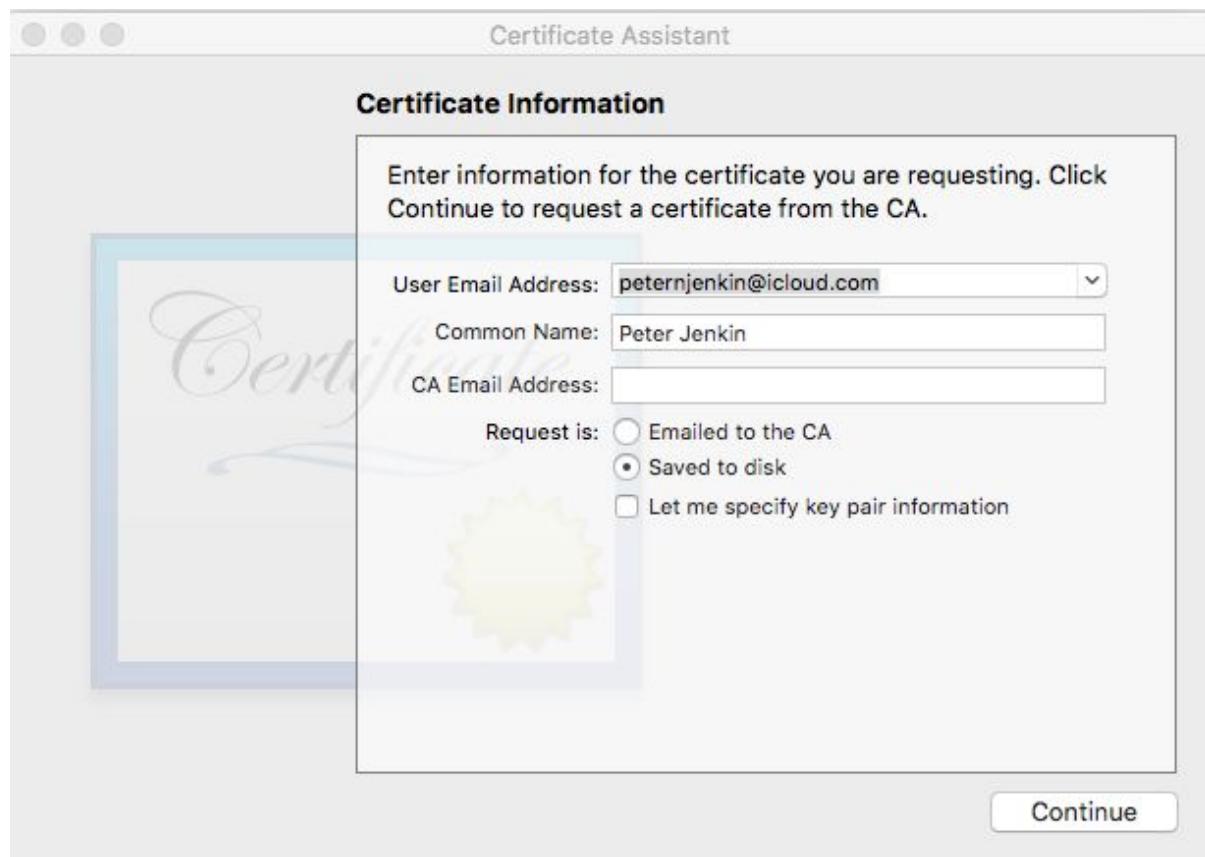
Create a New Certificate

Upload a Certificate Signing Request
To manually generate a Certificate, you need a Certificate Signing Request (CSR) file from your Mac.
[Learn more >](#)

Choose File

At this point, on Mac, Cmd+SPACE (for spotlight) & search for/open '**keychain**' - open 'Keychain Access'

From Keychain Access, select *Keychain Access/Certificate Assistant/Request a Certificate From a Certificate Authority* - Select 'Saved to disk' and leave contact details filled-in.



Now the saved file e.g. *DeliveryAppCertificateSigningRequest.certSigningRequest* can be selected from the developer.apple.com webpage, and thus uploaded and a certificate will be available to download as *ios_distribution.cer*. This file should be downloaded *on the Mac*, and double-clicked to install into the keychain access/keystore (ready for XCode use) *on the Mac*.

Certificates, Identifiers & Profiles

Download Your Certificate

Download

Certificate Details

Certificate Name: Peter Jenkin

Certificate Type: iOS Distribution

Expiration Date: 2020/07/09

Created By: Peter Jenkin (peternjenkin@icloud.com)

Download your certificate to your Mac, then double click the .cer file to install in Keychain Access. Make sure to save a backup copy of your private and public keys somewhere secure.

ios_distribution.cer

Copyright © 2019 Apple Inc. All rights reserved. | Terms of Use | Privacy Policy

This is valid for 1 year and is useful to make a provisioning profile. If successfully made, the certificate will be visible in the web page (with an EXPIRATION date 1 year from the present).

Certificates, Identifiers & Profiles

Certificates +

	NAME ~	TYPE	PLATFORM	CREATED BY	EXPIRATION
Identifiers	com.peternjenkin.Parse-Insta-Clone	Apple Push Services	iOS	Peter Jenkin	2020/05/17
Devices	Peter Jenkin (PNJ dev Mac 09)	iOS Development	iOS	Peter Jenkin	2020/04/14
Profiles	Peter Jenkin	iOS Distribution	iOS	Peter Jenkin	2020/07/09
Keys					
More					

STAY WITH MAC (THOUGH CERTIFICATE IS NOW ONLINE) BECAUSE A NEW PROVISIONING PROFILE MUST BE INSTALLED IN XCODE. THIS WILL REQUIRE KEYCHAIN AND XCODE (BOTH BEING ONLY ON MAC).

Back in the start of developer.apple.com , select the side-menu **Profiles** and click on '+' for a new provisioning profile:

← → ⌂ https://developer.apple.com/account/resources/profiles/list

Apple Developer

Certificates, Identifiers & Profiles

Certificates

Identifiers

Devices

Profiles

Keys

More

Profiles

NAME ▾

PLATFORM

VS: WildCard Development

iOS

For profile type, select 'Ad Hoc' for distribution only on a few devices (this would be good for checking the app) or 'App Store' if intending to submit to the App Store.

← → ⌂ https://developer.apple.com/account/resources/profiles/add

Certificates, Identifiers & Profiles

< All Profiles

Register a New Provisioning Profile

Development

- iOS App Development**
Create a provisioning profile to install development apps on test devices.
- tvOS App Development**
Create a provisioning profile to install development apps on tvOS test devices.
- macOS App Development**
Create a provisioning profile to install development apps on test devices.

Distribution

- Ad Hoc**
Create a distribution provisioning profile to install your app on a limited number of registered devices.
- tvOS Ad Hoc**
Create a distribution provisioning profile to install your app on a limited number of registered tvOS devices.
- App Store**
Create a distribution provisioning profile to submit your app to the App Store.

Next, select an App ID for the profile - the one on which we're currently working:

Certificates, Identifiers & Profiles

< All Profiles

Generate a Provisioning Profile

[Back](#) [Continue](#)

Select Type > Configure > Generate > Download

Select an App ID

If you plan to use services such as Game Center, In-App Purchase, and Push Notifications, or want a Bundle ID unique to a single app, use an explicit App ID. If you want to create one provisioning profile for multiple apps or don't need a specific Bundle ID, select a wildcard App ID. Wildcard App IDs use an asterisk (*) as the last digit in the Bundle ID field.

App ID:

CY- Extender (3TVT39HT56.CY-9A186B06-62D9-11E9-9850-58B035A27AE8) ▾

CY- Extender (3TVT39HT56.CY-9A186B06-62D9-11E9-9850-58B035A27AE8.com.cydia.Extender)
CY- Extender VPN (3TVT39HT56.CY-9B89FC5C-62D9-11E9-85F5-58B035A27AE8.com.cydia.Extender.VPN)
CY- uncOver (3TVT39HT56.CY-2F7204FA-62DA-11E9-BE2A-58B035A27AE8.science.xnu.undecimus)
Deliveries application (3TVT39HT56.com.guidebookplus.DeliveriesApp)
XC com peternjenkin -Gag-layout-project (3TVT39HT56.com.peternjenkin.-Gag-layout-project)
XC com peternjenkin -Gag-layout-projectUITests (3TVT39HT56.com.peternjenkin.-Gag-layout-projectUITests)
XC com peternjenkin Insta-Clone-Firebase (3TVT39HT56.com.peternjenkin.Insta-Clone-Firebase)
XC com peternjenkin Insta-Clone-FirebaseUITests (3TVT39HT56.com.peternjenkin.Insta-Clone-FirebaseUITests)
XC com peternjenkin Parse-Foursquare-Clone (3TVT39HT56.com.peternjenkin.Parse-Foursquare-Clone)
XC com peternjenkin Parse-Foursquare-CloneUITests (3TVT39HT56.com.peternjenkin.Parse-Foursquare-CloneUITests)
XC com peternjenkin Parse-Insta-Clone (3TVT39HT56.com.peternjenkin.Parse-Insta-Clone)
XC Wildcard (3TVT39HT56.*)
CY- Extender (3TVT39HT56.CY-9A186B06-62D9-11E9-9850-58B035A27AE8) ▾

Then select certificates to include in provisioning profile (probably only 1 if a non-wildcard Bundle ID was set).

Set a Provisioning Profile Name e.g. 'Peter Jenkin Delivery App Provisioning Profile PP'. Click Generate.



Certificates, Identifiers & Profiles

< All Profiles

Generate a Provisioning Profile

[Back](#) [Generate](#)

Select Type > Configure > Generate > Download

Review, Name and Generate.

The name you provide will be used to identify the profile in the portal.

Provisioning Profile Name

Peter Jenkin Delivery App Provisioning Profile PP

Type

iOS Distribution

App ID

Deliveries application(3TVT39HT56.com.guidebookplus.DeliveriesApp)

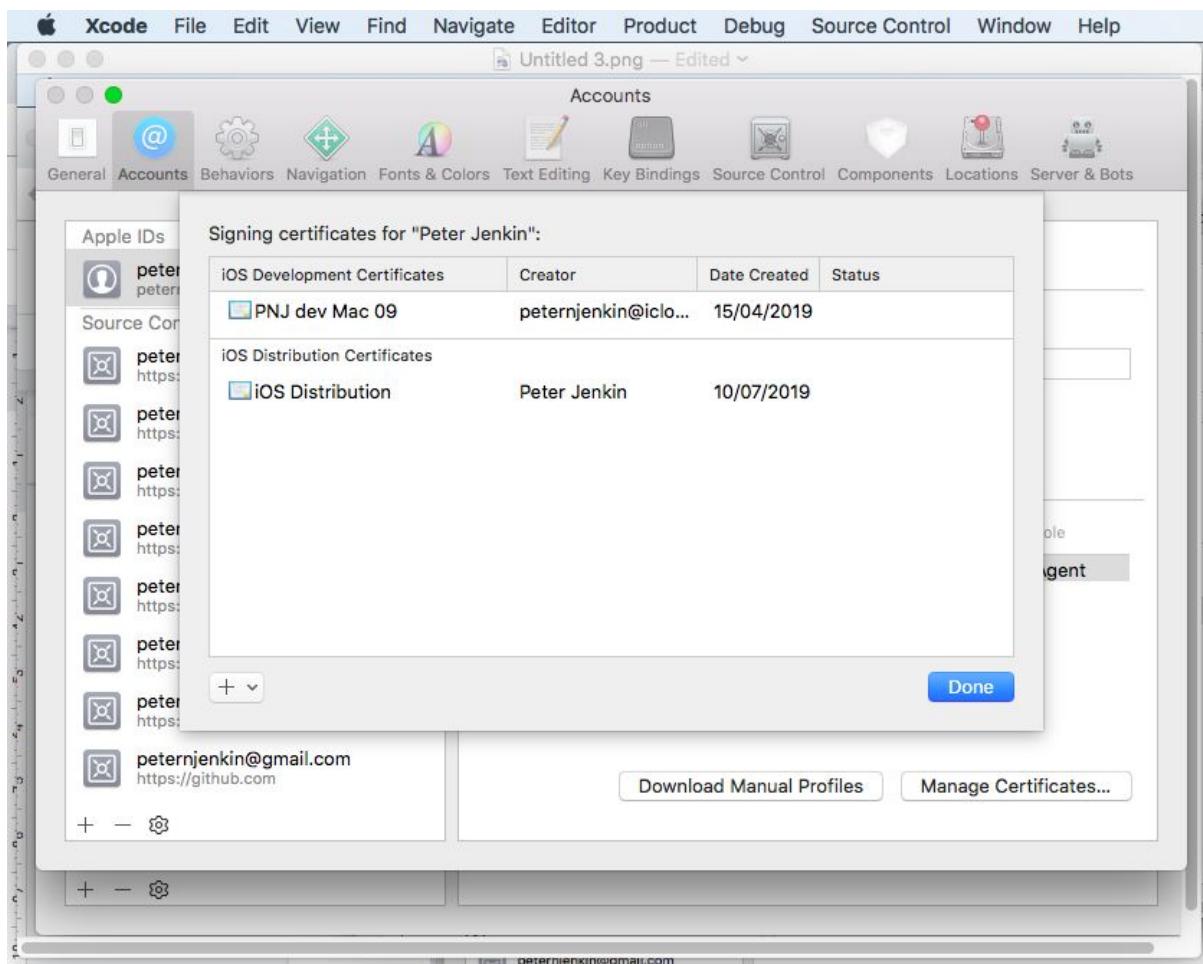
Certificates

1 Selected

Download the provisioning profile on the Mac and double-click/install the *MyProfileName.mobileprovision* file. This should install the new provisioning profile in XCode - check this by XCode/Preferences/Accounts (sign-in if needed)/click on '*Manage Certificates*' - the new certificate used in generating the provisioning profile should be seen - with the current date, to help identification (e.g. 10/7/19 if made on that date). (Preferably in keychain? If certificate is listed under iOS Distribution Certificates but Saying 'Not in keychain', go to developer.apple.com *on the Mac*, find the certificate and download the certificate on the Mac; this should then go into Keychain Access *on the Mac and thus into XCode's use*). After checking the certificate's presence, click on '*Download Manual Profiles*' which will download and install, ready for XCode on the Mac, all relevant provisioning profiles (including the one just now made online).

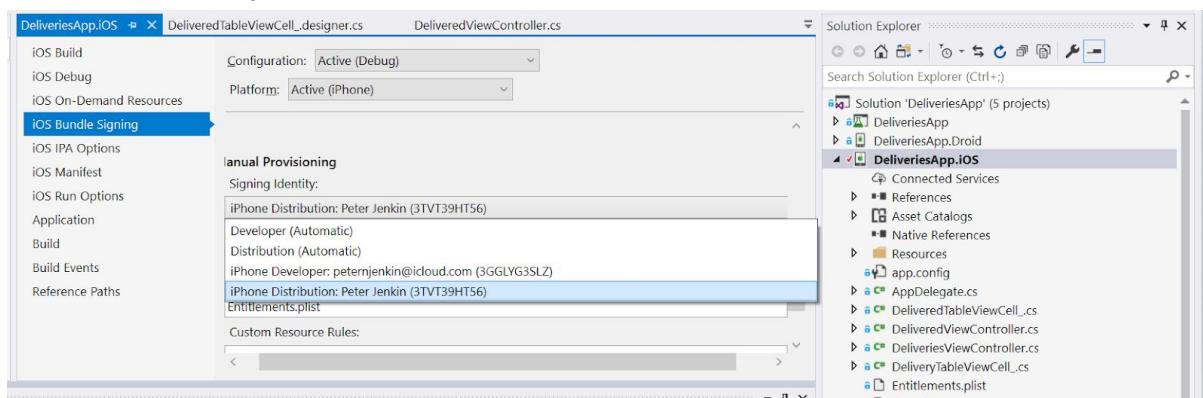
NB Mac keychain import is for .p12 or .pfx file formats.

TODO: certificate should be in keychain?

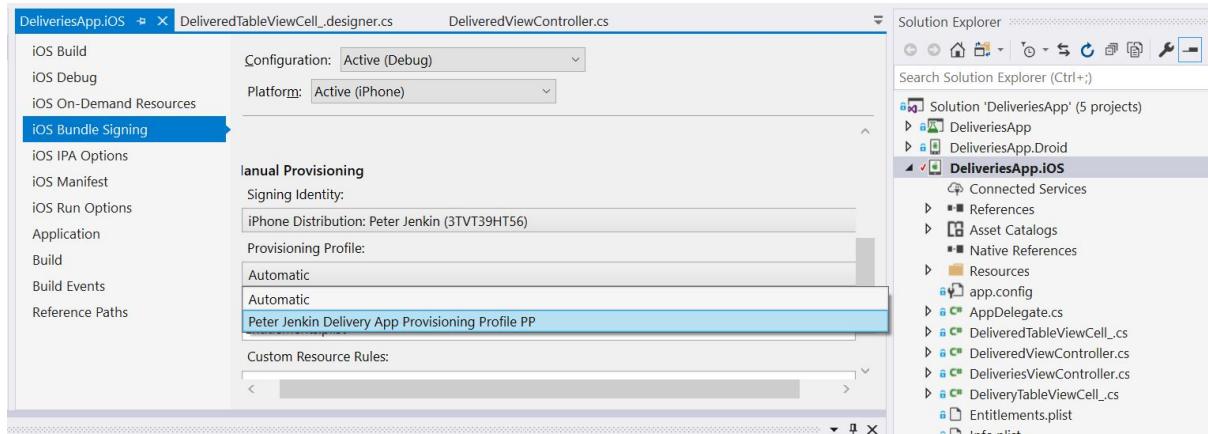


BACK IN WINDOWS VISUAL STUDIO IS OK FROM HEREON (AS NEITHER XCODE NOR KEYCHAIN SHOULD BE NEEDED). MAC SHOULD HOWEVER REMAIN PAIRED WITH PC.

Rt-click on iOS project, select *Properties*, and then *iOS Bundle Signing* - since connected/paired to the Mac with the profile just now loaded, *Signing Identity* should be the one used previously.



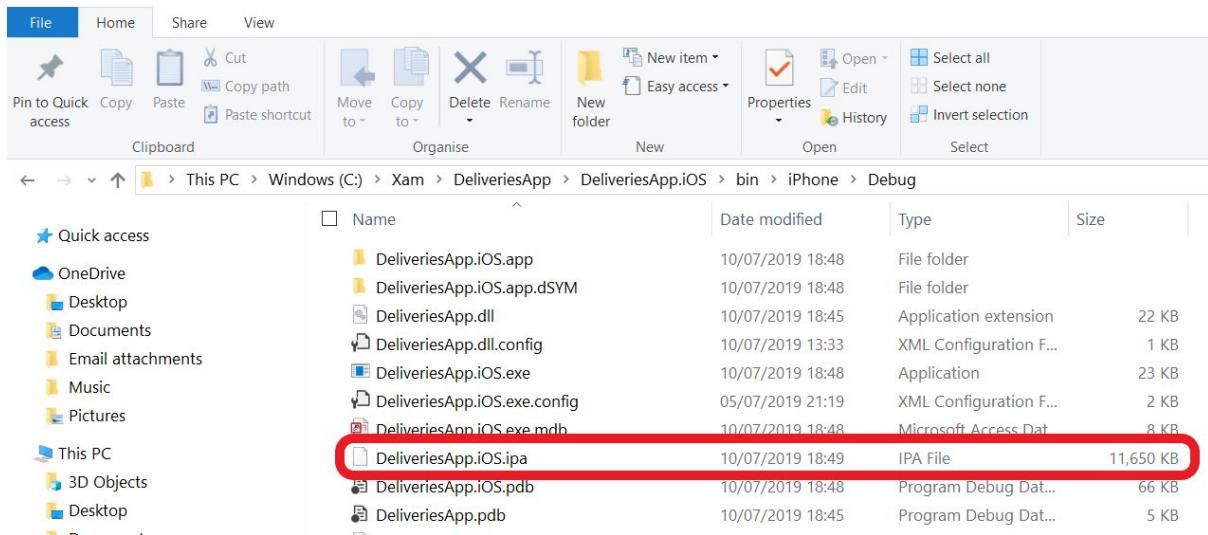
Likewise if the certificate and associated provisioning profile worked ok for XCode on the Mac, that Provisioning Profile should be visible (via the Mac pairing) and can be selected.



Problem/Error: Could not see correct Provisioning Profile however (not in keychain?) - tried 'Automatic Provisioning'. Seemed to work? IPA file produced? But would this IPA file be valid if it were checked on submission to App Store? - I had not downloaded & imported *ios_distribution.cer* certificate file onto the Mac itself and thus into its keystore, hence not showing up on PC. Fixed by downloading .cer file on Mac and double-clicking (checked in XCode/Preferences/Accounts/Manage Certificates).

Properties/iOS IPA Options - tick '**Build iTunes Package Archive (IPA)**' - rt-click and Build the iOS project to produce an .ipa file.

The ipa file will be in the path *C:\Xam\DeliveriesApp\DeliveriesApp.iOS\bin\iPhone\Debug* or similar according to configuration (should really be release!)



27-197

Publishing your iOS Application

https://medium.com/@the_manifest/how-to-publish-your-app-on-apples-app-store-in-2018-f76f22a5c33a

<https://developer.apple.com/app-store/submissions/>

<https://developer.apple.com/ios/submit/>

Send IPA for review to Apple app store.

Using <https://itunesconnect.apple.com> / <https://appstoreconnect.apple.com> - navigate to My Apps - from My Apps, select + to make New App

The screenshot shows the main dashboard of App Store Connect. At the top, there are several large blue icons with white symbols: a stylized 'A' for 'My Apps', a bar chart for 'App Analytics', a line graph for 'Sales and Trends', a window with a checkmark for 'Payments and Financial Reports', a lock icon for 'Users and Access', a pen writing on a dotted line for 'Agreements, Tax, and Banking', and a question mark inside a circle for 'Resources and Help'. Below each icon is a label: 'My Apps', 'App Analytics', 'Sales and Trends', 'Payments and Financial Reports', 'Users and Access', 'Agreements, Tax, and Banking', and 'Resources and Help'. At the bottom left, there is a navigation bar with back, forward, and refresh buttons, followed by the URL 'Apple Inc. [US] | https://appstc'. Below the navigation bar, the text 'App Store Connect My Apps' is displayed, followed by a large blue plus sign button. A dropdown menu is open over the plus sign, showing two options: 'New App' and 'New macOS App', with 'New App' being the selected item.

← → C Apple Inc. [US] | https://appstoreconnect.apple.com/WebObjects/iTunesConnect.woa/ra/ng/app

App Store Connect My Apps

[+](#)

New App

Platforms ? iOS tvOS

Name ?

Primary Language ?

Bundle ID ?

SKU ?

User Access ? Limited Access Full Access

[Cancel](#) [Create](#)

App Store Connect My Apps

Delivery App PNJ

Peter Jenkins | [?](#)

App Store Features TestFlight Activity

APP STORE INFORMATION

App Information [Save](#)

Pricing and Availability

IOS APP

● 1.0 Prepare for Submission

[VERSION OR PLATFORM](#)

App Information

This information is used for all platforms of this app. Any changes will be released with your next app version.

Localizable Information

English (U.K.) [?](#)

Name ? [Privacy Policy URL](#) ?

Subtitle ? 30

General Information

Bundle ID ? [Register a new bundle ID.](#) Primary Language ? English (U.K.)

Your Bundle ID com.guidebookplus.DeliveriesApp

Category ? Utilities

SKU ? 9999999999 Secondary (optional)

Apple ID ? 1472495552 License Agreement [Edit](#)

Apple's Standard License Agreement

Pricing & availability by territory, fairly straightforward-ish:



App Store Connect My Apps ▾



App Store Features TestFlight Activity

APP STORE INFORMATION

App Information

Pricing and Availability

IOS APP

● 1.0 Prepare for Submissi...

+ VERSION OR PLATFORM

Pricing and Availability

Price Schedule

Price ?	Start Date ?	End Date ?
GBP 0 (Free)		
GBP 0.99 (Tier 1)		
GBP 1.99 (Tier 2)		
GBP 2.99 (Tier 3)		
GBP 3.99 (Tier 4)		

Prepare for submission: simulator can be used for screen shots with various devices, 1024x1024 App Store icon, IPA

App Store Features TestFlight Activity

APP STORE INFORMATION

App Information

Pricing and Availability

iOS APP

● 1.0 Prepare for Submissi...

+ VERSION OR PLATFORM

iOS App 1.0

● Prepare for Submission

Save Submit for Review

Version Information

English (U.K.) ▾ ?

App Previews and Screenshots ?



View All Sizes in Media Manager

Drag up to 3 app previews and 10 screenshots here.

We'll use these for all iPhone display sizes and localizations selected in Media Manager.

View [iOS Screenshot Properties](#) and [App Preview Properties](#).0 of 3 App Previews | 0 of 10 Screenshots | [Choose File](#) | [Delete All](#)

Promotional Text ?

Keywords ?

Peter Jenkin ▾
Peter Jenkin | ?

App Store Features TestFlight Activity

APP STORE INFORMATION

App Information

Pricing and Availability

iOS APP

● 1.0 Prepare for Submissi...

+ VERSION OR PLATFORM

iOS App 1.0

● Prepare for Submission

Save Submit for Review

Rating [Edit](#)

No Rating

Apt., suite, bldg. (optional)

Redruth

State

TR15 3DH

United Kingdom

Phone number

Email

Routing App Coverage File ?

Choose File (Optional)

Game Center

App Review Information

Sign-in Information ?

Provide a user name and password so we can sign in to your app. We'll need this to complete your app review.

 Sign-in required User name Password

Contact Information ?

First name

Last name

Phone number

Email

App Store Features TestFlight Activity

APP STORE INFORMATION

App Information

Pricing and Availability

iOS APP

1.0 Prepare for Submissi...

VERSION OR PLATFORM

iOS App 1.0

● Prepare for Submission

Save

Submit for Review

4000

Attachment ?

Choose File (Optional)

Version Release

Pre-orders are an easy way to generate sales and exposure before release. To make your app available for pre-order, go to Pricing and Availability.

After your app has been approved, we can release it for you immediately. If you want to release the app yourself, choose a date or manually release it at any point after the approval. While your app is in the "Pending Developer Release" state, you can give out promotional codes, continue TestFlight Beta Testing, or reject the release and submit a new build. Whichever of these you choose, we have to process your app before it's made available on the App Store. While your app is in the "Processing for App Store" state, you can't get new promotional codes, invite new testers, or reject your app.

 Manually release this version Automatically release this version ? Automatically release this version after App Review, no earlier than ?

Your local date and time.

Jul 11, 2019

12:00 AM

Application Loader for use with .ipa file (NB ‘...loader’ not ‘...launcher’!) - spotlight search ‘application loader’ then when Application Loader started, ‘Deliver your app’ - locate .

[For signing in to Application Loader, may need to generate *app-specific password* for Application Loader, from [appleid.apple.com](https://appleid.apple.com/account/manage) -]

Apple Inc. [US] | <https://appleid.apple.com/account/manage>

LANGUAGE

English (UK) - English (UK)

COUNTRY / REGION

United Kingdom

Security

PASSWORD

[Change Password...](#)

TRUSTED PHONE NUMBERS

+44 7960 895413

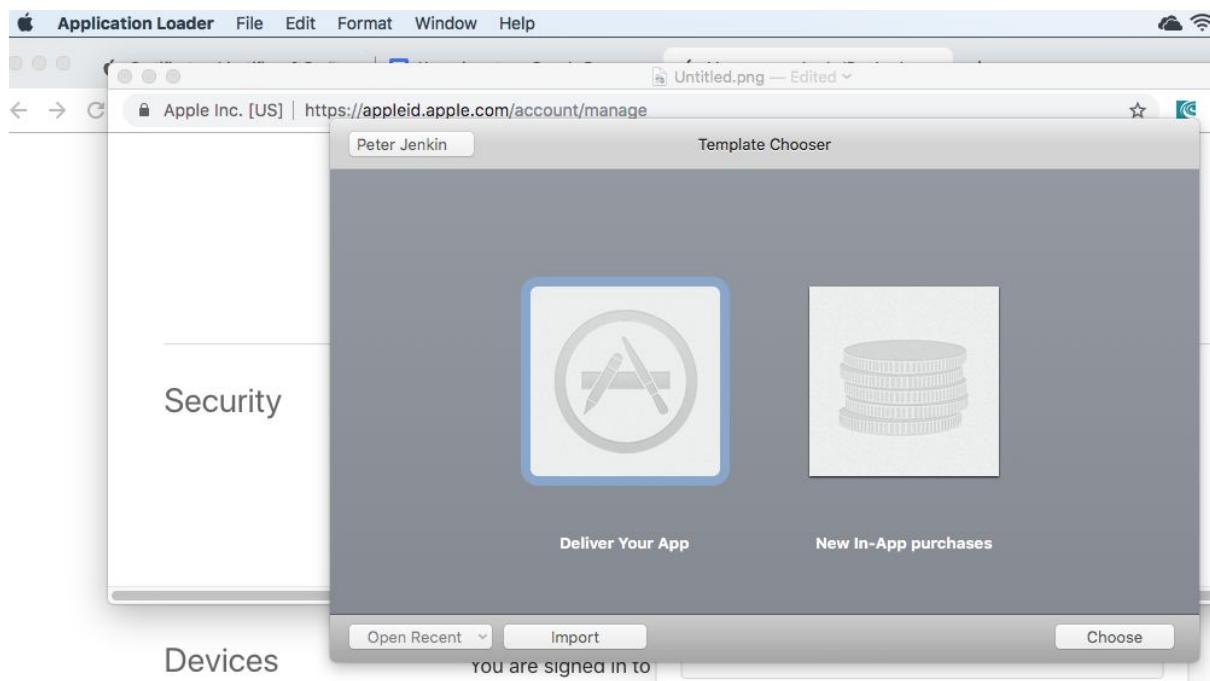
[Edit](#)

TWO-FACTOR AUTHENTICATION

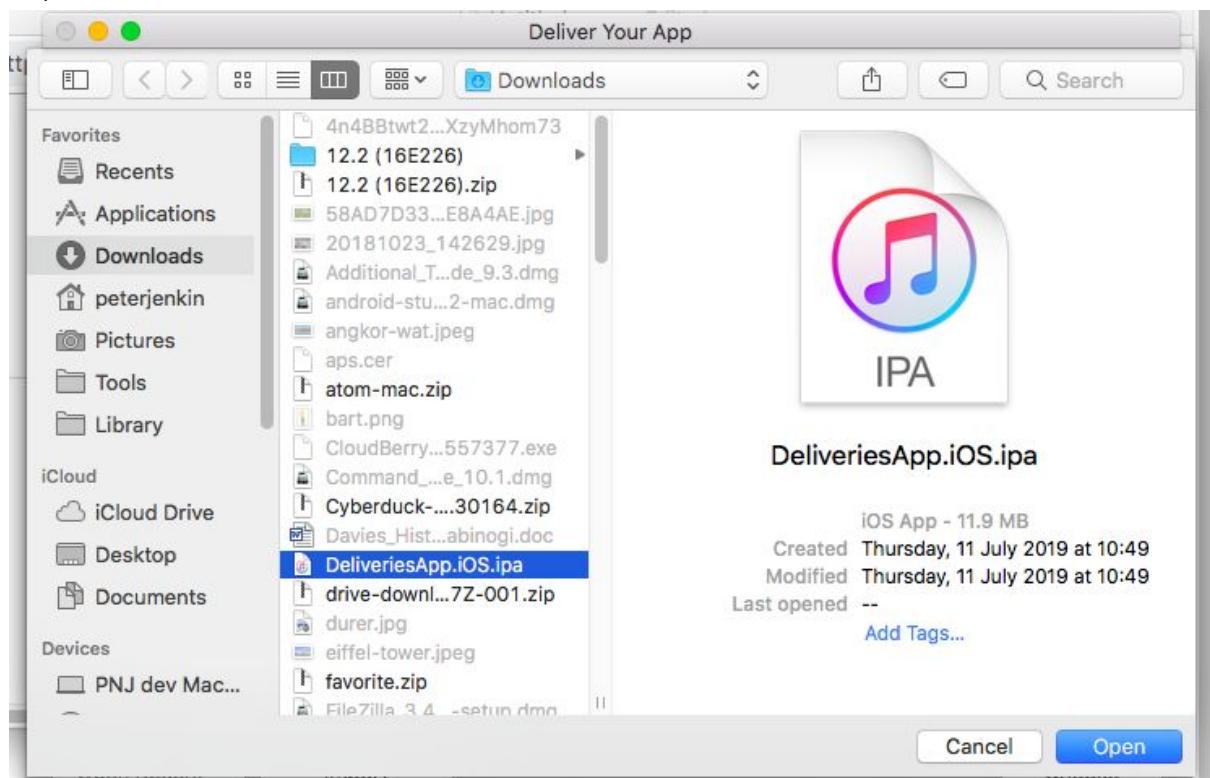
On

APP-SPECIFIC PASSWORDS

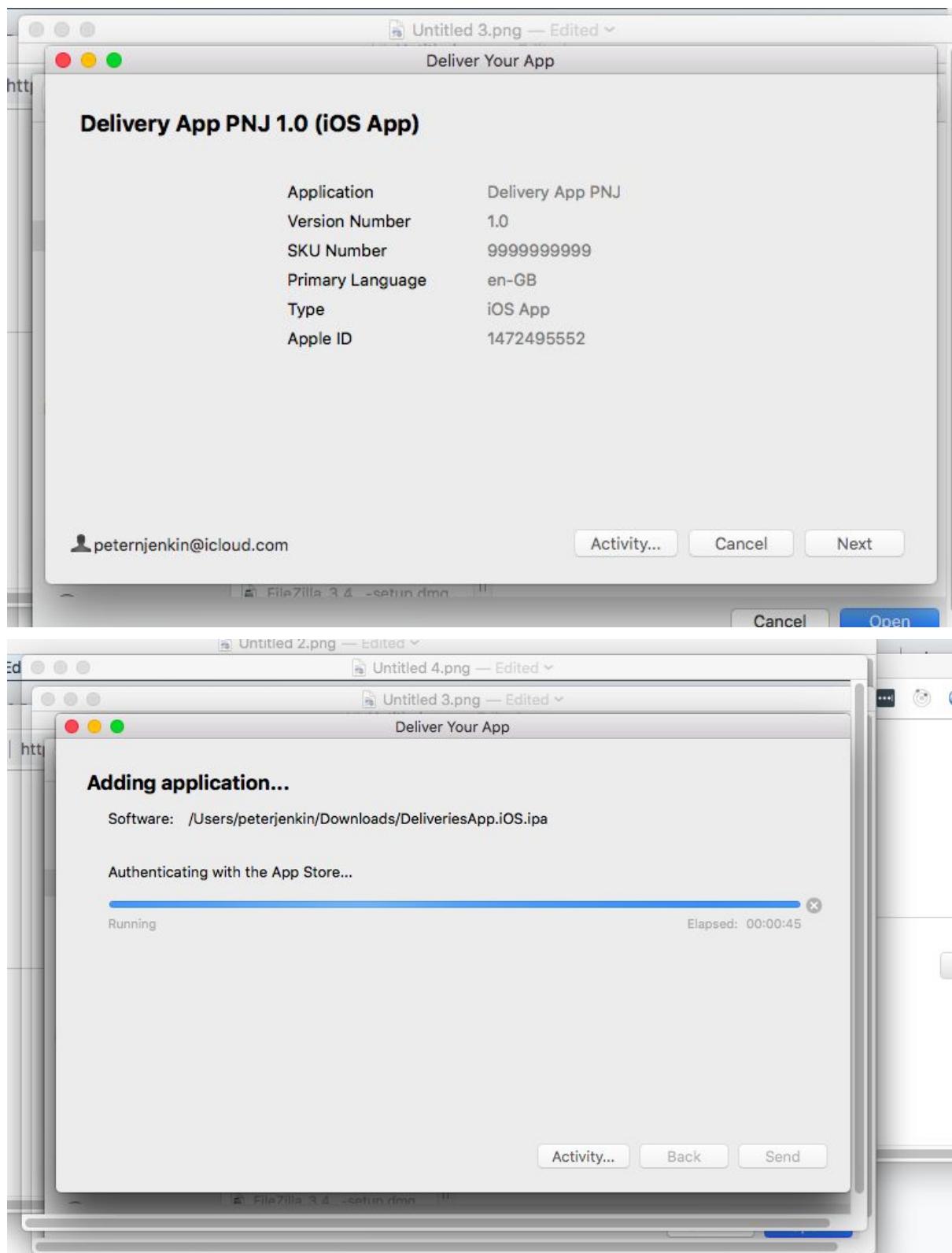
[Generate Password...](#)



Click on '*Deliver Your App*' to highlight and click '*Choose*' button - make sure that IPA file is accessible to the Mac (on a network, downloaded from cloud, on a USB stick/memory card,)



Navigate to the location and click 'Open' to select the IPA file then review the details and click 'Next':

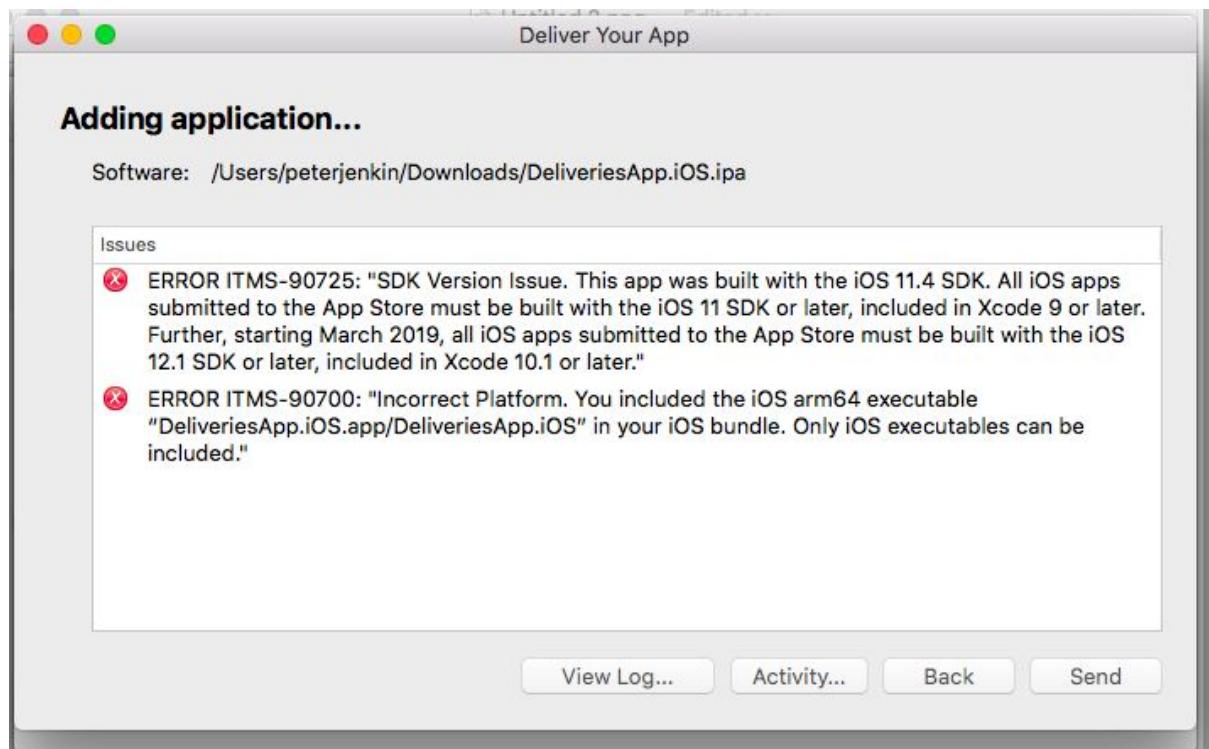


NB may get stuck here at 'Authenticating with the App Store ...' although first time for me after about 2:30 this changes to Verifying Assets with the App Store.

<https://stackoverflow.com/questions/22443425/application-loader-stuck-at-authenticating-with-the-itunes-store-when-uploading>

<https://medium.com/@iBoostUp/submitting-to-the-app-store-stuck-at-authenticating-with-the-itunes-store-in-xcode-7516c3e782de>

However, at July 2019 I am seeing this from using XCode 9.4 and best efforts:



TODO: workaround?? iOS 12 somehow? Virtual Mac build?

However, hypothetically, would say something like Adding Application... Uploaded package to the App Store.

After this, the <https://itunesconnect.apple.com> / <https://appstoreconnect.apple.com> // New App dialogue's *Build* section will be accessible, with at least 1 IPA uploaded, for selection. A build selected here will be listed as a version.

Contact information must be left so that any necessary communication from the App Store pre-release reviewers (ok-ers) can arrive.

Click 'Submit for Review' when ready, then some T&Cs, then click 'Submit'.

TODO: Continuous Deployment mentioned viz updates at 0:30 in 27-198

27-198

Sending Updates to the Stores - iOS & Android

<https://developer.apple.com/app-store/app-updates/>

Build a new IPA, upload and set this build as a new version.

Android - App Releases - production, beta & alpha - Management - upload APK & enter new release details.

28-In App Purchases

28-199

About In-App Purchases

- Consumable
- Non-consumable
- Subscription (optionally auto-renewable)

Usually 70% of in-app purchase price, Google & Apple 85% after subscription has been active for 1 year.

Contracts required with iOS and Google.

Technical requirements: permissions and code.

28-200

Creating the iOS In-App Purchases

<https://developer.apple.com/in-app-purchase/>

<https://medium.com/@bestiosdevelope/implement-in-app-purchase-iap-in-ios-applications-swift-4d1649509599>

App ID must be specific to app, not wildcard, for in-app Purchases.

On web (App Store Connect <https://appstoreconnect.apple.com/login>) for app, In-App purchase service must be enabled.

App Store/App Information'/Features/In-App Purchases '+' (e.g. Consumable, Non-consumable, Subscription (optionally auto-renewable), Subscription (non-renewable)). 'Reference Name' just an internal identifier, 'Product ID' used similarly to App IDs (e.g. reverse of domain name).

'Subscription Group Reference Name' - e.g. several subscriptions for same app, but of different durations (1 month, 3 months, 1 year, ...).

Price by territory can be set - also Localization, promotional image, description and screenshot.

NB *Application Loader* in-app purchases feature.

28-201

Performing the Purchase on iOS

NuGet package **Plugin.InAppBilling** - onto portable and native device projects.

Add another Bar Button Item (in VCs next to to '+' for adding another delivery).

Code of how to start implementing in-app purchase as in 28-202 (copy/pasted).

<https://support.apple.com/en-gb/HT202023>

28-202

Performing the Purchase on Android (code)

Set up (how?) in-app purchase in Google developer console.

To *AndroidManifest.xml*, add:

```
<uses-permission android:name="com.android.vending.BILLING" />
```

To give user a means of purchasing, in *Resources/menu/tabsMenu.xml*, add an item

```
<?xml version="1.0" encoding="utf-8" ?>
```

```
<!--For all properties see:
```

```
http://developer.android.com/guide/topics/resources/menu-resource.html-->
```

```
<menu xmlns:android="http://schemas.android.com/apk/res/android"
```

```
    xmlns:app="http://schemas.android.com/apk/res-auto">
```

```
<!-- namespace added as per 19-157 http://schemas.android.com/apk/res-auto (using
support) -->
```

```

<item android:id="@+id/action_add"
    app:showAsAction="always"
    android:text="Add"
    android:icon="@mipmap/ic_action_add_circle_outline"
/>
<item android:id="@+id/action_subscribe"
    app:showAsAction="always"
    android:text="Subscribe"
    android:icon="@mipmap/ic_action_add_circle_outline"
/>

```

With code called from the new menu item's Click handler:

```

private void TabsToolbar_MenuItemClick(object sender,
Android.Support.V7.Widget.Toolbar.MenuItemEventArgs e)
{
    // throw new NotImplementedException();
    // Good practice to always check which menu item was selected (even if only 1
item) - use id from resource xml file
    if (e.Item.ItemId == Resource.Id.action_add)
    {
        StartActivity(typeof(NewDeliveryActivity));           // use (2nd) overload
requiring type not Intent
    }
    else if (e.Item.ItemId == Resource.Id.action_subscribe)
    {
        Subscribe();
    }
}

private async void Subscribe()
{
    //throw new NotImplementedException();

    // Code copy/pasted from iOS project
MainTabBarController::SubscriptionBarButtonItem_Clicked(object sender, EventArgs e)
try
{
    var productId = "";      // if a ProductID has been declared online (App
Store Connect: ProductID) , use here
    var appStoreConnection = await CrossInAppBilling.Current.ConnectAsync();
// connect to AppStore using Plugin.InAppBilling

// User will see AppStore dialogues according to available purchase type (e.g.
subscription) set up previously

    if (!appStoreConnection)
    {
        return;
        // TODO show alert that purchase didn't happen (maybe due to
network problems)
    }

    var purchase = await CrossInAppBilling.Current.PurchaseAsync(productId,
Plugin.InAppBilling.Abstractions.ItemType.Subscription, "appPayLoadNotNeededYet");

    if (purchase == null)      // if something went wrong so there d'seem
to have been no purchase
    {
        // TODO handle no purchase here
    }
}

```

```

        else
        {
            // TODO handle results of purchase (unlocking, setting device
memory UserDefaults &c) according to returned purchase value
            var id = purchase.Id;
            var token = purchase.PurchaseToken;
            var autoRenewing = purchase.AutoRenewing;
            var state = purchase.State;           // state could be cancelled,
free trial, deferred, paymentpending, failed, unknown, restored, purchased ...
        }
    }
    catch (Exception exc)
    {
        // TODO: handle untoward errors here
    }

    finally
    {
        await CrossInAppBilling.Current.DisconnectAsync();           // important to
disconnect from App Store correctly
    }
}

```

<https://developer.android.com/distribute/best-practices/earn/in-app-purchases>

https://developer.android.com/google/play/billing/billing_overview

Finis.

Design Task	iOS	Android
Tabs & their icons	Easier (<i>Storyboard & define VCs</i>)	Harder (<i>fragments & axml</i>)
Placement of controls - Constraints	Harder	Easier (<i>mostly XML attributes</i>)
Maps	Easier (<i>MapKit</i>)	Harder (<i>various NuGet packages with compatibility/obsolescence issues</i>)
Amount of extra packages	Easier	Harder (<i>Inter-dependent NuGet packages with different versions/compatibilities</i>)
Overview of flow between	Easier	Harder

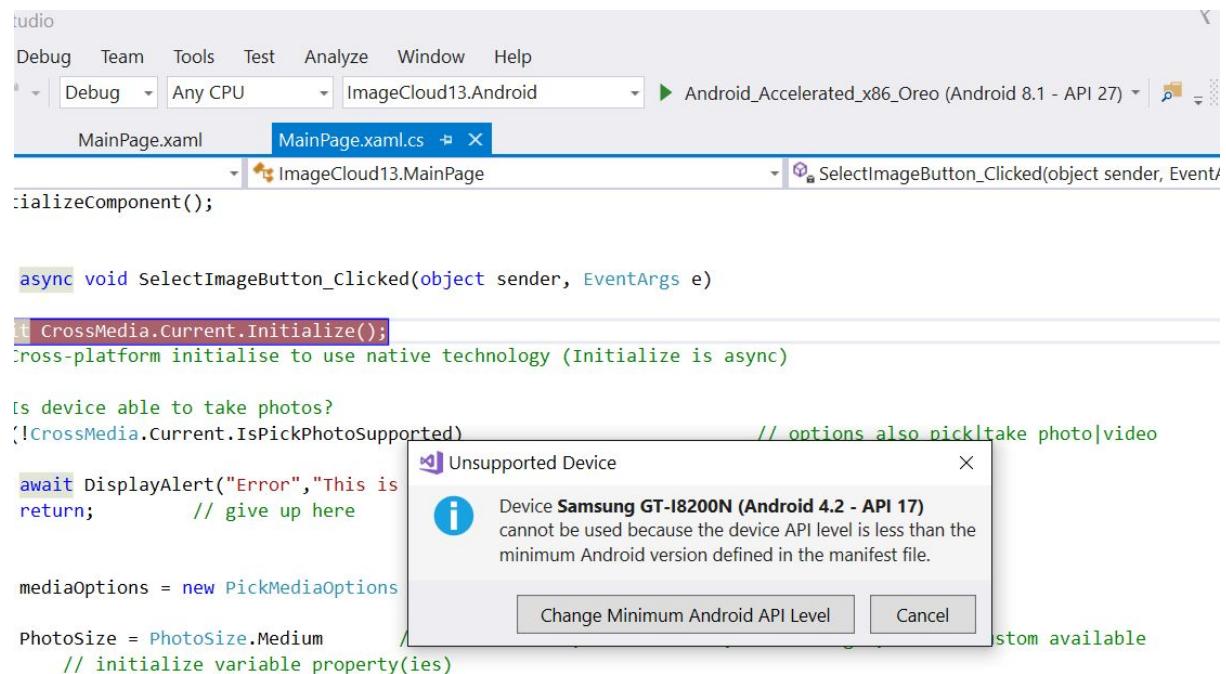
screens	(Everything as storyboard if not using xib)	
Editing of individual screens	Harder	Easier
Implementing code-behind		
Stability of code packages	Easier	Harder
Event handlers	Same (+= in C#, not GUI XCode - controls referenced by Name)	Same (+= in C# - controls resources must be FindViewById'd)

In C#/Xamarin, for both Android and iOS, event handlers are set up with += and TAB - rather than via the IDE as with XCode (outlets &c).

Generally slightly more code required for Android.

Debugging/deploying from Xamarin on physical devices

NB Some USB-micro USB cables would charge the Android phone device, but would not allow USB data transfer (shown by notification in top of screen). I tried several cables before finding one (apparently randomly) where the USB data transfer was indeed working ok.



<https://docs.microsoft.com/en-us/xamarin/android/app-fundamentals/android-api-levels?tabs=windows>

Android project/**Android Manifest/Minimum Android version** to change the minimum API (eg down to 4.2).

```
adb tcpip 5555  
adb disconnect
```

```
adb connect <phone's IP address>: 5555
```

(If Android device disappears from VS 'run' drop-down box, try again `adb connect <phone's IP address>: 5555`)

Leave phone plugged in to USB power supply, with 'don't sleep if plugged-in' option in settings, to avoid phone dropping out before deploy following build on VS.

i8200N

'Unable to find software to communicate with your device'

On Windows, not showing up as '*connected as media device*' at all

NB Try as many USB cables as possible - some cables just don't work at connecting phone to computer

iOS

<https://docs.microsoft.com/en-us/xamarin/ios/get-started/installation/device-provisioning/>

Automatic provisioning:

<https://docs.microsoft.com/en-us/xamarin/ios/get-started/installation/device-provisioning/automatic-provisioning?tabs=macos>

Mac VS: Edit Info.plist (choose "open with Property List Editor" - nice interface) - in section '*Bundle Signing*' select '*Automatic Provisioning*' radio button and sign in to Apple (developer) account.

Windows VS: select iOS project, rt-click and edit 'Properties' - in iOS '*Bundle Signing*', set to '*Automatic*' (away from '*Manual*'). Also select a team (default team is yourself!).

.. supposedly - pair iPhone to XCode with USB (XCode:Window/Devices and Simulators/ & 'enable network deployment'

Creating a new wildcard App ID...

Creating new App ID named VS Wildcard...

There was an error while trying to automatically provision the project: 'An App ID with Identifier '' is not available. Please enter a different string.'*

Note

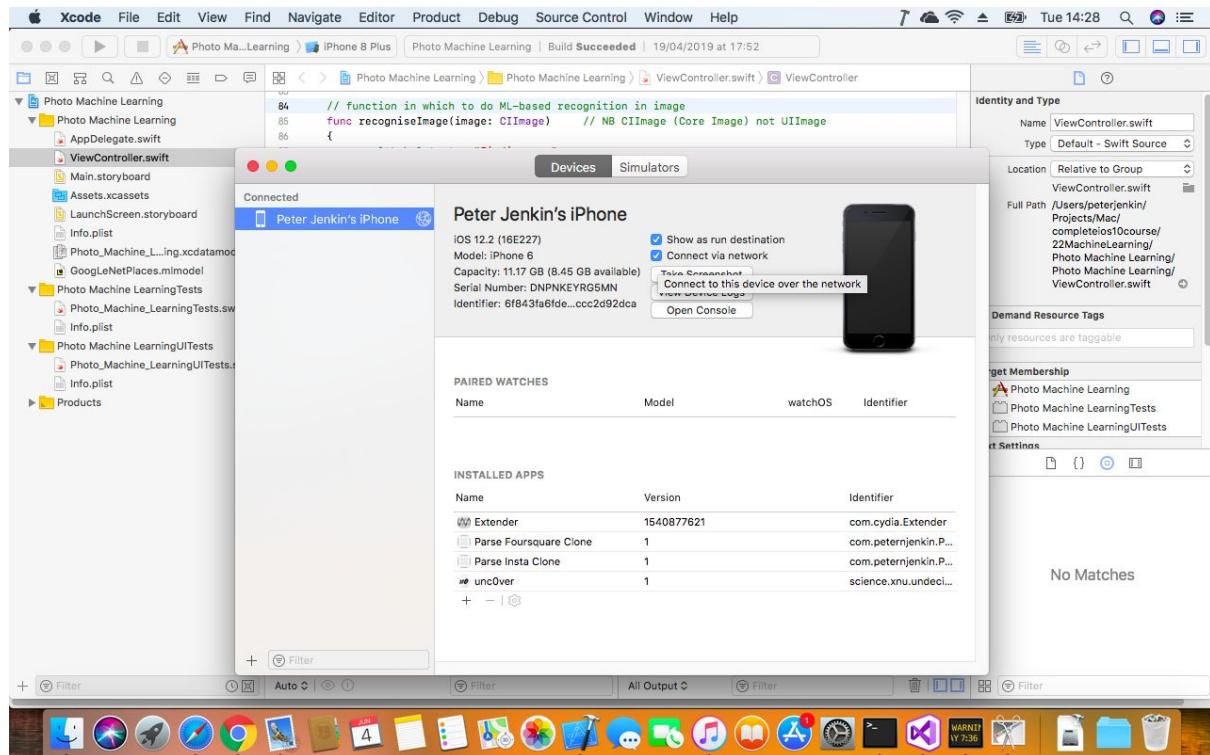
Automatic provisioning with wildcard App IDs is currently only available in Visual Studio for Mac.

(in docs for automatic provisioning, link above)

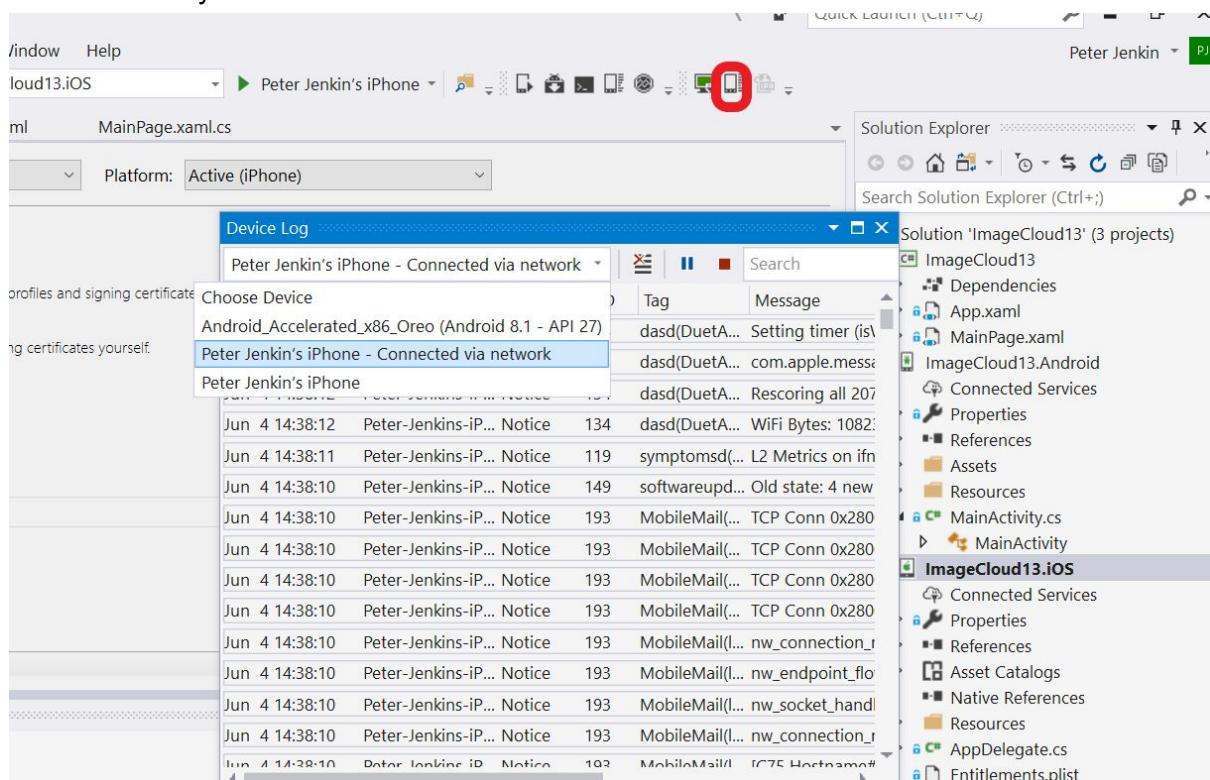
*Wildcard App ID is leaving a * on the end of the reverse notation domain name eg com.domainname.* https://developer.apple.com/library/archive/qa/qa1713/_index.html*

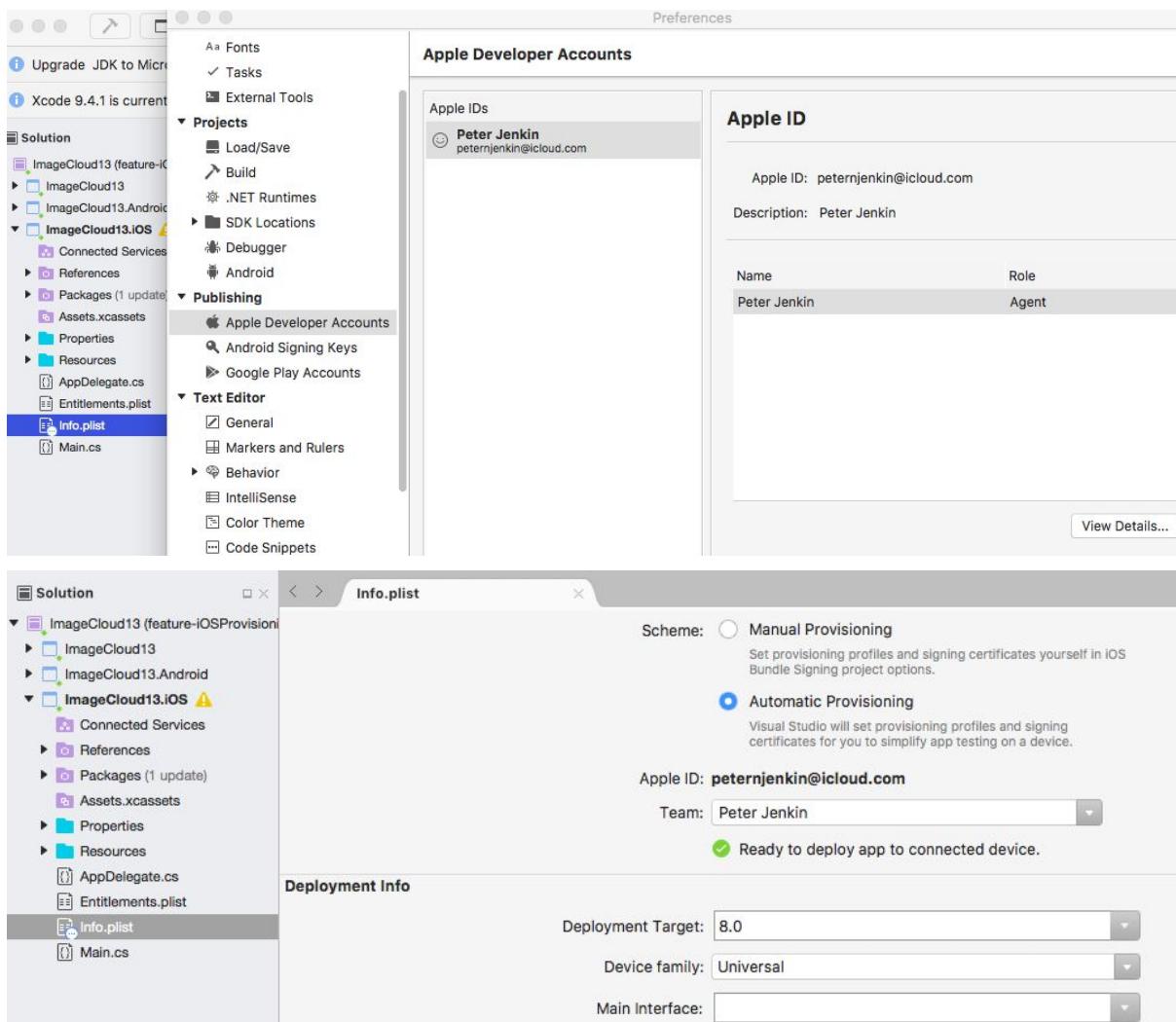
Enabling 'Connect via Network' - XCode/Window/Devices and Simulators (once connected) - find 'Connect via Network' tick box

<https://stackoverflow.com/a/23827549/11365317>



The device may then be accessible from Windows VS.





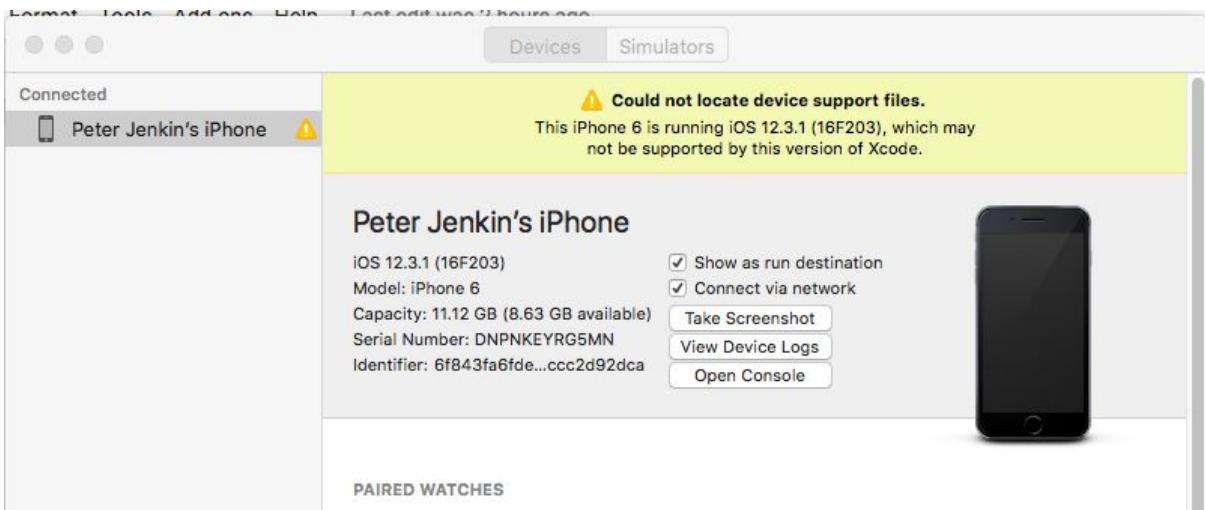
(Having previously coughed up @£100 for 1 year Apple Developer Program membership)
Also Xamarin installed Fastlane

<https://docs.microsoft.com/en-gb/xamarin/ios/deploy-test/provisioning/fastlane/>

Fastlane helpful with provisioning profile and so forth

Also set-up on Windows Visual Studio, via Tools/Preferences/Xamarin/Apple Accounts

Oh FFS - after being nagged into an iPhone update (people pleaser - aggressive assholes), suddenly this:



Don't know if this could work as my xcode is only 9.4

<https://stackoverflow.com/a/56425455/11365317>

<https://medium.com/swift2go/how-to-run-ios-12-on-real-device-using-xcode-9-51aa51df7c4>

<https://stackoverflow.com/questions/56366563/ios-12-3-1-16f203-support-files-needed>

Did this - fudging Device Support files -

/Applications/Xcode.app/Contents/Developer/Platforms/iPhoneOS.platform/DeviceSupport/12.3.1 (16A404) containing DeveloperDiskImage.dmg and

DeveloperDiskImage.dmg.signature - just copied over older most-recent folder contents, themselves a bodge of Swift notes 17-162 - to look like correct version for 12.3.1 - Xcode took 20 minute+ from Window/Devices & Simulator to build up support files (on iPhone via cable?).

Working again, and wirelessly debugging on iPhone. Even if this worked, tis only a matter of time before some other FU will occur and things will be nil.

BEWARE UPDATES !!!

Set iPhone's Auto-Lock to "Never" just because.

iOS breakpoints

<https://forums.xamarin.com/discussion/115170/anyone-with-ios-breakpoint-problems>

https://bugzilla.xamarin.com/show_bug.cgi?id=56231

Attach to process (eg 215 as listed on start of app in VS console)

Failed to attach to process: The .NET Debugger (vsdbg) has insufficient privileges to debug this process. To debug this process, vsdbg must be running with root permissions.

<https://docs.microsoft.com/en-us/xamarin/cross-platform/troubleshooting/questions/debugger-settings>

Win VS: **Portable** / root project - Options/ Build:Advanced.../Debugging Information: **Full**
Win VS: **iOS** project - Options/iOS Debug/tick **Enable debugging:** , & tick **Debug over Wifi**
Win VS: **Android** project - Options/Android Options/: [**Enable developer instrumentation (debugging and profiling)**]

Mac VS: **Portable** / root project - Options/Build|Compiler/Debug Information: **Full**
Mac VS: **iOS** project - Options/iOS Debug/ tick **Enable Debugging** (d'oh!)
Mac VS: **Android** project - Options/Android Build|Android Build/Debugging Options: [**Enable developer instrumentation (debugging and profiling)**]
RUN in DEBUG configuration NOT RELEASE !!! :-)

TODO look up Swift UI &c

TODO understand iOS Provisioning, App IDs, signing & certificates

<https://mobilefirstplatform.ibmcloud.com/tutorials/en/foundation/6.3/authentication-security/device-provisioning-concepts/>

Device provisioning is the process of attaching a certificate to the device identity.

<https://docs.aws.amazon.com/iot/latest/developerguide/iot-provision.html>

<https://docs.microsoft.com/en-us/azure/iot-dps/about-iot-dps>

Simplified Modus Op For Xamarin Classic/Native

PCL solution/project:

- To solution, add projects for Android & iOS
- in References of these, Add the PCL project.

Android:

- Add layout & activity
- In OnCreate, setContent to Resource.layout.itsname
- main_content is the starting layout and LinearLayout with android:orientation="vertical" is sanity-saving

iOS:

- Drag in ViewControllers,
- delete defaults where necessary & drag entry point,
- Ctrl-drag relationships,
- select bottom-left of VCs & set Class property to have a file made,
- UINavigationController can be handy at start
- ready for hassle with constraints

Cf , , 14-125, 25-178 for starting steps

Bad pronunciation. Terrible accent to understand. Xamarin=samin/sarin, NuGet=njeh, course=curse, IEnumerable=emirable.

What are you saying?? Use the vowels properly, and while you're at that, please learn to use the consonants as well.

Imagine ghghghhavin tu reed ah bukka on Samin uhsspel lika dee thpitha een deetha veejo.

Zero spaces between words.

So that all words run together and it'd become impossible to understand what is being said. Imagine ghghghhavintureedahbukkaonSaminuhsspellikathethpithaeendeethaveejo.

Hoping this delivery will improve.

Not trying to be <https://www.youtube.com/watch?v=TbobnfaBhcg> but...

Just about every sentence starts high in pitch and ends low in pitch.

(Delivery did not improve. A great many sentences ended with, “.... and that's it.”, similar to other Udemy catchphrases/tics (e.g. “Let's get started”, “Super excited” (which was jokey at least), &c).

TODO: UWP implementations of all of the above

TODO: print off PATH variable (system and user) at least and maybe other environment variables (for quicker dev env setup)

(\$env:path).Replace(';', "`r`n")

One notable exception is the **PATH** variable which is a **combined** result of the **system** and **user** variables: <https://superuser.com/a/878382>

git remote | %{git push \$_ --all}