Notification Hub - ANDROID - Full Doc part 2 of 2

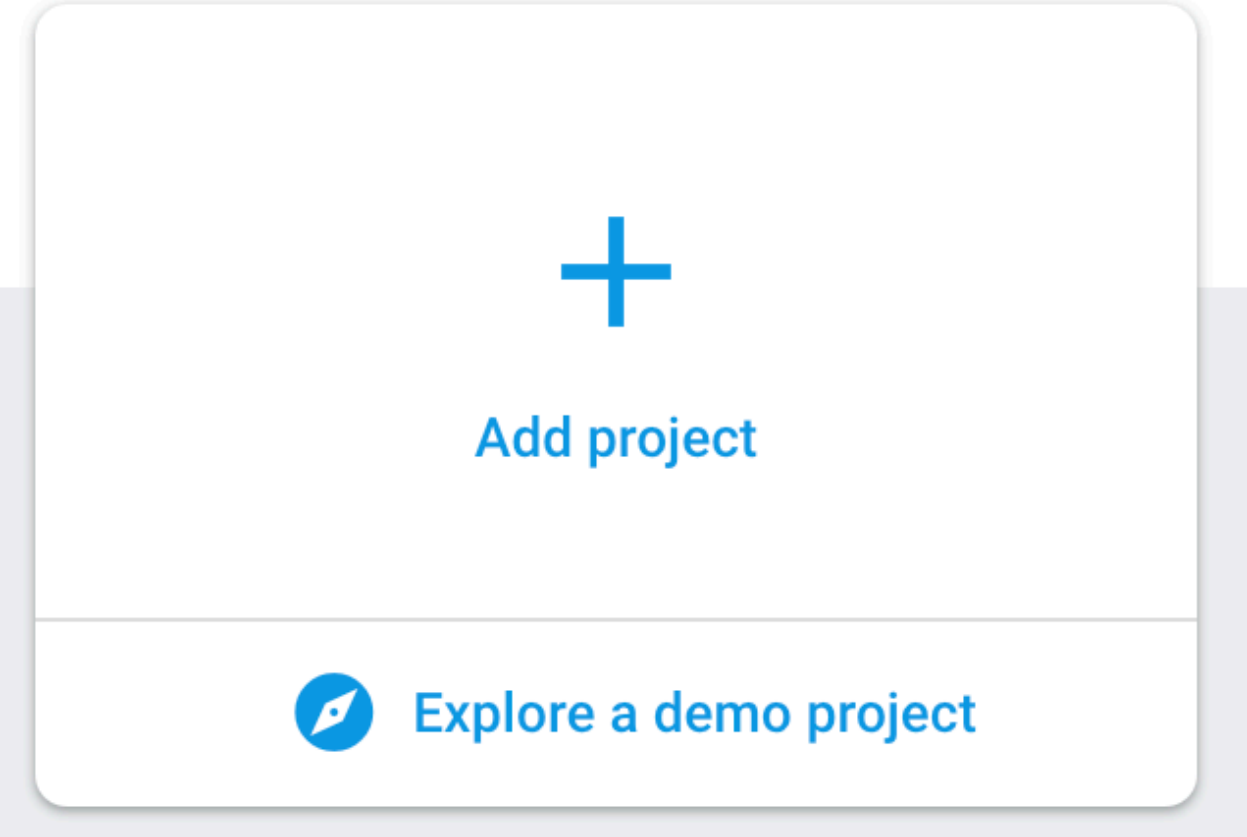
BRANCH 8

This is a continuation of Branch 2. (Yes - we've gone back close to the beginning to restart the process for the Android app.)

Android-Branch-08-XamarinFormsApp(register-with-Azure-Notification-Hub)

First get a registration going on Android's Firebase console:
Follow this tutorial:
https://docs.microsoft.com/en-us/azure/notification-hubs/xamarin-notification-hubs-push-notifications-android-gcm

FIREBASE:
https://console.firebase.google.com/?pli=1


Add project
Explore a demo project

Project name

XFPushSample

Tip: Projects span apps across platforms

Project ID

xfpushsample

Country/region

United States

Use the default settings for sharing Google Analytics for Firebase data

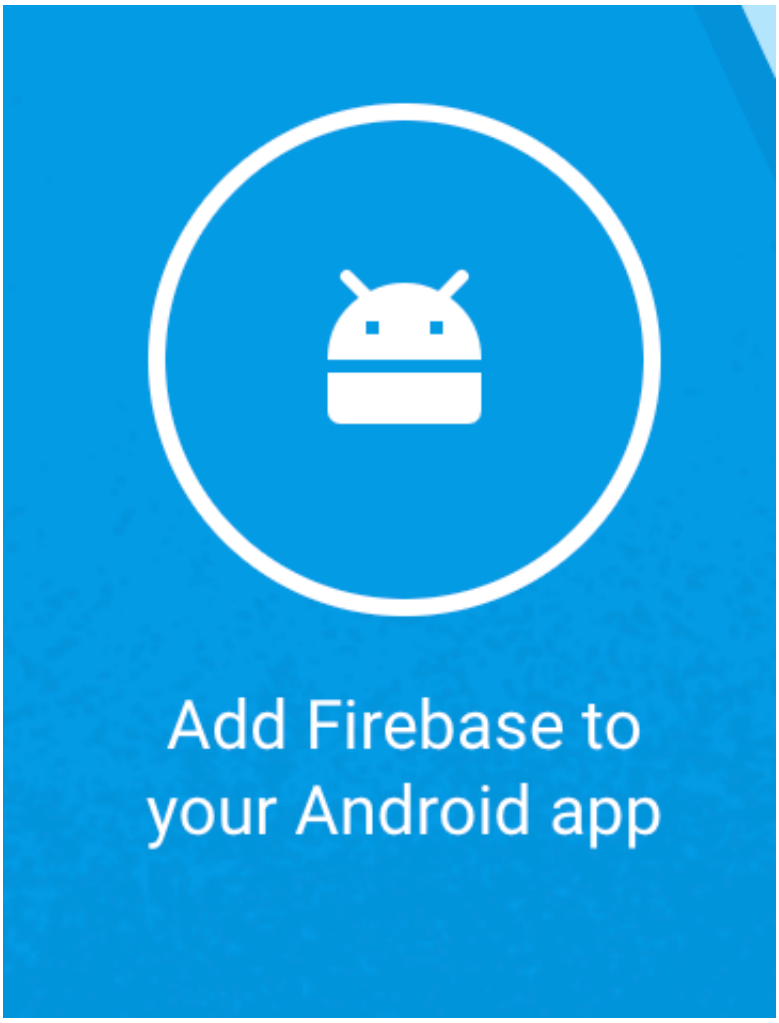
- Share your Analytics data with Google to improve Google Products and Services
- Share your Analytics data with Google to enable technical support
- Share your Analytics data with Google to enable Benchmarking
- Share your Analytics data with Google Account Specialists

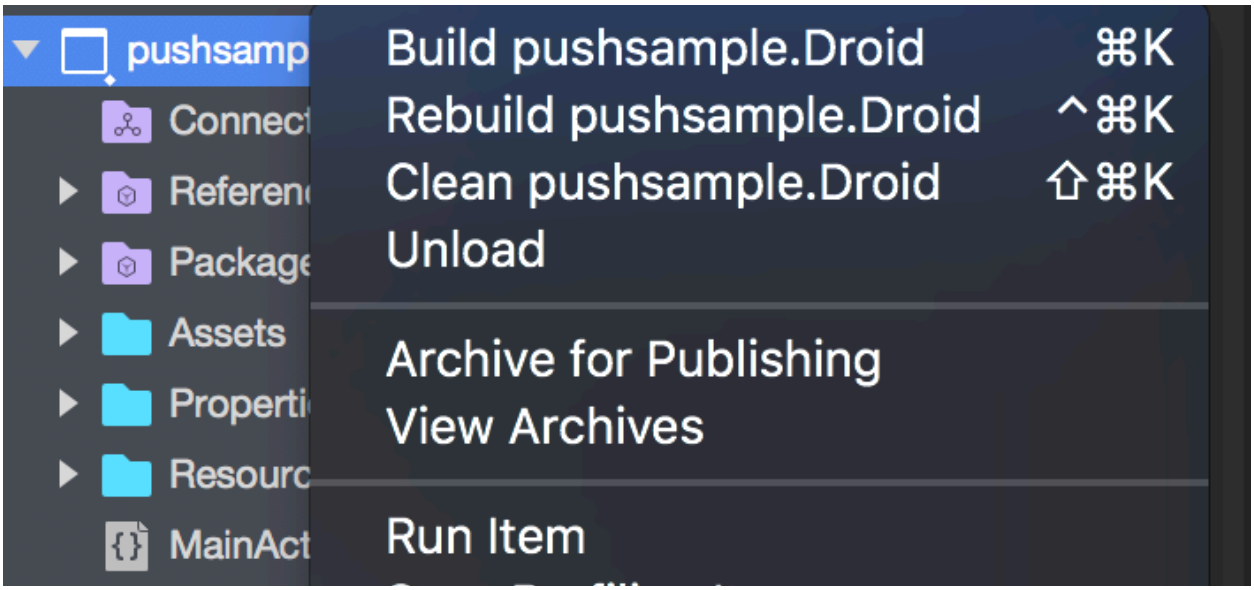
I accept the controller-controller terms. This is required when sharing Analytics data to improve Google Products and Services. Learn more

I agree that I am using Firebase services in my app and I agree to the applicable terms.

Cancel

Create project


Add Firebase to
your Android app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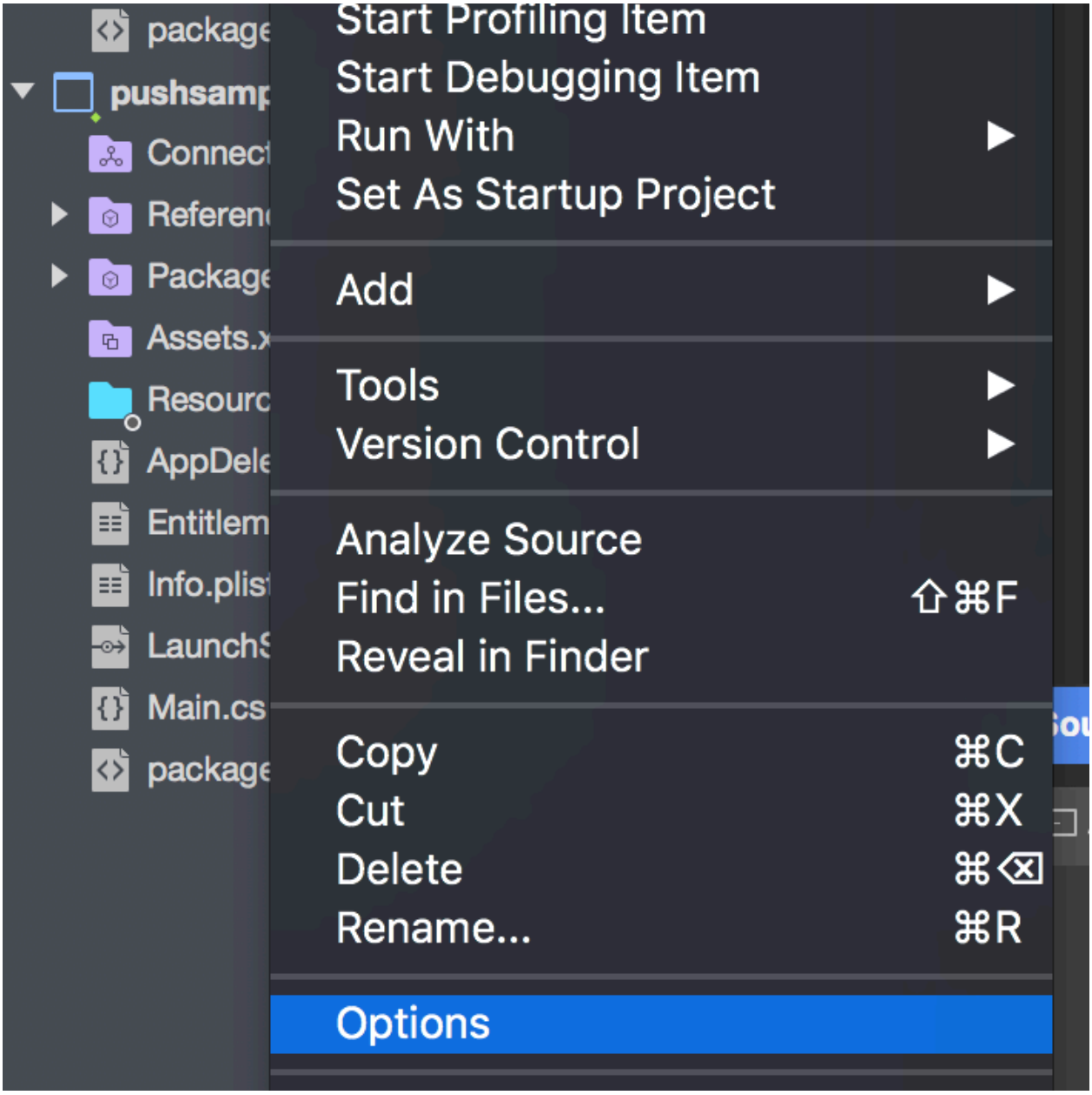
Rebuild pushsample.Droid ^⌘K
Clean pushsample.Droid ⇧⌘K
Unload
Archive for Publishing
View Archives
Run Item


package
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Version Control
Analyze Source
Find in Files... ⇧⌘F
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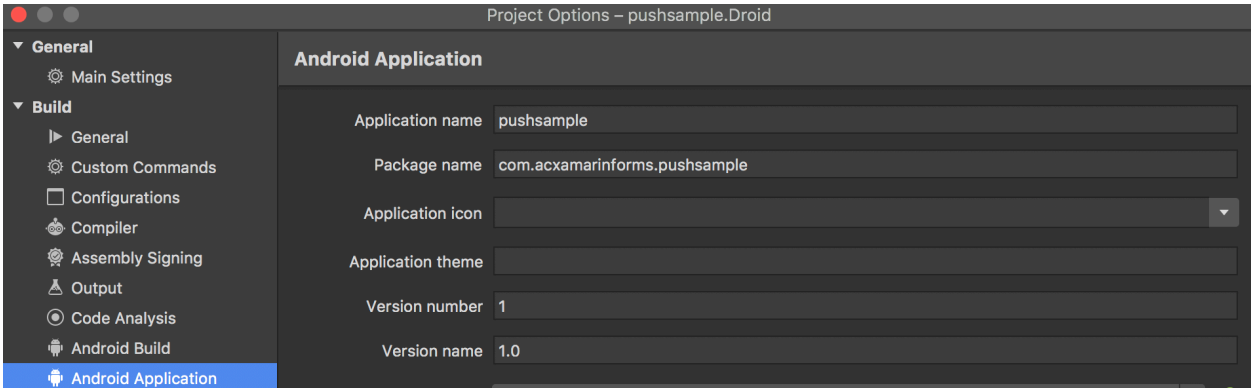
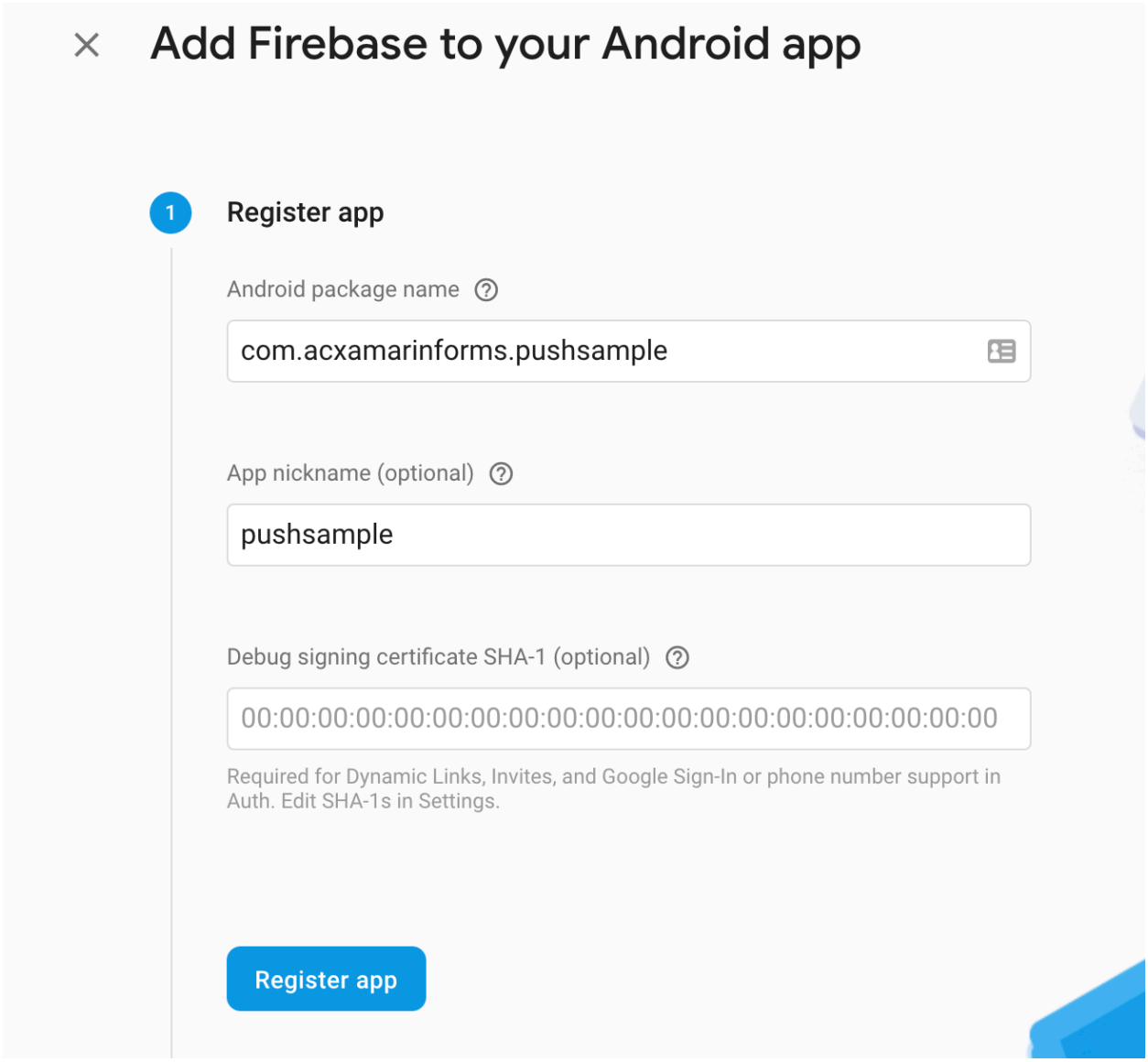
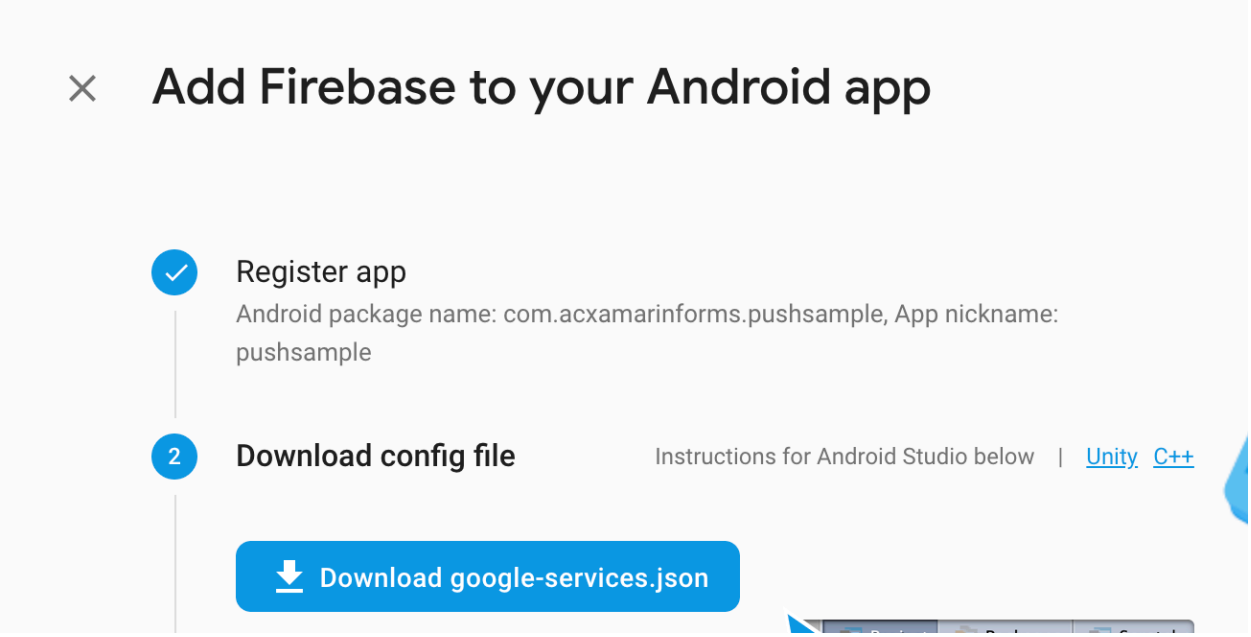
Copy ⌘C
Cut ⌘X
Delete ⌘⌫
Rename... ⌘R
Options

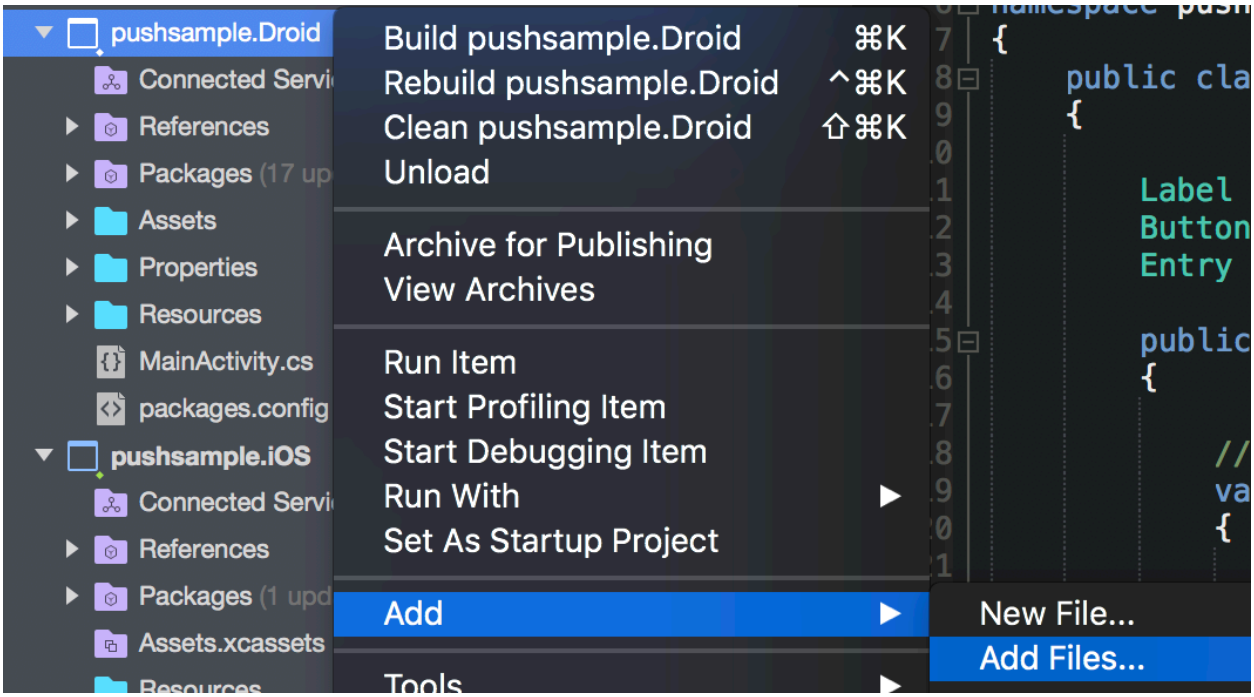

Project Options – pushsample.Droid
General
Main Settings
Build
General
Custom Commands
Configurations
Compiler
Assembly Signing
Output
Code Analysis
Android Build
Android Application
Android Application
Application name
pushsample
Package name
com.acxamarinforms.pushsample
Application icon
Application theme
Version number
1
Version name
1.0

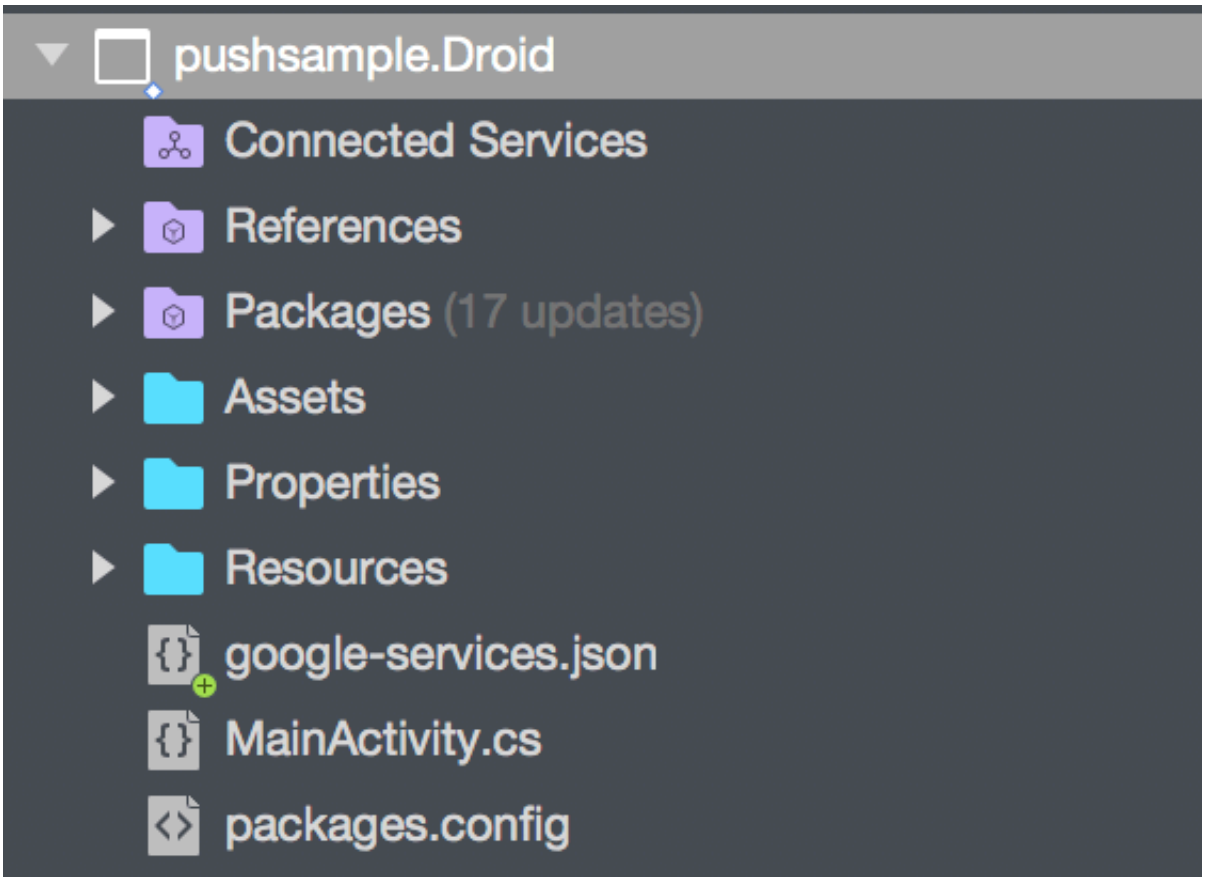

Add Firebase to your Android app
1
Register app
Android package name
com.acxamarinforms.pushsample
App nickname (optional)
pushsample
Debug signing certificate SHA-1 (optional)
00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00:00
Required for Dynamic Links, Invites, and Google Sign-In or phone number support in Auth. Edit SHA-1s in Settings.
Register app

Download this file:



And then add it to your Android project:





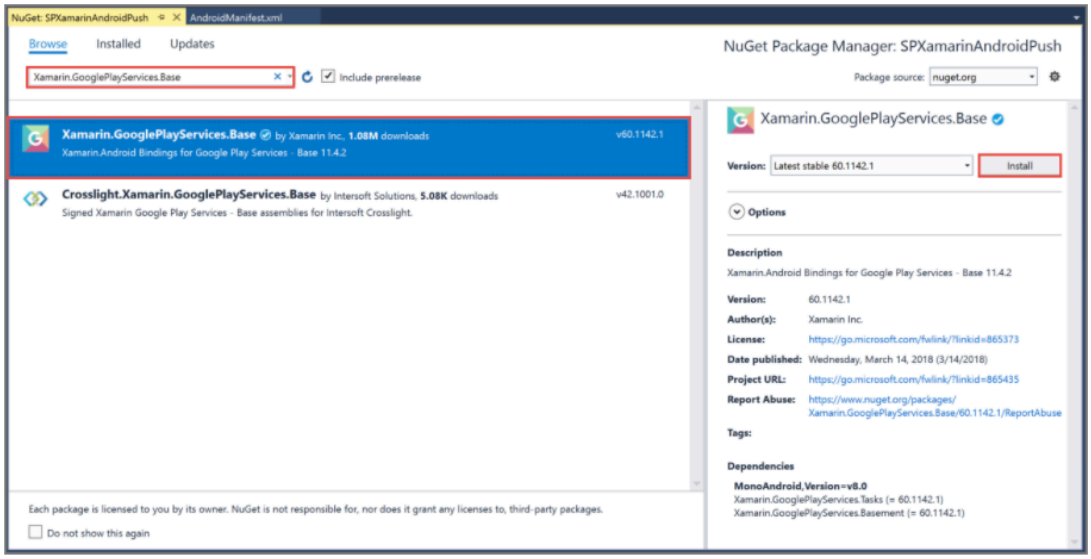
Notice the google-services.json file above.

You're going to need to change the build action of that file to **GoogleServicesJson** (right click on the file and press properties.)

However, you won't see this right away and you'll need add a Nuget package first to see it.

3. Right-click your project, and select **Manage NuGet Packages....**

4. Select the **Browse** tab. Search for **Xamarin.GooglePlayServices.Base**. Select **Xamarin.GooglePlayServices.Base** in the result list. Then, select **Install**.



And then you might need to CLEAN ALL on your project (Visual Studio - Build > Clean all)

And you may even need to restart Visual Studio.

Now - you'll need to add two more packages:

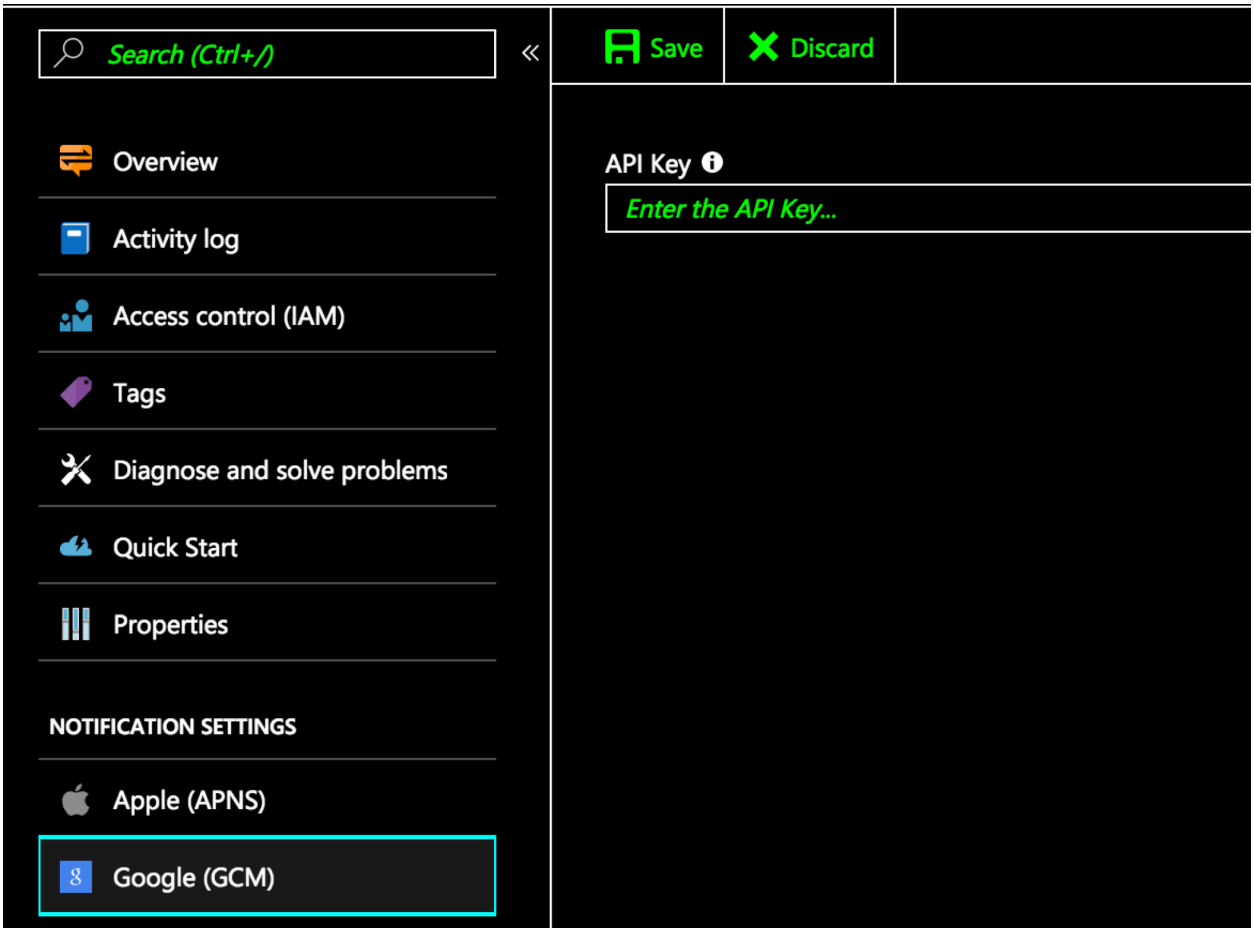
We'll also need to add these two as well:

5. In the **NuGet Package Manager** window, search for **Xamarin.Firebase.Messaging**. Select **Xamarin.Firebase.Messaging** in the result list. Then, select **Install**.
6. Now, search for **Xamarin.Azure.NotificationHubs.Android**. Select **Xamarin.Azure.NotificationHubs.Android** in the result list. Then, select **Install**.

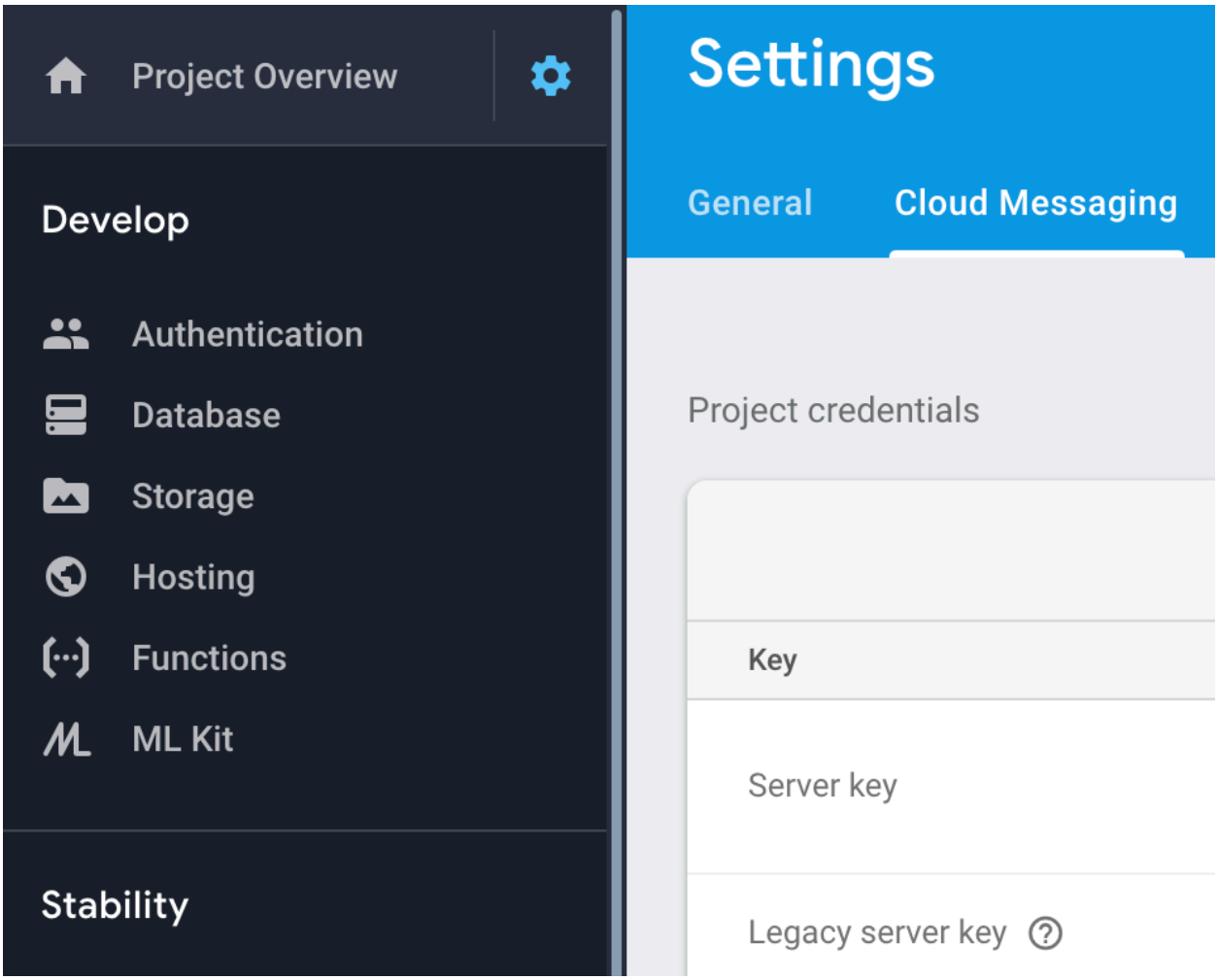
At this point - you've added the necessary files to get connect to Azure Notification Hubs and Google Firebase Messaging.
However you still haven't added the code necessary to handle the receiving of notifications… we'll handle but first — let's create the actual Azure Notification Hub.

Follow these steps (Under the heading Create a Notification Hub):
https://docs.microsoft.com/en-us/azure/notification-hubs/xamarin-notification-hubs-push-notifications-android-gcm#create-a-notification-hub

Here - I am using a new notification hub for my Android notifications.



The API key is the Legacy Server Key found here (Look for the Legacy server key found in the bottom right)

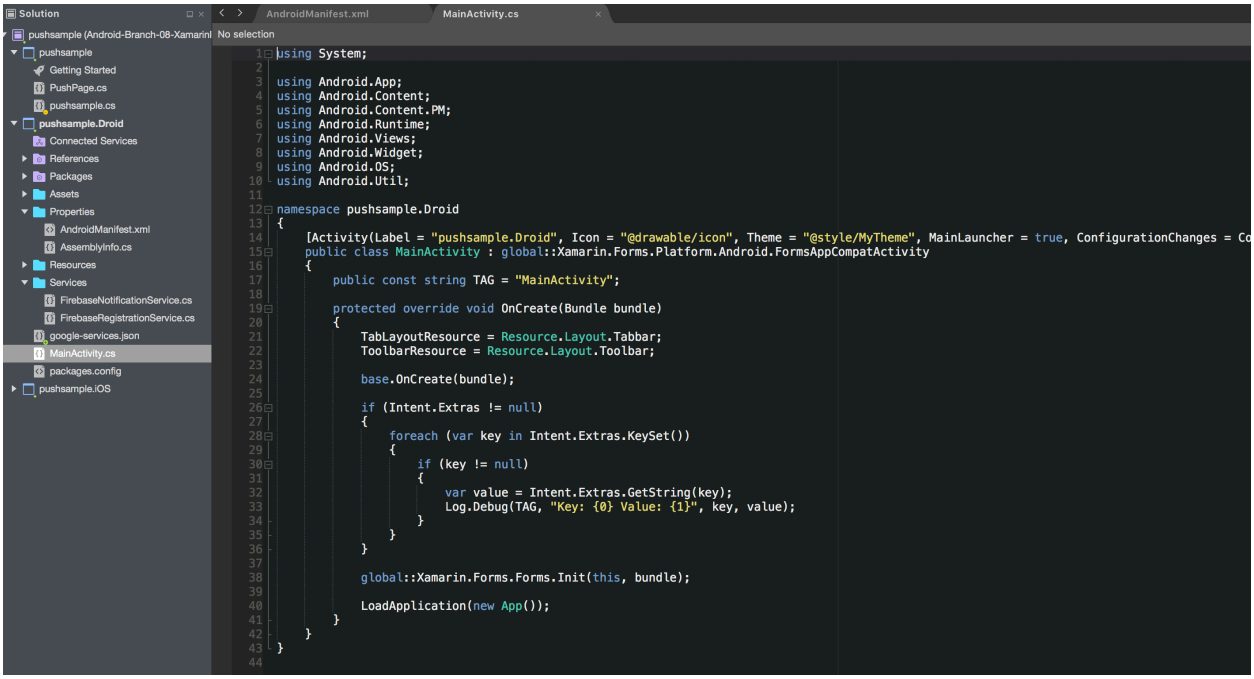


Now Azure Notification Hubs is setup, and we're going to need to add the code necessary to the Android project to appropriate listen for and handle notifications.

Let's start here:
https://docs.microsoft.com/en-us/azure/notification-hubs/xamarin-notification-hubs-push-notifications-android-gcm#registering-with-firebase-cloud-messaging

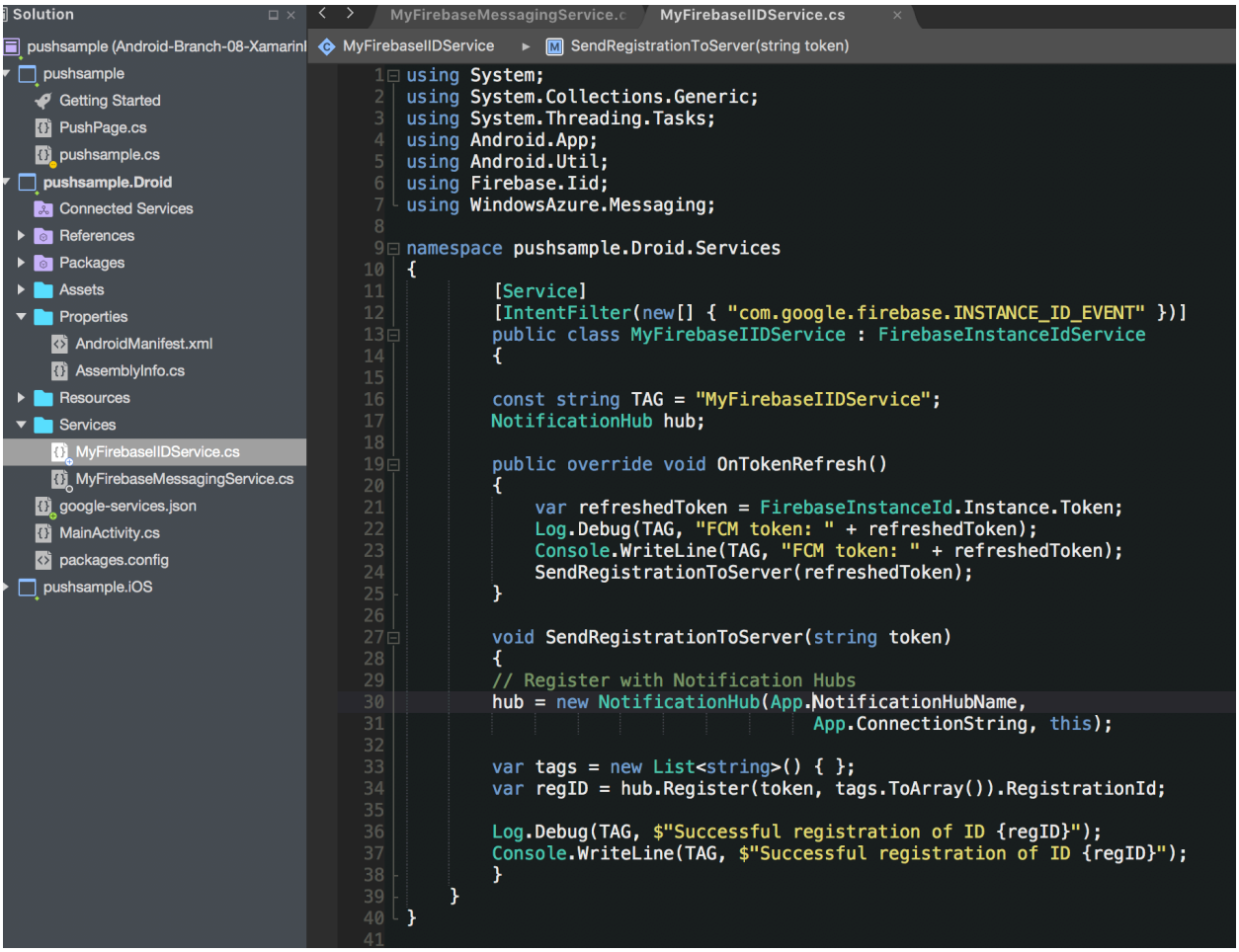
```
nanifest
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android" android:versionCode="1" android:versionName
    uses-sdk android:minSdkVersion="26" android:targetSdkVersion="27" />
    <application android:label="pushsample">
        <receiver android:name="com.google.firebase.iid.FirebaseInstanceIdInternalReceiver" android:exported="fa
        <receiver android:name="com.google.firebase.iid.FirebaseInstanceIdReceiver" android:exported="true" andr
            <intent-filter>
                <action android:name="com.google.android.c2dm.intent.RECEIVE" />
                <action android:name="com.google.android.c2dm.intent.REGISTRATION" />
                <category android:name="${applicationId}" />
            </intent-filter>
        </receiver>
    </application>
</manifest>
```

Next you'll want to add to your MainActivity.cs



Let's create a folder called Services - to create the new files: MyFirebaseIIDService.cs & MyFirebaseMessagingService.cs

MyFirebaseIIDService.cs



MyFirebaseMessagingService.cs is the next file we will need:

14. Add the following code to **MyFirebaseMessagingService.cs**:

C# Copy

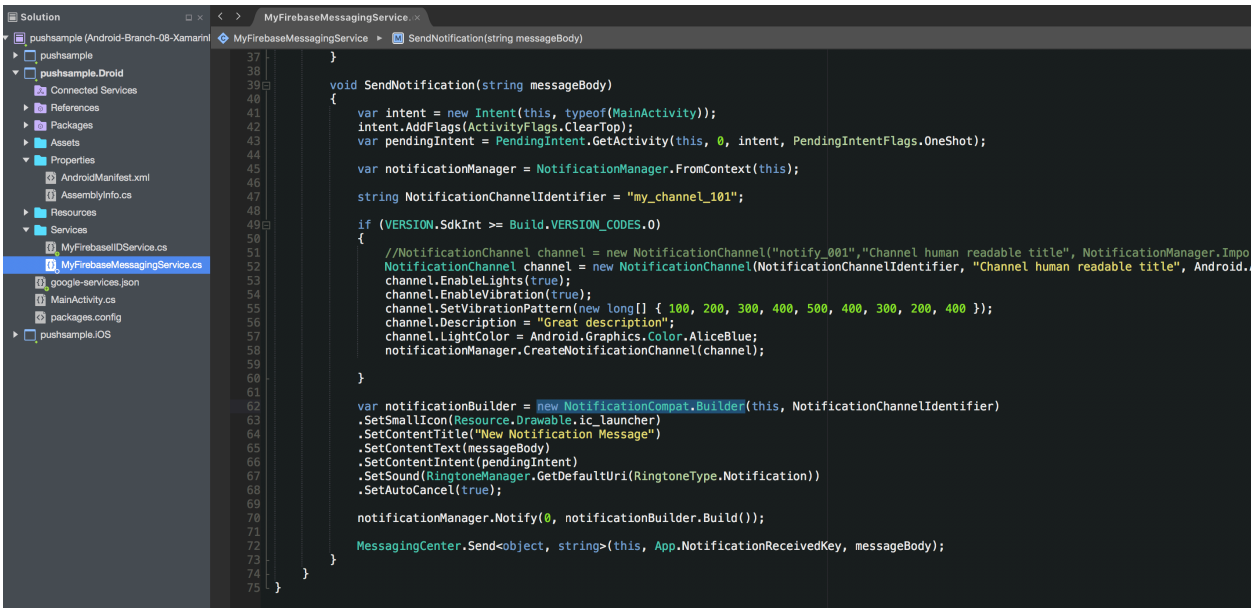
```
const string TAG = "MyFirebaseMsgService";
public override void OnMessageReceived(RemoteMessage message)
{
    Log.Debug(TAG, "From: " + message.From);
    if(message.GetNotification()!= null)
    {
        //These is how most messages will be received
        Log.Debug(TAG, "Notification Message Body: " + message.GetNotification().Body);
        SendNotification(message.GetNotification().Body);
    }
    else
    {
        //Only used for debugging payloads sent from the Azure portal
        SendNotification(message.Data.Values.First());

    }

}

void SendNotification(string messageBody)
{
    var intent = new Intent(this, typeof(MainActivity));
    intent.AddFlags(ActivityFlags.ClearTop);
    var pendingIntent = PendingIntent.GetActivity(this, 0, intent, PendingIntentFlags.On

    var notificationBuilder = new Notification.Builder(this)
                .SetContentTitle("FCM Message")
                .SetSmallIcon(Resource.Drawable.ic_launcher)
                .SetContentText(messageBody)
                .SetAutoCancel(true)
                .SetContentIntent(pendingIntent);

    var notificationManager = NotificationManager.FromContext(this);

    notificationManager.Notify(0, notificationBuilder.Build());
}
```

However, it will not work as is.

Oreo (Android 8.0+) has required the use of Notification Channels in your project otherwise those notifications will not send! (Also btw, if you are lacking a small icon you'll also not send those notifications.)

Add the Notification Channel info - and add it to your new NotificationCompat.Builder constructor. It will be ignored if you're running prior to Oreo.

So look at the SendNotification in the code — it will look like this:

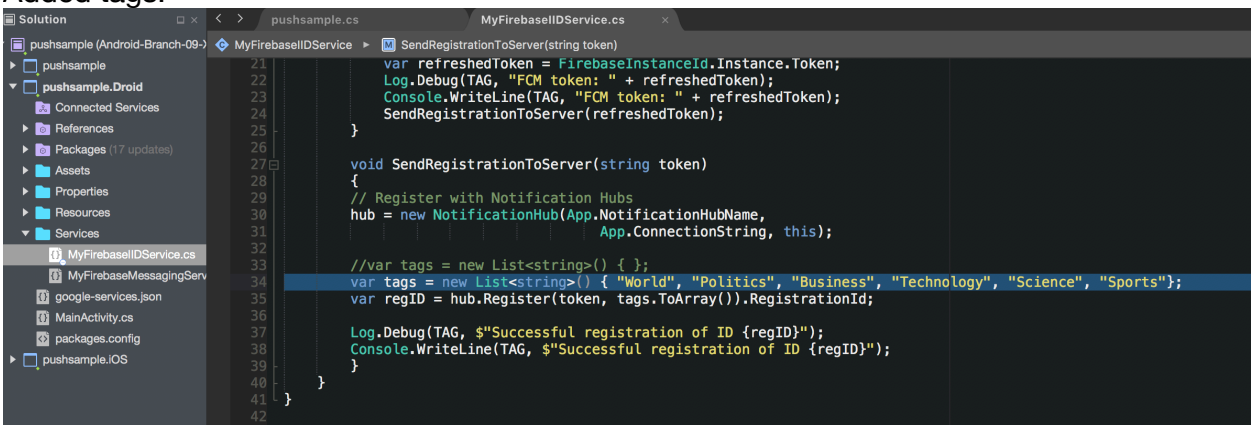


BRANCH 9

This is a continuation of Branch 8.

Android-Branch-09-XamarinFormsApp(Tags+Template+Console)

Added tags:



Added Template Registration:

```
43        void SendTemplateRegistrationToServer(string token)
44        {
45            // Register with Notification Hubs
46            hub = new NotificationHub(App.NotificationHubName, App.ConnectionString, this);
47
48            //var tags = new List<string>() { };
49            var tags = new List<string>() { "World" };
50
51            String templateBodyGCM = "{\"data\":{\"message\":\"$(messageParam)\"}}";
52
53            var regID = hub.RegisterTemplate(token, "SimpleGCMTemplate", templateBodyGCM, tags.ToArray()).RegistrationId;
54
55            Log.Debug(TAG, $"Successful registration of ID {regID}");
56            Console.WriteLine(TAG, $"Successful registration of ID {regID}");
57        }
58
59        void SendTemplateMultipleRegistrationToServer(string token)
60        {
61            // Register with Notification Hubs
62            hub = new NotificationHub(App.NotificationHubName, App.ConnectionString, this);
63
64            //var tags = new List<string>() { };
65            var tags = new List<string>() { "World", "Politics", "Business", "Technology", "Science", "Sports" };
66
67            String templateBodyGCM = "{\"data\":{\"message\":\"$(messageParam)\"}}";
68
69            var regID = hub.RegisterTemplate(token, "SimpleGCMTemplate", templateBodyGCM, tags.ToArray()).RegistrationId;
70
71            Log.Debug(TAG, $"Successful registration of ID {regID}");
72            Console.WriteLine(TAG, $"Successful registration of ID {regID}");
```

Added Console application to send 3 types of notifications:

1) Native Notification
2) Template Notification
3) Template Notification Multiple

NOTE: In case you run into issues - for the console, app - I'm running this App from my Windows Visual Studio

You can switch which notification style you would like to send here:

```
10        {
11            public static void Main(string[] args)
12            {
13
14                //SendNativeNotificationAsyncNativeAndroid();  //(native registration only)
15                //SendTemplateNotificationAsync(); //(Template registration only)
16                SendTemplateNotificationMultipleAsync(); //Tempalte registration only)
17
```

NATIVE MESSAGES:

```
private static async void SendNativeNotificationAsyncNativeAndroid()
{
    //
    //THIS WILL ONLY WORK IF IN YOUR ANDROID APPLICATION - YOU USE A NATIVE REGISTRATION
    //

    NotificationHubClient hubClient = Microsoft.Azure.NotificationHubs.NotificationHubClient.CreateClientFromConnectionString
        (
            AzureConstants.AndroidConsoleFullAccessConnectionString,
            AzureConstants.AndroidConsoleApplicationNotificationHubName,
            true
        );
    // Create an array of breaking news categories.
    var categories = new string[] { "World", "Politics", "Business", "Technology", "Science", "Sports" };

    var jsonString4 = "{\"data\":{\"message\":\"From your console - native registration\"}}";

    await hubClient.SendGcmNativeNotificationAsync(jsonString4, "World");

    //USE THIS IF YOU HAVE NOT USED TAGS IN YOUR REGISTRATION
    //HOWEVER - THE SAMPLE IN BRANCH 09 + WILL INCLUDE TAGS
    //BE SURE TO DELETE APP FROM PHONE FIRST AND REBUILD TO TRIGGER NEW REGISTRATIONS
    //await hubClient.SendGcmNativeNotificationAsync(jsonString4);

}
```

TEMPLATE MESSAGES:

```
private static async void SendTemplateNotificationAsync()
{

    //
    //THIS WILL ONLY WORK IF IN YOUR IOS APPLICATION - YOU USE A TEMPLATE REGISTRATION
    //

    NotificationHubClient hubClient = Microsoft.Azure.NotificationHubs.NotificationHubClient.CreateClientFromConnectionString
        (
            AzureConstants.AndroidConsoleFullAccessConnectionString,
            AzureConstants.AndroidConsoleApplicationNotificationHubName,
            true
        );
    // Create an array of breaking news categories.
    var categories = new string[] { "World", "Politics", "Business", "Technology", "Science", "Sports" };

    Dictionary<string, string> templateParams = new Dictionary<string, string>();
    //{
    //    { "messageParam", "Hello World"}
    //};
    //SINGLE NOTIFICATION
    templateParams["messageParam"] = "Breaking " + categories[0] + " News!";
    await hubClient.SendTemplateNotificationAsync(templateParams, "World");

    //MULTIPLE NOTIFICATIONS
    //await hubClient.SendTemplateNotificationAsync(templateParams, categories);
}
```

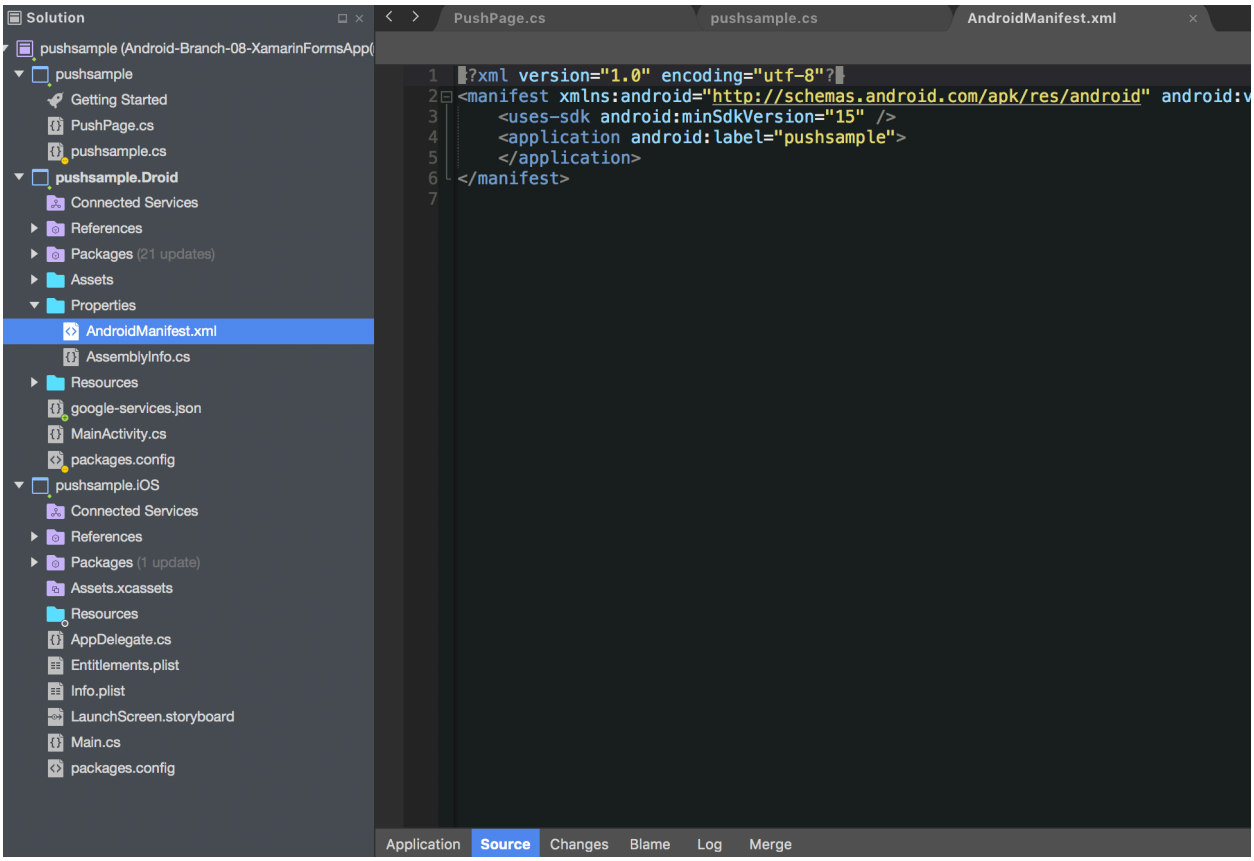
~~https://docs.microsoft.com/en-us/azure/notification-hubs/xamarin-notification-hubs-push-notifications-android-gcm#registering-with-firebase-cloud-messaging~~

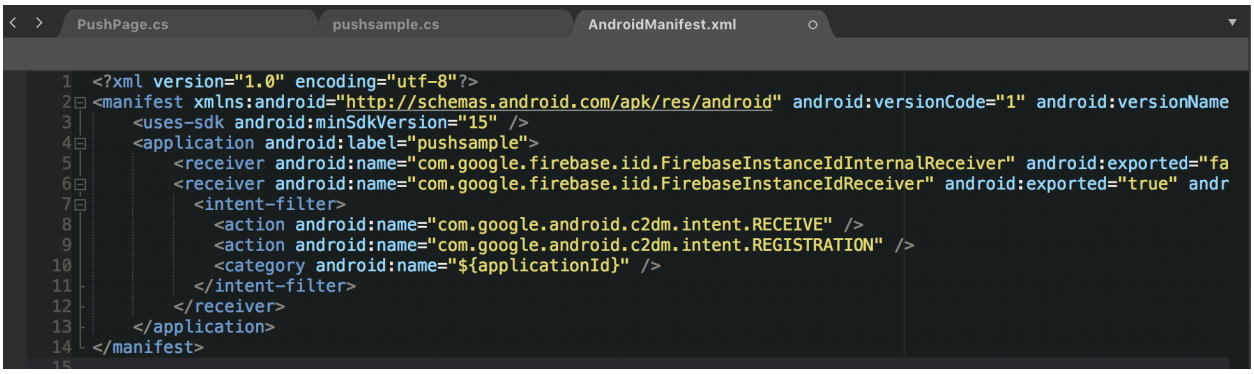
I'm going to switch it up and add the code from this Xamarin.Forms specific project - however, there will be some modifications as we will not be using the Mobile App back end for our registrations - we will either do it directly from the client or do it via an Azure Function: https://docs.microsoft.com/en-us/xamarin/xamarin-forms/data-cloud/push-notifications/azure#android-1

Notice the process is similar to iOS - you need to (ask for a token) and then (handle the receipt of the token).

In case you're not sure where to put the code for this section: https://docs.microsoft.com/en-

us/xamarin/xamarin-forms/data-cloud/push-notifications/azure#declaring-the-receiver-in-the-android-manifest: Look below - and then put the code between the <application tags> below:





So there are two things happening here.
First the Firebase Instance Receiver will basically get Firebase Messages (your messages) and Firebase Instance Id (your client registration).
And then it will send those as appropriate to your internal FirebaseInstanceIdInternalReceiver.

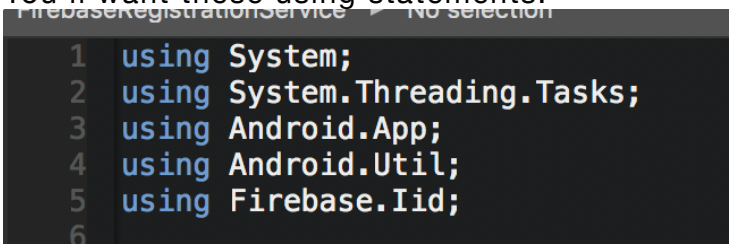
ie.

The `FirebaseInstanceIdReceiver` receives `FirebaseInstanceId` and `FirebaseMessaging` even ts and delivers them to the class that's derived from `FirebasesInstanceIdService`.

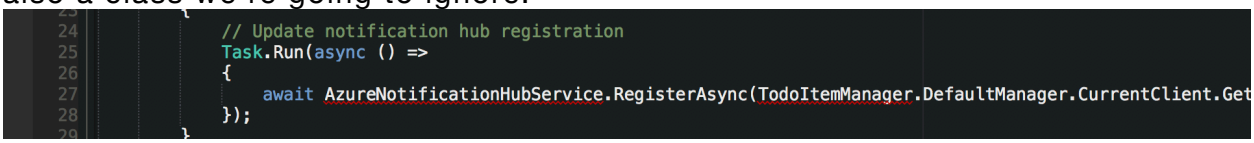
For the next step: Implementing the Firebase Instance ID Service (https://docs.microsoft.com/en-us/xamarin/xamarin-forms/data-cloud/push-notifications/azure#implementing-the-firebase-instance-id-service)

You'll need to create a new C# class — and you'll probably also want to put this in a new folder because we'll be adding a couple files to your project.
Create a new folder called: Services.

You'll want these using statements:



And you can ignore this line for now - it includes a class we'll make next and also a class we're going to ignore:



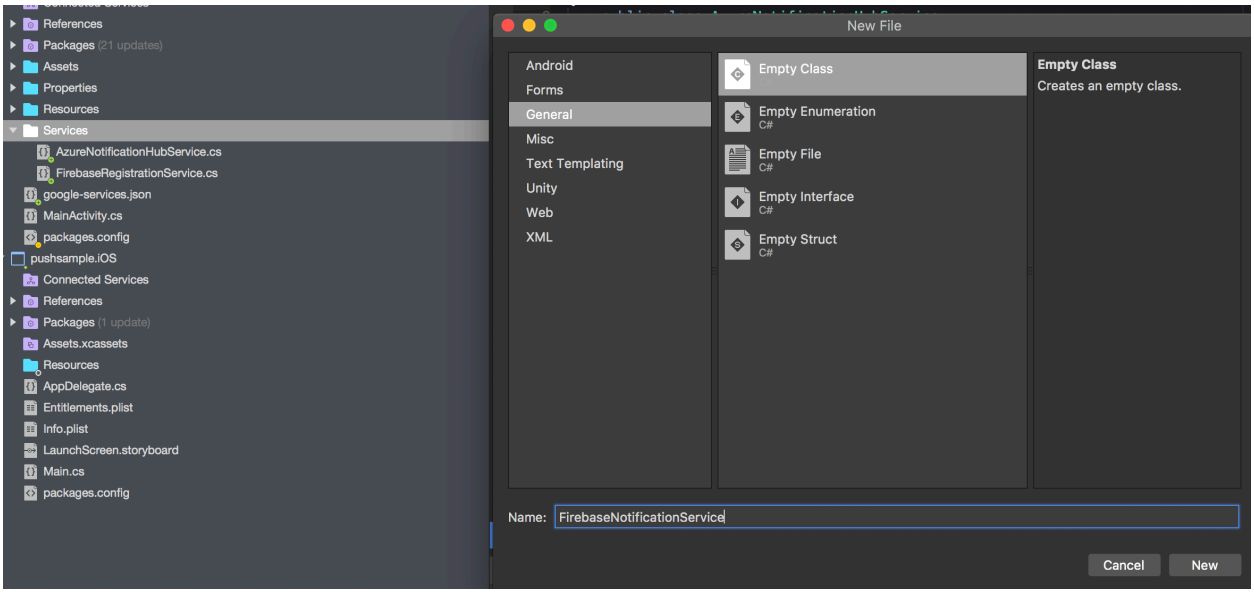
For the next step it should look like this - don't worry about the word Push - we'll be fixing / modifying this:
https://docs.microsoft.com/en-us/xamarin/xamarin-forms/data-cloud/push-notifications/azure#registering-with-the-azure-notification-hub

AzureNotificationHubService ▸ RegisterAsync(Push push, string token)

```
using System;
using System.Threading.Tasks;
using Android.Util;
using Newtonsoft.Json.Linq;

namespace pushsample.Droid.Services
{
    public class AzureNotificationHubService
    {
        const string TAG = "AzureNotificationHubService";

        public static async Task RegisterAsync(Push push, string token)
        {
            try
            {
                const string templateBody = "{\"data\":{\"message\":\"$(messageParam)\"}}";
                JObject templates = new JObject();
                templates["genericMessage"] = new JObject
                {
                    {"body", templateBody}
                };

                await push.RegisterAsync(token, templates);
                Log.Info("Push Installation Id: ", push.InstallationId.ToString());
            }
            catch (Exception ex)
            {
                Log.Error(TAG, "Could not register with Notification Hub: " + ex.Message);
            }
        }
    }
}
```

For the next step:
https://docs.microsoft.com/en-us/xamarin/xamarin-forms/data-cloud/push-notifications/azure#displaying-the-contents-of-a-push-notification

Create a new class in the Services:



The final file will look like this:

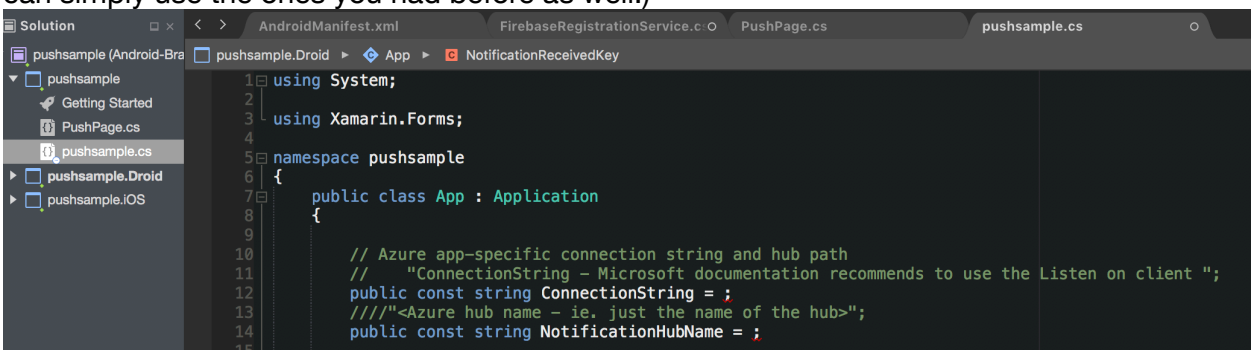
```
using System;
using Android.App;
using Android.Content;
using Android.Media;
using Android.Support.V4.App;
using Android.Util;
using Firebase.Messaging;

namespace pushsample.Droid.Services
{
    [Service]
    [IntentFilter(new[] { "com.google.firebase.MESSAGING_EVENT" })]
    public class FirebaseNotificationService : FirebaseMessagingService
    {
        const string TAG = "FirebaseNotificationService";

        public override void OnMessageReceived(RemoteMessage message)
        {
            Log.Debug(TAG, "From: " + message.From);

            // Pull message body out of the template
            var messageBody = message.Data["message"];
            if (string.IsNullOrWhiteSpace(messageBody))
                return;

            Log.Debug(TAG, "Notification message body: " + messageBody);
            SendNotification(messageBody);
        }

        void SendNotification(string messageBody)
        {
            var intent = new Intent(this, typeof(MainActivity));
            intent.AddFlags(ActivityFlags.ClearTop);
            var pendingIntent = PendingIntent.GetActivity(this, 0, intent, PendingIntentFlags.OneShot);

            var notificationBuilder = new NotificationCompat.Builder(this)
                .SetSmallIcon(Resource.Drawable.ic_stat_ic_notification)
                .SetContentTitle("New Todo Item")
                .SetContentText(messageBody)
                .SetContentIntent(pendingIntent)
                .SetSound(RingtoneManager.GetDefaultUri(RingtoneType.Notification))
                .SetAutoCancel(true);

            var notificationManager = NotificationManager.FromContext(this);
            notificationManager.Notify(0, notificationBuilder.Build());
        }
    }
}
```

You'll need to add one image to make this fully work:
You'll need this file (Look for the Download button) and then right click and do a save as in the next screen to get it on your computer:
https://github.com/xamarin/xamarin-forms-samples/blob/master/WebServices/TodoAzurePush/Droid/Resources/drawable/ic_stat_ic_notification.png

You'll want to get it in your drawable folder and change the Build Action setting (by right clicking on the file) to an AndroidResource if it is not set that way automatically.

NOW - we're going to switch gears - we're going to now modify the above app to register directly from the app.
https://docs.microsoft.com/en-us/azure/notification-hubs/xamarin-notification-hubs-push-notifications-android-gcm

You'll need to create a Notification Hub Client so let's get the appropriate strings from the portal - in the case we want a Access Policy > with only LISTEN privileges. Second, we just the Notification Hub Name (this is similar to steps we've done in previous branches and you can simply use the ones you had before as well.)



Second - let's do the following:

5. Add an instance variable to **MainActivity.cs** that will be used to show an alert dialog when the app is running:

```
C#                                                                    Copy

    public const string TAG = "MainActivity";
```

6. Add the following code to `OnCreate` in **MainActivity.cs** after `base.OnCreate(savedInstanceState)`:

```
C#                                                                    Copy

    if (Intent.Extras != null)
    {
        foreach (var key in Intent.Extras.KeySet())
        {
            if(key!=null)
            {
                var value = Intent.Extras.GetString(key);
                Log.Debug(TAG, "Key: {0} Value: {1}", key, value);
            }
        }
    }
```

Now in Firebase Registration Service - make the following changes:

```
using System;
using System.Collections.Generic;
using System.Threading.Tasks;
using Android.App;
using Android.Util;
using Firebase.Iid;
using WindowsAzure.Messaging;

namespace pushsample.Droid.Services
{
    [Service]
    [IntentFilter(new[] { "com.google.firebase.INSTANCE_ID_EVENT" })]
    public class FirebaseRegistrationService : FirebaseInstanceIdService
    {
        const string TAG = "FirebaseRegistrationService";

        NotificationHub hub;

        public override void OnTokenRefresh()
        {
            var refreshedToken = FirebaseInstanceId.Instance.Token;
            Log.Debug(TAG, "Refreshed token: " + refreshedToken);
            SendRegistrationTokenToAzureNotificationHub(refreshedToken);
        }

        void SendRegistrationTokenToAzureNotificationHub(string token)
        {
            // Update notification hub registration
            //Task.Run(async () =>
            //{
            //    await AzureNotificationHubService.RegisterAsync(TodoItemManager.DefaultManager.CurrentClient.GetPush(), token);
            //});

            hub = new NotificationHub(App.NotificationHubName,
                                      App.ConnectionString, this);

            var tags = new List<string>() { };
            var regID = hub.Register(token, tags.ToArray()).RegistrationId;

            Log.Debug(TAG, $"Successful registration of ID {regID}");

        }
    }
}

```

BRANCH 10

Continuation of Branch 9:

Android-Branch-10-PushViaFunction-1

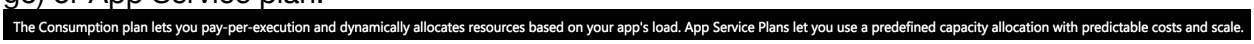
Azure Functions will be used to trigger the notification.
The Function is currently HTTP trigger and anonymous.

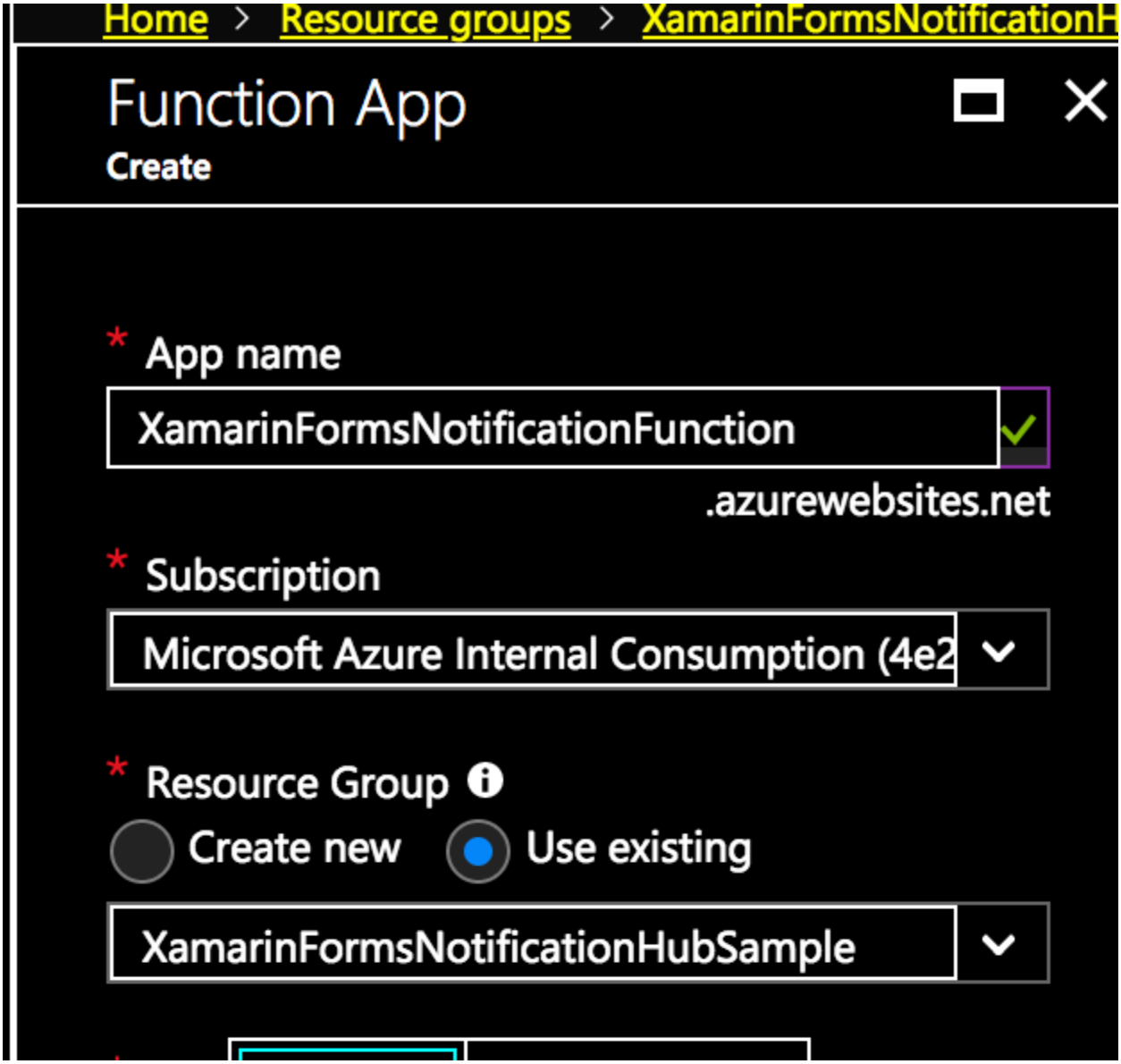
(THIS IS THE PRINTOUT OF BRANCH 3 EARLIER)
Create Azure Function:
This tutorial will at first use an anonymous function - but security should of course be a consideration in the production environment: https://docs.microsoft.com/en-us/azure/azure-functions/

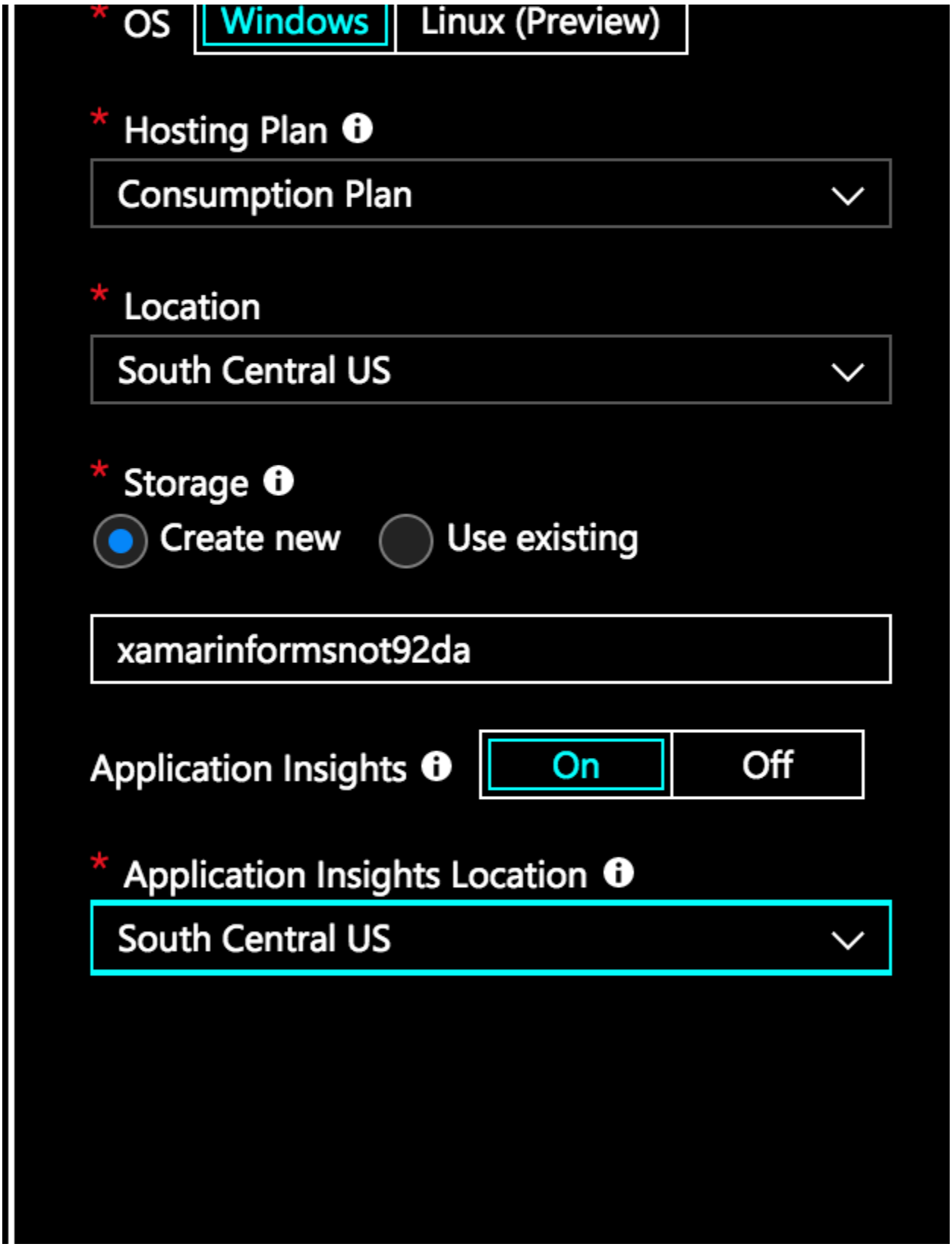
The setup of Azure Function is best described here (in terms of what is required in Visual Studio and a quick setup):
If you've never used an Azure Function - I would start with the following two tutorials.

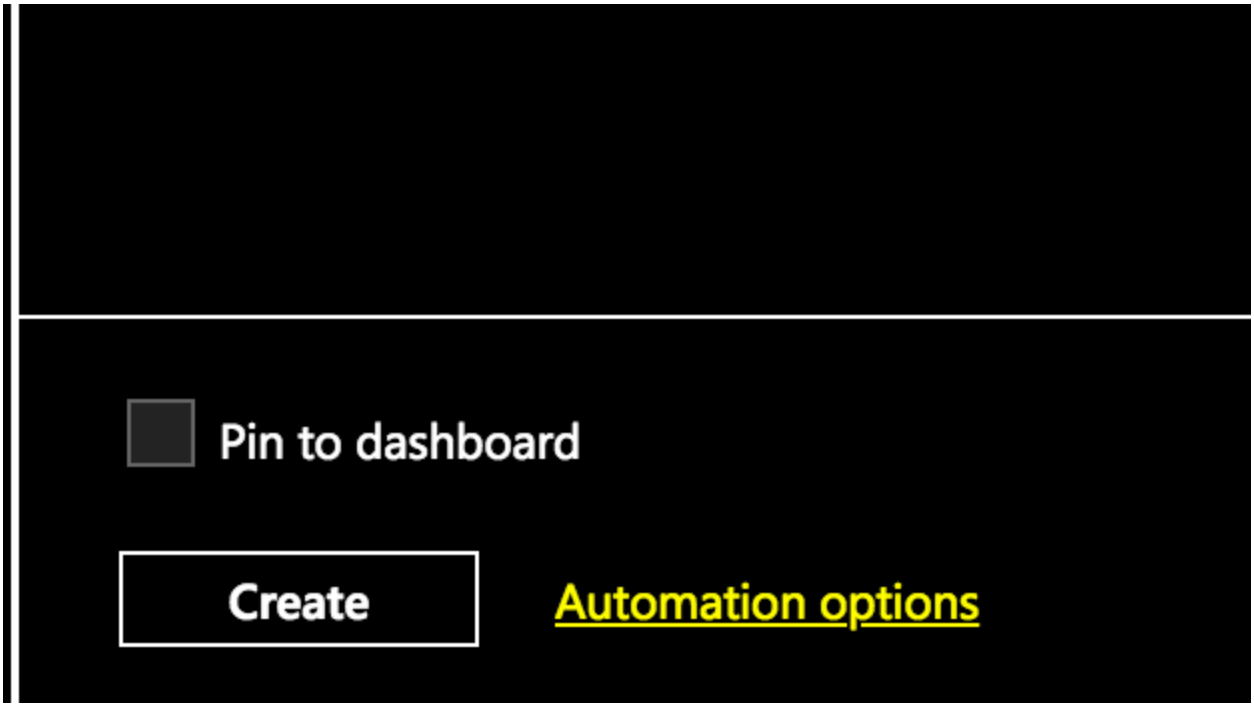
https://docs.microsoft.com/en-us/azure/azure-functions/functions-create-first-azure-function
https://docs.microsoft.com/en-us/azure/azure-functions/functions-create-your-first-function-visual-studio

You can use these setting generally - the Hosting Plan can either be consumption (pay as you go) or App Service plan:

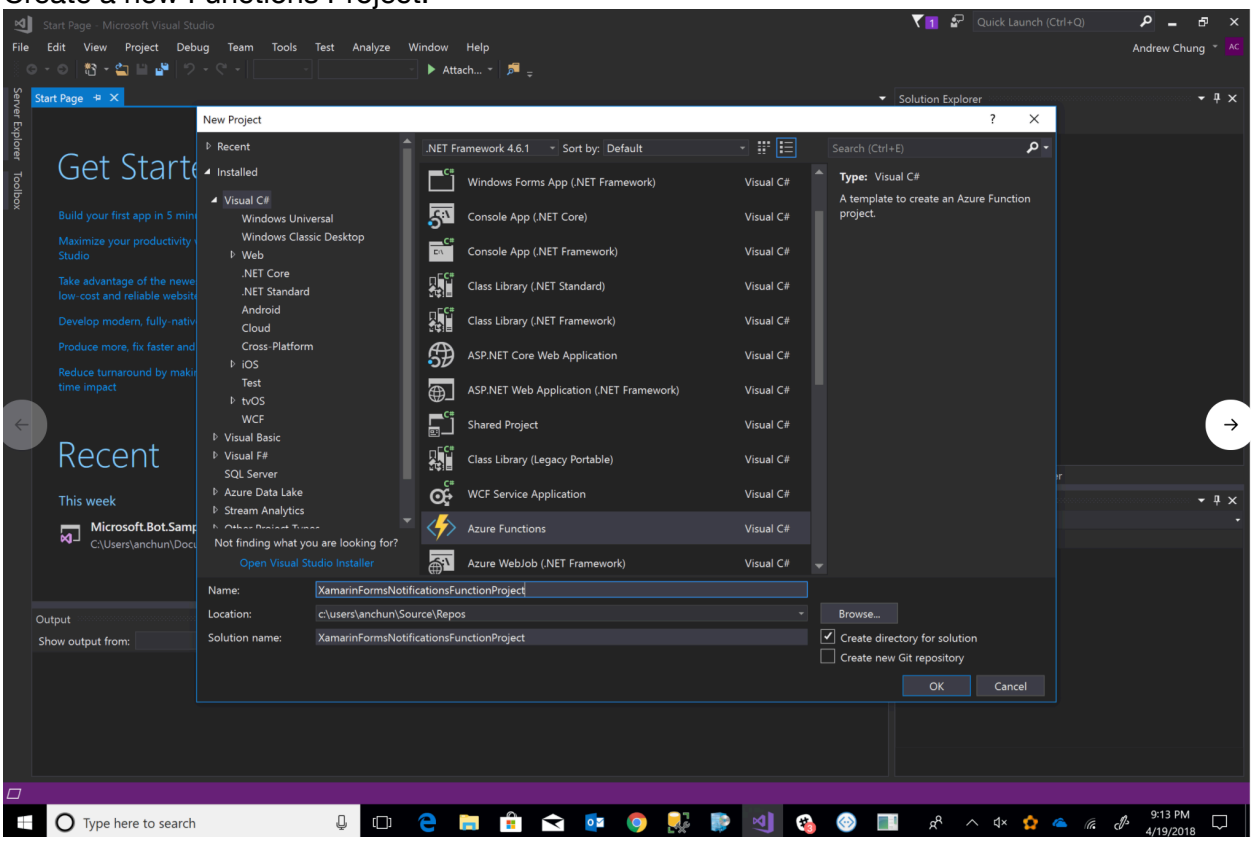




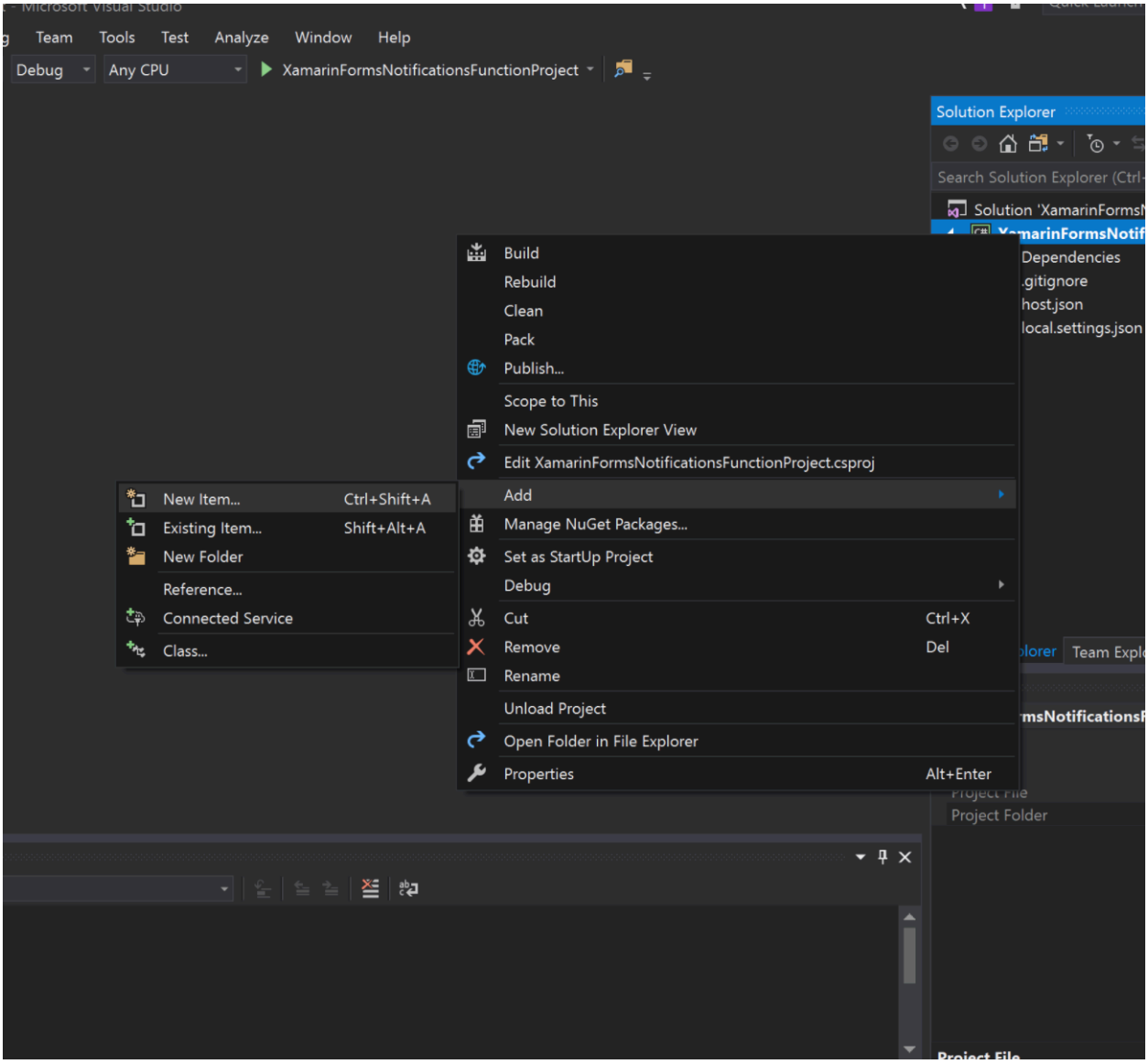

* OS
Windows
Linux (Preview)
* Hosting Plan
Consumption Plan
* Location
South Central US
* Storage
Create new
Use existing
xamarinformsnot92da
Application Insights
On
Off
* Application Insights Location
South Central US



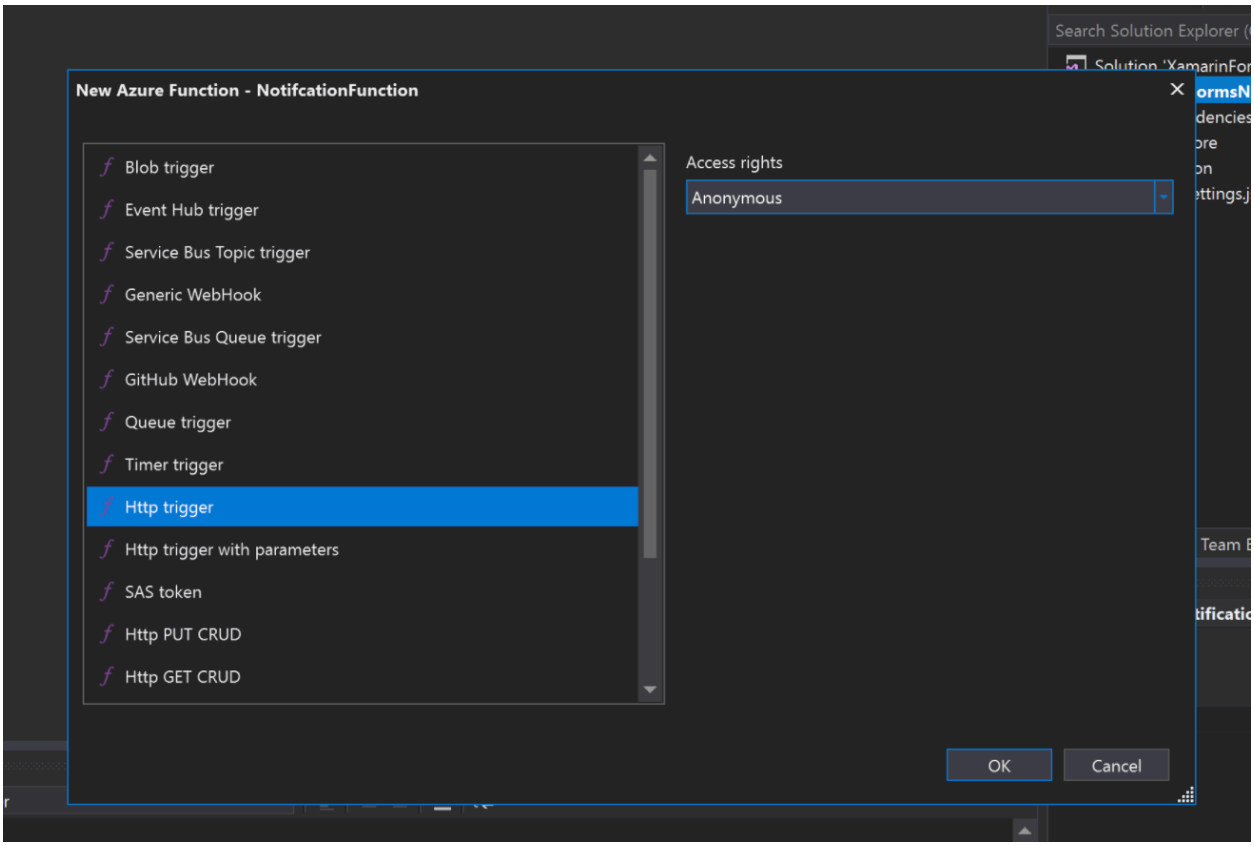
Create a new Functions Project:



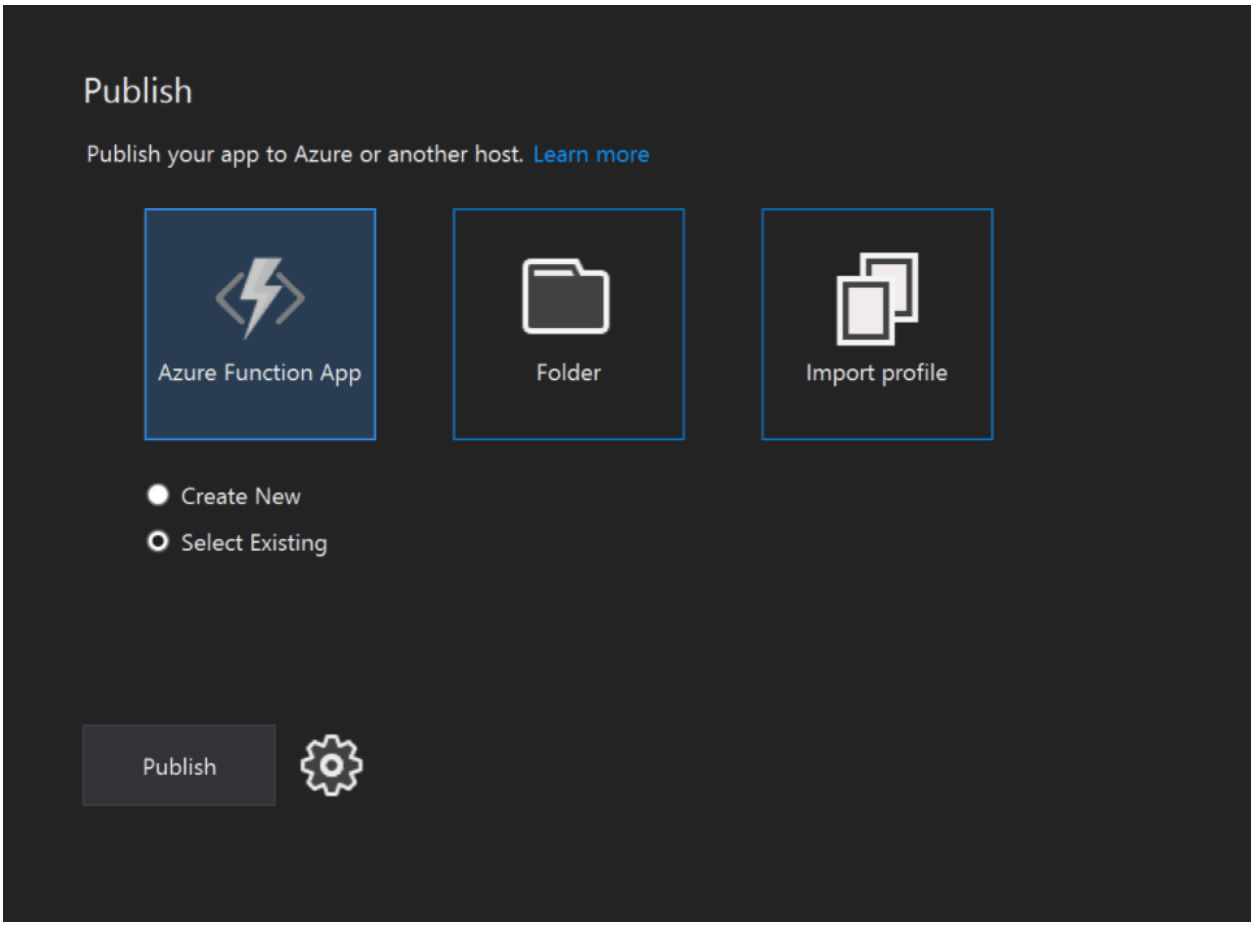
And a New Item:



This tutorial will at first use an anonymous function - but security should of course be a consideration in the production environment: https://docs.microsoft.com/en-us/azure/azure-functions/

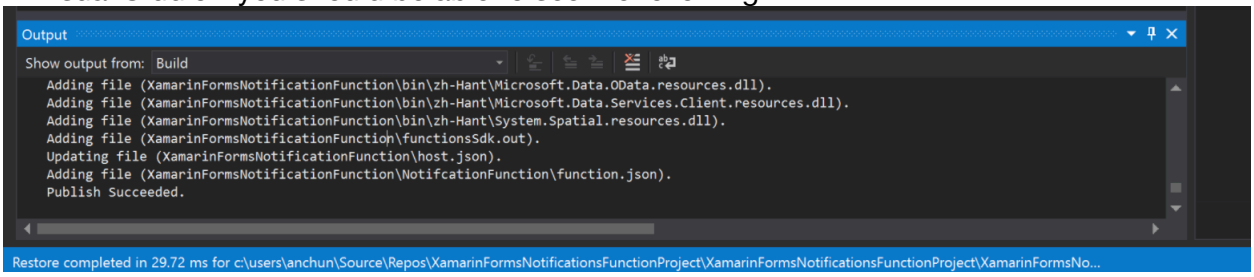


Right Click your Function project to Publish.
Choose “Select Existing”
Press Publish



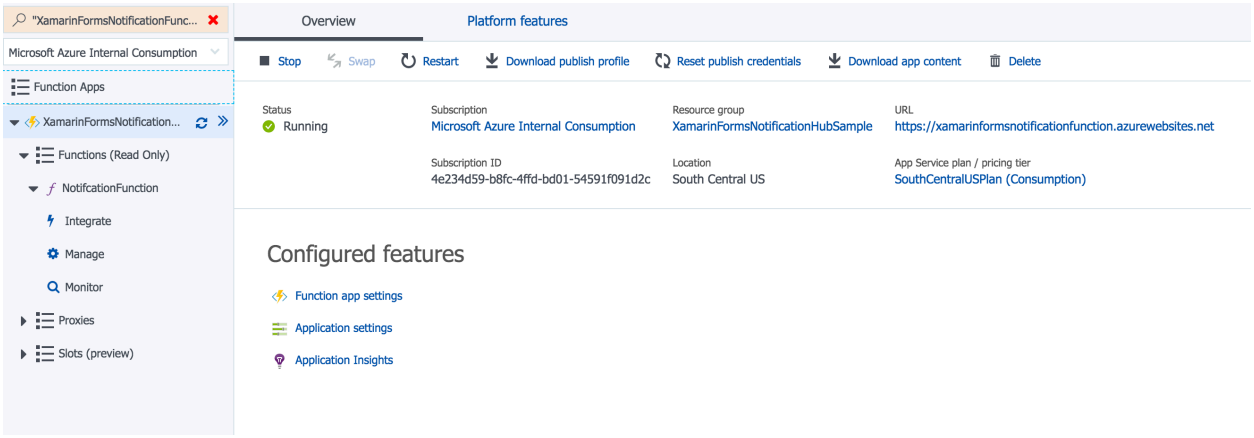
You'll be asked for your credentials and then once you log in - you'll be able to see your Resource Group —> then Select your Functions App that you created.
Then press Publish.

In Visual Studio - you should be able to see the following:



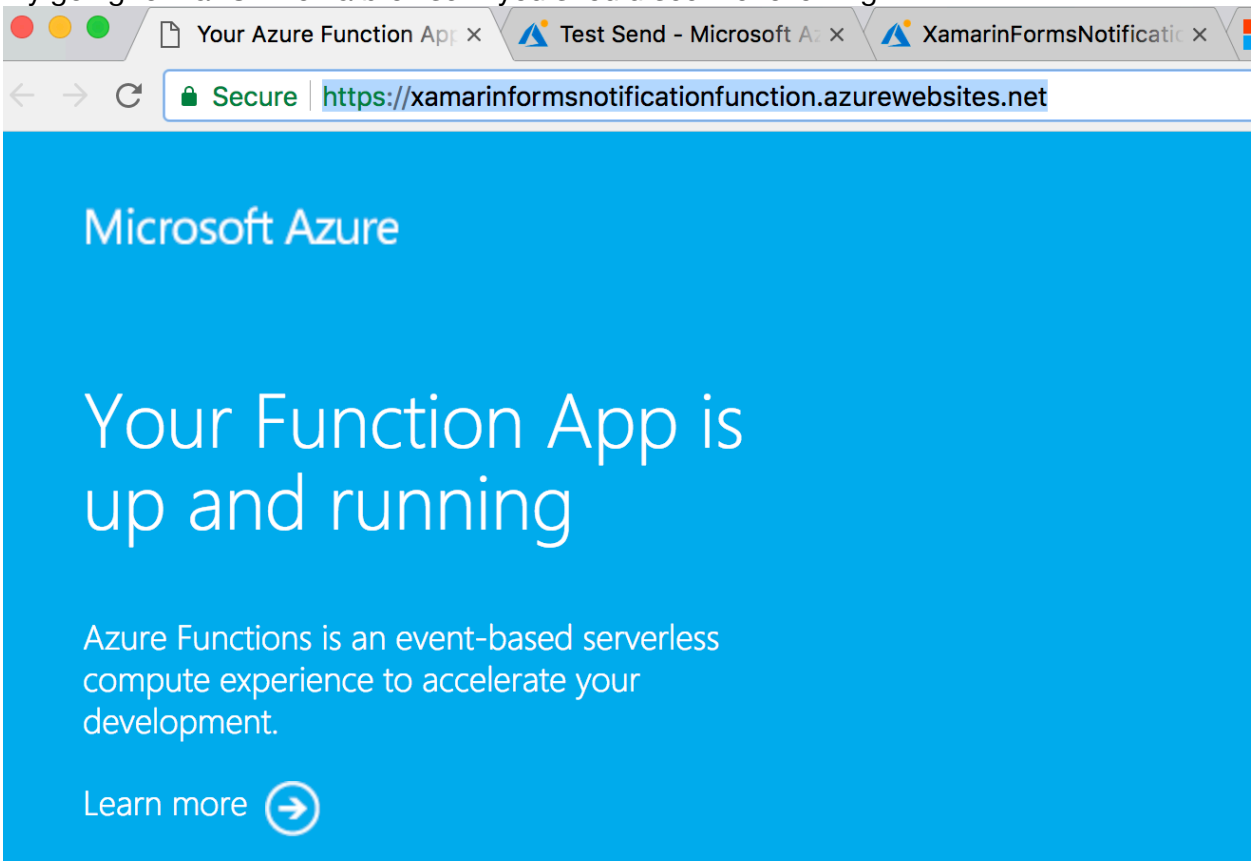
Go back to the Azure portal - back into the Function app you created:

You should see something like this:



Notice the Url on the upper right?

Try going to that URL on a browser - you should see the following:

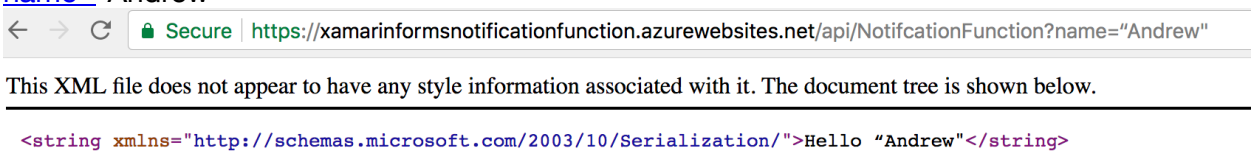


Then try <YOUR_URL> / api / {Name of your Function that you defined in your code }

```
amespace XamarinFormsNotificationsFunctionProject

    public static class NotifcationFunction
    {
        [FunctionName("NotifcationFunction")]
        public static async Task<HttpResponseMessage
```

Mine is: https://xamarinformsnotificationfunction.azurewebsites.net/api/NotifcationFunction

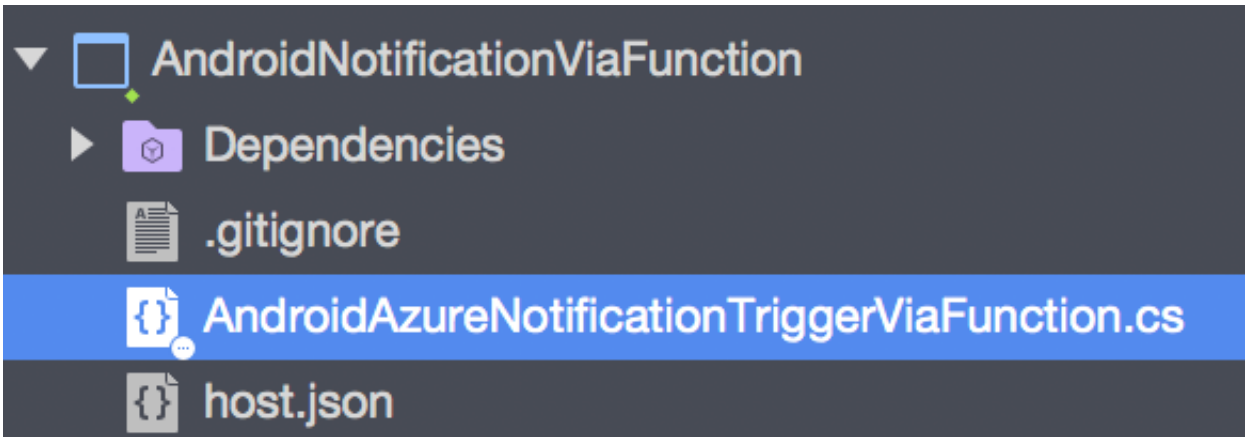
And then it will ask for a name, so try:
https://xamarinformsnotificationfunction.azurewebsites.net/api/NotifcationFunction?name=“Andrew"



A small object lesson here!
Notice - I misspelled Notification above — since this very much has a magic string feel to it, please remember to check your spelling quite carefully and don’t caught up in small gotchas like this one! (If you’re having issues and can’t figure it out — consider reviewing URLs and using Postman (https://www.getpostman.com/) to double check your work.

REMEMBER
PHONE (Trigger Native Registration) --> AZURE FUNCTION (Native Registrations) —Pairs With —> Azure Functions (Native Notifications)
OR
PHONE (Trigger Template Registration) --> AZURE FUNCTION (Template Registrations) — Pairs With —> Azure Functions (Template Notifications)

Remember there are three configurations to trigger the Notifications (one is Native the other two are Template)



[FunctionName(“AndroidNotificationFunctionNative")]
https://YourAzureFunction.net/api/AndroidNotificationFunctionNative
[FunctionName("AndroidNotificationFunctionTemplate”)] //sends only 1 notification
https://YourAzureFunction.net/api/AndroidNotificationFunctionTemplate
[FunctionName("AndroidNotificationFunctionTemplateMultiple”)] //sends notifications to several Tags
https://YourAzureFunction.net/api/AndroidNotificationFunctionTemplateMultiple

How do you trigger the Notification?

Use a program called: Postman: https://www.getpostman.com/
to trigger the URLS:

REMEMBER! You can save and run your Functions locally — you just need to change the first part of the URL (before /api/YourSpecificFunctionName) to the URL shown when you press the |> Button for the Function:

```
AndroidNotificationFunctionNative: http://localhost:7071/api/AndroidNotificationFunctionNative

AndroidNotificationFunctionTemplate: http://localhost:7071/api/AndroidNotificationFunctionTemplate

AndroidNotificationFunctionTemplateMultiple: http://localhost:7071/api/AndroidNotificationFunctionTemplateMultiple
```

But the most important GOTCHA is that you have to PUBLISH your function each time you change it — for it to properly reflect the changes.

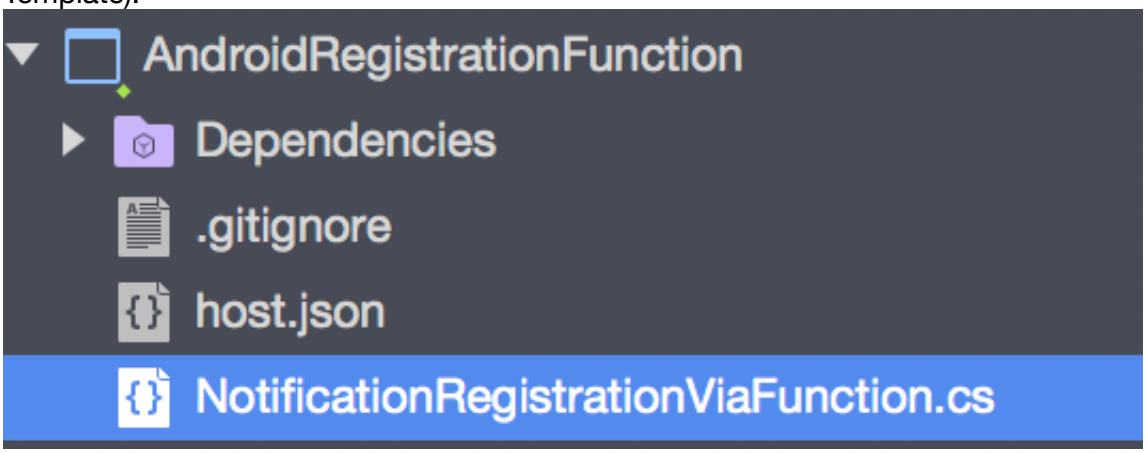
BRANCH 11

Continuation of Branch 10:

Android-Branch-11-Register-Via-Functions-I

REGISTRATIONS:

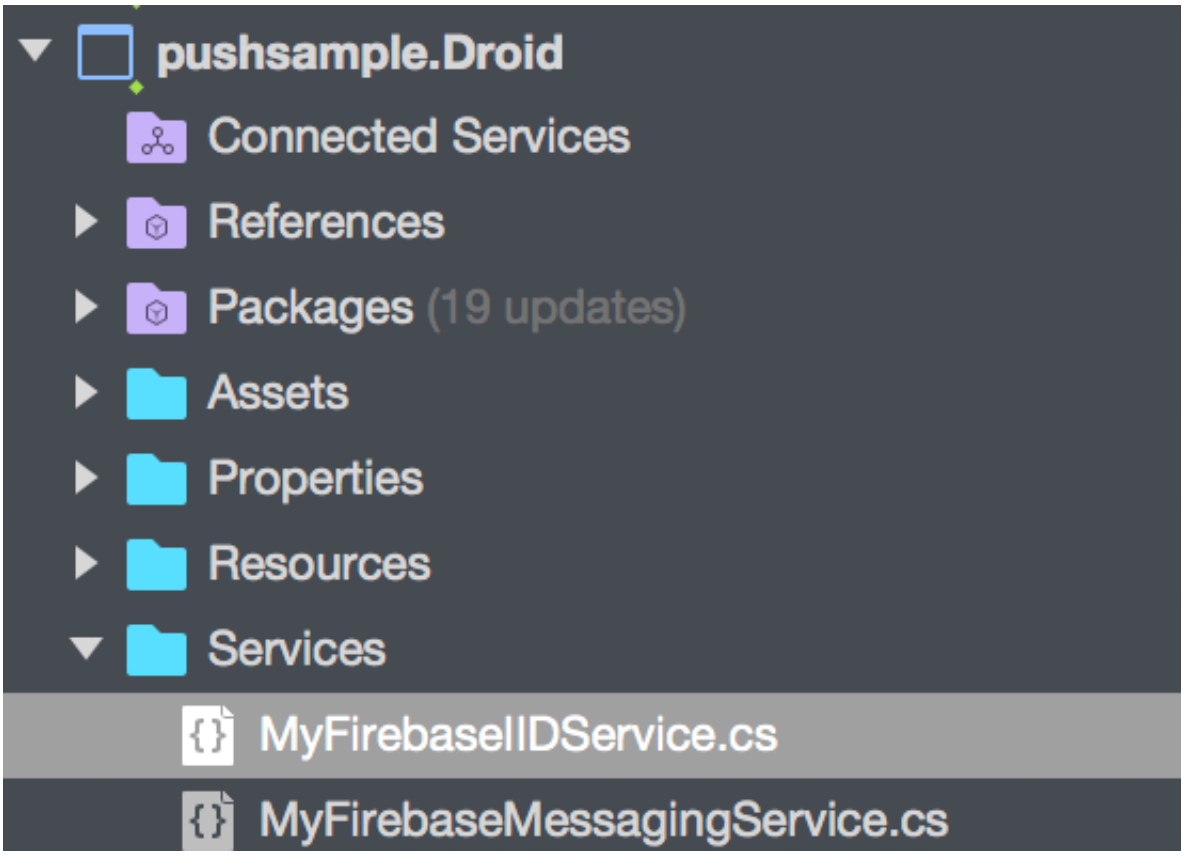
From the Function - there are two configuration to Register the Notifications (Native vs Template):



[FunctionName("NativeAndroidRegistrationWithTagsAndUsername")]
https://YourAzureFunction.net/api/GetNativeAndroidRegistrationIdPassingHandleUsername/{handleString}

[FunctionName("TemplateAndroidRegistrationWithTagsUsername")]
https://YourAzureFunction.net/api/GetTemplateAndroidRegistrationWithTagsUsername/{handleString}

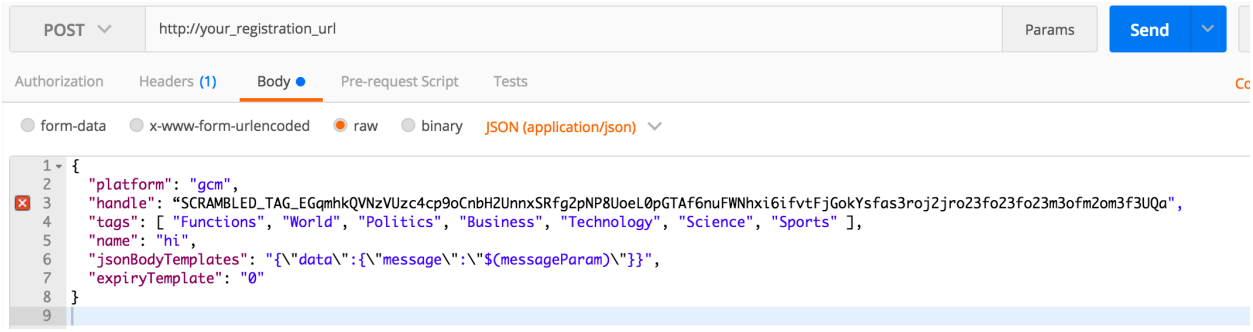
TRIGGERING / TOGGLING REGISTRATION TYPE FROM THE PHONE:
You've defined the registration - you need to now trigger it from the App.



TOGGLE BETWEEN THE COMMENTED OUT LINES OF CODE:

```
32
33      public override void OnTokenRefresh()
34      {
35          var refreshedToken = FirebaseInstanceId.Instance.Token;
36          Log.Debug(TAG, "FCM token: " + refreshedToken);
37          Console.WriteLine(TAG, "FCM token: " + refreshedToken);
38
39          //REGISTRATION FROM APP DIRECTLY
40          //SendNativeRegistrationToServer(refreshedToken);
41          //SendTemplateRegistrationToServer(refreshedToken);
42          //SendTemplateMultipleRegistrationToServer(refreshedToken);
43
44          //FUNCTION REGISTRATION
45          //NativeAndroidSendRegistrationToServerAsync(refreshedToken);
46          TemplateAndroidSendRegistrationToServerAsyncTemplate(refreshedToken);
47
48          //FUNCTION REGISTRATION WITH USERNAME
49          //NativeAndroidSendRegistrationToServerAsyncWithClientUsername(refreshedToken);
50          //TemplateAndroidSendRegistrationToServerAsyncTemplateWithClientUsername(refreshedToken);
51
52      }
```

SIDE NOTE - AS A DEBUGGING STEP:



By the way, here’s what I was using in my in my Postman Posts.

{
"platform": "gcm",
"handle":
“SCRAMBLED_TAG_EGqmhkQVNzVUzc4cp9oCnbH2UnnxSRfg2pNP8UoeL0pGTAf6nuFWNhxi6ifvtFjGokYsfas3roj2jro23fo23fo23m3ofm2om3f3UQa",
"tags": ["Functions", "World", "Politics", "Business", "Technology", "Science", "Sports"],
"name": "hi",
"jsonBodyTemplates": "{\"data\":{\"message\":\"$(messageParam)\"}}",
"expiryTemplate": "0"
}

BRANCH 12

This is a continuation of Branch 11.

Android-Branch-12-Register-and-Trigger-Username

The only difference is that there is a tag —> to distinguish it from other “tags” we’re going to follow a pattern where we create a prefix to the tag (username:). The tag will look like this “username:YourUsername”.

This example will add the tags in various various parts of the code — and adds it to the array of tags at the time of registration.

Here's an example of adding the username at the time of Registrations.

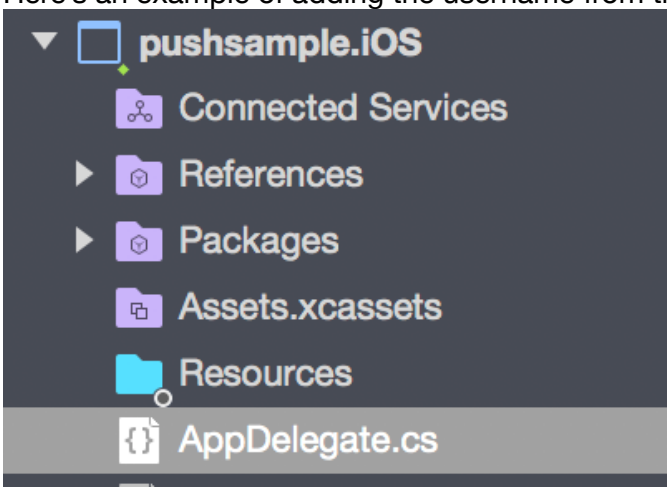
NATIVE

```
113
114             //ADD CHECK IF USER IS ALLOWED TO USE THESE TAGS
115             registration.Tags = new HashSet<string>(deviceUpdate.Tags);
116             var androidNativeUsername = "AndroidFriendlyUser101";
117             registration.Tags.Add("username:" + androidNativeUsername);
```

TEMPLATE

```
164         var stringTags = deviceRegistrationObjectWithTemplate.Tags;
165
166         Array.Resize(ref stringTags, stringTags.Length + 1);
167         var AndroidTemplateUsername = "AndroidTemplateUser101";
168         stringTags[stringTags.Length - 1] = "username:" + AndroidTemplateUsername;
169
```

Here's an example of adding the username from the client (phone):



NATIVE

```
253
254         string[] stringTags = new string[] { "Functions", "World", "Politics", "Business", "Technology", "Science", "Sports" };
255
256         Array.Resize(ref stringTags, stringTags.Length + 1);
257         var AndroidClientUsername = "AndroidClientNewUser101";
258         stringTags[stringTags.Length - 1] = "username:" + AndroidClientUsername;
259
```

TEMPLATE

```
            string[] stringTags = new string[] { "Functions", "World", "Politics", "Business", "Technology", "Science", "Sports" };

            Array.Resize(ref stringTags, stringTags.Length + 1);
            var AndroidClientUsername = "AndroidClientNewUser101";
            stringTags[stringTags.Length - 1] = "username:" + AndroidClientUsername;
```

Here's the Triggering of the Notifications with Username - simply add the Username with the addition of the prefix:
CONSOLE APPLICATION:
Here we used a simplistic send - Branch 6 (iOS) shows a slightly more complicated customization of sent messages:
Native:

```
private static async void SendNativeNotificationAsyncNativeAndroidUsername()
{
    //
    //THIS WILL ONLY WORK IF IN YOUR ANDROID APPLICATION - YOU USE A NATIVE REGISTRATION
    //

    NotificationHubClient hubClient = Microsoft.Azure.NotificationHubs.NotificationHubClient.CreateClientFromConnectionString
        (
            AzureConstants.AndroidConsoleFullAccessConnectionString,
            AzureConstants.AndroidConsoleApplicationNotificationHubName,
            true
        );
    // Create an array of breaking news categories.
    var categories = new string[] { "World", "Politics", "Business", "Technology", "Science", "Sports" };

    Array.Resize(ref categories, categories.Length + 1);
    var AndroidClientUsername = "AndroidNativeUser101";
    categories[categories.Length - 1] = "username:" + AndroidClientUsername;

    var jsonString4 = "{\"data\":{\"message\":\"From your console - native registration\"}}";

    await hubClient.SendGcmNativeNotificationAsync(jsonString4, "World");

    //USE THIS IF YOU HAVE NOT USED TAGS IN YOUR REGISTRATION
    //HOWEVER - THE SAMPLE IN BRANCH 09 + WILL INCLUDE TAGS
    //BE SURE TO DELETE APP FROM PHONE FIRST AND REBUILD TO TRIGGER NEW REGISTRATIONS
    //await hubClient.SendGcmNativeNotificationAsync(jsonString4);

}
```

Template:

```
private static async void SendTemplateNotificationAsyncUsername()
{

    //
    //THIS WILL ONLY WORK IF IN YOUR IOS APPLICATION - YOU USE A TEMPLATE REGISTRATION
    //

    NotificationHubClient hubClient = Microsoft.Azure.NotificationHubs.NotificationHubClient.CreateClientFromConnectionString
        (
            AzureConstants.AndroidConsoleFullAccessConnectionString,
            AzureConstants.AndroidConsoleApplicationNotificationHubName,
            true
        );
    // Create an array of breaking news categories.
    var categories = new string[] { "World", "Politics", "Business", "Technology", "Science", "Sports" };


    Array.Resize(ref categories, categories.Length + 1);
    var AndroidClientUsername = "AndroidTemplateUser101";
    categories[categories.Length - 1] = "username:" + AndroidClientUsername;

    Dictionary<string, string> templateParams = new Dictionary<string, string>();
    //{
    //    { "messageParam", "Hello World"}
    //};
    //SINGLE NOTIFICATION
    templateParams["messageParam"] = "Breaking " + categories[0] + " News!";
    await hubClient.SendTemplateNotificationAsync(templateParams, "World");

    //MULTIPLE NOTIFICATIONS
    //await hubClient.SendTemplateNotificationAsync(templateParams, categories);
}
```

Template Multiple:

```
private static async void SendTemplateNotificationMultipleAsyncUsername()
{
    //
    //THIS WILL ONLY WORK IF IN YOUR IOS APPLICATION - YOU USE A TEMPLATE REGISTRATION
    //


    NotificationHubClient hubClient = Microsoft.Azure.NotificationHubs.NotificationHubClient.CreateClientFromConnectionString
        (
            AzureConstants.AndroidConsoleFullAccessConnectionString,
            AzureConstants.AndroidConsoleApplicationNotificationHubName,
            true
        );
    // Create an array of breaking news categories.
    var categories = new string[] { "World", "Politics", "Business", "Technology", "Science", "Sports" };

    Array.Resize(ref categories, categories.Length + 1);
    var AndroidClientUsername = "AndroidTemplateUser101";
    categories[categories.Length - 1] = "username:" + AndroidClientUsername;

    Dictionary<string, string> templateParams = new Dictionary<string, string>();
    //{
    //    { "messageParam", "Hello World"}
    //};
    //templateParams["messageParam"] = "Breaking News!";

    foreach (var category in categories)
    {
        templateParams["messageParam"] = "Breaking " + category + " News!";
        await hubClient.SendTemplateNotificationAsync(templateParams, categories);
    }
}
```

Here's the Triggering of the Notifications with Username - simply add the Username with the addition of the prefix:
FUNCTION APPLICATION:
Native:

```
[FunctionName("AndroidNotificationFunctionNative")]
public static async Task<HttpResponseMessage> RunAndroidNotificationFunctionNative([HttpTrigger(AuthorizationLevel.Anonymous, "get", "post", Route = null)]HttpRequest
{

    //
    //THIS WILL ONLY WORK IF IN YOUR ANDROID APPLICATION - YOU USE A NATIVE REGISTRATION
    //

    try
    {
        NotificationHubClient hubClient = Microsoft.Azure.NotificationHubs.NotificationHubClient.CreateClientFromConnectionString
            (
                AndroidAzureConstants.AndroidAzureConstants.AndroidConsoleFullAccessConnectionString,
                AndroidAzureConstants.AndroidAzureConstants.AndroidConsoleApplicationNotificationHubName,
                true
            );
        // Create an array of breaking news categories.
        var categories = new string[] { "World", "Politics", "Business", "Technology", "Science", "Sports" };

        Array.Resize(ref categories, categories.Length + 1);
        var nativeUsername = "AndroidNativeUser101";
        categories[categories.Length - 1] = "username:" + nativeUsername;

        for (int i = 0; i < categories.Length; i++)
        {
            //FOR FORMAT REQUIRING MODIFIED MESSAGES IN YOUR ALERT
            var _data = new Data()
            {
                message = String.Format("From Azure Functions - {0} native registration.", categories[i])
            };

            var _rootObject = new RootObject
            {
                data = _data
            };

            string newJsonString = JsonConvert.SerializeObject(_rootObject);

            await hubClient.SendGcmNativeNotificationAsync(newJsonString, categories[i]);

            //FOR FORMATS NOT REQUIRING MODIFIED MESSAGES IN YOUR ALERT
            //string jsonString2 = String.Format("{\"aps\":{\"alert\":\"From your console - native registration\"}}");
            //await hubClient.SendAppleNativeNotificationAsync(jsonString2, categories[i]);
        }

        return req.CreateResponse(System.Net.HttpStatusCode.OK, "Success - Notification Function triggered - Native");
    }

    catch (Exception exception)
    {
        Debug.WriteLine("Error: ", exception.Message);
    }

    return req.CreateResponse(System.Net.HttpStatusCode.BadRequest, "Bad Requestion - Notification Function triggered - Native");
```

It was necessary to create an object that would serialize and mimic the Json string that follows the format of notification that Apple expects from your notification message. Why was this done? This was necessary to create text in the messages that would accept “variables” that could be customized to change the wording of the notification. In the above example you’ll see it as categories[i].
Template:

```
[FunctionName("AndroidNotificationFunctionTemplate")]
public static async Task<HttpResponseMessage> RunAndroidNotificationFunctionTemplate([HttpTrigger(AuthorizationLevel.Anonymous, "get", "post", Route = null)]Htt
{
    //
    //THIS WILL ONLY WORK IF IN YOUR ANDROID APPLICATION - YOU USE A TEMPLATE REGISTRATION
    //

    try
    {
        NotificationHubClient hubClient = Microsoft.Azure.NotificationHubs.NotificationHubClient.CreateClientFromConnectionString
            (
                AndroidAzureConstants.AndroidAzureConstants.AndroidConsoleFullAccessConnectionString,
                AndroidAzureConstants.AndroidAzureConstants.AndroidConsoleApplicationNotificationHubName,
                true
            );
        // Create an array of breaking news categories.
        var categories = new string[] { "World", "Politics", "Business", "Technology", "Science", "Sports" };

        Array.Resize(ref categories, categories.Length + 1);
        var nativeUsername = "AndroidTemplateUser101";
        categories[categories.Length - 1] = "username:" + nativeUsername;

        Dictionary<string, string> templateParams = new Dictionary<string, string>();
        //{
        //    { "messageParam", "Hello World"}
        //};
        //SINGLE NOTIFICATION
        templateParams["messageParam"] = "Breaking " + categories[0] + " News!";
        await hubClient.SendTemplateNotificationAsync(templateParams, "World");

        //MULTIPLE NOTIFICATIONS
        //await hubClient.SendTemplateNotificationAsync(templateParams, categories);

        return req.CreateResponse(System.Net.HttpStatusCode.OK, "Success - Notification Function triggered - Template");

    }
    catch (Exception exception)
    {
        Debug.WriteLine("Error: ", exception.Message);
    }

    return req.CreateResponse(System.Net.HttpStatusCode.BadRequest, "Bad Request - Notification Function triggered - Template");
}
```

Template Multiple:

```
[FunctionName("AndroidNotificationFunctionTemplateMultiple")]
public static async Task<HttpResponseMessage> RunAndroidNotificationFunctionTemplateMultiple([HttpTrigger(AuthorizationLevel.Anonymous, "get", "post", Route =
{
    //
    //THIS WILL ONLY WORK IF IN YOUR ANDROID APPLICATION - YOU USE A TEMPLATE REGISTRATION
    //
    try
    {
        NotificationHubClient hubClient = Microsoft.Azure.NotificationHubs.NotificationHubClient.CreateClientFromConnectionString
            (
                AndroidAzureConstants.AndroidAzureConstants.AndroidConsoleFullAccessConnectionString,
                AndroidAzureConstants.AndroidAzureConstants.AndroidConsoleApplicationNotificationHubName,
                true
            );
        // Create an array of breaking news categories.
        var categories = new string[] { "World", "Politics", "Business", "Technology", "Science", "Sports" };

        Array.Resize(ref categories, categories.Length + 1);
        var nativeUsername = "AndroidTemplateUser101";
        categories[categories.Length - 1] = "username:" + nativeUsername;

        Dictionary<string, string> templateParams = new Dictionary<string, string>();

        foreach (var category in categories)
        {
            templateParams["messageParam"] = "Breaking " + category + " News!";
            await hubClient.SendTemplateNotificationAsync(templateParams, categories);
        }

        return req.CreateResponse(System.Net.HttpStatusCode.OK, "Success - Notification Function triggered - Template Multiple");

    }

    catch (Exception exception)
    {
        Debug.WriteLine("Error: ", exception.Message);
    }

    return req.CreateResponse(System.Net.HttpStatusCode.BadRequest, "Bad Request - Notification Function triggered - Template Multiple");
}
```

NOTE: If you need to add the tags later on (say - a week or after the registration) — you can either CreateOrUpdate the Native Registration or you can simply register the Template Registration.

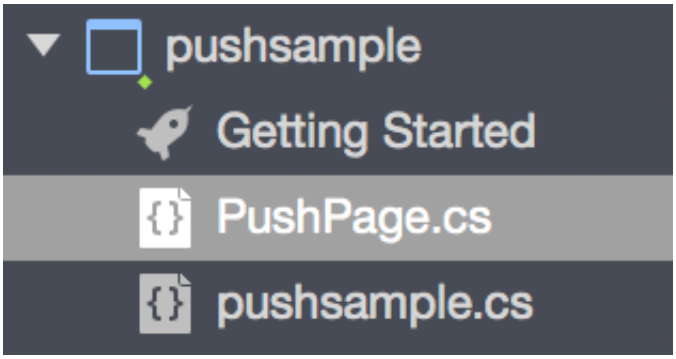
BRANCH 14

This is a continuation of Branch 12.

Android-Branch-14-TriggerButtonPress

In this example, we're simply using Buttons to trigger notifications.

You can press the button and then quickly close the app if you want to trigger notifications and see how they operate with the app closed.



The Function is currently HTTP trigger and anonymous.
So all we do, is set up a HttpClient - configure it with the current URL to trigger the function.

This is one example of the format of the buttons - there is one for each type of Notification (Native / Template / MultipleTemplate)

```
async void OnBtnSendClicked_MultipleTemplate(object sender, EventArgs e)
{
    Debug.WriteLine($"Sending message notification MultipleTemplate to URI {AzureNotificationsViaFunctionsURLS.AndroidMultipleTemplateApiURL}");

    var httpRequest = new HttpRequestMessage
    {
        Method = new HttpMethod("POST"),
        RequestUri = new Uri(AzureNotificationsViaFunctionsURLS.AndroidMultipleTemplateApiURL),
    };

    var result = await _httpClient.SendAsync(httpRequest).ConfigureAwait(false);

    Debug.WriteLine("Send result: " + result.IsSuccessStatusCode);
}
```

Remember:
REMEMBER
PHONE (Trigger Native Registration) --> AZURE FUNCTION (Native Registrations) —Pairs With —> Azure Functions (Native Notifications)

OR
PHONE (Trigger Template Registration) --> AZURE FUNCTION (Template Registrations) — Pairs With —> Azure Functions (Template Notifications)

See more at Branch 5 on how to change the registration of the application.