

Mobile Application Builder-Android Guide
Oracle Banking Digital Experience
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ORACLE®

Mobile Application Builder-Android Guide

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1. Preface

1.1 Intended Audience

This document is intended for the following audience:

- Customers
- Partners

1.2 Documentation Accessibility

For information about Oracle's commitment to accessibility, visit the Oracle Accessibility Program website at <http://www.oracle.com/pls/topic/lookup?ctx=acc&id=docacc>.

1.3 Access to Oracle Support

Oracle customers have access to electronic support through My Oracle Support. For information, visit

<http://www.oracle.com/pls/topic/lookup?ctx=acc&id=info> or visit

<http://www.oracle.com/pls/topic/lookup?ctx=acc&id=trs> if you are hearing impaired.

1.4 Structure

This manual is organized into the following categories:

Preface gives information on the intended audience. It also describes the overall structure of the User Manual.

The subsequent chapters describes following details:

- Introduction
- Preferences & Database
- Configuration / Installation.

1.5 Related Information Sources

For more information on Oracle Banking Digital Experience Release 21.1.0.0.0, refer to the following documents:

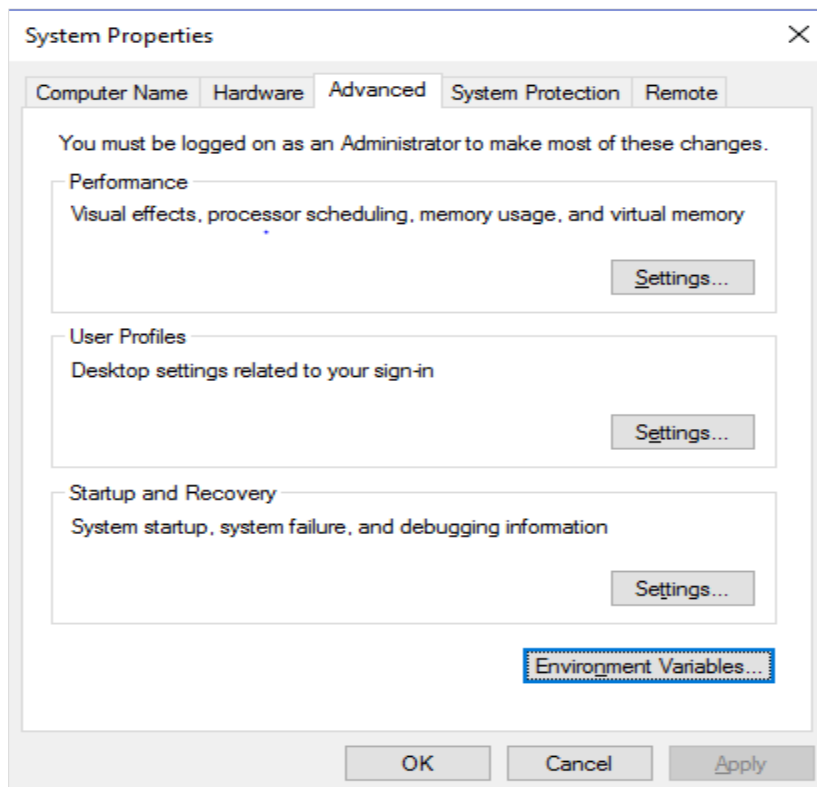
- Oracle Banking Digital Experience Installation Manuals

2. OBDX Servicing Application

2.1 Prerequisites

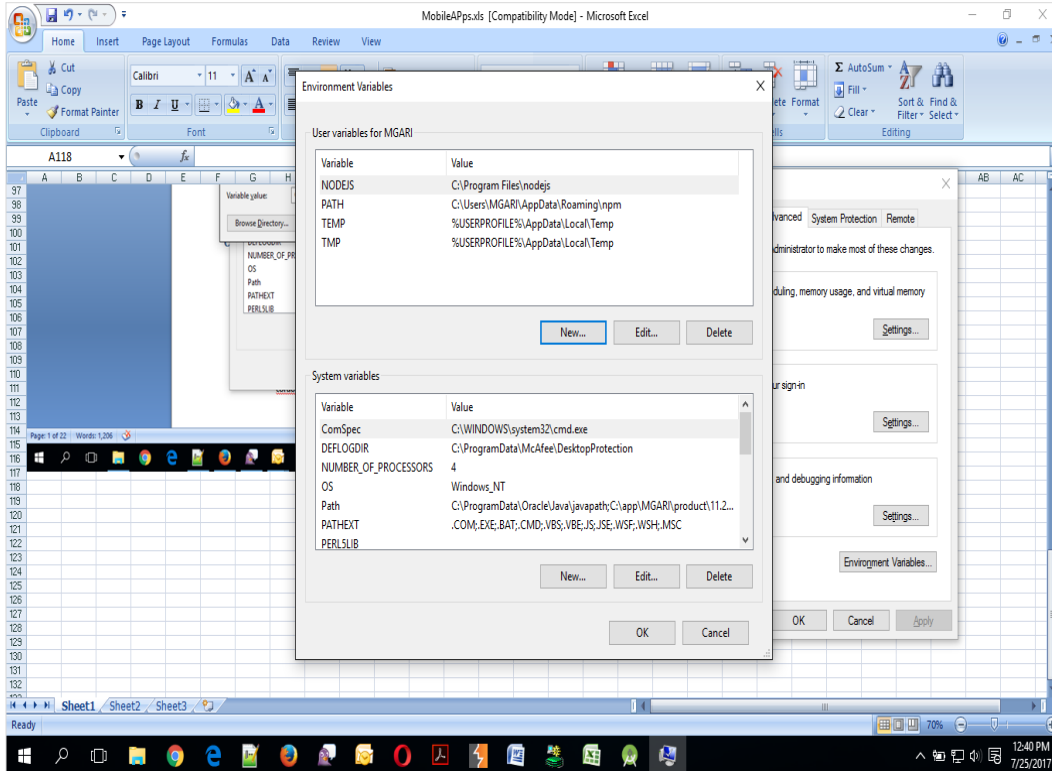
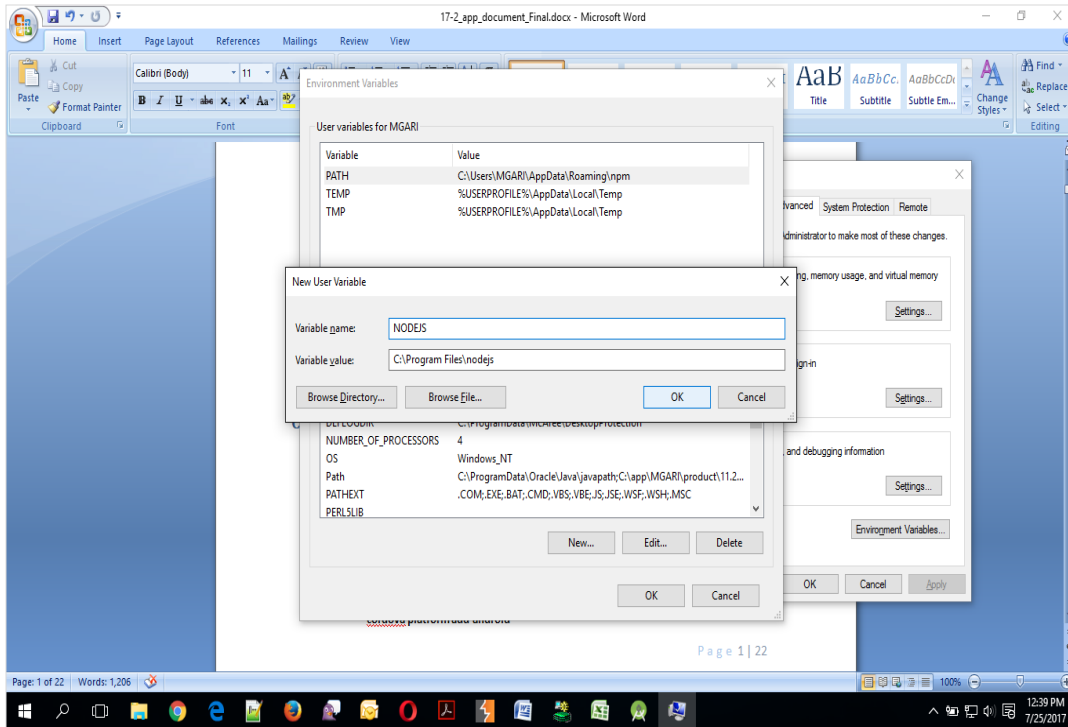
OBDX Android App is supported only on versions n (current) and n-1 release.

- a. Download and Install node Js (will be downloaded to default path)
- b. Install node js from <https://nodejs.org>
- c. DOWNLOAD AND INSTALL ANDROID STUDIO
- d. Download and install Android Studio from <https://developer.android.com/studio/index.html>
- e. Download and Install Android platforms
- f. Update Android SDK to latest API Level.
- g. Cordova Version: 6.x
- h. Gradle Version: gradle-4.6
- i. Android Gradle Plugin Version (3.4.0): 'com.android.tools.build:gradle:3.4.0' or above
- j. Set Environment variables
- k. Set following system variables:
 1. Click on Windows key and type Environment Variables.
 2. A dialog box will appear. Click on the Environment Variables button as shown below



3. NODEJS <nodejs_path> Example: “C:\Program Files\nodejs”.

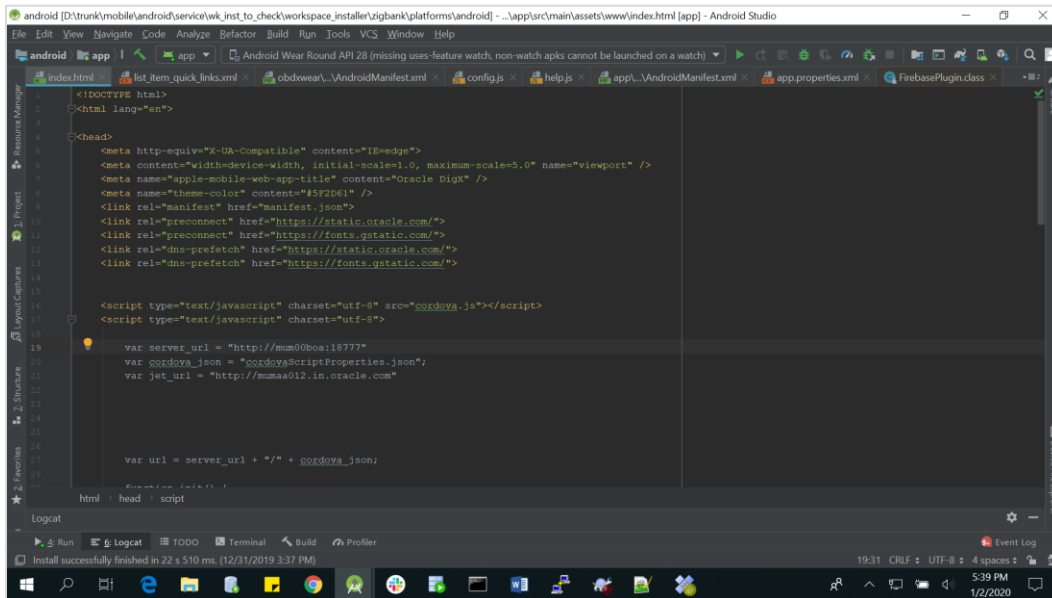
- I. Add the above variables in “PATH” system variable.



In 20.1, you can create app in two ways-using local UI or using remote UI (if want to create using remote go to 2.2 else directly to 2.3)

2.2 Create project using Remote UI

a. Index.html changes(use Android Studio or any other editor)



1. In var server_url ,put the same KEY_SERVER_URL to be used in app.properties.xml
2. In workspace create a copy of index.html in the same folder and rename it to home.html. In index.html/home.html in workspace update jet_url = "<https://static.oracle.com/cdn>"
3. On the server side where UI is deployed in framework/js/configurations/config.js set Jet "baseUr1" as <https://static.oracle.com/cdn/jet>

After this proceed to **2.4 Importing in Android Studio** directly.

2.3 Local UI

2.3.1 Adding UI to workspace

Use any 1 option below of a/b

- a. Building un-built UI (required in case of customizations)
(UI is same for internet and mobile, same build process of internet to be followed)
- b. Using built UI (out of box shipped with installer)

Available at --

OBDX_Installer/installables/ui/deploy (Main release, OBDX installer),
OBDX_Patch_Installer/installables/ui/deploy (Patchsets)

- Create a copy of index.html in the same folder and rename it to home.html.
- Copy folders(components,extensions,framework,images,flows,lzn,home.html ,partials,resource, index.html,build.fingerprint) to workspace (platforms/android/app/android/app/src/main/assets/www/)

Note: When copying to www, index.html already present in the workspace should be replaced)

Ensure webhelp folder is not copied.

Download oraclejet-x.y.source zip file

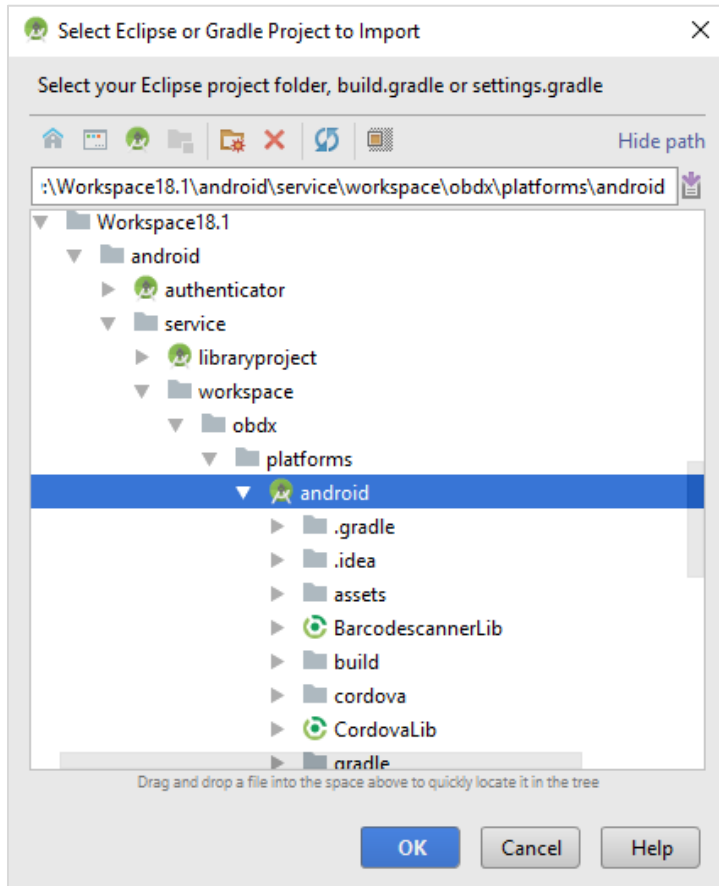
x.y refer to the version of Oracle JET used

4. Unzip & copy js & css folders to workspace as below
 - a. assets\www\framework\js\libs\oraclejet\x.y.0\js
 - b. assets\www\framework\js\libs\oraclejet\x.y.0\css
5. In config.js update values as highlighted below
 - a. {hostedAt:"**local**",baseUrl:"**framework/js/libs/oraclejet**"}
6. In index.html update require.js path
 - a. framework/js/libs/oraclejet/x.y.0/js/libs/require/require.js

2.4 Importing in Android Studio

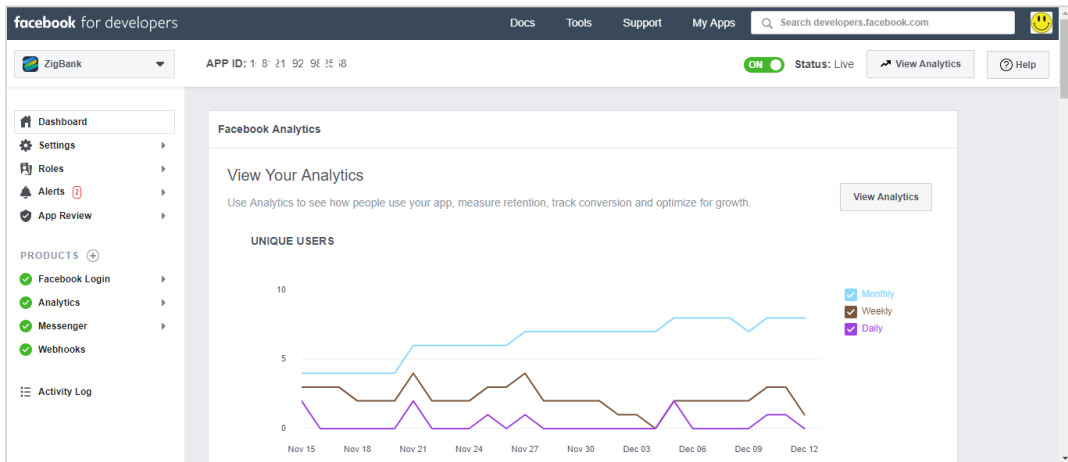
Open Android Studio

1. Import zigbank/platforms/android in android studio by clicking on Open an Existing Project.



2. For Adding Facebook (Required for social payments only)
 - a. Open facebookconnect.xml
 - b. Replace FB_APP_ID with your fb app id generated from facebook developer console
 - c. Replace FB_APP_NAME with the App name

As shown below



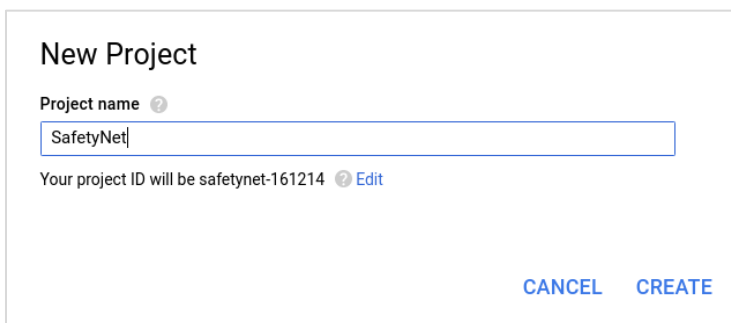
The screenshot shows the AndroidManifest.xml file in Android Studio. The code is as follows:

```
<?xml version="1.0" encoding="utf-8"?>
<resources>
  <string name="fb_app_id">16_124650172</string>
  <string name="fb_app_name">Zigbank</string>
</resources>
```

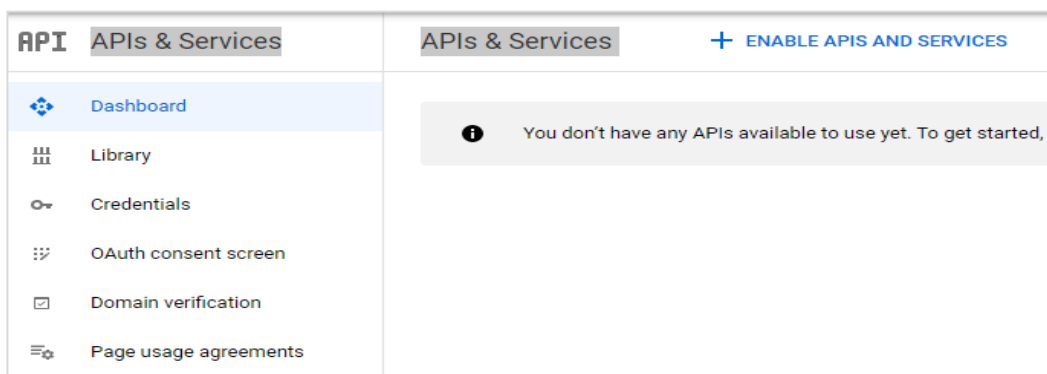
[Home](#)

3. Google Play Integrity

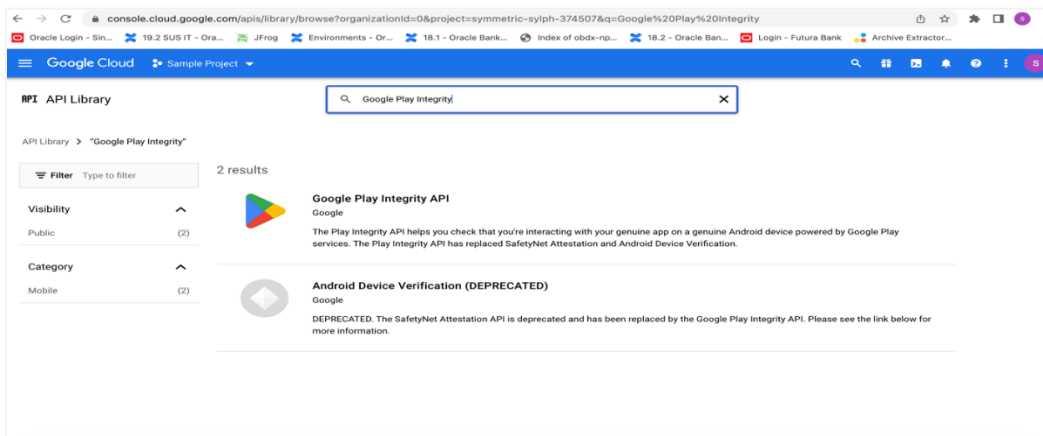
- a. Go to URL <https://console.developers.google.com/>
- b. Create a new Project and set name of you project



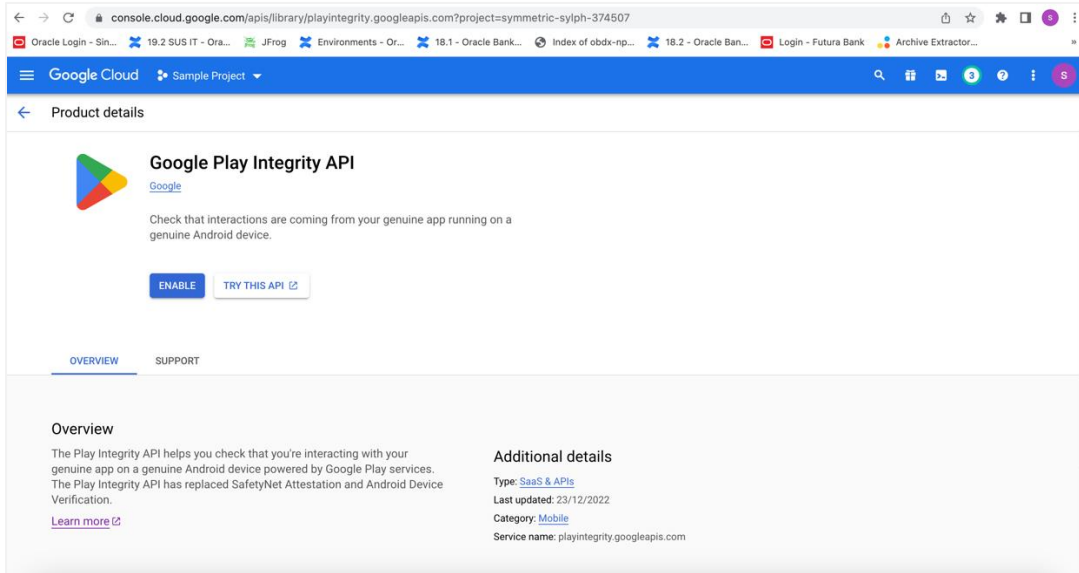
- c. Choose 'API's & Services' option from side bar.
- d. In API's & Services > Dashboard > Choose 'Enable APIS AND SERVICES'.



- e. This will redirect to 'Library' where we need to search 'Google Play Integrity API'.

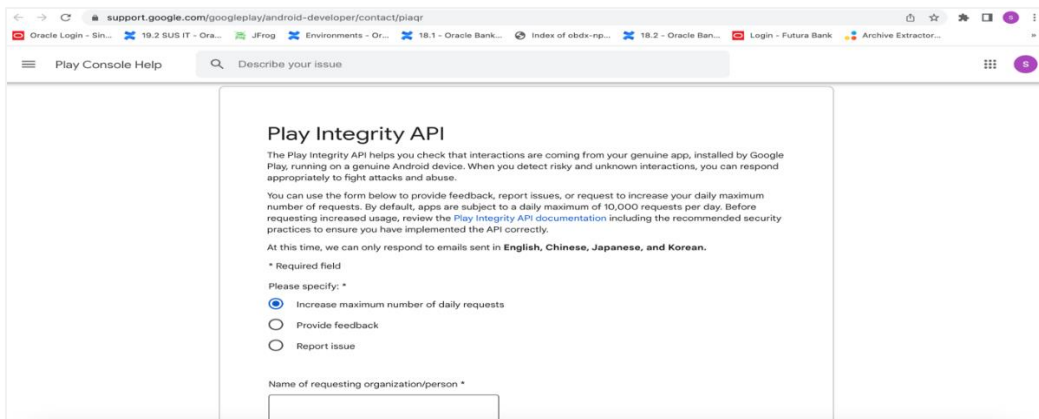


- f. Click on Google Play Integrity API and enable it



g. If the application usage is high, the quota request form needs to be submitted. Please fill quota request form from below site. Also select below options.

<https://support.google.com/googleplay/android-developer/contact/piaqr>



support.google.com/googleplay/android-developer/contact/piaqr

Play Console Help Describe your issue

How are you calling the Play Integrity API? *

- My app is calling the API directly
- A third party I'm using in the app is calling the API, please specify

How often will you call the API for each user? *

- Once per day or less
- Once per hour
- Once per 15 min
- Once per 5 min or more

Is there any PII or SPII used for the nonce (e.g. user id, user name, phone number, Android ID, SSN, etc)? *

- Yes, but hashed or encrypted
- Yes, in plain-text
- No

support.google.com/googleplay/android-developer/contact/piaqr

Play Console Help Describe your issue

How are you validating Play Integrity API responses? *

- Server side - by calling Play's server to decrypt and verify
- Server side - by decrypting and verifying with self-managed API keys
- In my app - by calling Play's server to decrypt and verify
- In my app - by decrypting and verifying with self-managed API keys
- Other, please specify

How does your app retry in case of Play Integrity API errors? *

- No retry
- A small number of retry attempts within a short time window
- Retry with exponential backoff
- Other, please specify

support.google.com/googleplay/android-developer/contact/piaqr

Play Console Help Describe your issue

How will your app act when the Play Integrity API detects risky traffic? *

Please answer with your end goal in mind even if your app is not acting yet. As a reminder, your app should also be able to deal with Play Integrity API errors and the API being unavailable.

- Deny access to functionality (for example, users won't be able to log-in). I want unauthorized usage of my app to go down.
- Alter or limit specific features (for example, only users on good devices will be allowed on a leaderboard). Overall usage of my app might stay the same.
- A mix - deny access for some responses and change features for other responses. I want some unauthorized usage of my app to go down.
- No action, I'm only collecting data.
- Other, please specify

Quota request - Estimated total queries per day *

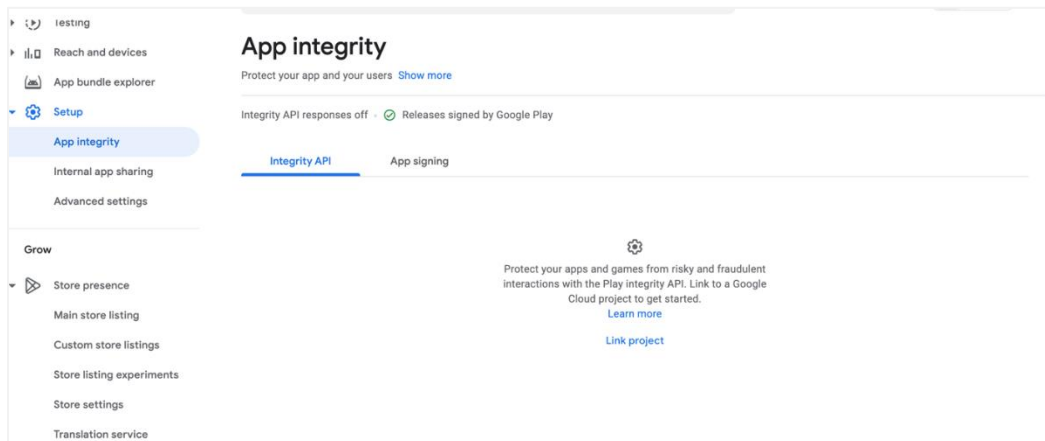
- 10,000 to 1,000,000 (10K to 1M)
- 1,000,000 to 10,000,000 (1M to 10M)
- 10,000,000 to 100,000,000 (10M to 100M)
- 100,000,000 or more (100M+)

Quota request - Estimated total queries per day * → The approximate load, Play Integrity API is called once each time the app is opened

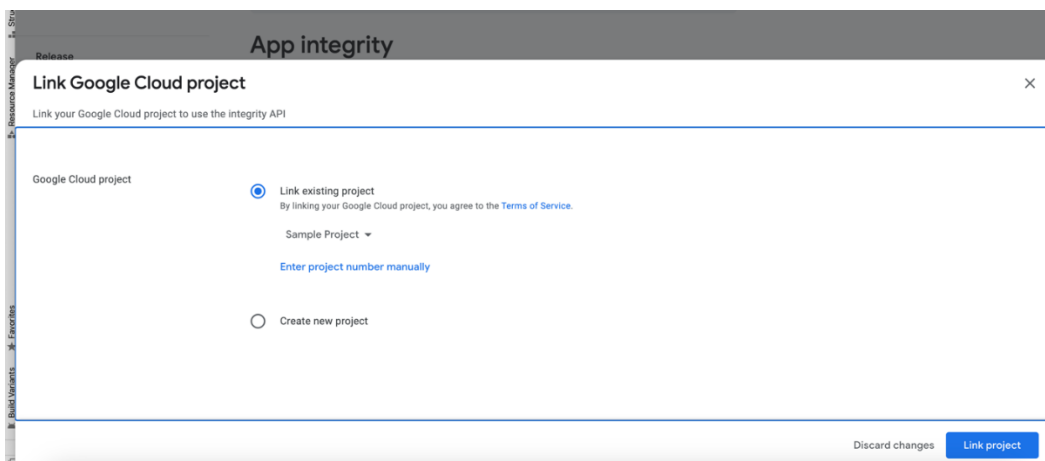
Quota request - Estimated peak queries per second → Leave blank

h. To enable Play Integrity responses please follow below steps-

Go to Google Play Console->Side Menu->Setup->App Integrity



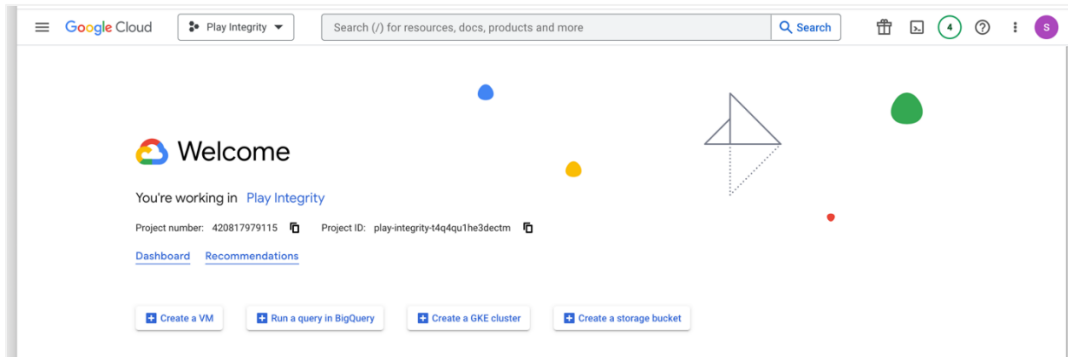
Click on **Link project** and then link your existing google cloud project. If it is not created then create new and link the same.



i. Add project number in below property of app.properties

```
<string name="GOOGLE_CLOUD_PROJECT_NO">@@GOOGLE_CLOUD_PROJECT NO</string>
```

You will get the project number on google cloud console project

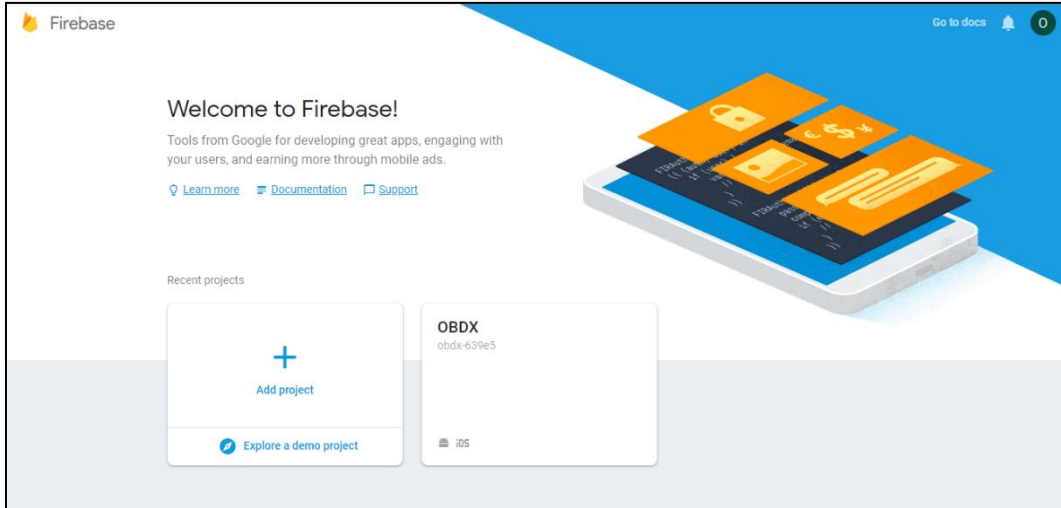


j. Mention the time in seconds to which app can hit the play integrity api. By default it is 300seconds but you can configure as per the requirement. Please use below property in RootCheckFlags.java(workspace_installer/zigbank/platforms/android/app/src/main/java/com/ofs/s/digx/mobile/android/)

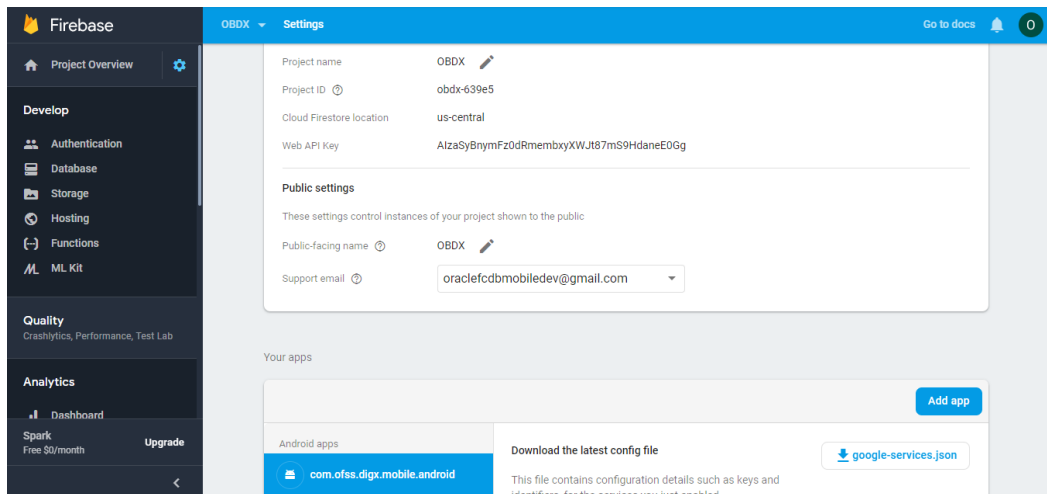
```
long playIntegrityAPICallTime = your_time_in_seconds;
```

4. FCM Push Notifications

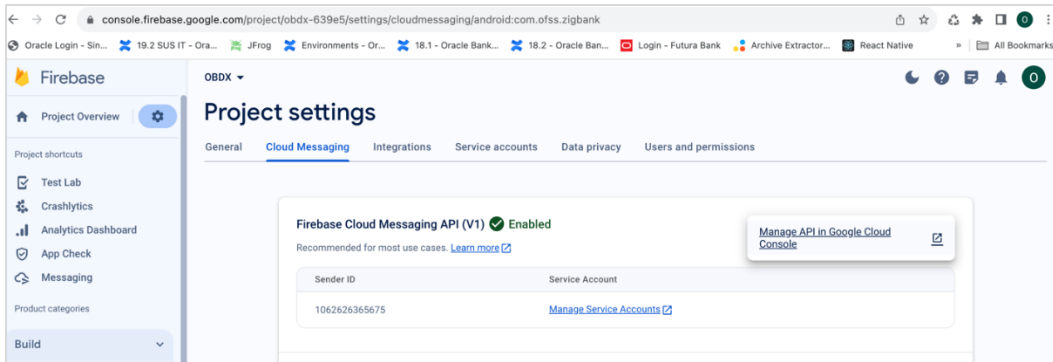
- Go to URL <https://firebase.google.com/>
- Traverse to console and create a project



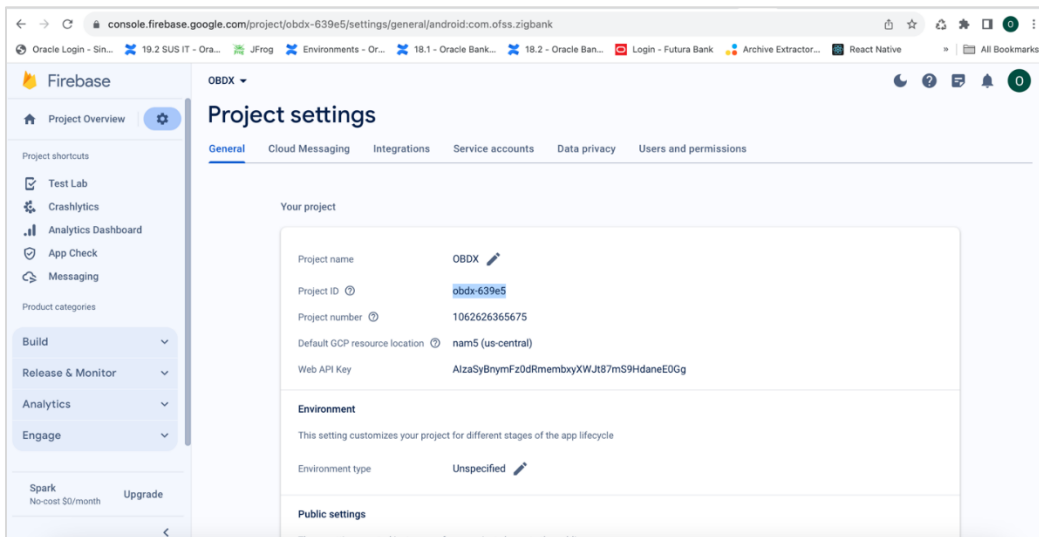
- Download google-services.json from below page and save to (zigbank\platforms\android\app) directory.
- Remember to keep the projects package name and firebase package name same.



e. Traverse to cloud messaging tab Enable Firebase Cloud Messaging API(V1) by clicking on Manage API in Google Cloud Console.



f. Get the Project ID from Project Setting in Firebase console



g. Update FCM URL in below table as-

update DIGX_FW_CONFIG_ALL_B set prop_value =
'https://fcm.googleapis.com/v1/projects/YOUR_PROJECT_ID/messages:send' where prop_id
= 'FCM_URL';

Add YOUR_PROJECT_ID in url which is captured on above step

h. If proxy address is to be used, provide the same in database as mentioned in point 3.

i. Generate private key for your service account by using below steps-

- In the Firebase console, open **Settings** > [Service Accounts](#)

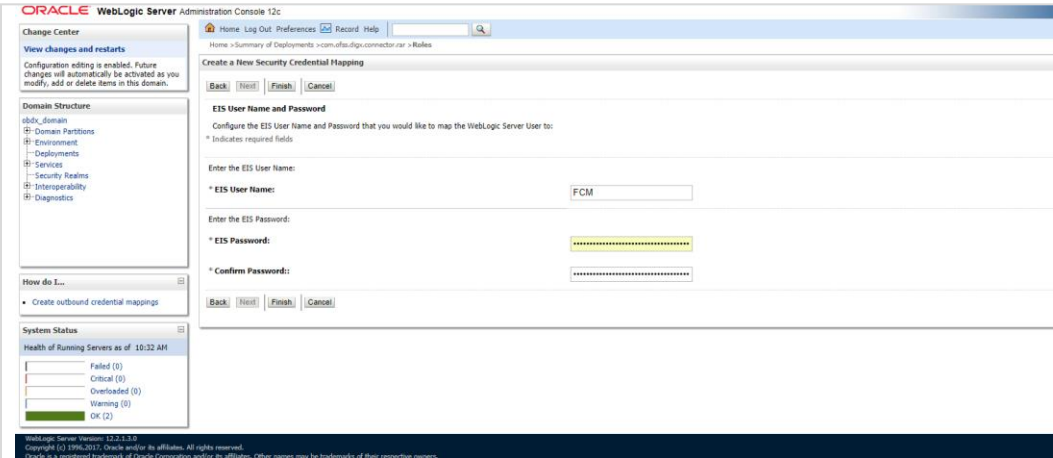
- Click **Generate New Private Key**, then confirm by clicking **Generate Key**

You can also follow below google doc -

<https://firebase.google.com/docs/cloud-messaging/auth-server#provide-credentials-manually>

Sr. No.	Table	PROP_ID	CATEGORY_ID	PROP_VALUE	Purpose
1	DIGX_FW_CONFIG_VAR_B	FCM	DispatchDetails	<Server_Key>	Service account json file content captured in above step
2	DIGX_FW_CONFIG_ALL_B	FCMKeyStore	DispatchDetails	DATABASE or CONNECTOR	Specifies whether to pick server key from database or from connector. Default DB (No change)
3	DIGX_FW_CONFIG_ALL_B	Proxy	DispatchDetails	<protocol,proxy_address>	Provides proxy address, if any, to be provided while connecting to APNS server. Delete row if proxy not required. Example: HTTP,148.50.60.8

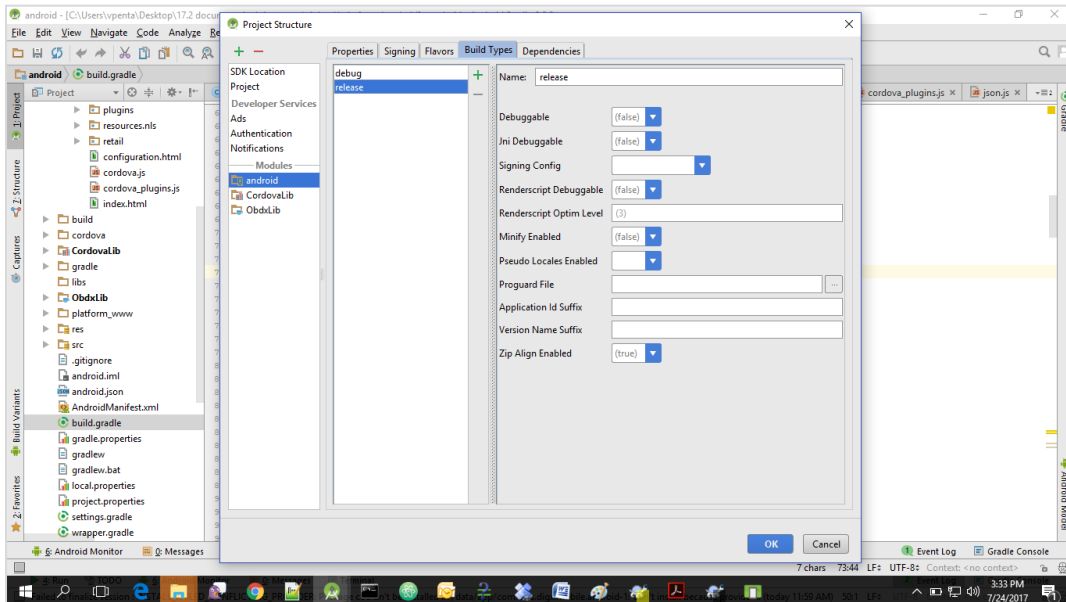
If CONNECTOR is selected in Step 2 update password as below



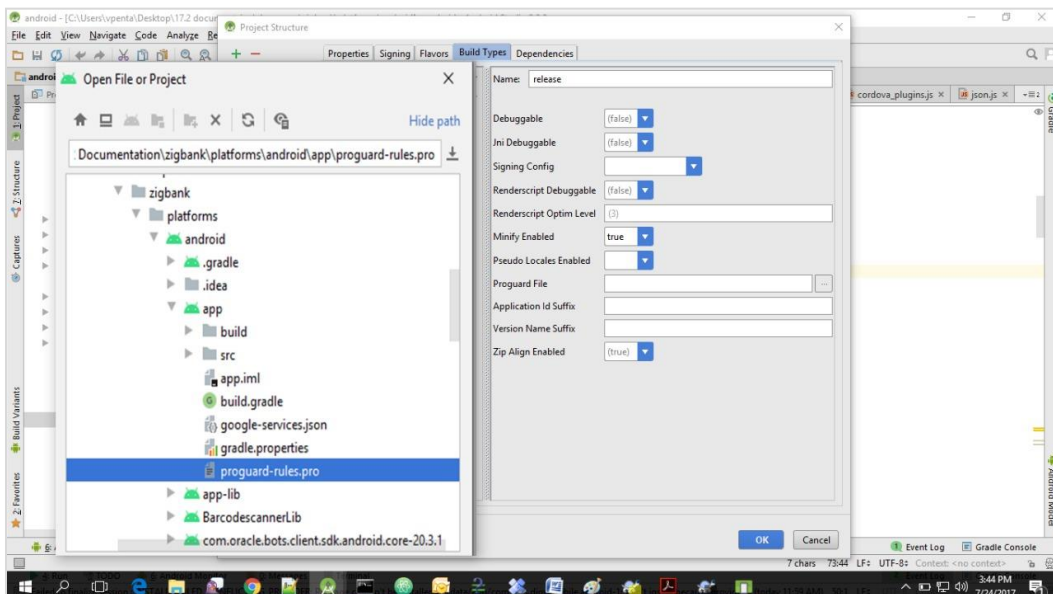
[Home](#)

5. Build Release Artifacts

1. Clean and Rebuild your project in Android Studio.
2. In Android Studio, on the menu bar Click on **Build -> Edit Build Types -> select release**



3. Set Minify Enabled -> True & click on Proguard File selection -> Navigate to proguard-rules.pro (zigbank\platforms\android\app)



4. Click on OK -> again click on OK.
5. Adding URLs to app.properties.xml (customizations/src/main/res/values/)
 - a. NONOAM (DB Authenticator setup)

SERVER_TYPE	NONOAM
KEY_SERVER_URL	Eg. https://mumaa012.in.oracle.com:18443
WEB_URL	Eg. https://mumaa012.in.oracle.com:18443
SERVER_CERTIFICATE_KEY	Refer point 6.7

- b. OAM Setup (Refer to installer pre requisite documents for OAuth configurations)

SERVER_TYPE	OAM
KEY_SERVER_URL	Eg. https://mumaa012.in.oracle.com:18443 (This URL must be of OHS without webgate)
WEB_URL	Eg. https://mumaa012.in.oracle.com:18443
KEY_OAUTH_PROVIDER_URL	http://mum00aon.in.oracle.com:14100/oauth2/rest/token
APP_CLIENT_ID	<Base64 of clientid:secret> of Mobile App client
APP_DOMAIN	OBDXMobileAppDomain
WATCH_CLIENT_ID	<Base64 of clientid:secret> of wearables
WATCH_DOMAIN	OBDXWearDomain
SNAPSHOT_CLIENT_ID	<Base64 of clientid:secret> of snapshot
SNAPSHOT_DOMAIN	OBDXSnapshotDomain
LOGIN_SCOPE	OBDXMobileAppResServer.OBDXLoginScope
SERVER_CERTIFICATE_KEY	Refer point 6.7

c. IDCS Setup

SERVER_TYPE	IDCS
KEY_SERVER_URL	Eg. https://mumaa012.in.oracle.com:18443 (This URL must be of OHS without webgate)
WEB_URL	Eg. https://mumaa012.in.oracle.com:18443
KEY_OAUTH_PROVIDER_URL	http://obdx-tenant01.identity.c9dev0.oc9qadev.com/oauth2/v1/token
APP_CLIENT_ID	<Base64 of clientid:secret> of Mobile App client
WATCH_CLIENT_ID	<Base64 of clientid:secret> of wearables
SNAPSHOT_CLIENT_ID	<Base64 of clientid:secret> of snapshot
LOGIN_SCOPE	obdxLoginScope
OFFLINE_SCOPE	urn:opc:ldm:__myscopes__ offline_access
SERVER_CERTIFICATE_KEY	Refer point 6.7

6. Domain Based Setup

To use domain based setup please enable below flag in app.properties file -

```
<string name="DOMAIN_BASED_CATEGORIZATION">true</string>
```

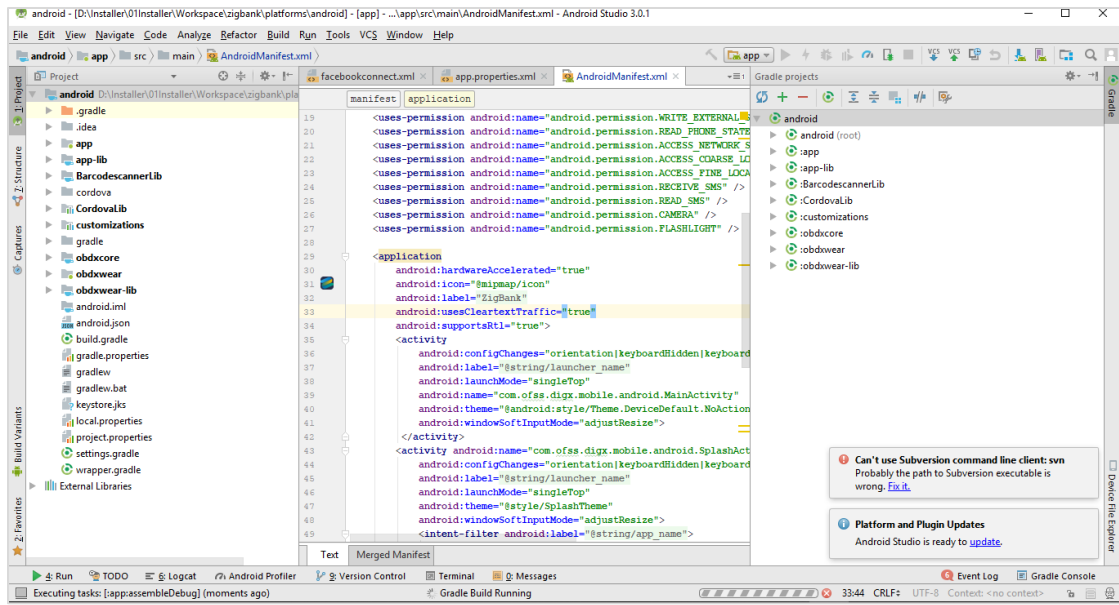
If you are using local UI then enable below flag in config.js(platforms/android/app/src/main/assets/www/framework/js/configurations/config.js) file -

```
domainDeployment: {
    enabled: true
}
```

7. Adding chatbot support to mobile application (Optional)

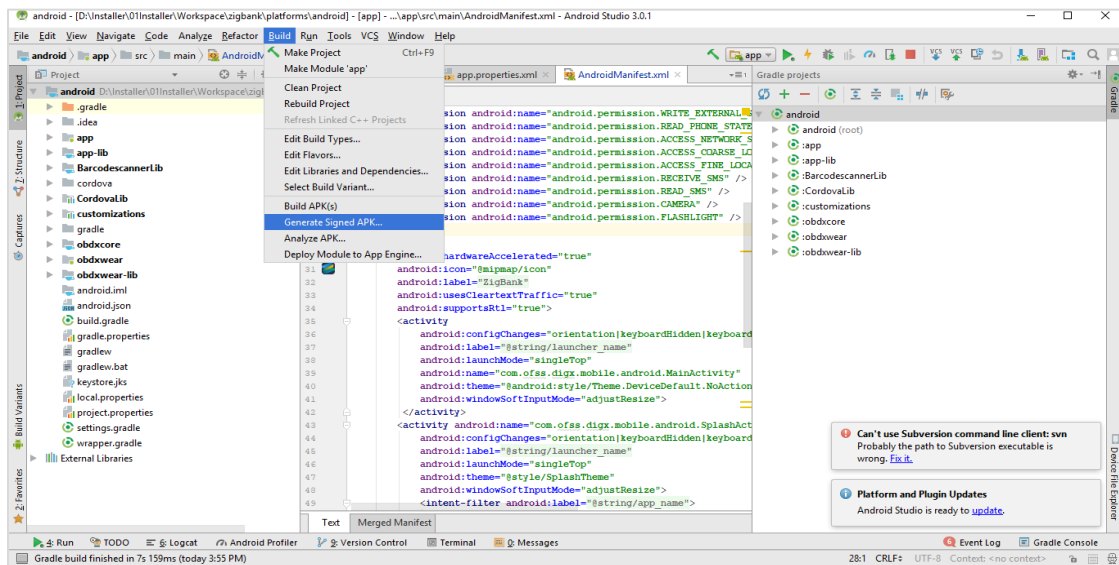
CHATBOT_ID	The tenant ID
CHATBOT_URL	The URL for the ChatApp application in ODA

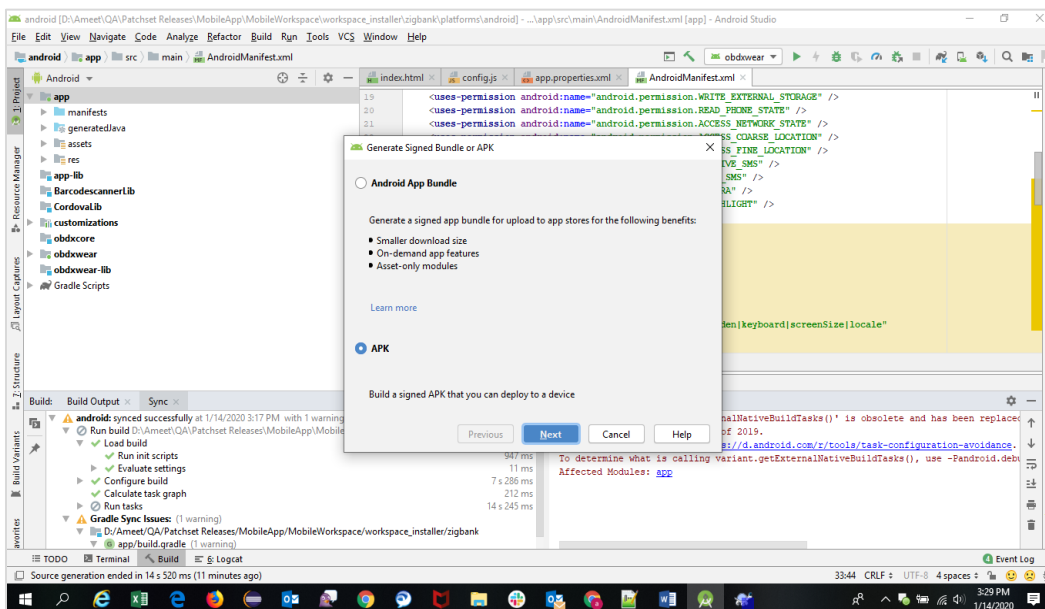
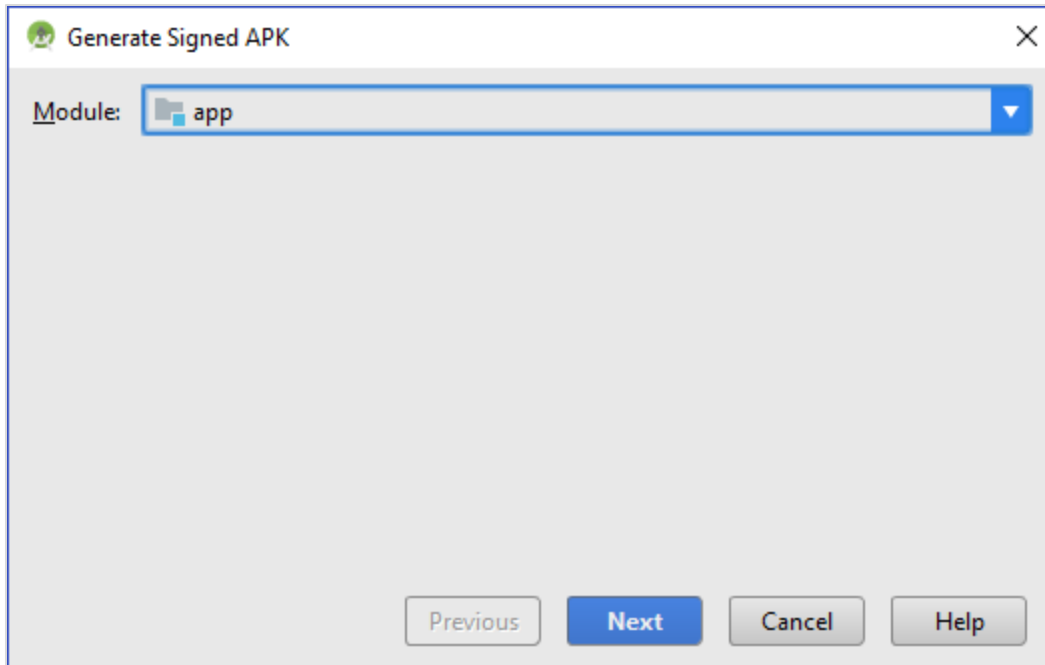
8. If using http protocol for development add (android:usesCleartextTraffic="true") to application tag of AndroidManifest.xml (on app & obdxwear target)



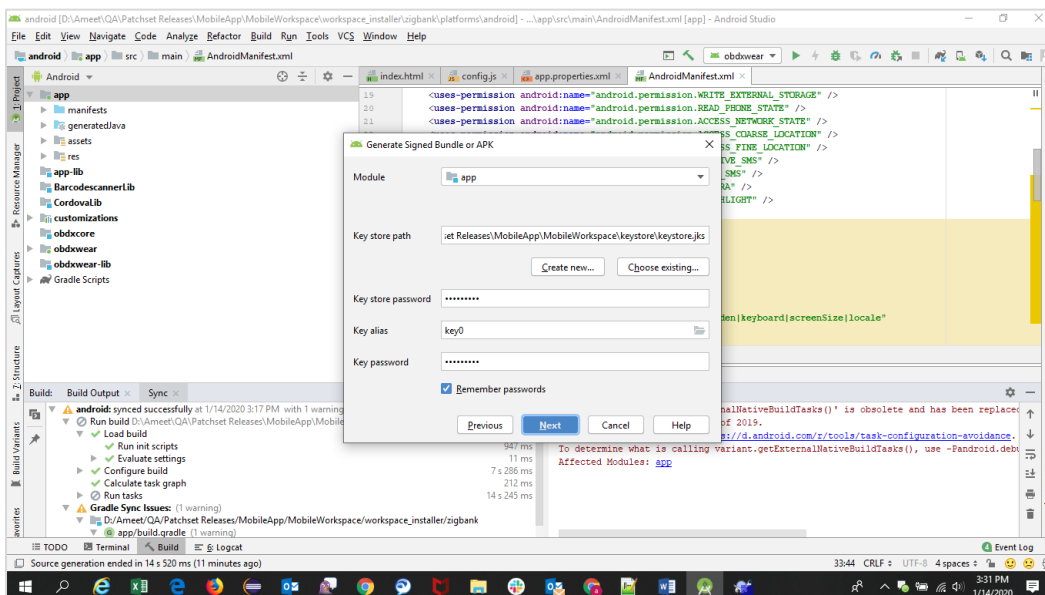
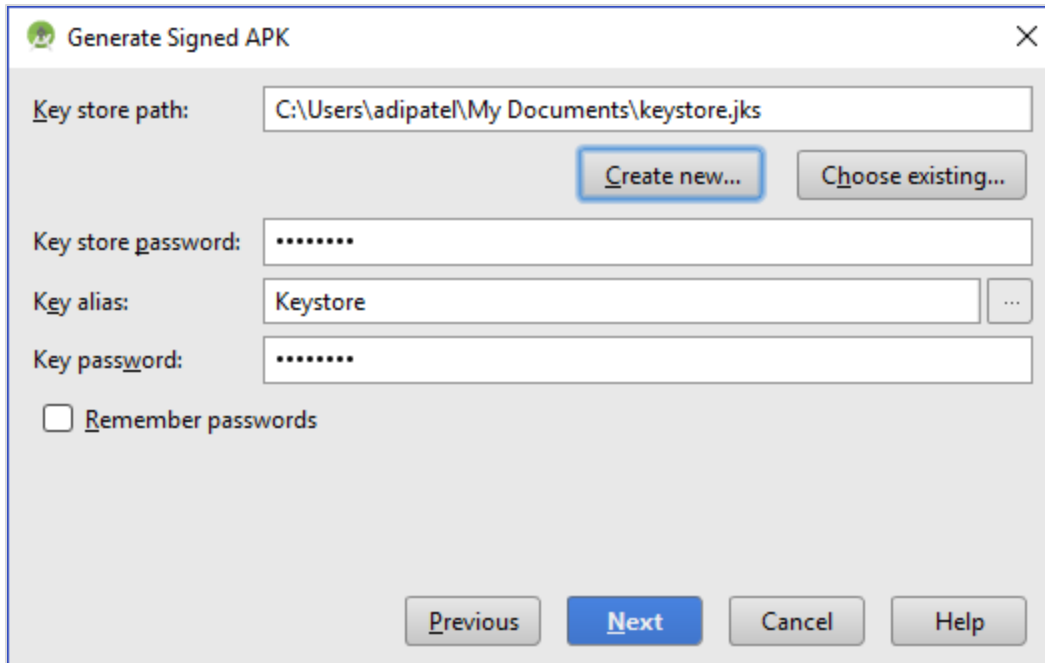
9. For Generating Signed Apk: To Generate release-signed apk as follows:

On menu bar click on Build -> Generate Signed Apk

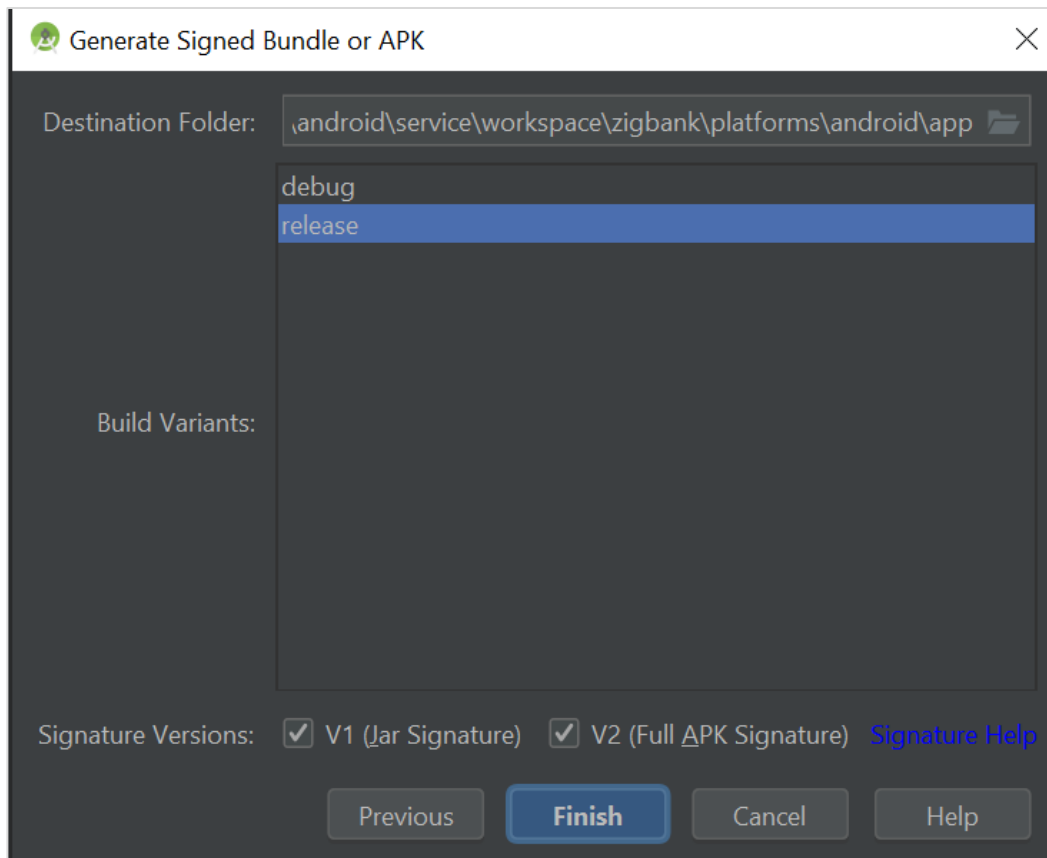




10. If you have an existing keystore.jks file then select choose Existing else click on Create New

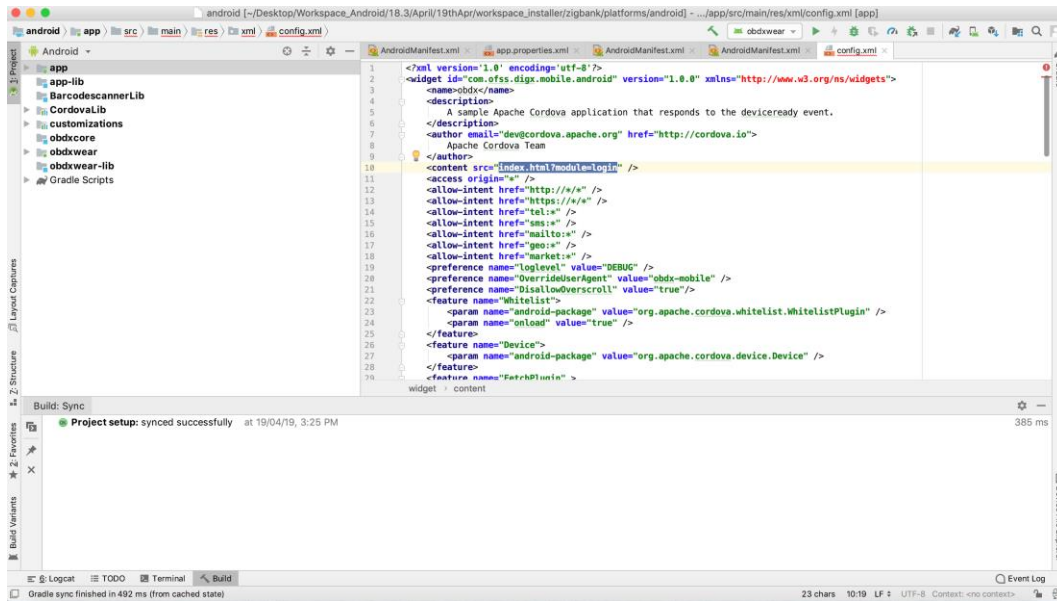


11. Select **Build Type** as **Release**, **Signature Version** as **V1(JAR Signature)** and **V2(Full APK Signature)** and Change **APK Destination** folder if you want and click on **Finish**



12. This will generate APK by the given name and destination folder. Default APK Destination folder is **zigbank\platforms\android\app\release**
13. Run the App and select Device or Simulator.
14. **Repeat same steps (From step 8 and obdxwear as module) for OBDX Wear App for Release Signing.** Use proguard-rules.pro from **workspace_installer\zigbank\platforms\android\obdxwear** using explorer. The select obdxwear as the module and follow same signing steps with same keystore.
15. The application has a config page at launch to enter the URL of the server (for development only). To remove this page, update the config.xml as shown below

The application has config page to add URL. This is for development purpose only and can be removed using below step. (Update content src tag)



16. Application will work on https only. If you want to run application on http then set targetSdkVersion, compileSdkVersion to 30 and buildToolsVersion to 30.0.3 in app's build.gradle(zigbank\platforms\android\app) and replace below code block from obdx.conf(config/obdx.conf).

```
<IfModule mod_headers.c>
```

```
<If "%{HTTP_USER_AGENT} =~ /obdx-mobile-android/">
```

```
Header edit Set-Cookie ^(.*)$ $1;SameSite=None;Secure
```

```
</If>
```

```
<If "%{HTTP_USER_AGENT} =~ /obdx-softtoken/">
```

```
Header edit Set-Cookie ^(.*)$ $1;SameSite=None;Secure
```

```
</If>
```

```
</IfModule>
```

With below one as,

```
<IfModule mod_headers.c>  
  <If "%{HTTP_USER_AGENT} =~ /obdx-mobile-android/">  
    Header edit Set-Cookie "SameSite=Strict" ""  
  </If>  
  <If "%{HTTP_USER_AGENT} =~ /obdx-softtoken/">  
    Header edit Set-Cookie "SameSite=Strict" ""  
  </If>  
</IfModule>
```

Note: We strongly recommend you to use https setup with sdk 31 only, as google play store won't allow app's below sdk 31.

[Home](#)

6. OBDX Authenticator Application

6.1 Authenticator UI (Follow any one step below)









6.1.1 Using built UI

For Non-OAM - Unzip dist.tar.gz directory from OBDX_Patch_Mobile\authenticator\non-oam

For OAM - Unzip dist.tar.gz directory from OBDX_Patch_Mobile\authenticator\oam

6.1.2 Building UI manually

1. Extract authenticator_ui.tar.gz from OBDX_Patch_Mobile\authenticator\unbuilt_ui. The folder structure is as shown:

<input type="checkbox"/> Name	Date modified	Type	Size
 _build	10/25/2018 2:42 PM	File folder	
 components	7/27/2018 12:02 PM	File folder	
 css	7/27/2018 12:02 PM	File folder	
 framework	7/27/2018 12:03 PM	File folder	
 images	7/27/2018 12:03 PM	File folder	
 non-oam	7/27/2018 12:03 PM	File folder	
 pages	7/27/2018 12:03 PM	File folder	
 resources	7/27/2018 12:02 PM	File folder	

2. Build UI based on selected Authentication mechanism.

- a. OAM based Authentication

- Open command prompt at “_build” level.
- Run following command :

```
npm install -g grunt-cli

npm install

node render-requirejs/render-requirejs.js

grunt authenticator --verbose
```

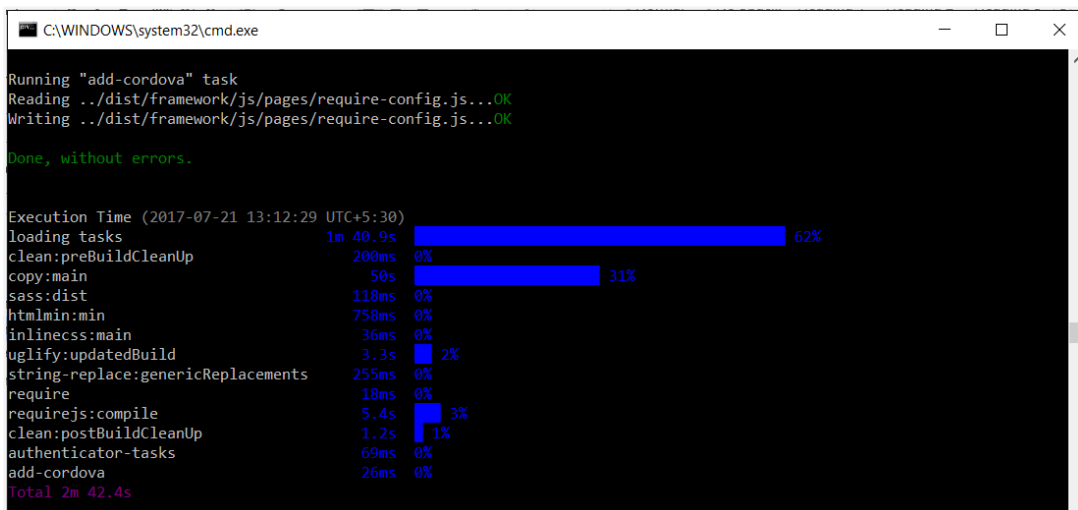
- After running above commands and getting result as “Done, without errors.” a new folder will be created in “ui” with name as “dist”.

b. NON-OAM Based Authentication

- Copy “non-oam /login” folder and paste it at location “components/modules” location. This will replace existing “login” folder.
- Open command prompt at “_build” level.
- Run following command :

```
npm install -g grunt-cli
npm install
node render-requirejs/render-requirejs.js
grunt authenticator --verbose
```

- After running above commands and getting result as “Done, without errors.” a new folder will be created in “ui” folder with name as “dist”.

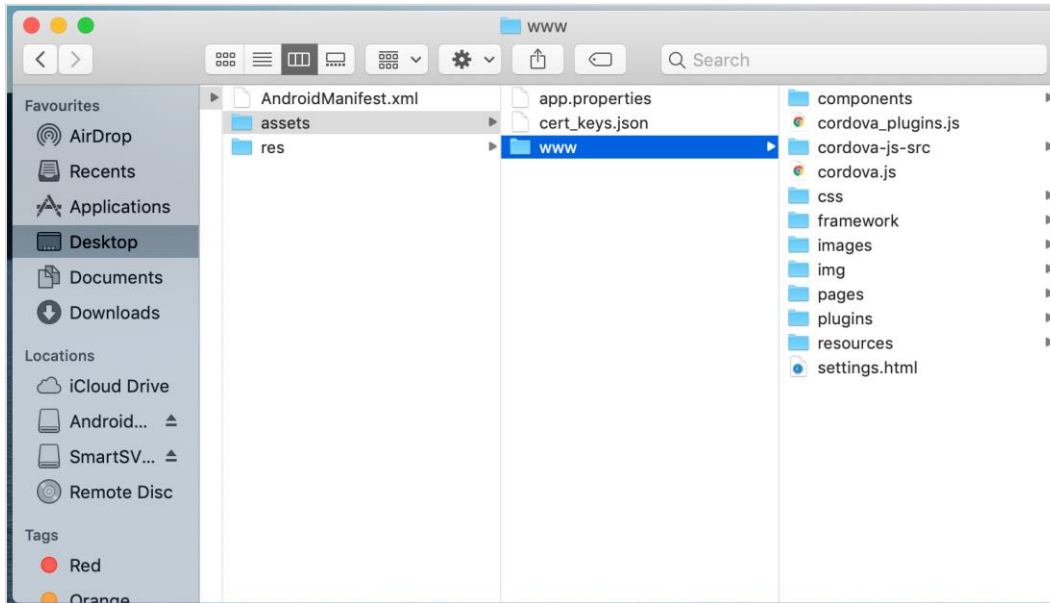


<input type="checkbox"/>	Name	Date modified	Type	Size
<input checked="" type="checkbox"/>	_build	10/25/2018 2:51 PM	File folder	
<input checked="" type="checkbox"/>	components	7/27/2018 12:02 PM	File folder	
<input checked="" type="checkbox"/>	css	7/27/2018 12:02 PM	File folder	
<input checked="" type="checkbox"/>	dist	10/25/2018 2:50 PM	File folder	
<input checked="" type="checkbox"/>	framework	7/27/2018 12:03 PM	File folder	
<input checked="" type="checkbox"/>	images	7/27/2018 12:03 PM	File folder	
<input checked="" type="checkbox"/>	non-oam	7/27/2018 12:03 PM	File folder	
<input checked="" type="checkbox"/>	pages	7/27/2018 12:03 PM	File folder	
<input checked="" type="checkbox"/>	resources	7/27/2018 12:02 PM	File folder	

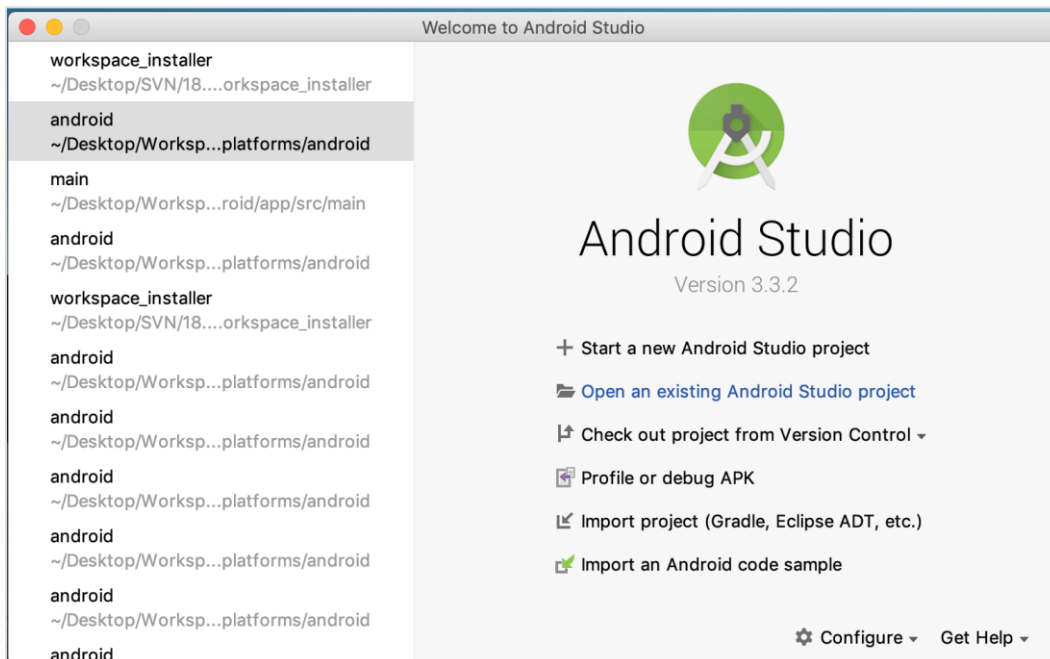
6.2 Authenticator Application Workspace Setup

1. Copy UI (Directories – components, css, framework, images, pages, resources) from /dist directory to workspace/installer/app/src/main/assets/www/

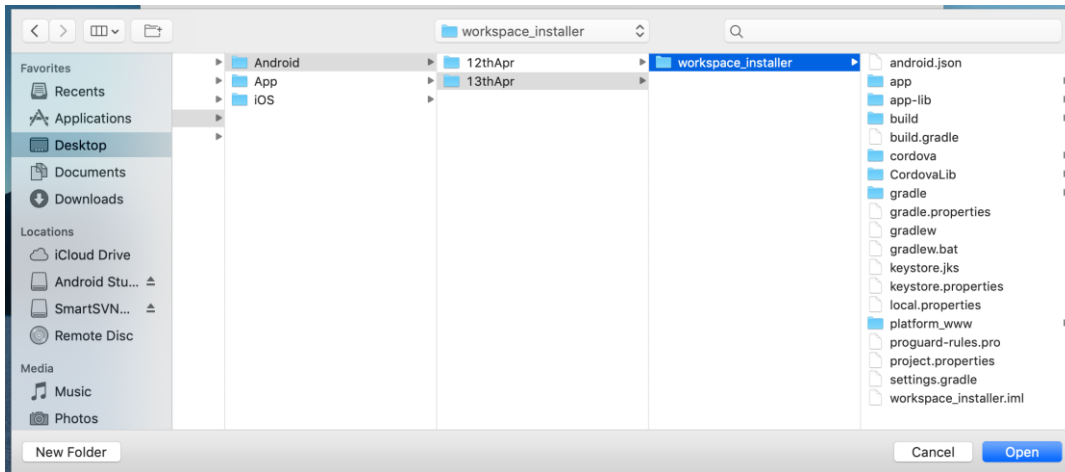
In case any popup appears, click replace



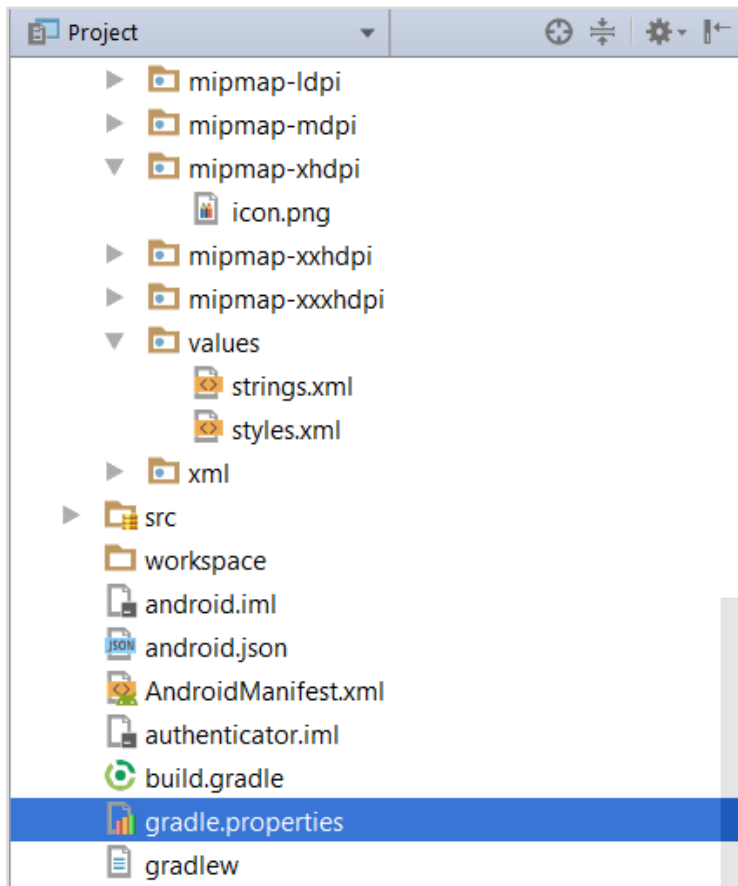
2. Launch Android Studio and open existing project



3. Open OBDX_Installer/workspace_installer folder in Android Studio.



4. Open gradle.properties file and update following properties with relevant proxy address if required

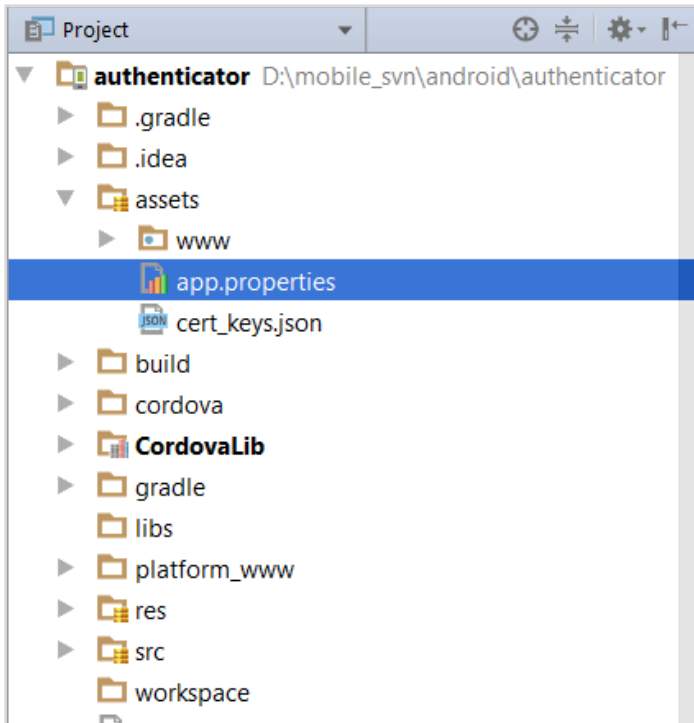


```

systemProp.http.proxyHost = <proxy_address>
systemProp.https.proxyPort = <port_number>
systemProp.https.proxyHost = <proxy_address>
systemProp.http.proxyPort = <port_number>

```

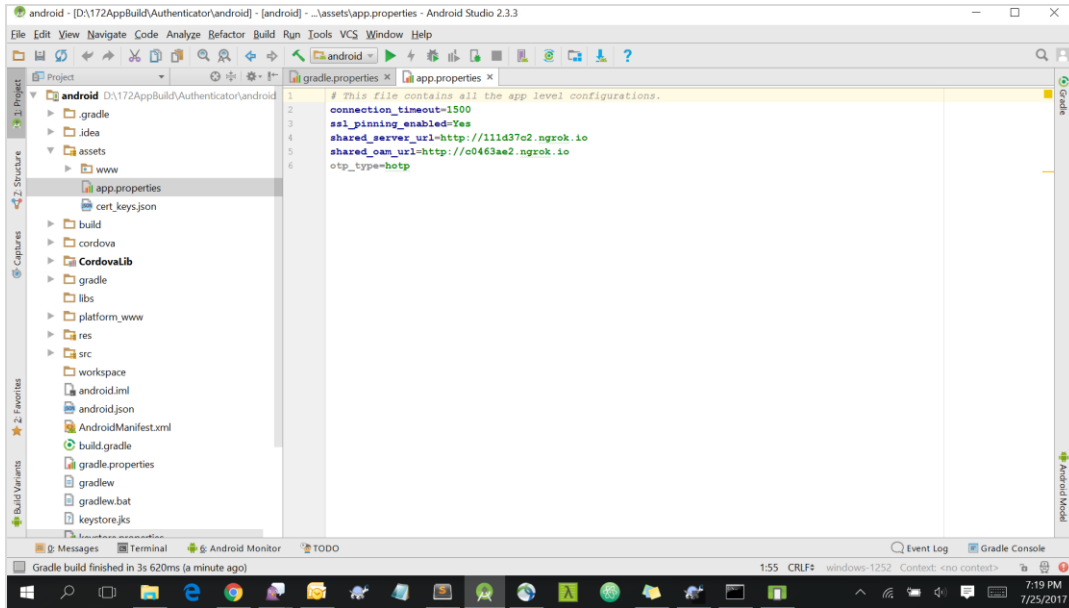
5. Open “*assets\app.properties*” file and update following properties as per requirement



```

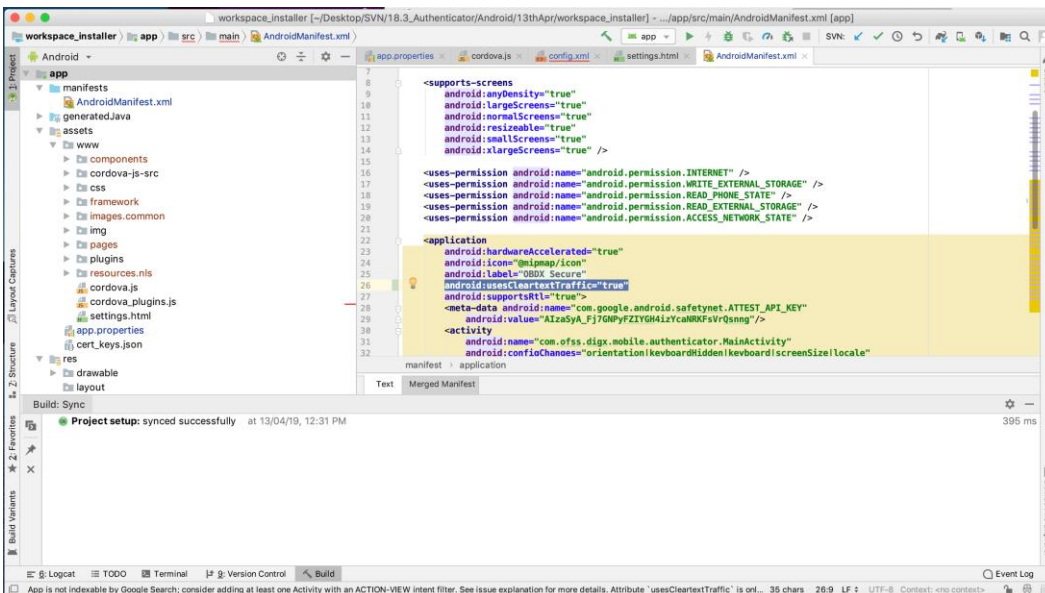
connection_timeout = <timeout_in_milliseconds>
ssl_pinning_enabled = <YES or NO>
shared_server_url = <server_url>
shared_oam_url = <oam_url>
otp_type = <HOTP or TOTP>

```



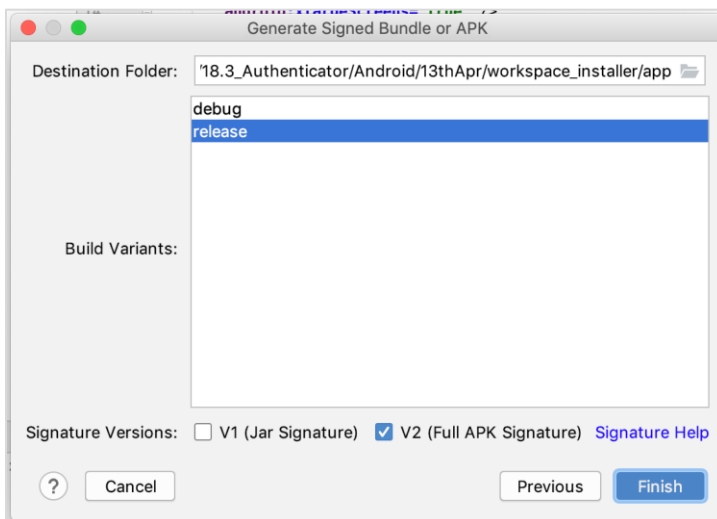
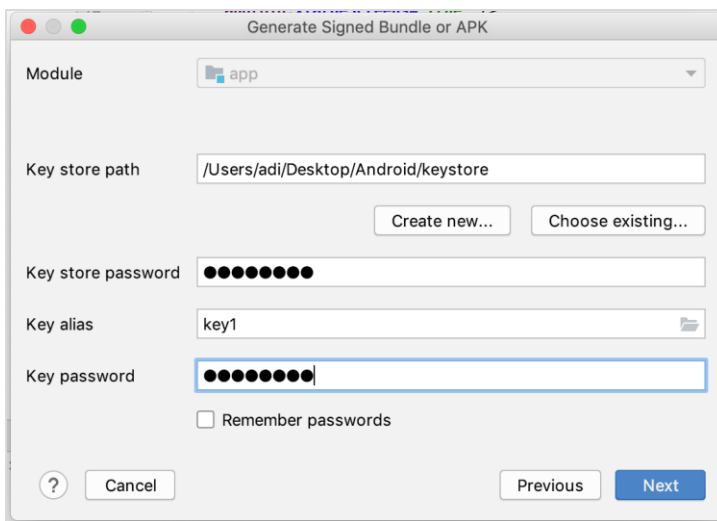
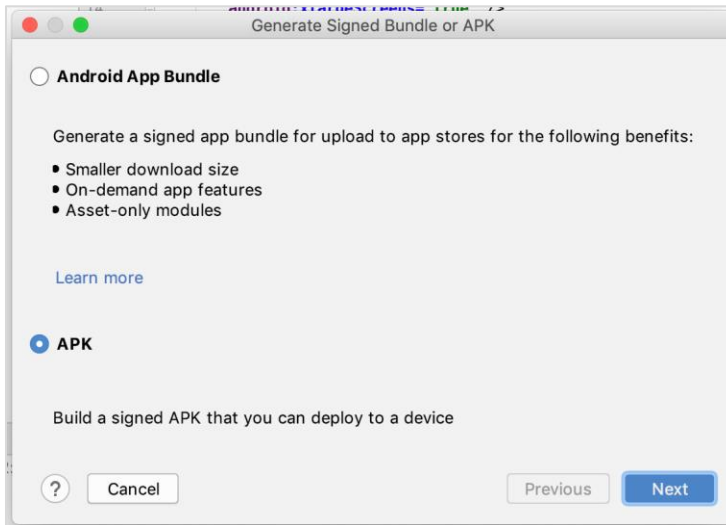
Note: If selected authentication mechanism is not OAM based then remove “shared_oam_url” property.

6. Click Build → Clean & Build → Rebuild project in Android Studio.
7. Click on Build → Edit Build Type → app → release
 - Enable minify → true
 - Add proguard file from workspace_installer/proguard-rules.pro
 - Click OK
8. If using http protocol for development add (android:usesCleartextTraffic="true") to application tag of AndroidManifest.xml



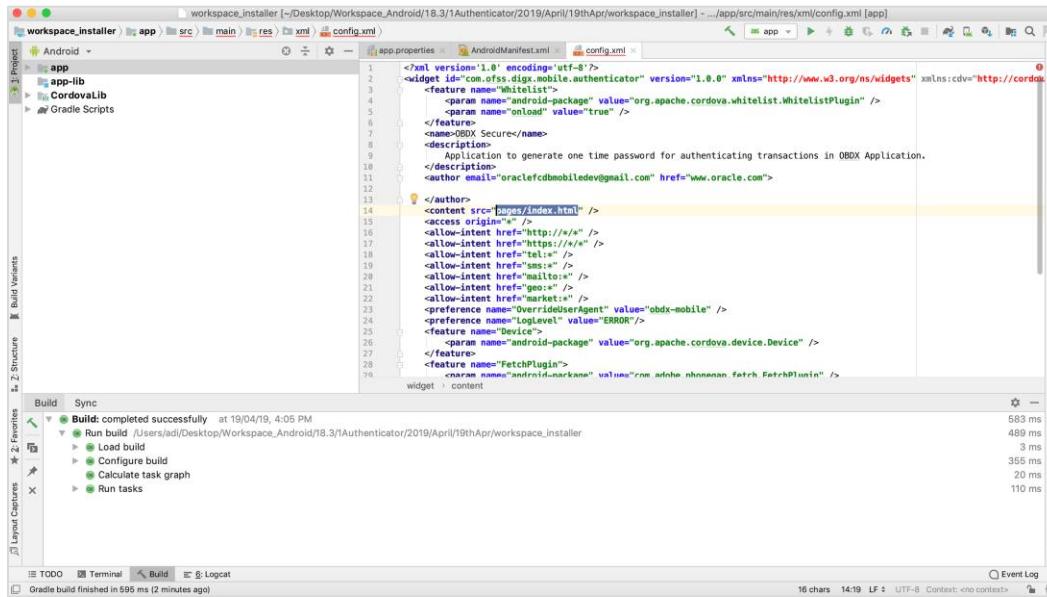
9. **For Generating Signed Apk:** To Generate release-signed apk as follows:

10. On menu bar click on Build -> Generate Signed Apk



Click Finish to generate .apk

The application has config page to add URL. This is for development purpose only and can be removed using below step. (Update content src tag)



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7. Application Security Configuration

Root Check → Ensure Step 3.1 is completed

1. Open google developer console. Select your app then navigate to

Setup-> App Integrity-> change option of Response Encryption

In the window that appears, click Manage and download my response encryption keys and follow below steps to generate response encryption keys-

- a. Create a new private-public key pair. RSA key size must be 2048 bits using below command-

```
openssl genrsa -aes128 -out your_path/private.pem 2048
```

Then use your password phrase for creating private.pem and also use the same password for verifying the private.pem. Then hit the below command.

```
openssl rsa -in your_path/private.pem -pubout -out your_path/public.pem
```

Enter the same password which you have used while creating private.pem. These two files will now appear on your mentioned path. Then upload the public.pem file on the window which was appeared after clicking on Manage and download my response encryption keys option. Once you upload the public.pem file it will automatically download your_app_pkg_name.enc file. Then hit below command as,

```
openssl rsautl -decrypt -oaep -inkey your_path/private.pem -in your_app_pkg_name.enc -out your_path/api_keys.txt
```

Enter the password for private.pem. It will create api_keys.tx file on your path. It must be consist of VERIFICATION_KEY and DECRYPTION_KEY.

2. Maintain this VERIFICATION_KEY and DECRYPTION_KEY in **DIGX_FW_CONFIG_ALL_B** table corresponding to the following keys respectively:

PLAY_INTEGRITY_ENCRYPTION_KEY and **PLAY_INTEGRITY_DECRYPTION_KEY**

An example query will be:

```
update DIGX_FW_CONFIG_ALL_B set prop_value = 'YOUR_DECRYPTION_KEY' where prop_id = 'PLAY_INTEGRITY_DECRYPTION_KEY';
```

```
update DIGX_FW_CONFIG_ALL_B set prop_value = 'YOUR_ENCRYPTION_KEY' where prop_id = 'PLAY_INTEGRITY_ENCRYPTION_KEY';
```

3. Similarly, Obtain the same keys for authenticator app by using above step 1 and then maintain those in **DIGX_FW_CONFIG_ALL_B** table corresponding to the following keys respectively:

PLAY_INTEGRITY_ENCRYPTION_KEY_AUTHENTICATOR and
PLAY_INTEGRITY_DECRYPTION_KEY_AUTHENTICATOR

An example query will be:

```
update DIGX_FW_CONFIG_ALL_B set prop_value = 'YOUR_DECRYPTION_KEY' where
prop_id = 'PLAY_INTEGRITY_DECRYPTION_KEY_AUTHENTICATOR';
```

```
update DIGX_FW_CONFIG_ALL_B set prop_value = 'YOUR_ENCRYPTION_KEY' where
prop_id = 'PLAY_INTEGRITY_ENCRYPTION_KEY_AUTHENTICATOR';
```

- Similarly, we also have to maintain package names of Servicing and Authenticator app in the same table, i.e. **DIGX_FW_CONFIG_ALL_B** corresponding to the following keys respectively:

ANDROID_SERVICING_PACKAGE and ANDROID_AUTHENTICATOR_PACKAGE

An example query will be:

```
insert into digx_fw_config_all_b (PROP_ID, CATEGORY_ID, PROP_VALUE,
FACTORY_SHIPPED_FLAG, PROP_COMMENTS, SUMMARY_TEXT, CREATED_BY,
CREATION_DATE, LAST_UPDATED_BY, LAST_UPDATED_DATE, OBJECT_STATUS,
OBJECT_VERSION_NUMBER) values ('ANDROID_SERVICING_PACKAGE',
'mobileconfig', 'com.ofss.zigbank', 'N', '', 'Stores device id in OUD', 'ofssuser', sysdate,
'ofssuser', sysdate, 'Y', 1,);
```

SSL Pinning

- Get the list of Base 64 encoded SHA256 hashed certificates' public keys of server's valid certificates. Use below command to generate this hash for your certificate. Replace '<certificate.der>' with the path to your certificate.

```
openssl x509 -inform der -in <certificate.der> -pubkey -noout | openssl pkey -pubin -
outform der | openssl dgst -sha256 -binary | openssl enc -base64
```

- Add the hashed keys generated in point 6 to **zigbank\platforms\android\customizations\src\main\res\values\app.properties.xml file** in 'certificate_public_keys' array. Append this key to 'sha256/' in an <item> tag as shown below. Multiple certificate keys can be added to 'certificate_public_keys' array by adding them in <item> tags.

Eg.:

```
<string-array name="certificate_public_keys">  
  <item>sha256/5kJvNEMw0KjrCAu7eXY5HZdvyCS13BbA0VJG1RSP91w=</item>  
</string-array>
```

Eg. for multiple certificates (In case OAM/IDCS is used):

```
<string-array name="certificate_public_keys">  
  <item>sha256/5kJvNEMw0KjrCAu7eXY5HZdvyCS13BbA0VJG1RSP91w=</item>  
  <item>sha256/3rgsgghoqrDegekpkk92Fgw1w7exyYCS1okef90o1w=</item>  
</string-array>
```

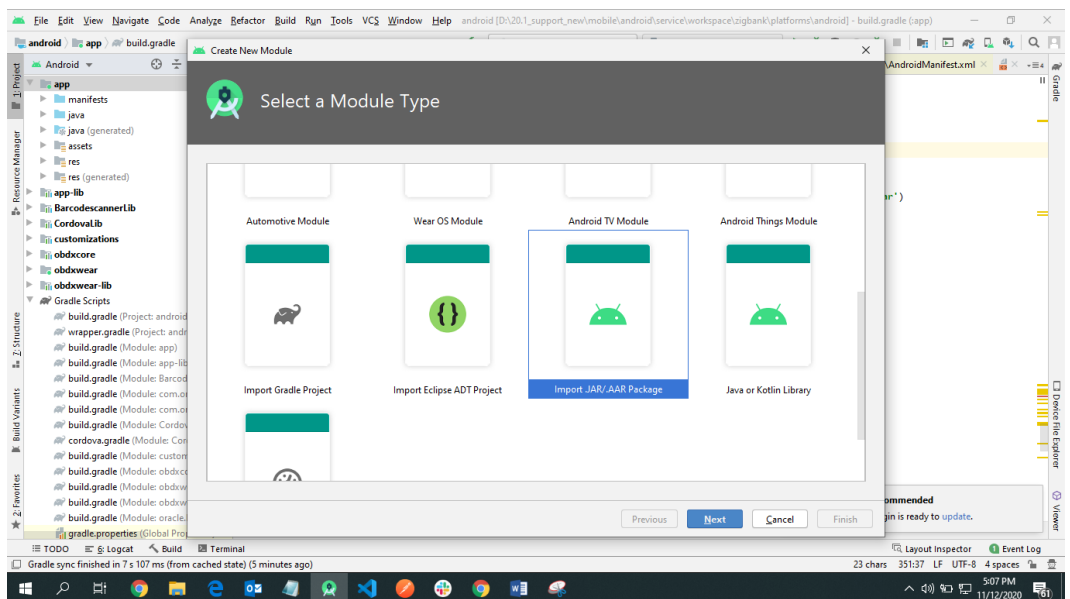
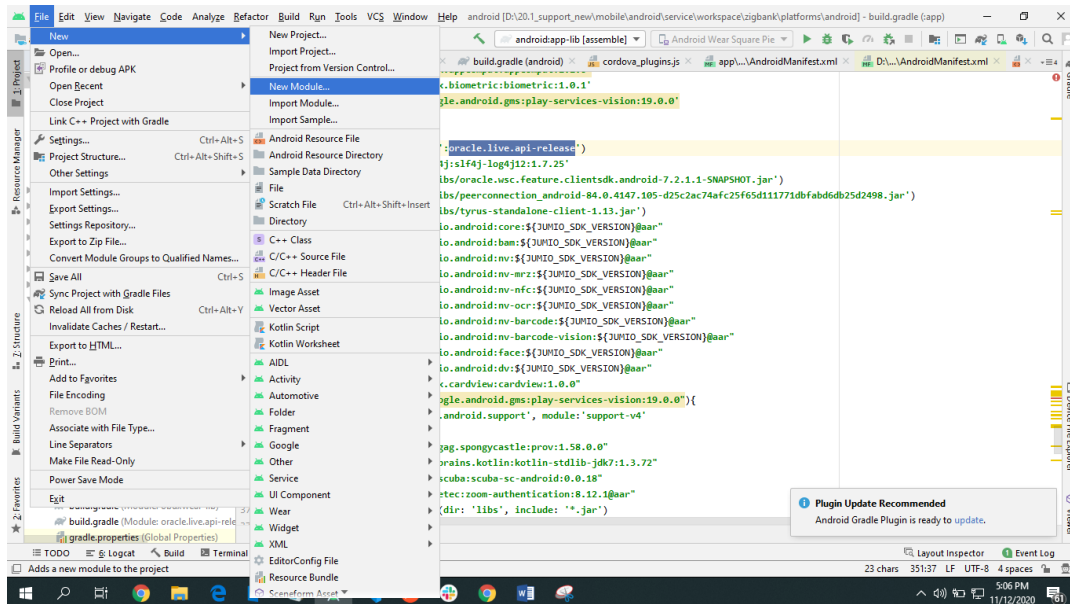
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8. Live Experience With Jumio Integration

1. Download live experience android sdk from below download link.

<https://www.oracle.com/downloads/cloud/oracle-live-experience-downloads.html>

2. Import 'oracle.live.api-release' file as a New Module.



3. Add Live Experience Client ID and Cloud Address in below two properties under app.properties.xml(zigbank\platforms\android\customizations\src\main\res\values)

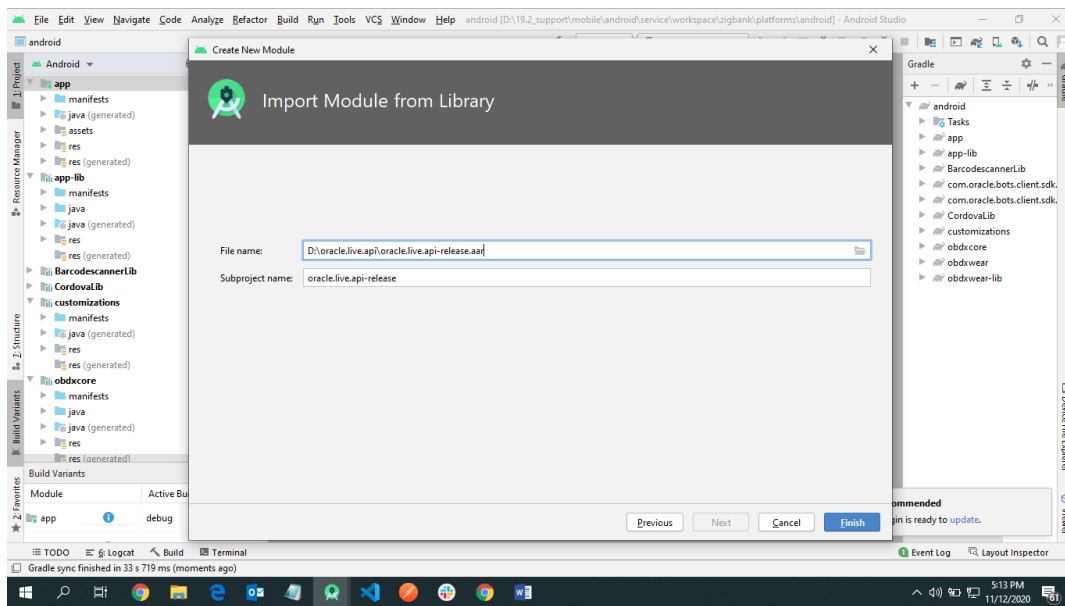
```
<string name="LX_CLIENT_ID">@@CLIENT_ID</string>
```

```
<string name="LX_ADDRESS">@@ADDRESS</string>
```

Note: Add LX_ADDRESS without https://

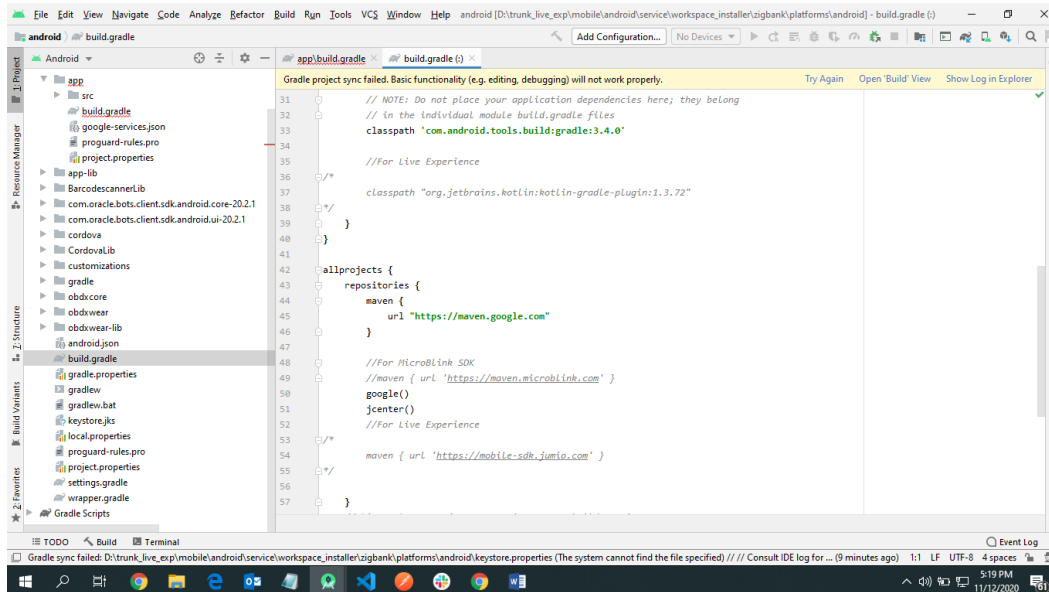
For example. If the LX_ADDRESS is <https://live.oraclecloud.com> then add only live.oraclecloud.com.

4. Click **Next** and navigate to oracle.live.api-release aar file location and click **Finish**.

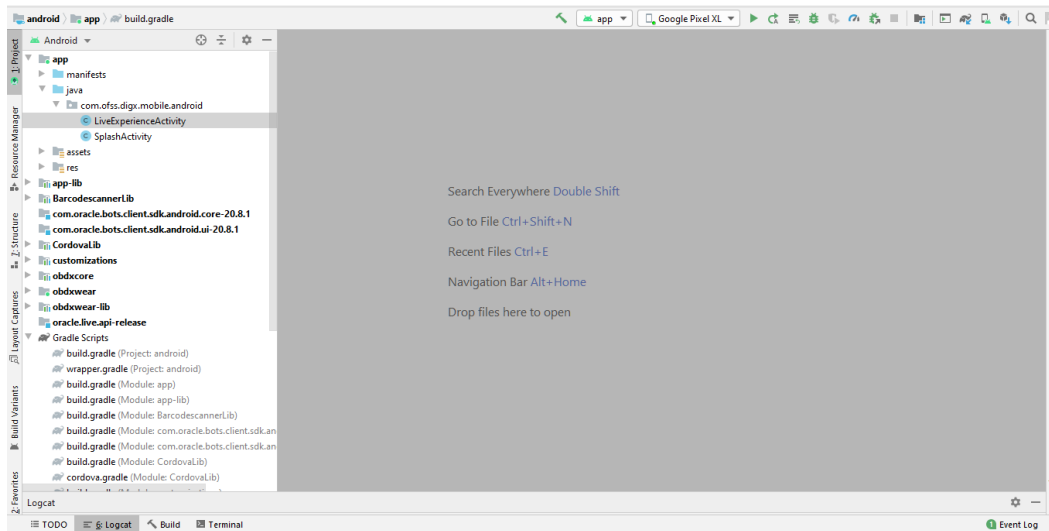


5. Un-comment the Live Experience SDK's from zigbank\platforms\android\app\build.gradle.

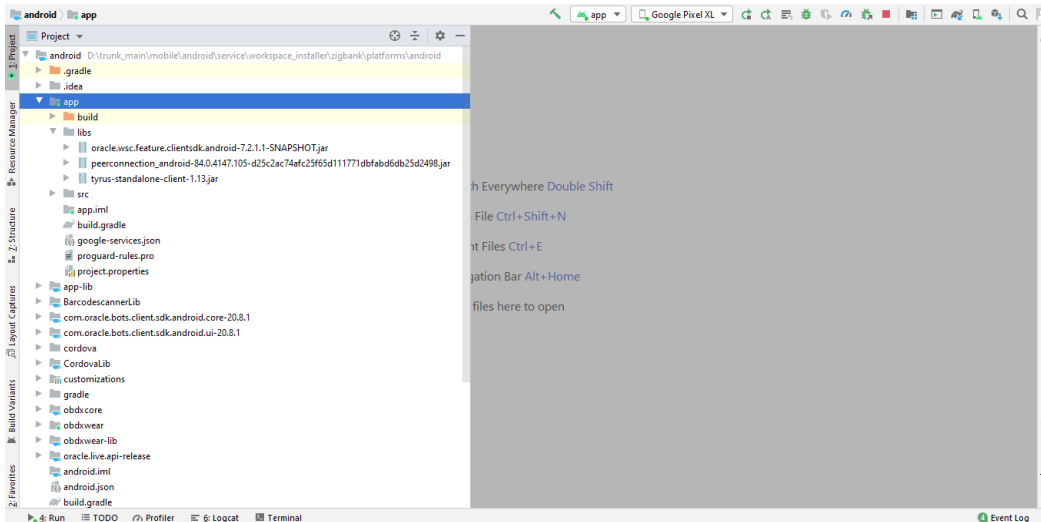
6. Un-comment the gradle maven files for Live Experience from zigbank\platforms\android\build.gradle



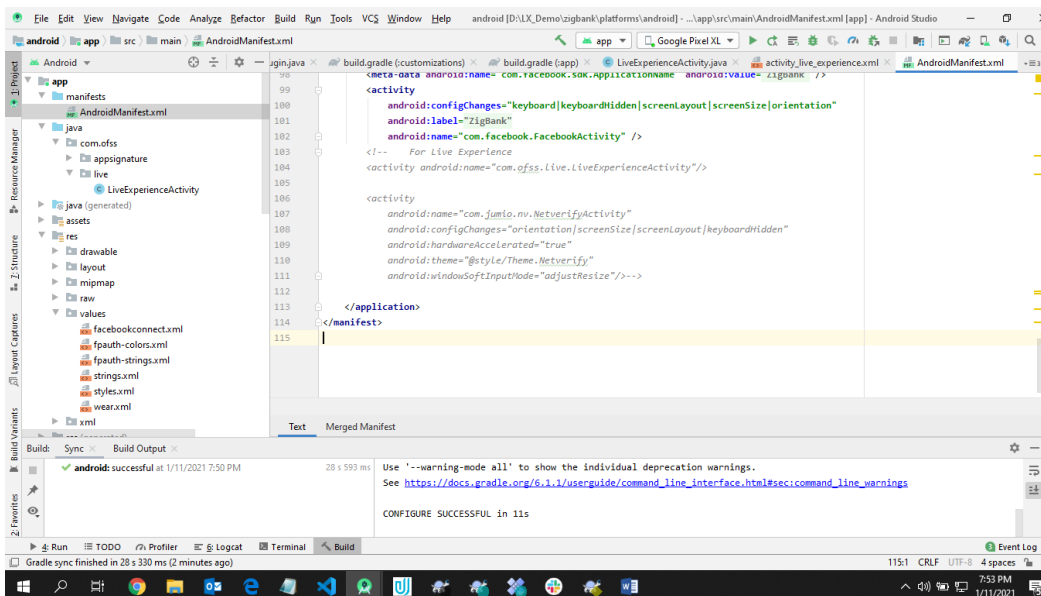
7. Add LiveExperienceActivity.java folder from AppExtensions\live experience\ at zigbank\platforms\android\app\src\main\java\com\ofss\digx\mobile\android



8. Add libs folder at zigbank\platforms\android\app and copy below jars from downloaded sdk folder in it.
 - i) oracle.wsc.feature.clientsdk.android-7.2.1.1-SNAPSHOT.jar
 - ii) peerconnection_android-84.0.4147.105-25c2ac74afc25f65d111771dbfabd6db25d2498.jar
 - iii) tyrus-standalone-client-1.13.jar



9. Un-comment LiveExperienceActivity and NetverifyActivity from zigbank\platforms\android\app\src\main\AndroidManifest.xml



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9. Adding Custom Cordova Plugin

Step 1 -

Create java folder and add your package under app(zigbank\platforms\android\app)

Create java file under your package which will extends CordovaPlugin

Override execute method with JSONArray as a parameter

Retrieve jsonobject from JSONArray and get the data which passed from js file

Example:

```
public class GetDirectionMapPlugin extends CordovaPlugin {
    @Override
    public boolean execute(String action, JSONArray args, CallbackContext callbackContext)
        throws JSONException {
        try{
            JSONObject object = args.getJSONObject(0);
            String yourKey = object.getString("your_key");
        }catch (Exception e){
            Log.e(TAG,e.getMessage());
        }
        return true;
    }
}
```

Step 2 –

Create plugin file under plugins folder of

www(zigbank\platforms\android\service\workspace\app\src\main\assets\www\plugins)

Example:

```
cordova.define("cordova-plugin-getdirection", function(require, exports, module) {
    var exec = cordova.require('cordova/exec');
    exports.navigate = function(args, successCallback, errorCallback) {
        cordova.exec(successCallback, errorCallback, "GetDirectionMapPlugin", "direction",
```

```

        [args]);
    };
});
cordova-plugin-getdirection.getDirectionPlugin -> user defined id from
cordova_plugin.js(zigbank\platforms\android\service\workspace\app\src\main\assets\ww
w\cordova_plugin.js)
GetDirectionMapPlugin-> name of java plugin class
direction -> action
navigate -> this can be use in js file to this function

```

Step 3 –

Make entry of plugin in
 cordova_plugin.js(zigbank\platforms\android\service\workspace\zigbank\platforms\android\app\sr
 c\main\assets\www) as below ->

Example:

```

{
  "id": "cordova-plugin-getdirection.getDirectionPlugin", -> user defined id
  "file": "plugins/cordova-plugin-getdirection/www/mapgetdirection.js", -> path of plugin js
  file
  "pluginId": "cordova-plugin-getdirection",
  "clobbers": [
    "window.getDirection" -> this can be used in js file to call plugin
  ]
}

```

Step 4 -

Make entry of java plugin class in
 config.xml(zigbank\platforms\android\service\workspace\zigbank\platforms\android\app\src\main\r
 es\xml) file of app as below -

Example:

```
<feature name="GetDirectionMapPlugin">  
<param name="android-package" value="Your_Plugin_Java_Class_Path" />  
</feature>
```

GetDirectionMapPlugin -> Name of java plugin class

Step 5 -

Plugin calling in js file ->

Example:

```
    window.getDirection.navigate({  
    originLatLng: origin,  
    destinationLatLng: location  
    })
```

window.getDirection -> clobber define in the cordova_plugin.js file

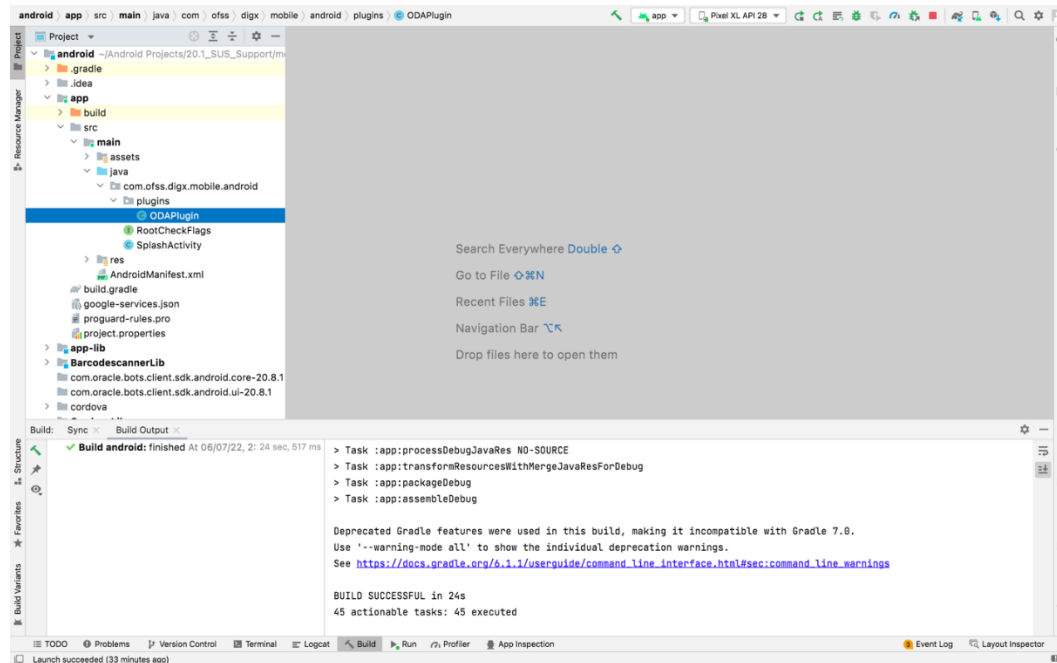
navigate -> name of the function defined in plugin js file

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10. ODA Chatbot Inclusion

To enable ODA Chatbot services in the mobile app, the following changes needs to be made:

1. Copy ODAPugin.java from workspace_installer/AppExtension/oda to workspace_installer/zigbank/platforms/android/app/src/main/java/com/ofss/digx/mobile/android/plugins/

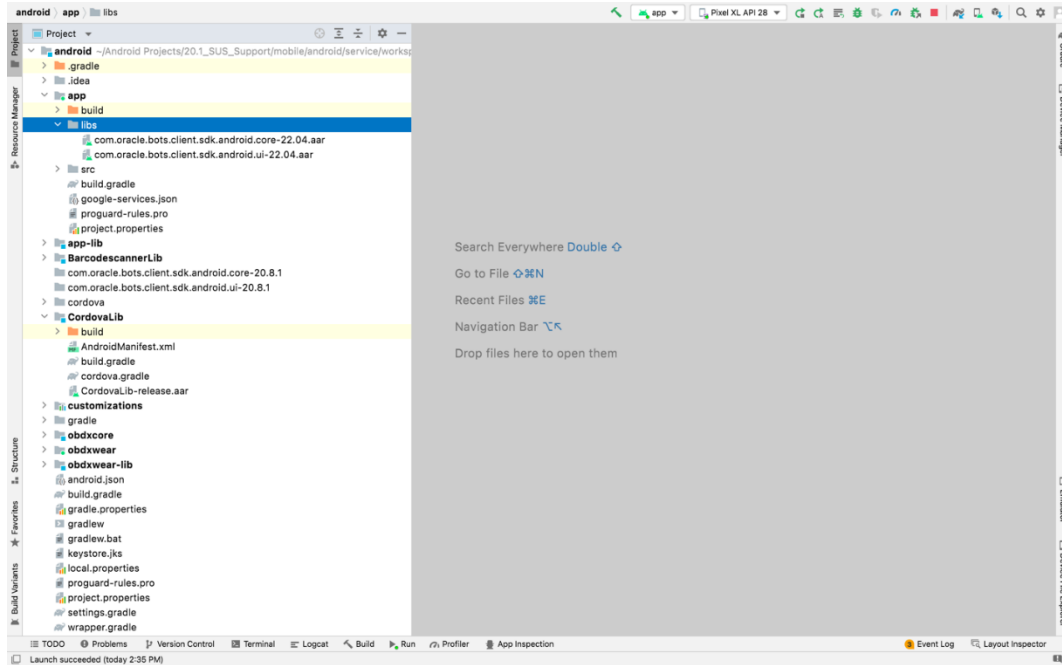


2. Download ODA Android sdk from below link-

<https://www.oracle.com/downloads/cloud/amce-downloads.html>

3. Add libs folder at zigbank\platforms\android\app and copy below files from downloaded sdk folder in it.

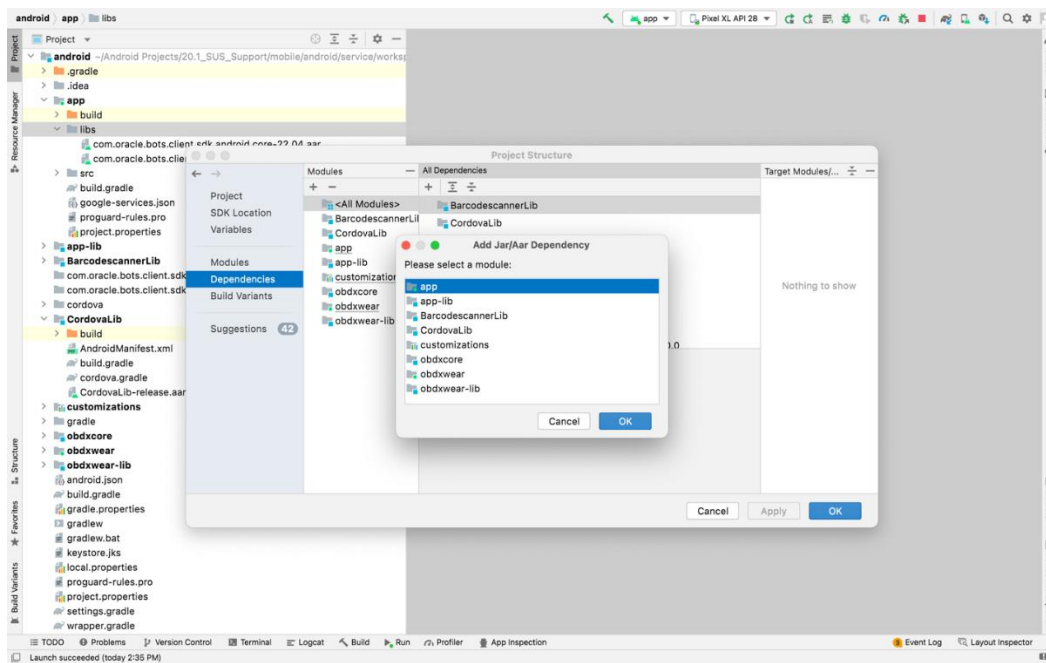
- c. com.oracle.bots.client.sdk.android.core-xx.aar
- d. com.oracle.bots.client.sdk.android.ui-22.04.aar



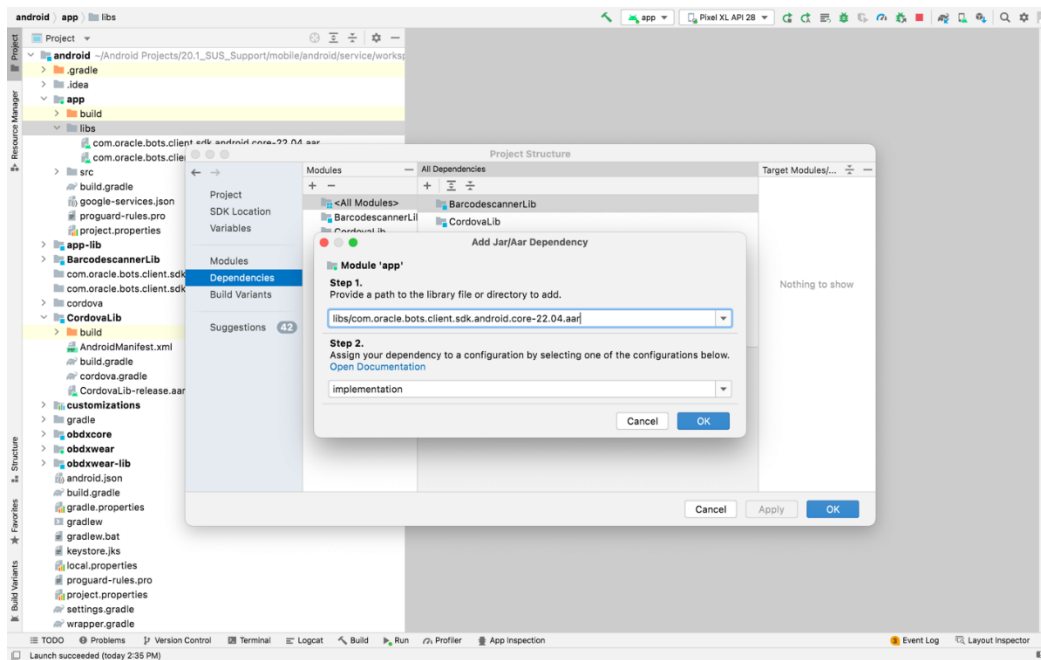
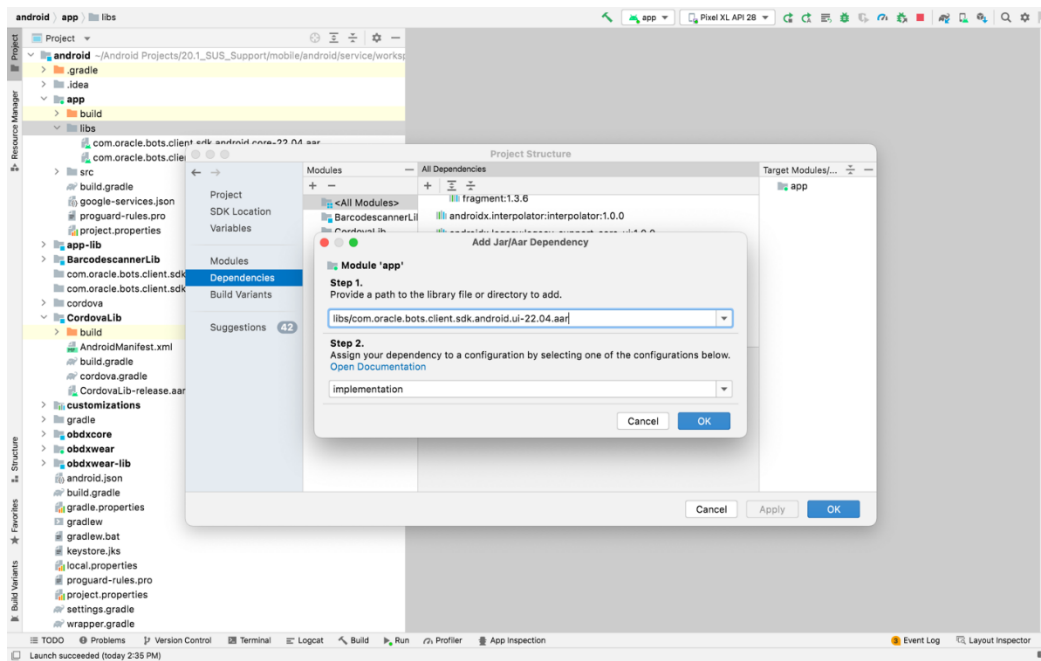
4. In Android Studio follow below steps-

File -> Project Structure -> Dependencies

5. Click on "+" icon and select JR/AAR Dependency and select app module and click Ok.



6. Add both .aar file paths from step3. Then click Apply and Ok.



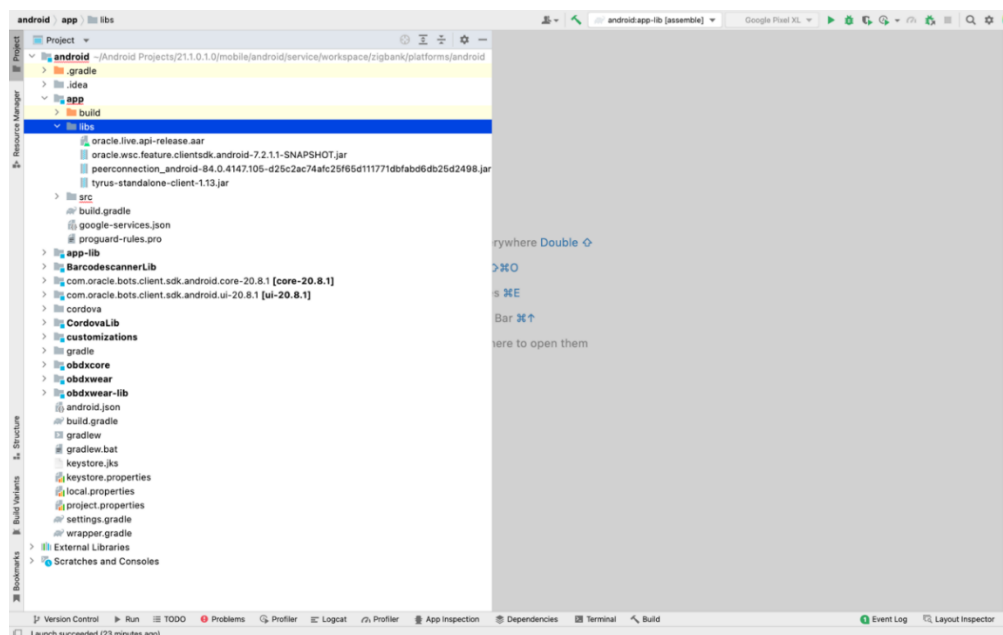
7. Add Chatbot ID and Chatbot URL in app.properties.xml(zigbank\platforms\android\customizations\src\main\res\values)

```
<string name="CHATBOT_ID">@@CHATBOT_ID</string>
```

```
<string name="CHATBOT_URL">@@CHATBOT_URL</string>
```

11. Live Experience Integration

1. Download live experience android sdk from below download link.
<https://www.oracle.com/downloads/cloud/oracle-live-experience-downloads.html>
2. Add libs folder at zigbank\platforms\android\app and copy below jars from downloaded sdk folder in it.
 - oracle.wsc.feature.clientsdk.android-7.2.1.1-SNAPSHOT.jar
 - peerconnection_android-84.0.4147.105-25c2ac74afc25f65d111771dbfabd6db25d2498.jar
 - tyrus-standalone-client-1.13.jar
 - oracle.live.api-release.aar



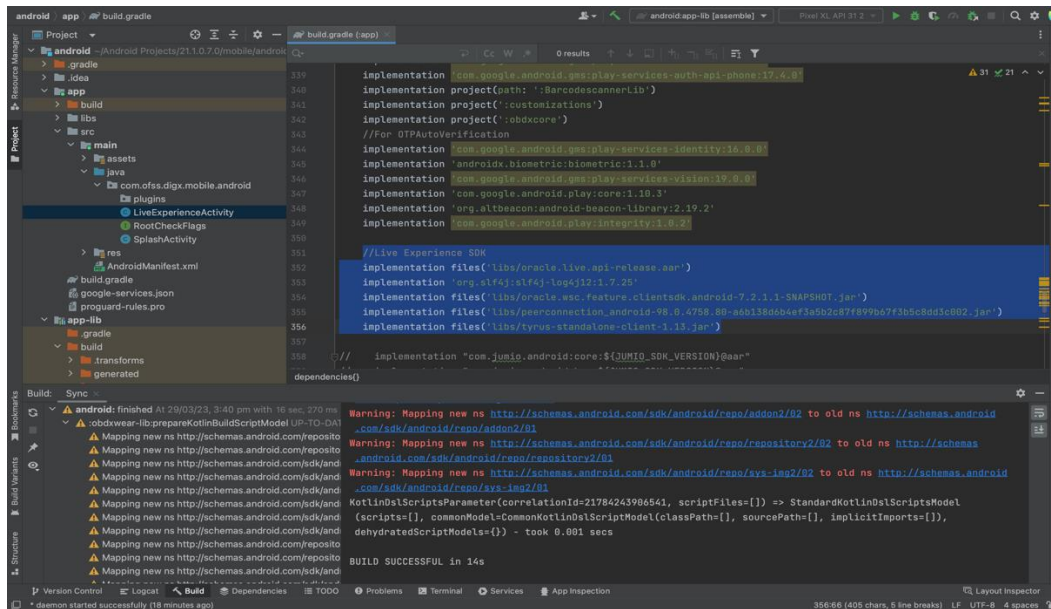
3. Add Live Experience Client ID and Cloud Address in below two properties under app.properties.xml(zigbank\platforms\android\customizations\src\main\res\values)


```
<string name="LX_CLIENT_ID">@@CLIENT_ID</string>
<string name="LX_ADDRESS">@@ADDRESS</string>
```

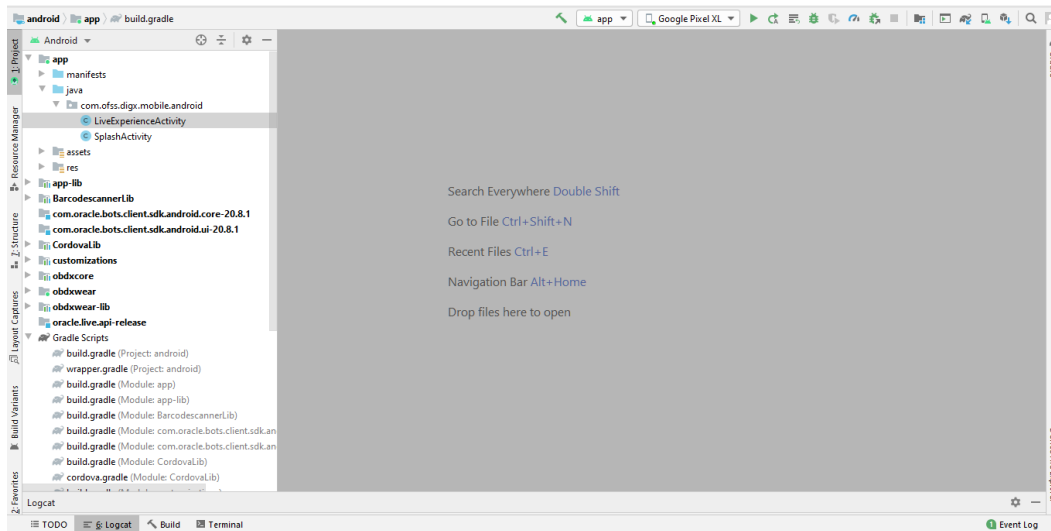
Note: Add LX_ADDRESS without https://

For example. If the LX_ADDRESS is https://live.oraclecloud.com then add only live.oraclecloud.com.

4. Un-comment the Live Experience SDK's from zigbank\platforms\android\app\build.gradle.



5. Add LiveExperienceActiviy.java folder from AppExtensions\live experience\ at zigbank\platforms\android\app\src\main\java\com\ofss\digx\mobile\android



6. Un-comment LiveExperienceActivity from zigbank\platforms\android\app\src\main\AndroidManifest.xml