Publishing an Android Application

Android Application

1. the steps involved with the public distribution of an application created with Xamarin.Android are :

- publish the application

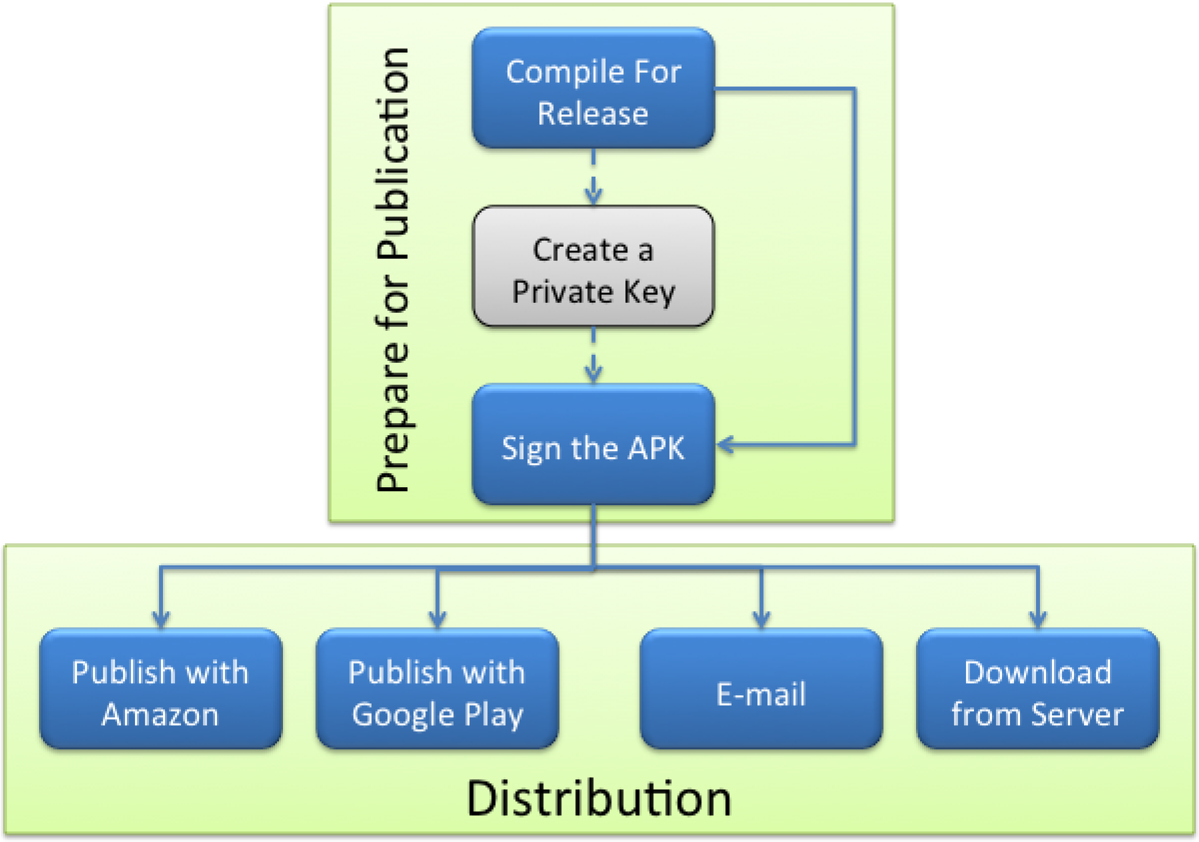
- Publishing is the process of compiling a Xamarin.Android application so that it is ready for users to install on their devices, and
- it involves two essential tasks:

1. **Preparing for Publication**

- A release version of the application is created

2. **Distribution**

- The release version of an application is made available any one distribution channels.
- channels such as e-mail, a private web server, Google Play, or the Amazon App Store for Android.
- Publishing to Google Play



1. **Preparing an Application for Release**

- this steps start ,After an application has been coded and tested
- in which we prepare a package for distribution

1. first step is to build the application for release to get package ,

- for this we need to be setting some application attributes :

1. **Specify the Application Icon**

- strongly recommended that each Xamarin.Android application specifies an application icon, Google Play does not allow to publish , without it.
- it can be set in Android Manifest -> App Icon
- it can also be set in Properties\AssemblyInfo.cs

```
[assembly: Application(Icon = "@drawable/icon")]
```

2. **Version the Application**

- initializing or updating the versioning information.
- so user aware of the version of app
- it is important for application maintenance and distribution.
- To assist with versioning, Android recognizes two different types of information:

1. ***Version Number***

- An integer value (used internally) that represents the version of the application
- stored in AndroidManifest.xml file as android:versionCode.

2. ***Version Name*** + A string used to inform user or Google Paly about version of app,not used internally. + stored in the AndroidManifest.xml file as android:versionName.
3. **Shrink the APK**

- The size of the final APK can be substantially reduced by using combination of both, in same order:

1. ***Xamarin.Android linker***

- which removes unnecessary managed code + optimize the app at the managed code level

- Configure the linker
  - Release mode turns off the shared runtime and turns on linking,to ship[only required code .
  - linker uses static analysis to determine which assemblies, types, and type members are used or referenced and discards the rest.
  - linker provides 3 options :
  1. None : Linker turned off
  2. SDK Assemblies only : link assemblies required by X.Android(i.e static analysis of only these files)
  3. Sdk and User Assemblies:
  - link all assemblies required by app.

2. ***ProGuard tool from the Android SDK***

- ProGuard is a Java class file shrinker, optimizer, and pre-verifier. It detects and removes unused code, analyzes and optimizes bytecode.
  - It reads input jars shrinks, optimizes, and pre-verifies them and then write result to output jar

    - step to process input jar are Shrinking step,Optimization step ,Obfuscation step,Preverification step
    - ProGuard is disabled by default.
    - The Enable ProGuard option is available only when the project is set to Release mode
    - Xamarin.Android ProGuard configuration does not obfuscate the APK,for this need Dotfuscator.

4. **Protect the Application**

- Prevent users or attackers from debugging, tampering, or reverse engineering the application by

1. ***Disable Debugging***

- in app development,debugging is performed with the use of the Java Debug Wire Protocol (JDWP).
    - JDWP can pose a security issue for released applications.
    - so, Always disable the debug state, in released app
    - it can be done using :
    1. android:debuggable attribute in Android Manifest set to false
    2. adding a conditional compile statement in AssemblyInfo.cs:

```
#if DEBUG
[assembly: Application(Debuggable=true)]
  #else
 [assembly: Application(Debuggable=false)]
#endif
```

3. **Obfuscating the managed code**

- ***Dotfuscator Community Edition*** (CE) can be used to obfuscate managed code and
- inject runtime security state detection code into a Xamarin.Android app at build time to detect and respond if the app is running on a rooted device.
- it is done as Even with debugging disabled, it is still possible for attackers to tamper with application.
- To use Dotfuscator,

> click Tools > PreEmptive Protection - Dotfuscator.

4. **Bundle Assemblies into Native Code**

- When this option is enabled, assemblies are bundled into a native shared library.
- allows assemblies to be compressed, permitting smaller .apk files
- This option requires an Enterprise license
- this does not mean that the assemblies are compiled into native code. as not possible to use AOT Compilation .

5. **AOT Compilation**

- this option (on the Packaging Properties page) enables Ahead-of-Time (AOT) compilation of assemblies
- it reduces JIT startup overhead by precompiling assemblies.
- it result shorter app startup time but large APK size

6. **LLVM Optimizing Compiler**

- LLVM Optimizing Compiler will create smaller and faster compiled code and convert AOT-compiled assemblies into native code,
- but at the expense of slower build times.
- need AOT Compilation enabled.

5. **Set Packaging Properties**

- Packaging properties control the creation of the Android application package (APK).
- Packaging properties can be set in the Android Options section of project Properties
- Use Shared Runtime, and Use Fast Deployment are intended for Debug mode
- this step, optimizes the APK, protects its assets, and modularizes the packaging as needed
- can provide your users with an Android App Bundle that's optimized for their devices.
- it does

1. **Specify Supported Architectures**

- you explicitly select an architecture (or architectures) when your app is configured for Release.
  - Under the Android Options-> Packaging properties -> Advanced -> Supported architectures
  - supported arch from old to new are armeabi(not supported from Android 9.2) ,armeabi-v7a (default for app),arm64-v8a,x86,x86_64
  - based on target we must select arch. like deploy app to an x86 device, select x86.
  - We can use the Generate one package (.apk) per selected ABI option i.e target multiple arch.

2. **Generate One Package (.APK) per Selected ABI**
   - When this option is enabled, one APK will be created for each of the supported ABI's(Arch binary interface)
3. **Multi-Dex**
   - When the Enable Multi-Dex option is enabled, Android SDK tools are used to bypass the 65K method limit of the .dex file format.
   - The 65K method limitation is based on the number of Java methods that an app references
   - The best practice is to enable Enable Multi-Dex only if absolutely necessary, i.e.the app still references more than 65K Java methods even after using ProGuard.
4. **Android App Bundles**

- it's a format that is intended to be uploaded with all of your compiled code and resources.
- After you upload your signed app bundle, Google Play will have everything it needs to build and sign your application's APKs and serve them to your users using Dynamic Delivery.
- We can now generate an app bundle by following the Archive Flow.

6. **Compile**

- This step compiles the code and assets to verify that it builds in Release mode.
- After all of the above steps are completed, the app is ready for compilation.
- Select Build > Rebuild Solution to verify that it builds successfully in Release mode.
-
  ```
  Note that this step does not yet produce an APK.
  ```

7. **Archive for Publishing**

- This step builds the app and places it in an archive for signing and publishing.

- Signing the Android Application Package

1. begin the publishing process can be done in two ways

- right-click the project in Solution Explorer and select the Archive... context menu item
- right-click the Solution in the Solution Explorer and select Archive All.

Publishing to Google Play