

Publishing to TIZEN Using the Automated Conversion/Repackaging of Existing Android Apps

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Needs of Automated Converting From Android to TIZEN

Key Considerations for Emerging Platform



Manufacturer

How can I have **a lot of applications** in my store, so the devices become better competitive?



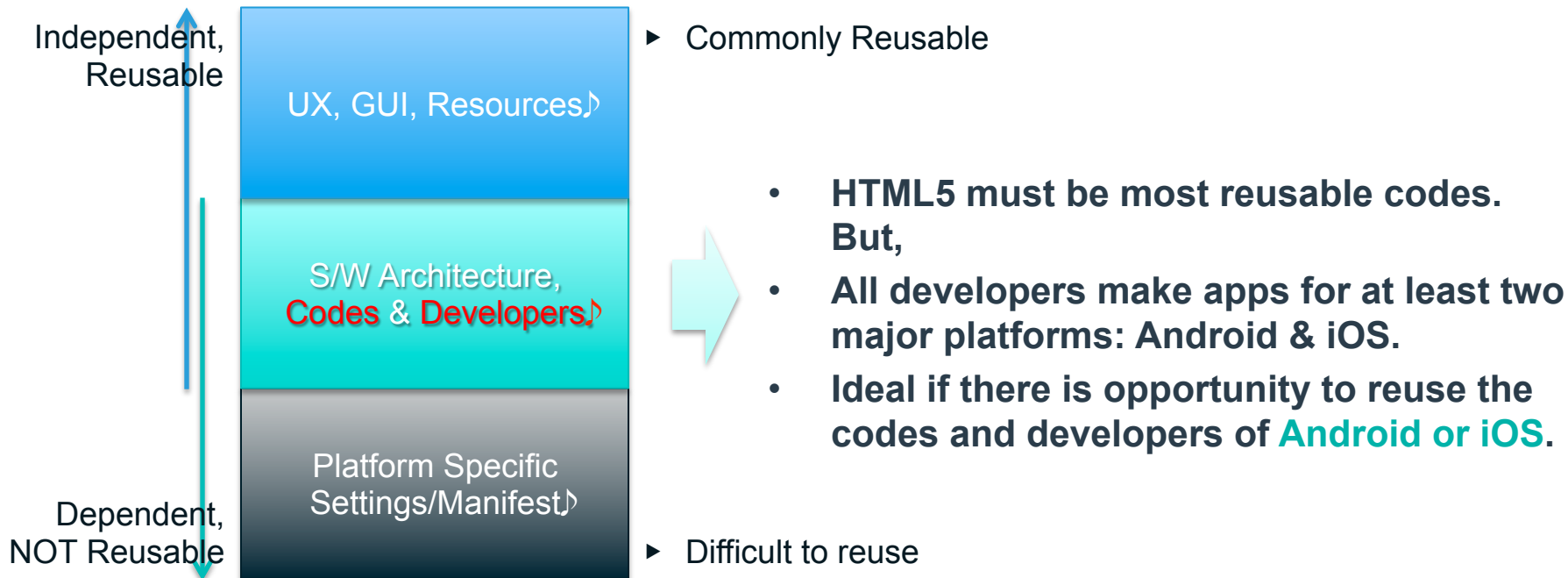
REUSE EXISTING ELEMENTS

How can I **reduce** the development **time & costs** for new platform, so I make a profit?



Developer

What & How To Reuse

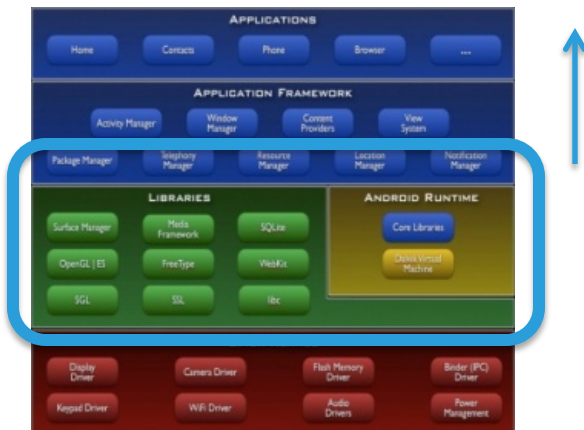


Approach of Other Platforms

- **Other platforms also consider migration from Android or iOS.**
 - Windows 8
 - Providing the porting guide from Android and iOS to Windows 8.
 - BlackBerry 10
 - Supporting various programming languages, such as, Java, HTML5, and flash, among others.
 - Providing the porting guide from Android and iOS to BlackBerry.
 - Providing [Android Runtime](#) and tools.

Looking Into Android

- Android provides the H/W independent runtime environment, which is based on Virtual Machine.

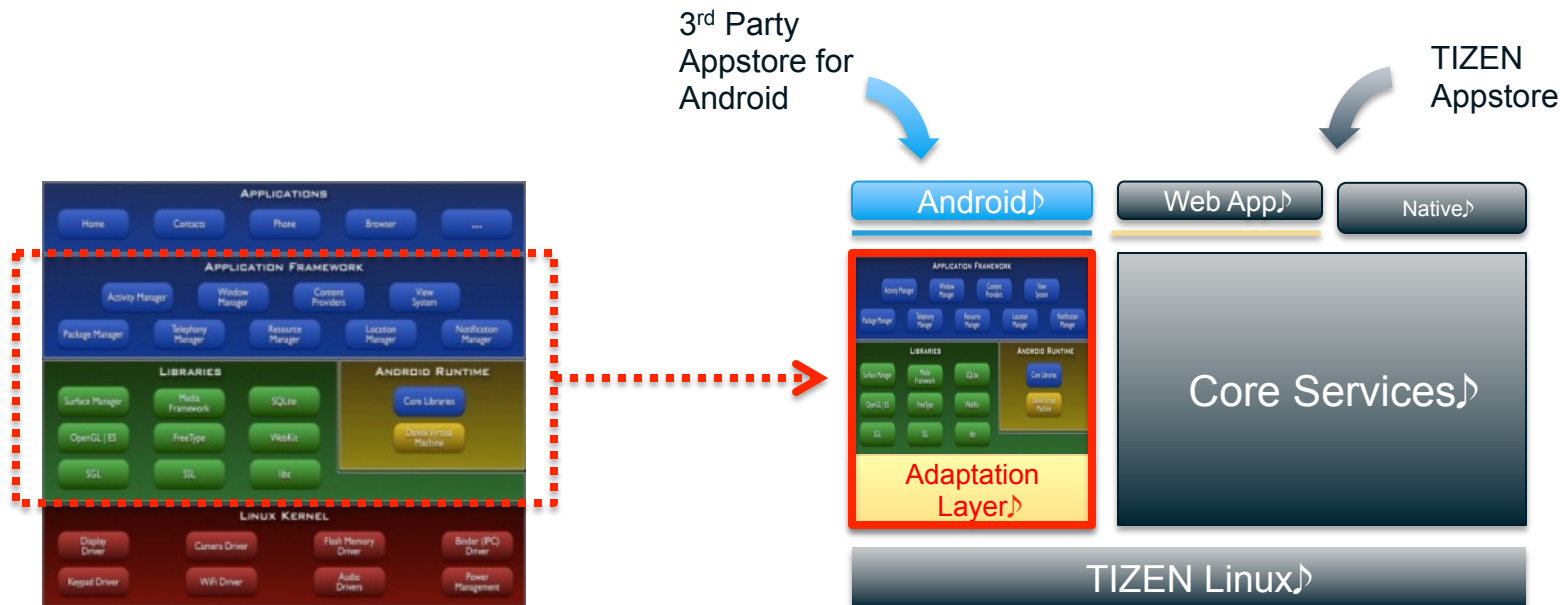


- Android applications have the following characteristics
 - H/W independent,
 - Highly **reusable** codes
 - Compatible at binary level

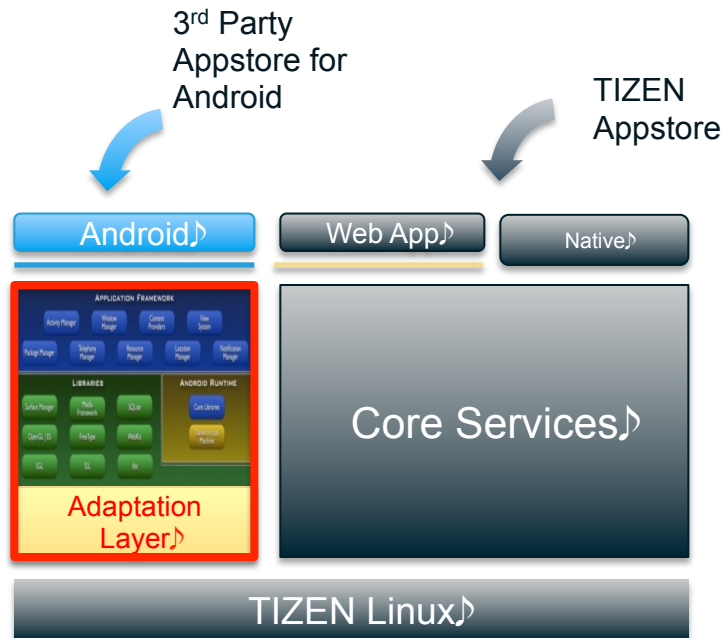
- If Android Runtime is ported on the device, Android application can be executed on top of the **Android Runtime**.

Android Runtime on TIZEN

- Possible Architecture



However, Just Good Effect for TIZEN Eco-system?

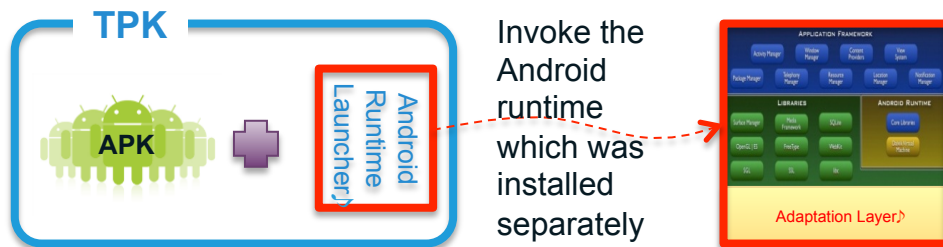


- To access 3rd Party Appstore, **NOT TIZEN Store**
- To download APK, **not TPK**

**This is not TIZEN.
NOT GOOD for TIZEN**

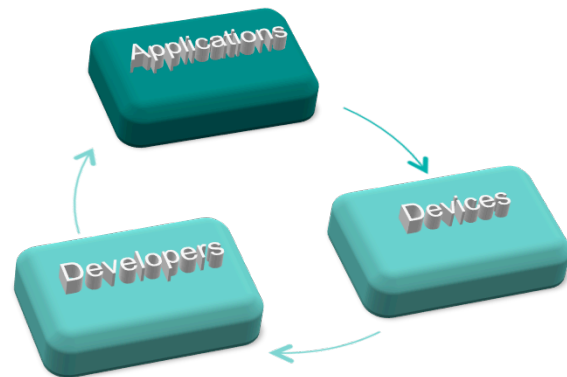
Another Approach That Seems Better

- **APK is converted to TPK, which contains “classes.dex”, so still requires Android Runtime.**
 - Exactly speaking, APK is repackaged to TPK, then TPK can be uploaded to TIZEN Store.
 - TPK will use the Android Runtime.



Expected Effects of This Approach

- **TPK can an be uploaded to TIZEN app store.**
 - To make the **TIZEN eco-system healthy** by increasing the number of applications in the TIZEN app store.
 - The users won't realize the difference of app types, because the icon is placed on the main menu to be the same as TIZEN apps.
 - The users can focus on the TIZEN app store.
- **Most codes that are already developed can be reusable.**
 - The developers can also be reused as can be the codes.





Details of Converting Service by **PAG (POLARIS® App Generator)**

Overview of Converting Service

- The most effective way to migrate Android app to TIZEN.
- **Android APK is automatically converted (generated) to TIZEN TPK**, which can be uploaded to TIZEN store, downloaded into TIZEN device, and executed as same as TIZEN app.



Service Flow



Verify



Generate



Play

TIZEN™
App Store

TIZEN™
Device

- Verifying the compatibility with POLARIS® App Player.
- This automatic tool can show whether the APK can be run on the PAP or not.



- Converting an Android APK to TIZEN TPK.
- Can upload to TIZEN Appstore, and download/install in the TIZEN device, same as other TIZEN applications.
- Running these apps using Polaris® App Player, which is already installed in the device separately.

- Running an Android App (or applications generated from PAG) on non-android devices, such as TIZEN.



Demonstration

Verify



POLARIS®
App Verifier

Generate



※ You can access “<http://pag.polarismobile.com>”

Play



POLARIS®
App Player



※ You can see this video on Youtube,
<http://www.youtube.com/user/infrawareinc>

Verification Reports

- This report gives you what you remove or modify, if the conversion is expected to be unsuccessful.

This converted TPK may not be compatible with PAP(Polaris App Player) with following features:

```
[Unsupported Java Framework Library]
Landroid/location/LocationListener;onLocationChanged
Landroid/location/LocationListener;onStatusChanged
Landroid/location/LocationManager;.getLastKnownLocation
Landroid/location/LocationManager;.requestLocationUpdates
Landroid/telephony/TelephonyManager;.getDeviceId
```

```
[Unsupported So Library Function]
chmod
fork
```

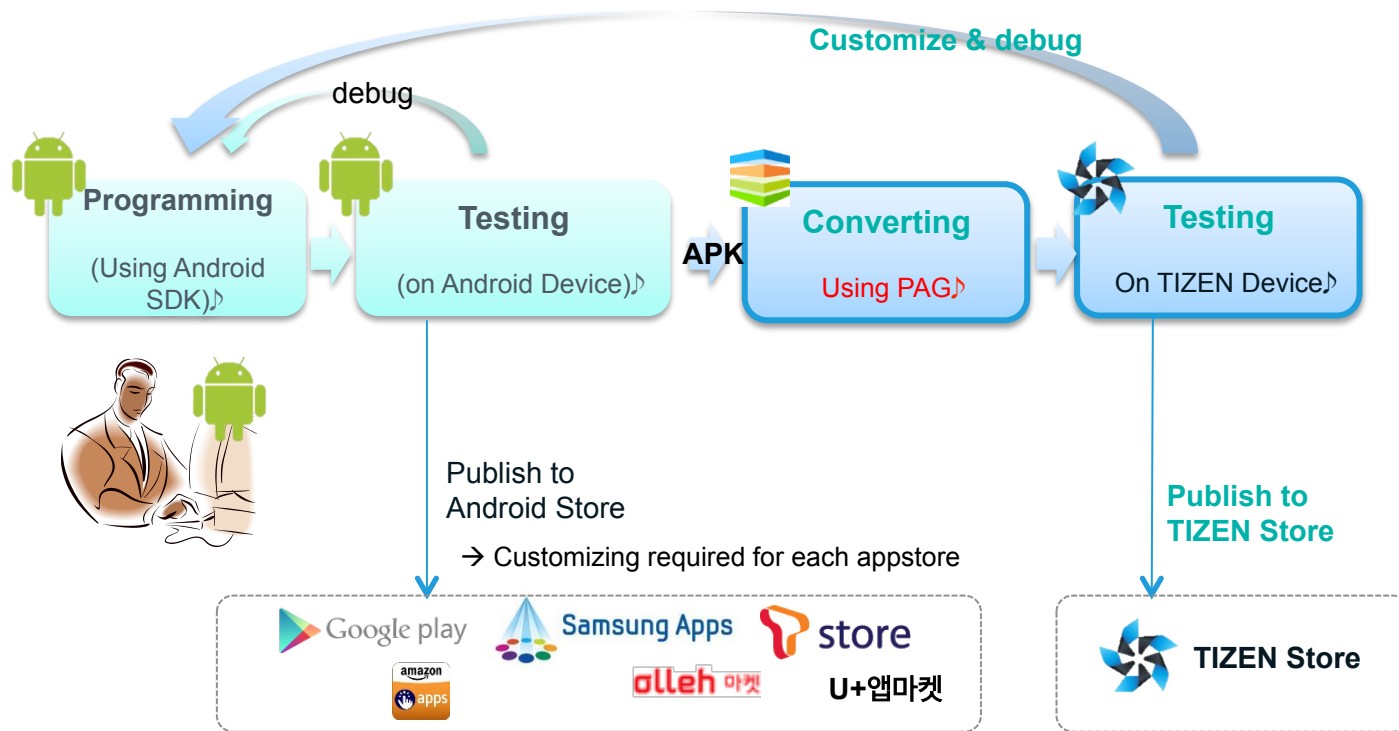

What To Be Customized, If Needed (1)

- **Access to device's critical data (email, contact, calendar) are not supported.**
- **Widgets, Wallpapers, Homescreen and Launcher Intents are not supported.**
- **Background Services are not supported.**
- **Push notifications when app is not active are not supported yet.**
 - **Push API which is integrated to TIZEN push framework will be provided.**
- **Linux file systems in root (/proc, /sys, /dev, etc) are not supported.**
- **Linux kernel functions (fork(), exec(), etc) are not supported.**

What To Be Customized, If Needed (2)

- **Accessing some device settings is not supported.**
- **Some media formats are not supported. (depends on the device)**
- **API level control of Telephony, SMS, Bluetooth, WIFI, Camera is not supported. (Invoking App is supported.)**
- **Google Service Framework is not supported. (In-app purchase, Google Ads, GCM, Map API, Application Licensing, Automatic Updates, Authorization, Android Backup Service, Google+, etc)**
 - **API for IAP, Ads, Updates, Application Licensing, Messaging, which are integrated to TIZEN framework, will be provided.**

The Developer Process



How Many Apps PAG Can Cover

- **80% of Android applications** can benefit from PAG
 - We tested over 200 apps including famous games
 - About **50%** of applications were successfully converted to TPK, so they were executed on TIZEN devices **without any modifications**.
 - About **30%** of applications contained the codes that needed to be removed or modified, so applications may **be modified slightly**. (such as, In-app billing, GCM, and other gsf)

Summary

- **Android Runtime, and reuse of Android codes**
 - It is fair to deduce that there should be many **applications** in the app store, thereby making TIZEN more competitive.
 - **Reusing the existing codes** may be the best way to ensure many applications are available in a short time.
 - Reusing the existing codes also benefits developers for **saving costs and time to market**.
- **Automated Converting by PAG**
 - APK is automatically repackaged to TPK, which can be uploaded to the TIZEN app store.
 - **Developers can publish the Android App to TIZEN at a low cost and in a short time.**

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