

ANDROID APP MODEL

Lecture 7

COMPSCI 702

Security for Smart-Devices

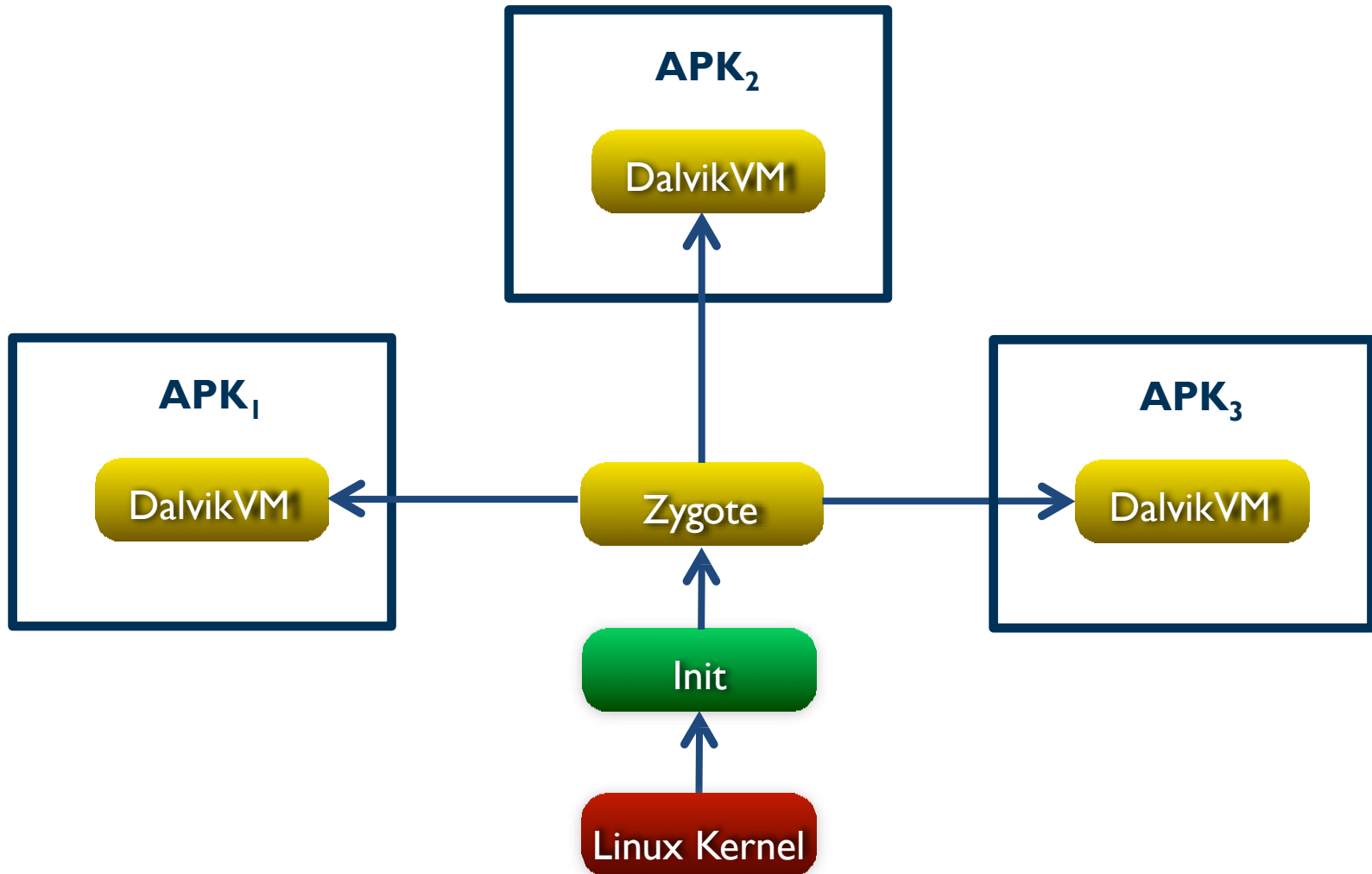
Muhammad **Rizwan** Asghar

March 16, 2021



THE UNIVERSITY OF
AUCKLAND
NEW ZEALAND

AN INSTANCE OF DALVIK VM PER APK



ANDROID APPLICATION PACKAGE (APK)



- APK is a packing format
- Parts of an APK
 - Classes.dex (Dalvik executable)
 - Android app components
 - Application can contain native code
 - C/C++ shared libraries linked dynamically
 - Resources and assets
 - E.g., images, string values, layout definitions, and raw data
 - META-INF
 - It includes the certificate and signature information
 - Application manifest

APPLICATION MANIFEST



- An XML format
- Declares application metadata and components
 - Names, intent filters, and permissions
- Main elements
 - Package information
 - Package name and version
 - App information
 - Launcher icon
 - Activity component
 - ...

APPLICATION MANIFEST: A SAMPLE



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

<manifest xmlns:"http://schemas.android.com/apk/res/android"
  android:versionCode="1"
  android:versionName="1.0"
  package="com.example.compsci702.helloworld"
  platformBuildVersionCode="23"
  platformBuildVersionName="6.0-2438415">
  <uses-sdk android:minSdkVersion="15"
    android:targetSdkVersion="23" />
  <application android:theme="@style/AppTheme"
    android:label="@string/app_name"
    android:icon="@mipmap/ic_launcher"
    android:allowBackup="true"
    android:supportsRtl="true">
    <activity android:theme="@style/AppTheme_NoActionBar"
      android:label="@string/app_name"
      android:name="com.example.compsci702.helloworld.MainActivity">
      <intent-filter>
        <action android:name="android.intent.action.MAIN" />
        <category android:name="android.intent.category.LAUNCHER" />
      </intent-filter>
    </activity>
  </application>
</manifest>
```

ANDROID APP COMPONENTS



- Android app is a combination of loosely coupled components
- Each component can offer multiple entry points
 - Activity
 - User interface
 - Service
 - Background services
 - Content provider
 - Database
 - Broadcast receiver
 - Mailbox for broadcasted messages

INTENT



- Intents are named events
- Represents the *intent* to do something
- Examples
 - Launching an activity
 - Starting a service or
 - Broadcasting a message
- Its payload and attributes describe the intended action
- It can be sent and received by an application

INTENT TYPES



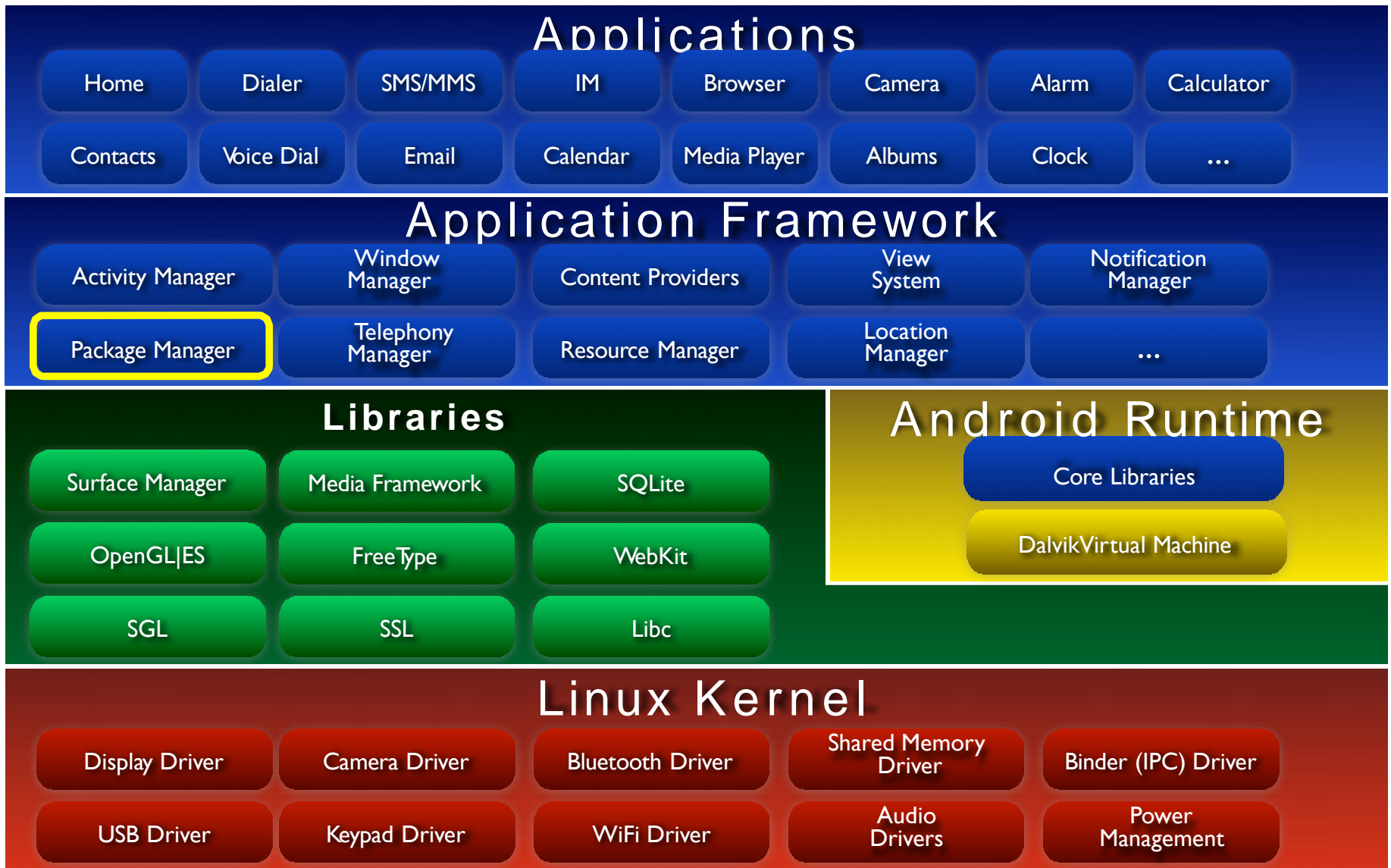
■ Explicit

- Sets the target component name
- E.g., “com.example.app.MainActivity”

■ Implicit

- Provides information including action, data, and type
- Resolved at runtime by the Package Manager
- Android framework will find a suitable receiver for this intent
- Example
 - Action=intent.ACTION_VIEW;
 - Data=www.youtube.com
 - It will open the app that can show youtube
 - It could be the default web browser or youtube app

WHERE IS PACKAGE MANAGER?



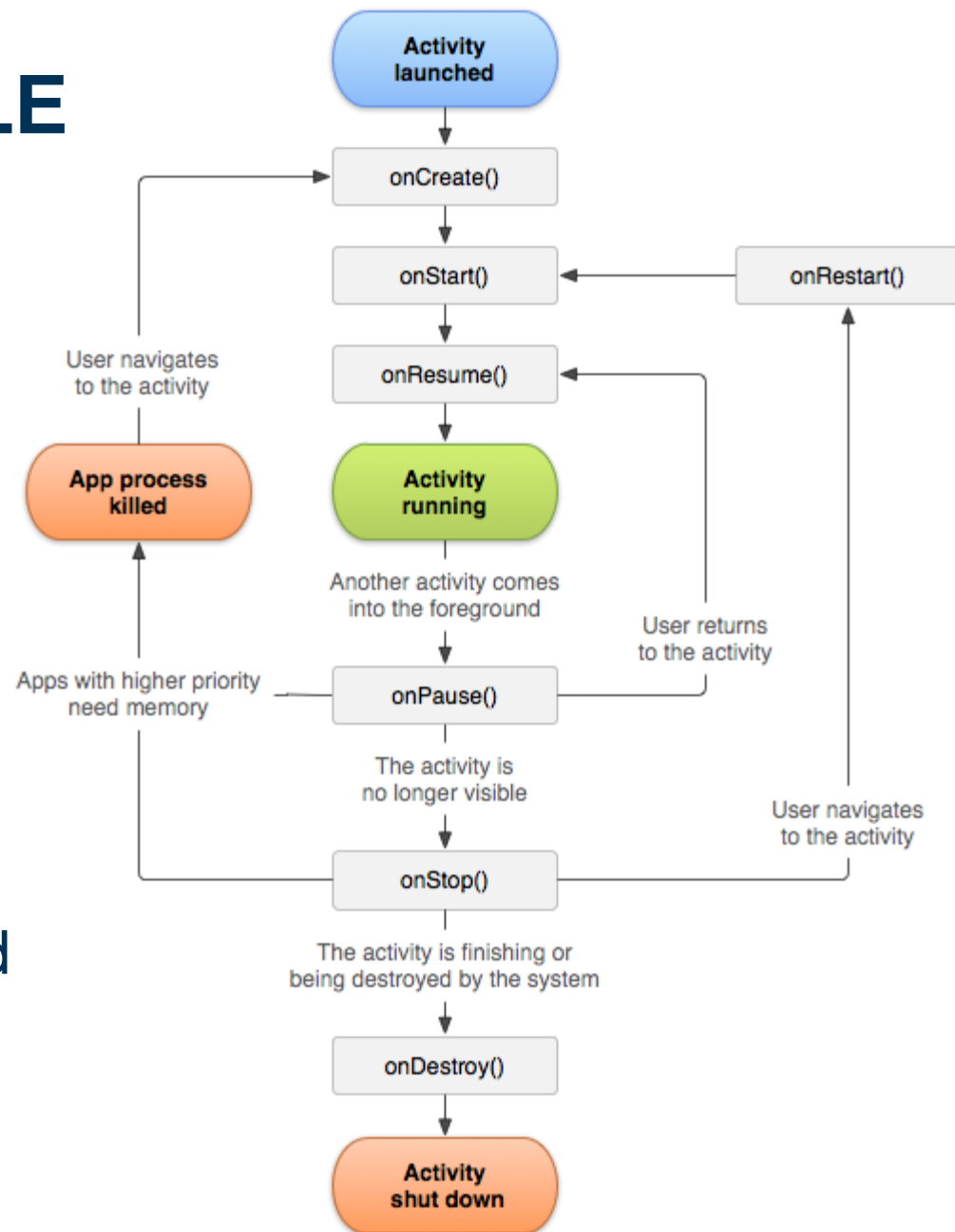
ACTIVITY



- A main building block of Android GUI applications
- Activity is like a website
 - Multiple activities ~ multiple web pages
 - Main activity ~ homepage
 - Moving from one activity to another ~ navigation
 - E.g., in Contacts app, choosing to compose a message to a contact by launching the Messaging app

ACTIVITY LIFECYCLE

- System calls component as its state changes due to user actions
- If another activity is started, the on-going activity is paused
- App process may be killed
- A stopped activity may be destroyed



Source: android.com

TO BE CONTINUED



- See the next lecture



Questions?

Thanks for your attention!