

# An Introduction to Android

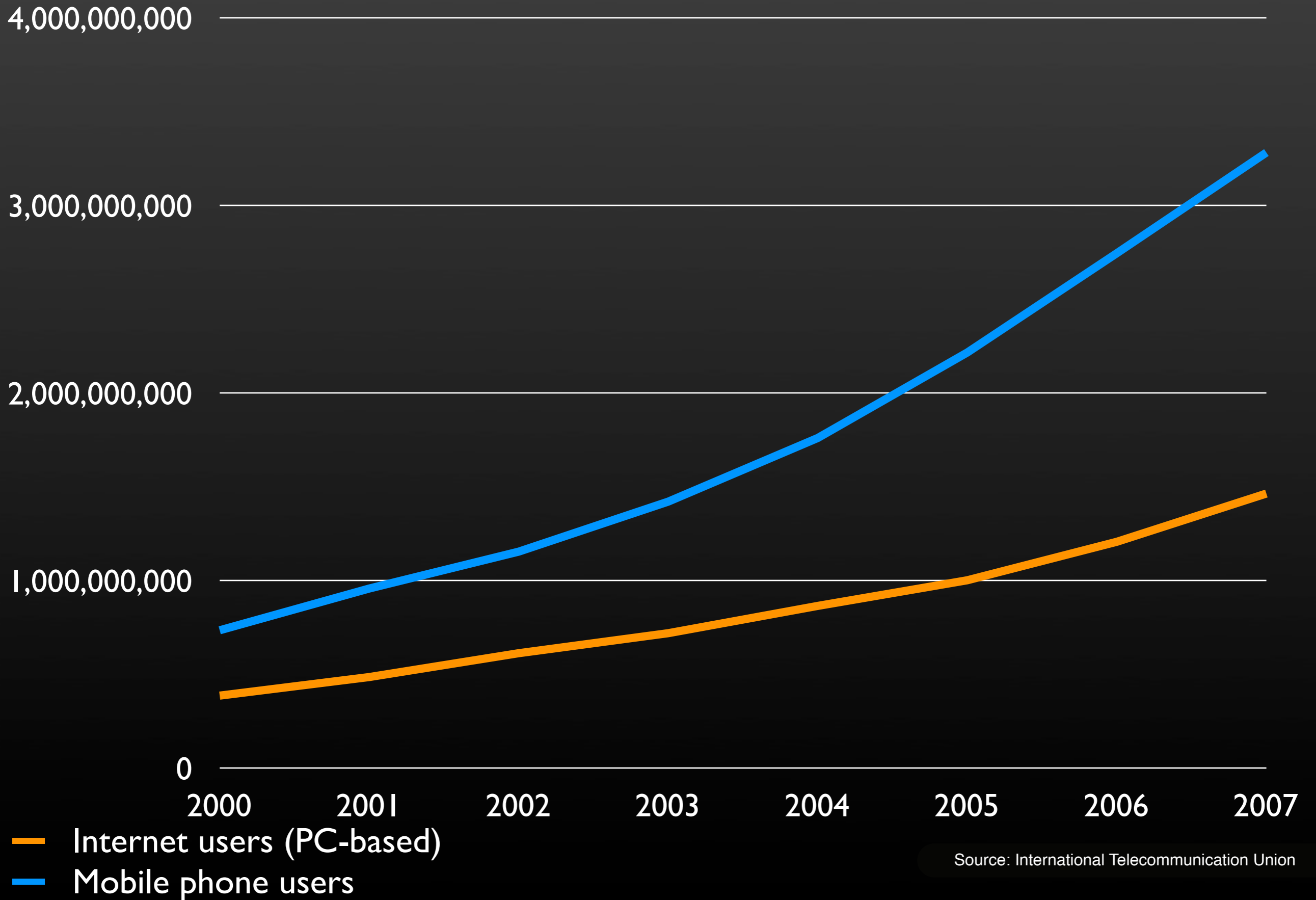


Jason Chen  
Developer Advocate  
Google I/O 2008

- 
- **Background**
  - What is Android?
  - Latest News



# Internet and Mobile Phone Users, Worldwide



open  
handset  
alliance

# Mobile Operators



open  
handset  
alliance

## Handset Manufacturers



## Mobile Operators



open  
handset  
alliance

# Handset Manufacturers



# Software



# Mobile Operators



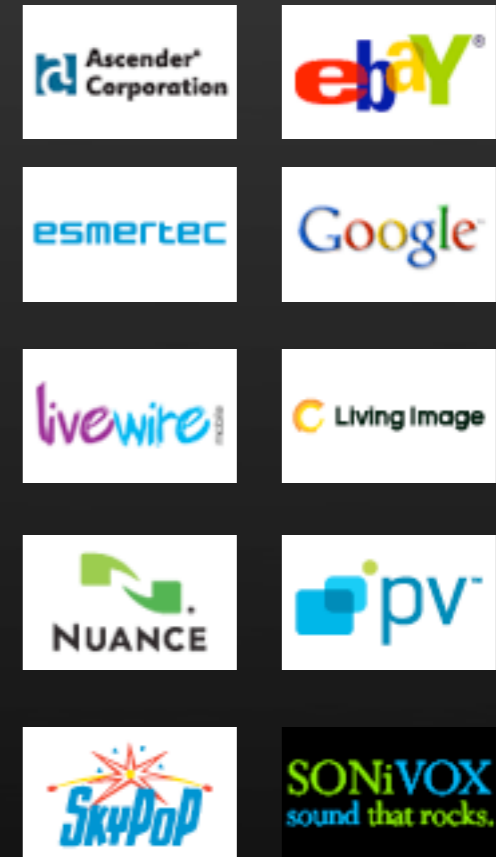
open  
handset  
alliance



# Handset Manufacturers



# Software



# Mobile Operators



open  
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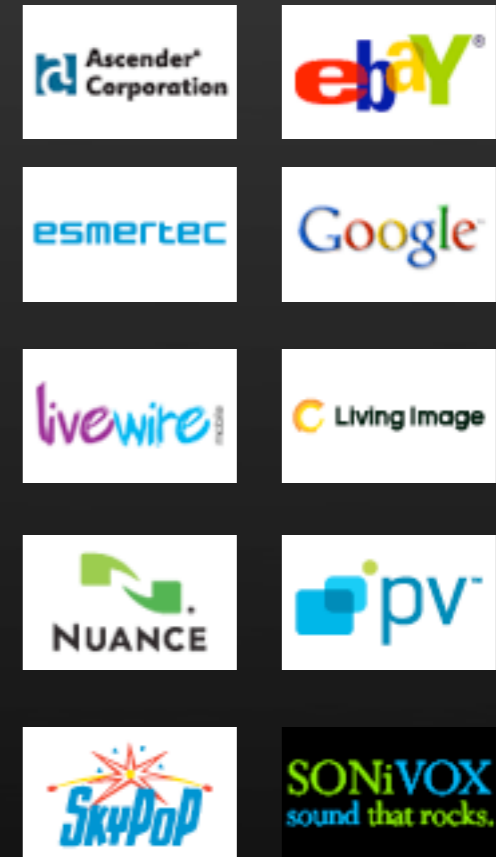
# Semiconductor



# Handset Manufacturers



# Software



# Mobile Operators



open  
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alliance

# Semiconductor



# Commercialization



- 
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LINUX KERNEL

Display Driver

Camera Driver

Bluetooth Driver

Flash Memory Driver

Binder (IPC) Driver

USB Driver

Keypad Driver

WiFi Driver

Audio Drivers

Power Management

## LIBRARIES

Surface Manager

Media Framework

SQLite

OpenGL | ES

FreeType

WebKit

SGL

SSL

libc

## LINUX KERNEL

Display Driver

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Flash Memory Driver

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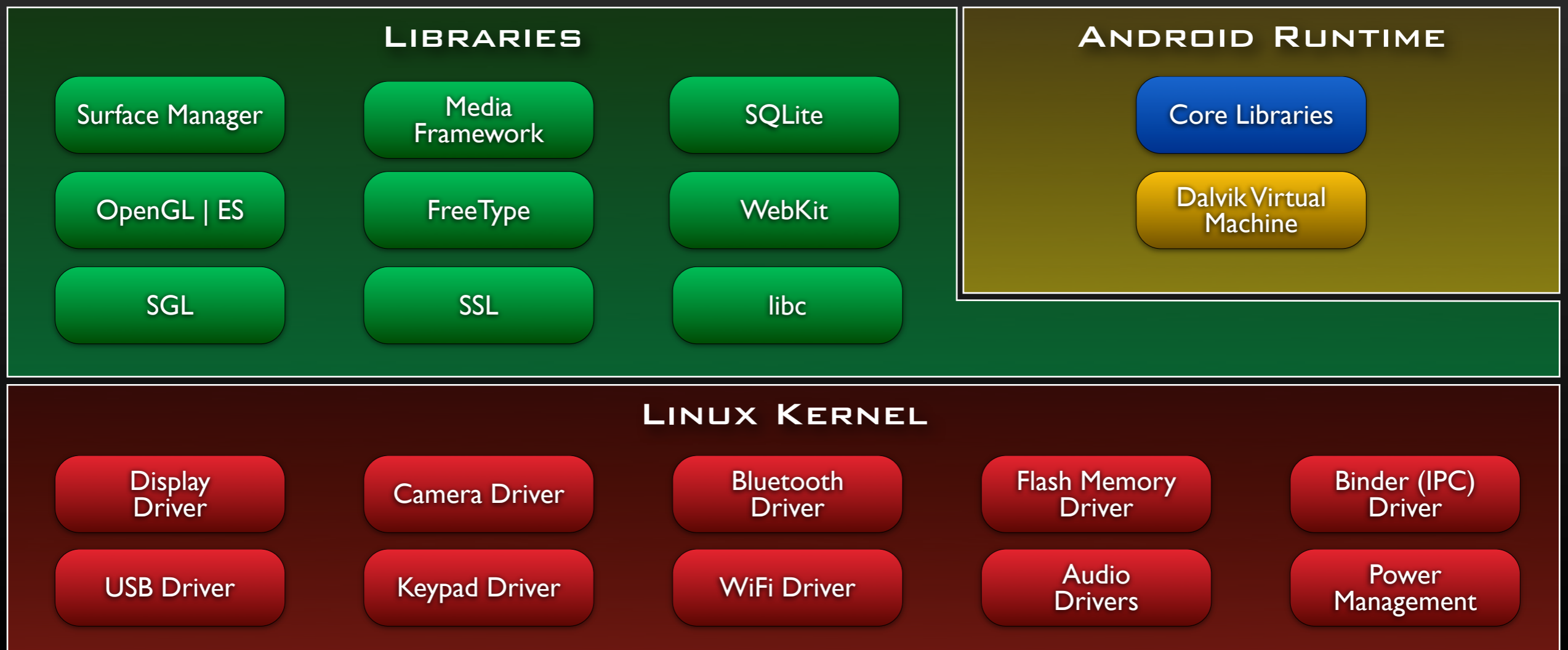
USB Driver

Keypad Driver

WiFi Driver

Audio Drivers

Power Management



## APPLICATION FRAMEWORK

Activity Manager

Window Manager

Content Providers

View System

Notification Manager

Package Manager

Telephony Manager

Resource Manager

Location Manager

GTalk Service

## LIBRARIES

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Media Framework

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## ANDROID RUNTIME

Core Libraries

Dalvik Virtual Machine

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## APPLICATIONS

Home

Contacts

Phone

Browser

...

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# Application Building Blocks



Activity	UI component typically corresponding to one screen.
IntentReceiver	Set and respond to notifications or status changes. Can wake up your app.
Service	Faceless task that runs in the background.
ContentProvider	Enable applications to share data.



# Developer Toolchain

# Emulator



- QEMU-based ARM emulator runs same system image as a device
- Use same toolchain to work with devices or emulator

# Eclipse Plugin



Project template

A screenshot of the 'New Android Project' dialog box in the Eclipse IDE. The dialog has a title bar with three window control buttons (red, yellow, green) and the text 'New Android Project'. Below the title bar, the text 'New Android Project' is followed by 'Creates a new Android Project resource.' and a yellow starburst icon containing the Eclipse logo. The main area contains four text input fields: 'Project name:', 'Package Name:', 'Activity Name:', and 'Application Name:'. Below these is a checked checkbox labeled 'Use default location'. Underneath is a 'Location:' field with the path '/Users/mcleron/Documents/workspace-x' and a 'Browse...' button. At the bottom, there are four buttons: a help button with a question mark, '< Back', 'Next >', 'Cancel', and 'Finish'.

# Debugging



**Call stack**

- PhoneWindow\$DecorView(View).draw(Canvas, Transformation)
- PhoneWindow\$DecorView.draw(Canvas, Transformation, long)
- PhoneWindow\$DecorView(View).drawTraversal(Canvas, Trans
- PhoneWindow\$DecorView(FrameLayout).drawTraversal(Canva
- PhoneWindow\$DecorView.drawTraversal(Canvas, Transformat
- ViewRoot.draw(boolean) line: 373
- ViewRoot.performTraversals() line: 288
- ViewRoot.handleMessage(Message) line: 421
- ViewRoot(Handler).dispatchMessage(Message) line: 40

Name	Value
this	PhoneWindow\$DecorView (id=830011)
canvas	Canvas (id=830011571256)
mBitmap	null
mNativeCanvas	1249144
mSurfaceFormat	4
currentTransformation	null
drawTime	1179363240090

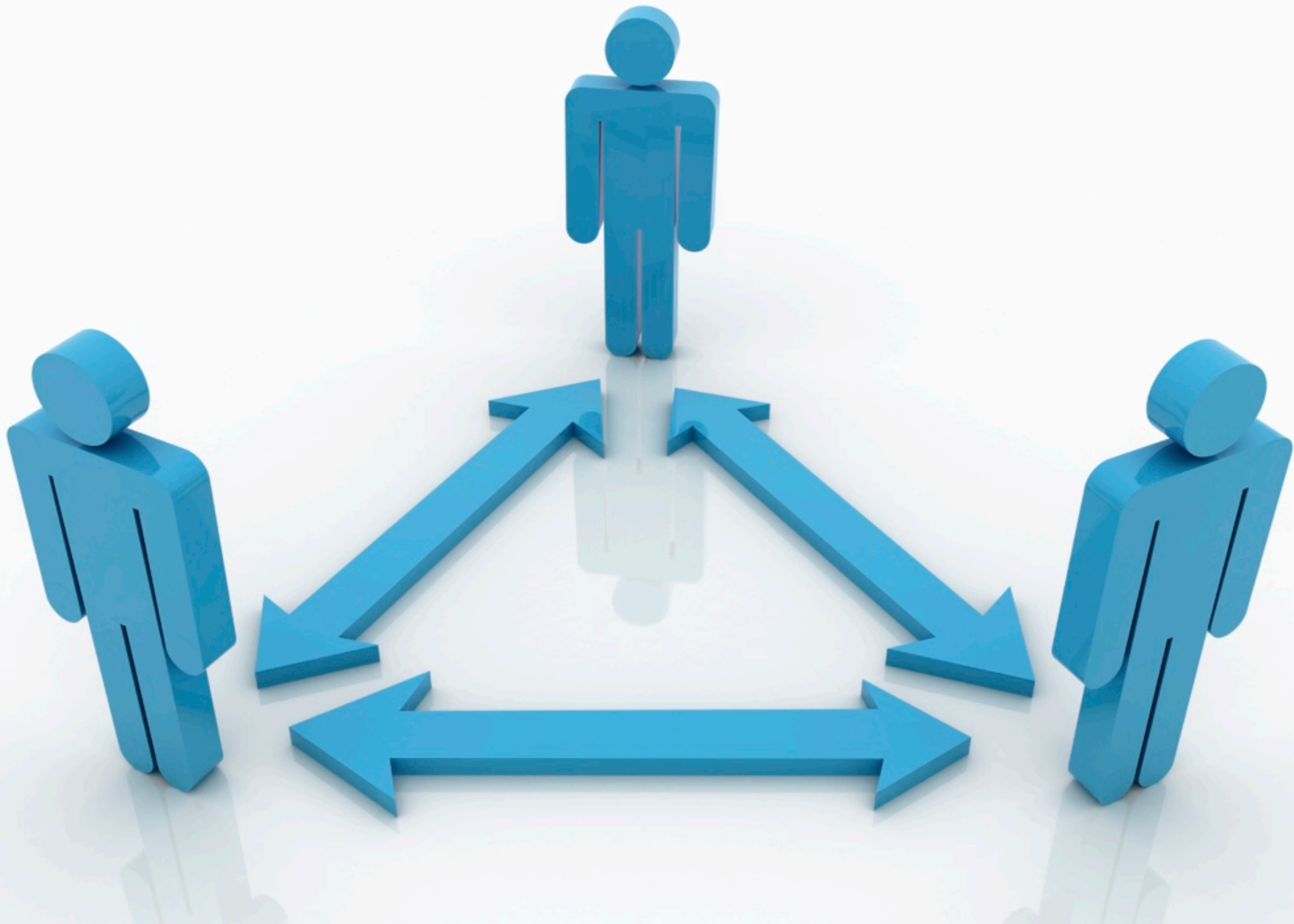
**Examine variables**

```
1823  * @param drawTime The time at which the current draw pass started
1824  */
1825  protected void draw(Canvas canvas, Transformation currentTransformation, long drawTime) {
1826      Drawable bg = mBGDrawable;
1827      if (bg == null) {
1828          mBackgroundSizeChanged = false;
1829          return;
1830      }
1831  }
```

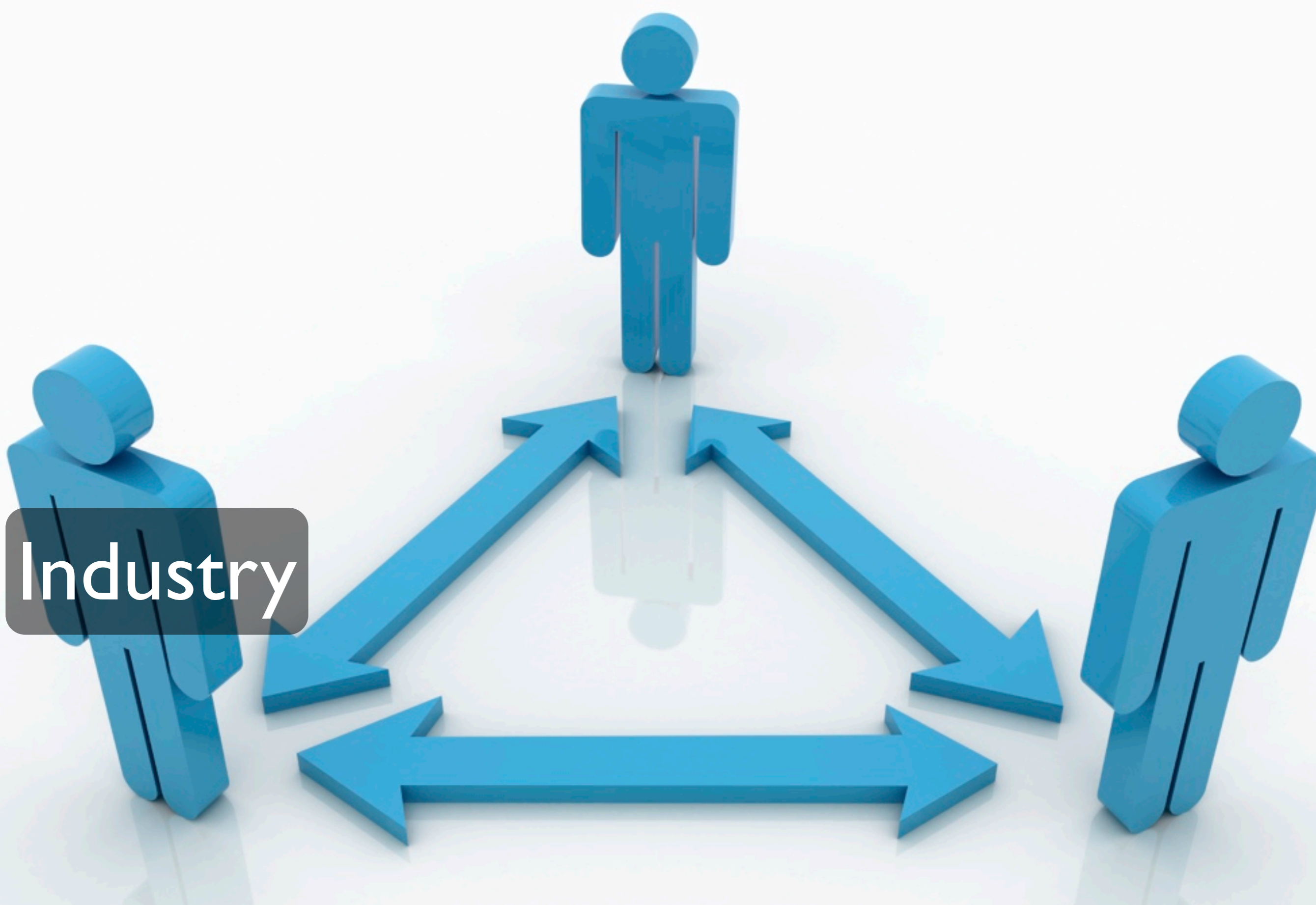
**Breakpoints, single stepping**

What does open mean?





Industry



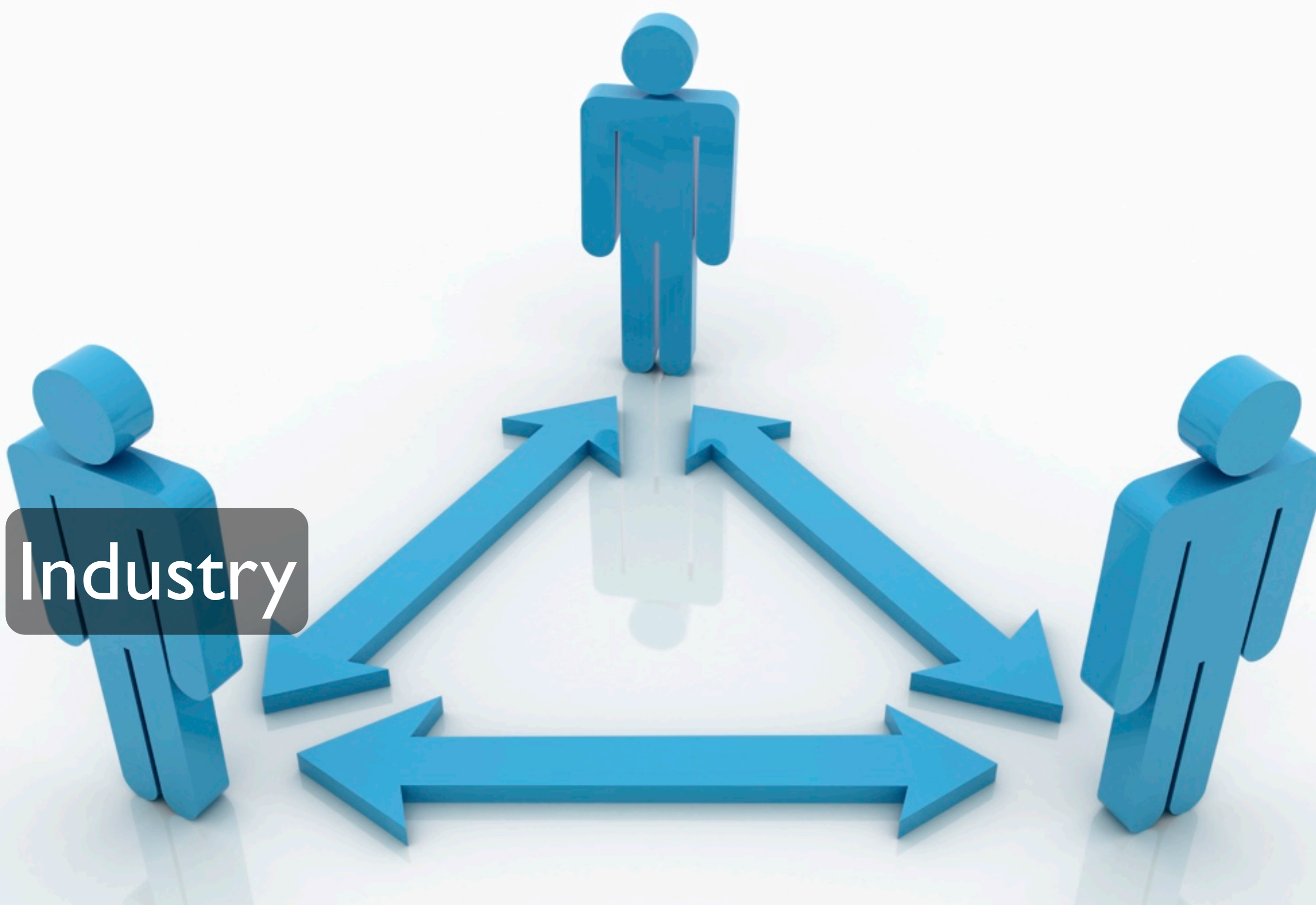




# Industry

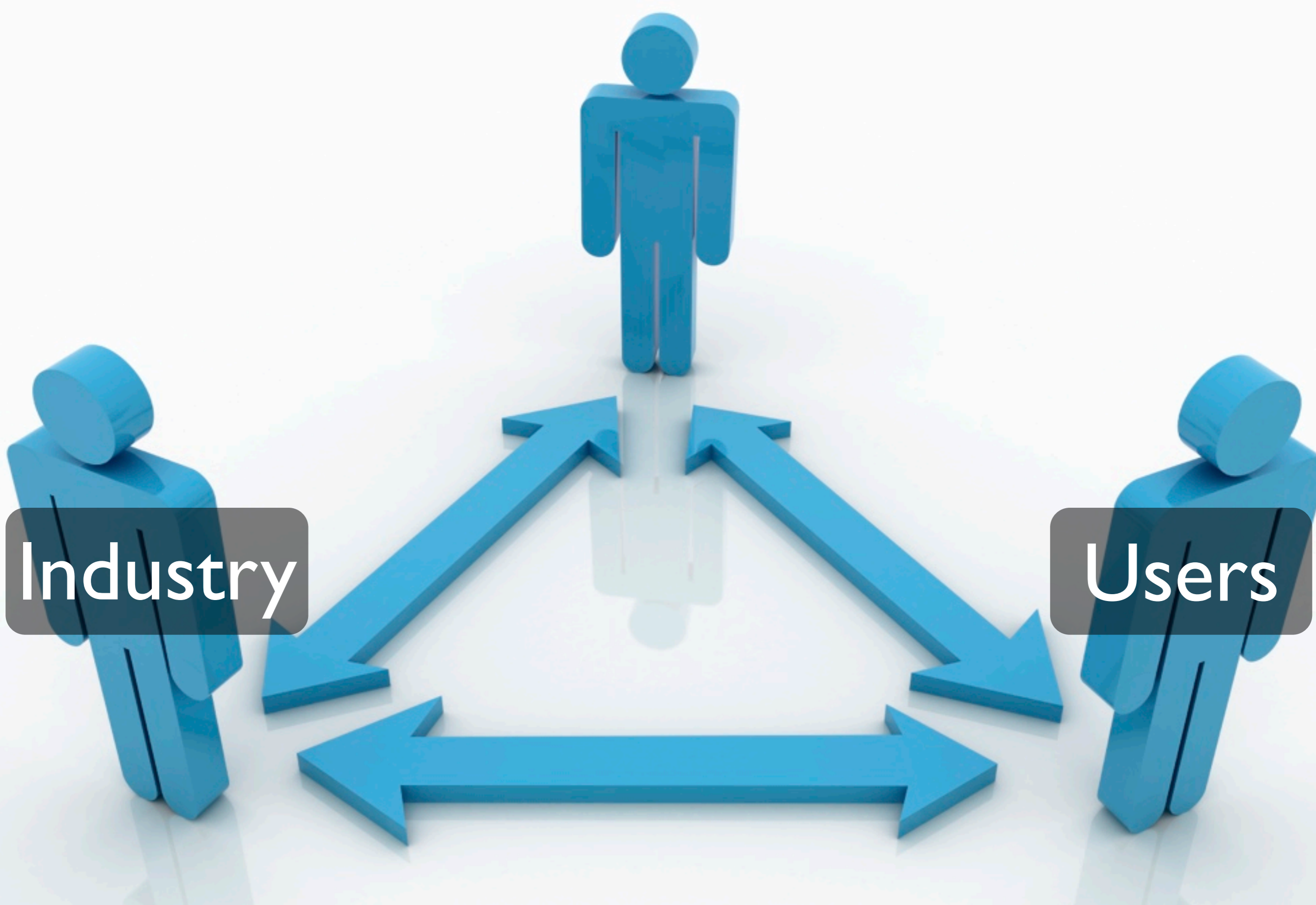
- Software stack open-sourced under Apache 2.0 license
- Source available after first handsets ship
- Anyone will be able to build a system image

Industry



Industry

Users





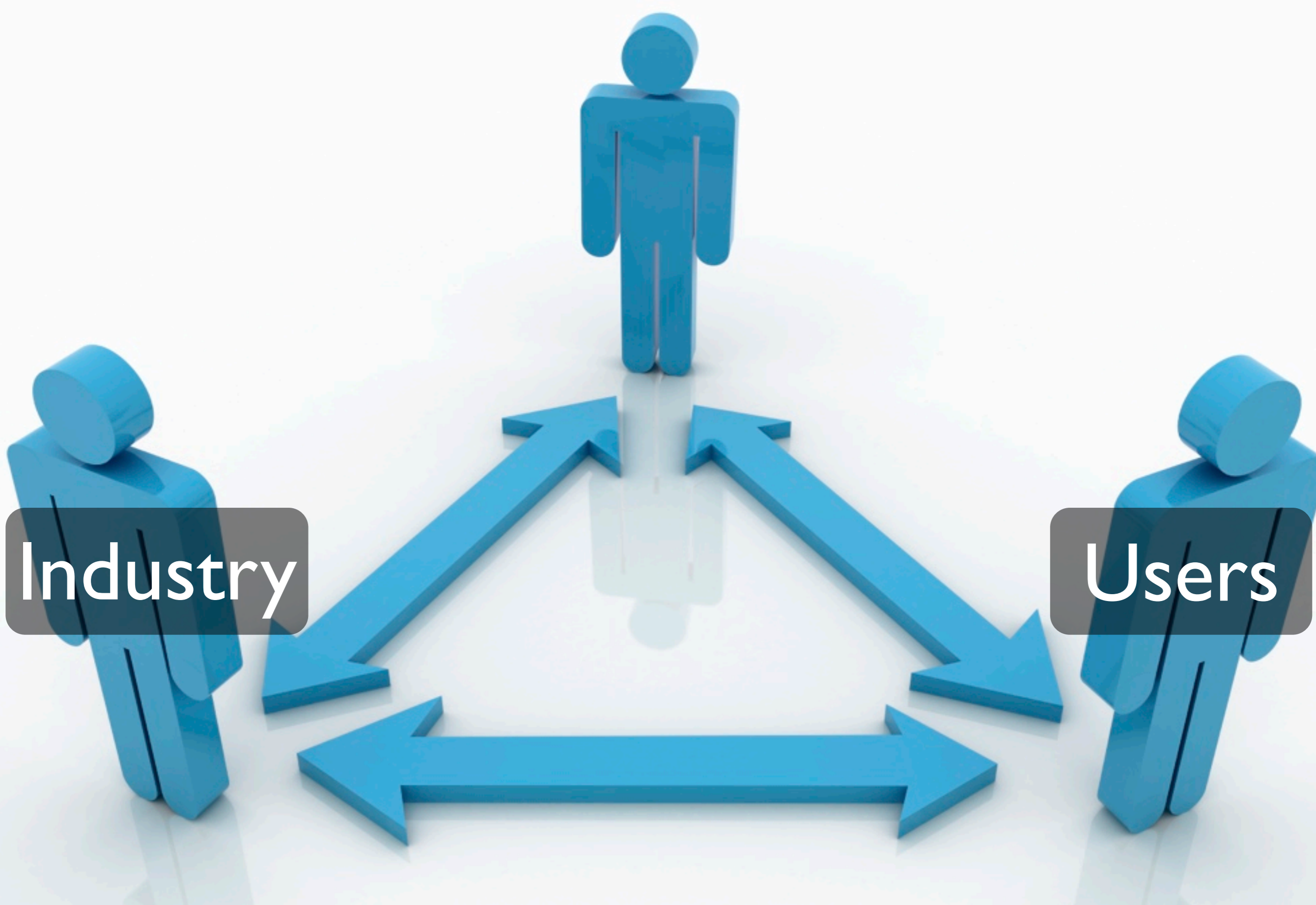
Industry

- Users have control of their experience
- They control what gets installed
- They choose the defaults

Users

Industry

Users



Developers

Industry

Users



# Developers

- Don't need permission to ship an application
- No hidden or privileged framework APIs
- Can **integrate, extend, and replace** existing components

Industry

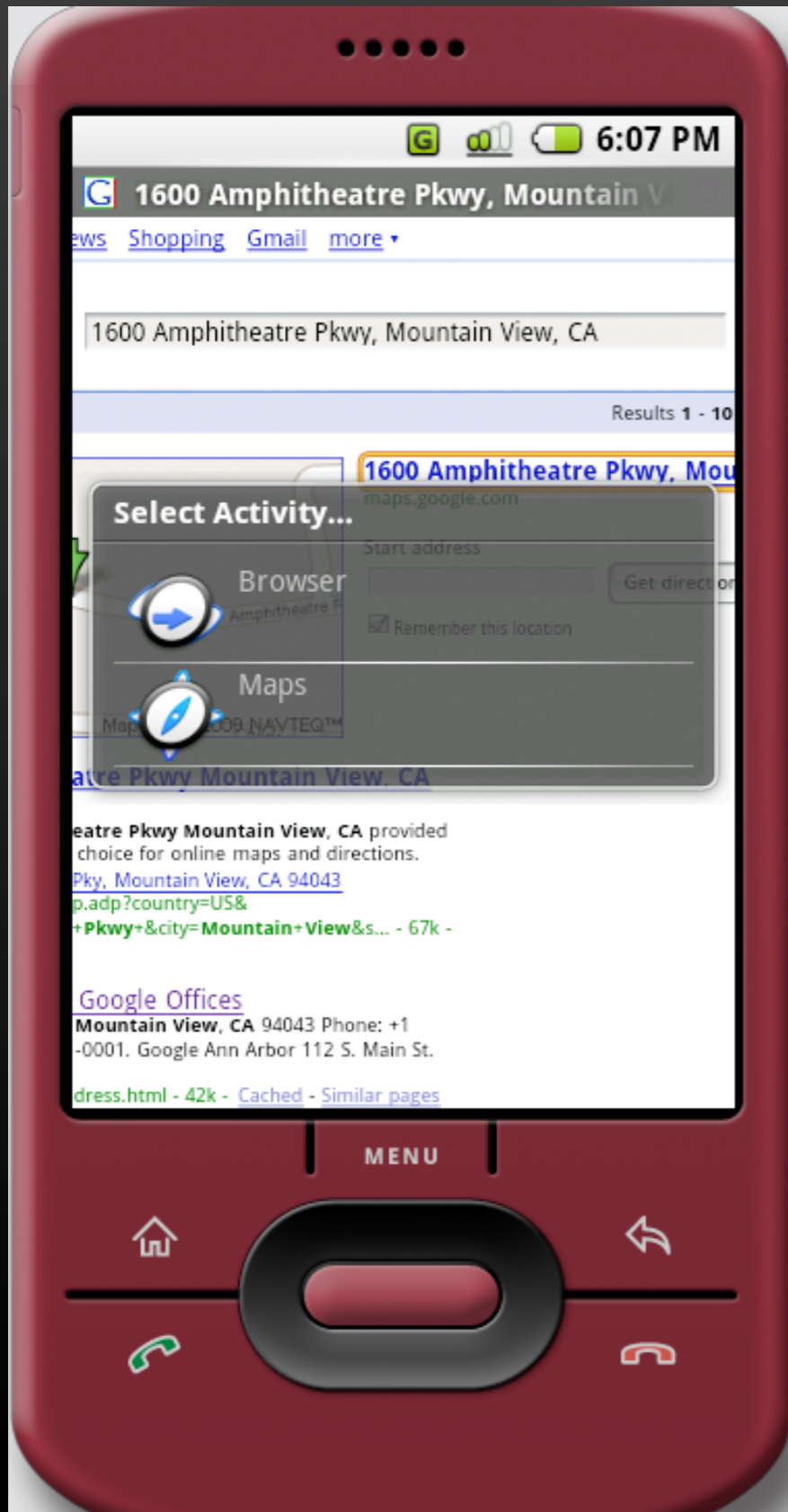
Users



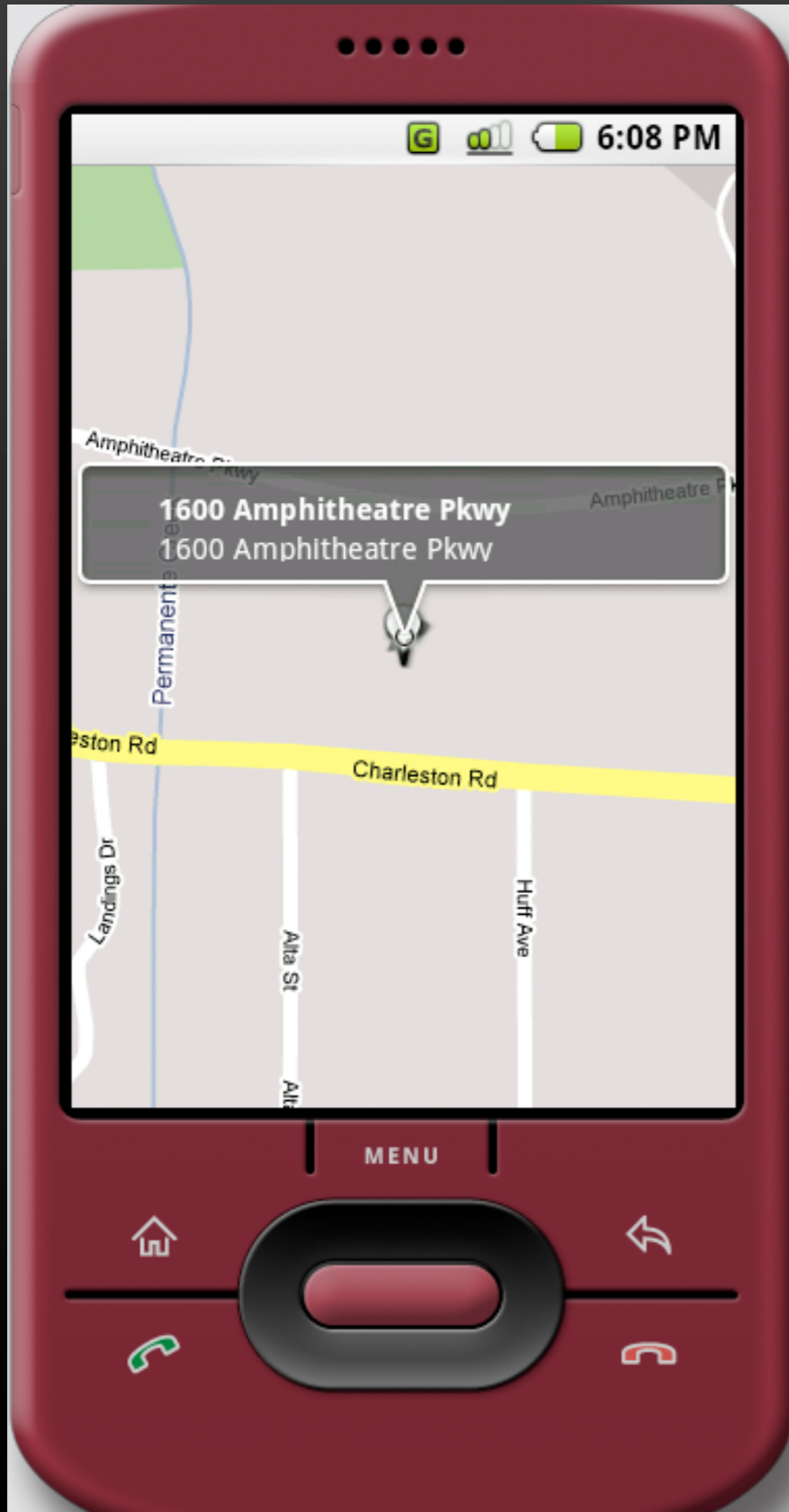


Integrate

# Integrate

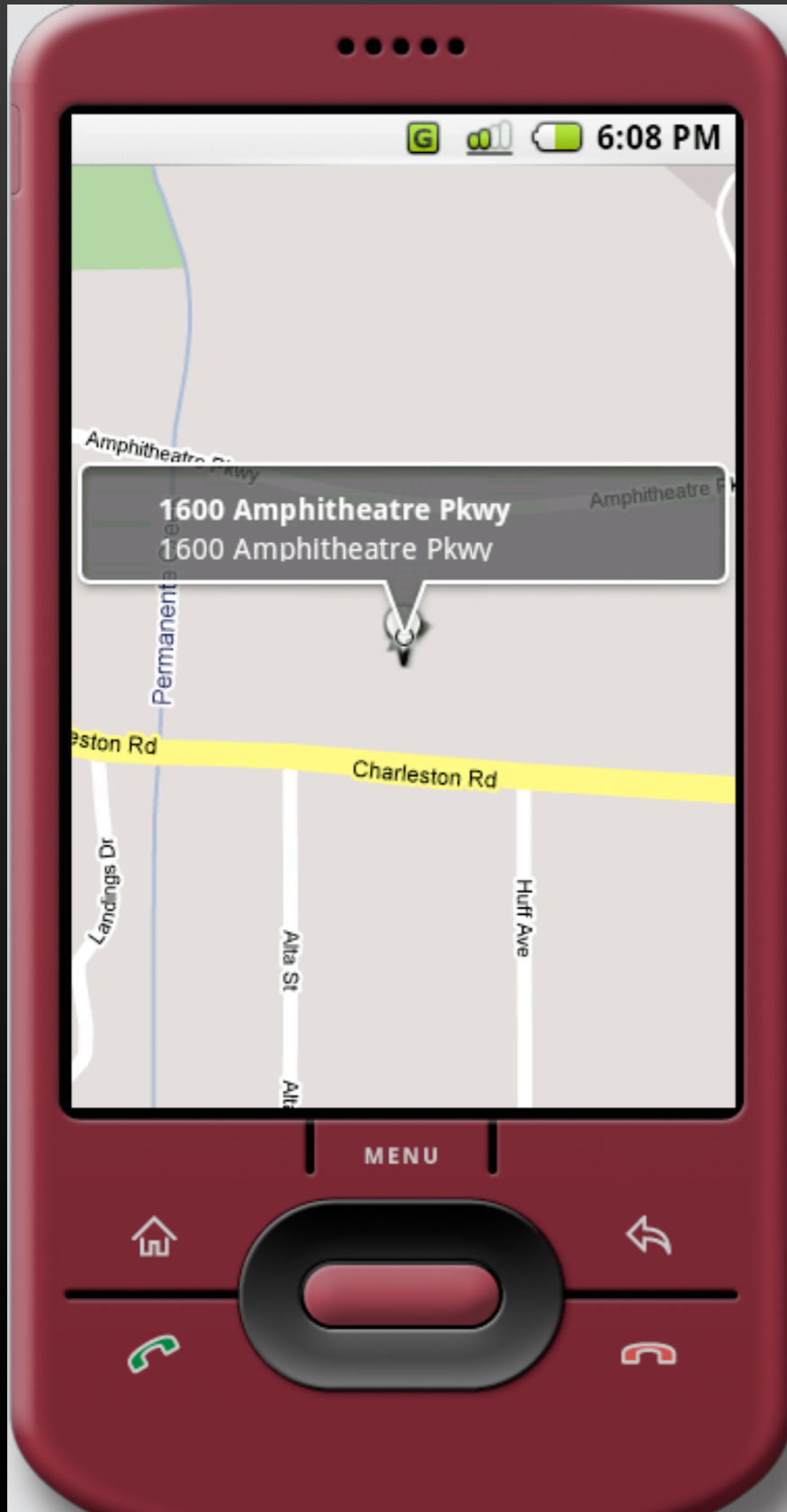


# Integrate

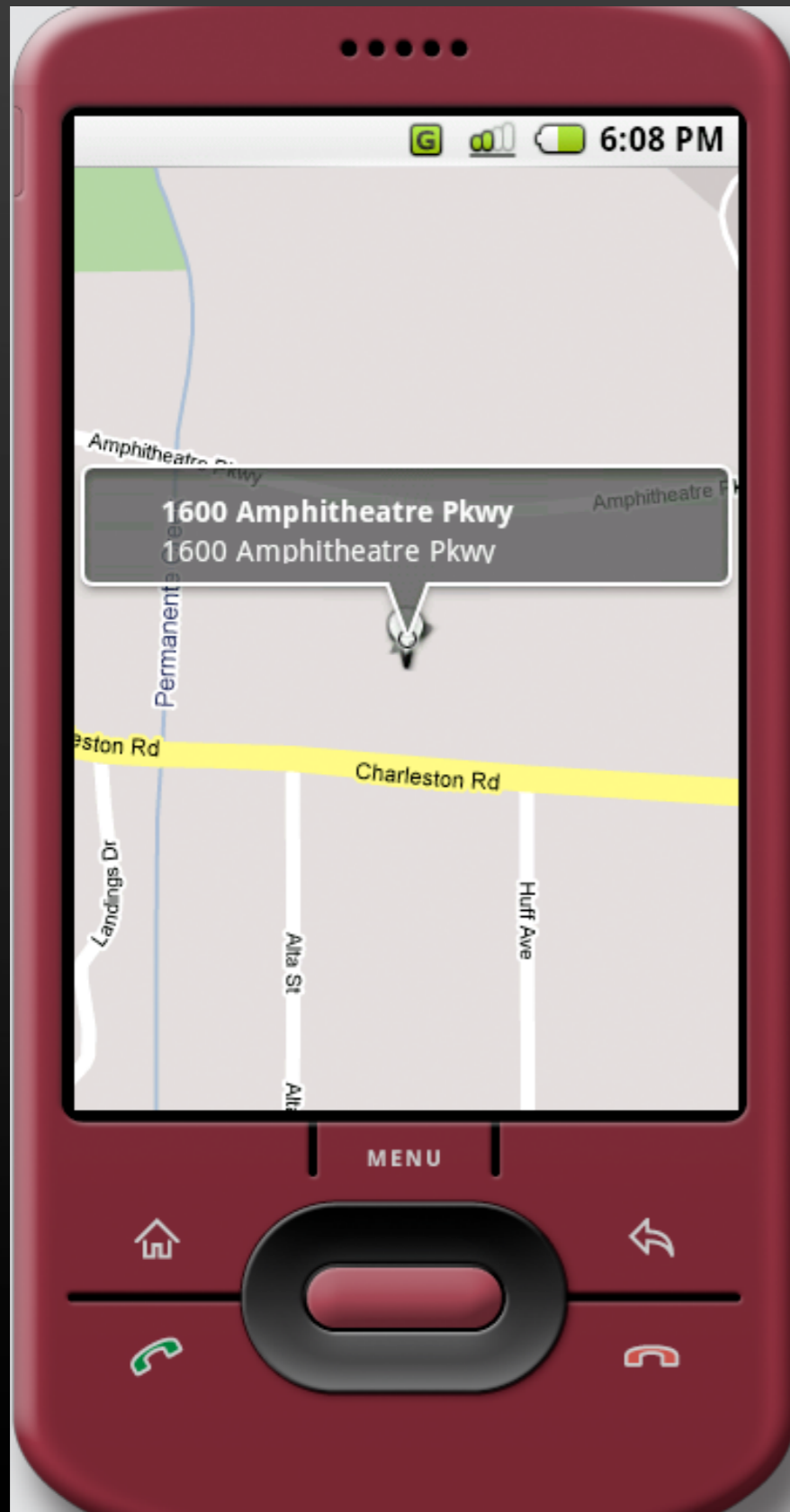


# Integrate

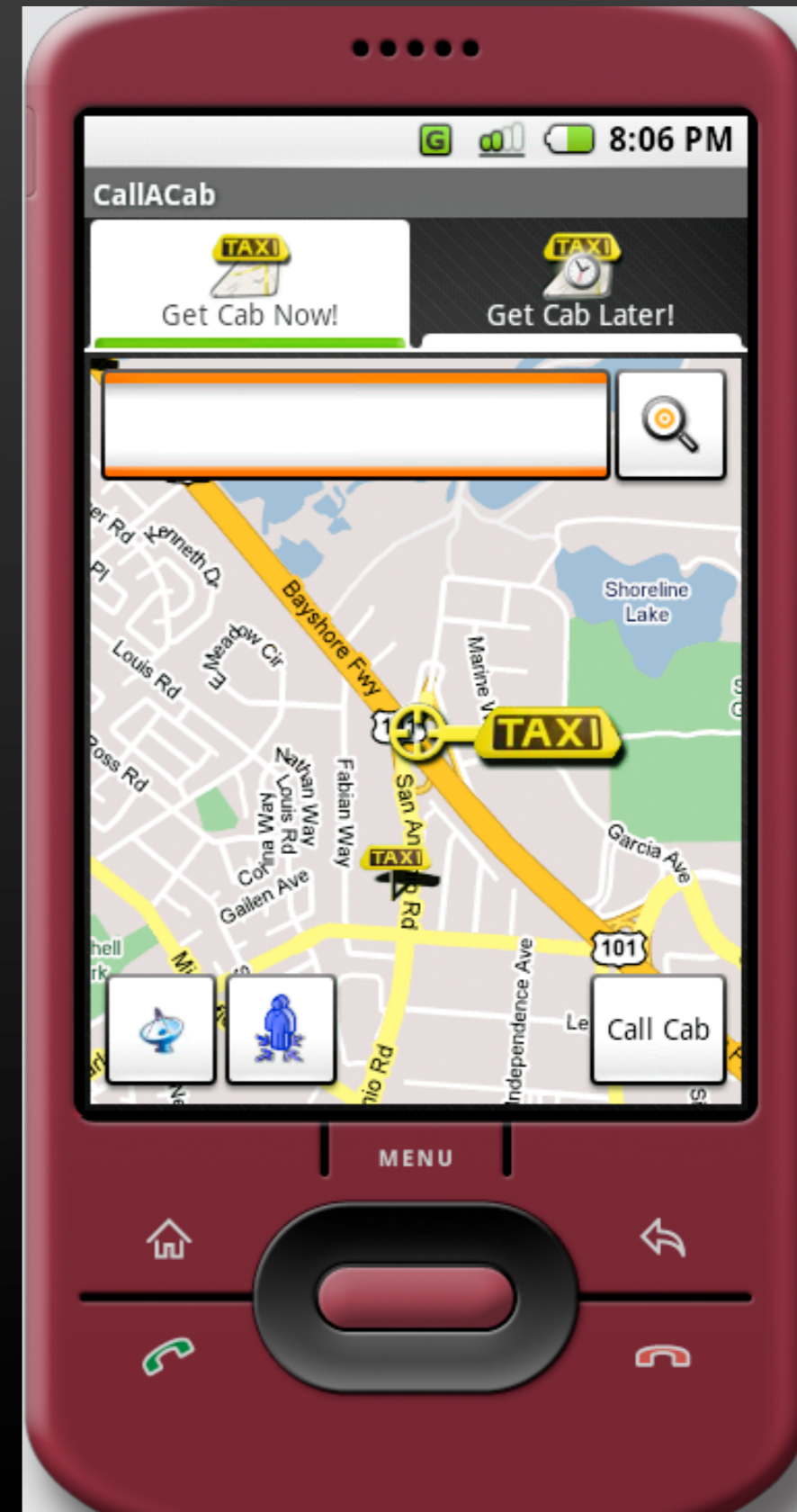
# Extend



# Integrate

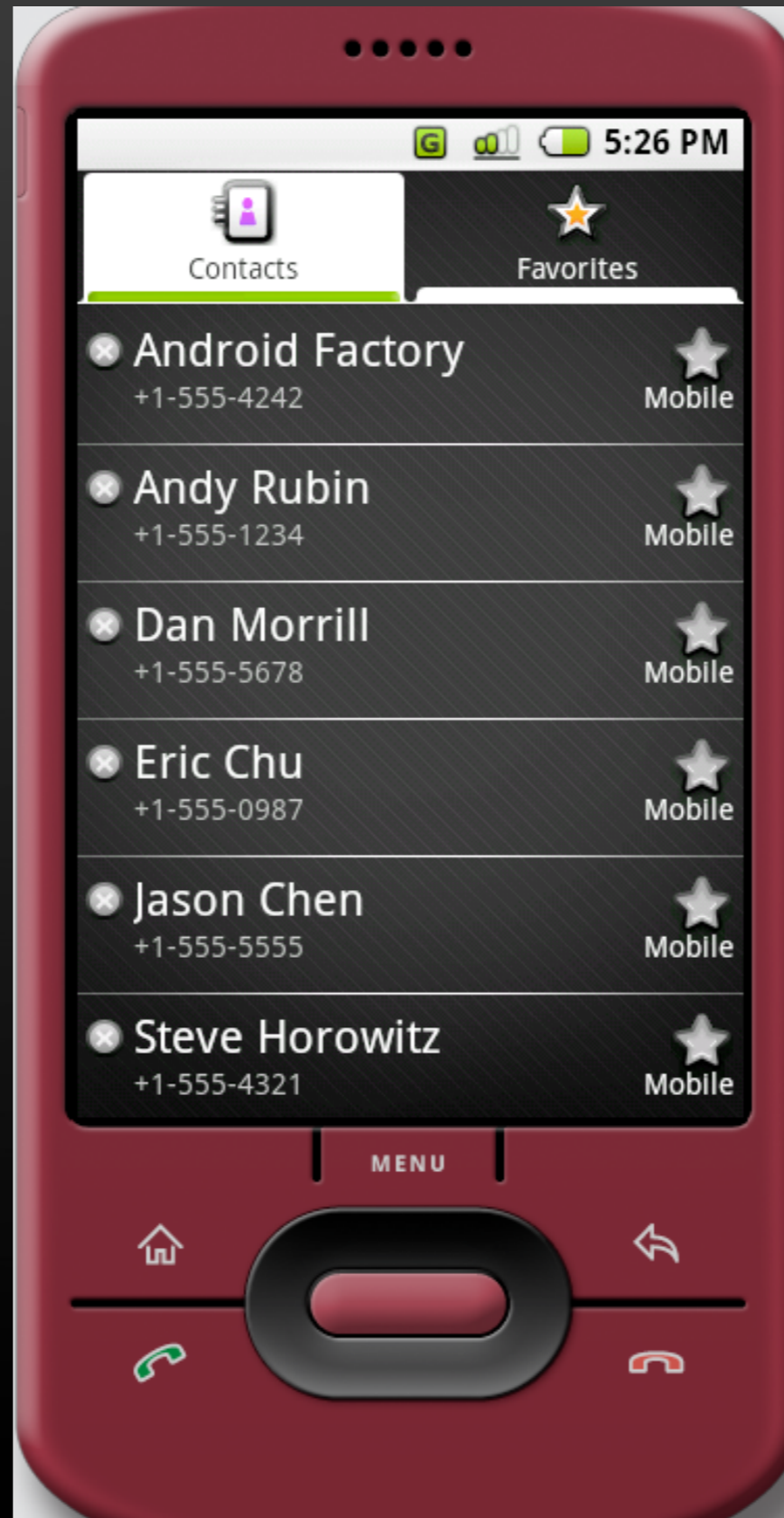


# Extend

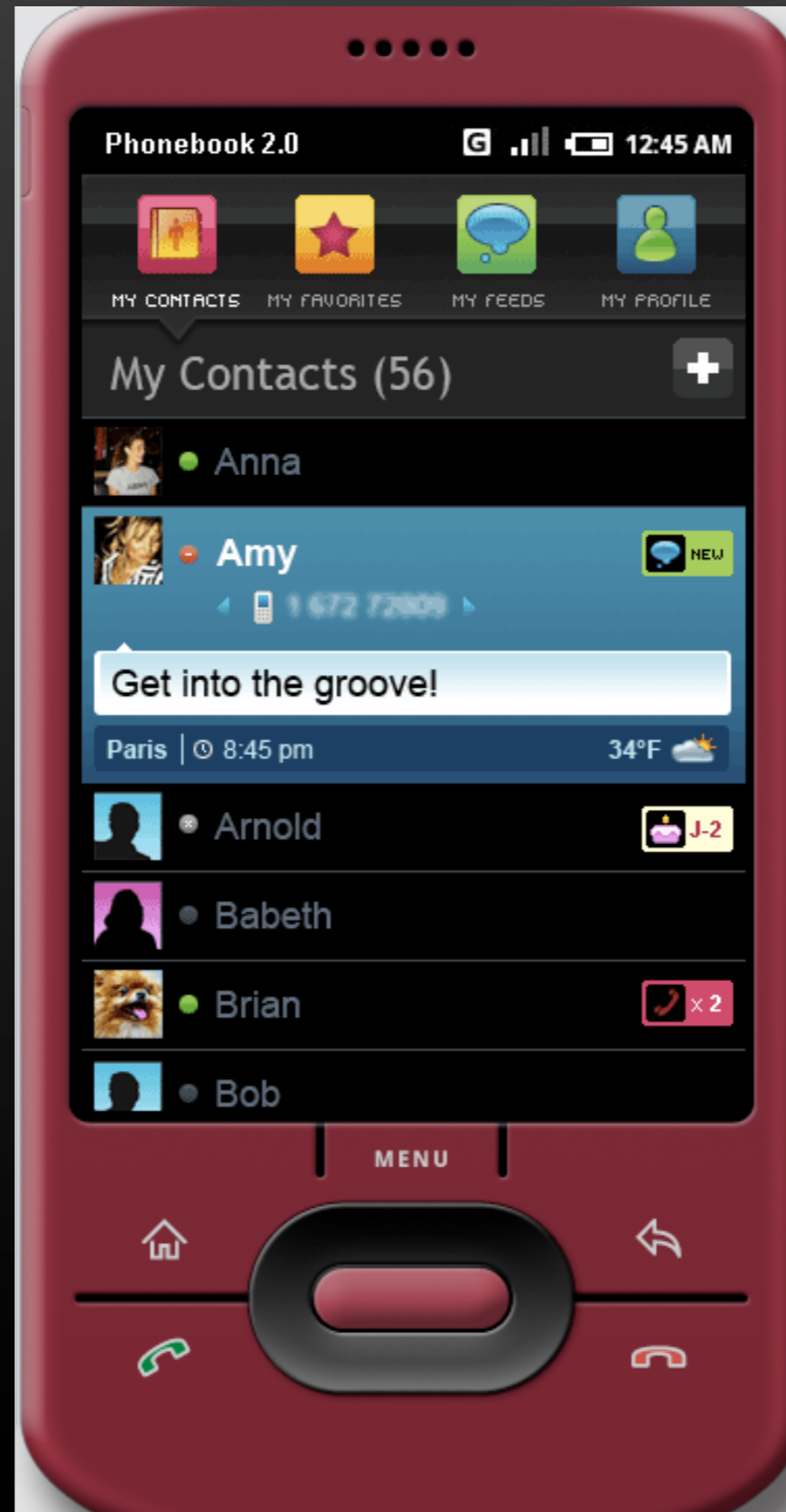


Replace

# Replace



# Replace

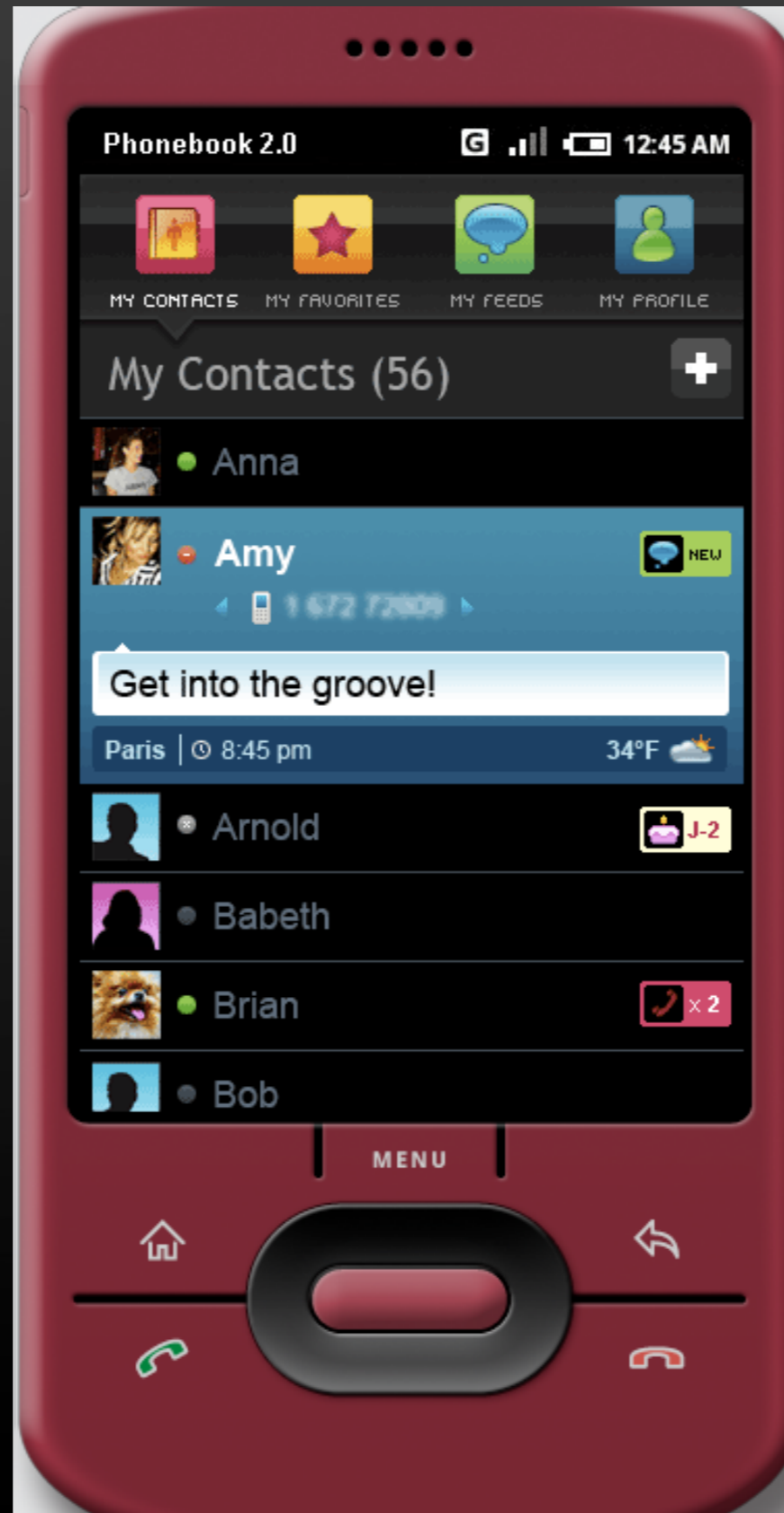




# Replace



# Replace





The image features two hands emerging from circular holes in a white paper surface. The hand on the left is open, palm facing forward. The hand on the right is holding a black padlock with a silver metal shackle. A semi-transparent dark grey rectangular box is centered over the image, containing the text "What about security?".

What about security?

A man with dark hair, glasses, and a beard is shown from the chest up. He is wearing a light blue cardigan over a white collared shirt and a dark bow tie. He has a thoughtful expression, with his hand resting on his chin and looking upwards and to the left. The background is a red wall with a repeating pattern of light-colored floral or geometric motifs.

What does this mean  
for developers?

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# Latest News

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- 5 Nov 2007: Android announced
- 12 Nov 2007: early look of the SDK released
- 14 Dec 2007: bug-fix SDK released
- 3 Jan 2008: Android Developer Challenge I starts accepting submissions
- 13 Feb 2008: m5-rc15 SDK released
- 14 Apr 2008: 1788 total submissions for Challenge I
- 12 May 2008: Top 50 Application in Challenge I announced

# Android Developer Challenge

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- Goal: help developers turn great ideas into great code
- Challenge I & II each have a \$5MM USD purse
- Challenge II will begin after devices go on sale



Q & A

