

Astronomy in Your Pocket:

An **Android** Development Journey

Sean Dague
<http://dague.net>
@sdague



Mobile vs Small Computing



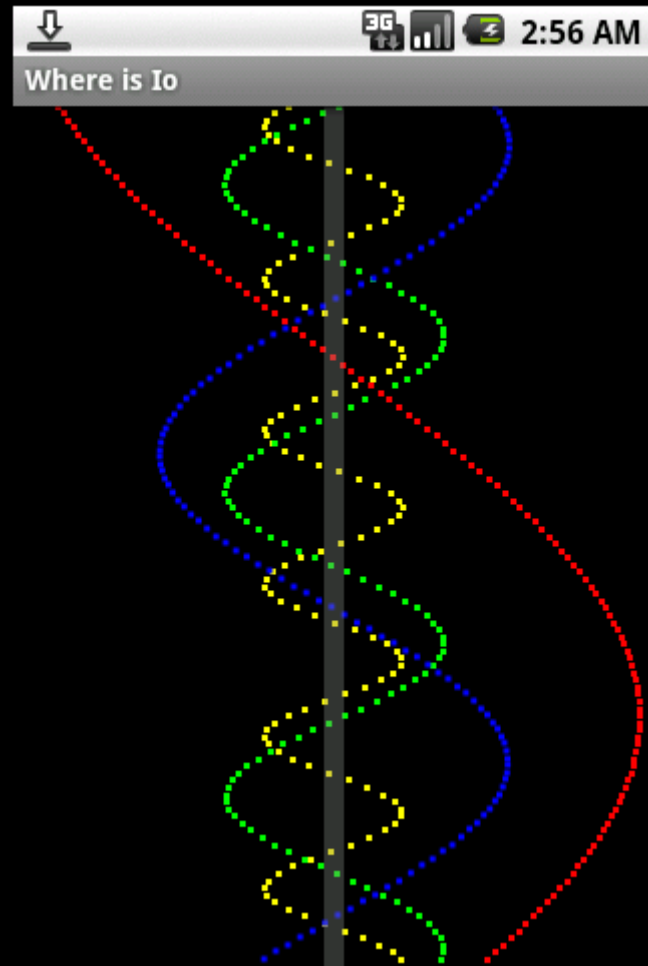
What Makes a Good Mobile Application?

My Itch



What am I looking at?

Where is Io - First Working Code



Where is Io



Main Layout

```
<?xml version="1.0" encoding="utf-8"?>
<LinearLayout android:id="@+id/LinearLayout01"
    android:orientation="vertical"
    android:layout_width="fill_parent" android:layout_height="fill_parent"
    xmlns:android="http://schemas.android.com/apk/res/android">

    <net.dague.astro.views.Diarama android:id="@+id/diarama"
        android:layout_width="fill_parent" android:layout_height="150dp"
        android:layout_margin="5dp"
        android:src="@drawable/sun_icon"
    />

    <Button android:id="@+id/time_button"
        style="@style/AstroButton"
        android:text="@string/time_text"
        android:layout_width="fill_parent"
    ></Button>

    <Button android:id="@+id/jupiter_button"
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Layout Containers

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Layout Containers
Resources

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Layout Containers
Resources
Styles

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Layout Containers
Resources
Styles
Display Independent Pixels

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






</LinearLayout>
```

Layout Containers
Resources
Styles
Display Independent Pixels
Custom View

Second Activity

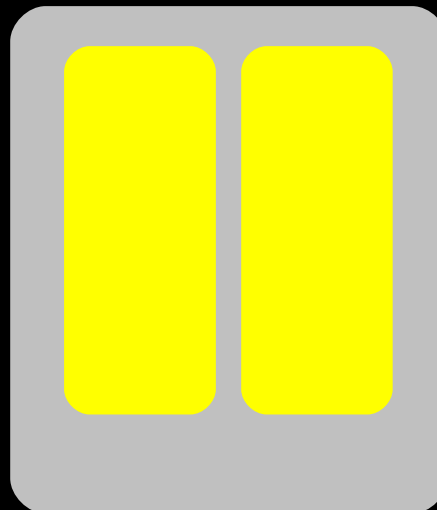
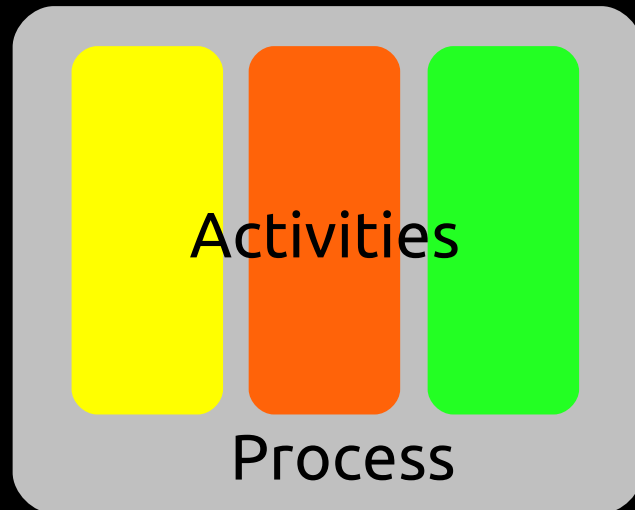


A screenshot of a mobile application interface. At the top, a status bar shows icons for Wi-Fi, 3G, signal strength, and battery, along with the time 10:02 PM. Below the status bar is a header labeled "Rise and Set times". The main content area is a table with three columns: a column of celestial body images, a column for rise times, and a column for set times. The table lists eight celestial bodies: the Sun, the Moon, Mars, Jupiter, Saturn, Uranus, and Neptune. Each row contains a small circular image of the body, its corresponding rise time, and its set time.

Rise and Set times		
	7:03	18:20
	6:43	18:17
	9:29	18:43
		
	9:39	19:35
	17:28	5:12
	6:12	18:08
	17:29	5:24

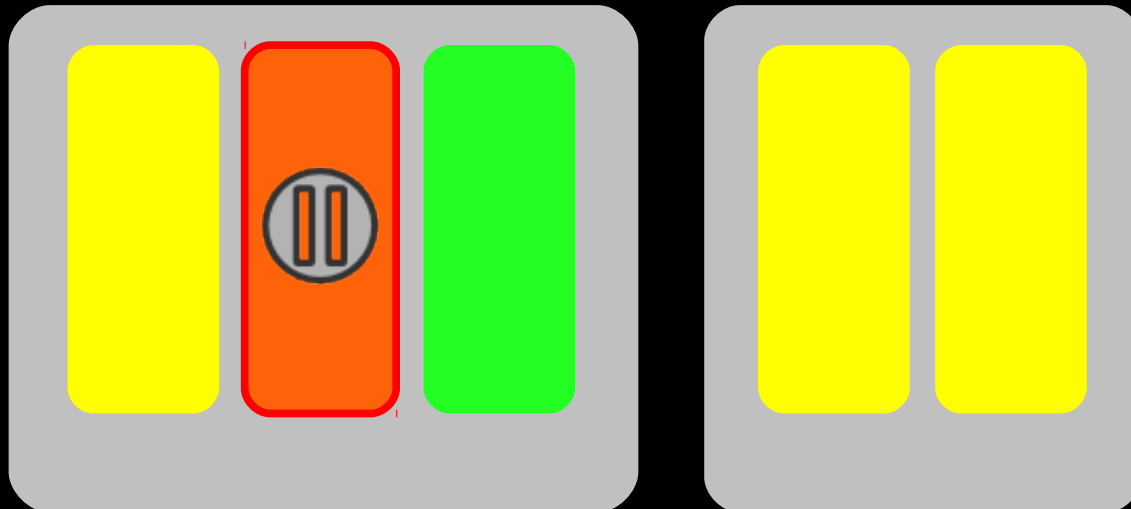
The Illusion Multitasking

User Visible
Screens



The Illusion Multitasking

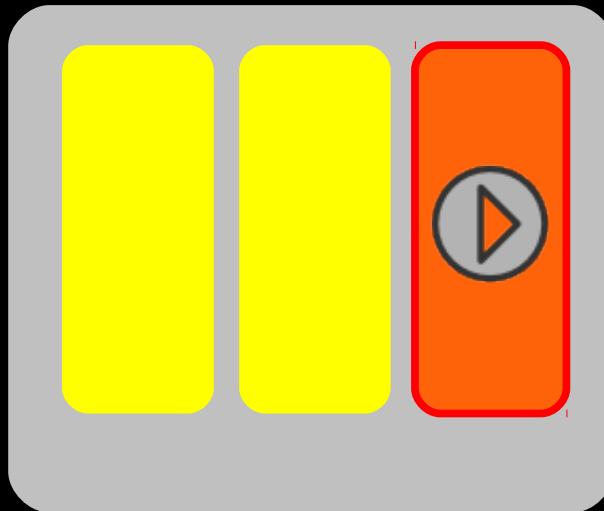
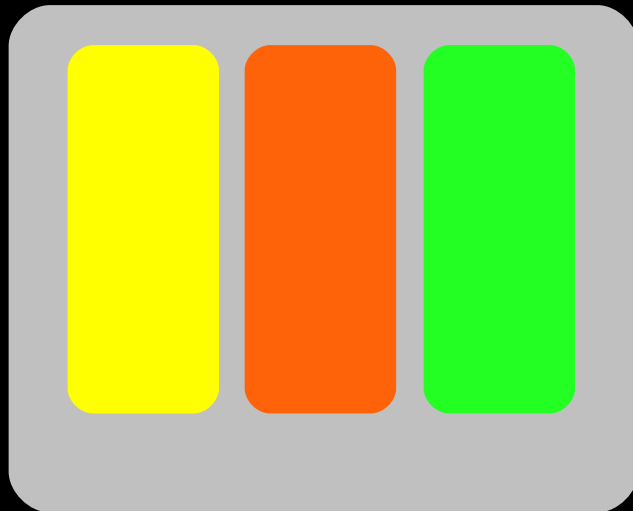
User Visible
Screens



`onPause()` - gives you a chance to save a state bundle

The Illusion Multitasking

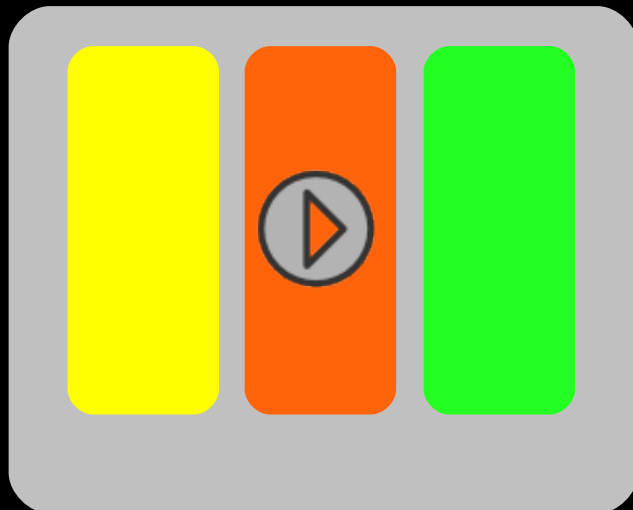
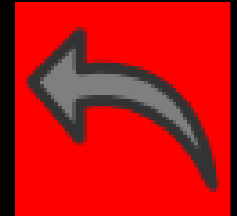
User Visible
Screens



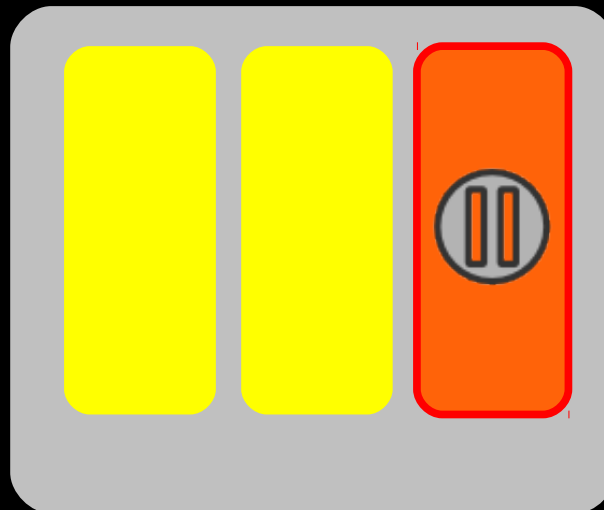
`onCreate(bundle)` - start up a new activity

The Illusion Multitasking

User Visible
Screens



onResume()

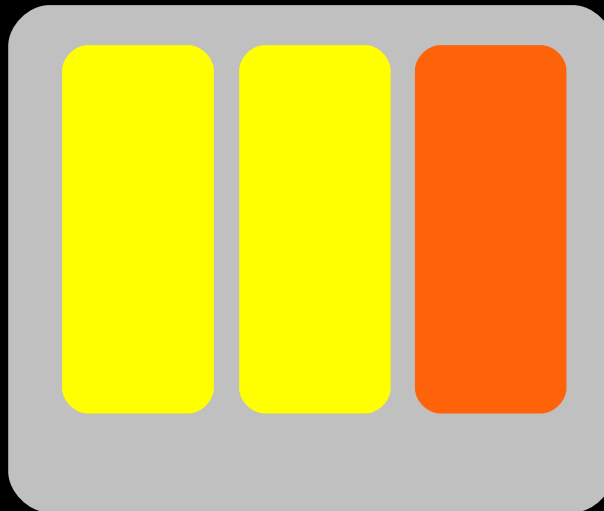
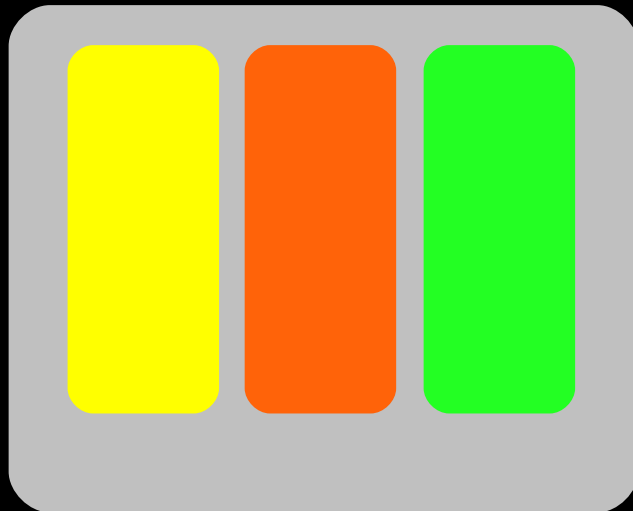


onPause()

The Illusion Multitasking

Under Memory Pressure

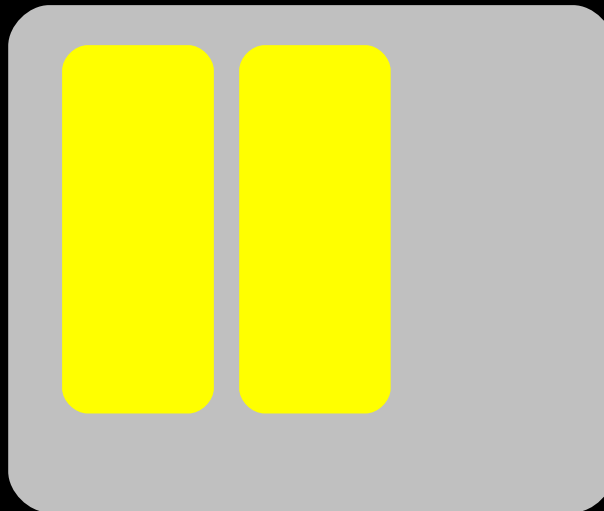
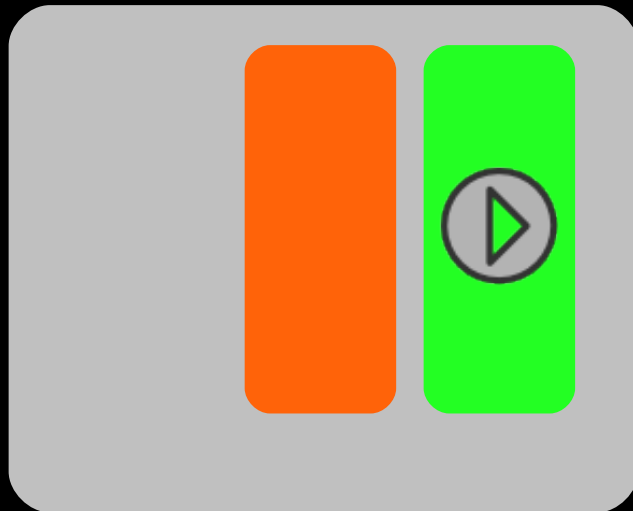
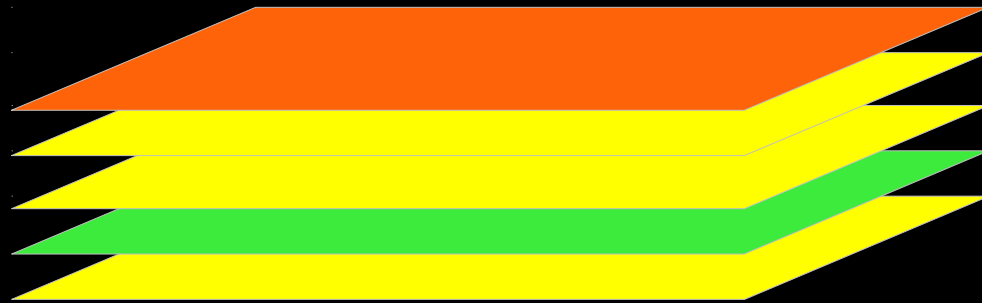
User Visible
Screens



onStop() ?
onDestroy() ?
no warning?

The Illusion Multitasking

User Visible
Screens



onCreate(bundle) - you did save state correctly, right?

More Advanced Graphics



What Other Open Source Exists?

Jupiter

Magnitude: **-2.75**

Absolute Magnitude: 25.81

RA/DE (J2000): 23h49m2.7s/-2° 55'13.6"

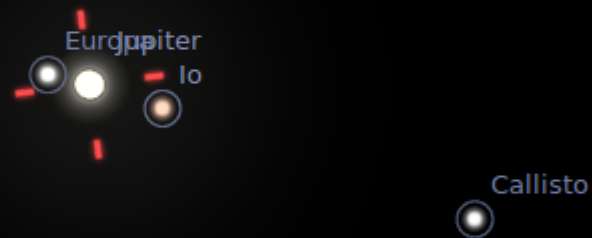
RA/DE (of date): 23h49m36s/-2°51'39"

Hour angle/DE: 23h37m16s/-2°51'39"

Az/Alt: +171°54'38"/+45°20'19"

Distance: 3.98881370AU

Apparent diameter: +0° 0'49.4"



Words you never want to read

/*****

The L1 theory of the galilean satellites
by Valery Lainey can be found at
<ftp://ftp.imcce.fr/pub/ephem/satel/galilean/L1>

I (Johannes Gajdosik) have just taken the Fortran code and data
obtained from above and rearranged it into this piece of software.

I can neither allow nor forbid the usage of the L1 theory.
The copyright notice below covers not the work of Valery Lainey
but just my work, that is the compilation of the L1 theory
into the software supplied in this file.

Copyright (c) 2005 Johannes Gajdosik

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copy of this software and associated documentation files (the "Software"),
to deal in the Software without restriction, including without limitation
the rights to use, copy, modify, merge, publish, distribute, sublicense,
and/or sell copies of the Software, and to permit persons to whom the
Software is furnished to do so, subject to the following conditions:

Going Native

Rest of Application - Java



Java Class with native methods



JNI Export layer - C

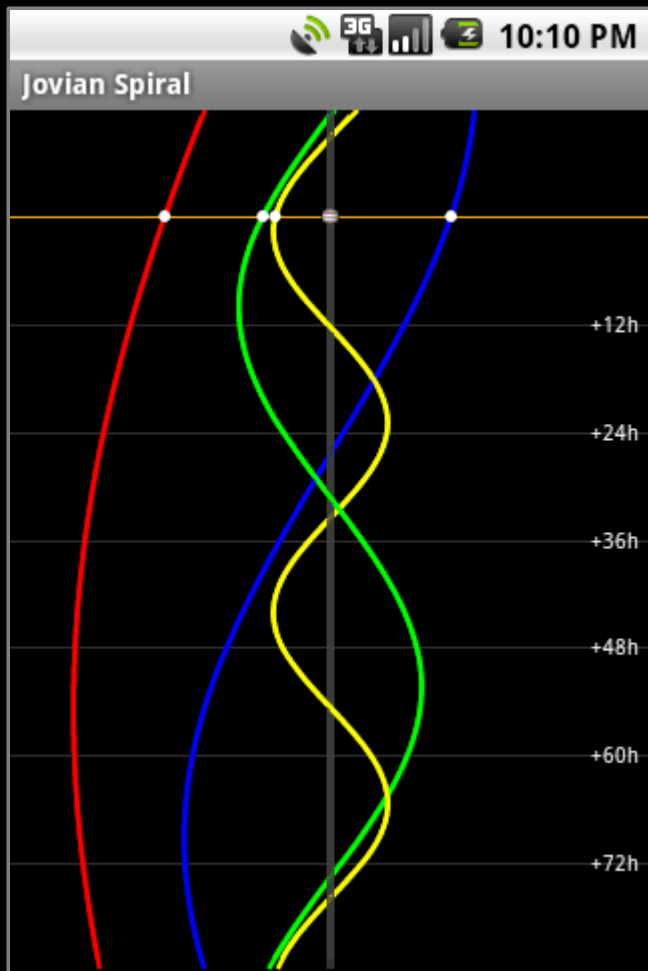


C lib created from Stellarium



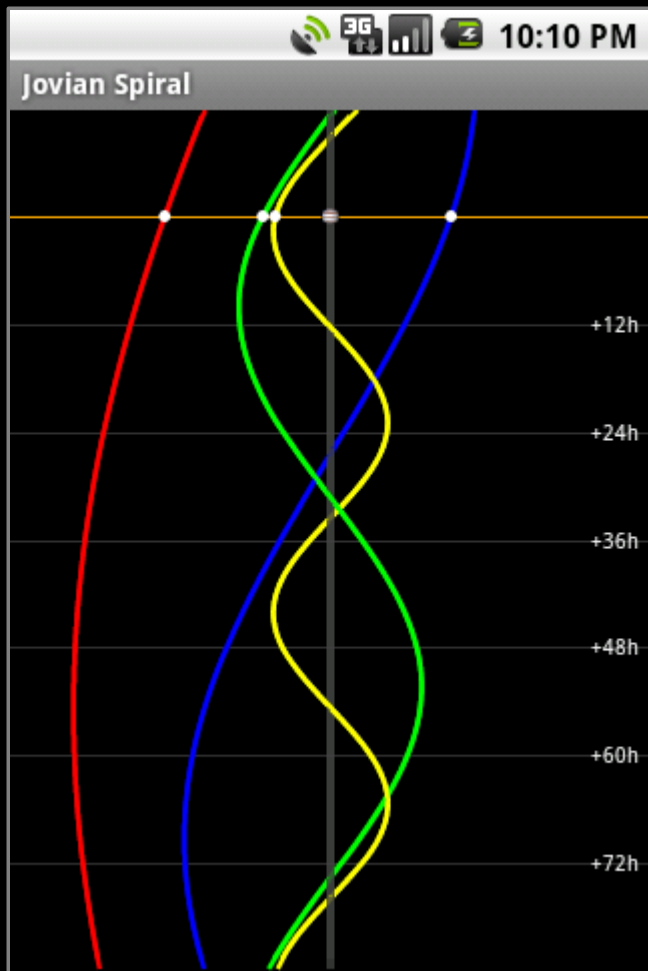
Nota Franca, alio nomine dicitur Terra Nova, anno 1494 a Brimondus per mare detecta cum Jacobi & Laurentii de anno 1494 a Laurentio Veraciano Florentina, qui ex parte Deprechii et Marty, fidei nomine Francisci Regis Galliarum ab eadem apparet ad gradum 44. latitudinis borealis per altitudinem

Computational Time



- 120 points per curve
- Pure Computation
 - HTC Hero - 17s
 - Droid 1 - 12s
 - Nexus One - 8s
- 5 Second Rule

Dance of the Threads



JovianSpiralView

Main UI

JovianThread

Draws to UI
Handles Animations
Uses **Looper**

JovianCalculator

Background
Data Cruncher

SQLite

Detecting Touch



Thinking of the Possibilities



What Makes a Good Mobile Application?

Things to Remember With Android

- No Save
- No Quit
- No foreground processing
- You will be interrupted, plan accordingly

Learning More

- <http://developer.android.com>
- <http://android-developers.blogspot.com>
- <http://github.com/sdague/where-is-io>