Android APIs 2.0 & 2.1
What‘s new?

m2d2, 23.02.2010

Markus Junginger

greenrobot

Outline

- Historie Android 1.0 - 2.0
- Android 2.0 APIs
- Bluetooth
- Quick Contacts
- Multitouch
- Live Wallpaper

Android 1.1

- API-Level 2
- API Änderungen sehr überschaubar
- Bugfix Release
- android:minSdkVersion ist Pflicht-Attribut
- Kleine App Verbesserungen
  - Suche nach POI (Google-Maps-App)
  - MMS Anlagen lokal speichern

Android 1.5 (cupcake)

- API-Level 3
- UI-Elemente überarbeitet
- Virtual Keyboard
- Home-Screen Widgets
- Copy & Paste
- Performance Verbesserungen

greenrobot

Android 1.6 (donut)

- API-Level 4
- Android-Market Update
- Quick-Search-Box
- Native VPN-Unterstützung
- Text-to-speech Engine
- Auflösungen und Pixeldichten
- Energieverbrauch AppWidget
- Native Entwicklung mit dem NDK

greenrobot

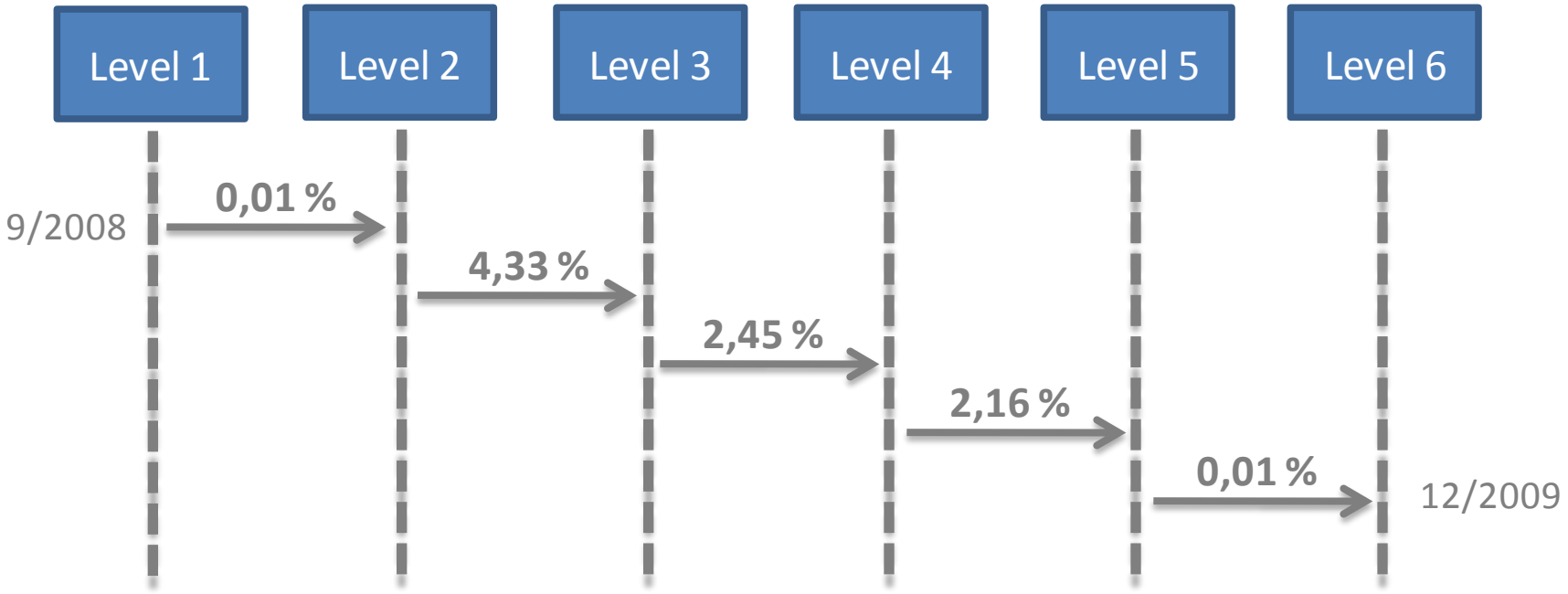
Android 2.0 (eclair)

- API-Level 5 und 6 (2.0.1)
- Multitouch API
- Bluetooth API
- Verbesserte virtuelle Tastatur
- Quick-Search (SMS, MMS)
- Quick-Contact-Widget
- Aktualisierter Browser
- Mehrere Email-Konten synchronisieren
- Kamera-Funktionen erweitert

greenrobot

Android API Differences Report

$$\text{Percentage difference} = \frac{100 * (\text{added} + \text{removed} + 2*\text{changed})}{\text{sum of public elements in BOTH APIs}}$$



greenrobot

Bluetooth

- Android BT Stack basiert auf Bluez 4.47
  - Linux Standard (von SIG anerkannt)
- Bluetooth 2.1 EDR (2,1 Mb/s)
- Emulator unterstützt kein Bluetooth
- `permission.BLUETOOTH`
  - Mit Paired-Devices verbinden
- `permission.BLUETOOTH_ADMIN`
  - Finden und Verbinden von BT-Geräten

Bluetooth Workflow

- BluetoothServerSocket binden
- BT Discovery starten (→ BluetoothDevice)
- Verbindung über BluetoothSocket zu einem BluetoothDevice herstellen
- Mit Streams lesen und/oder schreiben

Bluetooth API: Klassen (1)

- BluetoothAdapter: BT-Zentrale
  - Status
  - Discovery starten
  - Server BT-Socket
- BluetoothDevice: Remote BT-Gerät
  - Properties (Name, Adresse, …)
  - Client-BT-Socket

Bluetooth API: Klassen (2)

- BluetoothSocket
  - Analog TCP Socket (java.net.Socket)
  - Client-Verbindung aufbauen und verwalten
- BluetoothServerSocket
  - Analog TCP ServerSocket (java.net.ServerSocket)

Code: Bluetooth Check

```
BluetoothAdapter bluetoothAdapter =
  BluetoothAdapter.getDefaultAdapter();
if (bluetoothAdapter != null) {
  if(!bluetoothAdapter.isEnabled()) {
    Intent intent = new Intent
      (BluetoothAdapter.ACTION_REQUEST_ENABLE);
    startActivityForResult(intent, 1);
    // check for RESULT_OK in onActivityResult
  }
} else {
  // No BT available
}
```

greenrobot

Code: Geräte suchen

```
registerReceiver(new MyReceiver(), new
   IntentFilter(BluetoothDevice.ACTION_FOUND));
bluetoothAdapter.startDiscovery();

class MyReceiver extends BroadcastReceiver()
{
   @Override
   public void onReceive(Context context,
       Intent intent) {
       if(intent.getAction().equals(
             BluetoothDevice.ACTION_FOUND) {
             // See next slide
       }
   }
}
```

greenrobot

Code: Geräte suchen (2)

```
// Continued from last slide inside onReceive()

BluetoothDevice device = (BluetoothDevice)
intent.getExtras().get(BluetoothDevice.EXTRA_DEVICE);

Log.d(TAG, "name:" + device.getName() + " address: "
   + device.getAddress());

BluetoothClass clazz=device.getBluetoothClass();
boolean hasAudio =
   clazz.hasService(BluetoothClass.Service.AUDIO);
```

greenrobot

Code: Bluetooth Server

```
UUID uuid = uuid.fromString("27648B4D-D854-5674-
   FA60E4F535E44AF7");

BluetoothServerSocket serverSocket =
   adapter.listenUsingRfcommWithServiceRecord("MyBlue
   toothApp", uuid);

BluetoothSocket socket = serverSocket.accept();
InputStream in = socket.getInputStream();
OutputStream out = socket.getOutputStream();
// Read, write, and close
```

greenrobot

Code: Bluetooth Client

```
UUID uuid = uuid.fromString("27648B4D-D854-5674-
   FA60E4F535E44AF7");  // identical UUID

BluetoothDevice device = adapter.
   getRemoteDevice("00:11:22:33:44:55");

BluetoothSocket socket = device.
   createRfcommSocketToServiceRecord(uuid);

socket.connect();
InputStream in = socket.getInputStream();
OutputStream out = socket.getOutputStream();
// Read, write, and close
```

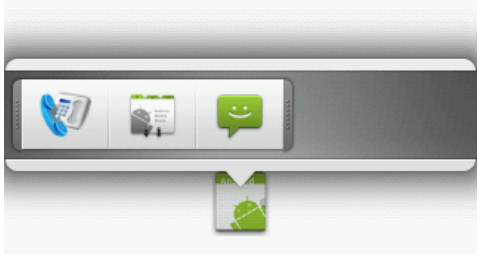
greenrobot

Bluetooth Profile (keine API)

- Protokoll zum Datenaustausch
- Werden beim Verbindungsaufbau mitgeteilt
- Android 1.0 Profile
  - SDP, L2CAP, GAP, RFCOMM, SPP
- Android 1.5
  - AVCTP, AVRCP, GAVDP, AVDTP, A2DP
- Android 2.0 neue Profile
  - OOP (Object Push Profile)
  - PBAP (Phonebook Access Profile, read only)

Quick Contact

- Neues Widget (abgeleitet von ImageView) `android.widget.QuickContactBadge`
- Schneller Zugriff auf Kontaktdaten
- Leicht in eigene App integrierbar
- Referenzierung des Kontakts via URI, Email-Adresse oder Telefonnummer



greenrobot

Quick Contact - Beispiel

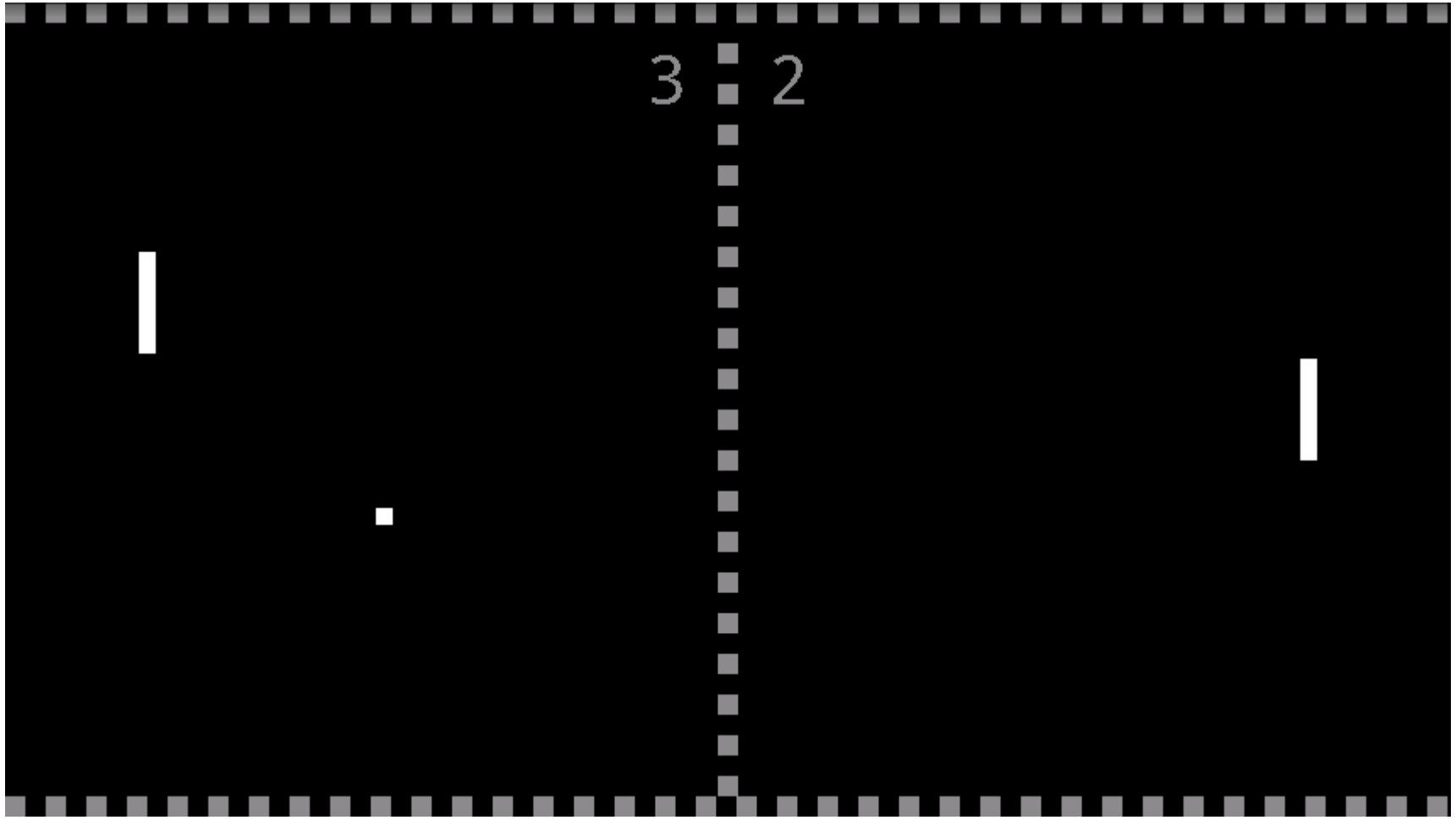
```
protected void onCreate(Bundle savedInstanceState) {
   super.onCreate(savedInstanceState);
   setContentView(R.layout.contacts);

   String phoneNumber = "0891234";
   QuickContactBadge badge = (QuickContactBadge)
       findViewById(R.id.QuickContactBadge);
   badge.assignContactFromPhone(phoneNumber, true);
}
```

greenrobot

Touch und Multitouch UIs

- Touch: wesentlich für moderne mobile UIs
- iPhone hat es vorgemacht
- Multitouch erlaubt Gesten (Pinch & Zoom)
- G1 Hardware Multitouch-Gesten fähig
- API Multitouch Support ab Android 2.0
- Basiert auf Touch API

Anwendungsbei**spiel** ☺



greenrobot

(Single) Touch Events

- Seit Android 1.0
- Auf MotionEvent registrieren
  - Activity.onTouchEvent
  - OnTouchListener
- MotionEvent Daten
  - Action: Down, Move, Up
  - X und Y Koordinaten

(Single) Touch Events: Code

```
@Override
public boolean onTouch(View v,
  MotionEvent event) {
   if (event.getAction() ==
  MotionEvent.ACTION_DOWN) {
      int x = event.getX();
      int y = event.getX();
      doSomething(x,y);
}
```

greenrobot

Multitouch API Dokumentation

- Keine API Demos, kein Blogpost
- API Docs teilweise verwirrend (z.B. ACTION_POINTER_1_DOWN)
- Android Developer Mailing Liste
  http://groups.google.com/group/android-developers/browse_thread/thread/962b1a27a31e450d
- Try & Error (Loggen von Events)

greenrobot

Android 2.0 Multitouch API

- MotionEvent: zusätzliche Daten
- Pointer
- `event.getPointerCount()`
- `event.getX(pointerIndex)`
- Analog: `getY, getPressure`
- `event.getPointerId(pointerIdx)`

Multitouch: Action Kodierung

- Action bei Multitouch

```
int action = event.getAction() &
MotionEvent.ACTION_MASK;
```

- Pointer ID aus Action bestimmen

```
int id = (event.getAction() &
MotionEvent.ACTION_POINTER_ID_MASK) >>
MotionEvent.ACTION_POINTER_ID_SHIFT;
```

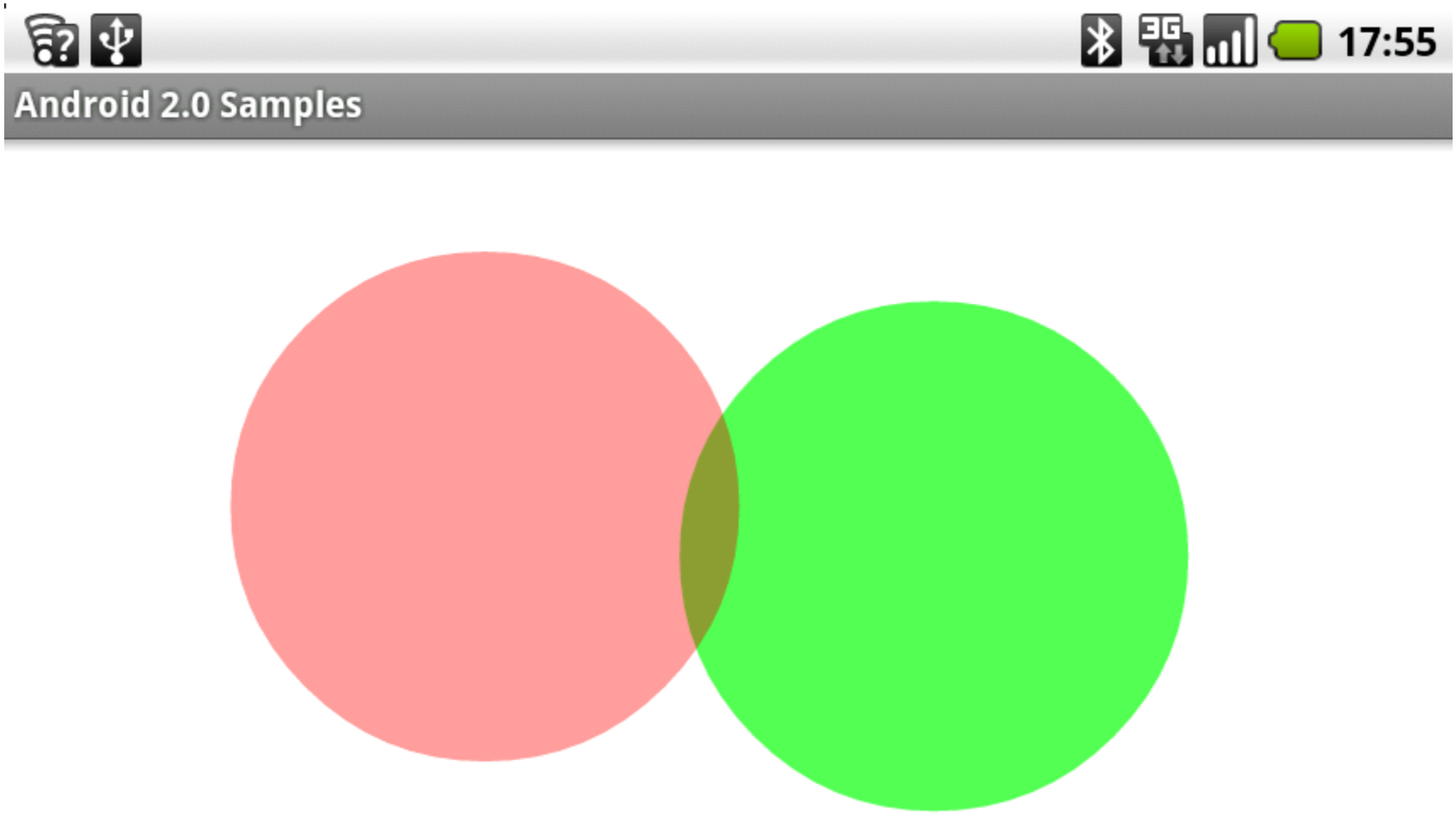
Multitouch: Neue Actions

- ACTION_POINTER_DOWN
- ACTION_POINTER_UP
- Pointer ID aus Action Kodierung
- Beispiel Ablauf (ohne Move):
  - ACTION_DOWN: 1. Finger
  - ACTION_POINTER_DOWN: 2. Finger
  - ACTION_POINTER_UP: 1. oder 2. Finger
  - ACTION_UP: Verbliebener Finger

Beispiel Ablauf (ohne Move)

- ACTION_DOWN: 1. Finger
- ACTION_POINTER_DOWN: 2. Finger
- ACTION_POINTER_UP: 1./2. Finger
- ACTION_UP: Verbliebener Finger

Multitouch Code-Beispiel



greenrobot

Multitouch Code-Beispiel 1/2

- Farben setzen bei UP/DOWN

```
int action =
  event.getAction()& MotionEvent.ACTION_MASK;

int id = (event.getAction() &
  MotionEvent.ACTION_POINTER_ID_MASK) >>
  MotionEvent.ACTION_POINTER_ID_SHIFT;

if (action == MotionEvent.ACTION_DOWN || action ==
  MotionEvent.ACTION_POINTER_DOWN) {
      colors[id] = colorsDown[id];
} else if (action == MotionEvent.ACTION_UP || action
  == MotionEvent.ACTION_POINTER_UP) {
      colors[id] = colorsUp[id];
}
```

greenrobot

Multitouch Code-Beispiel 2/2

- Positionen setzen

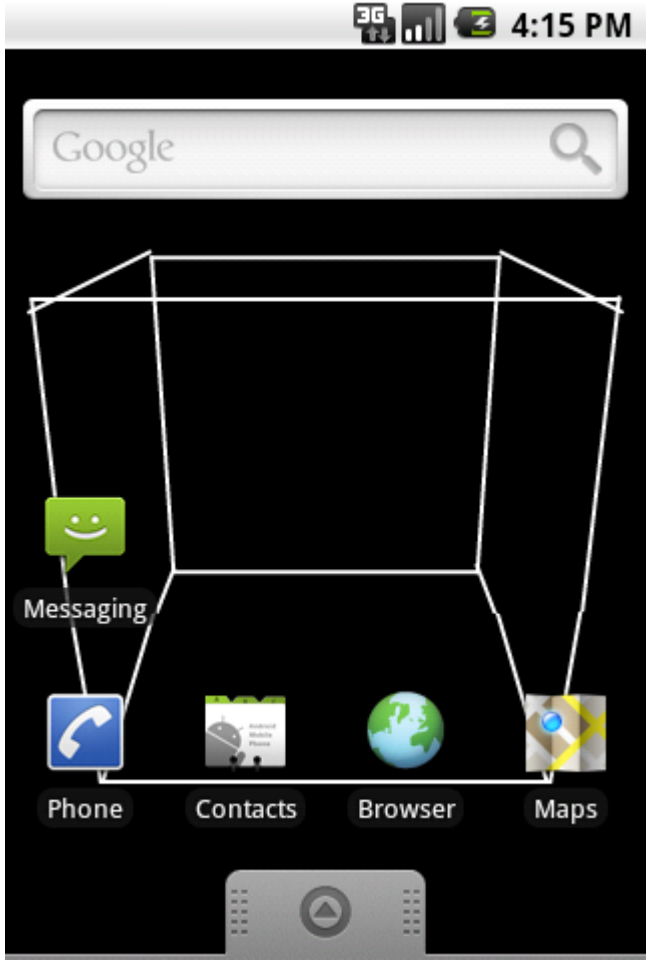
```
int count = event.getPointerCount();
for (int i = 0; i < count; i++) {
    int pointerId = event.getPointerId(i);
    float x = event.getX(i);
    float y = event.getY(i);
    points[pointerId] = new PointF(x, y);
}
```

Multitouch Anmerkungen

- Keine Beschränkung: Anzahl der Punkte
- Motorola Milestone Milestone
  - Erstes Android 2.0 Gerät
  - Unterstützt nur 2 gleichzeitige Punkte (Finger)
- HTC Geräte noch beschränkter: Bounding-Box zwischen 2 Fingern

Live Wallpaper

- Aktiver Home Screen Hintergrund ab API 2.1
- Animationen, Interaktion
- Als Service realisiert (WallpaperService)
- Implementierung über WallpaperService.Engine
- XML Metadaten



greenrobot

WallpaperService im Manifest

```
<service android:label="@string/wallpaper_label"
      android:name=".MyWallpaper1"
      android:permission =
      "android.permission.BIND_WALLPAPER">
      <intent-filter>
            <action android:name =
"android.service.wallpaper.WallpaperService"/>
      </intent-filter>
      <meta-data
            android:name="android.service.wallpaper"
            android:resource="@xml/myxmlfile" />
</service>
```

greenrobot

WallpaperService Class

```
public class MyWallpaper extends WallpaperService {
      @Override
      public Engine onCreateEngine() {
            return new MyWallpaperEngine();
      }

      // onCreate, onDestroy, …
}
```

WallpaperService.Engine

- Life-Cycle Methoden
  `onCreate, onDestroy`
- Offset-Änderung
  `onOffsetsChanged`
- Surface Callbacks
  `onSurface…`
- Interaktion (Touch)
  `onTouchEvent`

greenrobot

Zeichnen des Wallpapers

- SurfaceHolder

```
final SurfaceHolder holder = getSurfaceHolder();
Canvas c = holder.lockCanvas();
if (c != null) {
    drawSomething(c);
    holder.unlockCanvasAndPost(c);
}
```

- Asynchron: mit Thread oder Handler

Wallpaper Einstellungen

- Im Manifest Verweis auf Datei in res/xml/

```
<?xml version="1.0" encoding="UTF-8"?>
<wallpaper xmlns:android =
    "http://schemas.android.com/apk/res/android"
android:thumbnail="@drawable/thumbnail"
android:description="@string/description"
android:settingsActivity="PreferenceActivity"/>
```

Wunschliste Android 3.0

- JIT Compiler
- Hardware-beschleunigtes Rendering
- OpenGL ES 2.0
- Market Verbesserungen
  - Bezahlmöglichkeiten
  - In-App Käufe
- iTunes Pendant für Desktop (Synchronisieren & Verwalten)
- Einheitliches Multitouch

Vielen Dank! Q&A

kontakt@greenrobot.de
http://greenrobot.de
@greenrobot_de

greenrobot