ArcGIS for Android开发基础

Esri中国（北京）有限公司　崔福东

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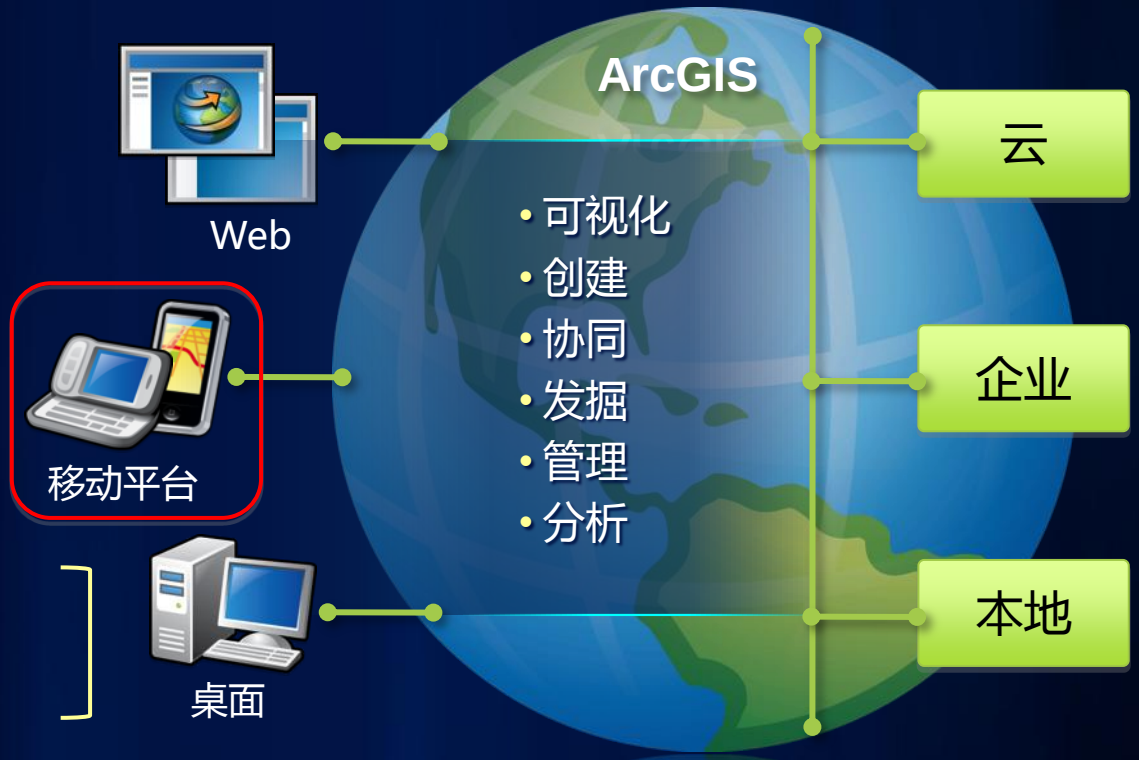
ArcGIS for Android简介

ArcGIS移动端技术

ArcPad
ArcGIS for Mobile
ArcGIS for iOS
ArcGIS for Windows Phone
ArcGIS for Android

测试版已于2011年2月发布
正式版将于2011年10月发布



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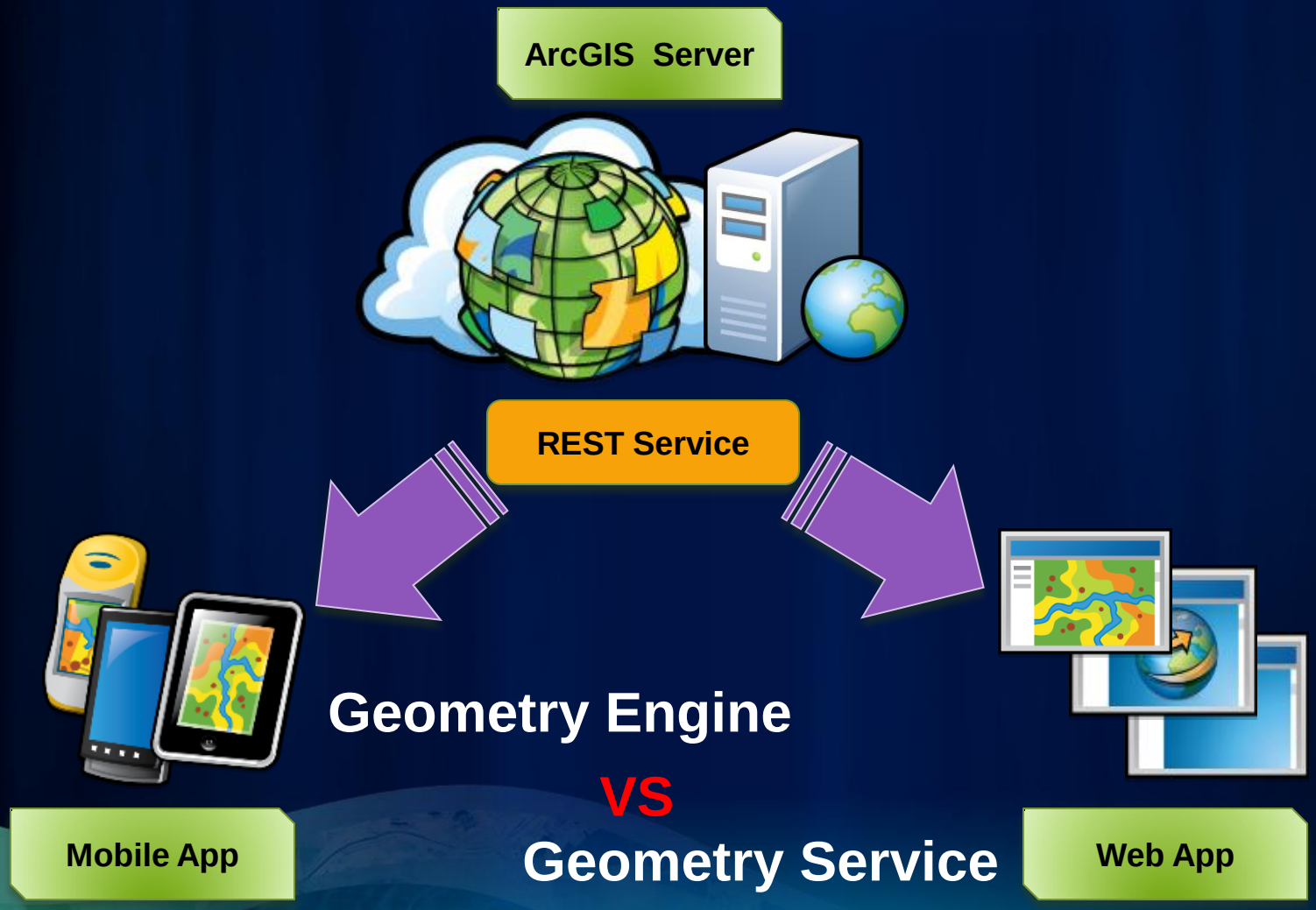
基于共同的REST接口



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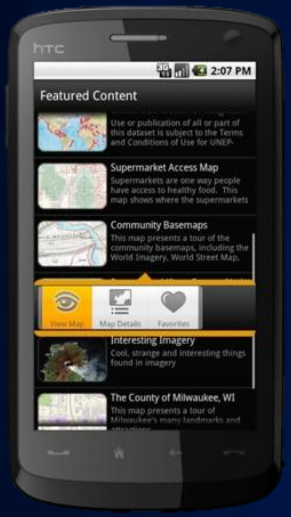
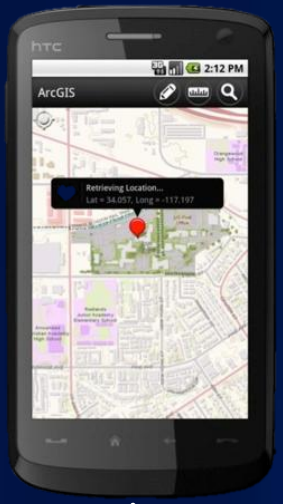
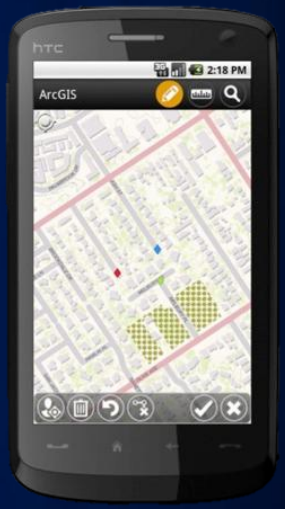
ArcGIS for Android 应用程序







- ArcGIS Online
- ArcGIS Server
- 支持各种地图服务

- GPS
- 地址搜索
- 线面测量
- 逆地理编码

- 属性编辑，支持附件
- 要素编辑，点、线、面

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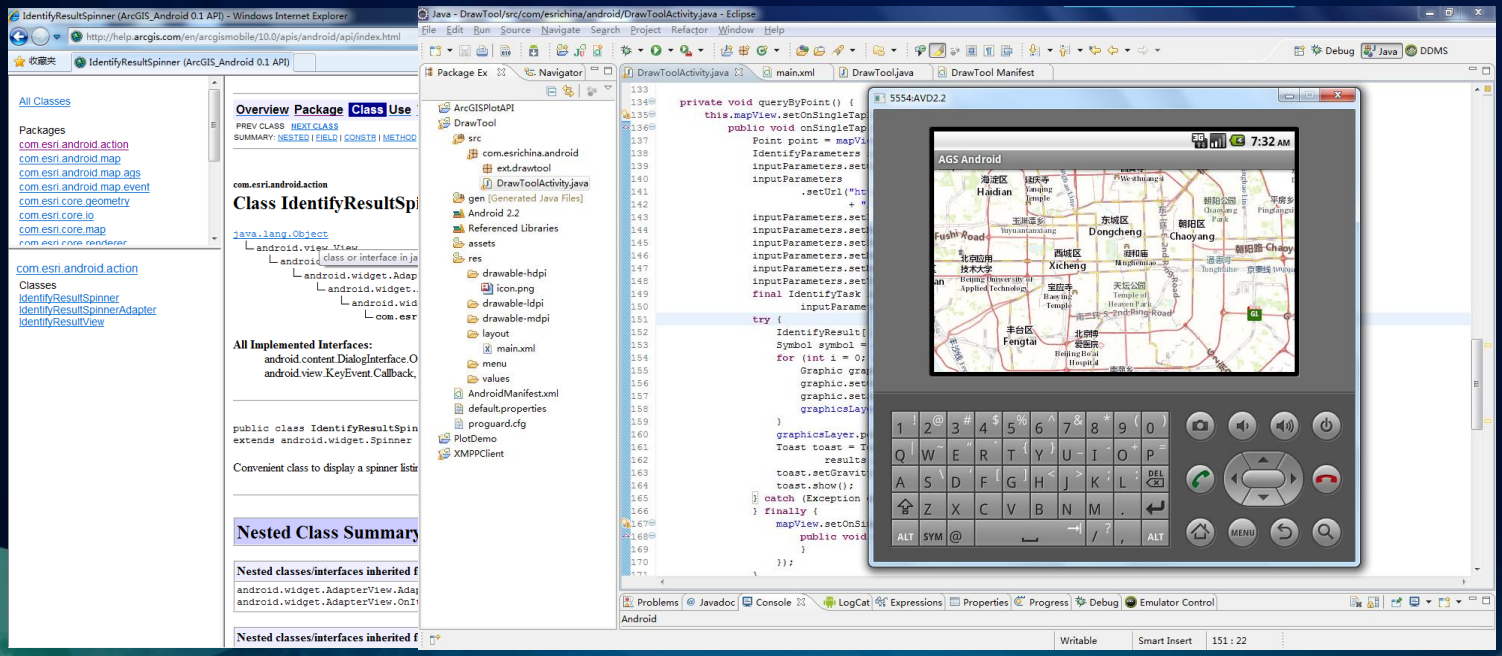
ArcGIS for Android SDK

- 2011年2月发布beta版，10月发布正式版
- API、API Reference、Sample
- 支持Android 2.1、2.2（正式版支持2.2 、2.3、3.0）
- ArcGIS for Android Eclipse Plugin



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ArcGIS for Android SDK提供的功能

- 地图可视化:

  MapView, Dynamic, Tiled, Graphics, Feature

- 查询、分析:

  Query, Identify, Geocode, Geoprocessing

- 数据编辑:

  Feature Layer 、Feature Template

- 客户端几何计算：

  Geometry Engine

结合GPS、重力感应、摄像头等创建Mobile应用

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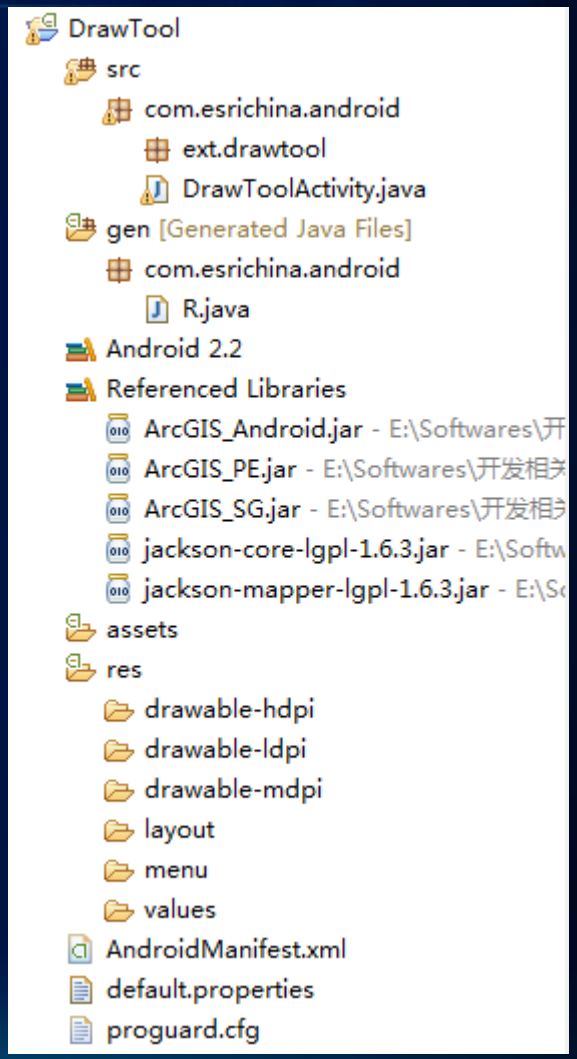
ArcGIS for Android开发基础

开发环境搭建

- Java Development Kit 6
- Eclipse 3.5、3.6
- Android SDK 2.1、2.2（ 正式版支持2.2 、2.3、3.0 ）
- Android Development Tools（ ADT ）
- ArcGIS for Android Eclipse Plugin

ArcGIS for Android工程目录

- src
  - 源文件
- gen
  - Android自动生成R类
- res
  - 图标
  - layout、menu、values …
- Android SDK
- Reference Libraries
- AndroidMenifest.xml



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地图可视化组件

MapView

- ArcGISDynamicMapServiceLayer
- ArcGISTiledMapServiceLayer
- ArcGISFeatureLayer
- GraphicsLayer

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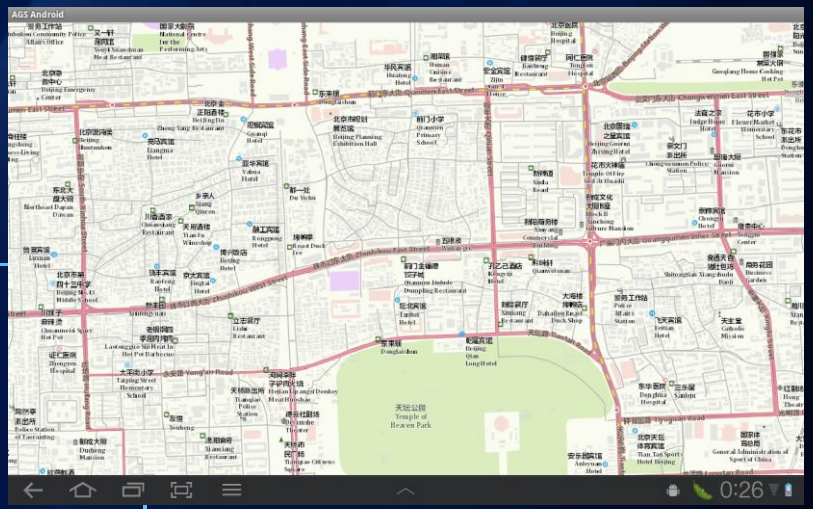
演示：地图加载



配置、获取、显示地图

通过配置文件加载地图

```
<?xml version="1.0" encoding="utf-8"?>
<com.esri.android.map.MapView
    xmlns:android="http://schemas.android.com/apk/res/android" android:id="@+id/map"
    android:layout_width="fill_parent" android:layout_height="fill_parent"
    initExtent="12923422.5039639 4827746.45379021 12990763.5258831 4877354.08514722">
    <com.esri.android.map.ags.ArcGISTiledMapServiceLayer
        url="http://cache1.arcgisonline.cn/ArcGIS/rest/services/ChinaOnline/MapServer" />
</com.esri.android.map.MapView>
```

```
super.onCreate(savedInstanceState);
setContentView(R.layout.main);
```

通过代码加载地图

```
MapView mapView = new MapView(this);
LayerView layer = new ArcGISTiledMapServiceLayer(this,url);
mapView.addLayer(layer);
this.setContentView(mapView);
```

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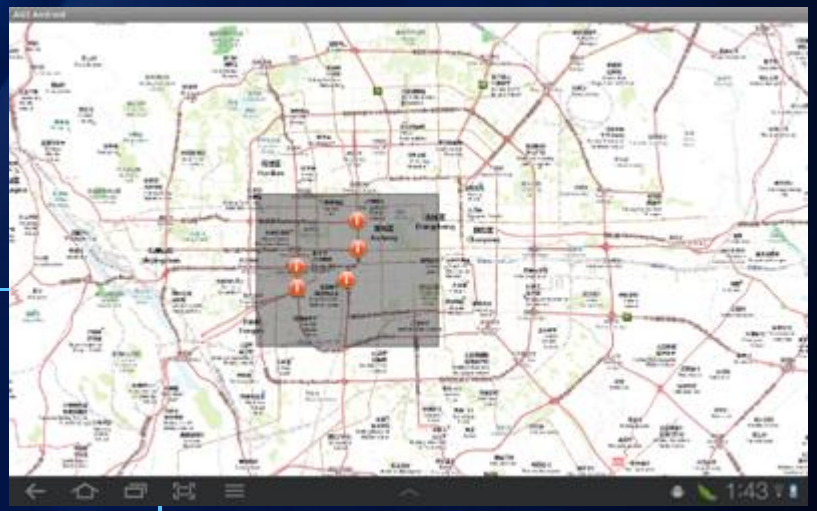
演示：框选查询



数据查询 QueryTask

同步查询

```
Query query = new Query();
query.setWhere("1=1");
query.setGeometry(env);
query.setUrl(url);
query.setReturnGeometry(true);
query.setOutFields(new String[] { "名称", "地址" });
QueryTask queryTask = new QueryTask(query);
FeatureSet featureSet = queryTask.execute();
```

异步查询

```
Query query = new Query();
query.setWhere("1=1");
query.setGeometry(env);
query.setUrl(url);
query.setReturnGeometry(true);
query.setOutFields(new String[] { "名称", "地址" });
new QueryTask(query, new TaskListener<FeatureSet>(){
    public void onCompletion(short state, FeatureSet value) {
        alarmLayer.addGraphics(value.getGraphics());
    }
    public void onError(Throwable ex) {
        ex.printStackTrace();
    }
}).call();
```

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显示结果 GraphicsLayer

GraphicsLayer初始化

```
this.alarmLayer = new GraphicsLayer(this);
Renderer<Graphic> renderer = new SimpleRenderer(
    new PictureMarkerSymbol(this
        .getResources().getDrawable(R.drawable.alert)));
this.alarmLayer.setRenderer(renderer);
this.mapView.addLayer(this.alarmLayer);
```

GraphicsLayer add Graphics

```
new QueryTask(query, new TaskListener<FeatureSet>(){
    public void onCompletion(short state, FeatureSet value) {
        alarmLayer.addGraphics(value.getGraphics());
    }
    public void onError(Throwable ex) {
        ex.printStackTrace();
    }
}).call();
```

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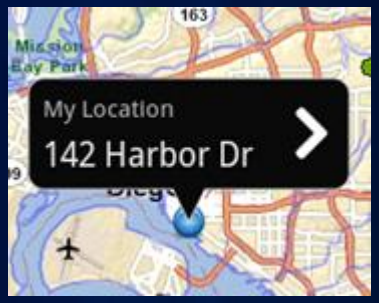
演示：Callout

弹出框 Callout

通常用来显示某一点处的信息

一个MapView实例只有一个Callout实例



Callout style

```
<?xml version="1.0" encoding="utf-8"?>
<resources>
    <calloutViewStyle titleTextColor="#ffffff"
        titleTextSize="20"
        titleTextStyle="1"
        titleTextTypeface="微软雅黑"
        backgroundColor="#66ffcc"
        backgroundAlpha="200"
        frameColor="#66ffcc"
        flat="false"
        cornerCurve="10"
        anchor="5"/>
</resources>
```

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Callout 显示

```
Graphic[] graphics = alarmLayer.getGraphics(x, y, 30);
Callout callout = mapView.getCallout();
if(graphics.length>0){
    Graphic g = graphics[0];
    callout.setStyle(R.xml.calloutstyle);
    String name = g.getAttributeValue("名称").toString();
    String address = g.getAttributeValue("地址").toString();
    TextView text = new TextView(mapView.getContext());
    text.setTextColor(Color.YELLOW);
    text.setTextSize(20);
    text.setText("名称: "+name+"\n"+"地址: "+address);
    callout.show((Point)g.getGeometry(),text);
}else if(callout.isShowing())
    callout.hide();
```

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演示：处理屏幕旋转

应对设备旋转

屏幕旋转

- onPause()
- onStop()
- onDestroy()
- onCreate() { 关键 }
- onStart()
- onResume()

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恢复屏幕旋转之前的状态

```
public void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.main);
    // other code.....
    // retain map state
    Object[] init = (Object[])getLastNonConfigurationInstance();
    if(init != null){
        this.mapView.restoreState(init[0].toString());
        this.alarmLayer.addGraphics((Graphic[])init[1]);
    }
}

@Override
public Object onRetainNonConfigurationInstance(){
    Graphic[] graphics = this.alarmLayer.getGraphics();
    return new Object[]{this.mapView.retainState(), graphics};
}
```

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其它两种方式

禁止onCreate()方法被调用（慎用）

```
<activity android:name=".DrawToolActivity" android:label="@string/ap
    android:configChanges="orientation">
    <intent-filter>
        <action android:name="android.intent.action.MAIN" />
        <category android:name="android.intent.category.LAUNCHER" />
    </intent-filter>
</activity>
```

指定屏幕方向（推荐）

```
<activity android:name=".DrawToolActivity" android:label="@string/app_name"
    android:screenOrientation="portrait">
    <intent-filter>
        <action android:name="android.intent.action.MAIN" />
        <category android:name="android.intent.category.LAUNCHER" />
    </intent-filter>
</activity>
```

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演示：几何计算

几何计算 Geometry Engine

以clip()方法为例

```
Geometry clipResult = GeometryEngine.clip(clipTarget,
        clipEnv, mapView.getSpatialReference());
Graphic graphic = new Graphic(clipResult);
graphic.setSymbol(new SimpleFillSymbol(Color.GREEN));
graphicsLayer.addGraphic(graphic);
graphicsLayer.postInvalidate();
```

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Geometry Engine其它方法

static Polygon[]	buffer(Geometry[] geometries, SpatialReference spatialReference, double[] distances, Unit unit, boolean toUnionResults) Calculates a buffer polygon for each geometry at each of the corresponding specified distances.
static Polygon	buffer(Geometry geometry, SpatialReference spatialReference, double distance, Unit unit) Calculates buffer polygon of the geometry as specified by the distance input.
static Geometry	clip(Geometry geometry, Envelope envelope, SpatialReference spatialReference) calculates the clipped geometry from an target geometry object by an envelope
static Proximity2DResult	getNearestCoordinate(Geometry geometry, Point inputPoint, boolean bTestPolygonInterior) Finds the coordinate on the geometry which is closest to the specified point
static Proximity2DResult	getNearestVertex(Geometry geometry, Point inputPoint) Finds nearest vertex on the geometry which is closed to the specified point
static Proximity2DResult[]	getNearestVertices(Geometry geometry, Point inputPoint, double searchRadius, int maxVertexCountToReturn) Finds all vertices in the given distance from the specified point, sorted from closest to furthest
static MapGeometry	jsonToGeometry(org.codehaus.jackson.JsonParser json) Imports the MapGeometry from it's Json representation.
static Geometry	project(Geometry geometry, SpatialReference inputSR, SpatialReference outputSR) Projects the given Geometry instance from the input Spatial Reference to the output Spatial Reference.
static Geometry	simplify(Geometry geometry, SpatialReference spatialReference) Performs the simplify operation on the geometry.
static boolean	touches(Geometry geometry1, Geometry geometry2, SpatialReference spatialReference) Test if one geometry (geometry1) touches another geometry object (geometry2)
static Geometry	union(Geometry[] geometries, SpatialReference spatialReference) Constructs the union of the geometries in the input array.
static boolean	within(Geometry geometry1, Geometry geometry2, SpatialReference spatialReference) Test if one geometry (geometry1) is within another geometry object (geometry2)

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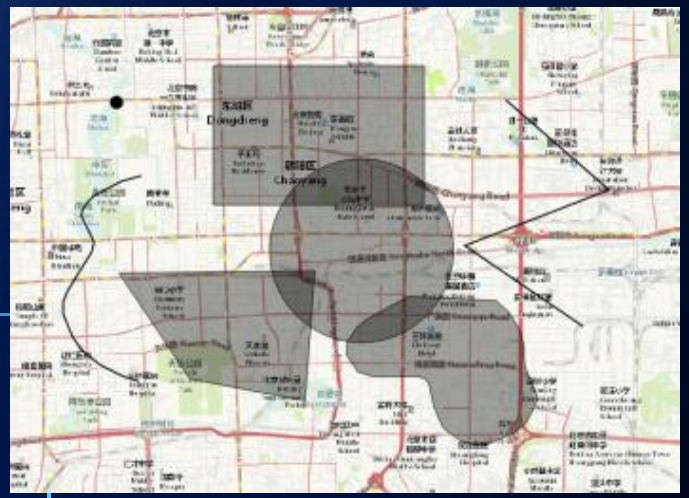
演示：处理手势



处理手势

Constructor Summary

	MapOnTouchListener(android.content.Context context, MapView view) Instantiates an object of MapOnTouchListener with the activity context and the MapView.

Method Summary

boolean	onDoubleTap(android.view.MotionEvent point) Notified when a single-pointer-double-tap gesture occurs.
boolean	onDragPointerMove(android.view.MotionEvent from, android.view.MotionEvent to) Notified when a part of a single touch drag gesture event occurs.
boolean	onDragPointerUp(android.view.MotionEvent from, android.view.MotionEvent to) Notified when a part of a single-touch-drag gesture event occurs.
void	onLongPress(android.view.MotionEvent point) Notified when a long-press gesture occurs.
void	onMultiPointersSingleTap(android.view.MotionEvent event) Notified when a two-pointers-single-tap gesture occurs.
boolean	onPinchPointersDown(android.view.MotionEvent event) Notified when a part of a pinch gesture occurs.
boolean	onPinchPointersMove(android.view.MotionEvent event) Notified when a part of a pinch gesture occurs.
boolean	onPinchPointersUp(android.view.MotionEvent event) Notified when a part of a pinch gesture occurs.
boolean	onSingleTap(android.view.MotionEvent point) Notified when a single-pointer-single-tap gesture occurs.
boolean	onTouch(android.view.View v, android.view.MotionEvent event) Called when a touch event is dispatched to a view.

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处理手势

扩展MapOnTouchListener

```
// 扩展MapOnTouchListener，实现画图功能
class DrawTouchListener extends MapOnTouchListener
```

Override相应方法

```
public boolean onSingleTap(MotionEvent event) {
    if (active /*符合业务逻辑*/) {
        //处理业务逻辑
        return true;
    }
    return false;
}
```

MapView set Listener

```
drawListener = new DrawTouchListener(mapView.getContext(),
        mapView);
mapView.setOnTouchListener(drawListener);
```

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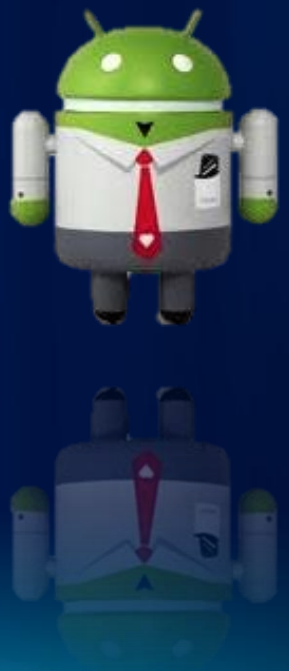
更多的功能…

- Symbol
- Geocede
- GPS
- Identify
- Feature Edit
- Geoprocessing
- Bing Geocode



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Demo：动态标绘

移动开发技术选择

Why Android ?

- 开放、可定制
- 支持多种设备
- 稳定发展的客户群
- 强大的自带API

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移动开发技术选择

- ArcGIS for Android
- ArcGIS for IOS
- ArcGIS for Windows Phone
- ArcGIS for Mobile

- Flex AIR for Mobile

现有设备　　特殊功能

客户需求　　技术储备　　用户群体

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更多资源

Android Developers：http://developer.android.com

ArcGIS for Android： http://resources.arcgis.com/content/arcgis-android

Esri中国社区 ： http://bbs.esrichina-bj.cn/ESRI

新浪微博 ArcGIS_Mobile： http://weibo.com/arcgismobiles

ArcGIS Online中国： http://www.arcgisonline.cn

ArcGIS 4 Android QQ群：167467748

个人博客： http://blog.csdn.net/GISpace

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ArcGIS在线体验中心(原群英萃)

在线体验

视频中心

地图长廊

资源下载

知识中心

虚拟课堂

http://tm.esrichina-bj.cn

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