NAVIGATION

TYPE OF NAVIGATIONS

- Two main types of navigation
- Intra application navigation (via nav graph)
- Inter application navigation (via Intents)

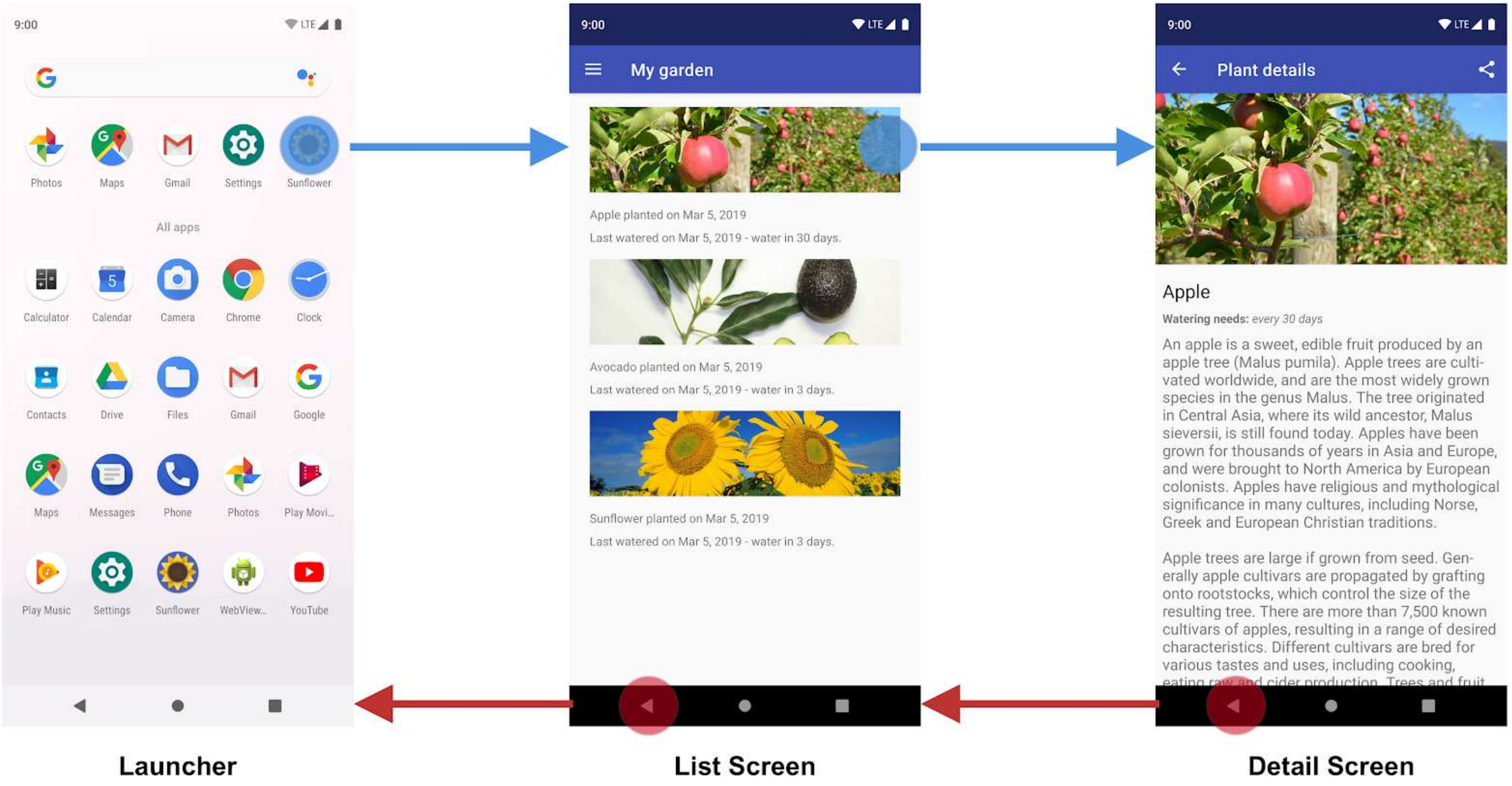
MAIN NATIGATION PATTERNS

- **Forward navigation** refers to moving between screens at consecutive levels of hierarchy

- **Reverse/backward navigation** refers to moving backwards through screens either chronologically (within one app or across different apps) or hierarchically (within an app).

- **Lateral navigation** refers to moving between screens at the same level of hierarchy.

EXAMPLE OF FORWARD/BACKWARD NAVIGATION



Apple planted on Mar 5, 2019

Last watered on Mar 5, 2019 - water in 30 days.

Avocado planted on Mar 5, 2019

Last watered on Mar 5, 2019 - water in 3 days.

Sunflower planted on Mar 5, 2019

Last watered on Mar 5, 2019 - water in 3 days.

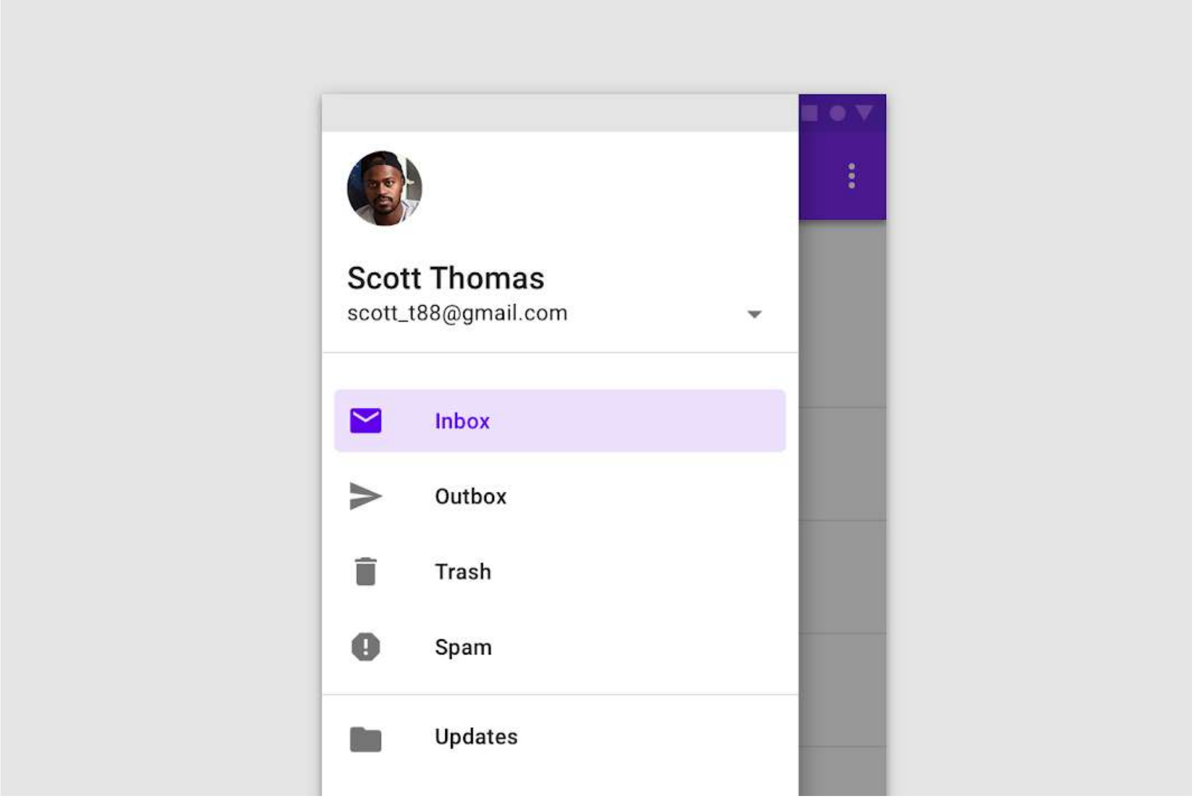
Apple

Watering needs: *every 30 days*

An apple is a sweet, edible fruit produced by an apple tree (Malus pumila). Apple trees are cultivated worldwide, and are the most widely grown species in the genus Malus. The tree originated in Central Asia, where its wild ancestor, Malus sieversii, is still found today. Apples have been grown for thousands of years in Asia and Europe, and were brought to North America by European colonists. Apples have religious and mythological significance in many cultures, including Norse, Greek and European Christian traditions.

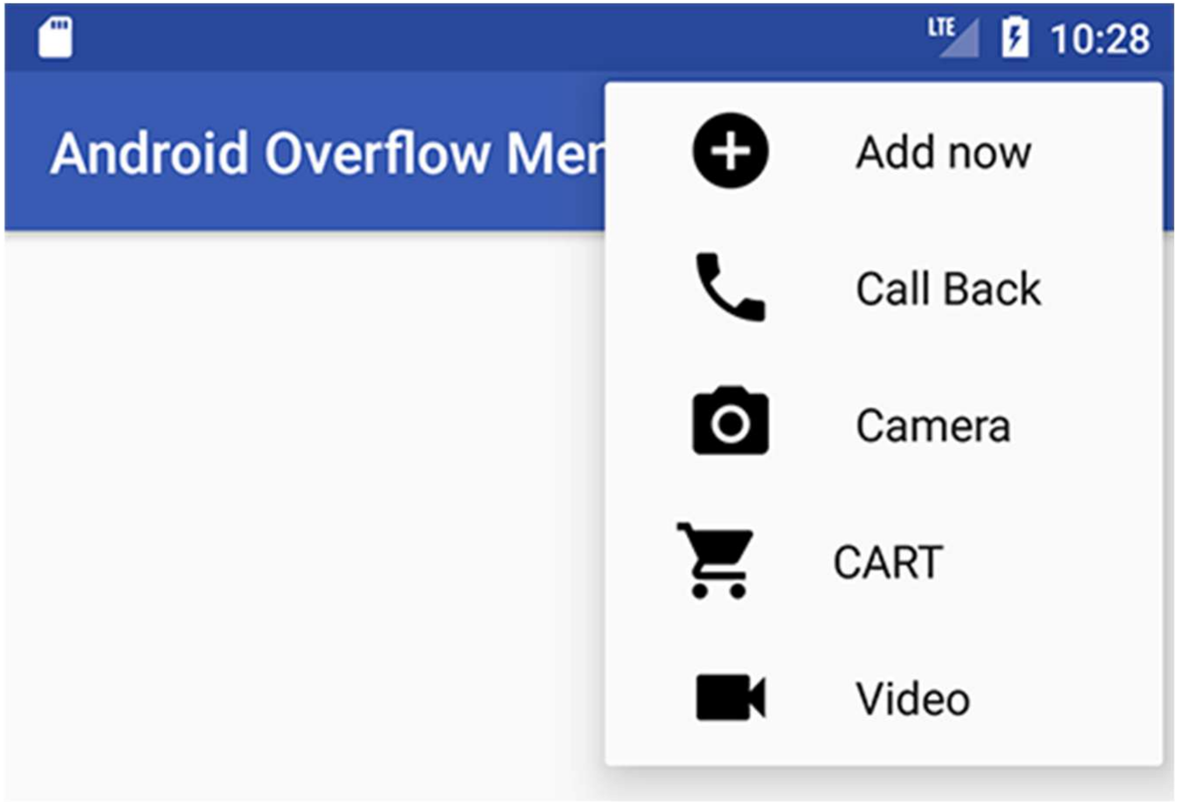
Apple trees are large if grown from seed. Generally apple cultivars are propagated by grafting onto rootstocks, which control the size of the resulting tree. There are more than 7,500 known cultivars of apples, resulting in a range of desired characteristics. Different cultivars are bred for various tastes and uses, including cooking, eating raw and cider production. Trees and fruit

LATERAL NAVIGATION: NAVIGATION DRAWER

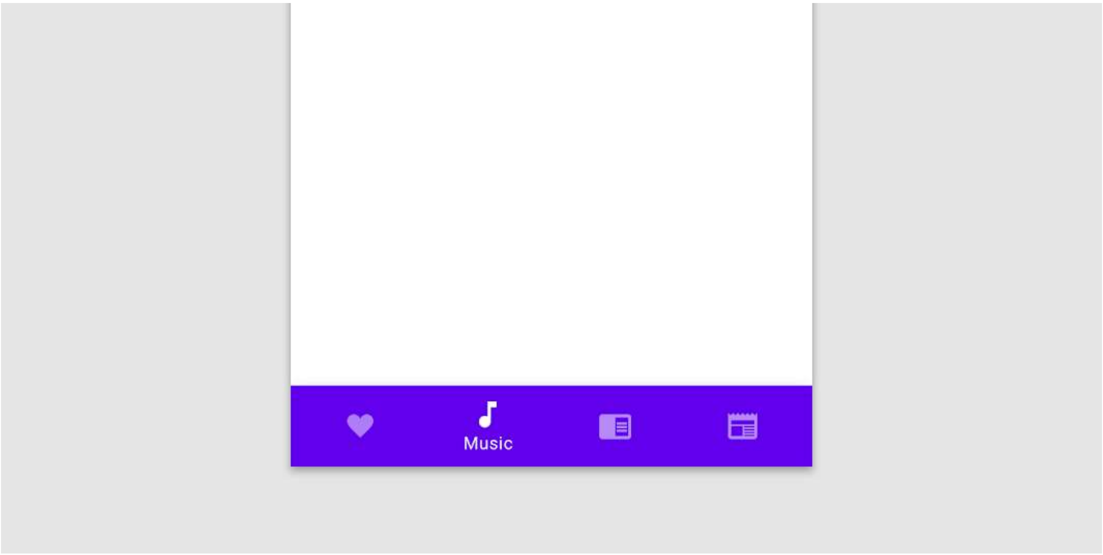


At least 5 destinations

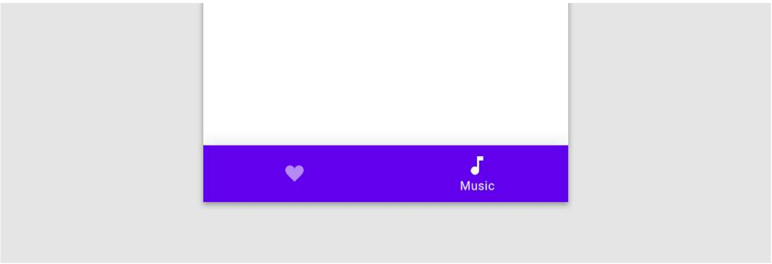
LATERAL NAVIGATION: MENU NAVIGATION



LATERAL NAVIGATION: BOTTOM NAVIGATION

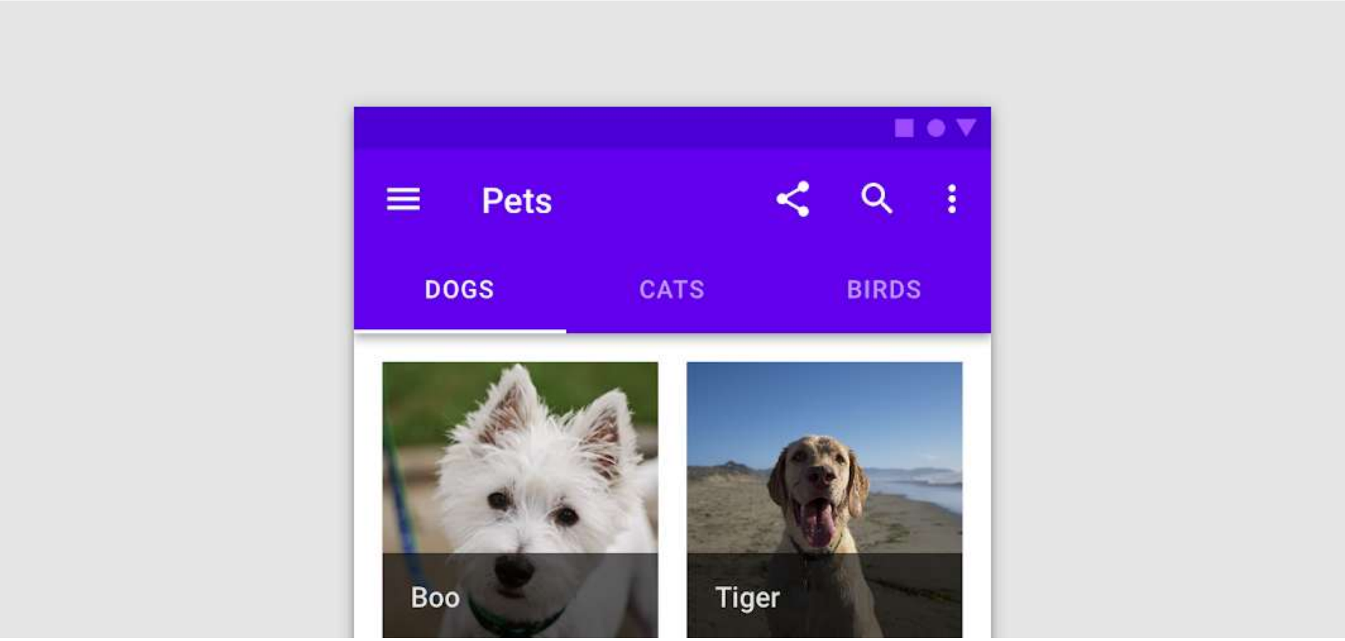


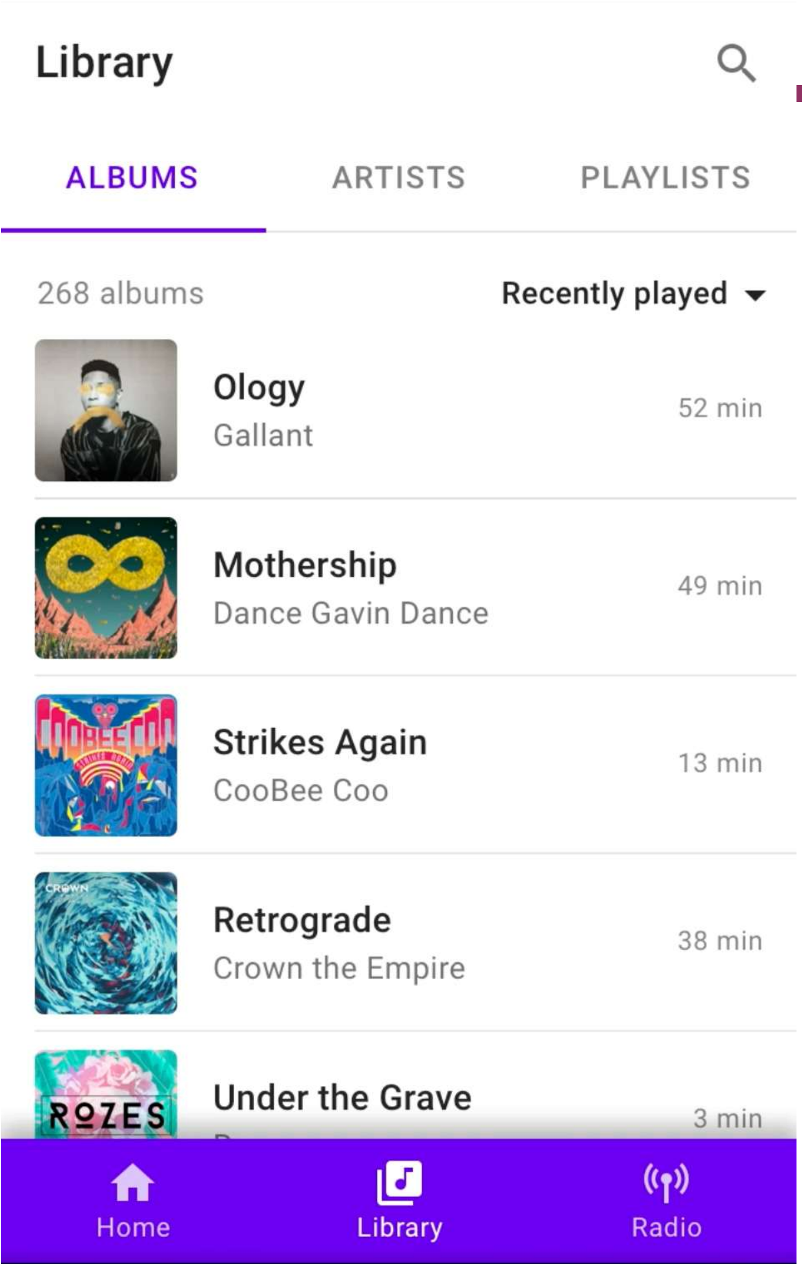
3-4 destinations



Doesn’t look nice

LATERAL NAVIGATION: TAB NAVIGATION





Library

268 albums

Recently played

Ology
Gallant
52 min

Mothership
Dance Gavin Dance
49 min

Strikes Again
CooBee Coo
13 min

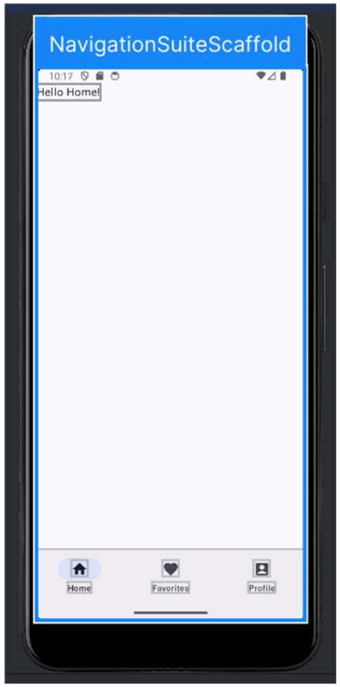
Retrograde
Crown the Empire
38 min

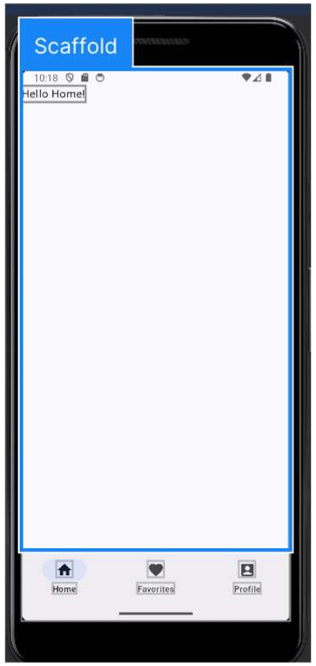
Under the Grave
3 min

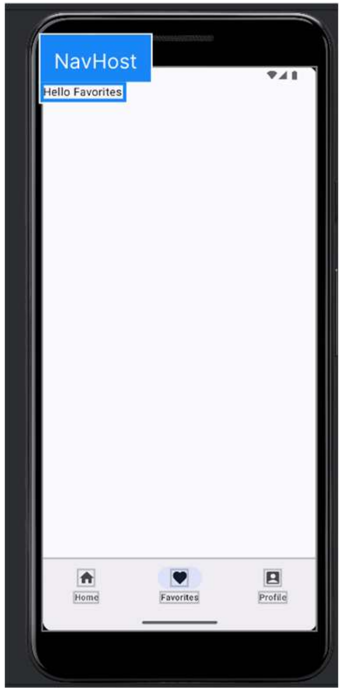
UI DESIGN

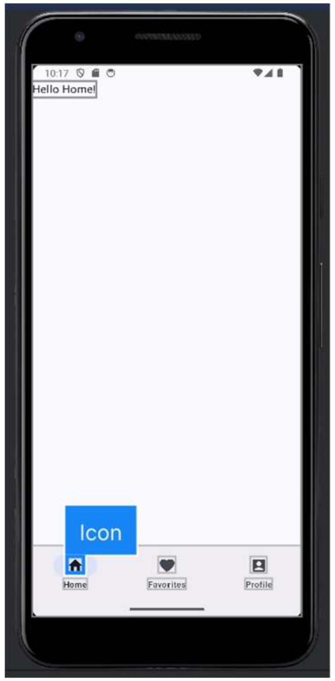
- Refer to https://developer.android.com/design/ui/mobile for a guide on UI design

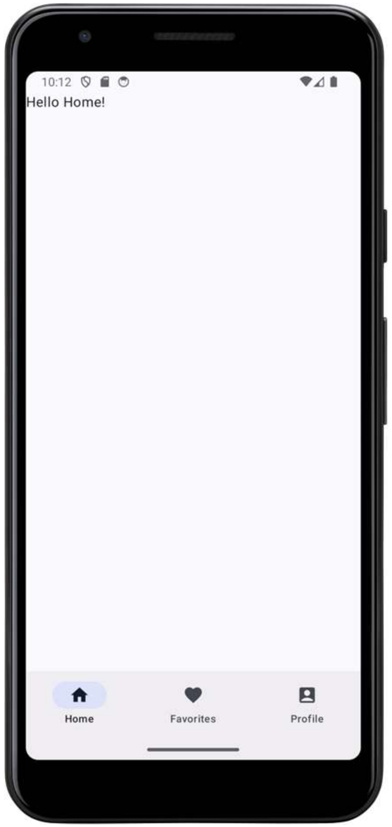
EXAMPLE











(see layout inspector)

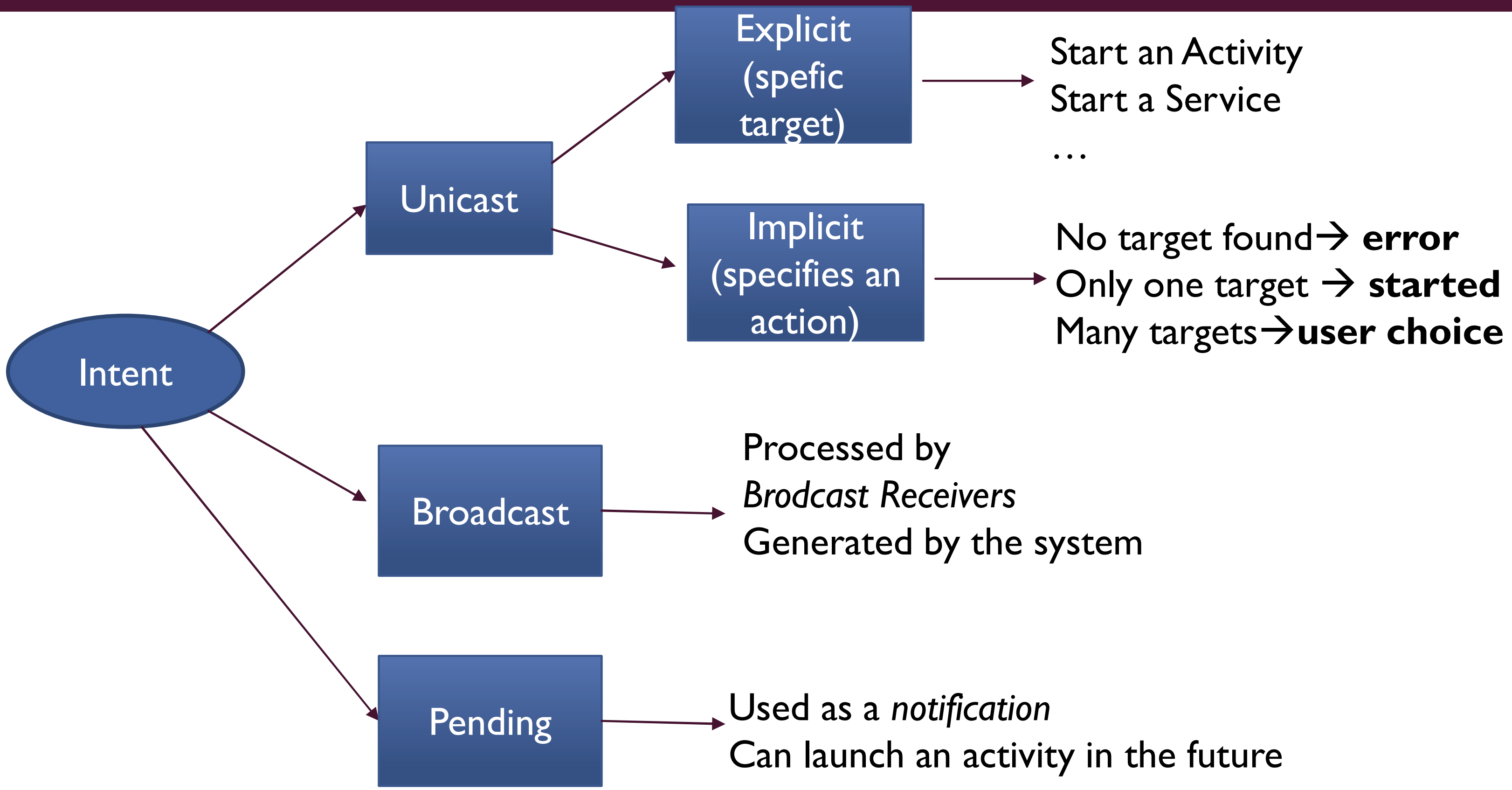
INTENTS

- An intents is like a messages that activates another software component
- It has a **target** and a **body** (containing data and metadata)
- An intent may also describe an abstract description of an operation to be performed, called **action** and additional information about the type of action (**category**)
  - Intent.ACTION_VIEW, Intent.ACTION_SEND
  - CATEGORY_LAUNCHER

INTENTS

- An intent can be
- **explicit** when the target of the intent is declared inside the intent
- **implicit** : the intent just specifies the *action* the component should provide
- Software components declare the action they can perform inside their **intent-filters** tag in the manifest file
- An intent can also be **pending**, meaning that some component will be activated in the future (e.g., notification)
- It can be **broadcast** when it announces something to all (see broadcast receivers)

INTENTS: CLASSIFICATION



Intent

Unicast

Explicit (spefic target)

Start an Activity
Start a Service
…

Implicit (specifies an action)

No target found→ **error**
Only one target → **started**
Many targets→**user choice**

Broadcast

Processed by
Brodcast Receivers
Generated by the system

Pending

Used as a *notification*
Can launch an activity in the future

INTENT FIELDS (PRIMARY ATTRIBUTES)

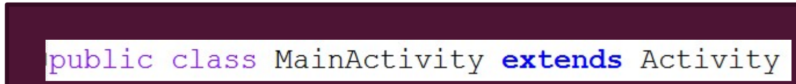
- Action:
  - a string representing the operation
    - For example: «**android.intent.action.MAIN**» (if it goes in the manifest file)
    - Referred symbolically in the code as **Intent.ACTION_MAIN**

- Data:
  - A URI that references data to operate on (*scheme://authority/path*)
    - For example: ***content://contacts/people/1*** → Display information about the person whose identifier is "1"

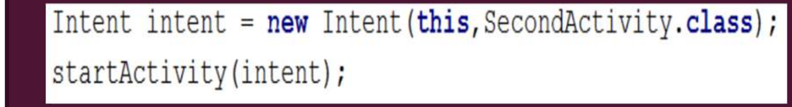
INTENT FIELDS (SECONDARY ATTRIBUTES)

- Category:
  - A string representing additional information about the component that can manage the intent
    - For example: «**android.intent.category.LAUNCHER**»
    - Symbolically ad **Intent.CATEGORY_LAUNCHER**
- Type:
  - Specicies the MIME type of the intent data
- Component
  - The name of the component to start (used when the component that can handle the intent is known).
- Extras
  - Key-value pairs (i.e., a bundle) to carry additional information required to perform the requested action
    - For example, if the action it to send an e-mail message, one could also include extra pieces of data here to supply a subject, body, etc.

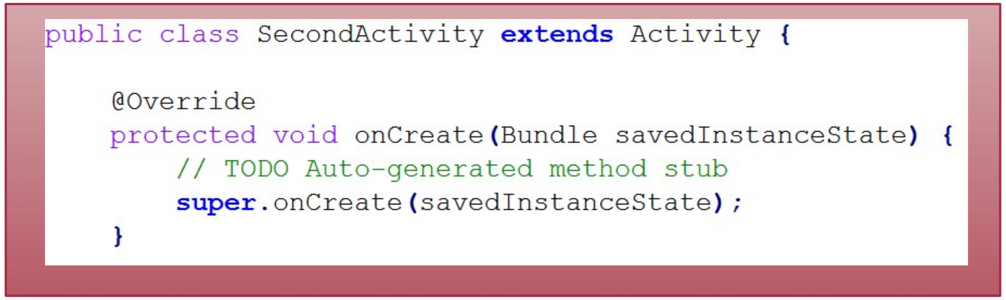
EXAMPLE



```
public class MainActivity extends Activity
```



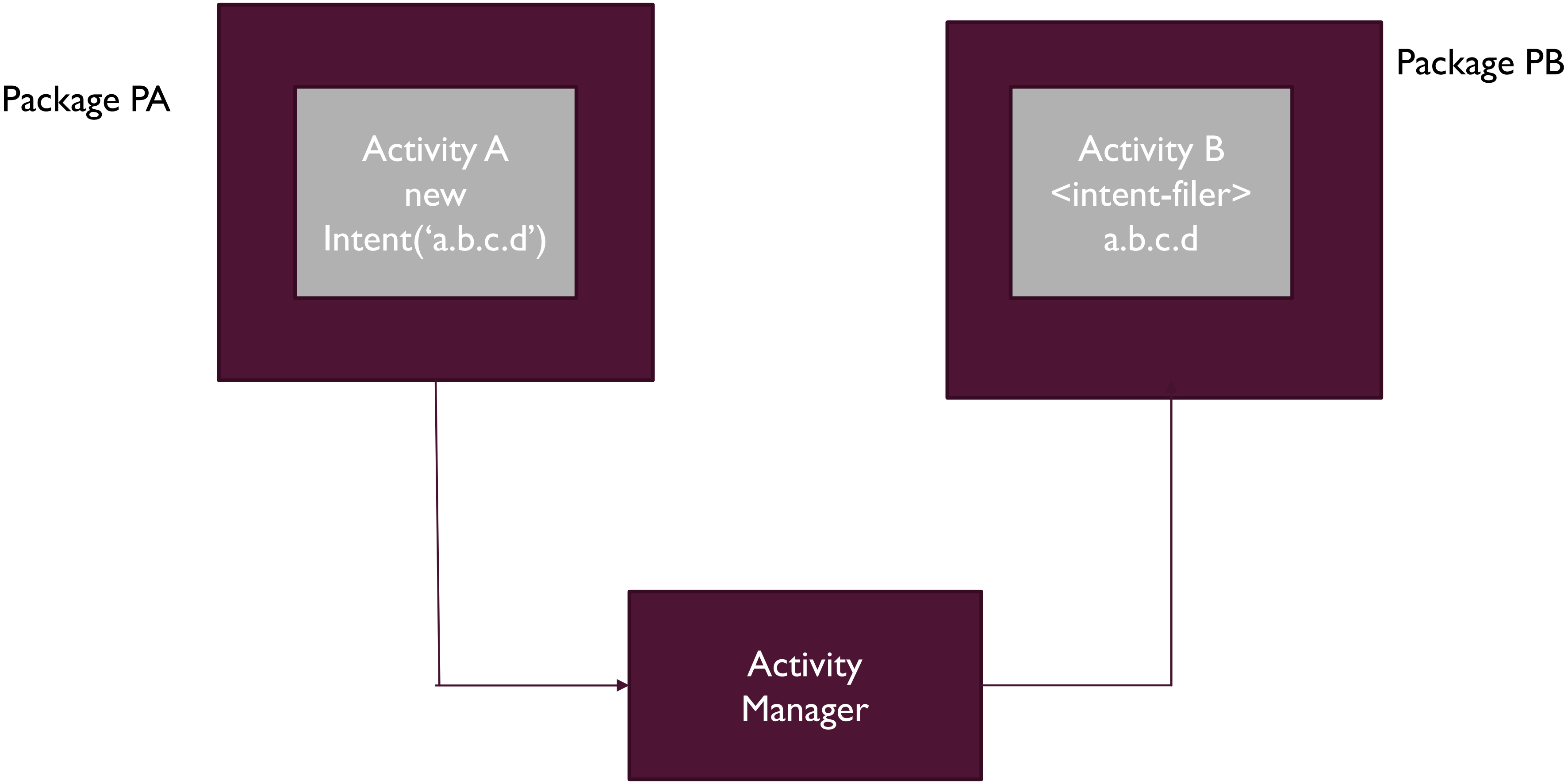
```
Intent intent = new Intent(this,SecondActivity.class);
startActivity(intent);
```



```
public class SecondActivity extends Activity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        // TODO Auto-generated method stub
        super.onCreate(savedInstanceState);
    }
```

STARTING AN ACTIVITY IN ANOTHER PACKAGE



Package PA

Activity A
new
Intent('a.b.c.d')

Package PB

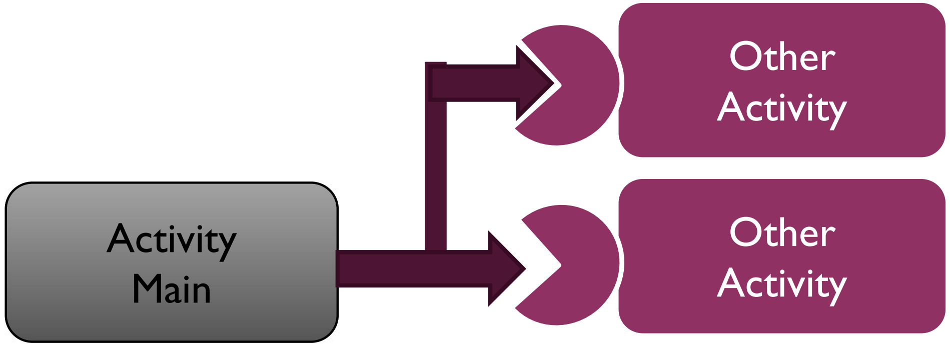
Activity B
<intent-filer>
a.b.c.d

Activity
Manager

IMPLICIT INTENTS

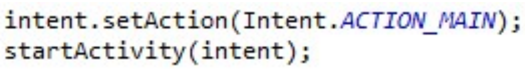
- The Intent doesn't specify the Activity to start, but only an "Action"
- There are several predefined actions in the 'system' to choose from

- A user can define its own action as well
- Intents declares their ability to perform actions in the manifest file

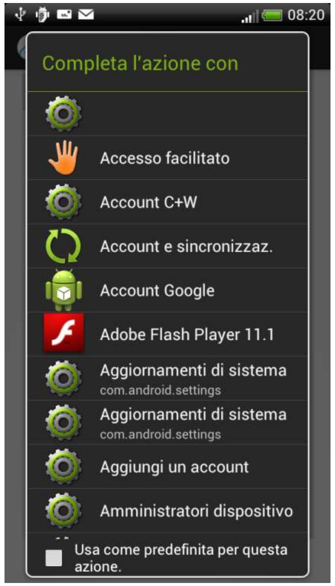


EXAMPLE

- In this example, the system proposes all the installed application that declares to be able to respond to the MAIN action



```
intent.setAction(Intent.ACTION_MAIN);
startActivity(intent);
```



08:20

Completa l'azione con

Accesso facilitato

Account C+W

Account e sincronizzaz.

Account Google

Adobe Flash Player 11.1

Aggiornamenti di sistema
com.android.settings

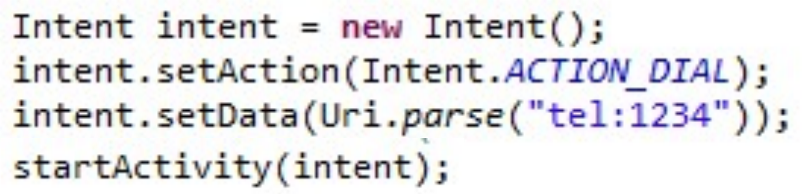
Aggiornamenti di sistema
com.android.settings

Aggiungi un account

Amministratori dispositivo

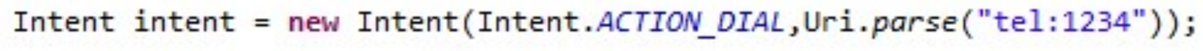
□ Usa come predefinita per questa azione.

EXAMPLE: PLACING A CALL

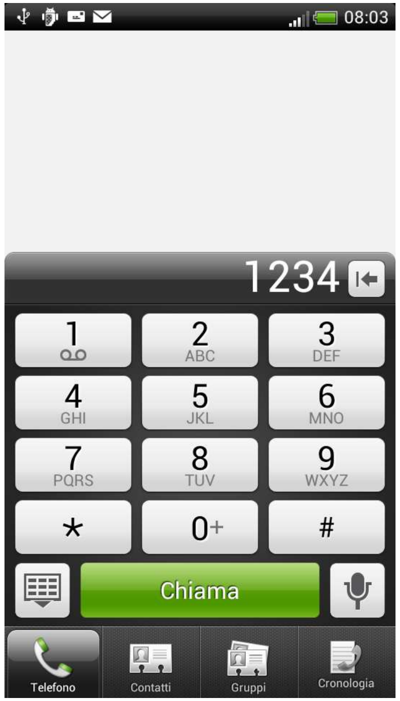


```
Intent intent = new Intent();
intent.setAction(Intent.ACTION_DIAL);
intent.setData(Uri.parse("tel:1234"));
startActivity(intent);
```

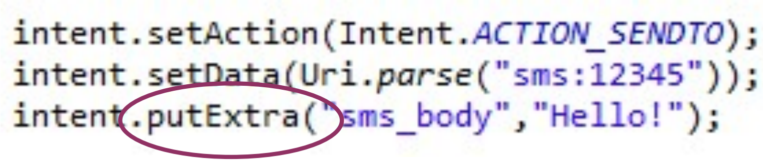
Same as



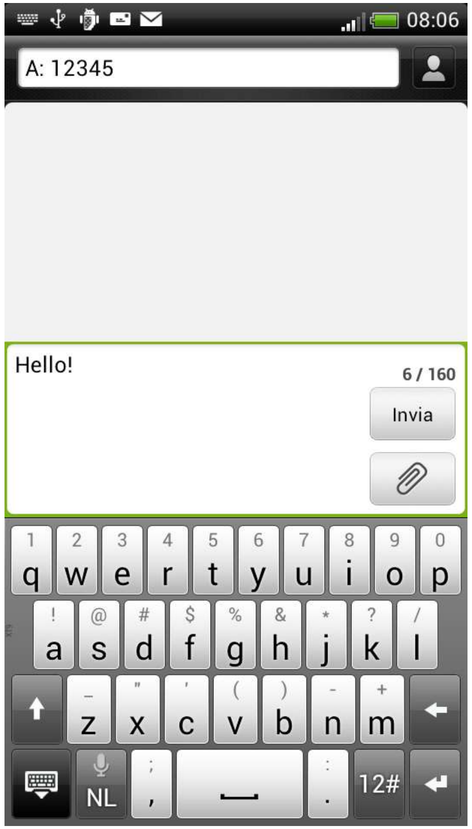
```
Intent intent = new Intent(Intent.ACTION_DIAL,Uri.parse("tel:1234"));
```



EXAMPLE: SENDING SMS



```
intent.setAction(Intent.ACTION_SENDTO);
intent.setData(Uri.parse("sms:12345"));
intent.putExtra("sms_body","Hello!");
```

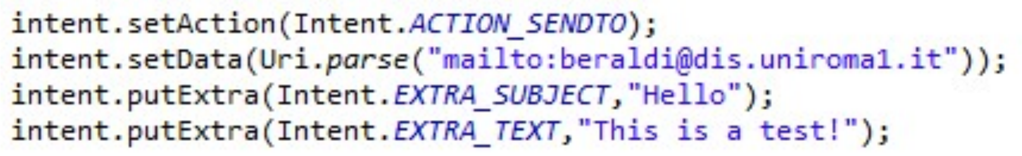


A: 12345

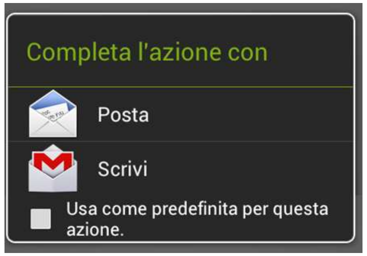
Hello!

6 / 160

EXAMPLE: SENDING AN EMAIL



```
intent.setAction(Intent.ACTION_SENDTO);
intent.setData(Uri.parse("mailto:beraldi@dis.uniroma1.it"));
intent.putExtra(Intent.EXTRA_SUBJECT,"Hello");
intent.putExtra(Intent.EXTRA_TEXT,"This is a test!");
```

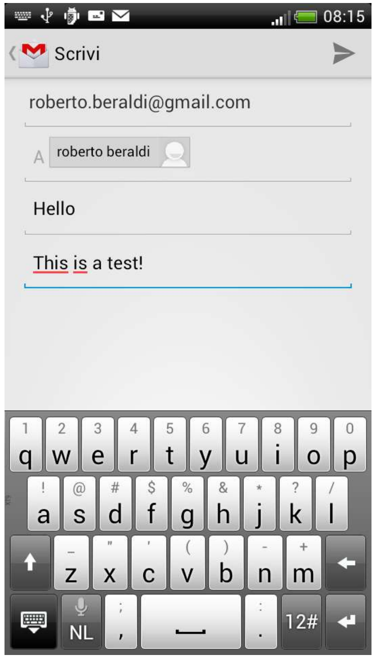


Completa l'azione con

Posta

Scrivi

□ Usa come predefinita per questa azione.



roberto.beraldi@gmail.com

A roberto beraldi

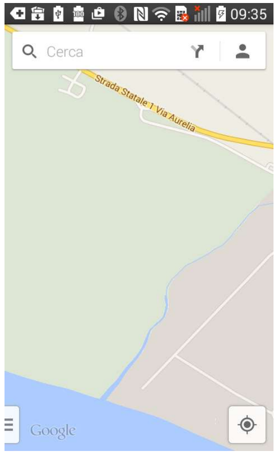
Hello

This is a test!

- The are two activities in the device that can perform the action
- The user needs to select one
- Can set the choice as the default

EXAMPLE: USING MAPS

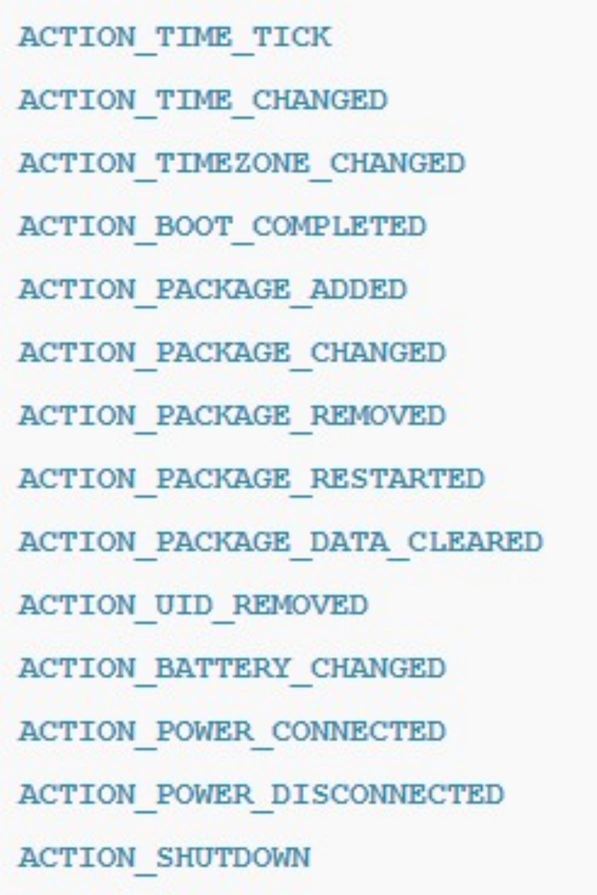
- intent.setAction(Intent.ACTION_VIEW);intent.setData(Uri.parse("**geo:42,12**"));
- intent.setAction(Intent.ACTION_VIEW);intent.setData(Uri.parse("**http://maps.google.com/maps?sadd=42.12,10.2&daddr=42.12,10.11**"));



PENDINGINTENTS

- They specify an action to take in the future
- The application that will execute that Intent will have the same permissions as the sending application, whether or not such application is still around when the Intent is eventually invoked.
- For example, used in notification

BROADCAST INTENTS AND RECEIVERS



```
ACTION_TIME_TICK
ACTION_TIME_CHANGED
ACTION_TIMEZONE_CHANGED
ACTION_BOOT_COMPLETED
ACTION_PACKAGE_ADDED
ACTION_PACKAGE_CHANGED
ACTION_PACKAGE_REMOVED
ACTION_PACKAGE_RESTARTED
ACTION_PACKAGE_DATA_CLEARED
ACTION_UID_REMOVED
ACTION_BATTERY_CHANGED
ACTION_POWER_CONNECTED
ACTION_POWER_DISCONNECTED
ACTION_SHUTDOWN
```

- Broadcast receiver: component that reacts to system-wide events
- The action specifies that an event is occurred

- A receiver has to register to specific intents
- For example: BOOT_COMPLETED