


Android Components
Introduction to Android Smartphone Programming

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Outline

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- 1 Data Storage
- 2 Messages to the User
- 3 Background Work
- 4 App Widgets
- 5 Useful Widgets
- 6 Summary

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Data Storage

Database

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- Many ways to store data of the application.
- Android provides support for SQLite databases^[3].
- Accessible for every class inside the application.
- No possibility to access from outside of application.
- Use *Cursor* object to loop through data inside the database.
- Easy to display cursor data inside an activity by creating an adapter and binding it to the activity, for example *ListAdapter* for *ListView*.

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Data Storage

Example: Creating and filling a table
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- Use method `execSQL` to execute one SQL statement.
- Exceptions: Do not use a `SELECT` statement or one that returns data.

```
1 try {
2     SQLiteDatabase db = openOrCreateDatabase("
3         myDB", MODE_PRIVATE, null);
4     db.execSQL("CREATE TABLE IF NOT EXISTS
5         myTable (Driver TEXT, Team TEXT);");
6     db.execSQL("INSERT OR IGNORE INTO myTable
7         VALUES ('Glock', 'Toyota');");
8     ...
9 }
```



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Data Storage

Examples
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- Creation of Cursor object to access data from database

```
1 Cursor SQLiteDatabase.query(boolean distinct,
2     String table, String[] columns, String
3     selection, String[] selectionArgs, String
4     groupBy, String having, String orderBy,
5     String limit)
```

- Example

```
1 Cursor c = db.query(true, "myDB", values, null,
2     null, null, null, null, null);
```



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Example: Accessing data from a table
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```
1 try {
2     Cursor c = ...
3     c.moveToFirst();
4     String driverStr = c.getString(c.
5         getColumnIndexOrThrow("Driver"));
6     String teamStr = c.getString(c.
7         getColumnIndexOrThrow("Team"));
8     c.moveToNext();
9     ...
10 }
```



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Data Storage

Content Provider
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- Mostly used to share data between applications[2].
- Many predefined Content Providers available, for example to access phone contacts.
- Provide mechanisms to define data security.
- Access of data through content URI.
 - Example: `people.CONTENT_URI` to access the phone contacts.



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Example: Usage of a Content Provider
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```
1 String[] proj = new String[] {People._ID,
2   People.NAME, People.NUMBER};
3 try {
4   Cursor c = managedQuery(People.CONTENT_URI,
5     proj, null, null, null);
6   if (c == null) return;
7   int name = c.getColumnIndexOrThrow(People.
8     NAME);
9   if (!c.moveToFirst()) return;
10  String nameString = c.getString(name);
11  ...
12 }
```



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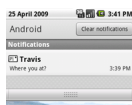
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Messages to the User

Status Bar Notifications
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- Can be created using the `Notification` class.
- Adds an icon to the status bar and a message in the notifications window of the system[5].
- Used to notify the user about an event from a background service, not from a visible application.
- Can be selected in the notifications window, which fires a predefined `intent` (message).



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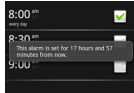
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Messages to the User

Toast Notifications
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- *Toast*: Small message that pops up when shown^[6].
- User's current activity remains visible and interactive.
- Fades in and out.
- Does not provide any means for user interaction.
- Used to display short text messages.



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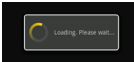
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Messages to the User

Dialog Notifications
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- *Dialog*: Small window that appears in front of current Activity^[4].
- Used for notifications or interaction directly related with the application.
- Example usage scenarios:
 - Display of a progress bar till the application is updated.
 - Display a short message the user needs to confirm with *OK* or *Cancel*.



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Background Work: Services

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- Used to perform long-running operations in background^[7].
- Does not provide a user interface.
- Continues to run even when starting component is not active anymore.
- *Interprocess communication* (IPC) possible for interaction between component and service.
- Used for example for handling network transactions, play music, etc.



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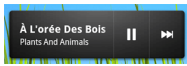
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App Widgets

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- Miniature application view that can be embedded in other application, for example home screen[1].
- Receives periodic updates.
- Example usage: Displaying current song of music player as seen in picture below.



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Useful Widgets

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- *DatePicker* can be used to pick a date including year, month and day.
- *TimePicker* enables the user to specify a time in 24 hour or AM/PM mode.



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Summary

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- Persistent data storage can be archived with *SQLite databases*.
- Data can be shared between different applications using *Content Providers*.
- Messages to the user can be displayed as small text message through a *Toast*, a *Status Bar Notification* from a service or a *Dialog*, if user interaction is required.
- *Services* are used to perform background work.
- *App Widgets* can be placed on the home screen and receive periodic updates.



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