Android Components
Android Smartphone Programming

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Matthias Keil
Institute for Computer Science
Faculty of Engineering
University of Freiburg

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Outline
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6 Summary

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*.

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("
      myDB", MODE_PRIVATE, null);
3   db.execSQL("CREATE TABLE IF NOT EXISTS
      myTable (Driver TEXT,Team TEXT);");
4   db.execSQL("INSERT OR IGNORE INTO myTable
      VALUES ('Glock','Toyota');");
5   ...
6 }
```

Data Storage
Examples
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- Creation of Cursor object to access data from database

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

- Example

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

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

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.
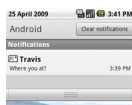 - Example: *people.CONTENT_URI* to access the phone contacts.

Notizen

Data Storage
Example: Usage of a Content Provider
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```
String[] proj = new String[] {People._ID,
    People.NAME, People.NUMBER};
try {
  Cursor c = managedQuery(People.CONTENT_URI,
      proj, null, null, null);
  if (c == null) return;
  int name = c.getColumnIndexOrThrow(People.
      NAME);
  if (!c.moveToFirst()) return;
  String nameString = c.getString(name);
  ...
}
```

Notizen

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.
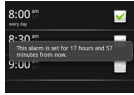- Can be selected in the notifications window, which fires a predefined *intent* (message).

Notizen

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.
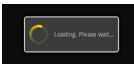- Used to display short text messages.

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*.

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.
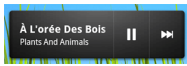- Used for example for handling network transactions, play music, etc.

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.

À L'orée Des Bois
Plants And Animals

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.

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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