CS/SE Individual Practical

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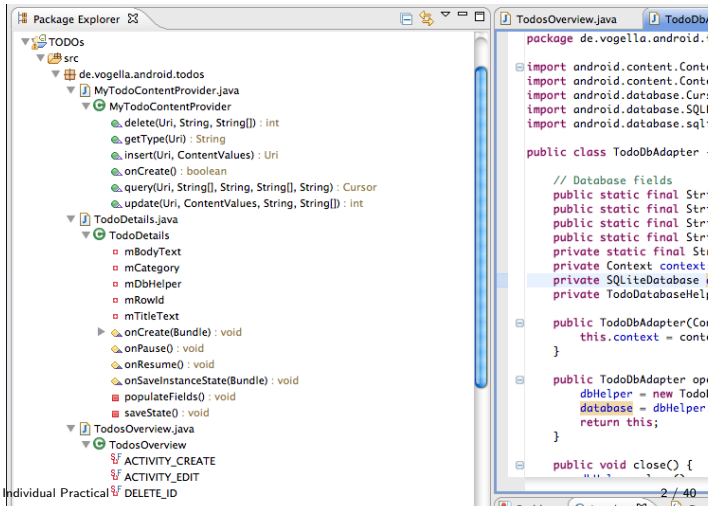
A database example Running the application TODOs application code Inspecting the database Using LogCat

Lars Vogel example: TODOs



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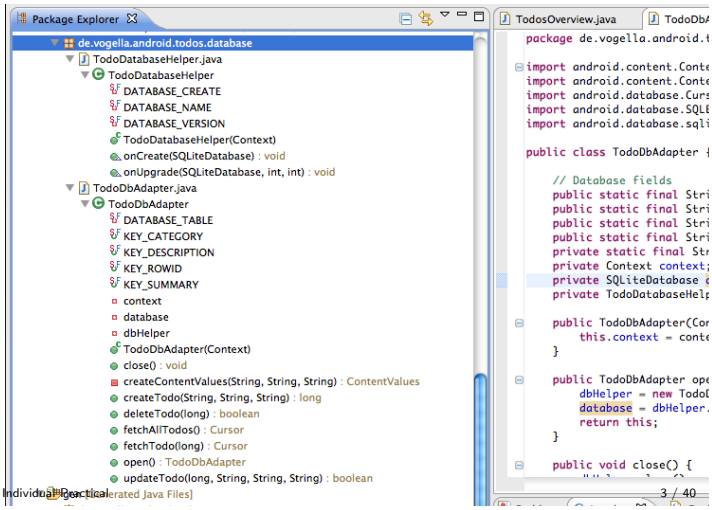
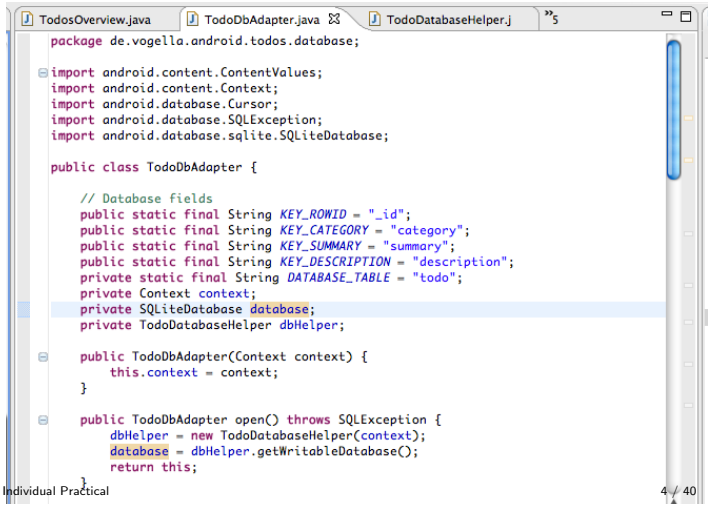
A database example



TodoDatabaseAdapter



A database example Running the application TODOs application code Inspecting the database Using LogCat

TodoDatabaseHelper (`onCreate()`)

```
package de.vogella.android.todos.database;

import android.content.Context;
import android.database.sqlite.SQLiteDatabase;
import android.database.sqlite.SQLiteOpenHelper;
import android.util.Log;

public class TodoDatabaseHelper extends SQLiteOpenHelper {
    private static final String DATABASE_NAME = "applicationdata";

    private static final int DATABASE_VERSION = 1;

    // Database creation sql statement
    private static final String DATABASE_CREATE = "create table todo (_id integer primary key autoincrement, "
            + "category text not null, summary text not null, description text not null);";

    public TodoDatabaseHelper(Context context) {
        super(context, DATABASE_NAME, null, DATABASE_VERSION);
    }

    // Method is called during creation of the database
    @Override
    public void onCreate(SQLiteDatabase database) {
        database.execSQL(DATABASE_CREATE);
    }

    // Method is called during an upgrade of the database, e.g. if you increase
    // the database version
    @Override
    public void onUpgrade(SQLiteDatabase database, int oldVersion,
            int newVersion) {
        Log.w(TodoDatabaseHelper.class.getName(),
                "Upgrading database from version " + oldVersion + " to "
                        + newVersion + ", which will destroy all old data");
        database.execSQL("DROP TABLE IF EXISTS todo");
        onCreate(database);
    }
}
```

Table "todo" has columns _id, category, summary, and description

TodoDatabaseHelper (`onUpgrade()`)

```
public class TodoDatabaseHelper extends SQLiteOpenHelper {
    private static final String DATABASE_NAME = "applicationdata";

    private static final int DATABASE_VERSION = 1;

    // Database creation sql statement
    private static final String DATABASE_CREATE = "create table todo (_id integer primary key autoincrement, "
            + "category text not null, summary text not null, description text not null);";

    public TodoDatabaseHelper(Context context) {
        super(context, DATABASE_NAME, null, DATABASE_VERSION);
    }

    // Method is called during creation of the database
    @Override
    public void onCreate(SQLiteDatabase database) {
        database.execSQL(DATABASE_CREATE);
    }

    // Method is called during an upgrade of the database, e.g. if you increase
    // the database version
    @Override
    public void onUpgrade(SQLiteDatabase database, int oldVersion,
            int newVersion) {
        Log.w(TodoDatabaseHelper.class.getName(),
                "Upgrading database from version " + oldVersion + " to "
                        + newVersion + ", which will destroy all old data");
        database.execSQL("DROP TABLE IF EXISTS todo");
        onCreate(database);
    }
}
```

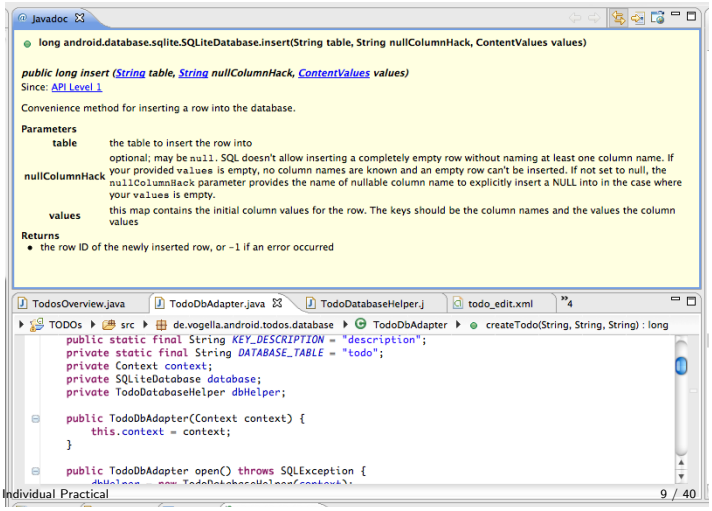
TodoDatabaseAdapter (`open()`, `close()`)

```
package de.vogella.android.todos.database;

import android.content.ContentValues;
import android.content.Context;
import android.database.Cursor;
import android.database.SQLException;
import android.database.sqlite.SQLiteDatabase;

public class TodoDbAdapter {

    // Database fields
    public static final String KEY_ROWID = "_id";
    public static final String KEY_CATEGORY = "category";
    public static final String KEY_SUMMARY = "summary";
    public static final String KEY_DESCRIPTION = "description";
    private static final String DATABASE_TABLE = "todo";
    private Context context;
    private SQLiteDatabase database;
    private TodoDatabaseHelper dbHelper;

    public TodoDbAdapter(Context context) {
        this.context = context;
    }

    public TodoDbAdapter open() throws SQLException {
        dbHelper = new TodoDatabaseHelper(context);
        database = dbHelper.getWritableDatabase();
        return this;
    }

    public void close() {
        dbHelper.close();
    }

    /**
     * Create a new todo If the todo is successfully created return the new
     * rowId for that note, otherwise return a -1 to indicate failure.
```

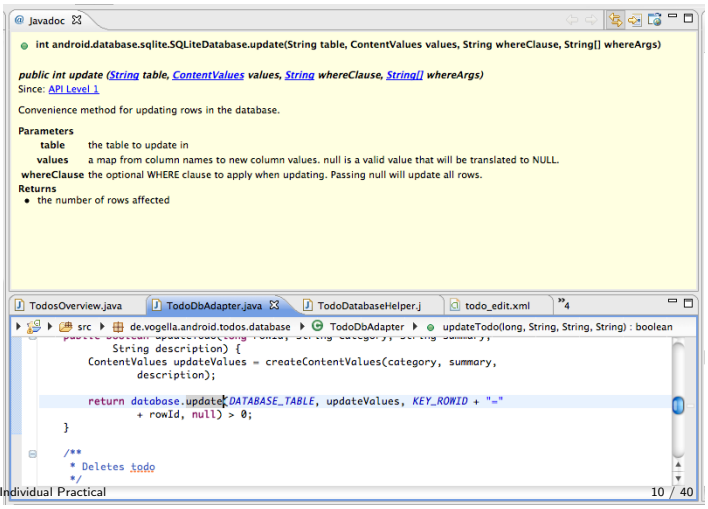

The create, update, and delete methods

```
    /**
     * Create a new todo If the todo is successfully created return the new
     * rowId for that note, otherwise return a -1 to indicate failure.
     */
    public long createTodo(String category, String summary, String description) {
        ContentValues initialValues = createContentValues(category, summary,
                description);

        return database.insert(DATABASE_TABLE, null, initialValues);
    }

    /**
     * Update the todo
     */
    public boolean updateTodo(long rowId, String category, String summary,
            String description) {
        ContentValues updateValues = createContentValues(category, summary,
                description);

        return database.update(DATABASE_TABLE, updateValues, KEY_ROWID + "="
                + rowId, null) > 0;
    }

    /**
     * Deletes todo
     */
    public boolean deleteTodo(long rowId) {
        return database.delete(DATABASE_TABLE, KEY_ROWID + "=" + rowId, null) > 0;
    }

    /**
     * Return a Cursor over the list of all todo in the database
     *
     * @return Cursor over all notes
```

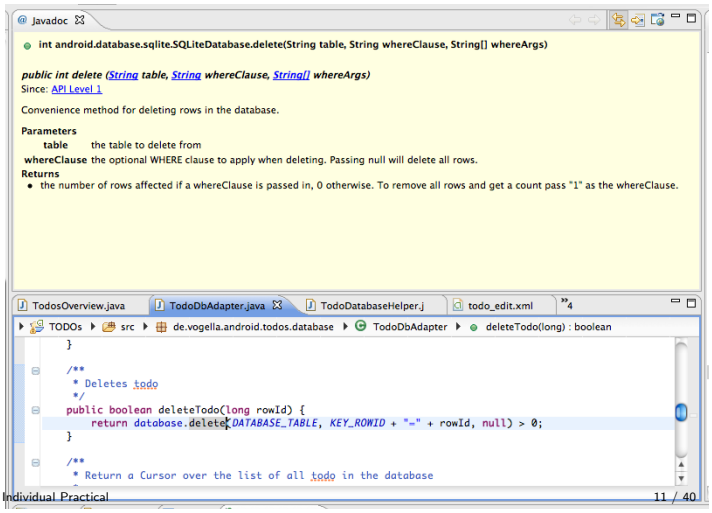

The `insert()` method



The `update()` method



The `delete()` method



Fetch data

```
    /**
     * Return a Cursor over the list of all todo in the database
     *
     * @return Cursor over all notes
     */
    public Cursor fetchAllTodos() {
        return database.query(DATABASE_TABLE, new String[] { KEY_ROWID,
                KEY_CATEGORY, KEY_SUMMARY, KEY_DESCRIPTION }, null, null, null,
                null, null);
    }

    /**
     * Return a Cursor positioned at the defined todo
     */
    public Cursor fetchTodo(long rowId) throws SQLException {
        Cursor mCursor = database.query(true, DATABASE_TABLE, new String[] {
                KEY_ROWID, KEY_CATEGORY, KEY_SUMMARY, KEY_DESCRIPTION },
                KEY_ROWID + "=" + rowId, null, null, null, null, null);
        if (mCursor != null) {
            mCursor.moveToFirst();
        }
        return mCursor;
    }

    private ContentValues createContentValues(String category, String summary,
            String description) {
        ContentValues values = new ContentValues();
        values.put(KEY_CATEGORY, category);
        values.put(KEY_SUMMARY, summary);
        values.put(KEY_DESCRIPTION, description);
        return values;
    }
```

Create content values

```
                KEY_CATEGORY, KEY_SUMMARY, KEY_DESCRIPTION }, null, null, null,
                null, null);
    }

    /**
     * Return a Cursor positioned at the defined todo
     */
    public Cursor fetchTodo(long rowId) throws SQLException {
        Cursor mCursor = database.query(true, DATABASE_TABLE, new String[] {
                KEY_ROWID, KEY_CATEGORY, KEY_SUMMARY, KEY_DESCRIPTION },
                KEY_ROWID + "=" + rowId, null, null, null, null, null);
        if (mCursor != null) {
            mCursor.moveToFirst();
        }
        return mCursor;
    }

    private ContentValues createContentValues(String category, String summary,
            String description) {
        ContentValues values = new ContentValues();
        values.put(KEY_CATEGORY, category);
        values.put(KEY_SUMMARY, summary);
        values.put(KEY_DESCRIPTION, description);
        return values;
    }

}
```

roblems @ Javadoc Declaration Console

de.vogella.android.todos.database.TodoDbAdapter

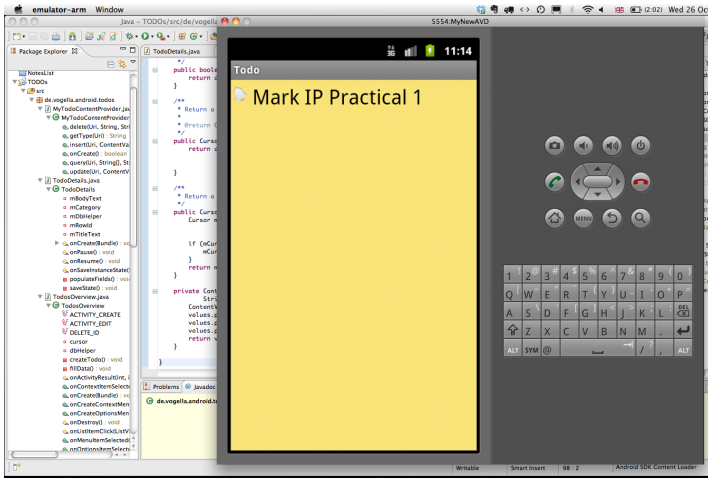
Resources

```
/* AUTO-GENERATED FILE.  DO NOT MODIFY.

package de.vogella.android.todos;

public final class R {
    public static final class array {
        public static final int priorities=0x7f040000;
    }
    public static final class attr {
    }
    public static final class color {
        public static final int black=0x7f060001;
        public static final int listcolor=0x7f060000;
    }
    public static final class drawable {
        public static final int icon=0x7f020000;
        public static final int reminder=0x7f020001;
        public static final int todo=0x7f020002;
    }
    public static final class id {
        public static final int linearLayout01=0x7f080001;
        public static final int TextView01=0x7f080006;
        public static final int category=0x7f080000;
        public static final int icon=0x7f080005;
        public static final int insert=0x7f080008;
        public static final int label=0x7f080007;
        public static final int todo_edit_button=0x7f080004;
        public static final int todo_edit_description=0x7f080003;
        public static final int todo_edit_summary=0x7f080002;
```

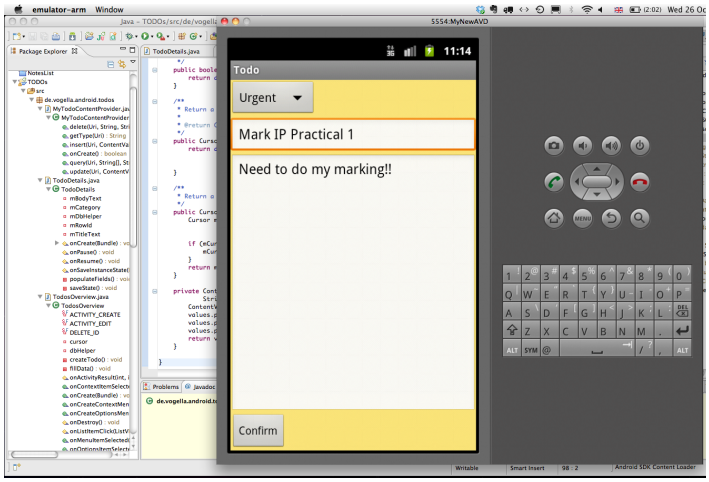
Problems Javadoc Declaration Console

0 errors, 6 warnings, 0 others

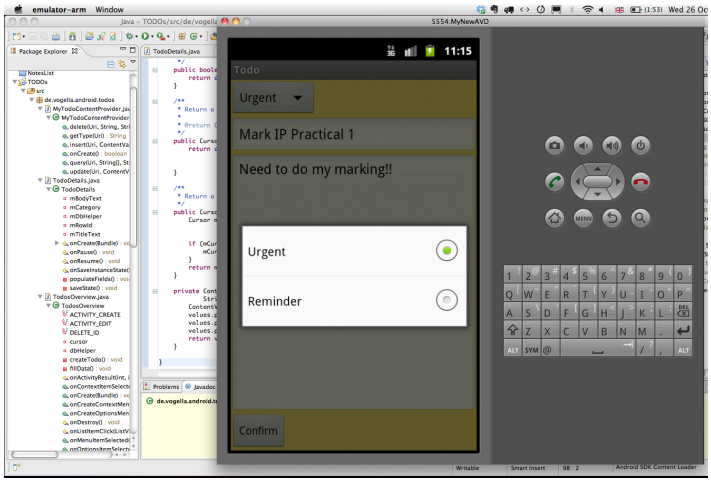
Running the TODOs application



Editing a TODO item



Setting category to “Urgent”



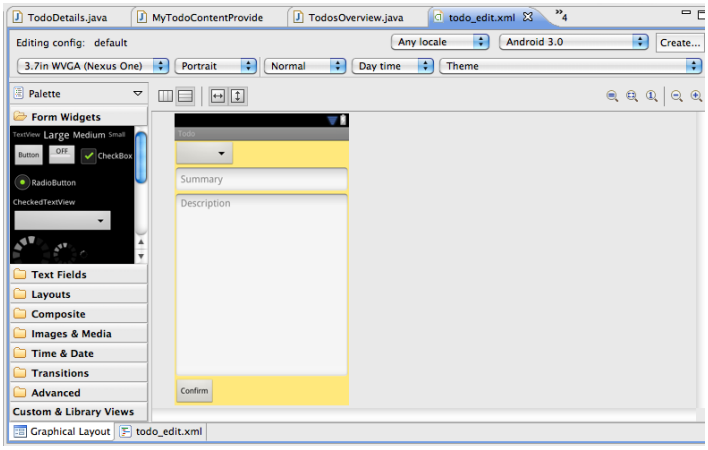
TodoDetails (imports)

```
package de.vogella.android.todos;

import android.app.Activity;
import android.database.Cursor;
import android.os.Bundle;
import android.util.Log;
import android.view.View;
import android.widget.Button;
import android.widget.EditText;
import android.widget.Spinner;
import de.vogella.android.todos.database.TodoDbAdapter;

public class TodoDetails extends Activity {
    private EditText mTitleText;
    private EditText mBodyText;
    private Long mRowId;
    private TodoDbAdapter mDbHelper;
    private Spinner mCategory;

    @Override
    protected void onCreate(Bundle bundle) {
        super.onCreate(bundle);
        mDbHelper = new TodoDbAdapter(this);
        mDbHelper.open();
        setContentView(R.layout.todo_edit);
        mCategory = (Spinner) findViewById(R.id.category);
        mTitleText = (EditText) findViewById(R.id.todo_edit_summary);
```

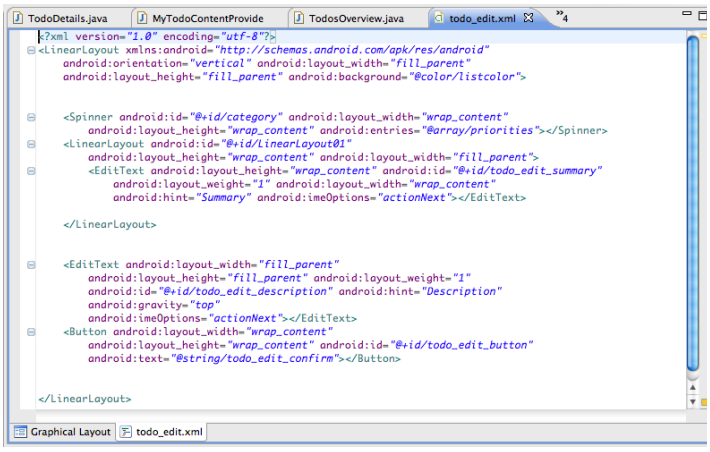
TodoDetails (onCreate)

```
@Override
protected void onCreate(Bundle bundle) {
    super.onCreate(bundle);
    mDbHelper = new TodoDbAdapter(this);
    mDbHelper.open();
    setContentView(R.layout.todo_edit);
    mCategory = (Spinner) findViewById(R.id.category);
    mTitleText = (EditText) findViewById(R.id.todo_edit_summary);
    mBodyText = (EditText) findViewById(R.id.todo_edit_description);

    Button confirmButton = (Button) findViewById(R.id.todo_edit_button);
    mRowId = null;
    Bundle extras = getIntent().getExtras();
    mRowId = (bundle == null) ? null : (Long) bundle
            .getSerializable(TodoDbAdapter.KEY_ROWID);
    if (extras != null) {
        mRowId = extras.getLong(TodoDbAdapter.KEY_ROWID);
    }
    populateFields();
    confirmButton.setOnClickListener(new View.OnClickListener() {
        public void onClick(View view) {
            setResult(RESULT_OK);
            finish();
        }

    });
}
```

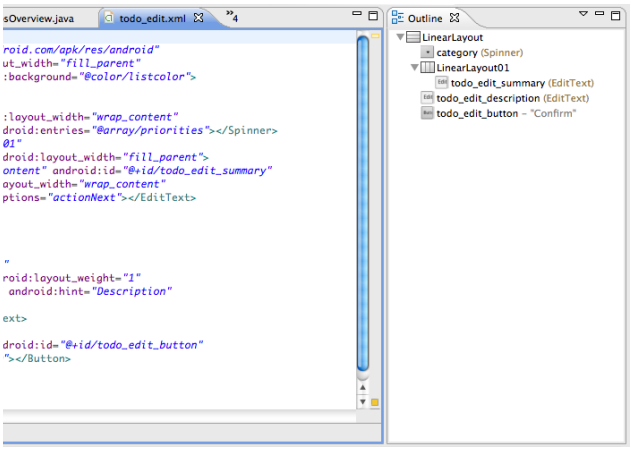

Graphical layout of `todo_edit.xml`



Text of `todo_edit.xml`



Outline of `todo_edit.xml`



TodoDetails (populateFields)

```
private void populateFields() {
    if (mRowId != null) {
        Cursor todo = mDbHelper.fetchTodo(mRowId);
        startManagingCursor(todo);
        String category = todo.getString(todo
                .getColumnIndexOrThrow(TodoDbAdapter.KEY_CATEGORY));

        for (int i = 0; i < mCategory.getCount(); i++) {

            String s = (String) mCategory.getItemAtPosition(i);
            Log.e(null, s + " " + category);
            if (s.equalsIgnoreCase(category)) {
                mCategory.setSelection(i);
            }
        }

        mTitleText.setText(todo.getString(todo
                .getColumnIndexOrThrow(TodoDbAdapter.KEY_SUMMARY)));
        mBodyText.setText(todo.getString(todo
                .getColumnIndexOrThrow(TodoDbAdapter.KEY_DESCRIPTION)));
    }
}
```


Save state, onPause, onResume

```
protected void onSaveInstanceState(Bundle outState) {
    super.onSaveInstanceState(outState);
    saveState();
    outState.putSerializable(TodoDbAdapter.KEY_ROWID, mRowId);
}

@Override
protected void onPause() {
    super.onPause();
    saveState();
}

@Override
protected void onResume() {
    super.onResume();
    populateFields();
}
```

Save state

```
private void saveState() {
    String category = (String) mCategory.getSelectedItem();
    String summary = mTitleText.getText().toString();
    String description = mBodyText.getText().toString();

    if (mRowId == null) {
        long id = mDbHelper.createTodo(category, summary, description);
        if (id > 0) {
            mRowId = id;
        }
    } else {
        mDbHelper.updateTodo(mRowId, category, summary, description);
    }
}
```


TodosOverview (onCreate)

```
package de.vogella.android.todos;

import android.app.ListActivity;

public class TodosOverview extends ListActivity {
    private TodoDbAdapter dbHelper;
    private static final int ACTIVITY_CREATE = 0;
    private static final int ACTIVITY_EDIT = 1;
    private static final int DELETE_ID = Menu.FIRST + 1;
    private Cursor cursor;

    /** Called when the activity is first created. */
    @Override
    public void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.todo_list);
        this.getListView().setDividerHeight(2);
        dbHelper = new TodoDbAdapter(this);
        dbHelper.open();
        fillData();
        registerForContextMenu(getListView());
    }

    // Create the menu based on the XML defintion
    @Override
    public boolean onCreateOptionsMenu(Menu menu) {
        MenuInflater inflater = getMenuInflater();
```

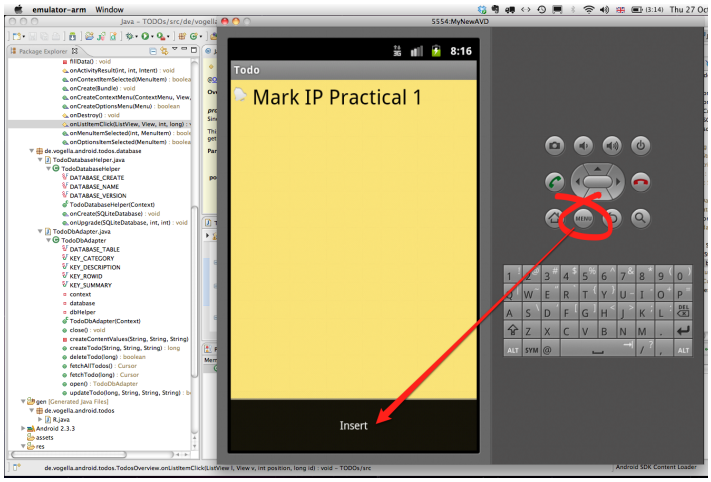

Options menu, item selected

```
// Create the menu based on the XML defintion
@Override
public boolean onCreateOptionsMenu(Menu menu) {
    MenuInflater inflater = getMenuInflater();
    inflater.inflate(R.menu.listmenu, menu);
    return true;
}

// Reaction to the menu selection
@Override
public boolean onMenuItemSelected(int featureId, MenuItem item) {
    switch (item.getItemId()) {
    case R.id.insert:
        createTodo();
        return true;
    }
    return super.onMenuItemSelected(featureId, item);
}
```

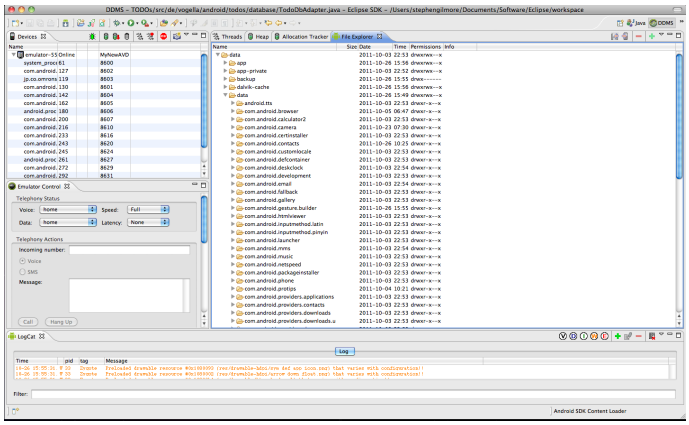

Options item selected

```
// Create the menu based on the XML defintion
public boolean onCreateOptionsMenu(Menu menu) {

// Reaction to the menu selection
public boolean onMenuItemSelected(int featureId, MenuItem item) {

@Override
public boolean onOptionsItemSelected(MenuItem item) {
    switch (item.getItemId()) {
    case R.id.insert:
        createTodo();
        return true;
    }
    return super.onOptionsItemSelected(item);
}

@Override
public boolean onContextItemSelected(MenuItem item) {
```

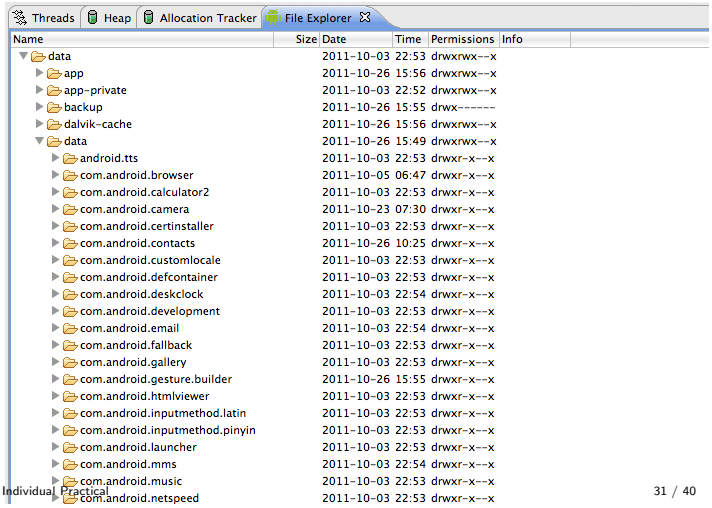

Accessing the insert menu



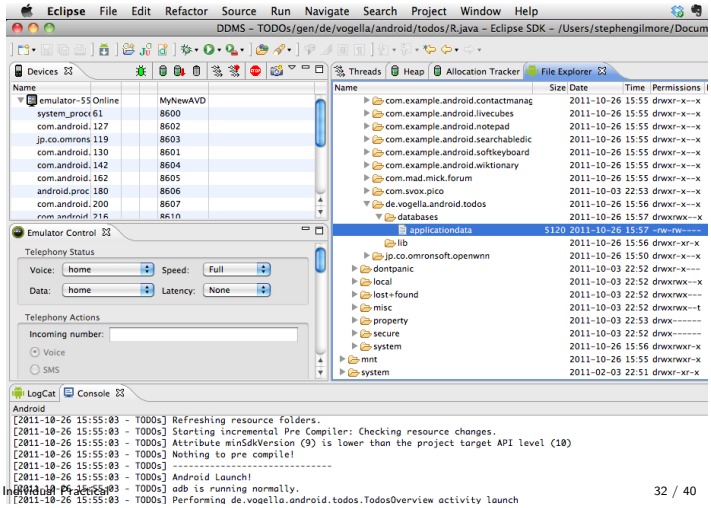
Dalvik Debug Monitor Server (DDMS)



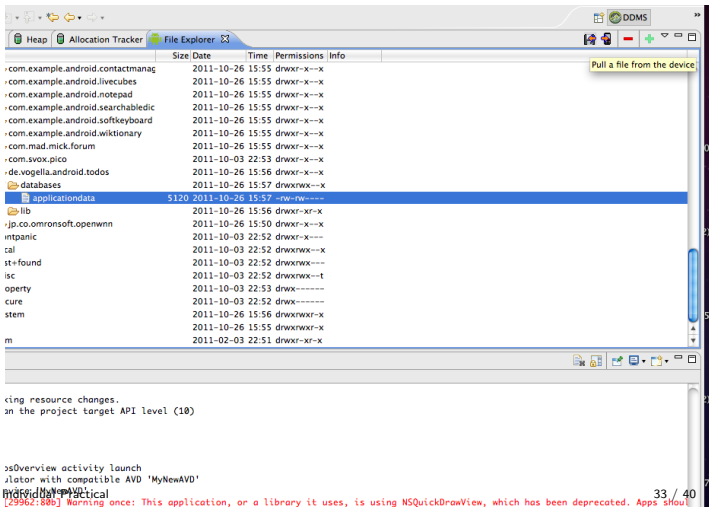
File explorer in DDMS



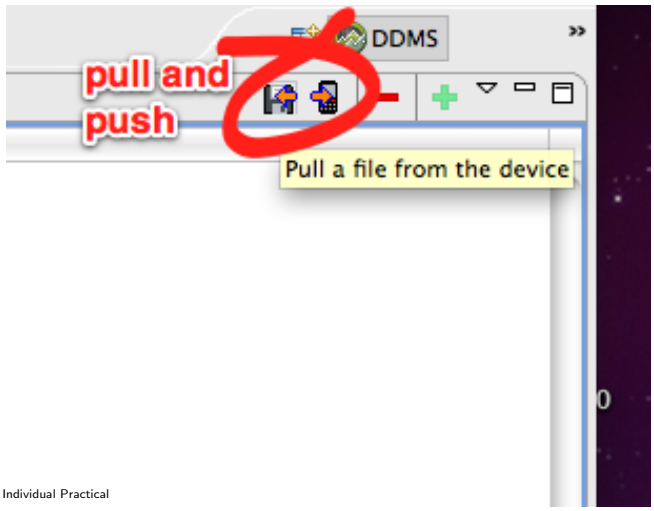
/data/data/de.vogella.android.todos/...



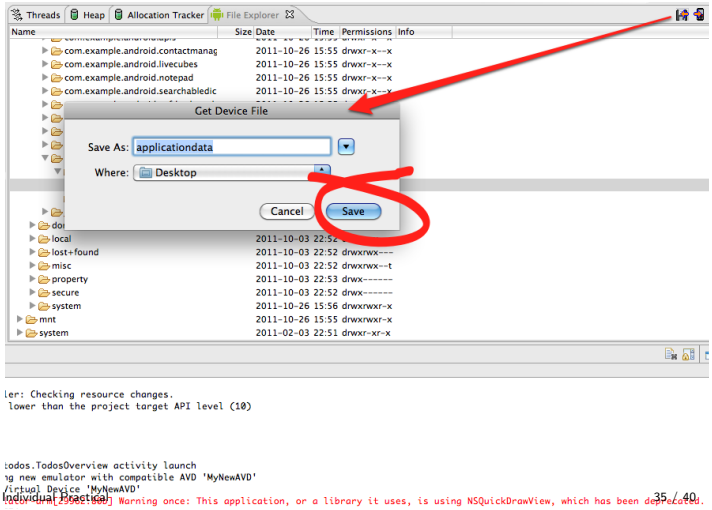
Pulling a file from the device



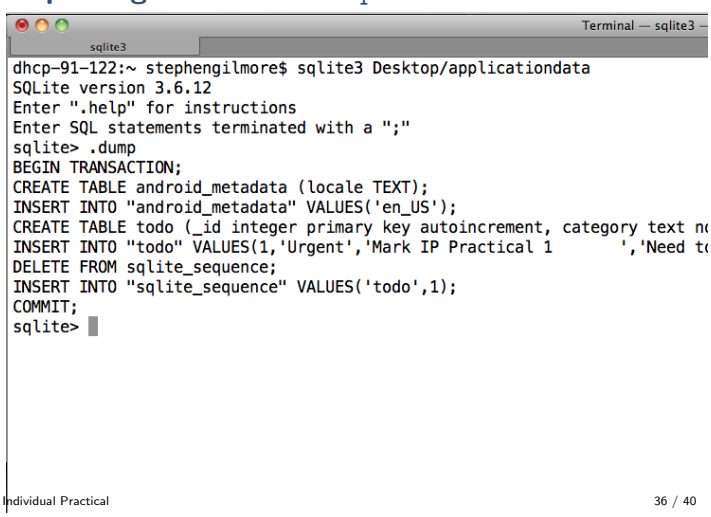
Pulling a file from the device



Get the device file



Inspecting the file with `sqlite3`

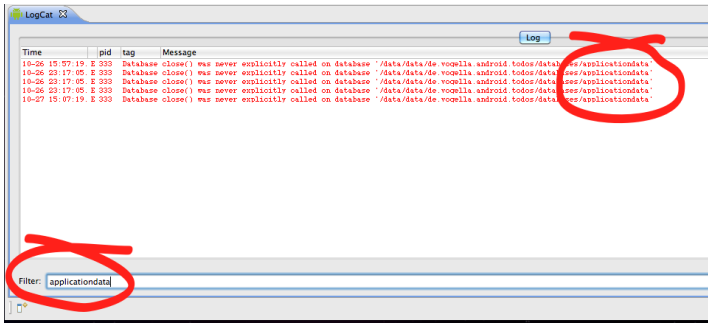


Inspecting the file with `sqlite3` on DiCE

```
Terminal — ssh
sqlite3 ssh
[belfast]stg: sqlite3 /home/stg/applicationdata
SQLite version 3.3.6
Enter ".help" for instructions
sqlite> .dump
BEGIN TRANSACTION;
CREATE TABLE android_metadata (locale TEXT);
INSERT INTO "android_metadata" VALUES('en_US');
CREATE TABLE todo (_id integer primary key autoincrement, category text nc
INSERT INTO "todo" VALUES(1, 'Urgent', 'Mark IP Practical 1      ', 'Need t
DELETE FROM sqlite_sequence;
INSERT INTO "sqlite_sequence" VALUES('todo', 1);
COMMIT;
sqlite>
```


Debugs and errors displayed in LogCat

Can filter messages displayed in LogCat



Can use view menu to export messages