Mobile Application Development

Higher Diploma in Science in Computer Science

Produced by

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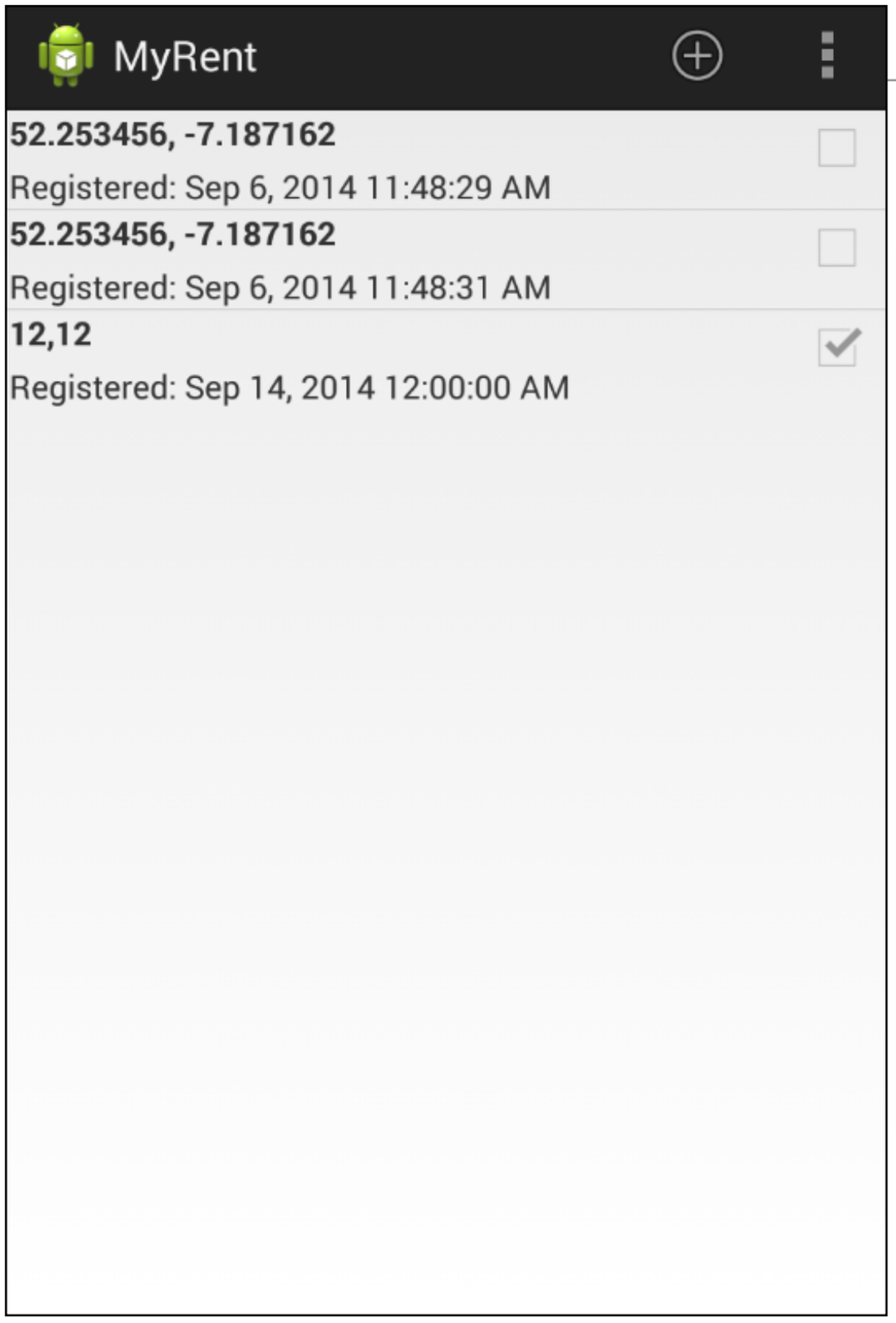
eLearning support unit

File IO in MyRent



- Json Representation

```
[
  {
    “date”        : 1410000509060,
    “geolocation”: "52.253456, -7.187162”,
    “id”          : "6a8d44df-7534-43c5-8130-444678fcc187",
    “rented”      : false
   },
  {
    “date”        : 1410000511943,
    “geolocation": "52.253456, -7.187162”,
    “id”          : "483eb7da-0dd2-41d3-b53e-ba3d51f9c55d",
    “rented”      : false
  },
  {
    “date”        : 1410649200000,
    “geolocation”: "12,12",
    “id”          :"9cf116a4-2c75-40a8-b28b-f3bc9a3939a6",
    “rented”      :true
  }
]
```

Residence

- Introduce JSON Support libraries

```
import org.json.JSONException;
import org.json.JSONObject;
```

- Define string IDs for each field

```
  private static final String JSON_ID              = "id"          ;
  private static final String JSON_GEOLOCATION     = "geolocation" ;
  private static final String JSON_DATE            = "date"        ;
  private static final String JSON_RENTED          = "rented"      ;
```

Residence

- Write a json Residence Object

```
public JSONObject toJSON() throws JSONException
{
  JSONObject json = new JSONObject();
  json.put(JSON_ID             , id.toString());
  json.put(JSON_GEOLOCATION    , geolocation);
  json.put(JSON_DATE           , date.getTime());
  json.put(JSON_RENTED         , rented);
  return json;
}
```

- Read a json Residence Object

```
public Residence(JSONObject json) throws JSONException
{
  id             = UUID.fromString(json.getString(JSON_ID));
  geolocation    = json.getString(JSON_GEOLOCATION);
  date           = new Date(json.getLong(JSON_DATE));
  rented         = json.getBoolean(JSON_RENTED);
}
```

Residence

- Complete json support

```
public class Residence
{
  public UUID id;

  public String  geolocation;
  public Date    date;
  public boolean rented;

  private static final String JSON_ID             = "id"            ;
  private static final String JSON_GEOLOCATION    = "geolocation"   ;
  private static final String JSON_DATE           = "date"          ;
  private static final String JSON_RENTED         = "rented"        ;

  public Residence()
  {
    this.id          = UUID.randomUUID();
    this.date        = new Date();
    this.geolocation = "";
  }

  public Residence(JSONObject json) throws JSONException
  {
    id             = UUID.fromString(json.getString(JSON_ID));
    geolocation    = json.getString(JSON_GEOLOCATION);
    date           = new Date(json.getLong(JSON_DATE));
    rented         = json.getBoolean(JSON_RENTED);
  }

  public JSONObject toJSON() throws JSONException
  {
    JSONObject json = new JSONObject();
    json.put(JSON_ID             , id.toString());
    json.put(JSON_GEOLOCATION    , geolocation);
    json.put(JSON_DATE           , date.getTime());
    json.put(JSON_RENTED         , rented);
    return json;
  }

  public String getDateString()
  {
    return "Registered: " + DateFormat.getDateTimeInstance().format(date);
  }
}
```

PortfolioSerializer

- A class to orchestrate the Serialization of a collection of Residence Objects to/from Disk

- Constructor + 2 Methods

- Fully Encapsulates serialisation mechanisms

```
public class PortfolioSerializer
{
  private Context mContext;
  private String mFilename;

  public PortfolioSerializer(Context c, String f)
  {
    mContext = c;
    mFilename = f;
  }

  public void saveResidences(ArrayList<Residence> residences) throws …
  {
    //...
  }

  public ArrayList<Residence> loadResidences() throws …
  {
    //...
  }
}
```

Portfolio

- Uses the serialiser to read and write the residence list
- Read - in constructor when Portfolio create
- Write - in ‘saveResidences()’ method, called when data may have changed

```
public class Portfolio
{
  public  ArrayList<Residence>  residences;
  private PortfolioSerializer   serializer;

  public Portfolio(PortfolioSerializer serializer)
  {
    this.serializer = serializer;
    try
    {
      residences = serializer.loadResidences();
    }
    catch (Exception e)
    {
      info(this, "Error loading residences: " + e.getMessage());
      residences = new ArrayList<Residence>();
    }
  }

  public boolean saveResidences()
  {
    try
    {
      serializer.saveResidences(residences);
      info(this, "Residences saved to file");
      return true;
    }
    catch (Exception e)
    {
      info(this, "Error saving residences: " + e.getMessage());
      return false;
    }
  }

  //…
}
```

MyRentApp

- Creates the serializer, giving it a file name to use
- Passes the serialiser to the Portfolio object, which will be responsible for loading / saving to the file using the serializer

```
public class MyRentApp extends Application
{
  private static final String FILENAME = "portfolio.json";

  public Portfolio portfolio;

  @Override
  public void onCreate()
  {
    super.onCreate();
    PortfolioSerializer serializer = new PortfolioSerializer(this, FILENAME);
    portfolio = new Portfolio(serializer);

    info(this, "RentControl app launched");
  }
}
```

ResidenceActivity

- Call to save triggered by ‘onPause’ event detected by ResidenceActivity

- This will occur when the user leaves the activity

```
public class ResidenceActivity extends Activity implements …
{
  //…
  private Portfolio portfolio;

  public void onPause()
  {
    super.onPause();
    portfolio.saveResidences();
  }
  //…
}
```

The Serialization Mechanism

```
public class PortfolioSerializer
{
  private Context mContext;
  private String mFilename;

  public PortfolioSerializer(Context c, String f)
  {
    mContext = c;
    mFilename = f;
  }

  public void saveResidences(ArrayList<Residence> r
  {
    //...
  }

  public ArrayList<Residence> loadResidences() thro
  {
    //...
  }
}
```

```
public class Residence
{
  public UUID id;

  public String  geolocation;
  public Date    date;
  public boolean rented;

  private static final String JSON_ID              = "id"             ;
  private static final String JSON_GEOLOCATION     = "geolocation"    ;
                              ON_DATE              = "date"           ;
                              ON_RENTED            = "rented"         ;


                                                   mUUID();
    ret
  }

  publi
  {
    return "Registered: " + DateFormat.getDateTimeInstance().format(date);
  }
}
```

```
[
  {
    “date”        : 1410000509060,
    “geolocation”: "52.253456, -7.187162”,
    “id”          : "6a8d44df-7534-43c5-8130-444678fcc187",
    “rented”      : false
  },
  {
    “date”        : 1410000511943,
    “geolocation": "52.253456, -7.187162”,
    “id”          : "483eb7da-0dd2-41d3-b53e-ba3d51f9c55d",
    “rented”      : false
  },
  {
    “date”        : 1410649200000,
    “geolocation”: "12,12",
    “id”          :"9cf116a4-2c75-40a8-b28b-f3bc9a3939a6",
    “rented”      :true
  }
]
```

saveResidences

- Create a JSONArray object
- Place each residence in turn into the object
- Write the object to the file
- Close the file
- If any exceptions occur, ‘propagate’ to the caller (whoever that is)

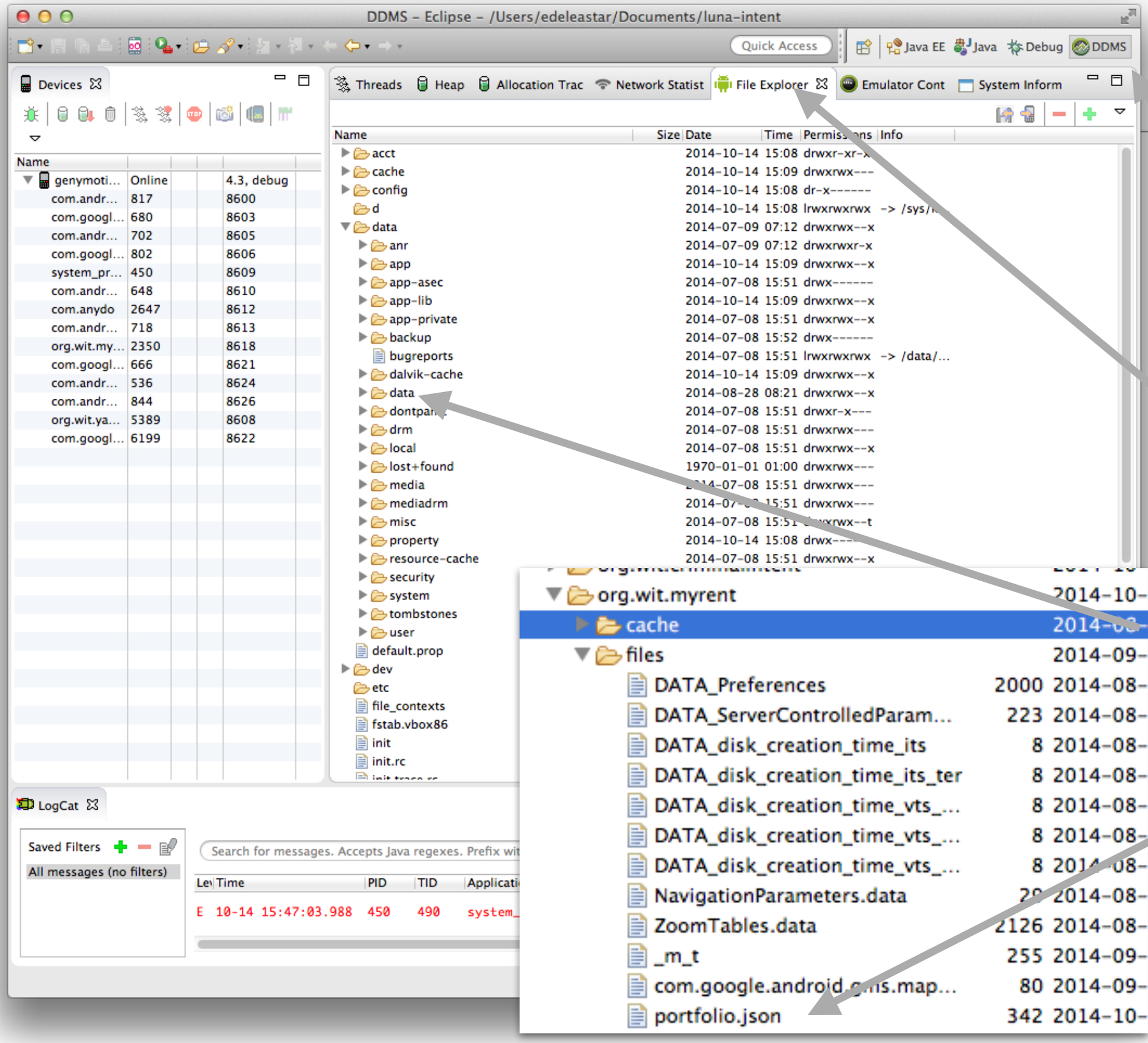
```
public void saveResidences(ArrayList<Residence> residences)
                                                throws JSONException, IOException
{
  // build an array in JSON
  JSONArray array = new JSONArray();
  for (Residence c : residences)
    array.put(c.toJSON());

  // write the file to disk
  Writer writer = null;
  try
  {
    OutputStream out = mContext.openFileOutput(mFilename, Context.MODE_PRIVATE);
    writer = new OutputStreamWriter(out);
    writer.write(array.toString());
  }
  finally
  {
    if (writer != null)
      writer.close();
  }
}
```

LoadResidences

- Create Residence Array
- Attach a reader to the file (via a buffered reader)
- Read the file into a string
- Tokenize the string into individual json objects
- Extract each object in turn and create a new Residence Object from it
- Add to our Residence list

```
public ArrayList<Residence> loadResidences() throws IOException, JSONException
{
  ArrayList<Residence> residences = new ArrayList<Residence>();
  BufferedReader reader = null;
  try
  {
    // open and read the file into a StringBuilder
    InputStream in = mContext.openFileInput(mFilename);
    reader = new BufferedReader(new InputStreamReader(in));
    StringBuilder jsonString = new StringBuilder();
    String line = null;
    while ((line = reader.readLine()) != null)
    {
      // line breaks are omitted and irrelevant
      jsonString.append(line);
    }
    // parse the JSON using JSONTokener
    JSONArray array = (JSONArray) new JSONTokener(jsonString.toString()).nextValue();
    // build the array of residences from JSONObjects
    for (int i = 0; i < array.length(); i++)
    {
      residences.add(new Residence(array.getJSONObject(i)));
    }
  }
  catch (FileNotFoundException e)
  {
    // we will ignore this one, since it happens when we start fresh
  }
  finally
  {
    if (reader != null)
      reader.close();
  }
  return residences;
}
```

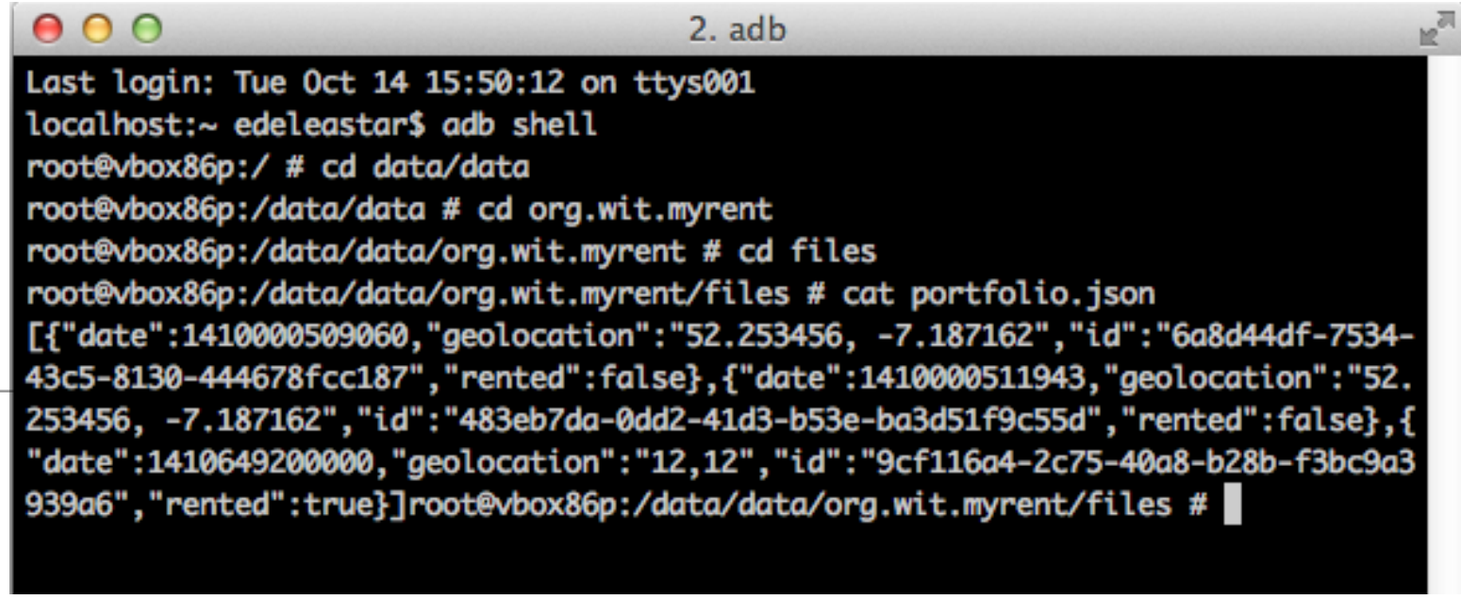
Application Specific files



- open DDMS perspective
- Select File Explorer
- Browse / data/data/.. application id

Alternatively … log in to emulator

- “abd shell” + navigate using shell commands to folder




```
[
  {
    “date”        : 1410000509060,
    “geolocation”: "52.253456, -7.1871
    “id”          : "6a8d44df-7534-43c5-
    “rented”      : false
   },
  {
    “date”        : 1410000511943,
    “geolocation": "52.253456, -7.1871
    “id”          : "483eb7da-0dd2-41d3-
    “rented”      : false
  },
  {
    “date”        : 1410649200000,
    “geolocation”: "12,12",
    “id”          :"9cf116a4-2c75-40a8-
    “rented”      :true
  }
]
```


```
adb shell
root@vbox86p:/ # cd data/data
root@vbox86p:/data/data # cd org.wit.myrent
root@vbox86p:/data/data/org.wit.myrent # cd files
root@vbox86p:/data/data/org.wit.myrent/files # cat portfolio.json
[{"date":1410000509060,"geolocation":"52.253456,
-7.187162","id":"6a8d44df-7534-43c5-8130-444678fcc187","rented":fal
se},{"date":1410000511943,"geolocation":"52.253456,
-7.187162","id":"483eb7da-0dd2-41d3-b53e-
ba3d51f9c55d","rented":false},{"date":
1410649200000,"geolocation":"12,12","id":"9cf116a4-2c75-40a8-b28b-
f3bc9a3939a6","rented":true}]root@vbox86p:/data/data/
org.wit.myrent/files #
```