National University of Computer and Emerging Sciences, Lahore Campus

Course:	**Software for Mobile Devices**	**Course Code:**	**CS-440**
Program:	**BS (Computer Science)**	**Semester:**	**Fall 2018**
Duration:	**180 Minutes**	**Total Marks:**	**80**
Paper Date:	**24-Dec-18**	**Weight**	**40 %**
Section:	**A & B**	**Page(s):**	**3**
Exam:	**Final**	**Reg. No.**	

Instruction/Notes: This exam is open book and open notes.
While writing code, make best effort to write correct and relevant code only. Minor syntactic errors are acceptable and will be ignored during marking but overall concept and approach must be correct.

Question 1 **(40 points)**

Consider designing a simple Quotations application. When user opens the application (s)he will see some quotations from famous authors around the world and will go to next screen on tap of a single button.

The important consideration is that the layout containing View components such as textview, imageview, button will be determined through server, along with their sequence and layout attributes such as margin, padding, text, text size etc (you need to draw only those view components which are coming from server with their respective attributes).

You will get all these elements after API is hit. (If button comes first in layout it should be drawn first, if imageview comes first in layout it should be drawn first and so on) with their respective attributes. All these layouts will be drawn vertically and you need to code in Java to draw these.

Basic flow of application is illustrated as under:

[App launches → Server API Hit automatically → after the response, UI is loaded → users see quotations → tap button → goes to next screen]

You are required to:

- Download and parse the layout from the server, while dealing with both success and failure scenarios. Work out a proper model / business layer class with proper thread management for handling the response. **15 points**
- On success response, display the UI programmatically with proper thread management. Use all the attributes in the defined layout and display the components in correct order (as they appear in the layout) **15 points**
- On failure response, show toast message to user **5 points**
- When user clicks on next button, move to next quotation **5 points**

You may use either of the JSON or XML response formats for the layout - A sample is given below for both success and failure scenarios. URI for the server is http://api.myquotations.com/android/layout

Success scenario

JSON

```
{
 "status_code": 200,
 "message": "Ok",
 "data":[

 {
    "view_component": "textview",
    "view_content" : "good luck",
    "view_url" : null,
    "view_padding" : 20,
    "view_text_size" : 17
 },

 {
    "view_component": "imageview",
    "view_content" : null,
    "view_url" :
"https://www.someimageonweb.com/smiley.png",
    "view_padding" : 20,
    "view_text_size" : 0
 },

 {
    "view_component": "button",
    "view_content" : "Next",
    "view_url" : null,
    "view_padding" : 30,
    "view_text_size" : 17
 }]

}
```

XML

```
<response>
 <status code="200"
         message="Ok" />
 <data>

   <component
    view_component="textview"
    view_content="good luck"
    view_url=""
    view_padding="20"
    view_text_size="17"
   />

   <component
    view_component="imageview"
    view_content=""
    view_url=
"https://www.someimageonweb.com/smiley.png"
    view_padding="20"
    view_text_size="0"
   />

   <component
    view_component="button"
    view_content="Next"
    view_url=""
    view_padding="30"
    view_text_size="17"
   />
  </data>
</response>
```

Failure Scenario

```
{
"status_code": 700,
"message" : "Some error occurred, please try
again later.",
"data": null
}
```

```
<response>
  <status code="700"
          message="Some error occurred,
                   please try again later"
  />
  <data />
</response>
```

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```
class Quote {
     int status;
     String message;
     ArrayList components;

     public void download(){
           // hit webserver with URL
           // http://api.myquotations.com/android/layout
           // and download contents in a string buffer

           parse(buffer.toString());
     }

     public void parse(String str){
          JSONObject object = new JSONObject(str);
          status = object.get("status").toString();
          message = object.get("message").toString();

          if(status == 200 && object.getJSONArray("data") != null){
               for(JSONObject o : object.getJSONArray("data")){
                    components.add(o);
               }
          }
     }
}
```

```
class QuotationActivity extends Activity {

     Quote quote;
     Handler handler = new Handler();

     public void onCreate(...){
          // set layout and other UI aspects ...

          download();
     }

     public void download(){
          quote = new Quote();
          Thread thread = new Thread(new Runnable(){
               public void run(){
                    quote.download();
                    handler.postRunnable(new Runnable(){
                         public void run(){
                              display(quote);
                         }
                    });
               }
```

```
            });
            thread.start();
        }

        public void display(Quote q){
            if (q.status == 200){
                for(JSONObject o : q.components){

                    if( o.view_component == "textview"){
                        // create a textview and add to layout
                    }
                    else if (o.view_component == "button"){
                        // create a button and add to layout
                        // set event handler
                    }
                    else if (o.view_component == "imageview"){
                        // create an imageview and add to layout
                        // download image in a separate thread
                    }
                }
             }
             else {
                // show toast with error message
             }
         }

         public void onClick(View v){
            if (v.getTag() == "Next"){
                clear();
                download();
            }
         }

         public void clear(){
            // clear current display
         }

}
```

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Question 2 **(20 points)**

Create a Simple App having [2 textviews + 1 button] **vertically** (declarative approach). Show folder hierarchy, code the layout and show how to reference these configurations in an activity. Create file/ folder where necessary.

- 2 TextViews settings:
  - **7" Tablet:** left margin 30dp, right margin 30dp, top margin 50dp bottom margin 0dp, text size 21sp
  - **smartphones:** left margin: 16dp, right margin 26dp, top margin 30dp bottom margin 0dp, textsize 19sp
- Button settings on:
  - **7" Tablet:** left margin 90dp, right margin 90dp, top margin 90dp bottom margin 30dp, text size 29sp
  - **smartphones:** left margin: 16dp, right margin 26dp, top margin 30dp, bottom margin 20dp, text size 21sp

File res/layout/mylayout.xml

```
<LinearLayout ...
              >
  <TextView ...
            android:marginLeft="16dp"
            ...
            />
  <TextView ...
            android:marginLeft="16dp"
            ...
            />
  <Button   ...
            android:marginLeft="16dp"
            ...
            />
</LinearyLayout>
```

File res/layout-large/mylayout.xml

```
<LinearLayout ...
              >
  <TextView ...
            android:marginLeft="30dp"
            ...
```

```
            />
  <TextView ...
            android:marginLeft="30dp"
            ...
            />
  <Button   ...
            android:marginLeft="30dp"
            ...
            />
</LinearyLayout>
```

Reference in Activity

setContentView(R.layout.mylayout);

Question 3 **(10 points)**

Describe in maximum of 8 lines, how Message Queue works when application is launched? (please write in legible / readable handwriting)

When application is launched, all the relevant UI events are enqueued in the Message Queue, while the attached main thread handles these events turn by turn. If other worker threads need to execute some piece of code on main thread, they may also enqueue that (in form of runnable) in message queue through the handler.

Question 4 **(10 points)**

Consider the Facebook App. Suppose you are asked to work out a strategy for updating the display picture of a user in the Facebook Android app; such that all the other users who have commented on that user's previous picture, are notified of the change, on their Facebook Android app in real-time. Describe the architectural approach required to implement this feature, supplemented with relevant code, where necessary.

When the display picture changes, the change will be communicated to Facebook Web Application (through HTTP post). The web application will determine the list of users who commented on the previous picture and the change will be notified through push notification to all these users if they are currently signed in, or else the Facebook Mobile App on the users' end will download this notification whenever they sign-in.