W228/307C

DUBLIN INSTITUTE OF TECHNOLOGY

BSc. (Honours) Degree in Computer Science

Year 3

WINTER EXAMINATIONS 2016/17

MOBILE SOFTWARE DEVELOPMENT CMPU3026

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FRIDAY 6TH JANUARY 1P.M. – 3 P.M.

DURATION: 2 HOURS

INSTRUCTIONS TO CANDIDATES

QUESTION 1 IS COMPULSORY.

ANSWER QUESTION 1 AND TWO OF THE REMAINING THREE QUESTIONS

QUESTION 1 CARRIES 50 MARKS. ALL OTHER QUESTIONS CARRY 25 MARKS EACH.

Q1. **(a)** Examine the code in Figure 1 Sample Android class and answer the following questions:

i. What is the super class of *MyListAdapter* class? (2 marks)
ii. How many parameters does the constructor for the MyListAdapter class require? (2 marks)
iii. Take any example of *casting* shown in the code and explain exactly *why* it is required in that example. (3 marks)
iv. When developing this class, if you remove the last line of code "`return row`", what error will this cause? (3 marks)
v. What is the benefit of declaring the attributes "private" in this class? (2 marks)
vi. The method `setImageResource()` is used. Explain what class this method belongs to, and explain your reason. (2 marks)
vii. Write out the java code for instantiating an *object* of this MyListAdapter class. You do not need to write any separate array declarations in your answer (2 marks)
viii. What java language feature is being used in the <string> in the class declaration, and what is the purpose of this feature? (4 marks)

(20 marks)

(b) Explain the purpose of *Interfaces* in java, using listener interfaces in Android event programming to support your answer.

(10 marks)

(c) Explain how Android lifecycle methods `onPause()` and `onResume()` can be used to improve the efficiency of location tracking functionality.

(10 marks)

(d) A new Android app is to be developed that will allow the general public to report problems to their local council, such as reporting road potholes or broken street lamps. The council will update the status of each problem as it addresses it. The public will be able to see the status of the problem they reported. They will also be able to see the general status of each type of problem that any other users have reported, so that they can have an overall view of how fast the council is fixing problems, and how many problems are being reported.

Explain what choices you would suggest for *persistent data storage* for this app. Clearly explain the reasons for your choices.

(10 marks)

```
public class MyListAdapter extends ArrayAdapter<String> {
        private String[] names;
        private String[] desc;
        private Integer[] imageid;
        private Activity context;


   public MyListAdapter(Activity context, String[] names, String[] desc,
           Integer[] imageid)
   {
         super(context, R.layout.list_layout, names);
         this.context = context;
         this.names = names;
         this.desc = desc;
         this.imageid = imageid;
    }


   @Override
   public View getView(int position, View convertView, ViewGroup
            parent)
   {
     LayoutInflater inflater = context.getLayoutInflater();
     View row = inflater.inflate(R.layout.list_layout, null,  true);
     TextView textViewName = (TextView) row.findViewById(R.id.textViewName);
     TextView textViewDesc = (TextView) row.findViewById(R.id.textViewDesc);
     ImageView image = (ImageView) row.findViewById(R.id.imageView);
     textViewName.setText(names[position]);
     textViewDesc.setText(desc[position]);
     image.setImageResource(imageid[position]);
     return row;
  }

]
```

Figure 1: Sample Android class

Q2. (a) Figure 2 shows a list in Android. Assume that the two pieces of text in each row are separately provided (e.g. “HTML” and “The Powerful Hyper Text Mark Up” are two separate pieces of text). Answer the following:

(i) How many layouts are required to implement this list? Explain your answer. (4 marks)

(ii) Write the XML code for the *row layout* required for this list. (6 marks)

(Total Q2(a) 10 Marks)

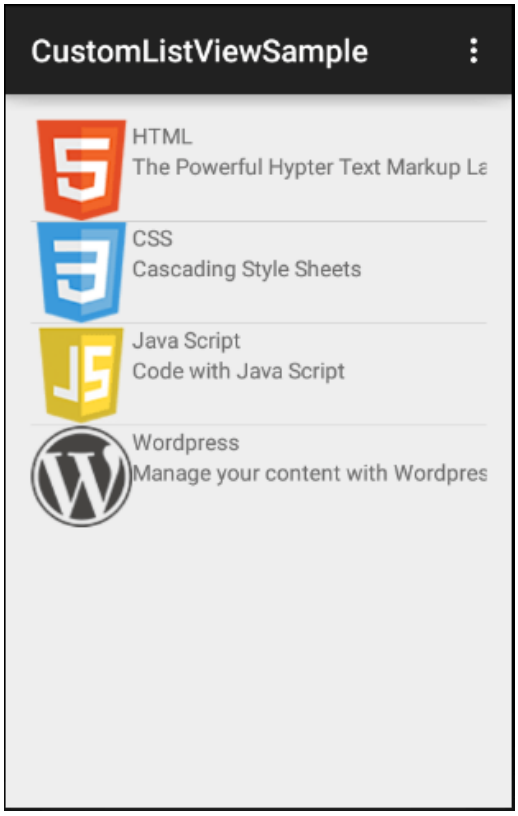

Figure 2: Sample Android List

(b) The code shown in Figure 1 Sample Android Class is the custom adapter class that will be used by a ListActivity to populate this list. Answer the following:

(i) When developing the custom ListActivity class (which is not shown here), what code (in your own words) is needed to link the custom ListActivity class to this adapter? Include any suggestions, with reasons, on *class structure* in your answer.

(6 marks)

(ii) The list is to be changed so that an additional piece of text will appear on the right hand side of *each row* of the list (showing the inventor name of the language). Explain the code changes needed to both *XML Layouts(s)* and the *custom adapter MyListAdapter class* to implement this. Assume that the inventor names are available in an extra array passed in to the adapter.

(9 marks)

(Total Q2(b) 15 Marks)

Q3. **(a)** In mobile apps, delays at the user interface should be avoided. Any long tasks should be pushed to background processing if possible. *Explain* how Android supports background processing, and *how* this is implemented. Also include a scenario *example* to support your explanation.

(10 Marks)

(b) Model-View-Controller (MVC) is a popular software architecture. *Explain* the following:

(i) The general principles of MVC and its advantages; (5 marks)

(ii) The extent to which the *Android* framework supports MVC for app development. (5 marks)

(10 Marks)

(c) The practice of embedding static data in dynamic code is best avoided as it can lead to the need to re-test software if static data is changed. *Explain in your own words* how the Android framework helps the developer to avoid this. Use data such as arrays or colour settings as an example.

(5 marks)

Q4. **(a)** A developer wishes to add functionality to a button on an Android app screen, whereby a click on the button results in a particular action. Describe *in your own words three* different ways in Android to implement event programming for a button click.

(10 Marks)

(b) A mobile app developer wishes to develop a new app with that will work on as many end user devices as possible amongst the general public. Explain the following:

(i) The choices available to the developer of *native* versus *hybrid* app and reasons for choosing either.

(5 marks)

(ii) How the developer could research the *variety of devices* and *Android versions* amongst Android users, if Android is chosen as the platform.

(5 marks)

(iii) *Five* techniques provided by the Android frame to enable apps to run successfully on a variety of screen devices

(5 marks)