

Midterm Examination

CSCE 4623 (Fall 2019)

October 18, 2019

Name: _____

UA ID: _____

Instructions:

1. You have 50 minutes to complete the exam. The exam is closed note and closed book. No material is allowed with you while you complete the exam.
2. There are five sections to this exam. A multiple choice section, a true false section, a fill-in-the-blank section, a short answer section, and a code review section. You should do your best to complete all sections. There is no penalty for getting a question wrong.
3. Any attempts to consult any materials, persons, or other means of obtaining information will be considered an Academic Integrity issue. You will be allowed to finish the examination, and the results will be collected and forwarded to the academic integrity board.
4. As a core part of its mission, the University of Arkansas provides students with the opportunity to further their educational goals through programs of study and research in an environment that promotes freedom of inquiry and academic responsibility. Accomplishing this mission is only possible when intellectual honesty and individual integrity prevail. Each University of Arkansas student is required to be familiar with and abide by the University's 'Academic Integrity Policy' which may be found at honesty.uark.edu/policy. Students with questions about how these policies apply to a particular course or assignment should immediately contact their instructor.

"I _____ have read the academic integrity statement and I agree to abide by the policies outlined within. I understand that unwillingness to agree with the policy will result in my test being returned ungraded. I attest that I have completed this examination without any academic integrity violations, and that the work is my own."

Signature: _____

Good luck!

Multiple Choice (1 points \times 10 questions = 10 points) Answer the following questions by circling the letter which is the best possible answer of the choices:

1. Which of the following callbacks will not be run for every Android activity?
 - (A) onStart()
 - (B) onResume()
 - (C) onRestart()
 - (D) onDestroy()
2. What is the name of an intent that does not directly specify a particular class?
 - (A) Implicit Intent
 - (B) Explicit Intent
 - (C) Pending Intent
 - (D) Intent Service
3. What is the terminology used to express computation started by the system?
 - (A) Passive Transaction
 - (B) Active Transaction
 - (C) Pending Transaction
 - (D) None of these
4. In the MVP design pattern, what does the “P” stand for?
 - (A) Presenter
 - (B) Pending
 - (C) Player
 - (D) Nothing – MVP is not a design pattern
5. What mobile computing design constraint has not kept pace with the others and therefore continues to pose a significant challenge since Smartphones first arrived?
 - (A) Memory
 - (B) Computation Speed
 - (C) Battery
 - (D) Storage
6. Which of the following types of service requires a status bar icon while it is running?
 - (A) Bound Service
 - (B) Foreground Service
 - (C) Background Service
 - (D) Intent Service
7. An event message that is delivered to zero or more listening applications may be referred to in Android as a:
 - (A) Content
 - (B) Broadcast
 - (C) Priority Interrupt
 - (D) Context
8. Which of the following is not a method that is exposed by the content provider?
 - (A) query
 - (B) insert
 - (C) delete
 - (D) focus

9. What fundamental Android application component may override the onBind() activity callback?
 - (A) Content Provider
 - (B) Service
 - (C) Activity
 - (D) Broadcast Receiver
10. Which of the following is not an available Android mechanism for future computation?
 - (A) Background Service
 - (B) Job Scheduler
 - (C) Alarm Manager and Broadcast Receiver
 - (D) None of the above

True/False (1 points \times 10 questions = 10 Points) Each statement is either true or false. Fill in T/F in the provided blank space.

1. _____ Context defined broadcast receivers will still receive broadcasts even if the app is destroyed.
2. _____ Activities must use a content provider to share data for interprocess communication.
3. _____ Status bar notifications can have actions associated with clicking or clearing the notification
4. _____ A broadcast can be handled by more than one broadcast receiver
5. _____ Each application is assigned a unique Linux user ID.
6. _____ An fragment will terminate if its host activity terminates.
7. _____ Background services should typically run in a separate thread
8. _____ Android leverages the Linux Kernel for its operating system
9. _____ A backstack cannot contain more than one instance of a given activity
10. _____ A “dwell” event in geofencing is when the user remains in a defined area for a period of time.

Fill-in-the-Blank (2 points \times 10 questions = 20 points) Each question is in the form of a sentence with a blank. Fill in the blank with the word/phrase that best completes the sentence.

1. The _____ is the concept that apps should have only the abilities that are necessary to perform their computational tasks.
2. _____ is the process of translating between user-friendly location names and latitude/longitude.
3. A _____ is an activity that has no parents and is generally accessible only from clicking notifications.
4. Android apps each run in a separate _____ to run code in isolation.
5. The Application _____ defines the application components, permissions, and requirements.
6. _____ is the application design pattern that uses “interactors” to map events into data changes.
7. To use a content provider, the ContentResolver must be provided with a(n) _____ that specifies the Content that will be obtained/manipulated.
8. The _____ is what provides access to lower level sensors and hardware devices.
9. A(n) _____ broadcast may be terminated to prevent lower priority receivers from obtaining the broadcast message.
10. A notification must be part of a(n) _____ so that the user can choose how to handle like notifications.

Short Answer (4 points \times 10 questions = 40 points) Provide a short (50 words or less) answer for each of the following questions:

1. Describe two of the “dimensions” of mobile computing, and comment on if the importance or relevance of each dimension is reduced over the last 12 years.
2. What dimension of mobile computing motivates the use of notifications? Why?
3. What is the principle of least privilege? Name one way that Android enforces this principle.
4. What is a task backstack? When is it useful to create an artificial backstack?
5. Is a context-registered broadcast receiver more secure than a manifest declared broadcast receiver? Why or why not?
6. Describe two uses of the Intent object.

Open Response (20 points total) Answer the questions associated with the particular pieces of code.

Problem 1: Given the activity and broadcast receiver below, answer questions 1-3. You can assume that the IntentFilter is set up properly to receive messages on the action "com.example.midterm.ACTION1" (2 points each):

```
public class SendingActivity extends AppCompatActivity{

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.first_activity);
    }
    @Override
    protected void onResume(){
        super.onResume();
        BroadcastReceiver br = new myReceiver();
        IntentFilter filter = new IntentFilter("com.example.midterm.ACTION1");
        this.registerReceiver(br, filter);
        Intent broadcastIntent = new Intent();
        broadcastIntent.setAction("com.example.midterm.ACTION1");
        broadcastIntent.putExtra("data1",5);
        broadcastIntent.putExtra("data2","six");
        sendBroadcast(broadcastIntent);
    }
}

public class myReceiver extends BroadcastReceiver{
    @Override
    public void onReceive(Context context, Intent receiveIntent){
        int myInt = Intent.getIntExtra("data1",7);
        String myString = Intent.getStringExtra("data2");
        Log.d("myReceiver","A: " + String.valueOf(myInt));
        Log.d("myReceiver","B: " + myString);
    }
}
```

Circle yes or no for the following three questions:

1. What comes after "A: " for the first logging statement?
2. What comes after "B: " for the first logging statement?
3. Assume that SendingActivity is destroyed and SecondActivity from earlier sends a broadcast for action "com.example.midterm.ACTION1". Will myReceiver execute its onReceive?

Problem 2: For Geofencing, draw a picture to describe each of the dwell, exit, and enter events (8 points):

Problem 3: Given the code below (you can assume that it builds), with two activities, answer questions 1-3 (2 points each)

```
public class FirstActivity extends AppCompatActivity{
    private int firstRun = 1;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.first_activity);
        Log.d("FirstActivity", "A");
    }
    @Override
    protected void onResume(){
        super.onResume();
        if(firstRun==1){
            firstRun = 0;
            Intent myIntent = new Intent(MyFirstActivity.this,SecondActivity.class);
        }
        startActivity(myIntent);
        Log.d("FirstActivity", "B");
    }
    @Override
    protected void onRestart(){
        super.onResume();
        Log.d("FirstActivity", "C");
    }
    @Override
    protected void onPause(){
        super.onPause();
        Log.d("FirstActivity", "D");
    }
    @Override
    protected void onDestroy(){
        super.onDestroy();
        Log.d("FirstActivity", "E");
    }
}

public class SecondActivity extends AppCompatActivity{
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.second_activity);
        Log.d("SecondActivity", "F");
    }
    @Override
    protected void onStart(){
        super.onStart();
        Log.d("SecondActivity", "G");
        finish();
    }
}
```

1. What is the order of logging statements that occurs on starting the application, assuming FirstActivity is the main activity? _____
2. What is the order of logging statements if the user leaves the app without destroying, and then returns to the application? _____
3. What is the order of logging statements if after returning to the application, the user presses the back button until the app is killed? _____