Mobile Technology

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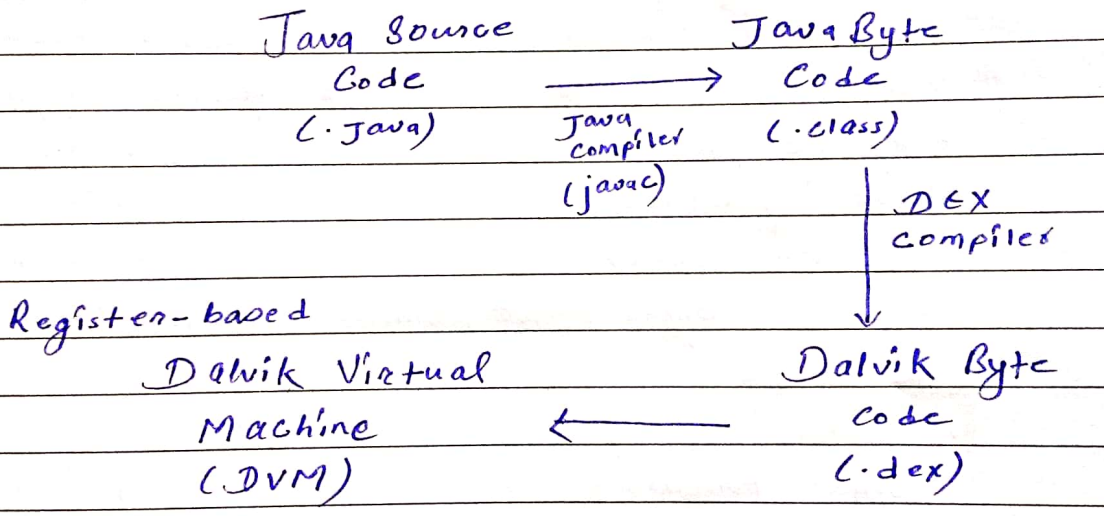
1. Define API level. Explain in Detail how android code execution works? Define ADB command line interface.

⇒ API Level is an integer value that uniquely identifies the framework API revision offered by a version of the Android platform. The Android platform provides a framework API that applications can use to interact with the underlying Android system.

In Android Java classes converted into DEX bytecode. The DEX bytecode format is translated to native machine code via either ART or the Dalvik runtimes.



Dalvik is a JIT (Just in time) compilation based engine. ART was introduced as a runtime and from Android 5.0 it has completely replaced Dalvik. ART uses AOT (Ahead of time) compilation.

ADB, Android Debug Bridge, is a command-line utility included with Google's Android SDK. ADB can control your device over USB from a computer, copy files back and forth, install and uninstall app, run shell commands, & more.

2. Define inheritance and its types. Why multiple inheritance is not supported in java?

⇒ Inheritance can be defined as the process where one class acquires the properties of another. The class which inherits the properties of other is known as sub class and the class whose properties are inherited is known as superclass.

The reason behind this is to prevent ambiguity. Consider a case where class B extends class A and class C and both class A and C have the same method display(). Now java compiler cannot decide, which display method it should inherit. To prevent such situation, multiple inheritance is not allowed in java.

Example:-

```
class Parent1 {
    void fun() {
        System.out.println("Parent1");
    }
}

class Parent2 {
    void fun() {
        System.out.println("Parent2");
    }
}

// Error : Test is inheriting from multiple classes
class Test extends Parent1, Parent2 {
    public static void main(String[] args) {
        Test t = new Test();
        t.fun();
    }
}
```

8. How do you make an activity default? Write down a simple program to pass data bundle from Login Activity to Profile Activity?

⇒ We can make an activity default by the following steps:

1. Configure Android Manifest file: To open the Android Manifest file go to the project manager window & follow the file hierarchy.

   App > manifests > AndroidManifest.xml

2. Add the following markup code within the activity tag to make it a Default Activity

```
<activity android:name=".NewMainActivity">
    <intent-filter>
        <action android:name="android.intent.action.MAIN" />
        <category android:name="android.intent.category.LAUNCHER" />
    </intent-filter>
</activity>
```

Simple program to pass data bundle from Login Activity to profile activity.

⇒ Ans: Program0.png

4. Define layout, view and view group in android. How can we declare layout in an android? How can we define styles in ~~d~~ android?

⇒ A layout defines the visual structure for a user interface, such as the UI for an activity or app widget. You can declare a layout in two ways: Declare UI elements in XML. Android provides a straight forward XML vocabulary that corresponds to the View class and subclass, such as those for widgets and layouts.

View is the basic biding block of UI (User Interface) in android. View refers to the android. It can be an image, a piece of text, a button or anything that an android application can display. The rectangle here is actually invisible, but every view occupies a rectangle shape.

A ViewGroup is a special view that can contain other views. The view group is the base class for layouts and views containers. This class also define the ViewGroup. Android contains the following commonly used ViewGroup subclasses.

→ LinearLayout → RelativeLayout → FrameLayout
→ ScrollView

You can also use Android Studio's Layout Editor to build your XML layout using a drag-and-drop interface.

Styles on Android allow you to separate the details of your app design from the UI structure and behavior. A style is a collection of attributes that specify the appearance for a single View.

6. What is Alarm Manager? What are the types of alarm

⇒ Android AlarmManager allows you to access system alarm. By the help of Android AlarmManager in android, you can schedule your application to run at a specific time in the future. It works whether your phone is running or not.

Types :- elapsed real-time alarms
real-time clock (RTC) alarms
and both use PendingIntent objects

a. RTC_Wakeup : Wakes device, fires intent at the specified clock time.

b. RTC : Doesn't wake device, fires intent at the specified clock time

c. ELAPSED_REALTIME : Doesn't wake device, fires intent at the specified time (interpreted relative to time since last boot)

d. ELAPSED_REALTIME_WAKEUP : Wakes device, fires intent at the specified time (interpreted relative to time since last boot)

```
public void startAlert() {
    EditText text = findViewById(R.id.time);
    int i = Integer.parseInt(text.getText().toString());
    Intent intent = new Intent(this, MyBroadcastReceiver.cla
    PendingIntent pendingIntent = PendingIntent.getBroadcast(
        this.getApplicationContext(), 234324243, intent, 0);
    AlarmManager alarm = (AlarmManager) getSystemService(ALARM
    alarm.set(alarm
                                        SERVICE);
    alarmManager.RTC_WAKEUP, System.currentTimeMillis() +
    (i*1000), pendingIntent);
    Toast.makeText(this, "Alarm in" + i + "seconds", Toast.
                                        LENGTH_LONG).show();
}
```

7. Define toast, toast notification, snack bar message. How does toast notification differ from status bar notification? Write a sample code to display a toast notification when the user registration is successful?

⇒ A toast provides simple feedback about an operation in a small popup. It only fills the amount of space required for the message and the current activity remains visible and interactive. Toast automatically disappear after a timeout.

Snackbar in android is a new widget introduced with the Material Design library as a replacement of a Toast. Android Snackbar is light-weight widget and they are used to show messages in the bottom of the application with swiping enabled. Snackbar android widget may contain an optional action button.

A status bar notification adds an icon to the system's status bar and an expanded message in the "Notifications" window. When the user selects the expanded message, Android fires an Intent that is defined by the notification.

```
Toast.makeText(getApplicationContext(),
                "Registration Success",
                Toast.LENGTH_LONG
).show();
```

8. Define Multitouch and gestures. How it is handled in android? Explain with example.

→ When more than one finger touches the screen at the same time to perform touch events is known as multitouch.

Android provides special types of touch screen event such as pinch, double tap, long presses and flinch. These are all known as gestures. Android provides GestureDetector Class to receive motion events and tell us that these events correspond to gestures or not.

When multiple pointers touch the screen at the same time, the system generates the following touch events:

- ACTION_DOWN: For the first pointer that touches the screen. This starts the gesture. The pointer data for this pointer is always at index 0 in the MotionEvent.
- ACTION_POINTER_DOWN: For extra pointers that enter the screen beyond the first. The pointer data for this pointer is at the index returned by getActionIndex().
- ACTION_MOVE: A change has happened during a press gesture.
- ACTION_POINTER_UP: Sent when a non-primary pointer goes up.
- ACTION_UP: Sent when the last pointer leaves the screen.

We keep track of individual pointers within a ~~MOTION~~ MotionEvent via each pointer's index & ID.

Example:

9. Explain Tweened and Interpolated view animation with sample code.

⇒ Tween Animation takes some parameters such as start value, end value, size, time duration, rotation angle e.t.c and perform the required animation on that object. It can be applied to any type of object. So in order to use this, android has provided up a class called Animation.

An interpolator defines the rate of change of an animation. This allows the basic animation effects (alpha, scale, translate, rotate) to be accelerated, decelerated, repeated, etc.

```
public void clockwise(View v){
ImageView image = (ImageView) findViewById(R.id.image);
image.setAnimation(
        AnimationUtils.loadAnimation(
                getApplicationContext(),
                R.anim.myanimation
                )
    );
```

10. How do you publish application in play store ?

⇒ The step-by-step on how to publish application in play store are:

1. Create a Developer Account
2. Plan to sell ? Link your merchant account
   a. Sign in to your Play Console
   b. Click on Download Reports - Financial
   c. Select set up a merchant account now
   d. Fill out your business information
3. Create an App
   a. Navigate to the 'All applications' tab in the menu.
   b. Click on 'Create Application
   c. Select your app's default language from the drop-down menu
   d. Type in a title for your app
   e. Click on "Create"
4. Prepare store listing
   Graphic Assets
   Language & Translations
   Categorization
   Contact Details
   Privacy Policy
5. Upload APK to an app release
6. Provide an Appropriate Content Rating
7. Set up pricing & Distribution
8. Rollout Release to Publish Your App

11. Define SQlite Database. Write a sample sqlite code to create a database named "students" in a public class StudentsOpenHelper extending SqliteOpenHelper.

⇒ SQLite is a opensource SQL database that stores data to a text file on a device. Android comes in with build in SQLite database implementation.

SQLite supports all the relational database features. In order to access this database, you don't need to establish any kind of connections for it like JDBC, ODBC etc.

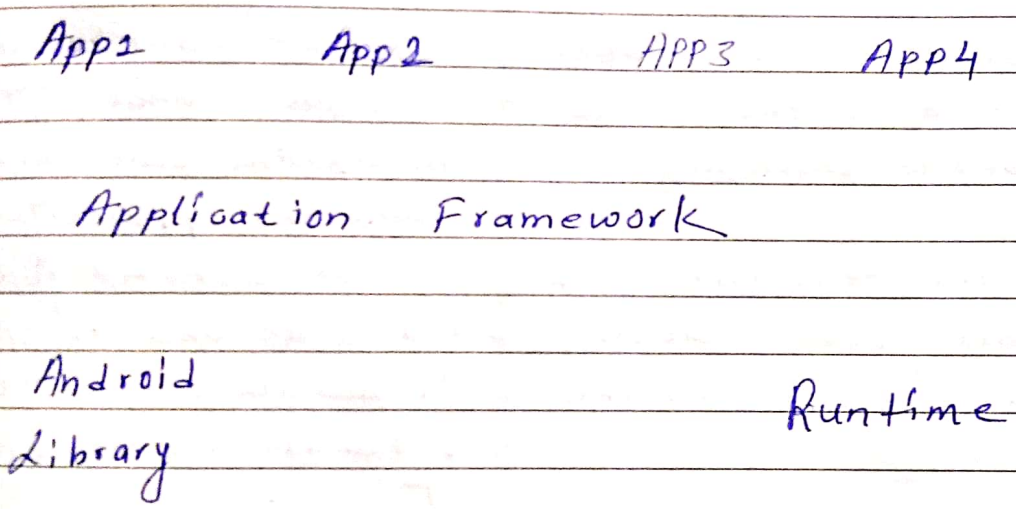
12. Write short notes on:
Signing in debugging and release mode

Debug apk vs release apk: For debug builds the apk will be signed with the default debug signing keys with debug flag enabled. For release keys you will have to explicitly specify the key to sign with and the debug flag will be turned off so that it cannot be debugged. Proguard can be turned on for release builds. (also for debug builds but not advised). This step need to be done explicitly and is false by default.

Android App Monetization: Monetizing an app is essentially any way in which an app is used to make money. With app monetization, you have a chance to leverage your user base in such a way that you can earn money - it's as simple as that. For app developers in particular, this is an incredibly important way of generating revenue without funding.

13. Explain Mobile Operating System and its structure with a diagram.

⇒ A mobile operating system is an operating system that helps to run other application software on mobile devices. It is the same kind of software as the famous computer operating system like MAC, Linux and Windows, but note they are light and simple to some extent.



14. Explain Dalvik Virtual Machine in Details? Differentiate between JIT and AOT.

	JiT	AoT
1.	Loads the application slower than AoT since it needs to compile the application when running for the first time	Loads the page more quick than the JiT compilation
2.	It download the compiler and compiles the application before displaying.	It doesn't want to download the compiler, since AoT already compiles the code when building the application.
3.	Since the code include the compiler code also the bundle size will be higher	Since it created fully compiled code and it's optimize so it bundle size will be half the bundle size compiled by JiT
4.	Suitable in development mode	Suitable in the case of production
5.	Following command use JiT ng build, ng serve	Following command use AoT ng build --aot, ng serve --aot, ng build --prod
6.	Template binding errors can be viewed at the time of displaying the application	Template binding errors are shown at the time of building.

15. What do you understand by intent? Write down its syntax? Write down the program to switch from activity "Login Activity" to another activity "Dashboard Activity".

⇒ An Intent is a messaging object you can use to request an action from another app component. Although intents facilitate communication between components in several ways, there are three fundamental use cases:

- Starting an activity
- Starting a service
- Delivering a broadcast

Example of explicit intent

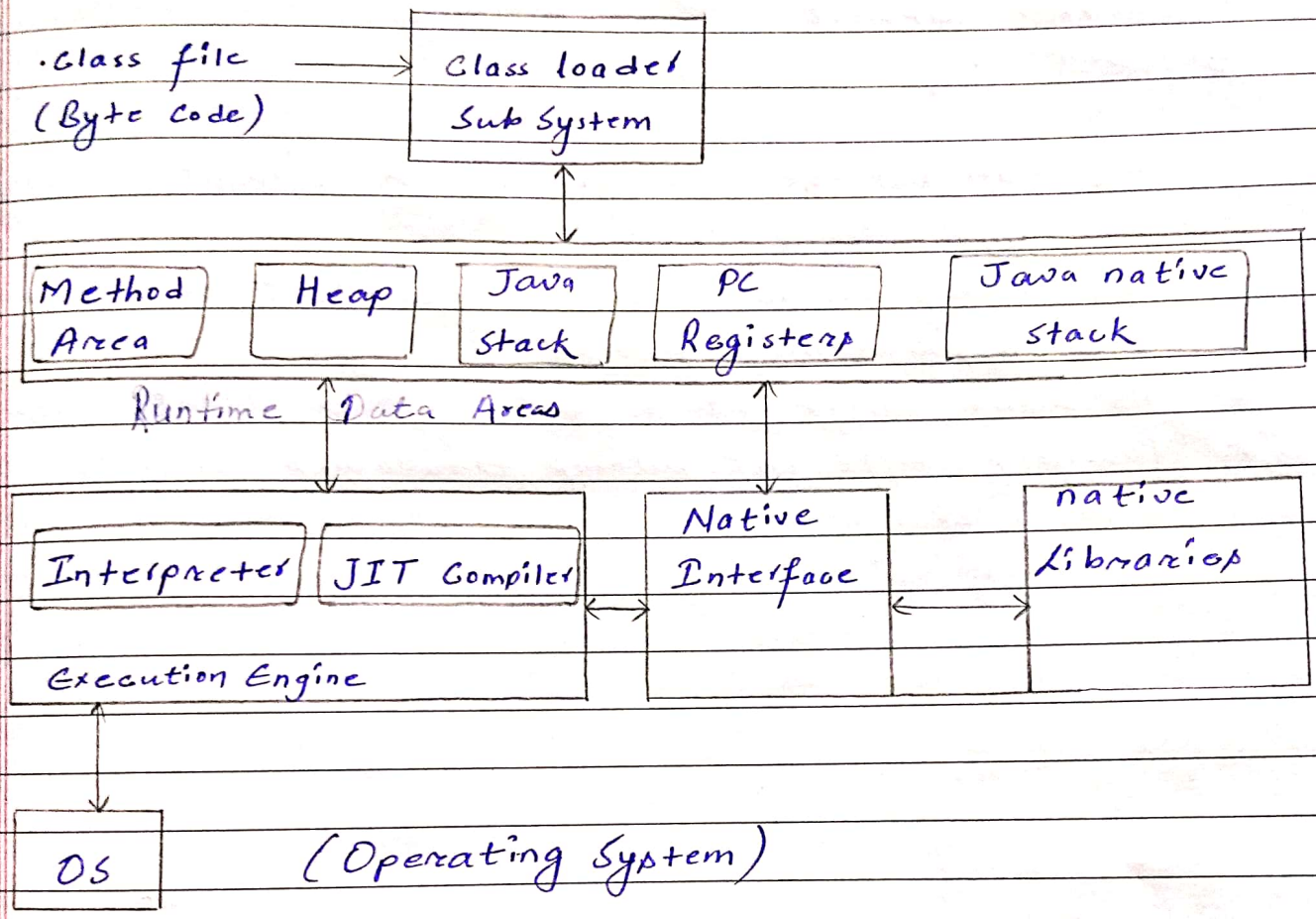
An explicit intent is one that you use to launch a specific app component, such as a particular activity or service in your app.

```
Intent intent = new Intent(this, SecondActivity.class);
startActivity(intent);
```

Example of implicit intent

⇒ program2.png

17. Explain JVM. Why java is platform independent ?



18. What do you mean by DPI ? How can you achieve multiple screen support in our Android application ? Explain.

⇒ DPI : Dots Per Inch

We can achieve multiple screen support in our Android application by

1. Explicitly declare in the Manifest which screen size our application supports.
2. Provides different layouts for different screen sizes.
3. Provides different bitmap drawables for different screen densities.

19. Write an xml for login layout with username, password & login button using Linear Layout.

⇒

```
<?xml version="1.0" encoding="utf-8" ?>
<LinearLayout xmlns:android="http://schemas.android.com/apk/res/android"
xmlns:app="http://schemas.android.com/apk/res-auto"
xmlns:tools="http://schemas.android.com/tools"
android:layout_width="match_parent"


tools:context=".MainActivity">

<EditText
    android:id="@+id/et_user_name"


/>
```

20. Describe processes, threads and broadcast Receiver class in android.

⇒ When an application component starts and the application does not have any other components running, the Android system starts a new Linux process for the application with a single thread of execution. .. An activity from another application that declares itself to handle this kind of intent then opens.

When an application is launched, the system creates a thread of execution for the application, called "main." This thread is very important because it is in charge of dispatching events to the appropriate user interface widgets, including drawing events. It is also almost always the thread in which your application interacts with components from the Android UI toolkit.

Android BroadcastReceiver is a dormant component of android that listens to system-wide broadcast events or intents. When any of these events occur it brings the application into action by either creating a statusbar notification or performing a task

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24. Write short notes on :

a) Shared Preferences : It is one of the ways of storing data of an application. Shared Preferences allow you to save and retrieve data in the form of key, value pair. In order to use shared preferences, you have to call a method getSharedPreferences() that returns a SharedPreference instance pointing to the file that contains the values of preferences.

b) User Notification :- User notification is a message that Android displays outside your app's UI to provide the user with reminders, communication from other people, or other timely information from your app. Users can tap the notification to open your app or take an action directly from the notification. The steps to create...

a. Create Notification Builder
b. Setting Notification properties
c. Attach Actions
d. Issue the notification

c) Inheritance in Java

30. Describe about AsyncTask class in android. Write program to upload image in database using AsyncTask

⇒ Android AsyncTask going to do background operation on background thread and update on main thread. In android we cant directly touch background thread to main thread in android development. asynctask help us to make communication between background thread to main thread.

31. What is ListView ? How you implement it in an android application ?

⇒ Android ListView is a view which groups several items and display them in vertical scrollable list. The list items are automatically inserted to the list using an Adapter that pulls content from a source such as an array or database.

Implementation :

DataSource	Adapter	Adapter View
Cursor		ListView
Arraylist		GridView
		Spinner

```
<ListView
  android:id = "@+id/name_list"
  android:layout_width = "fill_parent"
  android:layout_height = "wrap_content"
  />
```

```
package com.example.ListViewDemo;
import ...
public class MainActivity extends AppCompatActivity {
    String[] nameArray = {"Binod", "Gautam", "Shova", "Anu"};
    ListView listView;
@Override
protected void onCreate(Bundle savedInstanceState) {
    // YOUR CODE
```

34. What is Google Mobile Ads SDK? Write step to implement it?

⇒ The Google Mobile Ads SDK is the latest generation in Google mobile advertising featuring refined ad formats and streamlined APIs for access to mobile ad networks and advertising solutions. The SDK enables mobile app developers to maximize their monetization on Android, iOS and Window Phone.

The steps are:

1. Import the Mobile Ads SDK
2. Update your AndroidManifest.xml
3. Initialize the Mobile Ads SDK
4. Select an ad format
   - Banner
   - Interstitial
   - Native
   - Rewarded

35. Explain about APK? Describe the methods of App Monetization?

⇒ Android Package (APK) is the package file format used by the Android operating system, and a number of other Android-based operating systems for distribution and installation of mobile apps, mobile games and middleware.

- Free with ads (CTA) Click through Rate
- Freemium
- Paid
- Other tactics
- Wrap up

Monetizing Android app can be as simple as just offering it for sale in the Play store, but, utimately, the app's popularity will determine if it make any money, regardless of the sales model used. Therefore, the most important thing to do is create a compelling and intuitive app. After that, pick a business model that meets your needs and hopefully you will see some income.

31. Short notes on:

a. Inner class: In Java, it is also possible to nest classes (a class within a class). The purpose of nested class is to group classes that belong ~~togher~~ together, which makes your code more readable and maintainable.

To access the inner class, create an object of the outer class, and then create an object of the inner class.

```
class OuterClass {
    int x = 10;
    class InnerClass {
        int y = 5;
    }
}
public class Main {
    public static void main(String[] args)
    OuterClass myOuter = new OuterCla
    OuterClass.InnerClass myInner =
    myOuter.new InnerClass();
    Sout(myInner.y + myOuter.x);
```

b. ArrayAdapter

The Adapter act as a bridge between the UI Component and the Data Source. It converts data from the data sources into view items that can be displayed into the UI Component. Data Source can be Arrays, HashMap, Database, etc. and UI component can be ListView, GridView, Spinner etc. ArrayAdapter is the most commonly used adapter in android. When you have a list of single type items which are stored in an array you can use ArrayAdapter. Likewise, if you have a list of phone numbers, names, or &tlep. ArrayAdapter has a layout with a single TextView. If you want to have a more complex layout instead of ArrayAdapter use CustomArrayAdapter. The basic syntax for ArrayAdapter is given as:

```
public ArrayAdapter(Context context, int resource, int textView,
```

37. Explain implicit intent with example.

⇒ An Intent is a messaging object you can use to request an action from another app component. Although intents facilitate communication between components in several ways, there are three fundamental use cases:

- Starting an activity
- Starting a service
- Delivering a broadcast

Implicit intents do not name a specific component, but instead declare a general action to perform, which allows a component from another app to handle it. For example, if you want to show the user a location on a map, you can use an implicit intent to request that another capable app show a specified location on a map.

38. Point out the differences between broadcast receivers and services.

Broadcast Receivers	Services
Broadcast receivers are meant to respond to an intent and usually one sent by a service or a system event.	Services are meant to perform an action in the background for some period of time.
Broadcast receivers is not a component.	Services is application component.
More than one broadcast receiver can be started at once.	Only one service can be started at once.
Broadcast event if stopped, will not run again until another similar event is broadcast	Services can be restart many times even after it is killed by OS due to low memory.
Broadcast receiver runs for a short time.	Service runs for a long time

Convas Class drawCircle() drawARGB()
drawText() drawRect()
drawRoundRect() drawBitmap()

39. How basic animation is done in android?

⇒ The three animation system used in Android application are:

1. Property Animation
2. View Animation
3. Drawable Animation

2 ways to draw 2D graphics
1. Draw your animation into a View object from your layout.
2. Draw your animation directly to a Convas.

Property Animation

→ Property animation is the preferred method of animation in Android
→ This animation is the robust framework which let you animate any properties of any objects, view or non-view objects.
→ The android.animation provides class which handle property animation

View Animation

→ View Animation is also called as Tween Animation.
→ The android.view.animation provides classes which handle view animation
→ The animation can be used to animate the content of a view.
→ It is limited to simple transformation such as moving, resizing and rotation, but not its background color.

Drawable Animation

→ Drawable animation is implemented using the AnimationDrawable class.
→ This animation works by displaying a running sequence of 'Drawable' resources that is 'images, frame by frame inside a view object.

40. Short note: Android Architecture

b. Fragment : A fragment is a reusable class implementing a portion of an activity. A Fragment typically defines a part of a user interface. Fragment must be embedded in activities; they cannot run independently of activities. Importance :- Reusing View and Logic Components
- Tablet Support
- Screen Orientation

c. Spinner : Android spinner is like the combox box of AWT or Swing. It can be used to display the multiple options to the user in which only one item can be selected by the user. Android spinner is like the drop down menu with multiple values from which the end user can select only one value.

41. Which kernel does IOS use?

⇒ iOS use XNU kernel at its core. XNU may also be referred to as the "OS X kernel" or "iOS kernel". XNU stands for "X is Not Unix". XNU was first made by NeXT (cofounded by Steve Jobs) in 1989 for their operating system called NeXTSTEP. On December 20, 1996, Apple Inc. purchased NeXT and its software. Afterwards, the XNU kernel was used to make OS X and related operating system. Apple licensed XNU under the Apple Public Source License V2.0 (APSL). Therefore, XNU is open source.

XNU is a hybrid kernel (like window); although XNU is primarily monolithic (like Linux). This means that it uses concepts from both microkernel and monolithic (like Linux).

42. What is view class and Snackbar in android?

⇒ View refers to the android.view.View class, which is the super class for all the GUI components like TextView, ImageView, Button etc... It can be an image, a piece of text, a button or anything that an android application can display.

Snackbar in android is a new widget introduced with the Material Design library as a replacement of a Toast. Android Snackbar is light-weight widget & they are used to show messages in the bottom of the application with swiping enabled. Snackbar android widget may contain an optional action button.

45. What is multimedia ? Describe the life cycle of media player.

⇒ The Android multimedia framework includes support for playing variety of common media types, so that you can easily integrate audio, video and images into your applications.

Life cycle of media player

1. Idle state
2. Initialization state
3. Prepared state
4. Completed state

46. Short notes

a. Notification Builder : Builder class for Notification objects. Provides a convenient way to set the various fields of a Notification and generate content views using the platform's notification layout template. If your app supports versions of Android as old as API level 4, you can instead use NotificationCompat.Builder, available in the Android Support Library.

b. Thread

48. Which would you prefer database or shared preference for persistence storage

⇒ Persistent storage is any storage device or system that retains data after power is turned off. Persistent storage can be in the form of file, block or object storage. Because data persistence is assumed, this property is rarely mentioned in specifications for storage devices and systems.

Storage persistence was recently raised as an issue because of the rapid adoption of Docker Containers for developing, packaging and deploying applications.

49. What is third party library? How do you include them in android?

⇒ When developing new software, third-party libraries are commonly used to reduce implementation efforts. However, even these libraries undergo evolution activities to offer new functionalities and fix bugs or security issues.

Third-party libraries (TPLs) are widely used in mobile apps. For example, app developers often use advertising libraries as a source of revenue, or integrate social networking libraries to simplify the login process.

50. Different between relative layout and linear layouts

Relative Layout	Linear Layouts
Relative Layout is a type of view group in which we can arrange views / widgets according to the position of other view/widgets.	Linear Layout is a type of view group which is responsible for holding views in it either Horizontally or vertically.
It is independent of horizontal and vertical view and we can arrange it according to once satisfaction	We can adjust views and widgets according to one's satisfaction
Syntax: <RelativeLayout android:layout_width="wrap_cont" android:layout_height="wrap_content" <!-- ImageView, TextView, ButtonView etc --> </RelativeLayout>	Syntax: <LinearLayout android:layout_width="wrap_cont" android:layout_height="wrap_content" android:orientation="vertical/horizontal"> <!-- ImageView, TextView etc --> </LinearLayout>
It is useful when we arrange view in a relative fashion.	It is useful when we arrange views in a linear fashion
RelativeLayout is used more in application We can use RelativeLayout as a child of LinearLayout.	LinearLayout is less used as compared to RelativeLayout. We can use LinearLayout as a child of RelativeLayout.

52. Compare the asynctask with handler class.

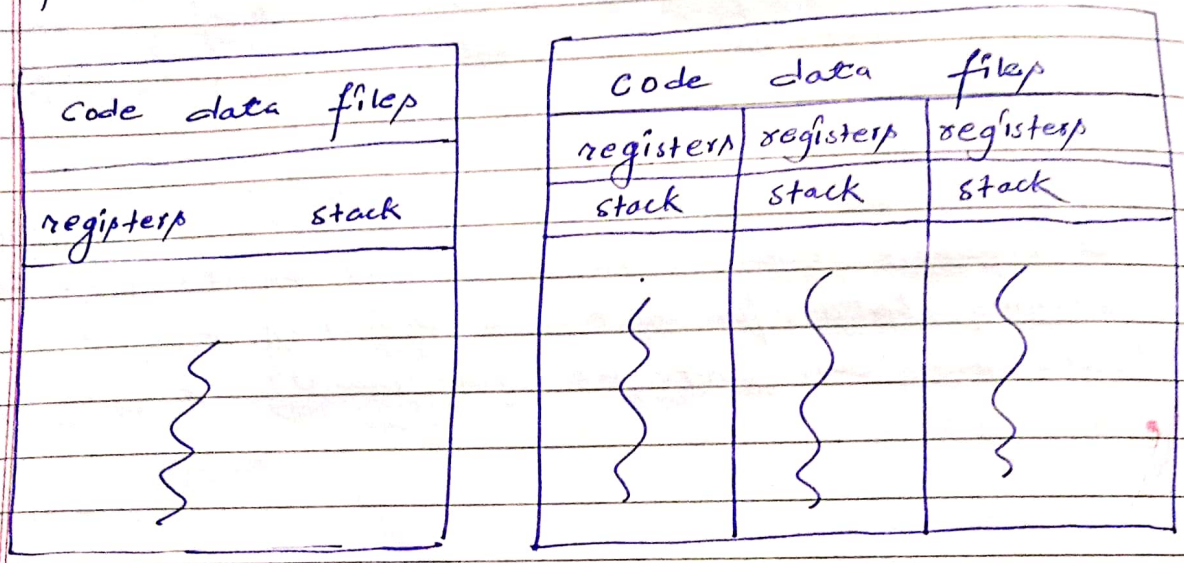
⇒ Handler are background thread that provide you to communicate with the UI. Updating a progressbar for instance should be done via Handler. Using Handlers you have the advantage of MessagingQueues, so if you want to schedule messages or update multiple UI elements or have repeating tasks.

⇒ AsyncTask are similar, infact they make use of Handler, but doesn't run in the UI thread, so it's good for fetching data, for instance fetching web services. Later you can interact with the UI

53. Explain the importance of thread in notification?

⇒ Importance:

1) A thread is a basic unit of CPU utilization, consisting of a program counter, a stack, and a set of registers.



Single-threaded process

multithreaded process

2) Threads are very useful in modern programming whenever a process has multiple tasks to perform independently of the others. (like multiple notification)

3) Notification allow the other tasks to proceed without blocking

4) Notification runs on the background in many threads when desired or allocated event fired from main thread.

5) Multiple thread allow for multiple requests to be satisfied simultaneously.

6) Notifications can be handled using thread called handler.

Benefits :- Responsiveness, Resource sharing, Economy, Scalability. (explain)

54. What is push notification ? Explain the Google Cloud Messaging System.

⇒ A push notification is a message that pops up on a mobile device. App publishers can send them at any time. users don't have to be in the app or using their devices to receive them. Each mobile platform has support for push notification - iOS, Android, Fire OS, Windows and BlackBerry all have their own services.

Google Cloud Messaging (GCM) was a mobile notification service developed by Google that enables third-party application developers to send notification data or information from developer-run servers to applications that target the Google Android Operating System, as well as applications or extensions developed for the Google Chrome Internet browser. It was available to developers free of charge. The GCM service was first announced in June 2012 as a successor to Google's now-defunct Android Cloud to Device Messaging service, citing improvement to authentication and delivery, new API endpoints and messaging parameters, and the removal of limitations on API send-rates and message sizes. It has been superseded by Google's Firebase Cloud Messaging on May 29, 2019.

Thank you