

Hello Students,

The Program is Bachelor of Science.

Subject Computer Science, Semester 6.

The Course code is CSC 108.

Title of the Course is Mobile Application Development.

The Module name is Android architecture, Under that, Dalvik virtual machine, APK files, Emulator, In emulator: Android virtual device.

This module is under Unit I that is, Introduction to Mobile Apps and Android.

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The outline of the module is Android Architecture under which I will explain Dalvik virtual machine, APK files, Android Emulator and Android Virtual device.

The learning outcomes are as follows:

At the end of the module, students will be able to describe the Dalvik virtual machine, explain the compiling and packaging process into an APK file, and explain Android Virtual Devices.

Let us begin the session.

Dalvik Virtual Machine comes under Android Runtime along with the core libraries and it is part of the Android architecture. Android Virtual machine that is the VM is optimized for mobile devices. It is optimized for memory, battery life and performance. Dalvik is the name of a town in Iceland. The Dalvik virtual machine was written by Dan Bornstein.

This virtual machine makes use of Linux core features like Memory management and Multithreading. It is designed to allow multiple virtual machine instances to run at once. That is, it enables every application to run in its own process with its own instance of Dalvik virtual machine.

That is, when you're running an application, that application runs with its own process with its own instance of Dalvik virtual machine, so it is designed to allow multiple virtual machine instances to run at once.

The advantage of this setup is applications are essentially sandboxed. That is, they cannot interfere with operating system or other applications, nor they can directly access the underlying device hardware.

The second advantage is, this enforced level of abstraction makes application platform neutral, that is the applications are not tied to any specific hardware platform.

Now let us understand the Compiling and Packaging process, that is getting the dot APK file.

The source code that you write in Java programming language or the Dot Java files, All these files of an application are converted to corresponding dot class files by the Java compiler. Then all these dot class files are converted into a single dot dex file or DX file by the Dex compiler. The Dex file we have from the different class files, then the AAPT that is Android's Assets Packaging Tool, this component it packages the dex file and all the assets such as XML layout files, or it could be images of an application, All these assets along with the Dex file are packaged into a package called APK. Wherein we get a dot APK file. So this is how an APK file is built from source code.

Now let us understand Android emulator

Android emulator simulates Android devices on your computer. That is, you can test your application on a variety of devices; Android API levels without even; I mean there's no need to have each physical device with you when you are testing your application for a particular device and for a particular API level. Using Android Emulator you can simulate Android devices on your computer and it provides almost all the capabilities of a physical device. But it is important to note that not all the features of the actual device the Android Emulator is capable of; features like NFC - Near Field Communication, then Bluetooth is not supported in Android Emulator.

Android Emulator can simulate multiple functions like incoming phone calls, text messages, then rotation and other hardware sensors, using the emulator you can also specify the location of the device.

Sometimes what happens testing the application, the application that you develop can be tested much faster in the emulator than on the actual device. One situation is transferring the data. If you are transferring the data from your application to the Android emulator, It is much faster as compared to the transferring data to the actual device connected via USB.

Next concept is Android Virtual Devices.

Each instance of Android Emulator uses an AVD that is an Android Virtual Device. Android Virtual device is used to specify Android version and hardware characteristics of the simulated device. The device on which we are planning to test the application. We need to create an AVD of the corresponding Android version and the hardware characteristics. And this we can create by means of Android Emulator.

So each instance of the Android Emulator effectively tests an application that we develop.

We need to create and manage AVDs that model each device on which the application is designed to run. To create and manage AVDs we need to use AVD Manager. Each AVD functions as an independent device. So when each AVD functions as an independent device, It consists of its own private storage for user data as well as the SD card data. So the emulator stores data, that is user data as well as the SD card data and cache in the directory specific to the AVD. So when you launch the emulator. It loads data from the AVD directory.

To test your application that you have developed, maybe for a particular platform, we will be selecting a specific AVD and running the application. So when the emulator launches the AVD it loads the data from the specific AVD directory.

To summarize the session, Dalvik Virtual Machine is optimized for memory, battery, life and performance.

It enables every application to run in its own process with its own instance of Dalvik virtual machine and essentially the applications are sandboxed so that they do not interact with the other applications or maybe operating system, nor they can directly interact with the hardware.

In the case of Android Emulator it simulates actual or physical Android devices on your computer and with the help of an AVD We can test our application on the Android emulator with a specific Android platform and hardware configuration. So AVD is a configuration that defines the characteristics of an Android phone or it could be a tablet, Wear OS, or Android thing etc that you want to simulate and test your application with.

These are my references.

Thank you.