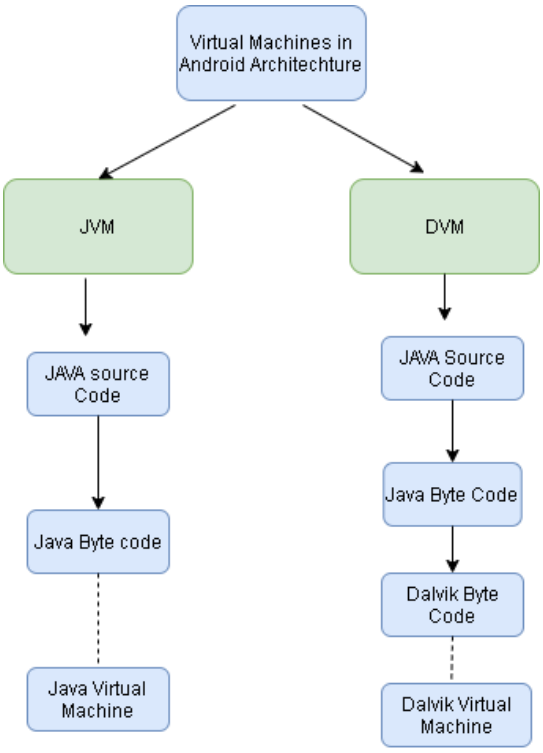
What is DVM(Dalvik Virtual Machine)?

Dalvik Virtual Machine is a Register-Based virtual machine. It was designed and written by Dan Bornstein with contributions of other Google engineers as part of the Android mobile phone platform. The Dalvik virtual machine was named after Bornstein after the fishing village “Dalvík” in Eyjafjörður, Iceland, where some of his ancestors used to live.

Working of DVM

The Java Compiler(javac) converts the Java Source Code into Java Byte-Code(.class). Then DEX Compiler converts this (.class) file into in Dalvik Byte Code i.e. “.dex” file.



Application

For Android, a new Virtual machine was developed by Google as stated above. It uses registers of the CPU to store the operands. So no requirement of any pushing and popping of instructions. Hence making execution faster. The instructions operate on virtual registers, being those virtual registers memory positions in the host device. Register-based models are good at optimizing and running on low memory. They can store common sub-expression results which can be used again in the future. This is not possible in a Stack-based model at all. Dalvik Virtual Machine uses its own byte-code and runs “.dex”(Dalvik Executable File) file.

Advantages

- DVM supports the Android operating system only.
- In DVM executable is APK.
- Execution is faster.
- From Android 2.2 SDK Dalvik has it’s own JIT (Just In Time) compiler.
- DVM has been designed so that a device can run multiple instances of the Virtual Machine effectively.

- Applications are given their own instances.
- The execution is faster in Android Dalvik Virtual Machine
- The Dalvik Virtual Machine has a lower boot time
- Dalvik Virtual Machine is specifically designed to work on Android devices
- Every Application can have their instance
- Android Dalvik Virtual Machine supports running of multiple instances
- It uses Just in Time (JIT) compiler due to which it consumes less space
- It is capable of executing APK files

Disadvantages

- DVM supports only Android Operating System.
- For DVM very few Re-Tools are available.
- Requires more instructions than register machines to implement the same high-level code.
- App Installation takes more time due to dex.
- More internal storage is required.
- Dalvik Virtual Machine has a poor garbage collection system

Working of Dalvik Virtual Machine in Android

Dalvik Virtual Machine(DVM). Android DDM was written by Dan Bornstein, and Dalvik is the name of a town in Iceland.

A Dalvik virtual machine enables Android applications to run in its own process with its own instance.

Virtual Machine

Firstly let us understand what a virtual machine is? It is basically a software implementation of a physical computer. This implementation works like a real physical computer. It even compiles and runs programs the same as a physical computer. It can be understood like an emulator. There are some issues with virtual machines too. One is that it is less efficient when compared to physical computers. Another issue is its performance, which is unstable when multiple virtual machines are working simultaneously on the same machine.

Even though Java Virtual machine has a high performance and provides great memory management, it is not optimized for low-powered devices. Dalvik VM is also a virtual machine that is highly optimized for mobile devices. Thus, it provides all the three things, that are **memory management, high performance as well as battery life**. It is strictly developed for Android mobile phones.

Role of the Dalvik Virtual Machine

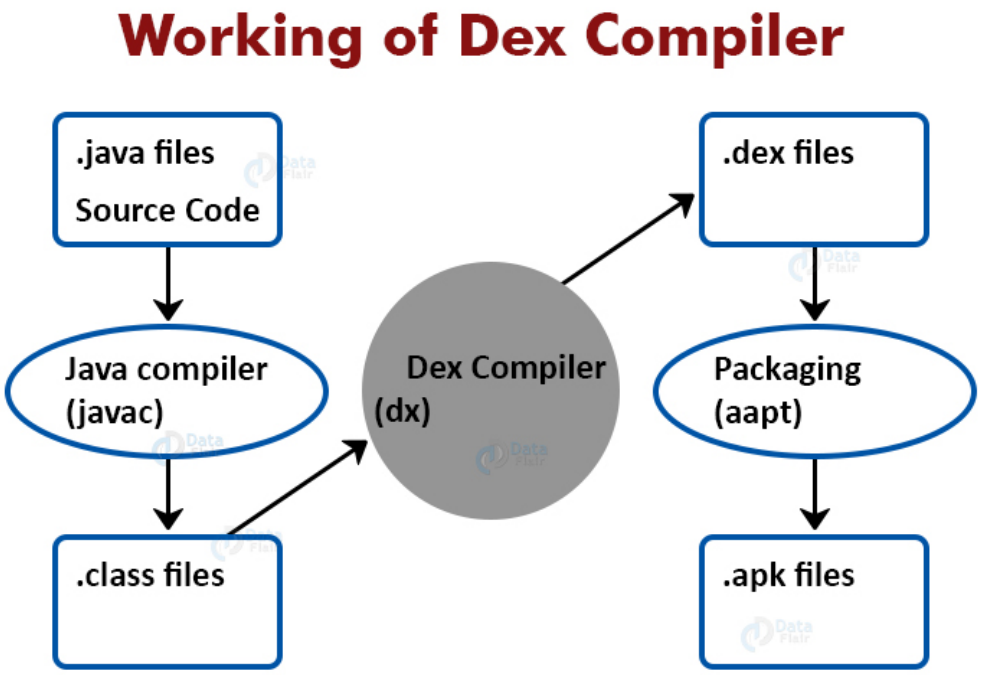
The Role of the DVM in Android includes:

- Optimizing the Virtual Machine for memory, battery life, and performance

- Conversion of class files into .dex file through Dex compiler that runs on Dalvik VM.
- Converting multiple class files into dex files.

The Dex compiler helps convert the class file into .dex file, the following image shows how it flows:

- First of all the .java file converts into .class file with the help of Java compiler.
- Next .class file converts into .dex file using Dec compiler.
- Then finally the packaging process is handled by the Android Assets packaging (aapt) tools.



Dalvik Virtual Machine vs Android Runtime:

Let us see comparison between Android DVM and Android Runtime:

Dalvik Virtual Machine	**Android Runtime**
Dalvik is slower in comparison to Android Runtime	Android Runtime is faster than Dalvik Virtual Machine
Dalvik Virtual Mchine takes less time to boot, Booting is fast	Android Runtime takes more time to boot, Booting is slow
The Cache builds up fast over time, reducing the reboot time	The cache is built at first boot, increasing the reboot time
Dalvik Virtual Mchine needs less space as it uses Just In Time compiler	Android Runtime needs more space as it uses AOT.
Dalvik Virtual Mchine utilizes more battery, thus it has low battery performance	Android Runtime utilizes less battery, thus it has high battery performance

Dalvik Virtual Mchine has a poor Garbage collection when compared to Android Runtime	Android Runtime has a better Garbage collection when compared to DVM
In Android DVM, apps are less responsive in accordance with Android Runtime	Apps here are very responsive and work smoothly.
Dalvik Runtime Virtual Machine converts bytecode every time the application launches	On the other hand, Android Runtime converts the bytecode only once at the time of installation of application
It is a stable and time-tested virtual machine	It is highly experimented and new
DVM is the choice of Android developers	It doesn't have a lot of support from app developers until now
DVM works better for lower internal storage devices as space occupied is less	It consumes more internal storage space, as it stores compiled apps in addition to the APKs
It came prior to Android Runtime and it is replaced with Android Runtime	Android Runtime is the upgraded version of Dalvik Virtual Machine and comes up with a lot of improvements