

nexus 5

RAM & MEMORY MANAGEMENT



Assignment:
Submitted by:
Roll no:
Submitted to:
Date:

Operating System
M. Rehan Asghar
BSSE 5 - 15126
Miss Samra
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Memory Specifications:

RAM : 2 GB
MEMORY: 16 / 32 GB (built-in)

I am currently using an Android Device called Nexus 5 which was developed by Google with the alliance of LG. This mobile has 2gb ram with 16 or 32GB builtin memory. In this device the RAM has been distributed as explained below:

Random-access memory (RAM) is a valuable resource in any software development environment, but it's even more valuable on a mobile operating system where physical memory is often constrained. Although Android's Dalvik virtual machine performs routine garbage collection, this doesn't allow you to ignore when and where your app allocates and releases memory.

How Android Manages Memory?

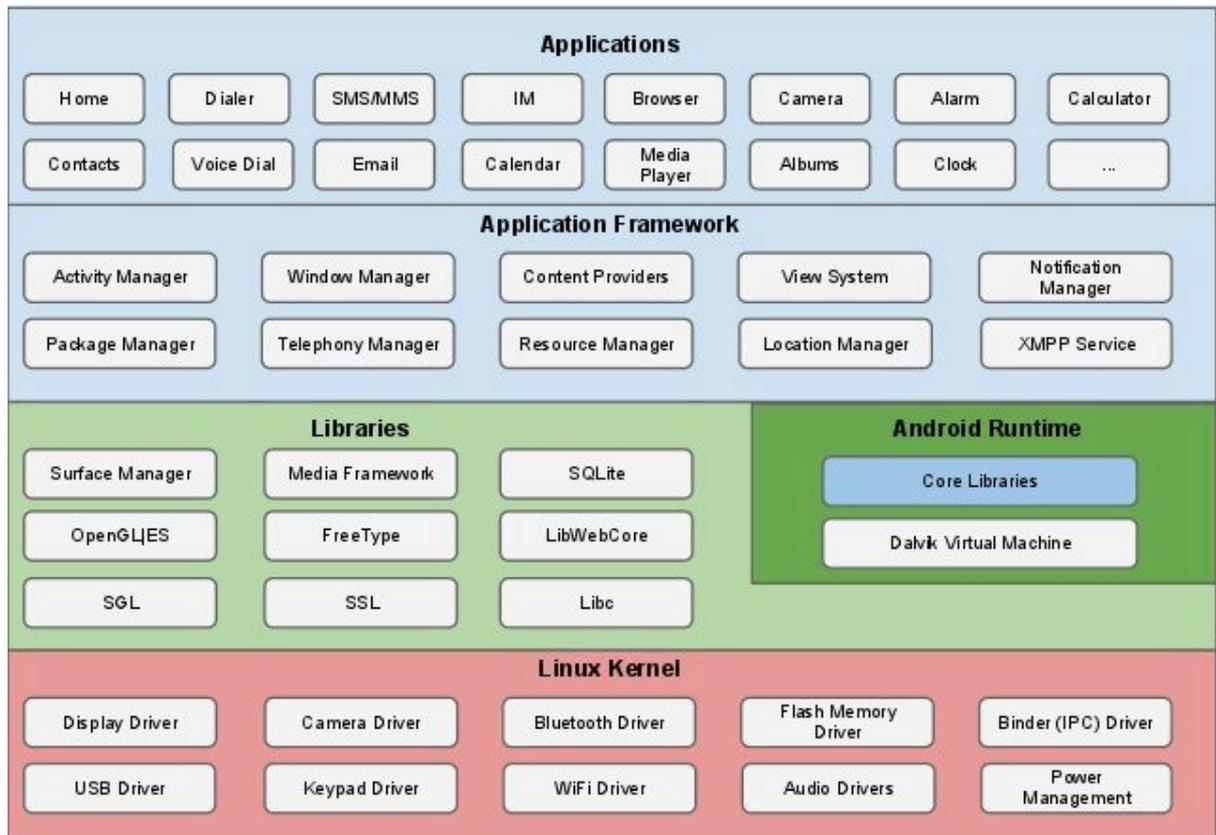
Android does not offer swap space for memory, but it does use paging and memory-mapping to manage memory. This means that any memory you modify whether by allocating new objects or touching mmapped page remains resident in RAM and cannot be paged out. So the only way to completely release memory from your app is to release object references you may be holding, making the memory available to the garbage collector. That is with one exception: any files mmapped in without modification, such as code, can be paged out of RAM if the system wants to use that memory elsewhere.

Android devices manages the memory by following these steps:

- 1. Sharing Memory**
- 2. Allocating and Reclaiming App Memory**
- 3. Restricting App Memory**
- 4. Switching Apps**

Architecture of Android:

Android operating system is a stack of software components which is roughly divided into five sections and four main layers as shown below in the architecture diagram:



Linux kernel:

At the bottom of the layers is Linux - Linux 2.6 with approximately 115 patches. This provides basic system functionality like process management, memory management, device management like camera, keypad, display etc. Also, the kernel handles all the things that Linux is really good at such as networking and a vast array of device drivers, which take the pain out of interfacing to peripheral hardware.

Libraries:

On top of Linux kernel there is a set of libraries including open-source Web browser engine WebKit, well known library libc, SQLite database which is a useful repository for storage and sharing of application data, libraries to play and record audio and video, SSL libraries responsible for Internet security etc.

Android Runtime:

This is the third section of the architecture and available on the second layer from the bottom. This section provides a key component called Dalvik Virtual Machine which is a kind of Java Virtual Machine specially designed and optimized for Android.

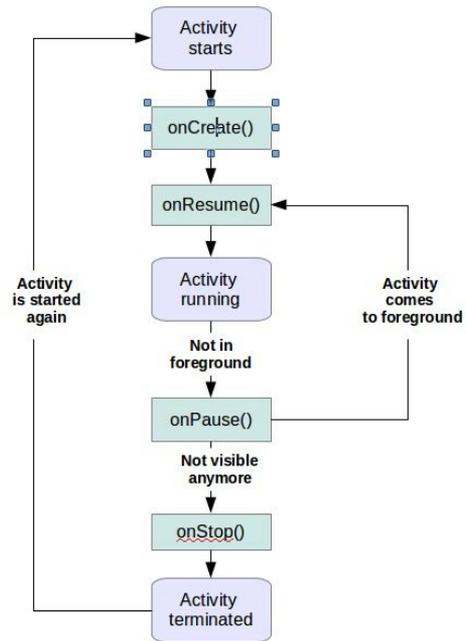
The Dalvik VM makes use of Linux core features like memory management and multi-threading, which is intrinsic in the Java language. The Dalvik VM enables every Android application to run in its own process, with its own instance of the Dalvik virtual machine. The Android runtime also provides a set of core libraries which enable Android application developers to write Android applications using standard Java programming language.

Application Framework:

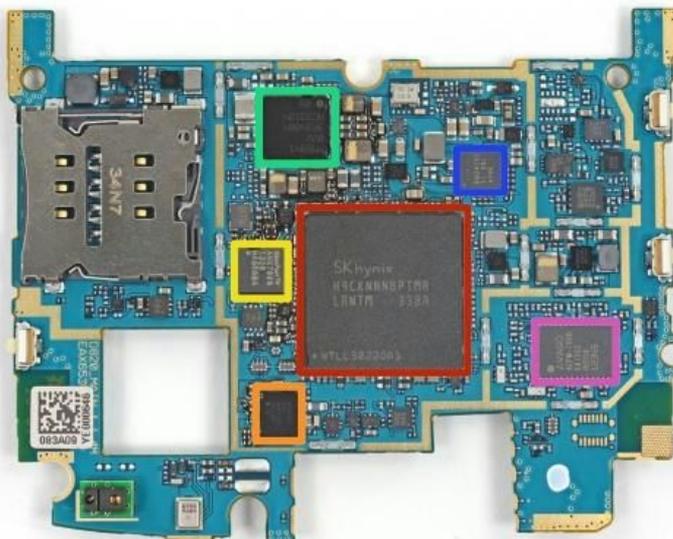
The Application Framework layer provides many higher-level services to applications in the form of Java classes. Application developers are allowed to make use of these services in their applications.

Applications:

You will find all the Android application at the top layer. You will write your application to be installed on this layer only. Examples of such applications are Contacts Books, Browser, Games etc.



Android Application Activity Lifecycle



Main Chip - Showing Physical Memory