

CS303 Operating Systems - Lab6

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Q1.

- The Android Runtime (ART) and Dalvik virtual machine use paging and memory-mapping (mmap) to manage memory. Android does not support swapping, which means any memory your application touches cannot be paged out unless you release all references.
- The Dalvik's Virtual Machine's heap size for application processes is limited. Android stores background application processes in LRU cache. It kills processes according to LRU strategy when system runs low on memory, but it also considers which application is the largest memory consumer.
- Garbage Collection: it has two goals - find data objects in a program that cannot be accessed in the future; and reclaim the resources used by those objects.
- Shared Memory: Android tries to fit share RAM pages across processes. Each process is forked from the parent Zygote process (which contains the code common to all the processes) and so saves memory and resource.
- App memory: To maintain functional multitasking environment, Android sets a hard limit on the heap size for each app. If your app has reached the heap capacity and tries to allocate more memory, it can receive an OutOfMemoryError.

Q2.

1. Contiguous Memory Allocation: In order to support dynamic memory allocation in contiguous memory allocation, we would have to re-allocate the entire program since there is not enough space for the program to grow its allocated memory space as the memory has been allocated contiguously.
2. Paging: In order to support dynamic memory allocation in paging method, we can incrementally allocate new pages and store page numbers of these pages and allocate memory discontinuously without requiring relocation of program's address space.

Q3.

- Virtual memory isn't required when the memory necessities of all applications are notable and controlled. A few models are special-purpose processors (e.g., network processors), embedded processors, and super-PCs. In this circumstance, we ought to consistently think about utilizing all the more real memory. In the event that the working framework didn't need to help virtual memory, the code would be a lot more straightforward and littler. In these circumstances supporting virtual memory would be an ill-conceived notion and we are increasing a lot less complex and small program by not having backing to virtual memory.
- The disadvantage of VM is also that translation (VA to PA) takes time. In order to speed this up, modern processors buffer translations in the translation look-aside buffer (TLB). Filling the TLB is done in the background and autonomously by the memory management unit (MMU). All of this costs money and electricity.

Q4.

Yes, it is possible for the base register and the limit register of a process to contain the same value.

When a process is run, the base register is loaded with the physical location where the process begins in memory. The limit register is loaded with the length of the process. In other words, they define the logical address space.

Consider an example where base and limit registers have the same value: a program starts at location 16384 in memory and has a length of 16384 indicating that the program occupies all space between 16384 and 32768. Coincidentally, these registers have the same value for this program.