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On Free Memory

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👁 275

Apple platforms have APIs, inherited from Mach, that return low-level memory statistics [1]. Some third-party tools report those statistics as if they were relevant to app developers. In most cases they are not.

Specifically, any report on the amount of *free memory* is unlikely to be useful. This number is the size of the kernel's free memory pool. Most VM-based OSes attempt to keep a certain amount of free memory available to avoid running out of memory in critical circumstances (for example, when trying to allocate memory on the page out path). But the size of that pool has very little to do with the amount of memory pressure on the system. Remember that the kernel's goal is to keep the pool at a certain size, so it lets memory go to 'waste' until critical thresholds are crossed, as which point it starts cleaning up.

As a concrete example of this, consider an iPhone running Safari. When you press the Home button, you return to the home screen but the system leaves Safari loaded in memory. At this point the free memory is X, where X is slightly higher than the threshold where the system would remove Safari from memory. Now apply some memory pressure to the system. It responds by removing Safari from memory, whereupon the free memory jumps up to Y, where Y is much larger than X. So putting memory pressure on the system has resulted in a *larger* free memory value. If you were using this free memory value as a proxy for memory pressure, you'd end up drawing exactly the wrong conclusion.

Apple platforms have various standard techniques for handling memory pressure — memory warnings, `NSCache`, purgeable memory, `DISPATCH_SOURCE_TYPE_MEMORYPRESSURE`, and so on — and you should use those techniques rather than any sort of free memory value.

Finally, if you want to get a summary of how much memory your app is using, you should look at its *footprint*. If you're building an automated test suite, you can get this value programmatically. See this post for details.

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[1] Specifically, the `host_statistics` API and the various structures defined in `<mach/vm_statistics.h>`.

Debugging   Asked 1 year ago by eskimo

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