

Memory Allocation/Deallocation

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Memory Management

- Memory allocation
- Memory freeing

Memory

- Low Memory
 - Kernel
- High Memory
 - Heap
 - User processes

Memory Organization

- Memory Management Unit
 - > Maps physical addresses to virtual addresses
- Paging
 - Addresses divided into equal size pages
- Segmentation
 - Segments with defined attributes

Memory Allocation

- Stack
- Global
- Heap

Memory Allocation

- System Calls
 - VirtualAlloc()
 - mmap()
 - brk()
 - sbrk()
- Program level
 - C: malloc
 - Java, C++: new
 - Python: automatic

Freeing Memory

- Process
 - C: free()
 - Marks memory as not used
 - Can be allocated by malloc
 - Still allocated to process (not system)
- System
 - When program exits returns memory
 - brk(), other system calls

Garbage Collection

- Automatic freeing of memory
- Example: Java
 - Done by Java Virtual Machine (not OS)
 - Scans all reachable objects
 - Frees any memory not held by reachable objects
 - Memory is still in process space

Sources

- http://www.cprogramming.com/tutorial/virtual_memory_and_heaps.html
- <http://stackoverflow.com/questions/5716100/what-happens-in-the-kernel-during-malloc>
- http://www.tutorialspoint.com/operating_system/os_memory_management.htm
- <http://stackoverflow.com/questions/6530355/is-memory-allocation-a-system-call>
- <http://www.dynatrace.com/en/javabook/how-garbage-collection-works.html>