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.tutorialspoint.com/operating_system/os_memory_management.htm](http://www.tutorialspoint.com/operating_system/os_memory_management.htm)
- [http://stackoverflow.com/questions/6530355/is-memory-allocation-a-system-call](http://stackoverflow.com/questions/6530355/is-memory-allocation-a-system-call)