.NET/OS Interaction

The .NET CLR interfaces with the OS using the Windows API. To control heap management, it creates and drops segments for each generation using specific API calls.

The key APIs are:

- `VirtualAlloc` –allocate virtual memory
- `VirtualFree` –free allocated memory.

`VirtualAlloc` is a key function because it allows .NET to reserve portions of the virtual memory address space in chunks, for use in the creation of segments when they are needed. However, only when the memory is actually required does .NET claim the reserved virtual memory.

It is important to remember that the allocated memory is virtual, which means it doesn't directly refer to physical memory. Instead, it refers to a virtual memory address that is translated by the CPU to a physical memory address on demand.

The reason for using virtual addresses is to allow for a much more flexible memory space to be constructed; one which is far larger than what is actually available in physical RAM. To make this possible, a machine's hard drive is used as a kind of secondary memory store to increase the total amount of memory available to our applications, and we will now explore that virtual/physical relationship.