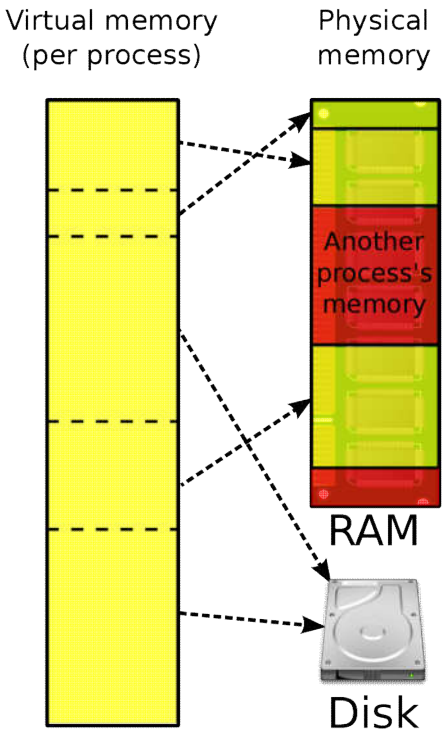
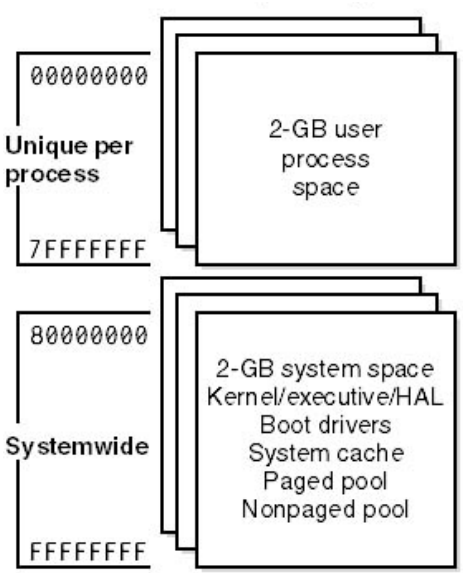
Virtual memory

Virtual memory



Memory manager

- Each application has allocated a virtual address space only for it
  - x86 (32 bits) – 4GB virtual addresses per application (both user and kernel mode)
  - X64 (64 bits) – 8TB virtual address space per application (user mode part)



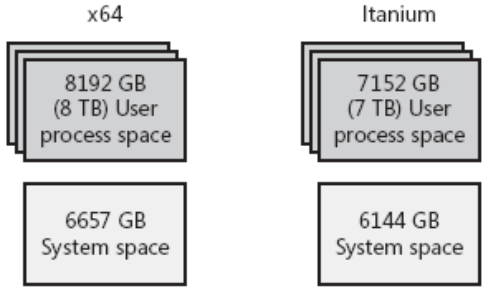
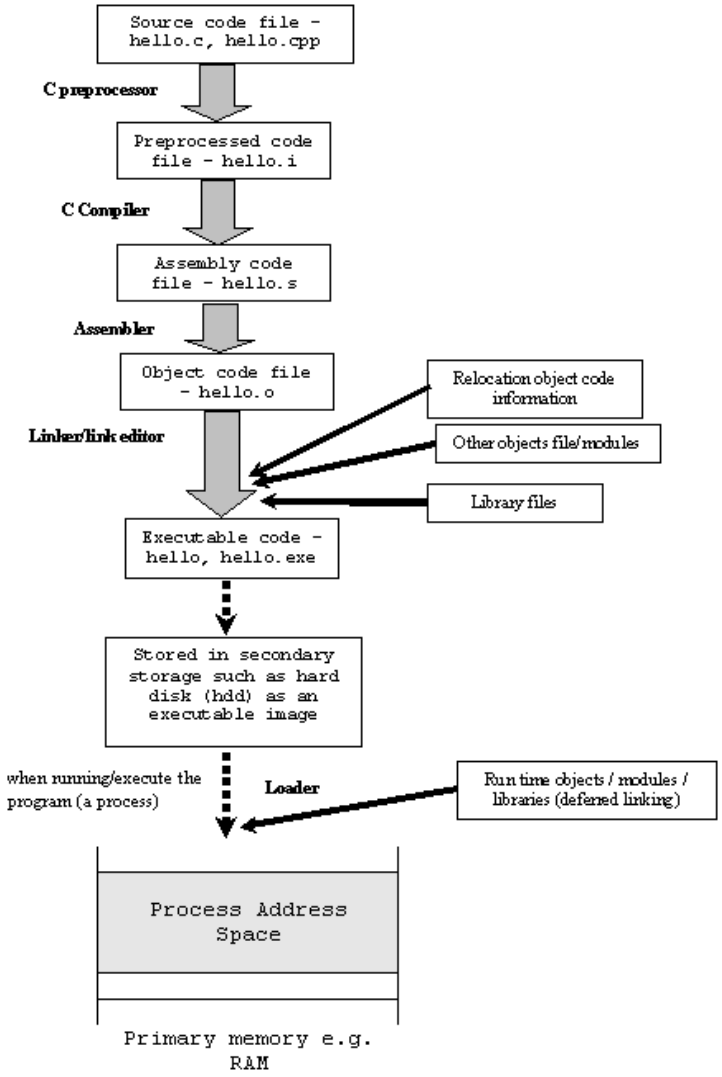


Figure 1-5 Address space layouts for 64-bit Windows

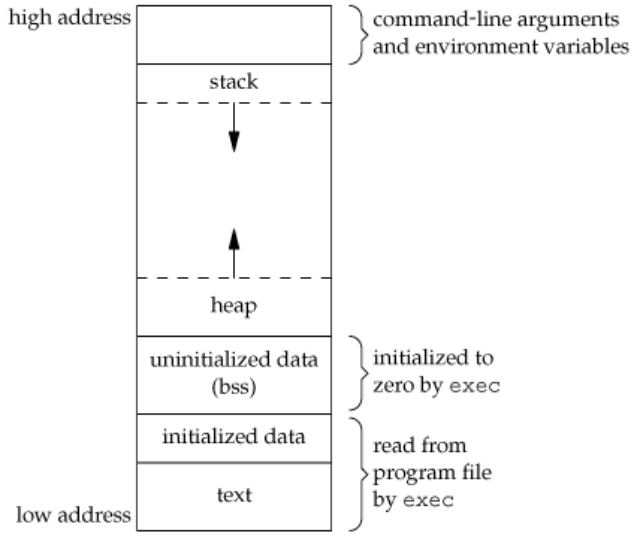
Compiling process

- Static libraries vs. Dynamic libraries
  - Static vs. Dynamic linking
- Compiling tools



Memory sections

- Memory sections of programs are mapped to memory segments at execution
  - Text section – code segment
  - Data, bss, heap – data segment
  - Stack section – stack segment



Compiling tools

- Linker
  - Various object files will include references to each others code and/or data
  - These shall need to be combined during the link time
  - After linking all of the object files together, the linker uses the relocation records to find all of the addresses that need to be filled in
  - It is accomplished by the symbol table that contains a list of names and their corresponding offsets in the text and data segments

Compiling tools

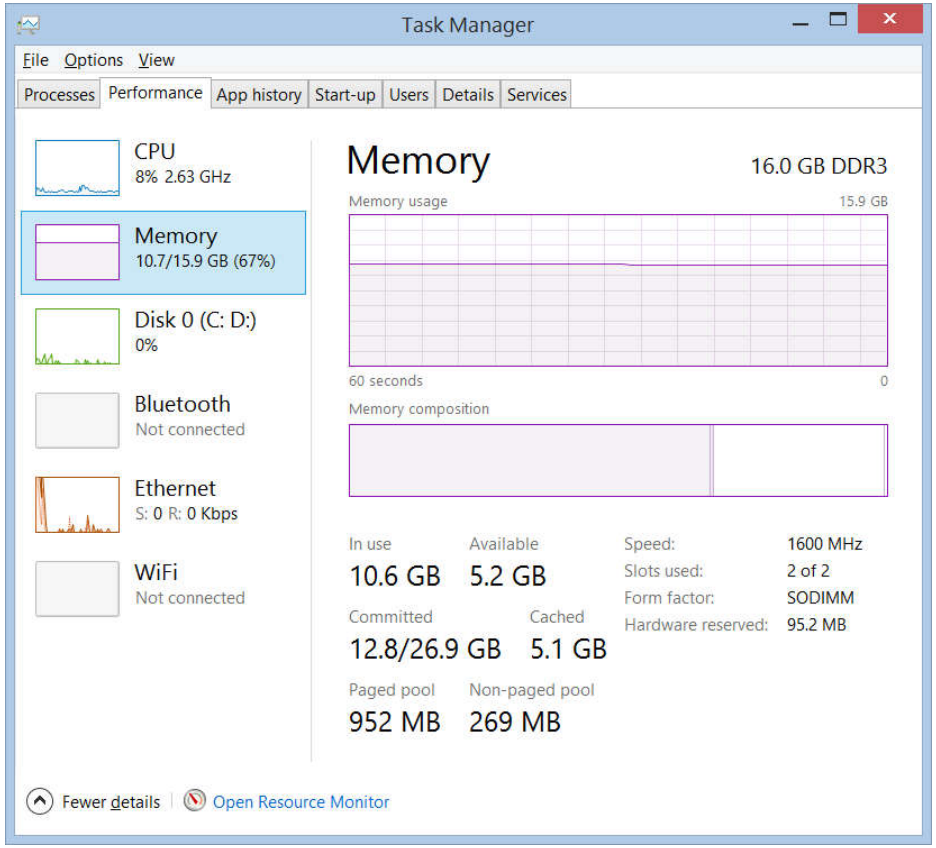
- Static linking
  - Program and the particular library that it's linked against are combined together by the linker at link time
  - The binding between the program and the particular library is fixed and known at link time before the program run
  - The drawback of this technique is that the executable is quite big in size, all the needed information need to be brought together

Compiling tools

- Dynamic linking
  - The program and the particular library it references are not combined together by the linker at link time
  - Instead, the linker places information into the executable that tells the loader which shared object module the code is in and which runtime linker should be used to find and bind the references
  - This means that the binding between the program and the shared object is done at runtime that is before the program starts, the appropriate shared objects are found and bound.

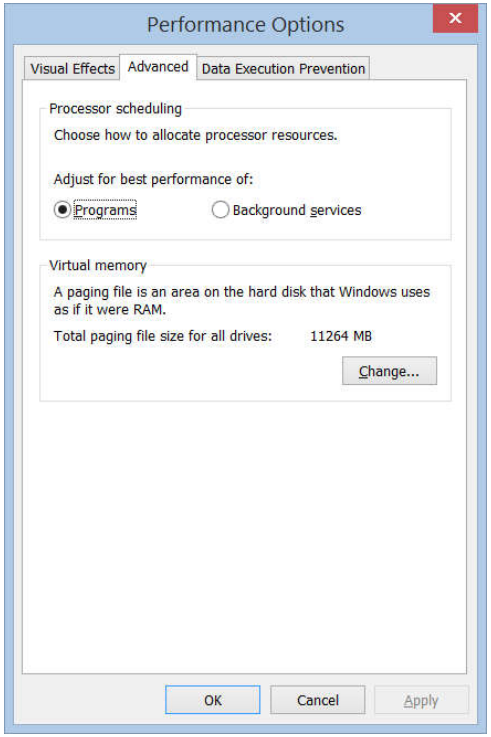
Memory usage

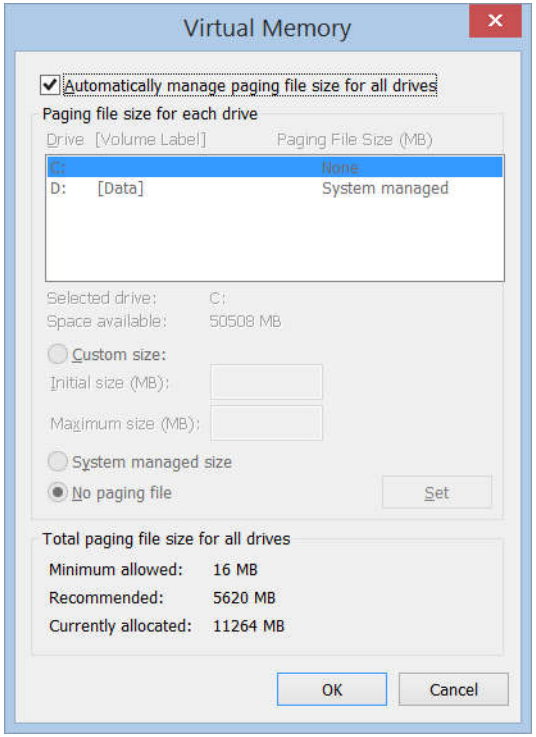
- Commited limit = RAM + pagefile



Memory usage

- System properties -> Advanced -> Performance options
  - Pagefile





System files

- pagefile.sys
- hiberfil.sys
- swapfile.sys