



1.2.1 Memory Management

Memory Management

Programs that are currently running are loaded into RAM so their instructions and data can be accessed by the CPU.

In order to have multiple programs running at the same time, memory must be allocated to each of these programs. This allocation is managed by the operating system which tracks which locations are currently in use and which are available to use.

To optimise the use of memory, it is split into sections using either **paging** or **segmentation**.

Paging

Paging divides memory into **fixed sized physical divisions** called pages.

Programs may be divided over several pages and may not even be in adjacent memory locations.

Pages can be loaded into RAM or moved out of RAM when needed.

Segmentation

Segmentation divides a program into **variable-sized logical sections** called segments. Each segment represents a logical part of the program, such as code, data or the stack

The size of these divisions depends on the program structure and flow.

Virtual Memory

If there is not enough memory in RAM to hold all programs currently running then virtual memory may be used.

A section of secondary storage is reserved as virtual memory and programs or sections of **programs that are not currently being used can be moved from RAM to virtual memory**, freeing RAM for other programs. When they are needed again, they can be moved back into RAM

Virtual memory is slower to access than RAM, so excessive use of virtual memory can reduce system performance.

