Betriebssysteme und Systemnahe Programmierung

Kapitel 7 • Memory Management

Winter 2016/17

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Monoprogramming without Swapping or Paging

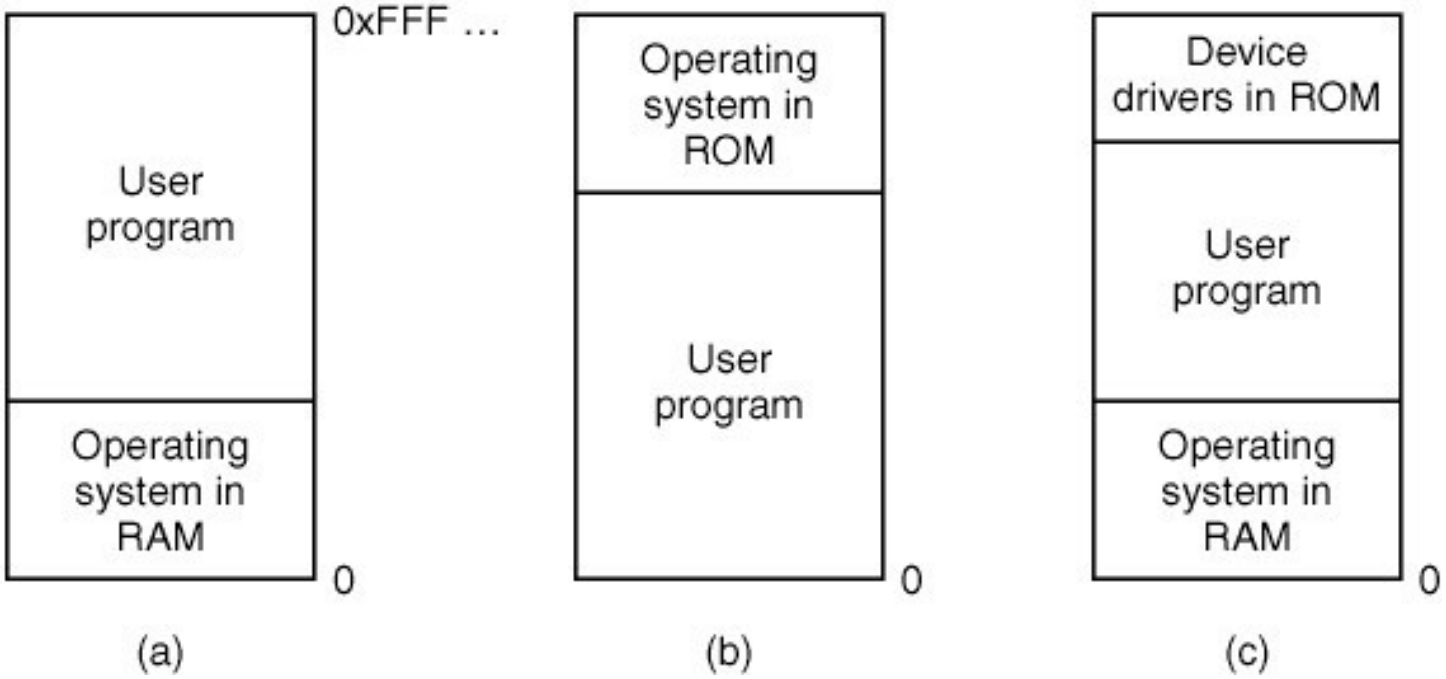
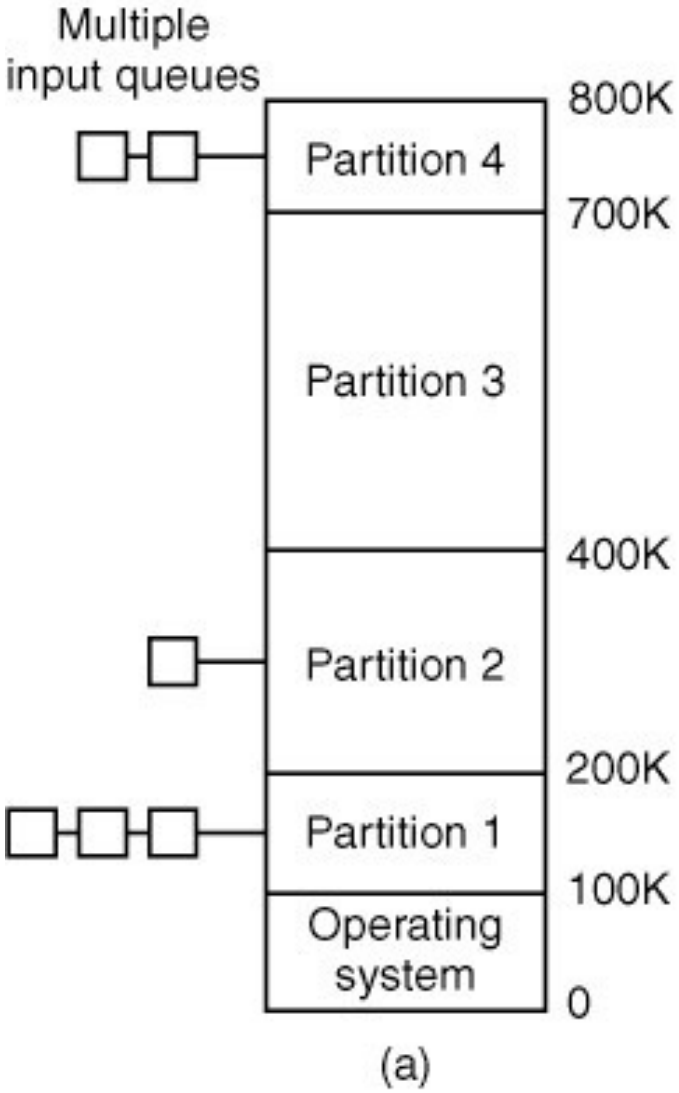


Figure 4-1. Three simple ways of organizing memory with an operating system and one user process. Other possibilities also exist.

Multiprogramming with Fixed Partitions (1)

Figure 4-2. (a) Fixed memory partitions with separate input queues for each partition.



Multiprogramming with Fixed Partitions (2)

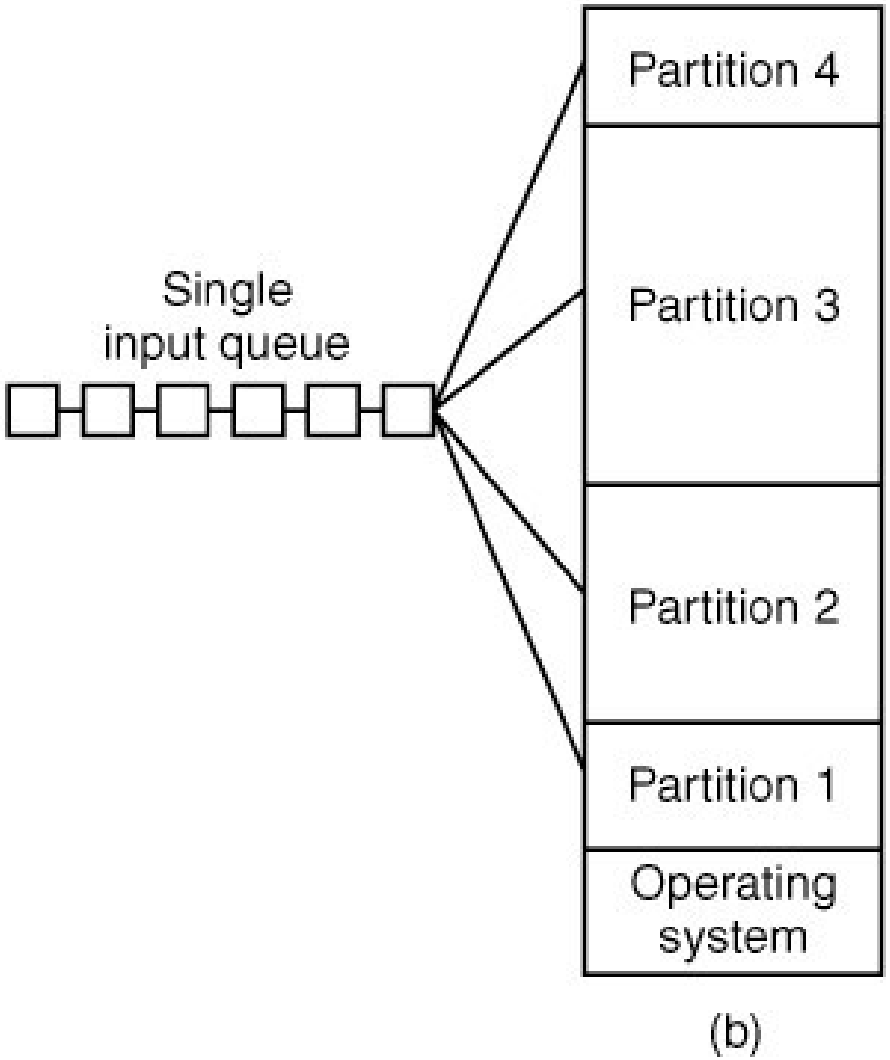


Figure 4-2. (b) Fixed memory partitions with a single input queue.

Swapping (1)

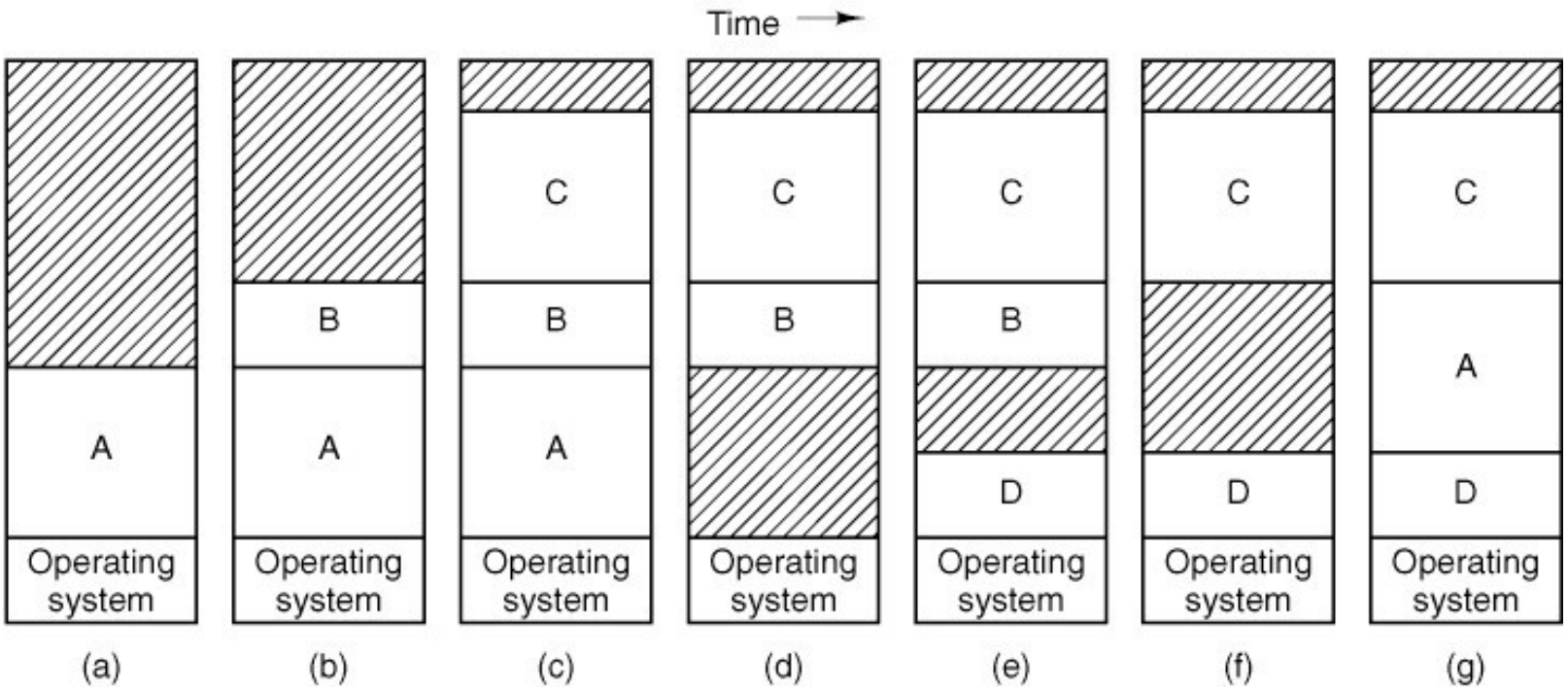


Figure 4-3. Memory allocation changes as processes come into memory and leave it. The shaded regions are unused memory.

Swapping (2)

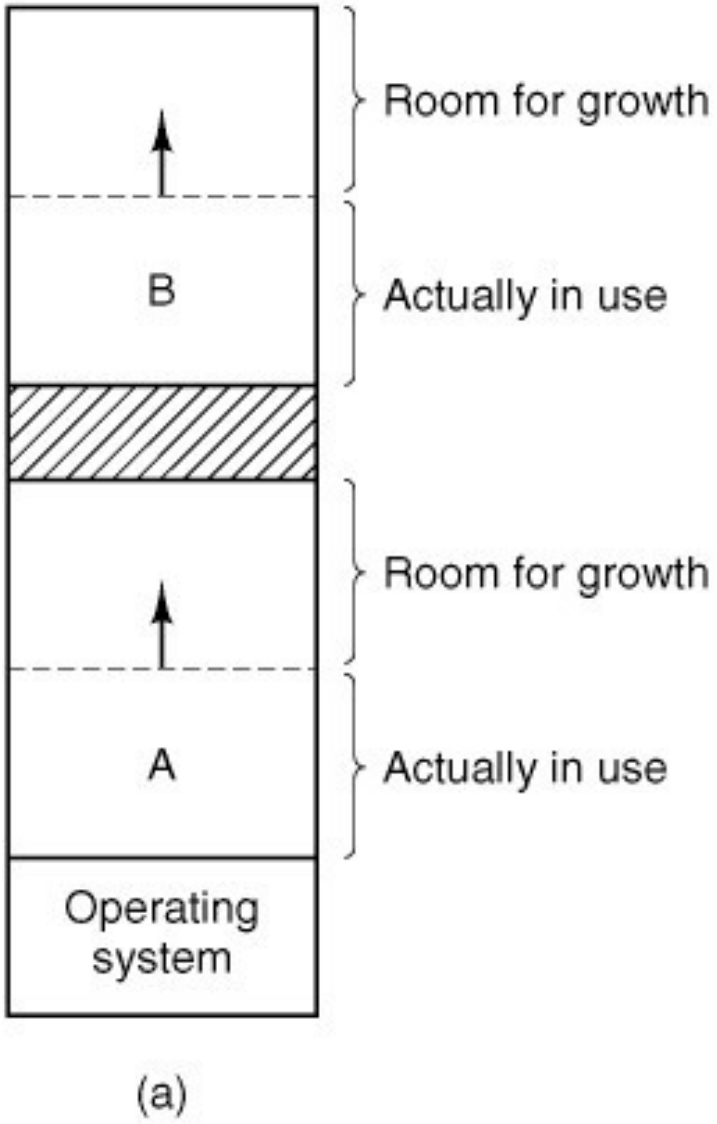
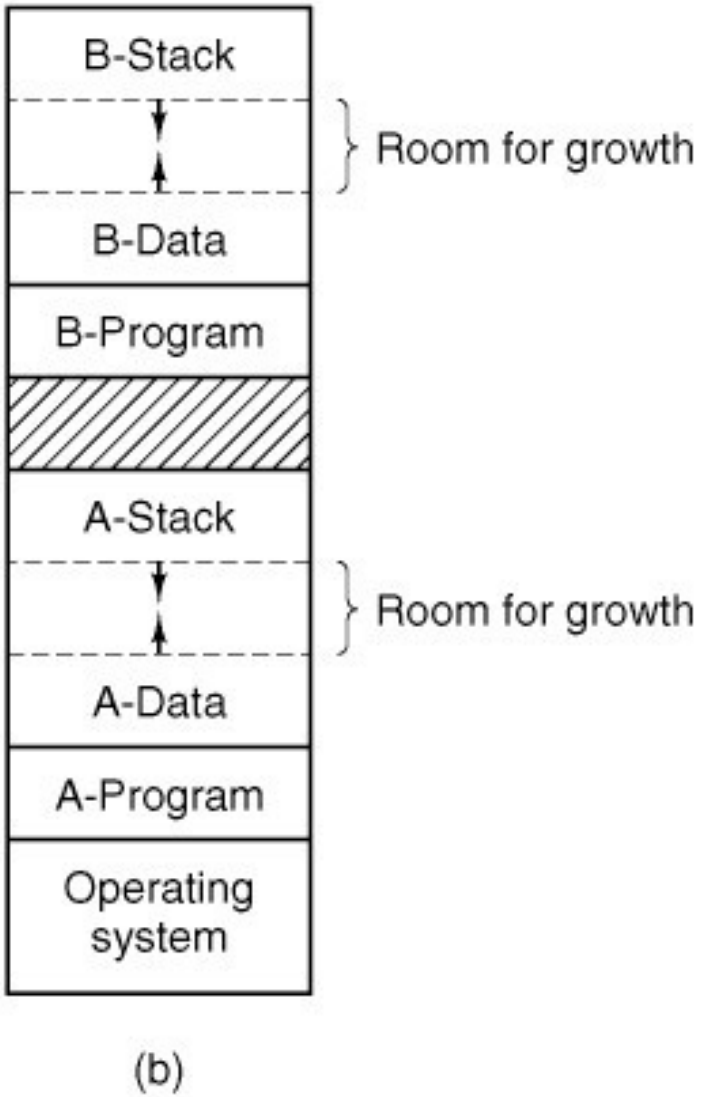


Figure 4-4. (a) Allocating space for a growing data segment.

Assuming contiguous processes (more, better options later)

Swapping (3)

Figure 4-4. (b) Allocating space for a growing stack and a growing data segment.



Memory Management with Bitmaps

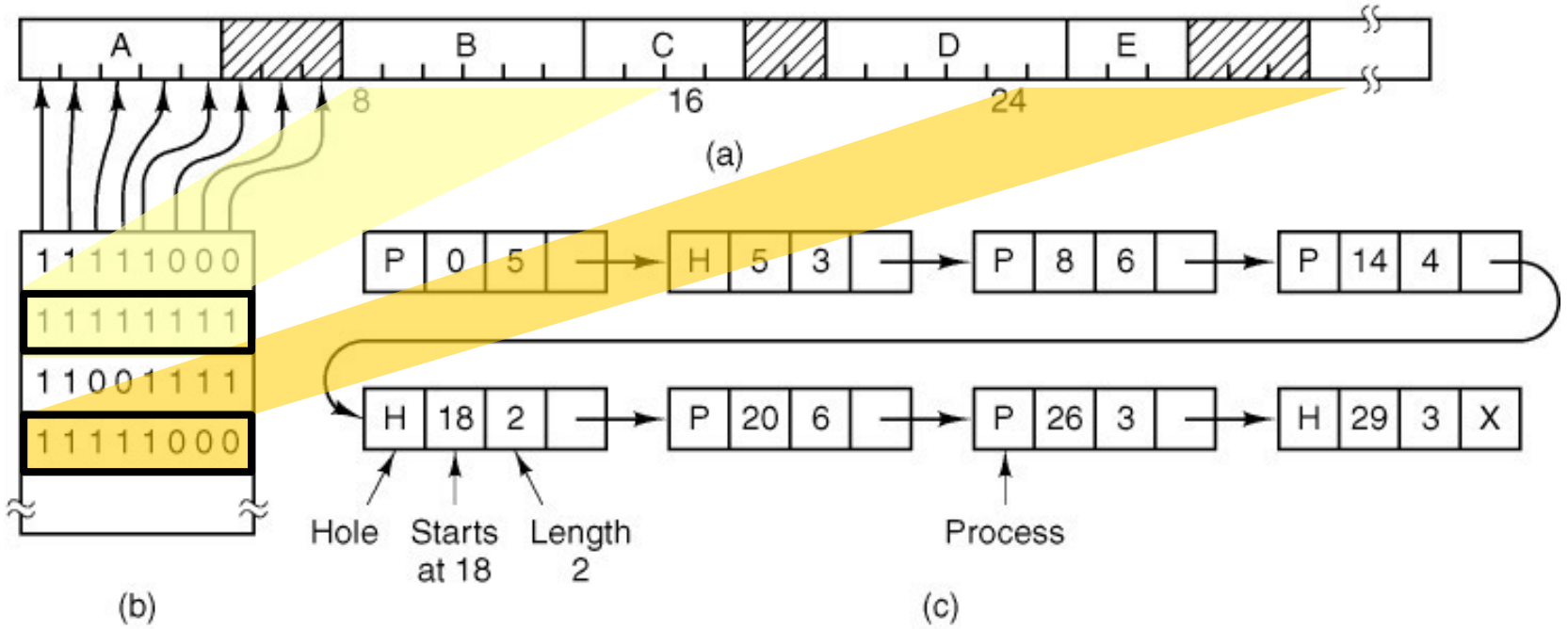


Figure 4-5. (a) A part of memory with five processes and three holes. The tick marks show the memory allocation units. The shaded regions (0 in the bitmap) are free. (b) The corresponding bitmap. (c) The same information as a list.

Memory Management with Linked Lists

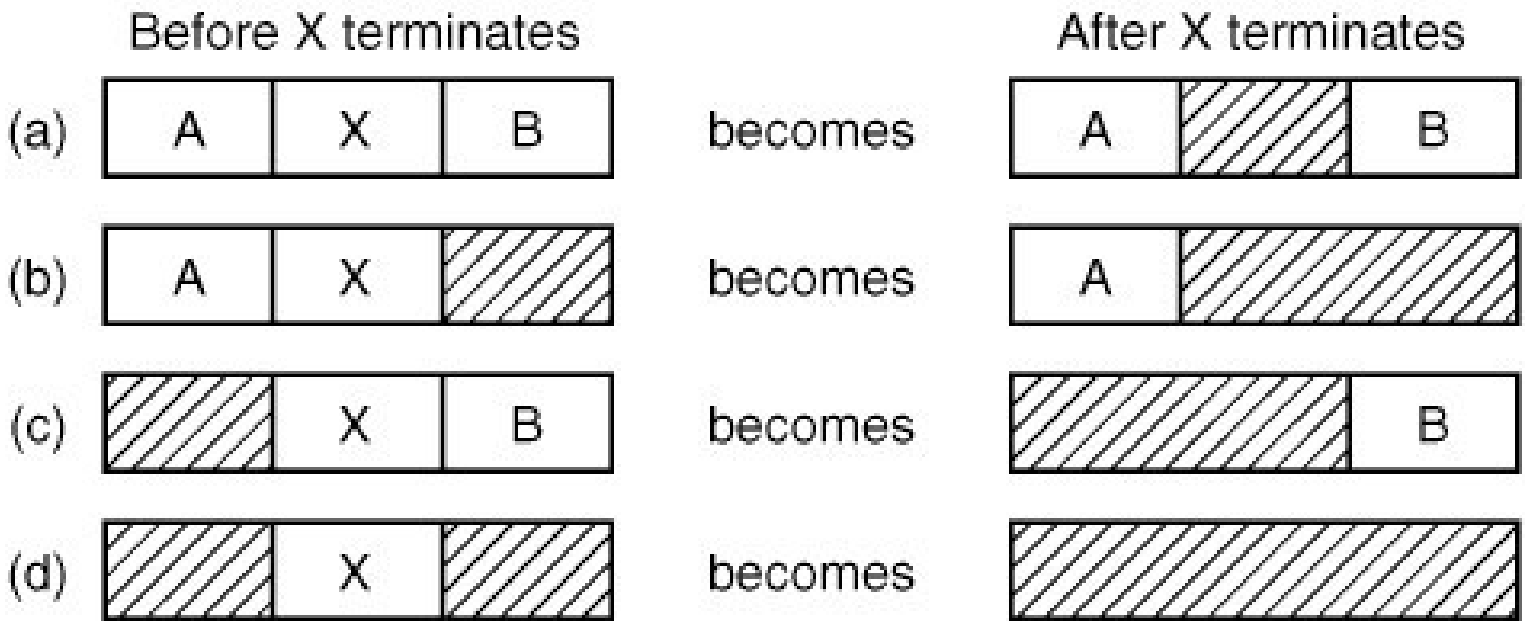


Figure 4-6. Four neighbor combinations for the terminating process, X.

Memory Allocation Algorithms

- First fit
  Use first hole big enough
- Next fit
  Use next hole big enough
- Best fit
  Search list for smallest hole big enough
- Worst fit
  Search list for largest hole available
- Quick fit
  Separate lists of commonly requested sizes

Which one is best? Advantages? Disadvantages?