

- 5.8 On a system using first-fit allocation, assume memory is allocated as specified in Fig. 5.10 before additional requests for 20K, 10K, and 5K (in that order) are received. At what starting address will each of the additional requests be allocated?

Used	Hole	Used	Hole	Used	Hole	Used	Hole	Used	Hole	Used	Hole
10K	10K	20K	30K	10K	5K	30K	20K	10K	15K	20K	20K

Fig. 5.10 Variable partition memory allocation

Answer:

First-fit searches for the first hole larger than or equal to 20K. The first hole is too small (10K). The second hole (30K) can accommodate the request. So the first request would be allocated at the start of the second hole, location, 40K. This would reduce the size of the second to 10K. Memory would now look as follows.

Used	Hole	Used	Hole	Used	Hole	Used	Hole	Used	Hole	Used	Hole
10K	10K	40K	10K	10K	5K	30K	20K	10K	15K	20K	20K

The second request for 10K would be allocated into the first hole at starting location 10K, eliminating the first hole. Memory would now look as follows.

Used	Hole	Used	Hole	Used	Hole	Used	Hole	Used	Hole
60K	10K	10K	5K	30K	20K	10K	15K	20K	20K

For the final request, the first hole not smaller than 5K starts at location 60K.

- 5.9 On a system using best-fit allocation, assume memory is allocated as specified in Fig. 5.10 before additional requests for 20K, 10K, and 5K (in that order) are received. At what starting address will each of the additional requests be allocated?

Answer:

Best fit searches for the smallest hole larger than or equal to 20K. The fourth hole is exactly 20K, making it the best fit. That hole starts at location $10K + 10K + 20K + 30K + 10K + 5K + 30K = 115K$. Memory would now look as follows.

Used	Hole	Used	Hole	Used	Hole	Used	Hole	Used	Hole
10K	10K	20K	30K	10K	5K	60K	15K	20K	20K

The second request for 10K would be allocated into the first hole at starting location 10K, eliminating the first hole. Memory would now look as follows.

Used	Hole	Used	Hole	Used	Hole	Used	Hole
40K	30K	10K	5K	60K	15K	20K	20K

The final request of 5K would be allocated to the hole of 5K that starts at location $60K + 10K + 10K = 80K$.

- 5.10 On a system using worst-fit allocation, assume memory is allocated as specified in Fig. 5.10 before additional requests for 20K, 10K and 5K (in that order) are received. At what starting address will each of the additional requests be allocated?

Answer:

Worst fit always allocates the largest hole, so the first request would be allocated to the second hole, 30K. The second hole starts at location 40K. Memory would now look as follows.

Used	Hole	Used	Hole	Used	Hole	Used	Hole	Used	Hole	Used	Hole
10K	10K	40K	10K	10K	5K	30K	20K	10K	15K	20K	20K

The fourth hole is now the largest and would be allocated to the second request. (The sixth hole is also 20K. It would be equally correct to derive a solution based on worst fit choosing the sixth hole instead of the fourth hole.) This hole starts at location $10K + 10K + 40K + 10K + 10K + 5K + 30K = 115K$. Memory would now look as follows.

Used	Hole	Used	Hole	Used	Hole	Used	Hole	Used	Hole	Used	Hole
10K	10K	40K	10K	10K	5K	40K	10K	10K	15K	20K	20K

Now the largest hole is the last one. The final request would be allocated starting at location $10K + 10K + 40K + 10K + 10K + 5K + 40K + 10K + 10K + 15K + 20K = 180K$.

- 5.11 On a system using next-fit allocation, assume memory is allocated as specified in Fig. 5.10 before additional requests for 20K, 10K, and 5K (in that order) are received. At what starting address will each of the additional requests be allocated?

Answer:

Next fit searches for the first hole larger than or equal to 20K. The first hole is too small (10K). The second hole (30K) can accommodate the request. So the first request would be allocated at the start of the second hole, location 40K. This would reduce the size of the second hole to 10K. Memory would now look as follows.

Used	Hole	Used	Hole	Used	Hole	Used	Hole	Used	Hole	Used	Hole
10K	10K	40K	10K	10K	5K	40K	20K	10K	15K	20K	20K

For the next request, next fit starts searching with the last allocated block. Starting the search with the second hole, the second hole is found to be able to accommodate the 10K request. Thus, the second request would be allocated starting at location 60K. Memory would now look as follows.

Used	Hole	Used	Hole	Used	Hole	Used	Hole	Used	Hole
10K	10K	60K	5K	30K	20K	10K	15K	20K	20K

The search for a hole for the third request would start at location 80K; the hole at that location would be selected for the third request.