

CSE 3033 - OPERATING SYSTEMS

PROJECT 3 REPORT

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CODE EXPLANATION

We generated structs for Publisher and Packagers, Buffers and books inside buffers. We created a linked list to keep the books in the buffers. We defined them with typedef.

These publishers and packgers contain threads.

When we create threads, we use threads within structs.

Main Function

After taking the sizes of publisher, packager and buffer as input, we generated the size using the malloc. Since each type has its own buffer, we generated a buffer array with malloc for each struct. Then, we generated semaphore arrays in order to control threads. Also, we used malloc for open a place for them. In this way, we tried to maintain communication between threads.

Buffers are generated by calling the createLinkedListBuffer function. Since we used a linked list for the Buffer, empty nodes are generated with given buffer size. Thus, buffers are generated each types. We generated threads for publisher and packager and sent them to required functions.

void createLinkedListBuffer(int length, int type);

Firstly, we generated a loop that returns as much as the type value we get as input. We have defined a linked list for each type in this loop. These linked lists are the buffers between publisher threads and packager threads.

Then, we generated empty nodes in the linked list with given size. Buffers of each type have been created.

```
void addLinkedListBuffer(int type, char *book_name, int thread_id);
```

Firstly, Bookname is determined exactly. Then, Packager goes into thread critical section and we check it with semaphore. In the buffer, bookBuffer navigates over the linked list. If it finds an empty place, it passes the information to the empty node. If there is no free space, it calls the createingLinkedListBuffer function and increases the existing size by two, and then books are added.

```
void *Package(void *threadPackager);
```

First of all, We cast our thread to my-package to use it in function. There is a while loop that returns until all buffers are empty and all threads exit the system. Then, we throw random numbers in the loop to find out which buffer to choose. Also, we check threads using semaphore and we start the packager process. Firstly, We check whether the buffer is full or not. If there is an element in the buffer, we get the first element to enter (FIFO -> first in first out). The element we received from the buffer we call our replaceBuffer function to remove it from the buffer. If our pack is full, we print them on the screen and empty our package. Exiting the while loop means that the threads of the publishers exit the system and the buffers are emptied. As the last process, the books left in the packages are printed.

```
void replaceBuffer (int type);
```

Our buffer consists of a linked list. By applying the first in first out method, the information of the book that should be included in the package is copied to the package. Information other than the copied information is shifted towards the node where the copied information is located. In this way, without deleting the node from the linked list information is being received. With this system, we are removing the book without changing the Buffer size. Buffer size is preserved, which is the most important part.

ERROR CHECK

```
ezgidogruer@pardus:~/Masaüstü$ ./project -n 2 3 4 -b 5 -s 6
Wrong input,try again
ezgidogruer@pardus:~/Masaüstü$ ./project -n 2 3 -b 5 -s 6 7
Wrong input,try again
ezgidogruer@pardus:~/Masaüstü$ ./project -n 2 3 -b -s 6 7
Wrong input,try again
ezgidogruer@pardus:~/Masaüstü$
```

OUTPUT

```
ezgidogruer@pardus:~/Masaüstü$ gcc project.c -o project -lpthread
ezgidogruer@pardus:~/Masaüstü$ ./project -n 2 3 4 -b 5 -s 6 7

Publisher 3 type 1      Book1_1 is published and put into the buffer 1.
Publisher 3 type 1      Book1_2 is published and put into the buffer 1.
Publisher 3 type 1      Book1_3 is published and put into the buffer 1.
Publisher 3 type 1      Book1_4 is published and put into the buffer 1.
Publisher 3 type 1      Book1_5 is published and put into the buffer 1.
Publisher 3 type 1      finished publishing 5 books.Exiting the system..
Publisher 1 type 2      Book2_1 is published and put into the buffer 2.
Publisher 1 type 2      Book2_2 is published and put into the buffer 2.
Publisher 1 type 2      Book2_3 is published and put into the buffer 2.
Publisher 1 type 2      Book2_4 is published and put into the buffer 2.
Publisher 1 type 2      Book2_5 is published and put into the buffer 2.
Publisher 1 type 2      finished publishing 5 books.Exiting the system..
Publisher 2 type 2      Book2_6 is published and put into the buffer 2.
Publisher 2 type 2      Book2_7 is published and put into the buffer 2.
Publisher 2 type 2      Buffer is full. Resizing the buffer.
Publisher 2 type 2      Book2_8 is published and put into the buffer 2.
Publisher 2 type 2      Book2_9 is published and put into the buffer 2.
Publisher 2 type 2      Book2_10 is published and put into the buffer 2.
Publisher 2 type 2      finished publishing 5 books.Exiting the system..
Publisher 3 type 2      Book2_11 is published and put into the buffer 2.
Publisher 3 type 2      Book2_12 is published and put into the buffer 2.
Publisher 3 type 2      Book2_13 is published and put into the buffer 2.
Publisher 3 type 2      Book2_14 is published and put into the buffer 2.
Publisher 3 type 2      Buffer is full. Resizing the buffer.
Publisher 3 type 2      Book2_15 is published and put into the buffer 2.
Publisher 3 type 2      finished publishing 5 books.Exiting the system..
Publisher 2 type 1      Book1_6 is published and put into the buffer 1.
Publisher 2 type 1      Book1_7 is published and put into the buffer 1.
Publisher 2 type 1      Buffer is full. Resizing the buffer.
Publisher 2 type 1      Book1_8 is published and put into the buffer 1.
Publisher 2 type 1      Book1_9 is published and put into the buffer 1.
Publisher 2 type 1      Book1_10 is published and put into the buffer 1.
Publisher 2 type 1      finished publishing 5 books.Exiting the system..
Publisher 1 type 1      Book1_11 is published and put into the buffer 1.
Publisher 1 type 1      Book1_12 is published and put into the buffer 1.
Publisher 1 type 1      Book1_13 is published and put into the buffer 1.
Publisher 1 type 1      Book1_14 is published and put into the buffer 1.
Publisher 1 type 1      Buffer is full. Resizing the buffer.
Publisher 1 type 1      Book1_15 is published and put into the buffer 1.
Publisher 1 type 1      finished publishing 5 books.Exiting the system..
Packager 4              Put Book2_1 into the package.
Packager 4              Put Book2_2 into the package.
Packager 4              Put Book1_1 into the package.
Packager 4              Put Book1_2 into the package.
```

continuation of the output :

```
Packager 4      Put Book2_3 into the package.
Packager 4      Put Book2_4 into the package.
Packager 4      Finished preparing one package. The package contains: Book2_1, Book2_2, Book1_1, Book1_2, Book2_3, Book2_4.
Packager 4      Put Book2_5 into the package.
Packager 4      Put Book2_6 into the package.
Packager 4      Put Book2_7 into the package.
Packager 4      Put Book2_8 into the package.
Packager 4      Put Book1_3 into the package.
Packager 4      Put Book1_4 into the package.
Packager 4      Finished preparing one package. The package contains: Book2_5, Book2_6, Book2_7, Book2_8, Book1_3, Book1_4.
Packager 4      Put Book2_9 into the package.
Packager 4      Put Book2_10 into the package.
Packager 4      Put Book2_11 into the package.
Packager 4      Put Book1_5 into the package.
Packager 4      Put Book2_12 into the package.
Packager 4      Put Book2_13 into the package.
Packager 4      Finished preparing one package. The package contains: Book2_9, Book2_10, Book2_11, Book1_5, Book2_12, Book2_13.
Packager 4      Put Book2_14 into the package.
Packager 4      Put Book2_15 into the package.
Packager 4      Put Book1_6 into the package.
Packager 4      Put Book1_7 into the package.
Packager 4      Put Book1_8 into the package.
Packager 4      Put Book1_9 into the package.
Packager 4      Finished preparing one package. The package contains: Book2_14, Book2_15, Book1_6, Book1_7, Book1_8, Book1_9.
Packager 4      Put Book1_10 into the package.
Packager 4      Put Book1_11 into the package.
Packager 4      Put Book1_12 into the package.
Packager 4      Put Book1_13 into the package.
Packager 4      Put Book1_14 into the package.
Packager 4      Put Book1_15 into the package.
Packager 4      Finished preparing one package. The package contains: Book1_10, Book1_11, Book1_12, Book1_13, Book1_14, Book1_15.
Packager 4      There are no publishers left in the system. Only 0 of 6 number of books could be packaged. The package contains: .
Packager 3      There are no publishers left in the system. Only 0 of 6 number of books could be packaged. The package contains: .
Packager 2      There are no publishers left in the system. Only 0 of 6 number of books could be packaged. The package contains: .
Packager 1      There are no publishers left in the system. Only 0 of 6 number of books could be packaged. The package contains: .
EXITING THE SYSTEM...
ezgidogruer@pardus:~/Masaüstü$
```


ANOTHER OUTPUT

```
ezgidogrue@pardus:~/Masaüstü$ ./project -n 4 4 3 -b 7 -s 6 5
```

```
Publisher 4 type 1      Book1_1 is published and put into the buffer 1.
Publisher 4 type 1      Book1_2 is published and put into the buffer 1.
Publisher 4 type 1      Book1_3 is published and put into the buffer 1.
Publisher 4 type 1      Book1_4 is published and put into the buffer 1.
Publisher 4 type 1      Book1_5 is published and put into the buffer 1.
Publisher 4 type 1      Buffer is full. Resizing the buffer.
Publisher 4 type 1      Book1_6 is published and put into the buffer 1.
Publisher 4 type 1      Book1_7 is published and put into the buffer 1.
Publisher 4 type 1      finished publishing 7 books.Exiting the system..
Publisher 1 type 2      Book2_1 is published and put into the buffer 2.
Publisher 1 type 2      Book2_2 is published and put into the buffer 2.
Publisher 1 type 2      Book2_3 is published and put into the buffer 2.
Publisher 1 type 2      Book2_4 is published and put into the buffer 2.
Publisher 1 type 2      Book2_5 is published and put into the buffer 2.
Publisher 1 type 2      Buffer is full. Resizing the buffer.
Publisher 1 type 2      Book2_6 is published and put into the buffer 2.
Publisher 1 type 2      Book2_7 is published and put into the buffer 2.
Publisher 1 type 2      finished publishing 7 books.Exiting the system..
Publisher 2 type 2      Book2_8 is published and put into the buffer 2.
Publisher 2 type 2      Book2_9 is published and put into the buffer 2.
Publisher 2 type 2      Book2_10 is published and put into the buffer 2.
Publisher 2 type 2      Buffer is full. Resizing the buffer.
Publisher 2 type 2      Book2_11 is published and put into the buffer 2.
Publisher 2 type 2      Book2_12 is published and put into the buffer 2.
Publisher 2 type 2      Book2_13 is published and put into the buffer 2.
Publisher 2 type 2      Book2_14 is published and put into the buffer 2.
Publisher 2 type 2      finished publishing 7 books.Exiting the system..
Publisher 3 type 2      Book2_15 is published and put into the buffer 2.
Publisher 3 type 2      Book2_16 is published and put into the buffer 2.
Publisher 3 type 2      Book2_17 is published and put into the buffer 2.
Publisher 3 type 2      Book2_18 is published and put into the buffer 2.
Publisher 3 type 2      Book2_19 is published and put into the buffer 2.
Publisher 3 type 2      Book2_20 is published and put into the buffer 2.
Publisher 3 type 2      Buffer is full. Resizing the buffer.
Publisher 3 type 2      Book2_21 is published and put into the buffer 2.
Publisher 3 type 2      finished publishing 7 books.Exiting the system..
Publisher 4 type 2      Book2_22 is published and put into the buffer 2.
Publisher 4 type 2      Book2_23 is published and put into the buffer 2.
Publisher 4 type 2      Book2_24 is published and put into the buffer 2.
Publisher 4 type 2      Book2_25 is published and put into the buffer 2.
Publisher 4 type 2      Book2_26 is published and put into the buffer 2.
Publisher 4 type 2      Book2_27 is published and put into the buffer 2.
Publisher 4 type 2      Book2_28 is published and put into the buffer 2.
Publisher 4 type 2      finished publishing 7 books.Exiting the system..
Publisher 1 type 3      Book3_1 is published and put into the buffer 3.
Publisher 1 type 3      Book3_2 is published and put into the buffer 3.
```

continuation of the second output :

```
Publisher 1 type 3    Book3_3 is published and put into the buffer 3.
Publisher 1 type 3    Book3_4 is published and put into the buffer 3.
Publisher 1 type 3    Book3_5 is published and put into the buffer 3.
Publisher 1 type 3    Buffer is full. Resizing the buffer.
Publisher 1 type 3    Book3_6 is published and put into the buffer 3.
Publisher 1 type 3    Book3_7 is published and put into the buffer 3.
Publisher 1 type 3    finished publishing 7 books.Exiting the system..
Publisher 2 type 3    Book3_8 is published and put into the buffer 3.
Publisher 2 type 3    Book3_9 is published and put into the buffer 3.
Publisher 2 type 3    Book3_10 is published and put into the buffer 3.
Publisher 2 type 3    Buffer is full. Resizing the buffer.
Publisher 2 type 3    Book3_11 is published and put into the buffer 3.
Publisher 2 type 3    Book3_12 is published and put into the buffer 3.
Publisher 2 type 3    Book3_13 is published and put into the buffer 3.
Publisher 2 type 3    Book3_14 is published and put into the buffer 3.
Publisher 2 type 3    finished publishing 7 books.Exiting the system..
Publisher 3 type 3    Book3_15 is published and put into the buffer 3.
Publisher 3 type 3    Book3_16 is published and put into the buffer 3.
Publisher 3 type 3    Book3_17 is published and put into the buffer 3.
Publisher 3 type 3    Book3_18 is published and put into the buffer 3.
Publisher 3 type 3    Book3_19 is published and put into the buffer 3.
Publisher 3 type 3    Book3_20 is published and put into the buffer 3.
Publisher 3 type 3    Buffer is full. Resizing the buffer.
Publisher 3 type 3    Book3_21 is published and put into the buffer 3.
Publisher 3 type 3    finished publishing 7 books.Exiting the system..
Publisher 3 type 1    Book1_8 is published and put into the buffer 1.
Publisher 3 type 1    Book1_9 is published and put into the buffer 1.
Publisher 3 type 1    Book1_10 is published and put into the buffer 1.
Publisher 3 type 1    Buffer is full. Resizing the buffer.
Publisher 3 type 1    Book1_11 is published and put into the buffer 1.
Publisher 3 type 1    Book1_12 is published and put into the buffer 1.
Publisher 3 type 1    Book1_13 is published and put into the buffer 1.
Publisher 3 type 1    Book1_14 is published and put into the buffer 1.
Publisher 3 type 1    finished publishing 7 books.Exiting the system..
Publisher 4 type 3    Book3_22 is published and put into the buffer 3.
Publisher 4 type 3    Book3_23 is published and put into the buffer 3.
Publisher 4 type 3    Book3_24 is published and put into the buffer 3.
Publisher 4 type 3    Book3_25 is published and put into the buffer 3.
Publisher 4 type 3    Book3_26 is published and put into the buffer 3.
Publisher 4 type 3    Book3_27 is published and put into the buffer 3.
Publisher 4 type 3    Book3_28 is published and put into the buffer 3.
Publisher 4 type 3    finished publishing 7 books.Exiting the system..
Publisher 1 type 4    Book4 1 is published and put into the buffer 4.
```


continuation of the second output :

```
Publisher 1 type 4      Book4_2 is published and put into the buffer 4.
Publisher 1 type 4      Book4_3 is published and put into the buffer 4.
Publisher 1 type 4      Book4_4 is published and put into the buffer 4.
Publisher 1 type 4      Book4_5 is published and put into the buffer 4.
Publisher 1 type 4      Buffer is full. Resizing the buffer.
Publisher 1 type 4      Book4_6 is published and put into the buffer 4.
Publisher 1 type 4      Book4_7 is published and put into the buffer 4.
Publisher 1 type 4      finished publishing 7 books.Exiting the system..
Publisher 2 type 4      Book4_8 is published and put into the buffer 4.
Publisher 2 type 4      Book4_9 is published and put into the buffer 4.
Publisher 2 type 4      Book4_10 is published and put into the buffer 4.
Publisher 2 type 4      Buffer is full. Resizing the buffer.
Publisher 2 type 4      Book4_11 is published and put into the buffer 4.
Publisher 2 type 4      Book4_12 is published and put into the buffer 4.
Publisher 2 type 4      Book4_13 is published and put into the buffer 4.
Publisher 2 type 4      Book4_14 is published and put into the buffer 4.
Publisher 2 type 4      finished publishing 7 books.Exiting the system..
Publisher 2 type 1      Book1_15 is published and put into the buffer 1.
Publisher 2 type 1      Book1_16 is published and put into the buffer 1.
Publisher 2 type 1      Book1_17 is published and put into the buffer 1.
Publisher 2 type 1      Book1_18 is published and put into the buffer 1.
Publisher 2 type 1      Book1_19 is published and put into the buffer 1.
Publisher 2 type 1      Book1_20 is published and put into the buffer 1.
Publisher 2 type 1      Buffer is full. Resizing the buffer.
Publisher 2 type 1      Book1_21 is published and put into the buffer 1.
Publisher 2 type 1      finished publishing 7 books.Exiting the system..
Publisher 3 type 4      Book4_15 is published and put into the buffer 4.
Publisher 3 type 4      Book4_16 is published and put into the buffer 4.
Publisher 3 type 4      Book4_17 is published and put into the buffer 4.
Publisher 3 type 4      Book4_18 is published and put into the buffer 4.
Publisher 3 type 4      Book4_19 is published and put into the buffer 4.
Publisher 3 type 4      Book4_20 is published and put into the buffer 4.
Publisher 3 type 4      Buffer is full. Resizing the buffer.
Publisher 3 type 4      Book4_21 is published and put into the buffer 4.
Publisher 3 type 4      finished publishing 7 books.Exiting the system..
Publisher 4 type 4      Book4_22 is published and put into the buffer 4.
Publisher 4 type 4      Book4_23 is published and put into the buffer 4.
Publisher 4 type 4      Book4_24 is published and put into the buffer 4.
Publisher 4 type 4      Book4_25 is published and put into the buffer 4.
Publisher 4 type 4      Book4_26 is published and put into the buffer 4.
Publisher 4 type 4      Book4_27 is published and put into the buffer 4.
Publisher 4 type 4      Book4_28 is published and put into the buffer 4.
Publisher 4 type 4      finished publishing 7 books.Exiting the system..
Publisher 1 type 1      Book1_22 is published and put into the buffer 1.
Publisher 1 type 1      Book1_23 is published and put into the buffer 1.
```

continuation of the second output :

```
Publisher 1 type 1      Book1_24 is published and put into the buffer 1.
Publisher 1 type 1      Book1_25 is published and put into the buffer 1.
Publisher 1 type 1      Book1_26 is published and put into the buffer 1.
Publisher 1 type 1      Book1_27 is published and put into the buffer 1.
Publisher 1 type 1      Book1_28 is published and put into the buffer 1.
Publisher 1 type 1      finished publishing 7 books.Exiting the system..
Packager 3      Put Book4_1 into the package.
Packager 3      Put Book4_2 into the package.
Packager 3      Put Book1_1 into the package.
Packager 3      Put Book4_3 into the package.
Packager 3      Put Book2_1 into the package.
Packager 3      Put Book4_4 into the package.
Packager 3      Finished preparing one package. The package contains: Book4_1, Book4_2, Book1_1, Book4_3, Book2_1, Book4_4.
Packager 3      Put Book4_5 into the package.
Packager 3      Put Book4_6 into the package.
Packager 3      Put Book3_1 into the package.
Packager 3      Put Book1_2 into the package.
Packager 3      Put Book4_7 into the package.
Packager 3      Put Book2_2 into the package.
Packager 3      Finished preparing one package. The package contains: Book4_5, Book4_6, Book3_1, Book1_2, Book4_7, Book2_2.
Packager 3      Put Book2_3 into the package.
Packager 3      Put Book2_4 into the package.
Packager 3      Put Book4_8 into the package.
Packager 3      Put Book3_2 into the package.
Packager 3      Put Book2_5 into the package.
Packager 3      Put Book3_3 into the package.
Packager 3      Finished preparing one package. The package contains: Book2_3, Book2_4, Book4_8, Book3_2, Book2_5, Book3_3.
Packager 3      Put Book1_3 into the package.
Packager 3      Put Book4_9 into the package.
Packager 3      Put Book4_10 into the package.
Packager 3      Put Book4_11 into the package.
Packager 3      Put Book3_4 into the package.
Packager 3      Put Book2_6 into the package.
Packager 3      Finished preparing one package. The package contains: Book1_3, Book4_9, Book4_10, Book4_11, Book3_4, Book2_6.
Packager 3      Put Book1_4 into the package.
Packager 3      Put Book4_12 into the package.
Packager 3      Put Book1_5 into the package.
Packager 3      Put Book4_13 into the package.
Packager 3      Put Book2_7 into the package.
Packager 3      Put Book1_6 into the package.
Packager 3      Finished preparing one package. The package contains: Book1_4, Book4_12, Book1_5, Book
```


continuation of the second output :

```
4_13, Book2_7, Book1_6.
Packager 3      Put Book4_14 into the package.
Packager 3      Put Book1_7 into the package.
Packager 3      Put Book4_15 into the package.
Packager 3      Put Book1_8 into the package.
Packager 3      Put Book4_16 into the package.
Packager 3      Put Book2_8 into the package.
Packager 3      Finished preparing one package. The package contains: Book4_14, Book1_7, Book4_15, Book1_8, Book4_16, Book2_8.
Packager 3      Put Book4_17 into the package.
Packager 3      Put Book3_5 into the package.
Packager 3      Put Book1_9 into the package.
Packager 3      Put Book3_6 into the package.
Packager 3      Put Book4_18 into the package.
Packager 3      Put Book4_19 into the package.
Packager 3      Finished preparing one package. The package contains: Book4_17, Book3_5, Book1_9, Book3_6, Book4_18, Book4_19.
Packager 3      Put Book4_20 into the package.
Packager 3      Put Book1_10 into the package.
Packager 3      Put Book1_11 into the package.
Packager 3      Put Book4_21 into the package.
Packager 3      Put Book3_7 into the package.
Packager 3      Put Book3_8 into the package.
Packager 3      Finished preparing one package. The package contains: Book4_20, Book1_10, Book1_11, Book4_21, Book3_7, Book3_8.
Packager 3      Put Book2_9 into the package.
Packager 3      Put Book3_9 into the package.
Packager 3      Put Book2_10 into the package.
Packager 3      Put Book1_12 into the package.
Packager 3      Put Book2_11 into the package.
Packager 3      Put Book1_13 into the package.
Packager 3      Finished preparing one package. The package contains: Book2_9, Book3_9, Book2_10, Book1_12, Book2_11, Book1_13.
Packager 3      Put Book3_10 into the package.
Packager 3      Put Book2_12 into the package.
Packager 3      Put Book4_22 into the package.
Packager 3      Put Book3_11 into the package.
Packager 3      Put Book1_14 into the package.
Packager 3      Put Book1_15 into the package.
Packager 3      Finished preparing one package. The package contains: Book3_10, Book2_12, Book4_22, Book3_11, Book1_14, Book1_15.
Packager 3      Put Book3_12 into the package.
Packager 3      Put Book1_16 into the package.
Packager 3      Put Book1_17 into the package.
Packager 3      Put Book2_13 into the package.
```

continuation of the second output :

```
Packager 3      Put Book1_18 into the package.
Packager 3      Put Book4_23 into the package.
Packager 3      Finished preparing one package. The package contains: Book3_12, Book1_16, Book1_17, Book2_13, Book1_18, Book4_23.
Packager 3      Put Book3_13 into the package.
Packager 3      Put Book4_24 into the package.
Packager 3      Put Book3_14 into the package.
Packager 3      Put Book3_15 into the package.
Packager 3      Put Book2_14 into the package.
Packager 3      Put Book2_15 into the package.
Packager 3      Finished preparing one package. The package contains: Book3_13, Book4_24, Book3_14, Book3_15, Book2_14, Book2_15.
Packager 3      Put Book3_16 into the package.
Packager 3      Put Book2_16 into the package.
Packager 3      Put Book2_17 into the package.
Packager 3      Put Book3_17 into the package.
Packager 3      Put Book1_19 into the package.
Packager 3      Put Book4_25 into the package.
Packager 3      Finished preparing one package. The package contains: Book3_16, Book2_16, Book2_17, Book3_17, Book1_19, Book4_25.
Packager 3      Put Book1_20 into the package.
Packager 3      Put Book2_18 into the package.
Packager 3      Put Book3_18 into the package.
Packager 3      Put Book3_19 into the package.
Packager 3      Put Book3_20 into the package.
Packager 3      Put Book4_26 into the package.
Packager 3      Finished preparing one package. The package contains: Book1_20, Book2_18, Book3_18, Book3_19, Book3_20, Book4_26.
Packager 3      Put Book3_21 into the package.
Packager 3      Put Book1_21 into the package.
Packager 3      Put Book2_19 into the package.
Packager 3      Put Book2_20 into the package.
Packager 3      Put Book3_22 into the package.
Packager 3      Put Book2_21 into the package.
Packager 3      Finished preparing one package. The package contains: Book3_21, Book1_21, Book2_19, Book2_20, Book3_22, Book2_21.
Packager 3      Put Book2_22 into the package.
Packager 3      Put Book1_22 into the package.
Packager 3      Put Book2_23 into the package.
Packager 3      Put Book2_24 into the package.
Packager 3      Put Book2_25 into the package.
Packager 3      Put Book2_26 into the package.
Packager 3      Finished preparing one package. The package contains: Book2_22, Book1_22, Book2_23, Book2_24, Book2_25, Book2_26.
Packager 3      Put Book1_23 into the package.
```

final part of the second output :

```
Packager 3      Put Book1_24 into the package.
Packager 3      Put Book2_27 into the package.
Packager 3      Put Book3_23 into the package.
Packager 3      Put Book3_24 into the package.
Packager 3      Put Book3_25 into the package.
Packager 3      Finished preparing one package. The package contains: Book1_23, Book1_24, Book2_27, Bo
ok3_23, Book3_24, Book3_25.
Packager 2      Put Book4_27 into the package.
Packager 2      Put Book1_25 into the package.
Packager 3      Put Book4_28 into the package.
Packager 3      Put Book2_28 into the package.
Packager 3      Put Book3_26 into the package.
Packager 3      Put Book3_27 into the package.
Packager 3      Put Book3_28 into the package.
Packager 2      Put Book1_26 into the package.
Packager 2      Put Book1_27 into the package.
Packager 2      Put Book1_28 into the package.
Packager 2      There are no publishers left in the system. Only 5 of 6 number of books could be packa
ge. The package contains: Book4_27, Book1_25, Book1_26, Book1_27, Book1_28.
Packager 3      There are no publishers left in the system. Only 5 of 6 number of books could be packa
ge. The package contains: Book4_28, Book2_28, Book3_26, Book3_27, Book3_28.
Packager 1      There are no publishers left in the system. Only 0 of 6 number of books could be packa
ge. The package contains: .
EXITING THE SYSTEM...
ezgidogruer@pardus:~/Masaüstü$
```