System Programming Homework 4 Report

How to solve issues in this HW?

I solved the synchronization problem by used 2 distinct System V semaphore mutex. I used one for 6 chief and wholesaler threads named mutex_sem and initialized 1.The other mutex (named wholesaler_mutex_sem and initialized 0) was used only to give the wholesaler the ingredients and wait for the specified chef to make the dessert, and to continue when he/she did.

I created semaphores in the program and 2 additional chef and wholesaler main functions. For the wholesaler while loop, I first waited on mutex_sem and created a critical section. I made 1 line reading here and I saved the materials I read in my buffer named buf which all threads can access. Then I posted mutex_sem and closed my critical section. After all this, I waited wholesaler_mutex_sem to get the ingredients he gave to the buf for the chefs and wait until the dessert is made.

On the other hand, with the help of the global array in the chef function, I distributed what materials it lacked. Then, in the while loop, if the materials in the buf are the materials it needs, I created a critical section by waiting for mutex_sem. In this critical section, he took the ingredients from buf and made dessert, then closed the critical section. After all, he/she posted wholesaler_mutex_sem so that the wholesaler can continue its loop.

In order for the chefs to be finished when the ingredient distribution is finished, when the file reading is finished by the wholesaler, I assigned buf to the characters defined as FINISHED. So the function is complete when the chefs see FINISHED characters.

Used Functions

void print_error(char error_message[]): Prints error in the STDERR.

void print_string(char string[]): Prints string in the STDOUT.

ssize_t read_lock(int fd, void *buf, size_t count): Reads with locking and returns number of read bytes.

void choose_random_lack_ingredient(char wanted_ingredients[]): Chooses the random lack ingredient for chefs.

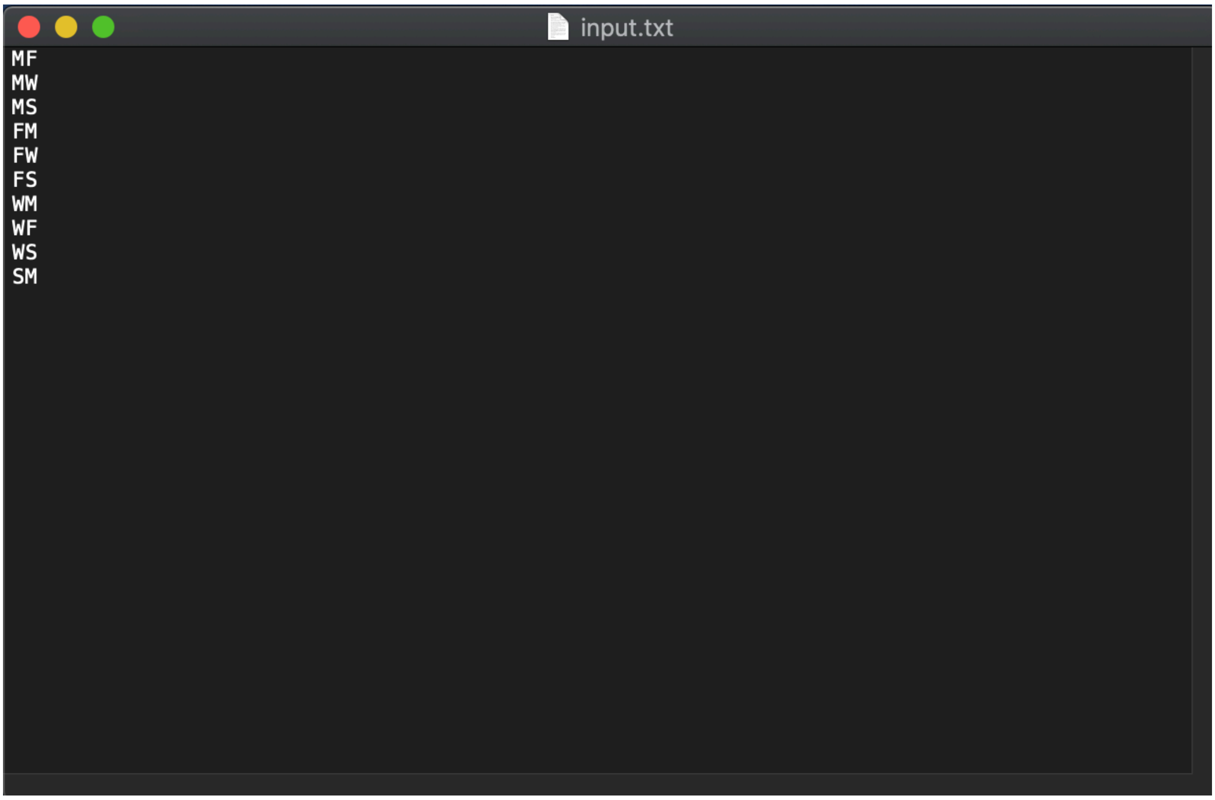
void *chef (void *arg): Thread function of the chef. It randomly takes the materials it needs and makes a güllaç and continues to wait.

void wholesaler(int fd): Function of the chef. Reads a file and gives the ingredients to chefs.

int main(int argc,char *argv[]): Firstly controls and initialize the parameters after that creates 2 semaphore and then creates 6 chef thread by using above chef(..) function. On the other hand calls wholesaler function. At the end frees all resources and exits.

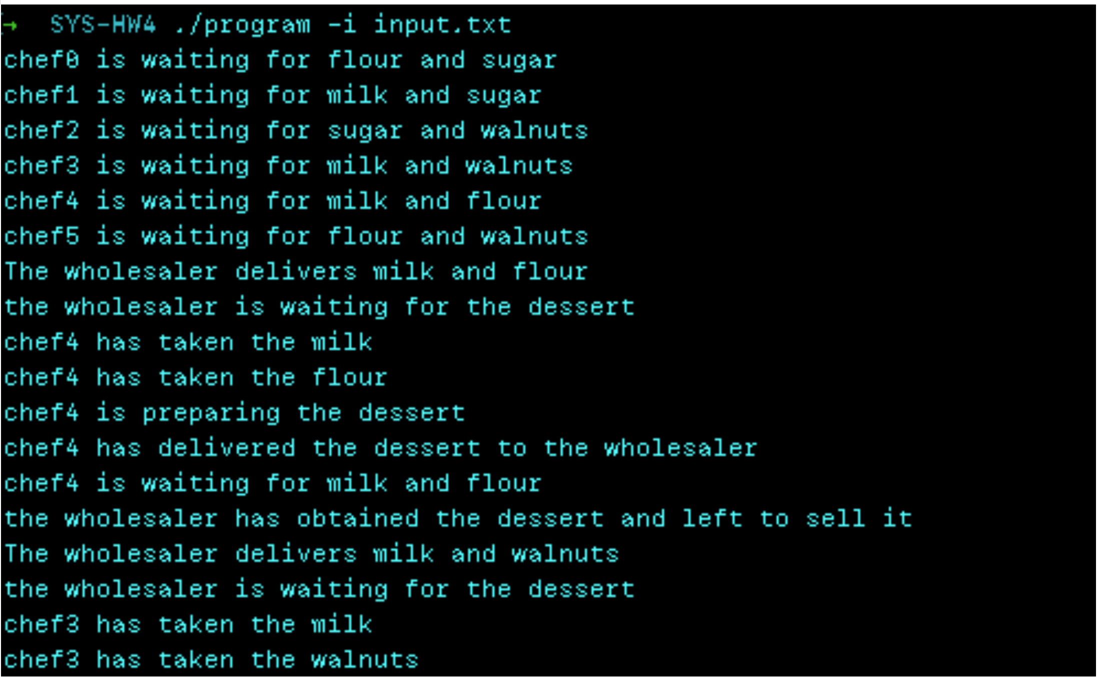
Sample Screenshots

Input file:



```
MF
MW
MS
FM
FW
FS
WM
WF
WS
SM
```

Outputs:



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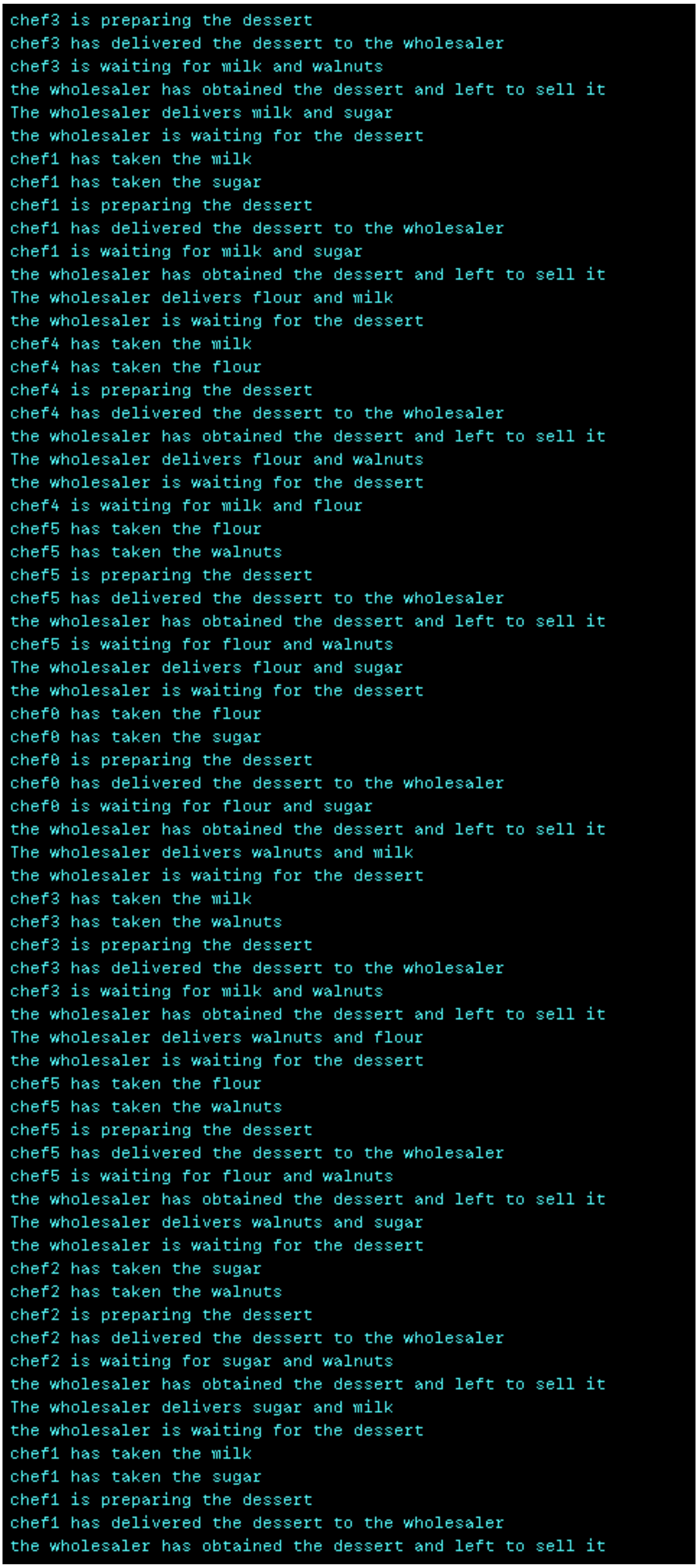
→  SYS-HW4 ./program -i input.txt
chef0 is waiting for flour and sugar
chef1 is waiting for milk and sugar
chef2 is waiting for sugar and walnuts
chef3 is waiting for milk and walnuts
chef4 is waiting for milk and flour
chef5 is waiting for flour and walnuts
The wholesaler delivers milk and flour
the wholesaler is waiting for the dessert
chef4 has taken the milk
chef4 has taken the flour
chef4 is preparing the dessert
chef4 has delivered the dessert to the wholesaler
chef4 is waiting for milk and flour
the wholesaler has obtained the dessert and left to sell it
The wholesaler delivers milk and walnuts
the wholesaler is waiting for the dessert
chef3 has taken the milk
chef3 has taken the walnuts
```



```
chef3 is preparing the dessert
chef3 has delivered the dessert to the wholesaler
chef3 is waiting for milk and walnuts
the wholesaler has obtained the dessert and left to sell it
The wholesaler delivers milk and sugar
the wholesaler is waiting for the dessert
chef1 has taken the milk
chef1 has taken the sugar
chef1 is preparing the dessert
chef1 has delivered the dessert to the wholesaler
chef1 is waiting for milk and sugar
the wholesaler has obtained the dessert and left to sell it
The wholesaler delivers flour and milk
the wholesaler is waiting for the dessert
chef4 has taken the milk
chef4 has taken the flour
chef4 is preparing the dessert
chef4 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
The wholesaler delivers flour and walnuts
the wholesaler is waiting for the dessert
chef4 is waiting for milk and flour
chef5 has taken the flour
chef5 has taken the walnuts
chef5 is preparing the dessert
chef5 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
chef5 is waiting for flour and walnuts
The wholesaler delivers flour and sugar
the wholesaler is waiting for the dessert
chef0 has taken the flour
chef0 has taken the sugar
chef0 is preparing the dessert
chef0 has delivered the dessert to the wholesaler
chef0 is waiting for flour and sugar
the wholesaler has obtained the dessert and left to sell it
The wholesaler delivers walnuts and milk
the wholesaler is waiting for the dessert
chef3 has taken the milk
chef3 has taken the walnuts
chef3 is preparing the dessert
chef3 has delivered the dessert to the wholesaler
chef3 is waiting for milk and walnuts
the wholesaler has obtained the dessert and left to sell it
The wholesaler delivers walnuts and flour
the wholesaler is waiting for the dessert
chef5 has taken the flour
chef5 has taken the walnuts
chef5 is preparing the dessert
chef5 has delivered the dessert to the wholesaler
chef5 is waiting for flour and walnuts
the wholesaler has obtained the dessert and left to sell it
The wholesaler delivers walnuts and sugar
the wholesaler is waiting for the dessert
chef2 has taken the sugar
chef2 has taken the walnuts
chef2 is preparing the dessert
chef2 has delivered the dessert to the wholesaler
chef2 is waiting for sugar and walnuts
the wholesaler has obtained the dessert and left to sell it
The wholesaler delivers sugar and milk
the wholesaler is waiting for the dessert
chef1 has taken the milk
chef1 has taken the sugar
chef1 is preparing the dessert
chef1 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
```