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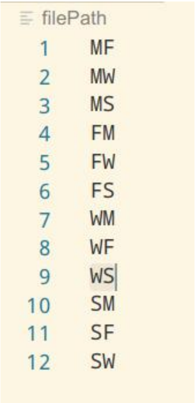
CSE344 HOMEWORK 4

1) Problem Solution

In this assignment, I made my usage message and getopt part first. Then I check if the user gives enough input. I check if the file he sent is opened or if he follows the rules stated in the homework. I am using the totalDoubleIngredient parameter when checking the file. This parameter is increasing every double delivery. For example, this parameter increases by reading MS, MW, FM values. So I learn how many deliveries in total. I define 2 of my semaphores behind. I used these semaphores as mutex and will tell you later. One of them is chef_mutex, the other is supplier_mutex. Then I create the thread array. The function I will send my threads to is make_gullac. I am sending chefID to this function. So I know which chef works in that function. Then I go from the file to the reading section. I read 3 characters from the file at the beginning of each loop. The first two characters represent the material to be sent, and the last character represents '\ n'. I keep the number of materials in my ingredientCount array each time I read them. The size of this array is 4 (M F W S). Supplier_mutex comes into play in this loop. This mutex initially starts from 0. And since he has to wait for the dessert after increasing the materials to be sent to the array, the supplier is kept with sem_wait (supplier_mutex). This mutex is posted when any chef finishes the dessert. The currentDoubleIngredient value increases each time the Supplier sends the material. This value checks whether all the values in the file are read. If the currentDoubleIngredient value is equal to the totalDoubleIngredient value, the program is terminated. After this cycle, pthread_join is run to wait for the threads to finish running. Thus, the zombie process is prevented. Finally, the make_gullac function remains. This function works as an infinite loop since it is not known how many times it will run. Exits the loop when the currentDoubleIngredient value equals the totalDoubleIngredient value. Here, first of all, which chief works. Then, the ingredientCount array is checked because each chef has special needs. If there are two materials needed for the chef (not just one), the value of these materials in the array is reduced. And sleep (randomNumber) is called by generating a random number between 1 and 5. And the supplier_mutex semaphore is posted. Thus, the supplier can continue to send materials. Necessary messages are printed during these processes. Also, sem_wait (chef_mutex) is called at the beginning of the cycle. It is used in order not to spoil the structure of the program. At the end of the cycle, this semaphore is posted.

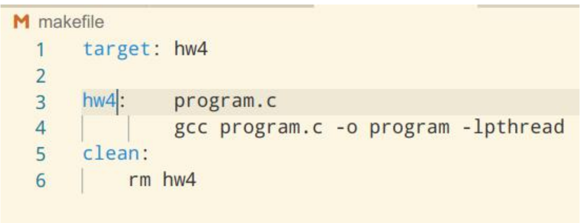
2) Output

A) filePath



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

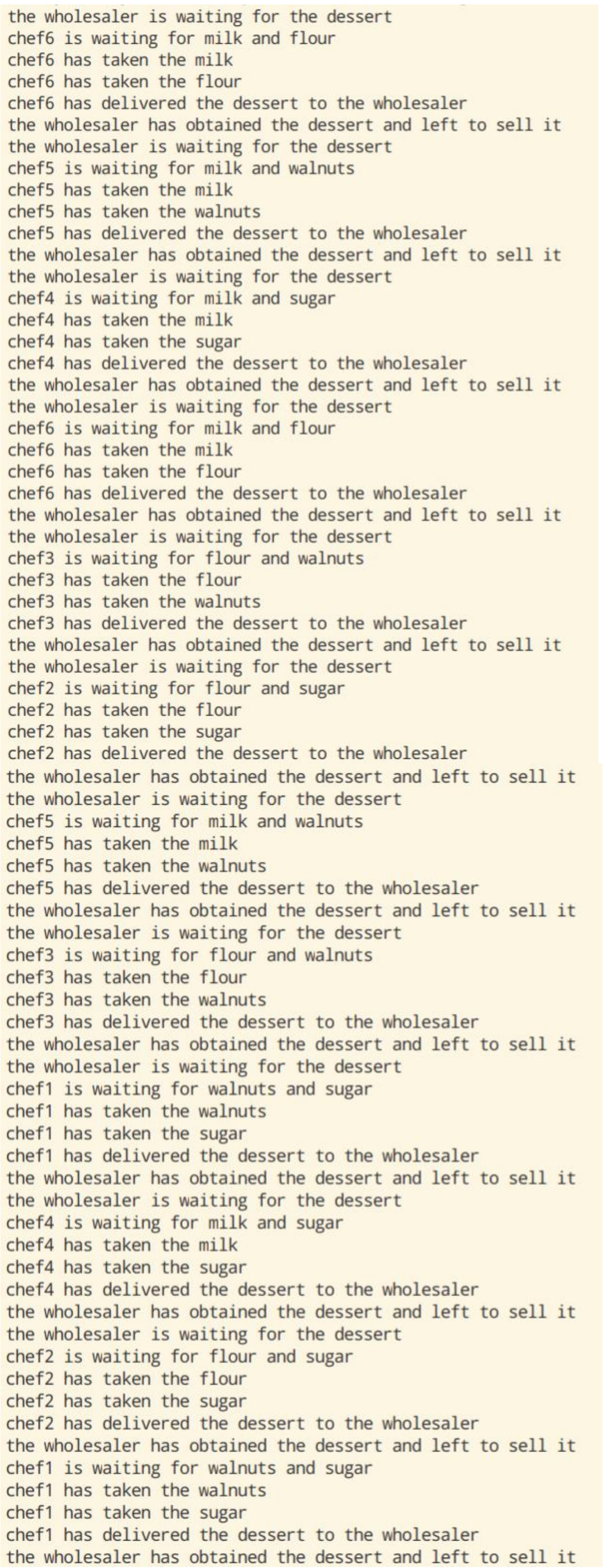
B) Makefile



```
target: hw4

hw4:		program.c
		gcc program.c -o program -lpthread
clean:
	rm hw4
```

C) Terminal



```
the wholesaler is waiting for the dessert
chef6 is waiting for milk and flour
chef6 has taken the milk
chef6 has taken the flour
chef6 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
the wholesaler is waiting for the dessert
chef5 is waiting for milk and walnuts
chef5 has taken the milk
chef5 has taken the walnuts
chef5 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
the wholesaler is waiting for the dessert
chef4 is waiting for milk and sugar
chef4 has taken the milk
chef4 has taken the sugar
chef4 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
the wholesaler is waiting for the dessert
chef6 is waiting for milk and flour
chef6 has taken the milk
chef6 has taken the flour
chef6 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
the wholesaler is waiting for the dessert
chef3 is waiting for flour and walnuts
chef3 has taken the flour
chef3 has taken the walnuts
chef3 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
the wholesaler is waiting for the dessert
chef2 is waiting for flour and sugar
chef2 has taken the flour
chef2 has taken the sugar
chef2 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
the wholesaler is waiting for the dessert
chef5 is waiting for milk and walnuts
chef5 has taken the milk
chef5 has taken the walnuts
chef5 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
the wholesaler is waiting for the dessert
chef3 is waiting for flour and walnuts
chef3 has taken the flour
chef3 has taken the walnuts
chef3 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
the wholesaler is waiting for the dessert
chef1 is waiting for walnuts and sugar
chef1 has taken the walnuts
chef1 has taken the sugar
chef1 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
the wholesaler is waiting for the dessert
chef4 is waiting for milk and sugar
chef4 has taken the milk
chef4 has taken the sugar
chef4 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
the wholesaler is waiting for the dessert
chef2 is waiting for flour and sugar
chef2 has taken the flour
chef2 has taken the sugar
chef2 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
chef1 is waiting for walnuts and sugar
chef1 has taken the walnuts
chef1 has taken the sugar
chef1 has delivered the dessert to the wholesaler
the wholesaler has obtained the dessert and left to sell it
```