Ahmet DENİZLİ 161044020

CSE344 System Programming HW3 Report

1. Design

I adapt the cigarette smokers solution to this problem. In this problem we are preparing güllaç and needs 4 ingredients which are milk (M), flour (F), walnuts (W), and sugar (S).

I created 4 pusher process for 4 ingredients. Each pusher wait its igredient and checks whether its first igredient or second. If its first ingredient, change its flag to the 1 and then waits again. If its second ingredient, checks first ingredient and post to the correct chef. There are 4 semaphores for each ingredient and 1 mutex semaphore for the synchronization.

There is 6 chef and each chef waits his lack ingredients. When any chef takes the ingredients from the pusher, he prepares the dessert and delivers it to the wholesaler. Every chef has a semaphore for him.

The wholesaler opens the input file, reads the file, store ingredient to the array and sends it to the pushers. Then waits the dessert from the chefs. After all ingredients readed from the file sends sigint signal to the chefs and pushers. Then the wholesaler collects the return values of the chef processes, and prints the total number of desserts delivered to him. There is 1 semaphore for wholesaler.

In hw3unnamed, everything is the same but semaphores are unnamed and used in shared memory.

2. Signal Handling

Defined sigint handler function with sigaction for the chefs and pushers to exit. When takes SIGINT signal, changes the global sigint flag to 1. All processes breaks, free their resources and exits.

3. Functions

3.1. hw3named.c

void pusherFun(int i): This function performs process for pushers. It waits ingredient from wholesaler, when getting first ingredient change its flag to 1. When the other pusher gets the second ingredient, checks first ingredient and post to the correct chef. Then changes first ingredient flag to 0.

void errExit(char *s): This function prints given error via perror then exits.

void sigint_handler(int signum): Handler for SIGINT and SIGTERM for wholesaler.

void sigint_handler2(int signum): Handler for SIGINT and SIGTERM for chefs and pushers.

int main(int argc, char *argv[]): Creates chefs and pushers and create shared memory.

Chefs waits ingredients from the pushers, then prepares the dessert and delivers it to the wholesaler.

The wholesaler opens the input file, reads the file and sends ingredient to the pushers. Then waits the dessert from the chefs. After all ingredients readed from the file sends sigint signal to the chefs and pushers. Then the wholesaler collects the return values of the chef processes, and prints the total number of desserts delivered to him.

3.2. hw3unnamed.c

void pusherFun(int i): This function performs process for pushers. It waits ingredient from wholesaler, when getting first ingredient change its flag to 1. When the other pusher gets the second ingredient, checks first ingredient and post to the correct chef. Then changes first ingredient flag to 0.

void errExit(char *s): This function prints given error via perror then exits.

void sigint_handler(int signum): Handler for SIGINT and SIGTERM for wholesaler.

void sigint_handler2(int signum): Handler for SIGINT and SIGTERM for chefs and pushers.

void init_semaphores(): This function initializes the unnamed semaphores required by the program.

void dest_semaphores(): This function destroys the unnamed semaphores.

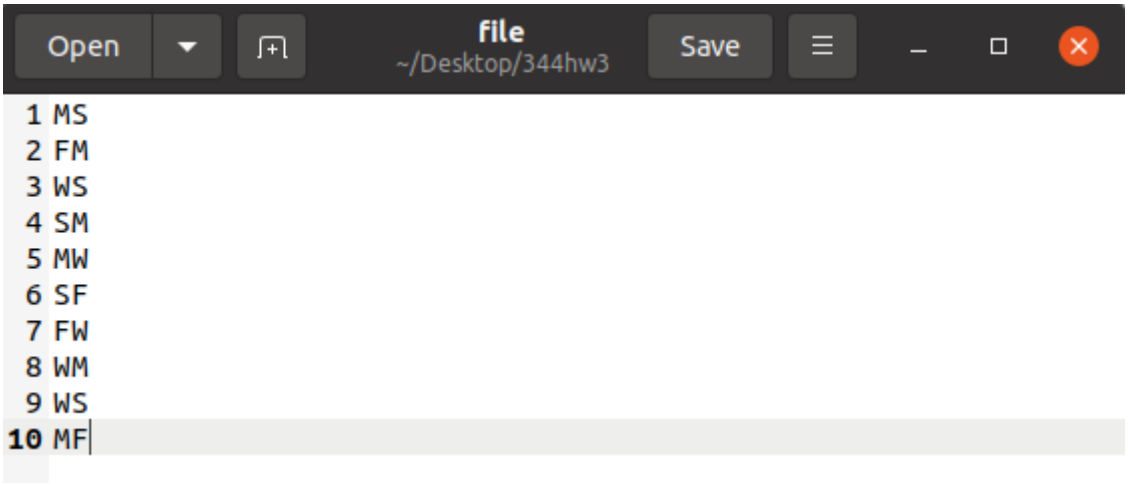
int main(int argc, char *argv[]): Creates chefs and pushers and create shared memory.

Chefs waits ingredients from the pushers, then prepares the dessert and delivers it to the wholesaler.

The wholesaler opens the input file, reads the file and sends ingredient to the pushers. Then waits the dessert from the chefs. After all ingredients readed from the file sends sigint signal to the chefs and pushers. Then the wholesaler collects the return values of the chef processes, and prints the total number of desserts delivered to him.

4. Sample Screenshots

Input File



Output

```
ubuntu@ubuntu:~/Desktop/344hw3$ ./hw3named -i file -n name
chef0 (pid 44639) is waiting for W and S (ingredients array [-,-])
chef3 (pid 44642) is waiting for M and F (ingredients array [-,-])
chef4 (pid 44643) is waiting for M and W (ingredients array [-,-])
chef5 (pid 44644) is waiting for S and M (ingredients array [-,-])
the wholesaler (pid 44638) delivers M and S
the wholesaler (pid 44638) is waiting for the dessert
chef5 (pid 44644) has taken the M (ingredients array [M,S])
chef5 (pid 44644) has taken the S (ingredients array [-,S])
chef5 (pid 44644) is preparing the dessert (ingredients array [-,-])
chef5 (pid 44644) has delivered the dessert (ingredients array [-,-])
chef5 (pid 44644) is waiting for S and M (ingredients array [-,-])
the wholesaler (pid 44638) has obtained the dessert and left
the wholesaler (pid 44638) delivers F and M
the wholesaler (pid 44638) is waiting for the dessert
chef3 (pid 44642) has taken the F (ingredients array [F,M])
chef3 (pid 44642) has taken the M (ingredients array [-,M])
chef3 (pid 44642) is preparing the dessert (ingredients array [-,-])
chef3 (pid 44642) has delivered the dessert (ingredients array [-,-])
chef3 (pid 44642) is waiting for M and F (ingredients array [-,-])
the wholesaler (pid 44638) has obtained the dessert and left
the wholesaler (pid 44638) delivers W and S
the wholesaler (pid 44638) is waiting for the dessert
chef0 (pid 44639) has taken the W (ingredients array [W,S])
chef0 (pid 44639) has taken the S (ingredients array [-,S])
chef0 (pid 44639) is preparing the dessert (ingredients array [-,-])
chef0 (pid 44639) has delivered the dessert (ingredients array [-,-])
chef0 (pid 44639) is waiting for W and S (ingredients array [-,-])
the wholesaler (pid 44638) has obtained the dessert and left
the wholesaler (pid 44638) delivers S and M
the wholesaler (pid 44638) is waiting for the dessert
```

```
chef2 (pid 44641) is waiting for S and F (ingredients array [S,M])
chef5 (pid 44644) has taken the S (ingredients array [S,M])
chef5 (pid 44644) has taken the M (ingredients array [-,M])
chef5 (pid 44644) is preparing the dessert (ingredients array [-,-])
chef5 (pid 44644) has delivered the dessert (ingredients array [-,-])
chef5 (pid 44644) is waiting for S and M (ingredients array [-,-])
the wholesaler (pid 44638) has obtained the dessert and left
the wholesaler (pid 44638) delivers M and W
the wholesaler (pid 44638) is waiting for the dessert
chef1 (pid 44640) is waiting for F and W (ingredients array [M,W])
chef4 (pid 44643) has taken the M (ingredients array [M,W])
chef4 (pid 44643) has taken the W (ingredients array [-,W])
chef4 (pid 44643) is preparing the dessert (ingredients array [-,-])
chef4 (pid 44643) has delivered the dessert (ingredients array [-,-])
chef4 (pid 44643) is waiting for M and W (ingredients array [-,-])
the wholesaler (pid 44638) has obtained the dessert and left
the wholesaler (pid 44638) delivers S and F
the wholesaler (pid 44638) is waiting for the dessert
chef2 (pid 44641) has taken the S (ingredients array [S,F])
chef2 (pid 44641) has taken the F (ingredients array [-,F])
chef2 (pid 44641) is preparing the dessert (ingredients array [-,-])
chef2 (pid 44641) has delivered the dessert (ingredients array [-,-])
the wholesaler (pid 44638) has obtained the dessert and left
the wholesaler (pid 44638) delivers F and W
the wholesaler (pid 44638) is waiting for the dessert
chef2 (pid 44641) is waiting for S and F (ingredients array [F,W])
chef1 (pid 44640) has taken the F (ingredients array [F,W])
chef1 (pid 44640) has taken the W (ingredients array [-,W])
chef1 (pid 44640) is preparing the dessert (ingredients array [-,-])
chef1 (pid 44640) has delivered the dessert (ingredients array [-,-])
the wholesaler (pid 44638) has obtained the dessert and left
the wholesaler (pid 44638) delivers W and M
the wholesaler (pid 44638) is waiting for the dessert
chef1 (pid 44640) is waiting for F and W (ingredients array [W,M])
chef4 (pid 44643) has taken the W (ingredients array [W,M])
chef4 (pid 44643) has taken the M (ingredients array [-,M])
chef4 (pid 44643) is preparing the dessert (ingredients array [-,-])
chef4 (pid 44643) has delivered the dessert (ingredients array [-,-])
chef4 (pid 44643) is waiting for M and W (ingredients array [-,-])
the wholesaler (pid 44638) has obtained the dessert and left
the wholesaler (pid 44638) delivers W and S
the wholesaler (pid 44638) is waiting for the dessert
chef0 (pid 44639) has taken the W (ingredients array [W,S])
chef0 (pid 44639) has taken the S (ingredients array [-,S])
chef0 (pid 44639) is preparing the dessert (ingredients array [-,-])
chef0 (pid 44639) has delivered the dessert (ingredients array [-,-])
chef0 (pid 44639) is waiting for W and S (ingredients array [-,-])
the wholesaler (pid 44638) has obtained the dessert and left
the wholesaler (pid 44638) delivers M and F
the wholesaler (pid 44638) is waiting for the dessert
chef3 (pid 44642) has taken the M (ingredients array [M,F])
chef3 (pid 44642) has taken the F (ingredients array [-,F])
chef3 (pid 44642) is preparing the dessert (ingredients array [-,-])
chef3 (pid 44642) has delivered the dessert (ingredients array [-,-])
chef3 (pid 44642) is waiting for M and F (ingredients array [-,-])
the wholesaler (pid 44638) has obtained the dessert and left
chef0 (pid 44639) is exiting
chef1 (pid 44640) is exiting
chef2 (pid 44641) is exiting
chef3 (pid 44642) is exiting
chef4 (pid 44643) is exiting
chef5 (pid 44644) is exiting
the wholesaler (pid 44638) is done (total desserts: 10)
```