

User Manual

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MPX Initialization

- Open a terminal under the Hard_To_C directory.
- Enter the “**make**” command.
- After make is done executing, run “**./mpx.sh.**” Now MPX is ready to run.

Menu Instructions

After MPX was initialized, you are brought to a menu like in the example below:



```

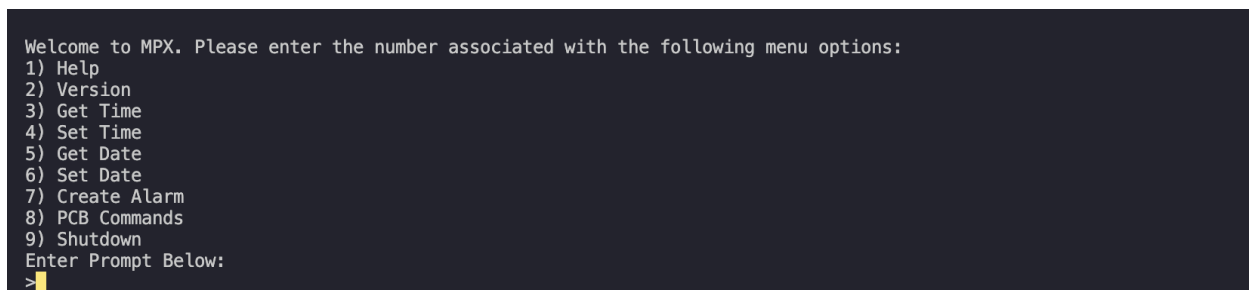
Welcome to MPX. Please enter the number associated with the following menu options:
1) Help
2) Version
3) Get Time
4) Set Time
5) Get Date
6) Set Date
7) PCB Commands
8) Shutdown
Enter Prompt Below:
>

```

You are prompted to select a number that coordinates with the following commands. Your input must fall within range of 1-8 or the menu will be rebooted.

Commands:

- **Help**
 - Displays the description of available commands available in MPX.
 - Example:



```

Welcome to MPX. Please enter the number associated with the following menu options:
1) Help
2) Version
3) Get Time
4) Set Time
5) Get Date
6) Set Date
7) Create Alarm
8) PCB Commands
9) Shutdown
Enter Prompt Below:
>

```

- **Version**

- There are no extra steps taken after the version command is selected, as it only prints the current version and compilation date.
- Example:

```
Version 1.0  
Compilation Date: February 2nd, 2024  
  
Press any key to continue
```

- **Get Time**

- This command outputs the current time
- Example:

```
Your Response: 3  
Current Time: 1:49:8  
  
Press any key to continue
```

- **Set Time**

- This command lets user set a time of their choice. The user inputs the hour, minute and second one at a time.
- Example:

```
Your Response: 4  
Please input the hour (HH): 09  
Please input the minute (MM): 11  
Please input the second (SS): 00  
Time has been set!  
Current Time: 9:11:00  
  
Press any key to continue
```

- **Get Date**

- This command outputs the current date.
- Example:

```
Your Response: 5  
Current Date: 2/2/24
```

```
Press any key to continue
```

- **Set Date**

- This command lets the user set the date of their choice. The user inputs the month, day and year one at a time.
- Example:

```
Please input the month (MM): 03
```

```
Please input the day (DD): 17
```

```
Please input the year (YY): 2024  
Input invalid!
```

```
Please input the year (YY): 24
```

```
Date has been set!  
Current Date: 3/17/24
```

```
Press any key to continue
```

● Create Alarm

- This command lets the user set an alarm with a time of their choice. The user inputs the hour, minute, second, month, day and year one at a time.
- Example:

```

Your Response: 7
Please input the hour (HH):
11

IDLE PROCESS EXECUTING.

Please input the minute (MM): 15
IDLE PROCESS EXECUTING.

Please input the second (SS): 00
IDLE PROCESS EXECUTING.

Please input the month (MM): 4
IDLE PROCESS EXECUTING.

Please input the day (DD): 15
IDLE PROCESS EXECUTING.

Please input the year (YY): 24
IDLE PROCESS EXECUTING.

Enter an alarm message: alarm testing

```

● PCB Commands

- This command displays all the available functions for PCBs.
- Example:

```

Your Response: 7
PCB Functions Menu:
1) Help
2) Load Process
3) Load Suspended Process
4) Delete PCB
5) Block PCB
6) Unblock PCB
7) Suspend PCB
8) Resume PCB
9) Set PCB Priority
10) Show PCB
11) Show Ready
12) Show Blocked
13) Show All
14) Yield CPU
15) Return to previous menu
Enter Prompt Below:
>

```

- The PCB menu will be reloaded if anything outside of the range of 1-15 is selected. When 15 is selected the user will return to the original menu.

- **Shutdown**

- Will prompt the user for shutdown confirmation. If the user selects "1", then the shutdown procedure will start (first screenshot). If the user selects "0", it will return to the main menu (second screenshot).
- Example:

```
Are you sure you want to shutdown?
Enter 1 for yes or 0 for no.
> 1klogv: Starting system shutdown procedure...
klogv: Halting CPU...
```

```
Are you sure you want to shutdown?
Enter 1 for yes or 0 for no.
> 0
Welcome to MPX. Please enter the number associated with the following menu options:
1) Help
2) Version
3) Get Time
4) Set Time
5) Get Date
6) Set Date
7) PCB Commands
8) Shutdown
Enter Prompt Below:
>|
```

- **Delete PCB**

- Lets the user delete a process of their choice.
- Example:

```
Your Response: 3

Enter the name of the PCB to delete
>timeless

PCB successfully deleted.
Press any key to continue
```

- **Suspend PCB**

- This command lets a user change the dispatching state of a process of their choice to SUSPENDED.

- Example:

```
Your Response: 6

Please input the process name
>timeless

PCB successfully suspended.

Press any key to continue
```

- **Resume PCB**

- This command lets the user change the dispatching state of a process of their choice to ACTIVE or NOT SUSPENDED.

- Example:

```
Your Response: 7

Please input the process name
>timeless

PCB successfully resumed.
```

- **Set PCB Priority**

- This command lets a user change the priority of a desired process

- Example:

```
Your Response: 8

Please input the process name
>timeless

Enter the new priority
>1

Press any key to continue
```


- **Show PCB**

- This command displays a specific process that the user desires.
- Example:

```

Enter Prompt Below:
>9

Your Response: 9

  Please enter the name of the PCB to show.
>doodles
-----

Name: doodles
Class: USER
Execution State: READY
Status: ACTIVE
Priority: 7
-----

Press any key to continue

```

- **Show Ready PCB**

- This command displays all the PCB(s) that are in READY state.
- Example:

```

Your Response: 10
READY QUEUE
-----

Name: doodles
Class: USER
Execution State: READY
Status: ACTIVE
Priority: 7
-----

Name: rawr
Class: KERNEL
Execution State: READY
Status: ACTIVE
Priority: 9
-----

```

- **Show Block PCB**

- This command displays all the PCB(s) that are in BLOCKED state.
- Example:

```
Your Response: 11
BLOCKED QUEUE
-----

Name: timeless
Class: USER
Execution State: BLOCKED
Status: ACTIVE
Priority: 1
-----
```

- **Show All**

- This command displays all PCBs available.
- Example:

```

Your Response: 12
READY QUEUE
-----

Name: doodles
Class: USER
Execution State: READY
Status: ACTIVE
Priority: 7
-----

Name: rawr
Class: KERNEL
Execution State: READY
Status: ACTIVE
Priority: 9
-----

BLOCKED QUEUE
-----

Name: timeless
Class: USER
Execution State: BLOCKED
Status: ACTIVE
Priority: 1
-----

```

- **Load Process**

- Each process is loaded and queued in a non-suspended ready state. Output should look like this:

```

PCB Functions Menu:
1) Help
2) Load Process
3) Load Suspended Process
4) Delete PCB
5) Block PCB
6) Unblock PCB
7) Suspend PCB
8) Resume PCB
9) Set PCB Priority
10) Show PCB
11) Show Ready
12) Show Blocked
13) Show All
14) Yield CPU
15) Return to previous menu
Enter Prompt Below:
>2

Your Response: 2

Press any key to continue

```

- **Load Suspended Process**

- Each process is loaded and queued in a suspended ready state. Output should look like this:

```
Press any key to continue
PCB Functions Menu:
1) Help
2) Load Process
3) Load Suspended Process
4) Delete PCB
5) Block PCB
6) Unblock PCB
7) Suspend PCB
8) Resume PCB
9) Set PCB Priority
10) Show PCB
11) Show Ready
12) Show Blocked
13) Show All
14) Yield CPU
15) Return to previous menu
Enter Prompt Below:
>3

Your Response: 3

Press any key to continue
```

- **CPU Yield**

- If there are any non-suspended processes in the ready queue, they will execute. Output should look like this:

Your Response: 14

```

dispatched proc2
dispatched proc4
dispatched proc2
dispatched proc4
exiting proc2
dispatched proc4
dispatched proc1
dispatched proc4
exiting proc1
exiting proc4
dispatched proc3
dispatched proc3
dispatched proc3
exiting proc3

```

Press any key to continue

- If there are not any processes available to execute, the menu will be reloaded after any key is entered and the output should look like this:

Your Response: 14

Press any key to continue

PCB Functions Menu:

- 1) Help
- 2) Load Process
- 3) Load Suspended Process
- 4) Delete PCB
- 5) Block PCB
- 6) Unblock PCB
- 7) Suspend PCB
- 8) Resume PCB
- 9) Set PCB Priority
- 10) Show PCB
- 11) Show Ready
- 12) Show Blocked
- 13) Show All
- 14) Yield CPU
- 15) Return to previous menu

Enter Prompt Below:

>

- **Initialize Heap**

- The command allocates all memory available as a single, large block.
- Example:

```
Your Response: 7
How many bytes would you like to allocate?
>11
IDLE PROCESS EXECUTING.

Memory successfully initialized.

Press any key to continue
```

- **Allocate Memory**

- The command will allocate heap memory and once it successfully allocates memory, it will print out the address of the newly allocated block.
- Example:

```
Your Response: 8
Enter the size of memory to allocate: 12
IDLE PROCESS EXECUTING.

Successfully allocated memory at address: 0xD00085C

Press any key to continue
```

- **Free Memory**

- The command will free any allocated heap memory when the user enters the address in hexadecimal format. This function has two kinds of outputs depending on the user's address input.

- Example:

Successful Address found:

```
Your Response: 9
Enter the memory address to free in hexadecimal format: 0xD00085C
IDLE PROCESS EXECUTING.
```

```
Memory sucessfully freed.
```

```
Press any key to continue
```

Invalid Address:

```
Your Response: 9
Enter the memory address to free in hexadecimal format: 0xD00019A
IDLE PROCESS EXECUTING.
```

```
Memory could not be freed.
```

```
Press any key to continue
```

- **Show Free Memory**

- If there are any free memory blocks in the memory queue, the output should look similar to this:

```
Your Response: 10
```

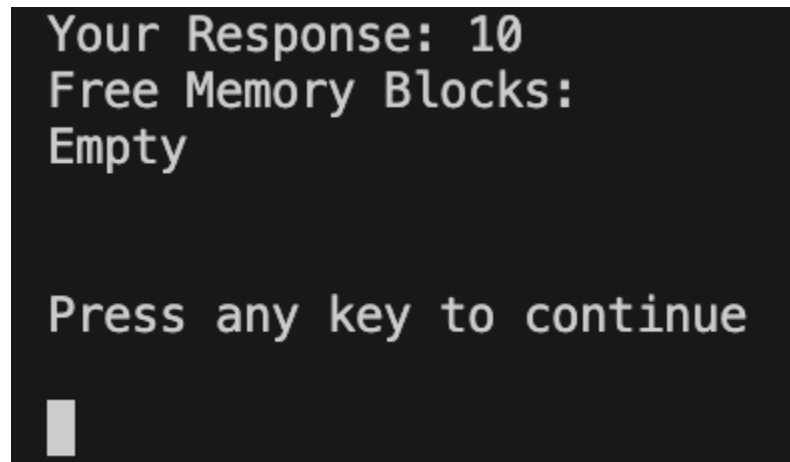
```
Free Memory Blocks:
```

```
Start Address: 0xD000C58
```

```
Size: 8960
```

```
Press any key to continue
```

- If there is no memory available (the heap has not been initialized) the output should look like this:

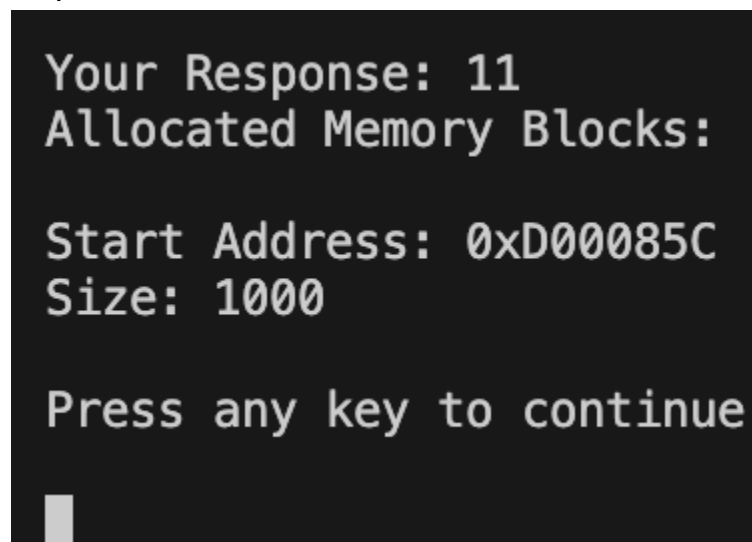


```
Your Response: 10
Free Memory Blocks:
Empty

Press any key to continue
```

- **Show Allocated Memory**

- If there are any allocated memory blocks in the memory queue, the output should look similar to this:



```
Your Response: 11
Allocated Memory Blocks:

Start Address: 0xD00085C
Size: 1000

Press any key to continue
```

- If there are not any allocated memory blocks in the memory queue, the output should look like this:


```
Your Response: 11
Allocated Memory Blocks:
Empty

Press any key to continue
```

- **Show All Memory**

- If there is any memory blocks in the memory queue, the output should look similar to this:

```
Your Response: 12
Memory Blocks:

Start Address: 0xD00085C
Size: 1000
Type: ALLOCATED

Start Address: 0xD000C58
Size: 8960
Type: FREE

Press any key to continue
```

- If there are no memory blocks in the memory queue (the heap has not been initialized) the output should look similar to this:

```
Your Response: 12
```

```
Memory Blocks:
```

```
Empty
```

```
Press any key to continue
```

