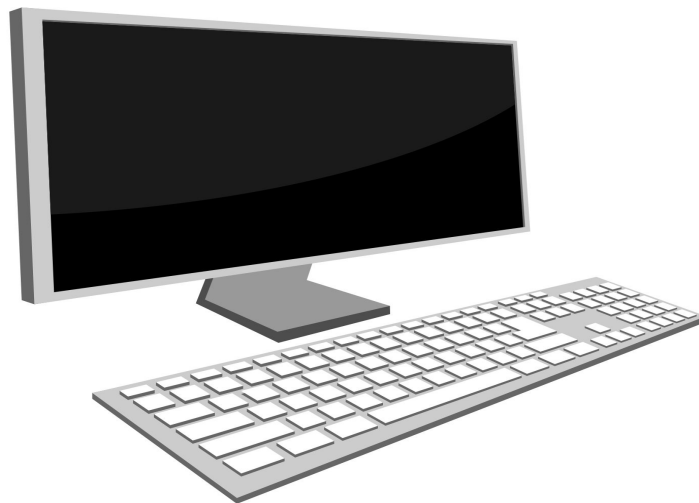


# MPX-OS User's Manual

## Version 5.0                      2019

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# The Menu

MPX-OS is a menu-driven operating system. Once you have booted up MPX, you will be greeted with the USERNAME logo. Type `help` to get a list of valid commands or begin by writing out the command you want to execute.

```
klogv: Initializing virtual memory...  
  
      USERNAME  
  
MPX-OS V2.70  
Type help for a list of commands...  
  
klogv: Initilizing idle process...  
klogv: Transferring control to commhand...  
klogv: Initilizing infinite process...  
█
```

Certain actions will prompt you with another menu that will look similar to this, simply repeat the same process.

If you use the `clear` command, the terminal will be cleared of all previous inputs and outputs.


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## Help

If you want to perform a certain action but do not know what the command(s) is to help you accomplish it, you can simply type “help”, and you can see a list of all available commands.

```
Available Commands are
version
help [command]
shutdown
get-time
get-date
set-time
set-date
show-all
show-blocked
show-ready
show-pcb [pcb_name]
delete-pcb [pcb_name]
suspend-pcb [pcb_name]
resume-pcb [pcb_name]
set-pcb-priority [pcb_name] [new_priority]
loadr3
clear
```

To get information on a specific command, type help followed by the name of the command you want information on.



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Example: help set-time

## Shutting Down MPX-OS

Shutting down your operating system is a very simple process. Simply type “shutdown”, and then you will be prompted again to confirm that you do in fact want power off your device. Type ‘Y’ for yes and ‘N’ for no.

If your device shuts down properly, you should see a display similar to that of the image below.

```
shutdown
Are you sure? (Y/N)
Y
MPX is shutting down...
klogv: Starting system shutdown procedure...
klogv: Shutdown complete. You may now turn off the machine. (QEMU: C-a x)
```

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## Displaying the Current Time

To check the time on MPX, all you will need to do is type “get-time” . This will display a time in HH:MM:SS format.

An Example of this is seen below:

```
get-time  
the current time is : 14:13:34
```

---

## Checking the Date

Checking the date is a simple and easy as checking the time in MPX-OS! To check the date in MPX, all you will need to do is type “get-date”. This will display the current date in MM/DD/YY format.

An Example is seen below:

```
get-date
```

```
The date is : 10/03/2019
```


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## Setting your clock

If the time displayed on your device is incorrect, you can change it through MPX's main menu. First, type "set-time" and then you will be prompted to enter in the Hour, Minute, and Second one at a time. Please note that this uses a 24-hour clock (11 pm = 23).

```
set-time  
Enter the hour : 10  
Enter the minutes : 17  
Enter the second : 0  
get-time  
the current time is : 10:17:04
```

Also note that if you hit Enter without submitting a number, then MPX will default that value to 0.





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## Setting the Date

Setting the date is much like setting the time. First, type “set-date” and then you will be prompted to enter in the Month, Day, and Year one at a time, pressing the enter button in between each value. Note that this is in MM/DD/YY format. If a Day value beyond the number of days in the Month is entered, an error message will be displayed and you will have to redo this process. Same if the month exceeds 12 or the Year is less or more than four digits.

```
set-date
Enter a month (MM): 07
Enter a day (DD): 04
Enter a year (1700 - 2100) (YYYY): 1776
get-date
The date is : 07/04/1776
```

---

## Deleting a Process Control Block - User Restricted

Deleting a process is very simple. The command takes a process name as an argument in the following UNIX-like format

```
delete-pcb [process name]
```

An example is shown below:

```
All Processes:
supersecretpcb | System Process | Ready | not suspended | 05
mycomputer    | User Process   | Ready | not suspended | 04
sysprocess5    | System Process | Ready | not suspended | 02
process1010    | User Process   | Ready | not suspended | 00

delete-pcb process1010

show-all

All Processes:
supersecretpcb | System Process | Ready | not suspended | 05
mycomputer     | User Process   | Ready | not suspended | 04
sysprocess5     | System Process | Ready | not suspended | 02
```

---

## Blocking a Process Control Block - User Restricted

To block a process control block you follow the same set of instructions as you would for deleting one.

The Command is:

`block-pcb [process name]`

And example is shown below

```
All Processes:
process123      | System Process | Ready   | not suspended | 01

block-pcb process123

show-all

All Processes:
process123      | System Process | Blocked | not suspended | 01
```

Notice how the PCB goes from a green “ready” to a red “blocked”

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# Unblocking a Process Control Block - User Restricted

After you blocked a process, you might say to yourself: “ah gee wiz I sure wish I hadn’t blocked that PCB!”

Well don’t fret, you can unblock it JUST AS EASILY!

Command:

`unblock-pcb [process name]`

Example:

```
All Processes:
process123      | System Process | Blocked | not suspended | 01

unblock-pcb process123

show-all

All Processes:
process123      | System Process | Ready  | not suspended | 01
```

---

# Updating the Priority of a Process

Once you've created a PCB and set its priority, you may decide to change its priority. To do this, you must enter the following command.

`set-pcb-priority [process name] [int 0-9]`

EXAMPLE: `set-pcb-priority process1 3`

```
create-pcb
Please Enter a name for the process:    process1
Please Enter the class [ 0 for system process, 1 for user process]:    1
Please Enter the priority [ 0 being the lowest, and 9 being the highest]:    1
set-pcb-priority process1 8
show-all

All Processes:
process1 | User Process | Ready | not suspended | 08
```

---

# Suspending a PCB

Suspending a PCB is simple.

Command:

suspend-pcb [process name]

Example:

```
All Processes:
process1 | User Process | Ready | not suspended | 08
suspend-pcb process1

show-all

All Processes:
process1 | User Process | Ready | SUSPENDED | 08
█
```

---

## Resuming a PCB

Once a PCB is suspended, it will eventually need to be resumed. Doing this is as simple as suspending it.

Command:

`resume-pcb [process name]`

Example:

```
All Processes:
process1 | User Process | Ready | SUSPENDED | 01
resume-pcb process1

show-all

All Processes:
process1 | User Process | Ready | not suspended | 01
```

---

# Displaying Processes

You may want to display the processes on your MPX OS. You have four different ways you can do this.

Showing 1 process: `show-pcb [process name]`

Showing all processes: `show-all`

Showing ready processes: `show-ready`

Showing blocked processes: `show-blocked`

```
show-all
All Processes:
process2 | System Process | Ready | not suspended | 04
process3 | System Process | Ready | not suspended | 03
process7 | User Process   | Ready | SUSPENDED     | 05
process1 | User Process   | Ready | SUSPENDED     | 01
process5 | System Process | Ready | not suspended | 00
process1 | User Process   | Ready | SUSPENDED     | 01
process6 | User Process   | Blocked | not suspended | 02
process4 | User Process   | Blocked | not suspended | 02
show-ready
process2 | System Process | Ready | not suspended | 04
process3 | System Process | Ready | not suspended | 03
process7 | User Process   | Ready | SUSPENDED     | 05
process1 | User Process   | Ready | SUSPENDED     | 01
process5 | System Process | Ready | not suspended | 00
process1 | User Process   | Ready | SUSPENDED     | 01
show-blocked
process6 | User Process | Blocked | not suspended | 02
process4 | User Process | Blocked | not suspended | 02
show-pcb process1
process1 | User Process | Ready | SUSPENDED | 01
QEMU: Terminated
```




---

# Alarm

The MPX now supports adding alarms that can be used to display a message at certain times of the day specified by the user.

To use this feature, type “alarm” and follow the prompts to enter the alarm’s execution time and the message you want to display. Once the time has elapsed, your message will display. An example is shown below.



```
alarm

Please enter alarm time
Hours: 20

Minutes: 44

Enter message you want displayed: alarm now

ALARM: Not time yet --- TIME:      ALARM SET TO: 2044      ALARM SET TO: 1230      Message: Hello
ALARM COMPLETE: alarm now
```

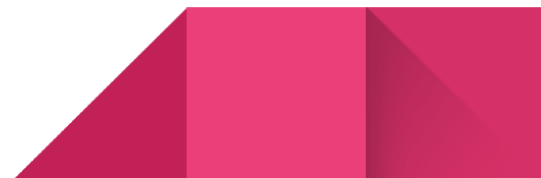
The image shows a terminal window with a dark background. The first part shows the user typing 'alarm' and being prompted to enter an alarm time. They enter '20' for hours and '44' for minutes. Then they enter 'alarm now' as the message. The second part shows the terminal output after the alarm is set. It displays 'ALARM: Not time yet --- TIME:' followed by 'ALARM SET TO: 2044' and 'ALARM SET TO: 1230' and 'Message: Hello'. Below that, it shows 'ALARM COMPLETE: alarm now'.

The first image is an example of how to enter the alarm, the second is an example of an alarm that has not executed yet, and an alarm that has executed.

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## Loadr3 - User Restricted (TESTING ONLY)

This function loads five test processes into the suspended-ready queue for testing purposes.



---

## Show Allocated Memory

You can display all allocated memory blocks in MPX-OS using the command “show-alloc-mem”. This displays a table where the rows are each memory block and the columns are respectively the name, size, address, and memory type.

```
show-alloc-mem
```

kernel      Makefile

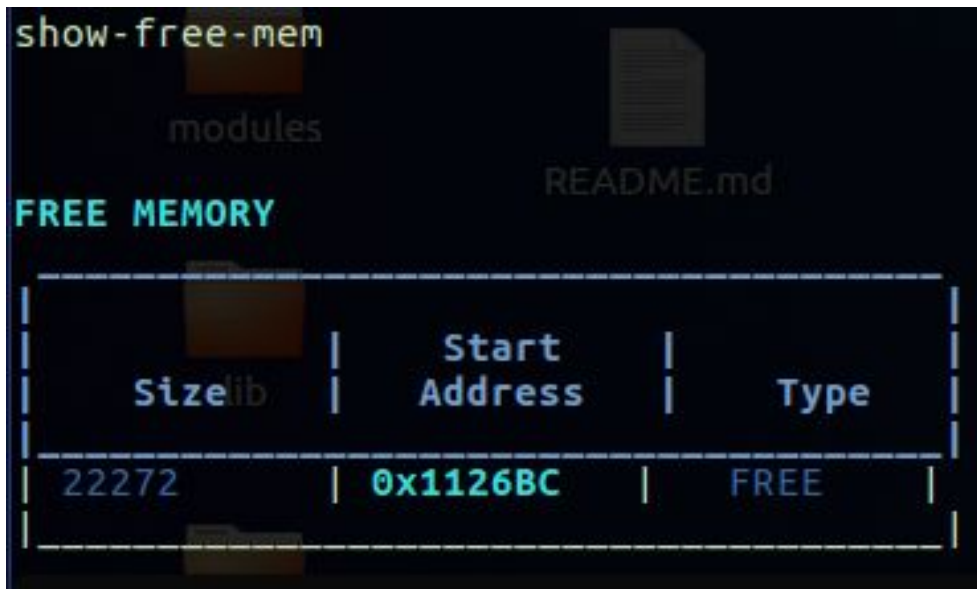
**ALLOCATED MEMORY**

Name	Size	Start Address	Type
idle_process	1080	0x11088C	ALLOCATED
comhand_process	1080	0x110CDC	ALLOCATED
process01	1080	0x11112C	ALLOCATED
process02	1080	0x11157C	ALLOCATED
process03	1080	0x1119CC	ALLOCATED
process04	1080	0x111E1C	ALLOCATED
process05	1080	0x11226C	ALLOCATED

---

## Show Free (Available) Memory

You can display all Free memory blocks in MPX-OS using the command “free-alloc-mem”. This displays a table where the rows are each free memory block and the columns are respectively the size, address, and memory type.



```
show-free-mem
modules
FREE MEMORY
```

Size	Start Address	Type
22272	0x1126BC	FREE

---

# Command History

Typing “history” will display the last 100 commands used.

Pressing the up arrow will cycle through the history of commands starting from most recent, moving towards older commands. The down arrow will move in the other direction.

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**TAB** - Pressing tab will auto-complete a command that matches a partially typed string.