MPX

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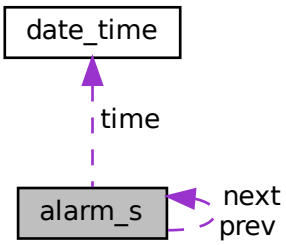
Chapter 3

Data Structure Documentation

3.1 alarm_s Struct Reference

`#include <alarm.h>`

Collaboration diagram for alarm_s:



Data Fields

- struct alarm_s * next
- struct alarm_s * prev
- date_time time
- char message [20]

3.1.1 Field Documentation

3.1.1.1 message

```
char message[20]
```

3.1.1.2 next

```
struct alarm_s* next
```

3.1.1.3 prev

```
struct alarm_s* prev
```

3.1.1.4 time

```
date_time time
```

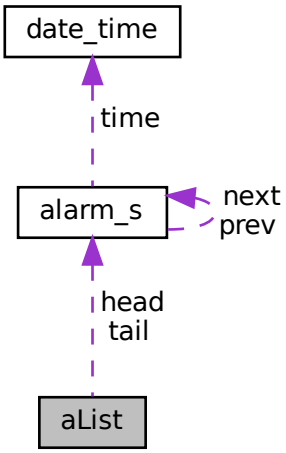
The documentation for this struct was generated from the following file:

- mpx_core/modules/R4/alarm.h

3.2 aList Struct Reference

```
#include <list.h>
```

Collaboration diagram for aList:



Data Fields

- int count
- alarm_t * head
- alarm_t * tail

3.2.1 Field Documentation

3.2.1.1 count

```
int count
```

3.2.1.2 head

```
alarm_t* head
```

3.2.1.3 tail

```
alarm_t* tail
```

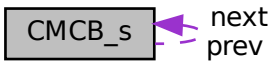
The documentation for this struct was generated from the following file:

- mpx_core/modules/R4/list.h

3.3 CMCB_s Struct Reference

```
#include <memoryManagment.h>
```

Collaboration diagram for CMCB_s:



Data Fields

- int type
- u32int start
- int size
- char namePCB [9]
- struct CMCB_s * next
- struct CMCB_s * prev

3.3.1 Field Documentation

3.3.1.1 namePCB

```
char namePCB[9]
```

3.3.1.2 next

```
struct CMCB_s* next
```

3.3.1.3 prev

```
struct CMCB_s* prev
```

3.3.1.4 size

```
int size
```

3.3.1.5 start

```
u32int start
```

3.3.1.6 type

```
int type
```

The documentation for this struct was generated from the following file:

- mpx_core/modules/R5/memoryManagment.h

3.4 Context Struct Reference

```
#include <context.h>
```

Data Fields

- u32int gs
- u32int fs
- u32int es
- u32int ds
- u32int edi
- u32int esi
- u32int ebp
- u32int esp
- u32int ebx
- u32int edx
- u32int ecx
- u32int eax
- u32int eip
- u32int cs
- u32int eflags

3.4.1 Field Documentation

3.4.1.1 cs

```
u32int cs
```

3.4.1.2 ds

```
u32int ds
```

3.4.1.3 eax

```
u32int eax
```

3.4.1.4 ebp

```
u32int ebp
```

3.4.1.5 ebx

```
u32int ebx
```

3.4.1.6 ecx

```
u32int ecx
```

3.4.1.7 edi

```
u32int edi
```

3.4.1.8 edx

```
u32int edx
```

3.4.1.9 eflags

```
u32int eflags
```

3.4.1.10 eip

```
u32int eip
```

3.4.1.11 es

```
u32int es
```

3.4.1.12 esi

```
u32int esi
```

3.4.1.13 esp

```
u32int esp
```

3.4.1.14 fs

```
u32int fs
```

3.4.1.15 gs

```
u32int gs
```

The documentation for this struct was generated from the following file:

- mpx_core/modules/R3/context.h

3.5 date_time Struct Reference

```
#include <system.h>
```

Data Fields

- int sec
- int min
- int hour
- int day_w
- int day_m
- int day_y
- int mon
- int year

3.5.1 Field Documentation

3.5.1.1 day_m

```
int day_m
```

3.5.1.2 day_w

```
int day_w
```

3.5.1.3 day_y

```
int day_y
```

3.5.1.4 hour

```
int hour
```

3.5.1.5 min

```
int min
```

3.5.1.6 mon

```
int mon
```

3.5.1.7 sec

```
int sec
```

3.5.1.8 year

```
int year
```

The documentation for this struct was generated from the following file:

- mpx_core/include/system.h

3.6 dcb_s Struct Reference

```
#include <driver.h>
```

Data Fields

- int com_port
- int port_open
- int * e_flag
- status_t status
- char * buffer_ptr
- int * count_ptr
- char * buffer_loc
- int byte_count

3.6.1 Detailed Description

+* struct dcb represents a Device Control Block. +* A dcb should exist for each COM port, but you can just use COM1 +*

Parameters

com_port	the COM port. (You can omit this and just always use COM1) +*
port_open	whether the COM is open. +*
e_flag	whether the operation has completed (0 or 1). +*
status	the different operations (IDLE, READ, WRITE). +*
buffer_ptr	the buffer array to read into/write from. +*
count_ptr	how many characters to read/write. +*
buffer_loc	the current location we are reading/writing at. +*
byte_count	the number of bytes that have been read/written so far.

3.6.2 Field Documentation

3.6.2.1 buffer_loc

```
char* buffer_loc
```

3.6.2.2 buffer_ptr

```
char* buffer_ptr
```

3.6.2.3 byte_count

```
int byte_count
```

3.6.2.4 com_port

```
int com_port
```

3.6.2.5 count_ptr

```
int* count_ptr
```

3.6.2.6 e_flag

```
int* e_flag
```

3.6.2.7 port_open

```
int port_open
```

3.6.2.8 status

```
status_t status
```

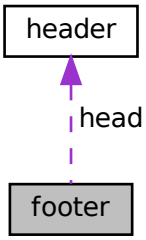
The documentation for this struct was generated from the following file:

- mpx_core/modules/R6/driver.h

3.7 footer Struct Reference

```
#include <heap.h>
```

Collaboration diagram for footer:



Data Fields

- header head

3.7.1 Field Documentation

3.7.1.1 head

```
header head
```

The documentation for this struct was generated from the following file:

- mpx_core/include/mem/heap.h

3.8 gdt_descriptor_struct Struct Reference

`#include <tables.h>`

Data Fields

- u16int limit
- u32int base

3.8.1 Field Documentation

3.8.1.1 base

`u32int base`

3.8.1.2 limit

`u16int limit`

The documentation for this struct was generated from the following file:

- mpx_core/include/core/tables.h

3.9 gdt_entry_struct Struct Reference

`#include <tables.h>`

Data Fields

- u16int limit_low
- u16int base_low
- u8int base_mid
- u8int access
- u8int flags
- u8int base_high

3.9.1 Field Documentation

3.9.1.1 access

```
u8int access
```

3.9.1.2 base_high

```
u8int base_high
```

3.9.1.3 base_low

```
u16int base_low
```

3.9.1.4 base_mid

```
u8int base_mid
```

3.9.1.5 flags

```
u8int flags
```

3.9.1.6 limit_low

```
u16int limit_low
```

The documentation for this struct was generated from the following file:

- mpx_core/include/core/tables.h

3.10 header Struct Reference

```
#include <heap.h>
```

Data Fields

- int size
- int index_id

3.10.1 Field Documentation

3.10.1.1 index_id

```
int index_id
```

3.10.1.2 size

```
int size
```

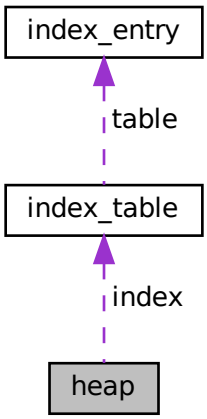
The documentation for this struct was generated from the following file:

- mpx_core/include/mem/heap.h

3.11 heap Struct Reference

```
#include <heap.h>
```

Collaboration diagram for heap:



Data Fields

- index_table index
- u32int base
- u32int max_size
- u32int min_size

3.11.1 Field Documentation

3.11.1.1 base

```
u32int base
```

3.11.1.2 index

```
index_table index
```

3.11.1.3 max_size

```
u32int max_size
```

3.11.1.4 min_size

```
u32int min_size
```

The documentation for this struct was generated from the following file:

- mpx_core/include/mem/heap.h

3.12 idt_entry_struct Struct Reference

```
#include <tables.h>
```

Data Fields

- u16int base_low
- u16int sselect
- u8int zero
- u8int flags
- u16int base_high

3.12.1 Field Documentation

3.12.1.1 base_high

```
u16int base_high
```

3.12.1.2 base_low

```
u16int base_low
```

3.12.1.3 flags

```
u8int flags
```

3.12.1.4 sselect

```
u16int sselect
```

3.12.1.5 zero

```
u8int zero
```

The documentation for this struct was generated from the following file:

- mpx_core/include/core/tables.h

3.13 idt_struct Struct Reference

`#include <tables.h>`

Data Fields

- u16int limit
- u32int base

3.13.1 Field Documentation

3.13.1.1 base

`u32int base`

3.13.1.2 limit

`u16int limit`

The documentation for this struct was generated from the following file:

- mpx_core/include/core/tables.h

3.14 index_entry Struct Reference

`#include <heap.h>`

Data Fields

- int size
- int empty
- u32int block

3.14.1 Field Documentation

3.14.1.1 block

```
u32int block
```

3.14.1.2 empty

```
int empty
```

3.14.1.3 size

```
int size
```

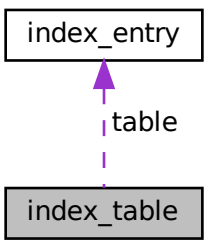
The documentation for this struct was generated from the following file:

- mpx_core/include/mem/heap.h

3.15 index_table Struct Reference

```
#include <heap.h>
```

Collaboration diagram for index_table:



Data Fields

- index_entry table [TABLE_SIZE]
- int id

3.15.1 Field Documentation

3.15.1.1 id

```
int id
```

3.15.1.2 table

```
index_entry table[TABLE_SIZE]
```

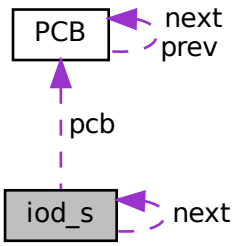
The documentation for this struct was generated from the following file:

- mpx_core/include/mem/heap.h

3.16 iod_s Struct Reference

```
#include <IOqueue.h>
```

Collaboration diagram for iod_s:



Data Fields

- int op_code
- char name [18]
- char * buffer_ptr
- int * count_ptr
- struct iod_s * next
- PCB * pcb

3.16.1 Field Documentation

3.16.1.1 buffer_ptr

```
char* buffer_ptr
```

3.16.1.2 count_ptr

```
int* count_ptr
```

3.16.1.3 name

```
char name[18]
```

3.16.1.4 next

```
struct iod_s* next
```

3.16.1.5 op_code

```
int op_code
```

3.16.1.6 pcb

```
PCB* pcb
```

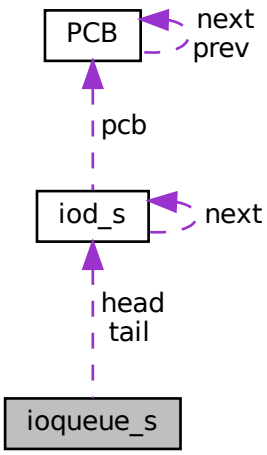
The documentation for this struct was generated from the following file:

- mpx_core/modules/R6/IOqueue.h

3.17 ioqueue_s Struct Reference

`#include <IOqueue.h>`

Collaboration diagram for ioqueue_s:



Data Fields

- iod_t * head
- iod_t * tail
- int count

3.17.1 Field Documentation

3.17.1.1 count

`int count`

3.17.1.2 head

`iod_t* head`

3.17.1.3 tail

```
iod_t* tail
```

The documentation for this struct was generated from the following file:

- mpx_core/modules/R6/IOqueue.h

3.18 LMCB_s Struct Reference

```
#include <memoryManagment.h>
```

Data Fields

- int type
- int size

3.18.1 Field Documentation

3.18.1.1 size

```
int size
```

3.18.1.2 type

```
int type
```

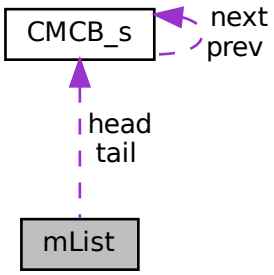
The documentation for this struct was generated from the following file:

- mpx_core/modules/R5/memoryManagment.h

3.19 mList Struct Reference

`#include <mList.h>`

Collaboration diagram for mList:



Data Fields

- int count
- CMCB_t * head
- CMCB_t * tail

3.19.1 Field Documentation

3.19.1.1 count

`int count`

3.19.1.2 head

`CMCB_t* head`

3.19.1.3 tail

`CMCB_t* tail`

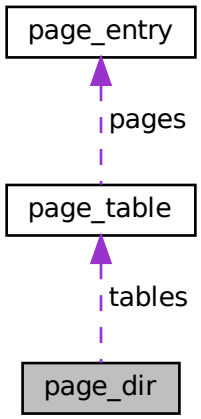
The documentation for this struct was generated from the following file:

- mpx_core/modules/R5/mList.h

3.20 page_dir Struct Reference

`#include <paging.h>`

Collaboration diagram for page_dir:



Data Fields

- page_table * tables [1024]
- u32int tables_phys [1024]

3.20.1 Field Documentation

3.20.1.1 tables

`page_table* tables[1024]`

3.20.1.2 tables_phys

`u32int tables_phys[1024]`

The documentation for this struct was generated from the following file:

- mpx_core/include/mem/paging.h

3.21 page_entry Struct Reference

`#include <paging.h>`

Data Fields

- u32int present: 1
- u32int writeable: 1
- u32int usermode: 1
- u32int accessed: 1
- u32int dirty: 1
- u32int reserved: 7
- u32int frameaddr: 20

3.21.1 Field Documentation

3.21.1.1 accessed

`u32int accessed`

3.21.1.2 dirty

`u32int dirty`

3.21.1.3 frameaddr

`u32int frameaddr`

3.21.1.4 present

`u32int present`

3.21.1.5 reserved

`u32int reserved`

3.21.1.6 usermode

```
u32int usermode
```

3.21.1.7 writeable

```
u32int writeable
```

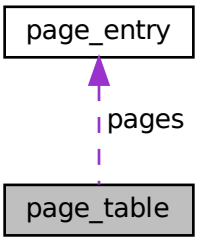
The documentation for this struct was generated from the following file:

- mpx_core/include/mem/paging.h

3.22 page_table Struct Reference

```
#include <paging.h>
```

Collaboration diagram for page_table:



Data Fields

- page_entry pages [1024]

3.22.1 Field Documentation

3.22.1.1 pages

```
page_entry pages[1024]
```

The documentation for this struct was generated from the following file:

- mpx_core/include/mem/paging.h

3.23 param Struct Reference

```
#include <mpx_supt.h>
```

Data Fields

- int op_code
- int device_id
- char * buffer_ptr
- int * count_ptr

3.23.1 Field Documentation

3.23.1.1 buffer_ptr

```
char* buffer_ptr
```

3.23.1.2 count_ptr

```
int* count_ptr
```

3.23.1.3 device_id

```
int device_id
```

3.23.1.4 op_code

```
int op_code
```

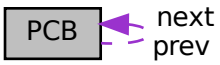
The documentation for this struct was generated from the following file:

- mpx_core/modules/mpx_supt.h

3.24 PCB Struct Reference

`#include <pcb.h>`

Collaboration diagram for PCB:



Data Fields

- char name [9]
- int class
- int priority
- int status
- int suspended
- struct PCB * next
- struct PCB * prev
- unsigned char stack [1024]
- unsigned char * stackTop
- unsigned char * stackBase

3.24.1 Field Documentation

3.24.1.1 class

`int class`

3.24.1.2 name

`char name[9]`

3.24.1.3 next

`struct PCB* next`

3.24.1.4 prev

```
struct PCB* prev
```

3.24.1.5 priority

```
int priority
```

3.24.1.6 stack

```
unsigned char stack[1024]
```

3.24.1.7 stackBase

```
unsigned char* stackBase
```

3.24.1.8 stackTop

```
unsigned char* stackTop
```

3.24.1.9 status

```
int status
```

3.24.1.10 suspended

```
int suspended
```

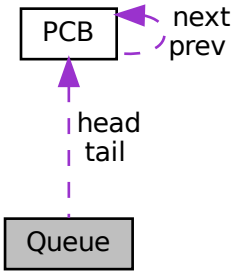
The documentation for this struct was generated from the following file:

- mpx_core/modules/R2/pcb.h

3.25 Queue Struct Reference

`#include <queue.h>`

Collaboration diagram for Queue:



Data Fields

- int count
- struct PCB * head
- struct PCB * tail
- char * name

3.25.1 Field Documentation

3.25.1.1 count

`int count`

3.25.1.2 head

`struct PCB* head`

3.25.1.3 name

`char* name`

3.25.1.4 tail

```
struct PCB* tail
```

The documentation for this struct was generated from the following file:

- mpx_core/modules/R2/queue.h

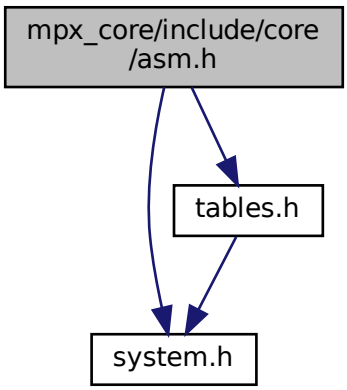
Chapter 4

File Documentation

4.1 mpx_core/include/core/asm.h File Reference

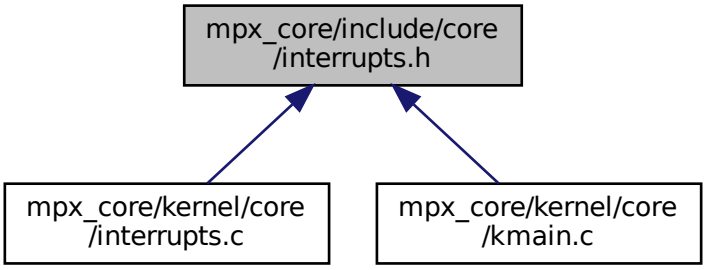
```
#include <system.h>
#include <tables.h>
```

Include dependency graph for asm.h:



4.2 mpx_core/include/core/interrupts.h File Reference

This graph shows which files directly or indirectly include this file:



Functions

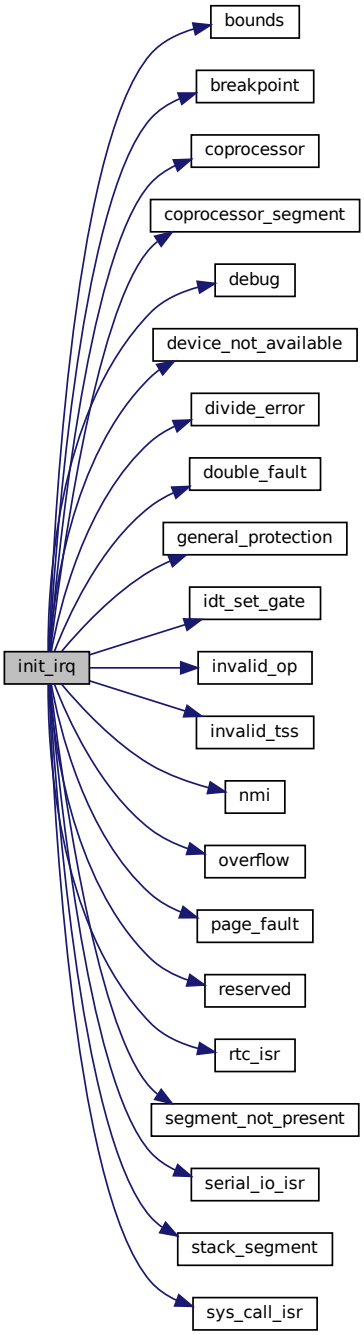
- void init_irq (void)
- void init_pic (void)

4.2.1 Function Documentation

4.2.1.1 init_irq()

```
void init_irq (
            void  )
```

Here is the call graph for this function:

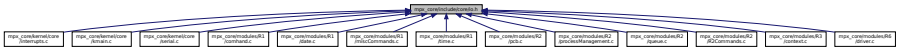


4.2.1.2 init_pic()

```
void init_pic (
            void  )
```

4.3 mpx_core/include/core/io.h File Reference

This graph shows which files directly or indirectly include this file:



Macros

- #define outb(port, data) asm volatile ("outb %%al,%%dx" : : "a" (data), "d" (port))
- #define inb(port)

4.3.1 Macro Definition Documentation

4.3.1.1 inb

```
#define inb(
               port )
```

Value:

```
      ({                          \
      unsigned char r;                    \
      asm volatile ("inb %%dx,%%al": "=a" (r): "d" (port)); \
      r;                                  \
    })
```

4.3.1.2 outb

```
#define outb(
               port,
               data )  asm volatile ("outb %%al,%%dx" :  :  "a" (data), "d" (port))
```

4.4 mpx_core/include/core/serial.h File Reference

This graph shows which files directly or indirectly include this file:

Macros

- #define COM1 0x3f8
- #define COM2 0x2f8
- #define COM3 0x3e8
- #define COM4 0x2e8

Functions

- int init_serial (int device)
- int serial_println (const char *msg)
- int serial_print (const char *msg)
- int set_serial_out (int device)
- int set_serial_in (int device)
- int * polling (char *buffer, int *count)
- void resetLine ()
- void resetCursor ()
- void backspaceChar ()
- void letterChar ()
- void deleteChar ()
- void rightArrowChar ()
- void leftArrowChar ()
- int isEscape (char *letter)
- int isBackspace (char *letter)
- int isEnter (char *letter)
- int isLetter (char *letter)
- int isRightArrow (char *letter)
- int isLeftArrow (char *letter)
- int isDownArrow (char *letter)
- int isUpArrow (char *letter)
- void initializeHistory ()
- int addToHistory (char *command)
- int historyFull ()
- char * getCommand ()
- int comEmpty ()
- void getHistory (char *buffer, char *letter)
- char * getCommandUp ()
- char * getCommandDown ()

4.4.1 Macro Definition Documentation

4.4.1.1 COM1

```
#define COM1 0x3f8
```

4.4.1.2 COM2

```
#define COM2 0x2f8
```

4.4.1.3 COM3

```
#define COM3 0x3e8
```

4.4.1.4 COM4

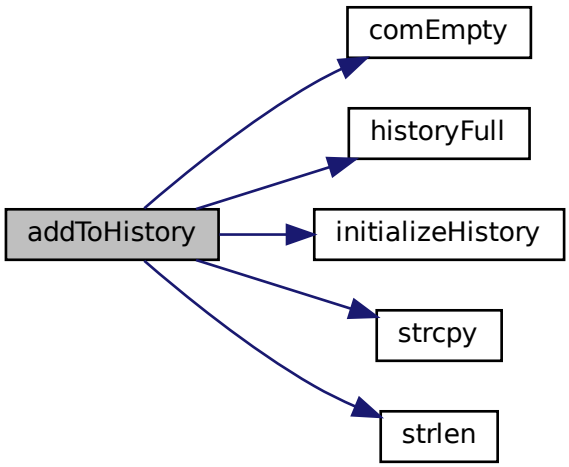
```
#define COM4 0x2e8
```

4.4.2 Function Documentation

4.4.2.1 addToHistory()

```
int addToHistory (
            char * command )
```

Here is the call graph for this function:



4.4.2.2 backspaceChar()

```
void backspaceChar ( )
```

4.4.2.3 Function: backspaceChar

Handles backspace characters. Copies the current buffers content up to the cursor location into a new buffer and concatenates that with everything past the cursor.

Parameters

∗buffer	the buffer to be changed

Author

Brendan Michael

4.4.2.4 comEmpty()

```
int comEmpty ( )
```

4.4.2.5 deleteChar()

```
void deleteChar ( )
```

4.4.2.6 Function: deleteChar

Handles delete character. Copies the current buffers content up to the cursor location into a new buffer and concatenates that with everything past the cursor not including the final character.

Parameters

∗buffer	the buffer to be changed

Author

Brendan Michael

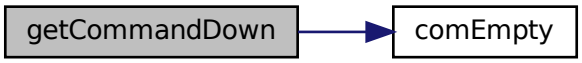
4.4.2.7 getCommand()

```
char* getCommand ( )
```

4.4.2.8 getCommandDown()

```
char* getCommandDown ( )
```

Here is the call graph for this function:



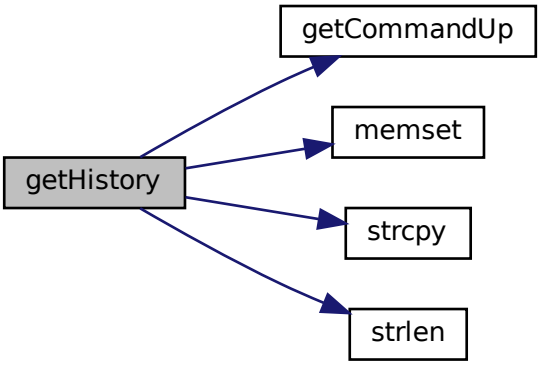
4.4.2.9 getCommandUp()

```
char* getCommandUp ( )
```

4.4.2.10 getHistory()

```
void getHistory (
            char * buffer,
            char * letter )
```

Here is the call graph for this function:



4.4.2.11 historyFull()

```
int historyFull ( )
```

4.4.2.12 init_serial()

```
int init_serial (
            int device )
```

4.4.2.13 initializeHistory()

```
void initializeHistory ( )
```

4.4.2.14 isBackspace()

```
int isBackspace (
            char * letter )
```

4.4.2.15 isDownArrow()

```
int isDownArrow (
            char * letter )
```

4.4.2.16 isEnter()

```
int isEnter (
            char * letter )
```

4.4.2.17 isEscape()

```
int isEscape (
            char * letter )
```

4.4.2.18 isLeftArrow()

```
int isLeftArrow (
            char * letter )
```

4.4.2.19 isLetter()

```
int isLetter (
            char * letter )
```

4.4.2.20 isRightArrow()

```
int isRightArrow (
            char * letter )
```

4.4.2.21 isUpArrow()

```
int isUpArrow (
            char * letter )
```

4.4.2.22 leftArrowChar()

```
void leftArrowChar ( )
```

4.4.2.23 Function: leftArrowChar

Moves the cursor one space to the left and decrements the buffer index.

Parameters

∗buffer	the buffer to be changed

Author

Brendan Michael

Here is the call graph for this function:

4.4.2.24 letterChar()

```
void letterChar ( )
```

4.4.2.25 Function: letterChar

Adds a non-special character to the buffer and adjusts buffer size and index.

Author

Brendan Michael

4.4.2.26 polling()

```
int* polling (
            char * buffer,
            int * count )
```

4.4.2.27 Function: polling

Fills the buffer with keyboard input and returns to command handler when enter key is pressed. Also handles special characters

Parameters

∗buffer	String buffer to be filled
∗count	size of the buffer

Returns

the buffer size

Author

Brendan Michael

4.4.2.28 Function: polling

Fills the buffer with keyboard input and returns to command handler when enter key is pressed. Also handles special characters

Parameters

∗*buffer*	String buffer to be filled
∗*count*	size of the buffer

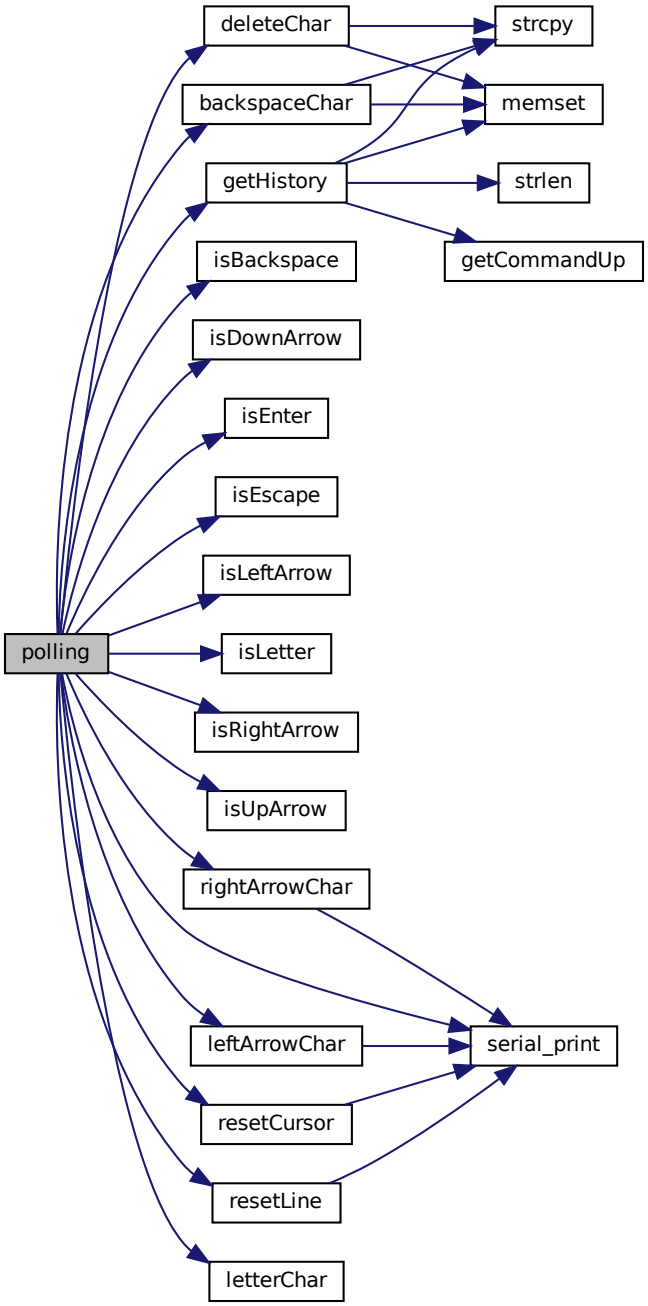
Returns

the buffer size

Author

Brendan Michael

Here is the call graph for this function:



4.4.2.29 resetCursor()

```
void resetCursor ( )
```

4.4.2.30 Function: resetCursor

Using escape sequences, moves the cursor from the start of the line up to the current location in the buffer

Author

Brendan Michael

4.4.2.31 Function: resetCursor

Using escape sequences, moves the cursor from the start of the line up to the current location in the buffer

Author

Brendan Michael

Here is the call graph for this function:

4.4.2.32 resetLine()

```
void resetLine ( )
```

4.4.2.33 Function: resetLine

Using escape sequences, moves the cursor to the beginning of the line, clears it, and changes the color to green.

Author

Brendan Michael

4.4.2.34 Function: resetLine

Using escape sequences, moves the cursor to the beginning of the line, clears it, and changes the color to green.

Author

Brendan Michael

Here is the call graph for this function:

4.4.2.35 rightArrowChar()

```
void rightArrowChar ( )
```

4.4.2.36 Function: righArrowChar

Moves the cursor one space to the right and increments the buffer index.

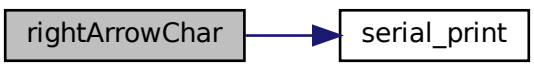
Parameters

∗buffer	the buffer to be changed

Author

Brendan Michael

Here is the call graph for this function:



4.4.2.37 serial_print()

```
int serial_print (
            const char * msg )
```

4.4.2.38 serial_println()

```
int serial_println (
            const char * msg )
```

4.4.2.39 set_serial_in()

```
int set_serial_in (
            int device )
```

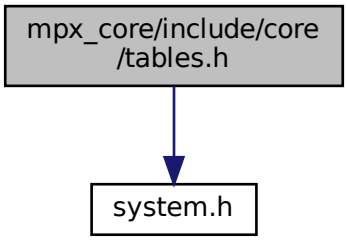
4.4.2.40 set_serial_out()

```
int set_serial_out (
            int device )
```

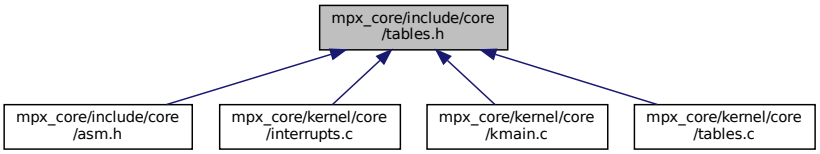
4.5 mpx_core/include/core/tables.h File Reference

```
#include "system.h"
```

Include dependency graph for tables.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct idt_entry_struct
- struct idt_struct
- struct gdt_descriptor_struct
- struct gdt_entry_struct

Functions

- struct idt_entry_struct __attribute__ ((packed)) idt_entry
- void idt_set_gate (u8int idx, u32int base, u16int sel, u8int flags)
- void gdt_init_entry (int idx, u32int base, u32int limit, u8int access, u8int flags)
- void init_idt ()
- void init_gdt ()

Variables

- u16int base_low
- u16int sselect
- u8int zero
- u8int flags
- u16int base_high
- u16int limit
- u32int base
- u16int limit_low
- u8int base_mid
- u8int access

4.5.1 Function Documentation

4.5.1.1 __attribute__()

```
struct gdt_entry_struct __attribute__ (
             (packed)  )
```

4.5.1.2 gdt_init_entry()

```
void gdt_init_entry (
             int idx,
             u32int base,
             u32int limit,
             u8int access,
             u8int flags )
```

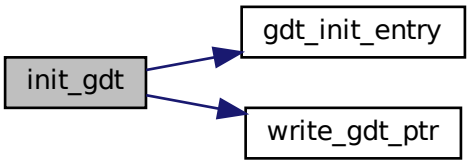
4.5.1.3 idt_set_gate()

```
void idt_set_gate (
             u8int idx,
             u32int base,
             u16int sel,
             u8int flags )
```

4.5.1.4 init_gdt()

```
void init_gdt ( )
```

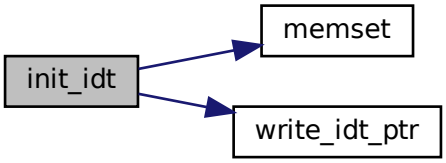
Here is the call graph for this function:



4.5.1.5 init_idt()

```
void init_idt ( )
```

Here is the call graph for this function:



4.5.2 Variable Documentation

4.5.2.1 access

```
u8int access
```

4.5.2.2 base

```
u32int base
```

4.5.2.3 base_high

```
u8int base_high
```

4.5.2.4 base_low

```
u16int base_low
```

4.5.2.5 base_mid

```
u8int base_mid
```

4.5.2.6 flags

```
u8int flags
```

4.5.2.7 limit

```
u16int limit
```

4.5.2.8 limit_low

```
u16int limit_low
```

4.5.2.9 sselect

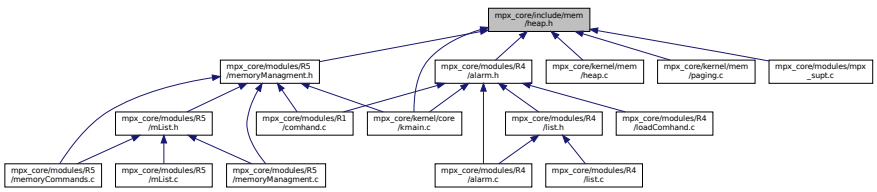
```
u16int sselect
```

4.5.2.10 zero

```
u8int zero
```

4.6 mpx_core/include/mem/heap.h File Reference

This graph shows which files directly or indirectly include this file:



Data Structures

- struct header
- struct footer
- struct index_entry
- struct index_table
- struct heap

Macros

- #define TABLE_SIZE 0x1000
- #define KHEAP_BASE 0xD000000
- #define KHEAP_MIN 0x10000
- #define KHEAP_SIZE 0x1000000

Functions

- u32int _kmalloc (u32int size, int align, u32int *phys_addr)
- u32int kmalloc (u32int size)
- u32int kfree ()
- void init_kheap ()
- u32int alloc (u32int size, heap *hp, int align)
- heap * make_heap (u32int base, u32int max, u32int min)

4.6.1 Macro Definition Documentation

4.6.1.1 KHEAP_BASE

```
#define KHEAP_BASE 0xD000000
```

4.6.1.2 KHEAP_MIN

```
#define KHEAP_MIN 0x10000
```

4.6.1.3 KHEAP_SIZE

```
#define KHEAP_SIZE 0x1000000
```

4.6.1.4 TABLE_SIZE

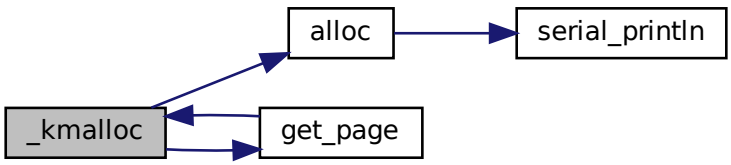
```
#define TABLE_SIZE 0x1000
```

4.6.2 Function Documentation

4.6.2.1 _kmalloc()

```
u32int _kmalloc (
            u32int size,
            int align,
            u32int * phys_addr )
```

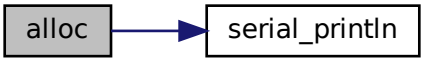
Here is the call graph for this function:



4.6.2.2 alloc()

```
u32int alloc (
            u32int size,
            heap * hp,
            int align )
```

Here is the call graph for this function:



4.6.2.3 init_kheap()

```
void init_kheap ( )
```

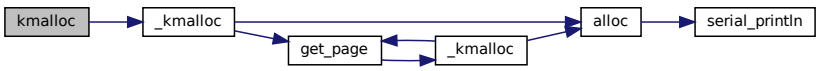
4.6.2.4 kfree()

```
u32int kfree ( )
```

4.6.2.5 kmalloc()

```
u32int kmalloc (
            u32int size )
```

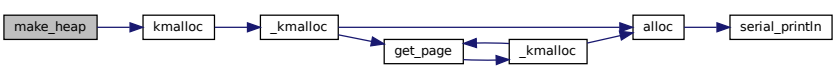
Here is the call graph for this function:



4.6.2.6 make_heap()

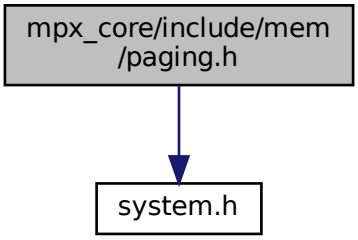
```
heap* make_heap (
            u32int base,
            u32int max,
            u32int min )
```

Here is the call graph for this function:

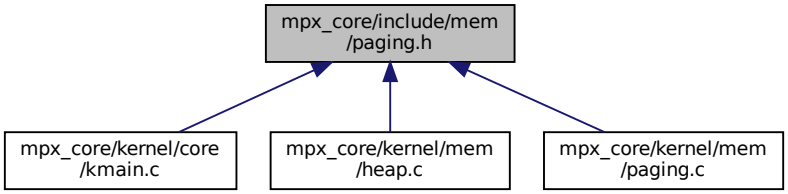


4.7 mpx_core/include/mem/paging.h File Reference

`#include <system.h>`
Include dependency graph for paging.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct page_entry
- struct page_table
- struct page_dir

Macros

- #define PAGE_SIZE 0x1000

Functions

- void set_bit (u32int addr)
- void clear_bit (u32int addr)
- u32int get_bit (u32int addr)
- u32int first_free ()
- void init_paging ()
- void load_page_dir (page_dir *new_page_dir)
- page_entry * get_page (u32int addr, page_dir *dir, int make_table)
- void new_frame (page_entry *page)

4.7.1 Macro Definition Documentation

4.7.1.1 PAGE_SIZE

```
#define PAGE_SIZE 0x1000
```

4.7.2 Function Documentation

4.7.2.1 clear_bit()

```
void clear_bit (
            u32int addr )
```

4.7.2.2 first_free()

```
u32int first_free ( )
```

4.7.2.3 get_bit()

```
u32int get_bit (
            u32int addr )
```

4.7.2.4 get_page()

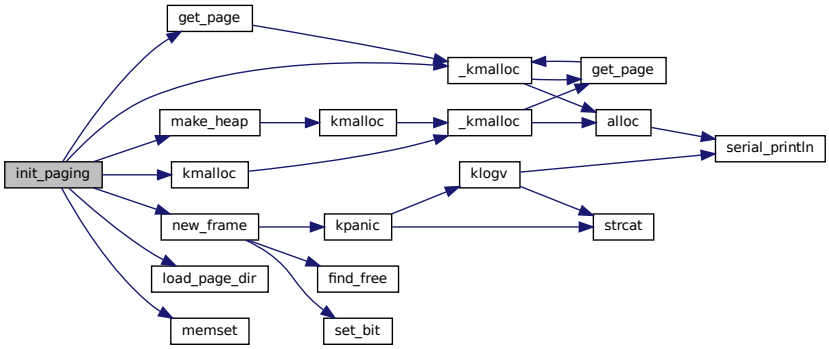
```
page_entry* get_page (
            u32int addr,
            page_dir * dir,
            int make_table )
```

Here is the call graph for this function:

4.7.2.5 init_paging()

```
void init_paging ( )
```

Here is the call graph for this function:



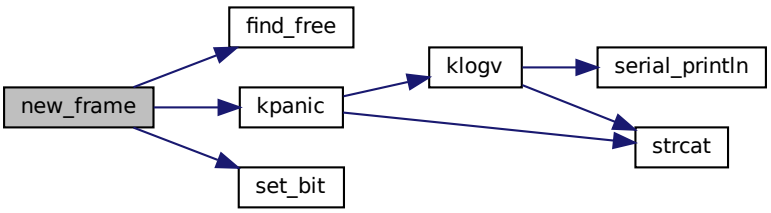
4.7.2.6 load_page_dir()

```
void load_page_dir (
            page_dir * new_page_dir )
```

4.7.2.7 new_frame()

```
void new_frame (
            page_entry * page )
```

Here is the call graph for this function:

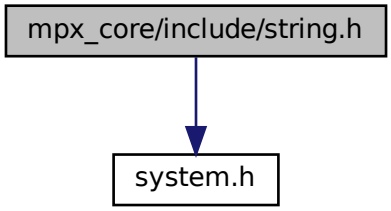


4.7.2.8 set_bit()

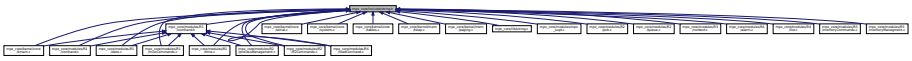
```
void set_bit (
              u32int addr )
```

4.8 mpx_core/include/string.h File Reference

`#include <system.h>`
Include dependency graph for string.h:



This graph shows which files directly or indirectly include this file:



Functions

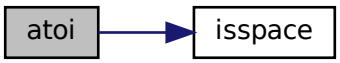
- int isspace (const char *c)
- void * memset (void *s, int c, size_t n)
- char * strcpy (char *s1, const char *s2)
- char * strcat (char *s1, const char *s2)
- int strlen (const char *s)
- int strcmp (const char *s1, const char *s2)
- char * strtok (char *s1, const char *s2)
- int atoi (const char *s)
- int strcasecmp (const char *s1, const char *s2)
- char toupper (char x)
- char * itoa (int value, char *buffer, int base)

4.8.1 Function Documentation

4.8.1.1 atoi()

```
int atoi (
            const char * s )
```

Here is the call graph for this function:



4.8.1.2 isspace()

```
int isspace (
            const char * c )
```

4.8.1.3 itoa()

```
char* itoa (
            int value,
            char * buffer,
            int base )
```

4.8.1.4 Function: itoa

Iterative function to implement itoa() function in C geeksforgeeks.org/implement-itoa/ for reference. Changed a little to make own.

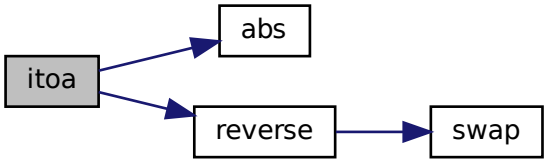
Parameters

value	integer taken as input
base	integer of the desired base to convert.
buffer	character buffer where the written output is being passed to.

Author

Bryce Williams

Here is the call graph for this function:



4.8.1.5 memset()

```
void* memset (
              void * s,
              int c,
              size_t n )
```

4.8.1.6 strcasecmp()

```
int strcasecmp (
              const char * s1,
              const char * s2 )
```

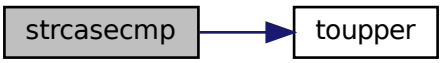
4.8.1.7 Function: strcasecmp

Compares two strings while being case insentsitive.

Author

Bryce Williams

Here is the call graph for this function:



4.8.1.8 strcat()

```
char* strcat (
            char * s1,
            const char * s2 )
```

4.8.1.9 strcmp()

```
int strcmp (
            const char * s1,
            const char * s2 )
```

4.8.1.10 strcpy()

```
char* strcpy (
            char * s1,
            const char * s2 )
```

4.8.1.11 strlen()

```
int strlen (
            const char * s )
```

4.8.1.12 strtok()

```
char* strtok (
            char * s1,
            const char * s2 )
```

4.8.1.13 toupper()

```
char toupper (
            char x )
```

4.8.1.14 Function: toupper

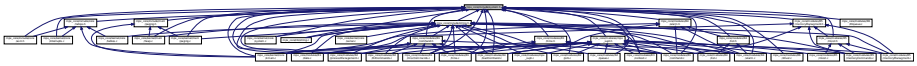
Converts character to uppercase. ex: 'a' -> 'A'

Author

Bryce Williams

4.9 mpx_core/include/system.h File Reference

This graph shows which files directly or indirectly include this file:



Data Structures

- struct date_time

Macros

- #define NULL 0
- #define no_warn(p) if (p) while (1) break
- #define asm __asm__
- #define volatile __volatile__
- #define sti() asm volatile ("sti"::)
- #define cli() asm volatile ("cli"::)
- #define nop() asm volatile ("nop"::)
- #define hlt() asm volatile ("hlt"::)
- #define iret() asm volatile ("iret"::)
- #define GDT_CS_ID 0x01
- #define GDT_DS_ID 0x02

Typedefs

- typedef unsigned int size_t
- typedef unsigned char u8int
- typedef unsigned short u16int
- typedef unsigned long u32int

Functions

- void klogv (const char *msg)
- void kpanic (const char *msg)

4.9.1 Macro Definition Documentation

4.9.1.1 asm

```
#define asm __asm__
```

4.9.1.2 cli

```
#define cli( ) asm volatile ("cli"::)
```

4.9.1.3 GDT_CS_ID

```
#define GDT_CS_ID 0x01
```

4.9.1.4 GDT_DS_ID

```
#define GDT_DS_ID 0x02
```

4.9.1.5 hlt

```
#define hlt( ) asm volatile ("hlt"::)
```

4.9.1.6 iret

```
#define iret( ) asm volatile ("iret"::)
```

4.9.1.7 no_warn

```
#define no_warn(
             p ) if (p) while (1) break
```

4.9.1.8 nop

```
#define nop( ) asm volatile ("nop"::)
```

4.9.1.9 NULL

```
#define NULL 0
```

4.9.1.10 sti

```
#define sti( ) asm volatile ("sti"::)
```

4.9.1.11 volatile

```
#define volatile __volatile__
```

4.9.2 Typedef Documentation

4.9.2.1 size_t

```
typedef unsigned int size_t
```

4.9.2.2 u16int

```
typedef unsigned short u16int
```

4.9.2.3 u32int

```
typedef unsigned long u32int
```

4.9.2.4 u8int

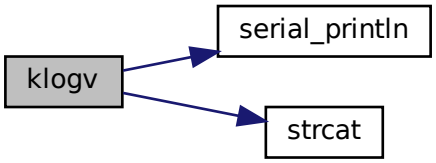
```
typedef unsigned char u8int
```

4.9.3 Function Documentation

4.9.3.1 klogv()

```
void klogv (
            const char * msg )
```

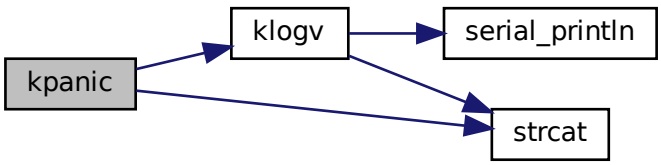
Here is the call graph for this function:



4.9.3.2 kpanic()

```
void kpanic (
            const char * msg )
```

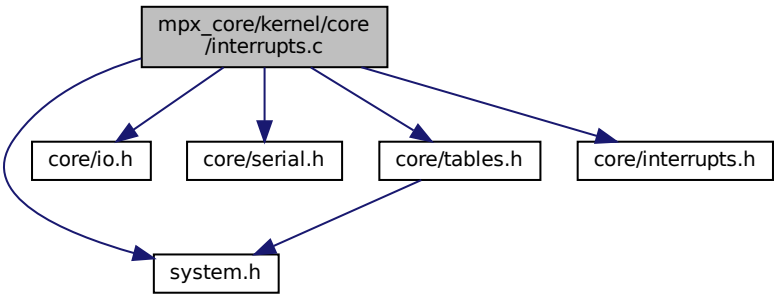
Here is the call graph for this function:



4.10 mpx_core/kernel/core/interrupts.c File Reference

```
#include <system.h>
#include <core/io.h>
#include <core/serial.h>
#include <core/tables.h>
#include <core/interrupts.h>
```

Include dependency graph for interrupts.c:



Macros

- #define PIC1 0x20
- #define PIC2 0xA0
- #define ICW1 0x11
- #define ICW4 0x01
- #define io_wait() asm volatile ("outb $0x80")

Functions

- void divide_error ()
- void debug ()
- void nmi ()
- void breakpoint ()
- void overflow ()
- void bounds ()
- void invalid_op ()
- void device_not_available ()
- void double_fault ()
- void coprocessor_segment ()
- void invalid_tss ()
- void segment_not_present ()
- void stack_segment ()
- void general_protection ()
- void page_fault ()
- void reserved ()
- void coprocessor ()
- void rtc_isr ()

- void sys_call_isr ()
- void serial_io_isr ()
- void isr0 ()
- void do_isr ()
- void init_irq (void)
- void init_pic (void)
- void do_divide_error ()
- void do_debug ()
- void do_nmi ()
- void do_breakpoint ()
- void do_overflow ()
- void do_bounds ()
- void do_invalid_op ()
- void do_device_not_available ()
- void do_double_fault ()
- void do_coprocessor_segment ()
- void do_invalid_tss ()
- void do_segment_not_present ()
- void do_stack_segment ()
- void do_general_protection ()
- void do_page_fault ()
- void do_reserved ()
- void do_coprocessor ()

Variables

- idt_entry idt_entries [256]

4.10.1 Macro Definition Documentation

4.10.1.1 ICW1

```
#define ICW1 0x11
```

4.10.1.2 ICW4

```
#define ICW4 0x01
```

4.10.1.3 io_wait

```
#define io_wait( ) asm volatile ("outb $0x80")
```

4.10.1.4 PIC1

```
#define PIC1 0x20
```

4.10.1.5 PIC2

```
#define PIC2 0xA0
```

4.10.2 Function Documentation

4.10.2.1 bounds()

```
void bounds ( )
```

4.10.2.2 breakpoint()

```
void breakpoint ( )
```

4.10.2.3 coprocessor()

```
void coprocessor ( )
```

4.10.2.4 coprocessor_segment()

```
void coprocessor_segment ( )
```

4.10.2.5 debug()

```
void debug ( )
```

4.10.2.6 device_not_available()

```
void device_not_available ( )
```

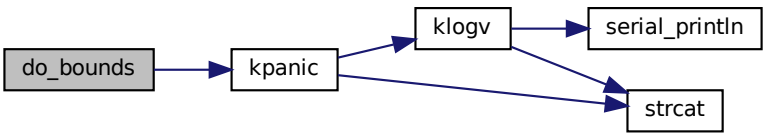
4.10.2.7 divide_error()

```
void divide_error ( )
```

4.10.2.8 do_bounds()

```
void do_bounds ( )
```

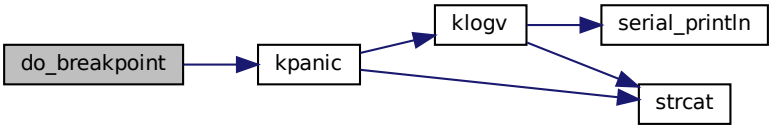
Here is the call graph for this function:



4.10.2.9 do_breakpoint()

```
void do_breakpoint ( )
```

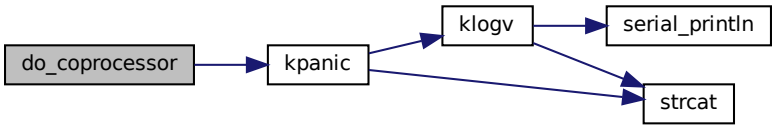
Here is the call graph for this function:



4.10.2.10 do_coprocessor()

```
void do_coprocessor ( )
```

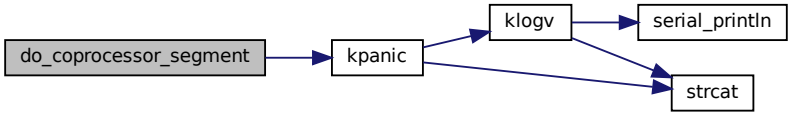
Here is the call graph for this function:



4.10.2.11 do_coprocessor_segment()

```
void do_coprocessor_segment ( )
```

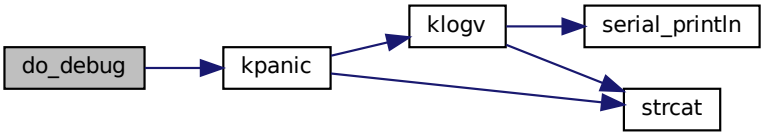
Here is the call graph for this function:



4.10.2.12 do_debug()

```
void do_debug ( )
```

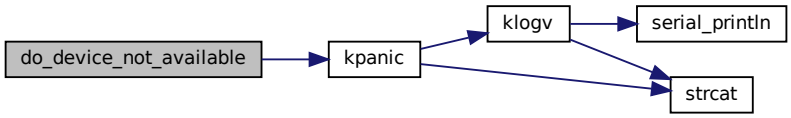
Here is the call graph for this function:



4.10.2.13 do_device_not_available()

```
void do_device_not_available ( )
```

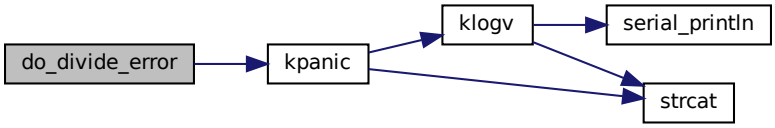
Here is the call graph for this function:



4.10.2.14 do_divide_error()

```
void do_divide_error ( )
```

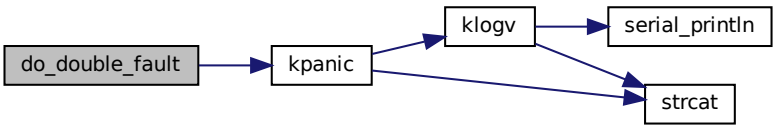
Here is the call graph for this function:



4.10.2.15 do_double_fault()

```
void do_double_fault ( )
```

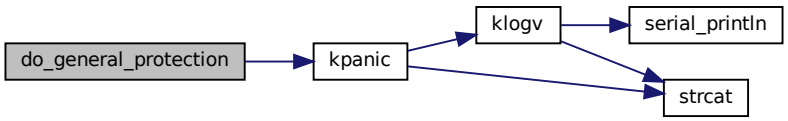
Here is the call graph for this function:



4.10.2.16 do_general_protection()

```
void do_general_protection ( )
```

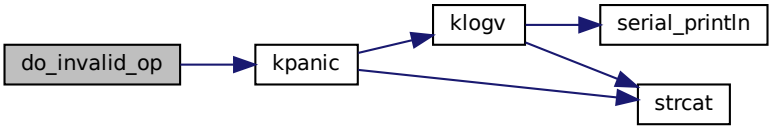
Here is the call graph for this function:



4.10.2.17 do_invalid_op()

```
void do_invalid_op ( )
```

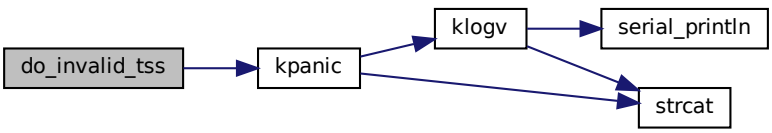
Here is the call graph for this function:



4.10.2.18 do_invalid_tss()

```
void do_invalid_tss ( )
```

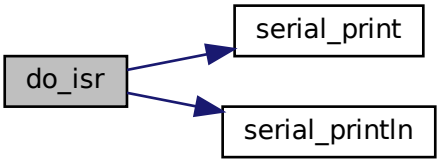
Here is the call graph for this function:



4.10.2.19 do_isr()

```
void do_isr ( )
```

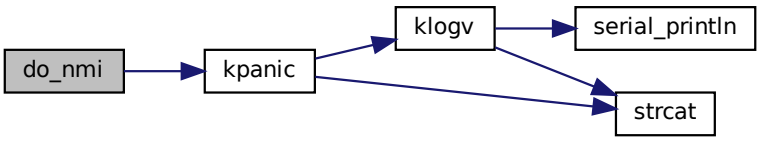
Here is the call graph for this function:



4.10.2.20 do_nmi()

```
void do_nmi ( )
```

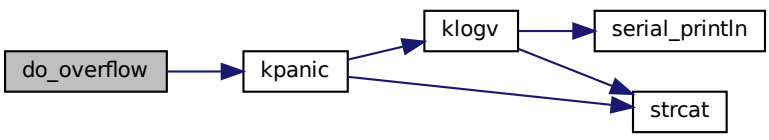
Here is the call graph for this function:



4.10.2.21 do_overflow()

```
void do_overflow ( )
```

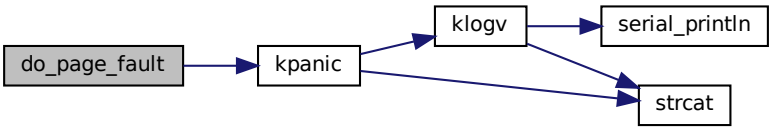
Here is the call graph for this function:



4.10.2.22 do_page_fault()

```
void do_page_fault ( )
```

Here is the call graph for this function:



4.10.2.23 do_reserved()

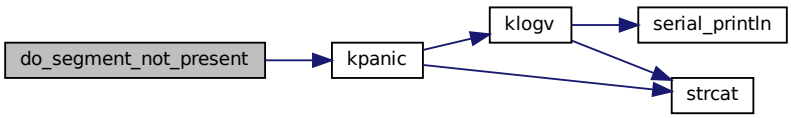
```
void do_reserved ( )
```

Here is the call graph for this function:

4.10.2.24 do_segment_not_present()

```
void do_segment_not_present ( )
```

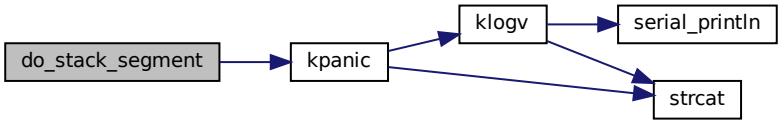
Here is the call graph for this function:



4.10.2.25 do_stack_segment()

```
void do_stack_segment ( )
```

Here is the call graph for this function:



4.10.2.26 double_fault()

```
void double_fault ( )
```

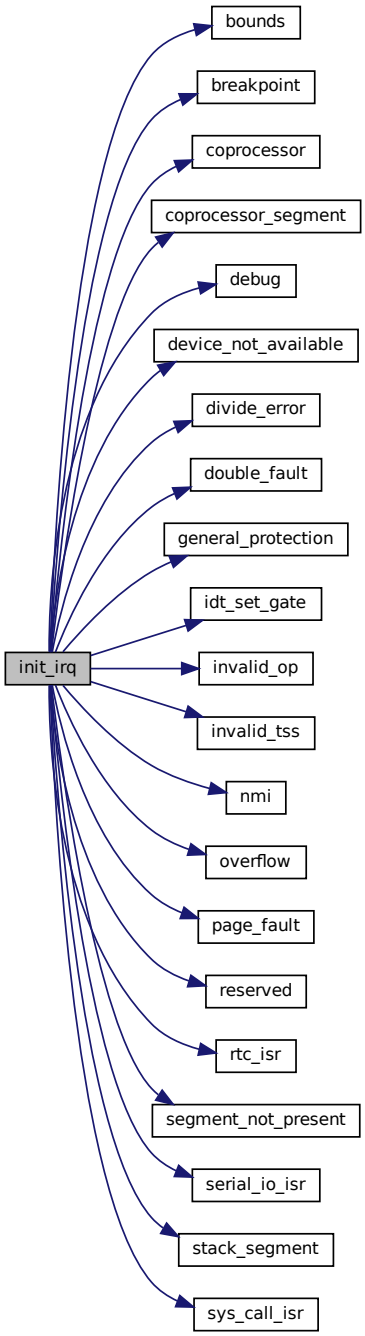
4.10.2.27 general_protection()

```
void general_protection ( )
```

4.10.2.28 init_irq()

```
void init_irq (
            void  )
```

Here is the call graph for this function:



4.10.2.29 init_pic()

```
void init_pic (
            void  )
```

4.10.2.30 invalid_op()

```
void invalid_op ( )
```

4.10.2.31 invalid_tss()

```
void invalid_tss ( )
```

4.10.2.32 isr0()

```
void isr0 ( )
```

4.10.2.33 nmi()

```
void nmi ( )
```

4.10.2.34 overflow()

```
void overflow ( )
```

4.10.2.35 page_fault()

```
void page_fault ( )
```

4.10.2.36 reserved()

```
void reserved ( )
```

4.10.2.37 rtc_isr()

```
void rtc_isr ( )
```

4.10.2.38 segment_not_present()

```
void segment_not_present ( )
```

4.10.2.39 serial_io_isr()

```
void serial_io_isr ( )
```

4.10.2.40 stack_segment()

```
void stack_segment ( )
```

4.10.2.41 sys_call_isr()

```
void sys_call_isr ( )
```

4.10.3 Variable Documentation

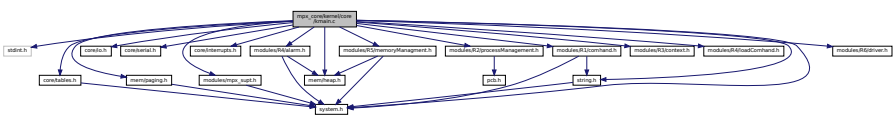
4.10.3.1 idt_entries

```
idt_entry idt_entries[256]  [extern]
```

4.11 mpx_core/kernel/core/kmain.c File Reference

```
#include <stdint.h>
#include <string.h>
#include <system.h>
#include <core/io.h>
#include <core/serial.h>
#include <core/tables.h>
#include <core/interrupts.h>
#include <mem/heap.h>
#include <mem/paging.h>
#include "modules/mpx_supt.h"
#include "modules/R1/comhand.h"
#include "modules/R2/processManagement.h"
#include "modules/R3/context.h"
#include "modules/R4/loadComhand.h"
#include "modules/R4/alarm.h"
#include "modules/R5/memoryManagment.h"
#include "modules/R6/driver.h"
```

Include dependency graph for kmain.c:



Functions

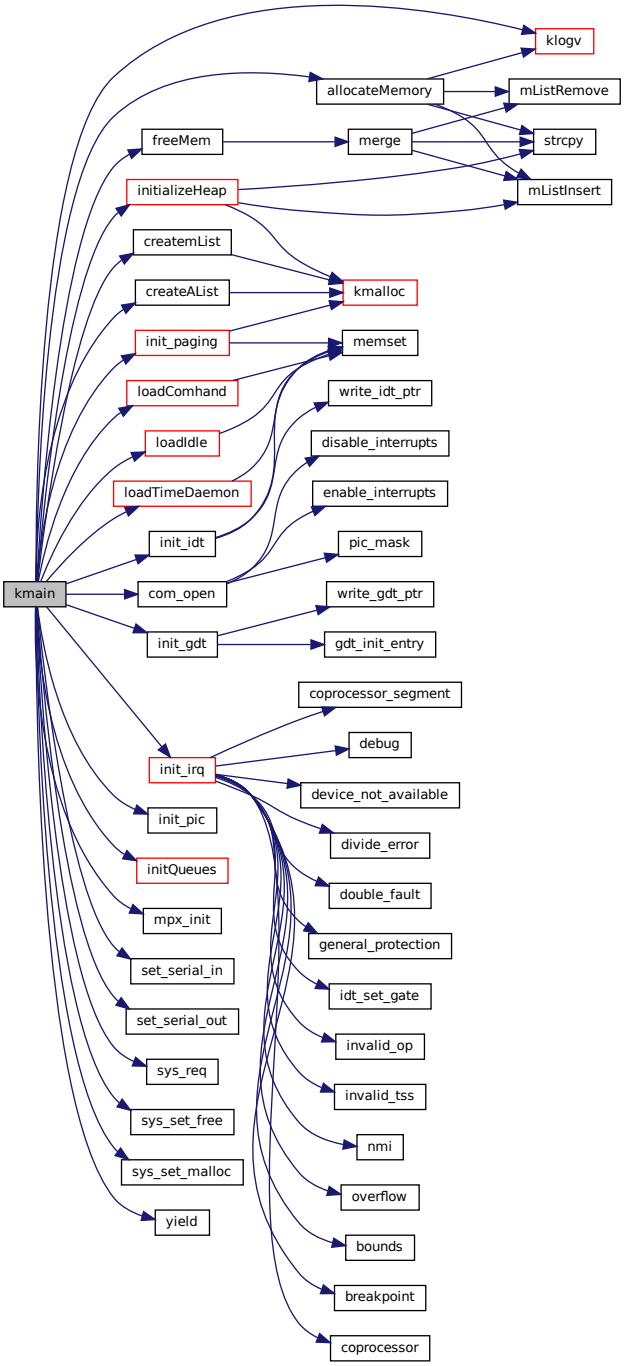
- void kmain (void)

4.11.1 Function Documentation

4.11.1.1 kmain()

```
void kmain (
            void  )
```

Here is the call graph for this function:

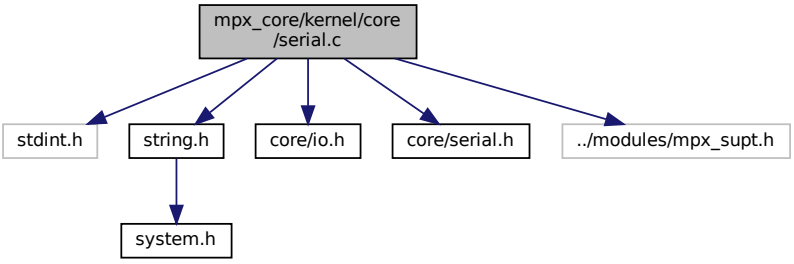


4.12 mpx_core/kernel/core/serial.c File Reference

```
#include <stdint.h>
#include <string.h>
#include <core/io.h>
#include <core/serial.h>
```

```
#include <../modules/mpx_supt.h>
```

Include dependency graph for serial.c:



Macros

- #define NO_ERROR 0
- #define NEWLINE 10
- #define ENTER 13
- #define DELETE 8
- #define DOWN_ARROW 66
- #define ESCAPE 27
- #define RIGHT_ARROW 67
- #define LEFT_ARROW 68
- #define LEFT_BRACKET 91
- #define UP_ARROW 65
- #define BACKSPACE 127
- #define MV_CURSOR_START "\033[1000D"
- #define MV_CURSOR_RIGHT "\033[C"
- #define MV_CURSOR_LEFT "\033[D"
- #define CLEAR_LINE "\033[2K"
- #define PRINT_GREEN "\033[92m"
- #define MAX_SIZE 20
- #define UP "\033[A"
- #define DOWN "\033[B"
- #define max 99

Functions

- int init_serial (int device)
- int serial_println (const char *msg)
- int serial_print (const char *msg)
- int set_serial_out (int device)
- int set_serial_in (int device)
- int * polling (char *buffer, int *count)
- void resetLine ()
- void resetCursor ()
- void letterChar (char *buffer, char *letter)
- void deleteChar (char *buffer)
- void backspaceChar (char *buffer)

- void rightArrowChar ()
- void leftArrowChar ()
- int isUpArrow (char *letter)
- int isDownArrow (char *letter)
- int isRightArrow (char *letter)
- int isLeftArrow (char *letter)
- int isEscape (char *letter)
- int isBackspace (char *letter)
- int isEnter (char *letter)
- int isLetter (char *letter)
- void initializeHistory ()
- int addToHistory (char *command)
- int comEmpty ()
- void getHistory (char *buffer, char *letter)
- char * getCommandUp ()
- char * getCommandDown ()
- int historyFull ()

Variables

- int bufferSize
- int bufferIndex
- int serial_port_out = 0
- int serial_port_in = 0
- char commands [21][31]
- int size
- int index

4.12.1 Macro Definition Documentation

4.12.1.1 BACKSPACE

```
#define BACKSPACE 127
```

4.12.1.2 CLEAR_LINE

```
#define CLEAR_LINE "\033[2K"
```

4.12.1.3 DELETE

```
#define DELETE 8
```

4.12.1.4 DOWN

```
#define DOWN "\033[B"
```

4.12.1.5 DOWN_ARROW

```
#define DOWN_ARROW 66
```

4.12.1.6 ENTER

```
#define ENTER 13
```

4.12.1.7 ESCAPE

```
#define ESCAPE 27
```

4.12.1.8 LEFT_ARROW

```
#define LEFT_ARROW 68
```

4.12.1.9 LEFT_BRACKET

```
#define LEFT_BRACKET 91
```

4.12.1.10 max

```
#define max 99
```

4.12.1.11 MAX_SIZE

```
#define MAX_SIZE 20
```

4.12.1.12 MV_CURSOR_LEFT

```
#define MV_CURSOR_LEFT "\033[D"
```

4.12.1.13 MV_CURSOR_RIGHT

```
#define MV_CURSOR_RIGHT "\033[C"
```

4.12.1.14 MV_CURSOR_START

```
#define MV_CURSOR_START "\033[1000D"
```

4.12.1.15 NEWLINE

```
#define NEWLINE 10
```

4.12.1.16 NO_ERROR

```
#define NO_ERROR 0
```

4.12.1.17 PRINT_GREEN

```
#define PRINT_GREEN "\033[92m"
```

4.12.1.18 RIGHT_ARROW

```
#define RIGHT_ARROW 67
```

4.12.1.19 UP

```
#define UP "\033[A"
```

4.12.1.20 UP_ARROW

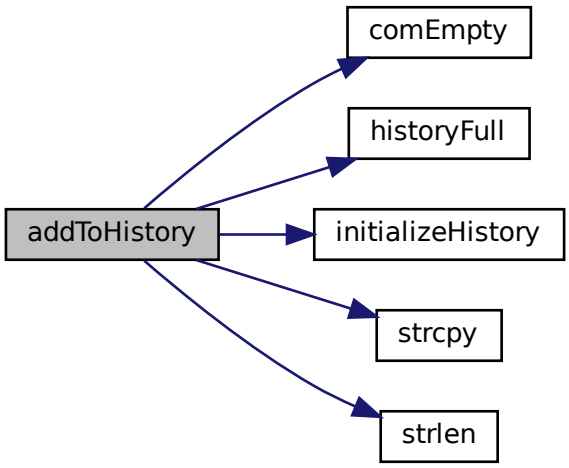
```
#define UP_ARROW 65
```

4.12.2 Function Documentation

4.12.2.1 addToHistory()

```
int addToHistory (
            char * command )
```

Here is the call graph for this function:



4.12.2.2 backspaceChar()

```
void backspaceChar (
            char * buffer )
```

4.12.2.3 Function: backspaceChar

Handles backspace characters. Copies the current buffers content up to the cursor location into a new buffer and concatenates that with everything past the cursor.

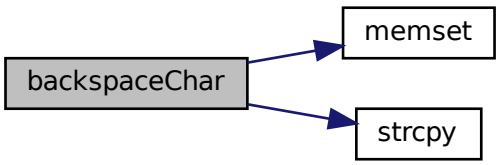
Parameters

∗buffer	the buffer to be changed

Author

Brendan Michael

Here is the call graph for this function:



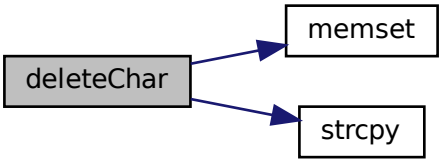
4.12.2.4 comEmpty()

```
int comEmpty ( )
```

4.12.2.5 deleteChar()

```
void deleteChar (
            char * buffer )
```

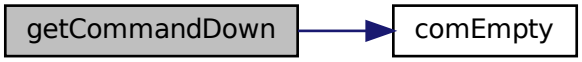
Here is the call graph for this function:



4.12.2.6 getCommandDown()

```
char* getCommandDown ( )
```

Here is the call graph for this function:



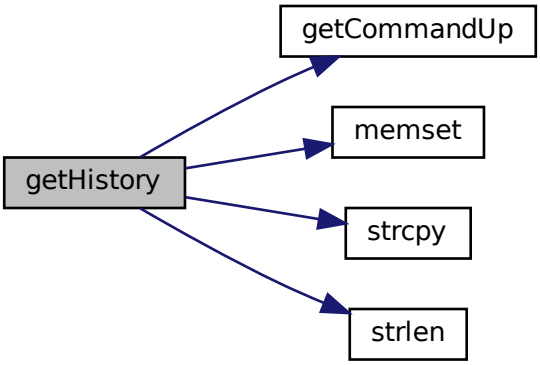
4.12.2.7 getCommandUp()

```
char* getCommandUp ( )
```

4.12.2.8 getHistory()

```
void getHistory (
            char * buffer,
            char * letter )
```

Here is the call graph for this function:



4.12.2.9 historyFull()

```
int historyFull ( )
```

4.12.2.10 init_serial()

```
int init_serial (
            int device )
```

4.12.2.11 initializeHistory()

```
void initializeHistory ( )
```

4.12.2.12 isBackspace()

```
int isBackspace (
            char * letter )
```

4.12.2.13 isDownArrow()

```
int isDownArrow (
            char * letter )
```

4.12.2.14 isEnter()

```
int isEnter (
            char * letter )
```

4.12.2.15 isEscape()

```
int isEscape (
            char * letter )
```

4.12.2.16 isLeftArrow()

```
int isLeftArrow (
            char * letter )
```

4.12.2.17 isLetter()

```
int isLetter (
            char * letter )
```

4.12.2.18 isRightArrow()

```
int isRightArrow (
            char * letter )
```

4.12.2.19 isUpArrow()

```
int isUpArrow (
            char * letter )
```

4.12.2.20 leftArrowChar()

```
void leftArrowChar ( )
```

4.12.2.21 Function: leftArrowChar

Moves the cursor one space to the left and decrements the buffer index.

Parameters

∗buffer	the buffer to be changed

Author

Brendan Michael

Here is the call graph for this function:

4.12.2.22 letterChar()

```
void letterChar (
            char * buffer,
            char * letter )
```

4.12.2.23 polling()

```
int* polling (
            char * buffer,
            int * count )
```

4.12.2.24 Function: polling

Fills the buffer with keyboard input and returns to command handler when enter key is pressed. Also handles special characters

Parameters

∗buffer	String buffer to be filled
∗count	size of the buffer

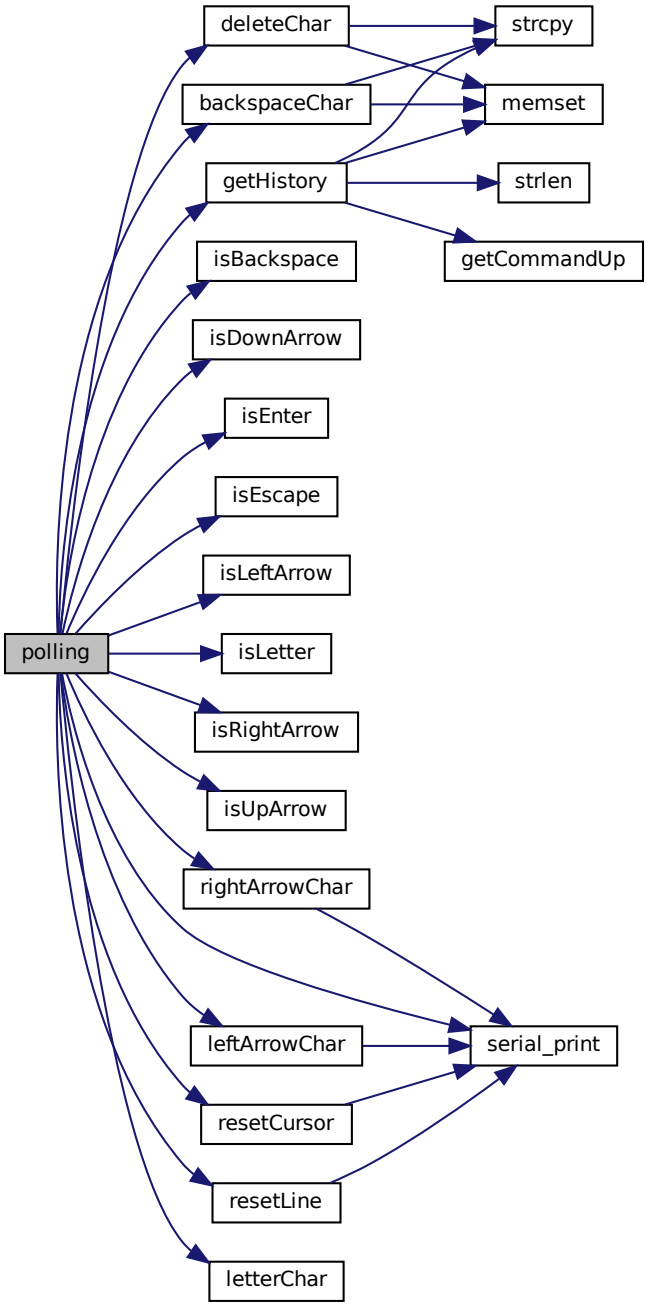
Returns

the buffer size

Author

Brendan Michael

Here is the call graph for this function:



4.12.2.25 resetCursor()

```
void resetCursor ( )
```

4.12.2.26 Function: resetCursor

Using escape sequences, moves the cursor from the start of the line up to the current location in the buffer

Author

Brendan Michael

Here is the call graph for this function:

4.12.2.27 resetLine()

```
void resetLine ( )
```

4.12.2.28 Function: resetLine

Using escape sequences, moves the cursor to the beginning of the line, clears it, and changes the color to green.

Author

Brendan Michael

Here is the call graph for this function:

4.12.2.29 rightArrowChar()

```
void rightArrowChar ( )
```

4.12.2.30 Function: righArrowChar

Moves the cursor one space to the right and increments the buffer index.

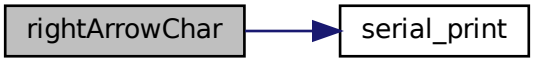
Parameters

∗buffer	the buffer to be changed

Author

Brendan Michael

Here is the call graph for this function:



4.12.2.31 serial_print()

```
int serial_print (
            const char * msg )
```

4.12.2.32 serial_println()

```
int serial_println (
            const char * msg )
```

4.12.2.33 set_serial_in()

```
int set_serial_in (
            int device )
```

4.12.2.34 set_serial_out()

```
int set_serial_out (
            int device )
```

4.12.3 Variable Documentation

4.12.3.1 bufferIndex

```
int bufferIndex
```

4.12.3.2 bufferSize

```
int bufferSize
```

4.12.3.3 commands

```
char commands[21][31]
```

4.12.3.4 index

```
int index
```

4.12.3.5 serial_port_in

```
int serial_port_in = 0
```

4.12.3.6 serial_port_out

```
int serial_port_out = 0
```

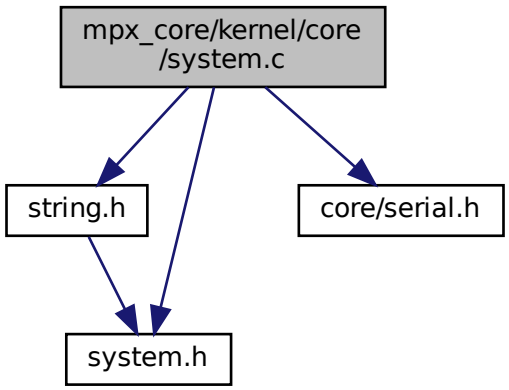
4.12.3.7 size

```
int size
```

4.13 mpx_core/kernel/core/system.c File Reference

```
#include <string.h>
#include <system.h>
#include <core/serial.h>
```

Include dependency graph for system.c:



Functions

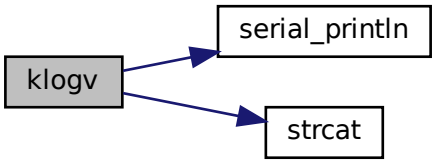
- void klogv (const char *msg)
- void kpanic (const char *msg)

4.13.1 Function Documentation

4.13.1.1 klogv()

```
void klogv (
            const char * msg )
```

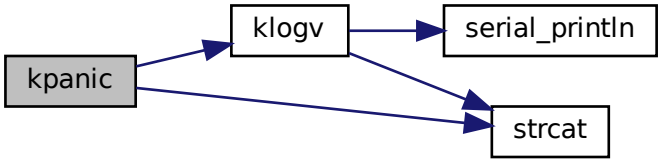
Here is the call graph for this function:



4.13.1.2 kpanic()

```
void kpanic (
            const char * msg )
```

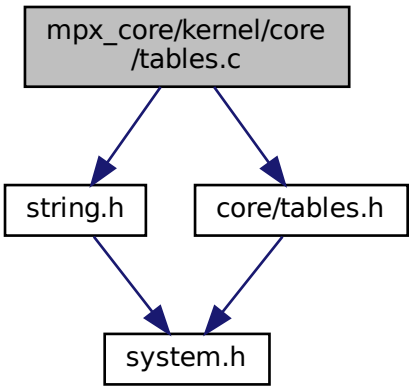
Here is the call graph for this function:



4.14 mpx_core/kernel/core/tables.c File Reference

```
#include <string.h>
#include <core/tables.h>
```

Include dependency graph for tables.c:



Functions

- void write_gdt_ptr (u32int, size_t)
- void write_idt_ptr (u32int)
- void idt_set_gate (u8int idx, u32int base, u16int sel, u8int flags)
- void init_idt ()
- void gdt_init_entry (int idx, u32int base, u32int limit, u8int access, u8int flags)
- void init_gdt ()

Variables

- gdt_descriptor gdt_ptr
- gdt_entry gdt_entries [5]
- idt_descriptor idt_ptr
- idt_entry idt_entries [256]

4.14.1 Function Documentation

4.14.1.1 gdt_init_entry()

```
void gdt_init_entry (
             int idx,
             u32int base,
             u32int limit,
             u8int access,
             u8int flags )
```

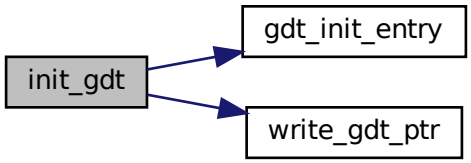
4.14.1.2 idt_set_gate()

```
void idt_set_gate (
             u8int idx,
             u32int base,
             u16int sel,
             u8int flags )
```

4.14.1.3 init_gdt()

```
void init_gdt ( )
```

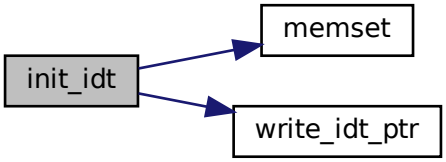
Here is the call graph for this function:



4.14.1.4 init_idt()

```
void init_idt ( )
```

Here is the call graph for this function:



4.14.1.5 write_gdt_ptr()

```
void write_gdt_ptr (
             u32int ,
             size_t  )
```

4.14.1.6 write_idt_ptr()

```
void write_idt_ptr (
             u32int  )
```

4.14.2 Variable Documentation

4.14.2.1 gdt_entries

```
gdt_entry gdt_entries[5]
```

4.14.2.2 gdt_ptr

```
gdt_descriptor gdt_ptr
```

4.14.2.3 idt_entries

```
idt_entry idt_entries[256]
```

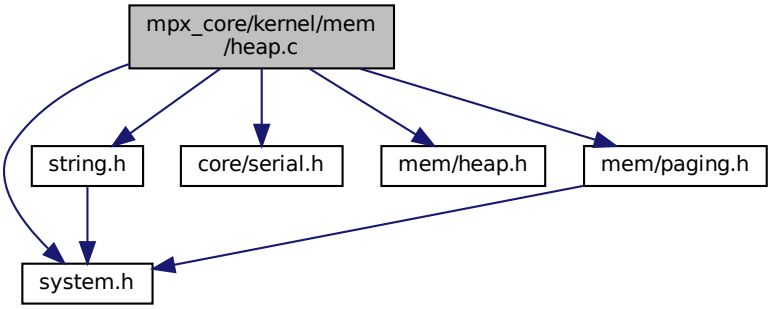
4.14.2.4 idt_ptr

```
idt_descriptor idt_ptr
```

4.15 mpx_core/kernel/mem/heap.c File Reference

```
#include <system.h>
#include <string.h>
#include <core/serial.h>
#include <mem/heap.h>
#include <mem/paging.h>
```

Include dependency graph for heap.c:



Functions

- u32int _kmalloc (u32int size, int page_align, u32int *phys_addr)
- u32int kmalloc (u32int size)
- u32int alloc (u32int size, heap *h, int align)
- heap * make_heap (u32int base, u32int max, u32int min)

Variables

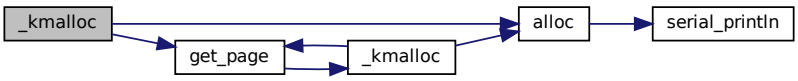
- heap * kheap = 0
- heap * curr_heap = 0
- page_dir * kdir
- void * end
- void _end
- void __end
- u32int phys_alloc_addr = (u32int)&end

4.15.1 Function Documentation

4.15.1.1 _kmalloc()

```
u32int _kmalloc (
            u32int size,
            int page_align,
            u32int * phys_addr )
```

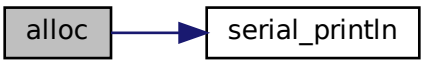
Here is the call graph for this function:



4.15.1.2 alloc()

```
u32int alloc (
            u32int size,
            heap * h,
            int align )
```

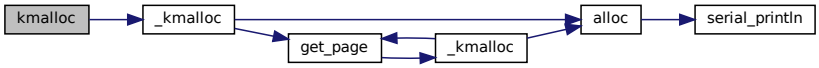
Here is the call graph for this function:



4.15.1.3 kmalloc()

```
u32int kmalloc (
            u32int size )
```

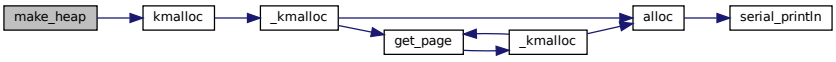
Here is the call graph for this function:



4.15.1.4 make_heap()

```
heap* make_heap (
            u32int base,
            u32int max,
            u32int min )
```

Here is the call graph for this function:



4.15.2 Variable Documentation

4.15.2.1 __end

```
void __end
```

4.15.2.2 _end

```
void _end
```

4.15.2.3 curr_heap

```
heap* curr_heap = 0
```

4.15.2.4 end

```
void* end  [extern]
```

4.15.2.5 kdir

```
page_dir* kdir  [extern]
```

4.15.2.6 kheap

```
heap* kheap = 0
```

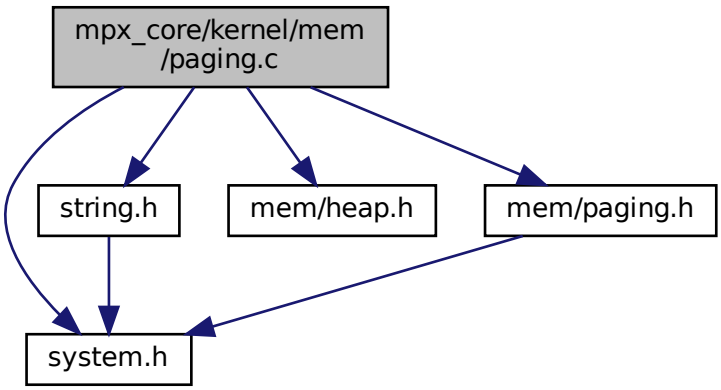
4.15.2.7 phys_alloc_addr

```
u32int phys_alloc_addr = (u32int)&end
```

4.16 mpx_core/kernel/mem/paging.c File Reference

```
#include <system.h>
#include <string.h>
#include "mem/heap.h"
#include "mem/paging.h"
```

Include dependency graph for paging.c:



Functions

- void set_bit (u32int addr)
- void clear_bit (u32int addr)
- u32int get_bit (u32int addr)
- u32int find_free ()
- page_entry * get_page (u32int addr, page_dir *dir, int make_table)
- void init_paging ()
- void load_page_dir (page_dir *new_dir)
- void new_frame (page_entry *page)

Variables

- u32int mem_size = 0x4000000
- u32int page_size = 0x1000
- u32int nframes
- u32int * frames
- page_dir * kdir = 0
- page_dir * cdir = 0
- u32int phys_alloc_addr
- heap * kheap

4.16.1 Function Documentation

4.16.1.1 clear_bit()

```
void clear_bit (
            u32int addr )
```

4.16.1.2 find_free()

```
u32int find_free ( )
```

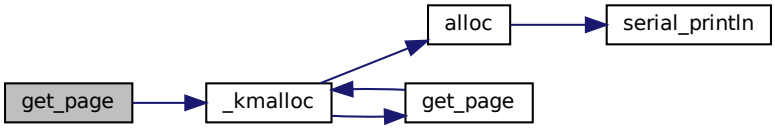
4.16.1.3 get_bit()

```
u32int get_bit (
            u32int addr )
```

4.16.1.4 get_page()

```
page_entry* get_page (
            u32int addr,
            page_dir * dir,
            int make_table )
```

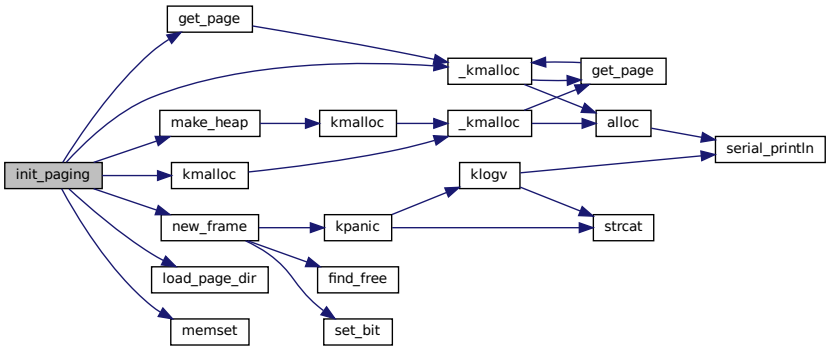
Here is the call graph for this function:



4.16.1.5 init_paging()

```
void init_paging ( )
```

Here is the call graph for this function:



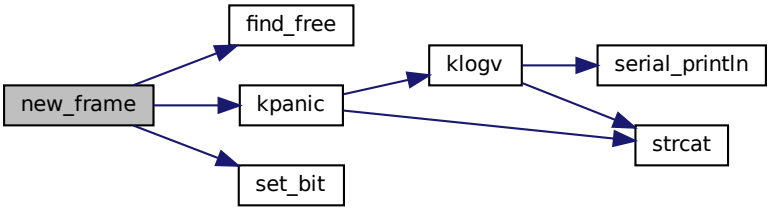
4.16.1.6 load_page_dir()

```
void load_page_dir (
            page_dir * new_dir )
```

4.16.1.7 new_frame()

```
void new_frame (
            page_entry * page )
```

Here is the call graph for this function:



4.16.1.8 set_bit()

```
void set_bit (
            u32int addr )
```

4.16.2 Variable Documentation

4.16.2.1 cdir

```
page_dir* cdir = 0
```

4.16.2.2 frames

```
u32int* frames
```

4.16.2.3 kdir

```
page_dir* kdir = 0
```

4.16.2.4 kheap

```
heap* kheap  [extern]
```

4.16.2.5 mem_size

```
u32int mem_size = 0x4000000
```

4.16.2.6 nframes

```
u32int nframes
```

4.16.2.7 page_size

```
u32int page_size = 0x1000
```

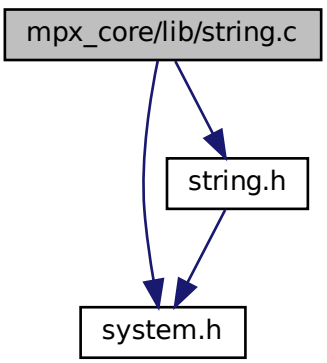
4.16.2.8 phys_alloc_addr

```
u32int phys_alloc_addr  [extern]
```

4.17 mpx_core/lib/string.c File Reference

```
#include <system.h>
#include <string.h>
```

Include dependency graph for string.c:



Functions

- int strlen (const char *s)
- char * strcpy (char *s1, const char *s2)
- int atoi (const char *s)
- int strcmp (const char *s1, const char *s2)
- char * strcat (char *s1, const char *s2)
- int isspace (const char *c)
- void * memset (void *s, int c, size_t n)
- char * strtok (char *s1, const char *s2)
- int strcasecmp (const char *s1, const char *s2)
- char toupper (char x)
- int abs (int number)
- void swap (char *x, char *y)
- char * reverse (char *buffer, int i, int j)
- char * itoa (int value, char *buffer, int base)

4.17.1 Function Documentation

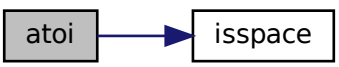
4.17.1.1 abs()

```
int abs (
            int number )
```

4.17.1.2 atoi()

```
int atoi (
            const char * s )
```

Here is the call graph for this function:



4.17.1.3 isspace()

```
int isspace (
            const char * c )
```

4.17.1.4 itoa()

```
char* itoa (
            int value,
            char * buffer,
            int base )
```

4.17.1.5 Function: itoa

Iterative function to implement itoa() function in C geeksforgeeks.org/implement-itoa/ for reference. Changed a little to make own.

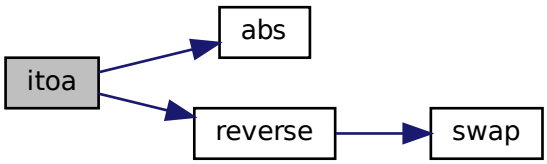
Parameters

value	integer taken as input
base	integer of the desired base to convert.
buffer	character buffer where the written output is being passed to.

Author

Bryce Williams

Here is the call graph for this function:



4.17.1.6 memset()

```
void* memset (
            void * s,
            int c,
            size_t n )
```

4.17.1.7 reverse()

```
char* reverse (
            char * buffer,
            int i,
            int j )
```

Here is the call graph for this function:

4.17.1.8 strcasecmp()

```
int strcasecmp (
            const char * s1,
            const char * s2 )
```

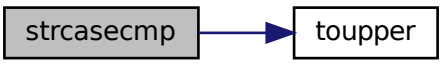
4.17.1.9 Function: strcasecmp

Compares two strings while being case insentsitive.

Author

Bryce Williams

Here is the call graph for this function:



4.17.1.10 strcat()

```
char* strcat (
            char * s1,
            const char * s2 )
```

4.17.1.11 strcmp()

```
int strcmp (
            const char * s1,
            const char * s2 )
```

4.17.1.12 strcpy()

```
char* strcpy (
            char * s1,
            const char * s2 )
```

4.17.1.13 strlen()

```
int strlen (
            const char * s )
```

4.17.1.14 strtok()

```
char* strtok (
            char * s1,
            const char * s2 )
```

4.17.1.15 swap()

```
void swap (
            char * x,
            char * y )  [inline]
```

4.17.1.16 toupper()

```
char toupper (
            char x )
```

4.17.1.17 Function: toupper

Converts character to uppercase. ex: 'a' -> 'A'

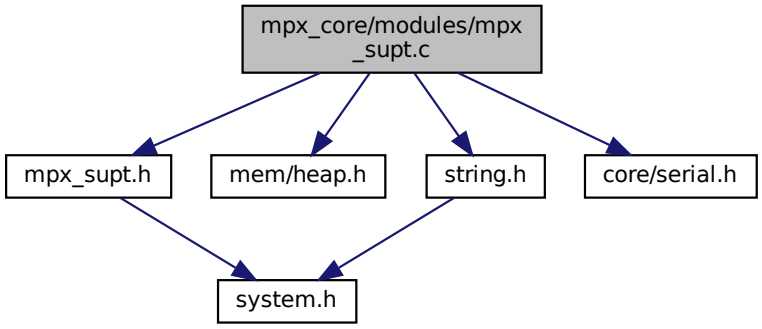
Author

Bryce Williams

4.18 mpx_core/modules/mpx_supt.c File Reference

```
#include "mpx_supt.h"
#include <mem/heap.h>
#include <string.h>
#include <core/serial.h>
```

Include dependency graph for mpx_supt.c:



Functions

- int is_io_module_active ()
- int sys_req (int op_code, int device_id, char *buffer_ptr, int *count_ptr)
- void mpx_init (int cur_mod)
- void sys_set_malloc (u32int(*func)(u32int))
- void sys_set_free (int(*func)(void *))
- void * sys_alloc_mem (u32int size)
- int sys_free_mem (void *ptr)
- void idle ()
- void printMessage (char *message)
- void printlnMessage (char *message)

Variables

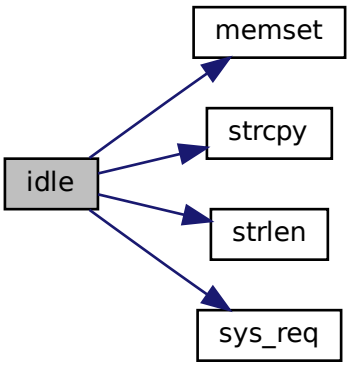
- param params
- int current_module = -1
- u32int(* student_malloc)(u32int)
- int(* student_free)(void *)

4.18.1 Function Documentation

4.18.1.1 idle()

```
void idle ( )
```

Here is the call graph for this function:



4.18.1.2 is_io_module_active()

```
int is_io_module_active ( )
```

4.18.1.3 mpx_init()

```
void mpx_init (
            int cur_mod )
```

4.18.1.4 printlnMessage()

```
void printlnMessage (
            char * message )
```

4.18.1.5 Function: printMessage

Calls sysreq to display a user entered message while a starting a newline.

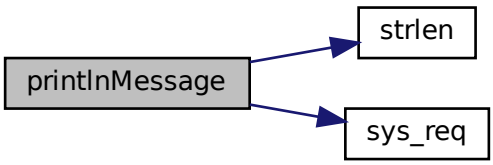
Parameters

message	character pointer pointing to text inside message.

Author

Bryce Williams

Here is the call graph for this function:



4.18.1.6 printMessage()

```
void printMessage (
            char * message )
```

4.18.1.7 Function: printMessage

Calls sysreq to display a user entered message without a starting a newline.

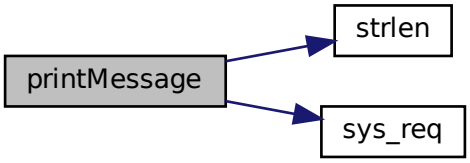
Parameters

message	character pointer pointing to text inside message.

Author

Bryce Williams

Here is the call graph for this function:



4.18.1.8 sys_alloc_mem()

```
void* sys_alloc_mem (
            u32int size )
```

4.18.1.9 sys_free_mem()

```
int sys_free_mem (
            void * ptr )
```

4.18.1.10 sys_req()

```
int sys_req (
            int op_code,
            int device_id,
            char * buffer_ptr,
            int * count_ptr )
```

4.18.1.11 sys_set_free()

```
void sys_set_free (
            int(*)(void *) func )
```

4.18.1.12 sys_set_malloc()

```
void sys_set_malloc (
            u32int(*)(u32int) func )
```

4.18.2 Variable Documentation

4.18.2.1 current_module

```
int current_module = -1
```

4.18.2.2 params

```
param params
```

4.18.2.3 student_free

```
int(* student_free) (void *)
```

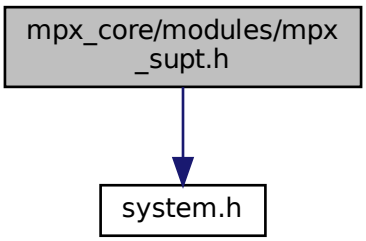
4.18.2.4 student_malloc

```
u32int(* student_malloc) (u32int)
```

4.19 mpx_core/modules/mpx_supt.h File Reference

```
#include <system.h>
```

Include dependency graph for mpx_supt.h:



This graph shows which files directly or indirectly include this file:

Data Structures

- struct param

Macros

- #define EXIT 0
- #define IDLE 1
- #define READ 2
- #define WRITE 3
- #define INVALID_OPERATION 4
- #define TRUE 1
- #define FALSE 0
- #define MODULE_R1 0
- #define MODULE_R2 1
- #define MODULE_R3 2
- #define MODULE_R4 4
- #define MODULE_R5 8
- #define MODULE_F 9
- #define IO_MODULE 10
- #define MEM_MODULE 11
- #define INVALID_BUFFER 1000
- #define INVALID_COUNT 2000
- #define DEFAULT_DEVICE 111
- #define COM_PORT 222
- #define NO_ERROR 0

Functions

- int sys_req (int op_code, int device_id, char *buffer_ptr, int *count_ptr)
- void mpx_init (int cur_mod)
- void sys_set_malloc (u32int(*func)(u32int))
- void sys_set_free (int(*func)(void *))
- void * sys_alloc_mem (u32int size)
- int sys_free_mem (void *ptr)
- void idle ()
- void printMessage (char *message)
- void printlnMessage (char *message)
- int is_io_module_active ()

4.19.1 Macro Definition Documentation

4.19.1.1 COM_PORT

```
#define COM_PORT 222
```

4.19.1.2 DEFAULT_DEVICE

```
#define DEFAULT_DEVICE 111
```

4.19.1.3 EXIT

```
#define EXIT 0
```

4.19.1.4 FALSE

```
#define FALSE 0
```

4.19.1.5 IDLE

```
#define IDLE 1
```

4.19.1.6 INVALID_BUFFER

```
#define INVALID_BUFFER 1000
```

4.19.1.7 INVALID_COUNT

```
#define INVALID_COUNT 2000
```

4.19.1.8 INVALID_OPERATION

```
#define INVALID_OPERATION 4
```

4.19.1.9 IO_MODULE

```
#define IO_MODULE 10
```

4.19.1.10 MEM_MODULE

```
#define MEM_MODULE 11
```

4.19.1.11 MODULE_F

```
#define MODULE_F 9
```

4.19.1.12 MODULE_R1

```
#define MODULE_R1 0
```

4.19.1.13 MODULE_R2

```
#define MODULE_R2 1
```

4.19.1.14 MODULE_R3

```
#define MODULE_R3 2
```

4.19.1.15 MODULE_R4

```
#define MODULE_R4 4
```

4.19.1.16 MODULE_R5

```
#define MODULE_R5 8
```

4.19.1.17 NO_ERROR

```
#define NO_ERROR 0
```

4.19.1.18 READ

```
#define READ 2
```

4.19.1.19 TRUE

```
#define TRUE 1
```

4.19.1.20 WRITE

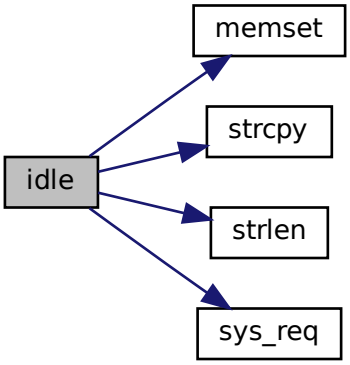
```
#define WRITE 3
```

4.19.2 Function Documentation

4.19.2.1 idle()

```
void idle ( )
```

Here is the call graph for this function:



4.19.2.2 is_io_module_active()

```
int is_io_module_active ( )
```

4.19.2.3 mpx_init()

```
void mpx_init (
            int cur_mod )
```

4.19.2.4 printlnMessage()

```
void printlnMessage (
            char * message )
```

4.19.2.5 Function: printMessage

Calls sysreq to display a user entered message while a starting a newline.

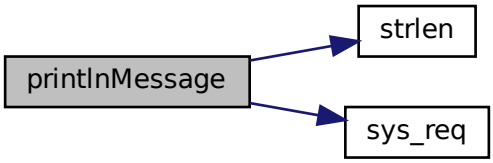
Parameters

message	character pointer pointing to text inside message.

Author

Bryce Williams

Here is the call graph for this function:



4.19.2.6 printMessage()

```
void printMessage (
            char * message )
```

4.19.2.7 Function: printMessage

Calls sysreq to display a user entered message without a starting a newline.

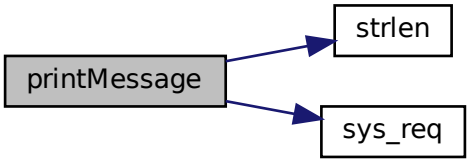
Parameters

message	character pointer pointing to text inside message.

Author

Bryce Williams

Here is the call graph for this function:



4.19.2.8 sys_alloc_mem()

```
void* sys_alloc_mem (
            u32int size )
```

4.19.2.9 sys_free_mem()

```
int sys_free_mem (
            void * ptr )
```

4.19.2.10 sys_req()

```
int sys_req (
            int op_code,
            int device_id,
            char * buffer_ptr,
            int * count_ptr )
```

4.19.2.11 sys_set_free()

```
void sys_set_free (
            int(*)(void *) func )
```

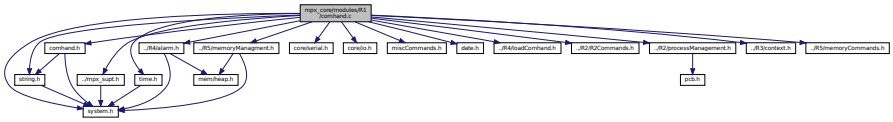
4.19.2.12 sys_set_malloc()

```
void sys_set_malloc (
            u32int(*)(u32int) func )
```

4.20 mpx_core/modules/R1/comhand.c File Reference

```
#include <string.h>
#include <system.h>
#include <core/serial.h>
#include "../mpx_supt.h"
#include <core/io.h>
#include "comhand.h"
#include "miscCommands.h"
#include "date.h"
#include "time.h"
#include "../R4/alarm.h"
#include "../R4/loadComhand.h"
#include "../R2/R2Commands.h"
#include "../R2/processManagement.h"
#include "../R3/context.h"
#include "../R5/memoryCommands.h"
#include "../R5/memoryManagment.h"
```

Include dependency graph for comhand.c:



Macros

- #define RED "\033[91m"
- #define GREEN "\033[92m"
- #define WHITE "\033[97m"
- #define UP "\033[A"
- #define DOWN "\033[B"

Functions

- int comhand ()
- void noSuchCommand ()
- void poll ()
- void resetBuffer ()
- void printRed ()
- void printGreen ()
- void printWhite ()

Variables

- int introSize = 32
- char intro [ ] = "\nType help for commands list"
- int cmdBufferSize = 99
- char cmdBuffer [100]

4.20.1 Macro Definition Documentation

4.20.1.1 DOWN

```
#define DOWN "\033[B"
```

4.20.1.2 GREEN

```
#define GREEN "\033[92m"
```

4.20.1.3 RED

```
#define RED "\033[91m"
```

4.20.1.4 UP

```
#define UP "\033[A"
```

4.20.1.5 WHITE

```
#define WHITE "\033[97m"
```

4.20.2 Function Documentation

4.20.2.1 comhand()

```
int comhand ( )
```

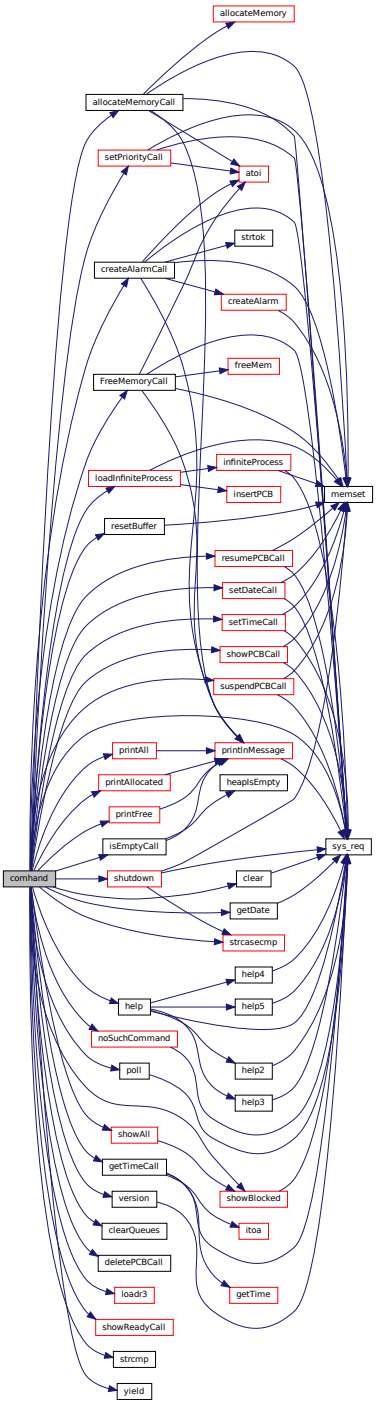
4.20.2.2 Function: comhand

Executes commands based on input gathered from calling polling. Displays an error message if the entered command does not exist.

Authors

Selim Demircan, Brendan Michael Bryce Williams, Farhan Shahbaz

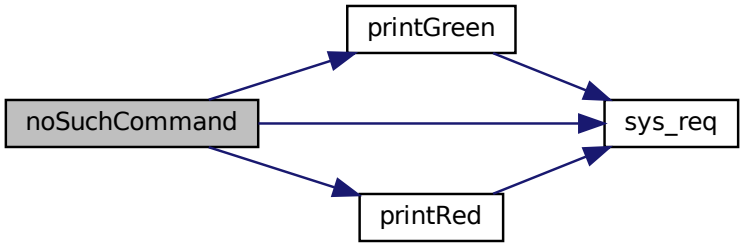
Here is the call graph for this function:



4.20.2.3 noSuchCommand()

```
void noSuchCommand ( )
```

Here is the call graph for this function:



4.20.2.4 poll()

```
void poll ( )
```

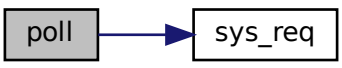
4.20.2.5 Function: poll

Calls polling from within the command handler.

Author

Brendan Michael

Here is the call graph for this function:



4.20.2.6 printGreen()

```
void printGreen ( )
```

Here is the call graph for this function:

4.20.2.7 printRed()

```
void printRed ( )
```

Here is the call graph for this function:

4.20.2.8 printWhite()

```
void printWhite ( )
```

Here is the call graph for this function:

4.20.2.9 resetBuffer()

```
void resetBuffer ( )
```

Here is the call graph for this function:

4.20.3 Variable Documentation

4.20.3.1 cmdBuffer

```
char cmdBuffer[100]
```

4.20.3.2 cmdBufferSize

```
int cmdBufferSize = 99
```

4.20.3.3 intro

```
char intro[] = "\nType help for commands list"
```

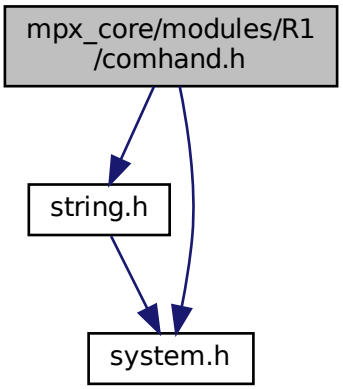
4.20.3.4 introSize

```
int introSize = 32
```

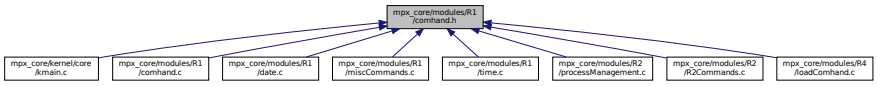
4.21 mpx_core/modules/R1/comhand.h File Reference

```
#include <string.h>
#include <system.h>
```

Include dependency graph for comhand.h:



This graph shows which files directly or indirectly include this file:



Functions

- int comhand ()
- void poll ()
- void deletePCBCall ()
- void noSuchCommand ()
- void createPCBC ()
- void printRed ()
- void printWhite ()
- void printGreen ()
- void resetBuffer ()

4.21.1 Function Documentation

4.21.1.1 comhand()

```
int comhand ( )
```

4.21.1.2 Function: comhand

Executes commands based on input gathered from calling polling. Displays an error message if the entered command does not exist.

Authors

Brendan Michael, Selim Demircan, Bryce Williams, Farhan Shahbaz

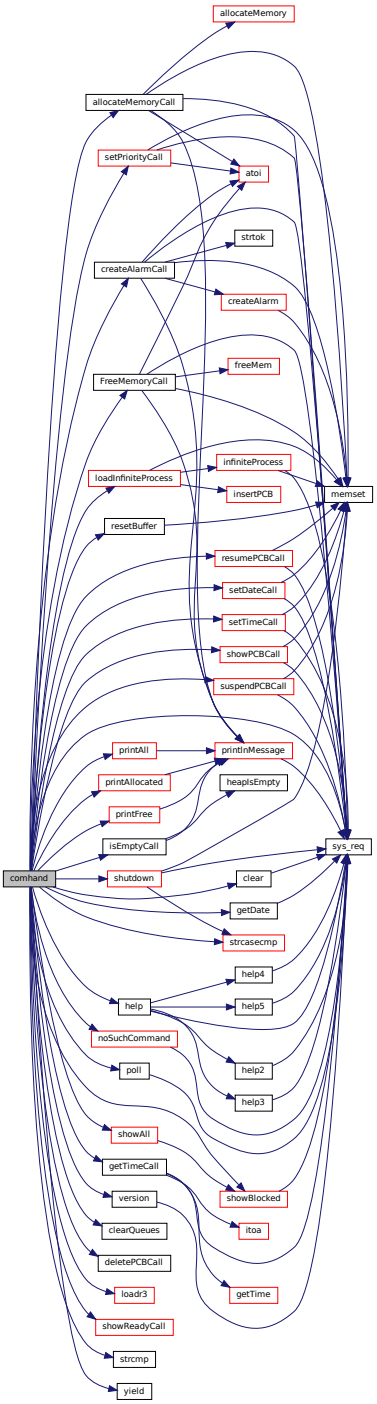
4.21.1.3 Function: comhand

Executes commands based on input gathered from calling polling. Displays an error message if the entered command does not exist.

Authors

Selim Demircan, Brendan Michael Bryce Williams, Farhan Shahbaz

Here is the call graph for this function:



4.21.1.4 createPCBC()

```
void createPCBC ( )
```

4.21.1.5 deletePCBCall()

```
void deletePCBCall ( )
```

4.21.1.6 Function: noSuchCommand

Displays an error message when an entered command is invalid.

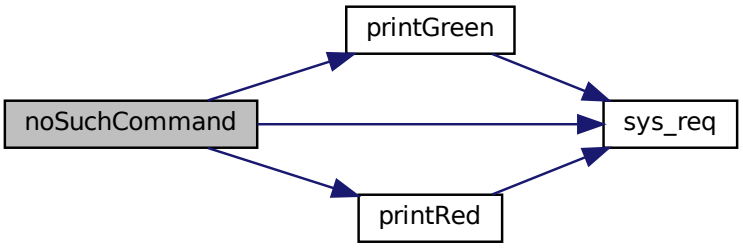
Author

Brendan Michael

4.21.1.7 noSuchCommand()

```
void noSuchCommand ( )
```

Here is the call graph for this function:



4.21.1.8 poll()

```
void poll ( )
```

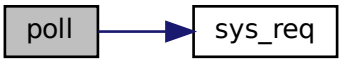
4.21.1.9 Function: poll

Calls polling from within the command handler.

Author

Brendan Michael

Here is the call graph for this function:



4.21.1.10 printGreen()

```
void printGreen ( )
```

Here is the call graph for this function:

4.21.1.11 printRed()

```
void printRed ( )
```

Here is the call graph for this function:

4.21.1.12 printWhite()

```
void printWhite ( )
```

Here is the call graph for this function:

4.21.1.13 resetBuffer()

```
void resetBuffer ( )
```

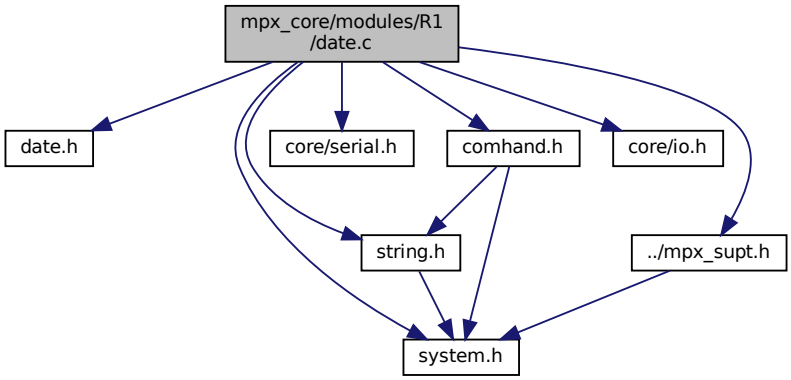
Here is the call graph for this function:

4.22 mpx_core/modules/R1/date.c File Reference

```
#include "date.h"
#include <string.h>
#include <system.h>
#include <core/serial.h>
#include "../mpx_supt.h"
#include <core/io.h>
```

```
#include "comhand.h"
```

Include dependency graph for date.c:



Functions

- void setDate (int day, int month, int year)
- void getDate ()
- void parseDate (char ∗date, int ∗m, int ∗d, int ∗y)
- void setDateCall ()

4.22.1 Function Documentation

4.22.1.1 getDate()

```
void getDate ( )
```

4.22.1.2 Function: getDate

Displays the current date in the format mm/dd/yyy Default time zone is UTC.

Author

Farhan Shahbaz

Here is the call graph for this function:

4.22.1.3 parseDate()

```
void parseDate (
             char * date,
             int * m,
             int * d,
             int * y )
```

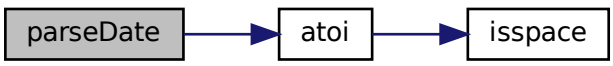
4.22.1.4 Function: parseDate

Parser is used to get and seperate the digit values from the '/' in the date. Makes sure it is in porper form.

Author

Farhan Shahbaz

Here is the call graph for this function:



4.22.1.5 setDate()

```
void setDate (
             int day,
             int month,
             int year )
```

4.22.1.6 Function: setDate

Prompts the user for what date they want to set. The function accesses the day, month, and year registers. Needs to be in the dd/mm/yyyy format.

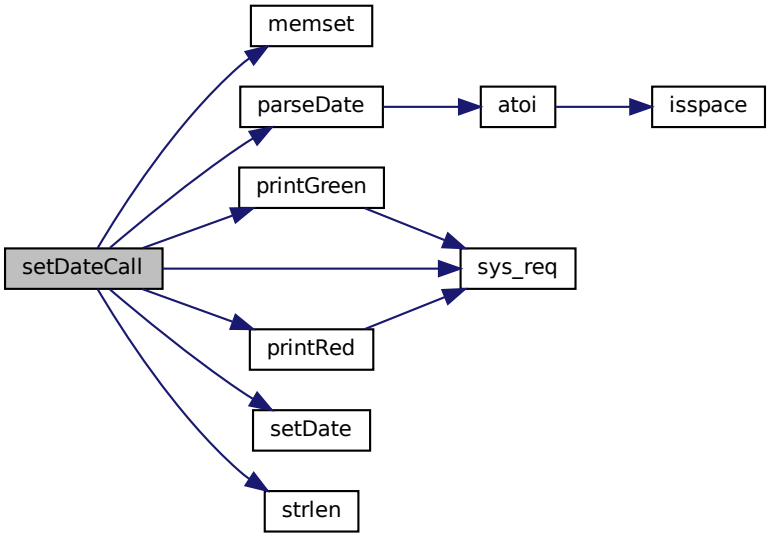
Author

Farhan Shahbaz

4.22.1.7 setDateCall()

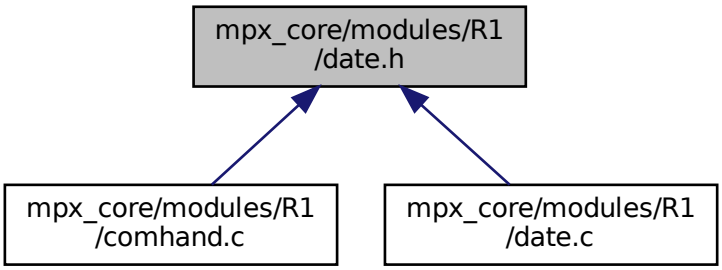
```
void setDateCall ( )
```

Here is the call graph for this function:



4.23 mpx_core/modules/R1/date.h File Reference

This graph shows which files directly or indirectly include this file:



Functions

- void setDate (int day, int month, int year)
- void getDate ()
- void parseDate (char ∗date, int ∗m, int ∗d, int ∗y)
- void setDateCall ()

4.23.1 Function Documentation

4.23.1.1 getDate()

```
void getDate ( )
```

4.23.1.2 Function: getDate

Displays the current date in the format mm/dd/yyy Default time zone is UTC.

Author

Farhan Shahbaz

Here is the call graph for this function:

4.23.1.3 parseDate()

```
void parseDate (
            char * date,
            int * m,
            int * d,
            int * y )
```

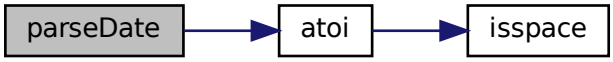
4.23.1.4 Function: parseDate

Parser is used to get and seperate the digit values from the '/' in the date. Makes sure it is in porper form.

Author

Farhan Shahbaz

Here is the call graph for this function:



4.23.1.5 setDate()

```
void setDate (
             int day,
             int month,
             int year )
```

4.23.1.6 Function: setDate

Prompts the user for what date they want to set. The function accesses the day, month, and year registers. Needs to be in the dd/mm/yyyy format.

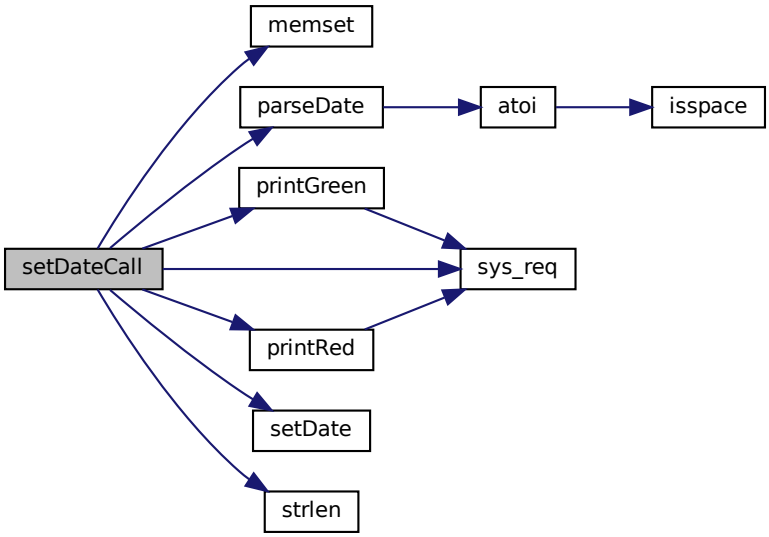
Author

Farhan Shahbaz

4.23.1.7 setDateCall()

```
void setDateCall ( )
```

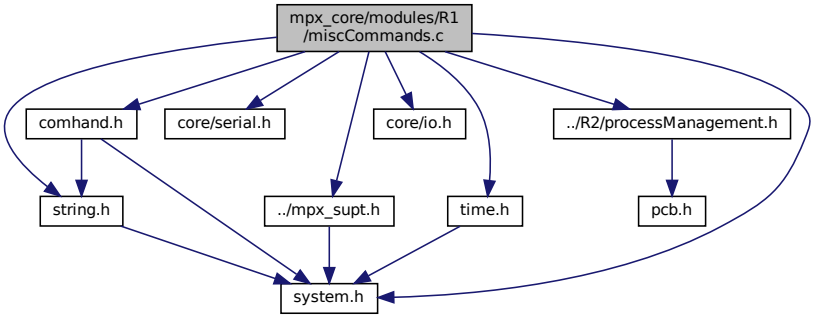
Here is the call graph for this function:



4.24 mpx_core/modules/R1/miscCommands.c File Reference

```
#include <string.h>
#include <system.h>
#include <core/serial.h>
#include "../mpx_supt.h"
#include <core/io.h>
#include "comhand.h"
#include "../R2/processManagement.h"
#include "time.h"
```

Include dependency graph for miscCommands.c:



Macros

- #define CLEAR_ALL "\033[2J"
- #define MOVE_DEFAULT "\033[0;0H"

Functions

- void getTimeCall ()
- void clear ()
- void version ()
- void help2 ()
- void help3 ()
- void help4 ()
- void help5 ()
- void help ()
- int shutdown ()
- void showPCBCall ()

4.24.1 Macro Definition Documentation

4.24.1.1 CLEAR_ALL

```
#define CLEAR_ALL "\033[2J"
```

4.24.1.2 MOVE_DEFAULT

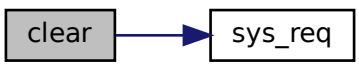
```
#define MOVE_DEFAULT "\033[0;0H"
```

4.24.2 Function Documentation

4.24.2.1 clear()

```
void clear ( )
```

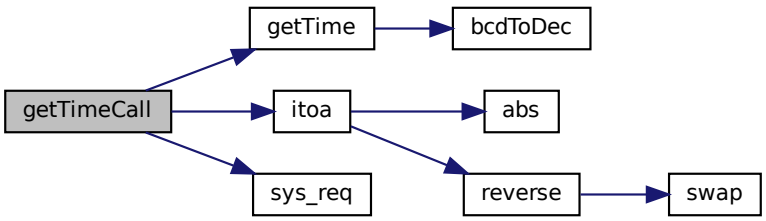
Here is the call graph for this function:



4.24.2.2 getTimeCall()

```
void getTimeCall ( )
```

Here is the call graph for this function:



4.24.2.3 help()

```
void help ( )
```

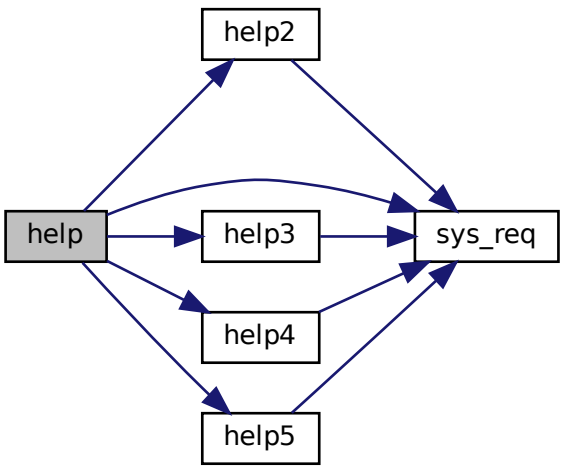
4.24.2.4 Function: help

print statement of the current commands that are executable. Tells user what commands do.

Author

Bryce Williams

Here is the call graph for this function:



4.24.2.5 help2()

```
void help2 ( )
```

Here is the call graph for this function:

4.24.2.6 help3()

```
void help3 ( )
```

Here is the call graph for this function:

4.24.2.7 help4()

```
void help4 ( )
```

Here is the call graph for this function:

4.24.2.8 help5()

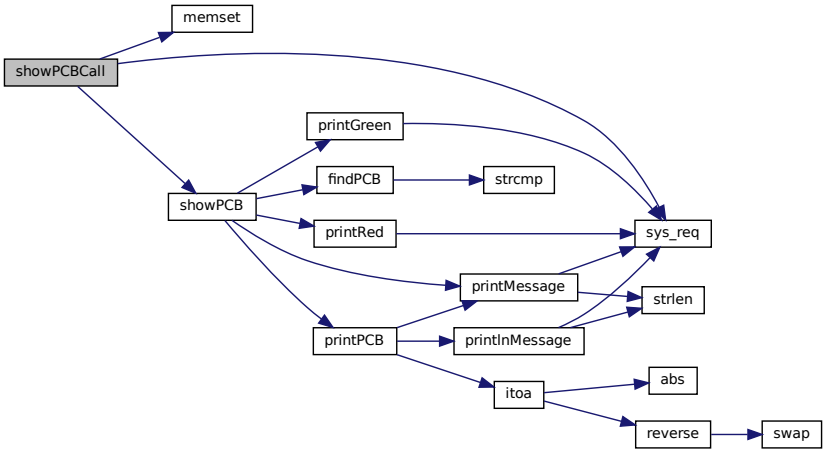
```
void help5 ( )
```

Here is the call graph for this function:

4.24.2.9 showPCBCall()

```
void showPCBCall ( )
```

Here is the call graph for this function:



4.24.2.10 shutdown()

```
int shutdown ( )
```

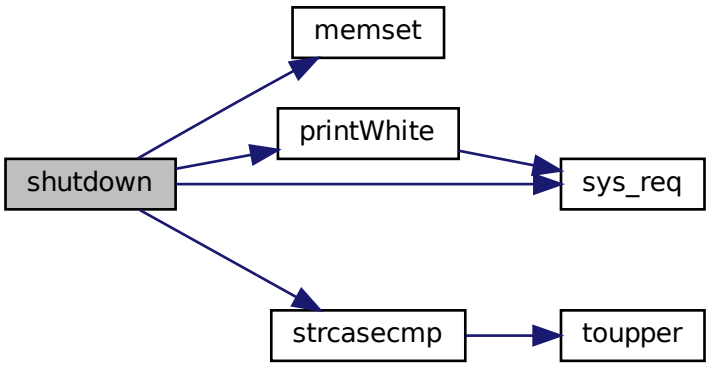
4.24.2.11 Function: shutdown

Shuts downt the comhand by asking the user for a confirmation first

Author

Farhan Shahbaz

Here is the call graph for this function:



4.24.2.12 version()

```
void version ( )
```

4.24.2.13 Function: version

Displays the current version of the project.

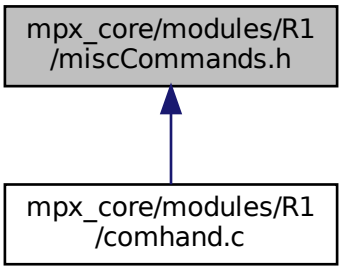
Author

Bryce Williams

Here is the call graph for this function:

4.25 mpx_core/modules/R1/miscCommands.h File Reference

This graph shows which files directly or indirectly include this file:



Functions

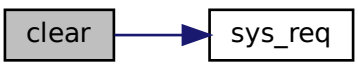
- void version ()
- void help ()
- void help2 ()
- void help3 ()
- void help4 ()
- void help5 ()
- void clear ()
- void getTimeCall ()
- int shutdown ()
- void showPCBCall ()

4.25.1 Function Documentation

4.25.1.1 clear()

```
void clear ( )
```

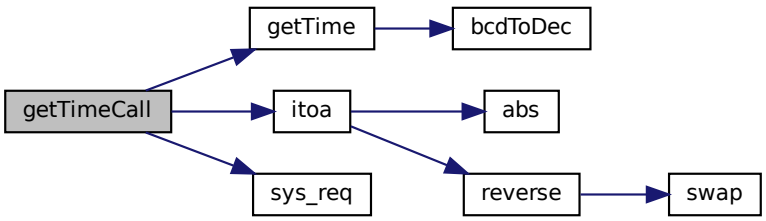
Here is the call graph for this function:



4.25.1.2 getTimeCall()

```
void getTimeCall ( )
```

Here is the call graph for this function:



4.25.1.3 help()

```
void help ( )
```

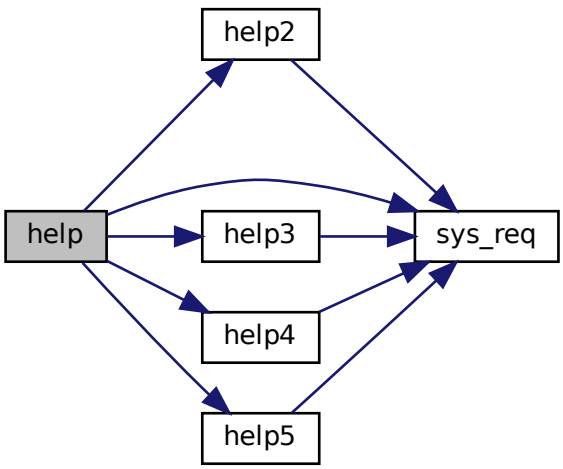
4.25.1.4 Function: help

print statement of the current commands that are executable. Tells user what commands do.

Author

Bryce Williams

Here is the call graph for this function:



4.25.1.5 help2()

```
void help2 ( )
```

Here is the call graph for this function:

4.25.1.6 help3()

```
void help3 ( )
```

Here is the call graph for this function:

4.25.1.7 help4()

```
void help4 ( )
```

Here is the call graph for this function:

4.25.1.8 help5()

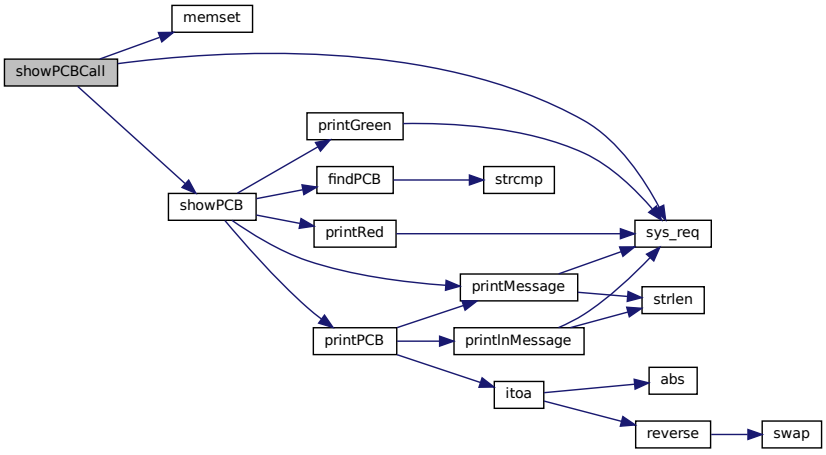
```
void help5 ( )
```

Here is the call graph for this function:

4.25.1.9 showPCBCall()

```
void showPCBCall ( )
```

Here is the call graph for this function:



4.25.1.10 shutdown()

```
int shutdown ( )
```

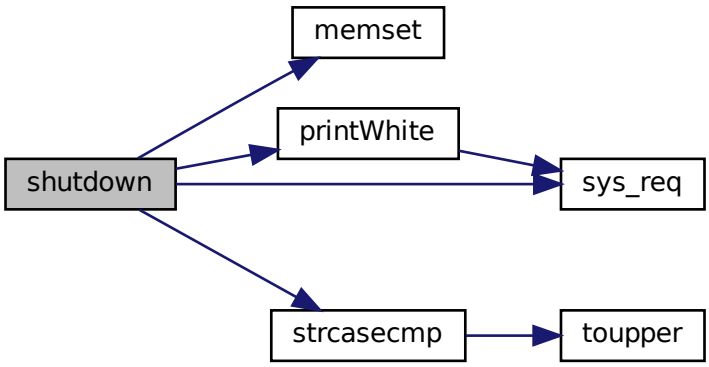
4.25.1.11 Function: shutdown

Shuts downt the comhand by asking the user for a confirmation first

Author

Farhan Shahbaz

Here is the call graph for this function:



4.25.1.12 version()

```
void version ( )
```

4.25.1.13 Function: version

Displays the current version of the project.

Author

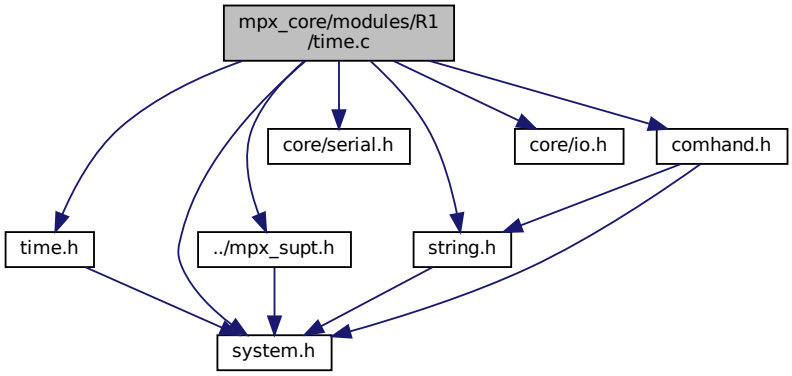
Bryce Williams

Here is the call graph for this function:

4.26 mpx_core/modules/R1/time.c File Reference

```
#include "time.h"
#include <string.h>
#include <system.h>
#include <core/serial.h>
#include "../mpx_supt.h"
#include <core/io.h>
#include "comhand.h"
```

Include dependency graph for time.c:



Functions

- date_time getTime ()
- void setTime (int hours_int, int min_int, int sec_int)
- void parseTime (char *time, int *hh, int *mm, int *ss)
- void setTimeCall ()
- int bcdToDec (int bcd)

4.26.1 Function Documentation

4.26.1.1 bcdToDec()

```
int bcdToDec (
            int bcd )
```

4.26.1.2 getTime()

```
date_time getTime ( )
```

4.26.1.3 Function: getTime

Displays the current time in millitary format: hh:mm:ss. Default time zone is UTC.

Author

Bryce Williams

Here is the call graph for this function:

4.26.1.4 parseTime()

```
void parseTime (
            char * time,
            int * hh,
            int * mm,
            int * ss )
```

4.26.1.5 Function: parseTime

Parses user entered time by replacing ':' array location to terminate null string. atoi() parses time until reaching null character.

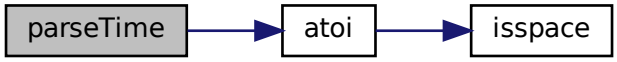
Parameters

time	the time as a character array in the format hh:mm:ss
hh	hours parsed from time are stored in this variable
mm	minutes parsed from time are stored in this variable
ss	seconds parsed from time are stored in this variable

Author

Bryce Williams

Here is the call graph for this function:



4.26.1.6 setTime()

```
void setTime (
            int hours_int,
            int min_int,
            int sec_int )
```

4.26.1.7 Function: setTime

Prompts the user to enter time in the format hh:mm:ss Changes the time in the intel clock register to user set time for displaying with getTime()

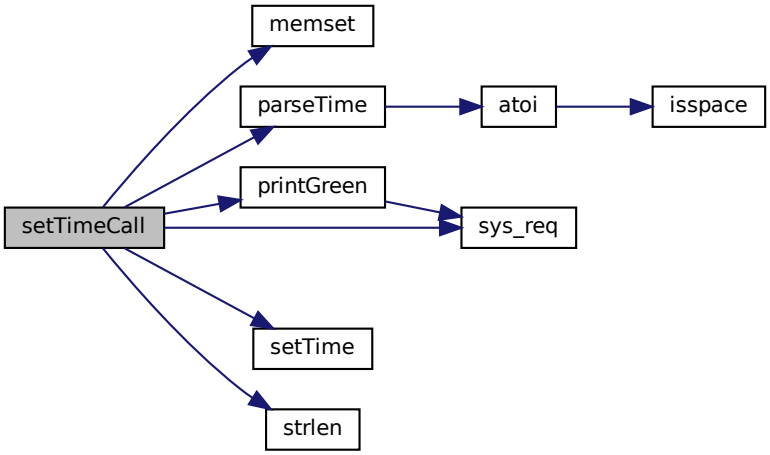
Author

Bryce Williams

4.26.1.8 setTimeCall()

```
void setTimeCall ( )
```

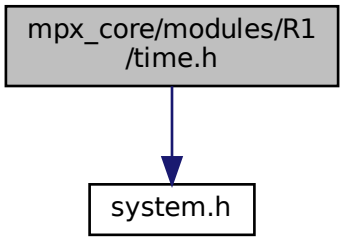
Here is the call graph for this function:



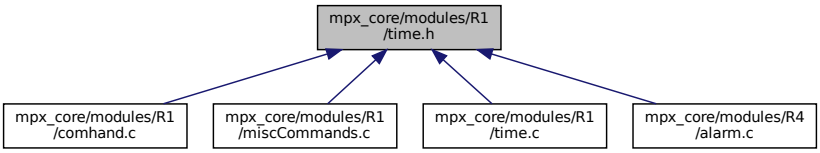
4.27 mpx_core/modules/R1/time.h File Reference

```
#include <system.h>
```

Include dependency graph for time.h:



This graph shows which files directly or indirectly include this file:



Functions

- date_time getTime ()
- void setTime (int hours_int, int min_int, int sec_int)
- void parseTime (char *time, int *hh, int *mm, int *ss)
- void setTimeCall ()
- int bcdToDec (int bcd)

4.27.1 Function Documentation

4.27.1.1 bcdToDec()

```
int bcdToDec (
            int bcd )
```

4.27.1.2 getTime()

```
date_time getTime ( )
```

4.27.1.3 Function: getTime

Displays the current time in millitary format: hh:mm:ss. Default time zone is UTC.

Author

Bryce Williams

Here is the call graph for this function:

4.27.1.4 parseTime()

```
void parseTime (
            char * time,
            int * hh,
            int * mm,
            int * ss )
```

4.27.1.5 Function: parseTime

Parses user entered time by replacing ':' array location to terminate null string. atoi() parses time until reaching null character.

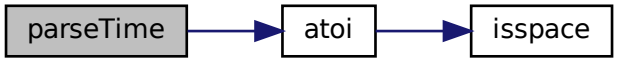
Parameters

time	the time as a character array in the format hh:mm:ss
hh	hours parsed from time are stored in this variable
mm	minutes parsed from time are stored in this variable
ss	seconds parsed from time are stored in this variable

Author

Bryce Williams

Here is the call graph for this function:



4.27.1.6 setTime()

```
void setTime (
             int hours_int,
             int min_int,
             int sec_int )
```

4.27.1.7 Function: setTime

Prompts the user to enter time in the format hh:mm:ss Changes the time in the intel clock register to user set time for displaying with getTime()

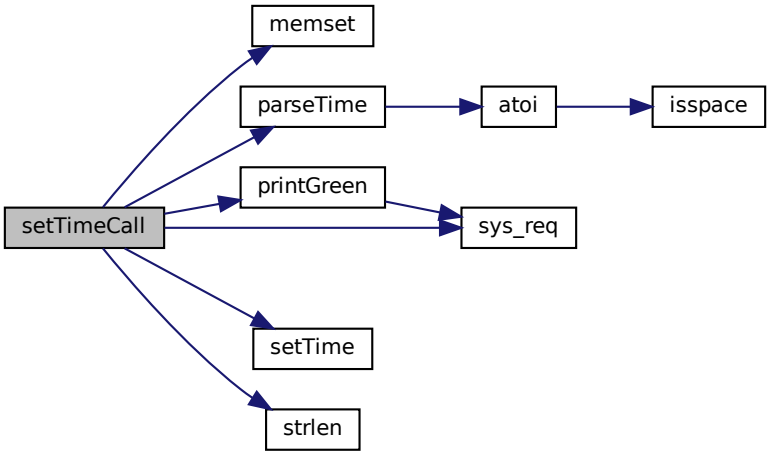
Author

Bryce Williams

4.27.1.8 setTimeCall()

```
void setTimeCall ( )
```

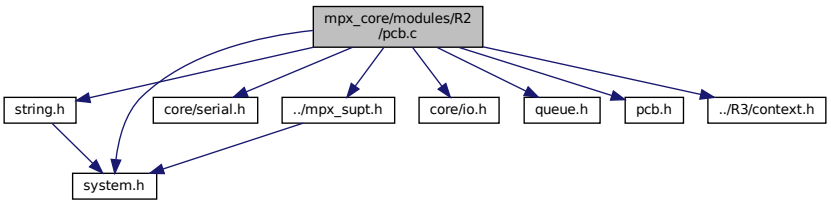
Here is the call graph for this function:



4.28 mpx_core/modules/R2/pcb.c File Reference

```
#include <string.h>
#include <system.h>
#include <core/serial.h>
#include "../mpx_supt.h"
#include <core/io.h>
#include "queue.h"
#include "pcb.h"
#include "../R3/context.h"
```

Include dependency graph for pcb.c:



Functions

- PCB ∗ allocatePCB ()
- int freePCB (PCB ∗p)
- PCB ∗ setupPCB (char ∗name, int class, int priority)
- void printPCB (PCB ∗pcb_p)

4.28.1 Function Documentation

4.28.1.1 allocatePCB()

```
PCB* allocatePCB ( )
```

4.28.1.2 Function: allocatePCB

Dynamically allocates a PCB.

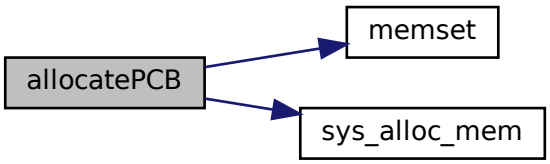
Returns

the allocated PCB

Author

Brendan Michael

Here is the call graph for this function:



4.28.1.3 freePCB()

```
int freePCB (
            PCB * p )
```

4.28.1.4 Function: freePCB

Frees memory associated with a PCB

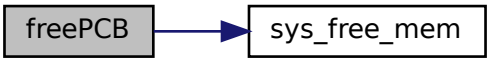
Returns

1 if no error

Author

Brendan Michael

Here is the call graph for this function:



4.28.1.5 printPCB()

```
void printPCB (
            PCB * pcb_p )
```

4.28.1.6 Function: printPCB

Displays the name, status, and class of the selected PCB.

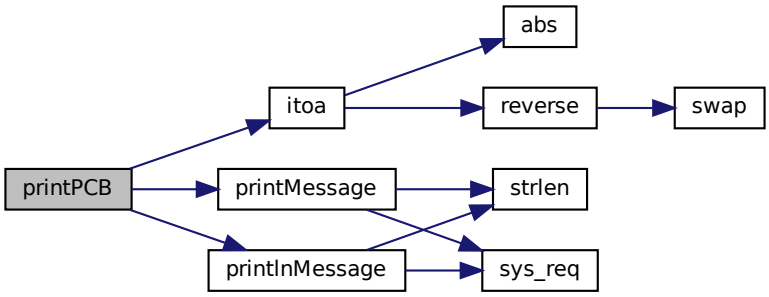
Parameters

pcb_p	pointer of a declared PCB.

Author

Bryce Williams

Here is the call graph for this function:



4.28.1.7 setupPCB()

```
PCB* setupPCB (
            char * name,
            int class,
            int priority )
```

4.28.1.8 Function: setupPCB

Sets a PCBS fields according to the provided parameters

Parameters

∗name	the name for the PCB
class	int class value to be assigned
priority	int priority value to be assigned

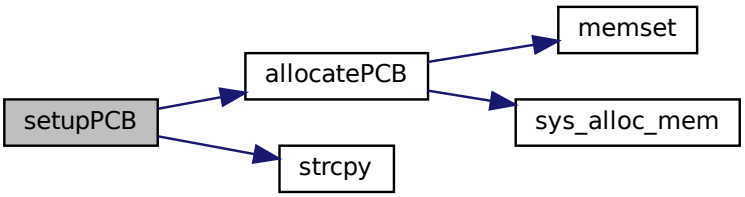
Returns

a pointer to the set up PCB

Author

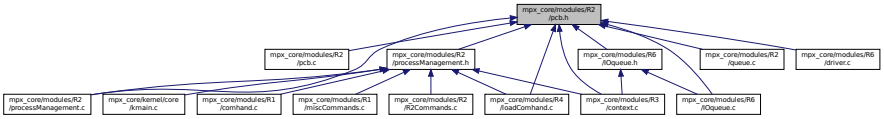
Brendan Michael

Here is the call graph for this function:



4.29 mpx_core/modules/R2/pcb.h File Reference

This graph shows which files directly or indirectly include this file:



Data Structures

- struct PCB

Macros

- #define READY 0
- #define RUNNING 1
- #define BLOCKED 2
- #define SUSPENDED 1
- #define NOTSUSPENDED 0
- #define SYSTEM 0
- #define APPLICATION 1
- #define stackSize 1024

Typedefs

- typedef struct PCB PCB

Functions

- PCB ∗ allocatePCB ()
- int freePCB (PCB ∗p)
- PCB ∗ setupPCB (char ∗name, int class, int priority)
- void printPCB (PCB ∗pcb_p)

4.29.1 Macro Definition Documentation

4.29.1.1 APPLICATION

```
#define APPLICATION 1
```

4.29.1.2 BLOCKED

```
#define BLOCKED 2
```

4.29.1.3 NOTSUSPENDED

```
#define NOTSUSPENDED 0
```

4.29.1.4 READY

```
#define READY 0
```

4.29.1.5 RUNNING

```
#define RUNNING 1
```

4.29.1.6 stackSize

```
#define stackSize 1024
```

4.29.1.7 SUSPENDED

```
#define SUSPENDED 1
```

4.29.1.8 SYSTEM

```
#define SYSTEM 0
```

4.29.2 Typedef Documentation

4.29.2.1 PCB

```
typedef struct PCB PCB
```

4.29.3 Function Documentation

4.29.3.1 allocatePCB()

```
PCB* allocatePCB ( )
```

4.29.3.2 Function: allocatePCB

Dynamically allocates a PCB.

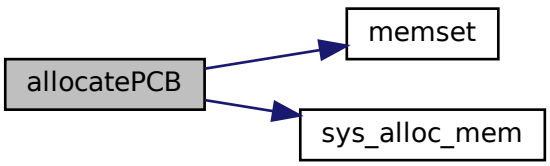
Returns

the allocated PCB

Author

Brendan Michael

Here is the call graph for this function:



4.29.3.3 freePCB()

```
int freePCB (
            PCB * p )
```

4.29.3.4 Function: freePCB

Frees memory associated with a PCB

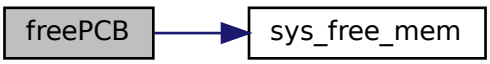
Returns

1 if no error

Author

Brendan Michael

Here is the call graph for this function:



4.29.3.5 printPCB()

```
void printPCB (
            PCB * pcb_p )
```

4.29.3.6 Function: printPCB

Displays the name, status, and class of the selected PCB.

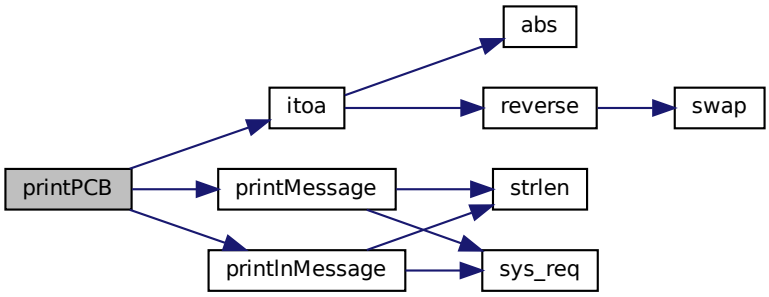
Parameters

pcb_p	pointer of a declared PCB.

Author

Bryce Williams

Here is the call graph for this function:



4.29.3.7 setupPCB()

```
PCB* setupPCB (
            char * name,
            int class,
            int priority )
```

4.29.3.8 Function: setupPCB

Sets a PCBS fields according to the provided parameters

Parameters

∗name	the name for the PCB
class	int class value to be assigned
priority	int priority value to be assigned

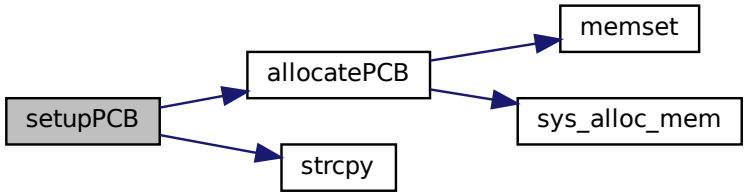
Returns

a pointer to the set up PCB

Author

Brendan Michael

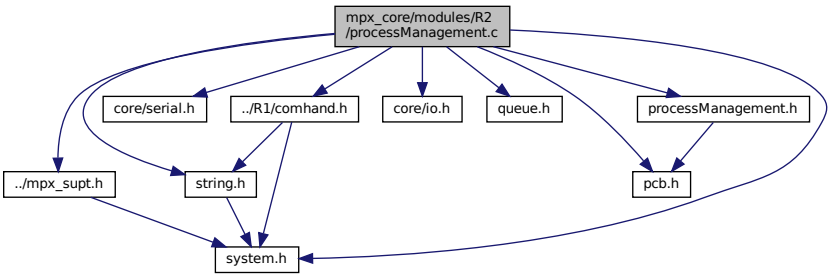
Here is the call graph for this function:



4.30 mpx_core/modules/R2/processManagement.c File Reference

```
#include <string.h>
#include <system.h>
#include <core/serial.h>
#include "../mpx_supt.h"
#include <core/io.h>
#include "queue.h"
#include "pcb.h"
#include "processManagement.h"
#include "../R1/comhand.h"
```

Include dependency graph for processManagement.c:



Functions

- Queue * createQueue (char *name)
- PCB * getNextReady ()
- void noQueueError ()
- int clearQueues ()
- void initQueues ()
- int deletePCB (char *name)
- void insertPCB (PCB *pcb)
- void createPCB (char *name, int class, int priority)
- int showReady ()

- void setPCBpriority (char *name, int priority)
- void showAll ()
- void showBlocked ()
- void removeReady (PCB *p)
- void removeBlocked (PCB *p)
- int blockPCB (char *name)
- int unblockPCB (char *name)
- int resumePCB (char *name)
- int suspendPCB (char *name)
- void showPCB (char *name)

Variables

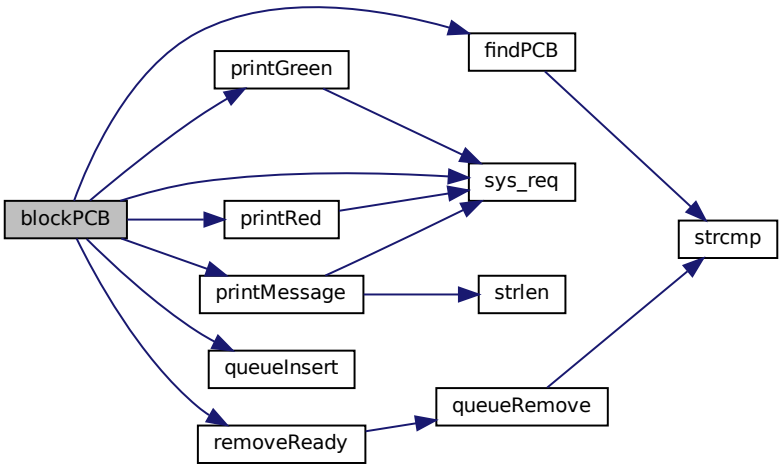
- Queue * readyQueue
- Queue * blockedQueue
- int queuesCleared

4.30.1 Function Documentation

4.30.1.1 blockPCB()

```
int blockPCB (
            char * name )
```

Here is the call graph for this function:



4.30.1.2 clearQueues()

```
int clearQueues ( )
```

4.30.1.3 createPCB()

```
void createPCB (
            char * name,
            int class,
            int priority )
```

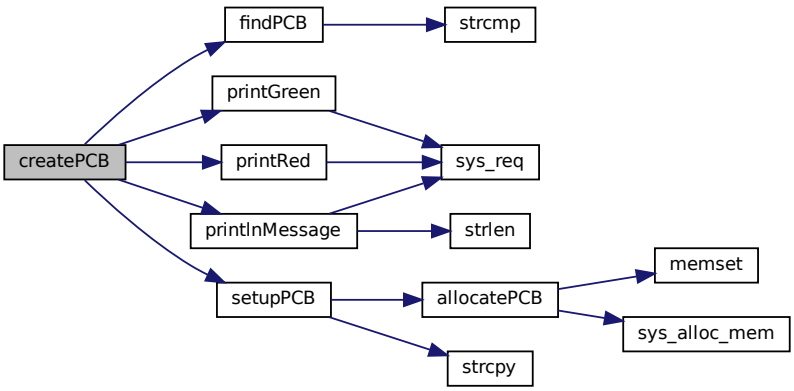
4.30.1.4 Function: createPCB

Allocates memory for a new PCB

Author

Brendan Michael

Here is the call graph for this function:



4.30.1.5 createQueue()

```
Queue* createQueue (
            char * name )
```

4.30.1.6 Function: showBlocked

Displays the blocked queue

Returns

1 if no error

Author

Brendan Michael Function: createPCB

Creates PCB with user specifies name and priority. If user enters a name already in use, display error message.

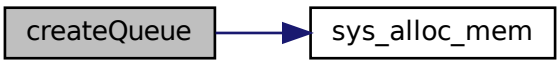
Parameters

name	user entered name of PCB
class	int value representing class of PCB
priority	int value representing priority of PCB

Author

Bryce Williams

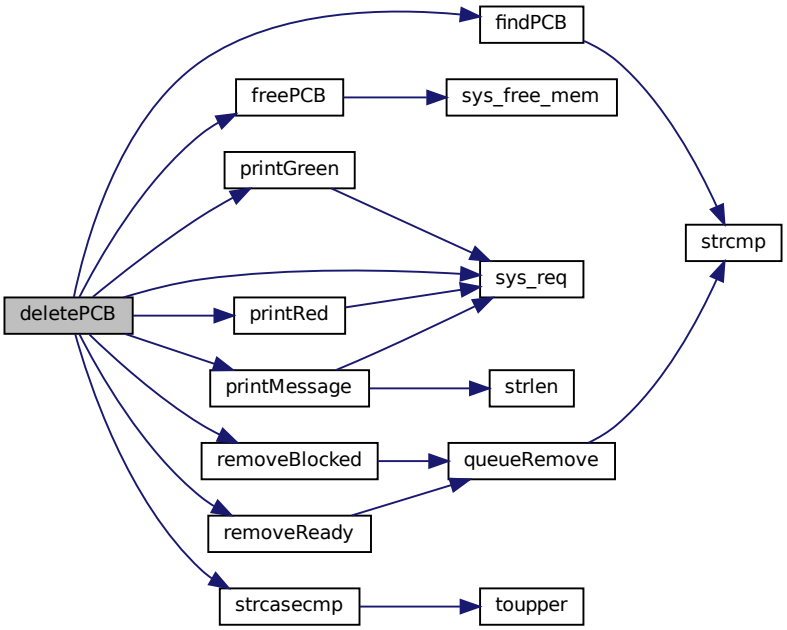
Here is the call graph for this function:



4.30.1.7 deletePCB()

```
int deletePCB (
            char * name )
```

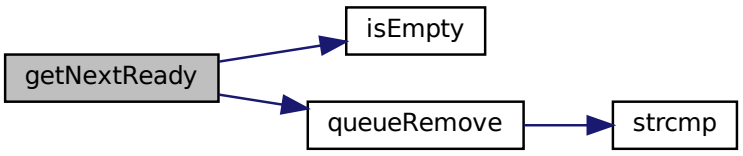
Here is the call graph for this function:



4.30.1.8 getNextReady()

```
PCB* getNextReady ( )
```

Here is the call graph for this function:



4.30.1.9 initQueues()

```
void initQueues ( )
```

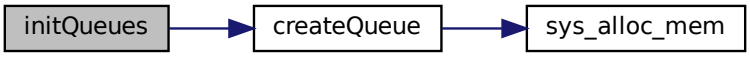
4.30.1.10 Function: initQueues

Initializes the ready and blocked queues

Author

Brendan Michael

Here is the call graph for this function:



4.30.1.11 insertPCB()

```
void insertPCB (
            PCB * pcb )
```

Function: showBlocked

Displays queues that are currently in the blocked state.
If nothing is in block queue displays message that
the queue is currently empty.

Author

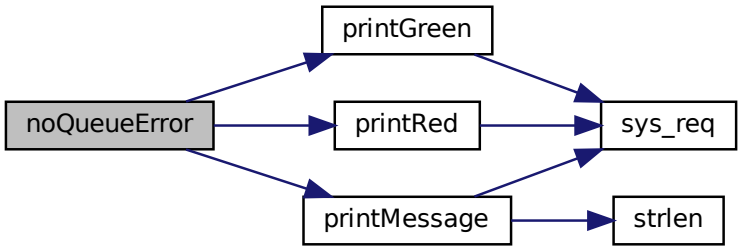
Bryce Williams

Here is the call graph for this function:

4.30.1.12 noQueueError()

```
void noQueueError ( )
```

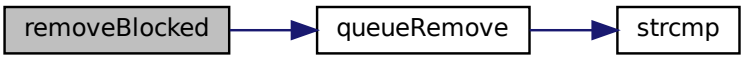
Here is the call graph for this function:



4.30.1.13 removeBlocked()

```
void removeBlocked (
            PCB * p )
```

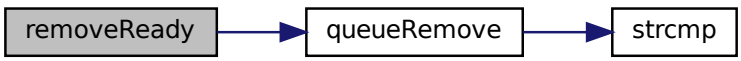
Here is the call graph for this function:



4.30.1.14 removeReady()

```
void removeReady (
            PCB * p )
```

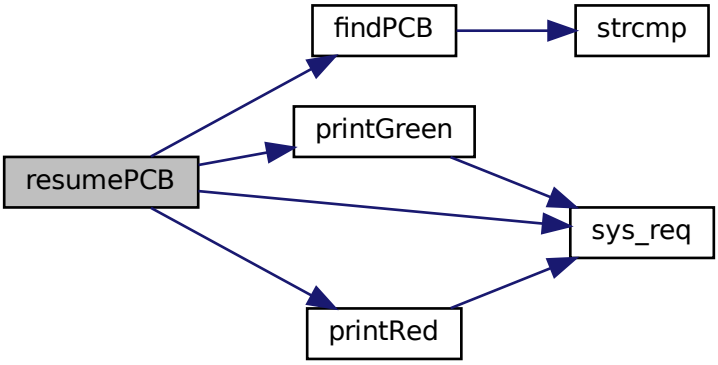
Here is the call graph for this function:



4.30.1.15 resumePCB()

```
int resumePCB (
            char * name )
```

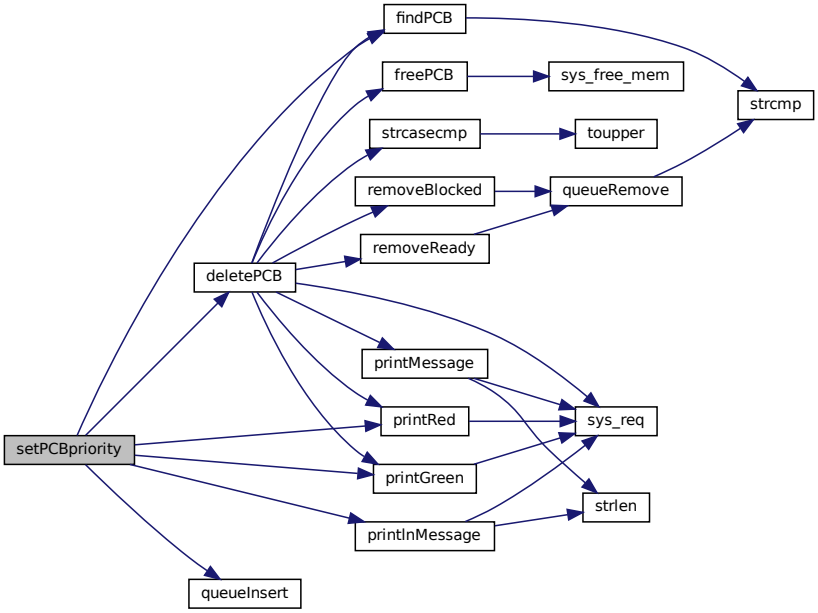
Here is the call graph for this function:



4.30.1.16 setPCBpriority()

```
void setPCBpriority (
            char * name,
            int priority )
```

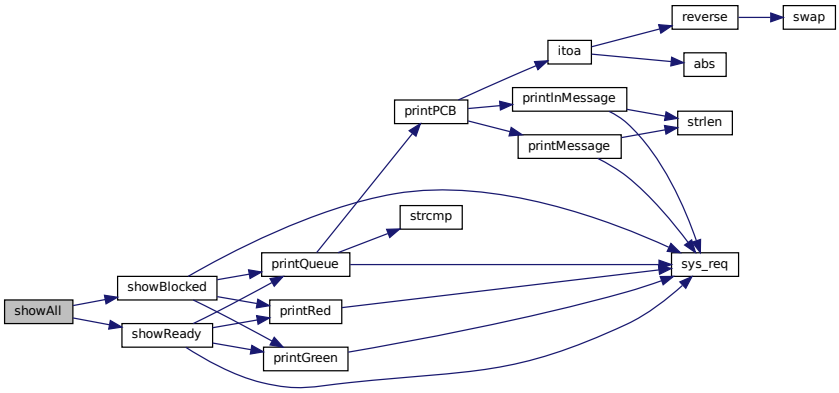
Here is the call graph for this function:



4.30.1.17 showAll()

```
void showAll ( )
```

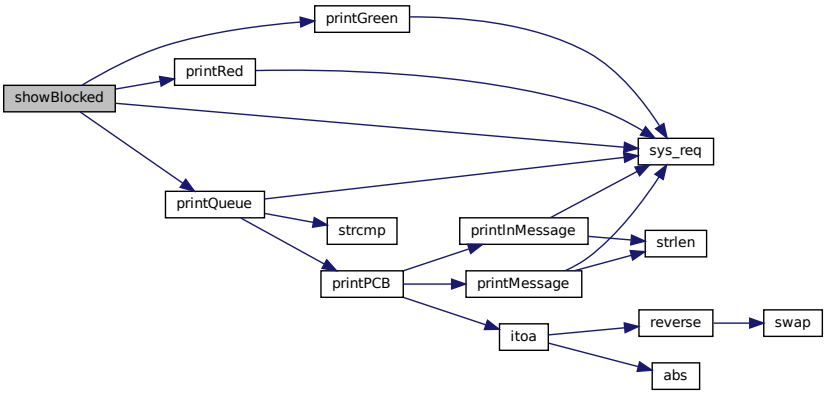
Here is the call graph for this function:



4.30.1.18 showBlocked()

```
void showBlocked ( )
```

Here is the call graph for this function:



4.30.1.19 showPCB()

```
void showPCB (
            char * name )
```

4.30.1.20 Function: showPCB

Finds pcb based on user entered name. Searches in readyQueue then blockedQueue.

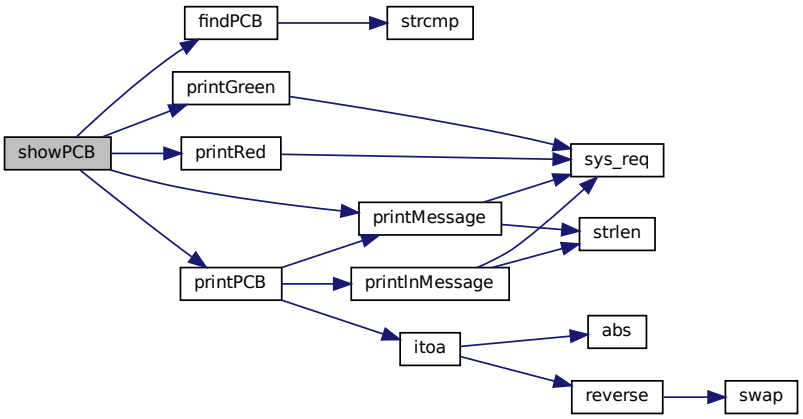
Parameters

name	name of the PCB to search for.

Author

Bryce Williams

Here is the call graph for this function:



4.30.1.21 showReady()

```
int showReady ( )
```

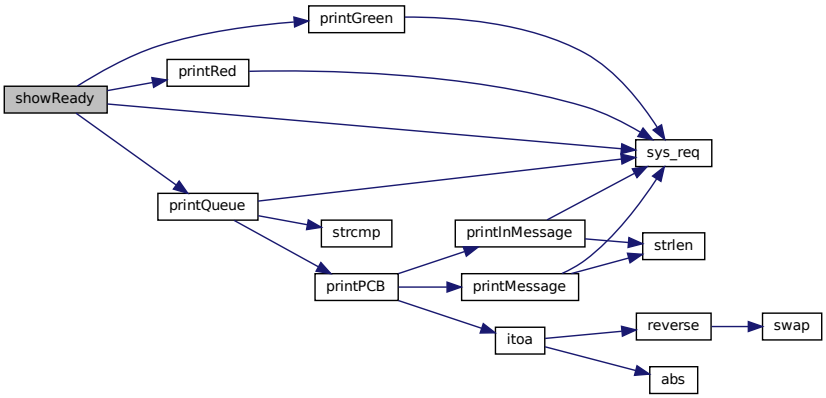
4.30.1.22 Function: showReady

Displays the pcb's currently in the ready state. Checks to see if readyQueue is empty. If it is empty displays an error message.

Author

Bryce Williams

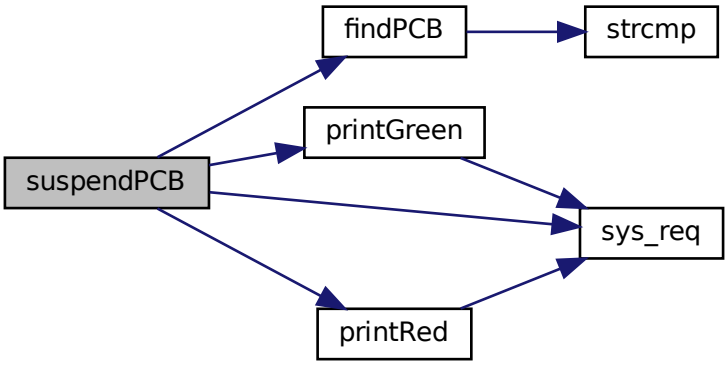
Here is the call graph for this function:



4.30.1.23 suspendPCB()

```
int suspendPCB (
            char * name )
```

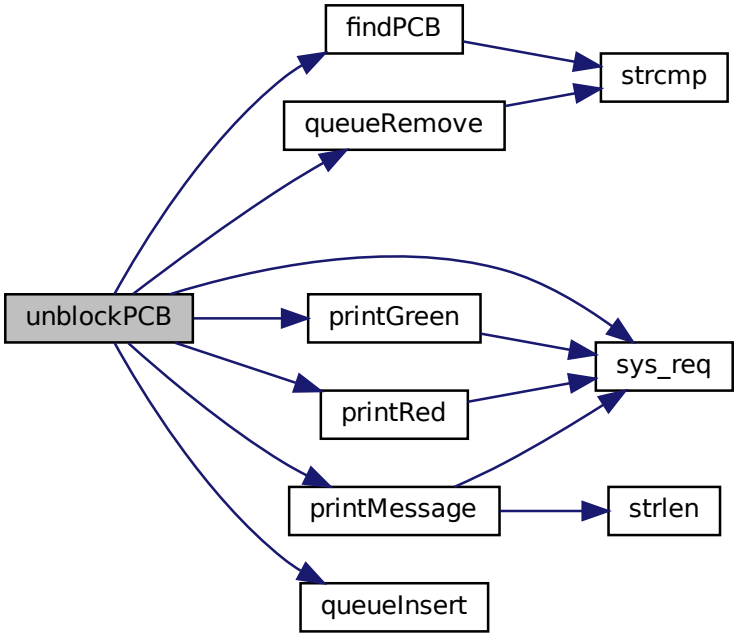
Here is the call graph for this function:



4.30.1.24 unblockPCB()

```
int unblockPCB (
            char * name )
```

Here is the call graph for this function:



4.30.2 Variable Documentation

4.30.2.1 blockedQueue

```
Queue* blockedQueue
```

4.30.2.2 queuesCleared

```
int queuesCleared
```

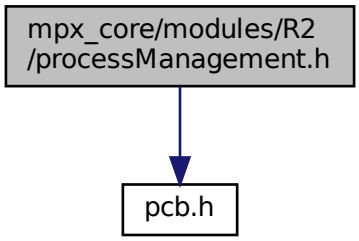
4.30.2.3 readyQueue

```
Queue* readyQueue
```

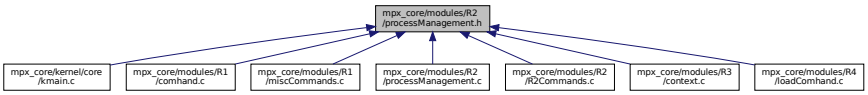
4.31 mpx_core/modules/R2/processManagement.h File Reference

```
#include "pcb.h"
```

Include dependency graph for processManagement.h:



This graph shows which files directly or indirectly include this file:



Functions

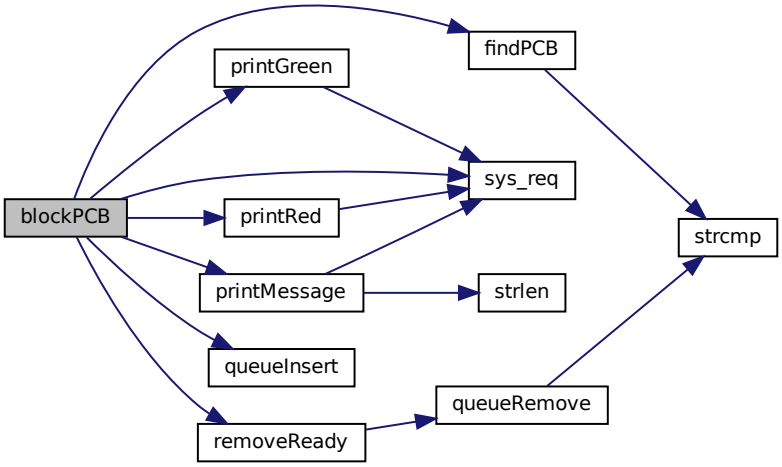
- void initQueues ()
- void createPCB (char ∗name, int class, int priority)
- int showReady ()
- struct Queue ∗ createQueue (char ∗name)
- void showAll ()
- int deletePCB (char ∗name)
- void insertPCB (PCB ∗pcb)
- PCB ∗ getNextReady ()
- void showBlocked ()
- int blockPCB (char ∗name)
- int unblockPCB (char ∗name)
- void showPCB (char ∗name)
- void setPCBpriority (char ∗name, int priority)
- void noQueueError ()
- void removeReady (PCB ∗p)
- void removeBlocked (PCB ∗p)
- int resumePCB (char ∗name)
- int suspendPCB (char ∗name)
- int clearQueues ()

4.31.1 Function Documentation

4.31.1.1 blockPCB()

```
int blockPCB (
            char * name )
```

Here is the call graph for this function:



4.31.1.2 clearQueues()

```
int clearQueues ( )
```

4.31.1.3 createPCB()

```
void createPCB (
            char * name,
            int class,
            int priority )
```

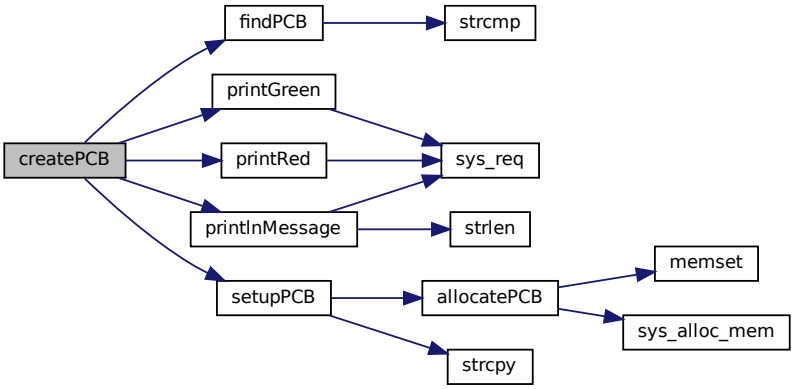
4.31.1.4 Function: createPCB

Allocates memory for a new PCB

Author

Brendan Michael

Here is the call graph for this function:



4.31.1.5 createQueue()

```
struct Queue* createQueue (
            char * name )
```

4.31.1.6 Function: showBlocked

Displays the blocked queue

Returns

1 if no error

Author

Brendan Michael Function: createPCB

Creates PCB with user specifies name and priority. If user enters a name already in use, display error message.

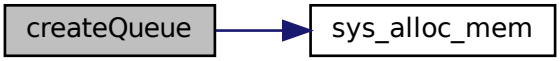
Parameters

name	user entered name of PCB
class	int value representing class of PCB
priority	int value representing priority of PCB

Author

Bryce Williams

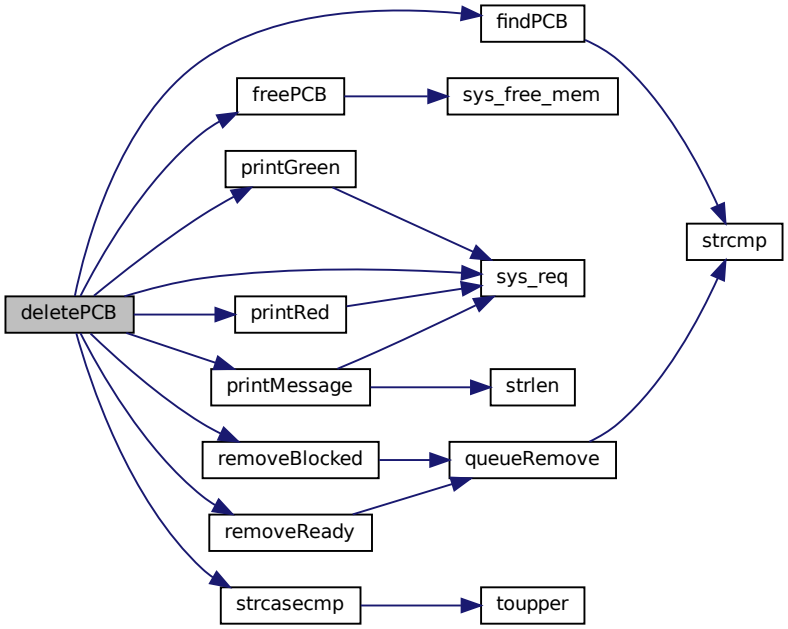
Here is the call graph for this function:



4.31.1.7 deletePCB()

```
int deletePCB (
            char * name )
```

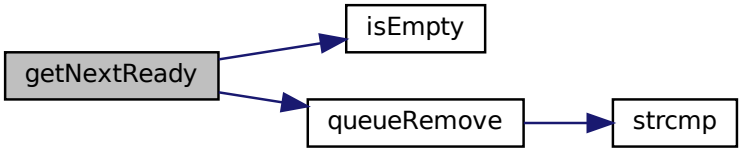
Here is the call graph for this function:



4.31.1.8 getNextReady()

```
PCB* getNextReady ( )
```

Here is the call graph for this function:



4.31.1.9 initQueues()

```
void initQueues ( )
```

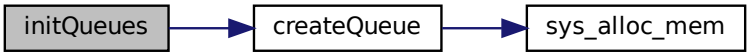
4.31.1.10 Function: initQueues

Initializes the ready and blocked queues

Author

Brendan Michael

Here is the call graph for this function:



4.31.1.11 insertPCB()

```
void insertPCB (
            PCB * pcb )
```

Function: showBlocked

Displays queues that are currently in the blocked state.
If nothing is in block queue displays message that
the queue is currently empty.

Author

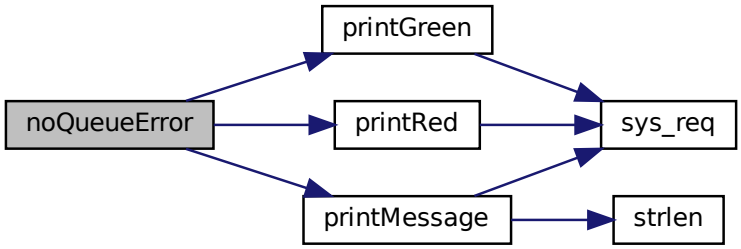
Bryce Williams

Here is the call graph for this function:

4.31.1.12 noQueueError()

```
void noQueueError ( )
```

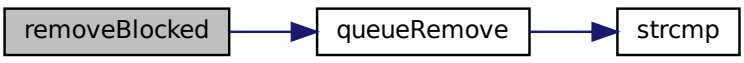
Here is the call graph for this function:



4.31.1.13 removeBlocked()

```
void removeBlocked (
            PCB * p )
```

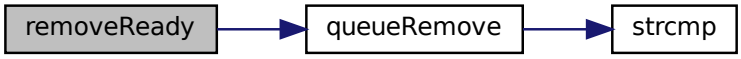
Here is the call graph for this function:



4.31.1.14 removeReady()

```
void removeReady (
            PCB * p )
```

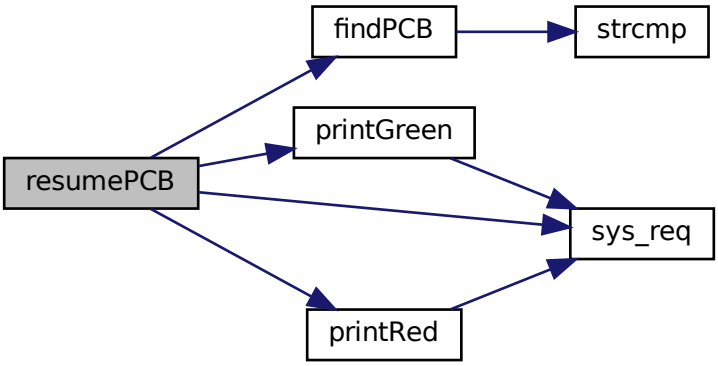
Here is the call graph for this function:



4.31.1.15 resumePCB()

```
int resumePCB (
            char * name )
```

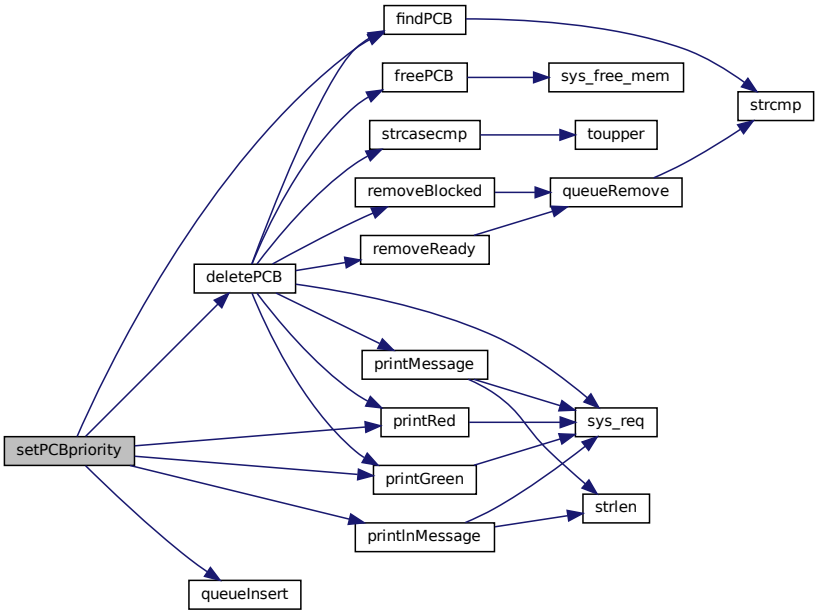
Here is the call graph for this function:



4.31.1.16 setPCBpriority()

```
void setPCBpriority (
            char * name,
            int priority )
```

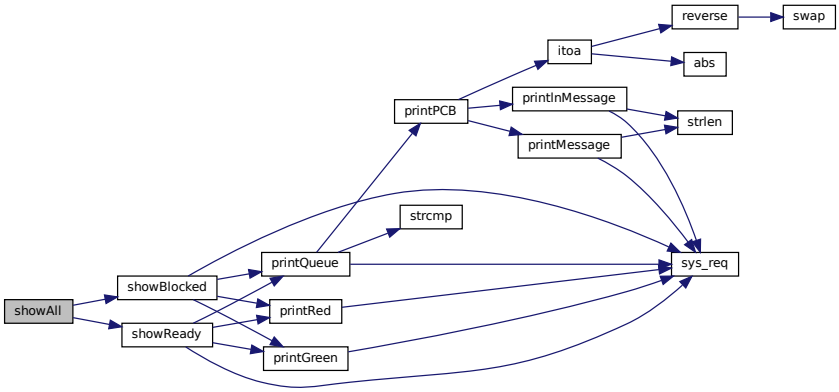
Here is the call graph for this function:



4.31.1.17 showAll()

```
void showAll ( )
```

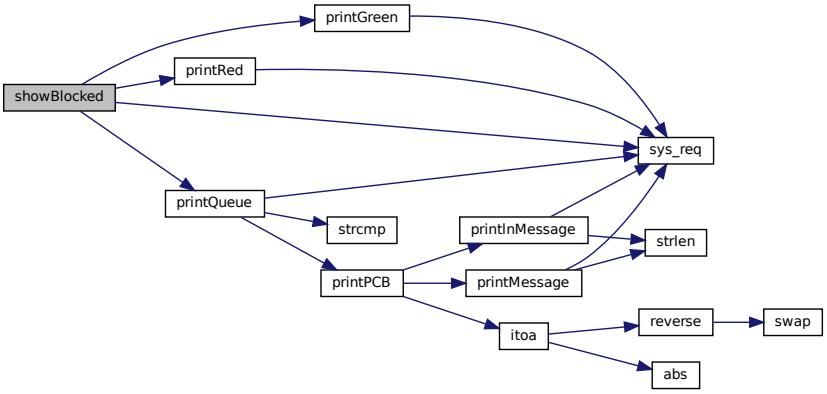
Here is the call graph for this function:



4.31.1.18 showBlocked()

```
void showBlocked ( )
```

Here is the call graph for this function:



4.31.1.19 showPCB()

```
void showPCB (
            char * name )
```

4.31.1.20 Function: showPCB

Finds pcb based on user entered name. Searches in readyQueue then blockedQueue.

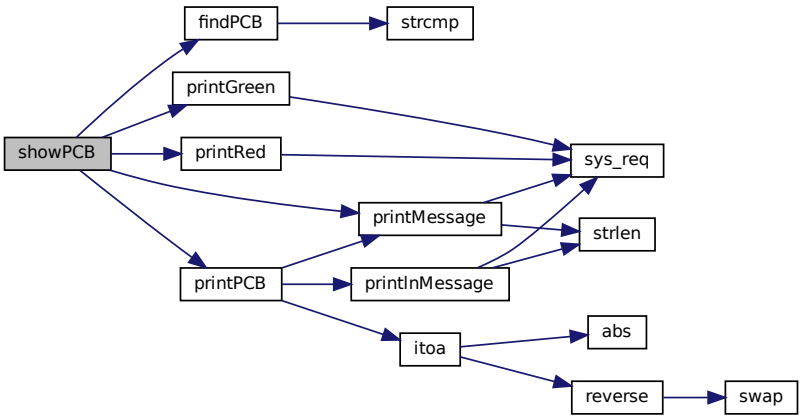
Parameters

name	name of the PCB to search for.

Author

Bryce Williams

Here is the call graph for this function:



4.31.1.21 showReady()

```
int showReady ( )
```

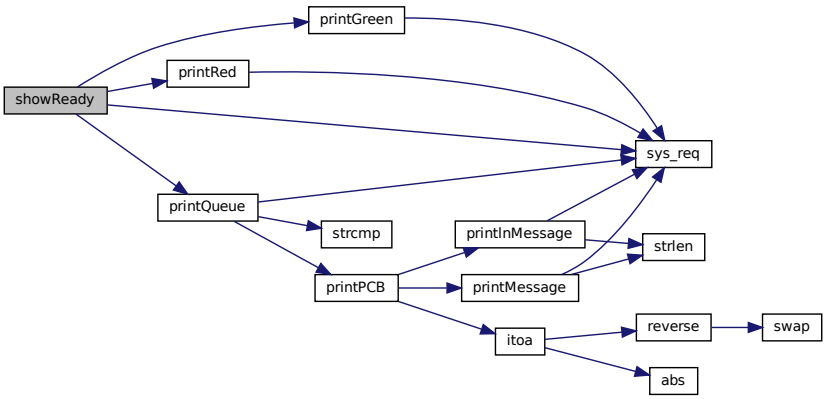
4.31.1.22 Function: showReady

Displays the pcb's currently in the ready state. Checks to see if readyQueue is empty. If it is empty displays an error message.

Author

Bryce Williams

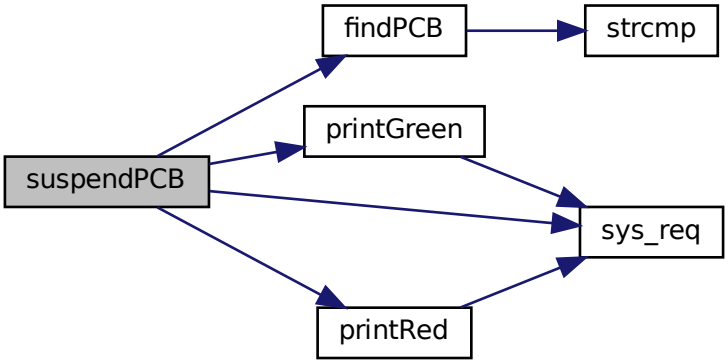
Here is the call graph for this function:



4.31.1.23 suspendPCB()

```
int suspendPCB (
            char * name )
```

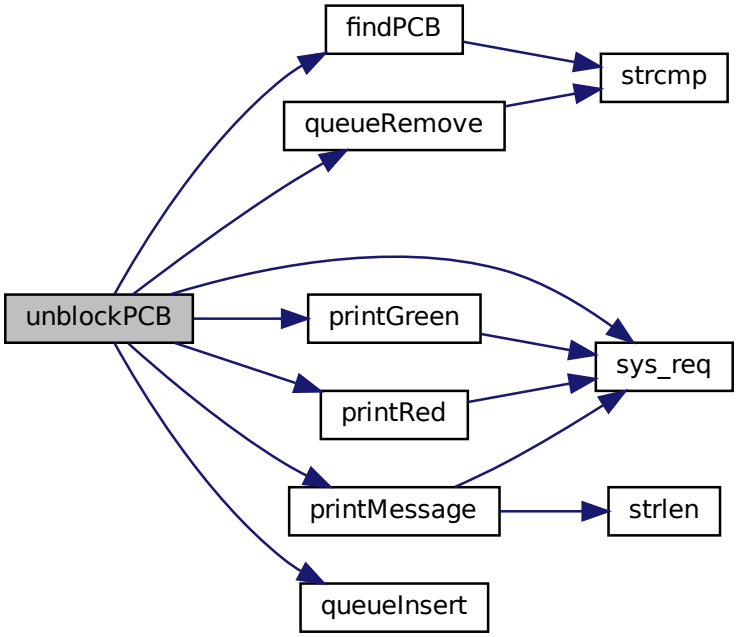
Here is the call graph for this function:



4.31.1.24 unblockPCB()

```
int unblockPCB (
            char * name )
```

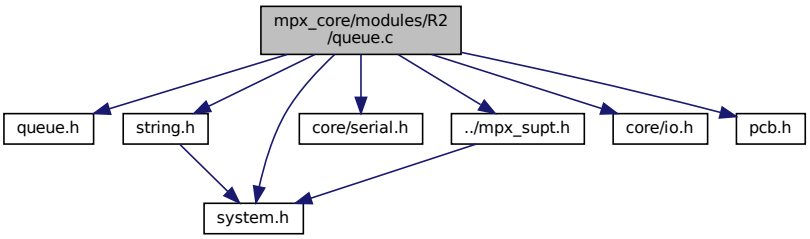
Here is the call graph for this function:



4.32 mpx_core/modules/R2/queue.c File Reference

```
#include "queue.h"
#include <string.h>
#include <system.h>
#include <core/serial.h>
#include "../mpx_supt.h"
#include <core/io.h>
#include "pcb.h"
```

Include dependency graph for queue.c:



Functions

- int isEmpty (Queue *q)
- int queueInsert (Queue *q, PCB *pcb)
- int queueRemove (Queue *q, PCB *pcb)
- void peek (Queue *q)
- PCB * findPCB (char *name, Queue *q)
- void printQueue (Queue *q)

Variables

- char * readyTitle = "READY QUEUE\n"
- char * blockedTitle = "BLOCKED QUEUE\n"
- int titleSize = 20
- char * border = "==========\n"
- int borderSize = 16

4.32.1 Function Documentation

4.32.1.1 findPCB()

```
PCB* findPCB (
            char * name,
            Queue * q )
```

4.32.1.2 Function: findPCB()

Finds and returns a PCB based on the given name and queue.

Parameters

*name	the PCB name
*q	the queue to look through

Returns

the found PCB

Author

Brendan Michael

Here is the call graph for this function:

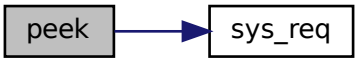
4.32.1.3 isEmpty()

```
int isEmpty (
            Queue * q )
```

4.32.1.4 peek()

```
void peek (
            Queue * q )
```

Here is the call graph for this function:



4.32.1.5 printQueue()

```
void printQueue (
            Queue * q )
```

4.32.1.6 Function: createQueue

Creates and initializes an empty queue.

Returns

the created queue

Author

Brendan Michael

4.32.1.7 Function: findPCB()

Finds and returns a PCB based on the given name and queue.

Parameters

∗name	the PCB name
∗q	the queue to look through

Returns

the found PCB

Author

Brendan Michael

4.32.1.8 Function: printQueue

Prints out the contents of the given queue

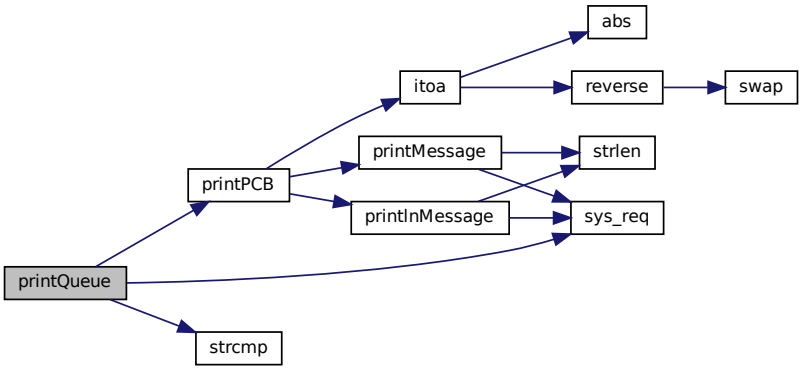
Parameters

∗q	the queue to print out

Author

Brendan Michael

Here is the call graph for this function:



4.32.1.9 queueInsert()

```
int queueInsert (
            Queue * q,
            struct PCB * pcb )
```

4.32.1.10 Function: queueInsert

Parameters

∗q	the queue to be inserted into
∗pcb	the pcb to be inserted

Returns

1 if no error occured

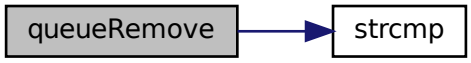
Author

Bryce Williams and Brendan Michael

4.32.1.11 queueRemove()

```
int queueRemove (
            Queue * q,
            PCB * pcb )
```

Here is the call graph for this function:



4.32.2 Variable Documentation

4.32.2.1 blockedTitle

```
char* blockedTitle = "BLOCKED QUEUE\n"
```

4.32.2.2 border

```
char* border = "==============\n"
```

4.32.2.3 borderSize

```
int borderSize = 16
```

4.32.2.4 readyTitle

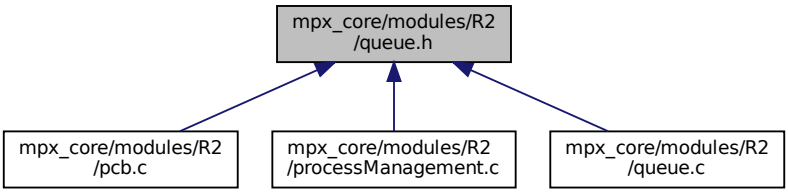
```
char* readyTitle = "READY QUEUE\n"
```

4.32.2.5 titleSize

```
int titleSize = 20
```

4.33 mpx_core/modules/R2/queue.h File Reference

This graph shows which files directly or indirectly include this file:



Data Structures

- struct Queue

Typedefs

- typedef struct Queue Queue

Functions

- void printQueue (Queue ∗q)
- struct PCB ∗ findPCB (char ∗name, Queue ∗q)
- int queueInsert (Queue ∗q, struct PCB ∗pcb)
- int queueRemove (Queue ∗q, struct PCB ∗pcb)
- int isEmpty (Queue ∗q)
- void peek (Queue ∗q)

4.33.1 Typedef Documentation

4.33.1.1 Queue

```
typedef struct Queue Queue
```

4.33.2 Function Documentation

4.33.2.1 findPCB()

```
struct PCB* findPCB (
            char * name,
            Queue * q )
```

4.33.2.2 Function: findPCB()

Finds and returns a PCB based on the given name and queue.

Parameters

∗*name*	the PCB name
∗*q*	the queue to look through

Returns

the found PCB

Author

Brendan Michael

Here is the call graph for this function:

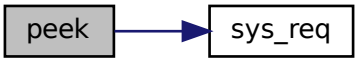
4.33.2.3 isEmpty()

```
int isEmpty (
            Queue * q )
```

4.33.2.4 peek()

```
void peek (
            Queue * q )
```

Here is the call graph for this function:



4.33.2.5 printQueue()

```
void printQueue (
            Queue * q )
```

4.33.2.6 Function: createQueue

Creates and initializes an empty queue.

Returns

the created queue

Author

Brendan Michael

4.33.2.7 Function: findPCB()

Finds and returns a PCB based on the given name and queue.

Parameters

∗name	the PCB name
∗q	the queue to look through

Returns

the found PCB

Author

Brendan Michael

4.33.2.8 Function: printQueue

Prints out the contents of the given queue

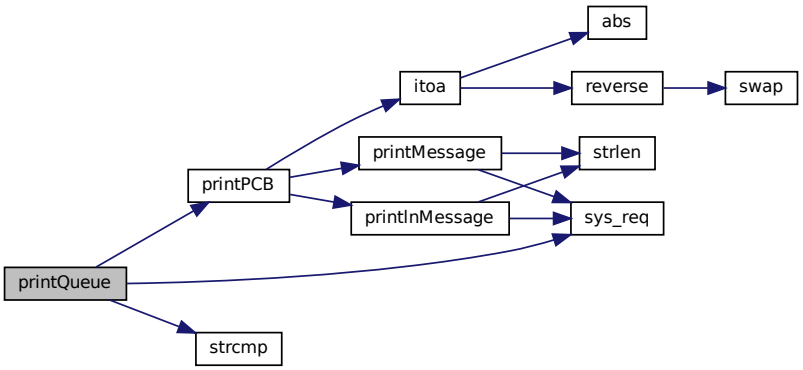
Parameters

∗q	the queue to print out

Author

Brendan Michael

Here is the call graph for this function:



4.33.2.9 queueInsert()

```
int queueInsert (
            Queue * q,
            struct PCB * pcb )
```

4.33.2.10 Function: queueInsert

Parameters

∗q	the queue to be inserted into
∗pcb	the pcb to be inserted

Returns

1 if no error occured

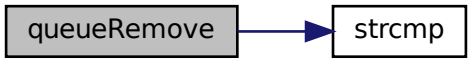
Author

Bryce Williams and Brendan Michael

4.33.2.11 queueRemove()

```
int queueRemove (
            Queue * q,
            struct PCB * pcb )
```

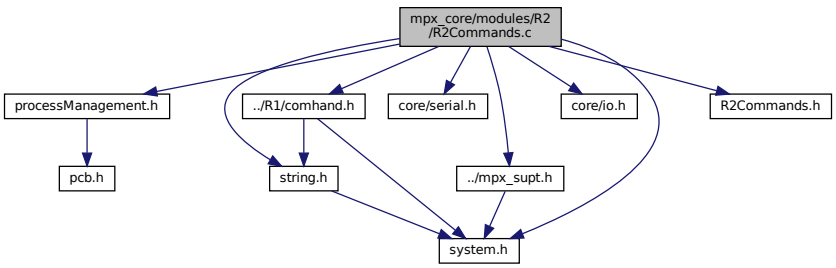
Here is the call graph for this function:



4.34 mpx_core/modules/R2/R2Commands.c File Reference

```
#include "processManagement.h"
#include <string.h>
#include <system.h>
#include <core/serial.h>
#include "../mpx_supt.h"
#include <core/io.h>
#include "../R1/comhand.h"
#include "R2Commands.h"
```

Include dependency graph for R2Commands.c:



Functions

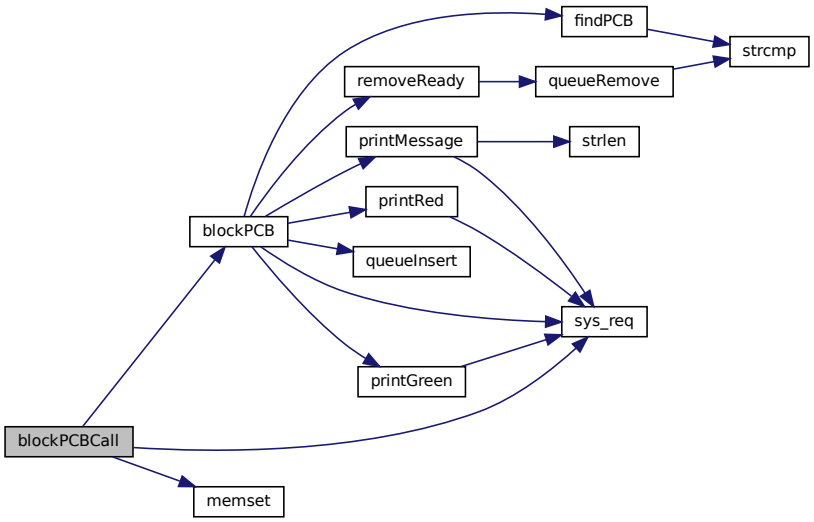
- void showReadyCall ()
- void setPriorityCall ()
- void deletePCBCall ()
- void createPCBCall ()
- void blockPCBCall ()
- void unblockPCBCall ()
- void suspendPCBCall ()
- void resumePCBCall ()

4.34.1 Function Documentation

4.34.1.1 blockPCBCall()

```
void blockPCBCall ( )
```

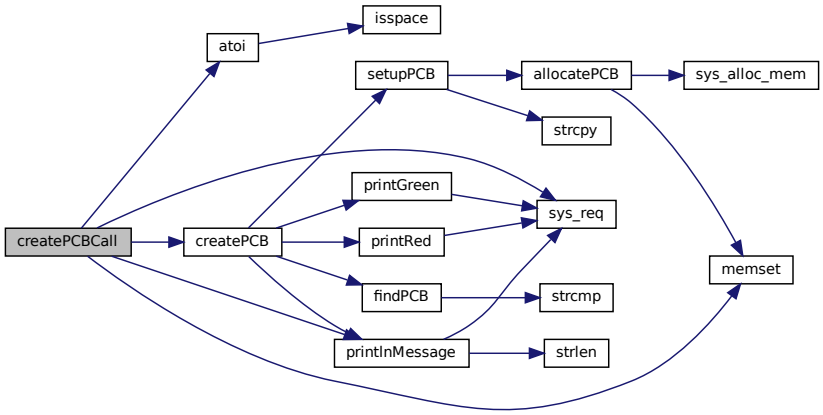
Here is the call graph for this function:



4.34.1.2 createPCBCall()

```
void createPCBCall ( )
```

Here is the call graph for this function:



4.34.1.3 deletePCBCall()

```
void deletePCBCall ( )
```

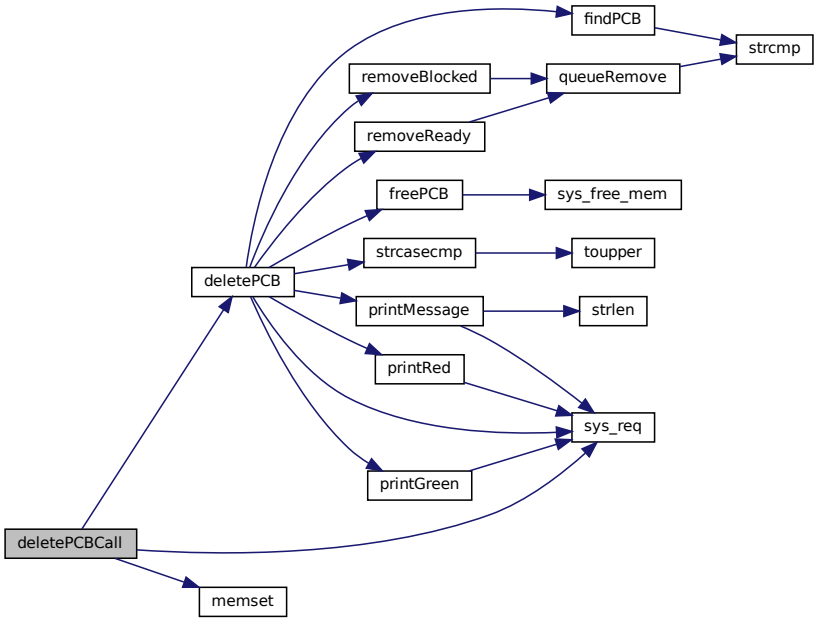
4.34.1.4 Function: noSuchCommand

Displays an error message when an entered command is invalid.

Author

Brendan Michael

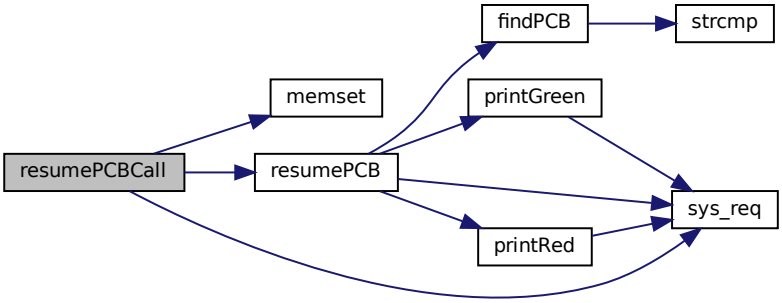
Here is the call graph for this function:



4.34.1.5 resumePCBCall()

```
void resumePCBCall ( )
```

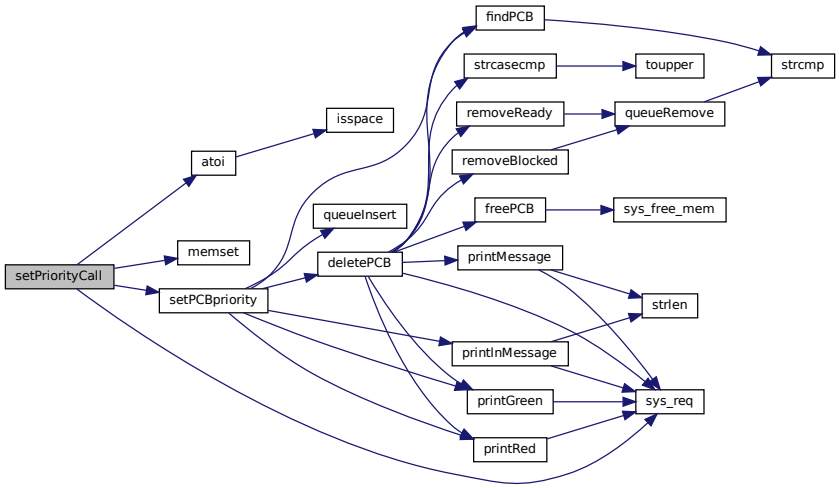
Here is the call graph for this function:



4.34.1.6 setPriorityCall()

```
void setPriorityCall ( )
```

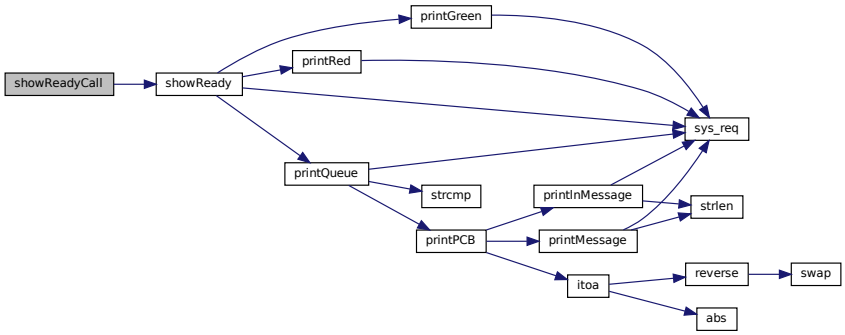
Here is the call graph for this function:



4.34.1.7 showReadyCall()

```
void showReadyCall ( )
```

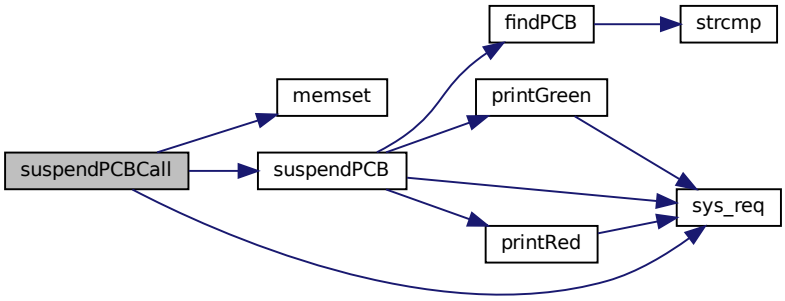
Here is the call graph for this function:



4.34.1.8 suspendPCBCall()

```
void suspendPCBCall ( )
```

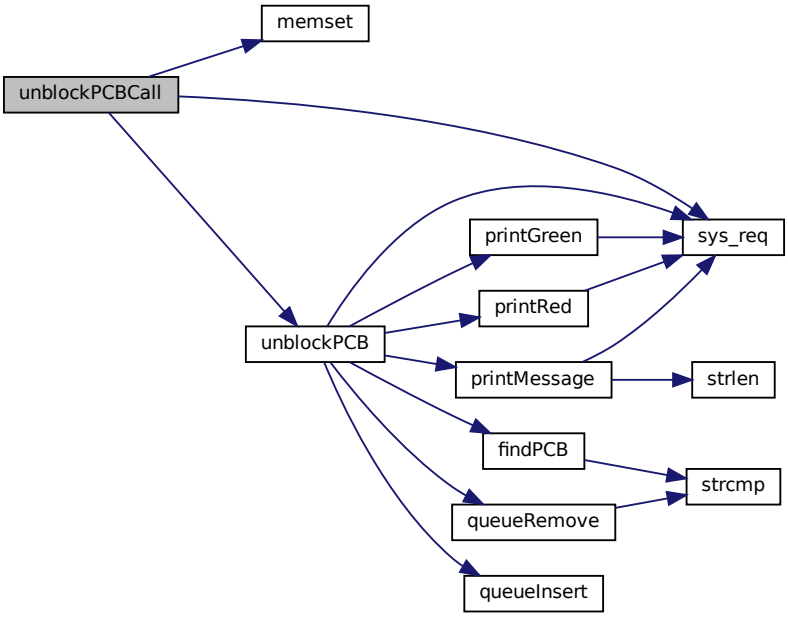
Here is the call graph for this function:



4.34.1.9 unblockPCBCall()

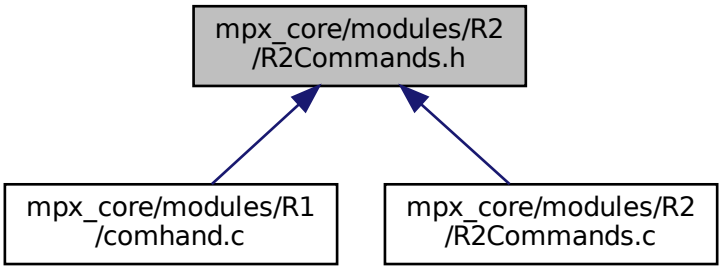
```
void unblockPCBCall ( )
```

Here is the call graph for this function:



4.35 mpx_core/modules/R2/R2Commands.h File Reference

This graph shows which files directly or indirectly include this file:



Functions

- void deletePCBCall ()
- void createPCBCall ()
- void showReadyCall ()
- void unblockPCBCall ()
- void blockPCBCall ()
- void setPriorityCall ()
- void suspendPCBCall ()

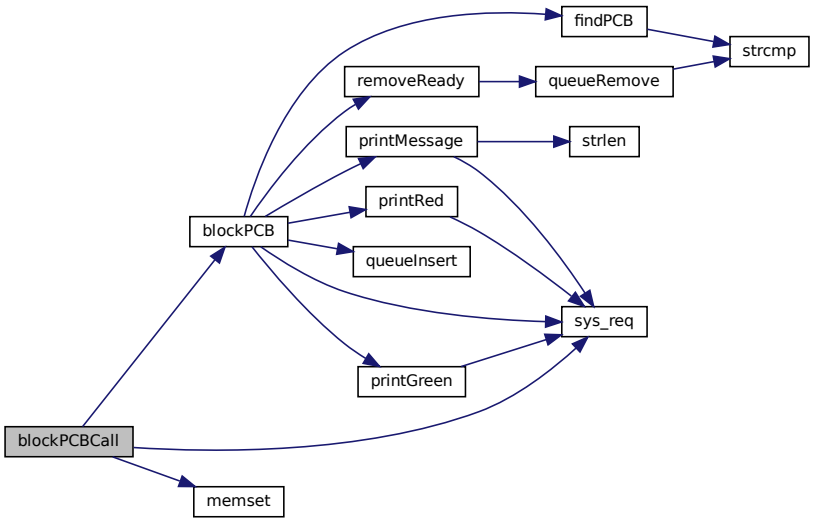
- void resumePCBCall ()

4.35.1 Function Documentation

4.35.1.1 blockPCBCall()

```
void blockPCBCall ( )
```

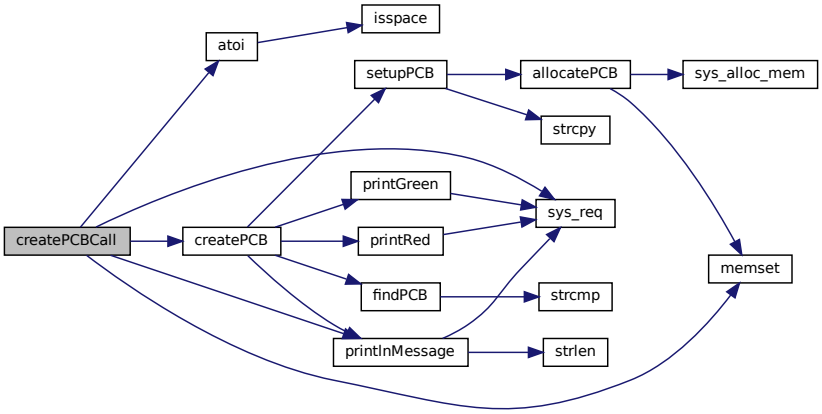
Here is the call graph for this function:



4.35.1.2 createPCBCall()

```
void createPCBCall ( )
```

Here is the call graph for this function:



4.35.1.3 deletePCBCall()

```
void deletePCBCall ( )
```

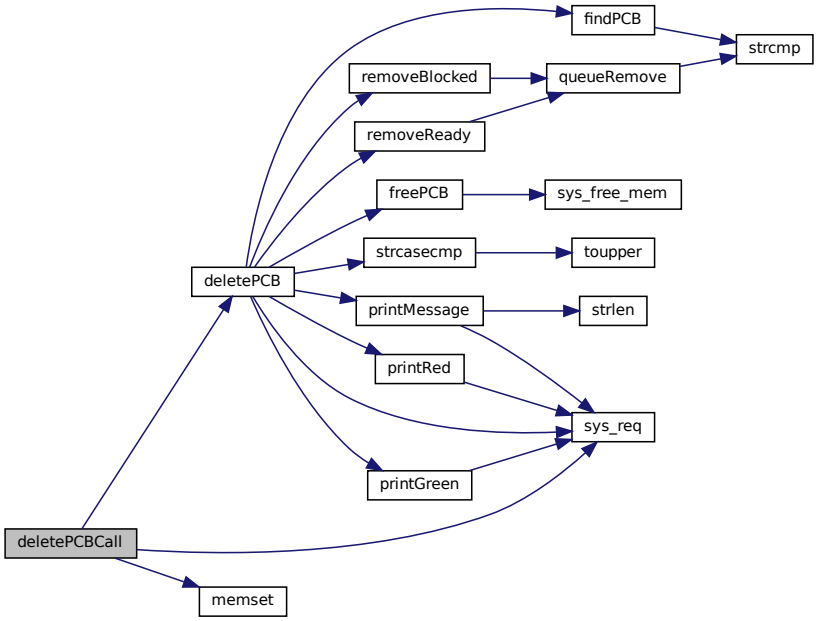
4.35.1.4 Function: noSuchCommand

Displays an error message when an entered command is invalid.

Author

Brendan Michael

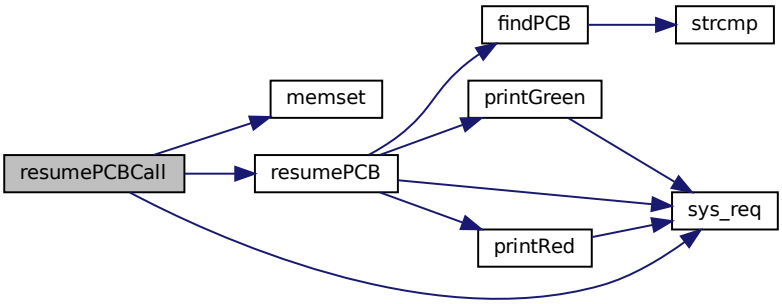
Here is the call graph for this function:



4.35.1.5 resumePCBCall()

```
void resumePCBCall ( )
```

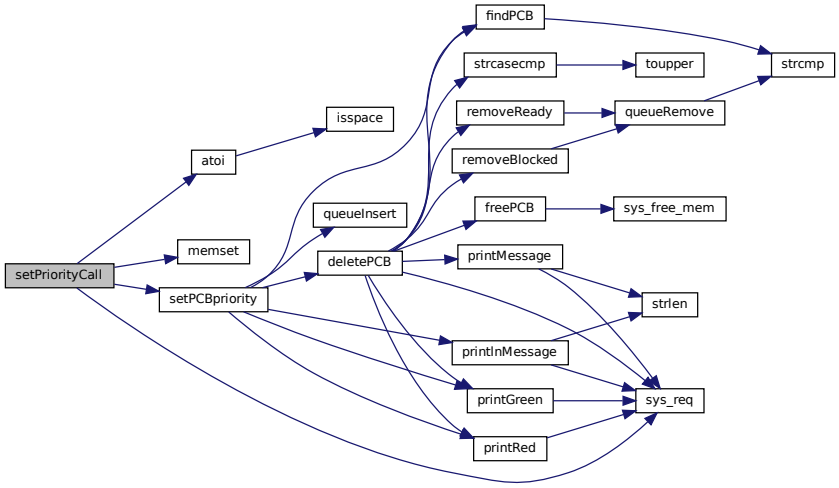
Here is the call graph for this function:



4.35.1.6 setPriorityCall()

```
void setPriorityCall ( )
```

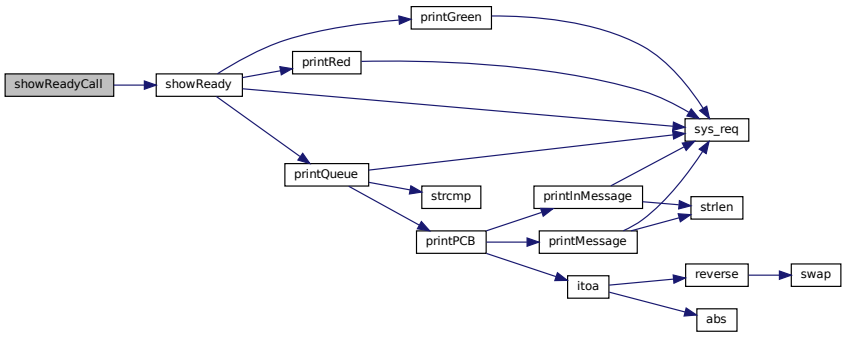
Here is the call graph for this function:



4.35.1.7 showReadyCall()

```
void showReadyCall ( )
```

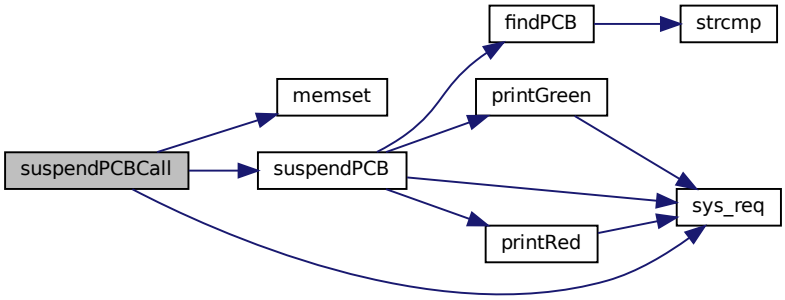
Here is the call graph for this function:



4.35.1.8 suspendPCBCall()

```
void suspendPCBCall ( )
```

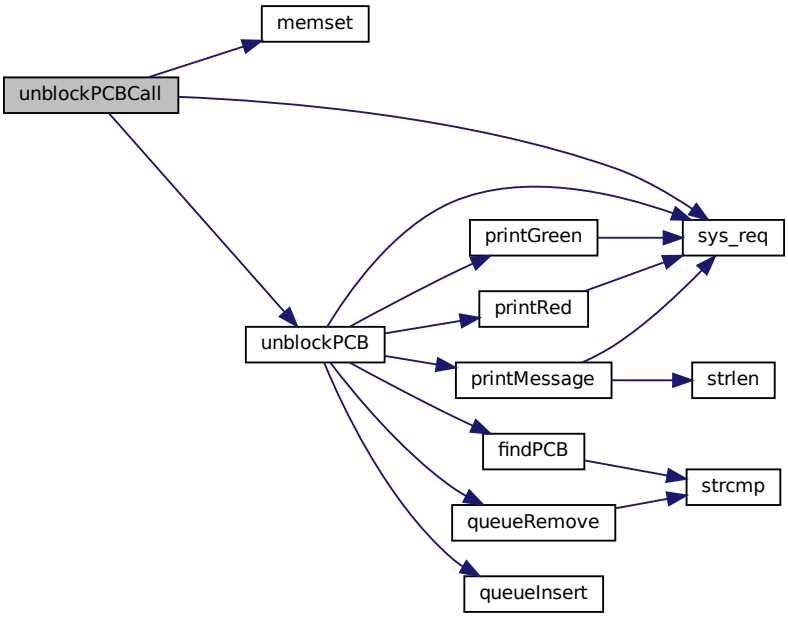
Here is the call graph for this function:



4.35.1.9 unblockPCBCall()

```
void unblockPCBCall ( )
```

Here is the call graph for this function:

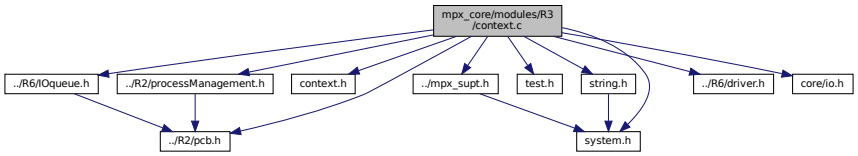


4.36 mpx_core/modules/R3/context.c File Reference

```
#include "../R2/pcb.h"
#include <system.h>
#include "context.h"
#include "../mpx_supt.h"
#include "../R2/processManagement.h"
```

```
#include "test.h"
#include "string.h"
#include "../R6/IOqueue.h"
#include "../R6/driver.h"
#include <core/io.h>
```

Include dependency graph for context.c:



Typedefs

- typedef void(∗ func_ptr) ()

Functions

- void loadProcess (char ∗name, func_ptr func)
- void loadr3 ()
- u32int ∗ sys_call (Context ∗registers)
- void yield ()
- void io_scheduler ()

Variables

- dcb_t ∗ DCB
- PCB ∗ cop
- Context ∗ old
- param params
- ioqueue_t ioqueue

4.36.1 Typedef Documentation

4.36.1.1 func_ptr

```
typedef void(* func_ptr) ()
```

4.36.2 Function Documentation

4.36.2.1 io_scheduler()

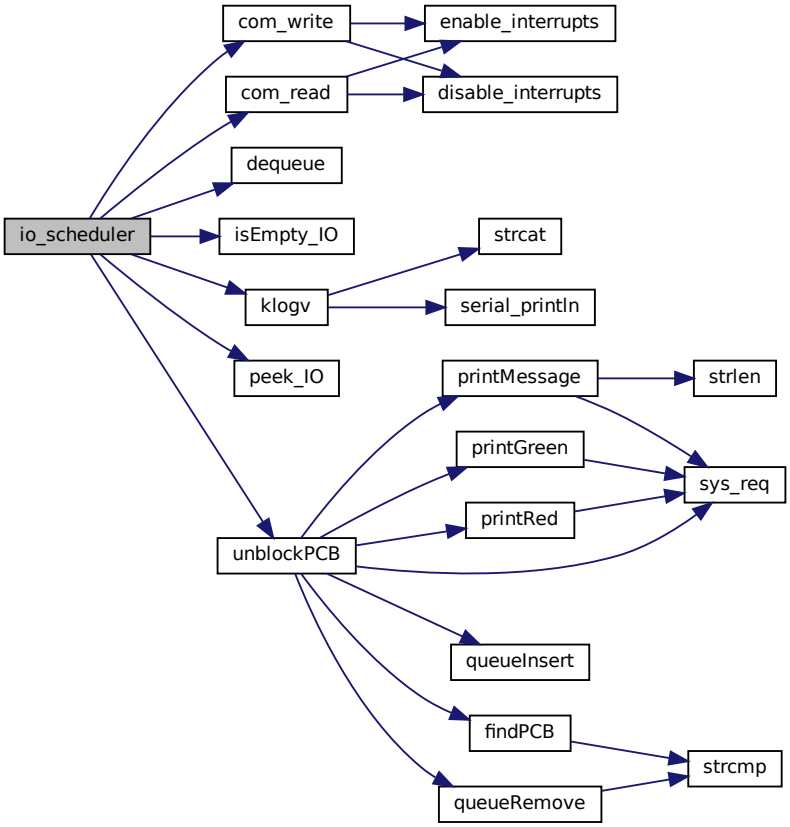
```
void io_scheduler ( )
```

+∗ io_scheduler() creates an io device for the PCB requesting IO. +∗

Parameters

(the	params you give it depends on the design of your system)

Here is the call graph for this function:



4.36.2.2 loadProcess()

```
void loadProcess (
            char * name,
            func_ptr func )
```

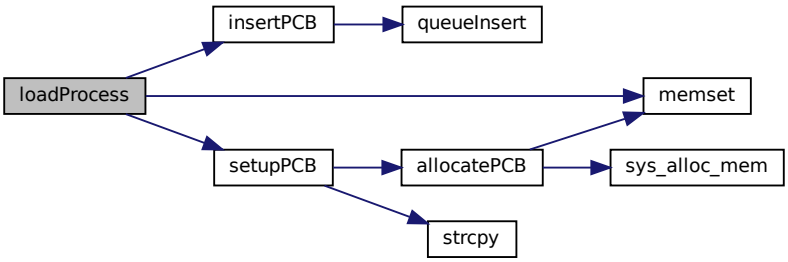
4.36.2.3 Function: loadProcess

Loads process into PCB.

Author

Farhan Shahbaz

Here is the call graph for this function:



4.36.2.4 loadr3()

```
void loadr3 ( )
```

4.36.2.5 Function: loadr3

Loads test processes into memory in a suspended ready state

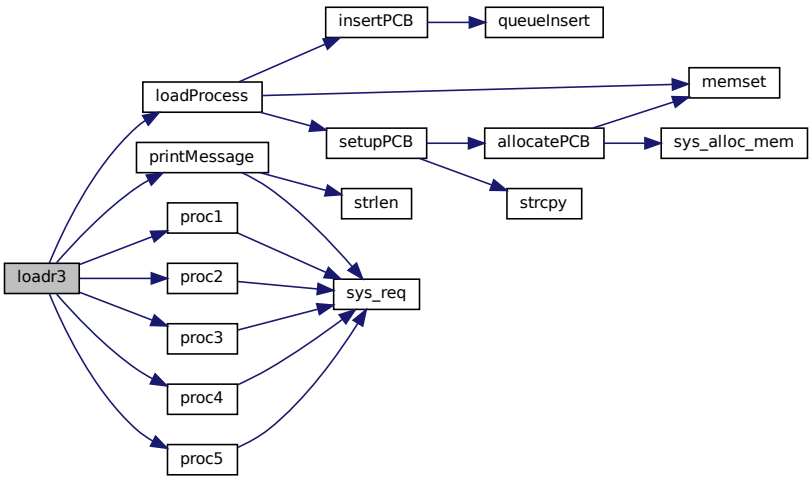
Returns

the created queue

Author

Brendan Michael, Selim Demircan

Here is the call graph for this function:



4.36.2.6 sys_call()

```
u32int* sys_call (
            Context * registers )
```

4.36.2.7 Function: sys_call

Performs context switching beteween current process and next ready process

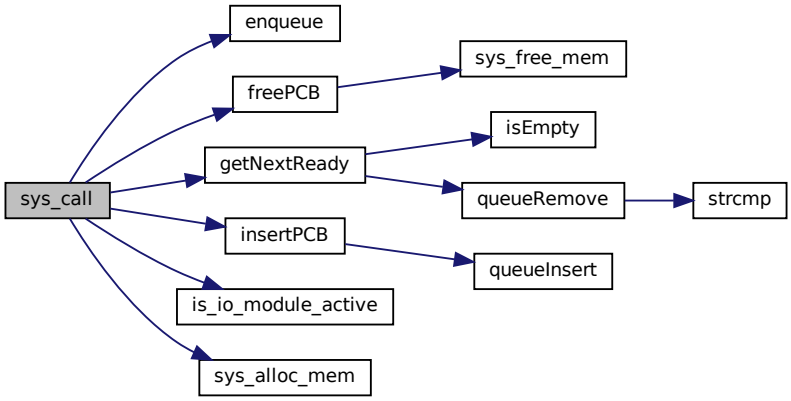
Returns

u32int*: Registers

Author

Brendan Michael, Farhan Shahbaz

Here is the call graph for this function:



4.36.2.8 yield()

```
void yield ( )
```

4.36.2.9 Function: yield

Causes the comhand to give up CPU time to other processes. Processes in the ready queue will be executed

Author

Brendan Michael

4.36.3 Variable Documentation

4.36.3.1 cop

```
PCB* cop
```

4.36.3.2 DCB

```
dcb_t* DCB  [extern]
```

4.36.3.3 ioqueue

```
ioqueue_t ioqueue  [extern]
```

4.36.3.4 old

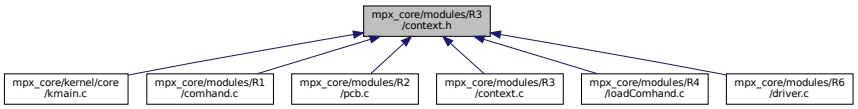
```
Context* old
```

4.36.3.5 params

```
param params  [extern]
```

4.37 mpx_core/modules/R3/context.h File Reference

This graph shows which files directly or indirectly include this file:



Data Structures

- struct Context

Typedefs

- typedef struct Context Context

Functions

- void loadr3 ()
- u32int * sys_call (Context *registers)
- void yield ()
- void io_scheduler ()

4.37.1 Typedef Documentation

4.37.1.1 Context

```
typedef struct Context Context
```

4.37.2 Function Documentation

4.37.2.1 io_scheduler()

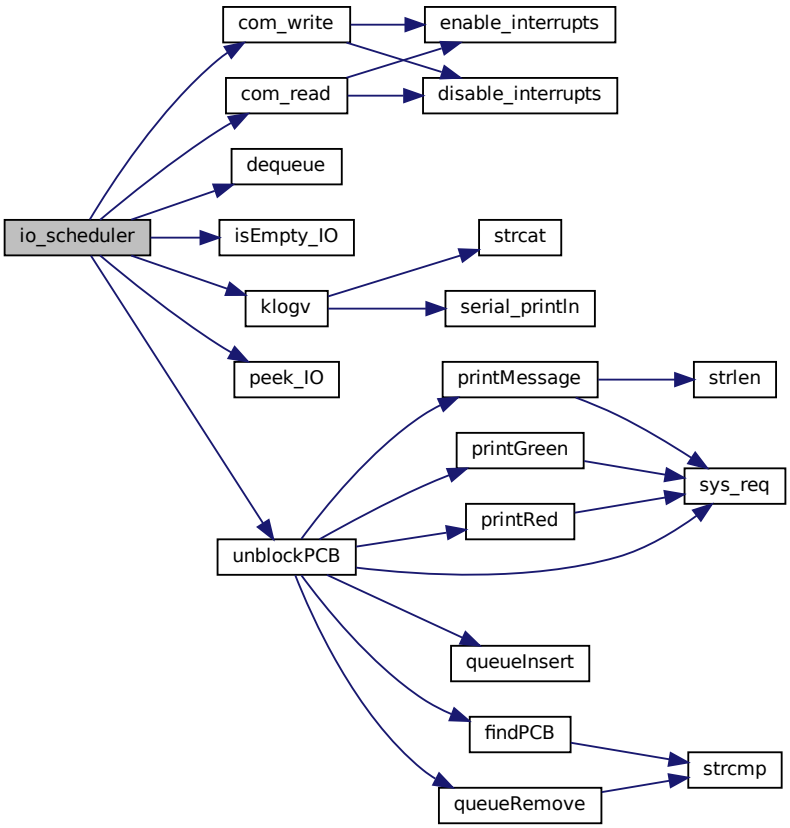
```
void io_scheduler ( )
```

+∗ io_scheduler() creates an io device for the PCB requesting IO. +∗

Parameters

(the	params you give it depends on the design of your system)

Here is the call graph for this function:



4.37.2.2 loadr3()

```
void loadr3 ( )
```

4.37.2.3 Function: loadr3

Loads test processes into memory in a suspended ready state

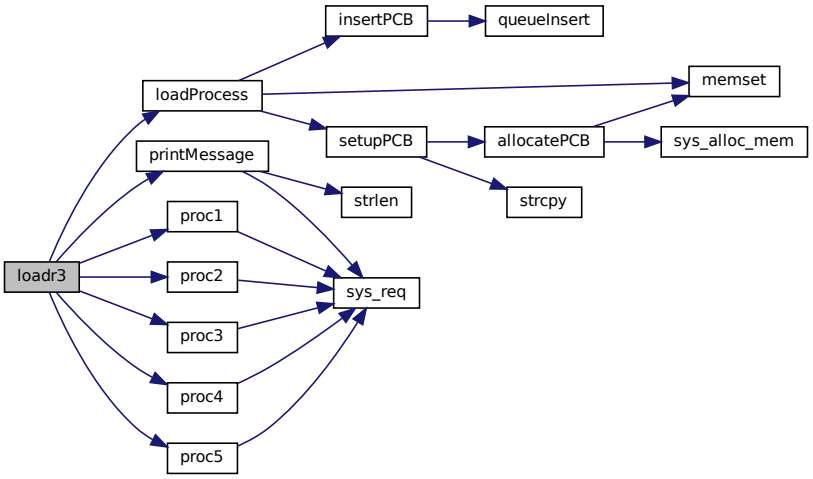
Returns

the created queue

Author

Brendan Michael, Selim Demircan

Here is the call graph for this function:



4.37.2.4 sys_call()

```
u32int* sys_call (
            Context * registers )
```

4.37.2.5 Function: sys_call

Performs context switching beteween current process and next ready process

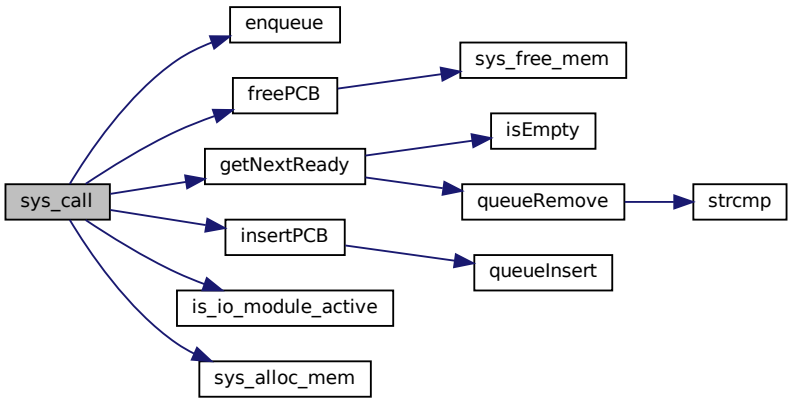
Returns

u32int*: Registers

Author

Brendan Michael, Farhan Shahbaz

Here is the call graph for this function:



4.37.2.6 yield()

```
void yield ( )
```

4.37.2.7 Function: yield

Causes the comhand to give up CPU time to other processes. Processes in the ready queue will be executed

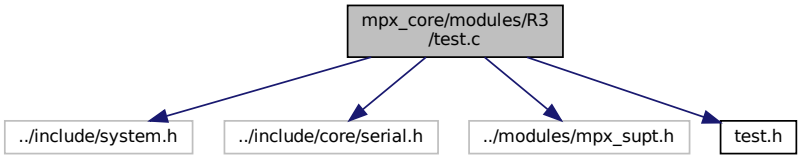
Author

Brendan Michael

4.38 mpx_core/modules/R3/test.c File Reference

```
#include "../include/system.h"
#include "../include/core/serial.h"
#include "../modules/mpx_supt.h"
#include "test.h"
```

Include dependency graph for test.c:



Macros

- #define RC_1 1
- #define RC_2 2
- #define RC_3 3
- #define RC_4 4
- #define RC_5 5

Functions

- void proc1 ()
- void proc2 ()
- void proc3 ()
- void proc4 ()
- void proc5 ()

Variables

- char * msg1 = "\nproc1 dispatched"
- char * msg2 = "\nproc2 dispatched"
- char * msg3 = "\nproc3 dispatched"
- char * msg4 = "\nproc4 dispatched"
- char * msg5 = "\nproc5 dispatched"
- int msgSize = 18
- char * er1 = "proc1 ran after it was terminated"
- char * er2 = "proc2 ran after it was terminated"
- char * er3 = "proc3 ran after it was terminated"
- char * er4 = "proc4 ran after it was terminated"
- char * er5 = "proc5 ran after it was terminated"
- int erSize = 34

4.38.1 Macro Definition Documentation

4.38.1.1 RC_1

```
#define RC_1 1
```

4.38.1.2 RC_2

```
#define RC_2 2
```

4.38.1.3 RC_3

```
#define RC_3 3
```

4.38.1.4 RC_4

```
#define RC_4 4
```

4.38.1.5 RC_5

```
#define RC_5 5
```

4.38.2 Function Documentation

4.38.2.1 proc1()

```
void proc1 ( )
```

Here is the call graph for this function:

4.38.2.2 proc2()

```
void proc2 ( )
```

Here is the call graph for this function:

4.38.2.3 proc3()

```
void proc3 ( )
```

Here is the call graph for this function:

4.38.2.4 proc4()

```
void proc4 ( )
```

Here is the call graph for this function:

4.38.2.5 proc5()

```
void proc5 ( )
```

Here is the call graph for this function:

4.38.3 Variable Documentation

4.38.3.1 er1

```
char* er1 = "proc1 ran after it was terminated"
```

4.38.3.2 er2

```
char* er2 = "proc2 ran after it was terminated"
```

4.38.3.3 er3

```
char* er3 = "proc3 ran after it was terminated"
```

4.38.3.4 er4

```
char* er4 = "proc4 ran after it was terminated"
```

4.38.3.5 er5

```
char* er5 = "proc5 ran after it was terminated"
```

4.38.3.6 erSize

```
int erSize = 34
```

4.38.3.7 msg1

```
char* msg1 = "\nproc1 dispatched"
```

4.38.3.8 msg2

```
char* msg2 = "\nproc2 dispatched"
```

4.38.3.9 msg3

```
char* msg3 = "\nproc3 dispatched"
```

4.38.3.10 msg4

```
char* msg4 = "\nproc4 dispatched"
```

4.38.3.11 msg5

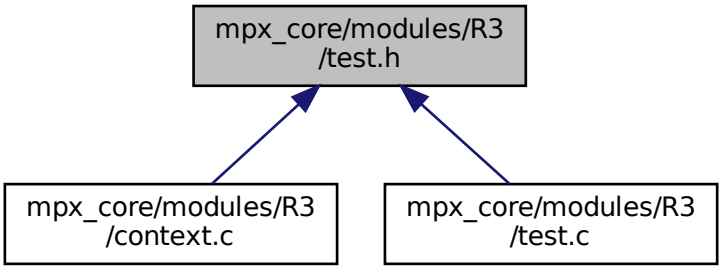
```
char* msg5 = "\nproc5 dispatched"
```

4.38.3.12 msgSize

```
int msgSize = 18
```

4.39 mpx_core/modules/R3/test.h File Reference

This graph shows which files directly or indirectly include this file:



Functions

- void proc1 ()
- void proc2 ()

- void proc3 ()
- void proc4 ()
- void proc5 ()

4.39.1 Function Documentation

4.39.1.1 proc1()

```
void proc1 ( )
```

Here is the call graph for this function:

4.39.1.2 proc2()

```
void proc2 ( )
```

Here is the call graph for this function:

4.39.1.3 proc3()

```
void proc3 ( )
```

Here is the call graph for this function:

4.39.1.4 proc4()

```
void proc4 ( )
```

Here is the call graph for this function:

4.39.1.5 proc5()

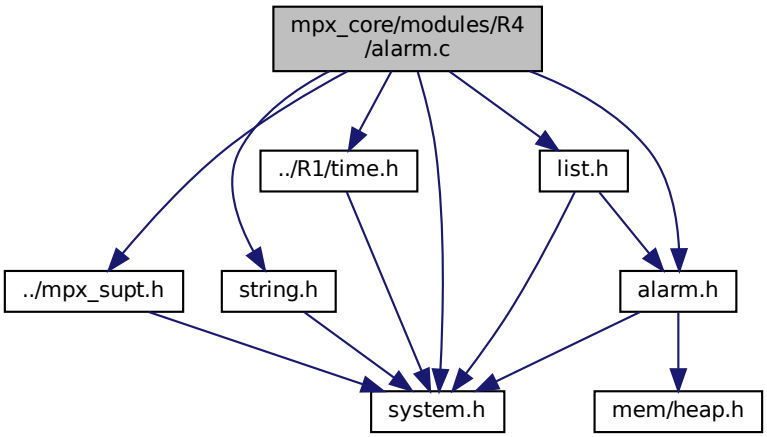
```
void proc5 ( )
```

Here is the call graph for this function:

4.40 mpx_core/modules/R4/alarm.c File Reference

```
#include "alarm.h"
#include <system.h>
#include "../mpx_supt.h"
#include <string.h>
#include "../R1/time.h"
#include "list.h"
```

Include dependency graph for alarm.c:



Functions

- void createAList ()
- void timeDaemon ()
- void createAlarmCall ()
- void createAlarm (int hh, int mm, int ss, char ∗message)
- void infiniteProcess ()

Variables

- aList ∗ head_alarms

4.40.1 Function Documentation

4.40.1.1 createAlarm()

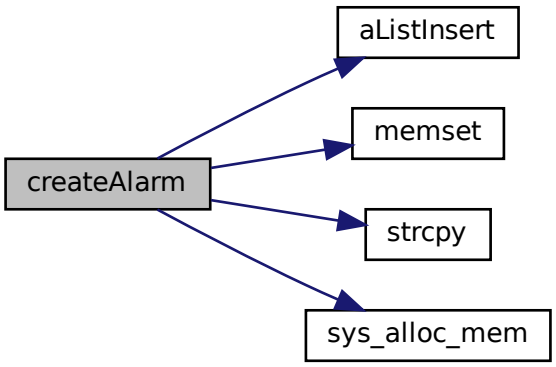
```
void createAlarm (
            int hh,
            int mm,
            int ss,
            char * message )
```

4.40.1.2 Function: createAlarm

Author

Brendan Michael

Here is the call graph for this function:



4.40.1.3 createAlarmCall()

```
void createAlarmCall ( )
```

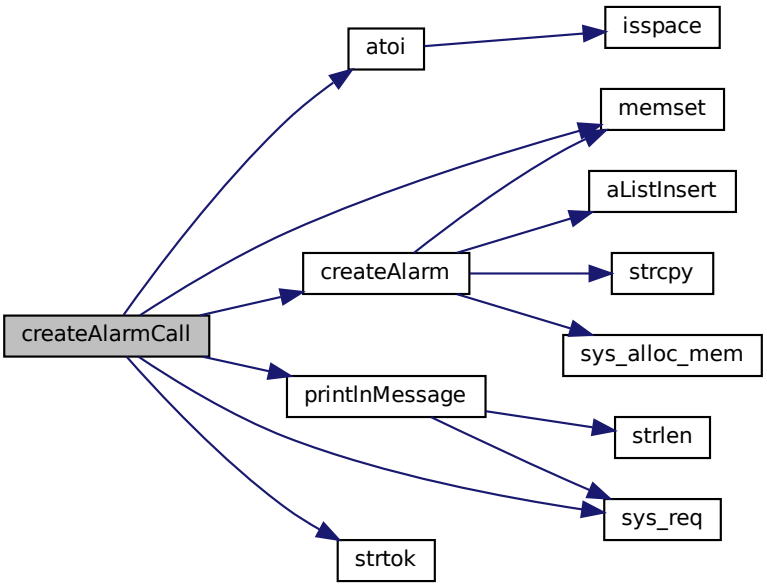
4.40.1.4 Function: createAlarmCall

Call to createAlarm that prompts user to enter alarm message/time. Sent to commhand.

Author

Farhan Shahbaz

Here is the call graph for this function:



4.40.1.5 createAList()

```
void createAList ( )
```

4.40.1.6 Function: createAlarm

Creates a new alarm based on user specified time and adds it to the list of alarms

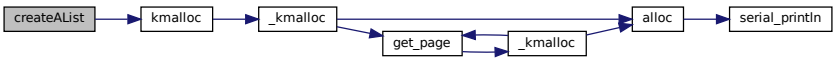
Parameters

message	the message to be displayed at the given time

Author

Brendan and Farhan

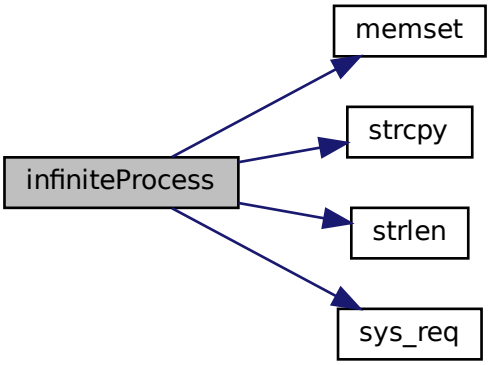
Here is the call graph for this function:



4.40.1.7 infiniteProcess()

```
void infiniteProcess ( )
```

Here is the call graph for this function:



4.40.1.8 timeDaemon()

```
void timeDaemon ( )
```

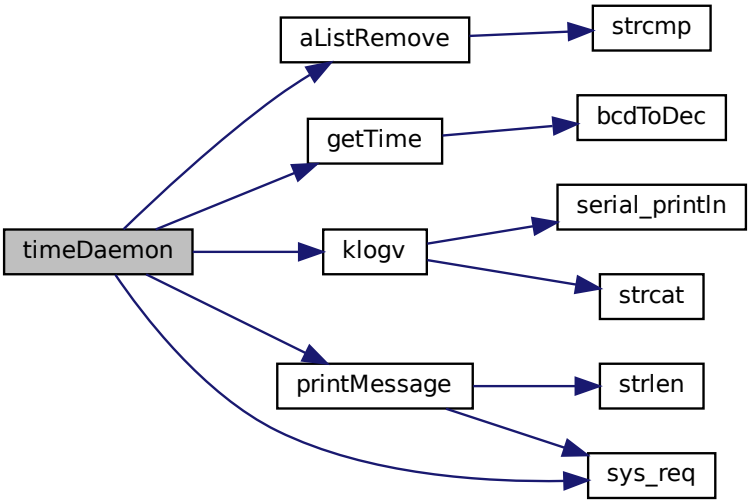
4.40.1.9 Function: timeDaemon

Background process running to check if an alarm has been set.

Author

Bryce Williams

Here is the call graph for this function:



4.40.2 Variable Documentation

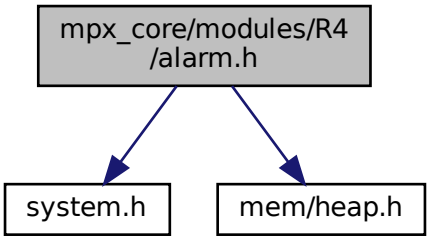
4.40.2.1 head_alarms

```
aList* head_alarms
```

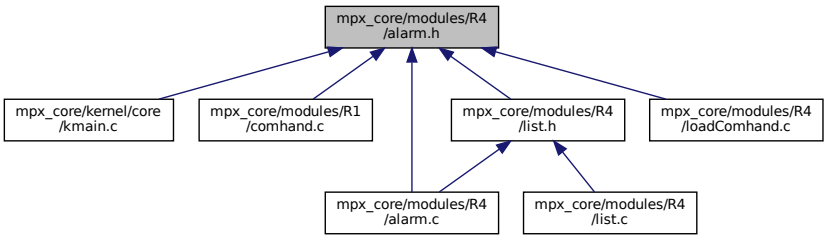
4.41 mpx_core/modules/R4/alarm.h File Reference

```
#include <system.h>
#include <mem/heap.h>
```

Include dependency graph for alarm.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct alarm_s

Typedefs

- typedef struct alarm_s alarm_t

Functions

- void createAlarmCall ()
- void createAList ()
- void createAlarm (int hh, int mm, int ss, char *message)

- void timeDaemon ()
- void infiniteProcess ()

4.41.1 Typedef Documentation

4.41.1.1 alarm_t

```
typedef struct alarm_s alarm_t
```

4.41.2 Function Documentation

4.41.2.1 createAlarm()

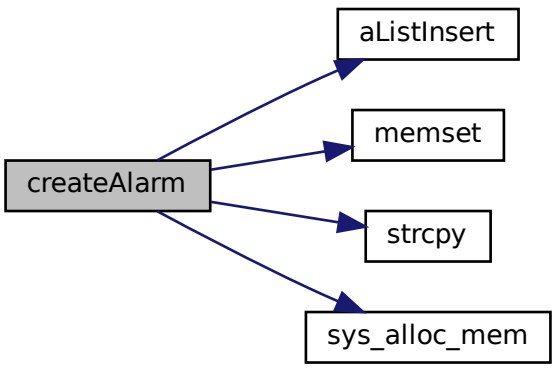
```
void createAlarm (
            int hh,
            int mm,
            int ss,
            char * message )
```

4.41.2.2 Function: createAlarm

Author

Brendan Michael

Here is the call graph for this function:



4.41.2.3 createAlarmCall()

```
void createAlarmCall ( )
```

4.41.2.4 Function: alarmCommand

Gathers and error checks user input to create an alarm.

Author

Bryce Williams

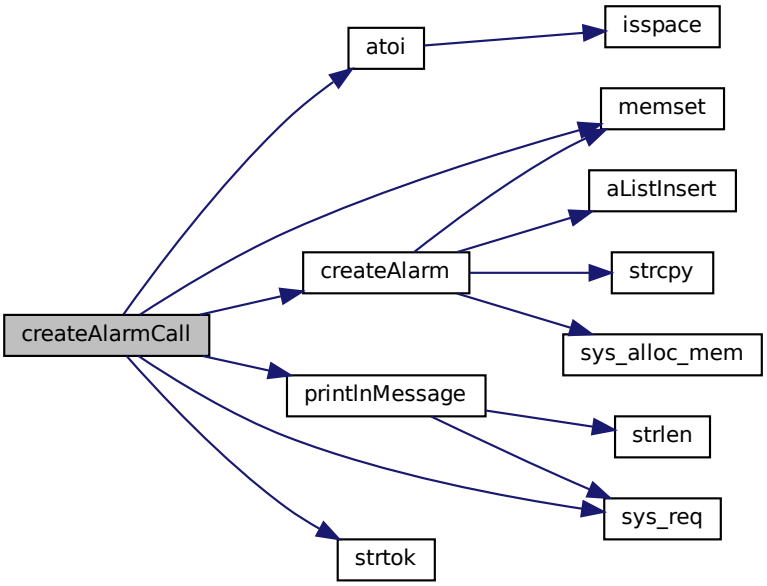
4.41.2.5 Function: createAlarmCall

Call to createAlarm that prompts user to enter alarm message/time. Sent to commhand.

Author

Farhan Shahbaz

Here is the call graph for this function:



4.41.2.6 createAList()

```
void createAList ( )
```

4.41.2.7 Function: createAlarm

Creates a new alarm based on user specified time and adds it to the list of alarms

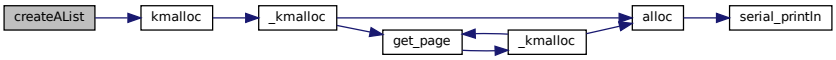
Parameters

message	the message to be displayed at the given time

Author

Brendan and Farhan

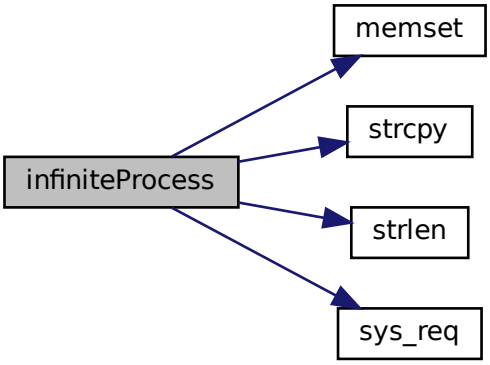
Here is the call graph for this function:



4.41.2.8 infiniteProcess()

```
void infiniteProcess ( )
```

Here is the call graph for this function:



4.41.2.9 timeDaemon()

```
void timeDaemon ( )
```

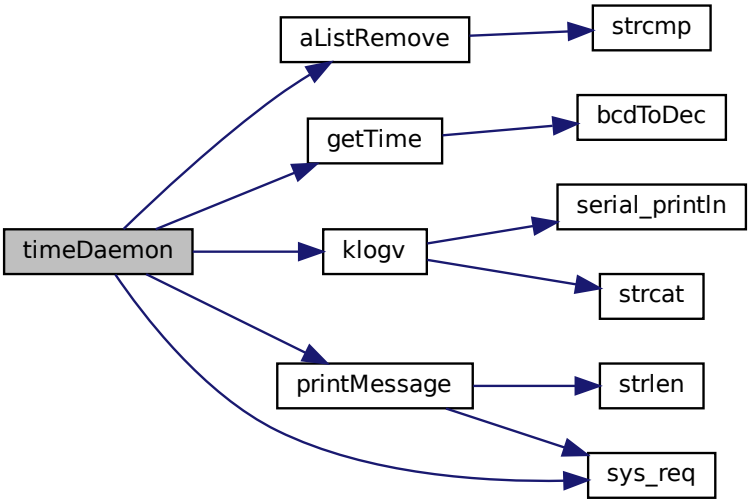
4.41.2.10 Function: timeDaemon

Background process running to check if an alarm has been set.

Author

Bryce Williams

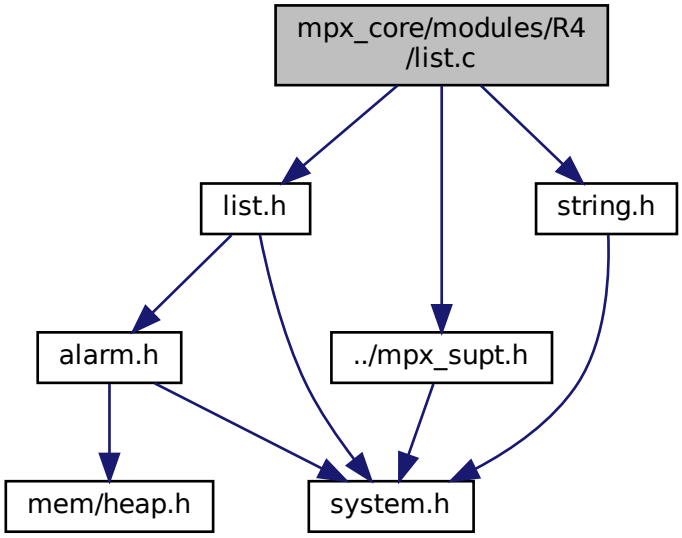
Here is the call graph for this function:



4.42 mpx_core/modules/R4/list.c File Reference

```
#include "list.h"
#include "../mpx_supt.h"
#include <string.h>
```

Include dependency graph for list.c:



Functions

- int aListInsert (aList ∗q, alarm_t ∗pcb)
- int aListRemove (aList ∗q, alarm_t ∗pcb)

4.42.1 Function Documentation

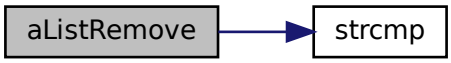
4.42.1.1 aListInsert()

```
int aListInsert (
            aList * q,
            alarm_t * pcb )
```

4.42.1.2 aListRemove()

```
int aListRemove (
            aList * q,
            alarm_t * pcb )
```

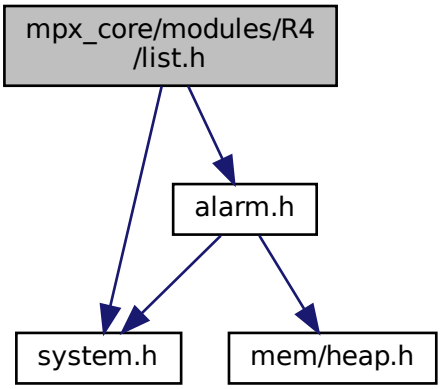
Here is the call graph for this function:



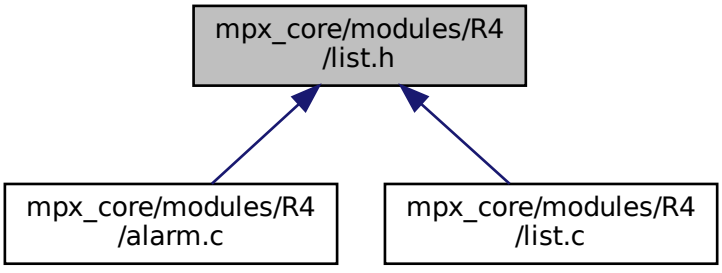
4.43 mpx_core/modules/R4/list.h File Reference

```
#include "alarm.h"
#include <system.h>
```

Include dependency graph for list.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct aList

Typedefs

- typedef struct aList aList

Functions

- int aListInsert (aList *q, alarm_t *pcb)
- int aListRemove (aList *q, alarm_t *pcb)

4.43.1 Typedef Documentation

4.43.1.1 aList

```
typedef struct aList aList
```

4.43.2 Function Documentation

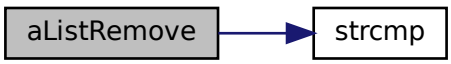
4.43.2.1 aListInsert()

```
int aListInsert (
            aList * q,
            alarm_t * pcb )
```

4.43.2.2 aListRemove()

```
int aListRemove (
            aList * q,
            alarm_t * pcb )
```

Here is the call graph for this function:

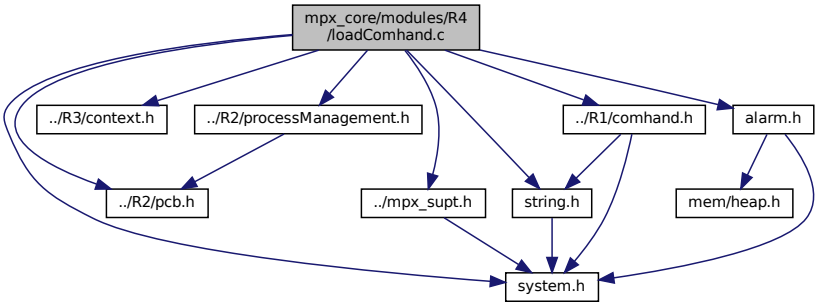


4.44 mpx_core/modules/R4/loadComhand.c File Reference

```
#include "../R2/pcb.h"
#include <system.h>
#include "../R3/context.h"
#include "../mpx_supt.h"
#include "../R2/processManagement.h"
#include "string.h"
#include "../R1/comhand.h"
```

```
#include "alarm.h"
```

Include dependency graph for loadComhand.c:



Functions

- void loadComhand ()
- void loadIdle ()
- void loadTimeDaemon ()
- void loadInfiniteProcess ()

4.44.1 Function Documentation

4.44.1.1 loadComhand()

```
void loadComhand ( )
```

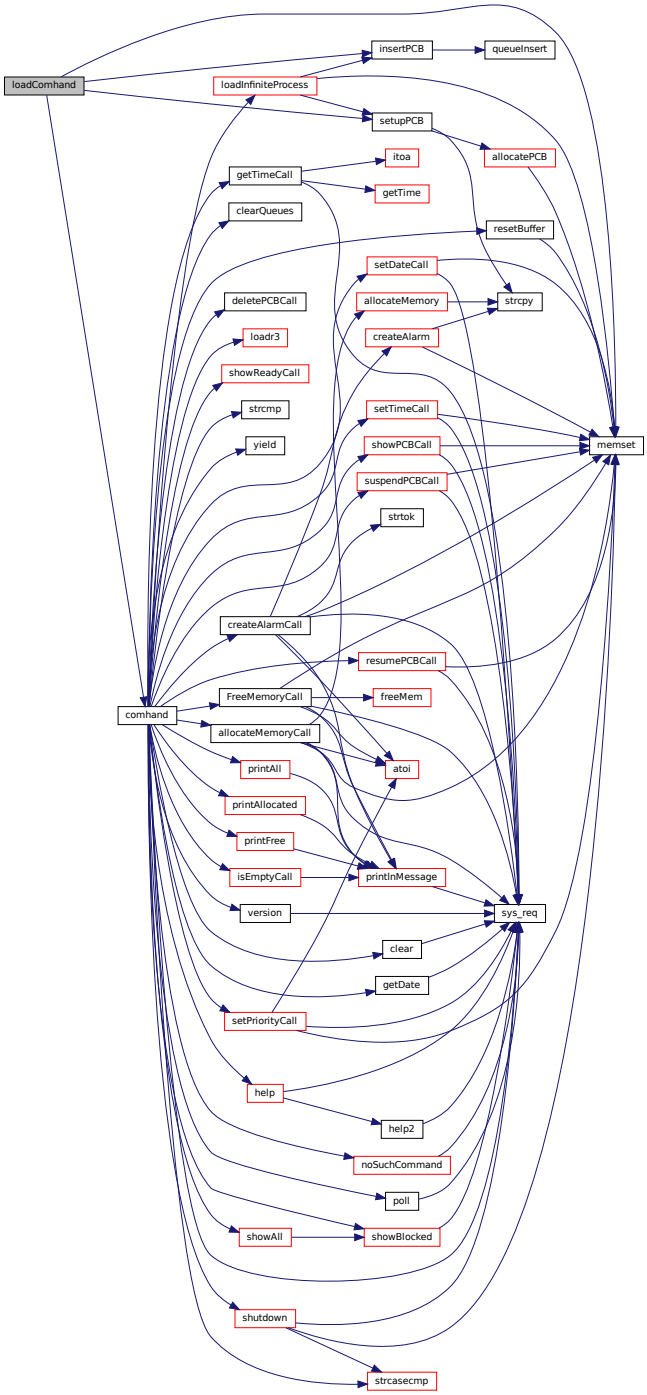
4.44.1.2 Function: loadComhand

Loads comhand as a system process with a high set priority.

Author

Bryce Williams

Here is the call graph for this function:



4.44.1.3 loadIdle()

```
void loadIdle ( )
```

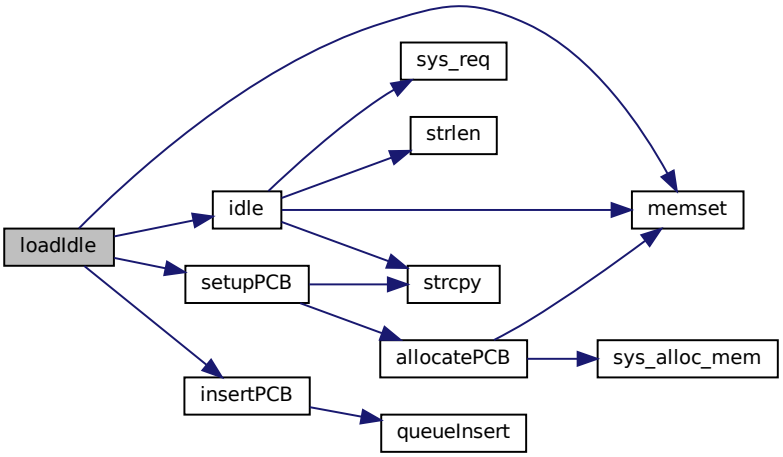
4.44.1.4 Function: loadIdle

Loads idle as a system process with a low set piority

Author

Bryce Williams

Here is the call graph for this function:



4.44.1.5 loadInfiniteProcess()

```
void loadInfiniteProcess ( )
```

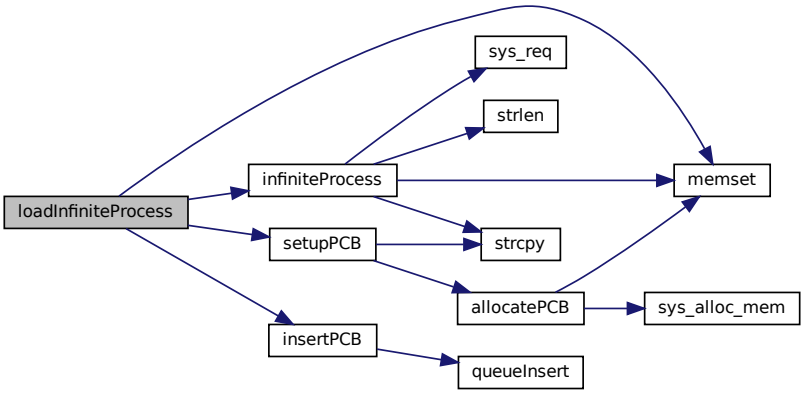
4.44.1.6 Function: loadInfiniteProcess

Loads an infinite process as an application with a low set priority.

Author

Brendan Michael

Here is the call graph for this function:



4.44.1.7 loadTimeDaemon()

```
void loadTimeDaemon ( )
```

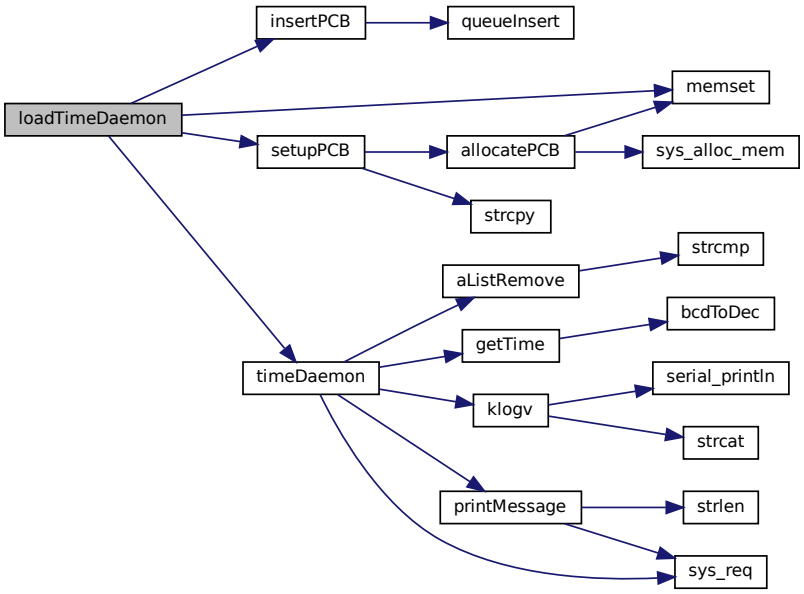
4.44.1.8 Function: loadTimeDaemon

Loads TimeDaemon as a system process with a high set priority.

Author

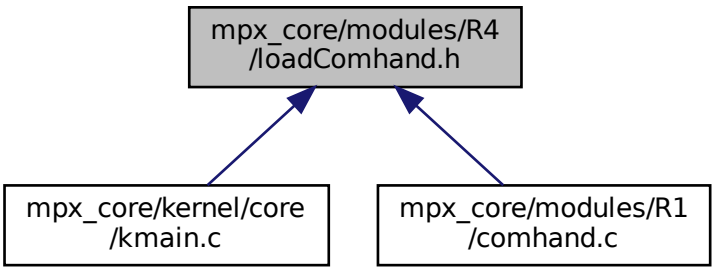
Bryce Williams

Here is the call graph for this function:



4.45 mpx_core/modules/R4/loadComhand.h File Reference

This graph shows which files directly or indirectly include this file:



Functions

- void loadComhand ()
- void loadIdle ()
- void loadTimeDaemon ()
- void loadInfiniteProcess ()

4.45.1 Function Documentation

4.45.1.1 loadComhand()

```
void loadComhand ( )
```

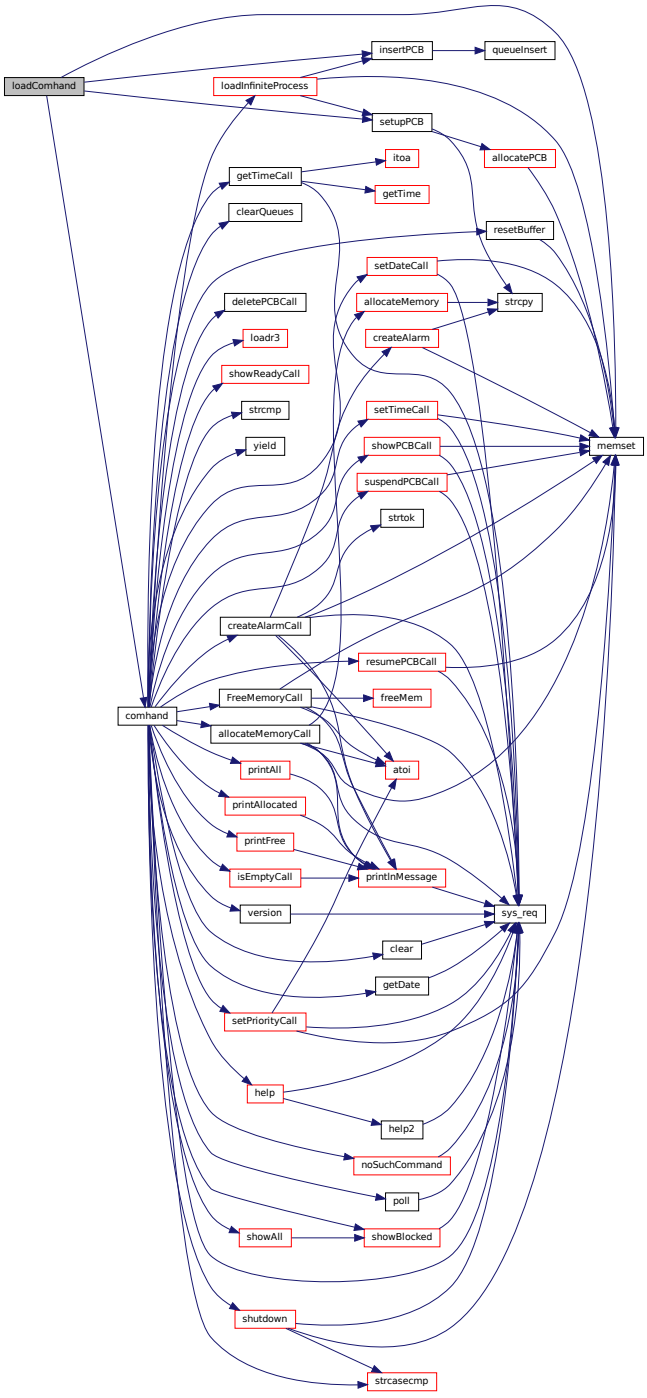
4.45.1.2 Function: loadComhand

Loads comhand as a system process with a high set priority.

Author

Bryce Williams

Here is the call graph for this function:



4.45.1.3 loadIdle()

```
void loadIdle ( )
```

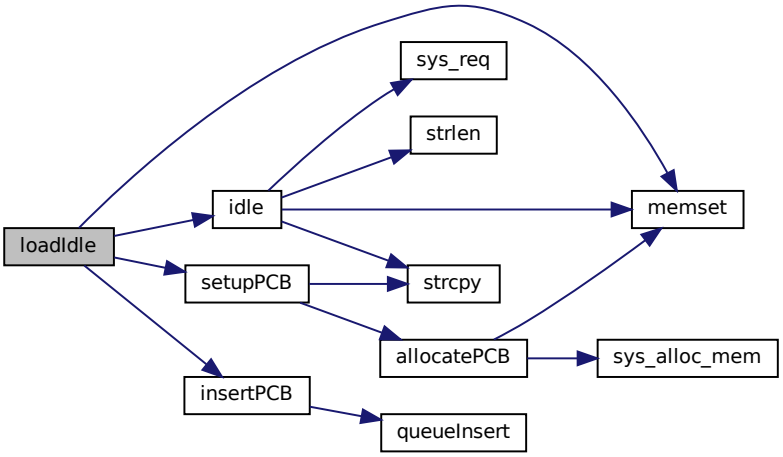
4.45.1.4 Function: loadIdle

Loads idle as a system process with a low set piority

Author

Bryce Williams

Here is the call graph for this function:



4.45.1.5 loadInfiniteProcess()

```
void loadInfiniteProcess ( )
```

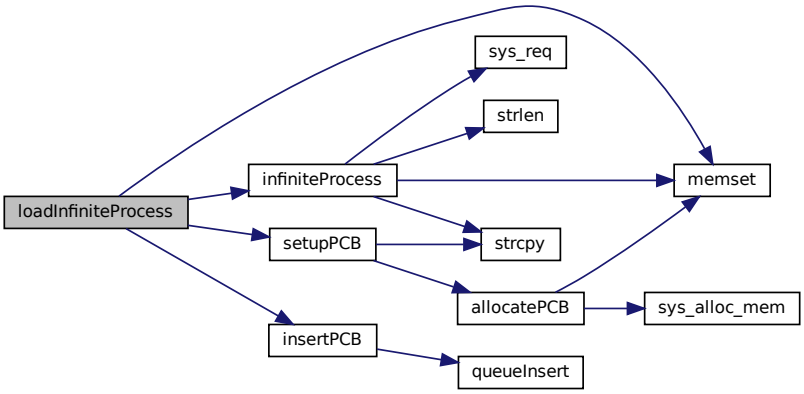
4.45.1.6 Function: loadInfiniteProcess

Loads an infinite process as an application with a low set priority.

Author

Brendan Michael

Here is the call graph for this function:



4.45.1.7 loadTimeDaemon()

```
void loadTimeDaemon ( )
```

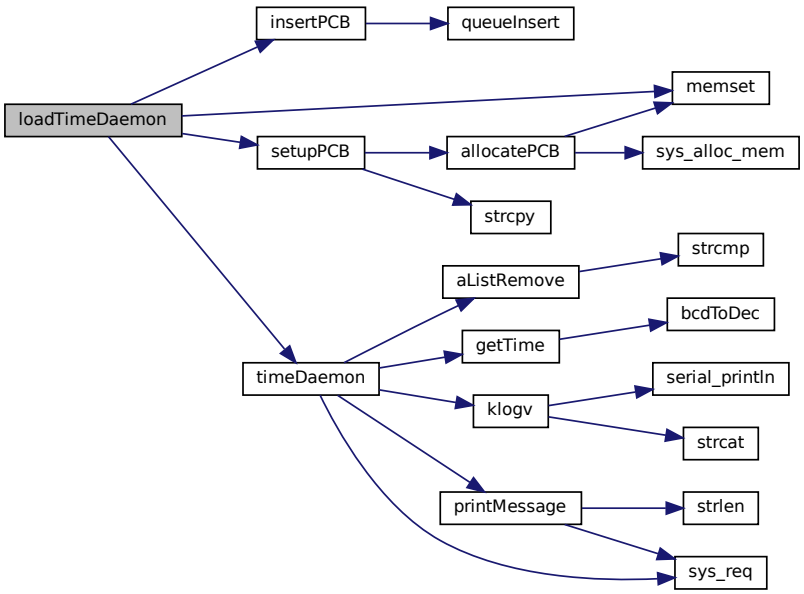
4.45.1.8 Function: loadTimeDaemon

Loads TimeDaemon as a system process with a high set priority.

Author

Bryce Williams

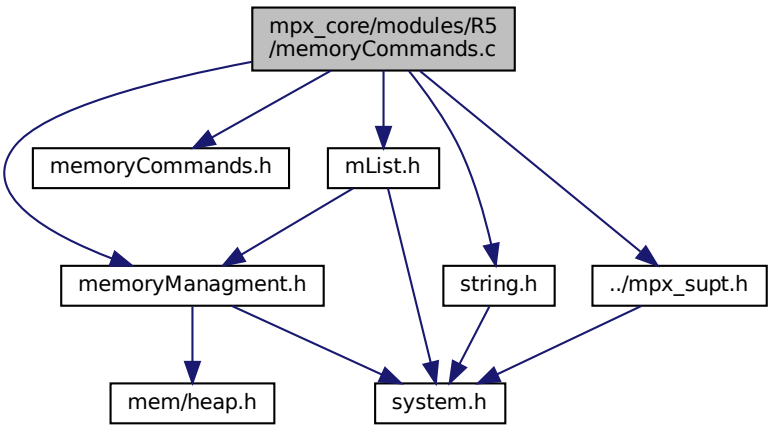
Here is the call graph for this function:



4.46 mpx_core/modules/R5/memoryCommands.c File Reference

```
#include "memoryManagment.h"
#include "memoryCommands.h"
#include "../mpx_supt.h"
#include <string.h>
#include "mList.h"
```

Include dependency graph for memoryCommands.c:



Functions

- void allocateMemoryCall ()
- void FreeMemoryCall ()
- void isEmptyCall ()

4.46.1 Function Documentation

4.46.1.1 allocateMemoryCall()

```
void allocateMemoryCall ( )
```

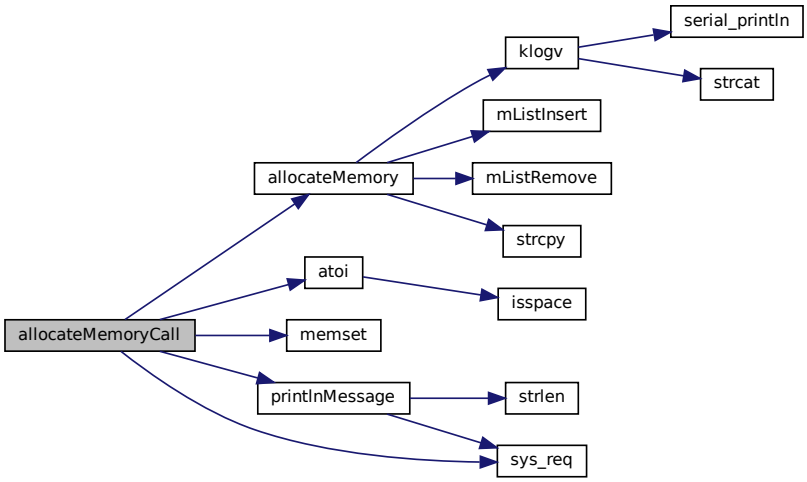
4.46.1.2 Function: allocateMemoryCall

Prompts the user for how much memory they will like to allocate, in bytes, and allocates it using the allocateMemory function(first fit)

Authors

Farhan Shahbaz

Here is the call graph for this function:



4.46.1.3 FreeMemoryCall()

```
void FreeMemoryCall ( )
```

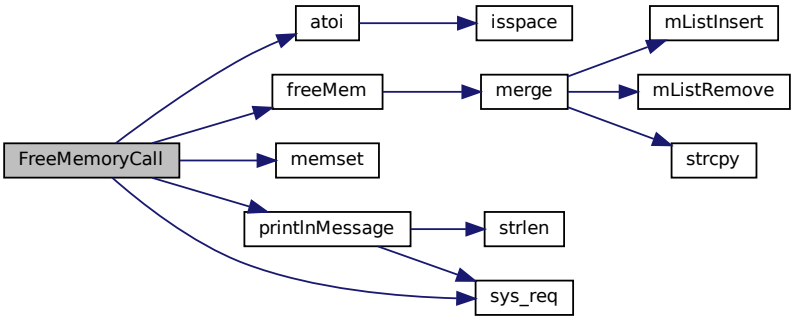
4.46.1.4 Function: freeMemoryCall

Prompts the user for which memory address they would like to free (has to be allocated), and frees it using the freeMem function

Authors

Farhan Shahbaz

Here is the call graph for this function:



4.46.1.5 isEmptyCall()

```
void isEmptyCall ( )
```

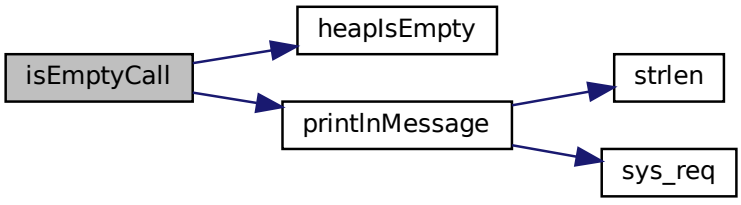
4.46.1.6 Function: isEmptyCall

Informs the user if the heap is empty

Authors

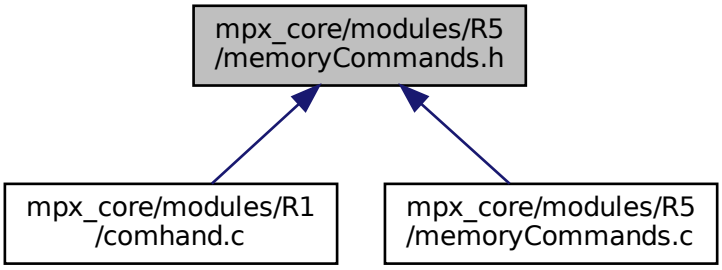
Selim Demircan

Here is the call graph for this function:



4.47 mpx_core/modules/R5/memoryCommands.h File Reference

This graph shows which files directly or indirectly include this file:



Functions

- void allocateMemoryCall ()
- void FreeMemoryCall ()
- void isEmptyCall ()

4.47.1 Function Documentation

4.47.1.1 allocateMemoryCall()

```
void allocateMemoryCall ( )
```

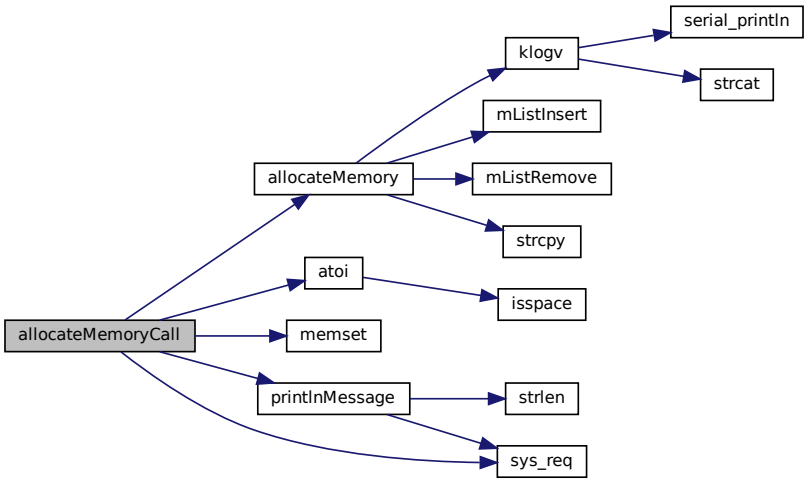
4.47.1.2 Function: allocateMemoryCall

Prompts the user for how much memory they will like to allocate, in bytes, and allocates it using the allocateMemory function(first fit)

Authors

Farhan Shahbaz

Here is the call graph for this function:



4.47.1.3 FreeMemoryCall()

```
void FreeMemoryCall ( )
```

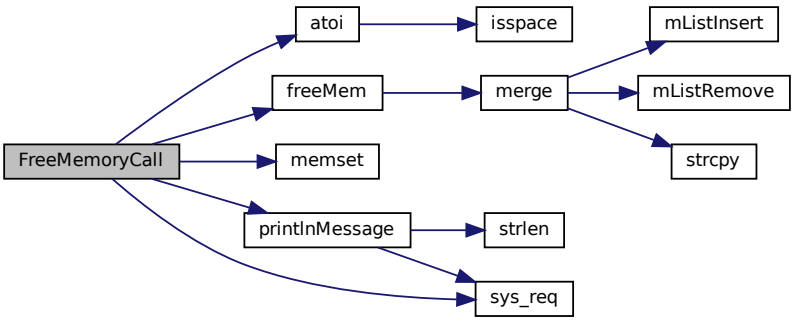
4.47.1.4 Function: freeMemoryCall

Prompts the user for which memory address they would like to free (has to be allocated), and frees it using the freeMem function

Authors

Farhan Shahbaz

Here is the call graph for this function:



4.47.1.5 isEmptyCall()

```
void isEmptyCall ( )
```

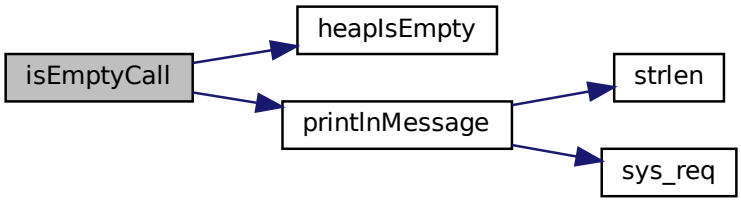
4.47.1.6 Function: isEmptyCall

Informs the user if the heap is empty

Authors

Selim Demircan

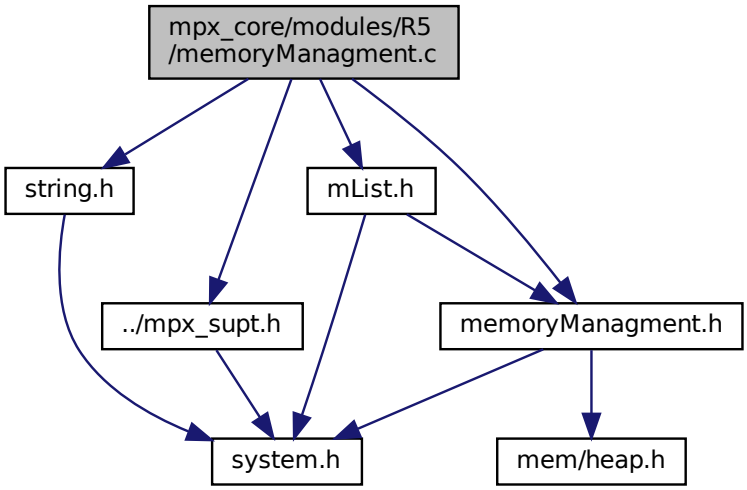
Here is the call graph for this function:



4.48 mpx_core/modules/R5/memoryManagment.c File Reference

```
#include "memoryManagment.h"
#include "../mpx_supt.h"
#include <string.h>
#include "mList.h"
```

Include dependency graph for memoryManagment.c:



Functions

- void createmList ()
- int initializeHeap (int size)
- u32int allocateMemory (u32int bytes)
- int freeMem (void *ptr)
- void merge (CMCB_t *current)
- int heapIsEmpty ()
- void printCMCB (CMCB_t *block)
- void printAllocated ()
- void printFree ()
- void printAll ()

Variables

- mList * MCBList
- void * heap_top = NULL

4.48.1 Function Documentation

4.48.1.1 allocateMemory()

```
u32int allocateMemory (
            u32int bytes )
```

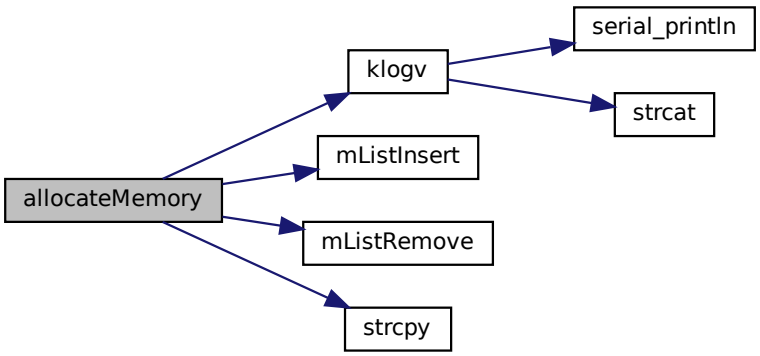
4.48.1.2 Function: allocateMemory

Allocates memory from the heap by taking in a specific amount of bytes. Uses the first fit method for the memory blocks

Authors

Brenden Michael, Farhan Shahbaz

Here is the call graph for this function:



4.48.1.3 createmList()

```
void createmList ( )
```

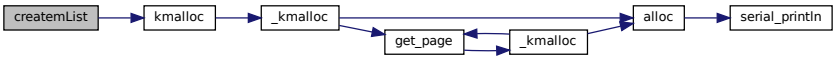
4.48.1.4 Function: createmList

Initializes MCBList. Allocates the memory, sets head and tail to null, and sets count to 0.

Authors

Brendan Michael

Here is the call graph for this function:



4.48.1.5 freeMem()

```
int freeMem (
            void * ptr )
```

4.48.1.6 Function: freeMem

Frees up memory specified by the address of ptr. Returns 0 if the address does not exist or the block is already free.Returns 1 if succesfully freed.

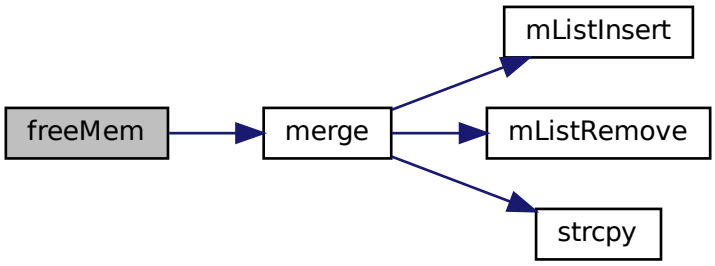
Parameters

ptr-	Pointer to memory location that needs to be freed.

Authors

Bryce Williams

Here is the call graph for this function:



4.48.1.7 heapIsEmpty()

```
int heapIsEmpty ( )
```

4.48.1.8 Function: heapIsEmpty

Checks to see if the heap is empty. Returns 0 for false and 1 for true

Authors

Farhan Shahbaz

4.48.1.9 initializeHeap()

```
int initializeHeap (
            int size )
```

4.48.1.10 Function: initializeHeap

Allocates the heap memory specified by the parameter size using kmalloc.

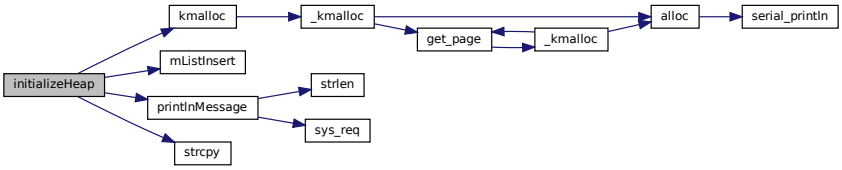
Parameters

size-	The size of the heap in bytes.

Authors

Bryce Williams

Here is the call graph for this function:



4.48.1.11 merge()

```
void merge (
            CMCB_t * current )
```

4.48.1.12 Function: merge

Merges the memory specified by current with the rest of the free memory if possible.

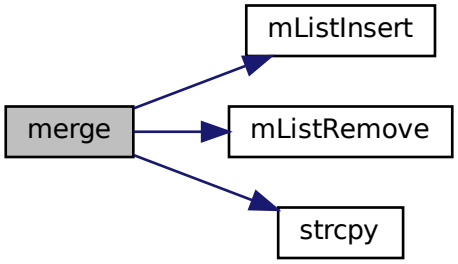
Parameters

current-	pointer to the memory address that needs to be merged.

Authors

Brendan Michael

Here is the call graph for this function:



4.48.1.13 printAll()

```
void printAll ( )
```

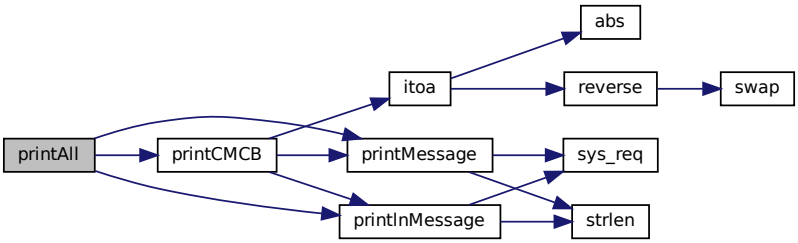
4.48.1.14 Function: printAll

Prints allocated and free blocks of memory.

Authors

Selim Demircan

Here is the call graph for this function:



4.48.1.15 printAllocated()

```
void printAllocated ( )
```

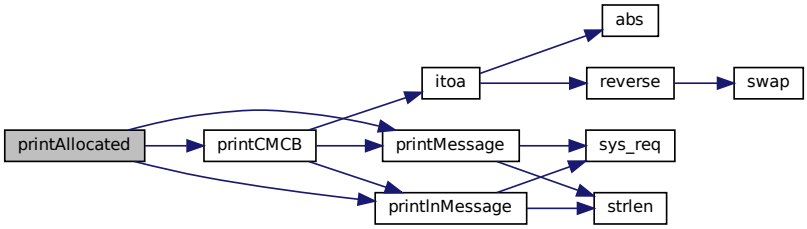
4.48.1.16 Function: printAllocated

Prints all allocated blocks of memory.

Authors

Selim Demircan

Here is the call graph for this function:



4.48.1.17 printCMCB()

```
void printCMCB (
            CMCB_t * block )
```

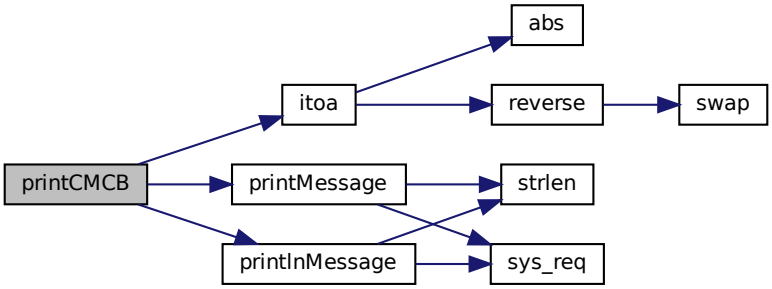
4.48.1.18 Function: printCMCB

Prints the block information and block address. Takes the pointer to the memory block.

Authors

Selim Demircan

Here is the call graph for this function:



4.48.1.19 printFree()

```
void printFree ( )
```

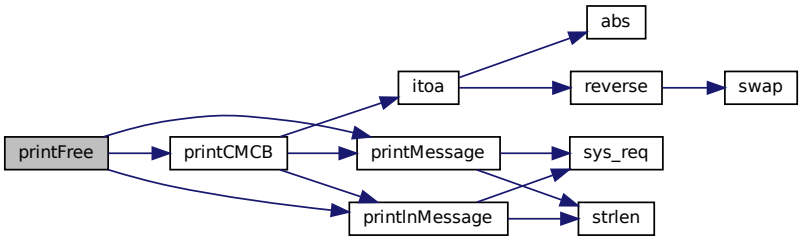
4.48.1.20 Function: printFree

Prints all free blocks of memory.

Authors

Selim Demircan

Here is the call graph for this function:



4.48.2 Variable Documentation

4.48.2.1 heap_top

```
void* heap_top = NULL
```

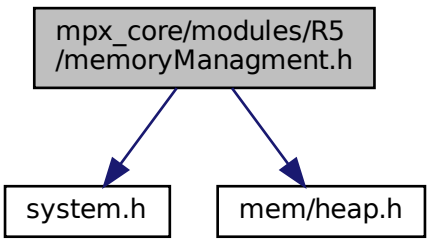
4.48.2.2 MCBList

```
mList* MCBList
```

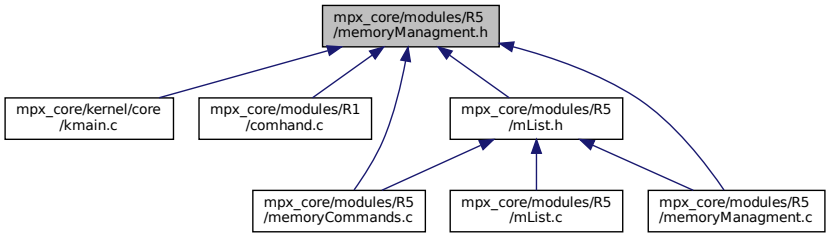
4.49 mpx_core/modules/R5/memoryManagment.h File Reference

```
#include <system.h>
#include <mem/heap.h>
```

Include dependency graph for memoryManagment.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct CMCB_s
- struct LMCB_s

Macros

- #define HEAP_SIZE 50000
- #define FREE_MEMORY 1
- #define ALLOCATED_MEMORY 2

Typedefs

- typedef struct CMCB_s CMCB_t
- typedef struct LMCB_s LMCB_t

Functions

- int heapIsEmpty ()
- int initializeHeap (int size)
- void merge (CMCB_t *current)
- u32int allocateMemory (u32int bytes)
- int freeMem (void *ptr)
- void printCMCB (CMCB_t *block)
- void printAllocated ()
- void printFree ()
- void createmList ()
- void printAll ()

4.49.1 Macro Definition Documentation

4.49.1.1 ALLOCATED_MEMORY

```
#define ALLOCATED_MEMORY 2
```

4.49.1.2 FREE_MEMORY

```
#define FREE_MEMORY 1
```

4.49.1.3 HEAP_SIZE

```
#define HEAP_SIZE 50000
```

4.49.2 Typedef Documentation

4.49.2.1 CMCB_t

```
typedef struct CMCB_s CMCB_t
```

4.49.2.2 LMCB_t

```
typedef struct LMCB_s LMCB_t
```

4.49.3 Function Documentation

4.49.3.1 allocateMemory()

```
u32int allocateMemory (
            u32int bytes )
```

4.49.3.2 Function: allocateMemory

Allocates a memory block of the desired size. Uses the first fit strategy, the first first free memory block with a large enough size is the one allocated.

Parameters

u32int	bytes: The requested block size

Returns

u32int: returns the address of the allocated block

Author

Brendan Michael

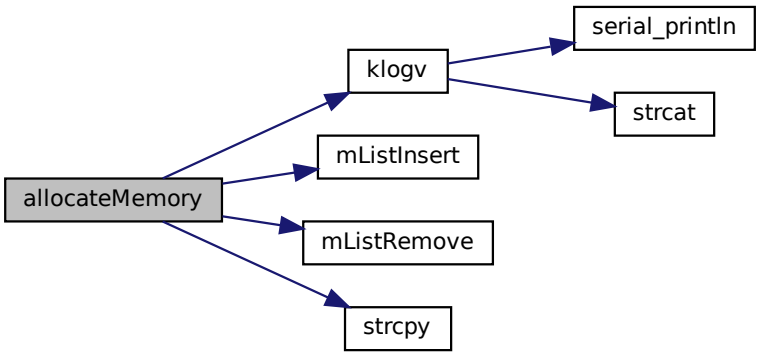
4.49.3.3 Function: allocateMemory

Allocates memory from the heap by taking in a specific amount of bytes. Uses the first fit method for the memory blocks

Authors

Brenden Michael, Farhan Shahbaz

Here is the call graph for this function:



4.49.3.4 createmList()

```
void createmList ( )
```

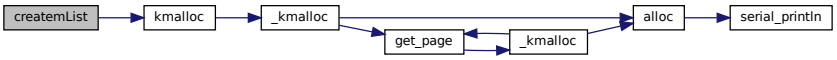
4.49.3.5 Function: createmList

Initializes MCBList. Allocates the memory, sets head and tail to null, and sets count to 0.

Authors

Brendan Michael

Here is the call graph for this function:



4.49.3.6 freeMem()

```
int freeMem (
            void * ptr )
```

4.49.3.7 Function: freeMem

Frees the memory at a given address. Calls merge to combine the freed block with adjacent free blocks.

Parameters

void	∗ptr: Memory address of block to be freed

Returns

int: returns 1 is sucessful 0 otherwise

Author

Brendan Michael

4.49.3.8 Function: freeMem

Frees up memory specified by the address of ptr. Returns 0 if the address does not exist or the block is already free.Returns 1 if succesfully freed.

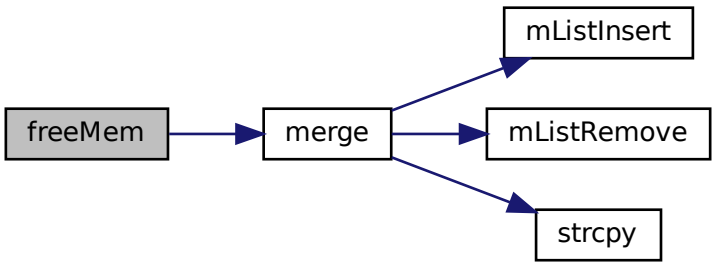
Parameters

ptr-	Pointer to memory location that needs to be freed.

Authors

Bryce Williams

Here is the call graph for this function:



4.49.3.9 heapIsEmpty()

```
int heapIsEmpty ( )
```

4.49.3.10 Function: heapIsEmpty

Searches the memory list and returns 1 if no allocated blocks are found in it. @ param int size: size of desired heap @ return int: returns 1 if empty 0 otherwise

Author

Brendan Michael

4.49.3.11 Function: heapIsEmpty

Checks to see if the heap is empty. Returns 0 for false and 1 for true

Authors

Farhan Shahbaz

4.49.3.12 initializeHeap()

```
int initializeHeap (
            int size )
```

4.49.3.13 Function: initializeHeap

Initializes the heap that stores memory blocks. Inserts a single CMCB that represents the free memory allocated for the heap. @ param int size: size of desired heap @ return int: returns 1 if sucessful 0 otherwise

Author

Brendan Michael

4.49.3.14 Function: initializeHeap

Allocates the heap memory specified by the parameter size using kmalloc.

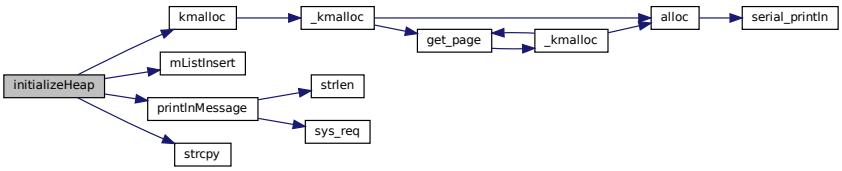
Parameters

size-	The size of the heap in bytes.

Authors

Bryce Williams

Here is the call graph for this function:



4.49.3.15 merge()

```
void merge (
            CMCB_t * current )
```

4.49.3.16 Function: merge

Merges the just freed memory block with adjacent free memory blocks. Merged blocks are removed from the memory list. @ param CMCB_t ∗current: the just freed memory block to be merged

Author

Brendan Michael

4.49.3.17 Function: merge

Merges the memory specified by current with the rest of the free memory if possible.

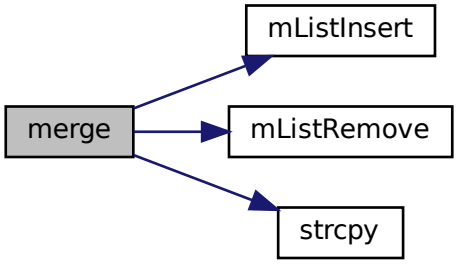
Parameters

current-	pointer to the memory address that needs to be merged.

Authors

Brendan Michael

Here is the call graph for this function:



4.49.3.18 printAll()

```
void printAll ( )
```

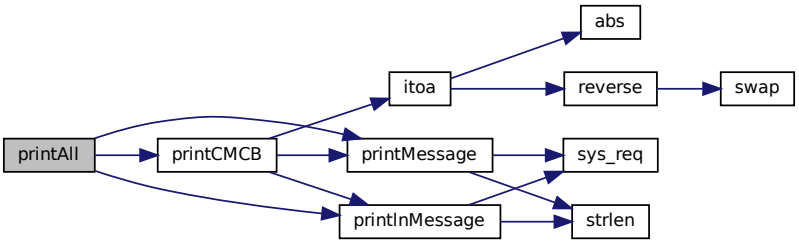
4.49.3.19 Function: printAll

Prints allocated and free blocks of memory.

Authors

Selim Demircan

Here is the call graph for this function:



4.49.3.20 printAllocated()

```
void printAllocated ( )
```

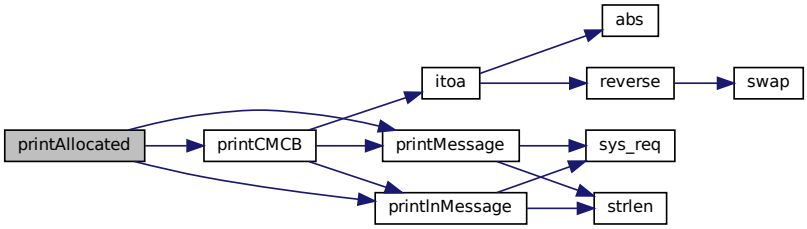
4.49.3.21 Function: printAllocated

Prints all allocated blocks of memory.

Authors

Selim Demircan

Here is the call graph for this function:



4.49.3.22 printCMCB()

```
void printCMCB (
            CMCB_t * block )
```

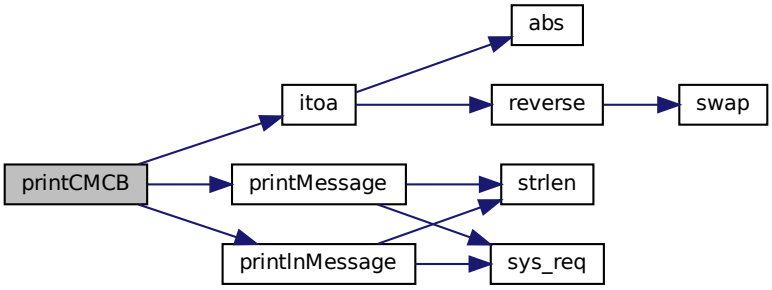
4.49.3.23 Function: printCMCB

Prints the block information and block address. Takes the pointer to the memory block.

Authors

Selim Demircan

Here is the call graph for this function:



4.49.3.24 printFree()

```
void printFree ( )
```

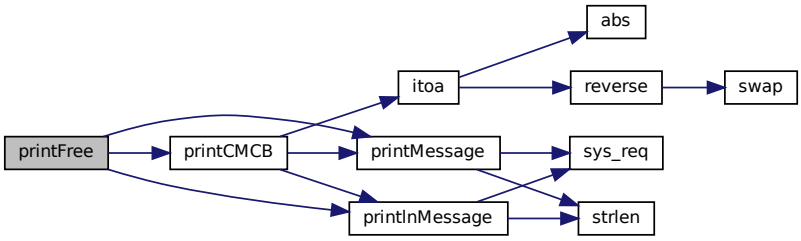
4.49.3.25 Function: printFree

Prints all free blocks of memory.

Authors

Selim Demircan

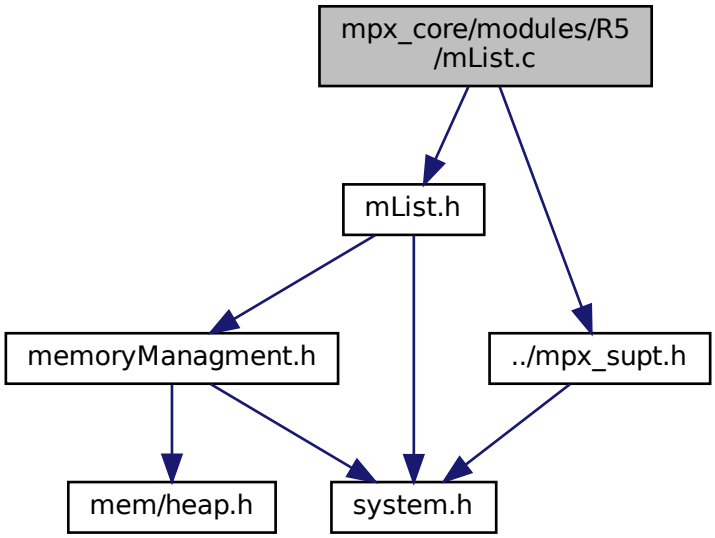
Here is the call graph for this function:



4.50 mpx_core/modules/R5/mList.c File Reference

```
#include "mList.h"
#include "../mpx_supt.h"
```

Include dependency graph for mList.c:



Functions

- int mListInsert (mList *q, CMCB_t *cmcb)
- int mListRemove (mList *q, CMCB_t *cmcb)

4.50.1 Function Documentation

4.50.1.1 mListInsert()

```
int mListInsert (
            mList * q,
            CMCB_t * cmcb )
```

4.50.1.2 Function: mListInsert

Inserts cmcb block into the list specified by q.

Parameters

q-Pointer	to the list.
cmcb-	Pointer to the cmcb block to be inserted into the list.

Authors

Bryce Williams

4.50.1.3 mListRemove()

```
int mListRemove (
            mList * q,
            CMCB_t * cmcb )
```

4.50.1.4 Function: mListInsert

Removes cmcb block from the list specified by q.

Parameters

q-Pointer	to the list.
cmcb-	Pointer to the cmcb block to be removed from the list.

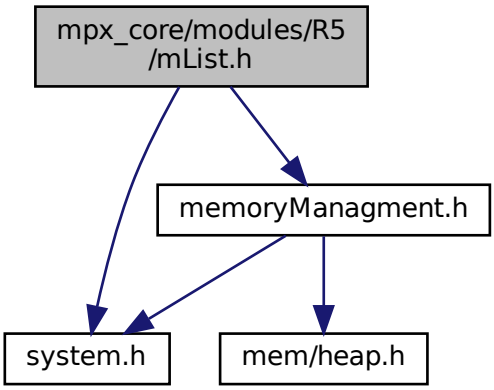
Authors

Bryce Williams

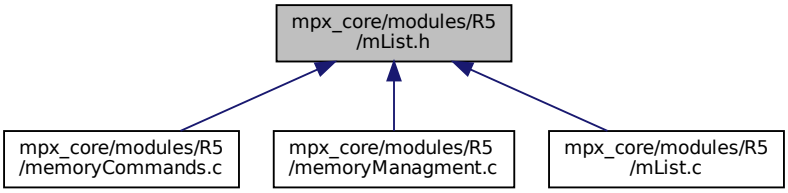
4.51 mpx_core/modules/R5/mList.h File Reference

```
#include "memoryManagment.h"
#include <system.h>
```

Include dependency graph for mList.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct mList

Typedefs

- typedef struct mList mList

Functions

- int mListInsert (mList *q, CMCB_t *pcb)
- int mListRemove (mList *q, CMCB_t *pcb)

4.51.1 Typedef Documentation

4.51.1.1 mList

```
typedef struct mList mList
```

4.51.2 Function Documentation

4.51.2.1 mListInsert()

```
int mListInsert (
            mList * q,
            CMCB_t * cmcb )
```

4.51.2.2 Function: mListInsert

Inserts cmcb block into the list specified by q.

Parameters

q-Pointer	to the list.
cmcb-	Pointer to the cmcb block to be inserted into the list.

Authors

Bryce Williams

4.51.2.3 mListRemove()

```
int mListRemove (
            mList * q,
            CMCB_t * cmcb )
```

4.51.2.4 Function: mListInsert

Removes cmcb block from the list specified by q.

Parameters

q-Pointer	to the list.
cmcb-	Pointer to the cmcb block to be removed from the list.

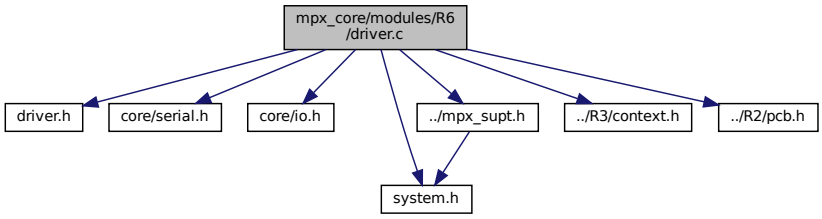
Authors

Bryce Williams

4.52 mpx_core/modules/R6/driver.c File Reference

```
#include "driver.h"
#include <core/serial.h>
#include <core/io.h>
#include "system.h"
#include "../mpx_supt.h"
#include "../R3/context.h"
#include "../R2/pcb.h"
```

Include dependency graph for driver.c:



Functions

- void disable_interrupts ()
- void enable_interrupts ()
- void pic_mask (char enable)
- int com_open (int *e_flag, int baud_rate)
- int com_close (void)
- int com_read (char *buf_ptr, int *count_ptr)
- int com_write (char *buf_ptr, int *count_ptr)
- void serial_io ()
- void serial_write ()
- void serial_read ()

Variables

- dcb_t * DCB

4.52.1 Function Documentation

4.52.1.1 com_close()

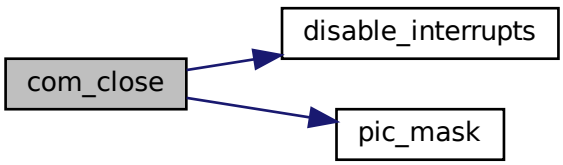
```
int com_close (
            void  )
```

+* com_close() Closes the communication port. +*

Returns

error code if port was not open, or a 0 for successful operation

Here is the call graph for this function:



4.52.1.2 com_open()

```
int com_open (
            int * e_flag,
            int baud_rate )
```

+∗ com_open() Opens the communication port. +∗

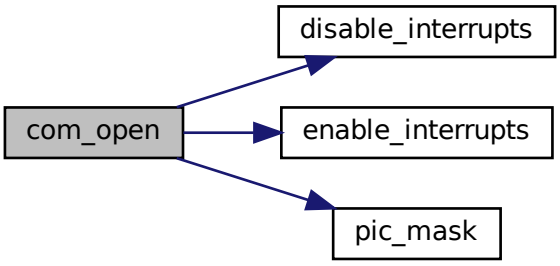
Parameters

e_flag	event flag will be set to 1 if read/write +∗
baud_rate	the desired baud rate +∗

Returns

Returns three possible error codes, or a 0 for successful operation.

Here is the call graph for this function:



4.52.1.3 com_read()

```
int com_read (
            char * buf_ptr,
            int * count_ptr )
```

+∗ com_read() Reads the buffer from the port. Non-blocking. +∗

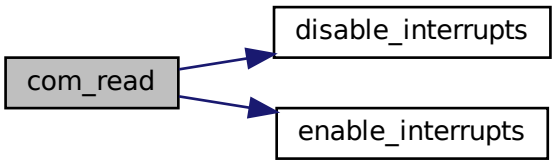
Parameters

buf_ptr	buffer in which the read characters will be stored. +∗
count_ptr	the maximum number of bytes to read. After completion, +∗ this will contain the number of characters read. +∗

Returns

Returns four possible error codes, or a 0 for successful operation.

Here is the call graph for this function:



4.52.1.4 com_write()

```
int com_write (
            char * buf_ptr,
            int * count_ptr )
```

+∗ com_write() Writes the buffer to the port. Non-blocking. +∗

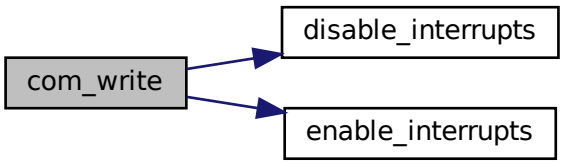
Parameters

buf_ptr	buffer in which the characters to write are stored. +∗
count_ptr	the number of characters from the buffer to write. +∗

Returns

Returns four possible error codes, or a 0 for successful operation.

Here is the call graph for this function:



4.52.1.5 disable_interrupts()

```
void disable_interrupts ( )
```

+∗ disable_interrupts() disables all interrupts to device.

4.52.1.6 enable_interrupts()

```
void enable_interrupts ( )
```

+∗ enable_interrupts() enables interrupts to device.

4.52.1.7 pic_mask()

```
void pic_mask (
            char enable )
```

+∗ pic_mask() masks so only the desired PIC interrupt is enabled or disabled. +∗

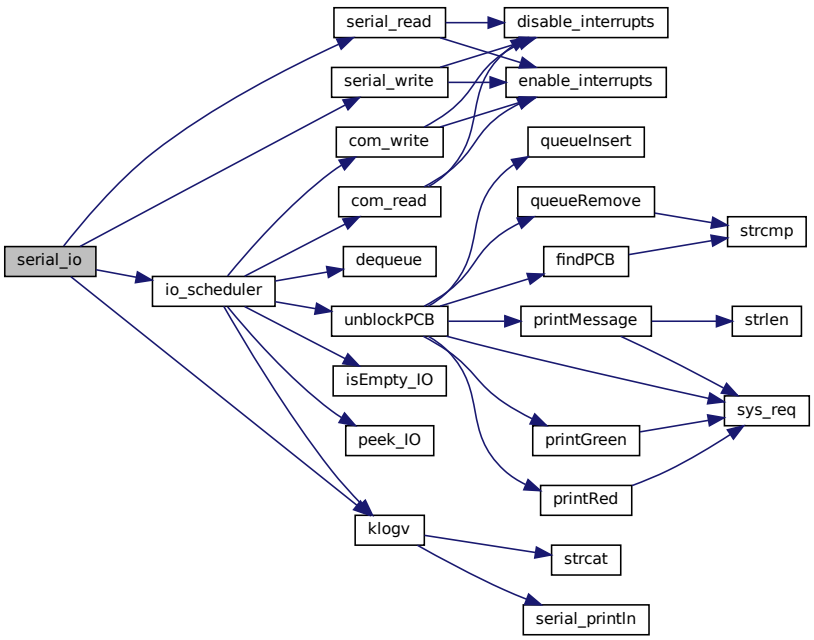
Parameters

enable	1 to enable or 0 to disable.

4.52.1.8 serial_io()

```
void serial_io ( )
```

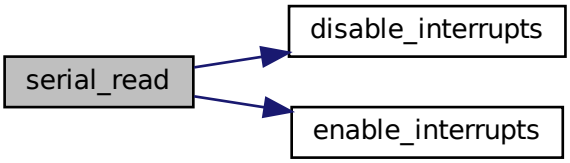
+∗ serial_io() is the interrupt C routine for serial IO. Here is the call graph for this function:



4.52.1.9 serial_read()

```
void serial_read ( )
```

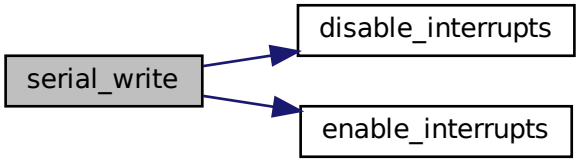
+∗ serial_read() provides interrupt routine for reading IO. Here is the call graph for this function:



4.52.1.10 serial_write()

```
void serial_write ( )
```

+∗ serial_write() provides interrupt routine for writing IO. Here is the call graph for this function:



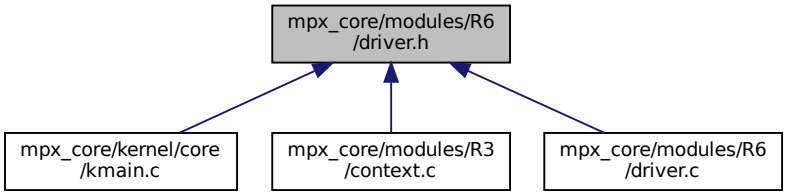
4.52.2 Variable Documentation

4.52.2.1 DCB

```
dcb_t* DCB
```

4.53 mpx_core/modules/R6/driver.h File Reference

This graph shows which files directly or indirectly include this file:



Data Structures

- struct dcb_s

Macros

- #define PIC_REG 0x20
- #define PIC_EOI 0x20
- #define PIC_MASK 0x21
- #define IRQ_COM1 0x10
- #define REG_RHR 0
- #define REG_THR 0
- #define REG_LSB 0
- #define REG_MSB 1
- #define REG_IER 1
- #define REG_IIR 2
- #define REG_LCR 3
- #define REG_MCR 4
- #define REG_LSR 5
- #define REG_MSR 6
- #define REG_SCRATCH 7

Typedefs

- typedef enum status_t status_t
- typedef struct dcb_s dcb_t

Enumerations

- enum status_t { STATUS_IDLE, STATUS_READING, STATUS_WRITING }

Functions

- void pic_mask (char enable)
- void disable_interrupts ()
- void enable_interrupts ()
- int com_open (int *e_flag, int baud_rate)
- int com_close (void)
- int com_read (char *buf_ptr, int *count_ptr)
- int com_write (char *buf_ptr, int *count_ptr)

- void serial_io ()
- void serial_write ()
- void serial_read ()

4.53.1 Macro Definition Documentation

4.53.1.1 IRQ_COM1

```
#define IRQ_COM1 0x10
```

4.53.1.2 PIC_EOI

```
#define PIC_EOI 0x20
```

4.53.1.3 PIC_MASK

```
#define PIC_MASK 0x21
```

4.53.1.4 PIC_REG

```
#define PIC_REG 0x20
```

4.53.1.5 REG_IER

```
#define REG_IER 1
```

4.53.1.6 REG_IIR

```
#define REG_IIR 2
```

4.53.1.7 REG_LCR

```
#define REG_LCR 3
```

4.53.1.8 REG_LSB

```
#define REG_LSB 0
```

4.53.1.9 REG_LSR

```
#define REG_LSR 5
```

4.53.1.10 REG_MCR

```
#define REG_MCR 4
```

4.53.1.11 REG_MSB

```
#define REG_MSB 1
```

4.53.1.12 REG_MSR

```
#define REG_MSR 6
```

4.53.1.13 REG_RHR

```
#define REG_RHR 0
```

4.53.1.14 REG_SCRATCH

```
#define REG_SCRATCH 7
```

4.53.1.15 REG_THR

```
#define REG_THR 0
```

4.53.2 Typedef Documentation

4.53.2.1 dcb_t

```
typedef struct dcb_s dcb_t
```

+∗ struct dcb represents a Device Control Block. +∗ A dcb should exist for each COM port, but you can just use COM1 +∗

Parameters

com_port	the COM port. (You can omit this and just always use COM1) +∗
port_open	whether the COM is open. +∗
e_flag	whether the operation has completed (0 or 1). +∗
status	the different operations (IDLE, READ, WRITE). +∗
buffer_ptr	the buffer array to read into/write from. +∗
count_ptr	how many characters to read/write. +∗
buffer_loc	the current location we are reading/writing at. +∗
byte_count	the number of bytes that have been read/written so far.

4.53.2.2 status_t

```
typedef enum status_t status_t
```

+∗ enum for the possible dcb states.

4.53.3 Enumeration Type Documentation

4.53.3.1 status_t

```
enum status_t
```

+∗ enum for the possible dcb states.

Enumerator

STATUS_IDLE	Port is idle
STATUS_READING	Port is reading
STATUS_WRITING	Port is writing

4.53.4 Function Documentation

4.53.4.1 com_close()

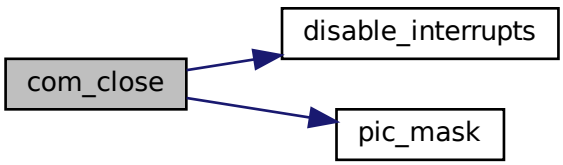
```
int com_close (
            void  )
```

+∗ com_close() Closes the communication port. +∗

Returns

error code if port was not open, or a 0 for successful operation

Here is the call graph for this function:



4.53.4.2 com_open()

```
int com_open (
            int * e_flag,
            int baud_rate )
```

+∗ com_open() Opens the communication port. +∗

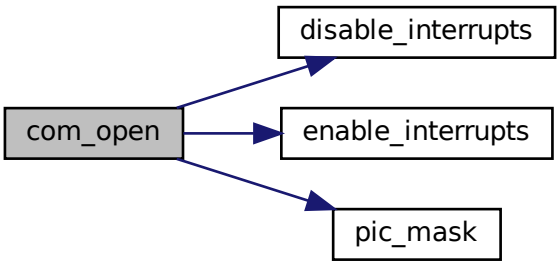
Parameters

e_flag	event flag will be set to 1 if read/write +∗
baud_rate	the desired baud rate +∗

Returns

Returns three possible error codes, or a 0 for successful operation.

Here is the call graph for this function:



4.53.4.3 com_read()

```
int com_read (
            char * buf_ptr,
            int * count_ptr )
```

+∗ com_read() Reads the buffer from the port. Non-blocking. +∗

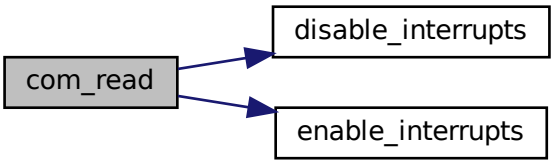
Parameters

buf_ptr	buffer in which the read characters will be stored. +∗
count_ptr	the maximum number of bytes to read. After completion, +∗ this will contain the number of characters read. +∗

Returns

Returns four possible error codes, or a 0 for successful operation.

Here is the call graph for this function:



4.53.4.4 com_write()

```
int com_write (
            char * buf_ptr,
            int * count_ptr )
```

+∗ com_write() Writes the buffer to the port. Non-blocking. +∗

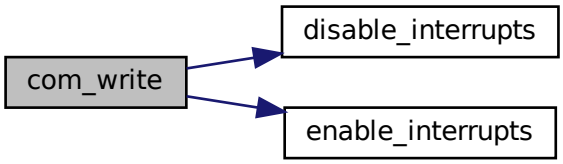
Parameters

buf_ptr	buffer in which the characters to write are stored. +∗
count_ptr	the number of characters from the buffer to write. +∗

Returns

Returns four possible error codes, or a 0 for successful operation.

Here is the call graph for this function:



4.53.4.5 disable_interrupts()

```
void disable_interrupts ( )
```

+∗ disable_interrupts() disables all interrupts to device.

4.53.4.6 enable_interrupts()

```
void enable_interrupts ( )
```

+∗ enable_interrupts() enables interrupts to device.

4.53.4.7 pic_mask()

```
void pic_mask (
            char enable )
```

+∗ pic_mask() masks so only the desired PIC interrupt is enabled or disabled. +∗

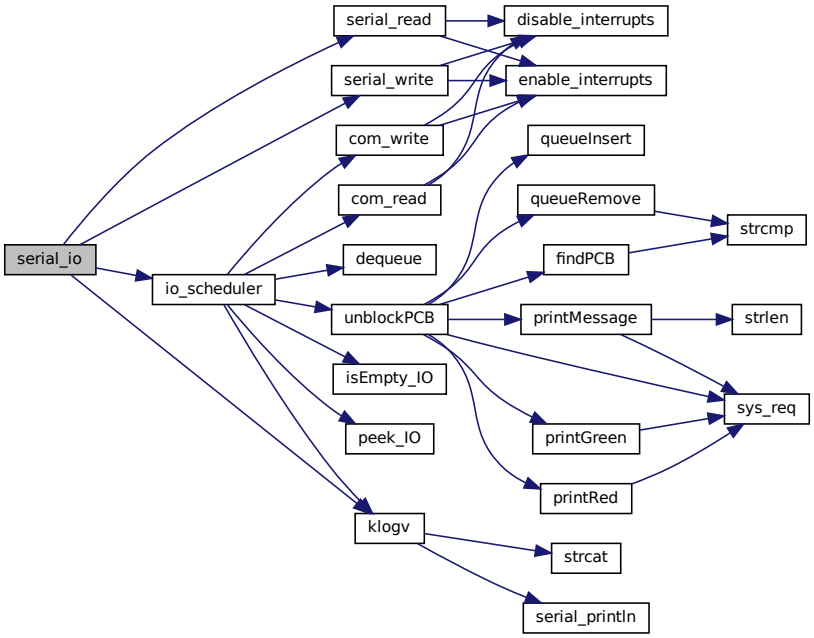
Parameters

enable	1 to enable or 0 to disable.

4.53.4.8 serial_io()

```
void serial_io ( )
```

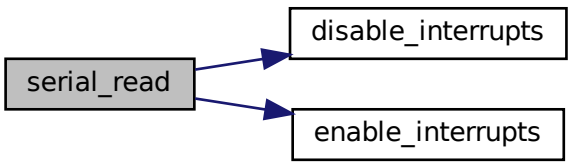
+∗ serial_io() is the interrupt C routine for serial IO. Here is the call graph for this function:



4.53.4.9 serial_read()

```
void serial_read ( )
```

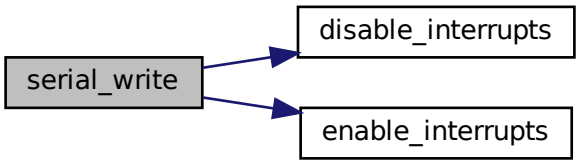
+∗ serial_read() provides interrupt routine for reading IO. Here is the call graph for this function:



4.53.4.10 serial_write()

```
void serial_write ( )
```

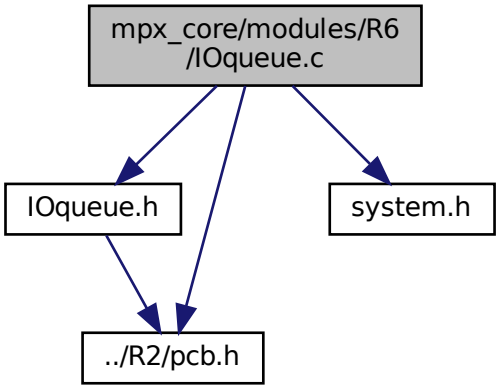
+∗ serial_write() provides interrupt routine for writing IO. Here is the call graph for this function:



4.54 mpx_core/modules/R6/IOqueue.c File Reference

```
#include "IOqueue.h"
#include <system.h>
#include "../R2/pcb.h"
```

Include dependency graph for IOqueue.c:



Functions

- void enqueue (ioqueue_t ∗queue, iod_t ∗item)
- iod_t ∗ dequeue (ioqueue_t ∗queue)
- iod_t ∗ peek_IO (ioqueue_t ∗queue)
- int isEmpty_IO (ioqueue_t ∗queue)

Variables

- ioqueue_t ioqueue ={NULL,NULL,0}

4.54.1 Function Documentation

4.54.1.1 dequeue()

```
iod_t* dequeue (
              ioqueue_t * queue )
```

4.54.1.2 enqueue()

```
void enqueue (
              ioqueue_t * queue,
              iod_t * item )
```

4.54.1.3 isEmpty_IO()

```
int isEmpty_IO (
              ioqueue_t * queue )
```

4.54.1.4 peek_IO()

```
iod_t* peek_IO (
              ioqueue_t * queue )
```

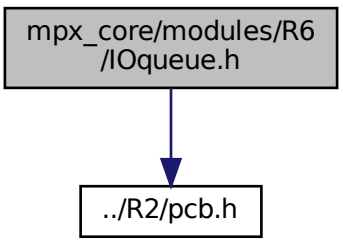
4.54.2 Variable Documentation

4.54.2.1 ioqueue

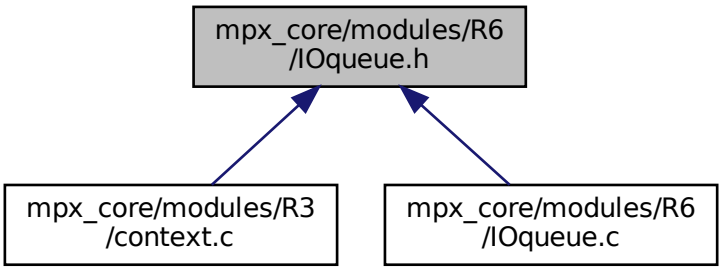
```
ioqueue_t ioqueue ={NULL,NULL,0}
```

4.55 mpx_core/modules/R6/IOqueue.h File Reference

```
#include "../R2/pcb.h"
```
Include dependency graph for IOqueue.h:



This graph shows which files directly or indirectly include this file:



Data Structures

- struct iod_s
- struct ioqueue_s

Typedefs

- typedef struct iod_s iod_t
- typedef struct ioqueue_s ioqueue_t

Functions

- void enqueue (ioqueue_t *queue, iod_t *item)
- iod_t * dequeue (ioqueue_t *queue)
- iod_t * peek_IO (ioqueue_t *queue)
- int isEmpty_IO (ioqueue_t *queue)

4.55.1 Typedef Documentation

4.55.1.1 iod_t

```
typedef struct iod_s iod_t
```

4.55.1.2 ioqueue_t

```
typedef struct ioqueue_s ioqueue_t
```

4.55.2 Function Documentation

4.55.2.1 dequeue()

```
iod_t* dequeue (
            ioqueue_t * queue )
```

4.55.2.2 enqueue()

```
void enqueue (
            ioqueue_t * queue,
            iod_t * item )
```

4.55.2.3 isEmpty_IO()

```
int isEmpty_IO (
            ioqueue_t * queue )
```

4.55.2.4 peek_IO()

```
iod_t* peek_IO (
            ioqueue_t * queue )
```

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