MPX Thunder Krakens

R6

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Contents

Chapter 1

Main Page

Welcome to the Programmer's manual for the Thunder Kracken's MPX Operating system. This document catalogues all of the information one may need to know regarding the use and modification of this Operating system and its contents. Included is a complete API of every method created for the operating system which includes all inputs and outputs as well as a brief summary of the purpose of each method. This will give you a more in depth look at all of the ordinary user commands as well as the internal commands used to perform functions that normal users cannot access. Most likely these commands will be the most important for making new programs on the operating system. This document also lists the documentation for the files files in the operating system. This includes all of the variables and methods used in each file. These will help direct you as to where certain functions are defined. For general usage tips, please refer to the user manual. We hope you find working with the Thunder Kracken's MPX Operating System as enjoyable as we do and we thank you for using our product.

Chapter 2

Data Structure Index

2.1 Data Structures

Here are the data structures with brief descriptions:

Chapter 3

File Index

3.1 File List

Here is a list of all files with brief descriptions:

Chapter 4

Data Structure Documentation

4.1 cmcb Struct Reference

Complete Memory Control Block Struct.

Data Fields

- enum mcb_type type

  Type indicating free or allocated.
- void * begin_address

  Beginning address.
- u32int size

  Indicates size of block in bytes.

4.1.1 Detailed Description

Complete Memory Control Block Struct.

These members are private to prevent potential manipulation so that the MPX system can remain functioning correctly.

4.1.2 Field Documentation

4.1.2.1 void* cmcb::begin_address

Beginning address.

4.1.2.2 u32int cmcb::size

Indicates size of block in bytes.

4.1.2.3 enum mcb_type cmcb::type

Type indicating free or allocated.

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

- modules/r5/mcb.c

4.2 context Struct Reference

Context structure that holds the 15 CPU register values to begin and resume process execution.

`#include <context.h>`

Data Fields

- u32int gs
  Segment register.
- u32int fs
  Segment register.
- u32int es
  Segment register.
- u32int ds
  Segment register.
- u32int edi
  General-purpose register.
- u32int esi
  General-purpose register.
- u32int ebp
  General-purpose register.
- u32int esp
  General-purpose register.
- u32int ebx
  General-purpose register.
- u32int edx
  General-purpose register.
- u32int ecx
  General-purpose register.
- u32int eax
  General-purpose register.
- u32int eip
  Status and control register.
- u32int cs
  Status and control register.
- u32int eflags
  Status and control register.

4.2.1 Detailed Description

Context structure that holds the 15 CPU register values to begin and resume process execution.

4.2.2 Field Documentation

4.2.2.1 u32int context::cs

Status and control register.

4.2.2.2 u32int context::ds

Segment register.

4.2.2.3 u32int context::eax

General-purpose register.

4.2.2.4 u32int context::ebp

General-purpose register.

4.2.2.5 u32int context::ebx

General-purpose register.

4.2.2.6 u32int context::ecx

General-purpose register.

4.2.2.7 u32int context::edi

General-purpose register.

4.2.2.8 u32int context::edx

General-purpose register.

4.2.2.9 u32int context::eflags

Status and control register.

4.2.2.10 u32int context::eip

Status and control register.

4.2.2.11 u32int context::es

Segment register.

4.2.2.12 u32int context::esi

General-purpose register.

4.2.2.13 u32int context::esp

General-purpose register.

4.2.2.14 u32int context::fs

Segment register.

4.2.2.15 u32int context::gs

Segment register.

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

- modules/r3/context.h

4.3 data_sector Struct Reference

Structure containing the sector's data.

`#include <disk_img_manager.h>`

Data Fields

- uint8_t data [512]

  The sector's raw data.

4.3.1 Detailed Description

Structure containing the sector's data.

-

4.3.2 Field Documentation

4.3.2.1 uint8_t data_sector::data[512]

The sector's raw data.

Number of bytes 512.

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

- modules/r6/disk_img_manager.h

4.4 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

4.4.1 Field Documentation

4.4.1.1 int date_time::day_m

4.4.1.2 int date_time::day_w

4.4.1.3 int date_time::day_y

4.4.1.4 int date_time::hour

4.4.1.5 int date_time::min

4.4.1.6 int date_time::mon

4.4.1.7 int date_time::sec

4.4.1.8 int date_time::year

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

- include/system.h

4.5 dir_entry_info Struct Reference

Structure containing the directory/file entry's information and data in sector.

`#include <disk_img_manager.h>`

Data Fields

- uint8_t file_name [8]

  File name in ASCII Characters.
- uint8_t extension [3]

File extension in ASCII Characters.

- uint8_t attributes

  File attributes.

- uint16_t reserved

  Reserved.

- uint16_t create_time

  Time created file.

- uint16_t create_date

  Date created file.

- uint16_t last_acc_date

  Date last accessed file.

- uint16_t ignore1

  Ignore file data.

- uint16_t last_wri_time

  Last modified file time.

- uint16_t last_wri_date

  Last modified file date.

- uint16_t first_log_clu

  First logical cluster specifies where the file or subdirectory begins.

- uint32_t file_size

  File size in bytes.

4.5.1 Detailed Description

Structure containing the directory/file entry's information and data in sector.

4.5.2 Field Documentation

4.5.2.1 uint8_t dir_entry_info::attributes

File attributes.

Number of bytes 1 and starting at byte location 11.

4.5.2.2 uint16_t dir_entry_info::create_date

Date created file.

Number of bytes 2 and starting at byte location 16.

4.5.2.3 uint16_t dir_entry_info::create_time

Time created file.

Number of bytes 2 and starting at byte location 14.

4.5.2.4 uint8_t dir_entry_info::extension[3]

File extension in ASCII Characters.

Number of bytes 3 and starting at byte location 8.

4.5.2.5 uint8_t dir_entry_info::file_name[8]

File name in ASCII Characters.

Number of bytes 8 and starting at byte location 0.

4.5.2.6 uint32_t dir_entry_info::file_size

File size in bytes.

Number of bytes 4 and starting at byte location 28.

4.5.2.7 uint16_t dir_entry_info::first_log_clu

First logical cluster specifies where the file or subdirectory begins.

Number of bytes 2 and starting at byte location 26.

4.5.2.8 uint16_t dir_entry_info::ignore1

Ignore file data.

Number of bytes 2 and starting at byte location 20.

4.5.2.9 uint16_t dir_entry_info::last_acc_date

Date last accessed file.

Number of bytes 2 and starting at byte location 18.

4.5.2.10 uint16_t dir_entry_info::last_wri_date

Last modified file date.

Number of bytes 2 and starting at byte location 24.

4.5.2.11 uint16_t dir_entry_info::last_wri_time

Last modified file time.

Number of bytes 2 and starting at byte location 22.

4.5.2.12 uint16_t dir_entry_info::reserved

Reserved.

Number of bytes 2 and starting at byte location 12.

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

- modules/r6/disk_img_manager.h

4.6 dir_itr Struct Reference

`#include <file_dir_iterator.h>`

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

- modules/r6/file_dir_iterator.h

4.7 fat_date Struct Reference

Structure containing the date information.

`#include <disk_img_manager.h>`

Data Fields

- uint8_t day
  Day.
- uint8_t mon
  Month.
- uint16_t year
  Year.

4.7.1 Detailed Description

Structure containing the date information.

4.7.2 Field Documentation

4.7.2.1 uint8_t fat_date::day

Day.

4.7.2.2 uint8_t fat_date::mon

Month.

4.7.2.3 uint16_t fat_date::year

Year.

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

- modules/r6/disk_img_manager.h

4.8 fat_time Struct Reference

Structure containing the time information.

`#include <disk_img_manager.h>`

Data Fields

- uint8_t se
  Seconds.
- uint8_t mi
  Minutes.
- uint8_t hr
  Hours.

4.8.1 Detailed Description

Structure containing the time information.

4.8.2 Field Documentation

4.8.2.1 uint8_t fat_time::hr

Hours.

4.8.2.2 uint8_t fat_time::mi

Minutes.

4.8.2.3 uint8_t fat_time::se

Seconds.

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

- modules/r6/disk_img_manager.h

4.9 file_iter Struct Reference

`#include <file_dir_iterator.h>`

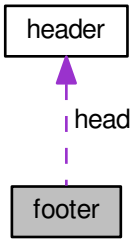
The documentation for this struct was generated from the following file:

- modules/r6/file_dir_iterator.h

4.10 footer Struct Reference

`#include <heap.h>`

Collaboration diagram for footer:



Data Fields

- header head

4.10.1 Field Documentation

4.10.1.1 header footer::head

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

- include/mem/heap.h

4.11 gdt_descriptor Struct Reference

`#include <tables.h>`

Data Fields

- u16int limit
- u32int base

4.11.1 Field Documentation

4.11.1.1 u32int gdt_descriptor::base

4.11.1.2 u16int gdt_descriptor::limit

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

- include/core/tables.h

4.12 gdt_entry Struct Reference

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

Data Fields

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

4.12.1 Field Documentation

4.12.1.1 u8int gdt_entry::access

4.12.1.2 u8int gdt_entry::base_high

4.12.1.3 u16int gdt_entry::base_low

4.12.1.4 u8int gdt_entry::base_mid

4.12.1.5 u8int gdt_entry::flags

4.12.1.6 u16int gdt_entry::limit_low

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

- include/core/tables.h

4.13 header Struct Reference

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

Data Fields

- int size
- int index_id

4.13.1 Field Documentation

4.13.1.1 int header::index_id

4.13.1.2 int header::size

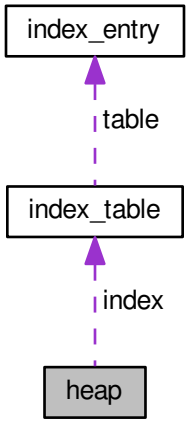
The documentation for this struct was generated from the following file:

- include/mem/heap.h

4.14 heap Struct Reference

`#include <heap.h>`

Collaboration diagram for heap:



Data Fields

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

4.14.1 Field Documentation

4.14.1.1 u32int heap::base

4.14.1.2 index_table heap::index

4.14.1.3 u32int heap::max_size

4.14.1.4 u32int heap::min_size

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

- include/mem/heap.h

4.15 idt_descriptor Struct Reference

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

Data Fields

- u16int limit
- u32int base

4.15.1 Field Documentation

4.15.1.1 u32int idt_descriptor::base

4.15.1.2 u16int idt_descriptor::limit

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

- include/core/tables.h

4.16 idt_entry Struct Reference

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

Data Fields

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

4.16.1 Field Documentation

4.16.1.1 u16int idt_entry::base_high

4.16.1.2 u16int idt_entry::base_low

4.16.1.3 u8int idt_entry::flags

4.16.1.4 u16int idt_entry::sselect

4.16.1.5 u8int idt_entry::zero

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

- include/core/tables.h

4.17 img_boot_sector Struct Reference

Structure containing the Boot Sector's information and data.

`#include <disk_img_manager.h>`

Data Fields

- uint8_t ignore1 [11]
  Ignore file data.
- uint16_t byte_per_sector
  Bytes per sector.
- uint8_t sector_per_cluster
  Sectors per cluster.
- uint16_t reserved_sec_num
  Number of reserved rectors.
- uint8_t fat_copies_num
  Number of FAT copies.
- uint16_t root_dir_max_num
  Max number of root directory entries.
- uint16_t sec_num
  Total number of sectors in the File System.
- uint8_t ignore2
  Ignore file data.
- uint16_t sec_per_fat_num
  Number of Sectors per FAT.
- uint16_t sec_per_track
  Sectors per track.
- uint16_t head_num
  Number of heads.
- uint32_t ignore3
  Ignore file data.
- uint32_t total_sec_fat32
  Total sector count for FAT32.
- uint16_t ignore4
  Ignore file data.
- uint8_t boot_sign
  Boot signature.
- uint32_t vol_id

Volume ID.

- uint8_t vol_label [11]

  Volume label (or name of File System) as an ASCII string.

- uint8_t file_sys_type [8]

  File System Type as an ASCII string.

- uint8_t ignore5 [450]

  Ignore file data.

4.17.1 Detailed Description

Structure containing the Boot Sector's information and data.

4.17.2 Field Documentation

4.17.2.1 uint8_t img_boot_sector::boot_sign

Boot signature.

Number of bytes 1 and starting at byte location 38.

4.17.2.2 uint16_t img_boot_sector::byte_per_sector

Bytes per sector.

Number of bytes 2 and starting at byte location 11.

4.17.2.3 uint8_t img_boot_sector::fat_copies_num

Number of FAT copies.

Number of bytes 1 and starting at byte location 16.

4.17.2.4 uint8_t img_boot_sector::file_sys_type[8]

File System Type as an ASCII string.

Number of bytes 8 and starting at byte location 54.

4.17.2.5 uint16_t img_boot_sector::head_num

Number of heads.

Number of bytes 2 and starting at byte location 26.

4.17.2.6 uint8_t img_boot_sector::ignore1[11]

Ignore file data.

Number of bytes 11 and starting at byte location 0.

4.17.2.7 uint8_t img_boot_sector::ignore2

Ignore file data.

Number of bytes 1 and starting at byte location 21.

4.17.2.8 uint32_t img_boot_sector::ignore3

Ignore file data.

Number of bytes 4 and starting at byte location 28.

4.17.2.9 uint16_t img_boot_sector::ignore4

Ignore file data.

Number of bytes 2 and starting at byte location 36.

4.17.2.10 uint8_t img_boot_sector::ignore5[450]

Ignore file data.

Number of bytes 450 and starting at byte location 62.

4.17.2.11 uint16_t img_boot_sector::reserved_sec_num

Number of reserved rectors.

Number of bytes 2 and starting at byte location 14.

4.17.2.12 uint16_t img_boot_sector::root_dir_max_num

Max number of root directory entries.

Number of bytes 2 and starting at byte location 17.

4.17.2.13 uint16_t img_boot_sector::sec_num

Total number of sectors in the File System.

Number of bytes 2 and starting at byte location 19.

4.17.2.14 uint16_t img_boot_sector::sec_per_fat_num

Number of Sectors per FAT.

Number of bytes 2 and starting at byte location 22.

4.17.2.15 uint16_t img_boot_sector::sec_per_track

Sectors per track.

Number of bytes 2 and starting at byte location 24.

4.17.2.16 uint8_t img_boot_sector::sector_per_cluster

Sectors per cluster.

Number of bytes 1 and starting at byte location 13.

4.17.2.17 uint32_t img_boot_sector::total_sec_fat32

Total sector count for FAT32.

Number of bytes 4 and starting at byte location 32.

4.17.2.18 uint32_t img_boot_sector::vol_id

Volume ID.

Number of bytes 4 and starting at byte location 39.

4.17.2.19 uint8_t img_boot_sector::vol_label[11]

Volume label (or name of File System) as an ASCII string.

Number of bytes 11 and starting at byte location 43.

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

- modules/r6/disk_img_manager.h

4.18 img_writer Struct Reference

`#include <file_dir_iterator.h>`

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

- modules/r6/file_dir_iterator.h

4.19 index_entry Struct Reference

`#include <heap.h>`

Data Fields

- int size
- int empty
- u32int block

4.19.1 Field Documentation

4.19.1.1 u32int index_entry::block

4.19.1.2 int index_entry::empty

4.19.1.3 int index_entry::size

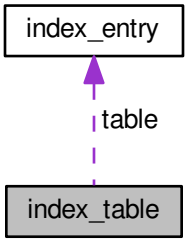
The documentation for this struct was generated from the following file:

- include/mem/heap.h

4.20 index_table Struct Reference

`#include <heap.h>`

Collaboration diagram for index_table:



Data Fields

- index_entry table [TABLE_SIZE]
- int id

4.20.1 Field Documentation

4.20.1.1 int index_table::id

4.20.1.2 index_entry index_table::table[TABLE_SIZE]

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

- include/mem/heap.h

4.21 lmcb Struct Reference

Limited Memory Control Block Struct.

Data Fields

- enum mcb_type type

  Type indicating free or allocated.
- u32int size

  Indicates size of block in bytes.

4.21.1 Detailed Description

Limited Memory Control Block Struct.

These members are private to prevent potential manipulation so that the MPX system can remain functioning correctly.

4.21.2 Field Documentation

4.21.2.1 u32int lmcb::size

Indicates size of block in bytes.

4.21.2.2 enum mcb_type lmcb::type

Type indicating free or allocated.

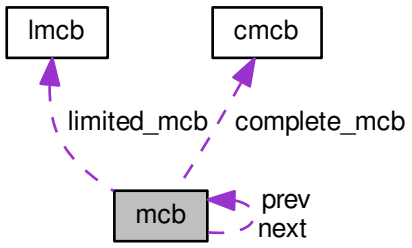
The documentation for this struct was generated from the following file:

- modules/r5/mcb.c

4.22 mcb Struct Reference

Memory Control Block Struct.

Collaboration diagram for mcb:



Data Fields

- struct cmcb * complete_mcb

  Complete Memory Control Block.

- struct lmcb * limited_mcb

  Limited Memory Control Block.

- struct mcb * prev

  The previous adjacent Memory Control Block.

- struct mcb * next

  The next adjacent Memory Control Block.

4.22.1 Detailed Description

Memory Control Block Struct.

These members are private to prevent potential manipulation so that the MPX system can remain functioning correctly.

4.22.2 Field Documentation

4.22.2.1 struct cmcb* mcb::complete_mcb

Complete Memory Control Block.

4.22.2.2 struct lmcb* mcb::limited_mcb

Limited Memory Control Block.

4.22.2.3 struct mcb * mcb::next

The next adjacent Memory Control Block.

4.22.2.4 struct mcb* mcb::prev

The previous adjacent Memory Control Block.

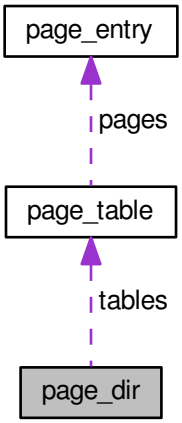
The documentation for this struct was generated from the following file:

- modules/r5/mcb.c

4.23 page_dir Struct Reference

`#include <paging.h>`

Collaboration diagram for page_dir:



Data Fields

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

4.23.1 Field Documentation

4.23.1.1 page_table* page_dir::tables[1024]

4.23.1.2 u32int page_dir::tables_phys[1024]

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

- include/mem/paging.h

4.24 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

4.24.1 Field Documentation

4.24.1.1 u32int page_entry::accessed

4.24.1.2 u32int page_entry::dirty

4.24.1.3 u32int page_entry::frameaddr

4.24.1.4 u32int page_entry::present

4.24.1.5 u32int page_entry::reserved

4.24.1.6 u32int page_entry::usermode

4.24.1.7 u32int page_entry::writeable

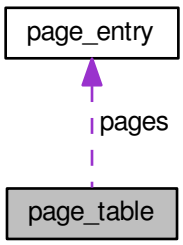
The documentation for this struct was generated from the following file:

- include/mem/paging.h

4.25 page_table Struct Reference

`#include <paging.h>`

Collaboration diagram for page_table:



Data Fields

- page_entry pages [1024]

4.25.1 Field Documentation

4.25.1.1 page_entry page_table::pages[1024]

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

- include/mem/paging.h

4.26 param Struct Reference

A structure to represent interrupt.

`#include <mpx_supt.h>`

Data Fields

- int op_code

  interrupt's operation
- int device_id

  interrupt's device

4.26.1 Detailed Description

A structure to represent interrupt.

4.26.2 Field Documentation

4.26.2.1 int param::device_id

interrupt's device

4.26.2.2 int param::op_code

interrupt's operation

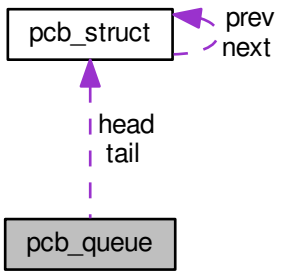
The documentation for this struct was generated from the following file:

- modules/mpx_supt.h

4.27 pcb_queue Struct Reference

Queue structure that will store PCBs.

Collaboration diagram for pcb_queue:



Data Fields

- int count
  The length of the queue.
- struct pcb_struct * head
  Pointer to the start/head of the queue.
- struct pcb_struct * tail
  Pointer to the end/tail of the queue.

4.27.1 Detailed Description

Queue structure that will store PCBs.

These members are private to prevent potential manipulation so that the MPX system can remain functioning correctly.

4.27.2 Field Documentation

4.27.2.1 int pcb_queue::count

The length of the queue.

4.27.2.2 struct pcb_struct* pcb_queue::head

Pointer to the start/head of the queue.

4.27.2.3 struct pcb_struct* pcb_queue::tail

Pointer to the end/tail of the queue.

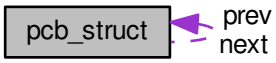
The documentation for this struct was generated from the following file:

- modules/r2/pcb.c

4.28 pcb_struct Struct Reference

Struct that will describe PCB Processes.

Collaboration diagram for pcb_struct:



Data Fields

- char name [SIZE_OF_PCB_NAME]

  PCB's name.
- enum process_class class

  PCB's class is an application or system process.
- unsigned char priority

  PCB's priority an integer between 0 and 9.
- enum process_state running_state

  PCB's states are ready, running, or blocked.
- enum process_suspended is_suspended

  PCB process is either suspended or not suspended.
- unsigned char * stack_top

  Pointer to top of the stack.
- unsigned char * stack_base

  Pointer to base of the stack.
- struct pcb_struct * prev

  Pointer to the previous PCB in the queue.
- struct pcb_struct * next

  Pointer to the next PCB in the queue.

4.28.1 Detailed Description

Struct that will describe PCB Processes.

These members are private to prevent potential manipulation so that the MPX system can remain functioning correctly.

4.28.2 Field Documentation

4.28.2.1 enum process_class pcb_struct::class

PCB's class is an application or system process.

4.28.2.2 enum process_suspended pcb_struct::is_suspended

PCB process is either suspended or not suspended.

4.28.2.3 char pcb_struct::name[SIZE_OF_PCB_NAME]

PCB's name.

4.28.2.4 struct pcb_struct* pcb_struct::next

Pointer to the next PCB in the queue.

4.28.2.5 struct pcb_struct* pcb_struct::prev

Pointer to the previous PCB in the queue.

4.28.2.6 unsigned char pcb_struct::priority

PCB's priority an integer between 0 and 9.

Processes with higher priority values execute before lower priority processes.

4.28.2.7 enum process_state pcb_struct::running_state

PCB's states are ready, running, or blocked.

4.28.2.8 unsigned char* pcb_struct::stack_base

Pointer to base of the stack.

4.28.2.9 unsigned char* pcb_struct::stack_top

Pointer to top of the stack.

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

- modules/r2/pcb.c

Chapter 5

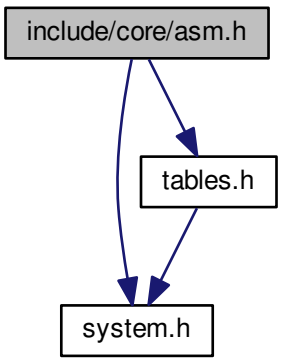
File Documentation

5.1 documentation/mainpage.dox File Reference

5.2 include/core/asm.h File Reference

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

Include dependency graph for asm.h:



5.3 include/core/interrupts.h File Reference

Functions

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

5.3.1 Function Documentation

5.3.1.1 void init_irq (void)

5.3.1.2 void init_pic (void)

5.4 include/core/io.h File Reference

Macros

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

5.4.1 Macro Definition Documentation

5.4.1.1 #define inb(*port*)

Value:

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

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

5.5 include/core/serial.h File Reference

Serial - Header.

Macros

- #define COM1 0x3f8
- #define COM2 0x2f8
- #define COM3 0x3e8
- #define COM4 0x2e8
- #define WithoutEcho 0
- #define WithEcho 1
- #define USER_INPUT_BUFFER_SIZE 100

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)

get_input_line

Get user's input from keyborad.

Parameters

buffer	*The pointer to the buffer where store the user's input.*
buffer_size	*The size of that buffer.*
bWithEcho	*With echo or not*

Returns

VOID

- void get_input_line (char ∗buffer, const int bWithEcho)

5.5.1 Detailed Description

Serial - Header.

Author

Thunder Krakens

Date

February 2nd, 2016

Version

R1

5.5.2 Macro Definition Documentation

5.5.2.1 #define COM1 0x3f8

5.5.2.2 #define COM2 0x2f8

5.5.2.3 #define COM3 0x3e8

5.5.2.4 #define COM4 0x2e8

5.5.2.5 #define USER_INPUT_BUFFER_SIZE 100

5.5.2.6 #define WithEcho 1

5.5.2.7 #define WithoutEcho 0

5.5.3 Function Documentation

5.5.3.1 void get_input_line (char ∗ *buffer,* const int *bWithEcho*)

5.5.3.2 int init_serial (int *device*)

5.5.3.3 int serial_print (const char ∗ *msg*)

5.5.3.4 int serial_println (const char * *msg*)

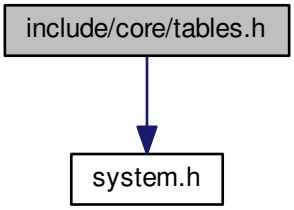
5.5.3.5 int set_serial_in (int *device*)

5.5.3.6 int set_serial_out (int *device*)

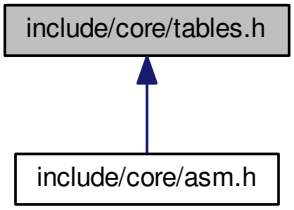
5.6 include/core/tables.h File Reference

```
#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 idt_descriptor
- struct gdt_descriptor
- struct gdt_entry

Functions

- 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 ()

5.6.1 Function Documentation

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

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

5.6.1.3 void init_gdt ( )

5.6.1.4 void init_idt ( )

5.7 include/mem/heap.h File Reference

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)

5.7.1 Macro Definition Documentation

5.7.1.1 #define KHEAP_BASE 0xD000000

5.7.1.2 #define KHEAP_MIN 0x10000

5.7.1.3 #define KHEAP_SIZE 0x1000000

5.7.1.4 #define TABLE_SIZE 0x1000

5.7.2 Function Documentation

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

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

5.7.2.3 void init_kheap ( )

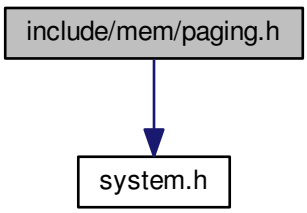
5.7.2.4 u32int kfree ( )

5.7.2.5 u32int kmalloc (u32int *size*)

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

5.8 include/mem/paging.h File Reference

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



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)

5.8.1 Macro Definition Documentation

5.8.1.1 #define PAGE_SIZE 0x1000

5.8.2 Function Documentation

5.8.2.1 void clear_bit (u32int *addr*)

5.8.2.2 u32int first_free ( )

5.8.2.3 u32int get_bit (u32int *addr*)

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

5.8.2.5 void init_paging ( )

5.8.2.6 void load_page_dir (page_dir * *new_page_dir*)

5.8.2.7 void new_frame (page_entry * *page*)

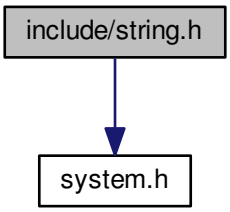
5.8.2.8 void set_bit (u32int *addr*)

5.9 include/string.h File Reference

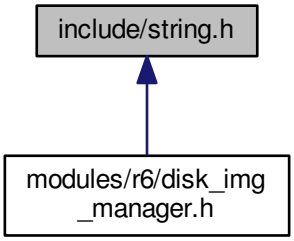
Many usefull functions that used for handling string.

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

Include dependency graph for string.h:



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



Functions

isspace.

Identifies if its space

Parameters

A	*constant character*

Returns

1 if it is space, otherwise return 0.

- int isspace (const char *c)

memset.

Sets region of memory

Parameters

s	*destination*
c	*byte to write*
n	*count*

Returns

the pointer to the memory space.

- void ∗ memset (void ∗s, int c, size_t n)

strcpy.

Copies one string to another.

Parameters

s1	*Destination string*
s2	*Source string*

Returns

pointer to the destination String

- char ∗ strcpy (char ∗s1, const char ∗s2)

strcat.

Concatenate the contents of one string onto another.

Parameters

s1	*Destination string*
s2	*Source string*

Returns

pointer to destination String

- char ∗ strcat (char ∗s1, const char ∗s2)

strlen.

Returns the length of a string.

Parameters

s	*String input.*

Returns

count Length of the String

- int strlen (const char ∗s)

strcmp.

String comparison.

Parameters

s1	*First string to use for the compare.*
s2	*Second string to use for the compare.*

Returns

whether they are the same or not.

- int strcmp (const char ∗s1, const char ∗s2)

strtok.

Split string into tokens.

Parameters

s1	*String*
s2	*Delimiter*

Returns

the pointer to the token.

- char ∗ strtok (char ∗s1, const char ∗s2)

atoi.

Convert an ASCII string to an integer.

Parameters

s	*String.*

Returns

The converted integer.

- int atoi (const char ∗s)

sprintf.

Generate a formatted string.

%[-x]c output a character, '-' - align right, x - the output width

%[-x]s output a string, '-' - align right, x - the output width

%[{-,+}x]d output a character, '-' - align right, '+' - align right and display '+' sign, x - the output width

%[-x]X (capital 'X') output a hexadecimal number, '-' - align right, x - the output width

note: Output width will be ignored if width is smaller than actual length.

Parameters

str	*- Output string.*
format	*- The format of the string.*
...	*- All of the additional parameters.*

Returns

vsprintf(str, format, ap) - Return the string with its format and pointer.

- int sprintf (char *str, const char *format,...)

printf.

Print out a formatted string.

%[-x]c output a character, '-' - align right, x - the output width

%[-x]s output a string, '-' - align right, x - the output width

%[{-,+}x]d output a character, '-' - align right, '+' - align right and display '+' sign, x - the output width

%[-x]X (capital 'X') output a hexadecimal number, '-' - align right, x - the output width

note: Output width will be ignored if width is smaller than actual length.

Parameters

str	*- Output string.*
format	*- The format of the string.*
...	*- All of the additional parameters.*

Returns

vsprintf(str, format, ap) - Return the string with its format and pointer.

- int printf (const char *format,...)

5.9.1 Detailed Description

Many usefull functions that used for handling string.

Author

Thunder Krakens

Date

February 2nd, 2016

Version

R1

5.9.2 Function Documentation

5.9.2.1 int atoi (const char * *s*)

5.9.2.2 int isspace (const char * *c*)

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

5.9.2.4 int printf (const char * *format*, ...)

5.9.2.5 int sprintf (char * *str,* const char * *format,* ...)

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

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

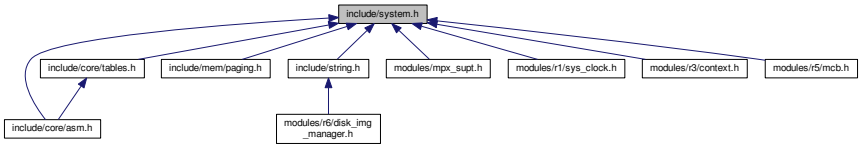
5.9.2.8 char* strcpy (char * *s1,* const char * *s2*)

5.9.2.9 int strlen (const char * *s*)

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

5.10 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

- static int irq_on ()
- void klogv (const char *msg)
- void kpanic (const char *msg)

5.10.1 Macro Definition Documentation

5.10.1.1 #define asm __asm__

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

5.10.1.3 #define GDT_CS_ID 0x01

5.10.1.4 #define GDT_DS_ID 0x02

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

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

5.10.1.7 #define no_warn(*p*) if (p) while (1) break

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

5.10.1.9 #define NULL 0

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

5.10.1.11 #define volatile __volatile__

5.10.2 Typedef Documentation

5.10.2.1 typedef unsigned int size_t

5.10.2.2 typedef unsigned short u16int

5.10.2.3 typedef unsigned long u32int

5.10.2.4 typedef unsigned char u8int

5.10.3 Function Documentation

5.10.3.1 static int irq_on ( ) [inline], [static]

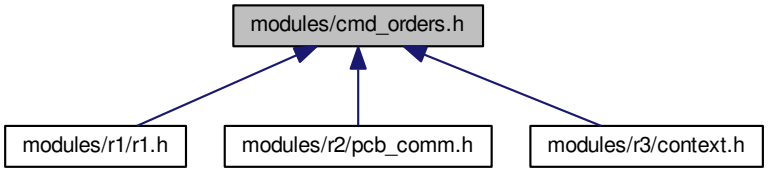
5.10.3.2 void klogv (const char * *msg*)

5.10.3.3 void kpanic (const char * *msg*)

5.11 modules/cmd_orders.h File Reference

This file contains orders & index of all the commands.

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



Macros

- #define WITH_R2_TEMP_CMD 0
- #define WITH_R3_TEMP_CMD 0
- #define WITH_R5_TEMP_CMD 0
- #define FUNCTIONS_BEGIN 0

- #define HELP 0
- #define MPX_FUNCTIONS_BEGIN 1

- #define VERSION MPX_FUNCTIONS_BEGIN+0
- #define GETTIME MPX_FUNCTIONS_BEGIN+1
- #define SETTIME MPX_FUNCTIONS_BEGIN+2
- #define GETDATE MPX_FUNCTIONS_BEGIN+3
- #define SETDATE MPX_FUNCTIONS_BEGIN+4
- #define SHUTDOWN MPX_FUNCTIONS_BEGIN+5
- #define LOADR3 MPX_FUNCTIONS_BEGIN+6
- #define MPX_FUNC_END MPX_FUNCTIONS_BEGIN+6
- #define PCB_FUNCTIONS_BEGIN MPX_FUNC_END+1

- #define SUSPDPCB PCB_FUNCTIONS_BEGIN+0
- #define RESUMEPCB PCB_FUNCTIONS_BEGIN+1
- #define SETPCBPRIO PCB_FUNCTIONS_BEGIN+2
- #define SHOWPCB PCB_FUNCTIONS_BEGIN+3
- #define PCB_FUNC_END PCB_FUNCTIONS_BEGIN+3
- #define MCB_FUNCTIONS_BEGIN PCB_FUNC_END+1

- #define SHOWMCB MCB_FUNCTIONS_BEGIN+0
- #define MCB_FUNC_END MCB_FUNCTIONS_BEGIN+0
- #define NUM_OF_FUNCTIONS MCB_FUNC_END+1

5.11.1 Detailed Description

This file contains orders & index of all the commands.

Author

Thunder Krakens

Date

February 7nd, 2016

Version

R5

5.11.2 Macro Definition Documentation

5.11.2.1 #define FUNCTIONS_BEGIN 0

5.11.2.2 #define GETDATE MPX_FUNCTIONS_BEGIN+3

5.11.2.3 #define GETTIME MPX_FUNCTIONS_BEGIN+1

5.11.2.4 #define HELP 0

5.11.2.5 #define LOADR3 MPX_FUNCTIONS_BEGIN+6

5.11.2.6 #define MCB_FUNC_END MCB_FUNCTIONS_BEGIN+0

5.11.2.7 #define MCB_FUNCTIONS_BEGIN PCB_FUNC_END+1

5.11.2.8 #define MPX_FUNC_END MPX_FUNCTIONS_BEGIN+6

5.11.2.9 #define MPX_FUNCTIONS_BEGIN 1

5.11.2.10 #define NUM_OF_FUNCTIONS MCB_FUNC_END+1

5.11.2.11 #define PCB_FUNC_END PCB_FUNCTIONS_BEGIN+3

5.11.2.12 #define PCB_FUNCTIONS_BEGIN MPX_FUNC_END+1

5.11.2.13 #define RESUMEPCB PCB_FUNCTIONS_BEGIN+1

5.11.2.14 #define SETDATE MPX_FUNCTIONS_BEGIN+4

5.11.2.15 #define SETPCBPRIO PCB_FUNCTIONS_BEGIN+2

5.11.2.16 #define SETTIME MPX_FUNCTIONS_BEGIN+2

5.11.2.17 #define SHOWMCB MCB_FUNCTIONS_BEGIN+0

5.11.2.18 #define SHOWPCB PCB_FUNCTIONS_BEGIN+3

5.11.2.19 #define SHUTDOWN MPX_FUNCTIONS_BEGIN+5

5.11.2.20 #define SUSPDPCB PCB_FUNCTIONS_BEGIN+0

5.11.2.21 #define VERSION MPX_FUNCTIONS_BEGIN+0

5.11.2.22 #define WITH_R2_TEMP_CMD 0

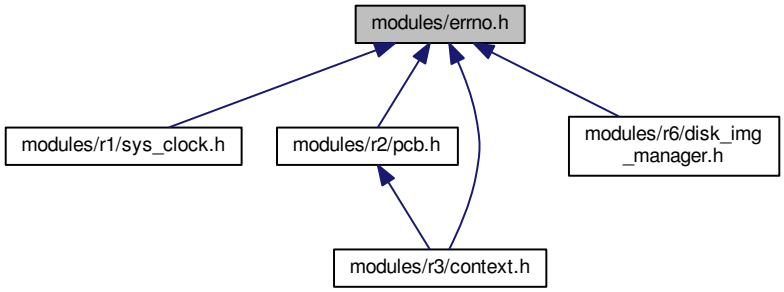
5.11.2.23 #define WITH_R3_TEMP_CMD 0

5.11.2.24 #define WITH_R5_TEMP_CMD 0

5.12 modules/errno.h File Reference

This file contains the type of errors.

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



Macros

- #define E_NOERROR 0
- #define E_INVPARA 1
- #define E_INVSTRF 2
- #define E_INVUSRI 3
- #define E_FREEMEM 4

  Error we cannot actually free the memory space since the student_free had not been implemented before R5.
- #define E_NULL_PTR 5

  A NULL Pointer Error.
- #define E_EMPTPCB 6

  The pcb queue is empty.
- #define E_PCB_SYS 7
- #define E_FILE_NF 8

  The file was not found.

- #define E_NAMEDUP 9

  The specific file name is already exsit.
- #define E_NAMEINV 10

  The specific file name contains invalid character.
- #define E_NOSPACE 11

  Not enough space to store the file.
- #define E_INVATTRS 12

  The file's attributes are invalid.
- #define E_FOLDFUL 13

  The specific directory is full.
- #define E_PROGERR 99

Typedefs

error_t.

The datetype that holds the error code.

- typedef unsigned int error_t

5.12.1 Detailed Description

This file contains the type of errors.

Author

Thunder Krakens

Date

February 7nd, 2016

Version

R2

The error can be from invalid paramter passed to a function, or invalid input format.

5.12.2 Macro Definition Documentation

5.12.2.1 #define E_EMPTPCB 6

The pcb queue is empty.

5.12.2.2 #define E_FILE_NF 8

The file was not found.

5.12.2.3 #define E_FOLDFUL 13

The specific directory is full.

5.12.2.4 #define E_FREEMEM 4

Error we cannot actually free the memory space since the student_free had not been implemented before R5.

5.12.2.5 #define E_INVATTRS 12

The file's attributes are invalid.

5.12.2.6 #define E_INVPARA 1

5.12.2.7 #define E_INVSTRF 2

5.12.2.8 #define E_INVUSRI 3

5.12.2.9 #define E_NAMEDUP 9

The specific file name is already exsit.

5.12.2.10 #define E_NAMEINV 10

The specific file name contains invalid character.

5.12.2.11 #define E_NOERROR 0

5.12.2.12 #define E_NOSPACE 11

Not enough space to store the file.

5.12.2.13 #define E_NULL_PTR 5

A NULL Pointer Error.

5.12.2.14 #define E_PCB_SYS 7

5.12.2.15 #define E_PROGERR 99

5.12.3 Typedef Documentation

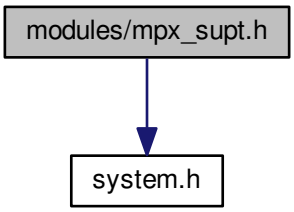
5.12.3.1 typedef unsigned int error_t

5.13 modules/mpx_supt.h File Reference

MPX System Supplementaries.

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

Include dependency graph for mpx_supt.h:



Data Structures

- struct param

  A structure to represent interrupt.

Macros

- #define EXIT 0
- #define IDLE 1
- #define READ 2
- #define WRITE 3
- #define MODULE_R1 0
- #define MODULE_R2 1
- #define MODULE_R3 2
- #define MODULE_R4 4
- #define MODULE_R5 8

Functions

sys_req

Generate interrupt 60H

Parameters

int	*op_code (IDLE)*

- int sys_req (int op_code)

mpx_init

Initialize MPX support software

Parameters

int	*cur_mod (symbolic constants MODULE_R1, MODULE_R2, etc*

- void mpx_init (int cur_mod)

set_malloc

Sets the memory allocation function for sys_alloc_mem

Parameters

Function	*pointer*

- void sys_set_malloc (u32int(∗func)(u32int))

set_free

Sets the memory free function for sys_free_mem

Parameters

s1-destination,s2-source	

- void sys_set_free (int(∗func)(void ∗))

sys_alloc_mem

Allocates a block of memory (similar to malloc)

Parameters

Number	*of bytes to allocate*

- void ∗ sys_alloc_mem (u32int size)

sys_free_mem

Frees memory

Parameters

Pointer	*to block of memory to free*

- int sys_free_mem (void ∗ptr)

idle

The idle process

Parameters

None	

- void idle ()

get_op_code

Returns the interrupt's operation code

Parameters

None	

- int get_op_code ()

5.13.1 Detailed Description

MPX System Supplementaries.

Author

Thunder Krakens

Date

March 18, 2016

Version

R3

5.13.2 Macro Definition Documentation

5.13.2.1 #define EXIT 0

5.13.2.2 #define IDLE 1

5.13.2.3 #define MODULE_R1 0

5.13.2.4 #define MODULE_R2 1

5.13.2.5 #define MODULE_R3 2

5.13.2.6 #define MODULE_R4 4

5.13.2.7 #define MODULE_R5 8

5.13.2.8 #define READ 2

5.13.2.9 #define WRITE 3

5.13.3 Function Documentation

5.13.3.1 int get_op_code ( )

5.13.3.2 void idle ( )

5.13.3.3 void mpx_init (int *cur_mod*)

5.13.3.4 void* sys_alloc_mem (u32int *size*)

5.13.3.5 int sys_free_mem (void * *ptr*)

5.13.3.6 int sys_req (int *op_code*)

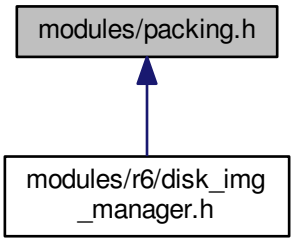
5.13.3.7 void sys_set_free (int(*)(void *) *func*)

5.13.3.8 void sys_set_malloc (u32int(*)(u32int) *func*)

5.14 modules/packing.h File Reference

Packing classes.

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



Macros

- #define PACKED(class_to_pack) __pragma(pack(push, 1)) class_to_pack __pragma(pack(pop))

5.14.1 Detailed Description

Packing classes.

Author

Thunder Krakens

Date

April 28th, 2016

Version

R6

5.14.2 Macro Definition Documentation

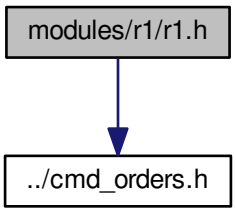
5.14.2.1 #define PACKED(*class_to_pack*) __pragma(pack(push, 1)) class_to_pack __pragma(pack(pop))

5.15 modules/r1/r1.h File Reference

The command handler and functions associations for Module R1.

```
#include "../cmd_orders.h"
```

Include dependency graph for r1.h:



Enumerations

- enum comm_type { mpx, pcb, mcb, help }

  Command types.

Functions

commhand

Accepts and handles commands from the user.

- void commhand ()

command_line_parser

Splits the complete command line into tokens by space, single quote, or double quote.

Parameters

CmdStr	*The complete input command.*
argc	*The number of tokens found.*
argv	*The array of tokens.*
MaxArgNum	*The maximum number of tokens that array can hold.*

MaxStrLen	*The maximum length of each token that string can hold.*

- void command_line_parser (const char *CmdStr, int *argc, char **argv, const int MaxArgNum, const int MaxStrLen)

print_help

Prints the help message of a certain function that specified by the index number

Parameters

function_index	*The index number of that function.*

- void print_help (const int function_index)

help_usages

Displays all the usage case of the specified command type.

Parameters

comm_type	*The command type.*

Returns

When finished execution returns 0.

- int help_usages (enum comm_type type)

5.15.1 Detailed Description

The command handler and functions associations for Module R1.

Author

Thunder Krakens

Date

March 17, 2016

Version

R3 & R4

5.15.2 Enumeration Type Documentation

5.15.2.1 enum comm_type

Command types.

Enumerator

mpx MPX System command.

pcb Process Control Block command.

mcb Memory Control Block command.

help Help command.

5.15.3 Function Documentation

5.15.3.1 void command_line_parser (const char * *CmdStr,* int * *argc,* char ** *argv,* const int *MaxArgNum,* const int *MaxStrLen*)

5.15.3.2 void commhand ( )

5.15.3.3 int help_usages (enum comm_type *type*)

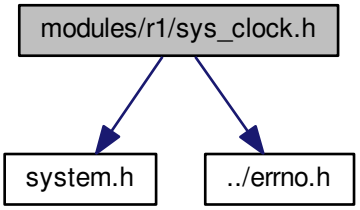
5.15.3.4 void print_help (const int *function_index*)

5.16 modules/r1/sys_clock.h File Reference

The main file that manipulates and controls the system's clock.

```
#include <system.h>
#include "../errno.h"
```

Include dependency graph for sys_clock.h:



Functions

set_time_main

The main set time argument handler for set time function.

Parameters

argc	*The number of tokens found.*
argv	*The array of tokens.*

Returns

0 when finished with execution.

- int set_time_main (int argc, char **argv)

get_time_main

The main get time argument handler for the get time function.

Parameters

argc	*The number of tokens found.*
argv	*The array of tokens.*

Returns

0 when finished with execution.

- int get_time_main (int argc, char **argv)

set_time_str

Sets the time for the system by string.

Parameters

timeStr	*The string type of current Time.*

Returns

The appropiate error code. See errno.h for details.

- error_t set_time_str (const char *timeStr)

get_time

Retrieves the system's current time and date.

Parameters

dateTimeValues	*The value of current time and date*

- void get_time (date_time *dateTimeValues)

set_time

Sets the time for the system by date_time structure.

Parameters

dateTimeValues	*The structure that holds the time values.*

Returns

The appropiate error number. See errno.h for details.

- error_t set_time (const date_time *dateTimeValues)

set_date_main

The set date argument handler for the set date function.

Parameters

argc	*The number of tokens.*
argv	*The array of tokens.*

Returns

0 when finished execution.

- int set_date_main (int argc, char **argv)

get_date_main

The get date argument handler for the get date function.

Parameters

argc	*The number of tokens.*
argv	*The array of tokens.*

Returns

0 when finished with execution.

- int get_date_main (int argc, char **argv)

get_date

Retrieves system's current date.

Parameters

dateTimeValues	*The structure that holds the value of current date.*

- void get_date (date_time *dateTimeValues)

set_date_str

Sets the date for the system by string.

Parameters

str	*The string type of current date.*

Returns

0 when finished with execution.

- int set_date_str (const char *str)

set_date.

Sets the date of the system.

Parameters

dateTimeValues	*The structure that holds the value of date*

Returns

The appropiate error number. See errno.h for details.

- error_t set_date (const date_time *dateTimeValues)

5.16.1 Detailed Description

The main file that manipulates and controls the system's clock.

Author

Thunder Krakens

Date

February 2nd, 2016

Version

R1

5.16.2 Function Documentation

5.16.2.1 void get_date (date_time * *dateTimeValues*)

5.16.2.2 int get_date_main (int *argc*, char ** *argv*)

5.16.2.3 void get_time (date_time * *dateTimeValues*)

5.16.2.4 int get_time_main (int *argc*, char ** *argv*)

5.16.2.5 error_t set_date (const date_time * *dateTimeValues*)

5.16.2.6 int set_date_main (int *argc*, char ** *argv*)

5.16.2.7 int set_date_str (const char * *str*)

5.16.2.8 error_t set_time (const date_time * *dateTimeValues*)

5.16.2.9 int set_time_main (int *argc*, char ** *argv*)

5.16.2.10 error_t set_time_str (const char * *timeStr*)

5.17 modules/r2/pcb.c File Reference

The Process Control Block.

Data Structures

- struct pcb_struct

  Struct that will describe PCB Processes.
- struct pcb_queue

  Queue structure that will store PCBs.

Variables

- static struct pcb_queue ready_queue

  PCBs stored in priority order with highest priority at head.
- static struct pcb_queue blocked_queue

  PCBs stored in FIFO order.

5.17.1 Detailed Description

The Process Control Block.

Author

Thunder Krakens

Date

March 18th, 2016

Version

R3

5.17.2 Variable Documentation

5.17.2.1 struct pcb_queue blocked_queue [static]

PCBs stored in FIFO order.

5.17.2.2 struct pcb_queue ready_queue [static]

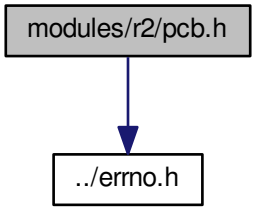
PCBs stored in priority order with highest priority at head.

5.18 modules/r2/pcb.h File Reference

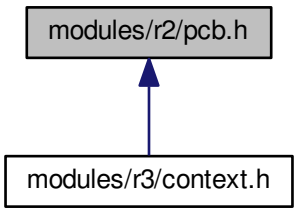
The Process Control Block.

```
#include "../errno.h"
```

Include dependency graph for pcb.h:



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



Macros

- #define SIZE_OF_STACK 1024

  The defualt size of the stack for the PCB.
- #define SIZE_OF_PCB_NAME 10

  The max length of the PCB name string.
- #define COMMHAND_PCB_NAME "commhand"

  The name of the command handler PCB.
- #define IDLE_PCB_NAME "idle"

  The name of the idle PCB.

Enumerations

- enum process_class { pcb_class_app, pcb_class_sys }

  PCB process class types.

Functions

pcb_init

Initializes the PCB queues

- void pcb_init ()

allocate_pcb

allocate a space for the PCB structure.

Returns

The pointer that point to the PCB structure.

- struct pcb_struct * allocate_pcb ()

free_pcb

Frees all memory associated with given PCB, including the PCB itself, the stack, etc, with sys_free_mem()

Parameters

pcb_ptr	*The pointer to the PCB*

Returns

The appropiate error code. See errno.h for details. Possible error code to be returned: E_NOERROR No error. E_INVPARA The PCB probably had not been removed from queue before free it.

- error_t free_pcb (struct pcb_struct *pcb_ptr)

setup_pcb

allocate a space for the PCB structure, setup the properties of the PCB.

NOTE: pName must less than 10 character, pClass should be either "application" or "system" , and pPriority must within the range of [0, 9].

Parameters

pName	*Process Name (length $<$ 10).*
pClass	*Process class (system or application).*
pPriority	*Process priority (0 $\sim$ 9).*

Returns

The pointer that point to the PCB structure.
NULL if error occured.

- struct pcb_struct * setup_pcb (const char *pName, const enum process_class pClass, const unsigned char pPriority)

find_pcb

Will search all queues for a process named pName

Parameters

pName	*The char pointer to the desired searched name*

Returns

The PCB pointer.
NULL if PCB is not found

- struct pcb_struct * find_pcb (const char *pName)

insert_pcb

Inserts PCB into the appropriate queue.

Parameters

pcb_ptr	*The pointer to the PCB*

Returns

The appropiate error code. See errno.h for details. Possible error code to be returned: E_NOERROR No error. E_NULL_PTR Null pointer error. E_INVPARA The given PCB has running status or abnormal data members.

- error_t insert_pcb (struct pcb_struct *pcb_ptr)

remove_pcb

Removes PCB from the queue it is currently in.

Parameters

pcb_ptr	*The pointer to the PCB*

Returns

The appropiate error code. See errno.h for details. Possible error code to be returned: E_NOERROR No error. E_NULL_PTR Null pointer error. E_INVPARA The given PCB has abnormal data members.

- error_t remove_pcb (struct pcb_struct *pcb_ptr)

suspend_pcb

Suspends the specific PCB.

Parameters

pcb_ptr	*The pointer to the PCB*

Returns

The appropiate error code. See errno.h for details. Possible error code to be returned: E_NOERROR No error. E_NULL_PTR Null pointer error.

- error_t suspend_pcb (struct pcb_struct *pcb_ptr)

resume_pcb

Resumes the specific PCB.

Parameters

pcb_ptr	*The pointer to the PCB*

Returns

The appropiate error code. See errno.h for details. Possible error code to be returned: E_NOERROR No error. E_NULL_PTR Null pointer error.

- error_t resume_pcb (struct pcb_struct *pcb_ptr)

set_pcb_priority

Sets the priority of the selected PCB

Parameters

pcb_ptr	*The PCB pointer.*
pPriorty	*The assigned priorirty*

Returns

The appropiate error code. See errno.h for details. Possible error code to be returned: E_NOERROR No error. E_NULL_PTR Null pointer error. E_INVPARA The pPriority is out of range. Or, the given PCB has abnormal data members (By "remove_pcb" or "insert_pcb").

- error_t set_pcb_priority (struct pcb_struct *pcb_ptr, const unsigned char pPriority)

show_pcb

Displays the name, class, state, suspend status, and priority of a PCB.

Parameters

pName	*The PCB pointer.*

Returns

The appropiate error code. See errno.h for details. Possible error code to be returned: E_NOERROR No error. E_NULL_PTR Null pointer error.

- error_t show_pcb (struct pcb_struct *pcb_ptr)

show_all_processes

Displays all of the processes and their attributes.

- void show_all_processes ()

show_ready_processes

Displays all of the ready processes and their attributes.

- void show_ready_processes ()

show_blocked_processes

Displays all blocked processes and their attributes

- void show_blocked_processes ()

block_pcb

puts the given pcb into the blocked state and places it into the correct queue

Parameters

pcb_ptr	*The pointer to the PCB*

Returns

The appropiate error code. See errno.h for details. Possible error code to be returned: E_NOERROR No error. E_NULL_PTR Null pointer error. E_INVPARA The given PCB has abnormal data members (By "remove_pcb" or "insert_pcb").

- error_t block_pcb (struct pcb_struct *pcb_ptr)

unblock_pcb

puts the given pcb into the unblocked state and places it into the correct queue

Parameters

pcb_ptr	*The pointer to the PCB*

Returns

The appropiate error code. See errno.h for details. Possible error code to be returned: E_NOERROR No error. E_NULL_PTR Null pointer error. E_INVPARA The given PCB has abnormal data members (By "remove_pcb" or "insert_pcb").

- error_t unblock_pcb (struct pcb_struct *pcb_ptr)

get_running_process

gets a unsuspended and unblocked process from the front of the queue, and sets it to running state.

Returns

NULL if there is no process available, otherwise, the pointer that point to the PCB structure.

- struct pcb_struct * get_running_process ()

save_running_process

sets the running process to ready state, and inserts it to the ready queue.

Parameters

pcb_ptr	*The pointer to the PCB.*
new_stack_top	*The pointer to the new stack top.*

Returns

The appropiate error code. See errno.h for details. Possible error code to be returned: E_NOERROR No error. E_NULL_PTR Null pointer error. E_INVPARA The given PCB has abnormal data members (By "insert_pcb").

- error_t save_running_process (struct pcb_struct *pcb_ptr, struct context *new_stack_top)

get_stack_top

gets the pointer to the stack top of the specific PCB.

Parameters

pcb_ptr	*The pointer to the PCB.*

Returns

The pointer that point to the stack top of the specific PCB.
NULL if the pcb_ptr is NULL.

- unsigned char * get_stack_top (struct pcb_struct *pcb_ptr)

get_stack_base

gets the pointer to the stack base of the specific PCB.

Parameters

pcb_ptr	*The pointer to the PCB.*

Returns

The pointer that point to the stack base of the specific PCB.
NULL if the pcb_ptr is NULL.

- unsigned char * get_stack_base (struct pcb_struct *pcb_ptr)

shutdown_pcb

called when system is going to shutdown, removes all PCBs, free all PCBs.

- void shutdown_pcb ()

5.18.1 Detailed Description

The Process Control Block.

Author

Thunder Krakens

Date

February 7th, 2016

Version

R3

5.18.2 Macro Definition Documentation

5.18.2.1 #define COMMHAND_PCB_NAME "commhand"

The name of the command handler PCB.

5.18.2.2 #define IDLE_PCB_NAME "idle"

The name of the idle PCB.

5.18.2.3 #define SIZE_OF_PCB_NAME 10

The max length of the PCB name string.

5.18.2.4 #define SIZE_OF_STACK 1024

The defualt size of the stack for the PCB.

5.18.3 Enumeration Type Documentation

5.18.3.1 enum process_class

PCB process class types.

Enumerator

pcb_class_app Process is an application process.

pcb_class_sys Process is a system process.

5.18.4 Function Documentation

5.18.4.1 struct **pcb_struct**∗ allocate_pcb ( )

5.18.4.2 **error_t** block_pcb (struct **pcb_struct** ∗ *pcb_ptr*)

5.18.4.3 struct **pcb_struct**∗ find_pcb (const char ∗ *pName*)

5.18.4.4 **error_t** free_pcb (struct **pcb_struct** ∗ *pcb_ptr*)

5.18.4.5 struct **pcb_struct**∗ get_running_process ( )

5.18.4.6 unsigned char∗ get_stack_base (struct **pcb_struct** ∗ *pcb_ptr*)

5.18.4.7 unsigned char∗ get_stack_top (struct **pcb_struct** ∗ *pcb_ptr*)

5.18.4.8 **error_t** insert_pcb (struct **pcb_struct** ∗ *pcb_ptr*)

5.18.4.9 void pcb_init ( )

5.18.4.10 **error_t** remove_pcb (struct **pcb_struct** ∗ *pcb_ptr*)

5.18.4.11 **error_t** resume_pcb (struct **pcb_struct** ∗ *pcb_ptr*)

5.18.4.12 **error_t** save_running_process (struct **pcb_struct** ∗ *pcb_ptr,* struct **context** ∗ *new_stack_top*)

5.18.4.13 **error_t** set_pcb_priority (struct **pcb_struct** ∗ *pcb_ptr,* const unsigned char *pPriority*)

5.18.4.14 struct **pcb_struct**∗ setup_pcb (const char ∗ *pName,* const enum **process_class** *pClass,* const unsigned char *pPriority*)

5.18.4.15 void show_all_processes ( )

5.18.4.16 void show_blocked_processes ( )

5.18.4.17 **error_t** show_pcb (struct **pcb_struct** ∗ *pcb_ptr*)

5.18.4.18 void show_ready_processes ( )

5.18.4.19 void shutdown_pcb ( )

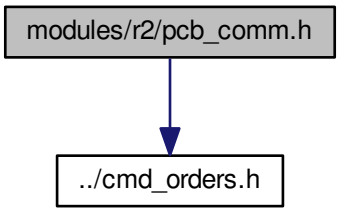
5.18.4.20 **error_t** suspend_pcb (struct **pcb_struct** ∗ *pcb_ptr*)

5.18.4.21 **error_t** unblock_pcb (struct **pcb_struct** ∗ *pcb_ptr*)

5.19 modules/r2/pcb_comm.h File Reference

The main functions that manipulate the PCB.

```
#include "../cmd_orders.h"
```
Include dependency graph for pcb_comm.h:



Functions

suspend_pcb_main

The main argument handler for the suspend PCB command.

Accepted formats: pcb suspend <name> pcb suspend –help

Parameters

argc	*The number of tokens found.*
argv	*The array of tokens.*

Returns

0 when finished execution.

- int suspend_pcb_main (int argc, char **argv)

resume_pcb_main

The main argument handler for the resume PCB command.

Accepted formats: pcb resume <name> pcb resume –help

Parameters

argc	*The number of tokens found.*
argv	*The array of tokens.*

Returns

0 when finished execution.

- int resume_pcb_main (int argc, char **argv)

set_pcb_priority_main

The main argument handler for the set PCB priority command.

Accepted formats: pcb setpriority <name> <priority> pcb setpriority –help

Parameters

argc	*The number of tokens found.*
argv	*The array of tokens.*

Returns

0 when finished execution.

- int set_pcb_priority_main (int argc, char **argv)

show_pcb_main

The main argument handler for the show PCB commands.

Accepted formats: pcb show [name] pcb show -all pcb show -ready pcb show -blocked pcb show –help

Parameters

argc	*The number of tokens found.*
argv	*The array of tokens.*

Returns

0 when finished execution.

- int show_pcb_main (int argc, char **argv)

5.19.1 Detailed Description

The main functions that manipulate the PCB.

Author

Thunder Krakens

Date

February 7th, 2016

Version

R2

5.19.2 Function Documentation

5.19.2.1 int resume_pcb_main (int *argc,* char ** *argv*)

5.19.2.2 int set_pcb_priority_main (int *argc,* char ** *argv*)

5.19.2.3 int show_pcb_main (int *argc,* char ** *argv*)

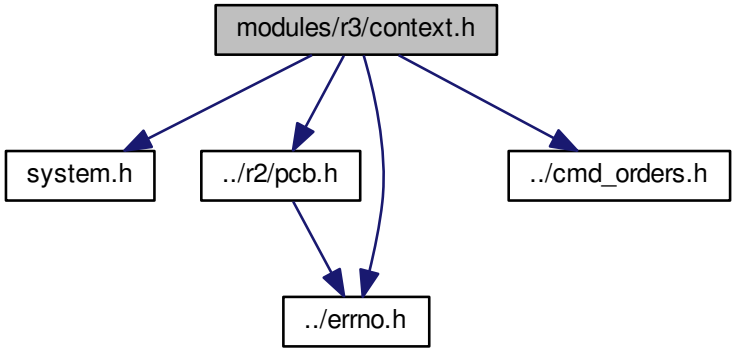
5.19.2.4 int suspend_pcb_main (int *argc,* char ** *argv*)

5.20 modules/r3/context.h File Reference

Context Switching.

```
#include <system.h>
#include "../r2/pcb.h"
#include "../errno.h"
#include "../cmd_orders.h"
```

Include dependency graph for context.h:



Data Structures

- struct context

  Context structure that holds the 15 CPU register values to begin and resume process execution.

Functions

sys_call

system call interrupt

Parameters

registers	*current registers*

Returns

result if there is no current process running, it will load new context. If the process is still running, it will load its old context.

- u32int * sys_call (struct context *registers)

load_process

loads a process into the PCB.

Parameters

pName	*Process Name*
pClass	*Process Class*
pPriority	*Process Priority*
∗function()	*A function pointer*

Returns

new_pcb Returns the values of the new PCB

- struct pcb_struct ∗ load_process (const char ∗pName, const enum process_class pClass, const unsigned char pPriority, void(∗function)())

load_r3_main

Loads the main function of R3.

Parameters

argc	*The number of tokens found.*
argv	*The array of tokens.*

Returns

0 when finished with execution.

- int load_r3_main (int argc, char ∗∗argv)

Variables

- struct context ∗ old_context
- struct pcb_struct ∗ cop

5.20.1 Detailed Description

Context Switching.

Author

Thunder Krakens

Date

March 18th, 2016

Version

R3

5.20.2 Function Documentation

5.20.2.1 struct pcb_struct* load_process (const char * *pName*, const enum process_class *pClass*, const unsigned char *pPriority*, void(*)() *function*)

5.20.2.2 int load_r3_main (int *argc*, char ** *argv*)

5.20.2.3 u32int* sys_call (struct context * *registers*)

5.20.3 Variable Documentation

5.20.3.1 struct pcb_struct* cop

5.20.3.2 struct context* old_context

5.21 modules/r5/mcb.c File Reference

Memory Control Block.

Data Structures

- struct cmcb

  Complete Memory Control Block Struct.
- struct lmcb

  Limited Memory Control Block Struct.
- struct mcb

  Memory Control Block Struct.

Enumerations

- enum mcb_type { free, allocated }

  PCB process class types.

5.21.1 Detailed Description

Memory Control Block.

Author

Thunder Krakens

Date

April 8th, 2016

Version

R5

5.21.2 Enumeration Type Documentation

5.21.2.1 enum mcb_type

PCB process class types.

Enumerator

free Process is an application process.

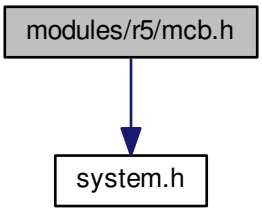
allocated Process is a system process.

5.22 modules/r5/mcb.h File Reference

Memory Control Block.

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

Include dependency graph for mcb.h:



Macros

- #define MAX_HEAP_SIZE 5000

  The maximum heap size.

Functions

init_heap

Allocates all the memory for MPX.

Parameters

size	*Size of heap in bytes.*

- void init_heap (u32int size)

mcb_allocate

Allocates a memory block.

Parameters

mem_size	*The MCB size to be allocated.*

Returns

Address to allocated MCB.
NULL if not enough space in free memory found.

- void * mcb_allocate (u32int mem_size)

show_mcb

Displays the allocated or free memory block's address, previous and next pointers, and block's size.

Parameters

mcb_ptr	*MCB Pointer*

- void show_mcb (struct mcb *mcb_ptr)

show_free_mcb

Displays all the free memory.

- void show_free_mcb ()

show_allocated_mcb

Displays all the allocated MCBs.

- void show_allocated_mcb ()

show_all_mcb

Displays all the free and allocated memory.

- void show_all_mcb ()

is_mcb_empty

Checks if the heap is empty.

Returns

0 or 1 (true or false).

- int is_mcb_empty ()

mcb_free_mpx

Calls mcb_free to free memory block, used as parameter for sys_set_free in kmain.c.

Parameters

mem_ptr	*Memory Pointer*

Returns

0 when finished with exectuion.

- int mcb_free_mpx (void *mem_ptr)

mcb_allocate_mpx

Calls mcb_allocate to allocate memory block, used as parameter for sys_set_malloc in kmain.c.

Parameters

size	*Size of block in bytes to allocate.*

Returns

Address of allocated MCB.

- u32int mcb_allocate_mpx (u32int size)

mcb_allocate_mpx2

MCB allocate MPX.

Parameters

mem_size	*Block size to allocate.*
name	*Name of the pcb process.*

Returns

Address pointer to allocated memory only used for testing in commhand for module R5.

- void * mcb_allocate_mpx2 (u32int size, const char *name)

show_mcb_main.

The function of show MCB for commhand.

Parameters

argc	*The number of tokens found.*
argv	*The array of tokens.*

Returns

0 when finished with execution.

- int show_mcb_main (int argc, char **argv)

shutdown_mcb.

Shutdown the pcb during the shutdown procedure.

Returns

0 when finished with execution.

- void shutdown_mcb ()

Variables

- u32int start_of_memory

  Global variable labeling start of memory.

5.22.1 Detailed Description

Memory Control Block.

Author

Thunder Krakens

Date

April 8th, 2016

Version

R5

5.22.2 Macro Definition Documentation

5.22.2.1 #define MAX_HEAP_SIZE 5000

The maximum heap size.

5.22.3 Function Documentation

5.22.3.1 void init_heap (u32int *size*)

5.22.3.2 int is_mcb_empty ( )

5.22.3.3 void* mcb_allocate (u32int *mem_size*)

5.22.3.4 u32int mcb_allocate_mpx (u32int *size*)

5.22.3.5 void* mcb_allocate_mpx2 (u32int *size,* const char * *name*)

5.22.3.6 int mcb_free_mpx (void * *mem_ptr*)

5.22.3.7 void show_all_mcb ( )

5.22.3.8 void show_allocated_mcb ( )

5.22.3.9 void show_free_mcb ( )

5.22.3.10 void show_mcb (struct mcb * *mcb_ptr*)

5.22.3.11 int show_mcb_main (int *argc,* char ** *argv*)

5.22.3.12 void shutdown_mcb ( )

5.22.4 Variable Documentation

5.22.4.1 u32int start_of_memory

Global variable labeling start of memory.

5.23 modules/r6/ansi.h File Reference

Macros

- #define T_RESET ""
- #define T_BOLD ""
- #define T_BOLD_OFF ""
- #define T_ITCS ""
- #define T_ITCS_OFF ""
- #define T_NRM ""
- #define T_RED ""
- #define T_CYAN ""
- #define T_WHT ""
- #define B_NRM ""
- #define B_CYAN ""
- #define T_DIR ""
- #define T_DIR_OFF ""

5.23.1 Macro Definition Documentation

5.23.1.1 #define B_CYAN ""

5.23.1.2 #define B_NRM ""

5.23.1.3 #define T_BOLD ""

5.23.1.4 #define T_BOLD_OFF ""

5.23.1.5 #define T_CYAN ""

5.23.1.6 #define T_DIR ""

5.23.1.7 #define T_DIR_OFF ""

5.23.1.8 #define T_ITCS ""

5.23.1.9 #define T_ITCS_OFF ""

5.23.1.10 #define T_NRM ""

5.23.1.11 #define T_RED ""

5.23.1.12 #define T_RESET ""

5.23.1.13 #define T_WHT ""

5.24 modules/r6/disk_file_manager.h File Reference

Disk File Manager.

Functions

type_file

Prints the contents of a file

This function will print any contents of a file with the extensions "TXT", "BAT", "C", or "HTM" in pagination form.

Parameters

file_entry_ptr	*The pointer to the file entry*

Returns

The appropiate error code. See errno.h for details.

- error_t type_file (struct dir_entry_info *file_entry_ptr)

extract_file

Extracts a file's data contents into new file outside of the disk image.

Parameters

file_entry_ptr	*The pointer to the file entry*
out_file_path	*The destination to save the new 'copied' file*

Returns

The appropiate error code. See errno.h for details.

- error_t extract_file (struct dir_entry_info *file_entry_ptr, const char *out_file_path)

import_file

Imports a file into a directory

Parameters

in_file_path	*Where the file to be imported is located*
dest_dir	*The directory destination for the imported file*

Returns

The appropiate error code. See errno.h for details.

- error_t import_file (const char *in_file_path, struct dir_entry_info *dest_dir)

move_file

Moves files from destination to another

Parameters

file_entry	*The file entry pointer to be moved*
dest_dir	*The destination of the moved file*

Returns

The appropiate error code. See errno.h for details.

- error_t move_file (struct dir_entry_info *file_entry, struct dir_entry_info *dest_dir)
- error_t delete_file (struct dir_entry_info *file_entry)

5.24.1 Detailed Description

Disk File Manager.

Author

Thunder Krakens

Date

April 28th, 2016 This contains functions that deal with files

Version

R6

5.24.2 Function Documentation

5.24.2.1 error_t delete_file (struct dir_entry_info * *file_entry*)

5.24.2.2 error_t extract_file (struct dir_entry_info * *file_entry_ptr,* const char * *out_file_path*)

5.24.2.3 error_t import_file (const char * *in_file_path,* struct dir_entry_info * *dest_dir*)

5.24.2.4 error_t move_file (struct dir_entry_info * *file_entry,* struct dir_entry_info * *dest_dir*)

5.24.2.5 error_t type_file (struct dir_entry_info * *file_entry_ptr*)

5.25 modules/r6/disk_folder_manager.h File Reference

Disk Folder Manager.

Macros

- #define FOLDER_STACK_SIZE 1000

Functions

folder_manager_init

Initializes the folder manager

Initializes the folder stack. Reads the boot sector's volume label and sets it as the root folder.

- void folder_manager_init ()

push_folder

Pushes the current folder onto the folder stack

Pushes current onto the folder stack and sets the child folder as the current folder.

Parameters

child_folder_ptr	*the pointer to a child folder of the current folder*

- void push_folder (struct dir_entry_info *child_folder_ptr)

pop_folder

Pops folder off the folder stack

The current folder is now set to the previous folder from the popped folder.

- void pop_folder ()

print_dir_entry_info

Prints the file/directory's detailed information

Displays the filename, extension, logical file size, and starting cluster of the specified file/directory.

Parameters

folder_ptr	*pointer to the file entry*

- void print_dir_entry_info (struct dir_entry_info *entry_ptr)

list_dir_entry_report

Prints all content's detailed information of the current directory

Displays the filename, extension, logical file size, and starting cluster of all the files/directories contained in the current directory

- void list_dir_entry_report ()

list_dir_entry_short

Displays all contents in the current directory

Displays all the filenames and/or directories in the current folder.

- void list_dir_entry_short ()

print_curr_path

Displays the current directory's path

- void print_curr_path ()

rename_entry

Renames indicated file/folder's name

Ensures that it is a unique file name by checking all of the file names in the current file before renaming it.

Parameters

parent_dir_entry	*A pointer to the current directory*
file_entry	*A pointer to the file entry to rename*

new_name	*The file entry's new name*

Returns

The appropiate error code. See errno.h for details.

- error_t rename_entry (struct dir_entry_info *parent_dir_entry, struct dir_entry_info *file_entry, char *new_name)

get_entry_by_name

Retrieves the file/directory by name

Parameters

parent_dir_entry	*A pointer to the current directory of the file*
nameStr	*The name of the file/directory to retrieve*

Returns

Returns a pointer to the correct dir_entry_info struct or NULL if it is not found

- struct dir_entry_info * get_entry_by_name (const struct dir_entry_info *parent_dir_entry, char *nameStr)

get_entry

Retrieves the file/directory by it's full file path

Parameters

full_path	*The full file path of the*

- struct dir_entry_info * get_entry (char *full_path)

change_dir

Change the current directory to the specified path

Parameters

full_path	*The path to the new location*

- void change_dir (char *full_path)

list_files_entry_ext

Lists all the files with the indicated extension

Used when the wildcard '' is indicated as the filename. (Ex: *.txt will list all the files with the 'txt' extension)*

Parameters

ext	*extension of entry*

- void list_files_entry_ext (const char *ext)

list_files_entry_name

Lists all the files with the indicated name

Used when the wildcard '' is indicated as the extension. (Ex: filename.* will list all the files with the name 'filename')*

Parameters

name	*Name of the file*

- void list_files_entry_name (const char ∗name)

list_file_report

Lists the indicated file's full details

Displays the filename, extension, logical file size, and starting cluster of the indicated name and extension. If wildcard is true (1) then it will list the full details of the indicated. (Example. ∗.txt will list the full report of all files with the 'txt' extension)

Parameters

name	*name of file*
ext	*extension of file*
wildcard	*1 or 0 (true or false)*

- void list_file_report (const char ∗name, const char ∗ext, int wildcard)

print_report_heading

Prints the heading of the report.

- void print_report_heading ()

5.25.1 Detailed Description

Disk Folder Manager.

Author

Thunder Krakens

Date

April 28th, 2016 This contains functions that are related to the directory/folder.

Version

R6

5.25.2 Macro Definition Documentation

5.25.2.1 #define FOLDER_STACK_SIZE 1000

5.25.3 Function Documentation

5.25.3.1 void change_dir (char ∗ *full_path*)

5.25.3.2 void folder_manager_init ( )

5.25.3.3 struct dir_entry_info∗ get_entry (char ∗ *full_path*)

5.25.3.4 struct dir_entry_info* get_entry_by_name (const struct dir_entry_info * *parent_dir_entry,* char * *nameStr*)

5.25.3.5 void list_dir_entry_report ( )

5.25.3.6 void list_dir_entry_short ( )

5.25.3.7 void list_file_report (const char * *name,* const char * *ext,* int *wildcard*)

5.25.3.8 void list_files_entry_ext (const char * *ext*)

5.25.3.9 void list_files_entry_name (const char * *name*)

5.25.3.10 void pop_folder ( )

5.25.3.11 void print_curr_path ( )

5.25.3.12 void print_dir_entry_info (struct dir_entry_info * *entry_ptr*)

5.25.3.13 void print_report_heading ( )

5.25.3.14 void push_folder (struct dir_entry_info * *child_folder_ptr*)

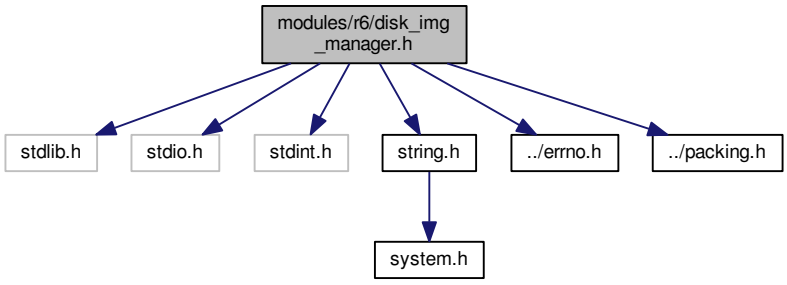
5.25.3.15 error_t rename_entry (struct dir_entry_info * *parent_dir_entry,* struct dir_entry_info * *file_entry,* char * *new_name*)

5.26 modules/r6/disk_img_manager.h File Reference

Disk Image Manager.

```
#include <stdlib.h>
#include <stdio.h>
#include <stdint.h>
#include <string.h>
#include "../errno.h"
#include "../packing.h"
```

Include dependency graph for disk_img_manager.h:



Data Structures

- struct img_boot_sector

  Structure containing the Boot Sector's information and data.
- struct dir_entry_info

  Structure containing the directory/file entry's information and data in sector.
- struct data_sector

  Structure containing the sector's data.
- struct fat_date

  Structure containing the date information.
- struct fat_time

  Structure containing the time information.

Macros

- #define ATTRIBUTE_READ 0x01
- #define ATTRIBUTE_HIDD 0x02
- #define ATTRIBUTE_SYST 0x04
- #define ATTRIBUTE_VOLL 0x08
- #define ATTRIBUTE_SUBD 0x10
- #define ATTRIBUTE_ARCH 0x20
- #define ATTRIBUTE_UUS1 0x40
- #define ATTRIBUTE_UUS2 0x80
- #define ATTR_ARCH_ONLY (!ATTRIBUTE_SYST & !ATTRIBUTE_VOLL & !ATTRIBUTE_SUBD & !ATTRIBUTE_UUS1 & !ATTRIBUTE_UUS2)

Functions

load_image_file

Loads the indeicated image file

Parameters

path_to_file	*String path to the image file*

Returns

The appropiate error code. See errno.h for details.

- error_t load_image_file (const char *path_to_file)

write_image_file

Writes to image file

Will write all changes made to the image

Returns

The appropiate error code. See errno.h for details.

- error_t write_image_file ()

print_boot_sec_info

Displays the boot sector information

Parameters

boot_sec	*Pointer to the boot sector*

- void print_boot_sec_info (const struct img_boot_sector *boot_sec)

clean_buffer

Clears the buffer

- void clean_buffers ()

ch_arr_to_str

Converts character array to a string

Parameters

dest	*Variable to hold converted string*
src	*Source char array*
size	*size of char array*

- void ch_arr_to_str (char *dest, const char *src, const unsigned int size)

str_to_ch_arr

Convert string to character array

Parameters

dest	*Variable to hold converted char array*
src	*Source string*
size	*size of string*

- void str_to_ch_arr (char *dest, const char *src, const unsigned int size)

get_fat_val

Retrieve FAT values

Parameters

copy_index	*Copies FAT Index*
byte_index	*Retrieves index in bytes*

- uint8_t * get_fat_val (const unsigned int copy_index, const unsigned int byte_index)

fat

Retrieve specified 12-bit value from the FAT array.

*Converts 2*1 byte to 12 bit.*

Parameters

fat_val	*FAT Value*
cluster_index	*Cluster Index*

- void fat (uint16_t *fat_val, const uint16_t cluster_index)

get_data_ptr

Retrieves the memory address of the data

Parameters

data_area_sec_-index	*Data sector index*

- void * get_data_ptr (const uint16_t data_area_sec_index)

write_fat

Writes the FAT value at the cluster index

Parameters

fat_val	*FAT value*
cluster_index	*Cluster index*

- void write_fat (const uint16_t fat_val, const uint16_t cluster_index)

find_unused_fat

Retrieves unused FAT index

Returns

the index of the FAT value for the fat array

- uint16_t find_unused_fat ()

calc_free_space

Calculates the free space in FAT

Returns

the value of free space.

- uint64_t calc_free_space ()

str_to_upper_case

Converts string characters to uppercase

Parameters

str	*String to conver to uppercase*
len	*The length of the string*

- void str_to_upper_case (char *str, const unsigned int len)

separate_file_name

Separates the filename string by name and extension.

Parameters

full_name	*The full name of the file (Example: file.ext)*
file_name	*The variable to store the filename*
file_ext	*The variable to store the file's extension*

Returns

The appropiate error code. See errno.h for details.

- error_t seperate_file_name (const char *full_name, char *file_name, char *file_ext)

get_fat_date

Stores FAT's date

Parameters

out_date	*A pointer to the struct that will hold the date*
fat_date_value	*The FAT date value*

- void get_fat_date (struct fat_date ∗out_date, const uint16_t fat_date_value)

get_fat_date_str

Stores the FAT's date in a string

Parameters

out_str	*The string to store the date's information*
fat_date_value	*The FAT date value*

- void get_fat_date_str (char ∗out_str, const uint16_t fat_date_value)

set_fat_time

Sets the FAT time

Parameters

in_time	*A pointer the time structure containing the information*
out_fat_time_value	*The FAT time value*

- void set_fat_time (const struct fat_time ∗in_time, uint16_t ∗out_fat_time_value)

get_fat_time

Stores the FAT time

Parameters

out_time	*A pointer to the structure containing the time*
fat_date_value	*The FAT time value*

- void get_fat_time (struct fat_time ∗out_time, const uint16_t fat_time_value)

get_fat_time_str

Stores the FAT's time in a string

Parameters

out_str	*The string to store the time's information*
fat_date_value	*The FAT date value*

- void get_fat_time_str (char ∗out_str, const uint16_t fat_time_value)

Variables

- struct img_boot_sector ∗ boot_sec
- struct dir_entry_info ∗ root_dir_file_arr
- struct data_sector ∗ data_area
- struct dir_entry_info ∗ root_dir_entry

5.26.1 Detailed Description

Disk Image Manager.

Author

Thunder Krakens

Date

April 28th, 2016

Version

R6

5.26.2 Macro Definition Documentation

5.26.2.1 #define ATTR_ARCH_ONLY (!ATTRIBUTE_SYST & !ATTRIBUTE_VOLL & !ATTRIBUTE_SUBD & !ATTRIBUTE_UUS1 & !ATTRIBUTE_UUS2)

5.26.2.2 #define ATTRIBUTE_ARCH 0x20

5.26.2.3 #define ATTRIBUTE_HIDD 0x02

5.26.2.4 #define ATTRIBUTE_READ 0x01

5.26.2.5 #define ATTRIBUTE_SUBD 0x10

5.26.2.6 #define ATTRIBUTE_SYST 0x04

5.26.2.7 #define ATTRIBUTE_UUS1 0x40

5.26.2.8 #define ATTRIBUTE_UUS2 0x80

5.26.2.9 #define ATTRIBUTE_VOLL 0x08

5.26.3 Function Documentation

5.26.3.1 uint64_t calc_free_space ( )

5.26.3.2 void ch_arr_to_str (char * *dest,* const char * *src,* const unsigned int *size*)

5.26.3.3 void clean_buffers ( )

5.26.3.4 void fat (uint16_t * *fat_val,* const uint16_t *cluster_index*)

5.26.3.5 uint16_t find_unused_fat ( )

5.26.3.6 void* get_data_ptr (const uint16_t *data_area_sec_index*)

5.26.3.7 void get_fat_date (struct fat_date * *out_date,* const uint16_t *fat_date_value*)

5.26.3.8 void get_fat_date_str (char * *out_str,* const uint16_t *fat_date_value*)

5.26.3.9 void get_fat_time (struct **fat_time** * *out_time,* const uint16_t *fat_time_value*)

5.26.3.10 void get_fat_time_str (char * *out_str,* const uint16_t *fat_time_value*)

5.26.3.11 uint8_t* get_fat_val (const unsigned int *copy_index,* const unsigned int *byte_index*)

5.26.3.12 **error_t** load_image_file (const char * *path_to_file*)

5.26.3.13 void print_boot_sec_info (const struct **img_boot_sector** * *boot_sec*)

5.26.3.14 **error_t** seperate_file_name (const char * *full_name,* char * *file_name,* char * *file_ext*)

5.26.3.15 void set_fat_time (const struct **fat_time** * *in_time,* uint16_t * *out_fat_time_value*)

5.26.3.16 void str_to_ch_arr (char * *dest,* const char * *src,* const unsigned int *size*)

5.26.3.17 void str_to_upper_case (char * *str,* const unsigned int *len*)

5.26.3.18 void write_fat (const uint16_t *fat_val,* const uint16_t *cluster_index*)

5.26.3.19 **error_t** write_image_file ( )

5.26.4 Variable Documentation

5.26.4.1 struct **img_boot_sector*** boot_sec

5.26.4.2 struct **data_sector*** data_area

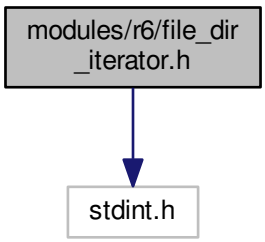
5.26.4.3 struct **dir_entry_info*** root_dir_entry

5.26.4.4 struct **dir_entry_info*** root_dir_file_arr

5.27 modules/r6/file_dir_iterator.h File Reference

File Directory Iterator.

```
#include <stdint.h>
```
Include dependency graph for file_dir_iterator.h:



Macros

- #define ROOT_DIR_SEC_INDEX 0

Functions

init_file_itr

Initializes the file iterator at the specified sector index

Returns

A pointer to the initialized file_itr

- struct file_itr * init_file_itr (const uint16_t sec_index)

fitr_begin

Starts the iterator

Parameters

itr_ptr	*Pointer of the iterator*

- void fitr_begin (struct file_itr *itr_ptr)

fitr_end

Checks if the iterator has reached the end of FAT (the last cluster in the file)

Parameters

itr_ptr	*Pointer of the iterator*

Returns

0 or 1 (true or false)

- uint8_t fitr_end (struct file_itr *itr_ptr)

fitr_next

Jumps to the next section in FAT

Parameters

itr_ptr	*Pointer of the iterator*

- void fitr_next (struct file_itr *itr_ptr)

fitr_get

Retrieves the data at the iterator

Parameters

itr_ptr	*Pointer of the iterator*

- struct data_sector * fitr_get (struct file_itr *itr_ptr)

init_dir_itr

Initializes the directory iterator at the specified sector's index

Parameters

sec_index	*Sector index*

- struct dir_itr * init_dir_itr (const uint16_t sec_index)

ditr_set_filter

Set's the directory iterator's attribute filter

Parameters

itr_ptr	*Pointer of the iterator*
attr_filter	*Attribute filter*

- void ditr_set_filter (struct dir_itr *itr_ptr, uint8_t attr_filter)

ditr_begin

Starts the directory iterator

Parameters

itr_ptr	*Pointer of the iterator*

- void ditr_begin (struct dir_itr *itr_ptr)

ditr_set_find_unused

Set up a search in directory iterator

Parameters

itr_ptr	*Pointer of the iterator*

- void ditr_set_find_unused (struct dir_itr *itr_ptr)

ditr_end

Check's if the iterator has reach to the last cluster in the file

Parameters

itr_ptr	*Pointer of the iterator*

- uint8_t ditr_end (struct dir_itr *itr_ptr)

ditr_next

Finds the next entry in directory

Parameters

itr_ptr	*Pointer of the iterator*

- void ditr_next (struct dir_itr *itr_ptr)

ditr_get

Gets the pointer that point to the current entry.

If the iterator had approched to the end, this will return NULL instead;

Parameters

itr_ptr	*Pointer of the iterator*

Returns

The pointer that point to the current entry. NULL if reached to the end.

- struct dir_entry_info * ditr_get (struct dir_itr *itr_ptr)

init_img_writer

Initialize the image writer

Parameters

entry_ptr	*The pointer of entry that this writer will write with.*

- struct img_writer * init_img_writer (struct dir_entry_info *entry_ptr)

iw_write

Function to write the image

Parameters

writer_ptr	*Pointer of the writer*
data	*The new data sector that needs to write.*

- void iw_write (struct img_writer *writer_ptr, const struct data_sector *data)

5.27.1 Detailed Description

File Directory Iterator.

Author

Thunder Krakens

Date

April 28th, 2016

Version

R6

5.27.2 Macro Definition Documentation

5.27.2.1 #define ROOT_DIR_SEC_INDEX 0

5.27.3 Function Documentation

5.27.3.1 void ditr_begin (struct dir_itr * *itr_ptr*)

5.27.3.2 uint8_t ditr_end (struct dir_itr * *itr_ptr*)

5.27.3.3 struct dir_entry_info* ditr_get (struct dir_itr * *itr_ptr*)

5.27.3.4 void ditr_next (struct dir_itr * *itr_ptr*)

5.27.3.5 void ditr_set_filter (struct dir_itr * *itr_ptr,* uint8_t *attr_filter*)

5.27.3.6 void ditr_set_find_unused (struct dir_itr * *itr_ptr*)

5.27.3.7 void fitr_begin (struct file_itr * *itr_ptr*)

5.27.3.8 uint8_t fitr_end (struct file_itr * *itr_ptr*)

5.27.3.9 struct data_sector* fitr_get (struct file_itr * *itr_ptr*)

5.27.3.10 void fitr_next (struct file_itr * *itr_ptr*)

5.27.3.11 struct dir_itr* init_dir_itr (const uint16_t *sec_index*)

5.27.3.12 struct file_itr* init_file_itr (const uint16_t *sec_index*)

5.27.3.13 struct img_writer* init_img_writer (struct dir_entry_info * *entry_ptr*)

5.27.3.14 void iw_write (struct img_writer * *writer_ptr,* const struct data_sector * *data*)

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