PotatOS

Generated by Doxygen 1.8.11

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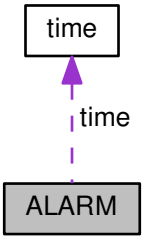
Data Structure Documentation

3.1 ALARM Struct Reference

Struct to hold alarm information.

`#include <alarmWrangler.h>`

Collaboration diagram for ALARM:



Data Fields

- char * **message**
- time_h **time**

3.1.1 Detailed Description

Struct to hold alarm information.

message The alarm message time The alarm execution time

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

- alarmWrangler.h

3.2 ALIAS Struct Reference

A struct to hold command aliases.

`#include <commandUtils.h>`

Data Fields

- char **c**
- char * **val**

3.2.1 Detailed Description

A struct to hold command aliases.

The ALIAS Struct is a custom struct that is designed to hold aliases for commands

Parameters

c	A string that will hold the initial command name
val	A string pointer that will point to the original command name

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

- commandUtils.h

3.3 COMMAND Struct Reference

A struct to hold commands.

`#include <commandUtils.h>`

Data Fields

- char * **str**
- int(* **func**)(char *)
- char * **alias**

3.3.1 Detailed Description

A struct to hold commands.

The COMMAND Struct is a custom struct that is designed to hold custom commands

Parameters

str	A string type to hold the name of the command
CommandPointer	A pointer to a command so that we can pass commands

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

- commandUtils.h

3.4 control_sequence Struct Reference

A struct to hold key mappings.

`#include <poll_input.h>`

Data Fields

- char **code** [8]
- int **id**

3.4.1 Detailed Description

A struct to hold key mappings.

The control_sequence Struct is a custom struct that is designed to hold mappings between control sequence codes used to encode arrow keys. It also holds other special buttons.

Parameters

code	The special keyboard code name
id	The keyboard code value

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

- poll_input.h

3.5 fakelong Struct Reference

Fake 64 bit integer.

`#include <time.h>`

Data Fields

- unsigned long int **lower**
- unsigned long int **upper**

3.5.1 Detailed Description

Fake 64 bit integer.

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

- time.h

3.6 HELP_PAGES Struct Reference

A struct to hold help outputs.

Data Fields

- char * **command_name**
- char * **command_help_page**

3.6.1 Detailed Description

A struct to hold help outputs.

The COMMAND Struct is a custom struct that is designed to hold custom commands

Parameters

str	A string type to hold the name of the command
command_help_page	A string that holds the actual help page

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

- cmdHelp.c

3.7 node Struct Reference

One element within the pcb queue.

```
#include <pcb_constants.h>
```

Collaboration diagram for node:

Data Fields

- pcb_t * **data**
- void * **next**
- void * **prev**
- unsigned char **flag**

3.7.1 Detailed Description

One element within the pcb queue.

This allows us to abbreviate code elsewhere... probably

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

- pcb_constants.h

3.8 pcb Struct Reference

Struct that contains all information related to a pcb.

`#include <pcb_constants.h>`

Data Fields

- char * **process_name**
- u32int **process_class**
- u32int **priority**
- u32int **last_time_run**
- u32int **state**
- char **stack** [2048]
- unsigned char * **stacktop**

3.8.1 Detailed Description

Struct that contains all information related to a pcb.

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

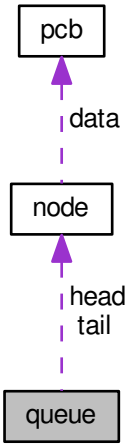
- pcb_constants.h

3.9 queue Struct Reference

Contains all the data needed to use/modify a queue.

`#include <pcb_constants.h>`

Collaboration diagram for queue:



Data Fields

- int **size**
- struct node * **head**
- struct node * **tail**

3.9.1 Detailed Description

Contains all the data needed to use/modify a queue.

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

- pcb_constants.h

3.10 time Struct Reference

A struct to all the time and date elements.

`#include <time.h>`

Data Fields

- int **seconds**
- int **minutes**
- int **hours**
- int **day_of_month**
- int **month**
- int **year**

3.10.1 Detailed Description

A struct to all the time and date elements.

The time Struct is a custom struct that is designed to hold all the elements necessary for time and date.

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

- time.h

Chapter 4

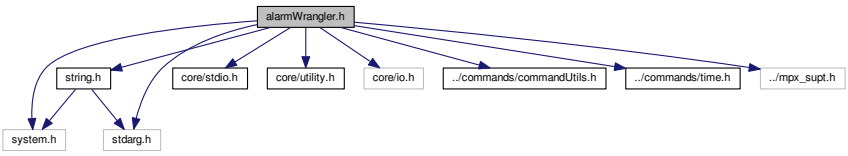
File Documentation

4.1 alarmWrangler.h File Reference

Contains all alarm processes and internal structures.

```
#include <string.h>
#include <core/stdio.h>
#include <core/utility.h>
#include <core/io.h>
#include <stdarg.h>
#include <system.h>
#include "../commands/commandUtils.h"
#include "../commands/time.h"
#include "../mpx_supt.h"
```

Include dependency graph for alarmWrangler.h:



Data Structures

- struct ALARM

  Struct to hold alarm information.

Macros

- #define **MAX_ALARM** 10

Functions

- int listAlarms ()

  List all alarms.
- int insertAlarm (char *message, char *dateIn)

  Insert an alarm into the array of alarms.
- int removeAlarm (const char *message)

  Remove an alarm from the array of alarms.
- int check ()

  Checks to see if any alarm has passed time and needs to send notification.
- void alarmProcess ()

  The Alarm Process that is initiated in Kmain.

4.1.1 Detailed Description

Contains all alarm processes and internal structures.

4.1.2 Function Documentation

4.1.2.1 void alarmProcess ( )

The Alarm Process that is initiated in Kmain.

Returns

Nothing

4.1.2.2 int check ( )

Checks to see if any alarm has passed time and needs to send notification.

Returns

Int SUCCESS/FAILURE

4.1.2.3 int insertAlarm (char * *message*, char * *dateIn*)

Insert an alarm into the array of alarms.

message The new alarms message dateIn The date and or time for the alarm to execute

Returns

Int SUCCESS/FAILURE

4.1.2.4 int listAlarms ( )

List all alarms.

Returns

Int SUCCESS/FAILURE

4.1.2.5 int removeAlarm (const char * *message*)

Remove an alarm from the array of alarms.

message The name of the alarm, message is name, that you are removing

Returns

Int SUCCESS/FAILURE

4.2 command_handler.h File Reference

The header file for the command handler for the Operating System.

Functions

- void command_handler ()

  Entry point for the command handler.

4.2.1 Detailed Description

The header file for the command handler for the Operating System.

4.3 commands.h File Reference

The header file for commands.c.

Functions

- int cmd_help (char *params)

  The help command will show a page to assist users with commands.
- int cmd_version (char *params)

  The version command will show the version information.
- int cmd_shutdown (char *params)

  shutdown the PotatOS
- int cmd_date (char *params)

  The date command will do one of two things. Show the current system date Set a new system date.
- int cmd_time (char *params)

  The time command will do one of two things. Show the current system time Set a new system time.
- int **cmd_test** (char *params)
- int cmd_clear (char *params)

  clears the screen and sets the pointer at home
- int cmd_create_pcb (char *params)

  Create a new pcb.
- int cmd_unblock_pcb (char *params)

  Unblock a pcb.
- int cmd_blockPCB (char *params)

  command to block PCB by name
- int cmd_resume (char *params)

  Resume PCB command.
- int cmd_suspend (char *params)

  Suspend PCB command.
- int cmd_show_pcb (char *params)

  Show PCB command.
- int cmd_show_all_pcbs (char *params)

  Show all PCBs command.
- int cmd_show_ready_pcbs (char *params)

  Show ready PCBs command.
- int cmd_show_blocked_pcbs (char *params)

  Show blocked PCBs command.
- int cmd_delete_pcb (char *params)

  command to delete PCB by name
- int cmd_set_priority_pcb (char *params)

  command to set PCB priority
- int cmd_potat (char *params)

  command to draw the potat
- int cmd_loadr3 (char *params)

  command to load r3 procs
- int cmd_yield (char *params)

  command to yield control from commhand
- int cmd_alias (char *params)

  Command to make an alias for a command.
- int cmd_alarm (char *params)

  Command to set/delete/list alarms.
- int cmd_infinity (char *params)

  The infinity alarm for R4.

4.3.1 Detailed Description

The header file for commands.c.

4.3.2 Function Documentation

4.3.2.1 int cmd_alarm (char * *params*)

Command to set/delete/list alarms.

Returns

SUCCESS or FAILURE

4.3.2.2 int cmd_alias (char * *params*)

Command to make an alias for a command.

Returns

SUCCESS

4.3.2.3 int cmd_blockPCB (char * *params*)

command to block PCB by name

Returns

Success or Failure

4.3.2.4 int cmd_clear (char * *params*)

clears the screen and sets the pointer at home

Parameters

params	param string typed by user

Returns

SUCCESS or FAILURE

4.3.2.5 int cmd_create_pcb (char * *params*)

Create a new pcb.

Parameters

params	string passed from command handler

Returns

SUCCESS or FAILURE

4.3.2.6 int cmd_date (char * *params*)

The date command will do one of two things. Show the current system date Set a new system date.

The date command can be used to query the systems RTC to display the current date. It can also be used to set the systems RTC to a desired date. There is code to check for illegal dates such as Feb 30 on a non leap year.

Parameters

params	param string typed by user

Returns

The current system date

Warning

The RTC only allows dates between 1700-2999

4.3.2.7 int cmd_delete_pcb (char * *params*)

command to delete PCB by name

Returns

Success if the PCB was removed, failure for anything else

4.3.2.8 int cmd_help (char * *params*)

The help command will show a page to assist users with commands.

The help command can be called to do one of two things List all the commands that have help pages Request a help page for a certain command

Parameters

params	param string typed by user

Returns

A help page

4.3.2.9 int cmd_infinity (char * *params*)

The infinity alarm for R4.

Returns

SUCCESS or FAILURE

4.3.2.10 int cmd_loadr3 (char * *params*)

command to load r3 procs

Returns

SUCCESS

4.3.2.11 int cmd_resume (char * *params*)

Resume PCB command.

Returns

SUCCESS or FAILURE

4.3.2.12 int cmd_set_priority_pcb (char * *params*)

command to set PCB priority

Returns

Success if the PCB priority was updated, failure for anything else

4.3.2.13 int cmd_shutdown (char * *params*)

shutdown the PotatOS

Parameters

params	string passed from command handler

Returns

SUCCESS or FAILURE

4.3.2.14 int cmd_suspend (char * *params*)

Suspend PCB command.

Returns

SUCCESS or FAILURE

4.3.2.15 int cmd_time (char * *params*)

The time command will do one of two things. Show the current system time Set a new system time.

The time command can be used to query the systems RTC to display the current time. It can also be used to set the systems RTC to a desired time. There is code to check for illegal times.

Parameters

params	param string typed by user

Returns

The current system time

Note

The time is kept in 24 hour time

4.3.2.16 int cmd_unblock_pcb (char * *params*)

Unblock a pcb.

Parameters

params	string passed from command handler

Returns

SUCCESS or FAILURE

4.3.2.17 int cmd_version (char * *params*)

The version command will show the version information.

The version command can be called to display the version information. The shortened return will just show the short version. The long return will include the current module, the version, and the contributing developers

Parameters

params	param string typed by user

Returns

A version page

4.3.2.18 int cmd_yield (char * *params*)

command to yield control from commhand

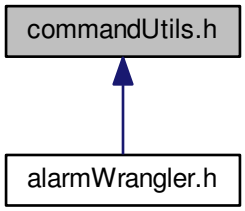
Returns

SUCCESS

4.4 commandUtils.h File Reference

Utilites that apply to all command files.

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



Data Structures

- struct ALIAS

  A struct to hold command aliases.
- struct COMMAND

  A struct to hold commands.

Macros

- #define CMDSIZE 100

  The command input buffer.
- #define SUCCESS 1

  Macro to return a 0 on success.
- #define FAILURE 0

  Macro to return a -1 on failure.
- #define MAXPARAMCOUNT 10

  The maximum parameters allowed per command.
- #define A_FLAG (1 << 0)
- #define B_FLAG (1 << 1)
- #define C_FLAG (1 << 2)
- #define D_FLAG (1 << 3)
- #define E_FLAG (1 << 4)
- #define F_FLAG (1 << 5)
- #define G_FLAG (1 << 6)
- #define H_FLAG (1 << 7)
- #define I_FLAG (1 << 8)
- #define J_FLAG (1 << 9)
- #define K_FLAG (1 << 10)
- #define L_FLAG (1 << 11)
- #define M_FLAG (1 << 12)
- #define N_FLAG (1 << 13)
- #define O_FLAG (1 << 14)
- #define P_FLAG (1 << 15)
- #define Q_FLAG (1 << 16)
- #define R_FLAG (1 << 17)
- #define S_FLAG (1 << 18)
- #define T_FLAG (1 << 19)
- #define U_FLAG (1 << 20)
- #define V_FLAG (1 << 21)
- #define W_FLAG (1 << 22)
- #define Y_FLAG (1 << 23)
- #define X_FLAG (1 << 24)
- #define Z_FLAG (1 << 25)
- #define NO_FLAG (1<<26)
- #define alphanum(c) (('a' <= c && c <= 'z') ? c - 'a' : c - 'A')

  A helper macro that will take a letter and return its integer equivalent.

Functions

- int set_flags (char *paramstr, int *flag, int num_aliases,...)

  Sets flags based on param string, flags and num aliases.
- char * get_pvalue (char c)

  Gets value of specific flag.
- char set_flags_search_alias (char *alias, int num_aliases, ALIAS aliases[])

  Used as a helper function for set_flags.
- COMMAND * search_commands (char *)

  search commands with a command name
- int **showAll** ()

Variables

- char gparamstr [CMDSIZE]

  A string to hold the command input up to the max command size.
- char * gparams [27]

  Will hold all the string pointers.

4.4.1 Detailed Description

Utilites that apply to all command files.

4.4.2 Macro Definition Documentation

4.4.2.1 #define A_FLAG (1 << 0)

cmd_help flags A flag binary bit shift macro

4.4.2.2 #define alphanum(c) (('a' <= c && c <= 'z') ? c - 'a' : c - 'A')

A helper macro that will take a letter and return its integer equivalent.

This is a helper macro that is used in set_flags and get_gparams. It takes in character and return the integer equivalent of that character.

Parameters

c	The character to be returned as an int

4.4.2.3 #define B_FLAG (1 << 1)

B flag binary bit shift macro

4.4.2.4 #define C_FLAG (1 << 2)

C flag binary bit shift macro

4.4.2.5 #define CMDSIZE 100

The command input buffer.

This a macro to store the command input buffer. Here we can change the amount of characters we allow to be entered into the command handler at once. We currently allow 100 characters.

4.4.2.6 #define D_FLAG (1 << 3)

D flag binary bit shift macro

4.4.2.7 #define E_FLAG (1 << 4)

E flag binary bit shift macro

4.4.2.8 #define F_FLAG (1 << 5)

F flag binary bit shift macro

4.4.2.9 #define G_FLAG (1 << 6)

G flag binary bit shift macro

4.4.2.10 #define H_FLAG (1 << 7)

H flag binary bit shift macro

4.4.2.11 #define I_FLAG (1 << 8)

I flag binary bit shift macro

4.4.2.12 #define J_FLAG (1 << 9)

J flag binary bit shift macro

4.4.2.13 #define K_FLAG (1 << 10)

K flag binary bit shift macro

4.4.2.14 #define L_FLAG (1 << 11)

L flag binary bit shift macro

4.4.2.15 #define M_FLAG (1 << 12)

M flag binary bit shift macro

4.4.2.16 #define N_FLAG (1 << 13)

N flag binary bit shift macro

4.4.2.17 #define NO_FLAG (1<<26)

NO flag binary bit shift macro

4.4.2.18 #define O_FLAG (1 << 14)

O flag binary bit shift macro

4.4.2.19 #define P_FLAG (1 << 15)

P flag binary bit shift macro

4.4.2.20 #define Q_FLAG (1 << 16)

Q flag binary bit shift macro

4.4.2.21 #define R_FLAG (1 << 17)

R flag binary bit shift macro

4.4.2.22 #define S_FLAG (1 << 18)

S flag binary bit shift macro

4.4.2.23 #define T_FLAG (1 << 19)

T flag binary bit shift macro

4.4.2.24 #define U_FLAG (1 << 20)

U flag binary bit shift macro

4.4.2.25 #define V_FLAG (1 << 21)

V flag binary bit shift macro

4.4.2.26 #define W_FLAG (1 << 22)

W flag binary bit shift macro

4.4.2.27 #define X_FLAG (1 << 24)

X flag binary bit shift macro

4.4.2.28 #define Y_FLAG (1 << 23)

Y flag binary bit shift macro

4.4.2.29 #define Z_FLAG (1 << 25)

Z flag binary bit shift macro

4.4.3 Function Documentation

4.4.3.1 char* get_pvalue (char *c*)

Gets value of specific flag.

Usage: get_pvalue('a');

Parameters

c	character of flag to get the value from

Returns

value after the flag specified

4.4.3.2 COMMAND* search_commands (char * *cmd*)

search commands with a command name

Returns

pointer to a COMMAND

search commands with a command name

Parameters

cmd	cmd typed by user

4.4.3.3 int set_flags (char * *paramstr,* int * *flag,* int *num_aliases, ...*)

Sets flags based on param string, flags and num aliases.

Usage: set_flags(paramstr,&flag,5, 'a',"alpha", 'b',"bravo", 'f',"foxtrot", 'g',"golf", 'r',"whiskey")

Parameters

paramstr	string that each command gets. Typed by the user
flag	pointer to integer flag
num_aliases	number of aliases specified

Returns

success or failure

Note

num_aliases must be the exact number of parameters. In the example, 5

4.4.3.4 char set_flags_search_alias (char * *alias,* int *num_aliases,* ALIAS *aliases[ ]*)

Used as a helper function for set_flags.

Parameters

alias	alias to search for in aliases
num_aliases	number of aliases in aliases
aliases	array of ALIASes to search through

Returns

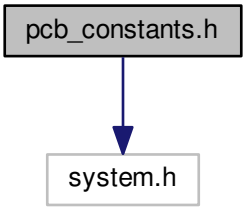
character of flag that it found

4.5 pcb_constants.h File Reference

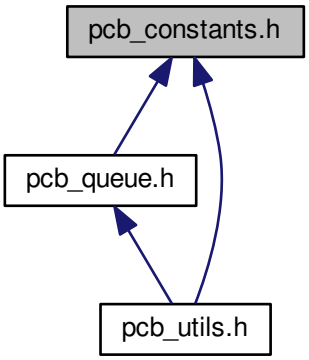
Contains all shared resources amongst all PCBs.

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

Include dependency graph for pcb_constants.h:



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



Data Structures

- struct pcb

  Struct that contains all information related to a pcb.
- struct node

  One element within the pcb queue.
- struct queue

  Contains all the data needed to use/modify a queue.

Macros

- #define **PCB_CONSTANTS_H**
- #define **DEFAULT_PRIORITY** 314159265

Typedefs

- typedef struct pcb pcb_t

  Struct that contains all information related to a pcb.
- typedef struct node node_t

  One element within the pcb queue.
- typedef struct queue queue_t

  Contains all the data needed to use/modify a queue.

Enumerations

- enum PROCESS_CLASS { **SYSTEM**, **APPLICATION** }

  Contains all possible process classes.
- enum PROCESS_STATE {
  RUNNING, **READY**, **BLOCKED**, **SUSPENDED_READY**,
  SUSPENDED_BLOCKED }

  Contains all possible process states.

4.5.1 Detailed Description

Contains all shared resources amongst all PCBs.

4.5.2 Typedef Documentation

4.5.2.1 typedef struct node node_t

One element within the pcb queue.

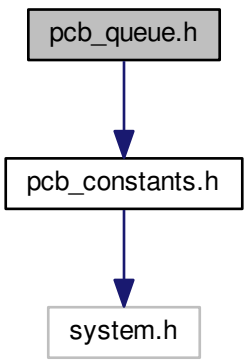
This allows us to abbreviate code elsewhere... probably

4.6 pcb_queue.h File Reference

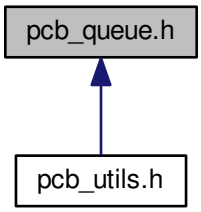
File to hold all queue functions.

```
#include "pcb_constants.h"
```

Include dependency graph for pcb_queue.h:



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



Functions

- void enqueue (queue_t *que, pcb_t *data)

  Appends an element to the end of the queue.
- void priority_enqueue (queue_t *cue, pcb_t *data)

  Appends an element onto the tail of the given queue.
- pcb_t * dequeue (queue_t *queue)

  Takes the PCB off of the head of the queue and moves head.
- queue_t * construct_queue ()

  Creates a queue.
- void destruct_queue (queue_t *queue)

  Destructs a queue and its contents.

4.6.1 Detailed Description

File to hold all queue functions.

4.6.2 Function Documentation

4.6.2.1 queue_t* construct_queue ( )

Creates a queue.

Creates and allocates a queue and sets all variables correctly for initialization.

Returns

A pointer to a newly constructed queue.

4.6.2.2 pcb_t* dequeue (queue_t * *queue*)

Takes the PCB off of the head of the queue and moves head.

Takes care of freeing the node returns the head PCB

Parameters

queue	A pointer to a queue that you want to dequeue the first element from.

Returns

A pointer to the dequed PCB

4.6.2.3 void destruct_queue (queue_t * *queue*)

Destructs a queue and its contents.

De-allocates a queue and all of the elements within it. This function exists to avoid memory leaks.

Parameters

queue	A pointer to the queue you wish to deallocate.

4.6.2.4 void enqueue (queue_t * *cue,* pcb_t * *data*)

Appends an element to the end of the queue.

This function searches for the end of the queue and, adds the specified pcb to the end of the list.

Parameters

que	A pointer to a queue that the PCB will be inserted into.
data	A pointer to the PCB to insert into the queue.

4.6.2.5 void priority_enqueue (queue_t * *cue,* pcb_t * *data*)

Appends an element onto the tail of the given queue.

This function inserts the given data (a PCB) into the queue according to priority.

Parameters

que	A poiter to the queue to insert the data into.
data	a pointer to the PCB that is to be inserted.

Note

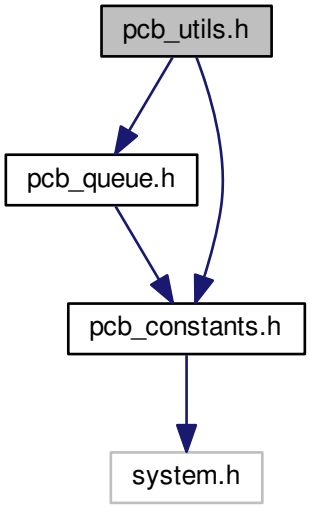
The data must point to a pcb with a valid priority.

4.7 pcb_utils.h File Reference

Utility functions for all PCBs.

```
#include "pcb_queue.h"
#include "pcb_constants.h"
```

Include dependency graph for pcb_utils.h:



Functions

- pcb_t * allocate_pcb ()
  simply allocates space for a pcb and returns that pointer
- pcb_t * setup_pcb (char *, PROCESS_CLASS, int priority)
  command to setup new PCB
- int free_pcb (pcb_t *)
  frees the space for a pcb
- pcb_t * find_pcb (char *pname)
  Finds a PCB in all queues.
- int **insert_pcb** (pcb_t *)
- pcb_t * remove_pcb (char *pname)
  Removes a PCB by process name.
- void init_queue ()
  Initializes queues.
- queue_t * get_ready_queue ()
  Getter function for the ready queue.
- queue_t * get_blocked_queue ()
  Getter function for the blocked queue.
- queue_t * get_suspended_ready_queue ()
  Getter function for the suspended ready queue.

- queue_t * get_suspended_blocked_queue ()

  Getter function for the suspended blocked queue.
- void print_pcb_info (const pcb_t *pcb)

  Prints the passed pcb's info in a stylized manner.
- const char * get_process_class_string (PROCESS_CLASS process_class)

  Returns a string corresponding to the process class enum.
- const char * get_process_state_string (PROCESS_STATE process_state)

  Returns a string corresponding to the process state enum.
- void kill_it___kill_it_all ()

4.7.1 Detailed Description

Utility functions for all PCBs.

4.7.2 Function Documentation

4.7.2.1 pcb_t* allocate_pcb ( )

simply allocates space for a pcb and returns that pointer

Returns

pointer to allocated pcb

4.7.2.2 pcb_t* find_pcb (char * *name*)

Finds a PCB in all queues.

Searches through all the system PCB queues to find a PCB with the specified process name given by pname.

Parameters

pname	The name of the process you want to find the PCB of.

Returns

A pointer to the pcb with the specified name or 'NULL' for not found.

4.7.2.3 int free_pcb (pcb_t * *p*)

frees the space for a pcb

Returns

Success or failure

4.7.2.4 queue_t* get_blocked_queue ( )

Getter function for the blocked queue.

Returns

A pointer to the blocked queue

4.7.2.5 const char* get_process_class_string (PROCESS_CLASS *process_class*)

Returns a string corresponding to the process class enum.

Parameters

process_class	An enumeration variant of the PROCESS_CLASS enum

Returns

A char pointer that is the enumeration name

4.7.2.6 const char* get_process_state_string (PROCESS_STATE *process_state*)

Returns a string corresponding to the process state enum.

Parameters

process_state	An enumeration variant of the PROCESS_STATE enum

Returns

A char pointer that is the enumeration name

4.7.2.7 queue_t* get_ready_queue ( )

Getter function for the ready queue.

Returns

A pointer to the ready queue

4.7.2.8 queue_t* get_suspended_blocked_queue ( )

Getter function for the suspended blocked queue.

Returns

A pointer to the suspended blocked queue

4.7.2.9 queue_t* get_suspended_ready_queue ( )

Getter function for the suspended ready queue.

Returns

A pointer to the suspended ready queue

4.7.2.10 void kill_it___kill_it_all ( )

kills the ready queue after commhand death

4.7.2.11 void print_pcb_info (const pcb_t * *pcb*)

Prints the passed pcb's info in a stylized manner.

Example output

Process Name: PROC1 Process Class: system State: ready Priority: 1 Suspended: true

4.7.2.12 pcb_t* remove_pcb (char * *name*)

Removes a PCB by process name.

Searches through all system queues to find the PCB with the given name.

Parameters

pname	Name of the process you want to remove.

Returns

Success condition (boolean).

4.7.2.13 pcb_t* setup_pcb (char * *pname,* PROCESS_CLASS *pclass,* int *priority*)

command to setup new PCB

Returns

Success if the PCB was created, failure for anything else

4.8 pcb_wrangler.h File Reference

Initiates the creation of all queues.

Functions

- void **init_process_queues** ()

4.8.1 Detailed Description

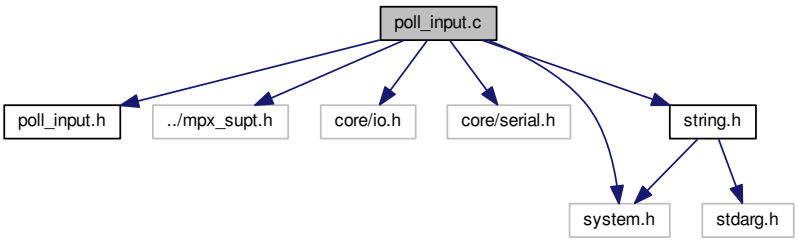
Initiates the creation of all queues.

4.9 poll_input.c File Reference

The polling input file that allows user input.

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

Include dependency graph for poll_input.c:



Macros

- #define **BUFFER_LEN** 100
- #define **LEAVE_TIME** 700

Functions

- int input_available ()

  Checks for input on COM1.
- int wait_for_input (int timeout)

  Loops N times to check for input.
- int get_key ()

  Receives a key press, whether a full control sequence or simple character.
- void move_cursor (int n)

  Moves the cursor n characters.
- void print_after_cursor (const char ∗str)

Prints text after the cursor without moving the cursor.

- void delete_after_cursor ()

  Deletes all text after the cursor.

- void memcpy (char *destination, const char *source, int n)

  Copies n bytes from one buffer to another.

- int poll_input (char *buffer, int *length)

  Polls COM1 for input and puts it into buffer.

Variables

- const ControlSequence control_sequences [ ]

  A collection of known control sequences and what they mean.

- const int TOLERANCE = 300

  Maximum amount of NOP cycles that can occur between two inputs from the same control sequence.

- const char ESC = '\x1B'

  The escape character.

- const int ALT_FLAG = 1 << 8

  The bit indicating a key from get_key was held with the ALT key.

4.9.1 Detailed Description

The polling input file that allows user input.

4.9.2 Function Documentation

4.9.2.1 int get_key ( )

Receives a key press, whether a full control sequence or simple character.

Calls inb(COM1) to receive bytes. If a control sequence is detected then it is parsed according to the control_↩ sequences array. If it was just a simple character like the A key. Then the char is sent as an int. Arrow keys and other control sequences are special numbers higher than 255 to differentiate themselves from the regular characters. The KEYS enum shows the special characters

Returns

Returns an int corresponding to the key

4.9.2.2 int input_available ( )

Checks for input on COM1.

Returns

1 if input is available, 0 if it isn't.

4.9.2.3 void memcpy (char * *destination*, const char * *source*, int *n*)

Copies n bytes from one buffer to another.

Parameters

destination	Where to copy the bytes to.
source	Where to copy the bytes from.
n	How many bytes to copy.

4.9.2.4 void move_cursor (int *n*)

Moves the cursor n characters.

Parameters

n	How many characters to move the character, can be negative.

4.9.2.5 int poll_input (char * *buffer,* int * *length*)

Polls COM1 for input and puts it into buffer.

An internal history is kept so the user can go through past commands

Parameters

buffer	a pointer to the buffer to put the user input into
length	a pointer to the length of buffer, will be modified to length of input

Returns

function status

4.9.2.6 void print_after_cursor (const char * *str*)

Prints text after the cursor without moving the cursor.

Parameters

str	A pointer to the string to print out

4.9.2.7 int wait_for_input (int *timeout*)

Loops N times to check for input.

Calls NOP in a while loop at most `timeout` times until it returns.

Parameters

timeout	How many times to loop before we give up

Returns

how many times were left in the timeout

4.9.3 Variable Documentation

4.9.3.1 const ControlSequence control_sequences[ ]

Initial value:

```
= {
  {"A", UP_ARROW},
  {"B", DOWN_ARROW},
  {"C", RIGHT_ARROW},
  {"D", LEFT_ARROW},

  {"1~", HOME},
  {"2~", INSERT},
  {"3~", DELETE},
  {"4~", END},
  {"5~", PAGE_DOWN},
  {"6~", PAGE_UP},

  {"[A", F1},
  {"[B", F2},
  {"[C", F3},
  {"[D", F4},
  {"[E", F5},
  {"17~", F6},
  {"18~", F7},
  {"19~", F8},
  {"20~", F9},
  {"21~", F10},
  {"23~", F11},
  {"24~", F12},

  {"", 0}
}
```

A collection of known control sequences and what they mean.

Control sequences are used to encode special input keys from the keyboard that aren't just a one byte character. They start with ESCAPE [and then a series of characters. This array holds the series of characters that comes after the bracket, along with the corresponding keyboard input. The keyboard inputs are from the KEYS enum.

4.9.3.2 const int TOLERANCE = 300

Maximum amount of NOP cycles that can occur between two inputs from the same control sequence.

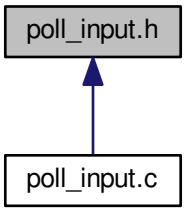
Note

This is entirely arbitrary and was just increased until things stopped being weird.

4.10 poll_input.h File Reference

The header file for the polling input.

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



Data Structures

- struct control_sequence
  A struct to hold key mappings.

Typedefs

- typedef struct control_sequence ControlSequence
  A struct to hold key mappings.

Enumerations

- enum **KEYS** {
  BASE = 1024, **UP_ARROW**, **DOWN_ARROW**, **RIGHT_ARROW**,
  LEFT_ARROW, **HOME**, **INSERT**, **DELETE**,
  END, **PAGE_UP**, **PAGE_DOWN**, **F1**,
  F2, **F3**, **F4**, **F5**,
  F6, **F7**, **F8**, **F9**,
  F10, **F11**, **F12** }

Functions

- int poll_input (char *buffer, int *length)
  Polls COM1 for input and puts it into buffer.

4.10.1 Detailed Description

The header file for the polling input.

4.10.2 Typedef Documentation

4.10.2.1 typedef struct control_sequence ControlSequence

A struct to hold key mappings.

The control_sequence Struct is a custom struct that is designed to hold mappings between control sequence codes used to encode arrow keys. It also holds other special buttons.

Parameters

code	The special keyboard code name
id	The keyboard code value

4.10.3 Function Documentation

4.10.3.1 int poll_input (char * *buffer*, int * *length*)

Polls COM1 for input and puts it into buffer.

An internal history is kept so the user can go through past commands

Parameters

buffer	a pointer to the buffer to put the user input into
length	a pointer to the length of buffer, will be modified to length of input

Returns

function status

4.11 splash.h File Reference

File to hold the splash screen.

Functions

- void draw_splash ()

  draw the splash screen

4.11.1 Detailed Description

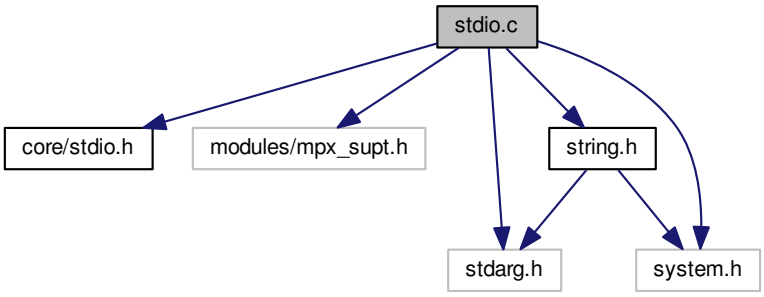
File to hold the splash screen.

4.12 stdio.c File Reference

Holds all implementation of standard I/O functions.

```
#include <core/stdio.h>
#include <modules/mpx_supt.h>
#include <stdarg.h>
#include <system.h>
#include <string.h>
```

Include dependency graph for stdio.c:



Functions

- int printf (char *form,...)

  takes in a format string and prints it out to the DEFAULT_DEVICE
- int puts (char *buff)

  prints out a string to DEFAULT_DEVICE

4.12.1 Detailed Description

Holds all implementation of standard I/O functions.

4.12.2 Function Documentation

4.12.2.1 int printf (char * *form,* ...)

takes in a format string and prints it out to the DEFAULT_DEVICE

c - charachter d/i - decimal integer x - hexadecimal integer s - string %% - percent sign Numbers can be included before the format specifier to declare alignment. i.e. %-10c = "c " A pad with 0s can also be added using a '0' directly after the percent i.e. %03c = "00c"

Parameters

form	character pointer to the format
valist	variadic arguments to match the format (see brief)

Returns

0 for failure 1 for success

4.12.2.2 int puts (char * *buff*)

prints out a string to DEFAULT_DEVICE

Parameters

buff	string to print out

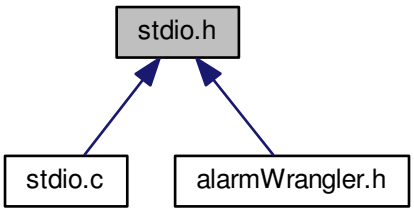
Returns

1

4.13 stdio.h File Reference

Holds all prototypes of standard I/O functions.

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



Functions

- int printf (char *form,...)

  takes in a format string and prints it out to the DEFAULT_DEVICE
- int puts (char *buffer)

  prints out a string to DEFAULT_DEVICE

4.13.1 Detailed Description

Holds all prototypes of standard I/O functions.

4.13.2 Function Documentation

4.13.2.1 int printf (char * *form*, ...)

takes in a format string and prints it out to the DEFAULT_DEVICE

c - charachter d/i - decimal integer x - hexadecimal integer s - string %% - percent sign Numbers can be included before the format specifier to declare alignment. i.e. %-10c = "c " A pad with 0s can also be added using a '0' directly after the percent i.e. %03c = "00c"

Parameters

form	character pointer to the format
valist	variadic arguments to match the format (see brief)

Returns

0 for failure 1 for success

4.13.2.2 int puts (char * *buff*)

prints out a string to DEFAULT_DEVICE

Parameters

buff	string to print out

Returns

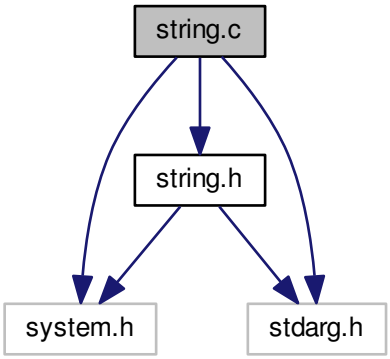
1

4.14 string.c File Reference

Holds all utility functions used to modify strings.

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

Include dependency graph for string.c:



Macros

- #define **F_MINUS** (1 << 0)
- #define **F_PLUS** (1 << 1)
- #define **F_PERCENT** (1 << 2)
- #define **F_ZERO** (1 << 3)

Typedefs

- typedef unsigned char **BYTE**

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 isdigit (char c)

  Checks if char c is a digit.
- char * reverse (char *str, int end)

  reverse a string from 0 to j
- char * itoa (int num, char *str, int base)

  Converts signed integer to string.
- char * utoa (u32int num, char *str, int base)

  Converts unsigned integer to string.
- char * sprintf_pad_helper (char *buffer, char pad, int fNum, int n, BYTE doAction)

adds spaces where needed for the sprintf function

- int sprintf_internal (char *buffer, char *format, va_list valist)

  Main implementation of the sprintf function.
- int sprintf (char *buffer, char *format,...)

  Visible representation of the sprintf function.
- char tolower (char c)

  Returns the lowercase representation of a charachter.
- char toupper (char c)

  Returns the uppercase representation of a charachter.
- char * trim (char *str)

  Returns a string with the begining and ending whitespaces removed.

4.14.1 Detailed Description

Holds all utility functions used to modify strings.

4.14.2 Function Documentation

4.14.2.1 int isdigit (char *c*)

Checks if char c is a digit.

Parameters

c	character to check

Returns

is digit: 1; is not digit: 0;

4.14.2.2 char* itoa (int *num*, char * *str*, int *base*)

Converts signed integer to string.

Parameters

num	number to convert
str	string to store result in
base	base to convert to

Returns

pointer to str

4.14.2.3 char* reverse (char * *str,* int *end*)

reverse a string from 0 to j

Parameters

str	string to reverse
j	index to reverse str to

Returns

pointer to str

4.14.2.4 int sprintf (char * *buffer,* char * *format,* ...)

Visible representation of the sprintf function.

c - charachter d/i - decimal integer x - hexadecimal integer s - string %% - percent sign Numbers can be included before the format specifier to declare alignment. i.e. %-10c = "c " A pad with 0s can also be added using a '0' directly after the percent i.e. %03c = "00c"

Parameters

buffer	character pointer to store spaces to
format	format string with format specifiers
valist	variadic list with parameters matching the format

Returns

pointer to buffer

4.14.2.5 int sprintf_internal (char * *buffer,* char * *format,* va_list *valist*)

Main implementation of the sprintf function.

c - charachter d/i - decimal integer x - hexadecimal integer s - string %% - percent sign Numbers can be included before the format specifier to declare alignment. i.e. %-10c = "c " A pad with 0s can also be added using a '0' directly after the percent i.e. %03c = "00c"

Parameters

buffer	character pointer to store spaces to
format	format string with format specifiers
valist	variadic list with parameters matching the format

Returns

pointer to buffer

4.14.2.6 char* sprintf_pad_helper (char * *buffer,* char *pad,* int *fNum,* int *n,* BYTE *doAction*)

adds spaces where needed for the sprintf function

Parameters

buffer	character pointer to store spaces to
pad	what character to pad with
fNum	format number from sprintf
n	length of string that has been/will be added
doAction	boolean on whether or not to add the spaces

Returns

pointer to buffer

4.14.2.7 char tolower (char *c*)

Returns the lowercase representation of a charachter.

Parameters

c	character to return the lowercase representation of

Returns

lowercase representation of c in ASCII

4.14.2.8 char toupper (char *c*)

Returns the uppercase representation of a charachter.

Parameters

c	character to return the uppercase representation of

Returns

uppercase representation of c in ASCII

4.14.2.9 char* trim (char * *str*)

Returns a string with the begining and ending whitespaces removed.

Parameters

str	the string to have white spaces removed from

Returns

a sting with the begining and ending whitespaces removed

4.14.2.10 char* utoa (u32int *num*, char * *str*, int *base*)

Converts unsigned integer to string.

Parameters

num	number to convert
str	string to store result in
base	base to convert to

Returns

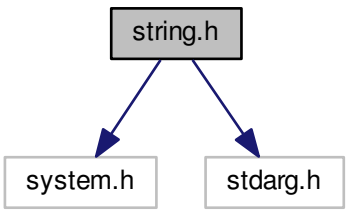
pointer to str

4.15 string.h File Reference

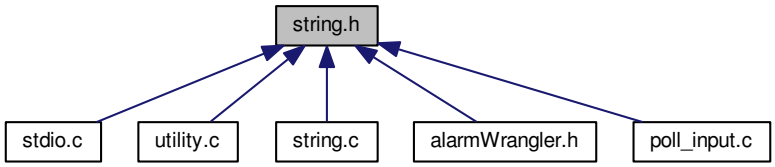
Holds all utility prototypes used to modify strings.

```
#include <system.h>
#include <stdarg.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 isdigit (char c)

  Checks if char c is a digit.
- char * reverse (char *str, int j)

  reverse a string from 0 to j
- int **atoi** (const char *s)
- char * itoa (int num, char *str, int base)

  Converts signed integer to string.
- char * utoa (u32int num, char *str, int base)

  Converts unsigned integer to string.
- int sprintf (char *buffer, char *format,...)

  Visible representation of the sprintf function.
- int sprintf_internal (char *buffer, char *format, va_list valist)

  Main implementation of the sprintf function.
- char tolower (char c)

  Returns the lowercase representation of a charachter.
- char toupper (char c)

  Returns the uppercase representation of a charachter.
- char * trim (char *str)

  Returns a string with the begining and ending whitespaces removed.

4.15.1 Detailed Description

Holds all utility prototypes used to modify strings.

4.15.2 Function Documentation

4.15.2.1 int isdigit (char *c*)

Checks if char c is a digit.

Parameters

c	character to check

Returns

is digit: 1; is not digit: 0;

4.15.2.2 char* itoa (int *num,* char * *str,* int *base*)

Converts signed integer to string.

Parameters

num	number to convert
str	string to store result in
base	base to convert to

Returns

pointer to str

4.15.2.3 char* reverse (char * *str,* int *end*)

reverse a string from 0 to j

Parameters

str	string to reverse
j	index to reverse str to

Returns

pointer to str

4.15.2.4 int sprintf (char * *buffer,* char * *format,* ...)

Visible representation of the sprintf function.

c - charachter d/i - decimal integer x - hexadecimal integer s - string %% - percent sign Numbers can be included before the format specifier to declare alignment. i.e. %-10c = "c " A pad with 0s can also be added using a '0' directly after the percent i.e. %03c = "00c"

Parameters

buffer	character pointer to store spaces to
format	format string with format specifiers
valist	variadic list with parameters matching the format

Returns

pointer to buffer

4.15.2.5 int sprintf_internal (char * *buffer,* char * *format,* va_list *valist*)

Main implementation of the sprintf function.

c - charachter d/i - decimal integer x - hexadecimal integer s - string %% - percent sign Numbers can be included before the format specifier to declare alignment. i.e. %-10c = "c " A pad with 0s can also be added using a '0' directly after the percent i.e. %03c = "00c"

Parameters

buffer	character pointer to store spaces to
format	format string with format specifiers
valist	variadic list with parameters matching the format

Returns

pointer to buffer

4.15.2.6 char tolower (char *c*)

Returns the lowercase representation of a charachter.

Parameters

c	character to return the lowercase representation of

Returns

lowercase representation of c in ASCII

4.15.2.7 char toupper (char *c*)

Returns the uppercase representation of a charachter.

Parameters

c	character to return the uppercase representation of

Returns

uppercase representation of c in ASCII

4.15.2.8 char* trim (char * *str*)

Returns a string with the begining and ending whitespaces removed.

Parameters

str	the string to have white spaces removed from

Returns

a sting with the begining and ending whitespaces removed

4.15.2.9 char* utoa (u32int *num,* char * *str,* int *base*)

Converts unsigned integer to string.

Parameters

num	number to convert
str	string to store result in
base	base to convert to

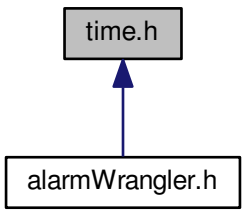
Returns

pointer to str

4.16 time.h File Reference

The header file for the date and time functions.

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



Data Structures

- struct time

  A struct to all the time and date elements.
- struct fakelong

  Fake 64 bit integer.

Macros

- #define **SECOND_REG** 0x00
- #define **MINUTE_REG** 0x02
- #define **HOUR_REG** 0x04
- #define **DAY_OF_MONTH_REG** 0x07
- #define **MONTH_REG** 0x08
- #define **CENTURY_REG** 0x32
- #define **YEAR_REG** 0x09
- #define **INDEX_REG** 0x70
- #define **DATA_REG** 0x71
- #define **MIN_YEAR** 1750
- #define **MAX_YEAR** 2500

Typedefs

- typedef struct time **time_h**

Enumerations

- enum **MONTH** {
  JANUARY = 1, **FEBRUARY**, **MARCH**, **APRIL**,
  MAY, **JUNE**, **JULY**, **AGUST**,
  SEPTEMBER, **OCTOBER**, **NOVEMBER**, **DECEMBER** }

Functions

- void format_time (char ∗dest, time_h ∗t)

  Generates a string with a standard format of time.
- time_h get_current_time ()

  Retrieves the current time in the Real Time Clock(RTC).
- int set_current_time (time_h time)

  Sets the current time in the RTC.
- int bcd_to_decimal (int bcd)

  Converts BCD values into decimal.
- struct fakelong rdtsc (void)

  return clock cycles since reset in a fake long long
- time_h ∗ **parseTandD** (time_h ∗dest, char ∗input)
- int **validTime** (char ∗hours, char ∗minutes, char ∗seconds)
- int **validDate** (char ∗year, char ∗month, char ∗day)
- int **compareTime** (time_h timeOne, time_h timeTwo)

4.16.1 Detailed Description

The header file for the date and time functions.

4.16.2 Function Documentation

4.16.2.1 int bcd_to_decimal (int *bcd*)

Converts BCD values into decimal.

This function converts BCD values, to be a more code friendly decimal value.

Parameters

bcd	Value that is in BCD that needs to be a normal decimal value.

Returns

The value of the BCD as an integer.

4.16.2.2 void format_time (char * *dest,* time_h * *t*)

Generates a string with a standard format of time.

Generates a string that contains all the data contained in a time_h. This form shows all data from largest timescale to smallest timescale.

Parameters

dest	Pointer to a string that is large enough to contain the output string
time	Pointer to the time to write into the destination string.

Returns

Return is through the 'dest' pointer.

Note

This is merely a convienience, as it is only an sprintf call.

4.16.2.3 time_h get_current_time ( )

Retrieves the current time in the Real Time Clock(RTC).

Aquires data from the RTC, packaging the data into a time_h struct for ease of use.

Returns

Returns the current time represented as 6 values in a time_h struct.

4.16.2.4 int set_current_time (time_h *time*)

Sets the current time in the RTC.

Uses a time_h struct to set the data members of the RTC. This function also does error checking on valid times, including leap-years, valid days of months, etc., to ensure the given time is valid.

Parameters

time	A time_h struct containing the new time, as defined by the user.

Returns

If the operation was successful in boolean format (1 = true, 0 = false).

Note

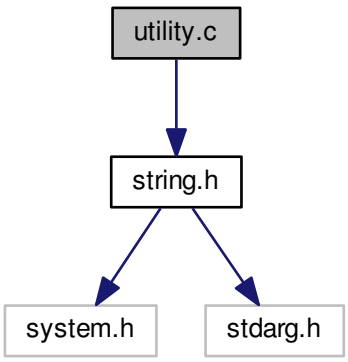
This function also ensures that the date will be set in the correct order within the RTC.
Setting a value in the input struct to a '-1' will skip the value in setting the time. Essentially, keeping the value as it was before. This is demonstrated in the commands.c file.

4.17 utility.c File Reference

Holds utility function implementations for this project.

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

Include dependency graph for utility.c:



Functions

- int isnullorspace (char test)

  Determines if a passed character is a null or space.

4.17.1 Detailed Description

Holds utility function implementations for this project.

4.17.2 Function Documentation

4.17.2.1 int isnullorspace (char *test*)

Determines if a passed character is a null or space.

Parameters

test	charachter to test

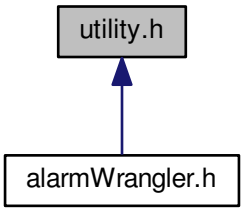
Returns

1 if space or null, 0 otherwise

4.18 utility.h File Reference

Holds utility function prototypes for this project.

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



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