CS23710 Assignment

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Data Structure Documentation

3.1 course Struct Reference

This data structure holds information about a course in the event.

`#include <course.h>`

Data Fields

- char course_id
  The course id.
- int nodes_size
  The number of nodes in the course.
- struct course * next
  Pointer to the next element in the list.
- int time_cp
  Number of check points where time is recorded in the course.
- int elements
  Number of node elements currently in the nodes array.
- int nodes [100]
  Array of nodes in the course.

3.1.1 Detailed Description

This data structure holds information about a course in the event.

A course consists of several nodes and a single capital letter to identify the course. This data structure is also used as a linked list, and so has a pointer to the next element in the list.

3.1.2 Field Documentation

3.1.2.1 char course::course_id

The course id.

The id is a single capital letter character.

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

- course.h

3.2 course_list Struct Reference

This is the course list.

`#include <course.h>`

Data Fields

- COURSE * head

  The head of the list.
- COURSE * tail

  The tail of the list.
- NODE_LIST * node_list

  A pointer to a NODE_LIST containing nodes that are used in this course.
- TRACK_LIST * track_list

  A pointer to a TRACK_LIST containing tracks that are used in this course.
- ENTRANT * entrants

  A pointer to a ENTRANT array containing entrants that are participating in this course.
- int size

  The size of the course list.

3.2.1 Detailed Description

This is the course list.

It is used to easily pass around the list and information about it to make working with it easier.

3.2.2 Field Documentation

3.2.2.1 ENTRANT* course_list::entrants

A pointer to a ENTRANT array containing entrants that are participating in this course.

The list may also contain entrants that are not participating in this course.

3.2.2.2 NODE_LIST* course_list::node_list

A pointer to a NODE_LIST containing nodes that are used in this course.

The list may also contain nodes that are not used in this course.

3.2.2.3 TRACK_LIST* course_list::track_list

A pointer to a TRACK_LIST containing tracks that are used in this course.

The list may also contain tracks that are not used in this course.

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

- course.h

3.3 cp_time Struct Reference

This data structure represents a check-in at a checkpoint.

`#include <cp_time.h>`

Data Fields

- NODE * node
  Pointer to the node that represents the checkpoint.
- char status
  The status of the entrant when he reaches the check point.
- TIME_STRUCT * time
  The string containing the time the entrant reached the CP.
- struct cp_time * next
  Pointer to the next element in the linked list.

3.3.1 Detailed Description

This data structure represents a check-in at a checkpoint.

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

- cp_time.h

3.4 cp_time_list Struct Reference

This structure is used to keep the list of CP_TIME elements.

`#include <cp_time.h>`

Data Fields

- CP_TIME * head
  Pointer to the head of the list.
- CP_TIME * tail
  Pointer to the tail of the list.
- int size
  Number of elements in the list.

3.4.1 Detailed Description

This structure is used to keep the list of CP_TIME elements.

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

- cp_time.h

3.5 entrant Struct Reference

A typedef of a struct representing a entrant in the competition.

`#include <entrant.h>`

Data Fields

- int comp_number

  The competitor number for the entrant.
- char course_id

  The Single letter course code for the course the entrant is participating in.
- int excluded

  Boolean used to denote if the entrant has been excluded from the race.
- char name [MAX_NAME_LENGTH]

  The name of the entrant.
- NODE * current_node

  The node the entrant currently is at.
- TIME_STRUCT * start_time

  The time the entrant reached the first check point.
- char total_time [20]

  The time the entrant has used so far.
- char status [20]

  The current status of the entrant.
- CP_TIME * last_cp

  Last check point the entrant was at.
- struct entrant * next

  A pointer to the next element in the linked list.
- CP_LIST * checkpoints

  List of check points the entrant has been at so far.

3.5.1 Detailed Description

A typedef of a struct representing a entrant in the competition.

3.5.2 Field Documentation

3.5.2.1 char entrant::status[20]

The current status of the entrant.

It can either be "Not Started", "Finished" or the id of the node the entrant last checked in at.

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

- entrant.h

3.6 entrant_list Struct Reference

This is the entrant list.

`#include <entrant.h>`

Data Fields

- ENTRANT * head

  Pointer to the head of the linked list.
- ENTRANT * tail

  Pointer to the tail of the linked list.
- int size

  The size of the linked list.

3.6.1 Detailed Description

This is the entrant list.

It is used to easily pass around the list and information about it to make working with it easier.

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

- entrant.h

3.7 event Struct Reference

The event structure holds information about the event such as the name, date, and time.

`#include <event.h>`

Data Fields

- char name [80]

  The name of the event.
- char date [80]

  The date of the event.
- char time [80]

  The time of the event.
- ENTRANT_LIST * entrants

  An array of the entrants participating in the event.
- NODE_LIST * nodes

  Linked list of all the courses in the event.
- TRACK_LIST * tracks

  List of all the tracks in this event.
- COURSE_LIST * courses

  List of all the courses in this event.

3.7.1 Detailed Description

The event structure holds information about the event such as the name, date, and time.

The structure also has a array of entrants and a linked list of the course nodes.

3.7.2 Field Documentation

3.7.2.1 char event::date[80]

The date of the event.

The date is in free text format, and no longer than 80 characters.

3.7.2.2 ENTRANT_LIST* event::entrants

An array of the entrants participating in the event.

The size of the array is dynamic.

3.7.2.3 char event::name[80]

The name of the event.

Name can not be longer than 80 characters.

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

- event.h

3.8 node Struct Reference

The node data structure represents a checkpoint in the course.

`#include <node.h>`

Data Fields

- int node_id

  The node id used to identify the node.
- char node_type [10]

  The node type.
- struct node * next

  Pointer to the next node element.
- int elements

  Number of track elements currently in the tracks array.
- TRACK tracks [100]

  Array of tracks for this node.

3.8.1 Detailed Description

The node data structure represents a checkpoint in the course.

There are several different checkpoints. Each node is identified by a positive integer. The data structure is also a linked list and has a pointer to the next element in the list.

3.8.2 Field Documentation

3.8.2.1 int node::node_id

The node id used to identify the node.

The id is a positive integer.

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

- node.h

3.9 node_list Struct Reference

This is the node list.

`#include <node.h>`

Data Fields

- NODE * head

  The head of the linked list.

- NODE * tail

  The tail of the linked list.

- int size

  The size of the linked list.

3.9.1 Detailed Description

This is the node list.

It is used to easily pass around the list and information about it to make working with it easier.

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

- node.h

3.10 time_struct Struct Reference

The structure used to represent time.

`#include <time_struct.h>`

Data Fields

- int **hours**
- int **minutts**
- char time_str [20]

  The current time in string format: xH yM.

3.10.1 Detailed Description

The structure used to represent time.

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

- time_struct.h

3.11 track Struct Reference

This structure holds the information about each track.

`#include <track.h>`

Data Fields

- int track_id

  The ID of the track.
- int start_id

  The ID of the start node.
- int end_id

  The ID of the end node.
- int time

  The estimated time a entrant should use to go from start to end.
- struct track * next

  Pointer to the next track element in the linked list.

3.11.1 Detailed Description

This structure holds the information about each track.

The structure also has a pinter to the another track to act as a linked list.

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

- track.h

3.12 track_list Struct Reference

This is the track list.

`#include <track.h>`

Data Fields

- TRACK * head

  Head of the list.
- TRACK * tail

  Tail of the list.
- int size

  Size of the list.

3.12.1 Detailed Description

This is the track list.

It is used to easily pass around the list and information about it to make working with it easier.

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

- track.h

Chapter 4

File Documentation

4.1 course.c File Reference

This file contains functions used to work with the course data structure.

```
#include <stdlib.h>
#include <stdio.h>
#include <errno.h>
#include <string.h>
#include "node.h"
#include "track.h"
#include "course.h"
#include "entrant.h"
```

Functions

- COURSE_LIST * read_courses (char *path, NODE_LIST *node_list, TRACK_LIST *track_list)

  This function reads and parses the file with the courses.
- int validate_course (COURSE course, NODE_LIST *node_list)

  Validates if the COURSE is combined of nodes with that tracks that are valid.
- COURSE * search_course_id (COURSE_LIST *list, char id)

  This function searches for a COURSE with the given ID.

Variables

- int **errno**

4.1.1 Detailed Description

This file contains functions used to work with the course data structure.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.11.25

4.1.2 Function Documentation

4.1.2.1 COURSE_LIST* read_courses (char * *path*, NODE_LIST * *node_list*, TRACK_LIST * *track_list*)

This function reads and parses the file with the courses.

The function will check that the node specified exists, and that there is a valid track between the nodes. The data should consist of a single capital character which will be the course ID. Followed by a positive integer which will be the number of nodes for the course. The rest of the line should be the ID of each node separated by spaces.

Parameters

path	Path to the file containing the course data.
node_list	Pointer to the node list. It is needed to verify that the nodes in the course exists.
track_list	Pointer to the track list. It is needed to verify that there is a valid path between the nodes of the course.

Returns

If the function is successful it will return a pointer to the first element of the list. If it fails it will return NULL.

4.1.2.2 COURSE* search_course_id (COURSE_LIST * *list*, char *id*)

This function searches for a COURSE with the given ID.

Parameters

list	List of the courses.
id	The ID of the COURSE you are looking for.

Returns

Returns a pointer to the COURSE if it is found, if it fails NULL is returned.

4.1.2.3 int validate_course (COURSE *course*, NODE_LIST * *node_list*)

Validates if the COURSE is combined of nodes with that tracks that are valid.

Parameters

course	The course you want to validate.
node_list	A list of nodes, this is needed to lookup the nodes.

Returns

Returns 1 if it is a valid COURSE. If the COURSE is invalid 0 is returned.

4.2 course.h File Reference

This file contains the definition of the course data structure and definitions of functions used to work with the data structure.

```
#include "entrant.h"
#include "node.h"
#include "track.h"
```

Data Structures

- struct course

  This data structure holds information about a course in the event.
- struct course_list

  This is the course list.

Typedefs

- typedef struct course COURSE

  This data structure holds information about a course in the event.
- typedef struct course_list COURSE_LIST

  This is the course list.

Functions

- int validate_course (COURSE course, NODE_LIST *node_list)

  Validates if the COURSE is combined of nodes with that tracks that are valid.
- COURSE_LIST * read_courses (char *path, NODE_LIST *node_list, TRACK_LIST *track_list)

  This function reads and parses the file with the courses.
- COURSE * search_course_id (COURSE_LIST *list, char id)

  This function searches for a COURSE with the given ID.

4.2.1 Detailed Description

This file contains the definition of the course data structure and definitions of functions used to work with the data structure.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.11.25

4.2.2 Typedef Documentation

4.2.2.1 typedef struct course COURSE

This data structure holds information about a course in the event.

A course consists of several nodes and a single capital letter to identify the course. This data structure is also used as a linked list, and so has a pointer to the next element in the list.

4.2.2.2 typedef struct course_list COURSE_LIST

This is the course list.

It is used to easily pass around the list and information about it to make working with it easier.

4.2.3 Function Documentation

4.2.3.1 COURSE_LIST* read_courses (char * *path*, NODE_LIST * *node_list*, TRACK_LIST * *track_list*)

This function reads and parses the file with the courses.

The function will check that the node specified exists, and that there is a valid track between the nodes. The data should consist of a single capital character which will be the course ID. Followed by a positive integer which will be the number of nodes for the course. The rest of the line should be the ID of each node separated by spaces.

Parameters

path	Path to the file containing the course data.
node_list	Pointer to the node list. It is needed to verify that the nodes in the course exists.
track_list	Pointer to the track list. It is needed to verify that there is a valid path between the nodes of the course.

Returns

If the function is successful it will return a pointer to the first element of the list. If it fails it will return NULL.

4.2.3.2 COURSE* search_course_id (COURSE_LIST * *list*, char *id*)

This function searches for a COURSE with the given ID.

Parameters

list	List of the courses.
id	The ID of the COURSE you are looking for.

Returns

Returns a pointer to the COURSE if it is found, if it fails NULL is returned.

4.2.3.3 int validate_course (COURSE *course*, NODE_LIST * *node_list*)

Validates if the COURSE is combined of nodes with that tracks that are valid.

Parameters

course	The course you want to validate.
node_list	A list of nodes, this is needed to lookup the nodes.

Returns

Returns 1 if it is a valid COURSE. If the COURSE is invalid 0 is returned.

4.3 cp_time.c File Reference

This file contains functions used to work with the CP_TIME data structure.

```
#include <stdio.h>
#include <stdlib.h>
#include <errno.h>
#include <string.h>
#include "cp_time.h"
#include "node.h"
#include "event.h"
#include "functions.h"
```

Functions

- int read_event_data (char *path, EVENT *event)

  This function reads the check point data from a file.

4.3.1 Detailed Description

This file contains functions used to work with the CP_TIME data structure.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.12.06

4.3.2 Function Documentation

4.3.2.1 int read_event_data (char * *path*, EVENT * *event*)

This function reads the check point data from a file.

Parameters

path	Path to the file containing the checkpoint data.
event	Event structure.

Returns

On success this function returns 1, 0 is returned on failure.

4.4 cp_time.h File Reference

This file contains the definition of the data structure used to represent a entrant checking in at a check point.

```
#include "node.h"
#include "time_struct.h"
```

Data Structures

- struct cp_time

  This data structure represents a check-in at a checkpoint.
- struct cp_time_list

  This structure is used to keep the list of CP_TIME elements.

Typedefs

- typedef struct cp_time CP_TIME

  This data structure represents a check-in at a checkpoint.
- typedef struct cp_time_list CP_LIST

  This structure is used to keep the list of CP_TIME elements.

4.4.1 Detailed Description

This file contains the definition of the data structure used to represent a entrant checking in at a check point.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.12.06

4.5 entrant.c File Reference

This file holds the functions used to work with the ENTRANT data structure.

```
#include <stdio.h>
#include <stdlib.h>
#include <errno.h>
#include <string.h>
#include "entrant.h"
#include "event.h"
#include "course.h"
#include "node.h"
#include "functions.h"
```

Functions

- ENTRANT_LIST * read_entrants (char *path)

  This function opens a file containing the data about the entrants.
- void update_status (ENTRANT *ent, EVENT *event)

  Updates the status of entrant.
- ENTRANT * entrant_id_search (int entrant_id, ENTRANT_LIST *entrants)

Searches the entrant list for a entrant that has the passed ID.

- ENTRANT * entrant_name_search (char *name, ENTRANT_LIST *entrants)

  Search the entrant list by name.

Variables

- int **errno**

4.5.1 Detailed Description

This file holds the functions used to work with the ENTRANT data structure.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.11.20

4.5.2 Function Documentation

4.5.2.1 ENTRANT* entrant_id_search (int *entrant_id,* ENTRANT_LIST * *entrants*)

Searches the entrant list for a entrant that has the passed ID.

Parameters

entrant_id	The ID of the entrant to search for.
entrants	List of entrants.

Returns

Returns a pointer to the entrant if found. If no entrant is found NULL is returned.

4.5.2.2 ENTRANT* entrant_name_search (char * *name,* ENTRANT_LIST * *entrants*)

Search the entrant list by name.

Parameters

name	Name of the entrant you are searching for.
entrants	List of entrants.

Returns

Returns a pointer to the entrant if found. If no entrant is found NULL is returned.

4.5.2.3 ENTRANT_LIST* read_entrants (char * *path*)

This function opens a file containing the data about the entrants.

The function does some simple error checking on the file, and will return a negative integer on failure. The Data

should include a positive integer that represents a id. A single capital character which is the id of the course the entrant has signed up for. Followed by a no longer than 80 characters long name.

Parameters

path	Path to the file you want to open.

Returns

Returns 1 if successful, a negative integer otherwise.

4.5.2.4 void update_status (ENTRANT * *ent*, EVENT * *event*)

Updates the status of entrant.

Valid statues are "Not Started", "Finished", or the id of the last node the entrant checked in at.

Parameters

ent	The entrant to update.
event	Event structure.

4.6 entrant.h File Reference

This file holds structures and values needed to work with entrants.

```
#include "cp_time.h"
#include "time_struct.h"
```

Data Structures

- struct entrant

  A typedef of a struct representing a entrant in the competition.
- struct entrant_list

  This is the entrant list.

Macros

- #define MAX_NAME_LENGTH 50

  As stated in assignment, no name is longer than 50 chars including spaces.
- #define ENTRANTS_MIN_SIZE 100

  Minimum size of the entrant array.
- #define ENT_FORMAT "%-5d%-50s%-10c%-15s%-15s%-10s\n"

  The format string used when printing out data about a entrant.

Typedefs

- typedef struct entrant ENTRANT

  A typedef of a struct representing a entrant in the competition.
- typedef struct entrant_list ENTRANT_LIST

  This is the entrant list.

Functions

- ENTRANT_LIST * read_entrants (char *path)

  This function opens a file containing the data about the entrants.
- ENTRANT * entrant_id_search (int entrant_id, ENTRANT_LIST *entrants)

  Searches the entrant list for a entrant that has the passed ID.
- void print_entrant (ENTRANT *entrant)

  Prints out nicely formated info about a entrant.
- void print_entrant_header ()

  Prints out the header used showing what each colum is.
- ENTRANT * entrant_name_search (char *name, ENTRANT_LIST *entrants)

  Search the entrant list by name.

4.6.1 Detailed Description

This file holds structures and values needed to work with entrants.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.11.20

4.6.2 Typedef Documentation

4.6.2.1 typedef struct entrant_list ENTRANT_LIST

This is the entrant list.

It is used to easily pass around the list and information about it to make working with it easier.

4.6.3 Function Documentation

4.6.3.1 ENTRANT* entrant_id_search (int *entrant_id*, ENTRANT_LIST * *entrants*)

Searches the entrant list for a entrant that has the passed ID.

Parameters

entrant_id	The ID of the entrant to search for.
entrants	List of entrants.

Returns

Returns a pointer to the entrant if found. If no entrant is found NULL is returned.

4.6.3.2 ENTRANT* entrant_name_search (char * *name*, ENTRANT_LIST * *entrants*)

Search the entrant list by name.

Parameters

name	Name of the entrant you are searching for.
entrants	List of entrants.

Returns

Returns a pointer to the entrant if found. If no entrant is found NULL is returned.

4.6.3.3 void print_entrant (ENTRANT * *entrant*)

Prints out nicely formated info about a entrant.

Parameters

entrant	The entrant to print out.

4.6.3.4 ENTRANT_LIST* read_entrants (char * *path*)

This function opens a file containing the data about the entrants.

The function does some simple error checking on the file, and will return a negative integer on failure. The Data should include a positive integer that represents a id. A single capital character which is the id of the course the entrant has signed up for. Followed by a no longer than 80 characters long name.

Parameters

path	Path to the file you want to open.

Returns

Returns 1 if successful, a negative integer otherwise.

4.7 event.c File Reference

This file contains function used to work with the event data structure.

```
#include <stdio.h>
#include <stdlib.h>
#include <errno.h>
#include "event.h"
#include "cp_time.h"
```

Functions

- EVENT * read_event (char *path)

  This function opens a file containing the name of the event, the date and, the time.

Variables

- int **errno**

4.7.1 Detailed Description

This file contains function used to work with the event data structure.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.12.02

4.7.2 Function Documentation

4.7.2.1 EVENT* read_event (char * *path*)

This function opens a file containing the name of the event, the date and, the time.

The file has 3 lines each no longer than 79 characters.

Parameters

path	Path to the file to read.

Returns

Returns 1 if successful, a negative integer otherwise.

4.8 event.h File Reference

This file contains the definition of the event structure and other variables related to the event.

```
#include "entrant.h"
#include "node.h"
#include "track.h"
#include "course.h"
```

Data Structures

- struct event

  The event structure holds information about the event such as the name, date, and time.

Typedefs

- typedef struct event EVENT

  The event structure holds information about the event such as the name, date, and time.

Functions

- EVENT * read_event (char *path)

  This function opens a file containing the name of the event, the date and, the time.

4.8.1 Detailed Description

This file contains the definition of the event structure and other variables related to the event.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.11.24

4.8.2 Typedef Documentation

4.8.2.1 typedef struct event EVENT

The event structure holds information about the event such as the name, date, and time.

The structure also has a array of entrants and a linked list of the course nodes.

4.8.3 Function Documentation

4.8.3.1 EVENT* read_event (char * *path*)

This function opens a file containing the name of the event, the date and, the time.

The file has 3 lines each no longer than 79 characters.

Parameters

path	Path to the file to read.

Returns

Returns 1 if successful, a negative integer otherwise.

4.9 functions.c File Reference

This file contains various functions for the program.

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include "functions.h"
#include "time_struct.h"
#include "entrant.h"
#include "event.h"
#include "course.h"
#include "cp_time.h"
#include "node.h"
#include "track.h"
```

Functions

- void calc_time (TIME_STRUCT *start, TIME_STRUCT *now, char *total_time)

This function calculates the time the entrant has used so far.

- TIME_STRUCT * format_time (char *time_str)

  Extracts the time from a string, eg 07:30, and stores it in the TIME_STRUCT type.
- void print_entrant_header ()

  Prints out the header used showing what each colum is.
- void print_entrant (ENTRANT *entrant)

  Prints out nicely formated info about a entrant.
- void not_started (EVENT *event)

  Prints out a nicely formated list of entrants that has not started yet.
- void finished (EVENT *event)

  Prints out a nicely formated list of entrants that has finished the course.
- void out_track (EVENT *event)

  Prints out a nicely formated list of all entrants that are currently out on the track.
- void print_all (EVENT *event)

  Prints out a nicely formated list of all entrants.
- int entrant_finished (EVENT *event, ENTRANT *entrant)

  This function checks if a user has finished the course the entrant is attending.
- void add_cp (EVENT *event, char status, NODE *node, ENTRANT *ent, char *time)

  This function is used to add a check point to a entrant.

4.9.1 Detailed Description

This file contains various functions for the program.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.12.04

4.9.2 Function Documentation

4.9.2.1 void add_cp (EVENT * *event*, char *status*, NODE * *node*, ENTRANT * *ent*, char * *time*)

This function is used to add a check point to a entrant.

Parameters

event	Event structure with data about the event.
status	The status read from file.
node	Pointer to the node that is the checkpoint.
ent	The entrant that checked in at the check point
time	Time string of the time.

4.9.2.2 void calc_time (TIME_STRUCT * *start*, TIME_STRUCT * *now*, char * *total_time*)

This function calculates the time the entrant has used so far.

Parameters

start	The time the entrant started
now	The time now.
total_time	String buffer to store the result.

4.9.2.3 int entrant_finished (EVENT * *event*, ENTRANT * *entrant*)

This function checks if a user has finished the course the entrant is attending.

The function creates a array of all check points in the course where time is recorded. It then compares the contents of the array with the checkpoints the entrant has been to. If they are in the same order and equal the entrant is finished.

Parameters

event	Event structure containing data the function needs.
entrant	The entrant you want to check.

Returns

If the entrant is finished 1 is returned, if the entrant is not finished 0 is returned.

4.9.2.4 void finished (EVENT * *event*)

Prints out a nicely formated list of entrants that has finished the course.

Parameters

event	Event structure.

4.9.2.5 TIME_STRUCT* format_time (char * *time_str*)

Extracts the time from a string, eg 07:30, and stores it in the TIME_STRUCT type.

Parameters

time_str	THe string containing the time you want to extract.

Returns

If successful the function returns a pointer to a TIME_STRUCT. NULL is returned if the function fails.

4.9.2.6 void not_started (EVENT * *event*)

Prints out a nicely formated list of entrants that has not started yet.

Parameters

event	Event structure.

4.9.2.7 void out_track (EVENT * *event*)

Prints out a nicely formated list of all entrants that are currently out on the track.

Parameters

event	Event structure.

4.9.2.8 void print_all (EVENT * *event*)

Prints out a nicely formated list of all entrants.

Parameters

event	Event structure.

4.9.2.9 void print_entrant (ENTRANT * *entrant*)

Prints out nicely formated info about a entrant.

Parameters

entrant	The entrant to print out.

4.10 functions.h File Reference

This file contains definitions of various functions.

```
#include "node.h"
#include "track.h"
#include "event.h"
#include "entrant.h"
#include "time_struct.h"
```

Functions

- TRACK_LIST * read_tracks (char *path, NODE_LIST *list)

  This function reads in and parses a file containing the track data.
- TIME_STRUCT * format_time (char *time_str)

  Extracts the time from a string, eg 07:30, and stores it in the TIME_STRUCT type.
- void calc_time (TIME_STRUCT *start, TIME_STRUCT *now, char *total_time)

  This function calculates the time the entrant has used so far.
- int read_event_data (char *path, EVENT *event)

  This function reads the check point data from a file.
- void update_status (ENTRANT *ent, EVENT *event)

  Updates the status of entrant.
- void not_started (EVENT *event)

  Prints out a nicely formated list of entrants that has not started yet.
- void finished (EVENT *event)

  Prints out a nicely formated list of entrants that has finished the course.
- void out_track (EVENT *event)

Prints out a nicely formated list of all entrants that are currently out on the track.

- void print_all (EVENT *event)

  Prints out a nicely formated list of all entrants.

- int entrant_finished (EVENT *event, ENTRANT *entrant)

  This function checks if a user has finished the course the entrant is attending.

- void add_cp (EVENT *event, char status, NODE *node, ENTRANT *ent, char *time)

  This function is used to add a check point to a entrant.

4.10.1 Detailed Description

This file contains definitions of various functions.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.11.30

4.10.2 Function Documentation

4.10.2.1 void add_cp (EVENT * *event*, char *status*, NODE * *node*, ENTRANT * *ent*, char * *time*)

This function is used to add a check point to a entrant.

Parameters

event	Event structure with data about the event.
status	The status read from file.
node	Pointer to the node that is the checkpoint.
ent	The entrant that checked in at the check point
time	Time string of the time.

4.10.2.2 void calc_time (TIME_STRUCT * *start*, TIME_STRUCT * *now*, char * *total_time*)

This function calculates the time the entrant has used so far.

Parameters

start	The time the entrant started
now	The time now.
total_time	String buffer to store the result.

4.10.2.3 int entrant_finished (EVENT * *event*, ENTRANT * *entrant*)

This function checks if a user has finished the course the entrant is attending.

The function creates a array of all check points in the course where time is recorded. It then compares the contents of the array with the checkpoints the entrant has been to. If they are in the same order and equal the entrant is finished.

Parameters

event	Event structure containing data the function needs.
entrant	The entrant you want to check.

Returns

If the entrant is finished 1 is returned, if the entrant is not finished 0 is returned.

4.10.2.4 void finished (EVENT * *event*)

Prints out a nicely formated list of entrants that has finished the course.

Parameters

event	Event structure.

4.10.2.5 TIME_STRUCT* format_time (char * *time_str*)

Extracts the time from a string, eg 07:30, and stores it in the TIME_STRUCT type.

Parameters

time_str	THe string containing the time you want to extract.

Returns

If successful the function returns a pointer to a TIME_STRUCT. NULL is returned if the function fails.

4.10.2.6 void not_started (EVENT * *event*)

Prints out a nicely formated list of entrants that has not started yet.

Parameters

event	Event structure.

4.10.2.7 void out_track (EVENT * *event*)

Prints out a nicely formated list of all entrants that are currently out on the track.

Parameters

event	Event structure.

4.10.2.8 void print_all (EVENT * *event*)

Prints out a nicely formated list of all entrants.

Parameters

event	Event structure.

4.10.2.9 int read_event_data (char * *path*, EVENT * *event*)

This function reads the check point data from a file.

Parameters

path	Path to the file containing the checkpoint data.
event	Event structure.

Returns

On success this function returns 1, 0 is returned on failure.

4.10.2.10 TRACK_LIST* read_tracks (char * *path*, NODE_LIST * *node_list*)

This function reads in and parses a file containing the track data.

It uses this data to create a linked list of the tracks. The file should have data about paths between nodes and the maximum time a entrant should use between the nodes.

Parameters

path	The path to the file containing the track data.
node_list	Pointer to the list of nodes, the list is needed to look up the nodes that are used in the track data to verify that the track is between nodes that exist.

Returns

Upon success this function returns a pointer to the first element in the linked list. If it fails it will return NULL.

4.10.2.11 void update_status (ENTRANT * *ent*, EVENT * *event*)

Updates the status of entrant.

Valid statues are "Not Started", "Finished", or the id of the last node the entrant checked in at.

Parameters

ent	The entrant to update.
event	Event structure.

4.11 input.c File Reference

This file holds functions related to getting input from the user.

```
#include <stdio.h>
#include <stdlib.h>
#include <string.h>
#include "entrant.h"
#include "node.h"
#include "track.h"
#include "course.h"
#include "functions.h"
```

Functions

- int ask_int (char *question, int min, int max)

  This function asks the user a question and takes a single integer between a set range as input.
- void ask_str (char *question, char *response)

  This function ask the user a question and takes a line or up to 255 characters of input.
- ENTRANT_LIST * get_entrants ()

  This function prompts the user with a question asking for the path to a file containing data on entrants.
- NODE_LIST * get_nodes ()

  This function prompts the user with a question asking for the path to a file containing data on nodes.
- TRACK_LIST * get_tracks (NODE_LIST *node_list)

  This function prompts the user with a question asking for the path to a file containing data on tracks.
- EVENT * get_event ()

  Prompts the user with a question about the path to the file containing the date about the event.
- COURSE_LIST * get_courses (NODE_LIST *nodes, TRACK_LIST *tracks)

  Prompts the user about the path to a file containing data about courses.
- void get_cp_data (EVENT *event)

  Prompts the user with the question to enter the path to the filename containing the checkpoint data.
- void load_cp_data (EVENT *event)

  Prompts the user with the choice of loading the check point data from file or entering it manually.
- int show_menu ()

  This function prints out the main user menu the user will use to interact with the different parts of the program .
- ENTRANT * query_entrant (EVENT *event)

  Searches for a entrant either by name or id given by the user.

4.11.1 Detailed Description

This file holds functions related to getting input from the user.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.12.1

4.11.2 Function Documentation

4.11.2.1 int ask_int (char * *question*, int *min*, int *max*)

This function asks the user a question and takes a single integer between a set range as input.

The function will repeat the question until a valid integer is entered as input.

Parameters

question	String with the question you want to ask the user.
min	Minimum limit of the range.
max	Maximum limit of the range.

Returns

The integer value the user inputted.

4.11.2.2 void ask_str (char * *question*, char * *response*)

This function ask the user a question and takes a line or up to 255 characters of input.

The input is copied into a buffer which should not be smaller than 256 characters.

Parameters

question	String with the question you want to ask the user.
response	The buffer the response is copied into. This buffer should not be smaller than 256 characters.

4.11.2.3 COURSE_LIST* get_courses (NODE_LIST * *nodes*, TRACK_LIST * *tracks*)

Prompts the user about the path to a file containing data about courses.

The data should consist of a single capital character which will be the course ID. Followed by a positive integer which will be the number of nodes for the course. The rest of the line should be the ID of each node separated by spaces.

Parameters

nodes	Pointer to a populated linked list of nodes. The nodes are needed to verify that the course is made of known nodes.
tracks	Pointer to a populated linked list of tracks. The tracks are needed to verify that there is a valid path from start to goal.

Returns

The function returns a pointer to a linked list of courses if successful. If it fails NULL is returned.

4.11.2.4 void get_cp_data (EVENT * *event*)

Prompts the user with the question to enter the path to the filename containing the checkpoint data.

Parameters

event	The result are stored in this variable.

4.11.2.5 ENTRANT_LIST* get_entrants ( )

This function prompts the user with a question asking for the path to a file containing data on entrants.

The Data should include a positive integer that represents a id. A single capital character which is the id of the course the entrant has signed up for. Followed by a no longer than 80 characters long name.

Returns

The function returns a pointer to a ENTRANT array if the function was successful. If it fails the function returns NULL.

4.11.2.6 EVENT* get_event ( )

Prompts the user with a question about the path to the file containing the date about the event.

The file should have date about the name event, start time and date.

Returns

If the function is successful it will return a pointer to a event populated with the data from the file. If i fails NULL is returned.

4.11.2.7 NODE_LIST* get_nodes ( )

This function prompts the user with a question asking for the path to a file containing data on nodes.

The data should contain a node ID and a short string used to identify what type of node the node is.

Returns

The function returns a pointer to a NODE_LIST, the NODE_LIST will be populated with data if successful. If it fails NULL is returned.

4.11.2.8 TRACK_LIST* get_tracks (NODE_LIST * *node_list*)

This function prompts the user with a question asking for the path to a file containing data on tracks.

The file should have data about paths between nodes and the maximum time a entrant should use between the nodes.

Parameters

node_list	A pointer to a NODE_LIST, it should be populated. The nodes are needed to ensure that the tracks does not contain none existing nodes.

Returns

This function returns a pointer to a TRACK_LIST if successful. If the function fails NULL is returned.

4.11.2.9 void load_cp_data (EVENT * *event*)

Prompts the user with the choice of loading the check point data from file or entering it manually.

Parameters

event	Event data structure. The result will be stored in this variable.

4.11.2.10 ENTRANT* query_entrant (EVENT * *event*)

Searches for a entrant either by name or id given by the user.

The function prompts the user with the choice of searching by name or by the entrant id.

Parameters

event	Event structure. The result will be stored in this variable.

Returns

If successful the function returns a pointer to the entrant. If it fails NULL is returned.

4.11.2.11 int show_menu ( )

This function prints out the main user menu the user will use to interact with the different parts of the program .

The user is given the choice to go to several different sub menus. The function takes a integer as input and returns the input.

Returns

User inputed integer.

4.12 input.h File Reference

This file contains function definitions for input.c.

```
#include "entrant.h"
```

Functions

- ENTRANT_LIST * get_entrants ()

  This function prompts the user with a question asking for the path to a file containing data on entrants.
- NODE_LIST * get_nodes ()

  This function prompts the user with a question asking for the path to a file containing data on nodes.
- TRACK_LIST * get_tracks (NODE_LIST *node_list)

  This function prompts the user with a question asking for the path to a file containing data on tracks.
- EVENT * get_event ()

  Prompts the user with a question about the path to the file containing the date about the event.
- COURSE_LIST * get_courses (NODE_LIST *nodes, TRACK_LIST *tracks)

  Prompts the user about the path to a file containing data about courses.
- int show_menu ()

  This function prints out the main user menu the user will use to interact with the different parts of the program .
- ENTRANT * query_entrant (EVENT *event)

  Searches for a entrant either by name or id given by the user.
- int ask_int (char *question, int min, int max)

  This function asks the user a question and takes a single integer between a set range as input.
- void ask_str (char *question, char *response)

  This function ask the user a question and takes a line or up to 255 characters of input.
- void get_cp_data (EVENT *event)

  Prompts the user with the question to enter the path to the filename containing the checkpoint data.
- void load_cp_data (EVENT *event)

  Prompts the user with the choice of loading the check point data from file or entering it manually.

4.12.1 Detailed Description

This file contains function definitions for input.c.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.11.30

4.12.2 Function Documentation

4.12.2.1 int ask_int (char * *question*, int *min*, int *max*)

This function asks the user a question and takes a single integer between a set range as input.

The function will repeat the question until a valid integer is entered as input.

Parameters

question	String with the question you want to ask the user.
min	Minimum limit of the range.
max	Maximum limit of the range.

Returns

The integer value the user inputted.

4.12.2.2 void ask_str (char * *question*, char * *response*)

This function ask the user a question and takes a line or up to 255 characters of input.

The input is copied into a buffer which should not be smaller than 256 characters.

Parameters

question	String with the question you want to ask the user.
response	The buffer the response is copied into. This buffer should not be smaller than 256 characters.

4.12.2.3 COURSE_LIST* get_courses (NODE_LIST * *nodes*, TRACK_LIST * *tracks*)

Prompts the user about the path to a file containing data about courses.

The data should consist of a single capital character which will be the course ID. Followed by a positive integer which will be the number of nodes for the course. The rest of the line should be the ID of each node separated by spaces.

Parameters

nodes	Pointer to a populated linked list of nodes. The nodes are needed to verify that the course is made of known nodes.
tracks	Pointer to a populated linked list of tracks. The tracks are needed to verify that there is a valid path from start to goal.

Returns

The function returns a pointer to a linked list of courses if successful. If it fails NULL is returned.

4.12.2.4 void get_cp_data (EVENT * *event*)

Prompts the user with the question to enter the path to the filename containing the checkpoint data.

Parameters

event	The result are stored in this variable.

4.12.2.5 ENTRANT_LIST* get_entrants ( )

This function prompts the user with a question asking for the path to a file containing data on entrants.

The Data should include a positive integer that represents a id. A single capital character which is the id of the course the entrant has signed up for. Followed by a no longer than 80 characters long name.

Returns

The function returns a pointer to a ENTRANT array if the function was successful. If it fails the function returns NULL.

4.12.2.6 EVENT* get_event ( )

Prompts the user with a question about the path to the file containing the date about the event.

The file should have date about the name event, start time and date.

Returns

If the function is successful it will return a pointer to a event populated with the data from the file. If i fails NULL is returned.

4.12.2.7 NODE_LIST* get_nodes ( )

This function prompts the user with a question asking for the path to a file containing data on nodes.

The data should contain a node ID and a short string used to identify what type of node the node is.

Returns

The function returns a pointer to a NODE_LIST, the NODE_LIST will be populated with data if successful. If it fails NULL is returned.

4.12.2.8 TRACK_LIST* get_tracks (NODE_LIST * *node_list*)

This function prompts the user with a question asking for the path to a file containing data on tracks.

The file should have data about paths between nodes and the maximum time a entrant should use between the nodes.

Parameters

node_list	A pointer to a NODE_LIST, it should be populated. The nodes are needed to ensure that the tracks does not contain none existing nodes.

Returns

This function returns a pointer to a TRACK_LIST if successful. If the function fails NULL is returned.

4.12.2.9 void load_cp_data (EVENT * *event*)

Prompts the user with the choice of loading the check point data from file or entering it manually.

Parameters

event	Event data structure. The result will be stored in this variable.

4.12.2.10 ENTRANT* query_entrant (EVENT * *event*)

Searches for a entrant either by name or id given by the user.

The function prompts the user with the choice of searching by name or by the entrant id.

Parameters

event	Event structure. The result will be stored in this variable.

Returns

If successful the function returns a pointer to the entrant. If it fails NULL is returned.

4.12.2.11 int show_menu ( )

This function prints out the main user menu the user will use to interact with the different parts of the program .

The user is given the choice to go to several different sub menus. The function takes a integer as input and returns the input.

Returns

User inputed integer.

4.13 node.c File Reference

This file holds function used to wok with the node data structure.

```
#include <stdlib.h>
#include <stdio.h>
#include <errno.h>
#include "node.h"
```

Functions

- NODE * node_id_search (int id, NODE_LIST *list)

  This function searches for a node with a given ID.
- NODE_LIST * read_nodes (char *path)

  This functions read in nodes from file and creates a linked list of the nodes.

Variables

- int **errno**

4.13.1 Detailed Description

This file holds function used to wok with the node data structure.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.11.25

4.13.2 Function Documentation

4.13.2.1 NODE* node_id_search (int *id*, NODE_LIST * *list*)

This function searches for a node with a given ID.

Parameters

id	The ID of the node you want to search for.
list	Pointer to the list, this list is the list that will be searched.

Returns

If the node is found the function returns the a pointer to the node. If the node is not found it will return NULL.

4.13.2.2 NODE_LIST* read_nodes (char * *path*)

This functions read in nodes from file and creates a linked list of the nodes.

The data should contain a node ID and a short string used to identify what type of node the node is.

Parameters

path	Path to the file where the node data is stored.

Returns

Returns a pointer to the first NODE in the linked list. Returns NULL if something went wrong.

Need to set a start if it hasn't been done yet.

4.14 node.h File Reference

This file contains the definition of the node data structure and definitions of functions used to work with the data structure.

```
#include "track.h"
```

Data Structures

- struct node

  The node data structure represents a checkpoint in the course.
- struct node_list

  This is the node list.

Typedefs

- typedef struct node NODE

  The node data structure represents a checkpoint in the course.
- typedef struct node_list NODE_LIST

  This is the node list.

Functions

- NODE * node_id_search (int id, NODE_LIST *list)

  This function searches for a node with a given ID.
- NODE_LIST * read_nodes (char *path)

  This functions read in nodes from file and creates a linked list of the nodes.

4.14.1 Detailed Description

This file contains the definition of the node data structure and definitions of functions used to work with the data structure.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.11.25

4.14.2 Typedef Documentation

4.14.2.1 typedef struct node NODE

The node data structure represents a checkpoint in the course.

There are several different checkpoints. Each node is identified by a positive integer. The data structure is also a linked list and has a pointer to the next element in the list.

4.14.2.2 typedef struct node_list NODE_LIST

This is the node list.

It is used to easily pass around the list and information about it to make working with it easier.

4.14.3 Function Documentation

4.14.3.1 NODE* node_id_search (int *id*, NODE_LIST * *list*)

This function searches for a node with a given ID.

Parameters

id	The ID of the node you want to search for.
list	Pointer to the list, this list is the list that will be searched.

Returns

If the node is found the function returns the a pointer to the node. If the node is not found it will return NULL.

4.14.3.2 NODE_LIST* read_nodes (char * *path*)

This functions read in nodes from file and creates a linked list of the nodes.

The data should contain a node ID and a short string used to identify what type of node the node is.

Parameters

path	Path to the file where the node data is stored.

Returns

Returns a pointer to the first NODE in the linked list. Returns NULL if something went wrong.

Need to set a start if it hasn't been done yet.

4.15 tests.h File Reference

This file contains the definitions of several functi.

Functions

- void entrant_read ()

  Test reading and parsing of entrant file.
- void **name_read** ()
- void **node_read** ()
- void **track_read** ()
- void course_read ()

  *void track_read() { NODE *start = read_nodes("data/nodes.txt"); TRACK *track_start = read_tracks("data/tracks.txt", start);*
- void **event_data_read** ()
- void **test_calc_time** ()
- void **test_all_files** ()
- void **entrant_search_test** ()
- void **test** ()

4.15.1 Detailed Description

This file contains the definitions of several functi.

Author

Sindre Smistad sis13@aber.ac.uk

on 24 November 2012, 02:09

4.15.2 Function Documentation

4.15.2.1 void course_read ( )

void track_read() { NODE ∗start = read_nodes("data/nodes.txt"); TRACK ∗track_start = read_tracks("data/tracks.-txt", start);

```
printf("breakpoint\n");
```

}

4.16 time_struct.h File Reference

This file contains the definition of the data structure used to represent the time structure.

Data Structures

- struct time_struct

  The structure used to represent time.

Typedefs

- typedef struct time_struct TIME_STRUCT

  The structure used to represent time.

4.16.1 Detailed Description

This file contains the definition of the data structure used to represent the time structure.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.12.07

4.17 track.c File Reference

This file contains functions used to work with the track data structure.

```
#include <stdio.h>
#include <stdlib.h>
#include <errno.h>
#include "track.h"
#include "node.h"
```

Functions

- TRACK_LIST * read_tracks (char *path, NODE_LIST *node_list)

  This function reads in and parses a file containing the track data.
- int validate_track (int node_one, int node_two, TRACK track)

  Checks if the given track is between the given nodes.
- void **free_track** (TRACK_LIST *track_list)

Variables

- int **errno**

4.17.1 Detailed Description

This file contains functions used to work with the track data structure.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.11.30

4.17.2 Function Documentation

4.17.2.1 TRACK_LIST* read_tracks (char * *path*, NODE_LIST * *node_list*)

This function reads in and parses a file containing the track data.

It uses this data to create a linked list of the tracks. The file should have data about paths between nodes and the maximum time a entrant should use between the nodes.

Parameters

path	The path to the file containing the track data.
node_list	Pointer to the list of nodes, the list is needed to look up the nodes that are used in the track data to verify that the track is between nodes that exist.

Returns

Upon success this function returns a pointer to the first element in the linked list. If it fails it will return NULL.

4.17.2.2 int validate_track (int *node_one*, int *node_two*, TRACK *track*)

Checks if the given track is between the given nodes.

Parameters

node_one	ID of one of the NODEs.
node_two	The ID of the other NODE.
track	The TRACK you want to check.

Returns

Returns 1 if the TRACK is between NODEs. If fails 0 is returned.

4.18 track.h File Reference

This file contains the definition of the track structure.

Data Structures

- struct track

  This structure holds the information about each track.
- struct track_list

  This is the track list.

Typedefs

- typedef struct track TRACK

  This structure holds the information about each track.
- typedef struct track_list TRACK_LIST

  This is the track list.

Functions

- int validate_track (int node_one, int node_two, TRACK track)

  Checks if the given track is between the given nodes.
- void **free_track** (TRACK_LIST *track_list)

4.18.1 Detailed Description

This file contains the definition of the track structure.

Author

Sindre Smistad sis13@aber.ac.uk

Date

2012.11.24

4.18.2 Typedef Documentation

4.18.2.1 typedef struct track TRACK

This structure holds the information about each track.

The structure also has a pinter to the another track to act as a linked list.

4.18.2.2 typedef struct track_list TRACK_LIST

This is the track list.

It is used to easily pass around the list and information about it to make working with it easier.

4.18.3 Function Documentation

4.18.3.1 int validate_track (int *node_one,* int *node_two,* TRACK *track*)

Checks if the given track is between the given nodes.

Parameters

node_one	ID of one of the NODEs.
node_two	The ID of the other NODE.
track	The TRACK you want to check.

Returns

Returns 1 if the TRACK is between NODEs. If fails 0 is returned.

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