

My Project

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Chapter 1

Class Index

1.1 Class List

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Chapter 2

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Chapter 3

Class Documentation

3.1 beam Struct Reference

Beam.

```
#include <phaser.h>
```

Public Attributes

- [BeamColor](#) `core_color`
- [BeamColor](#) `falloff_color`

3.1.1 Detailed Description

Beam.

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

- phaser.h

3.2 beamcolor Struct Reference

BeamColor.

```
#include <phaser.h>
```

Public Attributes

- int `r`
- int `g`
- int `b`
- int `a`

3.2.1 Detailed Description

BeamColor.

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

- phaser.h

3.3 colordata Struct Reference

ColorData.

```
#include <torpedo.h>
```

Public Attributes

- int **r**
- int **g**
- int **b**
- int **a**

3.3.1 Detailed Description

ColorData.

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

- torpedo.h

3.4 DebugmallocData Struct Reference

Public Attributes

- char **logfile** [256]
- long **max_block_size**
- long **alloc_count**
- long long **alloc_bytes**
- long **all_alloc_count**
- long long **all_alloc_bytes**
- [DebugmallocEntry](#) **head** [debugmalloc_tablesize]
- [DebugmallocEntry](#) **tail** [debugmalloc_tablesize]

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

- debugmalloc.h

3.5 DebugmallocEntry Struct Reference

Public Attributes

- void * **real_mem**
- void * **user_mem**
- size_t **size**
- char **file** [64]
- unsigned **line**
- char **func** [32]
- char **expr** [128]
- struct [DebugmallocEntry](#) * **prev**
- struct [DebugmallocEntry](#) * **next**

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

- debugmalloc.h

3.6 DinStr Struct Reference

Public Attributes

- int **size**
- char * **str**

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

- string_operations.h

3.7 enemyarmada Struct Reference

EnemyArmada.

```
#include <enemy_ship.h>
```

Public Attributes

- int **number_of_squadrons**
- int * **no_of_ships_per_sq**
- [EnemySquadronShip](#) ** **enemy_armada**
- int * **squadron_dirs**
- int * **squadron_heights**
- bool * **entry_finished_per_squadron**
- bool **ready_to_move**

3.7.1 Detailed Description

EnemyArmada.

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

- `enemy_ship.h`

3.8 enemyship Struct Reference

EnemyShip.

```
#include <enemy_ship.h>
```

Public Attributes

- `int y_coor`
- `int x_coor`
- [TextureData](#) `texture_data`
- `int speed`
- `int health`
- `int damage`

3.8.1 Detailed Description

EnemyShip.

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

- `enemy_ship.h`

3.9 enemysquadronship Struct Reference

EnemySquadronShip.

```
#include <enemy_ship.h>
```

Public Attributes

- [EnemyShip](#) `ship`
- `struct enemysquadronship * next_ship`
- `struct enemysquadronship * prev_ship`

3.9.1 Detailed Description

EnemySquadronShip.

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

- enemy_ship.h

3.10 gameassets Struct Reference

GameAssets.

```
#include <game_assets.h>
```

Public Attributes

- [StarMap](#) * **star_map**
- [PlayerShip](#) * **player_ship**
- [EnemyArmada](#) * **enemy_armada**
- [TorpedoShot](#) * **player_torpedo**
- [TorpedoShot](#) * **quantum_torpedo**
- [TorpedoShot](#) * **enemy_torpedo**

3.10.1 Detailed Description

GameAssets.

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

- game_assets.h

3.11 gameattributes Struct Reference

GameAttributes.

```
#include <game_attributes.h>
```

Public Attributes

- int **width**
- int **height**
- [InputStateInterface](#) **isi**
- SDL_TimerID **id**

3.11.1 Detailed Description

GameAttributes.

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

- `game_attributes.h`

3.12 inputstateinterface Struct Reference

InputStateInterface.

```
#include <input_state_interface.h>
```

Public Attributes

- `bool quit`
- `bool up`
- `bool down`
- `bool left`
- `bool right`
- `bool torpedo`
- `bool torpedo_ready`
- `bool left_mouse_button`
- `bool right_mouse_button`
- [MousePosition](#) `mouse_position`
- `bool phaser_ready`
- `bool phaser_firing`

3.12.1 Detailed Description

InputStateInterface.

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

- `input_state_interface.h`

3.13 keymap Struct Reference

KeyMap.

```
#include <keymap.h>
```


Public Attributes

- char * **upkey**
- char * **downkey**
- char * **leftkey**
- char * **rightkey**
- char * **torpedokey**

3.13.1 Detailed Description

KeyMap.

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

- keymap.h

3.14 leveledtt Struct Reference

LevelDTT.

```
#include <data_transfer_types.h>
```

Public Attributes

- int **number_of_waves**
- int **number_of_squadrons**
- [ShipDTT](#) ** **shiptypes_per_squadron**
- int * **ships_per_squadron**

3.14.1 Detailed Description

LevelDTT.

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

- data_transfer_types.h

3.15 mouseposition Struct Reference

MousePosition.

```
#include <input_state_interface.h>
```

Public Attributes

- int **mouse_x**
- int **mouse_y**

3.15.1 Detailed Description

MousePosition.

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

- input_state_interface.h

3.16 phaserbeam Struct Reference

PhaserBeam.

```
#include <phaser.h>
```

Public Attributes

- int **beg_x**
- int **beg_y**
- int **end_x**
- int **end_y**
- [Beam](#) **beam_composition**

3.16.1 Detailed Description

PhaserBeam.

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

- phaser.h

3.17 playership Struct Reference

PlayerShip.

```
#include <player_ship.h>
```

Public Attributes

- int **y_coor**
- int **x_coor**
- [TextureData](#) texture_data
- [PhaserBeam](#) * phaser_blast
- int **phaser_timer**
- int **health**
- int **speed**

3.17.1 Detailed Description

PlayerShip.

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

- player_ship.h

3.18 shipdtt Struct Reference

ShipDTT.

```
#include <data_transfer_types.h>
```

Public Attributes

- int **speed**
- int **health**
- int **damage**

3.18.1 Detailed Description

ShipDTT.

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

- data_transfer_types.h

3.19 spritemapdata Struct Reference

SpriteMapData.

```
#include <texture_data.h>
```

Public Attributes

- int **x_coor**
- int **y_coor**
- int **width**
- int **hight**

3.19.1 Detailed Description

SpriteMapData.

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

- texture_data.h

3.20 star Struct Reference

Star.

```
#include <star_map.h>
```

Public Attributes

- int **y_coor**
A csillagot jelkezo kor y koordinataja.
- int **x_coor**
A csillagot jelkezo kor x koordinataja.
- int **radius**
A csillagot jelkezo kor sugara.

3.20.1 Detailed Description

Star.

Ez az adatstruktura tarolja a hatter egy csillagat. Ertekei a csillag kirajzolasahoz szukseges koordinatak es sugar. Ez az adattarolo a fuggvenyhivaskor megadando parameterlistak leroviditeset, illetve az osszetartozo adatok egy helyen tartasat szolgaltja.

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

- star_map.h

3.21 starcolor Struct Reference

StarColor.

```
#include <star_map.h>
```

Public Attributes

- **int r**
A csillag RGBA piros erteke.
- **int g**
A csillag RGBA zold erteke.
- **int b**
A csillag RGBA kek erteke.
- **int a**
A csillag RGBA alfa erteke (ez hatarozza meg a csillag attetszoseget).

3.21.1 Detailed Description

StarColor.

Ez az adatstruktura tarolja a hatter csillaganak szinet. Ertekei a csillag RGBA-ban meghatarozott szinertekei. Ez az adatterolo a fuggvenyhivaskor megadando parameterlistak leroviditeset szolgolja.

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

- star_map.h

3.22 starmap Struct Reference

StarMap.

```
#include <star_map.h>
```

Public Attributes

- **int length**
A lista hossza.
- [Star](#) * **stars**
A csillagokat tarolo lista.
- [StarColor](#) **color**
A csillagok szinet tarolo struktura.

3.22.1 Detailed Description

StarMap.

Ez az adatstruktura tarolja a hatter osszes csillagat. Ertekei a lista hossza, a csillagokat tartalmazo lista, illetve azok szine. Ez az adatterolo a hatter csillagainak konnyu letehozasat, tarolasat es felszabaditasat szolgolja.

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

- star_map.h

3.23 texturedata Struct Reference

TextureData.

```
#include <texture_data.h>
```

Public Attributes

- int **width**
- int **height**
- int **texture_center_x**
- int **texture_center_y**

3.23.1 Detailed Description

TextureData.

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

- texture_data.h

3.24 torpedocolors Struct Reference

TorpedoColors.

```
#include <torpedo.h>
```

Public Attributes

- [ColorData](#) **outter_ring**
- [ColorData](#) **inner_ring**
- [ColorData](#) **center**

3.24.1 Detailed Description

TorpedoColors.

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

- torpedo.h

3.25 torpedoshot Struct Reference

TorpedoShot.

```
#include <torpedo.h>
```

Public Attributes

- int **x_coor**
- int **y_coor**
- int **damage**
- int **speed**
- int **dir**
- [TorpedoColors](#) **colors**
- struct [torpedoshot](#) * **next_torpedo**
- struct [torpedoshot](#) * **prev_torpedo**

3.25.1 Detailed Description

TorpedoShot.

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

- torpedo.h

Chapter 4

File Documentation

4.1 data_transfer_types.h

```
1 #ifndef DATA_TRANSFER_TYPES_H_INCLUDED
2 #define DATA_TRANSFER_TYPES_H_INCLUDED
3
4
5 typedef struct shipdtt{
6     int speed;
7     int health;
8     int damage;
9 }ShipDTT;
10
11 typedef struct leveledtt{
12     int number_of_waves;
13     int number_of_squadrons;
14     ShipDTT **shiptypes_per_squadron;
15     int *ships_per_squadron;
16 }LevelDTT;
17
18 #endif // DATA_TRANSFER_TYPES_H_INCLUDED
```

4.2 debugmalloc.h

```
1 #ifndef DEBUGMALLOC_H
2 #define DEBUGMALLOC_H
3
4 #include <stdbool.h>
5 #include <stddef.h>
6 #include <stdlib.h>
7 #include <stdio.h>
8 #include <ctype.h>
9 #include <string.h>
10 #include <stdarg.h>
11
12
13 enum {
14     /* size of canary in bytes. should be multiple of largest alignment
15      * required by any data type (usually 8 or 16) */
16     debugmalloc_canary_size = 64,
17
18     /* canary byte */
19     debugmalloc_canary_char = 'K',
20
21     /* hash table size for allocated entries */
22     debugmalloc_tablesize = 256,
23
24     /* max block size for allocation, can be modified with debugmalloc_max_block_size() */
25     debugmalloc_max_block_size_default = 1048576
26 };
27
28
29 /* make getpid and putenv "crossplatform". deprecated on windows but they work just fine,
30  * however not declared. */
31 #ifdef _WIN32
32     /* windows */
33     #include <process.h>
```

```

34     #ifdef _MSC_VER
35         /* visual studio, getenv/getpid deprecated warning */
36         #pragma warning(disable: 4996)
37     #else
38         /* other windows. the declaration is unfortunately hidden
39          * in mingw header files by ifdefs. */
40         int putenv(const char *);
41     #endif
42 #else
43     /* posix */
44     #include <unistd.h>
45 #endif
46
47
48 /* linked list entry for allocated blocks */
49 typedef struct DebugmallocEntry {
50     void *real_mem;      /* the address of the real allocation */
51     void *user_mem;      /* address shown to the user */
52     size_t size;         /* size of block requested by user */
53
54     char file[64];       /* malloc called in this file */
55     unsigned line;       /* malloc called at this line in file */
56     char func[32];       /* allocation function called (malloc, calloc, realloc) */
57     char expr[128];      /* expression calculating the size of allocation */
58
59     struct DebugmallocEntry *prev, *next; /* for doubly linked list */
60 } DebugmallocEntry;
61
62
63 /* debugmalloc singleton, storing all state */
64 typedef struct DebugmallocData {
65     char logfile[256];   /* log file name or empty string */
66     long max_block_size; /* max size of a single block allocated */
67     long alloc_count;    /* currently allocated; decreased with free */
68     long long alloc_bytes;
69     long all_alloc_count; /* all allocations, never decreased */
70     long long all_alloc_bytes;
71     DebugmallocEntry head[debugmalloc_tablesize], tail[debugmalloc_tablesize]; /* head and tail elements
72     of allocation lists */
73 } DebugmallocData;
74
75 /* this forward declaration is required by the singleton manager function */
76 static DebugmallocData * debugmalloc_create(void);
77
78
79 /* creates singleton instance. as this function is static included to different
80 * translation units, multiple instances of the static variables are created.
81 * to make sure it is really a singleton, these instances must know each other
82 * somehow. an environment variable is used for that purpose, ie. the address
83 * of the singleton allocated is stored by the operating system.
84 * this implementation is not thread-safe. */
85 static DebugmallocData * debugmalloc_singleton(void) {
86     static char envstr[100];
87     static void *instance = NULL;
88
89     /* if we do not know the address of the singleton:
90      * - maybe we are the one to create it (env variable also does not exist)
91      * - or it is already created, and stored in the env variable. */
92     if (instance == NULL) {
93         char envvarname[100] = "";
94         sprintf(envvarname, "%s%d", "debugmallocsingleton", (int) getpid());
95         char *envptr = getenv(envvarname);
96         if (envptr == NULL) {
97             /* no env variable: create singleton. */
98             instance = debugmalloc_create();
99             sprintf(envstr, "%s=%p", envvarname, instance);
100             putenv(envstr);
101         } else {
102             /* another copy of this function already created it. */
103             int ok = sscanf(envptr, "%p", &instance);
104             if (ok != 1) {
105                 fprintf(stderr, "debugmalloc: nem lehet ertelmezni: %s!\n", envptr);
106                 abort();
107             }
108         }
109     }
110
111     return (DebugmallocData *) instance;
112 }
113
114
115 /* better version of strncpy, always terminates string with \0. */
116 static void debugmalloc_strcpy(char *dest, char const *src, size_t destsize) {
117     strncpy(dest, src, destsize);
118     dest[destsize - 1] = '\0';
119 }

```

```

120
121
122 /* set the name of the log file for debugmalloc. empty filename
123  * means logging to stderr. */
124 static void debugmalloc_log_file(char const *logfile) {
125     if (logfile == NULL)
126         logfile = "";
127     DebugmallocData *instance = debugmalloc_singleton();
128     debugmalloc_strncpy(instance->logfile, logfile, sizeof(instance->logfile));
129 }
130
131
132 /* set the maximum size of one block. useful for debugging purposes. */
133 static void debugmalloc_max_block_size(long max_block_size) {
134     DebugmallocData *instance = debugmalloc_singleton();
135     instance->max_block_size = max_block_size;
136 }
137
138
139
140 /* printf to the log file, or stderr. */
141 static void debugmalloc_log(char const *format, ...) {
142     DebugmallocData *instance = debugmalloc_singleton();
143     FILE *f = stderr;
144     if (instance->logfile[0] != '\0') {
145         f = fopen(instance->logfile, "a");
146         if (f == NULL) {
147             f = stderr;
148             fprintf(stderr, "debugmalloc: nem tudom megnyitni a %s fajlt irasra!\n", instance->logfile);
149             debugmalloc_strncpy(instance->logfile, "", sizeof(instance->logfile));
150         }
151     }
152
153     va_list ap;
154     va_start(ap, format);
155     vfprintf(f, format, ap);
156     va_end(ap);
157
158     if (f != stderr)
159         fclose(f);
160 }
161
162
163 /* initialize a memory block allocated for the user. the start and the end
164  * of the block is initialized with the canary characters. if 'zero' is
165  * true, the user memory area is zero-initialized, otherwise it is also
166  * filled with the canary character to simulate garbage in memory. */
167 static void debugmalloc_memory_init(DebugmallocEntry *elem, bool zero) {
168     unsigned char *real_mem = (unsigned char *) elem->real_mem;
169     unsigned char *user_mem = (unsigned char *) elem->user_mem;
170     unsigned char *canary1 = real_mem;
171     unsigned char *canary2 = real_mem + debugmalloc_canary_size + elem->size;
172     memset(canary1, debugmalloc_canary_char, debugmalloc_canary_size);
173     memset(canary2, debugmalloc_canary_char, debugmalloc_canary_size);
174     memset(user_mem, zero ? 0 : debugmalloc_canary_char, elem->size);
175 }
176
177 /* check canary, return true if ok, false if corrupted. */
178 static bool debugmalloc_canary_ok(DebugmallocEntry const *elem) {
179     unsigned char *real_mem = (unsigned char *) elem->real_mem;
180     unsigned char *canary1 = real_mem;
181     unsigned char *canary2 = real_mem + debugmalloc_canary_size + elem->size;
182     for (size_t i = 0; i < debugmalloc_canary_size; ++i) {
183         if (canary1[i] != debugmalloc_canary_char)
184             return false;
185         if (canary2[i] != debugmalloc_canary_char)
186             return false;
187     }
188     return true;
189 }
190
191
192 /* dump memory contents to log file. */
193 static void debugmalloc_dump_memory(char const *mem, size_t size) {
194     for (unsigned y = 0; y < (size + 15) / 16; y++) {
195         char line[80];
196         int pos = 0;
197         pos += sprintf(line + pos, "    %04x ", y * 16);
198         for (unsigned x = 0; x < 16; x++) {
199             if (y * 16 + x < size)
200                 pos += sprintf(line + pos, "%02x ", mem[y * 16 + x]);
201             else
202                 pos += sprintf(line + pos, " ");
203         }
204         pos += sprintf(line + pos, " ");
205         for (unsigned x = 0; x < 16; x++) {
206             if (y * 16 + x < size) {

```

```

207         unsigned char c = mem[y * 16 + x];
208         pos += sprintf(line + pos, "%c", isprint(c) ? c : '.');
209     }
210     else {
211         pos += sprintf(line + pos, " ");
212     }
213 }
214 debugmalloc_log("%s\n", line);
215 }
216 }
217
218
219 /* dump data of allocated memory block.
220  * if the canary is corrupted, it is also written to the log. */
221 static void debugmalloc_dump_elem(DebugmallocEntry const *elem) {
222     bool canary_ok = debugmalloc_canary_ok(elem);
223
224     debugmalloc_log("  %p, %u bajt, kanari: %s\n"
225         "  %s:%u, %s(%s)\n",
226         elem->user_mem, (unsigned) elem->size, canary_ok ? "ok" : "**SERULT**",
227         elem->file, elem->line,
228         elem->func, elem->expr);
229
230     if (!canary_ok) {
231         debugmalloc_log("    ELOTTE kanari: \n");
232         debugmalloc_dump_memory((char const *) elem->real_mem, debugmalloc_canary_size);
233     }
234
235     debugmalloc_dump_memory((char const *) elem->user_mem, elem->size > 64 ? 64 : elem->size);
236
237     if (!canary_ok) {
238         debugmalloc_log("    UTANA kanari: \n");
239         debugmalloc_dump_memory((char const *) elem->real_mem + debugmalloc_canary_size + elem->size,
240             debugmalloc_canary_size);
241     }
242 }
243
244 /* dump data of all memory blocks allocated. */
245 static void debugmalloc_dump(void) {
246     DebugmallocData *instance = debugmalloc_singleton();
247     debugmalloc_log("** DEBUGMALLOD DUMP *****\n");
248     int cnt = 0;
249     for (size_t i = 0; i < debugmalloc_tablesize; i++) {
250         DebugmallocEntry *head = &instance->head[i];
251         for (DebugmallocEntry *iter = head->next; iter->next != NULL; iter = iter->next) {
252             ++cnt;
253             debugmalloc_log("** %d/%d. rekord:\n", cnt, instance->alloc_count);
254             debugmalloc_dump_elem(iter);
255         }
256     }
257     debugmalloc_log("** DEBUGMALLOD DUMP VEGE *****\n");
258 }
259
260
261 /* called at program exit to dump data if there is a leak,
262  * ie. allocated block remained. */
263 static void debugmalloc_atexit_dump(void) {
264     DebugmallocData *instance = debugmalloc_singleton();
265
266     if (instance->alloc_count > 0) {
267         debugmalloc_log("\n"
268             "*****\n"
269             "* MEMORIASZIVARGAS VAN A PROGRAMBAN!!!\n"
270             "*****\n"
271             "\n");
272         debugmalloc_dump();
273     } else {
274         debugmalloc_log("*****\n"
275             "* Debugmalloc: nincs memoriaszivargas a programban.\n"
276             "* Osszes foglalas: %d blokk, %d bajt.\n"
277             "*****\n",
278             instance->all_alloc_count, instance->all_alloc_bytes);
279     }
280 }
281
282
283 /* hash function for bucket hash. */
284 static size_t debugmalloc_hash(void *address) {
285     /* the last few bits are ignored, as they are usually zero for
286      * alignment purposes. all tested architectures used 16 byte allocation. */
287     size_t cut = (size_t)address >> 4;
288     return cut % debugmalloc_tablesize;
289 }
290
291
292 /* insert element to hash table. */

```

```

293 static void debugmalloc_insert(DebugmallocEntry *entry) {
294     DebugmallocData *instance = debugmalloc_singleton();
295     size_t idx = debugmalloc_hash(entry->user_mem);
296     DebugmallocEntry *head = &instance->head[idx];
297     entry->prev = head;
298     entry->next = head->next;
299     head->next->prev = entry;
300     head->next = entry;
301     instance->alloc_count += 1;
302     instance->alloc_bytes += entry->size;
303     instance->all_alloc_count += 1;
304     instance->all_alloc_bytes += entry->size;
305 }
306
307
308 /* remove element from hash table */
309 static void debugmalloc_remove(DebugmallocEntry *entry) {
310     DebugmallocData *instance = debugmalloc_singleton();
311     entry->next->prev = entry->prev;
312     entry->prev->next = entry->next;
313     instance->alloc_count -= 1;
314     instance->alloc_bytes -= entry->size;
315 }
316
317
318 /* find element in hash table, given with the memory address that the user sees.
319  * @return the linked list entry, or null if not found. */
320 static DebugmallocEntry *debugmalloc_find(void *mem) {
321     DebugmallocData *instance = debugmalloc_singleton();
322     size_t idx = debugmalloc_hash(mem);
323     DebugmallocEntry *head = &instance->head[idx];
324     for (DebugmallocEntry *iter = head->next; iter->next != NULL; iter = iter->next)
325         if (iter->user_mem == mem)
326             return iter;
327     return NULL;
328 }
329
330
331 /* allocate memory. this function is called via the macro. */
332 static void *debugmalloc_malloc_full(size_t size, char const *func, char const *expr, char const *file,
    unsigned line, bool zero) {
333     /* imitate standard malloc: return null if size is zero */
334     if (size == 0)
335         return NULL;
336
337     /* check max size */
338     DebugmallocData *instance = debugmalloc_singleton();
339     if (size > instance->max_block_size) {
340         debugmalloc_log("debugmalloc: %s @ %s:%u: a blokk merete tul nagy, %u bajt;
debugmalloc_max_block_size() fuggvennyel novelheto.\n", func, file, line, (unsigned) size);
341         abort();
342     }
343
344     /* allocate more memory, make room for canary */
345     void *real_mem = malloc(size + 2 * debugmalloc_canary_size);
346     if (real_mem == NULL) {
347         debugmalloc_log("debugmalloc: %s @ %s:%u: nem sikerult %u meretu memoriat foglalni!\n", func,
file, line, (unsigned) size);
348         return NULL;
349     }
350
351     /* allocate memory for linked list element */
352     DebugmallocEntry *newentry = (DebugmallocEntry *) malloc(sizeof(DebugmallocEntry));
353     if (newentry == NULL) {
354         free(real_mem);
355         debugmalloc_log("debugmalloc: %s @ %s:%u: le tudtam foglalni %u memoriat, de utana a sajatnak
nem, sry\n", func, file, line, (unsigned) size);
356         abort();
357     }
358
359     /* metadata of allocation: caller function, code line etc. */
360     debugmalloc_strncpy(newentry->func, func, sizeof(newentry->func));
361     debugmalloc_strncpy(newentry->expr, expr, sizeof(newentry->expr));
362     debugmalloc_strncpy(newentry->file, file, sizeof(newentry->file));
363     newentry->line = line;
364
365     /* address of allocated memory chunk */
366     newentry->real_mem = real_mem;
367     newentry->user_mem = (unsigned char *) real_mem + debugmalloc_canary_size;
368     newentry->size = size;
369     debugmalloc_memory_init(newentry, zero);
370
371     /* store in list and return pointer to user area */
372     debugmalloc_insert(newentry);
373     return newentry->user_mem;
374 }
375

```

```

376
377 /* free memory and remove list item. before deleting, the chunk is filled with
378  * the canary byte to make sure that the user will see garbage if the memory
379  * is accessed after freeing. */
380 static void debugmalloc_free_inner(DebugmallocEntry *deleted) {
381     debugmalloc_remove(deleted);
382
383     /* fill with garbage, then remove from linked list */
384     memset(deleted->real_mem, debugmalloc_canary_char, deleted->size + 2 * debugmalloc_canary_size);
385     free(deleted->real_mem);
386     free(deleted);
387 }
388
389
390 /* free memory - called via the macro.
391  * as all allocations are tracked in the list, this function can terminate the program
392  * if a block is freed twice or the free function is called with an invalid address. */
393 static void debugmalloc_free_full(void *mem, char const *func, char const *file, unsigned line) {
394     /* imitate standard free function: if ptr is null, no operation is performed */
395     if (mem == NULL)
396         return;
397
398     /* find allocation, abort if not found */
399     DebugmallocEntry *deleted = debugmalloc_find(mem);
400     if (deleted == NULL) {
401         debugmalloc_log("debugmalloc: %s @ %s:%u: olyan területet próbálsz felszabadítani, ami nincs
402         lefoglalva!\n", func, file, line);
403         abort();
404     }
405
406     /* check canary and then free memory */
407     if (!debugmalloc_canary_ok(deleted)) {
408         debugmalloc_log("debugmalloc: %s @ %s:%u: a %p memóriaterületet túlíndexelt!\n", func, file,
409         line, mem);
410         debugmalloc_dump_elem(deleted);
411     }
412     debugmalloc_free_inner(deleted);
413 }
414
415 /* realloc-like function. */
416 static void *debugmalloc_realloc_full(void *oldmem, size_t newsize, char const *func, char const *expr,
417 char const *file, unsigned line) {
418     /* imitate standard realloc: equivalent to free if size is null. */
419     if (newsize == 0) {
420         debugmalloc_free_full(oldmem, func, file, line);
421         return NULL;
422     }
423     /* imitate standard realloc: equivalent to malloc if first param is NULL */
424     if (oldmem == NULL)
425         return debugmalloc_malloc_full(newsize, func, expr, file, line, 0);
426
427     /* find old allocation. abort if not found. */
428     DebugmallocEntry *oldentry = debugmalloc_find(oldmem);
429     if (oldentry == NULL) {
430         debugmalloc_log("debugmalloc: %s @ %s:%u: olyan területet próbálsz átmeretezni, ami nincs
431         lefoglalva!\n", func, file, line);
432         abort();
433     }
434
435     /* create new allocation, copy & free old data */
436     void *newmem = debugmalloc_malloc_full(newsize, func, expr, file, line, false);
437     if (newmem == NULL) {
438         debugmalloc_log("debugmalloc: %s @ %s:%u: nem sikerült új memóriát foglalni az
439         átmeretezéshez!\n", func, file, line);
440         /* imitate standard realloc: original block is untouched, but return NULL */
441         return NULL;
442     }
443     size_t smaller = oldentry->size < newsize ? oldentry->size : newsize;
444     memcpy(newmem, oldmem, smaller);
445     debugmalloc_free_inner(oldentry);
446
447     return newmem;
448 }
449
450 /* initialize debugmalloc singleton. returns the newly allocated instance */
451 static DebugmallocData * debugmalloc_create(void) {
452     /* config check */
453     if (debugmalloc_canary_size % 16 != 0) {
454         debugmalloc_log("debugmalloc: a kanari merete legyen 16-tal osztható\n");
455         abort();
456     }
457     if (debugmalloc_canary_char == 0) {
458         debugmalloc_log("debugmalloc: a kanari legyen 0-tól különbozo\n");
459         abort();
460     }
461 }

```

```

458  /* avoid compiler warning if these functions are not used */
459  (void) debugmalloc_realloc_full;
460  (void) debugmalloc_log_file;
461  (void) debugmalloc_max_block_size;
462
463  /* create and initialize instance */
464  DebugmallocData *instance = (DebugmallocData *) malloc(sizeof(DebugmallocData));
465  if (instance == NULL) {
466      debugmalloc_log("debugmalloc: nem sikerult elinditani a memoriakezelest\n");
467      abort();
468  }
469  debugmalloc_strncpy(instance->logfile, "", sizeof(instance->logfile));
470  instance->max_block_size = debugmalloc_max_block_size_default;
471  instance->alloc_count = 0;
472  instance->alloc_bytes = 0;
473  instance->all_alloc_count = 0;
474  instance->all_alloc_bytes = 0;
475  for (size_t i = 0; i < debugmalloc_tablesize; i++) {
476      instance->head[i].prev = NULL;
477      instance->head[i].next = &instance->tail[i];
478      instance->tail[i].next = NULL;
479      instance->tail[i].prev = &instance->head[i];
480  }
481
482  atexit(debugmalloc_atexit_dump);
483  return instance;
484 }
485
486
487 /* These macro-like functions forward all allocation/free
488 * calls to debugmalloc. Usage is the same, malloc(size)
489 * gives the address of a new memory block, free(ptr)
490 * deallocates etc.
491 *
492 * If you use this file, make sure that you include this
493 * in *ALL* translation units (*.c) of your source. The
494 * builtin free() function cannot deallocate a memory block
495 * that was allocated via debugmalloc, yet the name of
496 * the function is the same! */
497
498 #define malloc(S) debugmalloc_malloc_full((S), "malloc", #S, __FILE__, __LINE__, false)
499 #define calloc(N,S) debugmalloc_malloc_full((N)*(S), "calloc", #N " ", " #S, __FILE__, __LINE__, true)
500 #define realloc(P,S) debugmalloc_realloc_full((P), (S), "realloc", #S, __FILE__, __LINE__)
501 #define free(P) debugmalloc_free_full((P), "free", __FILE__, __LINE__)
502
503 #endif

```

4.3 enemy_ship.c File Reference

```
#include "enemy_ship.h"
```

Functions

- [EnemyShip](#) [create_enemy_ship](#) ([ShipDTT](#) *ship_dtt, int y_coord)
create_enemy_ship
- [EnemyArmada](#) * [init_enemy_armada](#) ([LevelDTT](#) *level_dtt, [TextureData](#) texture_data, [GameAttributes](#) *game_attributes)
init_enemy_armada
- int [squadron_size](#) ([EnemySquadronShip](#) *squadron)
squadron_size
- void [position_enemy_armada](#) ([EnemySquadronShip](#) *squadron, [GameAttributes](#) *game_attributes, int dir)
position_enemy_armada
- bool [enemy_armada_entry_animation](#) ([EnemySquadronShip](#) *squadron, [GameAttributes](#) *game_attributes, int dir)
enemy_armada_entry_animation
- void [modify_enemy_dir](#) ([EnemyArmada](#) *armada)

- modify_enemy_dir*
- void `manage_enemy_dirs` (`EnemyArmada` *armada, `GameAttributes` *game_attributes)
- manage_enemy_dirs*
- void `move_enemy_armada` (`EnemyArmada` *armada, `GameAttributes` *game_attributes)
- move_enemy_armada*
- void `free_enemy_squadron_ship` (`EnemySquadronShip` **ess)
- free_enemy_squadron_ship*
- void `free_enemy_squadron` (`EnemySquadronShip` *squadron)
- free_enemy_squadron*
- void `free_enemy_armada` (`EnemyArmada` *armada)
- free_enemy_armada*

4.3.1 Function Documentation

4.3.1.1 create_enemy_ship()

```
EnemyShip create_enemy_ship (
    ShipDTT * ship_dtt,
    int y_coord )
```

create_enemy_ship

az ellenseges hajok generalasaert felelos fuggveny. Hivasonkent csak egy hajot general

Parameters

in	<i>ship_dtt</i>	az ellenseges hajo attributumait tartalmazo fajlbeolvasasbol szarmazo adatstruktura
in	<i>y_coord</i>	az ellenseges hajo y koordinataja

Returns

[out] `EnemyShip` ellenseges urhajo tipusokkal ter vissza

4.3.1.2 enemy_armada_entry_animation()

```
bool enemy_armada_entry_animation (
    EnemySquadronShip * squadron,
    GameAttributes * game_attributes,
    int dir )
```

enemy_armada_entry_animation

a jatek kezdo animaciojat vezerli.

Parameters

in, out	<i>squadron</i>	egy hajo-sor egy elemere mutato lancolt lista elem pointer
in	<i>game_attributes</i>	az osszes jatekattributumot tartlmazo adatstruktura
in	<i>dir</i>	a hajo x iranyu mozgasi iranya

Returns

[out] bool true ertekkel ter vissza, ha a kezdo animacio befejezodott.

4.3.1.3 free_enemy_armada()

```
void free_enemy_armada (
    EnemyArmada * armada )
```

free_enemy_armada

az ellenseges hadsereg által elfoglalt memoriaterulet felszabaditasaert felel

Parameters

[]	armada
----	--------

Returns

void

4.3.1.4 free_enemy_squadron()

```
void free_enemy_squadron (
    EnemySquadronShip * squadron )
```

free_enemy_squadron

az ellenseges hajok által soronként elfoglalt memoriaterulet felszabaditasaert felel

Parameters

[]	squadron
----	----------

Returns

void

4.3.1.5 free_enemy_squadron_ship()

```
void free_enemy_squadron_ship (
    EnemySquadronShip ** ess )
```

free_enemy_squadron_ship

az ellenseges hajok által elfoglalt memoriaterület egyenkenti felszabadításaért felel

Parameters

[]	ess
-----	-----

Returns

void

4.3.1.6 init_enemy_armada()

```
EnemyArmada * init_enemy_armada (
    LevelDTT * level_dtt,
    TextureData texture_data,
    GameAttributes * game_attributes )
```

init_enemy_armada

az ellenseges hadsereget inicializálja a bemeneti paraméterek alapján.

VIGYAZAT: a hadsereg és az azt alkotó hajok felszabadításaért a hívó felel!

MEGJEGYZÉS: ez a függvény és a segédfüggvényei a végleges verzióhoz refaktoralason esnek majd át, a függvény ajelenlegi verzióban működik ugyan, de nem azt a feladatot látja el, amit majd a végleges verzióban kell.

Parameters

in	<i>level_dtt</i>	az ellenseges hadsereg attribútumait tartalmazó fájlbeolvasásból származó adatstruktúra
in	<i>texture_data</i>	az egyes hajok textúra adatai a kirajzoláshoz (közép koordináták, textúra szélesség)
in	<i>game_attributes</i>	az összes játékattribútumot tartalmazó adatstruktúra

Returns

[out] EnemyArmada az ellenseges hajokkal tér vissza

4.3.1.7 manage_enemy_dirs()

```
void manage_enemy_dirs (
    EnemyArmada * armada,
    GameAttributes * game_attributes )
```

manage_enemy_dirs

visszafordítja az ellenseges hajokat a játék csata animációja közben, amennyiben azok elérték a mozgási szabadságuk végét jelző x koordinátát

Parameters

<code>[]</code>	<code>armada</code>
<code>[]</code>	<code>game_attributes</code>

Returns

void

4.3.1.8 modify_enemy_dir()

```
void modify_enemy_dir (
    EnemyArmada * armada )
```

modify_enemy_dir

az ellenseges hajók mozgási irányát változtatja az ellenkezőjére

Parameters

<code>in, out</code>	<code>armada</code>	az ellenseges hadsereget tartalmazó adatstruktúra
----------------------	---------------------	---

Returns

void

4.3.1.9 move_enemy_armada()

```
void move_enemy_armada (
    EnemyArmada * armada,
    GameAttributes * game_attributes )
```

move_enemy_armada

az egész ellenseges hadsereg mozgásáért felel

Parameters

<code>[]</code>	<code>armada</code>
<code>[]</code>	<code>game_attributes</code>

Returns

void

4.3.1.10 position_enemy_armada()

```
void position_enemy_armada (
    EnemySquadronShip * squadron,
    GameAttributes * game_attributes,
    int dir )
```

position_enemy_armada

az ellenseges hajokat a kepernyon kívül elhelyezi, elokeszitve azokat jatek kezdeti animaciojara

Parameters

in, out	<i>squadron</i>	egy hajo-sor egy elemere mutato lancolt lista elem pointer
in	<i>game_attributes</i>	az osszes jatekattributumot tartlmazo adatstruktura
in	<i>dir</i>	a hajo x iranyu mozgasi iranya

Returns

[out] void

4.3.1.11 squadron_size()

```
int squadron_size (
    EnemySquadronShip * squadron )
```

squadron_size

egy ellenseges hajo-sort tartalmazo lancolt lista alapjan visszater az adott sorban levo hajok szamaval

Parameters

in	<i>squadron</i>	egy adott sor ellenseges hajot tarolo lancolt lista head pointere
----	-----------------	---

Returns

[out] int visszater egy sor hajo meretevel

4.4 enemy_ship.h

```
1 #ifndef ENEMY_SHIP_H_INCLUDED
```

```

2 #define ENEMY_SHIP_H_INCLUDED
3
4 #include "game_attributes.h"
5 #include "data_transfer_types.h"
6 #include "random_number_in_interval.h"
7 #include "texture_data.h"
8
9 #include <stdlib.h>
10 #include <stdbool.h>
11
12 #include "debugmalloc.h"
13
14 typedef struct enemyship{
15     int y_coor;
16     int x_coor;
17     TextureData texture_data;
18     int speed;
19     int health;
20     int damage;
21 }EnemyShip;
22
23 typedef struct enemysquadronship{
24     EnemyShip ship;
25     struct enemysquadronship *next_ship;
26     struct enemysquadronship *prev_ship;
27 }EnemySquadronShip;
28
29 typedef struct enemyarmada{
30     int number_of_squadrons;
31     int *no_of_ships_per_sq;
32     EnemySquadronShip **enemy_armada;
33     int *squadron_dirs;
34     int *squadron_heights;
35     bool *entry_finished_per_squadron;
36     bool ready_to_move;
37 }EnemyArmada;
38
39 #endif // ENEMY_SHIP_H_INCLUDED

```

4.5 file_management.c File Reference

```
#include "file_management.h"
```

Functions

- [ShipDTT](#) * [import_ship_dtt](#) (char *filepath)
import_ship_dtt

4.5.1 Function Documentation

4.5.1.1 import_ship_dtt()

```
ShipDTT * import_ship_dtt (
    char * filepath )
```

import_ship_dtt

beimportálja az urhajok alapveto attributumainak listait egy adott forrasfajlbol, majd azokbol egy listak dinamikus tombje pointerrel ter vissza.

Parameters

<code>[]</code>	<code>filepath</code>
-----------------	-----------------------

Returns

ShipDTT

4.6 file_management.h

```
1 #ifndef FILE_MANAGEMENT_H_INCLUDED
2 #define FILE_MANAGEMENT_H_INCLUDED
3
4 #include "data_transfer_types.h"
5
6 #include <stdio.h>
7
8 #include "debugmalloc.h"
9
10 #endif // FILE_MANAGEMENT_H_INCLUDED
```

4.7 game_assets.h

```
1 #ifndef GAME_ASSETS_H_INCLUDED
2 #define GAME_ASSETS_H_INCLUDED
3
4 #include "star_map.h"
5 #include "player_ship.h"
6 #include "enemy_ship.h"
7 #include "torpedo.h"
8
9
10 typedef struct gameassets{
11     StarMap *star_map;
12     PlayerShip *player_ship;
13     EnemyArmada *enemy_armada;
14     TorpedoShot *player_torpedo;
15     TorpedoShot *quantum_torpedo;
16     TorpedoShot *enemy_torpedo;
17 }GameAssets;
18
19 #endif // GAME_ASSETS_H_INCLUDED
```

4.8 game_attributes.h

```
1 #ifndef GAME_ATTRIBUTES_H_INCLUDED
2 #define GAME_ATTRIBUTES_H_INCLUDED
3
4 #include "input_state_interface.h"
5 #include <SDL.h>
6
7 typedef struct gameattributes{
8     int width;
9     int height;
10     InputStateInterface isi;
11     SDL_TimerID id;
12 }GameAttributes;
13
14 #endif // GAME_ATTRIBUTES_H_INCLUDED
```

4.9 game_engine.c File Reference

```
#include "game_engine.h"
```

Functions

- Uint32 [input_timer](#) (Uint32 ms, void *param)
input_timer
- [GameAssets](#) * [init_game_assets](#) ([GameAttributes](#) *game_attributes)
init_game_assets
- [GameAttributes](#) * [init_game_attributes](#) ()
init_game_attributes
- [KeyMap](#) * [default_keymap_init](#) ()
default_keymap_init
- void [clear_graphics](#) ([GameAssets](#) *game_assets)
clear_graphics
- void [draw_graphics](#) (int player_ship_time, [GameAssets](#) *game_assets, [GameAttributes](#) *game_attributes)
draw_graphics
- void [calculate_game_assets](#) ([GameAssets](#) *game_assets, [GameAttributes](#) *game_attributes, int enemy_ship_time)
calculate_game_assets
- void [free_assets](#) ([GameAssets](#) *game_assets)
free_assets
- void [free_components](#) ([GameAssets](#) *game_assets, [GameAttributes](#) *game_attributes)
free_components
- int [keep_player_time](#) ()
keep_player_time
- int [keep_enemy_time](#) ()
keep_enemy_time
- void [game_loop](#) ([GameAssets](#) *game_assets, [KeyMap](#) *key_map, [GameAttributes](#) *game_attributes)
game_loop
- void [runtime](#) ()
game

4.9.1 Function Documentation

4.9.1.1 calculate_game_assets()

```
void calculate_game_assets (
    GameAssets * game_assets,
    GameAttributes * game_attributes,
    int enemy_ship_time )
```

[calculate_game_assets](#)

a jatek assetek mozgassat es mukodeset vezerlo szamitasok aggregalo fuggvenye

Parameters

in	<i>game_assets</i>	
in	<i>game_attributes</i>	
in	<i>enemy_ship_time</i>	

Returns

void

4.9.1.2 clear_graphics()

```
void clear_graphics (
    GameAssets * game_assets )
```

clear_graphics

kirajzoltatas előtt mindent torol a kepernyorol.

Parameters

<i>[]</i>	game_assets
-----------	-------------

Returns

void

4.9.1.3 default_keymap_init()

```
KeyMap * default_keymap_init ( )
```

default_keymap_init

az iranyitashoz hasznalt alapertelmezett billentyuket inicializalja egy KeyMap tipusba

Returns

KeyMap

4.9.1.4 draw_graphics()

```
void draw_graphics (
    int player_ship_time,
    GameAssets * game_assets,
    GameAttributes * game_attributes )
```

draw_graphics

az osszes asset kirajzolasaert felel

Parameters

in	<i>player_ship_time</i>	
in	<i>game_assets</i>	
in	<i>game_attributes</i>	

Returns

void

4.9.1.5 free_assets()

```
void free_assets (
    GameAssets * game_assets )
```

free_assets

felszabadítja a játék asseteket a játék beázarasa előtt.

Parameters

in	<i>game_assets</i>	
----	--------------------	--

Returns

void

4.9.1.6 free_components()

```
void free_components (
    GameAssets * game_assets,
    GameAttributes * game_attributes )
```

free_components

az összes játékkomponens felszabadításaért felel.

Parameters

[]	<i>game_assets</i>
[]	<i>game_attributes</i>

Returns

void

4.9.1.7 game_loop()

```
void game_loop (
    GameAssets * game_assets,
    KeyMap * key_map,
    GameAttributes * game_attributes )
```

game_loop

a jatek fo vezerlesi logikaja

Parameters

<i>[]</i>	game_assets
<i>[]</i>	key_map
<i>[]</i>	game_attributes

Returns

void

4.9.1.8 init_game_assets()

```
GameAssets * init_game_assets (
    GameAttributes * game_attributes )
```

init_game_assets

inicializalja az osszes jatekhoz szukseges assetet.

Parameters

in, out	game_attributes	
---------	-----------------	--

Returns

GameAssets

4.9.1.9 init_game_attributes()

```
GameAttributes * init_game_attributes ( )
```

init_game_attributes

inicializálja a játék attribútumait, amelyeket aztán a vezérles használ

Returns

GameAttributes

4.9.1.10 input_timer()

```
Uint32 input_timer (
    Uint32 ms,
    void * param )
```

input_timer

az inputok beolvasásának időzítéseért felel

Parameters

in	<i>ms</i>	
in	<i>param</i>	

Returns

Uint32

4.9.1.11 keep_enemy_time()

```
int keep_enemy_time ( )
```

keep_enemy_time

az ellenseges hajók időzítéséhez szükséges számítást végzi el

Returns

int

4.9.1.12 keep_player_time()

```
int keep_player_time ( )
```

keep_player_time

a jatekos hajo idozitesehez szukseges szamitast vegzi el

Returns

int

4.9.1.13 runtime()

```
void runtime ( )
```

game

aggregálja az összes játék működéséhez szükséges logikai függvényt. Amikor a game_loop kilep a ciklusból felszabadít mindent és kilep az SDL2ből.

Returns

void

4.10 game_engine.h

```
1 #ifndef GAME_ENGINE_H_INCLUDED
2 #define GAME_ENGINE_H_INCLUDED
3
4 #include "input_state_interface.h"
5 #include "keymap.h"
6 #include "graphics.h"
7 #include "ui_input.h"
8 #include "game_assets.h"
9 #include "game_attributes.h"
10 #include "star_map.h"
11 #include "player_ship.h"
12 #include "enemy_ship.h"
13 #include "hit_management.h"
14 #include "data_transfer_types.h"
15 #include "file_management.h"
16 #include "random_number_in_interval.h"
17 #include "texture_data.h"
18
19 #include <stdio.h>
20 #include <stdlib.h>
21 #include <stdbool.h>
22 #include <SDL.h>
23
24 #include "debugmalloc.h"
25
26 void runtime();
27
28 #endif // GAME_ENGINE_H_INCLUDED
```

4.11 graphics.c File Reference

```
#include "graphics.h"
```

Functions

- `SDL_Texture * load_sdl_texture (char *img_name)`
load_sdl_texture
- `void create_textures (char *fed, char *enemy)`
create_textures
- `void create_window (int width, int height)`
create_window
- `void draw_background (StarMap *sm)`
draw_background
- `void draw_player_ship (PlayerShip *ps)`
draw_player_ship
- `void draw_crosshair (int x_coor, int y_coor)`
draw_crosshair
- `void draw_enemy_ships (EnemyArmada *armada)`
draw_enemy_ships
- `void draw_phaser (PhaserBeam *phaser)`
draw_phaser
- `void draw_torpedo (TorpedoShot *torpedoes)`
draw_torpedo
- `void clear_screen ()`
clear_screen
- `void render_screen ()`
render_screen
- `void destroy_textures ()`
destroy_textures

4.11.1 Function Documentation

4.11.1.1 clear_screen()

```
void clear_screen ( )
```

`clear_screen`

torol mindent a jatekablakbol

Returns

`void`

4.11.1.2 create_textures()

```
void create_textures (
    char * fed,
    char * enemy )
```

`create_textures`

felepiti a texturakat

Parameters

<code>[]</code>	fed
<code>[]</code>	enemy

Returns

void

4.11.1.3 create_window()

```
void create_window (
    int width,
    int height )
```

create_window

legeneralja a jatekablakot

Parameters

<code>[]</code>	width
<code>[]</code>	height

Returns

void

4.11.1.4 destroy_textures()

```
void destroy_textures ( )
```

destroy_textures

torli a texturakat

Returns

void

4.11.1.5 draw_background()

```
void draw_background (
    StarMap * sm )
```

draw_background

kirajzolja a hatteret

Parameters

<code>[]</code>	<code>sm</code>
-----------------	-----------------

Returns

`void`

4.11.1.6 draw_crosshair()

```
void draw_crosshair (
    int x_coor,
    int y_coor )
```

`draw_crosshair`

kirajzolja a celkeresztet

Parameters

<code>[]</code>	<code>x_coor</code>
<code>[]</code>	<code>y_coor</code>

Returns

`void`

4.11.1.7 draw_enemy_ships()

```
void draw_enemy_ships (
    EnemyArmada * armada )
```

`draw_enemy_ships`

kirajzolja az ellenseges hajokat

Parameters

<code>[]</code>	<code>armada</code>
-----------------	---------------------

Returns

`void`

4.11.1.8 draw Phaser()

```
void draw Phaser (
    PhaserBeam * Phaser )
```

draw Phaser

kirajzolja a fezer sugarat

Parameters

<i>[]</i>	Phaser
-----------	--------

Returns

void

4.11.1.9 draw Player Ship()

```
void draw Player Ship (
    PlayerShip * ps )
```

draw Player Ship

kirajzolja a jatekos hajot

Parameters

<i>[]</i>	ps
-----------	----

Returns

void

4.11.1.10 draw Torpedo()

```
void draw Torpedo (
    TorpedoShot * torpedoes )
```

draw Torpedo

kirajzolja a kilott torpedot

Parameters

<code>[]</code>	<code>torpedoes</code>
-----------------	------------------------

Returns

void

4.11.1.11 load_sdl_texture()

```
SDL_Texture * load_sdl_texture (
    char * img_name )
```

load_sdl_texture

betölti az SDL által használt texturákat

Parameters

<code>[]</code>	<code>img_name</code>
-----------------	-----------------------

Returns

SDL_Texture

4.11.1.12 render_screen()

```
void render_screen ( )
```

render_screen

rendereli a jatekablakot

Returns

void

4.12 graphics.h

```
1 #ifndef GRAPHICS_H_INCLUDED
2 #define GRAPHICS_H_INCLUDED
3
4 #include "star_map.h"
5 #include "player_ship.h"
6 #include "enemy_ship.h"
7 #include "input_state_interface.h"
8 #include "phaser.h"
9 #include "torpedo.h"
```

```

10
11 #include <SDL.h>
12 #include <SDL_image.h>
13 #include <SDL2_gfxPrimitives.h>
14 #include <math.h>
15 #include <stdlib.h>
16 #include <stdbool.h>
17
18 #include "debugmalloc.h"
19
20 void create_window(int width, int height);
21
22 void draw_background(StarMap *sm);
23
24 void clear_background(StarMap *sm);
25
26 void draw_player_ship(PlayerShip *ps);
27
28 void clear_player_ship(PlayerShip *ps);
29
30 void draw_enemy_ship(EnemyArmada *armada);
31
32 void clear_enemy_ship(EnemyArmada *armad);
33
34 void render_screen();
35
36 #endif // GRAPHICS_H_INCLUDED

```

4.13 hit_management.c File Reference

```
#include "hit_management.h"
```

Functions

- void [detect_player_hit](#) ([GameAssets](#) *game_assets, [GameAttributes](#) *game_attributes)
detect_player_hit
- void [manage_hits](#) ([GameAssets](#) *game_assets, [GameAttributes](#) *game_attributes)
manage_hits

4.13.1 Function Documentation

4.13.1.1 detect_player_hit()

```

void detect_player_hit (
    GameAssets * game_assets,
    GameAttributes * game_attributes )

```

[detect_player_hit](#)

ellenorzi, hogy barmelyik ellenseges hajo talalatot kapott-e.

Parameters

<i>[]</i>	game_assets
<i>[]</i>	game_attributes

Returns

void

4.13.1.2 manage_hits()

```
void manage_hits (
    GameAssets * game_assets,
    GameAttributes * game_attributes )
```

manage_hits

aggregalo fuggveny a hit management logikahoz

Parameters

<i>[]</i>	game_assets
<i>[]</i>	game_attributes

Returns

void

4.14 hit_management.h

```
1 #ifndef HIT_MANAGEMENT_H_INCLUDED
2 #define HIT_MANAGEMENT_H_INCLUDED
3
4 #include "game_assets.h"
5 #include "game_attributes.h"
6 #include "torpedo.h"
7 #include "enemy_ship.h"
8
9 #include <stdbool.h>
10
11 #include "debugmalloc.h"
12
13 #endif // HIT_MANAGEMENT_H_INCLUDED
```

4.15 input_state_interface.h

```
1 #ifndef INPUT_STATE_INTERFACE_H_INCLUDED
2 #define INPUT_STATE_INTERFACE_H_INCLUDED
3
4 #include <stdbool.h>
5
10 typedef struct mouseposition{
11     int mouse_x;
12     int mouse_y;
13 }MousePosition;
14
19 typedef struct inputstateinterface{
20     bool quit;
21     bool up;
22     bool down;
23     bool left;
24     bool right;
25     bool torpedo;
26     bool torpedo_ready;
27     bool left_mouse_button;
```

```

28     bool right_mouse_button;
29     MousePosition mouse_position;
30     bool phaser_ready;
31     bool phaser_firing;
32 } InputStateInterface;
33
34 #endif // INPUT_STATE_INTERFACE_H_INCLUDED

```

4.16 keymap.h

```

1 #ifndef KEYMAP_H_INCLUDED
2 #define KEYMAP_H_INCLUDED
3
4 typedef struct keymap{
5     char *upkey;
6     char *downkey;
7     char *leftkey;
8     char *rightkey;
9     char *torpedokey;
10 } KeyMap;
11
12 #endif // KEYMAP_H_INCLUDED

```

4.17 phaser.c File Reference

```
#include "phaser.h"
```

Functions

- [Beam](#) [create_beam_attributes](#) ([BeamColor](#) core, [BeamColor](#) falloff)
create_beam_attributes
- [PhaserBeam](#) * [phaser_init](#) ([Beam](#) beam_att, int x_coor, int y_coor)
phaser_init
- void [free Phaser](#) ([PhaserBeam](#) *phaser)
phaser_init

4.17.1 Function Documentation

4.17.1.1 create_beam_attributes()

```

Beam create_beam_attributes (
    BeamColor core,
    BeamColor falloff )

```

[create_beam_attributes](#)

legeneralja a fezer sugar kirajzolasahoz szukseges attributum tipust.

Parameters

<i>[]</i>	core
<i>[]</i>	falloff

Returns

void

4.17.1.2 free Phaser()

```
void free Phaser (
    PhaserBeam * Phaser )
```

Phaser_init

felszabadítja a Phaser memóriaterületet.

Parameters

[]	*Phaser
----	---------

Returns

void

4.17.1.3 Phaser_init()

```
PhaserBeam * Phaser_init (
    Beam beam_att,
    int x_coor,
    int y_coor )
```

Phaser_init

inicializálja a sugarat.

Parameters

[]	beam_att
[]	x_coor
[]	y_coor

Returns

void

4.18 Phaser.h

```
1 #ifndef PHASER_H_INCLUDED
```

```

2 #define PHASER_H_INCLUDED
3
4 #include "input_state_interface.h"
5 #include "debugmalloc.h"
6
11 typedef struct beamcolor{
12     int r;
13     int g;
14     int b;
15     int a;
16 }BeamColor;
17
22 typedef struct beam{
23     BeamColor core_color;
24     BeamColor falloff_color;
25 }Beam;
26
31 typedef struct phaserbeam{
32     int beg_x;
33     int beg_y;
34     int end_x;
35     int end_y;
36     Beam beam_composition;
37 }PhaserBeam;
38
39 #endif // PHASER_H_INCLUDED

```

4.19 player_ship.c File Reference

```
#include "player_ship.h"
```

Functions

- [PlayerShip](#) * [init_player_ship](#) (int width, int height, [TextureData](#) texture_data, int health, int speed)
init_player_ship
- void [move_player_ship](#) ([PlayerShip](#) *ps, [InputStateInterface](#) *isi, int width, int height)
move_player_ship
- void [fire Phaser](#) ([InputStateInterface](#) *isi, [PlayerShip](#) *ps, int elapsed_interval)
fire Phaser
- void [free_player_ship](#) ([PlayerShip](#) *ps)
move_player_ship

4.19.1 Function Documentation

4.19.1.1 fire Phaser()

```

void fire Phaser (
    InputStateInterface * isi,
    PlayerShip * ps,
    int elapsed_interval )

```

fire Phaser

Kilo egy fezersugarat.

Parameters

in, out	<i>isi</i>	pointer to an InputStateInterface type
in, out	<i>ps</i>	pointer to a PlayerShip type
in	<i>elapsed_interval</i>	marker of elapsed ticks since program started

Returns

void

4.19.1.2 free_player_ship()

```
void free_player_ship (  
    PlayerShip * ps )
```

move_player_ship

felszabadítja a játékos hajókat

Parameters

[]	ps
----	----

Returns

void

4.19.1.3 init_player_ship()

```
PlayerShip * init_player_ship (  
    int width,  
    int height,  
    TextureData texture_data,  
    int health,  
    int speed )
```

init_player_ship

inicializálja a játékos hajókat

Parameters

[]	width
[]	height
[]	texture_data
[]	health
[]	speed

Returns

PlayerShip

4.19.1.4 move_player_ship()

```
void move_player_ship (
    PlayerShip * ps,
    InputStateInterface * isi,
    int width,
    int height )
```

move_player_ship

a játékos hajójának mozgásáért felelős számításokat végzi

Parameters

<code>[]</code>	ps
<code>[]</code>	isi
<code>[]</code>	width
<code>[]</code>	height

Returns

void

4.20 player_ship.h

```
1 #ifndef PLAYER_SHIP_H_INCLUDED
2 #define PLAYER_SHIP_H_INCLUDED
3
4 #include "input_state_interface.h"
5 #include "texture_data.h"
6 #include "player_ship.h"
7 #include "phaser.h"
8
9 #include <stdbool.h>
10
11 #include "debugmalloc.h"
12
13 typedef struct playership{
14     int y_coor;
15     int x_coor;
16     TextureData texture_data;
17     PhaserBeam *phaser_blast;
18     int phaser_timer;
19     int health;
20     int speed;
21 }PlayerShip;
22
23 PlayerShip *init_player_ship(int width, int height, TextureData texture_data, int health, int speed);
24
25 void move_player_ship(PlayerShip *ps, InputStateInterface *isi, int width, int height);
26
27 void free_player_ship(PlayerShip *ps);
28
29 #endif // PLAYER_SHIP_H_INCLUDED
```


4.21 random_number_in_interval.c File Reference

```
#include "random_number_in_interval.h"
```

Functions

- int [random_number_in_range](#) (int lower, int upper)
random_number_in_range

4.21.1 Function Documentation

4.21.1.1 random_number_in_range()

```
int random_number_in_range (  
    int lower,  
    int upper )
```

random_number_in_range

egy random számmal ter vissza egy meghatározott intervallumon belül. Csak ez a modul hívhatja

Parameters

in	<i>lower</i>	az intervallum also hatara.
in	<i>upper</i>	az intervallum felso hatara.

Returns

int

4.22 random_number_in_interval.h

```
1 #ifndef RANDOM_NUMBER_IN_INTERVAL_H_INCLUDED  
2 #define RANDOM_NUMBER_IN_INTERVAL_H_INCLUDED  
3  
4 int random_number_in_range(int lower, int upper);  
5  
6 #endif // RANDOM_NUMBER_IN_INTERVAL_H_INCLUDED
```

4.23 star_map.c File Reference

```
#include "star_map.h"
```

Functions

- void `advance_starmap_frame` (`StarMap` *sm, int width, int height)
advance_starmap_frame
- `StarMap` * `starmap_init` (int width, int height)
starmap_init
- void `free_starmap` (`StarMap` *sm)
free_starmap

4.23.1 Function Documentation

4.23.1.1 advance_starmap_frame()

```
void advance_starmap_frame (
    StarMap * sm,
    int width,
    int height )
```

`advance_starmap_frame`

a csillagterkepet eloremozditja egy kockaval. Vegigmegy a csillagokat tartalmazo dinamikus listan, es mindnek egyel noveli az y koordinatajat, amennyiben az nem 10-el nagyobb az ablak magassaganal. Amennyiben ennél az értéknél magasabb az adott csillag y értéke, úgy az y koordinatát 0-ra, az x koordinatát pedig egy, a képernyő szélességében található random értékre állítja.

Parameters

out	<i>sm</i>	egy StarMap típusu pointer, a játék StarMap típusában tarolt csillagok koordinatait tarolja.
in	<i>width</i>	a képernyő szélessége. Erre a random szám generálásához van szükség.
in	<i>height</i>	a képernyő magassága. Erre a csillag y koordinatajának ellenőrzéséhez van szükség.

Returns

void

4.23.1.2 free_starmap()

```
void free_starmap (
    StarMap * sm )
```

`free_starmap`

Ez a függvény a parameterként kapott csillagterkep csillagainak listajat, majd magat a csillagterkepet szabaditja fel.

Parameters

in	sm	a felszabaditando csillagterkep pointer.
----	----	--

Returns

void

4.23.1.3 starmap_init()

```
StarMap * starmap_init (
    int width,
    int height )
```

starmap_init

Ez a függvény inicializálja a StarMap csillagterkep listáját. létrehoz egy, a csillagok vart szamanak megfelelo hosszúsagu dinamikus tombot, majd abban elhelyezi a sorban generalt csillagokat. Visszateresi erteke egy csillagterkep.

Parameters

in	width	a kepernyo szelessege. Erre a csillagok x koordinatajanak generalasahoz van szukseg.
in	height	a kepernyo magassaga. Erre a csillagok y koordinatajanak generalasahoz van szukseg.

Returns

StarMap

4.24 star_map.h

```
1 #ifndef STAR_MAP_H_INCLUDED
2 #define STAR_MAP_H_INCLUDED
3
4 #include "random_number_in_interval.h"
5
6 #include "debugmalloc.h"
7
14 typedef struct starcolor{
15     int r;
16     int g;
17     int b;
18     int a;
19 }StarColor;
20
27 typedef struct star{
28     int y_coor;
29     int x_coor;
30     int radius;
31 }Star;
32
38 typedef struct starmap{
39     int length;
40     Star *stars;
41     StarColor color;
42 }StarMap;
43
44
```

```

45 StarMap *starmap_init(int width, int height);
46
47
48 void advance_starmap_frame(StarMap *sm, int width, int height);
49
50
51 void free_starmap(StarMap *sm);
52
53 #endif // STAR_MAP_H_INCLUDED

```

4.25 string_operations.c File Reference

```
#include "string_operations.h"
```

Functions

- bool [dinstr_alloc](#) ([DinStr](#) *str, int size)
dinstr_alloc

4.25.1 Function Documentation

4.25.1.1 dinstr_alloc()

```

bool dinstr_alloc (
    DinStr * str,
    int size )

```

[dinstr_alloc](#)

dinamikus sztringet allokal

Parameters

<i>[]</i>	str
<i>[]</i>	size

Returns

bool

4.26 string_operations.h

```

1 #ifndef STRING_OPERATIONS_H_INCLUDED
2 #define STRING_OPERATIONS_H_INCLUDED
3
4 #include <string.h>
5
6 #include "debugmalloc.h"

```

```

7
8 typedef struct DinStr {
9     int size;
10    char *str;
11 } DinStr;
12
13
14 #endif // STRING_OPERATIONS_H_INCLUDED

```

4.27 texture_data.h

```

1 #ifndef TEXTURE_DATA_H_INCLUDED
2 #define TEXTURE_DATA_H_INCLUDED
3
4 #include "debugmalloc.h"
5
10 typedef struct spritemapdata{
11     int x_coor;
12     int y_coor;
13     int width;
14     int hight;
15 }SpriteMapData;
16
17
22 typedef struct texturedata{
23     int width;
24     int height;
25     int texture_center_x;
26     int texture_center_y;
27 }TextureData;
28
29 #endif // TEXTURE_DATA_H_INCLUDED

```

4.28 torpedo.c File Reference

```
#include "torpedo.h"
```

Functions

- [TorpedoColors](#) [init_torpedo_colors](#) (bool is_enemy_torpedo, bool is_quantum_torpedo)
init_torpedo_colors
- [TorpedoShot](#) * [add_torpedo_shot](#) ([TorpedoShot](#) *torpedoes, int damage, int speed, int x_coor, int y_coor, bool is_enemy_torpedo, bool is_quantum_torpedo)
add_torpedo_shot
- void [move_torpedoes](#) ([TorpedoShot](#) **torpedo, [GameAttributes](#) *game_attributes)
move_torpedoes
- void [remove_torpedo_shot](#) ([TorpedoShot](#) **torpedo)
remove_torpedo_shot
- void [free_torpedoes](#) ([TorpedoShot](#) *torpedoes)
free_torpedoes

4.28.1 Function Documentation

4.28.1.1 add_torpedo_shot()

```
TorpedoShot * add_torpedo_shot (
    TorpedoShot * torpedoes,
    int damage,
    int speed,
    int x_coor,
    int y_coor,
    bool is_enemy_torpedo,
    bool is_quantum_torpedo )
```

add_torpedo_shot

hozzaad a kilott torpedok listajahoz egy ujabb elemet

Parameters

[]	torpedoes
[]	damage
[]	speed
[]	x_coor
[]	y_coor
[]	is_enemy_torpedo
[]	is_quantum_torpedo

Returns

TorpedoShot

4.28.1.2 free_torpedoes()

```
void free_torpedoes (
    TorpedoShot * torpedoes )
```

free_torpedoes

felszabaditja a torpedok listajat

Parameters

[]	torpedoes
----	-----------

Returns

void

4.28.1.3 init_torpedo_colors()

```
TorpedoColors init_torpedo_colors (
    bool is_enemy_torpedo,
    bool is_quantum_torpedo )
```

init_torpedo_colors

inicializálja a torpedók színeit adó TorpedoColors structot

Parameters

[]	is_enemy_torpedo
[]	is_quantum_torpedo

Returns

TorpedoColors

4.28.1.4 move_torpedoes()

```
void move_torpedoes (
    TorpedoShot ** torpedo,
    GameAttributes * game_attributes )
```

move_torpedoes

a torpedók mozgáshoz szükséges számításokat végzi

Parameters

[]	torpedo
[]	game_attributes

Returns

void

4.28.1.5 remove_torpedo_shot()

```
void remove_torpedo_shot (
    TorpedoShot ** torpedo )
```

remove_torpedo_shot

amennyiben a torpedo eltalál valamit, vagy kimegy a játéktérből, törli azt.

Parameters

<code>[]</code>	<code>torpedo</code>
-----------------	----------------------

Returns

void

4.29 torpedo.h

```

1 #ifndef TORPEDO_H_INCLUDED
2 #define TORPEDO_H_INCLUDED
3
4 #include "game_attributes.h"
5
6 #include <stdbool.h>
7
8 #include "debugmalloc.h"
9
14 typedef struct colordata{
15     int r;
16     int g;
17     int b;
18     int a;
19 }ColorData;
20
25 typedef struct torpedocolors{
26     ColorData outter_ring;
27     ColorData inner_ring;
28     ColorData center;
29 }TorpedoColors;
30
35 typedef struct torpedoshot{
36     int x_coor;
37     int y_coor;
38     int damage;
39     int speed;
40     int dir;
41     TorpedoColors colors;
42     struct torpedoshot *next_torpedo;
43     struct torpedoshot *prev_torpedo;
44 }TorpedoShot;
45
46 #endif // TORPEDO_H_INCLUDED

```

4.30 ui_input.c File Reference

```
#include "ui_input.h"
```

Functions

- void `user_input` ([InputStateInterface](#) *isi, [KeyMap](#) *key_map, SDL_TimerID id)
user_input

4.30.1 Function Documentation

4.30.1.1 user_input()

```
void user_input (
    InputStateInterface * isi,
    KeyMap * key_map,
    SDL_TimerID id )
```

user_input

A felhasználótól érkező billentyűparancsokat értelmezi, és egy interface-n keresztül adja át a program többi részének

Parameters

in, out	<i>isi</i>	a játék InputStateInterface-re mutató pointer. Ezen keresztül kommunikálnak egymással a vezérlőmodulok.
in	<i>key_map</i>	ez a vezérlő KeyMap interfácen keresztül hasonlítja össze a bejövő billentyűparancsokat a valid vezérlő gombokkal.
in	<i>id</i>	egy SDL_TimerID típusú időzítő. Feladata, hogy generáljon egy SDL_USEREVENT-et, amennyiben az időzítő lejártával nincs beérkező esemény/parancs (enélkül a vezérlő blokkolná a program futását, nem működne a háttér animáció, és semmi nem történne, amíg nincs felhasználói interakció).

Returns

void

4.31 ui_input.h

```
1 #ifndef UI_INPUT_H_INCLUDED
2 #define UI_INPUT_H_INCLUDED
3
4 #include "input_state_interface.h"
5 #include "keymap.h"
6
7 #include "SDL_timer.h"
8 #include <stdbool.h>
9 #include <SDL.h>
10 #include <SDL2_gfxPrimitives.h>
11
12 #include "debugmalloc.h"
13
14 void user_input(InputStateInterface *isi, KeyMap *key_map, SDL_TimerID id);
15
16 #endif // UI_INPUT_H_INCLUDED
```


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