

tAltris
v1.0

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Chapter 1

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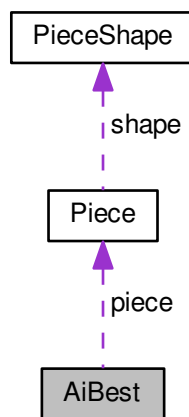
Chapter 3

Data Structure Documentation

3.1 AiBest Struct Reference

```
#include <engine.h>
```

Collaboration diagram for AiBest:



Data Fields

- **Piece * piece**
- double **score**

3.1.1 Field Documentation

3.1.1.1 piece

Piece* piece

3.1.1.2 score

double score

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

- src/ai/genetic/ **engine.h**

3.2 AiCoefs Struct Reference

```
#include <engine.h>
```

Data Fields

- double **agg_height**
- double **holes**
- double **clears**
- double **bumpiness**

3.2.1 Field Documentation

3.2.1.1 agg_height

double agg_height

3.2.1.2 bumpiness

double bumpiness

3.2.1.3 clears

```
double clears
```

3.2.1.4 holes

```
double holes
```

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

- src/ai/genetic/ **engine.h**

3.3 Board Struct Reference

```
#include <board.h>
```

Data Fields

- int **width**
- int **height**
- **Cell** * **cells**

3.3.1 Field Documentation

3.3.1.1 cells

```
Cell* cells
```

3.3.1.2 height

```
int height
```

3.3.1.3 width

```
int width
```

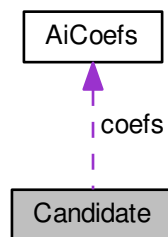
The documentation for this struct was generated from the following file:

- src/engine/ **board.h**

3.4 Candidate Struct Reference

```
#include <candidate.h>
```

Collaboration diagram for Candidate:



Data Fields

- **AiCoefs * coefs**
- double **fitness**

3.4.1 Field Documentation

3.4.1.1 coefs

```
AiCoefs* coefs
```


3.4.1.2 fitness

```
double fitness
```

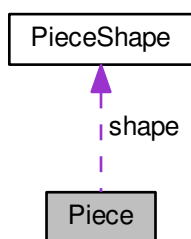
The documentation for this struct was generated from the following file:

- `src/ai/genetic/ candidate.h`

3.5 Piece Struct Reference

```
#include <piece.h>
```

Collaboration diagram for Piece:



Data Fields

- **PieceType** type
- **const PieceShape * shape**
- **int x**
- **int y**
- **Angle angle**

3.5.1 Field Documentation

3.5.1.1 angle

Angle angle

3.5.1.2 shape

```
const PieceShape* shape
```

3.5.1.3 type

```
PieceType type
```

3.5.1.4 x

```
int x
```

3.5.1.5 y

```
int y
```

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

- src/engine/piece/ **piece.h**

3.6 PieceQueue Struct Reference

```
#include <piece_queue.h>
```

Data Fields

- unsigned int **seed**
- size_t **length**
- **PieceType** * **data**

3.6.1 Field Documentation

3.6.1.1 data

```
PieceType* data
```

3.6.1.2 length

```
size_t length
```

3.6.1.3 seed

```
unsigned int seed
```

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

- src/engine/piece/ **piece_queue.h**

3.7 PieceShape Struct Reference

```
#include <piece_shape.h>
```

Data Fields

- int **shape** [**ANGLE_ESIZE**][**PIECE_SHAPE_HEIGHT**][**PIECE_SHAPE_WIDTH**]
- Cell **fill**

3.7.1 Field Documentation

3.7.1.1 fill

```
Cell fill
```

3.7.1.2 shape

```
int shape[ ANGLE_ESIZE][ PIECE_SHAPE_HEIGHT][ PIECE_SHAPE_WIDTH]
```

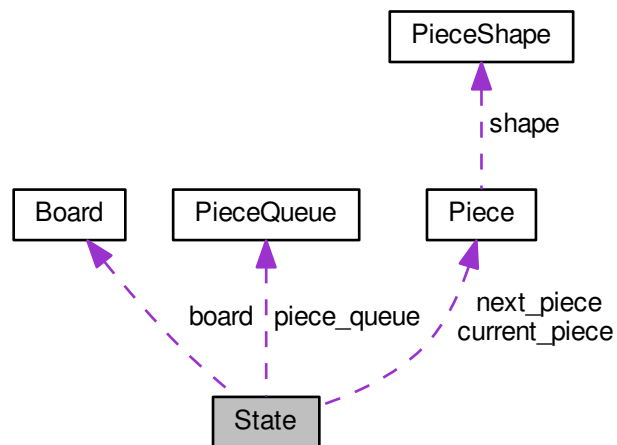
The documentation for this struct was generated from the following file:

- src/engine/piece/ **piece_shape.h**

3.8 State Struct Reference

```
#include <state.h>
```

Collaboration diagram for State:



Data Fields

- unsigned int **score**
- unsigned int **level**
- unsigned int **broken_lines**
- unsigned int **step**
- unsigned int **input_counts**
- **Board** * **board**
- **PieceQueue** * **piece_queue**
- size_t **piece_queue_index**
- **Piece** * **current_piece**
- **Piece** * **next_piece**

3.8.1 Field Documentation

3.8.1.1 board

```
Board* board
```

3.8.1.2 broken_lines

unsigned int broken_lines

3.8.1.3 current_piece

Piece* current_piece

3.8.1.4 input_counts

unsigned int input_counts

3.8.1.5 level

unsigned int level

3.8.1.6 next_piece

Piece* next_piece

3.8.1.7 piece_queue

PieceQueue* piece_queue

3.8.1.8 piece_queue_index

size_t piece_queue_index

3.8.1.9 score

unsigned int score

3.8.1.10 step

unsigned int step

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

- src/engine/ **state.h**

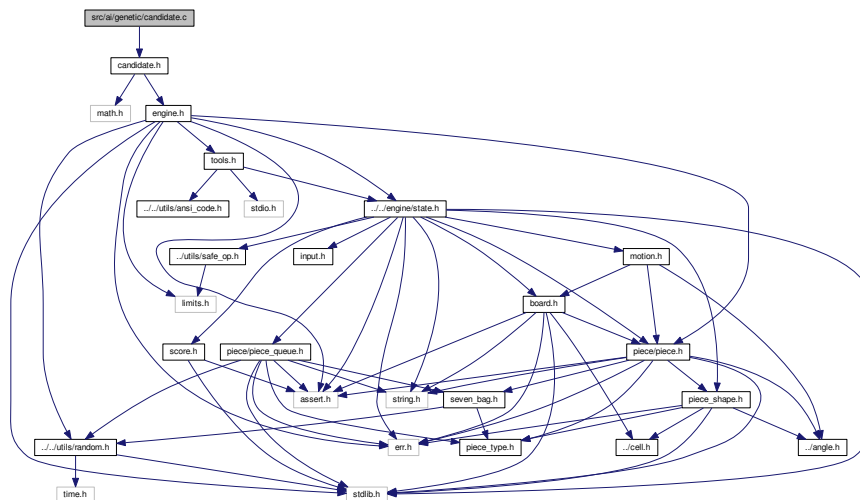
Chapter 4

File Documentation

4.1 src/ai/genetic/candidate.c File Reference

Candidate (p. 8).

```
#include "candidate.h"
Include dependency graph for candidate.c:
```



Functions

- **Candidate *** `genetic_candidate_create ()`
- **Candidate *** `genetic_candidate_create_random ()`
- void `genetic_candidate_free (Candidate *candidate)`
- void `genetic_candidate_normalize (Candidate *candidate)`
- **Candidate *** `genetic_candidate_crossover (Candidate *cdt1, Candidate *cdt2)`
- void `genetic_candidate_mutate (Candidate *cdt)`
- void `array_shift_left (int *tab, size_t *len, size_t pos)`
- **Candidate **** `genetic_tournament_select_pair (Candidate **cdt, size_t ways)`

4.1.1 Detailed Description

Candidate (p. 8).

Author

S4MasterRace

Version

2.0

4.1.2 Function Documentation

4.1.2.1 array_shift_left()

```
void array_shift_left (
    int * tab,
    size_t * len,
    size_t pos )
```

4.1.2.2 genetic_candidate_create()

```
Candidate* genetic_candidate_create ( )
```

4.1.2.3 genetic_candidate_create_random()

```
Candidate* genetic_candidate_create_random ( )
```

4.1.2.4 genetic_candidate_crossover()

```
Candidate* genetic_candidate_crossover (
    Candidate * cdt1,
    Candidate * cdt2 )
```


4.1.2.5 genetic_candidate_free()

```
void genetic_candidate_free (
    Candidate * candidate )
```

4.1.2.6 genetic_candidate_mutate()

```
void genetic_candidate_mutate (
    Candidate * cdt )
```

4.1.2.7 genetic_candidate_normalize()

```
void genetic_candidate_normalize (
    Candidate * candidate )
```

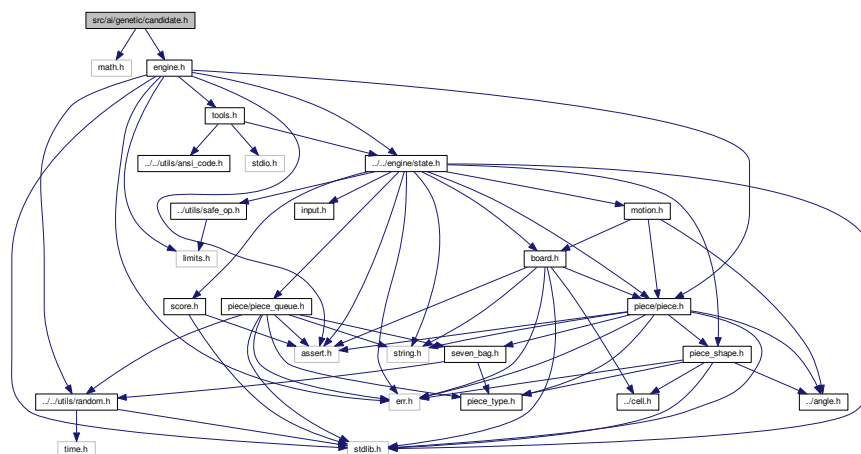
4.1.2.8 genetic_tournament_select_pair()

```
Candidate** genetic_tournament_select_pair (
    Candidate ** cdt,
    size_t ways )
```

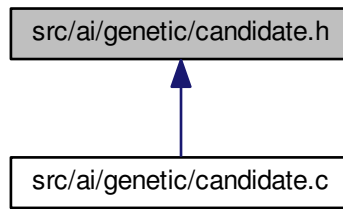
4.2 src/ai/genetic/candidate.h File Reference

Candidate (p. 8).

```
#include <math.h>
#include "engine.h"
Include dependency graph for candidate.h:
```



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



Data Structures

- struct **Candidate**

Functions

- **Candidate** * **genetic_candidate_create** ()
- **Candidate** * **genetic_candidate_create_random** ()
- void **genetic_candidate_free** (**Candidate** *candidate)
- void **genetic_candidate_normalize** (**Candidate** *candidate)
- **Candidate** * **genetic_candidate_crossover** (**Candidate** *cdt1, **Candidate** *cdt2)
- void **genetic_candidate_mutate** (**Candidate** *cdt)

4.2.1 Detailed Description

Candidate (p. 8).

Author

S4MasterRace

Version

2.0

4.2.2 Function Documentation

4.2.2.1 **genetic_candidate_create**()

```
Candidate* genetic_candidate_create ( )
```

4.2.2.2 genetic_candidate_create_random()

```
Candidate* genetic_candidate_create_random ( )
```

4.2.2.3 genetic_candidate_crossover()

```
Candidate* genetic_candidate_crossover (
    Candidate * cdt1,
    Candidate * cdt2 )
```

4.2.2.4 genetic_candidate_free()

```
void genetic_candidate_free (
    Candidate * candidate )
```

4.2.2.5 genetic_candidate_mutate()

```
void genetic_candidate_mutate (
    Candidate * cdt )
```

4.2.2.6 genetic_candidate_normalize()

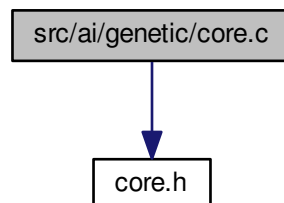
```
void genetic_candidate_normalize (
    Candidate * candidate )
```

4.3 src/ai/genetic/core.c File Reference

Core of the genetic algorithm.

```
#include "core.h"
```

Include dependency graph for core.c:



4.3.1 Detailed Description

Core of the genetic algorithm.

Author

S4MasterRace

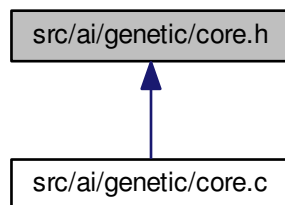
Version

2.0

4.4 src/ai/genetic/core.h File Reference

Core of the genetic algorithm.

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



4.4.1 Detailed Description

Core of the genetic algorithm.

Author

S4MasterRace

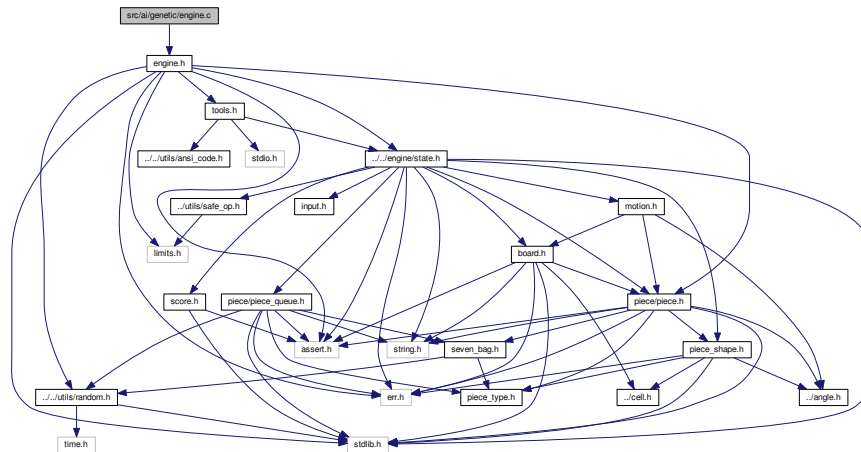
Version

2.0

4.5 src/ai/genetic/engine.c File Reference

Engine for the genetic algorithm.

```
#include "engine.h"
Include dependency graph for engine.c:
```



Functions

- **AiCoefs** * **genetic_aicoefs_get** ()
- **AiCoefs** * **genetic_aicoefs_random** ()
- void **genetic_aicoefs_free** (**AiCoefs** *coefs)
- **AiBest** * **genetic_aibest_create** (**Piece** *p, double s)
- void **genetic_aibest_free** (**AiBest** *ab)
- double **genetic_get_rank** (const **State** *state)
- **AiBest** * **_genetic_best** (const **State** *state, int current, int max)
- **Piece** * **genetic_best** (const **State** *state)

4.5.1 Detailed Description

Engine for the genetic algorithm.

Author

S4MasterRace

Version

2.0

4.5.2 Function Documentation

4.5.2.1 _genetic_best()

```
AiBest* _genetic_best (
    const State * state,
    int current,
    int max )
```

4.5.2.2 genetic_aibest_create()

```
AiBest* genetic_aibest_create (
    Piece * p,
    double s )
```

4.5.2.3 genetic_aibest_free()

```
void genetic_aibest_free (
    AiBest * ab )
```

4.5.2.4 genetic_aicoefs_free()

```
void genetic_aicoefs_free (
    AiCoefs * coefs )
```

4.5.2.5 genetic_aicoefs_get()

```
AiCoefs* genetic_aicoefs_get ( )
```

4.5.2.6 genetic_aicoefs_random()

```
AiCoefs* genetic_aicoefs_random ( )
```

4.5.2.7 genetic_best()

```
Piece* genetic_best (
    const State * state )
```

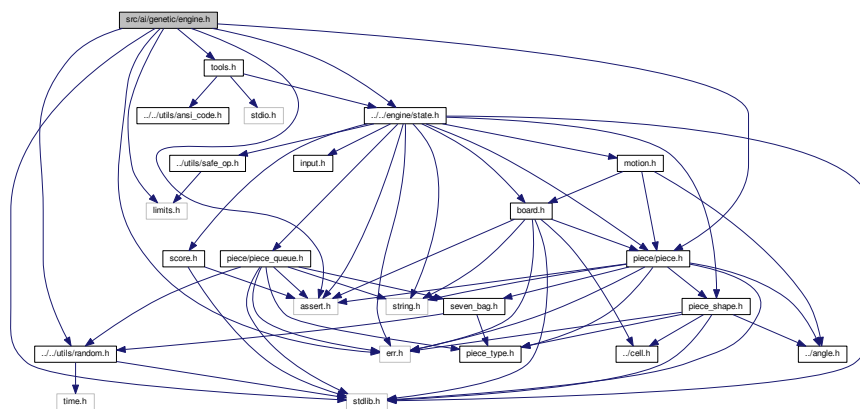
4.5.2.8 genetic_get_rank()

```
double genetic_get_rank (
    const State * state )
```

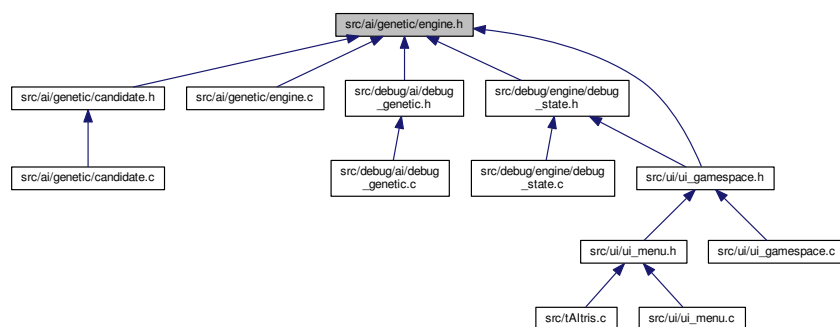
4.6 src/ai/genetic/engine.h File Reference

Engine for the genetic algorithm.

```
#include <stdlib.h>
#include <assert.h>
#include <err.h>
#include <limits.h>
#include "tools.h"
#include "../engine/state.h"
#include "../engine/piece/piece.h"
#include "../utils/random.h"
Include dependency graph for engine.h:
```



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



Data Structures

- struct **AiBest**
- struct **AiCoefs**

Functions

- **AiCoefs** * **genetic_aicoefs_get** ()
- **AiCoefs** * **genetic_aicoefs_random** ()
- void **genetic_aicoefs_free** (**AiCoefs** *coefs)
- **AiBest** * **genetic_aibest_create** (**Piece** *p, double s)
- void **genetic_aibest_free** (**AiBest** *ab)
- double **genetic_get_rank** (const **State** *state)
- **Piece** * **genetic_best** (const **State** *state)

4.6.1 Detailed Description

Engine for the genetic algorithm.

Author

S4MasterRace

Version

2.0

4.6.2 Function Documentation

4.6.2.1 **genetic_aibest_create()**

```
AiBest* genetic_aibest_create (
    Piece * p,
    double s )
```

4.6.2.2 **genetic_aibest_free()**

```
void genetic_aibest_free (
    AiBest * ab )
```


4.6.2.3 genetic_aicoefs_free()

```
void genetic_aicoefs_free (
    AiCoefs * coefs )
```

4.6.2.4 genetic_aicoefs_get()

```
AiCoefs* genetic_aicoefs_get ( )
```

4.6.2.5 genetic_aicoefs_random()

```
AiCoefs* genetic_aicoefs_random ( )
```

4.6.2.6 genetic_best()

```
Piece* genetic_best (
    const State * state )
```

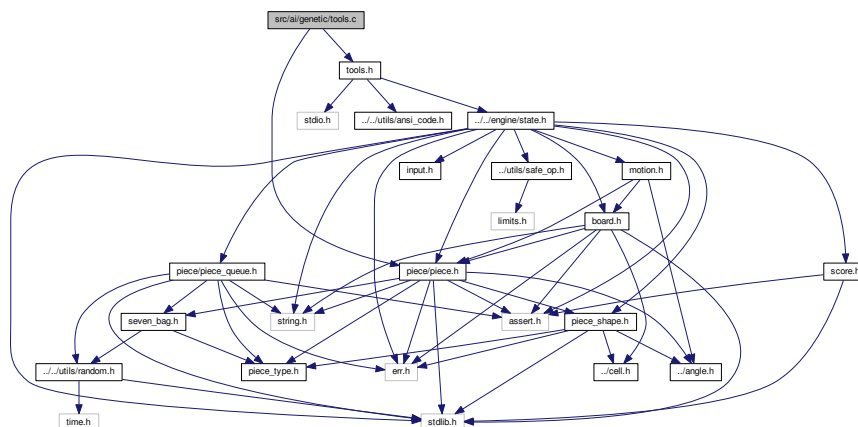
4.6.2.7 genetic_get_rank()

```
double genetic_get_rank (
    const State * state )
```

4.7 src/ai/genetic/tools.c File Reference

Tools for the genetic algorithm.

```
#include "tools.h"
#include "../engine/piece/piece.h"
Include dependency graph for tools.c:
```



Functions

- int **genetic_tools_height** (const **State** *state, int x)
- void **genetic_tools_heights** (const **State** *state, int *heights)
- int **genetic_tools_bumpiness** (const **State** *state)
- int **genetic_tools_aggregate_height** (const **State** *state)
- int **genetic_tools_hole** (const **State** *state, int x)
- int **genetic_tools_holes** (const **State** *state)
- int **genetic_tools_clears** (const **State** *state)
- **Input** **delta_piece** (const **Piece** *current, const **Piece** *target)

4.7.1 Detailed Description

Tools for the genetic algorithm.

Author

S4MasterRace

Version

2.0

4.7.2 Function Documentation

4.7.2.1 **delta_piece()**

```
Input delta_piece (  
    const Piece * current,  
    const Piece * target )
```

4.7.2.2 **genetic_tools_aggregate_height()**

```
int genetic_tools_aggregate_height (  
    const State * state )
```

4.7.2.3 **genetic_tools_bumpiness()**

```
int genetic_tools_bumpiness (  
    const State * state )
```

4.7.2.4 genetic_tools_clears()

```
int genetic_tools_clears (
    const State * state )
```

4.7.2.5 genetic_tools_height()

```
int genetic_tools_height (
    const State * state,
    int x )
```

4.7.2.6 genetic_tools_heights()

```
void genetic_tools_heights (
    const State * state,
    int * heights )
```

4.7.2.7 genetic_tools_hole()

```
int genetic_tools_hole (
    const State * state,
    int x )
```

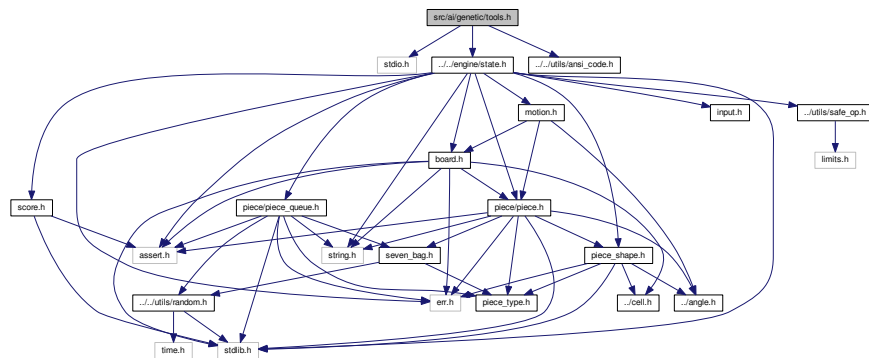
4.7.2.8 genetic_tools_holes()

```
int genetic_tools_holes (
    const State * state )
```

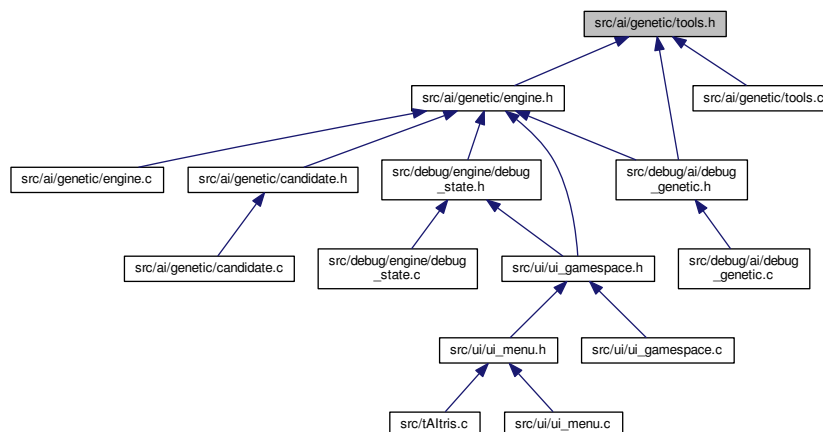
4.8 src/ai/genetic/tools.h File Reference

Tools for the genetic algorithm.

```
#include <stdio.h>
#include "../engine/state.h"
#include "../utils/ansi_code.h"
Include dependency graph for tools.h:
```



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



Macros

- `#define TOOLS_ABS(X) (((X) < 0) ? (-1 * (X)) : (X))`

Functions

- `int genetic_tools_height (const State *state, int x)`
- `void genetic_tools_heights (const State *state, int *heights)`
- `int genetic_tools_bumpiness (const State *state)`
- `int genetic_tools_aggregate_height (const State *state)`
- `int genetic_tools_hole (const State *state, int x)`
- `int genetic_tools_holes (const State *state)`
- `int genetic_tools_clears (const State *state)`
- `Input delta_piece (const Piece *current, const Piece *target)`

4.8.1 Detailed Description

Tools for the genetic algorithm.

Author

S4MasterRace

Version

2.0

4.8.2 Macro Definition Documentation

4.8.2.1 TOOLS_ABS

```
#define TOOLS_ABS(  
    X ) ((X) < 0) ? (-1 * (X)) : (X)
```

4.8.3 Function Documentation

4.8.3.1 delta_piece()

```
Input delta_piece (  
    const Piece * current,  
    const Piece * target )
```

4.8.3.2 genetic_tools_aggregate_height()

```
int genetic_tools_aggregate_height (  
    const State * state )
```

4.8.3.3 genetic_tools_bumpiness()

```
int genetic_tools_bumpiness (  
    const State * state )
```

4.8.3.4 genetic_tools_clears()

```
int genetic_tools_clears (
    const State * state )
```

4.8.3.5 genetic_tools_height()

```
int genetic_tools_height (
    const State * state,
    int x )
```

4.8.3.6 genetic_tools_heights()

```
void genetic_tools_heights (
    const State * state,
    int * heights )
```

4.8.3.7 genetic_tools_hole()

```
int genetic_tools_hole (
    const State * state,
    int x )
```

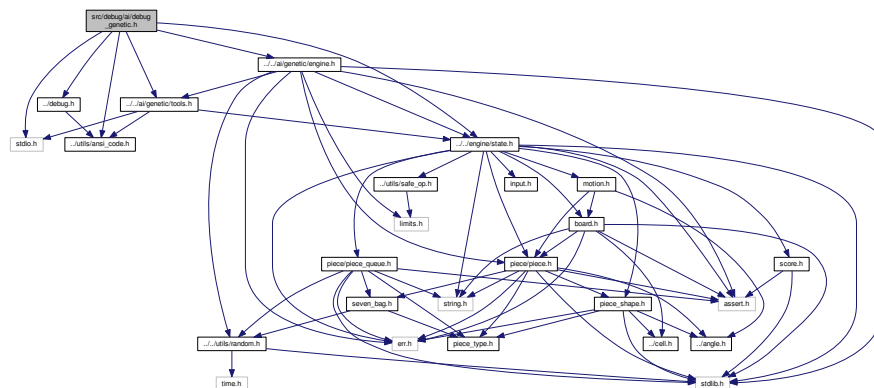
4.8.3.8 genetic_tools_holes()

```
int genetic_tools_holes (
    const State * state )
```

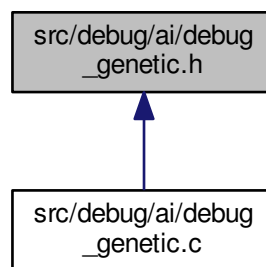

4.10 src/debug/ai/debug_genetic.h File Reference

Genetic algorithm debugging.

```
#include <stdio.h>
#include "../debug.h"
#include "../../utils/ansi_code.h"
#include "../../engine/state.h"
#include "../../ai/genetic/tools.h"
#include "../../ai/genetic/engine.h"
Include dependency graph for debug_genetic.h:
```



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



Macros

- `#define DEBUG_STATE_NAME "Genetic"`
- `#define DEBUG_STATE_COLOR ANSI_FG_BLUE`
- `#define DEBUG_STATE_TAG DEBUG_TAG(DEBUG_STATE_NAME, DEBUG_STATE_COLOR)`

Functions

- `void debug_genetic_print_stats (const State *state)`

4.10.1 Detailed Description

Genetic algorithm debugging.

Author

S4MasterRace

Version

2.0

4.10.2 Macro Definition Documentation

4.10.2.1 DEBUG_STATE_COLOR

```
#define DEBUG_STATE_COLOR  ANSI_FG_BLUE
```

4.10.2.2 DEBUG_STATE_NAME

```
#define DEBUG_STATE_NAME  "Genetic"
```

4.10.2.3 DEBUG_STATE_TAG

```
#define DEBUG_STATE_TAG  DEBUG_TAG( DEBUG_STATE_NAME,  DEBUG_STATE_COLOR)
```

4.10.3 Function Documentation

4.10.3.1 debug_genetic_print_stats()

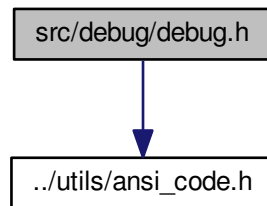
```
void debug_genetic_print_stats (
    const  State * state )
```

4.11 src/debug/debug.h File Reference

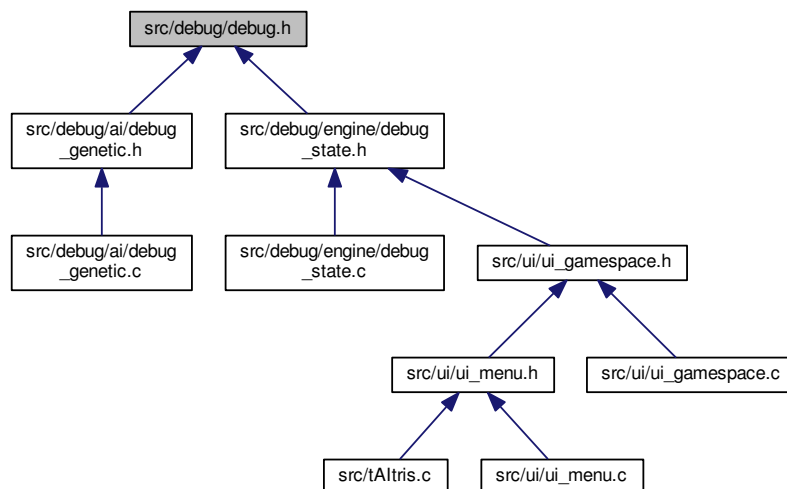
Debug.

```
#include "../utils/ansi_code.h"
```

Include dependency graph for debug.h:



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



Macros

- `#define DEBUG_TAG(_name_, _color_)`

4.11.1 Detailed Description

Debug.

Author

S4MasterRace

Version

2.0

4.11.2 Macro Definition Documentation

4.11.2.1 DEBUG_TAG

```
#define DEBUG_TAG(  
    _name_,  
    _color_ )
```

Value:

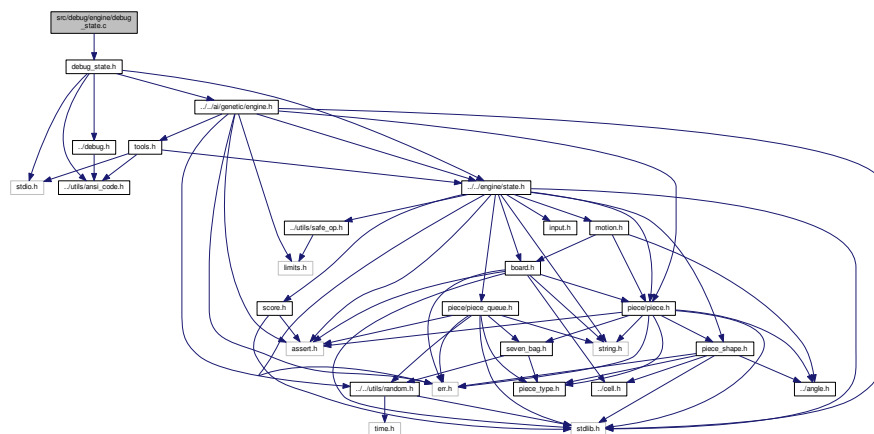
```
ANSI_RESET \
  "[" ANSI_FG_CYAN "Debug" ANSI_RESET "]" \
  "(" _color_ _name_ ANSI_RESET ")" "
```

4.12 src/debug/engine/debug_state.c File Reference

Debug state.

```
#include "debug_state.h"
```

Include dependency graph for debug_state.c:



Functions

- void **debug_state_print_line_number** (const **Board** *brd, int y)
- void **debug_state_print_cell** (**Cell** c)
- void **debug_state_print_infos** (const **State** *state, int y)
- void **debug_state_print_next_piece** (const **Piece** *pc, int y)
- void **debug_state_print** (const **State** *state)

4.12.1 Detailed Description

Debug state.

Author

S4MasterRace

Version

2.0

4.12.2 Function Documentation

4.12.2.1 debug_state_print()

```
void debug_state_print (
    const State * state )
```

4.12.2.2 debug_state_print_cell()

```
void debug_state_print_cell (
    Cell c )
```

4.12.2.3 debug_state_print_infos()

```
void debug_state_print_infos (
    const State * state,
    int y )
```

4.12.2.4 debug_state_print_line_number()

```
void debug_state_print_line_number (
    const Board * brd,
    int y )
```

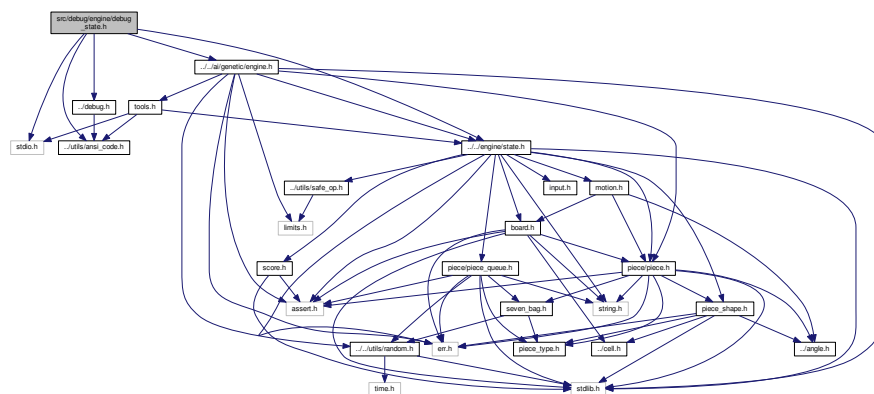
4.12.2.5 debug_state_print_next_piece()

```
void debug_state_print_next_piece (
    const Piece * pc,
    int y )
```

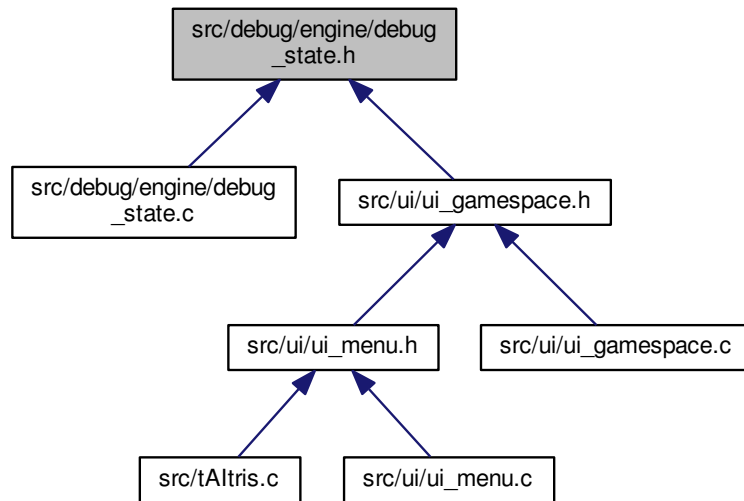
4.13 src/debug/engine/debug_state.h File Reference

Debug state.

```
#include <stdio.h>
#include "../debug.h"
#include "../../engine/state.h"
#include "../../utils/ansi_code.h"
#include "../../ai/genetic/engine.h"
Include dependency graph for debug_state.h:
```



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



Macros

- `#define DEBUG_STATE_NAME "State"`
- `#define DEBUG_STATE_COLOR ANSI_FG_MAGENTA`
- `#define DEBUG_STATE_TAG DEBUG_TAG(DEBUG_STATE_NAME, DEBUG_STATE_COLOR)`

Functions

- void **debug_state_print** (const **State** *state)

4.13.1 Detailed Description

Debug state.

Author

S4MasterRace

Version

2.0

4.13.2 Macro Definition Documentation

4.13.2.1 DEBUG_STATE_COLOR

```
#define DEBUG_STATE_COLOR  ANSI_FG_MAGENTA
```

4.13.2.2 DEBUG_STATE_NAME

```
#define DEBUG_STATE_NAME  "State"
```

4.13.2.3 DEBUG_STATE_TAG

```
#define DEBUG_STATE_TAG  DEBUG_TAG( DEBUG_STATE_NAME,  DEBUG_STATE_COLOR)
```

4.13.3 Function Documentation

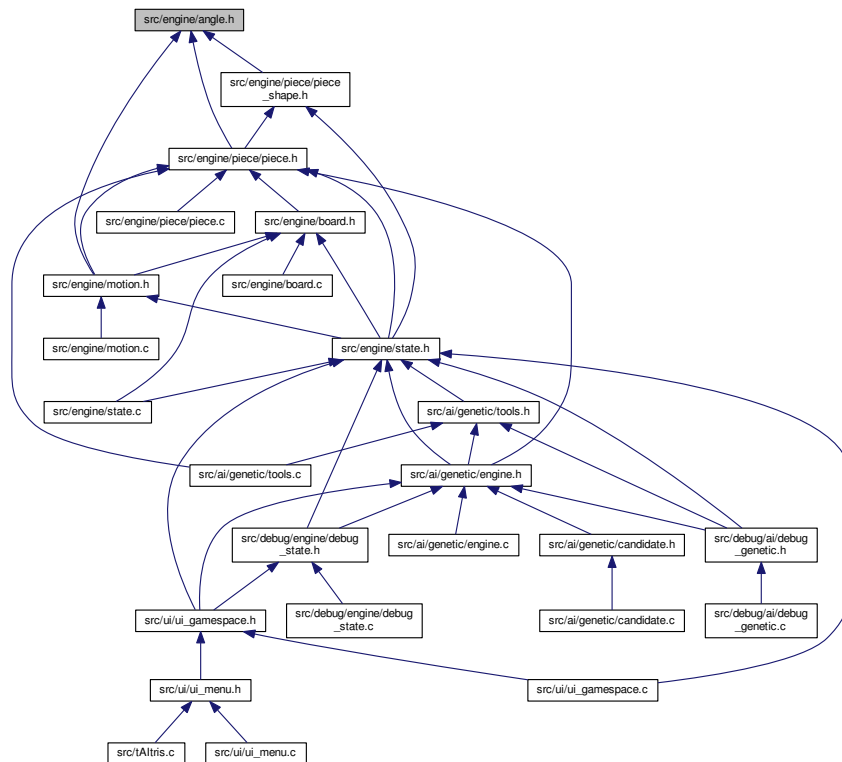
4.13.3.1 debug_state_print()

```
void debug_state_print (
    const  State * state )
```

4.14 src/engine/angle.h File Reference

Angle.

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



Macros

- `#define` **ANGLE_ESIZE** 4

Enumerations

- enum **Angle** { **ANGLE_UP**, **ANGLE_RIGHT**, **ANGLE_DOWN**, **ANGLE_LEFT** }
- enum **Rotation** { **ROTATE_LEFT** = -1, **ROTATE_RIGHT** = 1 }

4.14.1 Detailed Description

Angle.

Author

S4MasterRace

Version

2.0

4.14.2 Macro Definition Documentation

4.14.2.1 ANGLE_ESIZE

```
#define ANGLE_ESIZE 4
```

4.14.3 Enumeration Type Documentation

4.14.3.1 Angle

```
enum Angle
```

Enumerator

ANGLE_UP	
ANGLE_RIGHT	
ANGLE_DOWN	
ANGLE_LEFT	

4.14.3.2 Rotation

```
enum Rotation
```

Enumerator

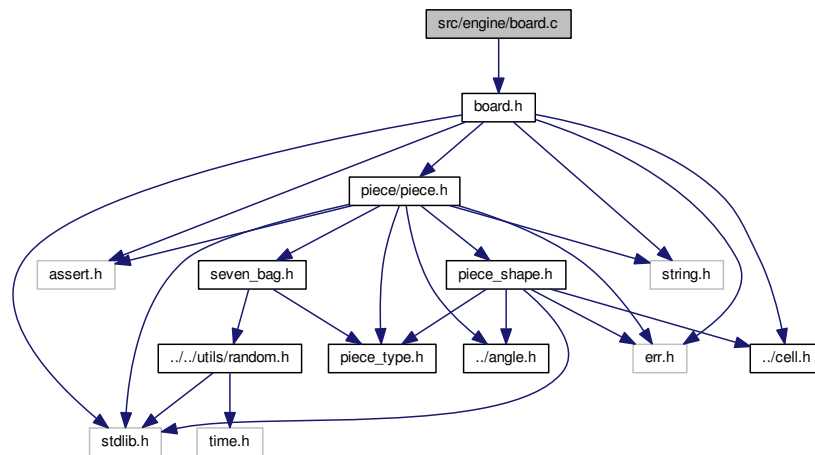
ROTATE_LEFT	
ROTATE_RIGHT	

4.15 src/engine/board.c File Reference

Board (p. 7).

```
#include "board.h"
```

Include dependency graph for board.c:



Functions

- **Board *** **board_create** (int width, int height)
- void **board_init** (**Board ***brd)
- void **board_free** (**Board ***brd)
- **Board *** **board_copy** (**Board ***brd)
- size_t **board_get_completed_lines** (const **Board ***brd, int *hist)
- void **board_break_lines** (**Board ***brd, const int *hist)
- int **board_merge_piece** (**Board ***brd, const **Piece ***pc)

4.15.1 Detailed Description

Board (p. 7).

Author

S4MasterRace

Version

2.0

4.15.2 Function Documentation

4.15.2.1 board_break_lines()

```
void board_break_lines (
    Board * brd,
    const int * hist )
```

4.15.2.2 board_copy()

```
Board* board_copy (
    Board * brd )
```

4.15.2.3 board_create()

```
Board* board_create (
    int width,
    int height )
```

4.15.2.4 board_free()

```
void board_free (
    Board * brd )
```

4.15.2.5 board_get_completed_lines()

```
size_t board_get_completed_lines (
    const Board * brd,
    int * hist )
```

4.15.2.6 board_init()

```
void board_init (
    Board * brd )
```

4.15.2.7 board_merge_piece()

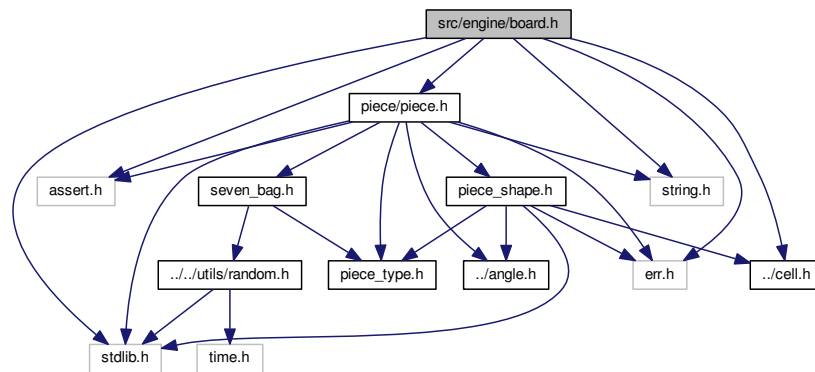
```
int board_merge_piece (
    Board * brd,
    const Piece * pc )
```

4.16 src/engine/board.h File Reference

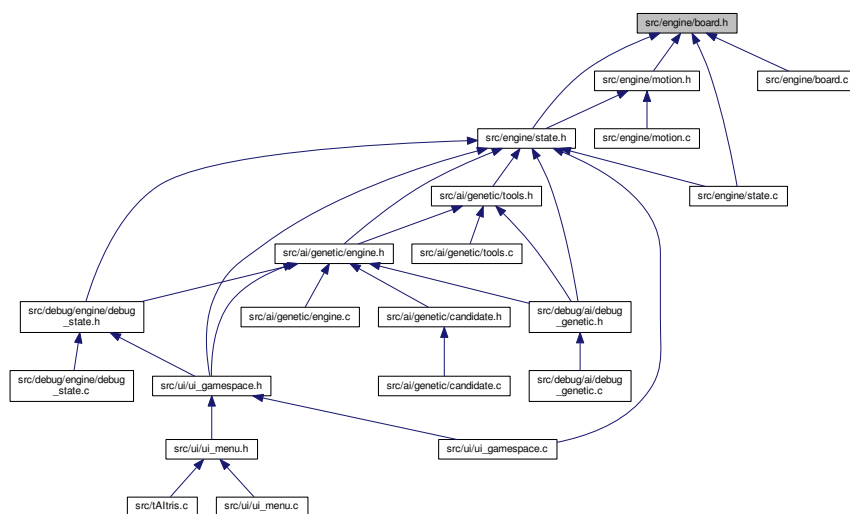
Board (p. 7).

```
#include <stdlib.h>
#include <assert.h>
#include <string.h>
#include <err.h>
#include "piece/piece.h"
#include "cell.h"
```

Include dependency graph for board.h:



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



Data Structures

- struct **Board**

Macros

- `#define BOARD_WIDTH 10`
- `#define BOARD_HEIGHT 20`
- `#define BOARD_HIDDEN 2`
- `#define board_reverse_y(_brd_, _y_) ((_brd_)->height - 1 - (_y_))`

Functions

- **Board** * **board_create** (int width, int height)
- void **board_init** (**Board** *brd)
- void **board_free** (**Board** *brd)
- **Board** * **board_copy** (**Board** *brd)
- size_t **board_get_completed_lines** (const **Board** *brd, int *hist)
- void **board_break_lines** (**Board** *brd, const int *hist)
- int **board_merge_piece** (**Board** *brd, const **Piece** *pc)

4.16.1 Detailed Description

Board (p. 7).

Author

S4MasterRace

Version

2.0

4.16.2 Macro Definition Documentation

4.16.2.1 BOARD_HEIGHT

```
#define BOARD_HEIGHT 20
```

4.16.2.2 BOARD_HIDDEN

```
#define BOARD_HIDDEN 2
```

4.16.2.3 board_reverse_y

```
#define board_reverse_y(  
    _brd_,  
    _y_ ) ((_brd_)->height - 1 - (_y_))
```

4.16.2.4 BOARD_WIDTH

```
#define BOARD_WIDTH 10
```

4.16.3 Function Documentation

4.16.3.1 board_break_lines()

```
void board_break_lines (  
    Board * brd,  
    const int * hist )
```

4.16.3.2 board_copy()

```
Board* board_copy (  
    Board * brd )
```

4.16.3.3 board_create()

```
Board* board_create (  
    int width,  
    int height )
```

4.16.3.4 board_free()

```
void board_free (  
    Board * brd )
```

4.16.3.5 board_get_completed_lines()

```
size_t board_get_completed_lines (
    const Board * brd,
    int * hist )
```

4.16.3.6 board_init()

```
void board_init (
    Board * brd )
```

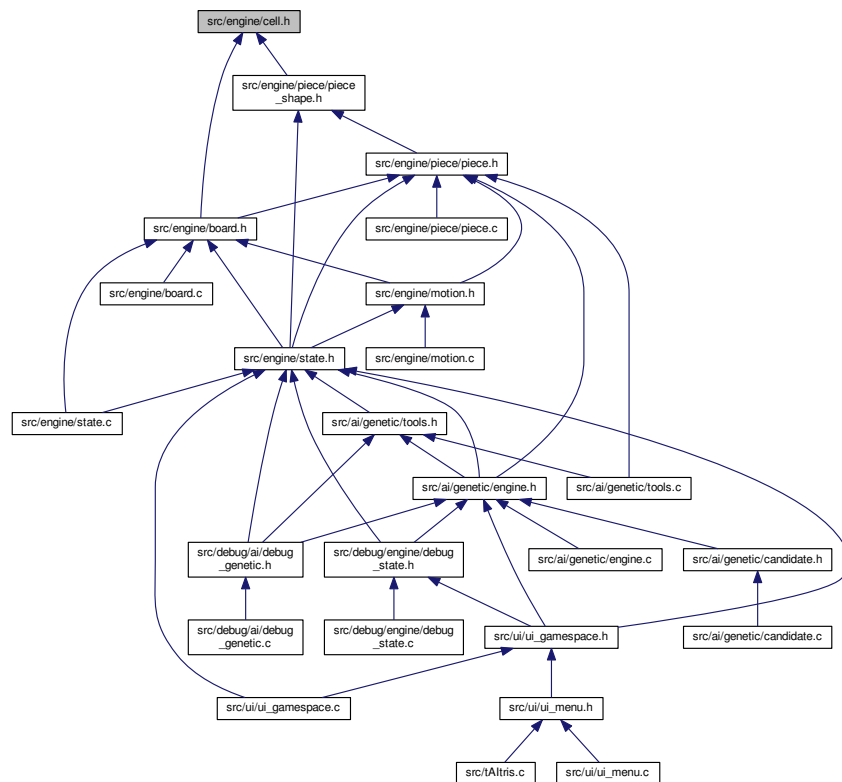
4.16.3.7 board_merge_piece()

```
int board_merge_piece (
    Board * brd,
    const Piece * pc )
```

4.17 src/engine/cell.h File Reference

Cell.

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



Macros

- `#define CELL_ESIZE 8`

Enumerations

- `enum Cell {
CELL_EMPTY, CELL_CYAN, CELL_YELLOW, CELL_PURPLE,
CELL_GREEN, CELL_RED, CELL_BLUE, CELL_ORANGE }`

4.17.1 Detailed Description

Cell.

Author

S4MasterRace

Version

2.0

4.17.2 Macro Definition Documentation

4.17.2.1 CELL_ESIZE

```
#define CELL_ESIZE 8
```

4.17.3 Enumeration Type Documentation

4.17.3.1 Cell

```
enum Cell
```

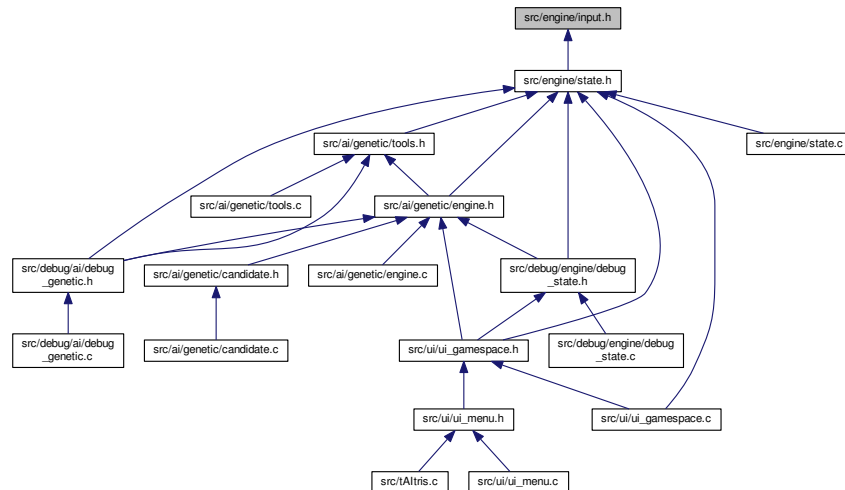
Enumerator

CELL_EMPTY	
CELL_CYAN	
CELL_YELLOW	
CELL_PURPLE	
CELL_GREEN	
CELL_RED	
CELL_BLUE	
CELL_ORANGE	

4.18 src/engine/input.h File Reference

Input.

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



Macros

- `#define INPUT_ESIZE 6`

Enumerations

- `enum Input {`
`INPUT_MOVE_LEFT, INPUT_MOVE_RIGHT, INPUT_ROTATE_RIGHT, INPUT_ROTATE_LEFT,`
`INPUT_SOFT_DROP, INPUT_HARD_DROP }`

4.18.1 Detailed Description

Input.

Author

S4MasterRace

Version

2.0

4.18.2 Macro Definition Documentation

4.18.2.1 INPUT_ESIZE

```
#define INPUT_ESIZE 6
```

4.18.3 Enumeration Type Documentation

4.18.3.1 Input

```
enum Input
```

Enumerator

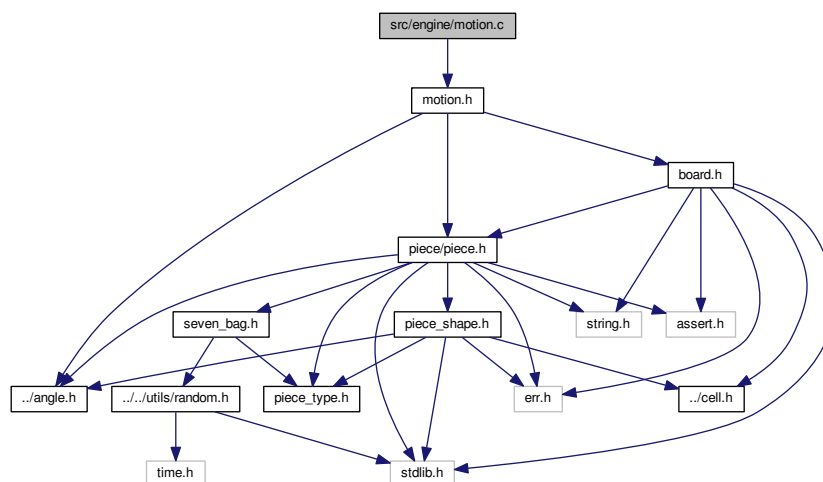
INPUT_MOVE_LEFT	
INPUT_MOVE_RIGHT	
INPUT_ROTATE_RIGHT	
INPUT_ROTATE_LEFT	
INPUT_SOFT_DROP	
INPUT_HARD_DROP	

4.19 src/engine/motion.c File Reference

Motion.

```
#include "motion.h"
```

Include dependency graph for motion.c:



Functions

- int **motion_is_valid** (const **Piece** *pc, const **Board** *brd)
- int **motion_try_move** (**Piece** *pc, const **Board** *brd, int dx, int dy)
- int **motion_try_down** (**Piece** *pc, const **Board** *brd)
- int **motion_try_rotate** (**Piece** *pc, const **Board** *brd, **Rotation** r)
- int **motion_can_move** (const **Piece** *pc, const **Board** *brd, int dx, int dy)
- int **motion_can_rotate** (const **Piece** *pc, const **Board** *brd, **Rotation** r)

4.19.1 Detailed Description

Motion.

Author

S4MasterRace

Version

2.0

4.19.2 Function Documentation

4.19.2.1 motion_can_move()

```
int motion_can_move (
    const Piece * pc,
    const Board * brd,
    int dx,
    int dy )
```

4.19.2.2 motion_can_rotate()

```
int motion_can_rotate (
    const Piece * pc,
    const Board * brd,
    Rotation r )
```

4.19.2.3 motion_is_valid()

```
int motion_is_valid (
    const Piece * pc,
    const Board * brd )
```

4.19.2.4 motion_try_down()

```
int motion_try_down (
    Piece * pc,
    const Board * brd )
```

4.19.2.5 motion_try_move()

```
int motion_try_move (
    Piece * pc,
    const Board * brd,
    int dx,
    int dy )
```

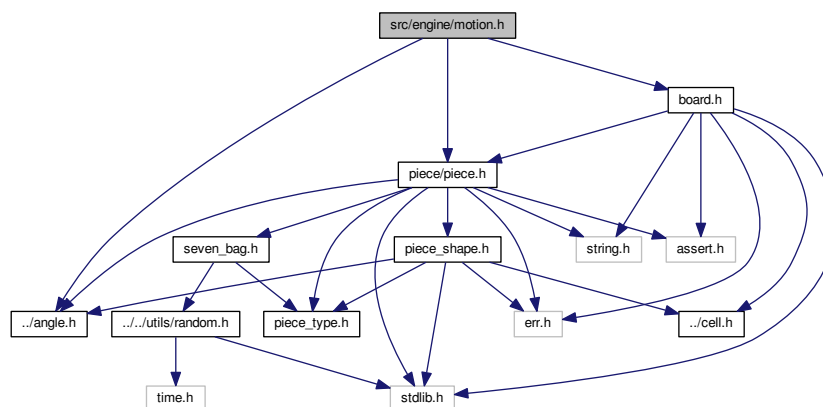
4.19.2.6 motion_try_rotate()

```
int motion_try_rotate (
    Piece * pc,
    const Board * brd,
    Rotation r )
```

4.20 src/engine/motion.h File Reference

Motion.

```
#include "piece/piece.h"
#include "board.h"
#include "angle.h"
Include dependency graph for motion.h:
```



4.20.2.1 motion_can_move()

```
int motion_can_move (
    const Piece * pc,
    const Board * brd,
    int dx,
    int dy )
```

4.20.2.2 motion_can_rotate()

```
int motion_can_rotate (
    const Piece * pc,
    const Board * brd,
    Rotation r )
```

4.20.2.3 motion_is_valid()

```
int motion_is_valid (
    const Piece * pc,
    const Board * brd )
```

4.20.2.4 motion_try_down()

```
int motion_try_down (
    Piece * pc,
    const Board * brd )
```

4.20.2.5 motion_try_move()

```
int motion_try_move (
    Piece * pc,
    const Board * brd,
    int dx,
    int dy )
```

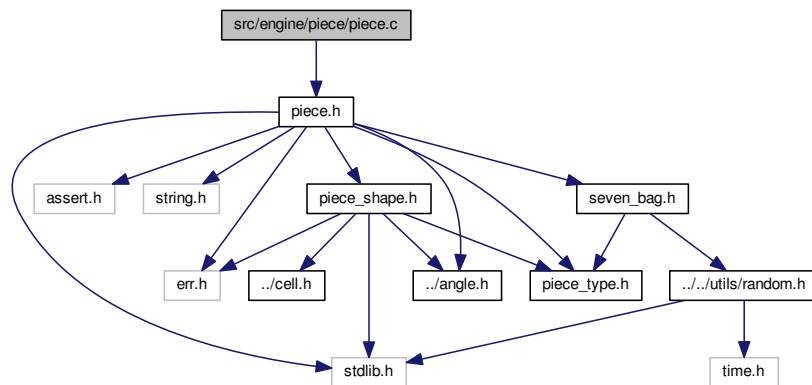
4.20.2.6 motion_try_rotate()

```
int motion_try_rotate (
    Piece * pc,
    const Board * brd,
    Rotation r )
```

4.21 src/engine/piece/piece.c File Reference

Piece (p. 9).

```
#include "piece.h"
Include dependency graph for piece.c:
```



Functions

- **Piece * piece_create** (**PieceType** type, int x, int y, **Angle** angle)
- void **piece_free** (**Piece** *pc)
- **Piece * piece_copy** (const **Piece** *pc)
- **Piece * piece_random** (int x, int y, **Angle** angle)

4.21.1 Detailed Description

Piece (p. 9).

Author

S4MasterRace

Version

2.0

4.21.2 Function Documentation

4.21.2.1 piece_copy()

```
Piece* piece_copy (
    const Piece * pc )
```

4.21.2.2 piece_create()

```
Piece* piece_create (
    PieceType type,
    int x,
    int y,
    Angle angle )
```

4.21.2.3 piece_free()

```
void piece_free (
    Piece * pc )
```

4.21.2.4 piece_random()

```
Piece* piece_random (
    int x,
    int y,
    Angle angle )
```

4.22 src/engine/piece/piece.h File Reference

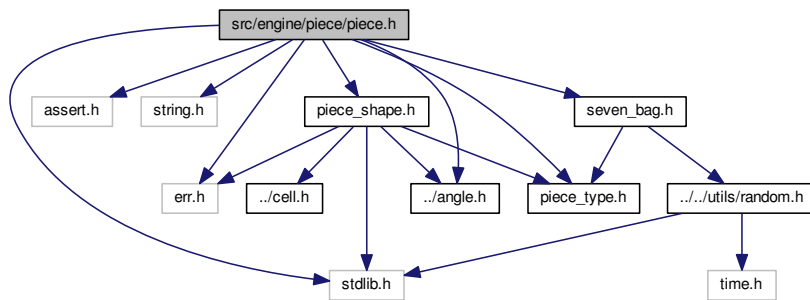
Piece (p. 9).

```
#include <stdlib.h>
#include <assert.h>
#include <string.h>
#include <err.h>
#include "piece_type.h"
#include "piece_shape.h"
#include "../angle.h"
```

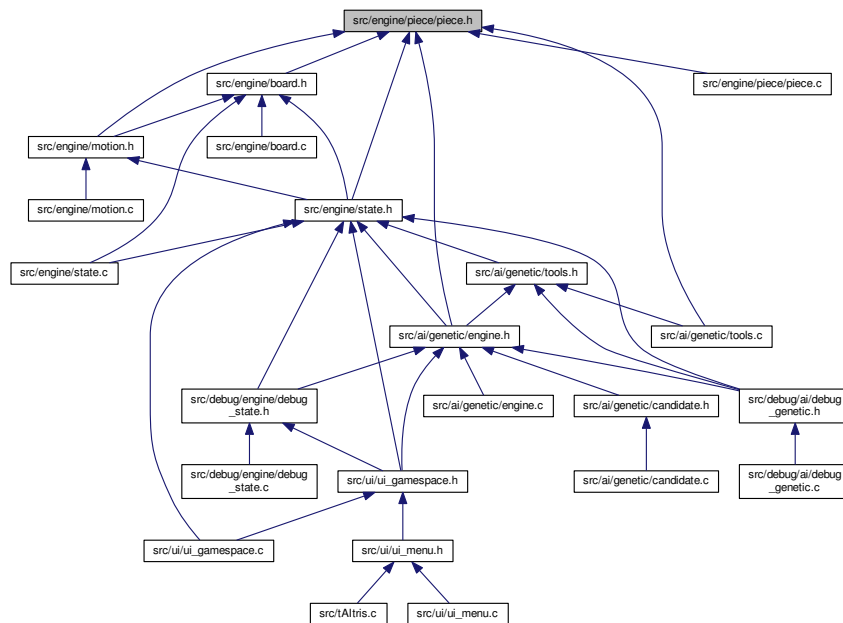


```
#include "seven_bag.h"
```

Include dependency graph for piece.h:



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



Data Structures

- struct **Piece**

Functions

- **Piece *** **piece_create** (**PieceType** type, int x, int y, **Angle** angle)
- void **piece_free** (**Piece** *pc)
- **Piece *** **piece_copy** (const **Piece** *pc)
- **Piece *** **piece_random** (int x, int y, **Angle** angle)

4.22.1 Detailed Description

Piece (p. 9).

Author

S4MasterRace

Version

2.0

4.22.2 Function Documentation

4.22.2.1 piece_copy()

```
Piece* piece_copy (
    const Piece * pc )
```

4.22.2.2 piece_create()

```
Piece* piece_create (
    PieceType type,
    int x,
    int y,
    Angle angle )
```

4.22.2.3 piece_free()

```
void piece_free (
    Piece * pc )
```

4.22.2.4 piece_random()

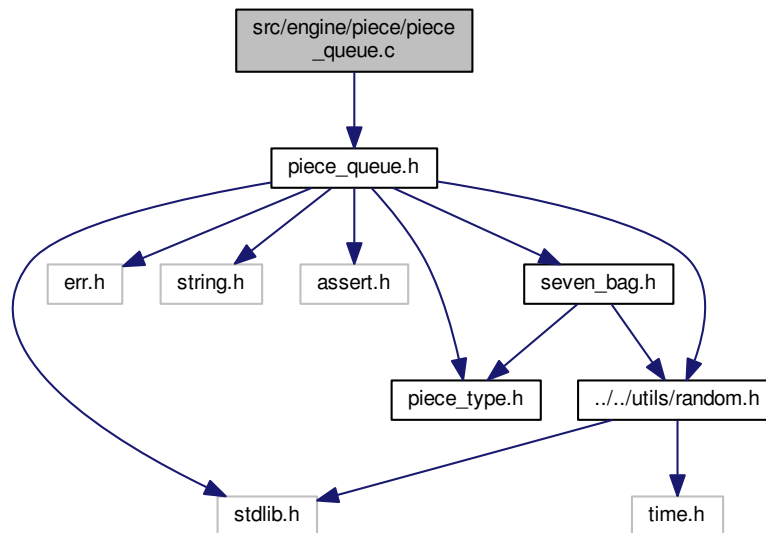
```
Piece* piece_random (
    int x,
    int y,
    Angle angle )
```

4.23 src/engine/piece/piece_queue.c File Reference

Piece (p. 9) queue.

```
#include "piece_queue.h"
```

Include dependency graph for piece_queue.c:



Functions

- **PieceQueue * piece_queue_create** (unsigned int seed)
- void **piece_queue_free** (PieceQueue *q)
- void **piece_queue_fill_data** (PieceType *data, size_t length)
- void **piece_queue_extend** (PieceQueue *q)
- **PieceType piece_queue_get** (PieceQueue *q, size_t index)

4.23.1 Detailed Description

Piece (p. 9) queue.

Author

S4MasterRace

Version

2.0

4.23.2 Function Documentation

4.23.2.1 piece_queue_create()

```
PieceQueue* piece_queue_create (
    unsigned int seed )
```

4.23.2.2 piece_queue_extend()

```
void piece_queue_extend (
    PieceQueue * q )
```

4.23.2.3 piece_queue_fill_data()

```
void piece_queue_fill_data (
    PieceType * data,
    size_t length )
```

4.23.2.4 piece_queue_free()

```
void piece_queue_free (
    PieceQueue * q )
```

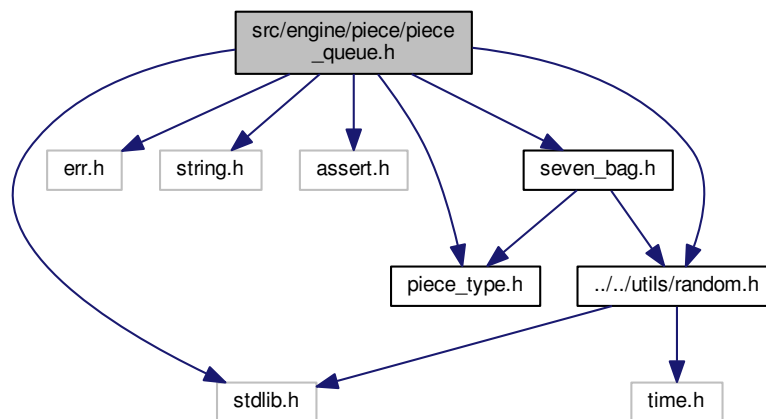
4.23.2.5 piece_queue_get()

```
PieceType piece_queue_get (
    PieceQueue * q,
    size_t index )
```

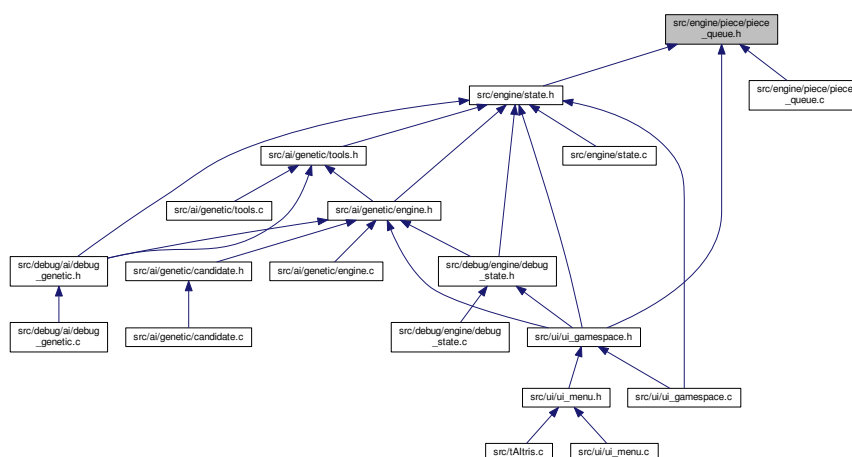
4.24 src/engine/piece/piece_queue.h File Reference

Piece (p. 9) queue.

```
#include <stdlib.h>
#include <err.h>
#include <string.h>
#include <assert.h>
#include "piece_type.h"
#include "seven_bag.h"
#include "../../utils/random.h"
Include dependency graph for piece_queue.h:
```



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



Data Structures

- struct **PieceQueue**

Macros

- `#define PIECE_QUEUE_LENGTH 100`

Functions

- **PieceQueue** * **piece_queue_create** (unsigned int seed)
- void **piece_queue_free** (**PieceQueue** *q)
- void **piece_queue_fill_data** (**PieceType** *data, size_t length)
- void **piece_queue_extend** (**PieceQueue** *q)
- **PieceType** **piece_queue_get** (**PieceQueue** *q, size_t index)

4.24.1 Detailed Description

Piece (p. 9) queue.

Author

S4MasterRace

Version

2.0

4.24.2 Macro Definition Documentation

4.24.2.1 **PIECE_QUEUE_LENGTH**

```
#define PIECE_QUEUE_LENGTH 100
```

4.24.3 Function Documentation

4.24.3.1 **piece_queue_create()**

```
PieceQueue* piece_queue_create (  
    unsigned int seed )
```

4.24.3.2 piece_queue_extend()

```
void piece_queue_extend (  
    PieceQueue * q )
```

4.24.3.3 piece_queue_fill_data()

```
void piece_queue_fill_data (  
    PieceType * data,  
    size_t length )
```

4.24.3.4 piece_queue_free()

```
void piece_queue_free (  
    PieceQueue * q )
```

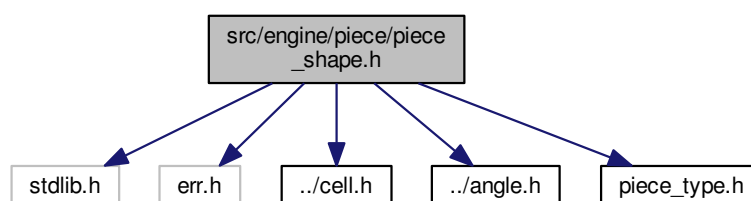
4.24.3.5 piece_queue_get()

```
PieceType piece_queue_get (  
    PieceQueue * q,  
    size_t index )
```

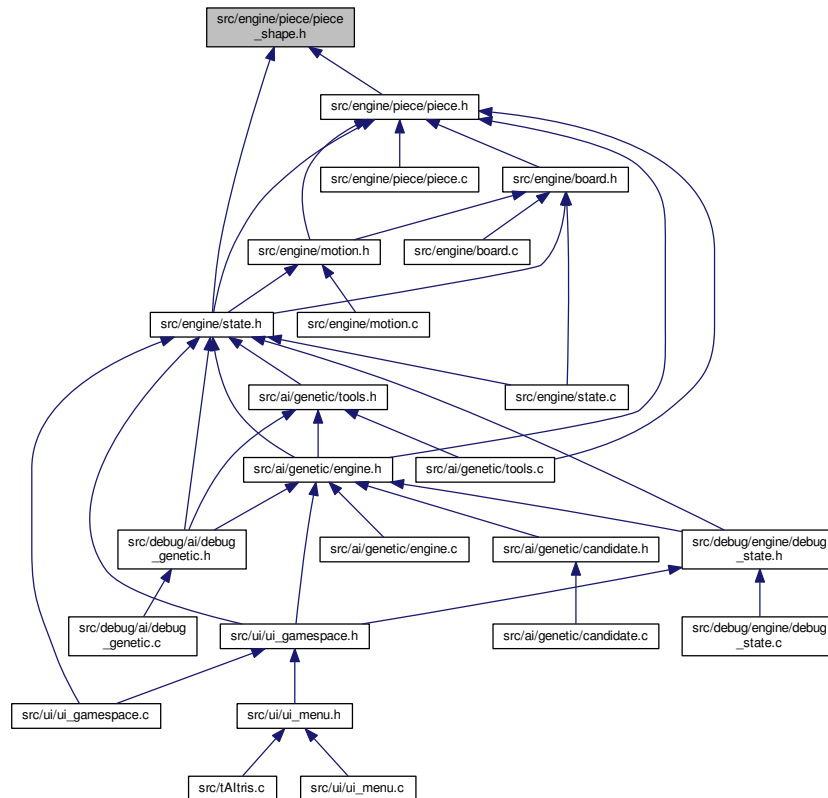
4.25 src/engine/piece/piece_shape.h File Reference

Piece (p. 9) shape.

```
#include <stdlib.h>  
#include <err.h>  
#include "../cell.h"  
#include "../angle.h"  
#include "piece_type.h"  
Include dependency graph for piece_shape.h:
```



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



Data Structures

- struct **PieceShape**

Macros

- #define **PIECE_SHAPE_WIDTH** 4
- #define **PIECE_SHAPE_HEIGHT** 4

4.25.1 Detailed Description

Piece (p. 9) shape.

Author

S4MasterRace

Version

2.0

4.25.2 Macro Definition Documentation

4.25.2.1 PIECE_SHAPE_HEIGHT

```
#define PIECE_SHAPE_HEIGHT 4
```

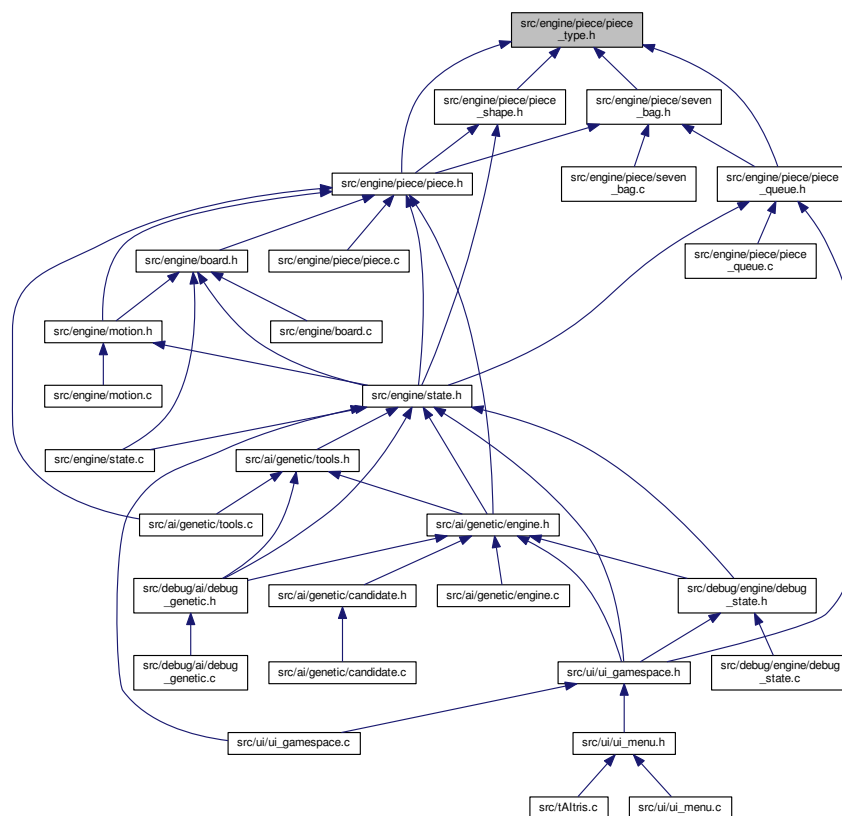
4.25.2.2 PIECE_SHAPE_WIDTH

```
#define PIECE_SHAPE_WIDTH 4
```

4.26 src/engine/piece/piece_type.h File Reference

Piece (p. 9) type.

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



Macros

- `#define` **PIECE_TYPE_ESIZE** 7

Enumerations

- `enum` **PieceType** {
PIECE_TYPE_I, **PIECE_TYPE_O**, **PIECE_TYPE_T**, **PIECE_TYPE_L**,
PIECE_TYPE_J, **PIECE_TYPE_Z**, **PIECE_TYPE_S**}

4.26.1 Detailed Description

Piece (p. 9) type.

Author

S4MasterRace

Version

2.0

4.26.2 Macro Definition Documentation

4.26.2.1 **PIECE_TYPE_ESIZE**

```
#define PIECE_TYPE_ESIZE 7
```

4.26.3 Enumeration Type Documentation

4.26.3.1 **PieceType**

```
enum PieceType
```

Enumerator

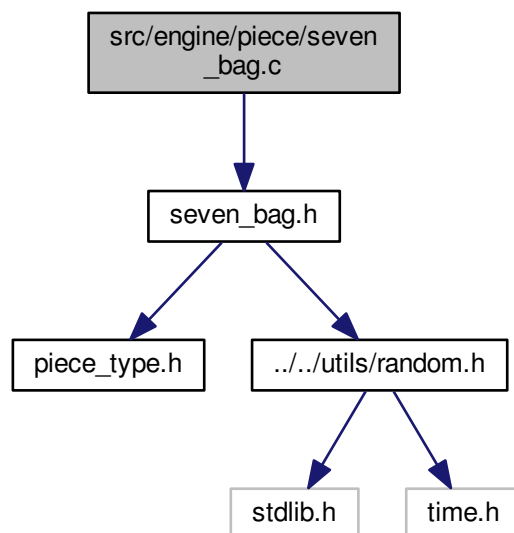
PIECE_TYPE_I	
PIECE_TYPE_O	
PIECE_TYPE_T	
PIECE_TYPE_L	
PIECE_TYPE_J	
PIECE_TYPE_Z	

4.27 src/engine/piece/seven_bag.c File Reference

7-Bag generator

```
#include "seven_bag.h"
```

Include dependency graph for seven_bag.c:



Functions

- void **seven_bag_init** (**PieceType** *bag)
- void **seven_bag_swap** (**PieceType** *a, **PieceType** *b)
- void **seven_bag_shuffle** (**PieceType** *bag)
- **PieceType** **seven_bag_draw** ()

4.27.1 Detailed Description

7-Bag generator

Author

S4MasterRace

Version

2.0

4.27.2 Function Documentation

4.27.2.1 seven_bag_draw()

```
PieceType seven_bag_draw ( )
```

4.27.2.2 seven_bag_init()

```
void seven_bag_init (
    PieceType * bag )
```

4.27.2.3 seven_bag_shuffle()

```
void seven_bag_shuffle (
    PieceType * bag )
```

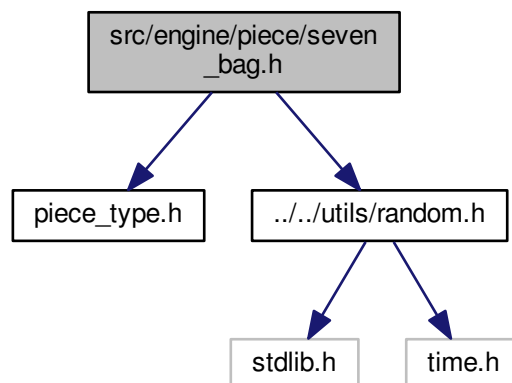
4.27.2.4 seven_bag_swap()

```
void seven_bag_swap (
    PieceType * a,
    PieceType * b )
```

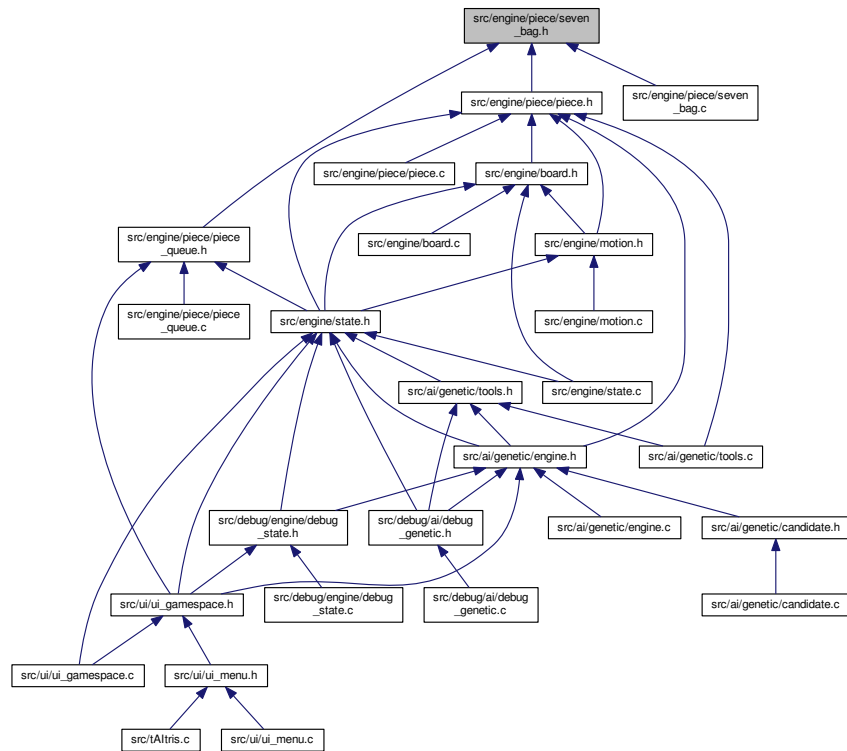
4.28 src/engine/piece/seven_bag.h File Reference

7-Bag generator

```
#include "piece_type.h"
#include "../utils/random.h"
Include dependency graph for seven_bag.h:
```



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



Functions

- void **seven_bag_init** (**PieceType** *bag)
- void **seven_bag_swap** (**PieceType** *a, **PieceType** *b)
- void **seven_bag_shuffle** (**PieceType** *bag)
- **PieceType** **seven_bag_draw** ()

4.28.1 Detailed Description

7-Bag generator

Author

S4MasterRace

Version

2.0

4.28.2 Function Documentation

4.28.2.1 seven_bag_draw()

```
PieceType seven_bag_draw ( )
```

4.28.2.2 seven_bag_init()

```
void seven_bag_init (
    PieceType * bag )
```

4.28.2.3 seven_bag_shuffle()

```
void seven_bag_shuffle (
    PieceType * bag )
```

4.28.2.4 seven_bag_swap()

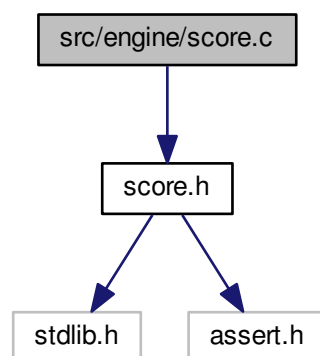
```
void seven_bag_swap (
    PieceType * a,
    PieceType * b )
```

4.29 src/engine/score.c File Reference

Scoring system.

```
#include "score.h"
```

Include dependency graph for score.c:



Functions

- unsigned int **score_compute_break** (const int hist[], size_t len, unsigned int level)

4.29.1 Detailed Description

Scoring system.

Author

S4MasterRace

Version

2.0

4.29.2 Function Documentation

4.29.2.1 score_compute_break()

```
unsigned int score_compute_break (  
    const int hist[],  
    size_t len,  
    unsigned int level )
```

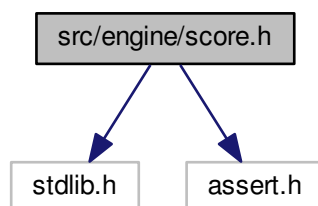
4.30 src/engine/score.h File Reference

Scoring system.

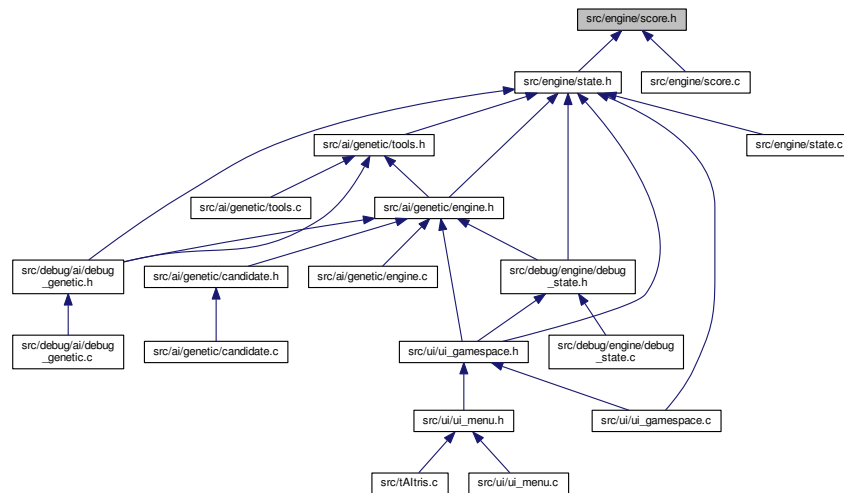
```
#include <stdlib.h>
```

```
#include <assert.h>
```

Include dependency graph for score.h:



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



Macros

- `#define SCORE_SINGLE 100`
- `#define SCORE_DOUBLE 300`
- `#define SCORE_TRIPLE 500`
- `#define SCORE_TETRIS 800`
- `#define SCORE_SDROP 1`
- `#define SCORE_HDROP 2`
- `#define SCORE_LVL_PER_LINE 10`

Functions

- unsigned int **score_compute_break** (const int hist[], size_t len, unsigned int level)

4.30.1 Detailed Description

Scoring system.

Author

S4MasterRace

Version

2.0

4.30.2 Macro Definition Documentation

4.30.2.1 SCORE_DOUBLE

```
#define SCORE_DOUBLE 300
```

4.30.2.2 SCORE_HDROP

```
#define SCORE_HDROP 2
```

4.30.2.3 SCORE_LVL_PER_LINE

```
#define SCORE_LVL_PER_LINE 10
```

4.30.2.4 SCORE_SDROP

```
#define SCORE_SDROP 1
```

4.30.2.5 SCORE_SINGLE

```
#define SCORE_SINGLE 100
```

4.30.2.6 SCORE_TETRIS

```
#define SCORE_TETRIS 800
```

4.30.2.7 SCORE_TRIPLE

```
#define SCORE_TRIPLE 500
```

4.30.3 Function Documentation

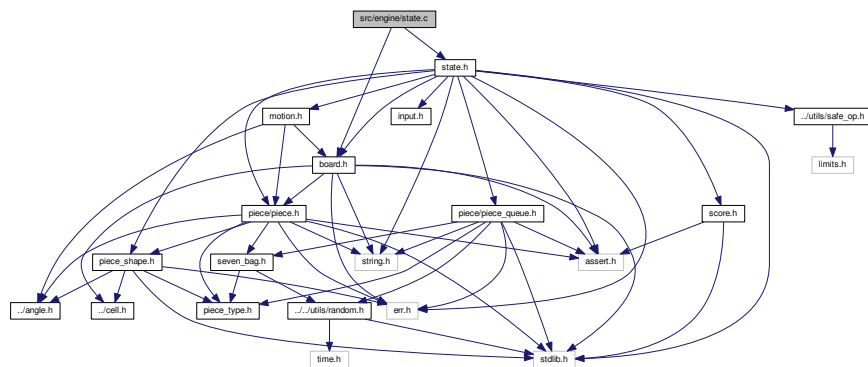
4.30.3.1 score_compute_break()

```
unsigned int score_compute_break (
    const int hist[],
    size_t len,
    unsigned int level )
```

4.31 src/engine/state.c File Reference

State (p. 12).

```
#include "state.h"
#include "board.h"
Include dependency graph for state.c:
```



Functions

- **State * state_create** ()
- void **state_init** (**State** *state, **PieceQueue** *q)
- void **state_free** (**State** *state)
- **State * state_copy** (const **State** *state)
- **Piece * state_create_piece** (**State** *state)
- void **state_next_piece** (**State** *state)
- int **state_step** (**State** *state)
- int **state_apply_input** (**State** *state, **Input** input)
- int **state_apply_inputs** (**State** *state, **Input** input[], size_t len)

4.31.1 Detailed Description

State (p. 12).

Author

S4MasterRace

Version

2.0

4.31.2 Function Documentation

4.31.2.1 state_apply_input()

```
int state_apply_input (
    State * state,
    Input input )
```

4.31.2.2 state_apply_inputs()

```
int state_apply_inputs (
    State * state,
    Input input[],
    size_t len )
```

4.31.2.3 state_copy()

```
State* state_copy (
    const State * state )
```

4.31.2.4 state_create()

```
State* state_create ( )
```

4.31.2.5 state_create_piece()

```
Piece* state_create_piece (
    State * state )
```

4.31.2.6 state_free()

```
void state_free (
    State * state )
```

4.31.2.7 state_init()

```
void state_init (
    State * state,
    PieceQueue * q )
```

4.31.2.8 state_next_piece()

```
void state_next_piece (
    State * state )
```

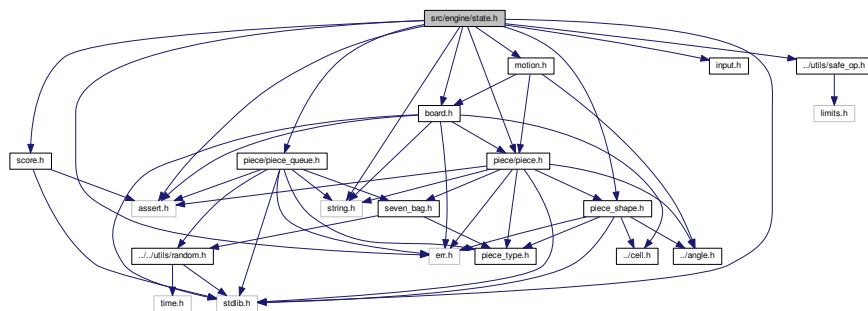
4.31.2.9 state_step()

```
int state_step (
    State * state )
```

4.32 src/engine/state.h File Reference

State (p. 12).

```
#include <stdlib.h>
#include <err.h>
#include <string.h>
#include <assert.h>
#include "board.h"
#include "piece/piece.h"
#include "piece/piece_shape.h"
#include "piece/piece_queue.h"
#include "motion.h"
#include "input.h"
#include "score.h"
#include "../utils/safe_op.h"
Include dependency graph for state.h:
```



4.32.2.1 state_apply_input()

```
int state_apply_input (
    State * state,
    Input input )
```

4.32.2.2 state_apply_inputs()

```
int state_apply_inputs (
    State * state,
    Input input[],
    size_t len )
```

4.32.2.3 state_copy()

```
State* state_copy (
    const State * state )
```

4.32.2.4 state_create()

```
State* state_create ( )
```

4.32.2.5 state_create_piece()

```
Piece* state_create_piece (
    State * state )
```

4.32.2.6 state_free()

```
void state_free (
    State * state )
```

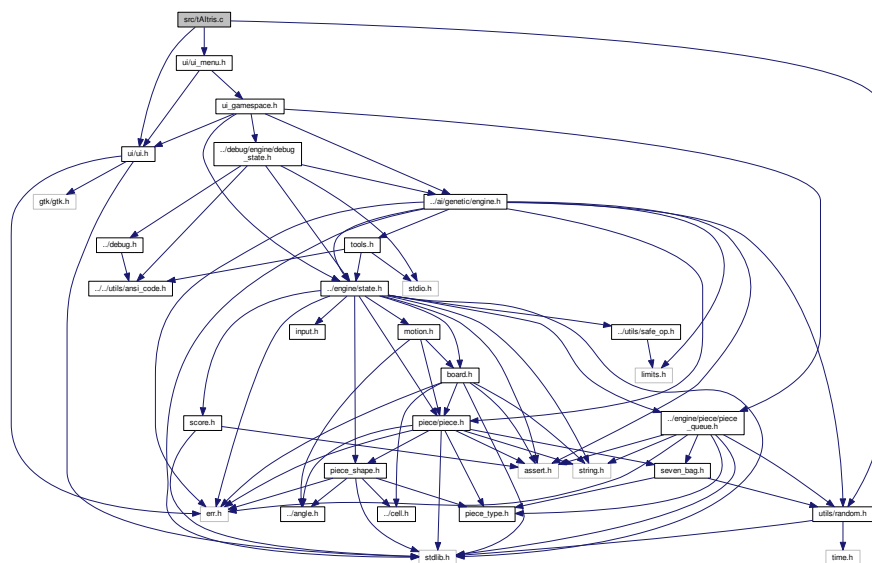
```
void state_init (
    State * state,
    PieceQueue * q )
```

```
void state_next_piece (
    State * state )
```

```
int state_step (
    State * state )
```

Main file.

Include dependency graph for tAltris.c:



Functions

- int **main** (int argc, char *argv[])

4.33.1 Detailed Description

Main file.

Author

S4MasterRace

Version

2.0

4.33.2 Function Documentation

4.33.2.1 main()

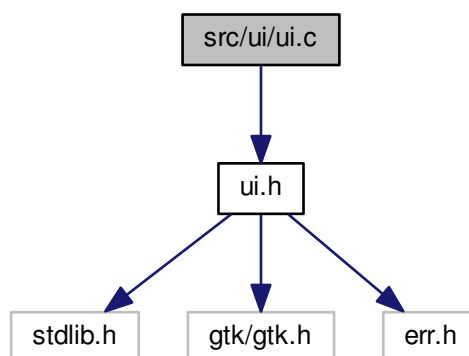
```
int main (  
    int argc,  
    char * argv[] )
```

4.34 src/ui/ui.c File Reference

User interface.

```
#include "ui.h"
```

Include dependency graph for ui.c:



Functions

- void **ui_init** (int argc, char *argv[])
- GtkBuilder * **ui_get_builder** ()
- void **ui_load_glade** (const gchar *filename)
- GObject * **ui_get_object** (const gchar *name)
- GtkWidget * **ui_get_widget** (const gchar *name)

4.34.1 Detailed Description

User interface.

Author

S4MasterRace

Version

2.0

4.34.2 Function Documentation

4.34.2.1 ui_get_builder()

```
GtkBuilder* ui_get_builder ( )
```

4.34.2.2 ui_get_object()

```
GObject* ui_get_object (
    const gchar * name )
```

4.34.2.3 ui_get_widget()

```
GtkWidget* ui_get_widget (
    const gchar * name )
```

4.34.2.4 ui_init()

```
void ui_init (
    int argc,
    char * argv[] )
```

4.34.2.5 ui_load_glade()

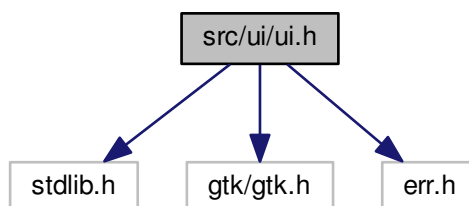
```
void ui_load_glade (
    const gchar * filename )
```

4.35 src/ui/ui.h File Reference

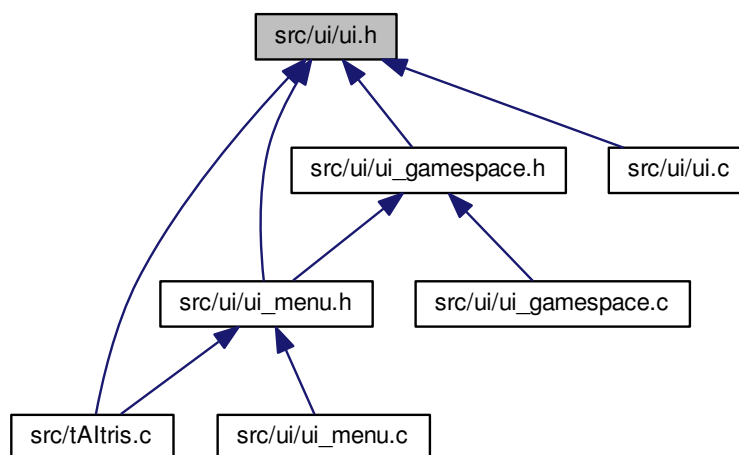
User interface.

```
#include <stdlib.h>
#include <gtk/gtk.h>
#include <err.h>
```

Include dependency graph for ui.h:



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



Functions

- void **ui_init** (int argc, char *argv[])
- GtkBuilder * **ui_get_builder** ()
- void **ui_load_glade** (const gchar *filename)
- GObject * **ui_get_object** (const gchar *name)
- GtkWidget * **ui_get_widget** (const gchar *name)

4.35.1 Detailed Description

User interface.

Author

S4MasterRace

Version

2.0

4.35.2 Function Documentation

4.35.2.1 ui_get_builder()

```
GtkBuilder* ui_get_builder ( )
```


Functions

- void **ui_gamespace_init** ()
- void **game** (GtkWidget *win, int mode)
- void **ui_gamespace_show** (int mode)

4.36.1 Detailed Description

Gamespace.

Author

S4MasterRace

Version

2.0

4.36.2 Function Documentation

4.36.2.1 game()

```
void game (  
    GtkWidget * win,  
    int mode )
```

4.36.2.2 ui_gamespace_init()

```
void ui_gamespace_init ( )
```

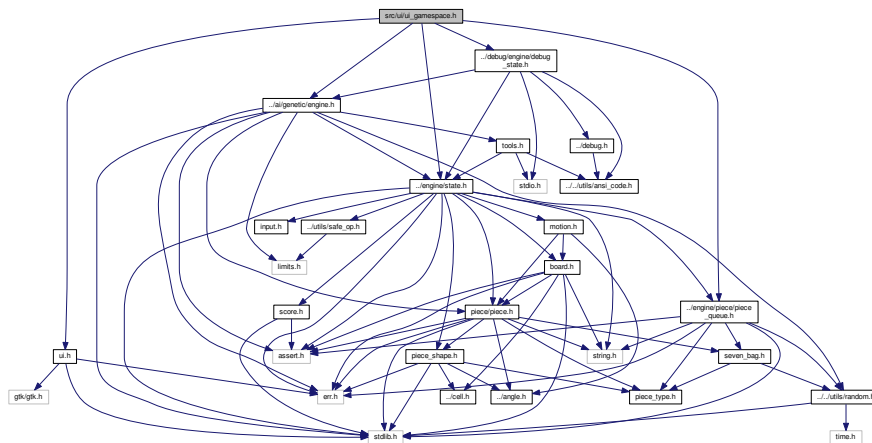
4.36.2.3 ui_gamespace_show()

```
void ui_gamespace_show (  
    int mode )
```

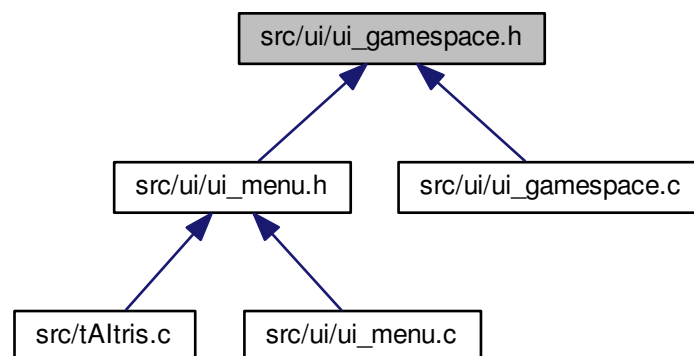
4.37 src/ui/ui_gamespace.h File Reference

Gamespace.

```
#include "ui.h"
#include "../engine/piece/piece_queue.h"
#include "../engine/state.h"
#include "../ai/genetic/engine.h"
#include "../debug/engine/debug_state.h"
Include dependency graph for ui_gamespace.h:
```



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



Macros

- `#define UI_GAMESPACE_GLADE` `"../res/Gamespace.glade"`
- `#define UNUSED(x)` `(void)(x)`

Functions

- void **ui_gamespace_init** ()
- void **ui_gamespace_show** (int mode)

4.37.1 Detailed Description

Gamespace.

Author

S4MasterRace

Version

2.0

4.37.2 Macro Definition Documentation

4.37.2.1 UI_GAMESPACE_GLADE

```
#define UI_GAMESPACE_GLADE "../res/Gamespace.glade"
```

4.37.2.2 UNUSED

```
#define UNUSED(  
    x ) (void) (x)
```

4.37.3 Function Documentation

4.37.3.1 ui_gamespace_init()

```
void ui_gamespace_init ( )
```

4.37.3.2 ui_gamespace_show()

```
void ui_gamespace_show (  
    int mode )
```


4.38.2.1 ui_menu_init()

```
void ui_menu_init ( )
```

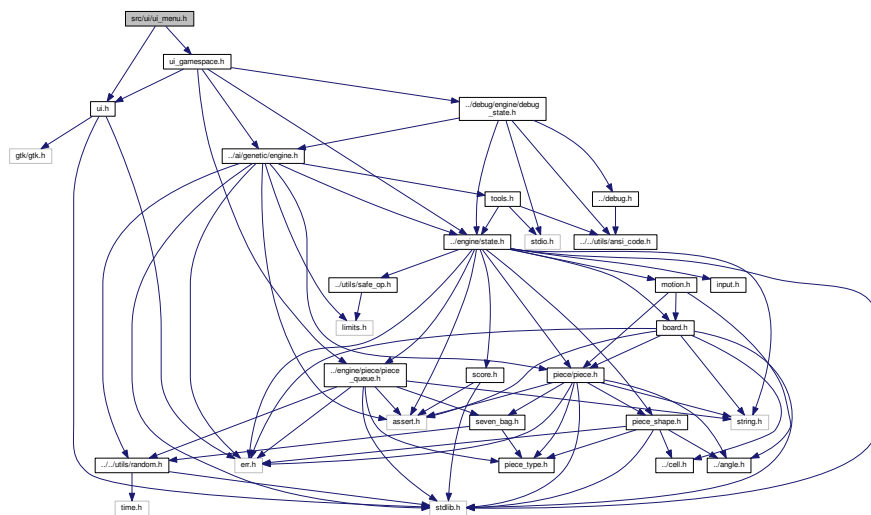
4.38.2.2 ui_menu_show()

```
void ui_menu_show ( )
```

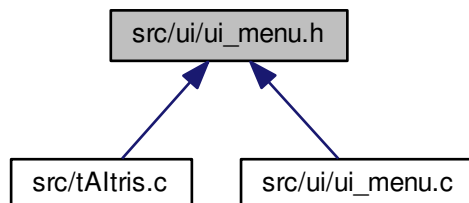
4.39 src/ui/ui_menu.h File Reference

Menu.

```
#include "ui.h"
#include "ui_gamespace.h"
Include dependency graph for ui_menu.h:
```



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



Macros

- `#define UI_MENU_GLADE "/res/Menu.glade"`

Functions

- void `ui_menu_init()`
- void `ui_menu_show()`

4.39.1 Detailed Description

Menu.

Author

S4MasterRace

Version

2.0

4.39.2 Macro Definition Documentation

4.39.2.1 UI_MENU_GLADE

```
#define UI_MENU_GLADE "/res/Menu.glade"
```

4.39.3 Function Documentation

4.39.3.1 ui_menu_init()

```
void ui_menu_init ( )
```

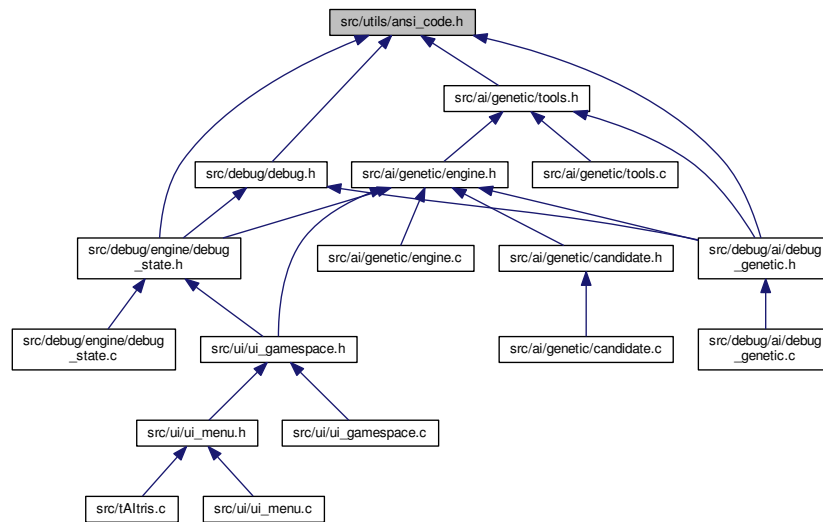
4.39.3.2 ui_menu_show()

```
void ui_menu_show ( )
```

4.40 src/utils/ansi_code.h File Reference

ANSI escape code.

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



Macros

- `#define ANSI_ESC "\x1b"`
- `#define ANSI_SGR(_code_) ANSI_ESC "[" #_code_ "m"`
- `#define ANSI_RESET ANSI_SGR(0)`
- `#define ANSI_BOLD ANSI_SGR(1)`
- `#define ANSI_FAINT ANSI_SGR(2)`
- `#define ANSI_ITALIC ANSI_SGR(3)`
- `#define ANSI_UNDERLINE ANSI_SGR(4)`
- `#define ANSI_SBLINK ANSI_SGR(5)`
- `#define ANSI_RBLINK ANSI_SGR(6)`
- `#define ANSI_CROSSEDOUT ANSI_SGR(9)`
- `#define ANSI_FRAMED ANSI_SGR(51)`
- `#define ANSI_ENCIRCLED ANSI_SGR(52)`
- `#define ANSI_OVERLINED ANSI_SGR(53)`
- `#define ANSI_FG_DEFAULT ANSI_SGR(39)`
- `#define ANSI_FG_BLACK ANSI_SGR(30)`
- `#define ANSI_FG_RED ANSI_SGR(31)`
- `#define ANSI_FG_GREEN ANSI_SGR(32)`
- `#define ANSI_FG_YELLOW ANSI_SGR(33)`
- `#define ANSI_FG_BLUE ANSI_SGR(34)`
- `#define ANSI_FG_MAGENTA ANSI_SGR(35)`
- `#define ANSI_FG_CYAN ANSI_SGR(36)`
- `#define ANSI_FG_WHITE ANSI_SGR(37)`
- `#define ANSI_FG_BBLACK ANSI_SGR(90)`
- `#define ANSI_FG_BRED ANSI_SGR(91)`
- `#define ANSI_FG_BGREEN ANSI_SGR(92)`

- `#define ANSI_FG_BYELLOW ANSI_SGR(93)`
- `#define ANSI_FG_BBLUE ANSI_SGR(94)`
- `#define ANSI_FG_BMAGENTA ANSI_SGR(95)`
- `#define ANSI_FG_BCYAN ANSI_SGR(96)`
- `#define ANSI_FG_BWHITE ANSI_SGR(97)`
- `#define ANSI_BG_DEFAULT ANSI_SGR(49)`
- `#define ANSI_BG_BLACK ANSI_SGR(40)`
- `#define ANSI_BG_RED ANSI_SGR(41)`
- `#define ANSI_BG_GREEN ANSI_SGR(42)`
- `#define ANSI_BG_YELLOW ANSI_SGR(43)`
- `#define ANSI_BG_BLUE ANSI_SGR(44)`
- `#define ANSI_BG_MAGENTA ANSI_SGR(45)`
- `#define ANSI_BG_CYAN ANSI_SGR(46)`
- `#define ANSI_BG_WHITE ANSI_SGR(47)`
- `#define ANSI_BG_BBLACK ANSI_SGR(100)`
- `#define ANSI_BG_BRED ANSI_SGR(101)`
- `#define ANSI_BG_BGREEN ANSI_SGR(102)`
- `#define ANSI_BG_BYELLOW ANSI_SGR(103)`
- `#define ANSI_BG_BBLUE ANSI_SGR(104)`
- `#define ANSI_BG_BMAGENTA ANSI_SGR(105)`
- `#define ANSI_BG_BCYAN ANSI_SGR(106)`
- `#define ANSI_BG_BWHITE ANSI_SGR(107)`

4.40.1 Detailed Description

ANSI escape code.

Author

S4MasterRace

Version

2.0

4.40.2 Macro Definition Documentation

4.40.2.1 ANSI_BG_BBLACK

```
#define ANSI_BG_BBLACK ANSI_SGR(100)
```

4.40.2.2 ANSI_BG_BBLUE

```
#define ANSI_BG_BBLUE ANSI_SGR(104)
```

4.40.2.3 ANSI_BG_BCYAN

```
#define ANSI_BG_BCYAN  ANSI_SGR(106)
```

4.40.2.4 ANSI_BG_BGREEN

```
#define ANSI_BG_BGREEN  ANSI_SGR(102)
```

4.40.2.5 ANSI_BG_BLACK

```
#define ANSI_BG_BLACK  ANSI_SGR(40)
```

4.40.2.6 ANSI_BG_BLUE

```
#define ANSI_BG_BLUE  ANSI_SGR(44)
```

4.40.2.7 ANSI_BG_BMAGENTA

```
#define ANSI_BG_BMAGENTA  ANSI_SGR(105)
```

4.40.2.8 ANSI_BG_BRED

```
#define ANSI_BG_BRED  ANSI_SGR(101)
```

4.40.2.9 ANSI_BG_BWHITE

```
#define ANSI_BG_BWHITE  ANSI_SGR(107)
```

4.40.2.10 ANSI_BG_BYELLOW

```
#define ANSI_BG_BYELLOW  ANSI_SGR(103)
```

4.40.2.11 ANSI_BG_CYAN

```
#define ANSI_BG_CYAN  ANSI_SGR(46)
```

4.40.2.12 ANSI_BG_DEFAULT

```
#define ANSI_BG_DEFAULT  ANSI_SGR(49)
```

4.40.2.13 ANSI_BG_GREEN

```
#define ANSI_BG_GREEN  ANSI_SGR(42)
```

4.40.2.14 ANSI_BG_MAGENTA

```
#define ANSI_BG_MAGENTA  ANSI_SGR(45)
```

4.40.2.15 ANSI_BG_RED

```
#define ANSI_BG_RED  ANSI_SGR(41)
```

4.40.2.16 ANSI_BG_WHITE

```
#define ANSI_BG_WHITE  ANSI_SGR(47)
```

4.40.2.17 ANSI_BG_YELLOW

```
#define ANSI_BG_YELLOW  ANSI_SGR(43)
```

4.40.2.18 ANSI_BOLD

```
#define ANSI_BOLD  ANSI_SGR(1)
```

4.40.2.19 ANSI_CROSSEDOUT

```
#define ANSI_CROSSEDOUT ANSI_SGR(9)
```

4.40.2.20 ANSI_ENCIRCLED

```
#define ANSI_ENCIRCLED ANSI_SGR(52)
```

4.40.2.21 ANSI_ESC

```
#define ANSI_ESC "\\x1b"
```

4.40.2.22 ANSI_FAINT

```
#define ANSI_FAINT ANSI_SGR(2)
```

4.40.2.23 ANSI_FG_BBLACK

```
#define ANSI_FG_BBLACK ANSI_SGR(90)
```

4.40.2.24 ANSI_FG_BBLUE

```
#define ANSI_FG_BBLUE ANSI_SGR(94)
```

4.40.2.25 ANSI_FG_BCYAN

```
#define ANSI_FG_BCYAN ANSI_SGR(96)
```

4.40.2.26 ANSI_FG_BGREEN

```
#define ANSI_FG_BGREEN ANSI_SGR(92)
```

4.40.2.27 ANSI_FG_BLACK

```
#define ANSI_FG_BLACK  ANSI_SGR(30)
```

4.40.2.28 ANSI_FG_BLUE

```
#define ANSI_FG_BLUE  ANSI_SGR(34)
```

4.40.2.29 ANSI_FG_BMAGENTA

```
#define ANSI_FG_BMAGENTA  ANSI_SGR(95)
```

4.40.2.30 ANSI_FG_BRED

```
#define ANSI_FG_BRED  ANSI_SGR(91)
```

4.40.2.31 ANSI_FG_BWHITE

```
#define ANSI_FG_BWHITE  ANSI_SGR(97)
```

4.40.2.32 ANSI_FG_BYELLOW

```
#define ANSI_FG_BYELLOW  ANSI_SGR(93)
```

4.40.2.33 ANSI_FG_CYAN

```
#define ANSI_FG_CYAN  ANSI_SGR(36)
```

4.40.2.34 ANSI_FG_DEFAULT

```
#define ANSI_FG_DEFAULT  ANSI_SGR(39)
```


4.40.2.35 ANSI_FG_GREEN

```
#define ANSI_FG_GREEN  ANSI_SGR(32)
```

4.40.2.36 ANSI_FG_MAGENTA

```
#define ANSI_FG_MAGENTA ANSI_SGR(35)
```

4.40.2.37 ANSI_FG_RED

```
#define ANSI_FG_RED  ANSI_SGR(31)
```

4.40.2.38 ANSI_FG_WHITE

```
#define ANSI_FG_WHITE  ANSI_SGR(37)
```

4.40.2.39 ANSI_FG_YELLOW

```
#define ANSI_FG_YELLOW  ANSI_SGR(33)
```

4.40.2.40 ANSI_FRAMED

```
#define ANSI_FRAMED  ANSI_SGR(51)
```

4.40.2.41 ANSI_ITALIC

```
#define ANSI_ITALIC  ANSI_SGR(3)
```

4.40.2.42 ANSI_OVERLINED

```
#define ANSI_OVERLINED  ANSI_SGR(53)
```

4.40.2.43 ANSI_RBLINK

```
#define ANSI_RBLINK ANSI_SGR(6)
```

4.40.2.44 ANSI_RESET

```
#define ANSI_RESET ANSI_SGR(0)
```

4.40.2.45 ANSI_SBLINK

```
#define ANSI_SBLINK ANSI_SGR(5)
```

4.40.2.46 ANSI_SGR

```
#define ANSI_SGR(  
    _code_ ) ANSI_ESC "[" #_code_ "m"
```

4.40.2.47 ANSI_UNDERLINE

```
#define ANSI_UNDERLINE ANSI_SGR(4)
```

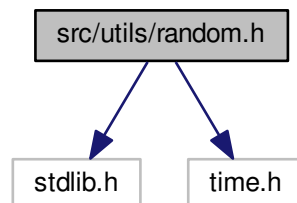
4.41 src/utils/random.h File Reference

Random number generation.

```
#include <stdlib.h>
```

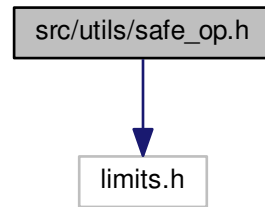
```
#include <time.h>
```

Include dependency graph for random.h:

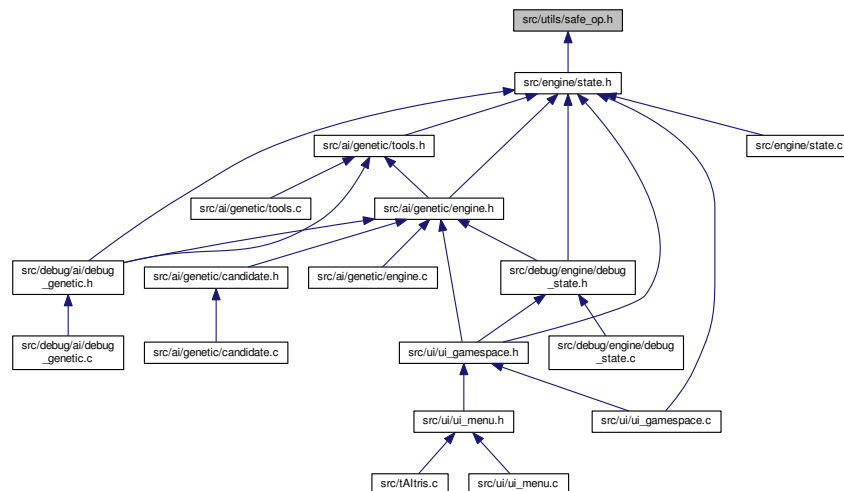



```
#include <limits.h>
```

Include dependency graph for safe_op.h:



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



Macros

- `#define` **SAFE_OP_SUCCESS** 0
- `#define` **SAFE_OP_OVERFLOW** 1
- `#define` **SAFE_OP_UNDERFLOW** (-1)

4.42.1 Detailed Description

Safe operations.

Author

S4MasterRace

Version

2.0

4.42.2 Macro Definition Documentation

4.42.2.1 SAFE_OP_OVERFLOW

```
#define SAFE_OP_OVERFLOW 1
```

4.42.2.2 SAFE_OP_SUCCESS

```
#define SAFE_OP_SUCCESS 0
```

4.42.2.3 SAFE_OP_UNDERFLOW

```
#define SAFE_OP_UNDERFLOW (-1)
```


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