BreakoutGame

1.0.0

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Chapter 1

Hierarchical Index

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Chapter 2

Class Index

2.1 Class List

Here are the classes, structs, unions and interfaces with brief descriptions:

Ball
: Represent the ball object in the break out game. Record velocity, position etc. info of the ball . . . 7

BreakoutGame
: Breakout Game main Class, where main logic located . . . 12

Brick
: Brick object Class . . . 32

BricksGenerator
: Helper class to load and generate each level bricks arrangement . . . 36

ConfigUtil
: Help class which use nlohmann::json library to process json format config file . . . 38

Contact
: Collision info struct . . . 40

Language
: Struct to store all key-value pair of game texts . . . 41

LanguageSelector
: Help class to read, load and manage multi language text data . . . 42

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Chapter 4

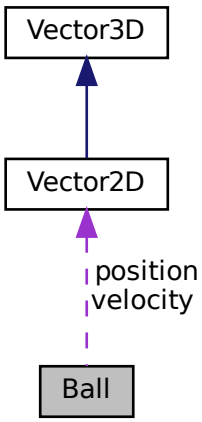
Class Documentation

4.1 Ball Class Reference

Represent the ball object in the break out game. Record velocity, position etc. info of the ball.

`#include <Ball.hpp>`

Collaboration diagram for Ball:



Public Member Functions

- Ball ()=default

  Construct a default all 0 value Ball object.
- Ball (Vector2D position, Vector2D velocity)

  Construct a new Ball object.
- void Update (float dt)

  Update the state of the ball.

- void Draw (SDL_Renderer *renderer)

  Draw ball on screen.
- void CollideWithPaddle (Contact const &contact)

  Update ball's state when collide with paddle.
- void CollideWithWall (Contact const &contact)

  Update ball's state when collide with wall.
- void CollideWithBrick (Contact const &contact)

  Update ball's state when collide with brick.

Public Attributes

- Vector2D position

  2D vector to store ball's position
- Vector2D velocity

  2D vector to store ball's velocity
- SDL_Rect rect {}

  A rectangle struct with left top position , height, width.

4.1.1 Detailed Description

Represent the ball object in the break out game. Record velocity, position etc. info of the ball.

4.1.2 Constructor & Destructor Documentation

4.1.2.1 Ball() [1/2]

```
Ball::Ball ( )  [default]
```

Construct a default all 0 value Ball object.

4.1.2.2 Ball() [2/2]

```
Ball::Ball (
            Vector2D position,
            Vector2D velocity )  [inline]
```

Construct a new Ball object.

Parameters

position	Initial position
velocity	The velocity of the ball

4.1.3 Member Function Documentation

4.1.3.1 CollideWithBrick()

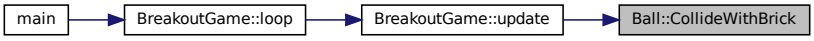
```
void Ball::CollideWithBrick (
            Contact const & contact )  [inline]
```

Update ball's state when collide with brick.

Parameters

contact	Collision info

Here is the caller graph for this function:



4.1.3.2 CollideWithPaddle()

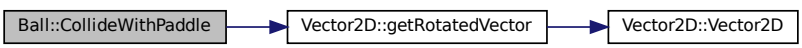
```
void Ball::CollideWithPaddle (
            Contact const & contact )  [inline]
```

Update ball's state when collide with paddle.

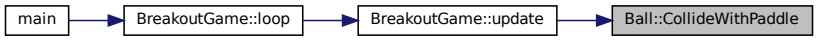
Parameters

contact	Collision info

Here is the call graph for this function:



Here is the caller graph for this function:



4.1.3.3 CollideWithWall()

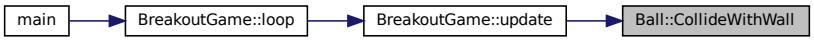
```
void Ball::CollideWithWall (
            Contact const & contact )  [inline]
```

Update ball's state when collide with wall.

Parameters

contact	Collision info

Here is the caller graph for this function:



4.1.3.4 Draw()

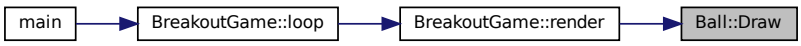
```
void Ball::Draw (
            SDL_Renderer * renderer )  [inline]
```

Draw ball on screen.

Parameters

renderer	Global renderer pointer

Here is the caller graph for this function:



4.1.3.5 Update()

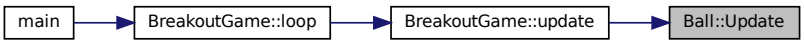
```
void Ball::Update (
            float dt )  [inline]
```

Update the state of the ball.

Parameters

dt	Time in milliseconds passed from last update

Here is the caller graph for this function:



4.1.4 Member Data Documentation

4.1.4.1 position

```
Vector2D Ball::position
```

2D vector to store ball's position

4.1.4.2 rect

```
SDL_Rect Ball::rect {}
```

A rectangle struct with left top position , height, width.

4.1.4.3 velocity

```
Vector2D Ball::velocity
```

2D vector to store ball's velocity

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

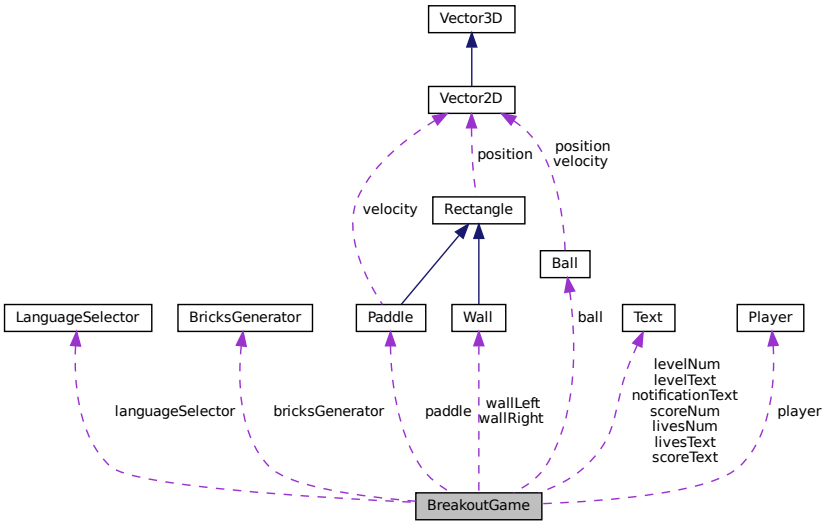
- include/Ball.hpp

4.2 BreakoutGame Class Reference

Breakout Game main Class, where main logic located.

```
#include <BreakoutGame.hpp>
```

Collaboration diagram for BreakoutGame:



Public Member Functions

- BreakoutGame (int w, int h, nlohmann::json js)

  Construct a new Breakout Game object.
- ~BreakoutGame ()

  Destroy the Breakout Game object.
- void update (float dt)

  Update game state.
- void render ()

  Render all things for next frame.
- void loop ()

  Game main loop.
- std::shared_ptr< SDL_Window > getSDLWindow ()

  Get current pointer to SDL_Window object.
- std::shared_ptr< SDL_Renderer > getSDLRenderer ()

  Get current pointer to SDL_Renderer object.

Private Member Functions

- void resetBricks ()

  Reset all current level bricks' state.
- bool initSDLSystems ()

  Init SDL systems.
- void initGameObjects ()

  Init all game Objects.
- bool loadResources ()

  Load all resource which need IO by using ResourceManger.
- void initBall ()

  Init or reset ball state.
- void initPaddle ()

  Init or reset paddle state.
- bool loadLevels ()

  Load level data from files.
- bool loadLanguages ()

  Load multi-language text data from file.
- void updateAllTexts ()

  Update all texts object when language change.
- Contact CheckPaddleCollision (Ball const &ball, Paddle const &paddle)

  Check whether ball collide with paddle.
- Contact CheckWallCollision (Ball const &ball)

  Check whether ball collide with wall.
- Contact CheckBrickCollision (Ball const &ball, Brick const &brick, float dt)

  Check whether ball collide with one brick.

Private Attributes

- nlohmann::json configs

  Json object contains loaded config data.
- GameState gameState

  Current game state.
- bool buttons [2] {}

  Button state array to represent whether left or right key(also 'a' and 'd') is pressed.
- int screenHeight

  Game window height.
- int screenWidth

  Game window width.
- int level = 1

  Current game level.
- int maxLevel

  Max level for this game.
- std::shared_ptr< SDL_Window > gWindow

  SDL window shared pointer.
- std::shared_ptr< SDL_Renderer > gRenderer

  SDL renderer shared pointer.
- std::shared_ptr< TTF_Font > contentFont_

  Font of score,player life,level.
- std::shared_ptr< TTF_Font > menuFont_

Font of all notification.

- std::shared_ptr< Mix_Chunk > wallHitSound

  Sound of ball hit wall.
- std::shared_ptr< Mix_Chunk > paddleHitSound

  Sound of ball hit paddle.
- std::shared_ptr< Mix_Chunk > winSound

  Sound of player win one level.
- std::shared_ptr< Mix_Chunk > loseSound

  Sound of player lose all lives.
- std::shared_ptr< Mix_Chunk > brickHitSound

  Sound of ball hit brick.
- std::shared_ptr< Mix_Chunk > loseLifeSound

  Sound of player lose one life.
- std::shared_ptr< Mix_Chunk > backgroundMusic

  Background music.
- Text scoreText

  Score Text.
- Text scoreNum

  Score number Text.
- Text livesText

  Lives Text.
- Text livesNum

  Player life number Text.
- Text levelText

  Level Text.
- Text levelNum

  Level number Text.
- Text notificationText

  Notification Text.
- Player player

  Player Object store player state.
- Wall wallLeft

  Wall object on the left.
- Wall wallRight

  Wall object on the right.
- Ball ball

  Ball object.
- Paddle paddle

  Paddle object.
- std::vector< Brick > bricks

  Array of all bricks in current level.
- BricksGenerator bricksGenerator

  Helper class to load level config and generate bricks for each level.
- LanguageSelector languageSelector

  Helper class to load different language texts.
- int restBricks

4.2.1 Detailed Description

Breakout Game main Class, where main logic located.

4.2.2 Constructor & Destructor Documentation

4.2.2.1 BreakoutGame()

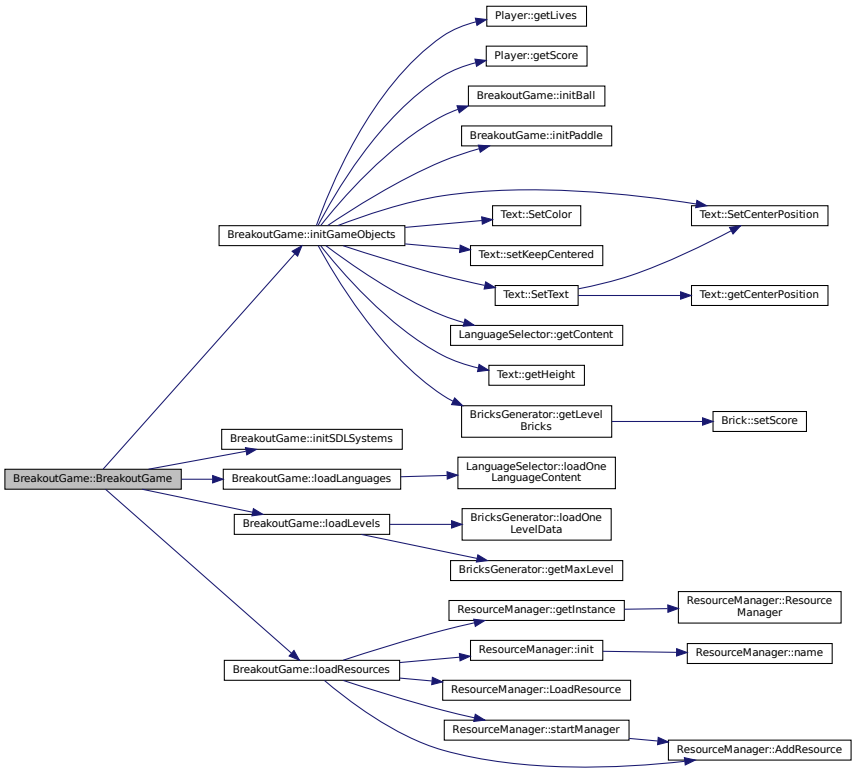
```
BreakoutGame::BreakoutGame (
            int w,
            int h,
            nlohmann::json js )
```

Construct a new Breakout Game object.

Parameters

w	Game program window width
h	Game program window height
js	Config json object

Here is the call graph for this function:

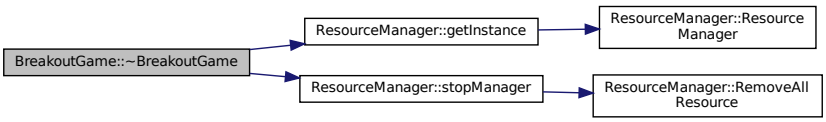


4.2.2.2 ~BreakoutGame()

```
BreakoutGame::~BreakoutGame ( )
```

Destroy the Breakout Game object.

Here is the call graph for this function:



4.2.3 Member Function Documentation

4.2.3.1 CheckBrickCollision()

```
Contact BreakoutGame::CheckBrickCollision (
            Ball const & ball,
            Brick const & brick,
            float dt )  [private]
```

Check whether ball collide with one brick.

Parameters

ball	Ball object
brick	Brick object
dt	Milliseconds passed from last update

Returns

Contact Collision info

Here is the caller graph for this function:

4.2.3.2 CheckPaddleCollision()

```
Contact BreakoutGame::CheckPaddleCollision (
            Ball const & ball,
            Paddle const & paddle )  [private]
```

Check whether ball collide with paddle.

Parameters

ball	Ball object
paddle	Paddle object

Returns

Contact Collision info

Here is the caller graph for this function:

4.2.3.3 CheckWallCollision()

```
Contact BreakoutGame::CheckWallCollision (
            Ball const & ball )  [private]
```

Check whether ball collide with wall.

Parameters

ball	Ball object

Returns

Contact Collision info

Here is the caller graph for this function:

4.2.3.4 getSDLRenderer()

```
std::shared_ptr< SDL_Renderer > BreakoutGame::getSDLRenderer ( )
```

Get current pointer to SDL_Renderer object.

Returns

std::shared_ptr<SDL_Renderer> Shared pointer to SDL_Renderer

4.2.3.5 getSDLWindow()

```
std::shared_ptr< SDL_Window > BreakoutGame::getSDLWindow ( )
```

Get current pointer to SDL_Window object.

Returns

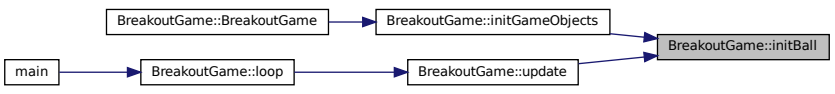
std::shared_ptr<SDL_Window> Shared pointer to SDL_Window

4.2.3.6 initBall()

```
void BreakoutGame::initBall ( )  [private]
```

Init or reset ball state.

Here is the caller graph for this function:

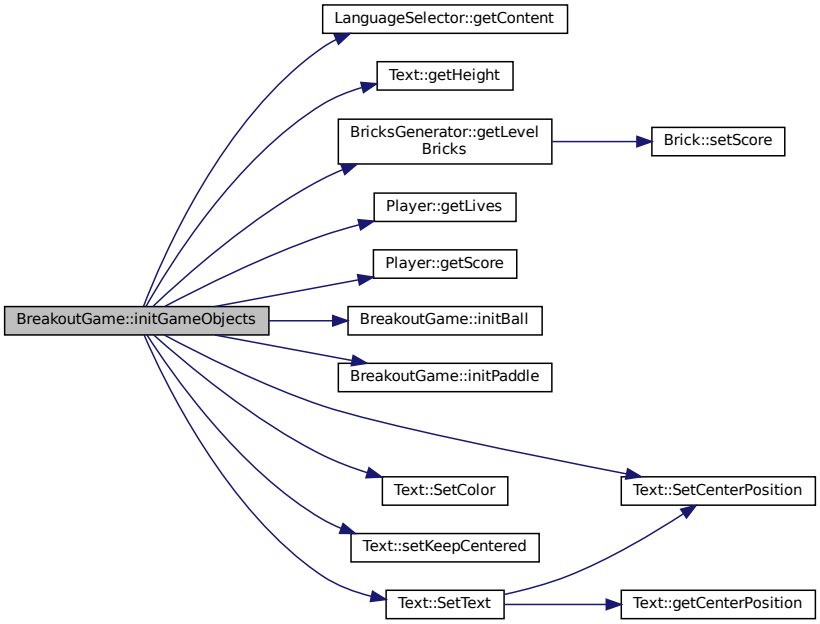


4.2.3.7 initGameObjects()

```
void BreakoutGame::initGameObjects ( )  [private]
```

Init all game Objects.

Here is the call graph for this function:



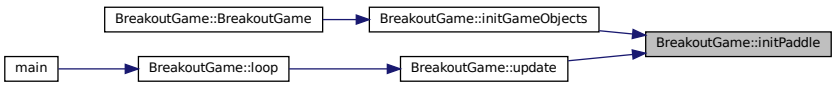
Here is the caller graph for this function:

4.2.3.8 initPaddle()

```
void BreakoutGame::initPaddle ( )  [private]
```

Init or reset paddle state.

Here is the caller graph for this function:



4.2.3.9 initSDLSystems()

```
bool BreakoutGame::initSDLSystems ( )  [private]
```

Init SDL systems.

Returns

true Init SDL and extra systems successfully

false Error occurs

Here is the caller graph for this function:

4.2.3.10 loadLanguages()

```
bool BreakoutGame::loadLanguages ( )  [private]
```

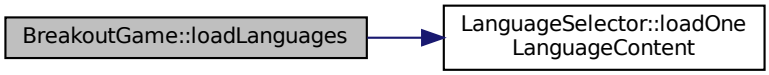
Load multi-language text data from file.

Returns

true Read and load all data successfully

false Error occurs

Here is the call graph for this function:



Here is the caller graph for this function:

4.2.3.11 loadLevels()

```
bool BreakoutGame::loadLevels ( )  [private]
```

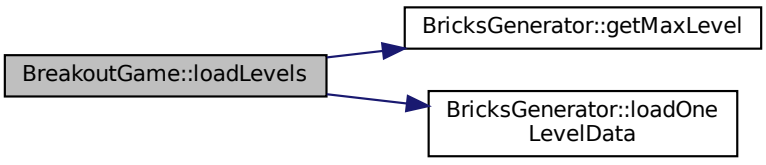
Load level data from files.

Returns

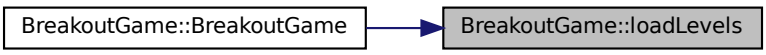
true Read and load level data successfully

false Error occurs

Here is the call graph for this function:



Here is the caller graph for this function:



4.2.3.12 loadResources()

```
bool BreakoutGame::loadResources ( )  [private]
```

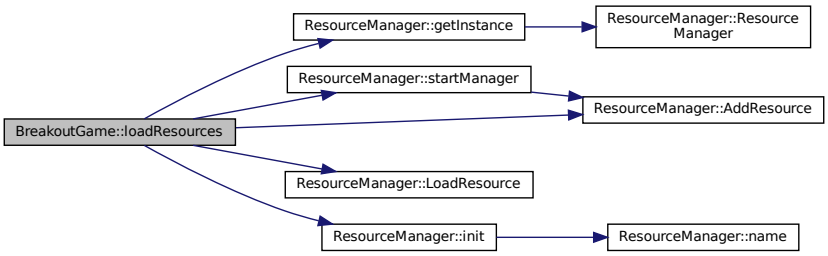
Load all resource which need IO by using ResourceManger.

Returns

true Load all resources successfully

false Error occurs

Here is the call graph for this function:



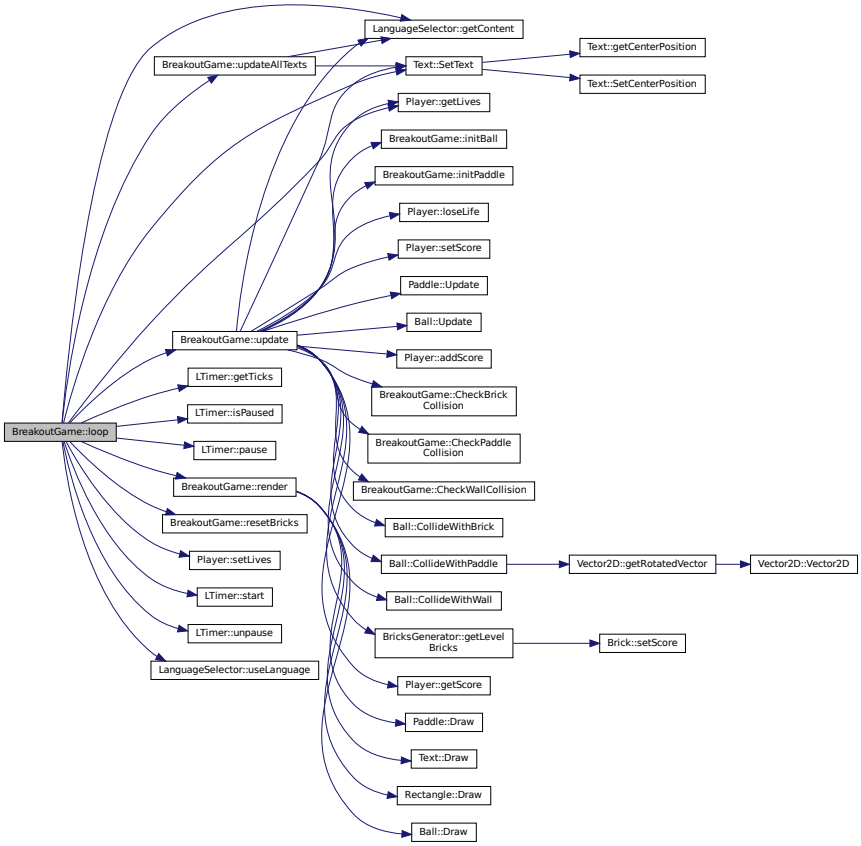
Here is the caller graph for this function:

4.2.3.13 loop()

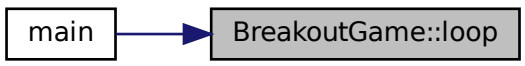
```
void BreakoutGame::loop ( )
```

Game main loop.

Here is the call graph for this function:



Here is the caller graph for this function:

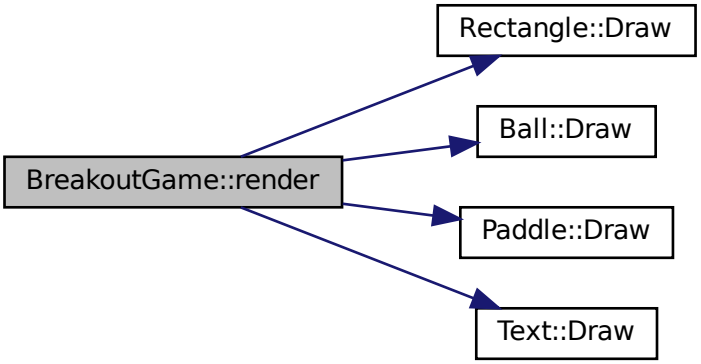


4.2.3.14 render()

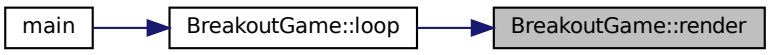
```
void BreakoutGame::render ( )
```

Render all things for next frame.

Here is the call graph for this function:



Here is the caller graph for this function:

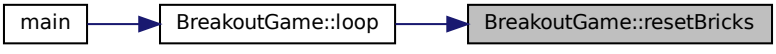


4.2.3.15 resetBricks()

```
void BreakoutGame::resetBricks ( )  [private]
```

Reset all current level bricks' state.

Here is the caller graph for this function:



4.2.3.16 update()

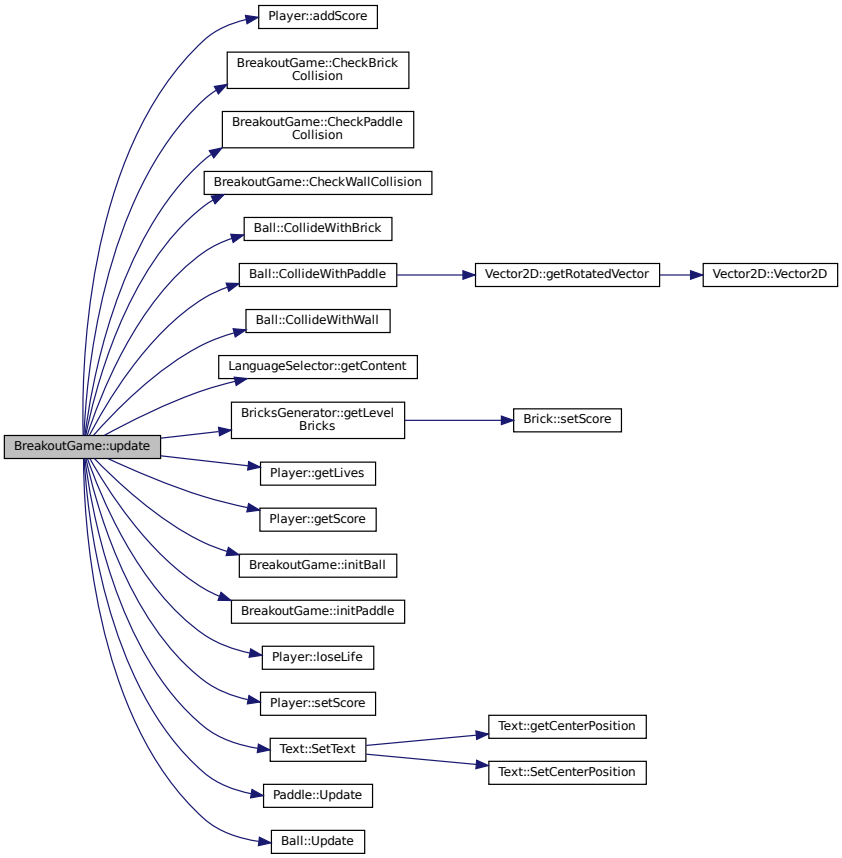
```
void BreakoutGame::update (
            float dt )
```

Update game state.

Parameters

dt	Milliseconds passed from last update

Here is the call graph for this function:



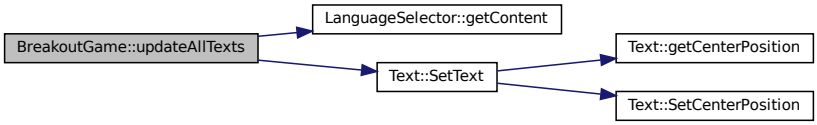
Here is the caller graph for this function:

4.2.3.17 updateAllTexts()

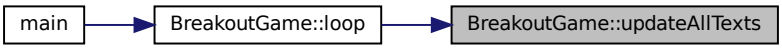
```
void BreakoutGame::updateAllTexts ( )  [private]
```

Update all texts object when language change.

Here is the call graph for this function:



Here is the caller graph for this function:



4.2.4 Member Data Documentation

4.2.4.1 backgroundMusic

```
std::shared_ptr<Mix_Chunk> BreakoutGame::backgroundMusic  [private]
```

Background music.

4.2.4.2 ball

```
Ball BreakoutGame::ball  [private]
```

Ball object.

4.2.4.3 brickHitSound

```
std::shared_ptr<Mix_Chunk> BreakoutGame::brickHitSound  [private]
```

Sound of ball hit brick.

4.2.4.4 bricks

```
std::vector<Brick> BreakoutGame::bricks  [private]
```

Array of all bricks in current level.

4.2.4.5 bricksGenerator

```
BricksGenerator BreakoutGame::bricksGenerator  [private]
```

Helper class to load level config and generate bricks for each level.

4.2.4.6 buttons

```
bool BreakoutGame::buttons[2] {}  [private]
```

Button state array to represent whether left or right key(also 'a' and 'd') is pressed.

4.2.4.7 configs

```
nlohmann::json BreakoutGame::configs  [private]
```

Json object contains loaded config data.

4.2.4.8 contentFont_

```
std::shared_ptr<TTF_Font> BreakoutGame::contentFont_  [private]
```

Font of score,player life,level.

4.2.4.9 gameState

```
GameState BreakoutGame::gameState  [private]
```

Current game state.

4.2.4.10 gRenderer

```
std::shared_ptr<SDL_Renderer> BreakoutGame::gRenderer  [private]
```

SDL renderer shared pointer.

4.2.4.11 gWindow

```
std::shared_ptr<SDL_Window> BreakoutGame::gWindow  [private]
```

SDL window shared pointer.

4.2.4.12 languageSelector

```
LanguageSelector BreakoutGame::languageSelector  [private]
```

Helper class to load different language texts.

4.2.4.13 level

```
int BreakoutGame::level = 1  [private]
```

Current game level.

4.2.4.14 levelNum

```
Text BreakoutGame::levelNum  [private]
```

Level number Text.

4.2.4.15 levelText

```
Text BreakoutGame::levelText  [private]
```

Level Text.

4.2.4.16 livesNum

```
Text BreakoutGame::livesNum  [private]
```

Player life number Text.

4.2.4.17 livesText

```
Text BreakoutGame::livesText  [private]
```

Lives Text.

4.2.4.18 loseLifeSound

```
std::shared_ptr<Mix_Chunk> BreakoutGame::loseLifeSound  [private]
```

Sound of player lose one life.

4.2.4.19 loseSound

```
std::shared_ptr<Mix_Chunk> BreakoutGame::loseSound  [private]
```

Sound of player lose all lives.

4.2.4.20 maxLevel

```
int BreakoutGame::maxLevel  [private]
```

Max level for this game.

4.2.4.21 menuFont_

```
std::shared_ptr<TTF_Font> BreakoutGame::menuFont_  [private]
```

Font of all notification.

4.2.4.22 notificationText

```
Text BreakoutGame::notificationText  [private]
```

Notification Text.

4.2.4.23 paddle

```
Paddle BreakoutGame::paddle  [private]
```

Paddle object.

4.2.4.24 paddleHitSound

```
std::shared_ptr<Mix_Chunk> BreakoutGame::paddleHitSound  [private]
```

Sound of ball hit paddle.

4.2.4.25 player

```
Player BreakoutGame::player  [private]
```

Player Object store player state.

4.2.4.26 restBricks

```
int BreakoutGame::restBricks  [private]
```

4.2.4.27 scoreNum

```
Text BreakoutGame::scoreNum  [private]
```

Score number Text.

4.2.4.28 scoreText

```
Text BreakoutGame::scoreText  [private]
```

Score Text.

4.2.4.29 screenHeight

```
int BreakoutGame::screenHeight  [private]
```

Game window height.

4.2.4.30 screenWidth

```
int BreakoutGame::screenWidth  [private]
```

Game window width.

4.2.4.31 wallHitSound

```
std::shared_ptr<Mix_Chunk> BreakoutGame::wallHitSound  [private]
```

Sound of ball hit wall.

4.2.4.32 wallLeft

```
Wall BreakoutGame::wallLeft  [private]
```

Wall object on the left.

4.2.4.33 wallRight

```
Wall BreakoutGame::wallRight  [private]
```

Wall object on the right.

4.2.4.34 winSound

```
std::shared_ptr<Mix_Chunk> BreakoutGame::winSound  [private]
```

Sound of player win one level.

The documentation for this class was generated from the following files:

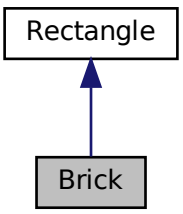
- include/BreakoutGame.hpp
- src/BreakoutGame.cpp

4.3 Brick Class Reference

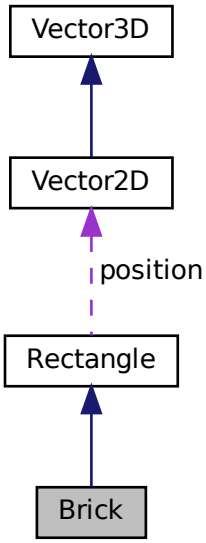
Brick object Class.

```
#include <Brick.hpp>
```

Inheritance diagram for Brick:



Collaboration diagram for Brick:



Public Member Functions

- Brick (Vector2D position, bool active=false)
  Construct a new Brick object.
- bool isActive () const
  Whether active.
- void setActive (bool state)
  Set the active state.
- int getScore () const
  Get the score of this brick.
- void setScore (int score)
  Set the brick's score.
- void Draw (SDL_Renderer *renderer)
  Draw brick on screen.

Private Attributes

- bool active
- int score = BRICK_DEFAULT_SCORE

Additional Inherited Members

4.3.1 Detailed Description

Brick object Class.

Store info of a brick: position,score whether active ...

4.3.2 Constructor & Destructor Documentation

4.3.2.1 Brick()

```
Brick::Brick (
            Vector2D position,
            bool active = false )  [inline]
```

Construct a new Brick object.

Parameters

position	Position
active	Whether active

4.3.3 Member Function Documentation

4.3.3.1 Draw()

```
void Brick::Draw (
            SDL_Renderer * renderer )  [inline]
```

Draw brick on screen.

Parameters

renderer	Global SDL_Renderer pointer

4.3.3.2 getScore()

```
int Brick::getScore ( ) const  [inline]
```

Get the score of this brick.

Returns

int Score value

4.3.3.3 isActive()

```
bool Brick::isActive ( ) const  [inline]
```

Whether active.

Returns

true Active

false Inactive

4.3.3.4 setActive()

```
void Brick::setActive (
            bool state )  [inline]
```

Set the active state.

Parameters

state	New state

4.3.3.5 setScore()

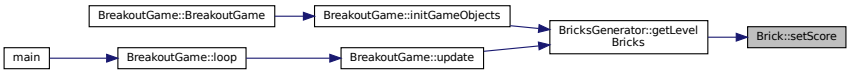
```
void Brick::setScore (
            int score )  [inline]
```

Set the brick's score.

Parameters

score	Score value

Here is the caller graph for this function:



4.3.4 Member Data Documentation

4.3.4.1 active

```
bool Brick::active  [private]
```

4.3.4.2 score

```
int Brick::score = BRICK_DEFAULT_SCORE  [private]
```

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

- include/Brick.hpp

4.4 BricksGenerator Class Reference

Helper class to load and generate each level bricks arrangement.

`#include <BricksGenerator.hpp>`

Public Member Functions

- bool loadOneLevelData (const std::string &path)
  Load one level config data form a file.
- std::vector< Brick > getLevelBricks (int level) const
  Get the bricks info of specific level.
- int getMaxLevel () const
  Get the Max Level.

Private Attributes

- std::vector< LevelData > allLevels
  All level data store in an array.

4.4.1 Detailed Description

Helper class to load and generate each level bricks arrangement.

4.4.2 Member Function Documentation

4.4.2.1 getLevelBricks()

```
std::vector<Brick> BricksGenerator::getLevelBricks (
            int level ) const  [inline]
```

Get the bricks info of specific level.

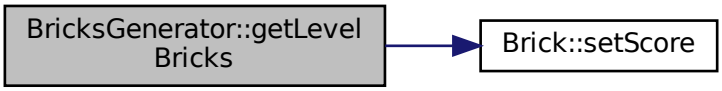
Parameters

level	Level number

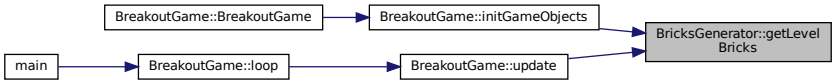
Returns

std::vector<Brick> Bricks array

Here is the call graph for this function:



Here is the caller graph for this function:



4.4.2.2 getMaxLevel()

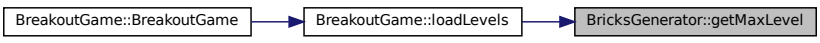
```
int BricksGenerator::getMaxLevel ( ) const  [inline]
```

Get the Max Level.

Returns

int Max Level number

Here is the caller graph for this function:



4.4.2.3 loadOneLevelData()

```
bool BricksGenerator::loadOneLevelData (
            const std::string & path )  [inline]
```

Load one level config data form a file.

Parameters

path	File path

Returns

true Success to load

false Error occurs

Here is the caller graph for this function:

4.4.3 Member Data Documentation

4.4.3.1 allLevels

```
std::vector<LevelData> BricksGenerator::allLevels  [private]
```

All level data store in an array.

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

- include/BricksGenerator.hpp

4.5 ConfigUtil Class Reference

Help class which use nlohmann::json library to process json format config file.

```
#include <ConfigUtil.hpp>
```

Static Public Member Functions

- static nlohmann::json loadConfig (const std::string &path)

  Get json object from file.
- static void loadAllVariables (nlohmann::json &js)

  Update all global variable value from json format config.

4.5.1 Detailed Description

Help class which use nlohmann::json library to process json format config file.

4.5.2 Member Function Documentation

4.5.2.1 loadAllVariables()

```
static void ConfigUtil::loadAllVariables (
            nlohmann::json & js )  [inline], [static]
```

Update all global variable value from json format config.

Parameters

js	Input json object

Here is the caller graph for this function:

4.5.2.2 loadConfig()

```
static nlohmann::json ConfigUtil::loadConfig (
            const std::string & path )  [inline], [static]
```

Get json object from file.

Parameters

path	File path

Returns

nlohmann::json Deserialized json object

Here is the caller graph for this function:

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

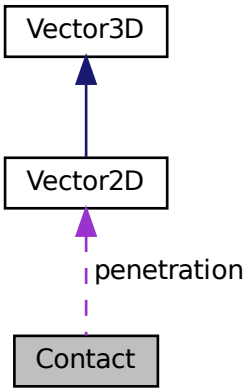
- include/ConfigUtil.hpp

4.6 Contact Struct Reference

Collision info struct.

`#include <Common.h>`

Collaboration diagram for Contact:



Public Attributes

- CollisionType type

  Collision direction.
- Vector2D penetration

  How much the ball has penetrated in hitted object.

4.6.1 Detailed Description

Collision info struct.

4.6.2 Member Data Documentation

4.6.2.1 penetration

```
Vector2D Contact::penetration
```

How much the ball has penetrated in hitted object.

4.6.2.2 type

```
CollisionType Contact::type
```

Collision direction.

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

- include/Common.h

4.7 Language Struct Reference

Struct to store all key-value pair of game texts.

```
#include <LanguageManager.hpp>
```

Public Attributes

- std::unordered_map< std::string, std::string > data

4.7.1 Detailed Description

Struct to store all key-value pair of game texts.

4.7.2 Member Data Documentation

4.7.2.1 data

```
std::unordered_map<std::string, std::string> Language::data
```

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

- include/LanguageManager.hpp

4.8 LanguageSelector Class Reference

Help class to read, load and manage multi language text data.

```
#include <LanguageManager.hpp>
```

Public Member Functions

- bool loadOneLanguageContent (const std::string &path, const std::string &name)

  Read and load one language data file.
- std::string const & getContent (const std::string &key) const
- void useLanguage (std::string const &lan)

  Set current language.

Private Attributes

- std::unordered_map< std::string, Language > languages

  all language text data
- std::string currentLanguage

  current language

4.8.1 Detailed Description

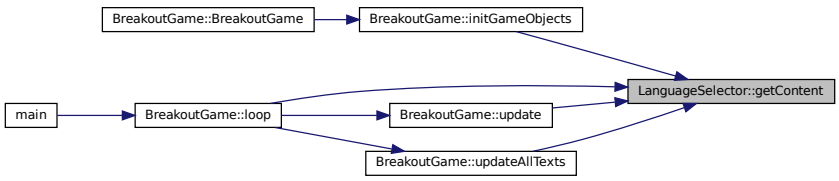
Help class to read, load and manage multi language text data.

4.8.2 Member Function Documentation

4.8.2.1 getContent()

```
std::string const& LanguageSelector::getContent (
            const std::string & key ) const  [inline]
```

Here is the caller graph for this function:



4.8.2.2 loadOneLanguageContent()

```
bool LanguageSelector::loadOneLanguageContent (
            const std::string & path,
            const std::string & name )  [inline]
```

Read and load one language data file.

Parameters

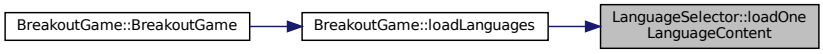
path	File path
name	Language name

Returns

true Success to read and load

false Error occurs

Here is the caller graph for this function:



4.8.2.3 useLanguage()

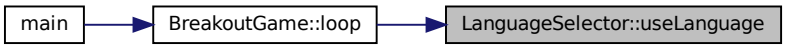
```
void LanguageSelector::useLanguage (
            std::string const & lan )  [inline]
```

Set current language.

Parameters

lan	Language name

Here is the caller graph for this function:



4.8.3 Member Data Documentation

4.8.3.1 currentLanguage

```
std::string LanguageSelector::currentLanguage  [private]
```

current language

4.8.3.2 languages

```
std::unordered_map<std::string, Language> LanguageSelector::languages  [private]
```

all language text data

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

- include/LanguageManager.hpp

4.9 LevelData Struct Reference

Struct to store brick arrangement data of one level.

```
#include <BricksGenerator.hpp>
```

Public Attributes

- std::vector< std::string > data

  Raw data stored in string for each row of bricks.

4.9.1 Detailed Description

Struct to store brick arrangement data of one level.

4.9.2 Member Data Documentation

4.9.2.1 data

```
std::vector<std::string> LevelData::data
```

Raw data stored in string for each row of bricks.

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

- include/BricksGenerator.hpp

4.10 LTimer Class Reference

The application time based timer.

```
#include <LTimer.h>
```

Public Member Functions

- LTimer ()
  Initializes variables.
- void start ()
  Start or reset and restart the timer.
- void stop ()
  Stop the timer.
- void pause ()
  Pause the timer.
- void unpause ()
  Unpause the timer.
- Uint32 getTicks ()
  Gets the timer's time.
- bool isStarted ()
  Check timer is started.
- bool isPaused ()
  Check timer is is paused.

Private Attributes

- Uint32 mStartTicks

  The clock time when the timer started.
- Uint32 mPausedTicks

  The ticks stored when the timer was paused.
- bool mPaused

  Whether paused.
- bool mStarted

  Whether started.

4.10.1 Detailed Description

The application time based timer.

4.10.2 Constructor & Destructor Documentation

4.10.2.1 LTimer()

```
LTimer::LTimer ( )
```

Initializes variables.

4.10.3 Member Function Documentation

4.10.3.1 getTicks()

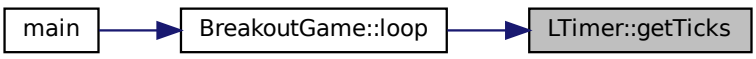
```
Uint32 LTimer::getTicks ( )
```

Gets the timer's time.

Returns

Uint32 Time value

Here is the caller graph for this function:



4.10.3.2 isPaused()

```
bool LTimer::isPaused ( )
```

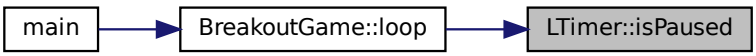
Check timer is is paused.

Returns

true Paused

false Not paused

Here is the caller graph for this function:



4.10.3.3 isStarted()

```
bool LTimer::isStarted ( )
```

Check timer is started.

Returns

true Started

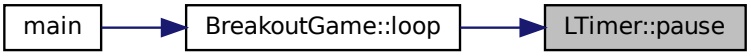
false Not started

4.10.3.4 pause()

```
void LTimer::pause ( )
```

Pause the timer.

Here is the caller graph for this function:

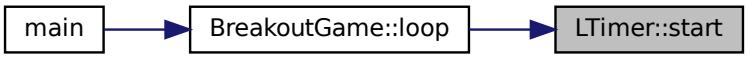


4.10.3.5 start()

```
void LTimer::start ( )
```

Start or reset and restart the timer.

Here is the caller graph for this function:



4.10.3.6 stop()

```
void LTimer::stop ( )
```

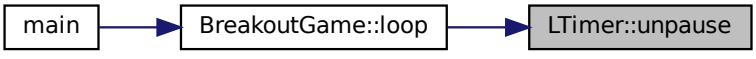
Stop the timer.

4.10.3.7 unpause()

```
void LTimer::unpause ( )
```

Unpause the timer.

Here is the caller graph for this function:



4.10.4 Member Data Documentation

4.10.4.1 mPaused

```
bool LTimer::mPaused  [private]
```

Whether paused.

4.10.4.2 mPausedTicks

```
Uint32 LTimer::mPausedTicks  [private]
```

The ticks stored when the timer was paused.

4.10.4.3 mStarted

```
bool LTimer::mStarted  [private]
```

Whether started.

4.10.4.4 mStartTicks

```
Uint32 LTimer::mStartTicks  [private]
```

The clock time when the timer started.

The documentation for this class was generated from the following files:

- include/LTimer.h
- src/LTimer.cpp

4.11 Matrix3D Struct Reference

Matrix 3D represents 3x3 matrices in Math.

```
#include <TinyMath.hpp>
```

Public Member Functions

- Matrix3D ()=default

  Construct a new Matrix3D object.
- Matrix3D (float n00, float n01, float n02, float n10, float n11, float n12, float n20, float n21, float n22)
- Matrix3D (const Vector3D &a, const Vector3D &b, const Vector3D &c)

  Matrix constructor from three vectors, putting each Vector to each column.
- float & operator() (int i, int j)
- const float & operator() (int i, int j) const
- Vector3D & operator[ ] (int i)

  Return a row from a matrix as a vector.
- const Vector3D & operator[ ] (int i) const

  Return a row from a matrix as a vector.
- bool operator== (const Matrix3D &m) const

  Equal operator.
- bool operator!= (const Matrix3D &m) const

  Unequal operator.
- Vector3D column (int j) const

  Return a column from a matrix as a vector.

Private Attributes

- float n [3][3]

  Store each value of the matrix.

4.11.1 Detailed Description

Matrix 3D represents 3x3 matrices in Math.

4.11.2 Constructor & Destructor Documentation

4.11.2.1 Matrix3D() [1/3]

```
Matrix3D::Matrix3D ( )  [default]
```

Construct a new Matrix3D object.

4.11.2.2 Matrix3D() [2/3]

```
Matrix3D::Matrix3D (
            float n00,
            float n01,
            float n02,
            float n10,
            float n11,
            float n12,
            float n20,
            float n21,
            float n22 )  [inline]
```

Matrix constructor with 9 scalar values. Row-major order

4.11.2.3 Matrix3D() [3/3]

```
Matrix3D::Matrix3D (
            const Vector3D & a,
            const Vector3D & b,
            const Vector3D & c )  [inline]
```

Matrix constructor from three vectors, putting each Vector to each column.

4.11.3 Member Function Documentation

4.11.3.1 column()

```
Vector3D Matrix3D::column (
            int j ) const  [inline]
```

Return a column from a matrix as a vector.

Here is the caller graph for this function:

4.11.3.2 operator"!=()

```
bool Matrix3D::operator!= (
            const Matrix3D & m ) const  [inline]
```

Unequal operator.

Here is the call graph for this function:

4.11.3.3 operator()() [1/2]

```
float& Matrix3D::operator() (
            int i,
            int j )  [inline]
```

Index operator with two dimensions Example: M(1,1) returns row 1 and column 1 of matrix M.

4.11.3.4 operator()() [2/2]

```
const float& Matrix3D::operator() (
            int i,
            int j ) const  [inline]
```

Index operator with two dimensions Example: M(1,1) returns row 1 and column 1 of matrix M.

4.11.3.5 operator==()

```
bool Matrix3D::operator== (
            const Matrix3D & m ) const  [inline]
```

Equal operator.

Here is the caller graph for this function:

4.11.3.6 operator[]() [1/2]

```
Vector3D& Matrix3D::operator[] (
            int i )  [inline]
```

Return a row from a matrix as a vector.

4.11.3.7 operator[]() [2/2]

```
const Vector3D& Matrix3D::operator[] (
            int i ) const  [inline]
```

Return a row from a matrix as a vector.

4.11.4 Member Data Documentation

4.11.4.1 n

```
float Matrix3D::n[3][3]  [private]
```

Store each value of the matrix.

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

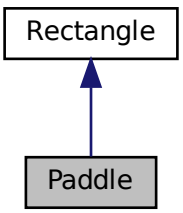
- include/TinyMath.hpp

4.12 Paddle Class Reference

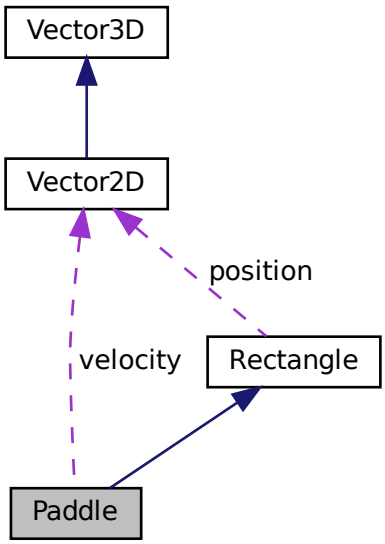
Paddle object class.

```
#include <Paddle.hpp>
```

Inheritance diagram for Paddle:



Collaboration diagram for Paddle:



Public Member Functions

- Paddle ()=default

  Construct a new Paddle object.
- Paddle (Vector2D position, Vector2D velocity)

  Construct a new Paddle object.
- void Update (float dt)

  Update paddle state.
- void Draw (SDL_Renderer ∗renderer)

  Draw the paddle on the screen.

Public Attributes

- Vector2D velocity

  The current velocity of the paddle.

4.12.1 Detailed Description

Paddle object class.

Keep track the info of the paddle in the game

4.12.2 Constructor & Destructor Documentation

4.12.2.1 Paddle() [1/2]

```
Paddle::Paddle ( )  [default]
```

Construct a new Paddle object.

4.12.2.2 Paddle() [2/2]

```
Paddle::Paddle (
            Vector2D position,
            Vector2D velocity )  [inline]
```

Construct a new Paddle object.

Parameters

position	Start position
velocity	Inital velocity

4.12.3 Member Function Documentation

4.12.3.1 Draw()

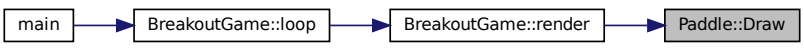
```
void Paddle::Draw (
            SDL_Renderer * renderer )  [inline]
```

Draw the paddle on the screen.

Parameters

renderer	The global SDL_Renderer

Here is the caller graph for this function:



4.12.3.2 Update()

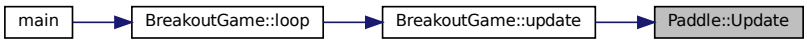
```
void Paddle::Update (
            float dt )  [inline]
```

Update paddle state.

Parameters

dt	Milliseconds from last updated

Here is the caller graph for this function:



4.12.4 Member Data Documentation

4.12.4.1 velocity

```
Vector2D Paddle::velocity
```

The current velocity of the paddle.

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

- include/Paddle.hpp

4.13 Player Class Reference

Player class, store info of the player.

```
#include <Player.hpp>
```

Public Member Functions

- Player ()=default

  Construct a new Player object.
- Player (int s, int l)

  Construct a new Player object.
- void addScore (int s)

  Add score.
- void setScore (int s)

  Set the Score.
- void setLives (int l)

  Set the Lives.
- void loseLife ()

  lose one life
- int getScore () const

  Get the current player's score.
- int getLives () const

  Get the current player's lives.

Private Attributes

- int score = 0

  Curret score of the player.
- int lives = PLAYER_DEFAULT_LIFE_NUM

  Current rest lives of the player.

4.13.1 Detailed Description

Player class, store info of the player.

4.13.2 Constructor & Destructor Documentation

4.13.2.1 Player() [1/2]

```
Player::Player ( )  [default]
```

Construct a new Player object.

4.13.2.2 Player() [2/2]

```
Player::Player (
            int s,
            int l )  [inline]
```

Construct a new Player object.

Parameters

s	Default score
l	Default livies

4.13.3 Member Function Documentation

4.13.3.1 addScore()

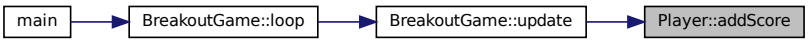
```
void Player::addScore (
            int s )  [inline]
```

Add score.

Parameters

s	Number to add

Here is the caller graph for this function:



4.13.3.2 getLives()

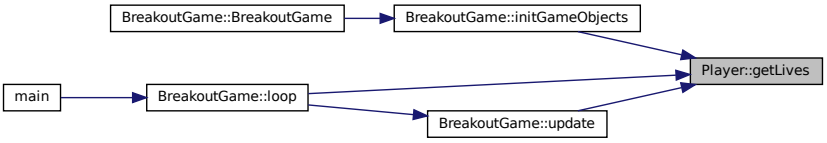
```
int Player::getLives ( ) const  [inline]
```

Get the current player's lives.

Returns

int Lives number

Here is the caller graph for this function:



4.13.3.3 getScore()

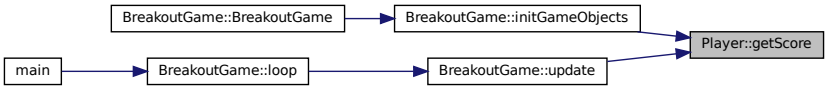
```
int Player::getScore ( ) const  [inline]
```

Get the current player's score.

Returns

int Score number

Here is the caller graph for this function:

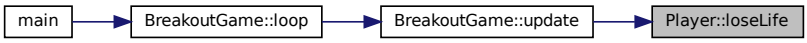


4.13.3.4 loseLife()

```
void Player::loseLife ( )  [inline]
```

lose one life

decrease 1 on lives Here is the caller graph for this function:



4.13.3.5 setLives()

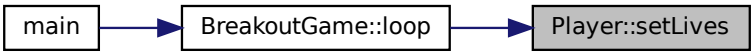
```
void Player::setLives (
            int l )  [inline]
```

Set the Lives.

Parameters

l	Number to set

Here is the caller graph for this function:



4.13.3.6 setScore()

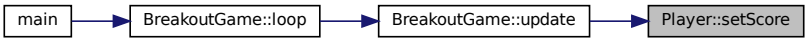
```
void Player::setScore (
            int s )  [inline]
```

Set the Score.

Parameters

s	Number to set

Here is the caller graph for this function:



4.13.4 Member Data Documentation

4.13.4.1 lives

```
int Player::lives = PLAYER_DEFAULT_LIFE_NUM  [private]
```

Current rest lives of the player.

4.13.4.2 score

```
int Player::score = 0  [private]
```

Curret score of the player.

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

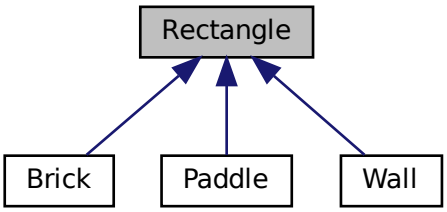
- include/Player.hpp

4.14 Rectangle Class Reference

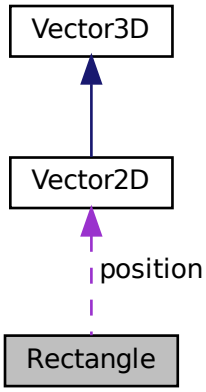
A simple rectange class to represnet a rectangle on screen.

`#include <Rectangle.hpp>`

Inheritance diagram for Rectangle:



Collaboration diagram for Rectangle:



Public Member Functions

- Rectangle ()=default

  Construct a new Rectangle object.
- Rectangle (Vector2D position, int w, int h)

  Construct a new Rectangle object.
- void Draw (SDL_Renderer ∗renderer)

  Draw the rectangle on screen.

Public Attributes

- Vector2D position

  The position of this rectangle.
- SDL_Rect rect {}

  A rectangle struct with left top position , height, width.

4.14.1 Detailed Description

A simple rectange class to represnet a rectangle on screen.

4.14.2 Constructor & Destructor Documentation

4.14.2.1 Rectangle() [1/2]

```
Rectangle::Rectangle ( )  [default]
```

Construct a new Rectangle object.

4.14.2.2 Rectangle() [2/2]

```
Rectangle::Rectangle (
            Vector2D position,
            int w,
            int h )  [inline]
```

Construct a new Rectangle object.

Parameters

position	Position of the Rectangle
w	Width of the Rectangle
h	Height of the Rectangle

4.14.3 Member Function Documentation

4.14.3.1 Draw()

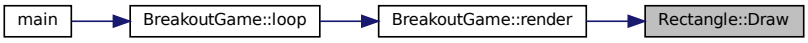
```
void Rectangle::Draw (
            SDL_Renderer * renderer )  [inline]
```

Draw the rectangle on screen.

Parameters

renderer	The pointer to the global SDL_Renderer

Here is the caller graph for this function:



4.14.4 Member Data Documentation

4.14.4.1 position

```
Vector2D Rectangle::position
```

The position of this rectangle.

4.14.4.2 rect

```
SDL_Rect Rectangle::rect {}
```

A rectangle struct with left top position , height, width.

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

- include/Rectangle.hpp

4.15 ResourceManager Class Reference

Singleton ResourceManager manage resources which loaded from files.

```
#include <ResourceManager.hpp>
```

Public Member Functions

- size_t size () const

  Get number of resources.
- std::string name () const

  Get the name of ResourceManager.
- void init (const std::string &name, const std::string &cfgFilePath)

  Init the ResourceManager.
- bool startManager (bool preload=false, void *args=nullptr)

  Start the manager, if preload enable, then load all resource according to the config file.
- bool stopManager ()

  Stop the manager.
- bool AddResource (const ResName &resName, void *args)

  Add a resource by find and load resource in resource-path map.
- bool AddResource (const ResName &resName, std::shared_ptr< SDL_RWops > newRes)

  Directly add a new resource.
- bool AddResource (const ResName &resName, const ResFilePath &resPath, void *args)

  Add a resource from file.
- std::shared_ptr< SDL_RWops > LoadResource (const ResName &resName) const

  Offer a resource to others to use.
- bool RemoveResource (const ResName &resName)

  Remove one resource by name.
- bool RemoveAllResource ()

  Remove all resources.
- ~ResourceManager ()

  Destroy the Resource Manager object.

Static Public Member Functions

- static ResourceManager & getInstance ()

  Get the reference to the ResourceManager Instance.

Private Member Functions

- ResourceManager ()

  Construct a new Resource Manager object.
- ResourceManager (const ResourceManager &other)=delete

  Abandon copy constructor.
- ResourceManager & operator= (const ResourceManager &other)=delete

  Abandon copy assign.

Private Attributes

- std::string name_

  ResourceManager name.
- std::string cfgFilePath_

  The config file which can be automatically loaded.
- bool useConfig_ = false

  Whether load config file.
- std::unordered_map< ResName, ResFilePath > fileMap_

  (Resource name , Resource file path) pair
- std::unordered_map< ResName, std::shared_ptr< SDL_RWops > > resMap_

  (Resource name , Resource pointer) pair

4.15.1 Detailed Description

Singleton ResourceManager manage resources which loaded from files.

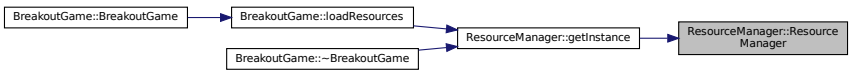
4.15.2 Constructor & Destructor Documentation

4.15.2.1 ResourceManager() [1/2]

```
ResourceManager::ResourceManager ( )  [inline], [private]
```

Construct a new Resource Manager object.

Here is the caller graph for this function:



4.15.2.2 ResourceManager() [2/2]

```
ResourceManager::ResourceManager (
            const ResourceManager & other )  [private], [delete]
```

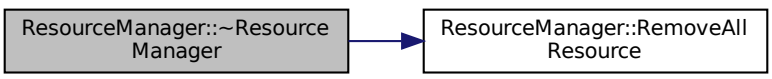
Abandon copy constructor.

4.15.2.3 ~ResourceManager()

```
ResourceManager::~ResourceManager ( )  [inline]
```

Destroy the Resource Manager object.

Here is the call graph for this function:



4.15.3 Member Function Documentation

4.15.3.1 AddResource() [1/3]

```
bool ResourceManager::AddResource (
            const ResName & resName,
            const ResFilePath & resPath,
            void * args )  [inline]
```

Add a resource from file.

Parameters

resName	Resource name
resPath	Resource file path
args	Extra args

Returns

true Success to add

false Fail to add

4.15.3.2 AddResource() [2/3]

```
bool ResourceManager::AddResource (
            const ResName & resName,
            std::shared_ptr< SDL_RWops > newRes )  [inline]
```

Directly add a new resource.

Parameters

resName	Resource name
newRes	Pointer to the resource object

Returns

true Success to add

false Fail to add

4.15.3.3 AddResource() [3/3]

```
bool ResourceManager::AddResource (
            const ResName & resName,
            void * args )  [inline]
```

Add a resource by find and load resource in resource-path map.

Parameters

resName	Resource name
args	Extra args

Returns

true Success to add

false Fail to add

Here is the caller graph for this function:

4.15.3.4 getInstance()

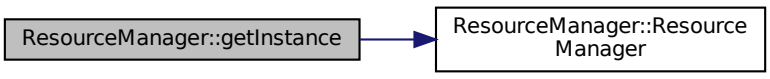
```
static ResourceManager& ResourceManager::getInstance ( )  [inline], [static]
```

Get the reference to the ResourceManager Instance.

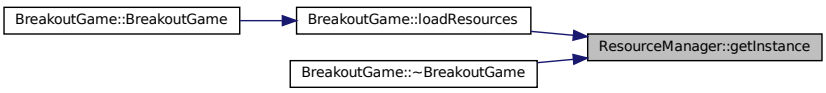
Returns

ResourceManager& The reference to the ResourceManager Instance

Here is the call graph for this function:



Here is the caller graph for this function:



4.15.3.5 init()

```
void ResourceManager::init (
            const std::string & name,
            const std::string & cfgFilePath )  [inline]
```

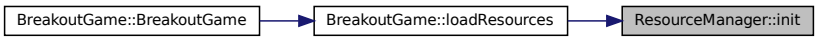
Init the ResourceManager.

Parameters

name	The name of the ResourceManager
cfgFilePath	Config file path, if empty then manage will not load config file

Here is the call graph for this function:

Here is the caller graph for this function:



4.15.3.6 LoadResource()

```
std::shared_ptr<SDL_RWops> ResourceManager::LoadResource (
            const ResName & resName ) const  [inline]
```

Offer a resource to others to use.

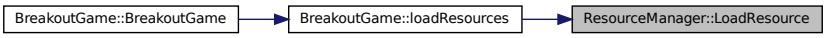
Parameters

resName	Resource name

Returns

std::shared_ptr<SDL_RWops> The pointer to the resource

Here is the caller graph for this function:



4.15.3.7 name()

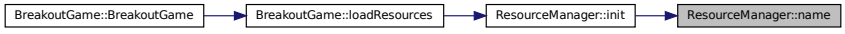
```
std::string ResourceManager::name ( ) const  [inline]
```

Get the name of ResourceManager.

Returns

std::string Name string

Here is the caller graph for this function:



4.15.3.8 operator=()

```
ResourceManager& ResourceManager::operator= (
            const ResourceManager & other )  [private], [delete]
```

Abandon copy assign.

4.15.3.9 RemoveAllResource()

```
bool ResourceManager::RemoveAllResource ( )  [inline]
```

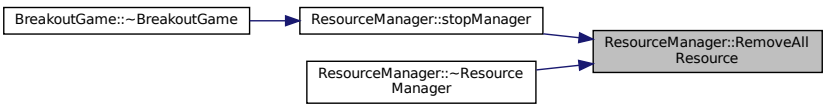
Remove all resources.

Returns

true Success to remove

false Fail to remove

Here is the caller graph for this function:



4.15.3.10 RemoveResource()

```
bool ResourceManager::RemoveResource (
            const ResName & resName )  [inline]
```

Remove one resource by name.

Parameters

resName	Resource name

Returns

true Success to remove

false Fail to remove

4.15.3.11 size()

```
size_t ResourceManager::size ( ) const  [inline]
```

Get number of resources.

Returns

size_t Number of resources

4.15.3.12 startManager()

```
bool ResourceManager::startManager (
            bool preload = false,
            void * args = nullptr )  [inline]
```

Start the manager, if preload enable, then load all resource according to the config file.

Parameters

preload	Whether preload
args	Extra args

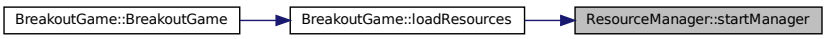
Returns

true Success to start

false Fail to start

Here is the call graph for this function:

Here is the caller graph for this function:



4.15.3.13 stopManager()

```
bool ResourceManager::stopManager ( )  [inline]
```

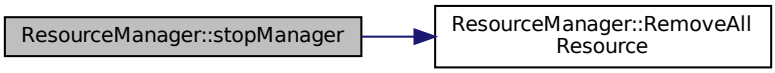
Stop the manager.

Returns

true Success to start

false Fail to start

Here is the call graph for this function:



Here is the caller graph for this function:

4.15.4 Member Data Documentation

4.15.4.1 cfgFilePath_

```
std::string ResourceManager::cfgFilePath_  [private]
```

The config file which can be automatically loaded.

4.15.4.2 fileMap_

```
std::unordered_map<ResName, ResFilePath> ResourceManager::fileMap_  [private]
```

(Resource name , Resource file path) pair

4.15.4.3 name_

```
std::string ResourceManager::name_  [private]
```

ResourceManager name.

4.15.4.4 resMap_

```
std::unordered_map<ResName, std::shared_ptr<SDL_RWops> > ResourceManager::resMap_  [private]
```

(Resource name , Resource pointer) pair

4.15.4.5 useConfig_

```
bool ResourceManager::useConfig_ = false  [private]
```

Whether load config file.

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

- include/ResourceManager.hpp

4.16 Text Class Reference

A text wrapper class.

```
#include <Text.hpp>
```

Public Member Functions

- Text ()=default
  Construct a new Text object.
- Text (Vector2D position, std::shared_ptr< SDL_Renderer > renderer, std::shared_ptr< TTF_Font > font)
  Construct a new Text object.
- void SetText (const std::string &str)
  Update the text content.
- void Draw ()
  Draw the text on screen.
- void SetPosition (const Vector2D &position)
  Set the Position of the text.
- void SetPosition (int x, int y)
  Set the Position of the text.
- void SetColor (Uint8 r, Uint8 g, Uint8 b, Uint8 a)
  Set the Color of the text.
- void SetCenterPosition (int x, int y)
  Set the Position of the text by given it's Center position.
- Vector2D getCenterPosition () const
  Get the Center Position.
- void setKeepCentered (bool state)
  Set the text maintain the its center position when its size changed.
- int getWidth () const
  Get the Width of the text.
- int getHeight () const
  Get the Height of the text.

Public Attributes

- std::shared_ptr< SDL_Renderer > renderer

  Shared pointer to global SDL_Renderer.
- std::shared_ptr< TTF_Font > font

  Shared pointer to TTF_Font.
- std::shared_ptr< SDL_Surface > surface

  Shared pointer to SDL_Surface.
- std::shared_ptr< SDL_Texture > texture

  Shared pointer to SDL_Texture.
- SDL_Rect rect

  A Rectange store the position and height, with of current text.
- SDL_Color color

  Text's color.
- std::string lastText

  The last text string, used to avoid updating by same string.
- bool keepCentered = false

  Whether keep the center position.

4.16.1 Detailed Description

A text wrapper class.

4.16.2 Constructor & Destructor Documentation

4.16.2.1 Text() [1/2]

```
Text::Text ( )  [default]
```

Construct a new Text object.

4.16.2.2 Text() [2/2]

```
Text::Text (
            Vector2D position,
            std::shared_ptr< SDL_Renderer > renderer,
            std::shared_ptr< TTF_Font > font )  [inline]
```

Construct a new Text object.

Parameters

position	The position of the text
renderer	Pinter to the renderer which used to render text
font	Pinter to the font object

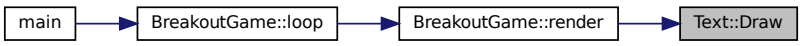
4.16.3 Member Function Documentation

4.16.3.1 Draw()

```
void Text::Draw ( )  [inline]
```

Draw the text on screen.

Here is the caller graph for this function:



4.16.3.2 getCenterPosition()

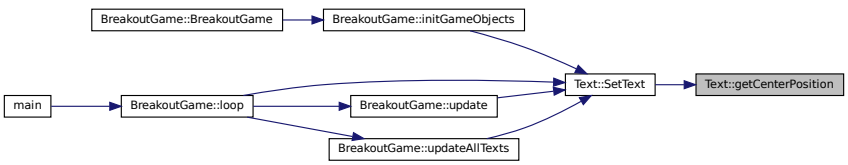
```
Vector2D Text::getCenterPosition ( ) const  [inline]
```

Get the Center Position.

Returns

Vector2D Center Position in a 2D vector

Here is the caller graph for this function:



4.16.3.3 getHeight()

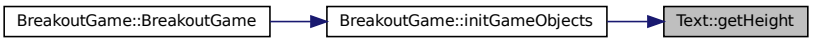
```
int Text::getHeight ( ) const  [inline]
```

Get the Height of the text.

Returns

int Height value

Here is the caller graph for this function:



4.16.3.4 getWidth()

```
int Text::getWidth ( ) const  [inline]
```

Get the Width of the text.

Returns

int Width value

4.16.3.5 SetCenterPosition()

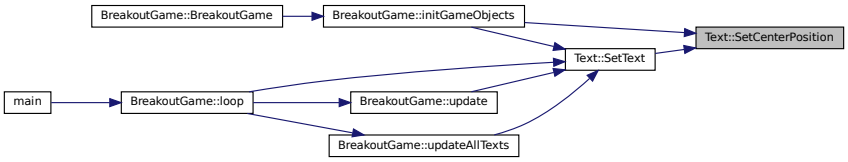
```
void Text::SetCenterPosition (
            int x,
            int y )  [inline]
```

Set the Position of the text by given it's Center position.

Parameters

x	Center position X-coordinate
y	Center position Y-coordinate

Here is the caller graph for this function:



4.16.3.6 SetColor()

```
void Text::SetColor (
            Uint8 r,
            Uint8 g,
            Uint8 b,
            Uint8 a )  [inline]
```

Set the Color of the text.

Parameters

r	Red value
g	Green value
b	Blue value
a	Alpha value

Here is the caller graph for this function:

4.16.3.7 setKeepCentered()

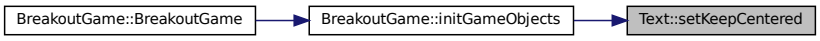
```
void Text::setKeepCentered (
            bool state )  [inline]
```

Set the text maintain the its center position when its size changed.

Parameters

state	Whether maintain

Here is the caller graph for this function:



4.16.3.8 SetPosition() [1/2]

```
void Text::SetPosition (
            const Vector2D & position )  [inline]
```

Set the Position of the text.

Parameters

position	New position

4.16.3.9 SetPosition() [2/2]

```
void Text::SetPosition (
            int x,
            int y )  [inline]
```

Set the Position of the text.

Parameters

x	X-coordinate
y	Y-coordinate

4.16.3.10 SetText()

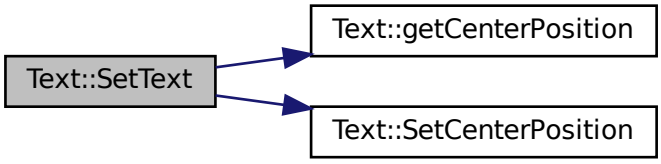
```
void Text::SetText (
            const std::string & str )  [inline]
```

Update the text content.

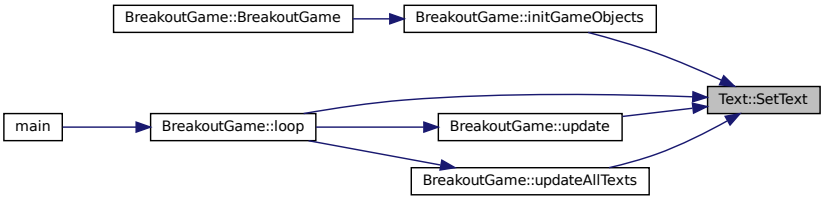
Parameters

str	New string

Here is the call graph for this function:



Here is the caller graph for this function:



4.16.4 Member Data Documentation

4.16.4.1 color

```
SDL_Color Text::color
```

Text's color.

4.16.4.2 font

```
std::shared_ptr<TTF_Font> Text::font
```

Shared pointer to TTF_Font.

4.16.4.3 keepCentered

```
bool Text::keepCentered = false
```

Whether keep the center position.

4.16.4.4 lastText

```
std::string Text::lastText
```

The last text string, used to avoid updating by same string.

4.16.4.5 rect

```
SDL_Rect Text::rect
```

A Rectange store the position and height, with of current text.

4.16.4.6 renderer

```
std::shared_ptr<SDL_Renderer> Text::renderer
```

Shared pointer to global SDL_Renderer.

4.16.4.7 surface

```
std::shared_ptr<SDL_Surface> Text::surface
```

Shared pointer to SDL_Surface.

4.16.4.8 texture

```
std::shared_ptr<SDL_Texture> Text::texture
```

Shared pointer to SDL_Texture.

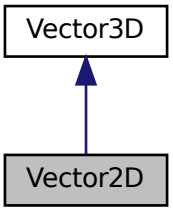
The documentation for this class was generated from the following file:

- include/Text.hpp

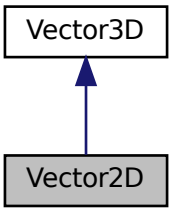
4.17 Vector2D Struct Reference

`#include <TinyMath.hpp>`

Inheritance diagram for Vector2D:



Collaboration diagram for Vector2D:



Public Member Functions

- Vector2D ()=default
- Vector2D (float a, float b)
- Vector2D getRotatedVector (float degree) const

Additional Inherited Members

4.17.1 Detailed Description

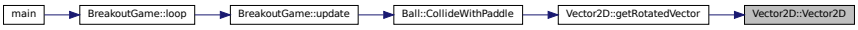
Vector2D performs vector operations with 2-dimensions The purpose of this class is primarily for 2D graphics applications.

4.17.2 Constructor & Destructor Documentation

4.17.2.1 Vector2D() [1/2]

```
Vector2D::Vector2D ( )  [default]
```

Here is the caller graph for this function:



4.17.2.2 Vector2D() [2/2]

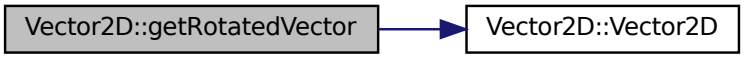
```
Vector2D::Vector2D (
            float a,
            float b )  [inline]
```

4.17.3 Member Function Documentation

4.17.3.1 getRotatedVector()

```
Vector2D Vector2D::getRotatedVector (
            float degree ) const  [inline]
```

Here is the call graph for this function:



Here is the caller graph for this function:

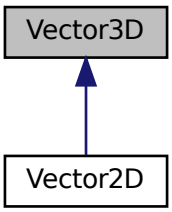
The documentation for this struct was generated from the following file:

- include/TinyMath.hpp

4.18 Vector3D Struct Reference

`#include <TinyMath.hpp>`

Inheritance diagram for Vector3D:



Public Member Functions

- Vector3D ()=default
- Vector3D (float a, float b, float c)
- float & operator[ ] (int i)
- const float & operator[ ] (int i) const
- Vector3D & operator*= (float s)
- Vector3D & operator/= (float s)

  Division Operator.
- Vector3D & operator+= (const Vector3D &v)

  Addition operator.
- Vector3D & operator-= (const Vector3D &v)

  Subtraction operator.
- bool operator== (const Vector3D &v) const

  Equal operator.
- bool operator!= (const Vector3D &v) const

  UnEqual operator.

Public Attributes

- float x
- float y
- float z

4.18.1 Detailed Description

Vector3D performs vector operations with 3-dimensions The purpose of this class is primarily for 3D graphics applications.

4.18.2 Constructor & Destructor Documentation

4.18.2.1 Vector3D() [1/2]

```
Vector3D::Vector3D ( )  [default]
```

Default conostrutcor 'why default?' https:///stackoverflow.com/questions/20828907/the-new-keyword-d

4.18.2.2 Vector3D() [2/2]

```
Vector3D::Vector3D (
            float a,
            float b,
            float c )  [inline]
```

The "Real" constructor we want to use. This initializes the values x,y,z

4.18.3 Member Function Documentation

4.18.3.1 operator"!=()

```
bool Vector3D::operator!= (
            const Vector3D & v ) const  [inline]
```

UnEqual operator.

4.18.3.2 operator*=()

```
Vector3D& Vector3D::operator*= (
            float s )  [inline]
```

Multiplication Operator Multiply vector by a uniform-scalar.

4.18.3.3 operator+=()

```
Vector3D& Vector3D::operator+= (
            const Vector3D & v )  [inline]
```

Addition operator.

4.18.3.4 operator-=()

```
Vector3D& Vector3D::operator-= (
            const Vector3D & v )  [inline]
```

Subtraction operator.

4.18.3.5 operator/=()

```
Vector3D& Vector3D::operator/= (
            float s )  [inline]
```

Division Operator.

4.18.3.6 operator==()

```
bool Vector3D::operator== (
            const Vector3D & v ) const  [inline]
```

Equal operator.

4.18.3.7 operator[]() [1/2]

```
float& Vector3D::operator[] (
            int i )  [inline]
```

Index operator, allowing us to access the individual x,y,z components of our vector. x,y,z are stored continuously, so we could recognize x as the first float number of a float[3] array There is no code to change here.

4.18.3.8 operator[]() [2/2]

```
const float& Vector3D::operator[] (
            int i ) const  [inline]
```

Index operator, allowing us to access the individual x,y,z components of our vector. x,y,z are stored continuously, so we could recognize x as the first float number of a float[3] array There is no code to change here.

4.18.4 Member Data Documentation

4.18.4.1 x

```
float Vector3D::x
```

Note: x,y,z are a convention x,y,z could be position, but also any 3-component value.

4.18.4.2 y

```
float Vector3D::y
```

4.18.4.3 z

```
float Vector3D::z
```

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

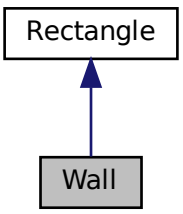
- include/TinyMath.hpp

4.19 Wall Class Reference

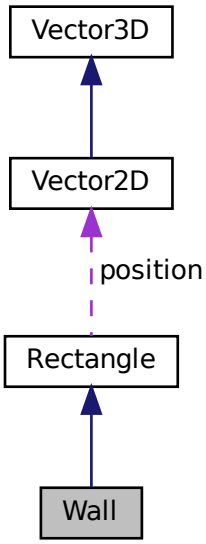
Wall object Class.

```
#include <Wall.hpp>
```

Inheritance diagram for Wall:



Collaboration diagram for Wall:



Public Member Functions

- Wall ()=default

  Construct a new Wall object.
- Wall (Vector2D position, int width)

  Construct a new Wall object.

Additional Inherited Members

4.19.1 Detailed Description

Wall object Class.

Store position info and width of the wall

4.19.2 Constructor & Destructor Documentation

4.19.2.1 Wall() [1/2]

```
Wall::Wall ( )  [default]
```

Construct a new Wall object.

4.19.2.2 Wall() [2/2]

```
Wall::Wall (
            Vector2D position,
            int width )  [inline]
```

Construct a new Wall object.

Parameters

position	Wall position
width	Wall width

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

- include/Wall.hpp

Chapter 5

File Documentation

5.1 assets/fonts/LICENSE_GPLv3.txt File Reference

Functions

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Variables

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5.1.2.2 Version

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5.2 config/levels/1.txt File Reference

5.3 config/levels/2.txt File Reference

5.4 config/levels/3.txt File Reference

5.5 config/levels/4.txt File Reference

5.6 config/levels/5.txt File Reference

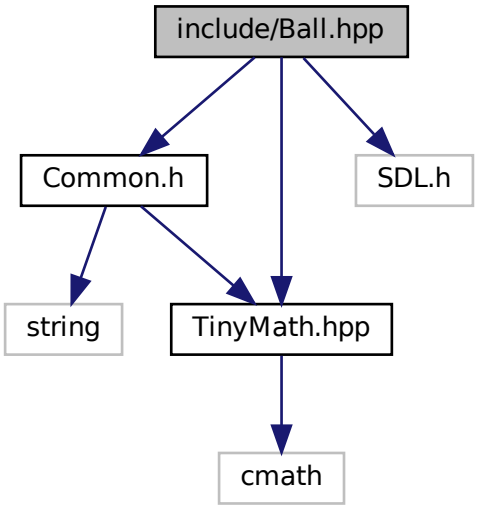
5.7 include/Ball.hpp File Reference

Ball object class.

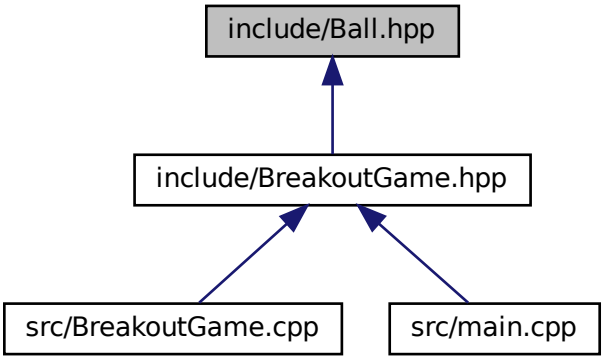
```
#include "Common.h"
#include "TinyMath.hpp"
```

```
#include <SDL.h>
```

Include dependency graph for Ball.hpp:



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



Classes

- class Ball

  Represent the ball object in the break out game. Record velocity, position etc. info of the ball.

5.7.1 Detailed Description

Ball object class.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 21:54:19 -08:00

Copyright

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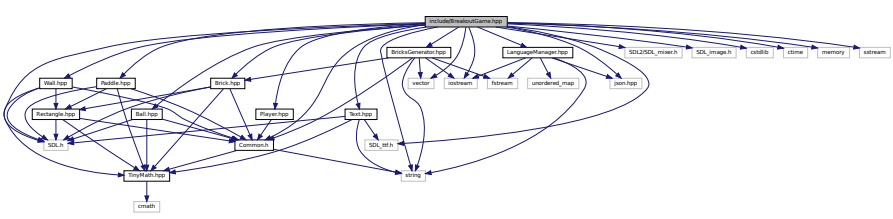
5.8 include/BreakoutGame.hpp File Reference

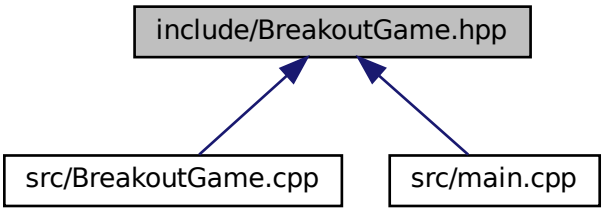
BreakoutGame main Class Header.

```
#include <SDL.h>
#include <SDL2/SDL_mixer.h>
#include <SDL_image.h>
#include <SDL_ttf.h>
#include <cstdlib>
#include <ctime>
#include <iostream>
#include <memory>
#include <sstream>
#include <string>
#include <vector>
#include "Ball.hpp"
#include "Brick.hpp"
#include "BricksGenerator.hpp"
#include "Common.h"
#include "LanguageManager.hpp"
#include "Paddle.hpp"
#include "Player.hpp"
#include "Text.hpp"
#include "Wall.hpp"
#include "json.hpp"
```

Include dependency graph for BreakoutGame.hpp:



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



Classes

- class BreakoutGame

  Breakout Game main Class, where main logic located.

5.8.1 Detailed Description

BreakoutGame main Class Header.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 21:55:07 -08:00

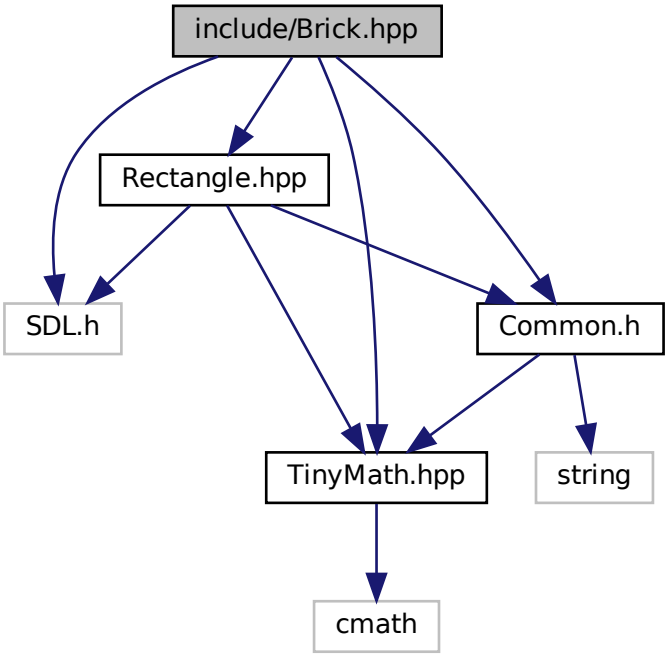
Copyright

5.9 include/Brick.hpp File Reference

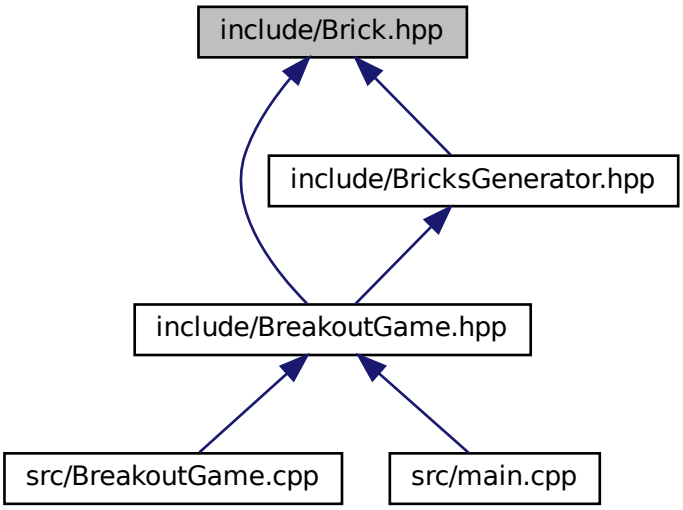
Brick object class.

```
#include <SDL.h>
#include "Common.h"
#include "Rectangle.hpp"
#include "TinyMath.hpp"
```

Include dependency graph for Brick.hpp:



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



Classes

- class Brick

  Brick object Class.

5.9.1 Detailed Description

Brick object class.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 22:44:19 -08:00

Copyright

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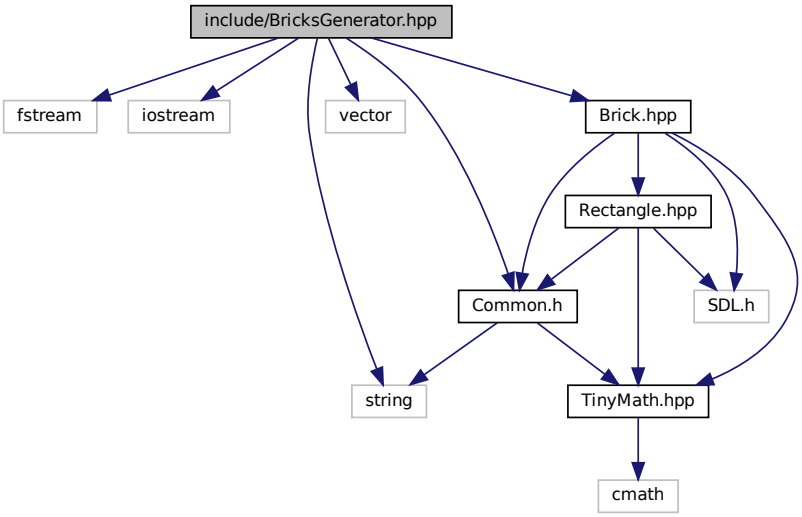
5.10 include/BricksGenerator.hpp File Reference

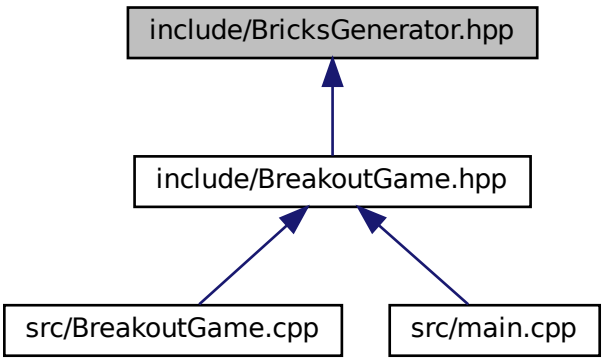
Header file for BricksGenerator.

```
#include <fstream>
#include <iostream>
#include <string>
#include <vector>
#include "Brick.hpp"
#include "Common.h"
```

Include dependency graph for BricksGenerator.hpp:



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



Classes

- struct LevelData

  Struct to store brick arrangement data of one level.
- class BricksGenerator

  Helper class to load and generate each level bricks arrangement.

5.10.1 Detailed Description

Header file for BricksGenerator.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 22:47:39 -08:00

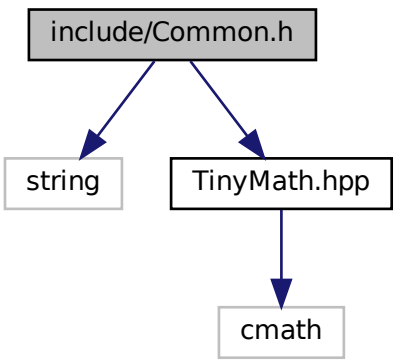
Copyright

5.11 include/Common.h File Reference

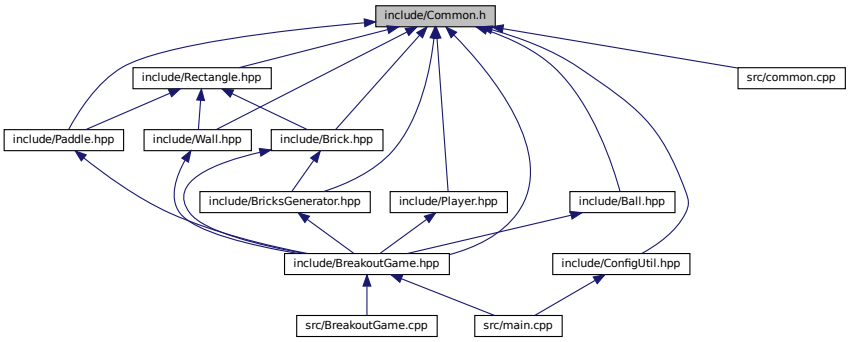
Header file to declare all global variables.

```
#include <string>
#include "TinyMath.hpp"
```

Include dependency graph for Common.h:



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



Classes

- struct Contact

  Collision info struct.

Enumerations

- enum Buttons { PaddleLeft = 0, PaddleRight }

  Indicate paddle moving state.
- enum GameState {
  Initializing, Running, PauseNormal, PauseWin,
  PauseClearGame, PauseLoseGame, PauseLoseLife }

  Game state Enum.
- enum CollisionType {
  CollisionType::None, CollisionType::Top, CollisionType::Middle, CollisionType::Bottom,
  CollisionType::Left, CollisionType::Right }

  Collision direction.

Variables

- int WINDOW_WIDTH
- int WINDOW_HEIGHT
- int GAME_SCENE_WIDTH
- int GAME_SCENE_LEFT
- int GAME_SCENE_RIGHT
- int WALL_WIDTH
- float PADDLE_SPEED
- int PADDLE_WIDTH
- int PADDLE_HEIGHT
- int PADDLE_DISTANCE_FROM_BOTTOM
- float BALL_START_DEGREE
- float BALL_SPEED
- int BALL_WIDTH
- int BALL_HEIGHT
- int BRICK_START_HEIGHT

- int BRICK_WIDTH
- int BRICK_HEIGHT
- int BRICK_INTERVAL
- int BRICK_ROW
- int BRICK_COLUMN
- int BRICK_DEFAULT_SCORE
- int PLAYER_DEFAULT_LIFE_NUM
- int DEFAULT_LEVEL

  Default begin level.
- int DEFAULT_FONT_SIZE
- int MENU_FONT_SIZE
- int SCREEN_FPS_60
- int SCREEN_TICKS_PER_FRAME_60

  Milliseconds between each frame update when fps is 60.
- int TICKS_PER_UPDATE

  Milliseconds between each update.

5.11.1 Detailed Description

Header file to declare all global variables.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 22:52:41 -08:00

Copyright

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5.11.2 Enumeration Type Documentation

5.11.2.1 Buttons

```
enum Buttons
```

Indicate paddle moving state.

Enumerator

PaddleLeft	Paddle is moving left.
PaddleRight	Paddle is moving right.

5.11.2.2 CollisionType

```
enum CollisionType  [strong]
```

Collision direction.

Enumerator

None	No collision happened.
Top	Ball is now moving towards top.
Middle	Ball hit the middle of the paddle.
Bottom	Ball is now moving towards bottom.
Left	Ball is now moving towards left.
Right	Ball is now moving towards right.

5.11.2.3 GameState

```
enum GameState
```

Game state Enum.

Enumerator

Initializing	Game is under initialization.
Running	Game is running.
PauseNormal	Game paused normally.
PauseWin	Game paused because player just finish one level.
PauseClearGame	Game paused because player finished all levels.
PauseLoseGame	Game paused because player lose all lives.
PauseLoseLife	Game paused because player lose one life.

5.11.3 Variable Documentation

5.11.3.1 BALL_HEIGHT

```
int BALL_HEIGHT
```

5.11.3.2 BALL_SPEED

```
float BALL_SPEED
```

5.11.3.3 BALL_START_DEGREE

```
float BALL_START_DEGREE
```

5.11.3.4 BALL_WIDTH

```
int BALL_WIDTH
```

5.11.3.5 BRICK_COLUMN

```
int BRICK_COLUMN
```

5.11.3.6 BRICK_DEFAULT_SCORE

```
int BRICK_DEFAULT_SCORE
```

5.11.3.7 BRICK_HEIGHT

```
int BRICK_HEIGHT
```

5.11.3.8 BRICK_INTERVAL

```
int BRICK_INTERVAL
```

5.11.3.9 BRICK_ROW

```
int BRICK_ROW
```

5.11.3.10 BRICK_START_HEIGHT

```
int BRICK_START_HEIGHT
```

5.11.3.11 BRICK_WIDTH

```
int BRICK_WIDTH
```

5.11.3.12 DEFAULT_FONT_SIZE

```
int DEFAULT_FONT_SIZE
```

5.11.3.13 DEFAULT_LEVEL

```
int DEFAULT_LEVEL
```

Default begin level.

5.11.3.14 GAME_SCENE_LEFT

```
int GAME_SCENE_LEFT
```

5.11.3.15 GAME_SCENE_RIGHT

```
int GAME_SCENE_RIGHT
```

5.11.3.16 GAME_SCENE_WIDTH

```
int GAME_SCENE_WIDTH
```

5.11.3.17 MENU_FONT_SIZE

```
int MENU_FONT_SIZE
```

5.11.3.18 PADDLE_DISTANCE_FROM_BOTTOM

```
int PADDLE_DISTANCE_FROM_BOTTOM
```

5.11.3.19 PADDLE_HEIGHT

```
int PADDLE_HEIGHT
```

5.11.3.20 PADDLE_SPEED

```
float PADDLE_SPEED
```

5.11.3.21 PADDLE_WIDTH

```
int PADDLE_WIDTH
```

5.11.3.22 PLAYER_DEFAULT_LIFE_NUM

```
int PLAYER_DEFAULT_LIFE_NUM
```

5.11.3.23 SCREEN_FPS_60

```
int SCREEN_FPS_60
```

5.11.3.24 SCREEN_TICKS_PER_FRAME_60

```
int SCREEN_TICKS_PER_FRAME_60
```

Milliseconds between each frame update when fps is 60.

5.11.3.25 TICKS_PER_UPDATE

```
int TICKS_PER_UPDATE
```

Milliseconds between each update.

5.11.3.26 WALL_WIDTH

```
int WALL_WIDTH
```

5.11.3.27 WINDOW_HEIGHT

```
int WINDOW_HEIGHT
```

5.11.3.28 WINDOW_WIDTH

```
int WINDOW_WIDTH
```

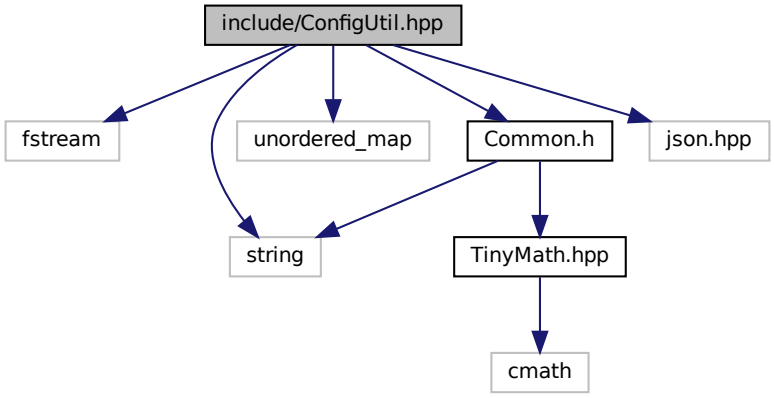
5.12 include/ConfigUtil.hpp File Reference

Helper class to load config from file.

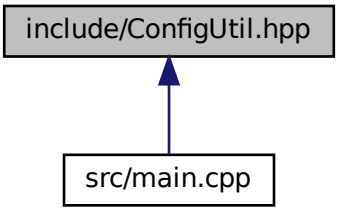
```
#include <fstream>
#include <string>
#include <unordered_map>
#include "Common.h"
```

```
#include "json.hpp"
```

Include dependency graph for ConfigUtil.hpp:



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



Classes

- class ConfigUtil

  Help class which use nlohmann::json library to process json format config file.

5.12.1 Detailed Description

Helper class to load config from file.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 23:05:14 -08:00

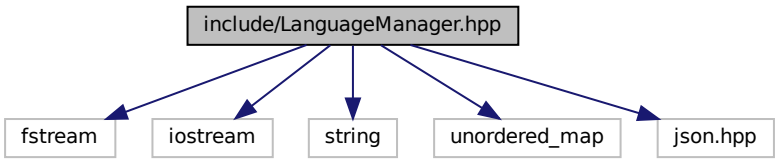
Copyright

5.13 include/LanguageManager.hpp File Reference

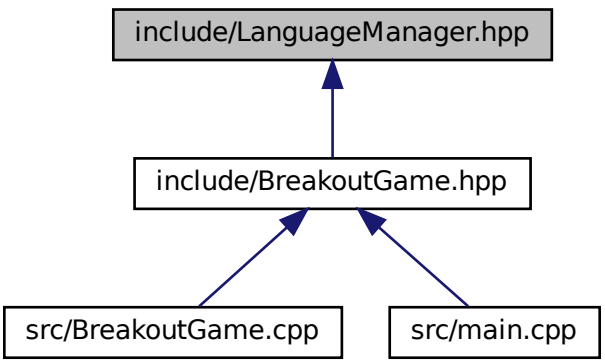
Helper class LanguageSelector.

```
#include <fstream>
#include <iostream>
#include <string>
#include <unordered_map>
#include "json.hpp"
```

Include dependency graph for LanguageManager.hpp:



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



Classes

- struct Language

  Struct to store all key-value pair of game texts.
- class LanguageSelector

  Help class to read, load and manage multi language text data.

5.13.1 Detailed Description

Helper class LanguageSelector.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 23:15:42 -08:00

Copyright

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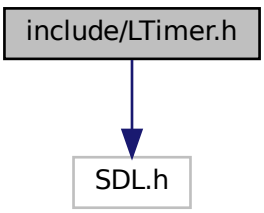
5.14 include/LTimer.h File Reference

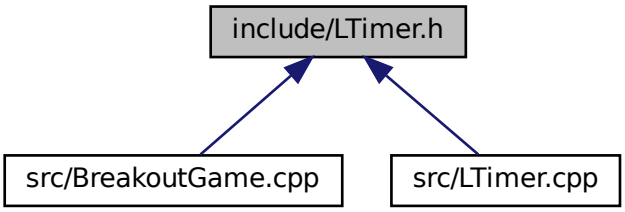
Simple Timer Class.

```
#include <SDL.h>
```

Include dependency graph for LTimer.h:



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



Classes

- class LTimer

  The application time based timer.

5.14.1 Detailed Description

Simple Timer Class.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 23:22:12 -08:00

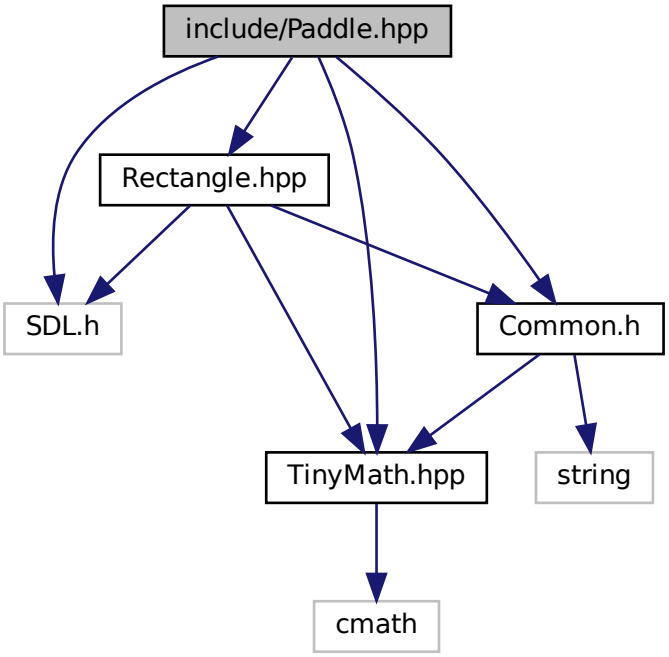
Copyright

5.15 include/Paddle.hpp File Reference

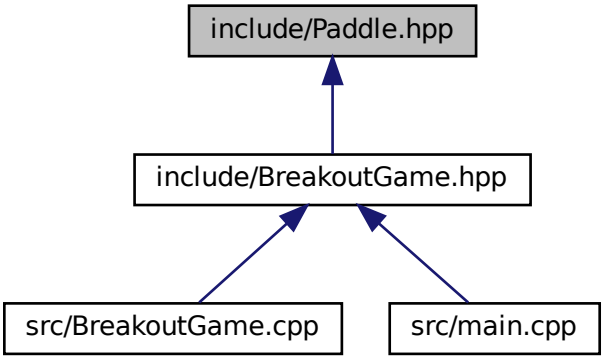
Paddle object Class.

```
#include <SDL.h>
#include "Common.h"
#include "Rectangle.hpp"
#include "TinyMath.hpp"
```

Include dependency graph for Paddle.hpp:



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



Classes

- class Paddle

  Paddle object class.

5.15.1 Detailed Description

Paddle object Class.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-23 00:01:56 -08:00

Copyright

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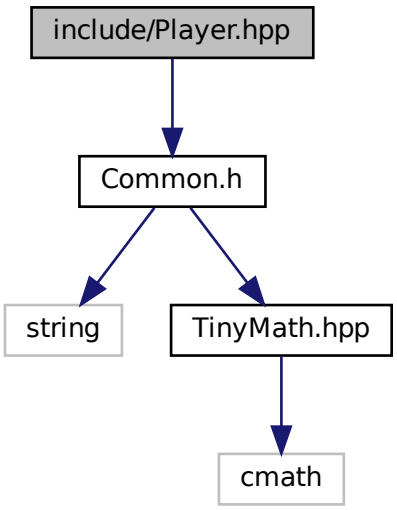
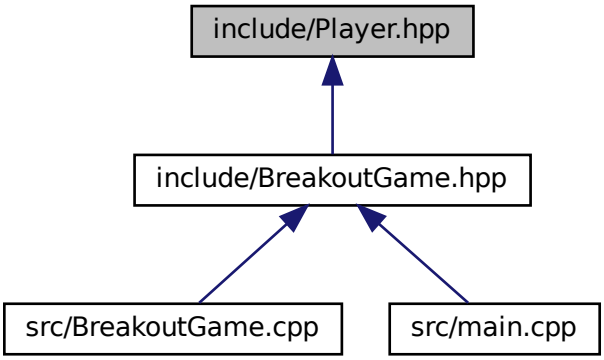
5.16 include/Player.hpp File Reference

```
#include "Common.h"
```

Include dependency graph for Player.hpp:



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



Classes

- class Player

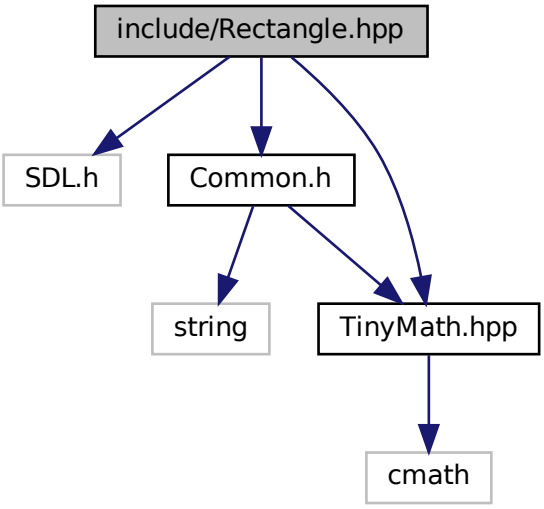
  Player class, store info of the player.

5.17 include/Rectangle.hpp File Reference

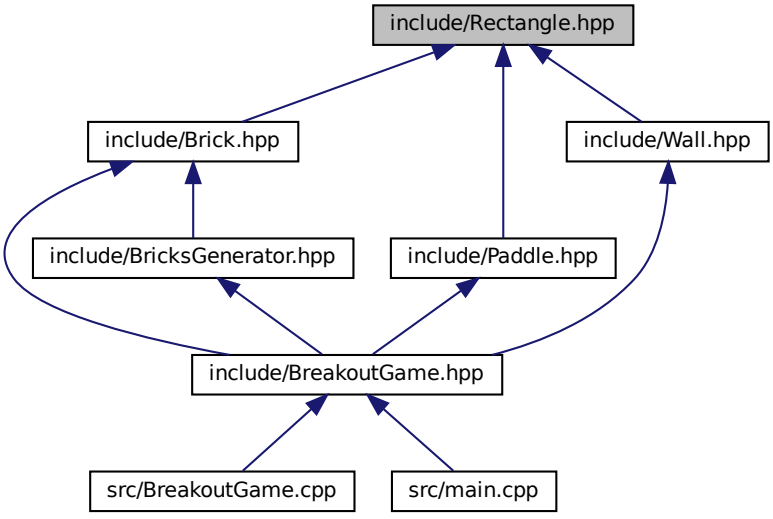
A rectangle class.

```
#include <SDL.h>
#include "Common.h"
#include "TinyMath.hpp"
```

Include dependency graph for Rectangle.hpp:



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



Classes

- class Rectangle

  A simple rectange class to represnet a rectangle on screen.

5.17.1 Detailed Description

A rectangle class.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-23 00:07:43 -08:00

Copyright

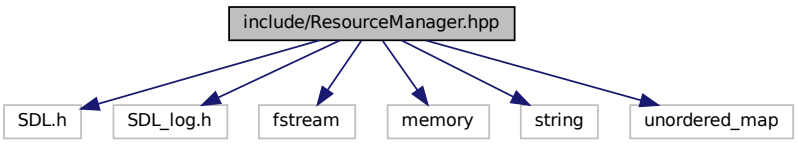
Copyright (c) 2021

5.18 include/ResourceManager.hpp File Reference

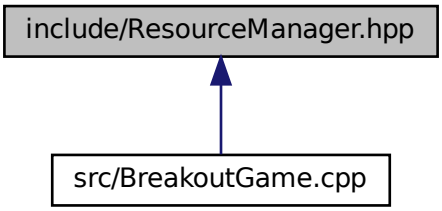
ResourceManager class header.

```
#include <SDL.h>
#include <SDL_log.h>
#include <fstream>
#include <memory>
#include <string>
#include <unordered_map>
```

Include dependency graph for ResourceManager.hpp:



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



Classes

- class ResourceManager

  Singleton ResourceManager manage resources which loaded from files.

Typedefs

- typedef std::string ResName
- typedef std::string ResFilePath

5.18.1 Detailed Description

ResourceManager class header.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 23:35:03 -08:00

Copyright

5.18.2 Typedef Documentation

5.18.2.1 ResFilePath

```
typedef std::string ResFilePath
```

5.18.2.2 ResName

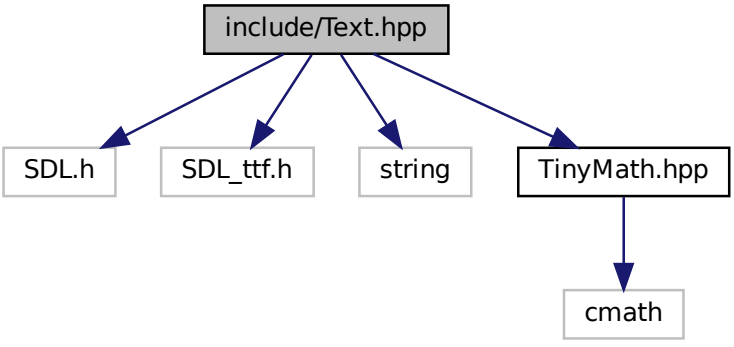
```
typedef std::string ResName
```

5.19 include/Text.hpp File Reference

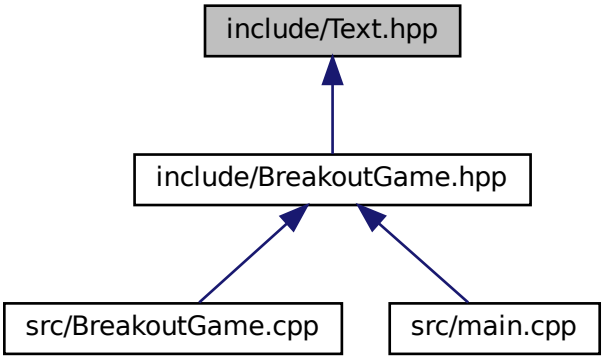
Text object class.

```
#include <SDL.h>
#include <SDL_ttf.h>
#include <string>
#include "TinyMath.hpp"
```

Include dependency graph for Text.hpp:



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



Classes

- class Text

  A text wrapper class.

5.19.1 Detailed Description

Text object class.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 23:53:09 -08:00

Copyright

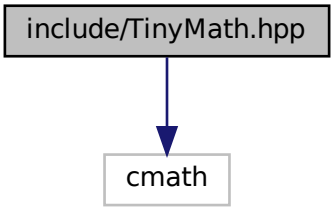
Copyright (c) 2021

5.20 include/TinyMath.hpp File Reference

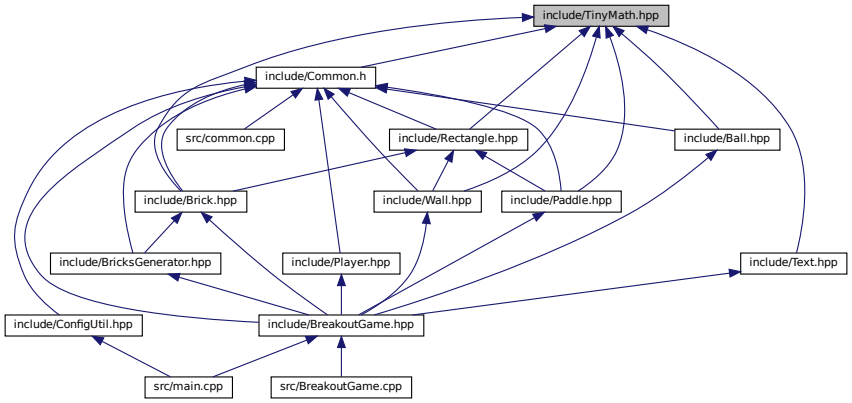
A tiny math library.

```
#include <cmath>
```

Include dependency graph for TinyMath.hpp:



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



Classes

- struct Vector3D
- struct Vector2D
- struct Matrix3D

  Matrix 3D represents 3x3 matrices in Math.

Enumerations

- enum Direction { UP, RIGHT, DOWN, LEFT }

  Vector main direction.

Functions

- float Dot (const Vector3D &a, const Vector3D &b)
  Compute the dot product of a Vector3D.
- Vector3D operator∗ (const Vector3D &v, float s)
  Multiplication of a vector by a scalar values.
- Vector3D operator/ (const Vector3D &v, float s)
  Division of a vector by a scalar value.
- Vector3D operator- (const Vector3D &v)
- float Magnitude (const Vector3D &v)
  Return the magnitude of a vector.
- Vector3D operator+ (const Vector3D &a, const Vector3D &b)
  Add two vectors together.
- Vector3D operator- (const Vector3D &a, const Vector3D &b)
  Subtract two vectors.
- Vector3D Project (const Vector3D &a, const Vector3D &b)
  Vector Projection.
- Vector3D Normalize (const Vector3D &v)
- Vector3D CrossProduct (const Vector3D &a, const Vector3D &b)
- Direction VectorDirectionSDL (Vector2D target)
  Get one 2D vector's main direction.
- Vector2D getUnitVectorFromDegree (float degree)
  Get the Unit Vector From given Degree number.
- Matrix3D operator∗ (const Matrix3D &A, const Matrix3D &B)
  Matrix Multiplication.
- Vector3D operator∗ (const Matrix3D &M, const Vector3D &v)
  Matrix multiply by a vector.

5.20.1 Detailed Description

A tiny math library.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 23:52:51 -08:00

Copyright

5.20.2 Enumeration Type Documentation

5.20.2.1 Direction

```
enum Direction
```

Vector main direction.

Enumerator

UP	
RIGHT	
DOWN	
LEFT	

5.20.3 Function Documentation

5.20.3.1 CrossProduct()

```
Vector3D CrossProduct (
            const Vector3D & a,
            const Vector3D & b )  [inline]
```

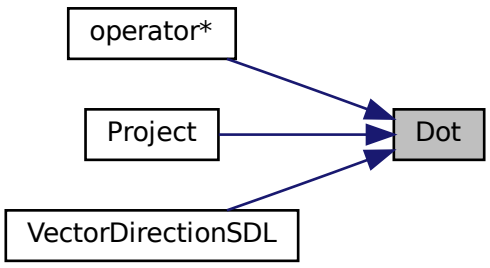
a x b (read: 'a crossed b') Produces a new vector perpendicular to a and b. (So long as a and b are not parallel which returns zero vector)

5.20.3.2 Dot()

```
float Dot (
            const Vector3D & a,
            const Vector3D & b )  [inline]
```

Compute the dot product of a Vector3D.

Here is the caller graph for this function:



5.20.3.3 getUnitVectorFromDegree()

```
Vector2D getUnitVectorFromDegree (
            float degree )  [inline]
```

Get the Unit Vector From given Degree number.

The direction of degree is same to the polar coordinate system

Parameters

degree	Given degree number

Returns

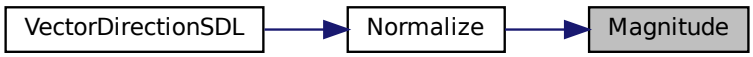
Vector2D The result Unit Vector

5.20.3.4 Magnitude()

```
float Magnitude (
            const Vector3D & v )  [inline]
```

Return the magnitude of a vector.

Here is the caller graph for this function:

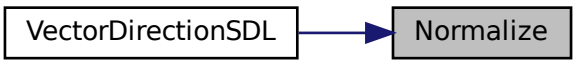


5.20.3.5 Normalize()

```
Vector3D Normalize (
            const Vector3D & v )  [inline]
```

Set a vectors magnitude to 1 Note: This is NOT generating a normal vector Here is the call graph for this function:

Here is the caller graph for this function:

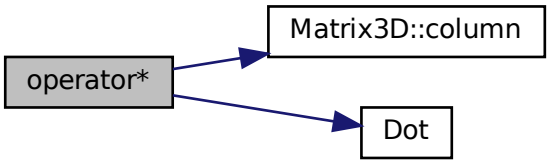


5.20.3.6 operator*() [1/3]

```
Matrix3D operator* (
            const Matrix3D & A,
            const Matrix3D & B )  [inline]
```

Matrix Multiplication.

Here is the call graph for this function:

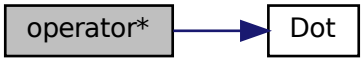


5.20.3.7 operator*() [2/3]

```
Vector3D operator* (
            const Matrix3D & M,
            const Vector3D & v )  [inline]
```

Matrix multiply by a vector.

Here is the call graph for this function:



5.20.3.8 operator*() [3/3]

```
Vector3D operator* (
            const Vector3D & v,
            float s )  [inline]
```

Multiplication of a vector by a scalar values.

5.20.3.9 operator+()

```
Vector3D operator+ (
            const Vector3D & a,
            const Vector3D & b )  [inline]
```

Add two vectors together.

5.20.3.10 operator-() [1/2]

```
Vector3D operator- (
            const Vector3D & a,
            const Vector3D & b )  [inline]
```

Subtract two vectors.

5.20.3.11 operator-() [2/2]

```
Vector3D operator- (
            const Vector3D & v )  [inline]
```

Negation of a vector Use Case: Sometimes it is handy to apply a force in an opposite direction

5.20.3.12 operator/()

```
Vector3D operator/ (
            const Vector3D & v,
            float s )  [inline]
```

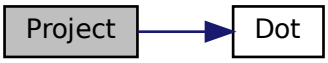
Division of a vector by a scalar value.

5.20.3.13 Project()

```
Vector3D Project (
            const Vector3D & a,
            const Vector3D & b )  [inline]
```

Vector Projection.

Here is the call graph for this function:



5.20.3.14 VectorDirectionSDL()

```
Direction VectorDirectionSDL (
            Vector2D target )  [inline]
```

Get one 2D vector's main direction.

Main direction is the nearest direction close to the given direction, which is the direction which has smallest included angle with the given vector among the 4 axis direction,

Parameters

target	Given 2D vector

Returns

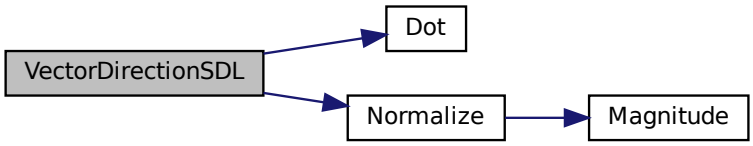
Direction Given 2D vector's main direction

up

right

down

leftHere is the call graph for this function:

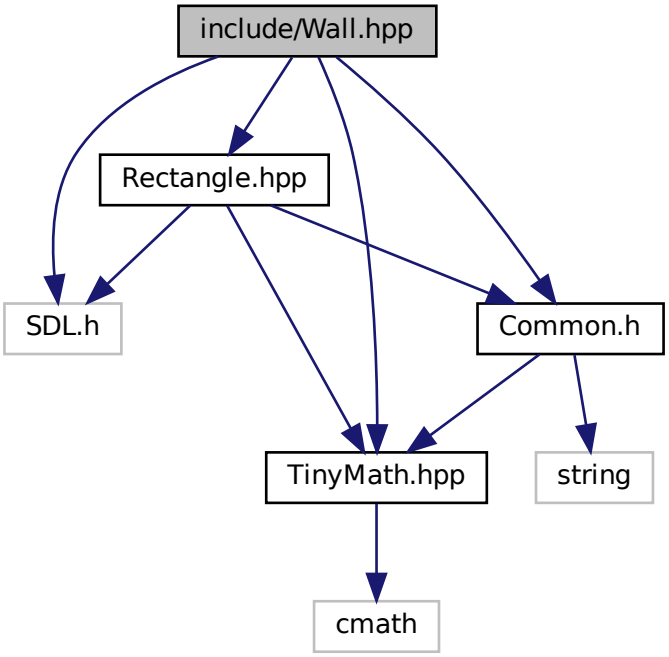


5.21 include/Wall.hpp File Reference

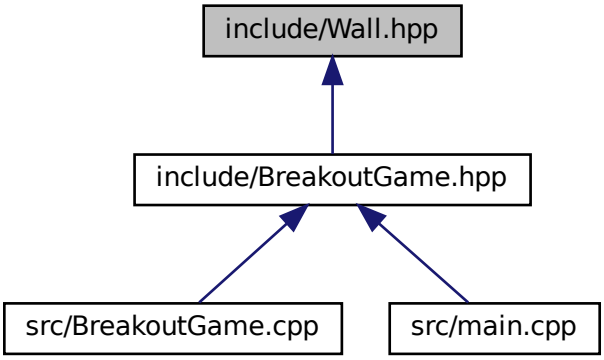
Wall object class header.

```
#include <SDL.h>
#include "Common.h"
#include "Rectangle.hpp"
#include "TinyMath.hpp"
```

Include dependency graph for Wall.hpp:



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



Classes

- class Wall

  Wall object Class.

5.21.1 Detailed Description

Wall object class header.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 23:26:56 -08:00

Copyright

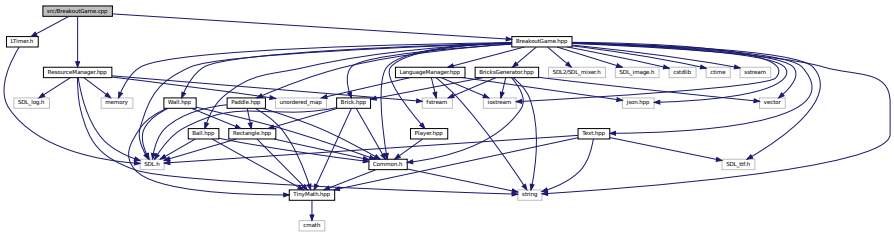
Copyright (c) 2021

5.22 src/BreakoutGame.cpp File Reference

BreakoutGame Class Implementation.

```
#include "BreakoutGame.hpp"
#include "LTimer.h"
#include "ResourceManager.hpp"
```

Include dependency graph for BreakoutGame.cpp:



5.22.1 Detailed Description

BreakoutGame Class Implementation.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 22:43:39 -08:00

Copyright

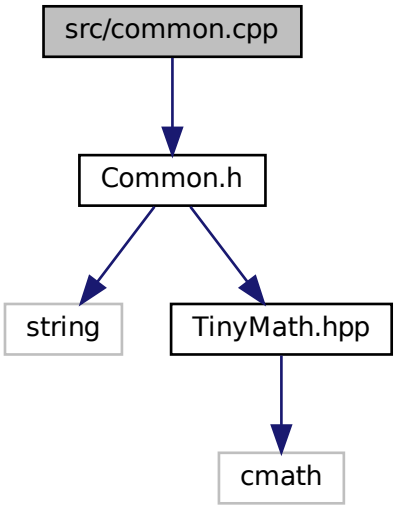
Copyright (c) 2021

5.23 src/common.cpp File Reference

Definition of all global variables.

```
#include "Common.h"
```

Include dependency graph for common.cpp:



Variables

- int WINDOW_WIDTH
- int WINDOW_HEIGHT
- int GAME_SCENE_WIDTH
- int GAME_SCENE_LEFT
- int GAME_SCENE_RIGHT
- int WALL_WIDTH
- float PADDLE_SPEED
- int PADDLE_WIDTH
- int PADDLE_HEIGHT
- int PADDLE_DISTANCE_FROM_BOTTOM
- float BALL_START_DEGREE
- float BALL_SPEED
- int BALL_WIDTH
- int BALL_HEIGHT
- int BRICK_START_HEIGHT
- int BRICK_WIDTH
- int BRICK_HEIGHT
- int BRICK_INTERVAL
- int BRICK_ROW
- int BRICK_COLUMN
- int BRICK_DEFAULT_SCORE
- int PLAYER_DEFAULT_LIFE_NUM
- int DEFAULT_LEVEL

  Default begin level.
- int DEFAULT_FONT_SIZE
- int MENU_FONT_SIZE

- int SCREEN_FPS_60
- int SCREEN_TICKS_PER_FRAME_60

  Milliseconds between each frame update when fps is 60.
- int TICKS_PER_UPDATE

  Milliseconds between each update.

5.23.1 Detailed Description

Definition of all global variables.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 23:03:50 -08:00

Copyright

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5.23.2 Variable Documentation

5.23.2.1 BALL_HEIGHT

```
int BALL_HEIGHT
```

5.23.2.2 BALL_SPEED

```
float BALL_SPEED
```

5.23.2.3 BALL_START_DEGREE

```
float BALL_START_DEGREE
```

5.23.2.4 BALL_WIDTH

```
int BALL_WIDTH
```

5.23.2.5 BRICK_COLUMN

```
int BRICK_COLUMN
```

5.23.2.6 BRICK_DEFAULT_SCORE

```
int BRICK_DEFAULT_SCORE
```

5.23.2.7 BRICK_HEIGHT

```
int BRICK_HEIGHT
```

5.23.2.8 BRICK_INTERVAL

```
int BRICK_INTERVAL
```

5.23.2.9 BRICK_ROW

```
int BRICK_ROW
```

5.23.2.10 BRICK_START_HEIGHT

```
int BRICK_START_HEIGHT
```

5.23.2.11 BRICK_WIDTH

```
int BRICK_WIDTH
```

5.23.2.12 DEFAULT_FONT_SIZE

```
int DEFAULT_FONT_SIZE
```

5.23.2.13 DEFAULT_LEVEL

```
int DEFAULT_LEVEL
```

Default begin level.

5.23.2.14 GAME_SCENE_LEFT

```
int GAME_SCENE_LEFT
```

5.23.2.15 GAME_SCENE_RIGHT

```
int GAME_SCENE_RIGHT
```

5.23.2.16 GAME_SCENE_WIDTH

```
int GAME_SCENE_WIDTH
```

5.23.2.17 MENU_FONT_SIZE

```
int MENU_FONT_SIZE
```

5.23.2.18 PADDLE_DISTANCE_FROM_BOTTOM

```
int PADDLE_DISTANCE_FROM_BOTTOM
```

5.23.2.19 PADDLE_HEIGHT

```
int PADDLE_HEIGHT
```

5.23.2.20 PADDLE_SPEED

```
float PADDLE_SPEED
```

5.23.2.21 PADDLE_WIDTH

```
int PADDLE_WIDTH
```

5.23.2.22 PLAYER_DEFAULT_LIFE_NUM

```
int PLAYER_DEFAULT_LIFE_NUM
```

5.23.2.23 SCREEN_FPS_60

```
int SCREEN_FPS_60
```

5.23.2.24 SCREEN_TICKS_PER_FRAME_60

```
int SCREEN_TICKS_PER_FRAME_60
```

Milliseconds between each frame update when fps is 60.

5.23.2.25 TICKS_PER_UPDATE

```
int TICKS_PER_UPDATE
```

Milliseconds between each update.

5.23.2.26 WALL_WIDTH

```
int WALL_WIDTH
```

5.23.2.27 WINDOW_HEIGHT

```
int WINDOW_HEIGHT
```

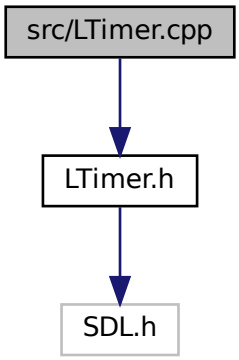
5.23.2.28 WINDOW_WIDTH

```
int WINDOW_WIDTH
```

5.24 src/LTimer.cpp File Reference

LTimer Class implementation.

```
#include "LTimer.h"
```
Include dependency graph for LTimer.cpp:



Functions

- bool isStarted ()

5.24.1 Detailed Description

LTimer Class implementation.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 23:24:41 -08:00

Copyright

5.24.2 Function Documentation

5.24.2.1 isStarted()

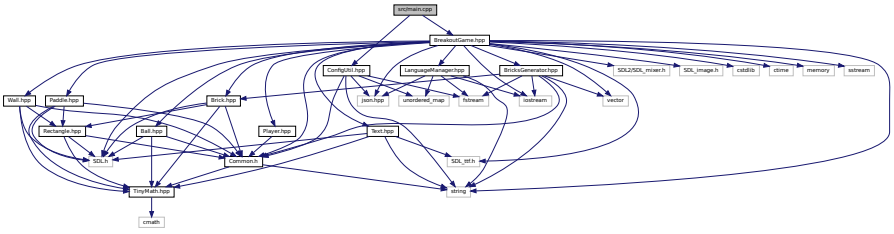
```
bool isStarted ( )
```

5.25 src/main.cpp File Reference

Enter point of the game.

```
#include "BreakoutGame.hpp"
#include "ConfigUtil.hpp"
```

Include dependency graph for main.cpp:



Functions

- int main (int argc, char **argv)
  Main function of the game.

5.25.1 Detailed Description

Enter point of the game.

Author

Yuxiang Cao (cao.yux@northeastern.edu)

Version

1.0.0

Date

2021-02-22 23:25:35 -08:00

Copyright

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5.25.2 Function Documentation

5.25.2.1 main()

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

Main function of the game.

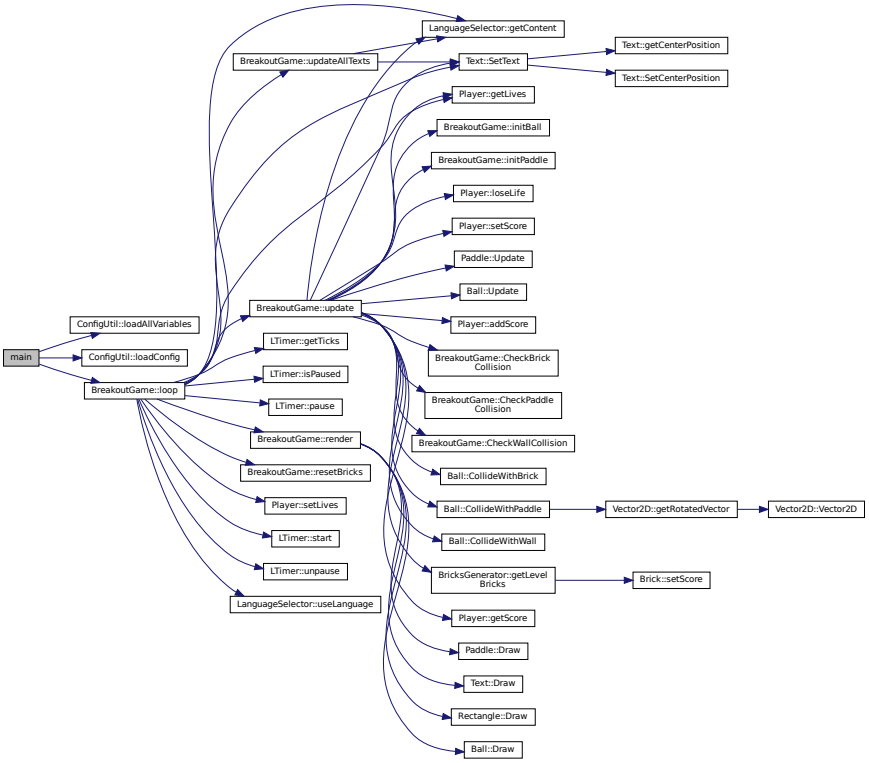
Parameters

argc	Number of argument
argv	Argument string array

Returns

int Program exit state

Here is the call graph for this function:



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