Overly Complicated Audio Engine

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1.1 Class Hierarchy

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Chapter 4

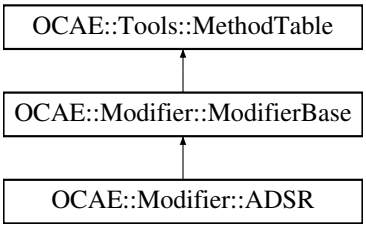
Class Documentation

4.1 OCAE::Modifier::ADSR Class Reference

Attack - Decay - Sustain - Release filter.

`#include <ADSR.hpp>`

Inheritance diagram for OCAE::Modifier::ADSR:



Public Member Functions

- ADSR (ADSR const &other)=delete
  Copy constructor. Deleted.
- ADSR (ADSR &&other) noexcept=default
  Default move constructor.
- virtual ~ADSR ()=default
  Default destructor.
- ADSR & operator= (ADSR const &rhs)=delete
  Copy assignment operator. Deleted.
- ADSR & operator= (ADSR &&rhs) noexcept=default
  Default move assignment operator.
- void Release (void)
  Will set the phase to the release phase, regardless of what the current phase is.
- virtual StereoData FilterSample (StereoData const &input)
  Takes input sample and filters it, returning the result.
- virtual bool IsBase ()
  Returns boolean for if the object calling this function is a ModifierBase or not.

Protected Member Functions

- ADSR (uint64_t attack, uint64_t decay, Math_t sustain, uint64_t release)

  Constructor.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()

  Creates a vector containing the names of functions, and the callable functions themselves.

Private Types

- enum State : int8_t {
  attack, **decay**, **sustain**, **release**,
  invalid = -1 }

  Enum for tracking the current state of the ADSR envelope.

Private Attributes

- Math_t m_Attack

  The rate of change in gain during the attack phase.
- Math_t m_Decay

  The rate of change in gain during the decay phase.
- Math_t m_Sustain

  The gain level during the sustain phase.
- Math_t m_Release

  The rate of change in gain during the release phase.
- State m_State

  The current phase of the envelope.
- Math_t m_Gain

  The current gain value updated during filtering.

Friends

- class ModifierFactory

  Add the factory as a friend so it can construct ADSR objects.

Additional Inherited Members

4.1.1 Detailed Description

Attack - Decay - Sustain - Release filter.

The most basic filter to create an envolpe over a given signal. The filter uses only linear slopes for the attack, decay, and release phases. The filter will only continue to the release phase when the ADSR::Release method is called.

4.1.2 Member Enumeration Documentation

4.1.2.1 State

```
enum OCAE::Modifier::ADSR::State :  int8_t  [strong], [private]
```

Enum for tracking the current state of the ADSR envelope.

```
00048                           : int8_t
00049         {
00050             attack,
00051             decay,
00052             sustain,
00053             release,
00054             invalid = -1,
00055         };
```

4.1.3 Constructor & Destructor Documentation

4.1.3.1 ADSR() [1/3]

```
OCAE::Modifier::ADSR::ADSR (
             ADSR const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

4.1.3.2 ADSR() [2/3]

```
OCAE::Modifier::ADSR::ADSR (
             ADSR && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.1.3.3 ADSR() [3/3]

```
OCAE::Modifier::ADSR::ADSR (
            uint64_t attack,
            uint64_t decay,
            Math_t sustain,
            uint64_t release )  [protected]
```

Constructor.

Parameters

attack	Time to increase gain from 0 to 1 in samples.
decay	Time to decrease gain from 0 to sustain in samples.
sustain	The gain level of the sustain phase.
release	Time to decrease from sustain to 0 in samples.

4.1.4 Member Function Documentation

4.1.4.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Modifier::ADSR::CreateMethodList ( )  [protected],
[virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Modifier::ModifierBase.

4.1.4.2 FilterSample()

```
virtual StereoData OCAE::Modifier::ADSR::FilterSample (
            StereoData const & input )  [virtual]
```

Takes input sample and filters it, returning the result.

Parameters

input	The input sample.

Returns

The filtered sample.

Reimplemented from OCAE::Modifier::ModifierBase.

4.1.4.3 IsBase()

```
virtual bool OCAE::Modifier::ADSR::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object calling this function is a ModifierBase or not.

Returns

False.

Reimplemented from OCAE::Modifier::ModifierBase.

```
00153 { return false; };
```

4.1.4.4 operator=() [1/2]

```
ADSR& OCAE::Modifier::ADSR::operator= (
            ADSR const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.1.4.5 operator=() [2/2]

```
ADSR& OCAE::Modifier::ADSR::operator= (
            ADSR && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

4.1.4.6 Release()

```
void OCAE::Modifier::ADSR::Release (
            void  )
```

Will set the phase to the release phase, regardless of what the current phase is.

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

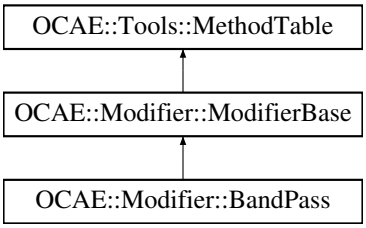
- ADSR.hpp

4.2 OCAE::Modifier::BandPass Class Reference

Bandpass filter.

```
#include <BandPass.hpp>
```

Inheritance diagram for OCAE::Modifier::BandPass:



Public Member Functions

- BandPass (BandPass const &other)=delete

  Copy constructor. Deleted.
- BandPass (BandPass &&other) noexcept=default

  Default move constructor.
- virtual ~BandPass ()

  Default destructor.
- BandPass & operator= (BandPass const &rhs)=delete

  Copy assignment operator. Deleted.
- BandPass & operator= (BandPass &&rhs) noexcept=default

  Default move assignment operator.
- Math_t GetFrequency () const

  Returns the central frequency of the filter.
- void SetFrequency (Math_t f)

  Sets the central frequency of the filter.
- Math_t GetQuality () const

  Returns the quality of the filter.
- void SetQuality (Math_t Q)

  Sets the quality of the filter.
- virtual StereoData FilterSample (StereoData const &input)

  Takes input sample and filters it, returning the result.
- virtual bool IsBase ()

  Returns boolean for if the object calling this function is a ModifierBase or not.

Protected Member Functions

- BandPass (Math_t f, Math_t Q=1)

  Constructor.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()

  Creates a vector containing the names of functions, and the callable functions themselves.
- void Reset (void)

  Resets the filters values in response to a change in the object's parameters.

Private Attributes

- Math_t m_CentralFrequency

  The central frequency.
- Math_t m_Quality

  The quality.
- Math_t m_A0

  The xn and xn-2 coefficient.
- Math_t m_B1

  The yn-1 coefficient.
- Math_t m_B2

  The yn-2 coefficient.

- StereoData m_X1

  The xn-1 sample.
- StereoData m_X2

  The xn-2 sample.
- StereoData m_Y1

  The yn-1 sample.
- StereoData m_Y2

  The yn-2 sample.

Friends

- class ModifierFactory

  Add the factory as a friend so it can construct BandPass objects.
- class Equalizer

  Add the Equalizer filter as a friend so it can construct BandPass objects.

Additional Inherited Members

4.2.1 Detailed Description

Bandpass filter.

4.2.2 Constructor & Destructor Documentation

4.2.2.1 BandPass() [1/3]

```
OCAE::Modifier::BandPass::BandPass (
            BandPass const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

4.2.2.2 BandPass() [2/3]

```
OCAE::Modifier::BandPass::BandPass (
```

```
            BandPass && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.2.2.3 BandPass() [3/3]

```
OCAE::Modifier::BandPass::BandPass (
            Math_t f,
            Math_t Q = 1 )  [protected]
```

Constructor.

Parameters

f	The central frequency.
Q	The filter quality.

4.2.3 Member Function Documentation

4.2.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Modifier::BandPass::CreateMethodList ( )  [protected],
[virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Modifier::ModifierBase.

4.2.3.2 FilterSample()

```
virtual StereoData OCAE::Modifier::BandPass::FilterSample (
            StereoData const & input )  [virtual]
```

Takes input sample and filters it, returning the result.

Parameters

input	The input sample.

Returns

The filtered sample.

Reimplemented from OCAE::Modifier::ModifierBase.

4.2.3.3 GetFrequency()

```
Math_t OCAE::Modifier::BandPass::GetFrequency ( ) const
```

Returns the central frequency of the filter.

Returns

The central frequency.

4.2.3.4 GetQuality()

```
Math_t OCAE::Modifier::BandPass::GetQuality ( ) const
```

Returns the quality of the filter.

Returns

The quality.

4.2.3.5 IsBase()

```
virtual bool OCAE::Modifier::BandPass::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object calling this function is a ModifierBase or not.

Returns

False.

Reimplemented from OCAE::Modifier::ModifierBase.

```
00179 { return false; };
```

4.2.3.6 operator=() [1/2]

```
BandPass& OCAE::Modifier::BandPass::operator= (
            BandPass const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.2.3.7 operator=() [2/2]

```
BandPass& OCAE::Modifier::BandPass::operator= (
            BandPass && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

4.2.3.8 Reset()

```
void OCAE::Modifier::BandPass::Reset (
            void  )  [protected]
```

Resets the filters values in response to a change in the object's parameters.

4.2.3.9 SetFrequency()

```
void OCAE::Modifier::BandPass::SetFrequency (
            Math_t f )
```

Sets the central frequency of the filter.

Parameters

f	The new central frequency.

4.2.3.10 SetQuality()

```
void OCAE::Modifier::BandPass::SetQuality (
            Math_t Q )
```

Sets the quality of the filter.

Parameters

Q	The new quality.

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

- BandPass.hpp

4.3 OCAE::Sound::Block Class Reference

This class defines a way of holding a Generator, Modifier and a method of combining the outputs of both of them to produce a single output sample.

```
#include <Block.hpp>
```

Public Types

- using Interaction_f = std::function< StereoData(StereoData, StereoData)>

  Alias for a function that returns a sample, and takes in a generator sample as the first parameter and a modifier sample as the second parameter.
- using GenBasePtr = Generator::GeneratorBasePtr

  Alias for GeneratorBasePtr.
- using ModBasePtr = Modifier::ModifierBasePtr

  Alias for ModifierBasePtr.

Public Member Functions

- Block (GenBasePtr const &gen, ModBasePtr const &mod, Interaction_f const &interactor)

  Block constructor.
- GenBasePtr & GetGenerator ()

  Returns a reference to the managed generator.
- ModBasePtr & GetModifier ()

  Returns a reference to the managed modifier.
- GenBasePtr const & GetGenerator () const

  Returns a reference to the managed generator.
- ModBasePtr const & GetModifier () const

  Returns a reference to the managed modifier.
- void PrimeInput (StereoData input)

  Primes the input for the next Process loop.
- StereoData LastOutput ()

  Returns the output of the last Process loop.
- void Process ()

  Processes the managed objects.

Private Attributes

- GenBasePtr m_Generator

  The generator managed by this Block.
- ModBasePtr m_Modifier

  The modifier managed by this Block.
- Interaction_f m_Interaction

  The interactor used by this Block.
- StereoData m_Input

  The input sample.
- StereoData m_Output

  The output sample.

4.3.1 Detailed Description

This class defines a way of holding a Generator, Modifier and a method of combining the outputs of both of them to produce a single output sample.

4.3.2 Constructor & Destructor Documentation

4.3.2.1 Block()

```
OCAE::Sound::Block::Block (
            GenBasePtr const & gen,
            ModBasePtr const & mod,
            Interaction_f const & interactor )
```

Block constructor.

Parameters

gen	The generator used for the block.
mod	The modifier used for the block.
interactor	The function that defines how the output of the generator and the modifier are combined. The first argument is the sample from the generator, and the second argument is the sample from the modifier.

4.3.3 Member Function Documentation

4.3.3.1 GetGenerator() [1/2]

```
GenBasePtr& OCAE::Sound::Block::GetGenerator ( )
```

Returns a reference to the managed generator.

Returns

The managed generator.

4.3.3.2 GetGenerator() [2/2]

```
GenBasePtr const& OCAE::Sound::Block::GetGenerator ( ) const
```

Returns a reference to the managed generator.

Returns

The managed generator.

4.3.3.3 GetModifier() [1/2]

```
ModBasePtr& OCAE::Sound::Block::GetModifier ( )
```

Returns a reference to the managed modifier.

Returns

The managed modifier.

4.3.3.4 GetModifier() [2/2]

```
ModBasePtr const& OCAE::Sound::Block::GetModifier ( ) const
```

Returns a reference to the managed modifier.

Returns

The managed modifier.

4.3.3.5 LastOutput()

```
StereoData OCAE::Sound::Block::LastOutput ( )
```

Returns the output of the last Process loop.

Returns

The most recent output.

4.3.3.6 PrimeInput()

```
void OCAE::Sound::Block::PrimeInput (
            StereoData input )
```

Primes the input for the next Process loop.

Parameters

input	The input.

4.3.3.7 Process()

```
void OCAE::Sound::Block::Process ( )
```

Processes the managed objects.

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

- Block.hpp

4.4 OCAE::Sound::Combinator Class Reference

This class allows for a modifyable way of combining a list of samples.

`#include <Combinator.hpp>`

Public Types

- enum Combinations { **Addition**, **Multiplication** }

  Enum defining the types of combinations that are possible.

Public Member Functions

- Combinator (Combinations c=Addition)

  Constructor.
- template<typename Iterator >
  StereoData Process (Iterator first, Iterator last)

  Processes the objects sequentially and either adds them or multiplies them depending on how the object was constructed.

Private Attributes

- Combinations m_Combination

  The combination method used for this Combinator.

4.4.1 Detailed Description

This class allows for a modifyable way of combining a list of samples.

4.4.2 Member Enumeration Documentation

4.4.2.1 Combinations

`enum OCAE::Sound::Combinator::Combinations`

Enum defining the types of combinations that are possible.

```
00042         {
00043             Addition,
00044             Multiplication,
00045         };
```

4.4.3 Constructor & Destructor Documentation

4.4.3.1 Combinator()

```
OCAE::Sound::Combinator::Combinator (
            Combinations c = Addition )
```

Constructor.

Parameters

c	The combination type for the object to use.

4.4.4 Member Function Documentation

4.4.4.1 Process()

```
template<typename Iterator >
StereoData OCAE::Sound::Combinator::Process (
            Iterator first,
            Iterator last )  [inline]
```

Processes the objects sequentially and either adds them or multiplies them depending on how the object was constructed.

Template Parameters

Iterator	The iterator type to process.

Parameters

first	The beginning of the list.
last	The end of the list.

Returns

The result of the Processing.

References OCAE::Left(), OCAE::Right(), and TYPEDEF_SHARED.

```
00092         {
00093             StereoData output;
00094
00095             switch(m_Combination)
00096             {
00097                 case Addition:
00098                     while(first != last)
00099                     {
00100                         Left(output) += Left(*first);
00101                         Right(output) += Right(*first);
00102
00103                         ++first;
00104                     }
00105                     break;
00106                 case Multiplication:
00107                     while(first != last)
00108                     {
00109                         Left(output) *= Left(*first);
```

```
00110                           Right(output) *= Right(*first);
00111
00112                           ++first;
00113                       }
00114                       break;
00115                   default:
00116                       break;
00117               };
00118
00119               return output;
00120           }
```

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

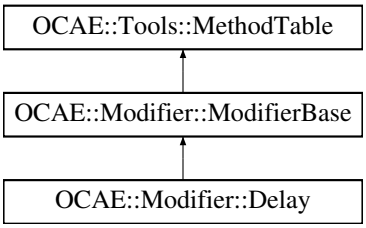
- Combinator.hpp

4.5 OCAE::Modifier::Delay Class Reference

Delay filter.

`#include <Delay.hpp>`

Inheritance diagram for OCAE::Modifier::Delay:



Public Member Functions

- Delay (Delay const &other)=delete

  Copy constructor. Deleted.
- Delay (Delay &&other) noexcept=default

  Default move constructor.
- Delay & operator= (Delay const &rhs)=delete

  Copy assignment operator. Deleted.
- Delay & operator= (Delay &&rhs) noexcept=default

  Default move assignment operator.
- void SetDelay (uint64_t samples)

  Sets a new delay length.
- uint64_t GetDelay () const

  Gets the current delay length.
- virtual StereoData FilterSample (StereoData const &input)

  Takes input sample and filters it, returning the result.
- virtual bool IsBase ()

  Returns boolean for if the object calling this function is a ModifierBase or not.

Protected Member Functions

- Delay (uint64_t samples)

  Constructor.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()

  Creates a vector containing the names of functions, and the callable functions themselves.

Private Attributes

- std::deque< StereoData > m_Delay

  Delayed sample storage.

Friends

- class ModifierFactory

  Add the factory as a friend so it can construct Delay objects.

Additional Inherited Members

4.5.1 Detailed Description

Delay filter.

The delay value is a whole number for simple whole sample calculations.

4.5.2 Constructor & Destructor Documentation

4.5.2.1 Delay() [1/3]

```
OCAE::Modifier::Delay::Delay (
            Delay const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

4.5.2.2 Delay() [2/3]

```
OCAE::Modifier::Delay::Delay (
            Delay && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.5.2.3 Delay() [3/3]

```
OCAE::Modifier::Delay::Delay (
            uint64_t samples )  [protected]
```

Constructor.

Parameters

samples	The delay amount in samples.

4.5.3 Member Function Documentation

4.5.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Modifier::Delay::CreateMethodList ( )  [protected],
[virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Modifier::ModifierBase.

4.5.3.2 FilterSample()

```
virtual StereoData OCAE::Modifier::Delay::FilterSample (
            StereoData const & input )  [virtual]
```

Takes input sample and filters it, returning the result.

Parameters

input	The input sample.

Returns

The filtered sample.

Reimplemented from OCAE::Modifier::ModifierBase.

4.5.3.3 GetDelay()

```
uint64_t OCAE::Modifier::Delay::GetDelay ( ) const
```

Gets the current delay length.

Returns

The delay length in samples.

4.5.3.4 IsBase()

```
virtual bool OCAE::Modifier::Delay::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object calling this function is a ModifierBase or not.

Returns

False.

Reimplemented from OCAE::Modifier::ModifierBase.

```
00143 { return false; };
```

4.5.3.5 operator=() [1/2]

```
Delay& OCAE::Modifier::Delay::operator= (
            Delay const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.5.3.6 operator=() [2/2]

```
Delay& OCAE::Modifier::Delay::operator= (
            Delay && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

4.5.3.7 SetDelay()

```
void OCAE::Modifier::Delay::SetDelay (
            uint64_t samples )
```

Sets a new delay length.

If the new delay is larger than the previous delay, 0 samples are inserted to the front of the delayed sample list.

Parameters

samples	New delay length in samples.

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

- Delay.hpp

4.6 OCAE::Core::Driver Class Reference

Handles the calculation of audio samples from different Sounds.

`#include <Driver.hpp>`

Public Member Functions

- Driver (uint64_t track_size, Math_t gain=DEFAULT_GAIN)

  Constructs an audio driver object.
- Driver (Driver const &other)=default

  Default copy constructor.
- Driver (Driver &&other) noexcept=default

  Default move constructor.
- ~Driver ()

  Destructor.
- Driver & operator= (Driver const &rhs)=default

  Default copy-assignment operator.
- Driver & operator= (Driver &&rhs) noexcept=default

  Default move-assignment operator.
- uint64_t AddSound (Sound::SoundPtr const &sound)

  Adds the given sound to the internal list of tracked sounds.
- Sound::SoundPtr RemoveSound (uint64_t id)

  Removes a sound from the Driver's processing.
- void SetGain (Math_t gain=DEFAULT_GAIN)

  Sets the gain to be used when summing all the audio values.
- Track_t const & GetOutputTrack () const

  Returns the track used for writing audio output after it has been processed.
- void Process ()

  Processes audio and returns a track of the calculated samples.

Static Private Member Functions

- static uint64_t GetID ()

  Returns an ID value for use within the driver.

Private Attributes

- Track_t m_OutputTrack

  The output track to store the results of processing.
- std::unordered_map< uint64_t, Sound::SoundPtr > m_Sounds

  All the sounds this driver is responsible for.
- Math_t m_Gain

  The output gain for the output samples.

Static Private Attributes

- static uint64_t s_IDCounter

  ID counter for generating IDs.

4.6.1 Detailed Description

Handles the calculation of audio samples from different Sounds.

4.6.2 Constructor & Destructor Documentation

4.6.2.1 Driver() [1/3]

```
OCAE::Core::Driver::Driver (
            uint64_t track_size,
            Math_t gain = DEFAULT_GAIN )
```

Constructs an audio driver object.

Parameters

track_size	The size of the output track in samples.
gain	The linear gain to be used when summing all audio values.

4.6.2.2 Driver() [2/3]

```
OCAE::Core::Driver::Driver (
            Driver const & other )  [default]
```

Default copy constructor.

Parameters

other	The object to copy.

4.6.2.3 Driver() [3/3]

```
OCAE::Core::Driver::Driver (
            Driver && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The object to move.

4.6.2.4 ~Driver()

```
OCAE::Core::Driver::~Driver ( )
```

Destructor.

4.6.3 Member Function Documentation

4.6.3.1 AddSound()

```
uint64_t OCAE::Core::Driver::AddSound (
            Sound::SoundPtr const & sound )
```

Adds the given sound to the internal list of tracked sounds.

Parameters

sound	The sound to add.

Returns

ID of the added sound.

4.6.3.2 GetID()

```
static uint64_t OCAE::Core::Driver::GetID ( )  [static], [private]
```

Returns an ID value for use within the driver.

Returns

The generated ID value.

4.6.3.3 GetOutputTrack()

```
Track_t const& OCAE::Core::Driver::GetOutputTrack ( ) const
```

Returns the track used for writing audio output after it has been processed.

Returns

Track_t containing the output of the latest process call.

4.6.3.4 operator=() [1/2]

```
Driver& OCAE::Core::Driver::operator= (
            Driver const & rhs )  [default]
```

Default copy-assignment operator.

Parameters

rhs	The object to copy.

Returns

this.

4.6.3.5 operator=() [2/2]

```
Driver& OCAE::Core::Driver::operator= (
            Driver && rhs )  [default], [noexcept]
```

Default move-assignment operator.

Parameters

rhs	The object to move.

Returns

this.

4.6.3.6 Process()

```
void OCAE::Core::Driver::Process ( )
```

Processes audio and returns a track of the calculated samples.

Returns

The calculated samples

4.6.3.7 RemoveSound()

```
Sound::SoundPtr OCAE::Core::Driver::RemoveSound (
            uint64_t id )
```

Removes a sound from the Driver's processing.

Parameters

id	The ID of the sound to be removed.

Returns

The sound that was removed.

4.6.3.8 SetGain()

```
void OCAE::Core::Driver::SetGain (
            Math_t gain = DEFAULT_GAIN )
```

Sets the gain to be used when summing all the audio values.

Parameters

gain	The linear gain value to be set.

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

- Driver.hpp

4.7 OCAE::Sound::Sound::Edge::E_Block Struct Reference

Structure to abstract away the node of the Sound graph, allowing for sounds and blocks to make up a sound.

`#include <Sound.hpp>`

Public Member Functions

- E_Block (SoundPtr const &s)
  Constructs an E_Block from a Sound object.
- E_Block (BlockPtr const &b)
  Constructs an E_Block from a Block obect.
- E_Block (E_Block const &other)=default
  Default copy constructor.
- E_Block (E_Block &&other) noexcept=default
  Default move constructor.
- ~E_Block ()=default
  Default destructor.
- E_Block & operator= (E_Block const &rhs)=default
  Default copy assignment operator.
- E_Block & operator= (E_Block &&rhs) noexcept=default
  Default move assignment operator.

Public Attributes

- std::any block
  Wrapper around the Block or Sound to abstract it away.
- bool const is_sound
  Bool that states whether the block member is a Sound or Block.

4.7.1 Detailed Description

Structure to abstract away the node of the Sound graph, allowing for sounds and blocks to make up a sound.

4.7.2 Constructor & Destructor Documentation

4.7.2.1 E_Block() [1/4]

```
OCAE::Sound::Sound::Edge::E_Block::E_Block (
            SoundPtr const & s )
```

Constructs an E_Block from a Sound object.

Parameters

s	The Sound object.

4.7.2.2 E_Block() [2/4]

```
OCAE::Sound::Sound::Edge::E_Block::E_Block (
            BlockPtr const & b )
```

Constructs an E_Block from a Block obect.

Parameters

b	The Block object.

4.7.2.3 E_Block() [3/4]

```
OCAE::Sound::Sound::Edge::E_Block::E_Block (
            E_Block const & other )  [default]
```

Default copy constructor.

Parameters

other	The object being copied.

4.7.2.4 E_Block() [4/4]

```
OCAE::Sound::Sound::Edge::E_Block::E_Block (
            E_Block && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The object being moved.

4.7.3 Member Function Documentation

4.7.3.1 operator=() [1/2]

```
E_Block& OCAE::Sound::Sound::Edge::E_Block::operator= (
            E_Block const & rhs )  [default]
```

Default copy assignment operator.

Parameters

rhs	The object being copied.

Returns

∗this.

4.7.3.2 operator=() [2/2]

```
E_Block& OCAE::Sound::Sound::Edge::E_Block::operator= (
            E_Block && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object being moved.

Returns

∗this.

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

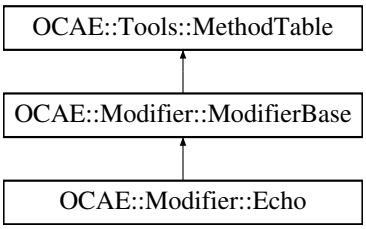
- Sound.hpp

4.8 OCAE::Modifier::Echo Class Reference

Echo IIR filter. Uses output sample for echoing instead of input, creating an infinite impulse responce (IIR).

`#include <Echo.hpp>`

Inheritance diagram for OCAE::Modifier::Echo:



Public Member Functions

- Echo (Echo const &other)=delete
  Copy constructor. Deleted.
- Echo (Echo &&other) noexcept=default
  Default move constructor.
- virtual ~Echo ()=default
  Default destructor.
- Echo & operator= (Echo const &rhs)=delete
  Copy assignment operator. Deleted.
- Echo & operator= (Echo &&rhs) noexcept=default
  Default move assignment operator.
- void SetDecayRatio (Math_t decay_ratio)
  Sets the decay ratio of the echo samples.
- Math_t GetDecayRatio () const
  Gets the decay ratio of the echo samples.
- virtual StereoData FilterSample (StereoData const &input)
  Takes input sample and filters it, returning the result.
- virtual bool IsBase ()
  Returns boolean for if the object calling this function is a ModifierBase or not.

Protected Member Functions

- Echo (uint64_t sample_delay, Math_t decay_ratio)
  Constructor.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()
  Creates a vector containing the names of functions, and the callable functions themselves.

Private Attributes

- std::deque< StereoData > m_Echo
  Filtered samples for continuous echo.
- Math_t m_Ratio
  Decay ratio for the echo.

Friends

- class ModifierFactory

  Add the factory as a friend so it can construct Echo objects.

Additional Inherited Members

4.8.1 Detailed Description

Echo IIR filter. Uses output sample for echoing instead of input, creating an infinite impulse responce (IIR).

The delay value between echos is a whole number for simple whole sample calculations.

4.8.2 Constructor & Destructor Documentation

4.8.2.1 Echo() [1/3]

```
OCAE::Modifier::Echo::Echo (
            Echo const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

4.8.2.2 Echo() [2/3]

```
OCAE::Modifier::Echo::Echo (
            Echo && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.8.2.3 Echo() [3/3]

```
OCAE::Modifier::Echo::Echo (
            uint64_t sample_delay,
            Math_t decay_ratio )  [protected]
```

Constructor.

Parameters

sample_delay	The delay in samples between the input signal and it's first echo.
decay_ratio	The decay ratio of the echo samples.

4.8.3 Member Function Documentation

4.8.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Modifier::Echo::CreateMethodList ( )  [protected],
[virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Modifier::ModifierBase.

4.8.3.2 FilterSample()

```
virtual StereoData OCAE::Modifier::Echo::FilterSample (
            StereoData const & input )  [virtual]
```

Takes input sample and filters it, returning the result.

Parameters

input	The input sample.

Returns

The filtered sample.

Reimplemented from OCAE::Modifier::ModifierBase.

4.8.3.3 GetDecayRatio()

```
Math_t OCAE::Modifier::Echo::GetDecayRatio ( ) const
```

Gets the decay ratio of the echo samples.

Returns

The decay ratio.

4.8.3.4 IsBase()

```
virtual bool OCAE::Modifier::Echo::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object calling this function is a ModifierBase or not.

Returns

False.

Reimplemented from OCAE::Modifier::ModifierBase.

```
00144 { return false; };
```

4.8.3.5 operator=() [1/2]

```
Echo& OCAE::Modifier::Echo::operator= (
            Echo const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.8.3.6 operator=() [2/2]

```
Echo& OCAE::Modifier::Echo::operator= (
            Echo && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

4.8.3.7 SetDecayRatio()

```
void OCAE::Modifier::Echo::SetDecayRatio (
            Math_t decay_ratio )
```

Sets the decay ratio of the echo samples.

Parameters

decay_ratio	The new decay ratio.

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

- Echo.hpp

4.9 OCAE::Sound::Sound::Edge Struct Reference

Structure representing the edges of the graph that defines a Sound.

`#include <Sound.hpp>`

Classes

- struct E_Block

  Structure to abstract away the node of the Sound graph, allowing for sounds and blocks to make up a sound.

Public Member Functions

- TYPEDEF_SHARED (E_Block)

  Alias for std::shared_ptr instantiated with E_Block.
- Edge (std::deque< E_BlockPtr > const &in, Combinator const &comb, std::deque< E_BlockPtr > const &out)

  Constructs an Edge object from the given components.
- void Process ()

  Processes the edge.
- void PrimeInput (StereoData in)

  Primes the input of this edge.

Public Attributes

- std::deque< E_BlockPtr > inputs

  The input blocks for this edge.
- Combinator combinator

  The method of combining.
- std::deque< E_BlockPtr > outputs

  The output blocks for this edge.

4.9.1 Detailed Description

Structure representing the edges of the graph that defines a Sound.

4.9.2 Constructor & Destructor Documentation

4.9.2.1 Edge()

```
OCAE::Sound::Sound::Edge::Edge (
            std::deque< E_BlockPtr > const & in,
            Combinator const & comb,
            std::deque< E_BlockPtr > const & out )
```

Constructs an Edge object from the given components.

Parameters

in	The list of input blocks.
comb	The Combinator defining how the outputs of the processed inputs should be defined.
out	The list of output blocks, whose inputs are primed with the output of the Combinator.

4.9.3 Member Function Documentation

4.9.3.1 PrimeInput()

```
void OCAE::Sound::Sound::Edge::PrimeInput (
            StereoData in )
```

Primes the input of this edge.

Parameters

in	The input sample.

4.9.3.2 Process()

```
void OCAE::Sound::Sound::Edge::Process ( )
```

Processes the edge.

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

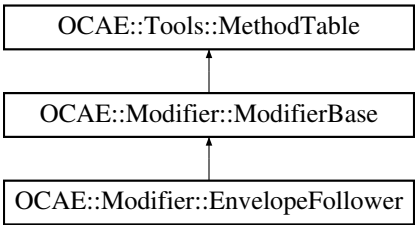
- Sound.hpp

4.10 OCAE::Modifier::EnvelopeFollower Class Reference

Envelope follower filter. Calculates the gain of the input signal over time.

`#include <Envelope.hpp>`

Inheritance diagram for OCAE::Modifier::EnvelopeFollower:



Public Member Functions

- EnvelopeFollower (EnvelopeFollower const &other)=delete

  Copy constructor. Deleted.
- EnvelopeFollower (EnvelopeFollower &&other) noexcept=default

  Default move constructor.
- virtual ~EnvelopeFollower ()

  Deconstructor.
- EnvelopeFollower & operator= (EnvelopeFollower const &rhs)=delete

  Copy assignment operator. Deleted.
- EnvelopeFollower & operator= (EnvelopeFollower &&rhs) noexcept=default

  Default move assignment operator.
- virtual StereoData FilterSample (StereoData const &input)

  Takes input sample and filters it, returning the result.
- virtual bool IsBase ()

  Returns boolean for if the object calling this function is a ModifierBase or not.

Protected Member Functions

- EnvelopeFollower (Math_t lower, Math_t upper)

  Constructor. Creates a follower with upper and lower bounds to what frequencies it should follow.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()

  Creates a vector containing the names of functions, and the callable functions themselves.

Private Attributes

- Math_t m_AU

  Tracking variable.
- Math_t m_BU

  Tracking variable.
- Math_t m_AD

  Tracking variables.
- Math_t m_BD

  Tracking variable.
- StereoData m_X1

  Previous sample.
- StereoData m_Y1

  Previous sample.

Friends

- class ModifierFactory

  Add the factory as a friend so it can construct EnvelopeFollower objects.

Additional Inherited Members

4.10.1 Detailed Description

Envelope follower filter. Calculates the gain of the input signal over time.

4.10.2 Constructor & Destructor Documentation

4.10.2.1 EnvelopeFollower() [1/3]

```
OCAE::Modifier::EnvelopeFollower::EnvelopeFollower (
            EnvelopeFollower const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

4.10.2.2 EnvelopeFollower() [2/3]

```
OCAE::Modifier::EnvelopeFollower::EnvelopeFollower (
            EnvelopeFollower && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.10.2.3 ~EnvelopeFollower()

```
virtual OCAE::Modifier::EnvelopeFollower::~EnvelopeFollower ( )  [virtual]
```

Deconstructor.

4.10.2.4 EnvelopeFollower() [3/3]

```
OCAE::Modifier::EnvelopeFollower::EnvelopeFollower (
            Math_t lower,
            Math_t upper )  [protected]
```

Constructor. Creates a follower with upper and lower bounds to what frequencies it should follow.

Parameters

lower	The lower bound of frequencies to follow.
upper	The upper bound of frequencies to follow.

4.10.3 Member Function Documentation

4.10.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Modifier::EnvelopeFollower::CreateMethodList ( )
[protected], [virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Modifier::ModifierBase.

4.10.3.2 FilterSample()

```
virtual StereoData OCAE::Modifier::EnvelopeFollower::FilterSample (
            StereoData const & input )  [virtual]
```

Takes input sample and filters it, returning the result.

Parameters

input	The input sample.

Returns

The filtered sample.

Reimplemented from OCAE::Modifier::ModifierBase.

4.10.3.3 IsBase()

```
virtual bool OCAE::Modifier::EnvelopeFollower::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object calling this function is a ModifierBase or not.

Returns

True for this class, false for any derived class.

Reimplemented from OCAE::Modifier::ModifierBase.

```
00133 { return false; };
```

4.10.3.4 operator=() [1/2]

```
EnvelopeFollower& OCAE::Modifier::EnvelopeFollower::operator= (
            EnvelopeFollower const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.10.3.5 operator=() [2/2]

```
EnvelopeFollower& OCAE::Modifier::EnvelopeFollower::operator= (
            EnvelopeFollower && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

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

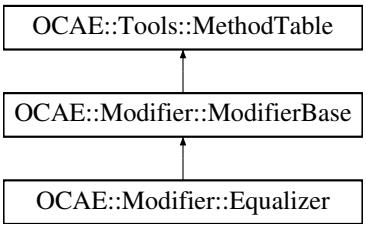
- Envelope.hpp

4.11 OCAE::Modifier::Equalizer Class Reference

Equalizer filter.

`#include <Equalizer.hpp>`

Inheritance diagram for OCAE::Modifier::Equalizer:



Public Member Functions

- Equalizer (Equalizer const &other)=delete
  Copy constructor. Deleted.
- Equalizer (Equalizer &&other) noexcept=default
  Default move constructor.
- virtual ~Equalizer ()=default
  Default destructor.
- Equalizer & operator= (Equalizer const &rhs)=delete
  Copy assignment operator. Deleted.
- Equalizer & operator= (Equalizer &&rhs) noexcept=default
  Default move assignment operator.
- void SetGain (uint32_t band, Math_t gain)
  Sets the gain for a given frequency band.
- Math_t GetGain (uint32_t band)
  Gets the gain from a given frequency band.
- virtual StereoData FilterSample (StereoData const &input)
  Takes input sample and filters it, returning the result.
- virtual bool IsBase ()
  Returns boolean for if the object calling this function is a ModifierBase or not.

Protected Member Functions

- Equalizer (uint32_t band_count, Math_t lower, Math_t upper)

  Constructor.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()

  Creates a vector containing the names of functions, and the callable functions themselves.

Private Attributes

- std::vector< Math_t > m_BandGains

  List of gains for each frequency band.
- std::vector< BandPassPtr > m_Bands

  List of band pass filters for each frequency band.

Friends

- class ModifierFactory

  Add the factory as a friend so it can construct Equalizer objects.

Additional Inherited Members

4.11.1 Detailed Description

Equalizer filter.

This filter splits a given signal across bands, using Modifier::BandPass objects to do so, then amplifies each band by a given gain before combining the bands again for the final output.

4.11.2 Constructor & Destructor Documentation

4.11.2.1 Equalizer() [1/3]

```
OCAE::Modifier::Equalizer::Equalizer (
            Equalizer const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

4.11.2.2 Equalizer() [2/3]

```
OCAE::Modifier::Equalizer::Equalizer (
            Equalizer && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.11.2.3 ~Equalizer()

```
virtual OCAE::Modifier::Equalizer::~Equalizer ( )  [virtual], [default]
```

Default destructor.

4.11.2.4 Equalizer() [3/3]

```
OCAE::Modifier::Equalizer::Equalizer (
            uint32_t band_count,
            Math_t lower,
            Math_t upper )  [protected]
```

Constructor.

Parameters

band_count	The number of frequency bands for the equalizer.
lower	The lowest frequency of the lowest band pass filter (not the central frequency).
upper	The highest frequency of the highest band pass filter (not the central frequency).

4.11.3 Member Function Documentation

4.11.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Modifier::Equalizer::CreateMethodList ( )  [protected],
[virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Modifier::ModifierBase.

4.11.3.2 FilterSample()

```
virtual StereoData OCAE::Modifier::Equalizer::FilterSample (
            StereoData const & input )  [virtual]
```

Takes input sample and filters it, returning the result.

Parameters

input	The input sample.

Returns

The filtered sample.

Reimplemented from OCAE::Modifier::ModifierBase.

4.11.3.3 GetGain()

```
Math_t OCAE::Modifier::Equalizer::GetGain (
            uint32_t band )
```

Gets the gain from a given frequency band.

Parameters

band	The frequency band to get the gain from.

Returns

4.11.3.4 IsBase()

```
virtual bool OCAE::Modifier::Equalizer::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object calling this function is a ModifierBase or not.

Returns

False.

Reimplemented from OCAE::Modifier::ModifierBase.

```
00155 { return false; };
```

4.11.3.5 operator=() [1/2]

```
Equalizer& OCAE::Modifier::Equalizer::operator= (
            Equalizer const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.11.3.6 operator=() [2/2]

```
Equalizer& OCAE::Modifier::Equalizer::operator= (
            Equalizer && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

4.11.3.7 SetGain()

```
void OCAE::Modifier::Equalizer::SetGain (
            uint32_t band,
            Math_t gain )
```

Sets the gain for a given frequency band.

Parameters

band	The frequency band to set the gain of.
gain	The new gain.

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

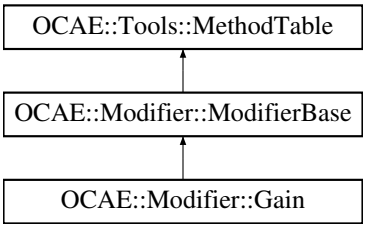
- Equalizer.hpp

4.12 OCAE::Modifier::Gain Class Reference

Simple gain filter for amplifying the input signal. The gain value can be negative allowing for inverting the input signal.

```
#include <Gain.hpp>
```

Inheritance diagram for OCAE::Modifier::Gain:



Public Member Functions

- Gain (Gain const &other)=delete

  Copy constructor. Deleted.
- Gain (Gain &&other) noexcept=default

  Default move constructor.
- virtual ~Gain ()=default

  Destructor.
- Gain & operator= (Gain const &rhs)=delete

  Copy assignment operator. Deleted.
- Gain & operator= (Gain &&rhs) noexcept=default

  Default move assignment operator.
- void SetGain (Math_t gain)

  Sets the gain for the filter.
- Math_t GetGain () const

  Returns the current gain for the filter.
- virtual StereoData FilterSample (StereoData const &input)

  Takes input sample and filters it, returning the result.
- virtual bool IsBase ()

  Returns boolean for if the object calling this function is a ModifierBase or not.

Protected Member Functions

- Gain (Math_t gain=DEFAULT_GAIN)

  Constructor.
- virtual Tools::MethodTable::MethodList_t CreateMethodList () override

  Creates a vector containing the names of functions, and the callable functions themselves.

Private Attributes

- Math_t m_Gain

  The gain.

Friends

- class ModifierFactory

  Add the factory as a friend so it can construct Gain objects.

Additional Inherited Members

4.12.1 Detailed Description

Simple gain filter for amplifying the input signal. The gain value can be negative allowing for inverting the input signal.

4.12.2 Constructor & Destructor Documentation

4.12.2.1 Gain() [1/3]

```
OCAE::Modifier::Gain::Gain (
            Gain const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

4.12.2.2 Gain() [2/3]

```
OCAE::Modifier::Gain::Gain (
            Gain && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.12.2.3 ~Gain()

```
virtual OCAE::Modifier::Gain::~Gain ( )  [virtual], [default]
```

Destructor.

4.12.2.4 Gain() [3/3]

```
OCAE::Modifier::Gain::Gain (
            Math_t gain = DEFAULT_GAIN )  [protected]
```

Constructor.

Parameters

gain	The gain to apply to the input data. Can be negative allowing for inverting the signal.

4.12.3 Member Function Documentation

4.12.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Modifier::Gain::CreateMethodList ( )  [override],
[protected], [virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Modifier::ModifierBase.

4.12.3.2 FilterSample()

```
virtual StereoData OCAE::Modifier::Gain::FilterSample (
            StereoData const & input )  [virtual]
```

Takes input sample and filters it, returning the result.

Parameters

input	The input sample.

Returns

The filtered sample.

Reimplemented from OCAE::Modifier::ModifierBase.

4.12.3.3 GetGain()

```
Math_t OCAE::Modifier::Gain::GetGain ( ) const
```

Returns the current gain for the filter.

Returns

The gain of the filter.

4.12.3.4 IsBase()

```
virtual bool OCAE::Modifier::Gain::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object calling this function is a ModifierBase or not.

Returns

False.

Reimplemented from OCAE::Modifier::ModifierBase.

```
00141 { return false; };
```

4.12.3.5 operator=() [1/2]

```
Gain& OCAE::Modifier::Gain::operator= (
            Gain const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.12.3.6 operator=() [2/2]

```
Gain& OCAE::Modifier::Gain::operator= (
            Gain && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

4.12.3.7 SetGain()

```
void OCAE::Modifier::Gain::SetGain (
            Math_t gain )
```

Sets the gain for the filter.

Parameters

gain	The new gain. Can be negative.

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

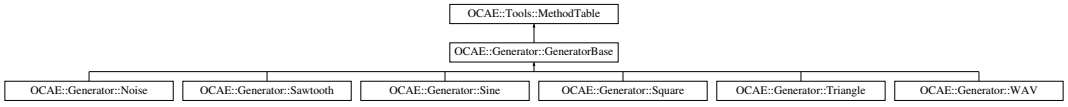
- Gain.hpp

4.13 OCAE::Generator::GeneratorBase Class Reference

General base class for all generator (sounds) to inherit from. Any derived classes with extra methods that may need to be acquired can be accessed through their setup of the Tools::MethodTable.

`#include <GeneratorBase.hpp>`

Inheritance diagram for OCAE::Generator::GeneratorBase:



Public Member Functions

- GeneratorBase (GeneratorBase const &other)=delete

  Copy constructor. Deleted.
- GeneratorBase (GeneratorBase &&other) noexcept=default

  Default move constructor.
- virtual ~GeneratorBase ()=default

  Default destructor.
- GeneratorBase & operator= (GeneratorBase const &rhs)=delete

  Copy assignment operator. Deleted.
- GeneratorBase & operator= (GeneratorBase &&rhs) noexcept=default

  Default move assignment operator.
- virtual StereoData SendSample (void)

  Calculates the sample. For the base class this is simply 0.
- virtual bool IsBase ()

  Returns boolean for if the object is a GeneratorBase or not.

Protected Member Functions

- GeneratorBase ()

  Constructor.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()

  Creates a vector containing the names of functions, and the callable functions themselves.

Friends

- class GeneratorFactory

  Add the factory as a friend so it can construct GeneratorBase objects.

Additional Inherited Members

4.13.1 Detailed Description

General base class for all generator (sounds) to inherit from. Any derived classes with extra methods that may need to be acquired can be accessed through their setup of the Tools::MethodTable.

4.13.2 Constructor & Destructor Documentation

4.13.2.1 GeneratorBase() [1/3]

```
OCAE::Generator::GeneratorBase::GeneratorBase (
            GeneratorBase const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

4.13.2.2 GeneratorBase() [2/3]

```
OCAE::Generator::GeneratorBase::GeneratorBase (
            GeneratorBase && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.13.2.3 ~GeneratorBase()

```
virtual OCAE::Generator::GeneratorBase::~GeneratorBase ( )  [virtual], [default]
```

Default destructor.

4.13.2.4 GeneratorBase() [3/3]

```
OCAE::Generator::GeneratorBase::GeneratorBase ( )  [inline], [protected]
```

Constructor.

References CreateMethodList(), and OCAE::Tools::MethodTable::RegisterMethods().

```
00135 : MethodTable() { RegisterMethods(CreateMethodList()); };
```

4.13.3 Member Function Documentation

4.13.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Generator::GeneratorBase::CreateMethodList ( )
[inline], [protected], [virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Implements OCAE::Tools::MethodTable.

Reimplemented in OCAE::Generator::WAV, OCAE::Generator::Sine, OCAE::Generator::Square, OCAE::Generator::↩ Sawtooth, OCAE::Generator::Triangle, and OCAE::Generator::Noise.

References TYPEDEF_SHARED.

Referenced by GeneratorBase().

```
00147 { return {}; };
```

4.13.3.2 IsBase()

```
virtual bool OCAE::Generator::GeneratorBase::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object is a GeneratorBase or not.

Returns

True for this class, false for any derived class.

Reimplemented in OCAE::Generator::Sine, OCAE::Generator::Sawtooth, OCAE::Generator::Triangle, OCAE::↩ Generator::WAV, OCAE::Generator::Noise, and OCAE::Generator::Square.

```
00122 { return true; };
```

4.13.3.3 operator=() [1/2]

```
GeneratorBase& OCAE::Generator::GeneratorBase::operator= (
            GeneratorBase const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.13.3.4 operator=() [2/2]

```
GeneratorBase& OCAE::Generator::GeneratorBase::operator= (
            GeneratorBase && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

4.13.3.5 SendSample()

```
virtual StereoData OCAE::Generator::GeneratorBase::SendSample (
            void  )  [inline], [virtual]
```

Calculates the sample. For the base class this is simply 0.

Returns

The stereo sample data.

Reimplemented in OCAE::Generator::Sine, OCAE::Generator::Sawtooth, OCAE::Generator::Triangle, OCAE::Generator::WAV, OCAE::Generator::Noise, and OCAE::Generator::Square.

```
00113 { return StereoData(0.f, 0.f); };
```

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

- GeneratorBase.hpp

4.14 OCAE::Generator::GeneratorFactory Class Reference

Creates pointers to generators handled by std::shared_ptr to prevent memory leaks.

`#include <GeneratorFactory.hpp>`

Public Member Functions

- ~GeneratorFactory ()=delete

  Deleted destructor, ensuring an instance of this class can never be created.

Static Public Member Functions

- static GeneratorBasePtr CreateBase ()

  Creates a GeneratorBase object.
- static GeneratorBasePtr CreateNoise ()

  Creates a Noise object.
- static GeneratorBasePtr CreateSawtooth (Math_t freq)

  Creates a Sawtooth object.
- static GeneratorBasePtr CreateSine (Math_t freq)

  Creates a Sine object.
- static GeneratorBasePtr CreateSquare (Math_t freq)

  Creates a Square object.
- static GeneratorBasePtr CreateTriangle (Math_t freq)

  Creates a Triangle object.
- static GeneratorBasePtr CreateWAV ()

  Creates a WAV object with no WAV data.
- static GeneratorBasePtr CreateWAV (std::string const &filepath)

  Creates a WAV object with a file name to open for reading.
- static GeneratorBasePtr CreateWAV (std::vector< char > const &wav_data)

  Creates a WAV object with a vector containing the audio WAV data.

4.14.1 Detailed Description

Creates pointers to generators handled by std::shared_ptr to prevent memory leaks.

4.14.2 Member Function Documentation

4.14.2.1 CreateBase()

```
static GeneratorBasePtr OCAE::Generator::GeneratorFactory::CreateBase ( )  [static]
```

Creates a GeneratorBase object.

Returns

GeneratorBasePtr containing the created object.

4.14.2.2 CreateNoise()

```
static GeneratorBasePtr OCAE::Generator::GeneratorFactory::CreateNoise ( )  [static]
```

Creates a Noise object.

Returns

GeneratorBasePtr containing the created object.

4.14.2.3 CreateSawtooth()

```
static GeneratorBasePtr OCAE::Generator::GeneratorFactory::CreateSawtooth (
            Math_t freq )  [static]
```

Creates a Sawtooth object.

Parameters

freq	The frequency for the sawtooth.

Returns

GeneratorBasePtr containing the created object.

4.14.2.4 CreateSine()

```
static GeneratorBasePtr OCAE::Generator::GeneratorFactory::CreateSine (
            Math_t freq )  [static]
```

Creates a Sine object.

Parameters

freq	The frequency for the sine.

Returns

GeneratorBasePtr containing the created object.

4.14.2.5 CreateSquare()

```
static GeneratorBasePtr OCAE::Generator::GeneratorFactory::CreateSquare (
            Math_t freq )  [static]
```

Creates a Square object.

Parameters

freq	The frequency for the square.

Returns

GeneratorBasePtr containing the created object.

4.14.2.6 CreateTriangle()

```
static GeneratorBasePtr OCAE::Generator::GeneratorFactory::CreateTriangle (
            Math_t freq )  [static]
```

Creates a Triangle object.

Parameters

freq	The frequency for the triangle.

Returns

GeneratorBasePtr containing the created object.

4.14.2.7 CreateWAV() [1/3]

```
static GeneratorBasePtr OCAE::Generator::GeneratorFactory::CreateWAV ( )  [static]
```

Creates a WAV object with no WAV data.

Returns

GeneratorBasePtr containing the created object.

4.14.2.8 CreateWAV() [2/3]

```
static GeneratorBasePtr OCAE::Generator::GeneratorFactory::CreateWAV (
            std::string const & filepath )  [static]
```

Creates a WAV object with a file name to open for reading.

Parameters

filepath	

Returns

GeneratorBasePtr containing the created object.

4.14.2.9 CreateWAV() [3/3]

```
static GeneratorBasePtr OCAE::Generator::GeneratorFactory::CreateWAV (
            std::vector< char > const & wav_data )  [static]
```

Creates a WAV object with a vector containing the audio WAV data.

Parameters

wav_data	Raw WAVE data in RIFF format

Returns

GeneratorBasePtr containing the created object.

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

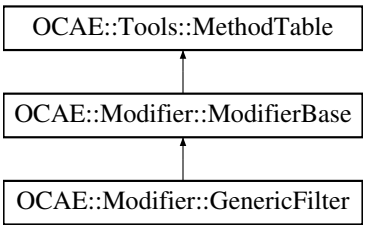
- GeneratorFactory.hpp

4.15 OCAE::Modifier::GenericFilter Class Reference

Generic audio filter with simple poles.

`#include <GenericFilter.hpp>`

Inheritance diagram for OCAE::Modifier::GenericFilter:



Public Types

- using ZeroContainer = std::vector< std::tuple< uint32_t, Math_t > >

  Container used for coefficients of zeros of a filter.
- using PoleContainer = std::vector< std::tuple< uint32_t, Math_t > >

  Container used for coefficients of poles of a filter.

Public Member Functions

- GenericFilter (GenericFilter const &other)=delete

  Copy constructor. Deleted.
- GenericFilter (GenericFilter &&other) noexcept=default

  Default move constructor.
- virtual ~GenericFilter ()=default

  Destructor.
- GenericFilter & operator= (GenericFilter const &rhs)=delete

  Assignment operator. Deleted.
- GenericFilter & operator= (GenericFilter &&rhs) noexcept=default

  Default move assignment operator.
- virtual StereoData FilterSample (StereoData const &input)

  Takes input sample and filters it, returning the result.
- virtual bool IsBase ()

  Returns boolean for if the object calling this function is a ModifierBase or not.

Protected Member Functions

- GenericFilter (ZeroContainer const &zeros, PoleContainer const &poles)

  Constructor.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()

  Creates a vector containing the names of functions, and the callable functions themselves.

Private Types

- using SampleContainer = std::deque< StereoData >

  Container used for the previous outputs and inputs of the filter.

Private Attributes

- ZeroContainer m_Zeros

  Vector of tuples, tuple of the x subscript and its coefficient.
- PoleContainer m_Poles

  Vector of tuples, tuple of the y subscript and its coefficient.
- SampleContainer m_Inputs

  Previous inputs to the filter.
- SampleContainer m_Outputs

  Previous outputs to the filter.

Friends

- class ModifierFactory

  Add the factory as a friend so it can construct GenericFilter objects.

Additional Inherited Members

4.15.1 Detailed Description

Generic audio filter with simple poles.

4.15.2 Constructor & Destructor Documentation

4.15.2.1 GenericFilter() [1/3]

```
OCAE::Modifier::GenericFilter::GenericFilter (
            GenericFilter const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

4.15.2.2 GenericFilter() [2/3]

```
OCAE::Modifier::GenericFilter::GenericFilter (
            GenericFilter && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.15.2.3 ~GenericFilter()

```
virtual OCAE::Modifier::GenericFilter::~GenericFilter ( )  [virtual], [default]
```

Destructor.

4.15.2.4 GenericFilter() [3/3]

```
OCAE::Modifier::GenericFilter::GenericFilter (
            ZeroContainer const & zeros,
            PoleContainer const & poles )  [protected]
```

Constructor.

Parameters

zeros	Container a tuple of the x subscript and its coefficient. Expected to be ordered lowest to highest by subscript.
poles	Container of a tuple of the the y subscript and its coefficient. Expected to be ordered lowest to highest by subscript.

4.15.3 Member Function Documentation

4.15.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Modifier::GenericFilter::CreateMethodList ( )  [protected],
[virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Modifier::ModifierBase.

4.15.3.2 FilterSample()

```
virtual StereoData OCAE::Modifier::GenericFilter::FilterSample (
            StereoData const & input )  [virtual]
```

Takes input sample and filters it, returning the result.

Parameters

input	The input sample.

Returns

The filtered sample.

Reimplemented from OCAE::Modifier::ModifierBase.

4.15.3.3 IsBase()

```
virtual bool OCAE::Modifier::GenericFilter::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object calling this function is a ModifierBase or not.

Returns

False.

Reimplemented from OCAE::Modifier::ModifierBase.

```
00143 { return false; };
```

4.15.3.4 operator=() [1/2]

```
GenericFilter& OCAE::Modifier::GenericFilter::operator= (
            GenericFilter const & rhs )  [delete]
```

Assignment operator. Deleted.

Parameters

rhs	The object to copy.

Returns

this.

4.15.3.5 operator=() [2/2]

```
GenericFilter& OCAE::Modifier::GenericFilter::operator= (
            GenericFilter && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be copied.

Returns

this.

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

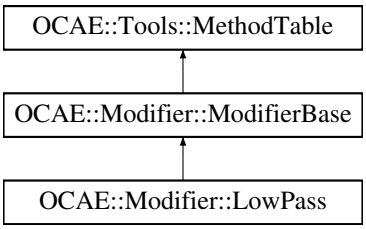
- GenericFilter.hpp

4.16 OCAE::Modifier::LowPass Class Reference

3rd Order Butterworth Low Pass filter with resonance.

`#include <LowPass.hpp>`

Inheritance diagram for OCAE::Modifier::LowPass:



Public Member Functions

- LowPass (LowPass const &other)=delete

  Copy constructor. Deleted.
- LowPass (LowPass &&other) noexcept=default

  Default move constructor.
- virtual ~LowPass ()=default

  Destructor.
- LowPass & operator= (LowPass const &rhs)=delete

  Copy assignment operator. Deleted.
- LowPass & operator= (LowPass &&rhs) noexcept=default

  Default move assignment operator.
- void SetCutoff (Math_t cutoff)

  Sets the cutoff frequency of the filter.
- void SetResonance (Math_t resonance)

  Sets the resonance angle of the filter.
- virtual StereoData FilterSample (StereoData const &input)

  Takes input sample and filters it, returning the result.
- virtual bool IsBase ()

  Returns boolean for if the object calling this function is a ModifierBase or not.

Protected Member Functions

- LowPass (Math_t cutoff, Math_t resonance)

  Constructor.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()

  Creates a vector containing the names of functions, and the callable functions themselves.
- void Reset ()

  Resets the values of the object. Called during construction, SetCutoff, and SetResonance.

Private Attributes

- Math_t m_Cutoff

  Cutoff frequency.
- Math_t m_Resonance

  Resonance.
- Math_t m_Coefficients [4]

  List of coefficients for the filter.
- StereoData m_Outputs [3]

  Previous outputs for future calculations.

Friends

- class ModifierFactory

  Add the factory as a friend so it can construct LowPass objects.

Additional Inherited Members

4.16.1 Detailed Description

3rd Order Butterworth Low Pass filter with resonance.

4.16.2 Constructor & Destructor Documentation

4.16.2.1 LowPass() [1/3]

```
OCAE::Modifier::LowPass::LowPass (
            LowPass const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

4.16.2.2 LowPass() [2/3]

```
OCAE::Modifier::LowPass::LowPass (
            LowPass && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.16.2.3 ~LowPass()

```
virtual OCAE::Modifier::LowPass::~LowPass ( )  [virtual], [default]
```

Destructor.

4.16.2.4 LowPass() [3/3]

```
OCAE::Modifier::LowPass::LowPass (
            Math_t cutoff,
            Math_t resonance )  [protected]
```

Constructor.

Parameters

cutoff	The cutoff frequency in Hz.
resonance	The resonance angle of the filter, value can be in range [0,1/6]. No safety checks are performed.

4.16.3 Member Function Documentation

4.16.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Modifier::LowPass::CreateMethodList ( )  [protected],
[virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Modifier::ModifierBase.

4.16.3.2 FilterSample()

```
virtual StereoData OCAE::Modifier::LowPass::FilterSample (
            StereoData const & input )  [virtual]
```

Takes input sample and filters it, returning the result.

Parameters

input	The input sample.

Returns

The filtered sample.

Reimplemented from OCAE::Modifier::ModifierBase.

4.16.3.3 IsBase()

```
virtual bool OCAE::Modifier::LowPass::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object calling this function is a ModifierBase or not.

Returns

False.

Reimplemented from OCAE::Modifier::ModifierBase.

```
00147 { return false; };
```

4.16.3.4 operator=() [1/2]

```
LowPass& OCAE::Modifier::LowPass::operator= (
            LowPass const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.16.3.5 operator=() [2/2]

```
LowPass& OCAE::Modifier::LowPass::operator= (
            LowPass && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

4.16.3.6 Reset()

```
void OCAE::Modifier::LowPass::Reset ( )  [protected]
```

Resets the values of the object. Called during construction, SetCutoff, and SetResonance.

4.16.3.7 SetCutoff()

```
void OCAE::Modifier::LowPass::SetCutoff (
            Math_t cutoff )
```

Sets the cutoff frequency of the filter.

Parameters

cutoff	The cutoff frequency.

4.16.3.8 SetResonance()

```
void OCAE::Modifier::LowPass::SetResonance (
            Math_t resonance )
```

Sets the resonance angle of the filter.

Parameters

resonance	The resonance angle, in range [0,1/6]. No safety checks are performed.

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

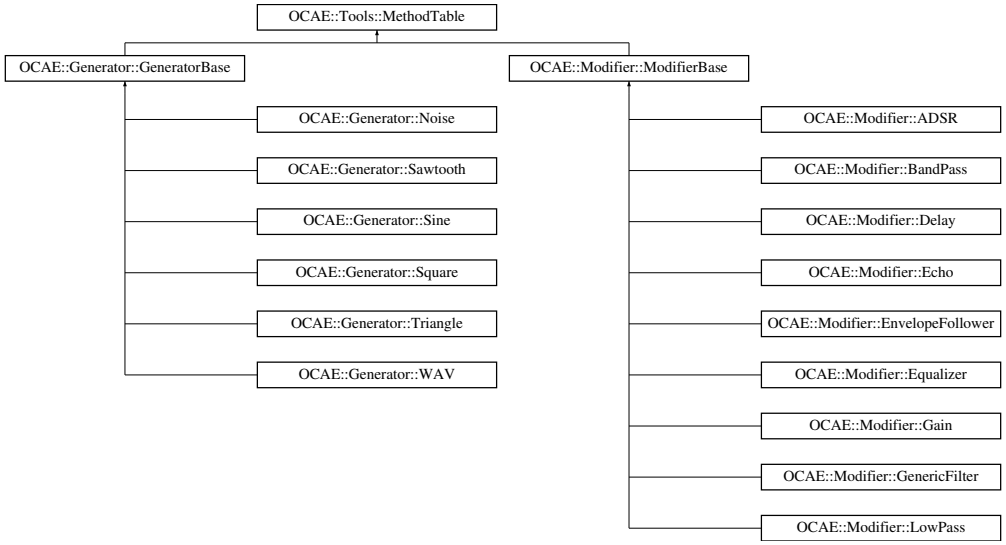
- LowPass.hpp

4.17 OCAE::Tools::MethodTable Class Reference

The purpose of this class is to create a simple interface for calling methods from an object of an unknown type.

`#include <MethodTable.hpp>`

Inheritance diagram for OCAE::Tools::MethodTable:



Public Types

- using Void_fn = std::function< void(void *)>

  Alias for a void-returning function that takes a void pointer.
- using MethodTable_t = std::unordered_map< std::string, Void_fn >

  Alias for the mapping of method names to the method.
- using MethodList_t = std::vector< std::tuple< std::string, Void_fn > >

  Alias for the list of method names and their associated methods.

Public Member Functions

- MethodTable ()

  Default constructor.
- MethodTable (MethodList_t const &list)

  Consturctor.
- virtual ~MethodTable ()=default

  Default destructor.
- template<typename... Args>
  void CallMethod (std::string const &fn, Args &&... args)

  Calls a method.

Protected Member Functions

- void RegisterMethod (std::string const &fn_name, Void_fn const &fn_obj)

  Registers a single method and its name within the internal method table.
- void RegisterMethods (MethodList_t const &list)

  Registers a list of methods and their names within the internal method table.
- virtual MethodList_t CreateMethodList ()=0

  Creates a vector containing the names of functions, and the callable functions themselves.

Protected Attributes

- MethodTable_t m_Table

  Object mapping a string to a function.

4.17.1 Detailed Description

The purpose of this class is to create a simple interface for calling methods from an object of an unknown type.

For example, within OCAE you have a Sine object currently represented by a GeneratorBasePtr object. To call the Sine method to set the frequency you would utilize this class in the following manner:

```
GeneratorBasePtr obj = CreateSine(440);

Math_t new_freq = 880;
obj->CallMethod("SetFrequency", METHOD_PARAM(new_freq));
obj->CallMethod("GetFrequency", METHOD_RET(new_freq));
```

Here, the `METHOD_RET()` and `METHOD_PARAM()` macros ensure that the values passed to the function will have the proper types, guaranteeing they are handled properly. See the macros' documentation and definition in Macro.hpp for more info.

It is recommended to construct the method table with the default constructor, and then set the methods for the class in a fashion like:

```
Foo:Foo() : MethodTable(), // ...
{
    RegisterMethods(CreateMethodList());

        // or

    RegisterMethod("method1", [this](void *){ method1(); });
    RegisterMethod("method2", [this](void * p){
        method2(
            std::get<0>(
                 *reinterpret_cast<METHOD_PARAM_T(int)>(p)
            )
        );
    });
    // ...
}

Tools::MethodTable::MethodList_t Foo::CreateMethodList()
{
        // Returns initializer list that constructs a MethodList_t
    return {
        std::make_tuple(
            std::string("method1"),
            Tools::MethodTable::Void_fn(
                [this](void *){ method1(); }
            )
        ),
        std::make_tuple(
            std::string("method2"),
            Tools::MethodTable::Void_fn(
                [this](void *){
                    method2(
                        std::get<0>(
                             *reinterpret_cast<METHOD_PARAM_T(int)>(p)
                        )
                    );
                }
            )
        ),
        // ...
    };
}
```

Here, `METHOD_PARAM_T()` is a macro that helps ensure that the type being casted to is in the correct format.

The user creating the derived classes will need to ensure that it properly registers all the methods they want to be accessible through this class in the constructors of the derived classes, including grandchildren classes.

4.17.2 Constructor & Destructor Documentation

4.17.2.1 MethodTable() [1/2]

```
OCAE::Tools::MethodTable::MethodTable ( )
```

Default constructor.

4.17.2.2 MethodTable() [2/2]

```
OCAE::Tools::MethodTable::MethodTable (
            MethodList_t const & list )
```

Consturctor.

Parameters

list	List of tuples for mapping a string to a function to initialize the internal method table.

4.17.2.3 ~MethodTable()

```
virtual OCAE::Tools::MethodTable::~MethodTable ( )  [virtual], [default]
```

Default destructor.

4.17.3 Member Function Documentation

4.17.3.1 CallMethod()

```
template<typename...  Args>
void OCAE::Tools::MethodTable::CallMethod (
            std::string const & fn,
            Args &&...  args )  [inline]
```

Calls a method.

If the provided function name does not exist within the map an exception will be thrown by std::unordered_map and the user will need to handle it if desired.

If the method is to return a value, the first parameter must be a reference to a variable that will store the returned value.

Template Parameters

Args	The arguments' types of the given method.

Parameters

fn	The name of the method. If a function matching this name is registered with the table, an exception will be thrown by std::unordered_map and the user will need to handle it if desired.
args	The parameters for the method.

References CreateMethodList(), RegisterMethod(), and RegisterMethods().

```
00186         {
```

```
00187             using tuple = std::tuple<Args...>;
00188             tuple params(std::forward<Args>(args)...);
00189             m_Table.at(fn)(reinterpret_cast<void*>(&params));
00190         }
```

4.17.3.2 CreateMethodList()

```
virtual MethodList_t OCAE::Tools::MethodTable::CreateMethodList ( )  [protected], [pure virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Implemented in OCAE::Generator::WAV, OCAE::Modifier::BandPass, OCAE::Modifier::Equalizer, OCAE::Modifier::ADSR, OCAE::Modifier::LowPass, OCAE::Modifier::GenericFilter, OCAE::Modifier::Echo, OCAE::Generator::Sine, OCAE::Modifier::Delay, OCAE::Modifier::Gain, OCAE::Modifier::EnvelopeFollower, OCAE::Modifier::ModifierBase, OCAE::Generator::Square, OCAE::Generator::Sawtooth, OCAE::Generator::Triangle, OCAE::Generator::GeneratorBase, and OCAE::Generator::Noise.

Referenced by CallMethod().

4.17.3.3 RegisterMethod()

```
void OCAE::Tools::MethodTable::RegisterMethod (
            std::string const & fn_name,
            Void_fn const & fn_obj )  [protected]
```

Registers a single method and its name within the internal method table.

Parameters

fn_name	The name of the function.
fn_obj	The callable function object.

Referenced by CallMethod().

4.17.3.4 RegisterMethods()

```
void OCAE::Tools::MethodTable::RegisterMethods (
            MethodList_t const & list )  [protected]
```

Registers a list of methods and their names within the internal method table.

Parameters

list	A list of methods and names to be added.

Referenced by CallMethod(), and OCAE::Generator::GeneratorBase::GeneratorBase().

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

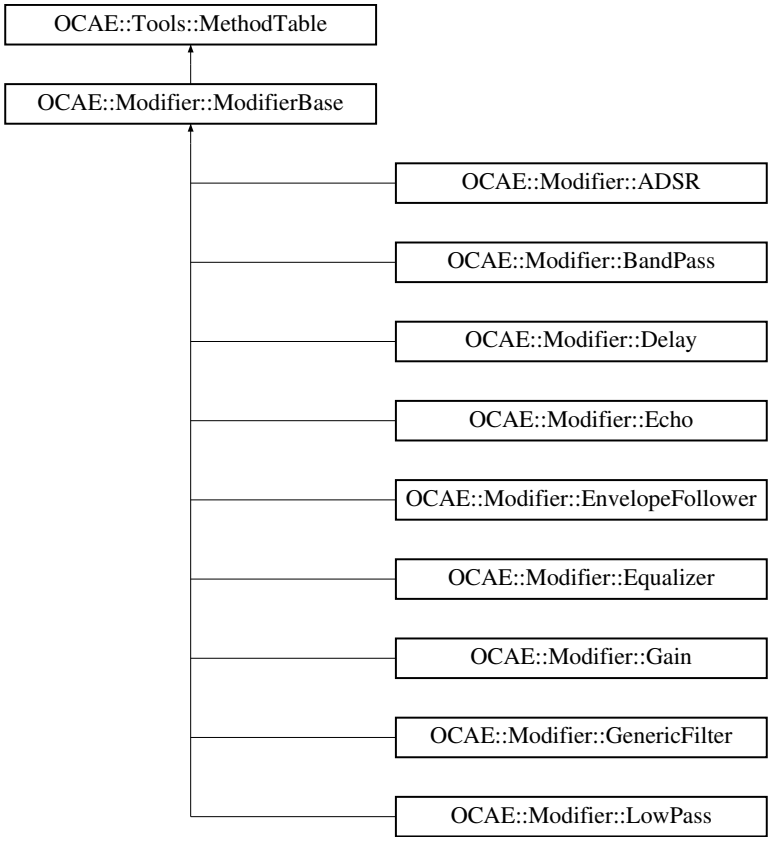
- MethodTable.hpp

4.18 OCAE::Modifier::ModifierBase Class Reference

The base Modifier class that all modifiers should inherit from.

`#include <ModifierBase.hpp>`

Inheritance diagram for OCAE::Modifier::ModifierBase:



Public Member Functions

- ModifierBase (ModifierBase const &other)=delete

  Copy constructor. Deleted.
- ModifierBase (ModifierBase &&other) noexcept=default

  Default move constructor.
- virtual ~ModifierBase ()=default

  Default destructor.
- ModifierBase & operator= (ModifierBase const &rhs)=delete

  Copy assignment operator. Deleted.
- ModifierBase & operator= (ModifierBase &&rhs) noexcept=default

  Default move assignment operator.
- virtual StereoData FilterSample (StereoData const &input)

  Takes input sample and filters it, returning the result.
- virtual bool IsBase ()

  Returns boolean for if the object calling this function is a ModifierBase or not.

Protected Member Functions

- ModifierBase ()

  Default constructor.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()

  Creates a vector containing the names of functions, and the callable functions themselves.

Friends

- class ModifierFactory

  Add the factory as a friend so it can construct ModifierBase objects.

Additional Inherited Members

4.18.1 Detailed Description

The base Modifier class that all modifiers should inherit from.

There are a few functions that should be overridden by derived classes, but are also implemented here for default behavior: FilterSample IsBase (This function will likely be removed in the future) CreateMethodList

See their individual documentation for more info.

4.18.2 Constructor & Destructor Documentation

4.18.2.1 ModifierBase() [1/3]

```
OCAE::Modifier::ModifierBase::ModifierBase (
            ModifierBase const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

4.18.2.2 ModifierBase() [2/3]

```
OCAE::Modifier::ModifierBase::ModifierBase (
            ModifierBase && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.18.2.3 ~ModifierBase()

```
virtual OCAE::Modifier::ModifierBase::~ModifierBase ( )  [virtual], [default]
```

Default destructor.

4.18.2.4 ModifierBase() [3/3]

```
OCAE::Modifier::ModifierBase::ModifierBase ( )  [inline], [protected]
```

Default constructor.

```
00153 : MethodTable() { RegisterMethods(CreateMethodList()); };
```

4.18.3 Member Function Documentation

4.18.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Modifier::ModifierBase::CreateMethodList ( )  [inline],
[protected], [virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Implements OCAE::Tools::MethodTable.

Reimplemented in OCAE::Modifier::BandPass, OCAE::Modifier::Equalizer, OCAE::Modifier::ADSR, OCAE::Modifier::LowPass, OCAE::Modifier::GenericFilter, OCAE::Modifier::Echo, OCAE::Modifier::Delay, OCAE::Modifier::Gain, and OCAE::Modifier::EnvelopeFollower.

References TYPEDEF_SHARED.

```
00165 { return {}; };
```

4.18.3.2 FilterSample()

```
virtual StereoData OCAE::Modifier::ModifierBase::FilterSample (
            StereoData const & input )  [inline], [virtual]
```

Takes input sample and filters it, returning the result.

Parameters

input	The input sample.

Returns

The filtered sample.

Reimplemented in OCAE::Modifier::BandPass, OCAE::Modifier::Equalizer, OCAE::Modifier::ADSR, OCAE::Modifier::LowPass, OCAE::Modifier::Echo, OCAE::Modifier::Delay, OCAE::Modifier::GenericFilter, OCAE::Modifier::Gain, and OCAE::Modifier::EnvelopeFollower.

```
00130 { return input; };
```

4.18.3.3 IsBase()

```
virtual bool OCAE::Modifier::ModifierBase::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object calling this function is a ModifierBase or not.

Returns

True for this class, false for any derived class.

Reimplemented in OCAE::Modifier::BandPass, OCAE::Modifier::Equalizer, OCAE::Modifier::ADSR, OCAE::Modifier::LowPass, OCAE::Modifier::Echo, OCAE::Modifier::Delay, OCAE::Modifier::GenericFilter, OCAE::Modifier::Gain, and OCAE::Modifier::EnvelopeFollower.

```
00140 { return true; };
```

4.18.3.4 operator=() [1/2]

```
ModifierBase& OCAE::Modifier::ModifierBase::operator= (
            ModifierBase const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.18.3.5 operator=() [2/2]

```
ModifierBase& OCAE::Modifier::ModifierBase::operator= (
            ModifierBase && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

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

- ModifierBase.hpp

4.19 OCAE::Modifier::ModifierFactory Class Reference

Factory class for constructing audio filters (Modifiers).

`#include <ModifierFactory.hpp>`

Public Types

- using ZeroContainer = GenericFilter::ZeroContainer

  Container used for coefficients of zeros of a filter in GenericFilter.
- using PoleContainer = GenericFilter::PoleContainer

  Container used for coefficients of poles of a filter in GenericFilter.

Public Member Functions

- ~ModifierFactory ()=delete

  Destructor. Deleted to ensure that an object can never be created.

Static Public Member Functions

- static ModifierBasePtr CreateBase ()

  Creates an empty modifier which will simply forward any input it recieves to it's output.
- static ModifierBasePtr CreateADSR (Math_t attack, Math_t decay, Math_t sustain, Math_t release)

  Creates a modifier for an ADSR envelope.
- static ModifierBasePtr CreateBandPass (Math_t lower, Math_t upper)

  Creates a bandpass filter.
- static ModifierBasePtr CreateDelay (Math_t seconds)

  Creates a delay filter.
- static ModifierBasePtr CreateEcho (Math_t delay_seconds, Math_t decay_ratio)

  Creates an echo filter.
- static ModifierBasePtr CreateEqualizer (uint32_t band_count=2, Math_t lower=20, Math_t upper=20000)

  Creates an equalizer filter.
- static ModifierBasePtr CreateEnvelopeFollower (Math_t lower=Math_t(20), Math_t upper=Math_t(20000))

  Creates an envelope follower filter.
- static ModifierBasePtr CreateGain (Math_t gain=DEFAULT_GAIN)

  Creates a gain filter.
- static ModifierBasePtr CreateGenericFilter (ZeroContainer const &zeros, PoleContainer const &poles)

  Creates a generic filter.
- static ModifierBasePtr CreateLowPass (Math_t cutoff, Math_t resonance=0)

  Creates a low pass filter.

4.19.1 Detailed Description

Factory class for constructing audio filters (Modifiers).

4.19.2 Constructor & Destructor Documentation

4.19.2.1 ~ModifierFactory()

```
OCAE::Modifier::ModifierFactory::~ModifierFactory ( )  [delete]
```

Destructor. Deleted to ensure that an object can never be created.

4.19.3 Member Function Documentation

4.19.3.1 CreateADSR()

```
static ModifierBasePtr OCAE::Modifier::ModifierFactory::CreateADSR (
            Math_t attack,
            Math_t decay,
            Math_t sustain,
            Math_t release )  [static]
```

Creates a modifier for an ADSR envelope.

Parameters

attack	The length of the attack phase in seconds.
decay	The length of the decay phase in seconds.
sustain	The sustain level in dB.
release	The length of the decay phase in seconds.

Returns

The generated modifier object.

4.19.3.2 CreateBandPass()

```
static ModifierBasePtr OCAE::Modifier::ModifierFactory::CreateBandPass (
            Math_t lower,
            Math_t upper )  [static]
```

Creates a bandpass filter.

Parameters

lower	The lower frequency of the band.
upper	The upper frequency of the band.

Returns

The generated modifier object.

4.19.3.3 CreateBase()

```
static ModifierBasePtr OCAE::Modifier::ModifierFactory::CreateBase ( )  [static]
```

Creates an empty modifier which will simply forward any input it recieves to it's output.

Returns

The generated modifier object.

4.19.3.4 CreateDelay()

```
static ModifierBasePtr OCAE::Modifier::ModifierFactory::CreateDelay (
            Math_t seconds )  [static]
```

Creates a delay filter.

Parameters

seconds	The amount of time in seconds to delay for.

Returns

The generated modifier object.

4.19.3.5 CreateEcho()

```
static ModifierBasePtr OCAE::Modifier::ModifierFactory::CreateEcho (
            Math_t delay_seconds,
            Math_t decay_ratio )  [static]
```

Creates an echo filter.

Parameters

delay_seconds	The amount of time between echos in seconds.
decay_ratio	The decay factor of the echo. Value should be in range of [0,1), if it's >= 1 or < 0 it will be clamped to the range.

Returns

The generated modifier object.

4.19.3.6 CreateEnvelopeFollower()

```
static ModifierBasePtr OCAE::Modifier::ModifierFactory::CreateEnvelopeFollower (
            Math_t lower = Math_t(20),
            Math_t upper = Math_t(20000) )  [static]
```

Creates an envelope follower filter.

Parameters

lower	The lower end of frequencies to follow. Defaults to 20Hz for normal human hearing range.
upper	The upper end of frequencies to follow. Defaults to 20kHz for normal human hearing range.

Returns

The generated modifier object.

4.19.3.7 CreateEqualizer()

```
static ModifierBasePtr OCAE::Modifier::ModifierFactory::CreateEqualizer (
            uint32_t band_count = 2,
            Math_t lower = 20,
            Math_t upper = 20000 )  [static]
```

Creates an equalizer filter.

Parameters

band_count	The number of bands in the equalizer. Defaults to 2.
lower	The lowest frequency of the equalizer. Defaults to 20Hz.
upper	The highest frequency of the equalizer. Defaults to 20kHz.

Returns

The generated modifier object.

4.19.3.8 CreateGain()

```
static ModifierBasePtr OCAE::Modifier::ModifierFactory::CreateGain (
            Math_t gain = DEFAULT_GAIN )  [static]
```

Creates a gain filter.

Parameters

gain	The gain to amplify the signal by. Value may be negative.

Returns

The generated modifier object.

4.19.3.9 CreateGenericFilter()

```
static ModifierBasePtr OCAE::Modifier::ModifierFactory::CreateGenericFilter (
            ZeroContainer const & zeros,
            PoleContainer const & poles )  [static]
```

Creates a generic filter.

Parameters

zeros	The list of coefficients for the zeros of the filter.
poles	The list of coefficients for the poles of the filter.

Returns

The generated modifier object.

4.19.3.10 CreateLowPass()

```
static ModifierBasePtr OCAE::Modifier::ModifierFactory::CreateLowPass (
            Math_t cutoff,
            Math_t resonance = 0 )  [static]
```

Creates a low pass filter.

Parameters

cutoff	The cutoff frequency of the filter.
resonance	The resonance of the filter at the cutoff frequency. Should be in the range of [0, 1/6], if the value is outside of this, it will be clamped to the range. Defaults to 0 for no resonance

Returns

The generated modifier object.

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

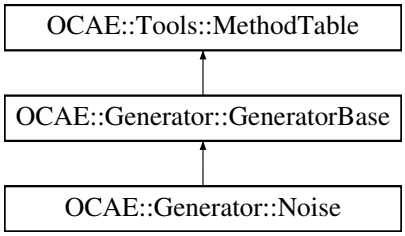
- ModifierFactory.hpp

4.20 OCAE::Generator::Noise Class Reference

Generates white noise.

`#include <Noise.hpp>`

Inheritance diagram for OCAE::Generator::Noise:



Public Member Functions

- Noise (Noise const &other)=delete

  Copy constructor. Deleted.
- Noise (Noise &&other) noexcept=default

  Default move constructor.
- virtual ~Noise ()=default

  Default destructor.
- Noise & operator= (Noise const &rhs)=delete

  Copy assignment operator. Deleted.
- Noise & operator= (Noise &&rhs) noexcept=default

  Default move assignment operator.
- virtual StereoData SendSample (void)

  Calculates the sample. For the base class this is simply 0.
- virtual bool IsBase ()

  Returns boolean for if the object is a GeneratorBase or not.

Protected Member Functions

- Noise ()

  Constructor.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()

  Creates a vector containing the names of functions, and the callable functions themselves.

Private Attributes

- std::uniform_int_distribution< int16_t > m_Distribution

  Distribution for random value generation.
- std::default_random_engine m_Engine

  Random value engine.

Friends

- class GeneratorFactory

  Add the factory as a friend so it can construct Noise objects.

Additional Inherited Members

4.20.1 Detailed Description

Generates white noise.

4.20.2 Constructor & Destructor Documentation

4.20.2.1 Noise() [1/3]

```
OCAE::Generator::Noise::Noise (
            Noise const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

4.20.2.2 Noise() [2/3]

```
OCAE::Generator::Noise::Noise (
            Noise && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.20.2.3 ~Noise()

```
virtual OCAE::Generator::Noise::~Noise ( )  [virtual], [default]
```

Default destructor.

4.20.2.4 Noise() [3/3]

```
OCAE::Generator::Noise::Noise ( )  [protected]
```

Constructor.

Referenced by IsBase().

4.20.3 Member Function Documentation

4.20.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Generator::Noise::CreateMethodList ( )  [inline],
[protected], [virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Generator::GeneratorBase.

References TYPEDEF_SHARED.

```
00147 { return {}; };
```

4.20.3.2 IsBase()

```
virtual bool OCAE::Generator::Noise::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object is a GeneratorBase or not.

Returns

False.

Reimplemented from OCAE::Generator::GeneratorBase.

References Noise().

```
00122 { return false; };
```

4.20.3.3 operator=() [1/2]

```
Noise& OCAE::Generator::Noise::operator= (
            Noise const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.20.3.4 operator=() [2/2]

```
Noise& OCAE::Generator::Noise::operator= (
            Noise && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

4.20.3.5 SendSample()

```
virtual StereoData OCAE::Generator::Noise::SendSample (
            void  )  [virtual]
```

Calculates the sample. For the base class this is simply 0.

Returns

The stereo sample data.

Reimplemented from OCAE::Generator::GeneratorBase.

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

- Noise.hpp

4.21 OCAE::Tools::Resampler Class Reference

Class for taking audio data of one sampling rate and translating it to another sampling rate.

`#include <Resampler.hpp>`

Public Member Functions

- Resampler (std::vector< StereoData > const &AudioData, int32_t SourceSampleRate, uint64_t LoopStart=0, uint64_t LoopEnd=0)

  Constructor for the resampler. If the resampler is set up to loop, the range of the looping is [LoopStart, LoopEnd).
- void SetPlaybackSpeed (Math_t playback_speed=1.0)

  Sets the playback speed. 1.0 is original playback speed.
- StereoData SendSample ()

  Sends a single sample to Core::Driver for output to the OS.

Private Types

- using Index_t = Math_t

  Type used for fractional indexing.

Private Attributes

- std::vector< StereoData > m_Data

  The original audio data.
- Index_t m_Index

  The index for tracking position within the audio data.
- Math_t const m_IndexIncrement

  The value to increment the index by.
- Math_t m_PlaybackSpeed

  The playback speed, allows speeding up and slowing down the data.
- uint64_t m_LoopStart

  The start position of the loop in samples, if any.
- uint64_t m_LoopEnd

  The end position of the loop in samples, if any.

4.21.1 Detailed Description

Class for taking audio data of one sampling rate and translating it to another sampling rate.

4.21.2 Constructor & Destructor Documentation

4.21.2.1 Resampler()

```
OCAE::Tools::Resampler::Resampler (
            std::vector< StereoData > const & AudioData,
            int32_t SourceSampleRate,
            uint64_t LoopStart = 0,
            uint64_t LoopEnd = 0 )
```

Constructor for the resampler. If the resampler is set up to loop, the range of the looping is [LoopStart, LoopEnd).

Parameters

AudioData	A const reference to the audio data.
SourceSampleRate	The sample rate of the source data.
LoopStart	The sample to start looping from. Defaults to 0.
LoopEnd	The sample at the loop point to loop back to LoopStart. Defaults to 0, which is interpretted as no looping.

4.21.3 Member Function Documentation

4.21.3.1 SendSample()

```
StereoData OCAE::Tools::Resampler::SendSample ( )
```

Sends a single sample to Core::Driver for output to the OS.

Returns

The stereo sample data.

4.21.3.2 SetPlaybackSpeed()

```
void OCAE::Tools::Resampler::SetPlaybackSpeed (
            Math_t playback_speed = 1.0 )
```

Sets the playback speed. 1.0 is original playback speed.

Parameters

playback_speed	The playback speed

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

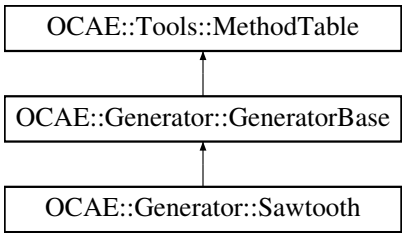
- Resampler.hpp

4.22 OCAE::Generator::Sawtooth Class Reference

Generates a sawtooth sound.

`#include <Sawtooth.hpp>`

Inheritance diagram for OCAE::Generator::Sawtooth:



Public Member Functions

- Sawtooth (Sawtooth const &other)=delete

  Copy constructor. Deleted.
- Sawtooth (Sawtooth &&other) noexcept=default

  Default move constructor.
- virtual ~Sawtooth ()=default

  Default destructor.
- Sawtooth & operator= (Sawtooth const &rhs)=delete

  Copy assignment operator. Deleted.
- Sawtooth & operator= (Sawtooth &&rhs) noexcept=default

  Default move assignment operator.
- void SetFrequency (Math_t freq)

  Sets a new frequency.
- virtual StereoData SendSample (void)

  Calculates the sample. For the base class this is simply 0.
- virtual bool IsBase ()

  Returns boolean for if the object is a GeneratorBase or not.

Private Member Functions

- Sawtooth (Math_t freq)

  Constructor.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()

  Creates a vector containing the names of functions, and the callable functions themselves.

Private Attributes

- Math_t m_lrate

  Combination of the sampling rate and desired frequency.
- Math_t m_lnc

  Sample to sample increment value.

Friends

- class GeneratorFactory

  Add the factory as a friend so it can construct Sawtooth objects.

Additional Inherited Members

4.22.1 Detailed Description

Generates a sawtooth sound.

4.22.2 Constructor & Destructor Documentation

4.22.2.1 Sawtooth() [1/3]

```
OCAE::Generator::Sawtooth::Sawtooth (
            Sawtooth const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

Referenced by IsBase().

4.22.2.2 Sawtooth() [2/3]

```
OCAE::Generator::Sawtooth::Sawtooth (
            Sawtooth && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.22.2.3 ~Sawtooth()

```
virtual OCAE::Generator::Sawtooth::~Sawtooth ( )  [virtual], [default]
```

Default destructor.

4.22.2.4 Sawtooth() [3/3]

```
OCAE::Generator::Sawtooth::Sawtooth (
            Math_t freq )  [private]
```

Constructor.

Parameters

freq	The frequency for the generator.

4.22.3 Member Function Documentation

4.22.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Generator::Sawtooth::CreateMethodList ( )  [private],
[virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Generator::GeneratorBase.

Referenced by IsBase().

4.22.3.2 IsBase()

```
virtual bool OCAE::Generator::Sawtooth::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object is a GeneratorBase or not.

Returns

False.

Reimplemented from OCAE::Generator::GeneratorBase.

References CreateMethodList(), Sawtooth(), and TYPEDEF_SHARED.

```
00129 { return false; };
```

4.22.3.3 operator=() [1/2]

```
Sawtooth& OCAE::Generator::Sawtooth::operator= (
            Sawtooth const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.22.3.4 operator=() [2/2]

```
Sawtooth& OCAE::Generator::Sawtooth::operator= (
            Sawtooth && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

4.22.3.5 SendSample()

```
virtual StereoData OCAE::Generator::Sawtooth::SendSample (
            void  )  [virtual]
```

Calculates the sample. For the base class this is simply 0.

Returns

The stereo sample data.

Reimplemented from OCAE::Generator::GeneratorBase.

4.22.3.6 SetFrequency()

```
void OCAE::Generator::Sawtooth::SetFrequency (
            Math_t freq )
```

Sets a new frequency.

Parameters

freq	The new frequency.

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

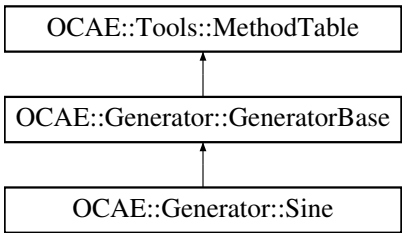
- Sawtooth.hpp

4.23 OCAE::Generator::Sine Class Reference

Generates sine data at the given frequency.

`#include <Sine.hpp>`

Inheritance diagram for OCAE::Generator::Sine:



Public Member Functions

- Sine (Sine const &other)=delete
  Copy constructor. Deleted.
- Sine (Sine &&other) noexcept=default
  Default move constructor.
- virtual ~Sine ()=default
  Destructor.
- Sine & operator= (Sine const &rhs)=delete
  Copy assignment operator. Deleted.
- Sine & operator= (Sine &&rhs) noexcept=default
  Default move assignment operator.
- void SetFrequency (Math_t freq)
  Sets the frequency to a new value.
- Math_t GetFrequency () const
  Gets the current frequency.
- virtual StereoData SendSample (void)
  Sends a single sample to Core::Driver for output to the OS.
- virtual bool IsBase ()
  Returns boolean for if the object is a GeneratorBase or not.

Protected Member Functions

- Sine (Math_t freq)
  Creates an object that outputs a simple sine wave without using inefficient functions like std::sin.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()
  Creates a vector containing the names of functions, and the callable functions themselves.
- void Reset (void)
  Sets all the coefficients for calculating samples.

Private Attributes

- Math_t irate
  Combination of the sampling rate and desired frequency.
- SampleType y1
  Previous sample.
- SampleType y2
  Previous sample.
- Math_t beta
  Sinusoidal recurrence relation.

Friends

- class GeneratorFactory

  Add the factory as a friend so it can construct Sine objects.

Additional Inherited Members

4.23.1 Detailed Description

Generates sine data at the given frequency.

4.23.2 Constructor & Destructor Documentation

4.23.2.1 Sine() [1/3]

```
OCAE::Generator::Sine::Sine (
            Sine const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

Referenced by IsBase().

4.23.2.2 Sine() [2/3]

```
OCAE::Generator::Sine::Sine (
            Sine && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.23.2.3 ~Sine()

```
virtual OCAE::Generator::Sine::~Sine ( )  [virtual], [default]
```

Destructor.

4.23.2.4 Sine() [3/3]

```
OCAE::Generator::Sine::Sine (
            Math_t freq )  [protected]
```

Creates an object that outputs a simple sine wave without using inefficient functions like std::sin.

Parameters

freq	The frequency for the sine-wav to output at.

4.23.3 Member Function Documentation

4.23.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Generator::Sine::CreateMethodList ( )  [protected],
[virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Generator::GeneratorBase.

Referenced by IsBase().

4.23.3.2 GetFrequency()

```
Math_t OCAE::Generator::Sine::GetFrequency ( ) const
```

Gets the current frequency.

Returns

The frequency of the generator.

4.23.3.3 IsBase()

```
virtual bool OCAE::Generator::Sine::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object is a GeneratorBase or not.

Returns

False.

Reimplemented from OCAE::Generator::GeneratorBase.

References CreateMethodList(), Reset(), Sine(), and TYPEDEF_SHARED.

```
00142 { return false; };
```

4.23.3.4 operator=() [1/2]

```
Sine& OCAE::Generator::Sine::operator= (
            Sine const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.23.3.5 operator=() [2/2]

```
Sine& OCAE::Generator::Sine::operator= (
            Sine && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

4.23.3.6 Reset()

```
void OCAE::Generator::Sine::Reset (
            void  )  [protected]
```

Sets all the coefficients for calculating samples.

Referenced by IsBase().

4.23.3.7 SendSample()

```
virtual StereoData OCAE::Generator::Sine::SendSample (
            void  )  [virtual]
```

Sends a single sample to Core::Driver for output to the OS.

Returns

The stereo sample data.

Reimplemented from OCAE::Generator::GeneratorBase.

4.23.3.8 SetFrequency()

```
void OCAE::Generator::Sine::SetFrequency (
            Math_t freq )
```

Sets the frequency to a new value.

Parameters

freq	The new frequency.

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

- Sine.hpp

4.24 OCAE::Sound::Sound Class Reference

Class for handling Generator and Modifier objects in a more abstract way in conjunction with a Driver.

`#include <Sound.hpp>`

Classes

- struct Edge

  Structure representing the edges of the graph that defines a Sound.

Public Types

- using Graph = std::deque< EdgePtr >

  Alias for the structure that represents the graph blocks that make up this Sound.

Public Member Functions

- TYPEDEF_SHARED (Edge)

  Alias for std::shared_ptr instantiated with Edge.
- Sound (Math_t input_gain=Math_t(1.0), Math_t output_gain=DEFAULT_GAIN)

  Default constructor.
- Sound (Sound const &other)

  Copy constructor. NOTE: The contsructed sound will not be registered to a driver, even if the sound being copied is.
- Sound (Sound &&other) noexcept

  Move constructor. NOTE: The constructed sound will not be registered to a driver, even if the sound being moved is.
- ~Sound ()=default

  Default destructor.
- Sound & operator= (Sound const &rhs)

  Copy assignment operator. NOTE: The copied sound will not change it's registration. If it needs to be registered to a different driver, you must handle that yourself.
- Sound & operator= (Sound &&rhs) noexcept

  Move assignment operator. NOTE: The moved sound will not change it's registration. If it needs to be registered to a different driver, you must handle that yourself.
- Graph & GetGraph ()

Returns a reference to the internal graph for direct modification of the structure.

- Graph const & GetGraph () const

  Returns a reference to the internal graph for direct modification of the structure.

- void SetInputGain (Math_t gain)

  Sets the gain for the input.

- void SetOutputGain (Math_t gain)

  Sets the gain for the output.

- void Pause ()

  Pauses the processing of this sound.

- void Unpause ()

  Unpauses the processing of this sound.

- void PrimeInput (StereoData input)

  Primes the input for the next processing round.

- void Process ()

  Processes audio configured in the internal graph, storing the output internally.

- StereoData LastOutput ()

  Returns the output from the previous round of processing.

Static Public Member Functions

- static EdgePtr CreateEdge (std::deque< Edge::E_BlockPtr > const &in, Combinator const &comb, std::deque< Edge::E_BlockPtr > const &out)

  Generates an Edge for the graph from the given lists of input blocks, output blocks, and a Combinator defining how the blocks should be combined.

- static Edge::E_BlockPtr CreateE_Block (SoundPtr const &sound)

  Creates an E_Block object from the given Sound.

- static Edge::E_BlockPtr CreateE_Block (BlockPtr const &block)

  Creates an E_Block object from the given Block.

- static void Register (SoundPtr const &self, Core::DriverPtr const &driver)

  Registers the given Sound object with the given Driver. If this Sound is already registered to a Driver, it will unregister itself before registering to the new Driver.

- static void Unregister (SoundPtr const &self)

  Unregisters the given Sound object from it's registered Driver.

Private Member Functions

- void MakeUnique ()

  Ensures that the internal graph contains only unique objects. If an object is not unique, it will create a copy of the object.

Private Attributes

- Graph m_Graph

  The graph of blocks.
- Modifier::ModifierBasePtr m_InputGain

  Input gain modifier.
- Modifier::ModifierBasePtr m_OutputGain

  Output gain modifier.
- StereoData m_Input

  Input sample.
- StereoData m_Output

  Output sample.
- Core::DriverPtr m_Driver

  Driver the Sound is registered with.
- uint64_t m_ID

  The ID of this Sound within the Driver.
- bool m_IsPaused

  Controls if the sound will Process.

4.24.1 Detailed Description

Class for handling Generator and Modifier objects in a more abstract way in conjunction with a Driver.

4.24.2 Constructor & Destructor Documentation

4.24.2.1 Sound() [1/3]

```
OCAE::Sound::Sound::Sound (
            Math_t input_gain = Math_t(1.0),
            Math_t output_gain = DEFAULT_GAIN )
```

Default constructor.

Parameters

input_gain	The gain for the input samples.
output_gain	The gain for the output samples.

4.24.2.2 Sound() [2/3]

```
OCAE::Sound::Sound::Sound (
            Sound const & other )
```

Copy constructor. NOTE: The contsructed sound will not be registered to a driver, even if the sound being copied is.

Parameters

other	The other sound being copied

4.24.2.3 Sound() [3/3]

```
OCAE::Sound::Sound::Sound (
            Sound && other )  [noexcept]
```

Move constructor. NOTE: The constructed sound will not be registered to a driver, even if the sound being moved is.

Parameters

other	The other sound being moved.

4.24.3 Member Function Documentation

4.24.3.1 CreateE_Block() [1/2]

```
static Edge::E_BlockPtr OCAE::Sound::Sound::CreateE_Block (
            SoundPtr const & sound )  [static]
```

Creates an E_Block object from the given Sound.

Parameters

sound	The Sound to be wrapped in an E_Block. Cannot be the same Sound object as the object the E_Block is added to or else endless recursion will occur.

Returns

The new E_Block object wrapped in a std::shared_ptr.

4.24.3.2 CreateE_Block() [2/2]

```
static Edge::E_BlockPtr OCAE::Sound::Sound::CreateE_Block (
            BlockPtr const & block )  [static]
```

Creates an E_Block object from the given Block.

Parameters

block	The Block to be wrapped in the E_Block.

Returns

The new E_Block object wrapped in a std::shared_ptr.

4.24.3.3 CreateEdge()

```
static EdgePtr OCAE::Sound::Sound::CreateEdge (
            std::deque< Edge::E_BlockPtr > const & in,
            Combinator const & comb,
            std::deque< Edge::E_BlockPtr > const & out )  [static]
```

Generates an Edge for the graph from the given lists of input blocks, output blocks, and a Combinator defining how the blocks should be combined.

Parameters

in	List of input blocks.
comb	Combinator. See Combinator documentation for more info.
out	List of output blocks.

Returns

The generated Edge object wrapped in a std::shared_ptr.

4.24.3.4 GetGraph() [1/2]

```
Graph& OCAE::Sound::Sound::GetGraph ( )
```

Returns a reference to the internal graph for direct modification of the structure.

Returns

A reference to the internal graph.

4.24.3.5 GetGraph() [2/2]

```
Graph const& OCAE::Sound::Sound::GetGraph ( ) const
```

Returns a reference to the internal graph for direct modification of the structure.

Returns

A reference to the internal graph.

4.24.3.6 LastOutput()

```
StereoData OCAE::Sound::Sound::LastOutput ( )
```

Returns the output from the previous round of processing.

Returns

The most recent output sample.

4.24.3.7 MakeUnique()

```
void OCAE::Sound::Sound::MakeUnique ( )  [private]
```

Ensures that the internal graph contains only unique objects. If an object is not unique, it will create a copy of the object.

4.24.3.8 operator=() [1/2]

```
Sound& OCAE::Sound::Sound::operator= (
            Sound const & rhs )
```

Copy assignment operator. NOTE: The copied sound will not change it's registration. If it needs to be registered to a different driver, you must handle that yourself.

Parameters

rhs	The sound being copied.

Returns

this.

4.24.3.9 operator=() [2/2]

```
Sound& OCAE::Sound::Sound::operator= (
            Sound && rhs )  [noexcept]
```

Move assignment operator. NOTE: The moved sound will not change it's registration. If it needs to be registered to a different driver, you must handle that yourself.

Parameters

rhs	The sound being moved.

Returns

this.

4.24.3.10 Pause()

```
void OCAE::Sound::Sound::Pause ( )
```

Pauses the processing of this sound.

4.24.3.11 PrimeInput()

```
void OCAE::Sound::Sound::PrimeInput (
            StereoData input )
```

Primes the input for the next processing round.

Parameters

input	The input to be processed.

4.24.3.12 Process()

```
void OCAE::Sound::Sound::Process ( )
```

Processes audio configured in the internal graph, storing the output internally.

4.24.3.13 Register()

```
static void OCAE::Sound::Sound::Register (
            SoundPtr const & self,
            Core::DriverPtr const & driver )  [static]
```

Registers the given Sound object with the given Driver. If this Sound is already registered to a Driver, it will unregister itself before registering to the new Driver.

Parameters

self	The Sound object to register to the given Driver.
driver	The Driver the given Sound object will be registered to.

4.24.3.14 SetInputGain()

```
void OCAE::Sound::Sound::SetInputGain (
            Math_t gain )
```

Sets the gain for the input.

Parameters

gain	The new gain.

4.24.3.15 SetOutputGain()

```
void OCAE::Sound::Sound::SetOutputGain (
            Math_t gain )
```

Sets the gain for the output.

Parameters

gain	The new gain.

4.24.3.16 Unpause()

```
void OCAE::Sound::Sound::Unpause ( )
```

Unpauses the processing of this sound.

4.24.3.17 Unregister()

```
static void OCAE::Sound::Sound::Unregister (
            SoundPtr const & self )  [static]
```

Unregisters the given Sound object from it's registered Driver.

Parameters

self	The Sound object to unregister.

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

- Sound.hpp

4.25 OCAE::Sound::SoundFactory Class Reference

Class containing functions that will generate Sound and Block objects from common inputs.

```
#include <SoundFactory.hpp>
```

Public Member Functions

- ~SoundFactory ()=delete

  Deleted destructor, ensuring an instance of this class can never be created.

Static Public Member Functions

- static SoundPtr CreateEmptySound ()

  Creates a Sound object with no associated generators or modifiers.
- static SoundPtr CreateBasicGenerator (Generator::GeneratorBasePtr const &g)

  Creates a Sound object from a given generator.
- static SoundPtr CreateBasicModifier (Modifier::ModifierBasePtr const &m)

  Creates a Sound object from a given modifier. The modifier takes input from the input the Sound object is given.
- static BlockPtr CreateBlock (Generator::GeneratorBasePtr const &g)

  Creates a Block object from a given generator.
- static BlockPtr CreateBlock (Modifier::ModifierBasePtr const &m)

  Creates a Block object from a given modifier.
- static BlockPtr CreateBlock (Generator::GeneratorBasePtr const &g, Modifier::ModifierBasePtr const &m)

  Creates a Block object from a given generator and modifier.
- static BlockPtr CreateBlock (Generator::GeneratorBasePtr const &g, Modifier::ModifierBasePtr const &m, Block::Interaction_f const &interactor)

  Creates a Block object from a given generator, modifier, and interactor.

4.25.1 Detailed Description

Class containing functions that will generate Sound and Block objects from common inputs.

4.25.2 Member Function Documentation

4.25.2.1 CreateBasicGenerator()

```
static SoundPtr OCAE::Sound::SoundFactory::CreateBasicGenerator (
            Generator::GeneratorBasePtr const & g )  [static]
```

Creates a Sound object from a given generator.

Parameters

g	The generator to be processed within this Sound object.

Returns

The generated Sound object wrapped inside a std::shared_ptr.

4.25.2.2 CreateBasicModifier()

```
static SoundPtr OCAE::Sound::SoundFactory::CreateBasicModifier (
            Modifier::ModifierBasePtr const & m )  [static]
```

Creates a Sound object from a given modifier. The modifier takes input from the input the Sound object is given.

Parameters

m	The modifier to be processed within this Sound object.

Returns

The generated Sound object wrapped inside a std::shared_ptr.

4.25.2.3 CreateBlock() [1/4]

```
static BlockPtr OCAE::Sound::SoundFactory::CreateBlock (
            Generator::GeneratorBasePtr const & g )  [static]
```

Creates a Block object from a given generator.

When processed, the output of the generator is forwarded to the output of the Block.

Parameters

g	The generator to be held within the Block.

Returns

The generated Block object wrapped inside a std::shared_ptr.

4.25.2.4 CreateBlock() [2/4]

```
static BlockPtr OCAE::Sound::SoundFactory::CreateBlock (
            Modifier::ModifierBasePtr const & m )  [static]
```

Creates a Block object from a given modifier.

When processed, the output of the modifier is forwarded to the output of the Block.

Parameters

m	The modifier to be held within the Block.

Returns

The generated Block object wrapped inside a std::shared_ptr.

4.25.2.5 CreateBlock() [3/4]

```
static BlockPtr OCAE::Sound::SoundFactory::CreateBlock (
            Generator::GeneratorBasePtr const & g,
            Modifier::ModifierBasePtr const & m )  [static]
```

Creates a Block object from a given generator and modifier.

When processed, the output of the generator and modifier are multiplied together and sent to the output of the Block.

Parameters

g	The generator to be held within the Block.
m	The modifier to be held within the Block.

Returns

The generated Block object wrapped inside a std::shared_ptr.

4.25.2.6 CreateBlock() [4/4]

```
static BlockPtr OCAE::Sound::SoundFactory::CreateBlock (
            Generator::GeneratorBasePtr const & g,
            Modifier::ModifierBasePtr const & m,
            Block::Interaction_f const & interactor )  [static]
```

Creates a Block object from a given generator, modifier, and interactor.

When processed, the output of the generator and modifier are combined together using the given interactor and sent to the output of the Block.

Parameters

g	The generator to be held within the Block.
m	The modifier to be held within the Block.
interactor	A function that will combine outputs from the generator and modifier when the Block is processed.

Returns

The generated Block object wrapped inside a std::shared_ptr.

4.25.2.7 CreateEmptySound()

```
static SoundPtr OCAE::Sound::SoundFactory::CreateEmptySound ( )  [static]
```

Creates a Sound object with no associated generators or modifiers.

Returns

The generated Sound object wrapped inside a std::shared_ptr.

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

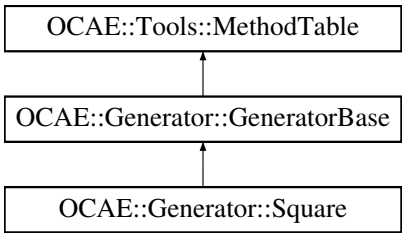
- SoundFactory.hpp

4.26 OCAE::Generator::Square Class Reference

Generates square wave data at the given frequency.

`#include <Square.hpp>`

Inheritance diagram for OCAE::Generator::Square:



Public Member Functions

- Square (Square const &other)=delete
  Copy constructor. Deleted.
- Square (Square &&other) noexcept=default
  Default move constructor.
- virtual ~Square ()=default
  Destructor.
- Square & operator= (Square const &rhs)=delete
  Copy assignment operator. Deleted.
- Square & operator= (Square &&rhs) noexcept=default
  Default move assignment operator.
- virtual StereoData SendSample (void)
  Sends a single sample to Core::Driver for output to the OS.
- virtual bool IsBase ()
  Returns boolean for if the object is a GeneratorBase or not.
- void SetFrequency (Math_t freq)
  Sets the frequency to a new value.

Private Member Functions

- Square (Math_t freq)

  Creates an object that outputs a simple square wave without using inefficient functions like std::sin.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()

  Creates a vector containing the names of functions, and the callable functions themselves.

Private Attributes

- Math_t m_Ind

  Current time value.
- Math_t m_Inv

  Point of inversion.

Friends

- class GeneratorFactory

  Add the factory as a friend so it can construct Square objects.

Additional Inherited Members

4.26.1 Detailed Description

Generates square wave data at the given frequency.

4.26.2 Constructor & Destructor Documentation

4.26.2.1 Square() [1/3]

```
OCAE::Generator::Square::Square (
            Square const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

4.26.2.2 Square() [2/3]

```
OCAE::Generator::Square::Square (
            Square && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.26.2.3 ~Square()

```
virtual OCAE::Generator::Square::~Square ( )  [virtual], [default]
```

Destructor.

4.26.2.4 Square() [3/3]

```
OCAE::Generator::Square::Square (
            Math_t freq )  [private]
```

Creates an object that outputs a simple square wave without using inefficient functions like std::sin.

Parameters

freq	The frequency for the square wav to output at.

4.26.3 Member Function Documentation

4.26.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Generator::Square::CreateMethodList ( )  [private],
[virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Generator::GeneratorBase.

4.26.3.2 IsBase()

```
virtual bool OCAE::Generator::Square::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object is a GeneratorBase or not.

Returns

False.

Reimplemented from OCAE::Generator::GeneratorBase.

References SetFrequency().

```
00120 { return false; };
```

4.26.3.3 operator=() [1/2]

```
Square& OCAE::Generator::Square::operator= (
            Square const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.26.3.4 operator=() [2/2]

```
Square& OCAE::Generator::Square::operator= (
            Square && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

4.26.3.5 SendSample()

```
virtual StereoData OCAE::Generator::Square::SendSample (
            void  )  [virtual]
```

Sends a single sample to Core::Driver for output to the OS.

Returns

The stereo sample data.

Reimplemented from OCAE::Generator::GeneratorBase.

4.26.3.6 SetFrequency()

```
void OCAE::Generator::Square::SetFrequency (
            Math_t freq )
```

Sets the frequency to a new value.

Parameters

freq	The new frequency.

Referenced by IsBase().

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

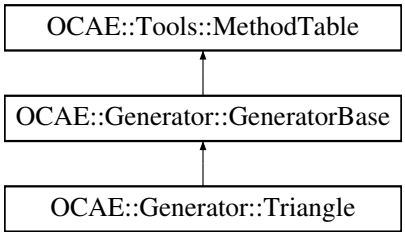
- Square.hpp

4.27 OCAE::Generator::Triangle Class Reference

Triangle wave generator.

`#include <Triangle.hpp>`

Inheritance diagram for OCAE::Generator::Triangle:



Public Member Functions

- Triangle (Triangle const &other)=delete

  Copy constructor. Deleted.
- Triangle (Triangle &&other) noexcept=default

  Default move constructor.
- virtual ~Triangle ()=default

  Default destructor.
- Triangle & operator= (Triangle const &rhs)=delete

  Copy assignment operator. Deleted.
- Triangle & operator= (Triangle &&rhs) noexcept=default

  Default move assignment operator.
- void SetFrequency (Math_t freq)

  Sets a new frequency for the generator.
- virtual StereoData SendSample (void)

  Calculates the sample. For the base class this is simply 0.
- virtual bool IsBase ()

  Returns boolean for if the object is a GeneratorBase or not.

Private Member Functions

- Triangle (Math_t freq)

  Constructor.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()

  Creates a vector containing the names of functions, and the callable functions themselves.

Private Attributes

- Math_t m_Irate

  Combination of the sampling rate and desired frequency.
- Math_t m_Inc

  Sample to sample increment value.

Friends

- class GeneratorFactory

  Add the factory as a friend so it can construct Triangle objects.

Additional Inherited Members

4.27.1 Detailed Description

Triangle wave generator.

4.27.2 Constructor & Destructor Documentation

4.27.2.1 Triangle() [1/3]

```
OCAE::Generator::Triangle::Triangle (
            Triangle const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

Referenced by IsBase().

4.27.2.2 Triangle() [2/3]

```
OCAE::Generator::Triangle::Triangle (
            Triangle && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.27.2.3 ~Triangle()

```
virtual OCAE::Generator::Triangle::~Triangle ( )  [virtual], [default]
```

Default destructor.

4.27.2.4 Triangle() [3/3]

```
OCAE::Generator::Triangle::Triangle (
            Math_t freq )  [private]
```

Constructor.

Parameters

freq	The frequency for the generator.

4.27.3 Member Function Documentation

4.27.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Generator::Triangle::CreateMethodList ( )  [private],
[virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Generator::GeneratorBase.

Referenced by IsBase().

4.27.3.2 IsBase()

```
virtual bool OCAE::Generator::Triangle::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object is a GeneratorBase or not.

Returns

False.

Reimplemented from OCAE::Generator::GeneratorBase.

References CreateMethodList(), Triangle(), and TYPEDEF_SHARED.

```
00129 { return false; };
```

4.27.3.3 operator=() [1/2]

```
Triangle& OCAE::Generator::Triangle::operator= (
            Triangle const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.27.3.4 operator=() [2/2]

```
Triangle& OCAE::Generator::Triangle::operator= (
            Triangle && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

4.27.3.5 SendSample()

```
virtual StereoData OCAE::Generator::Triangle::SendSample (
            void  )  [virtual]
```

Calculates the sample. For the base class this is simply 0.

Returns

The stereo sample data.1

Reimplemented from OCAE::Generator::GeneratorBase.

4.27.3.6 SetFrequency()

```
void OCAE::Generator::Triangle::SetFrequency (
            Math_t freq )
```

Sets a new frequency for the generator.

Parameters

freq	The new frequency.

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

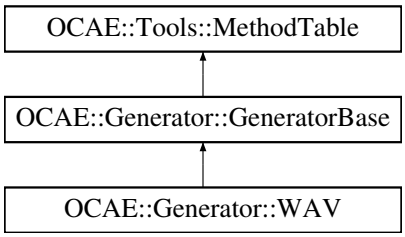
- Triangle.hpp

4.28 OCAE::Generator::WAV Class Reference

Plays audio from WAVE data.

```
#include <WAV.hpp>
```

Inheritance diagram for OCAE::Generator::WAV:



Public Member Functions

- WAV (WAV const &other)=delete

  Copy constructor. Deleted.
- WAV (WAV &&other) noexcept=default

  Default move constructor.
- virtual ~WAV ()=default

  Default destructor.
- WAV & operator= (WAV const &rhs)=delete

  Copy assignment operator. Deleted.
- WAV & operator= (WAV &&rhs) noexcept=default

  Default move assignment operator.
- virtual StereoData SendSample (void)

  Sends a single sample to Core::Driver for output to the OS.
- virtual bool IsBase ()

  Returns boolean for if the object is a GeneratorBase or not.
- void ReadFile (std::string const &path)

  Reads a file from the disk and parses it for the WAV data.
- void LoadWAV (std::vector< char > const &wav_data)

  Loads the supplied WAV data and sets up the object to play the audio data.

Protected Member Functions

- WAV ()

  Default constructor. If no data is provided in calling WAV::ReadFile, then WAV::SendSample will only output 0 data.
- WAV (std::string const &path)

  Path to a WAV file.
- WAV (std::vector< char > const &wav_data)

  std::vector with the contents of a WAV file.
- WAV (int argc)

  *Integer argc parameter passed into main. Uses the functions in Input.*pp to access the command-line parameters.*
- void ParseWAV (char const *array, int size)

  Parses WAVE data from the given raw data.
- virtual Tools::MethodTable::MethodList_t CreateMethodList ()

  Creates a vector containing the names of functions, and the callable functions themselves.

Private Attributes

- Tools::ResamplerPtr m_Resampler

  Resampler used for resampling input WAV data to the OCAE's sampling rate.

Friends

- class GeneratorFactory

  Add the factory as a friend so it can construct GeneratorBase objects.

Additional Inherited Members

4.28.1 Detailed Description

Plays audio from WAVE data.

Supported formats: 8-bit, 16-bit, and 24-bit audio.

4.28.2 Constructor & Destructor Documentation

4.28.2.1 WAV() [1/6]

```
OCAE::Generator::WAV::WAV (
            WAV const & other )  [delete]
```

Copy constructor. Deleted.

Parameters

other	The other object to be copied.

4.28.2.2 WAV() [2/6]

```
OCAE::Generator::WAV::WAV (
            WAV && other )  [default], [noexcept]
```

Default move constructor.

Parameters

other	The other object to be moved.

4.28.2.3 ~WAV()

```
virtual OCAE::Generator::WAV::~WAV ( )  [virtual], [default]
```

Default destructor.

4.28.2.4 WAV() [3/6]

```
OCAE::Generator::WAV::WAV ( )  [protected]
```

Default constructor. If no data is provided in calling WAV::ReadFile, then WAV::SendSample will only output 0 data.

4.28.2.5 WAV() [4/6]

```
OCAE::Generator::WAV::WAV (
            std::string const & path )  [protected]
```

Path to a WAV file.

Parameters

path	The path.

4.28.2.6 WAV() [5/6]

```
OCAE::Generator::WAV::WAV (
            std::vector< char > const & wav_data )  [protected]
```

std::vector with the contents of a WAV file.

Parameters

wav_data	The WAV data

4.28.2.7 WAV() [6/6]

```
OCAE::Generator::WAV::WAV (
            int argc )  [protected]
```

Integer argc parameter passed into main. Uses the functions in Input.∗pp to access the command-line parameters.

Parameters

argc	Parameter passed into main.

4.28.3 Member Function Documentation

4.28.3.1 CreateMethodList()

```
virtual Tools::MethodTable::MethodList_t OCAE::Generator::WAV::CreateMethodList ( )  [protected],
[virtual]
```

Creates a vector containing the names of functions, and the callable functions themselves.

See Tools::MethodTable documentation on more info about this system.

Returns

The vector containing callable functions and their names as strings.

Reimplemented from OCAE::Generator::GeneratorBase.

4.28.3.2 IsBase()

```
virtual bool OCAE::Generator::WAV::IsBase ( )  [inline], [virtual]
```

Returns boolean for if the object is a GeneratorBase or not.

Returns

False.

Reimplemented from OCAE::Generator::GeneratorBase.

References LoadWAV(), and ReadFile().

```
00126 { return false; };
```

4.28.3.3 LoadWAV()

```
void OCAE::Generator::WAV::LoadWAV (
            std::vector< char > const & wav_data )
```

Loads the supplied WAV data and sets up the object to play the audio data.

Parameters

wav_data	The WAV data

Referenced by IsBase().

4.28.3.4 operator=() [1/2]

```
WAV& OCAE::Generator::WAV::operator= (
            WAV const & rhs )  [delete]
```

Copy assignment operator. Deleted.

Parameters

rhs	The object to be copied.

Returns

this.

4.28.3.5 operator=() [2/2]

```
WAV& OCAE::Generator::WAV::operator= (
            WAV && rhs )  [default], [noexcept]
```

Default move assignment operator.

Parameters

rhs	The object to be moved.

Returns

this.

4.28.3.6 ParseWAV()

```
void OCAE::Generator::WAV::ParseWAV (
            char const * array,
            int size )  [protected]
```

Parses WAVE data from the given raw data.

NOTE: The data in the array should be the fully RIFF-structured data.

Parameters

array	The raw WAVE data to be parsed.
size	The size of the WAVE data.

4.28.3.7 ReadFile()

```
void OCAE::Generator::WAV::ReadFile (
            std::string const & path )
```

Reads a file from the disk and parses it for the WAV data.

Parameters

path	The path to the file.

Referenced by IsBase().

4.28.3.8 SendSample()

```
virtual StereoData OCAE::Generator::WAV::SendSample (
            void  )  [virtual]
```

Sends a single sample to Core::Driver for output to the OS.

Returns

The stereo sample data.

Reimplemented from OCAE::Generator::GeneratorBase.

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

- WAV.hpp

4.29 OCAE::Tools::WAVHeader Struct Reference

A POD structure representing the structure of the header of a WAVE file.

```
#include <WAVHeader.hpp>
```

Public Member Functions

- WAVHeader (uint16_t af=1, uint16_t cc=2, uint32_t R=SAMPLE_RATE, uint16_t bps=16)

  Consturctor for a WAVE header, with default values for standard 16-bit audio data.
- ~WAVHeader ()=default

  Default destructor.

Public Attributes

- uint16_t AudioFormat

  Offset 00 = 1.
- uint16_t ChannelCount

  Offset 02 = 1 or 2.
- uint32_t SamplingRate

  Offset 04 = (ex. 44.1kHz, 48kHz, 96kHz, 192kHz)
- uint32_t BytesPerSecond

  Offset 08 = SamplingRate ∗ BytesPerSample.
- uint16_t BytesPerSample

  Offset 12 = BitsPerSample/8 ∗ ChannelCount.
- uint16_t BitsPerSample

  Offset 14 = 8 or 16.

4.29.1 Detailed Description

A POD structure representing the structure of the header of a WAVE file.

4.29.2 Constructor & Destructor Documentation

4.29.2.1 WAVHeader()

```
OCAE::Tools::WAVHeader::WAVHeader (
            uint16_t af = 1,
            uint16_t cc = 2,
            uint32_t R = SAMPLE_RATE,
            uint16_t bps = 16 )
```

Consturctor for a WAVE header, with default values for standard 16-bit audio data.

Parameters

af	The audio format, should generally be left at 1.
cc	The channel count. OCAE uses two-channel audio.
R	The sampling rate. OCAE uses SAMPLE_RATE (probably defined as 48kHz).
bps	Bits per audio sample. We are using 16-bit audio as it is all of the quality you should need.

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

- WAVHeader.hpp

Chapter 5

File Documentation

5.1 ADSR.hpp File Reference

```
#include "../Engine.hpp"
#include "ModifierBase.hpp"
```

Classes

- class OCAE::Modifier::ADSR

  Attack - Decay - Sustain - Release filter.

Functions

- OCAE::Modifier::TYPEDEF_SHARED (ADSR)

  Alias for a std::shared_ptr instantiated with the ADSR class.

5.1.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.2 BandPass.hpp File Reference

```
#include "../Engine.hpp"
#include "ModifierBase.hpp"
```

Classes

- class OCAE::Modifier::BandPass

  Bandpass filter.

Functions

- OCAE::Modifier::TYPEDEF_SHARED (BandPass)

  Alias for a std::shared_ptr instantiated with the BandPass class.

5.2.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.3 Block.hpp File Reference

```
#include <memory>
#include <type_traits>
#include <vector>
#include "../Engine.hpp"
#include "../Generators/GeneratorBase.hpp"
#include "../Modifiers/ModifierBase.hpp"
```

Classes

- class OCAE::Sound::Block

  This class defines a way of holding a Generator, Modifier and a method of combining the outputs of both of them to produce a single output sample.

Functions

- OCAE::Sound::TYPEDEF_SHARED (Block)

  Alias for std::shared_ptr instantiated with Block.

5.3.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.4 Combinator.hpp File Reference

```
#include "../Engine.hpp"
```

Classes

- class OCAE::Sound::Combinator

  This class allows for a modifyable way of combining a list of samples.

Functions

- OCAE::Sound::TYPEDEF_SHARED (Combinator)

  Alias for std::shared_ptr instantiated with Combinator.

5.4.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.5 Core.hpp File Reference

```
#include "Engine.hpp"
#include "Core/Driver.hpp"
```

5.5.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.6 Delay.hpp File Reference

```
#include "../Engine.hpp"
#include <deque>
#include "ModifierBase.hpp"
```

Classes

- class OCAE::Modifier::Delay

  Delay filter.

Functions

- OCAE::Modifier::TYPEDEF_SHARED (Delay)

  Alias for a std::shared_ptr instantiated with the Delay class.

5.6.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.7 Driver.hpp File Reference

```
#include <functional>
#include <unordered_map>
#include <memory>
#include "../Engine.hpp"
#include "../Sounds/Sound.hpp"
```

Classes

- class OCAE::Core::Driver

  Handles the calculation of audio samples from different Sounds.

Functions

- OCAE::Core::TYPEDEF_SHARED (Driver)

  Typedef for a std::shared_ptr instantiated with the Driver class.

5.7.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.7.2 Function Documentation

5.7.2.1 TYPEDEF_SHARED()

```
OCAE::Core::TYPEDEF_SHARED (
            Driver  )
```

Typedef for a std::shared_ptr instantiated with the Driver class.

Forwarded alias of std::shared_ptr instantiated with Driver.

5.8 Echo.hpp File Reference

```
#include "../Engine.hpp"
#include <deque>
#include "ModifierBase.hpp"
```

Classes

- class OCAE::Modifier::Echo

  Echo IIR filter. Uses output sample for echoing instead of input, creating an infinite impulse responce (IIR).

Functions

- OCAE::Modifier::TYPEDEF_SHARED (Echo)

  Alias for a std::shared_ptr instantiated with the Echo class.

5.8.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.9 Engine.hpp File Reference

```
#include "Macro.hpp"
#include "Types.hpp"
#include "Util.hpp"
#include "Core.hpp"
#include "Generators.hpp"
#include "Modifiers.hpp"
#include "Sounds.hpp"
#include "Tools.hpp"
```

5.9.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.10 Envelope.hpp File Reference

```
#include "../Engine.hpp"
#include "ModifierBase.hpp"
```

Classes

- class OCAE::Modifier::EnvelopeFollower

  Envelope follower filter. Calculates the gain of the input signal over time.

Functions

- OCAE::Modifier::TYPEDEF_SHARED (EnvelopeFollower)

  Alias for a std::shared_ptr instantiated with the ModifierBase class.

5.10.1 Detailed Description

Author

Chyler Morrison

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Project: Audio Engine

Copyright

5.11 Equalizer.hpp File Reference

```
#include <vector>
#include "../Engine.hpp"
#include "BandPass.hpp"
#include "ModifierBase.hpp"
```

Classes

- class OCAE::Modifier::Equalizer

  Equalizer filter.

Functions

- OCAE::Modifier::TYPEDEF_SHARED (Equalizer)

  Alias for a std::shared_ptr instantiated with the Equalizer class.

5.11.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.12 Gain.hpp File Reference

```
#include "../Engine.hpp"
#include "ModifierBase.hpp"
```

Classes

- class OCAE::Modifier::Gain

  Simple gain filter for amplifying the input signal. The gain value can be negative allowing for inverting the input signal.

Functions

- OCAE::Modifier::TYPEDEF_SHARED (Gain)

  Alias for a std::shared_ptr instantiated with the Gain class.

5.12.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.13 GeneratorBase.hpp File Reference

```
#include <functional>
#include <unordered_map>
#include <string>
#include "../Engine.hpp"
#include "../Tools/MethodTable.hpp"
#include "GeneratorFactory.hpp"
```

Classes

- class OCAE::Generator::GeneratorBase

  General base class for all generator (sounds) to inherit from. Any derived classes with extra methods that may need to be acquired can be accessed through their setup of the Tools::MethodTable.

Functions

- OCAE::Generator::TYPEDEF_SHARED (GeneratorBase)

  Alias for a std::shared_ptr instantiated with the GeneratorBase class.

5.13.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.14 GeneratorFactory.hpp File Reference

```
#include "../Engine.hpp"
#include <string>
#include <vector>
```

Classes

- class OCAE::Generator::GeneratorFactory

  Creates pointers to generators handled by std::shared_ptr to prevent memory leaks.

Functions

- OCAE::Generator::TYPEDEF_SHARED (GeneratorBase)

  Alias for a std::shared_ptr instantiated with the GeneratorBase class.

5.14.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.15 Generators.hpp File Reference

```
#include "Engine.hpp"
#include "Generators/GeneratorFactory.hpp"
#include "Generators/GeneratorBase.hpp"
#include "Generators/Noise.hpp"
#include "Generators/Sawtooth.hpp"
#include "Generators/Sine.hpp"
#include "Generators/Square.hpp"
#include "Generators/Triangle.hpp"
#include "Generators/WAV.hpp"
```

5.15.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.16 GenericFilter.hpp File Reference

```
#include <tuple>
#include <vector>
#include <deque>
#include "../Engine.hpp"
#include "ModifierBase.hpp"
```

Classes

- class OCAE::Modifier::GenericFilter

  Generic audio filter with simple poles.

Functions

- OCAE::Modifier::TYPEDEF_SHARED (GenericFilter)

  Alias for a std::shared_ptr instantiated with the GenericFilter class.

5.16.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.17 Input.hpp File Reference

```
#include <string>
#include <vector>
```

Functions

- void OCAE::Tools::InitOptions (int argc, char ∗argv[ ])

  Creates a container to hold the command-line options passed into main.
- std::string const & OCAE::Tools::GetOption (int index)

  Returns a const reference to string at the given index.

5.17.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.17.2 Function Documentation

5.17.2.1 GetOption()

```
std::string const& OCAE::Tools::GetOption (
            int index )
```

Returns a const reference to string at the given index.

Parameters

index	The argument index to retrieve.

Returns

The string at the given index.

5.17.2.2 InitOptions()

```
void OCAE::Tools::InitOptions (
            int argc,
            char * argv[] )
```

Creates a container to hold the command-line options passed into main.

Parameters

argc	The number of arguments.
argv	Pointer to the array of arguments.

5.18 LowPass.hpp File Reference

```
#include "../Engine.hpp"
#include "ModifierBase.hpp"
```

Classes

- class OCAE::Modifier::LowPass

  3rd Order Butterworth Low Pass filter with resonance.

Functions

- OCAE::Modifier::TYPEDEF_SHARED (LowPass)

  Alias for a std::shared_ptr instantiated with the LowPass class.

5.18.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.19 Macro.hpp File Reference

```
#include <cmath>
#include <type_traits>
#include <memory>
```

Macros

- #define SAMPLE_RATE 48000

  The sample rate OCAE runs at (probably 48kHz)
- #define INC_RATE (1.0/double(SAMPLE_RATE))

  Inverse of the sample rate.
- #define DEFAULT_GAIN Math_t(0.5)

  Default amplification of the engine.
- #define MAX_BUFFER (SAMPLE_RATE/100)

  Macro for the maximum buffer size to allow for high performant audio, which is currently defined as 10ms.
- #define EPSILON (1.0/double(1 << 24))

  Macro for the value at which we call the difference between two 64-bit floating point values effectively zero.
- #define EPSILON_F (1.0f/float(1 << 16))

  Macro for the value at which we call the difference between two 32-bit floating point values effectively zero.
- #define PI std::acos(-1.0)

  It's uhh, it's Pi, the mathematical constant.

- #define PI2 (2∗PI)

  2 ∗ Pi, I hope I don't have to explain further
- #define LOG_10 std::log(10.0)

  Logarithm of 10, for easy conversion of unknown bases to base 10.
- #define SQRT_HALF std::sqrt(0.5)

  sqrt(0.5) for easy use
- #define DB_TO_LINEAR(dB) std::pow(10.0, dB/20.0)

  Converts logarithmic decibels to linear gain.
- #define LINEAR_TO_DB(g) (20.0∗std::log(g)/LOG_10)

  Converts linear gain to logarithmic decibels.
- #define MONO_TO_STEREO(x) StereoData(SampleType(Math_t(x)∗SQRT_HALF),SampleType(Math_t(x)∗SQRT_HALF))

  Converts monophonic audio sample to stereophonic.
- #define STEREO_TO_MONO(x) SampleType(Math_t(std::get<0>(x) + std::get<1>(x))/SQRT_HALF)

  Converts stereophonic audio sample to monophonic.
- #define METHOD_RET_T(t) std::add_lvalue_reference_t<std::remove_const_t<t>>

  Turns the given type into a reference.
- #define METHOD_RET(v) METHOD_RET_T(decltype(v))(v)

  Casts the passed object to be a lvalue reference.
- #define METHOD_PARAM_T(t) std::add_lvalue_reference_t<t const>

  Turns the given type into a const reference.
- #define METHOD_PARAM(v) METHOD_PARAM_T(decltype(v))(v)

  Casts the passed object to the plain type.
- #define TYPEDEF_SHARED(type) using type##Ptr = std::shared_ptr<type>

  Creates an alias for std::shared_ptr instantiated with the given type.
- #define TO_STR(p) #p

  Creates string from "p". E.g. TO_STR(HEAP_SIZE) creates the string "HEAP_SIZE".
- #define PRINT(p) TO_STR(p)

  Creates string from what "p" defines. E.g. PRINT(HEAP_SIZE) creates the string "1024" if `HEAP_SIZE` is defined to `1024`
- #define DO_PRAGMA(x)

  Do platform-specific pragma command.
- #define TODO(x)

  Print the to-do message.
- #define UNREFERENCED_PARAMETER(P) (void)(P)

  Clears unused parameter warning.
- #define PUSH_WARNINGS()

  Push warnings.
- #define MSVC_DISABLE_WARNING(x)

  Disable given VC++ warning.
- #define CLANG_DISABLE_WARNING(x)

  Disable given clang warning.
- #define GCC_DISABLE_WARNING(x)

  Disable given gcc warning.
- #define POP_WARNINGS()

  POP_WARNINGS.

5.19.1 Detailed Description

Author

Chyler Morrison

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Project: Audio Engine

Copyright

5.20 MethodTable.hpp File Reference

```
#include <string>
#include <tuple>
#include <type_traits>
#include <unordered_map>
#include <utility>
#include <vector>
#include "../Engine.hpp"
```

Classes

- class OCAE::Tools::MethodTable

  The purpose of this class is to create a simple interface for calling methods from an object of an unknown type.

5.20.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.21 ModifierBase.hpp File Reference

```
#include <cstring>
#include <type_traits>
#include "../Engine.hpp"
#include "../Tools/MethodTable.hpp"
```

Classes

- class OCAE::Modifier::ModifierBase

  The base Modifier class that all modifiers should inherit from.

Functions

- OCAE::Modifier::TYPEDEF_SHARED (ModifierBase)

  Alias for a std::shared_ptr instantiated with the ModifierBase class.

5.21.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: OCAE

Copyright

5.22 ModifierFactory.hpp File Reference

```
#include "../Engine.hpp"
#include "GenericFilter.hpp"
```

Classes

- class OCAE::Modifier::ModifierFactory

  Factory class for constructing audio filters (Modifiers).

Functions

- OCAE::Modifier::TYPEDEF_SHARED (ModifierBase)

  Alias for a std::shared_ptr instantiated with the ModifierBase class.

5.22.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.23 Modifiers.hpp File Reference

```
#include "Modifiers/ModifierBase.hpp"
#include "Modifiers/ModifierFactory.hpp"
#include "Modifiers/ADSR.hpp"
#include "Modifiers/BandPass.hpp"
#include "Modifiers/Delay.hpp"
#include "Modifiers/Echo.hpp"
#include "Modifiers/Envelope.hpp"
#include "Modifiers/Equalizer.hpp"
#include "Modifiers/Gain.hpp"
#include "Modifiers/GenericFilter.hpp"
#include "Modifiers/LowPass.hpp"
```

5.23.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

5.24 Noise.hpp File Reference

```
#include "../Engine.hpp"
#include <random>
#include "GeneratorBase.hpp"
```

Classes

- class OCAE::Generator::Noise

  Generates white noise.

Functions

- OCAE::Generator::TYPEDEF_SHARED (Noise)

  Alias for a std::shared_ptr instantiated with the Noise class.

5.24.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

5.25 Resampler.hpp File Reference

```
#include <memory>
#include <vector>
#include "../Engine.hpp"
```

Classes

- class OCAE::Tools::Resampler

  Class for taking audio data of one sampling rate and translating it to another sampling rate.

Functions

- OCAE::Tools::TYPEDEF_SHARED (Resampler)

  Alias for a std::shared_ptr instantiated with the Resampler class.

5.25.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.26 Sawtooth.hpp File Reference

```
#include "../Engine.hpp"
#include "GeneratorBase.hpp"
```

Classes

- class OCAE::Generator::Sawtooth

  Generates a sawtooth sound.

Functions

- OCAE::Generator::TYPEDEF_SHARED (Sawtooth)

  Alias for a std::shared_ptr instantiated with the Sawtooth class.

5.26.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.27 Sine.hpp File Reference

```
#include "../Engine.hpp"
#include "GeneratorBase.hpp"
```

Classes

- class OCAE::Generator::Sine

  Generates sine data at the given frequency.

Functions

- OCAE::Generator::TYPEDEF_SHARED (Sine)

  Alias for a std::shared_ptr instantiated with the Sine class.

5.27.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.28 Sound.hpp File Reference

```
#include <any>
#include <deque>
#include <map>
#include <memory>
#include <tuple>
#include <vector>
#include "../Engine.hpp"
#include "Combinator.hpp"
#include "Block.hpp"
```

Classes

- class OCAE::Sound::Sound

  Class for handling Generator and Modifier objects in a more abstract way in conjunction with a Driver.
- struct OCAE::Sound::Sound::Edge

  Structure representing the edges of the graph that defines a Sound.
- struct OCAE::Sound::Sound::Edge::E_Block

  Structure to abstract away the node of the Sound graph, allowing for sounds and blocks to make up a sound.

Functions

- OCAE::Sound::TYPEDEF_SHARED (Sound)

  Forwarded alias of std::shared_ptr instantiated with Sound.
- OCAE::Core::TYPEDEF_SHARED (Driver)

  Typedef for a std::shared_ptr instantiated with the Driver class.

5.28.1 Detailed Description

Author

Chyler Morrison

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Project: Audio Engine

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5.28.2 Function Documentation

5.28.2.1 TYPEDEF_SHARED()

```
OCAE::Core::TYPEDEF_SHARED (
            Driver  )
```

Typedef for a std::shared_ptr instantiated with the Driver class.

Forwarded alias of std::shared_ptr instantiated with Driver.

5.29 SoundFactory.hpp File Reference

```
#include "../Engine.hpp"
#include "../Modifiers/ModifierBase.hpp"
#include "../Generators/GeneratorBase.hpp"
#include "Sound.hpp"
```

Classes

- class OCAE::Sound::SoundFactory

  Class containing functions that will generate Sound and Block objects from common inputs.

5.29.1 Detailed Description

Author

Chyler Morrison

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Project: Audio Engine

Copyright

5.30 Sounds.hpp File Reference

```
#include "Sounds/Sound.hpp"
#include "Sounds/SoundFactory.hpp"
#include "Sounds/Block.hpp"
#include "Sounds/Combinator.hpp"
```

5.30.1 Detailed Description

Author

Chyler Morrison

Email: contact@chyler.info

Project: Audio Engine

Copyright

5.31 Square.hpp File Reference

```
#include "../Engine.hpp"
#include "GeneratorBase.hpp"
```

Classes

- class OCAE::Generator::Square

  Generates square wave data at the given frequency.

Functions

- OCAE::Generator::TYPEDEF_SHARED (Square)

  Alias for a std::shared_ptr instantiated with the Square class.

5.31.1 Detailed Description

Author

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Project: Audio Engine

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5.32 Tools.hpp File Reference

```
#include "Tools/Input.hpp"
#include "Tools/MethodTable.hpp"
#include "Tools/Resampler.hpp"
#include "Tools/WAVHeader.hpp"
#include "Tools/WAVWriter.hpp"
```

5.32.1 Detailed Description

Author

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Project: Audio Engine

Copyright

5.33 Triangle.hpp File Reference

```
#include "../Engine.hpp"
#include "GeneratorBase.hpp"
```

Classes

- class OCAE::Generator::Triangle
  Triangle wave generator.

Functions

- OCAE::Generator::TYPEDEF_SHARED (Triangle)
  Alias for a std::shared_ptr instantiated with the Triangle class.

5.33.1 Detailed Description

Author

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5.34 Types.hpp File Reference

```
#include <cstdint>
#include <functional>
#include <memory>
#include <tuple>
```

Typedefs

- using OCAE::Math_t = double

  Define the type used for mathematics operations.
- using OCAE::SampleType = float

  Define the type used for sample types.
- using OCAE::StereoData = std::tuple< SampleType, SampleType >

  Define the type used for stereo audio data.
- using OCAE::Track_t = std::vector< StereoData >

  Define the type used for stereo audio tracks.

5.34.1 Detailed Description

Author

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Project: Audio Engine

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5.35 Util.hpp File Reference

```
#include "Engine.hpp"
```

Functions

- constexpr SampleType & OCAE::Left (StereoData &s)

  Returns the left audio sample from a stereo data pair.
- constexpr SampleType const & OCAE::Left (StereoData const &s)

  Returns the left audio sample from a stereo data pair.
- constexpr SampleType & OCAE::Right (StereoData &s)

  Returns the right audio sample from a stereo data pair.
- constexpr SampleType const & OCAE::Right (StereoData const &s)

  Returns the right audio sample from a stereo data pair.

5.35.1 Detailed Description

Author

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Project: Audio Engine

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5.35.2 Function Documentation

5.35.2.1 Left() [1/2]

```
constexpr SampleType& OCAE::Left (
            StereoData & s )
```

Returns the left audio sample from a stereo data pair.

Parameters

s	The stereo audio sample.

Returns

The left audio sample.

References OCAE::Left().

Referenced by OCAE::Left(), and OCAE::Sound::Combinator::Process().

```
00040     {
00041         return std::get<0>(s);
00042     }
```

5.35.2.2 Left() [2/2]

```
constexpr SampleType const& OCAE::Left (
            StereoData const & s )
```

Returns the left audio sample from a stereo data pair.

Parameters

s	The stereo audio sample.

Returns

The left audio sample.

References OCAE::Left().

```
00055     {
00056         return std::get<0>(s);
00057     }
```

5.35.2.3 Right() [1/2]

```
constexpr SampleType& OCAE::Right (
            StereoData & s )
```

Returns the right audio sample from a stereo data pair.

Parameters

s	The stereo audio sample.

Returns

The right audio sample.

References OCAE::Right().

Referenced by OCAE::Sound::Combinator::Process(), and OCAE::Right().

```
00070     {
00071         return std::get<1>(s);
00072     }
```

5.35.2.4 Right() [2/2]

```
constexpr SampleType const& OCAE::Right (
            StereoData const & s )
```

Returns the right audio sample from a stereo data pair.

Parameters

s	The stereo audio sample.

Returns

The right audio sample.

References OCAE::Right().

```
00085     {
00086         return std::get<1>(s);
00087     }
```

5.36 WAV.hpp File Reference

```
#include <string>
#include <memory>
#include <vector>
#include "../Engine.hpp"
#include "GeneratorBase.hpp"
#include "../Tools/MethodTable.hpp"
#include "../Tools/Resampler.hpp"
```

Classes

- class OCAE::Generator::WAV

  Plays audio from WAVE data.

Functions

- OCAE::Generator::TYPEDEF_SHARED (WAV)

  Alias for a std::shared_ptr instantiated with the WAV class.

5.36.1 Detailed Description

Author

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Project: Audio Engine

Copyright

5.37 WAVHeader.hpp File Reference

```
#include "../Engine.hpp"
```

Classes

- struct OCAE::Tools::WAVHeader

  A POD structure representing the structure of the header of a WAVE file.

5.37.1 Detailed Description

Author

Chyler Morrison

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Project: Audio Engine

Copyright

5.38 WAVWriter.hpp File Reference

```
#include <RIFF-Util/RIFF.hpp>
#include "../Engine.hpp"
```

Functions

- RIFF::vector_t OCAE::Tools::WriteWAV (Track_t const &audio)

  To be used in tandom with the recording system built into Core::Driver.

5.38.1 Detailed Description

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Project: Audio Engine

Copyright

5.38.2 Function Documentation

5.38.2.1 WriteWAV()

```
RIFF::vector_t OCAE::Tools::WriteWAV (
            Track_t const & audio )
```

To be used in tandom with the recording system built into Core::Driver.

Parameters

audio	The audio to be formatted into WAVE (RIFF) data.

Returns

The formatted data.

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