

Grail

1.0

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Chapter 1

Hierarchical Index

1.1 Class Hierarchy

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Class Index

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Chapter 3

Class Documentation

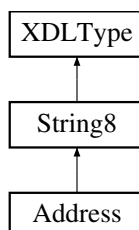
3.1 A Class Reference

Public Member Functions

- void **doit** (const char filename[])

3.2 Address Class Reference

Inheritance diagram for Address:



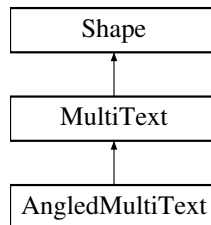
Public Member Functions

- **Address** (const std::string &s)
- void **writeMeta** (Buffer &b) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Additional Inherited Members

3.3 AngledMultiText Class Reference

Inheritance diagram for AngledMultiText:



Public Member Functions

- **AngledMultiText** ([Canvas](#) *c, const [Style](#) *s, float angle, float x, float y)
- void **render** () override

Additional Inherited Members

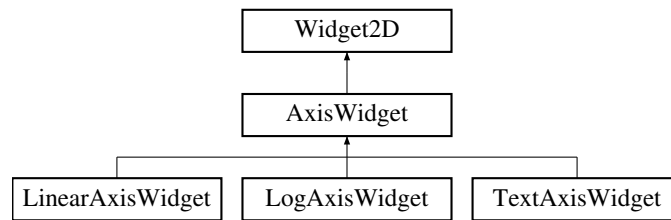
3.4 AudioPlayer Class Reference

Public Member Functions

- **AudioPlayer** (const [AudioPlayer](#) &orig)=delete
- [AudioPlayer](#) & **operator=** (const [AudioPlayer](#) &orig)=delete
- void **newContext** (std::string name)
- void **setCurrentContext** (std::string name)
- void **addFile** (std::string filePath)
- void **addPlaylist** (std::string filePath, bool append=false)
- void **setVolume** (int volume)
- void **seekLocation** (std::string time, std::string type="relative")
- void **revertSeek** ()
- void **playlistNext** ()
- void **playlistPrev** ()
- void **playlistPlayIndex** (int index)
- void **playlistClear** ()
- void **playlistRemoveIndex** (int index)
- void **playlistMove** (int index1, int index2)
- void **playlistShuffle** ()
- void **togglePause** ()
- void **setPlaying** ()
- void **setPaused** ()
- void **printCurrentTime** ()

3.5 AxisWidget Class Reference

Inheritance diagram for AxisWidget:



Classes

- struct [Format](#)

Public Member Functions

- **AxisWidget** ([StyledMultiShape2D](#) *m, [MultiText](#) *t, double x, double y, double w, double h, double minBound=0, double maxBound=0, double tickInterval=1, double tickDrawSize=5, bool showTicks=true, bool isVert=false, std::string axisTitle="", const glm::vec4 &axisColor=glm::black, const glm::vec4 &tickColor=glm::black, int tickFormatWidth=2, int tickFormatPrecision=2, double bottomOffset=0)
- void **setTickDrawSize** (double i)
- void **setShowTicks** (bool b)
- void **setIsVert** (bool b)
- void **setTitle** (std::string text)
- void **setAxisColor** (const glm::vec4 &color)
- void **setTickColor** (const glm::vec4 &color)
- void **setTickFormat** (int width, int precision)
- double **getTickInterval** ()
- double **getMinBound** ()
- double **getMaxBound** ()
- virtual void **setBounds** (double minBound, double maxBound)=0
- virtual void **setTickInterval** (double tickInterval)=0
- virtual void **setTickLabels** (std::vector< std::string > tickLabels)=0

Protected Member Functions

- void **addAxisTitle** ()

Protected Attributes

- double **minBound**
- double **maxBound**
- double **tickInterval**
- double **tickDrawSize**
- [Format](#) **tickFormat**
- bool **showTicks**
- bool **isVert**
- std::string **axisTitle**
- glm::vec4 **axisColor**
- glm::vec4 **tickColor**
- double **bottomOffset**

3.6 BadType Class Reference

```
#include <Config.hh>
```

Public Member Functions

- **BadType** (const char filename[], int lineNum)

Friends

- ostream & **operator**<< (ostream &s, const [BadType](#) &e)

3.6.1 Detailed Description

Represent a config file used to configure complicated applications

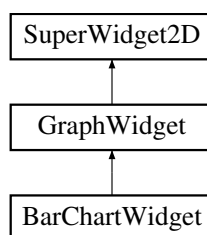
File format supports comments starting with #
name-value pairs of data, with declaration of the type of names

supported in the constructor so that subclasses of [Config](#) can specify the required types of each tag. In this way, the [Config](#) utility can display the line number and an error if the data is not as required

TODO: Since [Config](#) files can be very large, and parsing is slow, it is possible to extend this model to automatically generate a binary version of the config. In this way, the config file can effectively be compiled. This is important only if the file is large so at the moment we can ignore

3.7 BarChartWidget Class Reference

Inheritance diagram for BarChartWidget:



Public Member Functions

- **BarChartWidget** ([Canvas](#) *c, [StyledMultiShape2D](#) *m, [MultiText](#) *t, double x, double y, double w, double h)
- void **setBarWidth** (double width)
- void **setBarColors** (const std::vector< glm::vec4 > &colors)
- void **setValues** (const std::vector< double > &values)
- void **setNames** (const std::vector< std::string > &names)
- void **createXAxis** (AxisType a=AxisType::TEXT) override
- void **createYAxis** (AxisType a) override
- void **init** () override

Additional Inherited Members

3.8 Benchmark Class Reference

Public Member Functions

- uint64_t **elapsed** () const
- void **start** ()
- void **end** ()

Static Public Member Functions

- static void **benchmark** (void(*Func)())
- static void **benchmark** (void(*Func)(int), int n)

Friends

- std::ostream & **operator<<** (std::ostream &s, const [Benchmark](#) &b)

3.9 Bezier Class Reference

Public Member Functions

- **Bezier** (float ax, float bx, float cx, float dx, float ay, float by, float cy, float dy, int n, bool end, const glm::vec4 &c={0, 0, 0, 1})
- float **getax** () const
- float **getay** () const
- float **getbx** () const
- float **getby** () const
- float **getcx** () const
- float **getcy** () const
- float **getdx** () const
- float **getdy** () const
- float **getp1x** () const
- float **getp1y** () const
- float **getp2x** () const
- float **getp2y** () const
- float **getp3x** () const
- float **getp3y** () const
- float **getp4x** () const
- float **getp4y** () const
- int **getn** () const
- double **getdt** () const
- bool **getEnd** () const
- glm::vec4 **getColor** () const

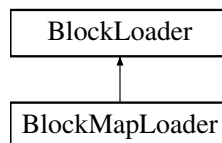
3.10 BlockAllocator< blockSize > Class Template Reference

Public Member Functions

- **BlockAllocator** (uint32_t size)
- void * **alloc** (uint32_t size)

3.11 BlockLoader Class Reference

Inheritance diagram for BlockLoader:



Classes

- struct [GeneralHeader](#)
- struct [Info](#)
- struct [SecurityHeaderV0](#)
- struct [SecurityHeaderV1](#)

Public Types

- enum class **Type** { **gismap** , **hashmap** }

Public Member Functions

- **BlockLoader** (const char filename[])
- **BlockLoader** (const [BlockLoader](#) &orig)=delete
- [BlockLoader](#) & **operator=** (const [BlockLoader](#) &orig)=delete
- void **init** (uint64_t *mem, uint64_t size)
- void **init** (uint64_t bytes, Type t, uint32_t version)
- void **readBlockFile** (const char filename[])
- uint32_t **getAuthHeaderSize** () const
- uint32_t **getHeaderSize** () const
- bool **authenticate** () const
- **BlockLoader** (uint64_t bytes, Type t, uint32_t version)
- uint32_t **getAuthHeaderSize** () const
- bool **authenticate** () const

Public Attributes

- uint64_t * **mem**
- uint64_t **size**
- [GeneralHeader](#) * **generalHeader**
- [SecurityHeaderV0](#) * **securityHeader**

Protected Member Functions

- **BlockLoader** (const [Info](#) &info)

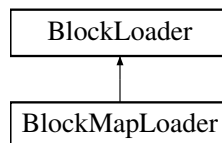
3.12 BlockMapLoader::BlockMapHeader Struct Reference

Public Attributes

- uint32_t **numNamedEntities**
- uint32_t **numRegionContainers**
- uint32_t **numRegions**
- uint32_t **numSegments**
- uint32_t **numPoints**
- uint32_t **deltaEncoded**: 1
- [BoundRect](#) **bounds**

3.13 BlockMapLoader Class Reference

Inheritance diagram for BlockMapLoader:



Classes

- struct [BlockMapHeader](#)
- struct [BoundRect](#)
- struct [NamedEntities](#)
- struct [NamedEntry](#)
- struct [Region](#)
- struct [RegionContainer](#)
- struct [Segment](#)

Public Types

- enum class **EntityType** { **REGION_CONTAINER** , **REGION** , **SEGMENT** , **POINT** }

Public Member Functions

- void **init** (const uint64_t *mem, uint64_t size)
- void **init** (uint32_t numLists, uint32_t numPoints)
- **BlockMapLoader** (const char filename[])
- **BlockMapLoader** (const char filename[], const char[])
- const [Region](#) * **getRegions** () const
- const [Segment](#) * **getSegments** () const
- void **save** (const char filename[])
- void **filterX** (double xMin, double xMax)
- void **filterY** (double yMin, double yMax)
- void **filter** (double xMin, double xMax, double yMin, double yMax)
- void **methodPolygon** ()
- void **methodPolyline** ()
- uint64_t **sum** () const
- void **deltaEncode** ()
- void **deltaUnEncode** ()
- void **dumpSegment** (uint32_t seg)
- uint32_t **getNumRegionContainers** () const
- const [BlockMapHeader](#) * **getBlockMapHeader** () const
- uint32_t **getNumRegions** () const
- uint32_t **getNumSegments** () const
- uint32_t **getNumPoints** () const
- const float * **getXPoints** () const
- const float * **getYPoints** () const
- const [Segment](#) & **getSegment** (uint32_t i)

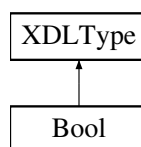
Static Public Member Functions

- static [BlockMapLoader](#) **loadCompressed** (const char filename[])
- static void **diff** (const [BlockMapLoader](#) &a, const [BlockMapLoader](#) &b)

Additional Inherited Members

3.14 Bool Class Reference

Inheritance diagram for Bool:



Public Member Functions

- **Bool** (bool val=false)
- DataType **getDataType** () const override
- uint32_t **size** () const override
- void **write** ([Buffer](#) &buf) const override
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

Additional Inherited Members

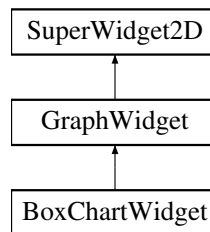
3.15 BlockMapLoader::BoundRect Struct Reference

Public Attributes

- float **xMin**
- float **xMax**
- float **yMin**
- float **yMax**

3.16 BoxChartWidget Class Reference

Inheritance diagram for BoxChartWidget:



Public Member Functions

- **BoxChartWidget** ([Canvas](#) *c, [StyledMultiShape2D](#) *m, [MultiText](#) *t, double x, double y, double w, double h)
- void **setBoxWidth** (double width)
- void **setBoxColor** (glm::vec4 &color)
- void **setPointsPerBox** (int n)
- void **setData** (const std::vector< double > &data)
- void **setNames** (const std::vector< std::string > &names)
- void **createXAxis** (AxisType a=AxisType::TEXT) override
- void **createYAxis** (AxisType a=AxisType::LINEAR) override
- void **init** () override

Additional Inherited Members

3.17 Buffer Class Reference

```
#include <BinBuffer.hh>
```

Public Member Functions

- **Buffer** (int initialSize)
- **Buffer** (size_t initialSize, bool writing)
- **Buffer** (const char filename[], size_t initialSize)
- **Buffer** (const char filename[], size_t initialSize, const char *)
- **Buffer** (const [Buffer](#) &c)=delete
- void **operator=** (const [Buffer](#) &orig)=delete
- void **attachWrite** (int sockfd)
- void **attachRead** (int sockfd)
- void **displayText** (ostream &s) const
- void **displayRawRead** () const
- void **displayRaw** () const
- void **displayHTTPRaw** ()
- void **flush** ()
- void **readNext** ()
- void **write** (const string &s)
- void **write** (const char *s, uint32_t len)
- void **appendU8** (uint8_t)
- void **appendU16** (uint16_t)
- void **appendU32** (uint32_t)
- void **appendU64** (uint64_t)
- void **appendI8** (int8_t)
- void **appendI16** (int16_t)
- void **appendI32** (int32_t)
- void **appendI64** (int64_t)
- void **appendF32** (float)
- void **appendF64** (double)
- void **append** (const char *v)
- void **append** (const char *v, uint32_t len)
- uint32_t **parseU32** ()
- double **parseF64** ()
- float **parseF32** ()
- bool **parseRegex** (const regex &r, const char *&start, int &len)
- bool **parseToken** (const string &match)
- bool **getUri** (const char *&ptr, uint32_t &len)
- bool **getHTTPVersion** (const char *&ptr, uint32_t &len)
- bool **getHost** (const char *&ptr, uint32_t &len)
- void **pointToStart** ()
- bool **getNextTokenWithSpace** (const char *&ptr, const uint32_t &len)
- string **readString8** ()
- string **readString16** ()
- string **readString32** ()
- void **write** (DataType t)
- DataType **readType** ()
- void **write** (DataType t, const char *name)
- template<typename T >
void **write** (T v)
- void **write** ([XDLRaw](#) &v)
- void **specialWrite** (const char *buf, const uint32_t len)
- template<typename T >
void **writeList** ([List1](#) < T > &list)
- void **writeStudent** ([Student](#) v)
- void **writeList** ([List1](#) < [Student](#) > &list)
- void **checkSpace** (size_t sz)

- void **fastCheckSpace** (size_t sz)
- template<typename T >
void **checkArraySpace** (T v[], size_t n)
- template<typename T >
void **checkVectorSpace** (const vector< T > &v)
- template<typename T >
[Buffer](#) & **operator**<< (T v)
- int8_t **_readI8** ()
- int16_t **_readI16** ()
- int32_t **_readI32** ()
- int64_t **_readI64** ()
- int8_t **readI8** ()
- int16_t **readI16** ()
- int32_t **readI32** ()
- int64_t **readI64** ()
- uint8_t **_readU8** ()
- uint16_t **_readU16** ()
- uint32_t **_readU32** ()
- uint64_t **_readU64** ()
- float **_readF32** ()
- double **_readF64** ()
- uint8_t **readU8** ()
- uint16_t **readU16** ()
- uint32_t **readU32** ()
- uint64_t **readU64** ()
- float **readF32** ()
- double **readF64** ()
- template<typename T >
T **_read** ()

3.17.1 Detailed Description

A binary high-speed buffer to support writing objects portably to a binary stream so it can be read back in (persistence)

3.17.2 Member Function Documentation

3.17.2.1 getNextTokenWithSpace()

```
bool Buffer::getNextTokenWithSpace (
    const char *& ptr,
    const uint32_t & len )
```

extract the next space-delimited value from the buffer if return true, this means ptr is pointing to the text, len = the length of the token (until the next space) and the current pointer advances past the token

3.17.2.2 write() [1/2]

```
template<typename T >
void Buffer::write (
    T v ) [inline]
```

write is the fast write that does not check for buffer overrun. Use only when checking size of a large block

Template Parameters

<i>T</i>	the tpe of the integer to write
----------	---------------------------------

Parameters

<i>v</i>	the value
----------	-----------

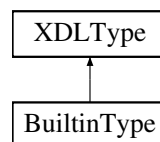
3.17.2.3 write() [2/2]

```
void Buffer::write (
    XDLRaw & v )
```

Special case for [XDLRaw](#) which will write out a complete block of bytes directly without copying

3.18 BuiltinType Class Reference

Inheritance diagram for BuiltinType:



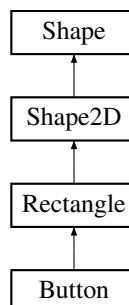
Public Member Functions

- **BuiltinType** (const std::string &name, const DataType &t)
- uint32_t **size** () const override
- void **write** ([Buffer](#) &buf) const override
- void **writeMeta** ([Buffer](#) &buf) const override
- DataType **getDataType** () const override
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

Additional Inherited Members

3.19 Button Class Reference

Inheritance diagram for Button:



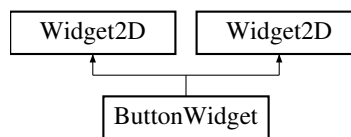
Public Member Functions

- **Button** (float x, float y, float width, float height)
- void **init** ()
- void **updateButton** ()
- void **render** ()

Additional Inherited Members

3.20 ButtonWidget Class Reference

Inheritance diagram for ButtonWidget:



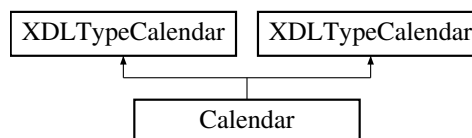
Public Member Functions

- **ButtonWidget** (StyledMultiShape2D *m, MultiText *t, const std::string &text, float x, float y, float w, float h)
- void **init** () override
- **ButtonWidget** (StyledMultiShape2D *m, MultiText *t, const std::string[] &text, float x, float y, float w, float h)
- void **init** () override

Additional Inherited Members

3.21 Calendar Class Reference

Inheritance diagram for Calendar:



Public Member Functions

- **Calendar** (const char filename[])
- **Calendar** (const char filename[])

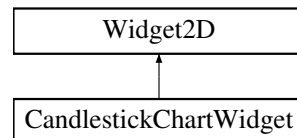
3.22 Camera Class Reference

Public Member Functions

- **Camera** (int screenWidth, int screenHeight, const glm::vec3 &camPos=glm::vec3(4, 3, 5), const glm::vec3 &lookingAt=glm::vec3(0, 0, 0), const glm::vec3 &upVector=glm::vec3(0, 1, 0), float fov=45.0f, float zNear=0.1f, float zFar=100.0f)
- void **setScreenWidth** (int w)
- void **setScreenHeight** (int h)
- void **setCamPos** (const glm::vec3 &pos)
- void **translate** (float x, float y, float z)
- void **setLookingAt** (const glm::vec3 &pos)
- void **incrCamPos** (const glm::vec3 &pos)
- void **incrLookingAt** (const glm::vec3 &pos)
- void **setUpVector** (const glm::vec3 &pos)
- void **setFovRad** (float r)
- void **setZnear** (float z)
- void **setZFar** (float z)
- void **zoomIn** (float s)
- void **zoomIn** ()
- void **zoomOut** ()
- glm::mat4 **getViewProjection** ()

3.23 CandlestickChartWidget Class Reference

Inheritance diagram for CandlestickChartWidget:



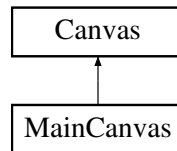
Public Member Functions

- **CandlestickChartWidget** (StyledMultiShape2D *m, MultiText *t, float x, float y, float w, float h, const std::string &title, const Style *titleStyle, const Style *barStyle, float min, float max, float maxMultiplier, float relativeSpace, int tickThicknessStart, int tickThicknessEnd, float tickSize, float tickStart, Scale *yAxis)
- **CandlestickChartWidget** (StyledMultiShape2D *m, MultiText *t, float x, float y, float w, float h)
- **CandlestickChartWidget** (StyledMultiShape2D *m, MultiText *t, float x, float y, float w, float h, const std::vector< float > &b)
- void **setMinMax** (float min, float max)
- void **setAxisScale** (Scale *yAxis)
- void **setTitleStyle** (const Style *s)
- void **chart** (const std::vector< float > &b, int rulerInterval, int dataPointsPerBar)
- void **setTitle** (const std::string &s)
- void **init** () override

Additional Inherited Members

3.24 Canvas Class Reference

Inheritance diagram for Canvas:



Public Member Functions

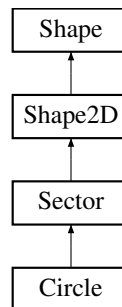
- **Canvas** ([GLWin](#) *w, const [Style](#) *style, uint32_t vpX, uint32_t vpY, uint32_t vpW, uint32_t vpH, uint32_t pX, uint32_t pY)
- **Canvas** (const [Canvas](#) &orig)=delete
- [Canvas](#) & **operator=** (const [Canvas](#) &orig)=delete
- uint32_t **getWidth** () const
- uint32_t **getHeight** () const
- glm::mat4 * **getProjection** ()
- void **setProjection** (const glm::mat4 &proj)
- void **setOrthoProjection** (float xLeft, float xRight, float yBottom, float yTop)
- [Camera](#) * **setLookAtProjection** (float eyeX, float eyeY, float eyeZ, float lookAtX, float lookAtY, float lookAtZ, float upX, float upY, float upZ)
- void **resetProjection** ()
- template<typename S >
S * **addLayer** (S *shape)
- [Shape](#) * **getLayer** (uint32_t i)
- void **init** ()
- void **process_input** (Inputs *in, float dt)
- void **update** ()
- const [Style](#) * **getStyle** () const
- void **render** ()
- void **cleanup** ()

Protected Attributes

- [GLWin](#) * w
- std::vector< [Shape](#) * > layers
- uint32_t vpX
- uint32_t vpY
- uint32_t vpW
- uint32_t vpH
- uint32_t pX
- uint32_t pY
- glm::mat4 projection
- glm::mat4 originalProjection
- const [Style](#) * style
- [Camera](#) * cam

3.25 Circle Class Reference

Inheritance diagram for Circle:



Public Member Functions

- **Circle** (float x, float y, float rad, float angleInc, [Style](#) *s)

Additional Inherited Members

3.26 Client< SocketImpl, ProtocolImpl > Class Template Reference

Public Member Functions

- **Client** (const char addr[])
- **Client** (const [Client](#) &)=delete
- [Client](#) & **operator=** (const [Client](#) &)=delete
- void **connect** (const char addr[])
- < T > void [write](#) (const T &data)
- void **send** ()
- void **sendAndWaitforResponse** ()
- void **sendAndKeepOpen** ()

3.26.1 Member Function Documentation

3.26.1.1 write()

```

template<typename SocketImpl , typename ProtocolImpl >
<T> void Client< SocketImpl, ProtocolImpl >::write (
    const T & data ) [inline]
  
```

Write data into the out buffer

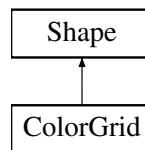
3.27 Color Class Reference

Public Member Functions

- **Color** (float r, float g, float b, float a)
- **operator glm::vec4** () const
- **Color lighter** () const
- **Color darker** () const

3.28 ColorGrid Class Reference

Inheritance diagram for ColorGrid:



Public Member Functions

- **ColorGrid** (uint32_t xsize, uint32_t ysize)
- void **init** () override
- void **render** () override
- void **addGrid** (float x0, float y0, float dx, float dy)
- void **addRectangle** (float x, float y, float w, float h)

Additional Inherited Members

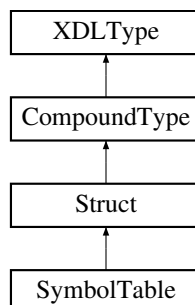
3.29 Combiner Class Reference

Public Member Functions

- **Combiner** (const char staticFileName[])
- void **parsePage** (int pageNum, const char dynamicFileName[])

3.30 CompoundType Class Reference

Inheritance diagram for CompoundType:



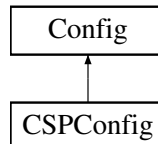
Public Member Functions

- **CompoundType** (const std::string &name)

Additional Inherited Members

3.31 Config Class Reference

Inheritance diagram for Config:



Public Types

- enum class **Type** {
U16 , **U32** , **U64** , **I16** ,
I32 , **I64** , **F64** , **F32** ,
BOOL , **STRING** }

Public Member Functions

- void **load** (const string &filename)
- void **save** (const string &filename)
- template<typename T >
void **set** (const string &name, T val)
- uint16_t **getUInt16** (const string &name) const
- uint32_t **getUInt32** (const string &name) const
- uint64_t **getUInt64** (const string &name) const
- int16_t **getInt16** (const string &name) const
- int32_t **getInt32** (const string &name) const
- int64_t **getInt64** (const string &name) const
- bool **getBool** (const string &name) const
- double **getDouble** (const string &name) const
- string **getString** (const string &name) const
- void **mandatory** (int count...)
- void **optional** (int count...)

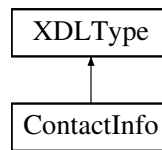
3.32 HashMap< Val >::ConstIterator Class Reference

Public Member Functions

- **ConstIterator** (const [HashMap](#) &list)
- bool **operator!** () const
- void **operator++** ()
- const char * **key** () const
- const Val * **value** () const

3.33 ContactInfo Class Reference

Inheritance diagram for ContactInfo:



Public Member Functions

- **ContactInfo** (const [Address](#) &address, const [Phone](#) &phone, const [Email](#) &email)
- DataType **getDataType** () const override
- uint32_t **size** () const override
- void **write** ([Buffer](#) &b) const override
- void **writeMeta** ([Buffer](#) &b) const override
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

Additional Inherited Members

3.34 csp Class Reference

```
#include <configcsp.hh>
```

Public Attributes

- uint16_t **port**
- prot **protocol**
- ip **ip_ver**
- string **log**
- string **base**
- buf **buffer**

3.34.1 Detailed Description

NEEDED: We need a hardcoded list of what all is needed in the proj

```
check_correct(HashMap map1<k,v>): for name in hardcoded_list: if typeOF(map1[name]) == type we need/within
enum/range continue else raise error with type_name print error to log exit 1
```

3.35 CSPClient Class Reference

Public Member Functions

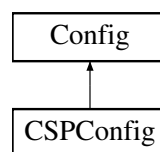
- **CSPClient** (char *addr, int port)
- [pageBuffer](#) **pageRequest** (uint32_t pageid)
- void **testPrint** (int pageid)
- void **addPage** (string staticData, vector< [Insertion](#) > &dynamic)
- void **addPage** (string staticData)
- void **addPage** (string staticFile, string offsetFile)
- void **printPageData** (int pageid)
- [pageBuffer](#) **pageRequestFile** (uint32_t pageid)

Protected Attributes

- [Buffer](#) & in
- [Buffer](#) & out

3.36 CSPConfig Class Reference

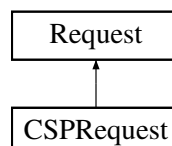
Inheritance diagram for CSPConfig:



Additional Inherited Members

3.37 CSPRequest Class Reference

Inheritance diagram for CSPRequest:



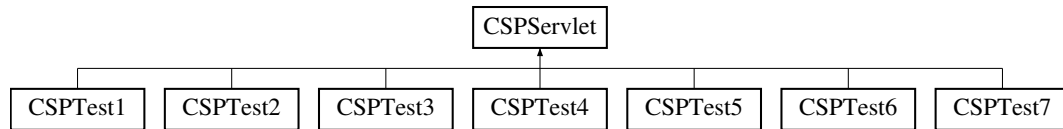
Public Member Functions

- void **handle** (int fd) override
- void **handle** (int sckt, const char *command) override

Additional Inherited Members

3.38 CSPServlet Class Reference

Inheritance diagram for CSPServlet:



Public Member Functions

- void **request** ([Request](#) &r)
- virtual void **request** ([CSPRequest](#) &r)=0

Static Public Member Functions

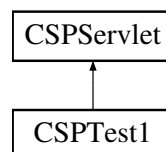
- static int **add** ([CSPServlet](#) *s)

Friends

- class **CSPRequest**

3.39 CSPTTest1 Class Reference

Inheritance diagram for CSPTTest1:



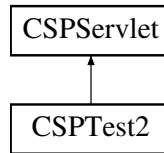
Public Member Functions

- void **request** ([CSPRequest](#) &r)

Additional Inherited Members

3.40 CSPTTest2 Class Reference

Inheritance diagram for CSPTTest2:



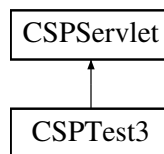
Public Member Functions

- void **request** ([CSPRequest](#) &r)

Additional Inherited Members

3.41 CSPTTest3 Class Reference

Inheritance diagram for CSPTTest3:



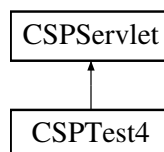
Public Member Functions

- void **request** ([CSPRequest](#) &r)

Additional Inherited Members

3.42 CSPTTest4 Class Reference

Inheritance diagram for CSPTTest4:



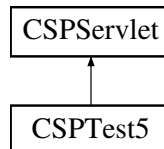
Public Member Functions

- void request ([CSPRequest](#) &r)

Additional Inherited Members

3.43 CSPTTest5 Class Reference

Inheritance diagram for CSPTTest5:



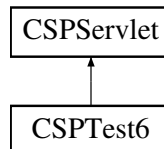
Public Member Functions

- void request ([CSPRequest](#) &r)

Additional Inherited Members

3.44 CSPTTest6 Class Reference

Inheritance diagram for CSPTTest6:



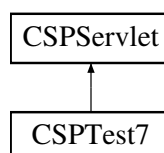
Public Member Functions

- void request ([CSPRequest](#) &r)

Additional Inherited Members

3.45 CSPTTest7 Class Reference

Inheritance diagram for CSPTTest7:



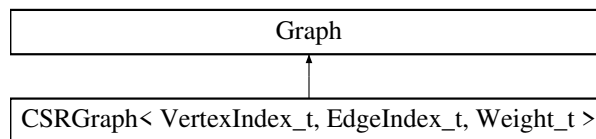
Public Member Functions

- void **request** ([CSPRequest](#) &r)

Additional Inherited Members

3.46 CSRGraph< VertexIndex_t, EdgeIndex_t, Weight_t > Class Template Reference

Inheritance diagram for CSRGraph< VertexIndex_t, EdgeIndex_t, Weight_t >:



Classes

- struct [VertexCount](#)

Public Types

- typedef void(* **FuncVert**) (uint32_t src, uint32_t dest)

Public Member Functions

- **CSRGraph** (const [CSRGraph](#) &orig)=delete
- [CSRGraph](#) & **operator=** (const [CSRGraph](#) &orig)=delete
- uint32_t **getV** () const
- uint64_t **getE** () const
- Weight_t **getW** (VertexIndex_t src, VertexIndex_t dest) const
- bool **isAdjacent** (VertexIndex_t src, VertexIndex_t dest) const
- void **getEdge** (EdgeIndex_t i, VertexIndex_t *v1, VertexIndex_t *v2)
- VertexIndex_t **countAdjacencies** (VertexIndex_t v)
- **CSRGraph** (const char csrBeginName[], const char csrAdjName[], const char weightName[])
- void **dfs** (VertexIndex_t v, FuncVert f)
- void **bfs** (uint32_t v, FuncVert f)
- uint32_t * **computeHistogram** () const
- void **printHistogram** () const
- const VertexIndex_t * **group** ()
- void **cluster** ()

Static Public Member Functions

- static bool **sortDescCount** (const [VertexCount](#) &a, const [VertexCount](#) &b)

Public Attributes

- VertexIndex_t **startIndexLen**
- EdgeIndex_t **adjLen**
- EdgeIndex_t **weightLen**
- EdgeIndex_t * **startIndex**
- VertexIndex_t * **adjacency**
- Weight_t * **weight**

3.47 CString Class Reference

Public Member Functions

- **CString** (const char msg[], uint32_t len)
- **CString** (const [CString](#) &orig)
- [CString](#) & **operator=** (const [CString](#) &orig)
- **CString** ([CString](#) &&orig)
- char **operator[]** (uint32_t i) const
- char & **operator[]** (uint32_t i)
- uint32_t **len** () const
- char * **str** ()

Friends

- std::ostream & **operator<<** (std::ostream &s, const [CString](#) &str)

3.48 CSVParser Class Reference

Static Public Member Functions

- static std::vector< std::vector< std::string > > [readCSV](#) (const char filename[])
Read CSV file, Excel dialect. Accept "quoted fields ""with quotes""".

3.49 CTimer Class Reference

Public Member Functions

- void **reset** ()
- double **elapsedSeconds** () const
- double **elapsedMillis** () const
- double **elapsedMicros** () const
- double **elapsedNanos** () const

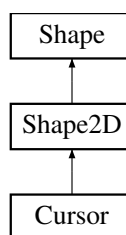
3.50 CubicFunc Class Reference

Public Member Functions

- double **arcLength** () const
- double **segmentLength** (int i) const
- double **deriv** (int i, double t) const

3.51 Cursor Class Reference

Inheritance diagram for Cursor:



Public Member Functions

- **Cursor** (float x, float y, [Style](#) *s, int id)
- void **initIndices** ()
- void **process_input** (Inputs *in, float dt)
- void **update** ()
- void **render** ()

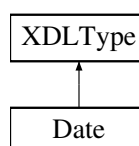
Static Public Member Functions

- static float **getXPos** (int id)
- static float **getYPos** (int id)

Additional Inherited Members

3.52 Date Class Reference

Inheritance diagram for Date:



Public Member Functions

- **Date** ([JulianDate](#) jd)
- **operator JulianDate** () const
- **Date** (int32_t year, uint32_t month, uint32_t day)
- **Date operator+** (int32_t days) const
- **Date operator-** (int32_t days) const
- **Date operator+=** (int32_t days)
- **Date operator-=** (int32_t days)
- bool **operator==** ([Date](#) d) const
- int32_t **getYear** () const
- uint32_t **getMonth** () const
- uint32_t **getDay** () const
- **Date** (int32_t year, uint8_t month, uint8_t day)
- int32_t **getYear** () const
- uint32_t **getMonth** () const
- uint32_t **getDay** () const
- DataType **getDataType** () const
- uint32_t **size** () const override
- void **write** ([Buffer](#) &buf) const override
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

Friends

- int32_t **operator-** ([Date](#) d1, [Date](#) d2)

Additional Inherited Members

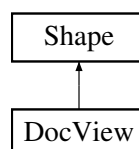
3.53 Document Class Reference

Public Member Functions

- **Document** (const [PageLayout](#) &layout)
- **Document** (const [Document](#) &orig)=delete
- **Document** & **operator=** (const [Document](#) &orig)=delete
- const unsigned char * **getText** () const
- const [Page](#) * **getPage** (uint32_t p) const
- const [PageLayout](#) * **getLayout** () const
- uint32_t **getPageCount** () const
- void **appendFile** (const [PageLayout](#) &layout, const char filename[])

3.54 DocView Class Reference

Inheritance diagram for DocView:



Public Member Functions

- **DocView** ([Canvas](#) *c, const [Style](#) *style, const [Document](#) *doc)
- void **clear** ()
- void **printPageNum** (uint32_t page)
- void **print** (float x, float y, const [Font](#) *f, uint32_t v)
- void **advance** ()
- void **advance10** ()
- void **back** ()
- void **top** ()
- void **bottom** ()
- void **gotoPage** (uint32_t pageNum)
- void **addChar** (const [Font](#) *f, uint8_t c)
- void **init** ()
- void **process_input** (Inputs *in, float dt)
- void **update** ()
- void **render** ()

Additional Inherited Members

3.55 DynArray< T > Class Template Reference

Public Member Functions

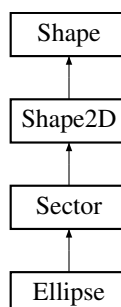
- **DynArray** (uint32_t capacity)
- void **clear** ()
- **DynArray** (const [DynArray](#) &orig)
- [DynArray](#) & **operator=** (const [DynArray](#) &orig)=delete
- void **add** (const T &v)
- T **removeEnd** ()
- const T & **operator[]** (uint32_t i) const
- T & **operator[]** (uint32_t i)
- uint32_t **size** () const
- const T & **last** () const

Friends

- std::ostream & **operator<<** (std::ostream &s, const [DynArray](#) &d)

3.56 Ellipse Class Reference

Inheritance diagram for Ellipse:



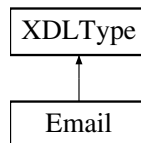
Public Member Functions

- **Ellipse** (float x, float y, float xRad, float yRad, float angleInc, [Style](#) *s)

Additional Inherited Members

3.57 Email Class Reference

Inheritance diagram for Email:



Public Member Functions

- **Email** (const std::string &s)
- DataType **getDataType** () const override
- uint32_t **size** () const override
- void **write** ([Buffer](#) &b) const override
- void **writeMeta** ([Buffer](#) &b) const override
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

Additional Inherited Members

3.58 ESRIPoint Class Reference

Public Member Functions

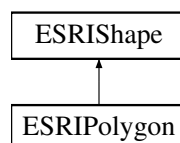
- **ESRIPoint** (double x, double y)

Public Attributes

- double **x**
- double **y**

3.59 ESRIPolygon Class Reference

Inheritance diagram for ESRIPolygon:



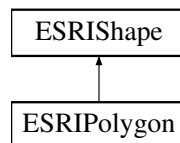
Public Member Functions

- **ESRIPolygon** (SHPObject *shapePtr)
- std::vector< [ESRIPoint](#) > **getPoints** ()

Additional Inherited Members

3.60 ESRIShape Class Reference

Inheritance diagram for ESRIShape:



Public Member Functions

- **ESRIShape** (SHPObject *shapePtr)
- virtual std::vector< [ESRIPoint](#) > **getPoints** ()=0

Static Public Member Functions

- static std::vector< std::unique_ptr< [ESRIShape](#) > > **convertSHPObjects** (const std::vector< SHPObject * > &shapeObjects)

Public Attributes

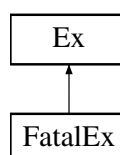
- int **shapeType**

Protected Attributes

- SHPObject * **shapePtr**

3.61 Ex Class Reference

Inheritance diagram for Ex:



Public Member Functions

- **Ex** (const char filename[], uint32_t lineNumber, Errcode e, const std::string &name="")

Public Attributes

- const char * **filename**
- const uint32_t **lineNum**
- const std::string **name**
- int **param**
- Errcode **e**

Static Public Attributes

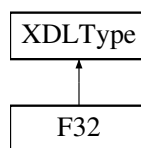
- static const char * **errNames** []

Friends

- std::ostream & **operator**<< (std::ostream &s, const [Ex](#) &e)

3.62 F32 Class Reference

Inheritance diagram for F32:



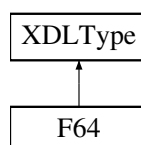
Public Member Functions

- **F32** (float val=0)
- DataType **getDataType** () const override
- uint32_t **size** () const override
- void **write** ([Buffer](#) &buf) const override
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

Additional Inherited Members

3.63 F64 Class Reference

Inheritance diagram for F64:



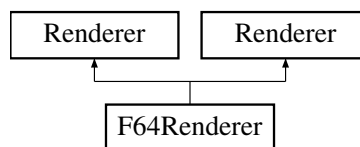
Public Member Functions

- **F64** (double val=0)
- DataType **getDataType** () const
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Additional Inherited Members

3.64 F64Renderer Class Reference

Inheritance diagram for F64Renderer:



Public Member Functions

- virtual void **display** (Buffer &in, MultiShape2d *m, MultiText *t, float x0, float y0, float *w, float *h) const override
- virtual void **display** (Buffer &in, MultiShape2d *m, MultiText *t, float x0, float y0, float *w, float *h) const override

Additional Inherited Members

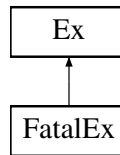
3.65 FastFontHeader Struct Reference

Public Attributes

- uint32_t **magic**
- uint32_t **version**
- uint32_t **w**
- uint32_t **h**
- uint32_t **numFaces**
- uint32_t **numFonts**
- uint32_t **numGlyphs**

3.66 FatalEx Class Reference

Inheritance diagram for FatalEx:



Public Member Functions

- **FatalEx** (const char filename[], int lineNum, Errcode e, const std::string &name="")

Additional Inherited Members

3.67 FileUtil Class Reference

Public Member Functions

- void **searchDir** (const char dirName[])

Static Public Member Functions

- static char * **readComplete** (const char filename[])
- static void **readComplete** (char **p, uint32_t *len, const char filename[])
- static bool **isDir** (const std::string &path)
- template<typename T >
static uint32_t **findAll** (std::regex *reg, const std::string &dirName, T *handler, void(T::*f)(std::string filePath, std::string filename))
- static void **buildMapNameToFile** (const std::regex *pattern, std::string dirName, void(*)(std::string name, const std::string &path))

3.67.1 Member Function Documentation

3.67.1.1 buildMapNameToFile()

```

static void FileUtil::buildMapNameToFile (
    const std::regex * pattern,
    std::string dirName,
    void(*) (std::string name, const std::string &path) f ) [inline], [static]
  
```

This is static because it makes no sense to load fonts over and over again into multiple browser windows when they should be sharing

3.68 Font Class Reference

Classes

- class [Glyph](#)

Public Member Functions

- **Font** ([FontFace](#) *Face, FT_Face ftFace, uint16_t height, uint8_t bitmap[], uint32_t &sizeX, uint32_t &sizeY, uint32_t &currX, uint32_t &currY, uint32_t &rowSize)
- **Font** (std::istream &)
- uint32_t **getStartGlyph** () const
- void [addGlyph](#) (FT_Face ftFace, std::unordered_map< uint32_t, uint32_t > &glyphMap, uint8_t c, uint8_t bitmap[], uint32_t &sizeX, uint32_t &sizeY, uint32_t &currX, uint32_t &currY, uint32_t &rowSize)
- const [Glyph](#) * **getGlyph** (uint32_t i) const
- uint16_t **getHeight** () const
- uint32_t **getTexture** () const
- float **getWidth** (const char text[], const uint32_t len) const
- void **save** (std::ostream &fastfont)

Static Public Member Functions

- static [Font](#) * **getDefault** ()

Public Attributes

- uint32_t **maxWidth**
- uint16_t **spaceWidth**

Friends

- class **FontFace**
- std::ostream & **operator**<< (std::ostream &s, const [Font](#) &f)

3.68.1 Member Function Documentation

3.68.1.1 addGlyph()

```
void Font::addGlyph (
    FT_Face ftFace,
    std::unordered_map< uint32_t, uint32_t > & glyphMap,
    uint8_t c,
    uint8_t bitmap[],
    uint32_t & sizeX,
    uint32_t & sizeY,
    uint32_t & currX,
    uint32_t & currY,
    uint32_t & rowSize )
```

- convert to an anti-aliased bitmap */

3.69 FontFace Class Reference

Public Member Functions

- uint32_t **getTexture** () const
- **FontFace** (FT_Library ft, const std::string &faceName, const std::string &facePath, uint32_t minFontSize, uint32_t inc, uint32_t maxFontSize, uint8_t bitmap[], uint32_t &sizeX, uint32_t &sizeY, uint32_t &currX, uint32_t &currY, uint32_t &rowSize)
- const [Font](#) * **getFont** (uint32_t size, int weight) const

Static Public Member Functions

- static void **initAll** ()
- static void **addFontName** (std::string name, const std::string &path)
- static void **emptyFaces** ()
- static const [FontFace](#) * **getFace** (int i)
- static const [Font](#) * **get** (const char faceName[], uint32_t size, uint32_t boldness)

Public Attributes

- uint32_t **maxWidthIndex**

Static Public Attributes

- static FT_Library **ftLib**
- static constexpr char **TIMES** [] = "Times"
- static constexpr char **HELVETICA** [] = "Helvetica"
- static constexpr char **COURIER** [] = "Courier"
- static constexpr uint32_t **NORMAL** = 1
- static constexpr uint32_t **BOLD** = 9

Friends

- class **Font**

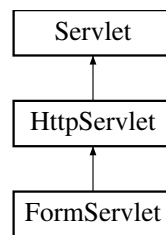
3.70 AxisWidget::Format Struct Reference

Public Attributes

- int **width**
- int **precision**

3.71 FormServlet Class Reference

Inheritance diagram for FormServlet:

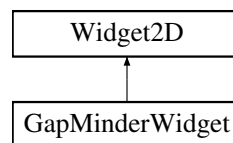


Public Member Functions

- void **request** ([Request](#) &r)

3.72 GapMinderWidget Class Reference

Inheritance diagram for GapMinderWidget:



Public Member Functions

- **GapMinderWidget** ([StyledMultiShape2D](#) *m, [MultiText](#) *t, float x, float y, float w, float h, const std::string &title, const [Style](#) *titleStyle, const [Style](#) *barStyle, float minX, float maxX, float minY, float maxY, float max↵Multiplier, float minMultiplier, float tickSize, float tickStart, [Scale](#) *yAxis, [Scale](#) *xAxis)
- **GapMinderWidget** ([StyledMultiShape2D](#) *m, [MultiText](#) *t, float x, float y, float w, float h)
- **GapMinderWidget** ([StyledMultiShape2D](#) *m, [MultiText](#) *t, float x, float y, float w, float h, const std::vector< float > &xLocations, const std::vector< float > &yLocations)
- void **setMinMaxY** (float min, float max)
- void **setAxisScale** ([Scale](#) *yAxis)
- void **setTitleStyle** (const [Style](#) *s)
- void **chart** (const std::vector< float > &yLocations, const std::vector< float > &xLocations, const std↵::vector< float > &sizes, int rulerInterval, const std::vector< glm::vec4 > &c)
- void **setTitle** (const std::string &s)
- void **init** () override

Additional Inherited Members

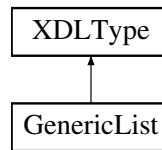
3.73 BlockLoader::GeneralHeader Struct Reference

Public Attributes

- uint32_t **magic**
- uint32_t **type**: 16
- uint32_t **version**: 16

3.74 GenericList Class Reference

Inheritance diagram for GenericList:



Public Member Functions

- **GenericList** (const std::string &name, uint32_t size, const std::string &listType)
- DataType **getDataType** () const override
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **writeMeta** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const override
- XDLIterator * **createIterator** () override

Additional Inherited Members

3.75 GLWin Class Reference

Public Types

- enum **Inputs** {
INSERT = 260 , **DEL** = 261 , **RARROW** = 262 , **LARROW** = 263 ,
UPARROW = 265 , **DOWNARROW** = 264 , **PAGEUP** = 266 , **PAGEDOWN** = 267 ,
F1 = 290 , **F2** = 291 , **F3** = 292 , **F4** = 293 ,
F5 = 294 , **F6** = 295 , **F7** = 296 , **F8** = 297 ,
F9 = 298 , **F10** = 299 , **F11** = 300 , **F12** = 301 ,
WHEELUP = 401 , **WHEELDOWN** = 399 , **MOUSE0** = 0 , **MOUSE1** = 1 ,
MOUSE2 = 2 , **MOUSE3** = 3 , **MOUSE4** = 4 , **PRESS** = 8 ,
RELEASE = 0 , **CTRL** = 512 , **SHIFT** = 1024 , **ALT** = 2048 }
- enum class **Security** { **SAFE** , **RESTRICTED** , **ASK** }

Public Member Functions

- float **getTime** () const
- uint32_t **lookupAction** (const char actionName[])
- void **setEvent** (uint32_t e, uint32_t a)
- void **setEvent** (uint32_t key, uint32_t mod, uint32_t a)
- void **setAction** (uint32_t a, Action action)
- void **loadBindings** ()
- uint32_t **internalRegisterAction** (const char name[], Security s, Action action)
- void **bind** (uint32_t input, const char actionName[])
- void **bind** (const char inputCmd[], const char actionName[])
- double **time** () const

- void **setDt** (double delta)
- **GLWin** (uint32_t bgColor=0x000000FF, uint32_t fgColor=0xFFFFFFFF, const char title[]=nullptr, uint32_t exitAfter=0)
- **GLWin** (uint32_t w, uint32_t h, uint32_t bgColor, uint32_t fgColor, const char title[], uint32_t exitAfter=0)
need to call setSize, startWindow manually
- **Tab** * **currentTab** ()
- void **setSize** (uint32_t w, uint32_t h)
- uint32_t **getWidth** () const
- uint32_t **getHeight** () const
- virtual void **init** ()
- void **startWindow** ()
- virtual void **render** ()
- void **addFontPath** (std::string path, std::string name)
- virtual void **update** ()
- virtual void **cleanup** ()
- void **resetAnim** ()
- void **setTime** (float t)
- void **tick** ()
- void **setEndTime** (float t)
- void **setDesiredColor** (const glm::vec3 &c, float delta)
- void **random** (glm::vec3 &v)
- void **mainLoop** ()
- void **setDirty** ()
- const **Style** * **getDefaultStyle** () const
- const **Style** * **getGuiStyle** () const
- const **Style** * **getGuiTextStyle** () const
- const **Style** * **getMenuStyle** () const
- const **Style** * **getMenuTextStyle** () const
- const **Font** * **getDefaultFont** () const
- const **Font** * **getGuiFont** () const
- const **Font** * **getMenuFont** () const
- virtual void **baselnit** ()
- void **bind2DOrtho** ()
- void **bind3D** ()
- void **clearSelected** (**GLWin** *w)
- double **getTime** ()

Static Public Member Functions

- static int **init** (**GLWin** *g, uint32_t w, uint32_t h, uint32_t exitAfter=0)
- static int **init** (**GLWin** *g, uint32_t exitAfter=0)
- static glm::mat4 * **getProjection** ()
- static void **classInit** ()
- static void **classCleanup** ()
- static void **quit** (**GLWin** *w)
- static void **refresh** (**GLWin** *w)
- static void **saveFrame** (**GLWin** *w)
- static void **resetCamera** (**GLWin** *w)
- static void **gotoStartTime** (**GLWin** *w)
- static void **gotoEndTime** (**GLWin** *w)
- static void **speedTime** (**GLWin** *w)
- static void **slowTime** (**GLWin** *w)
- static void **resetTimeDilation** (**GLWin** *w)

- static void **resetProjection3D** (GLWin *w)
- static void **zoomOut3D** (GLWin *w)
- static void **zoomIn3D** (GLWin *w)
- static void **panRight3D** (GLWin *w)
- static void **panLeft3D** (GLWin *w)
- static void **panUp3D** (GLWin *w)
- static void **panDown3D** (GLWin *w)
- static void **selectObject3D** (GLWin *w)
- static void **addSelectObject3D** (GLWin *w)
- static void **toggleSelectObject3D** (GLWin *w)
- static void **resetProjection2D** (GLWin *w)
- static void **zoomOut2D** (GLWin *w)
- static void **zoomIn2D** (GLWin *w)
- static void **panRight2D** (GLWin *w)
- static void **panLeft2D** (GLWin *w)
- static void **panUp2D** (GLWin *w)
- static void **panDown2D** (GLWin *w)
- static void **gotoTop** (GLWin *w)
- static void **gotoBottom** (GLWin *w)
- static void **scrollUp** (GLWin *w)
- static void **scrollDown** (GLWin *w)
- static void **pageUp** (GLWin *w)
- static void **pageDown** (GLWin *w)
- static void **sectionUp** (GLWin *w)
- static void **sectionDown** (GLWin *w)
- static void **playSound** (GLWin *w, const char name[])
- static void **stopSound** (GLWin *w)
- static void **pressOnWidget** (GLWin *w)
- static void **releaseWidget** (GLWin *w)

Public Attributes

- double **mouseX**
- double **mouseY**
- float **mousePressX**
- float **mousePressY**
- bool **dragMode**
- int **winXPos**
- int **winYPos**
- uint32_t **width**
- uint32_t **height**
- bool **dirty**
- bool **dirty2**
- bool **focused**
- uint32_t **exitAfter**
- uint32_t **numActions** [3]

Static Public Attributes

- constexpr static uint32_t **COMMON_SHADER** = 0
- constexpr static uint32_t **PER_VERTEX_SHADER** = 1
- constexpr static uint32_t **TEXT_SHADER** = 2
- constexpr static uint32_t **TEXTURE_SHADER** = 3
- constexpr static uint32_t **CURSOR_SHADER** = 4
- constexpr static uint32_t **MULTI_TEXTURE_SHADER** = 5
- static std::string **baseDir**
- static uint32_t **inputMap** [32768]
- static Action **actionMap** [4096]
- static std::unordered_map< std::string, int > **actionNameMap**

Protected Attributes

- [Style](#) * **defaultStyle**
- [Style](#) * **guiStyle**
- [Style](#) * **guiTextStyle**
- [Style](#) * **menuStyle**
- [Style](#) * **menuTextStyle**
- [Font](#) * **defaultFont**
- [Font](#) * **guiFont**
- [Font](#) * **menuFont**

3.76 Font::Glyph Class Reference

Public Member Functions

- **Glyph** (float advance, float bearingX, float bearingY, float sizeX, float sizeY, float u0, float u1, float v1, float v0)

Public Attributes

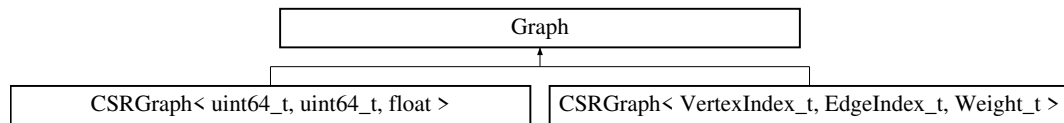
- float **advance**
- float **bearingX**
- float **bearingY**
- float **sizeX**
- float **sizeY**
- float **u0**
- float **u1**
- float **v1**
- float **v0**

Friends

- std::ostream & **operator**<< (std::ostream &s, const [Font::Glyph](#) &g)

3.77 Graph Class Reference

Inheritance diagram for Graph:

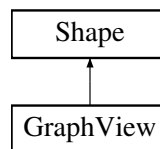


Public Attributes

- uint64_t **V**
- uint64_t **E**

3.78 GraphView Class Reference

Inheritance diagram for GraphView:



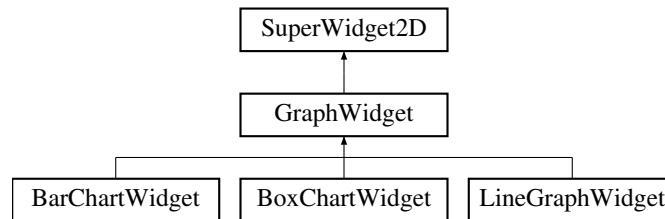
Public Member Functions

- [CSRGraph](#)< uint64_t, uint64_t, float > * **getGraph** ()
- void **setVertexRadius** (float vertR)
- void **addColor** (float r, float g, float b)
- void **addVert** (uint64_t v, float x, float y, uint8_t initialVertColor, [Point](#) points[])
- void **addEdge** (uint64_t i, float x1, float y1, float x2, float y2, uint8_t initialEdgeColor)
- void **updateVert** (uint64_t v, uint8_t colorVal)
- void **updateEdge** (uint64_t i, uint8_t colorVal)
- **GraphView** ([CSRGraph](#)< uint64_t, uint64_t, float > &g, [Canvas](#) *c, [Style](#) *style, glm::vec4 s)
- uint64_t **getE** () const
- void **process_input** (Inputs *, float dt) override
- void **init** () override
- void **render** () override
- void **update** () override
- void **addEdges** (const [Point](#) vertexPos[], uint8_t initialEdgeColor)

Additional Inherited Members

3.79 GraphWidget Class Reference

Inheritance diagram for GraphWidget:



Public Types

- enum **AxisType** { **LINEAR** , **LOGARITHMIC** , **TEXT** }

Public Member Functions

- **GraphWidget** ([Canvas](#) *c, [StyledMultiShape2D](#) *m, [MultiText](#) *t, double x, double y, double w, double h)
- virtual void **createXAxis** (AxisType a)=0
- virtual void **createYAxis** (AxisType a)=0
- void **setGraphTitle** (std::string text)
- void **setXAxisTextStyle** (const [Style](#) *xAxisTextStyle)
- void **setYAxisTextStyle** (const [Style](#) *yAxisTextStyle)

Public Attributes

- [AxisWidget](#) * **xAxis**
- [AxisWidget](#) * **yAxis**

Protected Member Functions

- void **commonRender** ()

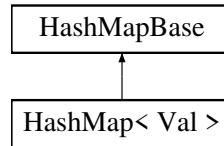
Protected Attributes

- std::string **graphTitle**
- const [Style](#) * **xAxisTextStyle**
- const [Style](#) * **yAxisTextStyle**
- AxisType **xAxisType**
- AxisType **yAxisType**

3.80 Hash Class Reference

3.81 `HashMap< Val >` Class Template Reference

Inheritance diagram for `HashMap< Val >`:



Classes

- class [ConstIterator](#)
- class [Iterator](#)

Public Member Functions

- **HashMap** (`uint32_t sz, uint32_t symbolSize=1024 * 1024`)
- **HashMap** (`const HashMap &orig`)=delete
- **HashMap & operator=** (`const HashMap &orig`)=delete
- void **checkGrow** ()
- void **add** (`const char s[], const Val &v`)
- Val **add** (`const char s[], uint32_t len, const Val &v`)
- bool **get** (`const char s[], Val *v`) const
- Val * **get** (`const char s[]`)
- const Val * **get** (`const char s[]`) const
- Val * **get** (`const char *s, uint32_t len`)
- `uint64_t` **hist** () const

Public Attributes

- friend **Iterator**
- friend **ConstIterator**

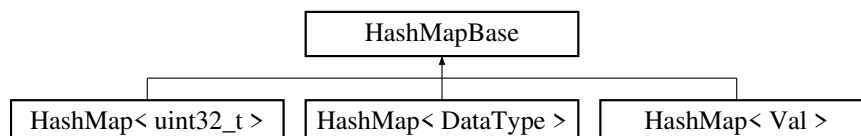
Friends

- `std::ostream & operator<<` (`std::ostream &s, const HashMap &h`)

Additional Inherited Members

3.82 `HashMapBase` Class Reference

Inheritance diagram for `HashMapBase`:



Public Member Functions

- const char * **getWords** () const
- uint32_t **getWordsSize** () const

Protected Member Functions

- uint32_t **fasthash1** (const char s[]) const
- uint32_t **bytewisehash** (const char s[], uint32_t len) const
- uint32_t **bytewisehash** (const char s[]) const
- uint32_t **hash** (const char s[]) const
- uint32_t **hash** (const char s[], uint32_t len) const
- **HashMapBase** (uint32_t sz, uint32_t symbolSize)

Static Protected Member Functions

- static bool **hasNoZero** (uint32_t v)
- static bool **hasNoZero** (uint64_t v)
- static bool **haszero** (uint32_t v)
- static bool **notzero** (uint64_t v)

Protected Attributes

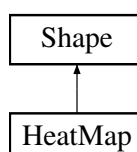
- uint32_t **size**
- uint32_t **symbolSize**
- char * **symbols**
- char * **current**
- uint32_t * **table**

Static Protected Attributes

- constexpr static int **r1** = 5
- constexpr static int **r2** = 7
- constexpr static int **r3** = 17
- constexpr static int **r4** = 13
- constexpr static int **r5** = 11
- constexpr static int **r6** = 16

3.83 HeatMap Class Reference

Inheritance diagram for HeatMap:



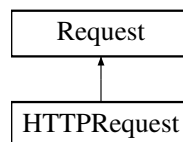
Public Member Functions

- **HeatMap** (uint32_t w, uint32_t h)
- void **add** (float x1, float y1, float v1, float x2, float y2, float v2, float x3, float y3, float v3, float x4, float y4, float v4)
- void **init** () override
- void **render** () override
- void **update** () override

Additional Inherited Members

3.84 HTTPRequest Class Reference

Inheritance diagram for HTTPRequest:



Public Member Functions

- **HTTPRequest** (const char *ReqType)
- void **handle** (int sckt) override
- void **handle** (int sckt, const char *command) override

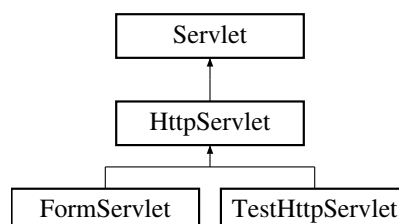
Static Public Attributes

- static const std::string **POST** = "POST"
- static const std::string **GET** = "GET"
- static const std::string **UNIMPLEMENTED** = "???"

Additional Inherited Members

3.85 HttpServlet Class Reference

Inheritance diagram for HttpServlet:

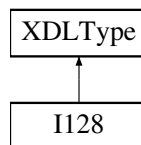


Public Member Functions

- virtual void **request** ([Buffer](#) &out)=0

3.86 I128 Class Reference

Inheritance diagram for I128:



Public Member Functions

- **I128** (int64_t a, uint64_t b)
- **I128** (int64_t b)
- DataType **getDataType** () const
- uint32_t **size** () const override
- void **write** ([Buffer](#) &buf) const override
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

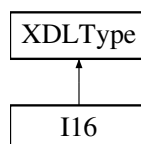
Friends

- bool **operator==** (const [I128](#) &a, const [I128](#) &b)

Additional Inherited Members

3.87 I16 Class Reference

Inheritance diagram for I16:



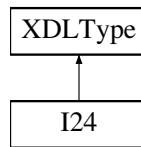
Public Member Functions

- **I16** (int16_t val)
- DataType **getDataType** () const
- uint32_t **size** () const override
- void **write** ([Buffer](#) &buf) const override
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

Additional Inherited Members

3.88 I24 Class Reference

Inheritance diagram for I24:



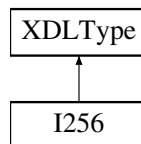
Public Member Functions

- **I24** (int32_t val)
- DataType **getDataType** () const
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Additional Inherited Members

3.89 I256 Class Reference

Inheritance diagram for I256:



Public Member Functions

- **I256** (int64_t a, uint64_t b, uint64_t c, uint64_t d)
- DataType **getDataType** () const override
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

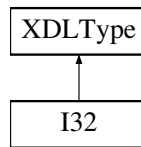
Friends

- bool **operator==** (const I256 &a, const I256 &b)

Additional Inherited Members

3.90 I32 Class Reference

Inheritance diagram for I32:



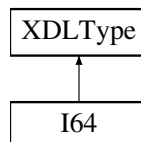
Public Member Functions

- **I32** (int32_t val)
- DataType **getDataType** () const
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Additional Inherited Members

3.91 I64 Class Reference

Inheritance diagram for I64:



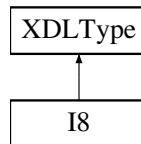
Public Member Functions

- **I64** (int64_t val)
- DataType **getDataType** () const override
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Additional Inherited Members

3.92 I8 Class Reference

Inheritance diagram for I8:



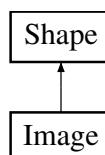
Public Member Functions

- **I8** (int8_t val)
- DataType **getDataType** () const
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Additional Inherited Members

3.93 Image Class Reference

Inheritance diagram for Image:



Public Member Functions

- **Image** (Canvas *c, float x, float y, float width, float height, uint32_t textureId, const Style *s)
- **Image** (Canvas *c, float x, float y, float width, float height, const char *filePath, const Style *s)
- **Image** (Canvas *c, float x, float y, float width, float height, char *filePath, const Style *s)
- void **change** (const char *filePath)
- void **init** ()
- void **process_input** (Inputs *in, float dt)
- void **update** ()
- void **render** ()
- void **addImage** (float x, float y, float width, float height, float u0=0, float v0=0, float u1=1, float v1=1)

Static Public Member Functions

- static void **combineImage** (const std::vector< std::string > &images)

Additional Inherited Members

3.94 BlockLoader::Info Struct Reference

Public Attributes

- uint64_t **bytes**
- Type **t**
- uint32_t **version**

3.95 InputEvent Class Reference

Public Member Functions

- **InputEvent** (uint16_t userid, uint16_t input, uint16_t mods, uint16_t x, uint16_t y)

Public Attributes

- const uint16_t **userid**
- const uint16_t **input**: 12
- const uint16_t **mods**: 4
- const uint16_t **x**
- const uint16_t **y**

3.96 Insertion Class Reference

Public Member Functions

- **Insertion** (uint32_t offset, DataType d)

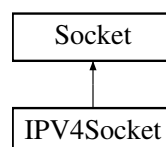
Public Attributes

- const uint32_t **offset**
- const DataType **d**

3.97 InterpretCSPStream Class Reference

3.98 IPV4Socket Class Reference

Inheritance diagram for IPV4Socket:



Public Member Functions

- **IPV4Socket** (const char *addr, uint16_t port)
- **IPV4Socket** (uint16_t port)
- void **listenOnPort** ()
- void **wait** ()
- void **send** (const char *command)
- void **send** (uint32_t reqn)

Static Public Member Functions

- static int **send** (socket_t sckt, const char *buf, int size, int flags)
- static int **recv** (socket_t sckt, const char *buf, int size, int flags)

Additional Inherited Members

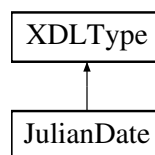
3.99 HashMap< Val >::Iterator Class Reference

Public Member Functions

- **Iterator** (const [HashMap](#) &list)
- bool **operator!** () const
- void **operator++** ()
- const char * **key** () const
- Val * **value** ()

3.100 JulianDate Class Reference

Inheritance diagram for JulianDate:



Public Member Functions

- **JulianDate** (int32_t year, uint32_t month, uint32_t day, uint32_t hour=0, uint32_t min=0, uint32_t second=0)
- [JulianDate](#) **operator+** (double days) const
- [JulianDate](#) **operator-** (double days) const
- [JulianDate](#) **operator+=** (double days)
- [JulianDate](#) **operator-=** (double days)
- bool **operator==** ([JulianDate](#) orig)
- **operator double** () const
- int32_t **getYear** () const
- uint32_t **getMonth** () const

- uint32_t **getDay** () const
- uint32_t **getHour** () const
- uint32_t **getMinute** () const
- double **getSecond** () const
- void **format** (char dest[])
- double **getJulDate** () const
- void **extract** (int32_t *year, uint32_t *mm, uint32_t *dd, uint32_t *hh, uint32_t *min, uint32_t *ss)
- **JulianDate** (int32_t year, uint8_t month, uint8_t day, uint8_t hour, uint8_t min, uint8_t sec)
- int32_t **getYear** () const
- uint32_t **getMonth** () const
- uint32_t **getDay** () const
- uint32_t **getHour** () const
- uint32_t **getMin** () const
- double **getSecond** () const
- DataType **getDataType** () const override
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Static Public Member Functions

- static bool **isLeap** (uint32_t year)

Static Public Attributes

- static const double **epoch** = 2000
- static const uint16_t **daysUpTo** [12]
- static const uint16_t **daysInMonth** [12]
- static const char * **monthAbbr** [12]
- static const char * **monthNames** [12]

Friends

- class **Date**
- double **operator-** (JulianDate a, JulianDate b)
- std::ostream & **operator<<** (std::ostream &s, const JulianDate &jd)

Additional Inherited Members

3.100.1 Member Data Documentation

3.100.1.1 daysInMonth

```
const uint16_t JulianDate::daysInMonth [static]
```

Initial value:

```
= {
    31,
    28,
    31,
    30,
    31,
    30,
    31,
    30,
    31,
    31,
    30,
    31,
    30,
    31,
    31
}
```

3.100.1.2 daysUpTo

```
const uint16_t JulianDate::daysUpTo [static]
```

Initial value:

```
= {
    0,
    31,
    59,
    90,
    120,
    151,
    181,
    212,
    243,
    273,
    304,
    334
}
```

3.100.1.3 monthAbbr

```
const char * JulianDate::monthAbbr [static]
```

Initial value:

```
= { "Jan", "Feb", "Mar", "Apr",
    "May", "Jun", "Jul", "Aug",
    "Sep", "Oct", "Nov", "Dec" }
```

3.100.1.4 monthNames

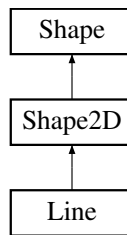
```
const char * JulianDate::monthNames [static]
```

Initial value:

```
= {
    "January", "February", "March", "April", "May", "June",
    "July", "August", "September", "October", "November", "December" }
```

3.101 Line Class Reference

Inheritance diagram for Line:



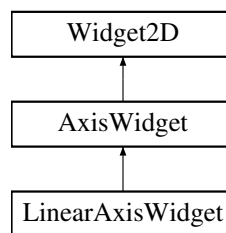
Public Member Functions

- **Line** ([Canvas](#) *c, float x1, float y1, float x2, float y2, [Style](#) *s)
- void **initIndices** ()
- void **render** ()

Additional Inherited Members

3.102 LinearAxisWidget Class Reference

Inheritance diagram for LinearAxisWidget:



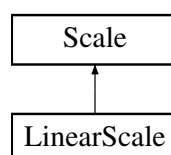
Public Member Functions

- **LinearAxisWidget** ([StyledMultiShape2D](#) *m, [MultiText](#) *t, double x, double y, double w, double h)
- void **setBounds** (double minBound, double maxBound) override
- void **setTickInterval** (double tickInterval) override
- void **init** () override

Additional Inherited Members

3.103 LinearScale Class Reference

Inheritance diagram for LinearScale:



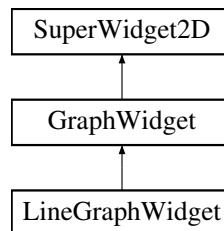
Public Member Functions

- float **transform** (double x) override
- void **init** (double min, double max, double shift, double axisSize, double tickInterval) override
- float **next** (float v) override

Additional Inherited Members

3.104 LineGraphWidget Class Reference

Inheritance diagram for LineGraphWidget:



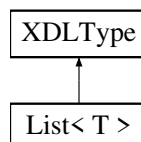
Public Member Functions

- **LineGraphWidget** ([Canvas](#) *c, [StyledMultiShape2D](#) *m, [MultiText](#) *t, double x, double y, double w, double h)
- void **setPointFormat** (char pt, double size, glm::vec4 &color)
- void **setXPoints** (const std::vector< double > &xPoints)
- void **setYPoints** (const std::vector< double > &yPoints)
- void **createXAxis** (AxisType a) override
- void **createYAxis** (AxisType a) override
- void **init** () override

Additional Inherited Members

3.105 List< T > Class Template Reference

Inheritance diagram for List< T >:



Public Member Functions

- **List** (uint32_t size=16)
- DataType **getDataType** () const
- void **add** (const T &e)
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **writeMeta** (Buffer &buf) const override
- void **read** (Buffer &buf)
- XDLIterator * **createIterator** () override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const override

Additional Inherited Members

3.106 List1< T > Class Template Reference

Public Member Functions

- **List1** (uint8_t initialSize)
- **List1** (const List &orig)=delete
- List1 & **operator=** (const List &orig)=delete
- void **addEnd** (const T &v)
- **List1** (uint32_t initialSize)
- **List1** (const List1 &orig)
- uint32_t **serializeSize** () const
- char * **read** (char *p)
- char * **write** (char *p)
- void **add** (const T &v)
- uint32_t **getUsed** () const
- uint32_t **getCapacity** () const
- T **getData** (int i) const
- uint32_t **size** () const

3.107 List2 Class Reference

Public Member Functions

- **List2** (uint16_t size)

3.108 Log Class Reference

Public Types

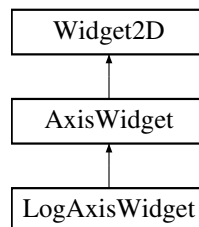
- enum class **Level** {
LOGINFO , LOGDEBUG , LOGWARN , LOGERROR ,
LOGCRITICAL }

Public Member Functions

- void **setLogFile** (const char filename[])
- void **setLevel** (Level L)
- void **log** (Level severity, uint16_t message)
- void **log** (Level severity, uint16_t message, uint32_t param)
- void **log** (Level severity, uint16_t message, uint32_t param1, uint32_t param2)
- void **log** (Level severity, uint16_t message, const std::string &name)
- void **warn** (Errcode message)
- void **error** (Errcode message)
- void **critical** (Errcode message)

3.109 LogAxisWidget Class Reference

Inheritance diagram for LogAxisWidget:



Public Member Functions

- **LogAxisWidget** (StyledMultiShape2D *m, MultiText *t, double x, double y, double w, double h)
- void **setBounds** (double minBound, double maxBound) override
- void **setTickInterval** (double tickInterval) override
- void **init** () override

Additional Inherited Members

3.110 LogReader Class Reference

```
#include <Log.hh>
```

Public Member Functions

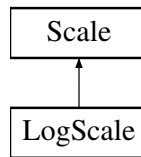
- **LogReader** (const char filename[], const char language[])
- bool **hasNext** (Log::Level severity)
- bool **hasNext** (uint16_t message)
- void **print** (std::ostream &s)

3.110.1 Detailed Description

Display a binary log in a user's preferred language

3.111 LogScale Class Reference

Inheritance diagram for LogScale:



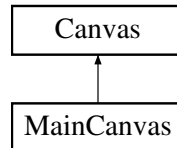
Public Member Functions

- float **transform** (double x) override
- void **init** (double min, double max, double shift, double axisSize, double tickInterval) override
- float **next** (float v) override

Additional Inherited Members

3.112 MainCanvas Class Reference

Inheritance diagram for MainCanvas:



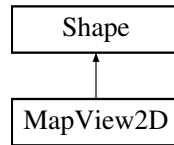
Public Member Functions

- **MainCanvas** ([GLWin](#) *parent)
- **MainCanvas** (const [MainCanvas](#) &)=delete
- [MainCanvas](#) & **operator=** (const [MainCanvas](#) &)=delete
- [StyledMultiShape2D](#) * **getGui** ()
- [MultiText](#) * **getGuiText** ()
- [StyledMultiShape2D](#) * **getMenu** ()
- [MultiText](#) * **getMenuText** ()
- void **init** ()
- void **render** ()
- void **cleanup** ()
- void **addButton** (const char text[], float x, float y, float w, float h)
- void **addLabel** (const char text[], float x, float y, float w, float h)
- void **addMenu** (const std::string menu[], uint32_t numStrings, float x, float y)

Additional Inherited Members

3.113 MapView2D Class Reference

Inheritance diagram for MapView2D:



Public Member Functions

- void **setProjection** ()
- void **translate** (float percentX, float percentY)
- void **uniformZoom** (float s)
- **MapView2D** ([Canvas](#) *parent, const [Style](#) *s, [BlockMapLoader](#) *bml=nullptr)
- glm::mat4 & **getTransform** ()
- void **init** () override
- void **render** () override
- void **update** () override
- void **dump** ()

Additional Inherited Members

3.114 MatrixGraph Class Reference

Public Member Functions

- **MatrixGraph** (int V)
- **MatrixGraph** (const [MatrixGraph](#) &orig)=delete
- [MatrixGraph](#) & **operator=** (const [MatrixGraph](#) &orig)=delete
- uint32_t **getV** () const
- uint32_t **getE** () const
- double **getW** (uint32_t from, uint32_t to) const
- void **setW** (uint32_t from, uint32_t to, double v)
- double **operator()** (int from, int to) const
- double & **operator()** (int from, int to)
- void **dfs** (int v)

Static Public Attributes

- constexpr static double **INF** = std::numeric_limits<double>::infinity()

Friends

- std::istream & **operator>>** (std::istream &s, [MatrixGraph](#) &g)

3.115 Struct::Member Class Reference

Public Member Functions

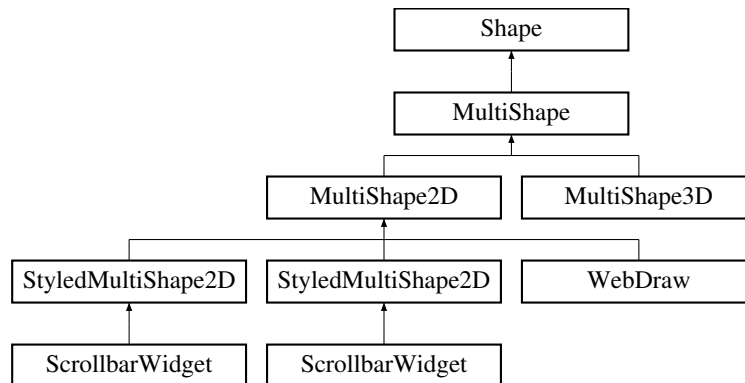
- **Member** (uint32_t nameOffset, uint32_t nameLen, const [XDLType](#) *type)

Public Attributes

- uint32_t **nameOffset**
- uint32_t **nameLen**
- const [XDLType](#) * **type**

3.116 MultiShape Class Reference

Inheritance diagram for MultiShape:



Public Member Functions

- **MultiShape** ([Canvas](#) *parent, uint32_t vertCount=1024, uint32_t solidIndCount=1024, uint32_t lineIndCount=1024, uint32_t pointIndCount=1024, uint32_t colorIndCount=1024)
- void **process_input** (Inputs *in, float dt) override
- void **update** () override
- void **addPoint** (float x, float y)

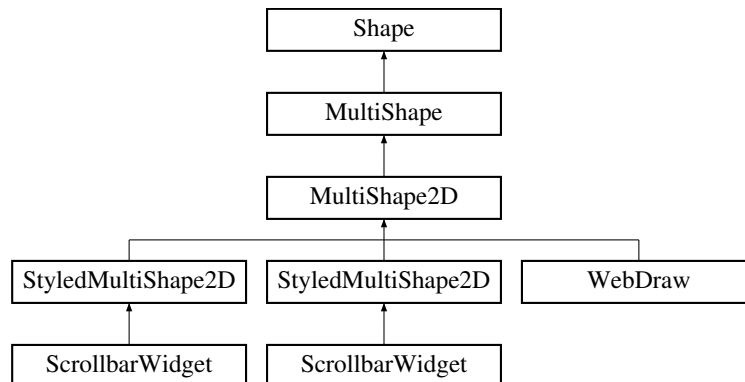
Protected Attributes

- std::vector< float > **vertices**
- std::vector< uint32_t > **solidIndices**
- std::vector< uint32_t > **lineIndices**
- std::vector< uint32_t > **pointIndices**
- std::vector< float > **colorIndices**

Additional Inherited Members

3.117 MultiShape2D Class Reference

Inheritance diagram for MultiShape2D:



Public Member Functions

- void **drawPoint** (float x, float y)
- **MultiShape2D** ([Canvas](#) *parent, const [Style](#) *s, uint32_t vertCount=1024, uint32_t solidIndCount=1024, uint32_t lineIndCount=1024, uint32_t pointIndCount=1024, uint32_t elemPerVert=2)
- void **init** () override
- void **render** () override
- void **fillRectangle** (float x, float y, float w, float h)
- void **fillRoundRect** (float x, float y, float w, float h, float rx, float ry)
- void **fillTriangle** (float x1, float y1, float x2, float y2, float x3, float y3)
- void **fillPolygon** (float x, float y, float xRad, float yRad, float n)
- void **fillCircle** (float x, float y, float rad, float angleInc)
- void **fillEllipse** (float x, float y, float xRad, float yRad, float angleInc)
- void **drawRectangle** (float x, float y, float w, float h)
- void **drawRoundRect** (float x, float y, float w, float h, float rx, float ry)
- void **drawTriangle** (float x1, float y1, float x2, float y2, float x3, float y3)
- void **drawPolygon** (float x, float y, float xRad, float yRad, float n)
- void **drawCompletePolygon** (float x, float y, float xRad, float yRad, float n)
- void **drawCircle** (float x, float y, float rad, float angleInc)
- void **drawEllipse** (float x, float y, float xRad, float yRad, float angleInc)
- void **drawLine** (float x1, float y1, float x2, float y2)
- void **bezierSegment** (const [Bezier](#) *b)
- void **bezierSegmentByPoints** (float p1x, float p1y, float p2x, float p2y, float p3x, float p3y, float p4x, float p4y, int n, bool end)
- void **endBezierSegment** (const [Bezier](#) *b)
- void **spline** (const std::vector< double > &points, int n)
- void **rectanglePoints** (float x, float y, float w, float h)
- void **roundRectPoints** (float x, float y, float w, float h, float rx, float ry)
- void **trianglePoints** (float x1, float y1, float x2, float y2, float x3, float y3)
- void **polygonPoints** (float x, float y, float xRad, float yRad, float n)
- void **circlePoints** (float x, float y, float rad, float angleInc)
- void **ellipsePoints** (float x, float y, float xRad, float yRad, float angleInc)
- const [Style](#) * **getStyle** ()

Protected Member Functions

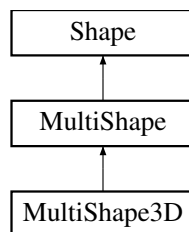
- void **sAddTriIndices** ()
- void **sAddQuadIndices** ()
- void **sAddSectorIndices** (uint32_t centerIndex, uint32_t indexCount)
- void **lAddTriIndices** ()
- void **lAddQuadIndices** ()
- void **lAddSectorIndices** (uint32_t centerIndex, uint32_t indexCount)
- void **pAddTriIndices** ()
- void **pAddQuadIndices** ()
- void **pAddSectorIndices** (uint32_t centerIndex, uint32_t indexCount)
- uint32_t **addSector** (float x, float y, float xRad, float yRad, float fromAngle, float toAngle, float angleInc)
- uint32_t **getPointIndex** () const
- void **addLine** (float x1, float y1, float x2, float y2)

Protected Attributes

- const [Style](#) * **style**
- uint32_t **elemPerVert**

3.118 MultiShape3D Class Reference

Inheritance diagram for MultiShape3D:



Public Member Functions

- **MultiShape3D** ([Canvas](#) *canv, [Camera](#) *c, const std::vector< const char * > &textureFiles, [Transformation](#) *t, uint32_t elemPerVert=3, uint32_t vertCount=1024, uint32_t solidIndCount=1024, uint32_t lineIndCount=1024, uint32_t pointIndCount=1024, uint32_t colorIndCount=1024)
- **MultiShape3D** ([Canvas](#) *canv, [Camera](#) *c, const char textureFile[], [Transformation](#) *t, uint32_t elemPerVert=3, uint32_t vertCount=1024, uint32_t solidIndCount=1024, uint32_t lineIndCount=1024, uint32_t pointIndCount=1024, uint32_t colorIndCount=1024)
- void **init** () override
- void **render** () override
- void **genFastRectPrism** (float x, float y, float z, uint32_t width, uint32_t length, uint32_t height, uint32_t texIndex, [TexCoordVector](#) &texCoords)
- void **genFastCube** (float x, float y, float z, uint32_t length, uint32_t texIndex, [TexCoordVector](#) &texCoords)
- void **genRectPrism** (float x, float y, float z, uint32_t width, uint32_t length, uint32_t height, uint32_t texIndex, [TexCoordVector](#) &texCoords)
- void **genCube** (float x, float y, float z, uint32_t length, uint32_t texIndex, [TexCoordVector](#) &texCoords)
- void **genOBJModel** (const char *filePath, std::vector< uint32_t > &texIndices, float xOffset=0, float yOffset=0, float zOffset=0)
- void **genOBJModel** (const char *filePath)

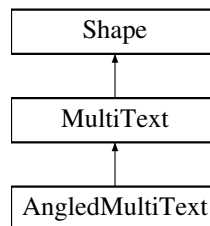
Protected Attributes

- `uint32_t elemPerVert`

Additional Inherited Members

3.119 MultiText Class Reference

Inheritance diagram for MultiText:



Public Member Functions

- **MultiText** (`Canvas` *c, const `Style` *style)
- **MultiText** (`Canvas` *c, const `Style` *style, `uint32_t` size)
- void **addChar** (float x, float y, const `Font` *f, const unsigned char c)
- void **addChar** (float x, float y, const `Font` *f, const `uint16_t` c)
- void **add** (float x, float y, const char s[], `uint32_t` len)
- void **add** (float x, float y, const `Font` *f, const char s[], `uint32_t` len)
- void **add** (float x, float y, `uint32_t` v)
- void **add** (float x, float y, const `Font` *f, `uint32_t` v)
- void **addHex** (float x, float y, const `Font` *f, `uint32_t` v)
- void **addHex8** (float x, float y, const `Font` *f, `uint32_t` v)
- void **add** (float x, float y, const `Font` *f, `int32_t` v)
- void **add** (float x, float y, float v)
- void **add** (float x, float y, const `Font` *f, float v)
- void **add** (float x, float y, double v)
- void **add** (float x, float y, const `Font` *f, double v)
- void **add** (float x, float y, const `Font` *f, double v, `int` fieldWidth, `int` precision)
- void **addCentered** (float x, float y, const `Font` *f, double v, `int` fieldWidth, `int` precision)
- void **addCentered** (float x, float y, const `Font` *f, const char s[], `uint32_t` len)
- void **checkAdd** (float &x, float &y, const `Font` *f, const unsigned char c, float endMargin, float rowSize, float startOverMargin)
- `uint32_t` **findFirstOverMargin** (float x, const `Font` *f, const char s[], `uint32_t` len, float rightMargin)
- void **clear** ()
- void **init** () override
- void **process_input** (`Inputs` *in, float dt)
- const `Style` * **getStyle** ()
- void **update** () override
- void **render** () override

Protected Member Functions

- void **addPoint** (float x, float y, float u, float v)

Protected Attributes

- uint32_t **textureId**
- const [Style](#) * **style**
- std::vector< float > **vert**
- float **veIX** = 1
- float **veIY** = 1

3.120 MultiThreadHttpRequest Class Reference

Public Member Functions

- void **handle** ()

3.121 MultiTransform Class Reference

Public Member Functions

- **MultiTransform** (const glm::vec3 &pos=glm::vec3(1, 1, 1), const glm::vec3 &rot=glm::vec3(1, 1, 1), const glm::vec3 &scale=glm::vec3(1, 1, 1))
- void **setPos** (const glm::vec3 &v)
- void **setRot** (const glm::vec3 &v)
- void **setScale** (const glm::vec3 &v)
- void **incrPos** (const glm::vec3 &v)
- void **incrRot** (const glm::vec3 &v)
- void **incrScale** (const glm::vec3 &v)
- glm::mat4 **getModel** ()

3.122 BlockMapLoader::NamedEntities Struct Reference

Public Attributes

- uint32_t **numNames**
- uint32_t **nameSizes**
- [NamedEntry](#) **entry** []

3.123 BlockMapLoader::NamedEntry Struct Reference

Public Attributes

- uint32_t **nameOffset**
- uint8_t **len**
- uint8_t **entityType**
- uint8_t **type**
- uint32_t **offset**

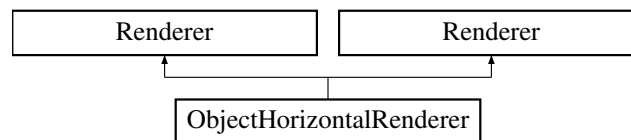
3.124 NullGraphObserver Class Reference

Public Member Functions

- void **addVert** (uint32_t index, float x, float y, uint8_t initialVertColor, std::vector< [Point](#) > &)
- void **addEdge** (uint64_t i, float x1, float y1, float x2, float y2, uint32_t initialEdgeColor)
- void **updateVert** (uint32_t i, uint8_t colorVal)
- void **updateEdge** (uint64_t j, uint8_t colorVal)

3.125 ObjectHorizontalRenderer Class Reference

Inheritance diagram for ObjectHorizontalRenderer:



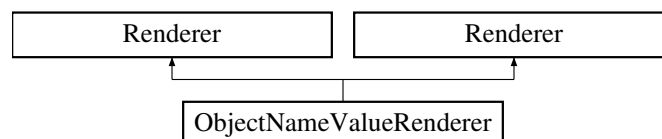
Public Member Functions

- virtual void **display** ([Buffer](#) &in, MultiShape2d *m, [MultiText](#) *t, float x0, float y0, float *w, float *h) const override
- virtual void **display** ([Buffer](#) &in, MultiShape2d *m, [MultiText](#) *t, float x0, float y0, float *w, float *h) const override

Additional Inherited Members

3.126 ObjectNameValueRenderer Class Reference

Inheritance diagram for ObjectNameValueRenderer:



Public Member Functions

- virtual void **display** ([Buffer](#) &in, MultiShape2d *m, [MultiText](#) *t, float x0, float y0, float *w, float *h) const override
- virtual void **display** ([Buffer](#) &in, MultiShape2d *m, [MultiText](#) *t, float x0, float y0, float *w, float *h) const override

Additional Inherited Members

3.127 Page Class Reference

Public Member Functions

- **Page** (const string &inputFile)
- **Page** (const string &staticContent, vector< [Insertion](#) > insertions)
- **Page** (const string &staticFile, const string &insertFile)
- char * **getStaticPointer** ()
- string **getStaticContent** () const
- vector< [Insertion](#) > **getInsertions** () const
- uint32_t **getSize** () const
- uint32_t **getStaticSize** () const
- void **addDynamic** (uint32_t offset, DataType d)
- void **addStatic** (const string &t)
- bool **isStatic** ()
- uint32_t **dynamicSize** (DataType d)
- **Page** (const unsigned char *text, const [PageLayout](#) *pageLayout, uint32_t offset)
- void **addLine** (uint32_t offset)
- uint32_t **getLine** (uint32_t line) const
- const [PageLayout](#) * **getLayout** () const
- uint32_t **size** () const

Friends

- ostream & **operator**<< (ostream &s, const [Page](#) &p)

3.128 pageBuffer Class Reference

Public Member Functions

- **pageBuffer** (char *content, uint32_t length)
- void **printPage** ()

3.129 PageLayout Class Reference

Public Member Functions

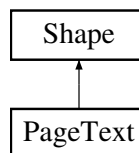
- **PageLayout** (float x0, float y0, float w, float h, float pageNumX, float pageNumY, float paragraphSpacing, uint32_t linesPerPage, const [Font](#) *f, float dropDead=0)

Public Attributes

- float **x0**
- float **x1**
- float **xDropDead**
- float **y0**
- float **y1**
- float **w**
- float **h**
- float **pageNumX**
- float **pageNumY**
- float **paragraphSpacing**
- uint32_t **linesPerPage**
- const [Font](#) * **f**

3.130 PageText Class Reference

Inheritance diagram for PageText:



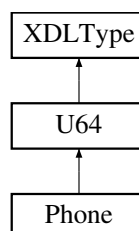
Public Member Functions

- **MultiText** (const [Style](#) *style, uint32_t size)
- void **clear** ()
- void **loadText** (const char s[], uint32_t len)
- void **addChar** (float x, float y, [Font](#) *f, const char c)
- void **add** (float x, float y, const char s[], uint32_t len)
- void **add** (float x, float y, uint32_t v)
- void **add** (float x, float y, float v)
- void **add** (float x, float y, double v)
- void **init** ()
- void **process_input** (Inputs *in, float dt)
- void **update** ()
- void **render** ()

Additional Inherited Members

3.131 Phone Class Reference

Inheritance diagram for Phone:



Public Member Functions

- **Phone** (uint64_t v)
- void **writeMeta** (Buffer &b) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Additional Inherited Members

3.132 Point Class Reference

Public Member Functions

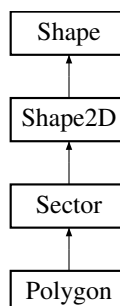
- **Point** (float x, float y)

Public Attributes

- double **x**
- double **y**
- double **z**
- float **x**
- float **y**

3.133 Polygon Class Reference

Inheritance diagram for Polygon:



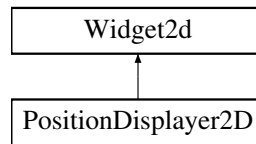
Public Member Functions

- **Polygon** (float x, float y, float xRad, float yRad, float n, Style *s)

Additional Inherited Members

3.134 PositionDisplayer2D Class Reference

Inheritance diagram for PositionDisplayer2D:



Public Member Functions

- **PositionDisplay2D** ([StyledMultiShape2D](#) *m, [MultiText](#) *t, uint32_t x, uint32_t y, uint32_t w, uint32_t h)
- void **addPoint** (float x, float y)
- void **move** (int i, float x, float y)
- void **init** ()

3.135 Prefs Class Reference

Public Member Functions

- void **load** ()
- void **save** ()
- std::string **getConfDir** () const
- std::string **getFontDir** () const
- std::string **getShaderDir** () const
- uint32_t **getPreferredX** () const
- uint32_t **getPreferredY** () const
- uint32_t **getPreferredWidth** () const
- uint32_t **getPreferredHeight** () const
- bool **getFastLoadShaders** () const
- void **setFastLoadShaders** (uint32_t fmt)

Public Attributes

- bool **trySavingShader**

3.136 RCString Class Reference

Public Member Functions

- **RCString** (const char msg[], uint32_t len)
- **RCString** (const char msg[])
- **RCString** (const [RCString](#) &a, const [RCString](#) &b, const [RCString](#) &c)
- **RCString** (const [RCString](#) &orig)
- [RCString](#) & **operator=** (const [RCString](#) &orig)
- **RCString** ([RCString](#) &&orig)
- char **operator[]** (uint32_t i) const
- char & **operator[]** (uint32_t i)
- uint32_t **len** () const

Static Public Member Functions

- static uint32_t **setMark** ()
- static void **freeToMark** (uint32_t mark)

Friends

- std::ostream & **operator**<< (std::ostream &s, const [RCString](#) &str)

3.137 Record Class Reference

Public Member Functions

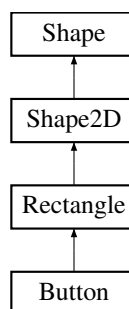
- void **add** (DataType t)

Friends

- ostream & **operator**<< (ostream &s, const [Record](#) &r)

3.138 Rectangle Class Reference

Inheritance diagram for Rectangle:



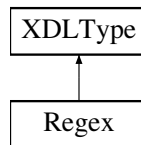
Public Member Functions

- **Rectangle** ([Canvas](#) *c, float x, float y, float width, float height, [Style](#) *s)
- void **initIndices** ()
- void **render** ()

Additional Inherited Members

3.139 Regex Class Reference

Inheritance diagram for Regex:



Public Member Functions

- **Regex** (const std::string &name, const std::string &exp)
- bool **match** (const std::string &text) const
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **writeMeta** (Buffer &buf) const override
- DataType **getDataType** () const
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Additional Inherited Members

3.140 BlockMapLoader::Region Struct Reference

Public Attributes

- uint32_t **segmentStart**
- uint32_t **startPoints**
- BoundRect **bounds**
- double **baseX**
- double **baseY**

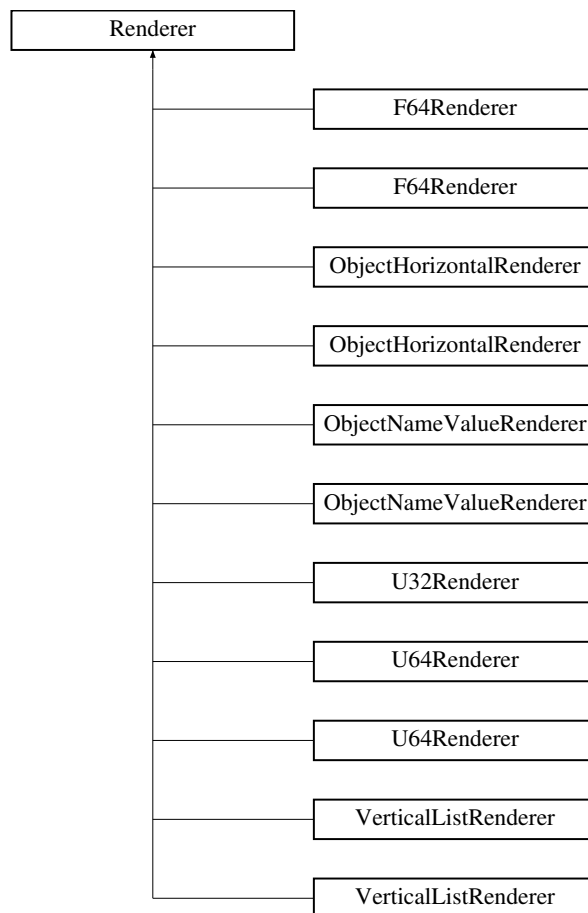
3.141 BlockMapLoader::RegionContainer Struct Reference

Public Attributes

- uint32_t **startRegion**
- uint32_t **endRegion**
- BoundRect **bounds**

3.142 Renderer Class Reference

Inheritance diagram for Renderer:



Public Types

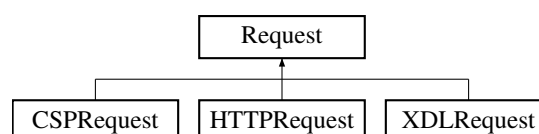
- enum **Dir** { **UP** , **DOWN** , **LEFT** , **RIGHT** }

Public Member Functions

- virtual void **display** ([Buffer](#) &in, MultiShape2d *m, [MultiText](#) *t, float x0, float y0, float *w, float *h) const =0
- void **update** (Dir)

3.143 Request Class Reference

Inheritance diagram for Request:



Public Member Functions

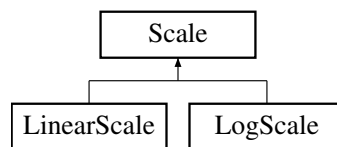
- virtual void **handle** (int sckt)=0
- virtual void **handle** (int sckt, const char *command)=0
- Buffer & **getOut** ()
- Buffer & **getIn** ()

Protected Attributes

- Buffer in
- Buffer out

3.144 Scale Class Reference

Inheritance diagram for Scale:



Public Member Functions

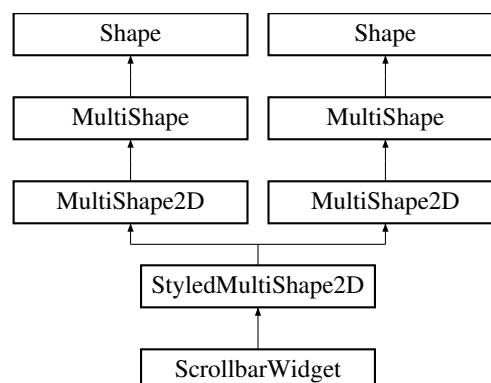
- virtual float **transform** (double x)=0
- virtual void **init** (double min, double max, double shift, double axisSize, double tickInterval)=0
- virtual float **next** (float v)=0

Protected Attributes

- double **scale**
- double **shift**
- double **min**
- double **max**
- double **tickInterval**
- double **numInterval**

3.145 ScrollbarWidget Class Reference

Inheritance diagram for ScrollbarWidget:



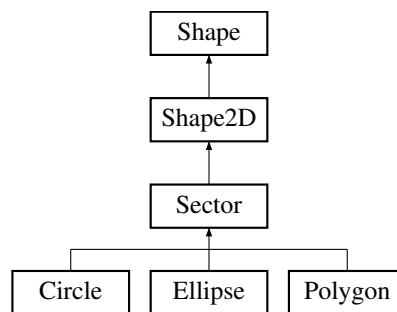
Public Member Functions

- **ScrollbarWidget** ([Canvas](#) *c, const [Style](#) *s, float x, float y, float w, float h)
- void **init** () override
- void **render** () override
- void **update** () override
- void **draw** ()
- void **scroll** (float dy)

Additional Inherited Members

3.146 Sector Class Reference

Inheritance diagram for Sector:



Public Member Functions

- **Sector** ([Canvas](#) *c, float x, float y, float xRad, float yRad, float fromAngle, float toAngle, float angleInc, [Style](#) *s)
- void **initIndices** ()
- void **render** ()

Additional Inherited Members

3.147 BlockLoader::SecurityHeaderV0 Struct Reference

Public Attributes

- uint64_t **yoho**

3.148 BlockLoader::SecurityHeaderV1 Struct Reference

Public Attributes

- uint8_t **hash** [32]
- uint8_t **hash2** [32]
- uint8_t **sigid** [32]

3.149 BlockMapLoader::Segment Struct Reference

Public Attributes

- uint32_t **numPoints**: 24
- uint32_t **type**: 8

3.150 Server< SocketImpl, HandlerImpl > Class Template Reference

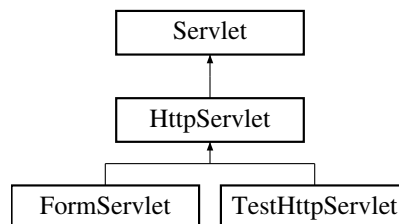
Public Member Functions

- **Server** (int port)

3.151 Servlet Class Reference

```
#include <Servlet.hh>
```

Inheritance diagram for Servlet:



Public Member Functions

- virtual void **request** (Buffer &out)=0

3.151.1 Detailed Description

Base class for servlet

This is the common behavior between protocols such as HTTP and CSP so this is the low-level data methods.

All servlets support a request, which is a client sending a message to

the server requesting data. In HTTP, a request is ASCII with many potential lines if input, whereas in CSP it is a lot shorter, fixed format, and binary

@author: Dov Kruger

3.152 ServletMap Class Reference

Public Member Functions

- **ServletMap** (uint32_t initialSize=32768)
- void **add** (const std::string &name, [HttpServlet](#) *s)
- [HttpServlet](#) * **get** (const char *s, size_t size) const

3.153 set1 Struct Reference

Public Attributes

- uint32_t **a**

3.154 set3 Struct Reference

Public Attributes

- string **first**
- string **last**

3.155 set4 Struct Reference

Public Attributes

- uint8_t **a**
- uint16_t **b**
- uint32_t **c**
- uint64_t **d**
- int8_t **e**
- int16_t **f**
- int32_t **g**
- int64_t **h**
- float **i**
- double **j**

3.156 Shader Class Reference

Public Member Functions

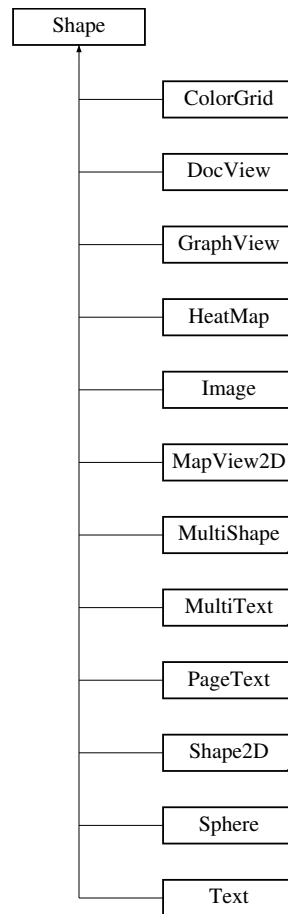
- **Shader** (const char shaderName[], const char vertexPath[], const char fragmentPath[], const char geometryPath[] = nullptr)
- void **cleanup** ()
- void **use** () const
- void **setBool** (const std::string &name, bool value) const
- void **setBool** (const char name[], bool value) const
- void **setBool** (int pos, bool value) const
- void **setInt** (const std::string &name, int value) const
- void **setInt** (const char name[], int value) const
- void **setInt** (int pos, int value) const
- void **setFloat** (const std::string &name, float value) const
- void **setFloat** (const char name[], float value) const
- void **setFloat** (int pos, float value) const
- void **setVec2** (const std::string &name, const glm::vec2 &value) const
- void **setVec2** (const char name[], const glm::vec2 &value) const
- void **setVec2** (int pos, const glm::vec2 &value) const
- void **setVec2** (const std::string &name, float x, float y) const
- void **setVec2** (const char name[], float x, float y) const
- void **setVec2** (int pos, float x, float y) const
- void **setVec3** (const std::string &name, const glm::vec3 &value) const
- void **setVec3** (const char name[], const glm::vec3 &value) const
- void **setVec3** (int pos, const glm::vec3 &value) const
- void **setVec3** (const std::string &name, float x, float y, float z) const
- void **setVec3** (const char name[], float x, float y, float z) const
- void **setVec3** (int pos, float x, float y, float z) const
- void **setVec4** (const std::string &name, const glm::vec4 &value) const
- void **setVec4** (const char name[], const glm::vec4 &value) const
- void **setVec4** (int pos, const glm::vec4 &value) const
- void **setVec4** (const std::string &name, float x, float y, float z, float w)
- void **setVec4** (const char name[], float x, float y, float z, float w)
- void **setVec4** (int pos, float x, float y, float z, float w)
- void **setMat2** (const std::string &name, const glm::mat2 &mat) const
- void **setMat2** (const char name[], const glm::mat2 &mat) const
- void **setMat2** (int pos, const glm::mat2 &mat) const
- void **setMat3** (const std::string &name, const glm::mat3 &mat) const
- void **setMat3** (const char name[], const glm::mat3 &mat) const
- void **setMat3** (int pos, const glm::mat3 &mat) const
- void **setMat4** (const std::string &name, const glm::mat4 &mat) const
- void **setMat4** (const char name[], const glm::mat4 &mat) const
- void **setMat4** (int pos, const glm::mat4 &mat) const
- uint32_t **getID** () const

Static Public Member Functions

- static void **setDir** (const std::string &shaderDir)
- static uint32_t **load** (const char shaderName[], const char vertRelPath[], const char fragRelPath[], const char geomRelPath[] = nullptr)
- static [Shader](#) * **useShader** (uint32_t sh)
- static void **cleanAll** ()

3.157 Shape Class Reference

Inheritance diagram for Shape:



Public Member Functions

- **Shape** ([Canvas](#) *parent)
- virtual void **init** ()=0
- virtual void **process_input** (Inputs *in, float dt)
- virtual void **update** ()=0
- virtual void **render** ()=0

Protected Member Functions

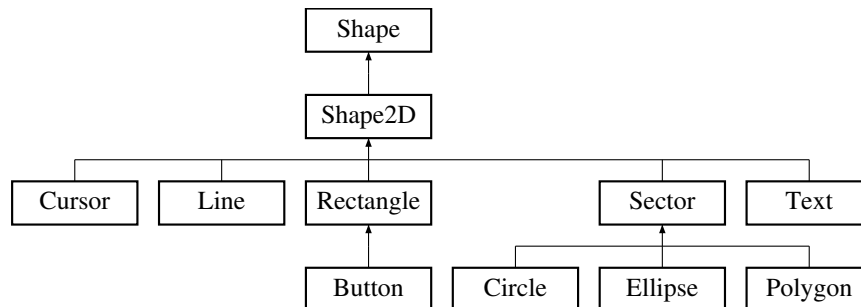
- template<typename T >
void **gen** (uint32_t &vb, std::vector< T > &list)

Protected Attributes

- uint32_t **vao**
- uint32_t **vbo**
- uint32_t **sbo**
- uint32_t **lbo**
- uint32_t **pbo**
- uint32_t **cbo**
- [Canvas](#) * **parentCanvas**

3.158 Shape2D Class Reference

Inheritance diagram for Shape2D:



Public Member Functions

- **Shape2D** ([Canvas](#) *c, float x, float y, [Style](#) *style, [Transformation](#) *transform=new [Transformation](#)())
- void **addPoint** (float x, float y)
- void **addColor** (float r, float g, float b)
- void **setColors** (float cols[], uint32_t size)
- void **setColors** (std::vector< float > cols)
- std::vector< float > **getVertices** ()
- uint32_t **getSize** ()
- [Style](#) * **getStyle** ()
- [Transformation](#) * **getTransformation** ()
- void **setTransform** ([Transformation](#) *t)
- virtual void **init** () override
- virtual void **process_input** (Inputs *in, float dt) override
- virtual void **update** () override
- virtual void **render** ()=0
- void **initIndices** ()

Protected Member Functions

- void **applyTransform** ([Shader](#) *s)

Protected Attributes

- float **x**
- float **y**
- std::vector< float > **vertices**
- std::vector< float > **colors**
- std::vector< uint32_t > **solidIndices**
- std::vector< uint32_t > **lineIndices**
- std::vector< uint32_t > **pointIndices**
- [Style](#) * **style**
- [Transformation](#) * **transform**

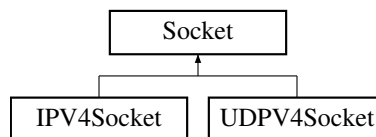
3.159 Shapefile Class Reference

Public Member Functions

- **Shapefile** (const char filename[])
- void **init** ()
- SHPObject * **getShape** (int index)
- std::vector< SHPObject * > **getShapeVector** ()
- double * **getMinBounds** ()
- double * **getMaxBounds** ()

3.160 Socket Class Reference

Inheritance diagram for Socket:



Public Member Functions

- **Socket** (const char *addr, uint16_t port)
- **Socket** (uint16_t port, [Request](#) *req)
- **Socket** (uint16_t port)
- void **attach** ([Request](#) *r)
- [Buffer](#) & **getOut** ()
- [Buffer](#) & **getIn** ()
- virtual void **wait** ()=0

Static Public Member Functions

- static void **classCleanup** ()
- static void **classInit** ()

Protected Attributes

- const char * **address**
- uint16_t **port**
- [Request](#) * **req**
- [Buffer](#) **in**
- [Buffer](#) **out**

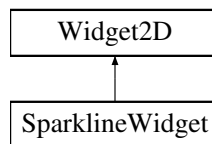
3.161 SocketIO Class Reference

Static Public Member Functions

- static int **send** (socket_t sckt, const char *buf, int size, int flags)
- static int **recv** (socket_t sckt, const char *buf, int size, int flags)

3.162 SparklineWidget Class Reference

Inheritance diagram for SparklineWidget:



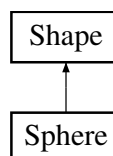
Public Member Functions

- **SparklineWidget** (StyledMultiShape2D *m, MultiText *t, float x, float y, float w, float h, const std::string &title, const Style *titleStyle, const Style *barStyle, float minX, float maxX, float minY, float maxY, float maxMultiplier, float minMultiplier, float tickSize, float tickStart, Scale *yAxis, Scale *xAxis)
- **SparklineWidget** (StyledMultiShape2D *m, MultiText *t, float x, float y, float w, float h)
- **SparklineWidget** (StyledMultiShape2D *m, MultiText *t, float x, float y, float w, float h, const std::vector< float > &xLocations, const std::vector< float > &yLocations)
- void **setMinMaxY** (float min, float max)
- void **setAxisScale** (Scale *yAxis)
- void **setTitleStyle** (const Style *s)
- void **chart** (const std::vector< float > &yLocations, const std::vector< float > &xLocations, glm::vec4 &c)
- void **setTitle** (const std::string &s)
- void **init** () override

Additional Inherited Members

3.163 Sphere Class Reference

Inheritance diagram for Sphere:



Public Member Functions

- **Sphere** (uint32_t latRes, uint32_t lonRes)
- void **init** ()
- void **render** ()
- void **cleanup** ()

Additional Inherited Members

3.164 Stack< T > Class Template Reference

Public Member Functions

- **Stack** (uint32_t capacity)
- void **push** (const T &v)
- bool **isEmpty** () const
- T **peek** () const
- T **pop** ()

Friends

- std::ostream & **operator**<< (std::ostream &s, const [Stack](#) &stack)

3.165 Stats1D< T > Class Template Reference

Classes

- struct [Summary](#)

Public Member Functions

- [Stats1D](#) (T *array, uint32_t size, bool sorted=false)
Construct a new [Stats1D](#) object of a numeric type.
- void [updateArray](#) (T *newArray, uint32_t newSize, bool sorted=false)
Updates the content of the array.
- double [getMean](#) ()
Calculates mean of a numeric type.
- std::vector< T > [getModes](#) ()
Finds the modes of a numeric type.
- T [getIQR](#) ()
Calculates the IQR of a numeric type.
- struct [Summary](#) [getSummary](#) ()
Returns a struct containing the five number summary of a numeric type.
- double [getStdDev](#) ()
Calculates the standard deviation of a numeric type.
- double [getVariance](#) ()
Calculates the variance of a numeric type.
- double [getQuantile](#) (double percentile)
getQuantile - Gets a quantile of the sorted array

Friends

- `template<typename U >`
`std::ostream & operator<< (std::ostream &os, Stats1D< U > &stats)`

3.165.1 Constructor & Destructor Documentation

3.165.1.1 Stats1D()

```
template<typename T >
Stats1D< T >::Stats1D (
    T * array,
    uint32_t size,
    bool sorted = false )
```

Construct a new [Stats1D](#) object of a numeric type.

The array may be of any numeric type and may be unsorted when it is passed into the object. The size of the array is assumed to match the size of the variable. The sorted flag defaults to false.

If a mistake is made when creating the array, or the array is updated, use `updateArray` to make any necessary changes.

Template Parameters

<i>T</i>	Any numeric type
----------	------------------

Parameters

<i>array</i>	A pointer to the array to be analyzed
<i>size</i>	The size of the array to be analyzed
<i>sorted</i>	A flag indicating if the array is sorted

3.165.2 Member Function Documentation

3.165.2.1 getIQR()

```
template<typename T >
T Stats1D< T >::getIQR
```

Calculates the IQR of a numeric type.

The interquartile range is the 50% range between the first and third quartile of a dataset. Together with the median of the dataset, it presents an alternative to the mean and standard deviation for finding outliers.

Template Parameters

<i>T</i>	Any numeric type
----------	------------------

Returns

T The IQR of a dataset

3.165.2.2 getMean()

```
template<typename T >  
double Stats1D< T >::getMean
```

Calculates mean of a numeric type.

For a dataset without outliers or skew, the mean will represent the center of a dataset. Together with the standard deviation, it is useful for catching extreme values and describing the distribution of the data.

Template Parameters

<i>T</i>	Any numeric type
----------	------------------

Returns

double The mean of a dataset

3.165.2.3 getModes()

```
template<typename T >  
vector< T > Stats1D< T >::getModes
```

Finds the modes of a numeric type.

The mode of a dataset is value that most frequently appears.

This returns a vector in order to allow the possibility of multiple modes, rather than just returning one of many modes.

Template Parameters

<i>T</i>	Any numeric type
----------	------------------

Returns

vector<*T*> [A](#) vector of modes of a dataset

3.165.2.4 getQuantile()

```
template<typename T >
double Stats1D< T >::getQuantile (
    double percentile )
```

getQuantile - Gets a quantile of the sorted array

This looks like it implements the R-6 algorithm for finding quantiles, but it is actually R-7. Upon reviewing the relevant paper, the index functions refer to an array with a starting index of 1, but C++ is 0-indexed. As such, the added one that is expected in R-7 has been negated. (Hyndman and Fan, 1997).

Parameters

<i>percentile</i>	The percentile to look for
-------------------	----------------------------

Returns

double The resultant quantile

3.165.2.5 getStdDev()

```
template<typename T >
double Stats1D< T >::getStdDev
```

Calculates the standard deviation of a numeric type.

The standard deviation of a dataset describes the spread of a data. A higher standard deviation indicates that the data is spread further from the mean of the dataset.

Template Parameters

<i>T</i>	Any numeric type
----------	------------------

Returns

double The standard deviation of a dataset

3.165.2.6 getSummary()

```
template<typename T >
struct Stats1D< T >::Summary Stats1D< T >::getSummary
```

Returns a struct containing the five number summary of a numeric type.

The five number summary contains the minimum, maximum, median, first quartile, and third quartile. These values are useful to describe the distribution of the dataset and find outliers.

Template Parameters

<i>T</i>	Any generic type
----------	------------------

Returns

struct Stats1D<T>::Summary [A](#) struct of the five number summary

3.165.2.7 getVariance()

```
template<typename T >
double Stats1D< T >::getVariance
```

Calculates the variance of a numeric type.

The variance of a dataset is the square of standard deviation and is another descriptor of the spread of a dataset. Among its many uses are sampling, inference, hypothesis testing, and goodness of fit.

Template Parameters

<i>T</i>	Any numeric type
----------	------------------

Returns

double The variance of a dataset

3.165.2.8 updateArray()

```
template<typename T >
void Stats1D< T >::updateArray (
    T * newArray,
    uint32_t newSize,
    bool sorted = false )
```

Updates the content of the array.

Template Parameters

<i>T</i>	Any numeric type
----------	------------------

Parameters

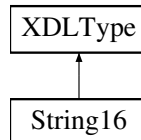
<i>newArray</i>	A new array
<i>newSize</i>	A new size

Parameters

<i>sorted</i>	A new sorted flag, defaults to the existing flag
---------------	--

3.166 String16 Class Reference

Inheritance diagram for String16:



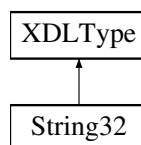
Public Member Functions

- **String16** (const std::string &val)
- DataType **getDataType** () const override
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Additional Inherited Members

3.167 String32 Class Reference

Inheritance diagram for String32:



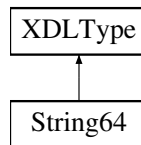
Public Member Functions

- **String32** (string val)
- DataType **getDataType** () const override
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Additional Inherited Members

3.168 String64 Class Reference

Inheritance diagram for String64:



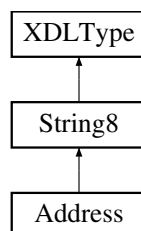
Public Member Functions

- **String64** (string val)
- DataType **getDataType** () const override
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const override
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Additional Inherited Members

3.169 String8 Class Reference

Inheritance diagram for String8:



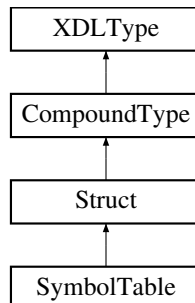
Public Member Functions

- **String8** (const std::string &val)
- DataType **getDataType** () const override
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Additional Inherited Members

3.170 Struct Class Reference

Inheritance diagram for Struct:



Classes

- class [Member](#)

Public Member Functions

- **Struct** (const char name[])
- void **add** (const char name[], DataType t)
- void **write** (char *buf)
- void **read** (const char buf[])
- **Struct** (const [Struct](#) &orig)
- **Struct** ([XDLCompiler](#) *compiler, const std::string &name)
- **Struct** ([XDLCompiler](#) *c)
- void **addSym** (const string &name, const [XDLType](#) *t)
- void **addSymCheckNull** (const string &name, const [XDLType](#) *t)
- void **addSymCheckDup** (const string &name, const [XDLType](#) *t)
- uint32_t **addMemberName** (const char memberName[])
- void **addMember** (const std::string &name, const [XDLType](#) *t)
- void **addBuiltin** (const std::string &name, DataType dt)
- void **addRegex** (const std::string &name, const std::string ®ex)
- void **addTypedef** (const char name[], const char type[])
- void **addStructMember** (const std::string &memberName, const [Struct](#) *memberStruct)
- const [XDLType](#) * **getMemberType** (const std::string &memberName) const
- const [XDLType](#) * **getMemberType** (uint32_t index) const
- uint32_t **getMemberCount** () const
- std::string **getMemberName** (uint32_t index) const
- uint32_t **size** () const override
- void **write** ([Buffer](#) &buf) const override
- void **writeMeta** ([Buffer](#) &buf) const override
- DataType **getDataType** () const
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

Protected Attributes

- [XDLCompiler](#) * **compiler**
- [DynArray](#)< [Member](#) > **members**

Friends

- std::ostream & **operator**<< (std::ostream &s, const [Struct](#) &str)

Additional Inherited Members

3.171 Student Class Reference

Public Member Functions

- **Student** (const std::string &first, const std::string &last, uint16_t id)
- uint32_t **serializeSize** () const
- std::string const **getFirst** ()
- std::string const **getLast** ()
- uint32_t const **getID** ()
- char * **write** (char *p)

3.172 Style Class Reference

Public Member Functions

- **Style** (const char *fontFamily, float fontSize, float fontWeight, float bgRed, float bgGreen, float bgBlue, float fgRed, float fgGreen, float fgBlue, int shaderIndex=0)
- **Style** (const char *fontFamily, float fontSize, float fontWeight, float bgRed, float bgGreen, float bgBlue, float bgAlpha, float fgRed, float fgGreen, float fgBlue, float fgAlpha, int shaderIndex=0)
- **Style** (const [Font](#) *font, float bgRed, float bgGreen, float bgBlue, float fgRed, float fgGreen, float fgBlue, int shaderIndex=0)
- **Style** (const [Font](#) *font, float bgRed, float bgGreen, float bgBlue, float bgAlpha, float fgRed, float fgGreen, float fgBlue, float fgAlpha)
- **Style** (const [Font](#) *font, const glm::vec4 &bgColor, const glm::vec4 &fgColor)
- const [Font](#) * **lookup** (const char *fontFamily, const float size, const float weight)
- void **apply** ()
- void **setShaderIndex** (uint32_t val)
- uint32_t **getShaderIndex** () const
- uint32_t **getLineWidth** () const
- void **setLineWidth** (uint32_t val)
- const glm::vec4 & **getBgColor** () const
- const glm::vec4 & **getFgColor** () const

Static Public Member Functions

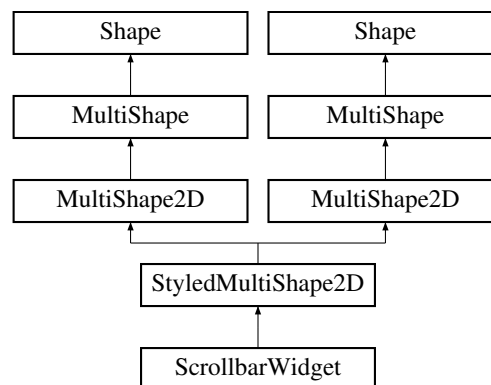
- static [Style](#) * **getStyle** (uint8_t a)

Public Attributes

- const [Font](#) * **f**
- glm::vec4 **bg**
- glm::vec4 **fg**
- float **lineWidth**
- int **shaderIndex**

3.173 StyledMultiShape2D Class Reference

Inheritance diagram for StyledMultiShape2D:



Public Member Functions

- **StyledMultiShape2D** ([Canvas](#) *parent, const [Style](#) *s, float angle=0, float x=0, float y=0, uint32_t vertCount=1024, uint32_t solidIndCount=1024, uint32_t lineIndCount=1024, uint32_t pointIndCount=1024)
- uint32_t **addSector** (float x, float y, float xRad, float yRad, float fromAngle, float toAngle, float angleInc, const glm::vec4 &c)
- void **addColor** (const glm::vec4 &rgb)
- void **addColor** (float r, float g, float b)
- void **setColors** (float cols[], uint32_t size)
- void **setColors** (std::vector< float > &cols)
- void **addStyledPoint** (float x, float y, const glm::vec4 &rgb)
- void **clear** ()
- void **init** () override
- void **render** () override
- void **updateColors** (const uint64_t pos, const float r, const float g, const float b)
- void **updatePoints** ()
- void **updateIndices** ()
- void **fillRectangle** (float x, float y, float w, float h, const glm::vec4 &c)
- void **fillRoundRect** (float x, float y, float w, float h, float rx, float ry, const glm::vec4 &c)
- void **fillTriangle** (float x1, float y1, float x2, float y2, float x3, float y3, const glm::vec4 &c)
- void **fillPolygon** (float x, float y, float xRad, float yRad, float n, const glm::vec4 &c)
- void **fillCircle** (float x, float y, float rad, float angleInc, const glm::vec4 &c)
- void **fillEllipse** (float x, float y, float xRad, float yRad, float angleInc, const glm::vec4 &c)
- void **drawRectangle** (float x, float y, float w, float h, const glm::vec4 &c)
- void **drawRoundRect** (float x, float y, float w, float h, float rx, float ry, const glm::vec4 &c)
- void **drawTriangle** (float x1, float y1, float x2, float y2, float x3, float y3, const glm::vec4 &c)
- void **drawPolygon** (const std::vector< float > &v, const glm::vec4 &c)

- void **drawPolygon** (float x, float y, float xRad, float yRad, float n, const glm::vec4 &c)
- void **drawCompletePolygon** (float x, float y, float xRad, float yRad, float n, const glm::vec4 &c)
- void **drawCircle** (float x, float y, float rad, float angleInc, const glm::vec4 &c)
- void **drawEllipse** (float x, float y, float xRad, float yRad, float angleInc, const glm::vec4 &c)
- void **drawLine** (float x1, float y1, float x2, float y2, const glm::vec4 &c)
- void **drawPolyline** (const float xy[], uint32_t n, const glm::vec4 &c)
- void **fillPolyline** (const float xy[], uint32_t n, const glm::vec4 &c)
- void **drawPolygon** (const float xy[], uint32_t n, const glm::vec4 &c)
- void **fillPolygon** (const float xy[], uint32_t n, const glm::vec4 &c)
- void **bezierSegment** (const [Bezier](#) *b)
- void **bezierSegmentByPoints** (float p1x, float p1y, float p2x, float p2y, float p3x, float p3y, float p4x, float p4y, int n, bool end, const glm::vec4 &c)
- void **spline** (const std::vector< double > &points, int n, const glm::vec4 &c)
- void **drawGrid** (float x0, float y0, float w, float h, uint32_t numHoriz, uint32_t numVert, const glm::vec4 &c)
- void **fillGrid** (float x0, float y0, float w, float h, uint32_t numHoriz, uint32_t numVert, const glm::vec4 &lc, const glm::vec4 &bc)
- void **drawTriGrid** (float x, float y, float s, uint32_t trianglesPerSide, const glm::vec4 &c)
- void **drawHexGrid** (float x, float y, float w, float h, uint32_t numHorizHexagons, const glm::vec4 &c)
- void **rectanglePoints** (float x, float y, float w, float h, const glm::vec4 &c)
- void **roundRectPoints** (float x, float y, float w, float h, float rx, float ry, const glm::vec4 &c)
- void **trianglePoints** (float x1, float y1, float x2, float y2, float x3, float y3, const glm::vec4 &c)
- void **polygonPoints** (float x, float y, float xRad, float yRad, float n, const glm::vec4 &c)
- void **circlePoints** (float x, float y, float rad, float angleInc, const glm::vec4 &c)
- void **ellipsePoints** (float x, float y, float xRad, float yRad, float angleInc, const glm::vec4 &c)
- void **dump** ()
- **StyledMultiShape2D** ([Canvas](#) *parent, const [Style](#) *s, float angle=0, float x=0, float y=0, uint32_t vert↔Count=1024, uint32_t solidIndCount=1024, uint32_t lineIndCount=1024, uint32_t pointIndCount=1024)
- uint32_t **addSector** (float x, float y, float xRad, float yRad, float fromAngle, float toAngle, float angleInc, const glm::vec4 &c)
- void **addColor** (const glm::vec4 &rgb)
- void **addColor** (float r, float g, float b)
- void **setColors** (float cols[], uint32_t size)
- void **setColors** (std::vector< float > &cols)
- void **addStyledPoint** (float x, float y, const glm::vec4 &rgb)
- void **clear** ()
- void **init** () override
- void **render** () override
- void **updateColors** (const uint64_t pos, const float r, const float g, const float b)
- void **updatePoints** ()
- void **updateIndices** ()
- void **fillRectangle** (float x, float y, float w, float h, const glm::vec4 &c)
- void **fillRoundRect** (float x, float y, float w, float h, float rx, float ry, const glm::vec4 &c)
- void **fillTriangle** (float x1, float y1, float x2, float y2, float x3, float y3, const glm::vec4 &c)
- void **fillPolygon** (float x, float y, float xRad, float yRad, float n, const glm::vec4 &c)
- void **fillCircle** (float x, float y, float rad, float angleInc, const glm::vec4 &c)
- void **fillEllipse** (float x, float y, float xRad, float yRad, float angleInc, const glm::vec4 &c)
- void **drawRectangle** (float x, float y, float w, float h, const glm::vec4 &c)
- void **drawRoundRect** (float x, float y, float w, float h, float rx, float ry, const glm::vec4 &c)
- void **drawTriangle** (float x1, float y1, float x2, float y2, float x3, float y3, const glm::vec4 &c)
- void **drawPolygon** (const std::vector< float > &v, const glm::vec4 &c)
- void **drawPolygon** (float x, float y, float xRad, float yRad, float n, const glm::vec4 &c)
- void **drawCompletePolygon** (float x, float y, float xRad, float yRad, float n, const glm::vec4 &c)
- void **drawCircle** (float x, float y, float rad, float angleInc, const glm::vec4 &c)
- void **drawEllipse** (float x, float y, float xRad, float yRad, float angleInc, const glm::vec4 &c)
- void **drawLine** (float x1, float y1, float x2, float y2, const glm::vec4 &c)

- void **drawPolyline** (const float xy[], uint32_t n, const glm::vec4 &c)
- void **fillPolyline** (const float xy[], uint32_t n, const glm::vec4 &c)
- void **drawPolygon** (const float xy[], uint32_t n, const glm::vec4 &c)
- void **fillPolygon** (const float xy[], uint32_t n, const glm::vec4 &c)
- void **bezierSegment** (const [Bezier](#) *b)
- void **bezierSegmentByPoints** (float p1x, float p1y, float p2x, float p2y, float p3x, float p3y, float p4x, float p4y, int n, bool end, const glm::vec4 &c)
- void **spline** (const std::vector< double > &points, int n, const glm::vec4 &c)
- void **drawGrid** (float x0, float y0, float w, float h, uint32_t numHoriz, uint32_t numVert, const glm::vec4 &c)
- void **fillGrid** (float x0, float y0, float w, float h, uint32_t numHoriz, uint32_t numVert, const glm::vec4 &lc, const glm::vec4 &bc)
- void **drawTriGrid** (float x, float y, float s, uint32_t trianglesPerSide, const glm::vec4 &c)
- void **drawHexGrid** (float x, float y, float w, float h, uint32_t numHorizHexagons, const glm::vec4 &c)
- void **drawCircleMarker** (float x, float y, float size, glm::vec4 &color)
- void **drawTriangleMarker** (float x, float y, float size, glm::vec4 &color)
- void **drawSquareMarker** (float x, float y, float size, glm::vec4 &color)
- void **drawPentagonMarker** (float x, float y, float size, glm::vec4 &color)
- void **drawHexagonMarker** (float x, float y, float size, glm::vec4 &color)
- void **drawCrossMarker** (float x, float y, float size, glm::vec4 &color)
- void **rectanglePoints** (float x, float y, float w, float h, const glm::vec4 &c)
- void **roundRectPoints** (float x, float y, float w, float h, float rx, float ry, const glm::vec4 &c)
- void **trianglePoints** (float x1, float y1, float x2, float y2, float x3, float y3, const glm::vec4 &c)
- void **polygonPoints** (float x, float y, float xRad, float yRad, float n, const glm::vec4 &c)
- void **circlePoints** (float x, float y, float rad, float angleInc, const glm::vec4 &c)
- void **ellipsePoints** (float x, float y, float xRad, float yRad, float angleInc, const glm::vec4 &c)
- void **dump** ()

Additional Inherited Members

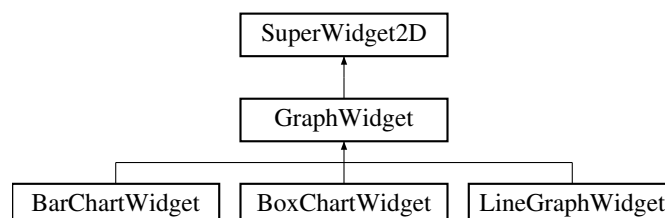
3.174 Stats1D< T >::Summary Struct Reference

Public Attributes

- double **min**
- double **max**
- double **q1**
- double **q3**
- double **median**

3.175 SuperWidget2D Class Reference

Inheritance diagram for SuperWidget2D:



Public Member Functions

- **SuperWidget2D** ([Canvas](#) *c, [StyledMultiShape2D](#) *m, [MultiText](#) *t, float x, float y, float w, float h)
- virtual void **init** ()=0

Protected Attributes

- [Canvas](#) * **c**
- [StyledMultiShape2D](#) * **m**
- [MultiText](#) * **t**
- float **x**
- float **y**
- float **w**
- float **h**

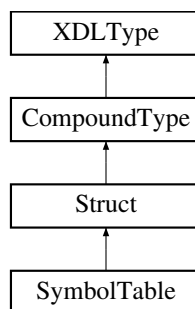
3.176 Symbol Class Reference

Public Attributes

- uint32_t **size**
- std::string **name**
- std::string **cppType**
- [Symbol](#) * **assignCompatibleWith**

3.177 SymbolTable Class Reference

Inheritance diagram for SymbolTable:



Public Member Functions

- **SymbolTable** ([XDLCompiler](#) *c)
- void **addRoot** (const [XDLType](#) *t)
- const [XDLType](#) * **getRoot** () const
- [Struct](#) * **addStruct** (const string &name)
- void **addXDLType** (const std::string &name, [XDLType](#) *xdlType)
- void **write** ([Buffer](#) &out)
- void **readMeta** ([Buffer](#) &metadataBuf)
- void **displayText** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const

Additional Inherited Members

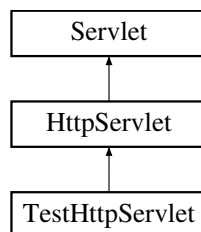
3.178 Tab Class Reference

Public Member Functions

- **Tab** ([GLWin](#) *parent)
- [GLWin](#) * **getParent** () const
- **Tab** (const [Tab](#) &orig)=delete
- [Tab](#) & **operator=** (const [Tab](#) &orig)=delete
- [Canvas](#) * **addCanvas** (const [Style](#) *style, uint32_t vpX, uint32_t vpY, uint32_t vpW, uint32_t vpH)
- [Canvas](#) * **getCanvas** (uint32_t i)
- [MainCanvas](#) * **getMainCanvas** ()
- void **init** ()
- void **update** ()
- void **render** ()
- void **cleanup** ()

3.179 TestHttpServlet Class Reference

Inheritance diagram for TestHttpServlet:



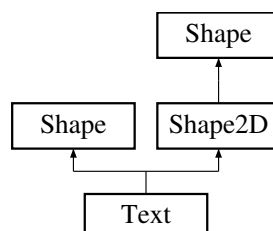
Public Member Functions

- void **request** ([HttpRequest](#) &req)

3.180 TestRecord Class Reference

3.181 Text Class Reference

Inheritance diagram for Text:



Public Member Functions

- **Text** (float x, float y, [Style](#) *style, const std::string &text)
- void **init** ()
- void **update** ()
- void **render** ()
- **Text** ([GLWin](#) *w, float x, float y, const std::string &text)
- void **init** ()
- void **render** ()

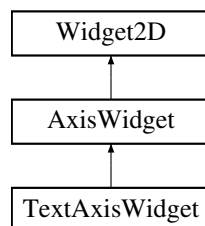
Static Public Attributes

- static const uint32_t **LINE_LENGTH** = 256
- constexpr static uint32_t **LINE_LENGTH** = 256

Additional Inherited Members

3.182 TextAxisWidget Class Reference

Inheritance diagram for TextAxisWidget:



Public Member Functions

- **TextAxisWidget** ([StyledMultiShape2D](#) *m, [MultiText](#) *t, double x, double y, double w, double h)
- void **setTickLabels** (std::vector< std::string > tickLabels) override
- void **init** () override

Additional Inherited Members

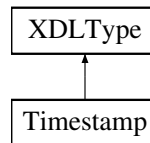
3.183 TextureArray Class Reference

Public Member Functions

- **TextureArray** ([Shader](#) *shader, uint8_t allocSize=32)
- GLuint **loadImage** (const char *imagePath, uint8_t unit)
- GLuint **bindImage** (uint8_t unit)

3.184 Timestamp Class Reference

Inheritance diagram for Timestamp:



Public Member Functions

- **Timestamp** (uint64_t v=0)
- void **write** ([Buffer](#) &b) const override
- void **writeMeta** ([Buffer](#) &buf) const override
- uint32_t **size** () const override
- DataType **getDataType** () const override
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

Additional Inherited Members

3.185 Transformation Class Reference

Public Member Functions

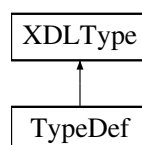
- void **ident** ()
- void **translate** (float x, float y, float z)
- void **scale** (float x, float y, float z)
- void **scale** (float s)
- void **setRotate** (float angleRad, float xAxis, float yAxis, float zAxis)
- void **rotate** (float angleRad, float xAxis, float yAxis, float zAxis)
- void **rotateZ** (float angleRad)
- const glm::mat4 & **getTransform** () const

Friends

- std::ostream & **operator**<< (std::ostream &s, const [Transformation](#) &t)

3.186 TypeDef Class Reference

Inheritance diagram for TypeDef:



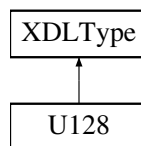
Public Member Functions

- **TypeDef** (const std::string &name, const [XDLType](#) *t)
- uint32_t **size** () const override
- void **write** ([Buffer](#) &buf) const override
- void **writeMeta** ([Buffer](#) &buf) const override
- DataType **getDataType** () const
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

Additional Inherited Members

3.187 U128 Class Reference

Inheritance diagram for U128:



Public Member Functions

- **U128** (uint64_t a=0, uint64_t b=0)
- DataType **getDataType** () const override
- uint32_t **size** () const override
- void **write** ([Buffer](#) &buf) const override
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

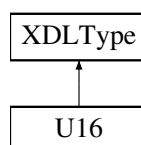
Friends

- bool **operator==** (const [U128](#) &a, const [U128](#) &b)

Additional Inherited Members

3.188 U16 Class Reference

Inheritance diagram for U16:



Public Member Functions

- **U16** (uint16_t val=0)
- DataType **getDataType** () const
- uint32_t **size** () const override
- void **write** (Buffer &buf) const
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

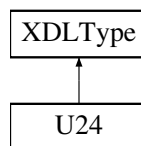
Friends

- bool **operator==** (const U16 &a, const U16 &b)

Additional Inherited Members

3.189 U24 Class Reference

Inheritance diagram for U24:



Public Member Functions

- **U24** (uint32_t val=0)
- DataType **getDataType** () const
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

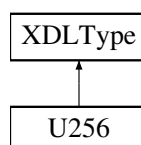
Friends

- bool **operator==** (const U24 &a, const U24 &b)

Additional Inherited Members

3.190 U256 Class Reference

Inheritance diagram for U256:



Public Member Functions

- **U256** (uint64_t a, uint64_t b, uint64_t c, uint64_t d)
- DataType **getDataType** () const
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

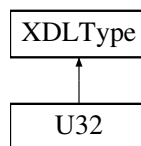
Friends

- bool **operator==** (const U256 &a, const U256 &b)

Additional Inherited Members

3.191 U32 Class Reference

Inheritance diagram for U32:



Public Member Functions

- **U32** (uint32_t val=0)
- DataType **getDataType** () const
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

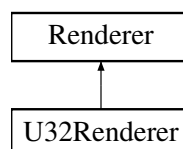
Friends

- bool **operator==** (const U32 &a, const U32 &b)

Additional Inherited Members

3.192 U32Renderer Class Reference

Inheritance diagram for U32Renderer:



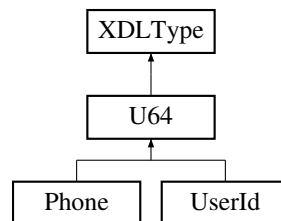
Public Member Functions

- virtual void **display** (Buffer &in, MultiShape2d *m, MultiText *t, float x0, float y0, float *w, float *h) const override

Additional Inherited Members

3.193 U64 Class Reference

Inheritance diagram for U64:



Public Member Functions

- U64** (uint64_t val=0)
- DataType **getDataType** () const
- uint32_t **size** () const override
- void **write** (Buffer &buf) const override
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

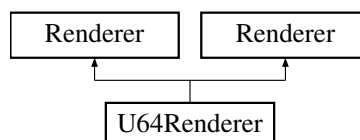
Friends

- bool **operator==** (const U64 &a, const U64 &b)

Additional Inherited Members

3.194 U64Renderer Class Reference

Inheritance diagram for U64Renderer:



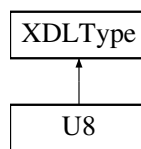
Public Member Functions

- virtual void **display** ([Buffer](#) &in, MultiShape2d *m, [MultiText](#) *t, float x0, float y0, float *w, float *h) const override
- virtual void **display** ([Buffer](#) &in, MultiShape2d *m, [MultiText](#) *t, float x0, float y0, float *w, float *h) const override

Additional Inherited Members

3.195 U8 Class Reference

Inheritance diagram for U8:



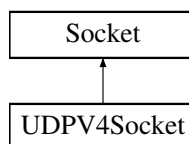
Public Member Functions

- **U8** (uint8_t val=0)
- DataType **getDataType** () const
- uint32_t **size** () const override
- void **write** ([Buffer](#) &buf) const
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const override
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

Additional Inherited Members

3.196 UDPV4Socket Class Reference

Inheritance diagram for UDPV4Socket:



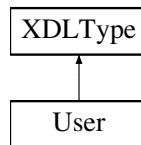
Public Member Functions

- **UDP4Socket** (const char *addr, uint16_t port)
- **UDP4Socket** (uint16_t port)
- void **listenOnPort** ()
- void **wait** ()
- void **send** (const char *buf, uint32_t len)
- void **send** (uint32_t reqn)

Additional Inherited Members

3.197 User Class Reference

Inheritance diagram for User:



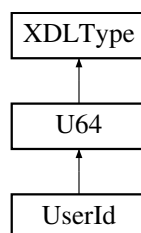
Public Member Functions

- **User** (const [UserId](#) &userid, const char firstname[], const char lastname[], const [Address](#) &address, const [Phone](#) &phone, const [Email](#) &email)
- DataType **getDataType** () const override
- uint32_t **size** () const override
- void **write** ([Buffer](#) &buf) const override
- void **writeMeta** ([Buffer](#) &buf) const override
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

Additional Inherited Members

3.198 UserId Class Reference

Inheritance diagram for UserId:



Public Member Functions

- **UserId** (uint64_t v)
- void **writeMeta** ([Buffer](#) &buf) const override
- void **display** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut) const
- void **format** ([Buffer](#) &binaryIn, [Buffer](#) &asciiOut, const char fmt[]) const

Additional Inherited Members

3.199 Vec3d Class Reference

Public Member Functions

- **Vec3d** (double x, double y, double z)

3.200 CSRGraph< VertexIndex_t, EdgeIndex_t, Weight_t >::VertexCount Struct Reference

Public Member Functions

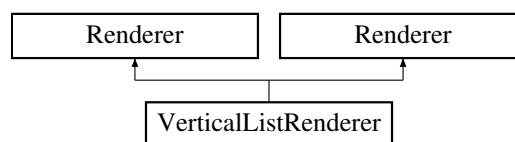
- **VertexCount** (VertexIndex_t v, VertexIndex_t countAdj)

Public Attributes

- VertexIndex_t **v**
- VertexIndex_t **countAdj**

3.201 VerticalListRenderer Class Reference

Inheritance diagram for VerticalListRenderer:



Public Member Functions

- virtual void **display** (Buffer &in, MultiShape2d *m, MultiText *t, float x0, float y0, float *w, float *h) const override
- virtual void **display** (Buffer &in, MultiShape2d *m, MultiText *t, float x0, float y0, float *w, float *h) const override

Additional Inherited Members

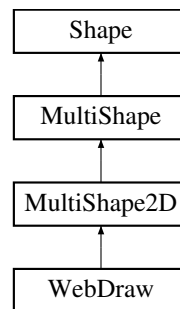
3.202 WebCursor Class Reference

Public Member Functions

- **WebCursor** (Canvas *c, MultiShape2D *s)
- **WebCursor** (Canvas *c, MultiText *m)
- void **addText** (Style *st, const char text[], uint32_t len)
- void **moveRight** (float w, float h)
- void **moveLeft** (float w, float h)

3.203 WebDraw Class Reference

Inheritance diagram for WebDraw:



Public Member Functions

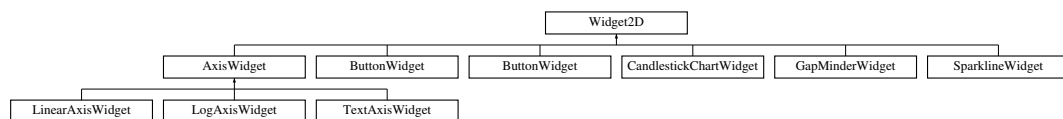
- **WebDraw** (uint32_t vertCount=1024, uint32_t solidIndCount=1024, uint32_t lineIndCount=1024, uint32_t pointIndCount=1024)
- uint32_t **addSector** (float x, float y, float xRad, float yRad, float fromAngle, float toAngle, float angleInc, const [Style](#) *s)
- void **addColor** (const glm::vec4 &rgb)
- void **addColor** (float r, float g, float b)
- void **setColors** (float cols[], uint32_t size)
- void **setColors** (std::vector< float > &cols)
- void **addStyledPoint** (float x, float y, const glm::vec4 &rgb)
- void **init** () override
- void **render** () override
- void **updateColors** (const uint64_t pos, const float r, const float g, const float b)
- void **fillRectangle** (float x, float y, float w, float h, const [Style](#) *s)
- void **fillRoundRect** (float x, float y, float w, float h, float rx, float ry, const [Style](#) *s)
- void **fillTriangle** (float x1, float y1, float x2, float y2, float x3, float y3, const [Style](#) *s)
- void **fillPolygon** (float x, float y, float xRad, float yRad, float n, const [Style](#) *s)
- void **fillCircle** (float x, float y, float rad, float angleInc, const [Style](#) *s)
- void **fillEllipse** (float x, float y, float xRad, float yRad, float angleInc, const [Style](#) *s)
- void **drawRectangle** (float x, float y, float w, float h, const [Style](#) *s)
- void **drawRoundRect** (float x, float y, float w, float h, float rx, float ry, const [Style](#) *s)
- void **drawTriangle** (float x1, float y1, float x2, float y2, float x3, float y3, const [Style](#) *s)
- void **drawPolygon** (float x, float y, float xRad, float yRad, float n, const [Style](#) *s)
- void **drawCompletePolygon** (float x, float y, float xRad, float yRad, float n, const [Style](#) *s)
- void **drawCircle** (float x, float y, float rad, float angleInc, const [Style](#) *s)
- void **drawEllipse** (float x, float y, float xRad, float yRad, float angleInc, const [Style](#) *s)
- void **drawLine** (float x1, float y1, float x2, float y2, const [Style](#) *s)
- void **drawArc** (float x, float y, float r, float ang1, float ang2)
- void **drawCubic** (float xy[], uint32_t length, uint32_t numSegments)
- void **rectanglePoints** (float x, float y, float w, float h, const [Style](#) *s)
- void **roundRectPoints** (float x, float y, float w, float h, float rx, float ry, const [Style](#) *s)
- void **trianglePoints** (float x1, float y1, float x2, float y2, float x3, float y3, const [Style](#) *s)
- void **polygonPoints** (float x, float y, float xRad, float yRad, float n, const [Style](#) *s)
- void **circlePoints** (float x, float y, float rad, float angleInc, const [Style](#) *s)
- void **ellipsePoints** (float x, float y, float xRad, float yRad, float angleInc, const [Style](#) *s)
- void **drawImage** (float x, float y, float w, float h, uint32_t textureId, float u1, float v1, float u2, float v2)
- void **drawImage** (float x, float y, float w, float h, uint32_t textureId)

- void **drawText** (float x, float y, [Style](#) *s, const char text[], uint32_t len)
- void **drawText** (float x, float y, [Style](#) *s, uint32_t baseChar, const char text[], uint32_t len)
- void **drawText** (float x, float y, [Style](#) *s, const uint16_t text[], uint32_t len)
- float **getTextWidth** ([Style](#) *s, const char text[], uint32_t len) const
- float **getTextHeight** ([Style](#) *s)
- void **addText** ([WebCursor](#) *cursor, [Style](#) *s, const char text[], uint32_t len)

Additional Inherited Members

3.204 Widget2D Class Reference

Inheritance diagram for Widget2D:



Public Member Functions

- **Widget2D** ([StyledMultiShape2D](#) *m, [MultiText](#) *t, float x, float y, float w, float h)
- virtual void **init** ()=0

Protected Attributes

- [StyledMultiShape2D](#) * m
- [MultiText](#) * t
- float x
- float y
- float w
- float h

3.205 X11Util Class Reference

Static Public Member Functions

- static void **setCursor** (float w_x, float w_y, float dx, float dy)

3.206 XDLCompiler Class Reference

Public Member Functions

- **XDLCompiler** (const char filename[])
- [SymbolTable](#) & **getSymbolTable** ()
- void **generateCode** ()
- void **error** (const std::string &msg)
- void **duplicateSymbol** (const std::string &name)
- void **undefinedSymbol** (const std::string &name)
- void **internalError** (const std::string &name)
- void **warning** (const std::string &msg)

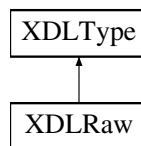
3.207 XDLIterator Class Reference

Public Member Functions

- void **advance** ()
- void **advance** (uint32_t d)
- uint32_t **getPos** () const

3.208 XDLRaw Class Reference

Inheritance diagram for XDLRaw:



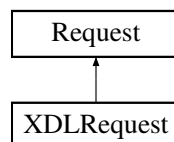
Public Member Functions

- **XDLRaw** (const char *p, size_t len)
- DataType **getDataType** () const
- uint32_t **size** () const override
- void **write** (Buffer &buf) const
- void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Additional Inherited Members

3.209 XDLRequest Class Reference

Inheritance diagram for XDLRequest:



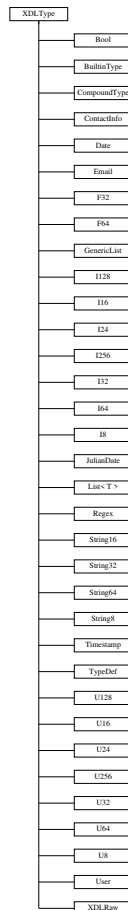
Public Member Functions

- **XDLRequest** (const char filename[])
- **XDLRequest** (const XDLRequest &r)=delete
- XDLRequest & **operator=** (const XDLRequest &r)=delete
- void **addPage** (const char metaDataFilename[], const char filename[])
- void **addPage** (const char filename[])
- void **handle** (int fd) override
- void **handle** (int sckt, const char *command) override

Additional Inherited Members

3.210 XDType Class Reference

Inheritance diagram for XDType:



Public Member Functions

- **XDType** (const std::string &typeName)
- **XDType** (DataType t)
- virtual void **write** (Buffer &b) const =0
- virtual void **writeMeta** (Buffer &buf) const
- virtual uint32_t **size** () const =0
- virtual DataType **getDataType** () const =0
- const std::string & **getTypeName** () const
- virtual XDIterator * **createIterator** ()
- virtual void **display** (Buffer &binaryIn, Buffer &asciiOut) const
- void **format** (Buffer &binaryIn, Buffer &asciiOut, const char fmt[]) const

Static Public Member Functions

- static void **classInit** ()
- static void **classCleanup** ()
- static uint32_t **computeNameOffset** (const std::string &typeName)
- static uint32_t **computeNameOffset** (DataType t)
- static const [XDLType](#) * **getBuiltinType** (DataType dt)
- static void **readMeta** ([XDLCompiler](#) *compiler, [Buffer](#) &in, uint32_t count, [Struct](#) *s)
- static const [Struct](#) * **read** ([Buffer](#) &in)
- static DataType **readType** ([Buffer](#) &in)

Static Protected Member Functions

- static void **addType** (const [XDLType](#) *type)

Protected Attributes

- uint32_t **nameOffset**

Static Protected Attributes

- static const std::string **empty** = ""
- static [DynArray](#)< const [XDLType](#) * > **types**
- static [DynArray](#)< std::string > **typeNameNames**
- static std::unordered_map< std::string, uint32_t > **byName**

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