U++ framework

Reference Guide
version 0.2.0

Core.h

Collections

Any variable: container of any type for one element
.Create<type**>()**: creates the element of type
bool **.Is<**type**>()**: returns true if element of type
Array<type**>** variable
.Add(value**)**: adds a value to the array
BiVector<type**>** variable: a bidirectional vector
.AddHead(value**)**: adds at top position
.AddTail(value**)**: adds a bottom position
.DropHead(): drops top value
Index<type**>** variable
.Add(value**)**: adds a value to the index collection
int **.Find(**value**)**: shows position of value
.FindAdd(value**)**: if value not found add it
.Insert(int, value**)**: inserts value at position int
bool **.IsUnlinked(**int**)**: is value at position int tagged unfindable with unlink method
.Put(value**)**: adds a value to the index
.Remove(int**)**: removes value at position int
.Set(int, value**)**: set value at position int
.Sweep(): remove all unlinked values from index
.Unlink(int**)**: sets value at position int not findable
InArray<type**>** variable: fast insert&remove ops
InVector<type**>** variable: fast insert&remove ops
One<type**>** variable: same as std::unique_ptr
Operator <<: adds values to the collection
Sort(variable**)**: sorts the collection type comparable
SortedArrayMap<type**>** variable: keeps sorted
SortedIndex<type**>** variable: keeps index sorted
SortedVectorMap<type**>** variable: keeps sorted
Tuple<type1, type2**>** variable: different types tuple
.MakeTuple(value, value**)**: insert values
variable **.Tie(**value, value**)**: extract individual values from a tuple variable
Vector<type**>** variable
.Add(value**)**
.Append({value, value**})**: adds a collection
variable **clone(**variable**)**: variable copy to variable
.Get(int, value**)**: gets the value at position int, if non existing returns value parameter
int **.GetCount()**: gets number of elements in a collection
.Insert(int, value**)**: adds value at position int
variable **pick(**variable**)**: variable move to variable
.Remove(int**)**: removes value at position int
VectorMap<type, type**>** variable **= { {**value, value**},** {value, value**}}**
.Add(value, value**)**: adds values to the map
value **.Find(**value**)**: finds a key
value **.FindNext(**value**)**: finds the next key
value **.Get(**value**)**: gets the value for a key
value **.GetKeys()**: shows the keys of the map
collection **.GetValues()**: shows all the values of the map
.SetKey(value, value**)**: sets the key for a value

CombineHash

uint **CombineHash(**variable, variable**)**: returns a hashing of both variables

Command Line

CommandLine() variable: define a command line variable
int **.GetCount()**: gets number of command line parameters
String **Operator[**int**]**: gets parameter int
SetExitCode(int**)**: returns a exit code int

Comparables

CombineCompare(variable,variable**)**
(variable,variable**)...** : compares all variables combined, use with struct and Comparable template

```
struct foo: Comparable<foo>
{
   String a;
   int b;
   int c;
   int Compare(const foo& x) const {return
   CombineCompare(a, x.a)(b, x.b)(c, x.c);}
};
```

int **SgnCompare(**int, int**)**: compares the sign, 0 if equal

Date and Time(rs)

Date variable
int **.year()**: gets the year part of the date
Date **GetSysDate()**: get current date
Time **GetSysTime()**: get current time
KillTimeCallback(int=0**)**: remove callback on queue
SetTimeCallback(int**, THISBACK(**function**),**int=0**)**: puts a callback on the timer queue with delay int ms (periodic if int is negative) with optional id int
Time variable
int **.hour()**: gets the hour part of the time

Dump to logfiles

DUMPC(variable**)**: dumps collection type
DUMPHEX(variable**)**: hex dump to TheIDE logfile
DUMPM(variable**)**: dumps map type
LOG(String**)**: log to TheIDE logfile

Functions and Lambdas

[variable=variable**]** **(**type variable**)** **->** type **{**commands;**};**:
[] part gets variables from current thread
=: takes all variables by value
&: takes all variables by reference
&variable: gets a variable by reference
() part sets parameter values to the lambda
-> part sets the return type from the lambda
{} part contains code
Event<> name **= [] {**commands;**};**: make an event
Function<type **(**type**)>** name **= [] (**type variable**)** **{**commands;**};**: makes a function with type and name. All types must be the same.
name**.Clear()**: clears the function assignment
Gate<type**>** name **= [] (**type variable**) {**commands; **return** boolean**;};**: a gate always returns a boolean
Operator <<: assigns new lambda to function

Loops

For (type variable **:** collection**) {}**: loops through collection

Mailing POP3

#include <Core/POP3/POP3.h>
InetMessage variable: define a mail format string
String **[**int**][“content-type”]**: gets the content type from attachment indexed int
int **[**int**].Decode().GetLength()**: returns the length of attachment indexed int
String **[“date”]**: returns the date field
String **[“from”]**: returns the sender field
String **[“subject”]**: returns the subject field
int **.GetCount()**: the number of attachments
bool **.Read(**messagestring**)**: returns true if the getmessage string is a valid string
Pop3 variable: define a pop3 connection variable
String **.GetLastError()**: gets the last error
String **.GetMessage(**int**)**: gets the indexed mail
int **.GetMessageCount()**: number of unread mails
.Host(String**)**: defines the pop3 mail server
bool **.Login()**: returns true if succesfull
.Port(int**)**: defines the pop3 tcp port
.SSL(): enable a SSL connection
.Trace(): enables pop3 logging
.User(String**,**String**)**: username and password

Mailing SMTP

#include <Core/SMTP/SMTP.h>
Smtp variable: define a smtp connection variable
.Attach(String**,**String**)**: attach a file named String with content String
.AttachFile(GetDataFile(String**))**: attach file String
.Auth(String**,**String**)**: authenticates user String with password String
.Body(String**)**: defines the body of the mail
String **.GetError()**: gets the error if the mail send method was not successful
.Host(String**)**: set the smtp server
bool **.Send()**: returns true if mail successfully send
.SSL(): activates ssl for the connection
.Subject(String**)**: set the mail subject
.To(String**)**: sends mail to address

Multithreading

auto variable **= Async(**lambda|function**,** value**)**: executes function in parallel in current thread with value as parameter for this function or lambda
value variable**.Get()**: gives return value when ready
CoDo(lambda**)**: parallel processing where the code does the scheduling

```
Vector<String> sdata;
for(int i=0;i<100;i++) sdata.Add(AsString(1.0/i));
double dsum=0;
std::atomic<int> ii=0; //atomic type for thread races
CoDo([&] {
 double m=0;
 for(int i=ii++;i<data.GetCount();i=ii++)
    m += data[i];
 CoWork::FinLock();
 dsum += m; });
```

CoFindIndex(collection, value**)**: parallel FindIndex
CoPartition(collection**,** lambda**)**: parallel processing of collections using a subrange

```
int isum=0; Vector<int> vdata;
for (int i=0;i<10000;i++) vdata.Add(i);
CoPartition(vdata,[&isum](const auto& subrange) {
 int partial_sum=0;
 for(const auto& x : subrange) partial_sum += x;
 CoWork::FinLock(); //CoPartition inherits CoWork
 isum += partial_sum; });
```

ConditionVariable variable: control thread flow
.Signal(): signals variable, awakens thread
.Wait(mutex**)**: wait for condition linked to mutex
CoSort(collection**)**: parallel sort

CoWork variable: worker threads over all cores
CoWork variable **&** lambda|function: starts a new worker thread
.Cancel(): cancel all worker threads, running ones will execute until ended
.Finish(): wait for worker threads to finish
bool **CoWork::IsCanceled()**: check if all threads are cancelled
Mutex variable: defines a mutex
.Enter(): locks the mutex
.Leave(): unlocks the mutex
Mutex::Lock__(variable**)**: lock until end of scope
Thread variable: defines a thread variable
.Run (lambda|function**)**: starts an async thread
.Wait(): waits for thread to finish

Randomize function

int **Random(**int**)**: gets a random int between 0 and int

Ranges and algorithms

collection **ConstRange(**int, int**)**: returns a collection of int number of values int
int **Count(**collection, value**)**: counts value presence
int **FindIndex(**collection, value**)**: gets the position of the value in the collection
int **FindMax(**collection**)**: position of max value
int **FindMin(**collection**)**: position of min value
collection **FilterRange(**variable, lambda**)**: filters the collection using a lambda function

```
DUMP(FilterRange(x, [] (int x){return x>30;}));
```

collection **GetSortOrder(**collection**)**: gets collection of int representing the order of values as sorted
value **Max(**collection**)**: gets maximum value
value **Min(**collection**)**: gets minimum value
collection **ReverseRange(**collection**)**: reverse order
collection **SortedRange(**collection**)**: sorts collection
collection **SubRange(**collection, int, int**)**: trims collection from position int to int
value **Sum(**collection**)**: summates all values

Sockets

HttpRequest variable: defines a http(s) request. If SSL needed add #include<Core/SSL/SSL.h>;
.Add(): create a new http request
.Do(): run the request, see inprogress
String **.GetContent()**: read requested content
String **.GetErrorDesc()**: gets error description
String **.GetPhaseName()**: gets the phase name of the current request (when inprogress)
String **.GetReasonPhrase()**: gets http reason phrase
String **.GetStatusCode()**: gets the req status code
bool **.InProgress()**: returns true if request busy
bool **.IsError()**: returns true if request error
bool **.IsSuccess()**: returns true if request ended ok
.TimeOut(int**)**: defines request timeout in ms. If int=0 then calls in asynchronous mode
.Url(String**)**: defines the url of the request
.UserAgent(String**)**: defines the user agent callsign
SocketWaitEvent variable: wait for sockets to be available to read from or to write to
.Add(socket**)**: adds a socket (eg HttpRequest var)
.Wait(int**)**: wait at most int ms (eg 10ms)
TcpSocket variable: defines a tcp socket variable
bool **.Accept(**serversocketvariable**)**: accepts a connection from serversocket variable in a socket stack

```
TcpSocket server;
bool success=server. Listen(1234,5);
for(;;){
 TcpSocket s;
 if(s.Accept(server)) {
    String w=s.GetLine(); //gets command
    s.Put("ack from:" + s.GetPeerAddr();
 }}
```

bool **.Connect(**String,int**)**: connects to host/ip address String on tcp port int
String **.GetLine()**: get answer from socket stack
String **.GetPeerAddr()**: returns the peer address
bool **.Listen(**int,int**)**: returns true if server socket on port int is initialized with a listen queue of int
.Put(String**)**: sends string data to the socket stack

Streams

CompareStream variable**(**variable**)**: compares stream variable with variable
bool **.IsEqual()**: check if streams are equal
.Put(object**)**: adds object to the stream
FileAppend variable**(**String**)**: appends to String file
.Close(): close the stream
FileIn variable**(**String**)**: opens a file stream with filename String
.Close(): close the stream
String **.Get(**long**)**: get long bytes from the stream
String **.GetLine()**: gets the full line from the stream
byte **.Peek()**: peeks at the byte at the pointer location
.Seek(long**)**: puts the pointer at location long
FileOut variable**(**String**)**: creates a file out stream with filename String
.Close(): close the stream
String **GetHomeDirFile(**String**)**: returns the user home directory appended with file name string
stream **LoadFile(**String**)**: loads entire file stream
Operator <<: adds objects to the stream
Operator %: serialization

```
StringStream ss3;
int x=123; Color h=White();
ss3 % x % h; // serialize the variables
StringStream ss4(ss3.GetResult());
int x2; Color h2;
ss4 % x2 % h2; // x2 and h2 are deserialized
```

OutFilterStream variable: output filter stream
SizeStream variable: stream to get the size
int **.GetSize()**: gets the size in bytes of the stream
StringStream variable: creates a stream of Strings
stream **.GetResult()**: Get the resulting stream
.Put32le(0x12345678**)**: little endian stream store
.Put32be(0x12345678**)**: big endian stream store
TeeStream variable**(**variable, variable**)**: a stream that sends to both streams variable, variable

String

String **Format(**String, values**)**: returns a String of a formatted String for the specific values

```
Format("%010d",value); //decimal 10 chars leading 0
Format("%c",value); //character value
Format("10<d",value); //width 10 chars, left align
Format("10=d",value); //width 10 chars, center align
Format("%d",value); //decimal value
Format("%i",value); //integer value
Format("%s",value); //string value
```

String variable
.Clear(): clears the value of the string
int **.Find(**chars**)**: get the position of chars
int **.GetLength()**: gets the length of the string
.Insert(int, chars**)**: inserts chars at position int
.Mid(int, int**)**: int chars from position int
.Remove(int, int**)**: removes int chars at position int
int **.ReverseFind(**chars**)**: get the position of chars in reverse order, from end to begin
bool **.StartsWith(**chars**)**: does string starts with chars?
.ToWString(): converts to wide string
.Trim(int**)**: trims string to int chars
Operator <<: add string, number values

StringBuffer

StringBuffer variable: *char API call compatibility
.SetLength(int**)**: defines buffer length
.StrLen(): adjust length to buffer values
strcopy(variable, variable**)**: byte copy variable into variable

Values

type variable **= Null**: sets null value to variable
Value variable **=** value: self type defining variable
bool **.Is<**type**>**: returns true if type is corresponding
ValueArray variable: self type defining valuearray
.Add(value**)**: adds a value to the array
.Insert(int, value**)**: inserts value at position int
.Remove(int**,** int**)**: removes int values from position int
.Set(int, value**)**: sets value at position int
ValueMap variable: self type defining map
.Add(value, value**)**: adds a key value with value
collection **.GetKeys()**: get all key values
.Set(value, value**)**: sets the key value to value
.SetKey(int, value**)**: sets position int to key value

WString

WString variable: double byte string Unicode
.cat(int**)**: adds a Unicode character at the end
.ToString(): converts to String

ZIP

#include <plugin/zip/zip.h>
FileUnZip variable**(**String**)**: define a variable to unzip a file with filename string
int **.GetLength()**: gets the length of the file
String **.GetPath()**: returns the path
Time **.GetTime()**: returns the time
bool **.IsError()**: is there a unzip error?
bool **.IsEof()**: is end of file reached?
bool **.IsFolder()**: is the object a folder?
String **.ReadFile()**: gets the content of the file and moves the pointer to the next file or folder
.SkipFile(): skips the current file and moves the pointer to the next file or folder
FileZip variable**(**String**)**: define a zip variable with filename string
.BeginFile(String**)**: opens file string to write to
.BeginFile(OutFilterStream**,**String**)**: uses a output filter stream to write to file string

```
FileZip zip(GetHomeDirFile("test.zip"));
{
 OutFilterStream oz;
 zip.BeginFile(oz,"file2.txt");
 oz << "Some Content";
} //OutFilterStream destructor calls EndFile
```

.EndFile(): closes a beginfile file
bool **.Finish()**:returns true if zip created succesfully
.Put(String**)**: puts string on a beginfile file

.WriteFile(String,String**)**: writes the contents of string to filename string
.WriteFolder(String,time**)**: makes a folder named string on time (see getsystime)

CtrlLib.h

ArrayCtrl

ArrayCtrl variable: creates a ArrayControl object
.Add(String, ...**)**: adds a row of text to the control
.AddColumn(String**)**: adds a column with a title
.Clear(): clears the control
int **.Find(**String**)**: find line of String in control
.HeaderTab(int**).SetText(**String**)**: Update list header with column int
.Remove(int**)**: removes line int
.Set(line, column, String**)**: sets a string at position
.WhenCursor()=lambda: when cursor enters ctrl
.WhenLeftDouble()=lambda: when left double click

Drawing

Draw& variable: gets a drawing context
.DrawArc(RectC(x1,y1,x2,y2**),Point(**x3,y3**),Point(**x4,y4**),**width,color**)**: draws arc in rectangle from point 3 to point 4
.DrawDrawing(x1,y1,x2,y2,drawing**)**: paint the drawingvariable to any drawing context rectangle
.DrawEllipse(x1,y1,x2,y2,fillcolor,width,color**)**: draws an ellipse in the rectangle
.DrawImage(x,y,image**)**: paint the image bitmap to a position in a drawing context
.DrawImage(x1,y1,x2,y2,image,fillcolor**)**: puts an image in a rectangle with color refill

```
w.DrawImage(10,10,100,100,CtrlImg::save(),Blue());
```

.DrawLine(x1,y1,x2,y2,width,color**)**: draws a line
.DrawPolyLine(pointcollection,width,color**)**: draws a polyline using a collection of Points
.DrawPolygon(pointcollection,fillcolor**)**: polygon
.DrawRect(GetSize(), fillcolor**)**: colored (enum Color) rectangle that fills the drawing context
.DrawRect(x1,x2,y1,y2,fillcolor**)**: filled rectangle
.DrawText(x1,y1,y2,String,Font,color**)**: places colored text rotated inside y2-y1

```
w.DrawText(10,10,20,"Test",Courier(100).Underline());
```

Drawing variable=drawingdrawvariable: set of vector drawing operations defined by DrawingDraw
DrawingDraw variable**(**x,y**)**: vector drawing context with size x*y, to be used with Draw* commands
.Draw*(params**)**: all draw methods available
Image variable=imagedrawvariable: set to an ImageDraw bitmap
ImageDraw variable**(**x,y**)**: image bitmap context with size x*y, to be used with Draw& commands
.Draw*(params**)**: all draw methods available
.Alpha(). Drawcommand**(**params**,GrayColor(**byte**))**: draws a drawcommand with alpha layer Graycolor (255 = non-transparent)

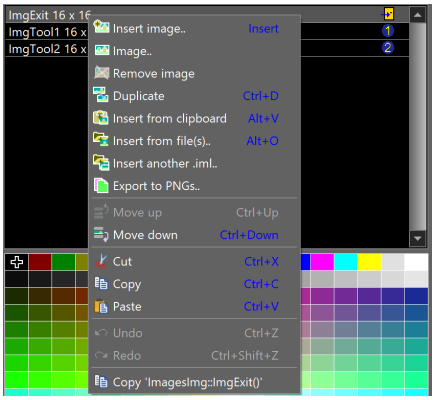
External applications (clipboard, ...)

LaunchWebBrowser(String**)**: launches the default web browser with the url string
WriteClipboardText(String**)**: writes to clipboard

Fonts

Font variable**(**name, size**)**: select a font object
int **.GetAscent()**: gets the distance from the baseline to the top of the font
int **.GetDescent()**: gets the distance from the baseline to the bottom of the font
int **.GetHeight()**: gets the height of the font
int **Font::GetFaceCount()**: gets the number of fonts present in the OS
String **Font::GetFaceName(**int**)**: gets the font name
Operator[]: gets the individual letter width

Images



#define IMAGECLASS name: define the imageclass for future macros. The name is visible in the image editor context menu, last item (see screenshot)
#define IMAGEFILE <folder****name**>**: enter the folder and file name of the iml file
#include <Draw/iml.h>: enables use of iml files
Imagevariable=Imagebuffervariable: copies the buffered image to a visible image and clears buffer
image imageclass**::Get(**int**)**: returns the image bitmap with index int
String imageclass**::GetId(**int**)**: returns the image name with index int
int imageclass**::GetCount()**: returns number of images present in the imageclass definition
Image variable: defines a bitmap image
ImageBuffer variable**(**x,y**)**: defines a bitmap image buffer of specified dimensions in pixels
Premultiply(imagebuffervariable**)**: premultiplies the alpha channel with the rgb channels
Imagevariable**=StreamRaster::LoadFileAny (~**fileselvariable**)**: loads a image from a FileSel standard dialog filename property

Images—cached

struct cachedclass**:Imagemaker**: Cached image class to be inherited from imagemaker
{type variable: defines the cached parameters
virtual String Key() const: key is a unique string
virtual Image Make() const}: make is the image to be cached
String cachedclass**::Key() const {**commands; **return** String**}**: make a function that returns a unique string value from the cached parameter variables
Image cachedclass**::Make() const {**commands; **return** Image**}**: make a function that returns the image to be cached (cache size is limited by OS)
cachedclass variable: instances an cached object
.parameter**=**value: defines the cached parameters
MakeImage(variable**)**: returns the cached image

JPEG Encoder

#include <plugin/jpg/jpg.h>
JPGEncoder variable**(**quality**)**: define a jpg object with a compression quality between 0 and 100
.Create(size**)**: creates a raster in memory

```
One<StreamRaster> raster=StreamRaster::OpenAny(file);
JPGEncoder jpg(20);
Jpg.Create(raster->GetSize());
```

.SetStream(fileout**)**: define a fileout variable for the output encoded jpeg stream
.WriteLine(fileout**)**: writes one line to the encoder

```
RasterLine l=raster->Getline(1); //gets line 1
Buffer<RGBA> out(raster->GetWidth());
for(int j=0;j<raster->GetWidth();j++) {
 out[j].g=out[j].b=out[j].r=l[j].g
 out[j].a=255; }
jpg.WriteLine(out); //writes 1 line to RasterEncoder
```

Layouts

#define LAYOUTFILE <folder****name**>**: enter the folder and file name of the lay file
#include <CtrlCore/lay.h>
buttonvariable**.Cancel() << Rejector(IDCANCEL)**: set return value for destructor of dialog window and add a default Cancel behavior
buttonvariable**.Ok() << Acceptor(IDOK)**: defines a button with dialog OK handling

```
struct MyApp:public WithDlgLayout<TopWindow> {
 MyApp() {
    CtrlLayout(*this,"My Dialog");
    ok.Ok()<<Acceptor(IDOK); }}
GUI_APP_MAIN {
 MyApp app;
 switch(app.run()) {
    Case IDOK: PromptOK("OK pressed"); break;}
```

CtrlLayout(*this,String**)**: sets up the dialog window titled String using the LAYOUTFILE specifications
WithDlgLayout<TopWindow> variable: defines a new model dialog layout based window
.layoutvariable**.ClearModify()**: set flag back to unmodified property
.layoutvariable**.Disable()**: disables editing
value **.**layoutvariable**.GetData()**: get the common display data for the specific control
Operator ~: same behavior as GetData method
bool **.**layoutvariable**.IsModified()**: returns true if the control has been modified
.layoutvariable**.SetData(**value**)**: sets display data
Operator <<=: same behavior as SetData method
.layoutvariable**.SetReadOnly()**: makes the control read-only

Menus, bars and buttons

AddFrame(menu**)**: add a top frame with a menu
AddFrame(InsetFrame()): add an inset frame
AddFrame(TopSeparatorFrame()): add a top separator frame
AddFrame(statusbar**)**: adds a bottom statusbar
AddFrame(toolbar**)**: add a top toolbar
Bar& variable: defines a menu bar item
.Add(String**,** lambda**)**: adds a single menu item
.Add(image, lambda**)**: adds a toolbar item
.Add(String**,** lambda**).Help(**String**)**: help status bar

.Add(String**,** image, lambda**)**: adds menu item with icon or toolbar item with tooltip, image = imageclass::object

```
bar.Add("Exit",ImagesImg::ImgExit(), [=] {Exit();});
```

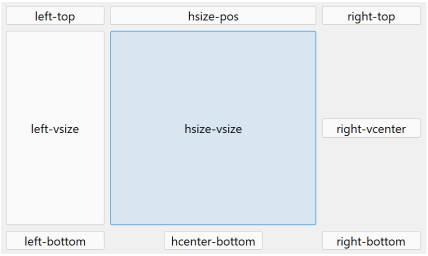
.Separator(): inserts a separator horizontal line

.Sub(String,lambda**)**: adds a menu heading

```
bar.Sub("File",[=]{bar.Add("Exit",[=]{Exit();});});
```

Button variable: creates a click button

.SetLabel(String**).**horpos**.**verpos: adds button at a specific position, see hor-ver labels in screenshot




```
Button lb,button;
*this<<lb.SetLabel("OK").HSizePos(220,220).VSizePos
 (60,60);
*this<<button.SetLabel("Zoomed").LeftPos(Zx(10),Zy
 (64)).TopPosZ(10,34); //Enables Font-Zooming
```

MenuBar variable: creates a menu

.Set(lambda**)**: executes menu bar design (subs)

```
MenuBar menu;
menu.Set([=](Bar&bar){Mainmenu(bar);});
```

.WhenHelp=statusbar: help text link to statusbar

MenuBar::Execute(lambda**)**: insert context menu, to be used in RightDown callback function

StatusBar variable: creates a statusbar at bottom

ToolBar variable: creates a toolbar at top

.Set(lambda**)**: executes toolbar design (items)

.WhenHelp=status: help text link to statusbar

Offset and Clipping

Draw& variable

.Clip(x1,y1,x2,y2**)**: clips the screen to rectangle

.ClipOff(x1,y1,x2,y2**)**: combines clipping and offset

.End(): ends the offset or clipping state

.Offset(x,y**)**: offsets the coordinate system

OpenGL drawing

#include <GLDraw/GLDraw.h>

#include <GLCtrl/GLCtrl.h>

struct glclass**:GLCtrl**: define an OpenGL class

{GLDraw variable: defines a GL draw object

.Draw*(params**)**: all Drawing methods work

.Init(size**)**: initializes the GL window

```
Size sz=GetSize();
GLDraw w;
w.Init(sz);
```

{virtual void GLPaint() {commands;**}**: define the paint event for an OpenGL class

```
GUI_APP_MAIN {
Ctrl::GlobalBackPaint(); //allow gl painting
TopWindow win;
glclass gl;
gl.SetFrame(InsetFrame());
win.Add(gl.HSizePos(10,10).VSizePos(10,10));
win.Open();
win.Run(); }
```

PDF

#include <PdfDraw/PdfDraw.h>

PdfDraw variable: defines a pdf drawing context

.Draw*(params**)**: all drawing methods are valid

PdfSignatureInfo variable: adds digital signatures

.cert=LoadDataFile(String**)**: certificate pem file

.contact_info=String: define contact information

.location=String: define a location for signing

.name=String: define a name for signing

.pkey=LoadDataFile(String**)**: private key pem file

.reason=String: define a reason for signing

SaveFile(String,pdfvariable**.Finish (&**pdfsignaturevariable**))**: save the pdf to a file

Printing

PrinterJob variable**(**String**)**: defines a named job

bool **.Execute()**: returns true if printing executed

Draw& variable = variable**.GetDraw()**: gets a drawing context pointing to the printjob variable. All coordinates are based upon 1/600 of an inch

.EndPage(): ends a printer page

.StartPage(): starts a new printer page

Standard dialogs

bool **EditText(**variable,String,String**)**: returns true if OK is pressed in an edit text field with title String and a query String, edit field comes in variable

FileSel variable: defines a file selection object

bool **.ExecuteOpen(**String**)**: opens dialog with title to choose filename. Returns true if valid filename

.Type(String,String**)**: define standard file types String with help name String

```
fs.Type("Images","*.bmp;*.png;*.tif;*.jpg");
```

StreamRaster and Rasterline

RasterLine variable: defines a scanline object

```
StreamRaster raster=StreamRaster::OpenAny(filename);
RasterLine l=raster->GetLine(1); //Get raster line 1
```

Operator []: returns the RGBA pixel value of the operand in the rasterline variable

StreamRaster variable: defines a raster image stream object (bitmap with scanlines)

::OpenAny(filein**)**: puts an image in the stream

int **->GetHeight()**: returns the number of lines in the bitmap

rasterline **->GetLine(**line**)**: gets scanline line from the bitmap as a rasterline type

int **->GetSize()**: returns the size of the bitmap

int **->GetWidth()**: returns width of the bitmap

Tray icons

#define IMAGECLASS Tray

#define IMAGEFILE <folder**/**file**.iml>**

#include <Draw/iml.h>

struct trayclass**:TrayIcon**: new tray icon class

{virtual void LeftDown() {commands…**}**: commands to execute when clicking on the tray icon

{virtual void Menu(Bar& variable**)**: adds a menu

{{.Add(String**, THISBACK(**method**))**: adds a menu item with text String to the tray icon menu

{Icon(imageclass**::**icon**())**: sets the tray icon

{Tip(String**)**: sets the tray icon tip text

Types

Color(r,g,b**)**: defines a color using RGB byte values

Point: defines a point with two coordinates

```
Vector<Point> p;
p << Point(10,10) << Point(20,20) << Point(30,30);
```

RGBA* variable: pointer to RGBA(lpha) values

.a: byte defining alpha (transparency) value

.b: byte defining blue value

.g: byte defining green value

.r: byte defining red value

```
ImageBuffer ib(50,50);
for(int y=0;y<50;y++) {
 RGBA* line=ib[y];
 for(int x=0;x<50;x++) {line->r=4*y; line++; }
```

Typedef appstruct **CLASSNAME**: needed for callback function macros like THISFN

Windowed application (Ctrl)

Break(): exits application

Ctrl::Eventloop(): wait for all windows to be closed

Delete this: delete the current window

(new appstruct**)->OpenMain()**: open new window

ProcessEvents(): process GUI events

PromptOK(String**)**: show information dialog

PromptOKCancel(String**)**: returns true if OK clicked

Refresh(): refreshes the paint operation

TopWindow variable: defines a modal window

.Close(): closes a non-modal window

.FullScreen(): full screen top-mode

bool **.IsOpen()**: checks if a non-modal window is open

.KillCaret(): removes the cursor from the window

.Open(this): opens a non-modal window

.Run(): shows the window and execute events

.SetAlpha(byte**)**: set the window transparency

.SetCaret(x,y,cx,cy**)**: set blinking cursor at position x,y with width cx and height cy

.SetPos(x,y**)**: sets the pointer position

.SetRect(x1,y1,x2,y2**)**: set window size

.Sizeable(): the window is sizeable

.Title(String**)**: the window title

.Zoomable(): the window is zoomable

```
struct MyApp:TopWindow {
 virtual void Paint(Draw& w) override {
    w.DrawRect(GetSize(), White()); }};
GUI_APP_MAIN
{  MyApp().Sizeable().Run();}
```

Windowed event functions (Ctrl)

virtual void Activate() override: when the window is toplevel and is activated

void Close() override: when closing window

virtual bool Key(dword key,int count) override: returns true if ctrl accepted the keystroke with keyvalue key and repeat count

virtual void LeftDouble(Point pos, dword flags) override: when double click left mouse button

virtual void LeftDown(Point pos, dword flags) override: when left mouse button down, pos = position, flags = shift,ctrl,alt keyflags

virtual void MouseMove(Point pos, dword flags) override: when mouse moves over window

virtual void MouseWheel(Point pos,int delta,dword flags) override: when mouse wheel rotates, delta is the amount of rotation

virtual void Paint(Draw& w) override: when OS is painting on the window drawing context