

@c *-texinfo-*

Triton

Release OpenTriton 2.0

Developer Documentation

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1 Introduction

1.1 Overview

The Triton GUI creation system offers an easy way to create good looking GUIs for your applications. It can be used with a variety of programming languages. Support for SAS/C is included directly in this package. Check out the AmiNet directory ‘dev/gui’ or the Triton Home Page at <http://home.pages.de/~szeiger/triton.html> for support files for other languages and development systems.

If you have released a Triton support package for a new language or development system, please contact me for inclusion into the list on the Triton home page.

This document describes how to use Triton in your own applications by providing you with some overview topics and a step by step introduction. It does **not** describe in detail the functions, structures, tags, etc. which are used, so you should always look them up in the autodocs file (see Section 1.4 [Introduction - Autodocs], page 3) and the C header file ‘Developer/Include/libraries/triton.h’.

The examples in this document assume that you’re using the C support files with the SAS/C compiler. There may be differences in other languages or even with other C development systems.

1.2 OOP Internals

Although Triton offers a mostly procedural API, it is based on an object-oriented system. As a Triton user you will never see Triton objects directly, but instead reference them through ID numbers.

1.3 Class Tree

The following classes are available in Triton:

Object	Abstract root class
'-- DisplayObject	Abstract class for window contents
+++ Button	BOOPSI button gadget
+++ CheckBox	GadTools CheckBox
+++ Cycle	GadTools Cycle and MX gadget
+++ DropBox	AppIcon dropping box
+++ FrameBox	Framing or grouping box
+++ Group	Triton's layout engine
+++ Image	Image
+++ Line	3D line
+++ Listview	GadTools Listview
+++ Palette	GadTools Palette gadget
+++ Progress	Progress indicator
+++ Scroller	GadTools Scroller
+++ Slider	GadTools Slider
+++ Space	Empty space
+++ String	GadTools String gadget
'-- Text	Text

Descriptions for all classes can be found in the Triton autodocs (see Section 1.4 [Introduction - Autodocs], page 3) under `triton.library/class_<classname>`.

1.4 Autodocs

Documentation on all Triton classes and 'triton.library' functions can be found in the Triton autodocs file 'Developer/Autodocs/triton.doc'. The function descriptions follow the usual syntax as used in the AmigaOS autodocs. The Triton classes are listed with the prefix `triton.library/class_` and are described using the following keywords:

- NAME

The name of the class and a short description.

- SUPERCLASS

The superclass. If the comment (no attributes inherited) is added, all attributes (see below) are described in this autodoc clip. Otherwise all attributes of the superclass are inherited.

- SYNOPSIS

The tags which invoke the creation of an instance of the class. If the tags are enclosed in parantheses the class is abstract and no instances can be created.

- ATTRIBUTES

The attributes which are created for every instance of the class. All attributes are listed with their tag names, except for the default attribute which is listed as `<Default>`. See above for superclass attributes. A comment in square brackets denotes if an attribute can be specified in a creation taglist, modified later with `TROM_SETATTRIBUTE` or `TR_SetAttribute()` or queried with `TROM_GETATTRIBUTE` or `TR_GetAttribute()`.

- **APPLICATION MESSAGES**

This section describes all application messages (`TRMS_...`) which objects of this class are currently able to send. If no messages are described, this doesn't mean that none are sent. Not all class descriptions have this section yet.

- **OBJECT MESSAGES**

This section describes all messages which can be sent to instances of this class. Deferred messages are listed in parantheses. Inherited messages are not listed.

2 Writing Applications

2.1 Applications

In order to use ‘triton.library’ you must first of all open it, like any other shared library, as described in the *Amiga ROM Kernel Reference Manual*, volume *Libraries*. Before quitting, you have to close it again. The following code makes sure that you can use functions from ‘triton.library’ release 1.2 or higher:

```
#include <libraries/triton.h>
#include <clib/triton_protos.h>
#include <pragmas/triton_pragmas.h>

struct Library *TritonBase;

int main(void)
{
    if(TritonBase=OpenLibrary(TRITONNAME,TRITON12VERSION))
    {
        /* Use functions from triton.library... */
        CloseLibrary(TritonBase);
    }
    else
    {
        /* React on the error... */
    }
    return 0;
}
```

All Triton programs are based on a Triton application structure (struct `TR_App`). This structure is the connection which keeps all Triton parts of your application together. Before using any other Triton functions, you have to create a Triton application, and you must delete it again before your program quits (and before you close ‘triton.library’ of course). Any Triton application must have at least a short name, which is used by Triton to identify the application. All other tags are optional. A typical code segment could look like this:

```
struct TR_App *myApp;
```

```

if(myApp=TR_CreateAppTags(
    TRCA_Name,    "MyApp",
    TRCA_Release, "1.0",
    TRCA_Version, "42.113",
    TRCA_Date,    "3.11.94",
    TAG_END))
{
    /* Use myApp for other Triton functions... */
    TR_DeleteApp(myApp);
}
else
{
    /* React on the error... */
}

```

The linker library ‘triton.lib’ offers an easier way to open ‘triton.library’ and create a Triton application structure. The two examples from above can be combined into the following short version:

```

#include <libraries/triton.h>
#include <proto/triton.h>

int main(void)
{
    if(TR_OpenTriton(TRITON12VERSION,
        TRCA_Name,    "MyApp",
        TRCA_Release, "1.0",
        TRCA_Version, "42.113",
        TRCA_Date,    "3.11.94",
        TAG_END))
    {
        /* The opened application is called 'Application' */
        TR_CloseTriton();
    }
    else
    {
        /* React on the error... */
    }
    return 0;
}

```

2.2 Projects

A Triton Project is the next smaller entity of a Triton GUI. Currently a project contains exactly one Intuition window, but in future versions of Triton it could be possible to attach more windows to a project. Upon opening a project, you have to specify all objects which are to be displayed in the window, the window’s menu and some tags describing window properties.

At first you have to specify the window properties, then the menus and finally one (!) object. Normally this object will be a group which contains other objects or groups.

Note that all tags are optional. You may just as well open a window without any tags. This will result in a small window, consisting only of the close and depth gadget and a small dragging bar, being opened over the default public screen's title bar.

As with naming Triton applications, you should give each project at least a unique ID which is used by Triton e.g. for remembering the window dimensions.

Opening and closing a project without any objects and menus could look like this:

```
struct TagItem dummyTags=
{
    TRWI_Title, (ULONG) "A dummy window",
    TRWI_ID,      42,
    TAG_END
};

void dummyFunction(void)
{
    struct TR_Project *dummyProject;

    if(dummyProject=TR_OpenProject(Application,dummyTags))
    {
        /* Opened successfully */
        TR_CloseProject(dummyProject);
    }
    else
    {
        /* React on the error... */
    }
}
```

Of course, this way of opening a project via a static TagItem list doesn't allow insertion of object parameters or localized strings. Since you need these features most times, you should instead use a dynamic TagList which is built on the stack at runtime. Be sure to set a large enough stack! Some development systems offer automatic stack setting in their startup code, which comes handy in those situations. Please do not rely on the user to set the stack!

Note that it is currently not possible to use TAG_MORE, TAG_SKIP and TAG_IGNORE with Triton taglists.

And now back to our code, this time with a dynamic list. Imagine a function STRPTR GetLocStr(int num) which gives you a localized string.


```

void dummyFunction(void)
{
    struct TR_Project *dummyProject;

    if(dummyProject=TR_OpenProjectTags(Application,
        TRWI_Title, (ULONG) GetLocStr(MSG_WINTITLE_DUMMY),
        TRWI_ID,      42,
        TAG_END))
    {
        /* Opened successfully */
        TR_CloseProject(dummyProject);
    }
    else
    {
        /* React on the error... */
    }
}

```

The ID 42 in the above examples has been chosen randomly. This is no problem as long as you stick to this ID in future updates of your application. Otherwise the window dimensions would be wrong and the user would have to adjust them again.

In order to not use IDs twice, it can be useful to enumerate them:

```
enum windowIDs {WINID_DUMMY=1, WINID_FOO, WINID_BAR};
```

Note that window IDs must be different from 0. 0 is equal to no ID at all.

See the autodoc clip `triton.library/TR_OpenProject()` for details about the supported tags.

2.3 Menus

Any project definition may contain menus. The menu tags must follow the window tags immediately, before the object tags. If a menu has an object ID, the `TRAT_ID` tag must be the last one in the menu definition.

Object IDs are more than Project IDs. Project IDs are used only internally by Triton. As an application programmer, you have to reference Projects by a pointer to their `struct TR_Project`. Objects instead are referenced only through object IDs. The same is true for menus, which use ordinary object IDs.

A typical menu definition could look like this:

```

TR_OpenProjectTags(...)
    TRMN_Title,    (ULONG) "Project",
    TRMN_Item,    (ULONG) "?_About",    TRAT_ID, 1,
    TRMN_Item,    (ULONG) TRMN_BARLABEL, TRAT_ID, 2,
    TRMN_Item,    (ULONG) "Q_Quit",    TRAT_ID, 3,
    ...);

```

The title of a menu item or sub-item can be `TRMN_BARLABEL` to insert a standard separator bar. Keyboard shortcuts can be specified by beginning the menu label with the shortcut key followed by an underscore character and the real menu label. These simple shortcuts (with the right Amiga key) are processed automatically. You can create a so-called 'extended shortcut' by starting a label with an underscore character, then the text for the shortcut, another underscore and the menu label. These extended shortcuts are only displayed with AmigaOS 3.0 or higher and they are not managed automatically. You have to listen to incoming keyboard events in order to handle these shortcuts yourself.

See the **Menus** window of the Triton demo application for a more detailed example on menus.

2.4 Objects

The heart of every Triton GUI is objects. Currently only instances of subclasses of the `DisplayObject` class can be created. See Section 1.3 [Introduction - Class Tree], page 2, for a short list of all classes. Detailed descriptions can be found in the autodocs.

Objects are created by inserting an object tag into a project definition. For example, a checked `CheckBox` object with an ID of 99 can be created the following way:

```

TROB_CheckBox,    NULL,
    TRAT_Value,    (ULONG) TRUE,
    TRAT_ID,       99,

```

All available tags are listed in the autodocs. The `<Default>` tag's value has to be inserted directly in the `TROB_<Class>` tag as its data. All other tags are inserted normally after the initial class tag.

Note: It is useful to **enumerate** object IDs as with project IDs. But in contrast to project IDs, object IDs may be used more than once. If you use an object ID several times within the same project, the objects with that ID will be linked together and whenever an attribute (only selected attributes, notably `TRAT_Value`!) of one object changes, this change will be broadcast to all other objects with that ID as if you had notified them yourself with `TR_SetAttribute()`. This is particularly useful to link a `CheckBox` gadget and a checkable menu item together.

See the **Connections** window of the Triton demo application for a more detailed example on attribute broadcasting.

2.5 Layout

Triton's layout engine is implemented through the **Group** class. **Space** objects also play an important role because (apart from a few exceptions) groups don't contain any 'empty' space. Instead this space is covered by instances of class **Space**. See the example below for details about spaces.

Group objects can create both vertical and horizontal groups, depending on whether they are created with **TRGR_Vert** or **TRGR_Horiz**.

Four different layout types are available for each instance of **Group** (adjustable with the group flags). They affect the primary direction only:

1. **TRGR_PROPSHARE**: Expands all objects proportionally to their minimum size. All spaces retain their minimum size and are not resizable. Non-resizable non-space objects do also retain their minimum sizes (well, they don't really have a choice, do they? ;).
2. **TRGR_EQUALSHARE**: Same as **TRGR_PROPSHARE** except that all non-space objects have the same size. Their minimum size equals the biggest minimum size of the individual objects.
3. **TRGR_PROPSPACES**: All non-space objects retain their minimum sizes all the time and do not get stretched. Instead the spaces are stretched proportionally to their minimum sizes.
4. **TRGR_ARRAY**: This group builds the top group of an array. In order to create an array, you have to set up an outer **TRGR_ARRAY** group (horizontal for a column array, vertical for a line array) and fill it with single objects (notably spaces) or **TRGR_PROPSHARE** groups in the opposite direction. All elements of the inner groups will be aligned to build an array. Inner groups which have the flag **TRGR_INDEP** set will not be aligned. This flag is mainly used to insert named separator bars (created with **TROB_Line** and **TROB_Text**) into an array.

Currently the only objects which are treated as spaces in the above scheme are instances of class **Space**.

The behaviour of the group in its secondary direction can be changed, too. Two additional flags are available for that purpose. In most cases you may want to set both of them:

1. **TRGR_ALIGN**: All resizable objects (i.e. resizable in the secondary dimension of the group) are stretched to fit the full space occupied by the group.
2. **TRGR_CENTER**: All non-resizable objects are centered in the group. Without this flag they get aligned to the left or top border.

It is also possible to keep a group at its minimum size and now allow it to be stretched in either or both directions. This can be accomplished with the `TRGR_FIXHORIZ` and `TRGR_FIXVERT` flags.

A group can be created like any other object. It takes other objects as its arguments. Every group has to be terminated with a `TRGR_End` tag. A typical horizontal group, which contains a `CheckBox`, a space and again a `CheckBox`, would look like this:

```
TRGR_Horiz,      TRGR_PROPSHARE|TRGR_ALIGN|TRGR_CENTER,

TROB_CheckBox, 0,
  TRAT_ID,      1,

TROB_Space,     TRST_NORMAL,

TROB_CheckBox, 0,
  TRAT_Value,   TRUE,
  TRAT_ID,      2,

TRGR_End,       0
```

See the `Groups` window of the Triton demo application for a more detailed example on groups and arrays.

2.6 Macros

The C header file `Developer/Include/libraries/triton.h` contains many macro definitions which make creating a Triton GUI much easier. With the help of the preprocessor `Mac2E`, these macros are also available in `AmigaE`. Other languages or compilers may support similar or different macros or none at all. If no macros are available in your development system, you have to do it the traditional way. If you can use macros, use them.

The static taglist definition can be written a bit simpler with macros:

```
ProjectDefinition(dummyTags)
{
  /* Insert project tags here */
};
```

But the main use for macros are the tags themselves. For example, the tags from the dummy window example (see Section 2.2 [Tutorial - Projects], page 6) would look like this:

```
WindowTitle("A dummy window"),
WindowID(42),
EndProject
```

Have a look at the macro definitions and the supplied demo applications for more detailed information about the macros.

2.7 Polling Loop

After creating a GUI you have to handle user input. In order to accomplish this task, Triton offers a polling system which resembles the Intuition IDCMP polling system. A basic polling loop looks like this:

```
void handleDummyWindow(void)
{
    BOOL closeMe=FALSE;
    struct TR_Message *trMsg;

    /* Open the window... */

    while(!closeMe)
    {
        TR_Wait(Application,NULL);
        while(trMsg=TR_GetMsg(Application))
        {
            switch(trMsg->trm_Class)
            {
                case TRMS_CLOSEWINDOW:
                    closeMe=TRUE;
                    break;

                case TRMS_ACTION:
                    switch(trmsg->trm_ID)
                    {
                        case ID_FOO:
                            /* Do something... */
                            break;
                        case ID_BAR:
                            /* Do something... */
                            break;
                    }
                    break;

                case TRMS_NEWVALUE:
                    switch(trMsg->trm_ID)
                    {
                        /* New value is in trMsg->trm_Data */
```

```

        case ID_MYCHECKBOX:
            /* Do something... */
            break;
        case ID_MYSLIDER:
            /* Do something... */
            break;
    }
    break;

    case TRMS_ERROR:
        puts(TR_GetErrorString(trMsg->trm_Data));
        break;
    }
    TR_ReplyMsg(trMsg);
}

/* Close the window... */
}

```

Note: Don't forget to reply all messages!

You could add a `switch()` for the project which sent the message if you have more than one project opened, but a better way is to use unique object IDs. This does also yield the advantage that moving an object from one window to another does not require any change in the message handling.

It is currently not very well documented which messages are sent by the different objects. As a general rule, activatable objects send `TRMS_ACTION` and objects which have a `TRAT_Value` or a similar modifiable attribute, send `TRMS_NEWVALUE`.

Here is a more detailed description of the message types:

- `TRMS_CLOSEWINDOW`: The user has pressed the close gadget or the `Esc` key (if it hasn't been disabled with `TRWF_NOESCCLOSE`).
- `TRMS_ERROR`: An error occurred. `TR_Message.trm_Data` contains the error code. You can use `TR_GetErrorString()` to generate a user-readable error message from this error code.
- `TRMS_NEWVALUE`: An object's attribute has changed. `TR_Message.trm_Data` contains the new value for the attribute.
- `TRMS_ACTION`: An object has been activated somehow (e.g. a button has been pressed or its keyboard shortcut was used instead).
- `TRMS_ICONDROPPED`: An icon has been dropped over a window. You will get this message only if an object in your window reacts on dropped icons or you ask directly for it by specifying the project flag `TRWF_APPWINDOW`. Otherwise Workbench will not allow you to drop icons over a Triton window. `TR_Message.trm_ID` contains the ID of the object

over which the icon was dropped or 0 if it was dropped over an object without an ID. `TR_Message.trm_Data` contains a pointer to the `struct AppMessage` which was sent by Workbench.

- **TRMS_KEYPRESSED:** A key has been pressed and Triton was unable to identify it (e.g. as a keyboard shortcut). `TR_Message.trm_Data` contains the ASCII code (if available, otherwise 0), `TR_Message.trm_Code` contains the RawKey code and `TR_Message.trm_Qualifier` the qualifier bits.
- **TRMS_HELP:** The user requests help for the object specified by `TR_Message.trm_ID` or for the whole window if the ID is 0.

A description of all fields of the `TR_Message` structure can be found in the C header file `'Developer/Include/libraries/triton.h'`.

2.8 Messages

Sometimes you may wish to query an object's attribute directly without waiting in a polling loop and then storing its value somewhere else. This is especially useful for string gadgets. You should *not* read their contents when you receive a **TRMS_NEWVALUE** message, because it is possible to exit a string gadget without triggering such a message. Instead you have to read the contents directly before you need them.

Attributes can be read with the `TR_GetAttribute()` function, which will return the value of an object's or project's attribute. Specify the object's ID or 0 for a project attribute. You can get the default attribute of an object by setting `Attribute` to 0. Otherwise set it to an attribute tag. Checkable menu items support the `TRAT_Value` attribute which is set to 0 if the menu item is not checked and a non-0 value if it is checked.

Setting a new attribute works the same way with the function `TR_SetAttribute()`. Again you may also modify project attributes. See the autodoc clip for a list of them. After setting a new attribute the on-screen representation of it will be updated if necessary.

If you want to send custom object messages (`TR_SetAttribute()` and `TR_GetAttribute()`) invoke the messages `TRDM_SETATTRIBUTE` and `TRDM_GETATTRIBUTE`, you have to use `TR_SendMessage()`. The autodocs will tell you which classes accept which messages.

Note: Do not confuse **Object Messages** (`TROM_...`) which are sent to Triton objects with **Application messages** (`TRMS_...`) which you receive in your message polling loop.

2.9 Help

Triton offers two ways of providing help for the user of a Triton application:

- **QuickHelp**

QuickHelp creates and handles requester bubbles (actually they are implemented as rectangular boxes at the moment). All you have to do is provide a **TRDO_QuickHelpString** attribute for every object which should have QuickHelp available. Then switch on QuickHelp with **TRWI_QuickHelp** (can be set when opening a project or modified later with **TR_SetAttribute()**). When the user moves the mouse pointer over an object which has a QuickHelp string attached, a small window will pop up near the object where the mouse pointer is located. This window contains the specified QuickHelp string. As soon as the mouse pointer leaves the borders of the object, the help window will disappear.

- **Manual help**

If you set **TRWF_HELP** when opening a project, you will receive a **TRMS_HELP** message whenever the user presses the **Help** key. As usual **TR_Message.trm_ID** contains the ID of the object for which the user requested help or 0 if no object could be assigned to the help request (you should normally provide help for the whole window in that case). The most common way to react on **TRMS_HELP** is to pop up an AmigaGuide document describing the object for which the user requested help. If you do not want to provide more extensive help than you do with the QuickHelp feature (see above), you can also pop up a requester containing the QuickHelp string for the specified object. The main window of the main Triton demo application shows how to do that.

2.10 Requesters

Triton offers two requester functions:

- **TR_EasyRequest()** creates and handles a simple requester with some lines of text (different text styles are possible) and a row of buttons at the lower end. You should use this function whenever possible. Not only is it easier to use than **TR_AutoRequest()**, but it could be made user-configurable in future Triton releases.
- **TR_AutoRequest()** is a simple message polling loop which opens a Triton window, waits until a **TRMS_ACTION** message comes in and returns the ID of the object which triggered the message. This function is often used in combination with the requester macros (**BeginRequester()**, **BeginRequesterGads** and **EndRequester()**).

Please consult the autodocs for more detailed information about these functions. The main demo application contains examples for both types of requesters.

If you need a more sophisticated requester (e.g. a string requester), you have to use your own message polling loop (see Section 2.7 [Tutorial - Polling Loop], page 12). You may still use the requester macros though.

3 Writing Classes

3.1 Class Basics

This chapter contains information on how to create your own custom classes to be used by Triton. At the moment your classes may inherit only from `Object` and `DisplayObject`.

Triton is using a single class tree. All classes inherit directly or indirectly from `Object` and all classes (apart from `Object` of course) inherit directly from exactly one parent class, their *super-class*.

While we're at it, let's define another term used in this tutorial: A *meta-class* in Triton is a class which is used to dispatch a method to an object. Thus it is either the *real* class of the object or one of its *ancestors*.

As you've already learned by using the built-in classes of Triton the API of a class is defined by class and attribute tags. Note that a class can be bound to more than one class tag. An example is `Group` which is bound to `TRGR_Horiz` and `TRGR_Vert`. You can make up your own tags by creating a number based on `TRTG_OBJ` or `TRTG_OAT` and adding `TRTG_SER(1)`. Serial number 0 is used by the built-in classes and serial numbers above 1 will be used in the future by public custom classes.

The interior of a class consists of a structure containing whatever internal data the class needs to keep track of and a number of functions representing the class' methods.

I suggest you use the following naming conventions:

- All tags use mixed capitalization. Class tags are prefixed by `TROB_` (*Triton Object*) and attribute tags by `TRAT_` (*Triton Attribute*). In order to avoid naming conflicts it is advisable to repeat the class name in the attribute tag names (example: `TRAT_SomeClass_SomeAttribute`).
- The class data structure is named after the class, using mixed capitalization and prefixed by `TROD_` (*Triton Object Data*).
- The method function names consist of the following parts, separated by underscores: `TROM` (*Triton Object Message*), the class name (using mixed capitalization) and the method name (upper case).

The method functions return an `unsigned long` value and take the following arguments:

1. `struct TROD_<Class> * object`

This is a pointer to the object on which the method should be performed. It is always casted to the metaclass type even if it is an instance of a descendant.

2. `ULONG messageid`

This is the ID of the message that was sent. Currently only a set of pre-defined message IDs are allowed here. It's mainly used for finding the correct superclass method to call.

3. `struct TROM_<MessageData> * data`

This is the data associated with the message. It can actually be of any type. Most of the standard messages use data structures following the above convention.

4. `struct TR_Class * metaclass`

This is the class which is currently processing the message, i.e. the class with which the current method function is associated. You need it for calling superclass methods (`...metaclass->trc_SuperClass...`).

3.2 Methods

Methods are performed on Triton objects by sending Object Messages to them.

Descriptions of all messages and the data structures associated with them can be found in the C header file 'Developer/Include/libraries/triton.h'.

3.3 Frames

Your own classes can (and should) use the Triton frame primitives for drawing frames (aka BevelBoxes). All available frame types are listed in the `TR_FrameTypes` enumeration. Currently 3 different kinds of frame types are available:

1. GadTools `BBFT_#?` style frames:

The 3 standard frame styles already known from GadTools are also available in Triton: `TRFT_BUTTON` is the most basic frame type, a simple raised bevelled box. `TRFT_RIDGE` is a double frame as used by GadTools string gadgets. `TRFT_ICONDROPOBOX` is a double frame with some free space between the two borders as used by standard Amiga icon drop boxes.

2. Additional low-level frame types:

Triton offers some additional frame styles, namely `TRFT_XENBUTTON1`, `TRFT_XENBUTTON2` and `TRFT_NEXTBUTTON`, which are used to create XEN and NeXT style frames.

3. Abstract frame types:

The third kind of frame types are abstract frame types which do not have a fixed look but a defined meaning (e.g. a button frame or a group frame). The look of these frame types can be configured by the user via the Triton preferences editor.

Before drawing a frame you usually have to know how big the borders will become. This can be accomplished with the `TR_FrameBorderWidth()` and `TR_FrameBorderHeight()` functions.

Then you can draw a frame using `TR_DrawFrame()`. The parameters of this function are all quite straight-forward, except for the last one. Its meaning depends on the kind of frame type. In the case of a low-level frame type, setting `inverted` to `TRUE` causes the frame to appear recessed instead of raised. In the case of an abstract frame type the user preferences decide whether a frame should be raised or recessed. Setting `inverted` to `TRUE` causes Triton to use the opposite of the user preferences.

3.4 Text

Similarly to the frame primitives there are also text primitives available for writing your own classes.

The usage is quite straight-forward: First, find out the width of a line of text by calling `TR_TextWidth()` if necessary. Second, draw the text into a window using `TR_PrintText()`. You should supply the same flags to both functions, selectable from the `TRTX_*` flags. The following flags are currently available:

- `TRTX_NOUNDERSCORE`

Underscores (as specified by the `TRWI_Underscore` project tag) will not be interpreted and simply treated as normal text characters.

- `TRTX_HIGHLIGHT`

The text will be highlighted, i.e. drawn using the pen for highlighted text instead of the one for normal text.

- `TRTX_3D`

The text will be drawn in the highlighting color with a shadow to the lower right side.

- `TRTX_BOLD`

The text will be drawn using the `bold` (soft) style. Note that this is not supported by all fonts.

- `TRTX_TITLE`

This is an abstract style which can be set by the user via the Preferences editor to either normal, highlighted or shadowed text. It is used for all kinds of titles (e.g. of framing boxes).

3.5 Images

You can use `TR_AreaFill()` for filling an area with one of Triton's default backfill pattern. See the AutoDocs for more details.

When you get a `TROM_INSTALL` message you can assume that your drawing area is filled with the background color the object's container (`TROD_DisplayObject.tro_BackfillType`).

3.6 Color

IF you want to draw your own shapes, other than texts, frames and the other ones which can be drawn with the primitives, you can use the normal `graphics.library` and `intuition.library` functions. Of course you need to take care of the colors you use yourself. In addition to the default system pens Triton offers its own pen selection scheme.

You can get a Triton pen with the `TR_GetPen()` function. As of V6 the following pen types are available:

- `TRPT_TRITONPEN`

Triton's own pens. These are in concept similar to the system pens, but Triton offers some additional ones. These pens can also be redefined by the user with the Triton Preferences program.

- `TRPT_SYSTEMPEN`

The intuition DrawInfo pens. PenData specifies which pen to return.

- `TRPT_GRAPHICSPEN`

A standard graphics pen. `TR_GetPen()` will simply return the PenData code as a pen number.

4 Style Guide

4.1 Guidelines

Please keep the following general rules in mind when designing and implementing a GUI with Triton:

- Window size

Please make sure that all windows of your GUI fit on a standard PAL Hires screen (640*256 pixels) with `'topaz.font'` in size 8.

- Keyboard shortcuts

Please add keyboard shortcuts to as many gadgets and menus as possible. It is very annoying for a user who works without a mouse most of the time to grab his mouse just because you forgot to add keyboard shortcuts.

- Test your GUI

You should always test your GUI with different font sizes (especially fixed-width and proportional fonts with different heights) and a non-standard window background to avoid making assumptions about the layout and coloring of your GUI resulting from observed behaviour, which is quite often wrong. Take special care not to use text spaces for spacing in your GUI (e.g. in array labels).

- Stack size

If your application requires a stack size above 4096 bytes (e.g. because of a huge TagList with a Triton project definition which is created on the stack during runtime), make sure that the stack does indeed have that size. Some development systems offer an automatic stack setting in their startup code, which comes handy in those situations. Please do not rely on the user to set the stack!

- And finally:

Don't forget the Amiga User Interface Style Guide...

4.2 Mailing list

There is a mailing list for discussions and questions about Triton. If you have any problems with Triton or simply want to get in touch with other developers who are using Triton, you can subscribe to the list.

In that case, send EMail to `majordomo@mail.im.net` with any subject and the line `subscribe triton` in the body of your message. If you want the list mail to be sent to a different EMail address (and *only* if you want this), please use `subscribe triton a.different@email.address`

instead (after replacing `a.different@email.address` with the address to send the mail to of course).

In order to unsubscribe from the list, simply follow the above rules, replacing **subscribe** by **unsubscribe**.

If you need more help, send mail to `majordomo@mail.im.net` with a line **help** in the body.

5 Odds & Ends

5.1 FAQ

Here are some frequently asked questions and their answers:

1. Q: Why shouldn't I use a simple `TR_Wait()` for dummy windows?

A: Triton has to process inputs from Intuition. This is done in `TR_GetMsg()`. But of course you have to call this functions so that Triton can process its input. After `TR_Wait()` returns, you have to run through a `while(TR_GetMsg())` loop as usual. An easier way to create a dummy window is using `TR_AutoRequest()`.

2. Q: How do I handle a progress indicator?

A: As already explained in answer 1, you have to call `TR_GetMsg()` regularly. When a progress indicator is displayed, you should update it regularly and run through a `while(TR_GetMsg())` loop every time. See the supplied Progress Indicator demo application for details.

3. Q: How do I activate a string gadget?

A: Beginning with Triton 1.3 (V4) you can use `TR_SendMessage(Project,ID,TROM_ACTIVATE,NULL)`.

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