$W_a f^e$ – A Tcl Interface to the X Toolkit or A Graphical Frontend for Applications in Various Programming Languages

Version: 1.0

Gustaf Neumann, Stefan Nusser

neumann@wu-wien.ac.at, nusser@wu-wien.ac.at

Wirtschaftsiuniversität Wien
Abteilung für Wirtschaftsinformatik
Augasse 2–6
A-1090 Vienna

June 19, 1994

Abstract

$W_a f^e$ provides a flexible and easy to use interface to the *X Toolkit* Release 4 or 5 (Xt), the *Athena* widget set (Xaw) and (incomplete) to the OSF/Motif widget set (Xm). $W_a f^e$ is implemented using the embeddable command language TCL. $W_a f^e$ allows access to Xt's functionality from all compiler and interpreter languages, provided that they can communicate unbuffered over *stdout* and *stdin*. Furthermore, $W_a f^e$ can be used with TCL scripts for easily creating new X Window Applications or user interfaces to existing Unix commands.

Contents

1 Introduction **4**

1.1 Using $\mathcal{W}_a f^e$ as a Frontend 5

1.2 Command Line Arguments 6

2 $\mathcal{W}_a f^e$'s Predefined Variables **8**

3 Widget Names and Widget References **9**

4 $\mathcal{W}_a f^e$ Commands **11**

4.1 Widget Creating Commands 11

4.2 Basic Toolkit Commands 13

4.2.1 Setting and Retrieving Resource Values 13

4.2.2 Resource Management over Resource Database 13

4.2.3 Obtaining Type and Class Information, Testing for Existance 15

4.2.4 Managing, Mapping, Realizing and Destroying Widgets . 16

4.2.5 Popup and Popdown Commands 17

4.2.6 Modifying Sensitivity 18

4.2.7 Raising and Lowering 18

4.2.8 Translating Coordinates and Obtaining Sizes 19

4.2.9 Locating Files 19

4.2.10 Terminating $\mathcal{W}_a f^e$ 20

4.3 Callbacks and Actions 20

4.4 Widget specific commands 26

4.4.1 Scrollbar 26

4.4.2 StripChart 27

4.4.3 List 27

4.4.4 Text 30

4.4.5 Tree 35

4.4.6 Form 35

4.4.7 Paned 35

4.4.8 Toggle . . . 36
4.4.9 SimpleMenu . . . 37
4.5 Communication, Handlers and Events . . . 37
4.5.1 The echo command . . . 37
4.5.2 Handlers . . . 38
4.5.3 The additional communication channel . . . 41
4.5.4 Suspending/delaying Execution in $W_a f^e$, Event Processing 42
4.5.5 Communicating from an Application Program to $W_a f^e$ . . 42
4.6 The selection mechanism . . . 43
4.7 Integration of the XPM image format . . . 46

A Short Reference 48

A.1 Tookit Widgets and Commands . . . 48
A.2 Athena Widgets and Commands . . . 55
A.3 Athena R5 Widgets and Commands . . . 60
A.4 Motif 1.1 Widgets and Commands . . . 60
A.5 Motif 1.2 Widgets and Commands . . . 72
A.6 XmGraph Extension to Motif Widgets . . . 74
A.7 Plotter Widget and Commands . . . 75
A.8 HyperText (HTML) Widget and Commands . . . 77
A.9 Ghostview Widget and Commands . . . 79
A.10 Drag and Drop Commands . . . 80
A.11 Miscelaneous Additional Commands . . . 80

1 Introduction

$\mathcal{W}_a f^e$ stands for *widget (Athena) front end* and provides an interface to the X Toolkit. The name $\mathcal{W}_a f^e$ is a historical leftover and not fully appropriate since $\mathcal{W}_a f^e$ supports not only the Athena Widgets but also the Plotter Widget Set[1] and the OSF/Motif widget set. The OSF/Motif support in the current release is not complete, but should be sufficient for most needs[2]. In addition $\mathcal{W}_a f^e$ supports the XmGraph[3] widget (OSF/Motif only, for arbitrary graphs, directed or undirected), Mosaic's Hypertext widget[4] (based on WWW's html) under Athena and OSF/Motif and the Ghostview[5] widget for displaying postscipt file (can be used together with the OSF/Motif and Athena widget sets). Furthermore $\mathcal{W}_a f^e$ supports additional widespread packages such as XPM or RDD (Drag and Drop library for drag and drop between multiple applications[6]).

$\mathcal{W}_a f^e$ can be used as a stand alone prototyping environment for X Toolkit applications (interactive or using scripts) or as a frontend to applications programs in various programming languages to provide a graphical user interface without facing the need to enhance the application languages with X Window and X Toolkit bindings. In addition $\mathcal{W}_a f^e$ can be used from the C language it the $\mathcal{W}_a f^e$-environment is linked together with another application program replacing the standard $\mathcal{W}_a f^e$ shell.

The basic idea of the frontend approach is to start an application in two separate processes: one process is dealing purely with application matters, the other one is responsible for the user interface. The two processes communicate using sockets. The application process writes to stdout, its output is parsed and interpreted by the frontend. This way the application process sends send commands or procedures to the frontend process, which builds up the graphical user interface and handles the incoming events.

The purpose of this manual is mostly to provide an overview of the commands available in the $\mathcal{W}_a f^e$ environment. A deeper discussion of the design overview of $\mathcal{W}_a f^e$ can be found in [4]. A more technical reference of the Widget sets and commands can be found in [5, 1, 3, 7]. For more details about the embeddable command language TCL refer to [6].

---

[1] The commands of the Plotter widget set supported by $\mathcal{W}_a f^e$ are listed in section A.7 on page 75.

[2] The commands of the OSF/Motif widget set supported by $\mathcal{W}_a f^e$ are listed in sections A.4 and A.5.

[3] The commands of the XmGraph widget supported by $\mathcal{W}_a f^e$ are listed in section A.6 on page 74.

[4] The commands of the HTML widget supported by $\mathcal{W}_a f^e$ are listed in section A.8 on page 77.

[5] The commands of the Ghostview widget supported by $\mathcal{W}_a f^e$ are listed in section A.9 on page 79.

[6] The commands of the drag and drop library supported by $\mathcal{W}_a f^e$ are listed in section A.10 on page 80.

The following section describes how to use W_af^e as a frontend and the the command line arguments of W_af^e. Section 4 describes the most important W_af^e commands (X Toolkit specific commands, Athena Widget specific commands, XPM [2] specific commands). The Short Reference in appendix A on page 48 was generated automatically from the W_af^e sources and provides the complete set of W_af^e commands and the names of the X Toolkit or OSF/Motif counterparts. The Short Reference is a complete assembly of all W_af^e commands.

1.1 Using W_af^e as a Frontend

The way W_af^e communicates with the application process is controlled by various command line arguments. If none of the options --*d*, --*e*, --*f* or --*v* is specified, the application program will be started as a subprocess of W_af^e. If the W_af^e application is called *myprog* and a link from W_af^e to the name *xmyprog* is made, executing *xmyprog* starts W_af^e with myprog as a subprocess.

```
ln -s /bin/X11/wafe xmyprog
xmyprog
```

If the local Unix variant does not support symbolic links, a hard link may be used instead of the symbolic link in the example above. W_af^e searches all directories in the path in order to spawn the child-process *myprog* (the name is simply derived by removing the leading character "x"). Alternatively the name of the application program can be specified using the --*p* command line option.

```
wafe --p myprog
```

The application *myprog* looses it's standard input and output streams, diagnostic output will be merged with W_af^e's stderr. W_af^e communicates with the application by reading it's stdout and writing to the stdin stream. Commands to W_af^e must be prefixed by a so called prompt character, defaulting to "%", otherwise they are just echoed to W_af^e's standard output. The prompt character can be changed with the --*c* command line option. Furthermore, if you want W_af^e to accept commands without prompt character, use the --*n* command line option (This means that the application completely looses its output stream).

The application class is derivated from the link's name by capitalizing the "x" and the first letter of the executable; any dots will be substituted by dashes. This is the name, under which *X* searches the application's defaults file. So, in our example, the class is *XMyprog* and the corresponding app-defaults file will be searched. The application instance name is the link's name with dots substituted by dashes.

Command line arguments can be passed to the client with one restriction: They mustn't begin with the characters "--", since this is reserved for $W_a f^e$'s arguments. Thus the command line

```
xmyprog filename --n
```

will cause $W_a f^e$ to spawn the process *myprog* with the argument *filename*. The "--n" is one of $W_a f^e$'s command line arguments, which are described in the next section.

1.2 Command Line Arguments

The following command line options change the behavior of $W_a f^e$'s communication mechanism:

--c*c* This option simply allows the user to specify the prompt character which is not used if --*n* is specified. It defaults to "%".

--d Enter *direct mode*; this is a special mode, which is particulary useful for debugging or testing purposes. $W_a f^e$ can be used like a shell in this mode:

```
wafe --d --n
```

Commands are now read from *stdin*, output is sent to *stdout*. Additionally, the option --*n* is recommended so that it is unnecessary to prefix every command with the prompt character.

If $W_a f^e$ is called without any mode changing parameters or links, it will default to this interactive mode.

--e Takes the next argument to be a valid $W_a f^e$ command string and executes it. Note that $W_a f^e$ doesn't terminate automatically in this mode.

--f Run in *file mode*. The next argument after specifying --*f* must be the name of a file containing valid TCL commands. The file will be executed by the TCL source command.

--i Switches to *input mode*, which means that $W_a f^e$ reads from *stdin* (which it normally doesn't) and forwards the commands to the client-application. Be aware that programs using input-mode can't be executed in the background!

--n Turn of the prompt character mechanism. This causes $W_a f^e$ to regard every message it receives from the application as a $W_a f^e$ command.

--p Specify name of client program explicitly. The next argument after --*p* must be the name of the program to be executed as client program. This option can be used alternatively to the standard link mechanism described above where the leading "x" is stripped to derive the client program's name.

--v Displays the current version of *Wafe* and exits immediately.

--C *applicationClassName* If this option is specified *Wafe* will use the provided string as Xt application class.

--D *option*

Starts *Wafe* in *debug mode* and passes the specified *option* to the *debug library*. The following example activates debugging and tracing (provided, wafe was compiled with the DBUG support enabled).

```
wafe --Dd:t
```

The full set of debugging and profiling options can be found in the documentation of the debug library.

--S *socketString*

This command line option can be used to communicate to *Wafe* (running typically as a subprocess of the application program) via sockets. Beginners my skip this point.

socketString can be of the form

1. *socketName*
   Example: `--S/tmp/wafe.1052-1`
2. *portNumber*
   Example: `--S8853`
3. *hostname:portNumber*
   Example: `--Smohegan:8853`

If the **--S** option is used, *Wafe* establishes during its initialization a socket communication determined by the *socketString* and connects its standard input and output to the created socket.

1. If *socketString* is of the form *socketName*, first the application program is responsible to create a unique socket name. Then it calls *Wafe* with the --S option, passing the socket name to *Wafe*. *Wafe* creates the specified unix domain socket (like a server) and waits, until the client application program connects. *Wafe* will remove the named socket on exit.

2. If *socketString* is of the form *portNumber*, *Wafe* binds the specified port (like a server) and waits for the application program to connect on it. Note, that the specified port is blocked on the host for the whole *Wafe* session.

3. If *socketString* is of the form *hostName:portNumber*, a simple two phase communication protocol is used to establish the connection.

   (a) In the first phase the application program on host *hostName* binds the specified port number (like a server), spawns *Wafe* (for example using remote shell) with the option:
   `--S`*hostName*`:`*portNumber*
   Wafe will connect to the specified host and port.

   (b) In the second phase *Wafe* will obtain a new unique port number, and establish itself as a sever listening on the new port. The Wafe will send the new obtained port number as a ASCII string to the application program over the primary socket. The application program reads the new port number form the primary socket and will connect to *Wafe* on the new port number and release the original port number such that another Wafe process can use *portNumber* as well.

   A sample implementation of an application program exploiting all three types of socket connections is provided in:
   `wafe/apps/lang/sock.pl`

--T *communicationChannels*

This option can be used to specify the file numbers of extra communication channel as a pair *wafeSide/clientSide*. See `wafe/apps/util/wafe.pl` for an example usage.

2 *Wafe*'s Predefined Variables

During initialization *Wafe* will set the TCL variables *ARGC, ARGV* and *env* to the corresponding contents. *ARGV* is C's argument vector in form of a TCL list, *ARGC* is its length. Starting with Version 0.96 *Wafe* supports like tclsh *argc, argv* and *argv0*. *argv0* is the program (or script) name, *argv* is the argument list, *argc* is the length of *argv*. The older *ARGC* and *ARGV* will be dropped in future versions.

The variable *tcl_interactive* indicates whether *Wafe* is running in interactive mode or not (i.e. not in frontend mode, not as a script; commands are accepted from a terminal).

The variable *XVERSION* is set to *R4* or *R5*, depending under which version of X *Wafe* was compiled. The variable *WAFEVERSION* keeps the version number of

Wafe. *PACKAGES* is a list of packages compiled into *Wafe*. *PID* is the process id of current process (similar to [pid] in tcl7.3). *CHILDPID* is the process id of forked application program running as a coprocess of Wafe (or 0).

The variable *WAFELIB* points to the location of the *Wafe* library (usually /usr/lib/X11/wafe).

The Tcl variable *FILESEARCHPATH* is used locate bitmaps or pixmap files for StringToBitmap or StringToPixmap converter (and for bitmaps/pixmaps/ gif files in HTML documents, when compiled with Hypertext support). For example:

```
set FILESEARCHPATH /usr/lib/X11/twm/%N:/usr/include/X11/%T/%N
Command c topLevel bitmap ghostview.xpm
realize
```

In this example the file 'ghostview.xpm' will be searched first in /usr/lib/X11/twm and then in /usr/include/X11/bitmaps.

If wafe/mofe is compiled without XPM support, only .xbm files will be converted. Wafe provides a reasonable default value for FILESEARCHPATH. If the environment variable XFILESEARCHPATH is set, its value will be used instead of the default. For a full documentation of the percent codes in the FILESEARCHPATH see XtResolvePathname in *"X Toolkit Intrinsics Reference Manual"*[1].

3 Widget Names and Widget References

Developing an user interface with Xt means creating instances of widgets from a predefined widget set and arrange and configure these according to application specific needs. Wafe supports the Athena widget set, the OSF/Motif widget set, and several additional widgets or widget sets (eg: Mosaic's HTML widget for hypertext applications (can be used together with the Athena or OSF/Motif widget set), the plotter widget set (linegraphs and bargraphs for Athena or OSF/Motif (see section A.7), the XmGraph widget (for arbitrary graph structures; OSF/Motif only).

The created widgets can be composite or non-composite, whereas composite widgets are commonly used for geometry management (defining the graphical layout of an application). A composite widget and all its children is commonly refered to as widget tree.

When an instance of a widget is created, the widget class defines its attributes (resources) and its methods (mostly callbacks and actions plus frequently additional procedures called the *programmatic interface* in Xt terms).

In W_af^e the creation of a widget is achieved through widget creating commands (see section 4.1). When a widget is created the user provides a name and specifies a parent widget to determine the position of new created widget in the widget trees of the applicaton. So called application shells are the roots of the widget trees and do not have parent widgets.

In general the names which are provided at widget creation time do not have to be unique, but in many circumstances it is more conveniant if they are. There are many situations where a user might want to refer at a later time to a created widget:

- to change attributes of a widget,
- to specify the position of a widget relative to another widget,
- to apply procedures of its progammatic interface,
- to delete a widget, and so on.

In order to refer to a widget, a widget reference is needed. The simplest widget reference it the widget name (the name provided at widget creation). However, since this name might be ambiguous, wafe provides the following types of widget references:

- widget names
- widget paths
- widget IDs
- anchored widget paths

A *widget path* starts with a widget name or the character "*", followed by a widget name, followed optionally by "*" or "." and widget-name, where the optional part can be repeated several times. Each time a widget is created, a unique *widget ID* is returend, which can be used as wiget reference as well. Finally a anchored widget path can be used to refer to a widget with a specified name under a widget denoted by its widget ID: A *anchored widget path* starts with an widget ID followed by "*" or "." and a widget name where the part after the widget id can be repeated several times.

Later in this text the term widget is commonly used instead of widget reference in argument descriptions.

4 W_af^e Commands

In addition to the standard TCL commands, W_af^e makes several new commands available for the client.

Please note that according to the very nature of the *Tcl* language and W_af^e's stream oriented communication mechanism, every argument's type has to be *string*. Widgets, for example, are always referenced by their names and conversions are done as necessary.

For the description of the new commands, the following conventions will be kept:

$expression^+$	means one or more occurrences of *expression*
$expression^*$	means zero or more occurrences of *expression*
$expression^?$	means one or zero occurrences of *expression*

To apply these rules on several arguments, angle brackets $\langle\ \rangle$ are used. Terminal symbols are written in sans-serif and nonterminals in *italic* font style. Informal descriptions are typeset in the normal text font style. Commands, which are different from their Xt counterparts are described in detail, those which are added to W_af^e without changes only have a short and informal description; it is assumed that the user refers to the Xt programming and reference manuals for a detailed description [5, 1].

4.1 Widget Creating Commands

The widget creating all have the following structure:

widgetClass widgetName parentWidget unmanaged$^?\langle$*attribute value*$\rangle^*$

widgetClass	$\longrightarrow$	*athensWidgetClass* | *motifWidgetClass* | *others*
widgetName	$\longrightarrow$	string name of instance
parentWidget	$\longrightarrow$	widget reference to previously created parent widget | topLevel
attribute	$\longrightarrow$	attribute of this widgetclass, please refer to a documentation of the widget set (eg. [1] or [7] for a complete list of valid attributes). The W_af^e command showRes can be used to display the names and types of attributes for a created widget instance interactively
value	$\longrightarrow$	type, corresponding to the chosen attribute

The names of the available widget classes depend on the compile options of W_af^e. Below, only the names of the Athena widget classes are listed (mostly for historical reasons).

athenaWidgetClass	⟶	*shell* | *simple* | *menu* | *text* | *composite* | *constraint*
motifWidgetClass	⟶	if $W_a f^e$ is compiled with OSF/Motif support, all its widgets are supported. Please refer to sections A.4 and A.5
others	⟶	depending on the compile options of $W_a f^e$ the plotter widget set (refer to section A.7), the XmGraph widget (refer to section A.6) and the HTML widget (refer to section A.8) might be supported
shell	⟶	OverrideShell | TransientShell | TopLevelShell
simple	⟶	Command | Label | Grip | Repeater | Toggle | Scrollbar | Tree | StripChart | Panner | List | Mailbox | Logo | Repeater
menu	⟶	SimpleMenu | Sme | SmeBSB | SmeLine | MenuButton
text	⟶	Text
composite	⟶	Box | Porthole
constraint	⟶	Paned | Viewport | Form | Tree | Dialog

The defined constant *topLevel*, is used to reference the application's top level widget, which is created automatically at startup.. For a list of possible attribute/value pairs and detailed information about a widget's functionality compare to [1] or [7]. If desired, a widget can be created without being managed by the parent by stating unmanaged after the parent's name. This can be advantageous if many widgets are created as children from the same parent or for dialog shells of the OSF/Motif widget set. They can be managed all together after the creation by using the manageChild command.

For a full list of all widget classes supported by $W_a f^e$ see the short reference guide in appendix A on page 48.

Starting with version 0.96 attribute value pairs can be specified as either as a Tcl list, or as separate arguments (like in earlier versions).

Note that the following command is the only exception from this general structure of the widget creation commands.

ApplicationShell *widget display* ⟨*attribute value*⟩*

display	⟶	string name of display

Use this command to create a new application shell widget on the specified display, which will be the top of a new widget tree. Note that this shell widget can be iconified separately and is subject to the window manager's client decorations.

4.2 Basic Toolkit Commands

This section describes Xt specific commands. Most of these commands correspond to commands described in the *"X Toolkit Intrinsics Reference Manual"*[1], where the leading *Xt* or *Xaw* prefix was removed. The $W_a f^e$ developer might wish to consult the **Gen* files in the `src` directory of the $W_a f^e$ distribution which are used as input to the C generator.

4.2.1 Setting and Retrieving Resource Values

setValues *widget* $\langle$*attribute value*$\rangle^+$

sV *widget* $\langle$*attribute value*$\rangle^+$

Changes one or more attribute-value pairs of the specified widget. Conversion is done to the corresponding argument type. Note that some attributes, which have no string representations, can't be set by this command (eg the *colormap* attribute). This sort of attributes are either specified in [1] or have to be found out by trial and error. $W_a f^e$ allows the *callback* resource to be set to a TCL command.

Starting with version 0.96 resource value pairs can be specified as either as a TCL list, or as separate arguments (like in earlier versions).

value
getValue *widget attribute*

value
gV *widget attribute*

value $\longrightarrow$ string, actual data type depending on queried attribute

The counterpart of setValues is getValue, which allows a specified attribute to be queried. Note that $W_a f^e$ tries to convert the result to the best possible string representation suitable for TCL. Some attributes are therefore returned in TCL list structure (as for example the attributes of type *WidgetList).*

4.2.2 Resource Management over Resource Database

mergeResources *widget* $\langle$*resName value*$\rangle^{+}$

widget	$\longrightarrow$	widget to determine resource database
resName	$\longrightarrow$	binding$^{?}\langle$binding component$\rangle^{*}$
binding	$\longrightarrow$	"." | "*"
component	$\longrightarrow$	"A"-"Z" | "a"-"z" | "0"-"9" | "_" | "-"

This command can be used to write one or more resource specifications into the resource database. It is useful to specify common resources of several widgets at the beginning of the application. Note that with mergeResources you can specify class names as well as instance names since the same syntax as in an application defaults file is used. Therefore the resource specification can, in contrast to the setValues command, be applied to several widgets in the application.

Starting with version 0.96 resource value pairs can be specified as either as a TCL list, or as separate arguments (like in earlier versions).

fallbackResources *widget* $\langle$*resName value*$\rangle^{+}$

widget	$\longrightarrow$	widget to determine resource database
resName	$\longrightarrow$	binding$^{?}\langle$binding component$\rangle^{*}$
binding	$\longrightarrow$	"." | "*"
component	$\longrightarrow$	"A"-"Z" | "a"-"z" | "0"-"9" | "_" | "-"

This command behaves like mergeResources exept in cases, where a matching ressource entry is already available in the resource database, the provided value in fallbackResources is ignored. FallbackResources have the lowest priority and can be used conveniantely together with resource files, which have an higher priority. They should be used to provide default resources. fallbackResources require X11R5 or newer.

combineFileDatabase *filename widget override*

filename	$\longrightarrow$	file name of a resource file
widget	$\longrightarrow$	widget to determine resource database
override	$\longrightarrow$	true or false

combineFileDatabase is similar to mergeResources or fallbackResources except that the resources are loaded form the specified file. If the override has the value false the resource file is used only for fallback resource, otherwise values in the resource database may be redefined.

string
getApplicationResource *baseWidget resourceName resourceClass*

baseWidget	⟶	widget reference
resourceName	⟶	user provided name of additional resource
resourceClass	⟶	user provided class name of additional resource

This command can be used to obtain values from the Xt's resource database. The provided *resourceName* and *resourceClass* can be arbitrary, application specific strings and must not interfere with the widget's resources provided by the toolkit. On success the return value is the resource value, on failure, an empty string is returned.

Example: the following resources are used for myApp

```
myApp*printCmd: mp | lpr -pPs
```

The application `myApp` issuses the following command:

```
set cmd [getApplicationResource topLevel \
    specificPrintCmd printCmd]
```

to obtain the value for `printCmd`.

4.2.3 Obtaining Type and Class Information, Testing for Existance

string
getClass *widget*

This function returns the class of a widget in form of a string

string
getTypeOfAttribute *widget attribute*

Use this function to determine the type of the given attribute in the widgetclass of *widget*. If the widgetclass does not have an attribute with the given name, an empty string is returned.

int
isWidget *widget*

This function returns 0 if no widget with the given name (widget path) exists currently, otherwise non-zero.

widgetID
nameToWidget *widget widgetPath*

> This command is a TCL binding for XtNameToWidget of Xt and can be used to search for a widget specified in *widgetPath* in the widget tree under *widgetRef*. If the command succeeds, the widget ID is returned, otherwise 0.

string
parent *widget*

> This function returns the name of the parent widget if the specified widget (widget path).

windowID
window *widget*

> returns the window id of the specified widget.

4.2.4 Managing, Mapping, Realizing and Destroying Widgets

mapWidget *widget*+

> This function maps all specified widgets to the assoziated display

unmapWidget *widget**

> This command takes any number of widgets as arguments and unmaps them.

manageChild *widget**

> This command takes any number of widgets as arguments and brings them under parental management. This is only necessary, when the widget creating commands are used with the unmanaged argument!

unmanageChild *widget**

> This command takes any number of widgets as arguments and removes them from parental management.

realize

This command realizes all top level application shells. The application's main shell with the name topLevel is created automatically.

realizeWidget *widget*$^+$

This function realizes all specified widgets. This command should only be used in cases where it is necessary to realize widgets separately.

unrealizeWidget *widget**

This command takes any number of widgets as arguments and unrealizes them.

destroyWidget *widget*$^+$

This command takes any number of widget-names as arguments, destroys them completely and releases all allocated resources.

4.2.5 Popup and Popdown Commands

popup *popupShell grab*

grab $\longrightarrow$ none | exclusive | nonexclusive

Shell is the name of a previously (either with TransientShell or with OverrideShell) created popup-shell. The kind of grab used is specified with *grab*, which is the way how user events are constrained to the popup shell or its children. It can be one of the constants none, nonexclusive or exclusive.

popupSpringLoaded *popupShell*

This command displays the specified and previously created *shell* widget as a spring-loaded popup, which means that it is invisible to the window manager and disables user input to all windows except to the popup itself.

popdown *popupShell*

The command popdown ca be used to pop down a previously created and mapped popup shell.

widgetList

popupChildren *widget*

This command is similar to [gV Widget children] of a composite widget, but it returns the list of popup Shells (eg.: TransientShells) which are created as children of the given widget. Popup shells are not required to be children of composite widgets. If a widget has no popup children an empty list is returned.

4.2.6 Modifying Sensitivity

setSensitive *widget state*

The command setSensitive sets a widget and its children sensitive or insensitive depending on the boolean *state* argument (for details see XtSetSensitive in *"X Toolkit Intrinsics Reference Manual"*[1]).

setBusy *widget state*

The command setBusy sets a given widget (typically a shell widget) and its children busy or not depending on the boolean *state* argument. If a widget is set busy a busy-cursor is set and input is inhibited for all children widgets. The appearance of the children widgets will not change. If a shell is set busy and set non-busy some time later, all the sensitivity states before the setBusy command are reestablished.

4.2.7 Raising and Lowering

raiseWindow *widget*

The command raiseWindow raises the window of the specified *Widget*. For example `raiseWindow topLevel` raises the topLevel shell.

lowerWindow *widget*

The command lowerWindow lowers the window of the specified *Widget*.

4.2.8 Translating Coordinates and Obtaining Sizes

translateCoords *widget x y outX outY*

This command translates x and y coordinates in the given widget into root window coordinates. After the execution the TCL variables *outX* and *outY* are bound with the resulting values.

int
widthOfScreen *widget*

This function returns the width of the screen on which the specified widget is displayed in pixels.

int
heightOfScreen *widget*

This function returns the height of the screen on which the specified widget is displayed in pixels.

int
textWidth *widget fontResource string*

The function textWidth returns width of given *string* in pixels using font from the *fontResource* of the specified *widget*. This routine is necessary, as long we have no font to string converter.

int
fontHeight *widget fontResource*

returns the height of a font in pixels. The font is taken is taken from the given *fontResource* of the given widget.

4.2.9 Locating Files

string
resolvePathname *widget type filename suffix path*

This function returns the fully qualified filename of a readable file with name *filename* and the specified *suffix* on the given *path*. *type* is either empty or the kind of file (eg. *bitmap* or *help*) and can be referred to via percent codes in the *path* argument. See XtResolvePathname in the *"X Toolkit Intrinsics Reference Manual"*[1] for detailed information. If no matching file can be located at the given path, tan empty string is returned.

4.2.10 Terminating *Wafe*

quit

To terminate *Wafe* use quit. To ensure that the spawned application process will also terminate, *Wafe* sends it the *SIGTERM* signal. This – of course – won't happen in *file mode* or *direct mode*.

When a Tcl procedure with the name onExit is defined by an application (without arguments), this routine will be executed whenever *Wafe* exits.

4.3 Callbacks and Actions

The *X-toolkit* provides two mechanisms to link widgets to application code: One of them are callbacks, easy to use for predefined purposes, the other actions, which are more flexible and configurable but involve a more complicated handling. This section describes how these features are implemented in *Wafe*, if your are not familiar with the basic concepts of callbacks and actions please refer to the Xt Programming Manual [5].

Callbacks which should be executed when certain widget specific conditions occur (such as clicking with pointer button 1 in an Athena Command widget) can be specified directly as resources during widget creation or the sV command. The content of the callback resources is a TCL command which should be executed. The content of a callback resource can be retrieved using gV. When a callback is activated, printf-like % substitutions are performed in a first step. In this way *Wafe* provides the functionality of *Xt*'s *call Data* mechanism). The table below shows the %-codes for the Athena widget. Please refer to the short reference (in appendix A on page 48) for a complete summary of the %-codes.

Widgets	*Callback*	*Code*	*Description*	*Type*
all	all	%w	name of widget	string
all	all	%W	widget ID	int
List	callback	%i	index	int
List	callback	%s	active element	string
Scrollbar	scrollProc	%p	position	int
Scrollbar	jumpProc	%p	percent	float

Please note that although different types are mentioned in the table, all of these codes will be substituted by a string. The resulting command string will be interpreted using TCL eval. To avoid unexpected side effects due to the substitution, characters like backslash, dollar or square brackets, which have special meanings in TCL are escaped in %s substitutions using a backslash. %s should be used inside double quoted strings.

callback *widget callbackResource type arg**

callbackResource	$\longrightarrow$	valid callback attribute of the specified widget
type	$\longrightarrow$	none | exclusive | nonexclusive | popdown | position | positionCursor
arg	$\longrightarrow$	additional arguments depending on type

This command sets the callback resource of the named widget to one of Wafe's predefined Toolkit function. For valid *types* refer to the following table. Note that the execution of a *Wafe* command can be registered with the callback resource of a widget with the setValues command.

Type	*Description*
none	realize a popup-shell, grab-type none
exclusive	realize a popup-shell, grab-type exclusive
nonexclusive	realize a popup-shell, grab-type nonexclusive
popdown	unrealize a popup-shell
position	position a popup-shell relative to its parent
positionCursor	position a popup-shell under the cursor

According to the type used, *callback* takes the following additional arguments.

Callback Types: none, exclusive, nonexclusive

callback *widget callbackResource* none *popupShell* or

callback *widget callbackResource* exclusive *popupShell* or

callback *widget callbackResource* nonexclusive *popupShell*

> These callbacks all take one additional argument: *shell*, specifying a popup-shell widget which will be realized with grab-type specified as none, exclusive or nonexclusive. Furthermore this callback will set the widget *widget* insensitive.

Callback Type: popdown

callback *widget callbackResource* popdown *popupShell enableWidget*

> *enableWidget* ⟶ name of a widget to be enabled after popdown
>
> This command registers a popdown callback for the specified widget. When the specified shell is popped down the widget *enableWidget* will be set sensitive.

Callback Type: position

callback *widget callbackResource* position *baseWidget:offset*

> *basis* ⟶ string name of a widget
>
> This command registers for the specified shell *widget* a popup callback that places the shell relative to another widget *baseWidget* and the specified offset. The full syntax of the last parameter is *widget-name:xoffset/yoffset*. If *yoffset* (and the slash) is omitted, *yoffset* is set to the value of *xoffset*. If *xoffset* is also omitted (no colon) *xoffset* and *yoffset* are set to the default value of 50.

For example the command

```
callback d1 popupCallback position mainWindow:10/20
```

registers a callback for a Dialog shell named `d1` that will position this shell with the xoffset 10 and the yoffset 20 from the widget (of the same application) named mainWindow.

Callback Type: positionCursor

callback *widget callbackResource* positionCursor *relPos*

> This command registers for the specified shell *widget* a popup callback that places the shell relative to the current cursor with the specified offset *relPos*. If *relPos* equals 0 the shell will be centered over the cursor position.

For example the command

```
callback d2 popupCallback positionCursor 40
```

registers a callback for a Dialog shell named `d2` that will position this shell 40 pixel left and 40 pixel up above the cursor when `d2` is popped up.

action *widget type translations*

type	⟶	augment | override | replace
translations	⟶	string translation table – refer to the Xt Reference Manual [1], Appendix F, for a detailed description.

This command allows the *translations* resource to be modified. The *type* argument specifies, how the new bindings are merged with the existing ones: override means that a translation specified for an existing event overrides the old action, augment defines precedence for the existing values. The use of replace means the total replacement of the previous bindings by the translation table specified.

If you are using the replace or override directives, you will need information about a widget's actions and default bindings in order to avoid conflicts with your own translations. For a complete description including the new R5 widgets refer to the MIT documentation [7].

In addition to the standard Xt actions, $W_a f^e$ provides a feature for binding the execution of a TCL command to an event. The globally registered action

exec *(string*)*

takes any number of strings as arguments, which compose together a valid TCL command and arranges for it to be executed. Note that due to the way Xt handles arguments to actions, you must not use a comma (",") in the command, since it will be regarded as an argument separator and will not be passed to the action!

> *Assuming an application with an Text widget named* `text`*, the following statement will arrange for the contents of the Text widget to be sent to the application by specifying a translation for a Key event.*

```
action text override \
      {Meta<Key>s: exec(echo [gV text string])}
```

Whenever the key `s` *is pressed while the Meta-key is held down inside the text widget, the contents of it will be sent to the application.*

One of the big advantages in using actions instead of callbacks is the possibility to access information from the event which triggered the execution. This feature is supported in a restricted fashion by the `exec` action with printf-like % codes. The valid events and the possible codes are

- ButtonPress, ButtonRelease, MotionNotify
- KeyPress, KeyRelease
- EnterNotify, LeaveNotify
- ClientMessage

Code	*Information*	*Valid Events*
%t	event type	all of the above mentioned events
%w	widget	all of the above mentioned events
%W	widget	all of the above mentioned events
%x	x-coordinate	all of the above mentioned events
%y	y-coordinate	all of the above mentioned events
%X	x-root-coordinate	all of the above mentioned events
%Y	y-root-coordinate	all of the above mentioned events
%a	ascii-character	KeyPress, KeyRelease
%b	number of button	ButtonPress, ButtonRelease
%k	keycode	KeyPress, KeyRelease
%p	protocol name	ClientMessage
%s	keysym	KeyPress, KeyRelease
%S	state	ButtonPress, ButtonRelease, MotionNotify, KeyPress, KeyRelease

The user has to ensure by a corresponding binding in the translation table that a % substitution occurs only with a valid event type. The %t code will return `unknown` if the event is none of the above mentioned.

With the following translation a string containing the keycode, character and keysym will be sent to the application any time a key is pressed in a text widget called `text`*.*

```
action text override \
  {<KeyPress>: exec(echo K:%k C:%a KS:%s)}
```

installAccelerators *destination source*

destination	$\longrightarrow$	widget in which events occur
source	$\longrightarrow$	widget whose actions are invoked

Accelerators provide a facility by which actions defined in one widget can be triggered by events in another widget (refer to the Xt Programming Manual [5]). The resource named accelerators of the source widget should be set to the accelerator table before this command is issued (eg. via the application default file).

The command installAllAccelerators installs the accelerators from source and its children to destination.

Note that two directives controlling the merging process can be specified as a part of the accelerator table: override means that the accelerators have precedence over the source widget's translations, augment means that existing bindings can't be overridden by the accelerators.

callCallbacks *widget callback* $\langle$*type data*$\rangle$

callback	$\longrightarrow$	callback resource name
type	$\longrightarrow$	float
data	$\longrightarrow$	string containing a value according to type

Callbacks can be called not only by the widget itself but also by the application using callCallbacks. If it is desired to pass a callData information to the callback procedure, this can be done by specifying type and data, otherwise the callData argument defaults to NULL.

callActionProc *widget eventInfo action arg**

eventInfo	$\longrightarrow$	"" | $\langle$buttonEvent *button*$\rangle$ | $\langle$keyEvent *key*$\rangle$
button	$\longrightarrow$	button1 | button2 | button3 | button4 | button5
key	$\longrightarrow$	string containing a key
action	$\longrightarrow$	string name of an action procedure
arg	$\longrightarrow$	string

This command can be used to explicitly invoke the action procedure named action of widget with the string arguments arg. The contents of the event union, which is passed to the action procedure, can be influenced with the *eventInfo* argument. If this argument is empty, an *XAnyEvent* structure is passed to the action. If buttonEvent is specified with a certain button, an *XButtonEvent* structure is passed. This structure contains as the *button* member the specified button, all other members are filled automatically. Alternatively, an *XKeyEvent* structure can be passed with the *keycode* member set according to the specified key.

Please note that this command does not offer all the features of it's Xt counterpart, which is due to the very complex structure of the XEvent union.

removeCallbacks *widget callback*

The command removeCallbacks is used to un-register all callback procedures currently associated with the callback resource callback of widget.

setWMProtocols *widget protocol*

widget	⟶	Name of a widget
protocol	⟶	WM_TAKE_FOCUS | WM_SAVE_YOURSELF | WM_DELETE_WINDOW

Use this command to set the WM_PROTOCOLS property of the specified widget's window (usually a shell widget) to one of the three predefined values.

4.4 Widget specific commands

Besides of the commands which provide the basic functionality, $W_a f^e$ offers widget specific commands – either for reasons of convenience or because some Xt features had to be implemented in a different manner. All of these commands are described in the following sections.

4.4.1 Scrollbar

XawScrollbarSetThumb *scrollbarWidget top shown*

scrollbarWidget	⟶	name of a Scrollbar widget instance
top	⟶	string which contains a float value
shown	⟶	string which contains a float value

This command is not more than a convenience function for accessing the top and shown attributes of a previously created Scrollbar widget. It moves the Scrollbar's thumb to a new position, where *top* specifies the position of the top and *shown* the length of the thumb, both as a fraction of the Scrollbar's total length.

Using this command is saver than using setValues, because setting a float attribute might cause problems on some systems. Note that this command doesn't work if called from a Scrollbar's *jumpProc* callback procedure.

4.4.2 StripChart

The StripChart widget class provides a real time chart of a single value. It's functionality is made accessible by the following command.

scSet *stripChartWidget value*

stripChartWidget	⟶	name of a StripChart widget instance
value	⟶	string, which contains a double value

This command is used to specify a stripChart widget's current value. The widget will plot a graph of this value by querying it every *update* seconds. The *update* resource can be changed with a call to setValues.

4.4.3 List

XawListUnhighlight *listWidget*

listWidget	⟶	name of a previously created List widget

This command unhighlights the highlighted element of a List widget. Only one element can be highlighted at a time, XawListChange unhighlights automatically the active element before performing the change.

XawListHighlight *listWidget index*

index	⟶	string containing an integer value

This command highlights the specified element.

val
XawListShowCurrent *listWidget*

val	$\longrightarrow$	name of a TCL array variable, having the elements list_index and string
*val(*list_index*)*	$\longrightarrow$	string containing an integer value
*val(*string*)*	$\longrightarrow$	string value

Use XawListShowCurrent to get the currently highlighted element and its index. Note that within a callback procedure, you can use the *%i* and *%s* substitution specifiers.

XawListChange *listWidget nitems longest resize type arg*$^+$

listWidget	$\longrightarrow$	name of a previously created List widget
nitems	$\longrightarrow$	string containing a signed int
longest	$\longrightarrow$	string containing a signed int
resize	$\longrightarrow$	1 | 0
type	$\longrightarrow$	Arg | File | List
arg	$\longrightarrow$	string depending on type

Use XawListChange to change the contents of *list*. This command modifies the *list, longest* and *nitems* attributes. If *nitems* or *longest* contain a value less than one, the List widget will calculate the actual value.

The new contents of the *list* widget can be specified in various ways depending on the value of the argument *arg*.

XawListChange *listWidget nitems longest resize* File *filename*

filename	$\longrightarrow$	valid Unix filename string

In this case the new contents of *listWidget* are read from the file *filename* where each line is taken to be one list element. The carriage-returns and line-feeds are discarded!

XawListChange *listWidget nitems longest resize* Arg *element*$^+$

element	$\longrightarrow$	string

Using the Arg type, the elements of the List widget can be specified as arguments to the XawListChange command. Each argument is regarded as one list element.

XawListChange *listWidget nitems longest resize* List *contents*

contents ⟶ TCLlist

When List is specified as contents type, the elements of listWidget are specified in a TCL list. Each element of the TCL list is regarded as one element of the List widget.

If the execution of a TCL command is registered with the callback attribute called *callback*, the current element and it's index can be accessed with the %i and %s substitution codes (see also callback).

The contents of a List widget can also be changed via *setValues*. Be sure that at any time the *numberStrings* resource is set to a value equal or lower to the number of strings in the list. Otherwise the List widget produces an unfriendly core dump.

XawListAppend *listWidget element*$^{+}$

This command can be used to append one or more elements to an existing list. It is no generic Athena command; the array of strings is merely rebuild with the new values appended and afterwards the value of the *list* resource is updated.

The following program creates an instance of the List widget class, reads in the contents of the current directory and sends the name of the chosen file to the application.

The first solution is implemented using the list resource of the List widget:

```
#!/usr/bin/X11/wafe --f
List browse topLevel \
   callback {sV topLevel title "Selected: %s"} \
   list [split [exec /bin/ls -1] \n]
realize
```

The second solution is implemented using XawListChange:

```
#!/usr/bin/X11/wafe --f
List browse topLevel \
   callback {sV topLevel title "Selected: %s"}
XawListChange browse 0 0 1 List [split [exec /bin/ls -1] \n]]
realize
```

Assuming the user selects the file `myprog` *with the pointer, the window title will change to* "You selected: myprog". *Note that* `split` *and* `exec` *are standard* TCL *commands. For further information refer to the* TCL *manual [6].*

4.4.4 Text

One of the most important widget classes is the Text widget class. Note that a great part of Text's functionality can be accessed via actions – if you want them to be triggered by the application rather then by the user, use callActionProc. Note that not all of the functions begin with "XawText", since some of them are made available by Text's subparts. All of these command expect as first argument an instance of the Text widget class (named *textWidget* below).

XawAsciiSaveAsFile *textWidget filename*

> This command saves the contents of *textWidget* to the specified file, regardless whether a file or a string is edited.

result
XawAsciiSave *textWidget*

> *result* ⟶ 1 | 0

> This command writes out the contents of an Text widget of type *file*, given that you made any changes since the last save.

result
XawAsciiSourceChanged *textWidget*

> *result* ⟶ 1 | 0

> Use this function to determine whether the source has changed since the last save.

XawTextSinkSetTabs *textWidget tab**

> *tab* ⟶ string which contains an integer

> Use this command to specify the distances between *Text*'s tabstops. The unit which is used to measure the distance is the width of a figure in the used font.

XawTextSetSelectionArray *textWidget selectType** selectNull

selectType	$\longrightarrow$	selectAll | selectChar | selectLine | selectParagraph | selectPosition | selectWord

This command is used to configure the Text widget's behavior for multi click text-selections. Each *selectType* argument corresponds to one click, the last argument must be selectNull. If an internal timeout value is exceeded, the widget restarts counting.

textPosition
XawTextSearch *textWidget scanDir txt*

textPosition	$\longrightarrow$	string containing a long integer value
scanDir	$\longrightarrow$	left | right
txt	$\longrightarrow$	name of a TCL array variable having the members firstPos, ptr and length
*txt(*firstPos*)*	$\longrightarrow$	string containing an integer value
*txt(*length*)*	$\longrightarrow$	string containing an integer value
*txt(*ptr*)*	$\longrightarrow$	a string

Use XawTextSearch to search in the text displayed by the text widget for the beginning of the specified textBlock. This command returns a value less than 0 upon unsuccessful termination, otherwise the position of the beginning of the searched block.

The following example searches in the text of an Text widget named text *for the word* example *and moves the insertion Point to this location.*

```
set textBlock(ptr) "example"
set textBlock(length) 7
set textBlock(firstPos) 0
textSetInsertPosition text \
   [XawTextSearch text right textBlock]
```

In most cases, when a C-function takes a structure as an argument, we implemented the corresponding *Wafe* command in this style. Usually the members of the TCL array have the same names as the C-language structure members.

read
XawTextSourceRead *textWidget begin txt length*

read	⟶	string containing a long integer value
begin	⟶	string containing a long integer value
length	⟶	string containing an integer value
txt	⟶	name of a TCL variable to be set as result; it will have the following members: firstPos, length and ptr
*txt(*firstPos*)*	⟶	string containing an integer value
*txt(*length*)*	⟶	string containing an integer value
*txt(*ptr*)*	⟶	a string

Use XawTextSourceRead to read the text of the specified widget. It may take several calls to this function to read the requested amount of text; the number of characters actually read is returned and can be compared to the requested number.

found
XawTextSourceScan *textWidget begin boundary direction count include*

found	⟶	string containing a long integer
begin	⟶	string containing a long integer
boundary	⟶	position | whiteSpace | EOL | paragraph | all
direction	⟶	left | right
count	⟶	string containing an integer
include	⟶	true | false

Use this command to search the widget from *begin* on in the specified direction for one of the predefined boundaries.

XawTextInvalidate *textWidget begin end*

begin	⟶	string containing a long integer value
begin	⟶	string containing a long integer value

This function causes the specified range from *begin* to *end* to be redisplayed.

lines
XawTextSinkMaxLines *textWidget height*

lines	$\longrightarrow$	string containing an integer value
height	$\longrightarrow$	string containing a long integer value

This command returns the maximum number of lines that will fit in a window with the specified height.

height
XawTextSinkMaxHeight *textWidget lines*

height	$\longrightarrow$	string containing an integer value
lines	$\longrightarrow$	string containing an integer value

Calculates the height that will taken by the specified number of lines.

XawTextEnableRedisplay *textWidget*

This function flushes any changes due to patched updates.

XawTextDisableRedisplay *textWidget*

To disable redisplay while making several changes use XawTextDisableRedisplay.

XawTextDisplay *textWidget*

This function forces redisplay of all accumulated updates.

topPosition
XawTextTopPosition *textWidget*

topPosition	$\longrightarrow$	a string containing a long integer value

Obtain the character position of the left-most character of the first line displayed.

XawTextSetInsertionPoint *textWidget insertPosition*

insertPosition	⟶	string containing a long integer value

Use this convenience function to set the value of the insertPosition resource.

insertPosition
XawTextGetInsertionPoint *textWidget*

Use this convenience function to get the value of the insertPosition resource.

XawTextDisplayCaret *textWidget trueFalse*

trueFalse	⟶	true | false

This convenience function can be used to modify the value of the displayCaret resource.

textGetSelectionPosition *textWidget beginVar endVar*

beginVar	⟶	name of a TCL variable
endVar	⟶	name of a TCL variable

Use this function to retrieve the text, which is currently selected. It will set the two TCL variables as specified by the arguments. If the values are equal, nothing is currently selected!

XawTextSetSelection *textWidget begin end*

begin	⟶	string containing a long integer value
end	⟶	string containing a long integer value

This function sets the PRIMARY selection buffer from character position *begin* to position *end* and highlights this area.

XawTextUnsetSelection *textWidget*

To unhighlight a previously highlighted text use XawTextUnsetSelection.

result
XawTextReplace *textWidget begin end txt*

result	$\longrightarrow$	editDone | positionError | editError
begin	$\longrightarrow$	string containing a long integer value
end	$\longrightarrow$	string containing a long integer value
txt	$\longrightarrow$	name of a TCL array having the members firstPos, ptr, length
*txt(*firstPos*)*	$\longrightarrow$	string containing an integer value
*txt(*length*)*	$\longrightarrow$	string containing an integer value
*txt(*ptr*)*	$\longrightarrow$	a string

Use this function to replace the text between *start* and *end*.

XawAsciiSourceFreeString *textWidget*

This function frees the memory which is allocated after a getValue command in order to build up the string. Note that this memory is automatically freed with the next getValue call!

4.4.5 Tree

XawTreeForceLayout *treeWidget*

treeWidget	$\longrightarrow$	name of previously created Tree widget instance

This command will force the Tree widget to recalculate its Layout and to arrange its children. If the *autoReconfigure* resource is set to false, this provides an efficient way to layout the tree.

4.4.6 Form

XawFormDoLayout *formWidget doLayout*

formWidget	$\longrightarrow$	name of previously created Form widget instance
doLayout	$\longrightarrow$	1 | 0

When making several changes to the children of a form, it might be desirable to set *doLayout* to 0 until after all changes have been made.

4.4.7 Paned

XawPanedAllowResize *panedChild allow*

panedChild	⟶	name of a Paned widget's child
allow	⟶	1 | 0

Equivalent to changing the *allowResize* constraint resource of the specified child.

XawPanedSetMinMax *panedChild min max*

min	⟶	string containing an integer
max	⟶	string containing an integer

Equivalent to setting the *min* and *max* constraint resources of the specified child.

XawPanedGetMinMax *panedChild minVar maxVar*

minVar	⟶	name of a TCL variable
maxVar	⟶	name of a TCL variable

Equivalent to querying the *min* and *max* constraint resources of the child. The specified TCL variables will be set by the command.

XawPanedSetRefigureMode *panedChild mode*

panedChild	⟶	name of a child widget of a Paned widget
mode	⟶	1 | 0

Use this command to enable and disable automatic recalculation of pane sizes and positions.

num
XawPanedGetNumSub *panedWidget*

num	⟶	string containing an integer value
panedWidget	⟶	name of a previously created Paned widget

This functions returns the number of children. Note that the *Grip* widgets are children of the Paned widget as well!

4.4.8 Toggle

XawToggleChangeRadioGroup *toggleWidget radioGroup*

toggleWidget ⟶ name of a previously created Toggle widget
radioGroup ⟶ name of a previously created Toggle widget | NULL.

Use this command to add *toggleWidget* to an existing radio group (*radio-Group* can be any member widget of this group) or to remove a Toggle from a radio group (by specifying NULL as *radioGroup*.

XawToggleUnsetCurrent *radioGroup*

Use this command to un-set all toggles in the specified radio group.

4.4.9 SimpleMenu

entry
XawSimpleMenuGetActiveEntry *simpleMenuWidget*

entry ⟶ name of an Object
simpleMenuWidget ⟶ name of a previously created SimpleMenu widget

This function returns the name of the currently active Object in the specified SimpleMenu widget

XawSimpleMenuClearActiveEntry *simpleMenuWidget*

This function un-highlights the currently selected entry.

4.5 Communication, Handlers and Events

This section explains, how Wafe's communication mechanism is used to transfer commands and data between Wafe and the application and how it can be modified by handlers. Note that an essential part of this topic is the use of the different command line arguments, which were already described earlier.

4.5.1 The echo command

echo *string*$^+$

string	$\longrightarrow$	character string

Communication with the application is primarily facilitated by the command *echo*. It takes any number of strings as arguments, which are send to the application. In *direct mode* or *file mode*, *echo* will behave just like an ordinary print command, writing its arguments on standard output. (Refer eg to the action command in order to see an example).

4.5.2 Handlers

Handlers offer the possibility to change *Wafe*'s communication mechanism. Normally, three streams are assigned to each application, which are redirected as described in the introduction. The *stdout* stream is echoed to the user, after being searched for commands (beginning with the *prompt-character*), *stderr* is merged with *Wafe*'s *stderr* and afterwards echoed to the user and the application's *stdin* is normally used to receive inputs of the frontend. An application running in *input mode* will furthermore receive the typed input from the associated terminal.

This standard configuration can be changed by command line arguments and by using handlers. The latter provide a mean to register a certain command with *Wafe*, which is to be executed whenever input is pending on the specified stream. The use of handlers is facilitated by the following commands.

register *source command*

source	$\longrightarrow$	stdin | stdout | stderr | xioerr | term | quit | int | hup | pipe | usr1 | usr2
command	$\longrightarrow$	valid *Wafe* command string

Use this command to install handler procedures, which are invoked under different conditions, as specified by the argument *source*.

By specifying stdin, stdout or stderr as first argument, *command* will be executed whenever data is pending on the corresponding stream. Before executing the command, *Wafe* will update a global TCL variable called STDIN, STDOUT or STDERR according to the handler registered, which will contain the pending data. Note that stdout and stderr are named as they are seen in frontend mode from an application running as an subprocess of *Wafe*. If the application writes to stdout or stderr the corresponding handler will be activated. If the frontend accepts an additional input from the terminal, a stdin handler can be registered.

The stdout handler is activated, when W_af^e is used in prompt mode, and W_af^e receives a buffer on the channel connected with stdout of the subprocess that does not start with the prompt character. This type of handler is typically used when W_af^e is used as a frontend. The following example shows the behaviour of this handler.

```
wafe --d
%echo hi there!
hi there!
%register stdout {echo you typed <$STDOUT>}
asdadasd
you typed <asdadasd
>
%quit
```

The stdin handler is has to be explicitely turned on by the `--i` command line option. Was this argument given, W_af^e will start listing at stdin and echo per default the incoming data to the client application (or to stdout if not running in frontend mode). Using the register command a TCL handler can be specified.

The stderr handler can be only used in frontend mode an listens to the client programs stderr output. Note that the registration of a handler procedure can change W_af^e's standard behavior: Registering an error-handler means that no error messages of the application will be echoed to the user's terminal.

W_af^e allows XIO errors to be caught by using the constant xioerr as first argument to the register command. Note that this is a fatal error condition and that W_af^e will anyway try to kill the application program before exiting afterwards. This type of handler procedure facilitates therefore cleanup operations.

The remaining handler types refer to signal for which handler can be specified as TCL commands. For signal handlers it is also possible to specify *IGNORE* or *DEFAULT* in the command string which cause either to ignore a signal completely or to default to the standard system action (i.e. not using any W_af^e specific signal handler). The command kill (see short reference guide in appendix A on page 48) support the same signal types.

unregister *source*

source $\longrightarrow$ stdin | stdout | stderr | xioerr | term | quit | int | hup | pipe | usr1 | usr2

This command is used to unregister the corresponding handler, which means that the default handler will be reinstalled.

Note that a handler procedure is called several times if the message consists of more than one line (Lines are separated by carriage returns). If more than one handler for the same input source is registered, the most recently created one will be used.

> *Assuming that the application consists of an Text widget named* `text`*, the following code will popup a warning shell, whenever an error occurs in the application (Wafe operates in frontend mode).*
>
> ```
> TransientShell errorShell text
> Command errorMessage errorShell \
>     callback {popdown errorShell} \
>     background red
> callback errorShell popupCallback positionCursor 20
>
> register STDERR {
>     sV error label $STDERR
>     popup errorShell exclusive
> }
> ```
>
> *Whenever the application writes something on stderr, the popupshell will pop up – positioned under the cursor – and display the error. Note that the error is displayed in a Command widget, which means that the shell can be dismissed by a button click.*

inputID
addInput *fileno handlerType tclVariable tclCommand*

inputID	⟶	handle, can be used to remove the input handler
handlerType	⟶	read, write, except or none

This command can be used to add additional input handlers or exception handlers. If used with read as 2nd argument, each time when data is ready the data is read and APPENDED to the specified *tclVariable* and *tclCommand* is executed. addInput returns an *inputId*.

Note that the ammount of data read might depend on the buffering of the operating system. If only the newly read data should be kept in the TclVariable, TclCommand should set it empty after processing its contents.

If fileno corresponds to an open file, a busy loop is likely to occur (see wafe/src/tcl/addInput.tcl for an example).

As shipped, 16 additional input handlers can be added by the application program. Increasing this number needs recompilation.

removeInput *inputID*

removes an input added by addInput. inputId is returned from addInput.

integer
fileno *tclFile readOrWrite*

readOrWrite	⟶	read or write

The function fileno returns for the file opened by using TCL's open command the file descriptor. For pipes the file descriptor might be different for reading or writing.

4.5.3 The additional communication channel

Wafe provides an additional facility which is used mostly to transfer large amounts of data from the application to the front end (eg the contents of an Text widget). When the application process is started, *Wafe* creates an additional socket-based communication channel. The following commands provide access to this feature.

fd
getChannel

fd	⟶	string containing an integer value

This command returns the file descriptor to be used by the application, which is under UNIX a small integer referring to an open file. Note that this way of communication can only be used if the application is able to write directly to a file descriptor. This way how to achieve this depends on the particular interpreter or compiler of the application programming language. So before the additional communication channel is used, the file descriptor should be queried and the information be sent to the application.

setCommunicationVariable *varName length command*

varName	⟶	Valid TCL variable name
length	⟶	string containing an integer value
command	⟶	valid TCL command string

Use the command setCommunicationVariable to make the transferred data availaible for the user interface. As soon as the data with *length* number of bytes is received, *Wafe* will create the TCL variable *varName*, which will contain the transferred data, and execute *command*. If the variable allready exists, the previous contents will be deleted. Note that this command does not depend on the data being allready availaible – if the transfer is complete, *command* will be executed immediately, if *length* bytes of data are not yet received, the execution is delayed until the transfer is complete.

4.5.4 Suspending/delaying Execution in $W_a f^e$, Event Processing

$W_a f^e$ provides a simple means for suspending/delaying execution and synchronizing the handling of events via the procedure waitForVariable.

waitForVariable *varName*

varName ⟶ Valid TCL variable name

This command can be used to "wait" in a TCL command until a TCL-variable is set (eg from a callback or action routine). waitForVariable is commonly used for synchronization tasks.

In a first step, waitForVariable unsets the specified GLOBAL TCL variable and enters a new event loop. This "inner" event loop will be left, when the specified variable is set. The return value of waitForVariable is the value of the specified variable.

For example, in a sequence

```
cmd1; waitForVariable x; cmd2; ...
```

$W_a f^e$ suspends until the TCL variable `x` is set (eg. via callback procedures, actions or handlers). When the variable `x` is set, the $W_a f^e$ commands `cmd2` is executed.

processPendingEvents

The command processPendingEvents can be used within in a TCL procedure to process all pending events and to continue later in the same point; for example, this can be useful for refreshing the screen while computing heavily in TCL. Another application area for this command is wafeperl/mofeperl where the use can force screen refresh etc. while computing in Perl.

Note, that also callback or actions procedures might be triggered by processPendingEvents, which might issue arbitrary $W_a f^e$ commands and alter global variables etc.

4.5.5 Communicating from an Application Program to $W_a f^e$

If $W_a f^e$ is used as a frontend, lines which are starting with the prompt character (usually "%") printed to stdout from an application program are interpeted as $W_a f^e$ (TCL) commands. Therefore, the remainder of these lines must be valid TCL statements, using the appropriate quoting and escaping of literals.

In certain cases, the interpretation of the commands is undesired. Uninterpreted data transfer can be achieved using the communication channel explained above. However, for certain interpreted programming languages, writing to the communication channel hard to achieve, or complicated. *Wafe* provides starting with version 0.95 means for uninterpreted assignment from client applications to TCL variables.

If the application program running under *Wafe* writes

```
%=myvar This will become the contents of myvar
```

to stdout, the TCL variable **myvar** is set to the string starting with 'This' and ending with 'myvar'.

The uninterpeted assignment works as follows:

- If the first character after '%' (or the character provided via the --c option) is '=', the next space terminated token is used as a variable name, and the remainder of the line is assigned to the named TCL variable.
- If the character after the '%' is a '+' followed by a space terminated token for the variable name, then the remainder is appended to the specified variable.
- If the character after the '%' is a '\' followed by a space terminated token for the variable name, then the remainder and a newline character are appended to the specified variable.
- If the character after the '%' is a '/' followed by a space terminated token for the variable name, then a newline character and the remainder of the line to the specified variable.

Using this mechanism, "virtual files" can be implemented, which write into TCL variables. An *"open"* command clears the specified variable, a *"write"* command appends to it, a *"newline"* command appends a newline and the *"close"* command just flushes stdout.

4.6 The selection mechanism

X defines an inter-program communication protocol (called ICCCM), which allows X-window based applications to exchange data. This facility is best known when text data is exchanged with the cut-and-paste mechanism. *Wafe* provides simplified access to the exchange of text selections with the following three commands.

Boolean
ownSelection *selection* ⟨NULL | *lostCom*⟩ ⟨NULL | *doneCom*⟩

selection	⟶	character string
lostCom	⟶	valid *Wafe* command string
doneCom	⟶	valid *Wafe* command string

Use the command ownSelection to claim ownership of the *PRIMARY* selection. The specified string *selection* will be placed in the buffer and be available for other applications. This means it can be "pasted" in a window of an application supporting this communication protocol.

This command takes two additional arguments, both of them valid *Wafe*-commands. By specifying *lostCom*, a command can be registered, which will be executed when the application looses ownership of the *PRIMARY* buffer. If *doneCom* is specified, the registered command will be evaluated whenever the selection transfer process is complete (which normally means a paste action). Specify the constant NULL if you do not want to use this feature.

getSelectionValue *selHandler*

selHandler	⟶	valid *Wafe* command string

This command is the counterpart of ownSelection, it is used to retrieve the current contents of the *PRIMARY* buffer. The registered command string will be ececuted as soon as the selection data is availaible. The global TCL variable PRIMARY will be set to pass the requested information. This command can only be used if the application is realized!

disownSelection

This command can be used if the application explicitly wants to disclaim its ownership of the *PRIMARY* buffer. Note that the application automatically looses the ownership, whenever an other application claims to be the owner.

A command registered with getSelectionValue will be invoked with an empty string if no data is currently selected. Execution will not be postponed until selection data is availaible! The selection mechanism shall be illustrated by the following example.

The following Wafe-script displays the current value of the primary selection buffer using the label of a Command widget and allows the user to

- *set the selection buffer (Btn1) to the value of the label (eg. the user has slected in the meantime another content, and wants to set the selection buffer to the old value of the label),*
- *read again the selection buffer, set the label to the new value (Btn2) and to highlight the widget, while the button is pressed (this is achieved by the command widget action* `set()`*, or to*
- *quit the program (Btn3).*

```
#!/usr/bin/X11/wafe --f
sV topLevel allowShellResize true
Command sel topLevel

action sel override  {<Btn1Down>: \
     exec(ownSelection [gV sel label]) set()}
action sel override  {<Btn2Down>: \
     exec(getSelectionValue {sV sel label $PRIMARY})}
action sel override  {<Btn3Down>: exec(quit)}

realize
getSelectionValue {sV sel label $PRIMARY}
```

At startup, the program shows whatever is selected at this moment. The user can make this text again the PRIMARY selection just by pressing the left pointer button within the window. The application is terminated by pressing the right button.

Beside of those commands, which are the counterparts of the highlevel Xt functions, *Wafe* offers also some of the lower level Xlib functions. They can be used to modify the *primary* selection buffer as well as the seven *cut buffers*.

convertSelection *widget targetBuffer*

widget	⟶	widget to determine display
targetBuffer	⟶	0 | 1 | 2 | 3 | 4 | 5 | 6

Use convertSelection to request the current value of the *primary* selection and place it in cut buffer *targetBuffer* for further use.

selection
fetchBuffer *widget cutBuffer*

selection	⟶	string value
widget	⟶	widget to determine display
cutBuffer	⟶	0 | 1 | 2 | 3 | 4 | 5 | 6

Use this function to retrieve the value of the specified cut buffer.

selection
fetchBytes *widget*

selection	⟶	string value
widget	⟶	widget to determine display

Convenience function, which calls convertSelection and fetchBuffer. The value of the *primary* selection is returned. Note that the contents of cut-buffer-0 will get lost!

storeBuffer *widget value cutBuffer*

widget	⟶	widget to determine display
value	⟶	string value
cutBuffer	⟶	0 | 1 | 2 | 3 | 4 | 5 | 6

Use storeBuffer to make *value* the content of the specified cut buffer.

4.7 Integration of the XPM image format

Wafe offers two commands, which provide – together with Arnaud Le Hors *xpm* library – a mean to include multicolored images in your application (For details please refer to the xpm documentation [2]).

First of all, a new string-to-pixmap converter was registered. Note that most of the attributes which currently use bitmaps (eg the resource *bitmap* of the Label widget) are actually of type *Pixmap*. If a bitmap is specified, it is rendered using the *foreground* and *background* colors, which are specified as seperate resources. The new converter procedure first attempts to convert the specified filename into a bitmap, using the standard Xt algorithm. If this conversion fails, it tries to interprete the file as an *xpm* image.

> *Assuming that wafe.xpm is a file in valid xpm format located in the current directory, the following* Wafe*-script will generate an instance of the Label widget class showing the image.*

```
#!/usr/bin/X11/wafe --f
Label image topLevel bitmap wafe.xpm
realize
```

Please note that this conversion allocates color cells, which won't be freed until the application terminates. The allocated resources are managed by Xt's caching mechanism, which means that a pixmap which is converted once, will be availaible for the application's lifetime. Furthermore, if the pixmap file is not located in the current directory, the filename has to be specified with an absolute path.

changePixmap *widget attribute filename*

attribute	⟶	an attribute of type *Pixmap*
filename	⟶	UNIX filename string | None

Use changePixmap to set a resource of type *Pixmap* to the specified image. Obviously, you could achieve the same result by using the following command

setValues *widget attribute filename*

The main difference is that changePixmap keeps track of converted pixmaps. A pixmap can be released by setting the attribute to another pixmap or to one of the following values: None, ParentRelative, or Unspecified. If there are no references to a pixmap, all resources (allocated memory as well as color cells) of the pixmap are released. So it is up to you wether you want the benefits of Xt's caching mechanism or wether you prefer having the color cells again availaible.

setIconPixmap *widget filename*

widget	⟶	name of a shell widget
filename	⟶	UNIX filename string

This command can be used to generate a multicolor XPM-icon for the specified shell widget. If clip-mask information is available it will be used correctly.

A Short Reference

A.1 Tookit Widgets and Commands

f **addTimeOut** .... *XtAppAddTimeOut*

Arguments:	time interval in ms, tcl command
Return value:	XtIntervalId

f **action** ....

Arguments:	widget, override | augment | replace, translatontable
Return value:	void

w **ApplicationShell** ....

f **bell** .... *XBell*

Arguments:	widget to determine display, percent (-100 = off, 0 .. 100)
Return value:	void

f **callActionProc** ....

Arguments:	widget, event type, action, args
Return value:	void

f **callCallbacks** ....

Arguments:	widget, callback, optional float and value
Return value:	void

f **callback** .... *wafeCallbackCmd*

Arguments:	widget, callback resource, none | exclusive | nonexclusive | popdown | position | positionCursor, string
Return value:	void

f **combineFileDatabase** ....

Arguments:	filename, widget to determine database, override
Return value:	Status

f **destroyWidget** .... *XtDestroyWidget*

Arguments:	widgets
Return value:	void

f **fallbackResources** ....

Arguments:	widget to determine database, resource value pairs
Return value:	void

f **fontHeight** ....

Arguments:	Widget, fontResource
Return value:	int

f **flush** .... *XFlush*

Arguments:	Widget to determine display
Return value:	void

f **getApplicationResource** ....

Arguments:	base widget, resource name, resource class
Return value:	String

f **getClass** ....

Arguments:	widget | None
Return value:	String

f **getResourceList** ....

Arguments:	widget, variable name for output of reslist
Return value:	int

f **getTypeOfAttribute** .... *wafeGetQTypeOfAttribute*

Arguments:	widget, attribute
Return value:	String

f **getValue** ....

Arguments:	widget, attribute
Return value:	String

f **grabPointer** .... *XtGrabPointer*

Arguments:	widget, true | false, pointer mode (sync | async), keyboard mode (sync | async), None | confine widget
Return value:	int

f **grabKeyboard** .... *XtGrabKeyboard*

Arguments:	widget, true | false, pointer mode (sync | async), keyboard mode (sync | async)
Return value:	int

f **heightOfScreen** .... *HeightOfScreen*

Arguments:	widget to determine screen
Return value:	int

f **installAccelerators** .... *XtInstallAccelerators*

Arguments:	destination, source
Return value:	void

f **installAllAccelerators** .... *XtInstallAllAccelerators*

Arguments:	destination, source
Return value:	void

f **isWidget** *name2WidgetId*

Arguments:	widget name
Return value:	WidgetID

w **Layout** ....

f **lowerWindow** .... *XLowerWindow*

Arguments:	Widget to be lowered
Return value:	void

f **manageChild** .... *XtManageChildren*

Arguments:	widgets
Return value:	void

f **mapWidget** .... *XtMapWidget*

Arguments:	widgets
Return value:	void

f **mergeResources** ....

Arguments:	widget to determine database, resource value pairs
Return value:	void

f **nameToWidget** .... *XtNameToWidget*

Arguments:	reference widget, partial widget name path
Return value:	WidgetID

w **OverrideShell** ....

f **parent** .... *ParentWidget*

Arguments:	child widget
Return value:	WidgetID

f **popdown** .... *XtPopdown*

Arguments:	shell widget
Return value:	void

f **popup** .... *XtPopup*

Arguments:	widget, none | nonexclusive | exclusive
Return value:	void

f **popupChildren** ....

Arguments:
Return value: String

f **popupSpringLoaded** .... *XtPopupSpringLoaded*

Arguments: shell widget
Return value: void

f **processPendingEvents** ....

Arguments:
Return value: void

f **raiseWindow** .... *XRaiseWindow*

Arguments: widget to be raised
Return value: void

f **realize** .... *realizeWidgets*

Arguments:
Return value: void

f **realizeWidget** .... *XtRealizeWidget*

Arguments: widgets
Return value: void

f **removeAllCallbacks** .... *XtRemoveAllCallbacks*

Arguments: widget, callback name
Return value: void

f **removeTimeOut** .... *XtRemoveTimeOut*

Arguments: interval ID
Return value: void

f **resolvePathname** .... *XtResolvePathname*

Arguments: Type, File, Suffix, Path, Substitutions, Number of Substitutions, XtFilePredicate
Return value: String

f **setBusy** ....

Arguments: shell widget, sensitive true | false
Return value: void

f **setKeyboardFocus** .... *XtSetKeyboardFocus*

Arguments: from widget tree, to widget | None
Return value: void

f **setSensitive** .... *XtSetSensitive*

Arguments:	widget, sensitive true | false
Return value:	void

f **setValues** ....

Arguments:	widget, resource value pairs
Return value:	void

f **setWMProtocols** .... *XSetWMProtocols*

Arguments:	Shell Widget, WM_TAKE_FOCUS | WM_SAVE_YOURSELF | WM_DELETE_WINDOW
Return value:	Boolean

f **sync** .... *XSync*

Arguments:	Widget to determine display, Discard (Boolean)
Return value:	void

f **textWidth** ....

Arguments:	Widget, fontResource, String
Return value:	int

w **TopLevelShell** ....

w **TransientShell** ....

f **translateCoords** .... *XtTranslateCoords*

Arguments:	widget, widget x, widget y, variable name for root x, variable name for root y
Return value:	void

f **ungrabPointer** .... *XtUngrabPointer*

Arguments:	widget with active pointer grab
Return value:	void

f **ungrabKeyboard** .... *XtUngrabKeyboard*

Arguments:	widget with active keyboard grab
Return value:	void

f **unmanageChild** .... *XtUnmanageChildren*

Arguments:	widgets
Return value:	void

f **unmapWidget** .... *XtUnmapWidget*

Arguments:	widgets

Return value: void

f **unrealizeWidget** .... *XtUnrealizeWidget*

Arguments: widgets
Return value: void

f **waitForVariable** ....

Arguments: variable Name
Return value: String

f **widgetId**
alias; for arguments see: *waitForVariable*

f **widgetName** *name2WidgetId*

Arguments: widget name
Return value: Widget

f **widthOfScreen** .... *WidthOfScreen*

Arguments: widget to determine screen
Return value: int

f **window** .... *XtWindow*

Arguments: widget whose window you want
Return value: long

f **disownSelection** .... *XtDisownSelection*

Arguments:
Return value: void

f **getSelectionValue** .... *XtGetSelectionValue*

Arguments: Tcl command
Return value: void

f **ownSelection** .... *wafeOwnSelectionCmd*

Arguments: string to be put into selection, NULL | loseSelection TCL-command, NULL | doneSelection TCL-command
Return value: Boolean

f **fetchBytes** .... *XFetchBytes*

Arguments: widget to determine display
Return value: String

f **convertSelection** .... *XConvertSelection*

Arguments: widget to determine display, target buffer number

Return value: void

f **storeBuffer** .... *XStoreBuffer*

Arguments: widget to determine display, String, buffer number (1-7)
Return value: void

f **fetchBuffer** .... *XFetchBuffer*

Arguments: widget to determine display, buffer number (1-7)
Return value: String

f **sV**
alias; for arguments see: *XFetchBuffer*

f **gV**
alias; for arguments see: *XFetchBuffer*

f **setIconPixmap** ....

Arguments: Shell Widget (eg topLevel), pixmap file
Return value: void

f **changePixmap** ....

Arguments: widget, resource, pixmap file
Return value: void

f **hooksOfDisplay** .... *XtHooksOfDisplay*

Arguments: widget to determine display
Return value: WidgetID

f **mapState** ....

Arguments:
Return value: MapState

f **addWorkProc** .... *XtAppAddWorkProc*

Arguments: tcl command
Return value: XtWorkProcId

f **removeWorkProc** .... *XtRemoveWorkProc*

Arguments: work proc ID
Return value: void

A.2 Athena Widgets and Commands

w **Text** . . . .

f **XawAsciiSave** . . . .

Arguments:	ascii text wiget
Return value:	Boolean

f **XawAsciiSaveAsFile** . . . .

Arguments:	ascii text wiget, file name
Return value:	int

f **XawAsciiSourceChanged** . . . .

Arguments:	ascii text wiget
Return value:	Boolean

f **XawAsciiSourceFreeString** . . . .

Arguments:	ascii text wiget
Return value:	void

w **Box** . . . .

w **Clock** . . . .

w **Command** . . . .

w **Dialog** . . . .

f **XawDialogGetValueString** . . . .

Arguments:	dialog widget
Return value:	String

w **Form** . . . .

f **XawFormDoLayout** . . . .

Arguments:	form widget, boolean
Return value:	void

w **Grip** . . . .

w **Label** . . . .

w **List** . . . .

c **callback**	%i	index
c **callback**	%s	selection

f **XawListAppend** .... *listAppend*

Arguments: list widget, items
Return value: void

f **XawListChange** .... *listChange*

Arguments: list widget, number of items, longest, resize, Arg items | File filename
Return value: void

f **XawListHighlight** ....

Arguments: list widget, item number
Return value: void

f **XawListShowCurrent** ....

Arguments: list widget
Return value: XawListReturnStruct *

f **XawListUnhighlight** ....

Arguments: list widget
Return value: void

w **Logo** ....

w **Mailbox** ....

w **MenuButton** ....

w **Paned** ....

f **XawPanedAllowResize** ....

Arguments: paned widget, boolean
Return value: void

f **XawPanedGetMinMax** ....

Arguments: paned widget, min, max
Return value: void

f **XawPanedGetNumSub** ....

Arguments: paned widget
Return value: int

f **XawPanedSetMinMax** ....

Arguments: paned widget, min, max
Return value: void

f **XawPanedSetRefigureMode** ....

Arguments:	paned widget, boolean
Return value:	void

w **Scrollbar** ....

c **scrollProc**	%p	position of thumb (in pixel)
c **jumpProc**	%p	floating position (0.0-1.0)

f **XawScrollbarSetThumb** ....

Arguments:	scrollbar widget, top, shown
Return value:	void

f **scSet**
alias; for arguments see: *XawScrollbarSetThumb*

w **SimpleMenu** ....

f **XawSimpleMenuClearActiveEntry** ....

Arguments:	widget
Return value:	void

f **XawSimpleMenuGetActiveEntry** ....

Arguments:	widget
Return value:	WidgetID

w **Sme** ....

w **SmeBSB** ....

w **SmeLine** ....

w **StripChart** ....

f **XawStripChartSet** ....*stripChartSet*

Arguments:	strip chart widget, value
Return value:	void

f **XawTextDisableRedisplay** ....

Arguments:	ascii text wiget
Return value:	void

f **XawTextDisplay** ....

Arguments:	ascii text wiget
Return value:	void

f **XawTextDisplayCaret** ....

Arguments:	ascii text wiget, boolean

Return value: void

f **XawTextEnableRedisplay** . . . .

Arguments: ascii text wiget
Return value: void

f **XawTextGetInsertionPoint** . . . .

Arguments: ascii text wiget
Return value: XawTextPosition

f **XawTextGetSelectionPos** . . . .

Arguments: ascii text wiget, varname for from position, varname for to position
Return value: void

f **XawTextInvalidate** . . . .

Arguments: ascii text wiget, from postion, to postion
Return value: void

f **XawTextSearch** . . . .

Arguments: ascii text wiget, scan direction, text block
Return value: XawTextPosition

f **XawTextSetInsertionPoint** . . . .

Arguments: ascii text wiget, position
Return value: void

f **XawTextSetSelection** . . . .

Arguments: ascii text wiget, from position, to position
Return value: void

f **XawTextSetSelectionArray** . . . .

Arguments: ascii text wiget, selction array
Return value: void

f **XawTextSinkMaxHeight** . . . .

Arguments: ascii text wiget, height
Return value: int

f **XawTextSinkMaxLines** . . . .

Arguments: ascii text wiget, height
Return value: int

f **XawTextSinkSetTabs** . . . .

Arguments:	ascii text wiget, tabs
Return value:	void

f **XawTextSourceRead** ....

Arguments:	ascii text wiget, position, varname for text block, length
Return value:	XawTextPosition

f **XawTextSourceScan** ....

Arguments:	ascii text wiget, position, scan type, scan direction, count, include (boolean)
Return value:	XawTextPosition

f **XawTextTopPosition** ....

Arguments:	ascii text wiget
Return value:	XawTextPosition

f **XawTextReplace** ....

Arguments:	ascii text wiget, from position, to position, text block
Return value:	int

f **XawTextUnsetSelection** ....

Arguments:	ascii text wiget
Return value:	void

w **Toggle** ....

f **XawToggleChangeRadioGroup** ....

Arguments:	toggle widget, NULL | toggle widget
Return value:	void

f **XawToggleGetCurrent** ....

Arguments:	toggle widget
Return value:	String

f **XawToggleSetCurrent** ....

Arguments:	toggle widget, radio data
Return value:	void

f **XawToggleSetRadioData** .... *toggleSetRadioData*

Arguments:	toggle widget, radio data
Return value:	void

f **XawToggleUnsetCurrent** ....

Arguments:	toggle widget

Return value: void

w **Viewport** ....

f **XawViewportSetCoordinates** ....

Arguments: viewport Widget, x position, y position
Return value: void

f **XawViewportSetLocation** ....

Arguments: viewport Widget, xoffset, yoffset
Return value: void

A.3 Athena R5 Widgets and Commands

w **Panner** ....

w **Porthole** ....

w **Repeater** ....

f **XawTalk** ....

Arguments: panner, porthole, managed widget
Return value: void

w **Repeater** ....

w **Tree** ....

f **XawTreeForceLayout** ....

Arguments: tree Widget
Return value: void

A.4 Motif 1.1 Widgets and Commands

f **XmProcessTraversal** ....

Arguments: Widget for which to traverse hierarchy, direction in which to traverse widget hierarchy
Return value: Boolean

f **XmAddTabGroup** ....

Arguments: widget to be added
Return value: void

w **XmArrowButton** ....

c **activateCallback** %c click count

w **XmArrowButtonGadget** . . . .

c **activateCallback** %c click count

w **XmBulletinBoard** . . . .

w **XmBulletinBoardDialog** . . . . *XmCreateBulletinBoardDialog*
for callbacks and functions see: *XmBulletinBoard*

w **XmCascadeButton** . . . .

w **XmCascadeButtonGadget** . . . .

f **XmCascadeButtonGadgetHighlight** . . . .

Arguments: cascadeButtonGadget to be highlighted, highlight (bool)
Return value: void

f **XmCascadeButtonHighlight** . . . .

Arguments: widget to be highlighted, highlight (bool)
Return value: void

w **XmCommand** . . . .

c **commandChangedCallback**
commandEnteredCallback %s command string

f **XmCommandAppendValue** . . . .

Arguments: command widget, command string
Return value: void

f **XmCommandError** . . . .

Arguments: command widget, error message
Return value: void

f **XmCommandGetChild** . . . .

Arguments: command widget, child reference
Return value: WidgetID

w **XmDialogShell** . . . .

w **XmDrawingArea** . . . .

c **exposeCallback**
inputCallback
resizeCallback %w window

w **XmDrawnButton** . . . .

c **activateCallback** %c click count

c **exposeCallback**
resizeCallback %w window

w **XmFileSelectionBox** . . . .

c **okCallback**
noMatchCallback
applyCallback %d base directory

c **okCallback**
noMatchCallback
applyCallback %p search pattern

c **okCallback**
noMatchCallback
applyCallback %m value of dirMask

c **okCallback**
noMatchCallback
applyCallback %s value of dirSpec

f **XmFileSelectionBoxGetChild** . . . .

Arguments: file selection box widget, child reference
Return value: WidgetID

w **XmFileSelectionDialog** . . . . *XmCreateFileSelectionDialog*
for callbacks and functions see: *XmFileSelectionBox*

f **XmFileSelectionDoSearch** . . . .

Arguments: file selection box, directory mask
Return value: void

w **XmForm** . . . .

w **XmFormDialog** . . . . *XmCreateFormDialog*
for callbacks and functions see: *XmForm*

w **XmFrame** . . . .

w **XmInformationDialog** . . . . *XmCreateInformationDialog*
for callbacks and functions see: *XmMessageBox*

w **XmLabel** . . . .

w **XmLabelGadget** . . . .

w **XmList** . . . .

c **browseSelectionCallback** **defaultActionCallback** **singleSelectionCallback**	%s	selected item
c **browseSelectionCallback** **defaultActionCallback** **singleSelectionCallback**	%p	item position
c **extendedSelectionCallback** **multipleSelectionCallback**	%S	selected items
c **extendedSelectionCallback** **multipleSelectionCallback**	%P	selected item positions
c **browseSelectionCallback** **defaultActionCallback** **extendedSelectionCallback** **multipleSelectionCallback** **singleSelectionCallback**	%t	selection type

f **XmListAddItem** ....

Arguments: List Widget, Item to add, Position
Return value: void

f **XmListAddItems** ....

Arguments: List Widget, items, number of items, position
Return value: void

f **XmListAddItemUnselected** ....

Arguments: List Widget, Item to add, Position
Return value: void

f **XmListDeleteAllItems** ....

Arguments: List Widget
Return value: void

f **XmListDeleteItem** ....

Arguments: List Widget, Item to delete
Return value: void

f **XmListDeleteItems** ....

Arguments: List Widget, items, number of items
Return value: void

f **XmListDeleteItemsPos** ....

Arguments:	List Widget, number of items, position of first item to be deleted
Return value:	void

f **XmListDeletePos** ....

Arguments:	List Widget, position of item
Return value:	void

f **XmListDeselectAllItems** ....

Arguments:	List Widget
Return value:	void

f **XmListDeselectItem** ....

Arguments:	List Widget, item
Return value:	void

f **XmListDeselectPos** ....

Arguments:	List Widget, position of item
Return value:	void

f **XmListGetMatchPos** ....

Arguments:	List Widget, item, list of positions
Return value:	Boolean

f **XmListGetSelectedPos** ....

Arguments:	List Widget, list of highlighted items
Return value:	Boolean

f **XmListItemExists** ....

Arguments:	List Widget, Item
Return value:	Boolean

f **XmListItemPos** ....

Arguments:	List Widget, Item
Return value:	int

f **XmListReplaceItems** ....

Arguments:	List Widget, Items to be replaced, number of items to be replaced, new items
Return value:	void

f **XmListReplaceItemsPos** ....

Arguments:	List Widget, New items, number of items to be replaced, first Pos of items to be replaced

Return value: void

f **XmListSelectItem** ....

Arguments: List Widget, item to highlight, Invoke callback yes/no
Return value: void

f **XmListSelectPos** ....

Arguments: List Widget, Position of item, Invoke callback yes/no
Return value: void

f **XmListSetAddMode** ....

Arguments: List Widget, Use Add Mode yes/no
Return value: void

f **XmListSetBottomItem** ....

Arguments: List Widget, item to be displayed as last item
Return value: void

f **XmListSetBottomPos** ....

Arguments: List Widget, item to be displayed as last item
Return value: void

f **XmListSetHorizPos** ....

Arguments: List Widget, horizontal Position
Return value: void

f **XmListSetItem** ....

Arguments: List Widget, item
Return value: void

f **XmListSetPos** ....

Arguments: List Widget, Position
Return value: void

w **XmMainWindow** ....

f **XmMainWindowSetAreas** ....

Arguments: main window widget, menu bar widget, command window widget, horizontal scrollbar widget, vertical scrollbar widget, work region widget
Return value: void

w **XmMenuBar** .... *XmCreateMenuBar*
for callbacks and functions see: *XmRowColumn*

w **XmMenuShell** . . . .

w **XmMessageBox** . . . .

f **XmMessageBoxGetChild** . . . .

Arguments: message box widget, child reference
Return value: WidgetID

w **XmMessageDialog** . . . . *XmCreateMessageDialog*
for callbacks and functions see: *XmMessageBox*

w **XmOptionMenu** . . . . *XmCreateOptionMenu*
for callbacks and functions see: *XmRowColumn*

w **XmPanedWindow** . . . .

w **XmPopupMenu** . . . . *XmCreatePopupMenu*
for callbacks and functions see: *XmRowColumn*

w **XmPromptDialog** . . . . *XmCreatePromptDialog*
for callbacks and functions see: *XmSelectionBox*

w **XmPulldownMenu** . . . . *XmCreatePulldownMenu*
for callbacks and functions see: *XmRowColumn*

w **XmPushButton** . . . .

c **activateCallback** %c click count

w **XmPushButtonGadget** . . . .

c **activateCallback** %c click count

w **XmQuestionDialog** . . . . *XmCreateQuestionDialog*
for callbacks and functions see: *XmMessageBox*

w **XmRadioBox** . . . . *XmCreateRadioBox*
for callbacks and functions see: *XmRowColumn*

w **XmRowColumn** . . . .

w **XmScale** . . . .

c **dragCallback**
valueChangedCallback %v value

w **XmScrollBar** . . . .

c **toBottomCallback**
toTopCallback %p pixel

c **decrementCallback**

dragCallback
incrementCallback
pageDecrementCallback
pageIncrementCallback
toBottomCallback
toTopCallback
valueChangedCallback %v value

f **XmScrollBarGetValues** . . . .

Arguments:	scrollbar widget, value (slider position), slider size, increment (smallest movement), page increment
Return value:	void

f **XmScrollBarSetValues** . . . .

Arguments:	scrollbar widget, value (slider position), slider size, increment (smallest movement), page increment, notify
Return value:	void

w **XmScrolledList** . . . . *XmCreateScrolledList*
for callbacks and functions see: *XmList*

w **XmScrolledText** . . . . *XmCreateScrolledText*
for callbacks and functions see: *XmText*

w **XmScrolledWindow** . . . .

w **XmSelectionBox** . . . .

c **applyCallback**
noMatchCallback
okCallback %s value

f **XmSelectionBoxGetChild** . . . .

Arguments:	selection box widget, child reference
Return value:	WidgetID

w **XmSelectionDialog** . . . . *XmCreateSelectionDialog*
for callbacks and functions see: *XmSelectionBox*

w **XmSeparator** . . . .

w **XmSeparatorGadget** . . . .

w **XmSimpleCheckBox** . . . . *XmCreateSimpleCheckBox*
for callbacks and functions see: *XmRowColumn*

w **XmSimpleMenuBar** . . . . *XmCreateSimpleMenuBar*
for callbacks and functions see: *XmRowColumn*

w **XmSimpleOptionMenu** .... *XmCreateSimpleOptionMenu*
for callbacks and functions see: *XmRowColumn*

w **XmSimplePopupMenu** .... *XmCreateSimplePopupMenu*
for callbacks and functions see: *XmRowColumn*

w **XmSimplePulldownMenu** .... *XmCreateSimplePulldownMenu*
for callbacks and functions see: *XmRowColumn*

w **XmSimpleRadioBox** .... *XmCreateSimpleRadioBox*
for callbacks and functions see: *XmRowColumn*

w **XmText** ....

c **losingFocusCallback** **modifyVerifyCallback** **motionVerifyCallback**	%i	position of insert cursor
c **losingFocusCallback** **modifyVerifyCallback** **motionVerifyCallback**	%n	new position of insert cursor
c **losingFocusCallback** **modifyVerifyCallback**	%f	startPos (from)
c **losingFocusCallback** **modifyVerifyCallback**	%t	endPos (to)
c **modifyVerifyCallback**	%s	text

f **XmTextClearSelection** ....

Arguments: Text widget
Return value: void

f **XmTextCopy** ....

Arguments: Text widget
Return value: void

f **XmTextCut** ....

Arguments: Text widget
Return value: void

w **XmTextField** ....

f **XmTextFieldClearSelection** ....

Arguments: Text field widget
Return value: void

f **XmTextFieldCopy** ....

Arguments:	Text field widget
Return value:	void

f **XmTextFieldCut** ....

Arguments:	Text field widget
Return value:	void

f **XmTextFieldGetBaseline** ....

Arguments:	Text field widget
Return value:	int

f **XmTextFieldGetLastPosition** ....

Arguments:	Text field widget
Return value:	XmTextPosition

f **XmTextFieldGetSelection** ....

Arguments:	Text field widget
Return value:	String

f **XmTextFieldGetSelectionPosition** ....

Arguments:	Text field widget, left boundary, right boundary
Return value:	Boolean

f **XmTextFieldInsert** ....

Arguments:	Text field widget, character position, text string to be inserted
Return value:	void

f **XmTextFieldPaste** ....

Arguments:	Text field widget
Return value:	void

f **XmTextFieldPosToXY** ....

Arguments:	Text field widget, character position, x coord relative to top left, y coord relative to top left
Return value:	Boolean

f **XmTextFieldRemove** ....

Arguments:	Text field widget
Return value:	Boolean

f **XmTextFieldReplace** ....

Arguments:	Text field widget, from character position, to character position, insert string

Return value: void

f **XmTextFieldSetAddMode** ....

Arguments: Text field widget, true | false
Return value: void

f **XmTextFieldSetHighlight** ....

Arguments: Text field widget, from character position, to character position, NORMAL | SELECTED | SECONDARY_SELECTED
Return value: void

f **XmTextFieldSetSelection** ....

Arguments: Text field widget, from character position, to character position
Return value: void

f **XmTextFieldShowPosition** ....

Arguments: Text field widget, character position to display
Return value: void

f **XmTextFieldXYToPos** ....

Arguments: Text field widget, x coord relative to top left, y coord relative to top left
Return value: void

f **XmTextGetBaseline** ....

Arguments: Text widget
Return value: int

f **XmTextGetLastPosition** ....

Arguments: Text widget
Return value: XmTextPosition

f **XmTextGetSelection** ....

Arguments: Text widget
Return value: String

f **XmTextGetSelectionPosition** ....

Arguments: Text widget, left boundary, right boundary
Return value: Boolean

f **XmTextInsert** ....

Arguments: Text widget, character position, text string to be inserted
Return value: void

f **XmTextPaste** ....

Arguments:	Text widget
Return value:	void

f **XmTextPosToXY** ....

Arguments:	Text widget, character position, x coord relative to top left, y coord relative to top left
Return value:	Boolean

f **XmTextRemove** ....

Arguments:	Text widget
Return value:	Boolean

f **XmTextReplace** ....

Arguments:	Text widget, from character position, to character position, insert string
Return value:	void

f **XmTextScroll** ....

Arguments:	Text widget, number of lines to scroll
Return value:	void

f **XmTextSetAddMode** ....

Arguments:	Text widget, true | false
Return value:	void

f **XmTextSetHighlight** ....

Arguments:	Text widget, from character position, to character position, NORMAL | SELECTED | SECONDARY_SELECTED
Return value:	void

f **XmTextSetSelection** ....

Arguments:	Text field widget, from character position, to character position
Return value:	void

f **XmTextShowPosition** ....

Arguments:	Text widget, character position to display
Return value:	void

f **XmTextXYToPos** ....

Arguments:	Text widget, x coord relative to top left, y coord relative to top left
Return value:	void

w **XmToggleButton** . . . .

c **valueChangedCallback**	%s	state

f **XmToggleButtonGetState** . . . .

Arguments:	toggle button widget
Return value:	Boolean

f **XmToggleButtonSetState** . . . .

Arguments:	toggle button widget, state (bool), notify (bool)
Return value:	void

w **XmToggleButtonGadget** . . . .

c **valueChangedCallback**	%s	state

f **XmToggleButtonGadgetGetState** . . . .

Arguments:	toggle button widget
Return value:	Boolean

f **XmToggleButtonGadgetSetState** . . . .

Arguments:	toggle button gadget, state (bool), notify (bool)
Return value:	void

f **XmUpdateDisplay** . . . .

Arguments:	widget
Return value:	void

w **XmWarningDialog** . . . . *XmCreateWarningDialog*
for callbacks and functions see: *XmMessageBox*

w **XmWorkingDialog** . . . . *XmCreateWorkingDialog*
for callbacks and functions see: *XmMessageBox*

A.5 Motif 1.2 Widgets and Commands

w **XmDropSiteManager** . . . .

c **dragProc**	%c	dragContext
c **dragProc**	%x	x position
c **dragProc**	%y	y position
c **dragProc**	%o	operation
c **dragProc**	%O	operations

w **XmDragContext** . . . .

c **dropProc** %c dragContext

c **dropProc** %x x position

c **dropProc** %y y position

c **dropProc** %o operation

c **dropProc** %O operations

c **convertProc** %t target widget

w **XmDropTransfer** ....

c **transferProc** %d destination widget

c **transferProc** %v value

f **XmDropSiteRegister** ....*convertSpecialResources*

Arguments: Widget to be registered, drop site resources
Return value: void

f **XmDropSiteUpdate** ....*convertSpecialResources*

Arguments: Drop site to be modified, drop site resources
Return value: void

f **XmDropSiteUnregister** ....

Arguments: Widget to be unregistered
Return value: void

f **XmDropSiteStartUpdate** ....

Arguments: Widget to identify shell with multiple drop sites
Return value: void

f **XmDropSiteEndUpdate** ....

Arguments: Widget to identify shell with multiple drop sites
Return value: void

f **XmDropTransferStart** *createDnDWidget4*

Arguments: Drag Context, Drop Transfer Resources
Return value: WidgetID

f **XmDragStart** *createDnDWidget5*

Arguments: Widget (source for drag and drop), Drag Context Resources
Return value: WidgetID

f **XmChangeColor** .... *xmChangeColor*

Arguments:	widget, color string for background
Return value:	void

f **XmTextDisableRedisplay** . . . .

Arguments:	Text widget
Return value:	void

f **XmTextEnableRedisplay** . . . .

Arguments:	Text widget
Return value:	void

f **XmScrollVisible** . . . .

Arguments:	scrolled window, widget to be made visible, left-right margin for positioning, top-botton margin for positioning
Return value:	void

A.6 XmGraph Extension to Motif Widgets

w **XmArc** . . . .

c **arcEditedCallback**	%f	old from
c **arcEditedCallback**	%t	old to
c **arcEditedCallback**	%F	new from
c **arcEditedCallback**	%T	new to

f **XmArcGetPos** . . . .

Arguments:	name of arc Widget, out: x1, out: y1, out: x2, out: y2
Return value:	void

w **XmGraph** . . . .

c **newArcCallback**
newNodeCallback
arcMovedCallback
nodeMovedCallback
defaultActionCallback
selectNodeCallback
selectArcCallback
deselectCallback
selectSubgraphCallback %N selected Nodes

c **newArcCallback**
newNodeCallback
arcMovedCallback

nodeMovedCallback
defaultActionCallback
selectNodeCallback
selectArcCallback
deselectCallback
selectSubgraphCallback %A selected Arcs

c **newArcCallback**
newNodeCallback
arcMovedCallback
defaultActionCallback
selectNodeCallback
selectArcCallback
deselectCallback
selectSubgraphCallback %I child widgetID

c **arcMovedCallback** %f old from

c **arcMovedCallback** %t old to

c **arcMovedCallback** %F new from

c **arcMovedCallback** %T new to

w **XmScrolledGraph** .... *XmCreateScrolledGraph*
for callbacks and functions see: *XmGraph*

f **XmGraphInsertRoots** ....

Arguments: XmGraphWidget, List of Widgets
Return value: void

A.7 Plotter Widget and Commands

w **AtAxis** ....

w **AtBarPlot** ....

f **AtBarPlotAttachData** ....

Arguments: bar plot widget, floats
Return value: void

w **AtLabelAxis** ....

f **AtLabelAxisAttachData** ....

Arguments: label axis wiget, strings
Return value: void

w **AtLinePlot** ....

f **AtLinePlotAttachData** ....

Arguments:	line plot widget, floats
Return value:	void

w **AtPlotter** ....

c **clickCallback** **motionCallback**	%x	pixel x coordinate
c **clickCallback** **motionCallback**	%y	pixel y coordinate
c **clickCallback** **motionCallback**	%a	1st axis x coordinate
c **clickCallback** **motionCallback**	%b	1st axis y coordinate
c **clickCallback** **motionCallback**	%c	2nd axis x coordinate
c **clickCallback** **motionCallback**	%d	2nd axis y coordinate
c **dragCallback** **slideCallback**	%x	pixel x lower left
c **dragCallback** **slideCallback**	%y	pixel y lower left
c **dragCallback** **slideCallback**	%a	1st axis x lower left
c **dragCallback** **slideCallback**	%b	1st axis y lower left
c **dragCallback** **slideCallback**	%c	2nd axis x lower left
c **dragCallback** **slideCallback**	%d	2nd axis y lower left
c **dragCallback** **slideCallback**	%X	pixel x upper right
c **dragCallback** **slideCallback**	%Y	pixel y upper right
c **dragCallback** **slideCallback**	%A	1st axis x upper right

c	**dragCallback** **slideCallback**	%B	1st axis y upper right
c	**dragCallback** **slideCallback**	%C	2nd axis x upper right
c	**dragCallback** **slideCallback**	%D	2nd axis y upper right

f **AtPlotterGeneratePostscript** ....

Arguments:	file name, plotter widget, title, bounding box: x1, bounding box: y1, bounding box: x2, bounding box: y2, landscape
Return value:	void

w **AtTextPlot** ....

w **AtXYAxis** ....

w **AtXYLinePlot** ....

f **AtXYLinePlotAttachData** .... *xyLinePlotAttachData*

Arguments:	xyLine plot widget, pairs of floats (xfloat/yfloat)
Return value:	void

A.8 HyperText (HTML) Widget and Commands

w **HTML** ....

c	**anchorCallback**	%t	text
c	**anchorCallback**	%h	hypertext reference
c	**anchorCallback**	%i	element id
c	**submitFormCallback**	%h	hypertext reference
c	**submitFormCallback**	%n	attribute names
c	**submitFormCallback**	%v	attribute values

f **HTMLGetText** ....

Arguments:	HTML Widget, Pretty Code 0-2
Return value:	String

f **HTMLGetTextAndSelection** ....

Arguments:	HTML Widget, Selection starts, Selcetion ends, Insertion Points

Return value: String

f **HTMLGetHRefs** .... *hTMLGetHRefs*

Arguments: HTML Widget
Return value: String

f **HTMLPositionToId** ....

Arguments: HTML Widget, x Coordinate, y Coordinate
Return value: int

f **HTMLIdToPosition** ....

Arguments: HTML Widget, Element ID, x Coordinate, y Coordinate
Return value: int

f **HTMLAnchorToPosition** ....

Arguments: HTML Widget, Anchor's name, x Coordinate, y Coordinate
Return value: int

f **HTMLClearSelection** ....

Arguments: HTML Widget
Return value: void

f **HTMLSetSelection** ....

Arguments: HTML Widget, start, end
Return value: void

f **HTMLSetText** ....

Arguments: HTML Widget, Text, Header Text, Footer Text, element_id, target_anchor
Return value: void

f **HTMLSearchText** .... *searchtext*

Arguments: HTML Widget, Pattern, Start, Result: Start, Result: End, Backward, Case Sensitive
Return value: int

f **HTMLGotoId** ....

Arguments: HTML Widget, Element ID
Return value: void

f **HTMLAnchorToId** ....

Arguments: HTML Widget, Anchor string
Return value: int

f **HTMLIdToElement** . . . .

Arguments:	HTML Widget, Element ID, Element Record
Return value:	Boolean

f **HTMLsetElementBg** . . . .

Arguments:	HTML Widget, Element ID, backgroundColor
Return value:	void

f **HTMLRetestAnchors** . . . .

Arguments:	HTML Widget
Return value:	void

A.9 Ghostview Widget and Commands

w **Ghostview** . . . .

c **callback**	%w	width
c **callback**	%h	height
c **callback**	%x	ps x
c **callback**	%y	ps y
c **callback**	%X	x dpi
c **callback**	%Y	y dpi

f **GhostviewEnableInterpreter** . . . .

Arguments:	ghostview widget
Return value:	void

f **GhostviewDisableInterpreter** . . . .

Arguments:	ghostview widget
Return value:	void

f **GhostviewIsInterpreterReady** . . . .

Arguments:	ghostview widget
Return value:	Boolean

f **GhostviewIsInterpreterRunning** . . . .

Arguments:	ghostview widget
Return value:	Boolean

f **GhostviewGetBackingPixmap** . . . .

Arguments:	ghostview widget

Return value:	Pixmap

f **GhostviewSendPS** . . . .

Arguments:	ghostview widget, open file, begin, length, boolean close
Return value:	Boolean

f **GhostviewNextPage** . . . .

Arguments:	ghostview widget
Return value:	Boolean

A.10 Drag and Drop Commands

f **rddSetDropData** . . . .

Arguments:	message string
Return value:	void

f **rddAddDropHandler** . . . .

Arguments:	widget, message
Return value:	void

A.11 Miscelaneous Additional Commands

f **ctime** . . . .

Arguments:	clock value
Return value:	String

f **echo** . . . .

Arguments:	strings
Return value:	void

f **getChannel** . . . .

Arguments:	None
Return value:	int

f **quit** . . . . *kill*

Arguments:	None
Return value:	void

f **kill** . . . .

Arguments:	process id, signalType
Return value:	void

f **register** .... *wafeRegisterCmd*

Arguments:	stdin | stdout | stderr | xioerr | ..signal.., tcl-command
Return value:	void

f **setCommunicationVariable** .... *wafeSetCommunicationVariableCmd*

Arguments:	variable name, length, tcl command to be executed
Return value:	void

f **unregister** .... *wafeUnregisterCmd*

Arguments:	stdin | stdout | stderr | xioerr
Return value:	void

f **addInput** .... *wafeAddInputCmd*

Arguments:	fileno, read | write | except | none, TclVariable, TclCommand
Return value:	XtInputId

f **removeInput** .... *wafeRemoveInputCmd*

Arguments:	input id
Return value:	void

f **fileno** .... *fileNo*

Arguments:	string identifying file, read | write
Return value:	int

f **alias** ....

Arguments:	new command, old command
Return value:	int

f **DBUG_PUSH** .... *DBUG_PUSH*

Arguments:	new debug options
Return value:	void

f **DBUG_POP** .... *DBUG_POP*

Arguments:	
Return value:	void

Index

OverrideShell, 17
TransientShell, 17

accelerators, 25
action, 23, 25, 38, 48
addInput, 40, 81
addTimeOut, 48
addWorkProc, 54
alias, 81
all, 32
ApplicationShell, 12, 48
Arg, 28
arg, 25
AtAxis, 75
AtBarPlot, 75
AtBarPlotAttachData, 75
AtLabelAxis, 75
AtLabelAxisAttachData, 75
AtLinePlot, 76
AtLinePlotAttachData, 76
AtPlotter, 76
AtPlotterGeneratePostscript, 77
AtTextPlot, 77
AtXYAxis, 77
AtXYLinePlot, 77
AtXYLinePlotAttachData, 77
augment, 23, 25

bell, 48
Box, 12, 55
buttonEvent, 25

callActionProc, 25, 30, 48
callback, 21–23, 26, 29, 48
callCallbacks, 25, 48
changePixmap, 47, 54
Clock, 55
combineFileDatabase, 14, 48
Command, 12, 55
command, 39
convertSelection, 45, 46, 53
convertSpecialResources, 73
createDnDWidget4, 73
createDnDWidget5, 73
ctime, 80

data, 25
x _POP, 81
x _PUSH, 81
destination, 25
destroyWidget, 17, 48
Dialog, 12, 55
disownSelection, 44, 53
displayCaret, 34

echo, 37, 38, 80
editDone, 35
editError, 35
EOL, 32
example, 31
except, 40
exclusive, 17, 21, 22
exec, 23, 24

fallbackResources, 14, 48
false, 14, 32, 34
fetchBuffer, 45, 46, 54
fetchBytes, 46, 53
File, 28
fileNo, 81
fileno, 41, 81
firstPos, 31, 32, 35
flush, 49
fontHeight, 19, 48
Form, 12, 55

getApplicationResource, 15, 49
getChannel, 41, 80
getClass, 15, 49
getResourceList, 49
getSelectionValue, 44, 53
getTypeOfAttribute, 15, 49
getValue, 13, 49

Ghostview, 79
GhostviewDisableInterpreter, 79
GhostviewEnableInterpreter, 79
GhostviewGetBackingPixmap, 79
GhostviewIsInterpreterReady, 79
GhostviewIsInterpreterRunning, 79
GhostviewNextPage, 80
GhostviewSendPS, 80
grabKeyboard, 49
grabPointer, 49
Grip, 12, 55
gV, 13, 20, 54

HeightOfScreen, 49
heightOfScreen, 19, 49
hooksOfDisplay, 54
HTML, 77
HTMLAnchorToId, 78
HTMLAnchorToPosition, 78
HTMLClearSelection, 78
HTMLGetHRefs, 78
hTMLGetHRefs, 78
HTMLGetText, 77
HTMLGetTextAndSelection, 77
HTMLGotoId, 78
HTMLIdToElement, 79
HTMLIdToPosition, 78
HTMLPositionToId, 78
HTMLRetestAnchors, 79
HTMLSearchText, 78
HTMLsetElementBg, 79
HTMLSetSelection, 78
HTMLSetText, 78
hup, 38, 39

insertPosition, 34
installAccelerators, 25, 49
installAllAccelerators, 25, 50
int, 38, 39
isWidget, 15, 50

kill, 39, 80

Label, 12, 55
Layout, 50
left, 31, 32
length, 31, 32, 35
List, 12, 28, 29, 55
listAppend, 56
listChange, 56
Logo, 12, 56
lowerWindow, 19, 50

Mailbox, 12, 56
manageChild, 12, 16, 50
mapState, 54
mapWidget, 16, 50
MenuButton, 12, 56
mergeResources, 14, 50

name2WidgetId, 50, 53
nameToWidget, 16, 50
None, 47
none, 17, 21, 22, 40
nonexclusive, 17, 21, 22
NULL, 25, 37, 44

onExit, 20
override, 14, 23, 25
OverrideShell, 12, 50
ownSelection, 44, 53

Paned, 12, 56
Panner, 12, 60
paragraph, 32
parent, 16, 50
ParentRelative, 47
ParentWidget, 50
pipe, 38, 39
popdown, 18, 21, 22, 50
popup, 17, 50
popupChildren, 18, 50
popupSpringLoaded, 17, 51
Porthole, 12, 60
position, 21, 22, 32
positionCursor, 21, 23
positionError, 35
PRIMARY, 44

processPendingEvents, 42, 51
ptr, 31, 32, 35

quit, 20, 38, 39, 80

raiseWindow, 18, 51
rddAddDropHandler, 80
rddSetDropData, 80
read, 40, 41
realize, 17, 51
realizeWidget, 17, 51
realizeWidgets, 51
register, 38, 39, 81
removeAllCallbacks, 51
removeCallbacks, 26
removeInput, 40, 81
removeTimeOut, 51
removeWorkProc, 54
Repeater, 12, 60
replace, 23
resolvePathname, 20, 51
right, 31, 32

sans-serif, 11
Scrollbar, 12, 57
scSet, 27, 57
searchtext, 78
selectAll, 31
selectChar, 31
selectLine, 31
selectNull, 31
selectParagraph, 31
selectPosition, 31
selectWord, 31
setBusy, 18, 51
setCommunicationVariable, 41, 81
setIconPixmap, 47, 54
setKeyboardFocus, 51
setSensitive, 18, 52
setValues, 13, 14, 21, 27, 47, 52
setWMProtocols, 26, 52
showRes, 11
SimpleMenu, 12, 57
Sme, 12, 57
SmeBSB, 12, 57
SmeLine, 12, 57
source, 25
STDERR, 38
stderr, 38, 39
STDIN, 38
stdin, 38, 39
STDOUT, 38
stdout, 38, 39
storeBuffer, 46, 54
StripChart, 12, 57
stripChartSet, 57
sV, 13, 20, 54
sync, 52

Tcl, 1, 4, 6, 8, 9, 11–14, 16, 19–21, 23, 28, 29, 31, 32, 34–36, 38, 39, 41–44, 89
term, 38, 39
Text, 12, 55
text, 31
textGetSelectionPosition, 34
textWidth, 19, 52
Toggle, 12, 59
toggleSetRadioData, 59
topLevel, 11, 17
TopLevelShell, 12, 52
TransientShell, 12, 52
translateCoords, 19, 52
Tree, 12, 60
true, 32, 34
type, 25

ungrabKeyboard, 52
ungrabPointer, 52
unknown, 24
unmanageChild, 16, 52
unmanaged, 11, 12, 16
unmapWidget, 16, 52
unrealizeWidget, 17, 53
unregister, 39, 81
Unspecified, 47
usr1, 38, 39
usr2, 38, 39

Viewport, 12, 60

wafeAddInputCmd, 81
wafeCallbackCmd, 48
wafeGetQTypeOfAttribute, 49
wafeOwnSelectionCmd, 53
wafeRegisterCmd, 81
wafeRemoveInputCmd, 81
wafeSetCommunicationVariableCmd, 81
wafeUnregisterCmd, 81
waitForVariable, 42, 53
whiteSpace, 32
widget, 25, 26
widgetId, 53
widgetName, 53
WidthOfScreen, 53
widthOfScreen, 19, 53
window, 16, 53
write, 40, 41

XawAsciiSave, 30, 55
XawAsciiSaveAsFile, 30, 55
XawAsciiSourceChanged, 30, 55
XawAsciiSourceFreeString, 35, 55
XawDialogGetValueString, 55
XawFormDoLayout, 35, 55
XawListAppend, 29, 56
XawListChange, 27, 28, 56
XawListHighlight, 27, 56
XawListShowCurrent, 28, 56
XawListUnhighlight, 27, 56
XawPanedAllowResize, 36, 56
XawPanedGetMinMax, 36, 56
XawPanedGetNumSub, 36, 56
XawPanedSetMinMax, 36, 56
XawPanedSetRefigureMode, 36, 56
XawScrollbarSetThumb, 26, 57
XawSimpleMenuClearActiveEntry, 37, 57
XawSimpleMenuGetActiveEntry, 37, 57
XawStripChartSet, 57
XawTalk, 60
XawTextDisableRedisplay, 33, 57
XawTextDisplay, 33, 57
XawTextDisplayCaret, 34, 57
XawTextEnableRedisplay, 33, 58
XawTextGetInsertionPoint, 34, 58
XawTextGetSelectionPos, 58
XawTextInvalidate, 32, 58
XawTextReplace, 35, 59
XawTextSearch, 31, 58
XawTextSetInsertionPoint, 34, 58
XawTextSetSelection, 34, 58
XawTextSetSelectionArray, 31, 58
XawTextSinkMaxHeight, 33, 58
XawTextSinkMaxLines, 33, 58
XawTextSinkSetTabs, 30, 58
XawTextSourceRead, 32, 59
XawTextSourceScan, 32, 59
XawTextTopPosition, 33, 59
XawTextUnsetSelection, 34, 59
XawToggleChangeRadioGroup, 37, 59
XawToggleGetCurrent, 59
XawToggleSetCurrent, 59
XawToggleSetRadioData, 59
XawToggleUnsetCurrent, 37, 59
XawTreeForceLayout, 35, 60
XawViewportSetCoordinates, 60
XawViewportSetLocation, 60
XBell, 48
XConvertSelection, 53
XFetchBuffer, 54
XFetchBytes, 53
XFlush, 49
xioerr, 38, 39
XLowerWindow, 50
XmAddTabGroup, 60
XmArc, 74
XmArcGetPos, 74
XmArrowButton, 60
XmArrowButtonGadget, 61
XmBulletinBoard, 61
XmBulletinBoardDialog, 61
XmCascadeButton, 61
XmCascadeButtonGadget, 61

XmCascadeButtonGadgetHighlight, 61
XmCascadeButtonHighlight, 61
XmChangeColor, 73
xmChangeColor, 73
XmCommand, 61
XmCommandAppendValue, 61
XmCommandError, 61
XmCommandGetChild, 61
XmCreateBulletinBoardDialog, 61
XmCreateFileSelectionDialog, 62
XmCreateFormDialog, 62
XmCreateInformationDialog, 62
XmCreateMenuBar, 65
XmCreateMessageDialog, 66
XmCreateOptionMenu, 66
XmCreatePopupMenu, 66
XmCreatePromptDialog, 66
XmCreatePulldownMenu, 66
XmCreateQuestionDialog, 66
XmCreateRadioBox, 66
XmCreateScrolledGraph, 75
XmCreateScrolledList, 67
XmCreateScrolledText, 67
XmCreateSelectionDialog, 67
XmCreateSimpleCheckBox, 67
XmCreateSimpleMenuBar, 67
XmCreateSimpleOptionMenu, 68
XmCreateSimplePopupMenu, 68
XmCreateSimplePulldownMenu, 68
XmCreateSimpleRadioBox, 68
XmCreateWarningDialog, 72
XmCreateWorkingDialog, 72
XmDialogShell, 61
XmDragContext, 72
XmDragStart, 73
XmDrawingArea, 61
XmDrawnButton, 61
XmDropSiteEndUpdate, 73
XmDropSiteManager, 72
XmDropSiteRegister, 73
XmDropSiteStartUpdate, 73
XmDropSiteUnregister, 73
XmDropSiteUpdate, 73
XmDropTransfer, 73
XmDropTransferStart, 73
XmFileSelectionBox, 62
XmFileSelectionBoxGetChild, 62
XmFileSelectionDialog, 62
XmFileSelectionDoSearch, 62
XmForm, 62
XmFormDialog, 62
XmFrame, 62
XmGraph, 74
XmGraphInsertRoots, 75
XmInformationDialog, 62
XmLabel, 62
XmLabelGadget, 62
XmList, 62
XmListAddItem, 63
XmListAddItems, 63
XmListAddItemUnselected, 63
XmListDeleteAllItems, 63
XmListDeleteItem, 63
XmListDeleteItems, 63
XmListDeleteItemsPos, 63
XmListDeletePos, 64
XmListDeselectAllItems, 64
XmListDeselectItem, 64
XmListDeselectPos, 64
XmListGetMatchPos, 64
XmListGetSelectedPos, 64
XmListItemExists, 64
XmListItemPos, 64
XmListReplaceItems, 64
XmListReplaceItemsPos, 64
XmListSelectItem, 65
XmListSelectPos, 65
XmListSetAddMode, 65
XmListSetBottomItem, 65
XmListSetBottomPos, 65
XmListSetHorizPos, 65
XmListSetItem, 65
XmListSetPos, 65
XmMainWindow, 65
XmMainWindowSetAreas, 65
XmMenuBar, 65
XmMenuShell, 66

XmMessageBox, 66
XmMessageBoxGetChild, 66
XmMessageDialog, 66
XmOptionMenu, 66
XmPanedWindow, 66
XmPopupMenu, 66
XmProcessTraversal, 60
XmPromptDialog, 66
XmPulldownMenu, 66
XmPushButton, 66
XmPushButtonGadget, 66
XmQuestionDialog, 66
XmRadioBox, 66
XmRowColumn, 66
XmScale, 66
XmScrollBar, 66
XmScrollBarGetValues, 67
XmScrollBarSetValues, 67
XmScrolledGraph, 75
XmScrolledList, 67
XmScrolledText, 67
XmScrolledWindow, 67
XmScrollVisible, 74
XmSelectionBox, 67
XmSelectionBoxGetChild, 67
XmSelectionDialog, 67
XmSeparator, 67
XmSeparatorGadget, 67
XmSimpleCheckBox, 67
XmSimpleMenuBar, 67
XmSimpleOptionMenu, 68
XmSimplePopupMenu, 68
XmSimplePulldownMenu, 68
XmSimpleRadioBox, 68
XmText, 68
XmTextClearSelection, 68
XmTextCopy, 68
XmTextCut, 68
XmTextDisableRedisplay, 74
XmTextEnableRedisplay, 74
XmTextField, 68
XmTextFieldClearSelection, 68
XmTextFieldCopy, 68
XmTextFieldCut, 69
XmTextFieldGetBaseline, 69
XmTextFieldGetLastPosition, 69
XmTextFieldGetSelection, 69
XmTextFieldGetSelectionPosition, 69
XmTextFieldInsert, 69
XmTextFieldPaste, 69
XmTextFieldPosToXY, 69
XmTextFieldRemove, 69
XmTextFieldReplace, 69
XmTextFieldSetAddMode, 70
XmTextFieldSetHighlight, 70
XmTextFieldSetSelection, 70
XmTextFieldShowPosition, 70
XmTextFieldXYToPos, 70
XmTextGetBaseline, 70
XmTextGetLastPosition, 70
XmTextGetSelection, 70
XmTextGetSelectionPosition, 70
XmTextInsert, 70
XmTextPaste, 71
XmTextPosToXY, 71
XmTextRemove, 71
XmTextReplace, 71
XmTextScroll, 71
XmTextSetAddMode, 71
XmTextSetHighlight, 71
XmTextSetSelection, 71
XmTextShowPosition, 71
XmTextXYToPos, 71
XmToggleButton, 72
XmToggleButtonGadget, 72
XmToggleButtonGadgetGetState, 72
XmToggleButtonGadgetSetState, 72
XmToggleButtonGetState, 72
XmToggleButtonSetState, 72
XmUpdateDisplay, 72
XmWarningDialog, 72
XmWorkingDialog, 72
XRaiseWindow, 51
XSetWMProtocols, 52
XStoreBuffer, 54
XSync, 52
XtAppAddTimeOut, 48
XtAppAddWorkProc, 54

XtDestroyWidget, 48
XtDisownSelection, 53
XtGetSelectionValue, 53
XtGrabKeyboard, 49
XtGrabPointer, 49
XtHooksOfDisplay, 54
XtInstallAccelerators, 49
XtInstallAllAccelerators, 50
XtManageChildren, 50
XtMapWidget, 50
XtNameToWidget, 50
XtPopdown, 50
XtPopup, 50
XtPopupSpringLoaded, 51
XtRealizeWidget, 51
XtRemoveAllCallbacks, 51
XtRemoveTimeOut, 51
XtRemoveWorkProc, 54
XtResolvePathname, 51
XtSetKeyboardFocus, 51
XtSetSensitive, 52
XtTranslateCoords, 52
XtUngrabKeyboard, 52
XtUngrabPointer, 52
XtUnmanageChildren, 52
XtUnmapWidget, 52
XtUnrealizeWidget, 53
XtWindow, 53
xyLinePlotAttachData, 77

References

[1] David Flanagan, *X Toolkit Intrinsics Reference Manual*, Third Edition, O'Reilly and Associates Inc., 1990.

[2] Arnaud Le Hors, *The X PixMap Format*, Part of the xpm distribution, 1991.

[3] Joel McCormack, Paul Asente and Ralph Swick, *X Toolkit Intrinsics – C Language Interface*, Massachusetts Institute of Technology, 1990.

[4] Gustaf Neumann, Stefan Nusser, *Wafe - An X Toolkit Based Frontend for Application Programs in Various Programming Languages* , Proc. USENIX Winter Conference, January 1993.

[5] Adrian Nye – Tim O'Reilly, *X Toolkit Intrinsics Programming Manual*, Second Edition, O'Reilly and Associates Inc., 1990.

[6] John K. Ousterhout, *Tcl: An Embeddable Command Language*, Proc. USENIX Winter Conference, January 1990.

[7] Ralph Swick – Terry Weissman, *X Toolkit Athena Widgets – C Language Interface*, Massachusetts Institute of Technology, 1990.