X11 XTEST EXTENSION

Version 2.2
X Consortium Standard

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1. Overview

This extension is a minimal set of client and server extensions required to completely test the X11 server with no user intervention.

This extension is not intended to support general journaling and playback of user actions. This is a difficult area [XTrap, 89] as it attempts to synchronize synthetic user interactions with their effects; it is at the higher level of dialogue recording/playback rather than at the strictly lexical level. We are only interested in the latter, simpler, case. A more detailed discussion and justification of the extension functionality is given in [Drake, 91].

We are only aiming to provide a minimum set of facilities that solve immediate testing and validation problems. The testing extension itself needs testing, where possible, and so should be as simple as possible.

We have also tried to:

- Confine the extension to an appropriate, high, level within the server to minimize portability problems. In practice this means that the extension should be at the DIX level, or use the DIX/DDX interface, or both. This has effects, in particular, on the level at which "input synthesis" can occur.
- Minimize the changes required in the rest of the server.
- Minimize performance penalties on normal server operation.

2. Description

The functions provided by this extension fall into two groups:

Client Operations

These routines manipulate otherwise hidden client-side behaviour. The actual implementation will depend on the details of the actual language binding and what degree of request buffering, GContext caching etc., is provided. In the C binding, defined in section 7, routines are provided to access the internals of two opaque data structures — *GC*s and *Visual*s — and to discard any requests pending within the output buffer of a connection. The exact details can be expected to differ for other language bindings.

Server Requests

The first of these requests is similar to that provided in most extensions: it allows a client to specify a major and minor version number to the server and for the server to respond with major and minor versions of its own. The remaining two requests

a) allow access to an otherwise "write-only" server resource: the cursor associated with a given window; and

b) perhaps most importantly, allow limited synthesis of input device events — almost as if a cooperative user had moved the pointing device or pressed a key or button.

3. Types

The following types are used in the request and event definitions in subsequent sections.

FAKE_EVENT_TYPE: {**KeyPress**, **KeyRelease**, **MotionNotify**, **ButtonPress**, **ButtonRelease**}

FAKE_EVENT: **[** type: FAKE_EVENT_TYPE; detail: BYTE; time: TIME; root: WINDOW; rootX: INT16; rootY: INT16; **]**

CurrentCursor **— 1**

4. Client Operations

These are abstract definitions of functionality. They refer to client-side objects like "GC" and "VISUAL" which are quoted to denote their abstract nature. Concrete versions of these functions are only defined for particular language bindings. In some circumstances a particular language binding may not implement the relevant abstract type or may provide it as a transparent, rather than opaque type, with the result that the corresponding function does not make sense or is not required, respectively.

XTestSetGContextOfGC

gc: "GC"
gid: GCONTEXT

Set the GCONTEXT within the "GC" *gc* to have the value specified by *gid*.

XTestSetVisualIDOfVisual

visual: "VISUAL"
visualid: VISUALID

Set the VISUALID within the "VISUAL" *visual* to have the value specified by *visualid*.

XTestDiscard

dpy: "CONNECTION"

=>

status: BOOL

Discard any requests that are present in the request buffer associated with the "CONNECTION" *dpy*. The *status* returned is **True** if there were one or more requests in the buffer and **False** otherwise.

5. Server Requests

XTestGetVersion

clientMajorVersion: CARD16
clientMinorVersion: CARD16

=>

serverMajorVersion: CARD16
serverMinorVersion: CARD16

Errors: **Length**

This request can be used to ensure that the server version of the XTEST extension is usable by the client. This document defines major version two (2), minor version one (1).

XTestCompareCursor

window: WINDOW
cursor: CURSOR or CurrentCursor or None

=>

same: BOOL

Errors: **Window**, **Length**, **Cursor**

This request looks up the cursor associated with *window* and compares it with

either
the null cursor if *cursor* is **None**,

or the current cursor (i.e., that being displayed)

or the cursor whose ID is *cursor*,

returning the result of the comparison in *same*.

XTestFakeInput

events: LISTofFAKE_EVENT

Errors: **Window**, **Length**, **Alloc**, **Value**

This request simulates the limited set of core protocol events within the set FAKE_EVENT_TYPE. Only the following event fields, defined in FAKE_EVENT, are interpreted:

type This must be one of **KeyPress**, **KeyRelease**, **MotionNotify**, **ButtonPress** or **ButtonRelease** or else a **Value** error occurs.

detail
For key events, this field is interpreted as the physical keycode. If the keycode is less than min-keycode or greater than max-keycode, as returned in the connection setup, then a **Value** error occurs. For button events, this field is interpreted as the physical (or core) button, meaning it will be mapped to the corresponding logical button according to the most recent **SetPointerMapping** request. If the button number is less than one or greater than the number of physical buttons, then a **Value** error occurs. For motion events, if this field is **True**, then *rootX* and *rootY* are relative distances from the current pointer location; if this field is **False,** then they are absolute positions.

time This is either **CurrentTime** (meaning no delay) or the delay in milli-seconds that the server should wait before simulating this event. No other requests from this client will be processed until this delay, if any, has expired and subsequent processing of the simulated event has been completed.

root In the case of motion events this field is the ID of the root window on which the new motion is to take place. If **None** is specified, the root window of the screen the pointer is currently on is used instead. If this field is not a valid window then a **Window** error occurs.

rootX & *rootY*
In the case of motion events these fields indicate relative distance or absolute pointer coordinates, according to the setting of *detail*. If the specified coordinates are off-screen, the closest on-screen coordinates will be substituted.

When the simulated event(s) are processed they cause event propagation, passive grab activation, etc., just as if the corresponding input device action had occurred. However, motion events might not be recorded in the motion history buffer.

For the currently supported event types, the event list must have length one, otherwise a **BadLength** error occurs.

XTestGrabControl

impervious: BOOL

If *impervious* is **True**, then the executing client becomes impervious to server grabs; that is, it can continue executing requests even if another client grabs the server. If *impervious* is **False**, then the executing client returns to the normal state of being susceptible to server grabs.

6. Encoding

Please refer to the X11 Protocol Encoding document as this document uses conventions established there.

The name of this extension is "XTEST".

New types

FAKE_EVENT_TYPE

2	KeyPress
3	KeyRelease
4	ButtonPress
5	ButtonRelease
6	MotionNotify

NOTE that the above values are defined to be the same as those for the corresponding core protocol event types.

Requests

XTestGetVersion

1	CARD8	opcode
1	0	xtest opcode
2	2	request length
1	CARD8	client major version
1		unused
2	CARD16	client minor version

=>

1	1	Reply
1	CARD8	server major version
2	CARD16	sequence number
4	0	reply length
2	CARD16	server minor version
22		unused

XTestCompareCursor

1	CARD8		opcode
1	1		xtest opcode
2	3		request length
4	WINDOW		window
4	CURSOR		cursor
	0	*None*	
	1	*CurrentCursor*	

=>

1	1	Reply
1	BOOL	cursors are the same
2	CARD16	sequence number
4	0	reply length
24		unused

XTestFakeInput

1	CARD8		opcode
1	2		xtest opcode
2	1+(1*8)		request length
1	FAKE_EVENT_TYPE		fake device event type
1	BYTE		detail: button or keycode
2			unused
4	TIME		delay (milli-seconds)
	0	*CurrentTime*	
4	WINDOW		root window for *MotionNotify*
	0	*None*	
8			unused
2	INT16		x position for *MotionNotify*
2	INT16		y position for *MotionNotify*
8			unused

XTestGrabControl

1	CARD8	opcode
1	3	xtest opcode
2	2	request length
1	BOOL	impervious
3		unused

7. C language Xlib Binding

The C routines either provide direct access to the protocol and add no additional semantics to those defined in section 5 or they correspond directly to the abstract descriptions of client operations in section 4.

All XTEST extension functions and procedures, and all manifest constants and macros, will start with the string "`XTest`". All operations are classified as server/client (`Server`) or client-only (`Client`). All routines that have return type `Status` will return non-zero for "success" and zero for "failure". Even if the XTEST extension is supported the server may withdraw such facilities arbitrarily; in which case they will subsequently return zero.

The include file for this extension is **<X11/extensions/XTest.h>**.

```
Bool
XTestQueryExtension (display, event_base, error_base, major_version, minor_version)
    Display      *display;
    int *event_base; /* RETURN */
    int *error_base; /* RETURN */
    int *major_version; /* RETURN */
    int *minor_version; /* RETURN */
```

Returns **True** if the specified display supports the XTEST extension else **False**. If the extension is supported, *event_base would be set to the event number for the first event for this extension and *error_base would be set to the error number for the first error for this extension. As no errors or events are defined for this version of the extension, the values returned here are not defined (nor useful). If the extension is supported, *major_version and *minor_version are set to the major and minor version numbers of the extension supported by the display. Otherwise none of the arguments

are set.

Bool
XTestCompareCursorWithWindow (display, window, cursor)
Display *display;
Window window;
Cursor cursor;

If the extension is supported, performs a comparison of the cursor whose ID is *cursor* (which may be **None**) with the cursor of the window *window* returning **True** if they are the same and **False** otherwise. If the extension is not supported, then the request is ignored and zero (0) is returned.

Bool
XTestCompareCurrentCursorWithWindow (display, window)
Display *display;
Window window;

If the extension is supported, performs a comparison of the current cursor with the cursor of the window *window* returning **True** if they are the same and **False** otherwise. If the extension is not supported, then the request is ignored and zero (0) is returned.

XTestFakeKeyEvent (display, keycode, is_press, delay)
Display *display;
unsigned int keycode;
Bool is_press;
unsigned long delay;

If the extension is supported, requests the server to simulate either a **KeyPress** (if *is_press* is **True**) or a **KeyRelease** (if *is_press* is **False**) of the key with keycode *keycode*, otherwise the request is ignored.

If the extension is supported, the simulated event will not be processed until *delay* milli-seconds after the request is received (if *delay* is **CurrentTime** then this is interpreted as no delay at all). No other requests from this client will be processed until this delay, if any, has expired and subsequent processing of the simulated event has been completed.

XTestFakeButtonEvent (display, button, is_press, delay)
Display *display;
unsigned int button;
Bool is_press;
unsigned long delay;

If the extension is supported, requests the server to simulate either a **ButtonPress** (if *is_press* is **True**) or a **ButtonRelease** (if *is_press* is **False**) of the logical button numbered *button*, otherwise the request is ignored.

If the extension is supported, the simulated event will not be processed until *delay* milli-seconds after the request is received (if *delay* is **CurrentTime** then this is interpreted as no delay at all). No other requests from this client will be processed until this delay, if any, has expired and subsequent processing of the simulated event has been completed.

XTestFakeMotionEvent (display, screen_number, x, y, delay)
Display *display;
int screen_number;
int x, y;
unsigned long delay;

If the extension is supported, requests the server to simulate a movement of the pointer to position (*x*, *y*) on the root window of screen number *screen_number*, otherwise the request is ignored. If *screen_number* is -1, the current screen (that the pointer is on) is used.

If the extension is supported, the simulated event will not be processed until *delay* milli-seconds after the request is received (if *delay* is **CurrentTime** then this is interpreted as no delay at all). No other requests from this client will be processed until this delay, if any, has expired and subsequent

processing of the simulated event has been completed.

XTestFakeRelativeMotionEvent (display, screen_number, x, y, delay)
Display *display;
int screen_number;
int x, y;
unsigned long delay;

If the extension is supported, requests the server to simulate a movement of the pointer by offsets (*x*, *y*) relative to the current pointer position on screen number *screen_number*, otherwise the request is ignored. If *screen_number* is -1, the current screen (that the pointer is on) is used.

If the extension is supported, the simulated event will not be processed until *delay* milli-seconds after the request is received (if *delay* is **CurrentTime** then this is interpreted as no delay at all). No other requests from this client will be processed until this delay, if any, has expired and subsequent processing of the simulated event has been completed.

XTestGrabControl (display, impervious)
Display *display;
Bool impervious;

If *impervious* is **True**, then the executing client becomes impervious to server grabs. If *impervious* is **False**, then the executing client returns to the normal state of being susceptible to server grabs.

Bool

XTestSetGContextOfGC (gc, gid)
GC gc;
GContext gid;

Sets the GContext within the opaque datatype referenced by *gc* to be that specified by *gid*.

XTestSetVisualIDOfVisual (visual, visualid)
Visual *visual;
VisualID visualid;

Sets the VisualID within the opaque datatype referenced by *visual* to be that specified by *visualid*.

Bool
XTestDiscard (display)
Display *display;

Discard any requests within the output buffer for display *display*, returning **True** if any requests were discarded, otherwise return **False**.

8. Bibliography

Annicchiarico, D., et al., *XTrap: The XTrap Architecture* Digital Equipment Corporation, July 1991.

Drake, K.J., *Some Proposals for a Minimum X11 Testing Extension* UniSoft Ltd., June 1991.