LINUX FU: X COMMAND

by: Al Williams

8 Comments

September 21, 2017

Text-based Linux and Unix systems are easy to manipulate. The way the Unix I/O system works you can always fake keyboard input to another program and intercept its output. The whole system is made to work that way. Graphical X11 programs are another matter, though. Is there a way to control X11 programs like you control text programs? The answer to that question depends on exactly what you want to do, but the general answer is yes.

As usual for Linux and Unix, though, there are many ways to get to that answer. If you really want fine-grained control over programs, some programs offer control via a special mechanism known as D-Bus. This allows programs to expose data and methods that other programs can use. In a perfect world your target program will use D-Bus but that is now always the case. So today we'll look more for control of arbitrary programs.

There are several programs that can control X windows in some way or another. There's a tool called xdo that you don't hear much about. More common is xdotool and I'll show you an example of that. Also, wmctrl can perform some similar functions. There's also autokey which is a subset of the popular Windows program AutoHotKey.

ABOUT XDOTOOL

The xdotool is probably the most useful of the commands when you need to take over GUI programs. It is sort of a Swiss Army knife of X manipulation. However, the command line syntax is a bit difficult and that's likely because the tool can do lots of different things. Most of the time I interested in its ability to move and resize windows. But it can also send fake keyboard and mouse input, and it can bind actions to things like mouse motion and window events.

Although you can make the tool read from a file, you most often see the arguments right on the command line. The idea is to find a window and then apply things to it. You

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can find windows by name or use other means such as letting the user click on the desired window.

For example, consider this:

```
echo Pick Window; xdotool selectwindow type "Hackaday"
```

If you enter this at a shell prompt, you can click on a window and see the given string appear as if it were typed there by the user. The tools is also capable of sending mouse events and performing a multitude of window operations like changing window focus, changing which desktop is shown, etc.

By the way, some of xdotool's features require the XTest extension to your X server. I've always found this turned on, but if things aren't working, you'd want to check your X server log to see if that extension is loaded.

WHAT ABOUT WMCTRL?

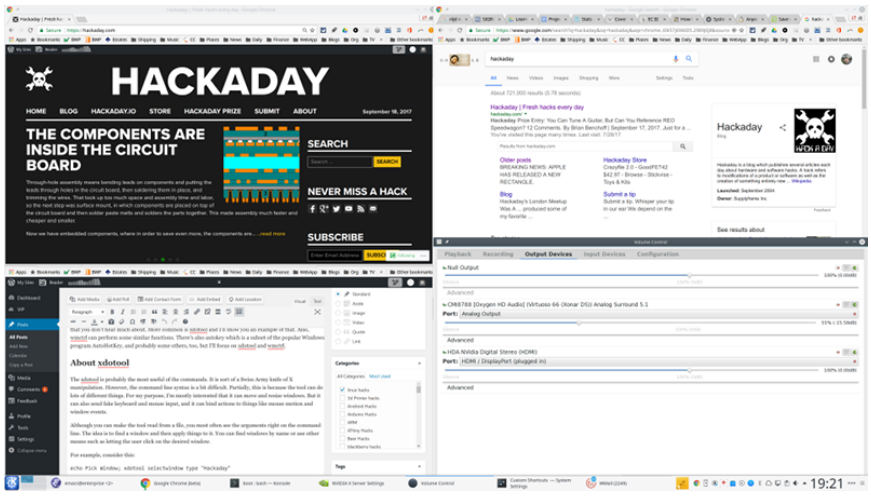
The wmctrl program has a lot of similar functions but mostly interacts with your window manager. The only problem is, it uses a standard interface to your window manager and not all window managers support all features. This is one of those things that makes distributing programs for Linux so exciting. No two systems are alike and some aren't even close!

The wmctrl program shines when you want to do things like switch desktops, maximize windows, and related tasks. However, it can do many of the tasks that xdotool can do, as well.

USING A BIG MONITOR

I recently switched out my three-monitor setup for a very large 4K monitor. The 43-inch behemoth has a resolution of 3840×2160. That's great, but I did miss being able to put one program on one monitor and a second (or third) program on another monitor.

The answer was to get the windows to slide into certain positions on the screen. You could use a tiled window manager, but I use KDE (which no longer has a tiling option). It will snap windows to certain positions if you drag them to just the right spot, but that's not very fast. Also, the snap areas were not all where I wanted them.



My original thought was just to use xdotool and map some keys using KDE's shortcuts. Control+Alt+1 could snap the current window to the top left of the screen and Control+Alt+0 could maximize. Control+Alt+6 would eat up the right half of the screen and Control+Alt+8 would take up the top half.

My first attempt at creating the Control+Alt+1 shortcut looked like this:

```
xdotool getwindowfocus windowmove 0 0 windowsize 1920 1080
```

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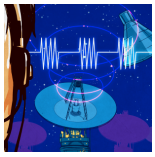

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The idea is to find the current window, move it to 0,0 and then make it take up a quarter of the screen. Sure, the hardcoded numbers aren't great, but it works for a single machine set up. You can set the size to 50% 50%, if you prefer. That makes sense for this one, but for the other macros where the position isn't 0,0 you have to use a hardcoded number anyway.

The first problem was that — in some cases — the moving wasn't working every time. Reversing the size and the move took care of that.

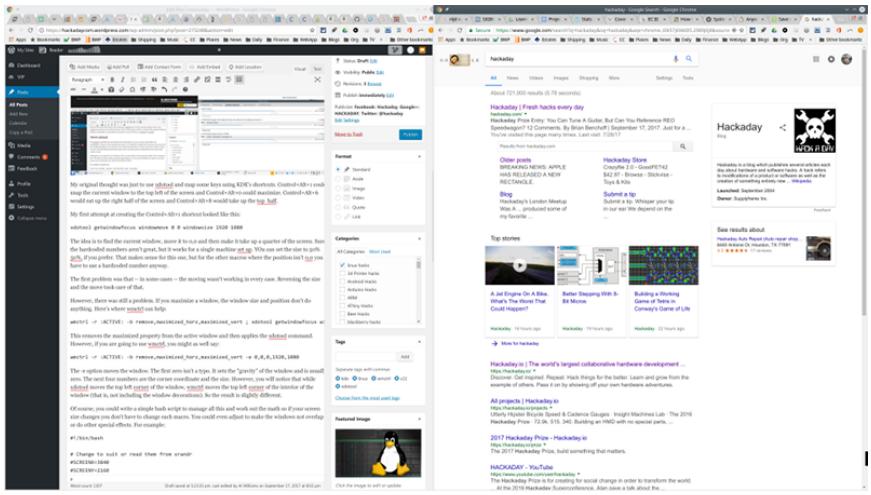
However, there was still a problem. If you maximize a window, the window size and position values don't do anything. Here's where wmctrl can help:

```
wmctrl -r :ACTIVE: -b remove,maximized_horz,maximized_vert ; xdot
```

This removes the maximized property from the active window and then applies the xdotool command. However, if you are going to use wmctrl, you might as well say:

```
wmctrl -r :ACTIVE: -b remove,maximized_horz,maximized_vert -e 0,0
```

The -e option moves the window. The first zero isn't a typo. It sets the "gravity" of the window and is usually zero. The next four numbers are the corner coordinate and the size. However, you will notice that while xdotool moves the top left corner of the window, wmctrl moves the top left corner of the interior of the window (that is, not including the window decorations). So the result is slightly different.



Of course, you could write a simple bash script to manage all this and work out the math so if your screen size changes you don't have to change each macro. You could even adjust to make the windows not overlap or do other special effects. For example:

```
#!/bin/bash

# Change to suit or read them from xrandr
#SCREENX=3840
#SCREENY=2160

# If you don't have xrandr, awk, or yours doesn't put the
# format out, just hardcode up top
SCREENX=`xrandr -q | awk -F'[ ,]+' '/current/ { print $8
SCREENY=`xrandr -q | awk -F'[ ,]+' '/current/ { print $10

# Could adjust the actual locations here if you wanted

HALFX=$(( SCREENX/2 ))
HALFY=$(( SCREENY/2 ))

if [ $# -ne 1 ]
then
ARG="?"
else
ARG="$1"
fi
```

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```
case "$ARG" in
nw)
TOP=0
LEFT=0
W=$HALFX
H=$HALFY
;;
n)
TOP=0
LEFT=0
W=$SCREENX
H=$HALFY
;;
ne)
TOP=0
LEFT=$HALFX
W=$HALFX
H=$HALFY
;;
w)
TOP=0
LEFT=0
W=$HALFX
H=$SCREENY
;;
center)
TOP=$(( $SCREENY/4 ))
LEFT=$(( $SCREENX/4 ))
W=$HALFX
H=$HALFY
;;

e)
TOP=0
LEFT=$HALFX
W=$HALFX
H=$SCREENY
;;

sw)
TOP=$HALFY
LEFT=0
W=$HALFX
H=$HALFY
;;


s)
TOP=$HALFY
LEFT=0
W=$SCREENX
H=$HALFY

;;

se)
TOP=$HALFY
LEFT=$HALFX
W=$HALFX
H=$HALFY
;;


*)
echo "Usage: winpos (nw, n, ne, w, center, e, sw, s, se)"
exit 1
;;
esac

# do it
# wmctrl -r :ACTIVE:-b remove,maximized_horz,maximized_ve
# or here's another way (note, this will show title bars
# the above method will cut them off at the top part of s
wmctrl -r :ACTIVE: -b remove,maximized_horz,maximized_ver
xdotool getwindowfocus windowsize $W $H windowmove $LEFT

exit 0
```


With this script, your keyboard macros can just call the script with a tag like “ne” (Northeast) or “center” to control the window position. Any changes are easy to manage in the script instead of spread over multiple macros.

SUMMARY

There's a line in one of the Star Trek movies (the real ones, with William Shatner) where Kirk tells someone that you have to learn how things work on a starship. Linux is much the same. There's not much you can't do if you can only figure out how and wade through the myriad tools that might be what you want. Sometimes it takes a combination of tools and dealing with the infinite variety of configurations is tough, but you can usually make things happen if you try.

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8 THOUGHTS ON "LINUX FU: X COMMAND"

me says:
September 21, 2017 at 10:14 am

I'm sure Wayland will have all these features right? I mean the developers have made it so clear that they intend to keep all that cool functionality that brings some of us to choose Linux/Unix in the first place and not just turn it into yet another boring Windows clone. They are only eliminating stuff that nobody at all is using because... well.. I guess games will run better after that. Right?!?!

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steelman says:
September 21, 2017 at 11:26 am

There is no Wayland. Well there is but it is not a program to run. It is a protocol and a library which implements it. Most development/design efforts went into securing Wayland. The result is the key difference between X and Wayland, in case of the latter, display server and window manager are integrated in a single process.

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Internet says:
September 21, 2017 at 10:27 am

Close. "You have to learn why things work on a starship." is the actual quote.

Autohotkey can do some similar things in a Windows environment.

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Kyle says:

September 21, 2017 at 10:40 am

devilspie is something one could use for controlling windows.

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Nathanael Dale Ries says:
September 21, 2017 at 11:02 am

you can do the same thing in windows without any additional software using the .Net Wscript.Shell

You can even do it through powershell by setting up a com-object.

https://github.com/nathanaelries/Powershell-Caffeine/blob/master/Caffeine.ps1

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Gravis says:
September 21, 2017 at 11:07 am

X11 was great for it's time but now it should be considered an insecure windowing system that uses hacked in hardware acceleration. Wayland is better but not great, so there currently a really good windowing system on Linux. :(

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Clara says:
September 21, 2017 at 11:28 am

I'm curious: what do you mean by "Wayland is better but not great"? What do you think it should do better?

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steelman says:
September 21, 2017 at 11:21 am

There are so called tiling window managers. Awesome is my favorite.

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