Wine & Windowing

An Impedance Mismatch

by Arek Hiler

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ivyl @ libera & oftc

The Layering

Win32
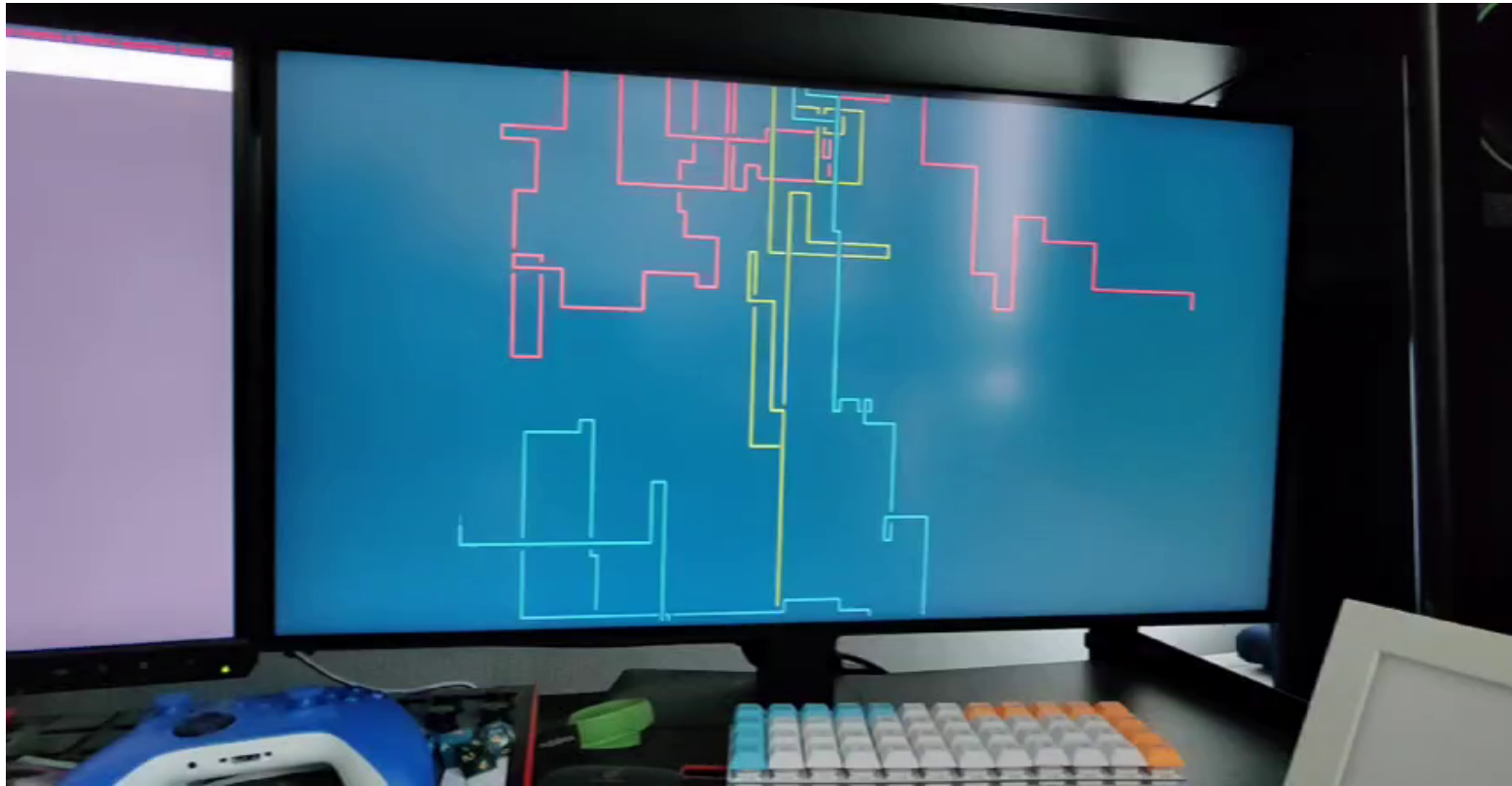
38 years of backwards compatible cruft

X11

39 years of backwards compatible cruft

winex11.drv

Let's Talk About Modesetting

(that's a video showing modeset in non-PDF version)

Fullscreen Hack

- never modeset

- image scaling

- letter- / pillar- boxing

- vulkan shader for scaling

```
dlls/winex11.drv/Makefile.in     |    1 +
dlls/winex11.drv/desktop.c       |    6 +-
dlls/winex11.drv/display.c       |   42 +-
dlls/winex11.drv/event.c         |   18 +-
dlls/winex11.drv/fs.c            |  971 ++++++++++++++++++++++++++++++++++
dlls/winex11.drv/graphics.c      |    3 +-
dlls/winex11.drv/init.c          |    6 +-
dlls/winex11.drv/mouse.c         |   46 +-
dlls/winex11.drv/opengl.c        | 1272 +++++++++++++++++++++++++++++++++++++++-
dlls/winex11.drv/vulkan.c        |  135 +++++
dlls/winex11.drv/window.c        |  242 ++++++++-
dlls/winex11.drv/x11drv.h        |   48 ++
dlls/winex11.drv/x11drv_main.c   |   11 +-
dlls/winex11.drv/xrender.c       |  136 ++++-
dlls/winex11.drv/xvidmode.c      |   22 +-
15 files changed, 2882 insertions(+), 77 deletions(-)
```

```
dlls/winevulkan/loader.c          |   54 +-
dlls/winevulkan/make_vulkan       |   16 +-
dlls/winevulkan/vulkan.c          | 1007 ++++++++++++++++++++++++++++++++++++++++
dlls/winevulkan/vulkan_loader.h   |   24 +
dlls/winevulkan/vulkan_private.h  |   43 ++
5 files changed, 1126 insertions(+), 18 deletions(-)
```

- not (that) necessary with XWayland

- X11 is still everywhere

- downstream, specific to Proton

Let's Talk About XWayland

```c
Pixmap pixmap = XCreatePixmap(display, window, 20, 20, 24);

GLXContext gl_context = glXCreateContext(display, visual_info,
                                         NULL, GL_TRUE);

glXMakeCurrent(display, window, gl_context);

GC gc = XCreateGC(display, window, 0, NULL);
```

GlColor3b(100, 0, 0); /* red */

```
glBegin(GL_QUADS);
glVertex2f(-1.0f, 1.0f);
glVertex2f(1.0f, 1.0f);
glVertex2f(1.0f, -1.0f);
glVertex2f(-1.0f, -1.0f);
glEnd();
```
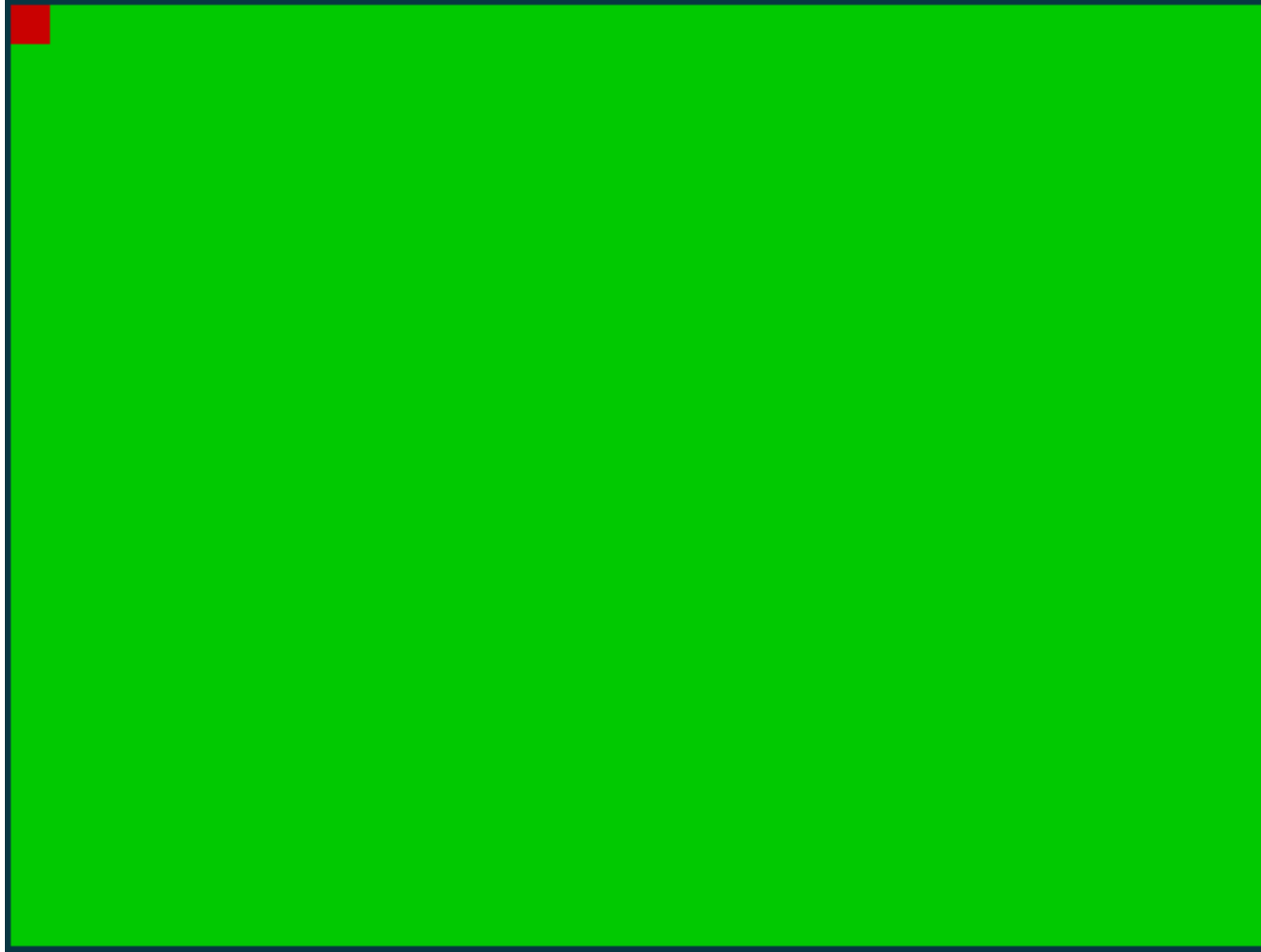
```
glXSwapBuffers(display, window);
```

```
XCopyArea(display, window, pixmap, gc, 0, 0, 20, 20, 0, 0);
XCopyArea(display, pixmap, window, gc, 0, 0, 20, 20, 0, 0);
```

?

```
XCopyArea(display, window, pixmap, gc, 0, 0, 20, 20, 0, 0);
XCopyArea(display, pixmap, window, gc, 0, 0, 20, 20, 0, 0);
```

Horrible Horrible Flicker

QtWebEngine
OpenGL rendering

BitBlt() 2x2 square every 1s
translated to XCopyArea()

workaround
LIBGL_ALWAYS_SOFTWARE=1

reported against gamescope

Let's Talk About WMs

Window Manager Specification Project

The Window Manager Specification is meant to unify the GNOME and KDE window manager hint conventions. Most of the design work takes place on *wm-spec-list@gnome.org*; you can subscribe to this list at http://mail.gnome.org/mailman/listinfo/wm-spec-list. To post without subscribing, subscribe to the no-traffic *post-only@gnome.org* list.

Mailinglist

You can find archives of the WM spec list here.

Repository

wm-spec is included with other freedesktop.org Specifications in the xdg-specs git repo.

- wm-spec history:
  - http://cgit.freedesktop.org/xdg/xdg-specs/log/wm-spec/
- Browse xdg-specs repo:
  - http://cgit.freedesktop.org/xdg/xdg-specs/
- Clone:
  - git://anongit.freedesktop.org/xdg/xdg-specs
  - ssh://git.freedesktop.org/git/xdg/xdg-specs
  - http://anongit.freedesktop.org/git/xdg/xdg-specs.git

Spec

- Version 1.3 - html (one page) - html (multiple pages) - xml
- Version 1.4.draft-2 - html (one page) - html (multiple pages) - xml

2022-October Archive by Thread

Messages are ordered newest-to-oldest in this index. The newest threads will be at the top of this page, the oldest will be at the bottom.

Within a single thread, the first mail note is the START of the thread; the notes following that are in the chronological order of when they were received. So globally, newest messages are at the top, but within a thread, the oldest (the start of the thread) is at the top.

If you think about it, it is confusing. Just go with the flow and everything will be all right.

- **Announcement: this mailing list will be retired by the end of Oct 2022**, *Andrea Veri*

wm-spec

date -> pubdate, so it appears in the HTML-generated pages •••

David Faure authored 9 years ago

e9be1b76

master ⌄

History   Find file   Edit ⌄

xdg-specs / wm-spec /   + ⌄

Copy SSH clone URL

Name	Last commit	Last update
..		
📄 Makefile	Add a Makefile for wm-spec	11 years ago
📄 wm-spe...	date -> pubdate, so it appears in the HTM...	9 years ago

- wm-spec

  - **version 1.5 ([one page](), [split pages]())**
  - [version 1.4]()
  - [version 1.3]()
  - [version 1.2]()
  - [version 1.1]()

- xembed-spec

  - **version 0.5 ([one page](), [split pages]())**

- xsettings-spec

wm-spec: update / redirect FDO wiki

Edit   Close issue   ⋮

☐ Open ☐ Issue created 55 minutes ago by **Arkadiusz Hiler**

https://www.freedesktop.org/wiki/Specifications/wm-spec/ is the first result that comes up when using DuckDuckGo, Mojeek and Google. It's outdated and misleading in many ways:

1. creates illusion that a draft of 1.4 is the latest version
2. mentions a defunct way of contributing (https://mail.gnome.org/archives/wm-spec-list/2022-October/msg00000.html)
3. link to the cgit repos instead of here
4. most links in supporter sections go to pages that are no longer there
5. claims to be `Last edited Fri May 7 01:22:37 2021` which would suggest that it's still fairly up to date

It's not clear if wm-spec is considered a done deal of if there's still a way of contributing / rising issues about unclear spec.

Let's Talk About Mutter

```c
static void map_window( HWND hwnd, DWORD new_style )
{
    /*...*/
    update_net_wm_states( data );
    sync_window_style( data );
    XMapWindow( data→display, data→whole_window );

    /* Mutter always unminimizes windows when handling map requests.
       Restore iconic state */
    if (new_style & WS_MINIMIZE)
        XIconifyWindow( data→display,
                        data→whole_window,
                        data→vis.screen );
    /*...*/
}
```

```c
static BOOL X11DRV_FocusIn( HWND hwnd, XEvent *xev )
{
    /* Focus was just restored but it can be right after super was
     * pressed and gnome-shell needs a bit of time to respond and
     * toggle the activity view. If we grab the cursor right away
     * it will cancel it and super key will do nothing.
     */
    if (event→mode == NotifyUngrab && wm_is_mutter(event→display))
    {
        LARGE_INTEGER timeout = {.QuadPart = 100 * -10000};
        NtDelayExecution( FALSE, &timeout );
    }
}
```

Let's Talk About KWin

```c
static HWND sync_window_position( struct x11drv_win_data *data,
                                  UINT swp_flags,
                                  const RECT *old_window_rect,
                                  const RECT *old_whole_rect,
                                  const RECT *old_client_rect )
{
    /*...*/
    /* KWin doesn't allow moving a window with
     * _NET_WM_STATE_FULLSCREEN set. So we need
     * to remove _NET_WM_STATE_FULLSCREEN before
     * moving the window and restore it later */
    if (wm_is_kde( data→display )
        && NtUserIsWindowRectFullScreen( &data→whole_rect ))
    /*...*/
}
```

Let's Talk About Mutter

DIGITAL MARKETING

DIGITAL MARKETING

_NET_WM_FULLSCREEN_MONITORS

- This hint might [...] be used by a movie or presentation application allowing users to display the media spanned over several monitors.

- A read-only list of 4 monitor indices indicating the top, bottom, left, and right edges of the window when the fullscreen state is enabled. The indices are from the set returned by the Xinerama extension.

_NET_WM_FULLSCREEN_MONITORS

- imposes constraints, e.g. window can't be moved to another monitor by using the Shift+Super+Arrows

- it can't be unset

Let's Talk About Focus Stealing Prevention

```
HWND hWnd = CreateWindowExW(WS_EX_APPWINDOW | WS_EX_WINDOWEDGE,
                            L"Nomad", L"Dunia", WS_POPUP,
                            0,0, 1,1, NULL, NULL, hInstance, NULL);

ShowCursor(TRUE);
ShowWindow(hWnd, SW_NORMAL);
ShowWindow(hWnd, SW_MINIMIZE);

Sleep(2000); /* game init */
ShowWindow(hWnd, SW_RESTORE);

Sleep(2000); /* more stuff happening */
SetWindowPos(hWnd, NULL, 0, 0, 1920, 1080,
             SWP_NOOWNERZORDER | SWP_DRAWFRAME | SWP_NOZORDER);

Sleep(2000); /* even more things */
SetForegroundWindow(hWnd);
```

"This cosmic dance of bursting decadence and withheld permissions twists all our arms collectively, but if sweetness can win, and it can, then I'll still be here tomorrow to high-five you yesterday, my friend. Peace."

- Royal Tart Toter, Adventure Time

Yeah, nah...

If I was WM I would also find this suspicious…

Let's talk about Gamescope

Gamescope

- Designed for games.

- Has its own quirks.

- XWayland.

- We expose GWL_STYLE and GWL_EXSTYLE as X11 properties and gamescope understands those.

- Used to make better informed decisions which window to focus / put in the foreground.

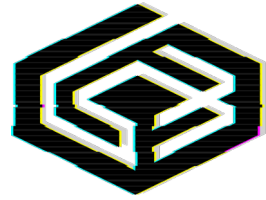- Used for handling transparent / layered Windows.

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Summary

- Any change to winex11.drv's core can cause a butterfly effect.

- We use X11 in ways that are underdefined.

- Impossible to get things exactly right without more exensions / WMs involvement.

- We try to make things as usable as possible with as few quirks as possible.

Thanks!

Questions?