

Embedded Xorg

The (Non) Requirements for Embedded Hardware



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Past and Present...

KDrive

- Very lightweight
 - (~2 MB RSS)
- Lacking support for modern extensions.
- Also lacking in active development.
- KDrive has served us well in the past (N8xx) however it's time to move on.

Xorg

- Not quite so lightweight.
 - (> 12 MB RSS)
- Supports the modern shiny extensions.
- Xorg is our server of choice
 - However, it's not without problems.
- **Active development community.**

Fitting Xorg on Embedded

- Several features are not needed on embedded HW.
- Xorg has already been shrinking.
 - Xorg: ~505 KLOC + Drivers
 - KDrive: ~285 KLOC
 - ```
$ git diff --stat xorg-server-0_99_1 composite/ config/ damageext/ dbe/ dix/ doc/ exa/ fb/ glx/ hw/xfree86/ include/ mi/ miext/ os/ randr/ record/ render/ test/ Xext/ xfixes/ Xi/ xkb/ | tail -n 1
```

  
1396 files changed, 151574 insertions(+), 365341 deletions(-)
- Nowadays a basic Xorg configuration for a tiny device looks like:
  - --disable-dga
  - --disable-dri
  - --disable-glx (N900 case)
  - --disable-ipv6 (-nolisten)
  - --disable-xinerama
  - --disable-xaa
  - --disable-xfree86-utils
- But we can still do better...

# Configuring the Server

- Different goals for same codebase: desktop vs embedded.
- Adding further configure options for fine-grained configuration,
- But this can hurt us in the long run:
  - No one is going to test every possible configuration builds, let alone runs correctly.
  - configure.ac becomes an (even bigger) mess of dependency checking...
  - Probably a necessary evil as integrating different configuration solutions with autotools is likely to be very difficult.
    - Kconfig based?
- Using Tinderbox for build & run verification?
  - Needs a lot of different hardware for run testing to be reliable...
  - All the builds could be done on a single fairly powerful box.

# Configuring the Server

- Cleaning up dependencies between the internal subsystems.
- Hey, but why are these still here?

|              |         |                    |
|--------------|---------|--------------------|
| libpciaccess | 48 kB   |                    |
| libdl        | 44 kB   | loader uses dlopen |
| libXau       | 40 kB   |                    |
| libXdmcp     | 48 kB   |                    |
| libcrypto    | 1232 kB | hashing only?      |
| librt        | 60 kB   |                    |
| libz         | 96 kB   |                    |
| libdbe       | 48 kB   | xserver module     |
| librecord    | 56 kB   | xserver module     |

– values got with `/proc/`pidof Xorg`/smaps`

# But we can do much more!

- X86emu
- VGAhw
- DDC
- Ramdac
- VBE
- i2c
- XACE extension
- other network layers
- cursor and ptrveloc
- mostly authentication hooks for clients
- etc

# And even more!

```
tiago@cachaca:~/git/fdo/xserver/hw/xfree86/common$ wc -l xf86Bus.c
xf86Configure.c xf86DGA.c xf86fbBus.c xf86noBus.c xf86pciBus.c
xf86sbusBus.c xf86ShowOpts.c xf86VGAarbiter.c xf86VidMode.c xf86xvmc.c
 683 xf86Bus.c
 885 xf86Configure.c
1222 xf86DGA.c
 94 xf86fbBus.c
 65 xf86noBus.c
 423 xf86pciBus.c
 688 xf86sbusBus.c
 128 xf86ShowOpts.c
1178 xf86VGAarbiter.c
 67 xf86VidMode.c
 29 xf86xvmc.c
6262 total
```

# Thinking Embedded

- Until now we haven't been thinking about embedded HW. e.g:
- **RandR**: Rotation happens infrequently on desktop/laptop systems, but can happen very frequently on embedded devices:
  - On the N900, every time you receive/end a phone call and must be as inexpensive as possible:
    - Extra exposes and reconfigures cause redrawing, which takes time.
- **Screensaver**: Support for external screensaver and blanking control:
  - Daemon controls the screensaver and blanking via sending D-Bus signals to the server. Simple and easy due to existing D-Bus framework.
  - Daemon also handles screen brightness, dimming timeout, etc.
  - Probably useful on other embedded systems, too.

**Questions?**

# Questions?

# Thanks!

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