



X Acceleration that Finally Works

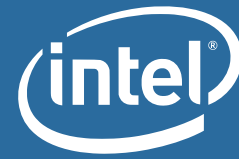
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X Graphics

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 linux.conf.au
MELBOURNE 2008
X Acceleration that Finally Works



xconsole

root@:-

xterm



xman

Manual Browser
Help Quit
Manual Page

X Graphics Rock



xlogo



Manual Page

Options Sections The current manual page is: xset(x).

XSET(1) XSET(1)

NAME
xset - user preference utility for X

SYNOPSIS
xset [-display *display*] [-b] [b on/off] [b [*volume* [*pitch* [*duration*]]] [[-]bc] [-c] [c on/off] [c [*volume*]] [[+]-dpms] [dpms *standby* [*suspend* [*off*]]] [dpms *force* *standby/suspend/off/on*] [[+]-fp[+]=] [*path*,*path*,...] [fp *default*] [fp *rehash*] [[-]led [*integer*]] [led on/off] [m[ouse] [*accel_mult*/*accel_div*] [*threshold*]] [m[ouse] *default*] [p *pixel color*] [[-]r [*keycode*]] [r on/off] [r *rate delay*] [rate]] [s [*length* [*period*]]] [s *blank/noblink*] [s *expose/noexpose*] [s on/off] [s *default*] [s *activate*] [s *reset*] [q]

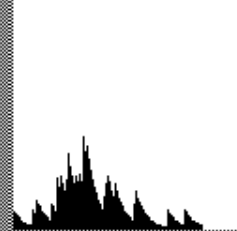
DESCRIPTION
This program is used to set various user preference options of the display.

OPTIONS
-display *display*
This option specifies the server to use; see *X(7)*.

b The **b** option controls bell volume, pitch and duration. This option accepts up to three numerical parameters, a preceding dash(-), or a 'on/off' flag. If no parameters are given, or the 'on' flag is used, the system defaults will be used. If the dash or 'off' are given, the bell will be turned off. If only one numerical parameter is given, the bell volume will be set to that value, as a percentage of its maximum. Likewise, the second numerical parameter specifies the bell pitch, in hertz, and the third numerical parameter specifies the duration in milliseconds. Note that not all hardware can vary the bell characteristics. The X server will set the characteristics of the bell as closely as it can to the user's specifications.

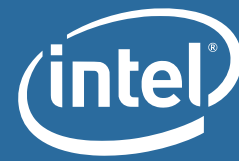
bc The **bc** option controls *bug compatibility* mode in the server, if

naobook



```
Dec 5 23:55 octave-bug-2.1.72
Dec 5 23:55 octave-bug -> octave-bug-2.1.72
Dec 5 23:55 octave-2.1.72
Dec 5 23:55 octave -> octave-2.1.72
Dec 5 23:55 mkoctfile-2.1.72
Dec 5 23:55 mkoctfile -> mkoctfile-2.1.72
Dec 5 23:55 ncgen
Dec 5 23:55 ncdump
Dec 5 23:55 blas-config
Dec 9 12:31 oneko
Dec 9 13:56 neko -> oneko
Dec 13 21:54 unrar
Jan 29 20:23 xdaliclock
Feb 15 23:08 xsetroot
Feb 15 23:11 oclock
Feb 15 23:11 xconsole
Feb 15 23:19 xcalc
Feb 15 23:19 xbiff
Feb 15 23:20 xset
Feb 15 23:20 xman
Feb 15 23:20 xeyes
Feb 15 23:20 .
creenshot
```

Problem Space



Core Xlib drawing primitives

- Solid fills
- Bitwise raster operations
- Non-antialiased lines/arcs
- Server-side fonts

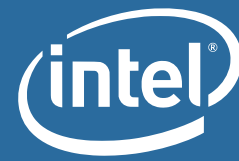


Render extension primitives

- Image compositing
- Client-side font support
- Trapezoid rasterization
- Gradients



Past attempts



XAA

- fills, copies, stipple fills, bresenham lines
- 2D rectangular memory manager
- almost no pixmap caching



KAA

- fills, copies
- linear memory manager
- caches all pixmaps

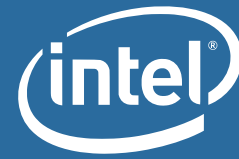


EXA

- fills, copies, textured blending
- linear memory manager
- caches all pixmap, migration heuristics



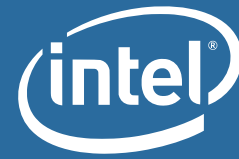
Hardware



Graphics device support

- Provides fills, copies, textured blending
- Has no local memory
- Aperture reads still expensive
- GART binding is cheap

Recent Work



TTM

- kernel graphics memory manager
- buffer objects
- fences



EXA with TTM

- fills copies, textured blending
- all pixmapes in buffer objects
- migration by GART binding

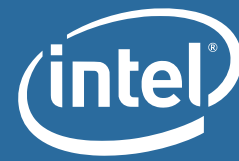


965 Render acceleration

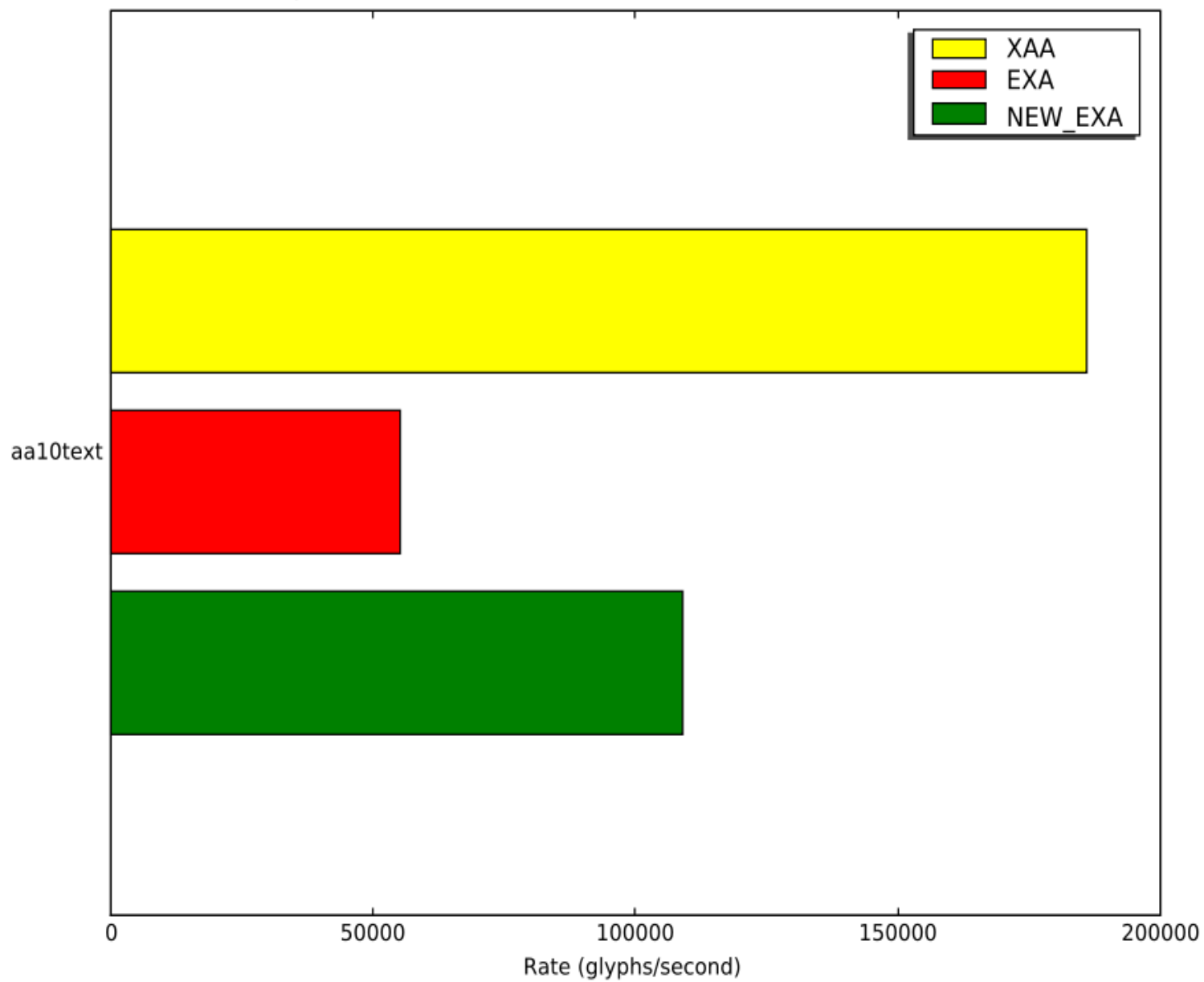
- Accumulates operations in batchbuffer
- Enumerate all programs and state



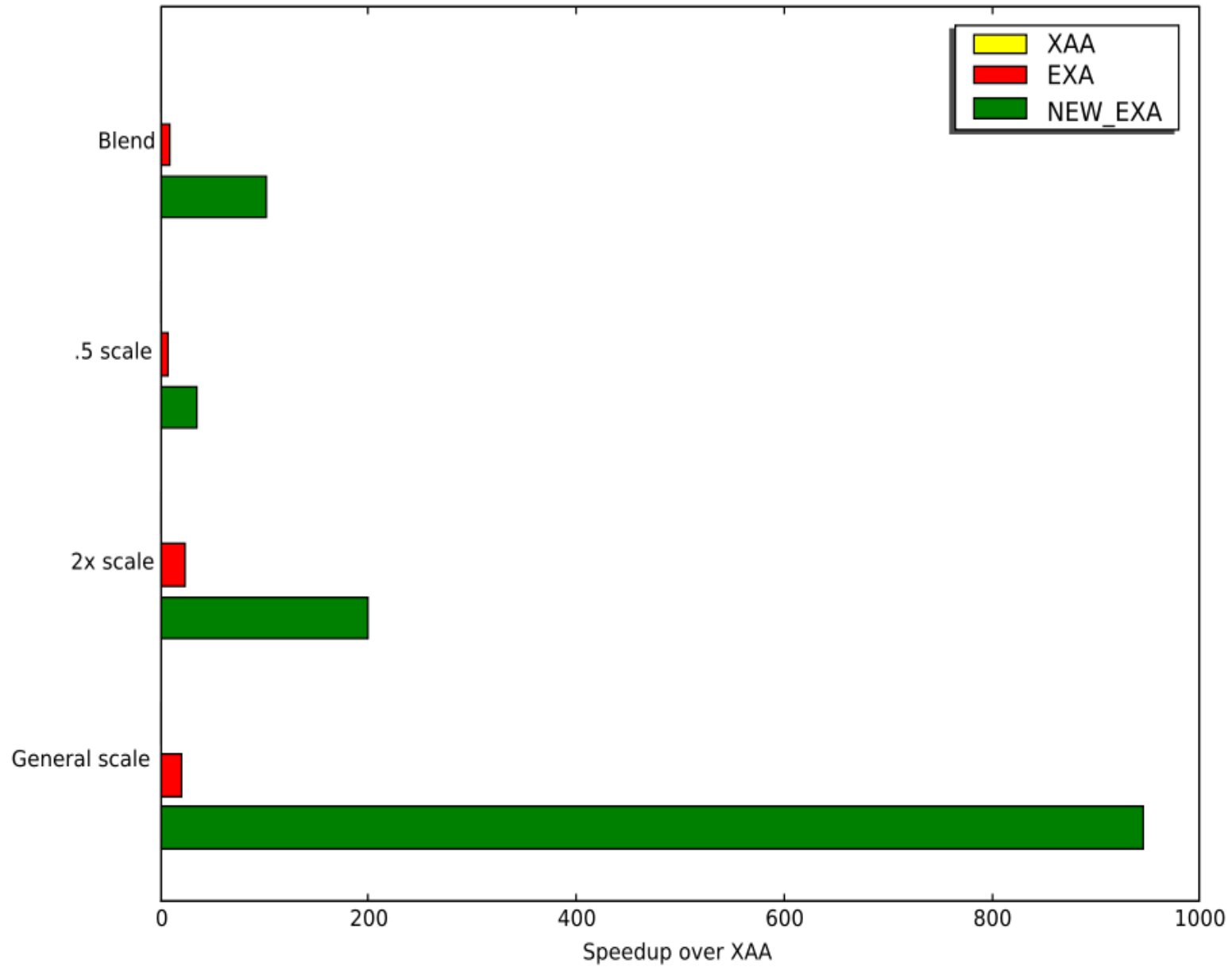
Status



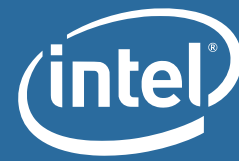
x11perf -aa10text: i965 XAA vs EXA (before and after batchbuffer)



Renderbench: i965 XAA vs. EXA (before and after batchbuffer)



Demo



Future work

- Cache flushing reduction
- Surface state caching
- Gradients acceleration

