Where does accessibility plug into the graphical desktop stack?

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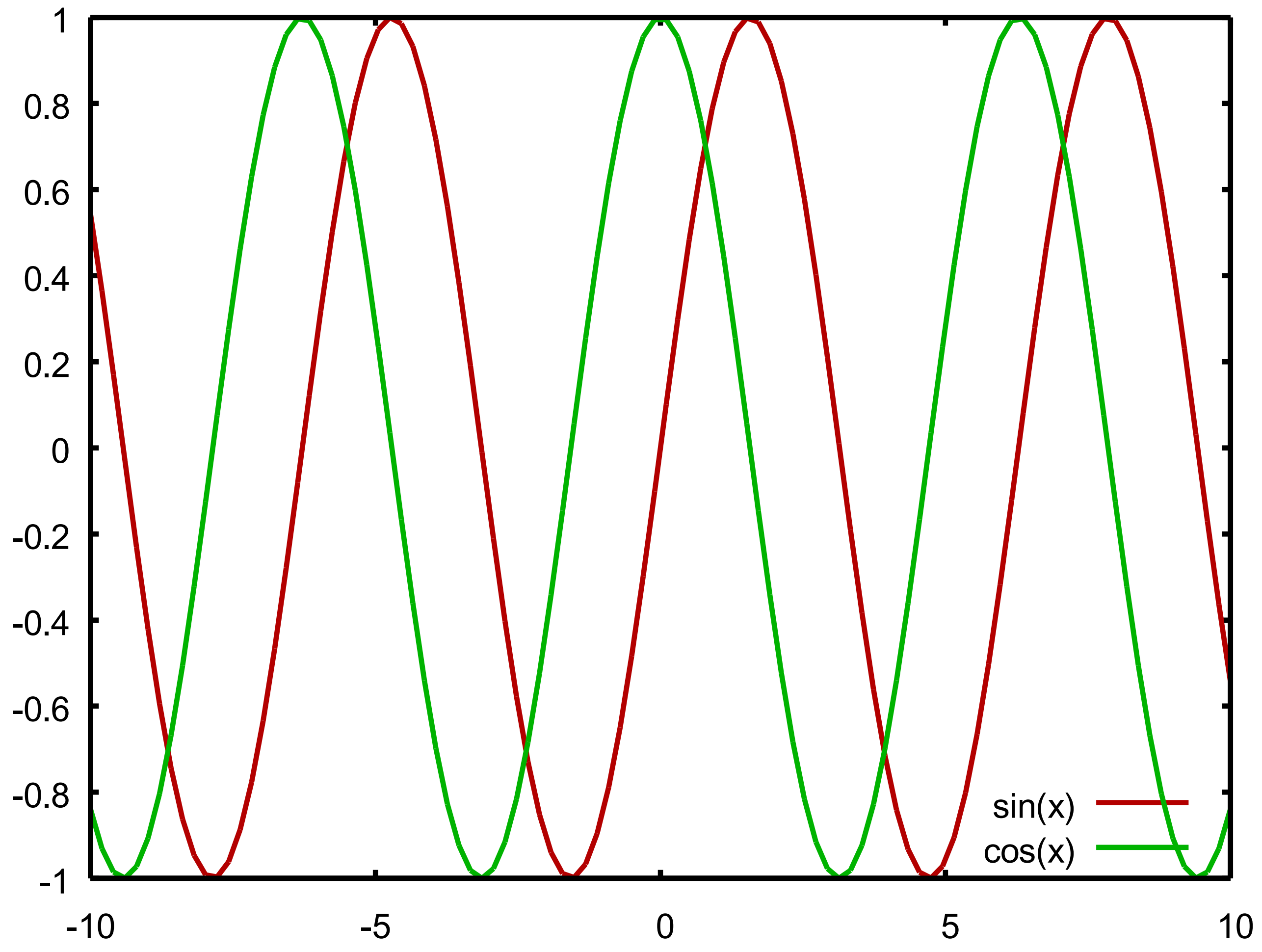
Slides & stuff on http://brl.thefreecat.org/
http://liberte0.org/

Outline

- Introduction to accessibility
- Story of an 'a'
- Input side
- Output side

Gnuplot



Color blindness: 8% male, 0.5% female

What is accessibility?

AKA a11y

Usable by people with specific needs

- Blind
- Low vision
- Deaf
- Colorblind
- One-handed
- Cognition (dyslexia, attention disorder, memory, ...)
- Motor disability (Parkinson, ...)
- Elderly

See Accessibility HOWTOs

- You

“Handicap” depends on the situation
and is not necessarily permanent

⡙⠑⠃⠊⠁⠝ Why making GUI accessible?

(when textmode seems so easier to make accessible)

- A lot of stuff is not available in textmode
  - e.g. real javascript support
- Business applications
- Non-tech people need to get help from non-tech people around

Dedicated software?

- e.g. edbrowse, a blind-oriented editor/browser
- Generally a bad idea!
  - Oriented to just one disability
  - Lack of manpower
    - e.g. Web browser
      - javascript/flash/table/CSS support?
    - e.g. An office suite
      - MSOffice/OpenOffice compatibility?
  - Disabled & non-disabled working together
    - Better use the same software

➔ Better make **existing** applications accessible

Design principles

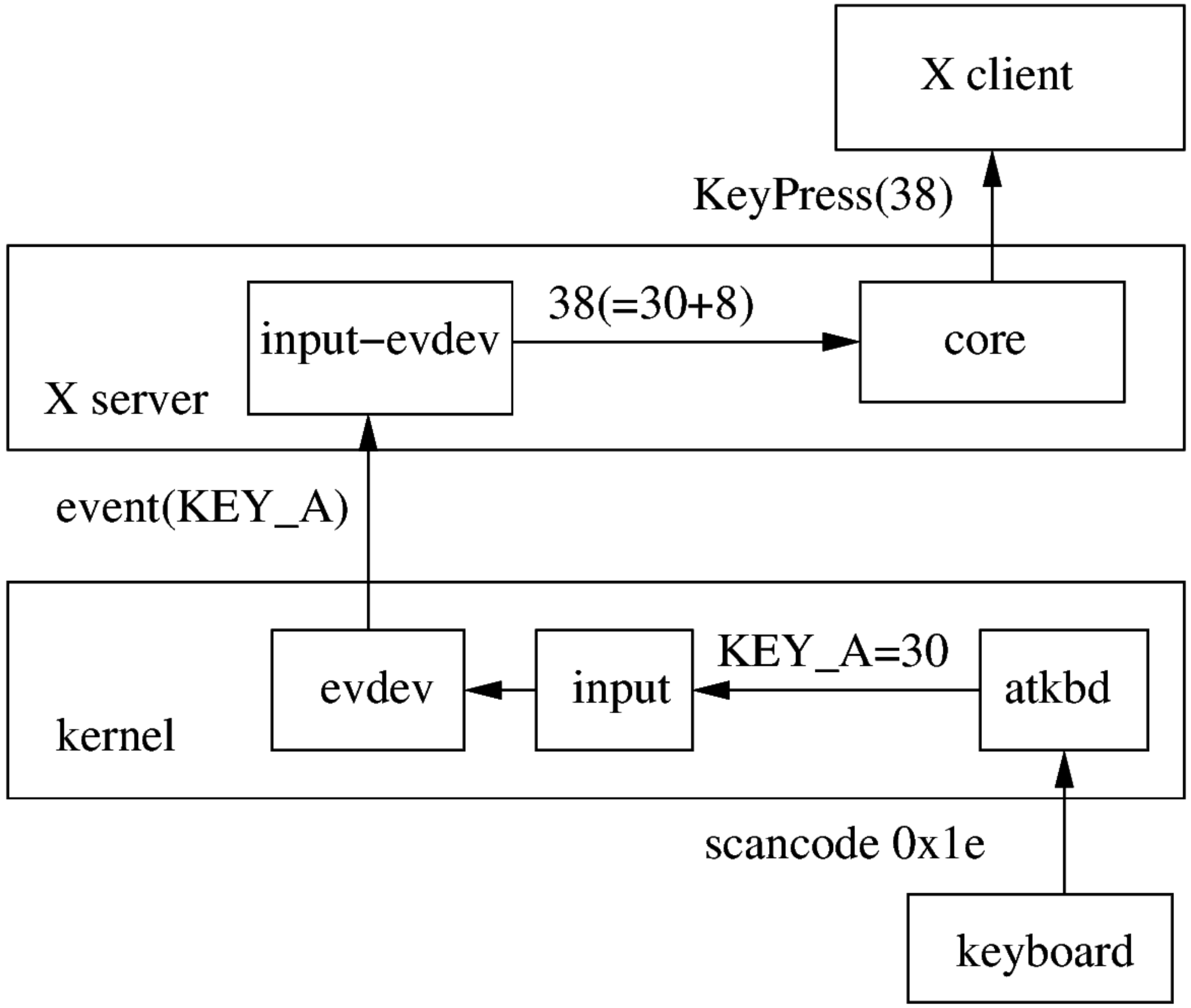
- Same software, made accessible
  - Understand each other, get help, etc.
- Synchronized work
  - Just alternate input/output
  - Being able to work together
- Pervasive
  - Shouldn't have to ask for software installation / configuration

Status in a few words

- Text mode is generally quite well accessible
  - But not so well suited to beginners
- Gnome quite accessible
  - Gnome 3 was however almost a restart-from-scratch
- We're late compared to the Windows world
  - We started less than a dozen years ago
  - They started a couple of decades ago
- We're Stone Age compared to the Apple world
  - Really *good* and *integrated* support

Story of an 'a'

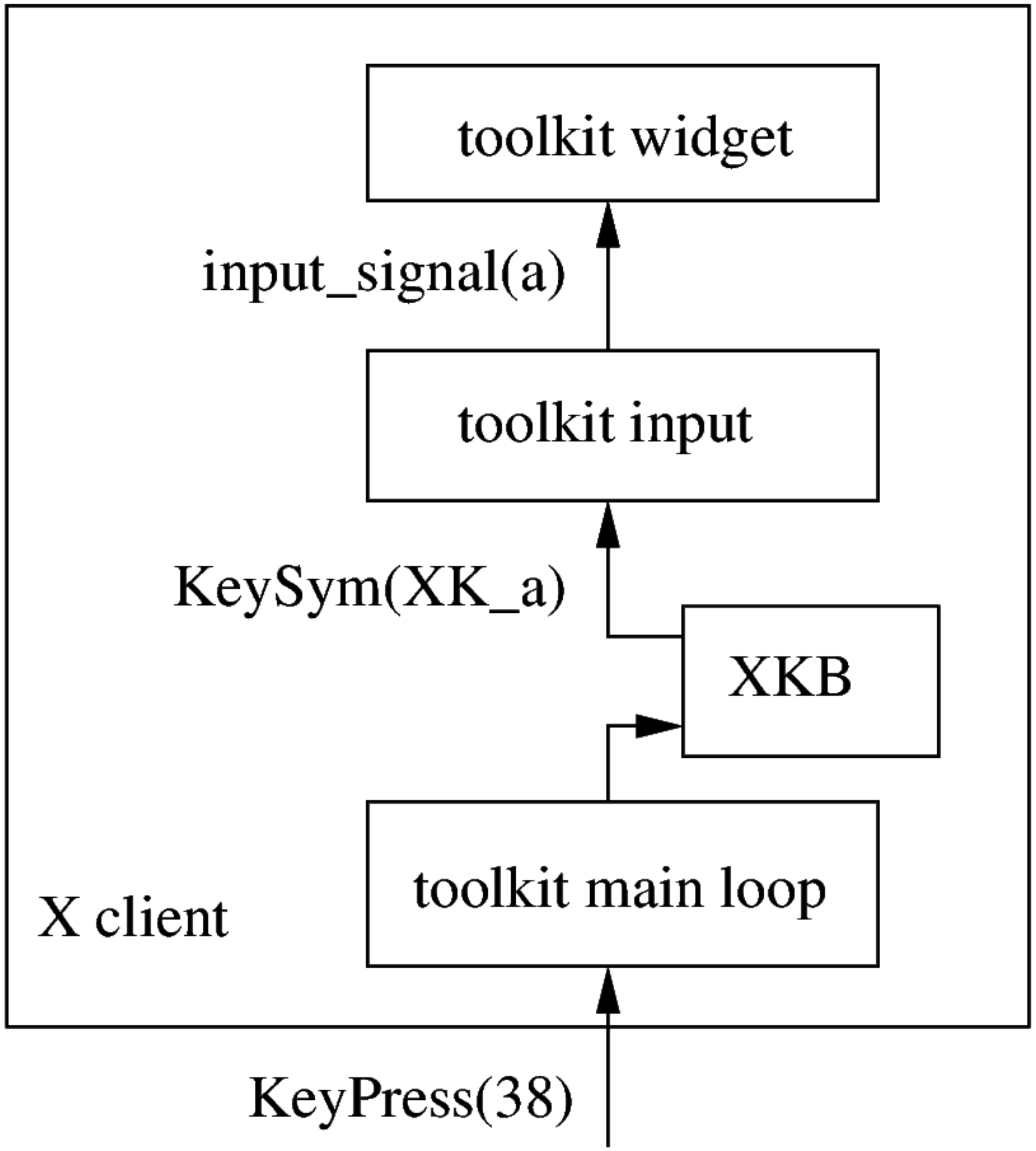
Input



Still a keycode

i.e. physical position

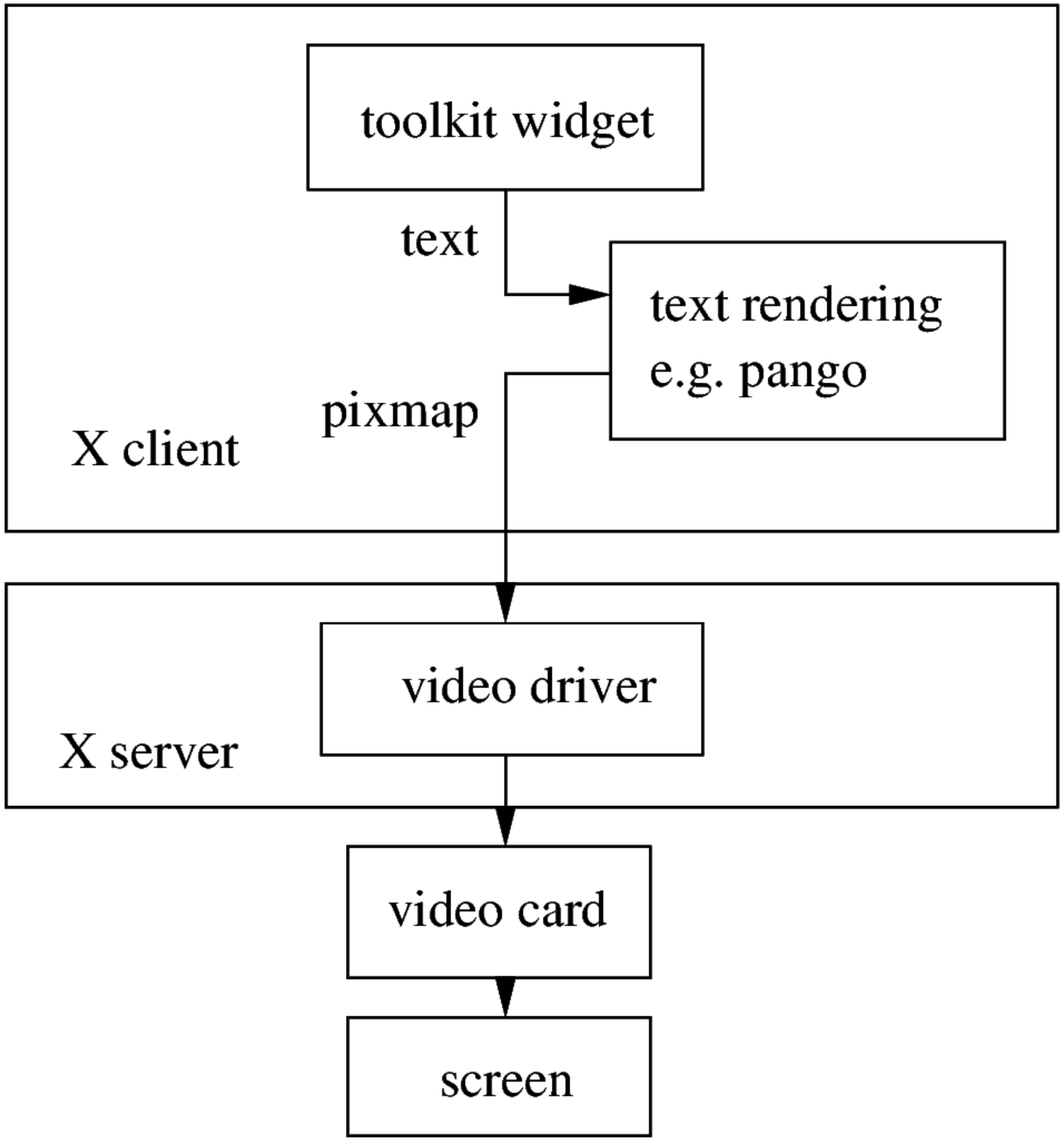
Input



XKB handles turning into keysym, i.e. keyboard cap

Widget eventually has some behavior, e.g. append to text

Output



Pixmap very early!

Not necessarily a screen, actually...

Accessibility in input

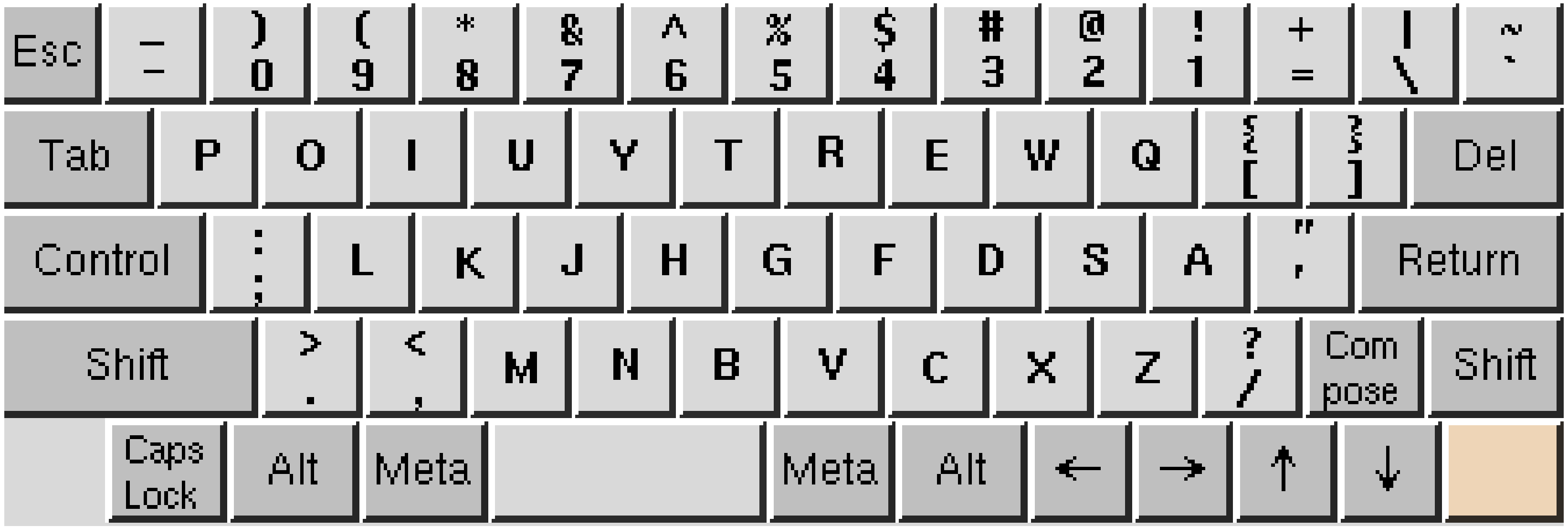
Versatility FTW!

Some people can only use

- A keyboard
  - Keyboard shortcuts, move mouse with it, ...
- A joystick
  - Use it as a mouse
- A mouse or a button
  - Use it on a virtual keyboard
- ...

Keyboard layouts

- One-hand?
  - Would need to move the hand a lot
  - Toggle to “mirror” the keyboard layout


Esc _ -) 0 (9 * 8 & 7 ^ 6 % 5 $ 4 # 3 @ 2 ! 1 + = | \ ~ `
Tab P O I U Y T R E W Q { [}] Del
Control : ; L K J H G F D S A " ' Return
Shift > . < , M N B V C X Z ? / Com pose Shift
Caps Lock Alt Meta Meta Alt ← → ↑ ↓

  - Not sure where to implement it, and layout details

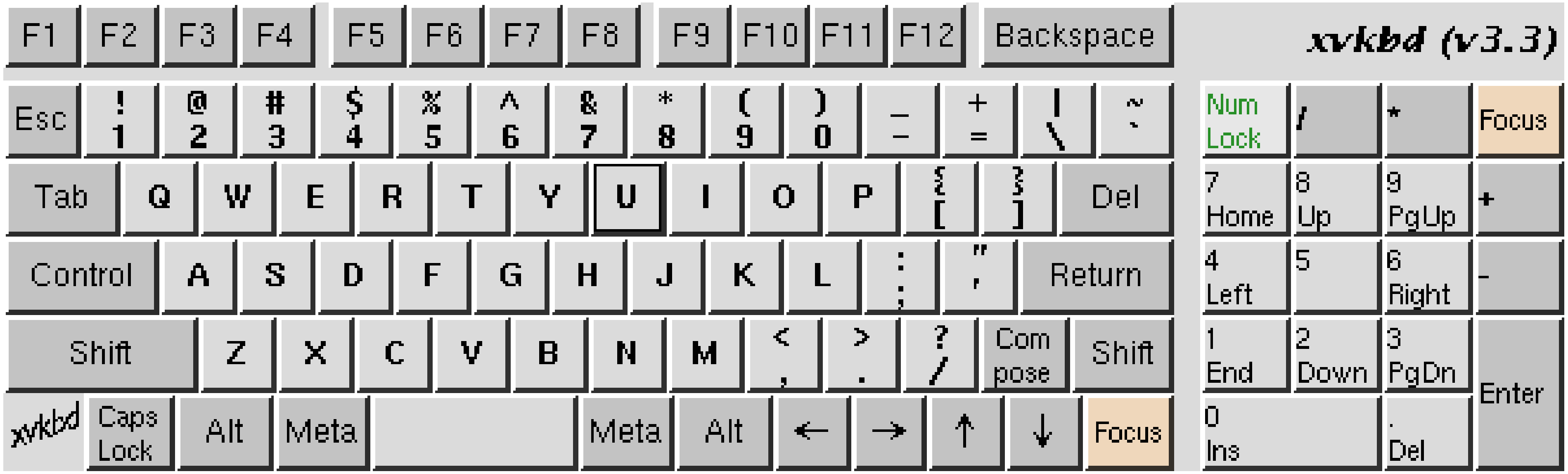
AccessX

Basically fine-tuning

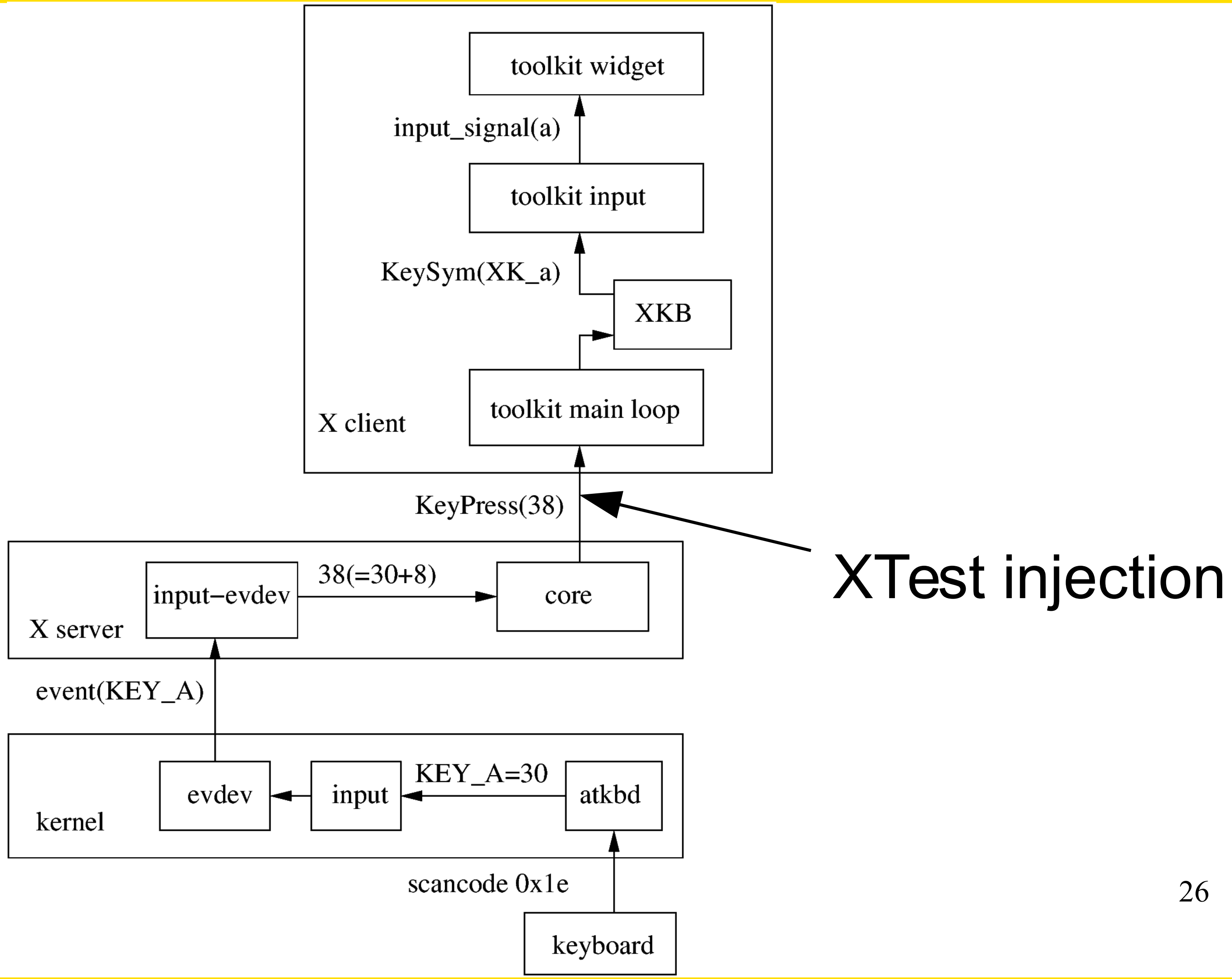
- StickyKeys: modifiers get sticky
- MouseKeys: turn keyboard into mouse
- SlowKeys: require key pressed for some time
- RepeatKeys: slow down repeat
- ToggleKeys: audio alert for toggles
- BounceKeys: delay between strokes
  - E.g. Parkinson

Implemented in XKB in X server & X client

Virtual keyboard


F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12 Backspace
xvkbd (v3.3)
Esc ! 1 @ 2 # 3 $ 4 % 5 ^ 6 & 7 * 8 (9) 0 _ - + = | \ ~ `
Num Lock / * Focus
Tab Q W E R T Y U I O P { [}] Del
7 Home 8 Up 9 PgUp +
Control A S D F G H J K L : ; " ' Return
4 Left 5 6 Right -
Shift Z X C V B N M < , > . ? / Com pose Shift
1 End 2 Down 3 PgDn Enter
xvkbd Caps Lock Alt Meta Meta Alt ← → ↑ ↓ Focus
0 Ins . Del

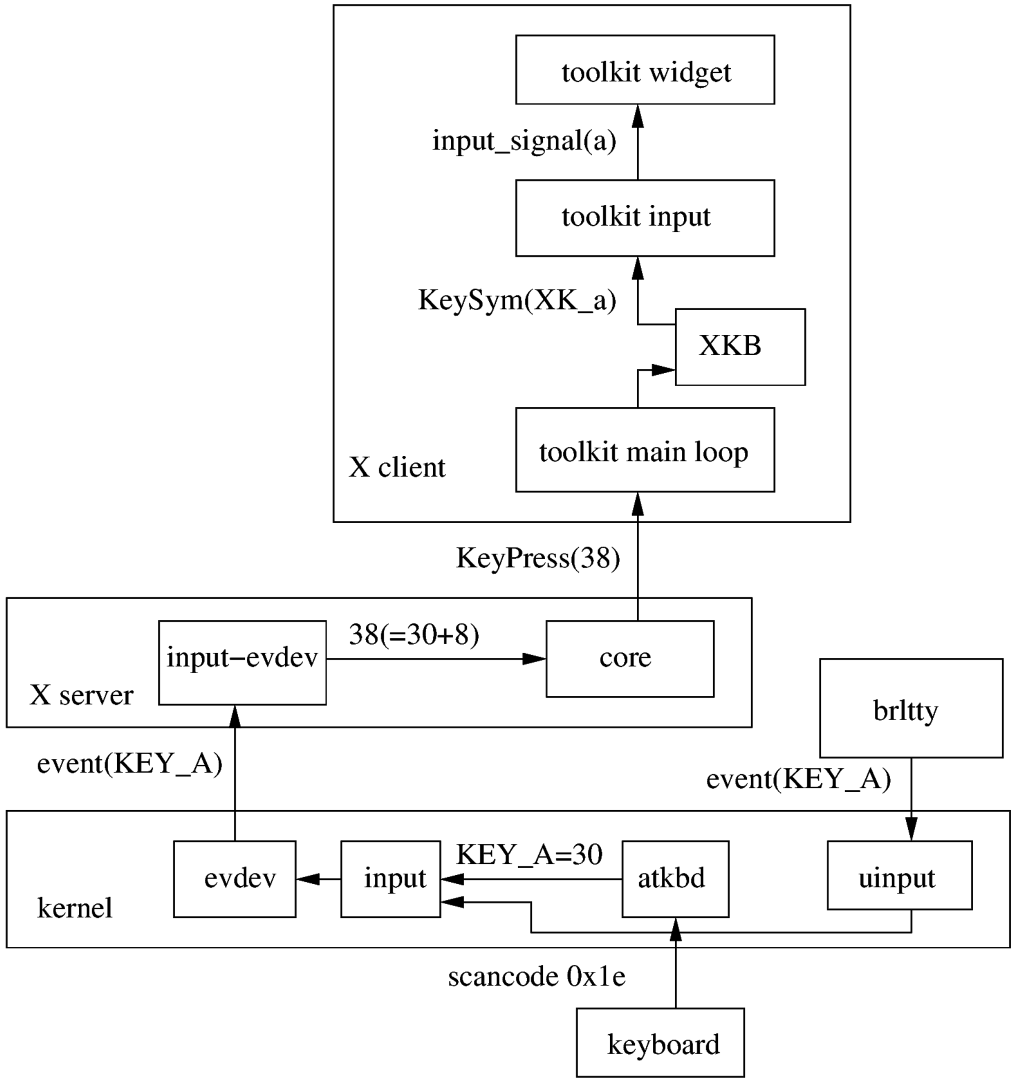
Virtual keyboard



Braille keyboards

Some braille devices have a classical PC keyboard

- No problem



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Braille keyboards

Others have a braille keyboard

- 8 keys for the 8 braille dots → 256 patterns
- Only a-z are world-standard, rest:
  - Depends on the language
    - ':' is not the same in English and in French!
  - Depends on the country
    - fr_BE vs fr_CA vs fr_FR
  - Depends on usage
    - French braille revisited several times.
    - VisioBraille devices have their own table.
    - ...

Braille keyboards

But now we have a keysym, not a keycode

- Have to backtranslate...

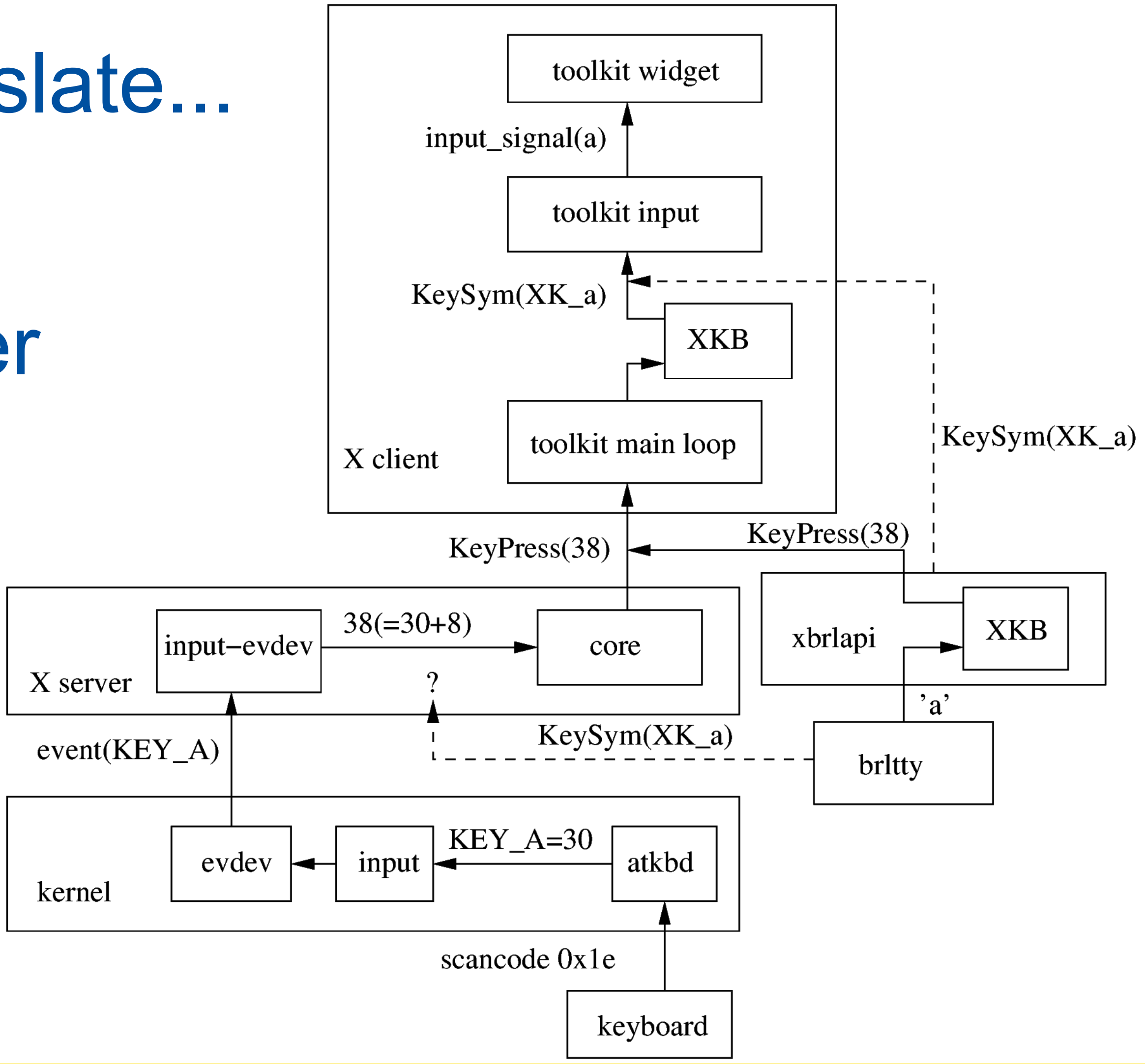
Typing 'A'

- Find case modifier

Typing 'ô'

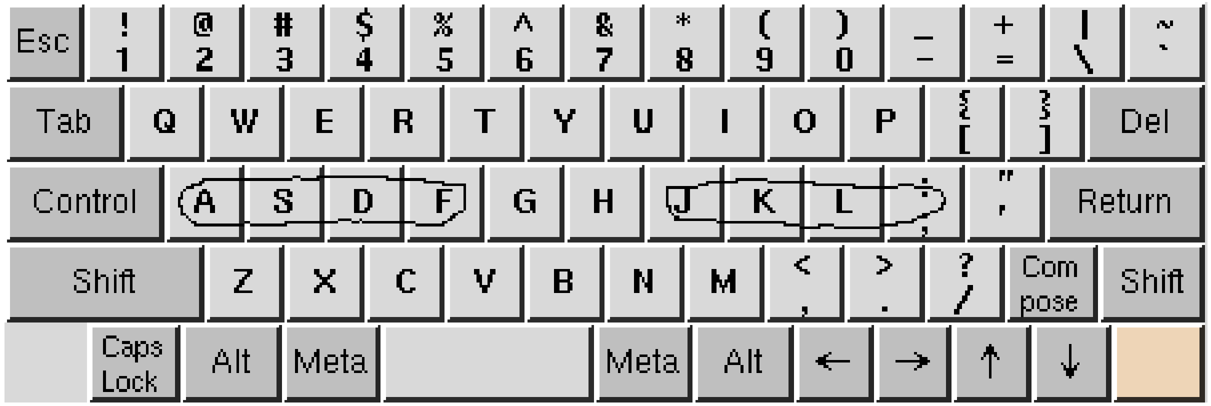
- Find dead or combining accent

Remap hack, eww



PC Braille keyboard

Typing braille with the PC keyboard


Esc ! 1 @ 2 # 3 $ 4 % 5 ^ 6 & 7 * 8 (9) 0 _ - + = | \ ~ `
Tab Q W E R T Y U I O P { [}] Del
Control A S D F G H J K L : ; " ' Return
Shift Z X C V B N M < , > . ? / Com pose Shift
Caps Lock Alt Meta Meta Alt ← → ↑ ↓

- Turn into dots
- Then turn into text

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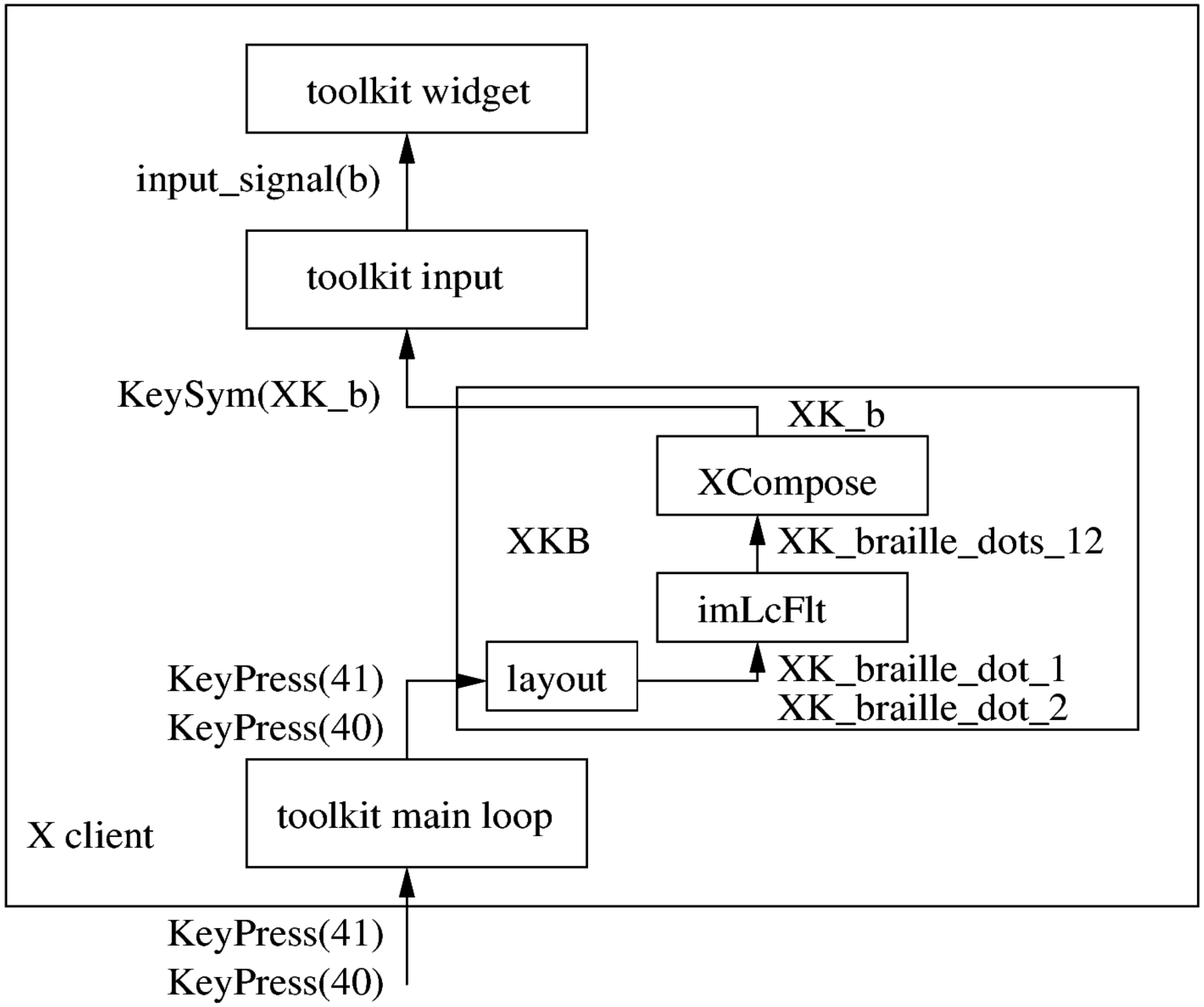
PC Braille keyboard

Mere XKB layout + imLcFlt + Xcompose

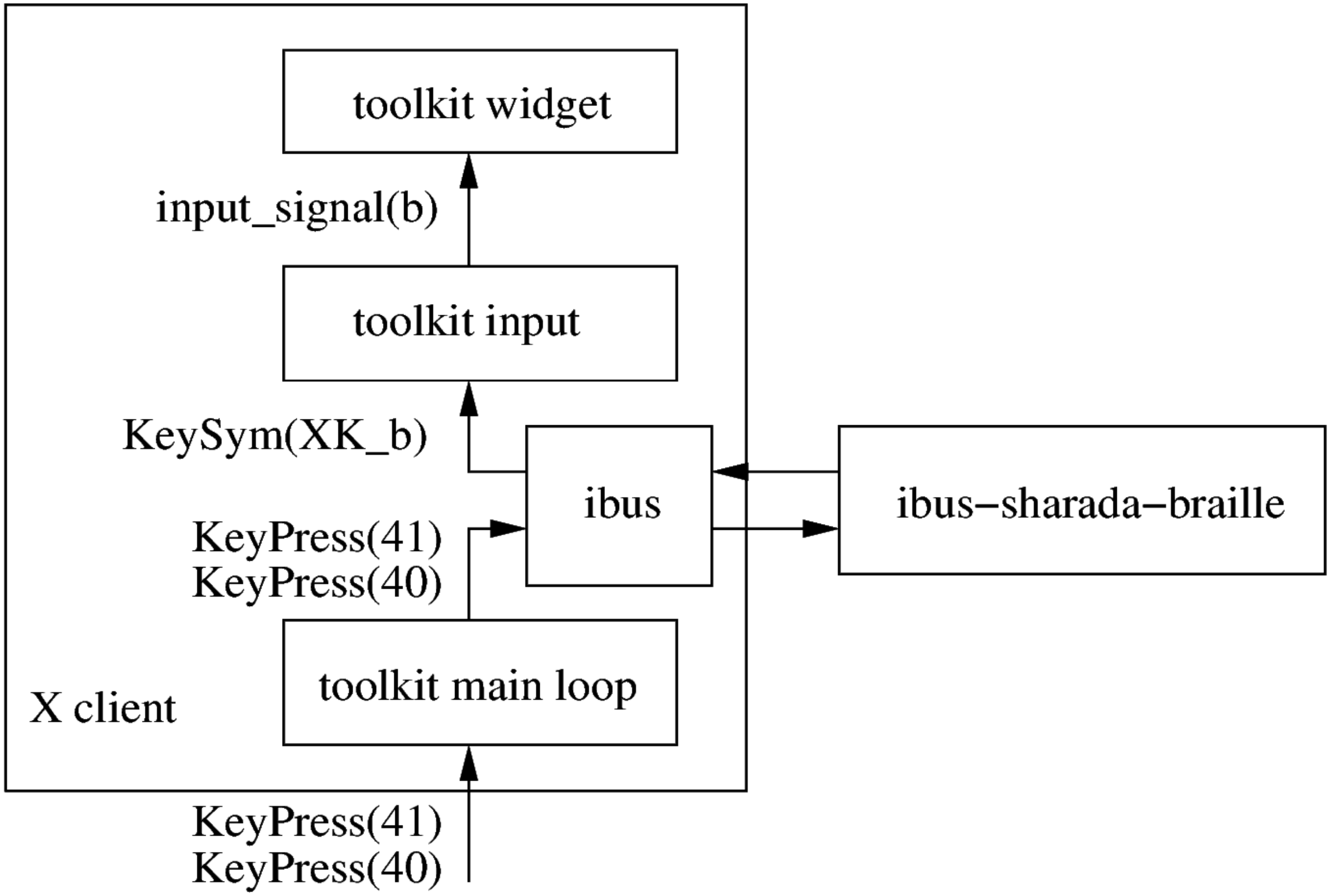


Braille abbreviations

- “Grade 0” ~= integral ~= litteral
  - One cell for each character
  - 8bit charsets: a mere bijection
    - A → ⠁, B → ⠃, C → ⠉, “ → ⠂, ...
  - Unicode and several languages: ambiguity
- “Grade 1/2” ~= abbreviated ~= contracted
  - Common language parts expressed with few cells
    - e.g. “ation” is ⠄⠝
  - Ambiguity
    - “ation” is the same as “N”

PC Braille keyboard

Ibus daemon



How about wayland?

- Is it passing keycodes, keysyms, something else?
- Ideally should allow synthesizing all of them.
- Opportunity to fix all of this?

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Accessibility in output

Tinkering with the rendering

- Tweak DPI to get bigger icons & fonts & such
- Xrandr panning support for basic zoom
- Gamma tuning & color inversion
- Screen mirror (!)
- TODO: Gtk3 “perfect” magnification
  - Widget requested to render in a bigger pixmap

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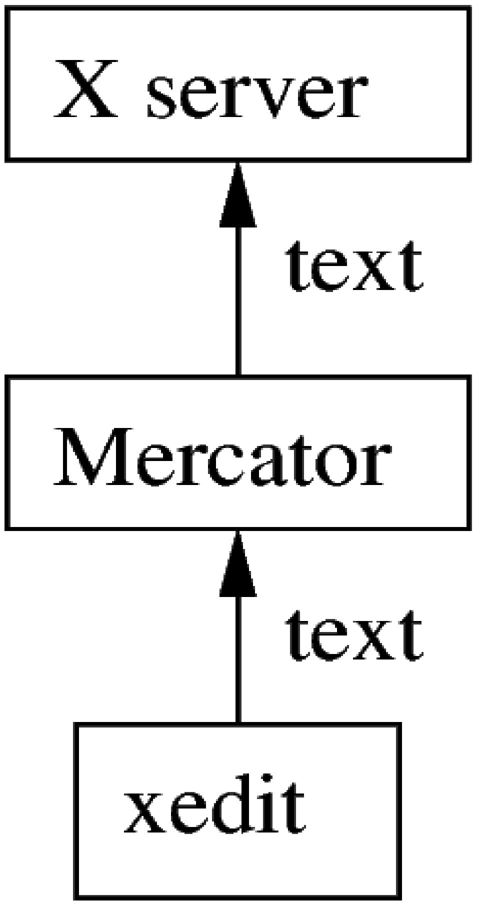
But for blind people?

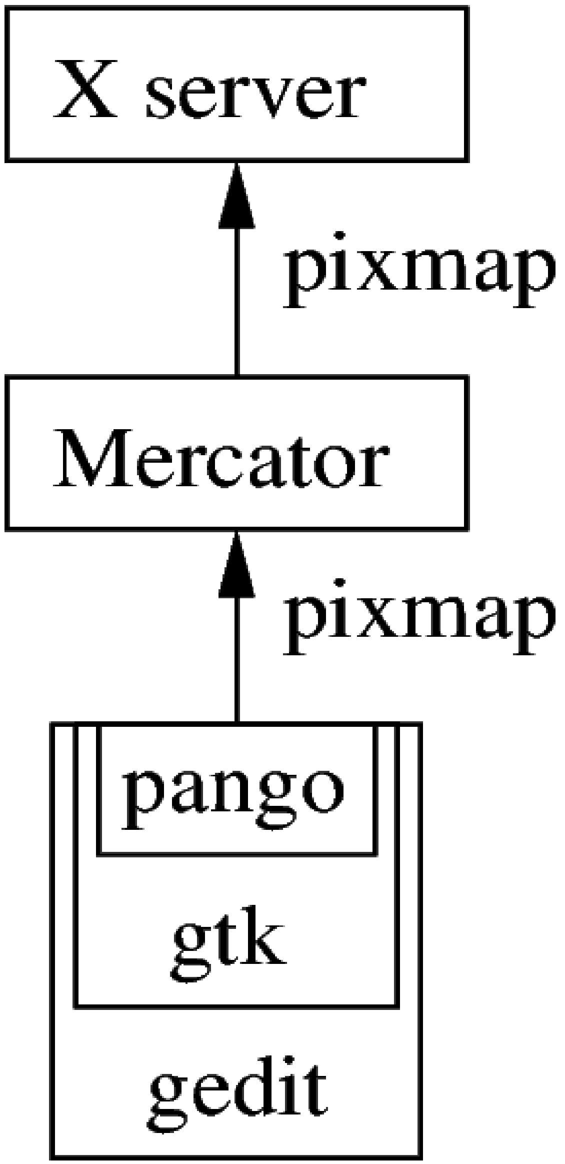
And a **lot** other accessibility possibilities

- Don't try to patch rendering,
- Make applications expose their semantics instead

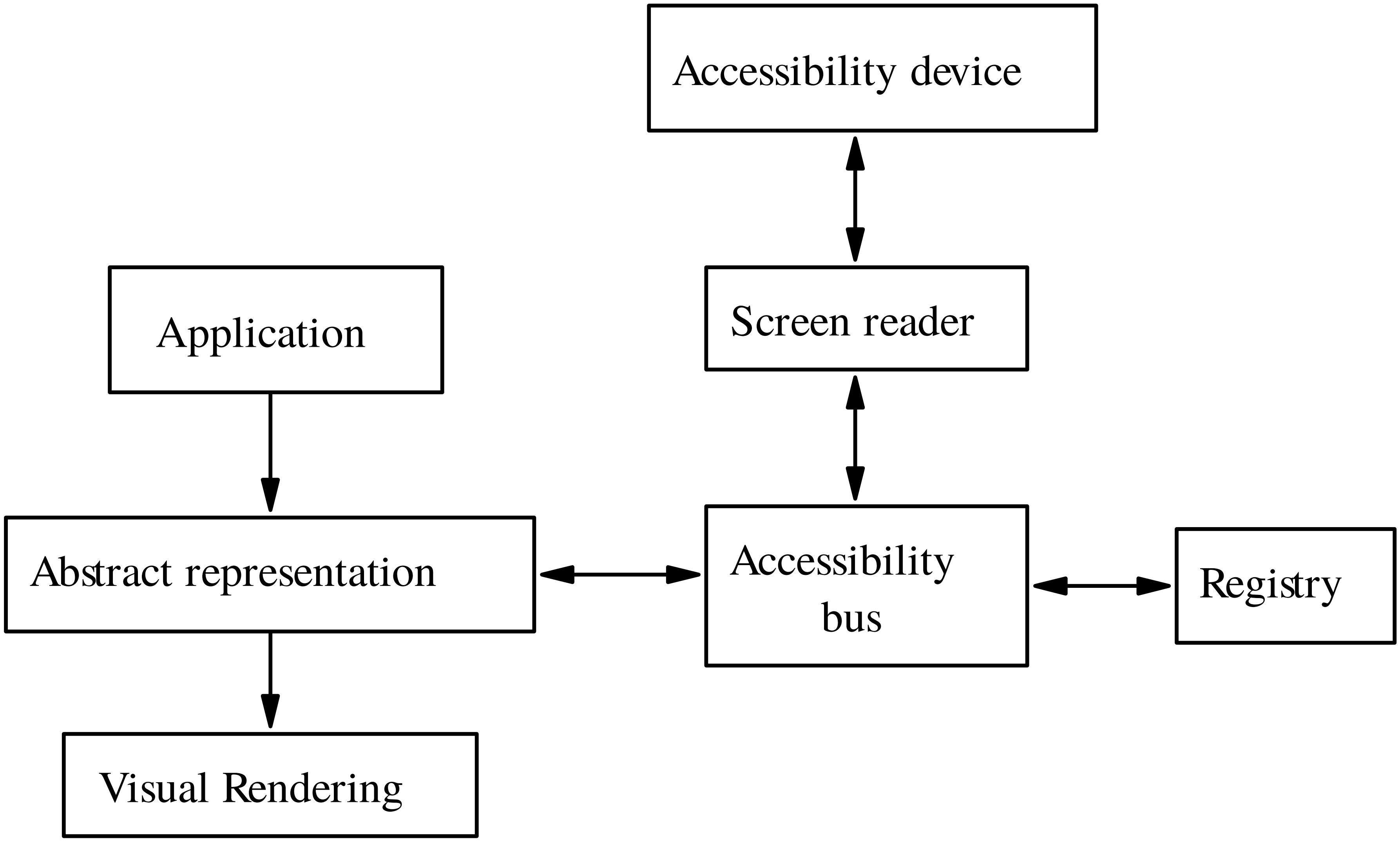
X accessibility, Mercator 1.0



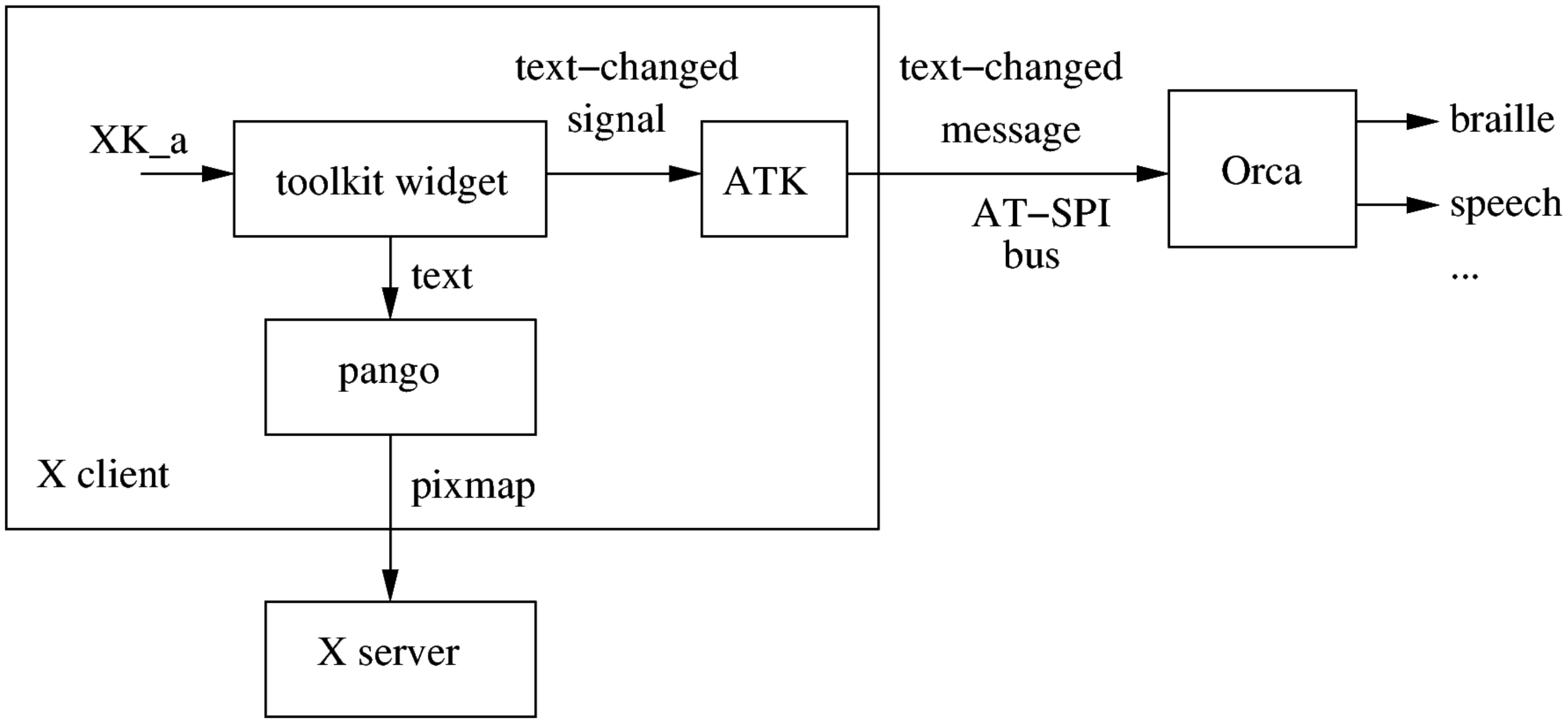
X accessibility, Mercator 1.0



Generic methodology

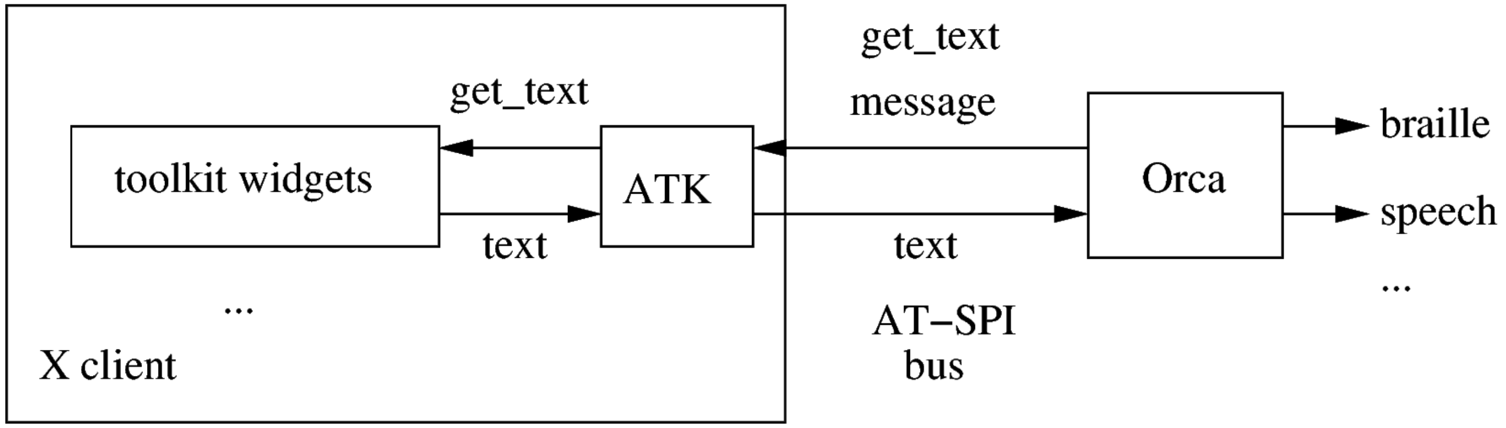


Story of an 'a', continued



But screen reader also needs reading

I.e. browse the application content



- Get text
- Get parent, children
- ...

Abstract representation

- Window
  - Vertical container
    - Menu bar
      - File Menu
        - Open Menu Item
        - …
      - ...
    - Horizontal container
      - Text area
      - Ok button

Technically speaking

- A lot of applications are already technically accessible
  - Console
  - GTK
  - KDE-Qt4/5 (“Real Soon Now”)
  - Acrobat Reader
- A lot are not
  - KDE-Qt3
  - Xt
  - Self-drawn (e.g. xpdf)

In practice

- A lot of technically-accessible applications actually aren't really usable
  - A visually-organized mess of widgets...

First name:	Foo
Last name:	Bar
Password:	baz

In practice

- A lot of technically-accessible applications actually aren't really usable
  - A visually-organized mess of widgets...

First column
- Label First Name
- Label Last Name
- Label Password

Second column
- Text Foo
- Text Bar
- Text baz

In practice

- A lot of technically-accessible applications actually aren't really usable
  - A visually-organized mess of widgets...

- Label First Name for Text Foo
- Label Last Name for Text Bar
- Label Password for Text baz

In practice

- A lot of technically-accessible applications actually aren't really usable
  - A visually-organized mess of widgets...

First column
- Label First Name
- Label Last Name
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In practice

- A lot of technically-accessible applications actually aren't really usable
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First column
- Label First Name
- Label Last Name
- Label Password

Second column
- Text Foo
- Text Bar
- Text baz

➔ Screen reader “Script” for each application

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Don't try to make applications accessible,
just make accessible applications

Quite often just a matter of
common sense from the start

Not a reason for not fixing
your existing apps of course,
it will just be a bit harder :)

Graphical applications

- Design your application **without** gui in mind first
  - Logical order, just like CSS ☺
- Use standard widgets
  - e.g. *labeled* text fields
  - Avoid homemade widgets, or else implement atk yourself for them
  - Always provide alternative textual content for visual content
- Keep it simple!
  - Not only to make screen reading easier, but to make life easier for all users too!

Some pitfalls and advices

(from the accessibility howtos)

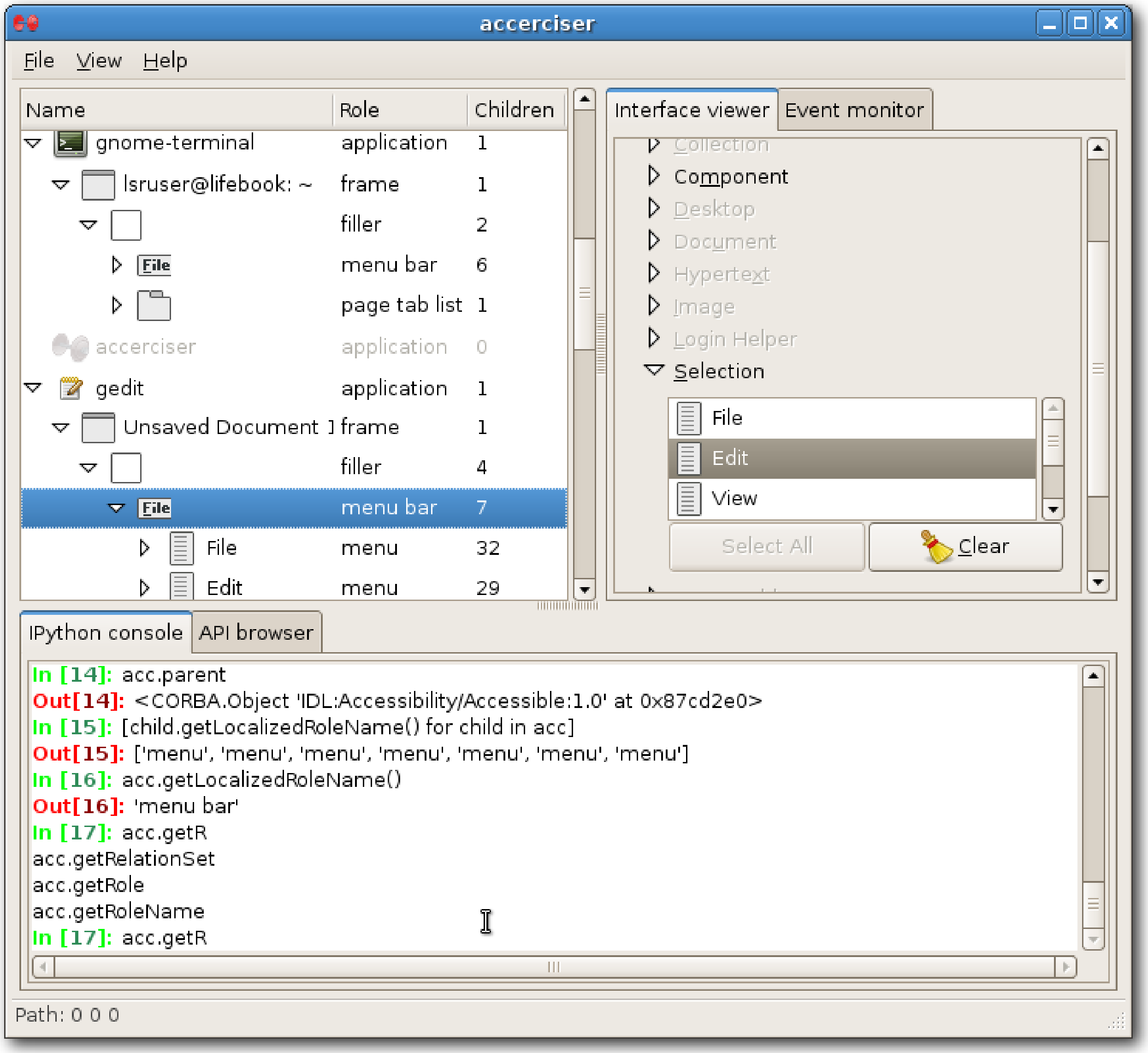
- Shouldn't *have* to use the mouse for anything
- Care of contrasts, configurable colors
- Avoid timing-based actions, or make them configurable
- No 2D organization, logical organization
- Keep it simple and obvious
- ...

Test it yourself! (GUIs)

Accerciser

Check that the tree of widgets looks sane and is complete

Text, notably



Name	Role	Children
gnome-terminal	application	1
lsruser@lifebook: ~	frame	1
	filler	2
File	menu bar	6
	page tab list	1
accerciser	application	0
gedit	application	1
Unsaved Document 1	frame	1
	filler	4
File	menu bar	7
File	menu	32
Edit	menu	29

```
In [14]: acc.parent
Out[14]: <CORBA.Object 'IDL:Accessibility/Accessible:1.0' at 0x87cd2e0>
In [15]: [child.getLocalizedRoleName() for child in acc]
Out[15]: ['menu', 'menu', 'menu', 'menu', 'menu', 'menu', 'menu']
In [16]: acc.getLocalizedRoleName()
Out[16]: 'menu bar'
In [17]: acc.getR
acc.getRelationSet
acc.getRole
acc.getRoleName
In [17]: acc.getR
```

Path: 0 0 0

Documentations

- Accessibility HOWTOs
  - Quite old, but still very useful advices
- Gnome Accessibility devel guide
  - For GTK applications

Conclusion

- Accessibility has very diverse X needs
  - Plug at various levels
  - Needs various tweaks
  - ➔ We need **no** regression there!
- Accessibility needs the semantics, not just the rendering
  - Separate form from content