eekboard
a virtual keyboard for GNOME

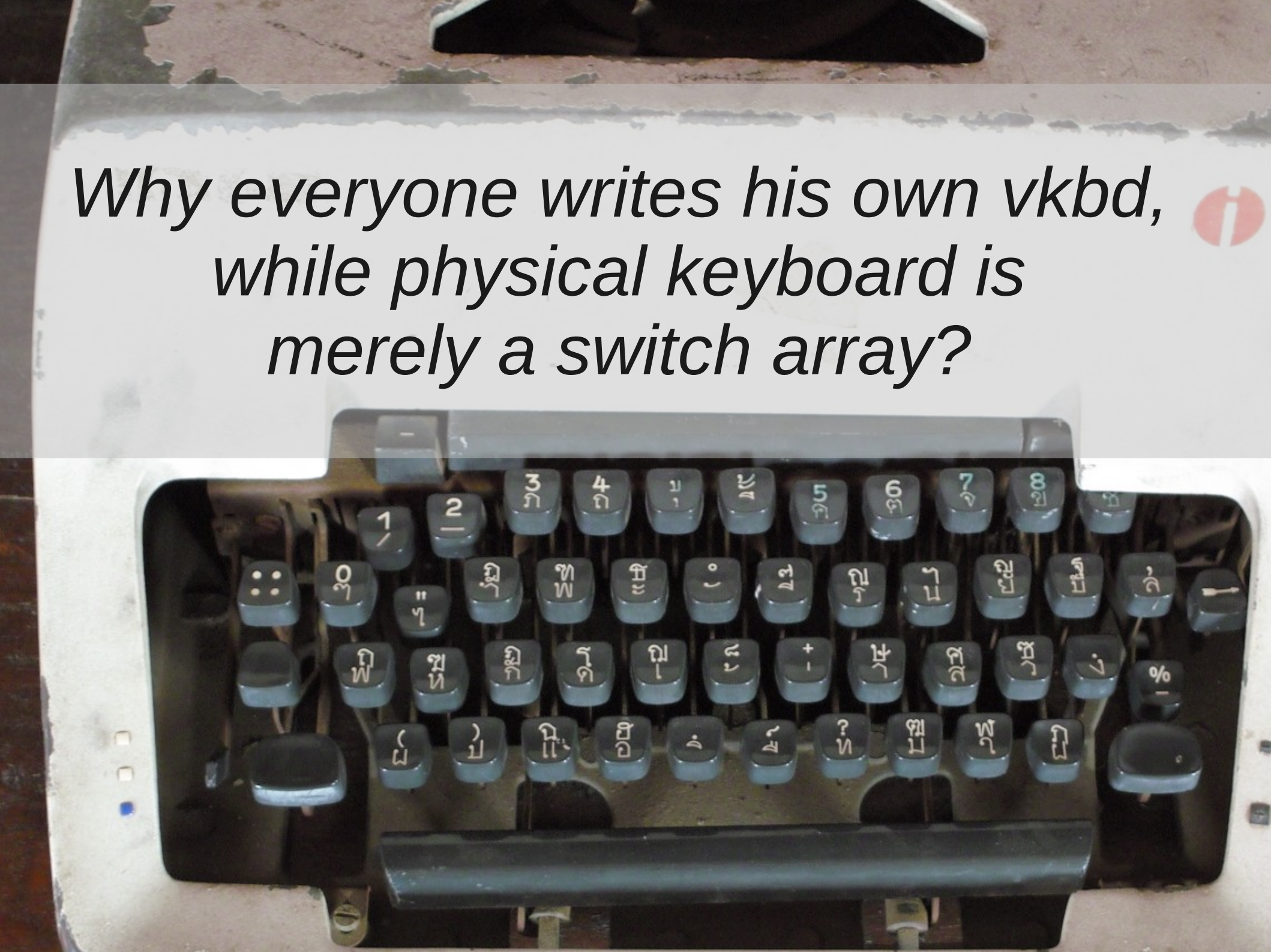
Daiki Ueno

ueno@unixuser.org

Red Hat, i18n team

Virtual keyboards (vkbds)

- Caribou
- matchbox-keyboard
- onBoard
- fvkbd
- GOK
- iok
- Florence
- CellWriter
- xvkbd
- kvkbd


Why everyone writes his own vkbd,
while physical keyboard is
merely a switch array?

Why?

- Geeks are all keyboard maniac ☺
- A wide variety of demands on vkbds
- Vkbds work closely with other desktop technologies, whose functions sometimes overlap each other
  - ➔ Many design decisions depend on how vkbds interact with those technologies

Vkbd use cases

- Kiosk
- Tablet PC
- Mobile phone without keyboard
- Typing tutor
- Unicode character input

Vkbd related desktop technologies

- GNOME Accessibility
  - Convert UI events to ones helpful for disabled users
- Input methods
  - Convert UI events to (typically multilingual) text
- Keyboard layout configuration
  - Convert physical key events to logical symbols, based on users' preferences
    - e.g. using generic US layout keyboard as Dvorak layout

Their functional territories sometimes conflict.

Vkbd related desktop technologies: contradictions

- Who activates vkbd?
  - GNOME Accessibility - Caribou
  - Input methods - ibus-input-pad, scim-panel-vkb-gtk
- How to deliver key events?
  - send them as X events
  - send translated symbols directly to input methods
- How can a vkbd intercept key events?
  - If vkbd should react to physical key events, how to capture them?

Ideas behind eekboard

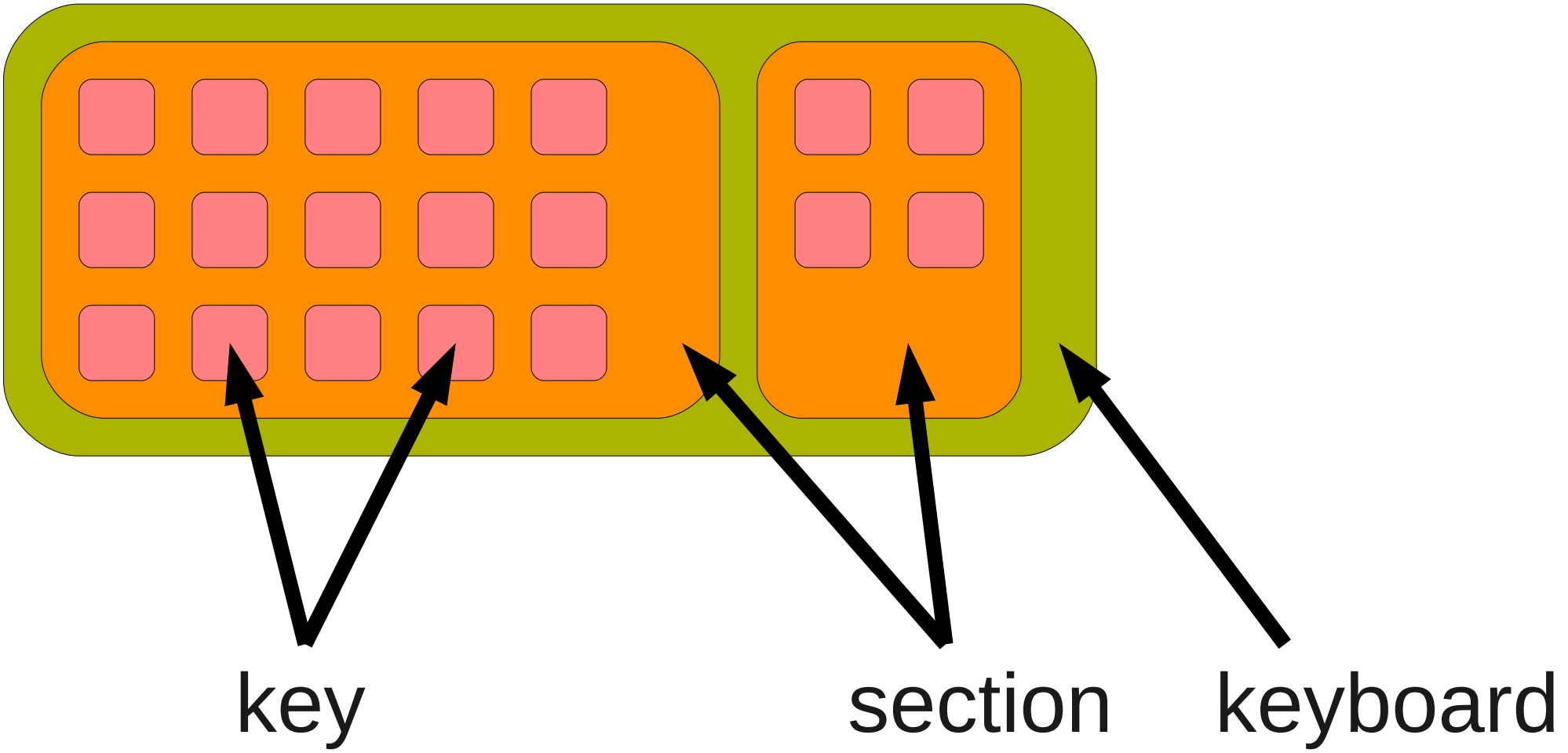
- Throw away the idea of creating a *single mighty vkbd* that meets all the requirements
  - Instead, start from a GUI library to create keyboard-like user interfaces
- Decouple the GUI from accessibility, input methods, and keyboard layout configuration

eekboard

- libeek
  - **e**asy **e**mbedded **k**eyboard
  - A library to create keyboard like UI
  - GUI toolkit agnostic API
  - Can read keyboard layout configuration from various sources
- eekboard
  - A sample vkbd implemented with libeek

libeek basic concepts: element tree

A keyboard is a tree of elements



GUI toolkit agnostic API

```
/* Create a GTK+ keyboard. */
keyboard = eek_gtk_keyboard_new ();

/* Create a section in the keyboard. */
section = eek_keyboard_create_section (keyboard);

/* Add a row in the section. */
eek_section_add_row (section, 10, ...);

/* Create keys in the section. */
key1 = eek_section_create_key (section, 0, 0);

/* Obtain actual GTK+ widget. */
widget = eek_gtk_keyboard_get_widget (keyboard);
```

Supported GUI widgets

- ClutterActor
- GtkDrawingArea
  - Code borrowed from libgnomekbd
- GTK+ button

Keyboard layout configuration

```
/* Create a keyboard layout configuration
   using XKB. */
layout = eek_xkb_layout_new ();
eek_xkb_layout_set_names_full (layout,
    “symbols”, “pc+us+in(ben)”,
    “geometry”, “kinesis”,
    -1);

/* Apply the layout to the keyboard.
   This will populate sections/keys in keyboard. */
eek_keyboard_set_layout (keyboard, layout);
```

Supported keyboard layout configuration

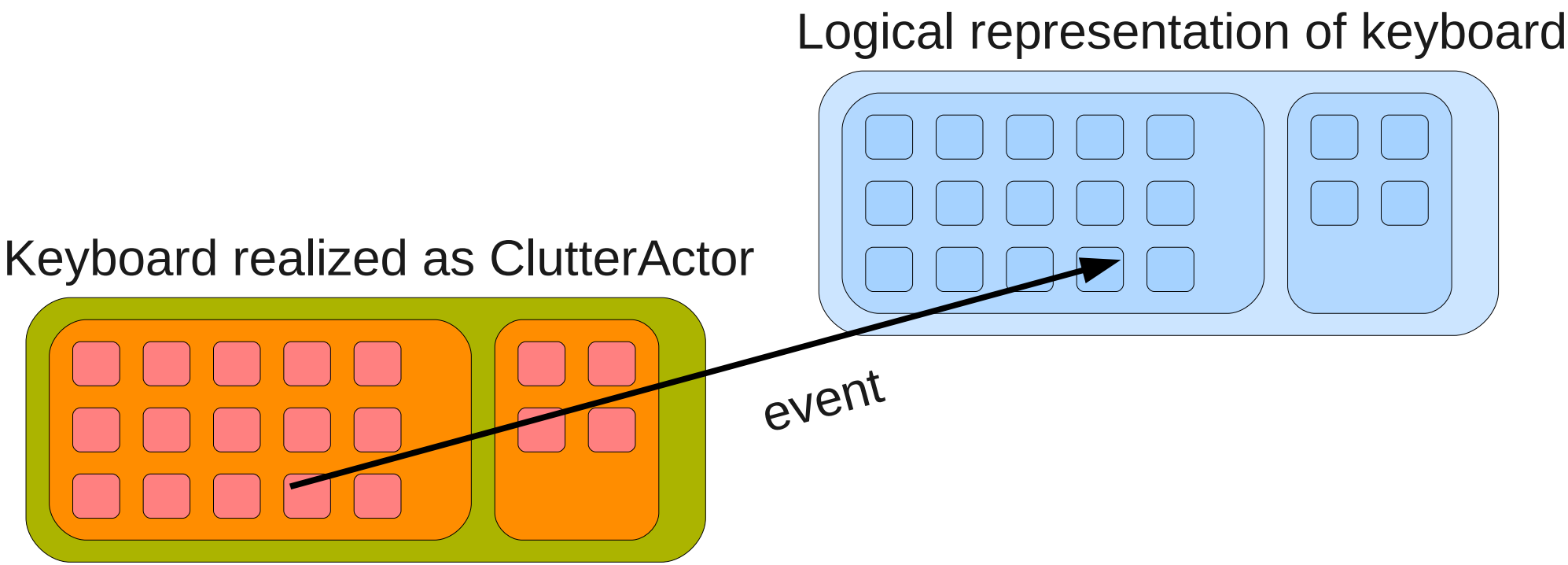
- XKB
  - Consists of 3 components
    - Keycodes – physical key IDs
    - Symbols – mapping from keycodes to logical symbols
    - Geometry – appearances of keyboard
  - libxklavier wrapper makes it easier to customize by
    - Model
    - Country
    - Language
- XML layout files

Put it all together

```
/* Create a keyboard layout configuration using
   libxklavier. */
layout = eek_xkl_layout_new ();

/* Create a keyboard element implemented
   as ClutterActor. */
keyboard = eek_clutter_keyboard_new ();

/* Apply the layout to the keyboard. */
eek_keyboard_set_layout (keyboard, layout);

/* Convert keyboard into ClutterActor. */
clutter_group_add (CLUTTER_GROUP(stage),
                   eek_clutter_keyboard_get_actor
                   (EEK_CLUTTER_KEYBOARD(keyboard)));
```

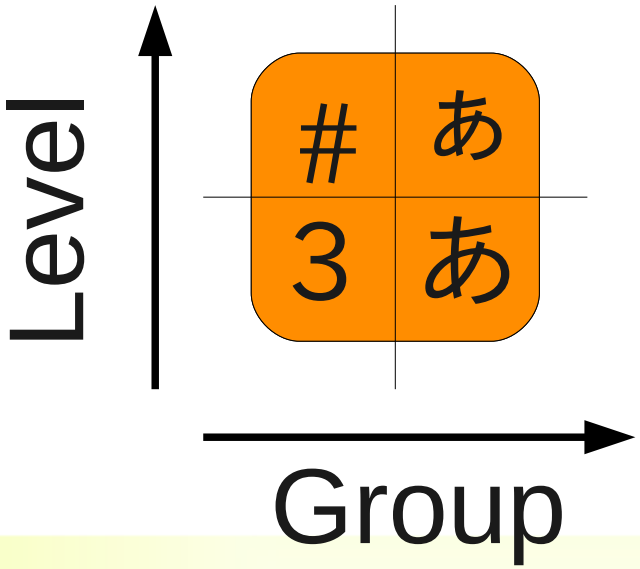
So how about event handling?

```
/* Find a key element in the logical keyboard. */
key = eek_keyboard_find_key_by_keycode
  (keyboard, 0x38);
g_signal_connect (key, "pressed", on_a_pressed);
```



How about modifiers?

Each key is assigned a matrix of symbols



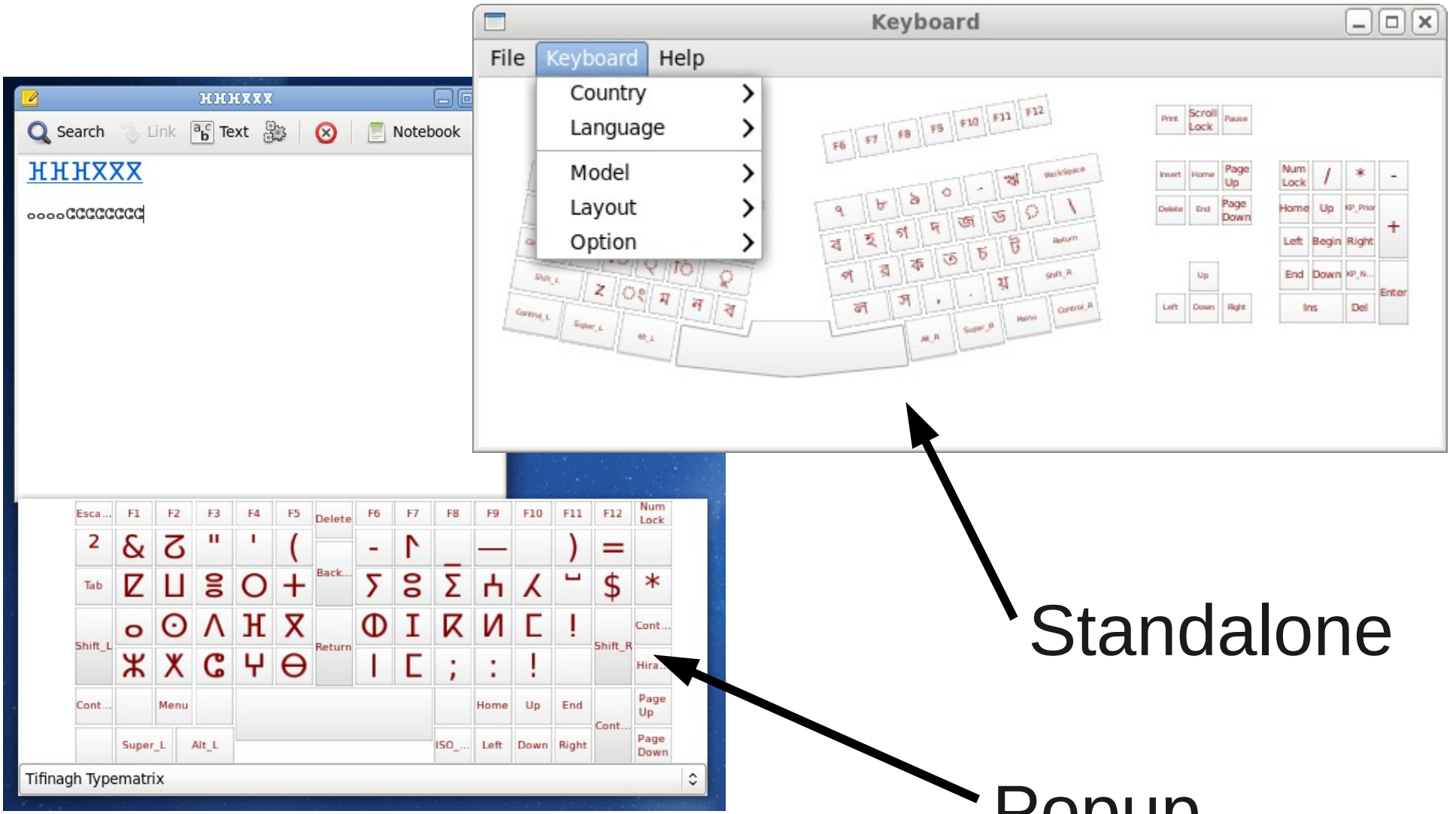
Not limited to 2x2

```
/* Assign symbol matrix to a key. */
eek_key_set_keysyms (key, keysyms,
                     num_groups, num_levels);
/* Set group/level of the entire keyboard. */
eek_keyboard_set_keysym_index (keyboard, group, level);
```

eekboard: a sample vkbd

- Startup
  - “tap” on any editable widget via a11y, or
  - invoke the command directly
- Layout can be changed from menu
- Typing monitor
  - Trap all key events and act as a typing monitor

eekboard: demo



Things to come...

- CSS based theme support
- Flick input
- Multi touch
- Rewrite eekboard in Vala
  - Currently it is written in C
  - libeek Vala binding is already available

Questions or Comments?

http://ueno.github.com/eekboard/