Keyboard (Character I/O)

Kedar Bellare 00005029

Prithviraj B.P. 00005006

kedarb@cse.iitb.ac.in

prithvir@cse.iitb.ac.in

Computer Science and Engineering Department

Indian Institute of Technology, Bombay

Inside a Keyboard

- Processor in the keyboard analyzes the key matrix and determines what scancodes to send to the keyboard controller on the motherboard.
- Maintains these scancodes in a buffer of memory which is usually 16 bytes large. For eg. scancode for Enter key pressed is 0x1c and Enter key released is 0x9c.
- Processor in keyboard monitors:
  - Position of the key in the **key matrix**
  - The amount of **bounce** and how to filter it
  - The speed at which to transmit the **typematics**

The OS and Keyboard

- The keyboard controller generates an interrupt when it receives input from the keyboard, which is handled by the ISR for the keyboard.
- The keyboard modes control the way linux informs your program on what's going on with the keys on your keyboard. There are four modes:
  - K_RAW : which means no translation will be done. This is used by X.
  - K_MEDIUMRAW : lets the kernel translate all scancodes received from the keyboard to so called keycodes.
  - K_XLATE : filters the keycodes through a keymap before it sends the bytes to your program.
  - K_UNICODE : translates just like K_XLATE, but not to ASCII-codes, but to UTF-8.

  The default mode is K_XLATE.

Tidbits

- A different keyboard mode can be chosen using the KDSKBMODE ioctl. The current mode can be queried using the KDGKBMODE ioctl.
- In K_XLATE mode keymaps are used to translate keycodes to characters. First the kernel determines which control keys are down. Control keys normally include Shift keys, alt keys, and of course control keys. Num lock and Caps lock are considered lock keys as well. Depending on these keys, a map is chosen.
- **Commands to try out:**
  - **Will not run in X.**
  - *showkeys* shows the keycodes pressed
  - *showkeys -s* shows the scancodes pressed
  - *dumpkeys* shows the keyboard translation tables
  - *loadkeys* sets the keyboard translation tables
  - *setkeycodes* lets you set the keycodes for keys
  - *kbdrate* helps you set the keyboard rate

References

- Keyboard: http://www.linuxhq.com/guides/LKMPG/node25.html
- Keyboard: http://computer.howstuffworks.com/keyboard.htm
- Linux Source: /usr/src/linux/driver/char/keyboard.c
- Keyboard Modes:

  http://www.ibiblio.org/gferg/ldp/Console-Programming-HOWTO/x87.html
- Scancodes: http://www.win.tue.nl/ aeb/linux/kbd/scancodes-1.html
- General Keyboard Fundaes:

  http://www.tldp.org/HOWTO/Keyboard-and-Console-HOWTO.html