

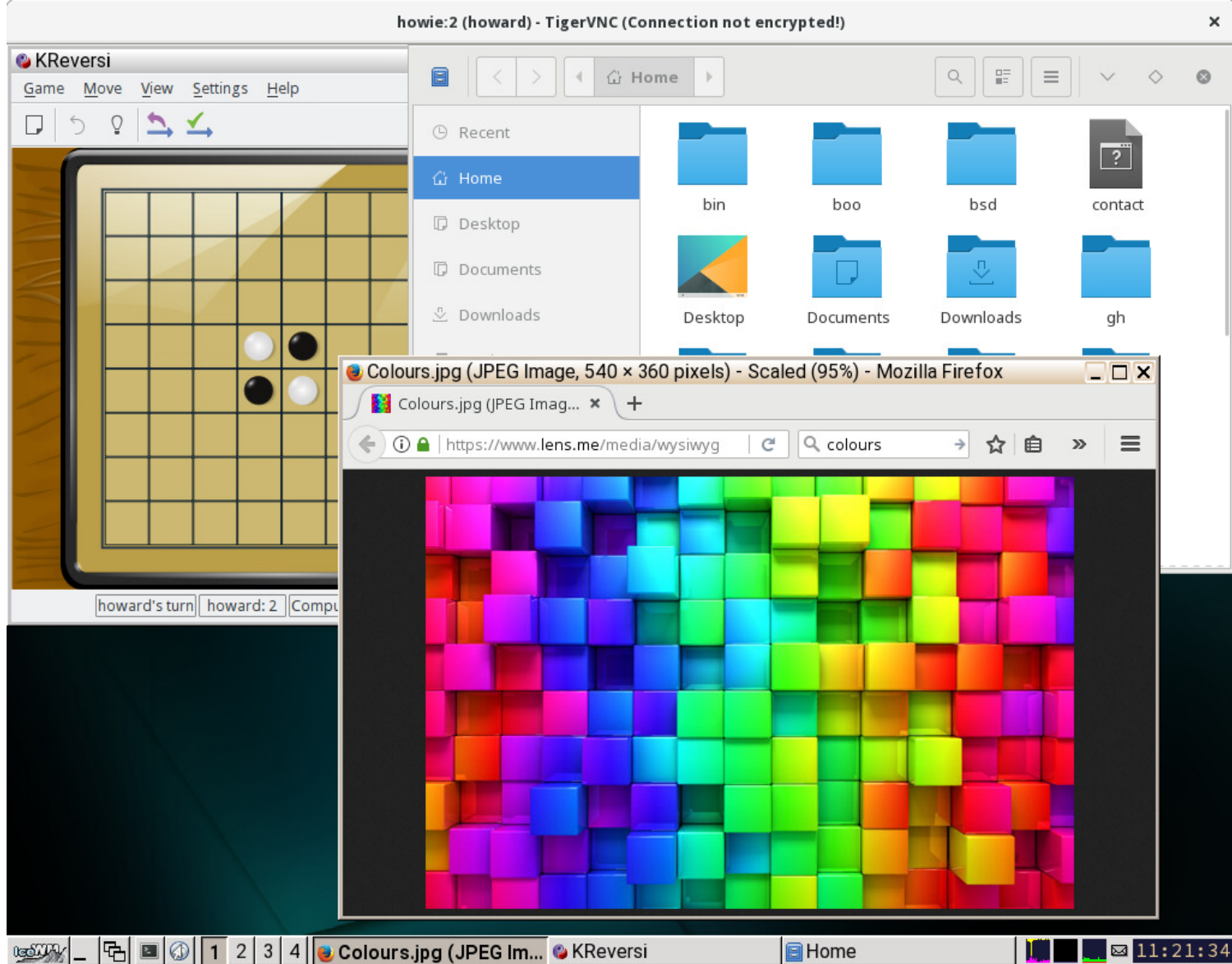
# Making a practical VNC client for character terminals

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# Virtual Network Computing

- Much like “Remote Desktop Service” of Microsoft Windows
- Simple tasks: move mouse, type keys, see the screen
- Cross-platform
  - Linux
  - Unix/macOS
  - Microsoft Windows





# Linux Terminal

- One of the first features of Linux kernel
- Powerful and efficient
- Text-oriented interface loved by geeks
- Unfortunately powerless in graphical tasks



```

1 [||||| 5.9%] Mem[||||| 3.076/47.16]
2 [||||| 1.0%] Swp[||||| 0K/2.016]
3 [||||| 0.0%] Tas[||||| 11111111/1225]
4 [||||| 0.0%] Loa[||||| 1.11/1.35/1.17]
5 [||||| 12.7%] Uptime: 00:20:46
6 [||||| 2.0%]
7 [||||| 5.0%]
8 [||||| 5.8%]

```

PID	S	USER	PR	NI	CPU%	RES	TIME+	Command
6780	S	howard	20	0	15.8	447M	15:03.25	/usr/lib64/libreoffice/program/soffice.
4718	S	root	20	0	4.0	20380	0:42.23	/usr/bin/python /usr/sbin/iotop
2405	S	howard	20	0	3.0	281M	0:46.15	/usr/bin/gnome-shell
2298	S	howard	20	0	2.0	112M	0:19.82	/usr/bin/X vt2 -displayfd 3 -auth /run/
4701	S	root	20	0	2.0	4372	0:13.48	htop
2419	S	howard	9	-11	2.0	21996	0:11.20	/usr/bin/pulseaudio --start --log-targe
16761	R	root	20	0	1.0	4332	0:02.31	htop -d 10
2650	S	howard	20	0	1.0	260M	0:37.27	/opt/google/chrome/chrome
4618	S	howard	20	0	1.0	6220	0:00.91	tmux
2495	S	root	20	0	0.0	8468	0:00.26	/usr/lib/udisks2/udisksd --no-debug
17385	S	root	20	0	0.0	8468	0:00.07	/usr/lib/udisks2/udisksd --no-debug
5134	S	howard	20	0	0.0	260M	0:03.49	/opt/google/chrome/chrome
2407	S	howard	20	0	0.0	281M	0:02.32	/usr/bin/gnome-shell
6994	S	howard	20	0	0.0	71424	0:09.87	/usr/bin/Xvnc :2 -auth /run/user/1000/g
1266	S	messagebu	20	0	0.0	6580	0:10.35	/bin/dbus-daemon --system --address=sys
476	S	root	20	0	0.0	4792	0:00.46	/usr/sbin/haveged -w 1024 -v 0 -F
2420	S	howard	-6	0	0.0	21996	0:06.05	/usr/bin/pulseaudio --start --log-targe
6452	S	howard	20	0	0.0	215M	0:09.31	/opt/google/chrome/chrome --type=render
2387	S	howard	20	0	0.0	112M	0:02.35	/usr/bin/X vt2 -displayfd 3 -auth /run/

F1 Help F2 Setup F3 Search F4 Filter F5 Tree F6 Sort F7 Nice F8 Kill F9 Quit F10 Quit

```

2017-05-23 17:04 HouzuoGuo o [master] (origin/master) (origin/HEAD) fix malfunctioned
2017-05-23 16:58 HouzuoGuo o avoid smtpd panic when public ip cannot be determined
2017-05-23 16:51 HouzuoGuo o do not rely on public ip on travis; start daemons in arb
2017-05-20 17:35 HouzuoGuo o introduce mail processor check to health checks; rename
2017-05-12 16:28 HouzuoGuo o avoid producing dynamically linked executable in beasta
2017-05-11 09:08 HouzuoGuo o introduce random delay in sockd failure handling
2017-05-07 16:19 HouzuoGuo o hook mailp integration test with wolframalpha; improve t
2017-05-07 15:31 HouzuoGuo o do not double print log message timestamp
2017-05-03 09:39 HouzuoGuo o refine usage of colours and gopher on poster picture
2017-05-03 08:58 HouzuoGuo o create a script for deploying zip bundle to /root/; litt
2017-05-02 10:23 HouzuoGuo o prevent concurrent access to port check result map
2017-04-28 09:29 HouzuoGuo o cap log message length to 1kB; get rid of imap disconnec
2017-04-24 16:41 HouzuoGuo o consider mail without from/to addr to be malformed; fix
2017-04-23 14:52 HouzuoGuo o enrich environment information report with system memory
2017-04-21 11:18 HouzuoGuo o remember to call initialise function on telegraphbot in t
2017-04-21 11:14 HouzuoGuo o remember to call initialise function on telegraphbot
2017-04-21 09:34 HouzuoGuo o improve make bundle with phantomjs executable and permis
2017-04-21 09:15 HouzuoGuo o remove unfinished test code
2017-04-21 09:04 HouzuoGuo o rename several browser related structs; fix segfault in
2017-04-20 21:32 HouzuoGuo o move logger initialisation from config to individual dae
2017-04-20 17:01 HouzuoGuo o (broken) wip browser server instance lifecycle managemen
2017-04-20 10:04 HouzuoGuo o fix misplaced configFile parameter check; do not proceed
2017-04-18 10:26 HouzuoGuo o test is broken: wip browser process management
2017-04-17 16:47 HouzuoGuo o wip phantomjs server management
2017-04-17 13:04 HouzuoGuo o Complete all fmt.Errorf messages with type and function
2017-04-16 18:12 HouzuoGuo o wip browser in browser
2017-04-16 15:51 HouzuoGuo o property set no-cache header for all http api responses;
2017-04-15 11:51 HouzuoGuo o remove typo comma from command form
2017-04-14 12:34 HouzuoGuo o fix malformed tcp dns reply that accidentally sent query
[main] d89020f2688425babf7c519ae1591c6d29106859 - commit 6 of 192

```

ALPINE 2.21 MESSAGE TEXT [A] ...guo@suse.com)INBOX Message 418 of 426 96%

Date: Tue, 23 May 2017 10:12:40 +0200  
 From: Howard Guo <hguo@suse.com>  
 To: talk@suse.de  
 Subject: [talk] Another chance for you to taste surströmming  
 Parts/Attachments:  
 1 Shown 8 lines Text  
 2 3.1 MB Image, "

Hello dear colleagues.

Last night 10 of us successfully overcome the odour of the traditional Swedish cusine and tasted the famous fish. In the end most of us reached to a conclusion that its taste is not as foul as the odour.

Therefore, I will open another can on tomorrow afternoon at 5PM. If you missed yesterday's occasion or wishes to taste more of the famous fish, drop me an Email and let's meet again tomorrow.

Kind regards,  
 Howard

[ Part 2, " " Image/JPEG (Name: "20170522\_161531.jpg") 3.1 MB. ]  
 [ Cannot display this part. Press "V" then "S" to save in a file. ]

2 Help 5 MsgIndex 3 PrevMsg 1 PrevPage 3 Delete 3 Reply  
 0 OTHER CMDS 5 ViewAttach 3 NextMsg 3 NextPage 3 Undelete 3 Forward

```

May 24 11:26:51 howie sudo[17141]: pam_systemd(sudo:session): Cannot create session:
Already running in a session
May 24 11:27:01 howie sudo[17195]: howard : TTY=pts/20 ; PWD=/home/howard ; USER=r
oot ; COMMAND=/usr/bin/zypper in tig
May 24 11:27:01 howie sudo[17195]: pam_unix(sudo:session): session opened for user r
oot by (uid=0)
May 24 11:27:01 howie sudo[17195]: pam_systemd(sudo:session): Cannot create session:
Already running in a session
May 24 11:27:04 howie dbus[1266]: [system] Activating service name='org.opensuse.Sna
ppper' (using servicehelper)
May 24 11:27:04 howie dbus[1266]: [system] Successfully activated service 'org.opens
use.Snapper'
May 24 11:27:05 howie [RPM][17247]: Transaction ID 592551e9 started
May 24 11:27:05 howie [RPM][17247]: install tig-2.2.1-3.1.x86_64: success
May 24 11:27:05 howie [RPM][17247]: install tig-2.2.1-3.1.x86_64: success
May 24 11:27:05 howie [RPM][17247]: Transaction ID 592551e9 finished: 0
May 24 11:27:06 howie sudo[17195]: pam_unix(sudo:session): session closed for user r
oot
May 24 11:27:48 howie dbus[1266]: [system] Activating via systemd: service name='org
.freedesktop.hostname1' unit='dbus-org.freedesktop.hostname1.service'
May 24 11:27:48 howie systemd[1]: plymouth-read-write.service: Cannot add dependency
job, ignoring: Unit plymouth-read-write.service is masked.
May 24 11:27:48 howie systemd[1]: plymouth-start.service: Cannot add dependency job,
ignoring: Unit plymouth-start.service is masked.
May 24 11:27:48 howie systemd[1]: systemd-firstboot.service: Cannot add dependency j
ob, ignoring: Unit systemd-firstboot.service is masked.
May 24 11:27:48 howie systemd[1]: Starting Hostname Service...
May 24 11:27:48 howie dbus[1266]: [system] Successfully activated service 'org.freed
esktop.hostname1'
May 24 11:27:48 howie systemd[1]: Started Hostname Service.

```

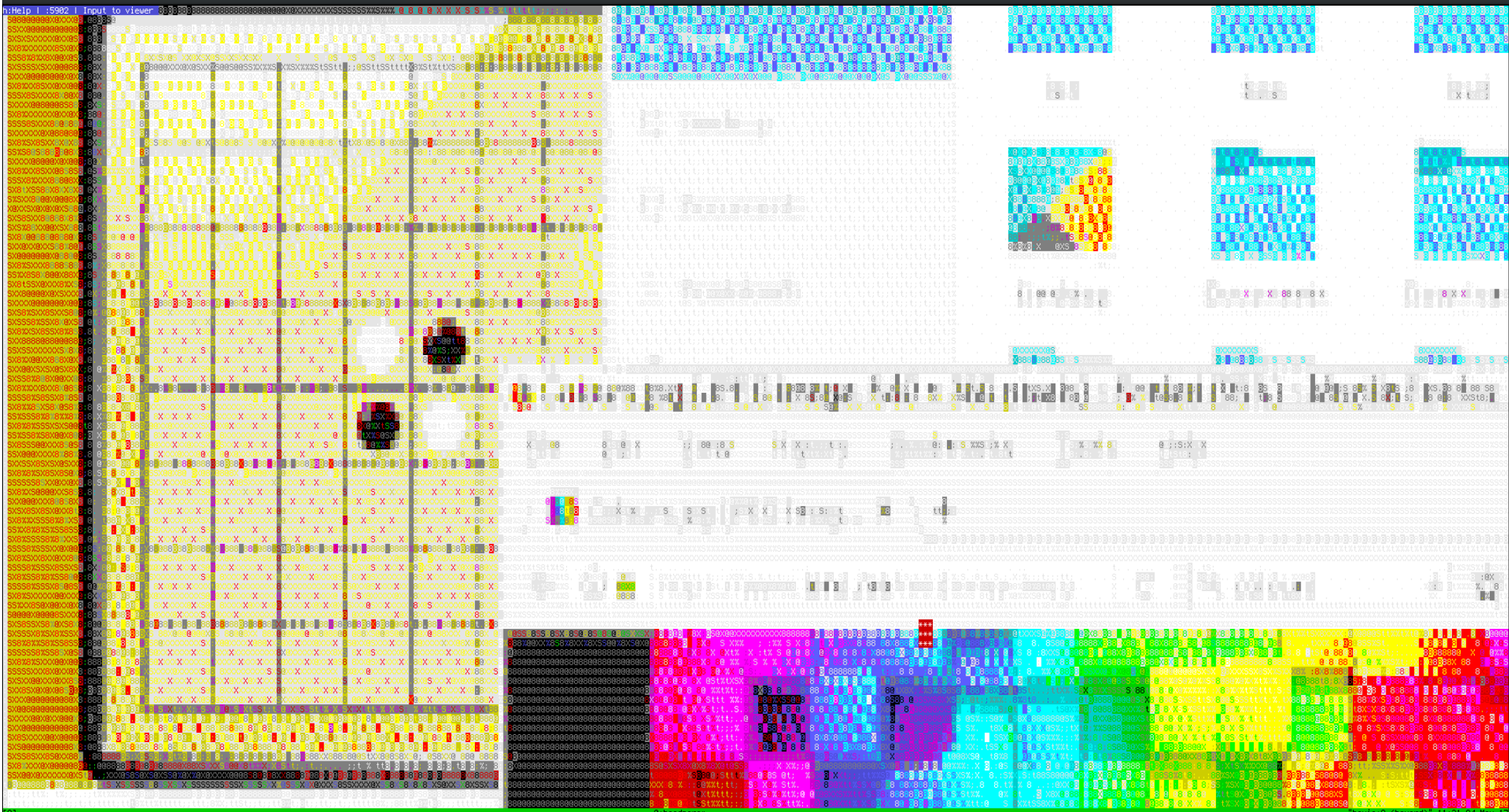
# headmore – VNC client for terminal

- Zoom in/out and pan around
- Move mouse cursor, click buttons, and keyboard input.
- Good enough for editing images, watching YouTube, etc
- <https://github.com/HouzuGuo/headmore>
- zypper install headmore (Tumbleweed, PackageHub)

“what drug are you having there, I want some of that 😊”







# Programming

- UTF-8 text and emojis 😊
- Rich set of colours
- Ordinary keys – letters, numbers, enter
- Special keys – modifiers, arrows, escape 🍏, F1-12
- Programming libraries
  - Primitive - ncurses
  - Feature rich - libcaca





# Sample Code

```
caca_display_t *dp = caca_create_display(NULL);
caca_canvas_t *cv = caca_get_canvas(dp);
caca_set_color_ansi(cv, CACA_BLACK, CACA_WHITE);
while (1) {
    caca_event_t ev;
    caca_get_event(dp, CACA_EVENT_KEY_PRESS, &ev, -1);
    caca_printf(cv, 0, 0, "That key was %c", caca_get_event_key_ch(&ev));
    caca_refresh_display(dp);
}
caca_free_display(dp);
```

How to draw an owl

1.



2.




# Quirks

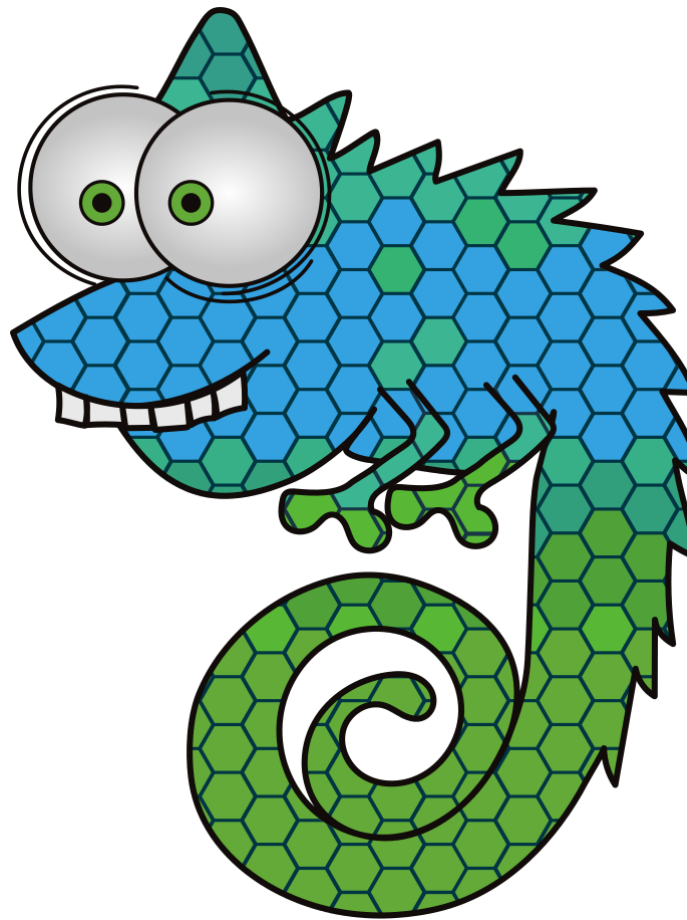
- Alt+Key emits two key codes – escape+key
- Ctrl+Key emits one key code
- Shift+Key emits one key code



# Thank You

- Check out my other pet projects in
- <https://github.com/HouzuGuo>
- Use social networks and control your  computer via telephone, SMS, satellite messaging:  
<https://github.com/HouzuGuo/laitos>





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### Template

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