Tmux - A Great Terminal Multiplexer

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1 About this slides

This slides explains why we want to use tmux as well as the basic features and configurations of tmux.

This page is a html slides. To view it in slides mode, press `x` then click mouse to start browsing. For more help, press `?`.

2 The Itches

- Loosing **everything** when the connection to a server break
- Cannot share **current** terminal with others
- Drag & drop **again and again** to tile terminal windows
- Switching among **dozens** of terminal windows
- Unable (or tedious) to open multiple connections

3 Why Tmux

A terminal multiplexer capable of

1. tabbed windowing
2. detach/re-attach
3. remote-share, pair-working (esp. remote pair-working)
4. window split and tiling
5. grouping windows
6. re-sizing windows
7. …

Meanwhile, it is

1. Easy to install & use
2. Well defined command line interface
    - For interactive use and for scripting.
3. Well documented
4. BSD licensed

4 Why NOT xxx

4.1 Why NOT VNC

The cons of VNC:

1. Depends on X (GUI environment).
2. Consume more CPU and network traffic (I think).
3. Can not resize the desktop (Latest realvnc can).
4. Does not tile (To be accurate, you can start a tiling WM in VNC. Average engineers just don't bother or able to do that).
5. Non-native windows that response slowly

The pros of VNC:

1. Uses dedicated password instead of login/password for sharing
2. Supports X applications

4.2 Why NOT GNU "screen"

Tmux is kind of the next-gen of screen. People say tmux is superior since it

1. Is easier to configure.
2. Is easier to split window and change layout.
3. Is able to resize window.
4. Is easier to scripting.
5. Cleaner architecture, code, document etc.

4.3 Why NOT secureCRT

I prefer "putty + tmux + to" since, as far as I know, secureCRT

1. can not detach/attach
2. can not group windows per projects(or bug/escalation etc.)
3. can not remote share
4. can not tile (?)
5. seems it does not support UTF-8
6. not convenient if the host list is really long
7. can not jump to destination host via an intermediate server
8. your hot-keys is not available other PCs, or after re-install
9. non-free

5 Feature Highlights

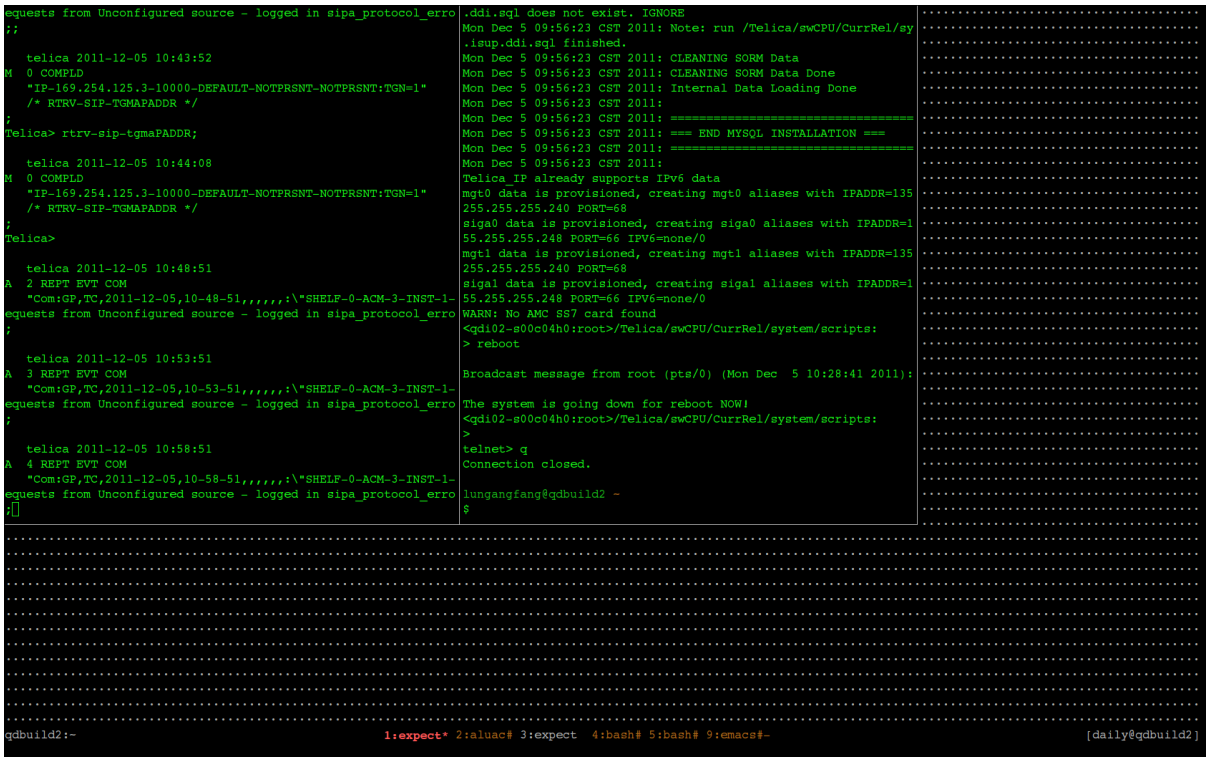
5.1 Detach and re-attach

- Network unstable?
- Has to bring laptop home or meeting room?
- Laptop crashed?
- Mistakenly closed the terminal?

Does NOT matter! just re-attach.

5.2 Multiple "tabbed" windows on one connection

5.3 Remote share and auto-resize



This is a window auto-resized since my peer's terminal window is smaller than mine.

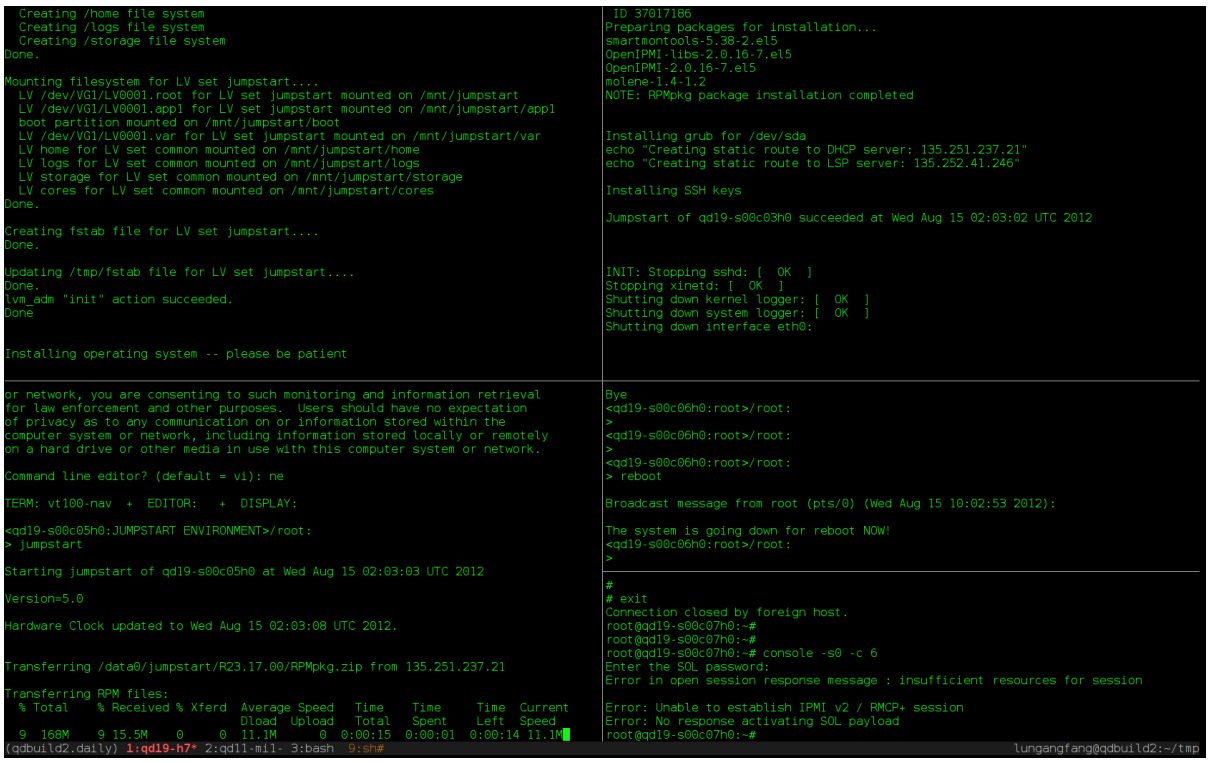
5.4 Split windows at will

5.4.1 Real-world example: working with TL1

One window for each of the following:

1. Emacs to compose TL1 commands
2. TL1 session to launch TL1 commands
3. MYSQL session to inspect DB
4. Another session to query DB to verify TL1 commands
5. Misc. tasks

5.4.2 Real-world example: upgrade ATCA blades simultaneously



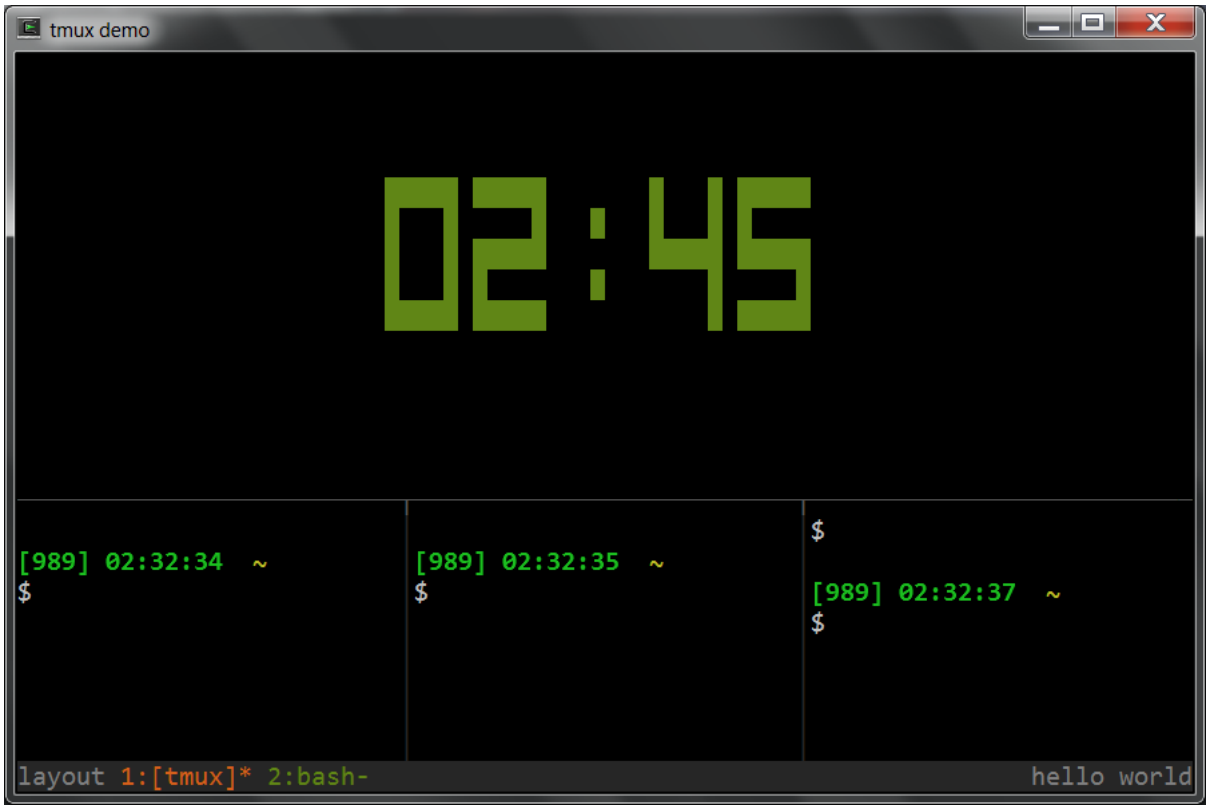
Each window monitors one blade.

5.5 Tile windows with preset layouts

Up / HOME / HELP / toggle view

5.5.1 tiled

5.5.2 main horizontal

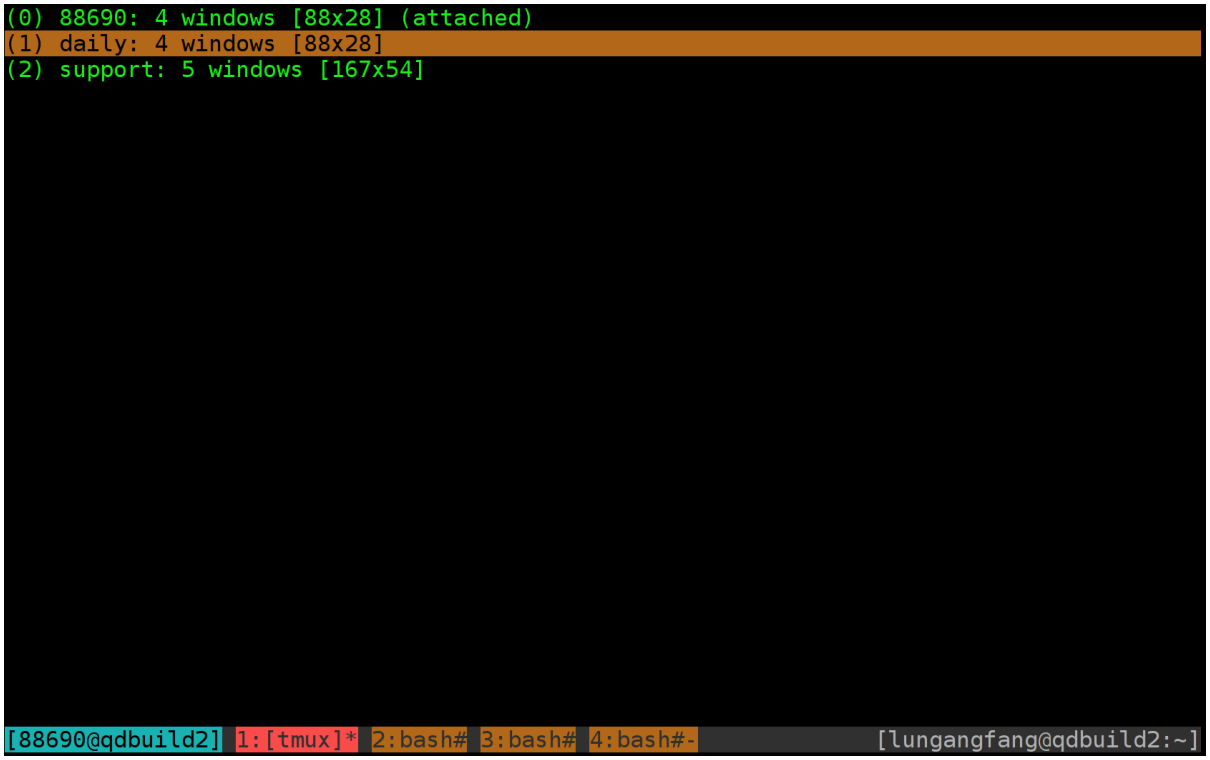


5.5.3 main vertical

Other layouts not shown in this slides:

- even horizontal
- even vertical

5.6 Group windows into sessions



Focus on what you are working on right now.

Say, one session per project/work-item. Easily switch among the handful windows within current session. Windows in other sessions does not distract you.

5.7 Easy to use

- A simplistic setup procedure (the section of setup)
- A minimal set of hotkeys (the basic operations)
- A nice support of mouse even though it is a CLI (how to enable mouse support)

5.8 Suports scripting

- Automatically create or attach to a session

```
function tg {
    local session_name="$1"

    if [ -n "$session_name" ]; then
        tmux -2 attach -t "$session_name" || tmux -2 new -s "$sessic
    else
        tmux -2 attach || tmux -2 new -s 'misc'
    fi
}
```

- Retrieve content of the clipboard of tmux in Emacs

```
(defun lgfang-get-tmux-copied ()
  "Get current tmux buffer"
  (interactive)
  (call-process "tmux" nil t nil "show-buffer"))
```

- A more complicated example can be found here

5.9 Free (as in "freedom")

Last but not least: it is BSD-licensed.

That means it is free to

- Use
- Modify
- Re-distribute
- Or even make profit from it.

6 Demo

If scheduled, demonstrate window/pane/attach/session/nesting

1. Connect to server HOST-A (say, a server hosts UDR virtual machines) which I already has at least one tmux session.
2. Create a demo session with "tg demo"
3. Create windows/panes and ssh to HOST-B, which is only accessible from HOST-A (say the pilot card with 10.* IPs)
4. Changing layout, rotate panes within the window
5. Join/swap panes
6. Share
7. Disconnect and re-attach
8. Create a nested tmux session on HOST-B and create windows within it.
9. Switch between the sessions on host-A
10. Explain the naming rule "session_name:window_index.pane_index"
11. Moving windows/panes between sessions
12. Automatically attach to tmux upon login
    - the putty way
    - the command line way

7 Installation

7.1 The most simple way

Copy a statically-linked "tmux" binary to the server.

7.2 The preferred way

Most modern linux/unix variants have package manage system like yum/ports which download and install tmux for you in a single command.

For instance, for fedora/rhel

```
yum install tmux
```

7.3 Install from source

Here is how you install tmux from source code in case needed. (NOTE: compile a **statically linked**, **32-bit** binary for portability)

```
# install libevent if not already
tar xvfz libevent-1.4.14b-stable.tar.gz
cd libevent-1.4.14b-stable
./configure --prefix=$HOME/.local
make && make install
tar xvfz tmux-1.6.tar.gz && cd tmux-1.6/
./configure --enable-static --prefix=$HOME/.local \
    CFLAGS="-I$HOME/.local/include" LDFLAGS="-L$HOME/.local/lib"
make && make install

# echo "LD_LIBRARY_PATH=$HOME/.local/bin:$LD_LIBRARY_PATH" >> ~/.bash_pr
echo "PATH=$HOME/.local/bin:$PATH" >> ~/.bash_profile
```

For cygwin, refer to here.

8 Setup

1. Server side

   Make sure your locale is a uft-8 one, such as `en_US.utf8` or `zh_CN.utf8`.

   ```
   # in your profile
   export LC_CTYPE=zh_CN.utf8 # or "LC_ALL" if you prefer
   ```

2. Make sure your terminal emulator
   1. deals with UTF8 chars correctly.
   2. does not intercept hot-keys sent to tmux.
   3. has a way to NOT send keys to application.

   Let's take PuTTY for example:

   - `Window -> Translation -> Received data...character set`: UTF-8

     Your putty can display UTF-8 characters (the TMUX pane border and the Chinese chars).

   - `Terminal -> Keyboard -> The Function keys and keypad`: XtermR6
   - `Window -> Selection -> Shift overrides applications use of mouse`.

This enables you to copy/paste in your PuTTY as usual except you need to hold down `<shift>` key in the meantime.

NOTE: refer to *copy mode* for more sophisticate copy/paste.

9 Basic operations

All that you need for your daily work (Note that I bind the prefix key to `F12`):

1. New session :: `tmux [new -s session-name]`
2. Attach :: `tmux attach [-t session-name]`
3. Detach :: `F12 d`
4. New window :: `F12 c`
5. Split vertically :: `F12 _`
6. Split horizontally :: `F12 |`
7. Change layout :: `F12 <space>`
8. Kill pane :: `F12 x` (Use this only when the pane does not response)

```
set-option -g prefix F12
```

10 Enable mouse support

```
set-option -g mouse-select-pane on
set-option -g mouse-resize-pane on
set-option -g mouse-select-window on
set-window-option -g mode-mouse on
```

11 Intermediate Usages

You are ready to get started already. However, you may find following slides useful.

11.1 Important concepts

- Server instance
- Sessions
- Windows
- Panes
- Handover of key-stokes

11.2 Customization

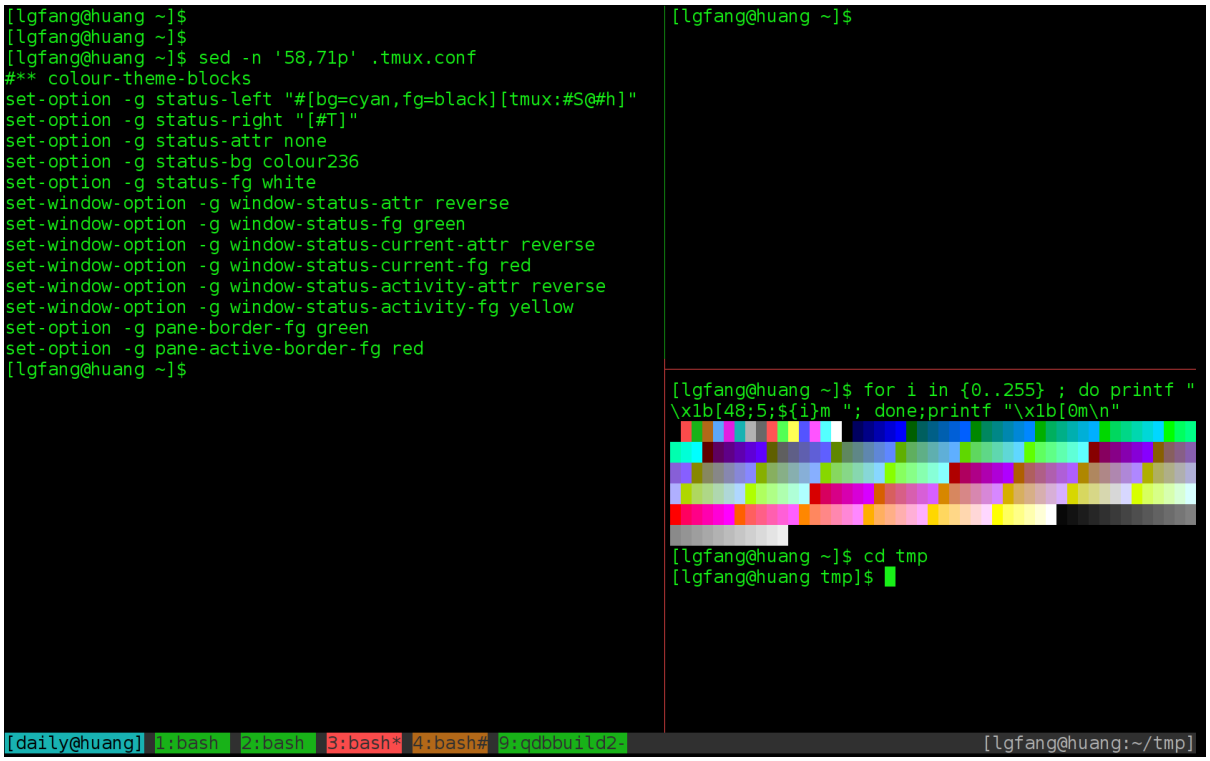
Refer to my `~/.tmux.conf` at ./tmux.html.

Some examples:

```
# Emacser can not use default prefix 'C-b' :)
set-option -g prefix F12
```

```
bind-key | split-window -h
bind-key _ split-window -v
```

11.3 Eye candy



11.4 Windows

1. Select previous working window :: `F12 l`
2. Select the N^th window :: `F12 N`
3. Select next window (index+1) :: `F12 n`
4. Select previous window (index-1) :: `F12 p`
5. To rename a window :: =F12 ,= then input new name

11.5 Panes

1. Select pane :: `F12 <Tab>/<left>/<right>/<up>/<down>`
2. Swap two adjacent panes :: `F12 {`
3. Break current pane to a new window :: `F12 !`
4. Join pane y in window x to current window :: `F12 j` then type in `x.y`
5. Swap with pane y of window x :: `F12 m` then type in `x.y`
6. Toggle Synchronize mode, i.e. duplicate input (key-stokes) to all panes in the same window :: `F12 Ctrl-s`. Sometimes, this is can be handy for testers

```
bind-key Tab select-pane -t:.+
bind-key BTab select-pane -t:.-
set-option -g display-time 3000
bind-key j command-prompt "join-pane -s '%1'"
bind-key m command-prompt -p "move (swap) current pane with: " "swap-par
bind-key C-s setw synchronize-panes
```

11.6 Copy mode

1. `F12 [` or `F12 <PageUp>` to enter ``copy mode'', and then view, search and copy screen output as described below.
   - Scroll up/down: `<PageUp>` / `<PageDown>`, or Emacs(or vi if you configured that way) key bindings, or mouse wheel.
   - Search, just use Emacs key bindings for search (or that of vi based on your configure):
     1. `Ctrl-r`
     2. Type in string to search
     3. `Enter`
     4. Press `n/N` for next/previous match
   - Copy: Emacs/vi key bindings
2. Paste: `F12 ]`
3. Show "clip board": `F12 =`
4. Customize if you want

```
set-window-option -g mode-keys emacs
set-option -g history-limit 600000
```

11.7 Sessions within tmux client

1. New session :: `F12 : new-session -s session_name`
2. Choose(switch) session :: `F12 s`
3. Move window among sessions :: `F12 : move-window -t session_name`

11.8 Run complicated commands

1. Command mode: `F12 : source-file .tmux.conf`
2. Command line command: `tmux source-file .tmux.conf`

11.9 About configuration

1. `F12 : source-file .tmux.conf`
2. "restart" tmux does not make new configure take effect?

   You just "restarted" a session, not the tmux server.

3. What does `-g` in `set-option -g` mean?

   Without `-g`, the option applies to current session only.

12 Advanced

12.1 Log screen outputs

When you want screen log of current pane, save it with `F12 Ctrl-h`

```
bind-key C-h command-prompt -p "save log to:" "copy-mode; send-keys 'M->
# # if "set-window-option -g mode-keys vi", use this one:
# bind-key C-h command-prompt -p "save log to:" "copy-mode; send-keys g
```

12.2 Another way

Though I do not recommend this one, here it is:

1. Start logging :: `F12 h`
2. Stop logging :: `F12 H`

```
# for mode-keys emacs
bind-key h pipe-pane "cat >>$HOME/#S-#I-#P.log" \; display-message "Star
bind-key H pipe-pane \; display-message "Stop logging(#S-#I-#P.log)"
```

12.3 Nesting tmux

There are sometimes when need to nest tmux sessions. For example: Start a tmux session on local Linux box. Then, from within that tmux session, ssh to a server and run another tmux session.

To send prefix to

1. Outer tmux session :: `F12`
2. Nested tmux session :: `F11`
3. tmux session nested twice :: `F11 Ctrl-b`
4. One more layer :: `F11 Ctrl-b Ctrl-b` (do you really want a nested nested nested … session?)

```
bind-key -n F11 send-prefix
bind-key C-b send-prefix
```

12.4 Types of hot-keys

1. Normal (follows the prefix) :: `bind-key Tab select-pane -t:.+`
2. Repeatable :: `bind-key -r Space next-layout`
3. Without prefix :: `bind-key -n F11 send-prefix`

12.5 Maximize a pane temporary

Use cases:

1. Show more in the pane for a little while
2. Maximize, copy (drag mouse) and restore

For latest tmux (version 1.8), already has built-in support. `F12 z` to toggle.

For older versions, *here* is a trick :

```
unbind z
bind-key z run "if [[ $(tmux list-window) =~ MAX ]]; then \
     tmux last-window;\
     tmux swap-pane -s MAX.0; \
     tmux kill-window -t MAX; \
     else tmux new-window -d -n MAX; \
     tmux swap-pane -s MAX.0; \
     tmux select-window -t MAX;fi"
```

12.6 Command line auto-complete

```
if [ -n "$BASH_VERSION" -a -f $HOME/.local/bin/bash_completion_tmux.sh ]
    source $HOME/.local/bin/bash_completion_tmux.sh
fi
# -n $BASH_VERSION ==> we are in bash
```

13 Q&A

References

- The official site: http://tmux.sourceforge.net/
- More tips from me: ./tmux.html

14 Backup

14.1 Reference card according to my conf

List Keys	F12 ?
Detach	F12 d
New window	F12 c
Split vertically	F12 _
Split horizontally	F12 |
Change layout	F12 <space>
Kill pane	F12 x
Select window	F12 idx
Last window	F12 l
Rename window	F12 , new-name
Save log	F12 Ctrl-h
Select pane	F12 <Tab>/<left>/<right>/<up>/<down>

Break current pane	F12 !
Join a pane	F12 j x.y
Swap two panes	F12 {

14.2 Auto-login and hot-keys

Some can not live without

1. auto-login: the emulators remember hostip/username/password.
2. auto-hotkey: a windows software enable you to define your own hotkeys.

I wrote "to" in expect, which is IMHO more convenient.

Created: 2016-09-18 Sun 18:45 by Emacs 24.5.1 (Org mode 8.2.10)