System76 Galago Pro review

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Milwaukee Linux Users Group, 2019-01-12

Agenda

- laptop review
- my experiences installing Debian and learning about EFI

System76

- specializes in computers that run Linux well
- plan to make more of their computers in-house
- now making cases and I/O boards in their new factory in Denver for desktop machines (“Thelio”)

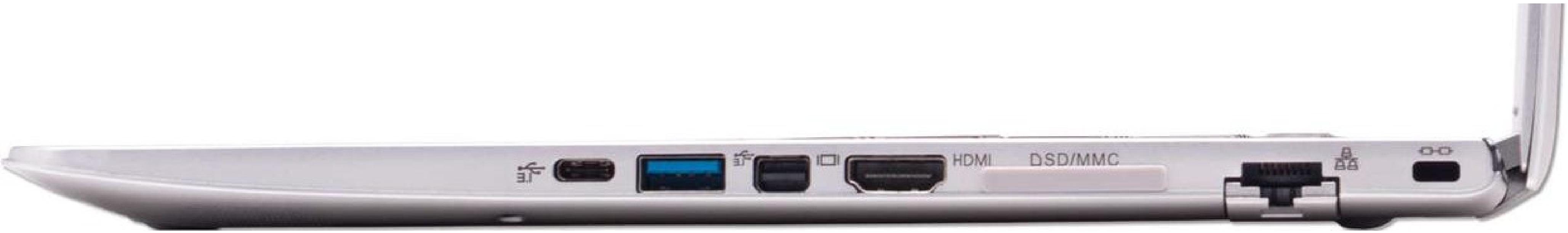
system76
system76
system76

```
  1 [||||||||||||||||||||||||100.0%]   Tasks: 161, 420 thr; 2 running
  2 [||                        5.3%]   Load average: 1.51 1.89 1.11
  3 [|||                       5.4%]   Uptime: 00:11:50
  4 [||                        4.1%]
  Mem[||||||||||        6.56G/31.2G]
  Swp[                     0K/4.00G]

  PID USER      PRI  NI  VIRT   RES   SHR S CPU% MEM%   TIME+  Command
 3275 ryan       20   0 1926M 63436 18108 S 104.  0.2  8:05.61 qemu-system-x86_6
 3278 ryan       20   0 1926M 63436 18108 R 100.  0.2  7:52.11 qemu-system-x86_6
 4466 ryan       20   0 3169M 1985M 19820 S  4.0  6.2  1:01.87 qemu-system-x86_6
 3865 ryan       20   0 3016M  963M 19128 S  4.0  3.0  1:07.54 qemu-system-x86_6
 4028 ryan       20   0 3192M 1412M 19632 S  4.0  4.4  1:55.62 qemu-system-x86_6
 2811 ryan       20   0 3952M  305M 76312 S  0.7  1.0  0:30.47 /usr/bin/gnome-bo
 8534 ryan       20   0 33440  4280  3176 R  0.7  0.0  0:01.62 htop
 8317 ryan       20   0  969M  102M 58520 S  0.0  0.3  0:16.61 /usr/bin/tilix --
 2846 ryan       20   0 1520M 33452 24768 S  0.0  0.1  0:03.60 /usr/sbin/libvirt
 3873 ryan       20   0 3016M  963M 19128 S  0.0  3.0  0:01.55 qemu-system-x86_6
 1226 gdm        20   0  378M 20864 17428 S  0.0  0.1  0:00.23 /usr/lib/gnome-se
 4031 ryan       20   0 3192M 1412M 19632 S  0.0  4.4  0:31.11 qemu-system-x86_6
 1222 gdm        20   0  380M 21240 17796 S  0.0  0.1  0:00.23 /usr/lib/gnome-se
 4471 ryan       20   0 3169M 1985M 19820 S  0.0  6.2  0:08.80 qemu-system-x86_6
F1Help  F2Setup F3SearchF4FilterF5Tree  F6SortByF7Nice -F8Nice +F9Kill  F10Quit
```

Galago Pro laptop being reviewed

- 4GHz CPU, 16G memory, 512G NVMe SSD
- 14″ matte 1080p screen (Intel UHD Graphics 620)
  13.3″ HiDPI also available (3200 x 1800)
- USB 3.1: 2 type A, 1 type C/Thunderbolt
- full-sizeSD card, “fold-out” full-size Ethernet
- video output: HDMI, mini DisplayPort
- slot for Kensington lock, unused SIM card port


3.1
HDMI
DSD/MMC

SIM
3.1

first impressions: the good

- machine is blindingly fast with a gorgeous screen
- sensitive trackpad; set up to use one-, two-, and three-finger tap for left-, right-, and middle-click
- special keys worked out-of-box (in Debian!)
- battery life up to 7 hours depending on usage
- no problems multi-booting Debian and Ubuntu

first impressions: the not as good

- had to download version of Debian with wireless firmware included (not a laptop issue)
- needed to change font DPI from 96 to 120 (screen resolution almost *too* good!)
- trackpad buttons were quite stiff at first, trackpad doesn’t respond well in upper corners
- no caps lock light

initial configuration

- Ubuntu 18.04 installed (Pop!_OS also available)
- 512M EFI partition (no secure boot)
- 4G swap partition at end of disk
- remaining space allocated for Ubuntu (ext4)

after installation of Debian

- 512M EFI partition
- master GRUB partition (more about this later)
- Ubuntu partition shrunk to 16G
- 2 X (256M ext2 boot, 32G XFS root) for Debian
- swap partition expanded to 16G for hibernate
- remainder for “common” partition (XFS)

FUN AND GAMES WITH EFI

Caveat utilitor!

learning EFI using KVM/QEMU

- install `ovmf` to create VMs with EFI firmware
- NVRAM at `/var/lib/libvirt/qemu/nvram`
- must copy NVRAM if creating snapshots or copying disk images (which you'll want to do in case of mishap)

EFI basics

- meant to replace BIOS/MBR
- EFI partition must be fat32, usually about 512M. Most distros mount this partition at `/boot/efi`.
- Each vendor puts their boot files in a directory named for the vendor (e.g. “debian”, “ubuntu”).
- EFI stores multiple *boot entries* (although most users won’t interact with them directly).

EFI setup

- like BIOS setup; there should be a GRUB menu item for it (or use `fwsetup` from GRUB prompt)
- you can also view EFI boot entries from Linux by installing `efibootmgr`
- EFI variables can be inspected by installing `efivar` (or viewing `/sys/firmware/efi/efivars`)

EFI shell

- should be a menu entry for it on EFI setup screens
- can install one if you don’t have it
- archaic DOS-like interface, but scripting is supported
- many utilities, can edit boot entries with `bcfg`

EFI multi-boot

- Linux distros typically add GRUB menu entries for other operating systems found on disk
- can also use `rEFInd` in place of GRUB,
  or `systemd-boot` (kernel wrapped w/EFI stub),
  or even `elilo`
- possible to install GRUB in its own partition and chain to config files in different partitions…

master GRUB partition — the holy grail

-
  ```
  grub-install --target=x86_64-efi \
  --efi-directory=/boot/efi \
  --boot-directory /mnt/grub \
  --removable
  ```
- `--removable` installs GRUB loader to `EFI/BOOT` in EFI system partition (avoiding vendor directories)
- don’t use `--bootloader-id` with `--removable`
- must create `grub.cfg` and add EFI boot entry

“chainloading” a GRUB config file

```
menuentry 'My Groovy OS' {
   set root=(hd0,gpt5)
   configfile /grub/grub.cfg
}
```

- can also chain to an EFI executable:

```
insmod chain
chainloader “\EFI\BOOT\BOOTX64.EFI”
```

editing EFI boot items… *if you dare*

- try `efibootmgr` (from Linux):

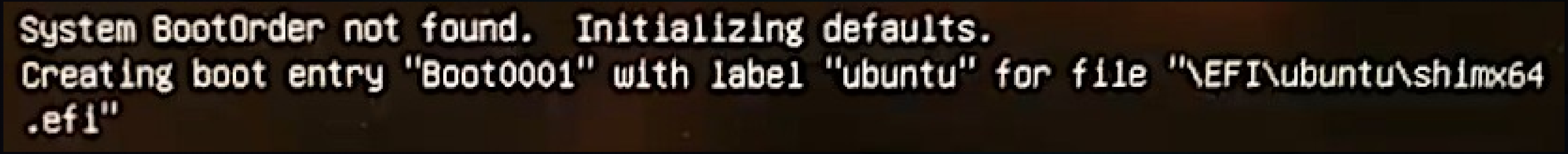
```
efibootmgr -c \
-d /dev/nvme0n1 -p 9 \
-l "\EFI\BOOT\BOOTX64.EFI" -L "MASTER_GRUB"
```

- or `bcfg` (from an EFI shell):

```
bcfg boot add \EFI\BOOT\BOOTX64.EFI \
”MASTER_GRUB”
```

- and hope it doesn’t get overwritten at next boot!

*Pray that you don't see this!**



```
System BootOrder not found.  Initializing defaults.
Creating boot entry "Boot0001" with label "ubuntu" for file "\EFI\ubuntu\shimx64
.efi"
```

EFI firmware may override your intentions in an effort to protect you from yourself… but this makes it harder for you to get it to do what you want.

*and you probably won't, since it appears for only a split-second

EFI takeaways

- I am new at this… I’m sure there is much more for me to learn in the future.
- *Be careful!* Standard disclaimers apply: don’t type in commands unless you know what they do, &c.
- Practice on a VM using a glove box and hazmat suit to minimize danger.

QUESTIONS