Netboot 4 Raspberry Pies

USM code coffee

PS: I got all the hints to start with and invaluable help during debugging from Jan Snigula@MPE

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Why?

- Controlling cameras (i.e. WST obs)
- Webpage viewer (run video loop or show some status or webcam images)
- Home entertainment station
- ... https://www.makeuseof.com/tag/different-uses-raspberry-pi/

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Hardware you need

- Raspberry Pi 4
- USB-C Power Supply (with enough W)
- Raspberry Pi Case
- SDCard + Monitor + keyboard + mouse
- Server / VM / another Rasp / NAS
- PC or Mac to create initial Rasp OS Card

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Software to start with

- TFTP - Server
- NFS - Server
- Raspberry Pi OS

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guidelines to follow

- https://linuxhit.com/raspberry-pi-pxe-boot-netbooting-a-pi-4-without-an-sd-card/NFS - Server
- more details in https://www.raspberrypi.org/documentation/hardware/raspberrypi/bcm2711_bootloader_config.md
- ... and you're done

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... just kidding

- Install new Raspberry Pi OS on memory card
  https://www.raspberrypi.org/software/
- modify boot ROM
- create bootable system image on server

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nasty details (TFTP boot copy)

- TFTP-Server for the boot partition:
  copy of /boot in subdir of TFTP root;
  subdir name is Pi serial number
- Max out logging of TFTP Server, you may need that for trouble shooting
- modify cmdline.txt in the /boot copy

  console=serial0,115200 console=tty1 root=/dev/nfs
  nfsroot=192.168.2.100:/nfs/serno,vers=3 rw ip=dhcp rootwait elevator=deadline

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nasty details (NFS system copy)

- NFS-Server for the system partition:
  ... many options depending on system, ymmv
  /nfs/client1 *(rw,sync,no_subtree_check,no_root_squash)
  /tftpboot *(rw,sync,no_subtree_check,no_root_squash)

- sudo rsync -xa --progress --exclude /nfs/client1 \
  --exclude /etc/systemd/network/10-eth0.netdev \
  --exclude /etc/systemd/network/11-eth0.network \
  --exclude /etc/dnsmasq.conf / /nfs/serno

- cd /nfs/serno
  sudo mount --bind /dev dev
  sudo mount --bind /sys sys
  sudo mount --bind /proc proc
  sudo chroot . rm /etc/ssh/ssh_host_*
  sudo chroot . dpkg-reconfigure openssh-server
  sudo chroot . systemctl enable ssh
  sudo umount dev sys proc

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nasty details (new boot ROM)

- Extract the configuration file

```
cp /lib/firmware/raspberrypi/bootloader/stable/pieeprom-2020-01-17.bin pieeprom.bin
rpi-eeprom-config pieeprom.bin > bootconf.txt
```

- edit bootconf.txt

```
BOOT_ORDER=0x21
TFTP_IP=xxx.xxx.xxx.xxx
CLIENT_IP=xxx.xxx.xxx.yyy #<if fix>
SUBNET=255.255.255.0
GATEWAY=xxx.xxx.xxx.zzz
TFTP_PREFIX=0
```

- Apply the configuration change to the EEPROM image file

```
rpi-eeprom-config --out pieeprom-new.bin --config bootconf.txt pieeprom.bin
# Flash the bootloader EEPROM
# Run 'rpi-eeprom-update -h' for more information
sudo rpi-eeprom-update -d -f ./pieeprom-new.bin
sudo reboot
```

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nasty details (things going wrong)

- check the tftp logs, check the NFS logs
- watch out for invisible line breaks @ wrong places in bootconf.txt (goes for all config files)
- exported file owner has to be root

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going on from here...

- mount /tmp on a /tmpfs RAM disk
  (if the system works you may also do that for /var/log, /var/run etc.)
- i.e. for cameras also use a RAM disk as intermediate storage
- use lsync to update from RAM disk to the NFS mounted shares
- for fixed IP: new networks require separate disabling of DHCP, no longer in /etc/networks/interfaces but /etc/dhcpd.conf