Petitboot - Four Years of Linux as a Bootloader

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Who am I?

• Ozlabs IBM in Canberra, Australia
• OPAL software engineer
• Petitboot maintainer
What is Petitboot?
Petitboot is a graphical bootloader for the PlayStation 3. It's based on the existing kboot project, plus the twin windowing system for the GUI.

At present, petitboot is very much a work-in-progress, but works on our test PS3.

Petitboot is licensed under the GPL v2.

screenshots

![Devices can provide their own icons](image1)

![Loading the Ubuntu PS3 CD](image2)

download

Petitboot, version 0.2:

- [oteros.bld](#) (PS3 flash image, 3.4M)

The [installing](#) section below has instructions on installing petitboot.

I have another image, same as the above, but with a telnet server, a ssh server and a http server enabled. However, this isn't secure; there is no password set, and anyone with network access to the machine can get root access. Only run this image if your ps3 is on a trusted network:

- [oteros-ps3boot-network.bld](#) (PS3 flash image, 3.5M)

You will need to rename this to ot eros .bld after you download it.

installing

1. Put your ot eros .bld file on to a USB disk, in a file called /PS3/ot eros /ot eros .bld. Assuming your USB disk is mounted at /media/usbdisk:

   ```
   [jkl@pokey ~]$ mkdir -p /media/usbdisk/PS3/ot eros
   [jkl@pokey ~]$ cp ot eros .bld /media/usbdisk/PS3/ot eros
   ```

2. Plug the USB disk into your PS3, and navigate to System → System Settings → Install Other OS. The PS3 should find the new file on the USB disk, and install it.

3. To boot with petitboot:

   ```
   [jkl@pokey ~]$ Petitboot
   ```

   1. Select your USB disk.
   2. Select your PS3 kernel.
   3. Select your PS3 loader.
   4. Select petitboot.
   5. Select load petitboot.
   6. Select boot petitboot.
   7. Congratulations! You should now have Petitboot loaded.

   If you don't have a USB disk, you can use any sort of media that the PS3 can read - CDROM, DVD, compact flash, etc. Just make sure that the file is called /PS3/ot eros /ot eros .bld.
2014 - IBM POWER8 with "OPAL"
All Linux!
Bootloader for all ppc64le servers
Boot Process

- Petitboot: Set of programs to find & boot Linux images
- Linux kernel and userspace built with Buildroot
- "kexec-lite" to boot next kernel
• "pb-discover" server process
  Manages devices, finds & boots boot targets

• "petitboot-nc" ncurses client
  Launched on each interface (VGA, IPMI..)

Various helpers for console setup, net config, device-tree tricks..
• Parses bootloader configurations found on system
• GRUB, Yaboot, Kboot, etc, and own format
• DHCPv4 & now DHCPv6 via udhcpc
• PXELINUX network boot support, some iPXE support
• Download & boot images directly
Petitboot System Configuration

Autoboot:  ( ) Disabled
(*) Enabled

Boot Order:  (0) disk: ca_dyn259-home [uuid: 79040f7e-62a5-4f6a-9bf9-30ce12c16d6e]
(1) Any USB device
(2) Any Network device

[    Add Device    ]
[  Clear & Boot Any  ]
[    Clear     ]

Timeout:    10  seconds

Network:  (*) DHCP on all active interfaces
( ) DHCP on a specific interface
( ) Static IP configuration

Flexible boot order priorities
Where is Petitboot running?
IBM POWER8 servers
Rackspace's POWER8 Barreleye
IBM POWER9
Witherspoon & Boston, the compute & storage nodes of Summit and Sierra
Elsewhere?
Why?
✔ Just Linux
✔ Open, extensible
✔ Intuitive
✔ Drop in replacement
Just Linux - the Good
• Huge amount of tools and infrastructure
• Thin layer of custom additions on top of Buildroot
• Use tools in new ways: dm-snapshots to protect disks
Exiting petitboot. Type 'exit' to return.
You may run 'pb-sos' to gather diagnostic data

# mount
rootfs on / type rootfs (rw,size=66902784k,nr_inodes=1045356)
devtmpfs on /dev type devtmpfs (rw,relatime,size=66902784k,nr_inodes=1045356,mode=755)
proc on /proc type proc (rw,relatime)
devpts on /dev/pts type devpts (rw,relatime, gid=5,mode=620,ptmxmode=000)
tmpfs on /dev/shm type tmpfs (rw,relatime,mode=777)
sysfs on /sys type sysfs (rw,relatime)
securityfs on /sys/kernel/security type securityfs (rw,relatime)
/dev/mapper/pb-sda1 on /var/petitboot/mnt/dev/sda1 type ext4 (ro,relatime, stripe=4)
/dev/mapper/pb-sda2 on /var/petitboot/mnt/dev/sda2 type ext4 (ro,relatime)
/dev/mapper/pb-sda3 on /var/petitboot/mnt/dev/sda3 type ext4 (ro,relatime)
/dev/mapper/pb-sda6 on /var/petitboot/mnt/dev/sda6 type xfs (ro,relatime,attr2,inode64,noquota)
/dev/mapper/pb-sdb2 on /var/petitboot/mnt/dev/sdb2 type xfs (ro,relatime,attr2,inode64,noquota)
/dev/mapper/pb-nvme0n1p5 on /var/petitboot/mnt/dev/nvme0n1p5 type xfs (ro,relatime,attr2,inode64,noquota)
/ #
Just Linux - the Bad
• Upstream dependencies: "free fixes" can also mean free bugs!
• Smaller architecture ecosystem: more corner cases
• Issues from unexpected use cases
Putting open source in to a normally closed space

Most disk setup utilities are closed source blobs
Can't always convince vendors to just open source them
How to solve and be user friendly?
Petitboot Plugins

[Disk: sda2 / 04669a04-0e78-42b7-a31c-79ec7d6dd26b]

Arcconf

Return to Main Menu

Enter=install pb-plugin interface
## Petitboot Plugin

<table>
<thead>
<tr>
<th>ID:</th>
<th>arcconf</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name:</td>
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<tr>
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<tr>
<td>Date</td>
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</tr>
</tbody>
</table>

**Commands:**  

```  
(*) arcconf  

[ Run selected command ]  
```

**Keyboard Shortcuts:**
- `tab=next`
- `shift+tab=previous`
- `x=exit`
- `h=help`
Petitboot & Security

• User expectations in 2014: "Does it boot?"
• User expectations in 2018: "Does it boot what its meant to?"
In OPAL:
• Trusted Boot with attached TPM
• Secure Boot to verify each firmware stage

In Petitboot:
• Signed & encrypted kernels, initrds, and boot arguments
  • Supports gpgme and OpenSSL
  • From external contributors! (Raptor and OpenGear)
Privilege separation via Linux users, password hashes saved in NVRAM
What's next?
• Just recently - simpler multi platform support
• Automatic ISO installs
• Expanding pb-plugins
• More!
Questions?
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