

# Booting over Wide Area Networks

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# Overview

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- Introduction to LAN boot
- OpenSLX Project
- Booting over WAN
- Demonstration

# Motivation Network Booting

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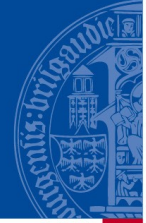


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- Provide flexible Linux systems easy to administer
- Separating the administration of hardware and software
  - Centralized management of software
  - Hardware can easily be replaced
- Dynamically change the default system to boot

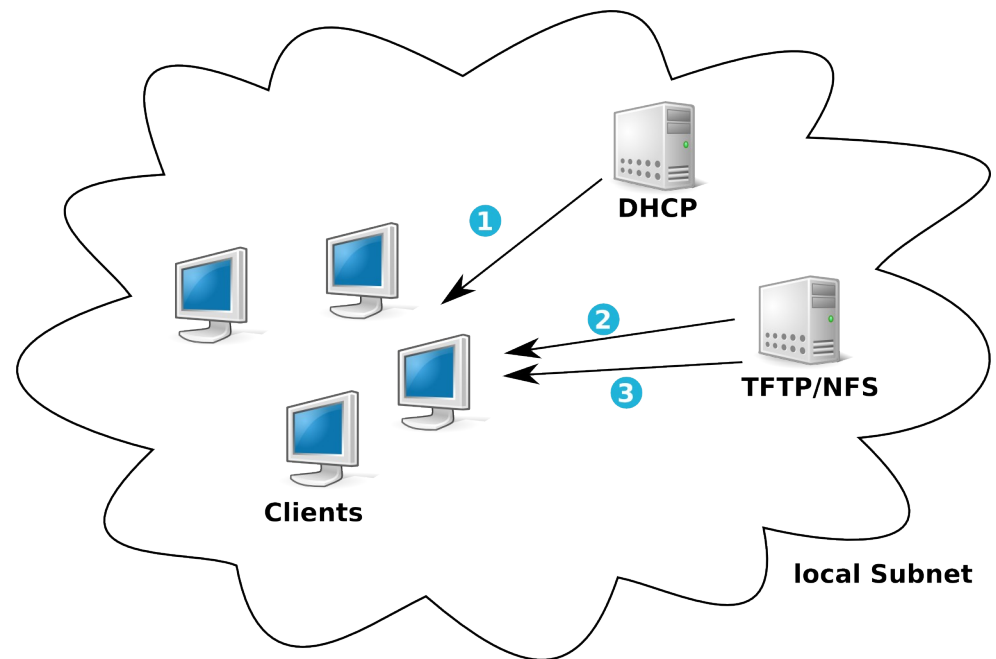
# Traditional LAN-Boot

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- Client gets IP Configuration from DHCP; additionally the next-server and filename directives
- Clients is requesting the filename from next-server via TFTP (e.g. pxelinux)



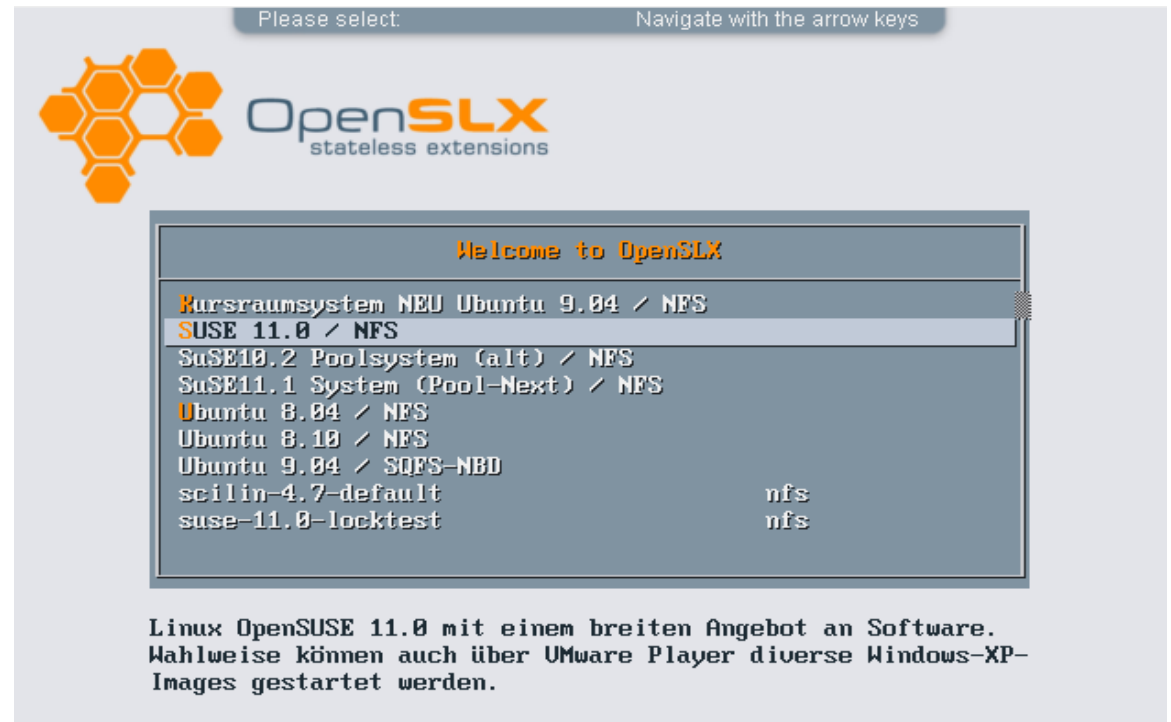
# Traditional LAN-Boot

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- (optional) depending on the configuration a boot menu can be displayed
- Kernel and Initialramfs are fetched
- Bootprocess is started



# OpenSLX - Motivation

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- Booting a kernel over the network is only half of the way
    - The initialramfs has to be modified to setup the hardware and mount the root filesystem over the network
    - The rootfilesystem itself has to be modified
- => OpenSLX is simplifying these tasks

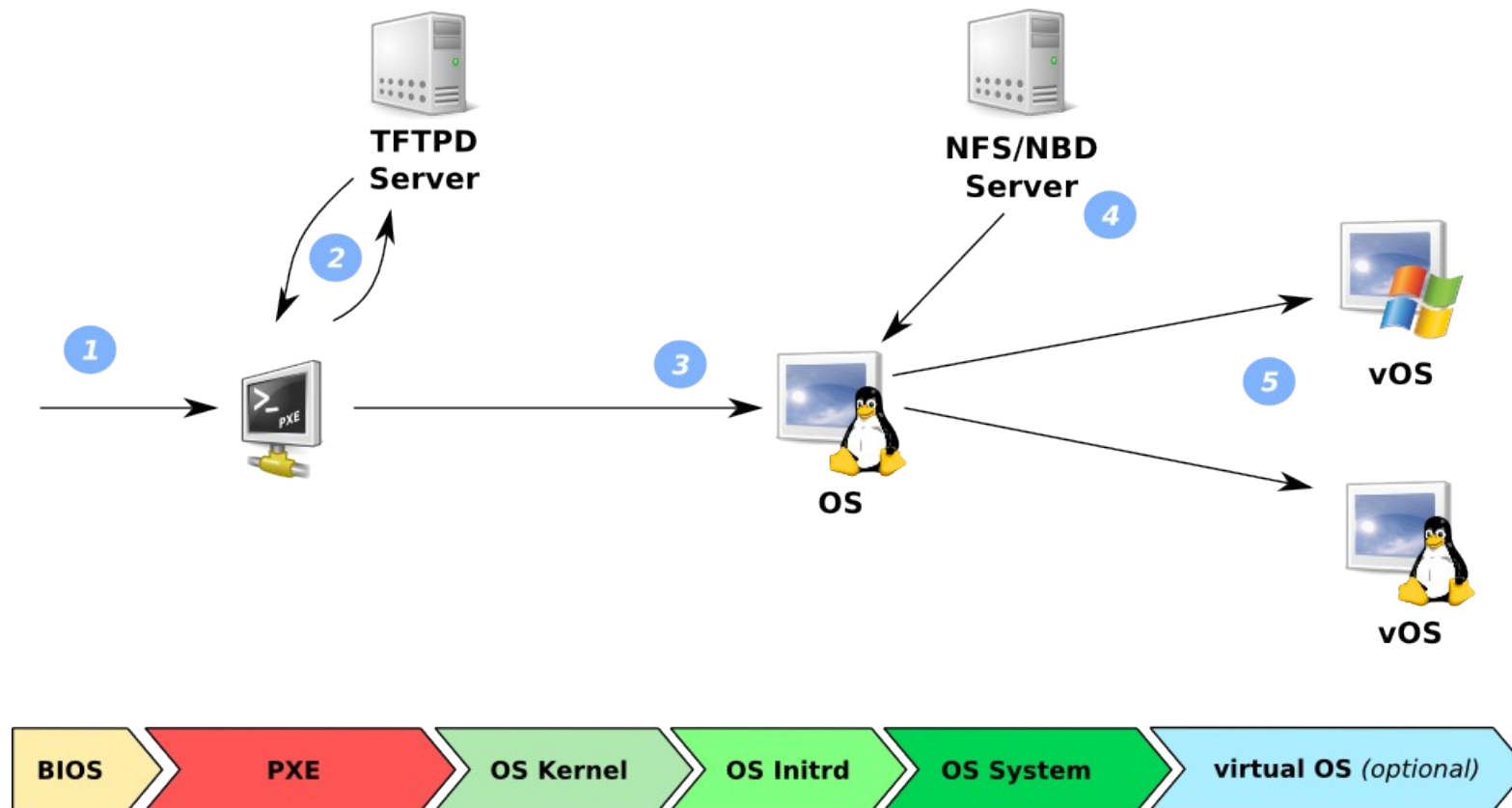
- A reference client is cloned (slxos-setup)
  - That means: content of the rootfilesystem is copied to the server
- The rootfilesystem gets modified and provided over the network via NFS, NBD (slxos-export)
- Initialramfs is generated and placed on the tftp server together with the kernel and a freshly updated pxe menu (slxconfig-demuxer)

# OpenSLX Boot

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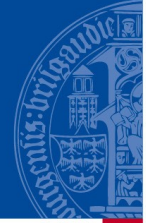
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# Limitations of LAN-Boot

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- PXE is embedded in the network hardware – no modifications possible
- You have to control the DHCP and TFTP Server (in some scenarios this is not possible)
- TFTP is not secure
- TFTP uses UDP – unreliable and slow over long distances
- You're bound to the local network

# Concept of WAN Boot

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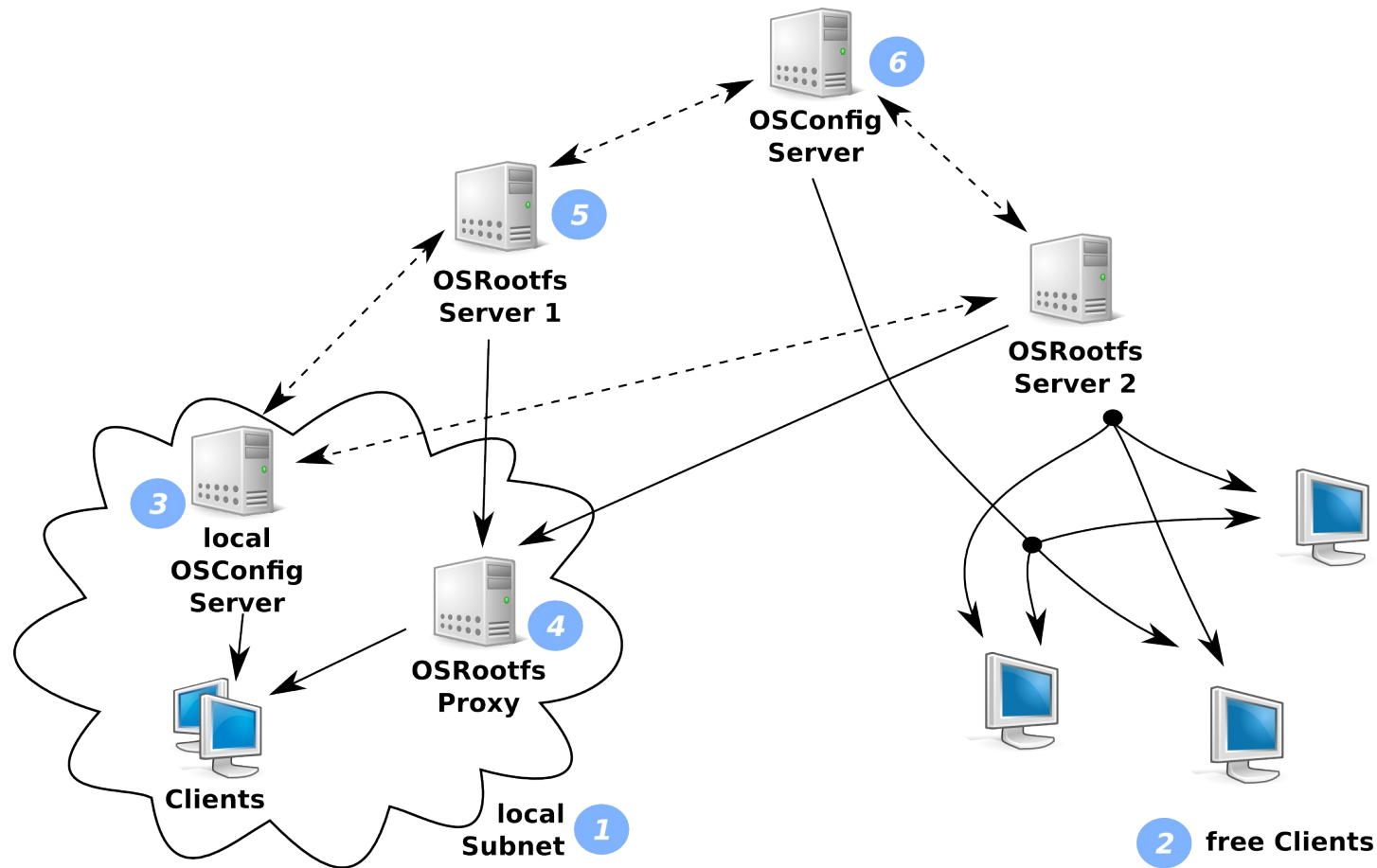
- To get rid of these limitations we replace the PXE part of the LAN Boot with a minimal Linux System
- It's responsible for
  - the initial network setup
  - the selection of the OS we want to boot
  - configuration
  - start of the “real” system (through kexec)

# Components - WAN-Boot

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# Preboot Environment (PBL)

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- Small Linux system - containing:
  - Optimized Kernel with support for the most common network adapters
  - Initialramfs based on busybox
  - Framebuffer GUI to replace the PXE menu
- Size: ~20MB
- Delivered via PXE, USB, HDD, CDROM, ..

- Replaces the PXE menu and adds features like per user configuration
- Based on QT Embedded
- There is no actual GUI – just a browser view based on WebKit
  - Modifying the GUI is easy – only the webpage has to be changed; no recompilation needed
  - Fancy HTML5 and CSS3 is possible
  - JavaScript extended with some functions (for example to push files from the server to the client)

- Webapplication managing
  - bootable systems
  - individual user configuration
  - global configuration
  - access rights
- Two views, for
  - PBL (accessed through the framebuffer GUI)
  - Admins/Users (accessed with a browser)

# OSConfig Server

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File View Help

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• Schnellstart


- Basissystem auswählen

• Expertenmodus

- Basissystem auswählen
- Session auswählen
- Einstellungen setzen

Auswahl des Basissystems

**Standard Lehrpool Umgebung**  
Ubuntu 10.04.2  
Kurzbeschreibung ..

**Standard Lehrpool Umgebung**  
Windows 7  
Kurzbeschreibung ..

Hilfe

Anmelden

[Beenden](#)













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CONTINUE

Angemeldet als **Test 1 Test 1** in der Rolle **SuperAdmin**

**ols**

Create Pool

Location	Actions
Keller	  
<b>Hardwarehash</b>	<b>Actions</b>
11bc2d3cd23f53a6cab48	
fbef0dc789e8cfe12455	
35e223a11c249d1b69fc	
5464f19629e2e8b1e9a9d	
EG	  
<b>Hardwarehash</b>	<b>Actions</b>
b85440c2031c19bb6812	
5267441ec144744439c7e	
1 OG	  
<b>Hardwarehash</b>	<b>Actions</b>
224771b7a3a0af4e02748	
84e9e386c1b57ded3e4d	
2 OG	  
<b>Hardwarehash</b>	<b>Actions</b>
093010ee309c060b1fca9c8011529af4	
00:22:00:22:00:22	
a3562c8cad2a4fa4fc11656025dc911b	

<< < 1 > >>

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# OSConfig Server

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Angemeldet als **Test 1 Test 1** in der Rolle **SuperAdmin**

## Pools

Create Pool

Title	Description	Location	Actions
Pool 1	Description 1	Keller	
	<b>Mac</b>	<b>Hardwarehash</b>	<b>Actions</b>
	00:00:00:00:00:10	ea9b82d9de911bc2d3cd23f53a6cab48	
	00:00:00:00:10:00	1e2b1599710fbbef0dc789e8cfe12455	
	00:00:00:10:10:00	8f6209ca3d6b35e223a11c249d1b69fc	
	00:00:10:00:00:00	e17ab09f3586464f19629e2e8b1e9a9d	
Pool 2	Description 2	EG	
	<b>Mac</b>	<b>Hardwarehash</b>	<b>Actions</b>
	00:10:00:00:00:00	9bf70279d283b85440c2031c19bb6812	
	10:00:00:00:00:00	ad3bce4464a6267441ec144744439c7e	
Pool 3	Description 3	1 OG	
	<b>Mac</b>	<b>Hardwarehash</b>	<b>Actions</b>
	00:55:00:55:00:55	e8d7e80d79f224771b7a3a0af4e02748	
	66:00:66:00:66:00	ded66ce272f384e9e386c1b57ded3e4d	
Pool 4	Description 4	2 OG	
	<b>Mac</b>	<b>Hardwarehash</b>	<b>Actions</b>
	00:ff:ff:ff:ff:ff	695610ee509c060b1fca9c8011529af4	
	00:22:00:22:00:22	a3562c8cad2a4fa4fc11656025dc911b	

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display Debug // last edit: 03/2011 // version: 0.1.1

- Schnellstart**
  - Basissystem auswählen
- Expertenmodus**
  - Basissystem auswählen
  - Session auswählen
  - Einstellungen setzen

Hilfe  
Anmelden  
Beenden

user  
Person  
Group  
Role  
Bootiso  
PreBoot  
BootMenu  
Config  
BootOs  
Client  
Filter  
Pool  
Change Membership  
Delete Account  
Logout



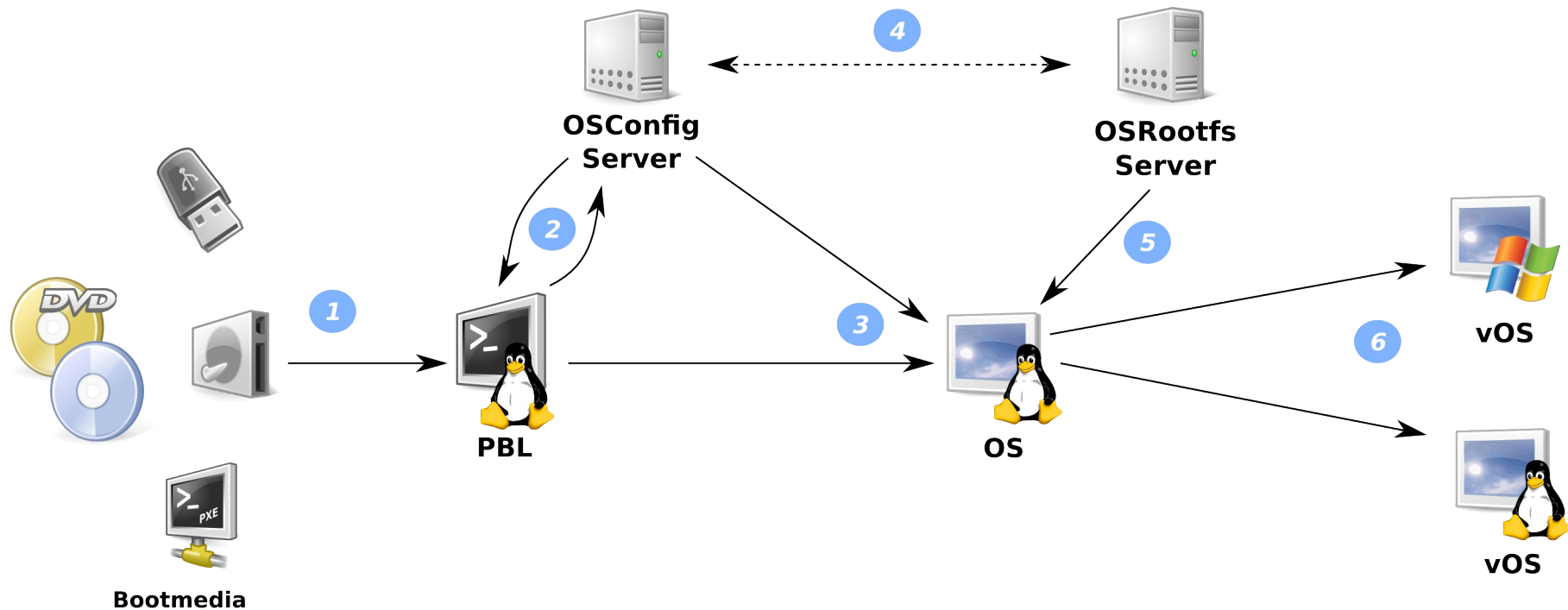
- Still in planing phase
- Responsible for sharing the root filesystems for every bootable system
- When finished it should support sharing filesystems via
  - NFS
  - Network Block Devices (NBD, DNBD, DNBD2)
  - Maybe more in far future (DAV, SMBFS, ..)

# Big Picture – WAN-Boot

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# Conclusion

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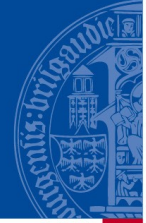


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- Due to the fact that the actual menu is fetched from a central webpage, it's really easy to change the default system to boot dynamically
- This allows the on demand selection of the bootable system by time, hardware, location, etc.
- In combination with wake on lan tasks like automated backup of local harddrives or anti virus scans during night are possible

# Links & Contact

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OpenSLX:

<http://lab.openslx.org/projects/openslx>

English Wiki:

<http://lab.openslx.org/projects/openslx/wiki/WikiStart-en>

GitWeb (for various projects including OpenSLX, vmchooser, fbgui, ..):

<http://git.openslx.org>

Current development of next major OpenSLX version (in German only):

<http://lab.ks.uni-freiburg.de/projects/preboot>

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