

Ezilla - WebOS

Toward the Private Cloud & Possibility of Virtual Classroom

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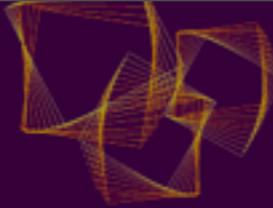
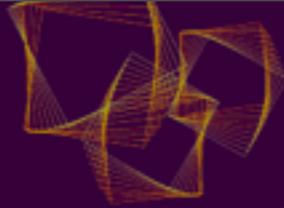


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- Demo
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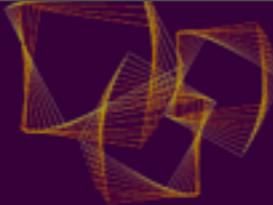
● Background & Purpose

- ✓ Cloud Computing rises as an alternative to High-end Computing, following the Grid Computing
- ✓ Providing Cloud Computing solution, following open standard
- ✓ Providing intuitive, friendly UI, leverage virtual as well as physical computing resource with ease
- ✓ Promoting the collaboration between NCHC and its partners, domestic and international

● Motivation

- ✓ Access Cloud resources with ease
- ✓ Concept of “Carry on Cloud” : joint and shared **efforts**
- ✓ Customized Cloud environment w/o duplicated efforts
- ✓ Application specific Cloud environment





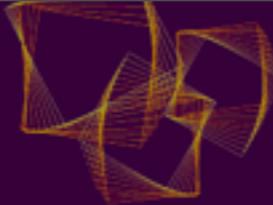
- What is Ezilla

- ✓ a toolkit for personal private Cloud environment
- ✓ create one's own virtual working environment with simple and straightforward GUI, following one's intuition

- Features of the Ezilla

- ✓ auto-installation
- ✓ Friendly UI
- ✓ real time monitoring & management via web
- ✓ interactive access to VMs
- ✓ dynamical resource pooling
- ✓ VM Image packaging

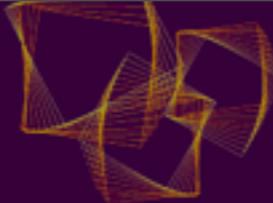




• Middleware adopted

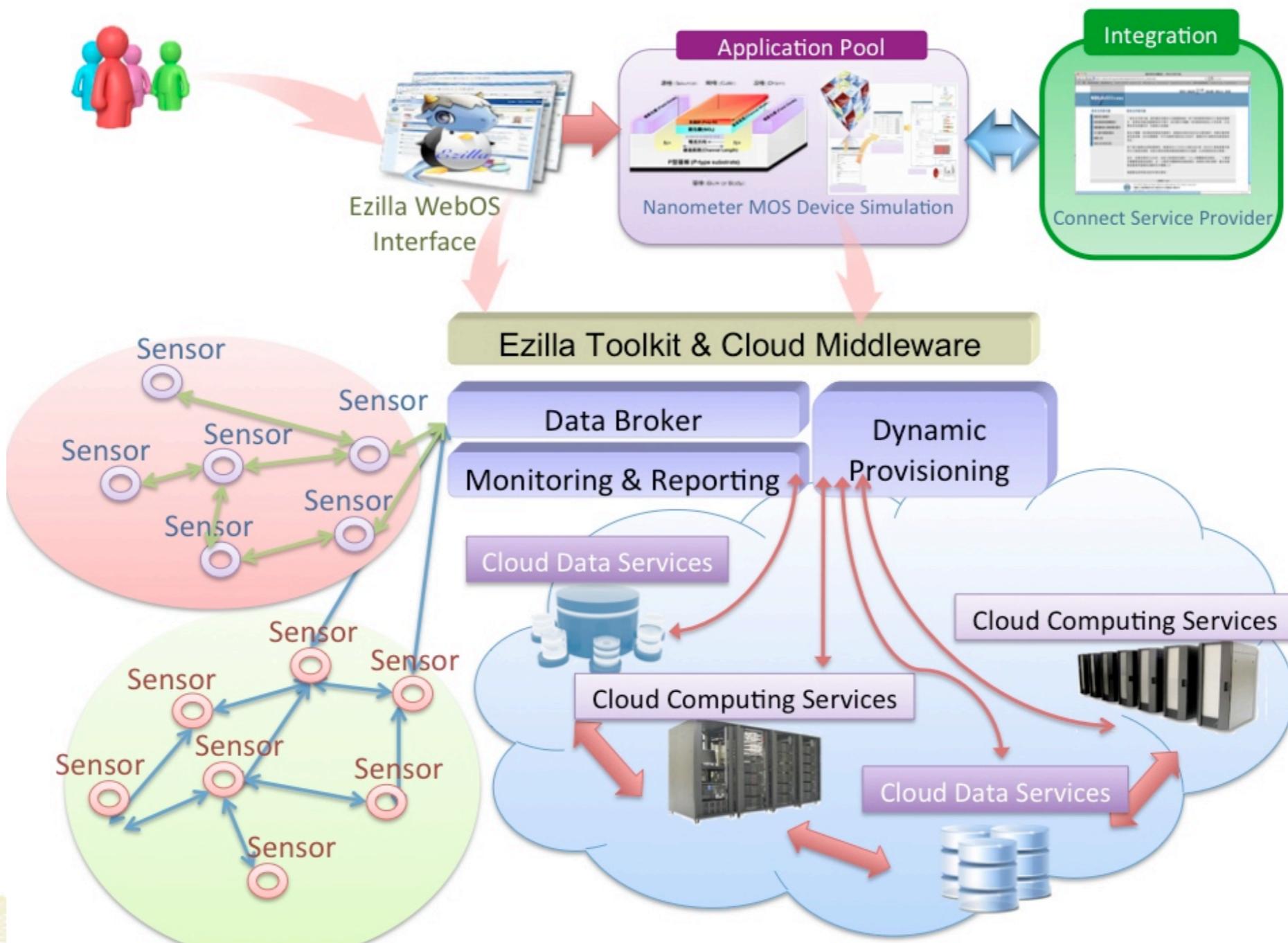
- ✓ DRBL (Diskless Remote Boot in Linux)
 - * boot OS image into Ezilla clients via PXE
- ✓ Cloud middleware
 - * OpenNebula
 - * KVM
 - * Libvirt
 - * Ruby
 - * ...
- ✓ GUI : WebOS (eyeOS)

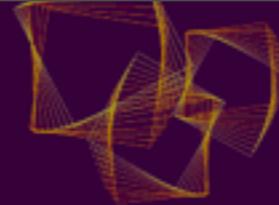




Implementation

● Architecture





- Deployment of Cloud via Ezilla



Unattended
Installation

DRBL SSI (Single System Image)
+
Virt. Tech.



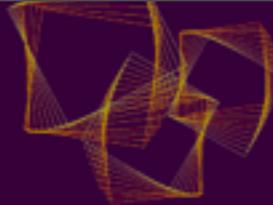
Ezilla Server



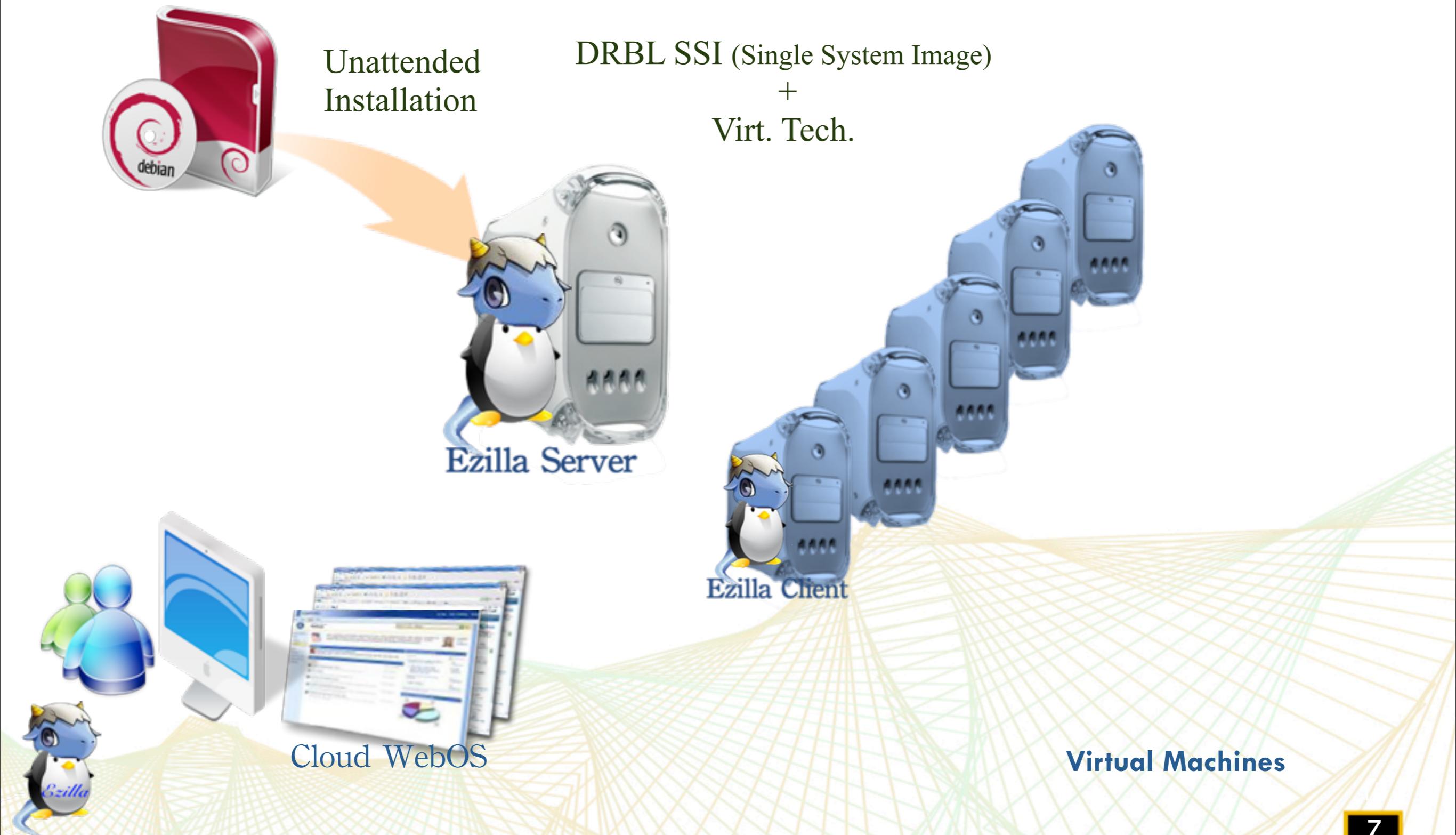
Ezilla Client

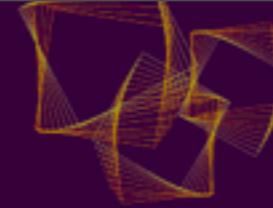
Virtual Machines



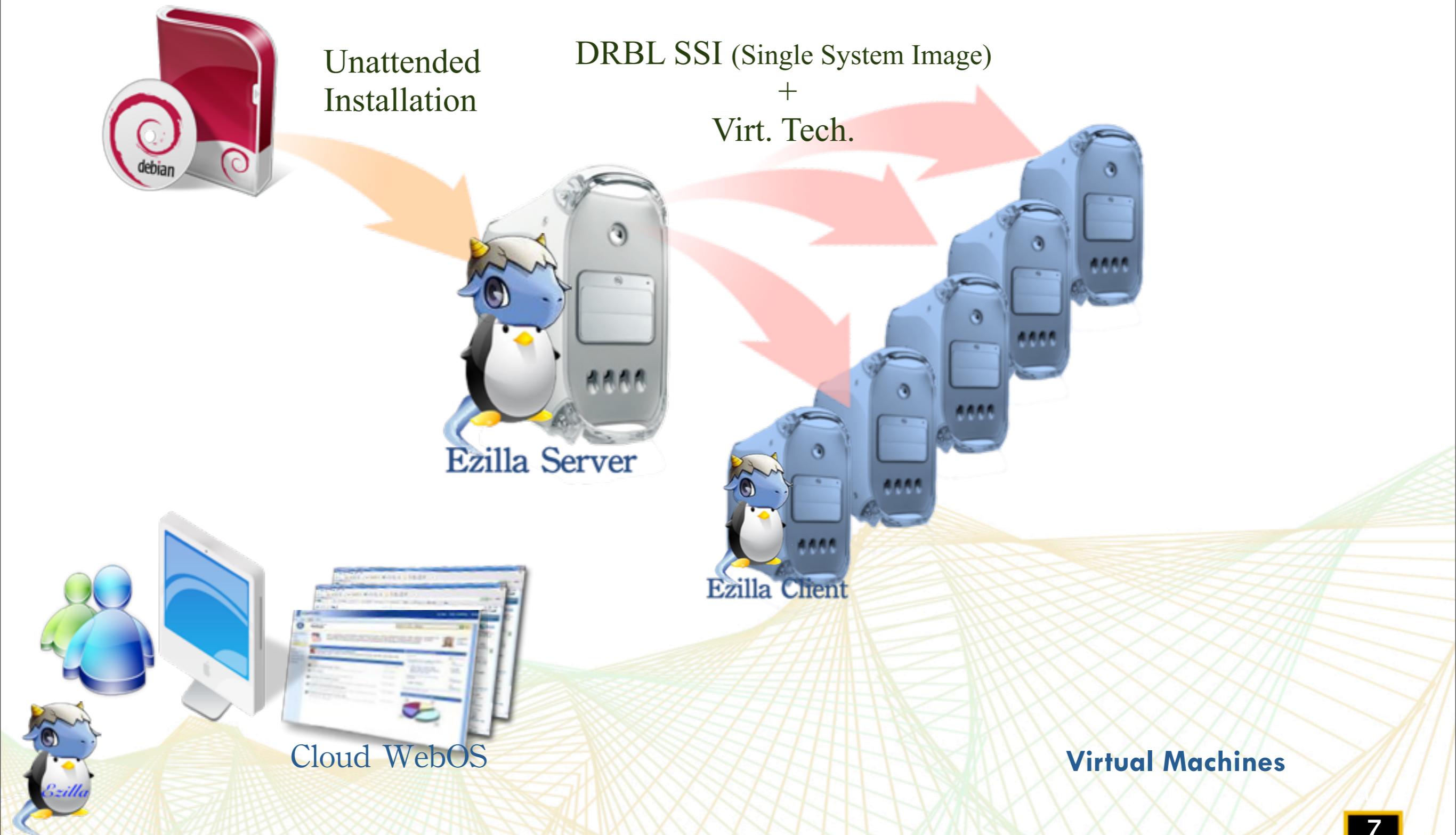


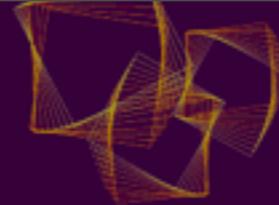
- Deployment of Cloud via Ezilla



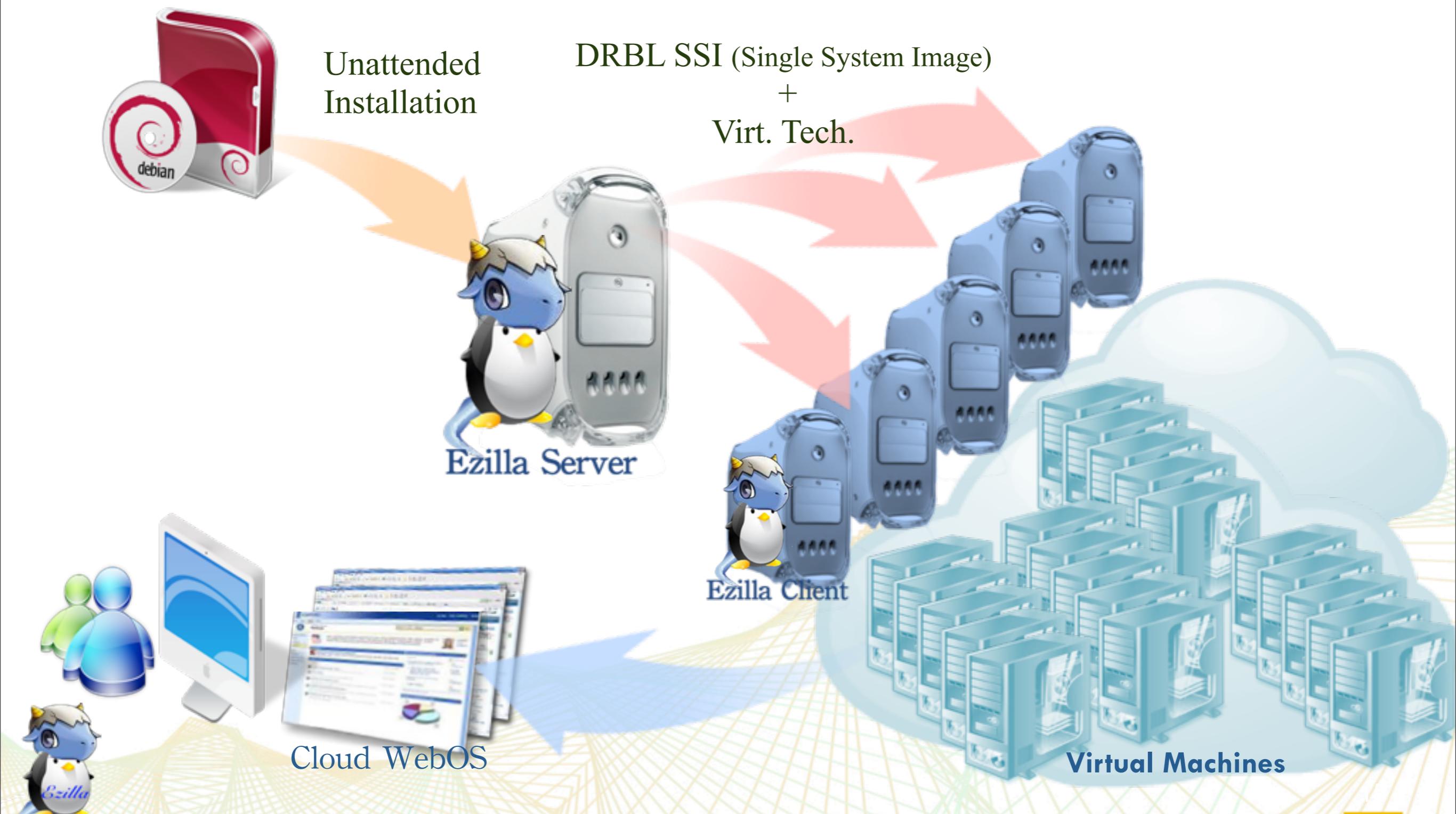


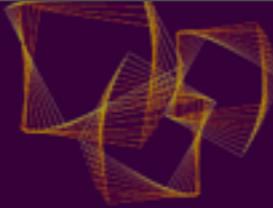
• Deployment of Cloud via Ezilla





• Deployment of Cloud via Ezilla





- Ezilla Server

- ✓ using the VM in the place of server
 - * for demo convenience

- GUI

- generate user's account

- Ezilla Client

- ✓ Resources added dynamically
 - ✓ diskless version
 - ✓ disk-full version to come

- VM Image Packaging

- ✓ useful for generating Application VM Image
 - ✓ keep updated status





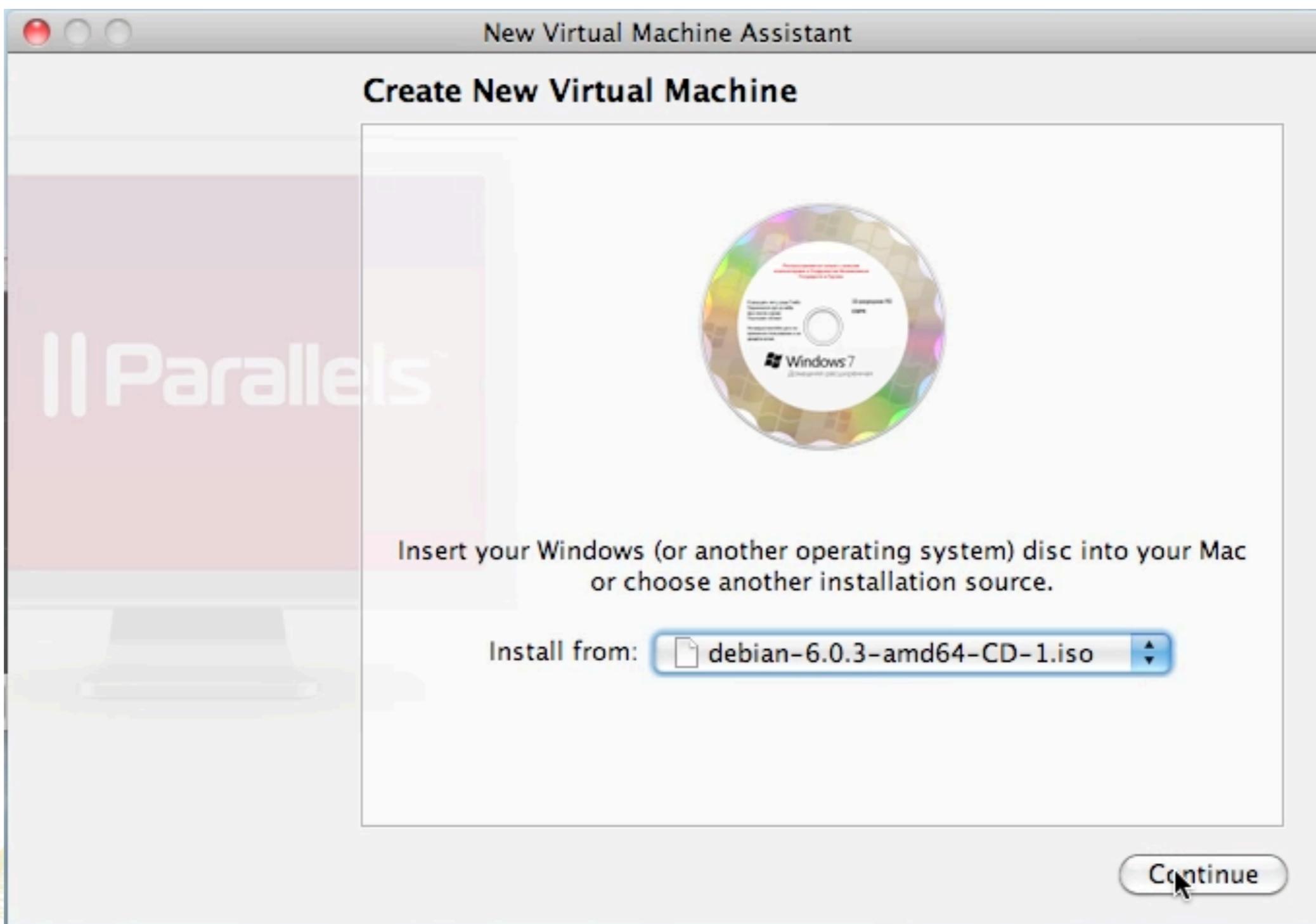
Ezilla Server Installation

- download the iso image from Ezilla website
 - ✓ <http://ezilla.info>
 - ✓ <http://sourceforge.net/projects/ezilla-nchc/>
 - ✓ <http://sourceforge.net/projects/ezilla-nchc/files/>
 - ✓ <http://sourceforge.net/projects/ezilla-nchc/files/VMImage/>
- **debian-6.0.3-amd64-CD-1.iso**
 - ✓ starting point
 - ✓ including the Ezilla packages
 - ✓ followed by DRBL installation over network





- boot up with Debian CD-ROM image





Ezilla Server Installation

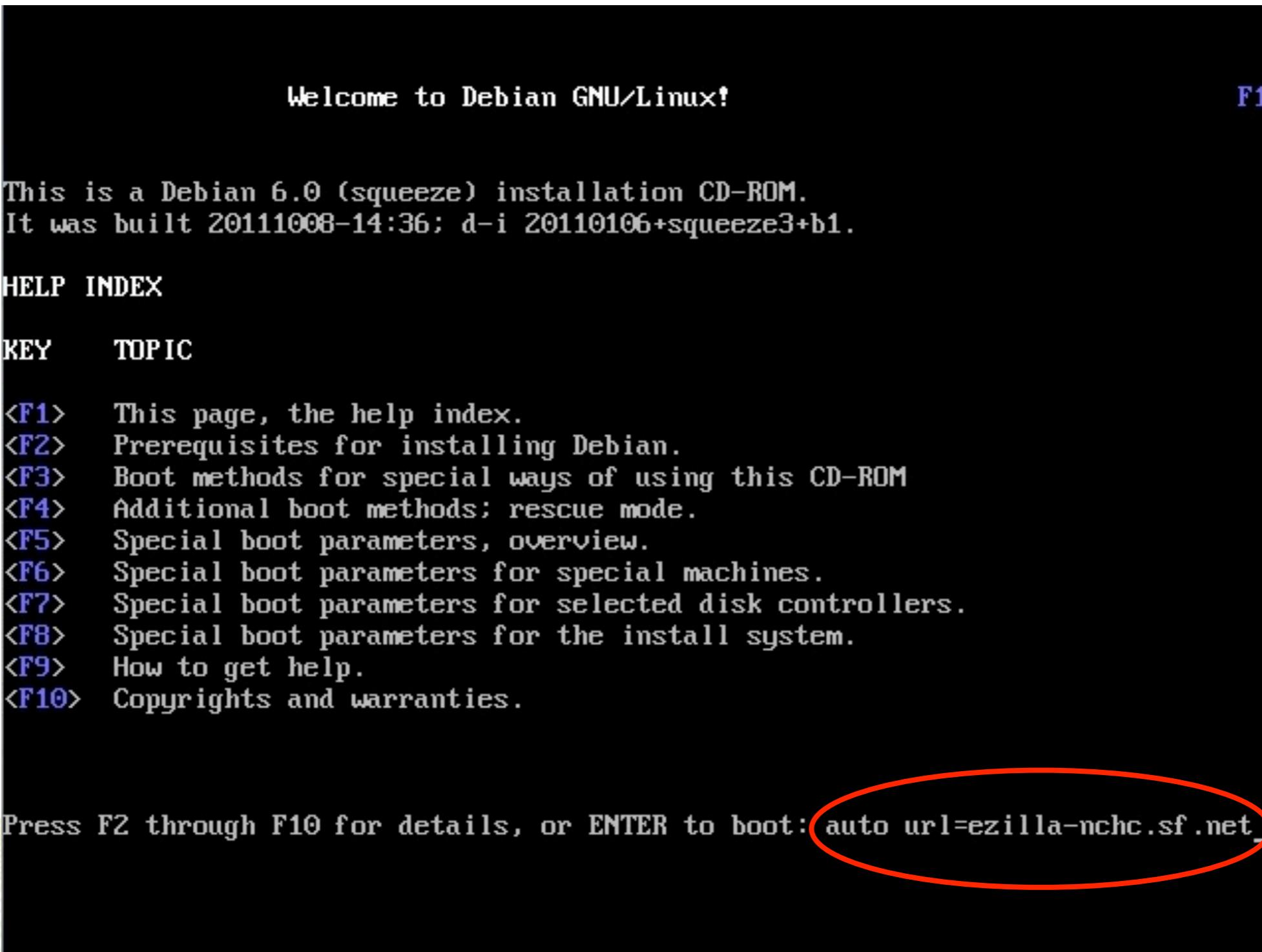
- boot up with Debian CD-ROM image
 - ✓ selecting “Help”





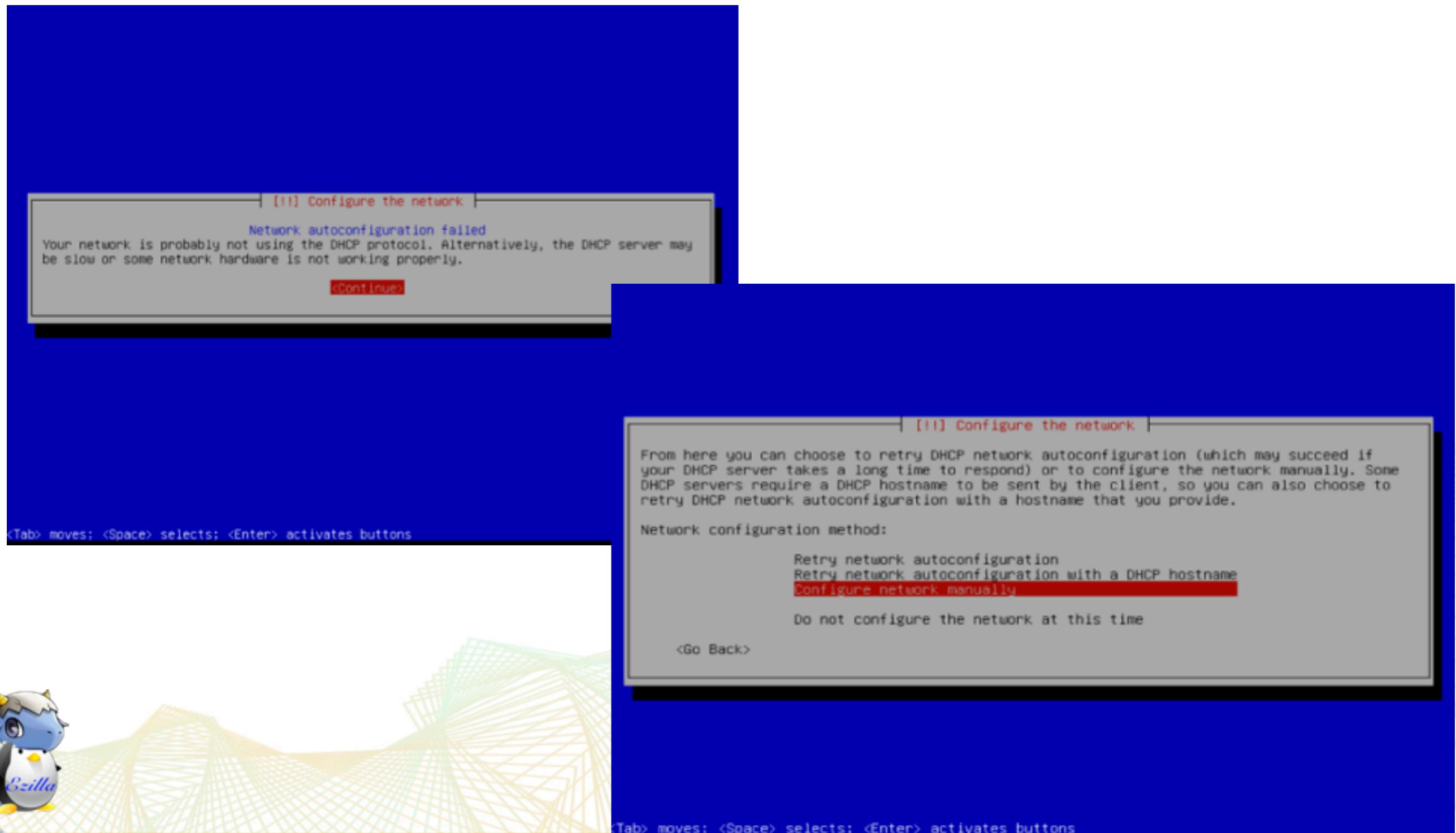
• unattended auto-installation

✓ auto url=ezilla-nchc.sf.net





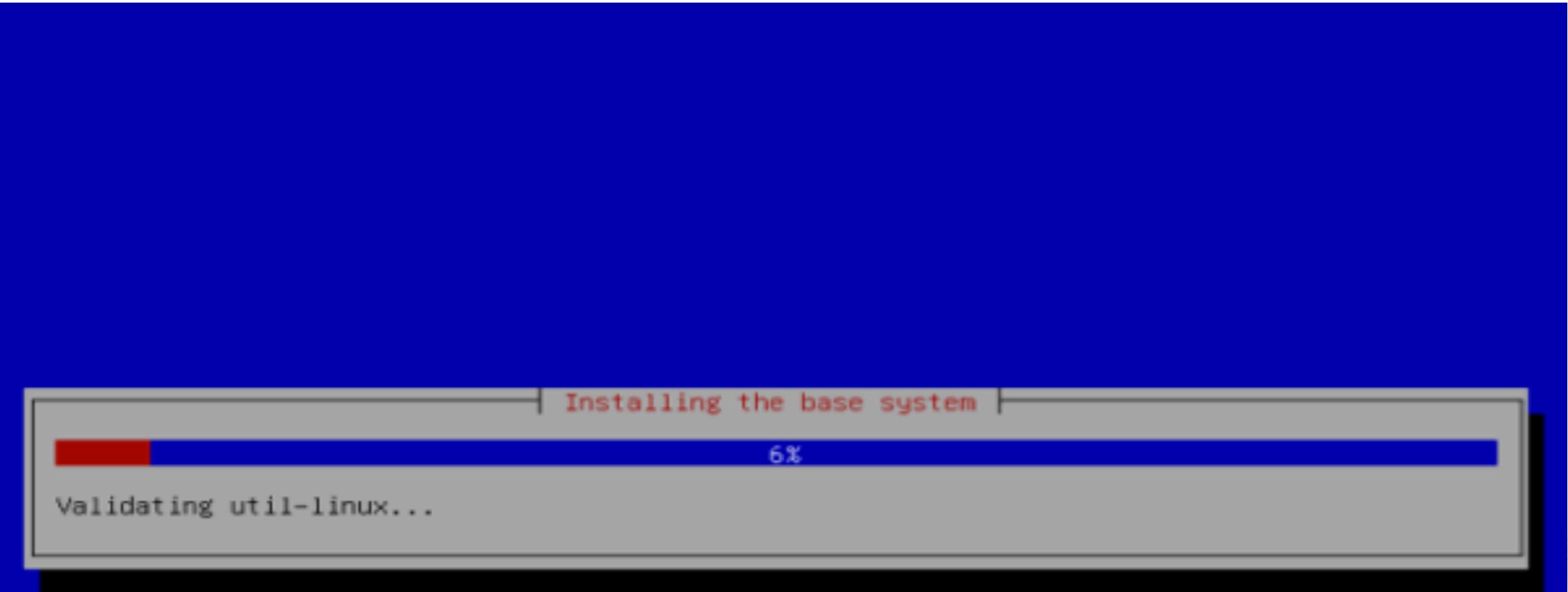
- Network setup manually
 - ✓ IP, network mask, gateway, name server





Ezilla Server Installation

- Installation continues w/o further interference till the completion of the OS





- Completion of Debian OS
 - ✓ request the 1st reboot

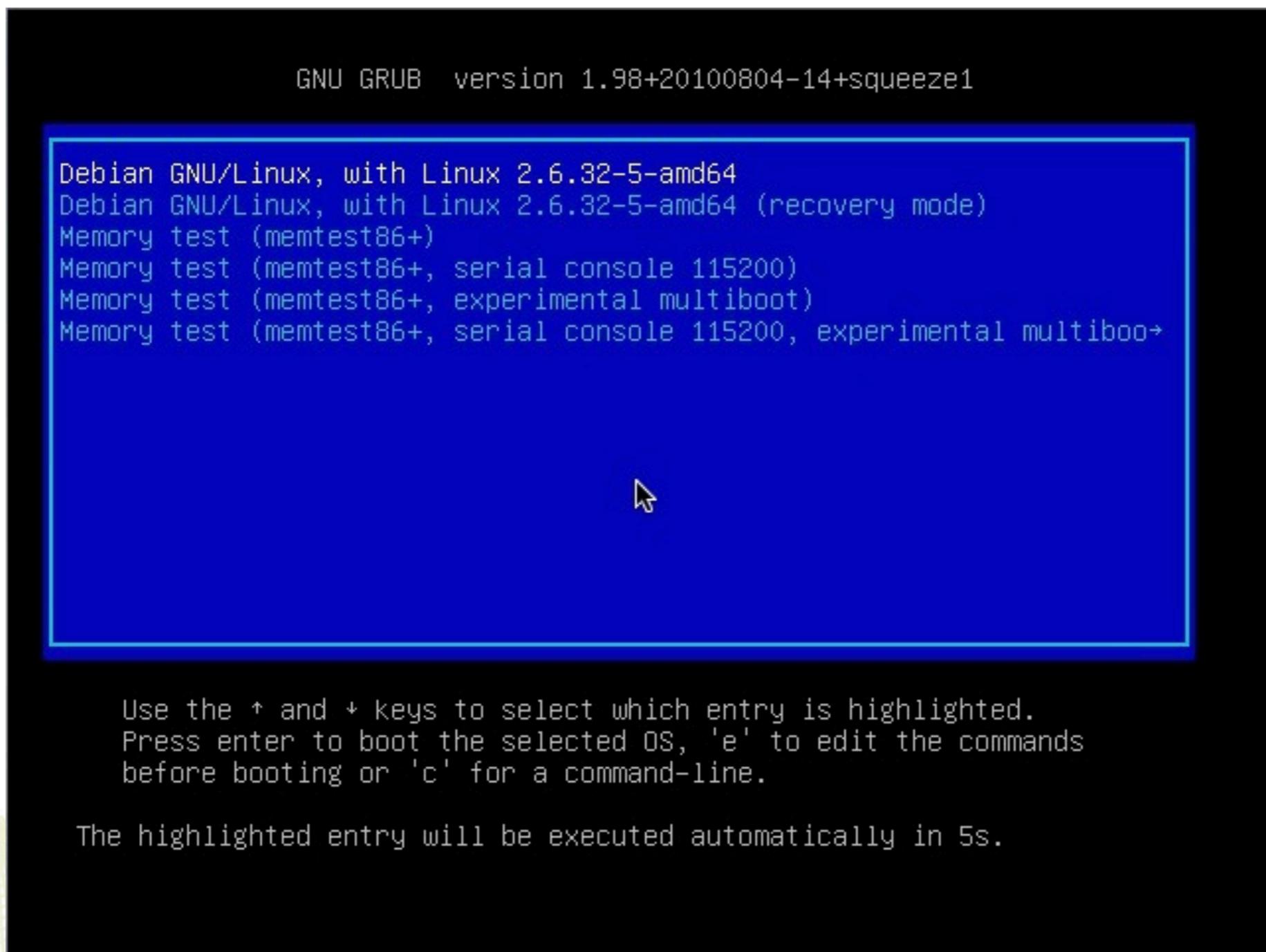


```
(process:343): INFO: kbd-mode: setting console mode to Unicode (UTF-8)
Sent SIGTERM to all processes
Sent SIGKILL to all processes
Requesting system reboot
```



• Installation of Ezilla middleware

- ✓ after the 1st boot up of the Debian OS
- ✓ no human interference





● Preparation for Ezilla Client

- ✓ PXE configuration
- ✓ no human interference

```
Installing kernel 2.6.32-5-amd64 for clients...
It might take several minutes to install this kernel, please be patient... ...done!
Generating modules.dep and map files for clients... done!
Preparing the kernel firmware for clients...
Found /boot/memtest86+.bin in this system, copying the memtest file to DRBL local repository...
Putting memtest86+ in DRBL package repository /opt/drbl/pkg/memtest86+...
Memtest86+ version: Memtest86 v4.10
done!
Found /usr/lib/syslinux/pixelinux.0 in this system, copying the PXELinux files to DRBL local repository...
Putting required pxelinux files in DRBL package repository /opt/drbl/pkg/syslinux...
PXELinux version: PXELINUX 4.02 debian-20101014
done!
*****.
Creating config file for PXE clients...
Copying pxelinux.0, gpxelinux.0, menu.c32, vesamenu.c32, chain.c32, mboot.c32, sanboot.c32 and memdisk to /tftpboot/nbi_img...
Copying memtest86+ to /tftpboot/nbi_img...
Copying FreeDOS files to /tftpboot/nbi_img/...
Generating default pxelinux config (/tftpboot/nbi_img/pixelinux.cfg/default)...
Use com32 module: vesamenu.c32
```





● Preparation for Ezilla Client

- ✓ DRBL services
- ✓ no human interference

```
SSI or clonezilla box mode! done!
Creating DRBL client: debian0-198 10.0.0.98... Pseudo client is created for DRBL
SSI or clonezilla box mode! done!
Creating DRBL client: debian0-199 10.0.0.99... Pseudo client is created for DRBL
SSI or clonezilla box mode! done!
Creating DRBL client: debian0-1100 10.0.0.100... Pseudo client is created for DR
BL SSI or clonezilla box mode! done!
Template client for DRBL SSI, Clonezilla box mode or Clonezilla live client is 1
0.0.0.1
Using template host /tftpboot/nodes/10.0.0.1
Generating SSH host keys for client 10.0.0.1 if they do not exist... done!
Generating the files for DRBL single system image template... root... etc... var
... opt/drbl... Root's openssh public key... done!
Disable the password in pxelinux simple menu for all clients
Disabling PXE password in config file /tftpboot/nbi_img/pxelinux.cfg/default...
done!
Now add necessary services to this DRBL server: DHCP, TFTP, NFS, NIS...
Generating the NFS exports for DRBL clients...
Backup the original /etc/exports as /etc/exports.drblisave
Exporting to clients by IP address line-by-line...
The /etc/exports setting is ok now!
Now generate the firewall rules for NAT service...
Stop the NAT service first...
Turn on ip_forward now.
-
```





• Completion of the Ezilla server

```
Trying to stop clonezilla if necessary so that the unnecessary services in rc1.d
will be removed... done!
*****
Using template host /tftpboot/nodes/10.0.0.1
Generating SSH host keys for client 10.0.0.1 if they do not exist... done!
Generating the files for DRBL single system image template... root... etc... var
... opt/drbl... Root's openssh public key... done!
*****
Trying to stop clonezilla if necessary so that the unnecessary services in rc1.d
will be removed... done!
*****
Using template host /tftpboot/nodes/10.0.0.1
Generating SSH host keys for client 10.0.0.1 if they do not exist... done!
Generating the files for DRBL single system image template... root... etc... var
... opt/drbl... Root's openssh public key... done!
Starting web server: apache2.
Starting deferred execution scheduler: atd.
Starting periodic command scheduler: cron.
Starting OpenBSD Secure Shell server: sshd.
Starting sysrq daemon: sysrqd.
Starting User-mode networking switch: uml_switch.

Debian GNU/Linux 6.0 debian tty1

debian login: _
```





- Client installation via

- ✓ PXE installation
- ✓ DRBL adopted

```
MAC: 08:00:27:ED:DC:91 UUID: 56424f58-0000-0000-0000-080027eddc91
Searching for server (DHCP).....
Me: 10.0.0.1, DHCP: 10.0.0.254, Gateway 10.0.0.254
Loading 10.0.0.254:pxelinux.0 ... (PXE).....done
```

```
PXELINUX 4.02 debian-20101014 Copyright (C) 1994-2010 H. Peter Anvin et al
!PXE entry point found (we hope) at 9F00:0680 via plan A
UNDI code segment at 9F00 len 0B20
UNDI data segment at 9E00 len 1000
Getting cached packet 01 02 03
My IP address seems to be 0A000001 10.0.0.1
ip=10.0.0.1:10.0.0.254:10.0.0.254:255.0.0.0
BOOTIF=01-08-00-27-ed-dc-91
SYSUUID=56424f58-0000-0000-0000-080027eddc91
TFTP prefix:
Trying to load: pxelinux.cfg/default                                ok
*****
Welcome to DRBL.
NCHC Free Software Labs, Taiwan.
http://drbl.nchc.org.tw; http://drbl.sf.net
*****
```

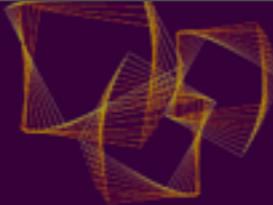


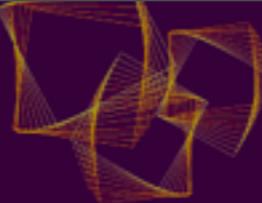


• Completion of Ezilla Clients

- ✓ via PXE & DRBL
- ✓ local disk untouched
- ✓ join the computing resource pool







• SSH Keypair

VCluster_Usr

VM Management VM Creator SSH Keypair

SSH Key Generate <----- Pressing down

Private Key:

```
-----BEGIN RSA PRIVATE KEY-----
MIIEoQIBAAKCAQEAcwcy+0KpacY6z9G3xo+5Dh0TDv62rdSo6ZSbHHGLjjktwsOuGqWxpKa/0L2Sulb
3mP+IWmD+kFn7Ozk8IGuLtOcnX8rHo3dyV+iSyWrXCcXS8PUr4Az1ndwtHFeUXWbIO0iHKwGkSi1B
x7sGT6Hlu8t33MK1wUpr1hNmI5jWdcjTi9n5722DUUISj/5USBEz6o0cJwgYDhepoGnxJQeaJhdjHPk7
McNJaqHwRRVcg9OsBbSZDBgmu8W6x0PViZwuYOH3XFYn65w0+IdgYMTToE18wKFaCxhy9c/fpwThq
6S292AFT5NbrJEhpnoVtEKGMMIH9sNf+GyP24u1x2muwlBlwKCAQBjqqyBODneoHYEnvFM/jFbgnN
MonVvdM2TG0HUFZmZoyQDN0yRpXfpjbDH6qKyRGfJFTAxCslqp52OrFw5toiH2wA7mWq/VcEt9h
2dG2sRBaCUxZcAlTKI8SIL2sYL6/ZyDxi9DVsoAAUY43IQgmEN6OyoIcF6UsRH2qgP/IDpo4gd73aL7y
6h79+YGxrFXcgw6tM4QIRLGhJ0uVX7VaWNbTLnaFefqxs3CWQjn/hqYdo9CQh9bb0RXJ4lbqEZve2op
WAwAOMATEZ5q7ASO1tzoyoS0ekN9SJlvAKEkiM3Jr1oydCuH40tMxokxXOGhC5DGtlc+EF5M73M5F
sQLAoGBAPyBYta+TneTPqtC1QnEwwGKF9JUtf8oXx5vA5TssmQzFE8mv+jppou7ROT8Usj7X4MA/
-----END RSA PRIVATE KEY-----
```

Public Key :

```
ssh-rsa
AAAAB3NzaC1yc2EAAAABIwAAAQEAwcy+0KpacY6z9G3xo+5Dh0TDv62rdSo6ZSbHHGLjjktwsOuGqWx
pKa/0L2Sulb3mP+IWmD+kFn7Ozk8IGuLtOcnX8rHo3dyV+iSyWrXCcXS8PUr4Az1ndwtHFeUXWbIO0iH
KwGkSi1Bx7sGT6Hlu8t33MK1wUpr1hNmI5jWdcjTi9n5722DUUISj/5USBEz6o0cJwgYDhepoGnxJQeaJh
djHPk7McNJaqHwRRVcg9OsBbSZDBgmu8W6x0PViZwuYOH3XFYn65w0+IdgYMTToE18wKFaCxhy9c/fpw
Thq6S292AFT5NbrJEhpnoVtEKGMMIH9sNf+GyP24u1x2muw== apache@blade1
```



- Extension of
 - ✓ Training Time
 - ✓ Location
- possible usage
- example of computerized classroom
- future enhancement



Virtual Computerized Classroom



Virtual Computerized Classroom



conventional
Computerized
Classroom



F-R-E-E

Flexibility + Reusability + Ease of efforts + Equal opportunity

- Flexible/Extended training time
- Flexible location
- Diverse training environment/courses
- Easier maintenance of training materials
- Build once, use everywhere
- Faster deployment, Less preparation time
- Equal opportunity for students
- Virtual Lab. w/hands-on experience



Examples of Education Adoption

- **Fu-Gen University**

- ✓ Statics course work
 - * solving software issue & hardware problem for students
 - ✓ 5 physical machines serves 50 VMs

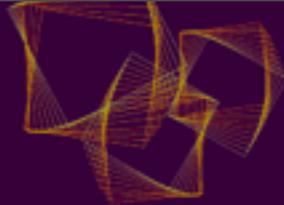
- **J.L. Institute of Tech.**

- ✓ IPV6 traing
 - ✓ 80 students but only 40 physical machines ...
 - ✓ different OS
 - * Windows
 - * Linux

- **MOE**

- ✓ J.Y. regional network center
 - * training course for remote sites
 - ✓ EzGo





- trim down the DRBL-SSI
- disk-full version (client)
- different Linux distributions
- enhanced Ezilla admin. capability
 - ✓ publishing the VMImage as shared service
- Education features
 - ✓ broad casting
 - ✓ replacing VNC
- OpenFlow/openvswitch
- dhcp issue, VM issue
- OpenNebula + OpenStack ?!



- ✓ <http://ezilla.info>
- ✓ <http://sourceforge.net/projects/ezilla-nchc/>

Thank You !



- ✓ <http://ezilla.info>
- ✓ <http://sourceforge.net/projects/ezilla-nchc/>



Thank You !