



# Linux School: Advanced Administration for IBM Software

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## The Linux Growth Paradigm

Accelerated Partitioning Primer

Time-saving Command Exploits

IBM Domino and Traveler — Better on Linux

Research Wrap-up

Appendix —

- Cygwin Tips
- Linux Growth Analysis



In 1999, Bill Gates famously opined that Linux was, “a threat to Windows only in the relatively tiny ‘student and hobbyist market.’”





Then in 2012, Microsoft became a Top 20 corporate Linux kernel contributor

“...a sign of just how thoroughly Linux has conquered the enterprise.”

Source: “*How Linux Conquered the Fortune 500*”,  
Fortune Magazine, 2013;

<http://money.cnn.com/2013/05/06/technology/linux-500.p>

@FortuneMagazine

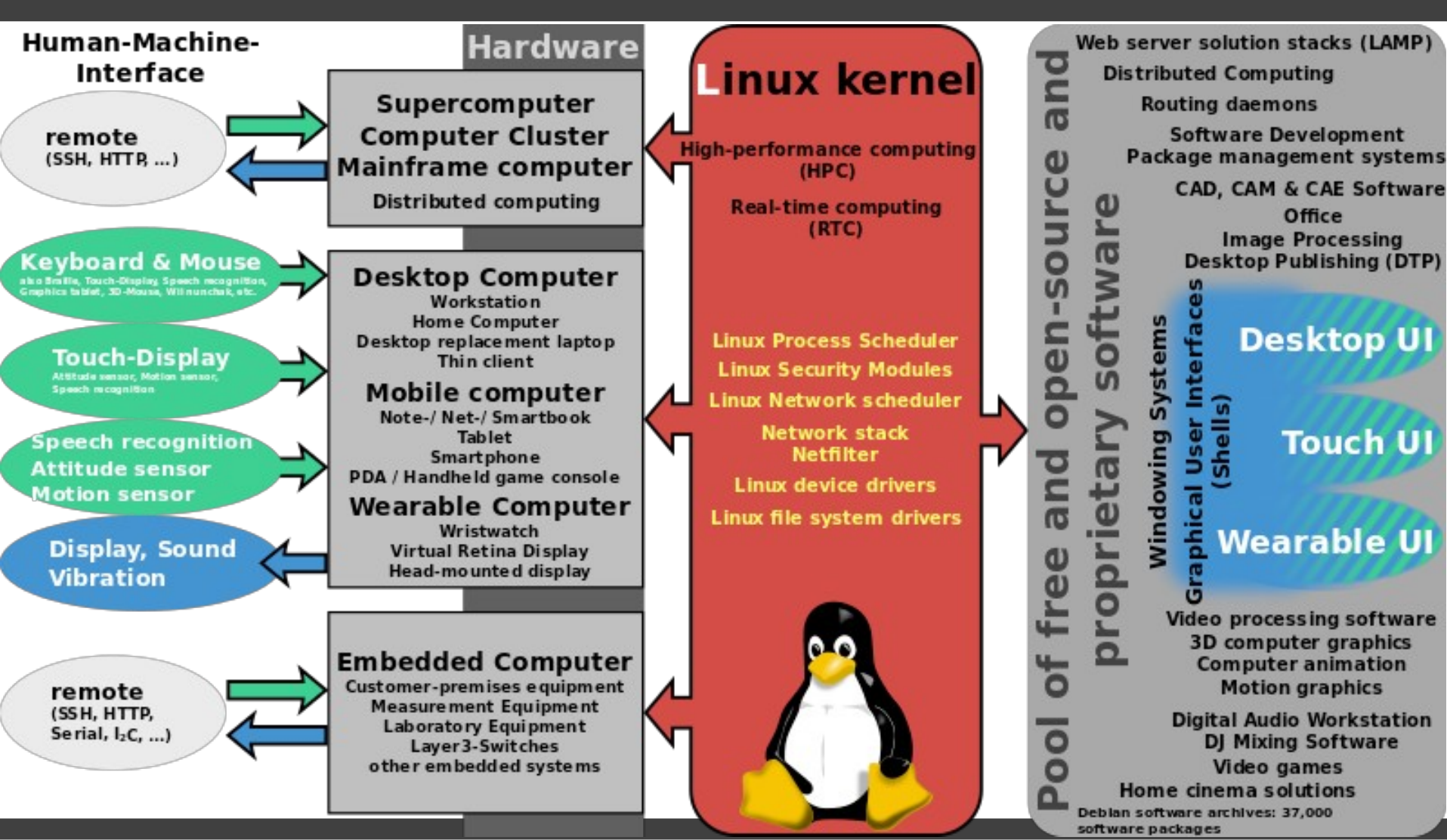


- Microsoft contributions are now non-existent
- Same is true for Nokia, whereas Google and Samsung along with Nvidia climbed quickly
- To contrast - Red Hat, Intel, Suse, and IBM contributed 25.6% of all kernel code in 2013

- Get the full report here, via Linux Foundation

<http://www.linuxfoundation.org/publications/linux-foundation>

# Ubiquity of the Linux Kernel – [Attribution: Shmuel Csaba Otto Traian]





“Linux is the market. You end up paying for too many licenses with Windows.”

- Susan Bulloch, IBM Connections Level 2 Support Engineer; @notesgoddess



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# Mind This Section...

Or you are building your server applications on here



3/14/14

@EngageUG  
#engageug



- Plan your usage before dissecting the drives
- /boot = 250MB
- Create an LVM or two for the rest
- Use multiple swap partitions
- Tip: Always keep the filesystems  $\geq 10\%$  free space to avoid fragmentation, else drive performance degrades



```
malchw@san-domino:/media/virtual-machines$ lsblk
NAME                                MAJ:MIN RM   SIZE RO TYPE MOUNTPOINT
sda                                  8:0    0 238.5G  0 disk
├─sda1                               8:1    0   190M  0 part /boot
├─sda2                               8:2    0 116.4G  0 part
│   └─vg--01-vol1--root (dm-1)       252:1    0  69.9G  0 lvm  /
│   └─vg--01-vol2--vmware (dm-2)    252:2    0  46.6G  0 lvm  /home/vmware
├─sda3                               8:3    0  29.8G  0 part [SWAP]
├─sda4                               8:4    0     1K  0 part
├─sda5                               8:5    0  11.2G  0 part /free
├─sda6                               8:6    0  80.9G  0 part
│   └─vg--02-vol3--home (dm-0)      252:0    0  80.9G  0 lvm  /home
sdb                                  8:16   0 465.8G  0 disk
├─sdb1                               8:17   0  326G  0 part /media/virtual-machines
└─sdb2                               8:18   0 139.8G  0 part /media/big-data
sdc                                  8:32   1   15G   0 disk
└─sdc1                               8:33   1   15G   0 part /media/Carls USB Drive
```



```
malchw@san-domino:/media/virtual-machines$ df -h
Filesystem                Size  Used Avail Use% Mounted on
/dev/mapper/vg--01-vol1--root 69G   11G   55G  16% /
udev                      16G    12K   16G   1% /dev
tmpfs                     6.3G   1.3M   6.3G   1% /run
none                      5.0M     0    5.0M   0% /run/lock
none                      16G   156K   16G   1% /run/shm
/dev/sda1                 184M   78M   98M  45% /boot
/dev/sda5                  11G   156M   11G   2% /free
/dev/sdb1                 321G  228G   77G  75% /media/virtual-machines
/dev/sdb2                 138G   90G   41G  69% /media/big-data
/dev/mapper/vg--02-vol3--home  80G   56G   20G  74% /home
/dev/mapper/vg--01-vol2--vmware 47G   34G   11G  77% /home/vmware
/dev/sdc1                  16G   15G   734M  96% /media/Carls USB Drive
```



```
/dev/mapper/VolGroup00-LogVol00Root on / type ext3 (rw)
proc on /proc type proc (rw)
sysfs on /sys type sysfs (rw)
devpts on /dev/pts type devpts (rw,gid=5,mode=620)
/dev/mapper/VolGroup00-LogVol02LotusBin on /opt type ext3 (rw)
/dev/mapper/VolGroup00-LogVol03LotusDat on /local type ext3 (rw)
/dev/mapper/VolGroup00-LogVol05Accounts on /home type ext3 (rw)
/dev/mapper/VolGroup00-LogVol04Logs on /var type ext3 (rw)
/dev/sda1 on /boot type ext3 (rw)
tmpfs on /dev/shm type tmpfs (rw)
none on /proc/sys/fs/binfmt_misc type binfmt_misc (rw)
sunrpc on /var/lib/nfs/rpc_pipefs type rpc_pipefs (rw)
[root@roma /]#
```



What filesystem is each mount point using?  
Provides ext3 labels as well

```
/dev/sda1: LABEL="boot" UUID="bfd9ab20-34c8-4d09-9d14-9e1df3f54b82" TYPE="ext4"  
/dev/sda2: UUID="B7w737-TpTJ-nhk8-VvgI-RFuz-kqzC-GBco80" TYPE="LVM2_member"  
/dev/sda3: UUID="3c54f4ad-8312-4245-b6f3-e2008069147b" TYPE="swap"  
/dev/sda5: LABEL="free" UUID="cc230e6c-6d4b-44b6-a4f3-4ba0082f8a38" TYPE="ext4"  
/dev/sda6: UUID="KkKWJu-S9N1-mLLY-mfdn-KAhq-H3rK-HwKl8y" TYPE="LVM2_member"  
/dev/sdb1: LABEL="virtual-machines" UUID="998176b2-f304-47d2-a3aa-c2735073e143" TYPE="ext4"  
/dev/sdb2: LABEL="big-data" UUID="9b9ea8cf-4f31-4f4b-a344-c6d783b04ff4" TYPE="ext4"  
/dev/mapper/vg--02-vol3--home: LABEL="home" UUID="a6ee278e-b990-4692-9c8b-0d601744a7f9" TYPE="ext4"  
/dev/mapper/vg--01-vol1--root: LABEL="root" UUID="1d5153eb-9d9e-43e6-b473-57d9e8442d11" TYPE="ext4"  
/dev/mapper/vg--01-vol2--vmware: LABEL="vmware" UUID="be924cc9-f088-4095-9015-b375a161b0d3" TYPE="ext4"
```



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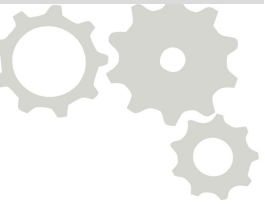
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- Cygwin Tips
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A few points on what I do to secure my public facing boxes





## Network Analysis and Troubleshooting

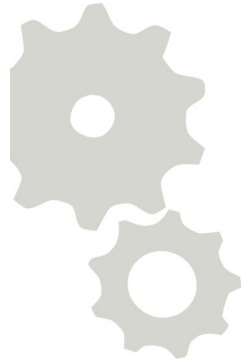


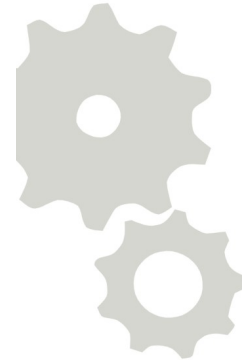
- #**iptraf** → real-time network statistics
  - Installation command options:
    - 1. `$sudo apt-get install iptraf -or-`
    - 2. `$yum install iptraf`
  - Many options, colorful TUI program
- #**nagios** → LAN monitoring application
- #**cacti** → GUI LAN monitoring
  - N.B.: Make certain you choose the correct web server during install



## Scanning ports

- \$ **lsof** for seeing who/what has a file open
- # **netstat |grep 10000**
  - Does not appear if in listen mode
- # **netstat -ln**
  - Display listen only ports
- \$ **ss -ln**





```
[bill@localhost Desktop]$ ss -ln
State  Recv-Q   Send-Q Local Address:Port Peer
Address:Port
LISTEN  0         128    *:10000           *: *
LISTEN  0         128    :::22             ::: *
LISTEN  0         128    *:22              *: *
LISTEN  0         128    127.0.0.1:631    *: *
LISTEN  0         128    :::1:631         ::: *
LISTEN  0         100    :::1:25          ::: *
LISTEN  0         100    127.0.0.1:25    *: *
```

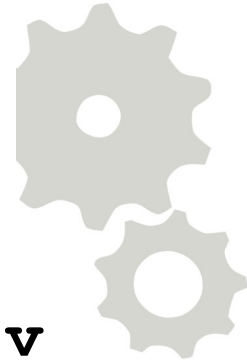


- Dump LAN traffic

```
- $ tcpdump -i eth0 'udp port 53' -v
```

- Measuring CPU Load

```
- $ mpstat -P ALL
```





- Batch mode - reads from input file
  - `$ {home}/.digrc` - stores user specific defaults
- Basic syntax: `$dig <domain> <type>`
- Uses `/etc/resolv.conf` for NS, unless supplied:
  - `$dig @<server> <domain> <type>`
- Reverse lookup
  - `$dig +short -x <ip address>`



- What library files Notes or Domino are missing

```
#strace -ff -o /tmp/strace  
/opt/ibm/lotus/notes/notes
```

- `$pstree` – prints process tree
- `$vmstat` – display memory, paging, block IO, cpu activity
- `$iostat` – display CPU stats; process bottleneck

N.B.: put the last two in cron jobs for frequent updates dumped to disk



## General Usage





Come out of hibernation/suspend mode with your VM, or extended network outage and you observe the time is incorrect.

How do you fix it fast?

```
bill@ubuntu:~$ sudo ntpdate pool.ntp.org
28 Apr 00:40:30 ntpdate[9434]: adjust time server 199.102.46.72 offset 0.000018
sec
```



Wildcards work in Linux and are very powerful, particularly when moving or removing files within a terminal window

```
malchw@san-domino:~/Downloads/Downloads$ ls VMware-*[Ff]ull-[98]*[04]-*
VMware-Workstation-Full-8.0.4-744019.x86_64.bundle
VMware-workstation-full-9.0.0-812388.exe
VMware-Workstation-Full-9.0.0-812388.x86_64.bundle
malchw@san-domino:~/Downloads/Downloads$ rm VMware-*[Ff]ull-[98]*[04]-*
malchw@san-domino:~/Downloads/Downloads$ !ls
ls VMware-*[Ff]ull-[98]*[04]-*
ls: cannot access VMware-*[Ff]ull-[98]*[04]-*: No such file or directory
malchw@san-domino:~/Downloads/Downloads$ ls VM*
VMware-Workstation-Full-9.0.1-894247.x86_64.bundle
malchw@san-domino:~/Downloads/Downloads$ ls VMware-*[Ff]ull-[98]*[04]-*
```

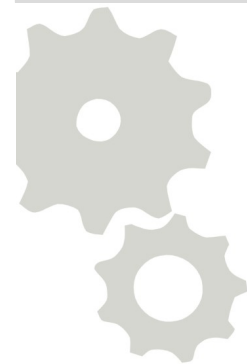
671 x 439 pixels 107.2 kB 100% 17 / 103



- Init.d, Upstart, and systemd
- Use Init.d for now (except on Ubuntu)
- Next major release of non-Ubuntu Linux distros will utilize systemd over Init.d
  - e.g. RHEL 7
  - Further details:  
<http://www.freedesktop.org/wiki/Software/systemd/>

See also:

<http://www.billmal.com/billmal/billmal.nsf/dx/vmware-tools-part-I.htm>





- Download and install Webmin
  - <http://webmin.com>
  - Use to lockdown SSH, setup virtual NICs, adjust firewall if needed, plus verify NTP, DHCP, DNS setup
    - Remove afterwards if disallowed in production

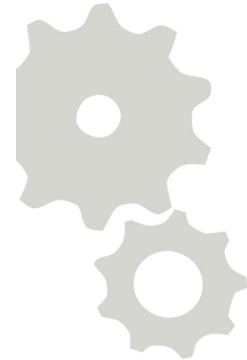
Try it live: <http://webmin-demo.virtualmin.com/>





Two options to work with this security barrier:

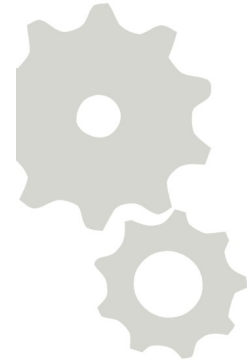
- Desktop firewall admin tool
- Command line – run this sequence
  - `# iptables -I INPUT 4 -m state --state NEW -m tcp -p tcp --dport 10000 -j ACCEPT`
  - `# service iptables save`
  - `# service iptables restart`
  - `# iptables -S`



N.B. last command lists all rules for all chains in the firewall table



- SSH X redirect – needs local X server
  - Xming, Cygwin/X (freeware examples)
  - SSH Clients available on key systems
    - Linux desktop native
    - Mac OS X native
    - Windows via third-party: Cygwin, Putty
- Remmina
  - Handles: SSH, SFTP, VNC, RDP
  - Highly recommended!
- VNC





- There are several ways to accomplish this task...
  - Method below simplifies it for 80+% of use cases
- On SSH Server
  - `# vi /etc/ssh/sshd_config`  
-> `X11Forwarding yes`
- Local machine
  - `ssh -XYC <user1>@<IP_Address> [-p port]`
  - `$ssh -XYC foo@192.168.90.123`
- Remote Machine
  - `ssh -XYC <user2>@localhost`
  - `$ssh -XYC root@localhost --OR--`
  - `$ssh -XYC john_walker@localhost`

N.B. The “-C” parameter is optional on fast LANs



- Linux reads, writes NTFS, FAT32, and FAT16
- ntfs-3g driver, invoke natively or as a mount type
- Basic Usage Examples:
  - `ntfs-3g /dev/sda1 /mnt/windows`
  - `mount -t ntfs-3g /dev/sda1 /mnt/windows`





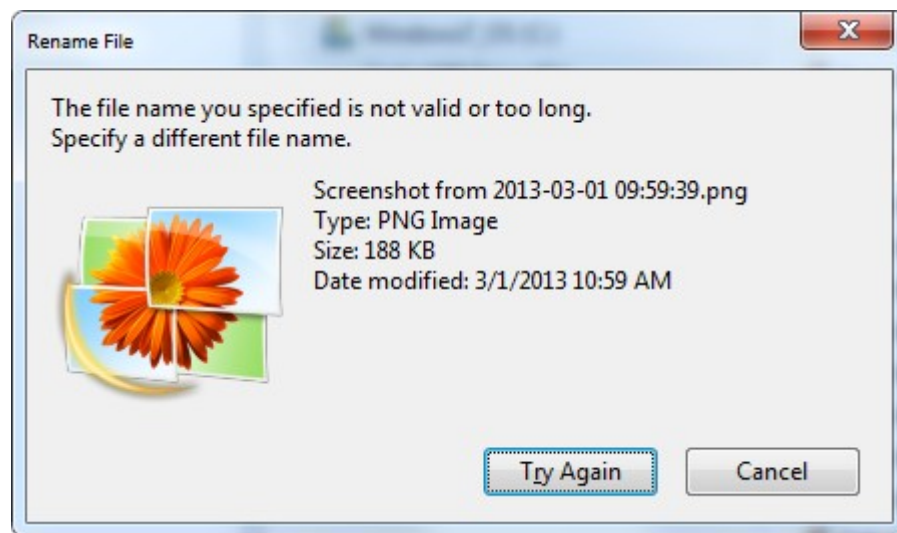
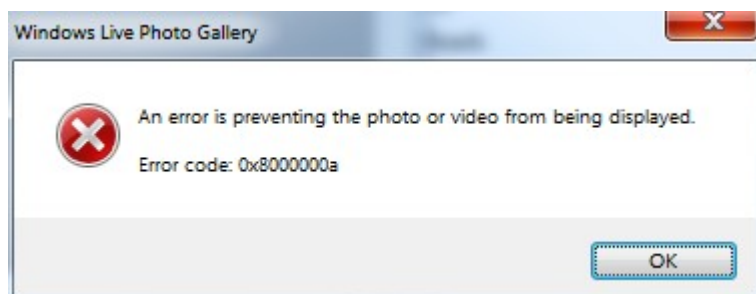
- Mount while mapping ownership to all files on target
  - `ntfs-3g /dev/sda5 /home/user/mnt -o ro,uid=1000`
- Modify */etc/fstab* to mount at boot
  - eg `/dev/sda5 /home/user/mnt ntfs-3g ro,uid=1000 0 0`
  - Set last two values to zero, or boot-up system check
  - When set, dump and fsck will then ignore this filesystem

## NTFS Support Tip – Moving Files From Linux to Windows

- Linux filenames can contain many characters – even ones that Windows dislikes
- If you have them, you can not open the file in Windows 7

A file name can't contain any of the following characters:  
\\/:\*?"<>|

...and you can not rename/delete them in Windows 7, as it will tell you the original filename is invalid



Additionally, Cygwin can not read them as the Windows file system does not know how to store them

```
bill@tester /cygdrive/c/Documents and Settings/bill/My Documents/Conferences/Iam
LUG 2013/Pictures
$ ls *.*
ls: cannot access blog.Screenshot from 2013-03-23 12:52:27.png: No such file or directory
ls: cannot access Screenshot from 2013-03-01 09:59:39.png: No such file or directory
ls: cannot access Screenshot from 2013-03-01 10:00:09.png: No such file or directory
ls: cannot access Screenshot from 2013-03-04 17:46:31.png: No such file or directory
ls: cannot access Screenshot from 2013-03-06 09:01:26.png: No such file or directory
ls: cannot access Screenshot from 2013-03-06 09:01:34.png: No such file or directory
ls: cannot access Screenshot from 2013-03-13 11:14:14.png: No such file or directory
ls: cannot access Screenshot from 2013-03-13 12:49:39.png: No such file or directory
ls: cannot access Screenshot from 2013-03-13 13:00:45.png: No such file or directory
ls: cannot access Screenshot from 2013-03-15 14:25:29.png: No such file or directory
ls: cannot access Screenshot from 2013-03-15 14:26:10.png: No such file or directory
ls: cannot access Screenshot from 2013-03-15 14:27:10.png: No such file or directory
```

Solution: save time and frustration by ensuring Windows friendly filenames before moving files



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## Stability

```
[12928:00007-5483408] Lotus Domino (r) Server (Release 8.5.3 for UNIX) 11/14/2013 23:48:05
[12928:00007-5483408] Server name: Servers/ESS -
[12928:00007-5483408] Domain name: ESS
[12928:00007-5483408] Server directory: /local/qpdata
[12928:00007-5483408] Partition: .local.qpdata
[12928:00007-5483408] Elapsed time: 771 days 01:58:43
```



# What about the underlying Linux Operating System?



Verified just before I left for Engage...

<b>System hostname</b>	██████████.effectivesoftware.com (127.0.0.1)
<b>Operating system</b>	Redhat Enterprise Linux 5
<b>Time on system</b>	Sat Mar 15 01:35:25 2014
<b>Kernel and CPU</b>	Linux 2.6.18-128.el5 on i686
<b>Processor information</b>	Intel(R) Xeon(R) CPU 5130 @ 2.00GHz, 2 cores
<b>System uptime</b>	1063 days, 2 hours, 22 minutes
<b>Running processes</b>	104



## What Linux flavors are you allowed to run with Domino 9 and still receive support?

Intel		System z
x64	i386	x64
RHEL 6 - Update 3 & 4+		
SLES 11 - SP1 & SP2+		
Notations: 1. Notes Traveler Linux server support -- Intel; System z remains unsupported 2. XGL and SELinux must be disabled for all Domino and related installs		

**NOTE:** Solaris is unsupported with Domino 9 Technote #7037859 - <http://www-01.ibm.com/support/docview.wss?uid=swg27037859>

## Domino works with hypervisors, but matching your OS is important to receive support

Product	Guest OS
IBM PR/SM (all versions) <sup>1</sup> z/VM 6.1 <sup>1</sup>	RHEL 6 Update 3 System z SLES 11 SP1 System z
KVM <sup>3</sup>	RHEL 6 default version, plus RHEV
	SLES 11 installed default
Microsoft Hyper-V Server 2012 <sup>2,3</sup>	RHEL 6 Update 3; SLES 11 SP2
VMware ESXi 4, 5	RHEL 6 Update 3 i386, x64 SLES 11 SP1 i386, x64

### Notations:

1. IBM PR/SM and z/VM are for System Z
2. Microsoft Hyper-V Server 2012 Linux Integration Services -
3. Windows is supported as a guest OS on KVM and Hyper-V



Want support with Traveler HA? Mind the chart.

Getting Your Supported RDBMS Fit			
Product	DB2 Enterprise Server Edition	DB2 Workgroup Server Edition	Microsoft SQL Server Enterprise Edition
Version	9.7, 10.1	9.7, 10.1	2008, 2008 R2
Fix Packs	9.7.0.5 to 9.7.0.8+ 10.1: Any	9.7.0.5 to 9.7.0.8+ 10.1: Any	2008 SP1+ 2008 R2: Any
<p>Notations:</p> <ol style="list-style-type: none"> <li>1. ND9 provides a limited use IBM DB2 10.1 Workgroup Server Edition license specifically for IBM Notes Traveler HA use <u>ONLY</u></li> <li>2. If utilized, DB2 must be the chosen Traveler HA RDBMS solution</li> <li>3. Notes Traveler is supported on RHEL and SLES; System z remains an unsupported platform</li> </ol>			



Just in-case... Avoid these Linux installation permutations

- 128 bit installations
- Notes Traveler (server) on mobile devices
- RHEL 6: Base to Update 2
- SLES 11: Base
- Ubuntu Server





- After installing your new Red Hat server, run
  - # **rhn\_register**
- Then utilizing yum on your new server works
  - # **yum update**
  - Always initiate after installing your server; before Domino
  - # **yum install libXtst.i686**



- Each application has specific Linux setup requirements
- Domino has three key components for Red Hat
  - Install non-standard issue library files
  - Disable SELinux and XGL (SUSE too)
  - Set ulimits to unlimited



- Always RTFM
  - Know you may need to go back a few versions to get the full story
- Bonus
  - Install *gdb* before you need it
    - **Critical tool for any server crashes**



Each report contains the latest on IBM Domino 9 OS requirements, patch levels, and support notations

- 9.0 - <http://tinyurl.com/d73zoqs>
- 9.0.1 - <http://tinyurl.com/p7sc758>



Domino 9 provides an excellent OS check tool

- Indicates which library files you need
- Prevents Domino from installing until satisfied
- Can run manually too
  - # `perl checkos.pl -f checkos.dat`

# Installing Missing Files - checkOS



```
root@localhost:/home/bill/Downloads/ND9/se/linux64/domino
File Edit View Search Terminal Help
eclipsemodssrc.zip  mozillaodssrc.zip  tools
install             remote_script.dat  unix_response.dat
[root@localhost domino]# ./install

IBM Domino for Unix Install Program
-----
```

To run this installer you need 32bit (i686) packages installed on your 64 bit Linux RedHat.

They are not installed by default, but are mandatory. The installer will exit after this message.

```
libXtst-1.0.99.2-3.el6.i686
libXmu-1.0.5-1.el6.i686
libXft-2.1.13-4.1.el6.i686
libXi-1.3-3.el6.i686
libstdc++-4.4.4-13.el6.i686
```





## Results of a manual checkOS operation

```
root@localhost:/home/bill/Downloads/ND9/ee/linux/tools
File Edit View Search Terminal Help
[root@localhost tools]# perl checkos.pl -f checkos.dat
```

```
OS: Linux 2.6.32-358.0.1.el6.x86_64
MACHINE: x86_64
```

The following OS patches or higher are missing. Please update all patches before starting the Domino Server.

```
libXtst-1.0.99.2-3.el6.i686
libXmu-1.0.5-1.el6.i686
libXp-1.0.0-15.1.el6.i686
libXft-2.1.13-4.1.el6.i686
libXi-1.3-3.el6.i686
libstdc++-4.4.4-13.el6.i686
```



- Utilizing package management software

- Yum on Red Hat makes it simple

- Powerful command sequence

- `#yum install libXtst.i686`
- `#yum install libXmu.i686`
- `#yum install libXft.i686`
- `#yum install libXi.i686`
- `#yum install libstdc++.i686`
- `#yum install libXp-1.0.0-15.1.el6.i686`



```
[root@localhost linux]# sestatus
SELinux status:                enabled
SELinuxfs mount:              /selinux
Current mode:                  enforcing
Mode from config file:        enforcing
Policy version:                24
Policy from config file:      targeted
[root@localhost linux]#
```



- Easy to do in three simple steps
  - `#vi /etc/sysconfig/selinux`
  - Edit SELINUX= line to “disabled”
  - `#init 6`



```
[root@localhost ~]# sestatus
SELinux status:                disabled
```



- Edit this file
  - # **vi /etc/security/limits.conf**
- Syntax: <notes\_OS\_user\_name> [soft|hard] nofile <value>
  - usenotesmail soft nofile 60000
  - usenotesmail hard nofile 80000
- Repeat for each server's Linux user account

Note: IBM updated Technote (2)1221870 to indicate higher nolim value recommendations



To use the ulimits values when you login next

```
# vi /etc/pam.d/sshd
```

Memory Address Space	Value
i386	Session required /lib/security/pam_limits.so
x64	Session required pam_limits.so

Note: If you put “/lib/security/pam\_limits.so” into the pam.d file on an x64 system, you will lock yourself out – all accounts

N.B. Writing a start/stop *init.d* script? Ensure that you include “`ulimit -n 60000`” in the “start” area



- Errors written in local execution directory via *InstallError.Log*
- Warnings and Success are strategically located  
`DOMINO_DATA_DIRECTORY_1/IBM_TECHNICAL_SUPPORT/traveler/logs/TravelerInstall.log`
- If file has old timestamp or non-existent  
Unrecoverable error occurred





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- Barrett, Daniel J.; *Linux Pocket Guide - Essential Commands*; O'Reilly & Associates
- Linux Foundation - Free Linux Training Online
  - <http://training.linuxfoundation.org/free-linux-training>
- IBM's Linux portal - <http://ibm.com/linux>
  - “Linux is certified on all IBM Systems. Choose the architecture that makes sense.”



- How Linux Is Built–Linux Foundation's YouTube channel
  - <http://www.youtube.com/user/TheLinuxFoundation>
- The Open Virtualization Alliance
  - <http://www.openvirtualizationalliance.org/>
  - Consortium founded by IBM, HP, Intel, Red Hat; 100's members



My Blog - <http://www.billmal.com>

- BillMal's Linux Sites & Domino 9 Install Tips

- <http://www.billmal.com/billmal/billmal.nsf/dx/linux-links.htm>

- <http://www.billmal.com/billmal/billmal.nsf/dx/domino9x64.htm>

- Linux Service Manager Insight

- <http://www.billmal.com/billmal/billmal.nsf/dx/vmware-tools-p>



- Co-founder of Linuxfest at Lotusphere/Connect
- Speaker at 20+ Lotus® related events/LUGs
- Co-authored two IBM® Redbooks on Linux®
- IBM Champion for Collaboration Solutions
  - 2011, 2012, 2013, 2014
- Linux aficionado



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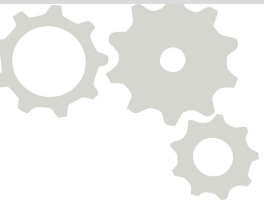


The Linux Growth Paradigm  
Accelerated Partitioning Primer  
Time-saving Command Exploits  
IBM Domino and Traveler — Better on Linux  
Research Wrap-up

Appendix —

- Cygwin Tips
- Linux Growth Analysis

# Appendix A – Linux Emulation on Windows



## Installation of Cygwin





- Get the files: <http://cygwin.net/>
- Two-step installation process saves time:
  - 1. Base packages first
  - 2. Then go back to the same install server and select additional files
  - Timeouts are tricky; waste time otherwise
- Next, add these useful programs:
  - Admin -> cron
  - Archive -> unzip, zip
  - Devel -> bashdb (optional; select to try BASH scripting, it helps with debugging)

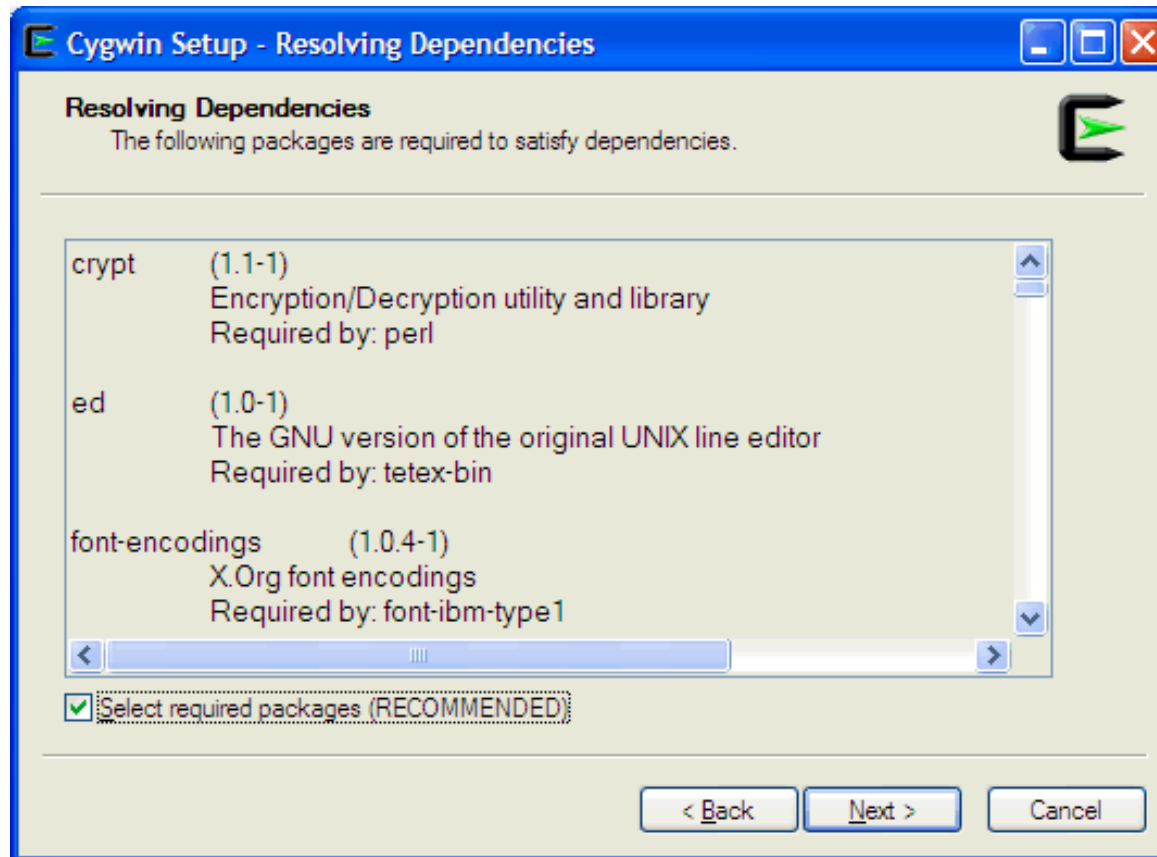


- Editors -> vim, vim-common, xxd, and if you want to edit binary files, try bvi
- Graphics -> GraphicsMagick, ImageMagick, bmp2png
- System -> ping, util-linux
- Text -> a2ps, enscrip (one of my favorite programs)
- Utils -> hdparm (only use in read mode, but provides useful info on your local HD), xtail



- If you encounter an installation program which requires an X Window environment,
  - Go back and install the X11 environment with Gnome or KDE
  - Otherwise, keep it simple.
- Installation program tip
  - Resolves program selection dependencies
  - Prompts you accordingly <see next slide>
- Cygwin only installs newly selected files, with each successive installation iteration

# Cygwin Installation - Dependency Resolution Warning Screen

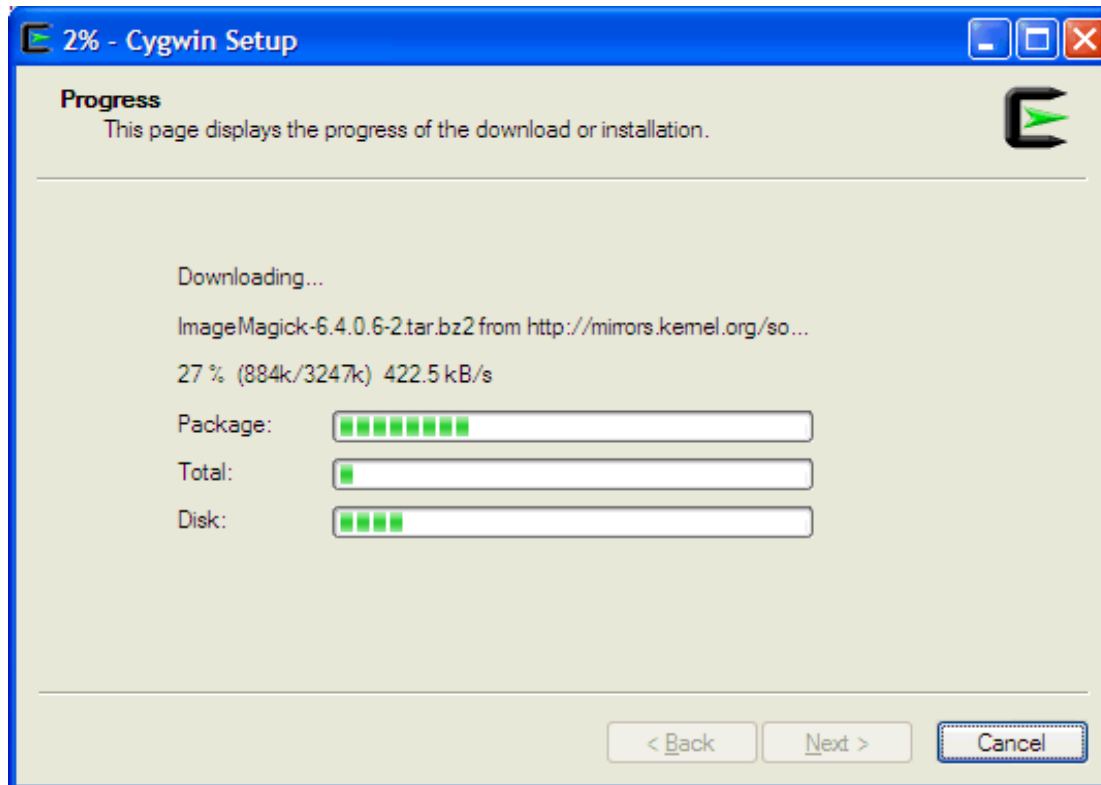


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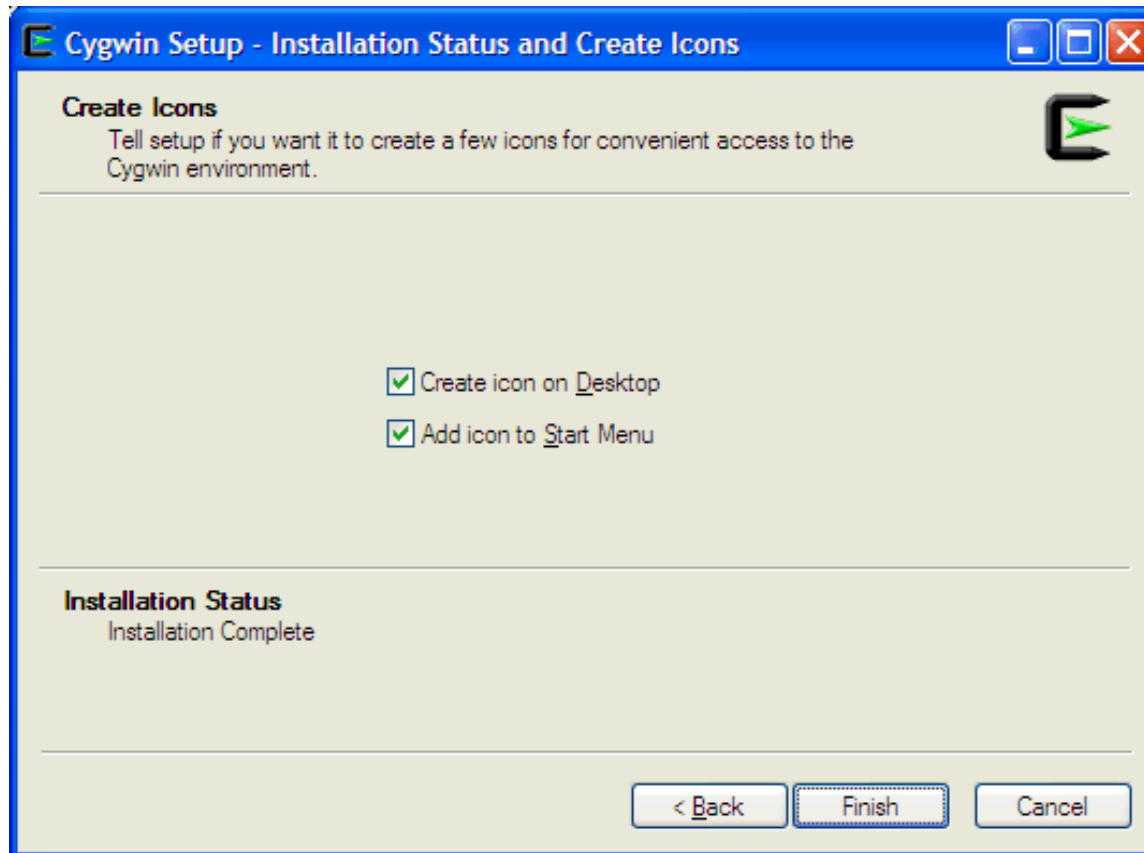
@EngageUG  
#engageug



Unlike Windows, these histograms are accurate



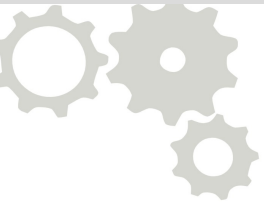
# Cygwin Install - Final Steps



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# Appendix B – Linux Growth Paradigm



## Trending Analysis



**LINUX ADOPTION  
GROWING TO SUPPORT  
CLOUD & MISSION-  
CRITICAL WORKLOADS**

Source: 2013 Enterprise End User Report.  
Linux Adoption: Third Annual Survey of  
World's Largest Enterprise Linux Users

<http://www.linuxfoundation.org/publications/linux-f>

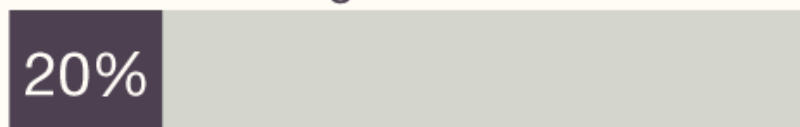


## FIVE YEAR PLANS FOR INCREASED OS INVESTMENTS

Increasing Use of Linux



Increasing Use of Windows



## LINUX IS CORE TO THE CLOUD

Maintaining or Increasing Linux to Support Cloud

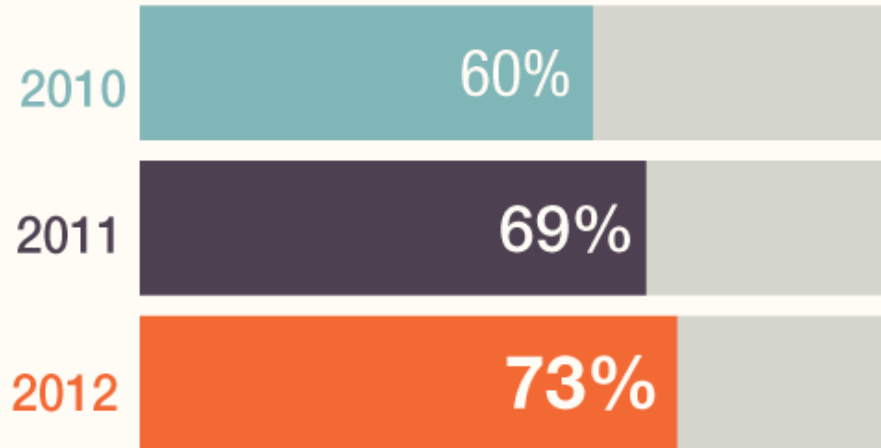


Decreasing Linux to Support Cloud





### ENTERPRISES INCREASING USE OF LINUX FOR MISSION-CRITICAL WORKLOADS





The following three slides contain key quotes from the 2013 report on Linux growth and utilization over Windows, plus server adoption insight on the concluding slide

Article:

<http://www.serverwatch.com/server-news/linux-adoption->

Cited Report:

<http://www.linuxfoundation.org/publications/linux-foundati>



“Some 39 percent of the survey respondents indicated that in response to Windows 8, they will now use more Linux.”



“In 2010, the same report found that 31 percent of respondents were migrating to Linux from Windows. In 2013 that number has increased to nearly 40 percent.”



- 73% of respondents use Linux for mission-critical work
- 76% of enterprise cloud solutions too  
“This has been increasing year-over-year.”
  - Amanda McPherson, VP Marketing and Developer Services, Linux Foundation