

Chapitre 3 - Linux for zSeries



- Chapitre 1 - Notions de base
 - Data Center
 - Consolidation de serveurs
 - Les techniques de Virtualisation
 - Virtualisation pour xSeries
 - Virtualisation pour Power Architecture
 - Virtualisation avec Linux
 - Le zEnterprise System
 - Les disques
 - Les cartes OSA
 - Les bandes
- Chapitre 2 – Virtualisation pour le zEnterprise
 - LPAR
 - z/VM
 - Notions de base z/VM
 - Le Réseau
 - Installation de z/VM
 - Performance Toolkit
 - DIRMAINT
 - RACF
 - RSCS
 - Autres produits
- Chapitre 3 – Linux for zSeries
 - L'Open
 - Consolidation
 - La mise en oeuvre
 - L'accès à distance
 - Administration de Linux
 - Le clonage
 - Les sauvegardes
 - Le réseau
 - De l'information

Open

A large, semi-transparent word cloud centered on the slide. The words are primarily in shades of blue and green. Key words include "Smarter software for a smarter planet", "IBM", "smarter", "software", "planet", and "smart". The background of the word cloud features faint, darker versions of the same words, creating a layered effect.

Open standards

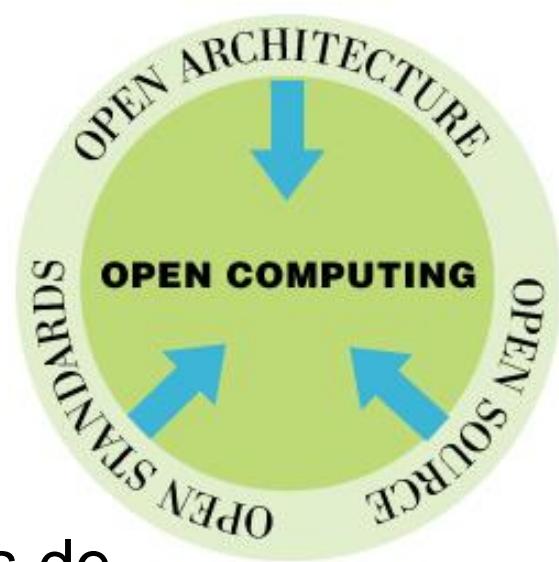
- Promouvoir l'interopérabilité en utilisant des standards ouverts publiés (spécifications des APIs, protocoles, données et formats de fichiers).

Open architecture

- Architecture ouverte et flexible avec des solutions reconfigurables

Open source software

- Promotion des standards
- Collaboration avec les communautés de développement





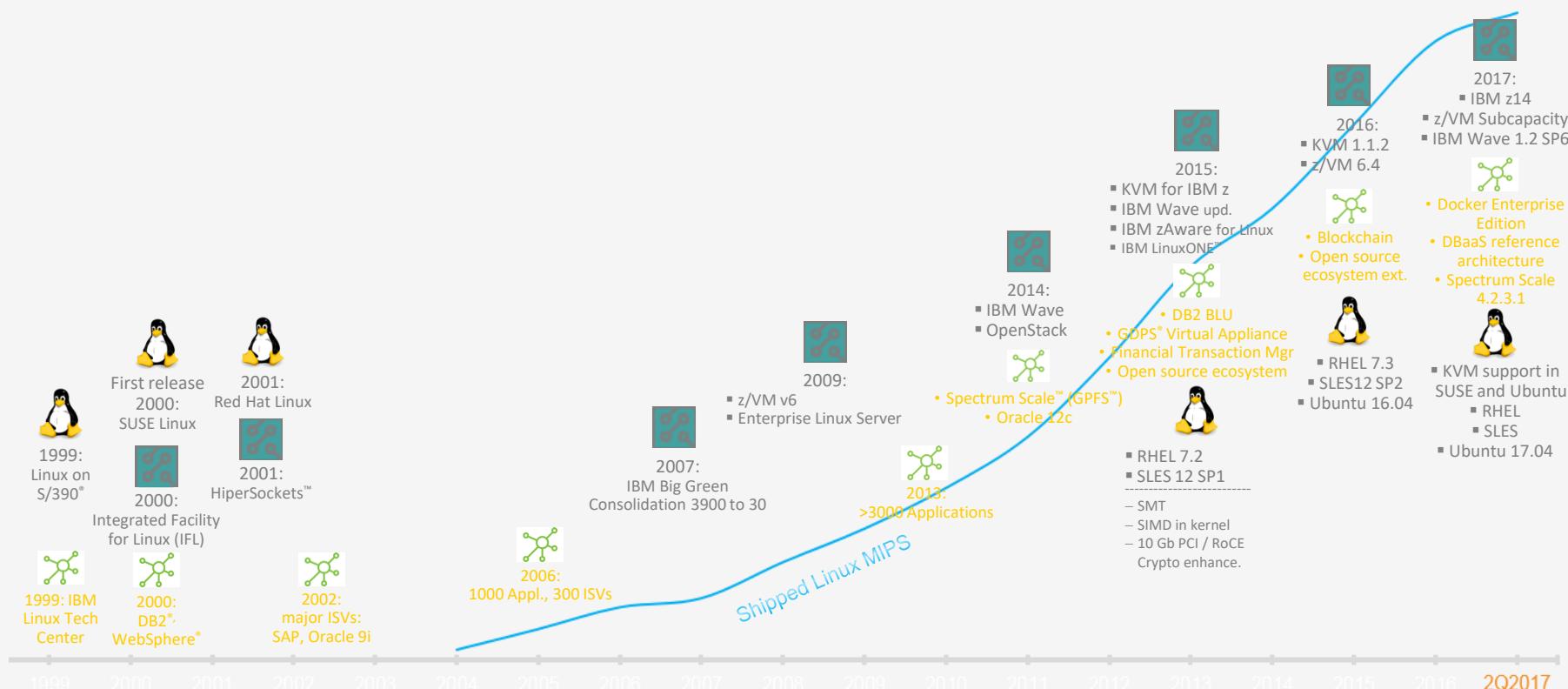
- Méthode de développement
 - Communauté, Méritocratie, Internet
- Open Source License
 - Logiciel dont le code Source est publié
 - Redistribution des droits (GPL – License)
 - Conforme à l'Open Source Initiative
- Caractéristiques
 - Logiciel - Haute Qualité et Performance
 - Bonne Sécurité – Système de type UNIX
- Peut être la référence de spécifications ouvertes (STANDARDS)



- Exemples de OSS:
 - LINUX – OS
 - Apache – web server
 - Eclipse – application development
- OpenOffice.org – productivity suite
 - Perl – Samba – SendMail – mail server



17-year Journey of Innovation and Technology



Des équipes IBM développant de l'Open Source

+600 membres à travers le monde

+80 projets Open source en cours

80% des contributions IBM sont acceptées

Site WEB

www.ibm.com/linux/ltc

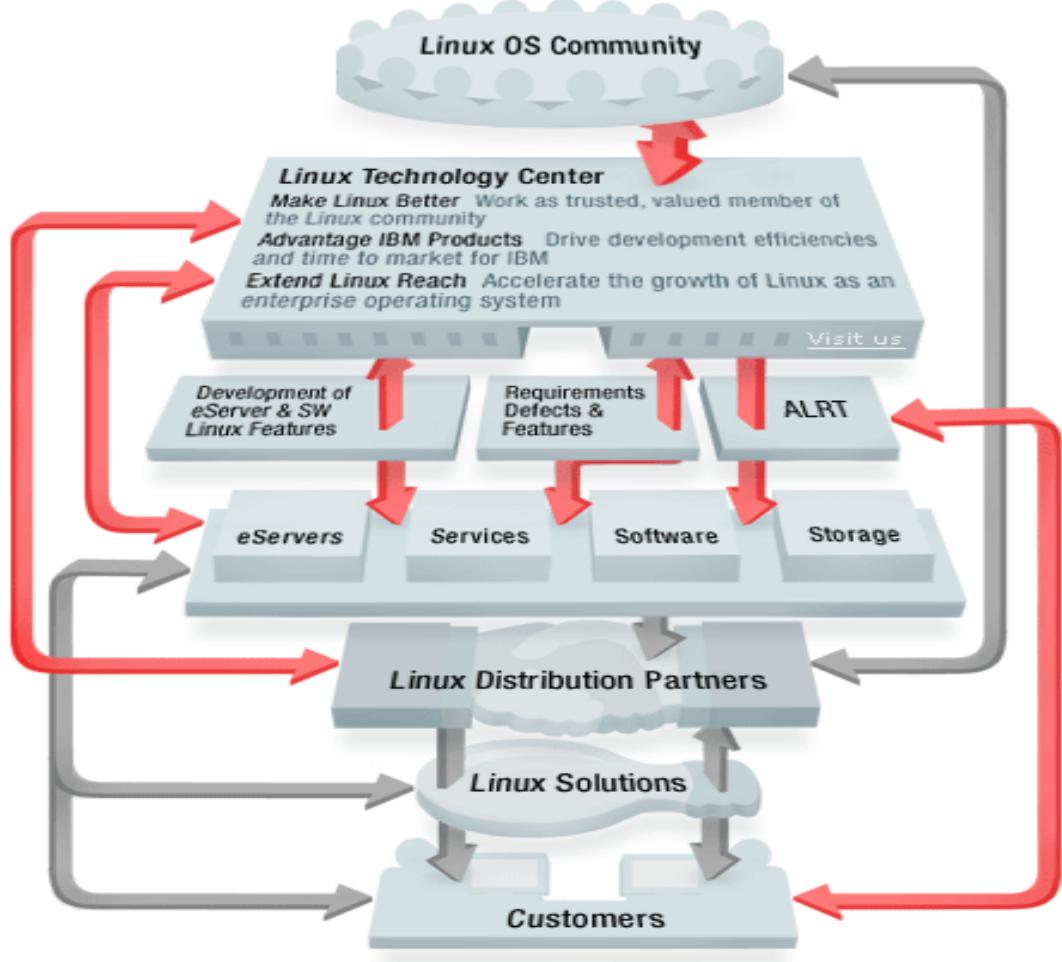
Forte implication et contribution

Dans le développement du kernel

De Samba: Andrew Tridgell

Participant et contributeur « Carrier Grade Linux »

Maintenance/Support (Correction des défauts)





Un consortium sans but lucratif dédié à l'amélioration et la croissance de Linux, créé par la fusion de "Open Source Development Labs" et le "Free Standards Group"

www.linux-foundation.org

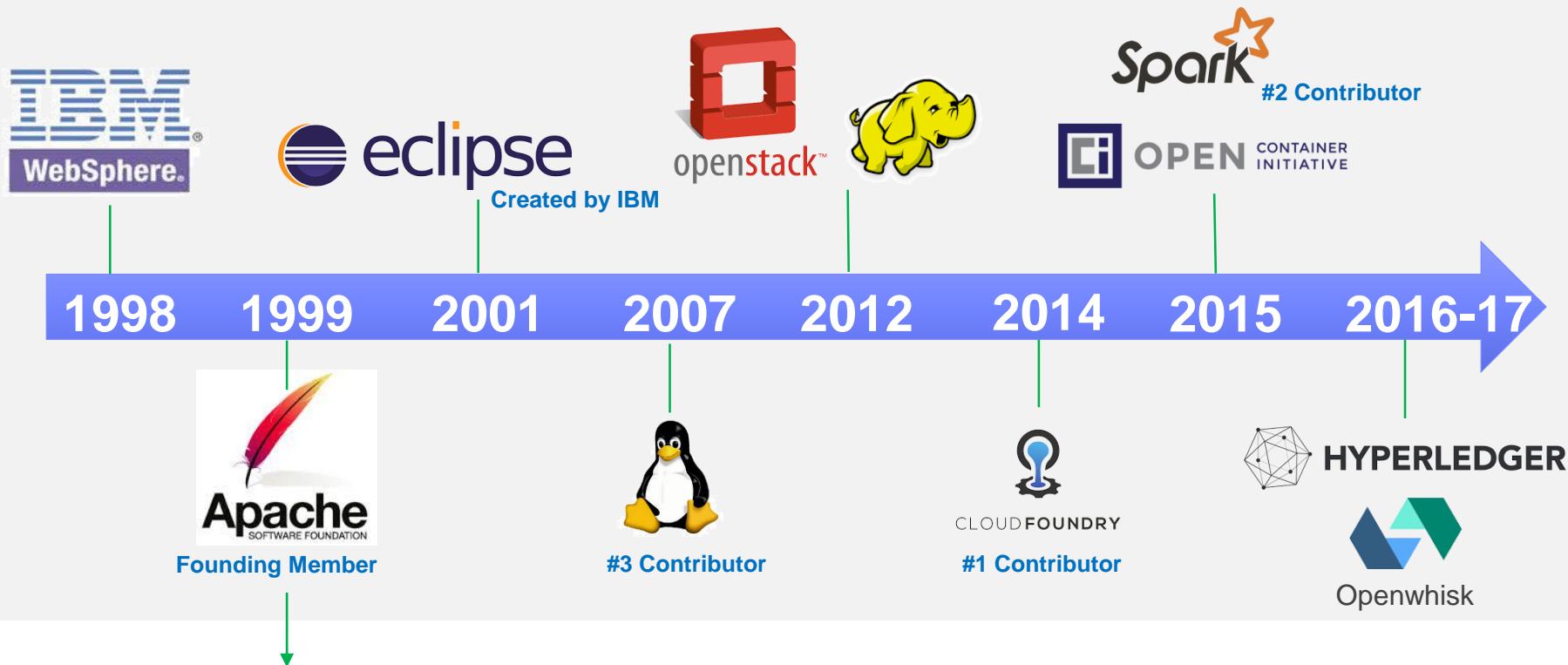
Fait la promotion, la protection et la standardisation de Linux en profitant des ressources et des services des communautés.



Novell.

ORACLE®

...



289 Top Level Projects, 59 Incubating

2 Million+ Code Commits

Projects started from IBM donations:

- Axis, Aries, Derby, Edgent, Geronimo, Harmony, Jakarta, OpenWhisk, SystemML, Toree, UIMA, Xalan, Xerces

Projects with major IBM contributions:

- Ambari, Atlas, CouchDB, Cordova, Hadoop, HTTP Server, Lucene, OpenJPA, Shindig, Spark, Tinkerpop, Web Services

Linux on z Systems



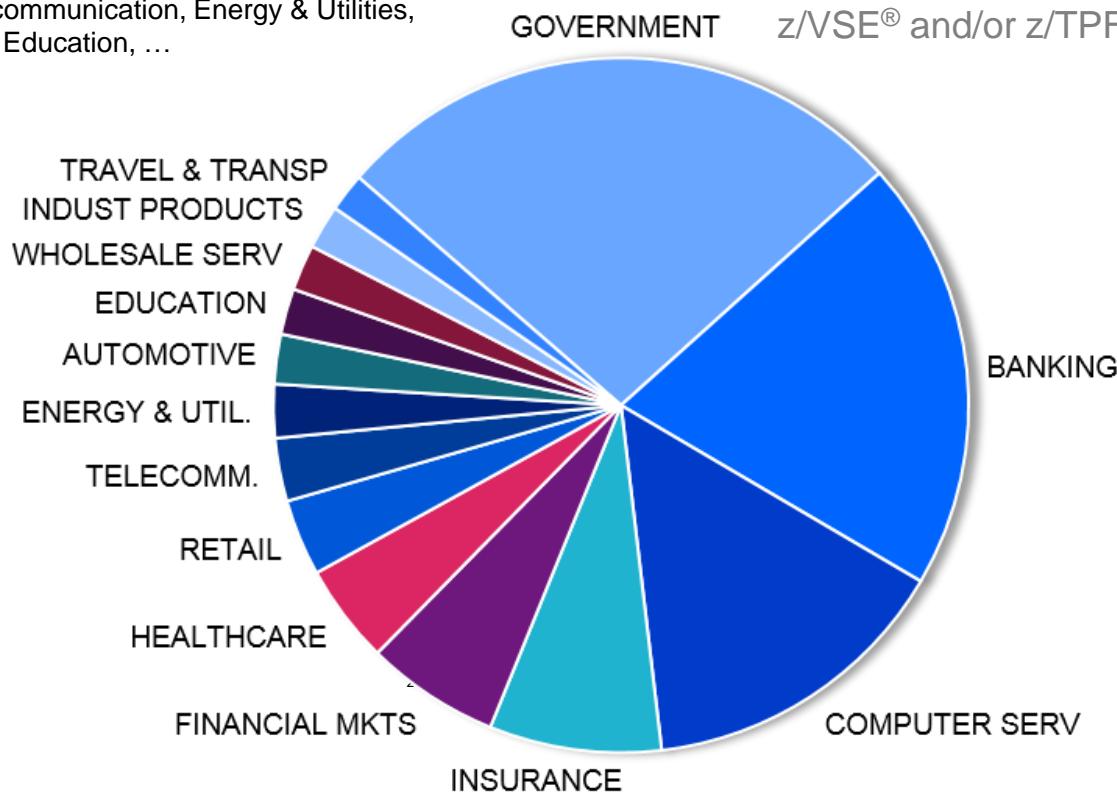
- Used in over 60 countries around the globe

- Used in 22 industries

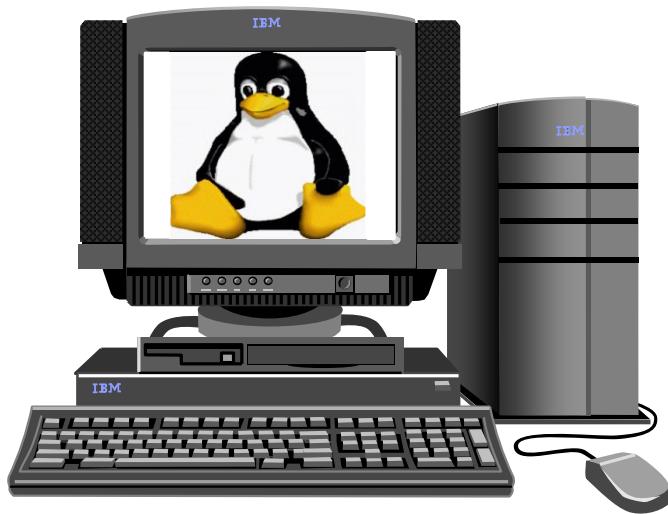
Most used in:

- Government, Banking and Computer Services
- Insurance, Financial Markets and Healthcare
- Retail, Telecommunication, Energy & Utilities, Automotive, Education, ...

- Very large installations with up to hundreds of IFLs in USA, Japan, Brazil and Germany
- Small installations with 2 IFLs in all countries and on all IBM Z models
- Most clients run Linux co-located with z/OS®, z/VSE® and/or z/TPF on an IBM Z server



Originellement conçu pour une Architecture basée sur des processeurs Intel



Processors

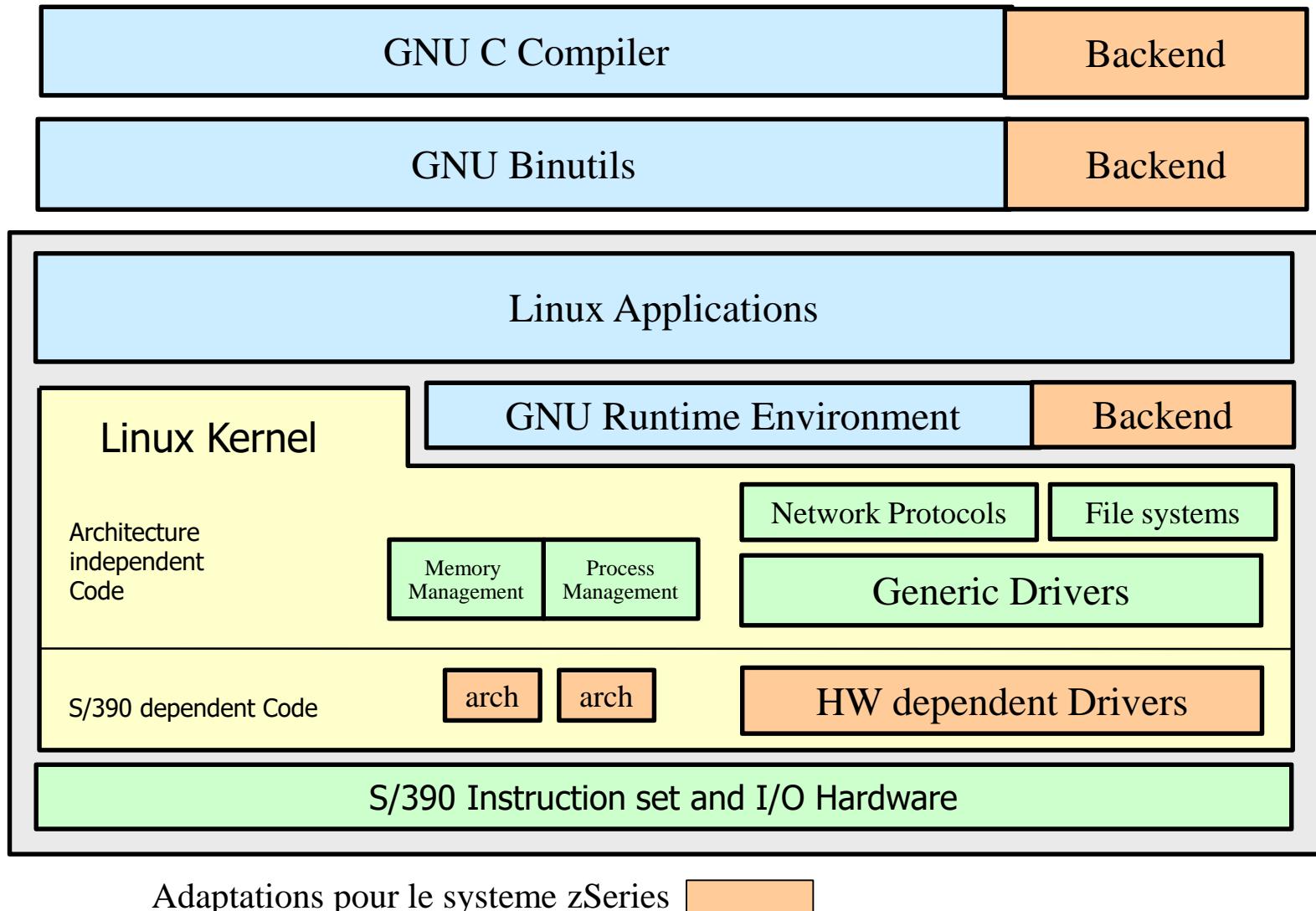
Mémoire

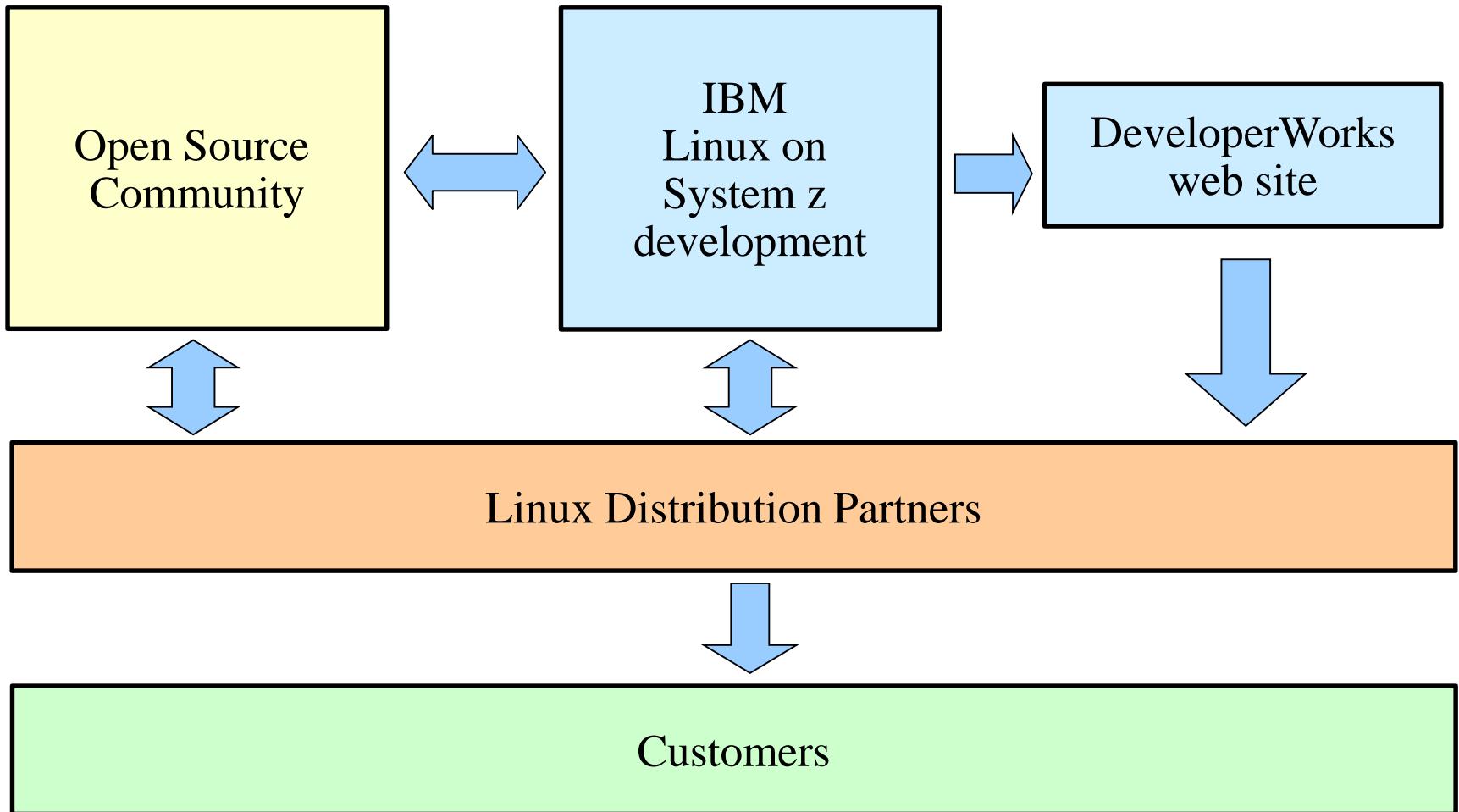
Clavier et Souris

Ecran de Terminal

Communications

Device Drivers





Linux on z Systems can run all kind of solutions.

- Cognitive and analytics solutions

- Cognos

- Database solutions

- DB2, Informix

- Data management solutions

Cognitive and solutions on IBM Z provides a modern, cost-competitive infrastructure with offerings ready for analytics and big data initiatives across all of your data sources

- Integration and messaging solutions

Integrated systems and applications deliver a differentiated customer experience

- Content management solutions

Enterprise Content Management puts business content to work and allows organizations to realize new value

- DevOps and application development

Virtualized, integrated solutions for application development leverage IBM Z servers and Linux for agile and innovative next gen apps

- Blockchain solution

Takes advantage of the cryptography, security and reliability of IBM Z

- Mobile and Web serving solutions

Sync existing IBM Z apps and queries via API connectivity to next gen apps, mobile and cloud environments

- Security and availability solutions

A full range of security features - z14 enables pervasive encryption -and applications are available from IBM, vendors and open source

- Open software solutions

The growing ecosystem of open source software on IBM Z helps on the innovation and quality of service of next gen apps

- Vendor software solutions

SAP, Oracle ...

IBM's strategy for Cloud Management for Linux on z Systems (IBM Z) is an open and standards-based approach.

IBM supports and embraces many of the major industry ecosystem initiatives around:

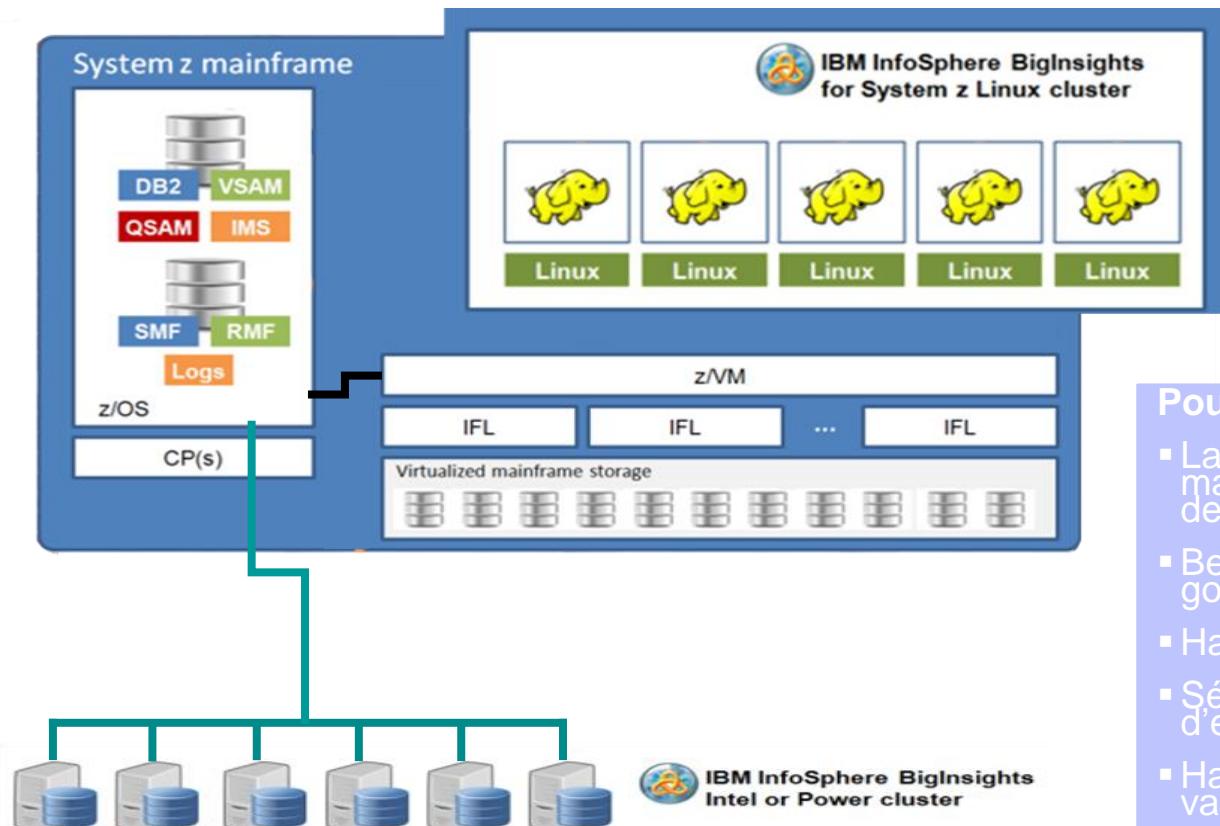
- Infrastructure as-a-Service
- Container management
- Platform as-a-Service



A list of Open Source validated on zSeries:

<https://www.ibm.com/developerworks/community/forums/html/topic?id=5dee144a-7c64-4bfe-884f-751d6308dbdf>

Fusion de l'analyse des données structurées et non-structurées



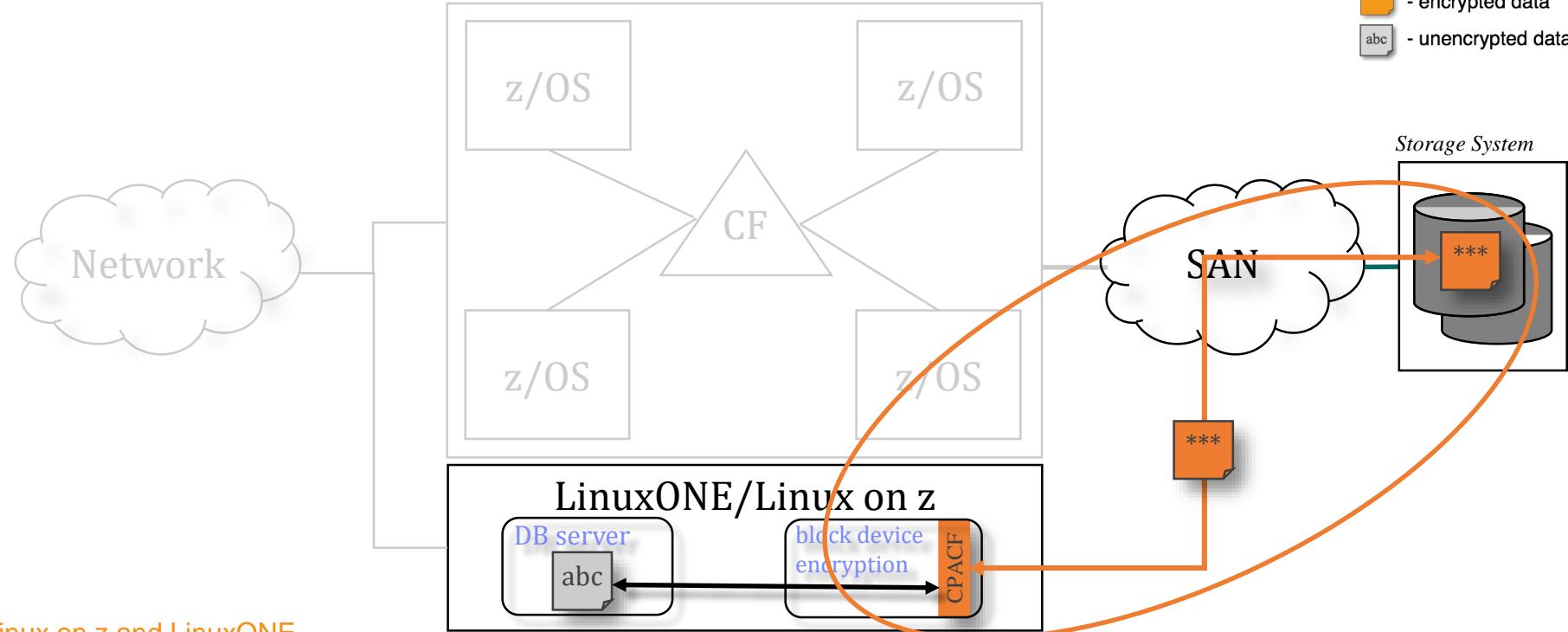
Pourquoi sur z Systems ?

- La majorité des données viennent du mainframe (Fichier de log, extraits de bases de données)
- Besoin de sécurité et de gouvernance
- Haute qualité de service
- Sécurisation du processus d'externalisation des données
- Hadoop apporte des outils à forte valeur ajoutée sur le z

Linux on z File Encryption

Submitted Upstream

Protection of data at-rest



Linux on z and LinuxONE

- *Transparent data encryption optimized with z14 CPACF hardware performance gains*
- *Leverage industry-unique CPACF encryption which prevents raw key material from being visible to OS and applications.*

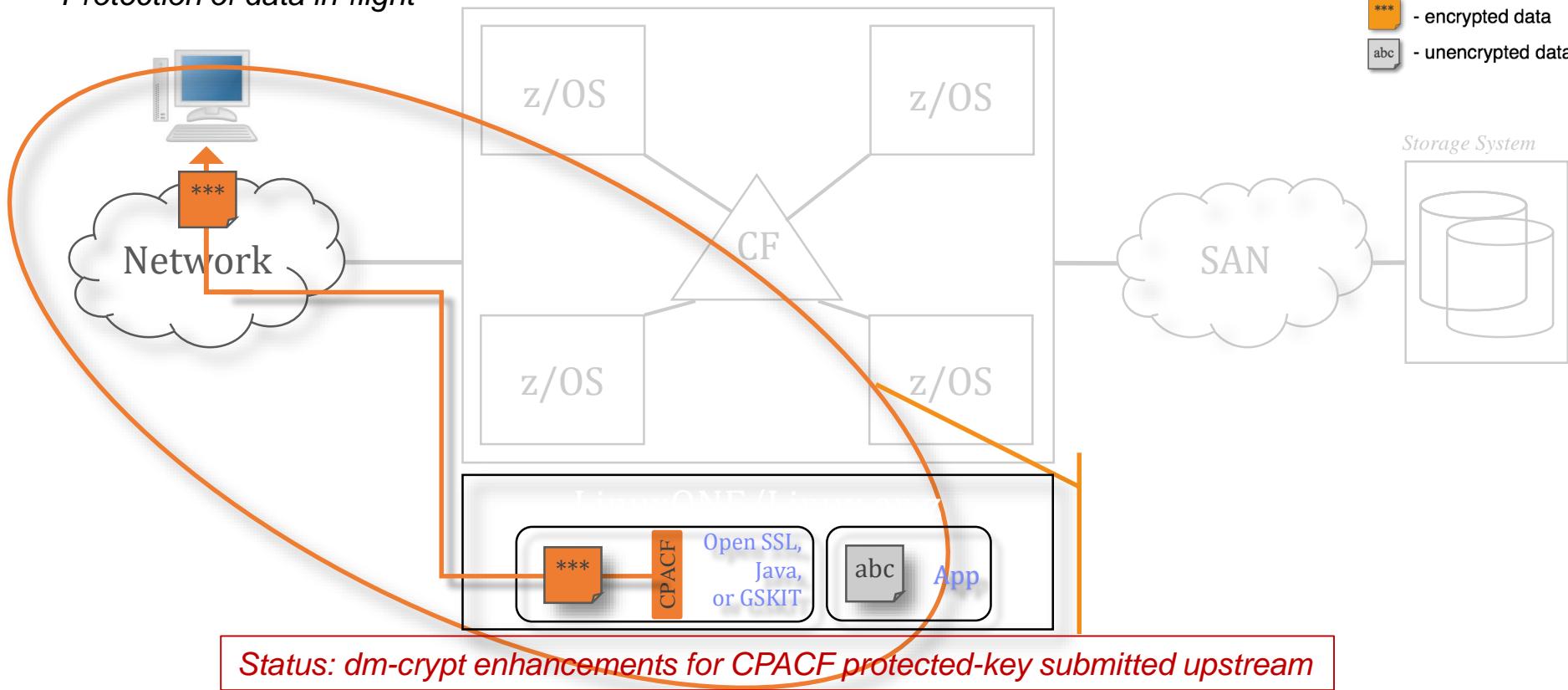
Status: dm-crypt enhancements for CPACF protected-key submitted upstream

Data Protection – Network Security



Submitted Upstream

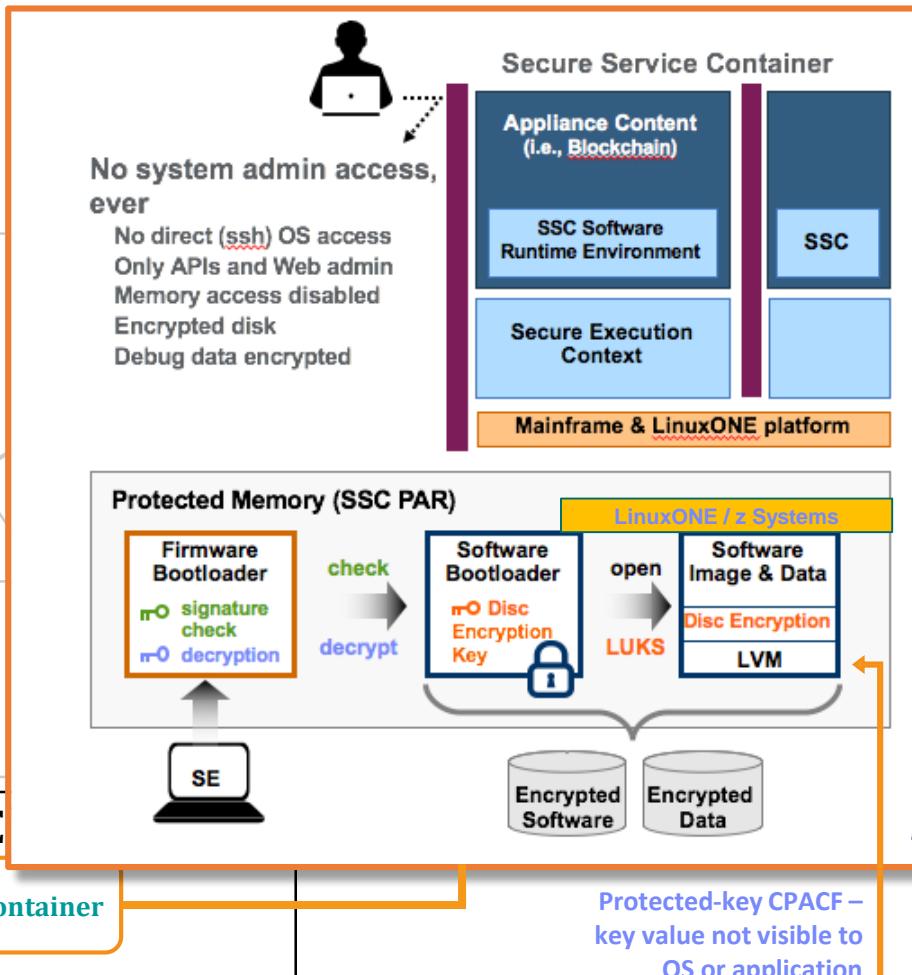
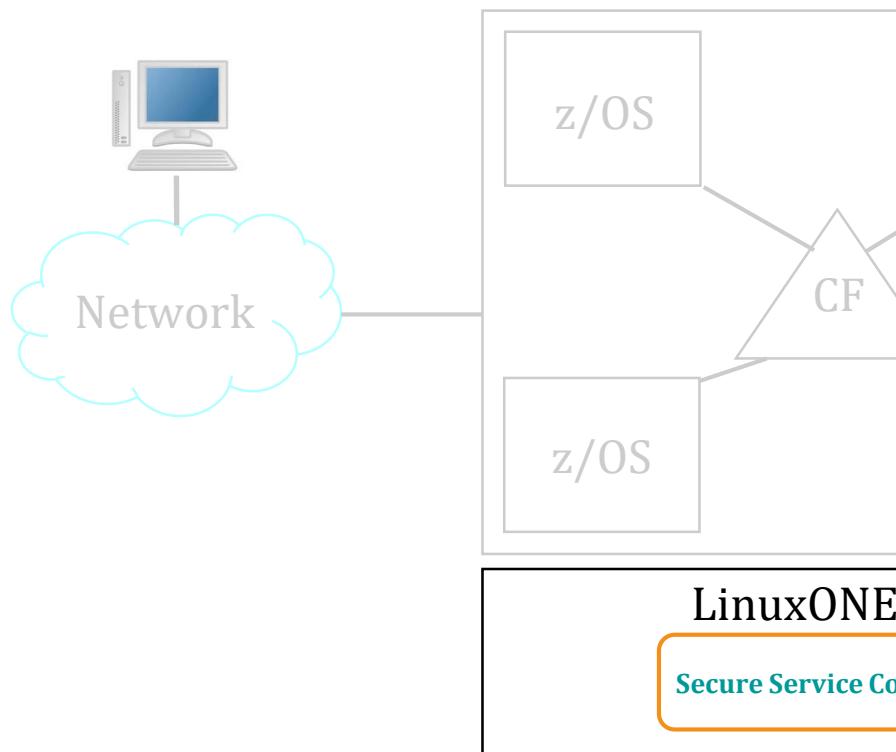
Protection of data in-flight

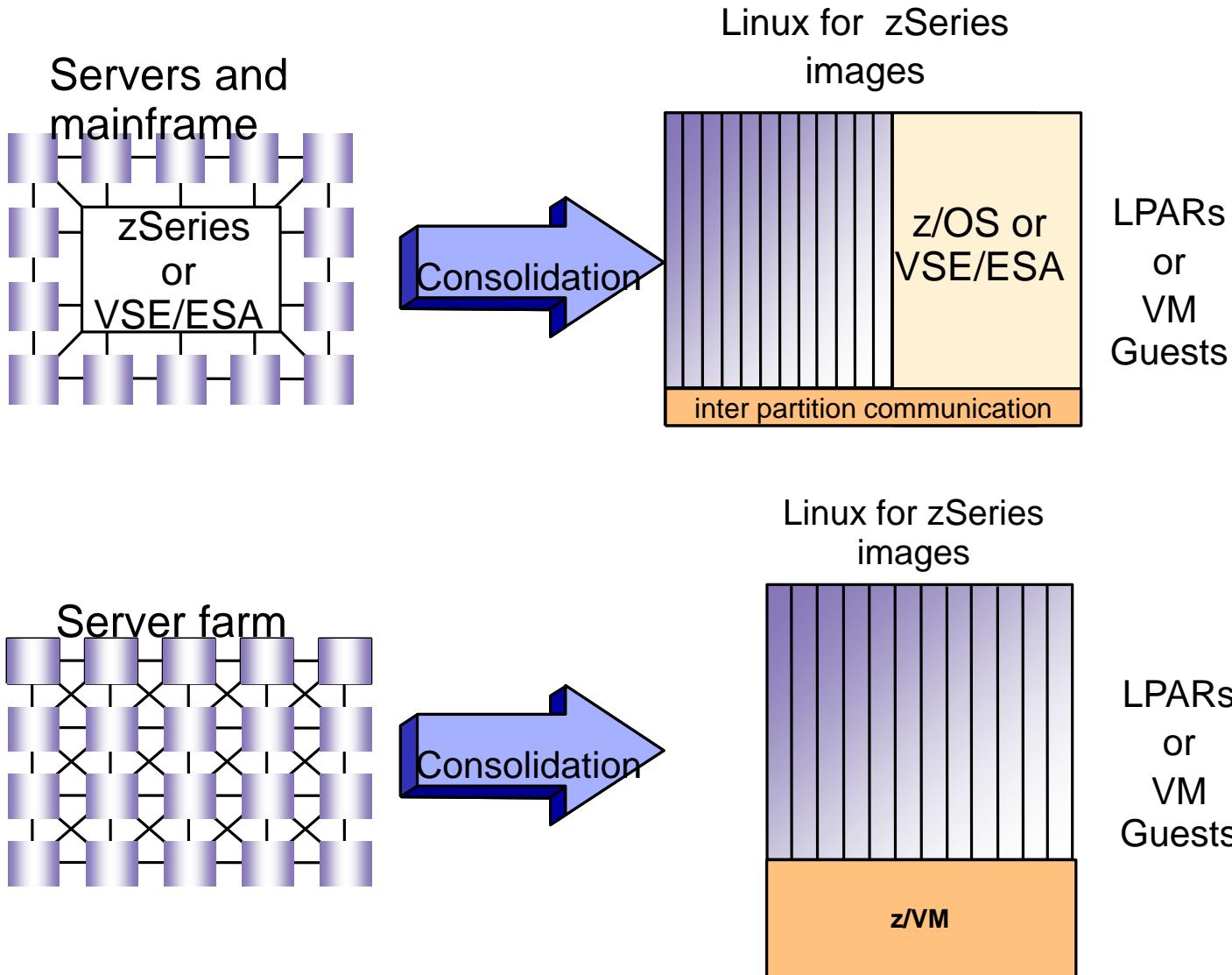


Linux on z and LinuxONE

- Transparently accelerate TLS & IPSec using CPACF & SIMD to leverage hardware performance gains

Extending the value of Z hardware crypto





Réduction des coûts (TCO)

- Environnement sauvegardé
 - Une Machine avec 100 serveurs Linux
- Consolidation
 - Moins de mémoire, de serveurs, de licenses, de gestion/support

Amélioration de la qualité de service

- Systems management (Un seul point de contrôle)
- Reliability, availability, security du System z (Haute Disponibilité)
- Intégration avec les systèmes d'exploitation du System z (OS)

Réponse à la Demande

- Capacity-on-demand (ajout de processeurs ou de mémoire à la demande)
- Allocation dynamique (ajout de machines virtuelles Linux à la demande)

What are Containers?

Virtual environment within Linux OS instance

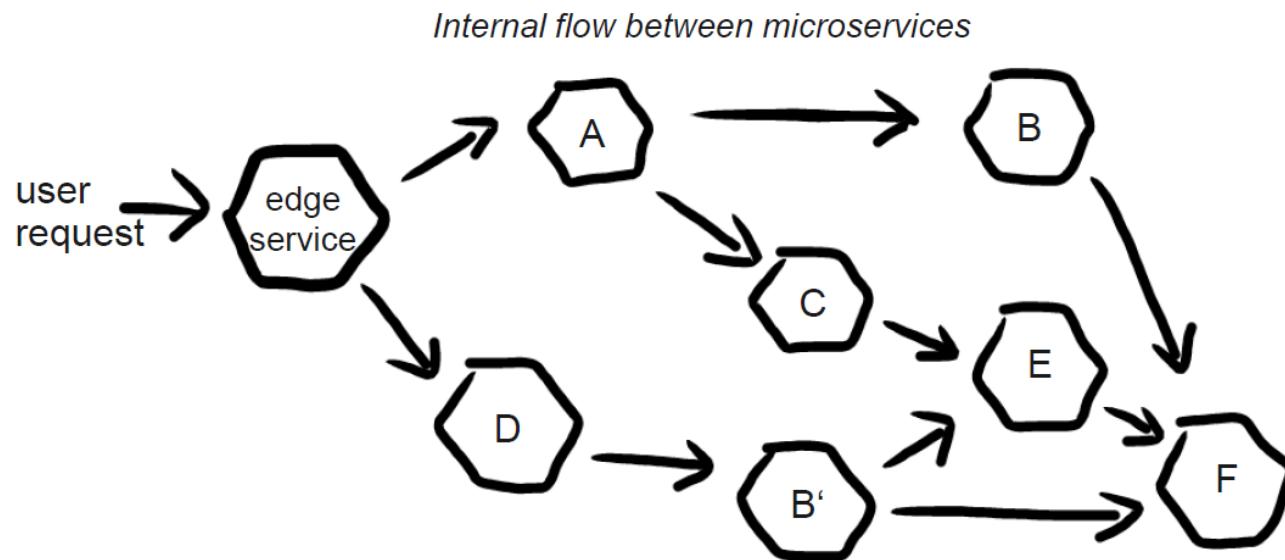
- Just user space
- Only application is started, not entire Linux environment
- So applications share OS kernel

Own file system tree via chroot environment

Container separation of OS objects via „name spaces“

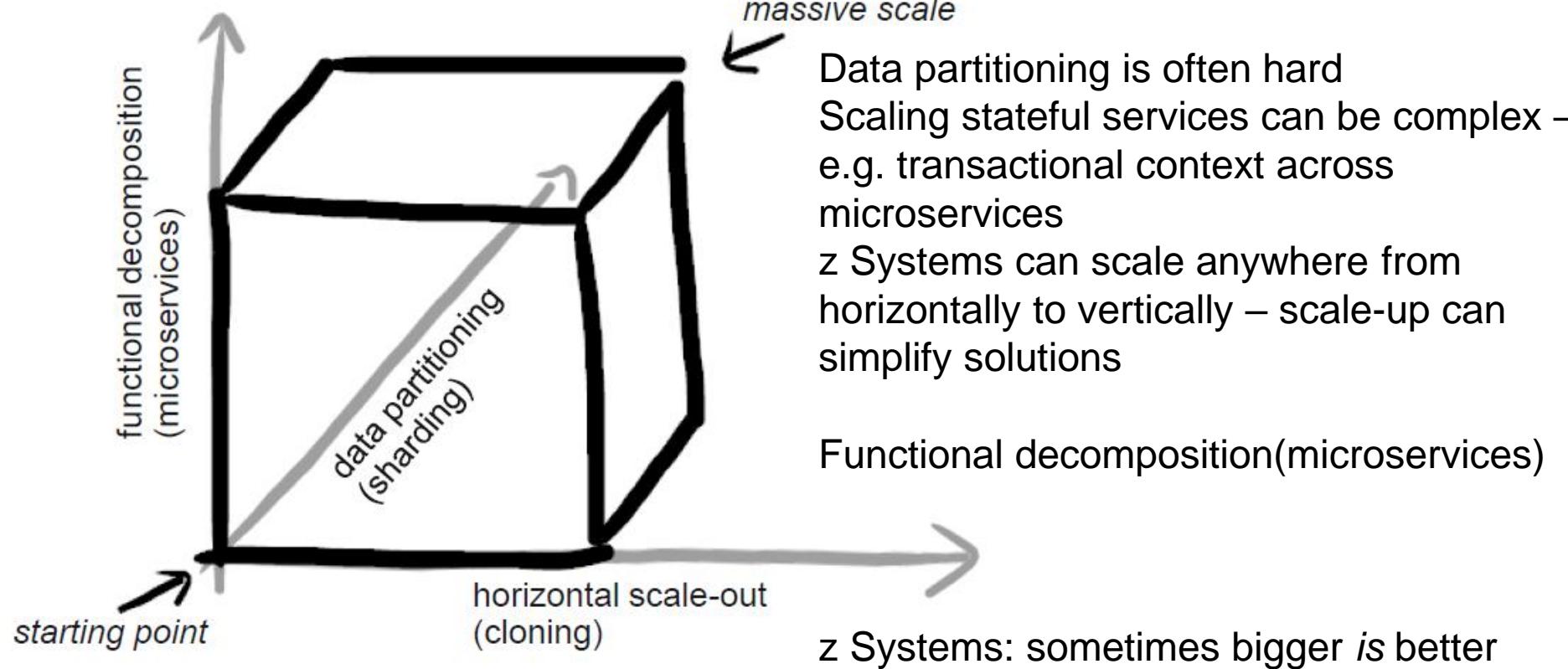
- Process IDs, network devices, mount points, users, and more

Latency

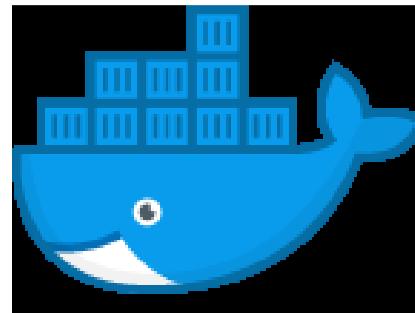


Network latencies add up in meshes of microservices
zSeries systems: large complex with in-box networks
reduces latencies

Replication components is mostly simple
Splitting applications into microservices can be hard



The Scale Cube (From Abbott & Fisher: „The Art of scalability“)



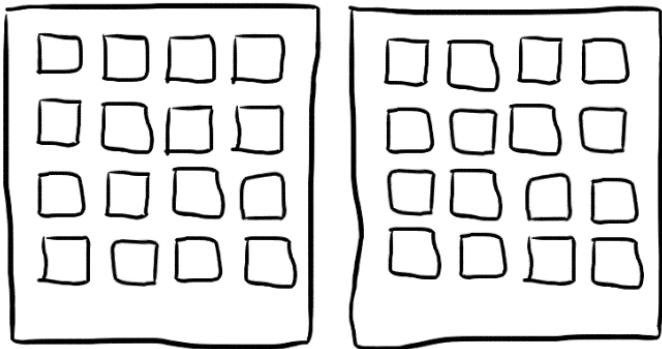
One implementation of a container solution

“Build, Ship, and Run Any Application, Anywhere”

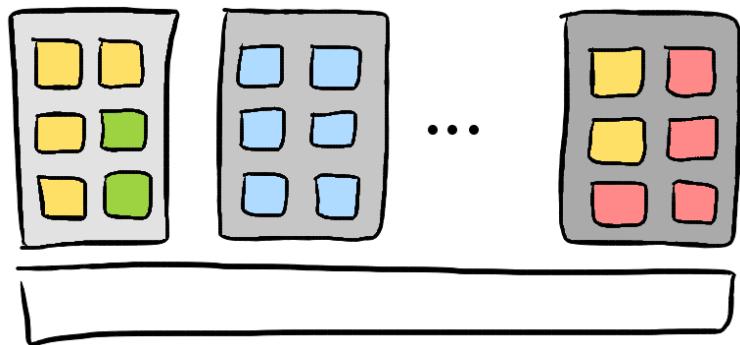
Terminology
image:

a self contained set of files, base for a container
container:

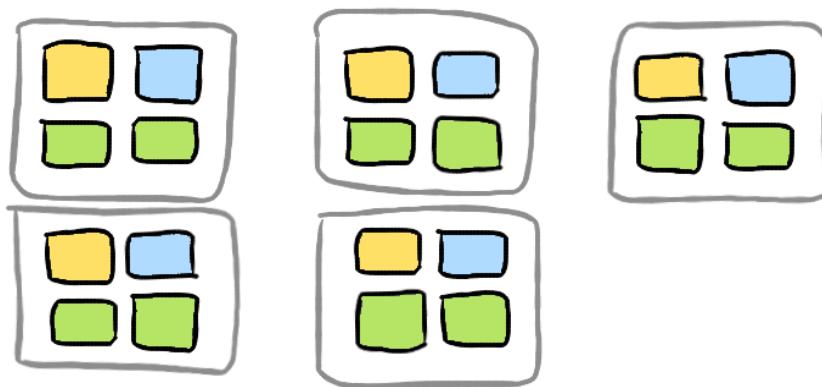
runnable instance, based on an image



Scale up for maximum efficiency



Isolation, QOS and scaling for tiers and tenants



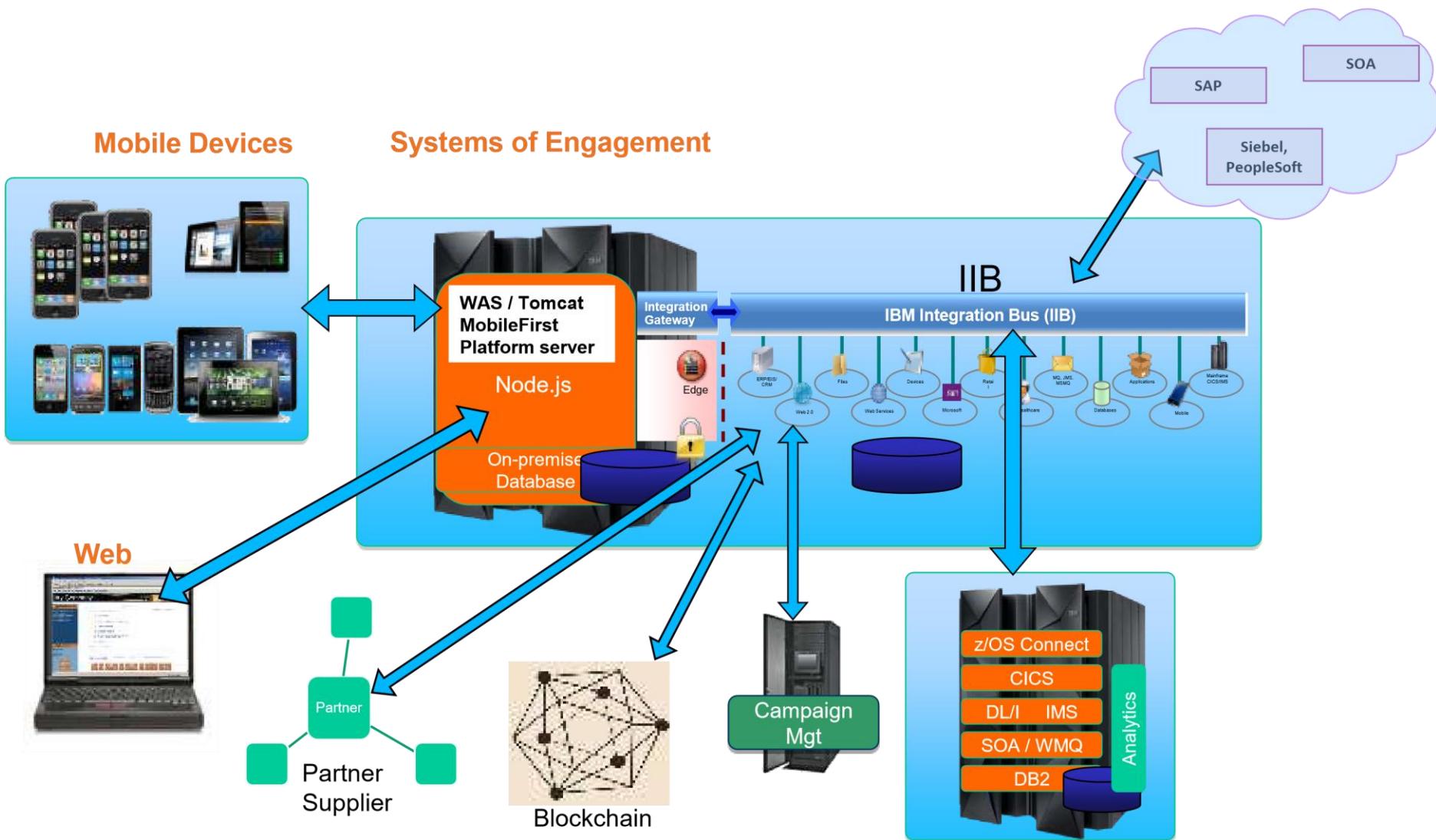
Grouping microservices end to end allows for simple scaling and optimized local communication

From monolithic architectures ...

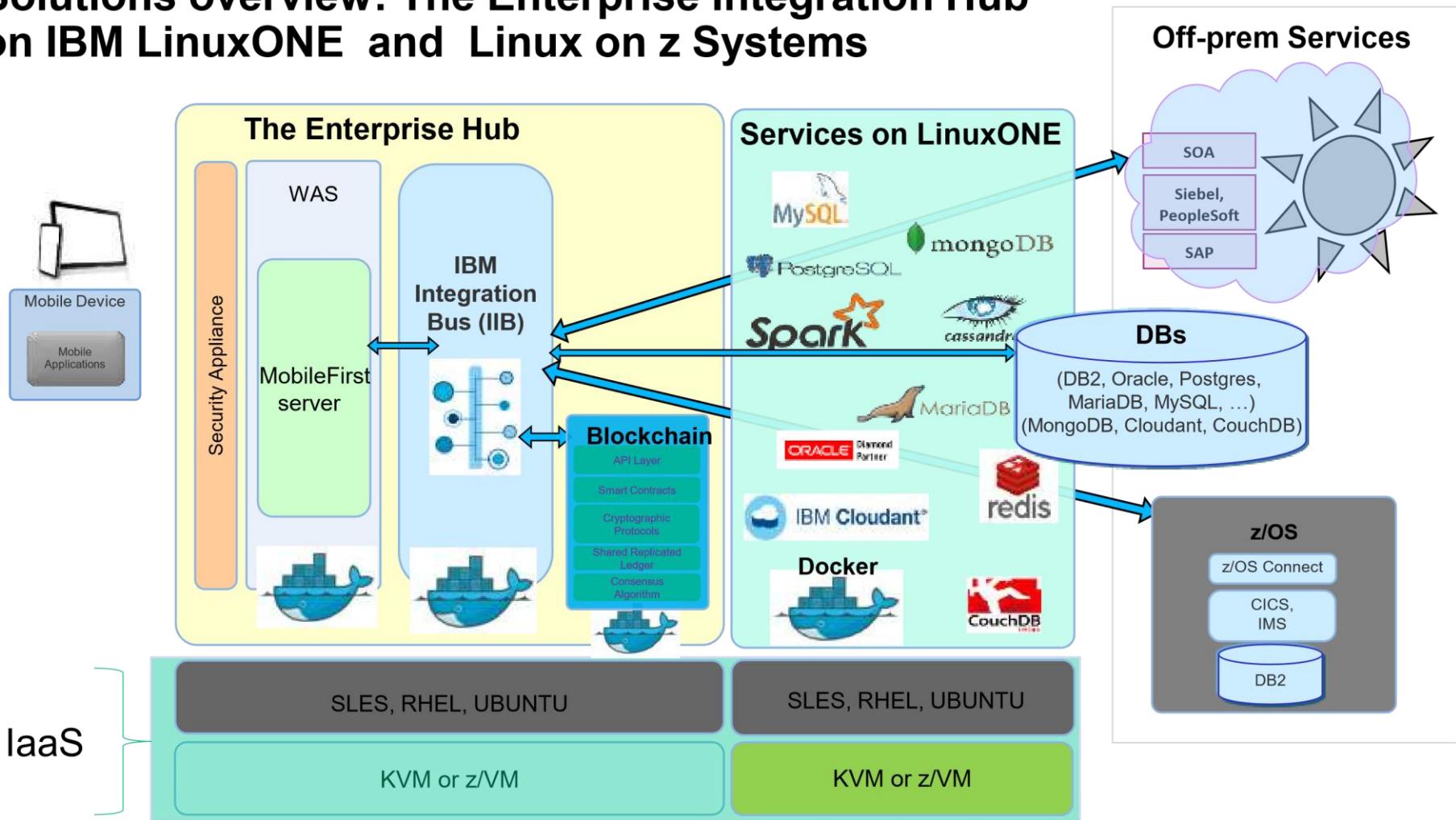
- Architecture aligned and optimized to server boundaries. Installed on these servers
- Layered applications with coarse granularity. Static, long living
- Often went virtualized, but no progress in solution structure
- Use components which fit to solution

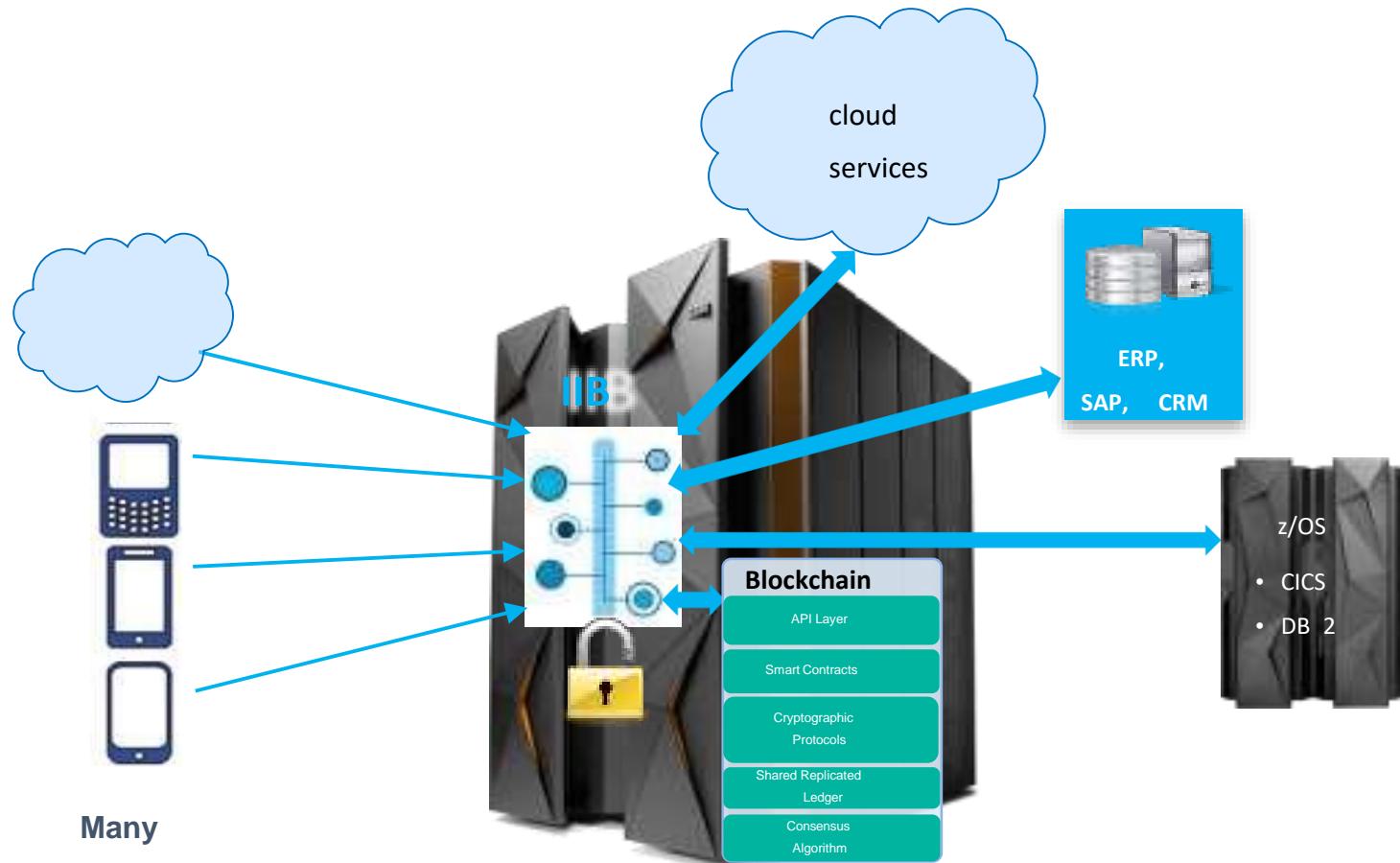
... to microservices

- Solution broken into small units. Delivered in containers (or images)
- Independent services, loosely coupled. Short life time, fast changes
- Resilient services. Scaling components is simple
- Using best tool for each subtask

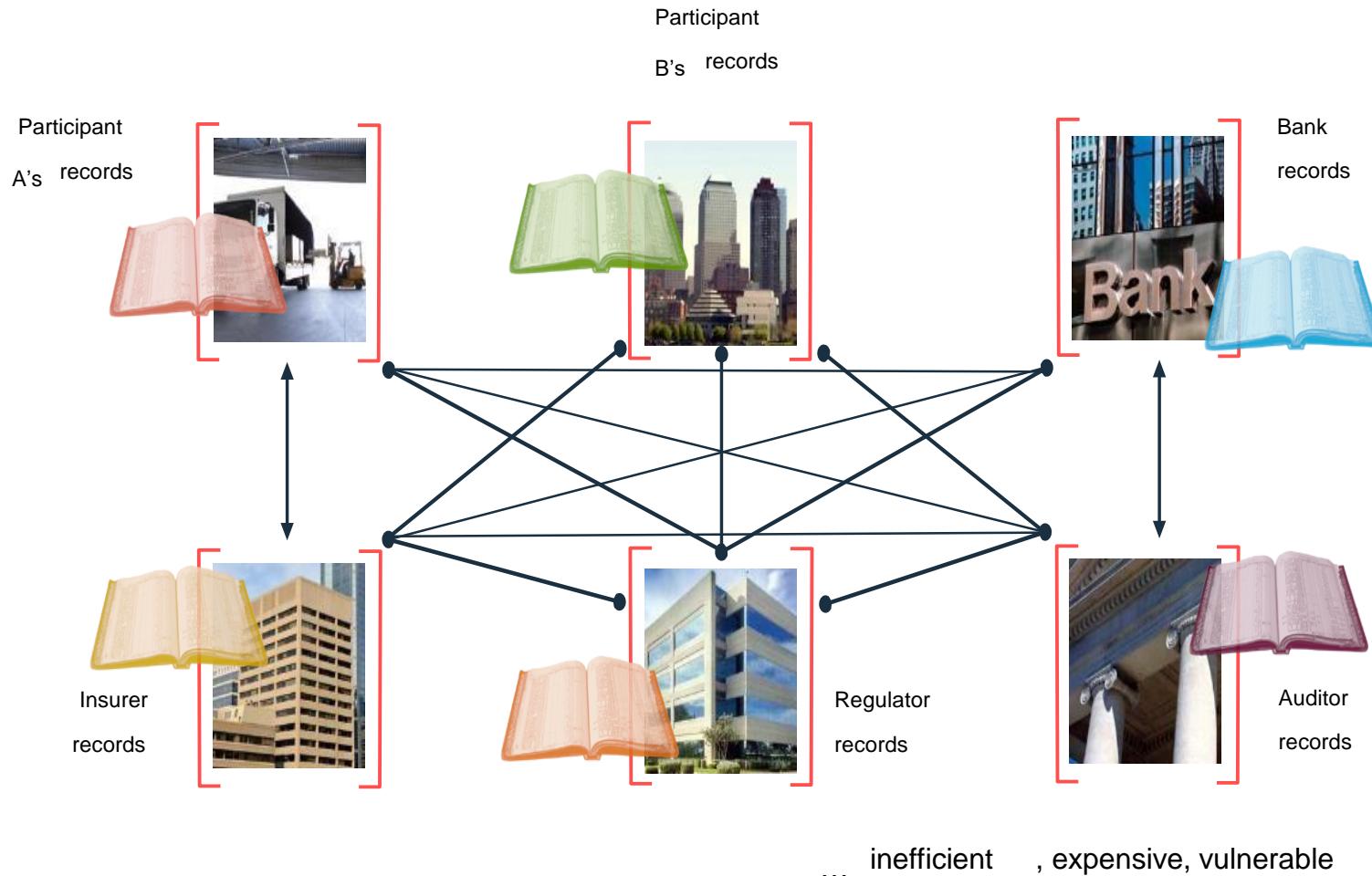


Solutions overview: The Enterprise Integration Hub on IBM LinuxONE and Linux on z Systems



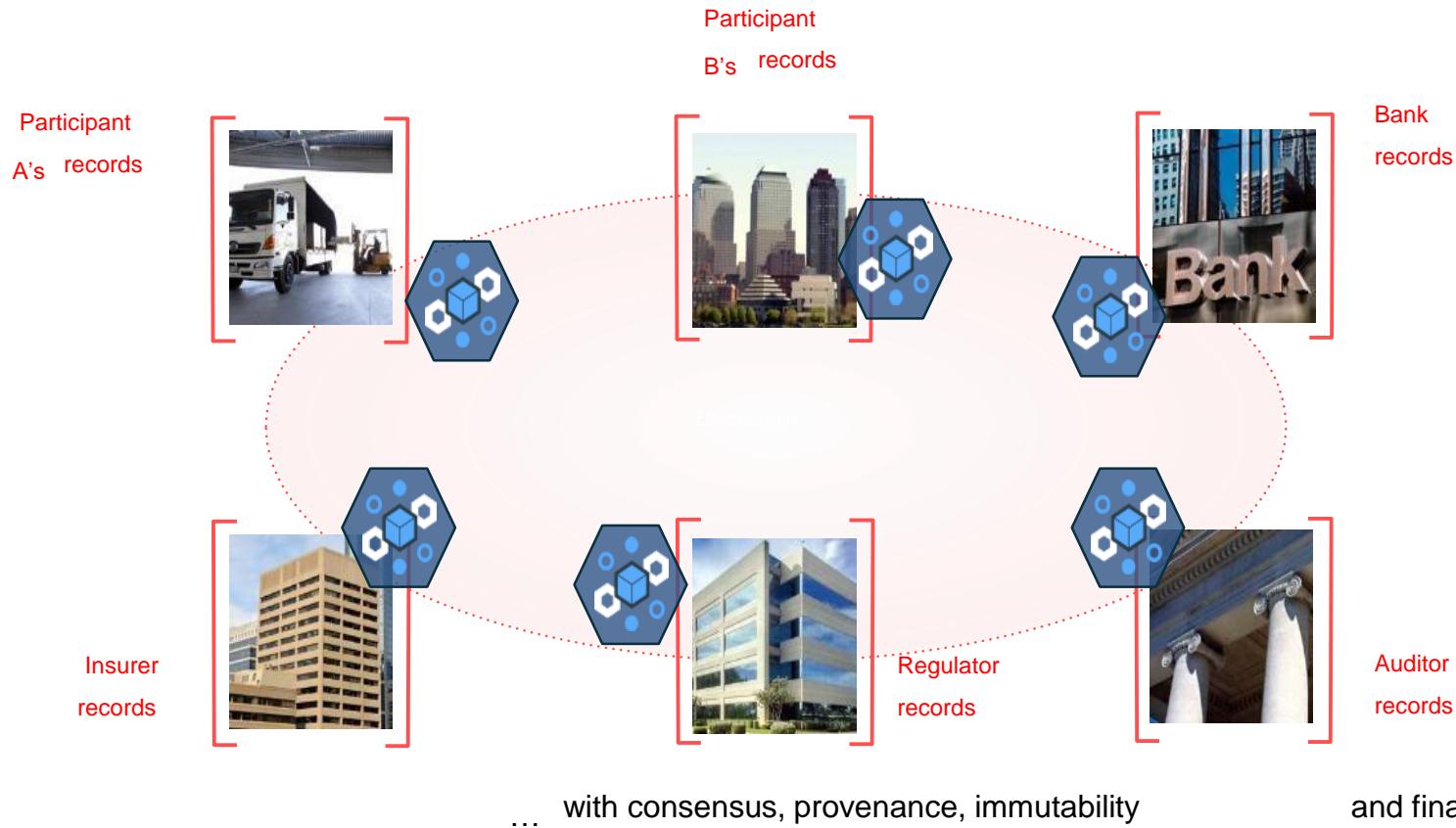


Problem



A shared replicated, permissioned ledger

...



Key players for Blockchain adoption



Regulator

- _ An organization who enforces the rules of play
- _ Regulators are keen to support Blockchain based innovations
- _ Concern is systemic risk _ new technology, distributed data, security



Industry Group

- _ Often funded by members of a business network
- _ Provide technical advice on industry trends
- _ Encourages best practice by making recommendations to members



Market Maker

- _ In financial markets, takes buy -side and sell -side to provide liquidity
- _ More generally, the organization who innovates
 - Creates a new good or service, and business process (likely)
 - Creates a new business process for an existing good or service

Blockchain underpins Bitcoin ...

bitcoin

An unregulated shadow - currency

The first blockchain application

Resource intensive

Blockchain for business differs in key areas:

Identity over anonymity

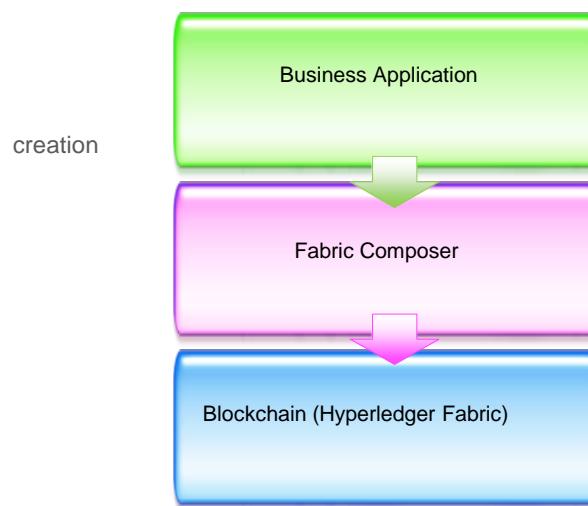
Selective endorsement over proof of work

Assets over cryptocurrency



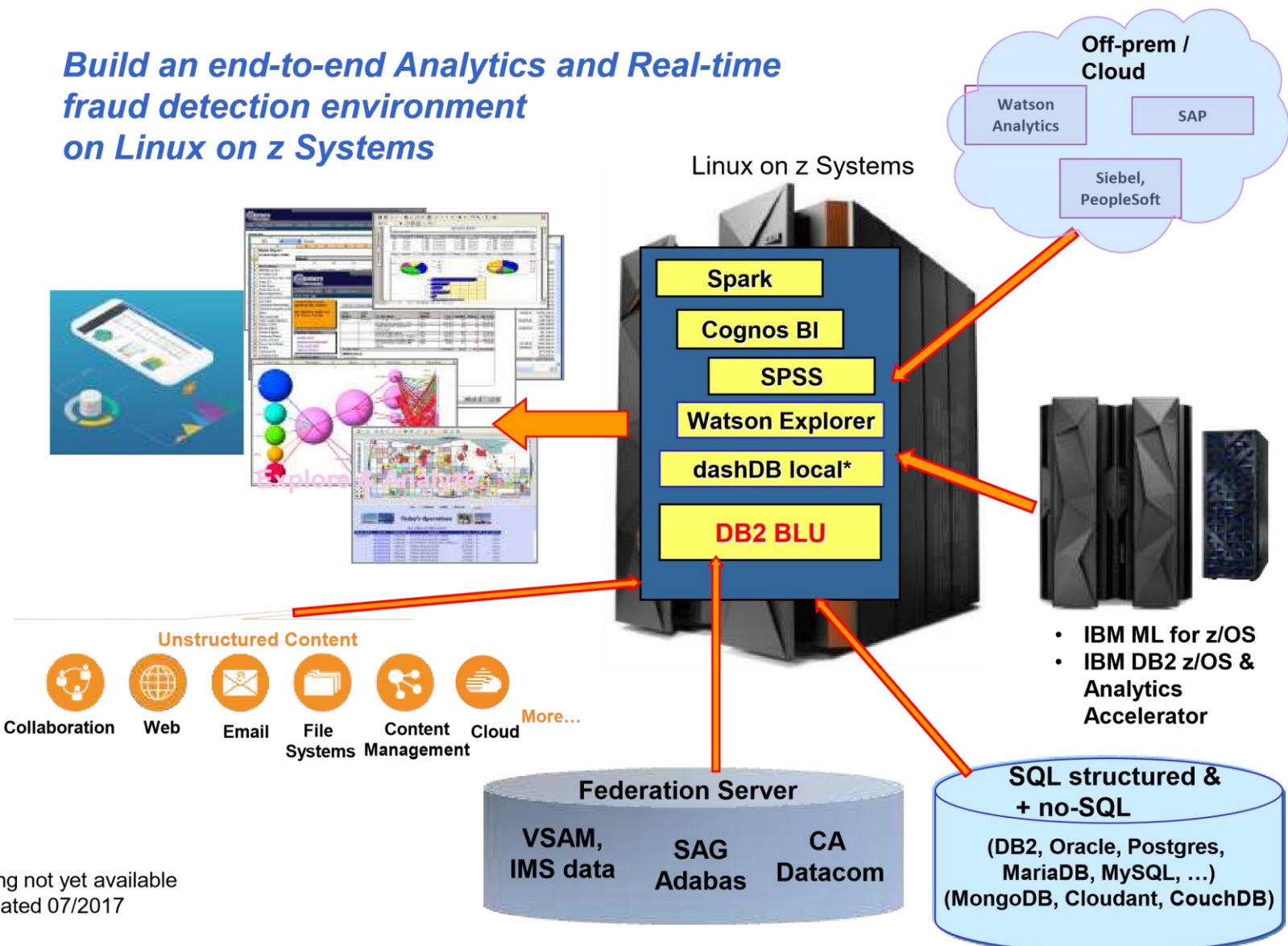
Fabric Composer: Accelerating time to value

- _ A suite of high level application abstractions for business networks
- _ Emphasis on business -centric vocabulary for quick solution
- _ Reduce risk, and increase understanding and flexibility



- _ Features
 - _ Model your business networks, test and expose via APIs
 - _ Applications invoke APIs transactions to interact with business network
 - _ Integrate existing systems of record using loopback/REST
- _ Fully open and part of Linux Foundation Hyperledger
- _ Try a demo now ! - <http://fabric-composer.mybluemix.net/>

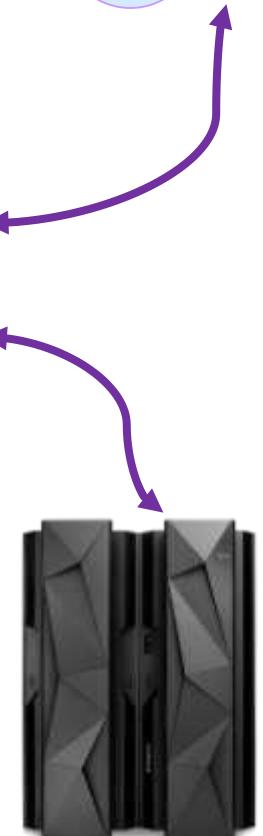
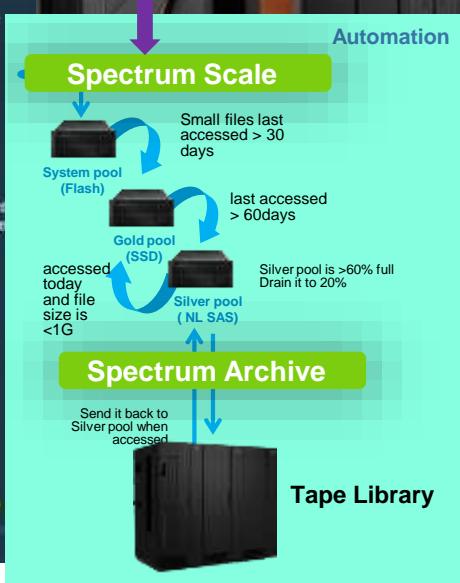
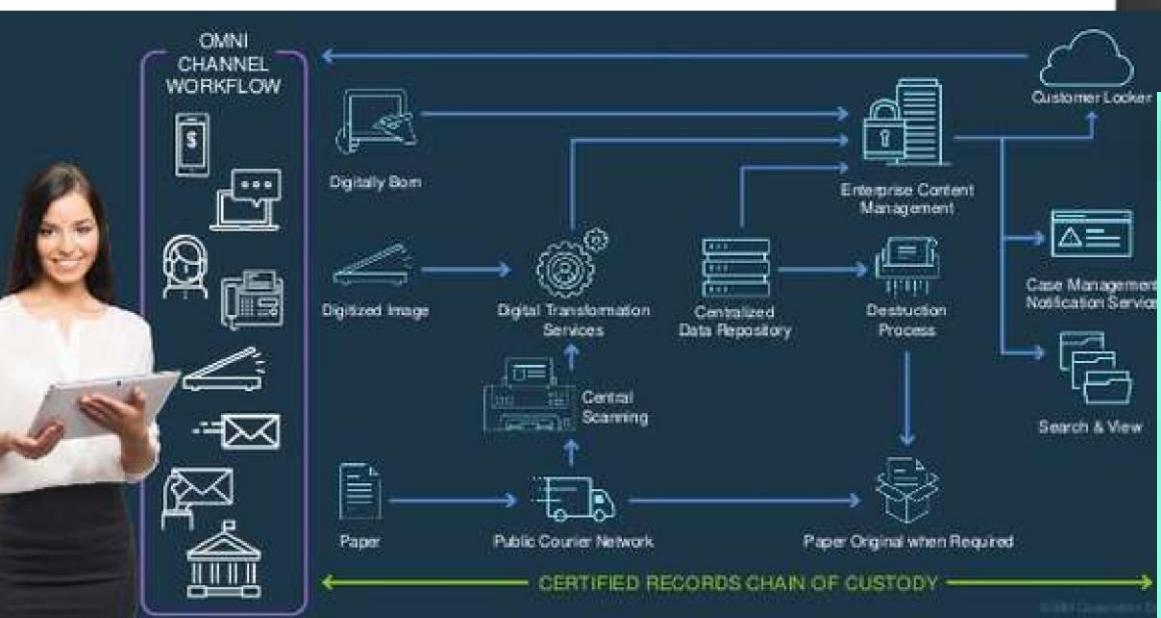
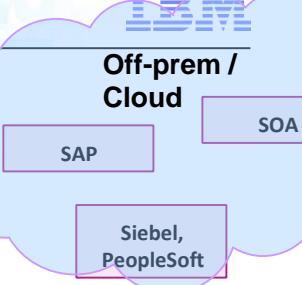
Build an end-to-end Analytics and Real-time fraud detection environment on Linux on z Systems



* - offering not yet available
estimated 07/2017



Linux on z Systems





La mise en œuvre

Smarter software for a smarter planet

- Linux for zSeries

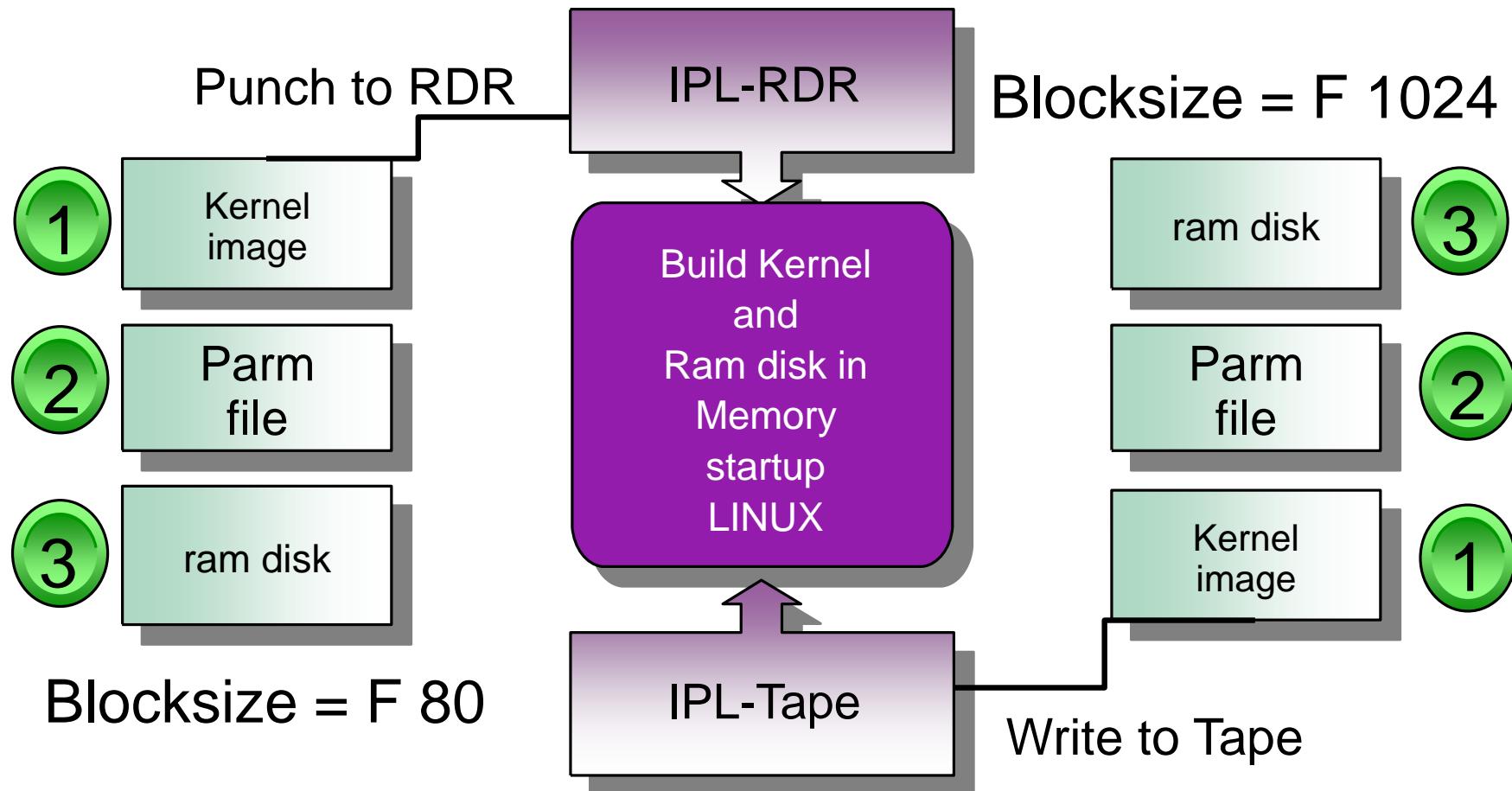
- Version compilée pour une architecture zSeries 64-bit (gcc, kernel, glibc ...)
- RPM de type xxxx.s390x.rpm
- Librairies de compatibilité pour les applications compilées en 31-bit
- Disponible depuis le kernel 2.6

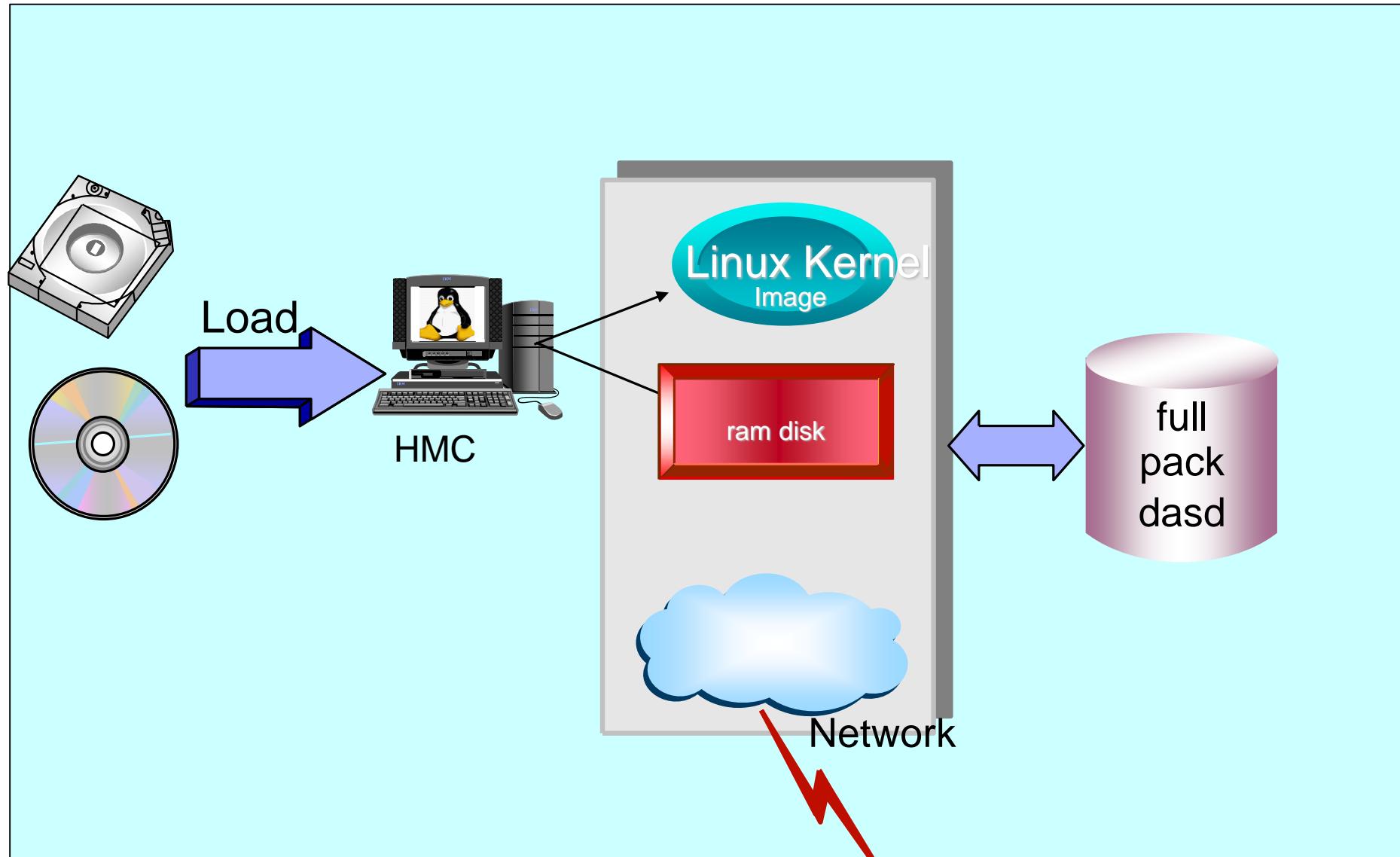
- Linux for S/390

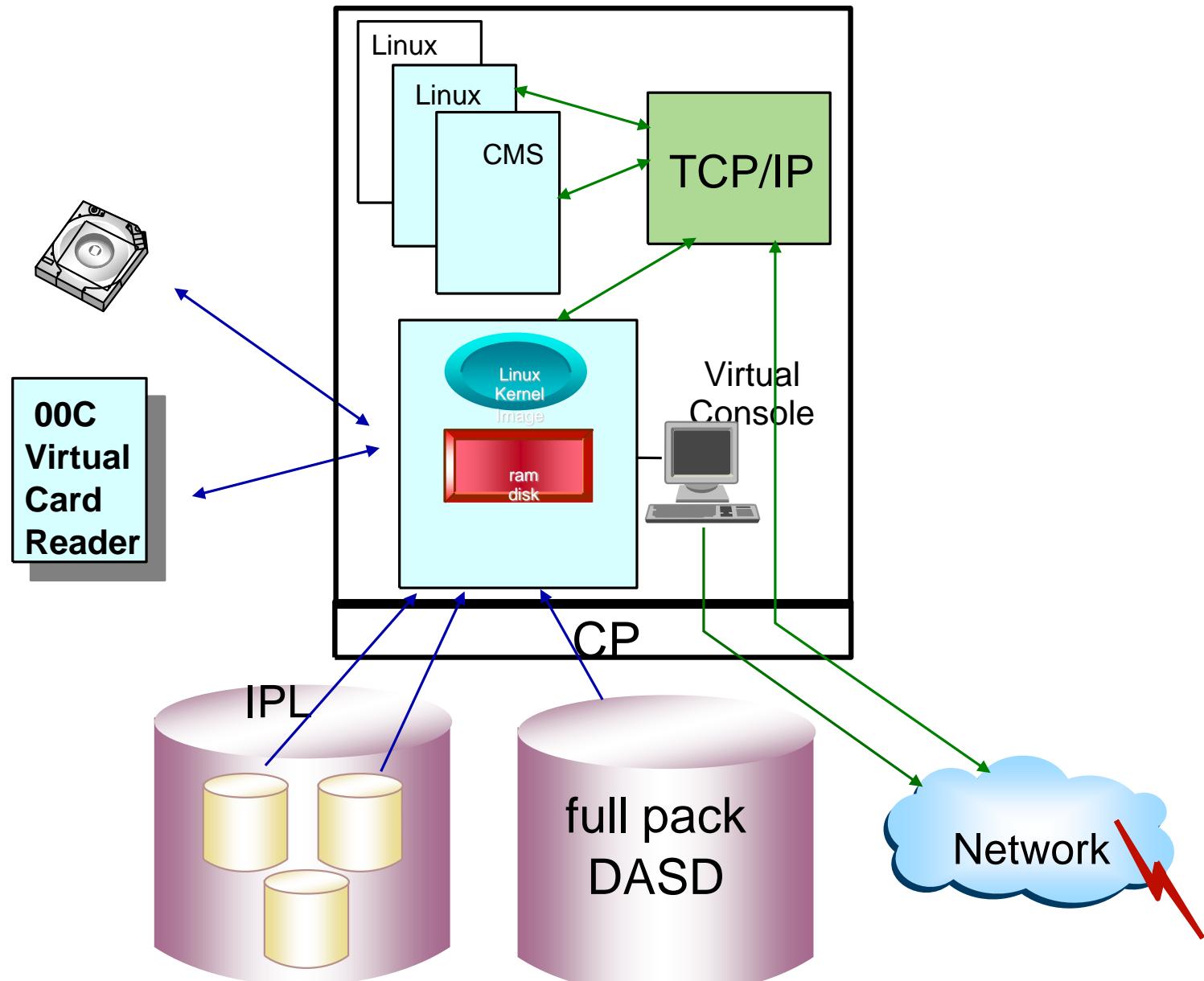
- Version compilée pour une architecture S/390 31-bit
- Adressage mémoire limité à 2Go
- RPM de type xxx.s390.rpm
- Existe depuis la première version de Linux pour le mainframe (kernel 2.2 - 1999)

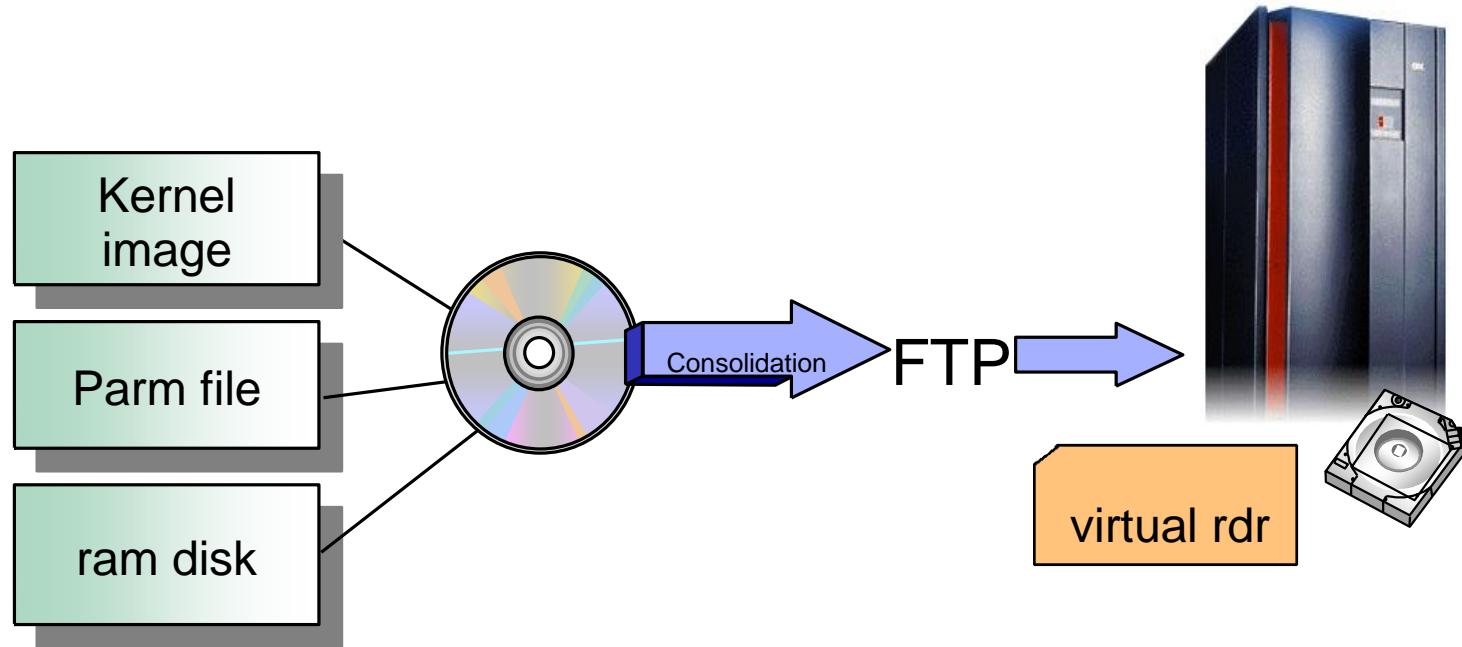
- En LPAR ou sous z/VM ?
 - Consolidation / Virtualisation
- Choix de la Distribution Linux.
- Préparation de l'environnement pour Linux.
 - Machines Virtuelles, LPAR, OSA, network environnement, (mini)disks
- Démarrage d'un Système Linux.
 - Boot initial Linux system from CD ou Bande ou Reader (Choix)
 - Préparation des environnement d'IPL
 - Upload des fichiers nécessaires au démarrage initial de Linux (kernel, parameter file, et root file system) du CD
 - Copy ou punch files vers le medium d'IPL (tape ou reader)
 - Boot initial Linux kernel
- Définition du ou des réseaux pour Linux.
- Installation de base (YaST, anaconda, ...).
- Réalisation du premier IPL du système installé.
- Reconnexion à l'installation et finalisation de la configuration.

Choix Reader ou Bande ?









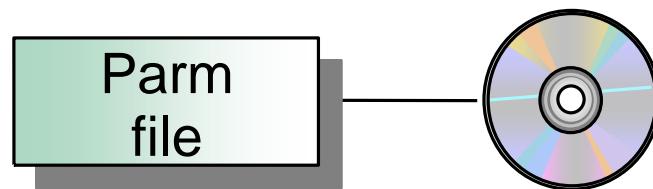
Usually FTP from PC to zSeries

Irecl=1024 for tape, Irecl=80 for virtual reader

Use MOVEFILE (VM) or IEBCGENER (z/OS) to write magnetic tape for LPAR/native

Make sure RECFM=F

- Utilisé pour passer des paramètres au Kernel au moment du BOOT
 - Intégré sur la media (PARM File)
- N'a pas besoin d'être modifié pour le système initial
- Modifié par XEDIT ou ISPF ou un autre éditeur
 - lrecl dépend du boot device



```
ramdisk_size=65536 root=/dev/ram1 ro init=/linuxrc TERM=dumb
```

Création d'une procédure EXEC :

Punch initial kernel, kernel parameter file, RAMDISK initial root file system vers le reader virtuel

IPL Linux kernel à partir du virtual reader

```
/* REXX */
'CP CLOSE RDR'
'PURGE RDR ALL'
'SPOOL PUNCH * RDR'
'PUNCH VMRDR KERNEL A (NOH'
'PUNCH PARM LINE A (NOH'
'PUNCH INITRD IMAGE A (NOH'
'CH RDR ALL KEEP NOHOLD'
'I OOC CLEAR'
```



Boot from reader, tape or CD
Check messages



**Linux version 2.6.5-7.97 -s390x (gcc version 3.3.3 (SuSE Linux))
We are running under VM (64-bit mode)**

**Kernel command line: ramdisk_size=65536 root=/dev/ram1 to
init=/linuxrc . . .**

. . .

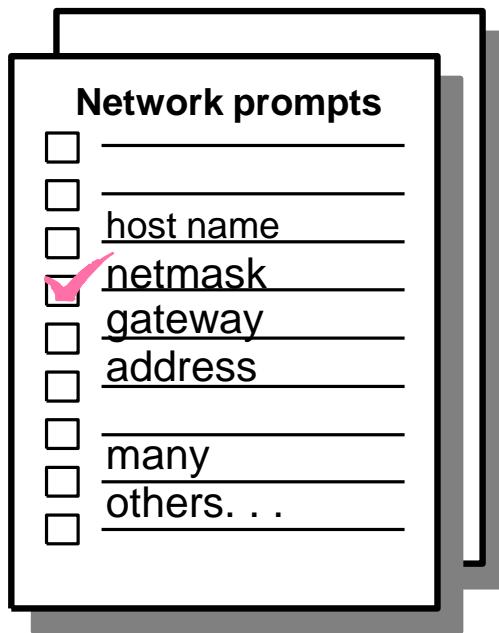
. . .

Welcome to SuSE Linux Enterprise Server 9 for zSeries

Please select the type of your network device:

- 0) no network
- 1) OSA Token Ring (lcs)
- 2) OSA Ethernet
- 3) OSA-Gigabit Ethernet or OSA-Express Fast Ethernet
- 4) Channel To Channel
- 5) Escon
- 6) IUCV
- 8) Hipersockets
- 9) OSA High speed Token Ring (qdio)
- 10) Show subchannels and detected devices

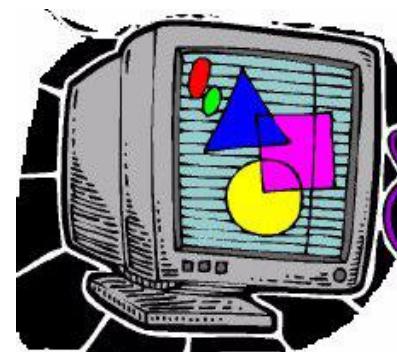
Enter your choice (0-10):



Are these values correct?

Enter a temporary password for root

I'm pinging

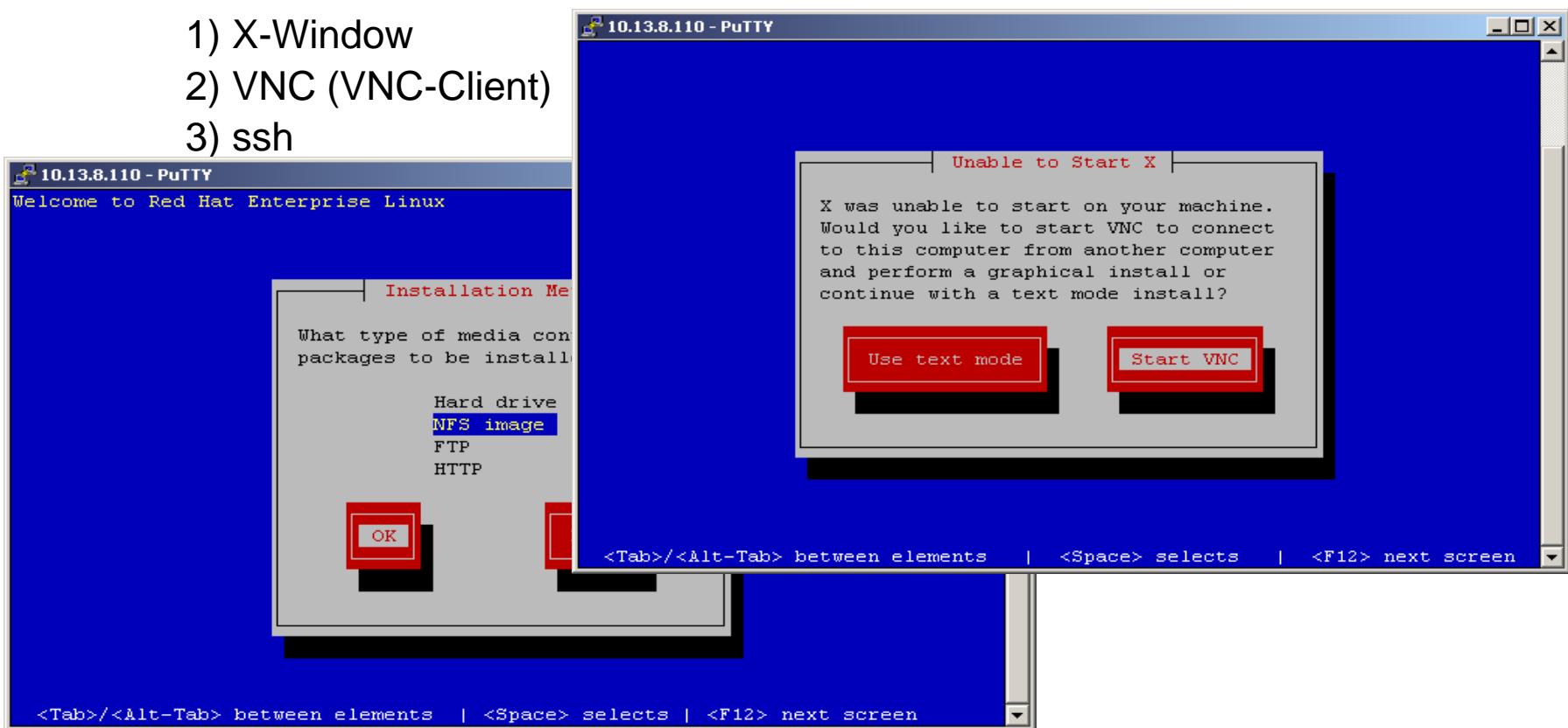


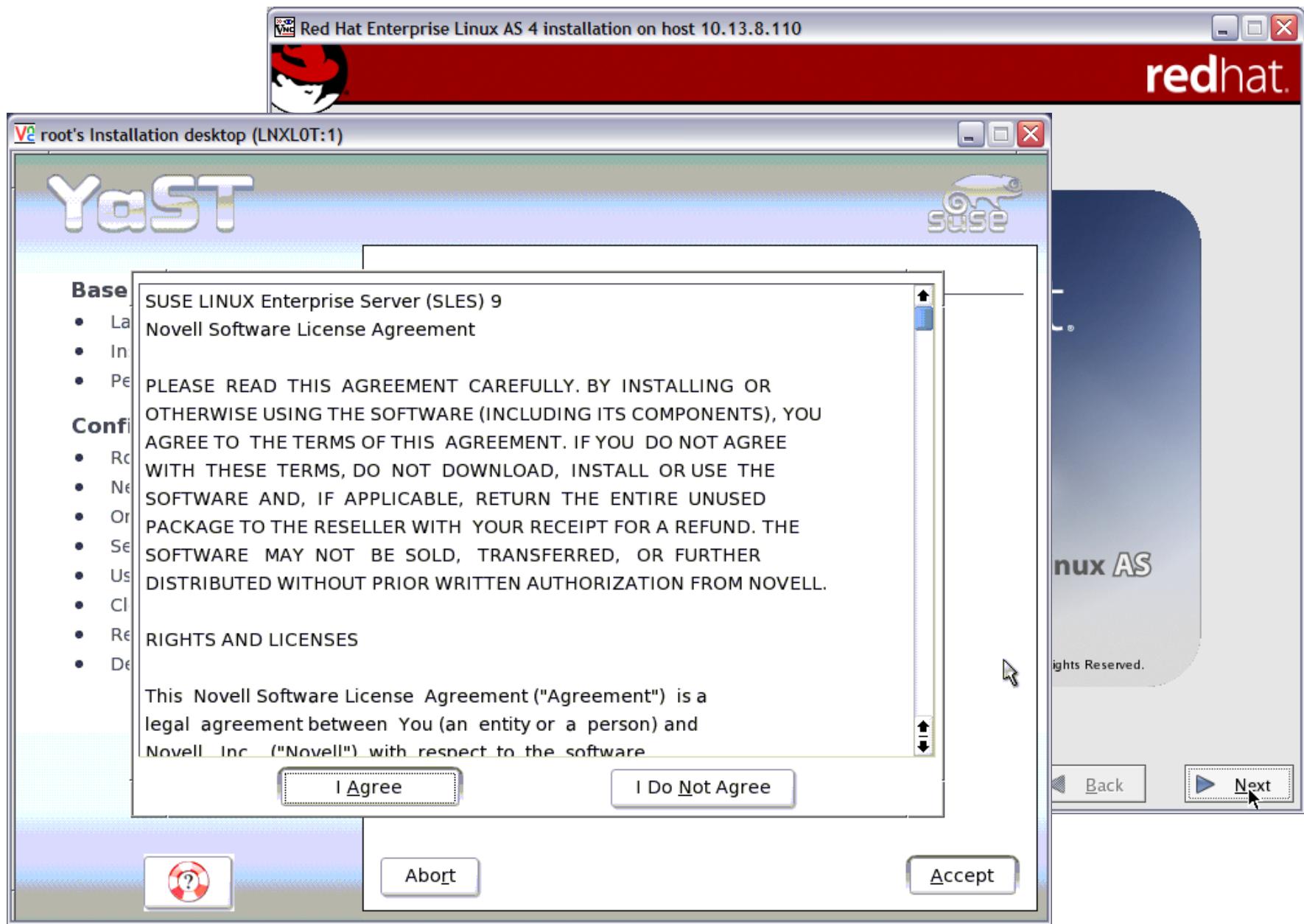
Please specify the installation Source:

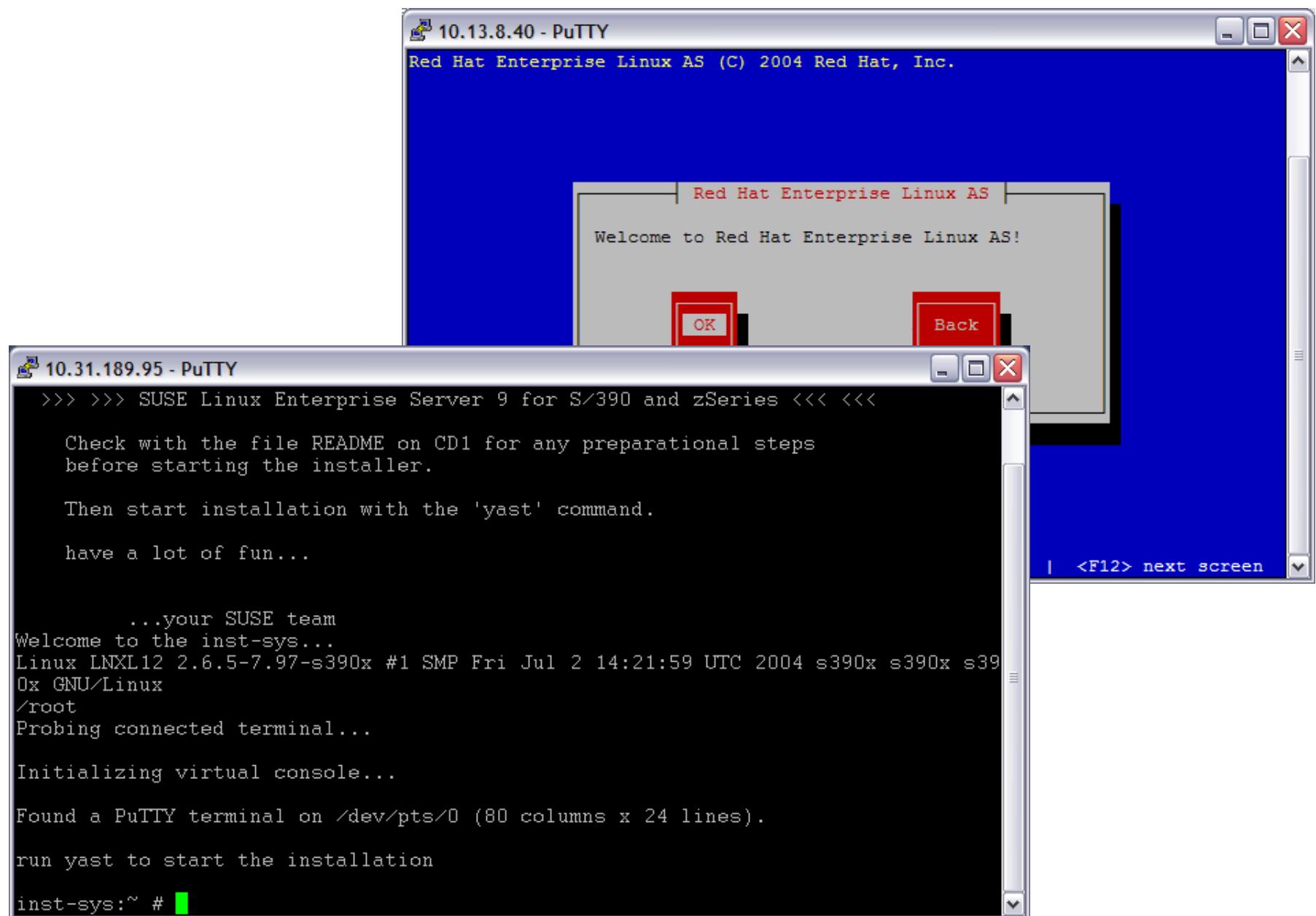
- 1) NFS
- 2) Samba
- 3) FTP
- 0) Abort

Which terminal do want to use?

- 1) X-Window
- 2) VNC (VNC-Client)
- 3) ssh



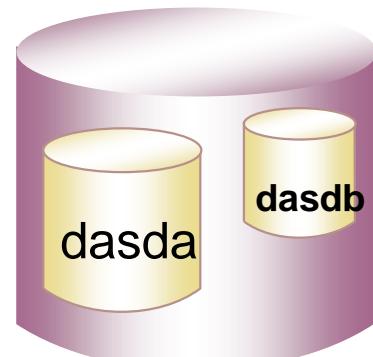
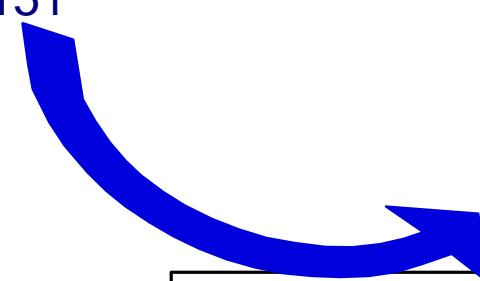




```
lsmod
Module           Size  Used by
sg                68680  0
st                68408  0
...
qeth              200608  0
qdio              76624   2 qeth

insmod dasd_mod dasd=150-151
insmod dasd_eckd_mod

lsmod
Module           Size  Used by
sg                68680  0
st                68408  0
dasd_eckd_mod    85760  0
dasd_mod         97616  1 dasd_eckd_mod
...
qeth              200608  0
qdio              76624   2 qeth
```



```
cat /proc/dasd/devices
0.0.0150(ECKD) at ( 94: 0) is dasda
0.0.0151(ECKD) at ( 94: 4) is dasdb
```

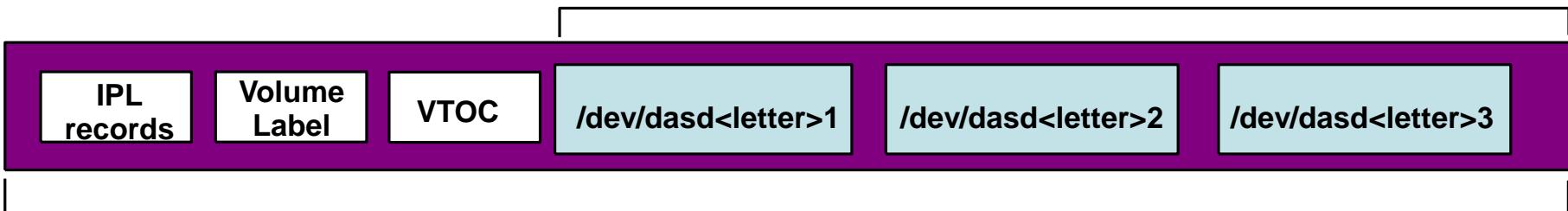
lsdasd

dasdfmt : fournit un bas-niveau de formatage pour prendre en compte la structure du DASD ECK

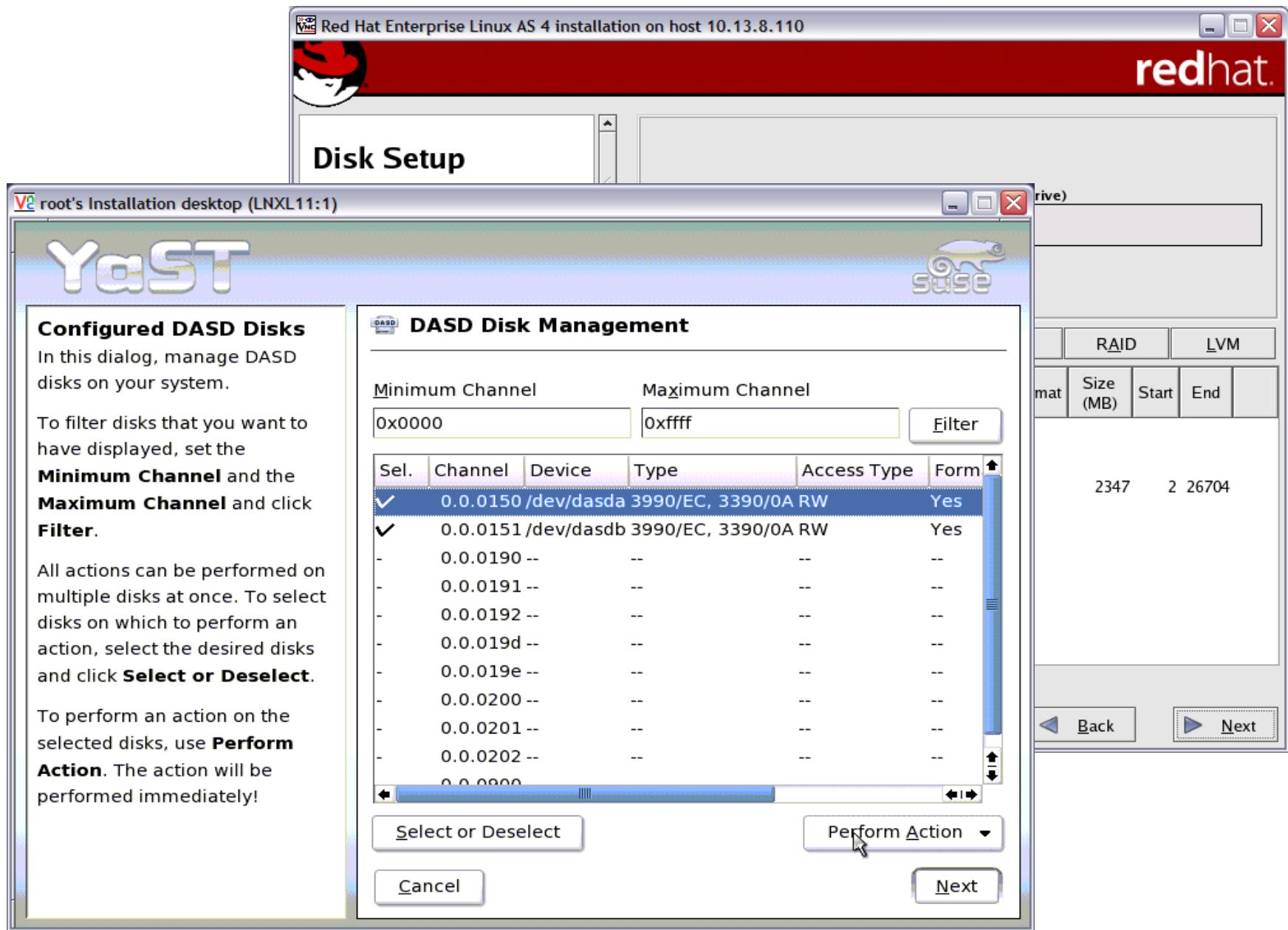
fdasd : partitionne l'unité (une seule partition)

mke2fs (ou autre) : création file system sur partition (`dasd<letter>1`)

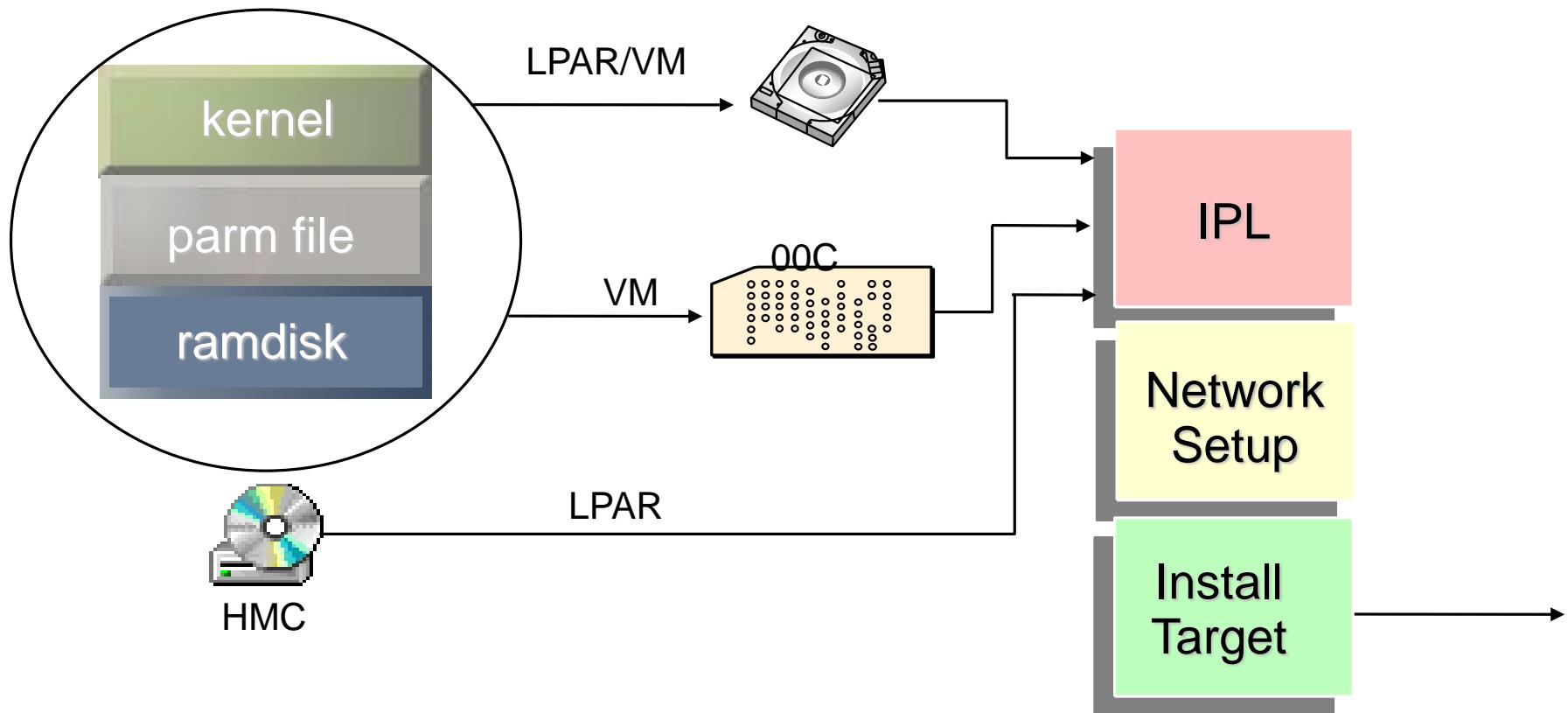
/dev/dasd<letter>x
minor number 1,5,9,...

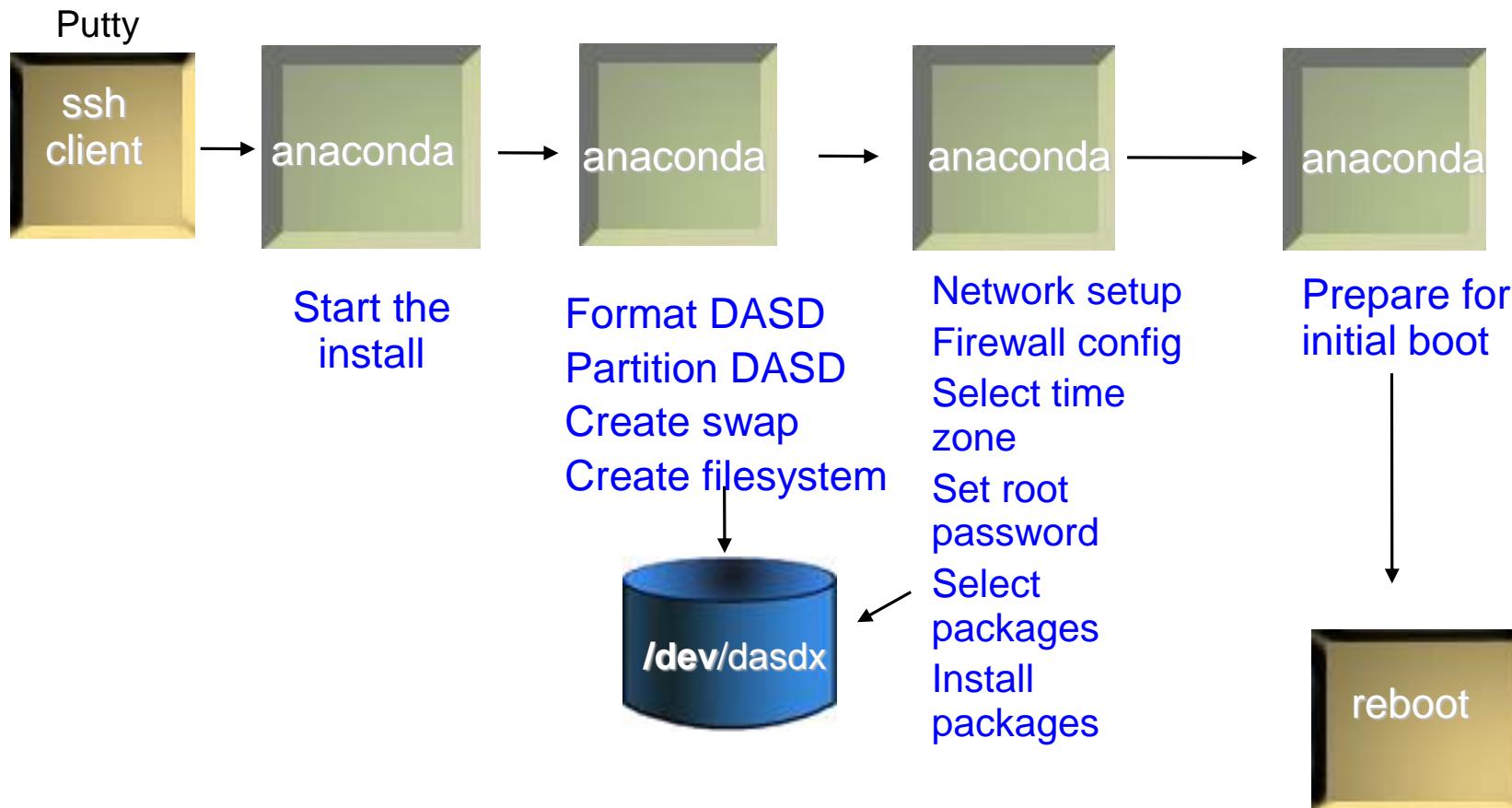


/dev/dasd<letter>
minor number 0,4,8,...
dasd device major number 94



Les différentes possibilités pour charger le 1^{er} Linux





cat /proc/dasd/devices ou lsdasd

Disponibilité des disques vu de Linux

Possible de contrôler les messages d'IPL / Boot dans
/var/log/boot.msg ou avec la commande **dmesg**

Trouver des fichiers pour Linux (classique)

find / -name “*blah*” -print

Trouver des unités pour Linux dans la machine VM à partir
de la console VM (caractère de CP #)

#CP QUERY DASD, #CP Q CTCA, #CP Q OSA

#CP QUERY ALL

VM terminal session management

si **CP READ** in the lower right simply type **B**, for BEGIN

si **MORE...**, then press the **PA2** key to display next screen

vi editor

Impératif quelques commandes

VM Console

CTRL keys ne marche pas sur VM console

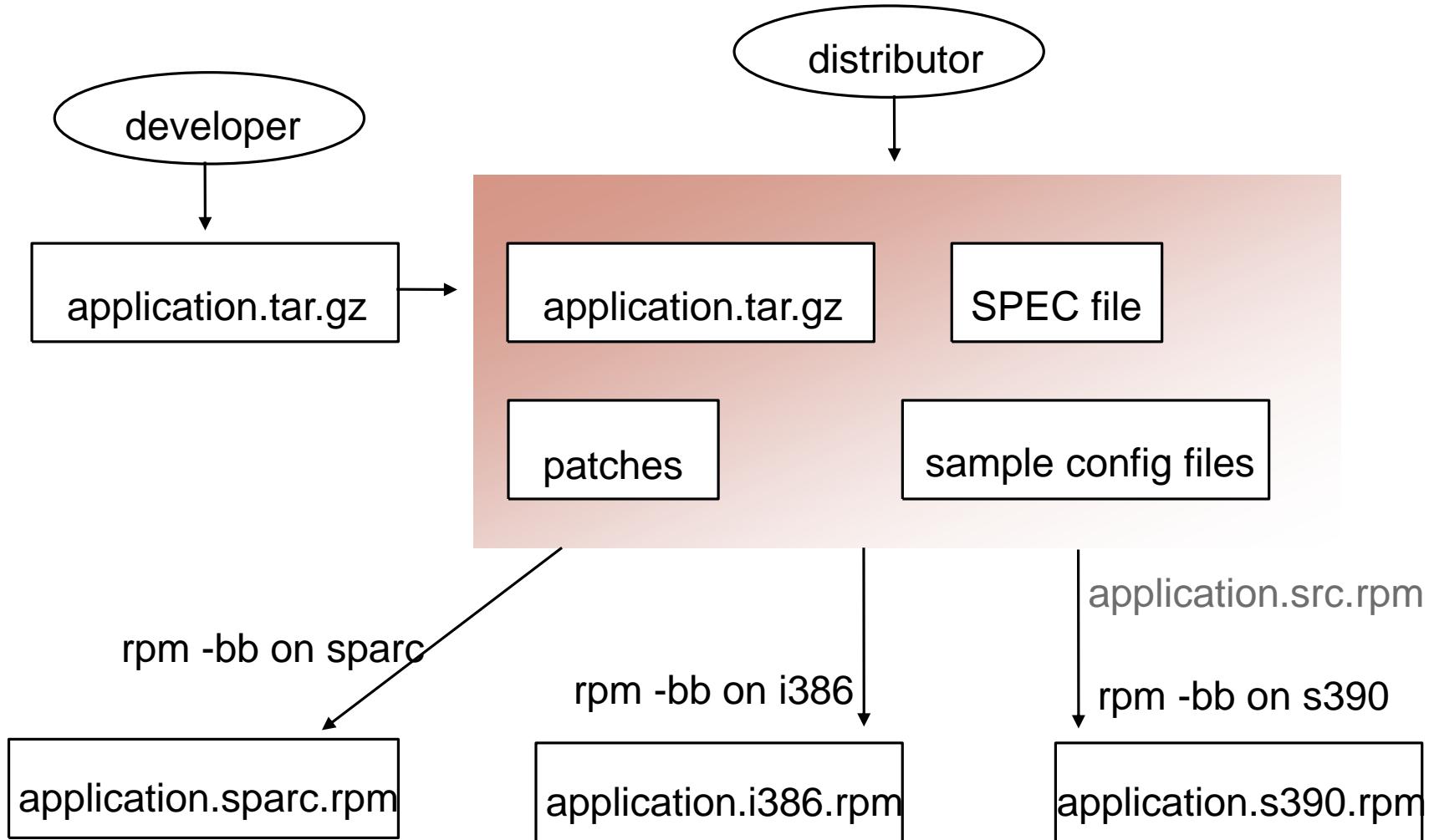
Ping sans -c option continue à jamais

Utilisation ^ character au lieu(for example, ^c = CTRL+C)

Telnet Emulators

Utilisation putty en windows, sinon screen sous Linux



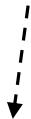


Note: RPM v4 uses **rpmbuild** instead of **rpm** for building RPMs

Grub n'existe pas

Display a menu at IPL time

1. Update /etc/zipl.conf ----->
2. Rewrite the boot record with
zipl -m menu1



```
# zipl
Using config file '/etc/zipl.conf'
Building bootmap '/boot//bootmap'
Building menu 'menu1'
Adding #1: IPL section 'ipl1' (default)
Adding #2: IPL section 'ipl2'
Preparing boot device: dasda (0150).
Done.
```

/etc/zipl.conf

```
[defaultboot]
  defaultmenu  = menu1
[ipl1]
  target = /boot/zipl
  image = /boot/image
  ramdisk = /boot/initrd
  parameters = "root=/dev/dasda1"

[ipl2]
  target = /boot/zipl
  image = /boot/image_lab9
  ramdisk = /boot/initrd
  parameters = "root=/dev/dasda1"

:menu1
  1 = ipl1
  2 = ipl2
  target = /boot/
  default = 1
  prompt = 1
  timeout = 30
```

I 150

zIPL v1.3.1 interactive boot menu

0. default (ipl1)

1. ipl1

2. ipl2

Note: VM users please use '#cp vi vmsg <input>'

Please choose (default will boot in 30 seconds):

#CP VI VMSG 2

Booting ipl2...

Linux version 2.6.5-7.97-s390x (geeko\$buildhost) (gcc
version 3.3.3 (SuSE Linux))

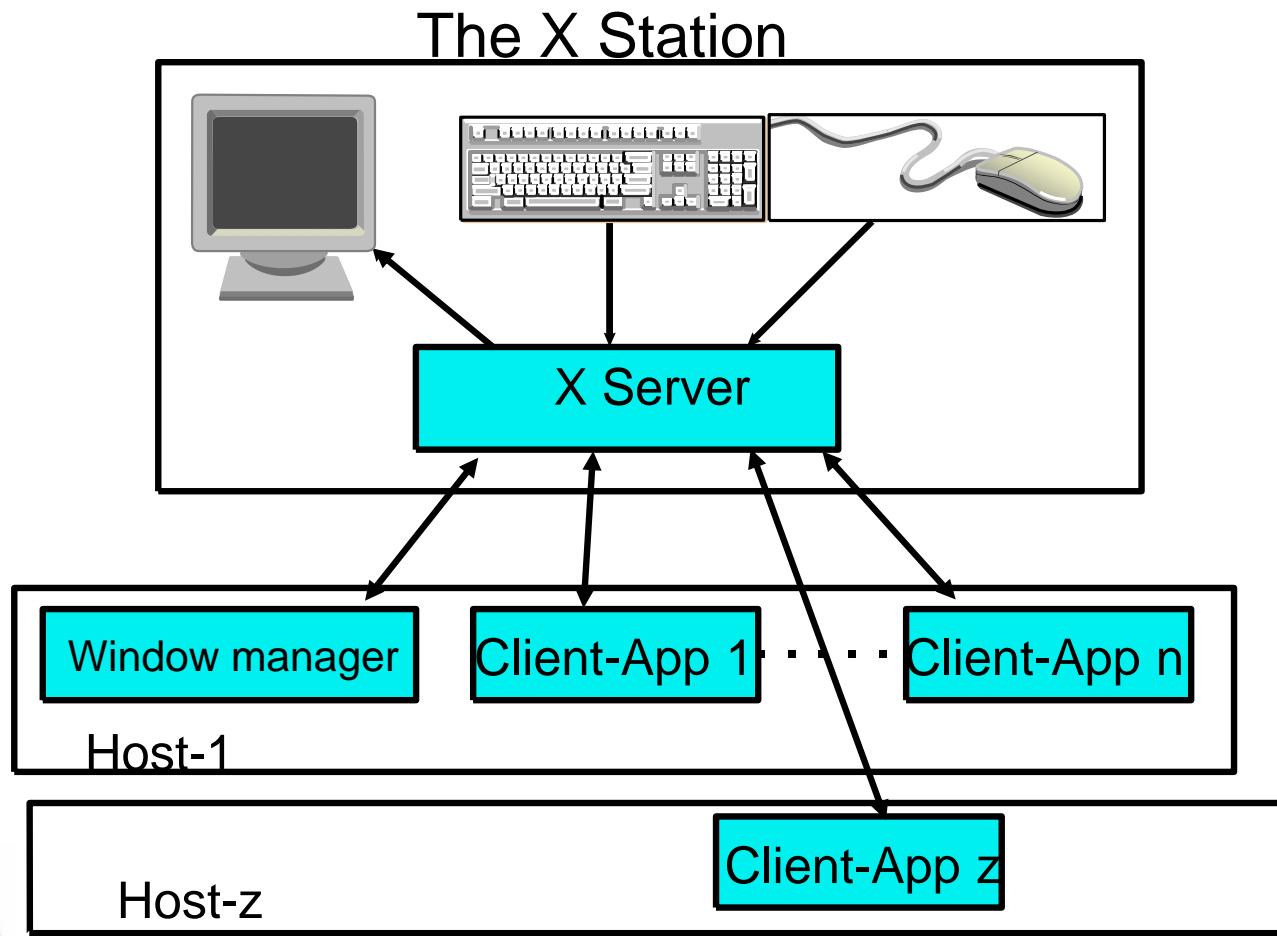
) #1 SMP Thu Feb 17 14:47:49 CET 2005

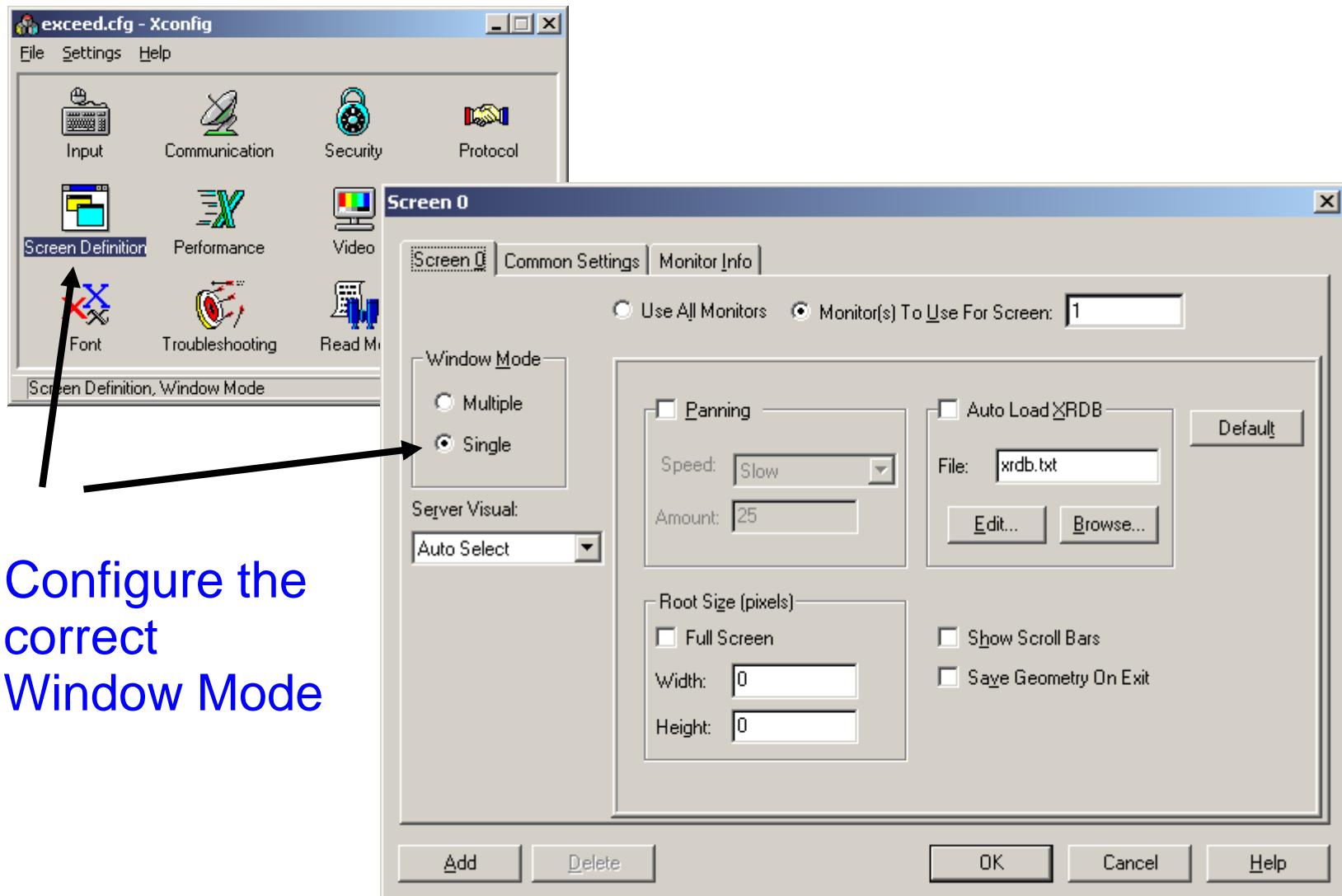
We are running under VM (64 bit mode)

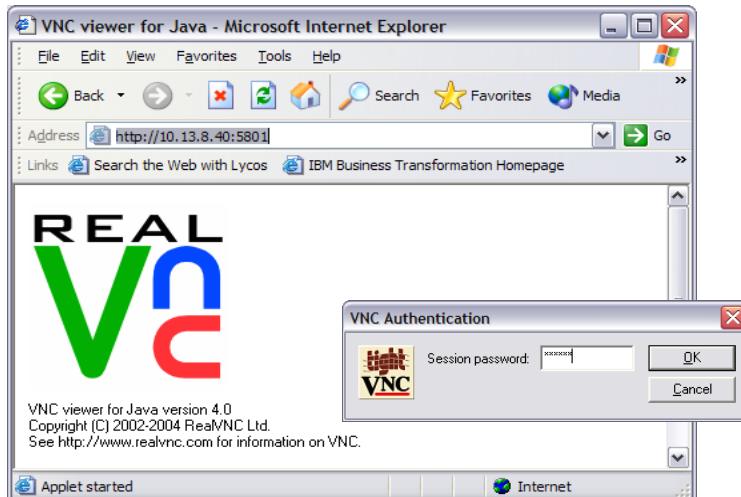
...

L'accès à distance

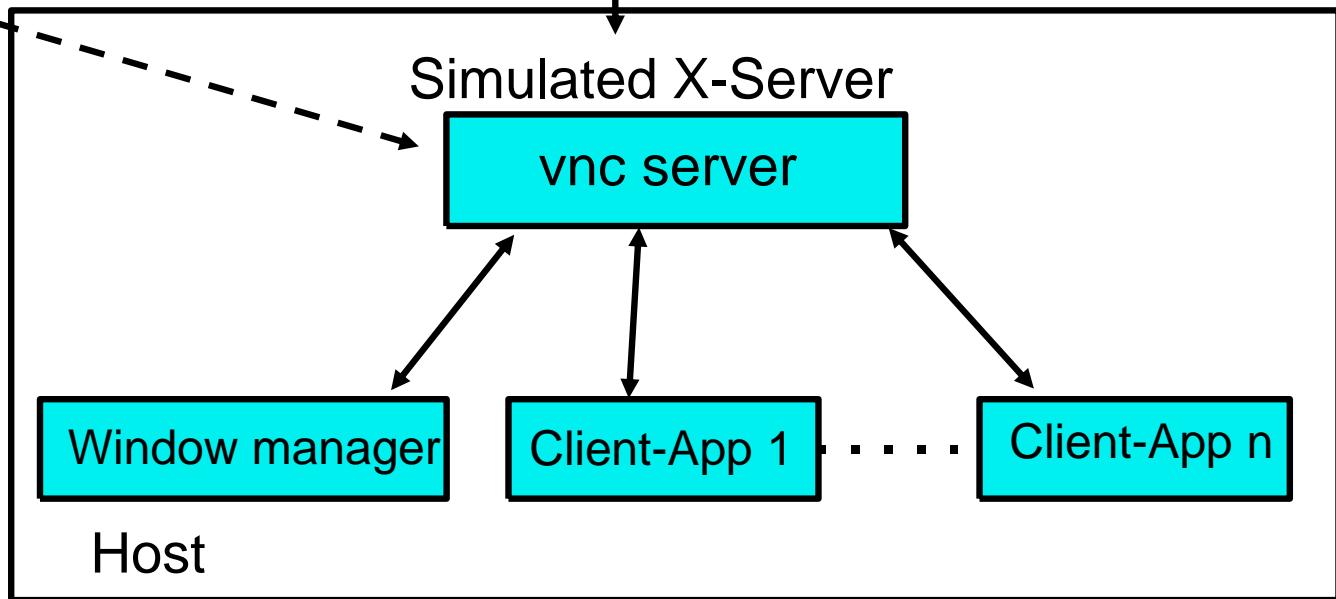




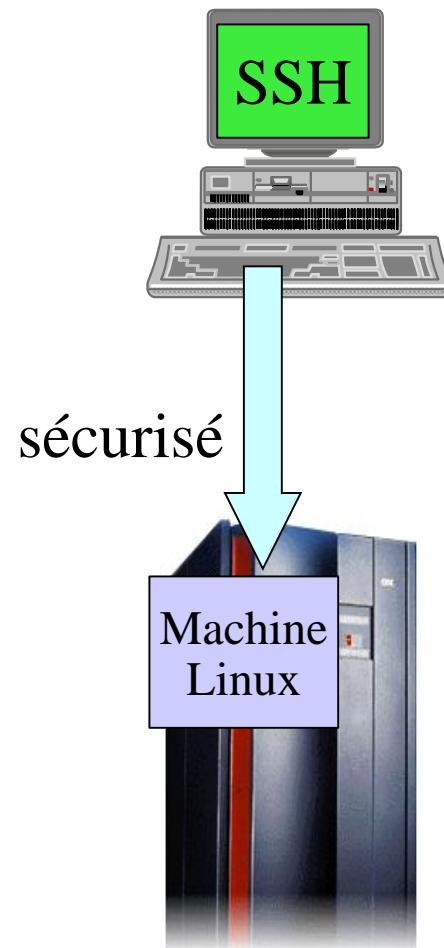
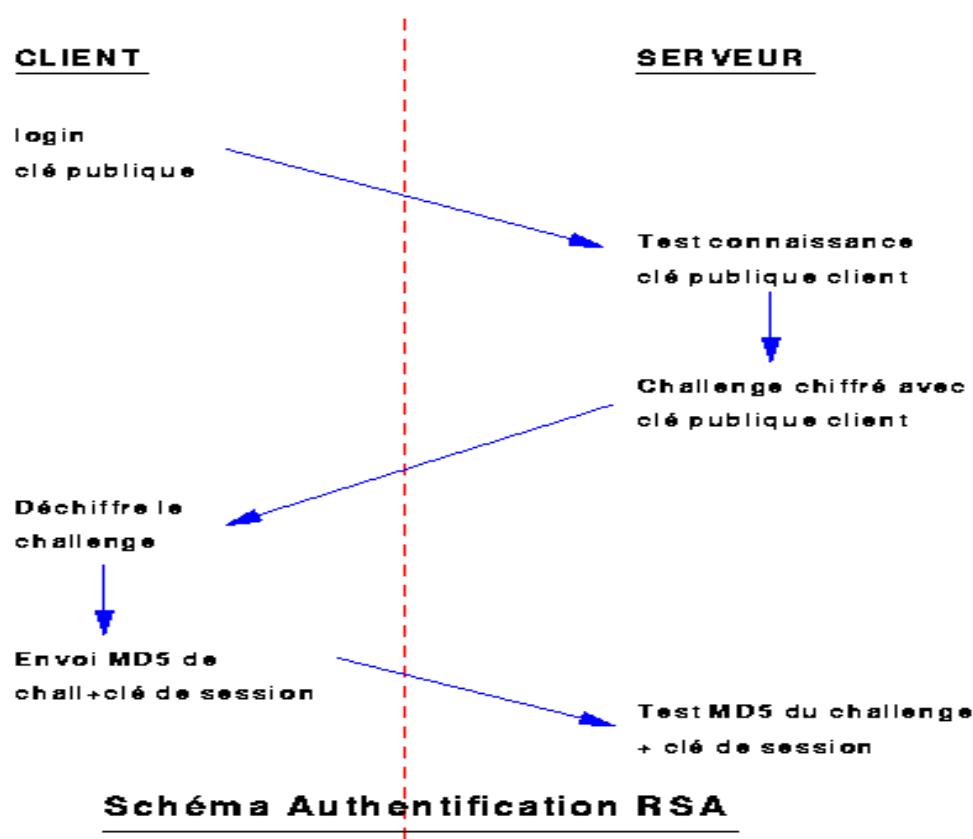




Browser ou vnc Viewer



■ Authentification RSA ■



Administration de Linux



Perform low-level format with compatible disk layout (CDL)

```
dasdfmt -f /dev/dasdc -b 4096
```

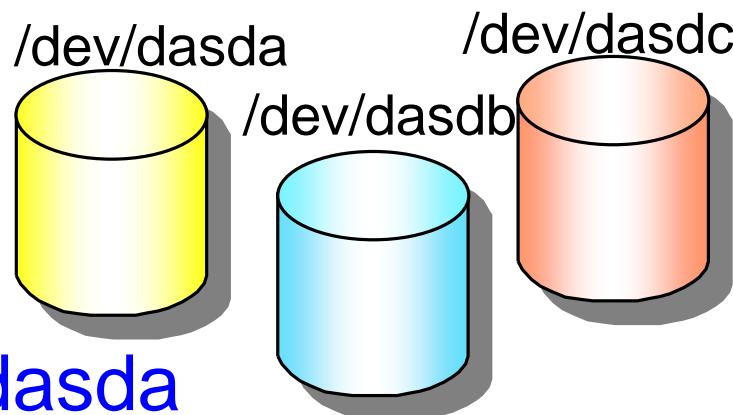
Create data partition

```
fdasd /dev/dasdc
reading volume label: VOL1
reading vtoc          : ok
...
Command (m for help): n
First track (1 track = 48 KByte) ([2]-1499):
Using default value 2
Last track or +size[c|k|M] (2-[1499]):
Using default value 1499

Command (m for help): w
writing VTOC...
rereading partition table...
```

Create filesystem on partition

```
mke2fs -j /dev/dasdc1 -b
4096
```



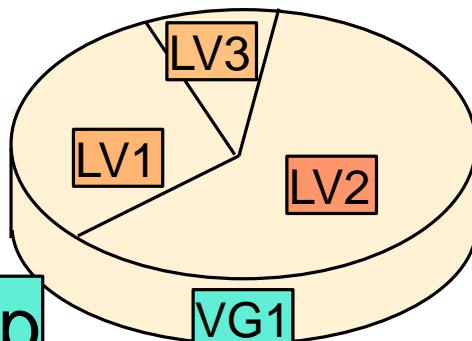
dasdview -t info -f /dev/dasda

Autres OS du zSeries voient les infos telles que :

data set	start	end
LINUX.V0X0150.PART0001.NATIVE	trk	trk
data set serial number : '0X0150'	2	50069
system code : 'IBM LINUX '	cyl/trk	cyl/trk
creation date : year 2004, day 266	0/ 2	3337/ 14

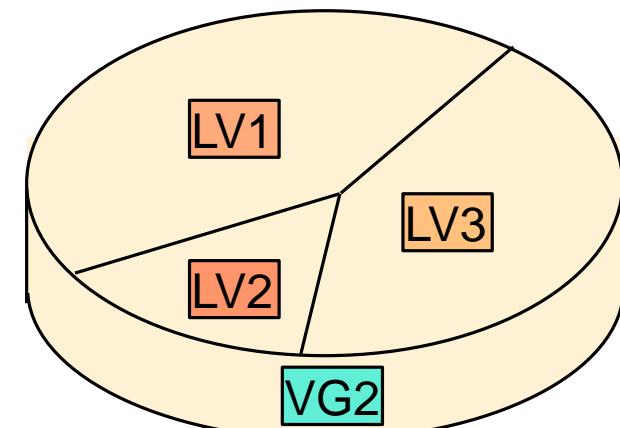
Logical Volume

Equivalent to Partitions



Volume Group

Equivalent to Hard Drives



Physical Volume

Has no equivalent
completely hidden by LVM



XFS (500TB)

From SGI

Dynamic allocation of i-node

B+Tree structure



Ext3fs/ext4fs (16TB)

By Stephen Tweedie

Still block-based, sequential search

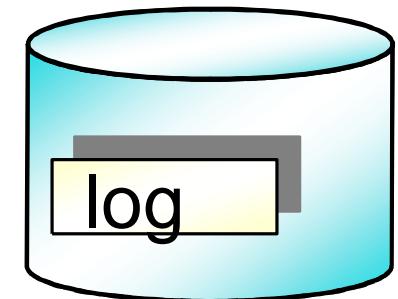
Journal can be on another device

Same structure as ext2fs (with journal)

Btrfs (futur filesystem)

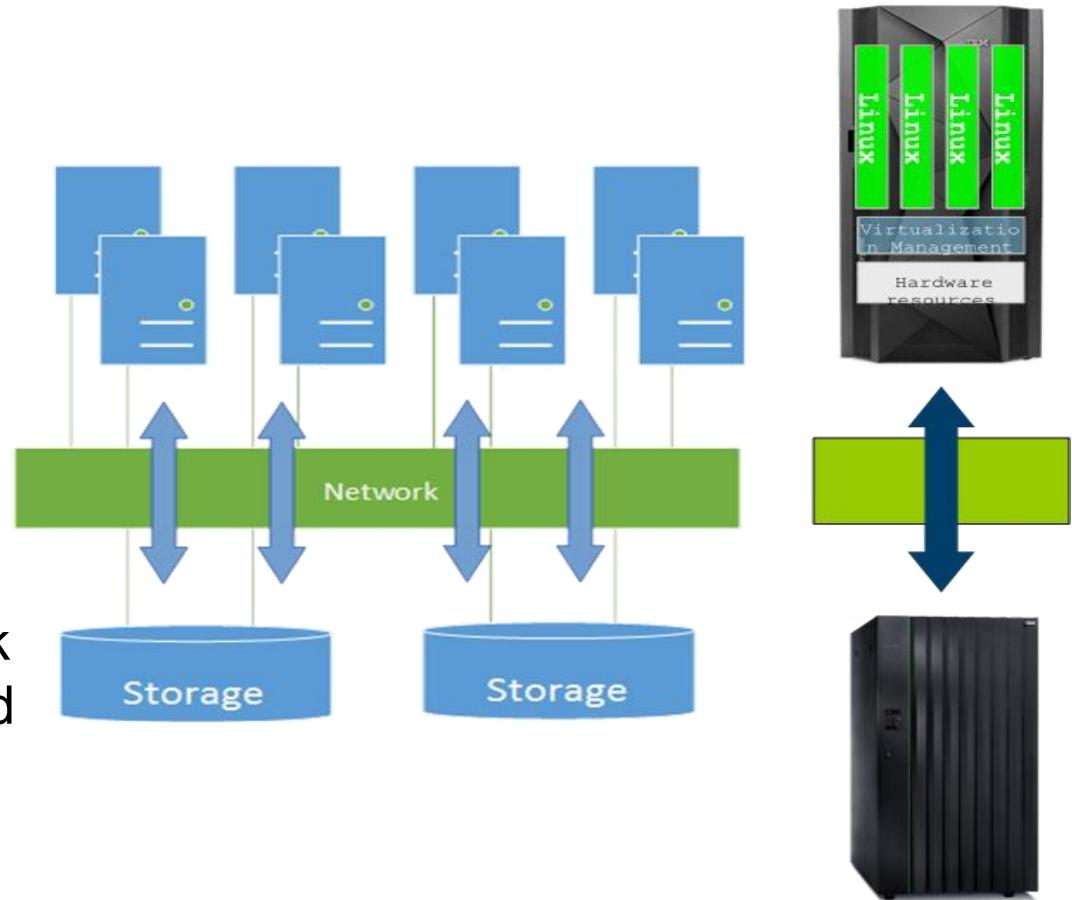
From Chris Mason

COW (Copy On Write) B+Tree structure

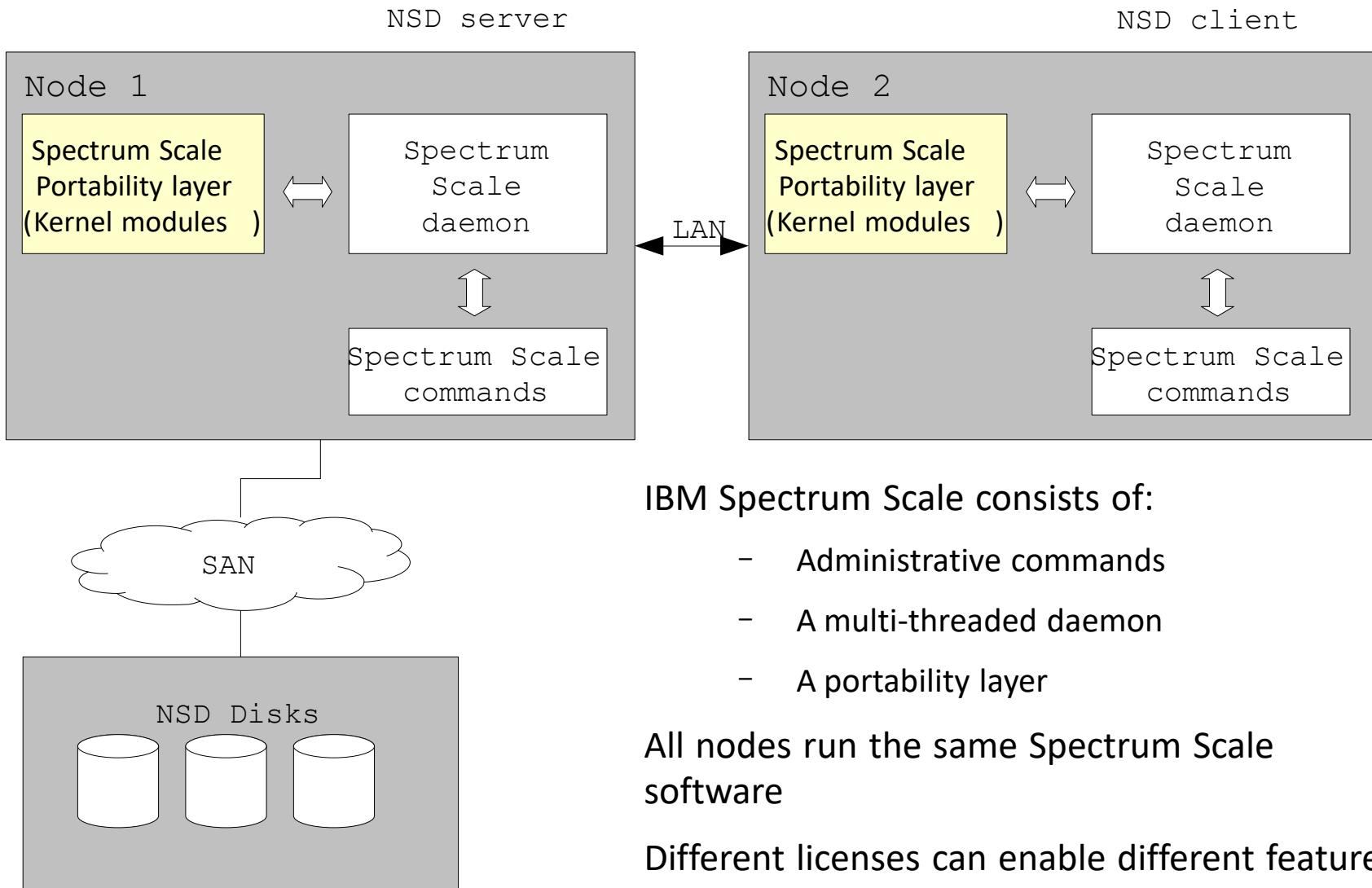


IBM's shared disk, parallel cluster file system

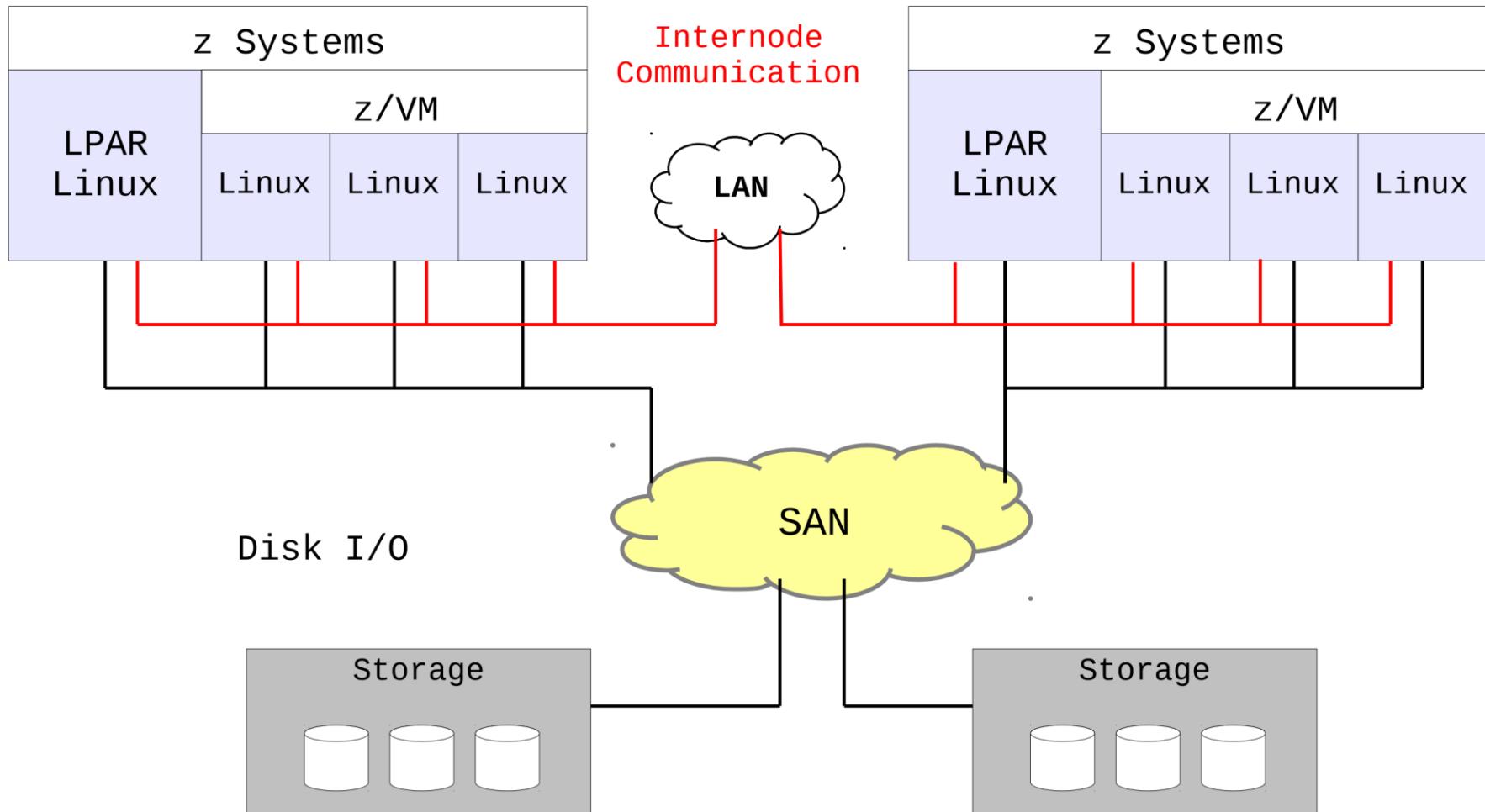
- Cluster:
1 to 16,384* nodes, fast reliable communication, common admin domain
- Shared disk:
all data and metadata on storage devices accessible from any node through block I/O interface (“disk”: any kind of block storage device)
- Parallel:
data and metadata flow from all of the nodes to all of the disks in parallel.



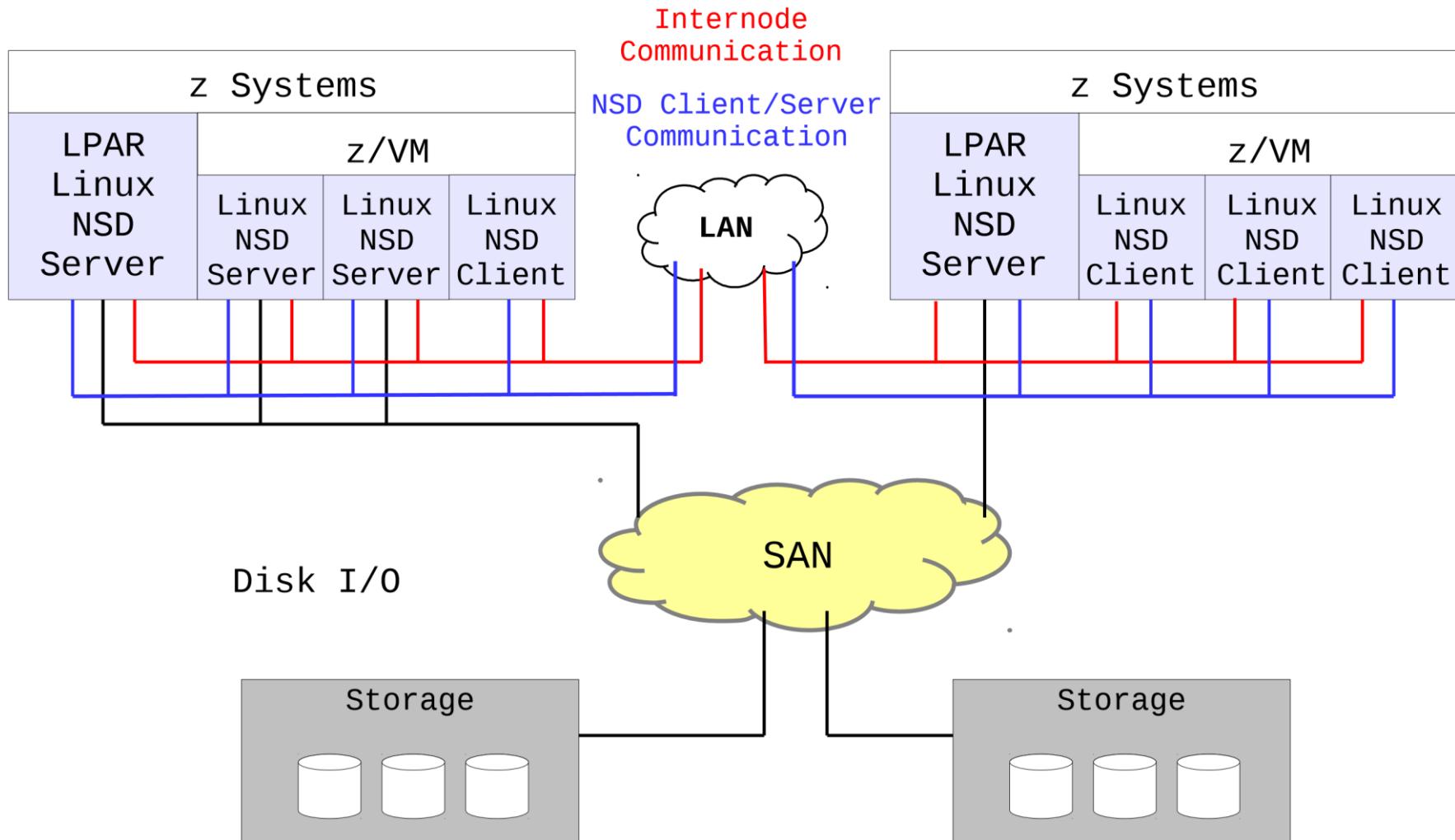
File system size limit	2^{99} bytes (Current tested 5.4PB)
Files per file system	2^{63} files
Number of nodes	16,384
A node is in a cluster if the node shows in mmlscluster or if the node is in a remote cluster and is mounting a file system in the local cluster.	
Mounted file systems	256
Disk size	Limited by the Linux used



Shared disk SAN model



Network Shared Disk (NSD) Client/Server Model



Cluster members

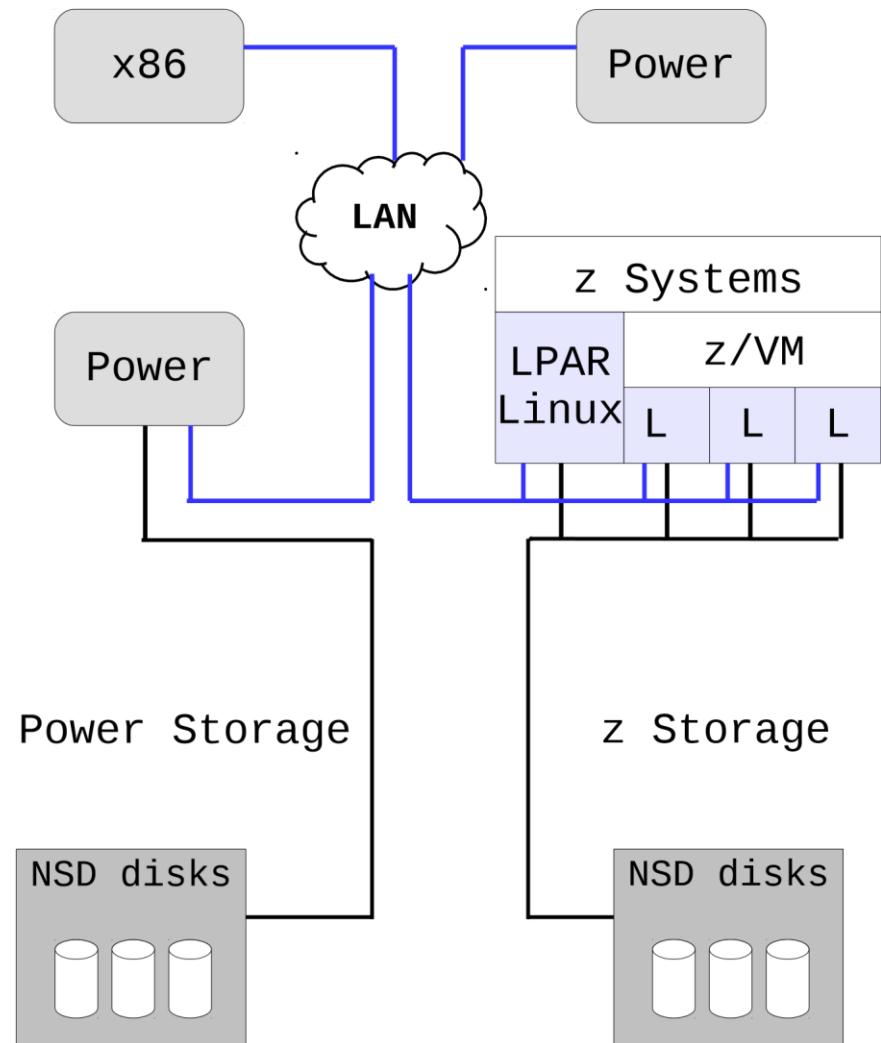
- X86 or Power servers running RHEL, SLES, AIX, Ubuntu or Debian

- Linux on z servers
- (no Windows nodes)

Cluster nodes can serve as NSD servers to access their local platform-dependent storage.

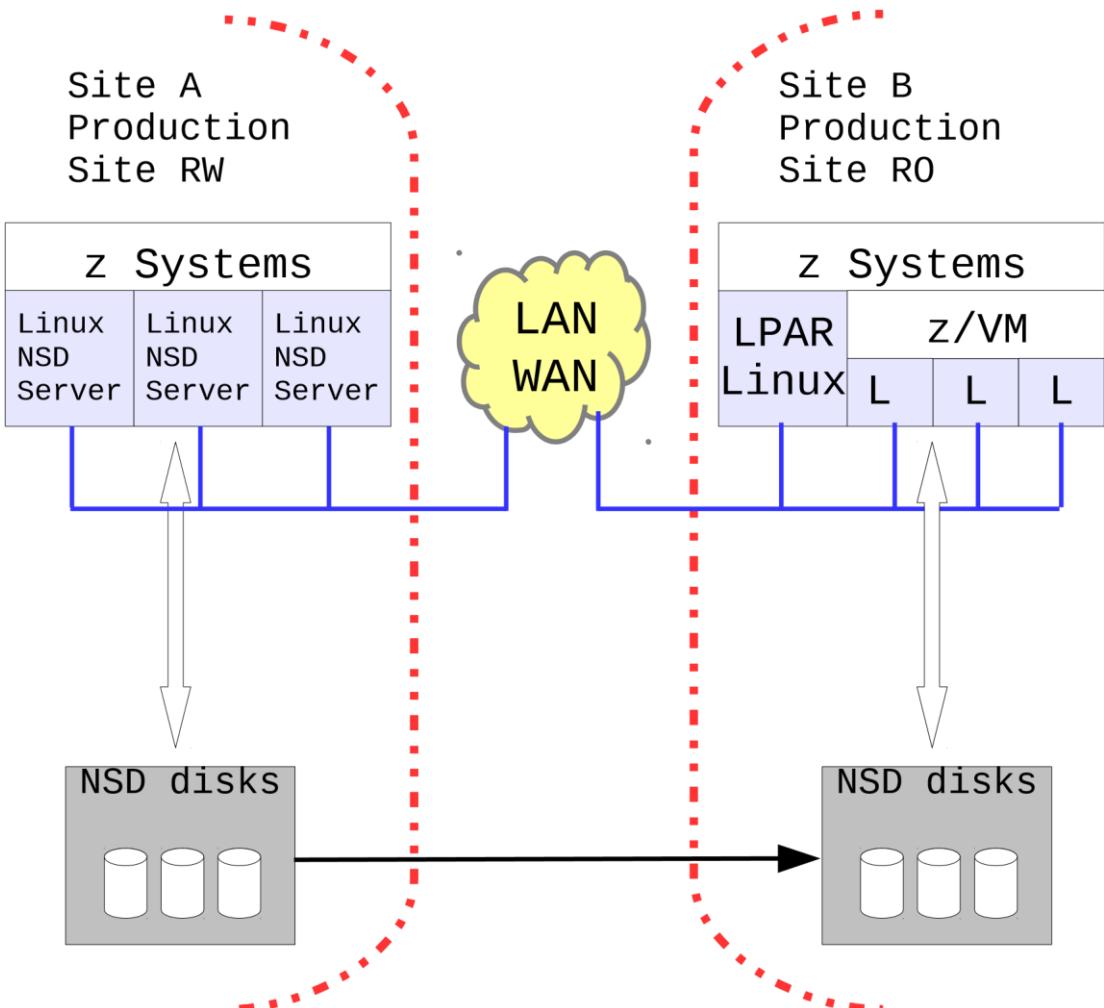
For Linux on z Systems

- SAN attached disks can only be accessed from Linux on z Systems cluster nodes.
- z Systems storage cannot be shared among different platforms.

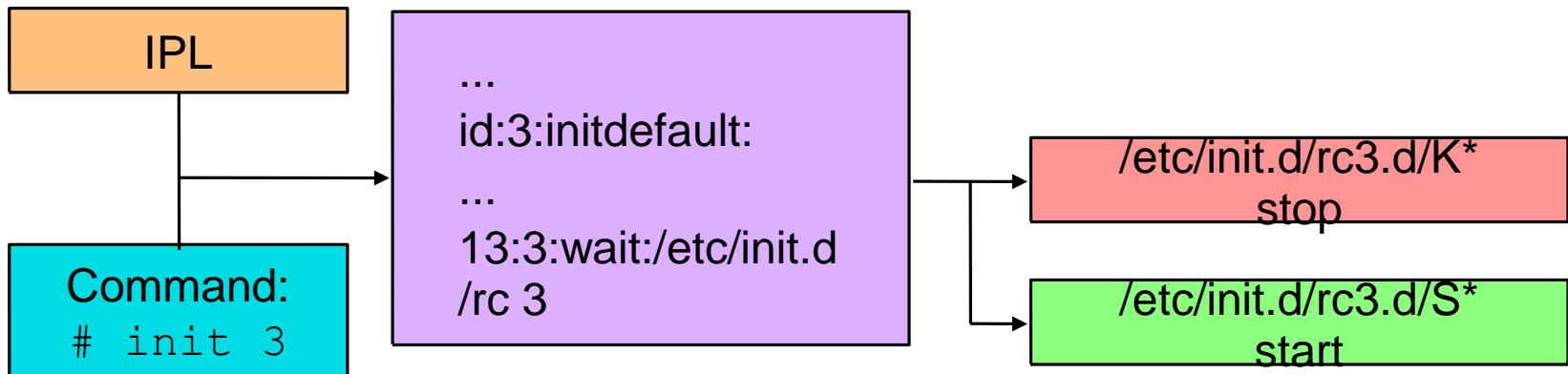


Async DR is an AFM based replication Disaster Recovery capability to replicate data from a primary site to a secondary site

- Failover to secondary when primary fails
- Fallback when primary comes back. The relationship is a strict one-to-one active-passive relationship
- Primary Site is active (RW), secondary site is passive (RO)



/etc/inittab:



```
# ls -l /etc/init.d/rc3.d
...
lrwxrwxrwx 1 root root 6 Sep 12 2000 K10xdm -> ../xdm
lrwxrwxrwx 1 root root 9 Sep 12 2000 K20apache -> ../apache
...
lrwxrwxrwx 1 root root 9 Sep 12 2000 S30apache -> ../apache
lrwxrwxrwx 1 root root 6 Sep 12 2000 S20xdm -> ../xdm
...
```

Scripts in /etc/init.d can be used to start or stop services manually

Common options:

Start

Stop

Restart

Other options (for instance, status) may also be available

```
# /etc/init.d/syslog restart
```

```
Shutting down syslog services
```

done

```
Starting syslog services
```

done

- Commande VM en Machine Linux
 - Para-Virtualisation CALL HYPERVISOR
 - Technique de DIAGNOSE

VMCP QUERY NAMES

selon le niveau de commande de la machine virtuelle

Use **shutdown** command

Warns users

Stops all running processes

Unmounts filesystems

Does an orderly shutdown

Reboots if necessary



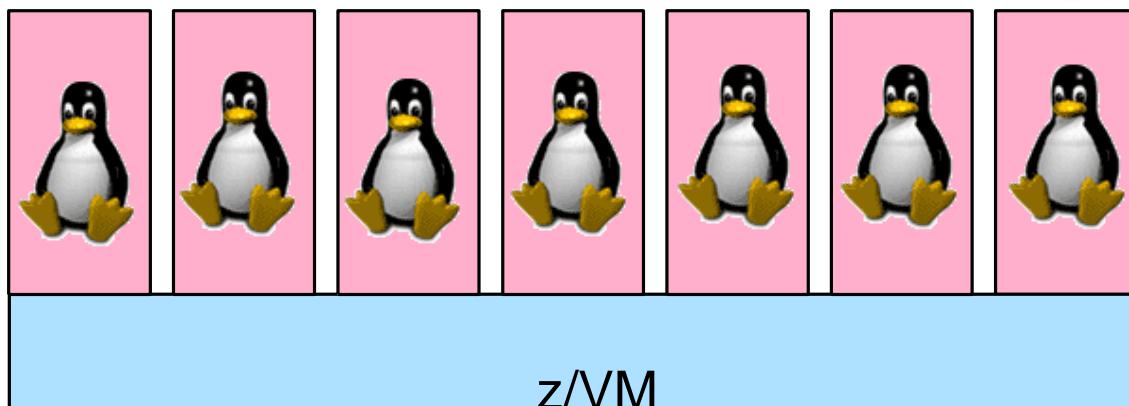
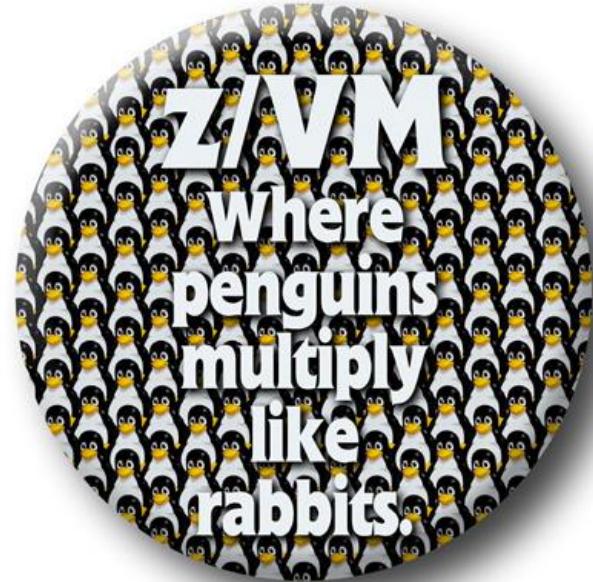
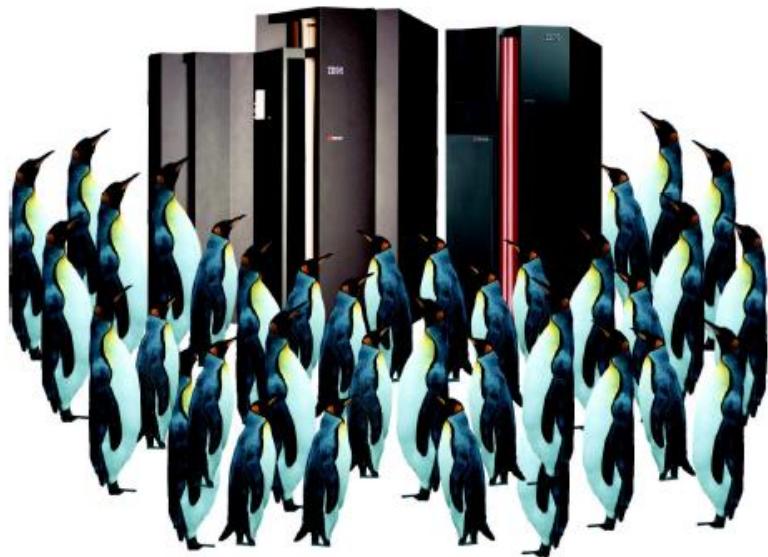
Examples:

To reboot: **shutdown -r now ou reboot**

To halt: **shutdown -h now ou halt**

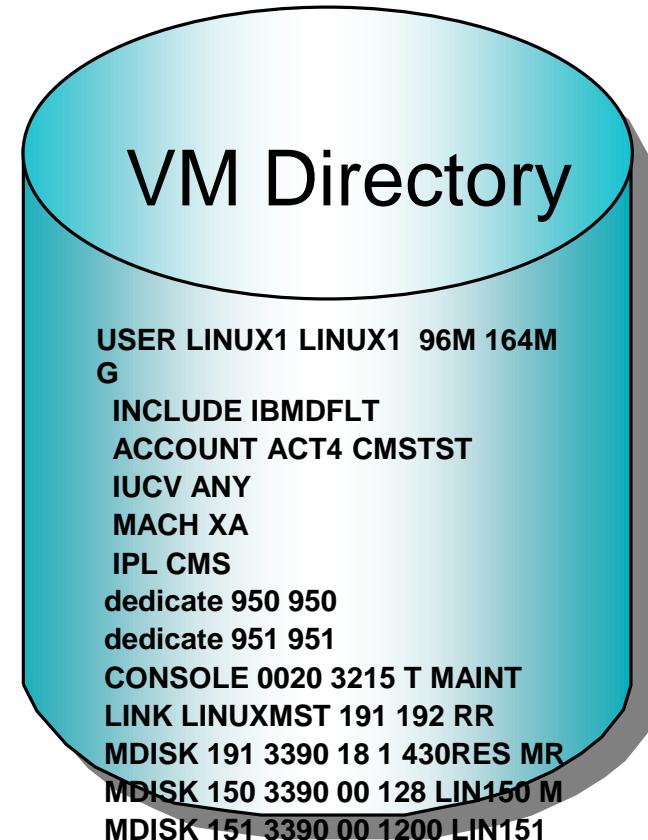
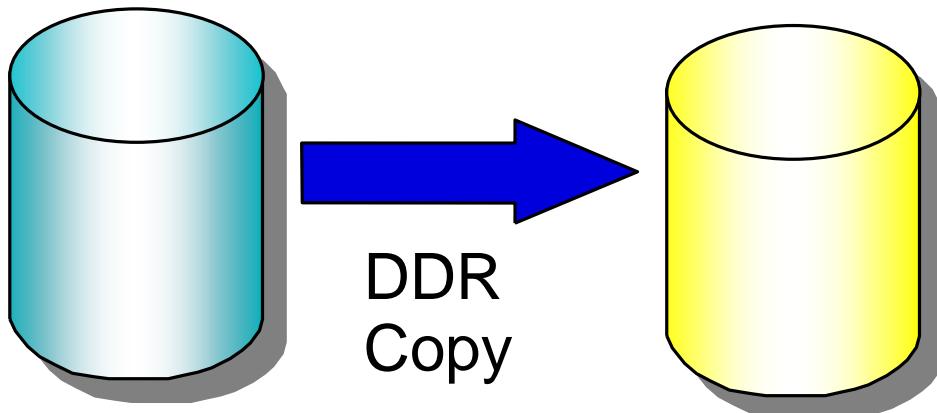
Le clonage

Smarter software for a smarter planet



Directory Entries

DDR the Mdisks

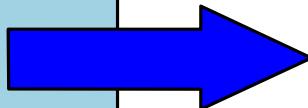


Changing Definitions on the Cloned Image
/etc/...

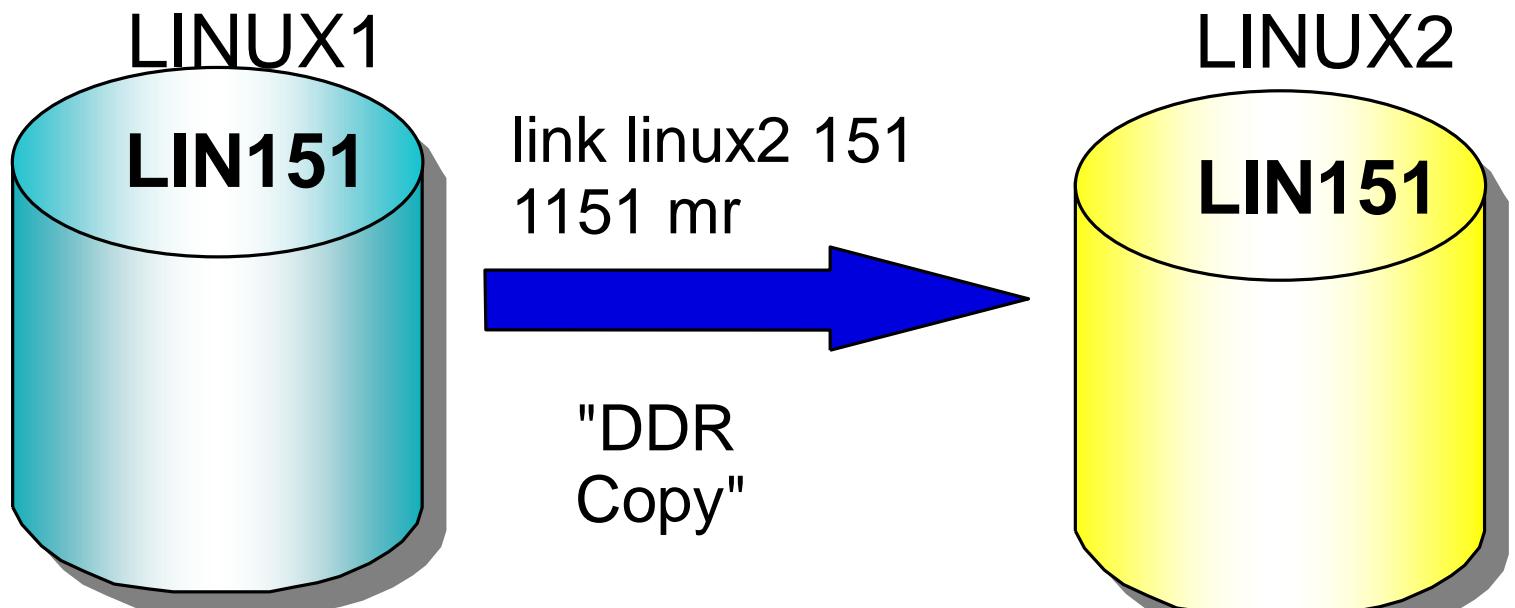
Duplication des définitions (USER DIRECT)



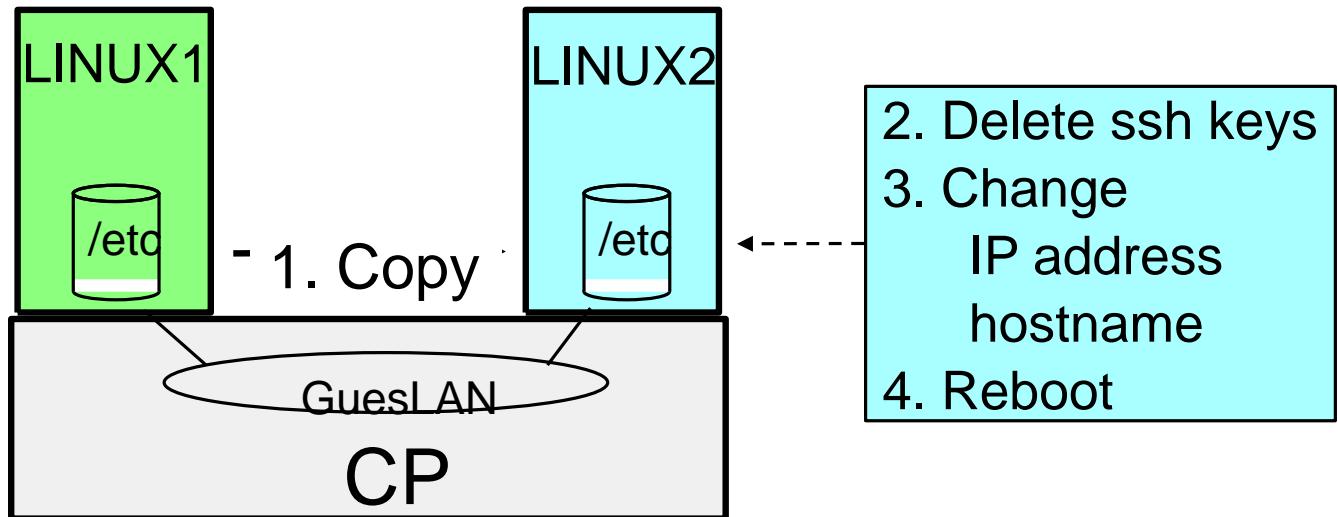
```
USER LINUX1 LINUX1 128M 512M G
INCLUDE IBMDFLT
ACCOUNT ACT4 CMSTST
SHARE RELATIVE 1500
MACH ESA
IPL CMS
SPECIAL 900 HIPERS 3 SYSTEM
LAN1
CONSOLE 0020 3215 T MAINT
LINK LINUXMST 191 192 RR
MDISK 191 3390 18 1 430RES MR
MDISK 150 3390 00 128 LIN150 MR
MDISK 151 3390 00 1200 LIN151 MR
```



```
USER LINUX2 LINUX2 128M 512M G
INCLUDE IBMDFLT
ACCOUNT ACT4 CMSTST
SHARE RELATIVE 1500
MACH ESA
IPL CMS
SPECIAL 900 HIPERS 3 SYSTEM
LAN1
CONSOLE 0020 3215 T MAINT
LINK LINUXMST 191 192 RR
MDISK 191 3390 128 1 430RES MR
MDISK 150 3390 00 128 LIN250 MR
MDISK 151 3390 00 1200 LIN251 MR
```



```
DDR  
z/VM DASD DUMP/RESTORE PROGRAM  
ENTER:  
sysprint cons  
ENTER:  
input 151 dasd  
ENTER:  
output 1151 dasd  
ENTER:  
copy all
```



2 systems with duplicate TCPIP and hostname definitions

Stop **LINUX1** and Start **LINUX2**

Delete all **/etc/ssh/ssh_h*** keys

Will be recreated at next startup to be unique

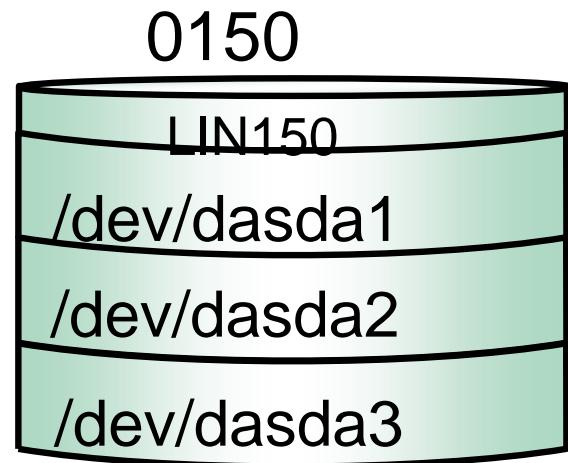
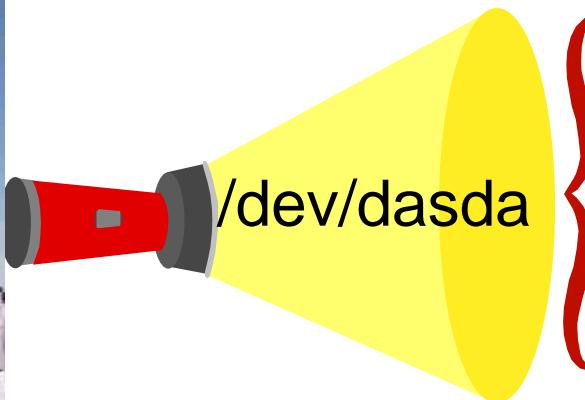
ssh into **LINUX2** and change (**vi**) the definition files

-OR-

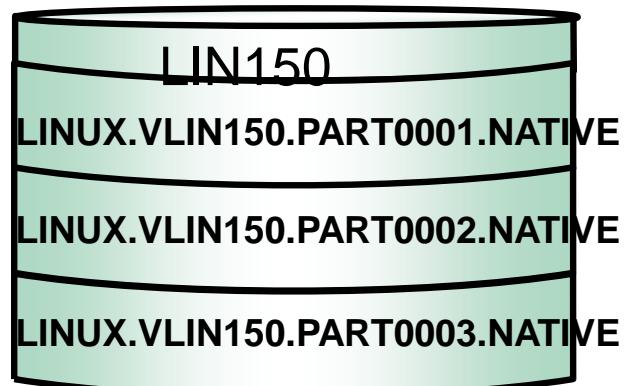
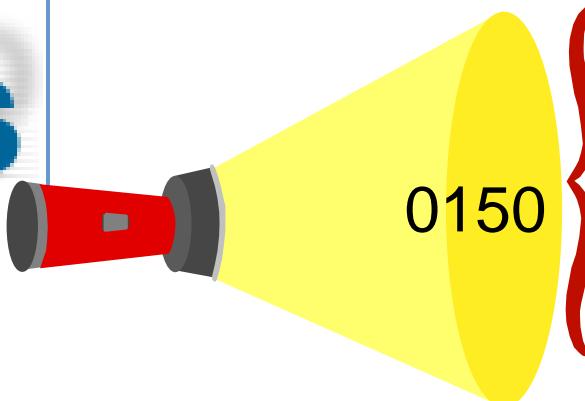
Use a dynamic tool to modify the changes to **LINUX2** from the console like RPL (freeware) or GDLFCFT (freeware)

Les sauvegardes



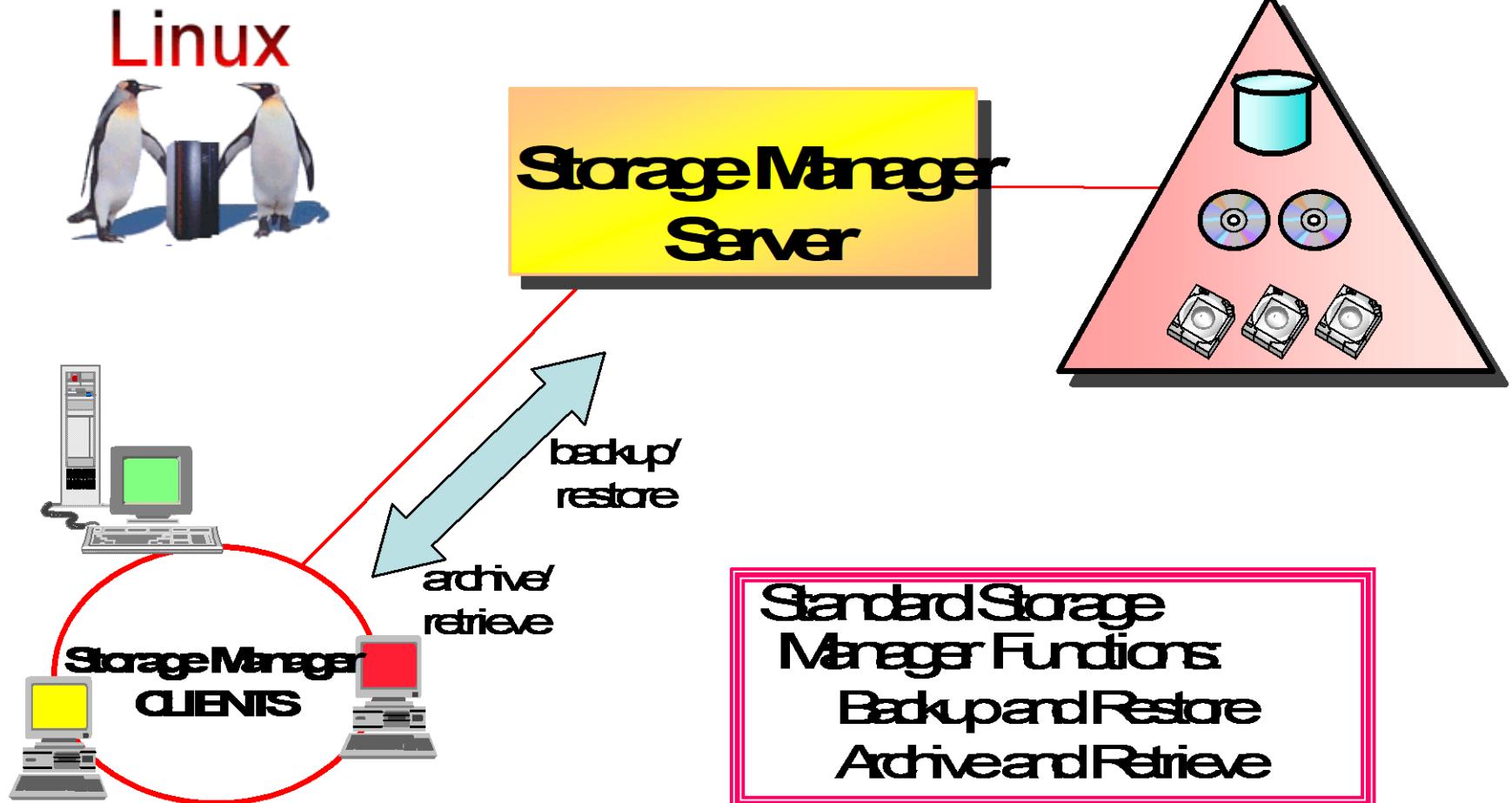


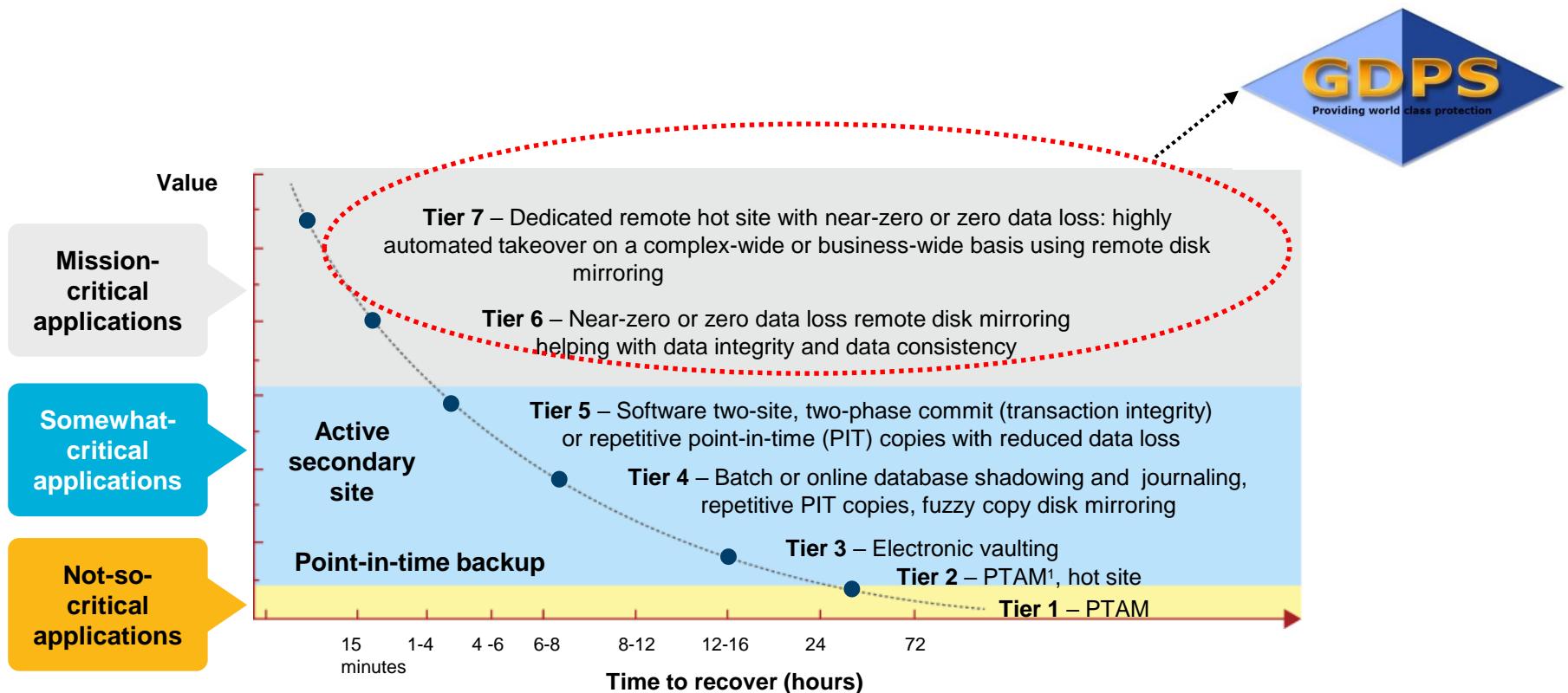
Linux's



z/OS's view

Tivoli





One of the best data recovery practices involves blending tiers of solutions in order to optimize application coverage at a reduced cost. One size, technology or methodology may not fit all applications.

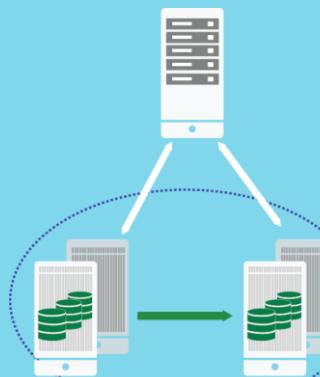
¹Pickup truck access method (PTAM) Note: More detail on this graph can be found at: <http://www.redbooks.ibm.com/abstracts/tips0057.html?Open>

GDPS: The Enterprise Continuous Availability/Disaster Recovery Solution

IBM GDPS/PPRC HM¹

Near-continuous availability of data within a data center

Single data center
Applications can remain active
Near-continuous access to data in the event of a storage subsystem outage

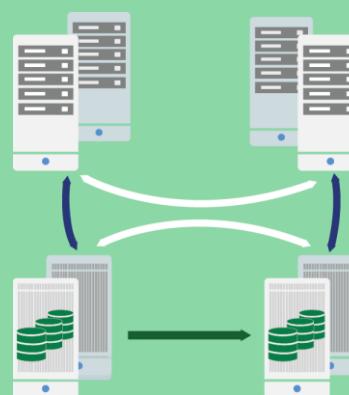


RPO equals 0 and RTO equals 0

GDPS/PPRC

Near-continuous availability (CA) and disaster recovery (DR) within a metropolitan region

Two data centers
Systems can remain active
Multisite workloads can withstand site and storage failures



DR RPO equals 0 and RTO is less than 1 hour or
CA RPO equals 0 and RTO minutes

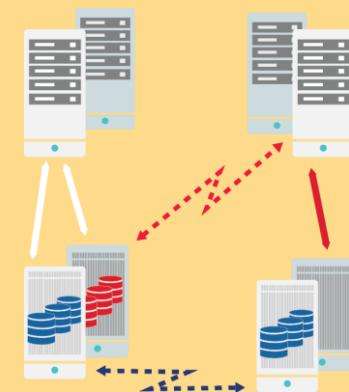
RPO – recovery point objective
RTO – recovery time objective

Synch replication
Asynch replication

GDPS/GM² and GDPS/XRC³

Disaster recovery at extended distance

Two data centers
More rapid systems disaster recovery with “seconds” of data loss
Disaster recovery for out-of-region interruptions

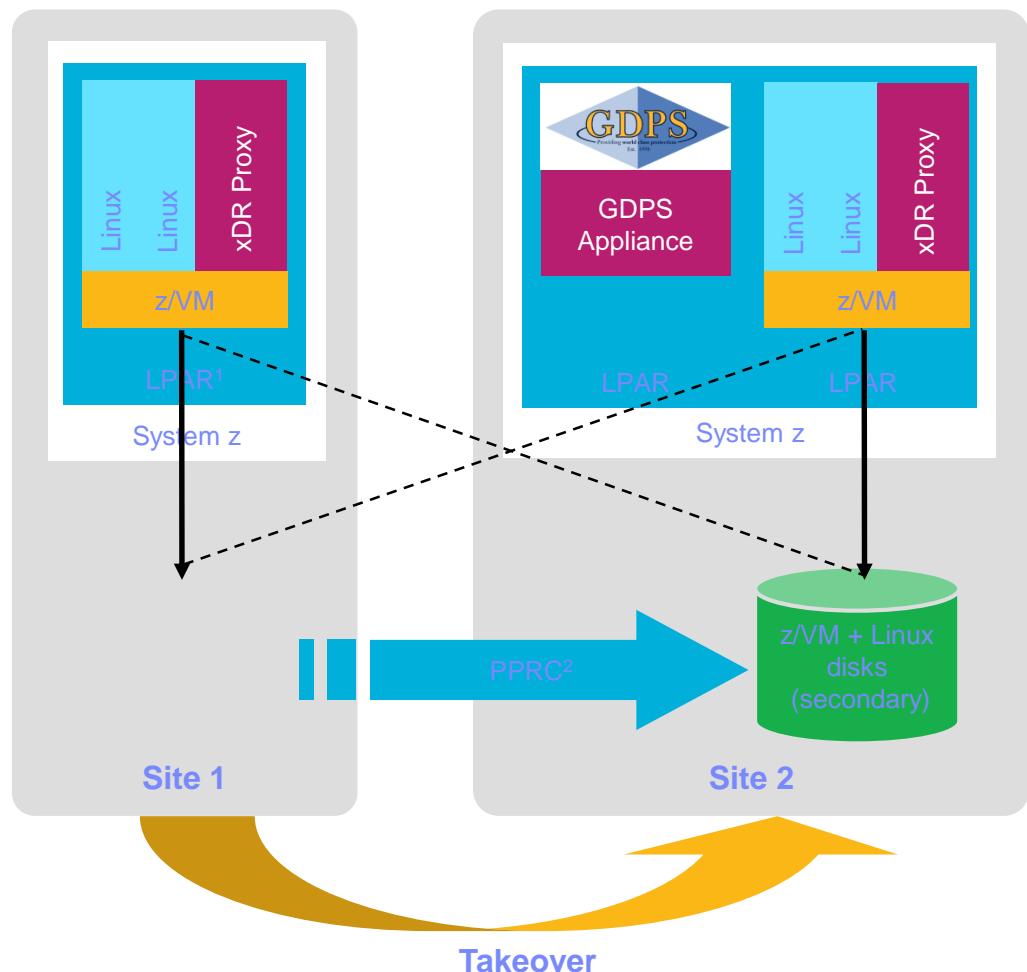


RPO seconds and RTO less than 1 hour

¹Peer-to-peer remote copy (PPRC) HyperSwap Manager (HM) ²Global Mirror (GM) ³Extended Remote Copy (XRC)

GDPS Virtual Appliance features:

- Single point of control and automation reduces the need for highly specialized skills to handle recovery and planned site switches
- Manages remote copy environment and keeps data available and consistent for operating systems and applications
- HyperSwap® function protects against failures to disk subsystems
- Monitoring and automation enables reliable and rapid recovery via automated processes
- GDPS Virtual Appliance requires:
 - A general purpose engine
 - z/VM® and Linux on System z
 - ECKD Disk



¹LPAR: Logical partitioning, ²PPRC: Peer-to-peer remote copy

Le réseau



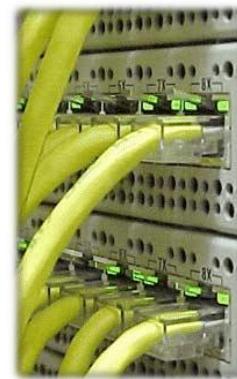
The QETH is able to drive:

- OSA Express card
 - Gigabit or 10Gigabit Ethernet
 - 1000 Base-T Ethernet
- System z HiperSockets (mainframe microcode facility)
- z/VM simulated devices
 - GuestLAN
 - Type QDIO (IP layer 2 or IP layer 3)
 - Type Hipersocket
 - VSWITCH (IP layer2 or IP layer3)
- IPv4, IPv6, VLAN, VIPA, Proxy ARP, IP Address Takeover, Channel Bonding



The primary network driver for Linux on System z

- CLAW (ESCON)
- CTC
- NETIUCV
- LCS



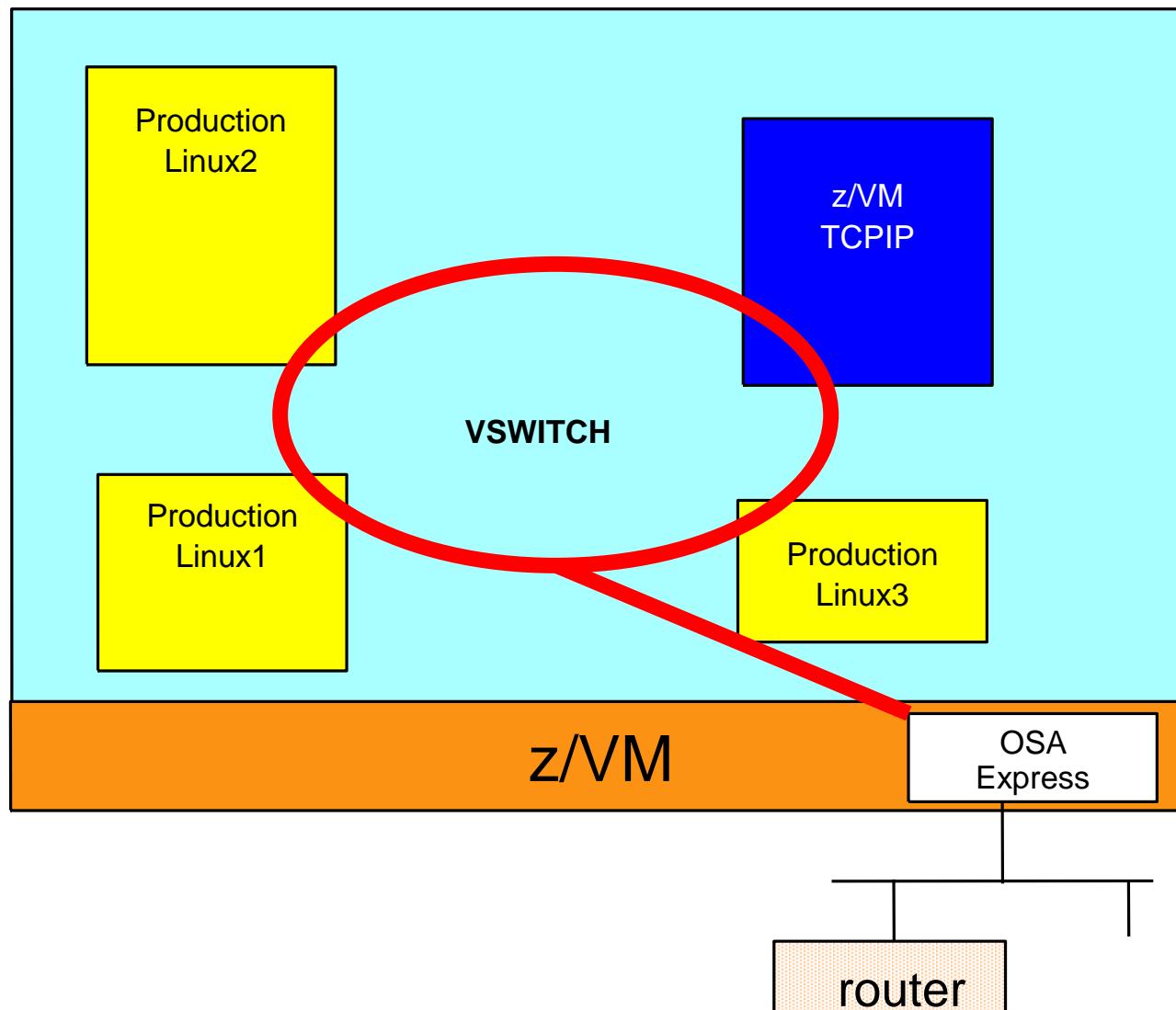
OSA

OSD (QDIO), OSE (non-QDIO), OSC (OSA ICC), OSN (OSA for NCP)

Device drivers description:

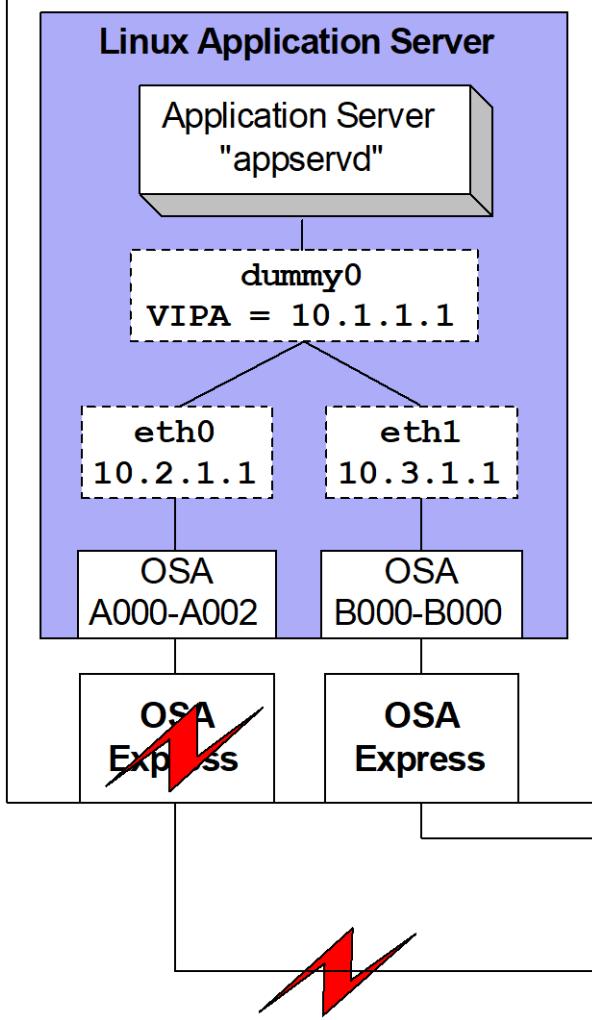
http://www.ibm.com/developerworks/linux/linux390/documentation_dev.html

L'utilisation du VSWITCH avec z/VM

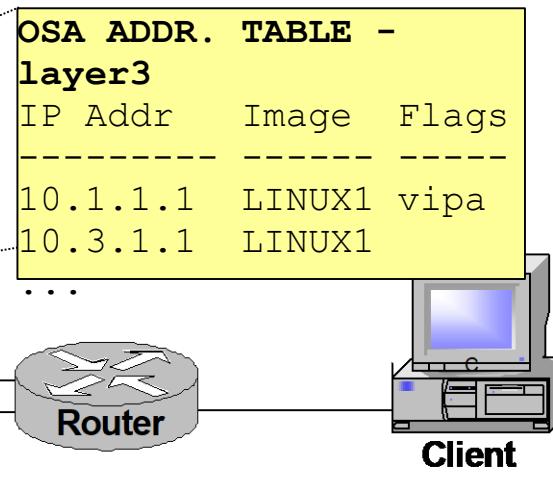


- Minimize outage due to adapter or network failure

zSeries



- Bind server applications to **system-wide virtual IP addresses** (instead of adapter specific addresses)
- Server can be reached via different routes



- Device Drivers divers

- CTC/ESCON
 - IUCV
 - LCS OSA/2
 - QETH (OSA-Express)
 -
- Web :

<http://www.ibm.com/developerworks/linux/linux390/index.html>

Brochures des Device Drivers :

<http://www.ibm.com/developerworks/linux/linux390/whatsnew.html>

Information

A large, semi-transparent word cloud centered on the slide. The words are primarily in shades of blue and green. Key words include "Smarter software for a smarter planet", "IBM", "smarter", "software", "planet", and "smart". The background of the word cloud features faint, darker versions of the same words, creating a layered effect.

Linux for S/390

Linux for Big Iron



<http://linuxvm.org/present/>

z/VM and Linux on IBM System z: The Virtualization Cookbook for SLES11

z/VM and Linux on IBM System z: The Virtualization Cookbook for RHEL5



Country/region [select] | Terms of use

All of dW

Search

Home | Products | Services & industry solutions | Support & downloads | My IBM

developerWorks >

Linux

Updated 01 Feb 2007



Automate Linux and UNIX using shells and scripting

Graphical interfaces are nice, but shells and shell scripting using Bash really let you tap the power of Linux and UNIX. This LPI certification exam-prep tutorial is a complete getting-started guide to making the most of shell commands. [More >](#)

Reduce your Linux memory footprint: Linux has a well deserved reputation for not using a lot of system resources, but here are five ways to reduce the amount of memory required even further and put the snap back into your applications.

Create uniform namespace using autofs with NFS Version 3 clients and servers: Identify methods that applications use to communicate with each other and use message queues, semaphores, and shared memory to connect your applications.

Install a large Linux cluster: Create a working Linux cluster from many separate pieces of hardware and software, including System x and IBM TotalStorage systems. This second part in a multipart series describes configuring the management server and installing the nodes in the cluster.

SSL secures VNC applications: Remote desktop application software has been around a long time, but here's an open source solution using ready-to-go components. See how to set up VNC in a standard browser but secured via SSL, which has security advantages over ssh.

Programming with the PowerPC branch processor: Assembly language and Power Architecture are a fast combination, so don't let program branching slow you down. Learn about the instructions and special-purpose registers that make decision points painless.

Programming high-performance applications on the Cell BE processor, Part 1: Linux on

developerWorks.

My developerWorks

Welcome guest

- Sign in
- Register

Innovate with SOA



→ Get results with
SOA: Learn more

Spotlight

- New to IBM Software
- Trial download:
Rational Software Modeler V7.0
- Trial download:
Rational Application Developer for WebSphere Software
- Linux certification-prep tutorials

developerWorks

AIX and UNIX

IBM Systems

Information Mgmt

Lotus

Rational

Tivoli

WebSphere

Workplace

Architecture

Autonomic computing

Grid computing

Java™ technology

Linux

• New to Linux

• Downloads & products

• Open source

• Technical library

• Training

• Forums

• Events

The screenshot shows a web browser window for IBM developerWorks. The URL in the address bar is www.ibm.com/developerworks/linux/linux390/index.html. The search bar contains "rhel 7 file system". The page title is "Linux on System z". The main content area displays the "Linux on System z" page with sections for "What is Linux?", "What is Linux on System z?", and "Why developerWorks pages for Linux on System z?". A sidebar on the left lists links for "Linux on System z®", "What's new", "Development stream", "Distribution hints", "Documentation", and "Feedback". Another sidebar on the left lists "Related links" such as "Linux on System z - Tuning hints & tips" and "Archive". A footer at the bottom right includes the copyright notice "© 2011 IBM Corporation".

IBM developerWorks : Linu... × +

www.ibm.com/developerworks/linux/linux390/index.html

rhel 7 file system

Most Visited IBM Standard Software... IT Help Central IBM http://oracle-randolf.b... Oracle sequential read ... IBM

IBM English Sign in (or register) dv

developerWorks® Technical topics Evaluation software Community Events

developerWorks > Technical topics >

Linux on System z

↳ [What is Linux?](#)

↳ [What is Linux on System z?](#)

↳ [Why developerWorks pages for Linux on System z?](#)

Linux is a registered trademark of Linus Torvalds in the United States, other countries, or both.

What is Linux?

Linux is an operating system whose kernel was developed by Linus Torvalds and initially distributed in 1991. Linux has evolved to become a widely accepted operating system with a wealth of applications. Today, many Linux distributions also contain a variety of tools and utilities provided by the open source community (e.g., from the GNU project). Linux is platform-independent and executes on many architectures, including IBM System z, IBM Power Systems™, Intel®, Alpha®, or Sparc®. Linux is Open Source software which means that the source code may be downloaded free of charge. You can learn more about Open Source on www.opensource.org.

Although the source code is free, only system programmers build their own distributions. For production purposes, Linux distributions built by Linux distribution partners are used.

Contact the IBM team

If you want to contact the Linux on System z IBM team refer to the [Contact the Linux on System z IBM team](#) page.

© 2011 IBM Corporation

IBM Redbooks | Linux +

www.redbooks.ibm.com/portals/linux g - rhel 7 file system

Most Visited IBM Standard Software... IT Help Central IBM http://oracle-randolf.b... Oracle sequential read ... IBM

Worldwide Welcome JEAN-FRANCOIS JIGUET [IBM Sign out]

IBM Industries & solutions Services Products Support & downloads My IBM IBM Redbooks

IBM Redbooks®

Advanced Search

Software

Storage

Systems & Servers

- PureSystems
- Power Systems
- System z
- System x
- Flex System
- BladeCenter
- Systems Software
- Linux**

System Networking

Solution topics

IT Business Perspectives

IBM Redbooks > Linux >

IBM Linux Redbooks



Linux & IBM
Unleash the power and flexibility of community innovation in your business

Just published Drafts Most popular Blogs Residencies

All | Solution Guides

Search Sort by relevance ➤

1 to 5 of 241 results [Next ➤](#) Results per page: [5](#) | [10](#) | [20](#)

1. [IBM PowerVC Version 1.2.1 Introduction and Configuration](#)

RSS feeds

- IBM Linux Redbooks
- IBM Linux Residencies
- Other Redbooks RSS feeds

Now available



New version of the official **IBM Redbooks mobile app** is now available! Features include links to valuable IBM resources & offerings such as recent Product Announcements