

L93

FCP Channel Virtualization in a Linux Environment

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FCP Channel Virtualization

Implementing Linux with FCP for zSeries

zSeries Expo, San Francisco, September 19-23 2005 Martin Peschke, Linux on zSeries Development

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Thanks for suggestions and input to Gerhard Banzhaf, Stefan Müller, Maxim Shchetynin

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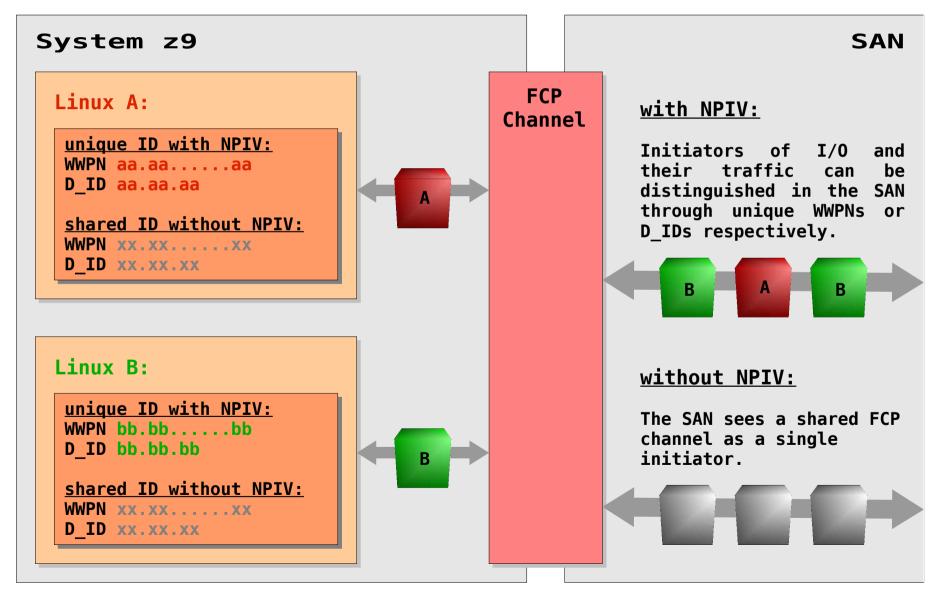
Acknowledgments

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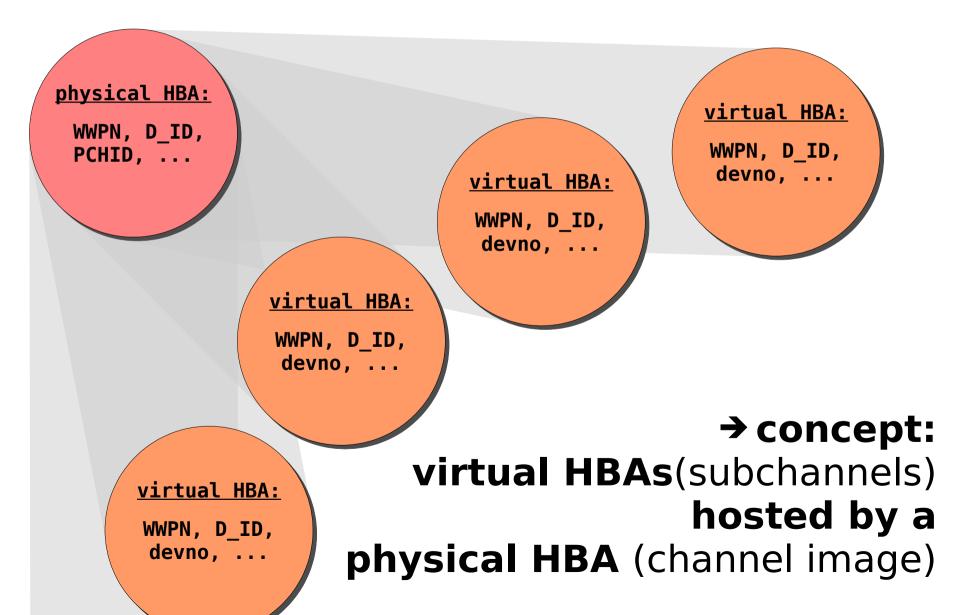
FCP Channel Virtualization

What is NPIV? New Possibilities Requirements Linux Support Getting Started Look'n Feel

Unique SAN Identities!



Think Virtual Adapters

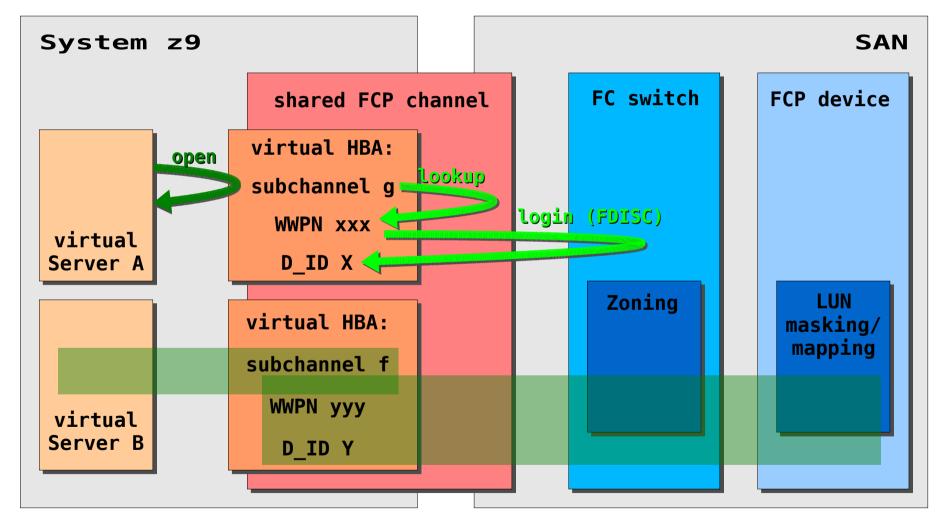


Industry-Standard Solution

- → NPIV = N_Port Identifier Virtualization
- → standard-based approach being embraced by the industry
- → System z9 persistently assigns unique WWPN to each FCP subchannel
- FCP Channel obtains separate D_ID for each subchannel from fabric switch
- → result: unique SAN identity for each FCP subchannel

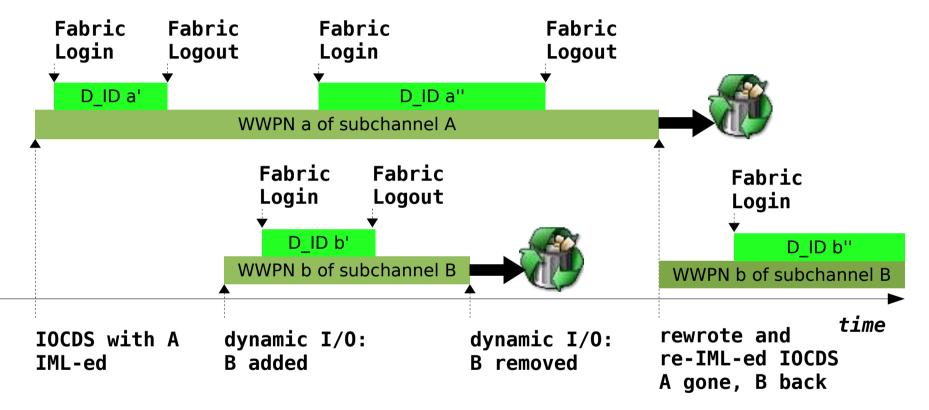
e Fibre Channel Framing and Signaling Interface

System z9 Implementation



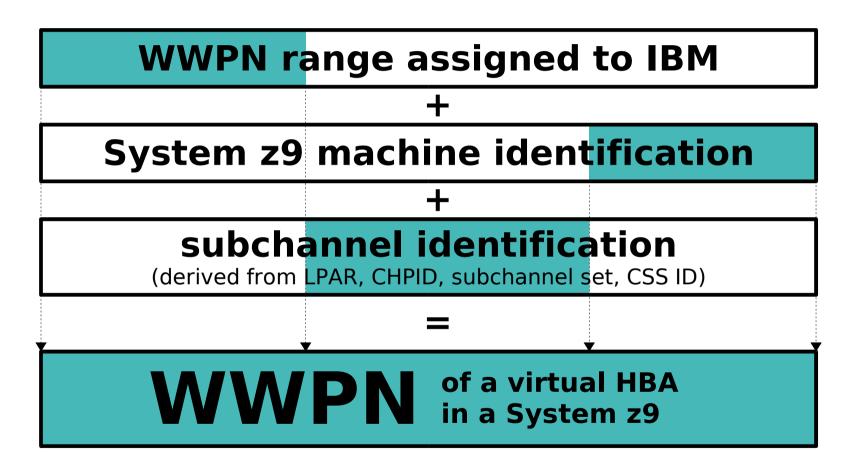
>connecting a virtual HBA to the SAN

System z9 Implementation



→ lifetime of virtual WWPN=
 lifetime of subchannel definition
 → D ID lifetime = fabric connection lifetime

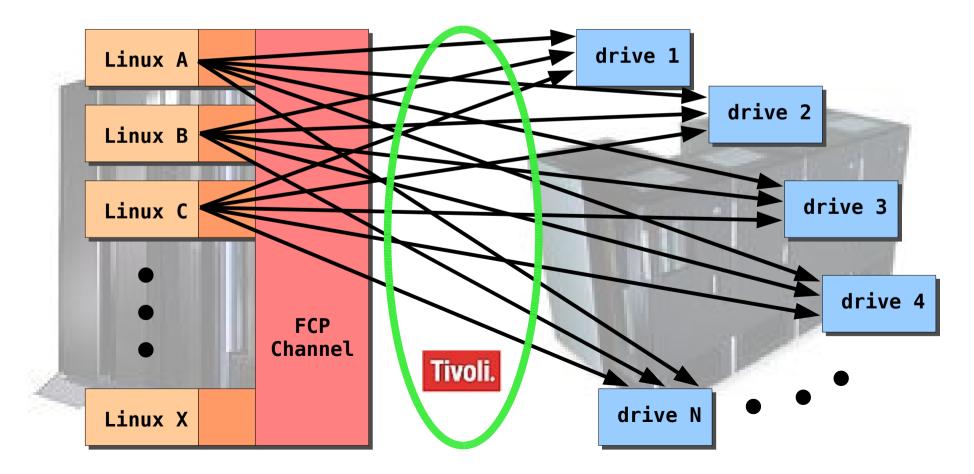
System z9 Implementation



→ well-defined "ingredients" guarantee uniqueness and permanence of WWPNs

New Possibilities Sharing Unlimited

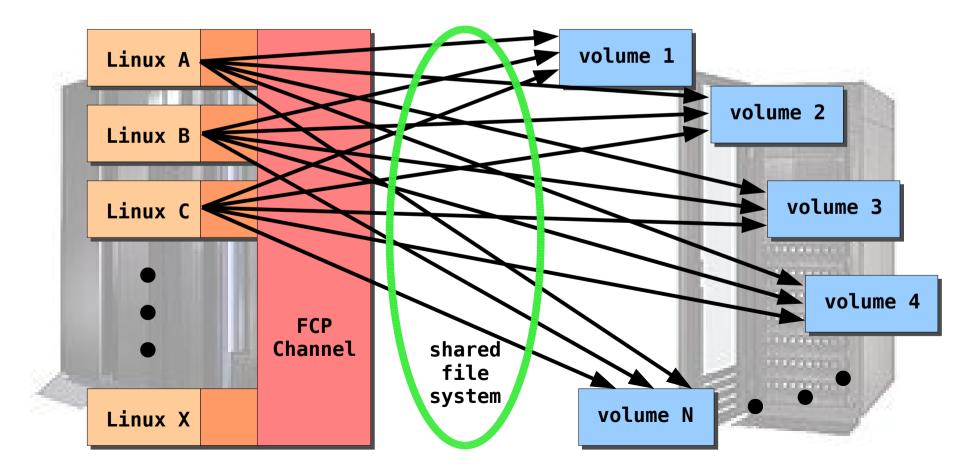
→ 'Exclusive LUN' policy abolished by NPIV: many-to-many tape backup solutions



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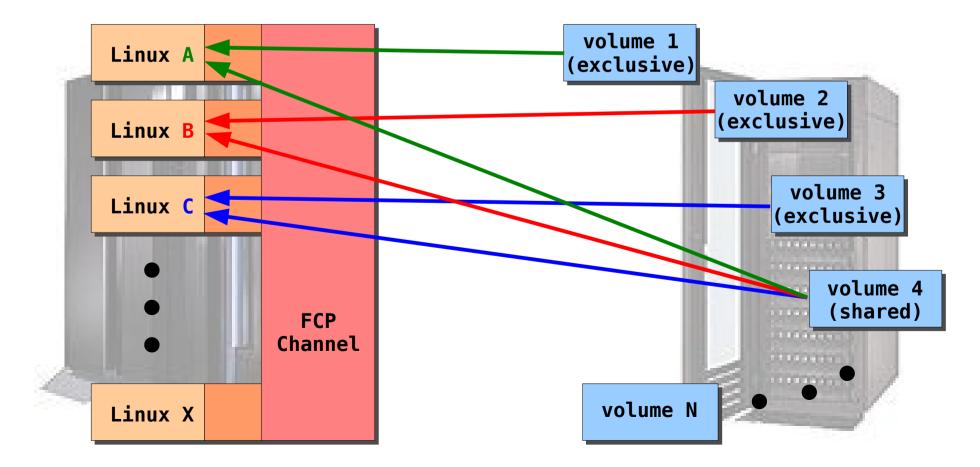
New Possibilities Sharing Unlimited

→ 'Exclusive LUN' policy abolished by NPIV: imagine shared SAN filesystems



Access Control Done Right

>LUN Masking works for virtual servers!



New Possibilities Access Control Done Right → Zoning works as well! zone "green Linux A **FCP** Channel Linux B zone "red" zone "blue" inux C

New Possibilities

Access Control Done Right

→ NPIV deprecates the FCP Channel Access Control feature

→ Access Control feature still available with System z9, though

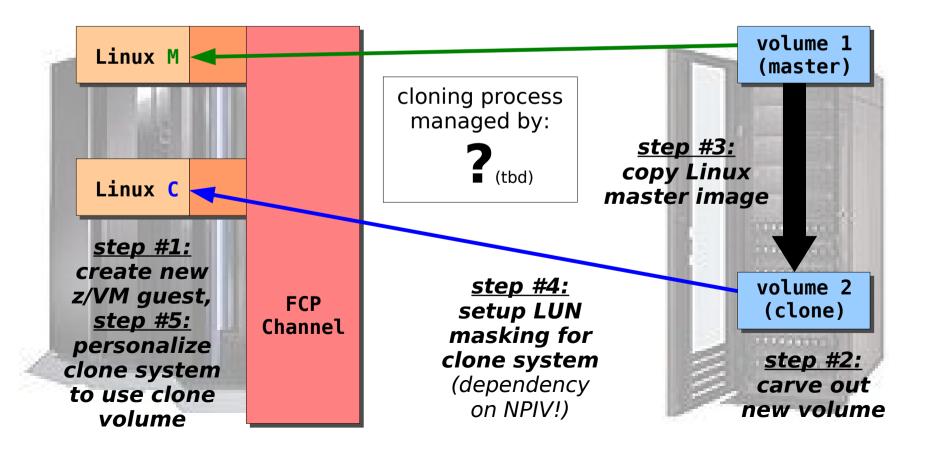
(could be used for subchannels operating in backward-compatible non-NPIV mode)

→ ACT rules – if defined – are not applied to FCP subchannels in NPIV mode

New Possibilities

All-Out Manageability

→ SCSI storage provisioning for virtual servers created by cloning – why not?





IBM System z9

ee IBM System z9 109

http://www.ibm.com/servers/systems/systemz9/z9109/features.html

NPIV-Capable Switch

- >only required for switch adjacent to z9
- → McData switches w/ firmware upgrade:

e E/05 8.00

http://www.mcdata.com/downloads/tc/cdesc/sphereon_4400_4700_wbt.pdf

Linux Support

Almost Dispensable

→ NPIV is more or less transparent for operating systems

(Linux uses the new virtual N_Port in the same way as it has used non-virtual N_Ports)

- > but: some new error codes/messages defined for NPIV-type subchannels (mostly conditions due to deficient planning)
- → Linux code to be shipped anytime soon (target: SLES9 SP3 and equivalent)

ee Linux on zSeries

Getting Started

"Floods" of WWPNs

- → many new WWPNs to be used by zoning and LUN masking/mapping functions
- → can be exported from SE through FTP



Getting Started NPIV Step-by-Step

1. pre-plan SAN with NPIV support - see practical limits of components

2. define FCP subchannels in IOCDS

- prior to IML, or
- using dynamic I/O (HCD/HCM)

3. perform IML, if needed

- WWPNs for new subchannels get assigned

4. query WWPNs using SE/HMC panel

- needed for configuration of SAN functions
- export function through FTP available

NPIV Step-by-Step (cont.)

5. configure switch adjacent to z9

- ensure NPIV is enabled
- ensure enough virtual N_Ports per port
- setup zoning for virtual N_Ports

6. configure target device

- setup LUN masking/mapping

7. enable NPIV-mode for CHPID in LPAR- CHPID must be temporarily toggled off

8. start using FCP subchannel in Linux
 - check for NPIV related error messages

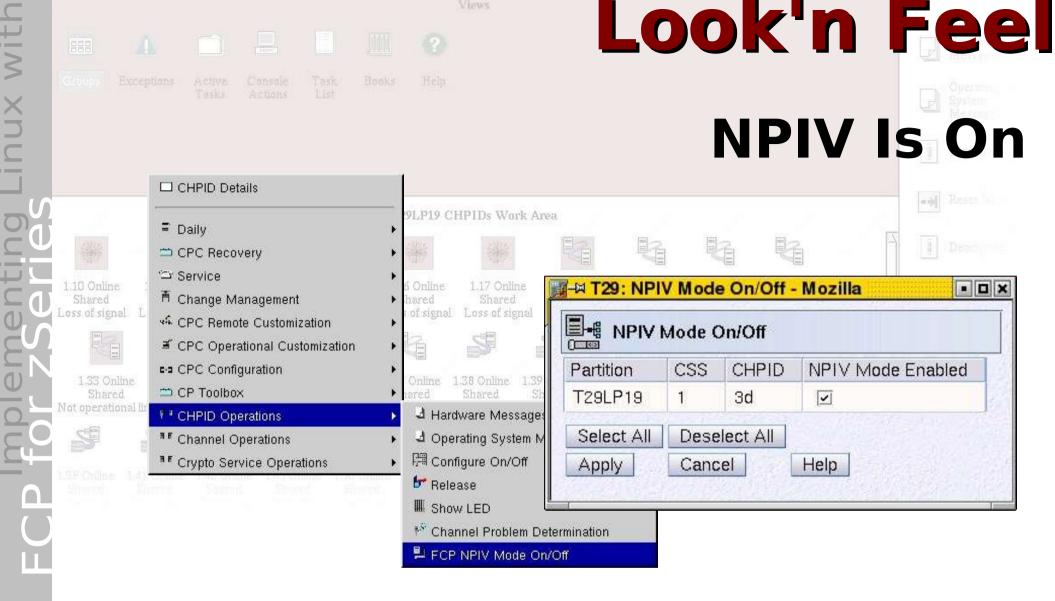
Getting Started

Implementation Limits

- → switches will presumably allow for 1024 or up to 8192 WWPNs in a SAN
- → storage device impose limits as well
- → theoretically up to 255 subchannels per channel connected at the same time
- → ≤ 510 active target port connections for all subchannels of a channel
- → each System z9 provides a total of 2 million WWPNs for virtual HBAs

 So
 So

 So
 http://www.ibm.com/servers/eserver/zseries/connectivity/fcp.html



→ your choice: toggle NPIV on with a per channel-and-LPAR granularity (CHPID needs to be toggled off temporarily)

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		년 View On/Off CoD Feature In	formation

List Of Virtual N_Ports

Look'n Feel

Partition CSS ID CHPID SSID Device Number WWPN IOCDS NPIV Mo T29LP46 03 01 3d 00 5200 c05076fffe803514 A0 A1 On T29LP46 03 01 3d 00 52fc c05076fffe803518 A0 A1 On T29LP46 03 01 3d 00 52fd c05076fffe80351c A0 A1 On T29LP46 03 01 55 00 1700 c05076fffe8031cc A0 A1 On T29LP19 01 04 3d 00 52fc c05076fffe8031cd A0 A1 On T29LP19 01 04 3d 00 52fc c05076fffe8031cd A0 A1 On T29LP19 01 04 3d 00 52fd c05076fffe8031c4 A0 A1 On T29LP08 00 08 3d 00 52fc c05076fffe803055 A0 A1 On T29LP08 00 08 3d 00 52fd c05076fffe803055 A0 A1	T29LP46 0	man Come		SSID	Device Number	WWPN	IOCDS	NPIV Mod
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Look'n Feel

Linux Proudly Presents: Its Own SAN Identity

FCP subchannel

virtual N_Port tied to this FCP subchannel

<u>in NPIV mode:</u> values differ <u>in non-NPIV mode:</u> same WWPN, same S_ID

physical N_Port tied to FCP channel (CHPID) -bash-3.00# pwd
/sys/bus/ccw/drivers/zfcp/0.0.5203

-bash-3.00# cat wwpn s_id
0xc05076fffe8031dc
0x652214

-bash-3.00# cat physical_wwpn physical_s_id
0x5005076401e06b18
0x652213

Summary

Ready, steady, ... go!

→ NPIV eradicates the root cause for limited practicability of FCP in virtual server environments

- → NPIV enables the deployment of standard SAN management functions with System z9
- → NPIV gives free rein to sophisticated SAN fantasies