Mainframe in a Tiny Box: What a Wonderful Concept, a Developer's Dream Come True

by

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Trademarks

Abstract

This session will outline and demonstrate the capabilities of IBM zPDT technology for the emulation of z Systems processing on an x86 hardware platform.

The execution of zVM, zOS, ZVSE, zTPF, and Linux for z Systems can be done reliably using IBM 1090/1091 licensed code to emulate mainframe hardware functions with remarkable performance. This has created a wonderful opportunity for developers, admins, and trainers to expand low-cost mainframe capabilities throughout an enterprise.

Introduction

Since 1952 IBM has been the leader in large scale data processing. Although the IBM 701 Data-Processing Machine was hardly a mainframe by todays standards it was the seed that led to the development of the venerable System/360 in 1964; and that was the supreme game-changer!

Since that time the technology has become more versatile, more complex, faster/better, and smaller. In 1998 IBM achieved a magnificent accomplishment with the introduction of a small (3 foot tall), office-friendly, mainframe, the Integrated Server (3006-B01). Designed as a hybrid, merging x86 technology with a S/390 CPU on an adapter card, it brought true low-cost mainframe processing to a distributed business model. The ability to develop and operate mainframe applications away from the main datacenter was a breakthrough concept easily embraced by application developers and system programmers.

What Developers Want

Every software developer, every system admin, every system programmer, every trainer have all fantasized about having their own personal mainframe under their complete and total control. They would not have to get permission to make system level changes. They would not have to coordinate IPLs or updates with other groups. The dream has always been to have your own world where you ruled with arbitrary command and control that benefits your individual purpose.

The dream is a alive and well thanks to the IBM elves in Poughkeepsie, NY. Since the turn of the century IBM has been quietly developing tools for internal use that can provide systems assurance testing of new hardware designs. These tools have evolved into the zPDT (ISV) and zDT (Commercial) product lines.

In The Beginning

Resources were limited and always physical

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Classic Computer Architecture

All computers used for commercial processing currently adhere to specific fundamentals of von Neumann architecture.
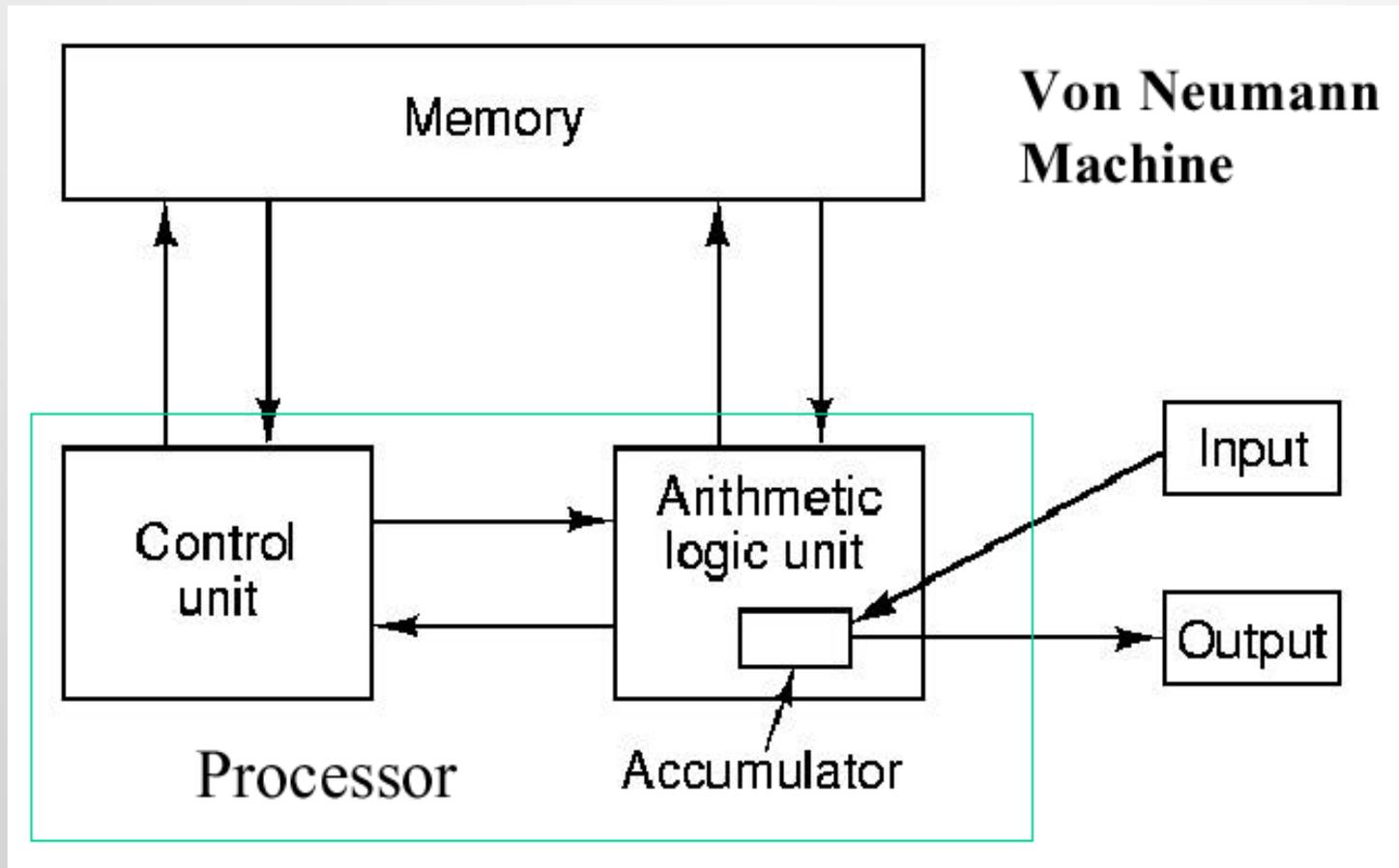
Game Changing Mainframe

CPU, Memory, Storage, I/O Devices – All Physical

z Emulation Model

Z Systems Images

zPDT / zDT Licensed Code

X86 Linux

X86 BIOS

z Systems Images

zOS	zOS	zVSE	zTPF	zCF	zLinux SuSE	zLinux Red Hat

zVM

zPDT / zDT Licensed Code

X86 Linux
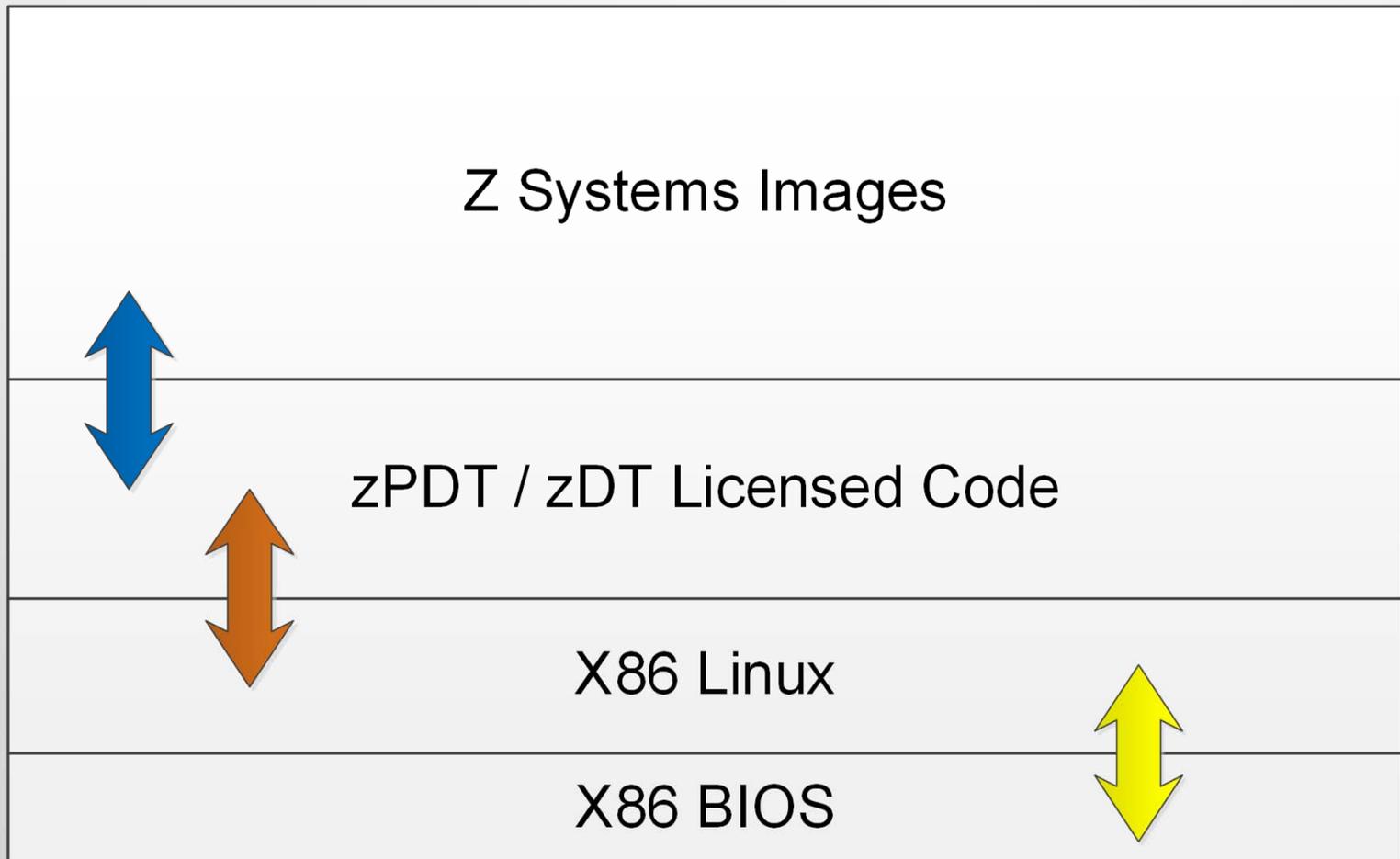
X86 BIOS
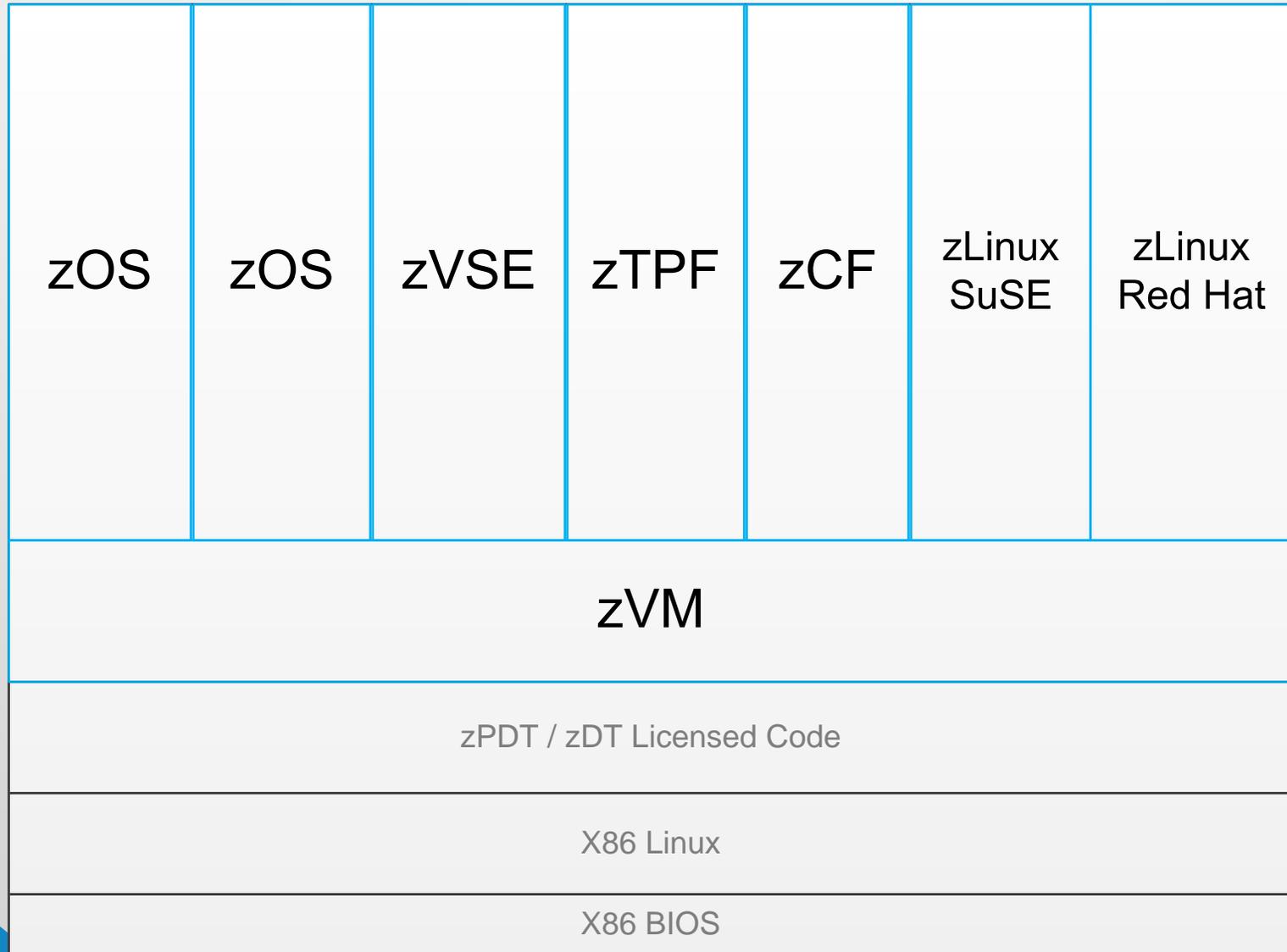
How it works

- zPDT is a Linux app that executes z Systems instructions using interpretative execution with a cached JIT compiler;

- zPDT can be defined with 1 to 8 z Systems processors; each can be independently defined as CP, IFL, zIIP or zAAP;

- Each z Systems processor defined must have at least one x86 core; two processors = two cores, etc.

- In addition to x86 cores required by zPDT, *at least* one additional core is required for I/O processing and sys admin;

- zPDT Device Managers provide the integration of virtual requests with physical resources;

z Systems Physical to Virtual

A zPDT system includes 12 *device managers*, each of which provides emulation for a related group of devices. A device manager can emulate multiple instances of its devices.

aws3274 Emulates a local, channel-attached 3274 control unit. This device manager is almost always used to provide the IBM MVS™ console, for example, and 3270 application sessions. Each terminal appears (to the z System operating system) as operating through a channel-attached non-SNA DFT IBM 3274 control unit. TN3270 sessions are used through the base Linux TCP/IP interface.

awsckd Emulates 3390 (and 3380) disk units, using a single Linux file for each 3390 or 3380 device.

awsosa Emulates an OSA-Express2 adapter, in either QDIO (OSD) or non-QDIO (OSE) mode. The hardware involved is an Ethernet adapter on the underlying PC. This device manager can support TCP/IP operation. SNA operation is not supported.6 It can also support OSA/SF usage.

awstape Emulates a 3420, 3480, 3490, or 3590 tape drive, using a Linux file in place of the tape media.

awscmd Emulates a tape drive but routes output records to the base Linux system where they are executed as commands, and returns Linux output to the emulated tape drive.

.**awsfba** Emulates FBA devices, which are supported by IBM z/VSE® and z/VM. A Linux file is used for each emulated device. This is not the Fibre Channel (Open Systems) FBA on recent z System machines.

awsoma Emulates the Optical Media Attach interface that works with Linux files in this format. This function is read-only.

aws3215 Emulates a 3215 console device (seldom used today), using a Linux terminal window for the interface.

awsprt Emulates a 1403 or 3211 printer, using a Linux file for output. Provides emulation of a 1403-N1 or 3211 printer. FCB emulation for 3211 is provided, but UCS functions are not provided. Automatic ASCII translation (fixed translation table) is provided.

awsrdr Emulates a 2540 card reader, using Linux files as input. The 2540 card punch functions are not emulated. Both EBCDIC and ASCII data can be used.

awsscsi Uses a Linux SCSI-attached tape drive as a z System tape drive, providing a way to read/write "real" mainframe tape volumes.

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awsctc Emulates an IBM 3088 channel-to-channel adapter by using TCP/IP as the communication mechanism. The connection can be the same zPDT instance, another instance in the same PC, or a zPDT instance in a LAN-connected machine.

Where we are with zPDT/zDT

- z13 GA-2 CPU level

- z13 GA-2 Crypto

- CP Assist for Cryptographic Function 1,2,3,4,5

- Crypto CCA 5.3

- CFCC Level 21

- Emulated z13 GA-2 Coupling Facility using zVM

- 3390-type CKD, ECKD with EAV and FBA 9336, CKD Versioning

- OSA-Express 2 in QDIO or non-QDIO mode

- Emulated tape: 3420, 3422, 3480, 3490E, 3590, 3592, OMA

- Other: 2540, 1403-N1, 3211, 3270, 3215, 3088

Summary and Conclusion

The world is a better place with zVM and zPDT!

zPDT technology significantly lowers the cost for mainframe application development, testing, and training.

zPDT provides true hands-on control of your own world. Control the world; control your destiny!

Need more information?

IBM zPDT for Independent Software developers

https://www-356.ibm.com/partnerworld/wps/servlet/ContentHandler/pw_com_zpdt

IBM zDT for commercial and personal developers

http://www-03.ibm.com/software/products/en/ibm-z-systems-development-and-test-environment

ITC complete solutions for zPDT and zDT

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