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zSY0455

50 Years of z/VSE – Still Going Strong

2015

IBM z Systems

Technical University

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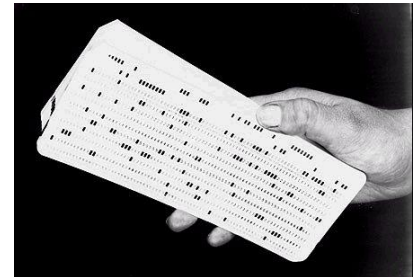
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The VSE history – a look into the past 50 years



- **How it began – DOS/360**
- **DOS/VS – added virtual storage capability**
- **DOS/VSE – “extended” version of DOS/VS**
- **SSX/VSE – Small System Executive**
- **VSE/SP – System Product**
- **VSE/ESA – 31-bit VSE version**
- **z/VSE – today’s VSE**



System/360 – Announced April 7, 1964



In the most important product announcement in company history to date, IBM introduces the IBM System/360 - a new concept in computers which creates a "family" of small to large computers incorporating IBM-designed Solid Logic Technology (SLT) microelectronics and uses the same programming instructions. The concept of a compatible "family" of computers transforms the industry.



“(System/360) was the biggest, riskiest decision I ever made, and I agonized about it for weeks, but deep down I believed there was nothing IBM couldn’t do.”

Father, Son & Co. 1990
Tom Watson, Jr.
IBM President 1952
IBM President and CEO 1956
IBM Chairman and CEO 1961-1971

IBM System/360 – April 7, 1964

Now one new computer fills all your data processing needs



IBM SYSTEM/360

Now one new computer fills all your data processing needs

Solves commercial problems

You can tailor SYSTEM/360 to fit a small operation, a medium size company or a big nationwide company with many offices and plants.

It's great on commercial problems... handles inventory management simulation, operations research, market forecasting and other problems more efficiently than ever before.

SYSTEM/360 comes with large memory that reduces the number of programs it takes to complete a big job. It comes with an improved assembler, compiler. It moves from job to job without operator intervention and that speeds workflow. But that's only the beginning.



Solves control problems

SYSTEM/360 can take transmitted data—in volume, as fast as it comes, any time it comes—and read it, store it, or process it, and also handle conventional data processing problems. That makes it an efficient tool for product testing, process control, process analysis, medical data collection.

The system processes the data in storage and it protects the data coming on. It prevents errors and even detects errors better than previous computers could.

It speeds analysis, decision and action and helps you improve forecasts because it brings you more up-to-date information.



Solves scientific/engineering problems

SYSTEM/360 also is a powerful and efficient scientific tool for linear programming, structural design engineering, statistical analysis of experimental data and other tasks.

It can handle floating point arithmetic calculations from 10⁻⁷⁵ to 10⁷⁷ in 24-digit accuracy.

It can let two computers share main core memory or files or tapes. It lets you back up a computer with a smaller, lower cost system, if you need extra processing power and system availability.

SYSTEM/360 comes with an improved, more efficient FORTRAN compiler.

Its big memory lets the engineer solve bigger problems than ever... more bigger and more complex programs... and solve problems more quickly.



Solves communications problems

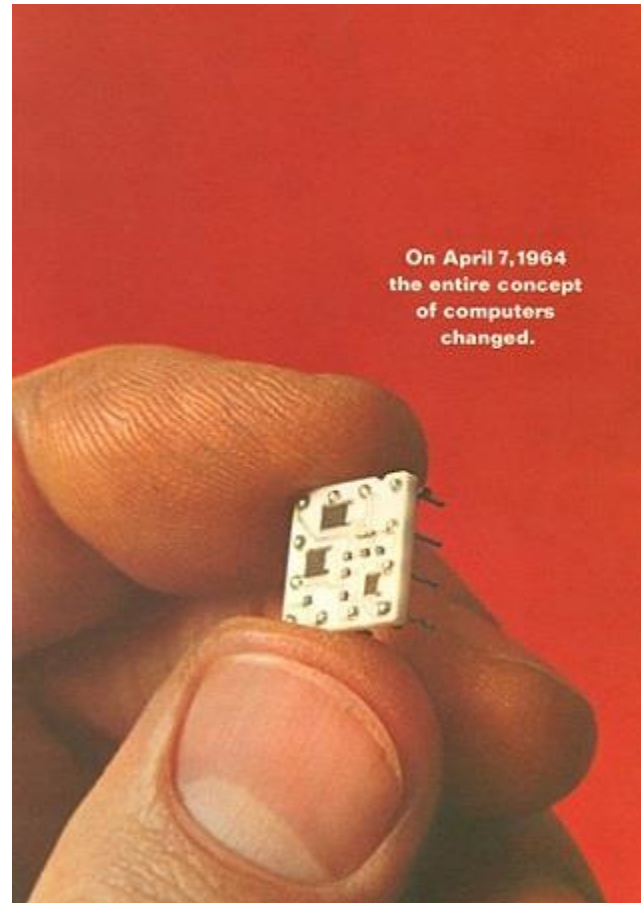
SYSTEM/360 was designed to handle data communications—from a small network of terminals to a big nationwide system—and also to handle normal data processing.

The system takes input from terminals, stores it or interrupts a running program to process a priority message. It answers inquiries in print or displays them on screen, disseminates messages to selected locations, speeds handling of communications, prevents delays during peak periods and also processes a scheduled data processing program.

Most important, the SYSTEM/360 lets you move into computer communications control gradually.

You can start small. You can add terminals as you need them.





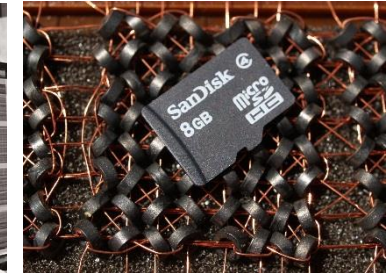
How it began

- Plan was to deliver a single operating system, OS/360
- OS/360 project was falling behind schedule
- **When finally released, a year late, it required at least 64 KB of memory**

IBM System/360 Model 30

- Typical arithmetic operations per second:
 - Decimal add (5 + 5 digits) 13,300
 - Fixed point add (32 bits) 34,500
- Memory sizes:
 - 8K, 16K, 32K, 64K

Model	Announced	First Shipped
30	April 7, 1964	June, 1965
40	April 7, 1964	April, 1965
50	April 7, 1964	August, 1965



Source: Wikipedia



DOS/360 – the first S/360 operating system



DOS/360 became available in 1965

- Designed for use of little memory
- Required approximately 6KB for system residence (supervisor)
- A minimum configuration consisted of
 - Model 30 with 16K memory
 - IBM 1052 printer keyboard
 - Card reader
 - Printer
 - Punch
 - One IBM 2311 disk drive (7.25 MB removable pack)
- User programming in
 - Macro Assembler
 - COBOL
 - Fortran
 - PL/I (designed for 32K systems)
 - RPG (Report Program Generator)
- One partition
 - Up to three with release 3
 - BTAM for telecommunications added with release 3

IBM System/360 Reference Data

MACHINE INSTRUCTIONS

NAME	SYMBOL	OP	MODE	REG	OPERANDS
Add (d)	AD	1A	RR	R1,R2	
Add (f)	AF	1A	RR	R1,D2(1),D2(2),D2(3)	
Add Decimal (d)	AD	1A	RR	R1,R2	
Add Halfword (d)	AH	1A	RR	R1,D2(1),D2(2)	
Add Logical (d)	AL	1E	RR	R1,R2	
Add Logical (f)	AL	1E	RR	R1,D2(1),D2(2),D2(3)	
AND (d)	AN	14	RR	R1,R2	
AND (f)	AN	14	RR	R1,D2(1),D2(2),D2(3)	
AND (h)	AN	14	RR	R1,D2(1),D2(2)	
AND (l)	AN	14	RR	R1,D2(1),D2(2)	
Branch and Link	BALR	05	RR	R1,R2	
Branch and Link	BAL	05	RR	R1,D2(1),D2(2)	
Branch and Store (d)	BASR	32	RR	R1,R2	
Branch and Store (f)	BAS	32	RR	R1,D2(1),D2(2),D2(3)	
Branch on Condition	BCR	27	RR	R1,R2	
Branch on Condition	BC	47	RR	R1,D2(1),D2(2),D2(3)	
Branch on Count	BCTR	06	RR	R1,R2	
Branch on Count	BCT	06	RR	R1,D2(1),D2(2),D2(3)	
Branch on Index High	BCH	05	RR	R1,R3,D2(1),D2(2)	
Branch on Index Low or Equal	BXLE	87	RR	R1,R3,D2(1),D2(2)	
Compare (d)	CR	19	RR	R1,R2	
Compare (f)	C	59	RR	R1,D2(1),D2(2),D2(3)	
Compare Decimal (d)	CF	19	RR	R1,R2	
Compare Halfword (d)	CH	49	RR	R1,D2(1),D2(2)	
Compare Logical (d)	CLR	15	RR	R1,R2	
Compare Logical (f)	CL	55	RR	R1,D2(1),D2(2),D2(3)	
Compare Logical (h)	CLH	05	RR	R1,D2(1),D2(2)	
Compare Logical (l)	CLL	05	RR	R1,D2(1),D2(2)	
Convert to Binary	CYB	4F	RR	R1,D2(1),D2(2),D2(3)	
Convert to Decimal	CYD	4E	RR	R1,D2(1),D2(2),D2(3)	
Diagnose (d)	DI	83	RR	R1,R2	
Diagnose (f)	DI	1D	RR	R1,R2	
Divide	D	52	RR	R1,D2(1),D2(2),D2(3)	
Divide Decimal (d)	DD	7D	RR	R1,D2(1),D2(2),D2(3)	
ED (d)	ED	0E	RR	R1,D2(1),D2(2)	
ED (f)	ED	0E	RR	R1,D2(1),D2(2),D2(3)	
Exclusive OR (d)	XR	17	RR	R1,R2	
Exclusive OR (f)	X	57	RR	R1,D2(1),D2(2),D2(3)	
Exclusive OR (h)	XH	07	RR	R1,D2(1),D2(2)	
Exclusive OR (l)	XL	07	RR	R1,D2(1),D2(2)	
Execute	EX	84	RR	R1,D2(1),D2(2),D2(3)	
Half (d) (d)	HIO	3E	RR	R1,D2(1)	
Half (d) (f)	HC	43	RR	R1,D2(1),D2(2),D2(3)	
Half (d) (h)	HIO	3E	RR	R1,D2(1)	
Half (d) (l)	HIO	3E	RR	R1,D2(1)	
Load	L	38	RR	R1,D2(1),D2(2),D2(3)	
Load Address	LA	81	RR	R1,D2(1),D2(2),D2(3)	
Load and Test (d)	LTR	72	RR	R1,R2	
Load Complement (d)	LCH	13	RR	R1,R2	
Load Halfword	LH	48	RR	R1,D2(1),D2(2)	
Load Multiple	LM	38	RR	R1,R3,D2(1),D2(2)	
Load Multiple Control (d)	LMC	88	RR	R1,R3,D2(1),D2(2)	
Load Register (d)	LRR	11	RR	R1,R2	
Load Register (f)	LFR	10	RR	R1,R2	
Load PDR (d)	LPR	82	RR	R1,D2(1)	
Load Real Address (d)	LRA	81	RR	R1,D2(1),D2(2),D2(3)	
Move	MV	89	RR	R1,D2(1),D2(2)	
Move	MVC	02	RR	R1,D2(1),D2(2),D2(3)	
Move Register	MVR	01	RR	R1,D2(1),D2(2)	
Move with Offset	MVQ	01	RR	R1,D2(1),D2(2),D2(3)	
Move Zeroes	MVZ	03	RR	R1,D2(1),D2(2),D2(3)	
Multiply	MR	1C	RR	R1,R2	
Multiply	M	3C	RR	R1,D2(1),D2(2),D2(3)	
Multiply Decimal (d)	MDC	8E	RR	R1,D2(1),D2(2),D2(3)	
Multiply Halfword	MH	4C	RR	R1,D2(1),D2(2)	
OR (d)	OR	16	RR	R1,R2	
OR (f)	O	56	RR	R1,D2(1),D2(2),D2(3)	
OR (h)	O	56	RR	R1,D2(1),D2(2)	
OR (l)	O	56	RR	R1,D2(1),D2(2)	

Things back in 1965



- Relative worth of \$ 1.00 from 1965 to 2014 is \$ 7.50 (using the Consumer Price Index)
- Dow Jones Industrial Average = 969
- Average cost of new house \$ 13,600
- Average income per year \$ 6,450
- Gas per gallon 31 Cent
- Average cost of a new car \$ 2,650



Ladies High Fashion mid 1960's Boots
From \$9.77 to \$13.70



Sixties Pocket Transistor Radios
\$14.95

- The Mary Quant designed Mini Skirt appears in London
- Popular films
 - Mary Poppins
 - The Sound of Music
 - Goldfinger
 - My Fair Lady
 - Cat Ballou



The VSE history



- How it began – DOS/360
- **DOS/VS** – added virtual storage capability
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System/370



▪ Virtual storage

- Translation of virtual to real addresses using Dynamic Address Translation (DAT) logic

▪ Compatible upgrade from S/360

▪ Fully integrated monolithic memory

▪ New I/O devices

- 3330 Direct Access Storage (100 MB removable disk pack)
- 3420 Magnetic Tape Subsystem
- 3505 Card Reader & 3525 Card Punch



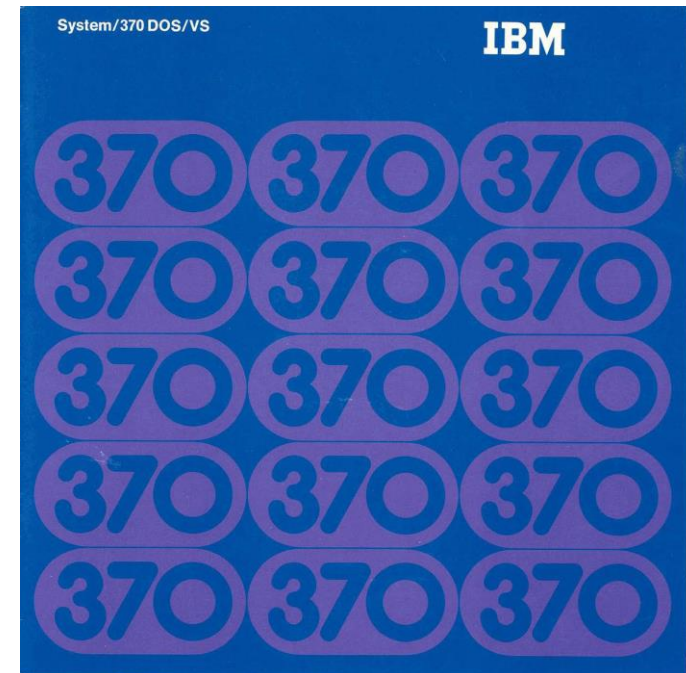
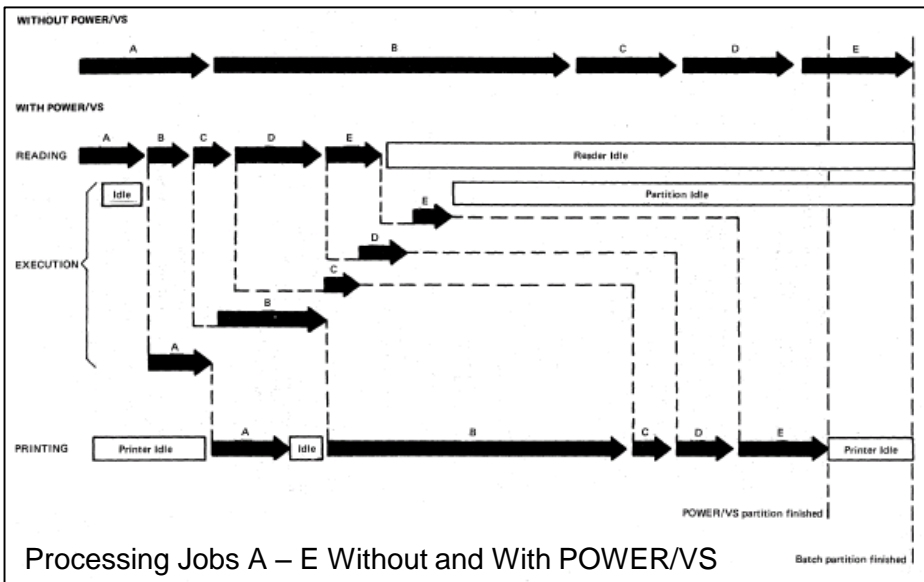
Model	Memory size	Announced	First Shipped
145	112K – 512KB	September 23, 1970	June, 1971
135	96K – 256KB	March 8, 1971	April, 1972
125	96K / 128KB	October 4, 1972	April, 1973
115	64K / 96KB	March 13, 1973	March 1974
138	512K – 1MB	June 30, 1976	November 1976
148	1MB – 2 MB	June 30, 1976	January 1977



DOS/VS - DOS with Virtual Storage support



- Releases 28 → 34
- Up to 16 MB virtual storage
- 5 partitions (up to 7 in release 34)
- Linkage Editor, Relocation Loader for effective multiprogramming
- POWER for I/O spooling (Priority Output Writers, Execution Processors, and Input Readers)
- New VSAM file system
- 'DBDC' → CICS and DL/I



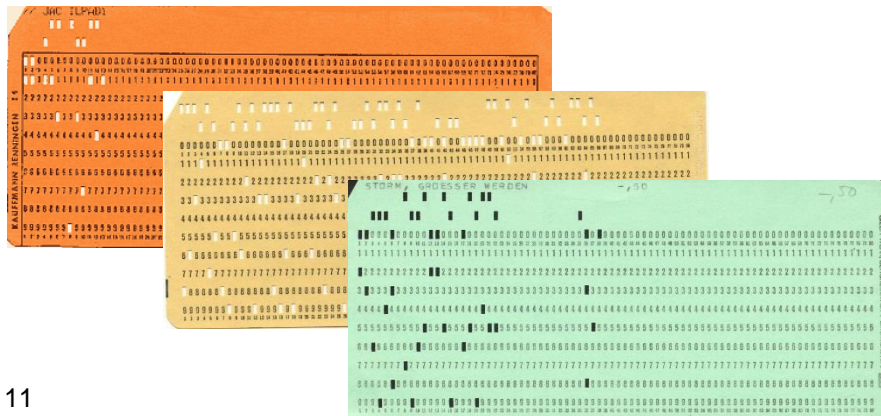
VSE development mission moved from Endicott, NY to Boeblingen, Germany



My first encounters with VSE



- Joint IBM in 1974 as Customer Engineer in Essen, Germany
- Initially serviced clients with IBM System/370 Model 125 and 115
- DOS/VS Release 29
- Operating system software, support, and 24x7 service was part of the monthly rental charge
- Different transaction monitors used – all moving to CICS later
- Main workload was batch processing
- Punched cards used for job control (JCL statements)
- Several clients still used punched cards for inventory control



The VSE history



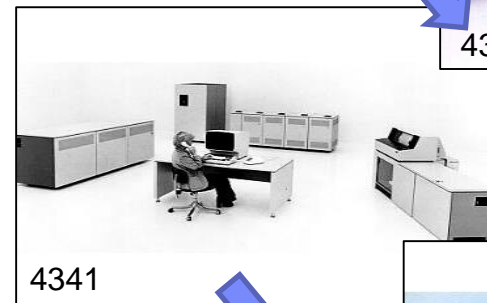
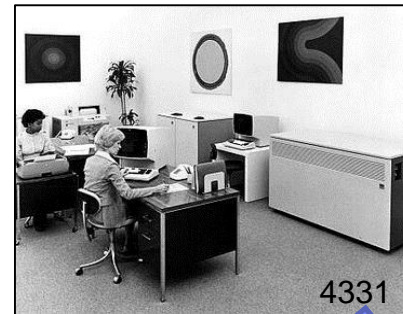
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IBM 4300



- Compact design and significantly reduced power and cooling requirements
- 4331 and 4341
 - High-density logic chips with up to 704 circuits
 - 64,000 bit memory chips
 - 0.5 and 1 MB memory on 4331
 - 2 and 4 MB memory on 4341
- 4361 and 4381
 - Very Large Scale Integration (VLSI) technology
 - Engineering/Scientific features
 - Extended Control Program Support (ECPS) facilities for improved performance
 - 4361: 2 to 12 MB memory
 - 4381: up to 16 MB on Model Group 1 and up to 32 MB with dual processors (Model Group 2&3)



DOS/VSE – “extended” version of DOS/VS



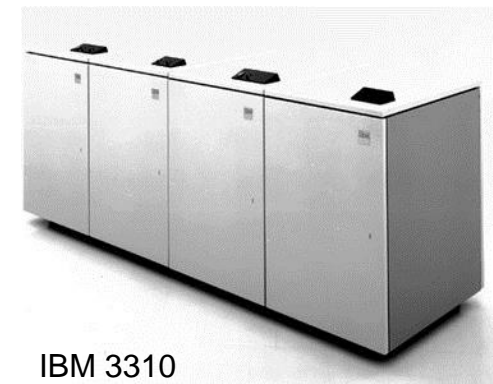
- Up to 12 partitions
- ICCF - Interactive Interface as an integral part of VSE
- ACF/VTAM became a component of VSE
- Maintain System History Program (MSHP) to install programming packages, APAR/local fixes, and service tapes
- Support of FBA disk devices
- Last free version of DOS

- In 1979, an imaginary DOS/VSE customer might have
 - a 4331 system with 512K bytes main memory
 - 6 IBM 3310 FBA disk drives (65 MB per drive) or
 - 4 IBM 3340 CKD disk drives (35/70 MB removable packs)
 - 2 IBM 8809 reel-to-reel tape drives
 - 1 IBM 3203 line printer

- Use of punched cards began to fade



IBM 3340 disk pack



IBM 3310

SSX/VSE - Small System Executive



- A pre-generated, pre-configured VSE operating system for the 4321, 4331, 4341, and 4361 systems
- Designed for ease of installation, operation and use
- SSX/VSE consists of VSE components and unique prompters and aids
- Tested as a single product including
 - Assembler, POWER, CICS/VS, ICCF, IPF, ACF/VTAM, VSE/VSAM, Sort/Merge, DITTO, Fast Copy, OCCF, IPCS, COBOL
 - plus optional products
- SSX integration approach was too rigid for most customers
- VSE/SP refined the concept

Installing an IBM 4321 or 4331?

Ask your **IBM** salesman about **SSX**. Ask your **MSA** salesman about **System 43**.

The only interactive family of business software for IBM's SSX System.

Now there's a complete family of business application systems for your IBM 4321 or 4331 computer that gives you the power of mainframe software without programmers. It's System 43™ from MSA. The first application software designed especially for IBM's new SSX (Small System Executive) operating system for the 4321 or 4331.

Improves productivity dramatically
How? Simple. With MSA's System 43, you get a system that's designed from the ground up to be used by your financial and accounting people without programmer assistance. You don't need a highly qualified system operator. And even installation can be handled by anyone with a minimum of data processing experience.

Important breakthrough
IBM's new SSX operating system is the most important development in user-friendly system software ever. And with System 43, you can make the most of it.

To bring you System 43, MSA began with extensive pre-release field testing as a beta site for SSX.

Then we developed special versions of our own line of user-friendly business application software. And with more than 6800 of our systems installed around the world, MSA

software is user-proven and highly refined. That's all together and you've got System 43. You can only get it from MSA.

The only business application system you'll need
You get a complete menu of business application software designed specifically to operate with SSX.

System 43 eliminates the problems you face in evaluating and purchasing systems from different suppliers. You don't have to worry about incompatibility between mismatched software systems. The application components available with System 43 function together to give you the information you need in a smooth, problem-free operating environment. Documentation is concise and easy-to-understand because it's written in plain English.

You get more than software
When you choose System 43 software, you also get the software company. At MSA, we know it takes a lot more than a great software package to give our customers the kind of service they need. That's why we provide on-going customer support that includes thorough documentation, periodic system enhancements, and continuous educational programs for your people.

Find out more
We'd like to tell you more about System 43 and other MSA systems. For more information please contact Robert Carpenter, (804) 262-2376. Or just clip the coupon below.

that won't confuse non-data processing personnel! And with MSA's worldwide customer service team to support your systems, software maintenance is greatly simplified.

Talk to the software experts
Divisions of more than half of the Fortune 500 companies use MSA software systems, in addition to several thousand other organizations, many with their first computers.

At MSA, we offer the most comprehensive line of business application packages currently available from one source. So you get a wider choice of application packages. And MSA Industry Specialist can show you how these systems will fit your company's software requirements.

These application components include all the same interfaces and online capabilities that come with other MSA systems.

MSA System 43 Components:

- 1. General Ledger
- 2. Accounts Payable
- 3. Accounts Receivable
- 4. Inventory Control
- 5. Purchasing and Contracting
- 6. Payroll
- 7. Fixed Assets

The Software Company
MSA IBM Business Unit, 1200 Albany Ave., Littleton, CO 80120

Please send me information on System 43 and other MSA systems.
 I would like to see a demo of your software.

NAME _____
TITLE _____
COMPANY _____
ADDRESS _____
CITY _____
STATE _____
ZIP _____

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Urheberrechtlich geschütztes Material

IBM ES/9370



- Designed to operate in an office environment
- Packaged for 19-inch racks
- Main memory ranged from 4 MB to 16 MB
- Different models with 0.5 to 1.4 MIPS
- New rack mounted devices
 - IBM 9332 or 9335 FBA disk
 - IBM 9347 Tape



- In 1987 new CMOS technology based IBM ES/9370 models were announced
 - 0.7 MIPS to 1.3 MIPS
 - Replacing Bi-polar technology with CMOS at the low end
- First CMOS implementation on mainframe



IBM ES/9370
VLSI PROCESSOR CHIPS
1 Micron CMOS Technology
Three Layers of Metal

Processor
200,000 Transistors
3,500 cm of Wiring
283,000 Layer Connections

Cache
800,000 Transistors
1,800 cm of Wiring
500,000 Layer Connections



IBM
Laboratory Böblingen

VSE/SP – System Product

- Integrated, pre-packaged VSE system
- ‘SIPO’ concept (System Installation Productivity Option)
- Fast Service Upgrade (FSU) made release-to-release migration simpler

VSE/SP V3 (1987):

- Packaging concept of ‘Base’ and ‘Optional’ products
 - ‘Base’ is an integrated package containing key, commonly used products
 - ‘Optional’ products are coordinated and shipped and serviced with the Base
- 12 partitions
- Virtual Address Extensions (VAE) supporting up to 9 address spaces
- New Librarian
- Interactive User Interface (IUI)
- Conditional JCL
- Capacity based pricing



```

BG 0000 * STEP 0 EXECUTED
BG 0000 * STEP 1 EXECUTED
BG 0000 * STEP 2 EXECUTED
BG 0000 * STEP 1 EXECUTED
BG 0000 * STEP 2 EXECUTED
BG 0000 * STEP 3 EXECUTED
BG 0000 EOJ DPPETE
  
```

Figure 3: Console Listing Showing the Order of Program Execution

```

CATALOG PROC2.PROC REPLACE=YES DATA=YES
// GOTO &STEP
/. STEP0
* STEP 0 EXECUTED
/. STEP1
* STEP 1 EXECUTED
/. STEP2
* STEP 2 EXECUTED
// IF $SRC EQ '0000' THEN
// SETPARM STEP=STEP5
// IF $SRC EQ '0000' THEN
// GOTO END
/. STEP3
* STEP 3 EXECUTED
/. END
/+
CATALOG PROC3.PROC REPLACE=YES DATA=YES
// GOTO &STEP
/. STEP4
* STEP 4 EXECUTED
/. STEP5
* STEP 5 EXECUTED
/. STEP6
* STEP 6 EXECUTED
/. END
/+
  
```

Figure 4: Branch Forward Procedure

The VSE history



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VSE and the Cat



- IBM introduced Extended Architecture (XA) to System/370 early 1983
 - 31-bit architecture expanding address range to 2 GB
 - Delivered first with the IBM 3081
 - IBM 4381 supported XA
 - MVS/XA and VM/XA
- VSE/SP was still S/370 mode only (16-bit architecture)
 - Customer concerns: ***Is VSE left behind by IBM ?***
- Many “industry experts” ridiculed the mainframe
 - The PC and Client/Server represent the future



“I predict that the last mainframe will be unplugged on March 15, 1996.”

Stewart Alsop, March 1991

Reports of the death of the mainframe were premature



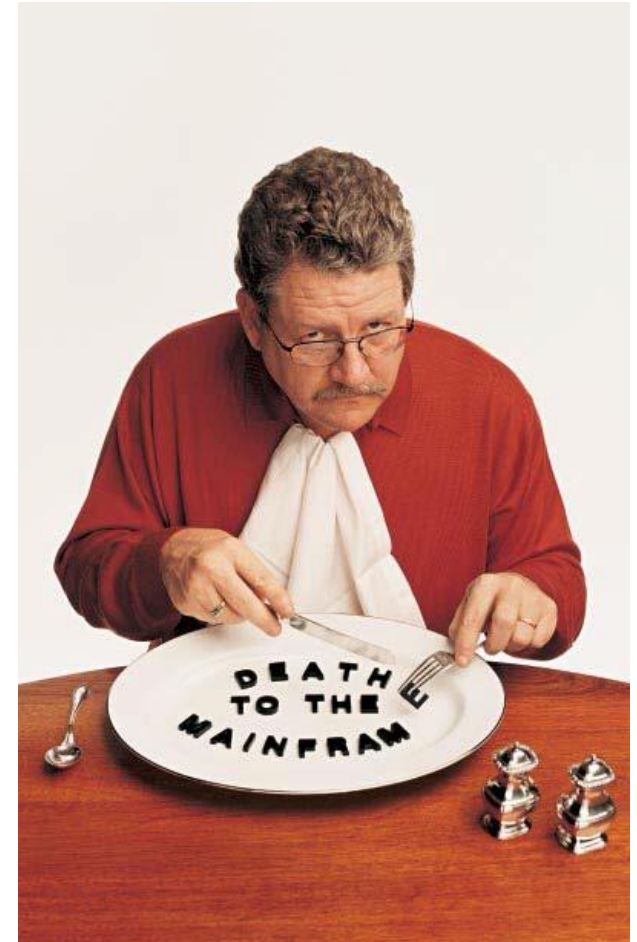
“I predict that the last mainframe will be unplugged on March 15, 1996.”

– *Stewart Alsop, March 1991*

“It’s clear that corporate customers still like to have centrally controlled, very predictable, reliable computing systems – exactly the kind of systems that IBM specializes in.”

– *Stewart Alsop, February 2002*

Source: IBM Annual Report 2001



VSE/ESA Version 1 was introduced with the ES/9000



“Project Blue” announcement in 1990: IBM Enterprise System/9000

- New ES/9000 processor family: ES/9021, ES/9121, ES/9221
 - ESCON channels
- Enterprise Systems Architecture (ESA)
 - MVS/XA → MVS/ESA
 - VM/XA SP → VM/ESA
 - **VSE/SP → VSE/ESA**



VSE/ESA



▪ VSE/ESA V1

- 31-bit real memory support, then added 31-bit virtual addressing
- Dynamic partitions
- Virtual storage constraint relief (VSCR)
 - Move ACF/VTAM and POWER out of shared partitions
 - Dynamic channels (XA channel subsystem)
 - Up to 1024 devices for added I/O bandwidth
- ESA exploitation (later releases)
 - ESA data spaces
 - Virtual disk in storage
 - ESA access registers
- New versions of CICS/VSE, ACF/VTAM, VS COBOL II
 - For greater MVS affinity

▪ In 1993, an imaginary VSE/ESA customer might have

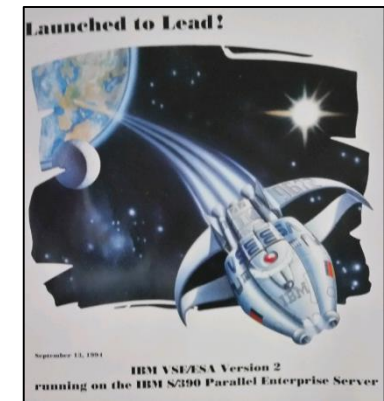
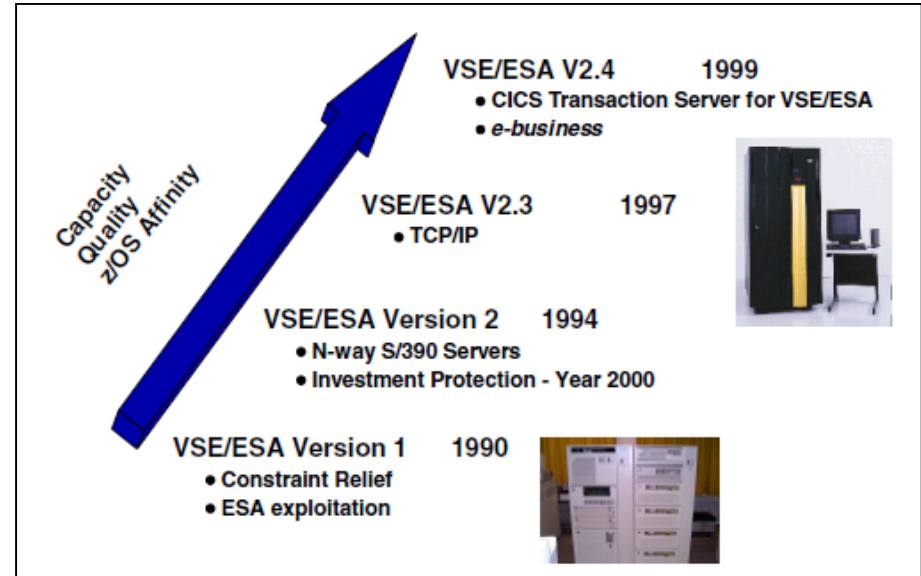
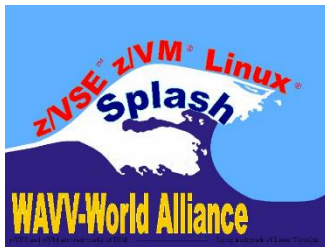
- a ES/9221-150 system with 128 MB main memory
- 8 IBM 9336 disk drives (470 MB per actuator in early models)
- IBM 3490 tape unit



VSE/ESA



- Focus on
 - Capacity
 - Quality
 - MVS 'affinity'
- Working more closely with ISVs
 - Engaged ISVs prior to GA
- VSE/ESA Version 2
 - N-way support for S/390 Parallel Enterprise Server
- WAVV user group formed in 1995
 - spin-off of GUIDE user group (U.S.)
 - First conference was held in October of 1995 in Winston Salem



VSE/ESA Version 2



VSE/ESA V2.2 (1996)

- Year 2000 ready

VSE/ESA V2.3 (1997)

- optional Turbo dispatcher, support for n-way processors
- VSAM KSDS > 4GB
- TCP/IP for VSE/ESA (native), offered under agreement with CSI
- ACF/VTAM V4.2
- LE and LE-based languages: COBOL, PL/1, C for VSE/ESA

VSE/ESA V2.4 (1999)

- CICS Transaction Server (TS)
 - Affinity with OS/390 CICS
 - CICS/VSE still shipped until z/VSE V4.2

VSE/ESA V2.5 (2000)

- Connectors (VSE and Java-based components)



Multiprise 2000 & 3000 Servers



S/390 Multiprise 2000 Servers (1996)

- Year 2000 ready
- Internal Disk feature
 - Up to 288 GB in 3380/3390 format (ECKD)
- First CMOS Cryptographic Coprocessor (optional feature)
- 1 to 5-way processing units
- 128 MB to 4 GB memory
- Up to 10 LPAR partitions

S/390 Multiprise 3000 (1999)

- Up to 4 GB memory and 1 or 2 processors
 - Configurable as CP or IFL (integrated Facility for Linux)
- Up to 216 GB internal disk storage (plus 288 GB with expansion unit)
- Up to 15 LPAR partitions



Linux on System z - How it began



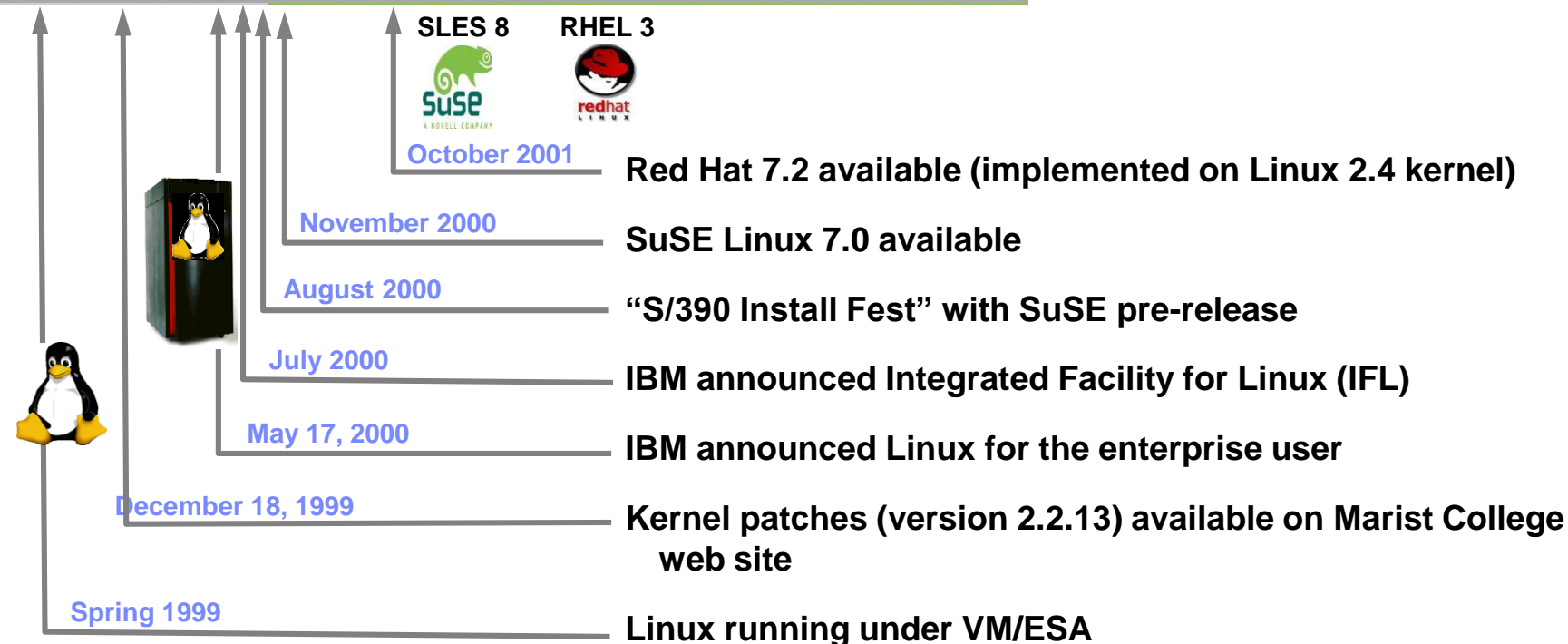
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"Our Linux initiative and our relationship with the Linux community have had a major impact on the IBM culture... I am convinced that this kind of collaborative culture is required for businesses that want to be innovation leaders in the 21st century."

- Irving Wladawsky-Berger

1999 2000 2001 2002 2003 2004 2005 2006

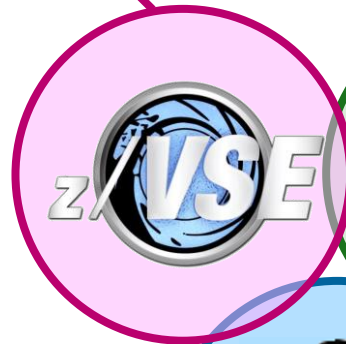


Introducing the new z/VSE Strategy



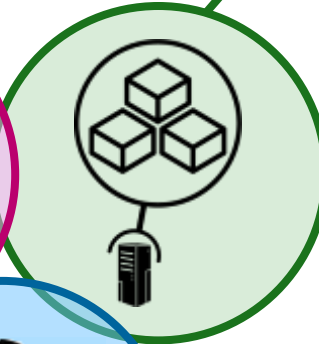
Protect existing investments

Legacy applications and data on z/VSE



Integrate with other Systems

*Connect to, and run backend System z applications
z/VSE Connectors to Java capable clients*



Extend for new workloads

Use the combination of Linux on System z and z/VSE

*The basic z/VSE strategy is as simple as **PIE**:*

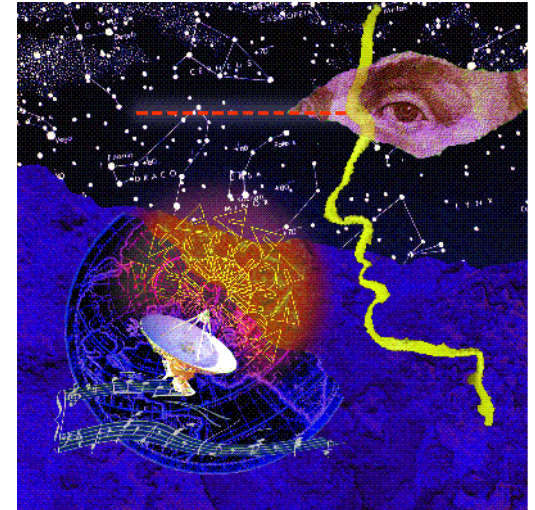
- **Protect**
- **Integrate**
- **Extend**



The VSE history



- How it began – DOS/360
- DOS/VS – added virtual storage capability
- DOS/VSE – “extended” version of DOS/VS
- SSX/VSE – Small System Executive
- VSE/SP – System Product
- VSE/ESA – 31-bit VSE version
- **z/VSE – today’s VSE**



z/VSE



▪ z/VSE V3

- 31-bit mode only
 - No z/Architecture, no 64-bit mode
- FCP-SCSI support

▪ z/VSE V4

- 64-bit real memory addressing
 - No support of 64-bit virtual memory addressing
- MWLC pricing
- Fast Path to Linux on System z

▪ z/VSE V5

- 64-bit virtual memory addressing

▪ z/VSE V6

- New CICS

Z JOURNAL

Virtual Addressing

With z/VSE: From 24-Bit to 64-Bit

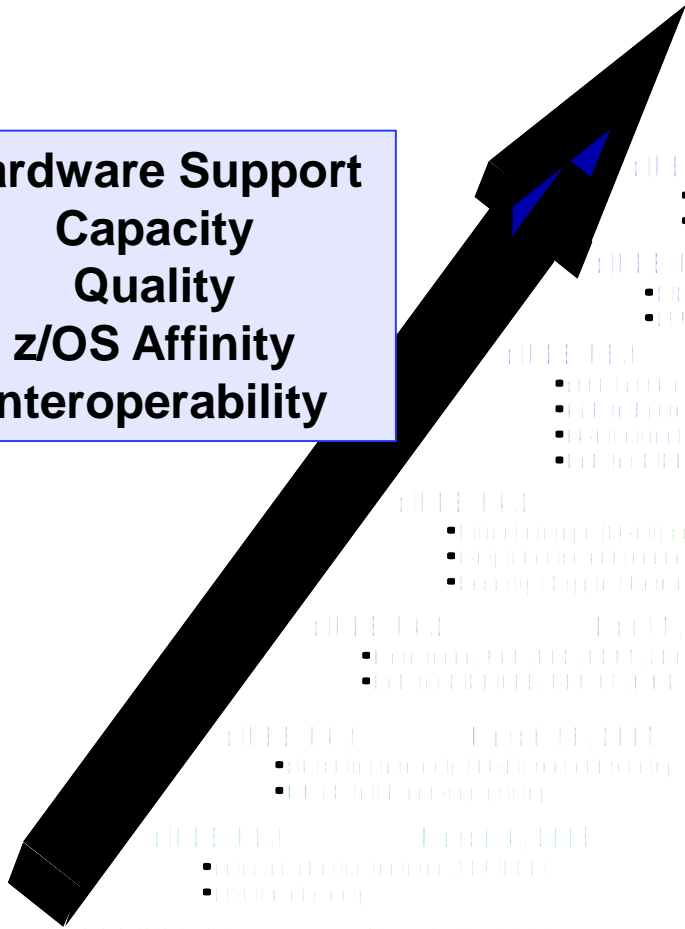
By Ingolf Salm

The 64-bit virtual support introduced in z/VSE 5.1, available since November 2011, lifts a boundary and provides more options for growth and new applications. Before we consider how 64-bit virtual is implemented and what it provides, let's examine the evolution of real and virtual addressing in VSE. >

z/VSE Evolution



**Hardware Support
Capacity
Quality
z/OS Affinity
Interoperability**



z/VSE Evolution Timeline (represented by colored code blocks):

- z/VSE V1 (Red)
- z/VSE V2 (Blue)
- z/VSE V3 (Green)
- z/VSE V4 (Cyan)
- z/VSE V5 (Orange)

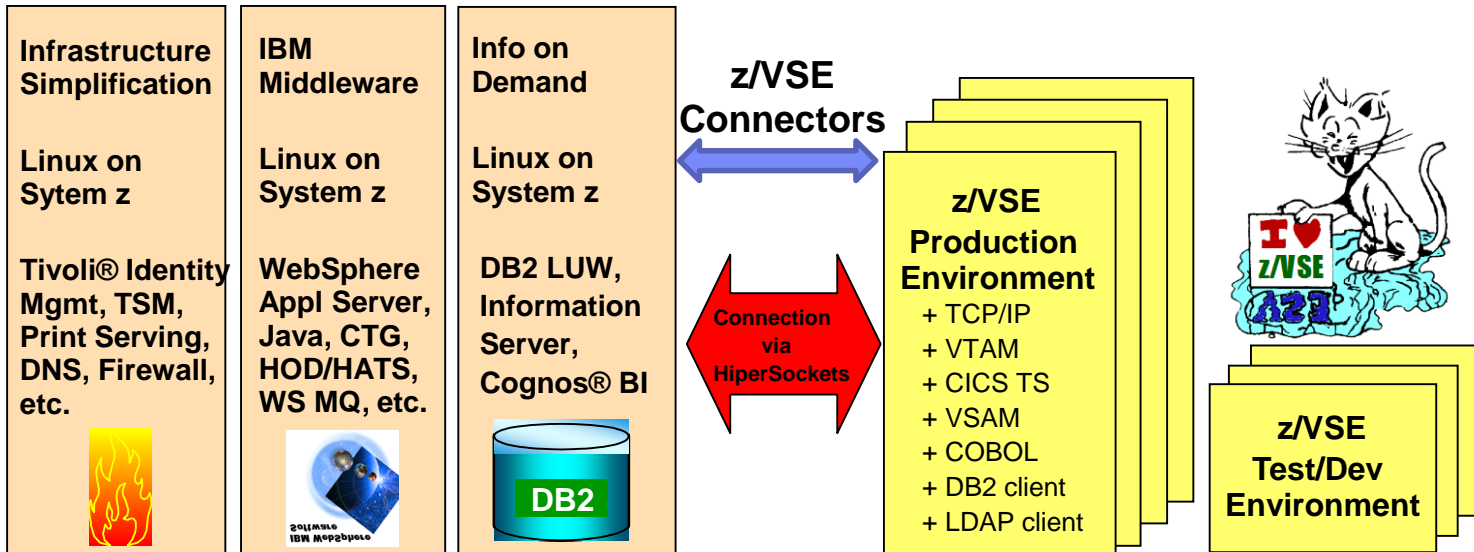


z/VSE Strategy with Linux on z Systems

Hybrid Environment leveraging z/VSE, z/VM, and Linux on System z



- P**rotect existing z/VSE investments
- I**ntegrate using middleware and z/VSE connectors
- E**xtend with Linux on IBM System z technology & solutions



z/VM-mode LPAR with z/VM

IFL Engine(s)

CP Engine(s)

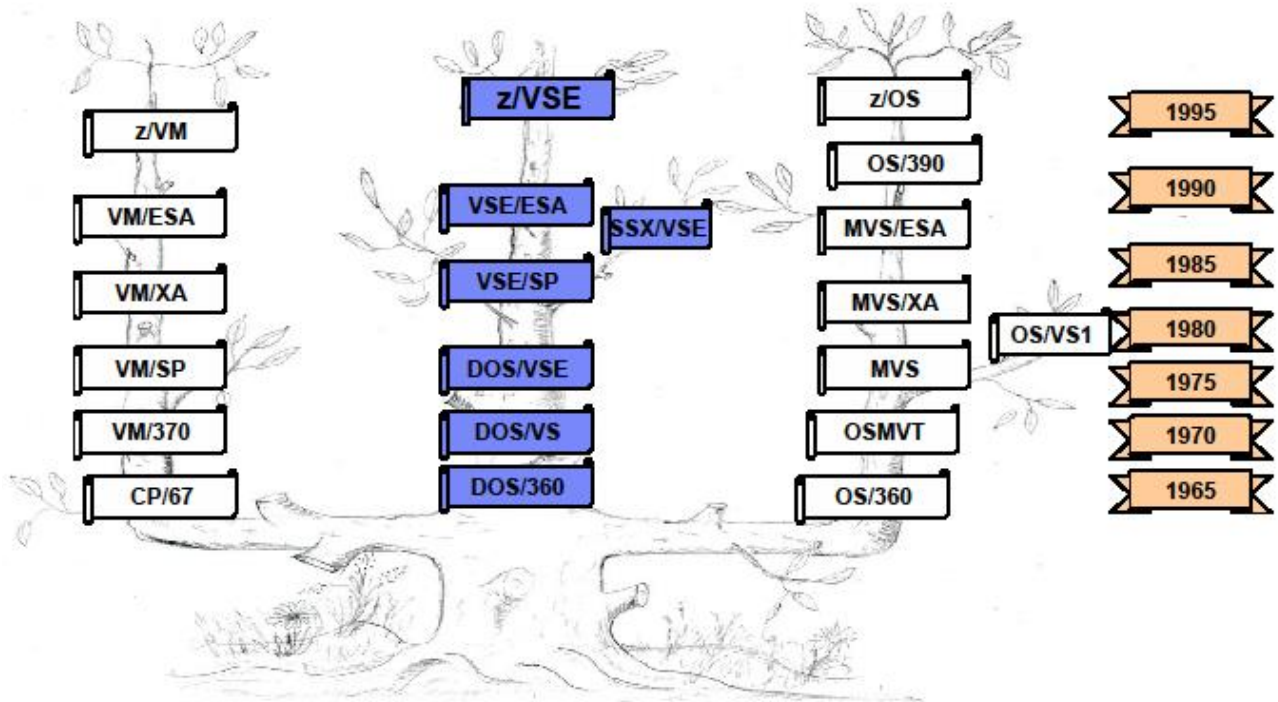
IBM System z10®, IBM zEnterprise: z196, z114, zEC12, zBC12, IBM z Systems: z13

z/VSE Evolution

- DOS/360 to z/VSE
- S/360 – S/370 – 4300 – 9370 – 9x21 – MP2000 - MP3000 – Gx – zServer – System z – z Systems

DOS/360
 DOS/VS
 DOS/VSE
 VSE
 VSE/SP
 VSE/ESA
 z/VSE

45 years

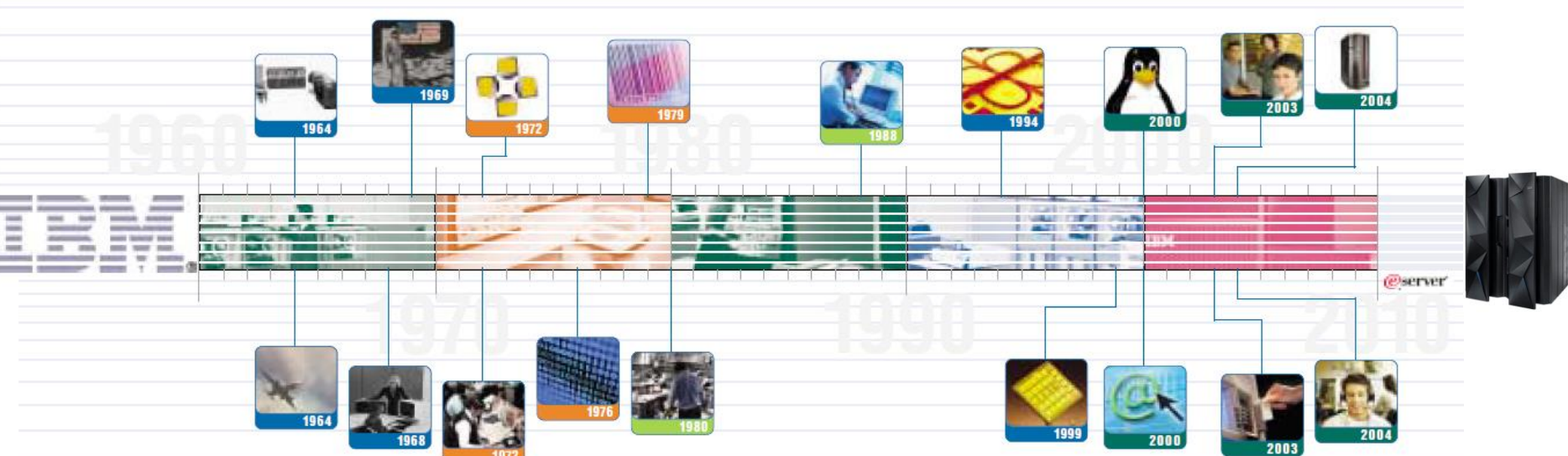


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... and z/VSE is part of this transformation!



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