

Linux for S/390



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S/390 is a registered trademark of the IBM Corporation

IBM  business servers. Technology. Innovation. Magic.

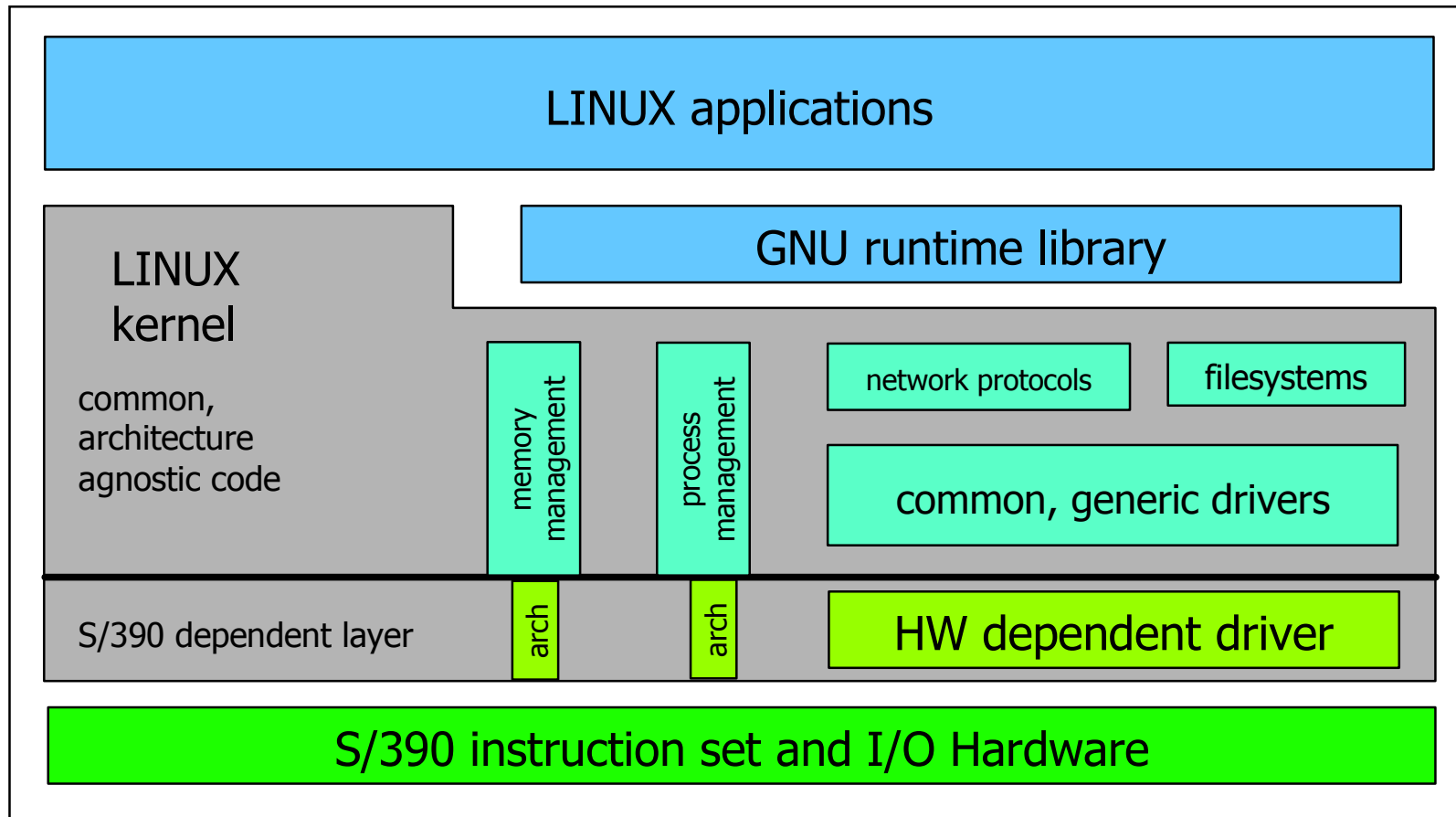


What is Linux ?

- Popular UNIX-like operating system
- Developed by Linus Torvalds in 1991
- Developed & tested by Open Source community communicating via Internet
- Open Source Software distributed under terms of the GNU Public License (GPL)
- Packaged and distributed by distributors which offer support (SuSE, RedHat, Caldera, Turbo Linux, et. al.)



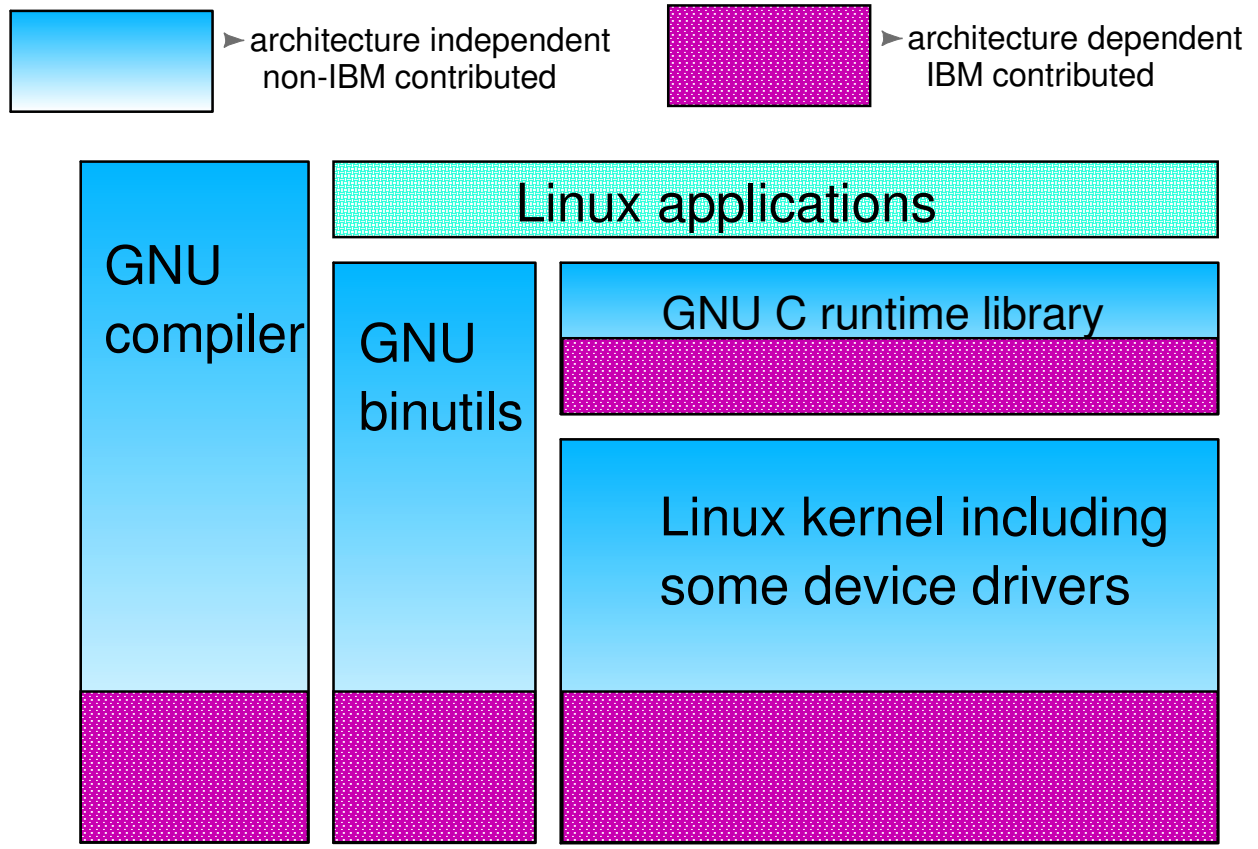
Linux for S/390 structure



Linux - modular and highly portable



Linux for S/390 block structure



The look and feel of Linux does not change on S/390



More about Linux

- **Rapidly Growing Market**
- **IDC estimates 5 - 7 million users not exclusively on Intel systems**
- **Server sales 700k units in 1998 nearly a threefold increase over 1997**
- **Netcraft estimates 58% of Web Servers Run Open Source Operating Systems**
- **IBM supports the Linux Platform in response to customer demand**
- **IBM provides complete e-business solutions which include hardware, software & support for Linux**



Linux for S/390: a brief history

- **November, 1999**

- IBM makes Statement of Interoperability for S/390 Operating Systems and Linux on other hardware platforms

- **December, 1999**

- IBM releases code modifications to Open Source which enable Linux to run on S/390 Hardware
- IBM begins Joint Project with Customers and internal sites using Linux for S/390
- Customers world wide download Linux for S/390 from the Internet and begin experimenting

- **February 2000**

- IBM shows Linux for S/390 at Linux World events in New York and Paris
- Linus Torvalds mentions significance of S/390 platform in keynote address



Interesting facts about Linux for S/390

- **Marist College Linux for S/390 Website - over 20,000 hits**
- **Over 1,100 downloads of Linux for S/390**
 - Over 200 unique, identifiable businesses
- **number of participants in Marist College Linux for S/390 discussion group quadruples since December release to Open Source**
- **Download sites for Linux for S/390 established in Europe and USA**
- **One website boasts over 400 packages and applications compiled for Linux for S/390**
- **Early users contributing press articles on Linux for S/390**
 - Scott Courtney - LinuxToday - "S/390: The Linux Dream Machine"



Linux for S/390 - Who's interested ?

- EDS
- Fujitsu
- Motorola
- US Environmental Protection Agency
- Computer Sciences Corp.
- Towers Perrin
- Thinking Objects Software
- El Camino Resources
- Comparex InformationSystems (Germany)
- Sterling Software
- Hitachi Data Systems
- Amdahl
- Supervalu
- EMC
- Cisco
- Thiokol
- Timken Co.
- Ingram Entertainment
- Ameritech
- Bell Atlantic
- Nortel Networks
- Attachmate
- Deutsche Telekom
- Nationwide Insurance
- U.S. Department of Energy
- Oklahoma Department of Corrections
- and others...



Linux for S/390 - Tools and applications examples

- Apache
- Samba
- Perl
- THE (editor, a clone of xedit)
- Regina (REXX for Linux)
- OpenLDAP
- Xwindows
- KaffeJVM
- IMAP
- SendMail
- Bind



Linux for S/390

What does Linux bring to S/390 ?

- Applications
 - Large selection
 - Rapid deployment
- Skills
 - Large numbers of highly skilled programmers familiar with Linux
 - Strong interest in colleges and universities
- Vendor enthusiasm
 - Major ISV / USV efforts for Linux
- Implementor enthusiasm
 - emerging interest in large datacenters



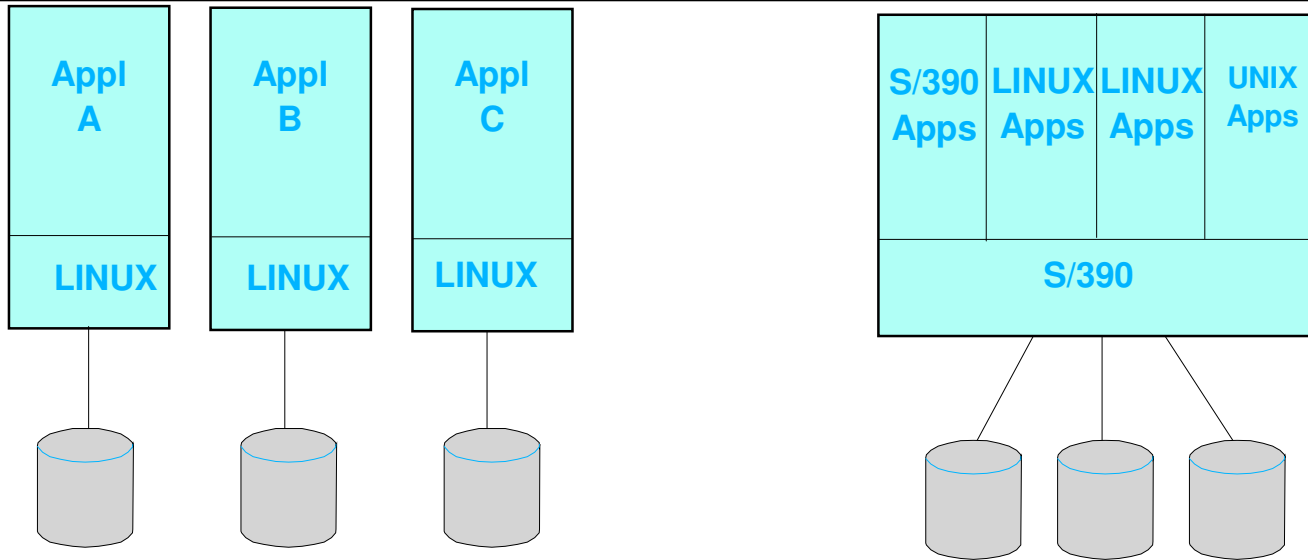
Linux for S/390

Why run Linux on a S/390 ?

- Reliability
 - The most reliable hardware platform available. Period.
 - Over 35 years of constant improvements
- Scalability
 - 15 Linux images possible on native hardware
 - Virtually unlimited Linux images possible with VM/ESA
- Manageability
 - Centralized Linux systems easier to manage / duplicate
 - Use management functions from S/390 operating systems for Linux
 - (e.g. backup, autostart, etc.)



S/390 Linux advantage



- Single application per server
- Separate/partitioned data bases
- Complex system management
- Complex to integrate applications

- Support for diverse work loads
- Multiple applications per server
- Databases shared with integrity
- Less complex system management
- Interoperability and integration between applications



S/390 hardware value for Linux environments

- Industry leading reliability, availability, and serviceability
 - Mean time between failure over 60 years
 - Transparent CPU sparing
 - Error detection and correction
 - Memory chip sparing
 - Remote Support Facility (RSF)
 - Download microcode fixes and updates
 - Concurrent microcode updates
 - "Phone home"
 - And much more.....
- Designed to support mixed work loads
 - Processor Resource System Manager (PR/SM)
 - Ability to scale from small to very large processor configurations
 - Multiple images for consolidation
 - Complete work load isolation
 - Eliminate network latency
 - ESCON Multiple Image Facility (EMIF)
 - Highly efficient memory management



Configuration requirements for native implementation

- Processors
 - G3 - G6
 - Multiprise 2000
 - Multiprise 3000
 - 64MB central storage minimum available for S/390 Linux environment
- Devices
 - DASD support via ECKD driver
 - One 3380 / 3390 / Multiprise Internal Disk volume required
 - Console support (select one, must be available for duration of test)
 - Hardware Management Console
 - 3215 console on coax attached 3174
 - 3215 console on emulated 3174
 - Network support via ESCON CTC or OSA-2 driver (Ethernet or Token Ring)
 - Workstation with CD-ROM for installation (optional)
- Connectivity
 - Access to the Internet to download code and other deliverables



Configuration requirements for VM/ESA Guest implementation

- Processors
 - G3 - G6
 - Multiprise 2000
 - Multiprise 3000
 - 64MB storage minimum available for S/390 Linux environment
- VM/ESA Software
 - VM/ESA Release 2.2 or higher
- Devices
 - DASD support via ECKD driver
 - One dedicated 3380 / 3390 / Multiprise Internal Disk volume required
or
 - One 500 cylinder minidisk
 - Console support (choose one, must be available for duration of test)
 - Hardware Management Console
 - 3215 console on coax attached 3174
 - 3215 console on emulated 3174
 - Network support via ESCON CTC or OSA-2 driver (Ethernet or Token Ring)
 - Workstation with CD-ROM for installation (optional)
- Connectivity
 - Access to the Internet to download code and other deliverables



Linux for S/390 Value Add for VM, VSE and TPF customers

- An alternate application platform for VM, VSE, and TPF customers
 - Linux offers a growing set of server and middleware products not available on VM, VSE, and TPF (e.g., Domino, WebSphere, MQ Server)
 - Linux offers richer Java and UNIX environments
- Linux can surround VM, VSE, and TPF systems without introducing other server platform(s)
 - Promoting exploitation of existing VM, VSE, and TPF applications while opening the door to new technology Linux applications
 - Cost Savings from server consolidation and system administration
 - Accessing VM, VSE, OS/390, and TPF data and applications without requiring network traffic (virtual CTC and IUCV)
- Linux products from IBM and ISVs will be functionally richer than their less dynamic counterparts (e.g., DB2 UDB)



VM/ESA Hypervisor Utility Value Checklist

	OS/390	VSE	TPF	Linux
<u>Performance</u>				
Virtual Disks in Storage		✓		✓
Minidisk cache	✓	✓	✓	✓
DB2 Guest Sharing (S/390 Dataspace exploitaiton)		✓		
High-performance virtual machine networking	✓	✓	✓	✓
N-way processor exploitation	✓	✓	✓	✓
Page fault handshaking		✓		
Transparent S/390 architecture exploitation (native code not req'd)	✓	✓	✓	✓
Fastpath CCW support	✓	✓	✓	
<u>Productivity</u>				
Temporary Disks (TDISK)		✓		✓
Resource simulation and virtualization	✓	✓	✓	✓
Complex environment testing without duplicating real hardware	✓	✓	✓	✓
Virtual processor support for SMP testing	✓	✓	✓	✓
Resource sharing (DASD, printers, I/O, memory, processors, etc.)	✓	✓	✓	✓
PVMG support for VSE VTAM sessions	✓	✓	✓	
Device-independent I/O support				✓
Guest Coupling Facility	✓		✓	
<u>RAS</u>				
S/390 error recovery (processors, I/O, etc)	✓	✓	✓	✓
Dynamic multi-image support for scaleability, hot backup, debug, etc	✓	✓	✓	✓
<u>Operations</u>				
Virtual machine controls, scheduling and automation	✓	✓	✓	✓
Performance measurement, reporting and management	✓	✓	✓	✓
Rapid creation and deletion of guest images	✓	✓	✓	✓
IPL from a VM saved segment	✓	✓	✓	✓
Dynamic I/O reconfiguration, CP Sparring, FICON	✓	✓	✓	✓



Some important websites and contacts for Linux for S/390

IBM developerWorks website with Linux for S/390 modifications

<http://oss.software.ibm.com/developerworks/opensource/linux390/index.html>

Marist College Linux for S/390 Download site

<http://linux390.marist.edu>

Marist College Linux for S/390 discussion group

Listserv@vm.marist.edu

send note with body SUBSCRIBE LINUX-VM your name

Princeton University Linux for S/390 site - compiled tools / applications

<http://penguinvm.princeton.edu/>

Thinking Objects Linux for S/390 site - over 400 compiled tools / applications

<http://linux.s390.org>