Linux for S/390 - It's cool Part 1

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Agenda - Part 1

- **Background**
- **Attributes**
- **Why Linux on S/390 ?**
- **System Structure**
- **System Requirements**
- **Platform Support**
- **Middleware / Applications / Tools**
- **Summary**
- **Linux for S/390 on the Web**

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Background

Linux for S/390

- What is Linux ?
  - A popular UNIX system, developed by Linus Torvalds in 1991
  - Portable, with support for numerous hardware platforms
  - Available in source code, under GNU General Public License (GNU GPL)
  - A very stable operating system, developed and tested by 1000s of programmers world wide
  - Fast reaction to market requirements
  - Lots of different distributiors, like Red Hat, SuSE, Caldera, Turbo Linux, Debian, and many others

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Background

Linux for S/390

- More facts about Linux ...
  - The number of Linux users grew from about 1,000 in 1992 to about 9 million last year, according to the Tower Group.
  - Linux is the fastest growing server operating system, growing at 166% last year, according to IDC.
  - Netcraft estimates 58% of Web Servers Run Open Source Operating Systems
  - IBM supports the Linux Platform in response to customer demand

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Background (cont.) Linux for S/390

- Linux for S/390
  - The project was initiated by a small development team in the IBM development laboratory in Böblingen/Germany
  - Open source in the internet 12/1999 under GNU GPL
    - first refresh 02/2000
    - second refresh 05/2000
    - permanent support for the open source community

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Background (cont.) Linux for S/390

- Linux for S/390
  - The source packages adapted to S/390 includes
    - kernel 2.2.13 (12/99) / 2.2.14 (2/00) / 2.2.15 (5/00)
    - gcc 2.95.1 (12/99) / 2.95.2 (5/00)
    - gdb 4.18
    - binutils 2.9.1
    - glibc 2.12
    - strace 3.1.0.1
  - Early users contributing press articles on Linux for S/390
    - Scott Courtney - LinuxToday - "S/390: The Linux Dream Machine"

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Background (cont.) Linux for S/390

- **Base Assumptions**
  - **Linux is Linux**
    - only adaptations required to match S/390 architecture
    - no modifications at the common code
    - Linux system structure remains untouched
  - **S/390 is S/390**
    - no adaptation layer required to run Linux
    - the S/390 architecture is sufficient to run Linux

➡ **Combine the strengths of Linux and S/390**

➡ **don't try to reinvent a S/390 specific Linux**

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Background (cont.) Linux for S/390

- **Proof of Concept**
  - **More than 400 Linux packages have been "ported"**
    - Apache, Samba, Xlib, Gimp, Gnome, Regina (REXX), THE (Xedit), (X)Emacs, Perl, OpenLDAP, OpenSSL, IMAP, Sendmail, Bind, Bochs, and many others more ...

➡ **Usually the porting "effort" was just a recompile only !**

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Attributes — Linux for S/390

- Linux for S/390 is a true Linux port
  - No API emulation layer on OS/390
  - Fully ASCII based
  - IEEE floating point support
- Runs on CMOS processors G2 or more recent
  - P/390, R/390
  - Integrated Server
  - Multiprise 2000 / 3000
  - 9672 Rx2 +

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Attributes (cont.) — Linux for S/390

- S/390 system environments
  - VM guest
  - Logical Partition (LPAR)
  - Native
- IPL / boot support
  - VM reader
  - Tape, including emulated tapes (Optical Media Attach)
  - Disk (ECKD)
  - HMC/SE CD-ROM IPL support * new * with MCL updrade

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Attributes (cont.)

Linux for S/390

- Multiprocessing support
  - Hardware : 12 way
  - VM guest : 32 way

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Why Linux on S/390

Linux for 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

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Why Linux on S/390 — Linux for 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.)
  - Simplified management - One server versus many

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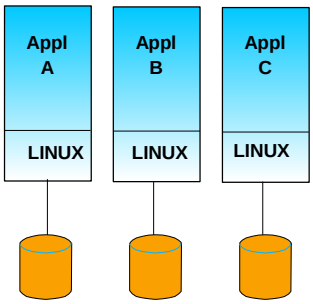
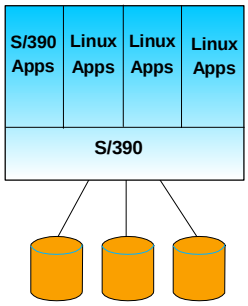
Linux Scenarios — Linux for S/390



- 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

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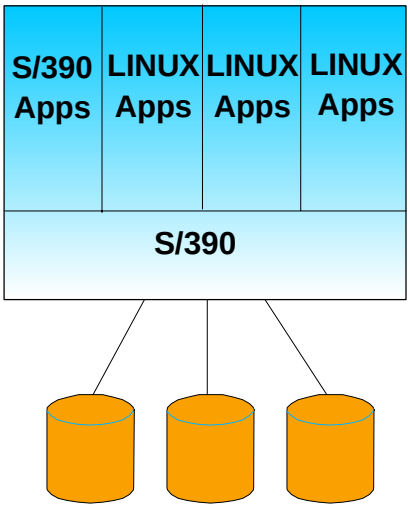
Linux Scenarios

Linux for S/390

- **S/390 Qualities of Service**
  - Leverage S/390 Technology
  - Low latency networking to Backend Transaction Data
- **Reduce Total Cost of Computing**
  - Large Horizontal growth through Virtual Servers
  - Low Administration and Management Overhead
  - Flexible, Fast Server Deployment



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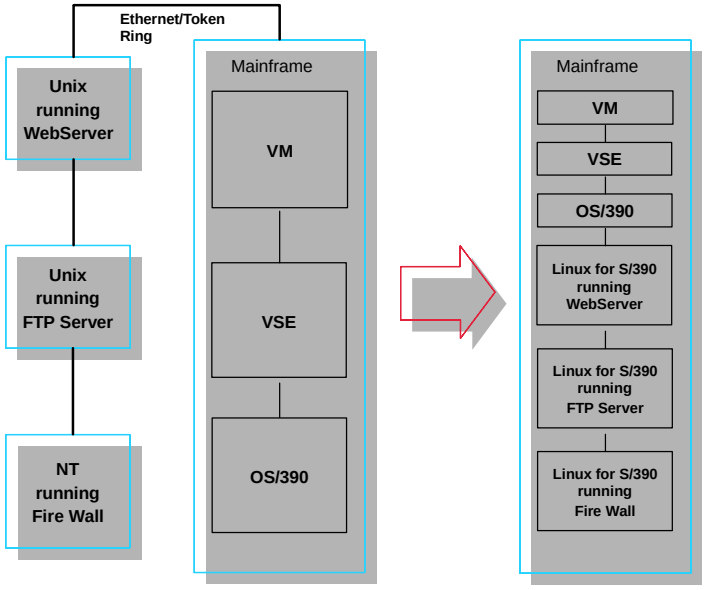
Linux Scenarios

Linux for S/390

- **Linux server consolidation**



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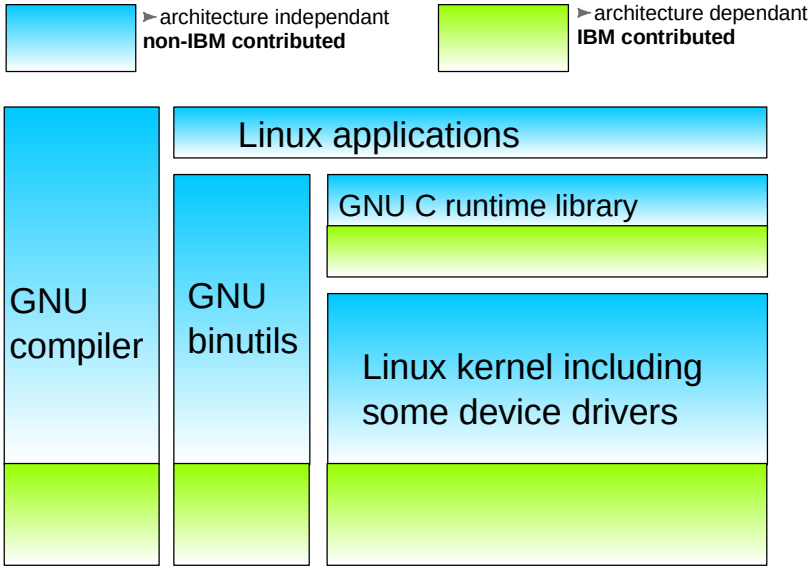
System Structure — Linux for S/390



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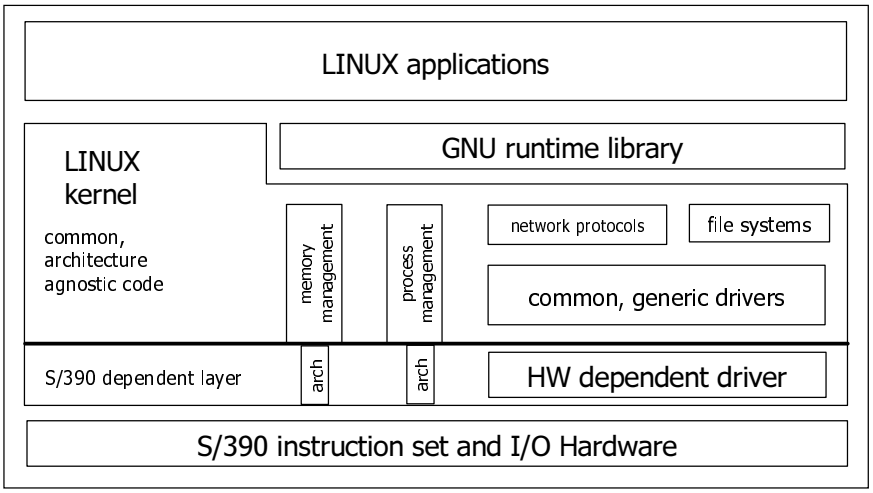
System Structure — Linux for S/390



Linux - modular and highly portable

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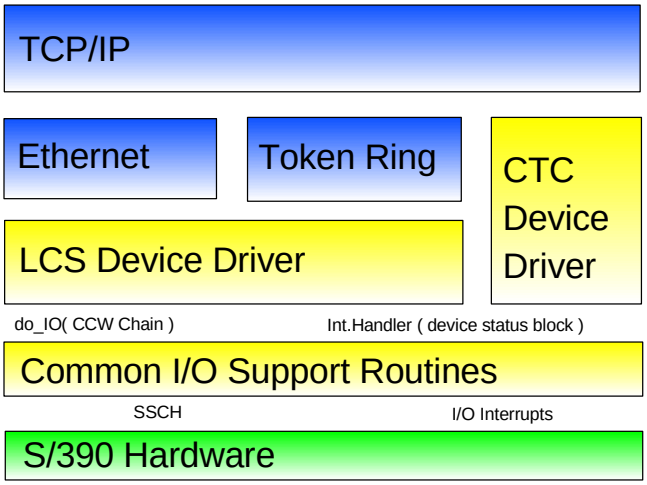
System Structure

Example for network support



- **Common Linux**
- **Linux for S/390 architecture specific code**
- **S/390 Hardware**

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Device Support

- **Common I/O Support**
  - **Allow for 64k subchannels**
  - **Dynamic device attach / detach**
- **System Console Support**
  - **Integrated Console at the Support Element (SE)**
  - **Hardware Management Console (HMC)**
  - **3215 line mode (VM, P/390, R/390, IS/390)**
- **Disk Support**
  - **ECKD (3990/3390, 3990/3380, 9345, ...)**
  - **Reserved VM Minidisks (CKD, ECKD, FBA)**

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Device Support

Linux for S/390

- Network Support
  - Ethernet, Token Ring, Fast Ethernet (FE), ATM LAN Emulation (ATM LE)
  - IUCV (VM)
  - ESCON, and parallel CTCA (incl. VCTCA - VM)
  - OSA-2 (EnTr, FE, ATM LE)
  - LAN Channel Station (LCS) protocol
  - OSA Express Fast Ethernet (LCS)
  - 3172 - real, emulated (LCS)
  - IBM 2216 Router (LCS - ESCON connected)
- Tape Support
  - 3480/3490 (in development)

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System Requirements

Linux for S/390

- Processor Requirements
  - 9672 Rx2 - Rx7
  - Multiprise 2000 / 3000
  - Integrated Server
  - P/390, R/390
- Memory Requirements
  - 64 MB+
- Disk Space Requirements
  - 500 Cyl + (3390)

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Where to get ... Linux for S/390

- **Marist College**
  - limited contents "distribution" based on the Linux for S/390 source deltas with about 100+ packages compiled.
- **SuSE**
  - SuSE announced to release a Linux for S/390 distribution in 2H2000
- **TurboLinux**
  - TurboLinux announced to release a Linux for S/390 distribution in 2H2000

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Software ... Linux for S/390

- **IBM**

Product / Package	Availability
DB2 Connect / DB2 UDB	Beta 3Q00 / Avail. 4Q00
IMS Connect	Beta 3Q00 / Avail. 4Q00
Webspere 3.5 on JVM 1.2.2	Beta 3Q00 / Avail. 4Q00
MQSeries	Beta 3Q00 / Avail. 4Q00
CICS Transaction Gateway	Beta 3Q00 / Avail. 4Q00

- **Software AG**
  - Tamino XML Information Server
- **BMC**
  - BMC Patrol

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Support ...

- IBM Global Services will offer ...
  - Consulting and planning services
  - Implementation services
  - Infrastructure design
  - Application enablement services
  - Database enablement services
  - Defect and remote technical support for SuSE and TurboLinux distributions

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Linux Strategy ...

- S/390 is pursuing ...
  - Evaluation of Linux marketplace - especially high end servers
  - Using S/390 Linux to complement S/390 Operating Systems and leverage enterprise data
  - S/390 hardware value for Linux environments
- S/390 is not pursuing ...
  - A unique version of Linux
  - A Linux personality on another operating system
  - Replacing an existing operating system with Linux for S/390

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Summary ... Linux for S/390

- **Linux for S/390 is no a replacement for existing S/390 operating system environments**
  - **Complementary system environment**
  - **Exploit S/390 'Quality of Service' for UNIX style customer applications**
  - **Brings Linux product portfolio to S/390**
  - **A single, common development / run-time environment : develop anywhere what you want to run on the host**

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Summary ... Linux for S/390

- **Linux for S/390 is no replacement for existing S/390 operating system environments (cont.)**
  - **Allows for heterogenous software solutions on single hardware platform**
    - **Allows for powerful connection of traditional S/390 applications to Linux/UNIX type applications**
    - **Allows for integrated Linux-OS/390, or Linux-VSE software solutions**

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Internet Web sites Linux for S/390

- IBM S/390 Linux Website
  - http://www.ibm.com/s390/linux/
- 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
- Princeton University Linux for S/390 site - compiled tools / applications
  - http://penguinvm.princeton.edu/

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Internet Web sites Linux for S/390

- Millenux Linux for S/390 site - over 400 compiled tools and applications
  - http://linux.s390.org
- Marist College Linux for S/390 discussion group
  - Listserv@vm.marist.edu
  - send note with body SUBSCRIBE LINUX-390 your name

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