

# LINUX<sup>®</sup> for S/390 Redefining Open Standards

*WAVV 2000*



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# Next Generation e-business

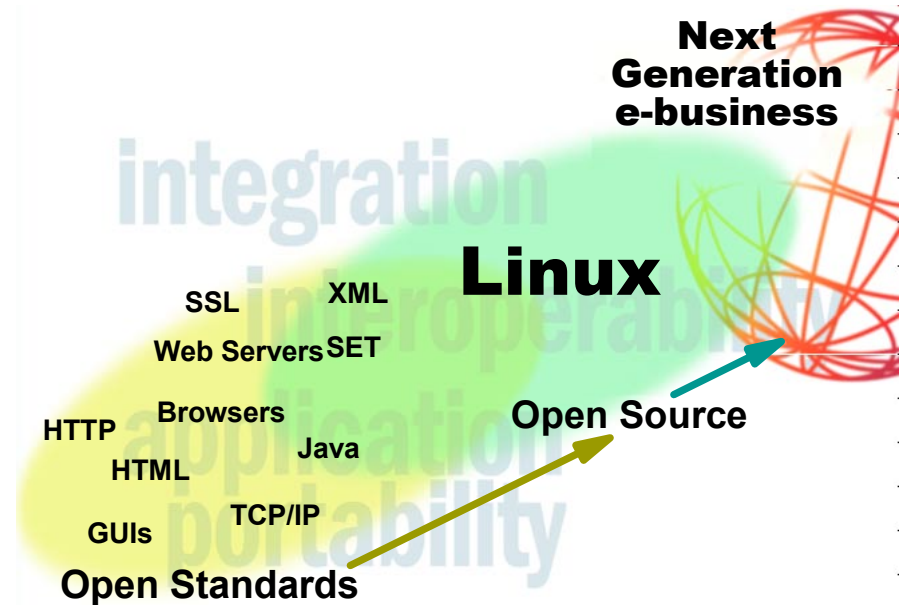
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More connectivity,  
more devices

- Data transaction servers
- Web application servers
- Appliance servers
- Pervasive devices

Next generation e-business

- Technology advances
- Increased integration
- Business innovation
- Standards and open source



***“Linux will do for applications what the Internet did for networks”***

Irving Wladawsky-Berger

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# What Is Linux?

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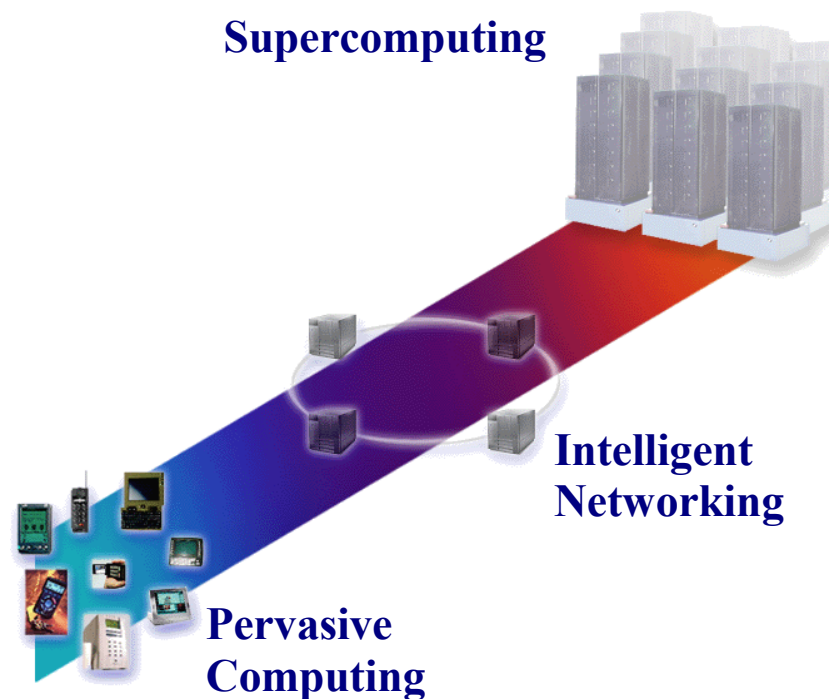
A fully-networked UNIX-like operating system

"Free" Open Source software

Multi-user, multitasking, multiprocessor

Coexists with other operating systems

Runs on multiple platforms



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# Linux Momentum Building

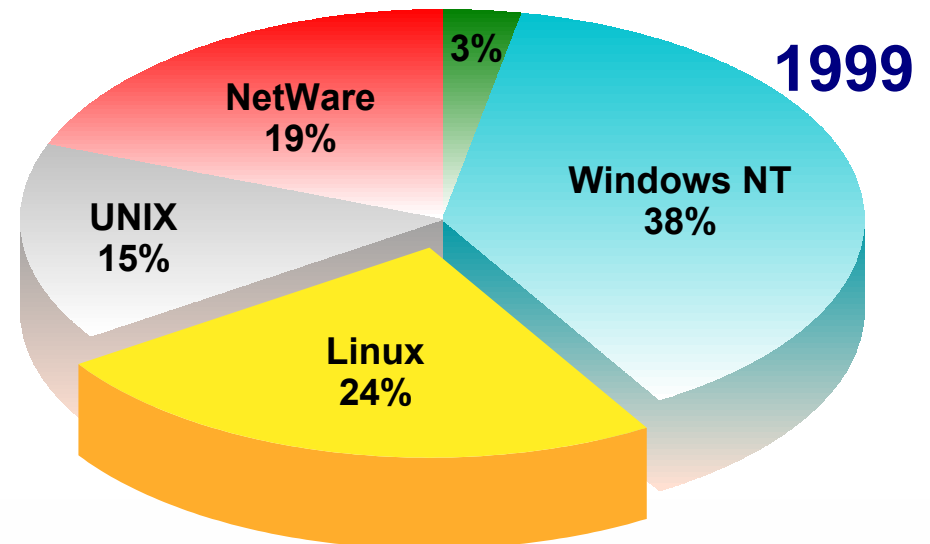
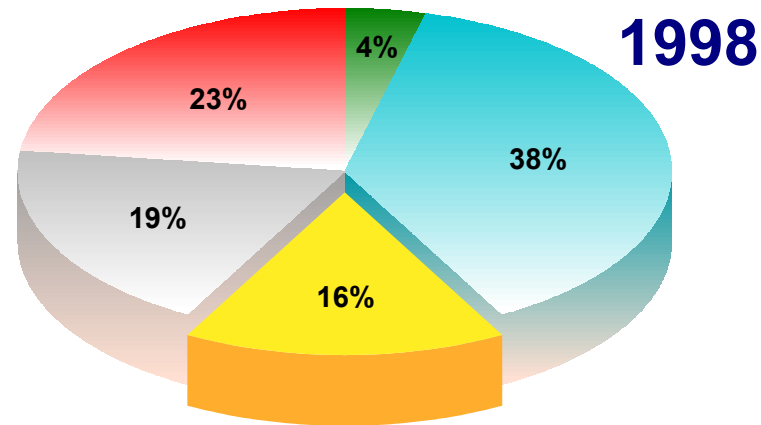
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## New server operating system shipments

Linux server shipments grew 93% from 1998 to 1999

Now the #2 volume operating system

Fastest growing server operating system



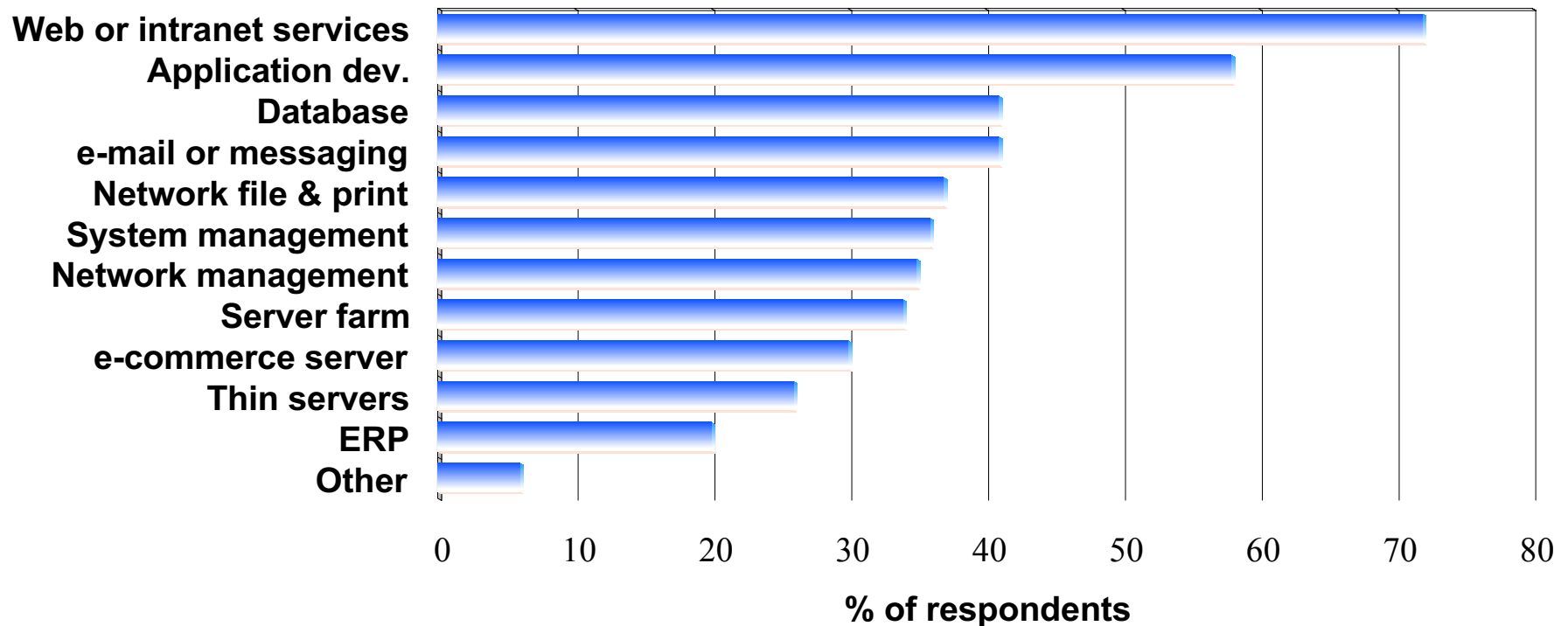
Source: IDC "Server Operating Environments Market Forecast & Analysis" June 2000

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# Linux Momentum Building ...

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## Server-based Use Of Linux In The Next 12 Months



**7/98 Survey: 3% IT managers had plans in 2 years**

**3/99 Survey: 14% claim use of Linux**


**12/99 Survey: 26% claim use of Linux, another 11% plan use in 1 year**

Source: InformationWeek Research Survey of 300 IT Managers 24 Jan 2000

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# IBM's Linux Focus

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Focus area	Actions
<b>Hardware</b>	Netfinity servers, ThinkPad and Intellistation clients (Intel-based), RS/6000, S/390 and  systems
<b>Software</b>	Key products ported to Linux (DB2, WebSphere, Lotus Domino, VA Java, MQSeries, etc.)
<b>Services</b>	WW Support, Training, Professional and Consulting Services offerings
<b>Alliances</b>	WW Partners with Caldera, Red Hat, SuSE, & TurboLinux on solution delivery and support
<b>Open source</b>	Significant code contributions and technical resources working with the open source community

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# Why Linux for S/390?

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1. Large number of highly skilled programmers
2. Increased application portfolio
3. Industrial strength Linux environment
4. Large scale server consolidation
5. Highly integrated e-business solution

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# A Brief History Of Linux for S/390

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## October 1999

- Preview of Linux for S/390 technology at WAVV 1999

## December 1999

- IBM contributes code which enables Linux to run on S/390

## January 2000

- Joint Customer Project begins
- Marist College provides first distribution of Linux for S/390

## February 2000

- Linux for S/390 makes its debut at Linux World in New York and Paris, Linus Torvalds mentions one hardware platform in his keynote speech at Linux World - the IBM S/390

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# A Brief History Of Linux for S/390 ...

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## May 2000

- IBM announcement at Vista 2000
- TurboLinux and SuSE as distribution partners
- IBM and ISV software

## August 2000

- IBM S/390 Integrated Facility for Linux
- IBM S/390 Virtual Image Facility for Linux
- Additional IBM and ISV software

## October 2000

- Linux for zSeries
- Red Hat as a distribution partner
- Additional hardware support

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# Press Reaction To Linux for S/390

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"It is a bit of a radical concept, and one that certainly wasn't a mainstream idea until this morning."

– Computerworld, IBM targets Linux at mainframe users, 5/17/00

"The fact that IBM, a company most high-tech watchers wrote off as a dying brontosaur at the beginning of the decade, has managed to outrun the competition in embracing Linux and open source technologies"

– Upside Today, IBM: World's fastest Linux company, 5/31/00

"With Websphere on Linux along with connectors to data on OS/390, you've got a very interesting foundation for e-business and b-to-b transactions"

– Internet Week, Linux Gets Ready for Mainframes - SuSe and TurboLinux plan distributions for IBM System 390, 5/29/00

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# What Is Linux for S/390?

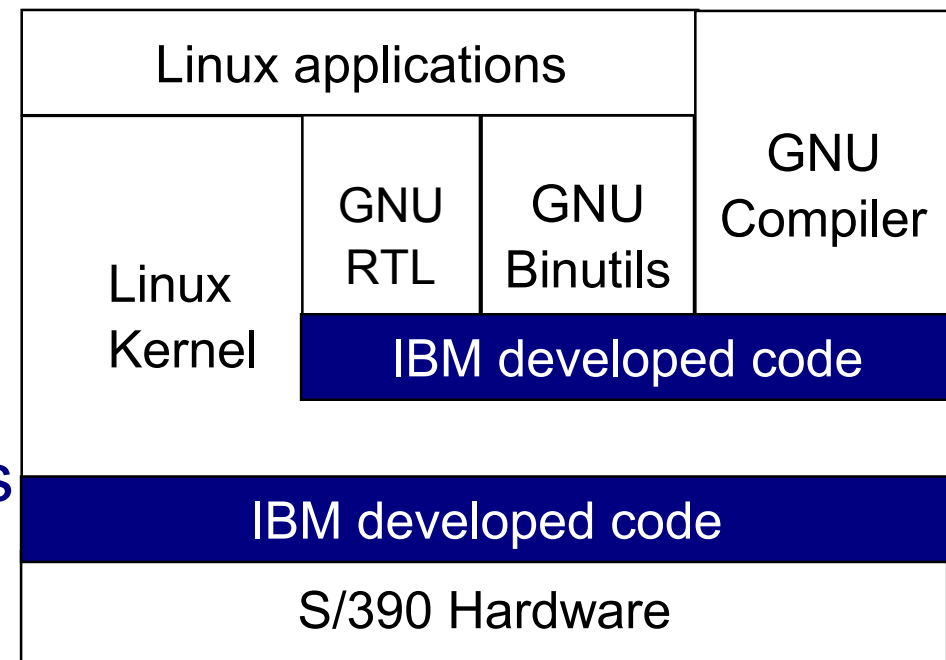
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Runs native, in an LPAR, on IBM S/390 Virtual Image Facility for Linux or on VM/ESA

- Pure Linux, an ASCII environment
- Exploits IBM S/390 hardware, including IEEE floating point

Not a unique version of Linux or other operating system

Not a replacement for other IBM S/390 operating systems



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# What S/390 Brings To Linux

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The most reliable hardware platform available. Period.

- Mean time between failure over 60 years

Error detection and correction

Remote Support Facility (RSF)

- Download microcode fixes and updates
- Concurrent microcode updates
- "Phone home"

Centralized Linux systems easier to manage / duplicate

Use management functions from S/390 operating systems for Linux (e.g. backup, autostart, etc.)

Over 35 years of constant innovation

*And much more ...*

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# What S/390 Brings To Linux ...

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## Scalability

- Physical - scale to very large processor configurations
- Logical - scale to hundreds of Linux images on a single footprint
- Non-disruptive capacity upgrade on demand

## Designed to support mixed work loads

- Allows consolidation while maintaining one server per application
- Complete work load isolation
- High speed inter-server connectivity
- Highly efficient memory management

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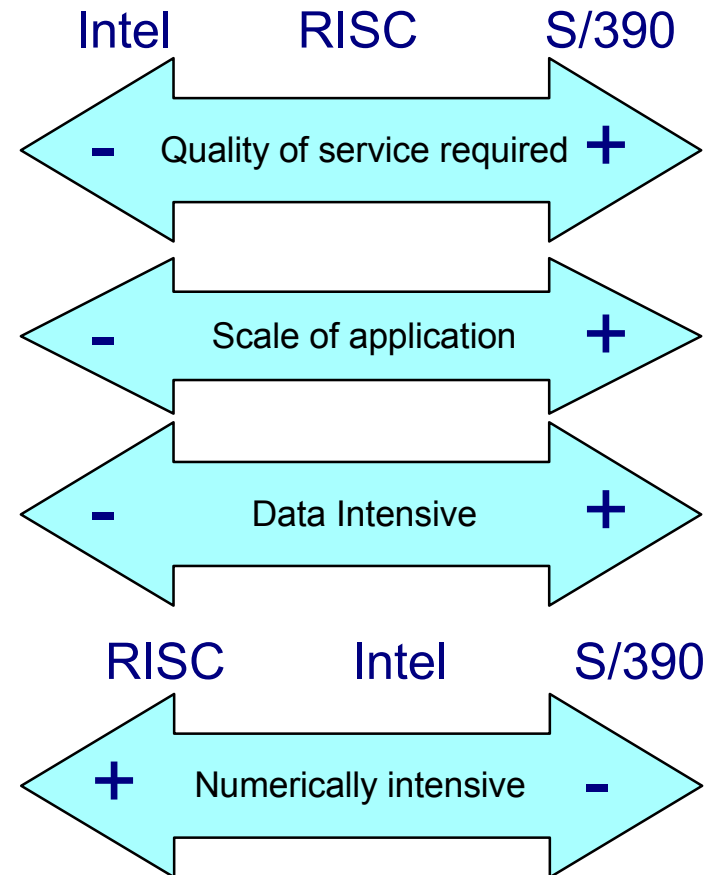
# Linux Architecture Comparison

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## Business considerations

- Existing infrastructure
  - Evaluate current existing capacity
- Expertise
  - Evaluate impact of changing the infrastructure on help desk, systems management etc.
- Long term cost of ownership
  - Systems management costs
  - Growth in number of physical servers
  - Replacement of hardware vs. upgrade

## Technical considerations



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# VSE/ESA Application Sourcing Strategy

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The IBM commitment to VSE/ESA is not affected by this new Linux direction

S/390 and zSeries customers are offered additional opportunities to leverage their VSE/ESA investments through Linux

New doors are opening for VSE/ESA customers to bring Linux-centric workloads to the platform

## Application sources

1. VSE/ESA -- traditional
2. Linux for S/390 and Linux for zSeries
3. Java, Enterprise Java Beans (EJB) and WebSphere

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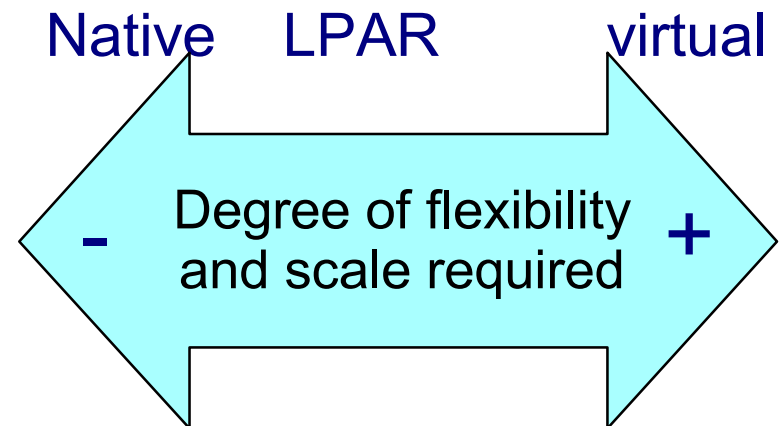


# Native, LPAR Or Virtual Images

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## Considerations

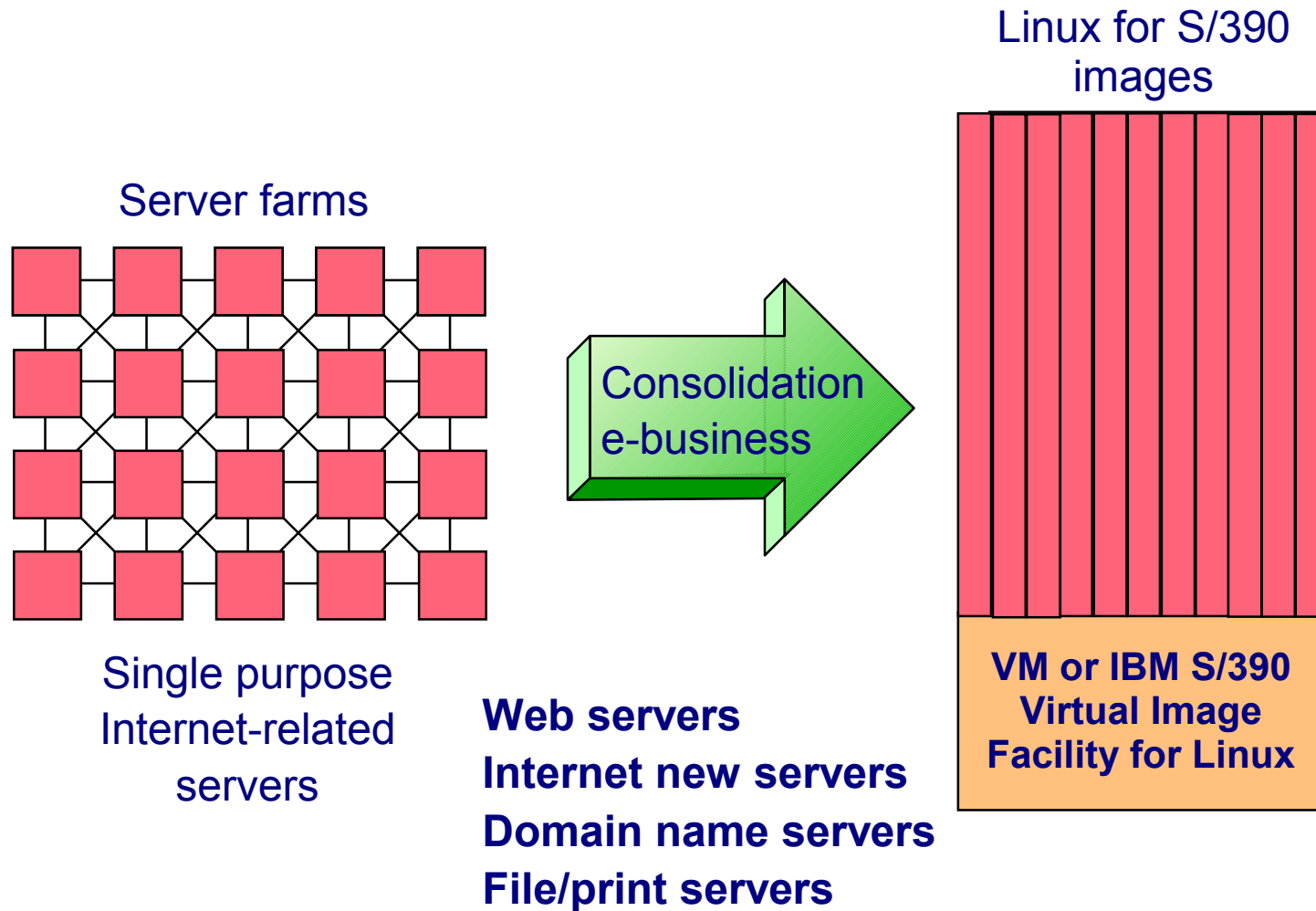
- Available expertise
- Co-residence of other servers
- Frequency of configuration changes
- Number of servers required
  - 1 with native
  - 15 with LPAR
  - Virtual Image Facility gives you 10s to 100s
  - VM gives you 100s to 1000s
- Inter-server communication



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# Consolidation Of Servers

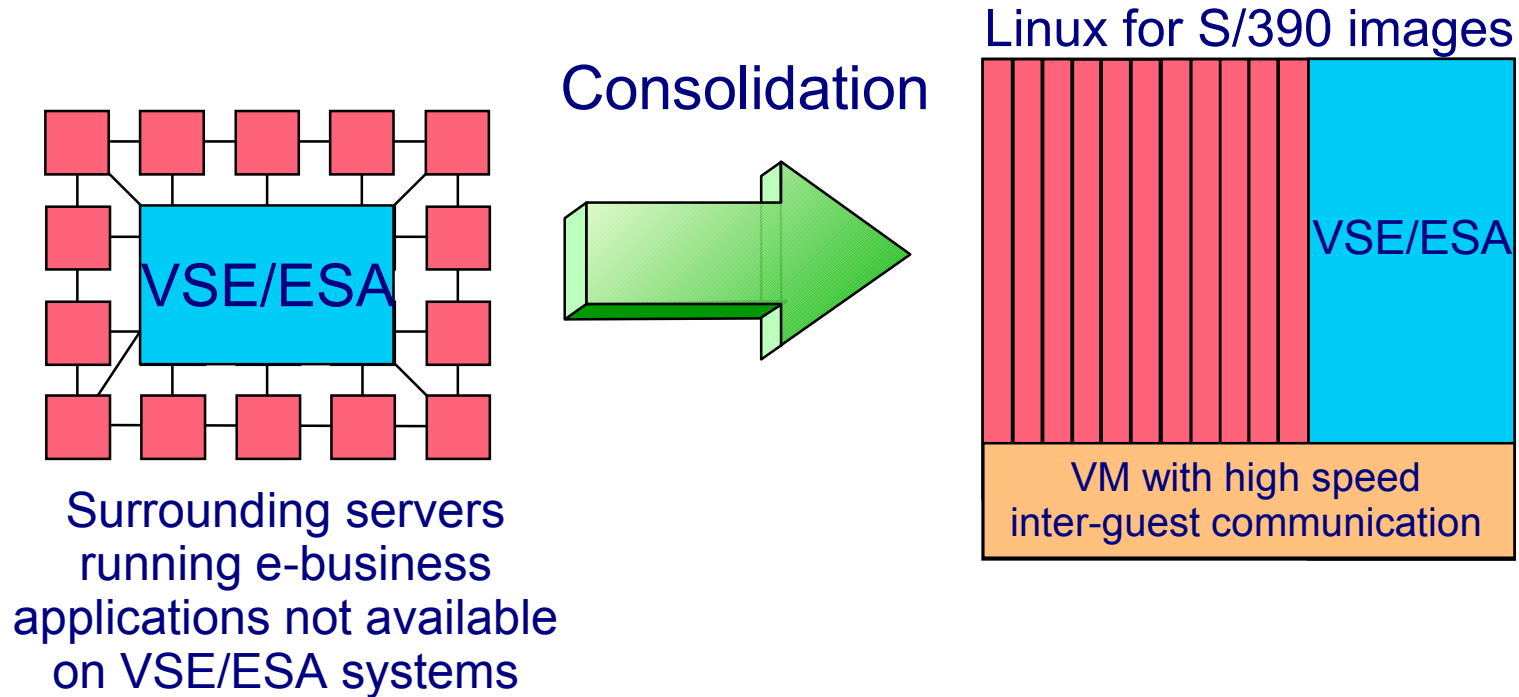
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# Enhancing Your VSE/ESA Investment

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Linux for S/390 augments VSE/ESA by providing key e-business tools and applications which run on same S/390 platform

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# Customer And Partner Work In Progress

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## Customers

- Marist College - Linux for S/390 powers the Linux for S/390 web site
- University of Nebraska - support for academic programs
- Grede Foundries - firewalls, domain name servers, etc.
- GAD - provide Linux for S/390 service for German financial

## Partners

- Equant - network and service provider
- Infocrossing - application services provider
- UTS Global - international porting center for Linux for S/390
- Sendmail - leading provider of Internet mail solutions

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# Popular Applications On Linux for S/390

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<b>Samba</b>	CIFS/Windows file and print service for Linux
<b>Apache</b>	Web server
<b>Perl</b>	Programming language
<b>Sendmail</b>	Mail server
<b>FW/1</b>	Firewall construction kit
<b>IMAP</b>	Remote mailbox access system
<b>POP3</b>	Remote mailbox access system
<b>OpenSSL</b>	SSL implementation
<b>OpenLDAP</b>	LDAP implementation
<b>PAM</b>	Authentication system

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# IBM Software On Linux for S/390

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DB2 Universal Database

WebSphere Application Server Advanced Edition

- Java Development Kit

Connectors

- DB2 Connect
- CICS Transaction Gateway
- IMS Connect
- MQSeries client

Tivoli

- Tivoli Framework
- Tivoli Storage Manager client

Pricing consistent with Linux applications on x architecture

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# IBM S/390 Virtual Image Facility for Linux

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Enables multiple Linux images to run on a single S/390 system

- Natively or in an LPAR
- Does not require VM skills
- Supports ten to hundreds of images, depending on workload

Complements the S/390 Integrated Facility for Linux

- Attractive pricing terms and conditions

Only supports the Linux for S/390 operating system

- SuSE and TurboLinux distributions for S/390 supported
- On zSeries processors supports 31 bit mode

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# IBM Integrated Facility for Linux

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Additional engines dedicated to Linux workloads

IBM S/390 Integrated Facility for Linux on 9672 G5/G6

- Supports Linux for S/390 and the IBM S/390 Virtual Image Facility for Linux

IBM zSeries Integrated Facility for Linux available for zSeries

- Supports Linux for S/390 (31 bit), Linux for zSeries (64 bit) and the IBM S/390 Virtual Image Facility for Linux (31 bit)

Begin deployment or consolidation of Linux, UNIX and NT workloads to S/390 immediately

Traditional S/390 software charges unaffected

- IBM S/390 software and middleware
- Independent Software Vendor products

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# z/VM

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## z/Architecture exploitation

- 64-bit real storage support - real storage constraint relief
- 64-bit virtual support - run 64-bit guest systems on zSeries

Supports Linux for S/390 and Linux for zSeries guests

Native FlashCopy support for the Enterprise Storage Server

Tivoli Storage Manager server pre-installed for high performance file level backup of Linux data

Connectivity enhancements for TCP/IP

- Native QDIO enabling exploitation of Gigabit Ethernet
- HiperSockets\*

Flat Workload License Charge

\* SOI

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# Linux for zSeries

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## Open source 64 bit contributions for zSeries

- 64 bit version of the kernel
- Key device drivers
- Compiler (gcc)
- Runtime Library (glibc)

## Support for 64 bit real

- Greater than 2 GB real storage
  - Reduction in swapping
  - Large buffers

## Support for 64 bit virtual

- Application may exploit larger virtual storage sizes

Based on Linux 2.4

Release to Open Source anticipated for early 2001

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# IBM Global Services

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## IBM Global Services

- Consulting and Planning
- Design and Implementation
- Database, Application, Cluster enablement

## IBM Technology Services

- How To and Defect Support

## IBM Learning Services

- Classroom and web-based courses
- Linux Professional Institute
- Red Hat Certified Engineer

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# Some Important Web Sites

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IBM Linux

[ibm.com/linux](http://ibm.com/linux)

IBM  zSeries

[ibm.com/eserver/zseries](http://ibm.com/eserver/zseries)

IBM developerWorks

[ibm.com/developerworks](http://ibm.com/developerworks)

IBM Linux for S/390

[ibm.com/s390/linux](http://ibm.com/s390/linux)

IBM Linux and VM

[ibm.com/s390/vm/linux](http://ibm.com/s390/vm/linux)

Red Hat

[redhat.com](http://redhat.com)

SuSE

[suse.com](http://suse.com)

TurboLinux

[turbolinux.com](http://turbolinux.com)

Linux for S/390  
discussion group

Send a note to [listserv@marist.edu](mailto:listserv@marist.edu), the  
body should contain "SUBSCRIBE  
LINUX-390 your name, organization"

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