Middleware for Linux on S/390 and zSeries

WAVV April, 2002

Ingolf Salm
Linux for zSeries Design (Middleware)
IBM Lab Boeblingen

Chart 1

Trademarks

The following are trademarks of the International Business Machines Corporation in the United States and / or other counties.

CICS*	IBM*	Virtual Image
DB2*	IBM logo*	Facility
DB2 Connect	IMS	VM/ESA*
DB2 Universal Database	Intelligent	VSE/ESA
e-business logo*	Miner	WebSphere*
Enterprise Storage	Multiprise*	xSeries
Server	MQSeries*	z/Architecture
HiperSockets	OS/390*	z/VM
	S/390*	zSeries

* Registered trademarks of IBM Corporation

The following are trademarks or registered trademarks of other companies.

LINUX is a registered trademark of Linus Torvalds
Tivoli is a trademark of Tivoli Systems Inc.
Java and all Java-related trademarks and logos are trademarks of Sun Microsystems, Inc., in the United States and other countries
UNIX is a registered trademark of The Open Group in the United States and other countries.
Microsoft, Windows and Windows NT are registered trademarks of Microsoft Corporation.
SET and Secure Electronic Transaction are trademarks owned by SET Secure Electronic Transaction LLC.
Intel is a registered trademark of Intel Corporation.

Chart 2
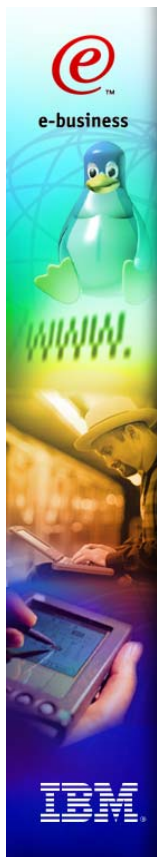
Agenda

- **IBM middleware**
  - ► **WebSphere Application Server and related products**
  - ► **DB2 Universal Database and related products**
  - ► **Connectors**
  - ► **Tivoli System Management products**

- **"Free" middleware**
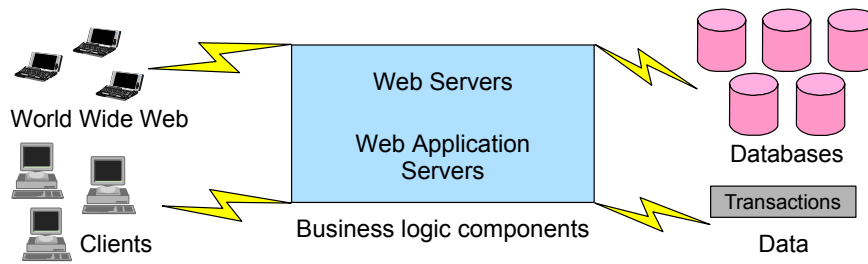
- **Non-IBM middleware**

Chart 3

Linux for S/390 (zSeries) Distributions

- **31 bit distributions = Linux for S/390**
  - ► **2.2 kernel/glibc 2.1**
    - − SuSE Linux Enterprise Server for S/390 (SLES 1)
    - − TurboLinux Server 6 for zSeries and S/390
  - ► **2.4 kernel/glibc 2.2**
    - − SuSE SLES 7
    - − Red Hat 7.2 (not yet IBM certified)

- **64 bit distributions = Linux for zSeries**
  (2.4 kernel/glibc 2.2, includes 31 bit compatibility mode)
  - ► **SuSE SLES 7 (planned to be available in 5/2002)**
  - ► **Red Hat 7.1 (in beta)**

Chart 3a

IBM WebSphere Application Model

Web Servers

Web Application
Servers

Business logic components

World Wide Web

Clients

Databases

Transactions

Data

- **Web application server manages applications at 2nd tier of a 3-tier model**
- **Application deployment environment (Web standards)**
- **Tight enterprise integration and cooperation**
  - ► **Use data from back-end systems (databases, transaction systems)**
  - ► **Provides output to Web browsers on a client**
- **Infrastructure services (security, scalability, ...)**

Chart 4

IBM WebSphere Product Family

WebSphere Homepage Builder
- Tools to create Web pages

WebSphere Studio
- Workbench
- Wizards
- Content Authoring
- Site Development
- Content Management

VisualAge
- Application Programming
- Component Development
- Team Development

Business Application Components

WebSphere Commerce Suite, WebSphere Portal Server, ...

Enterprise Edition
- CORBA ORB
- Dist. Business Components
- Trans. processing environment
- Clustering and scaling
- Back-end Connectors
- EJB, Java Servlet Run-time and services
- J2EE support

Advanced Edition
- EJB, Java Servlet Run-time and services
- Scalable EJS
- Server Groups
- EJB Relationships
- J2EE support

Standard Edition
- Database Connection Manager
- Java Servlet Run-time and services

IBM HTTP Server, NetScape, IIS, Apache, ...

Linux for S/390 AIX OS/400 z/OS W2000 NT ...

SiteAnalyzer
Usage Analysis
- Content Analysis
- Reports

WebSphere Edge Server
- Caching/Filtering
- Load Balancing
- Distributed Files

AE/EE System Management

Tivoli

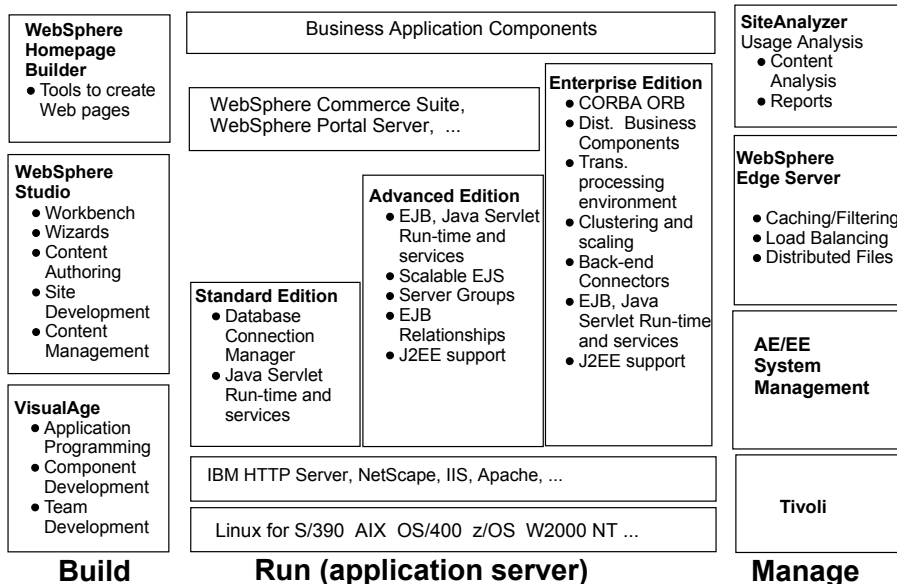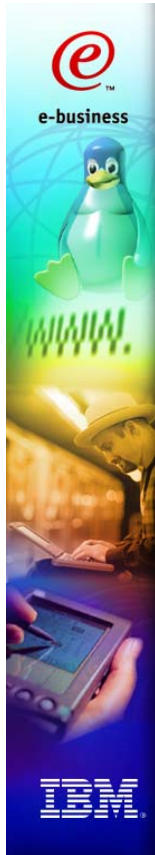**Build**   **Run (application server)**   **Manage**

Chart 5

IBM WebSphere Application Server (WAS)

- **Available on Linux for S/390**

- **WAS Advanced Edition (WAS AE) 3.5.3 (GA 3/2001)**
  - ►Including JDK 1.2.2 with Just-In-Time Compiler (JIT)

- **WAS Connectors**
  - – CICS Transaction Gateway (CTG) for Linux on zSeries V4
  - – CTG for Linux on zSeries V4.0.1 (J2EE support, GA 12/28/2001)
  - – IMS Connect API, IMS Connector for Java V1.1
  - – MQSeries Client for Linux for S/390 V5.2
  - – Java Database Connectivity (JDBC)

- **Latest Shipments:**
  WAS AE 3.5.5 (GA 11/2001)
  WAS AE 4.0.2 (GA 12/2001 - includes JDK 1.3.0)

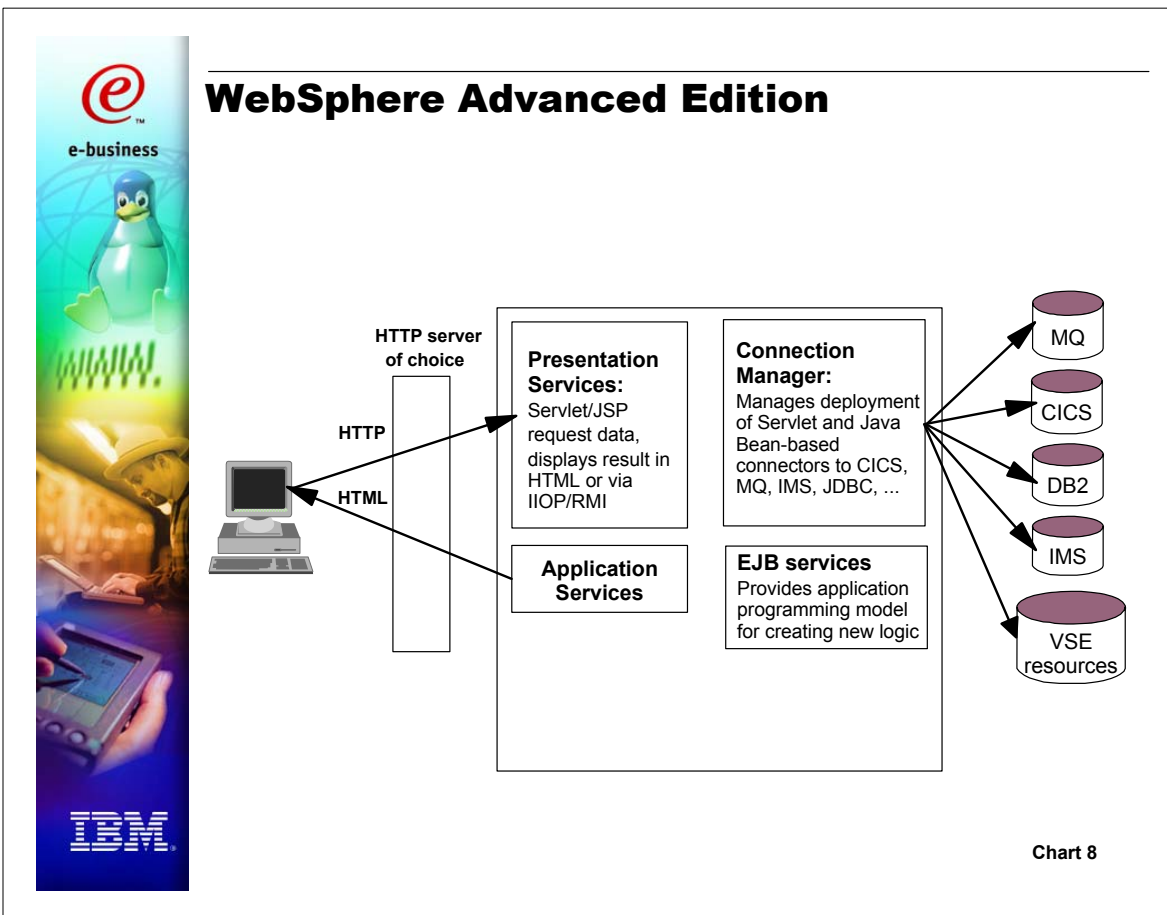- **ibm.com/software/webservers/appserv/**

Chart 6

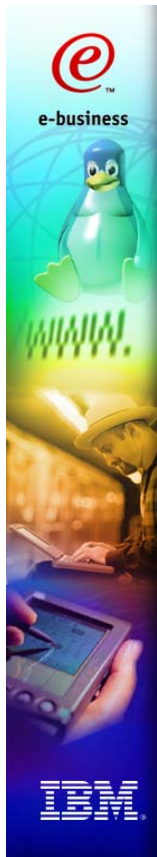# IBM WebSphere Application Server

- **Key functions:**
  - ►Administration client
  - ►Support for Java Server Pages, servlets, XML server tools
  - ►J2EE support (with WAS V4)
  - ►JVM, clustering and connection pooling
  - ►Workload management for Enterprise Java Beans (EJB)
  - ►EJB based connectivity (IIOP, RMI)
  - ►Support for Lightweight Directory Access Protocol (LDAP)

- **Minimum requirements:**
  - ►Runs on MP3000, G5, G6 or any zSeries z800, z900
  - ►512 MB main storage recommended to run WAS AE
  - ►Certified for SuSE Linux Enterprise Server for S/390 and
    TurboLinux Server 6.5 for zSeries and S/390
    - – 2.2 kernel/glibc 2.1

- **VisualAge for Java can be used to build WAS AE applications**

Chart 7

WebSphere Advanced Edition

HTTP server of choice

HTTP

HTML

Presentation Services:
Servlet/JSP request data, displays result in HTML or via IIOP/RMI

Application Services

Connection Manager:
Manages deployment of Servlet and Java Bean-based connectors to CICS, MQ, IMS, JDBC, ...

EJB services
Provides application programming model for creating new logic

MQ

CICS

DB2

IMS

VSE resources

Chart 8

WebSphere Host on Demand

- **Secure access to your host applications and data from a Java-enabled Web browser**
- **Access to S/390, AS/400, DEC/UNIX emulation in a single package**
- **Centralized deployment and administration**
- **Allows you to access multiple hosts concurrently**
- **Provides secure access across the Internet with SSL-based technology**
- **Installs on a server, simplifying maintenance, distribution and upgrades**
- **Requires no middle-tier server, simplifying deployment and improving scalability**
- **ibm.com/software/webservers/hostondemand/**

Chart 9

WebSphere Personalization 3.5

- **WebSphere Application Server based**

- **Provides services to customize web pages to the interest and needs of each site visitor**

- **Includes two main engines**
  - ▶ **Rules engine - Executes business rules that determine the content to be displayed**
  - ▶ **Resource engine - Enables optimization based on content and profile information**

- **ibm.com/software/webservers/personalization/**

Chart 10

WebSphere Commerce Suite Pro Edition

- **WebSphere Application Server based**

- **Provides services to deploy commerce applications and helps to build, maintain and manage stores to sell goods and services on the Web.**

- **Key components:**
  - ▶ **Commerce Server - Manages the online store by running a set of processes under WebSphere Application Server**
  - ▶ **WAS AE V3.5 - Provides foundation for WCS**
  - ▶ **Web Server - WCS includes the IBM HTTP Server**
  - ▶ **Database - Store all product, store and customer data, includes DB2 Universal Database**
  - ▶ **Payment Server - Handles payments using WebSphere Payment Manager**

- V5.1 GA September 2001
  - ▶ Certified for SuSE Linux Enterprise Server for S/390 and TurboLinux Server 6 for zSeries and S/390

- **ibm.com/software/webservers/commerce/**

**Chart 11**
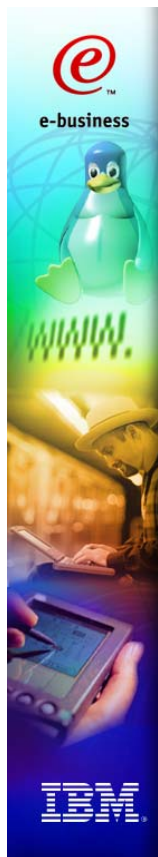
IBM Java Development Kit (JDK)

- **Provides Java development and runtime environment**

- **Current JDK levels: JDK 1.2.2, 1.3.0, 1.3.1**

- **Available via**
  - ▶ **WAS AE 3.5 (JDK 1.2.2), WAS AE 4.0.2 (JDK 1.3.0)**
  - ▶ **Download from SuSE ftp server (JDK 1.2.2 and 1.3.0)**
  - ▶ **Download from IBM DeveloperWorks (JDK 1.3.1)**

- **JDK 1.2.2, 1.3.0**
  Certified for SuSE Linux Enterprise Server for S/390 and TurboLinux Server 6 for zSeries and S/390
  - ▶ **Linux kernel 2.2, glibc 2.1**
- **JDK 1.3.1**
  - ▶ **Linux kernel 2.4, glibc 2.2.4 (31 bit)**
  - ▶ **Linux kernel 2.2, glibc 2.1**

- **ibm.com/developerworks/java/**

Chart 12
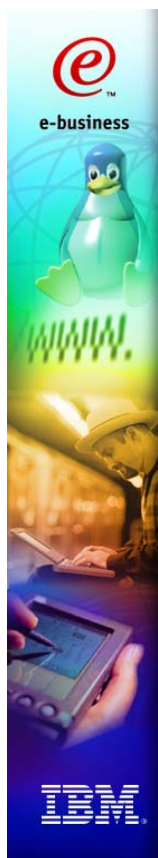
DB2 Universal DataBase

- **Key functions:**
  - ▶ **DB2 UDB Enterprise Edition**
    (DRDA application server, 2-phase commit, call level interface/ODBC)
  - ▶ **DB2 Connect Enterprise (DRDA client and gateway)**
  - ▶ **Java support**
  - ▶ **C/C++ support (for stored procedure, local applications, client/server applications, ...)**
  - ▶ **Backup command to backup to disk**
  - ▶ **DB2 NetSearch Extender**
  - ▶ **DB2 Intelligent Miner Scoring**
  - ▶ **Trial version available for download**
- **Latest shipment: DB2 UDB V7.2 (GA June 2001)**
- **Minimum requirements:**
  - ▶ **Certified for SuSE Linux Enterprise Server for S/390 and TurboLinux Server 6 for zSeries and S/390**

- **ibm.com/software/data/db2/linux/s390/**

Chart 13
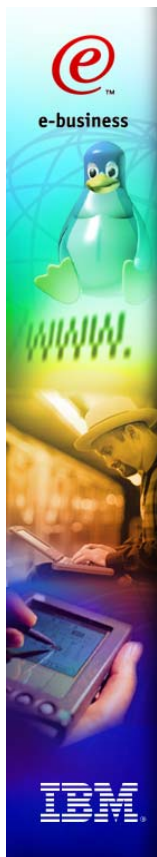
DB2 NetSearch Extender

- **Fast full text retrieval to Java and DB2 CLI**

- **Key benefits:**
  - ► Fast indexing of very large data volumes
  - ► Searching at high speed with a large number of concurrent users
  - ► Storing presorted table columns
    in main memory at indexing time
    to avoid expensive database access and paging at search time

- **ibm.com/software/data/db2/extenders/netsearch/**

Chart 14
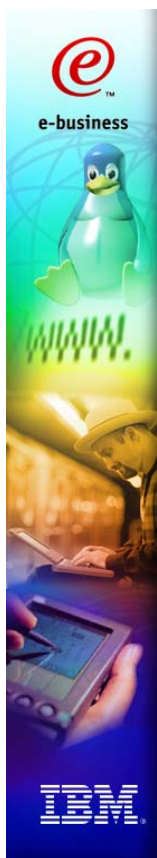
DB2 Intelligent Miner Scoring

- **Key functions:**
  - ► Easy-to-use data mining tool
  - ► Provides infrastructure necessary to deploy data mining analytics in enterprise applications
  - ► Manages the promotion of data mining models
  - ► Provides XML based language for modeling
  - ► SQL used as programming interface

- **Minimum requirements:**
  - ► DB UDB EE V7.1

- **ibm.com/software/data/iminer/scoring/**

Chart 15

WebSphere MQ Series V5.2 Client and Server

- **Provides message queuing for unlike environments**

- **Easy-to-use MQ API shields applications from complexity of different operating systems and networks**

- **Supports most major platforms**

- **MQ allows synchronous and asynchronous communication**

- **Latest shipment: MQ Series Server V5.2 (March 2002)**

- **Minimum requirements:**
  - ► **Client certified for 2.2 and 2.4 kernel, server for 2.4 kernel only**

- **ibm.com/software/mqseries**

Chart 16

Linux for S/390 and z/OS (OS/390)

z/OS (OS/390)

Client

Client

:

Client

Linux for S/390

WebSphere Application Server AdvancedEdition 4.0.2

SSL with 3.5.3

IMS connector

MQSeries Client

CICS Connector CTG V4

DB2 Connect

WAS EE

IMS Server

MQSeries Server

CTG

CICS Server

DB2 Server
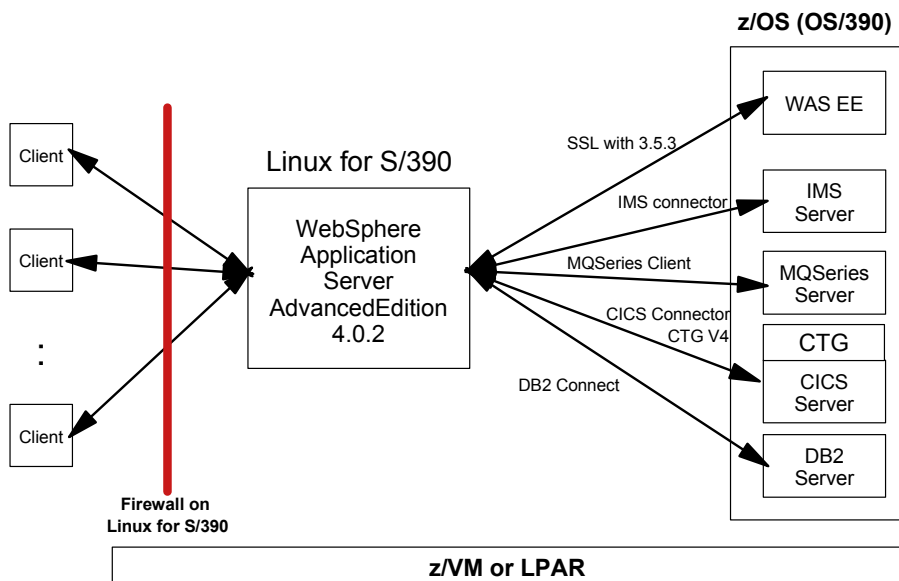
Firewall on Linux for S/390

z/VM or LPAR

Chart 17

VSE/ESA 2.5/2.6 - e-business Connectors

- **Easy access to VSE/ESA resources from other systems**

- **VSE e-business connectors include**
  - ▶ **Server code running on VSE/ESA**
  - ▶ **JAVA beans, servlets and samples on Java capable clients**
  - ▶ **Access to VSAM, DL/I, POWER, ICCF, Librarian, VSE console**

- **TCP/IP based communication**

- **Advantages**
  - ▶ **Exploitation of non-VSE e-business infrastructure**
  - ▶ **Always newest e-business components**
  - ▶ **VSE/ESA resources can be easily integrated into new e-business applications**

- **ibm.com/eserver/zseries/os/vse**

Chart 18

VSE/ESA 2.5/2.6 - e-business Connectors ...

- **VSE/ESA 2.6, GA: 12/2001**
  - ▶ **Focus on connectivity (e.g. to Linux for S/390)**
  - ▶ **OSA Express support (Gigabit Ethernet)**
  - ▶ **Internet Security via Secure Socket Layer (SSL) support**
  - ▶ **J2EE connectors**
  - ▶ **JDBC connector to VSAM file**
  - ▶ **JConVSE = Java-based VSE console**
  - ▶ **VSEPrint**
  - ▶ **VSAM Redirector**
  - ▶ **Virtual Tape**

- **VSE/ESA 2.7, Preview announcement: 2/2002**
  - ▶ **Focus on enhanced connectivity between VSE/ESA and Linux on zSeries**
  - ▶ **HiperSockets support**
  - ▶ **Hardware Crypto Support**
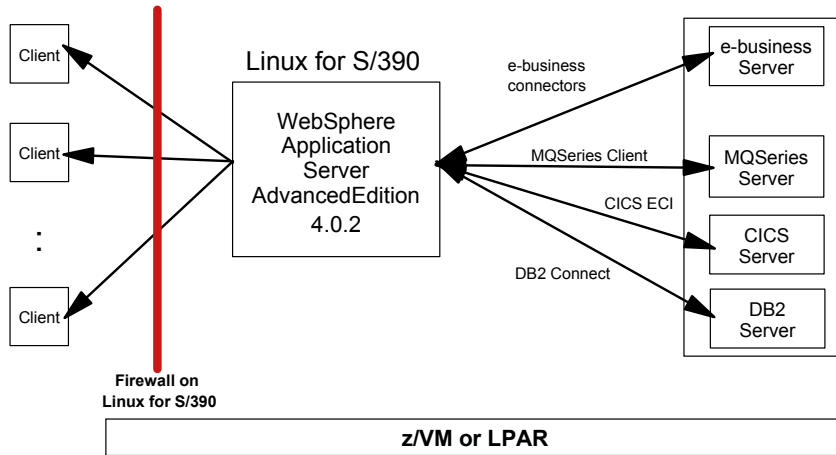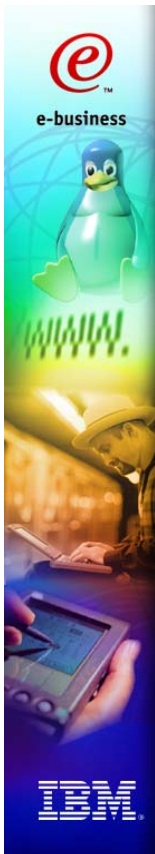
Chart 18a

Linux for S/390 and VSE/ESA

Client

Client

.
.

Client

**Firewall on
Linux for S/390**

Linux for S/390

WebSphere
Application
Server
AdvancedEdition
4.0.2

e-business
connectors

MQSeries Client

CICS ECI

DB2 Connect

e-business
Server

MQSeries
Server

CICS
Server

DB2
Server

z/VM or LPAR

Chart 19

Connectors

- **DB2 Connect Enterprise and Unlimited Edition 7.2**
  - ▶ **ibm.com**/software/data/db2/db2connect/

- **CICS Transaction Gateway V4 and CICS Universal Clients**
  - ▶ **ibm.com**/software/ts/cics/platforms/desktop/

- **IMS 1.1 Connect**
  - ▶ **ibm.com**/software/data/db2imstools/pdf/imsconnect.pdf

- **MQSeries 5.2 Client**
  - ▶ **ibm.com**/software/ts/mqseries/

Chart 20
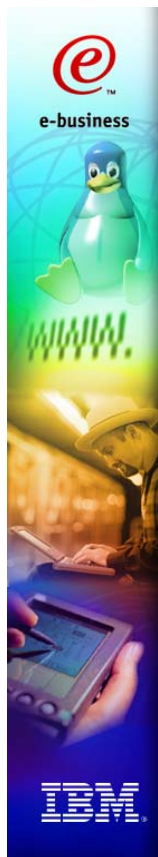
Tivoli System Management Products

- **Tivoli Software Distribution 4.0 (Available since 6/2001) (includes Tivoli Management Framework 3.7B)**
  - ▶ New name: IBM Tivoli Configuration Manager
  - ▶ Client, server: efficient and effective distribution of software and file packs

- **IBM Tivoli Workload Scheduler 8.1 (GA 10/2001)**
  - ▶ Client: manages and automates production workload and job scheduling

- **Tivoli Distributed Monitoring 4.1 (GA 11/2001)**
  - ▶ New name: IBM Tivoli Monitoring
  - ▶ Client, server: monitors business-critical resources and systems

- **IBM Tivoli Enterprise Console 3.7.1 (GA 2/2002)**
  - ▶ receives, customizes, analyzes and notifies on events from hardware, applications, middleware, ...

- **www.tivoli.com/products/**

Chart 21
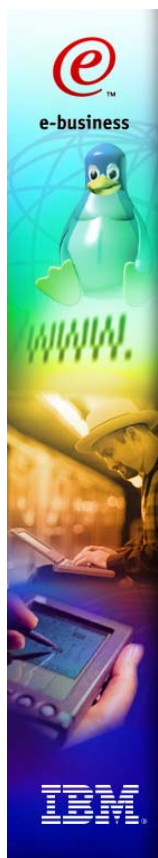
Tivoli Storage Manager (TSM)

- **TSM provides services to backup/restore, archive/retrieve (and more) file servers**

- **TSM 5.1 client (GA 4/2002) comes with the following interfaces to access the TSM server:**
  - ▶ **Command line interface**
    - – Administrative and backup/archive
  - ▶ **Web browser interface**
    - – Backup/archive
  - ▶ **API**
    - – Function calls to access the TSM server
  - ▶ **Backup/restore of EXT2 file system ACLs**

- **Certified for SuSE Linux Enterprise Server for S/390**

- **www.tivoli.com/products/index/storage_mgr/**

Chart 22

Tivoli Storage Manager (TSM) Client

z/OS (OS/390)
z/VM (VM/ESA)

Linux for S/390

Client

Client

:

Client

TSM Client

TSM Server

Firewall on Linux for S/390

z/VM or LPAR
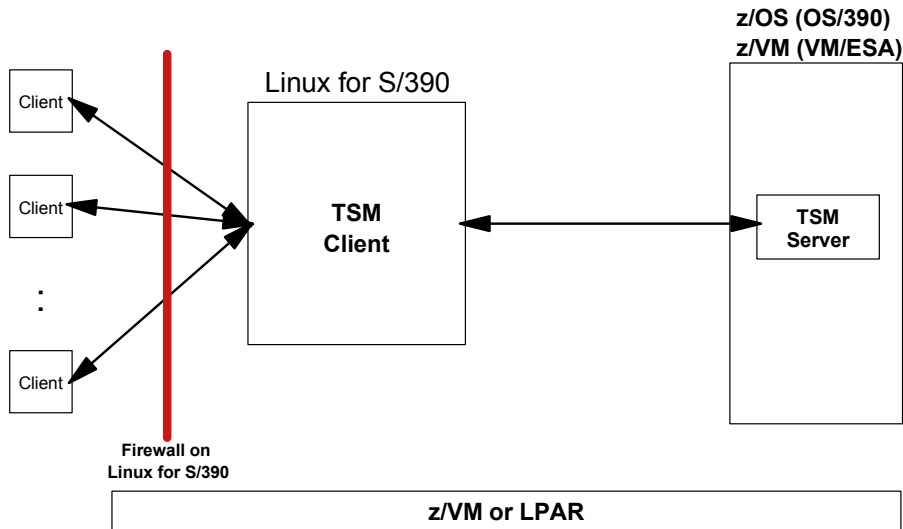
Chart 23

"Free" Middleware

- **SAMBA - File/Print Serving including web browser based administration**

Windows Clients

Windows Clients

SAMBA Server

Linux for S/390
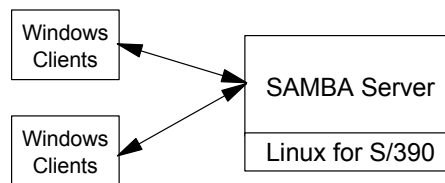
- **Electronic mail**
  - ▶ **IMAP4, POP2, POP3 mail servers**
  - ▶ **Postfix mail program**
  - ▶ **Procmail**
  - ▶ **Sendmail**

Chart 24

"Free" Middleware ...

- **Development tools**
  - ► **Editors (Emacs, vi, GNOME editor ...)**
  - ► **Documentation tools (tcl, LaTeX, postscript)**
  - ► **Compilers (gcc, gpp, Perl, Python, Regina REXX)**
  - ► **Diagnostic, test, performance tools**
  - ► **Debuggers, test coverage, monitors**
  - ► **Maintenance tools (configuration, release management)**
- **Networking**
  - ► **Apache webserver (including PHP3 scripting)**
  - ► **DHCP client/server**
  - ► **FTP**
  - ► **Telnet**
  - ► **NFS**
  - ► **openLDAP**
  - ► **Pluggable Authentication Methods (PAM)**
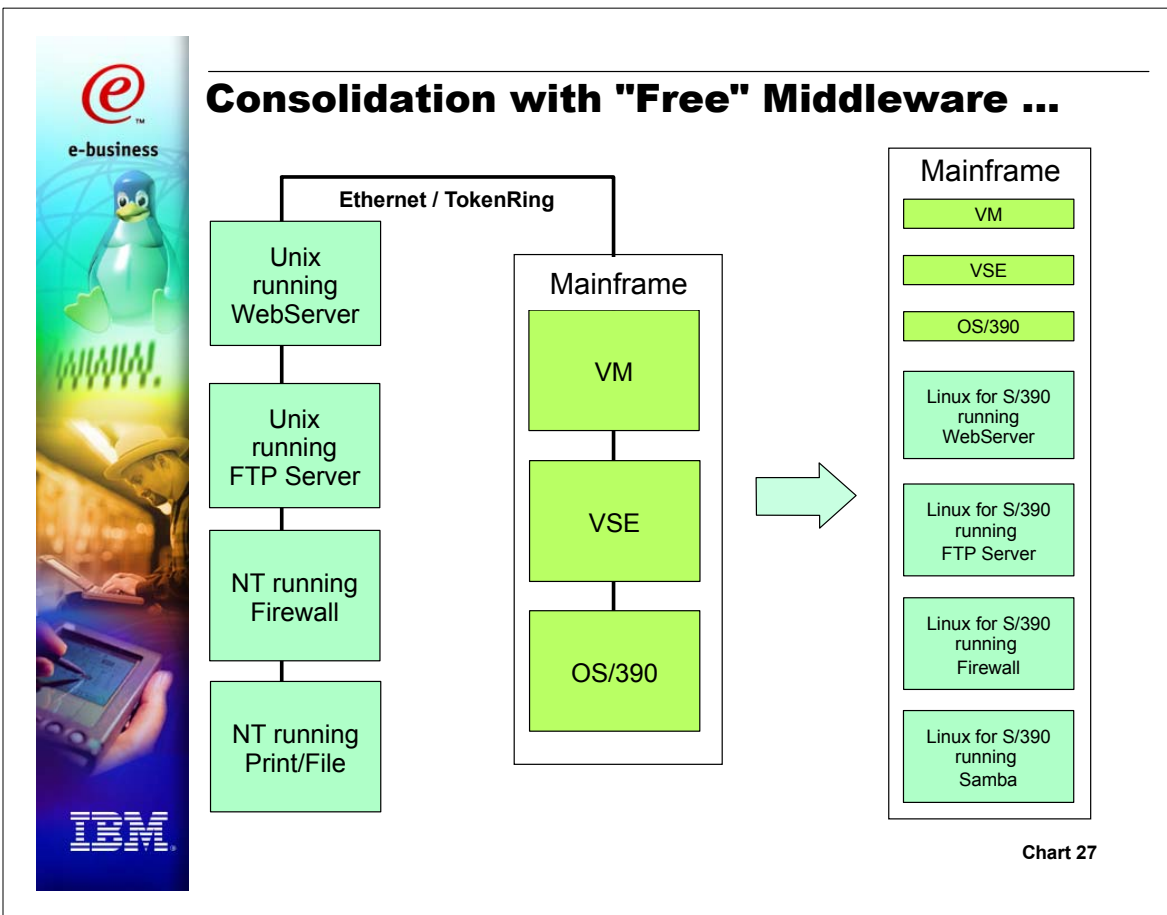 - ► **openSSL**

Chart 25

Consolidation with "Free" Middleware
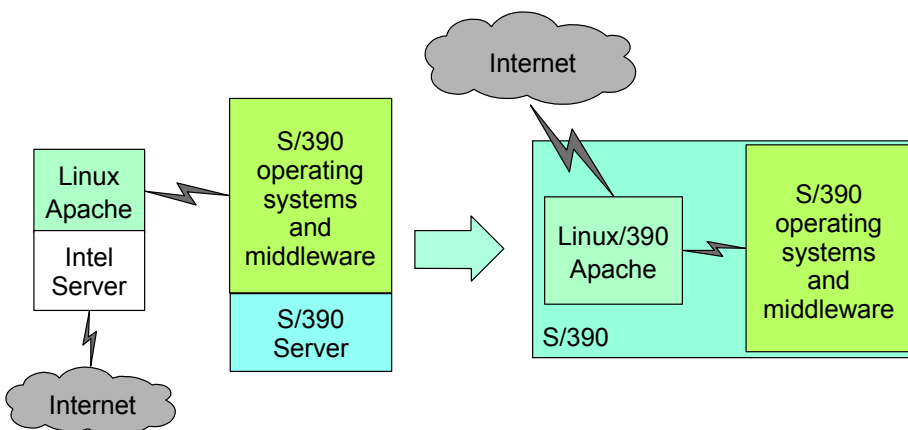
- **Integrated e-commerce server**
- **High speed access to corporate data**
- **Classic strengths of S/390**
- **Integration of diverse workloads**

Chart 26

Consolidation with "Free" Middleware ...

Ethernet / TokenRing

- Unix running WebServer
- Unix running FTP Server
- NT running Firewall
- NT running Print/File

Mainframe
- VM
- VSE
- OS/390

→

Mainframe
- VM
- VSE
- OS/390
- Linux for S/390 running WebServer
- Linux for S/390 running FTP Server
- Linux for S/390 running Firewall
- Linux for S/390 running Samba

Chart 27

ISV Software for Linux

- **ACTS**
  - ►Testing tools
- **Aeonware**
  - ►B2B/B2C
- **BMC Software**
  - ►Systems management
- **Bynari**
  - ►Mail and calendar server
- **Computer Associates**
  - ►Systems management
- **Compuware**
  - ►Systems management
- **Dignus**
  - ►Development tools

- **Logics Software**
  - ►Development tools
- **Macro4**
  - ►Print server
- **Rational Software**
  - ►Development tools
- **Rogue Wave Software**
  - ►Development tools
- **RTS Realtime Systems**
  - ►Stock tracking
- **SAP**
  - ►ERP
- **Sendmail**
  - ►Mail server
- **Software AG**
  - ►XML Database

Note: This is only a partial list of ISV software available for Linux for S/390 and zSeries. For more information check
ibm.com/eserver/zseries/solutions/s390da/linuxproduct.html

Chart 28

IBM Redbooks

- **Redbooks**
  - **Linux for S/390, SG24-4987**
  - **e-Business Intelligence: Leveraging DB2 for Linux on S/390, SG24-5687**
  - **WebSphere V3.5 Handbook, SG24-6161**
  - **WebSphere V4.0 Advanced Edition Handbook, SG24-6176**
  - **Linux on zSeries and S/390: ISP/ASP Solution, SG24-6299**
  - **Linux for S/390 and zSeries: Distributions, SG24-6176**

- **Redpaper**
  - **Building Linux Systems Under IBM VM**

- **For more information: ibm.com/redbooks**

Chart 29

Some Important Web Sites

IBM Linux	**ibm.com**/linux
IBM zSeries	**ibm.com**/eserver/zseries
IBM Linux for S/390	**ibm.com**/eserver/zseries/linux
IBM z/VM	**ibm.com**/eserver/zseries/zvm
Samba	www.samba.org
Red Hat	www.redhat.com
SuSE	www.suse.com
TurboLinux	www.turbolinux.com
Linux for S/390 discussion group	www.marist.edu/htbin/wlvindex?linux-vm

Chart 30

Contact Information

Ingolf Salm
Linux for zSeries Design
IBM Lab Boeblingen
salm@de.ibm.com

Chart 31