

# **IBM eServer Integrated Platform Express Product Information Gu**

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# IBM eServer Integrated Platform Express Product Information Guide

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## 1. Introduction

This *Product Information Guide* is a compilation of the product-based content from the IBM® *eServer*™ Integrated Platform for e-business Express solution Web site and related supplemental material. This document is divided into sections that review the solution architecture, software components, product configurations, and the optional database server. This guide also provides information on the scalability and flexibility of the integrated solution.

## 2. Solution architecture

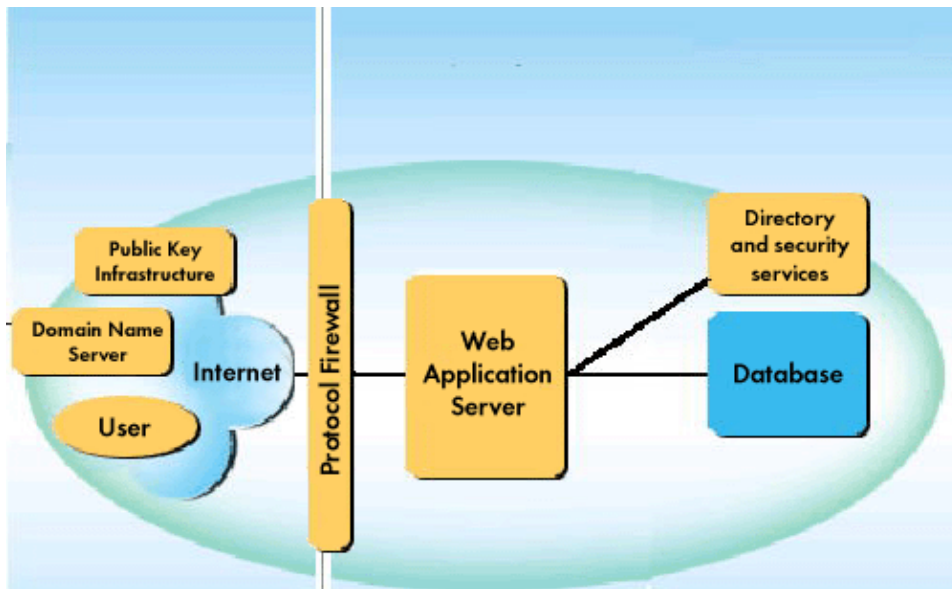
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The Integrated Platform Express provides an application deployment platform for a wide variety of server-based, Java, e-business applications. The solution is based on WebSphere Express v5.1 that supports the latest specifications for Java Server Pages, Java Servlets, and Web services. The solution is designed to provide a secure and affordable e-business infrastructure for small and medium business (SMB) customers who expect to have less than 4000 thousand simultaneous users. The Integrated Platform Express architecture is based on the [IBM Patterns for e-business](#) that provide a comprehensive classification of the various types of e-business applications. These patterns help information technology (IT) professionals design an e-business solution and recommend network topology and middleware products for each of the functional nodes.

The e-business pattern known as the [Self-Service](#) (or User-to-Business) pattern was chosen for the Integrated Platform Express. The Self-Service pattern captures the essence of direct interactions between the customers, business partners, stakeholders, employees, and other individuals with whom a business intends to interact. In the SMB market segment, this e-business pattern is typical for the Dynamic Interaction Read-only and Transactional e-business applications that are also likely to utilize the [Stand-alone Single Channel](#) or Directly-Integrated Single Channel application patterns. The Integrated Platform Express solution follows these application patterns to provide for applications that can be integrated with existing databases.

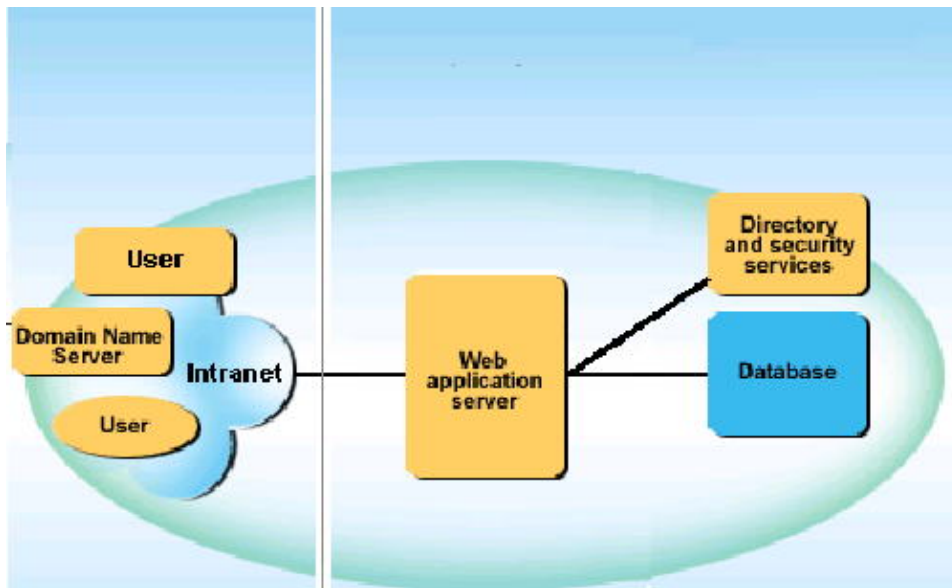
Several [Runtime Patterns](#) (or application topologies) can be recommended for these application patterns. To provide the network security aspect of the e-business solution and keep the solution affordable for the SMB segment, the Integrated Platform Express implements a runtime pattern that uses one firewall to place the Web application server in a more secure internal network.

The following is a diagram of the Integrated Platform Express Internet topology.



In addition to the Internet topology, the Integrated Platform Express provides an intranet topology for customers who want to implement a server-based Java solution for the internal applications. Unlike the Internet topology, the intranet topology does not require firewalls. The Web server and application server can also be installed on the same physical server.

The following is a diagram of the Integrated Platform Express intranet topology.



### 3. Software component overview

This section explores the functional nodes and "middleware" product stack of the Integrated Platform Express topologies.

Software products of the Integrated Platform Express have been integrated and tested in a single xSeries" hardware configuration. The Integrated Platform Express Internet topology contains the following functional nodes:

- Protocol firewall
- Application server
- Directory and security server
- Database server (optional)

The Cisco PIX-515e hardware firewall (or an equivalent firewall appliance) provides a protocol firewall for additional security and robustness. All other functional nodes are rack-optimized xSeries servers. SUSE Linux Enterprise Server 8 (SLES 8) Service Pack 3 – United Linux 1.0 is installed on all servers.

The "middleware" product stack includes:

- WebSphere® Application Server Express v5.1 for Application server
- IBM Tivoli® Directory Server v5.2 for directory and security services
- DB2 Universal Database (tm) v8.1.4 Express for application database (optional)

WebSphere Application Server Express v5.1 serves as the Web application server. The database server node hosting the application database in the internal network is implemented using DB2 Universal Database Express 8.1.4 for the Internet configurations.

In multi-server rack-based Integrated Platform Express configurations, the database is located on a separate physical server. Locating the application database on a separate server from the Application Server increases performance by reducing the server workload. This distribution also enhances scalability by allowing a customer with an increased workload to add more WebSphere Application Server servers that share the same application database.

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In addition to the network security provided by firewalls, an application–level security is provided by the Web application server node. The user information that is required for authentication and authorization is stored in the directory and security services node behind the domain firewall in the internal network. Authorization is done using the server–based Java security model (role mapping).

WebSphere authentication services are provided by IBM Tivoli Directory Server v5.2 that is installed on the same server as WebSphere Application Server Express. IBM Tivoli Directory Server v5.2 requires DB2 Universal Database 8.1.4 Personal Edition for the directory data; DB2 Universal Database 8.1.4 Personal Edition is provided with IBM Tivoli Directory Server v5.2 and should be installed locally on the same server.

The intranet topology consists of three functional nodes:

- Web and Application server
- Directory and security server
- Database server (optional)

The "middleware" product stack for the intranet topology includes:

- WebSphere Application Server Express v5.1 for Web and Application server
- IBM Tivoli Directory Server v5.2 for directory and security services
- DB2® Express v8.1.4

The IBM Tivoli Directory Server is installed on the same physical server as WebSphere Application Server.

## 4. Product configurations

The implementation of the IBM <sup>@server</sup> Integrated Platform for e–business Express provides the following options based on your customer's requirements:

- Two topology options: Internet or intranet.
- Two hardware–type options:
  - rack–based configurations based on x345 server(s)
  - single–server configurations based on tower (x225 or x235) or rack–optimized (x335, x345, x360) IBM x–Series servers
- Two hardware configuration options based on customer work load requirements: "low end" and high end".
- Three database options:
  - no database included
  - small DB2 database (RAID–1 array of two hard drives)
  - large DB2 database (RAID–5 array of up–to–six hard drives)

The following sections describe the configurations of the Integrated Platform Express.

### 4.1. Intranet topology

The intranet topology for the Integrated Platform Express enables your customers to implement a server–based Java solution for internal applications. This section reviews the following intranet topology features of the Integrated Platform Express: hardware and software configurations, server disk subsystem

characteristics, network infrastructure, and the solution hardware rack for the rack-based configurations.

**4.1.1. Intranet topology: rack-based configurations**

Table 1 describes the hardware components for each intranet topology rack-based configuration.

**Table 1. Intranet topology rack-based configurations: hardware components**

Web load level			low			high		
Database option (A-no, B-small, C-large)			A	B	C	A	B	C
Functional node	Hardware component	Space in rack units	Qty or processors/RAM (GB)					
Application server	xSeries 345	2	1/1	1/1	1/1	2/1.5	2/1.5	2/1.5
Database server	xSeries 345	2	0	1/1	1/1	0	2/1.5	2/1.5
Additional storage for application database	internal RAID-5 disk array	0	0	0	1	0	0	1
Ethernet switch	CISCO WS-C2950-12	1	1	1	1	1	1	1
Monitor and keyboard	NetBAY 2U Flat Panel Monitor Console Kit	2	1	1	1	1	1	1
KVM switch	NetBAY 1x4 console switch	1	0	1	1	0	1	1
UPS	APC 2U Smart-UPS 1400 RMB	2	1	1	1	1	1	1
Rack	NetBay11	11	1	1	1	1	1	1
	<b>Total xSeries servers</b>		1	2	2	1	2	2
	<b>Total rack units used</b>		8	10	10	8	10	10

Table 2 describes the software components for each intranet topology rack-based configuration.

**Table 2. Intranet topology rack-based configurations: software components**

Web load level			low			high		
Database option (A-no, B-small, C-large)			A	B	C	A	B	C
Functional node	Software component	Licenses						
Application server	WebSphere Application Server Express 5.1	1	1	1	2	2	2	
Directory and security services (optional)	IBM Tivoli Directory 5.2	1	1	1	1	1	1	
Application database (optional)	DB2 Universal Database 8.1.4 Express	0	1	1	0	2	2	
	SLES 8 (with Service Pack 3) OS	1	2	2	1	2	2	

A rack-based configuration consists of up to two Intel-based xSeries servers and other rack-mountable hardware assembled in a small 11-unit half-sized rack. All xSeries servers are preloaded with the following:

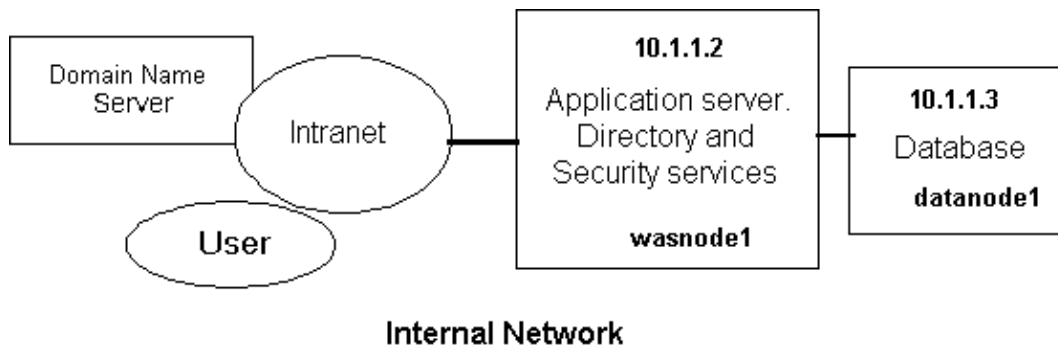
- A commercial grade version of Linux® (SLES 8 with Service Pack 3)
- Application middleware for functional nodes that is preconfigured to work as an integrated platform
- A sample J2EE application to test functionality and performance

Table 3 describes the disk subsystem characteristics of the servers in the rack-based configuration.

**Table 3. Rack-based configurations: disk subsystem characteristics**

Web load level		low			high			
Database option (A-no, B-small, C-large)		A	B	C	A	B	C	
server	HW characteristics	Qty or capacity						Comment
xSeries 345 for WebSphere Application Server	HDDs	2	2	2	2	2	2	Integrated Mirroring – 2 HDDs. Effective capacity is one HDD.
	HD size (GB)	36.4	36.4	36.4	36.4	36.4	36.4	
xSeries 345 for DB2	HDDs	0	2	2	0	2	2	Integrated Mirroring – 2 HDDs. Effective capacity is one HDD.
	HD size (GB)	0	36.4	36.4	0	36.4	36.4	
Internal RAID-5 disk array for that database	HDDs	0	0	4	0	0	4	4 HDDs in RAID-5 array. Effective capacity is three HDDs.
	HD size (GB)			36.4			36.4	Bigger size HD (73 GB Or 146 GB) can be used when more database storage is required.
	Effective capacity (GB)			109.2			109.2	

The following network diagram reflects the infrastructure of the Intergrated Platform Express intranet topology.



This topology consists of two functional nodes:

- wasnode1. This node represents the WebSphere Application server, including the HTTP server. The IBM Tivoli Directory Server software is also installed on this node.
- datanode1. This node represents the DB2 Express database server.



**4.1.2. Intranet topology: tower-based single-server configurations**

Table 4 describes the software and hardware components for all intranet topology single-server configurations. A single-server configuration consists of one xSeries server; x225 for configurations with or without a small database, and x235 for configurations with large databases that can use up to 9 hard drives.

The server is preloaded with the following software:

- A commercial grade version of Linux (SLES 8 with Service Pack 3).
- Application middleware for functional nodes that is preconfigured to work as an integrated platform.
- A sample J2EE application to test functionality and performance.

**Table 4. Intranet topology tower-based single-server configurations: hardware and software components**

Web load level		low			high		
Database option (A–no, B–small, C–large)		A	B	C	A	B	C
Functional node	Hardware/software component	Qty or processors/RAM (GB)					
Application server	WebSphere Application Server Express 5.1	1	1	1	2	2	2
Directory and security services (optional)	IBM Tivoli Directory 5.2	1	1	1	1	1	1
Application database (optional)	DB2 Universal Database 8.1.4 Express	0	1	1	0	2	2
	SLES 8 (with Service Pack 3) OS	1	1	1	1	1	1
	xSeries 225	1/1	1/1.5	0	2/1.5	2/2.5	0
	xSeries 235	0	0	1/1.5	0	0	2/2.5

Table 5 describes the disk subsystem characteristics in the single-server configurations, based on the selected database option.

**Table 5. Tower-based single-server configurations: disk subsystem characteristics**

Database option (A–no, B–small, C–large)	A	B	C	Comment
HDDs size in RAID–1 array for OS and for database (option B only)	36.4	73	36.4	Integrated Mirroring with hot–spare – three HDDs. Effective capacity is one HDD.
Number of HDDs in RAID–5 array for the database			3–6	Effective capacity is up to 5 HDDs.
HDDs size for DB (GB)			36.4	Bigger size HD (73 GB or 146 GB) can be used
DB effective capacity (GB)	0	36.4	182	with recommended HDD size
max DB effective capacity (GB)	0	110	876	with 146 GB HDDs

### 4.1.3. Intranet topology: rack-optimized single-server configurations

The following tables describe the software and hardware components for the intranet topology rack-optimized single-server configurations. Each of these configurations consists of one of the following rack-optimized xSeries servers: x335 (2-way, 1U height), x345 (2-way 2U height), or x360 (4-way, 3U height).

**Table 6. Intranet topology x335 or x345-based single-server configurations: hardware and software components**

Web load level		low			high		
Database option (A-no, B-small, C-large)		A	B	C	A	B	C
Functional node	Hardware/software component	Qty or processors/RAM (GB)					
Application server	WebSphere Application Server Express 5.1	1	1	1	2	2	2
Directory and security services (optional)	IBM Tivoli Directory 5.2	1	1	1	1	1	1
Application database (optional)	DB2 Universal Database 8.1.4 Express	0	1	1	0	2	2
	SLES 8 (with Service Pack 3) OS	1	1	1	1	1	1
	xSeries 335	1/1	1/1.5	0	2/1.5	2/2.5	0
	xSeries 345	1/1	1/1.5	1/1.5	2/1.5	2/2.5	2/2.5

**Table 7. Intranet topology x360-based single-server configurations: hardware and software components**

Web load level		low			high		
Database option (A-no, B-small, C-large)		A	B	C	A	B	C
Functional node	Hardware/software component	Qty or processors/RAM (GB)					
Application server	WebSphere Application Server Express 5.1	2	2	2	4	4	4
Directory and security services (optional)	IBM Tivoli Directory 5.2	1	1	1	1	1	1
Application database (optional)	DB2 Universal Database 8.1.4 Express edition	0	2	2	0	4	4
	SLES 8 (with Service Pack 3) OS	1	1	1	1	1	1
	xSeries 360	2/3	2/4	2/4	4/4	4/6	4/6
Storage expansion for application database	EXP300	0	0	1	0	0	1

The following tables describe the disk subsystem characteristics in the single-server configurations, based on the selected database option.

**Table 8. x335 or x345-based single-server configurations: disk subsystem characteristics**

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Database option (A–no, B–small, C–large)	A	B	C	Comment
HDDs size in RAID–1 array for OS and for database (option B only)	36.4	73	36.4	Integrated mirroring – two HDDs. Effective capacity is one HDD.
Number of HDDs in RAID–5 array for the database			4	Effective capacity is 3 HDDs.
HDDs size for DB (GB)			36.4	Bigger size HD (73 GB or 146 GB) can be used
DB effective capacity (GB)	0	36.4	109	with recommended HDD size
max DB effective capacity (GB)	0	110	438	with 146 GB HDDs

**Table 9. x360–based single–server configurations: disk subsystem characteristics**

Database option (A–no, B–small, C–large)	A	B	C	Comment
HDDs size in RAID–1 array for OS and for database (option B only)	36.4	73	36.4	Integrated mirroring with hot–spare – three HDDs. Effective capacity is one HDD.
Number of HDDs in the external RAID–5 array (EXP300) for the database			4–14	Effective capacity is 3–13 HDDs.
HDDs size for DB (GB)			36.4	Bigger size HD (73 GB or 146 GB) can be used
DB effective capacity (GB)	0	36.4	109.2	with recommended HDD size
max DB effective capacity (GB)	0	110	1898	with 146 GB HDDs

## 4.2. Internet topology

The Internet topology for the IBM  Integrated Platform Express enables your customers to implement a server–based Java solution for the Internet–facing applications. This section reviews the following Internet topology features of the platform: hardware and software configurations, server disk subsystem characteristics, network infrastructure, and the solution hardware rack for the rack–based configurations.

The Internet topology consists of the same configurations as the intranet topology. The main difference between the Internet and the intranet topologies is the presence of the Internet (protocol) firewall.

### 4.2.1. Internet topology: rack–based configurations

Table 10 describes the hardware components for each Internet topology configuration.

**Table 10. Internet topology rack–based configurations: hardware components**

Web load level			low			high		
Database option (A–no, B–small, C–large)			A	B	C	A	B	C
Functional node	Hardware component	Space in rack units	Qty or processors/RAM (GB)					
Protocol firewall	CISCO Firewall PIX–515e recommended	1	1	1	1	1	1	1
Application server	xSeries 345	2	1/1	1/1	1/1	2/1.5	2/1.5	2/1.5

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Database server	xSeries 345	2	0	1/1	1/1	0	2/1.5	2/1.5
Additional storage for application database	internal RAID-5 disk array	0	0	0	1	0	0	1
Ethernet switch	CISCO WS-C2950-12	1	1	1	1	1	1	1
Monitor and keyboard	NetBAY 2U Flat Panel Monitor Console Kit	2	1	1	1	1	1	1
KVM switch	NetBAY 1x4 Console Switch	1	0	1	1	0	1	1
UPS	APC 2U Smart-UPS 1400 RMB	2	1	0	0	1	0	0
	IBM UPS3000XHV	2	0	1	1	0	1	1
Rack	NetBay11	11	1	1	1	1	1	1
	<b>Total xSeries servers</b>		1	2	2	1	2	2
	<b>Total rack units used</b>		8	11	11	8	11	11

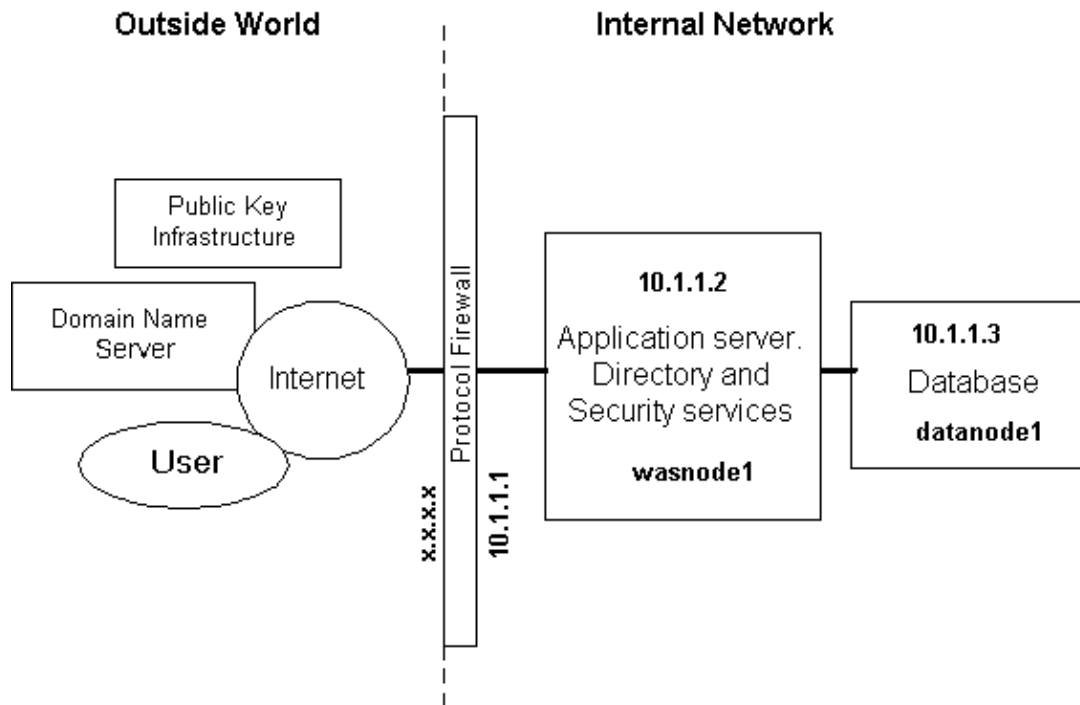
Table 11 describes the software components for each Internet topology rack-based configuration.

**Table 11. Internet topology rack-based configurations: software components**

Web load level		low			high		
		A	B	C	A	B	C
Database option (A-no, B-small, C-large)		A	B	C	A	B	C
Functional node	Software component	Licenses					
Application server	WebSphere Application Server Express 5.1	1	1	1	2	2	2
Directory and security services (optional)	IBM Tivoli Directory 5.2	1	1	1	1	1	1
Application database (optional)	DB2 Universal Database 8.1.4 Express edition	0	1	1	0	2	2
	SLES 8 (with Service Pack 3) OS	1	2	2	1	2	2

The disk subsystem characteristics of the servers in the Internet rack-based configurations are the same as for the corresponding intranet configurations (see Table 3).

The following network diagram reflects the infrastructure of the Integrated Platform Express Internet topology.



This topology consists of three functional nodes:

- Protocol Firewall, which is implemented as a hardware firewall appliance (Cisco PIX-515e is recommended)
- wasnode1. This node represents the WebSphere Express application server, including the embedded HTTP server. The IBM Tivoli Directory Server software is also installed on this node.
- datanode1. This node represents the DB2 database server.

#### 4.2.2. Internet topology: single-server configurations

The software and hardware components and the disk subsystem characteristics for the Internet topology single-server configurations are the same as for the corresponding intranet topology configurations.

#### 4.2.3. Internet topology: security considerations

Firewalls provide services that can be used to control inbound access from a less-trusted network. Traditional implementations of firewall services include screening routers and application gateways.

In the Internet topology of the Integrated Platform Express network diagram, the screening router is represented by a protocol firewall. The Cisco PIX-515e hardware (or a similar hardware firewall appliance) provides the protocol firewall. The firewall is configured to allow only HTTP and HTTPS traffic between the Internet and the Web server component of the WebSphere Application server. The default port on the Web Server for HTTP is 80. For the HTTPS (HTTP with SSL), the default port is 443.

## 5. Database configurations

A DB2 Universal Database v8.1.4 Express is used on the Integrated Platform Express configuration with a "small" or "large" database.

In the configurations with a "small" database, one logical disk is shared by the Linux operating system, the DB2 software, the DB2 log files, and the database. In these configurations, we are using two internal drives and RAID-1 (integrated mirroring) protection with an optional hot spare. Maximum effective capacity of the database in these configurations is limited by the size of one hard drive (the largest hard drive size is 146 GB).

In order to increase performance in the "large" database configurations, the database is separated from the other entities and placed on a separate logical drive. This drive is physically located on the additional 4 to 6 internal disks or in the case of x360-based configurations, on the external Storage Expansion unit EXP300, that can have up to 14 disks. The database is protected by a RAID-5 or RAID-5e array that provides better read access performance than RAID-1. Maximum effective capacity of the database in these configurations is the size of 3 hard drives (up to 438 GB), 5 hard drives (up to 730 GB), or 13 hard drives (up to 1898 GB) depending on the Integrated Platform Express configuration.

## 6. Scalability

The "low end" configurations of the Integrated Platform Express can be upgraded to the "high end" configuration by adding memory modules and extra processors to servers. Business Partners assembling Integrated Platform Express solutions based on the validated blueprint can easily change these hardware components in all recommended configurations.

## 7. Flexibility statement

Business Partners assembling Integrated Platform Express solutions based on the validated Blue Print can:

- Add additional RAM to any server. [See note 1]
- Add additional Intel® processors of the same type and speed to any server. [See note 1]
- Replace a server and additional processors with a new model with faster processors of the same xSeries server line. [See note 1]
- Replace recommended hard disks to larger disks of the same type on any server. [See note 1]
- Install a number of hard drives (more than 3) in the RAID-5 array of the configurations with a "large database". [See notes 1 and 2]
- Replace a recommended xSeries server in a single-server configuration of the Integrated Platform with any xSeries server that supports SUSE SLES 8. For example, you can replace an x335 with an x235 or x345 server, depending on your requirements.
- Replace a recommended xSeries server in a rack-based configuration of the Integrated Platform with any rack-optimized xSeries server that supports SUSE SLES 8. For example, you can replace an x335 with an x345 server, depending on your requirements.
- Replace a recommended xSeries server with and 32-bit (x86) xSeries server that supports SUSE SLES 8.
- Replace a recommended xSeries server with an IBM BladeCenter blade (HS20).

Business Partners can deploy server-based Java-compliant applications on the Integrated Platform WebSphere Application Server Express. They can also fine tune component software (for example, WebSphere Application Server or DB2) configuration parameters to optimize their applications.

### Note

Note 1: Refer to the IBM *Configuration and Options Guide* for possible memory configurations, processor upgrades, and hard disk sizes for the xSeries servers.

**Note**

Note 2: To achieve better database performance, it is recommended that smaller disks be used in the RAID-5 array. For example, if disk space requirements are 180 GB, it is better to use 6 disks of 36.4 GB in the RAID-5 array than 4 disks of 73 GB.

**Appendix A. Software installation and solution verification**

This appendix provides guidelines for the installation of the Linux operating system and the middleware for the various configurations of the Integrated Platform Express. After the installation, you can use one of the sample Java applications provided with WebSphere Express for verification of the solution.

**A.1. Single-server configurations without database**

Perform the following steps to install software on a single server without database:

1. Install SLES 8.
2. Install United Linux Service Pack 3.
3. Install IBM Tivoli Directory Server (without included DB2 and WebSphere Application Server Express).
4. Install WebSphere Application Server Express.

**A.2. Single-server configurations with database**

Perform the following steps to install software on a single server with database:

1. Install SLES 8.
2. Install United Linux Service Pack 3.
3. Install DB2.
4. Upgrade DB2 to fixpak 4.
5. Install IBM Tivoli Directory Server (without included DB2 and WebSphere Application Express).
6. Install WebSphere Application Server Express.

**A.3. Multi-server configurations with database**

Perform the following steps to install software on multiple servers with database:

1. Install SLES 8 on `wasnode1` and `datanode1`.
2. Install United Linux Service Pack 3 on `wasnode1` and `datanode1`.
3. Configure `wasnode1 eth0` as `10.1.1.2`
4. Configure `datanode1 eth0` as `10.1.1.3`
5. Enter the following command on `datanode1`: **`echo "10.1.1.2 wasnode1.local wasnode1" >> /etc/hosts`**
6. Enter the following command on `wasnode1`: **`echo "10.1.1.3 datanode1.local datanode1" >> /etc/hosts`**
7. Install DB2 Universal Database Express on `datanode1`.
8. Upgrade DB2 to fixpak 4 on `datanode1`.
9. Install IBM Tivoli Directory Server (with included DB2 and without WebSphere Application Express) on `wasnode1`.

10. Set up DB2 users on wasnode1.

a. Create the following groups on wasnode1:

- i. db2grp1
- ii. db2fgrp1
- iii. dasadm1

b. Create the following users on wasnode1:

- i. db2inst1, member of db2grp1 and dasadm1
- ii. db2fenc1, member of db2fgrp1
- iii. dasusr1, member of dasadm1

c. Enter the following command: **/opt/IBM/db2/V8.1/instance/dascrt -u dasusr1**

d. Enter the following command: **/opt/IBM/db2/V8.1/instance/db2icrt -a SERVER -u db2fenc1 db2inst1**

e. Enter the following command: **su - db2inst1 -c db2set**

f. Add the following line to `/etc/services`:

```
"db2c_db2inst150001/tcp"
```

11. Install WebSphere Application Server Express on wasnode1.