

# FUJITSU Software

## Symfoware Server V12.1.0

A decorative horizontal band with a red-to-dark-red gradient. It features abstract, glowing white and red lines that swirl and intersect, creating a sense of motion and energy.

# General Description

Windows/Linux

J2UL-1733-05ENZ0(00)  
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# Preface

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## Purpose of This Document

This document explains the Symfoware Server concepts to those who are to operate databases using it.

This document explains the features of Symfoware Server.

## Intended Readers

This document is intended for people who are:

- Considering installing Symfoware Server
- Using Symfoware Server for the first time
- Wanting to learn about the concept of Symfoware Server
- Wanting to see a functional overview of Symfoware Server

Readers of this document are also assumed to have general knowledge of:

- Computers
- Jobs
- Linux
- Windows(R)

## Structure of This Document

This document is structured as follows:

### [Chapter 1 Symfoware Server Basic](#)

Explains the features of Symfoware Server.

### [Appendix A List of Features](#)

Explains the lists of the main features provided by Symfoware Server.

## Export Control Restrictions

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# Chapter 1 Symfoware Server Basic

Symfoware Server is a database that is fully compatible with PostgreSQL. The reliability, operability, and usability of Symfoware Server can be further improved by extending the PostgreSQL functionality.

This chapter explains the functionality extended by Symfoware Server.

Symfoware Server has the following features:

- Flexible database recovery

Not only does Symfoware Server recover data to its most recent form when a failure occurs, which is essential for databases, but it can also recover to any point in time.

- Simple GUI-based installation and operation management

Symfoware Server uses GUI to simplify cumbersome database operations, and allows databases to be used intuitively.

**L**

- High reliability by using failover

Symfoware Server links with PRIMECLUSTER, thereby allowing highly reliable systems to be achieved by using failover.

**W**

- High reliability by using failover

Symfoware Server links with Microsoft Cluster Service or Microsoft Failover Cluster, thereby allowing highly reliable systems to be achieved by using failover.

- High reliability by using database multiplexing

Database multiplexing protects important data and enables highly reliable database operation.

- Stable operation of applications using PL/extJava

PL/extJava is a platform that gives the client access to business logic performed on the database server as stored functions. Using PL/extJava provides improved application performance and stable operation.

- Seamless migration from Oracle databases

Symfoware Server provides a compatibility feature with Oracle databases that localizes the correction of existing applications and allows easy migration to Symfoware Server.

- Linkage with integrated development environment

Symfoware Server links with Visual Studio, thereby allowing a standard framework to be used to create applications and construct a database server.

- Storage Data Protection using Transparent Data Encryption

Information can be protected from data theft by encrypting data to be stored in the database.

- Enhanced query plan stability

The following features can control SQL statement query plans:

- Optimizer hints

- Locked statistics

These features are used for curbing performance deterioration caused by changes in SQL statement query plans, such as with mission-critical jobs that emphasize performance stability over improved SQL statement processing performance.

## 1.1 Flexible Database Recovery

Threats such as data corruption due to disk failure and incorrect operations are unavoidable in systems that use databases. The ability to reliably recover corrupted databases without extensive damage to users when such problems occur is an essential requirement in database systems.

Symfoware Server provides the following recovery features that flexibly respond to this requirement:

- Media recovery, which recovers up to the most recent point in time
- Point-in-time recovery, which can recover up to a specific point in time

### Media recovery, which recovers up to the most recent point in time

When a disk failure occurs, media recovery can recover data to how it was immediately before the failure.

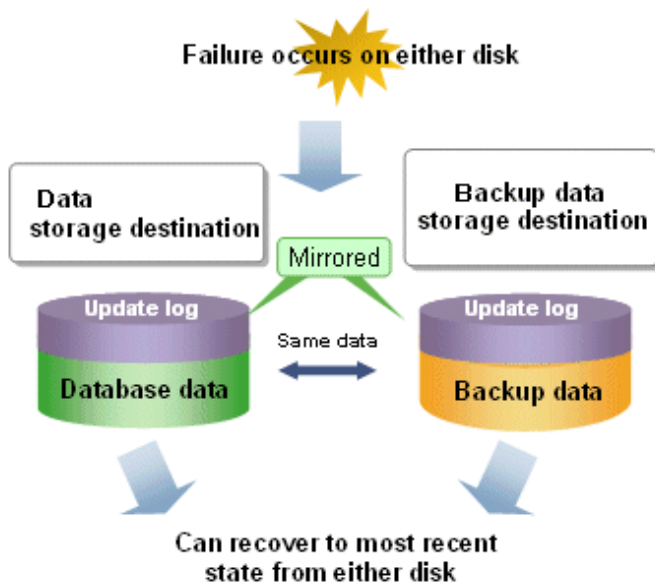
In order to recover the database, Symfoware Server accumulates a history of database update operations, such as data additions and deletions, as an update log.

Symfoware Server retains a duplicate (mirror image) of the update log after backup execution on the data storage destination and on the backup data storage destination. Therefore, the data on one disk can be used to recover to the most recent state of the database even if a disk failure has occurred on the other.

Media recovery is executed using either a GUI tool provided with Symfoware Server (WebAdmin) or server commands.

#### Information

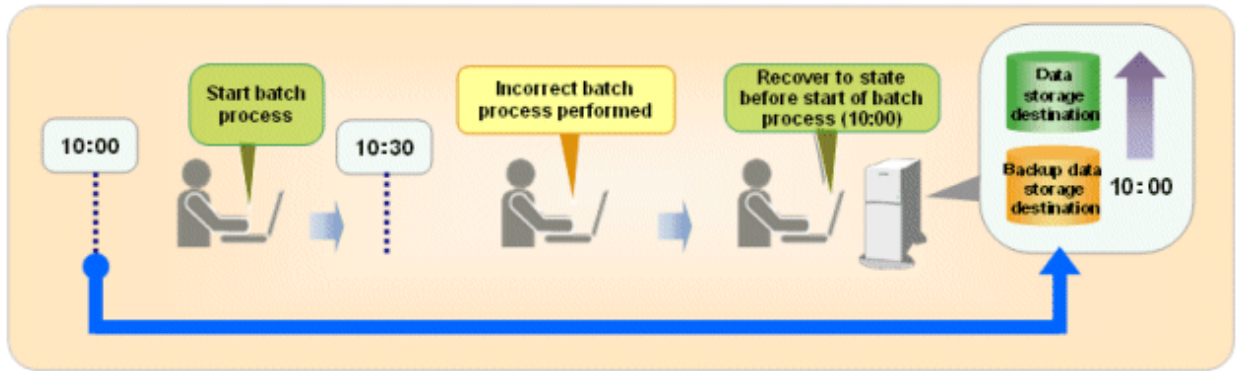
Recovery using WebAdmin requires less time and effort, since WebAdmin automatically determines the scope of the operation.



### Point-in-time recovery, which can recover up to a specific point in time

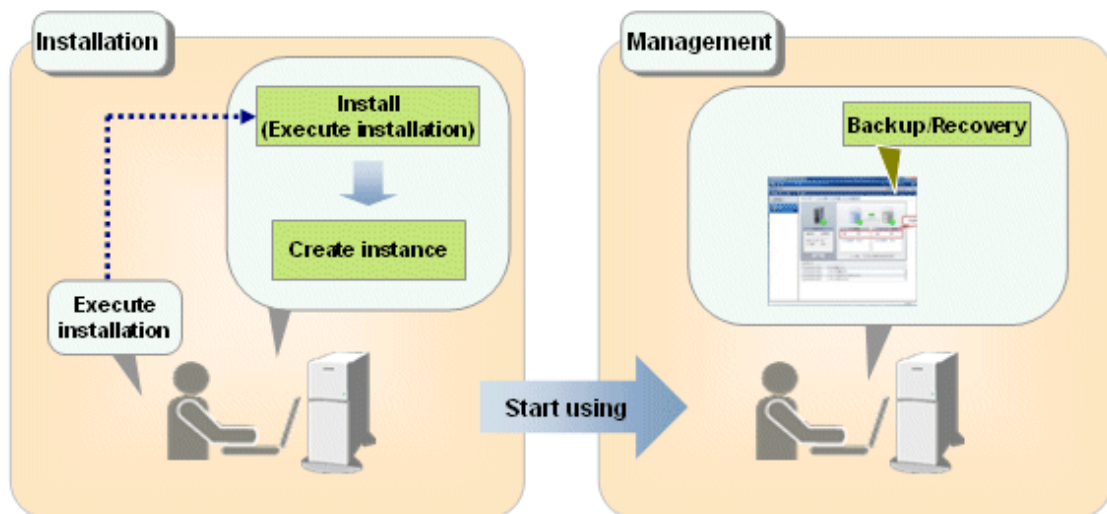
Point-in-time recovery can be used to recover a database that has been updated by an incorrect operation, for example, by specifying any date and time before the incorrect operation.

Point-in-time recovery is executed using Symfoware Server server commands.



## 1.2 Simple GUI-Based Installation and Operation Management

Symfoware Server provides WebAdmin, which is a GUI tool for a range of tasks, from database installation to operation management. This allows the databases to be used simply and intuitively.



WebAdmin can be used for Symfoware Server setup, database backups, and for recovery.

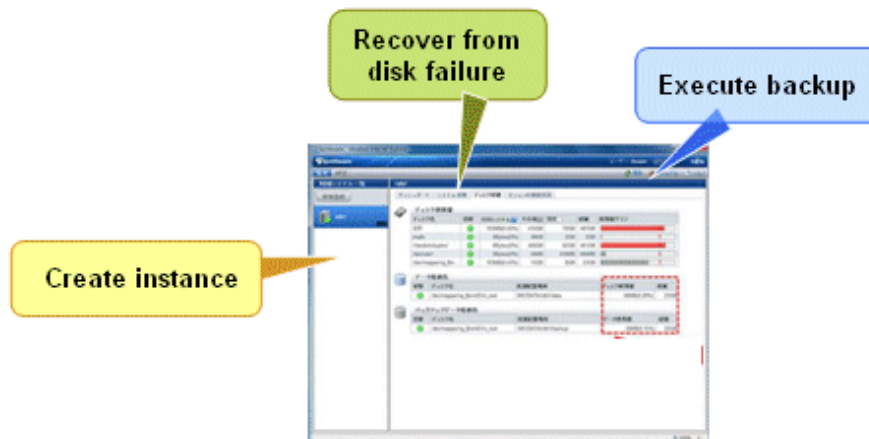
- Setup

To perform setup using WebAdmin, you must create an instance. Instances can be created easily and with only minimal required input, because the tool automatically determines the optimal settings for operation.

- Database backup/recovery

Database backup and recovery can be performed using simple GUI operations.

In particular, Symfoware Server can automatically identify and isolate the location of errors. This simplifies the recovery process and enables faster recovery.



In addition, Symfoware Server provides the following expanded features in pgAdmin:

- NCHAR type
- Expanded trigger definition
  - REPLACE feature
  - Function call feature

## 1.3 High Reliability by Using Failover

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When a system is stopped, service is interrupted until recovery is complete. The larger the system, the longer the downtime, and the greater the problems caused to those trying to use the service.

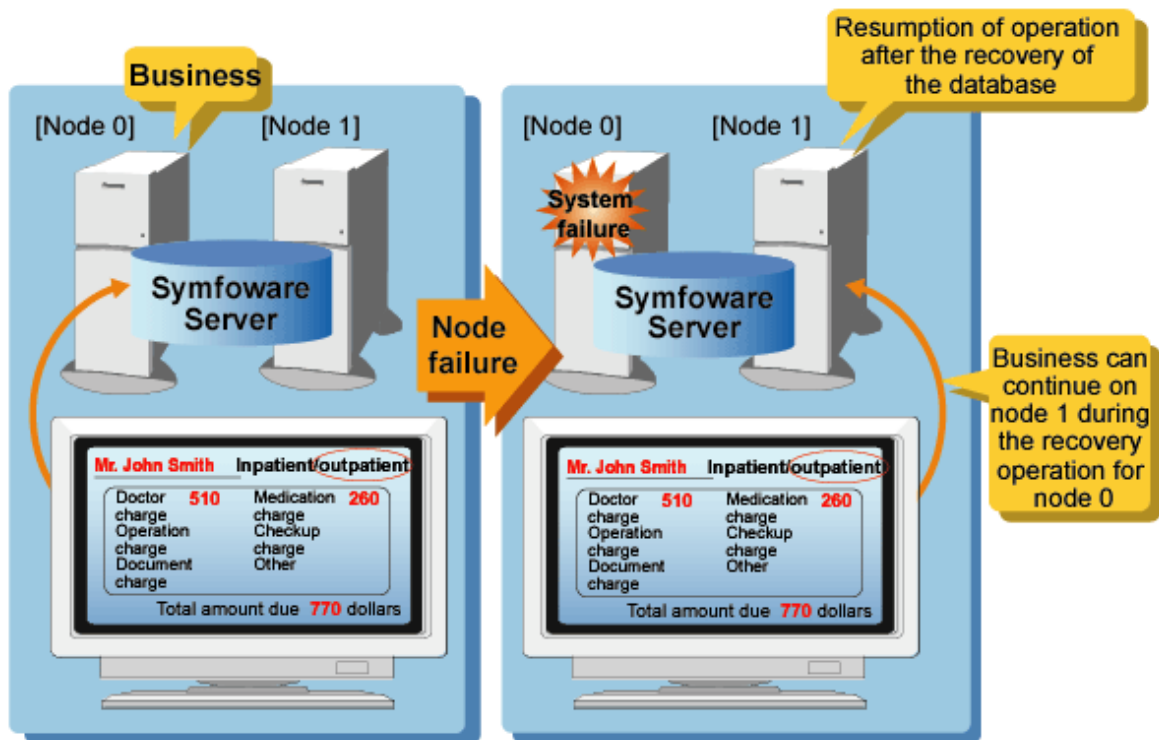
By using the failover feature linked to cluster software, Symfoware Server can minimize system downtime when an error occurs.

### For medical accounting systems

Some hospitals that take in many patients are managing and operating databases with the various types of data necessary for accounting. If an accounting system like this were to stop and take several minutes to recover, the effects would probably be considerable.

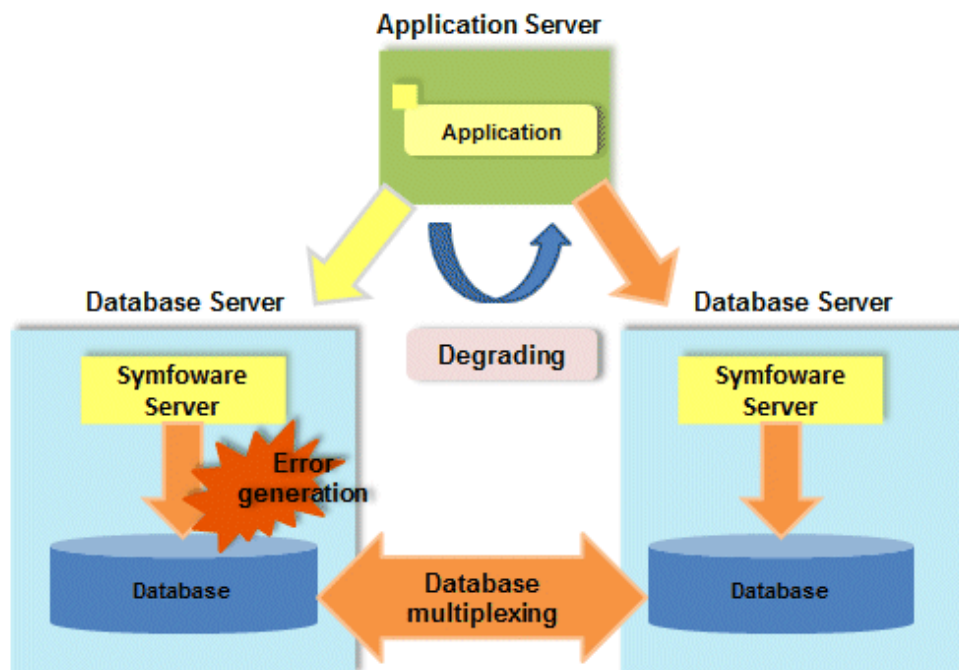
When failover is applied to such a system, it provides an uninterrupted service even if an abnormality occurs, by rapidly switching servers and transferring operations to a standby server whenever an abnormality occurs on the active server.

An example of a medical accounting system with failover is shown below.



## 1.4 High Reliability with Database Multiplexing

It is vital for systems that use databases to protect data from damage or loss caused by a range of factors such as hardware and software errors. Database multiplexing protects important data and enables highly reliable database operation.



Symfoware Server not only mirrors a database using the PostgreSQL streaming replication feature, but also provides simplified switchover and standby disconnection features as well as a feature to detect faults in elements that are essential for the continuity of process, disk, network, and other database operations.



In addition, the client automatically distinguishes between the primary and standby servers, so applications can be connected transparently regardless of the physical server.

### Mirroring Controller option

The Mirroring Controller option enables the primary server (the database server used for the main jobs) to be switched automatically to the standby server if an error occurs in the former.

In addition, by using the data on the standby server, reference jobs such as data analysis and form output can be performed in parallel to the jobs on the primary server.



Refer to "Database Multiplexing Mode" in the Cluster Operation Guide for information on the database multiplexing.

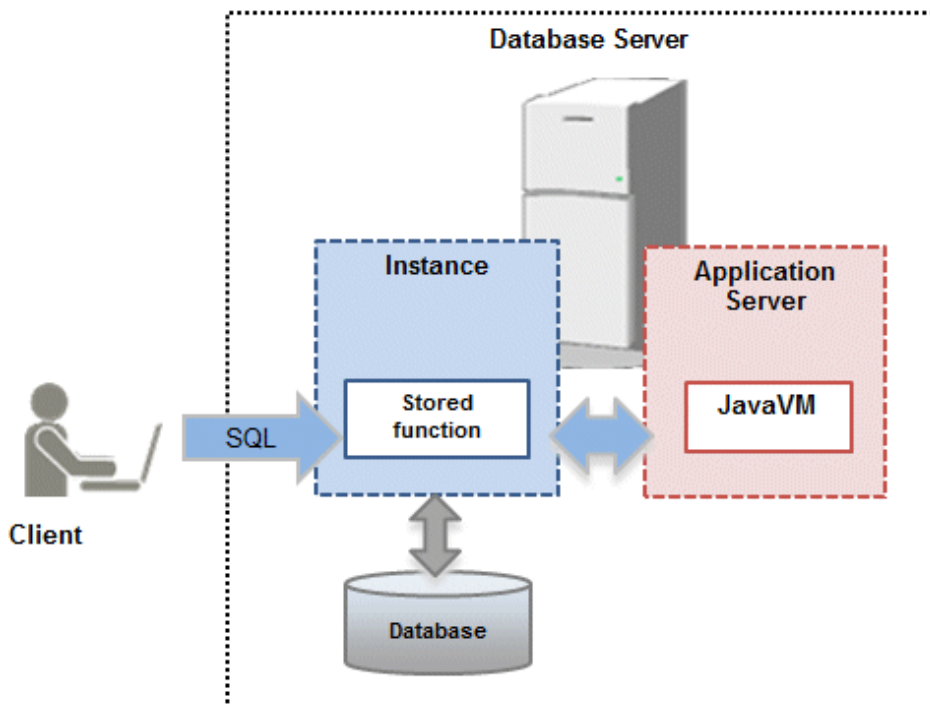
## 1.5 Application Operation using PL/extJava

PL/extJava is a framework for incorporating the application server into the database server and controlling the Java Virtual Machine (Java VM).

Jobs where a client frequently accesses a database using SQL mean a high volume of network traffic between them. As a result, not only these jobs may experience a drop in response, but other job systems may as well. It is possible to reduce network traffic and improve the job processing time by performing business logic, implemented via stored functions, on the database server instead of on the client.

However, if several clients access the database server simultaneously, Java VM multiplexer control and memory resources must be taken into account on the database server if Java VM is run.

PL/extJava can control the Java VM multiplexer control and memory resources using the application server, so stored functions can be executed efficiently even in operation modes that have simultaneous access from many clients.



Refer to "Setting up and Operating PL/extJava" in the Operation Guide for information on the PL/extJava.

## 1.6 Seamless Migration from Oracle Databases

Symfoware Server provides the features compatible with Oracle databases.

Using the compatibility feature reduces the cost of correcting existing applications and results in easy database migration.

The table below shows the compatibility features provided.

Category		Features compatible with Oracle databases	
		Item	Overview
SQL	Queries	Outer join operator (+)	Operator for outer joining
		DUAL table	Tables provided by the system
	Functions	DECODE	Compares and converts values
		SUBSTR	Extracting part of a character string
		NVL	NULL value conversion
Package	DBMS_OUTPUT	Message sending	
	UTL_FILE	File operation	
	DBMS_SQL	Dynamic SQL execution	

### Information

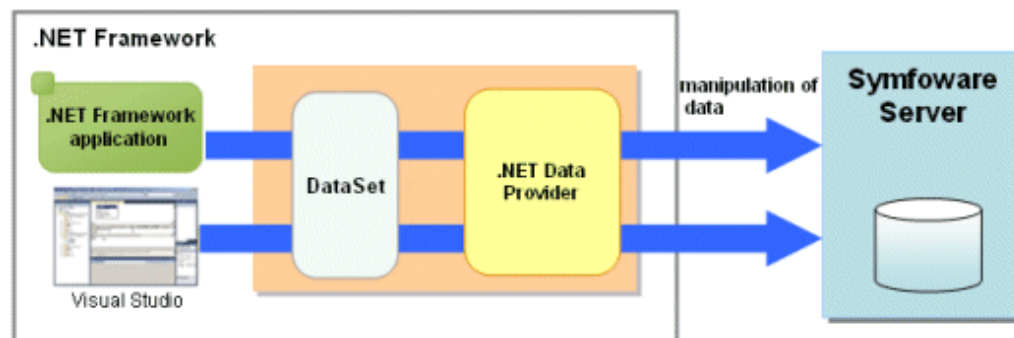
The features compatible with Oracle databases are enabled by default. Note that because some features differ from the external specifications, however, the features must be selected using compatibility mode. Refer to section "Notes on SUBSTR" in the Application Development Guide for details.

## 1.7 Linkage with Integrated Development Environment

You can link with Microsoft Visual Studio to create application. And, you can automatically generate applications to access database resources by linking to Visual Studio.

### Relationship between .NET Framework and Symfoware Server

Symfoware Server provides .NET Data Provider, which is an interface for ADO.NET of .NET Framework. This enables you to select Symfoware Server as the connection destination database of ADO.NET and use the intuitive and efficient application development features of Visual Studio.



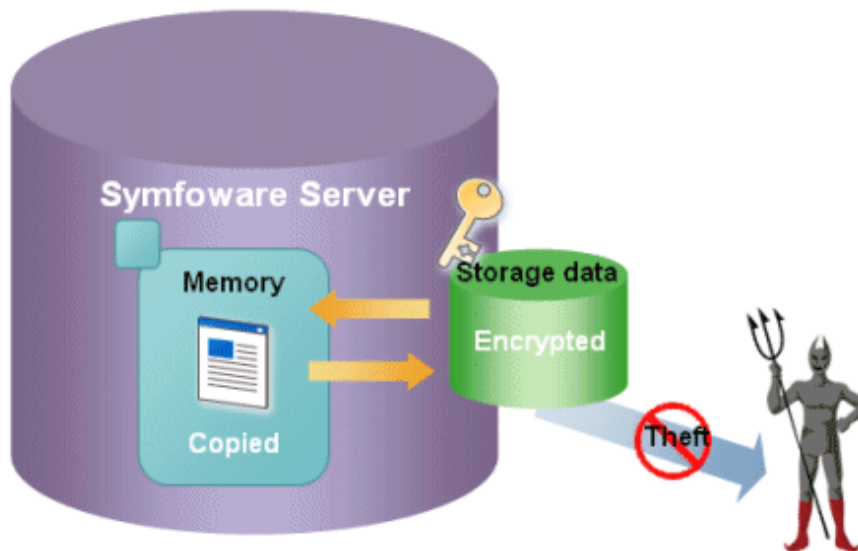
## 1.8 Storage Data Protection using Transparent Data Encryption

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The encryption of data to be stored in a database is essential under the following encryption requirements of PCI DSS (Payment Card Industry Data Security Standard), the data security standard of the credit industry:

- Confidential information (such as credit card numbers) can be encrypted.
- The encryption key and data are managed as separate entities.
- The encryption key is replaced at regular intervals.

To satisfy these requirements, Symfoware Server provides a transparent data encryption feature. Note that PostgreSQL uses an encryption feature called pgcrypto, which can also be used in Symfoware Server, but requires applications to be modified. Therefore, we recommend using Symfoware Server's transparent data encryption feature.



 See

Refer to "Protecting Storage Data Using Transparent Data Encryption" in the Operation Guide for information on stored data encryption.

## 1.9 Enhanced Query Plan Stability

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Symfoware Server estimates the cost of query plans based on SQL statements and database statistical information, and selects the least expensive query plan. However, like other databases, Symfoware Server does not necessarily select the most suitable query plan. For example, it may suddenly select unsuitable query plan due to changes in the data conditions.

In mission-critical systems, stable performance is more important than improved performance, and changes in query plans case to be avoided. In this situation, the following features can stabilize query plans:

- Optimizer hints

You can use `pg_hint_plan` to specify a query plan in each individual SQL statement.

- Locked statistics

You can use `pg_dmbs_stats` to lock statistical information per object, such as a database, schema, or table.

 See

Refer to "Optimizer Hints" in the Application Development Guide for information on optimizer hints.

Refer to "Locked Statistics" in the Application Development Guide or information on locked statistics.



 **Note**



Use the features provided when Symfoware Server is installed for optimizer hints and locked statistical information. Symfoware Server does not support other similar open-source features.



## Appendix A List of Features

The following table lists the main features provided by Symfoware Server.

Category	Feature	Linux		Windows	
		EE	SE	EE	SE
Fujitsu-developed software technology	WebAdmin (Rapid setup, One-click recovery)	Y	Y	Y	Y
Improved reliability	Failover	Y	Y	Y	Y
	Database multiplexing	Y (*1)	Y	Y (*1)	Y
Stable operation of applications	PL/extJava	Y	Y	Y	Y
Application development	Embedded SQL integration Java integration ODBC integration .NET Framework integration	Y	Y	Y	Y
	Features compatible with Oracle databases	Y	Y	Y	Y
Security	Storage data encryption	Y	Y	Y	Y
Performance tuning	Optimizer hints	Y	Y	Y	Y
	Fixed statistical information	Y	Y	Y	Y

Y: Provided

N: Not provided

\*1: The Mirroring Controller option is available.

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