

# Fujitsu Enterprise Postgres on IBM LinuxONE Datasheet



Sustainable, resilient, and scalable – from server to database

## Fujitsu's contribution to PostgreSQL

PostgreSQL is one of the most advanced and widely used open source relational database management systems (RDBMS) in the world.

Fujitsu has been involved in the PostgreSQL community since 2003. Fujitsu is a major sponsor of the PostgreSQL community, contributing to the development of many features.

## Fujitsu Enterprise Postgres

Fujitsu Enterprise Postgres is a mission-critical RDBMS on PostgreSQL that is ideal for hybrid, multi-cloud.

It is designed for full compatibility with the feature-rich open-source PostgreSQL server used by over 1 million users worldwide.

Fujitsu Enterprise Postgres is an ANSI-compliant enhanced PostgreSQL that combines the strengths of open-source PostgreSQL with enterprise features for mission-critical systems such as high performance, reliability, and security.

It builds on the strengths of open-source PostgreSQL with enhanced enterprise features such as high performance, reliability, and security.

Fujitsu Enterprise Postgres enables integration with a wide range of software, information use systems, development tools, and application runtime environments

## IBM LinuxONE

IBM LinuxONE is an enterprise-grade Linux® server with a unique architecture designed to meet the needs of mission-critical workloads in regulated industries.

## Fujitsu Enterprise Postgres on IBM LinuxONE

It is a PostgreSQL offering optimized with enterprise features on IBM LinuxONE.

Deployed on LinuxONE, Fujitsu Enterprise Postgres provides the scalability and business-critical availability that organizations need.

Choose from on-premises, cloud, and OpenShift environments, and subscription licenses can be converted across platforms.

## Fujitsu Enterprise Postgres on IBM LinuxONE is:

- Sustainable
- Secure
- Scalable

### Sustainable

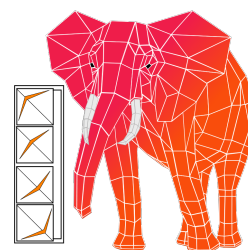
Fujitsu Enterprise Postgres delivers faster performance with more efficient periodic and batch aggregation, real-time aggregation of large amounts of data, and increased load performance relative to the number of CPU cores. Combined with IBM LinuxONE, organizations can meet their sustainability goals and reduce their carbon footprint without compromising performance, scale, and security.

### Secure

Encrypt data privacy everywhere with Transparent Data Encryption, Data Masking, and integration with IBM LinuxONE Crypto Card.

### Scalable

Leverage Fujitsu LinuxONE on-demand capacity and IBM Enterprise Postgres operator to automatically scale up resources to meet business demand.



Fujitsu Enterprise Postgres  
on IBM LinuxONE

Fujitsu Enterprise Postgres deployed on IBM LinuxONE delivers an environment on which users will benefit from reduced compute demand, end-to-end encryption, data and transactions managed at massive scale, and responsiveness to changing requirements on demand.

# Features and benefits

Main features	Benefits
<b>PostgreSQL-based RDBMS</b>	
<ul style="list-style-type: none"> <li>• 100% compatible with PostgreSQL</li> <li>• Compatible with other PostgreSQL databases</li> <li>• Extends open source PostgreSQL</li> <li>• Simple migration from proprietary databases</li> </ul>	<ul style="list-style-type: none"> <li>• No vendor lock-in</li> <li>• Supports Zabbix, Apache, Tomcat</li> <li>• Enterprise quality</li> <li>• Low migration cost</li> </ul>
<b>Security</b>	
<ul style="list-style-type: none"> <li>• Transparent Data Encryption</li> <li>• Data Masking</li> <li>• Dedicated Audit Log</li> <li>• Key management for Transparent Data Encryption</li> <li>• Cloud-based key management</li> <li>• Confidentiality management</li> <li>• Integration w/ CryptoCard HW security module (HSM)</li> </ul>	<ul style="list-style-type: none"> <li>• Increased security with PCI DSS-compliant 256-bit encryption</li> <li>• Protects production data</li> <li>• Efficient and accurate monitoring of audit log</li> <li>• Reduced risk of data leakage; lower operational costs</li> <li>• Improved security by storing keys in secure external services</li> <li>• Easier and more efficient security operations</li> <li>• Build a robust and secure database system.</li> </ul>
<b>Performance</b>	
<ul style="list-style-type: none"> <li>• Vertical Clustered Index†</li> <li>• Global Meta Cache</li> <li>• High-speed data load</li> <li>• zEnterprise Data Compression (zEDC)</li> </ul>	<ul style="list-style-type: none"> <li>• Improved performance for large data sets</li> <li>• Reduced overall memory usage with little performance degradation</li> <li>• Loads large volumes of data using parallelism according to available CPU</li> <li>• Reduced disk usage by compressing backup data and archive logs at high speed</li> </ul>
<b>Reliability and High Availability</b>	
<ul style="list-style-type: none"> <li>• Mirroring Controller</li> <li>• Connection Manager</li> <li>• Database Mirroring</li> <li>• Database Transaction Log Mirroring</li> <li>• WAL duplication</li> </ul>	<ul style="list-style-type: none"> <li>• Automated instant failover</li> <li>• Business continuity and fast failover without SQL relay</li> <li>• Two copies of a single database reside on different server instances</li> <li>• Transaction records are continuously streamed to the standby database</li> <li>• Solves PostgreSQL's single point of failure</li> </ul>
<b>DevOps</b>	
<ul style="list-style-type: none"> <li>• System usage statistics</li> <li>• WebAdmin</li> <li>• Enhanced GUI for cluster management</li> </ul>	<ul style="list-style-type: none"> <li>• Users can access database's utilization metrics and statistics</li> <li>• Easily manage database and its contents saving time and money</li> <li>• Management tool makes setup and cluster management simpler</li> </ul>
<b>Ease of use</b>	
<ul style="list-style-type: none"> <li>• Easy installation, setup and management</li> <li>• Web-based and command line interfaces</li> <li>• One-click backup and recovery</li> </ul>	<ul style="list-style-type: none"> <li>• Reduced technical staff overheads</li> <li>• Simplified operation management</li> <li>• Easily performed high-level tasks</li> </ul>
<b>Fujitsu support options</b>	
<ul style="list-style-type: none"> <li>• Version compatibility</li> <li>• Provides patches following PostgreSQL updates</li> <li>• Guaranteed support from end of sales period</li> </ul>	<ul style="list-style-type: none"> <li>• Low migration cost due to compatibility verification</li> <li>• Guaranteed standard support</li> <li>• Optional extended support period; extendable</li> </ul>

† Fujitsu's implementation of In-Memory Columnar Index by Fujitsu Laboratories Limited

# Topics

## PostgreSQL-based database system

Fujitsu Enterprise Postgres is based on PostgreSQL, the world's most advanced feature-rich open source database system. PostgreSQL, used by millions of users globally, enables integration with a wide range of software, information utilization systems, development tools, and application runtime environments.

## Easy and cost-effective migration

Fujitsu Enterprise Postgres has been designed to be fully compatible with open source PostgreSQL databases and also offers enhanced compatibility when migrating from existing Oracle® systems.

The solution significantly reduces migration time so that budget restraints and business disruption are no longer a concern; the migration process has now become much more streamlined.

## Enhanced system integration

The utilization of PostgreSQL technology enables integration with a wide range of software, information utilization systems, development tools, and application runtime environments. Investing in additional software systems and high migration costs are no longer considerations. User disruption is also avoided due to the ability to retain software products that users are already familiar with.

## Ease of use

### Reduced expenditure for database design and implementation

Fujitsu Enterprise Postgres employs a minimal setup process based on optimized resource deployment. The setup process performs dynamic hardware resource detection during installation and the software is automatically tuned with the customer's server configuration. Using this method, the parameter and backup settings are all completed during the deployment of the system.

Fujitsu's innovative development methodology has been a key factor in producing an installation process that takes just three simple steps to perform:

1. Launch the installer (the installation is completed using automatically tuned values).
2. Launch WebAdmin (GUI management tool).
3. Use WebAdmin to create new instances and configure backup and recovery options.

This simplified installation and setup process allows Fujitsu Enterprise Postgres to be implemented within a very efficient time frame.

### Reduced reliance on technical staff

Many operational tasks can be carried out by non-technical staff. For example, to back up or restore instances, simply click to backup and click to restore.

## Fujitsu support

### High-level support

Standard support and extended support options available to customers for ongoing assurance, so that future support and system confidence is a guaranteed business outcome.

## Security

### Transparent Data Encryption

Secure 256-bit Transparent Data Encryption (PCI-DSS compliant) and redundancy for high reliability and asset protection that is aligned with your data management strategy.

### Data Masking

Redacts data using masking policies to obscure data returned from queries, making it available for reference without exposing the actual data. Data masking makes it safe to use production data in a test or development environment.

### Key management for Transparent Data Encryption

By storing the encryption key outside the database, you can securely store the master encryption key and reduce the risk of data leakage. The database administrator is released from the operation and management of the master encryption key.

### Cloud-based key management

Transparent Data Encryption keys can be stored in cloud key management services. Supports plug-ins to call communication adapters in the cloud and to share data encryption keys. Key management services in the cloud provide more choices for key management, lower operational costs, and increased security.

### Confidentiality management

Simpler operations for role-based access control (RBAC) setting and audit. Easier and efficient security operations, and reduced human errors, minimizing security risks.

### Integration with CryptoCard Hardware Security Module (HSM)

Transparent Data Encryption (TDE) is a software functionality to encrypt data at rest without having to modify existing applications. It enables robust data management by leveraging encryption keys protected by CryptoCard - IBM's Hardware Security Module (HSM).

This feature is further integrated with Central Processor Assist for Cryptographic Function (CPACF), the on-chip accelerator feature, to allow encryption without impacting the server throughput. Another layer of data security is provided by managing encryption keys using hardware encryption with Crypto Express.

Integration with Cryptocard can reduce implementation and operational costs, since management design can be simplified.

### FIPS compliance

Fujitsu Enterprise Postgres with Cryptographic Module can use algorithms approved by the Cryptographic Module Security Requirements (Federal Information Processing Standard) 140, designed to ensure strengthened data encryption and communication security.

## **Performance**

### **Vertical Clustered Index**

The VCI engine integrated with Fujitsu Enterprise Postgres provides significantly faster analytical query processing by storing a columnar representation of row-oriented data in memory. Tests show that for a 280 GB dataset on a 56-core Linux node, this results in almost 5 times the throughput of analytical queries while maintaining equivalent transaction volumes.

### **Global Meta Cache**

System catalog and table information is cached in shared memory instead of in per-process memory. The memory usage of the overall system is reduced to enhance system performance.

### **zEnterprise Data Compression (zEDC)**

A unique backup/recovery feature is provided in Fujitsu Enterprise Postgres on IBM LinuxONE via the `pgx_dmpall/pgx_rcvall` commands, which enable online backup execution with continuous archiving and one-step recovery of backup data and archived WAL.

Furthermore, Fujitsu Enterprise Postgres on IBM LinuxONE works with the on-chip compression accelerator zEnterprise Data Compression (zEDC) to deliver efficient backup. zEDC reduces 90% of CPU cost and 40% of data compression processing time compared to conventional software compression.

## **Reliability and High Availability**

### **Mirroring Controller**

Constantly checks the status of database processes, and if a problem is detected, automatically redirects operations to the standby server, without the need for human intervention.

### **Connection Manager keeps your business running**

Heartbeat monitoring is performed between client and server, so business can be resumed immediately from the application side in case a failure occurs. Applications can connect to an instance without being aware of which server the instance is running on. Fast failover without SQL relay.

### **WAL duplication for simple, reliable recovery**

If a database problem occurs or if data is accidentally deleted, recovery of the WAL (Write-Ahead Log) can be performed with a single click.

# Technical details

Item		Fujitsu Enterprise Postgres				
Basic architecture	Max. database capacity		Unlimited			
	Max. number of columns in table		1,600			
	Max. row length in table		1.6 TB			
	Max. number of rows in table		Unlimited			
	Max. number of indexes per table		Unlimited			
	Index storage format in table		B-tree		GiST/SP-GiST	
			hash		GIN	
			BRIN		VCI (Fujitsu's In-Memory Columnar Index)	
	Data types	Character types	CHARACTER		NCHAR	
			CHARACTER VARYING		NCHAR VARYING	
			text			
		Numeric types	bigint	integer	smallint	
			bigserial	numeric	smallserial	
			decimal	real	serial	double precision
		Datetime types	date	time	time with time zone	
			interval	timestamp	timestamp with time zone	
		Binary data types	bytea	Large object		
		XML	Yes			
		JSON	Yes			
		Character set	UNICODE	Yes		
		Multilingual support		Yes (149 locales)		
Security	Transparent Data Encryption		256-bit (compliant with PCI-DSS)			
	Data Masking		Full masking / Partial masking / Regular expression masking			
	Dedicated Audit Log		Yes (compliant with PCI-DSS)			
	Key management for Transparent Data Encryption					
	Cloud-based key management					
	Confidentiality management					
	Integration with CryptoCard hardware security module (HSM)					
Reliability/ High Availability	Standby		Yes			
	Split brain control		Yes			
	Instant failover		Yes			
	Transparent connection		Yes (ability to connect to a database server without knowing its stage)			
Performance	In-Memory Columnar Index		Yes (implemented via Fujitsu's Vertical Clustered Index)			
	High-speed backup/recovery					
	High-speed data load					
	zEnterprise Data Compression (zEDC)					
Application development	SQL standard		Compliant with ANSI/ISO SQL:2016			
	Oracle-compatible SQL		Outer join operator			
			DUAL table			
			Functions (SUBSTR   NVL   DECODE)			
			Built-in packages (UTL_FILE   DBMS_OUTPUT   DBMS_SQL   DBMS_ALERT   DBMS_ASSERT   DBMS_PIPE   DBMS_RANDOM   DBMS_UTILITY   PLUNIT   PLVCHR   PLVDATE   PLVLEX   PLVSTR   PLVSUBST)			
	Language		C			
	Interface		ODBC    JDBC			
	Stored procedures / functions		Yes			
	Access control		Deadlock automatic detection			
			Query by other transactions during updates (Multiversion control)			
Support	High quality long-term support		Guaranteed			

# Supported environments

	Server operating system	Client operating system
on IBM Z and LinuxONE (s390x)	<ul style="list-style-type: none"><li>• Red Hat Enterprise Linux 9.0 or later minor version</li><li>• Red Hat Enterprise Linux 8.2 or later minor version</li><li>• SUSE Linux Enterprise 15 SP3 or later minor version</li></ul>	<ul style="list-style-type: none"><li>• Red Hat Enterprise Linux 9.0 or later minor version</li><li>• Red Hat Enterprise Linux 8.2 or later minor version</li><li>• SUSE Linux Enterprise 15 SP3 or later minor version</li></ul>