FUJITSU Enterprise Postgres and FUJITSU Server PRIMEQUEST

Choose the right architecture with the right enterprise database for superior performance and reliability on business-critical workloads, with optimized economics and HTAP capabilities.

About FUJITSU Server PRIMEQUEST

Combining the power of Intel® Xeon® Processor Scalable Family, the standard specifications of Microsoft Windows and Linux operating systems, and the wealth of market solutions with innovative RAS features for highest availability and business continuity, FUJITSU Server PRIMEQUEST systems provide new levels of operational efficiency for business and mission-critical computing with truly open standards and deliver highest performance. FUJITSU Server PRIMEQUEST systems combine the efficiency of an x86 architecture with the reliability levels rivalling that of a UNIX/mainframe architecture. This makes it ideal for HTAP workloads.

About FUJITSU Enterprise Postgres

Founded on PostgreSQL, the world's most advanced open source relational database system, FUJITSU Enterprise Postgres extends base PostgreSQL functionality with a number of enhanced enterprise features.

PRIMEQUEST 3800B

The FUJITSU Server PRIMEQUEST 3800B is the prime system for business-critical computing that offers superior performance and reliability with optimized economics. This 8-socket rack server combines the flexibility and economic benefits of x86 industry standard systems with business-critical uptime features. Featuring the latest Intel® Xeon® Processor Scalable Family with up to 28 cores per processor for a total of 224 cores, this server delivers superior compute performance leading to efficient business

results. With high capacity 12TB DDR4 memory at 2,666 MHz, populated over 96 DIMM slots, the system can support large amounts of data for in-memory workloads such as FUJITSU Enterprise Postgres' In-Memory Columnar Index for acceleration of hybrid transactional workloads.

The PRIMEQUEST 3800B system is lightweight and offers superior performance in an economic, space-saving footprint. All these features when combined with the PRIMEQUEST 3800B's advanced RAS features that prevent errors in advance, makes this 8-socket 5U rack server the right choice for demanding corporate databases, in-memory solutions and business-critical applications found in SAP environments or big data processing.

What is HTAP and why it is important for your business

HTAP stands for Hybrid Transactional/Analytical Processing, and is a term coined by Gartner to describe an architecture able to handle large workloads of transaction-oriented applications (OLTP) alongside large analytical workloads (OLAP).

The drive for the implementation of this type of systems is the fact that in a globalized, highly competitive world, online systems need to quickly and reliably process business transactions, while at the same time also need to quickly gather and analyse copious amounts of data so that information can be acted on.

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PostgreSQL and PRIMEQUEST 3800B combine the power of converged infrastructure and cloud virtualization delivering ground-breaking performance with HTAP

PRIMEQUEST 3800B's high-capacity memory specs, in conjunction with FUJITSU Enterprise Postgres and its In-Memory Columnar Index technology make it the system of choice for your business to run enterprise applications that demand enhanced performance and analytical capabilities. You will no longer need two separate environments to handle the different workloads, nor waste time balancing performance between transaction processing and real-time data analytics.

Introducing HTAP - performance considerations

When it comes to introducing HTAP to a pure OLTP workload, the main concern is the impact on your transactional throughput. In a world where transaction volumes are increasing exponentially, the concept of introducing HTAP can be seen as too high a risk for many applications, as it requires major database and application changes to adapt to new database approaches for its adoption.

OLTP — HTAP — OLAP

Online transaction processing — Hybrid transactional/ analytical processing — Online analytical processing
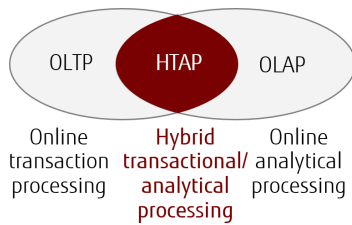
The most efficient and performant way to deliver HTAP functionality with minimal to no impact on transactions is by extending the indexing capability of your database to deliver Hybrid Query workloads. This must be implemented in such a way that under peak workloads the indexing can stay consistent with the underlying table, but cause minimal impact on transaction I/O performance. This can be achieved with intelligent usage of additional processing and memory capacity, and the right architecture. Some alternate approaches make application logic and planning a lot more complex, as they lack consistency of view within or across transactions, making the application developer responsible for business application consistency.

FUJITSU Enterprise Postgres delivers this by extending the PostgreSQL database capability with the implementation of In-Memory Columnar Index, known as VCI (Vertical Clustered Index*). This capability allows existing and new applications to be seamlessly extended to provide consistent analytical queries over their transactional systems, without application developers having to concern themselves with consistency.
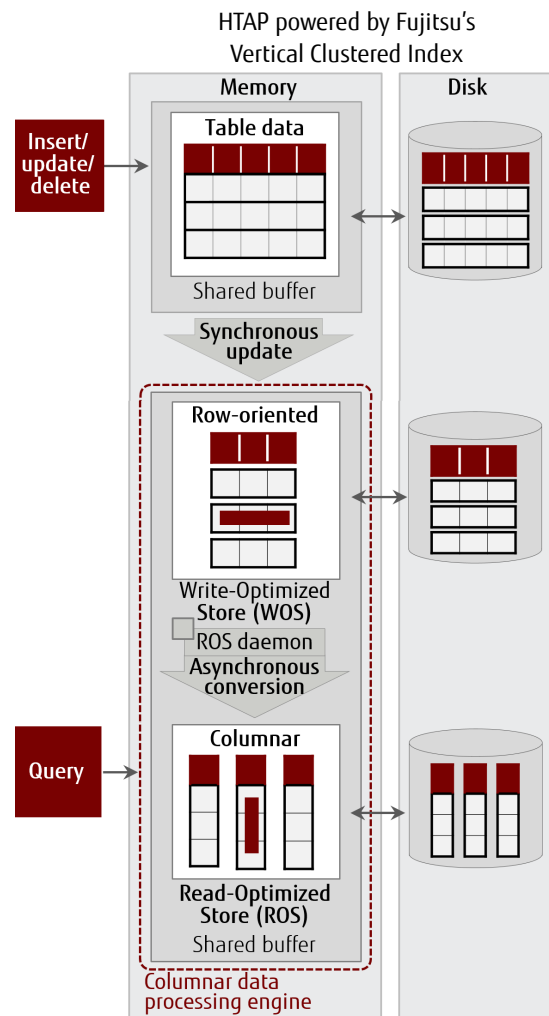
To demonstrate this, we took a standard OLTP workload and ran concurrent analytical queries on a PRIMEQUEST server, achieving up to 5x the throughput of analytical queries when compared with the same queries run without using VCI on the same server platform. This impressive performance leap was possible because Fujitsu's PRIMEQUEST server platform provides Intel® processor scalability and high-speed memory as well as the storage performance required to scale and stress-test HTAP database platforms.

The results demonstrated, with less than 1% delta in transaction throughput, that FUJITSU Enterprise Postgres was able to achieve 5x the analytical query throughput on complex, long TPC-H style queries across 5 parallel workers. No application changes were required, and full data consistency was preserved, enabling both in-process and point-of-decision query workloads, without developers having to worry about statefulness in their applications.

Deployment	Transactional throughput (tpmC)	Analytical queries (QphH)
FUJITSU Enterprise Postgres 10 **using** Vertical Clustered Index*	3,740	51
FUJITSU Enterprise Postgres 10 **not using** Vertical Clustered Index*	3,780	10
OSS PostgreSQL 10	3,749	11

* Developed by Fujitsu Laboratories Limited

The benchmark was run on a Linux single node on a PRIMEQUEST server partition configured for 56 cores with 380 GB of memory and a base loaded dataset of 280 GB.

HTAP powered by Fujitsu's Vertical Clustered Index

Memory — Disk

Table data

Insert/ update/ delete

Shared buffer

Synchronous update

Row-oriented

Write-Optimized Store (WOS)

ROS daemon

Asynchronous conversion

Columnar

Query

Read-Optimized Store (ROS)

Shared buffer

Columnar data processing engine

* VCI is a technology of Fujitsu Laboratories Ltd.

Main features and benefits of PRIMEQUEST 3800B

Scalable platform for transaction demanding workloads and consolidation:

- 8x Intel® Xeon® Platinum processors(8200) with up to 224 cores: *Unprecedented performance and memory capacity for demanding corporate databases, in-memory solutions and business-critical applications*
- Memory capacity of 12TB (DDR4, 2,993 MHz) over 96 DIMMs: *Fast memory and I/O throughput ensured*
- 16 PCIe 3.0 expansion options (including PHP slots)
- Compact 5U chassis: *Cost-efficient 5U chassis packs superior performance in an economic, space-saving footprint*
- Economic scaling from 2 to 8 sockets: *Designed to enable simple scale-up, as required components are "inside" the system thanks to the glue-less system design*

Smart architecture with advanced RAS for business-critical workloads:

- Glue-less design, no external UltraPath Interconnect (UPI) cables: *Ensures a high level of serviceability*
- Dual power feed option for two redundant phases
- CPU detects data errors and replays instructions: *Improved system resilience, system can continue operations even if two PSUs fail*
- Advanced memory protection, intra-socket mirroring and address range mirroring
- System health check and failure prevention (MCA Gen.2): *Advanced RAS features in CPUs and memories enable advanced actions for error circumvention, assisted by enterprise x86 operating systems to increase system availability*
- Online firmware update reduces downtime for system maintenance: *No need to stop the system during system update*

Cost efficiency for your data centre:

- Simplified server architecture with a compact chassis: *Reduced data centre hardware costs and electricity bills*
- Simplified and comprehensive power management with pre-defined power profiles: *Result in significant savings*
- Fujitsu ServerView Suite offers tools for installation and deployment, permanent status monitoring and control. A wide range of integration packs allow a seamless and easy integration in widely used enterprise management system

RELIABILITY   PERFORMANCE   SPACE & COST EFFICIENCY

Main features and benefits of FUJITSU Enterprise Postgres

PostgreSQL-based RDBMS:

- 100% compatible with PostgreSQL: *No vendor lock-in*
- Compatible with other open source PostgreSQL databases: *Also supports Zabbix, Apache, Tomcat*
- Extends open source PostgreSQL: *Enterprise quality*
- Simple migration from proprietary databases: *Low migration cost*

Ease of use:

- Easy installation, setup and management: *Reduced overheads*
- Web-based and command line interfaces: *Simplified operation*
- One-click backup and recovery: *Easily-performed high-level tasks*

Security:

- 256-bit transparent data encryption: *Increased security*
- PCI-DSS compliant
- Data masking: *Protects development and production data*
- Dedicated audit log: *Efficient and accurate monitoring*

High reliability and performance:

- Vertical Clustered Index: *Improved performance for large data sets.*
- High-speed data load: *Loads large volumes of data using parallelism according to available CPU*
- High-speed backup/recovery: *High-speed copy technology of choice can be used*
- DB Mirroring Controller: *Automated failover*
- WAL duplication: *Solves PostgreSQL's single point of failure*

Fujitsu support options:

- Version compatibility: *Low migration cost due to compatibility verification*
- Provides patches following open source PostgreSQL updates: *Guaranteed standard support*
- Guaranteed support from end-of-sales period (extendable): *Optional extended support period*

Contact us

If you have any questions about FUJITSU Server PRIMEQUEST or FUJITSU Enterprise Postgres and how they can help you with your business-critical and HTAP workloads, please contact us online or at postgresql@fast.au.fujitsu.com.

About Fujitsu

Fujitsu is the 5th largest IT service provider in the world, offering a full range of technology products, solutions and services. Around 160,000 Fujitsu employees support customers in over 100 countries.