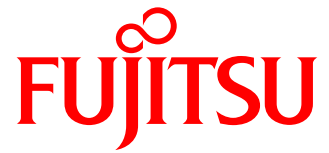# Sizing Guide
FUJITSU Enterprise Postgres

Hardware Sizing for FUJITSU Enterprise Postgres deployment - High-end customers

General recommendations

When sizing the hardware for a FUJITSU Enterprise Postgres installation, consider the following:

- Use scalable hardware, as you might want to add additional users and functionality in the future. The memory, disk space, and CPU should be larger than needed for the initial installation.
- Check specific restrictions of the selected operating system. Windows Server has a specific restriction that the machine should not run out of physical memory, or server problems will occur. In the case of FUJITSU Enterprise Postgres, it will crash if the instance tries to allocate additional memory.
- Small databases are usually fast. The more data is in use, the slower the application performs, and the more resources are needed on the Database Server.
- The database performance is defined by four parameters:
  - Number and performance of CPUs
  - Main memory used for the database
  - Disk I/O
  - Client-server connection speed

Sizing the Database Server

Database	Concurrent users	CPUs*1	Table space (in GB)	Memory (in GB)
Medium	300+	4	150+	64+
Large	600+	4-8	300+	128+
X Large	1000+	>8	900+	256+

*1: Dual core and Quad core

If the current database is at 100 GB with an annual growth-rate of 15 GB, we recommend building out your server with a hard drive larger than 150 GB.

A SAN array is a preferable option. Otherwise, the recommended hard drive setup would include 3 separate high-speed disk drives (i.e., 15k RPM).

In either solution, the recommendation is to have dedicated drives for the following:

Disk	Usage	Recommended size
Disk1	Data disk	Size of databases × 2
Disk2	Temporary database	Variable, but generally ≤100
Disk3	OS, program files, etc.	Variable, but generally ≤100

In many cases the best performance is achieved if an application loads the data being processed into the server's RAM before processing. This is even more significant if the VCI (Vertical Clustered Index) feature (Fujitsu' implementation of In-Memory Columnar Store) is deployed.

This is mainly to optimise performance so that all calculations occur live rather than requiring a new read operation for each new row.

Memory

To increase database performance, we recommend fitting the machines with more physical memory than necessary: 10 MB per connected user, with RAM allocation depending on the database size.

Disk I/O is reduced when more memory is allocated for the database, as some activities are buffered in the database memory.

A good rule of thumb is to reserve 1 GB of RAM by default, plus an additional 1 GB for each 4 GB between 4-16 and another 1 GB for every 8 GB installed above 16 GB. So, in a server with 32 GB RAM, 7 GB is for the OS, and the remaining 25 GB is dedicated to Database Server operations.

Hard disk

Write-intensive parts of the database (such as undo, redo log, temp) and system swap or page file need to be located on separate disks. We recommend using different disks for the database and the OS, to avoid any impact on the database. Each service (file service, swap, etc.) which uses disk I/O can affect the database performance.

As I/O is most critical to the database, it is recommended to use four to six physically separated disks, or an equivalent performing controller base RAID shelf (RAID 0/1) exclusively for the database, plus a separate disk for the OS. RAID 5 has to be used for archived redo log files.

The Database Server needs enough free disk space for:

- Database backups - database exports (hot backup) and file image backup (cold backup)
- Database logs
- Case of emergency - complete image backup (db files)
- Copies of the database dump for production, training, development, testing, upgrade, etc.

For the archive log, we recommend to provide disk space six times the size of the dump.

The Database Server requires at least 30 GB disk space at the beginning.

Database growth has to be monitored over time, and actions to be taken if more space is needed.

Network

We recommend a 1 GBit connection between the Database Server and the Application server.

Essential is the speed of the connection, not the throughput. 1 GBit LAN only defines the throughput. If the connection is heavily loaded, the elapsed time for each IP packet is high, and the connection will be slow. This is even more important if the system is designed as master server with one or more standby servers where, normally, all servers reside on different machines.

If database and application are on the same machine, the connection is faster than on separate machines.

Do not use a WAN to connect the Database Server with the Application Server.

Contact

Feel free to contact us at postgresql@fast.au.fujitsu.com should you want to discuss your database requirements with one of our consultants.