

Why PostgreSQL

It is not synonymous with Oracle Database

On January 1, 2016 in Russia, comes into effect the decision of the Russian Federation "On the establishment of a ban on admission of software originating from foreign countries for procurement purposes for providing state and municipal needs". In accordance with this resolution, to January 1, 2016 year formed the register of the Russian software (software) and state organizations can purchase the software from foreign firms (for example, Oracle) only if there is no Russian counterpart to this software, the details of which are included in the register, and which corresponds to the same class of software that software, planned to purchase, **according to their functional, technical and (or) does not meet the performance characteristics established customer requirements** for the planned purchase of the software.

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With regard to the database, it is likely that the registry will be submitted to the database PostgreSQL open source represented on the company Postgres Professional market. How can you justify that PostgreSQL does not meet the requirements of the customer? is an analog of Oracle database and the functional, technical and operational characteristics are not meets the requirements of the customer?

When choosing a database experts analyze the following main characteristics of the software:

1. Performance: The number of transactions per second, response time, the execution time of complex SQL queries
2. Reliability: the probability and duration of outages, the probability of data loss
3. Security and Data Protection
4. Manageability: cost management, resource efficiency equipment
5. Scalability: The software performance with an increase in load and the number of users, the possibility of increasing the volume of the hardware resources
6. Working with large amounts of data and large numbers of users
7. The presence and level of technical support
8. Total Cost of Ownership
9. Maturity database and its development prospects
10. Support for new technologies

For each of these parameters PostgreSQL lags behind Oracle. In other words, If you choose to create a small database of information systems where downtime is acceptable, no confidential data, to the speed of the high requirements not imposed on the number of users and amount of data is small, then the PostgreSQL is quite suitable for your solutions. If, however, at least one of the characteristics listed above is important to you, you should consider the use of database Oracle.

To substantiate this compare PostgreSQL database and Oracle in accordance with the list of these characteristics. Options and features the Oracle database, used in this comparison, in more detail documentation, as well as in the software catalog Oracle.

1. Performance: The number of transactions per second, response time, the execution of complex SQL queries

This criterion is the most obvious and traditional when comparing different databases, but it should be understood that the performance of IT systems depends on all the components of architecture - from storage systems directly to business applications. Database located in the middle of the stack, but can have a significant impact on all of the components, for example, through the effective use of hardware resources, and effective management of connections and caching applications. An important factor in choosing a database is also the presence and debugging tools, and performance optimization, resource allocation management.

There are a large number of tests - benchmarks that allow to compare different database under the same load and the environment. The most trusted tests are conducted by independent companies or consortiums, the results of which, along with the testing conditions and loading scenarios are published openly.

The PostgreSQL database has no analogues of Oracle technologies:

- Real Application Clusters - load balancing technology across multiple physical nodes in the cluster, which operate as a single database and provide greater total computing power than maximum power of each node;
- GRID - reallocation of computing power and components for critical care at the between services and applications;
- Developed diagnostics, optimization, proactive monitoring and self-tuning, including plans, controls query (declarative SQL optimizer hints, profiles, dynamic SQL plans);
- Partitioning - partitioning technology large relational tables and the possibility of intellectual optimization of queries to these tables in order to significantly reduce the amount of input-operation O, and as a result the total execution time of queries. This functionality present in The PostgreSQL, but it is implemented based on customizable triggers manually, that is, requires a significant resources for maintenance, while this feature is automated in Oracle, until automatically creating sections, if necessary;
- In-Memory - technology processing tabular data in memory including columnar Compression algorithms in storage, the low-level optimization processing using SIMD CPU instructions and special algorithms, such as the Bloom Filters and Vector GroupBy;
- Parallel query processing, including DML statements;
- Real Application Testing - Automated load testing technology at the level of DBMS capture and playback actual application load allowing to carry out the degradation analysis performance upgrades, parameter changes, the growth of the database volumes, etc.
- Resource Management - prioritization of funds and distribution of computing resources between applications based on declarative policies;
- Oracle Exadata - specialized hardware and software systems, integrates all Oracle technology to ensure the best performance and fault tolerance, such as GRID, RAC, In-Memory, and others. These systems are characterized by an optimized architecture that enables distributed load between the components and, due to the synergistic effect of the technologies used, to ensure performance, inaccessible systems, built according to traditional architecture;

Due to the low performance PostgreSQL database is never involved in independent tests performance, such as TPC (www.tpc.org).

2. Reliability: the probability and duration of outages, the likelihood of data loss

Modern databases are almost always a critical component of the IT environment. From their reliability, efficiency and security of the whole is often dependent companies and enterprises. at This concept of reliability database includes not only protection against hardware and software failures, but and the ability to restore the database after the logical error or intentional data corruption, software protect the database when application updates, security and validation of client connections. An important factor It is also the duration of works on reconstruction and administration. All of these factors normally describe the formal indicators RTO (recovery time objective) - the time required for restoration and RPO (recovery point objective) - the amount of data that can be lost during recovery. Combination Oracle technology allows us to reduce both of these parameters to zero, ensuring zero data loss due to means of synchronous replication and zero recovery time of service at the expense of active-active clustering.

In PostgreSQL, no:

- Real Application Clusters - technology of active-active clustering at the level of the database, providing protection from a server failure, the translation of the new transistor automatic computer running on the cluster nodes, as well as automatic Repeat aborted transaction;
- Data Guard Far Sync - to ensure disaster recovery technology by synchronizing the database copies at the remote site in real time without impacting performance and providing zero data loss. Oracle Data Guard technology also includes tools for automatic switching applications, and users to back up the database in case of failure of the primary, means automatic database integrity checking and recovery in the event of error detection;
- Recovery Manager - rich tool for creating database backups;
- Multitenant - technology allows to consolidate multiple databases into a single container, consolidating as well as their management objectives;
- Flashback - technologies that provide protection against human error on the part of administrators Databases, users, programmers, as well as from the application logic error;
- Automatic Storage Management - provides protection against the failure of the media carrier, Load balancing the I / O to the storage device;
- Edition based redefinition - means to ensure application updates without downtime users;
- Online redefinition - the ability to administer the database without interrupting the user experience and applications;
- Real Application Testing - Automated load testing technology with updates Database and / or platform;
- Enterprise Manager and OEM Packs - developed means of automated diagnostics, management lifecycle and configuration database, automate routine administrative tasks;
- Transparent Application Failover, Fast Application Notification, Application Continuity - a set of technologies, working at the client database driver, and provide transparent failover applications to the backup node in case of failure of the primary.

3. Security and Data Protection

The concept of data protection also includes many aspects: from the protection of personal data in the database from access from the outside to the periodic monitoring of database rights and the roles assigned to users. Correctly Organized data protection policy requires logging of data access operations, as well as predovtrasceniya nesanktsioniroannogo means of access, a single means of encryption and key management access, etc.

There are no PostgreSQL:

- Sertifikatsiya FSTEC on how personal data storage means;
- Database Vault - Database protection of privileged users;

- ~~Advanced Security~~ encryption data storage means, the transfer through the network, as well as in
- Database Masking and Subsetting - intelligent masking and truncation of data when creating copies DB, eg for testing and development;
- Database Audit Vault - the regular access control and detection of excessive user privileges DBMS;
- Database Firewall - to monitor and intercept dangerous SQL traffic, for example, to prevent SQL injection attacks;
- Key Vault - a common means of key management database access and data encryption.

4. Manageability: Administration costs, efficiency use of equipment resources

Maintenance of database systems is a time-consuming task, requiring sophisticated tools proactive monitoring of system performance in terms of increasing the volume and growth of the database load on them. Routine maintenance operations, such as installing service packs, as required automation of verification tools and configurations.

In addition, in order to ensure uninterrupted operation of critical systems, for maintenance work usually try to put in a specially dedicated to this time interval - the process window. On the duration of this interval have an impact and scope of the database, and the ability to perform certain work without disruptive systems and requirements to ensure coherence of individual elements of the infrastructure.

There are no PostgreSQL:

- Ability to perform work on the administration without disrupting applications and Users in either on-line, and in the mode of "rolling fashion";
- Enterprise Manager, Diagnostic and Tuning Pack - advanced administration tools, diagnostics, setting, self-tuning. The absence of such instruments would not allow efficient use equipment to prevent failures and ensure high performance.
- Enterprise Manager, Database Lifecycle Management Pack - automation of daily tasks maintenance and administration of DBMS;
- Means of self-adaptation and databases - specialized algorithms and components allowing the database to collect the diagnostic and statistical information on implementation queries, and based on this information to optimize its performance.

5. Scalability: providing performance increase load and number of users, the ability to increase hardware resources used

With increasing amount of data, increasing the number of users, applications and adding component there is a need to scale systems, ie the increase in the volume of software and hardware resources, allocated to them, in order to increase productivity. The obvious, but less effective in cost solution in this case is to replace the server hardware on more productive. But This vertical scaling option in most cases requires a long test period and system downtime, when the database is copied to the new server, applications and users on perekommutiruyutsya the new configuration. A further disadvantage of this solution is the impossibility of dynamic scaling DBMS resources as upwards and downwards, with periodic, for example, seasonal, bursts load. It is possible to ensure the dynamic horizontal scaling, ie scaling by adding (or removing) additional nodes to the cluster database Oracle offers a wide range of cluster technology, covering the whole stack of server hardware - from DBMS servers to storage systems. These technologies allow to build distributed systems serving tens of thousands of users, while ensuring the highest levels of reliability and protection.

There are no PostgreSQL:

- Real Application Clusters - technology of active-active clustering at the level of the database, providing uniform load balancing on all nodes in the cluster, with the ability to dynamically add and exceptions sites;

- Automatic Storage Management - clustering technology storage, load balancing on them, the automatic reallocation of data in case of configuration changes;
- Active Data Guard Far Sync - load sharing technology between the primary and backup database data allowing to make reporting and analytics, as well as bekapirovanie with the main site. Technology provides synchronous transfer of data without affecting processing performance user requests;
- Exadata - a specialized hardware and software system that uses all of the above technology, and thanks to them allowing smooth zooming including hardware without disruption to applications and users;
- Global Data Services - a set of technologies for managing complex IT landscapes and effective the user load balancing them.

6. Working with large amounts of data and large numbers of users

To ensure the performance when working with large databases (up to tens and hundreds of terabytes) in DBMS usually have special mechanisms and algorithms. This important issue of the database, in addition to the run-time queries on a large volume of data, it is the time period needed for administration, as these operations greatly affect the performance of the database, or even require its stopping, and process window limit, they often do not fit.

PostgreSQL does not support very large databases, providing efficient database processing with no more than a few terabytes.

There are no PostgreSQL:

- Technologies that provide necessary performance, not only OLTP load and OLAP - such as materialized views, OLAP multidimensional cubes, optimizing batch download, support schemes "Star" or "Snowflake" for data warehousing, special types of indexes, for example, BitMap Index;

- Advanced Compression - Data Compression algorithms, combined with a more performance According to this treatment (a combination of criteria for compression and circulation rate);
- In-Memory - additional level of storage tabular data in memory, allowing efficient combine in a single system OLTP and OLAP applications;
- Heat Map and Information Lifecycle Management - tools for automatic collection of statistics for circulation data and their modifications, as well as means of declarative ad data movement policies for levels of compression and / or storage;
- Multitenant - container architecture database, facilitates the process of consolidation and database migration data;
- Parallel query processing, including databases on different nodes of the cluster;
- Enterprise Manager, Diagnostic and Tuning Pack - advanced administration tools, diagnostics, setting, self-tuning;
- Ability to perform work on the administration without disrupting applications and Users in either on-line, and in the mode of "rolling fashion";
- Tools to optimize client connections to the database - connection pools, various types of client drivers and libraries;
- Active Data Guard Far Sync - Data replication technology with industrial database to a backup mode real time without impacting performance and zero data loss;
- Global Data Services - a set of technologies for managing complex IT landscapes, which include clustering and disaster recovery configuration. These tools allow you to control access client applications to database services, depending on the health and loading of databases data relative geo-location, and access policies, etc.

7. The presence and level of technical support

The efficiency of the database stack and quick resolution of the problem by the technical support system, the problem analysis, control responsibility work in 24x7 mode, prioritization of works, the ability to simulate failures, individual departments to find ways to solve problems and develop patches - Complex and the volume of industrial applications. In PostgreSQL, as an open source product such service no. Company Postgres Professional services among its claims to tech support, and the possibility of fixes in the database PostgreSQL, but at this stage it is difficult to judge the effectiveness of the service in By the obvious scarcity of companies, especially in comparison with Oracle industrial scale.

8. Total Cost of Ownership

PostgreSQL has no license cost and is absolutely free software.

However, the total cost of ownership of the software package consists not only of the cost of the license, but so the implementation of the cost, maintenance, technical support, zooming, and many other costs, including the salary costs DBA, etc. It is necessary to properly compare the configuration

Software, based on the required performance and efficiency of use of hardware resources. An important factor is also a difference in the cost of development and maintenance of the software application level, the presence of the certification application for a specific database and the need for additional optimization for its specificity. As a rule, the license cost is not the greatest,

10-20% portion of the total IT budget, while the remaining 80-90% - is to support costs, development, testing, implementation, etc.

Comparing Oracle and PostgreSQL, it should be noted:

- The degree of automation of administrative tasks from Oracle significantly higher, which reduces costs daily tasks for maintenance, such as updates, diagnostics, configuration and monitoring access policy, etc.
- Stack of Oracle Database includes not only, but also many other technological software, such as application server, integration products, operating systems, etc. All of these products predintegrovaný together, including configurations level. In addition, Oracle offers unique software-hardware systems that are already combine all the necessary server hardware and software, and do not require lengthy installation operations Software configuration, testing, etc. All of this significantly, tenfold, to reduce the time implementation and commissioning of new systems, which reduces the cost of implementation projects.
- Efficient use of hardware resources in Oracle above, as well as Oracle has a lot of improve data processing performance technology. This eventually leads to the fact that for provide the desired performance, Oracle require less hardware resources, and thus and reduces capital and operational costs associated with the hardware of the IT systems;
- By virtue of the broadest ubiquitous, Oracle database management system certified by an overwhelming majority application software developers, and hence eliminates the costs associated with adaptation of applications for the database;
- Oracle has its own training program and certification of developers and administrators that greatly facilitates the search for necessary staff. The number of such specialists the labor market is always consistently high. Additionally, the prevalence and quantity of the product existing staff reduces the need and costs for consulting services in the implementation of and support systems.

9. Maturity database and its development prospects

Oracle is a recognized leader in the segment database software vendors, exerting a significant influence for innovation the overall direction of the development of industry and software vendors without exception. This is confirmed by independent analytical Reports such as Gartner Magic Quadrant for Operational Database Management Systems:

PostgreSQL is not presented in this report, because is open source. However, its position

It can be estimated from the position of one of the clones
This database - EnterpriseDB, which is
commercial product of the same company,
having on the core set of add-ons PostgreSQL
in terms of fault tolerance, distributed
computing, handling, etc. The company since
also provides technical support services
and consulting. But even with all these
EnterpriseDB improvements significantly inferior
RDBMS Oracle.

10. Support for new technologies

Modern database management system - is a dynamically developing IT area in which
New technologies are emerging every year. Oracle is often the driving force of development,
offering the market products that have an impact on the development of the industry as a whole. Many vendors
DBMS, unable to invest comparable resources in research, find themselves in the role of catch-up,
when new functions implemented in their products, are in fact an adaptation, or simply copy
functionality already implemented in the Oracle database, tested and proven a variety of implementations.

PostgreSQL does not have a development similar to:

- Cloud database platform (DBaaS - Database as a Service) - a full-featured database,
deployed in their own data centers and available to customers on the company's standard network
protocols. This service allows you to significantly reduce the cost of deployment and maintenance
IT environments, reduce terms of time to market, improve the reliability of their systems. These
technologies include tools for building hybrid (hybrid) cloud environments, when the base
Data from private (private) cloud infrastructures can be easily migrated to a public
(Public) cloud;
- In-Memory technology, including not only the ability to buffer data in memory,
and mechanisms for data compression in the storage memory, intellectual query optimization,
low-level processing algorithms focused on memory, including SIMD
processor instructions, etc. ;
- Self-developed server SPARC processor having a unique hardware technology
acceleration of database operations, compression, encryption and data protection;
- Specialized software and hardware systems, and provides the highest performance
performance data, due to the widespread use of cluster GRID architecture;
- Polyglot Persistence - support for semi-structured (JSON, XML) and unstructured (Key-Value,
NoSQL) data within the database, and in other sources, including Big Data technology;
- Full-featured support BigData technologies, including both software (HDFS,
Hive, Hadoop, etc.) and integrated hardware and software systems that implement this
architecture and providing a high-performance processing of super-large data volumes.

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