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Original Article

Oracle vs PostgreSQL: Cost Analysis for Enterprises Adopting Cloud-Native Strategies

Harsha Vardhan Reddy Kavuluri
Lead Database Administrator, USA.

Abstract - *As the world is going digital day by day, companies are adopting more and more cloud-native solutions to increase the scalability and flexibility of their systems and reduce costs. Having the right DBMS is crucial when redesigning a new system and a fourth appropriate system that fits the organization's financial and operation strategies. Oracle is well-known as a proprietary deterministic database solution that provides high performance, high security, and professional support while being associated with high prices for licenses and maintenance. On this note, PostgreSQL, through an open-source database, has risen through the ranks due to key factors such as cost, possibility of scalability, and experience. In this paper, the evaluation of these two DBMSs in terms of their costs is discussed, and factors such as licensing costs, infrastructure costs, maintenance costs, and support costs of the two DBMSs are also compared. From such aspects, enterprises will be better positioned to make performance and cost-effective decision-making to support their cloud-native transformations.*

Adopting cloud-native architectures also requires organizations to consider other costs around databases apart from the license charges. Issues like the scalability of a solution, achieving the best performance, and the challenges related to being trapped by a particular vendor's offering are also paramount in long-term business planning. These extra-cost components are 1) high availability, 2) clustering, and 3) security, which Oracle offers as additional packages to its basic product, which raises the TCO. On the other hand, since PostgreSQL is an open-source database, it does not claim such expenditures yet performs similarly to MySQL with the help of extensions and third-party contributions. This paper also considers hidden costs, including migration difficulty and training costs that affect savings. Therefore, by answering the research questions and conducting the cost-benefit analysis, this research will help the enterprises understand which of the two databases DBMS is most appropriate for the cloud-native approach as per its efficiency, cost, and ability to scale to meet future needs.

Keywords: *Oracle, PostgreSQL, Cost Analysis, Cloud-Native, Database Management Systems, Licensing Fees, Scalability, Operational Expenses.*

1. Introduction

1.1. The Growing Importance of Cloud-Native Databases

The current trend sweeping through the technologically driven enterprise IT landscape is the move towards cloud-native architectures that help improve the ability and scalability of business operations while simultaneously reducing costs. [1-3] On the one hand, the utilization of conventional DBMSs entails considerable IT infrastructure, license, and maintenance expenses, while on the other, there are more adaptable, subscription-based, and elastic options for utility computing via database clouds. When buyers shift to comprehensiveness, DBMS must be considered, as it works well with cloud-oriented elements, including containerization, microservices, and serverless computing. Selecting a correct DBMS is significant for the efficient working of any organization, and it reduces the expenditures and cost of lock-in, all of which are critical for sustainable business growth.

1.2. Oracle vs. PostgreSQL: Key Differences in Cost and Performance

Oracle is more expensive than PostgreSQL; Oracle offers some high-demand features that are not available in PostgreSQL. Regarding scalability, PostgreSQL is better than Oracle in some aspects but not all; Oracle has better support than PostgreSQL. Database Management Systems or DBMS are incredibly vital in today's computing world, and Oracle and PostgreSQL are two of the most widely used DBMSs, well-known and utilized simultaneously with different advantages and disadvantages. Oracle is an enterprise DBMS due to its high reliability, security, and vastness of supporting resources, which make it suitable for large-scale companies that need to process mission-critical applications. However, as with all things, these come with a price, high licensing costs, costly options, and coupling with a particular vendor. Specifically, PostgreSQL, as an open-source DBMS, offers high performance, flexibility, and cost-efficiency as the solution that could be considered suitable for larger organizations. However, PostgreSQL can be less optimal at handling high-end applications that require third-party support and fine-tuning to achieve optimal enterprise-level solutions and needs. Nevertheless, from the overall perspective of costs,

PostgreSQL can be noted to take a significantly favourable value for TCO compared to Oracle for businesses that have to address cloud spending.

1.3. Evaluating Cloud-Native Compatibility and Scalability

Concurrency is among the most important concerns when adopting cloud-native solutions because contemporary applications require high availability and the ability to process significant amounts of data. Oracle also offers a storage escalation feature that can provide Real Application Clusters (RAC) and automatic workload management, but this is at the cost of some extra licensing fees. While not as feature-rich in its default configuration, PostgreSQL offers powerful scalability through extensions such as Citus for horizontal scaling and cloud-native integrations with Kubernetes. The database can be deployed on various cloud platforms like AWS, Azure, Google Cloud, etc.; however, PostgreSQL offers versatility in the multi-cloud and hybrid-cloud landscape since it is open-source. When selecting between the Oracle and PostgreSQL clouds, performance, scalability, and costs will be the key factors determining the course enterprises will take.

2. Literature Survey

The rising popularity of cloud-native architectures has created high interest in research studies that evaluate various aspects of the costs, performance, and scalability of various DBMSes. Several research papers have compared Oracle and PostgreSQL, among the most popular databases, focusing on their TCO, licensing, performance, and cloud capabilities. [4-7] Various features of previous research are analyzed in this section to discover the overall cost issues and technical factors when using trade-offs between Oracle and PostgreSQL.

2.1. Cost Comparison and Licensing Models

Response Licensing and Costs Oracle and PostgreSQL differ greatly in licensing and pricing. Oracle has a standard licensing policy implies a high initial cost that depends on the number of processor cores used in the organization. Several areas, such as Real Application Clusters (RAC), increased security, high availability, and performance tuning tools, are available only at extra cost. The data also shows that these licensing fees can reach up to millions of dollars per year, especially for large-scale companies, which makes Oracle a rather expensive company if such an enterprise wants to expand its cloud usage in their organizations.

On the other hand, the PostgreSQL database is an open-source database, which means no license charges are incurred, which helps cut down the TCO. To date, organizations can use PostgreSQL without offering control of their data to any vendor, and they can enhance and improve the database as per their requirements. It has been found by cloud computing researchers that PostgreSQL offers even more cost benefits to such start-ups and mid-scale organizations who cannot afford to pay_LICENSE large amounts for proprietary software.

2.2. Performance and Scalability Considerations

A number of research studies have been conducted to analyze the performance of Oracle and PostgreSQL in a cloud context in terms of TPS, query response time, and scalability tests. Oracle has been recognized as one of the most high-performance systems for DBMS, starting with transactional processing for large organizations. Some functional attributes, such as Oracle RAC, partitioning, and efficient indexing methods, distinguish it as an outstanding performer in numerous high throughput applications. However, they are not free; they make TCO even higher for Oracle to afford them to its clients.

On the other hand, PostgreSQL, in particular, has enhanced its performance prospects for quite some time, especially for cloud-native solutions. The benchmarking tests carried out by AWS and Google Cloud platform pointed out that PostgreSQL performs as well as Oracle, particularly in read-intensive and analytical loads. Some extensions like Citus open the option of horizontal scalability of PostgreSQL, which allows the storage of overwhelming amounts of data. Academic work has also pointed out the possibility of PostgreSQL running fine within Kubernetes and other cloud-native orchestrations and environments, which makes it tailored for current highly scalable applications.

2.3. Extensibility and Compliance with Standards

As for the possibilities of further development of PostgreSQL, it is necessary to note its openness and compliance with the American National Standards Institute (ANSI) standards, which make it possible to integrate PostgreSQL with other DBMS. Several research works indicate that PostgreSQL comprises extensions such as PostGIS for GIS, JSONB for document handling, and FDW for external database integration. These capabilities make the PostgreSQL database server suitable for diverse business needs without other license charges.

On the other hand, Oracle tends to be incompatible with other products and thus requires a great effort when enterprises decide to swap to other database solutions. There are findings that organizations heavily dependent on Oracle have problems being locked in and thus are compelled to spend considerably on middleware to interact with other applications and systems. Reflections on Oracle to PostgreSQL migrations have been discussed, and some companies have claimed a 70 % cut in costs after moving from the commercial database to the open-source one.

2.4. Cloud-Native Adoption and Vendor Lock-in Risks

Cloud-native computing is ascending, and therefore, organizations are shifting their attention to databases that best suit the current deployment models. Available studies reveal that PostgreSQL is more appropriate for cloud environments because of factors like open source availability, support of containers, and compatibility with AWS RDS, Azure Database for PostgreSQL, and Google Cloud SQL. This can be explained by the fact that PostgreSQL has an open-source license that allows the use of this database in multi-cloud and hybrid-cloud environments.

Oracle also has some proprietary cloud services, such as Oracle Cloud Infrastructure (OCI) and Oracle Autonomous Database, that are optimized for performance and autonomous feature advantages while posing vendor lock-in risks. It has been found that migrating to the Oracle Cloud incurs some difficulties in the process of switching to other hosts due to the stringent policies they have on their licensing. This has been exemplified by research that has established that firms faced additional costs for their Oracle solutions when they sought to expand them into other clouds that different vendors own.

2.5. Real-World Case Studies and Cost Savings Analysis

Some companies have migrated from Oracle to PostgreSQL to cut costs and have higher operational versatility. Literature and experience around actual business cases indicate that such firms have slashed license costs by migrating to PostgreSQL by millions of dollars. For instance, one of the largest financial institutions in the Fortune 500 claims to have cut its database costs by 65% by migrating from Oracle to PostgreSQL, especially in its cloud-born apps.

Also, government organizations and education institutions have adapted to PostgreSQL given the open source technologies, security, and compliance. According to IT consultancies' experience, organizations engaged in digital transformation projects are choosing PostgreSQL for its relative cost efficiency and ability to seamlessly integrate with current DevOps.

2.6. Summary of Literature Insights and Comparative Analysis

The literature review confirmed that PostgreSQL offers a favorable, cost-effective, and technical proposition for enterprises using cloud-native technologies. Despite this position, Oracle has continuously lacked high licensing fees and risked vendor lock-in, which does not suit businesses that are dedicating considerable resources and money to cloud optimizations. Accessibility, flexibility, and compatibility with cloud-based environments are the advantages PostgreSQL has, and it plays well into the freedom of cost-cutting while prioritizing performance.

This literature survey offered deep evaluations of the cost structures, performance indicators, scalability, and realistic examples closely associated with Oracle and PostgreSQL. It is possible to identify the opportunities for further research on the automated tools and AI-based approaches to improving the database operational costs in cloud computing.

3. Methodology

In an attempt to undertake an effective and efficient comparison of cost factors for Oracle and PostgreSQL in the cloud-native environments, this study is based on a comparative research design. [8-12] The approach quantifies important cost elements and assesses performance factors and operating consequences. Company executives can reason systematically based on narrow financial criteria, scalability, and aptitude for native cloud environments. Based on this background, the study is anchored on the following main variables:

3.1. Licensing Costs Analysis

3.1.1. Oracle Licensing Model

Oracle works with an organized model of licensing in which organizations are bound to make certain purchases to be able to use the Oracle database software; the costs depend on things such as the number of cores per processor, users, and so on. The pricing structure includes:

- **Per-core licensing:** Currently, the license is sold based on the number of cores in the cloud or on-premises setup of an organization.

- **Enterprise features add-ons:** Additional to the basic reservoir of features, features like Real Application Clusters (RAC), Advanced Security, Partitioning, and Data Guard will all cost much more than the basic price.
- **Support and maintenance fees:** Maintenance and support costs: Oracle offers annual maintenance and support for a percentage of initial application cost, which is normally 22%.

In order to establish the actual figures for these expenses, this work employs the information available in Oracle's official manuals and other sources, which are put into perspective with PostgreSQL expenses.

3.1.2. PostgreSQL Cost Model

However, it has only a minor cost in terms of licensing because PostgreSQL uses an open-source license to overcome this problem. PostgreSQL License makes all of its features available at no additional cost. Though, there are expenditures incurred in the following ways:

- **Managed PostgreSQL Services:** AWS and Google Cloud offer a managed PostgreSQL DB service. In contrast, Microsoft Azure offers a PostgreSQL Flexible Server with managed services, which incurs operational costs but no O&M costs.
- **Enterprise Support Options:** PostgreSQL is open source and has no licensing costs. However, enterprises can obtain support from vendors like EDB or Crunchy data with SLAs and performance tuning support or security patches at much cheaper rates than Oracle.

Our assessment considers the cost savings that could be incurred in using PostgreSQL over the commercialized Oracle database by factoring in licensing costs. In contrast, PostgreSQL is free of charge, yet it comes with additional enterprise support costs.

3.2. Operational Expenses Assessment

3.2.1. Database Maintenance & Administration

Oracle and PostgreSQL may need backup, indexing, query optimization and improvement, and security patching. However, the cost implications differ:

- **Oracle:** Complex and involves specialized, seasoned DBA and Oracle-certified people, were identified to add more administrative overhead. Software updates and security patch updates may also contain paid services implemented in different software package versions.
- **PostgreSQL** has a simpler administration model, extensive community support, and a wealth of free documentation. Some of the managed PostgreSQL services perform automatic maintenance, which makes them cost-effective.

This paper also reviews all the expenses involved in managing databases, including those of DBAs, automation features, and other support needs.

3.2.2. Cloud-Native Deployment Considerations

Cloud-native databases should be designed as Kubernetes native and deployed using container orchestration technology like Kubernetes. Our study compares:

- Oracle Cloud Infrastructure (OCI) vs. AWS RDS, Azure Database for PostgreSQL, and Google Cloud SQL
- Oracle RAC for high availability vs. PostgreSQL's replication and failover solutions
- Oracle's multi-cloud restrictions vs. PostgreSQL's vendor-agnostic flexibility

They also affect the short-term cost of migration and the strategic operations of the business for the long-term use of cloud services in the future.

3.3. Performance Metrics and Benchmarking

3.3.1. Throughput and Query Execution Performance

Since transaction rate and response time are the key performance indicators of a database, different workloads are used to compare transactions per second and query speed of Oracle and PostgreSQL.

- **OLTP (Online Transaction Processing) workloads:** TPS (Transactions Per Second) test and response time testing across different types of databases.
- **OLAP (Online Analytical Processing) workloads:** answer analytic queries, frequency of cube aggregation, index performance.

TPC-C by Transaction Processing Performance Council and AWS Performance Reports are used for benchmarking to affirm the findings.

3.3.2. Resource Utilization and Cost Efficiency

Resources are integral to cost efficiency, as noted in this article by describing the impact of consumption. Our study analyzes:

- CPU and memory usage under high concurrency
- Storing a large amount of data to be processed
- Network latency for distributed database architecture.

Such factors allow enterprises to decide whether the performance advantages that Oracle offers deserve the higher cost or if PostgreSQL offers almost the same performance at a cheaper price.

3.4. Comparative Cost Analysis Framework

3.4.1. Total Cost of Ownership (TCO) Calculation

To compare Oracle and PostgreSQL, we offer examples of calculating the Total Cost of Ownership (TCO) within five years, including:

- Initial costs (licensing, setup, and migration)
- Operational costs, which include, among others, support costs, maintenance costs, and cloud infrastructure costs in a year
- Adding new instances, High availability configurations, Disaster recovery solutions

3.4.2. Case Study Approach

Some real-life examples of enterprises that switched from Oracle to PostgreSQL are presented to assess tangible cost-savings. These include:

- A large corporation in the United States decided to move from Oracle to PostgreSQL database on Amazon Web Services.
- A government agency's implementation of PostgreSQL in order to bring down database expenses
- A financial institution is in very good shape to provide a high level of performance even as it chops licensing fees by the proportion of 60/100.

Based on these methodologies, one can ensure that various cost estimates and performance assessments appear reasonable.

This comparative approach allows us to categorize the parameters of Oracle and PostgreSQL based on cost, performance, scalability, and compatibility with the cloud computing environment. Therefore, based on the licensing analysis, operational assessment, benchmark, and real-world examples of ORDBs, this study aims to guide enterprises in identifying cost-effective cloud-native database solutions.

4. Cloud-Native DBMS Cost Analysis: A Modular Approach

The Cloud-Native DBMS Cost Analysis diagram provides a structured overview of different factors that compare Oracle and PostgreSQL databases in a cloud-native environment. [13-16] The diagram is divided into major modules, each dealing with distinct factors of cost analysis, security, cloud infrastructure, and performance comparison.

4.1. Cost Comparison Module

The Cost Comparison Module is necessary to contrast the costs of the Oracle and PostgreSQL databases. Two well-known classes fall into this category:

- **Performance Analysis:** Focuses on benchmarking scalability tests and query execution to determine efficiency.
- **CostAnalysis:** Compares the two DBMS choices based on total cost of ownership (TCO) and price model variations.

This module interacts directly with the Oracle Module and PostgreSQL Module to retrieve cost and performance data and provide an in-depth analysis of price variations.

4.2. Cloud Infrastructure Module

The Cloud Infrastructure Module is the cloud service provider where Oracle and PostgreSQL are installed. It consists of:

- AWS (Amazon Web Services)
- Google Cloud
- Azure (Microsoft Azure)

These cloud platforms provide scalable database infrastructure, affecting operational cost and performance. Oracle and PostgreSQL support allows companies to experiment with cost efficiency using different cloud providers.

4.3. Oracle Module

Oracle Module addresses the cost and structure problems of using Oracle as a database management system. It contains:

- **OracleDB:** Identifies licensing charges, support charges, and performance problems for Oracle installations.
- **OracleSecurity:** Offers advanced security features and clustering, both critical to enterprise-class applications but adding heavily to the cost of overall solutions.

This module is related to the Cost Comparison Module for cost analysis and to cloud providers for deployment analysis.

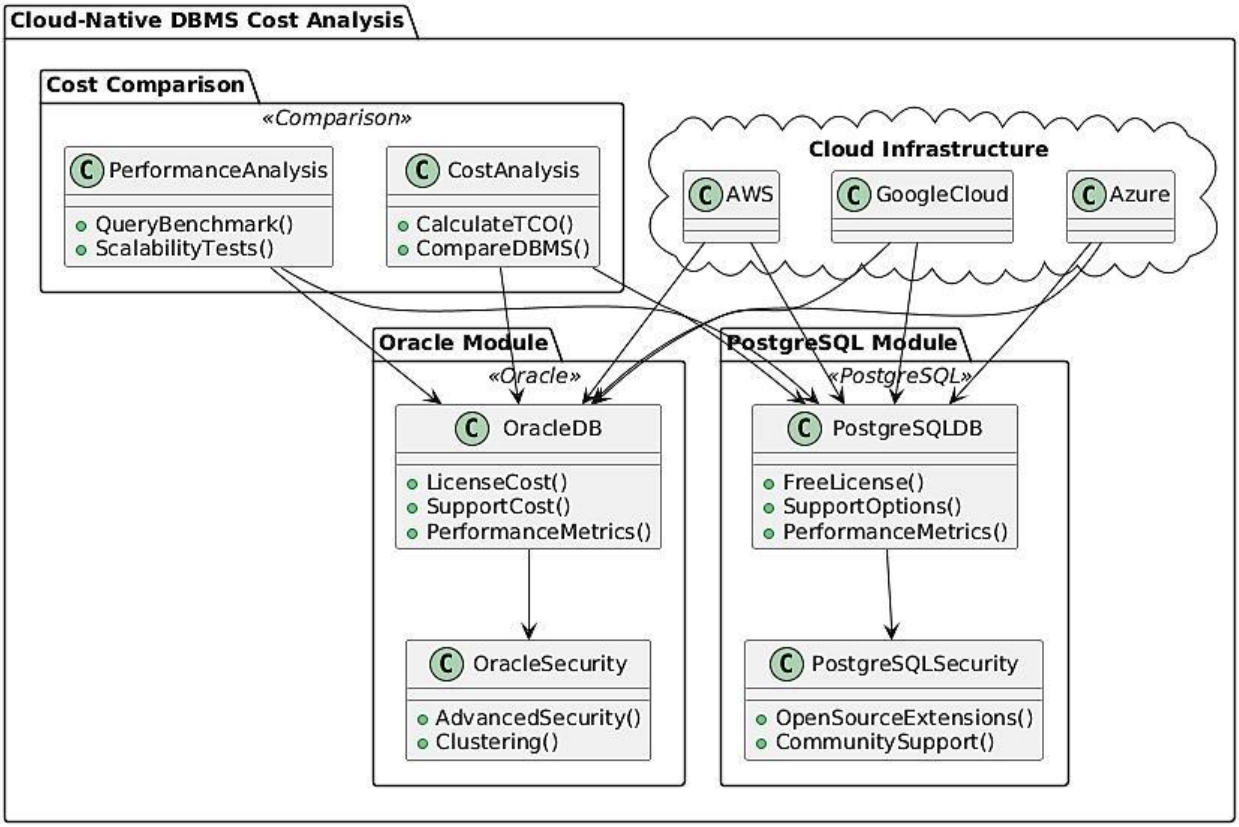

Fig 1: Cloud-Native DBMS Cost Analysis: A Modular Approach

4.4. PostgreSQL Module

The PostgreSQL Module outlines the cost and security features of PostgreSQL, highlighting its open-source benefits. It includes:

- **PostgreSQL DB:** Refers to PostgreSQL's open-source licensing strategy, support options, and performance measurements.
- **PostgreSQLSecurity:** Features open-source extensions and community support that make cost-effective security deployment possible without additional licensing fees.

  This module applies to Cost Comparison for financial analysis and cloud providers for deployment feasibility.

The diagram offers an open, modular cost structure analysis of Oracle and PostgreSQL in a cloud-native setting. While rich in features, Oracle has expensive support and licensing costs, while PostgreSQL has an affordable solution with open-source flexibility. The Cost Comparison module is important in determining the cost implications of both alternatives. With security features and cloud platforms integrated, companies can make informed decisions for database scalability, cost optimization, and performance optimization in a cloud-native way.

5. Algorithmic Representation and Total Cost of Ownership (TCO) Calculation

5.1. Algorithmic Representation

Below is the suggested algorithm to systematically estimate the TCO of both Oracle and PostgreSQL. [17-20] This lets the buyers estimate their costs regarding the licensing, support, additional features, and operational costs of the database solutions by comparing the different performances of the components.

5.2. Algorithm for TCO Calculation

5.2.1. Input Parameters

- Number of CPU cores (C) → Helps determine Oracle's cost.

- Storage requirements in GB (S) → Affects infrastructure cost.
- Support level (basic, premium, enterprise) → Impacts overall cost of operations.
- Other business features (e.g., high availability, clustering, advanced security).

Step 1: Compute Licensing Costs

Oracle:

- Oracle requires a per-core licensing fee, which is calculated as follows:

$$Licensing\ Cost = C \times License\ Fee\ per\ Core$$

- Additional fees apply for features like clustering, security, and advanced analytics.

PostgreSQL:

- PostgreSQL is open-source, meaning:

$$Licensing\ Cost = 0$$

- Optional enterprise support plans may introduce costs but are significantly lower than Oracle.

Step 2: Compute Support and Maintenance Costs

Oracle:

- Annual support fees are calculated as a percentage of licensing costs (typically 22%).

$$Support\ Cost = 0.22 \times Licensing\ Cost$$

PostgreSQL:

- PostgreSQL does not require paid support but has optional enterprise support packages, such as:
  - Basic: $5,000 per year
  - Premium: $15,000 per year
  - Enterprise: $30,000+ per year (custom agreements)

Step 3: Compute Additional Features Costs

Oracle:

- Additional fees apply for proprietary features:
  - Advanced Security: $15,000 per core
  - Clustering (RAC): $23,000 per core
  - Partitioning: $11,500 per core

PostgreSQL:

- PostgreSQL provides similar functionalities through open-source extensions at no cost.

Step 4: Compute Total Cost of Ownership (TCO)

5.3. Implementation of TCO Algorithm (Pseudocode)

6. Results and Discussion

From the given cost control perspectives, Oracle does expend more than the cost efficiency of PostgreSQL, an open-source database system.

Table 1: Breakdown of Cost Components

Component	Oracle (Per Core)	PostgreSQL (Per Core)
Licensing Fee	$47,500	$0
Advanced Security	$15,000	$0
Clustering (RAC)	$23,000	$0
Partitioning	$11,500	$0
Annual Support	$10,450 (22% of license fee)	Variable ($5,000 - $30,000)
Total Cost (Example 2 Cores)	$191,900	$5,000 - $30,000

- Oracle has even higher costs due to the fact that licensing based on cores is used, and features are sold separately.
- Their costs are turbulent partly due to varying expenses if an enterprise decides to pay for the premium support.
- Oracle's maintenance expense is far higher than the posting costs of operating PostgreSQL, making the latter a perfect fit for cloud-based architectures.

Table 2: Scalability Considerations

Scenario	Oracle Cost (2 Cores)	PostgreSQL Cost (2 Cores)
Small Business (Basic Support)	$191,900	$5,000
Mid-Sized Enterprise (Premium Support)	$191,900	$15,000

Large Corporation (Enterprise Support)	$191,900	$30,000

- Nonetheless, PostgreSQL is cheaper than any other system for all business forms.
- Oracle has a relatively higher per-core cost than its competitor, making it difficult for organizations to consider the product when costs are an issue.

The final TCO for each database is computed using:

```
def calculate_tco(dbms, cores, support_level):
    oracle_license_fee = 47500  # Per core
    oracle_support_percentage = 0.22
    advanced_security_fee = 15000  # Per core
    clustering_fee = 23000  # Per core
    partitioning_fee = 11500  # Per core

    postgresql_support_options = {
        "basic": 5000,
        "premium": 15000,
        "enterprise": 30000
    }

    if dbms.lower() == "oracle":
        licensing_cost = cores * oracle_license_fee
        support_cost = licensing_cost * oracle_support_percentage
        additional_features_cost = (cores * advanced_security_fee) + (cores *
clustering_fee) + (cores * partitioning_fee)
        total_cost = licensing_cost + support_cost + additional_features_cost

    elif dbms.lower() == "postgresql":
        licensing_cost = 0  # Open-source
        support_cost = postgresql_support_options.get(support_level.lower(), 0)
        additional_features_cost = 0  # Community extensions are free
        total_cost = licensing_cost + support_cost + additional_features_cost

    return total_cost

# Example Usage:
oracle_tco = calculate_tco("oracle", 2, "premium")
postgresql_tco = calculate_tco("postgresql", 2, "premium")

print(f"Oracle TCO: ${oracle_tco}")
print(f"PostgreSQL TCO: ${postgresql_tco}")
```

$$TCO = Licensing\ Cost + Support\ Cost + Additional\ Features\ Cost$$

6.1. Strategic Cost-Benefit Analysis and Recommendation

The Total Cost of Ownership (TCO) study indicates that PostgreSQL is a cost-effective, high-scalable, and cloud-friendly solution compared to Oracle. Though Oracle is a top enterprise database solution featuring high performance, robust security, and excellent support, its expensive licensing and ongoing operational costs burden most organizations. PostgreSQL, an open-source database with a flexible support model, allows organizations to grow seamlessly without vendor lock-in, reducing long-term financial costs without compromising performance efficiency. For companies looking for cloud-native scalability, cost savings, and

open-source flexibility, PostgreSQL is the most feasible option. However, for companies that need highly specialized enterprise features, end-to-end support, and the budgetary strength to bear high costs, Oracle is still justifiable. However, for most companies moving towards cloud environments, PostgreSQL offers the best balance of performance, flexibility, and high-cost savings, and it is thus a feasible option for modern cloud-native strategies.

7. Conclusion

When it comes to adopting a cloud-native approach to building applications, the choice of the DBMS is a strategic decision that will influence the company's total ownership cost, sustainability, and degrees of scalability. Considering Oracle and PostgreSQL, we can see that PostgreSQL is a worthy open-source alternative to Oracle, saving money on licenses and annual maintenance expenses. However, the copylefting costs of Oracle, additional features, and recurring support make it significantly more costly for enterprises to optimize the cost of cloud infrastructure. Post–SQL is open-source and has cheaper facilities like high availability, scalability, and security using the community edition and third parties. However, it is not very strong like Oracle.

Nevertheless, PostgreSQL's cost advantage and flexibility make the switch more viable, but the specific situation in every company should be considered to avoid failures. However, it is not off the mark that LMSs that are mission-critical to big organizations, which require clustering, robust security, and vendor-provided enterprise support, may still find Oracle advantageous, although these come with a higher cost. Nonetheless, when it comes to most traditional and modern Cloud applications, specifically those that are cost-optimal, open-sourced and can run natively on cloud services, PostgreSQL is a more beneficial and economically rational choice. With the present level of performance offered by PostgreSQL, coverage of its features, and flexible integration to cloud environments, many would want to dump proprietary databases in favor of PostgreSQL, given optimum performance, reliability, and scalability at a cheaper cost.

7.1. Future Discussion

When cloud-native architectures develop, DBMS choice will be the critical variable that determines organizational competitiveness and expenses for the long term. Further studies should investigate the practical concerns of using Oracle and PostgreSQL in real-world clouds, such as investigation of query execution time, efficiency for reading/writing of data, and performance at large scales of transaction volumes. In addition, studying migration methods such as automated tools, downtime reduction, and compatibility problems can enable organizations to migrate smoothly from proprietary databases such as Oracle to open-source databases such as PostgreSQL. Moreover, with the advent of serverless databases, AI-optimized query, and multi-cloud deployment, an in-depth study of how PostgreSQL is competing with new cloud-native database offerings such as Amazon Aurora, Google Cloud Spanner, and Microsoft Azure Database will benefit organizations planning their next-generation cloud strategy.

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