YCompany - eClaim System’s Database Engine

DAR Document



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# Introduction

As per requirement of the YComapany – eClaim design, it is required to choose a database engine that provides the desired level of performance, efficiency at minimum cost.

This document is for analyzing various database engines available in the marketplace and providing a detailed comparison of the available option. Comparison is made based on intended features using a point-based scoring system to identify the best fit.

## Objective and scope of document

The objective of system is to identify all the features required for a database engine to qualify for fittment to the system. Futher, not all features are equally important, some carry a higher weightage other may carry lower weightage.

Also, there are large number of database engines available in the market place but not all available options are compared in this document. Only the databases that are relied & trusted worldwide are cosidered for detailed comparision.

# Requirements at a Glance

The system require a database engine that provides easy integration, low prices and great performance to be integrated with various services. The system design divide the data of the system into multiple databases to divide the load on the system. So, performance is a requirement but unlike many other production systems the data stored is not in a single databse so there is no possibilty of a singel database server becoming a bottleneck for overall system performance.

Comparison of the available database engines will be done on following parameters:

* Performance
* Pricing
* Ease of development & integration
* Security & Compliance
* Replication
* Backup & Recovery
* Support & Online Help
* Manageability
* Scalability

# Available tools

There are many database engines available in the marketplace being used for enterprises application. Most common are : Oracle, MS SQL Server, MySQL, Aurora Db, Postgree SQL etc.

We are considering Oracle, MS SQL Server, and MySQL for comparison as these are the most trusted, most widely used and can be integrated easily in the proposed system.

## Azure SQL Database

Azure SQL Database is the intelligent, scalable database service built for the cloud with AI-powered features that maintain peak performance and durability.

Microsoft markets at many different editions of Microsoft SQL Server, aimed at different audiences and for workloads ranging from small single-machine applications to large Internet-facing applications with many concurrent users.

### Features

* SQL Server is a high-performance database able to perform at massive scale.
* Cross platform database engine.
* Provides different tiers for different purpose as per need of business.
* Gain mission-critical uptime, fast failover, easy setup, and load balancing of readable secondaries with enhanced Always On
* Build intelligent applications with SQL Server Machine Learning Services using R and Python.
* Combine in-memory column store and row store capabilities in SQL Server 2017 for real-time operational analytics—fast analytical processing right on transactional data.
* Elastic pool to offer resources from pool when unpredictable usage of resources.
* Develop once and deploy anywhere with consistent experience from on-premises to cloud with support for Windows and Linux as well as Docker containers.
* Point in time restore.
* Automated & manual backups
* SQL Server mirroring for high availability & failover solutions

### Pricing

Pricing has been considered with following configuration on Azure cloud:

|  |  |
| --- | --- |
| Type | Azure SQL DB Single Server |
| Storage Tier | GRS |
| Service Tier | Business Critical |
| Generation | Gen 5 |
| Instance | 2 vCore |
| Memory | 10.2 GB |
| Storage | 1 GB |

Here charges have been calculated per month based on the offered per hour price $1.3589/hour by Microsoft. It is assumed the highest consumption of resources which would lead 24hrs/ day and 750 hrs./month, which make the per month price as below.

For the configuration mentioned above, an instance of SQL Server costs approx. **1019 USD/Mo**.

## Azure MySQL Server

MySQL is an open-source relational database management system. MySQL was owned and sponsored by a single for-profit firm, the Swedish company MySQL AB, now owned by Oracle Corporation. For proprietary use, several paid editions are available, and offer additional functionality.

### Features

* Runs over all major OS like Linux, Windows, MAC etc.
* It has been tested with well-known memory leakage detector “Purify” and also with “Valgrind”
* Easy backup and restore.
* Fully multithreaded to use multiple CPUs.
* Transactional and non-transactional storage engines,
* Compliant with many industry standards
* Enables delivering high-performance and scalable Online Transaction Processing (OLTP) applications.
* Ease of use that has made MySQL famous along with industrial strength performance and reliability.
* Lower total cost of ownership - MySQL enables minimizing database TCO.

### Pricing

Pricing has been considered with following configuration on Azure cloud:

|  |  |
| --- | --- |
| Ttpe | Azure MySQL Single Server |
| Tier | Memory Optimized |
| Storage Tier | GRS |
| Generation | Gen 5 |
| Instance | 2 vCore |
| Memory | 20 GB |
| Storage | 1TB |

For the configuration mentioned above, an instance of MySQL Server costs approx. **172** **USD/mo**.

For standalone MY SQL price refer <https://www.mysql.com/products/> which become 2000 for standard edition per year.

## Azure Oracle VM

Oracle Database is a multi-model database management system produced and marketed by Oracle Corporation. It is a database commonly used for running online transaction processing (OLTP), data warehousing (DW) and mixed (OLTP & DW) database workloads. The latest generation Oracle database is available on-prem, on-Cloud, or in a hybrid-Cloud environment.

Oracle on Azure require a JAVA VM to which Oracle DB will be installed

### Features

Oracle is a feature rich database providing wide array of feature for wide array or domains, applications, security & performance requirements. Of course, it comes with all the base features that any RDBMS system has to offer, there is much more on the plate considering the offerings by oracle database.

Some of the most recent features added to oracle are:

* Data Concurrency and Consistency
* Business Intelligence
* Advanced compression
* High Availability
* Point in time restore, automated & manual backups
* Very Large Databases (VLDB)

### Pricing

Pricing has been considered with following configuration:

|  |  |
| --- | --- |
| Product | Enterprise Edition/ Processor License |
| Tier | Standard |
| Category | Memory Optimized |
| Instance | 2 vCore |
| Storage | 32GB |
| CPU | 2vCPU |
| Memory | 14GB |

Here Oracle license cost become 47500 **USD** for **5 years.** Software upgradation and support cost become **10450 USD** for **1 year**. Azure VM with above configuration will cost **$184** per monts.

It is calculated all cost per month basis then it becomes **1845 USD/ months.**

Also, Azure GRS storage is not covered hence geo redundant back will add more cost to the above figure.

# Comparison Analysis

All the three database engines compared on various features such as performance, scalability security, pricing security etc. listed in the table below, various feature bear different weightage.

## Comparison

Scoring has been done from 1-10 where 1 is minimum and 10 is maximum considering the requirement of resources on Azure for eClaim Insurance Applications.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Feature | SQL server | My SQL | Oracle |  |
| Security & Compliance | Fullfilled | Fullfilled | Fullfilled |  |
| Pricing | Average | Low | High | Oracle db sere will be installed on VM (IaaS) |
| Scalability | Fullfilled | Fullfilled | Fullfilled | For Oracle responsibily will fall with customer |
| Replication | Fullfilled | Fullfilled | Fullfilled | For Oracle responsibily will fall with customer |
| Backup & Recovery | Fullfilled | Fullfilled | Fullfilled | For Oracle responsibily will fall with customer |
| Support & Online Help | Fullfilled | Fullfilled | Fullfilled |  |

# Recommendation

Orcale is not an budget option as It will bring Oracle liscence to install it on VM as IaaS, Whereas MySQL and Azure SQL Database provides this service as PaaS where most of responsibility will fall with cloud provider.

From Azure SQL Database and Azure MySQL., Azure MySQL is the right choice as from budgeting point of view it is less costly and provides most of required features of RDBS.

# Assumptions

1. Either Enterprise version of databases or Azurre Databses (SQL and MySQL) have been considered for comparision, based on the proposed design.
2. OLTP database engines wont’be used for analytical purpose, so such features haven’t been considered for comparision. Further regarding analytics,
   1. Such use cases are out of scope.
3. Pricing mentioned for the considered database engines is done at the time of analysis and keep fluctuating by small amount in cloud environment.
4. The prices mentioned are just for comparision purpose & has been done for a single instance on average hardware. The actual number of database server nodes & number of instances will be identified later on.
5. Scoring has been done base on analysis done over features and pricing , there is no standrad formula has been considered.

# Risks

* The current architecture doesn’t make database as the core building block & the overall system performance doesn’t completely depend on the capabilities of the database engine. So, there is no risk involved from performance perspective.
* From management perspective, the current design relies on cloud services to backup, replicate, update & monitor databases, so minor risk is involved if migration to on premises design is considered. All these tasks will be handled by the on premises team,

# Appendix

## References

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