IT 650

Final Project: DBMS Solution – WildWood Apartments

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**Overview**

Twenty separate apartment buildings are owned by Wild Wood Apartments in the Northwest of the country. Every complex has a different number and size of apartments, with lease terms ranging from six months to a year. The hiring of a tenant to serve as manager for each apartment complex is one of the company's primary practices. They are responsible for paying rent as well as for repairs, replacements, and improvements. Each complex manager is required to prepare a thorough report and submit it to management.

**Problem**

The report forms that managers must fill out are challenging and time-consuming, which is the main issue. Concerns concerning the veracity and correctness of the reports that the complex managers are sending have also been voiced by corporate level management. These reports are written by hand, which simply increases the already excessive quantity of paperwork that complex managers must handle for repairs, maintenance, etc. Managers at the corporate office have reported that this results in more errors. The corporation has suggested creating a centralized database that will be used by the complex managers to track these daily business operations of their buildings in order to help with the reports in order to improve the convenience and efficiency with day-to-day operation. Rent, rates, lease details, maintenance, repairs, and other data can be entered into the database by managers. They can utilize all the data to compile a report that they can submit to corporate thanks to the database.

**Business Requirements**

The database will enable managers to send precise information that corporate will utilize moving forward when making business choices, even though they are still responsible for collecting rent and keeping up with maintenance and repairs. To be able to overcome diverse barriers, large enterprises need information, analytics, and apps. This enables a more effective organization with improved internal leadership and communication. Centralized databases offer a number of advantages:

1. Reduces Conflict

* Conflicts within the company are diminished when data collection and storage are handled by a centralized database. This happens because fewer people are involved in the data-driven decision-making processes.

1. Higher levels of Security

* When higher levels of data security are developed for the company when long-term financing is given to a centralized database. This is so that the company can benefit from the information it has acquired.

1. Easier to share ideas across the organization

* It promotes cooperation and minimizes silos for individuals and teams by adopting a central database that centralizes information and analytics.

1. Organizations can act with greater speed

* Because there are fewer layers of data to navigate when a core database is in charge of managing information, decisions about actions or strategies can be made more quickly.

**Limitations**

The existing approach has drawbacks, such as transmitting reports in a paper-based format. This increases the likelihood that there may be errors in the report and makes it more difficult to manage all the information in one document. Currently, complex managers are manually entering data onto a document. It would be simple for managers to overlook crucial details or complete the form inaccurately. Manual document filing is more expensive, takes up more space, and lacks security. Each manager of a complex will eventually need a lot of space to store all the reports they send in each month, which reduces productivity. Paper filing becomes less secure as a result of this. It's simple for documents to get lost or end up in the wrong hands. Additionally, accessing a cabinet full of files is significantly simpler than an encrypted file. Finally, the price is higher. You must pay staff to check each document for faults in addition to the additional costs for paper and ink. Over time, the organization is spending a lot of money and time on this procedure that could be used elsewhere.

**Departments and Operations**

All facets of the organization are impacted when reports with inaccurate information are submitted. For instance, the financial statement of the company would be dramatically altered if a manager at a complex unintentionally entered rent numbers in the repairs area, or vice versa. Falsely reporting revenue could result in serious consequences when the corporation has filed its business return at the end of the year. A mistake on these reports is more likely to occur the more complex and managers you have.

**Conceptual Model**

For this phase, we interviews the stakeholders for the Wild Wood apartment to get a better understanding of the needs from the database system. All the stakeholders agree to start with a high-level view, which is the Conceptual Model view.(Rivera 2023) This view helps the stakeholders to see all of the involved parts.

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Description automatically generated

Tenant

Lease

Apartment Building

Expenses

Maintenance

**Logical Model**

Now after completing Conceptual Model design, we moved on to the more details of Logical Model. This type of model give us entitles and their relationships (Suszterova 2023). <Please see attached file for Logical Model>

**Physical Model**

The last model we need for the technical stakeholders is the Physical Model. This model is similar to Logical Model because we get to see entities and their relationships, but we also get to see all the datatype of the fields.

<Please see attached file for Physical Model>

**Data Dictionary**

Building Table

A screenshot of a computer

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ApartmentUnit Table

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Tenant Table

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TenantRent Table

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Lease Table

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Expenses Table

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Maintenance Table

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**DBMS Research and Recommendations**

A software package known as a database management system (DBMS) is used to build, maintain, manipulate, and retrieve data from databases. A database management system (DBMS) is designed to primarily alter the data by using a set of predefined rules and handling ideas (AppsDynamics 2023). The Wild Wood Apartments need a database management system (DBMS) to help them preserve their spreadsheet-based records and make it possible for the Headquarters to get reports as needed. The DBMS products that Wild Wood Apartments are thinking about using are listed below.

**Oracle**

Since 1977, Oracle has been in existence. Making it one of the more established DBMSs available, it enables quick and secure data storage and retrieval. The Oracle pros and downsides are listed below (OracleTutorial 2023).

Advantages:

* A cross-platform database that is compatible with a variety of hardware and OS systems A logical data structure that enables database interaction without revealing the location of the data's physical storage
* Data recovery technology known as flashback that enables users to restore lost or accidentally deleted data
* The ability to combine small databases into one container database for greater scalability that can handle both large and small databases.
* Disadvantages

Compared to competing DBMS software, the operating expenses and licensing costs are significantly greater.

* Because of the system's great complexity, it can be challenging to find database administrators who are qualified to operate on it.

**MySQL**

The most well-known and well-known database system is MySQL, which is renowned for its simplicity and for enabling users who are only just learning about relational systems to construct quick, potent, and secure data storage systems. The benefits and drawbacks of MySQL are listed here (Wikipedia 2023):

Advantages

* Reduced cost due to the fact that it is open source
* An excellent product option for projects that need to target many platforms, like web applications, is a cross-platform database.
* It is known globally as the most reliable and secure database management systems

Disadvantages

* In terms of storing massive databases, it is less effective.
* There isn’t a very good developing and debugging tool
* It isn't particularly effective at handling transactions and is prone to data corruption.

**Microsoft SQL**

Microsoft SQL (MSSQL) is a database software suite that was created by Microsoft. It generally includes a relational database engine, Integration Services, Reporting Services, and Analysis Services:

Advantages

* Software for managing databases at the enterprise level that is simple to use.
* Data recovery and restoration are made possible by a number of characteristics.
* Ability to use triggers and integrate with .NET
* Updates are entirely automatic, and configuration and installation are simple
* Optimized data storage that allows you to store data from a different device on the same database

Disadvantages

* Higher cost for the businesses to use the software.
* Can only run on Windows-based servers.
* Advanced technology is needed to run the software.

Oracle would appear to be the greatest option given all of the benefits and drawbacks of the software described above. The technology is currently a bad fit for Wild Wood Apartments due to its expense and complexity. Because of this, I advise using Microsoft SQL. Since it is pretty simple to operate, there won't be a need for lengthy training. While MSSQL requires Windows to function, it is flexible in that it offers the option to upgrade should the business expand while maintaining the same user interface. Below is the list of hardware and software requirements needed to run MSSQL (Microsoft 2023).

Hardware:

* AMD or Intel-based x64 Processors.
* 1 GB system memory or 512 MB (For the Express Edition). However, it is recommended to have 4GB or more.
* CPU Clock Speed: x64 1.4 GHz or more with 2.0 GHz being recommended.
* Data Quality Services will require an additional 2 GB of system memory.

Software

* .NET edition 4.6.2 or higher is required for running SQL Server 2022.
* 6 GB of hard disk space needed for full installation.
* Windows Server 2016 or 2019 Editions only.

**Enterprise Data Model**

This data modeling process involves the recording of complex enterprise software system design by abstracting it to simplistic easy to use diagram that contains block with text and arrows to represent flow data (Dataversity 2023). As for our case with Wild Wood Apartments case studies, we also added database application standards and system operating rules to ensure the database system is aligned with business operation logic and has security safeguard.

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|  |  |  |  |  |
|  | |  | | --- | |  | | Managers/IT |  |  |
|  |  |  |  |  |
| **Apartments** |  |  |  | **Tenants** |
|  |  |  |  |  |
|  | **Maintenance** |  | **Leases** |  |
|  |  |  |  |  |
|  |  | **Rent** |  |  |

# Managers will be provided with access to view and update to all critical database tables that are related Wild Wood Apartment. As for IT staff that maintain the database tables, that group would have the same level of rights as managers as well the ability to delete data. The deletion of data rights are needed for IT staff because of corrupted non-conforming data entry that might creep into the database tables.

**Operating Rules**

Like every business, enterprise database has operating rules:

1. Headquarter managers: this group would have the ability to view/edit all tables/views for all apartment complex
2. Complex manager: this group would have the ability to view/edit apartment tables/views that the manager has oversight.
3. Rule Reflections

The rule reflections offer full support to the company’s organizational rules because they allow for the manager to enter data with integrity and accuracy and for the Headquarter managers to run summarizing reports for overall business footprint. The predefined rules are that apartment complexes have buildings and apartments; each complex has a manager; each complex has apartments; tenants will leave in apartments; each apartment has maintenance; each apartment has a lease, etc. The complex manager has full control of the local apartment to edit tenants, maintenance, building info, and everything that entail the daily business operations. The apartment complex manager is fully in charge, responsible, and accountable for the data entry timeliness, integrity, and accuracy. The rule reflection is essential to relationship building and the data that is entered in multiple tables, whereas the many-to-many relationships will store data in various tables.

**Law, Ethics, and Security**

**Standards**

There are a lot of legal and ethical requirements that should be taken into account because the data being entered into the database system is quite sensitive. Tenants will provide information such as their Social Security numbers, banking information, employment history, income history, and credit bureau information when they sign a lease. Conger writes, “Often some, or all, of the data in a database are confidential. Databases typically contain core business information that could be of great value to a competitor, or it may contain things such as credit card numbers or Social Security numbers that could pose financial and legal risks if revealed to the wrong people (Conger, 2014)”. A security administration team at WildWood headquarters will make sure that firewalls are set up to secure the data kept on the database and data on external devices there. There will be a big investment made in security measures because the theft of banking information and SSNs is a significant problem.

**Legal Compliance**

There are a lot of regulations that must be taken into account while discussing legal compliance. Tenants should receive a guarantee from WildWood Headquarters that all information will be kept secure in exchange for their cooperation. They acknowledge that if information falls into the wrong hands, they will be held liable. UKEssays writes,

● “Understand the business model and rules, specifically, how the enterprise will interact with its customers at every step of the way.

● Implement suitable information security rules or develop technical safeguards for the upkeep, archival, collection, usage, and distribution of client information. This will assist in identifying and averting potential privacy-related issues and concerns.

● Protect cardholder data (including bank and credit card accounts, social security, etc.).

● Encrypt transmission of cardholder data (to safeguard the data in the event it falls into the wrong hands).

● Protect stakeholder information (including email addresses, telephone numbers to protect them against spamming, phishing and/or unwanted robocalling).

● Keep abreast of legal developments and regulations concerning privacy and information security. Seek legal advice as required.

● Keep data completely anonymous (within and outside the organization).

● Acquire the user’s consent before obtaining any personal and sensitive information. (UKEssays, 2017)”.

The information that is collected determines the regulations that the database will use. The more sensitive the information, the higher security requirements, the tighter the regulations are in protecting the information stored.

**Ethical Practices**

Data stored at WildWood Headquarters should only be shared with tenants who have given their approval. The lease clauses should stipulate that tenants must express their approval in writing and should have the option of declining to do so. Having stated that, information should not be freely shared with just anybody; rather, it should be relevant to renters' improvement, such as opportunities, offers, and better circumstances. Teng et al writes, “Ownership and access are critical issues in the sharing of research data. In the United States, ownership of research data is usually under the regulation of laws as well as governmental and institutional policies. In particular, if a research project generates results that have economic values, ownership of the research data might be subject to intellectual property laws (Teng et al, 2022)”. In the event that WildWood decides to share tenant data with another organization, they will be subject to all applicable state and federal data sharing laws.

**Security Needs of Solution**

standards, discuss the security needs of your DBMS solution. Considering the group/department for which you constructed your enterprise data

model, discuss the differences in security needs at this level in comparison with those of the company as a whole.

Security is an important factor when it comes to database management. According to the

authors of TripWire the steps when building a database would be to begin with the physical database security, run servers to monitor active and reserve databases, deploy proxies, customize network ports, deploy database monitoring, deploy encryption protocols, backup data, keep the system up to date, and use powerful authentication. Overall, there are a number of security measures that have to be taken to protect data. In turn this will mitigate the threat of data being leaked into the wrong hands and the wrong people.

**Database Security Plan**

The security Administration at headquarters should take over monitoring the database at all times. Headquarters should enlist a team that works on the clock to ensure data is blacked up properly and efficiently. The database should be reviewed regularly as the organization grows. The organization should also review how far back they will go when it comes to the data being stored. If a Tenant has left their property for more than 5 years, storing their data is not effective and that data takes up the space of new data. With that being said, the system should be kept up to date, the software used to access the data should be regularly updated. The physical hardware each location uses should be updated regularly as well so that everyone can have continued access to the database. If the security team stays on top with traffic control and updates, this can be a system that Wild Wood uses for a long time.

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