**9-2 Final Project Submission: Wild Wood Apartment Database System**

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IT-650-Q2734 Principles of Database Design 20TW2

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February 6, 2021

**Abstract**

With over 20 apartment complexes with upwards to 60 separate apartments, the Wild Wood Apartments enterprise documents daily transactions and business functions as physical documentation. This report investigates the proposal of a relational database management system (RDBMS) to track expenses, data, and information in a physical, electronic database. An analysis of the organization, business requirements, and limitations of the current systems will be documented. Conceptual and logical models will be created for the database before translating the design into a Microsoft SQL physical database design. Proposals for the DBMS, recommendations, and necessary hardware and software to maintain the database will be shared as well. This report will also contain an enterprise data model reflecting one of the major stakeholders of the company – corporate managers – and their use of the database. Clear laws, ethics, and security rules will also be documented and serve as strict guidelines for the policies and procedures surrounding the RDBMS and its utilization.

**Current System Analysis of the Wild Wood Apartments**

Wild Wood Apartments’ company headquarters recognize the need for a database to easily manage anything from documents and relevant information to the maintenance and repair of the buildings, payments, and their statuses. The Wild Wood Apartments consists of 20 unique apartment complexes that house between 10 to 60 separate apartments of different sizes, with an apartment manager that utilizes physical documentation that is condensed into quarterly reports for company headquarters (Conger, 2014, pp. 17-18). Analysis of the current processes at Wild Wood Apartments proves that a relational database management system will benefit the company in organizing its data and reports.

**The Problems and Issues with the Current System**

To understand the overall scope of the current system’s issues, a variety of interviews, observations, and questionnaires were completed. Interviews are a great way of obtaining the necessary information and for asking “open-ended questions” that promote discussion that helps identify current pain points in the system as well as what stakeholders are needing or looking forward to in the new system (Conger, 2014, p. 29). User observation provides pertinent user feedback to the database administrator on how the current system is used and what are the current methods of organization and utilization of the system, while questionnaires allow a database administrator or analyst to collect information from as many people as possible in a small window of time (Eid, 2015).

Through these methods of data collection, the following issues were identified:

* Apartment managers must manually enter data and update all correspondences (i.e., books, reports, journal) for each change they make to ensure the data align across spreadsheets.
* Apartment managers review numerous documentation (i.e., rental receipts, repair receipts, appointment confirmation) which is then translated onto a paper form report that is then mailed back to headquarters.
* Reports are meticulous and may take an extensive amount of time to complete. Apartment managers must repeat this process for company headquarters every quarter.
* Any receipts or paper documents are currently saved in a physical envelope.
* While company headquarters send a quarterly paper form to apartment tenants, there are no strict guidelines on how to manage the information, report rent, assess how much rent is due, document what rent was paid and when, who is in the rental units, etc. Apartment managers are housing and maintaining information that may not be relevant for overall process efficiency and may hinder business operations.
* The current system is disorganized and may take the apartment manager quite a bit of time to retrieve and update certain documents, spreadsheets, or journals.

**Limitations of the Current System**

Items considered as limitations of the current system were defined by potential risks (i.e., security), inefficiencies, and impact on other stakeholders that may decrease productivity in the overall process and system. After analysis of the current system, the below items are hindering the efficiency, productivity, and accuracy of the database.

* Wild Wood Apartment company headquarters require Apartment Managers to submit a paper form (report) through the mail each quarter. Apartment Managers fill out the paper form and company headquarters must wait to receive the data on that form through the mail. This poses several different risks of exceeding turnaround times, security risks (i.e., mail interception), and potentially inaccurate data if apartment managers are summarizing expenses, profits, and figures.
* All information or reports are either on physical forms or individual spreadsheets.
* If tenants are late in paying their rent, the Apartment Manager must call each tenant individually. Based on the job shadow and observation report of Joe Kindel, an Apartment Manager at Eastlake Apartments, out of the three tenants that were late on their rent, only one answered, providing only a 33.33% success rate of delivering notifications that the rent was late (Conger, 2014, p. 39).
* Checks are either hand-delivered to Apartment Managers or dropped in a lockbox stored out in the open, posing security risks. It is also an inefficient way of collecting checks each month as it adds a considerable amount of time of running to banks to deposit the amount.
* Notes for maintenance requests, rent, or tenant feedback are documented on pads of paper in no specific organized fashion.

**Business Requirements and Rules**

***Business Requirements, Objectives, and Scope***

Business requirements highlight the change that is needed from the stakeholders using the current system (Spacey, 2018). As identified earlier, the current system utilizes the archaic organizational approach of paper documents and individual spreadsheets that must be updated across all materials when one change is made, requiring the user (apartment manager) to exhaust a good amount of time to update the system. Below are the business requirements that will need to be achieved by the new database according to feedback, observation, interviews, and data collection.

The key objectives and scope of the new database must accommodate the following:

* The Wild Wood Apartments database will manage and document all the major topics of Apartment Complex, Apartment Units, Lease, Receivables, Employees, Manager, Repairs, and Vendors in one centralized database.
* Apartment managers must be able to update and store all information for these specific entities in a concise, secure manner as the database will only allow authorized personnel to access the information.
* The database must track items such as outstanding rents, invoices/receipts, lease start, and end dates, completed repairs, and maintenance requests.
* The system must improve accuracy, turnaround times, efficiency, and tracking of leases, apartment units, receivables, statuses, and historical data.
* The database must be able to input data in relevant tables that are connected through database relationships to ensure all information is updated accordingly across the board.
* The database will also be used to generate and calculate necessary components of the report such as wages, expenses, profits, and occupancy rate.

Stakeholders must also be considered when creating business requirements as they provide different perspectives on the requirements for the new database system (Spacey, 2018). This will ensure that the intended audience’s concerns and pain points are addressed with the new system. Below is a list of the internal stakeholders and their requirements for Wild Wood Apartments’ new system.

* **Headquarters and Financial Manager(s)**
  + The database must be accessible at any given time.
  + Managers must have the capability of generating quarterly reports and a year-to-date (YTD) report for business operations in case apartment managers are unable to provide this information on time.
    - A full report must contain the rental income, occupancy rate, expenses in maintenance and repairs, and profits.
  + The database must provide apartment managers with the ability to upload receipts and reports for verifiability and accuracy.
  + Managers must be able to see trends such as what are common repairs to the apartment units.
* **Apartment Managers**
  + Must be able to search a tenant’s record and history relating to previous payments, repair requests, repair dates, payments submitted, and payment dates.
  + Apartment managers must be able to generate a report for company headquarters each quarter that contains summaries on rental income, occupancy rate, expenses in maintenance and repairs, and profits (Conger, 2014, p. 18).
  + Must be able to make one change that will apply across the entire database when applicable. For instance, if a tenant would like to update their emergency contact information, the apartment manager should be able to bring up their record, update the emergency information on the contact record, and that should be accessible in other tables where it is applicable.
  + Apartment managers must be able to generate a custom report in case any legal litigations arise. For instance, apartment managers must be able to generate a report within a given period or on a specific apartment unit and its tenant for failure to pay.
  + The database must be able to store notes and upload receipts or documents. The database should include a column just for any notes they may have and the capability of uploading receipts or documents to specific expense transactions.
* **Database Administrator**
  + The database administrator must have remote access to any given apartment complex’s information to review, manipulate, or fix the data and its tables.
  + The database must be able to notify the database administrator regarding any specific feedback or errors that occurred, either through the database platform or in an email.

***Business Rules***

Business rules are the statements in which an organization or company must follow to establish certain constraints for the database to follow within the new system (Conger, 2014, p. 52). Below are the business rules that the new system will need to follow that were not accommodated or only loosely followed in the current system.

* New Tenants must complete an online application that connects directly to the database. This online application will provide necessary information such as name, contact information, signed permission to confidentially store and provide access to Wild Wood Apartments managers (i.e., Apartment Managers, Database Administrator, Headquarters Managers), demographic information, signed legal documents, and contract agreement.
* A tenant may pay on the 10th of the month if they are older, have lived at the apartment complex for a long time, and is in good standing. Age of the tenant, length of rental history, and rental status (needs to be more pre-defined with headquarters) will be considered before payment is considered late. Otherwise, the below applies:
  + If rent is not paid, each tenant will be sent a text or email notification (based on their notification preferences).
    - The notification will follow:
      * 5 days after rent is due: notification before applying a $100 late fee to their account.
      * 6 days after rent is due: final notification for the month stating that an automatic $100 late fee was applied to their account.
    - The database will also send the apartment manager a report of all outstanding rents.
* Apartment Managers will be reminded each week before the end of the quarter to update the database as much as possible to ensure data is accurate and up-to-date before a report is generated and sent to Headquarters.
* Reports must automatically generate every quarter to company Headquarters regardless if the apartment manager has updated the database.
  + The database will identify any missing fields or incomplete data (if applicable) and mark the report as “Incomplete” with the sections missing identified.

**Departments and Operations**

Inefficient systems impact various areas and departments within the day-to-day operations of an organization. At Wild Wood Apartments, operations impact stakeholders as well as the objects and people with whom they interact. The best way to understand these impacts is by separating the managers of Wild Wood Apartments and the apartment tenants in which they provide service.

**Interaction of Managers at Company Headquarters and Apartment Managers.** As part of the business rules, managers at company headquarters must receive quarterly reports documenting accurate data regarding revenue, expenses, profits, occupancy rates, and calculations such as Total Profit/Loss. The current system requires Apartment Managers to submit paper forms and reports to headquarters that take a considerable amount of time to complete, which opens the door to summarized estimates instead of specific itemized details that contribute to a more accurate understanding of how the apartments are being managed. This causes inefficient and inaccurate data that may affect the organization, especially in terms of their year-to-date (YTD) report, taxes, and impact the ability to identify relevant trends to improve the business infrastructure. The lack of automation in providing reports and the inability to submit receipts, documents, or invoices on a centralized database impact effective workflow and productivity (Gustafsson et al., 2008).

**Interaction of Apartment Managers to Apartment Tenants.** Many of the processes involving tenants are manual and require a considerable amount of time on the Apartment Managers’ effort. For instance, when maintenance requests are made, tenants contact the Apartment Manager directly to report the concern, which is then physically written down by the manager on a pad of paper. The note is then relayed to the appropriate maintenance person or vendor but is not properly archived in a database. Apartment Managers must also fill the role of an accountant by documenting and receiving rent checks in person or dropped off in a chained box outside the apartment. The Apartment Manager then accesses a spreadsheet to document if rent was paid, and uses that spreadsheet after careful analysis to identify who still needs to pay their rent. Apartment Managers then call each person individually, with only a 33.33% success rate of reaching the other person. If tenants are wanting to verify if rent was paid or when it is due, they also must call the Apartment Manager to verify this information as the information is not readily accessible otherwise.

While this system functions and produces results for the apartment complex, there is a lot of manual work that apartment managers must do on behalf of their apartment tenants. It also affects the apartment tenants as they may not be able to provide extensive feedback to the Apartment Manager if the Apartment Manager is focused on other projects or responsibilities, which may impact the overall customer service. Tenants would also benefit from a more automated, accessible system to check the status of their rent and maintenance request, which would free the Apartment Manager to focus on more impending deadlines such as the quarterly reports.

**Conclusion**

After analysis of Wild Wood Apartments’ current system, a new system must be established that promotes electronic documentation, relationship database infrastructures to ensure data are connected across different tables, automation, accessibility by authorized personnel, and efficiency. The current system is outdated by using paper and physical forms to deliver important information in methods such as quarterly reports. The impacts of an outdated and inefficient system may cause unnecessary stress and may produce inaccurate data. By identifying business requirements, business rules, stakeholder requirements, and understanding how the operations are impacted by the current system, the database administrator hired for Wild Wood Apartments will be capable of producing a database that will accommodate all the organization’s objectives and expectations. In the next section, we will be disseminating the analysis and design of the Wild Wood Apartments database through conceptual, logical, and physical designs.

**Analysis and Design of the Wild Wood Apartments Database**

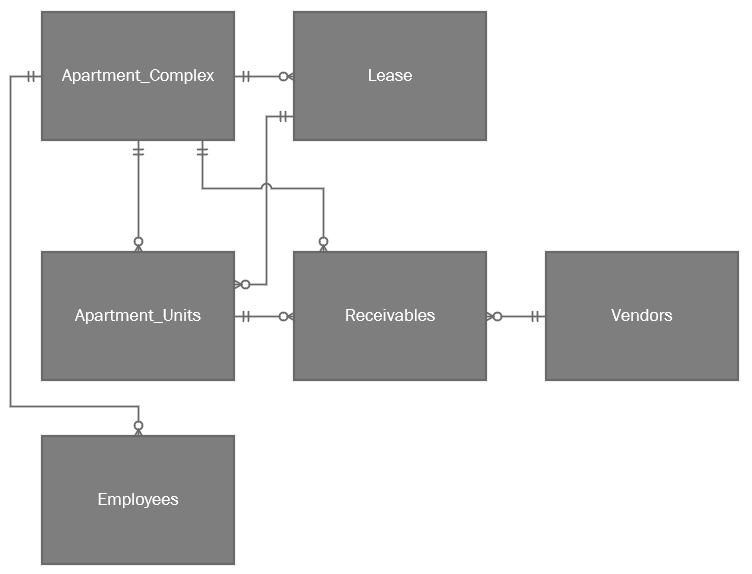
The Wild Wood Apartments headquarters and apartment managers need a system that can systematically organize, filter, store, and retrieve data in a relationship-based database. The design of the Wild Wood Apartment database consists of the conceptual design, logical design, and then finally the physical design to illustrate the intentions and purpose of the database. The conceptual design represents a simplified diagram regarding the one-to-many and many-to-one relationships between entities within the Wild Wood Apartments database. The logical design further elaborates these entities by listing their attributes that satisfy the business rules of the diagram to ensure the organization functions as requested and intended. The physical design was completed in Microsoft SQL’s Server Management Studio in database tables and diagrams. Each of these designs increments and build on one another to provide the final database product to the Wild Wood Apartments stakeholders.

**Conceptual Design**

The conceptual design is a high-level overview of the database that consists of important entities, relationships, and attributes (W3 Schools, 2020). Entities will represent anything that will be utilized within the database, relationships establish how these entities interact with one another, while attributes support what composes of that specific entity (Conger, 2014, p. 58). Conceptual designs are a great way to summarize the interactions between different tables and data objects in the database, and is easy to understand whether the reviewer is an expert in software development or from another department.

**Figure 1.1**

Conceptual Model of the Wild Wood Apartments Database



The Wild Wood Apartments database composes of the following entities and their attributes.

* **Entity**: Apartment Complex
  + *Attributes*:
    - AptComplex\_ID, Lease\_ID, Employee\_ID, AptComplex\_Name, Address, City, State, Zipcode, Phone.
  + *Relations*:
    - One-to-Many (Lease, Receivables, Apartment Units, Employees)
* **Entity**: Lease
  + *Attributes*:
    - Lease\_ID, AptComplex\_ID, AptUnit\_ID, Lease\_Status, Tenant Name, Tenant\_Contact\_Information, Start Date, End Date, Rent\_Amount, Deposit, Lease\_PDF, Confidentiality\_Release\_PDF.
  + *Relations*:
    - Many-to-One (Apartment Complex, Apartment Units)
    - One-to-Many (Receivables)
* **Entity**: Vendors
  + *Attributes*:
    - Vendor\_ID, Company\_Name, Company\_Contact\_Info, Company\_Email, Employee\_Name, Address, City, State, Zipcode.
  + *Relations*:
    - One-to-many (Receivables)
* **Entity**: Apartment Units
  + *Attributes*:
    - AptUnit\_ID, AptComplex\_ID, Lease\_ID, Number\_of\_Bedrooms, Number\_of\_Bathrooms, Floor
  + *Relations*:
    - Many-to-One (Apartment Complex)
    - One-to-Many (Lease, Receivables)
* **Entity**: Receivables
  + *Attributes*:
    - Receiveable\_ID, AptComplex\_ID, AptUnit\_ID, Vendor\_ID, Payment\_Status, Date\_Service\_Started, Problem, Receivable\_Type, Resolution, Date\_Resolution, Repair\_Status, Amount, Receipt\_PDF
  + *Relations*:
    - One-to-One (Receivables)
    - Many-to-One (Apartment Complex, Apartment Units)
* **Entity**: Employees
  + *Attributes*:
    - Employee\_ID, AptComplex\_ID, EE\_Status, Name, Position, Address, City, State, Zipcode, Wages
  + *Relations*:
    - Many-to-One (Apartment Complex)

The conceptual model is created based on the business rules required for Wild Wood Apartments. Business rules and requirements highlight the change that is needed from stakeholders using the current system (Spacey, 2018). As explained in Milestone One, the key business rules and requirements are that:

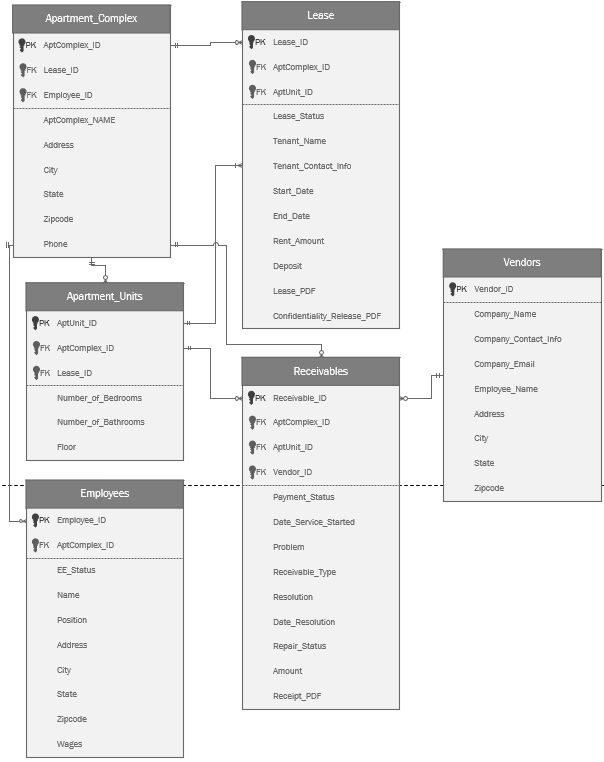
* The Wild Wood Apartments database will manage and document all major topics/entities in one centralized database.
* Apartment managers can update and store all information in a concise, secure manner.
* The database can track items such as receivables, document repairs, and lease information.
* The database will improve accuracy, turnaround times, and efficiency in day-to-day tasks such as tracking leases, collecting rent, and managing historical data.
* The system will migrate from physical forms to an electronic database.
* The database may also be used to generate and calculate necessary numerical evaluations such as wages and expenses through database queries.
* The database will allow Apartment Managers and company headquarters to identify when tenants may pay after rent is due (i.e., older residents who have been in the complex for a long time may pay on the 10th of the month), as well as send automatic notifications to people who have yet to pay rent.

**Logical Design**

Logical designs expand on conceptual design models by elaborating on entities’ attributes (which include primary key attributes, non-key, and foreign key attributes) (DataAcademy, 2017). The logical design for the Wild Wood Apartments database will have the same amount of entities but contain more information that allows stakeholders and database administrators to better understand these entities. The logical design will also display the relationships between these objects, which include one-to-one relationships, one-to-many relationships, and many-to-many relationships. The logical design will utilize the Crow’s feet notation. The objects in the logical design will also contain Primary Keys and Foreign Keys to ensure the RDBMS remains consistent in its relationship when displaying information in the Microsoft SQL database system. For instance, if we are searching for all repairs completed in an Apartment Unit, we would run a Microsoft SQL query to return this information and would expect the database to maintain the linkage between repairs completed in the designed Apartment Unit. If this relationship was not consistent, it would return random information that would not serve or satisfy business requirements for the Wild Wood Apartments company. Another trait of the logical design that differs from the conceptual design is that characteristics that support the object are now displayed. For instance, Apartment Complexes will now have their AptComplex\_ID, AptComplex\_NAME, Address, City, State, Zipcode, and Phone.

**Figure 2.1**

Logical Design of the Entity-Relationship Wild Wood Apartment Database



*Note*: The relational model utilizes Crow’s Feet notation to delineate the relationships between the different entities. In these entities, “PK” stands for Primary Key and “FK” stands for foreign keys.

There are four different entities: domain entities are entities that support the business of the database; linking entities are used to link entities to one another and resolve many-to-many relationships into only two one-to-many relationships; lookup entities are entities that you may use to look up and are utilized to ensure consistent data entry; and weak entities, which are used to display entities that are dependent on other entities (Conger, 2014, p. 74).

**Domain Entities**

* Receivables
* Lease

**Linking Entities**

* All linking entities within the database are resolved.

**Lookup Entities**

* Apartment Complex
* Apartment Units

**Weak Entities**

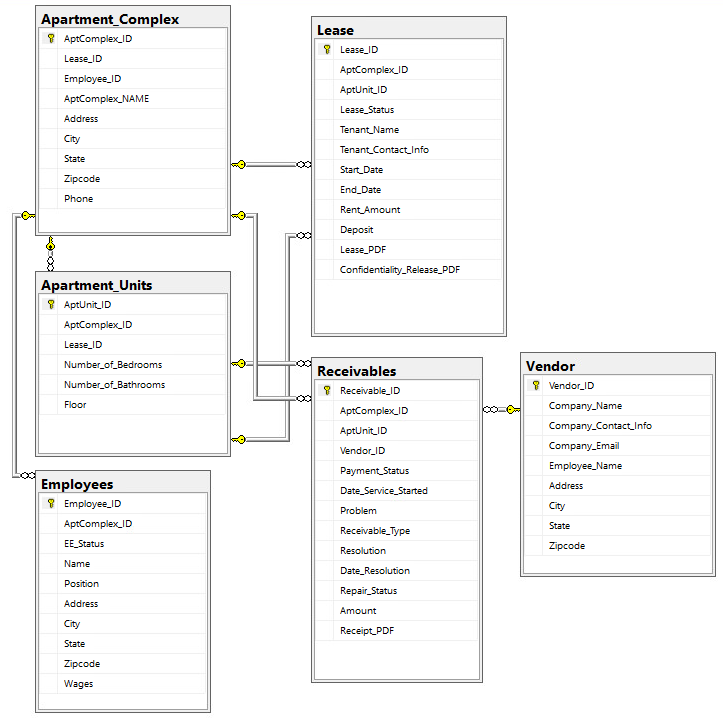
* Vendors
* Employees

**Physical Design of the Wild Wood Apartments Database**

The physical design of the Wild Wood Apartments Database will be completed within Microsoft’s Structured Query Language (SQL) Server Management Studio. The Microsoft SQL Server Management Studio provides a cost-free and easy-installation database option that allows users several data management options such as running queries to view and manipulate database tables while enhancing productivity with data management (Erkec, 2020). Through SQL, the database will consist of several tables and a database diagram with appropriate relationships. Queries may run to produce necessary reports for Wild Wood Apartment headquarters and managers for quarterly reports. These queries may pull information such as the occupancy statuses of apartments within a complex to all receivables associated with an apartment complex or apartment units.

**Figure 3.1**

Wild Woods Database Diagram

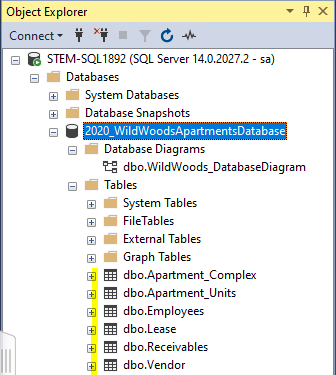


*Note*: The attributes with a key to the left represents the Primary Key of each entity in the Wild Wood Apartments database. The keys outside of the entities represent “one” in relationships such as “one-to-many” and “many-to-one”, with the infinity symbol representing “many”.

Database tables hold the entities’ attributes, their specific data types, and whether nulls are allowed in data input. There are 6 different database tables to holding this information within the database.

**Figure 3.2**

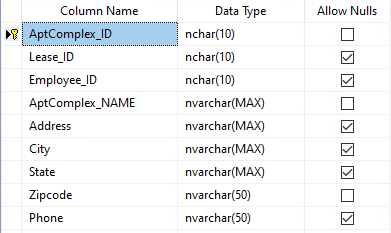
Tables within the 2020\_WildWoodsApartmentsDatabase



*Notes*: This screenshot is within the Object Explorer overview of the database within the Microsoft SQL Server Management Studio. The yellow highlighted items with “dbo.” as the leading extension represents the database tables that compose of the 2020\_WildWoodsApartmentsDatabase.

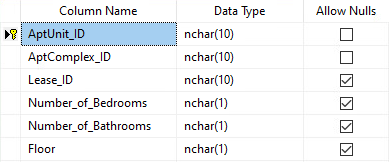
**Figure 3.3**

Apartment\_Complex database



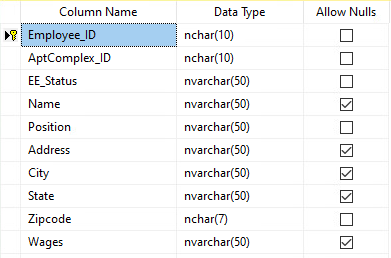
**Figure 3.4**

Apartment\_Units database



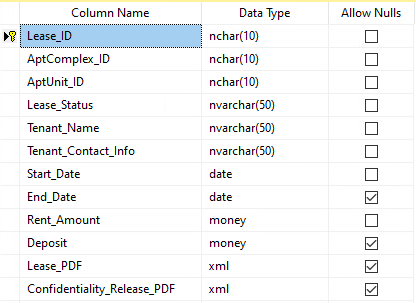
**Figure 3.5**

Employees database



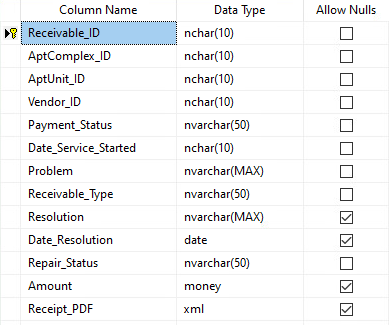
**Figure 3.6**

Lease database



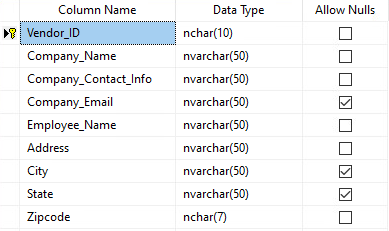
**Figure 3.7**

Receivables database



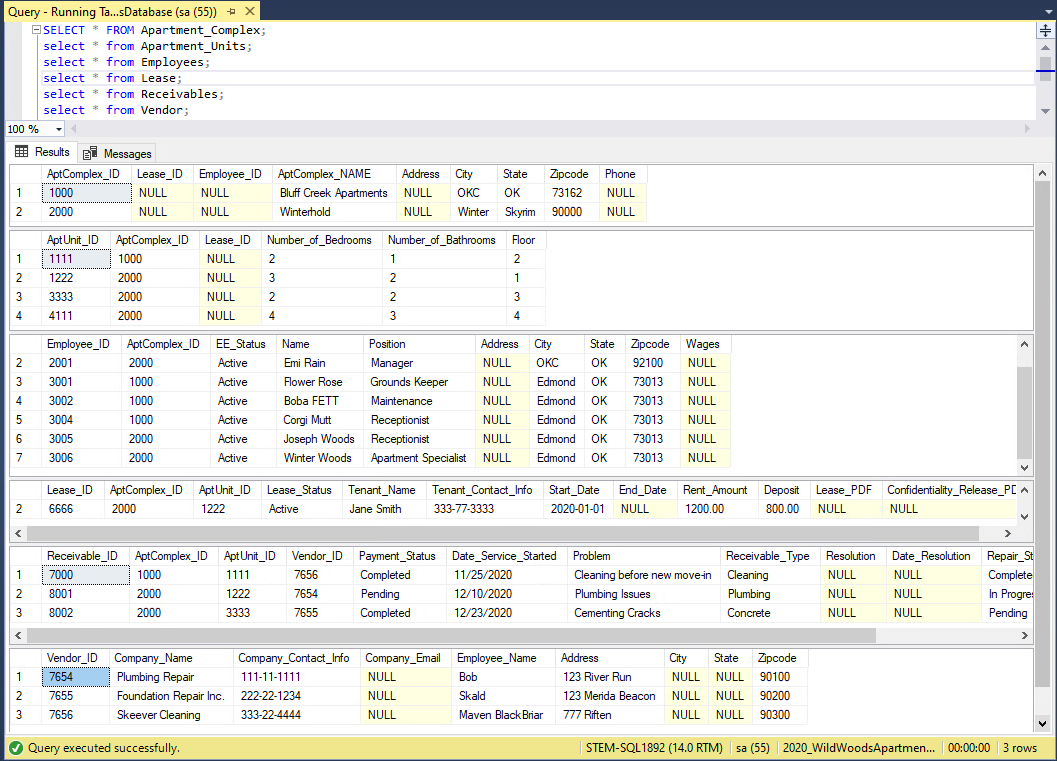
**Figure 3.8**

Vendor database



**Figure 3.9**

Query ran to display all database tables



*Note*: All data within these database tables were inputted before running the query. This query utilizes the “select \* from” feature. The “select \* from” feature returns a specified database’s data and columns from the overall database (Microsoft Docs, 2017). The query calls upon all 6 database tables and returns this information without any manipulation (such as SQL inner joins).

**Conclusion**

Every database should have conceptual, logical, and physical model designs. The conceptual model design represents the outline that demonstrates the main entities of a database in a simplified, easy-to-read diagram with relationships. The logical design dives deeper into the conceptual model by elaborating the different attributes and keys within these entities. The physical design takes into consideration both the conceptual and logical models, but inputs this information into a physical database (the Microsoft SQL Server Management Studio database) for review, management, and manipulation as necessary. These designs are the key to developing a functioning physical database that may be accessed by important stakeholders at Wild Wood Apartments database. The creation of this database promotes easier data management, allows for electronic documentation instead of archaic physical documentation, automatic reporting, and fulfills the necessary business rules to meet Wild Wood Apartments managers’ needs. In the next section, we will propose and recommend a physical DBMS that best suits the Wild Wood Apartments database model, business requirements, and model.

**Wild Wood Apartments Enterprise – Database Research and Recommendation**

The database selection is an important requirement for companies who are interested in managing and accessing their data to maintain good business operations. The criteria for selecting an appropriate database differ between organizations but primarily revolves around the cost-efficiency, application, security, availability, and analysis functions of that database for the organization. While there are many databases to consider, we will be looking at three market-leading database options and technologies and analyze their capabilities against the organizational needs of the Wild Wood Apartments enterprise.

**Databases from Microsoft, Oracle, and IBM**

**Microsoft SQL Server (with Amazon RDS)**

Amazon Relational Database Services (RDS) offers database management services for a variety of products, including the Microsoft Structured Query Language (SQL) Server which is a relational database management system (RDBMS) that supports and possesses business intelligence and analytics applications, and transaction processing (Rouse, 2019). SQL contains row-based tables with related data elements that are then connected by keys. The connection of these data tables through keys allows the database to retain data integrity, consistency, and accuracy. Microsoft SQL Server is an easy-to-use database with its main component being the SQL Server Database Engine that handles data processing, storage, and database security. In addition to the Microsoft SQL Server, Amazon provides database management assistance through their Amazon RDS team, so customers are worry-free from regular database tasks such as software patching, setup, backups, configuration, or hardware provisioning, with most of these services being fully automated at a click of a button and scalable to customers’ needs and expectations (AWS, 2007).

***Analysis of Application for Wild Wood Apartments***

The Wild Wood Apartments managers and staff at headquarters may use the Microsoft SQL Server and Amazon RDS services for day-to-day operations. Data records may be entered through queries into the relational database to record and document transactional records such as invoices, new applications, leases, and more. The Wild Wood Apartments managers can run a query to obtain specific relationships such as all the repairs a specific apartment had in the past year, what are the available apartment units, and more. The strengths of this database are that the Wild Wood Apartments managers would be able to utilize the database for everyday tasks and management, and may run a separate query quarterly to build the report for corporate headquarters. With additional training, responsibility may also shift to a financial accountant or record keeper at company headquarters as they now can pull comprehensive data on specific – or all – apartment complexes. The weaknesses in the Microsoft SQL Server is that running queries does not always produce the necessary end report in one query; multiple queries may need to run to pull comprehensive totals such as total expenses an apartment complex incurred in the calendar year versus active apartment units within a complex. The relational database will also only pull what is connected to the submitted query, and the vaguer it is, the more unnecessary data or columns there may be for the end report. However, with this said, the Amazon DBS team would be able to assist in outlining data transformation, analytical, and reporting services that would benefit Wild Wood Apartments users.

**Oracle Autonomous Database with Oracle Cloud Interface (OCI)**

Like Microsoft SQL, Oracle is one of the leading databases in the market and is made of a set of processes in that the Oracle Autonomous database with OCI has an infrastructure that is built with security, predictability, governance, and transparency (Miller, 2020, p. 13). Typically used for larger enterprises, the database prides itself in zero-data-loss architectures, its ability to scale performance and storage capacity when compared against other competitors (millions of input/output operations per second and with usable capacities of 340 terabytes), layers of resilience in terms of the consistent protection and policy-based backups, fast connectivity, and industry-first services (Miller, 2020, p. 14).

***Analysis of Application for Wild Wood Apartments***

The Wild Wood Apartments may use the Oracle Autonomous Database to store massive amounts of data, records, and documents within the database. The Oracle Autonomous Database is scalable for larger operations, which may be beneficial for Wild Wood Apartments should they absorb more apartment complexes or expand their current operations. The strengths of the Oracle Autonomous Database are its consistent reliability for performance, protection, and security across multiple enterprises, the OCI feature of storing everything on a cloud database with immediate access at any time, and its ability to scale performance and storage capacities when compared against other database competitors which would be beneficial for Wild Wood Apartments’ business needs and potential future requirements. The weaknesses of Oracle Autonomous Database are that it is much more expensive than the average competitor, is a much more difficult database language to learn when compared against Microsoft SQL, time-to-performance costs more when not including downtime costs, and may require additional enhancements to perform to enterprise expectations (Database Journal, 2004).

**IBM Db2 on Cloud**

IBM’s Db2 is a relational database that is commercially supported with an on-premises version and/or cloud-hosted version (IBM Cloud Education, 2020). Db2 represents a package of data management products offered by IBM (including the Db2 relational database) that also contains artificial intelligence (AI)-powered capabilities that help manage unstructured and structured data across various environments while also having a strong hybrid connection and model that helps support self-service, better scaling, and dev/test to production turnaround (IBM, 2020). This means that web applications are used to store and retrieve database data from the cloud, uses the hybrid architecture that pulls anything data from the public cloud but retains personally identifiable information and sensitive information on local premises, stores the data’s main application information (like inventory and transactional data) in Db2 on the cloud, consistently maintains an offsite node the help ensure availability and resiliency for disaster recovery efforts, has a dedicated team available 24/7 that manages updates for the operating systems, security patches, data protection, and data encryption, and has a pay-as-you-go model for scaling efforts to ensure that you are only paying as much as you need for the database (IBM, 2020).

***Analysis of Application for Wild Wood Apartments***

The Wild Wood Apartments staff may use the IBM Db2 to store relevant business documents and records on the IBM Db2 cloud database like Microsoft SQL Server. The strengths in the IBM Db2 database are: it is a pay-as-you-go model that is scalable which means that the Wild Wood Apartments headquarters will only pay for a database that meets their business requirements – and should they continue to expand or need more – could work with IBM Db2 to draft a new contract with increased pricing that comes with increased data and storage capacities; IBM has a 24/7 team that is available for questions, database implementation, functionality, and will ensure important maintenance features (i.e., security patches and operating system updates) are completed to maintain business functions; the data is accessible through simple web-based applications and can be accessible to pre-authorized users at any time; utilizes their own easy-to-use SQL editor for the cloud database; and, with IBM Db2 being a relational database, the data is always synced at any given time so users such as the Wild Wood Apartments headquarters could draw quarterly reports at any time without waiting on managers to provide these reports. The only notable weakness of the IBM Db2 on Cloud for Wild Wood Apartments’ business requirements and expectations are that as the project becomes larger, it may become costly for Wild Wood Apartments, so an evaluation of current and future budgeting needs are necessary (Ghosh, 2017).

**Wild Wood Apartments Database Recommendation**

The database recommendation for Wild Wood Apartments business and future endeavors is the IBM Db2 with Cloud database. The Wild Wood Apartments is a smaller to medium enterprise that contains 20 unique apartment complexes that house between 10 to 60 separate apartments of different sizes at any given time (Conger, 2014, pp. 17-18). At this time, the Wild Wood Apartments business requirements include quarterly reports that will analyze expenses, profits, and wages, documenting transactional maintenance records, lease information, and current statuses on the apartment units within these complexes. Unless Wild Wood Apartments headquarters demand additional information to be tracked or historical records and data exceed the database’s capacity, the expansion will not be required right away. IBM Db2 on the Cloud is a great database product to introduce Wild Wood Apartments to storing information on a relational database, while also having the readily available assistance from IBM’s teams. The Wild Wood Apartments staff will also not be required to maintain the database personally, as IBM’s service teams will be ensuring that the database will continuously update security certificates and operating system requirements. The team could also be used to devise a query that can properly analyze and automate the quarterly reports that are necessary for Wild Wood Apartments’ business operations. The Wild Wood Apartments team could also access the data at any time from a web-based application while also knowing that at any given time, the data is synced on the cloud, which streamlines current processes that are dependent on waiting for someone else to submit the information. The many capabilities and overall support provided to Wild Wood Apartments company make IBM Db2 a natural choice and recommendation.

**Software and Hardware Requirements**

To access and manage the IBM Db2 database efficiently, there are a few software and hardware requirements that must be achieved to ensure multi-department operational, functionality. According to IBM’s Cloud Documentation and specifications (with the assumption that Wild Wood Apartments will remain on the Windows operating system), Wild Wood Apartments computers must have the following:

* **Operating system (for servers):** Windows Server 2003 Standard, Enterprise, R2, or SP2 edition.
* **Operating system (for system administration clients, DB2 Information Integrator for Toolkits and Content Connectors)**: Windows Server 2003 Standard, Enterprise, R2, or SP2 edition, Windows XP Professional, Windows Vista Business, Ultimate, or Enterprise Edition.
* **Web Application Server**: WebSphere Application Server V6.1.0.
* **Web Browser (for the eClient program)**: Microsoft Internet Explorer 6 SP1 or Microsoft Internet Explorer 7.
* **Web Browser’s Java plug-in**: Sun Java plug-in 5 or 6.
* **Web Browser (for Information Center)**: Microsoft Internet Explorer 6 SP1 or Microsoft Internet Explorer 7, Mozilla 1.7, Firefox 1.0 or 2.0, and Safari 1.2 (IBM Support, 2016).

These system requirements will be required of any computer device that will be accessing the IBM Db2 database to ensure functional operations. These requirements specifically focus on the operating system and web browser applications because IBM Db2 relies on web-based applications. This will also ensure that those accessing the database may be able to access it anywhere as long as these system requirements are met on their device. There are also other system requirements listed under IBM’s Cloud documentation and specifications, but these apply to the actual servers and requirements on IBM’s end for their cloud computing infrastructure to which IBM maintains—and not Wild Wood Apartments. Individuals who will receive these computers that satisfy these system requirements are Apartment Managers, the Database Administrator, and any Wild Wood Apartments corporate staff that require – and are permitted – access to the database to retrieve items such as reports and accounting records.

**Conclusion**

Organizations must be able to choose a database that will adhere to their business requirements and expectations. The Wild Wood Apartments is looking for a database that will be able to document transactional records, maintain easy-to-use queries or searches that will produce results in a second (i.e., searching for a historical record of repairs completed for an apartment unit), and perform the necessary analysis and calculations for expenses, receivables, profits, and statuses of current units within the complex. After analyzing three leading databases in the market, the natural choice is IBM’s Db2 on Cloud package as it provides an easy-to-use database that comes with database support from IBM teams and is a great choice for Wild Wood Apartments who have never used a database before. IBM Db2 on Cloud database will also ensure the database and its data are consistently monitored and securely protected. The cloud features of the database also allow authorized access to users at any time, streamlining current processes such as headquarters waiting on reports to be composed and sent from all 20 apartment complexes. The IBM Db2 on Cloud database will be an efficient and helpful database for the Wild Wood Apartments enterprise. In the next section, we will be analyzing data modeling on a specific stakeholder group (corporate managers) in the Wild Wood Apartments company through enterprise data model and operating rules.

**Wilds Woods Apartments Enterprise Data Model and Operating Rules**

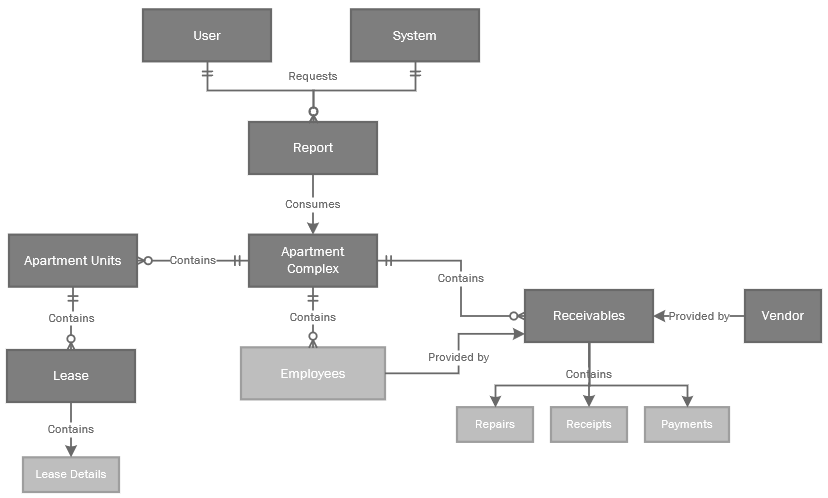
From conceptual to physical models, data modeling is an important aspect every business organization must consider. Data modeling illustrates and captures the flow of data within the system, the objects it interacts with, entity types and relationships, and depicts the system in a diagram that is easy to understand (Ambler, 2020). Enterprise data models may be created for target groups or audiences within the organization. For this section, we will focus on the enterprise data model for managers at the Wild Wood Apartments company headquarters and their utilization of the system.

**Enterprise Data Model**

Enterprise data modeling (EDM) is used to represent the architectural framework of how data is consumed, stored, used, and captured across the business enterprise (Smith, 2020). For the Wild Wood Apartments company, reports are critical necessities to business operations that each apartment manager must send a quarterly report to the Wild Wood Apartments company headquarters in San Francisco, where reports contain details such as total rent revenues, expenses in repairs and maintenance, occupancy rates, and more (Conger, 2014, p. 18). With the implementation of the Microsoft SQL database, all this information is viewable and accessible to the right pre-authorized users. The enterprise data model in Figure 1.1 focuses on Headquarters Managers receiving this information through a report and its process in the new database design. To streamline the process, managers at headquarters will receive an automatically generated report through a secure email portal (which is only accessible by pre-authorized personnel) containing all the necessary details for each apartment complex. Apartment Managers will be expected to submit all entries and data into the database a week before the quarter ends. This will ensure that should there be any missing data before the deadline that there is time to submit this information before the reports are automatically generated from the system.

**Figure 1.1**

*Enterprise Data Model for Headquarters Manager User*



*Note:* The Headquarters Manager user must request the report that they would like generated from the system. Once the request is solidified in the system, the user has the option to set a schedule where the report is automatically generated each quarter. Schedules may be edited at any time before or after the schedule to ensure the report continuously meets business expectations. Reports may also be generated outside of the schedule at any time as well. Once schedules are submitted to the system, it is the system that then requests and generates the report(s) before sending it to the secure email portal.

**Operating Rules**

To ensure the enterprise data model for Headquarters Managers is an applicable model, analysis and application of operating rules must be completed. Operating rules represent the set of rules that must be applied and maintained as the database is utilized. For the Wild Wood Apartments database, these operating rules for the Headquarters Manager user involve a mixture of pre-authorization, permissions, authentication, and updating current processes and policies.

**Operating rules for the Enterprise Data Model**:

* Headquarters must have viewing permissions to review information generating from Apartment Complexes, Apartment Units, Employees, Leases, Receivables, and Vendor tables.
* The database must be able to produce a report with appropriate selections and filters applied. For instance, if a manager needs a quarterly report on the receivables of Apartment Complex A, they should be able to apply these filters and generate that report.
* In the past, Apartment Managers were expected to submit quarterly reports to corporate headquarters every quarter. This caused dependencies on Apartment Managers to deliver this information. With the implementation of the new database, Headquarter Managers with proper authorization may generate these reports. For maximum efficiency of the enterprise data model, it is proposed that Headquarters Managers set up and establish a database schedule for their reports to generate every quarter.
* Headquarter permissions may be provided to pre-authorized administrators in case headquarters managers are unable to pull the information themselves.
* Headquarters will not have the ability or permissions to alter, change, or remove any information in the database. This is because they are not responsible for data management, but rather the analysis of the data for current business operations. Headquarters will have the ability to contact Database Administrators and make formal requests for updates or deletions that must be made in the database. For instance, if a new Apartment Complex was absorbed underneath the Wild Wood Apartments administration, this will need to be inserted into the database.

**Rule Reflection**

Accurate and efficient enterprise data models must represent the system application for the targeted group. For the Wild Wood Apartments company, the operating rules for headquarters managers are represented within the enterprise data model outlined for Headquarters Manager users. The enterprise data model for Headquarters Manager Users utilizes the EDM technique of top-down analysis; in Figure 1.1, the user and system actors are at the top of the diagram and requests the report, which then consumes data about the apartment complex as well as different areas (i.e., Apartment Units, Receivables) and information in the database to produce the report. In the enterprise data model, viewing permissions for all information are represented in the ability to see the objects of Apartment Complexes, Apartment Units, Employees, Leases, Receivables, and Vendor (and its associated data, with the only restriction being demographic information of Tenants which is why only “Lease Details” are contained under the Lease object). The enterprise data model also contains the various objects that the report can be built on. For instance, if a Headquarters Manager user only wishes to see a report of just the Apartment Complexes under the Wild Wood Apartments name, the user can filter out all other objects and only print information on Apartment complexes. To accommodate the streamlined process and operating rule of establishing schedules for automatic and quarterly report generation, the system was also included in the model to represent the system as an actor as it would be the computer system that automatically requests these reports from the database before sending it to the secure email portal to be accessed by the original scheduler. The enterprise data model also represents the operating rule that managers at Headquarters will only have the ability to view information from the system. The user (headquarter manager) or the system only requests reports in the system and are not active participants in changing or providing information, like Employees.

**Conclusion**

An enterprise data model represents the long-term (and ongoing) focus, the foundation for standardization, and investment while also serving as a basis for communication on how the system and database design will operate (Dataversity, 2019). For the Wild Wood Apartments database, the enterprise data model created represents the focus group of managers at headquarters and how these internal stakeholders will utilize the database to generate reports that best fits their business operations. Operating rules with appropriate permissions, authorizations, and processes were proposed to ensure the maximum efficiency of the database design for the group. Completing an enterprise data model allows visibility to the database architecture and its applicability to the enterprise. In the final section, we will evaluate the laws, standards, and ethics that must be considered in the creation and implementation of this database management system. We will also delineate the database security plan for the Wild Wood Apartments enterprise and the protocols that must be accommodated when running the database.

**Law, Ethics, and Security Plan and Database Management System**

Standards, legal compliance, and ethical practices are three important factors to consider when incorporating a new business system within a corporation. This is especially true with the reliance and usage of databases that contain and maintain confidential information, statistics, and sensitive data over modern technology. The implementation and maintenance of these standards and practices not only protect businesses but serves to retain the trust of users and customers.

**Standards**

The Wild Wood Apartments enterprise must ensure that standards are met, protected, and revised to provide the most relevant protection. Standards involve security provisions and privacy preservation. The database design will need to consider the standards, best practices, and implementation requirements to achieve appropriate standards. The standards of the Wild Wood Apartments database are based on the following:

* **Physical Location of the Database Server.** To promote security over the database itself, the physical computer machine that houses the Wild Wood database will be locked in a secured and monitored location to prevent any theft, access, or entry that is unauthorized. The physical machine will also not be stored on the same machine as the application and web servers to mitigate any breaches.
* **Database Server Firewalls**. Firewalls will be placed on the server that will deny all traffic except for access from specific applications or web servers that must access the database to return appropriate data. Access will be denied if the request is being made from unauthorized applications. If data is required for development, mock data will be used. Firewall rules will also be consistently monitored, maintained, and reviewed quarterly by the Database Administrator (DBA) to ensure the database is up-to-date in its firewall service.
* **Microsoft SQL Server will be customed**. The Wild Wood Apartments database will be utilizing the Microsoft SQL Server as the central database. This program comes with multiple features, functions, and access. To protect the database appropriately, any unnecessary function or service will be turned off or removed completely. The DBA will also ensure that the software is consistently up-to-date in security patches and updates.
* **Appropriate usage and documentation of Applications, Web Servers, and Coding.** Any access to the database will be properly recorded in a “Change History.” This will also document the users accessing the data, as well as the steps and queries requested from the database. Code will also be reviewed to ensure there are no SQL injection vulnerabilities. No spyware or additional programs will be installed on the web servers or applications to help mitigate any potential breaches from unauthorized users.
* **User Workstations must be secure**. Since the Wild Wood Apartments database will be accessed from multiple locations and by many different users (i.e., Apartment Managers, Corporate Managers), user workstations must be secured. To protect data, no physical copy of the data may be printed out for potential distribution. Computers will automatically lock after 5 minutes to mitigate access by unauthorized users. To further protect data, all workstations or computers that access the database will be required to login with an individual user ID and password. Any data that is no longer needed will also be deleted or cleared in browsers at the end of each day.
* **Administrator Accounts, Permissions, and Passwords**. At Wild Wood Apartments, the DBA is the only individual with full access to the database. All other users are allocated only certain permissions to either view, update, or alter the data. While the DBA contains access to delete data from the database, data should never be deleted and must always be documented for archival, legal, and record-keeping purposes. Passwords all must be complex, not be the same as the last 10 passwords, and will always include a mixture of numbers, lower case, upper case, and special characters. Any individual leaving or terminated from Wild Wood Apartments will automatically have their permissions revoked and their account closed.
* **Database Backup and Recovery**. The DBA will be responsible for maintaining records that document the backup and recovery procedures. He/she will also be in charge of periodically testing the database and ensuring the database continuously meets business requirements and expectations.
* **Database Encryption and Key Management**. All data that comes from the database and is transmitted over a network must always be encrypted to protect the data. Encryption will be applied on all application layers (i.e., application, network, workstations). Secure key management will also be maintained (UC Berkeley, 2021).

**Legal Compliance**

Databases must ensure that they participate in legal compliance to maintain their business operations. Many governmental and industry regulations drive and promote the need to improve administration, management, and protection of data within databases, such as HIPAA (Mullins, 2012). For Wild Wood Apartments, the management and retainment of its data must comply with legal standards and laws, especially on both local and federal laws. These are important items to given that the Wild Wood Apartments own complexes in California, Idaho, Oregon, and Washington (Conger, 2014, p. 17). The legal compliance of standards, such as the National Apartment Association, will be considered in the design to ensure current regulations and business operations are accommodated.

Legal compliance will be based on the adoption of these principles and regulations:

* **Communication, Data Security, and Privacy based on state**. The Wild Wood Apartments will consider the laws and regulations at local, state, and federal levels. For instance, in California, it is important to consider the California Consumer Privacy Act (CCPA) and ensure that tenant’s personal information is not distributed in reports to unauthorized individuals. This is to ensure that the database design and operations continuously meet regulations regarding the collection of sensitive data, its usage, and the security surrounding it.
* **Fair Housing of Data.** The Fair Housing Act (FHA) prohibits any form of discrimination against those underneath protected class statuses. These classes include race, color, religion, sex, national origin, handicap, and familial status. This is important to consider because when storing this information, database users may record this information in the database but should never use this information against someone’s application for a rental property. The same will also go towards those with criminal backgrounds or convictions. This information may be stored in the database but should ensure that policies, rules, and practices follow legal compliances regarding criminal screening.
* **Tenant Laws**. The database will contain data that may or may not support consistent tenancy in apartment complexes, but should always abide by the law. For instance, the California Tenant Protection Act of 2019 contains a segment that states that “Just Cause Termination” will not attach to tenant units where a tenant was lawfully and continuously occupying a residential property for 12 months (NAAhqVideos, 2019). This pertains to the database because the database stores information on when rental invoices were completed, delivered, and fulfilled to the tenants. Based on this law, the database must continuously document all historical rental invoices based on the tenant’s occupancy in a specific rental unit.
* **Rent Control**. The issue of rent and price increases must always be well-documented to prove no illegal activities are being committed by the Wild Wood Apartments. The database will monitor any control or changes that may occur, especially in terms of rent increases and invoice documentation. For instance, in California, there is a California Tenant Protection Act of 2019 (Assembly Bill 1482) that states that any annual rent increases must always be capped at 5 percent – plus inflation – for all buildings that are 15 years or older. This will translate to the database in that permissions and documentation from the Wild Wood Apartments’ corporate legal team must be submitted before any changes to rent are made for apartment units (National Apartment Association, 2020).

**Ethical Practices**

Business operations surrounding the implementation, maintenance, and usage of the database must fulfill moral obligations and ethical requirements to maintain the users’ trust and confidence in the system. Protection of these stakeholders' information and data should always be the number one priority for any business or organization. The Wild Wood Apartments will participate in a multitude of ethical practices that promote user data ownership, transparency, and data rights protocols.

These ethical protocols and practices are as follow:

* **Respecting User Privacy**. Data and information privacy and protection revolves around the collection, usage, and access of the data, along with the data user’s legal right to it. This includes (but is not limited to):
  + Private data should never be accessed by unauthorized personnel.
  + Data should never be inappropriately used.
  + The collection of data through technology about a person, entity, or corporation should always be accurate and complete.
  + Data content should always be available to the data subject and promote ownership of their data.
  + Users will always have the right to update, inspect, or correct these data (Lee et al, 2016).
* **Data will be protected**.
  + One of the key principles that Wild Wood Apartments will do for all external stakeholders (i.e., tenants, vendors) will be to only collect data necessary for legal contracts, agreements, and leases. For instance, legal first and last names will need to be disclosed to complete contracts, but demographics such as race, ethnicity, weight, and height are all voluntary or unnecessary information to provide to Apartment Managers and/or Apartment Assistants during the data collection or interview process.
  + The database will also only store information in a secure, encrypted store that is password-protected to ensure information is not accessible to unauthorized personnel.
  + Security standards and certificates will also consistently be acquired per law to ensure the Wild Wood Apartments staff and database continually meet ethically secure standards for storage and collection (UCD Dublin, 2021).
* **Transparent Uses and Disclosures.** The Wild Wood Apartments database and its uses will follow the basic principles of ensuring that any use of the data collected is defined and disclosed to all stakeholders. Confidential release statements provided to tenants will designate exactly how the information will be stored in the database, how the data will be used (as applicable), and all authorized individuals who can view and access the information (HHS.gov, 2013).

**Security Needs of Wild Wood Apartments DBMS Solution**

In the Wild Wood Apartments database, the enterprise data model was constructed for the Headquarters Manager user. The Headquarters managers are responsible for retrieving reports from the Wild Wood Apartments Microsoft SQL database. From the collected data, they analyze the data and create new reports for year-end requirements, taxes, metrics, and statistics. Headquarters managers only have access to view certain tables and data within the database. The security needs for this department relies on ensuring the reports collected from the database continue to be protected outside of the database.

For Headquarters managers, the security needs are:

* **Ensuring the workstation and physical machine are protected**. The computer workstation must contain antivirus programs and network encryption to ensure that no unauthorized program accesses the database. All workstations and physical machines will also have up-to-date firewall and instruction detection/prevention systems.
* **Encrypted transmission of data**.Once managers at headquarters are done with compiling the reports required, there may be times when the report must be sent to another manager or external member (i.e., lawyer, tax specialist). In these instances, the transmission of the report must be sent within an intra-network or in a secure email portal when outside of the corporate location. Managers at headquarters will have both these options when completing business operations, whereas other database users will not have the capability of sending reports or information back and forth. All transmissions between systems will encrypt the data so that information is not intercepted and interpreted during the transmission.
* **Periodic audits and monitoring for user authentication**. Frequent monitoring will be completed to ensure users accessing these reports and data are truly pre-authorized managers at corporate. The retrieval and distribution of the data will be continuously monitored by IT and the DBA to ensure authentic data access.
* **Periodic audit of security systems**. The security system must remain up-to-date with the appropriate detection and prevention programs, as well as certificates. Prioritizing this on a consistent schedule (i.e., monthly, quarterly) will ensure that computer systems are consistently checked and not left neglected. This will also help identify any vulnerabilities in the database system.

The security needs of the corporate managers versus other stakeholders will differ base on their access and responsibilities. For instance, corporate managers are responsible for accessing, analyzing, and delivering the reports (data from the database) to the appropriate entities. Apartment Managers are responsible for managing the data and ensuring all data is entered for apartment units, receipts, and repairs. The security needs of Apartment Managers will differ based on these differing responsibilities. For example, the basic security needs for Apartment Managers will involve ensuring only necessary data is collected from tenants and vendors to promote confidentiality, confidentiality release statements and contractual documents will need to be stored in the database in a secure, encrypted environment, and data cannot be a screenshot or shared in any capacity outside of the database. The only items that are similar to the corporate managers’ security needs are a consistent review of permissions, security programs, and firewalls on workstations that have access to the database.

**Database Security Plan**

The Wild Wood Apartments enterprise has a lot to consider when protecting its internal and external stakeholders. From the tenants who lease the apartment units to the managers handling day-to-day business operations, it is important to create an overall, high-level database security plan and list of protocols to follow. The creation of a database security plan provides a clear and concise set of expectations when utilizing the database in the present and long-term.

The security plan will consist of these core principles and protocols:

* **Personal login accounts and strong passwords**. Whether you are a tenant, applicant, or manager, all individuals will create an account on a secure web exchange. All passwords must contain numbers, letters, and special characters, but should not be a password from your 10 previously used passwords. Passwords will also automatically reset every 60 days to ensure a new password is created.
* **Routine review of database program and system**. Database applications like Microsoft SQL Server are third-party programs that routinely are updated with new features, add-ons, or applications. The DBA will review the database to ensure that the program did not download any malicious software, while also disabling or removing any features that are unnecessary to business operations. The DBA will also check to ensure that the system is consistently up-to-date and patched appropriately as many system patches contain updated coding that helps strengthen vulnerabilities in the system.
* **Practice coding practices that are secure and efficient**. It is important that the DBA and programmers continually update the database system to meet business requirements. This involves ensuring that secure coding practices are also maintained. In terms of SQL, unnecessary tables or columns must be removed from the system when it no longer correlates to business requirements.
* **Protect workstations and devices**. All workstations and devices must always be kept in a way that prevents unauthorized user access. In addition to login accounts and strong passwords, users will also utilize two-factor authentication programs to increase the level of security and help ensure that only authorized individuals are accessing these devices.
* **Routine server backup**.The DBA will perform weekly backups of the database server. Data will also be moved onto hard drives that are then appropriately labeled and stored on an off-site, secure storage location. Backing up servers will also ensure that the company can recover all data if ever necessary.
* **Consistent and automatic documentation**. Every action and movement within the database will be recorded. This record or change history will document the action, field change, time, and user account associated with the change and will help with auditing purposes.
* **Bi-Annual training will be required for all staff.** The Bi-Annual Training will include instructing, educating, and reminding all personnel of the importance of database security, information protection, and data security. This will also cover strict safety procedures (such as not containing any physical paperwork or notes at a workstation at any time) that will help mitigate these risks (Oracle, 2002).

**Conclusion**

Completing an analysis of current business requirements for any company and the limitations of the current system are the first steps in identifying the type of database that is required. For the Wild Wood Apartments enterprise, the Microsoft SQL database must retain the relationship between objects to ensure information is reported accurately and can be customized based on the business need (i.e., daily transaction report, quarterly reports, total expense reports). The database proposed for Wild Wood Apartments to use is the IBM dB2 database with cloud features, which ensures availability despite location and consistent security monitoring for important data and information. In addition to this added layer of protection, security policies and procedures are proposed to maintain the database in a lawful, ethical, and secure manner that is scalable and consistent. By following the proposals in this report, the Wild Wood Apartments company will utilize a database that will not only meet their business requirements but exceed them and ensure that all data retained are sufficiently documented and protected to promote internal and external operations.

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