IT 650 Final Project Submission:

Law, Ethics, and Security Plan/Database Management System

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Contents

I.   Organization

Background

Vince's Vinyl is a record shop in the University District. It sells all types of vinyl: 45s, LPs, old 76 RPM record and even newer artist's albums in vinyl. Owner Vince Roberts keeps most of his inventory in his head or a spiral notebook kept behind the counter. His inventory and sales have risen, and the business has outgrown Vince's memory and the notebook. Vince's Vinyl needs a database to collect and keep all its business happenings in order (Conger, 2010).

Problem/Challenge

Vince's Vinyl needs a way to track several aspects of the business. Vince does not have complete records of all his sales, buys, inventory and customer requests up to this point. He does not have any way to fully track the everyday workings within his store. Sales and inventory-buys have been jotted down in the notebook when it's convenient for Vince or when he remembers. Vince needs a better way to organize his business.

Business Requirements

The condition of the inventory needs to be tracked. He needs to know which records are worth more/less than expected. He needs a way to record where and whom the inventory is bought from and the price paid. Vince is also looking for a way to store and follow-up on customer requests for vinyl. Finally, he needs to track all sales so he can keep track of what he spent, what he has earned, and tax paid on his sales.

Vince also wants to expand his business online. To make this a reality the database must be able to function online fluently with up-to-data inventory and must have a way for his current

and future customers to make online purchases. Security will be a huge factor when customers

log in and add and use their personal and credit card information.

Limitations

Vince's Vinyl's current system has a few very large limitations. If Vince forgets to write

down a buy or a sale the transaction is lost forever. Customer requests for vinyl is another factor.

Requests should have a place to be stored and easily recalled when needed. The notebook could

be misplaced, and Vince's history will be gone. Currently, customers would have to come to the

store to find out what is in the inventory with no online presence. There is not a way to track

sales and tax uniformly.

Department and Operations

The departments of Vince's Vinyl that are impacted are:

- Inventory: Vince does not know if the store is in the negative or positive. There is no
  record on how much was paid for his current inventory.

- Sales: Vince does not have a complete record tracking his sales or tax collected up to this
  point.

- Customer vinyl requests. Vince does not have a designated place to keep requests.

- Pricing: How much should the albums cost to buy and then sell for a profit?

Future aspects for Vince's Vinyl could lead to internet sales, a website, customer

profiles/passwords and online inventory. Questions that could surface are: who will have access

to the database in the future of Vince's Vinyl's and how will customers locate inventory in the

future database?

Currently, there is not a place to look up the information for sales reports, transactions, inventory reports, inventory condition and customers in a quick easy query. Having a database that can hold these entities and allow them to interact with each other could help Vince's Vinyl. Before we look far into the future, it would be wise to start with what is in the shop now and start a sales report from our *new* Day 1. Vince needs to begin with making his first *positive* and recorded dollar, the database will follow (Conger, 2010).

II.   Analysis and Design

The purpose of this report is to show and retrieve information about creating a database for Vince's Vinyl. When faced with the dilemma of having to track inventory, sales, customers, sellers, requests, email lists and transactions, owner Vince had a hard time keeping up. Vince unlisted *ABC Design* to help with creating a database to track these issues and solve the problems with storing data. Creating a database requires planning. Three steps needed for mapping of the database are building: a conceptual model, a logical model and a physical model of a database. They will show a relationship between the tables and attributes in them and will be able to retrieve data easier than sorting through an unfiled paper in a folder (Hernandez, 2013).

Conceptual Model

A conceptual model is a simple pictograph used to show relationships between elements. It can be a quick sketch to show the main parts of a database and a simple line is used to show, there is, a relationship between the elements. It does not need to be a digital form; it can be drawn on a piece of paper. The characteristics of a conceptual model are that, it is high abstract (not including details), can be straightforward and understood easily. (DataAcedemy.in, 2017).

Inventory

Tax

Seller

Sold

Customer

Transactions

Request

Employee
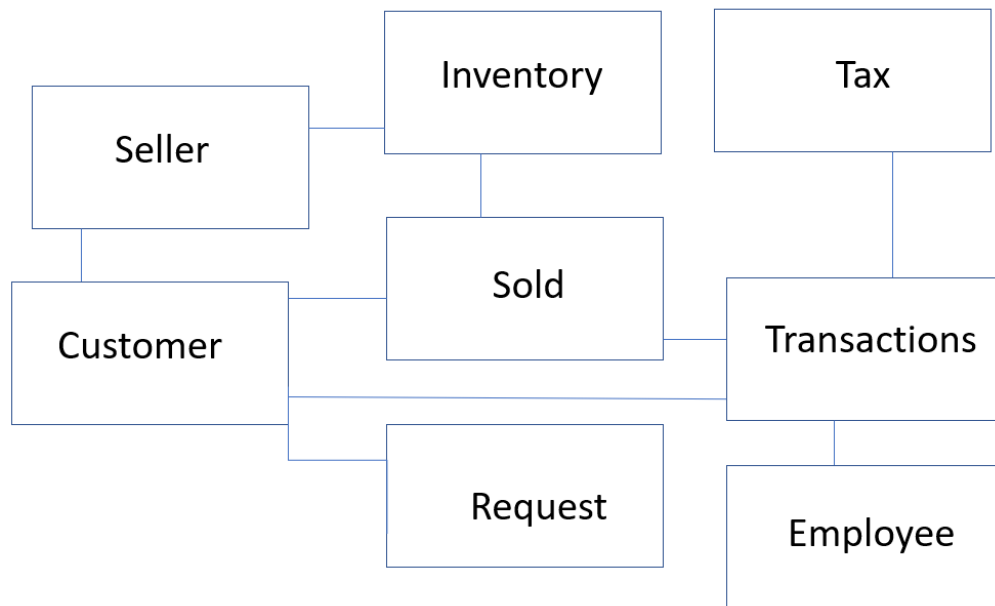
Example of a conceptual model for Vince's Vinyl (Hernandez, 2013)

This conceptual model for Vince's Vinyl solves the issues that Vince had with his day-to-day business. It shows where his inventory is coming from, when his inventory is bought, who bought it, when it was bought, who sold the record from his staff and how much tax will be reported for later use. This database's focus is to replace Vince's old method of his memory and a spiral notebook to a digital form for ease of use (Conger, 2014).

Logical Model

A logical model of a database is more elaborate than the conceptual model, it introduces attributes to the table shown in the previous conceptual model It displays key attributes and non-key attributes referred to as primary keys and foreign keys. The attribute is broken down to its simplest form for easy translation. It is usually non-specific to a certain dataset and most likely in digital form and a little harder to manipulate or change (Hernandez, 2013).
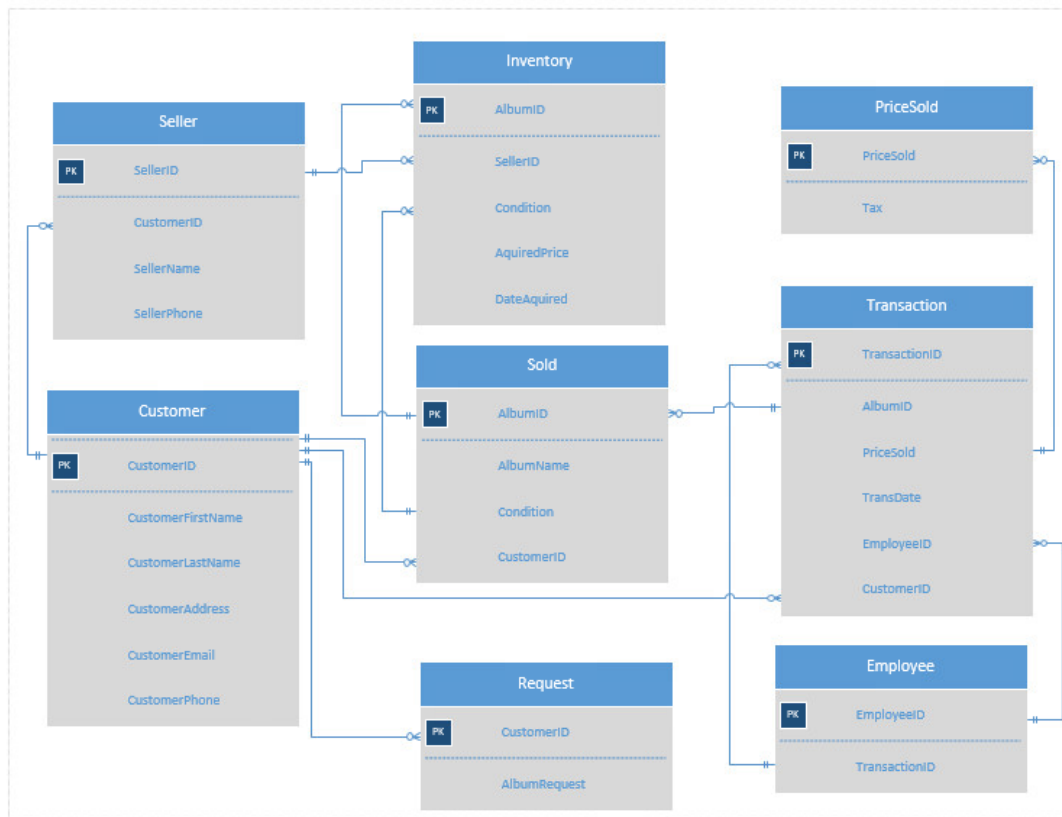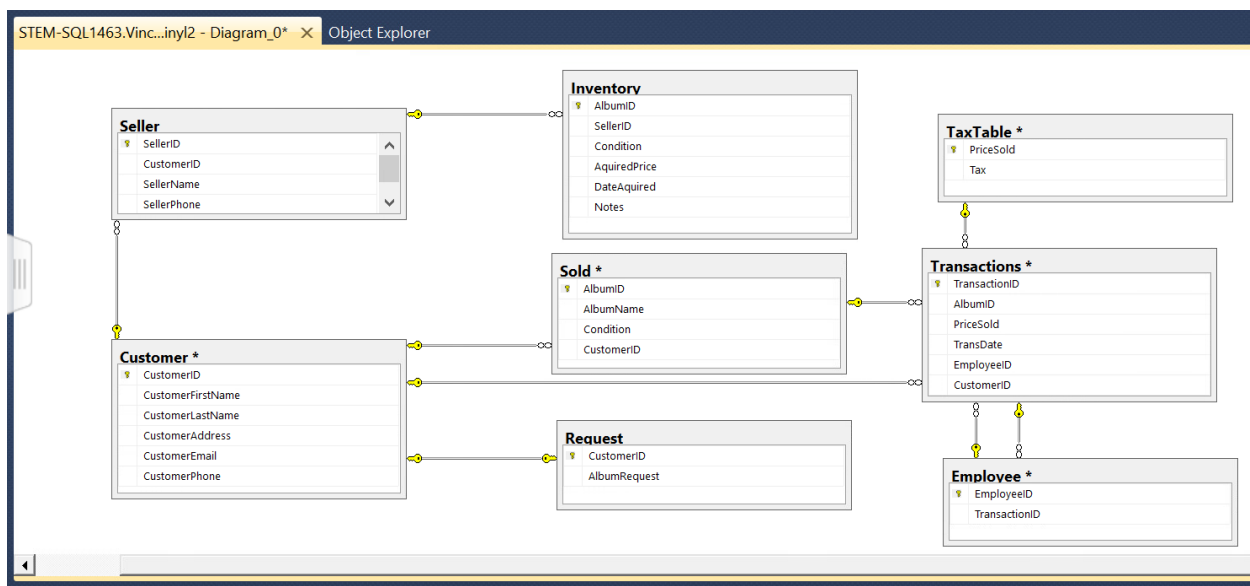
Example of a logical model for Vince's Vinyl (Hernandez, 2013)

The logical model for Vince's Vinyl shows the relationships between the entities and the primary keys for each. The logical model was built after interviewing staff and after the job shadowing report was written. The logical model shows the one-to-many relationships between the sellers, customers and employees to the inventory, sold and transaction entities. The one-to-many relationships are shown with a slash on one end of the relationship line and crow feet element on the other. The model presents how the database will interact with itself and where the data will be pulled from (Hernandez, 2013). Having a database as details as the model logical model shows, Vince will be able to track the data he needs for future reports and tax returns.

Physical Design

Physical models show where the data will be saved, how the database will organize the data and how the database will retrieve the data from the database when queried. It is shown in the table, columns, primary keys, data types, constraints like primary keys and foreign keys and the relationships all the attributes have with each other with mapping with relationship lines. The logical model is DBMS specified, it is made for a specific database (Last Bench Listener, 2017).

Example of a physical model for Vince's Vinyl (Soper, 2013)

The physical model above for Vince's was created by using common sense. By using the actual attributes and primary keys in the tables the physical model could be crafted. Unlike the models before the physical model needs to show the relationships in a way where the data in the tables would have a symbiotic relationship with each other. Using another source other than our text, the physical model was made through each table and the logical model came after the relationships were assigned, automatically. This was an easier process than drawing out the

relationships in the DIAGRAM area without knowing that the relationships will work or not.

(Soper, 2013).

III.   DBMS

A database management system (DBMS) is a software tool to organize data. The

purpose of a DBMS is to store and transform data into information to support making decisions

and give you more control over your data (Zanderbergen, n.d.).

Research

The DBMS is usually chosen based on the usage, requirements and budget constraints of

an organization. This report will research further into Amazon Aurora, My SQL, Oracle

Database and Microsoft's SQL Server.

Amazon Aurora

The top features of Amazon Aurora include:

- High performance and scalability – performance is on par with other commercial databases but

at 1/10 the price.

- High availability and durability – offers greater than 99.9% availability and makes 6 copies of

your data across 3 Availability Zones for a continuous backup in Amazon S3.

- Highly Secure – provides multi-level security with Amazon VPC and encrypting information

keyed in by the users.

- Fully Managed – fully managed by Amazon Relational Database Service with continuous back-

up and monitoring with Amazon CloudWatch.

- Mitigation Support – supports other platforms and makes it easy to integrate over data from

another platform (Aws.Amazon.com, n.d.).

MySQL

Some key features of MySQL are:

- An open-source database

- Free to download and has a free trial

- Solid data security provided

- Provides rollback capability

- Compatible with many different operating systems and is highly scalable

- Easy data migration (Capterra.com, n.d.)

Oracle Database

Some features of Oracle Database are:

- Data can be stored in the cloud or on-premises.

- No free version but does offer a free trial offer

- Compatible with Cloud, SAS or Web platforms

- Includes data migration

- Convertible database

- Support several programming languages

- Performs analysis

- Build Visualizations

- Has a built-in back up, recovery and replica system (Capterra.com, n.d.)

Microsoft SQL Server

SQL Server features the following:

- Works with ANY SIZE organization

- Report are multi-platform supported while reporting

- One-time price starting at $931.00 per user and does not offer a free trial

- Used on Windows-based operating systems only

- Has a back-up and recovery system (Capterra.com, n.d.)

Analysis

1)   All four databases support script writing like SQL and Python. Oracle and Aurora

support a long list of languages than the others.

2)   Only Amazon's Aurora is compatible and can be used on a mobile device

3)   MS SQL does not include data replication but the others do.

4)   Aurora and Oracle are cloud-based and there is not any need to have a permanent server

on the premises.

5)   Oracle creates visualizations

Aurora by Amazon Web Services	MySQL by MySQL	Oracle Database by Oracle	SQL Server by Microsoft
VISIT WEBSITE	VIEW DETAILS	VIEW DETAILS	VIEW DETAILS
✔ Access Controls/Permissions	✔ Access Controls/Permissions	✔ Access Controls/Permissions	✖ Access Controls/Permissions
✔ Backup and Recovery	✔ Backup and Recovery	✔ Backup and Recovery	✔ Backup and Recovery
✔ Data Migration	✔ Data Migration	✔ Data Migration	✖ Data Migration
✔ Data Replication	✔ Data Replication	✔ Data Replication	✖ Data Replication
✔ Database Conversion	✖ Database Conversion	✔ Database Conversion	✖ Database Conversion
✔ Mobile Access	✖ Mobile Access	✖ Mobile Access	✖ Mobile Access
✔ Multiple Programming Languages Supported	✖ Multiple Programming Languages Supported	✔ Multiple Programming Languages Supported	✖ Multiple Programming Languages Supported
✖ NOSQL	✖ NOSQL	✖ NOSQL	✖ NOSQL
✔ Performance Analysis	✖ Performance Analysis	✔ Performance Analysis	✖ Performance Analysis
✔ Relational	✔ Relational	✔ Relational	✖ Relational
✖ Virtualization	✖ Virtualization	✔ Virtualization	✖ Virtualization

Comparison of DBMS (Capterra.com, n.d.)

Recommendation

Oracle database would be the best recommendation as a rational database. It has an extreme number of features over the other DBMS and is web-based. Oracle database would be the best choice.

For the project assigned this semester, an easier and more cost-effective DBMS should be used; the choice for Vince's Vinyl would be Amazon's Aurora. It seems to have a user-friendly environment and can be updated from anywhere when Vince remembers to update his data. Aurora has 24/7 support and training can be done online, in-person, as webinars and through documentation. The record store's data would be automatically backed up and scaled to Vince's needs. It has all the features of a corporate database at a price a small organization can handle.

Hardware & Software

When using a cloud-based database there is not any special software that needs to be purchased. A laptop or personal computer with a monitor would have to be used with a program that can proficiently swiftly connect to the internet. A hard drive with 6 GB or more, the memory of 512 MB or more and an internet connection/modem that works independently and used for database connectivity. This computer and internet connection will be assigned to database use only.

According to Amazon, the minimum storage is 10 GB and the maximum can grow to 64 TB, in 10 GB increments. Storage does not need to be purchased in advance. The owner pays for what they need as they go. Staff will have to train on the new database and training can be done online, in-person or through documents (Aws.amazon.com, n.d.).

In Conclusion

It is recommended that Amazon's Aurora would be best for our semester's assignment, MS SQL Server will be used. It is the assigned program to be explored and used for this semester and is powerful for our project's needs. The feature where an E-R Diagram is produced is genius and easier to produce in MS SQL Server than in MS PowerPoint or Visio.

IV.   Data Model

Data modeling is a significant part of data architecture or framework, it defines the structures in which the enterprise data resides and evolves (Berson & Dubov, 2011). Data modeling is the act of studying data structures. It can be used for many reasons. In data modeling entities are identified, attributes are assigned to entities and relationships are built (Wambler, 2019). The data will be kept within the data model's structures. The department that creates the database must consult with management to form how the database will look, perform and what it will include. The database is tailored for the information that is needed to be stored and used for (Conger, 2014).

Enterprise Data Model (EDM)

Enterprise data modeling is a powerful process to describe, create and keep data structures and enable data integrity; gather business requirements; communicate and socialize the scope of enterprise data; its organization, levels of aggregation and constraints (Berson & Dubov, 2011).

The EDM that will be focused on in this report is inventory. Inventory is bought or bartered from sellers, recorded into the store's database and tracked when purchased/sold. The

store owner seeks help on keeping track of the store's inventory and wants to be able to look up

data about the inventory like price, quantity, condition and availability (Conger, 2014).

The EDM will be considered the starting point or blueprint, storing data about the inventory

(Kendle, 2005). Having the ability to visualize his inventory and manage it, will be very

accommodating with business onward. The EDM below shows the SELLER and SOLD tables

as parent tables. The INVENTORY and TRANSACTION tables are considered the child table.

The child tables only have a relationship with one parent table and the parent table can be

associated with several child tables (Hernandez, 2013). While researching information for this

report, it is noticed that there is a one-to-many relationship from the parent table to the child

tables; meaning only one instance in the parent table can be involved with many in the child

table. This may be the reason why in previous diagrams for this report, the TAXTABLE was not

able to function the way it was intended.
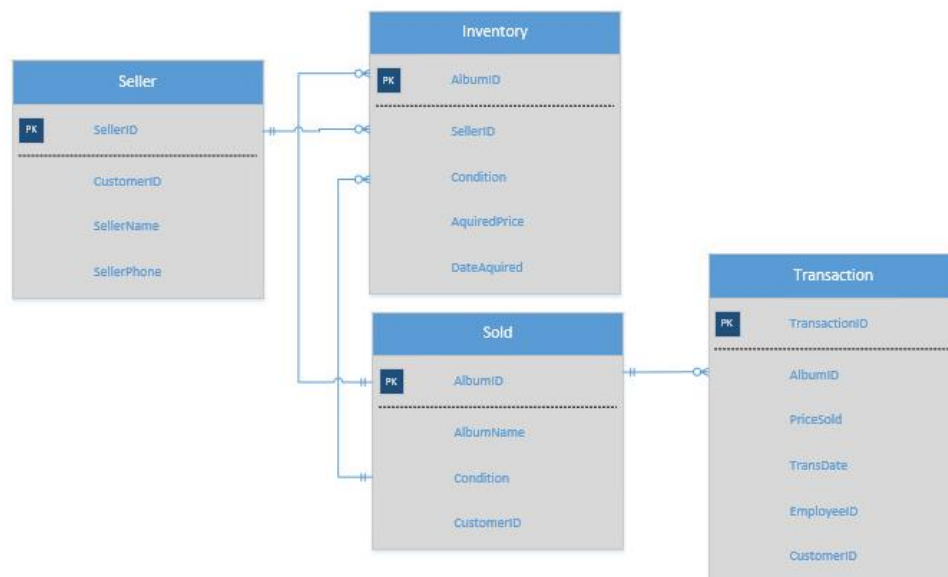
Enterprise Data Model for the Inventory of Vince's Vinyl

Operating Rules

Operating rules are "the necessary business rules and guidelines for the electronic exchange of information that are not defined by a standard or its implementation specifications" (CMS.gov, 2020). Business rules are statements that govern business decision-making. There are restrictions on certain aspects of a database based on the ways an organization perceives its data. (Hernandez, 2013). Below are the operating rules being considered for Vince's Vinyl inventory.

- All sellers should have contact information, at least name and phone number

- Every seller must be assigned a unique seller ID

- All albums will have a unique album ID

- An acquired date must be included with every album ID

- An acquired price must be included with every album ID

- Condition of albums will be more defined and uniform and included with every album ID

- All Albums will be listened to so to scan for scratches, quality and condition

- Album bought from a seller will be dated so the album can be tracked for its store life

- All transactions must include album ID(s) sold

- All transactions must have a date

- All transactions must have a customer ID

- All transactions must include the price sold.

- Every transaction must have an employee ID

- If a transaction includes an album from inventory, its album ID must be included

Rule Reflection

Once the business rules have been created and determined, actions to make sure they are exact and to evaluate them to make certain the model is precisely reflecting the rules stated. Be mindful of the business rules and be positive they correlate to your EDM relationships. Do relationships make sense? Are there business rules in place to reflect the relationships?

When writing the above operating rules Vince and one of his keyholders, Nancy, were consulted to hash-out rules that must be followed and are defined for each of the inventory tables. Although the employee who is part of a transaction needs an employee ID the employee table was left out. It will be determined whether an employee will be able to take in and assess used merchandise from their customers and/or sellers. The change/addition will be made upon decision from the company.

With the above rendering, Vince's Vinyl has an impressive start in the aspect of inventory for its database. The other departments will be evaluated and treated in the same manner as the inventory items.

V.   Law, Ethics, and Security

Standards

Ethics is a set of principles of right conduct or a theory of moral values. Sometimes ethics and morality seem to supersede the law. There is no law to administrate moral behavior. In any case, guidelines/rules/policies must be in place to shield the data collected in a database (Essays, UK, 2018). A policy or a set of rules to follow is recommended for all databases. It must include suitable and unsuitable actions that will be expected when accessing it.

Computing professionals created a document that conveys the conscience of the profession. The *ACM Code of Ethics and Professional Conduct* ("The Code") is the go-to guide to database and computing professionals, professors and students. It states the standards of the industry. The general principles in the document include:

- Contributing to society and to human well-being acknowledging that all people are stakeholders in computing

- Avoid harm

- Be honest and trustworthy

- Be fair and take action not to discriminate

- Respect the work required to produce new ideas, inventions, creative works, and computing artifacts.

- Respect privacy and

- Honor confidentiality

Some of these items are open to an individual's interpretation. What is honest and trustworthy to one person may seem dishonest and not trustworthy to another (AMC Council, 2018).

Legal Compliance

Legal compliance generally refers to behaviors and practices that are conducted in agreement with an entity's laws in which the business functions. Ensuring compliance start with the head of the company and works it was down to the database administrator (DBA). The company relies on the DBA to guarantee the data is protected and controlled (Mullins, 2012).

Usually, compliance requirements go hand and hand with security measures for your database. Improving security will help the company and its database be more compliant. Here are some methods that can be used:

- Controlling access to sensitive data – keep personal data secure

- Separate the database duties – not have the same people monitor themselves

- Monitoring management users – a plan should put in place to monitor the DBA and managers use

Privacy of customer information for in-store and web use should be allowed to be stored and used by the business' customers' permission. Customer's addresses, phone numbers, and credit card information must be given if allowed by the customer (McAfee, 2012).

Ethical Practices

As mentioned early in this report, one person's point of view on ethics could lead to the opposite to another person. There are four main principles one could base their actions on in life and the business world.

The Principle of Respect and Autotomy – honestly in dealing with others and must keep promises.

The Principle of Beneficence – one should make purposely steps to do no harm.

The Principle of Nonmaleficence – your actions should yield more good than harm.

The Principle of Justice – we work to assist those who are treated unfairly (Gracyk, 2012).

Vince's Vinyl will be storing customer's private information. Vince and his staff must uphold the customer's privacy and ensure that their data is not used wrongly or sold/stolen from the database.

Security Needs of Solution

        The database for Vince's Vinyl can use a few simple steps to provide security on the

level of malicious users, hackers or keeping data secure from prying eyes. These all can be done

without long timelines or hiring a specialized security team to get started. These methods, by

any means, are not the only security to be used but and outer level of security that can act as a

deterrent.

- Usernames and passwords – unique usernames and strong password with combinations

- Removing unnecessary components – leave off add-ons that your users will not be using

- Apply security patches – update security regularly

- Monitor and audit – database log should have a monitoring schedule (McAfee, 2012)

Database Security Plan

        The fear of the unknown threats almost makes it impossible for what a database would

need for security. If the database lives in-house only a lower security plan might work best.

Since Vince's Vinyl is planning on going online a higher plan of protection will be needed to

safeguard the security of the database's data. Using the McAfee's, *A Practice Guide to*

Database Compliance seems to be a great choice because they already have a brand name in

computer/internet security. The report suggests the following:

1. Think security – have a strong security filter

2. Use the least privilege principle – users should only have access to the data needed to do
   their job.

3. Minimize the attack surface – keep the database as simple as possible

4. Encrypt – recommended for private data because it can be costly

5. Develop, test and stage – create and *constantly* test the security and implement the plan

    (McAfee, 2012)

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