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Comp 361

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Systems and analysis assignment 5

Part A:

The relational data base schema serves as a blue print for the system design process, much like other modals but the complexity of this system is of the more advanced order and development of this modal requires more precaution and preparation. Either a class diagram or entity relationship diagram can be a starting point to the relational database. When representing classes it is wise at first to keep it simple and define the basic structure of every class and what it entails, then choose primary keys if necessary for controls, representing the classification hierarchies by showing the inheritance from parent class to child. When evaluating schema quality we can measure the flexibility or ease of implementation of future data model changes, and by if or how much redundant data is entered.

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| Integrity Controls: | Risk - Reduction Techniques |
| Input controls - | Prevent invalid or erroneuos data entry via forcing a input that controls access to the further into the system. Such as **Value limit controls**, **completeness controls** for required/valid info entry, **data validation controls** which match the data to referenced data, and **field combination controls** which review various field entries of data to ensure they are correct. |
| Access controls - | Restrict who or what has access to the system or systems resources |
| Transaction logging - | Logs any update with date, ID, time, input data and type of update, |
| Redundancy backup and recovery which - | Procedures that protect software and data from hardware failure. |
| Complex update controls - | Prevents errors from multiple updates of data at the same time. |
| Output controls - | Output controls references whether output information is accurate and complete. |

For the purpose of the Car Sharing IS the integrity controls that would be of utmost importance to implement would be the Access controls, input controls, and output controls. With that being said the below table of the risks of direct fraud and more malicious behaviour kind of controls implemented would be more important from a security standpoint whereas the above kind of security is moreso that the processes within the system are performing as they should. Although I only picked 3 of the most important techniques from the above table, the below table it is much harder to do this so I would say that all of them are important because while it is important for the system to perform as it should the integrity controls are secondary to the system already running as it should, they are somewhat of a precaution where as the fraud risk techniques are also secondary they differ where without them intellectual property could be stolen like customer information, financial information etc.

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| Factors Affecting Fraud Risk | Risk - Reduction Techniques |
| Separation of duties | Keeping in control who has access to what information in the database controls the knowledge of risk factors in certain sectors of the database. |
| Records and Audit trails | Employee records keeps track of what they do while they have access to the terminal, as well as being surveyed physically by cameras there is also a trail of their online activity logged within the company as well. |
| Monitoring | The constant calculated factors of data are monitored to assure nothing is where it is not expected to be and that nothing is left unaccounted for. |
| Asset Control and reconciliation | Physical records are compared to expected amounts of inventory items. |
| Security | Develop surveying systems within the database, and within physical parameters to keep outside attackers from getting in and keep those who have access inside closely surveyed. |

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| Table | Attributes |
| Inventory | Vehicleinventory, model, year, color, type, quantityAvailable, PriceOfVehicle, OrderMoreStock, Availability, Maintenance, DateOfMaitenence |
| Rental Location | **locationID**, locationAddress, management,contactInfo |
| Reservations | **reservationId**, newReservation, location, returnTime, changeOrCancel, vehiclePosition, quantity, taxAmount, grandTotal |
| Billing | billingId, date, paymentMethod, statement, amount |
| Membership | **membershipId**, name, address, billingAddress, contactNumber, paymentMethod, emailContact, recordOfRentals, rentalPreferences |
| Insurance | **policyId**, policyStartDate, policyExpiryDate, insuranceClaims |
| Account | **accountNo**, previousRentals, memberInfo, statements, membershipDetails, insuranceDetails, changeOrCancel |
| Order Details | **orderDetailId**, fees, orderStatus, otherCharges, rentalLocation, orderDate, emailConfirmation |

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### Part B:

The data replication server architecture contains s a primary data base, also additional data bases in different locations. Information created in one data base can be replicated and shared to its other locations. Data transfer within the infrastructure is separated into two separate categories asynchronous, and synchronous. Both of these methods replicate data from a client that has been input into a server but the asynchronous method does so faster as it is more immediate of a process than the synchronous which notifies the client the data has been replicated only after it completes the process of replicating to all the other servers.(Lutkevich, Ben, 2020). Synchronization can consume a significant amount of database servers' activity if it is done regularly which it needs to be due to newer data constantly being made which needs to be replicated. The copies of the database are updated with new information very frequently and it requires intricate planning to be able to replicate the new information as quickly as possible to all the other servers.(Satzinger, J. W., Jackson, 2012). This improves availability and accessability, while also the systems resiliance and reliability. Data replicas can improve access times while balancing the network load by combating latency issues. Disaster recovery is one of the more common understood uses of data replication which seeks to be able to restore lost data that would otherwise be destroyed in a system crash.(stitchdata,2022)

### Part C:

This time around I had more fun with this project, I think I was tearing out my hair thinking about requirements the first time around just how the questions were worded and the fact I had never submitted projects of this specific nature. Upon receiving feedback from my operating systems teacher I found a new type of confidence that I have noticed has carried over into my other classes just with how I intake what is in the textbook and how I convey that I understood what I have received from it. My first time in this class I must have read the online textbook front to back twice over and some parts many times over, and it never fully clicked. Although that somehow wasn’t even my main problem. The main problem was trying to understand requirements, and I will admit still had a tough time this time around but not nearly as bad due to receiving just enough feedback I believe. The feedback going forth is important to know you are picking up what has to be put down and what you can improve on. I know there is still room for improvement but I am proud of myself for sticking it out the way I did this time around and not being discouraged by not passing this class the first time around, so that being said upon reflection that I have completed the final assignment for this class, I feel greatly alleviated and am looking forward to moving on to other things, as operating systems has taken up the most of my time this semester, this class was the second in command in terms of time I put into my classes. There was a heat wave where I am currently writing from in the final month of my classes and my window where my computer is was broken so I was nearly passing out sitting at my computer all day writing assignments and had to take many breaks to get water and fresh air, which only adds to the triumph of finally completing this final assignment.

### References:

Satzinger, J. W., Jackson, R. B., & Burd, S. D. (2012). Systems Analysis Design In a Changing World (6th Edition). Cengage Learning Canada Inc.. <https://online.vitalsource.com/books/0176656766>

### What is Database Replication and How Does it Work?

#### What is Database Replication and How Does it Work?. (2021). Retrieved 1 July 2021, from <https://searchdatamanagement.techtarget.com/definition/database-replication>

#### Understanding data replication and its impact on business strategy

#### (2022). Retrieved 20 August 2022, from https://www.stitchdata.com/resources/data-replication