COMP 361 – Assignment #5
Athabasca University
Jason Bishop
3042012

Part A: Security and Controls

1 – System inputs for reservations
   a) Input mechanisms:

Most of the information will be entered through a graphical user interface (GUI). For web reservations, this will be embedded into the website as a reservation form with specific fields to fill in. Since this is a web page interface, users will access the GUI via the Internet. For telephone orders through the service contractor or manager, they can also use their browsers to access the reservation form, but in the case of the manager, this may be done through local intranet on the LAN. Contracted phone clerks can also have access to the LAN, or use the web interface as the designer chooses. I would have them access via the Internet.

As the user, manager, or phone clerk fills out the reservation, data may also be auto completed via database access. The member information, and the details of the vehicle, are prime examples of this type of input. The system will access the database to retrieve the information to display.

The main input devices used to enter information will be the keyboard and mouse. The person making the reservation will use the mouse to select fields, and click buttons to confirm details. Additionally, the mouse can be used to select items from drop down menus for input into fields like the date. The keyboard will be used to enter the data into the fields, such as an account number.

   b) System inputs and data contents:

System Input	Data Contents
Member account number	An integer to identify the member, input by the user to log in, or by the employee/phone clerk to begin the reservation.
Member information	String fields representing the name, address, and phone number of the member, automatically retrieved from the database.
Vehicle number	An integer number automatically generated by the database once a vehicle has entered the system.

[1],[2] J. W. Satzinger, R. B. Jackson and S. D. Burd, Systems Analysis and Design in a Changing World, 5th ed. Boston, USA: Thomson Course Technology, 2009.

Vehicle information	String fields representing the make, model, year and parking location of the car, automatically retrieved from the database.
Date of reservation	A string input by the person making the reservation using a drop down box.
Beginning time of reservation	A string input by the person making the reservation using a drop down box.
End time of reservation	A string input by the person making the reservation using a drop down box.
Employee ID number	An integer entered by the employee to identify themselves as the person making the reservation.
Phone clerk ID number	An integer entered by the phone clerk to identify themselves as the person making the reservation.

c) Integrity controls:

The several integrity controls used on the above information. For information about the member and vehicle, information is automatically retrieved from the database to ensure there are no user errors from erroneous input. For input fields like the date and time, a drop down box is used to ensure correct format of the data input. Other fields for the reservation are checked for format and completion when the reservation is attempted to be completed, and the reservation will not be accepted if there is an error. This same process is used to verify the correct input of IDs and passwords for log in information of members, employees and phone clerks. Lastly, the information is protected from fraudulent access by requiring this information to be entered to identify authorized users.

2 – System outputs for reservations
    a) Outputs:

Output	Integrity Controls	Description
Display log in screen		A window shown when trying to access to website, or reservation system.
Display reservation screen	Access controls, Encryption	A window shown when a new a new reservation is selected.
Show member details		Information displayed about the member for confirmation when the memberID is input into the system.
Show vehicle details	Access controls, Encryption, Transaction controls	Information displayed about the vehicle selected when chosen from the reservation screen.
Show reservation details		All the information is displayed about the reservation for confirmation when

[1],[2] J. W. Satzinger, R. B. Jackson and S. D. Burd, Systems Analysis and Design in a Changing World, 5th ed. Boston, USA: Thomson Course Technology, 2009.

			the user tries to confirm a reservation on the reservation screen.

b) Integrity controls:

Output	Output Integrity Controls	Input Integrity Controls	Database Integrity Controls
Display log in screen		Completeness controls, Data validation controls	Access controls, Encryption
Display reservation screen	Destination controls, Completeness/Accuracy/ Correctness controls	Completeness controls, Data validation controls, Value limit controls, Field combination controls	Access controls, Encryption
Show member details	Destination controls		Access controls, Encryption, Transaction controls
Show vehicle details	Destination controls		Access controls, Encryption, Transaction controls
Show reservation details	Destination controls, Completeness/Accuracy/ Correctness controls		Access controls, Encryption, Transaction controls, Update controls

See the table above for the types of integrity controls used in system outputs.

For the database integrity controls, the access controls make sure that the system is able to be accessed by authorized users only. The encryption controls ensure that sensitive information is secure when being publicly transmitted of the network or Internet. The transaction controls log who is making the reservation so that any problems can be identified and traced back to the person accessing the information. Finally, update controls are used to ensure that a new reservation is saved to the database by an authorized user.

For the input integrity controls are used to verify and check the information input into the output displays. The data validation controls ensure that the data input into the fields is the correct format. The completeness controls ensure that the necessary data has been entered into all fields. The value limit controls ensure that information is entered in a valid range, for example, a user can not make a reservation more than a year in advance. Finally the field combination controls ensure that the correct data is entered. For example, a user must select the date before they can select the time of the reservation.

[1],[2] J. W. Satzinger, R. B. Jackson and S. D. Burd, Systems Analysis and Design in a Changing World, 5th ed. Boston, USA: Thomson Course Technology, 2009.

Lastly, the output controls ensure that the output is accurate, and displayed only to authorized users. The destination controls will be the transaction-by-transaction type over the Internet. Completeness, accuracy and correctness controls, by displaying the date and time of the reservation and the user ID of the person making the reservation.

3 – Database integrity controls
    a) Recommendations:

I would recommend that each of the 5 areas of security and control be strictly implemented. As noted in the textbook, these areas are:
Access control
Data encryption
Transaction control
Update control
Backup and recovery protection [1]

Access controls allow only authorized users to access data. This is achieved through a ID/password combination to log in to the system. Only authorized users should be allowed to change data. For example, members can update their information, and make reservations, but they would not be allowed to add new vehicles to the system. A manager would be allowed to update information and make reservations as well, but they could add new vehicles and view reports that aggregate information from all users of the system. I would recommend that users and phone clerks have database access only to update information and make new reservations. Managers and system technicians should have greater access, allowing update and viewing privileges for information from all members, reservations and vehicles. However, they should not be able to see password information from other users.

Encryption is used in the transmission of data and also in the database. User passwords should be encrypted so that no one can access them to fraudulently log in to the system. Also, all information should be transmitted with an asymmetric key encryption when being transmitted publicly over the Internet.

Transaction controls allow tracking of updates to the database. I would recommend that all transactions be logged using the ID number of the user making the update. This includes making reservations, so that they can be traced back to the source of the transaction if there are any issues. Additionally, when more privileged users such as managers add new members, add new vehicles, or view reports, or update information, their ID should logged for auditing purposes.

[1],[2] J. W. Satzinger, R. B. Jackson and S. D. Burd, Systems Analysis and Design in a Changing World, 5th ed. Boston, USA: Thomson Course Technology, 2009.

Update controls allow the database to be accessed and updated by many applications or users at once. I would recommend that these be applied judiciously to all database tables or objects. For example, this will mean that a user can not change a reservation on the web at the same time they are on the phone changing it with a manager or phone clerk. These controls are also very important when dealing with financial transactions such as members paying off their monthly bill. The update to the member balance should not be completed until verification from a financial institution is received.

Lastly, the backup and recovery controls ensure that the database is accessible at all times and can recovery in the event of a crash or other major system issue. Maintaining a redundant database is too expensive for a pilot project. Therefore, I would recommend a backup of all data to an off-site location at least once per day, preferably during low usage times such as early in the morning. This will allow recovery of most data, and be financially feasible for the project.

4 – Access security
 a) Design for users of the Car Sharing IS

The Car Sharing IS should be designed for many types of users. The primary user will be the member of the program. They need a responsive system that will allow them to quickly and easily make reservations so that they are encouraged to use the system without any hassle. Additionally, the needs of managers should be kept in mind. The system also needs to be designed to capture many types of data for analysis of the project, to see if it will be feasible beyond the pilot stage, and to update the system in any problem areas. The manager will be the one to analyze this data, so they will need frequent and up-to-date information in many areas.

This system is not designed to be accessed by the general public, only those involved with the project. Therefore, little planning or detail needs to be put into promotion of the system at this point. If the plan moves beyond the pilot stage, this may change. Concentration should be put into making a reliable, easy, responsive and intuitive system for current users of the Car Sharing IS.

 b) access control list:

User	Access
Member	Update personal info, Update and make new reservations, Make payments, Access vehicles during reservation times.
Manager	Update all information, View aggregate information for all members,

[1],[2] J. W. Satzinger, R. B. Jackson and S. D. Burd, Systems Analysis and Design in a Changing World, 5th ed. Boston, USA: Thomson Course Technology, 2009.

	vehicles, employees, contractors, reservations, and trips, Access vehicles at all times, Add new members, vehicles and contractors
Employee	Update member information, Update and make new reservations, Access vehicles during reservation times (ex. for tidiness checks)
Phone clerk	Update member information, Update and make new reservations
Vehicle service contractor	Update and make new reservations (for service purposes only)
System technician	Complete database access (except for user passwords and modifying financial information)

Part B: Essay Question

Describe the difference between predictive and adaptive methodologies for system development. What are the characteristics, advantages, and disadvantages of each of these approaches? When do you use a predictive approach, and when do you use an adaptive approach?

Predictive methodologies for system development is based on advanced organization and planning and, according to the textbook, "...the new information system can be developed according to the plan.[1]" This is good for a designer when working in a well-established industry that has a history of systems use to fall back on. A careful plan also means that milestones and targets can be developed to make sure the plan is on-track. Additionally, there is usually low risk associated with predictive methods, because the tread familiar territory. However, this approach does not allow for much innovation or adaptation to a changing business environment. All this means that a predictive approach should be used when user and business requirements are well understood.

Adaptive methodologies for system development do involve planning, but not as much is done in advance. The textbook mentions that "[d]evelopers should still be...flexible and adapt the project as it progresses.[2]" This approach is good for designers to use when advanced planning can not be used, or when the requirements of the system are ill-defined. Also, without such a rigid plan in place, any changes can be made to the system relatively quickly, in the next iteration for example. However, the lack of a fixed schedule to development can make some people nervous because without milestones it can be difficult to tell if a development team is on track, or if they can deliver the full system in time. Together this means that an adaptive approach should be used when user and business requirements are unclear, or subject to change.

Part C: Reflection

[1],[2] J. W. Satzinger, R. B. Jackson and S. D. Burd, Systems Analysis and Design in a Changing World, 5th ed. Boston, USA: Thomson Course Technology, 2009.

Well I am finally done the last assignment. Hooray! I generally found this assignment to be the easiest of all. This is because I am very familiar with the system at this point and because the assignment does not involve making any models! I am also familiar with using security controls on other computer systems, so I understand those areas as well. Most people should also be familiar with these things if they have worked in any kind of office environment, or thought about how they access websites for on-line shopping.

What I found to be most difficult was trying to explain my thoughts. I think that a lot of this assignment is based on opinion. For example, the section on database integrity asks for a personal recommendation, even though I, or many others, may not have familiarity with designing and implementing databases. This means that many people may be unsure of themselves when answering these types of questions. However, in my opinion, the textbook provides a pretty thorough analysis of the issues concerning the questions in this assignment. I suggest that others re-read the applicable sections carefully, and be confident that you can use this knowledge to answer the questions properly.

Lastly, I would also suggest that you pay attention to the formatting of this assignment as it is specifically mentioned in the assignment details. You should be using text highlighting techniques, and formatting techniques to make everything presentable. Tables are specifically mentioned on the assignment and they should be formatted nicely, but also, good headings will direct readers to follow your presentation. Not only will this get you better marks on you assignment, but in future jobs, a better looking presentation will be looked at in a more positive light, and you will be viewed as more professional.

As usual, good luck to everyone with this assignment, and good luck on the final exam!

[1],[2] J. W. Satzinger, R. B. Jackson and S. D. Burd, Systems Analysis and Design in a Changing World, 5th ed. Boston, USA: Thomson Course Technology, 2009.