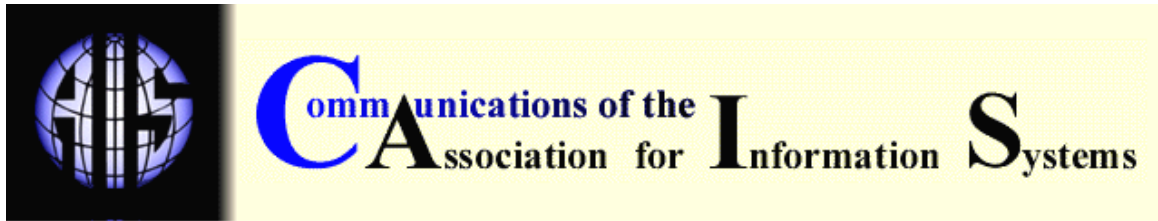

ADDITIONAL CASES

Deliverable specifications for a Systems Analysis and Design project based on Lost River Wind Riders are also available.

There is also a variation of this project titled Wind Riders of the Lost River Range for Systems Analysis and Design.

Contact me for a copy of the desired materials.



LOST RIVER WIND RIDERS: A PROJECT FOR TEACHING DATABASE DESIGN

Kevin R. Parker
College of Business
Idaho State University
parkerkr@isu.edu

ABSTRACT

Lost River Winder Riders is a project designed to provide students with a challenging hands-on exercise in relational database design. It is extensive enough to provide a stimulating exercise, but not so large as to be overwhelming. This case can be used as an individual or team project in a database design course. It is sufficiently detailed to challenge students as they apply design concepts to a problem that closely simulates a real-world situation.

KEYWORDS: Database design, database management, normalization, entity-relationship diagrams, database project.

Editor's Note: An instructor's guide for this project is available from the author via e-mail. Requestors must be listed in the AIS Faculty Directory (<http://www.isfacdir.org/default.htm>)

I. PROJECT SUMMARY

Lost River Wind Riders (LRWR) is a free-flight sports shop in central Idaho that specializes in sales and service of hang gliding, paragliding, and snowkiting equipment. The customer base expanded rapidly, with many customers owning multiple pieces of free-flight equipment. With the increasing customer base and sales comes the need for accessing meaningful information rapidly. The company was experiencing problems with inventory control, missing reorder points, and experiencing inventory stock-outs that resulted in lost sales.

Company records are currently maintained using an off-the-shelf accounting program, and additional information is derived using an Excel spreadsheet program. While this use of information systems was sufficient in the company's early days when volume was lower, the rapidly increasing volume of business necessitates better information access and record keeping. Sales history and trends cannot be determined from the current system. The company needs better control of capital by ensuring that needed items are purchased and less popular items are not.

In this project, students use knowledge attained in database design lectures and exercises to develop an entity-relationship diagram that models the system. Using the entities, relationships, and attributes that make up the E-R diagram, students next determine and specify the relational

schema for each relation. Students then normalize each relation. Once normalization is complete and the design is validated, a selected-features prototype of the database is implemented to demonstrate data entry forms, sample queries, advanced multi-table forms for data entry or confirmation, and sample reports. If the database management system supports them, students may also be required to develop stored procedures and triggers.

II. PROJECT DESCRIPTION

Solitude can be found in Idaho's deep gorges, high mountains, swift rivers, and chilly lakes. King Mountain, White Bird Hill, Heaven's Gate, and the Seven Devil Mountains are just a few Idaho locations that are suited for free-flight sports. Lost River Wind Riders (LRWR) is a specialty sports shop in central Idaho that specializes in sales and service of free-flight sports equipment like hang gliders and paragliders. A hang glider is a non-motorized, foot-launched rigid frame maintaining the shape of a wing constructed of rip-stop nylon or Mylar over an aluminum frame, with the pilot suspended in a prone position from a strap connected to the glider's frame. Figure 1 shows a series of photos of hang gliders.



Figure 1. Hang Glider Action Shots

A paraglider is a non-motorized, foot-launched inflatable canopy or wing constructed of rip-stop nylon from which the pilot is suspended by sturdy Kevlar lines called risers, and a harness. The pilot sits in a harness for maximum comfort. Figure 2 shows a series of photos of paragliders. Both hang gliders and paragliders soar on currents of air, able to stay aloft for 3 hours or more, climb to elevations up to 15,000 feet, and travel vast distances. Hang gliders offer a "cleaner" aerodynamic profile and generally are capable of flying at much higher speeds than paragliders.

Lost River Wind Riders was founded in 1990. The company was started as a co-operative to allow the owners and a few of their friends to buy top name equipment and accessories for their hang gliding and paragliding hobbies at a reduced price. As more enthusiasts became involved in free-flight sports, the owners saw an opportunity to leverage their hobby into a full time business while still doing what they loved. The market for free-flight sporting equipment in the central Idaho area is booming. Annual sales increased from \$20,000 in 1990 to more than \$1,200,000 in 2004. Consumer demand drove the company to its present location with a showroom, a warehouse,



Figure 2. Paraglider Action Shots

and a service and repair area. The showroom is a four thousand square foot expanse, allowing sufficient room to examine the various models that are available. The state-of-the-art warehouse features catalogued and indexed parts ready for installation. The service and repair area includes both an indoor and outdoor area, allowing for several repairs to be performed simultaneously. The firm is nestled in a pristine setting with a nearby escarpment that can be used for hang gliding and paragliding takeoffs for those who want to “test drive” the equipment. The company now employs approximately ten people in various capacities including sales, repair, and service, management, and general support.

Because free-flight sports are seasonal, Lost River Wind Riders expanded their sales line in 1999. In keeping with the theme of air-reliant vehicles they decided to add snowkiting equipment to their line of offerings to ensure year-round business. Snowkiting is an outdoor winter boardsport that combines the airfoil and techniques used in kitesurfing with the footgear and gliding surface used in snowboarding. Large, highly controllable foils or inflatable kites propel boarders across the snow with just the power of the wind, allowing the snowkiter to travel uphill with ease if the wind is blowing in the right direction. The snowkiting line proved to be a successful complement to the free-flight equipment. Figure 3 shows a series of snowkiting photos.

The company is also considering adding ultralight aircraft to their product line. This move would increase the company's operational complexity because government regulations require specific record keeping for all aeronautical equipment that is sold or serviced. Further, repairs on aeronautical equipment must be performed by technicians with the proper certifications, and replacement parts must be traceable to specific manufacturers. All aircraft are governed by very strict standards to ensure the safety of consumers and passengers. These regulations require parts tracking, service operations tracking, maintenance schedule tracking, etc. Figure 4 shows a series of images of ultralight aircraft.

Inventory control is problematic without an automated system. Reorder points are being missed and inventory stock-outs occur, resulting in lost sales. Manual systems require substantial record keeping and regular physical inventories to maintain sufficient stock on hand. The owners want to be able to generate a report that indicates not only the items that are below the reorder points,



Figure 4: SnowKiting Action Shots



Figure 3: Ultralight Aircraft Images

but will also include sales history and trends. This information will allow better control of capital as needed items are purchased and unnecessary or duplicated items are not.

Because they set high goals and standards for their company, the owners are concerned about improving their customer service and equipment sales system. They requested a database that

supports the core business requirements of the enterprise. LRWR provides standard retail services for customers through the following business processes:

- Customer purchases equipment
- Customer returns defective/unwanted equipment
- Customer requests equipment service or maintenance
- LRWR needs additional "back office" services to support business requirements:

Print purchase agreement	Print service agreement
Generate service detail report	Generate sales report
Generate service summary report	Print current inventory list
Order new equipment and parts	Process new inventory
Generate salesperson sales/ commission report	Generate technician service report

PROCESSING DESCRIPTIONS

The LRWR computer system makes use of barcodes to record information. Each piece of equipment is assigned a unique ID for inventory control.

Customer Purchases Equipment

A customer may purchase one or more items. A purchase generally follows a script:

1. The customer provides a picture ID and credit card for an imprint. Alternatively, the customer may pay with cash or check, although LRWR discourages the use of personal checks for the big ticket items that they sell.
2. Employee selects "Equipment Sale" from the main menu.
3. Employee requests customer phone number to determine if the customer is in the customer list.

If the phone number is not found, then the Customer Entry Form is displayed and their personal information is entered and added to the customer file, including:

- Name
- Telephone
- Address (include city, state, zip)
- E-mail address

If the phone number is found then the customer may be in the list and the Equipment Sale Form is displayed.

4. The Equipment Sale Form allows the following items to be entered

- Salesperson number
- Customer number
- Payment type
- Credit Card type*
- Credit Card number*
- Expiration date *
- Verification code*

*If appropriate

5. For each item purchased, the following information is entered into a form and stored:

- Equipment type (selected from a drop-down box listing each product category in alphabetical order followed by model numbers)

- Model number
- Serial number
- Description
- Price

6. The employee saves the purchase agreement and prints a copy, which the customer signs. One copy is retained and one copy given to the customer as a receipt.

Customer Returns Defective/Unwanted Equipment

When a customer returns defective or unwanted (and unused) equipment the following events take place:

1. The customer provides a receipt and the defective/unwanted equipment.
2. For non-defective items, the employee checks the date of the receipt to determine if the product is being returned within the 30 day period.
3. The employee selects "Equipment Return" from the main menu.
4. The customer indicates a reason for the return, and the employee checks the corresponding reason on the form.
5. The employee checks the item for extraneous damage. If there is none and the product was not defective, then it is returned to inventory. If it is defective, then the item will be returned to the supplier.
6. The Equipment Return Form contains the following items:

- | | | |
|---------------------|-------------------|-------------------|
| • Date returned | • Employee number | • Customer number |
| • Reason for return | • Model number | • Description |
| • Serial number | • Price | |

Customer Requests Equipment Service or Maintenance

The customer brings equipment in for service if it has been damaged or fails to work properly. The customer may also bring equipment in for regular maintenance. The equipment is not required to have been purchased at LRWR. The following sequence of steps is performed:

1. Employee selects "Equipment Service" from the main menu.
2. Employee requests customer phone number to determine if the customer is in the customer list.
 - If the phone number is not found, then the Customer Entry Form is displayed and their personal information is entered and added to the customer file. The details are discussed under customer purchases equipment.
 - If the phone number is found, then the customer may be in the list and the Equipment Service Form is displayed.
3. The employee records the problem as described by the customer.
4. The list of repair services is consulted, and the customer is given a rough estimate (non-binding) of the price and time required.
5. The following information is entered via a service entry form:

• Repair number	• Model number	• Serial number
• Customer number	• Description (list box)	• Problem description

6. A service agreement with the above information is printed¹ and signed by the customer to authorize the repairs. One copy is retained and another provided to the customer.
7. When service personnel work on the item their employee number is recorded as the technician of record. Generally only one technician works on a single piece of equipment, and even in those situations that require multiple technicians, only the primary technician is recorded.²
8. The technician records the repair service applied.
9. The technician records both the total time required to complete the repair and the parts used to complete the repair. Multiple parts may be required to complete a repair. The technician records the remaining information on the service entry form:
 - Technician number
 - Repair service applied
 - Parts needed
 - Parts Cost
 - Hours labor
 - Labor cost
10. When the customer returns to pick up the item, payment information is entered:

Payment type	Credit card number *	Verification code*
Credit card type *	Expiration date*	

*If appropriate

11. A repair service detail report is generated and signed by the customer. One copy is retained and one copy given to the customer as a receipt.

Print Purchase Agreement

A purchase agreement must be printed for every equipment sale. The purchase agreement contains the following information:

- *Header Section:* Current date/time, salesman number, customer name, customer address, customer city/state/zip, customer phone, customer e-mail
- *Detail Section (for each item):* Model number, description, serial number, sales price
- *Footer Section:* Sales subtotal, sales tax, grand total, payment method, masked credit card number.

Print Service Agreement

A service agreement must be printed prior to every repair. The service agreement contains the following information:

- *Header Section:* Current date/time, customer name, customer address, customer city/state/zip, customer phone, customer e-mail
- *Detail Section (for each item):* Repair number, model number, serial number, problem description, estimated parts, estimated labor, estimated cost
- *Footer Section:* Estimated total cost

¹ The service agreement is discussed in detail later in this section.

² Each technician must be properly certified before being hired. Technicians can be full time, part time, or contractors.

Print Service Detail Report

A repair service detail report is generated and provided to the customer. It includes the nature of the problem, the parts required and their associated cost, the total labor charge, and total charge. The Repair Service Detail Report contains the following information:

- *Header Section:* Current date/time, technician number, customer name, customer address, customer city/state/zip, customer phone, customer e-mail
- *Detail Section* (for each item): Model number, description, serial number, problem description, repair service applied, parts needed/cost, hours labor/cost
- *Footer Section:* parts and labor subtotal, sales tax, grand total, payment method, masked credit card number.

Generate Sales Report

The sales report can be generated on a daily basis or as needed. It includes a listing of all sales for a specified period, including:

- Header Section: Begin date, end date
- Detail Section: Model number, description, quantity sold, unit price, total sales
- Footer Section: Grand total

Generate Service Summary Report

The service summary report can be generated on a daily basis or as needed. It includes a listing of all service jobs performed for a specified period, including:

- *Header Section:* Begin date, end date
- *Detail Section:* Service performed, quantity performed, hours labor, labor cost, parts cost, total cost
- *Footer Section:* Total performed, total hours, total labor, total cost, grand total

Print Current Inventory List

Periodically an employee may find it necessary to print an inventory report. Such reports are used when it is necessary to take inventory of current stock, and also when restocking inventory. The report includes the following:

- *Header Section:* Current date/time
- *Detail Section* (for each item): Model number, description, count, reorder quantity, serial number, retail cost, purchase date

Order New Equipment and Parts

An order for new equipment is generated under the following circumstances:

1. Periodically an employee runs an inventory report (as indicated above) that indicates the total number of items in stock. If the number falls below a preset limit, a reorder request is generated for a number of items equal to the limit minus the current number. The preset limit is based on projected demand for a particular equipment type and is outside the scope of this system.
2. Before an order is actually placed, this reorder request is compared with projected demand for this particular equipment type, with the remaining sales season taken into account, and order quantities can be adjusted. Price is obtained from the supplier (outside the bounds of this system) for each item and entered into the purchase order. Shipping charges are also

provided by the supplier. The tax rate is obtained from local governmental tax regulations, and the subtotal, total tax, and total are all calculated.

3. Orders for the same supplier are combined together into a single purchase order.
4. These purchase orders are sent via email to suppliers who provided an email address for their contact (the sales representative). Otherwise they are faxed or mailed to the appropriate supplier.

Process New Inventory

Assume that all orders placed to a given supplier are received in full, and there is no need to make an allowance for partial shipments and backorders.

1. When a shipment is received, an employee enters the following information into the system for each item:
 - Serial number
 - Model number
 - Equipment description*
 - Retail cost
 - Purchase date
- *Equipment description is selected from a product category list.
2. The system creates a new record in the inventory table for each item. The system also generates the equipment ID in sequential order, and uses it as an inventory tag.

Generate Salesperson Sales/Commission Report

The salesperson sales/commission report can be generated for one or all salespersons as needed. It includes a listing of all sales and commission data, including:

- *Header Section:* Begin date, end date
- *Detail Section:* Salesperson number, commission percent, sales count, sales amount, commission amount
- *Footer Section:* Total count, total sales, total commission

Generate Technician Service Report

The technician service report can be generated for one or all technicians as needed. It includes a listing of all service jobs performed, including:

- *Header Section:* Begin date, end date
- *Detail Section:* Service performed, quantity performed, hours labor, labor cost, parts cost, total cost
- *Footer Section:* Total performed, total hours, total labor, total cost, grand total

Business Rules

A business rule is a statement of a policy, procedure, or principle that indicates how a specific organization operates in specific instances. In some cases these rules may change over time, and a system must be designed to accommodate such changes. A partial list of business rules associated with LRWR includes the following:

- An employee is assigned an employee number, which may be referred to as a technician number for technicians or a salesperson number for salespersons.
- Lost River does not sell parts directly.
- Purchases may be returned within a thirty day period only if the product is still in “new” condition. If there is an obvious defect in the equipment then the thirty day restriction may be waived.
- Each transaction will be charged a 7.75% sales tax.

- Indicate the primary key in each relation by underline, and double-underline or italicized foreign keys.
- Turn in a relational schema for each relation in the form TABLE_NAME (PRIMARY_KEY, ATTRIBUTE₂, ...ATTRIBUTE_N)
- Turn in the latest ER Diagram.

Deliverable III – Design Validation

Provide a validation of the forms and/or reports in terms of the latest E-R diagram. When performing the validation, select the primary entity on which the form or report is based, and then show how the attributes, including those from other entities, are obtained through, for example, foreign keys and composite keys. The form and report validations should appear in the deliverable in the same order in which they appear in the case description.

Deliverable IV – Table Creation/Data Entry

Using the latest relational model, create a database and the appropriate tables. Be sure to create tables to represent both the entities and the composite entities. Enter some sample data for each table. Make certain that the composite tables that provide the linkage between the two tables being bridged contain appropriate data. The steps that will be followed are listed below:

- Using your relational model, create each table.
- Specify table linkages. Access Note³: Use the Relationships button in Access to determine the linkages.
- Using the problem description, enter some sample data into each table. If you have to, make up some reasonable data. Enter at least five tuples into each table, and be sure that data that allows the tables to be linked is provided. Access Note: Do not accept the fifty character default length for text fields. Assign input masks, default values, and validation rules wherever they make sense. Use the Lookup Wizard in the Datatype field to display a description rather than a key value whenever you have a foreign key in one table.
- Print each table and include it in the deliverable. A screen capture program such as SnagIt may be used to capture a copy of each table.
- Print the structure for each table and include it in the report. Access Note: To print the database structure, use the Tools-Analyze-Documenter. Select the Options in the lower right corner and then click the middle radio button for Files. No other options should be selected.
- Print the table relationships. Access Note: Click on the Relationships button on the Access toolbar to obtain the relationships. The relationships can be printed using the File - Print Relationships command.
- Submit both a disk (or CD) and your printouts.

Deliverable V – Data Entry Forms

Using tables developed in Deliverable IV, design and create the data entry forms specified below. The forms will be graded on appearance and content. The steps that will be followed are:

Using the Access tables, design and create the Customer Entry Form (Figure 5) and Technician Entry Form (Figure 6). Set the forms up for data entry. Use applicable formats and masks if

³ The term Access Note throughout what follows helps students who use Microsoft Access as their database.

available. Test the forms to be sure data is entered properly. Save the forms to disk. Note that technician data is stored in both the Employee table and the Technician table.

Customer Entry Form

Customer # Date

Name

Street Address

City State Zip Code

Home Phone Work Phone Cell

e-mail

P.O. Box 1234, Idaho Falls, ID
(208) 529-8254 FAX: 529-8255

Record: 1 of 1

Figure 5. Customer Entry Form

Technician Entry Form

Employee # Technician #

Name Social Security #

Address Certification

City Classification

State Zip Code Salary

Home Phone Cell Phone

e-mail

P.O. Box 1234, Idaho Falls, ID
(208) 529-8254 FAX: 529-8255

Record: 1 of 1

Figure 6. Technician Entry Form

When designing forms, consider which data values can be supplied through a selection in a drop-down box, such as equipment type. Some may involve a logical default.

- Submit the forms on disk (or CD), with the form names clearly indicated, and provide a printout of the forms, using SnagIt or the Print command.

Deliverable VI – Query Design

Using the tables developed in Deliverable IV, develop a set of queries as specified in the query list. Include data in the tables to test each query. Be sure to save the queries and submit the database. Provide printouts of both the SQL view and the query result. Be sure that there is data in your tables so that the instructor or grader can duplicate your results.

- Submit the queries on disk (or CD) with the query names clearly indicated.
- For each query, provide a printout of the SQL view and the query result.
 - *Access Note:* To display the SQL view: from the query menu select View, and then select SQL View from the drop-down menu.
 - *Access Note:* To display the query result: from the query menu select Query, and then select Run from the drop-down menu.
 - *Access Note:* Don't forget that if your query includes an attribute name that has a # sign, like Technician#, the attribute name has to be enclosed in square brackets.

Query List

1. List the technician number, hours worked, salary per hour, and total salary for each technician who worked more than 40 hours. (You may need to add appropriate data to your technician table to obtain results.)
2. List the model description and manufacturer for all products whose manufacturer name begins with an "A" and has a third letter "r". (Your answer should include Aeros, Airwave, and Airush.)
3. List all salesman information, including employee number, name, sales count, and sales total (SalesAmount) and commission earned in descending order by commission earned.
4. List the customer name, serial number, model number, model description, and purchase agreement date for all items for which the purchase agreement date is May 10, 2005.
5. List all repair details (customer number, customer name, serial number, service date, problem description) for all repairs associated with a specified customer. The query should display a prompt requesting the customer number or name. This type of query is sometimes referred to as a parameter query.
6. Part 1: For each product category list the model number, description, and the total number of sales from that category. Part 2: As a continuation from Part 1, list the model number, description, and the total number of sales for the product category that has the highest number of sales.
7. List the model number, description, and number of suppliers for those product categories that were supplied by multiple suppliers.
8. Given a customer name, list all credit cards associated with that customer. Include card number, card type (Visa, Mastercard, etc.), and expiration month and year, in the format xx/xxxx. The query should display a prompt requesting the customer number or name.
9. List the model number, description, total number of repairs in 2005, and the repair year for all product categories on a category-by-category basis.
10. List supplier number and supplier name for all suppliers for which there are no current orders. Sort the list in ascending order by supplier name.

Deliverable VII – Advanced Forms

Create and submit the following forms, which are based on multiple tables.

- *Purchase Confirmation Form* - Create a form with subforms to replicate the purchase confirmation form. It will differ slightly from the case description to make it easier. It should display the various purchases, but is not intended for input. Therefore, you should disable all of the fields (set the Enable property to No). Figure 7 shows an example. Access Note: As participating entities) and base the main form on it. In this case it should probably be Purchase Agreement. Then embed subforms to supply data from the other participating entities. The example in Figure 7 contains two subforms, because a subform can actually be based on more than one table. Be sure that the primary key/foreign key linkage is present in the main form and each subform, even if the fields are hidden, because they are required to link the forms.
- As discussed in class, select the "primary entity" (the one that has connections to most other participating entities) and base the main form on it. In this case it should probably be Purchase Agreement. Then embed subforms to supply data from the other participating entities. The example in Figure 7 contains two subforms, because a subform can actually be based on more than one table. Be sure that the primary key/foreign key linkage is present in the main form and each subform, even if the fields are hidden, because they are required to link the forms.

Lost River Wind Riders
Purchase Confirmation Form

Purchase Agreement # 11/11/2004 5:30 PM

Customer: Cindy K. Kynoch Employee: Martin Short

Street Address: 1044 Norton Ave. Credit Card #: 1234-1111-9189-4444

City: Idaho Falls Type: Master Card

State: Idaho Expiration: 2 / 2004

Zip Code: 83402- Authorization Code: 123

Home Phone: (208) 529-8254

Work Phone: (208) 523-0600

Cell: (208) 521-9147

e-mail: cindy@ida.net

Model #	Description	Date	Serial #	Sale Price
7	Paraglider - Tequila	8/1/2004	1143	\$3,250.00

P.O. Box 1234, Idaho Falls, ID
(208) 529-8254 FAX: 529-8255

Record: 1 of 8

Figure 7. Purchase Confirmation Form

Equipment Entry Form - Create an Equipment Entry Form that permits data entry when new equipment is received. An example is shown in Figure 8. This form should be done without using subforms. The Model is selected through a list box. Note that the Sale Price, Date, Manufacturer, and Inventory Count are all disabled.

The screenshot shows a window titled "Equipment Entry" with a header image of various aircraft. Below the header, the text "Lost River Wind Riders" is displayed in red, followed by "Equipment Entry Form". The form contains the following data:

Serial #	65547
Purchase Price	\$2,000.00
Sale Price	\$2,600.00
Date	4/13/2005
Model	Hang Glider - Stealth 151
Supplier #	Topflight AirBorne
Manufacturer	Aeros
Inventory Count	5

At the bottom, a record navigation bar shows "Record: 1 of 1".

Figure 8. Equipment Entry Form

- In the case of the Manufacturer, the correct value is supplied when a Model is selected
- The date field is disabled because the default value of the field is set to the current date.
- The sale price value is calculated as soon as the Purchase Price is entered.
- The Inventory Count is also incremented by one automatically as soon as the Model is selected.

In the samples the subform cannot be distinguished from the form. Several properties must be set to accomplish this goal. Submit both a diskette (or CD) with the form names clearly indicated and a printed copy.

Deliverable VIII – Reports

Create and submit the reports specified as they appear in the problem description. Submit both a diskette (or CD) with the report names clearly indicated and printed copy.

- *Inventory Report* - List all items in inventory grouped by product category. Test your report with multiple items in stock for at least one model. Figure 9 presents an example.
- *Purchase Agreement* – Create a purchase agreement that lists all item charges, calculates a sum of those charges to get the subtotal, calculates the sales tax, and then adds the tax to the subtotal to obtain the total. Be sure to include purchase agreement information, customer details, details about each item purchased on this contract, and the credit card number (partially masked, like XXXX-XXXX-XXXX-1234) and card type. Your report format should resemble Figure 10 as closely as possible. You may generate a listing of all agreements, although you can easily modify the report so that it is based on a parameter query that requests an agreement number. Test your report with multiple purchases on at least one purchase agreement. Contact the instructor for tips on masking the credit card number.



Lost River Wind Riders

Inventory Report Friday, June 10, 2005

Model #	Description	Manufacturer	Count	Reorder Qty	Serial #	Price	Purch. Date	Supplier #
1	Hang Glider - Talon 140	Wills Wing	1	0	5688	\$1,500.00	1/1/2005	Wills Wing
					112255	\$1,500.00	4/15/2005	A.I.R.
4	Hang Glider - Steakh 15	Aeros	1	2	5530	\$2,000.00	11/21/2004	A.I.R.
					5428	\$2,000.00	1/1/2005	A.I.R.
5	Hang Glider - Stalker	Aeros	2	5	12431	\$7,000.00	10/21/2004	A.I.R.
					12430	\$7,000.00	10/21/2004	A.I.R.
7	Paraglider - Tequila	Skywalk	3	1	1143	\$2,500.00	8/1/2004	LibSpeeds
					1194	\$2,500.00	9/12/2004	A.I.R.
					11943	\$2,500.00	12/12/2004	LibSpeeds
					2201	\$2,500.00	10/11/2004	LibSpeeds
8	Paraglider - Cayenne	Skywalk	2	0	4010	\$2,850.00	8/22/2004	LibSpeeds
					4410	\$2,800.00	12/29/2004	AirBorne

Figure 9. Inventory Report



Lost River Wind Riders

Purchase Agreement

Agreement #	12	12/9/2004	3:14 PM	Employee	16
-------------	----	-----------	---------	----------	----

Customer # 3
 Ron A. Egeland (406) 252-2008 Home Phone
 631 Lewis Ave. (406) 698-5802 Work Phone
 Billings Montana 59102- Cell Phone

<u>Model #/Description</u>	<u>Serial #</u>	<u>Sale Price</u>
8 Paraglider - Cayenne	4410	\$3,380.00
Total:		\$3,380.00
Tax:		\$261.95
Customer Total:		\$3,641.95

Credit Card #: XXXX-XXXX-XXXX-1111
 Card Type Visa

Figure 10. Purchase Agreement

Deliverable IX – Stored Procedures and Triggers

Before beginning this deliverable, modify the Product_Category table to include a new Boolean (Yes/No) attribute called ReorderNecessary that will be set to true when an item needs to be reordered. The attribute should default to false.

- Since the default value may not be valid for all the data in your table, write a stored procedure to set the value of the new ReorderNecessary attribute to its correct value. If the ModelInventoryCount is less than or equal to the ModelReorderQuantity, then set the ReorderNecessary value to true. Otherwise set the ReorderNecessary value to false. Execute the procedure to reset the value.
- The next stored procedure is more complex. When an item is purchased by credit card, the card number must be validated. The algorithm to accomplish this task is fairly straightforward, and consists of three steps. These steps are performed by working from the rightmost digit of the credit card number.

Step 1: Double the value of alternate digits of the primary account number beginning with the second digit from the right (the right-most digit is the check digit.)

5	2	6	8	0	8	0	0	4	3	3	7	6	8	9	4
	x2		x2		x2		x2		x2		x2		x2		x2
	10		12		0		0		8		6		12		18

Step 2: Still working from the right, add the individual digits comprising the products obtained in Step 1 to each of the unaffected digits in the original number. For example, if the product is 12 then add 1 + 2 to the unaffected digit to the right.

$$\begin{aligned}
 &= 2+(1+0) + 8+(1+2) + 8+(0) + 0+(0) + 3+(8) + 7+(6) + 8+(1+2) + 4+(1+8) \\
 &= 3 + 11 + 8 + 0 + 11 + 13 + 11 + 13 \\
 &= 70
 \end{aligned}$$

Step 3: The total obtained in Step 2 must be a number ending in zero (or mod 10 = 0) for the account number to be validated.

$$70 \text{ mod } 10 = 0 \therefore \text{Card number is valid}$$

- Write a stored procedure to validate a credit card number. Test it with a valid credit card number like 5268 0800 4337 6894.
- The first trigger represents a typical inventory management task. Whenever an item is sold, the associated inventory count is decremented. The system should automatically check to see if the inventory count fell below the reorder quantity. Write a trigger to compare the Product_Category attribute ModelInventoryCount to the ModelReorderQuantity. If the value is less than or equal to the reorder quantity then the ReorderNecessary attribute should be set to true. The trigger should be invoked whenever the ModelInventoryCount or ModelReorderQuantity attributes are updated.
- The next trigger calls a stored procedure. When an item is purchased by credit card, the card number must be validated. Write a trigger to execute the stored procedure that you developed to validate the card number when the value of the PurchaseAgreementCardNumberUsed field is inserted or updated.

Final Project

Students are required to follow a specific technical report format that includes the following:

Executive Summary	Goals	Problems (encountered during the study that impact the company)
Results	Recommendations	Introduction
Company background	Problem (that made a new system necessary)	Entity-Relationship Diagram
Normalized Relational Schema	Design Validation	Implementation
Database Table Creation	Input Forms (single table)	Query Design
Advanced Forms (multiple tables)	Reports	Stored Procedures and Triggers
Summary		

The overall organization of the report as well as its content influence the grading, and that the presentation must be "professional quality" because in a real setting the presentation will be management's first exposure to a project, and a bad first impression is difficult to overcome.

ABOUT THE AUTHOR

Kevin R. Parker is Professor of Computer Information Systems at Idaho State University. He previously held an academic appointment at Saint Louis University. He has taught both computer science and information systems courses over his fourteen years in higher education. Dr. Parker's research interests include e-commerce marketing, competitive intelligence, knowledge management, the Semantic Web, and extreme programming. His work appears in such journals as *Journal of Information Technology Education*, *Journal of Information Systems Education*, *the International Journal of Internet and Enterprise Management*, and *Journal of Issues in Informing Science and Information Technology*. Dr. Parker's teaching interests include web development technologies, programming languages, data structures, and database management systems. Dr. Parker holds a BA in Computer Science from the University of Texas at Austin (1982), an MS in Computer Science from Texas Tech University (1991), and a Ph.D. in Management Information Systems from Texas Tech University (1995).

Copyright © 2005 by the Association for Information Systems. Permission to make digital or hard copies of all or part of this work for personal or classroom use is granted without fee provided that copies are not made or distributed for profit or commercial advantage and that copies bear this notice and full citation on the first page. Copyright for components of this work owned by others than the Association for Information Systems must be honored. Abstracting with credit is permitted. To copy otherwise, to republish, to post on servers, or to redistribute to lists requires prior specific permission and/or fee. Request permission to publish from: AIS Administrative Office, P.O. Box 2712 Atlanta, GA, 30301-2712 Attn: Reprints or via e-mail from ais@aisnet.org.



Communications of the Association for Information Systems

ISSN: 1529-3181

EDITOR-IN-CHIEF

Paul Gray

Claremont Graduate University

AIS SENIOR EDITORIAL BOARD

Jane Webster Vice President Publications Queen's University	Paul Gray Editor, CAIS Claremont Graduate University	Kalle Lyytinen Editor, JAIS Case Western Reserve University
Edward A. Stohr Editor-at-Large Stevens Inst. of Technology	Blake Ives Editor, Electronic Publications University of Houston	Reagan Ramsower Editor, ISWorld Net Baylor University

CAIS ADVISORY BOARD

Gordon Davis University of Minnesota	Ken Kraemer Univ. of Calif. at Irvine	M.Lynne Markus Bentley College	Richard Mason Southern Methodist Univ.
Jay Nunamaker University of Arizona	Henk Sol Delft University	Ralph Sprague University of Hawaii	Hugh J. Watson University of Georgia

CAIS SENIOR EDITORS

Steve Alter U. of San Francisco	Chris Holland Manchester Bus. School	Jaak Jurison Fordham University	Jerry Luftman Stevens Inst. of Technology
------------------------------------	---	------------------------------------	--

CAIS EDITORIAL BOARD

Tung Bui University of Hawaii	Fred Davis U. of Arkansas, Fayetteville	Candace Deans University of Richmond	Donna Dufner U. of Nebraska - Omaha
Omar El Sawy Univ. of Southern Calif.	Ali Farhoomand University of Hong Kong	Jane Fedorowicz Bentley College	Brent Gallupe Queens University
Robert L. Glass Computing Trends	Sy Goodman Ga. Inst. of Technology	Joze Gricar University of Maribor	Ake Gronlund University of Umea,
Ruth Guthrie California State Univ.	Alan Hevner Univ. of South Florida	Juhani Iivari Univ. of Oulu	Claudia Loebbecke University of Cologne
Michel Kalika U. of Paris Dauphine	Munir Mandviwalla Temple University	Sal March Vanderbilt University	Don McCubbrey University of Denver
Michael Myers University of Auckland	Seev Neumann Tel Aviv University	Dan Power University of No. Iowa	Ram Ramesh SUNY-Buffalo
Kelley Rainer Auburn University	Paul Tallon Boston College	Thompson Teo Natl. U. of Singapore	Doug Vogel City Univ. of Hong Kong
Rolf Wigand U. of Arkansas, Little Rock	Upkar Varshney Georgia State Univ.	Vance Wilson U. of Wisconsin, Milwaukee	Peter Wolcott U. of Nebraska-Omaha
Ping Zhang Syracuse University			

DEPARTMENTS

Global Diffusion of the Internet. Editors: Peter Wolcott and Sy Goodman	Information Technology and Systems. Editors: Alan Hevner and Sal March
Papers in French Editor: Michel Kalika	Information Systems and Healthcare Editor: Vance Wilson

ADMINISTRATIVE PERSONNEL

Eph McLean AIS, Executive Director Georgia State University	Reagan Ramsower Publisher, CAIS Baylor University
---	---