

Holeshot Point-of-Sale System

By

Booker Vann

Submitted to
the Faculty of the Information Engineering Technology Program
in Partial Fulfillment of the Requirements for
the Degree of Bachelor of Science
in Information Engineering Technology

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College of Applied Science

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Holeshot Point-of-Sale system

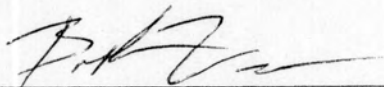
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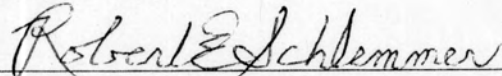
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6/2/05

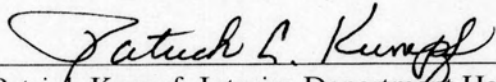
Date



Professor Robert Schlemmer, Advisor

6/2/05

Date



Dr. Patrick Kumpf, Interim Department Head

6-2-05

Date

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Abstract

Holeshot Point-of-Sale system is a store management system that allows Holeshot Motorsports to take advantage of the latest technologies to improve their customer experience while streamlining operations and leveraging existing investments. This system was customized to provide a better way for sales and inventory to be handled aiding in loss prevention and better cash handling. Holeshot POS system will also be a user friendly system and replace a command line driven system that was difficult to use. Some of the other features of Holeshot POS will allow user to receive stock into inventory, query inventory, and sell stock from inventory, and providing customer sales transaction receipts. Holeshot POS was design primarily for budget-conscious retailers and those who operate in limited-space areas. Delighting customers, driving profits by improving transaction convenience and developing easy business reports were the chief objectives for using advanced technology to help manage a business

1. Statement of the Problem

It is vitally important for a business to utilize the correct point-of-sale system for their environment. Point-of-sale systems are used for collecting, processing and recording data relating to business transactions. Each system has its own advantages and disadvantages, and it is up to the individual responsible for that particular point-of-sale system to choose the one that can operate most effectively within their environment.

One of the most important objectives with a point-of-sale system is keeping track of inventory. Controlling your inventory through a point-of sale system can reduce your inventory reports and make sure that you order more wisely. Point-of-sale systems will also help you monitor and control future inventory which will increase your efficiency. Inventory reports will help you to stock more products that give you greater profits and fewer products that give you the least amount of profit. Point-of-sale systems also speed up your customer checkout. With a barcode scanner, you can checkout a customer in half the time required with a cash register. Even if you don't use a barcode scanner, your checkout is still faster and more accurate because you are entering inventory item numbers which are automatically tied to the database for each inventory item. You can also reduce theft in your business. This is possible because your employees become more involved in watching the store inventory if they know that every piece of inventory in your business is being monitored. By comparing on shelf inventory to your computerized reports, both you and your employees are much more careful about giving away inventory and retaining obsolete inventory.

Keeping track of your customers is another feature that is an obvious asset for any small businesses. Simply obtaining the name and address of every one of your customers

can keep the business and customer on a personal level. Mailing coupons, sales, or advertising new items to your customers periodically keeps them coming back.

With some of the great advantages with point-of-sales systems there are some disadvantages that arrive particularly with small businesses. Most small businesses feel that the cost for a high price point-of-sale system is irrelevant (2). Some point-of-sale vendors charge small businesses a fortune for the complete system then charge them for support. Some vendors also sell small businesses things that they do not need, because most small businesses do not have IT departments or an expert in that field to give them good advice (2). Another disadvantage is that it is confusing and overwhelming to choose a point-of-sale system. Some businesses often select the wrong point-of-sale system for their business. There are around 1,000 different point-of-sale systems to choose from (1). Many companies commonly go through 2, 3 or even 4 different point-of-sale systems before they find one they're happy with (1). Those mistakes probably cost at least \$10,000 - \$100,000 (1). Most of the disadvantages or problems of a point-of-sale system is not caused by the functionality of the product, many problems are business problems between the vendor and the consumer. By learning the consumer's needs an appropriate IT solution can be designed.

Holeshot Motorsports is a small motorcycle shop that sell bike parts and used bikes; sponsor professional bike racers; and does repair. Holeshot Motorsports currently has a poorly designed point-of-sale system compared to other motorcycle shops or small businesses. Even with their current system there are still many tasks that the employees have to manually do such as;

- serial number tracking

- customer number tracking
- part searching
- credit

The current application interface is not user friendly and has to be operated by someone that has a lot of experience with this particular system. Even though Holeshoot Motorsports is a small business, a significant amount of customers crowd their store with tasks everyday. With various jobs, Holeshoot can use a more professionally designed system.

2. Description of the solution

The solution for Holeshoot Motorsports was to create an application with a database management system to be used as a more modern point-of-sale system. The application interface will have a professional appearance, and provide a user friendly interactive vehicle to deliver the needs of the business satisfaction. The application will connect to a database and do tasks that the current system cannot do such as;

- keep inventory and take orders for parts
- automate purchase orders
- credit frequent customers
- prepare invoices and many reports
- store statistics for the professional racers

An easy-to-use windows application will be created for the users to connect to the database and retrieve or insert information. A separate database for different catalog and vendor part numbers will be created to track parts.

I plan to work in two computing areas within the Information Engineering Technology program to complete this project. The main focuses will be on a database design and programming. A relational database will be created with Microsoft Access 2003. This database will be accessed by an application which will also address security issues. The program will be written to programming standards to be readable and maintainable. I will use standard protocols to communicate with the database to pull and receive data. I have decided to use C#.NET, which will work the best with my design in a Microsoft environment. Bar code technology will also be used to easily enter in data.

2.1 User Profile

Holeshot Motorcycle point-of-sales system (HMPOS) is used in a multi-user environment. There are three categories of application users. The three levels include guest, employee, and administrators. A user will get their account level based on their importance to Holeshot, not by their level of computer competence.

Guest Level User

Guest users needs to see data but should not be able to insert or delete any data. This user account will be given to auditors, tax officials, customers, or new employees. Computer competency at this level is not a concern because the user cannot impair any of the data with read-only rights.

Medium Level User

Medium level users have permission to read, write, and delete only data, but restrictions can be set by high level users. These users have access to control all of the data, but not the application features. These users are regular employees that help run the day to day operations of the shop. Computer competency at this level is a concern because mistakes can damage the data, so the appropriate training has to take place before the user is at this level.

High Level User

High level users have full control over every part of the application. These users also have the ability to set accounts and restrict access to desired parts of the application. Users with these rights are managers and technical supporters. Computer competency at this level is important because mistakes can damage the data and the application, so the appropriate training has to take place before the user is at this level.

2.2 Design Protocols

User Interface

The user interface will be created using C#.NET. The user interface is divided between the user roles of the Holeshoot point-of-sale system. A login screen along with three user screens will make up the main parts of the user interface. The color scheme will consist of a red background with yellow lettering to stay consistent with the company colors. Motorcycle images, artistic designs and a company logo will be properly placed on each screen. Each interface will change depending on the user's functionality and needs. The guest's role is to view data. So the guest user interface will only allow the user to view data. This screen will not have any insert or delete buttons. This screen will

consist of labels, text fields, scroll bars and navigation buttons to view the accessible data. Employee's role is to manage data in the database such as inserting and deleting data. To carry on these features insert and delete buttons will give the employee a way to manipulate and control the data in the database. The administrator role is to manage the application and monitors other users. This interface will have all of the features the employees have and buttons to change permissions for a user and to restrict data. The login or home interface main function is to authenticate the users. This screen will also serve as a welcome page, which will include the title of the application and a brief description.

Use Case Diagram

The use case diagram shows the top level user roles information flow through the HMPOS.

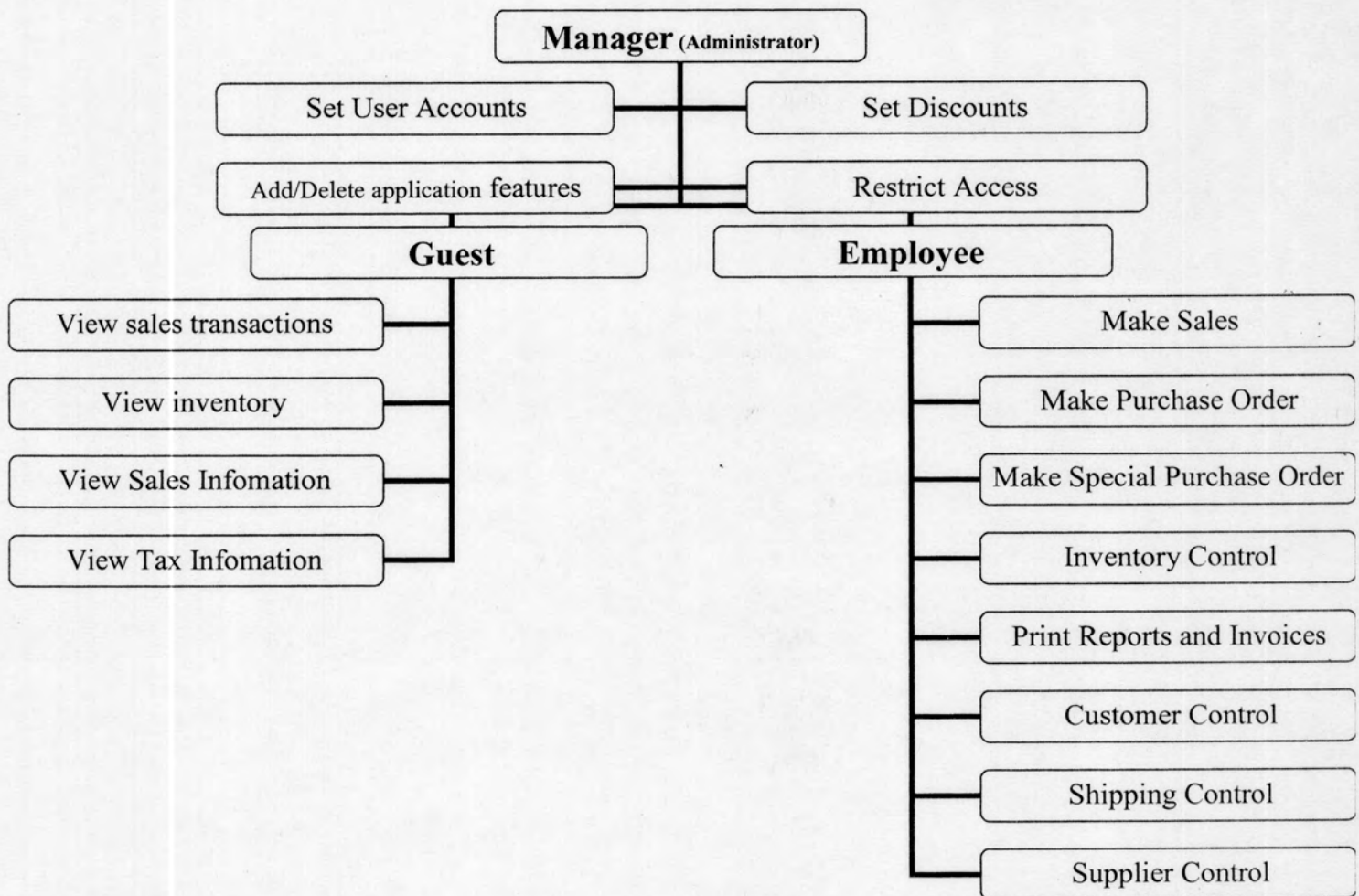


Figure 1 : Use Case Diagram

Database tables

Microsoft Access - [Relationships]				
File Edit View Relationships Tools Window Help				
Type a question for help				
SUPPLIER	PRODUCT	ORDERDETAILS	CUSTOMER	PURCHASEORDER
supplierID	prodNumber	orderID	custID	orderID
supName	prodName	bdNumber	custFirmName	emplID
supContact	w_price	w_price	custLastName	orderDate
supAddress	r_price	quantity	custAddress	recDate
supState	unitInStock	discount	custState	shipID
supCity	optimum		custCity	specialProd
supZip	supplierid		custZip	supplierId
supPhone	category		custPhone	freight
supEmail			custEmail	poSubTotal
SALES	SHIPMENT	SAL	SPECIALORDER	EMPLOYEE
saleID	shipID	saleID	sporderID	emplID
bdNumber	shipName	custID	custID	emplFirmName
salePrice	shipContact	saleDate	shipID	emplLastName
saleQuantity	shipAddress	emplID	supplierId	emplTitle
saleDiscount	shipState	saleTax	sporderDate	emplBirthDay
SDrefund	shipCity	paymentID	sprecDate	emplHireDate
	shipZip	refund	emplID	emplAddress
	shipPhone	subTotal	paymentID	emplState
	shipEmail	paid	spFreight	emplCity
	shipCost		spTax	emplZip
SPECIALORDER		PAY		
sporderID		paymentID		
bdNumber		payMethod		
quantity		paidAmount		
discount		paidINFull		
price				

Figure 2 : Database tables

3. Objectives of the project

- Advanced Product/Customer search facilities
- Serial number tracking
- Customer number tracking
- Part searching
- Keep inventory and take orders for parts
- Automate purchase orders
- Credit for frequent customers
- Invoices for many reports
- Refunds Handling
- Multi level permission based security
- Customer ordering at POS
- Bar Code scanning (If time allows)

4. Design and Development

4.1 Timeline

Task	2004				2005					
	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun
Research										
Write Proposal										
Present Proposal										
Database Design										
Front-in application Design										
Implement Database										
Implement C# code										
Develop Prototype										
Testing										
Transferring Data										
User Manual										
Final Presentation										

Figure 3 : Timeline

4.2 Budget

Access database	Item		cost
	Software	Barcode scanner software	\$75
		Visual Studios.NET	\$600
		Access 2002	\$150
	Hardware requirements for Access	Pentium 75 MHz	\$400
		64 MB of RAM	
		30 MB of hard disk space	
		Barcode scanner	\$150
	total:		\$1375

Figure 4 : Budget

4.3 Testing

HMPOS went through an iterative testing scheme. Testing was divided up into three different stages sub-system testing, partial integration testing and full-system testing. To perform this procedure each small component will be tested, then added together and tested again. This incremental approach to testing made it easier to find defects in each component of the system.

4.4 Software

Windows NT/98/2000/ XP

C# is a modern, object-oriented language that enables me to quickly build a wide range of applications for the point-of-sale system, and provides tools and services that fully exploit both computing and communications. Because of its object-oriented design, C# would be a great tool for developing a point-of-sale system because of its wide range of components, from high-level business objects to system-level applications. C# language also can be converted into XML Web services, allowing them to be invoked across the Internet, from any language running on any operating system. Although I'm not planning on adding any web features to this application, being able to convert C# to XML data will give me that option.

4.5 Hardware

Hardware	Requirements for Access
Processor	Pentium 75 MHz or higher
Memory	8 MB of RAM required for Access 2000, 64 MB of RAM for Windows 2000
Hard disk space	Access 2000 requires over 30 MB of hard disk space
Hardware	Requirements for SQL
Processor	Pentium 166 MHz or higher
Memory	128 MB RAM or more recommended
Hard disk space	270 MB (full installation),

Figure 5 : Hardware

5. Proof of Design

This section shows screen shots of some of the windows that make up Holeshot POS. These windows consist of buttons, labels, text boxes, combo boxes, and Crystal Report viewers. Each component has a specific purpose. Buttons are used to create an action such as to navigate through the application or deleting, inserting and updating records. These actions are driven by code specifically for that button. Labels display descriptions of text boxes and combo boxes. Text boxes and combo boxes are used to hold data that is entering or being retrieved from the database. Code also allows what data goes into the text boxes and combo boxes. Crystal Report viewers are used to capture a certain Crystal Report and display it on a form. This section will take you through the Manager role by showing screen shot and an explanation for these screens.

5.1 Login



Figure 6 : Login

The Login screen is the first screen to show. This screen will authenticate whether or not a user can get into the system. Depending on the role the user will go to the Employee, Guest, or Manager Login screen.

5.2 Manager Login

When a Manager logs into HPOS this is the screen that shows the different options that he/she can chose from. Notice that the username matches the Manager Name in the combo box. HPOS will keep track of where the user go throughout the system. The combo box will also populate the other employees. This will allow the other employees to complete tasks without logging in case the initial user gets

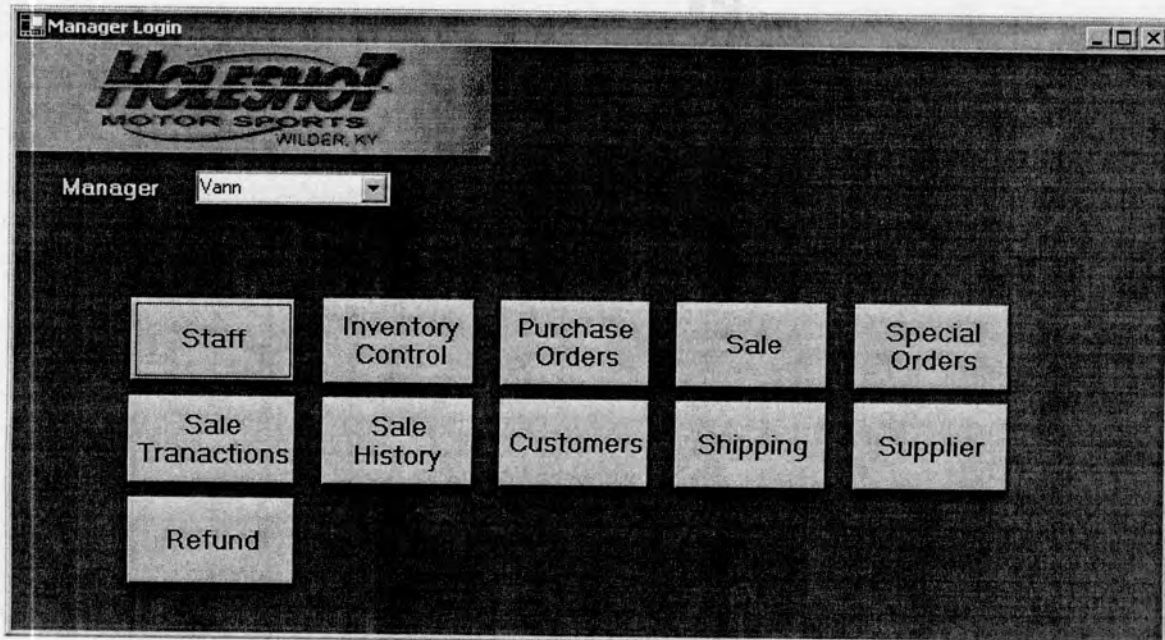


Figure 7 : Manger Login

5.3 Manager Inventory Control

This screen allows the Manager to control the inventory. The manager can navigate through the inventory with the navigation bars and the combo box. The manager also has the ability to update, insert, and delete inventory. The Under Stock buttons allow the manager to see if the items in the inventory is at the optimum level.

Figure 8 : Manager Inventory Control

5.4 Manager Users

ManUser

Manager: Vann

Employee ID: 1 Last: Vann First: Booker Title: CIO

Address: 12 Main St City: Cincinnati State: Ohio Zip: 45202-1111

Phone: (513) 431-1234 Hire Date: 12/10/2005 Birthdate: 04/10/1981

Username: vann password: 34 Role: Manager

Navigation: |<< < > >>|

Actions: Update Insert Delete Cancel

Figure 9 : Manager User

This screen allows the Manager to control the users. The manager can navigate through the users with the navigation bars and the combo box. The manager also has the ability to update, insert, and delete users.

5.5 Manager Customers

This screen allows the Manager to set information about a customer. The manager can navigate through the customers with the navigation bars and the combo box. The manager also has the ability to update, insert, and delete customers.

ManCustomer

Manager: Vann

Customer ID: 1 Last: Wagner First: tasha

Address: 15 Daniels City: middletown State: OH Zip: 46778

Phone: 5134223525 Email: lcc@hotmail.com

Navigation: |<< < > >>|

Actions: Update Insert Delete Cancel

Figure 10 : Manager Customer

5.6 Manager Shipping

This screen allows the Manager to access information about the shippers. The manager can navigate through the shipping companies that are used, with the navigation bars and the combo box. The manager also has the ability to update, insert, and delete companies.

The screenshot shows the 'ManShip' application window. At the top left is the logo for 'HARVEST MOTOR SPORTS WILDER, KY'. To the right of the logo is a 'Manager' dropdown menu with 'Vann' selected. Below this is a form with the following fields: 'Shipping ID' (1), 'Company' (FedEX), 'Contact' (John), 'Address' (3rd), 'City' (mill), 'State' (HI), 'Zip' (33333-333), 'Phone' ((333) 334-4444), 'Email' (sfsdfsdf), and 'Cost' (6). At the bottom of the form are two rows of buttons. The first row contains navigation buttons: '<<', '<', '>', and '>>'. The second row contains action buttons: 'Update', 'Insert', 'Delete', and 'Cancel'.

Figure 11 : Manger Shippers

5.7 Manager Supplier

The screenshot shows the 'ManSupplier' application window. At the top left is the logo for 'HARVEST MOTOR SPORTS WILDER, KY'. To the right of the logo is a 'Manager' dropdown menu with 'Vann' selected. Below this is a form with the following fields: 'Supplier ID' (1), 'Company' (bikeware), 'Contact' (jack), 'Address' (222 gin), 'City' (newport), 'State' (KY), 'Zip' (33333), 'Phone' (333390000), and 'Email' (slfjldsfjkl.com). At the bottom of the form are two rows of buttons. The first row contains navigation buttons: '<<', '<', '>', and '>>'. The second row contains action buttons: 'Update', 'Insert', 'Delete', and 'Cancel'.

Figure 12 : Manger Supplier

This screen allows the Manager to access information about the suppliers. The manager can navigate through the companies that are used, with the navigation bars and the combo box. The manager also has the ability to update, insert, and delete companies.

5.8 Sale

The Sales form is where a sales transaction will occur, completed by printing and invoice.

The screenshot shows a software window titled "Sale". The window has a dark theme. At the top left is a logo for "Horsehot MOTOR SPORTS WILDER, KY". To the right of the logo is a "Staff" dropdown menu with "Vann" selected and a numeric field with "1". Below the logo are several input fields: "SubTotal : \$", "Tax : \$", "Total : \$", "Amount Paid : \$0", and "Change : \$0". To the right of these fields are three buttons: "New Sale", "Add Item", and "Total". On the left side, there are fields for "Sale ID" and "Sale Date" (showing "6/8/2005"). A "Cancel" button is located on the right side. At the bottom of the window, there is a status bar with "Current Page No: 1", "Total Page No: 1+", and "Zoom Factor: 100%". A row of navigation icons is located above the main content area.

Figure 13 : Sale

The sale form will appear to you first like the figure above and after you click on the New Sale button the customer, item, and pay method fields will appear.

Sale

Hotshot MOTOR SPORTS
WILDER, KY

Staff: Vann 1

Item	Item ID	Price	Quantity	Discount %	Customer
nitris fluid	1534538130	56	5	0	James 7

Pay Method: Check

Sale ID: 61 Sale Date: 6/8/2005

SubTotal :	\$ 555.0
Tax :	\$ 33.300
Total :	\$ 588.300
Amount Paid :	\$ 600
Change :	\$ 11.700

Current Page No: 1 Total Page No: 1+ Zoom Factor: 100%

Figure 14 : Sale 2

After a customer, pay method, and each item is added the total button is clicked and the change and sales complete button will appear. The amount paid is entered then the change button is clicked and the change will appear.

Sale

HOLESHOT MOTOR SPORTS
WILDER, KY

Staff: Vann 1

Item	Item ID	Price	Quantity	Discount %	Customer
nitris fluid	1534538130	56	5	0	James 7

Pay Method: Check

Sale ID: 61 Sale Date: 6/8/2005

SubTotal : \$ 555.0
 Tax : \$ 33.300
 Total : \$ 588.300
 Amount Paid : \$ 600
 Change : \$ 11.700

MainReport

Invoice

HOLESHOT MOTOR SPORTS

4 Interstate Access RD
 Wilder KY 41076

Employee ID : 1

Customer : 7 James

Current Page No: 1 Total Page No: 1 Zoom Factor: 100%

Figure 15 : Sale 3

After the sales transaction is done the sale complete button should be clicked and an invoice will appear in the report viewer as in the figure above. Below is a closer look at the invoice. As you can see the employee, customer, and sale ID is recognized. Also the sale transaction and pay method is on the invoice.

Adobe Reader

File Edit View Document Tools Window Help

Open Save a Copy Print Email Search Select Text 118% YAHOO! TOOLBAR Get it free

Bookmarks Signatures Layers Pages

Sale Invoice

HOLESHOT MOTOR SPORTS

4 Interstate Access RD
Wilder KY 41076

Date : 6/8/2005
2:21:16AM

Employee ID : 1

Customer : 7 James

Sale ID : 61

<u>Item ID</u>	<u>Item</u>	<u>Quantity</u>	<u>Price</u>	<u>Discount %</u>
1113873143	racing boots	5	\$55.00	0
1534538130	nitris fluid	5	\$56.00	0

Sub Total : \$555.00

Tax : \$33.30

Total : \$588.30

Amount Paid \$600.00 Check

Change : \$11.70

8.5 x 11 in 1 of 1

Figure 16 : Sale Invoice

5.9 Purchase Order

A purchase order takes place when an item needs to be ordered from a supplier. The Purchase Order form will appear to you first as in the figure below and after you click on the New Order button the shipper, item, and supplier fields will appear.

The screenshot shows a software window titled "Purchase Order". In the top left corner is a logo for "HARVEY FIVE STAR MOTOR SPORTS WILDER, KY". To the right of the logo is a "Staff" dropdown menu showing "Vann" and a numeric field with "1". The main area contains several input fields: "SubTotal : \$" with a text box, "Frieght : \$" with a text box (containing "0"), and "Total : \$" with a text box. To the right of these are two buttons: "New Order" and "Add Item". Below the "SubTotal" field is a table with three columns: "Order ID", "Order Date", and "Received Date". The "Order Date" column contains the date "6/8/2005". Below the table is a row of navigation icons. To the right of the navigation icons is a "Cancel" button. At the bottom of the window is a status bar with three fields: "Current Page No: 1", "Total Page No: 1+", and "Zoom Factor: 100%".

Figure 17 : Purchase Order

After a shipper, supplier, and the first item is added the order complete button will appear. The freight is entered and a total is given after the order complete button is clicked and an invoice will appear in the report viewer as in the figure below.

Purchase Order

HOLESHOT MOTOR SPORTS
WILDER, KY

Staff: Vann 1

Item ID	Item	Price	Quantity	Discount
brake fluid	1117297253	15	4	0

Via: Express

Supplier: Bikeware

Order ID: 73 Order Date: 6/8/2005 Received Date:

SubTotal: \$120.0
Freight: \$5
Total: \$125.0

New Order **Add Item**

Order Complete

Cancel

MainReport

Purchase Order Invoice **HOLESHOT MOTOR SPORTS**

4 Interstate Access RD
Wilder KY 41076

Employee ID: 1 Order Date:

Current Page No: 1 Total Page No: 1 Zoom Factor: 100%

Figure 18 : Purchase Order 2

Below is a closer look at the purchase order invoice. As you can see the employee, ship company, supplier information, and order I D is recognized. Also the each item information and the cost are located on the invoice.

Adobe Reader

File Edit View Document Tools Window Help

Open Save a Copy Print Email Search Select Text 100% Upgrade to the latest Reader

Purchase Order Invoice **HOLESHOT MOTOR SPORTS**

4 Interstate Access RD
Wilder KY 41076

Order Date: 6/8/2005
2:25:50AM

Employee ID: 1

Parts Unlimited
342 Hopple
Dayton, OH 34343
(424) 220-3430

Via : Express Order ID: 73

<u>Item ID</u>	<u>Item</u>	<u>Quantity</u>	<u>Whole Sale</u>	<u>Retail</u>	<u>Discount %</u>
14397557	engine fluid	4	\$5.00	\$7.00	0.00
00128528	racing t-shirt	4	\$10.00	\$15.00	0.00
17297253	brake fluid	4	\$15.00	\$21.00	0.00

Sub Total: \$120.00
Freight: \$5.00
Total: \$125.00

8.5 x 11 in 1 of 1

Figure 19 : Purchase Order Invoice

5.10 Special Order

A special order is a purchase order and sale transaction combined. This takes place when a customer wants to order an item that is not in stock from a supplier. The Purchase Order form will appear to you first as in the figure below and after you click on the New Order button the shipper, item, supplier, customer, pay method fields will appear.

ManSpecialOrder

HARVEY'S MOTOR SPORTS WILDER, KY

Manager [Vendor] 1

Order ID [] Order Date 6/8/2005 Received Date []

SubTotal [] Freight: 0 Tax: [] Total: [] Amount Paid: 0 Change: 0

New Order Add Item Total Change Cancel

Current Page No: 1 Total Page No: 1+ Zoom Factor: 100%

Figure 20 : Special Order

After the shipper, item, supplier, customer, pay method fields are added and the total button needs to be clicked which will give you the total and automatically calculate tax. After the total and change is handled the order complete button will appear, the order complete button is clicked and an invoice will appear in the report viewer as in the figure below.

Adobe Reader

File Edit View Document Tools Window Help

Open Save a Copy Print Email Search Select Text 100% It's easier with Reader 7.0

Special Order Invoice **HOLESHOT MOTOR SPORTS**

4 Interstate Access RD
Wilder KY 41076

Date : 6/8/2005
2:31:45AM

Employee ID : 1

Customer : 6 Tucker
34 Tree
Chicago, IL 222211

Supplier: Parts Unlimited
342 Hopple
Dayton, OH 34343

Via : Slow

Special Order ID : 39

<u>Item ID</u>	<u>Item</u>	<u>Quantity</u>	<u>Price</u>	<u>Discount %</u>
1114397557	engine fluid	5	\$7	0
1117297253	brake fluid	5	\$21	0
1110235339	street boots	5	\$55	0

Sub Total : \$415.00

Tax : \$24.90

Freight : \$44.00

Total : **\$483.90**

Amount Paid : \$500.00 Cash

8.5 x 11 in 1 of 1

Figure 22 : Special Order Invoice

7. Conclusion

Virtually most companies depend on a computer-base system. Holeshoot POS is a great solution to replace an out-of date POS. Holeshoot's old POS had a significant amount of functionality, in fact it did most of the things that the new system does. An easy to use system is what separates the new POS. In a service environment user friendliness is of high priority, especially if most of your users are not very computer savvy. I watched how the old system was being used and saw technology that made the user do some manual work that could be automated. To solve this problem a solution had to be carefully planned to meet all of the user general needs such as automate manual processes, easy uses, and reiterate functionality. By completing this project a technical solution has given Holeshoot Motorsports an IT advantage.

8. Recommendations

Throughout this project, I experienced many challenges and learned from those challenges. The essential part of this project was analyzing the problem and matching that problem with a technical solution. I spent most of my time on analyzing how to make this an easier system to use by researching other modern POS systems. There are many different types of POS systems that use a variety of tools and resources. Some of the POS systems were very expensive, so I had to determine the most cost-efficient way to create a POS system that handled optimum functionality. Relearning some object-oriented programming and database concepts helped me develop better logical understanding for my design. With my knowledge of C#.NET, ADO.NET, Crystal Reports and database management I knew this will be a difficult project, but a project that could be done.