Valiant

By

Amy Doll

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

University of Cincinnati
College of Applied Science

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Acknowledgements

I would like to give thanks to Steve Daily, owner of Daily Machine, for the inspiration for this project, and for letting me analyse his business routine so that I could build this application specific to small business needs. I would also like to thank Dr. Hazem Said for believing in me when I didn't believe in myself, and helping me break things in to small pieces so I could accomplish this huge task. Last but not least, I would like to thank my husband, Chris Doll, for being there for me during this whole process, I wouldn't have been able to do it without you.

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Abstract

The *Valiant* software package simplifies the process of managing orders for small businesses with users who have a low to moderate level of computer literacy. This software application allows small business owners to make use of the Microsoft Office software already installed on their computers. Since Office was created for users at all levels of computer literacy, there is a great deal of functionality that goes unused by less experienced users. *Valiant* allows users with only basic computer skills to use the more robust features of Office such as report generation, invoicing, and information storage in a database, without getting confused and overwhelmed, and without taking valuable time away from their businesses to learn new software. *Valiant* takes into account the business flow process and reflects that in its usability. This is done by making the most common business functions, such as adding an order, and adding a customer, available on the Main Form of the application that users see first.

Valiant

1. Statement of the Problem

After purchasing a new computer loaded with Microsoft Office XP, Steve Daily, a friend and neighbor, was excited to show me what his new computer and software could do. He showed me how he was able to use templates to create invoices with Microsoft Word and to make spreadsheets using Microsoft Excel to keep a record of his expenses. I initially thought that this seemed like a reasonable solution to his problem. However, Steve explained to me that he was manually incrementing the invoice number and filling out the invoices with other time intensive methods. He expressed his frustration with the way he was completing his paperwork, and said, "It would be great if I could just select the business name, and it would fill in the address and everything would be sort of automatic." This is when I realized that there was a way to ease his workload. After talking with Mr. Daily at length about his business and what could be done to make it better, we came to the conclusion that he definitely needs a better way to complete paper work using his computer (2).

In addition to conversations with Mr. Daily, I spoke with two other small supplier/service business owners, and asked them how they were doing their paperwork. While they all had computers with Microsoft Office software or similar word processing and spread sheet software, none of them had the automated solution that Mr. Daily wanted. All of them reported either using paper invoices that were then entered in to the computer for accounting purposes or generating the invoices manually on the computer like Mr. Daily (1, 9).

While these people are running successful businesses, they either do not have the time to create their own solutions, the computer knowledge to do so, or the money to invest in another piece of expensive software (1, 9).

Mr. Steve Daily is a small business owner, with limited computer knowledge, time and funds. However, he needs to have software that will allow him to quickly and efficiently complete his business paperwork. While he currently owns Microsoft Office XP, he is not using it to its full potential.

2. Description of Solution

Computer "ownership in non-metropolitan areas grew by 30.6 percent" between 1998 and 2000. During that same time, small to medium-sized businesses were spending as much as one-quarter of all capital expenditures on "computer and communications equipment" (8). Daily Machine is a small business with two employees and a small operating budget. After buying his new computer and the software for it, Mr. Daily was not willing to invest in additional software that wouldn't make use of the software he had just purchased.

2.1 User Profile

There will be anywhere from 1-5 users of *Valiant*. The software will be installed on a single machine. Users are of two types, owners and employees. The features available in the application are available to all users. The owner of the business will be concerned with all business functions available in the software, and will use the software on a daily basis. However the computer literacy of the owner is expected to be limited to basic computer and software use. The owner should also know how to use the basic functionality of Microsoft Office products. This would include saving a file with the

name of their choice, and printing a file. The employees that will use Valiant will be expected to be at a similar computer literacy level as the owner.

2.2 Design Protocols

The best solution to making customized software was to use C# and access the Microsoft Office Objects, to make them do what is needed. In order to put in all of the functionality needed for a small business, a somewhat robust application was needed. Using VBA from within Office would have created a program that would work, but would have been frustratingly slow. There is also a database back end in Access that is used to store all of the information about customers, orders, products, employees, and expenses. From within Valiant, the user is able to do many tasks, such as enter a customer's name and address, once and then retrieve that information from the database. These tasks used to be done each time an invoice needed to be created.

2.2.1 Database Design

Because there are customer names, addresses, and orders to track, the best method for doing this was to set up a database. Given that Microsoft Access is part of the Office suite and the businesses that I targeted are small and do not have an extraordinary amount of data to store, this was an adequate choice of database software. The database design and table relationships can be found below (figure 1).

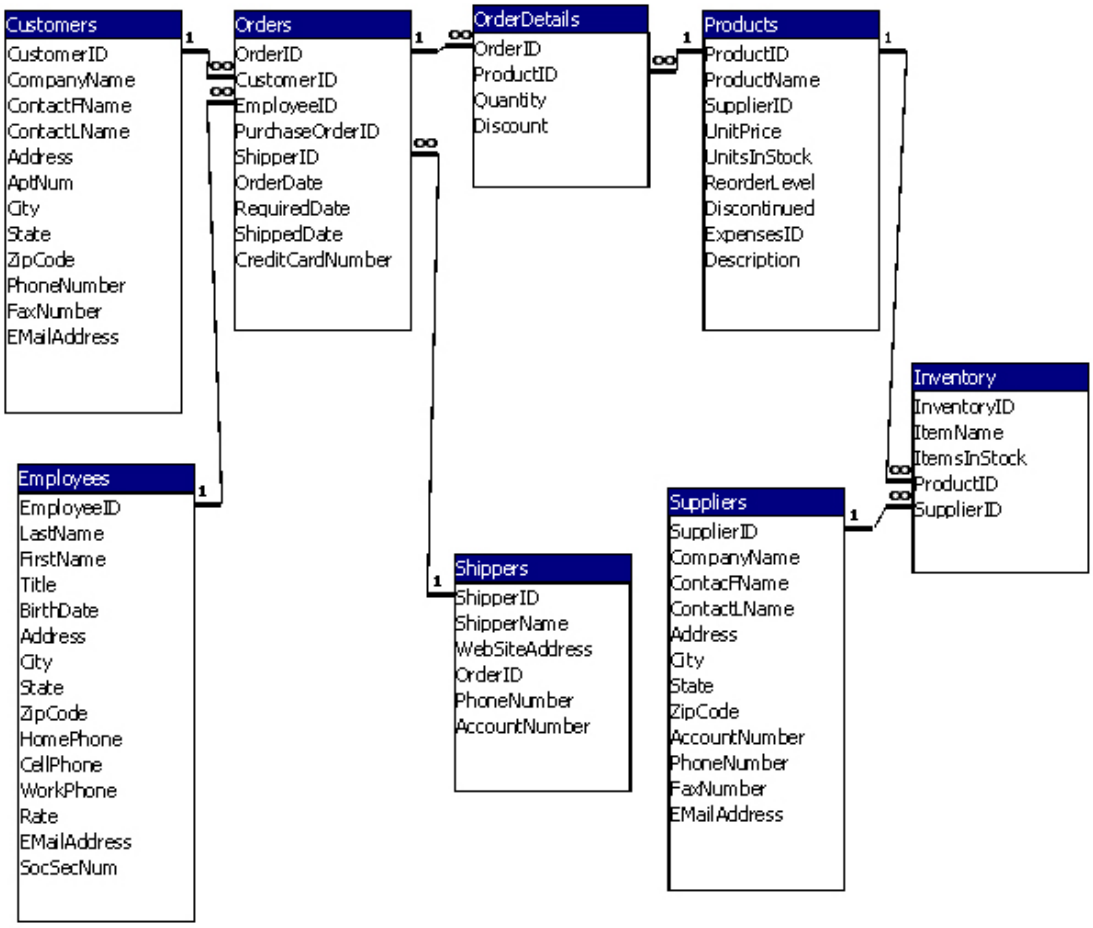


Figure 1. Database Tables

In addition to the database, there is a simple user interface. In my discussions with the business owners, they voiced concern over having to learn a complicated piece of software. Access does have the capability of creating forms and reports. However, a person with limited time and computer knowledge is not capable of taking advantage of these features. That is why I decided that a simple user interface that makes use of the features already built into Word, Excel and Access, was ideal.

Microsoft .Net's C# was the best solution for this. I was able to create a main user window with buttons, drop down lists for customer names, and other easy to use options that would be familiar to any Windows user.

2.2.2 Main Business Flow Design

After thinking through the steps that an owner or employee would go through from first answering the phone, to completing and shipping or delivering the product, I came up with a number of processes that the user would go through. These processes were used in developing the user interface, to make the steps as logical as possible. There are several diagrams explaining the flow of business processes used to develop the application (Figures 2-4).

- *New Customer* - The first process would begin with the user evaluating whether they were talking to a new or old customer. If they are talking to a new customer, then they know immediately that a new order needs to be created. If it isn't a new customer, they would then establish whether the order is to be a new order, or a modification to an existing order.
- *New Order* - If a new order needs to be entered, the user will need evaluate whether the product is a new product that needs to be created or bought from somewhere, or whether the product is an existing product.
- *Shipping* - The user can decide what type of shipping will take place. For certain businesses, the shipping will always be done by the business itself, since certain products require installation. (Figure 2).

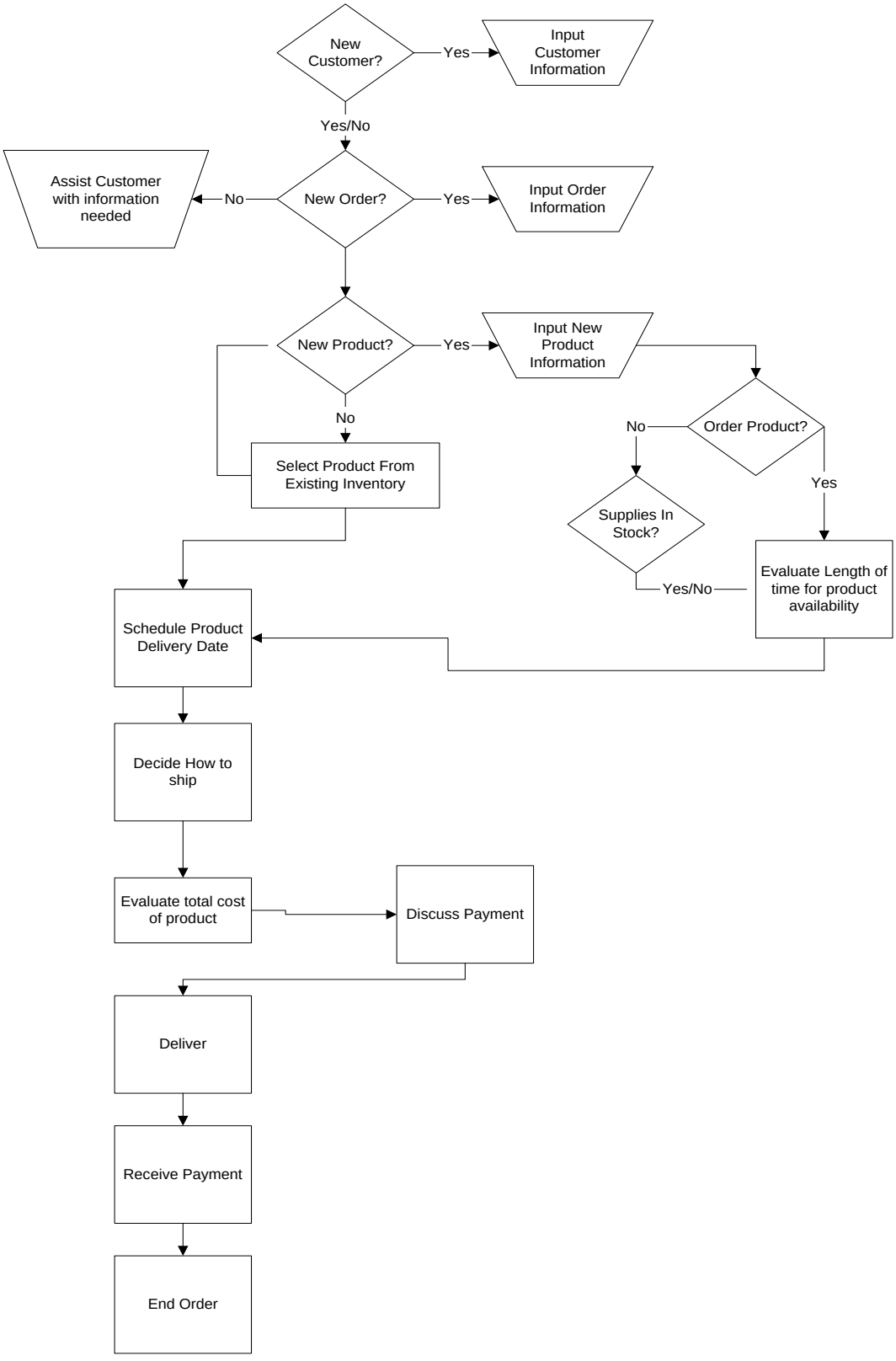


Figure 2. Main Business Flow

2.2.3 Custom Reports

Users should be able to create reports to display the information in the database. They are able to view these reports from within Valiant (Figure 3).

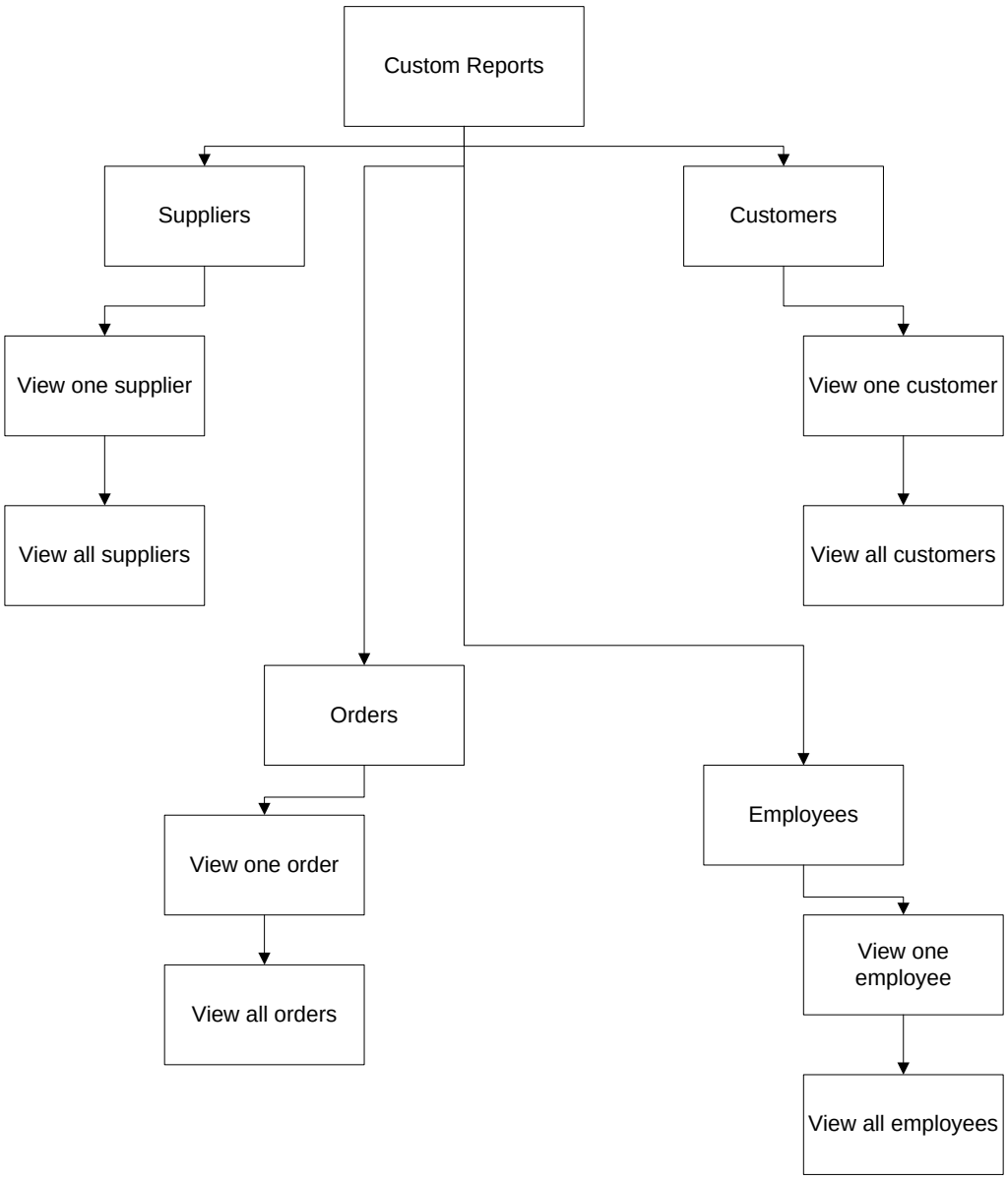


Figure 3. Custom Reports

2.2.1 Main Screen

The main screen appears when the application is opened, and gives the user immediate access to information that would be most frequently used or accessed, such as adding a new order, searching for a customer, and adding a customer or updating a customers' information. It also gives the user access to other features of the program by clicking buttons at the bottom of the screen.

2.2.2 New Customer

When the user needs to add a new customer, all they need to do is click the 'New Customer' Button. This gets a new customer ID, sets the state field to the last state entered, and gives focus to the Company field.

2.2.3 Orders

Whether there is a new customer that needs to place a new order, or an existing customer that needs to place a new order, the user needs to access the Orders form. The user does this by clicking the 'Add Order' button on the main form. This will bring up the Orders tab, where the user can either select the product the customer wants to order, or click the 'Add Product' button, and then add that new product to the customer's order.

2.2.4 View All Customers

Along with being able to view a single customer from the main form, by searching for the customer by various attributes, users can view all of the customers in the database by either clicking the 'View All Customers' button, or clicking on the customers tab.

2.2.5 Products

Users will also be able to go to the products tab to enter new products, view all of the products available, or delete a product from the database.

2.2.6 Invoice

By clicking the ‘Generate Invoice’ button, users are able to generate an invoice in Excel. The invoice will automatically be populated with the data from the Main Form, and the Orders form. The order total will be generated based on the products being ordered.

3. Objectives of the Project

An application for small business owners to manage their business operations needs to have certain specific features available. These features were defined during the design phase and will allow the user to:

- Start a new order
- Decide on a delivery date, and access each shippers information so the shipper can be contacted
- Generate invoices
- Generate reports
- Add and modify customers, products, shippers, suppliers, and employees.

Search for customers

A database with the following tables was also needed to contain information relating to small business functions:

- A Customers table, for the customers that the businesses service
- A Suppliers table, for the companies from which the businesses get their products

- A Customer Orders table, to track orders that are placed by customers/clients, when the product is needed, and the address to which the product will need to be delivered to.
- A Supplier Orders table, to track orders placed for parts, tools, or other supplies needed by the business
- An Order Details table, to show what was ordered, the quantity of units ordered, and cost of the product ordered
- An Expenses table, to track money spent by the business on payroll, electricity, insurance, and other business overhead costs.
- A products table, to contain product information, and to keep track of inventory
- An Employees table, so that employee data can be maintained for payroll, and tax purposes.

3.2 Interface Design

The aesthetic design of Valiant was carefully thought out. It was crucial that the application not appear overly complicated to the user. All users need to be able to sit down and feel comfortable that they can get to the data that they need, or that they can enter it in a timely manner. The colors also needed to be easy on they eye, so that the user is not irritated when looking at the screen for a length of time. Placement of all fields was thought out, so that the items used most would be near the top of the screen.

4. Budget

The budget shows the price of the software was used to complete the project (Figure 4).

Project Budget	
Product	**Price**
Microsoft Office XP	$579.00 http://shop.microsoft.com
Personal Computer	$1699.00 Best Buy
Programming Office XP	$35.00 http://www.half.com
Microsoft .NET IDE	$1085.00 http://shopper.cnet.com/shopping/resellers

Figure 4. Budget

5. Timeline

The overall timeline shows where the project began. It continues through to the current months and on to when the project will be finished (Figure 5).

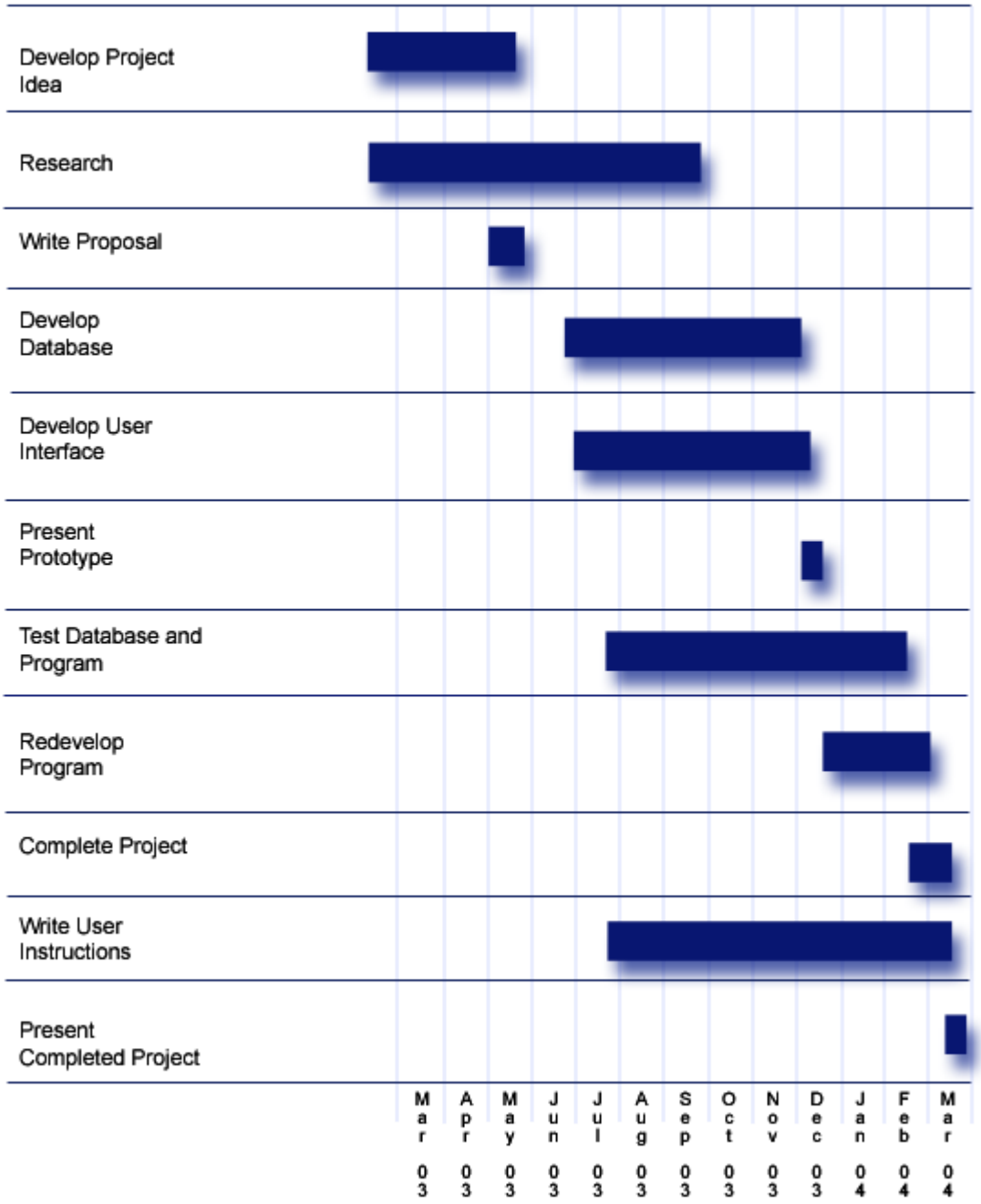


Figure 5. Timeline

6. Proof of Design

This section covers the deliverables of the project, proof that my design concepts were viable.

6.1 Main Form tab

The main form of Valiant is the first part of the application that users come in contact with. From here, the user, which would be an owner or employee of a company, would select their employee ID from the drop down list. After this, they come upon the 'Search By' box, where they can select whether to search for a customer by the customer's ID, Order ID, Purchase Order number, Last Name, Company Name, or Phone Number. Once the user selects one of the radio buttons, the cursor immediately go the text box next to the radio buttons, so the user can then enter the value they wish to search on. After a value is entered, the user then clicks the search button, and if there is a customer in the database that matches the search criteria, the customer information will be populated at the bottom of the form. If there is order information in the Order and Order Details table, that information will fill the Order information table. The user then has the option to modify customer data, or click the 'Add Order' button.

This form was designed based on the 'Z' principle of graphic design. This principle is based on research that shows that when a user looks at an image, their eyes follow a 'Z' pattern. That is why the most commonly used portions of the form are at the top, starting from the left hand side, and flow in a 'Z' pattern, to the 'Exit' button, which exits the application (Figure 6).

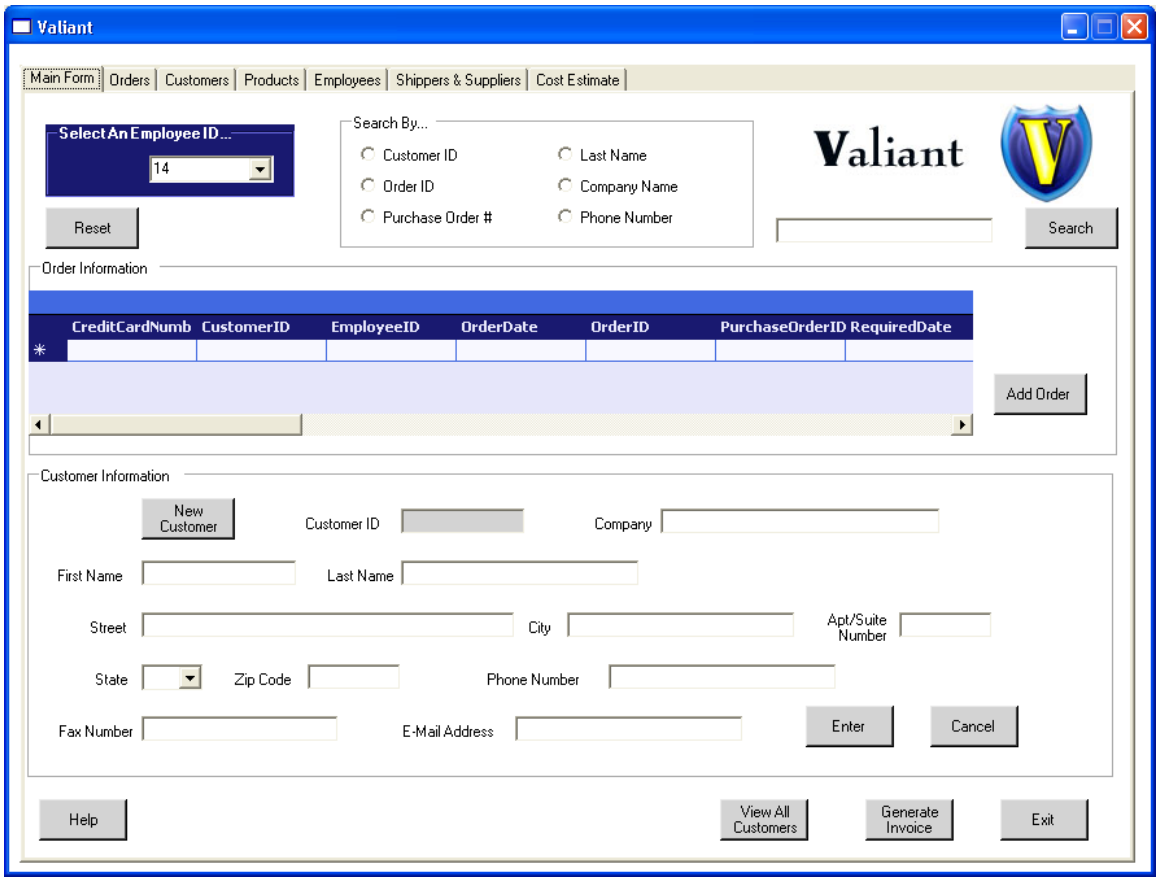
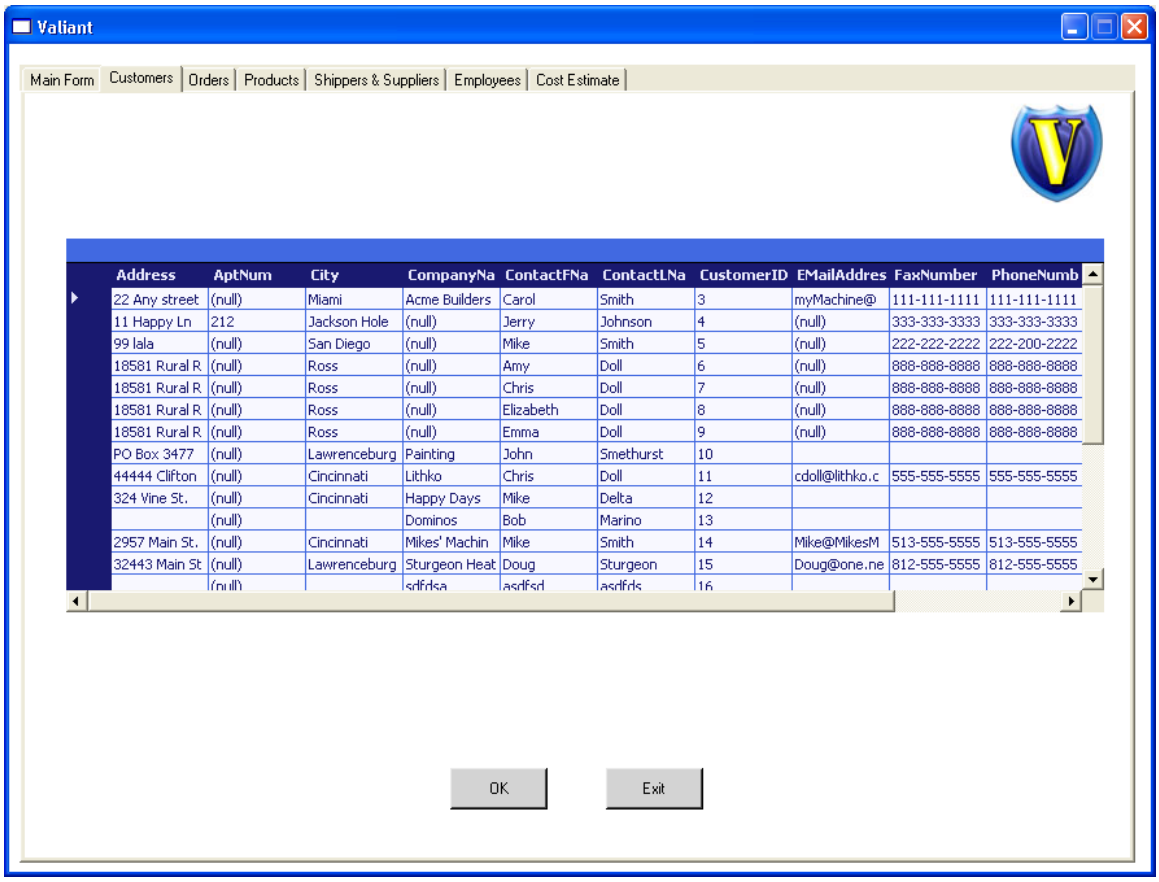


Figure 6. Main Screen

6.2 Customers tab

The Customers tab allows the user to view all of the customers stored in the database at one time. The user can access this information by either clicking 'View All Customers' button at the bottom of the 'Main Form', or by simply clicking the customers tab (Figure 7).



Address	AptNum	City	CompanyNa	ContactFNa	ContactLNa	CustomerID	EMailAddres	FaxNumber	PhoneNumb
22 Any street	(null)	Miami	Acme Builders	Carol	Smith	3	myMachine@	111-111-1111	111-111-1111
11 Happy Ln	212	Jackson Hole	(null)	Jerry	Johnson	4	(null)	333-333-3333	333-333-3333
99 lala	(null)	San Diego	(null)	Mike	Smith	5	(null)	222-222-2222	222-200-2222
18581 Rural R	(null)	Ross	(null)	Amy	Doll	6	(null)	888-888-8888	888-888-8888
18581 Rural R	(null)	Ross	(null)	Chris	Doll	7	(null)	888-888-8888	888-888-8888
18581 Rural R	(null)	Ross	(null)	Elizabeth	Doll	8	(null)	888-888-8888	888-888-8888
18581 Rural R	(null)	Ross	(null)	Emma	Doll	9	(null)	888-888-8888	888-888-8888
PO Box 3477	(null)	Lawrenceburg	Painting	John	Smethurst	10			
44444 Clifton	(null)	Cincinnati	Lithko	Chris	Doll	11	cdoll@lithko.c	555-555-5555	555-555-5555
324 Vine St.	(null)	Cincinnati	Happy Days	Mike	Delta	12			
	(null)		Dominos	Bob	Marino	13			
2957 Main St.	(null)	Cincinnati	Mikes' Machin	Mike	Smith	14	Mike@MikesM	513-555-5555	513-555-5555
32443 Main St	(null)	Lawrenceburg	Sturgeon Heat	Doug	Sturgeon	15	Doug@one.ne	812-555-5555	812-555-5555
	(null)		sdfdsa	asdfsd	asdfds	16			

Figure 7. Customers Tab

6.3 Orders tab

From the ‘Orders’ tab, users can enter a new order. A new Order ID number is generated for each new order. If the customer information was not filled out in the Main Form by the user searching for a customer that they know is already in the database, a Customer ID is generated at this point, and populates the Customer ID field. The employee ID field is automatically populated with the Employee ID that is selected from the drop down list on the Main Form. The Purchase Order ID number is also automatically generated, and increments for each order placed. This will be the value that is the invoice number when an invoice is generated. After the user selects a product from the products drop down list, then enter the quantity of the product the customer wishes to

order. After a quantity is ordered, the user clicks the 'Add To Order' button. This will calculate the total price of the product, based on the unit price, and populate the Order Total field. For each product added, then order total increases. After the user has entered all of the products that the user wishes to order, the OK button is clicked. This will then take the user to the Main form, which will display a summary of the order. (Figure 8).

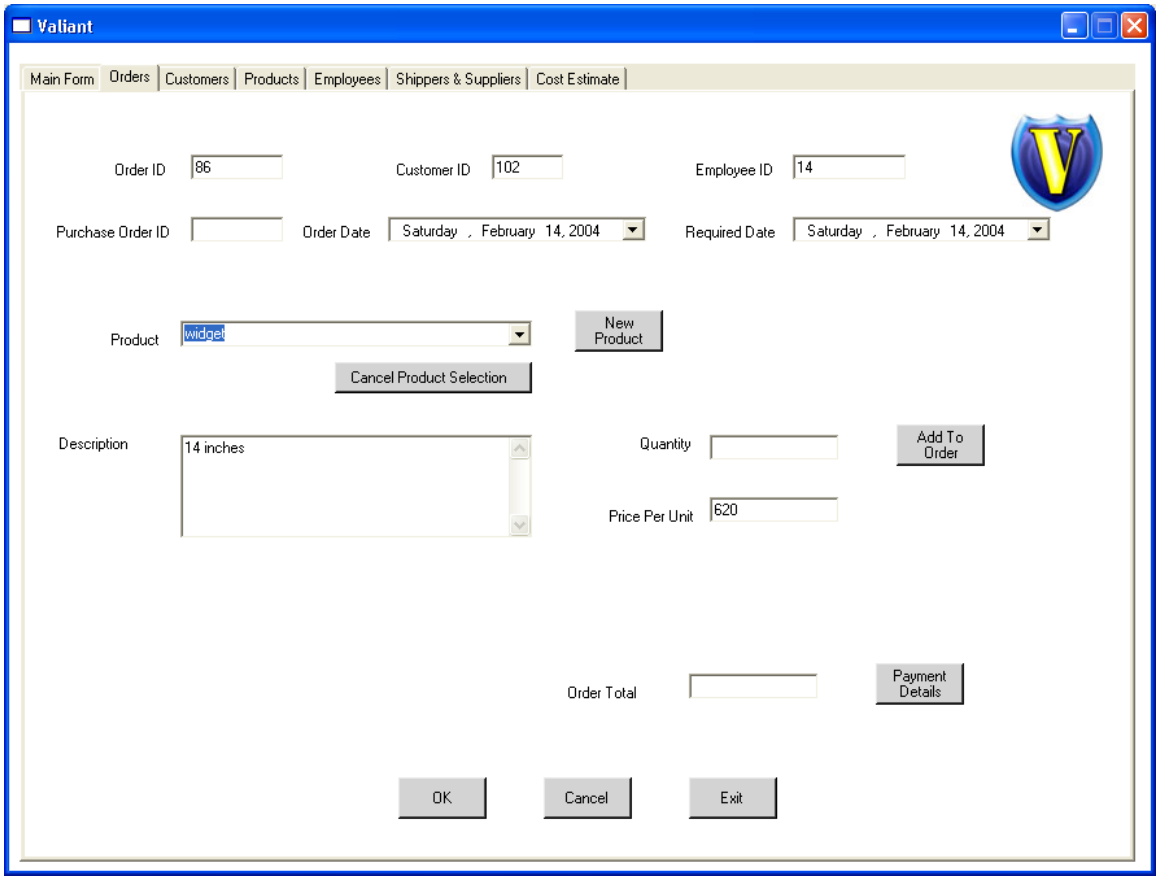


Figure 8. Orders Tab

6.4 Products tab

If there is no product in the database that is what the user needs, the user will click the 'New Product' button, which brings up the 'Products' tab. After the user goes

through the steps of creating a new product, which will be looked at next, they need to enter the quantity of the product the customer wants to order, and any discount, if there is one. The Description text box, allows the user to input any details that pertain to the specific product, such as measurements, color, etc. If there are multiple products to be ordered, the user can then click, 'Add to Order', so that another product can be selected from the list, and added. This can be done as many times as needed.

The next step is for the user to select the date that the product is being ordered on, and the date that the product is required by.

6.5 Products tab

The user can get to the Products tab by either clicking directly on the tab, or as discussed earlier, by clicking the 'Add Product' button from the Orders tab.

If the user clicks directly on the products tab, there are 3 buttons available to choose from. The user can add a new product, view a product, or view all products in the database. All of the tabs that have multiple options available have the buttons for those options located in the middle of the page. While the appearance is plain, it allows for ease of use, which is ideal for the level of computer knowledge, the users of Valiant will have (Figure 9).

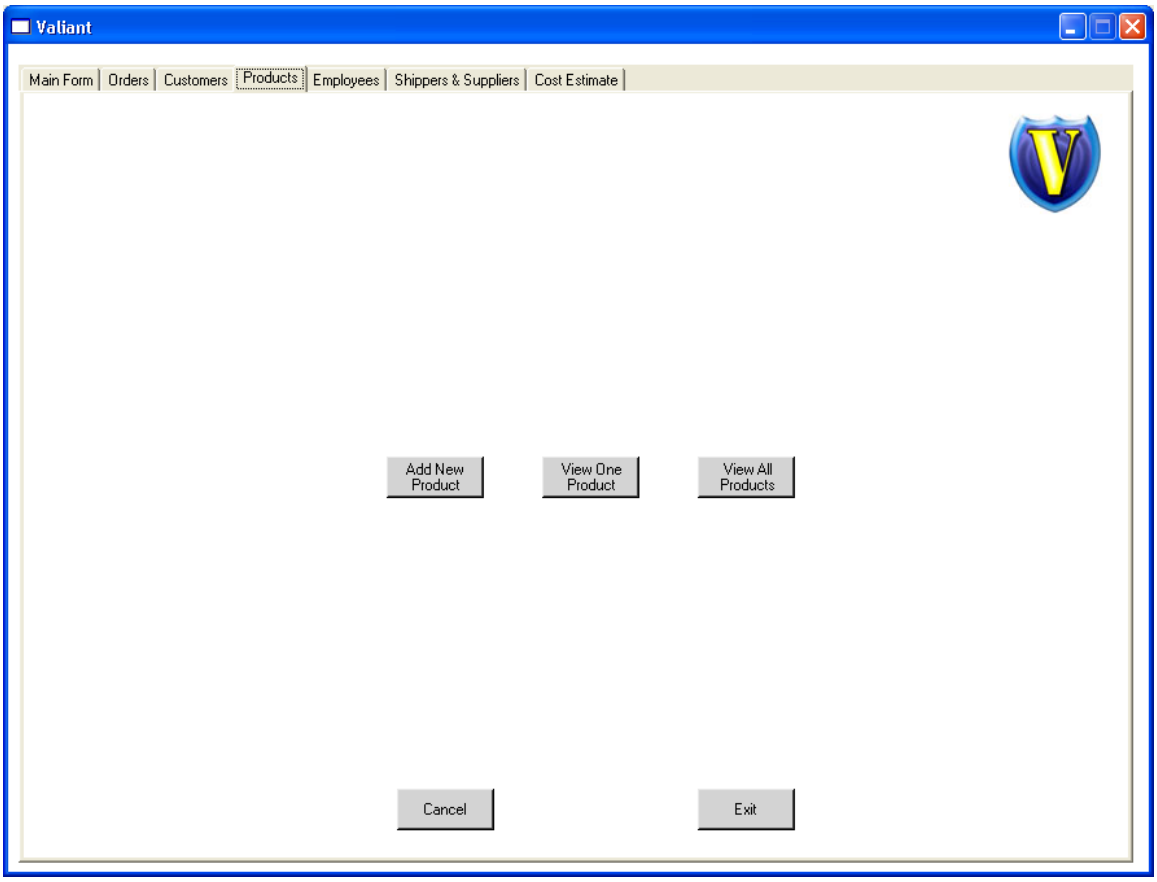


Figure 9. Products - Main Tab

6.5.1 Products Tab – Add a new product

The 'Add a new product' functionality is available from the Orders form while entering a new order, or from clicking directly on the tab, as discussed previously. This flexibility is ideal so that if new products need to be added to the database even when there is no customer to add an order for, the user can do so (Figure 10).

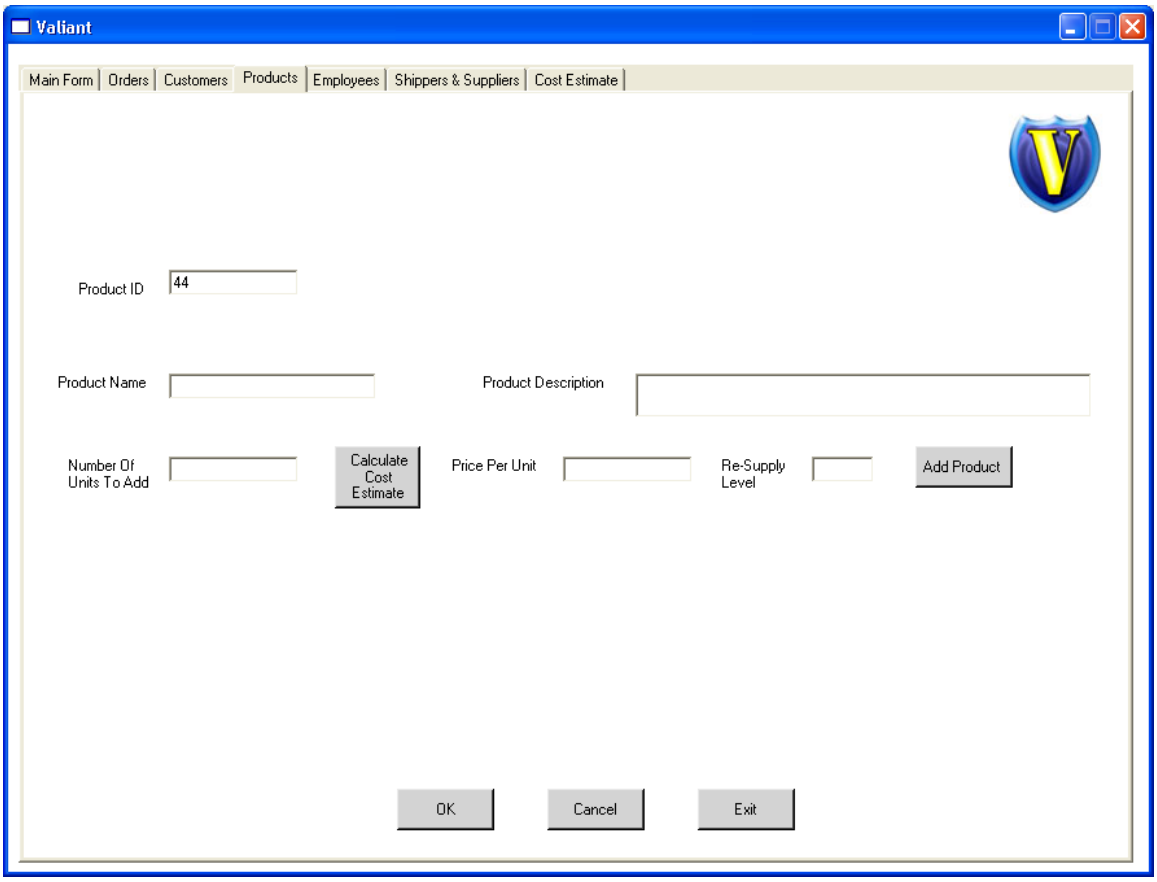


Figure 10. Products Tab – Add a new Product

6.5.2 Products Tab - View One Product

From this tab, users can search for a product on either the product ID, or the product name (Figure 11).

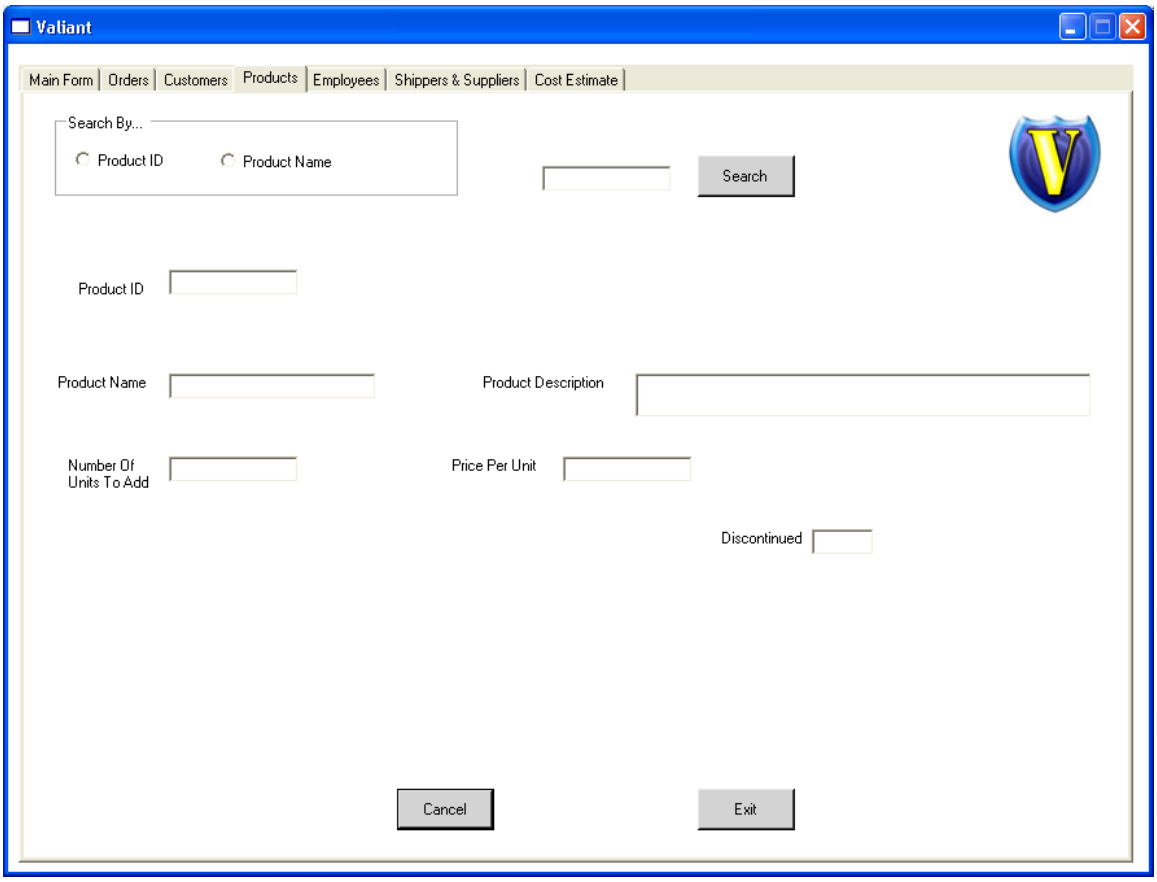


Figure 11. Products Tab - View One Product

6.5.3 Products Tab - View All Products

Users are able to view all of the products in their database from this view. The data is put in to a data grid, and users are able to scroll through the data.

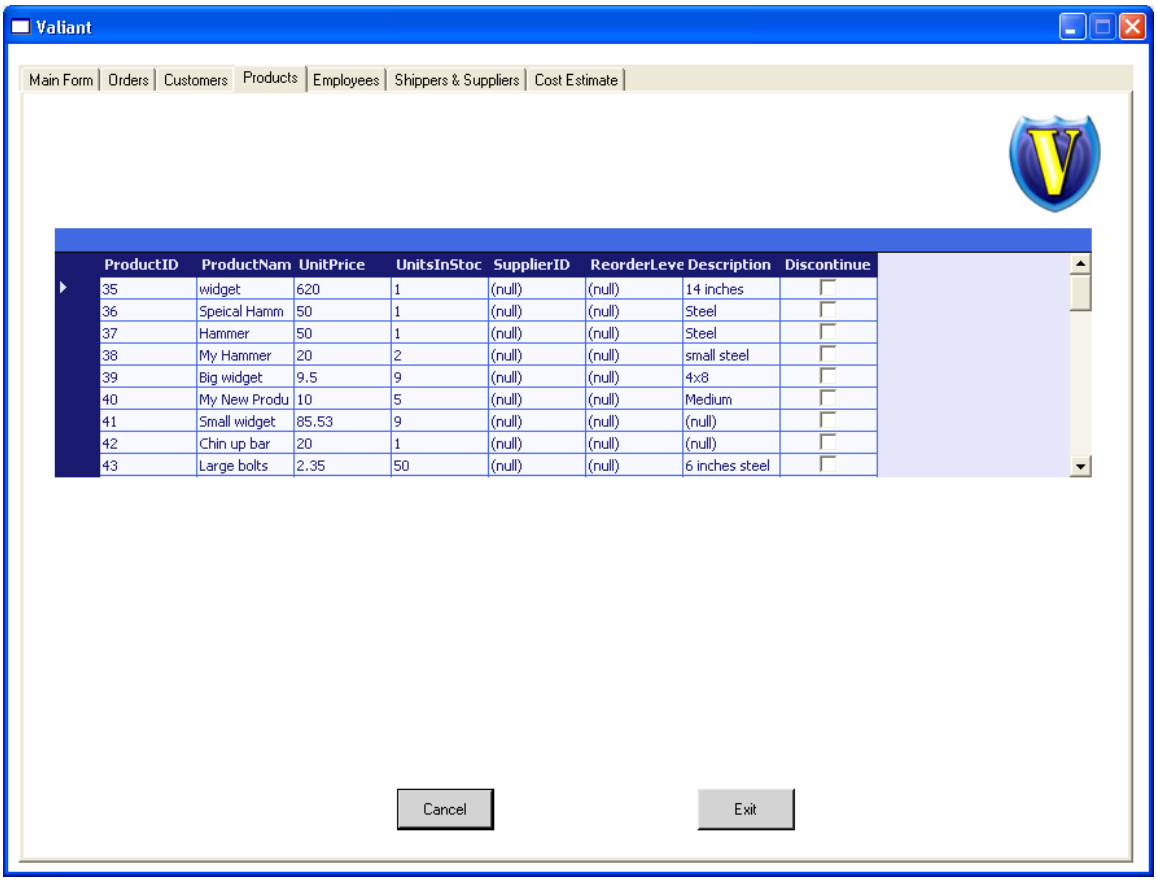


Figure 12. Products Tab - View All Products

6.6 Shippers and Suppliers tab

All companies whether large or small have a supplier. There are supplies that are need ranging from basic office supplies, to parts needed to make a product, to the actual product itself. Some companies also need to use a shipping agent of some sort at one time or another.

6.6.1 Shippers and Suppliers – Main Tab

From this tab, there are four buttons available to users. They can select to add a new shipper or supplier, or to view all shippers or suppliers (Figure 13).

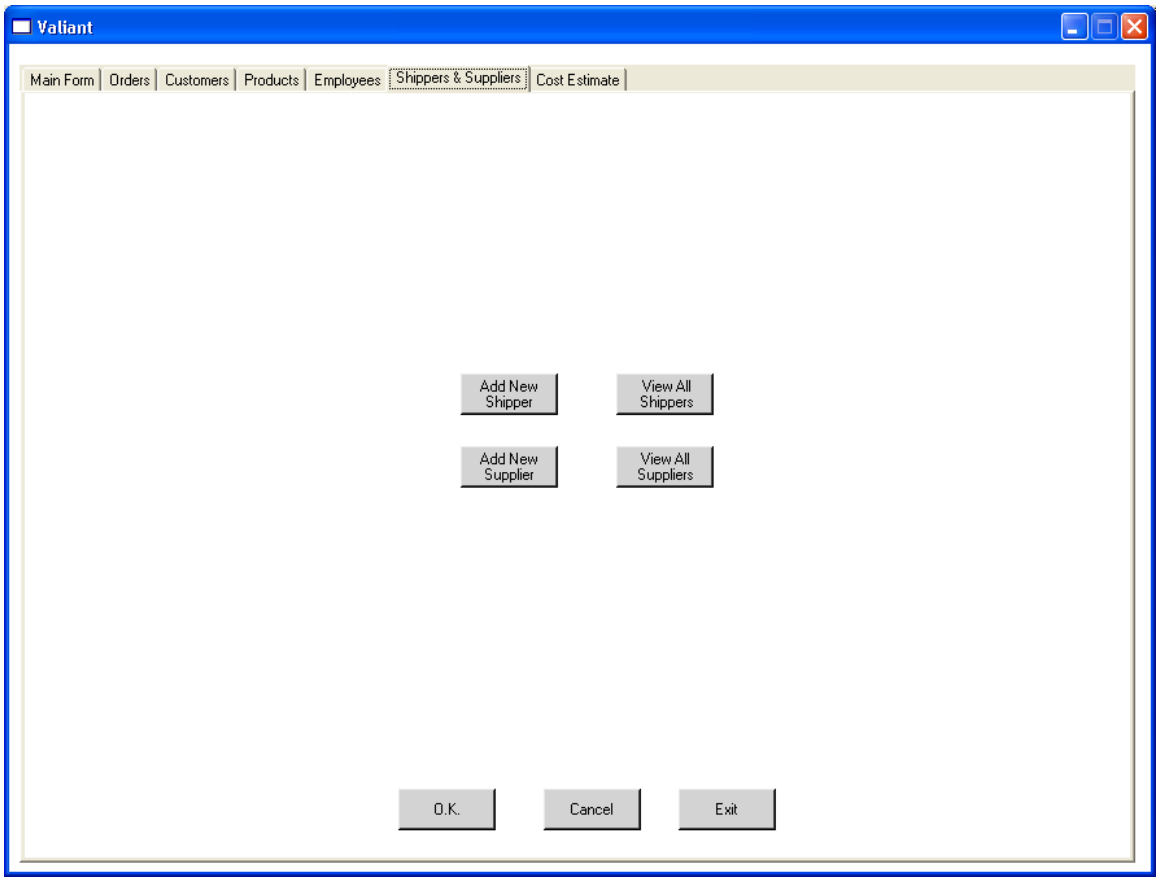


Figure 13 – Shippers and Suppliers Main Tab

6.6.2 Shippers and Suppliers Tab – Add New Shipper

Users are able to add a new shipper from this view. A shipper Id is automatically inserted in to the Shipper Id field (Figure 14).

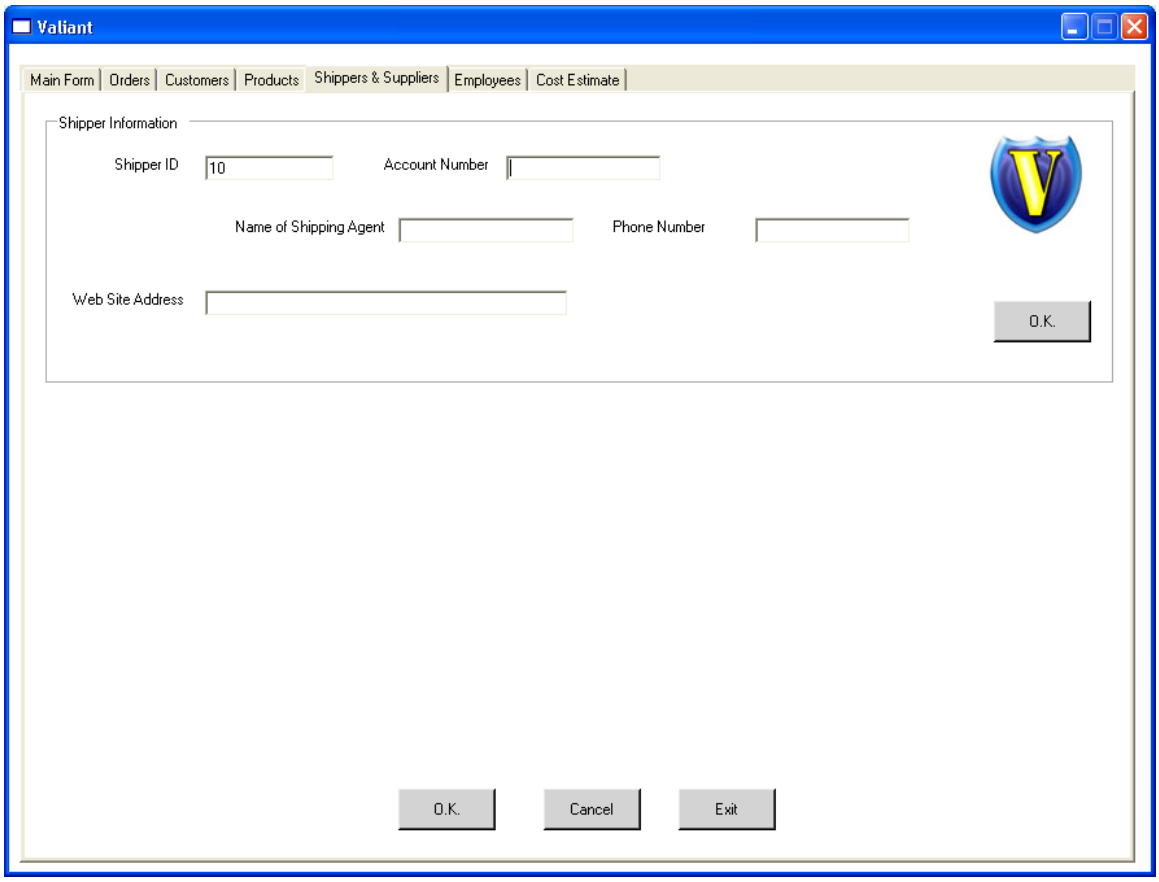


Figure 14. Shippers and Suppliers Tab – Add New Shipper

6.6.3 Shippers and Suppliers Tab – Add New Supplier

Users able to add a new supplier to their database (Figure 15).

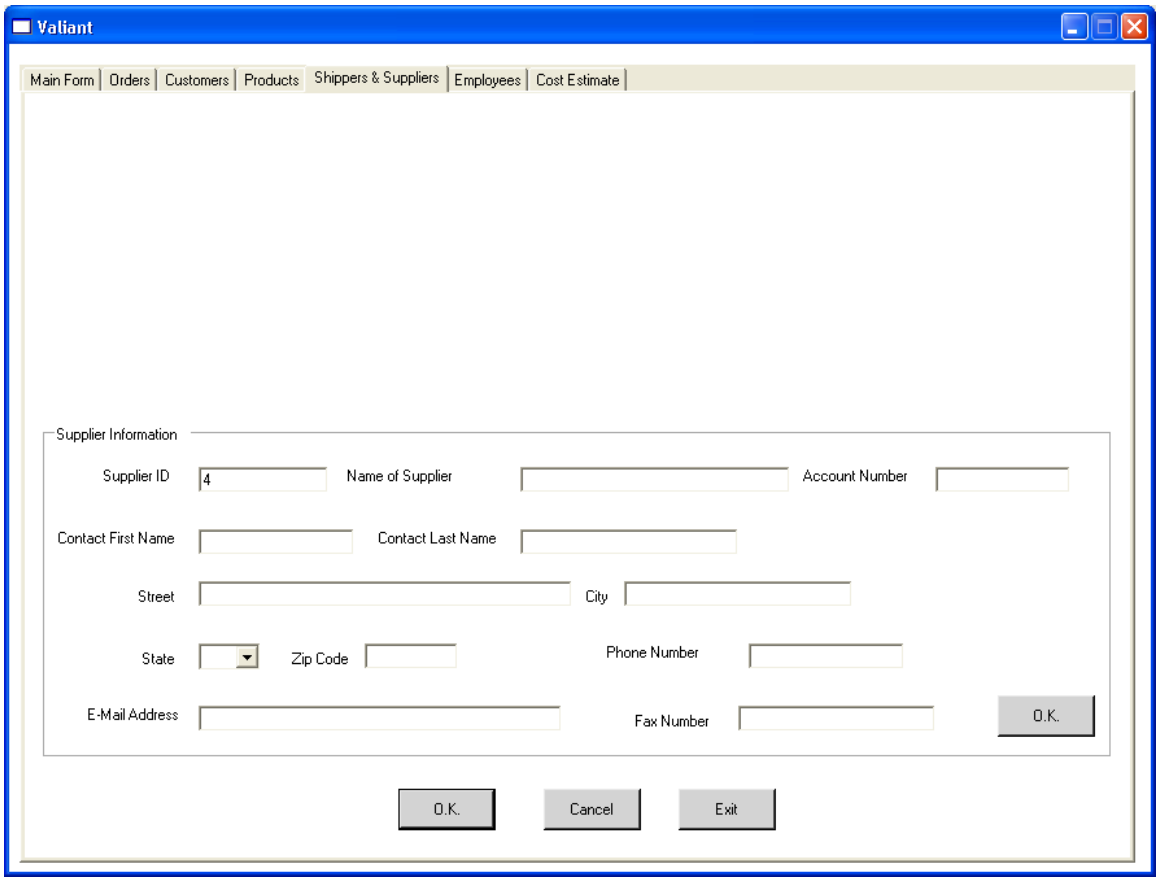


Figure 15. Shippers and Suppliers Tab – Add New Supplier

6.6.4 Shippers and Suppliers Tab – View All Shippers

All of the shippers in the database are available from this view. This is convienient in that users don't have to take the time to do a search for a shipper when they need one. The user can simply click, 'View All Shippers', and they will instantly be brought to the view with all of the shippers, and their contact information (Figure16).

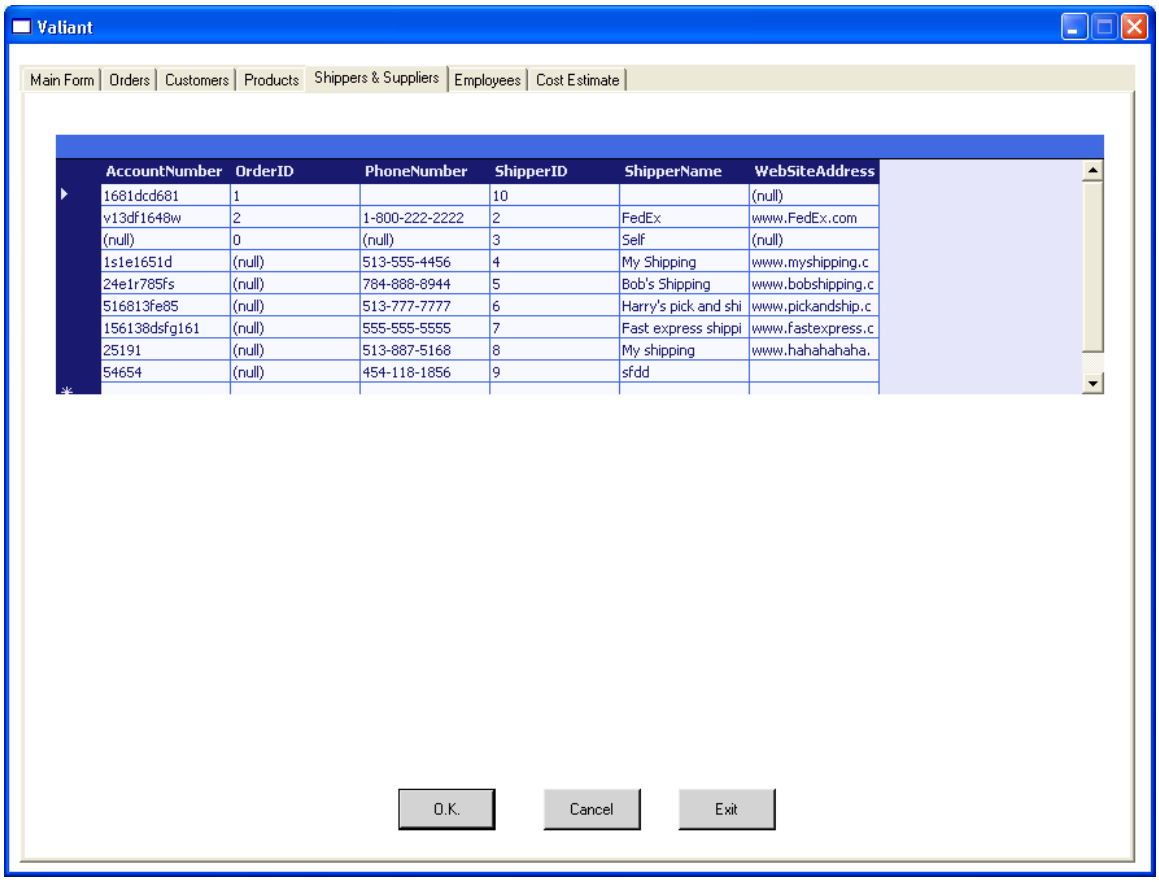


Figure 16. Shippers and Suppliers Tab – View All Shippers

6.6.5 Shippers and Suppliers Tab – View All Suppliers

All suppliers are available from this view. For the same reason that all shippers are viewable at once, users need to be able to access supplier contact information as quickly as possible (Figure 17).

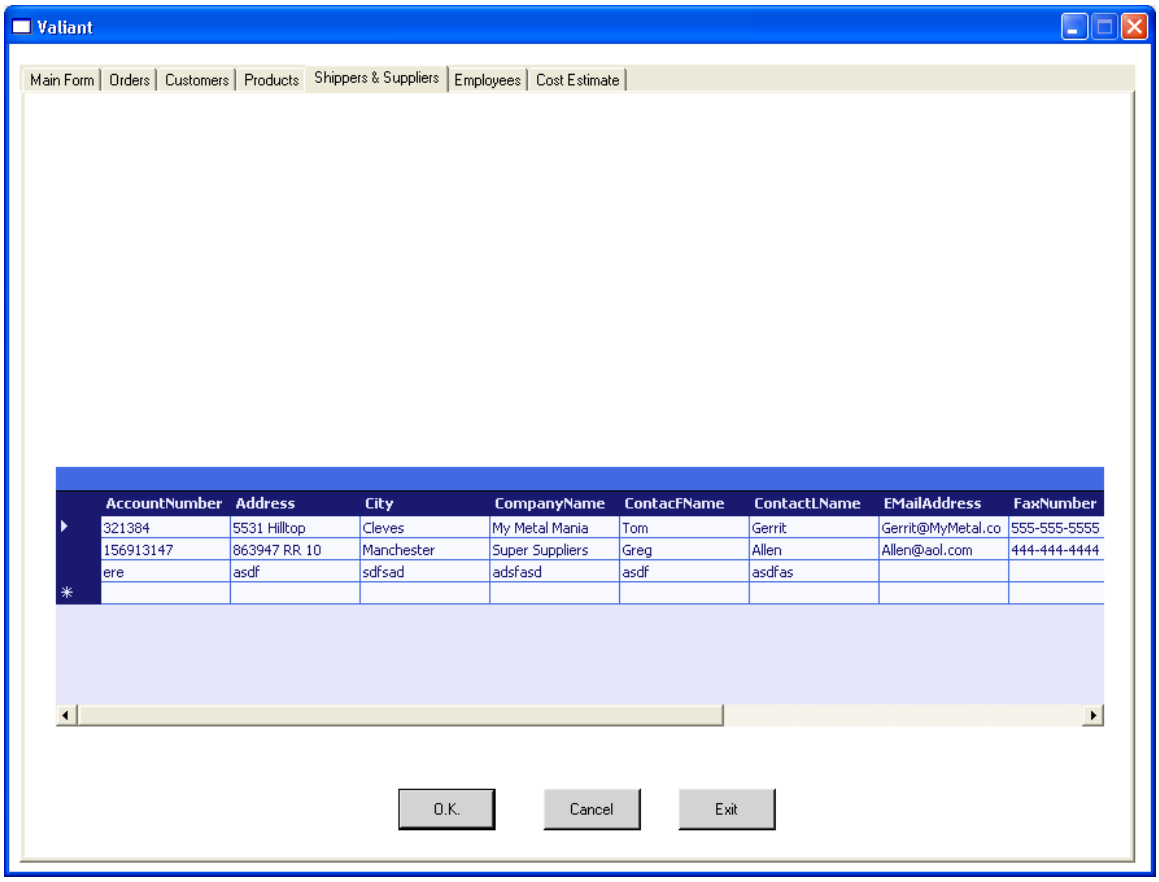


Figure 17. Shippers and Suppliers Tab – View All Suppliers

6.7 Employees tab

Using the same appearance as the other tabs for user comfort, the Employees tab is available with view one, add one, and view all features as well. The user clicks a button, and the tab makes the features available to the user that is needed for the functionality they wish to use (Figure 18).

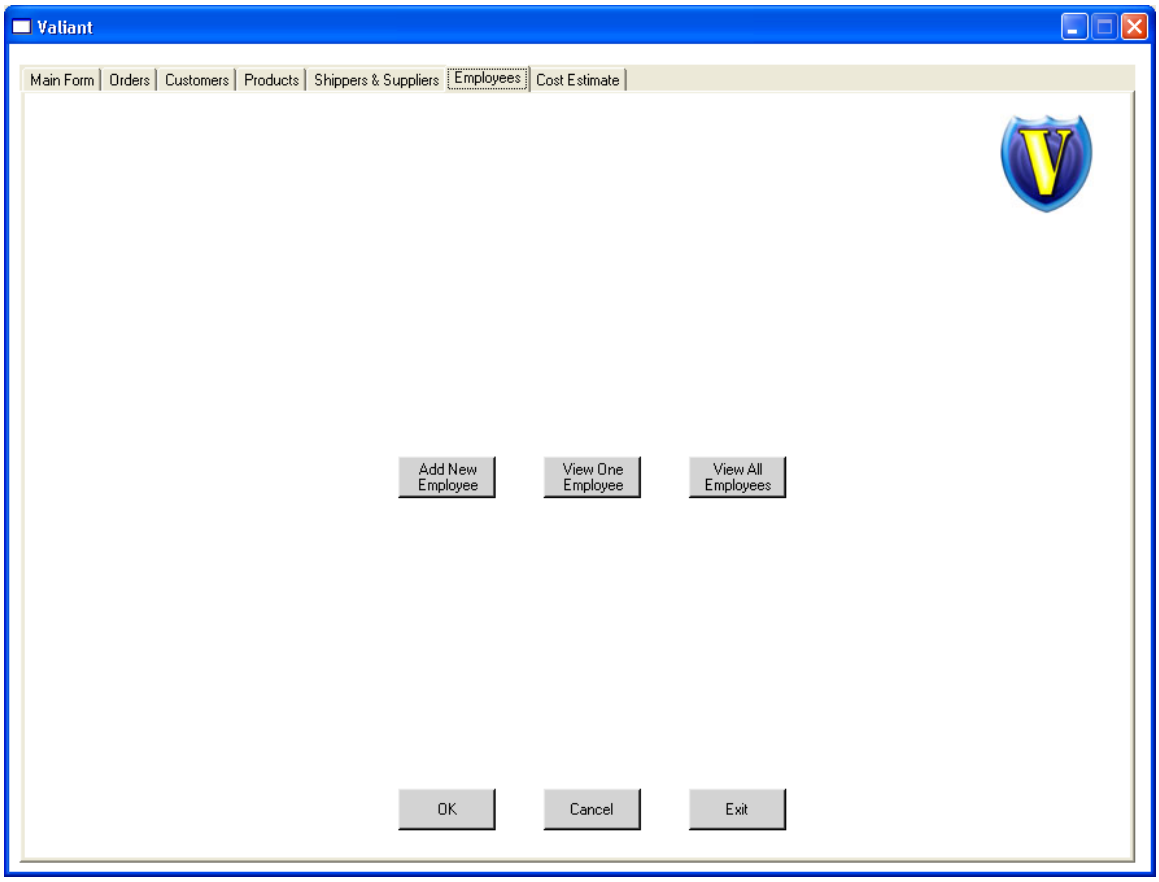


Figure 18. Employees – Main Tab

6.7.1 Employees Tab – Add New Employee

To make sure that users enter the social security number in the correct format, when they click the button to add a user, red text appears above the field, instructing them on how to enter the data (Figure 19).

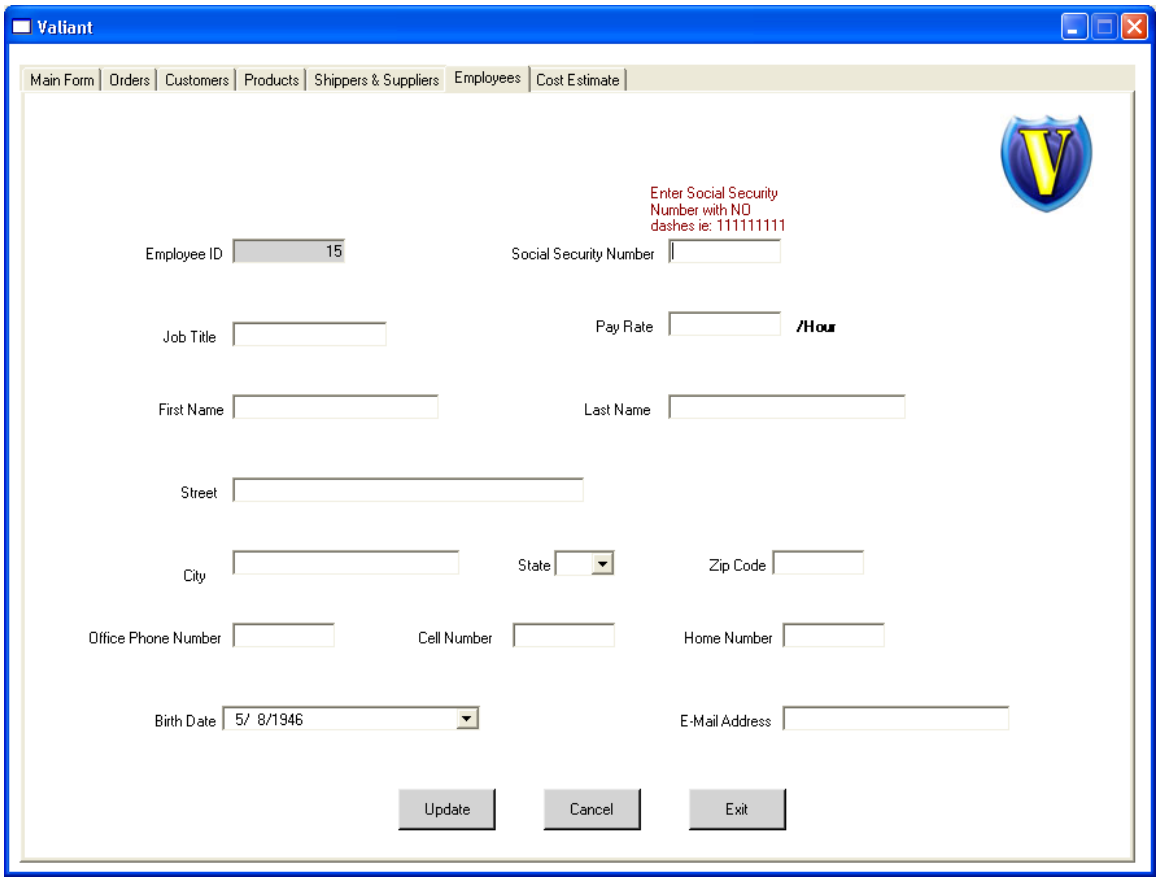


Figure 19. Employees Tab – Add New Employee

6.7.2 Employees Tab - View

Users can also search for an employee by their last name, social security number, or employee ID, which is unique to each user, and separate from the social security number (Figure 20).

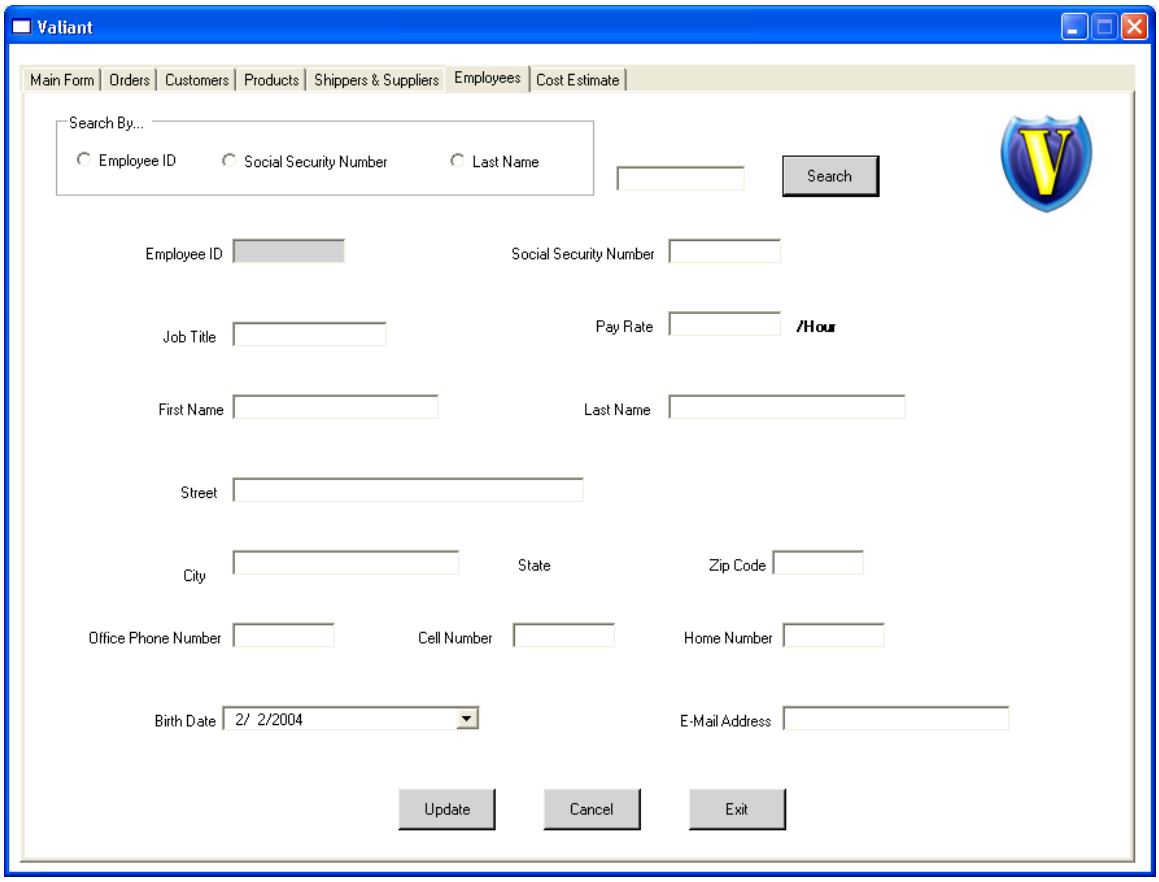


Figure 20. Employees Tab – View One Employee

6.7.3 Employees Tab – View

Users are also able to view all of the employees that they have in the database by clicking the 'View all employees' button (Figure 21).

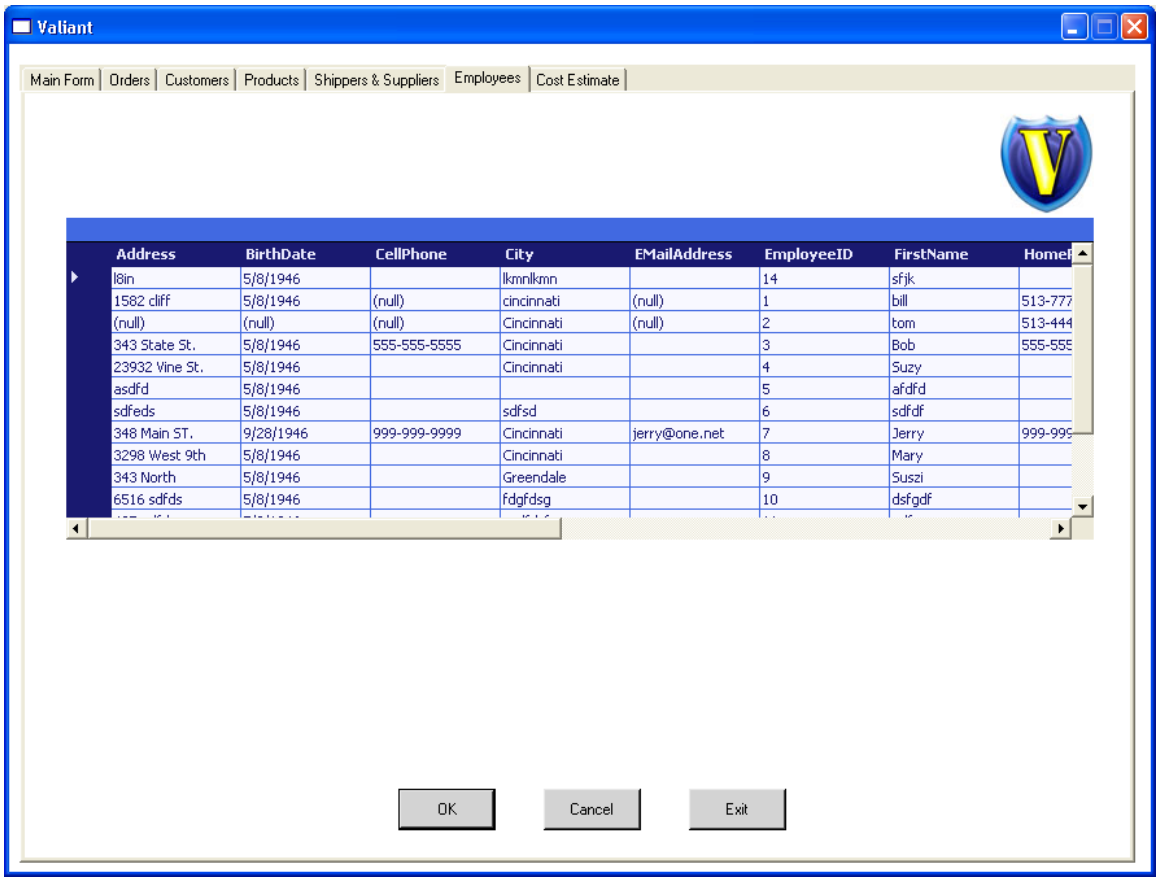


Figure 21. Employees Tab – View All Employees

6.8 Cost Estimate tab

The cost estimate tab is available either directly, by clicking on the tab, or through the products form. If a customer calls and simply wants an estimate for a certain product, including man hours, the user can easily click this tab, and calculate the amount. The user also needs to figure out what a product would cost, during entering a new product in to the database, so that a 'per unit' cost is entered in to the database (Figure 22).

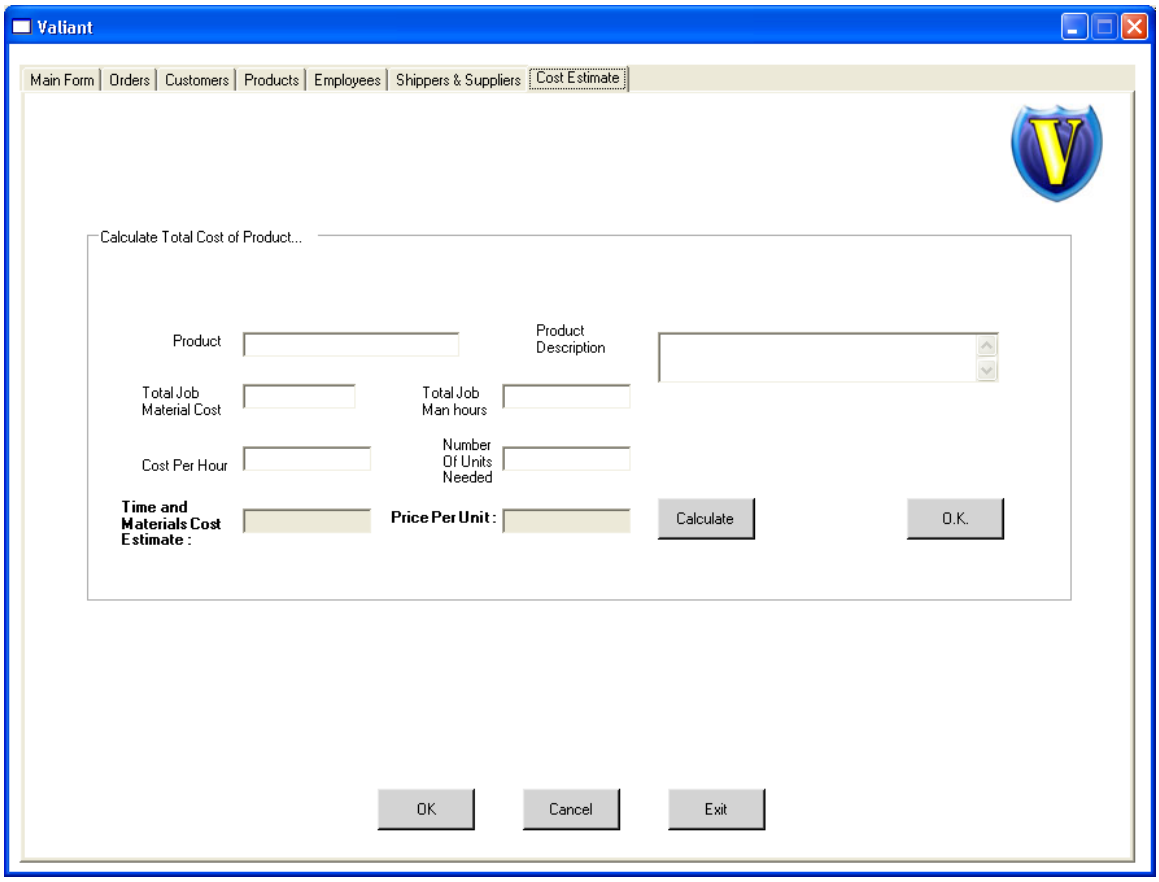


Figure 22. Cost Estimate Tab

7. Testing

During testing there were several errors in the program that were discovered. These are just 3 of the testing scenarios and what was done to resolve the issues.

7.1 Test scenario 1

During testing of Valiant I found that while all of my deliverables were completed, I didn't include the functionality to allow a user to enter more than one customer or order during a session. In order to fix the problem, I made a Reset button that clears all of the data bindings and text boxes to allow the user to start over from the beginning.

7.2 Test scenario 2

When clicking the ‘Add New Employee’ button, instead of the ‘OK’ button being visible to add the new employee, the ‘Update’ button was visible. This was because during the process of making the form more flexible, to accommodate user needs, I added buttons on top of one another, and changed whether they were visible or not for different functionality at different times, without changing the overall design of the form. This also allows the users to be comfortable with the location of the buttons for each type of functionality, which was essential, given their computer knowledge.

7.3 Test scenario 3

When searching for a customer by the values selecting with the radio buttons, an error was thrown that the search parameter was not in the correct format. At the time, there was no check in place to make sure that the user put text in where text should go, and numerical data in for phone numbers, customer IDs, order IDs, and purchase order numbers.

8. Conclusions and Recommendations

8.1 Conclusion

Valiant was created as a solution to the process of managing orders for small businesses with users who have a low to moderate level of computer literacy. It was created with the idea that it would allow small business owners to make use of the Microsoft Office software already installed on their computers and to make use of the functionality that goes unused by less experienced users. It allows users with only basic computer skills to use the more robust features of Office such as invoicing, and information storage in a database, without getting confused and overwhelmed, and

without taking valuable time away from their businesses to learn new software. Valiant takes into account the business flow process and reflects that in its usability. This was done by making the most common business functions, such as adding an order, and adding a customer, available on the Main Form of the application that users see first. C# was the programming language selected to complete the project, because of its ability to create a scaleable application that is able to make use of Microsoft Office objects. This project would be able to be completed on a budget of approximately $3398.00. Through testing and revisions, errors were found and repaired. Most deliverables were completed, with the exception of being able to use Microsoft Outlook for scheduling purposes, from the application.

8.2 Recommendations

While C# ended up being the best programming language for the application, there are other issues to consider, that I didn't think about in the beginning. Since C# is a relatively new language, it was very hard to get help if I got stuck on a problem. Since I was going beyond what is taught in class, it was difficult to find help at school. Books were also not helpful on most of the problems that I had, while web sites were helpful, it was very time consuming sorting through information to get to what I needed.

In the end, I wasn't able to find out how to open Microsoft Outlook from within the application, which resulted in my not being able to complete one of my deliverables. I believe that not only is this a problem with C# being new, but Microsoft just upgraded the .NET programming suite, and has changed how it deals with Office objects. Since I began the project using the old version of C#, I needed to continue, in order to not affect some of the functionality of the program.

Overall this project has been a great learning experience, and I felt satisfied that I was able to put to use some of the programming skills that I have learned the last 2 ½ years.

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