# Project 1: Requirements and Specification Document

for

# Small-Business Unified Database Operations with Online Access

Prepared by Alex Bonomo
Grace Park
Paul Servino
Supritha Sundaram
Neil Tilley
Hanako Ueda
Richard Van
Max Vujovic

for CS 130 Spring '09, UCLA

**April 20, 2009** 

## **Table of Contents**

Ta	Table of Contentsi		
D	Document Revision History		
		omer	
	1.1	Intended Customer	
	1.2	Specific Customer	1
	1.3	Product Suitability for Customer	1
2.	Com	petitive Landscape	
	2.1	Competitor: Everest Software	2
	2.2	Competitor: Microsoft Small Business Management	$\bar{2}$
3		Requirements	
٥.	3.1	Purchase Management	3
	3.2	Sales Management	3
	3.3	Product Management	3
	3.4	Supplier Management	3
	3.5	Shipper (Transportation Company) Management	4
	3.6	Customer Management	
	3.7	Inventory Management	
	3.8	Report Generation	
	3.9	Employee Profile Management	
	3.10	Special Orders	5
	3.11	Performance Requirements	
	3.12	Safety Requirements	5
	3.13	Software Quality Attributes	6
	3.14	Business Rules	
4.		Cases	
	4.1	Client Salesperson Employee Creates a New Customer Order	6
	4.2	Salesperson Employee Inputs a Supplier Purchase	7
	4.3	Warehouse Employee Receives a Supplier Shipment	7
	4.4	Warehouse Employee Ships Out Sale Order to Customer	
5.		Interface Requirements	.8
	5.1	Accessibility	
	5.2	Scalability	8
	5.3	Reliability	
	5.4	Security	8
_	5.5	Multilingual Interface	
		rity Requirements	
7.	Syste	em Requirements	.9
	$7.\overline{1}$	Environment Requirements	9
	7.2	Hardware Requirements	9
	7.3	Communications Requirements	
8.	Spec	ifications	.9
	$8.\overline{1}$	Graphical User Interface	0
	8.2	Graphical User Interface Diagram	1
	8.3	Figure of System Database	12
	8.4	Figures that Specify the System	13

## **Document Revision History**

Rev. 1.0 2009-04-18 – initial version Rev. 2.0 2009-04-20 – Reformatting by all team members

#### 1. Customer

#### 1.1 Intended Customer

This product is optimized for a particular sector of the private business economy. The intended customers are characterized as small in size (less than 250 employees) and operating under a management system that has reached the limit of effective use of employee resources. Because the product re-orients the primarily paper-based business to one electronically handled, this positions the businesses favorably to scale effectively to future growth needs, both in terms of customer base and assortment of products.

Our product is also geared well towards intermediate level businesses (neither source supplier nor consumer-end), both domestic and international sales operations. In other words, the businesses purchase items, in bulk or individually, from suppliers and resell the items to their customers who are local distributors. Accordingly, this product handles both sales transactions from the supply side as well as sales outgoing from the warehouse. Such businesses at this stage have organically grown, but their framework is not especially scalable.

#### 1.2 Specific Customer

The customer requesting the product is *Flowers Express*, a flower import sales enterprise located in Bassano del Grappa, Italy, inland from Venice. *Flowers Express* is a small-sized, mid-level sales and shipping business with between 30 and 40 employees, directed by owner Lori Santacroce. Ms. Santacroce plays an active managerial role in the day-to-day operations. The enterprise operates as does the typical floral business, with a high product turnover rate (2 to 10 days). Sales to customers are directly linked to supplier shipments. Thus *Flowers Express* seeks a system solution with the ability to allocate and accurately track customer requests to supplier inventory shipments. Due to this on-demand point-of-sale method of filling orders, supplier deliveries often times are already allocated to customer orders prior to the shipment's arrival in the warehouse.

#### 1.3 Product Suitability for Customer

This software system is a replacement from the previous stand-alone individual system, to an online business model. The current business operation is characterized by limited accessibility due to separated databases across major divisions of the enterprise and a lack of an online interface. This document describes the baseline of features to be in use for converting to a unified business database with web-based access. The intent of this product is to provide an interface with many user-friendly features that provide a user experience that is clear and easy to navigate, particularly for less-technically oriented fields of business.

## 2. Competitive Landscape

Competitors in this market sector are developers in the modular database management integration software products sector. Examples are identified below. Generally what characterizes competing

enterprises that offer analogous solutions are the following: distributors of proprietary enterprise software, often at a premium price, with a main selling point advertising seamless integration. In a few circumstances, some competitors require the inquiring customer to restructure its database system, product codes, and order processing procedures previously in use to the enterprise's product modules. A few prominent corporations gear their marketing to large scale business operations under the heading of *Enterprise Resource Planning Software* [1].

Competitors vary in size from serving the needs of vast corporations to small- to mid-size businesses. Larger firms, such as SAP and Oracle, market their products toward large-end businesses, particularly those that are able to afford their premium investment costs. Small-size clients are not suitable customers for such firms, in large part because they do not have the need for a business-wide overhaul of their database structures nor the budget and capital to afford it. The advantage of our product for such small client businesses is the integration of prior database structure, product codes, and user functionality without nearly as extensive of an investment.

Below, by way of comparison are presented closer looks at two sample competitive product lines.

[1] <a href="http://en.wikipedia.org/w/index.php?title=SAP\_AG&oldid=284333995">http://en.wikipedia.org/w/index.php?title=SAP\_AG&oldid=284333995</a> (April 17, 2009) Viewed on: April 19, 2009.

#### 2.1 Competitor: Everest Software

Everest is an all-in-one business suite that includes real-time inventory management and handles purchasing from suppliers, order fulfillment, reports generation, different employee authorization levels, and integrated accounting [2]. Everest is a feature oriented, generalized, and comprehensive but complex solution. Levels of added functionality yield to increased interaction complexity. Everest, moreover, requires direct contact with an Everest sales person for a price quote. Our solution would have a competitive advantage at the price point. By comparison with Everest, our competitive advantage is a much simpler solution with the tradeoff of fewer features but those that are tailored specifically to an shipping & sales business framework.

Everest encourages the purchase of in-house hardware and workstations that once more add to its cost and complexity. By contrast, the solution of this proposal is web-based, running on a server located offsite from the client company premises. Such operational costs are ongoing but minimal, even as low as a \$5/month for a small, reliable hosting account with stable companies offering 99.99% uptime guarantees. In-house hardware generally is both significantly more expensive and less reliable, in addition to requiring a foundational knowledge base and technical expertise. Therefore, for reasons of expense outlays and simplicity of design, our software is a better choice for smaller businesses.

[2] http://www.everestsoftwareinc.com/ Viewed on: April 19, 2009.

## 2.2 Competitor: Microsoft Small Business Management

The small business management application by Microsoft is a packaging of the basic Microsoft Office Suite together with additional financial support software [3]. The common and better known applications such as Microsoft Excel spreadsheet and Microsoft Access along with select number of business management applications make up the components of this product line. It claims "seamless" integration with the various Microsoft Office products. Unfortunately, in many respects it also falls short at the price point. Truly seamless integration is performing all actions in one application. Its strengths are exporting data into standard Excel format.

[3] <a href="http://www.microsoft.com/smallbusiness/products/office/management/default.aspx#Overview">http://www.microsoft.com/smallbusiness/products/office/management/default.aspx#Overview</a> Viewed on: April 19, 2009.

## 3. User Requirements

The Small-Business Unified Database Operations is a replacement for a paper-based business model that is currently in place. Since the new business model is serving as a replacement, all the features of the current system will be incorporated in the new system. The requirements of the client for the product are as follows:

- Track ingoing/outgoing shipments [high priority],
- Make changes in supply product list [medium priority],
- Produce shipping info [high priority],
- Stop shipment or cancel order [medium priority],
- Run reports on customers, supplies, inventory and orders and generate invoices for accounting department [high priority],
- Avoid need to memorize a new set of product codes (transfer items of present business transactions) [low priority],
- Provide appropriate read/write/admin privileges to users [high priority].

All of these features are essential to the business, beginning fundamentally with the "high priority" items.

#### 3.1 Purchase Management

An employee with appropriate authorization shall be able to add and delete new entries for purchases. For existing purchase entries, the employee shall be able to edit or remove information fields associated with those purchases. The employee shall have the functionality to search and find purchases, in a way that can be sorted by various fields.

### 3.2 Sales Management

An authorized employee shall be able to add and delete new entries for sales (client orders). For existing sales entries, the employee shall be able to edit or remove information fields associated with those sales. The employee shall be able use the search function to find sales, in a way that can be sorted by various fields.

#### 3.3 Product Management

An authorized employee shall be able to add and delete new entries for products (general types of items that the business purchases and sells). For existing product entries, the employee shall be able to edit or remove information fields associated with those products. The employee shall be able use the search function to find products, in a way that can be sorted by various fields.

#### 3.4 Supplier Management

An authorized employee shall be able to add and delete new entries for suppliers. For existing supplier entries, the employee shall be able to edit or remove information fields associated with those suppliers. The employee shall be able use the search function to find suppliers, in a way that can be sorted by various fields.

#### 3.5 Shipper (Transportation Company) Management

An authorized employee shall be able to add and delete new entries for shippers. For existing shipper entries, the employee shall be able to edit or remove information fields associated with those shippers. The employee shall be able use the search function to find shippers, in a way that can be sorted by various fields.

#### 3.6 Customer Management

An authorized employee shall be able to add and delete new entries for customers. For existing customer entries, the employee shall be able to edit or remove information fields associated with those customers. The employee shall be able use the search function to find customers, in a way that can be sorted by various fields.

#### 3.7 Inventory Management

The inventory interface links from the home page and is accessible from the left side bar menu. Inventory listings shall include a search function on unsold portions of purchases from suppliers and a full listing of the company's warehouse product contents, in a way that can be sorted by preference. The search function is provided to isolate a particular item or selection of items and display their current status.

#### 3.8 Report Generation

This feature shall allow the client to get a consolidated overview of specific data in the database for various purposes, both in on-screen and in printed out formats.

#### 3.8.1 Inventory snapshot

The inventory snapshot lists the product IDs, item names, and their unsold quantities. This makes available an inventory check allowing an accurate verification of this list against the contents of goods in the warehouse.

#### 3.8.2 Sales in a Time Frame

This report conveys the level of sales over a selected time period (as example, by week, month, or year). This interface generates a summary of sales in the specified time frame. It lists the product ID, the name of the product, the quantity that has been sold, and the value of sales.

#### 3.8.3 CustClear

CustClear is a client-specific report used for customs clearance. A Microsoft Excel spreadsheet file is then generated for the user to view and download. Initially, our primary implementation is in English, with the option to implement equivalent generation of forms in foreign languages as required.

#### 3.8.4 Nightly Database Backup/Export

An export of the database is saved as a backup onto a specified machine to be ready in the event of various failure modes. This feature may be implemented as an automatic feature, for example,

nightly outside regular business hours. Additionally, there must be a feature to import the database snapshot to restore information from the backup in the need of database recovery.

#### 3.9 Employee Profile Management

#### 3.9.1 Administrative Level

This function allows an administrator (e.g. owners of the company) to manage employees' profiles. On the navigation panel, this is accessed from a tab that shall be viewable only to administrators. From here, an administrator shall have the ability to view all employees' profiles. The user must also be able to add, edit, reactivate, deactivate, and delete any employee's account. Detailed information shall be accessible by clicking on an employee line.

#### 3.9.2 User Level

This function with user-level privileges shall allow a given employee to edit his own profile.

#### 3.10 Special Orders

Special orders are an exception to the normal day-to-day operation and are handled separately. A special order is characterized as atypically large, rare or exotic, or urgent and requiring handling within a compressed delivery window. The Small-Business Unified Database Operations provides for this option by recording relevant data from those special orders and proceeding with a supervisor's override clearance.

#### 3.11 Performance Requirements

This program must be able to accept data entries, manipulate search requests, and generate asneeded report documents on demand. Since the targeted client business is a small, nontechnically based business, such an online system must handle requests efficiently without locking up resources or locking out other users for long periods during operations hours. In other words, the database is updated at input commit time.

#### 3.12 Safety Requirements

With proper operation of the program, the most severe risk is the loss of unsaved work during a malfunction, for example, a power outage or loss of connectivity. In such a case occurring while loading or saving, a possible loss of a day's business transactions could occur.

At all times, data field entries must be properly sanitized to ensure that no exploits can be performed on the software. This is to guard against malicious alteration of the contents of the database.

Interference with outside programs is not considered a significant concern due to the nature of a contained SQL server and secure internet communications. Accordingly, the operation of this product poses no risks to concurrently running programs on personal computers, servers, or the internet network.

Regular backup mechanisms are an integral part of any reliable database system. In case of a power failure, a backup system must be in place. The product handles this in the following ways:

at the Administrator level, there are options to generate several data reports (for example, daily gross sales, customer entries, supplier entries, received shipments, etc.). Moreover, the database server can be directed to make a backup copy as needed or on a daily/monthly basis.

#### 3.13 Software Quality Attributes

The product is marked by quality characteristics such as portability, flexibility, usability, and adaptability. The Small-Business Unified Database Operations shall be able to import data to synchronize uploads of data from work that was done offline. It shall also perform robustly to handle non-standard inputs. For example, for exceptions to the address format in the customer database, an empty field will be acceptable input, with the option to list the correct address in a comments section. Considering the target users, the software should be tolerant to mistaken usage of features. The Small-Business Unified Database Operations must also be highly usable, as the key idea behind the project is to transition a small-scale business from a paper-based, multiple databases enterprise to a single-entry, scalable, highly searchable, web-accessible business database system. Activities should feel straightforward and not require extensive technical training.

#### 3.14 Business Rules

There are operating principles to follow while using this software. The username and password for user accounts must be controlled and distributed by an Administrator-level user, for example, the owner or a designated department manager. It is also recommended to change the password periodically for enhanced security.

#### 4. Use Cases

Below are the primary day-to-day operations of the business and their corresponding software actions. They are as follows: 1) a business front-end salesperson creating a sale; 2) a business front-end salesperson making a purchase of goods from a supplier; 3) a business back-end warehouse employee processing a shipment arrival and completing a customer order; 4) a similarly structured but alternative request.

#### 4.1 Client Salesperson Employee Creates a New Customer Order

- Salesperson logs in.
- Salesperson clicks "Orders" navigation tab.
- Salesperson contacts customer by telephone.
- Salesperson clicks "Add Order" from the *object actions menu* in the *inner area*.
- Step 1: Customer Selection:
  - Salesperson clicks "Add New Customer" or enters keywords in a search textbox, clicking "Search for and Select Existing Customer".
  - If "Add New Customer":
    - Enters new customer information and proceeds.
  - o If "Search for and Select Existing Customer":
    - Enters keywords/phrases to search for customer, retrieving listing of customer entries.
    - Clicks "Select Customer" button present within the desired customer entry.
- Step 2: Allocation of a Portion of a Supplier Purchase to this Order

- Salesperson searches for product (by product id, name if available, etc.), retrieving list of supplier "purchase component" entries corresponding to that product.
- Within desired purchase component entry:
  - Salesperson views the quantity of the supplier purchase still available for sale (quantity not allocated to previous orders).
  - Salesperson considers expiration date of the supplier purchase.
  - Salesperson allocates part of that supplier purchase component to the order.
    - (i.e. enters quantity and clicks "Add to Order" within an entry).
  - Page resets for adding another item.
  - Salesperson eventually clicks "Done."

#### Step 3: Order Review & Additional Information Input

- Salesperson verifies list of added products and quantities, may click remove beside each item.
- Salesperson may click "Add Another Item" (returning to Step 2).
- Salesperson enters additional order information (e.g. comments).
- o Clicks "Place Order".

#### 4.2 Salesperson Employee Inputs a Supplier Purchase

- Salesperson employee calls a supplier and makes a purchase.
- Salesperson employee clicks "Purchases" navigation tab and clicks "Add Purchase".
- Employee searches for and selects a supplier.
- Employee populates a table with rows corresponding to the parts of a supplier purchase, divided by product type (*supplier purchase components*).
- Employee enters the product id for a purchase component either:
  - o Directly.
  - Or searches for a product based on keywords and clicks "Select" button within a product entry.
- Employee enters the quantity for a purchase component.
- Employee clicks "Add Purchase".

#### 4.3 Warehouse Employee Receives a Supplier Shipment

- Warehouse employee physically receives a new shipment from a previous purchase.
- Warehouse employee clicks "Purchases" navigation tab and clicks "Search for Purchase".
- Employee searches for purchase (based on Supplier, Product received, etc.).
- Employee clicks "Edit Purchase" button within the *purchase* entry.
- Employee updates the purchase's "Transit Status" from "In Transit" to "In Stock".
- Employee updates the "Quantity Available for Sale" field to what quantity of the product was actually received and has not spoiled or expired.
- Employee clicks "Save Changes".

#### 4.4 Warehouse Employee Ships Out Sale Order to Customer

- Warehouse employee clicks "Sales Orders" navigation tab and clicks "List All Orders". Orders that are ready for shipment appear at the top of the listing.
- Employee clicks "View Order" button within an order entry.
- Employee views the order's profile page, which lists the corresponding supplier purchase components, allocated to the order.
- Employee gathers the specified components and packages them into a shipment.

- Employee clicks "Edit Order" button on the order profile page.
- Employee updates the sales order status to "Shipped".

## 5. User Interface Requirements

The aim is to make things as intuitive as possible for users, reducing the need for an online help system. While the priority of this feature is the same as the rest of the listed features, the product stands to benefit the most from the proper execution of the user interface. The benefit to an intuitive graphical interface is the ability of business employees to easily use the interface with minimal prior training. The downside of not implementing features in this fashion is software that, while capable, frustrates users and ultimately goes unused.

#### **5.1** Accessibility

The application organizes the ability to view several database tables in an intuitive manner, ability to generate automated reports, provides search functionality and add/edit/remove features to each object in the database from any computer with access to the internet.

#### 5.2 Scalability

The user interface needs to provide a consistent look for the interface for all company employees regardless of location or department. Certain features need to be specific to the business type but will be common for employees of the company. Side-bar menus and search functions need to be common on all web-based interface pages.

### **5.3** Reliability

Errors displayed need to be concise, and in natural language, as the intended audience are employees who will be confused at typical errors that the messages are meant to diagnose. This means that errors should include suggestions as to how to fix the problem, as opposed to the standard which is to simply name the reason for failure.

#### 5.4 Security

The product offers privacy standards – a three-tiered security access levels, with top level access, employee access and external protection. Only authorized access through a standard web browser will be allowed to view the user interface

#### 5.5 Multilingual Interface

Since the customer is an international company based in Italy, the product must provide support for both Italian and English.

## 6. Security Requirements

As the Small-Business Unified Database Operations is web based, privacy requirements are essential. Passwords must be issued by the Administrator, alterable when an employee's

employment status changes, and unique to identify a user by proper authorization level. Web access must be time limited and require re-logging in after limited periods of inactivity. Laptop users should be advised not to save passwords as an automatic log-on setting, to prevent attacks from laptops being stolen. Authorization levels must follow a need-to-know basis, to avoid compromising business contacts and customer database privacy concerns.

## 7. System Requirements

In this section are detailed the external entities on which the system depends including memory and hardware requirements, communication and performance requirements, and requirements of the software and system environment.

#### 7.1 Environment Requirements

This software is designed to run on a server with web-based Internet access specifically so that there are few environment requirements for those using the software. The program will behave properly whether it is run on an Internet-connected desktop computer or laptop with wireless access, whether the browser is run in a Linux, Windows, or Macintosh environment.

This has been taken into account when choosing page complexity and element locations, in order to maximize the available screen space and provide ease of use. The software is PHP based and utilizes a SQL database which provides an extensive library of prewritten and tested classes. This software is expected to coexist with any other application on the server, given that the application does not require exclusive access to the screen, mouse or keyboard. It is not expected that this program will cause undesirable results when run in parallel with any software.

#### 7.2 Hardware Requirements

The server operation must be powerful and robust enough to allow for all of the following features to be implemented in the software. The size of the persistent memory in the system must be such that the future storage needs are able to be accommodated through the life cycle of the stored data. The necessary infrastructure in place includes internet connectivity and electric power. Aside from that, the software is not dependent on any other components aside from the SQL libraries themselves.

### **7.3** Communications Requirements

Because it is web-based, establishing TCP/IP connections over a secure protocol (HTTPS) utilizing encryption is required to use the product. The Small-Business Unified Database Operations does not currently have any electronic communications (ie, smart phones) interfaces.

## 8. Specifications

The specification section will portray in graphic form every possible execution of the system, though not in great depth, as well as a rough sketch and explanation of the graphical user interface. The three following diagrams convey:

- 1. The logical structure of the database.
- 2. Flow chart pertaining to viewing and entering data for objects in the system.

3. Another view of the flow chart pertaining to entering and view sales and purchases information.

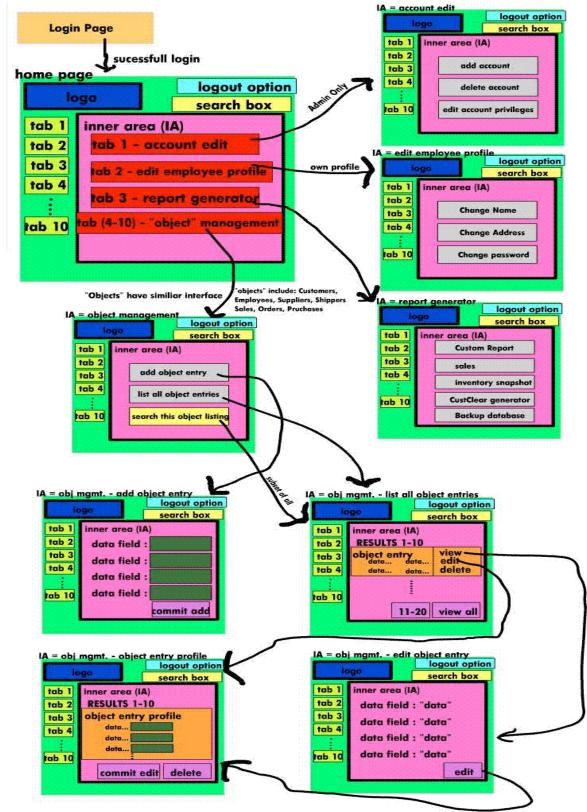
#### 8.1 Graphical User Interface

The graphical user interface is primarily the homepage where the following will appear on every screen: search box, navigation tabs, logo, and a logout option. There will be an inner area of the home page that can change to the following: user accounts edit page (only accessible to Administrator-level user), edit employee profile, report generator, customer table, supplier table, shippers table, products table, purchases table, and sales table.

In the following diagram (**Figure 8.1**), the workflow is described for when different navigation tabs or navigation options are clicked. Tab 1 directs the user to the Account Edit Page; Tab 2 directs the user to the Edit Employee Profile Page; Tab 3 will direct the user to the report generator; Tabs 4-10 act on "objects" which are similar in interface, each object referencing a different table on the database: Customer, Supplier, Shipper, Purchases, Sales, and Products.

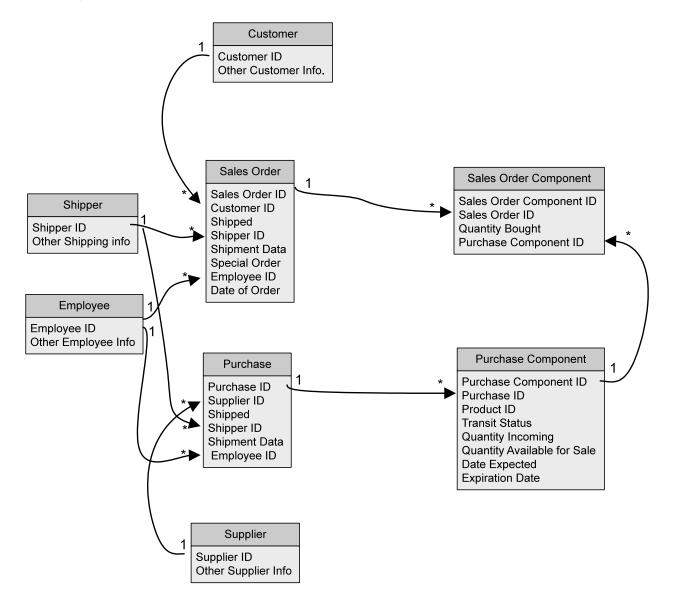
Searches performed in the search box on the homepage will search all database tables. Searches done in the inner area of tabs 4-10 will only search that respective table.

#### 8.2 Graphical User Interface Diagram



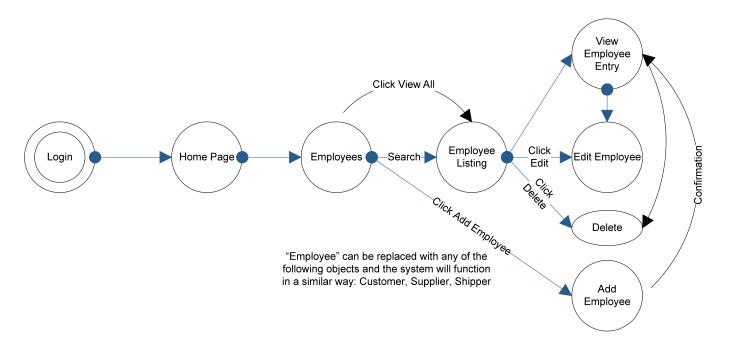
**Figure 8.1:** GUI diagram portraying interface behavior seen by user. Arrows indicate navigational flow of linked pages.

#### 8.3 Figure of System Database

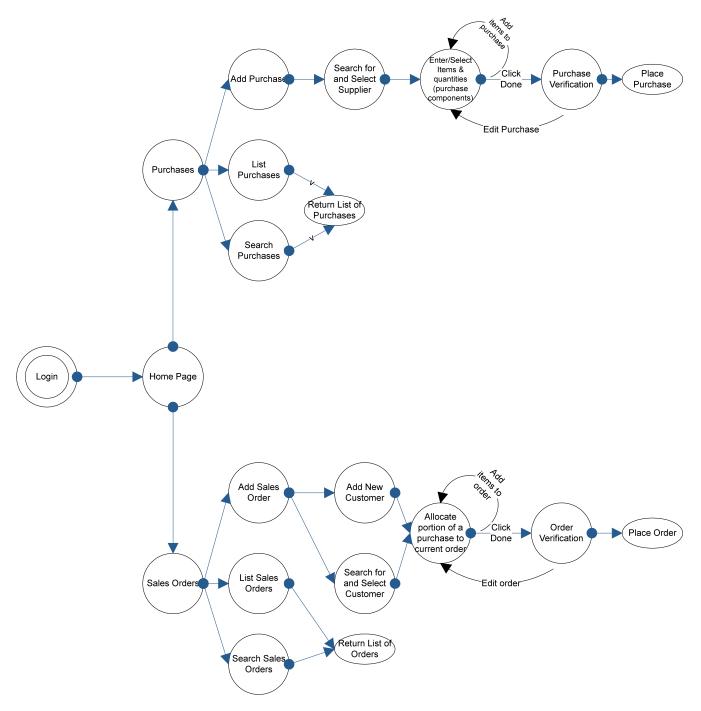


**Figure 8.2:** Conceptualized schematic of the major objects comprising the database of the business enterprise. Each rectangle conveys an object with the name shown at the top and having data fields listed beneath. Arrows indicate relations between one object and another, whether one-to-one (1..1), one-to-many (1..\*), or many-to-many (\*..\*). The heads of arrows typically indicate many object belong to the object where the arrow originates.

#### 8.4 Figures that Specify the System



**Figure 8.3:** State diagram portraying the pages relating to employees, customers, suppliers, and shippers. Diagram begins on the left ("Login") and proceeds to the right.



**Figure 8.4:** State diagram portraying the pages encountered when entering, editing, or viewing sales and purchases data. Diagram begins on the left ("Login") and proceeds to the right.