The Issues:

Associated Wholesale Grocers (AWG) was using a custom-designed order replenishment handheld application that provided all functions related to their subscriber grocers. This included order replenishment, label requests, back-room functionality, SRP, order reconciliation and validation. The application performed with limited results. This software had numerous functional limitations, and did not run well on the handheld platform in use, the Motorola / Symbol MC 3090 mobile computer, creating customer dissatisfaction. AWG had attempted numerous times to get these software issues resolved through the development vendor, with multiple patches applied and limited success, for some of the following reasons:

- The software, while running in a Microsoft Windows CE 5 environment, was not written with memory management in mind, allowing the application to attempt to allocate and use memory that was already in use, resulting in general protection fault and application crash.
- The software was written with limited data validation and enforcement, allowing the entry of bad / incomplete data into the system.
- The software is running in a 32mb operating system with 32 mb application space limited environment, forcing dramatic memory constraints and requiring extensive optimization of all introduced code.

The Solution:

AWG engaged MIT Group, Inc for a rewrite and enhancement of the customer code, specifically optimized for the Motorola / Symbol MC-3090. MIT Group developed this application using:

- Microsoft .net framework with c# development optimized for Windows CE 5.0 and developed for a low memory environment
- A local database designed in SQL Lite residing locally on the device
- All applications, database and downloadable maintenance files stored in 32 MB application space
- Database backups and ‘warm-boot’ recovery files stored on embedded storage card
- Multiple communications methods
- Enhancement of these applications as they were being developed to not only provide a workable solution for what was, but also provide some customer and AWG requested functionality

- System was designed as two different application loads for corporate or store usage by application – the Order Entry suite of applications and the Store Shelf Audit suite of applications.

The AWG Order Entry application was developed to provide the following modules:

Smart Order Entry System (Smart Order)
The smart order system functions off of the local SQL Lite database for item validation and enforcement. This database is updated daily with downloaded item maintenance. This system allows the AWG customer to scan or enter PLU and UPC information, automatically expand unexpanded UPC data, validate the item against the database, and enter an order quantity in individual item or case with varying case pack options. This information is collected throughout the area of responsibility of the user, then transmitted back to AWG for fulfillment via broadband internet utilizing an Ethernet dongle, Microsoft Active Sync via cradle connected pc, Windows Mobile Device Center via cradle connected pc, dial-up internet, or direct dial to AWG

Label Request
Some of the AWG customer grocers choose to have AWG print their labels and shelf tags. The Label Request application allows the collection of label data that is then transmitted back to AWG and shipped to the customer as part of their scheduled order delivery. This allows both the customer and AWG a much higher accuracy level when scanning and replenishing products, as when used correctly, the information is always current.

SRP
The SRP Maintenance Application is used to send a customer store's pricing to AWG so that the store's AWG price file is correct. If used in conjunction with the Label Request application, labels are generated for items that have price changes automatically. Price changes are entered as a manual or fixed auto percent change. Fixed percentages are controlled as single or multiple fixed percentages, where fixed auto sends the amount to AWG to be converted to percentage which gets updated every time there is a product price change at AWG.

Back Room Inventory Maintenance
The Backroom Inventory feature is provided to help make the user aware of stock existing elsewhere in the store. Backroom Inventory must be manually maintained by the order writer and inventory must be added and subtracted just as it is physically added to and removed from back stock. If the order taker attempts to order something that is designated as in the back room, the system will stop the user to make sure the quantity request is correct, and that additional in-store inventory is taken into consideration on replenishment.

ORCA (Order Reconciliation Credit Automation)
ORCA is an alternative to manually requesting credits for items that were missing on an order. It is also referred to as a load audit, since it involves auditing what was sent compared to what was billed. ORCA data defaults to UPC to allow rapid scanning of product, and upon product scan, displays the item, item description, item order information, item delivery information, and a product status code if the product status has changed. Status codes are **TEMP** = Temporarily Out, **SEAS** = Seasonal, **NEW** = New, **DISC** = Discontinued, and **DWO** = Discontinued and Out.

Free Format
Free Format is an application that is designed to be used by AWG personnel. The main use of Free Format is to scan name badges of members who attend the quarterly food shows. Free Format is intended only for data collection and due to that fact it will accept nearly any UPC/code/digits keyed or scanned including Alpha characters.

Validation
The Validation application exists to add/or remove items the store carries or does not carry to and from their AWG item/price file. If a store isn't validated but does get a host file and/or tags from AWG, they will receive tags and maintenance on every item AWG carries regardless of whether the store actually carries the item. However, when a store is "Validated" this means that the items they carry have been noted so that their file at AWG holds only those items, and not any extra ones that they do not actually sell.

The AWG Store Shelf Audit application was developed to provide the following modules:

Item Collection
Item Collection is the first application in the Store Shelf Audit Applications. The purpose of Item Collection is to simply scan every item in a store and record the items in a file for further reviewing. The items can be scanned by Item Code or UPC and can be used for existing or new stores, although it is most often used for new stores to get a file of what the store carries to compare to products that AWG carries. AWG uses this function to provide alternatives to products that new customers carry that AWG does not carry.

Price Verification
The purpose of Price Verification is to compare the advertised shelf tag retail to the retail AWG has on file for each item at the store. The items can be scanned by Item Code or UPC. This application is most often used as a service to the store being verified so that they ensure their shelf tags accurately reflect what the current price should be according to their AWG price file.

Price Collection
The purpose of Price Collection is to create a current pricing file that could then be uploaded to AWG's systems to become the store's AWG price file. The items can be

scanned by UPC only in Price Collection as it is typically used only for new stores, which would not have item codes readily available, that do not wish to change their pricing to one of AWG's price zones when they transfer to AWG as their supplier.

New Store Quick Collect

New Store Quick Collect is similar in function to the Price Collection Application but is meant to be quicker and easier. The purpose of New Store Quick Collect is to separate the items that the store currently carries that AWG will not be able to supply them. Since this application is used only for new stores about to switch to AWG, only UPC entries are allowed since these stores will not have AWG Item Codes readily available. Additionally, for items that are scanned but are not in the AWG price file (i.e. items the store will want to sell down before starting to get their deliveries from AWG), New Store Quick Collect will allow the entry of a base retail so that AWG can print "Was/Now" tags to reflect price reductions meant to move the items out of inventory more quickly.

Results

Over the course of this development, MIT Group has created a new series of applications meeting Associated Wholesale Grocers specifications, maintaining and enforcing a high level of accuracy, providing a stable application base for their customer base. These application increase efficiency from the store and from AWG to the customer, ensuring a high level of order and delivery accuracy with fewer bad items, and fewer items not shipped.