YAŞAR UNIVERSITY GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

MİMA: MARKET İÇİ MAĞAZA ASİSTANLARI

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Department of Computer Engineering

Bornova-IZMIR

2013

ÖZET
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Yüksek Lisans Tezi, Bilgisayar Mühendisliği Bölümü
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Söz konusu tez RFID teknolojisi ve bu teknolojinin süpermarketlerdeki kullanımı ile alakalıdır. Bu nedenle söz konusu tez bilgi değişimi ve tedarik zinciri üzerindeki radyo frekans tanımlamalarının olumlu ve olumsuz etkilerini içerir. RFID teknolojisi avantajlıdır çünkü düz bir tarama alanı gerektirmez. Daha az çaba ile görünürlüğünü artırır ve envanter yönetimini geliştirilmesini sağlar. Diğer yandan, RFID günümüzde pahalı bir çözüm yoludur. Fakat RFID çok fazla sayıda faydaları olan bir teknolojidir, buna rağmen firmalar barkod teknolojisini maliyetleri nedeniyle daha çok tercih etmektedir. [1]

Projenin amacı süpermarket müşterileri ve firma sahipleri için en uygun çözümler bulmaktır. Bu sonuca ulaşmak için, öncelikli olarak sistem gereksinimleri belirlenmiştir ve bu gereksinimler Agile Yazılım Geliştirme metodu temel alınmıştır ve UML diyagramları oluşturularak geliştirilmiştir. Bu durum gelecekte karşılaşılabilecek hatalardan kaçınmak için alt yapı sağlar.

Sonuç olarak, uygulama RFID teknolojisi kullanılarak hem kullanıcılara hem de firma sahiplerine avantajlar sunar.

Anahtar Kelimeler: RFID, Web Servis, süpermarket uygulamaları, dokunmatik ekran, Bi-Directional A* Algoritması, Agile Metodu

ABSTRACT
MİMA: MARKET İÇİ MAĞAZA ASİSTANLARI

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MSc in Computer Engineering
Advisor: Prof. Dr. Aydın Öztürk

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This research deals with RFID and its usage in the supermarkets. For this reason the research includes impacts of RFID on the Information Exchange, pros and cons of using radio-frequency identification (RFID) in supply chain management (SCM). RFID is advantageous because it does not require line-of-sight scanning; it acts to reduce labor levels, enhances visibility, and improves inventory management. On the other hand, RFID is presently a costly solution. By the way, while RFID has a greater number of benefits, but barcode is preferred by the companies because of its costs. [1]

Aim of the project is to find optimal solution for supermarket customers and owner of the supermarket. For achieving this result, initially requirements of system are defined and these requirements' specifications are studied with Agile Methodology and UML diagrams are developed for taking an idea about system and avoiding some mistakes that can be in the future.

As a result, the application provides advantages to both of users and the owner of the company by using RFID technology.

Keywords: RFID, Web Service, applications for supermarkets, touch screen monitors, Bi-Directional A* Algorithm, Agile Software Development Methodology

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I would like to address my thanks to Datakod LTD for their full support in my whole study.

This thesis is dedicated to my husband Mehmet Gülberk and my mother and my father who have always stood by me and dealt with all of my absence from many family occasions with a smile.

TEXT OF OATH

I declare and honestly confirm that my study titled ―An Application is named as MİMA (Market İçi Mağaza Asistanları) ‖, and presented as Master‘s Thesis has been written without applying to any assistance inconsistent with scientific ethics and traditions and all sources I have benefited from are listed in bibliography and I have benefited from these sources by means of making references.

12 / 02 / 2013

Sevgi ORHAN GÜLBERK

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1. INTRODUCTON

Automatic identification is not new in economic context. Just as existing systems such as Barcode, another identification technology finds its way into business, called Radio Frequency Identification (RFID). RFID enabled automatic identification of objects, commodities, and goods using radio waves without necessity of physical contact. RFID is used on the exchange of information within the aforementioned retail supply chain. [2]

Supply Chain Management (SCM) is the "management and control of all materials and information in the logistics process from acquisition of raw materials to delivery to the end user" [3]

Radio Frequency Identification (RFID) technology has opened the door to a new era in SCM, using existing barcode technology.

Also commonly known algorithms that are called as Single-Source Shortest Path are used. The algorithms are: Dijkstra's Algorithm, A* Algorithm, Bi-Directional Dijkstra's Algorithm and Bi-Directional A* Algorithm. Purpose is finding shortest path in the shortest time for the location information of the customer and products. For this reason Bi-Directional A* Algorithm is chosen to find shortest path.

Aim of the project is to find optimal solution for supermarket customers and owner of the supermarket. For achieving this result, initially requirements of system are defined and these requirements' specifications are studied with Agile Methodology and UML diagrams are developed for taking an idea about system and avoiding some mistakes that can be in the future.

Thesis mentions statement of the problem to give an overview of the project. On the other hand thesis draws the scope of the project by giving details about application. The technologies which are utilized in the project and the purpose of the use of these technologies can be found in this thesis. This research focuses on some shortest path algorithm to display location information. Operation of the system is explained to give general knowledge about the application. And also usage of the application is supported with the images from application. And finally thesis gives some ideas for the future work.

2. STATEMENT OF THE PROBLEM

Lines at the supermarket are always longest when you have the least time, or that's the way shopping seems for many people. This is one reason why stores want to improve shopping experience for consumers. Investors are dealing with improving life standards for making life easier.

For this reason, MIMA is a system which is supported with a touch screen monitors on the shopping cart, as shown at Figure 1. Supporting points are:

- Detailed Information of Product
- Discount Information of Product
- Inventory Information of Product
- Department Information of Product
- Top List of Product
- Information about the how many times a customer passes a category.
- Converting costumer traffic to sales
- Getting information about the average time a consumer spends in a category
- Getting information about consumer traffic pattern.
- Waiting time of customer at the checkout.
- Comfortable, pleasant, hassle-free shopping
- Sales efficiency of the product.

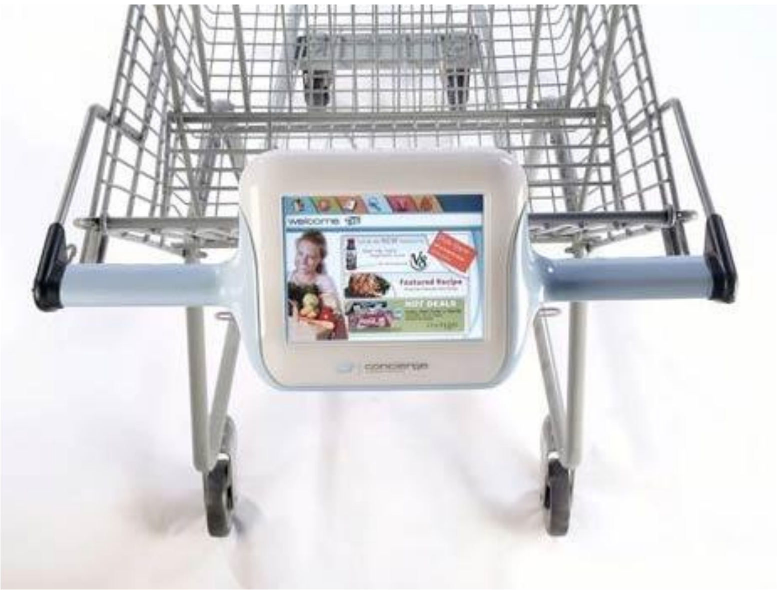


Figure 1: Shopping Cart Example

2.1. System Requirements

Project Sponsor:

Aydın ÖZTÜRK (Professor Doctor) is member of Yaşar University Computer Engineering Department.

Benefits:

Convenient and friendly for user

Avoid finding time

Increase customer demand

Saves time and effort

2.2. Charter Report

Purpose of the Document:

This document is intended to set default definitions and analysis of the “MiMA” graduate thesis and information regarding the project developer.

Intended Audience:

Project developer is Sevgi Orhan Gülberk and Project Manager is Aydın Öztürk.

Problem Statement:

“MİMA” is a kind of supermarket application which is user friendly and is helpful assistant in a supermarket according to customer requests and demands.

2.3. Requirement Specification

In this section we describe the requirement specifications by using some UML diagrams. To get more detailed information about the specifications please see the Appendix.

2.3.1. Use Case Diagram

As you see the figure below, shown as Figure 2, you will notice that there are two actors: system administrator, customer. System administrator can make some operations such as add, delete and update base information, can enter product info, can enter membership info, can enter sketch info and can draw sketch. Customer can use system with or without login and can search any product. Also customer can get some information about the product, can learn where he/she or product is located right now.

System includes the shopping cart module. So any product shall be added into cart. And then the system shows total cost. Further customer may display active campaigns.

Additionally system contains membership system. This part of the application is adaptable for demands.

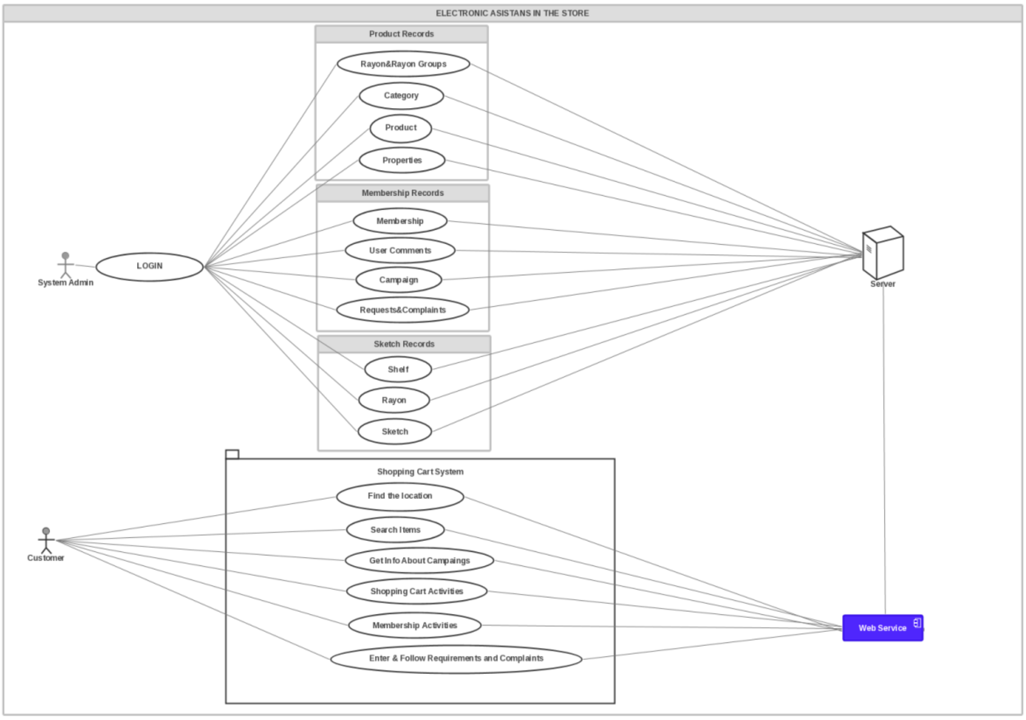


Figure 2: Use Case Diagram of the System

2.3.2. Class Diagram

The figures below, as shown as Figure 3, Figure 4, Figure 5, that notice classes and methods of the system.

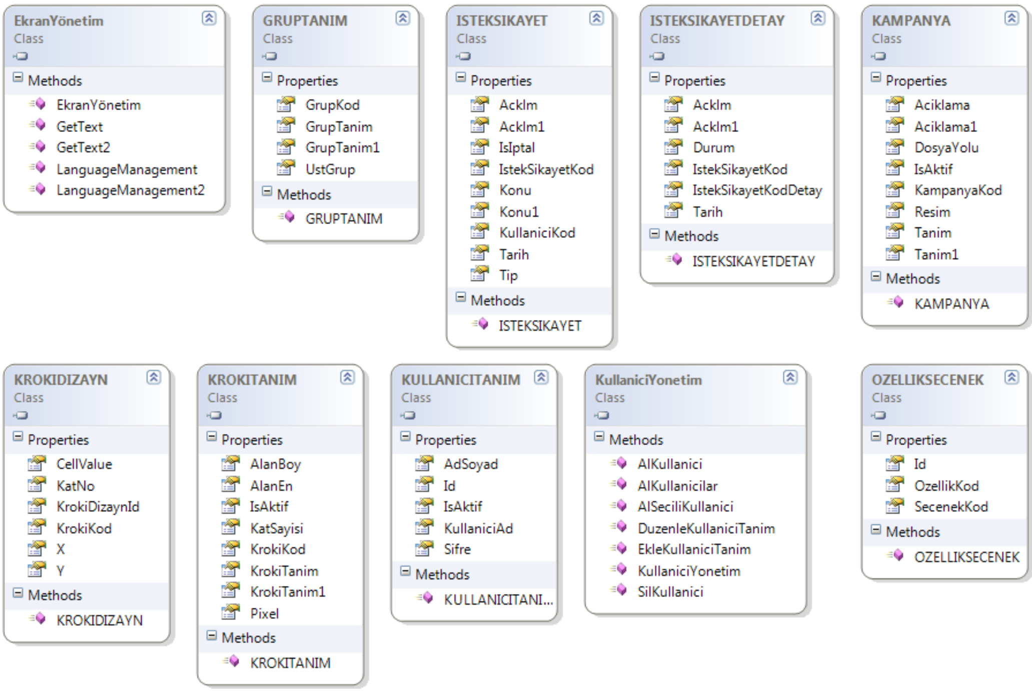


Figure 3: Class Diagram of the System

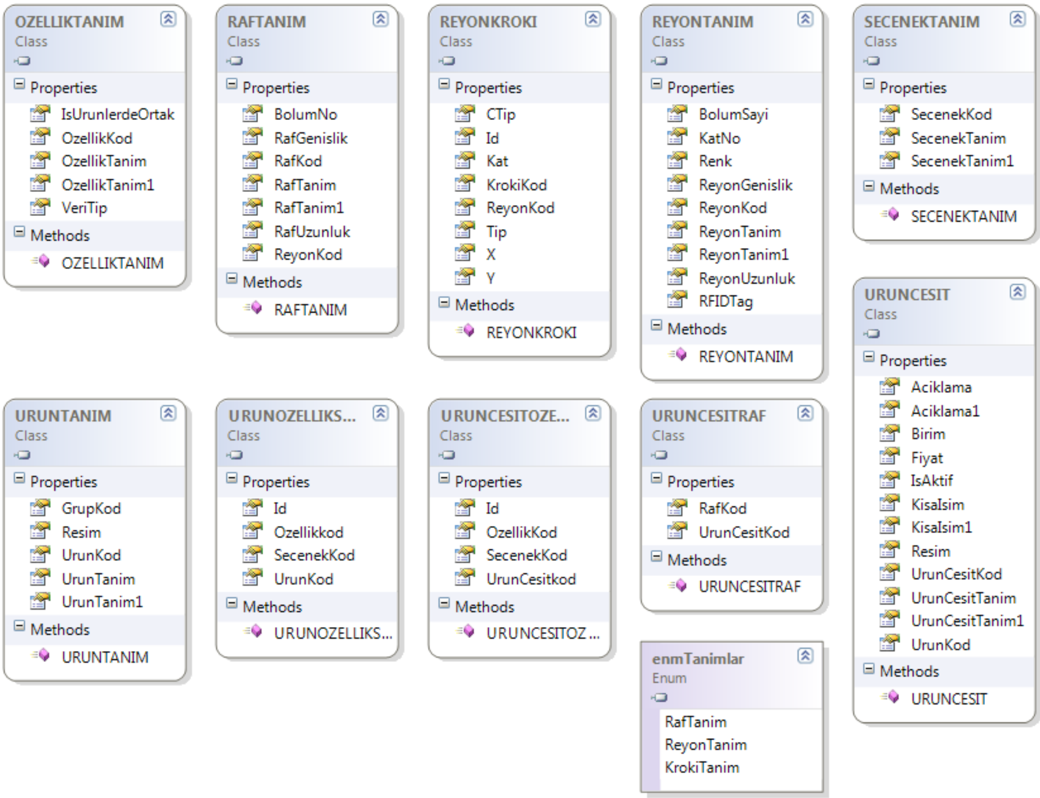


Figure 4: Class Diagram of the System

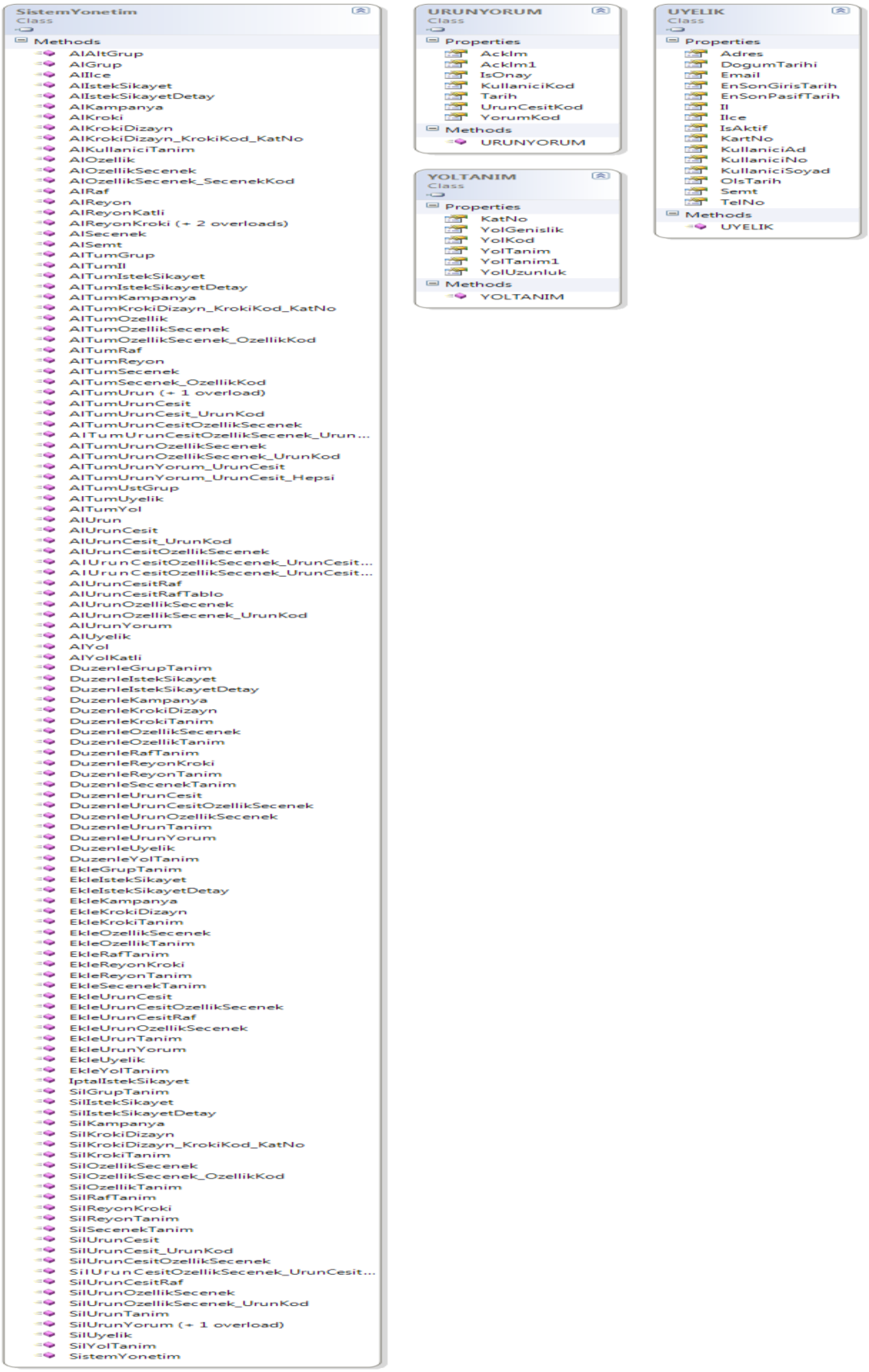


Figure 5 : Class Diagram of the System

3. SCOPE OF MİMA

3.1. General Product Information

This part deals with customers choices by giving default information of products. Therefore customers can decide appropriate items all around the products. Customers can search item whatever they want to find by using MİMA. MİMA presents them special information about product with photo.

3.2. Location of Product

This part deals with customers choices by giving location of products. Therefore customers can find appropriate items all around the products. Therefore can customers find product immediately.

3.3. Advertisement

Different kinds of advertising, informative and indirect comparison ads are used in order to augment the demand for products or to encourage customers to switch brands.

The most effective weapon in the fight against the competition is well prepared an advertisement campaign. Advertisements are involved in every aspect of our lives. The best address for presentation of ads is supermarkets. Brands will use the system to impact customer buying decisions.

3.4. Membership System

This part deals with membership. By given card, customers can login system and take some advantages about application. These advantages will be developed according to application owner demands.

4. TECHNOLOGIES

4.1. Touch Screen

A touch screen is an electronic visual display that can detect the presence and location of a touch within the display area. The touch screen computer systems are provided by using touch screen on the computer. In this way, computer operating system is provided on these computers. MİMA works on the touch screen monitor which is attached on a shopping cart.

4.2. RFID

4.2.1. What is the RFID?

RFID is a generic term for technologies that use radio waves to automatically identify people or objects and transfer data from a tag attached to an object, for the purposes of automatic identification and tracking. Some tags require no battery and are powered by the electromagnetic fields used to read them. [4] Others use a local power source and emit radio waves. The tag contains electronically stored information which can be read from up to several meters away. Unlike a bar code, the tag does not need to be within line of sight of the reader and may be embedded in the tracked object.

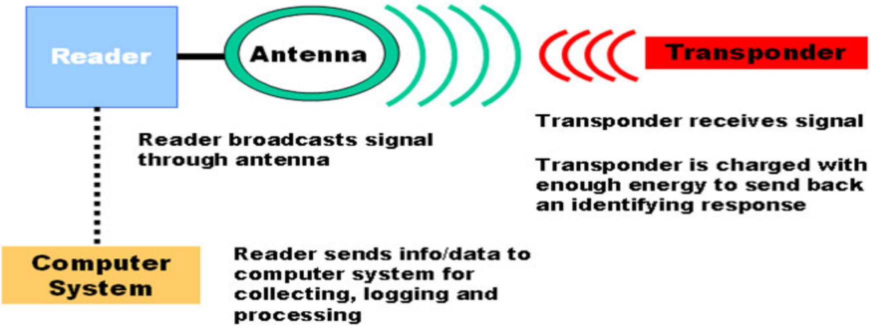

Reader
Antenna
Transponder
Transponder receives signal
Reader broadcasts signal through antenna
Transponder is charged with enough energy to send back an identifying response
Computer System
Reader sends info/data to computer system for collecting, logging and processing

Figure 6: How does RFID works?

One of RFID’s most attractive fundamental is not requiring line-of-sight when reading RFID tags. These tell us RFID does not require particular orientation for scanning, unlike barcodes. By the way RFID scanners can communicate to tags in milliseconds and have the ability to scan multiple items simultaneously. This ability makes easy identifying items or objects in huge areas such as supermarkets or fabrics, etc. How the RFID System works is shown as you see in the Figure 6 and Figure 7.

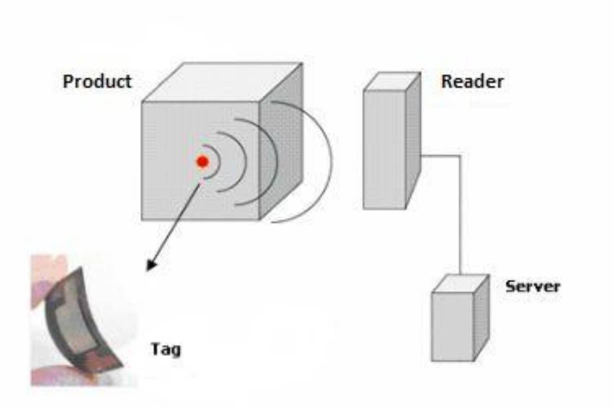


Figure 7 : RFID System Example

RFID is ideal for identifying items that require routine calibration, inspections, or that need to be checked in or out.

Therefore, organizations are dedicating to a more reliable and powerful technology that stores actively or passively product data and “uses radio waves to automatically identify physical objects”, called Radio Frequency Identification (RFID). With the use of RFID organizations expect enormous improvements in passing on information to suppliers and customers and vice versa that cannot be provided by using Barcode technology.

To sum up, RFID is not only overcoming Barcode for its technical advantages, but even more for its potential to cut costs. With the expected advantages the open market competition not only forces an adaption to RFID, but also sets up pressure on supply chain partners to integrate RFID in their business processes.

4.2.2. RFID Features

RFID tags can be defined in many different shapes (Figure 8). It can be as a small disc which includes a hole in the middle and its radius can be 1 millimeter to 10 centimeters. On the other hand it can be a glass capsule which is injected to animals and its size can be 12 millimeter to 32 millimeter.

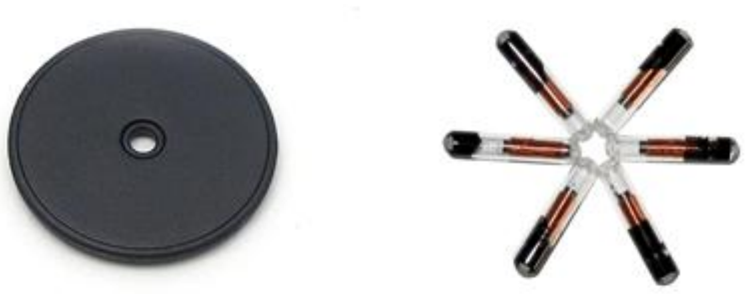


Figure 8: Different Shapes of RFID tags

There are two different energy types of RFID tags. These are active and passive tags. Passive tags do not have their own energy source. They are activated by reader’s magnetic waves and data is read from stored in tags. The active tags are powered by a battery. The active tags are expensive than passive tags but they can be read from 300 meters. The passive tags have limited reading distance.

4.2.2.1. Automatic Non-Line-of-Sight Scanning

RFID technology is not requiring line-of-sight when reading RFID tags. This means items do not require particular orientation for scanning,

RFID scanners can communicate to tags in milliseconds and have the ability to scan multiple items simultaneously. This ability significantly aids the automation of many SCM tasks that have typically been labor intensive roles such as checking and scanning incoming inventory.

4.2.2.2. Labor Reduction

RFID promises to help automate the supply chain to unprecedented levels, leading to labor reduction throughout the process.

4.2.2.3. Enhanced Visibility

The visibility offered by RFID could help to reduce this loss, by reducing waste, lowering inventory levels and improving safety. Improving visibility in the supply chain can help “lower distribution and handling costs and reduce inventory levels” [5].

Inventory visibility can be used to achieve gains in areas such as faster response to customer demands and market trends, improving the ability to have the right product in the right place at the right time.

4.2.3. RFID versus BARCODE

Figure 9 : Barcode versus RFID

RFID and Barcode are similar products (Figure 9). RFID tags and barcodes both carry information about products. However, there are important differences between these two technologies:

- RFID device does not need to be positioned precisely relative to the scanner. Barcode readers require a direct line of sight to the printed barcode; RFID readers do not require a direct line of sight to either active RFID tags or passive RFID tags.
- RFID devices have fallen to the point where they can be used as a "throwaway" inventory or control device.
- RFID to come into common use is the lack of standards in the industry.
- RFID devices can store data in micro-processors.
- RFID devices use radio waves to exchange data.
- The amount of information stored in RFID tags, are much higher than bar code labels.
- RFID tags are not affected in dirty and humid environments.
- RFID devices will work within a few feet (up to 20 feet for high-frequency devices) of the scanner.
- RFID readers can interrogate, or read, RFID tags much faster; read rates of forty or more tags per second are possible. RFID tags can be read at much

greater distances; an RFID reader can pull information from a tag at distances up to 300 feet. The range to read a barcode is much less, typically no more than fifteen feet. Reading barcodes is much more time-consuming; due to the fact that a direct line of sight is required, if the items are not properly oriented to the reader it may take seconds to read an individual tag. Barcode readers usually take a half-second or more to successfully complete a read.

- Barcodes have no read/write capability; that is, you cannot add to the information written on a printed barcode. RFID tags, however, can be read/write devices.

4.2.4. RFID Security Problems & Challenges

- Large volumes of data–Readers scan each RFID tag several times per second, which generates a high volume of raw data. Although the data is redundant and discarded at the reader level, processing large volumes of data can be difficult.
- Product information maintenance – When a high volume of RFID tags are processed by the reader, the attributes of each tagged product must be continually retrieved from a central product catalogue database – a process that results in challenges for large scale implementations.
- Configuration and management of readers and devices – When a large number of readers and related hardware devices are deployed across multiple facilities, configuration and management can be challenging. The implementation of automated devices for these processes is essential.
- Data security and privacy Depending on the nature of the business application and the solution scenario, security and privacy challenges could have a significant impact on the architecture.
- Unauthorized tag disabling: These are Denial-of-Service (DoS) attacks in which an attacker causes RFID tags to assume a state from which they can no longer function properly. This results in the tags becoming either temporarily or permanently incapacitated. Such attacks are often exacerbated by the mobile nature of the tags, allowing them to be manipulated at a distance by covert readers. Tag disabling can be a serious threat to the integrity of automated inventory and shipping applications. Any RFID system vulnerable to such attacks could become a serious organizational weakness.

- Replay attacks. These are integrity attacks in which the attacker uses a tag’s response to a rogue reader’s challenge to impersonate the tag. The main concern here is in the context of RFIDs being used as contactless identification cards (in substitution of magnetic swipe cards) to provide access to secured areas and/or resources. In such applications, RFIDs can be more vulnerable than other mechanisms, again due to their ability to be read at a distance by covert readers. [25]
- Unauthorized tag cloning. These are integrity attacks in which an attacker succeeds in capturing a tag’s identifying information. Again these attacks are exacerbated by the fact that the tags can be manipulated by rogue readers. The ability to create clones of tags can be used as a means to overcome counterfeit protection (e.g., in passports and drug labels) and as a preparatory step in a (large scale) theft scheme. Again, it exposes corporations to new vulnerabilities if RFIDs are used to automate verification steps to streamline security procedures. [25]
- Unauthorized tag tracking. These are privacy attacks in which the attacker can trace tags through rogue readers. We distinguish these attacks from “Big Brother” concerns that corporate entities managing the back-end server might leverage RFID capabilities to infringe on the privacy of consumers. A detailed analysis of consumer privacy concerns is given in [14], addressing policies, standards, and checks to protect consumer interests. In this research I concentrate instead on the prospect of rogue readers, controlled by hackers or adversarial organizations, being used to monitor tags. This issue is more difficult to address, since hackers cannot be presumed to adhere to policies or standards, or to follow specified protocols. [25]

4.3. Microsoft SQL Server

Microsoft SQL Server is a relational model database server produced by Microsoft. Its primary query languages are T-SQL and ANSI SQL. [6]

4.3.1. SQL Server 2005

SQL Server 2005 (codenamed Yukon), released in October 2005, is the successor to SQL Server 2000. It included native support for managing XML data, in addition to relational data. For this purpose, it defined an xml data type that could be used either as a data type in database columns or as literals in queries. XML columns can be associated with XSD schemas; XML data being stored is verified against the schema. XML is converted to an internal binary data type before being stored in the database.

Specialized indexing methods were made available for XML data. XML data is queried using XQuery; SQL Server 2005 added some extensions to the T-SQL language to allow embedding XQuery queries in T-SQL. In addition, it also defines a new extension to XQuery, called XML that allows query-based modifications to XML data. [6]

For relational data, T-SQL has been augmented with error handling features and support for recursive queries. SQL Server 2005 has also been enhanced with new indexing algorithms and better error recovery systems. Data pages are check summed for better error resiliency, and optimistic concurrency support has been added for better performance. Permissions and access control have been made more granular and the query processor handles concurrent execution of queries in a more efficient way. Partitions on tables and indexes are supported natively, so scaling out a database onto a cluster is easier. SQL CLR was introduced with SQL Server 2005 to let it integrate with the .NET Framework. [6]

4.4. Microsoft Visual Studio

Microsoft Visual Studio is an Integrated Development Environment (IDE) from Microsoft. It can be used to develop console and graphical user interface applications along with Windows Forms applications, web sites, web applications, and web services in both native code together with managed code for all platforms supported by Microsoft Windows, Windows Mobile, Windows CE, .NET Framework, .NET Compact Framework and Microsoft Silverlight. [7]

Visual Studio includes a code editor supporting IntelliSense as well as code refactoring. The integrated debugger works both as a source-level debugger and a machine-level debugger. Other built-in tools include a forms designer for building GUI applications, web designer, class designer, and database schema designer. [7]

Visual Studio supports languages by means of language services, which allow any programming language to be supported (to varying degrees) by the code editor and debugger, provided a language-specific service has been authored. Built-in languages include C/C++ (via Visual C++), VB.NET (via Visual Basic .NET), and C# (via Visual C#). It also supports XML/XSLT, HTML/XHTML, JavaScript and CSS. [7]

Currently, Visual Studio 2008 and 2005 Professional Editions, along with language specific versions (Visual Basic, C++, C#, J#) of Visual Studio 2005 are available for free to students as downloads via Microsoft's Dream Spark program. Visual Studio 2010 is currently in development. [7]

4.4.1. Microsoft Visual C Sharp

Microsoft Visual C# is Microsoft's implementation of the C# programming language specification, included in the Microsoft Visual Studio suite of products. It is based on the ECMA/ISO specification of the C# language, which Microsoft also created. While multiple implementations of the specification exist, Visual C# is by far the one most commonly used. In most contexts, an unqualified reference to "C#" is taken to mean "Visual C#." [8]

The term Visual denotes a brand-name relationship with other Microsoft programming languages such as Visual Basic, Visual FoxPro, Visual J# and Visual C++. All of these products are packaged with a graphical IDE and support rapid application development of Windows-based applications. [8]

4.4.1.1. Visual Studio 2010

On April 12, 2010, Microsoft has been released Visual Studio 2010. Visual Studio 2010 IDE has been redesigned which, according to Microsoft, clears the UI organization and "reduces clutter and complexity." The new IDE better supports multiple document windows and floating tool windows, while offering better multi-monitor support. The IDE shell has been rewritten using the Windows Presentation Foundation (WPF), whereas the internals have been redesigned using Managed Extensibility Framework (MEF) that offers more extensibility points than previous versions of the IDE that enabled add-ins to modify the behavior of the IDE.

4.4.2. Developer Express

Developer Express (DevExpress) is a software development company based in the United States. It produces coding assistance tools and components for Borland Delphi, C++ Builder and Microsoft Visual Studio developers. The major part of their product line is VCL, .NET Windows Forms and ASP.NET components that replicate the UI of Microsoft Windows and Microsoft Office applications. Developer Express has won many awards in the industry for its products. [9]

4.5. Web Service

Web Service is a system which is XML-based integration method. Web Service provides interaction between computers on the network and ensures compatibility.XML web service communicate with SOAP (Simple Object Access Protocol). Web services provide a standard means of interoperating between different software applications, running on a variety of platforms and/or frameworks.

A Web service is a software system designed to support interoperable machine-to-machine interaction over a network. It has an interface described in a machine-processable format (specifically WSDL). Other systems interact with the Web service in a manner prescribed by its description using SOAP messages, typically conveyed using HTTP with an XML serialization in conjunction with other Web-related standards.[24]

MİMA uses web service to check records according to the RFID. Especially MİMA gets information for presenting location of products by using Web Service.

5. ALGORITHMS

For this application, the most well-known path-finding algorithms are studied: Dijkstra and A*. And also two additional derivative algorithms: Bi-Directional Dijkstra and Bi-Directional A*. Demo application is useful for illustrating these algorithms.

5.1. Single-Source Shortest Path Problem

The single-source shortest path problem: given a weighted directed graph ((V; E); w) and a source vertex s in V, find a shortest path from s to every vertex of V. [25]

Notes:

If a path has negative weight edges in a cycle, then a shortest path is not defined. Some algorithms (like the Dijkstra) assume non-negative weights. Other algorithms (such as the Bellman-Ford algorithm, which we will not study) can be handled negative weight edges as long as they don't appear in cycles.

The problem of finding the shortest path between two particular vertices (the single-pair shortest path problem) may seem easier that the single-source shortest path problem, but no solution for the single-pair problem is known that is asymptotically faster than a solution for the single-source problem!

The all-pairs shortest path problem finds the shortest path between every pair of vertices.

5.1.1. Dijkstra’s Algorithm

Dijkstra's algorithm solves the single-source shortest path problem in the case where there are no negative weights.

Idea: Grow a shortest-path tree from the source vertex s. Every vertex v maintains a shortest-path estimate $d_s[v]$ and **parent** field that indicates the final edge of a path with this estimate. At each step, add the vertex v_{min} with the smallest shortest-path estimate to the tree via the edge to its parent. A priority queue can be used to manage extracting the node with the smallest shortest-path estimate.

The algorithm works because the lack of negative edges guarantees than any path from s to v_{min} that passes through other vertices not yet in the shortest-path tree must have a weight greater than that of the path from s to v_{min} via **parent**[v].

This algorithm is greedy in the sense that, at each step, it adds the \best" node (node with smallest shortest-path estimate) to the growing shortest-path tree.

```
Dijkstra (G, w, s)

    Initialize-Single-Source(G,s)

    shortest ←{}

        ➢ B vertices at which $d_s[v] = {}^{\delta}(s; v)$

    PQ ←Build-PQ (vertices[G])

        ➢ B Loop Invariants:
        ➢ B (1) Q contains (V - shortest) ordered by $d_s[v]$.
        ➢ B (2) $d_s[v] = {}^{\delta}(s, v)$ for every v in shortest.
        ➢ B (3) parent[v] is either nil or in shortest.
        ➢ B (4) $d_s[v] = d_s[parent[v]] + w(parent[v],v)$ for all v with non-nil
          parent.

    while not PQ-Empty?(Q) do

        a ← PQ-Delete-Min(Q)

        shortest ← shortest ∪ {a}

        for b in Adj[a] do

            Relax ((a,b), w)

            PQ-Decrease-Key(Q, b, $d_s[b]$)
```

Analysis:

- Build-PQ called once on |V| elements
- PQ-Delete-Min called |V| times
- Relax and PQ-Decrease-Key called |E| times.

Example

Consider the following weighted graph G:

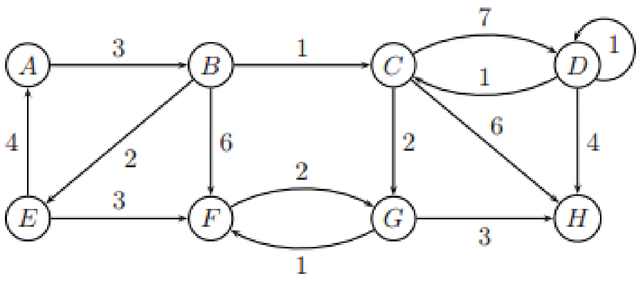
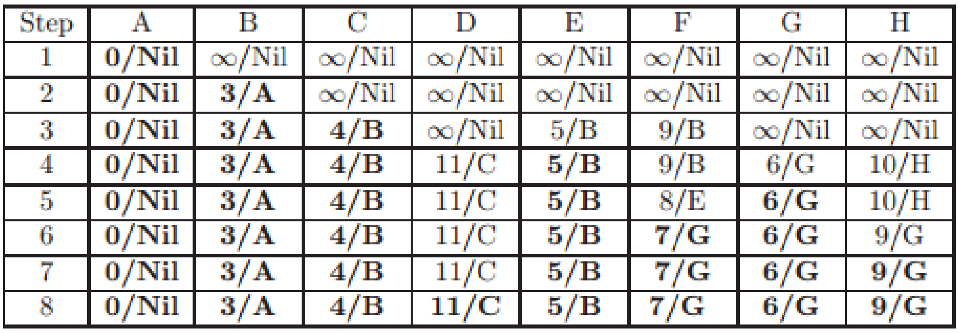


Figure 10: Dijkstra's Algorithm

Below is a table that summarizes the steps of Dijkstra's algorithm for the graph G and source vertex **A**. Each entry shows the shortest-path estimate and the shortest-path parent at each step of the algorithm. Those entries in bold are members of the set shortest that estimates are known to be exact. Estimates are lowered by relaxing an edge. In the table, a relaxation of an edge (s, t) is indicated in a row r wherever s is italicized and t is an entry whose estimate is reduced from row r to row r + 1. [28]



Step	A	B	C	D	E	F	G	H
1	**0/Nil**	∞/Nil	∞/Nil	∞/Nil	∞/Nil	∞/Nil	∞/Nil	∞/Nil
2	**0/Nil**	**3/A**	∞/Nil	∞/Nil	∞/Nil	∞/Nil	∞/Nil	∞/Nil
3	**0/Nil**	**3/A**	**4/B**	∞/Nil	5/B	9/B	∞/Nil	∞/Nil
4	**0/Nil**	**3/A**	**4/B**	11/C	**5/B**	9/B	6/G	10/H
5	**0/Nil**	**3/A**	**4/B**	11/C	**5/B**	8/E	**6/G**	10/H
6	**0/Nil**	**3/A**	**4/B**	11/C	**5/B**	**7/G**	**6/G**	9/G
7	**0/Nil**	**3/A**	**4/B**	11/C	**5/B**	**7/G**	**6/G**	**9/G**
8	**0/Nil**	**3/A**	**4/B**	**11/C**	**5/B**	**7/G**	**6/G**	**9/G**

Figure 11: Estimation Table

Below is the shortest path tree induced for Dijkstra's algorithm:

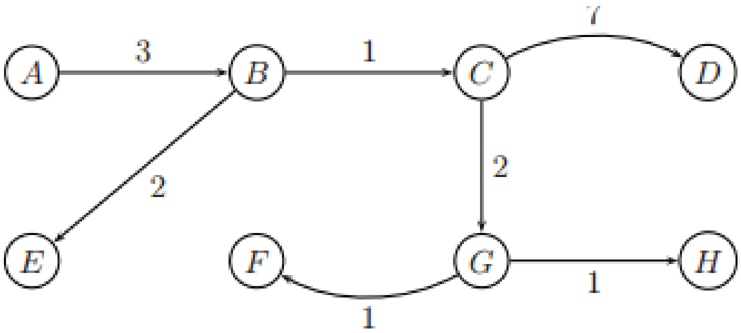


Figure 12: Shortest Path Tree for Dijkstra's algorithm

5.1.2. A*- Manhattan Search Algorithm

A* is one of the many search algorithms that takes an input, evaluates a number of possible paths and returns a solution. A* is the most popular choice for path finding, because it's fairly flexible and can be used in a wide range of contexts.

A* is like other graph-searching algorithms in that it can potentially search a huge area of the map. It's like Dijkstra's algorithm in that it can be used to find a shortest path. It's like Greedy Best-First-Search in that it can use a heuristic to guide itself.

If there is solution A* will find it. A* algorithm is similar to greedy best-first search but is more accurate because A* takes into account the nodes that have already been traversed. A* algorithm figures the least-cost path to the node which makes it a best first search algorithm.[29]

- The formula F(x)=g(x)+h(x)
  - G(x) is the total distance from the initial position to the current position.
  - H(x) is the heuristic function that is used to approximate distance from the current location to the goal state.
    - This function is distinct because it is a mere estimation rather than an exact value.
    - The more accurate the heuristic the better the faster the goal state is reach and with much more accuracy.

- F(x) = g(x) + h(x) this is the current approximation of the shortest path to the goal.

When starting at the initial node this search keeps track of the nodes to be traversed.

- This is known as the open set and it keeps track of nodes in order of the lowest f(x) to the highest f(x).
- In order of priority each node is removed from the queue and then the values for f(x) and h(x) neighboring nodes around the removed node are updated.
- This search continues until it reaches the node with the lowest f(x) value, which is called the goal node.
- H(x) at the goal is zero which is an admissible heuristic because the path to the goal is clearly not an overestimate.[29]

Dijkstra's and A* algorithms are very famous algorithms. A* algorithm, that is an advanced version of Dijkstra's, is widely used in navigation systems and in games. Usually, A* is used when we know the target location, while Dijkstra's is used when we don't know where the target is exactly. Both algorithms find the shortest path between two points on a graph, though A* may find a bit longer path (rarely) than Dijkstra's. In terms of speed, A* is much faster than Dijkstra's, because A* searches first where it "predicts" to find the target. In contrast, Dijkstra's searches everywhere. A* algorithm, firstly searches where it expects to find the target.

These algorithms are used usually to find a path between two nodes. In this research, we are interested in finding the shortest path between two nodes. This problem was raised in the middle of the last century. Computer scientist Edsger Dijkstra invented a good algorithm, in 1956, that solves the single-source shortest path problem for a graph with nonnegative edge path costs, producing a shortest path tree. Later in 1968, an enhanced version of Dijkstra's algorithm was published. A* algorithm uses Dijkstra's algorithm with some heuristics to find a path. There are several heuristics for A*, one of them is called "Manhattan", which we will consider here.

For instance, in this project there is a customer at a point which is called start point and customer wants to go any product/department which is called target point. Aim is to provide arrive customer target point using the shortest way.

What will be done is divide the area into squares. Give each square a distance from the starting point (i.e., the number of steps required to reach it). So, for example, the square (starting square) has a distance of 0. The right square from start position has a distance of 1. The right of that right square has a distance of 2, and so on.

Now, move anywhere until reach target point. In order to move anywhere, write the 8-neighbor (2 horizontally, 2 vertically, and 4 diagonally) squares from the last position to a list. Call this list "open list". To calculate their distances, add the square distance from the starting point to the distance between last position and the new square Then, choose the square having the lowest distance and move to it.

In order to remember the path later, add an arrow that points to the parent (the square that leads to it). So add an arrow from new square to the old one. When you move to this lowest-distance square, add again the 8 neighbor squares of that square to the open list, then choose the one having the lowest distance, move to it, and add a parent arrow. Keep repeating until you reach the target. When the target is found, the parent arrows will be followed from the target point in reverse until the starting point is reached, and thus the shortest path is found.

Already visited squares doesn't wanted to back to, so when you visit a square, you remove it from the open list and write it in a list in which you put squares you don't want to back to. Call this list "closed list". While you are checking the 8 neighbors, what if one of them is in the open list already? In this case, check if your distance is lower than the old distance in this square. If so, change its arrow to point to your square (i.e., your square's path is shorter). Recall that after we add a square to the closed list, we don’t back to it again. Hence, if we find that the neighbor square is in the closed list, we ignore it.

Dijkstra's algorithm; a distance is calculated from the starting point for every square, and let's call this distance "G cost", and select each time the lowest cost square. Hence, Dijkstra's algorithm is branched as a "greedy" algorithm, since it selects each time best square from the open list.

A* has a small addition. To find the shortest path, we consider another measure: H. H is the estimated distance between you and the target node. The squares are chosen according to the lowest sum of G (distance from the start) and H (estimated distance to the target). Call this sum F (so, obviously, F = G + H). Dijkstra's algorithm has the same method; expect that the H value will be 0 always. For A*, H is estimated by counting the required squares (horizontally and vertically) to reach the target, regardless if they are walkable (walls) or not.

On the other hand two additional derivative algorithms: Bi-Directional Dijkstra and Bi-Directional A* are considered.

5.1.3. Bidirectional Algorithms

Bidirectional search is a graph search algorithm that finds a shortest path from an initial vertex to a goal vertex. It executes two synchronous searches: one forward from the initial state and one backward from the goal, it is stopped when the two meet in the middle. Bidirectional search still guarantees optimal solutions. The cause for this approach why it is faster: for example, in a simplified model of search problem complexity in which both searches expand a tree with branching factor b, and the distance from start to goal is d, each of the two searches has complexity $O(b^{d/2})$ and the sum of these two search times is much less than the $O(b^{d})$ complexity that would result from a single search from the beginning to the goal.[26]

As in A* search, bi-directional search can be guided by a heuristic estimate of the remaining distance to the goal (in the forward tree) or from the start (in the backward tree).

Dijkstra’s Algorithm is extended to become bidirectional. Bi-directional graph algorithms are usually modified versions of existing graph algorithms. Instead of making the start point find the target point, Bi-directional A* and Bi-directional Dijkstra's make both points find each other:

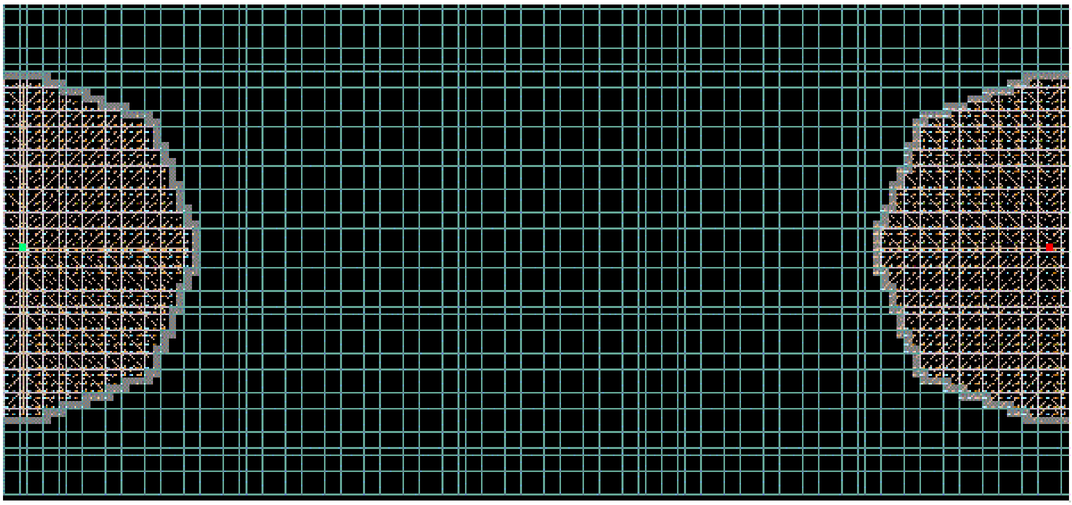


Figure 13: Illustration of bi-directional Dijkstra's from the demo

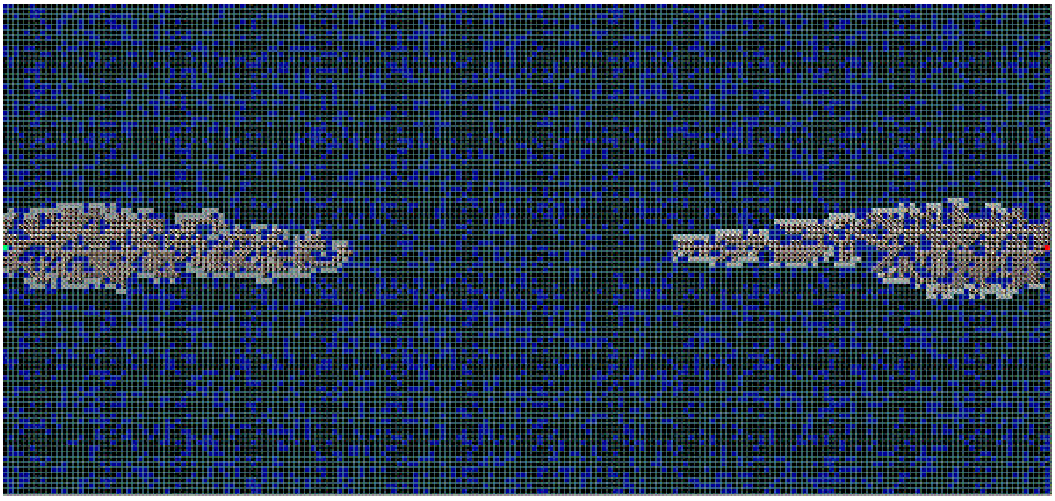


Figure 14: Illustration of bi-directional A* from the demo

This may consume more memory, yet can reduce the time to half. However, it is not appreciated in terms of shortest path, since the path found with bi-directional algorithms is often a little bit longer than single-direction algorithms.

The algorithms are the same as the previous versions, but will duplicate the open list to be two open lists (one for start-to-end and another for end-to-start). For the parents, we have a parent from start-to-end and a parent from end-to-start.

We will duplicate G, H, and F costs as well. When one of the two points finds a square that is in the close list of other, we stop and collect the path.

In this context the most efficient algorithm is chosen by comparison of these algorithms. Aim is finding shortest path but finding shortest path in a shortest time. Therefore bi-directional A* Algorithm is the most appropriate algorithm for the application. Bi-directional A* algorithm is used to obtain product and customer location information within the application.

5.2. Decision Tree Algorithm

Decision Tree algorithm is a classification and regression algorithm which is used in predictive modeling of both discrete and continuous attributes. For discrete attributes, the algorithm makes predictions based on the relationships between input columns in a dataset.

5.2.1. Why The Thesis Includes Decision Tree Algorithm

Analyses of Market carts are developed to find group of items that tend to occur together in transactions from typical supermarket checkout data. For many retailers this is the only source of sales information that is available for data mining.

The marketing department of the companies wants to identify the characteristics of previous customers that might indicate whether those customers are likely to buy a product in the future.

For example, analysis of checkout data uncovers the fact that customers who buy beer also buy chips. Or analysis may come up with the fact that on Thursdays customers often purchase diapers and beer together, an initially surprising result that, on reflection, makes some sense as young parents stock up for a weekend at home. [27]

Database stores demographic information that describes previous customers. By using the Decision Trees algorithm to analyze this information, the marketing department can build a model that predicts whether a particular customer will purchase products, based on the states of known columns about that customer, such as demographics or past buying patterns.

Direct marketing is another popular domain for data mining. Random promotional images offers are expensive and have a low (but highly profitable) response rate. Any data that helps focus promotions. Existing database contains demographic information that characterizes existing customers to predict what kind of people might buy which items and how many times.

Such information could be used for many purposes: planning store layouts, limiting special discounts to just one of a set of items that tend to be purchased together, offering coupons for a matching product when one of them is sold alone, and so on.

There is enormous added value in being able to store customer’s sales histories. Identification of individual customers not only allows historical analysis of purchasing but also permits special offers to be presented as promotional images to customers.

5.2.2. How The Algorithm Works?

The decision tree consists of nodes that form a rooted tree, meaning it is a directed tree with a node called “root” that has no incoming edges. All other nodes have exactly one incoming edge. A node with outgoing edges is called an internal or test node. All other nodes are called leaves. In a decision tree, each internal node splits the instance space into two or more sub-spaces according to a certain discrete function of the input attributes values. Typically the goal is to find the optimal decision tree by minimizing the generalization error. As you see in the Figure 15, system uses the defined data to decide displaying promotion screen to the user by Decision Tree Algorithm logic.

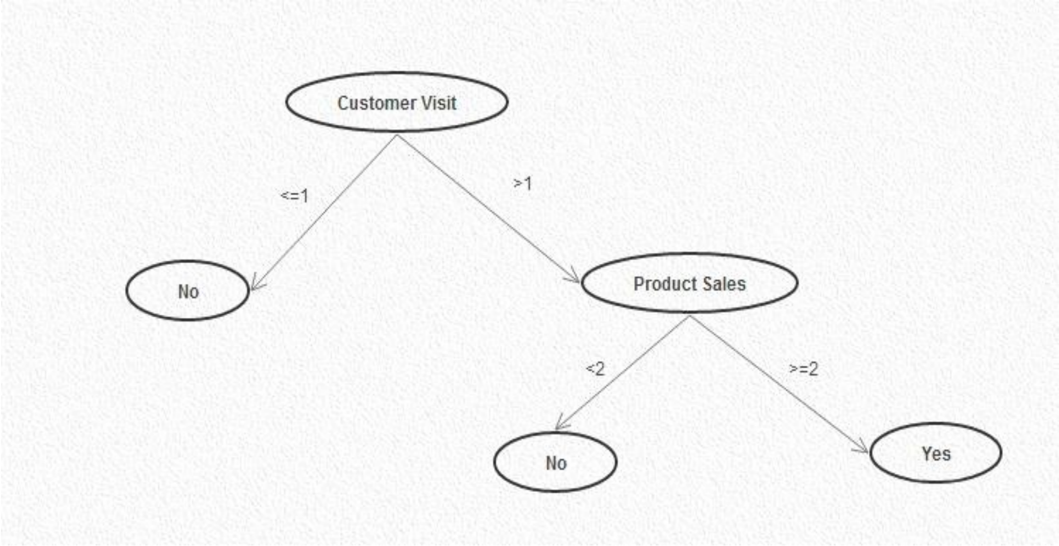


Figure 15 :Desicion Tree for Application

6. METHODOLOGY

6.1. Agile Methodology

6.1.1. What is Agile?

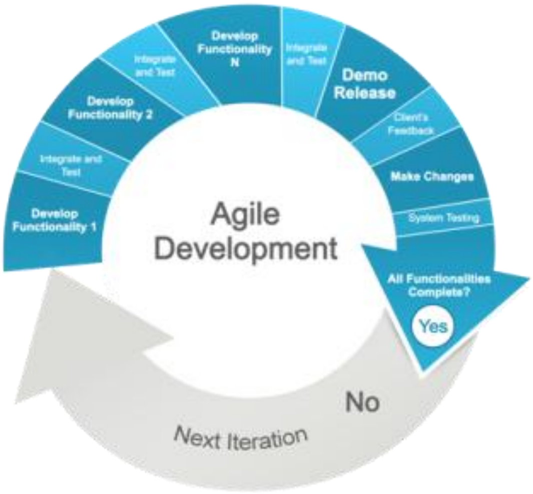


Figure 16:Agile Development

Agile methodology is an approach to project management, typically used in software development. It helps teams respond to the unpredictability of building software incrementally. It is very effective where client frequently changes his/her requirements. Since it has more iteration, as you see in the Figure 16, you can assure a solution that meets requirements of clients. It involves more client interaction and testing effort. [10]

Most agile methods attempt to minimize risk by developing software in short time boxes, called iterations. Every iteration is like a miniature software project of its own, and includes all of the tasks necessary to release the mini increment of new functionality: planning, requirements analysis, design, coding, testing, and documentation. [11]

Under this broad umbrella sits many more specific approaches. Some of the well-known agile software development methods are given below. [11]

· Extreme Programming (XP)

· Scrum

· Crystal Clear and Other Crystal Methodologies

· Feature Driven Development (FDD)

· Pragmatic Programming

· Dynamic Systems Development Method (DSDM) etc...

6.1.2. Characteristics of Agile Development

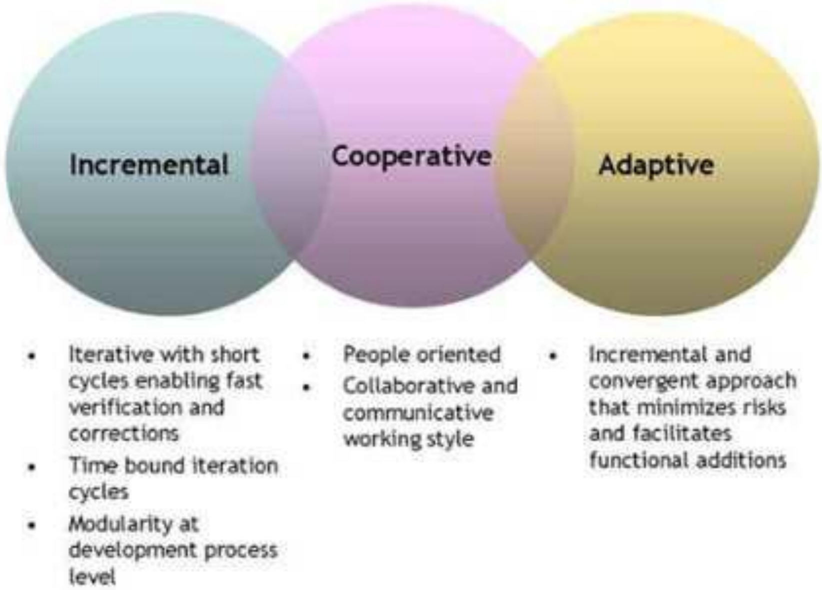

Incremental
Cooperative
Adaptive
• Iterative with short cycles enabling fast verification and corrections
• Time bound iteration cycles
• Modularity at development process level
• People oriented
• Collaborative and communicative working style
• Incremental and convergent approach that minimizes risks and facilitates functional additions

Figure 17: Characteristics of Agile Development

6.1.3. Where Did Agile Come From?

Paper of “Managing the Development of Large Software Systems,” was presented by Dr. Winston Royce in 1970 which he outlined his ideas on sequential development. Basically, his presentation claimed that a project could be developed much like an automobile on an assembly line, in which each piece is added in sequential phases. This means that every phase of the project must be completed before the next phase begins. Therefore firstly, developers collect all of a project’s requirements, then work on all of its architecture and design, then write all of the codes. Additionally must be cared if there are any communications between the specialized groups. [10]

6.1.4. Why Agile?

Agile development methodology provides many opportunities and conveniences to estimate the progress of a project throughout the development lifecycle. Each iteration helps to obtain this progress, because teams must present works at the end of every cycle. Agile methodology could be described as “iterative” and “incremental.” If there are any problems or failures about the project, there’s always time to steer it in another progress. This is the one of the important approaches in agile development which provides to intervene without delay. [10]

6.1.5. Introduction to Agile Method and Its Properties

6.1.5.1. Generic Agile Life Cycle

All software development methods, especially the agile methods, have some basic project life cycle. Some methods have certain abstract life cycles which is actually hard to know what activities to schedule and the all of them different terms for the same thing. [13]

Generic Agile Life Cycle provides a common system to explain some similarities and differences between the specific methods. The key elements are Project Initiation and Project Plan which are followed by one or more Releases with one or more time boxes. Elaborate Requirements and Architecture phases could be optional and performed in parallel with the Project Plan. [13]

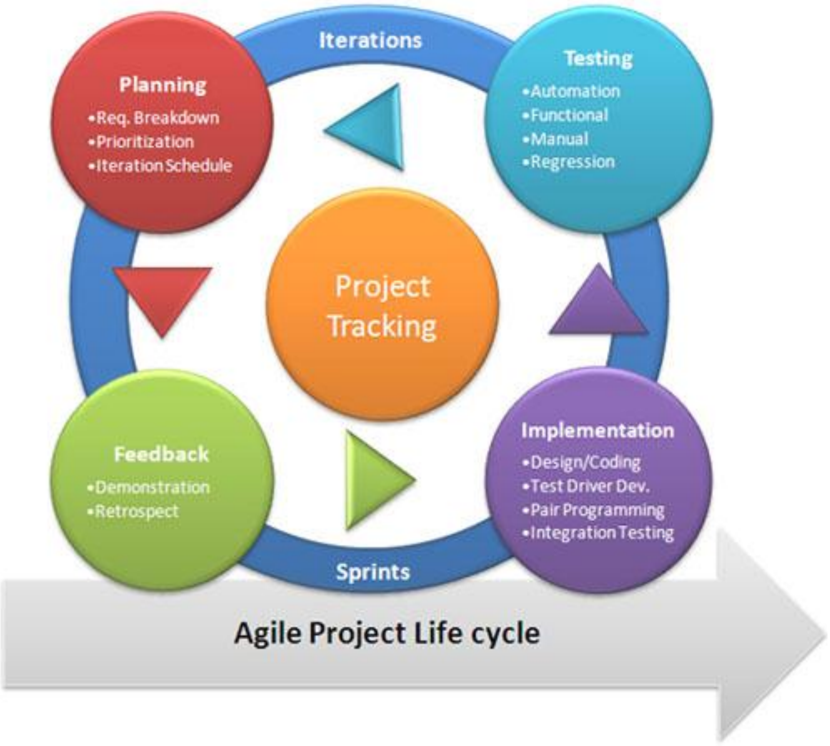


Figure 18 :Agile Project Life Cycle

Project Initiation:

In this phase, project is organized and focused on. Initial high level requirements are decided to get the project and its features. There can be some important questions to be defined at the start of any project. Project Initiation is the phase where these questions are determined and explained. [13]

Project Plan:

After Project Initiation project plan is make for handling how to continue with the project.

DSDM makes clear and necessary plan with its “Outline Plan” (created in Project Initiation) and “Development Plan” (created after the Requirements have been fleshed out). XP has something similar in the "Big Plan" done to verify a project, which develops into a release plan. [13]

Elaborate Requirements (optional):

There is no separate Elaboration phase in XP and Scrum, although the customer is expected to elaborate as much as necessary at the start of an XP Iteration

(Time box)

Crystal Orange and DSDM have a separate elaboration phase. Facilitated workshop(s) are to identify “High level requirements” which are then collated into a document that contains use cases and non-functional requirements. [13]

Architecture (optional):

The Agile approach is generally “design for today and refactor tomorrow” (at least in XP). An architecture phase is optional in XP and Crystal Orange. However, in

DSDM an architecture phase is compulsory and results in a "System Architecture Document". [13]

Release:

A Release is a piece of development where the customer gets some new software.

Releases can be from 2 weeks to 6 months, but are usually 3 months long. Releases have one or more time boxes. Unlike other methods, in DSDM one release is the norm, i.e. there is only one release to the customer in the entire project. [13]

Time box:

A Time box is 1 – 6 weeks long, but usually 3 – 4 weeks. The most important thing about a time box is that the delivery date is fixed. [13]

6.1.5.2. Roles and Responsibilities in Agile Method

Agile Developer – Life in a different world

Agile developer undertakes a variety of tasks (analysis, estimating, design, coding, testing) and generally does what it takes (which is pretty much all Scrum uses for a job definition). She/he is client facing, in fact client facing every day as the customer is one of the team. [13]

User/Customer – An Active Role

Life is different for an agile customer as well. Customer is part of the team and must actively participate. He/she is responsible for the requirements and must talk to other users and get their agreement, write up the requirements (if necessary), and explain them to developers. [13]

Project Manager as Shepherd

The role of the Project Manager is subtly different when using an agile approach. He/she gathers information from all stakeholders and integrate into workable plan; log estimates; log task assignments; sustain high rate of progress; make decisions; remove impediments; build and sustain team culture; ensure team sticks to process; manage customer relationships; get update plans; communicate progress. [13]

6.1.5.3. Change Management

Within the Agile world, change is expected and time is considered more important than functionality. So if something has to give to allow change, then functionality/scope loses and time wins, i.e. the customer must make tradeoffs. [13]

6.1.5.4. Quality Management

Quality must be addressed continuously within Agile Development. There are stated quality goals. In XP the product must pass 100% of unit tests and an acceptable number of functional tests. In DSDM there are documented quality criteria for all work products. XP uses Xunit for automatic Unit Tests and insists on tests before code. [13]

6.1.5.5. Risk Management

Agile process reduces level of 5 of top 10 risks:

- Feature creep
- Gold plating
- Short changed quality
- Overly optimistic estimates
- Friction between developers and customers [13]

6.1.5.6. Development

Agility is not so concerned with the technical aspects of development.

- **Programming:** In some ways Agile programming isn't so different from normal programming: still has coding standards. In other ways it is different, for example XP's Pair Programming and Test before code.
- **Design:** In the agile world a simple design is best. Design for today and refactor tomorrow (XP). This is true for on-going design and any initial architecture phase. An initial architecture phase is optional (XP, Crystal Orange); only DSDM makes an architecture phase compulsory. [13]

6.1.6. Benefits of Agile Methodology

Recent surveys show that use of agile methodologies is growing. For instance, enterprise project and lifecycle management solutions provider Version

One Software recently conducted .The survey draws attention to the following benefits that makes the adoption of agile methods so popular: [11]

· Accelerated time-to-market by 60%-80%

· Increased productivity by 55%-85%

· Reduced software defects by 55%-85%

· Reduced the cost of production by 30%-60%

6.1.7. Traditional vs. Agile Methodologies

There are some differences between traditional methods and agile methods. This information which is showed below can facilitate to understand which the best is.

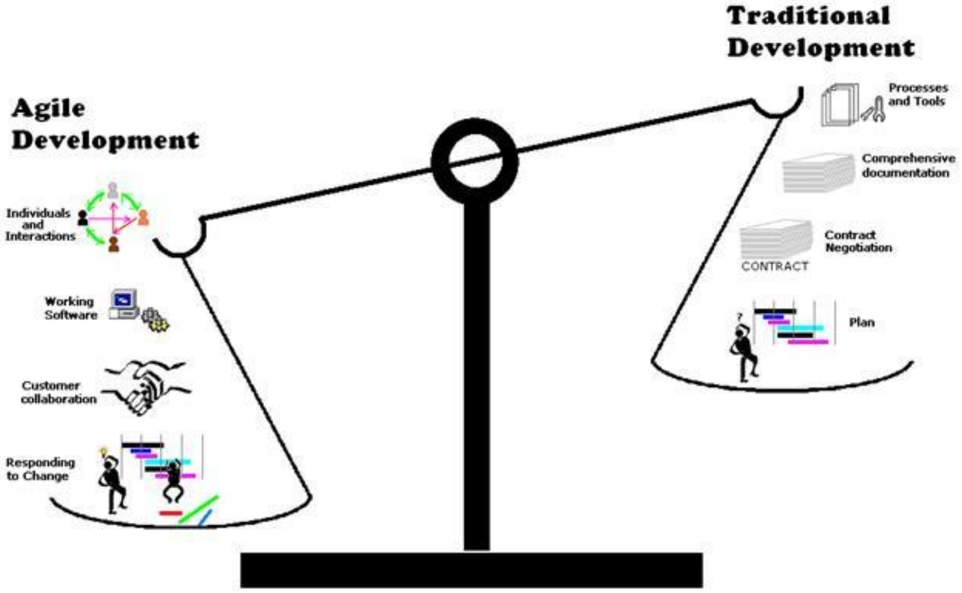


Figure 19 : Traditional versus Agile Methodology

6.1.8. Agile Manifesto

In 2001, seventeen distinct figures in the field of software development came together at the Snowbird ski resort in Utah to discuss the unifying theme of their methodologies. They created the Agile Manifesto which is widely referenced as the standard definition of agile development, and related with agile principles.

1. Our highest priority is to satisfy the costumer through early and continuous delivery of valuable software. [12]

2. Welcome changing requirements, even late in development. Agile process harness change for the customer’s competitive advantage. [12]

3. Deliver working software frequently, from a couple of weeks to a couple of months, with a preference to the shorter timescale. [12]

4. Business people and developers must work together daily throughout the project. [12]

5. Build projects around motivated individuals. Give them the environment and support they need, and trust them to get the job done. [12]

**Team composition in an agile project is usually cross-functional and self-organizing without consideration for any existing corporate hierarchy or the corporate roles of team members.

6. The most efficient and effective method of conveying information to and within a development team is face-to-face conversation. [12]

**Most agile methodologies include a routine and formal daily face-to-face communication among team members.

7. Working software is the primary measure of progress. [12]

8. Agile processes promote sustainable development. The sponsors, developers, and users should be able to maintain a constant pace indefinitely. [12]

9. Continuous attention to technical excellence and good design enhances agility. [12]

10. Simplicity – the art of maximizing the amount of work not done – is essential. [12]

11. The best architectures, requirements, and designs emerge from self-organizing teams. [12]

12. At regular intervals, the team reflects on how to become more effective, then tunes and adjusts its behavior accordingly. [12]

6.2. Extreme Programming

6.2.1. What is Extreme Programming (XP)?

Extreme Programming is a discipline of software development based on values of simplicity, communication, feedback, and courage. It works by bringing the whole team together in the presence of simple practices, with enough feedback to enable the team to see where they are and to tune the practices to their unique situation. [15]

XP stresses customer satisfaction. The methodology is designed to deliver the software customer needs when it is needed. XP empowers developers to confidently respond to changing customer requirements, even late in the life cycle. [14]

This methodology also emphasizes team work. Managers, customers, and developers are all part of a team dedicated to delivering quality software. XP implements a simple, yet effective way to enable groupware style development. XP programmers communicate with their customers and fellow programmers. [14]

XP improves a software project in four essential ways; communication, simplicity, feedback, and courage. These ways are explained detailed in the follow sections.

6.2.2. History

Extreme Programming was created by Kent Beck during his work on the Chrysler Comprehensive Compensation System (C3) payroll project. Beck became the C3 project leader in March 1996 and began to refine the development method used in the project and wrote a book on the method (in October 1999, Extreme Programming Explained was published). Chrysler cancelled the C3 project in February 2000, after the company was acquired by Daimler-Benz. [16]

Although Extreme Programming itself is relatively new, many of its practices have been around for some time; the methodology, after all, takes "best practices" to extreme levels. For example, the "practice of test-first development, planning and writing tests before each micro-increment" was used as early as NASA's Project Mercury, in the early 1960s (Larman 2003). Refactoring, modularity, bottom-up and incremental design were described by Leo Brodie in his book published in 1984. [16]

6.2.3. Why is it useful?

XP provides a collection of good software development practices. When used with each other for managing work and collaborating, these practices can lead to highly effective software development teams that produce high quality code. XP also enforces the idea of doing only what needs to be done and doing it extremely well. [17]

The main goal of XP is to lower the cost of change in software requirements. With traditional system development methodologies, like the Waterfall Methodology, the requirements for the system are determined and often "frozen" at the beginning of the development project. This means that the cost of changing the requirements at a later stage in the project can be very high. [18]

6.2.4. XP Variables

We will control four variables in our projects—cost, time, quality, and scope. Of these, scope provides us the most valuable form of control. Here is a model of software development from the perspective of a system of control variables. In this model, there are four variables in software development:

· Cost

· Time

· Quality

· Scope

The way the software development game is played in this model is that external forces (customers, managers) get to pick the values of any three of the variables. The development team gets to pick the resultant value of the fourth variable. [19]

- Interactions between the Variables

Cost—more money can grease the skids a little, but too much money too soon creates more problems than it solves. On the other hand, give a project too little money and it won't be able to solve the customer's business problem.

Time—more time to deliver can improve quality and increase scope. Since feedback from systems in production is vastly higher quality than any other kind of feedback, giving a project too much time will hurt it. Give a project too little time and quality suffers, with scope, time, and cost not far behind.

Quality—Quality is terrible as a control variable. You can make very short-term gains (days or weeks) by deliberately sacrificing quality, but the cost—human, business, and technical—is enormous.

Scope—less scope makes it possible to deliver better quality (as long as the customer's business problem is still solved). It also lets you deliver sooner or cheaper. [19]

6.2.5. XP activities

XP describes four basic activities that are performed within the software development process. [16]

Coding

The advocates of XP argue that the only truly important product of the system development process is code. Without code project has nothing. Coding can be drawing diagrams that will generate code, scripting a web-based system or coding a program that needs to be compiled. Coding can also be used to figure out the most suitable solution. [16]

Testing

One cannot be certain of anything unless one has tested it. Testing is not a perceived, primary need for the customer. A lot of software is shipped without proper testing and still works. In software development, XP says this means that one cannot be certain that a function works unless one tests it. This raises the question of defining what one can be uncertain about. [16]

· You can be uncertain whether what you coded is what you meant. To test this uncertainty, XP uses Unit Tests. These are automated tests that test the code. The programmer will try to write as many tests he or she can think of that might break the code he or she is writing; if all tests run successfully then the coding is complete. [16]

· You can be uncertain whether what you meant is what you should have meant. To test this uncertainty, XP uses acceptance tests based on the requirements given by the customer in the exploration phase of release planning. [16]

Listening

Programmers do not necessarily know anything about the business side of the system under development. The function of the system is determined by the business side.

For the programmers to find what the functionality of the system should be, they have to listen to business. Programmers have to listen "in the large": they have to listen to what the customer needs. Also, they have to try to understand the business problem, and to give the customer feedback about his or her problem, to improve the customer's own understanding of his or her problem. Communication between the customer and programmer is further addressed in The Planning Game. [16]

Designing

From the point of view of simplicity, one could say that system development doesn't need more than coding, testing and listening. If those activities are performed well, the result should always be a system that works. In practice, this will not work. One can come a long way without designing but at a given time one will get stuck. The system becomes too complex and the dependencies within the system cease to be clear. One can avoid this by creating a design structure that organizes the logic in the system. Good design will avoid lots of dependencies within a system; this means that changing one part of the system will not affect other parts of the system. [16]

6.2.6. XP values

Extreme Programming initially recognized four values in 1999. A new value was added in the second edition of Extreme Programming Explained. The five values are: [16]

Communication

Communication emphasizes person-to-person talking, rather than documents that explain the software. Several XP practices call for an on-site customer, so a lot of time is spent communicating with that customer. [20]

Simplicity

Simplicity is an XP value that calls for the solution of the customer’s problem to be pure. Both developers and customers easily understand the software solution. [20] Extreme Programming encourages starting with the simplest solution. Extra functionality can then be added later. [16]

Feedback

Feedback means that everything done is evaluated with respect to how well it works. How well it works is indicated through the feedback gained from exercising every working part of the solution. [14] Within Extreme Programming, feedback relates to different dimensions of the system development: Feedback from the system, Feedback from the customer, Feedback from the team. [16]

Courage

Courage means that developers are prepared to make important decisions that support XP practices while building and releasing something of value to the customer in each iteration. [14] Courage enables developers to feel comfortable with refactoring their code when necessary. [16]

Respect

The respect value manifests in several ways. In Extreme Programming, team members respect each other because programmers should never commit changes that break compilation, that make existing unit-tests fail, or that otherwise delay the work of their peers. Members respect their work by always striving for high quality and seeking for the best design for the solution at hand through refactoring. [16]

6.2.7. XP Principles

· The Planning Process -- The desired features of the software, which are communicated by the customer, are combined with cost estimates provided by the programmers to determine what the most important factors of the software are. This stage is sometimes called the Planning Game. [21]

XP planning addresses two key questions in software development: predicting what will be accomplished by the due date, and determining what to do next. The emphasis is on steering the project — which is quite straightforward — rather than on exact prediction of what will be needed and how long it will take — which is quite difficult. There are two key planning steps in XP, addressing these two questions:

Release Planning is a practice where the customer presents the desired features to the programmers, and the programmers estimate their difficulty.

Iteration Planning is the practice whereby the team is given direction every couple of weeks. XP teams build software in two-week “iterations”, delivering running useful software at the end of each iteration. [15]

Small Releases -- The software is developed in small stages that are updated frequently, typically every two weeks. [21]

XP teams practice small releases in two important ways: [15]

First, the team releases running, tested software, delivering business value chosen by the customer, for every iteration. The Customer then can use this software for any purpose, whether evaluation or even release to end users (highly recommended). The most important aspect is that the software is visible, and given to the customer, at the end of every iteration. This keeps everything open and tangible. [15]

Second, XP teams release to their end users frequently as well. XP Web projects release as often as daily, in house projects monthly or more frequently. Even shrink-wrapped products are shipped as often as quarterly. [15]

Metaphor -- All members on an XP team use common names and descriptions to guide development and communicate on common terms. [21]
Extreme Programming teams develop a common vision of how the program works, which we call the “metaphor”. At its best, the metaphor is a simple evocative description of how the program works, such as “this program works like a hive of bees, going out for pollen and bringing it back to the hive” as a description for an agent-based information retrieval system. [15]

Simple Design -- The software should include only the code that is necessary to achieve the desired results communicated by the customer at each stage in the process. The emphasis is not on building for future versions of the product. [21]

XP teams build software to a simple design. They start simple, and through programmer testing and design improvement, they keep it that way. An XP team keeps the design exactly suited for the current functionality of the system. There is no wasted motion, and the software is always ready for what’s next. Design in XP is not a one-time thing, or an up-front thing, it is an all-the-time thing. Beside this, there are design steps in release planning and iteration planning. [15]

Testing - Testing is done consistently throughout the process. Programmers design the tests first and then write the software to fulfill the requirements of the test. The customer also provides acceptance tests at each stage to ensure the desired results are achieved. [21]

Refactoring -- XP programmers improve the design of the software through every stage of development instead of waiting until the end of the development and going back to correct flaws. [21]

Pair Programming -- XP programmers work in pairs. All code is developed by two programmers who work together at a single machine. The expectation is that pair programming produces higher quality code at the same or less cost. [21]

It may seem inefficient to have two programmers doing “one programmer’s job”, but the reverse is true. Research into pair programming shows that pairing produces better code in about the same time as programmers working singly. That’s right: two heads really are better than one! [15]

Collective Ownership -- Every line of code belongs to every programmer working on the project, so there are no issues of proprietary authorship to slow the project down. Code is changed when it needs to be changed without delay. [21]

On an Extreme Programming project, any pair of programmers can improve any code at any time. This means that all code gets the benefit of many people’s attention, which increases code quality and reduces defects.

Collective ownership could be a problem if people worked blindly on code they did not understand. XP avoids these problems through two key techniques: the programmer tests catch mistakes, and pair programming. [15]

Continuous Integration -- The XP team integrates and builds the software system multiple times per day to keep all the programmers at the same stage of the development process at once. [21]

The benefit of this practice can be seen by thinking back on projects it may have heard about (or even been a part of) where the build process was weekly or less frequently, and usually led to “integration hell”, where everything broke and no one knew why. [15]

40-Hour Week -- The XP team does not work excessive overtime to ensure that the team remains well-rested, alert and effective. [21]

Extreme Programming teams are in it for the long term. They work hard, and at a pace that can be sustained indefinitely. This means that they work overtime when it is effective, and that they normally work in such a way as to maximize productivity week in and week out. [15]

On-Site Customer -- The XP project is directed by the customer who is available all the time to answer questions, set priorities and determine requirements of the project. [21]

All the contributors to an XP project sit together, members of one team. This team must include a business representative, programmers, testers, analysts and manager. None of these roles is necessarily the exclusive property of just one individual: Everyone on an XP team contributes in any way that they can. The best teams have no specialists, only general contributors with special skills. [15]

Coding Standard -- The programmers write all code in the same way. This allows them to work in pairs and to share ownership of the code. [10] XP teams follow a common coding standard, so that all the code in the system looks as if it was written by a single — very competent — individual. The specifics of the standard are not important: what is important is that all the code looks familiar, in support of collective ownership. [15]

6.2.8. Advantages of Extreme Programming

- For developers, XP allows IT staff of company to concentrate on coding and avoid unnecessary paper works and meeting. It creates better social atmosphere, more opportunities to learn new skills and makes your employees feel a sense of achievement. [22]
- A company can practice XP in order to create software with lesser number of defects compared to traditional programming. It lets you adapt the change of your business requirement very quickly with minimum cost and no complaints from developers. [22]
- In XP, you do not design for the future. You design for today. The whole idea is to write simple code and change your design plan accordingly if the need arises in the future. [22]
- The programmers of your IT staff writer all production code in pairs, and all work together all the time. The code is consistent and readable so that everyone can understand and improve all the code as needed. Also, pair coding provides maximum efficiency in a time frame. [22]
- The biggest difference of XP project and traditional software development is the idea of test driven development. You can start XP test before the code is written. Each piece of code has to pass unit test 100%. The absence of unit level and regression bugs means that testers can actually focus on their job.
- Your customers define automated acceptance test to define the level of quality that all of the features of the software are working. [22]
- You can have small release of tested software at the end of each iteration with XP. The most important is that the software is visible to your customer at the end of every iteration. [22]
- In the tradition waterfall method, if there is a change in the project schedule, it puts a major amount of effort to get things done in time. XP methodology makes you estimate the progress much earlier. [22]
- The feedback from the system, customer and team are the key for success for extreme programming. Flaws in the system are detected in the earlier stage with this concept and customer can conduct acceptance test repeatedly to minimize error in your deliverables. [22]

6.2.9. Disadvantages of Extreme Programming

- Extreme Programming is hard to do. You may have difficulty to get many developers accept this practice, and it takes a lot of discipline to keep doing them all. Your customers may not like the idea of so much involvement. Management may also find problems to get used with the practice that changes dynamically during the project life cycle. [23]
- XP team does not believe the idea of fixed price, fixed scope kind of terms with the customer. Other processes are more likely to encourage the creation of detailed planning from the beginning. [23]
- XP encourages pair programming. There may be a huge amount of duplication of codes that clubs with unit test. As a result, it is going to take long time to run and leave the database with lot of duplicate data. [23]
- XP is code centric rather than design centric development. The lack of XP design concept may not be serious for small programs. But, it can be problematic when programs are larger than a few thousand lines of code or when many people are associated with the project. [23]
- Another basic problem is that software today is very large and complex by nature. My practical experience is that it is hard to design by using incremental method that XP practices. [23]
- XP emphasizes on refactoring during software development process. But, as far as my experience goes, too much refactoring may not be that important all the time and can be a waste of time rather than being productive in positive sense. [23]

7. OPERATION OF THE SYSTEM

The system consists of three separate parts and two different applications. Application one of these is designed to identify default information. These are such as product, group of product, feature of product, department of supermarket, sketch of supermarket and shelves of supermarket, etc.

Other application is designed to be used by customers of supermarket. This application includes advertisements module, searching module, location module, campaign module, shopping cart module, membership module and complaints module. Advertisements module will present gif which gives info about a product or campaign. This space is rented by brands. Searching module is developed to allow users finding information about products. Users enter product keyword and similar products are listed. User chooses target product and get info about it. There will be direction map to achieve this product. This part is provided by RFID technology. Shopping cart module allows users to add products whatever they want to buy. Module calculates the products prices, automatically. Hereby, users know to pay how much on the cash desk. Membership module is to manage membership information. Complaint module is developed for customers' all complaints about supermarket. On the other hand users can enter comments about product on the product info page.

The system makes use of web service technology to serve information about products. Reason for, administrator identifies all of the data about supermarket and products. The data is obtained by using web service technology; data is presented to the customers.

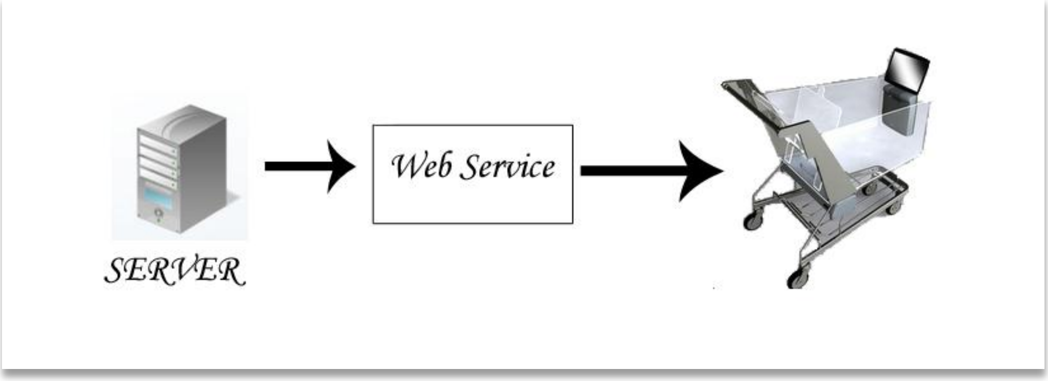


Figure 20: Operation of the System

With the same logic, location info of product or location of customers is obtained. But first of all, RFID reader which is attached on the shopping cart reads

RFID tags which are attached on the rayon. RFID numbers are matched on the system records. Herewith target info is returned to the customer.

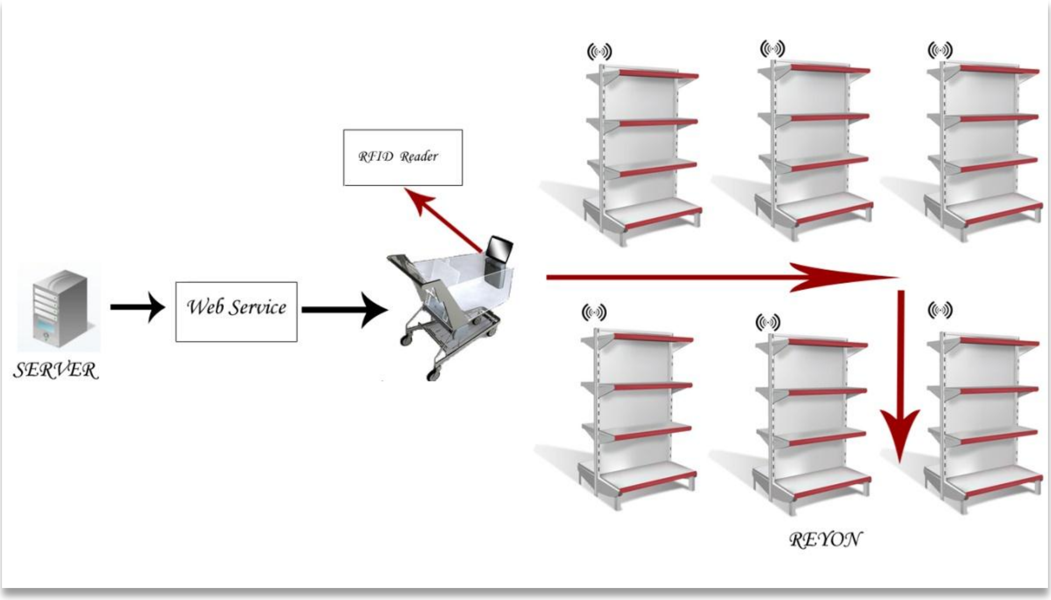


Figure 21: Operation of the System

8. TARGETS OF MİMA

- MİMA is the first usage of RFID over the interactive touch screen computers for the supermarkets.
- Aim to give information about requested product.
- Easy retrieval to requested product.
- Presenting a screen for searching products.
- Aim to give information about amount of products on the shelf.
- Giving detailed product information for easy access.
- Representation the way to getting selected product. (Especially on a map)
- Displaying advertisements for more information about the products.
- Advising according to membership information.
- In this manner, Return of Investment (ROI) will be tried to provide.

9. HOW TO USE MİMA

Programme is separated to two different applications. These are application of the Admin and End User. Admin application has been developed to create the infrastructure for the end user application.

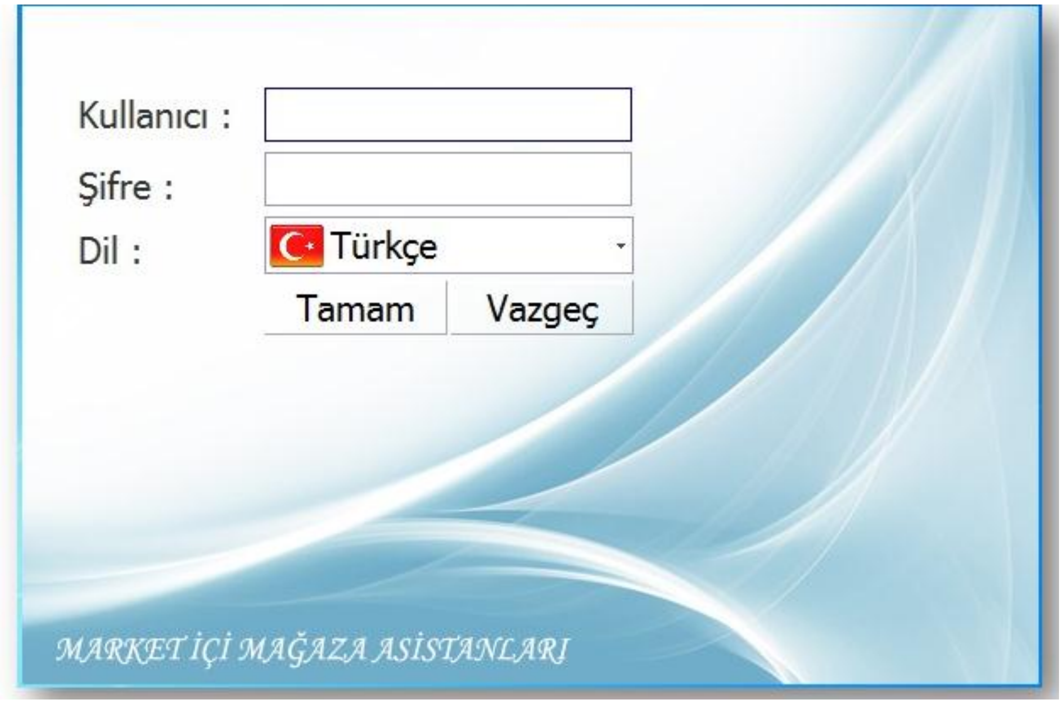
Therefore Admin part is used to determine every detail about the project by the administrator of the system. End user part is for costumers of the supermarket. This part helps user while they are shopping in the supermarket.

9.1. ADMIN

This part explains the ability of application which is developed for admin of the system.

9.1.1. LOGIN TO SYSTEM

System supports Turkish and English languages. Login page consists of username and password.

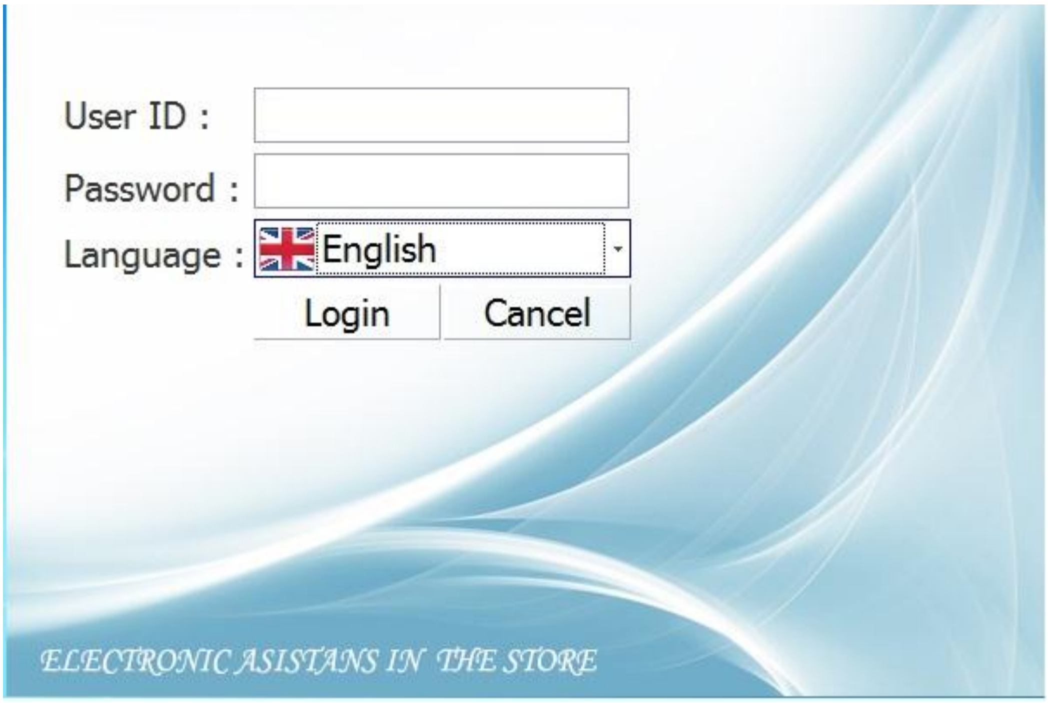


Kullanıcı :

Şifre :

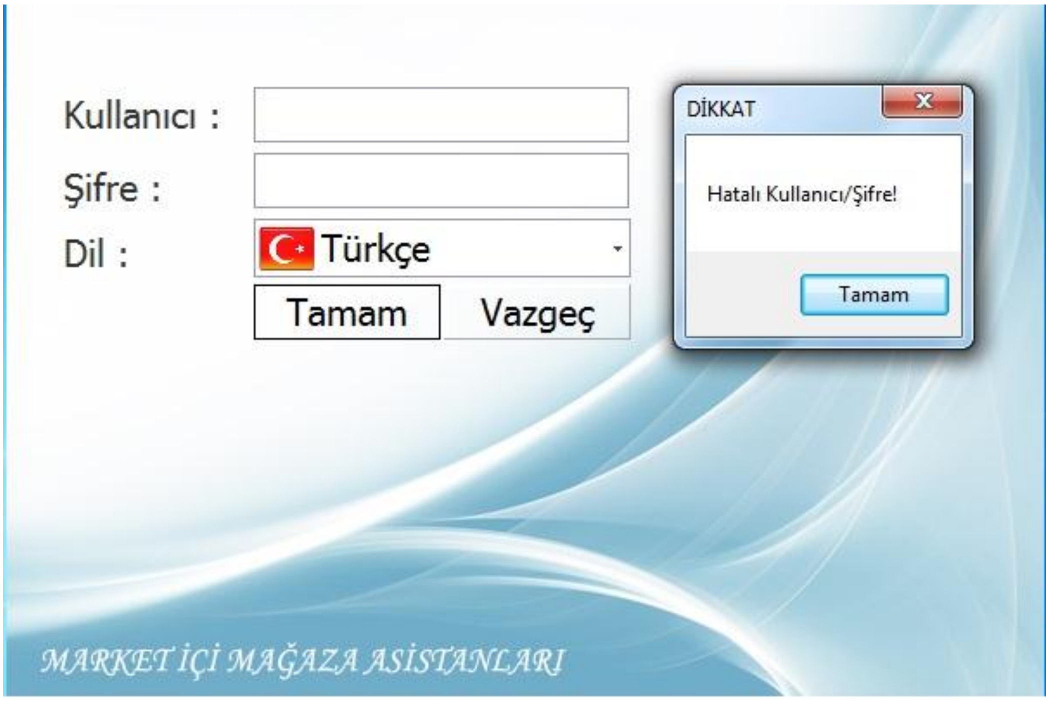
Dil : Türkçe

Figure 22: Login Page (Turkish)



Language : English

Figure 23: Login Page (English)



Dil : Türkçe

Hatalı Kullanıcı/Şifre!

Figure 24: Login Failed

System returns message for failed login.

9.1.2. MAIN MENU

Main menu is used for reaching all modules of the programs. All identification of the system is done by using the modules. The modules are System and Descriptions. Descriptions module includes basic definition about Product, Membership, and Sketch. Product module includes product description, product detail, department description, department group description, category description. Membership module consists of user descriptions, user comments, campaign descriptions, requests and complaints which are obtained from Membership module. Sketch module includes shelf descriptions, department descriptions, sketch descriptions, rfid tag descriptions.

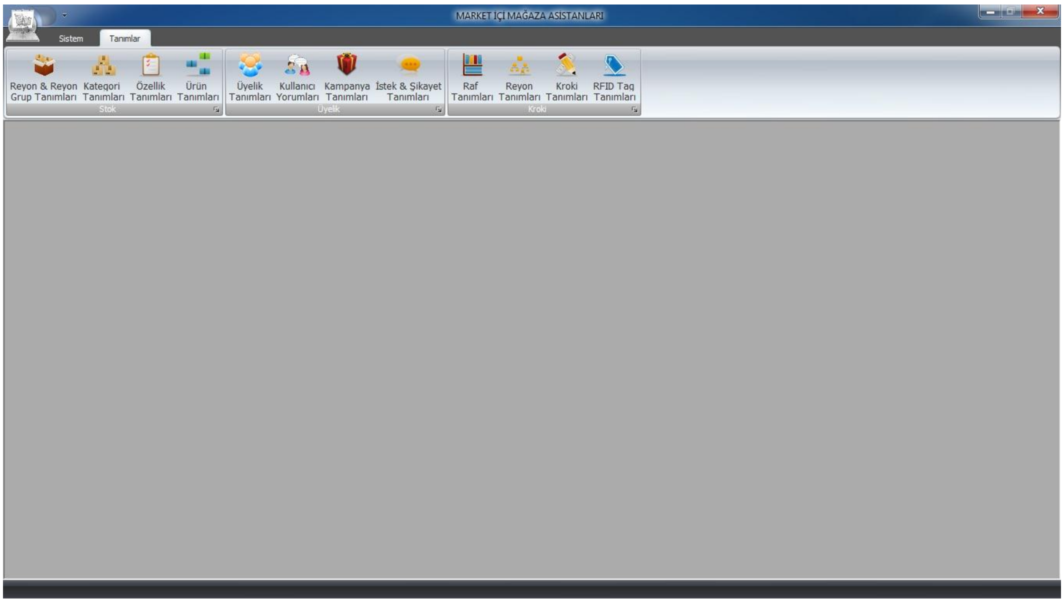
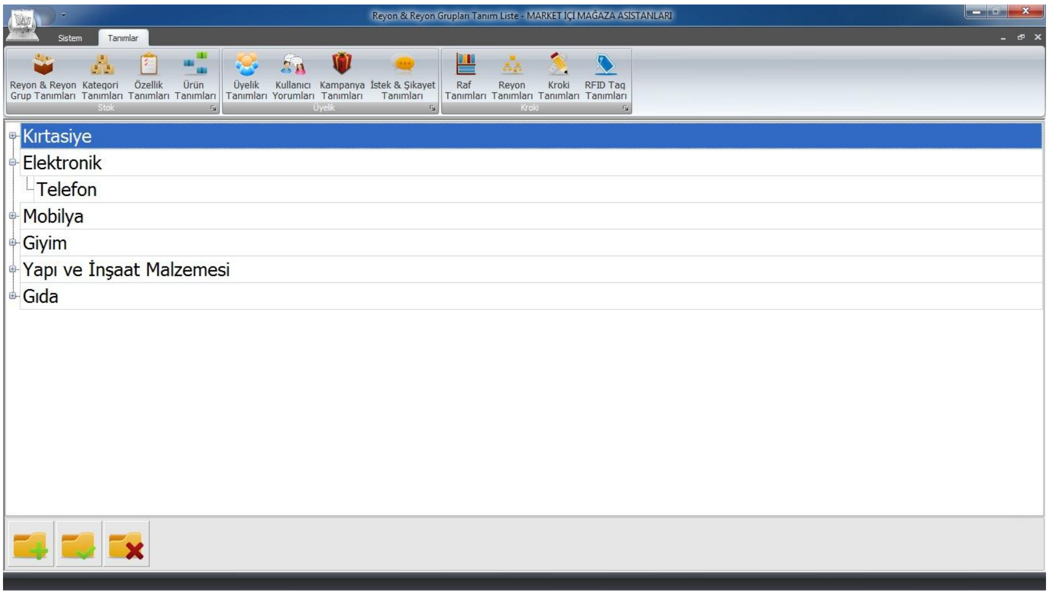


Figure 25:Main Form

9.1.2.1. Department & Department Group Description

The Department & Department Group Description part display a list which includes all Department & Department Groups. And also the form provides user to add, update department by using the corresponding buttons.

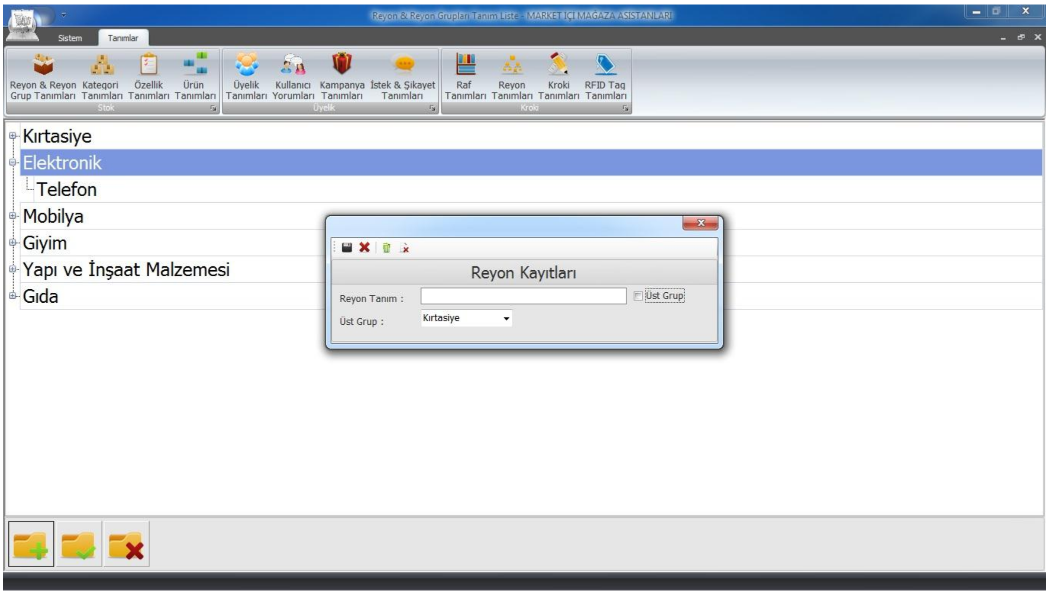


Kırtasiye
Elektronik
Telefon
Mobilya
Giyim
Yapı ve İnşaat Malzemesi
Gıda

Figure 26: Department & Department Group List Form

9.1.2.1.1. Adding New Department

The new form is opened when the user clicks the add button on the Department form. This form is for adding rayon. User can enter a department name and select upper group save these using add/edit button. Also user can exit from this form using exit button.



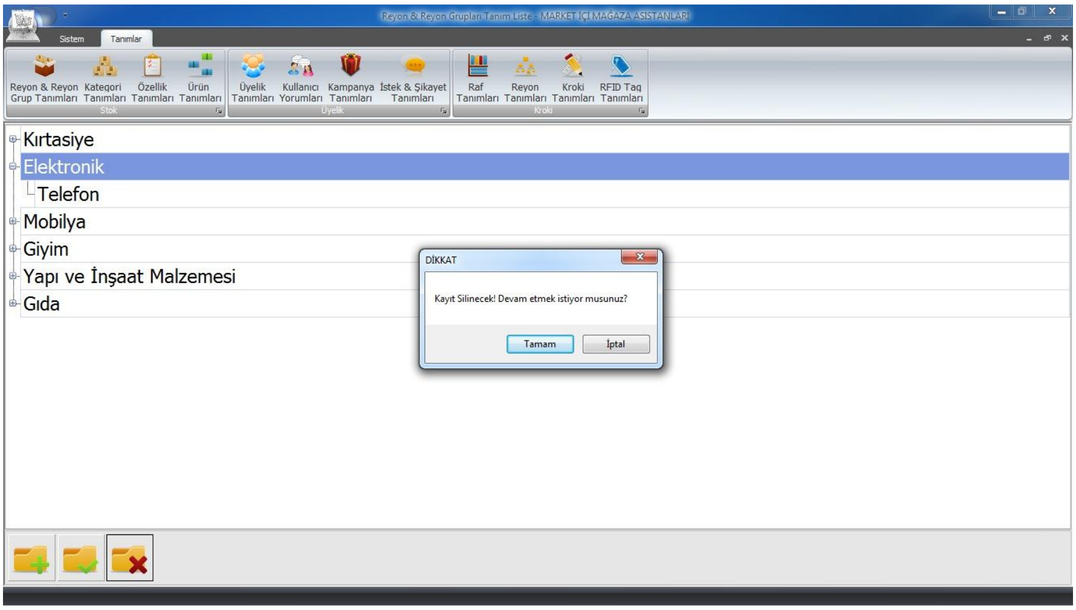
Kırtasiye
Elektronik
Telefon
Mobilya
Giyim
Yapı ve İnşaat Malzemesi
Gıda

Reyon Tanım :
□ Üst Grup
Üst Grup : Kırtasiye

Figure 27: Department & Department Group New Record

9.1.2.1.2. Deleting Existing Rayon

User can delete selected record on the form. Firstly the row is chosen, and then the delete button is clicked.



Kırtasiye
Elektronik
Telefon
Mobilya
Giyim
Yapı ve İnşaat Malzemesi
Gıda

DİKKAT

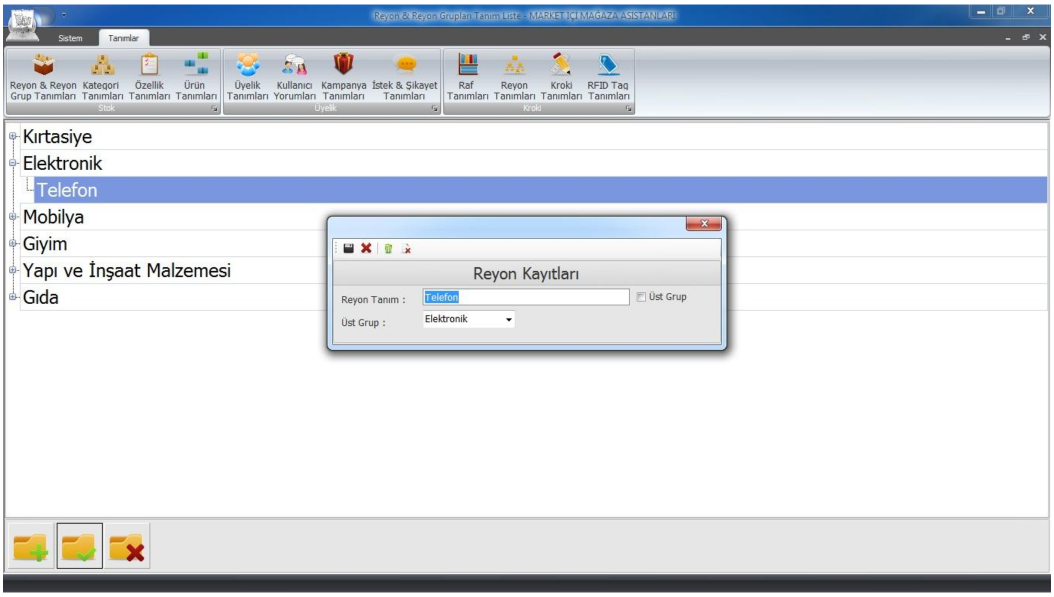
Kayıt Silinecek! Devam etmek istiyor musunuz?

Tamam İptal

Figure 28: Department & Department Group Delete Record

9.1.2.1.3. Updating an Existing Rayon

The new form is opened when the user clicks the edit button on the Department form. The form is for updating selected record properties.



Kırtasiye
Elektronik
Telefon
Mobilya
Giyim
Yapı ve İnşaat Malzemesi
Gıda

Reyon Kayıtları

Reyon Tanım : Telefon □ Üst Grup

Üst Grup : Elektronik

Figure 29: Department & Department Group Update Record

9.1.3. Category Description

The Category Description part allow user to reach category list and also provides user to add, update category by using the corresponding buttons.

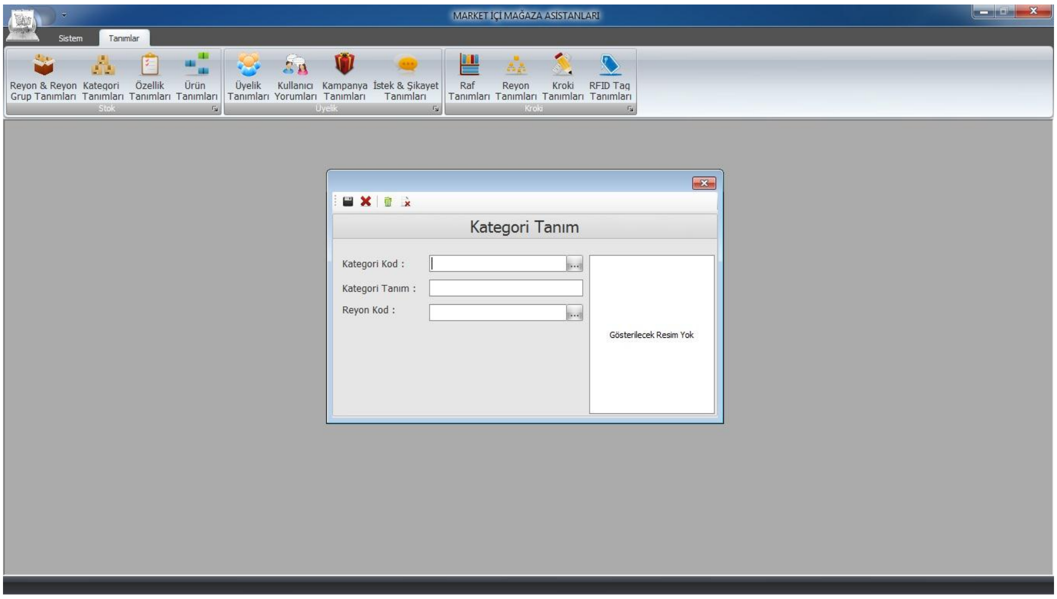
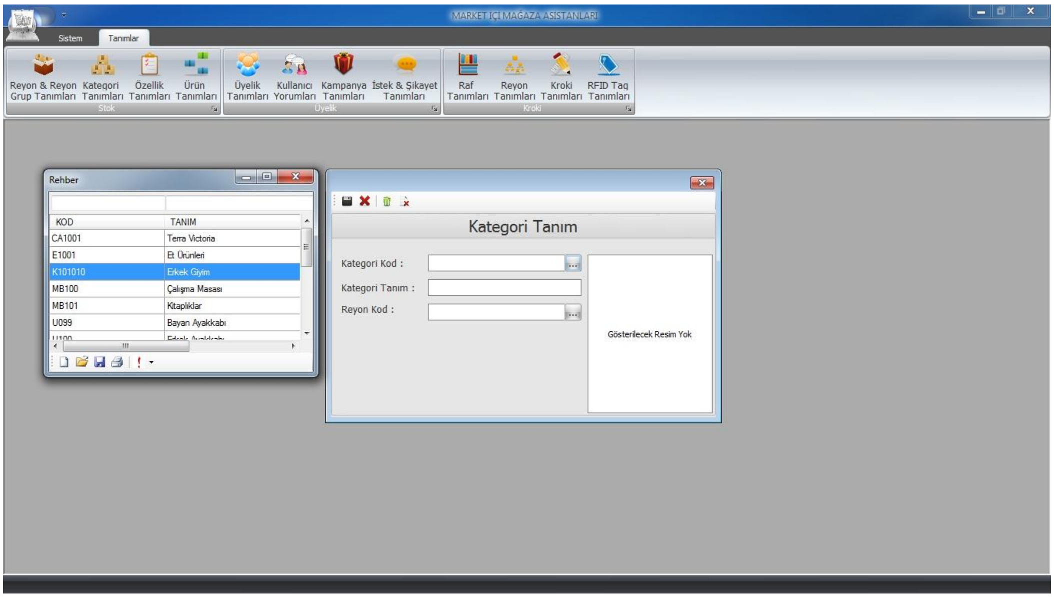


Figure 30: Category Form

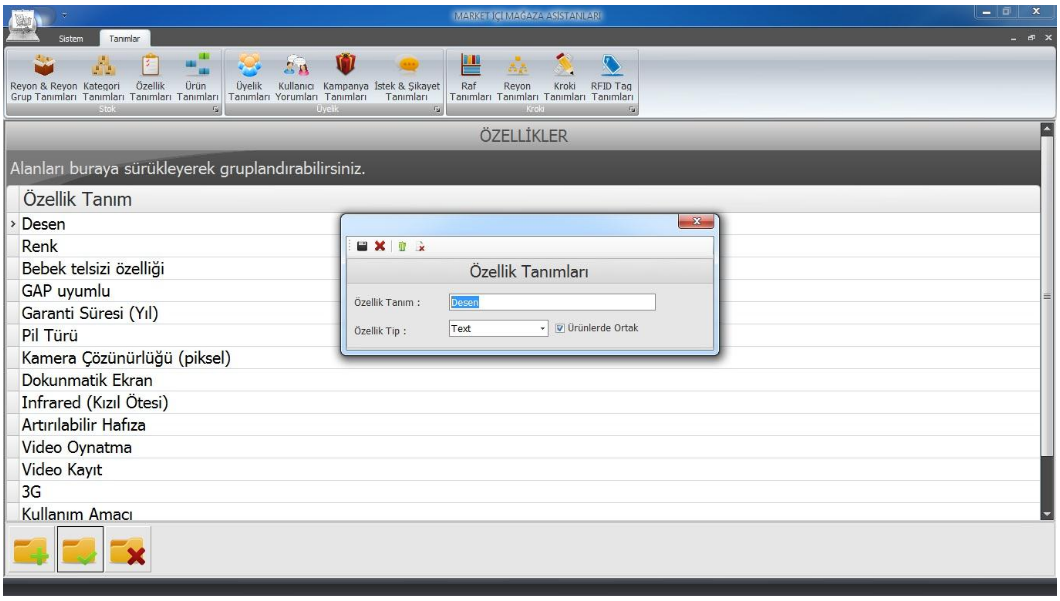


KOD	TANIM
CA1001	Terra Victoria
E1001	Et Ürünleri
K101010	Erkek Giyim
MB100	Çalışma Masası
MB101	Kitaplıklar
U099	Bayan Ayakkabı
U100	Erkek Ayakkabı

Figure 31: Category Selection Form

9.1.4. Property Description

The Property part displays a list which includes all properties of the products. And also the form provides user to add, update and delete properties of the product by using the corresponding buttons. User can reach add and edit operations using right click menu on the active property.



ÖZELLİKLER

Alanları buraya sürükleyerek gruplandırabilirsiniz.

Özellik Tanım
Desen
Renk
Bebek telsizi özelliği
GAP uyumlu
Garanti Süresi (Yıl)
Pil Türü
Kamera Çözünürlüğü (piksel)
Dokunmatik Ekran
Infrared (Kızıl Ötesi)
Artırılabilir Hafıza
Video Oynatma
Video Kayıt
3G
Kullanım Amacı

Özellik Tanımları

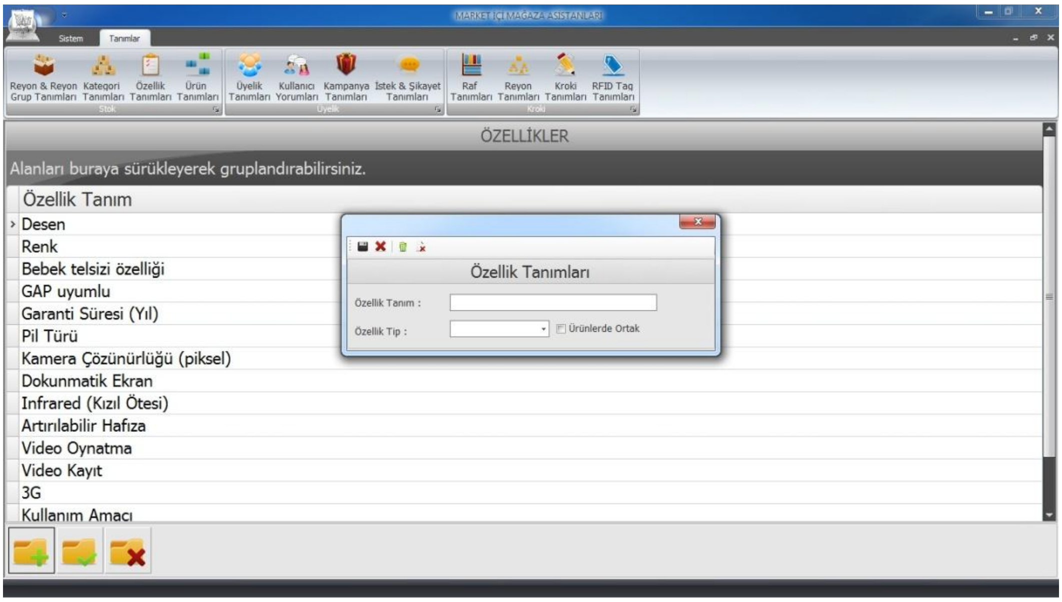
Özellik Tanım : Desen

Özellik Tip : Text ☑ Ürünlerde Ortak

Figure 32: Property Form

9.1.4.1. Adding New Property

The new form is opened when the user clicks the add button on the Property form. This form is for adding property. User can enter a property description and type and can save these using add/edit button. Also user can exit from this form using exit button.



ÖZELLİKLER

Alanları buraya sürükleyerek gruplandırabilirsiniz.

Özellik Tanım
Desen
Renk
Bebek telsizi özelliği
GAP uyumlu
Garanti Süresi (Yıl)
Pil Türü
Kamera Çözünürlüğü (piksel)
Dokunmatik Ekran
Infrared (Kızıl Ötesi)
Artırılabilir Hafıza
Video Oynatma
Video Kayıt
3G
Kullanım Amacı

Özellik Tanımları

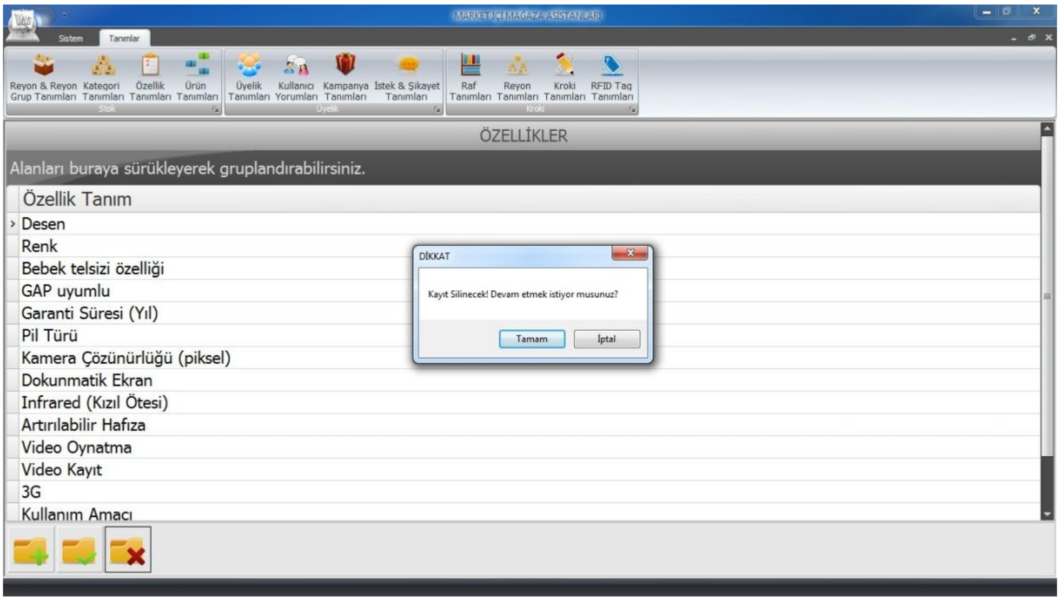
Özellik Tanım :

Özellik Tip : ☐ Ürünlerde Ortak

Figure 33: Property Form New Record

9.1.4.2. Deleting Existing Property Description

User can delete selected record on the form. Firstly the row is chosen, and then the delete button is clicked.



Alanları buraya sürükleyerek gruplandırabilirsiniz.

Özellik Tanım
Desen
Renk
Bebek telsizi özelliği
GAP uyumlu
Garanti Süresi (Yıl)
Pil Türü
Kamera Çözünürlüğü (piksel)
Dokunmatik Ekran
Infrared (Kızıl Ötesi)
Artırılabilir Hafıza
Video Oynatma
Video Kayıt
3G
Kullanım Amacı

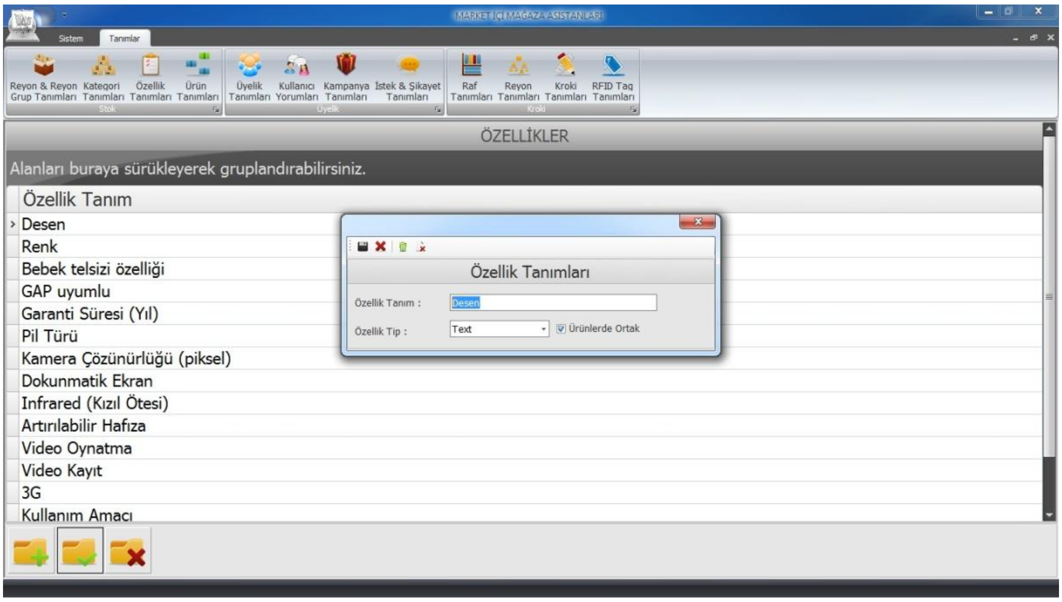
DİKKAT

Kayıt Silinecek! Devam etmek istiyor musunuz?

Figure 34: Property Form Delete Record

9.1.4.3. Updating Existing Property

The new form is opened when the user clicks the edit button on the Property form. The form is for updating selected record.



Alanları buraya sürükleyerek gruplandırabilirsiniz.

Özellik Tanım
Desen
Renk
Bebek telsizi özelliği
GAP uyumlu
Garanti Süresi (Yıl)
Pil Türü
Kamera Çözünürlüğü (piksel)
Dokunmatik Ekran
Infrared (Kızıl Ötesi)
Artırılabilir Hafıza
Video Oynatma
Video Kayıt
3G
Kullanım Amacı

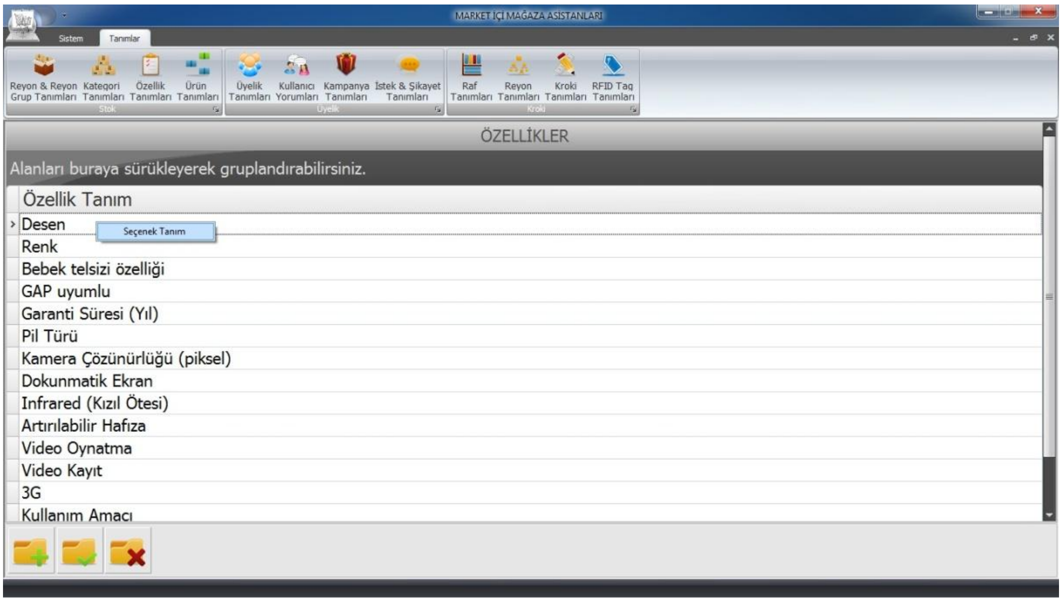
Özellik Tanımları

Özellik Tanım : Desen

Özellik Tip : Text ☑ Ürünlerde Ortak

Figure 35: Property Form Update Record

Additionally options can be assigned to the properties. By clicking right click button options form is opened and user add options to the list so the options are assigned to the property.

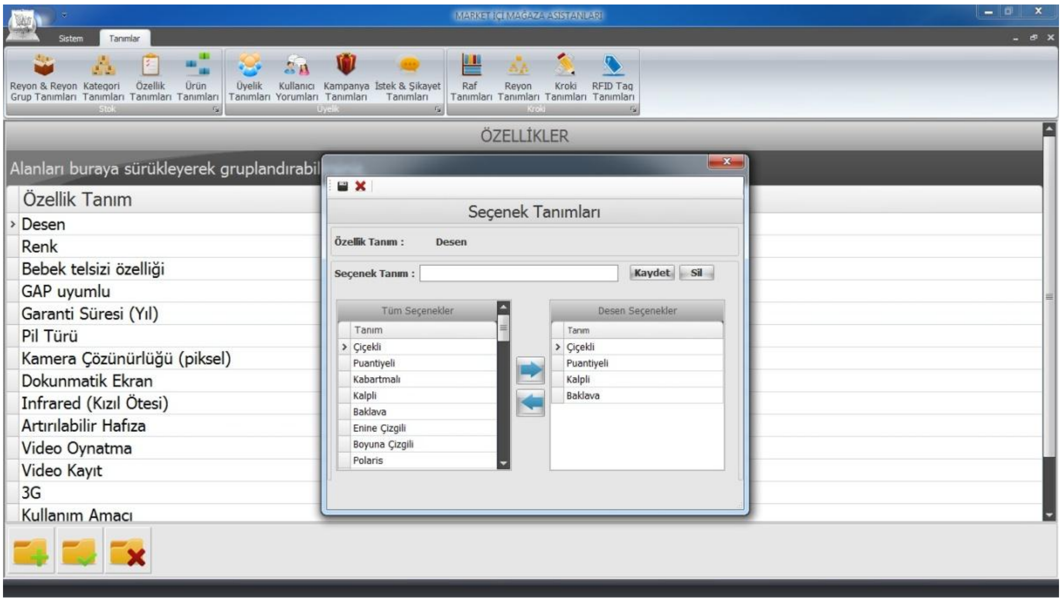


ÖZELLİKLER

Alanları buraya sürükleyerek gruplandırabilirsiniz.

Özellik Tanım
Desen
Renk
Bebek telsizi özelliği
GAP uyumlu
Garanti Süresi (Yıl)
Pil Türü
Kamera Çözünürlüğü (piksel)
Dokunmatik Ekran
Infrared (Kızıl Ötesi)
Artırılabilir Hafıza
Video Oynatma
Video Kayıt
3G
Kullanım Amacı

Figure 36: Property Form Add Option



ÖZELLİKLER

Alanları buraya sürükleyerek gruplandırabil

Özellik Tanım
Desen
Renk
Bebek telsizi özelliği
GAP uyumlu
Garanti Süresi (Yıl)
Pil Türü
Kamera Çözünürlüğü (piksel)
Dokunmatik Ekran
Infrared (Kızıl Ötesi)
Artırılabilir Hafıza
Video Oynatma
Video Kayıt
3G
Kullanım Amacı

Seçenek Tanımları

Özellik Tanım : Desen

Seçenek Tanım :

Tüm Seçenekler

Tanım
Çiçekli
Puantiyeli
Kabartmalı
Kalpli
Baklava
Enine Çizgili
Boyuna Çizgili
Polaris

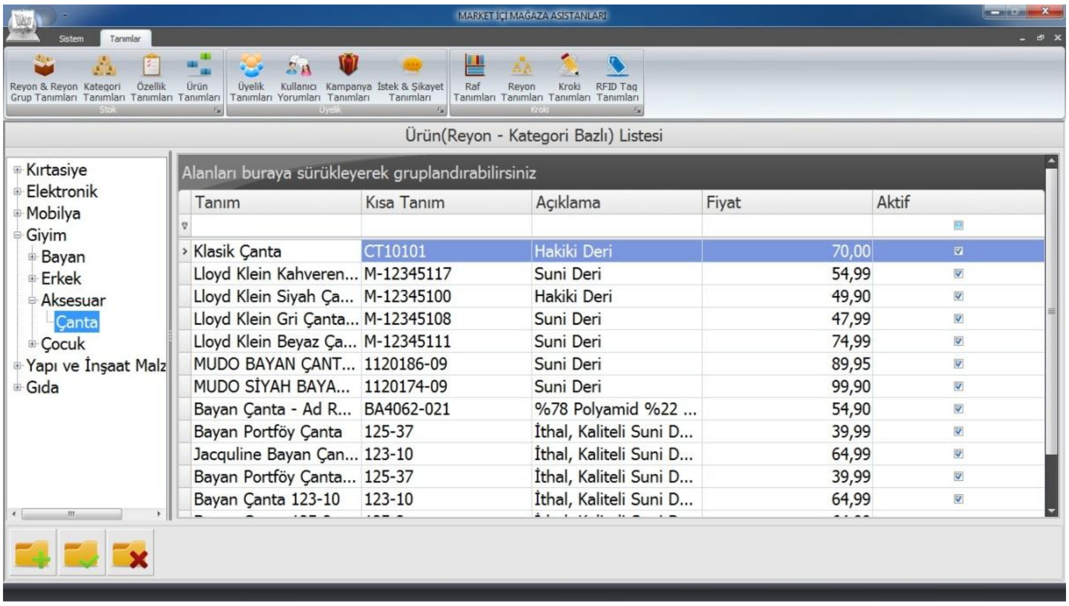
Desen Seçenekler

Tanım
Çiçekli
Puantiyeli
Kalpli
Baklava

Figure 37: Property Form Option List

9.1.5. Product Description

The Product Description part displays a list which includes all Products with Department info. And also the form provides user to add, update product by using the corresponding buttons.



Ürün(Reyon - Kategori Bazlı) Listesi

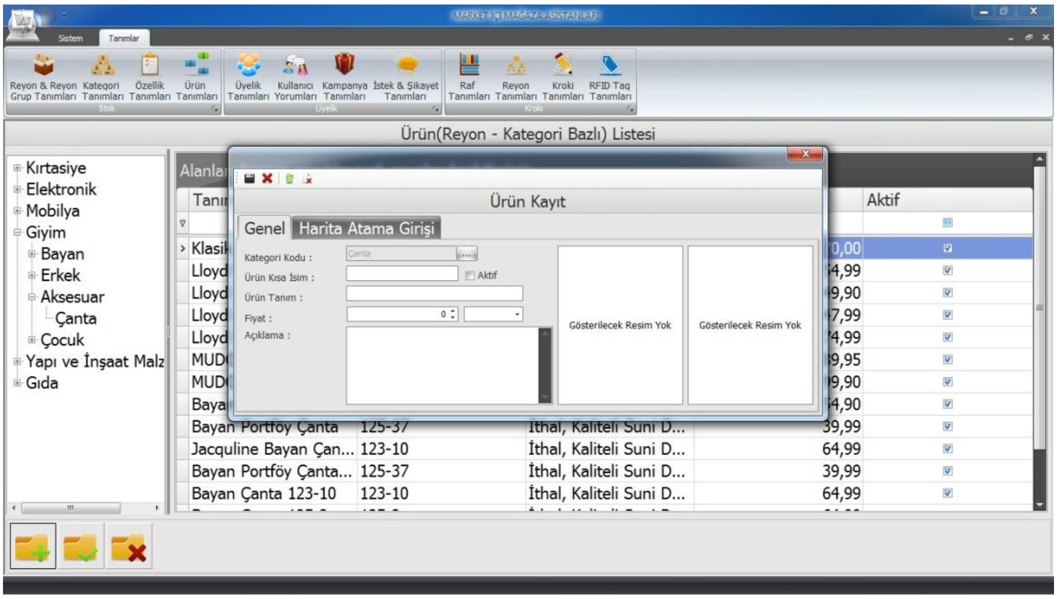
Alanları buraya sürükleyerek gruplandırabilirsiniz

Tanım	Kısa Tanım	Açıklama	Fiyat	Aktif
Klasik Çanta	CT10101	Hakiki Deri	70,00	☑
Lloyd Klein Kahveren...	M-12345117	Suni Deri	54,99	☑
Lloyd Klein Siyah Ça...	M-12345100	Hakiki Deri	49,90	☑
Lloyd Klein Gri Çanta...	M-12345108	Suni Deri	47,99	☑
Lloyd Klein Beyaz Ça...	M-12345111	Suni Deri	74,99	☑
MUDO BAYAN ÇANT...	1120186-09	Suni Deri	89,95	☑
MUDO SİYAH BAYA...	1120174-09	Suni Deri	99,90	☑
Bayan Çanta - Ad R...	BA4062-021	%78 Polyamid %22 ...	54,90	☑
Bayan Portföy Çanta	125-37	İthal, Kaliteli Suni D...	39,99	☑
Jacquline Bayan Çan...	123-10	İthal, Kaliteli Suni D...	64,99	☑
Bayan Portföy Çanta...	125-37	İthal, Kaliteli Suni D...	39,99	☑
Bayan Çanta 123-10	123-10	İthal, Kaliteli Suni D...	64,99	☑

Figure 38: Product List Form

9.1.5.1. Adding New Product

The new form is opened when the user clicks the add button on the Product form. This form is for adding product. User can enter general product descriptions such as Product Name, Price, and Note etc. And also add two different photos that are belong to product to display on the end user screen.



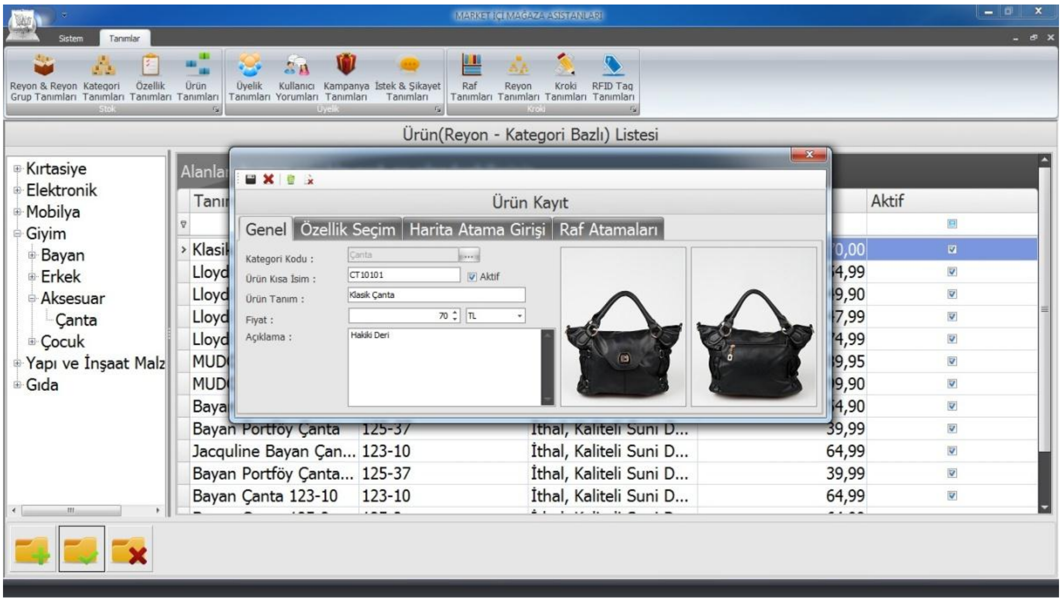
Ürün(Reyon - Kategori Bazlı) Listesi

Ürün Kayıt

Kategori Kodu : Çanta
Ürün Kısa İsim : ☐ Aktif
Ürün Tanım :
Fiyat : 0
Açıklama :

Figure 39: Product Form New Record

When user clicks save button other details forms will be available for the product. By the way properties can be assigned to the product with options.



Ürün(Reyon - Kategori Bazlı) Listesi

Ürün Kayıt

Kategori Kodu : Çanta

Ürün Kısa İsim : CT10101 ☑ Aktif

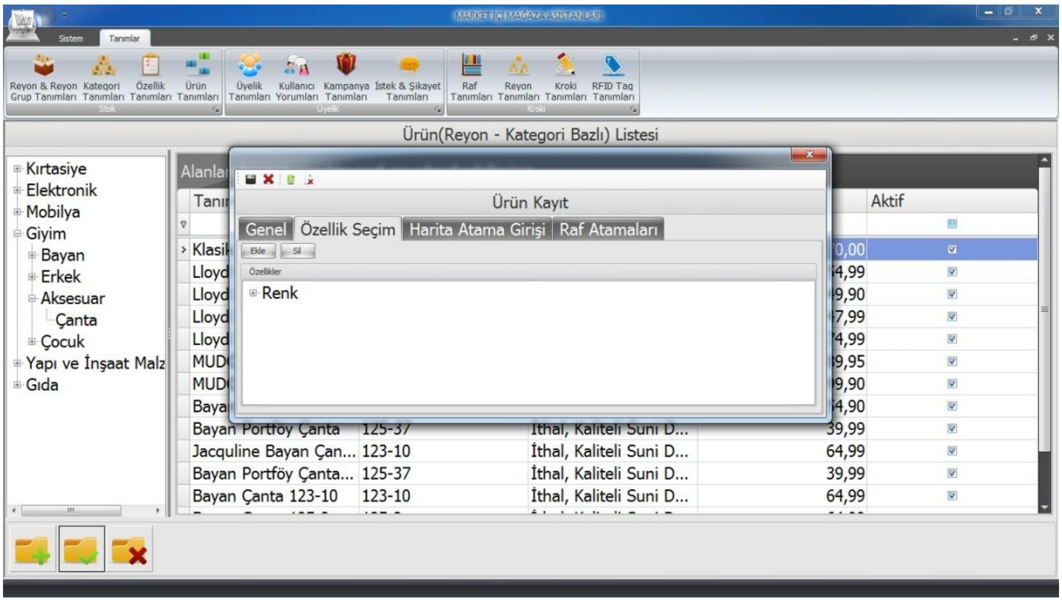
Ürün Tanım : Klasik Çanta

Fiyat : 70 TL

Açıklama : Hakiki Deri

Bayan Portföy Çanta	125-37	İthal, Kaliteli Suni D...	39,99	☑
Jacquline Bayan Çan...	123-10	İthal, Kaliteli Suni D...	64,99	☑
Bayan Portföy Çanta...	125-37	İthal, Kaliteli Suni D...	39,99	☑
Bayan Çanta 123-10	123-10	İthal, Kaliteli Suni D...	64,99	☑

Figure 40: Product Form Attach Photo



Ürün(Reyon - Kategori Bazlı) Listesi

Ürün Kayıt

Özellikler

Renk

Bayan Portföy Çanta	125-37	İthal, Kaliteli Suni D...	39,99	☑
Jacquline Bayan Çan...	123-10	İthal, Kaliteli Suni D...	64,99	☑
Bayan Portföy Çanta...	125-37	İthal, Kaliteli Suni D...	39,99	☑
Bayan Çanta 123-10	123-10	İthal, Kaliteli Suni D...	64,99	☑

Figure 41: Product Form Assign Property

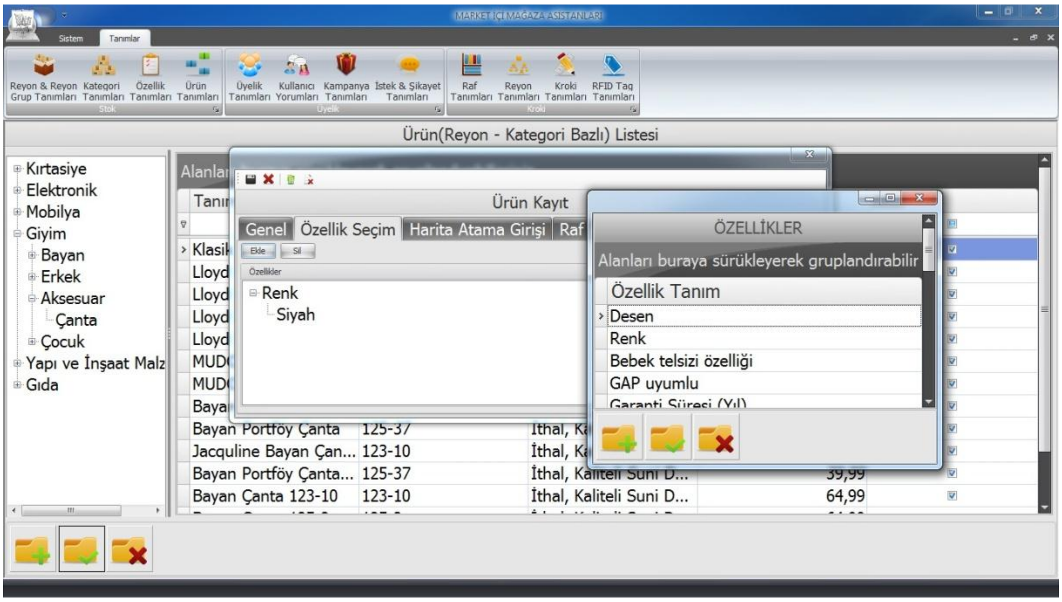


Figure 42: Product Form Property List

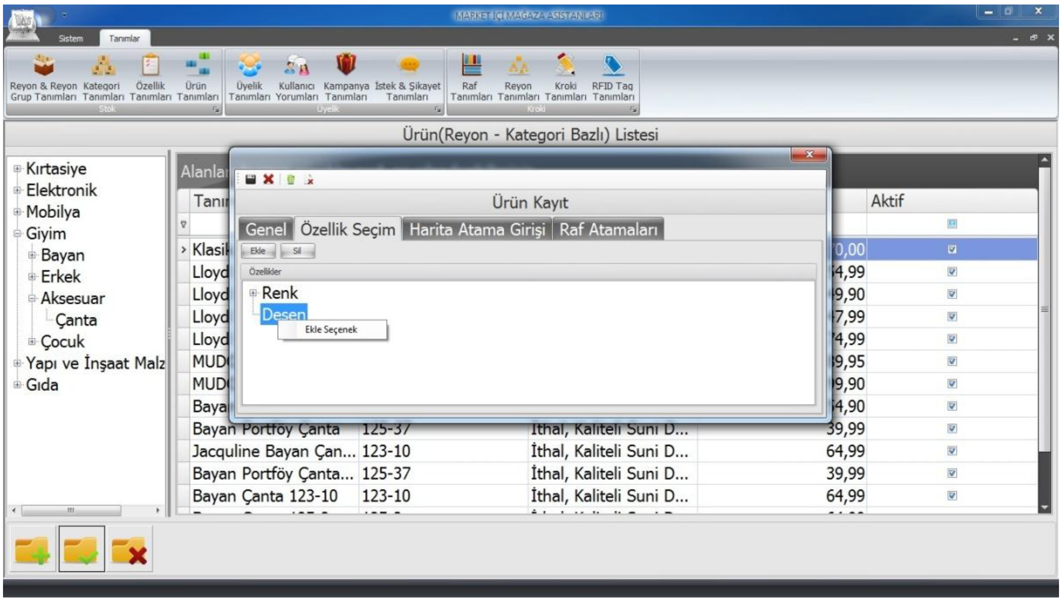
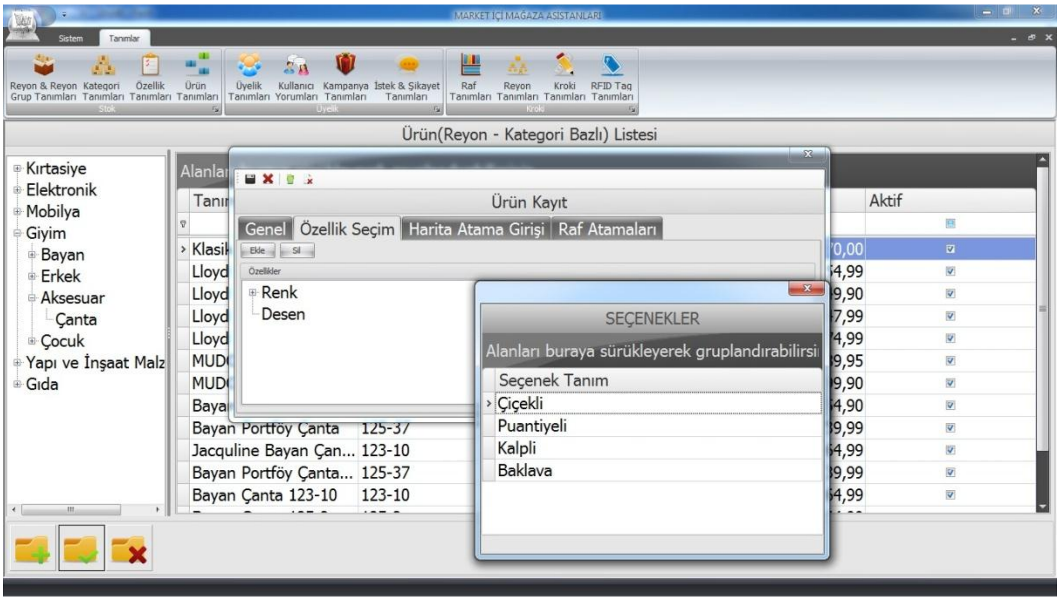


Figure 43: Product Form Assign Property Step 2



Ürün(Reyon - Kategori Bazlı) Listesi

- Kırtasiye
- Elektronik
- Mobilya
- Giyim
  - Bayan
  - Erkek
  - Aksesuar
    - Çanta
  - Çocuk
- Yapı ve İnşaat Malz
- Gıda

Ürün Kayıt

Genel | Özellik Seçim | Harita Atama Girişi | Raf Atamaları

- Renk
- Desen

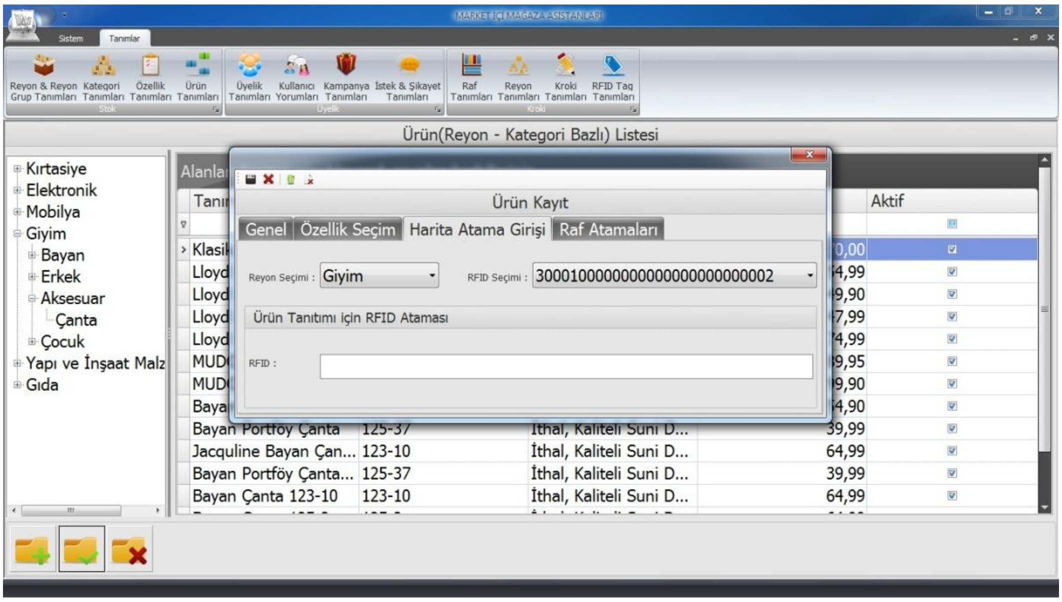
SEÇENEKLER

Seçenek Tanım
Çiçekli
Puantiyeli
Kalpli
Baklava

Tanım		Aktif
Klasik		☑
Lloyd		☑
Lloyd		☑
Lloyd		☑
Lloyd		☑
MUD		☑
MUD		☑
Baya		☑
Bayan Portföy Çanta	125-37	☑
Jacquline Bayan Çan...	123-10	☑
Bayan Portföy Çanta...	125-37	☑
Bayan Çanta 123-10	123-10	☑

Figure 44: Product Form Add Option to Property

Sketch details can be assigned to the product using the form. Assignment consists of the location info of the product and promotion tag info of the product for using by end user application.



Ürün(Reyon - Kategori Bazlı) Listesi

- Kırtasiye
- Elektronik
- Mobilya
- Giyim
  - Bayan
  - Erkek
  - Aksesuar
    - Çanta
  - Çocuk
- Yapı ve İnşaat Malz
- Gıda

Ürün Kayıt

Genel | Özellik Seçim | Harita Atama Girişi | Raf Atamaları

Reyon Seçimi : Giyim

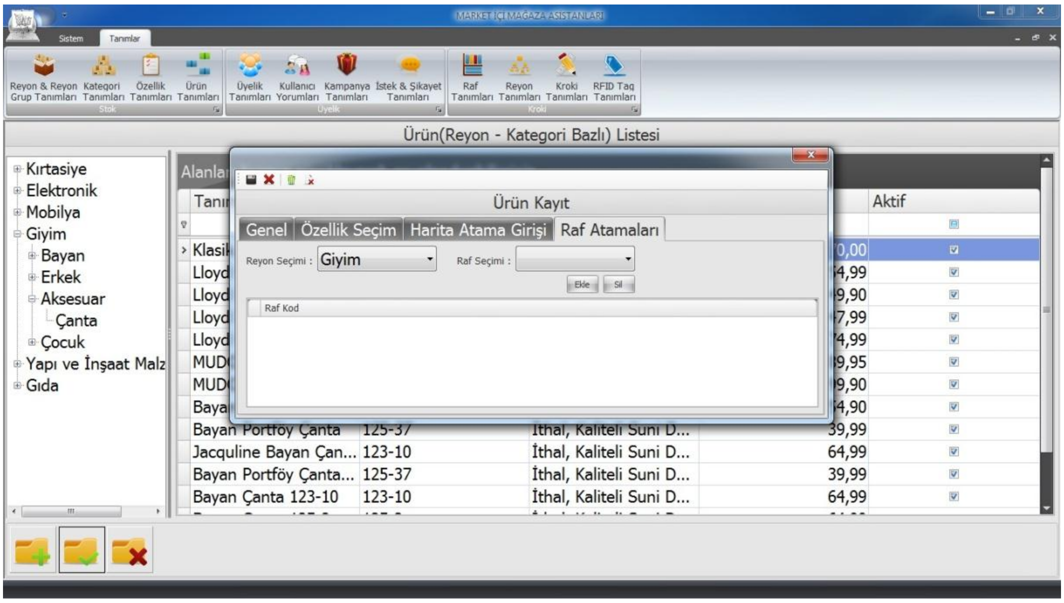
RFID Seçimi : 30001000000000000000000002

Ürün Tanıtımı için RFID Ataması

RFID :

Tanım				Aktif
Klasik				☑
Lloyd				☑
Lloyd				☑
Lloyd				☑
Lloyd				☑
MUD				☑
MUD				☑
Baya				☑
Bayan Portföy Çanta	125-37	İthal, Kaliteli Suni D...	39,99	☑
Jacquline Bayan Çan...	123-10	İthal, Kaliteli Suni D...	64,99	☑
Bayan Portföy Çanta...	125-37	İthal, Kaliteli Suni D...	39,99	☑
Bayan Çanta 123-10	123-10	İthal, Kaliteli Suni D...	64,99	☑

Figure 45: Product Form Assign Department



Ürün(Reyon - Kategori Bazlı) Listesi

Ürün Kayıt

Genel | Özellik Seçim | Harita Atama Girişi | Raf Atamaları

Reyon Seçimi : Giyim

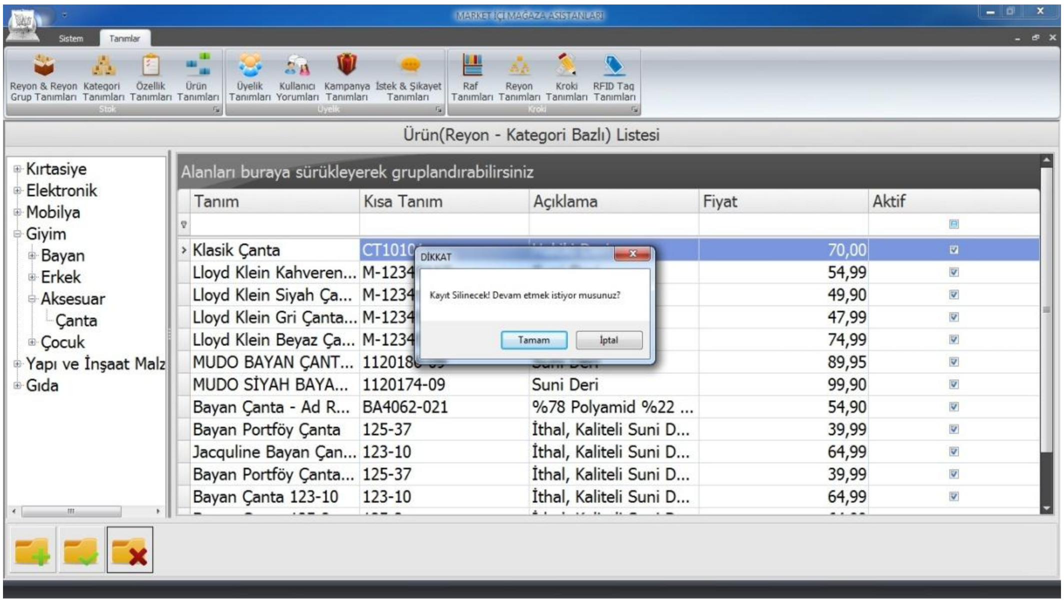
Raf Seçimi :

Raf Kod

Figure 46: Product Form Assign Shelf

9.1.5.2. Deleting Existing Product

User can delete selected record on the form. Firstly the row is chosen, and then the delete button is clicked.



Ürün(Reyon - Kategori Bazlı) Listesi

Alanları buraya sürükleyerek gruplandırabilirsiniz

Tanım	Kısa Tanım	Açıklama	Fiyat	Aktif
Klasik Çanta	CT1010		70,00	☑
Lloyd Klein Kahveren...	M-1234		54,99	☑
Lloyd Klein Siyah Ça...	M-1234		49,90	☑
Lloyd Klein Gri Çanta...	M-1234		47,99	☑
Lloyd Klein Beyaz Ça...	M-1234		74,99	☑
MUDO BAYAN ÇANT...	112018		89,95	☑
MUDO SİYAH BAYA...	1120174-09	Suni Deri	99,90	☑
Bayan Çanta - Ad R...	BA4062-021	%78 Polyamid %22 ...	54,90	☑
Bayan Portföy Çanta	125-37	İthal, Kaliteli Suni D...	39,99	☑
Jacquline Bayan Çan...	123-10	İthal, Kaliteli Suni D...	64,99	☑
Bayan Portföy Çanta...	125-37	İthal, Kaliteli Suni D...	39,99	☑
Bayan Çanta 123-10	123-10	İthal, Kaliteli Suni D...	64,99	☑

DİKKAT

Kayıt Silinecek! Devam etmek istiyor musunuz?

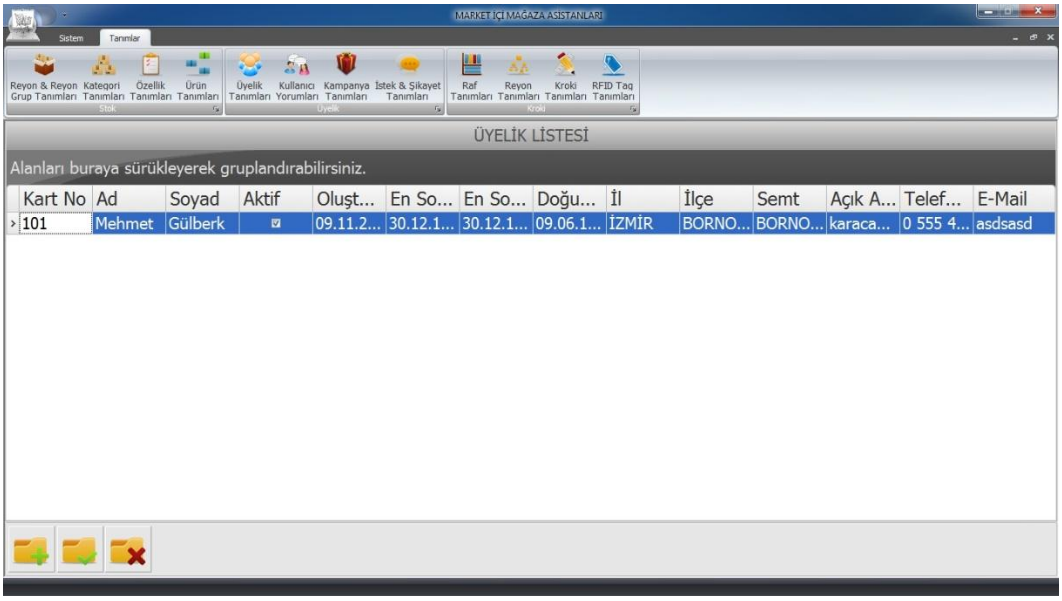
Figure 47: Product Form Delete Record

9.1.5.3. Updating Existing Product

The new form is opened when the user clicks the edit button on the Product form. The form is for updating selected record.

9.1.6. Membership Description

The Membership part displays a list which includes all members of the system. And also the form provides user to add, update and delete member to the system by using the corresponding buttons. User can reach add and edit operations using right click menu on the active property.



ÜYELİK LİSTESİ

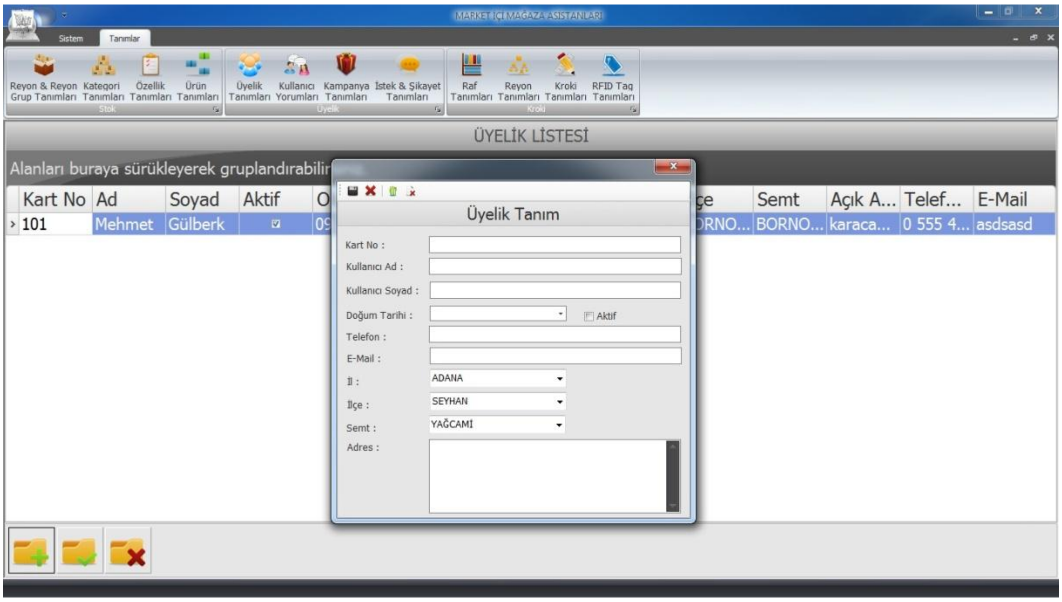
Alanları buraya sürükleyerek gruplandırabilirsiniz.

Kart No	Ad	Soyad	Aktif	Oluşt...	En So...	En So...	Doğu...	İl	İlçe	Semt	Açık A...	Telef...	E-Mail
101	Mehmet	Gülberk	☑	09.11.2...	30.12.1...	30.12.1...	09.06.1...	İZMİR	BORNO...	BORNO...	karaca...	0 555 4...	asdsasd

Figure 48: Membership List Form

9.1.6.1. Adding New Member

The new form is opened when the user clicks the add button on the Membership form. This form is for adding member.



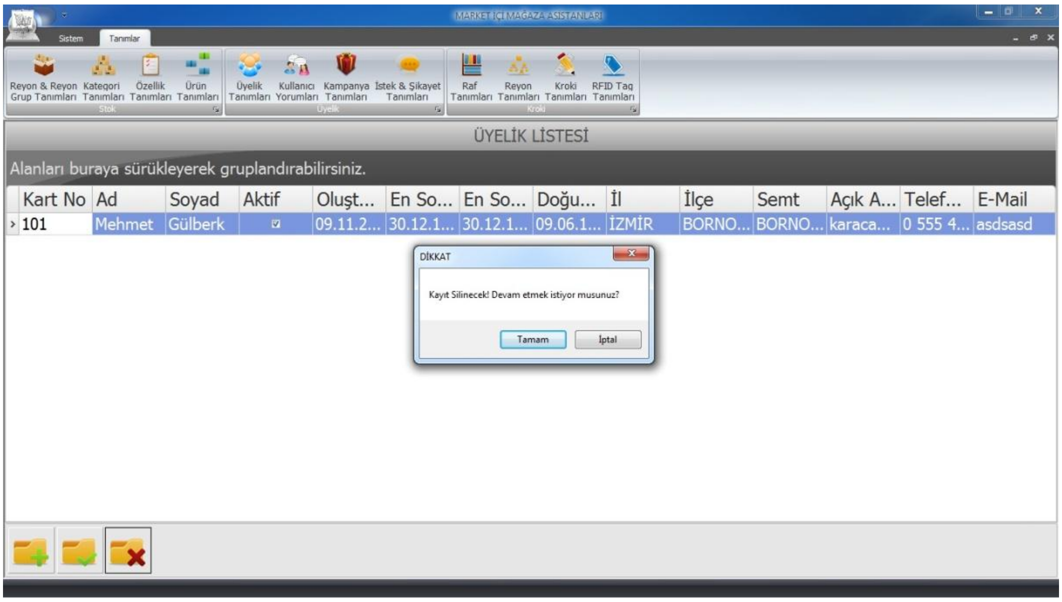
Üyelik Tanım

Kart No :
Kullanıcı Ad :
Kullanıcı Soyad :
Doğum Tarihi : □ Aktif
Telefon :
E-Mail :
İl : ADANA
İlçe : SEYHAN
Semt : YAĞCAMİ
Adres :

Figure 49: Membership Form New Record

9.1.6.2. Deleting Existing Member

User can delete selected record on the form. Firstly the row is chosen, and then the delete button is clicked.



ÜYELİK LİSTESİ

Alanları buraya sürükleyerek gruplandırabilirsiniz.

Kart No	Ad	Soyad	Aktif	Oluşt...	En So...	En So...	Doğu...	İl	İlçe	Semt	Açık A...	Telef...	E-Mail
101	Mehmet	Gülberk	☑	09.11.2...	30.12.1...	30.12.1...	09.06.1...	İZMİR	BORNO...	BORNO...	karaca...	0 555 4...	asdsasd

DİKKAT

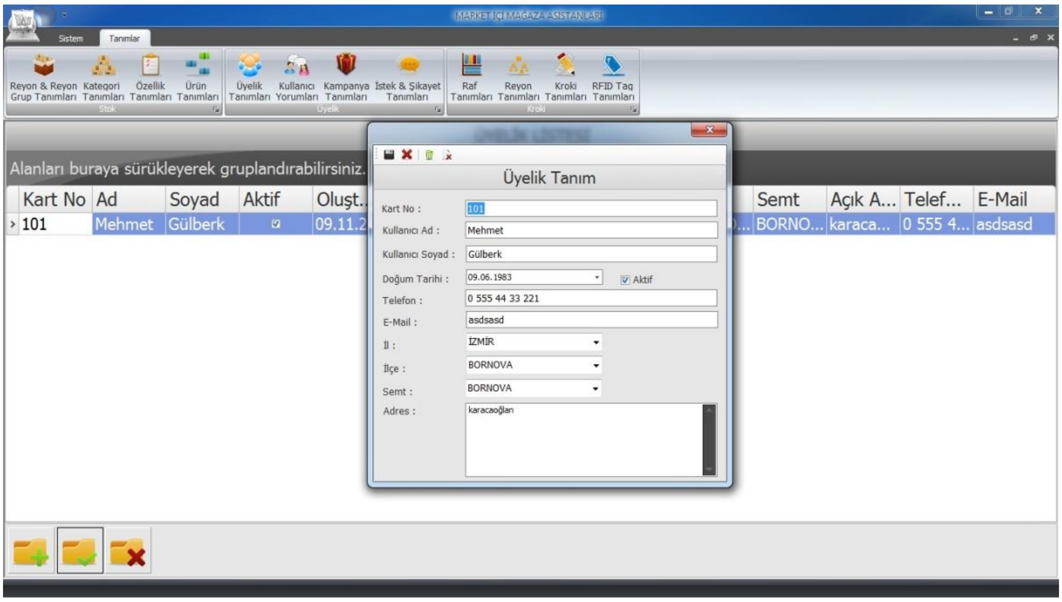
Kayıt Silinecek! Devam etmek istiyor musunuz?

Tamam | İptal

Figure 50: Membership Form Delete Record

9.1.6.3. Updating Existing Member

The new form is opened when the user clicks the edit button on the Membership form. The form is for updating selected record.



Alanları buraya sürükleyerek gruplandırabilirsiniz.

Üyelik Tanım

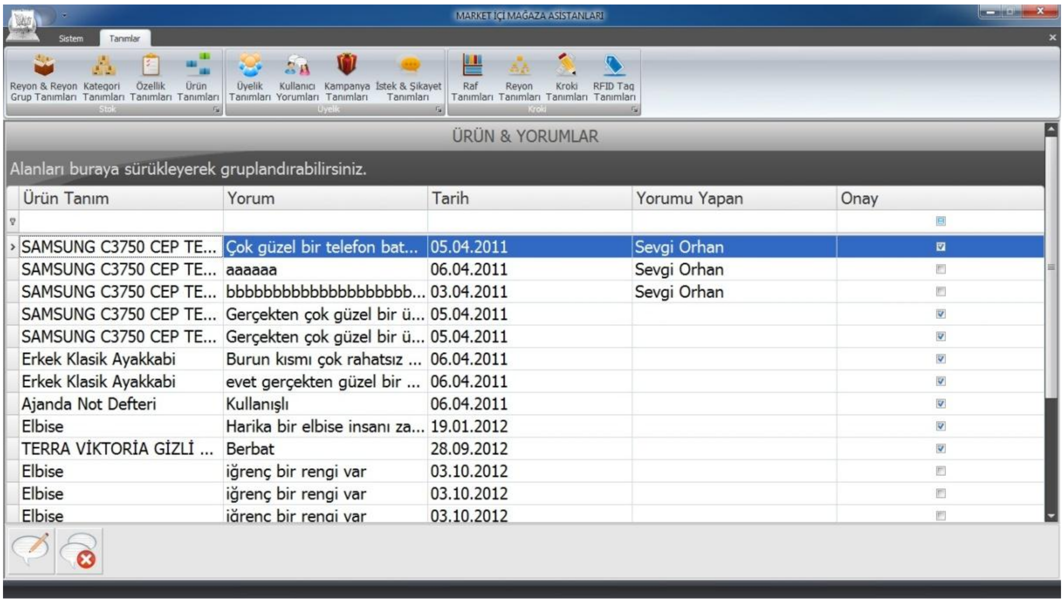
Kart No : 101
Kullanıcı Ad : Mehmet
Kullanıcı Soyad : Gülberk
Doğum Tarihi : 09.06.1983 ☑ Aktif
Telefon : 0 555 44 33 221
E-Mail : asdsasd
İl : İZMİR
İlçe : BORNOVA
Semt : BORNOVA
Adres : karacaoğlan

Figure 51: Membership Form Update Record

9.1.7. User Comments

This part provides a control to the admin for 'the user comments'. Form displays a list which includes all comments about the products.

Comment list can be viewed by the admin. And also if admin wants, can confirm them to be available on the end user application.

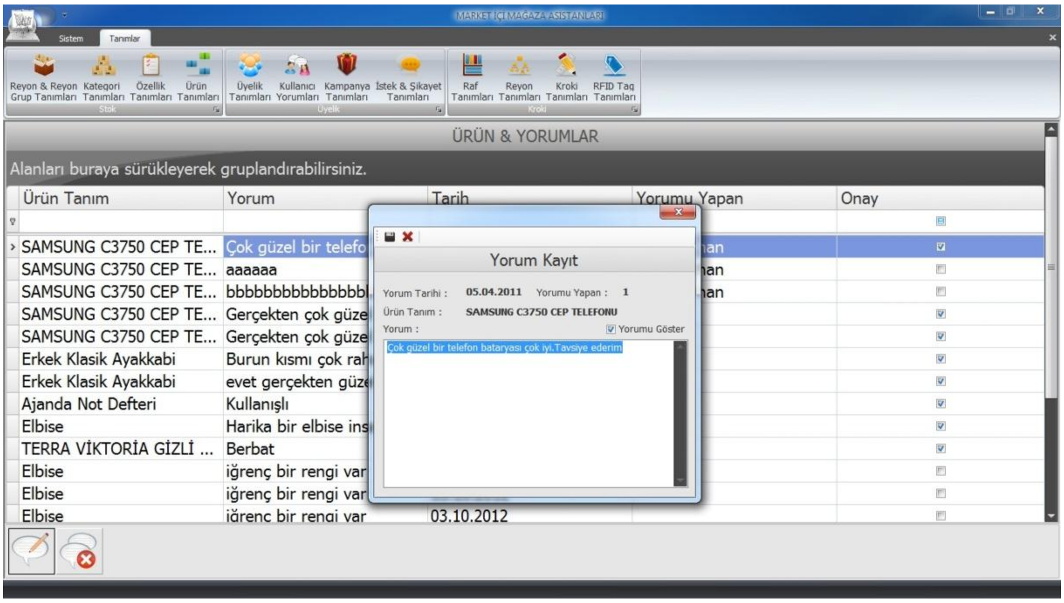


ÜRÜN & YORUMLAR

Alanları buraya sürükleyerek gruplandırabilirsiniz.

Ürün Tanım	Yorum	Tarih	Yorumu Yapan	Onay
SAMSUNG C3750 CEP TE...	Çok güzel bir telefon bat...	05.04.2011	Sevgi Orhan	☑
SAMSUNG C3750 CEP TE...	aaaaaa	06.04.2011	Sevgi Orhan	□
SAMSUNG C3750 CEP TE...	bbbbbbbbbbbbbbbbbbbb...	03.04.2011	Sevgi Orhan	□
SAMSUNG C3750 CEP TE...	Gerçekten çok güzel bir ü...	05.04.2011		☑
SAMSUNG C3750 CEP TE...	Gerçekten çok güzel bir ü...	05.04.2011		☑
Erkek Klasik Ayakkabi	Burun kısmı çok rahatsız ...	06.04.2011		☑
Erkek Klasik Ayakkabi	evet gerçekten güzel bir ...	06.04.2011		☑
Ajanda Not Defteri	Kullanışlı	06.04.2011		☑
Elbise	Harika bir elbise insanı za...	19.01.2012		☑
TERRA VİKTORİA GİZLİ ...	Berbat	28.09.2012		☑
Elbise	iğrenç bir rengi var	03.10.2012		□
Elbise	iğrenç bir rengi var	03.10.2012		□
Elbise	iğrenç bir rengi var	03.10.2012		□

Figure 52: Comments Form



ÜRÜN & YORUMLAR

Alanları buraya sürükleyerek gruplandırabilirsiniz.

Yorum Kayıt

Yorum Tarihi : 05.04.2011 Yorumu Yapan : 1

Ürün Tanım : SAMSUNG C3750 CEP TELEFONU

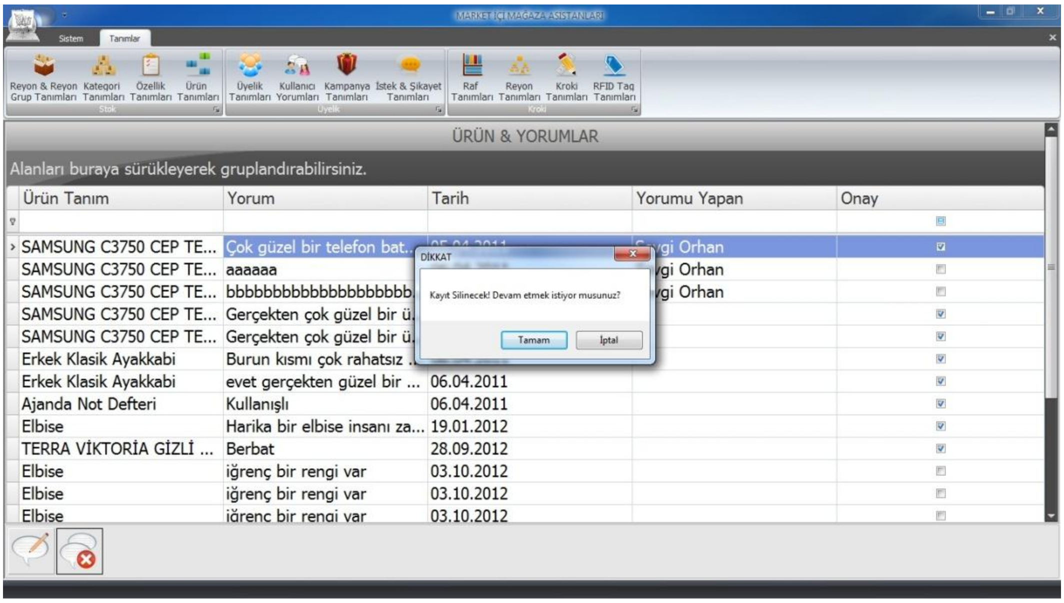
Yorum : ☑ Yorumu Göster

Çok güzel bir telefon bataryası çok iyi.Tavsiye ederim

Ürün Tanım	Yorum	Tarih	Yorumu Yapan	Onay
SAMSUNG C3750 CEP TE...	Çok güzel bir telefo		an	☑
SAMSUNG C3750 CEP TE...	aaaaaa		an	□
SAMSUNG C3750 CEP TE...	bbbbbbbbbbbbbbbbl		an	□
SAMSUNG C3750 CEP TE...	Gerçekten çok güze			☑
SAMSUNG C3750 CEP TE...	Gerçekten çok güze			☑
Erkek Klasik Ayakkabi	Burun kısmı çok rah			☑
Erkek Klasik Ayakkabi	evet gerçekten güze			☑
Ajanda Not Defteri	Kullanışlı			☑
Elbise	Harika bir elbise ins			☑
TERRA VİKTORİA GİZLİ ...	Berbat			☑
Elbise	iğrenç bir rengi var			□
Elbise	iğrenç bir rengi var			□
Elbise	iğrenç bir rengi var	03.10.2012		□

Figure 53: Comments Form Update

Admin has authority to delete any comment that is not suitable for confirming.



ÜRÜN & YORUMLAR

Alanları buraya sürükleyerek gruplandırabilirsiniz.

Ürün Tanım	Yorum	Tarih	Yorumu Yapan	Onay
SAMSUNG C3750 CEP TE...	Çok güzel bir telefon bat...		gi Orhan	☑
SAMSUNG C3750 CEP TE...	aaaaaa		gi Orhan	□
SAMSUNG C3750 CEP TE...	bbbbbbbbbbbbbbbbbbbb		gi Orhan	□
SAMSUNG C3750 CEP TE...	Gerçekten çok güzel bir ü			☑
SAMSUNG C3750 CEP TE...	Gerçekten çok güzel bir ü			☑
Erkek Klasik Ayakkabi	Burun kısmı çok rahatsız ..			☑
Erkek Klasik Ayakkabi	evet gerçekten güzel bir ...	06.04.2011		☑
Ajanda Not Defteri	Kullanışlı	06.04.2011		☑
Elbise	Harika bir elbise insanı za...	19.01.2012		☑
TERRA VİKTORİA GİZLİ ...	Berbat	28.09.2012		☑
Elbise	iğrenç bir rengi var	03.10.2012		□
Elbise	iğrenç bir rengi var	03.10.2012		□
Elbise	iğrenç bir rengi var	03.10.2012		□

DİKKAT

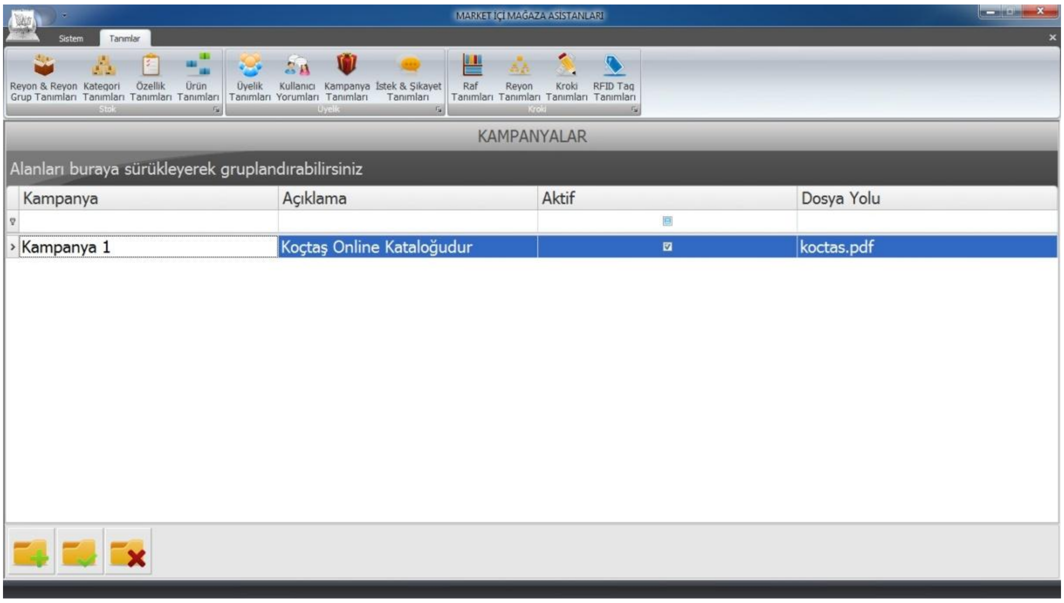
Kayıt Silinecek! Devam etmek istiyor musunuz?

Tamam İptal

Figure 54: Comments Form Delete Record

9.1.8. Campaigns

The Campaigns part displays a list which includes all campaigns of the firm. And also the form provides user to add, update and delete campaigns of the firm by using the corresponding buttons. User can reach add and edit operations using right click menu on the active property.



KAMPANYALAR

Alanları buraya sürükleyerek gruplandırabilirsiniz

Kampanya	Açıklama	Aktif	Dosya Yolu
Kampanya 1	Koçtaş Online Kataloğudur	☑	koctas.pdf

Figure 55: Campaign List Form

9.1.8.1. Adding Campaign

The new form is opened when the user clicks the add button on the Campaigns form. This form is for adding campaign.

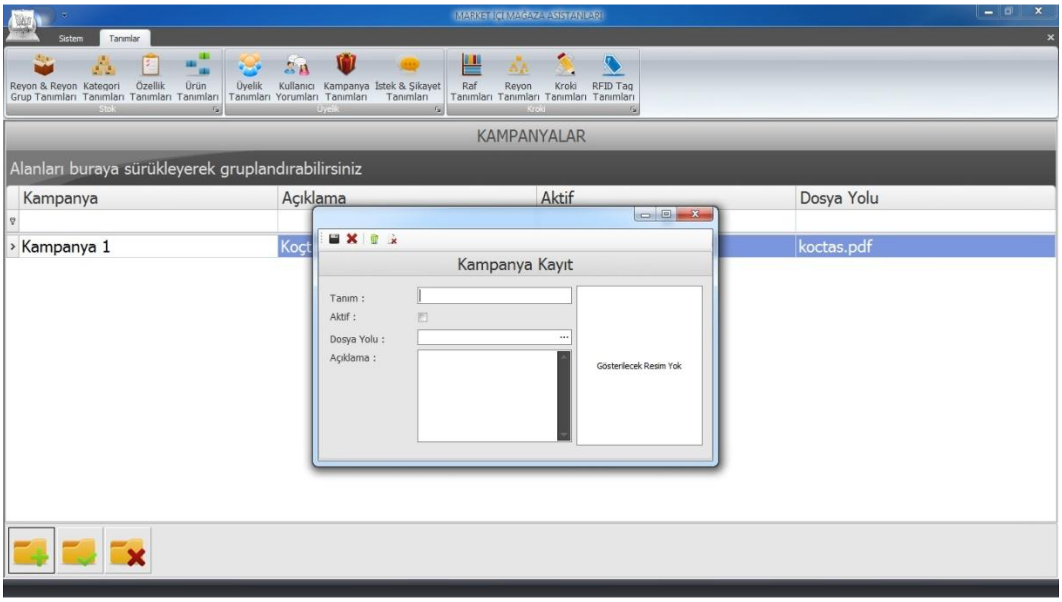
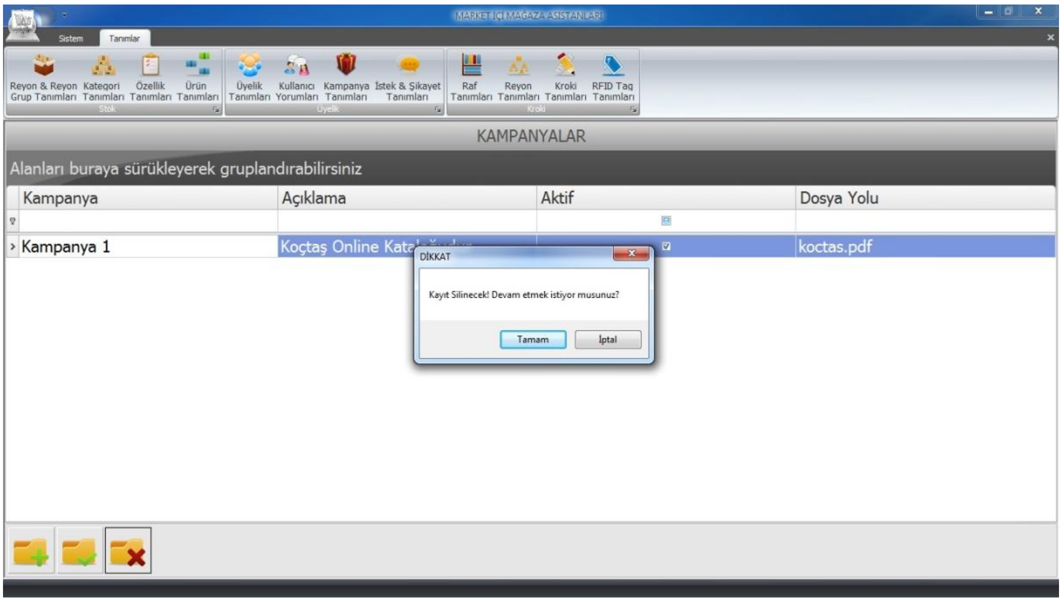


Figure 56: Campaign Form New Record

9.1.8.2. Deleting Existing Campaign

User can delete selected record on the form. Firstly the row is chosen, and then the delete button is clicked.

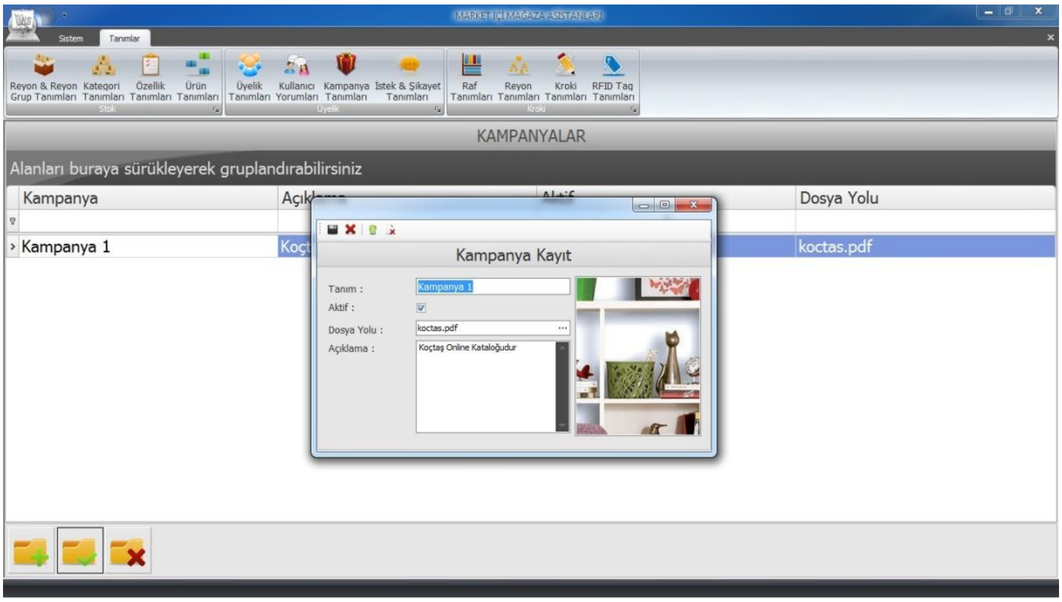


Kayıt Silinecek! Devam etmek istiyor musunuz?

Figure 57 Campaign Form Delete Record

9.1.8.3. Updating Existing Campaign

The new form is opened when the user clicks the edit button on the Campaigns form. The form is for updating selected record.



KAMPANYALAR

Alanları buraya sürükleyerek gruplandırabilirsiniz

Kampanya	Açıklama	Aktif	Dosya Yolu
Kampanya 1	Koçt		koctas.pdf

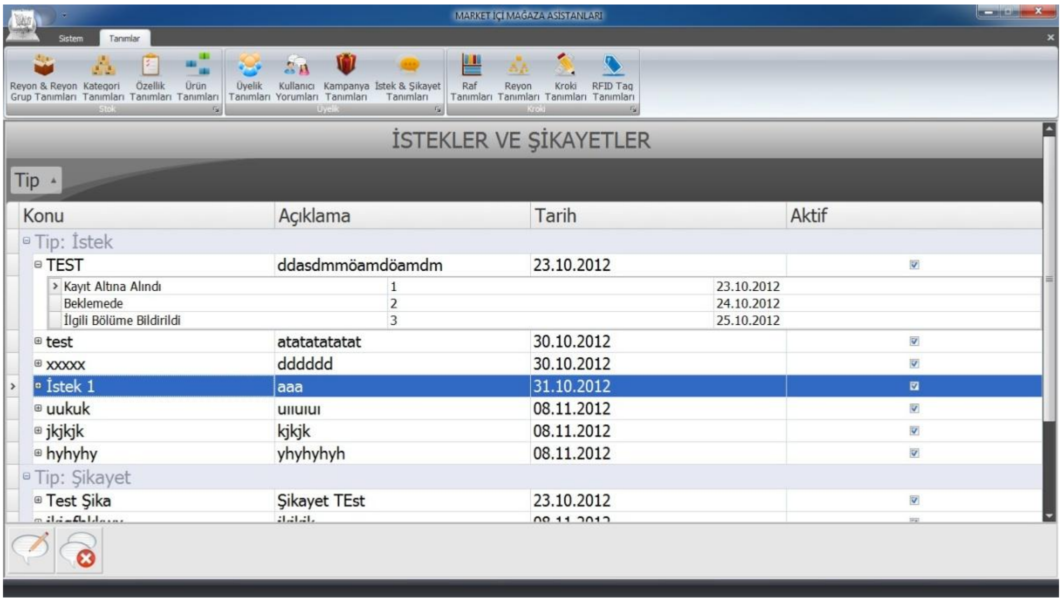
Kampanya Kayıt

Tanım : Kampanya 1
Aktif : ☑
Dosya Yolu : koctas.pdf
Açıklama : Koçtaş Online Kataloğudur

Figure 58 Campaign Form Update Record

9.1.9. Requests & Complaints

The Requests & Complaints part displays a list which includes all requests and complaints of the customers. And also the form provides user to update status of them. On the other hand admin has authority to delete them.

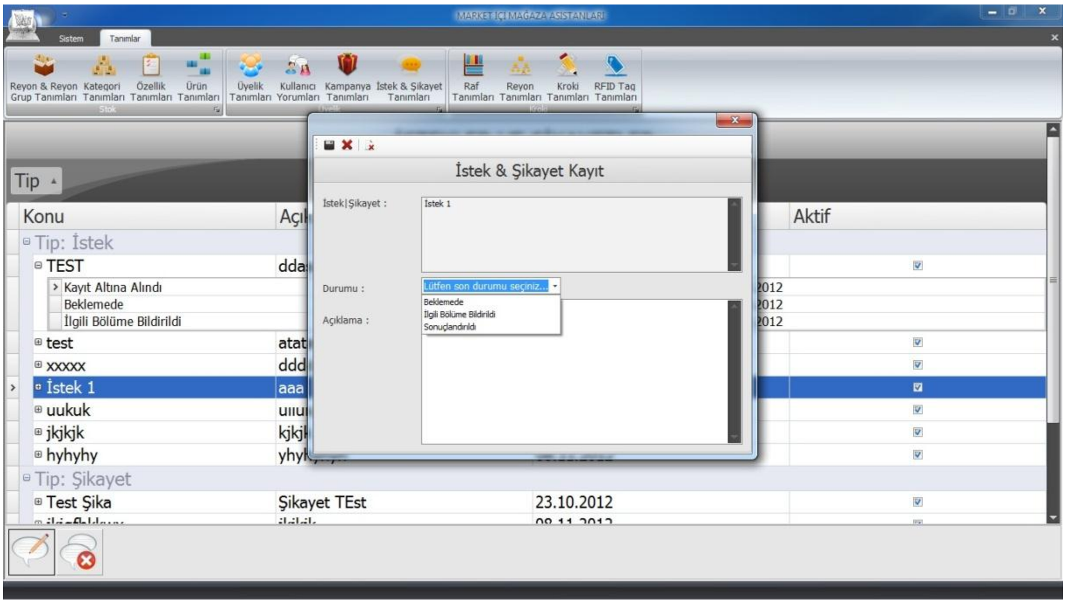


İSTEKLER VE ŞİKAYETLER

Tip

Konu	Açıklama	Tarih	Aktif
Tip: İstek			
TEST	ddasdmmöamdöamdm	23.10.2012	☑
Kayıt Altına Alındı	1	23.10.2012	
Beklemede	2	24.10.2012	
İlgili Bölüme Bildirildi	3	25.10.2012	
test	atatatatatat	30.10.2012	☑
xxxxx	dddddd	30.10.2012	☑
İstek 1	aaa	31.10.2012	☑
uukuk	uıııuıuı	08.11.2012	☑
jkjkjk	kjkjk	08.11.2012	☑
hyhyhy	yhyhyhyh	08.11.2012	☑
Tip: Şikayet			
Test Şika	Şikayet TEst	23.10.2012	☑

Figure 59: Request & Complaints List Form



İstek & Şikayet Kayıt

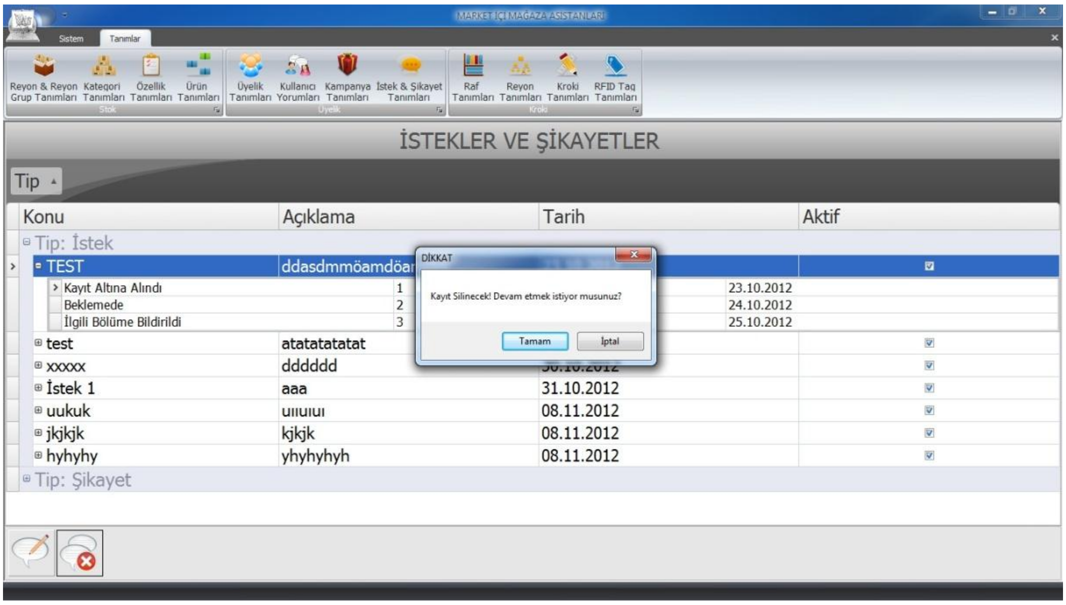
İstek|Şikayet : İstek 1

Durumu : Lütfen son durumu seçiniz...

- Beklemede
- İlgili Bölüme Bildirildi
- Sonuçlandırıldı

Açıklama :

Figure 60: Request & Complaints Form Update Status



İSTEKLER VE ŞİKAYETLER

Konu	Açıklama	Tarih	Aktif
Tip: İstek			
TEST	ddasdmmöamdöa		☑
Kayıt Altına Alındı	1	23.10.2012	
Beklemede	2	24.10.2012	
İlgili Bölüme Bildirildi	3	25.10.2012	
test	atatatatatat		☑
xxxxx	dddddd	30.10.2012	☑
İstek 1	aaa	31.10.2012	☑
uukuk	uıuıuı	08.11.2012	☑
jkjkjk	kjkjk	08.11.2012	☑
hyhyhy	yhyhyhyh	08.11.2012	☑
Tip: Şikayet			

DİKKAT

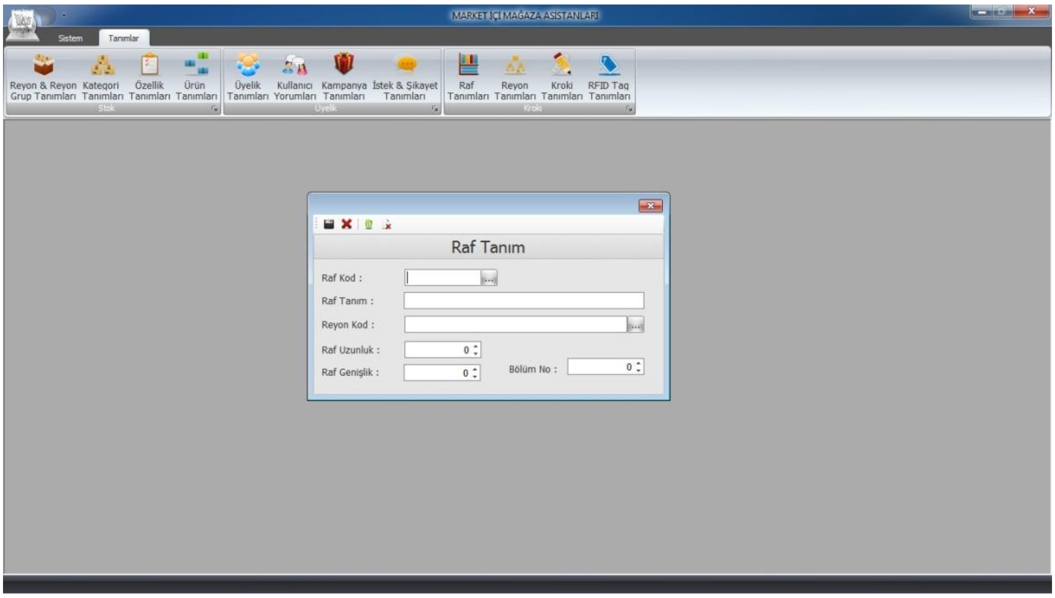
Kayıt Silinecek! Devam etmek istiyor musunuz?

Tamam İptal

Figure 61: Request & Complaints Form Delete Record

9.1.10. Shelf Descriptions for Sketch

The Shelf Description part has a list which includes all shelves of the firm. And also the form provides user to add, update and delete shelf description by using the corresponding buttons. User can reach add and edit operations using right click menu on the active property.



Raf Tanım

Raf Kod :

Raf Tanım :

Reyon Kod :

Raf Uzunluk : 0

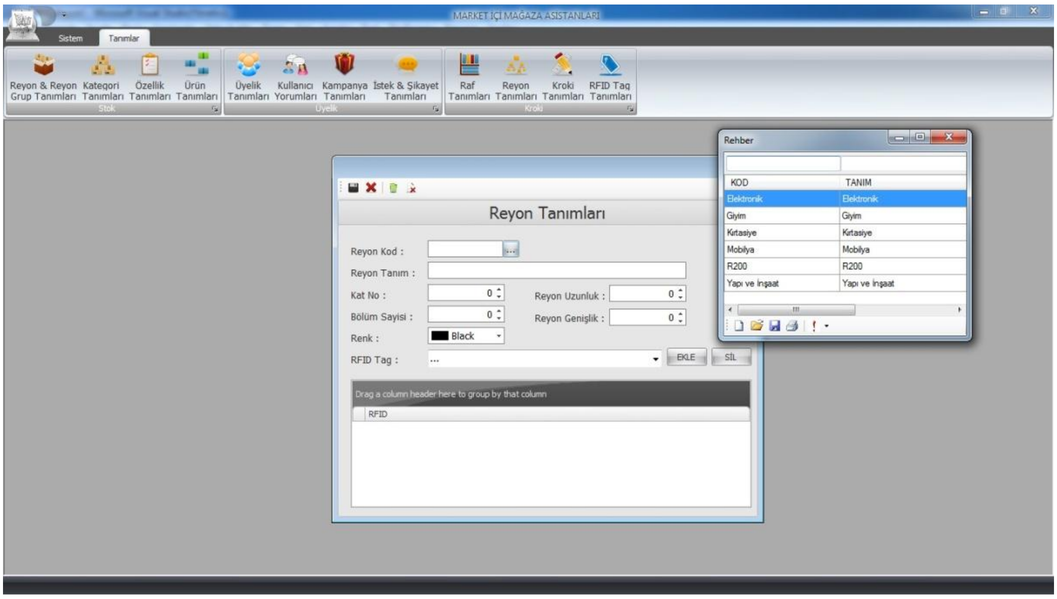
Raf Genişlik : 0

Bölüm No : 0

Figure 62: Shelf Form

9.1.11. Department Descriptions for Sketch

The Department part displays a list which includes all departments of the supermarket. And also the form provides user to add, update and delete department product by using the corresponding buttons. User can reach add and edit operations using right click menu on the active property.



Reyon Tanımları

Reyon Kod :

Reyon Tanım :

Kat No : 0

Reyon Uzunluk : 0

Bölüm Sayisi : 0

Reyon Genişlik : 0

Renk : Black

RFID Tag : ...

Drag a column header here to group by that column

RFID

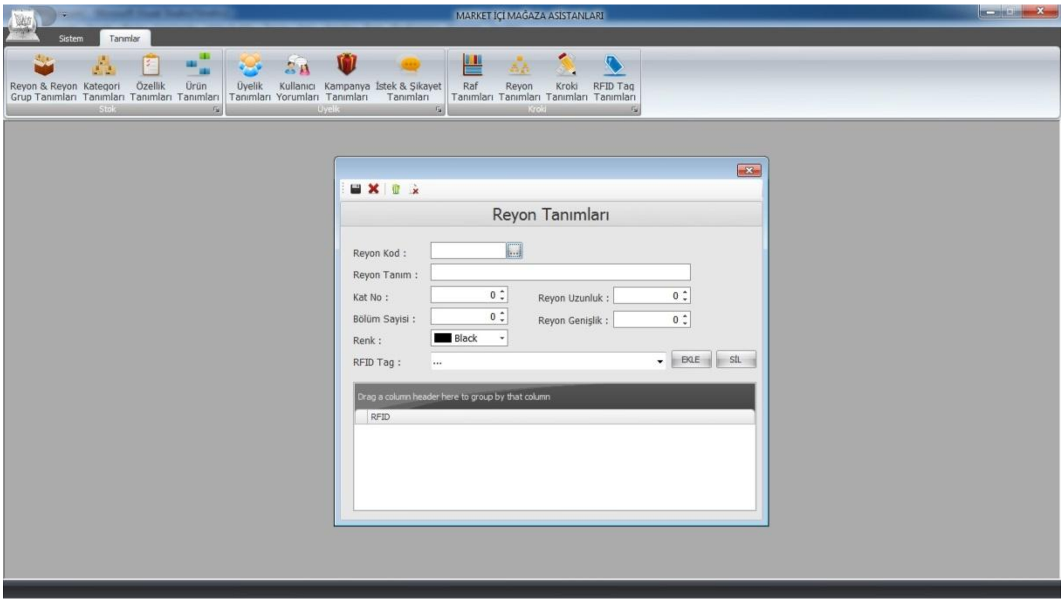
Rehber

KOD	TANIM
Elektronik	Elektronik
Giyim	Giyim
Kırtasiye	Kırtasiye
Mobilya	Mobilya
R200	R200
Yapı ve İnşaat	Yapı ve İnşaat

Figure 63: Department for Sketch Form

9.1.11.1. Adding Rayon

This form is for adding department to the system. User can enter all details about department and can save these using add/edit button. Also user can exit from this form using exit button.



Reyon Tanımları

Reyon Kod :

Reyon Tanım :

Kat No : 0

Reyon Uzunluk : 0

Bölüm Sayisi : 0

Reyon Genişlik : 0

Renk : Black

RFID Tag : ...

RFID

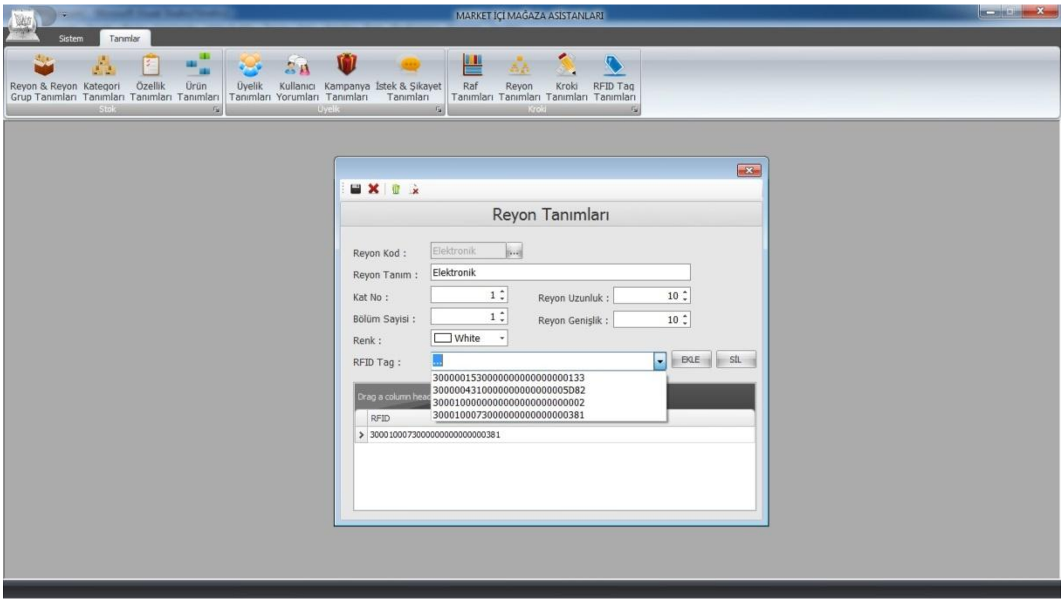
Figure 64: Department for Sketch Form New Record

9.1.11.2. Deleting Existing Department

User can delete selected record on the form. Firstly the row is chosen, and then the delete button is clicked.

9.1.11.3. Updating Existing Rayon

The form is filled when the user clicks the edit button on the screen by choosing record. The form is for updating selected record. And each of the department can be attached with a RFID tag for path finding algorithm.



Reyon Tanımları

Reyon Kod : Elektronik

Reyon Tanım : Elektronik

Kat No : 1

Reyon Uzunluk : 10

Bölüm Sayisi : 1

Reyon Genişlik : 10

Renk : White

RFID Tag : ...

300000153000000000000000133
300000431000000000000005D82
300010000000000000000000002
300010007300000000000000381

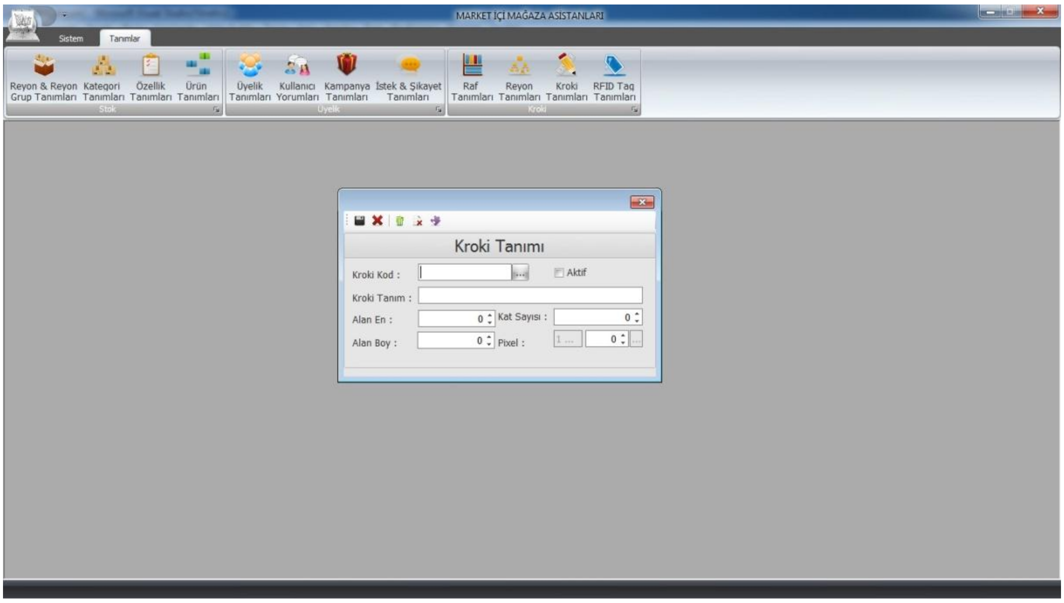
RFID

300010007300000000000000381

Figure 65: Department for Sketch Form Update Record

9.1.12. Sketch

This section enables you to prepare the infrastructure for the map to path finding. Sketch can be defined from this part. There exists selection menu that includes sketch list. A sketch is chosen from list and designing button is clicked to display map.



Kroki Tanımı

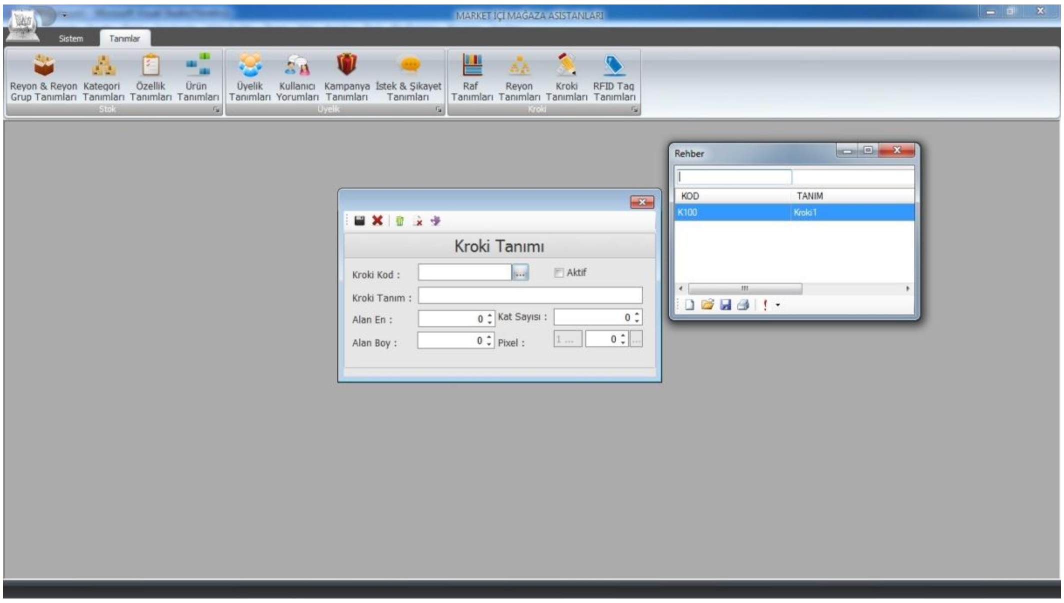
Kroki Kod : ☐ Aktif

Kroki Tanım :

Alan En : 0 Kat Sayısı : 0

Alan Boy : 0 Pixel : 1 ... 0

Figure 66: Sketch Form



Kroki Tanımı

Kroki Kod : ☐ Aktif

Kroki Tanım :

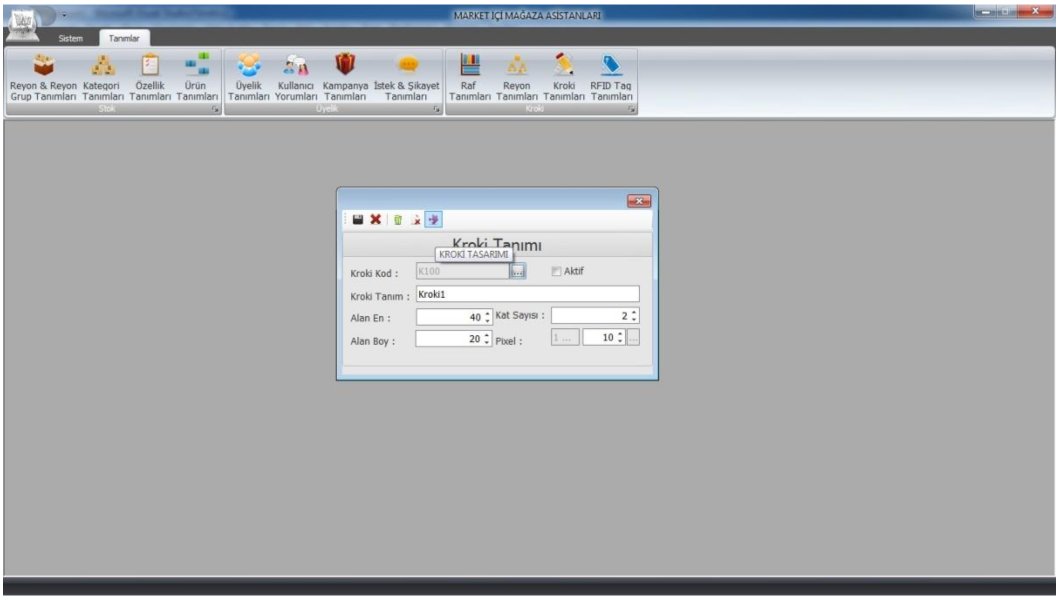
Alan En : 0 Kat Sayısı : 0

Alan Boy : 0 Pixel : 1 ... 0

Rehber

KOD	TANIM
K100	Kroki1

Figure 67: Sketch Form Selection Skecth



Kroki Tanımı

Kroki Kod : K100 □ Aktif

Kroki Tanım : Kroki1

Alan En : 40 Kat Sayısı : 2

Alan Boy : 20 Pixel : 1 10

Figure 68: Sketch Form Design Button

There are different maps for each floor. If the mouse over on the map department name is appear on the screen. This is for informational purposes. Red points are represents RFID tags for the department groups.

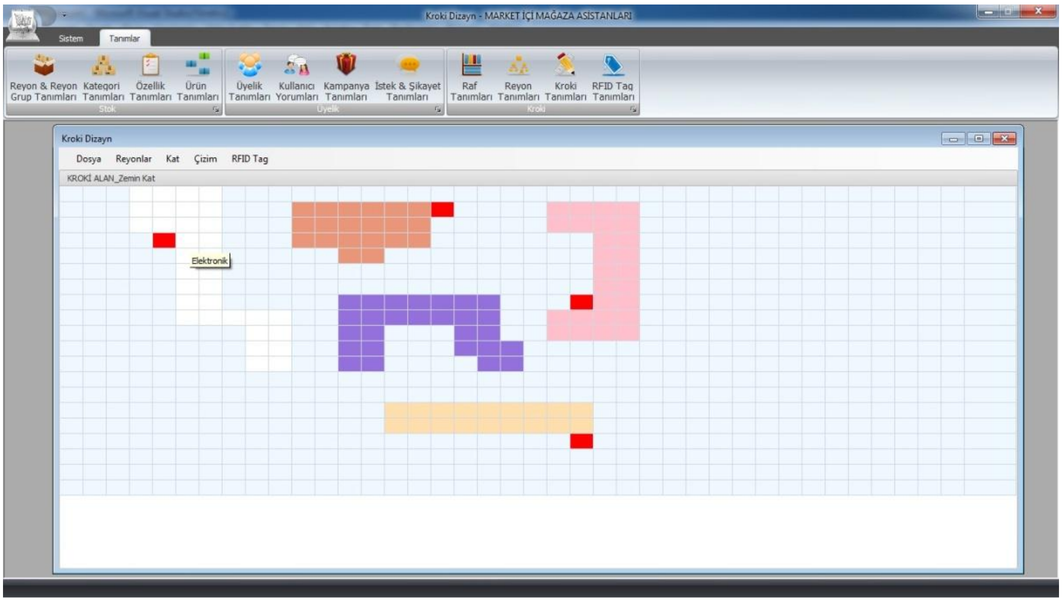


Figure 69: Sketch Form Design Form with Department Names

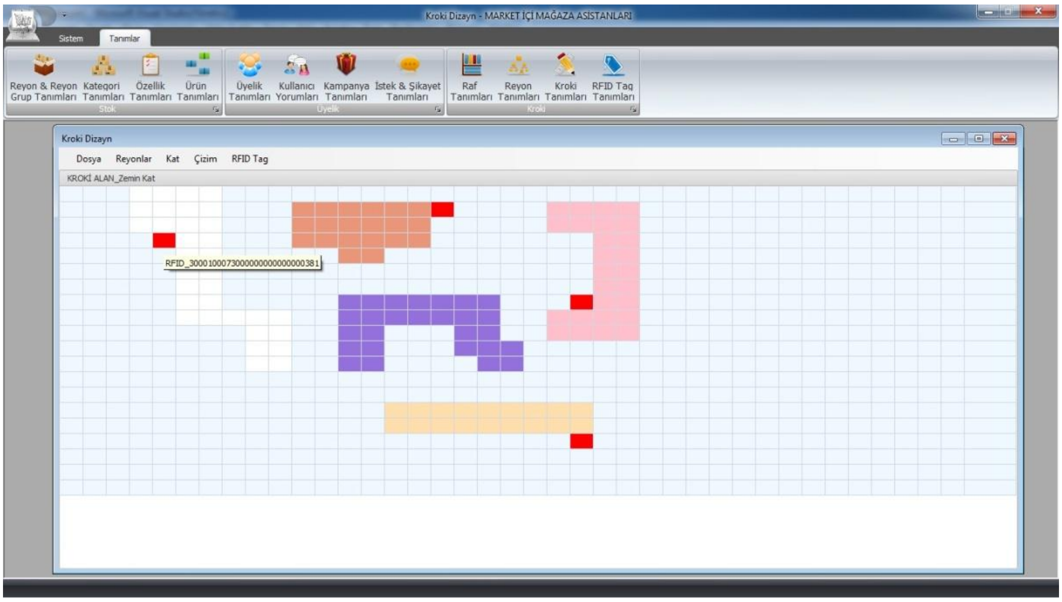


Figure 70: Sketch Form Design Form with RFID Point Names

Sub menus appear on the form.

File menu: The menu allow user to go back department description part for some changes.

User can save changes on the map. Last changes can be undoing from the menu.

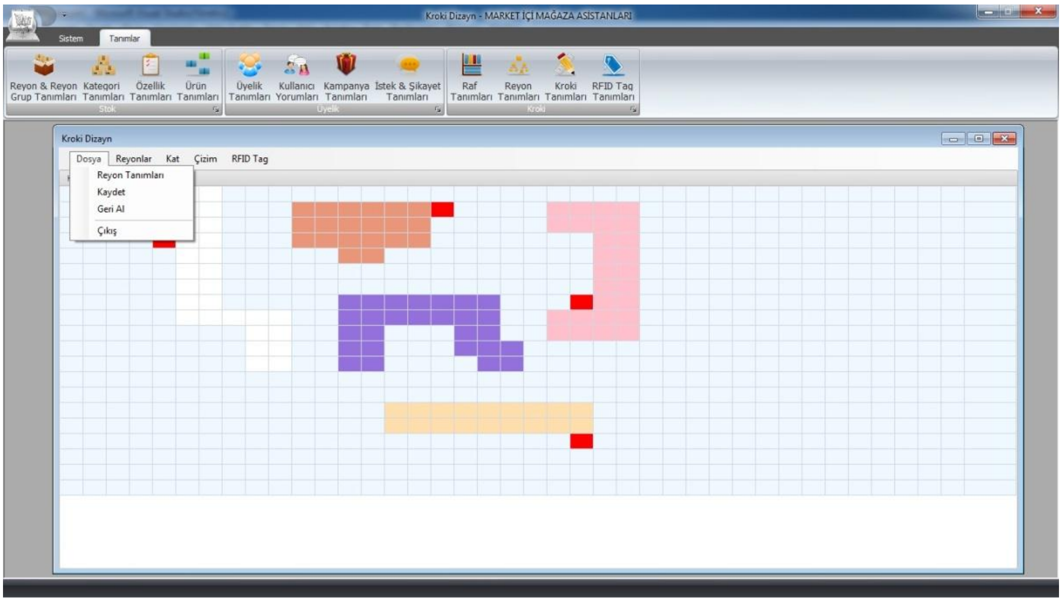


Figure 71: Sketch Form File Menu

Department Menu: The menu is filled automatically with department list. By choosing any of them, map can be drawn easily and with any shape.

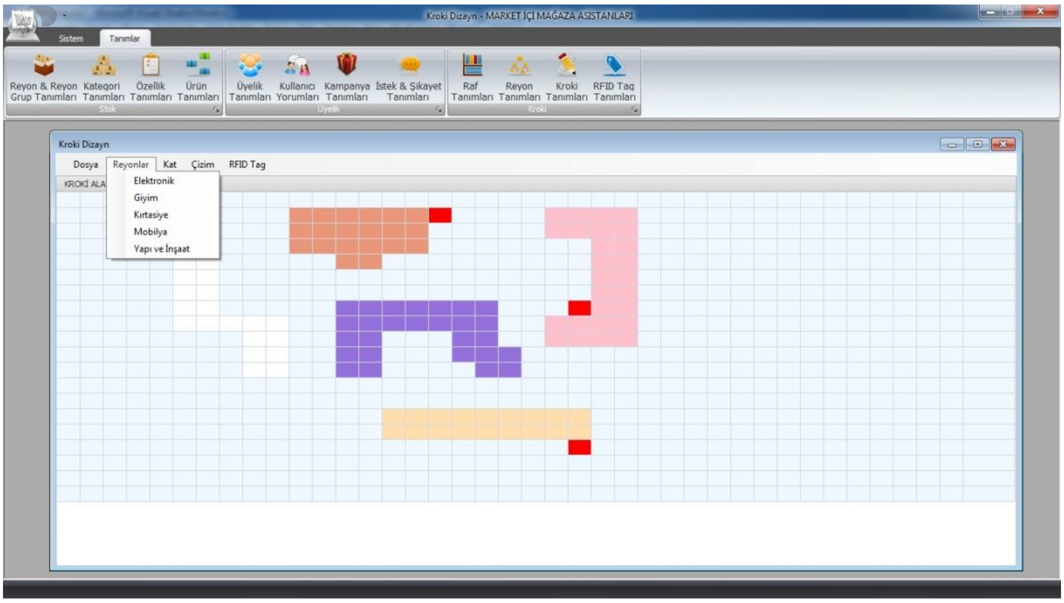


Figure 72: Sketch Form Department Menu

Floor Menu: The menu allows user to change floor of the sketch. Also Map is changed when the menu is clicked.

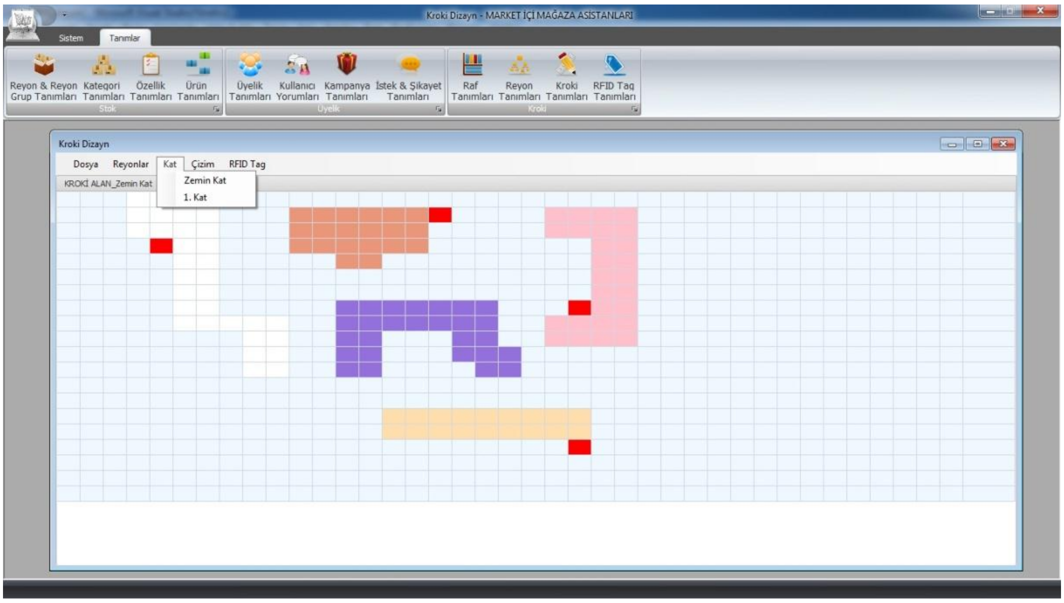


Figure 73: Sketch Form Floor Menu

Drawing Menu: Menu allows user to draw department or ‘walkable area’ on the sketch.

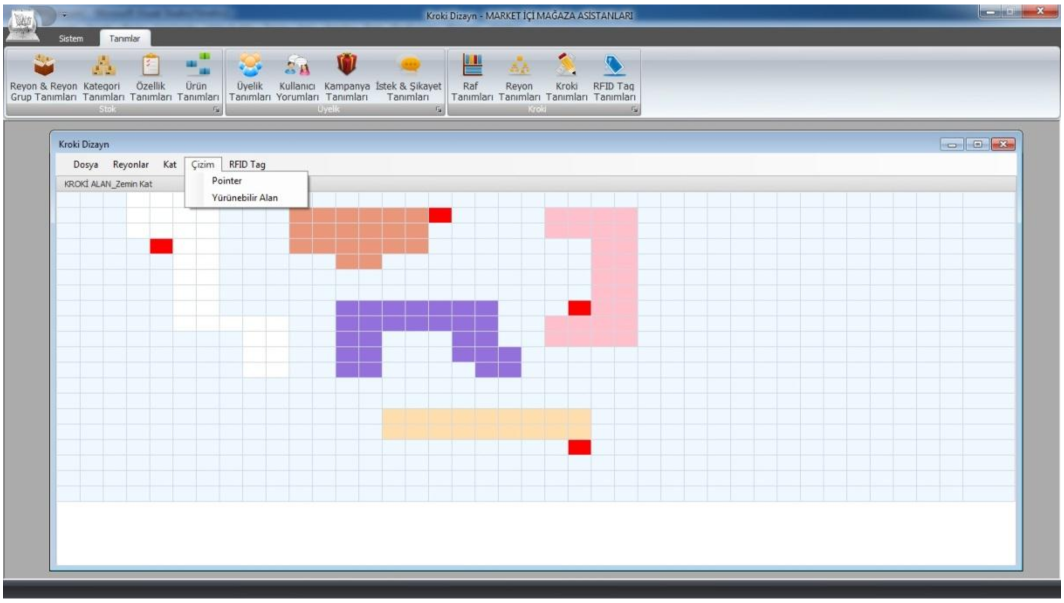


Figure 74: Sketch Form Drawing Menu

RFID Tag Menu: Menu allows user to assign RFID tags in to map. Menu is filled with RFID tag list by grouping.

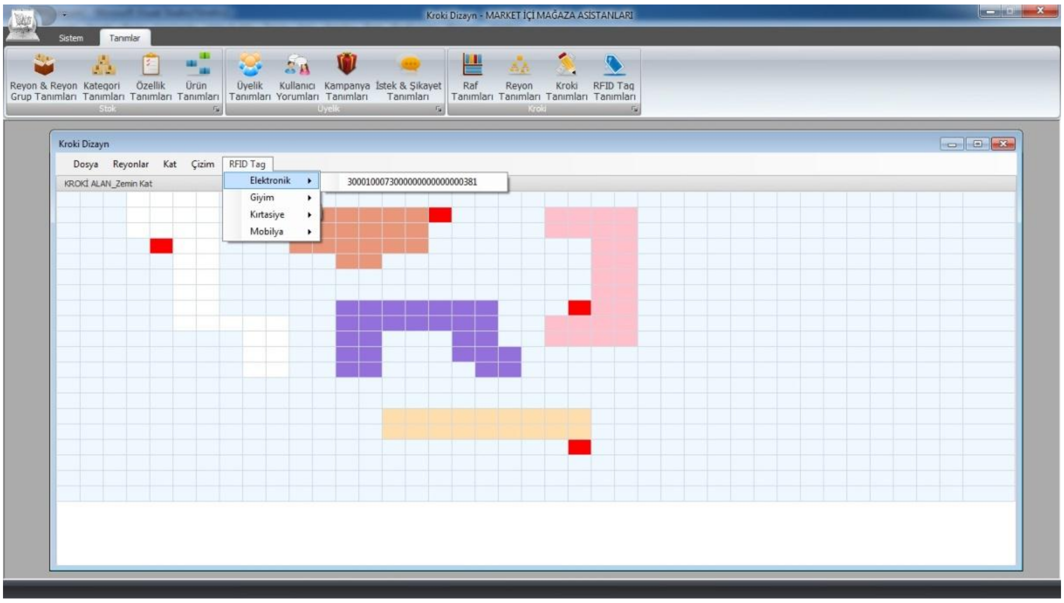


Figure 75: Sketch Form RFID Tag Menu

Additionally user can move drawn department easily.

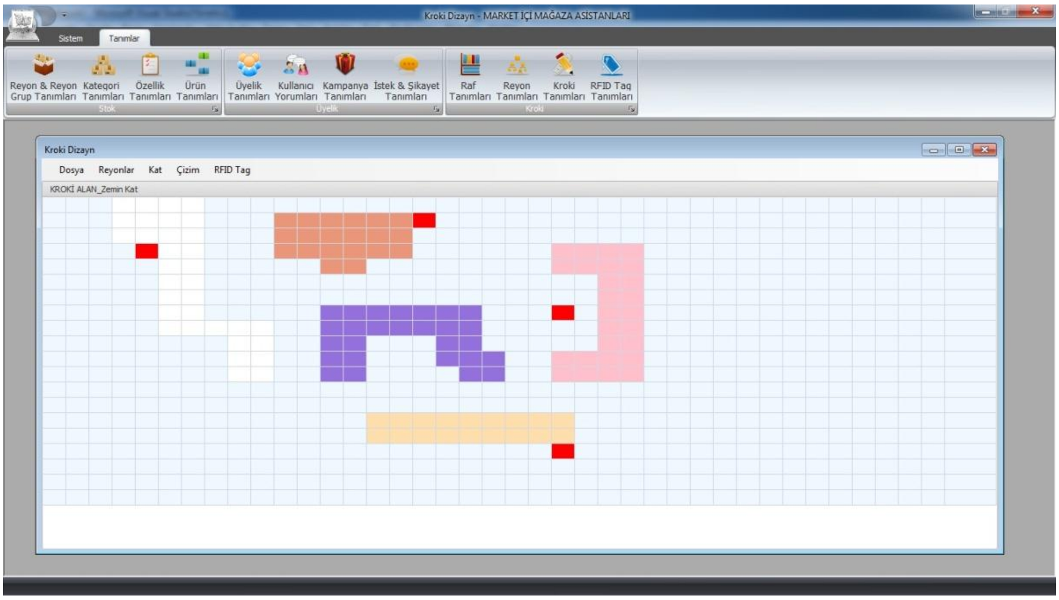
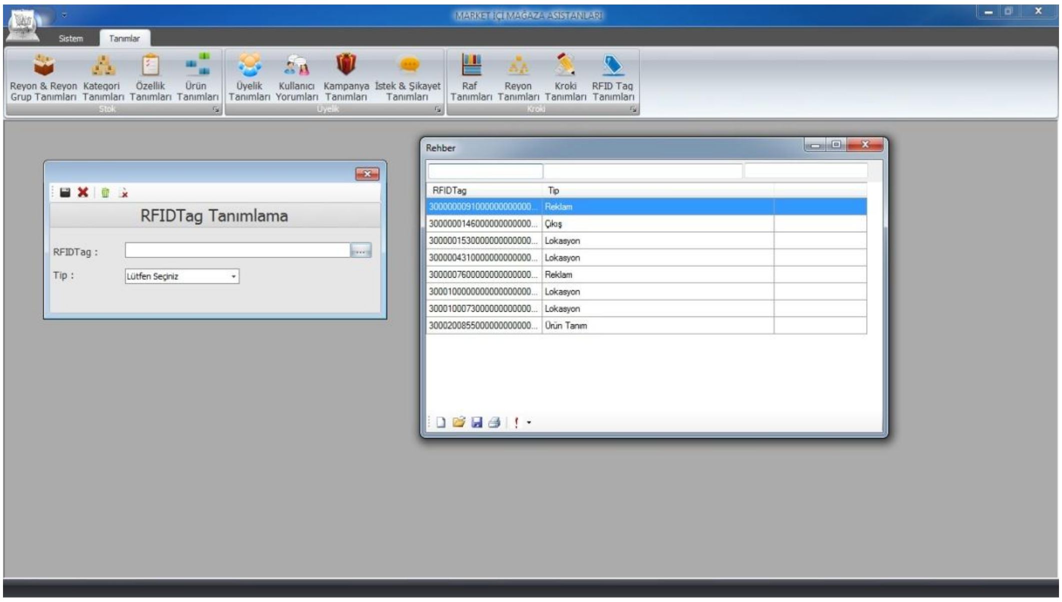


Figure 76: Sketch Form Moving Departments

9.1.13. RFID Tag Description

RFID tags are defined from this part. There is RFID tag unique value and type. Type is used by the end user application to classification while reading RFID tags.



RFIDTag Tanımlama

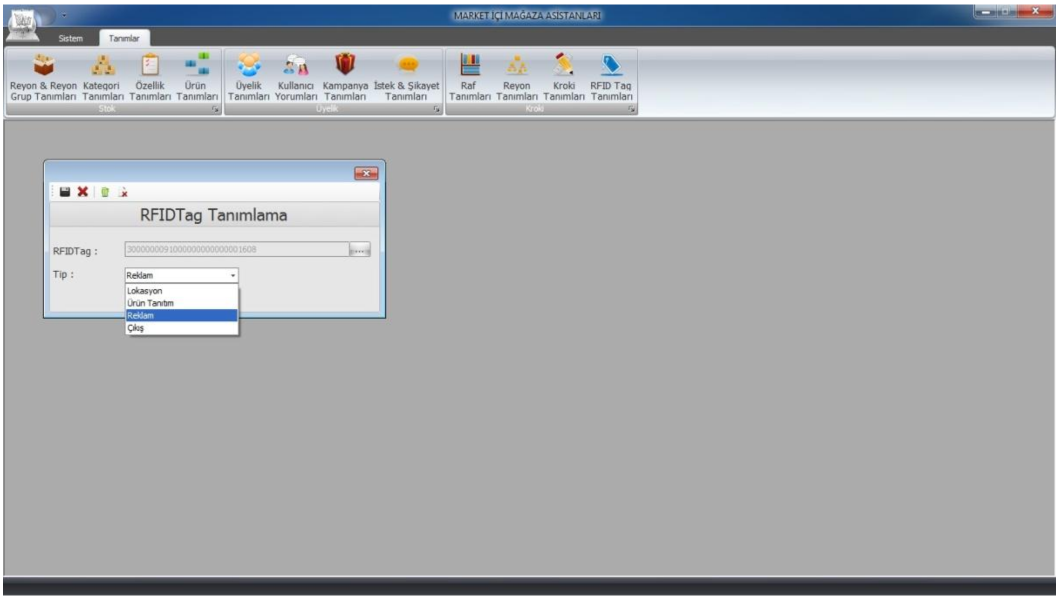
RFIDTag :

Tip : Lütfen Seçiniz

RFIDTag	Tip
300000009100000000000...	Reklam
300000014600000000000...	Çıkış
300000015300000000000...	Lokasyon
300000431000000000000...	Lokasyon
300000760000000000000...	Reklam
300010000000000000000...	Lokasyon
300010007300000000000...	Lokasyon
300020085500000000000...	Ürün Tanım

Figure 77:RFID Tag Form

Defined RFID tags can be updated and deleted by the admin.



RFIDTag Tanımlama

RFIDTag : 3000000091000000000000001608

Tip : Reklam

Figure 78:RFID Tag Form Update Record

9.2. END-USER SCREEN

This part explains the ability of application which is developed for customers of supermarket.

Program waits in idle mode as screenshot that is below until user makes a move. And when the starting RFID tag is read, main application starts with an advertisement video.

Figure 79: Start Page of the Application

In this section, user can skip to video or can watch whole of the video. Next screen is the main screen for the application.

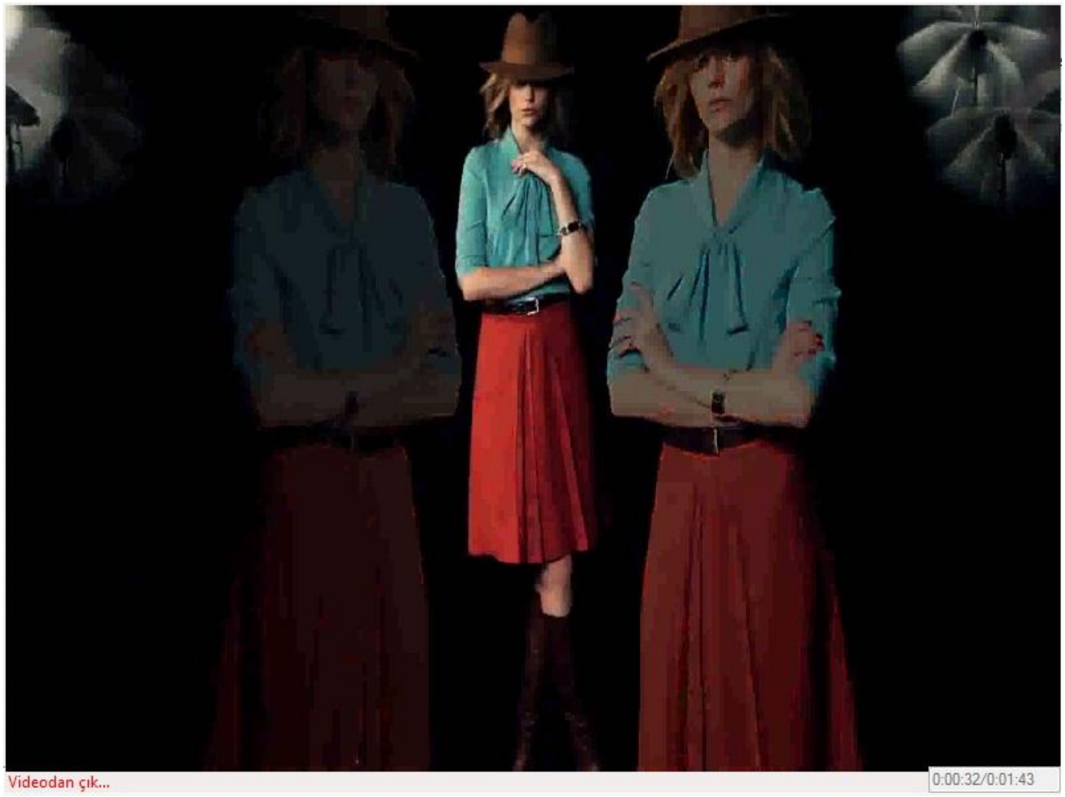


Figure 80: Promotional Video

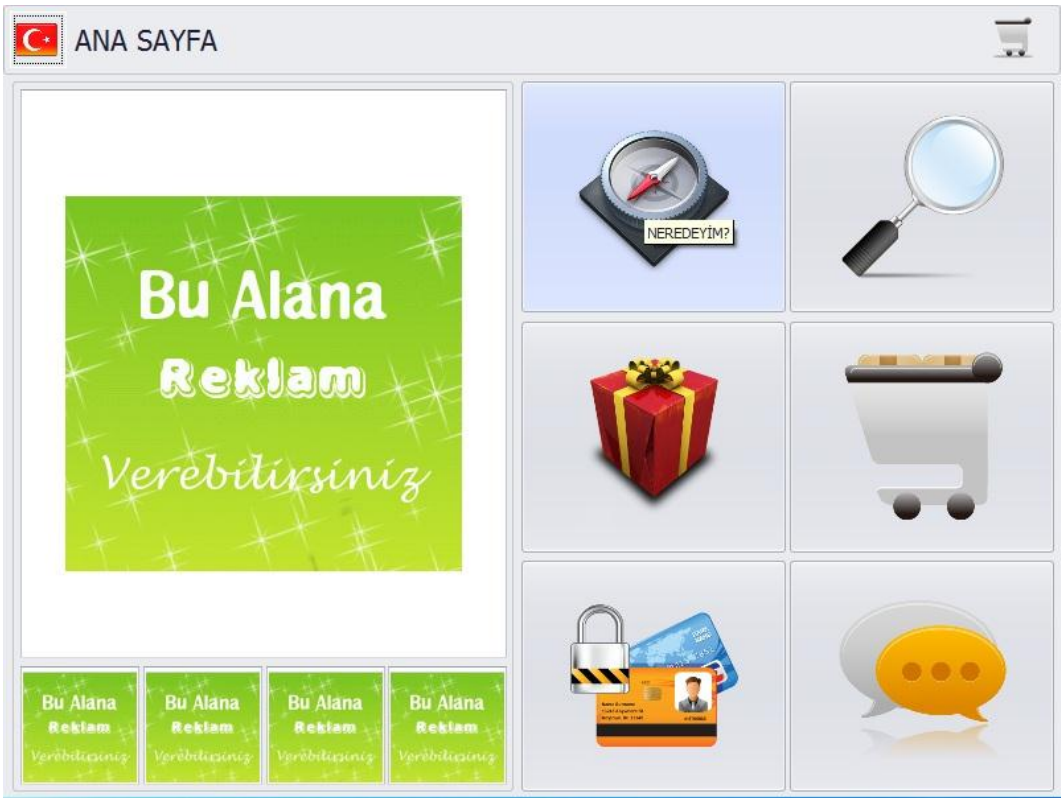


Figure 81: Main Page(Turkish)

Two languages are supported for the users.

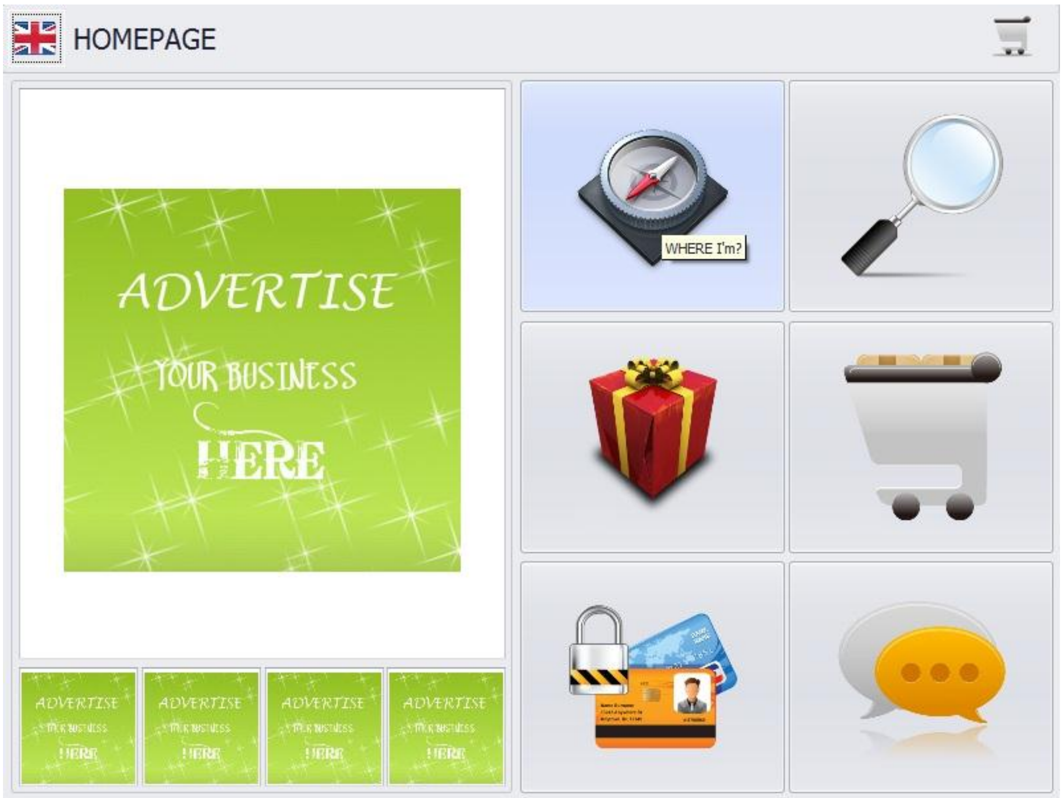


Figure 82: Main Page(English)

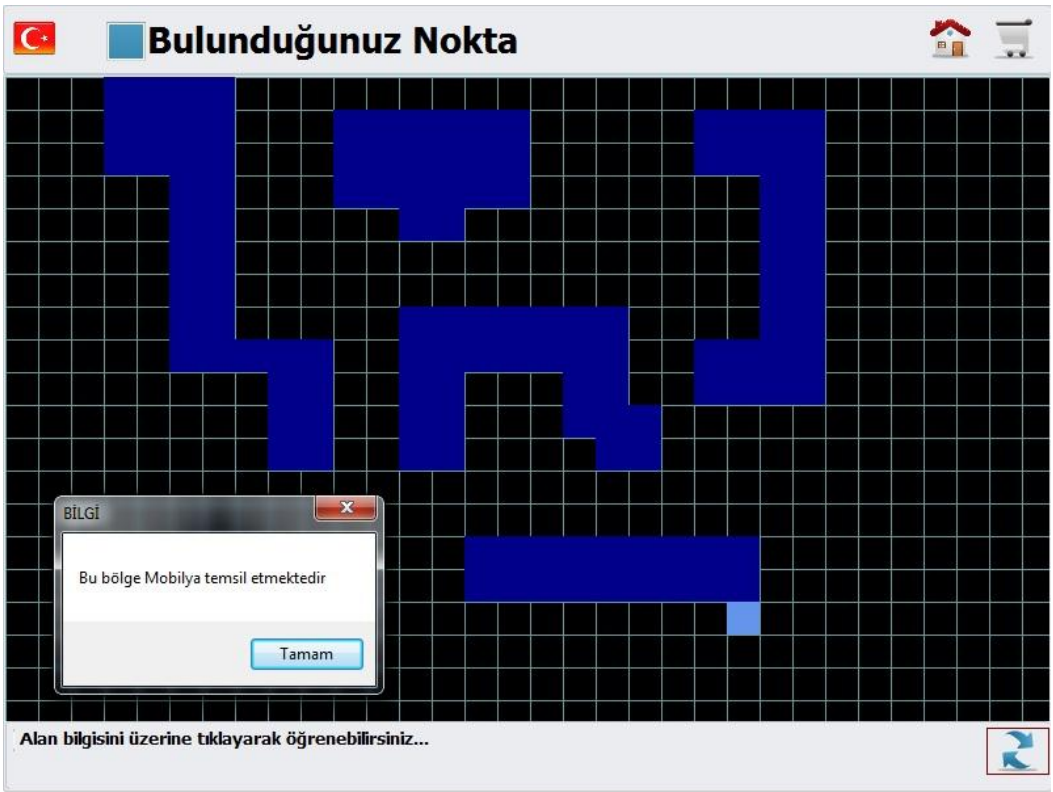
Application includes 6 modules and 5 advertisement buttons .The modules are:

- Where I’m?
- Search & List
- Campaigns
- Shopping Cart
- Membership System
- Complaints & Requests

Advertisement buttons are supported to display video when they are clicked. By the way, these buttons can be hired to the brands.

9.1.1. Where I’m

This module displays location of the user by drawing a sketch, which is designed by the administrator. When user makes a move, sketch is being updated.



Bu bölge Mobilya temsil etmektedir

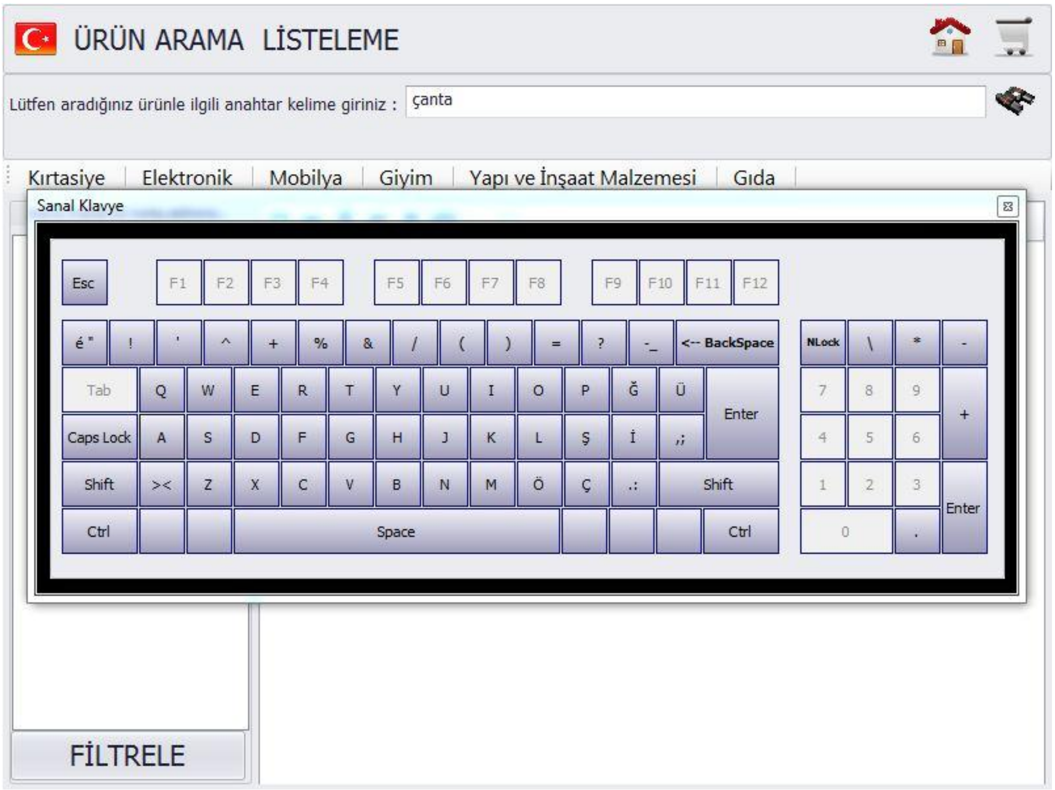
Alan bilgisini üzerine tıklayarak öğrenebilirsiniz...

Figure 83:Location of the user with Department Info

On the other hand, by clicking information of colored area can be learned. The main page and shopping cart screen can be reached by shortcut buttons which are located on the right side of the screen.

9.1.2. Search & List

Application lets users to enter keyword, so users can list products related to the keyword. User can search products also using Department Groups which are located on the screen as menu.

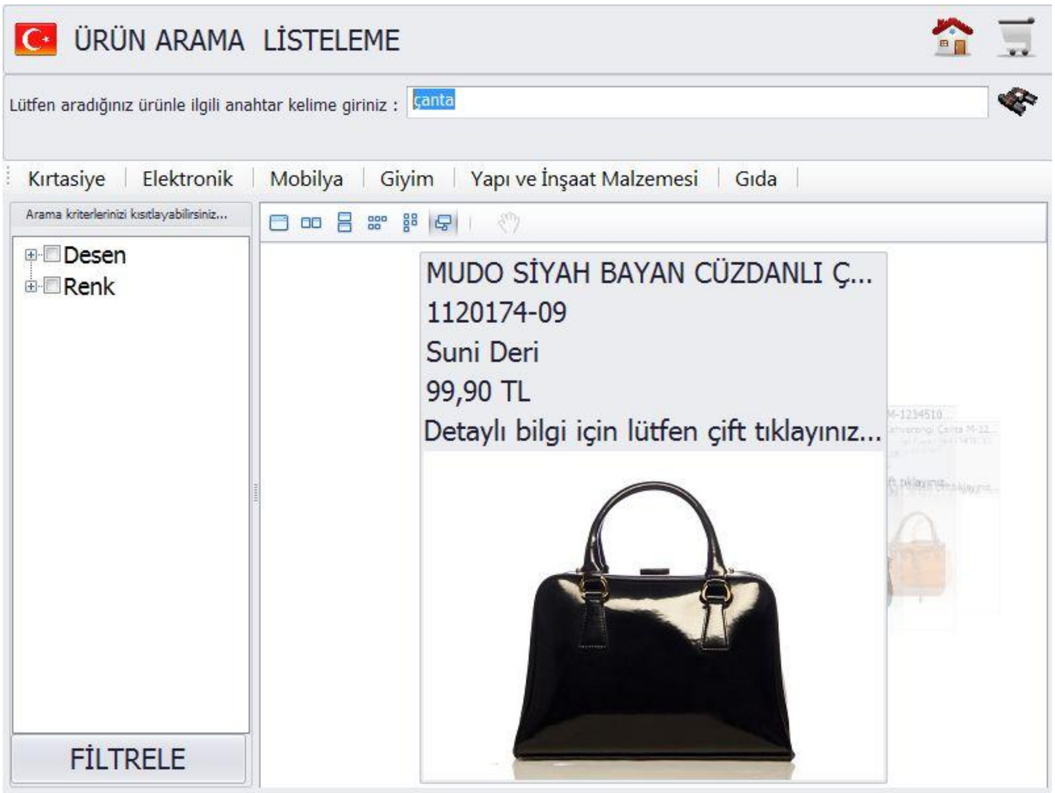


ÜRÜN ARAMA LİSTELEME

Lütfen aradığınız ürünle ilgili anahtar kelime giriniz : çanta

Kırtasiye
Elektronik
Mobilya
Giyim
Yapı ve İnşaat Malzemesi
Gıda
Sanal Klavye
Esc F1 F2 F3 F4 F5 F6 F7 F8 F9 F10 F11 F12
é " ! ' ^ + % & / ( ) = ? -_ <-- BackSpace NLock \ * -
Tab Q W E R T Y U I O P Ğ Ü Enter 7 8 9 +
Caps Lock A S D F G H J K L Ş İ ,; 4 5 6
Shift >< Z X C V B N M Ö Ç .: Shift 1 2 3 Enter
Ctrl Space Ctrl 0 .
FİLTRELE

Figure 84: Search Screen



ÜRÜN ARAMA LİSTELEME

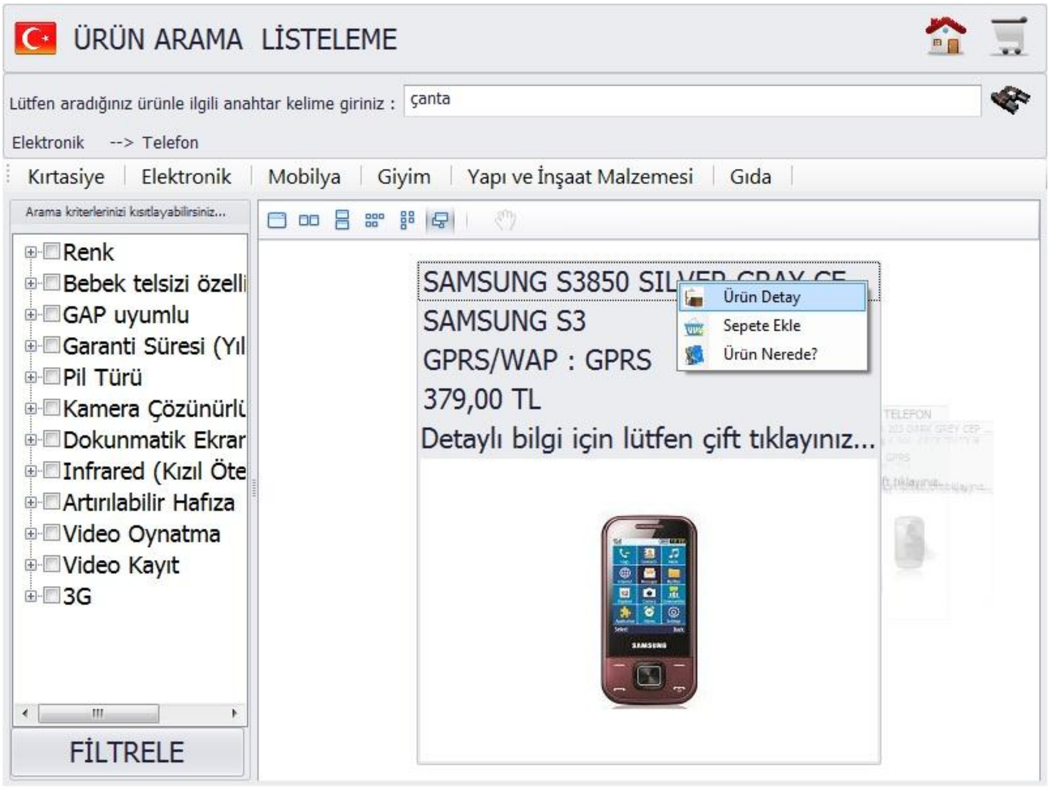
Lütfen aradığınız ürünle ilgili anahtar kelime giriniz : çanta

MUDO SİYAH BAYAN CÜZDANLI Ç...
1120174-09
Suni Deri
99,90 TL
Detaylı bilgi için lütfen çift tıklayınız...

Figure 85: Search Result Screen

Product list can be filtered by using filter menu which is located on the left side of the screen.

When a click occurs on the product, a menu appears on the screen. The menu covers three steps to act. Steps are 'Detailed Information about Product' and 'Adding Shopping Cart' and 'Location Information of the Product'.



Lütfen aradığınız ürünle ilgili anahtar kelime giriniz : çanta

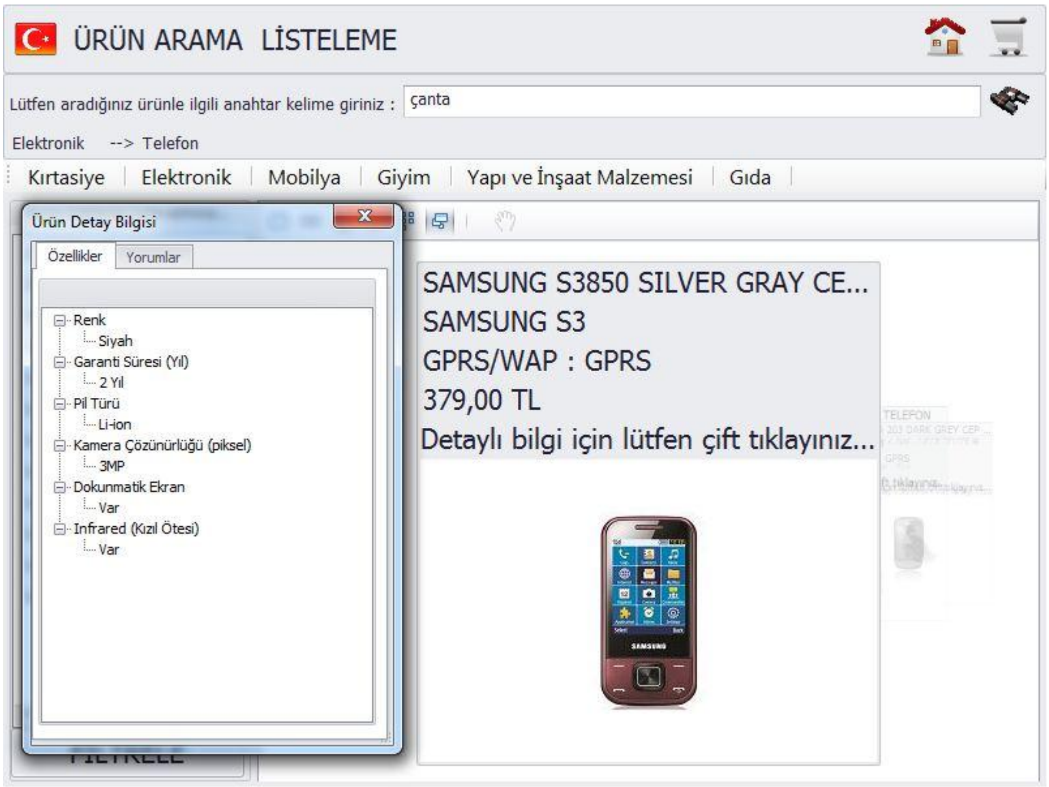
Elektronik --> Telefon

SAMSUNG S3850 SILVER GRAY CE
SAMSUNG S3
GPRS/WAP : GPRS
379,00 TL
Detaylı bilgi için lütfen çift tıklayınız...

Figure 86: Product Detail Context Menu

'Detailed Information about Product'

This step displays a mini menu which includes detailed information about product. For instance Color Info, Pattern Info, Warranty Info and etc. User can write a commentary and read all commands about product.



ÜRÜN ARAMA LİSTELEME

Lütfen aradığınız ürünle ilgili anahtar kelime giriniz : çanta

Elektronik --> Telefon

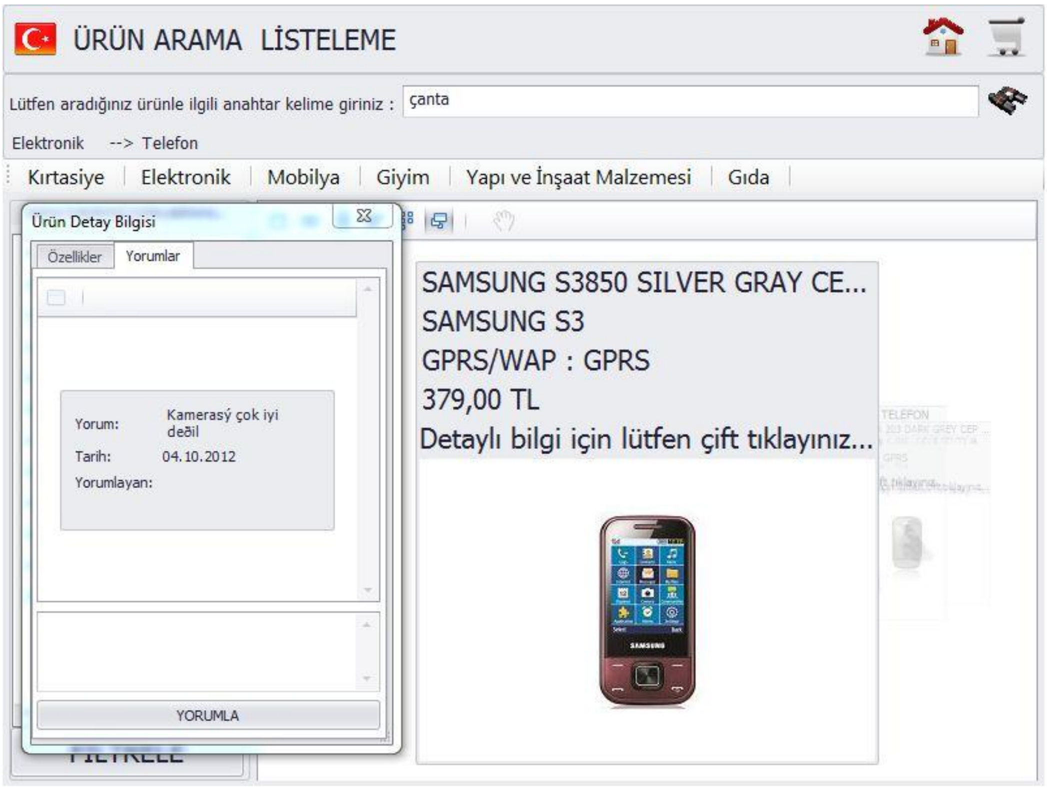
Kırtasiye | Elektronik | Mobilya | Giyim | Yapı ve İnşaat Malzemesi | Gıda

Ürün Detay Bilgisi

- Renk
  - Siyah
- Garanti Süresi (Yıl)
  - 2 Yıl
- Pil Türü
  - Li-ion
- Kamera Çözünürlüğü (piksel)
  - 3MP
- Dokunmatik Ekran
  - Var
- Infrared (Kızıl Ötesi)
  - Var

SAMSUNG S3850 SILVER GRAY CE...
SAMSUNG S3
GPRS/WAP : GPRS
379,00 TL
Detaylı bilgi için lütfen çift tıklayınız...

Figure 87: Product Detail Pop Up Menu



ÜRÜN ARAMA LİSTELEME

Lütfen aradığınız ürünle ilgili anahtar kelime giriniz : çanta

Elektronik --> Telefon

Kırtasiye | Elektronik | Mobilya | Giyim | Yapı ve İnşaat Malzemesi | Gıda

Ürün Detay Bilgisi

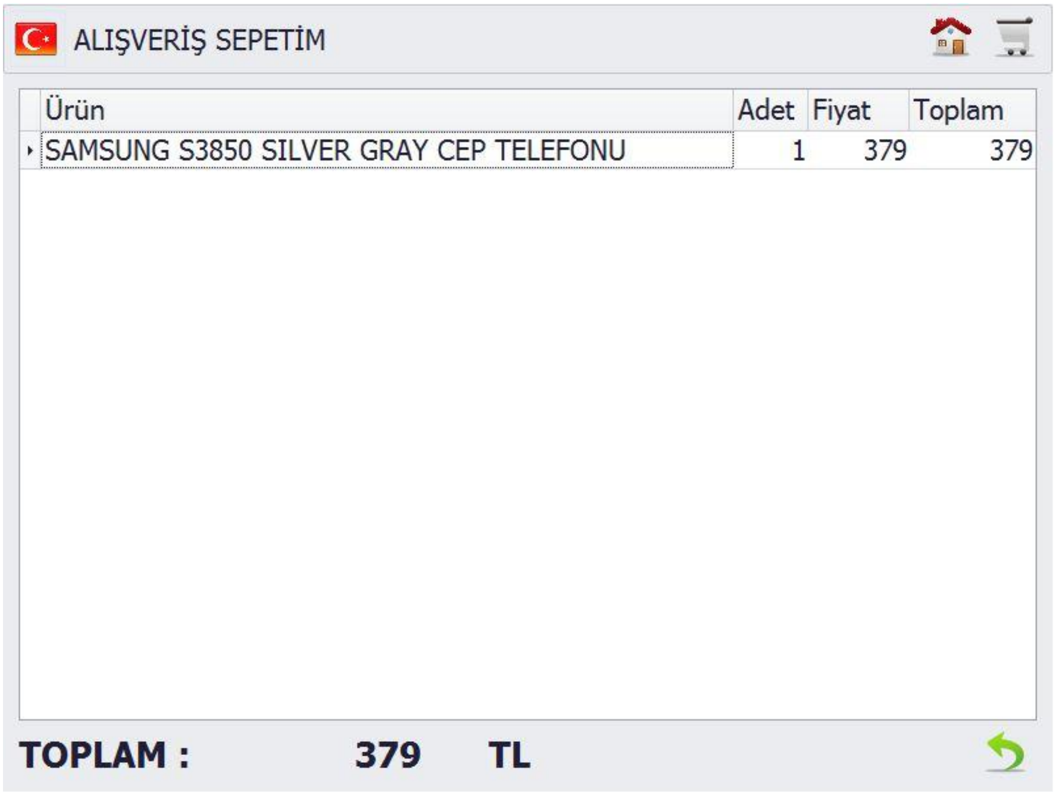
Yorum: Kamerasý çok iyi deðil
Tarih: 04.10.2012
Yorumlayan:

SAMSUNG S3850 SILVER GRAY CE...
SAMSUNG S3
GPRS/WAP : GPRS
379,00 TL
Detaylı bilgi için lütfen çift tıklayınız...

Figure 88: Product Detail Pop Up Menu-Comments

'Adding Shopping Cart'

This step allow user to add product into shopping cart. If user wants displaying content of shopping cart, they can go to shopping cart screen by clicking shopping cart button on the screen.



ALIŞVERİŞ SEPETİM

Ürün	Adet	Fiyat	Toplam
SAMSUNG S3850 SILVER GRAY CEP TELEFONU	1	379	379

TOPLAM : 379 TL

Figure 89: Shopping Cart List

'Location Information of the Product'

This step forwards to Sketch screen. System draws a sketch and displays that location of user and location of the product. System draws a path, path starts with location of user, ends with location of product. Hereby user gets access to the product easily.

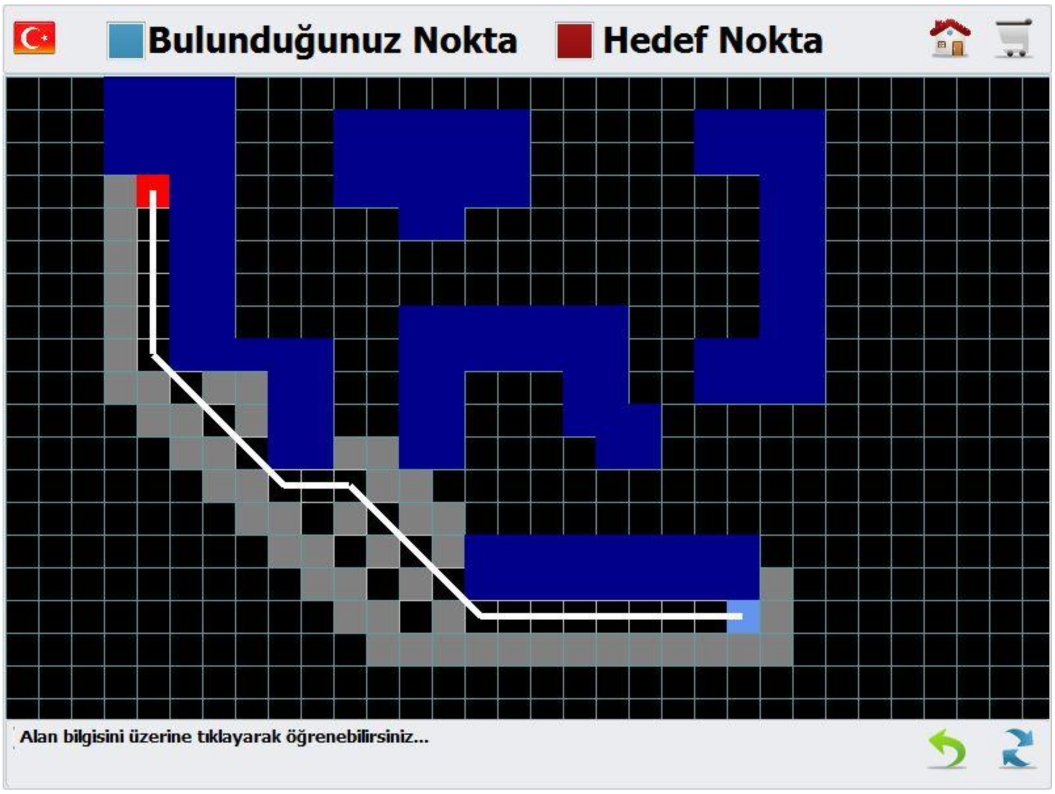
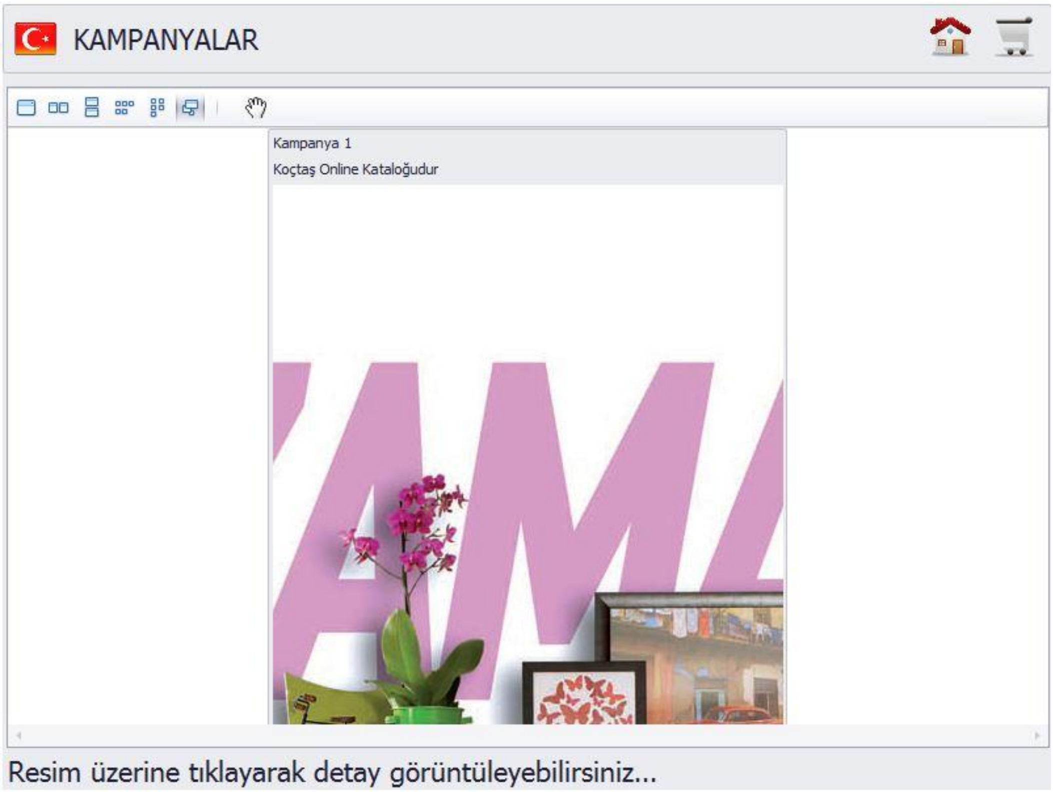


Figure 90: Location of the Product

9.1.3. Campaigns

Each month, the catalog is designed to offer products and prices as you know by the supermarkets. Module supports to display the catalog. So that customers are informed about campaigns.



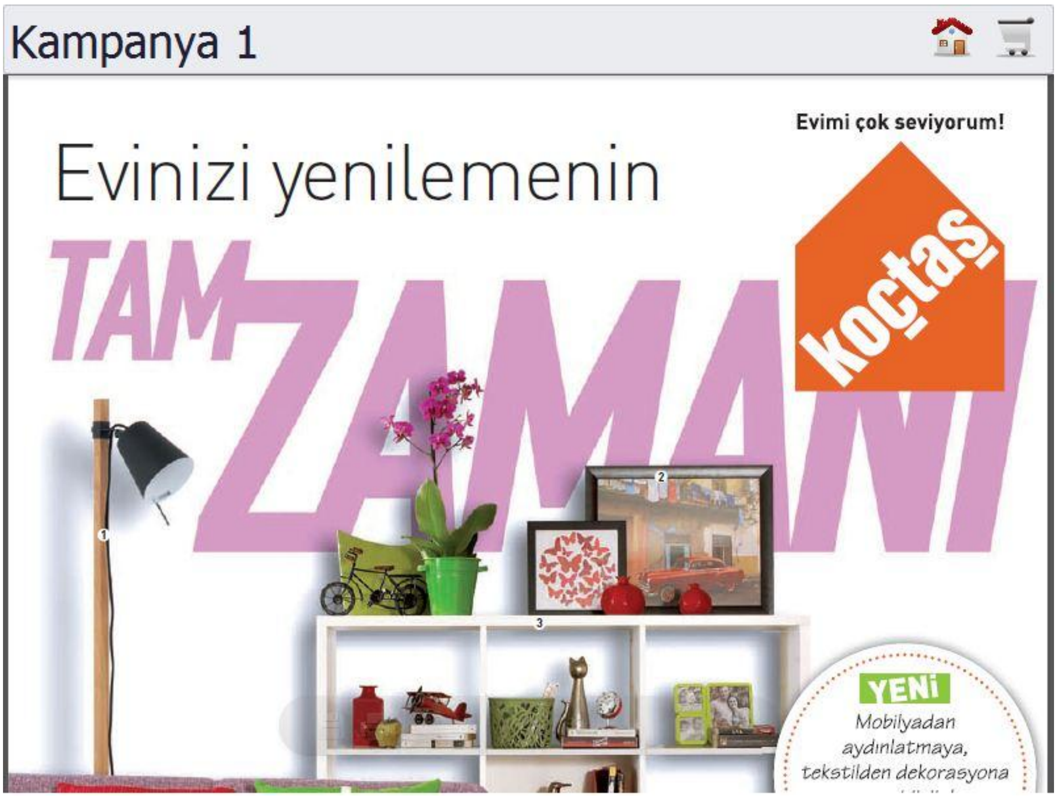
KAMPANYALAR

Kampanya 1

Koçtaş Online Kataloğudur

Resim üzerine tıklayarak detay görüntüleyebilirsiniz...

Figure 91: Campaing Example



Kampanya 1

Figure 92: Campaign Detail Screen

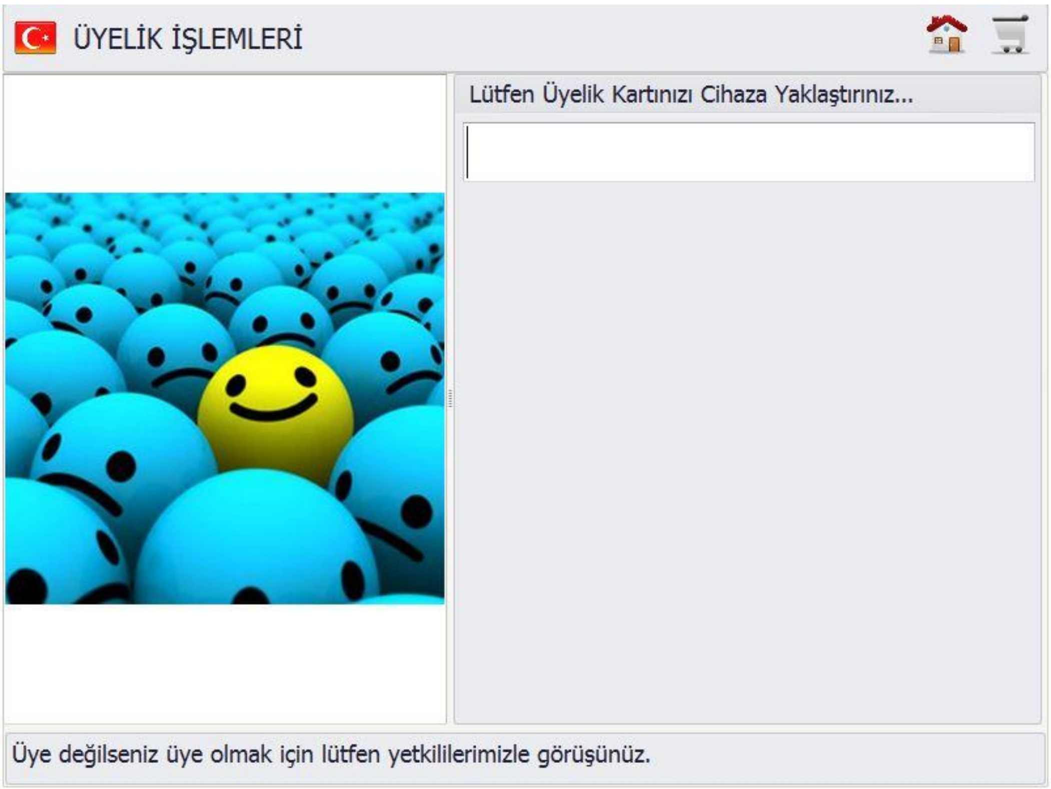
9.1.4. Shopping Cart

System lets to know customer info about the spending during the shopping in the supermarket. User can add products into shopping cart and can get info about payment from the shortcut buttons by clicking. Customer will not have any surprises when comes to the point of payment.

9.1.5. Membership System

Membership system is encouraged with a membership card which is a unique rfid tag.

Additionally important information for the owner of the company is achieved with this ability of the system. This situation is an important factor for the sales strategy. Integration with inventory tracking program will provide private discounts per customer/customer groups. If the integration is demanded product inventory information will be learned automatically.



ÜYELİK İŞLEMLERİ

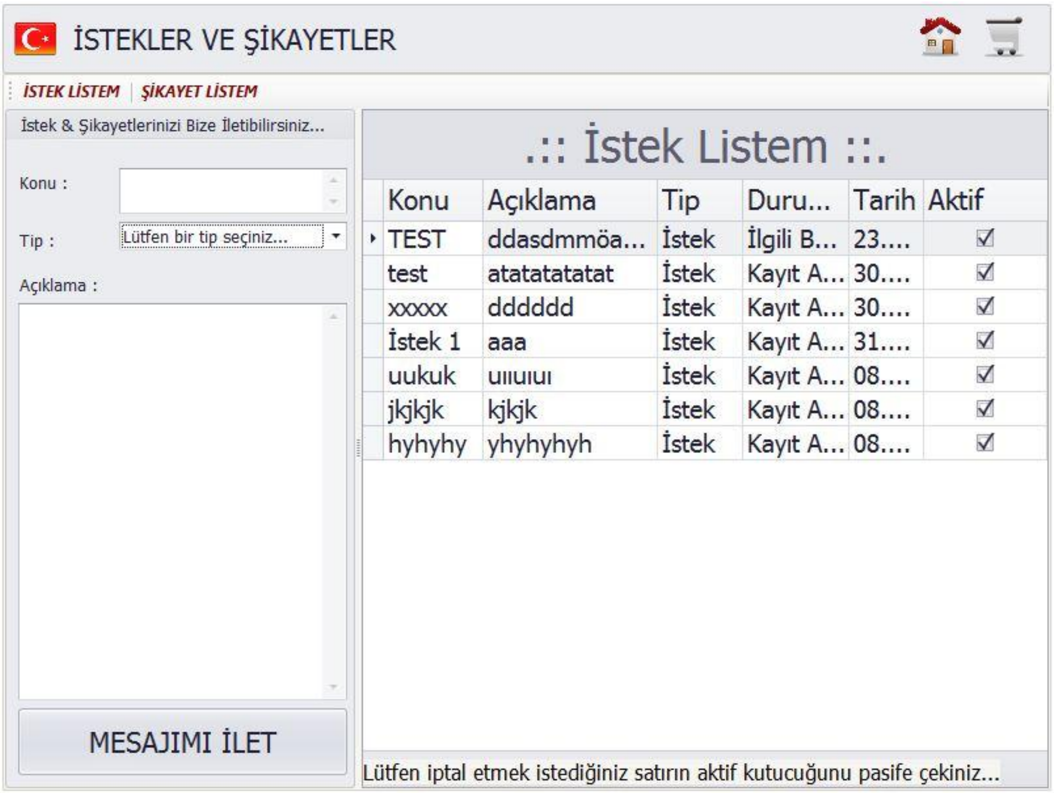
Lütfen Üyelik Kartınızı Cihaza Yaklaştırınız...

Üye değilseniz üye olmak için lütfen yetkililerimizle görüşünüz.

Figure 93: Membership Login Screen

9.1.6. Complaints & Requests

This module allows customer to enter their requests and complaints. If person who enters complaint (or request), will follow its statement from this screen. Requests and complaints from users will be able to enter the system, but only if they are members will be able to track the status of the screen.



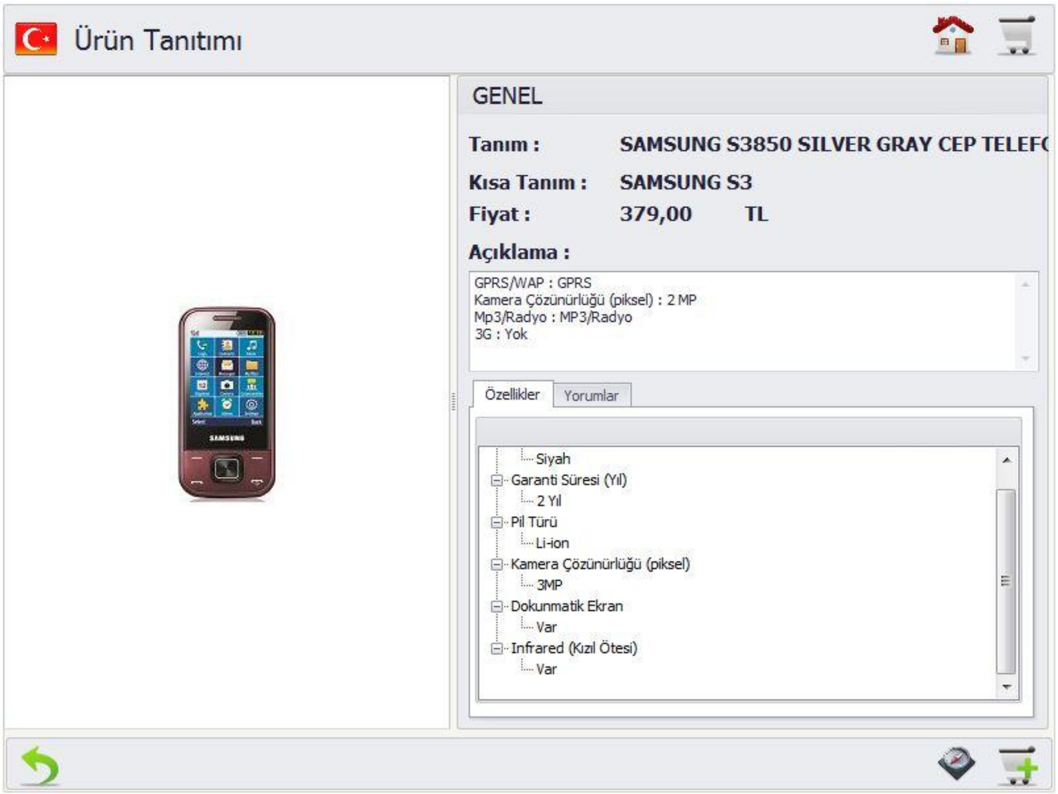
.:: İstek Listem ::.

Konu	Açıklama	Tip	Duru...	Tarih	Aktif
TEST	ddasdmmöa...	İstek	İlgili B...	23....	☑
test	atatatatatat	İstek	Kayıt A...	30....	☑
xxxxx	dddddd	İstek	Kayıt A...	30....	☑
İstek 1	aaa	İstek	Kayıt A...	31....	☑
uukuk	uııuıuı	İstek	Kayıt A...	08....	☑
jkjkjk	kjkjk	İstek	Kayıt A...	08....	☑
hyhyhy	yhyhyhyh	İstek	Kayıt A...	08....	☑

Lütfen iptal etmek istediğiniz satırın aktif kutucuğunu pasife çekiniz...

Figure 94: Complaints & Requests Entrance Screen

While customers are browsing in the store, they can get detailed information about product which is assigned with RFID tag by swiping the device. Customer can add the product in to shopping cart. Or they can learn location of the product.



GENEL

Tanım : SAMSUNG S3850 SILVER GRAY CEP TELEF

Kısa Tanım : SAMSUNG S3

Fiyat : 379,00 TL

Açıklama :

GPRS/WAP : GPRS
Kamera Çözünürlüğü (piksel) : 2 MP
Mp3/Radyo : MP3/Radyo
3G : Yok

- Siyah
- Garanti Süresi (Yıl)
  - 2 Yıl
- Pil Türü
  - Li-ion
- Kamera Çözünürlüğü (piksel)
  - 3MP
- Dokunmatik Ekran
  - Var
- Infrared (Kızıl Ötesi)
  - Var

Figure 95: Product Promotion Screen

RFID tags can be localized in the supermarket to display advertisement videos. The RFID tags are activated by the customer move, and then the video is displayed. The event is big an advantage for the owner, because RFID tags can be rented to the brands.

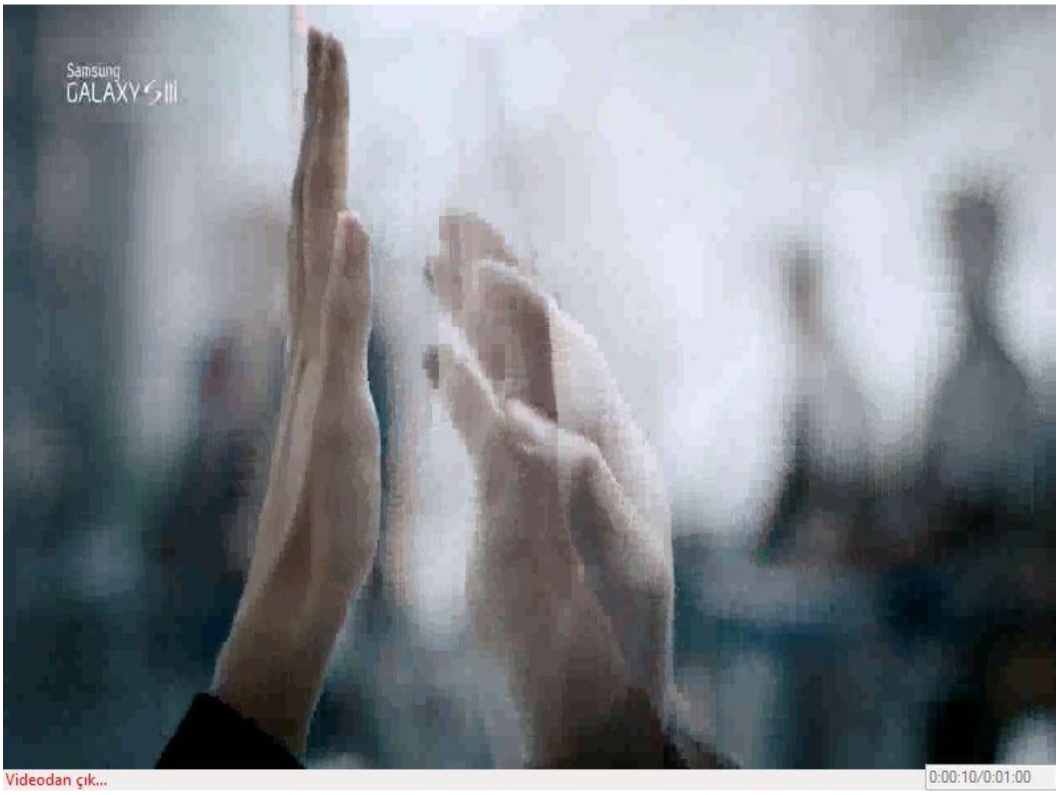


Figure 96: Assigned Promotion Video

Decision Tree algorithm running in the background, system displays the promotions about the products from previous shopping records. The program basically checks what types (category) of product is bought by that specific customer in the past and then compares them with the products currently on sale so that if any of them are similar then they are presented to the customer at the promotion box.

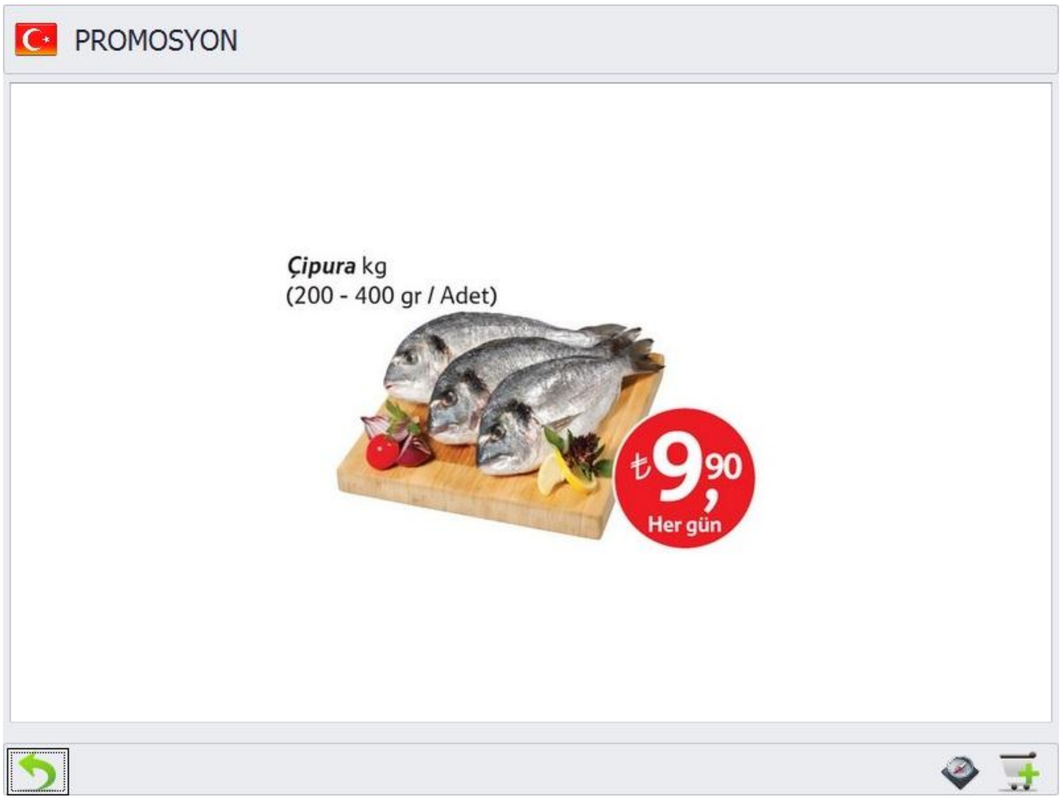


Figure 97: Random Product Promotion(pre-purchased)

10. CONCLUSION

In this thesis, the supermarket application is presented that defines all base definitions like

Product

- Department & Department Group
- Category
- Product
- Properties of Product

These are necessary for creating base info for product and let users to search products which are in the supermarket.

Membership

- Membership
- User Comments
- Campaign
- Request&&Complaint

These are necessary for membership info and then manage them.

Sketch

- Shelf
- Rayon
- Sketch

These are necessary for creating a sketch and then draw the sketch manually.

One of the advantages of the administrator program is drawing flexible maps for supermarket. Department and Shelves can be named as whatever administrator wants. Also Rayon, Group and Category names can be named as whatever administrator wants.

The program of customer interface provides many advantages. One of them is giving permission to customers for searching product. By the way customer can take detailed information such as purpose of usage about product.

ADVANTAGES FOR ADMIN SCREEN

1. Definition of Department / Department Group, Category.
2. Definition of Properties to Product.
3. Definition of RFID tags for location info.
4. RFID assigning for location info.
5. RFID assigning for product introduction.
6. Definition of membership.
7. Control for user comments/complaints.
8. Data entry for campaigns.
9. Definitions like Department and Shelves for drawing sketch.
10. Map drawing in a flexible manner

ADVANTAGES FOR END-USER SCREEN

1) When customer walk around the supermarket, the way which is followed by the customer is recorded.
    a. Situation helps owner of the application to get gain for sales strategies. Because the ways which are most followed are recorded.
2) The products which are attached to the cart are recorded.
    a. Situation helps owner of the application to get gain for sales strategies. System records data like which products are attached to cart or when the products are attached to cart.
3) Each shopping cart history is recorded.
    a. Therefore, the data which is about how many times a product is attached to the customer will be reached. This situation helps owner of the application for analysis.
4) Customer may learn the total price of the shopping cart.
    a. In this way, customer can control the budget.
5) Application provides to display ‘Portable Document Format’ documents that are about campaigns.

   a. Customer access information more discounted items. This saves the customer time.

6) Customer can view the current location information.
   a. In this way, the customer will reach more easily where it wants to go.
   b. The customer saves time.

7) Customer can examine the products can get detailed information about the products, write comments on products, see reviews on products. At the same time, the customer can access location information products.
   a. The customer wants to buy products examine in detail.
   b. Customer can learn the location of the product which is decided to buy.
   c. On the other hand, customer can learn the total price by adding product into basket.
   d. Customer may have a general conviction by reviews about the product.
   e. Customer may recommend or discredit the product to others by writing comments.

8) Customers can suggestion and complaint to the company. If customer has membership, can follow them.
   a. Customer can recommend about company without speaking with any person.
   b. Members can follow the suggestions or complaints.
   c. This is an advantage for the firm provides the customer satisfaction.

9) The application makes ad impressions for dedicated products.
   a. Brand owners can reach more easily to customers. Privilege is ensured to brands.
   b. Customer will be informed more about the product.
   c. In this way, firm provides advertising service to the brands.

10) The application presents detailed information screen for dedicated products
   a. Brand owners can reach more easily to customers. Privilege is ensured to brands.

b. Customer will be informed more about the product.
c. In this way, firm provides advertising service to the brands.

And also using DevExpress is the other additional feature for application. It contributed to make a good user interface and provided some ready-to-use properties like searching that we did not have to write code for this. But DevExpress had some difficulties too, because finding samples is more difficult than the normal.

11. FUTURE WORK

- Automatic Payment by identifying RFID tags on the whole items.
- Enumeration of items by identifying RFID tags on whole items.
- Shopping cart can be designed as a robotic machine that moves automatically. So that, the system helps people with disabilities.
- RFID tags can be configured to avoid theft incidents.
- By identifying RFID tags on the whole items, when an item is put into shopping cart, item can be seen on the shopping list automatically.
- Inventory tracking will be achieved easily by identifying RFID tags on the whole items.
- For advertisement displaying, stationary monitor can be used as a future work. Just for advertisement and product promotion the monitor can be designed. So all customers can benefit from this service without being a member of the system.

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