
INTEGRATED ELECTRONIC WAREHOUSE RECEIPT MANAGEMENT

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Abstract

Dynamic Web content provides us with time-sensitive and continuously changing data. To glean up-to-date information, users need to regularly browse, collect and analyze this Web content. Without proper tool support this information management task is tedious, time-consuming and error prone, especially when the quantity of the dynamic Web content is large, when many information management services are needed to analyze it, and when underlying services/network are not completely reliable. Electronic Warehouse Receipt is not a new concept. Electronic data has given the prospect of eliminating paper documents, reducing costs and improving efficiency by exchanging business information in electronic form. The objective of this paper is developing an Integrate Electronic Warehouse Receipt Management System for Indian agriculture market which supports services like trading, latest price information, electronic warehouse receipt and making all these services available on internet as well as IVR (Interactive Voice response) and Simple Messages Services. Although many agriculture e-business platforms exist in the market but they don't ensure that the commodity is actually held by the seller and the quantity and quality are as mentioned. To solve this problem we have come with the concept of Electronic Warehouse Receipt (EWR) which is the same as the concept of 'dematerialization of shares' or 'demat' in short.

Keywords: Electronic Warehouse Receipt, Web Information Management Systems, Dynamic Service Coordination, Dynamic Web Content, Semantic Interoperability.

1. Introduction

The Web is a nearly unlimited source of information. Recently, dynamic Web content that provides time-sensitive and continuously changing data has gained prominence. This paper is aimed at developing a business platform which supports regular e-trading as well as trading based on buying and selling of electronic warehouse receipts and providing the latest price information. These services can be accessed by internet, telephone (by Interactive Voice Response) and SMS as well.

1.1 Why Integrate Electronic Warehouse Receipt Management?

Any information management tool that supports this process of gleaning information for dynamic Web content should help alleviate the tedious and repetitive aspects, but should be flexible enough to allow users to incorporate the dynamic aspects of information analysis. About two-third of Indian population is engaged in agriculture. Agriculture being the major source of livelihood in India especially in villages is ironically very backward in technology. The farmers get low price for their products because of limited number of buyers and sellers due to limitations in form of geographical and temporal barriers, lack of price information and lack of technological knowledge. The e-business breaks these barriers because trading is fast and can be done from any place and with anyone irrespective of his location. It can also provide the latest price information.

1.2. What is Electronic Warehouse Receipt (EWR)?

A negotiable warehouse receipt is issued by a warehouse operator to a person depositing goods in the warehouse. It is accepted by commercial banks as collateral security for grant of loan against the goods stored in the warehouses and a warehouse receipt is also transferable by buying and selling. But there are certain problems associated with the present system of paper based warehouse receipts like the physical delivery of receipts, which is the final stage of transaction, can lead to extra transaction cost (handling, transporting and storing certificates) and may also lead to losses in form of theft, loss in transit or counterfeiting. An electronic warehouse receipt avoids these contingencies by keeping the electronic record of the ownership of receipts. This supplements e-business as the buyer can be sure about the quality and the quantity of the commodity mentioned in the offer and certificates are not required to be physically produced.

This concept is very similar to the concept of 'dematerialization of shares' or 'demat' in short, which was introduced in India for the first time by National Securities

Depository Limited (NSDL) in 1996. It has succeeded in persuading companies to dematerialize a portion of their shares and allow electronic trade and settlement. So, to make EWR a success there has to be a central body like NSDL.

1.3. How is this Integrate Electronic Warehouse Receipt Management different from the others?

Presently there are many agriculture e-business platforms existing in the market. Today's world, becoming more competitive every day, demands from business platforms, the flexibility to adjust themselves to the needs and the situation of the market and the targeted section of users. Because we are developing a business platform for Indian agriculture market, we have to take into account the basic features and needs of the targeted population i.e. the traders and the farmers. We have to take into account the literacy, understandability and computer literacy of the targeted section. Also, we have to take into account the reachability and availability of the internet in Indian villages and mandis. Accordingly, we have to introduce necessary innovations and flexibilities in our project to make it a success. We have identified some basic features of a business platform for agriculture, which are essential for its success in India, although some of these are general features which apply to any business platform in or outside India:

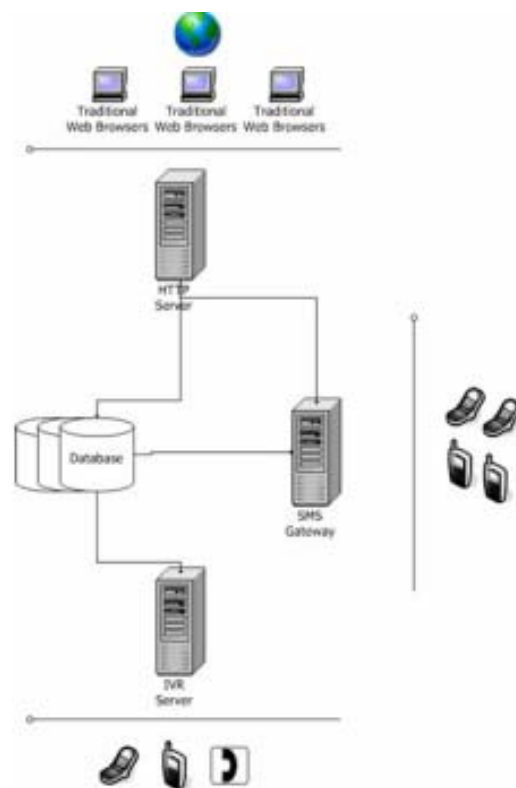
1. **Availability and reachability** : The traders and the farmers, who are the targeted users of this business platform, usually don't have access to internet in the villages and the mandis. In order to ensure the availability and reachability, the medium chosen should be a popular one. Therefore, we are developing the IVR system, which makes the services available through telephones, which are nowadays very common in mandis as well as villages.
2. **Language ease** : A large fraction of users i.e. farmers and the traders are not comfortable with English. So, we are trying to keep our platform bilingual, making available many services in Hindi too.
3. **Reliability** : Although many agriculture e-business platforms exist in the market but they don't ensure that the commodity is actually held by the seller and the quantity and quality are consistent with what is mentioned in the offer. To solve this problem we are come up with the concept of Electronic Warehouse Receipt (EWR) which is the same as the concept of 'dematerialization of shares' or 'demat' in short. In our model the commodity will be held in the warehouse and the offer can only be posted for that commodity. So, the interested buyers can be sure that the quantity and quality of commodity are what is mentioned in the offer.

4. **Related information:** The latest prices of the agricultural commodities are available for each mandi. Our project integrated system, provides the information about crop diseases, seeds, fertilizers, pesticides and the latest developments in the field of agriculture.

We planned to implement this project in three parts:

1. Web based Trading
2. Electronic Warehouse Receipt (EWR)
3. Mandi Administration

2. Architecture



Deployment diagram for e-business platform

- The backend consists of MySQL database engine and Apache tomcat application server running JSP and Servlets.
- Clients can connect through conventional web browsers and IP phones.
- JDBC (Java™ Database Connectivity) has been used for connection with the database.

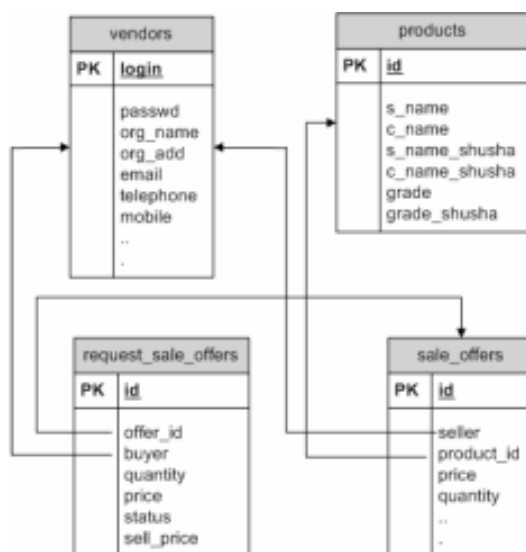
As mentioned earlier trading service is also available through telephone network by the use of IVR. For this purpose we are used a voice gateway 'Telepro' from PrologixSoft. Various updates and events like new counteroffer or acceptance of your offer are available through SMS alerts.

3. Web based trading

Web based trading provides farmers and traders a forum to buy or sell their products maximizing their profits. The major difference from other e-trading sites is that our portal also facilitates fractional trading. A typical transaction procedure goes through following steps.

1. A trader places an offer for a particular product along with a negotiable price tag and the quantity.
2. Other interested traders may now request specifying the price they would like to buy at and the quantity.
3. These requests have three kinds of statuses; waiting, accepted, rejected and confirmed. Initially, all the requests have waiting status which can be changed by the seller to either rejected or accepted.
4. After a request is accepted, the buyer has to confirm for the transaction to complete.

3.1 Database Design



Schema Diagram of Web-based trading

A simplified diagram of the database used has been shown above. Essentially, there are four tables, viz; vendors (the traders who use the portal for trading), products (different agricultural products), sale_offers (these are the offers posted by the vendors to sell items they possess) and request_sale_offers (the requests posted by other vendors for a particular offer along with the amount they wish to purchase and the price they would like to pay).

3.2 Interfaces

Any registered vendor is authorized for the following interfaces

1. Post a new Offer: can post a new offer for selling agricultural product he/she owns.
2. Current Offers: can view all the offers currently running
3. Search for Offers: search for offers for any particular product
4. My Offers: List of offers posted by him/her alongwith information about the counter requests
5. My Requests: List of requests made by him/her along with their status
6. My Committed Transactions: List of all the transactions that he/she has committed though our portal.
7. Vendor Detail: Details about some vendor
8. Offer Detail: Detailed information about any particular offer.
9. Requests for my Offers: List of all the counter requests for any particular offers posted by him/her. A facility for accepting/rejecting and auto-advisory is also provided here.

4. Electronic Warehouse Receipt (EWR)

In present system of paper warehouse receipt negotiable warehouse receipt is issued by a warehouse operator to a person depositing goods in the warehouse. It is accepted by the commercial banks as collateral security for grant of loan against the goods stored in the warehouses and a warehouse receipt is also transferable by buying and selling.

4.1 Problems in present system

There are certain inherent problems associated with the present system of paper based warehouse receipt. Some of the problems are:

- Physical delivery of receipts, which is the final stage of transaction, can lead to extra transaction cost (handling, transporting and storing certificates) and may also lead to losses in form of theft, loss in transit or counterfeiting.
- Warehouse receipt can be used as a security for taking loan or borrow money from the banks. In case the receipt gets lost, a fresh duplicate receipt is issued by the same warehouse which issued the original one. But this method gives rise to malpractices and forgery. The person holding an original copy which is no longer valid can borrow money or take loans from the banks showing them the original copy.
- There is also a geographical barrier as the receipt is to be physically shown. So, the person can only trade with other local traders.

4.2 A Solution: EWR

An electronic warehouse receipt avoids these contingencies by keeping the electronic record of the ownership of receipts. This supplements e-business as the buyer can be sure about the quality and the quantity of the commodity mentioned in the offer and certificates are not required to be physically produced.

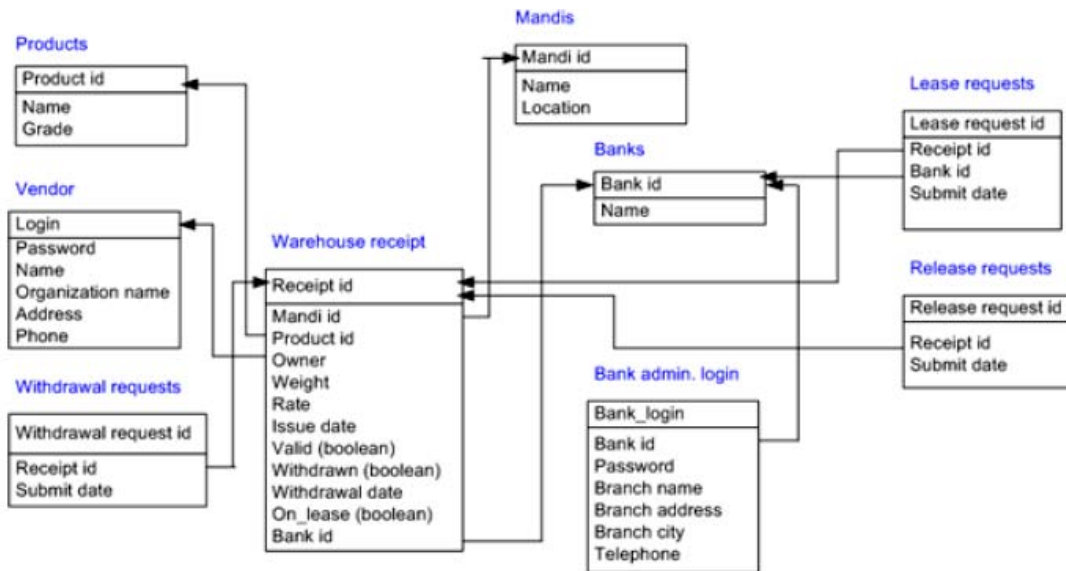
This concept is very similar to the concept of 'dematerialization of shares' or 'demat' in short, which was introduced in India for the first time by National Securities Depository Limited (NSDL) in 1996. It has succeeded in persuading companies to dematerialize a portion of their shares and allow electronic trade and settlement. So, to make EWR a success there has to be a central body like NSDL.

4.3 Advantages of EWR

- EWR is secure from fraud and forgery. As the information resides on the central database, no person can make a duplicate copy or use an outdated receipt.
- It also breaks all the geographical barriers as the physical production and exchange of document is not required. The seller can transfer the EWR to the buyer and transaction completes when the buyer confirms it.
- Warehouses that use EWRs will not have to print, store, deliver, receive, or stamp paper warehouse receipts.
- Digital Warehouse Receipts are different from paper warehouse receipts in that any part can be fractionalized to thousandths of the whole. And because of the digital nature of a DWR, this fractionalization can be executed by the bearer on demand.
- Using EWRs help better winning the trust of banks, depositors, lenders, producers and merchants due to its security from fraud and forgery.
- EWR supplements e-business as the buyer can be sure about the quality and the quantity of the commodity mentioned in the offer.

4.4 Database Design of EWR

A simplified diagram for the database used for EWR is shown below. It consists of 9 tables. Table products contain the information about different agricultural products. Similarly, are the two tables; mandi (the various registered mandis) and banks (registered banks)



Vendor are the user of the portal (table contains login and contact information). Table bank admin. login has the login information and information about the branch (a bank has multiple administrator login, each login belongs to a branch). Table warehouse receipt contains the information about the issued warehouse receipts (various attributes are product, mandi, owner, weight, estimated price etc.). Withdrawal request are the requests submitted for the withdrawal of the receipt. Similarly, the tables lease requests (requests submitted to a bank for putting a receipt on lease) and release receipt (requests for releasing some receipt which is on lease).

4.5 Transactions

Some transactions can only be performed by certain type of users (warehouses, users, banks) and types of transactions allowed are different for each.

4.5.1 Transactions initiated by warehouse

Every warehouse has a login to connect to the central database and can do following transactions:

1. Create electronic warehouse receipt: A new electronic warehouse receipt can be issued by the operator if some user brings some products to deposit. The receipt can be issued by entering the product details like grade, price, weight, date of deposit, owners id etc in the database.
2. Handle withdrawal requests: Warehouse can accept or reject the withdrawal request for the commodity accounting for any EWR. The request is rejected in case the EWR is on lease or doesn't belong to the user who has made the request.

4.5.2 Transactions initiated by user

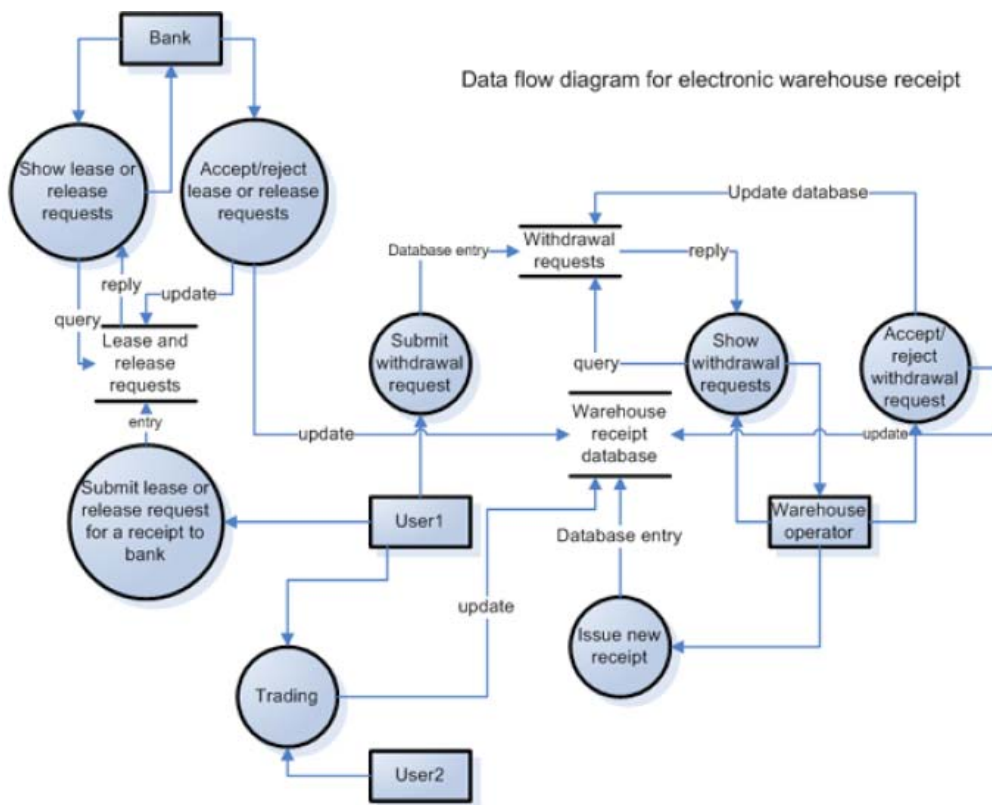
Every user also has a login for authentication. A user can initiate the following transactions:

1. Selling the product: The holder of the EWR can transfer a part of his deposited product or the entire deposited product to another user by posting an offer by web based trading.
2. Buying the product: A user can also place his counteroffer against a selling offer. If the seller accepts, the buyer has to confirm the offer.
3. Submit withdrawal request: User can also submit a request for the withdrawal of his deposited product. The request is accepted by the warehouse if the concerned EWR belongs to the user and is not on lease.
4. Taking credit from bank: The user can take bank credit or loan by putting his EWR on lease. Warehouses usually value the price of the commodity at the time of depositing. The individual banks can allow loans or credits up to some percentage of the value of EWR according to their policies.

4.5.3 Transactions initiated by banks

Every registered bank is also issued one or more logins. Banks have to handle the lease requests and the release requests. Bank places collateral on the product when the holder takes some loan or credit. Bank releases the collateral when the holder reimburses the amount taken as credit. The user has to make a request for placing or releasing the collateral.

4.5 Data flow diagram for electronic warehouse receipt



Data Flow Diagram for EWR

5. Mandi Administration

Every registered mandi is issued an administrator login at the time of registration. The administrator can further issue administrator logins and roles within his mandi domain. Every admin. can be issued a role to perform and can have different privileges.

5.1 Privileges

Every admin. login in the mandi domain has some privileges associated with it which decide that action can be performed by the user of that login. The privileges are decided at the time of issuing of the login and can be changed by an administrator in the domain of that mandi, if he himself enjoys the privilege to issue logins and roles. The various privileges are:

- Update price: The login with this privilege can be used to update the daily prices for that mandi. ?

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- Update product list: The login with this privilege can be used to update the list of commodities traded in that mandi. ??
 - Issue new logins and roles: This privilege gives the right to issue new logins and roles. Also the privileges of the existing logins can be changed and any login can be cancelled.
 - Privilege to perform warehouse operations: The privilege gives the right to perform various warehouse operations like issue new warehouse receipt, handling withdrawal requests etc.

5.2 Interfaces

The following actions can be performed by a mandi administrator provided he has the privilege to perform the action.

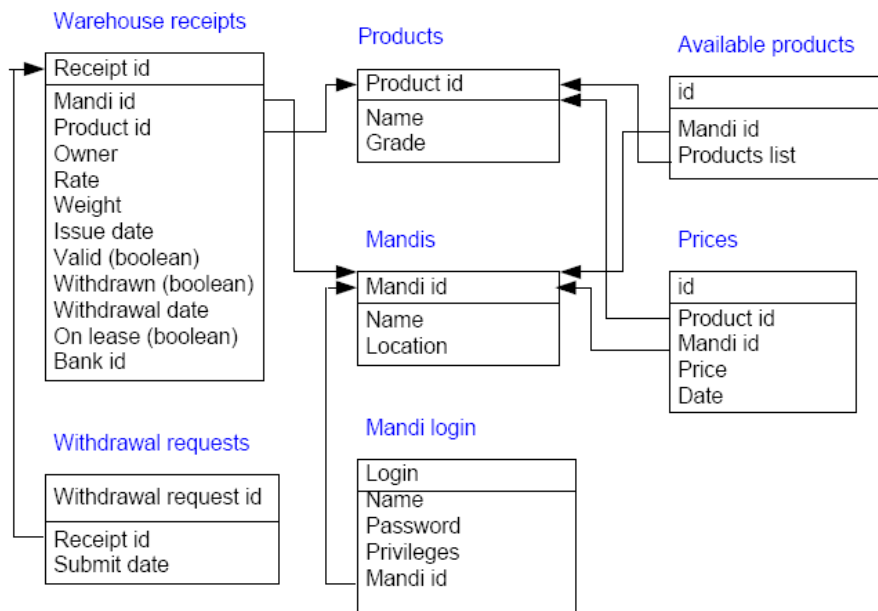
1. Update daily prices: The prices for the commodities available in the mandi can be updated.
2. Update list of commodities: The list of commodities traded in the mandi can be updated. Also list of the commodities for which warehouse facility is available can be updated.
3. Issue new logins and roles: New logins and roles can be issued in the mandi domain.
4. The privileges of the existing logins can be changed and logins can also be cancelled.
5. A new warehouse receipt can be issued if the administrator has the privilege to perform warehouse operations.
6. The withdrawal requests for warehouse receipt can also be handled if the privilege to perform the warehouse operations is available.
7. Also the latest prices for any mandi and product can be viewed, which requires no privileges and can be viewed by any ordinary user.

5.3 Data flow diagram for mandi administration system

The data flow diagram for mandi administration is shown below. It shows the data flow through various interfaces available to mandi administrator (those connected with dotted red lines) and the show price interface available to ordinary user. The data flow through four database tables (namely warehouse receipt, mandi administrator login, prices, commodity list) is also shown.

5.4 Database design

A simplified diagram for mandi administration system database is shown on the next page. It consists of 7 tables.



Schema diagram for the mandi administration system

Tables are products (various agricultural commodities); mandis (registered mandis); prices (daily price of a particular commodity in a particular mandi); available products (list of commodities traded in a mandi); mandi login (login information and privileges of a mandi administrator); warehouse receipt (mandi, product, weight, owner etc of an issued receipt); withdrawal request (requests for the withdrawal of a receipt).

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