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Performance Evaluation of Public Distribution System with Improved Security and Transparency under Cloud Environment

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Abstract: *Public distribution system i.e. rationing distribution is one the widely controversial issues that involve corruption and illegal distribution of the food grains and goods. The illegal activities are like ,wrong entry in the database about the amount of products given to the people, distribution of low quality of food grains than the actual quality provided for poor people. In databases where large amount of data is stored and accessed by different users and different access labels. Need to incorporate the security and transparency during the different kinds of information extraction according to role based access labels. The proposed data model is implemented on the different access labels and a cryptographic security is implemented during data access. After implementation of these security models the performance of the system is evaluated. In this paper the performance of the model is reported. The results show the model is efficient and able to prevent the data access for unauthorized access. In this paper, we also analyse the PDS system and compare them. We also mention the advantages and disadvantages of our proposed methodology.*

Keywords: *PDS (Public Distribution System), FPS (Fair Price Shop), RFID (Radio Frequency Card Reader), Transparency, Cryptographic Security*

1. INTRODUCTION

India's Public Distribution System (PDS)[1] with network of 4.78 Lakh Fair Price Shops (FPS) is perhaps the largest retail system in the world. Major problems due to this system are the inefficiency in the targeting of beneficiaries and the resulting leakage of subsidies. The TPDS system today supports over 40 crore Indians below the poverty line with monthly supply of subsidized food grains.

Public Distribution System (PDS) is an Indian [2] food security system. It is established by the Government of India under Ministry of Consumer Affairs, Food, and Public Distribution and managed jointly with state governments in India. The traditional PDS is used to distribute grocery items to India's poor who are valid ration card holders. The validity and the allocation of the ration cards is monitored by the state governments. A ration card holder should be given 35 kg of food grain as per the norms of PDS. However, there are concerns about the efficiency of the distribution process. In order to make it efficient and improve the current system of PDS we are implementing SMART RATION CARD. Here we are going to use a card similar to the swipe card or the credit card used for our shopping purpose. Using this card the card holder can get his/her grocery items from the Fair Price Shop's (FPS).The main reason for using this swipe card and making this process computerized is to remove the drawbacks of the present way of issuing products based on ration card. The main drawback in the current system is that

the PDS has been criticized for its urban bias and its failure to serve the poorer sections of the population effectively. The targeted PDS is costly and gives rise to much corruption in the process of extricating the poor from those who are less needy. Also many retail shopkeepers have large number of bogus cards to sell food grains in the open market. Many FPS dealers resort to malpractice since they acquire less salary. Most of the times Users do not get their rightful entitlement in terms of quantity. What's meant for them or the farm produce procured by the FPS's is diverted to the open market. So in order to avoid all these drawbacks we are going to use the Smart ration card which will help us to avoid the corruption in PDS if not eradicate it.

1.1 Overview: [3] The Public Distribution System (PDS) is introduced in India, it is more than half a century old system. It is used as a measure to distribute food grains to the consumers when prices were rising very high. Thus, rationing in times of crisis like famine was the historical precursor to the national policy of stabilization and management of food grains. Among the number of Price Control Conferences held during 1940-42, the sixth, held in September, 1942 laid down the basic principles of a Public Distribution System for India. The Food Department, set up in December, 1942, formulated an All India Basic Plan that dealt with issues such as procurement, contracts for purchasing agents, public Distribution , inspection and storage.

1.2 Public Distribution System: The Rationale:
The public distribution system as a social safety [4] net can be appreciated by the fact that aggregate availability of food grains per se is not enough to ensure the ability to acquire food grains. Production does not automatically guarantee consumption. The mere presence of food in the economy, or in the market, does not entitle a person to consume it. Even the ability to buy may not guarantee food security, unless there is an efficient distribution system. Colonial history of India also confirms that 'the major famines and scarcities occurred during a period when India was a food surplus country and was in fact exporting large quantities of food grains'. At the national level at least, famines in British India 'were not precipitated by absolute shortages of food caused by uncontrollable vagaries of nature. Historically, we find no one-to-one correspondence between per capita supply of food and deprivation of a section of Population in terms of food consumption.
The Public Distribution System (PDS) has remained a major instrument to execute the Government of India's economic policy to protect the poor. Public intervention in the food grains market aim at procurement of food grains for public distribution and maintenance of buffer stocks to give not only short-term but also long-term stability of prices of essential commodities and safeguard the interest of the consumers. Procurement of food grains also ensures remunerative returns to the farmers and provide them with incentives to invest more on agriculture to raise its productivity and to ensure that in the event of any glut or due to any other reason, the market prices do not fall below the support prices.
The purpose of the GOI since the early 1970s was to introduce the policy named as Minimum Support Prices (MSP) that was used to ensure that farmers should get good prices for their produce. The PDS aims at ensuring stability in the food grains market when open market prices of food grains fluctuate less because of steady availability in the hands of the government. This removes scarcity psychosis and checks speculative tendencies. The government view consumers under two categories to distribute food grains would be, Below Poverty Line (BPL) and Above Poverty Line (APL).

1.3 Analyze the functioning of PDS in India and bring out its limitations:
Ever Since the independence in 1947, one of the aims of Government of India has been to provide Food Security to all the citizens of India. Functioning of PDS encompasses following:
1) Procurement of Food Grains.
2) Identification of poor and needy.
3) Issue of ration cards to poor people.
4) Transportation of food grains to all Fair price shops.
5) Selling Food grains to all the needy people

1.3.1 Limitations of PDS:
The limitations of PDS are as follows:
1) Identification of poor by the states is not fool proof. A large number of poor and needy persons are left out and a lot of bogus cards are also issued.
2) Fair Price Shop owner gets bogus Ration cards and sell the food grains in the open market.
3) People do not get the entitled amount of food grains from the Fair price shop.
4) Low quality of food grains are distributed to the consumer by the owner.
5) Food grains are diverted by the owner and by the middle men.
6) Uneven distribution of Food generations, procurement and distribution. For example:
north eastern states are very far from Punjab and Haryana, from where wheat is procured. To transport food grains from

Punjab to far flung areas in North east will entail cost and time both.

1.3.2 Problems of functioning of ration shop:
1) Poor supervision
2) Lack of accountability
3) Some mortgage their ration card for money
4) Many shopkeepers are not authenticated to sell food grains in the market.
5) Many dealers resort to malpractice since they acquire less salary
6) Many BPL families are not able to acquire ration card either because they are seasonal migrant workers or because they live in the unauthorized colonies.
7) Spurring no of middle man who consume a good proportion of stock meant for poor production of coarse grains that are consumed by poor, to rice and wheat.

2. ADVANTAGES OF THE PUBLIC DISTRIBUTION SYSTEM

1. It has helped in stabilising food prices and making food available to consumers at affordable prices.
2. It has helped in avoiding hunger and famine by supplying food from surplus regions of the country to deficient regions.
3. The minimum support price policy and their procurement has contributed to increase in food grain production.
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3. DISADVANTAGES OF THE PUBLIC DISTRIBUTION SYSTEM

1. Instances of hunger occur despite granaries being full. These points to certain inefficiency in the system.
2. More storage of food grains often leads to wastage of food grains and their deterioration in quality.
3. The storage of food grains inculcates high carrying costs on the government.
4. The provision of minimum support price has encouraged farmers to divert land from production of coarse grains that are consumed by poor, to rice and wheat.

4. MOTIVATION

India is recognized by a long history of commercial and cultural wealth. India's political and economic history has led it to become one of the fastest developing countries in the world .Despite being a newly industrializing nation , India continues to face challenges of over population, poor water and sanitation and low adult literacy rate.

India is a country of villages and most of the Indian people are residing in village. Most of these peoples are depends on their farming or they are earning by daily basis. Therefore the economical differences in social points of view are found in very diverse manner. In order to compensate this difference, the government makes different levels of policies for improving the people's life style and their earnings. That is known as the subsidy for the end person. Subsidy is given to the needy people who are not able to buy food grains and fertilizers in actual prices to improve the economical differences.

On the other hand there are a number of issues and challenges are exist in distribution of these subsidized materials to the end user. Among them the corruption and illegal use of the available resources are the major hurdle of the new generation India. In this way the corrupted people, harm the rights of normal or common people. Therefore in order to maintain the transparency and privacy of end user the distribution of subsidized food grains is need to manage.

By the use of modern technology and innovation in the digital world we can develop a transparent system, through this we can reduce the misuse of resources and keep track of the transaction occur by the users in more transparent manner. That also helps to improve the accountability of resources and misuse of the available resources by better resource management and planning.

There are a number of techniques and technology exists that are used for improving the services produced by vendors to end clients. Additionally various privacy preserving and security models are also available by which the data generalization and securely distribution becomes feasible. But these techniques only used for aggregating the entire information into a common work place and reproduce the data to the same user as the data is requested. There are a number of social issues and a challenge exist by which a system is not properly becomes secure and transparent. But the need of work to produce the completely transparent, efficient and secure is motivate us to redesign a multiparty data in secure manner for producing the security and transparency both in same place.

5. COMPARISON OF EXISTING SYSTEM

Public Distribution System [5][6] of management of insufficiency and for distribution of food grains at affordable prices. Over the years, PDS has become an important part of Government's policy for management of food economy in the country. PDS is supplemental in nature and is not intended to make available the entire requirement of any of the commodities distributed under it to a household or a section of the society.

Since from the inter war period the public distribution of essential commodities had been in existence in India. PDS has its focus on distribution of food grains in urban scarcity areas, had emanated from the critical food shortages of 1960. PDS had substantially contributed to the containment of rise in food grains prices and ensured access of food to urban consumers. As the national agricultural production had grown in the aftermath of Green Revolution, the outreach of PDS was extended to tribal blocks and areas of high incidence of poverty in the 1970s and 1980s.

A.N. Madhur Shyam Nayse [7] "Automation in Rationing System using Arm 7" this system is based on radio frequency identification of customer. By entering the password we can access the system with this allocated RFID card.

First user is authenticated, and then system shows the balance of person. If he has enough of balance in his account he will get his allotted amount through the valve and after that valve get closed and remaining balance of his food grain is updated in the system database.

Rajesh C. Pingle, P. B. Borole "Automatic Rationing for Public Distribution System using RFID and GSM Module to Prevent Irregularities", In this automated system conventional ration card is replaced by smartcard in which all the details about users are provided including their AADHAR number which is used for user authentication.

It uses interface smart card to microcontroller and PC RS232.Government by using such system control and monitor all the distribution of food grain in the ration shop.

Hence it is possible to prevent the corruption and irregularities at ration shop. This would bring the transparency in public distribution system and there will be a direct communication between people and Government through this.

S.Valarmathy, R.Ramani "Automatic Ration Material Distributions Based on GSM and RFID Technology", proposed to use RFID and GSM technology based Ration cards by showing the RFID tag into the RFID reader. Microcontroller is used for executing the process in this system.

K.Balakarthik ,"[8] Cloud-Based Ration Card System using RFID and GSM Technology", Presents an efficient method for the user to buy the products in the ration shop by just flashing the card at the RFID reader at the ration store.

The developed system using Radio Frequency Identification and GSM technology will significantly improve the current manual process of ration card system and will reduce the security issues and malpractices.

Dhanojmohan , Rathikarani , Gopukumar" , Automation in ration shop using PLC'', it proposed a method for distribution of food grain using embedded PLC. Further updation to the government database is not needed.

6. ADVANTAGES OF PROPOSED MODEL

Advantages of proposed system are as follows:

1. It provide transparency to the system as the online processes and work flow of the organization improve the quality of the investigation, lack of resources, and issues in the organizational processes. Hence all users are on the same platform so they retrieve same data and submit their information at the same place.
2. 2. By implementing privacy preserving technology in the proposed system, it gives us the privacy for role based access to the system i.e. end user, distributor and governmental offices.
3. 3. It becomes very easy to handle all the records of the transactions held in the ration shop between end users and distributor, distributor and government and vice versa as all records made available online and only top level government can access it, any person from the registered people can access it and reduces conflicts.
4. 4. This system is more efficient as all resources and transactions become transparent.
5. 5. Management of resources and transaction becomes more easy and feasible.
6. 6. It solves many social conflicts i.e. illegal usage, over population, smuggling of food by providing transparency in the distribution of the food grain.

7. RESULT ANALYSIS

After implementing security and transparency in the model, we evaluate the performance of the proposed methodology. Performance of the proposed methodology are as stated:

Table 1: Performance parameters of the proposed methodology

S. No.	Parameters	Description
1.	Response time	Due to single cryptographic function is used for security and access control thus the computational overhead of the system is less as compared to traditional models
2.	Encryption time	The less encryption time is required with high secure cipher using the hybrid cryptographic approach
3.	Decryption time	The decryption time is less as compared to the encryption time additionally able to recover the data efficiently
4.	Memory usages	The amount of memory consumption in both the cases during encryption and decryption is remain constant and not much fluctuating with the data and experiments

8. CONCLUSION

Public Distribution System (PDS) is an Indian [2]food security system. It is established by the Government of India under Ministry of Consumer Affairs, Food, and Public Distribution and managed jointly with state governments in India. The traditional PDS is used to distribute grocery items to India's poor who are valid ration card holders. The validity and the allocation of the ration cards is monitored by the state governments.

The key aim of the proposed method is to accomplish a data model for security and improving the access control in public oriented data bases. Therefore as a case study the governmental organization and their subsidized food and fertilizers distribution centre's are aimed for investigation and model design. The entire system is needed not only to include the privacy and security that also needs to improve the transparency. Therefore the work includes preserving and releasing the different information according to the user access levels. The entire process includes three different users namely end user (looking for

service), distributor (public service distributor) and the governmental organization (accountable for public).

In order to develop and design such an effective PDS model the proposed technique includes the cryptographic data access architecture to prevent unauthorized access of data. Therefore to demonstrate the effectiveness of system design the entire work flow and the functional model is reported in this work. In this modeling the end user's information is preserved to access by the distributor and in next phase the entire information is released for public accountability through the governmental organization.

The implementation of the given technique is provided using the JAVA development environment and to justify the solution a traditional system is compared with the obtained performance. According to the obtained results the proposed data model shows efficient data control and distribution. Thus the proposed system is more adoptable and easy to implement with any kind of access control models. In near future the proposed work is extended for providing the other domains of security and access control. Additionally the given solution can also extend by the generalization for more than tree access levels.

9. FUTURE WORK

The proposed work for secure, transparent, efficient, and privacy preserving technique is implemented successfully. The given technique only considers the issues of the public distribution and resource management. Additionally the focuses are made on providing the security and transparency during data storage and access during the different levels of users. The given technique is efficient and secure for different purpose of use and that can be extended for the following area of applications.

1. The proposed system only enabled for the web based usages of the system that can also be enhanced by the electronic card based distribution model.
2. The proposed technique is only incorporated the three access roles for the system that can also be extended for the multi-user and multiple user access management.

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