AUOMATIC STORAGE MANAGEMENT FOR EMPLOYEES IN INDIAN FACTORIES USING PASSIVE RFID AND CLOUD COMPUTING

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Abstract- This paper focuses on the method with the help of which the information about the employee in the factory can be accessed electronically using radio frequency identification (RFID) technology. The proposed RFID system uses tags which are embedded in wristband through which info embedded on the tags are read by RFID readers. Data information is easily exchanged between the employee and authorized person of the factory. In the proposed system the cloud computing is attached to the RFID architecture to handle scalable RFID system.

Keywords- RFID, The Cloud, Scalable, Tag, Reader.

I. INTRODUCTION

RFID (Radio Frequency Identifier) is an automatic identification technology which was developed in early 1900's. According to the current situations our daily lifestyle is highly influenced by RFID. The tag which is the most important part of RFID can be attached to the cloths even it can be penetrated inside the skin. When we want to track any object RFID is the excellent choice. This technology offers number of features which are having more advantages as compared to other automatic identification technologies. Since every coin has two sides, this automatic technology is also having advantages as well as disadvantages. Before actually looking into the issues present in RFID we will understand the technology in detail into the subsequent paragraphs.
RFID is a wireless technology which makes the use of electromagnetic waves to transfer the data and with the help of which it identifies or tracks the objects. There are four main components in RFID. These components are tags, antenna, and reader and host computer. Tag is the device which consists of an electronic circuit and integrated antenna .It also consists portable memory. It makes use radio waves to transfer the data between the tag and the antenna. This tag is attached to the object which has to be tracked. The second component is antenna, it transmits as well as receives the electromagnetic waves. Antenna is the component which is present inside the tag as well as inside the reader. The reader communicates with the tag with the help of antenna which is present inside the reader. It interprets radio signals into digital information. The reader is the intermediator between the tag and the database which is present in the host computer. The last component is the host computer which consists of the database. This database stores the details about the tags. So it stores as well as evaluates the data obtained from the tags.

There are mainly two types of tags 1) active tag 2) passive tag. Active tag has it's on board battery which broadcasts the signals and achieves the communication with the reader. Passive tag does not have its own battery. Passive tag gets activated when it comes in contact with the reader because antenna which is present inside the reader broadcasts the signal .There are some advantages of passive tags: 1) the life of the passive is more as compared to the active tag because it does not consist of battery. 2) The passive tag is less expensive 3) the tag is small in size. The active tag is used when the distance between the tag and the reader is more. Because of the above advantages and in our application the distance between the tag and the reader is less than 10 centimetre we will make use of passive tags in the proposed application. Radio Frequency Identifier technology has to be viewed from the frequency perspective. The frequency can be classified according to distance of the signal, range of the signal, tag to the reader and reader to the tag. There are different frequency brands such as Low Frequency (LF), High Frequency (HF), Ultra High Frequency (UHF) and Microwave. Frequency that is from reader to tag is signal frequency or multi frequency. Tag to reader frequency is an-harmonic frequency, harmonic frequency or sub harmonic frequency. One more component is very important in RFID which is middleware .The middleware can be either single tier or multi-tier or it can be either located on the reader or the server.

The cloud computing is the terminology which refers to the computational resources which are available according to the user's demand over network. The term network in the cloud computing is called the cloud. With the help of cloud computing user can access computer resources as well as any other information from any location where the internet connection is available. Resources such as data

storage space, network, processing power for the computer can be shared with the help of cloud computing. Rapid elasticity, broad network access, measured services, on demand services and rapid elasticity are some main characteristics of the cloud computing. Because of the characteristic on demand self-service, computing resources are made available to the user according his demand. With the help of broad network access characteristic computing resources or services are made available over the private network or the internet. The main benefit of the cloud computing users can make use of services according to his need and he is charged according to his usage. Following service models are supported by the cloud computing: 1) Software as a service 2) platform as a service 3) infrastructure as a service. Software as a service is also called as application as a service. It consists of the process with the help of application is delivered to the user with the platform of the web. Platform as a service is the complete platform. It include the platform which includes development of the application, development of the interface, testing and storage are delivered to the subscriber through platform which is remotely hosted. With the help of infrastructure as service computational resources such as disk space, servers and storage are available on demand. With the help of IaaS users can deploy the software on virtual servers.

II. ISSUES IN RFID TECHNOLOGY

RFID technology is adopted worldwide but the technology has some issues. These issues are hampering the growth of the technology. These issues are as follows:
1) Computational capacity of RFID tags is limited.
2) Collision takes place when multiple tags try to communicate with the reader at the same time.

1) Computational capacity of RFID tags is limited:
RFID tags are dependent on the reader for the power, electromagnetic energy on the reader. RFID system generate huge amount of the data and this data has to be mined before usage. Thus even if the computational capacity of the RFID tag is improved the system will generate huge amount of the data and its storage is the other problem.

2) Collision takes place when multiple tags try to communicate with the reader at the same time:
This is one of the major problems in RFID system. The solution for this problem is anti-collision protocols. With the help of these protocols we can avoid collision among tags. Once the collision is avoided all the tags can be identified at the fast rate. Fast identification means more number of tags are recognized same unit of time. It results into more production of the data.
All the above portrayed scenarios point only one concern in RFID systems that is scalability. If RFID system wants to perform more computations then more data has to be handled efficiently. In the circumferences of RFID technology, when the single reader can identify number of tags and if it is able to communicate with them successfully then it results into scalable RFID. To handle scalable RFID it is required to revise the architecture of RFID system.

III. SOLUTION TO THE PROBLEM

To avoid the problems in RFID system we can attach mechanism called as cloud computing to the existing RFID architecture. This architecture consists of the front end and the back end. The front end consists RFID tags, RFID readers (RFID tags and readers are networked), computers which are having capacity of data storage and processing, application which is having capability to access cloud computing. The front end of the system starts working when tags and the readers come in contact with each other. Generation of the data takes place when the multiple tags come under the interrogation zone of the reader. The data which is read by the reader is sent to the system which is designed for processing the data. This data processing system consists of user interfaces and application which helps to access the cloud computing system. Huge amount of the data which is collected in RFID system will be filtered, stored and semantically deduced before the usage. The backend of the system consists of computers, systems for the data storage, servers, and different applications. These components are required so that services such as Software as a Service, Infrastructure As A Service and Platform As A Service can be offered on the cloud.

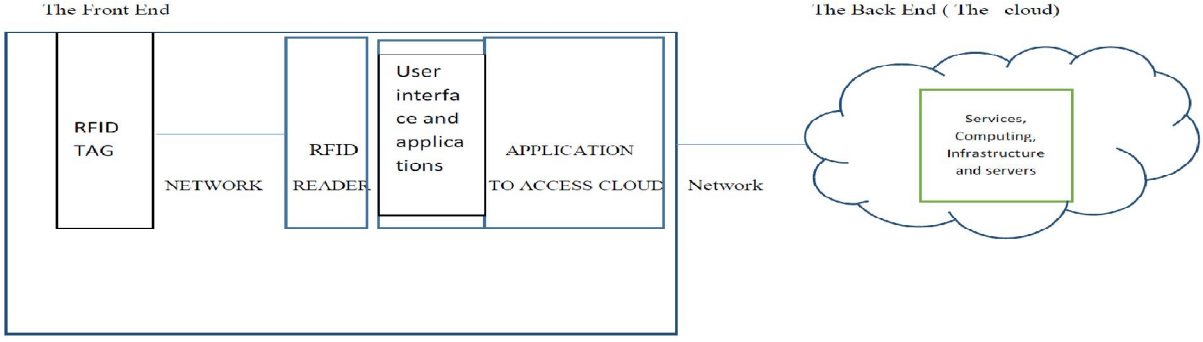

Fig. 1. RFID Architecture with the Cloud Computing

Existing system: In the Indian food factories employees have to follow the following procedure before starting their work. This procedure helps them to achieve safety of food. In factory one locker is maintained for each employee. As soon an employee enters into the factory he has to change his clothes and shoes. He will open his locker with the help of key. In that locker his new cloths (uniform he is supposed to wear while working) and shoes are kept. He has to change his existing cloths with dress code and has to wear shoes. In this case user has to keep his clothes and shoes inside the locker and go for his work..At the end of the day while leaving employee has to keep his dress code and shoes back in the locker. One more key of each locker is maintained by the laundry man. He has to take care of bundle of keys of all the lockers. There are some drawbacks in the existing system. Employee has to take care of his key; if it is lost then employee cannot open his locker and cannot enter into the factory until the new key is made. If any employee has left the job then factory authorities have to change the entire lock and that is quite expensive. These drawbacks can be avoided with the help of wireless technology called as RFID i.e. Radio Frequency Identifier. With the help of RFID technology we can automate locker system.

IV. PROPOSED SYSTEM

In the proposed system four lockers are maintained for each employee. Radio Frequency Identifier consists of components such as tag, reader, antenna and the database which is maintained in the host computer .In this case employee's details are maintained in the database with the help of following attributes such as employee identifier, employee name, locker_id1, locker_id2, locker_id3 and locker_id4. Each employee is provided with the tag which consists of unique tag id. Unique tag identifier is maintained as employee identifier. This tag is attached inside the employee's ID card. RFID reader is mounted on the door of the locker. Each reader has unique identifier and which is maintained as locker_id .In the data base employee's id is maintained along with identifiers of lockers which are assigned to that employee. In the proposed system first locker consists of eight compartments and thus it can be shared by eight employees. This locker's identifier is assigned to any eight employees and this data is maintained in the database about the employees' information. Second locker is the locker designed uniquely for each employee. One reader is mounted on the door of this locker and its reader identifier is maintained as locker_id2 for the employee. This locker cannot be shared among employees. Third locker has two compartments and it can be shared by two employees. Similarly like other lockers here also one reader is mounted on the door of the locker and it's reader identifier is maintained as locker_id 3 and it is shared among two employees. The last locker consists of eight compartments and thus shared by eight employees like first locker. Like other lockers one reader is mounted on the door of the locker and its reader's identifier is maintained as locker_id4.

V. FLOW OF PROCEDURE:

Employee enters into the factory along with his identity card .Initially he has to go the first locker. The reader mounted on the door of the locker reads the tag which is attached to the identity card of the employee. The reader reads tag identifier. The communication between the reader and the tag takes place with the help of electromagnetic waves. The reader sends this tag identifier to the host computer where the database of employee's information is stored. Help The reader extracts all the details about the employee from the database with the help of tag identifier. These details are in the form of employee-id (which is similar to the tag ID), employee name, locker_id1, locker_id2, locker_id3 and locker_id4. The reader compares it's identifier with locker_id1 and if it matches then the door of the locker will be opened. In this locker where eight compartments are there, employee can keep his shoes. Next he will go to the next lockers i.e. locker2 and locker3.Locker 3 is shared by two employees. In his locker employee's uniform is kept. One reader is mounted on the door of this locker i.e. locker3 it again fetches the details from the host computer and checks whether its identifier is matching with locker_id3 and if it matches then the door of the locker3 will be opened. From this locker employee can take his uniform and change his dress and keep his old dress inside the locker2. There is one more locker called as locker4. That locker is shared by eight employees. This locker also functions in similar way like the first locker only the difference is here the locker_id4 is compared with the tag's identifier of the locker. If it is matched then the door will be opened. In this locker the employee will get his shoes which he is supposed to wear in the factory. In this way he can enter inside the factory. Since the number of employees can be more, thus the reader can read more number of tags per unit of time and more data will be collected per unit of time. It leads to the scalable RFID system. To handle scalable RFID system we can attach the cloud computing technology to the RFID system.



Fig 2. Architecture of the Locker System.



Fig3. Locker Version

CONCLUSION

With the help of proposed system we can achieve electronic employee tracking using RFID. When the huge amount of data is collected by RFID reader it results into scalable RFID system. To manage the scalable RFID system cloud computing can be attached to the existing RFID architecture.

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