International Journal of Advance Engineering and Research Development

DIGITALIZING THE BILLING SYSTEM USING NEAR FIELD COMMUNICATION

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Abstract — *We performed assessment and observed that our billing system that we use today is pretty old and conventional. So we are going to change the billing system and mine data for users to get their loans approved. The main objective is to decrease the billing time and make a centralized system to store bills and that could be used by the banks to approve loans. We would be using android phones for both customers and users and will be building our API(REST) in ruby on rails. The android phones will be NFC(Near Field Communication) enabled which is a radio technology used for communication over small distances. The main advantage of our system that is a central system to store bills, no need to take care of those old paper bills for future references. As we using latest technologies to replace the paper billing system that will surely decrease the billing time and make the billing fast and e client. As we are having central database for all the users so we will be mining their monthly expenses that can be used by the banks to approve their loans.*

Keywords- Hypervisor; docker; API; Swarm; Virtual Machine
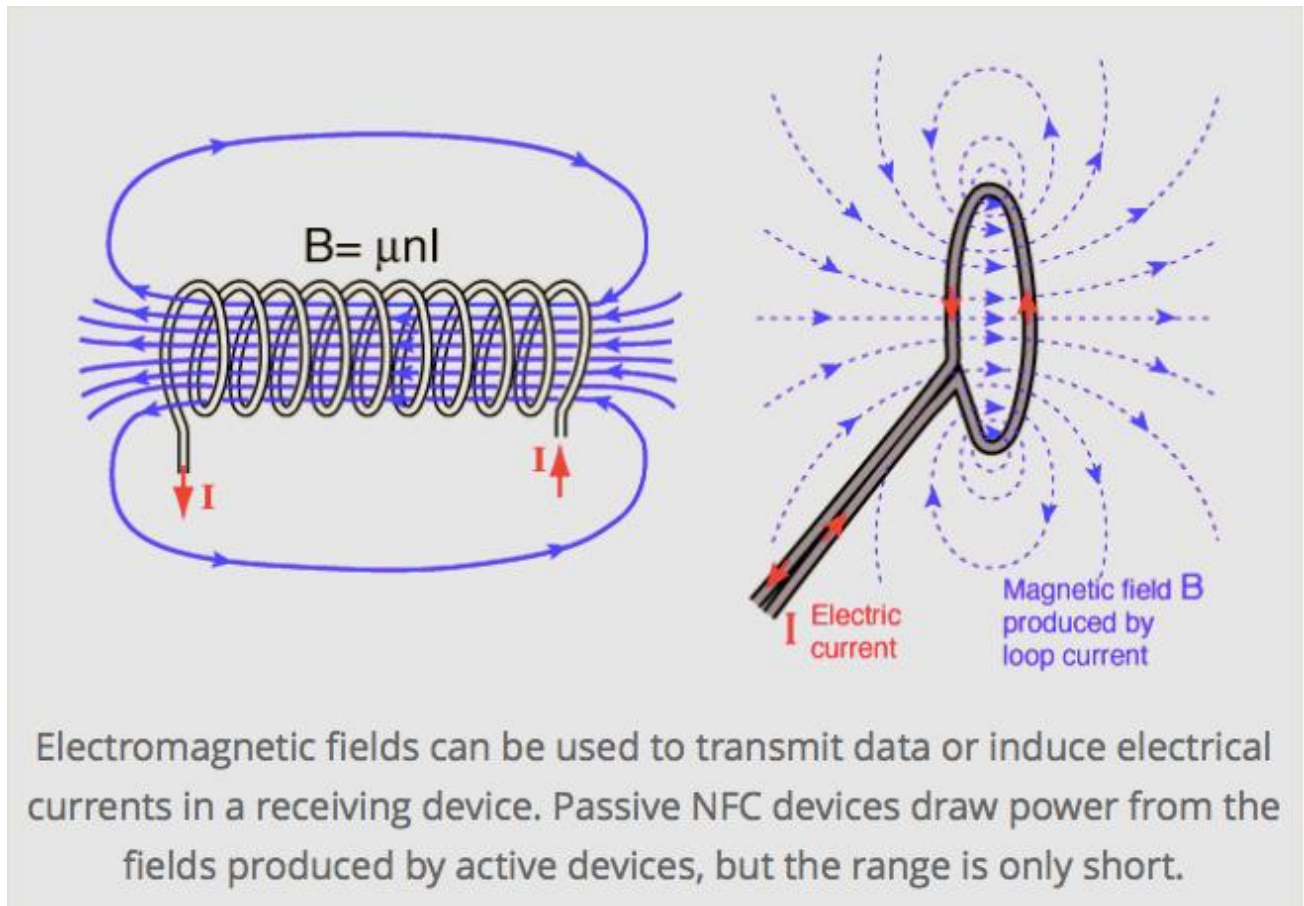
I.   INTRODUCTION (PROBLEM DEFINITION)

A centralized system for storing different types of bills is going to be developed. Here solution would include Fast billing system, Easy loans, Bills Security, Calculation of monthly expenditure and environmental problems like paper usage reduction. This application can be further extended when someone wants a loan from Bank . Bank can go through this system to analyze his overall summary of bills where and how much his expenditure is and based on this detail and salary detail provided by himself points will be assigned to him with respect to all the other people who also applied for loan. The bank will find out average points of all those people. If your point assigned is more than average point then loan will be sanctioned to you

LITERATURE SURVEY

2.1. What is NFC (Near Field Communication)

Near field communication (NFC) literally means radio communication over short distances, but has come to be used in most cases for a specific set of protocols that enable two electronic devices, one of which is usually a portable device such as a smartphone, to establish radio data communication with each other by bringing them closer than, typically, 10 cm (4 in) from each other. NFC tags are passive data stores which can be read, and under some circumstances written to, by an NFC device. They typically contain data (as of 2015 between 96 and 8,192 bytes) and are read-only in normal use, but may be rewritable. Applications include secure personal data storage (example. debit or credit card information, loyalty program data, Personal Identification Numbers (PINs), contacts). NFC tags can be custom-encoded by their manufacturers or use the industry specifications provided by the NFC Forum, an association with more than 160 members founded in 2004 by Nokia, Philips Semiconductors (which became NXP Semiconductors in 2006) and Sony were charged with promoting the technology and setting key standards, which includes the definition of four distinct types of tags that provide different communication speeds and capabilities in terms of flexibility, memory, security, data retention and write endurance. The Forum also promotes NFC and certifies device compliance. There can be secure communications by applying encryption algorithm as it is done for Credit Card and if it fits the criteria for being considered a personal area network.

2.2. How NFC works

The transmission frequency for data across NFC is 13.56 megahertz, and data can be sent at either 106, 212 or 424 kilobits per second, which is quick enough for a range of data transfers from contact details to swapping pictures and music. In order to determine what sort of information is to be exchanged between devices, the NFC standard currently has three distinct modes of operation for compliant devices. Perhaps the most common use in smartphones is the peer-to-peer mode, which allows two NFC-enabled devices to exchange various pieces of information between each other. In this mode both devices switch between active, when sending data, and passive states when receiving. Read/write mode, on the other hand, is a one way data transmission, where the active device, possibly your smartphone, links up with another device in order to read information from it. This is the mode used when you interact with an NFC advert tag.

$$B = \mu nI$$

Electromagnetic fields can be used to transmit data or induce electrical currents in a receiving device. Passive NFC devices draw power from the fields produced by active devices, but the range is only short.

"*Figure 1. NFC working*
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2.3. How NFC is different from Bluetooth

The major argument in favor of NFC is that it has much lower power consumption than Bluetooth, even lower than the new Bluetooth 4.0 (aka Bluetooth low energy). This makes NFC perfect for passive devices, such as the advertising tags that we mentioned earlier, as they can operate without the need for a major power source. However, this power saving does have some major drawbacks. Most noticeably that the range of transmission is much shorter than Bluetooth. While NFC has a range of around 10cm, just a few inches, Bluetooth connections can transmit data up to 10 meters or more from the source. Another drawback is that NFC is quite a bit slower than Bluetooth, transmitting data at a maximum speed of just 424 kbit/s, compared with 2.1 Mbit/s with Bluetooth 2.1 or around 1 Mbit/s with Bluetooth Low Energy. But NFC does have one advantage when it comes to speed, faster connectivity. Due to the use of inductive coupling, and the absence of manual pairing, it takes less than one tenth of a second to establish a connection between two devices, a speed which has only recently been matched by Bluetooth 4.0.
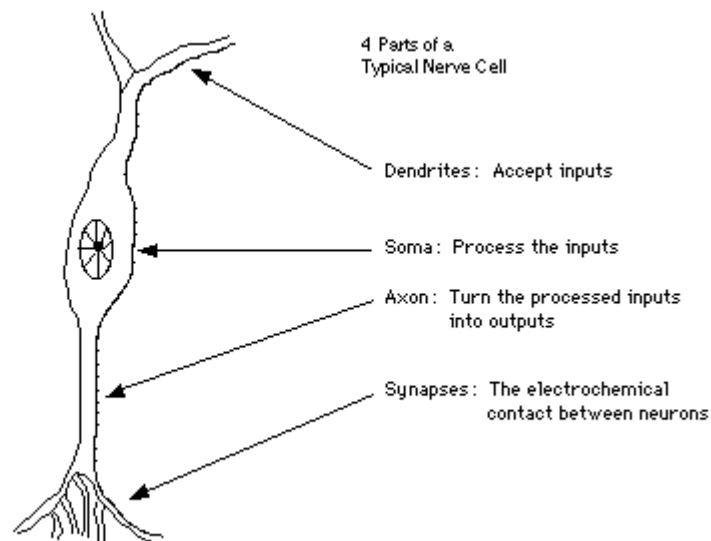
2.4. Artificial Neural Network

In machine learning and cognitive science, artificial neural networks (ANNs) are a family of models inspired by biological neural networks (the central nervous systems of animals, in particular the brain) and are used to estimate or approximate functions that can depend on a large number of inputs and are generally unknown. Artificial neural networks are generally presented as systems of interconnected "neurons" which exchange messages between each other. The connections have numeric weights that can be tuned based on experience, making neural nets adaptive to inputs and capable of learning. The exact workings of the human brain are still a mystery. Yet, some aspects of this amazing processor are known. In particular, the most basic element of the human brain is a specific type of cell which, unlike the rest of the body, doesn't appear to regenerate. Because this type of cell is the only part of the body that isn't slowly replaced, it is assumed that these cells are what provides us with our abilities to remember, think, and apply previous experiences to our every action. These cells, all 100 billion of them, are known as neurons. Each of these neurons can connect with up to 200,000 other neurons, although 1,000 to 10,000 is typical.

2.4.1. Human Brain Working

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artificial neural networks. These artificial neural networks try to replicate only the most basic elements of this complicated, versatile, and powerful organism. They do it in a primitive way. But for the software engineer who is trying to solve problems, neural computing was never about replicating human brains. It is about machines and a new way to solve problems.

"*Figure 2. A Simple Neuron*
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2.5. ARTIFICIAL NEURONS AND HOW THEY WORK

Within humans there are many variations on this basic type of neuron, further complicating man's attempts at electrically replicating the process of thinking. Yet, all natural neurons have the same four basic components. These components are known by their biological names - dendrites, soma, axon, and synapses. Dendrites are hair-like extensions of the soma which act like input channels. These input channels receive their input through the synapses of other neurons. The soma then processes these incoming signals over time. The soma then turns that processed value into an output which is sent out to other neurons through the axon and the synapses. Recent experimental data has provided further evidence that biological neurons are structurally more complex than the simplistic explanation above. They are significantly more complex than the existing artificial neurons that are built into today's artificial neural networks. As biology provides a better understanding of neurons, and as technology advances, network designers can continue to improve their systems by building upon man's understanding of the biological brain.

III. ACKNOWLEDGMENT

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