GPRS and Bluetooth Based Devices/Mobile Connectivity Shifting From Manual To Automation For Performance Optimization

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Abstract

Many companies/organizations are trying to move towards automation and provide their workers with the internet facility on their mobile in order to carry out their routine tasks to save time and resources. The proposed system is based on GPRS technology aims to provide a solution to problem faced in carryout routine tasks considering mobility. The system is designed in a way that facilitates Workers/field staff get updates on their mobile phone regarding tasks at hand. This System is beneficial in a sense that it saves resources in term of time, human resources and cuts down the paper work. The proposed system has been developed in view of research study conducted in the software development and telecom industry and provides a high end solution to the customers/fieldworkers that use GPRS technology for transactions updates of databases.

Keywords: *GPRS (General Packet Radio Service), GSM (Global System for Mobile communication), UMTS (universal Mobile Telecommunications System), HACS (SMS Based Wireless Home Appliance Control System), HTTP (hypertext transfer protocol), FTP (File Transfer Protocol), TCP/IP (Transmission Control Protocol / Internet Protocol)*

1. Introduction

Organizations are moving towards automation. With the growing need of gadget, mobility becomes the integral part of people's life [1] and now they are becoming more dependent on the mobility. They need solutions that are low in cost, high in speed, high in performances, saves human resources, increase the organization revenue and net profit, facilitate the customers, cut down the paper work etc. After analysis a system is proposed that provide the solution of the problem faced by the organizations, organization employees and customer. Following the results of research survey conducted proposed system is divided into two parts; "Server Side" [2] and "Client Side" [3]. Both Applications are connected to central database. Client side application is basically designed for mobile devices/phones and is connected to central database via GPRS [4]. "Client Side" application is used by field staff/workers, first they login then they are able to view the customer information and invoices in the database via GPRS connectivity, and are able to save the status of the customer in the database after delivering the product. "Server Side" application is especially for the administration side (the organization providing mobile data services) and is used by the employees who first login and then view, add, update, and delete the records.

The remaining part of this paper is divided into sections. In section II the reviewed literature is described, in sections III methodology is described in detail with frame work and mathematical model elaborated, in section VI implementation is described, in section V research analysis results and experimental results are illustrated and in last section conclusion and future work is summarized.

2. Literature Review

GPRS Mobile Phones - An Overview for Test Professionals [5], this paper focuses on the difference between GPRS and GSM, how GPRS operates and how GPRS is tested. GPRS (General Packet Radio Service) is widely growing technology that facilitates mobile users to transfer information in packets.

SMS Based Wireless Home Appliance Control System (HACS) for Automating Appliances and Security [6] remotely control the home appliances and also to provide the security to user when user is away from home and wireless technology has its impact on the living standards. This system provides solution for those problems which is faced by the home owner regarding security in their daily life. This system uses the GSM technology to access the appliance control and system for security.

The motivation behind design the system is to facilitate the user to automate their homes with a low cost system. Data Transfer Over GPRS: Palm OS [7], Transfer of files from a device to a pc (server) can be done in different way: like HTTP, FTP and TCP/IP. In these entire cases one thing that remains same is the channel that is the "Cellular Network". Things are bit different while sending data files across to the server, when we are using the cellular network. Software architecture should is considered very important when designing application depending on the GPRS.

Growth in the cellular telephony has increased demand for the wireless data services. There are many standards like 3G (3rd generation) UMTS (universal Mobile Telecommunications System) mobile networks but these are still away from the wide-scale development. In the meantime, the extension of GPRS (General Packet Radio Services) to current 2G GSM networks provides a widely deployed solution for data access. In the wired internet TCP is the dominant protocol and is very important for the mobile users too.

"Implementation of Telecontrol Applications over GPRS Networks" [8], depicts how GPRS technology has reached sufficient levels of development and reliability. GPRS can be applied in technological applications, either as a backup for private communications channels or as a main communications technology. It also tells how GPRS Applications work over network**.**

3. Methodology

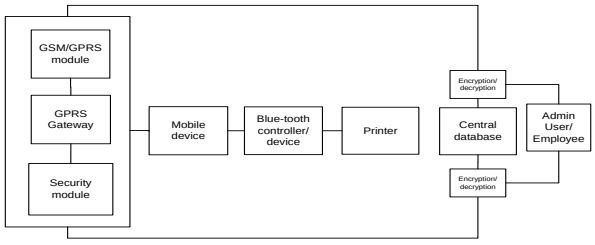

Figure 1: Frame work

The working of the system model given in fig1 is as follow:

Mobile Device (Bluetooth enabled): the mobile user wants to see the invoices of the customer. User first connects to the central database via GPRS and then user provides the login information. After successful login user will be able to view the invoices.

GPRS module: GPRS module provides the connectivity to the central database.

Central database: mobile user connects to the central database via GPRS module and Admin user/Employee connects to central database without using GPRS module.

Encryption/Decryption module: Encryption technique Caesar Cipher is used in order to provide the database security [9] [10].

Admin user/Employee: employee wants to insert, update and delete the records. Employee first connects to the central database and provides login information. After successful login employee can perform insertion, updating and deletion of records.

Bluetooth connectivity: mobile user print invoice by Bluetooth printer using Bluetooth connectivity.

Table 1: List of Factors

Symbols	Description
MU	Mobile user/Staff member/Worker
G	GPRS
Ec/Dc	Encryption/Decryption
S	Server
DB	Database
B	Bluetooth
P	Printer
R	Record
I	Insert
U	Update
D	Delete
PO	Place Order
C	Customer

E	Employee
Sv	Save
Ci	Customer Information
V	View
Aut	Authenticate
Linfo	Login Information
OI	Order Information
Ent	Enter
St	Save status in database
Pinv	Print invoice
Pdev	Deliver product

A. Client Side

Var1=C(PO) ———————— **(i)**

Var2=OI ———————— **(ii)**

Var3=E(Ent(Linfo)) ———————— **(iii)**

Var4= Aut(E(Ent(Linfo))) ———————— **(iv)**

Var5= MU(Ent(Linfo)) ———————— **(v)**

Var6=Aut(MU(Ent(Linfo)))

Var7=MU(V(Dc(Sv(Ci)))) ———————— **(vi)**

Var8=MU(V(Dc(E(Sv(Ec(OI)))))) ———————— **(vii)**

Var9=MU(Pdev) ———————— **(viii)**

Var10= MU(Sv(Ec(St))) ———————— **(ix)**

Var11=MU(Pinv) ———————— **(x)**

B. Server Side

Var1=E(Ent(Linfo)) ———————— **(i)**

Var2=Aut(E(Ent(Linfo))) ———————— **(ii)**

Var3=DB(Sv(Ec(E(I(R))))) ———————— **(iii)**

Var4=DB(Sv(Ec(E(U(R))))) ———————— **(iv)**

Var5=E(D(R)) ———————— **(v)**

4. Implementation

4.1 Characteristics of System

The system allow mobile user to remotely connect to the database in order to retrieve and enter the information, system security is provided by using the encryption/decryption at both ends (client side and server side).

4.2 Strengths of System

The proposed system has many advantages:

- Remotely access the database
- GPRS technology is used to provide connectivity to the central database
- The system is of low cost; provide high speed, cut down the paper works, saves on human resources.
- Easiness to the workers to carry out their tasks quickly and efficiently.
- Works gets tasks on their mobiles devices via GPRS, no need to go to offices in order to get their tasks.
- Workers get connected to central database via GPRS and can retrieve, update, save information directly in to database
- Data transactions are secured because encryption/decryption is applied at both ends (client side/server sides).

5. Results

Research is divided into two phases

5.1 Research Analysis Results
5.2 Experimental Results

5.1 Research Analysis Results

The research survey is divided into three sections i) Mobile applications in Organization ii) GPRS iii) Databases Sample size is 30 and the results of research are shown in graphs represented by Figure 2, Figure 3 and Figure 4.

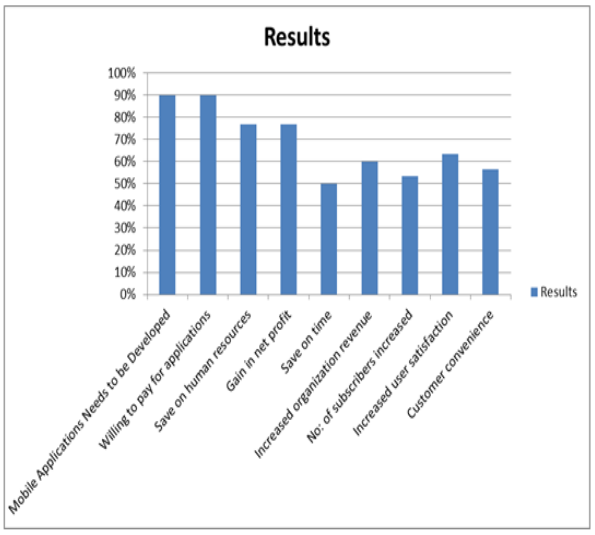

Figure 2: Importance of mobile applications

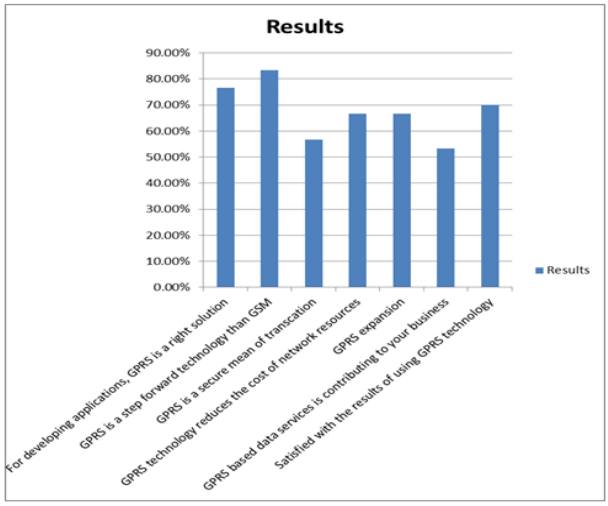

Figure 3: GPRS implementation

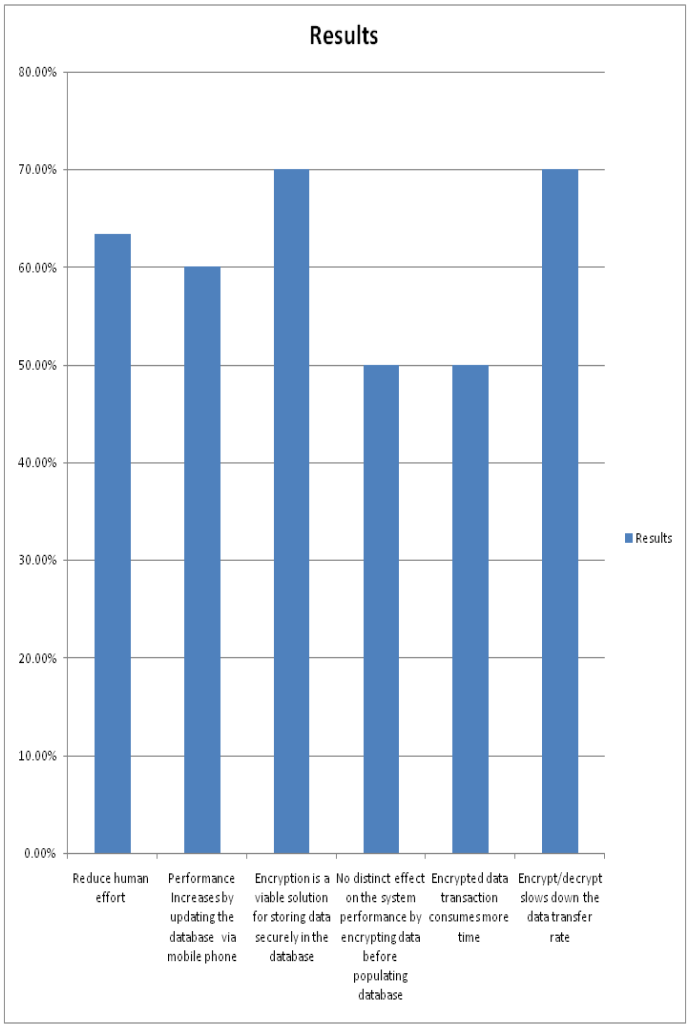

Figure 4: Databases

5.2 Experimental Results

5.1 Memory usage without encryption

\\PERSONAL-PC	
Memory	
% Committed Bytes In Use	32.118
Available MBytes	1,059.000
Cache Faults/sec	0.000

5.2 Memory usage with encryption

\\PERSONAL-PC	
Memory	
% Committed Bytes In Use	32.537
Available MBytes	1,040.000
Cache Faults/sec	0.000

5.3 Processor time without encryption

The fig 5 shows the processor time without encryption.

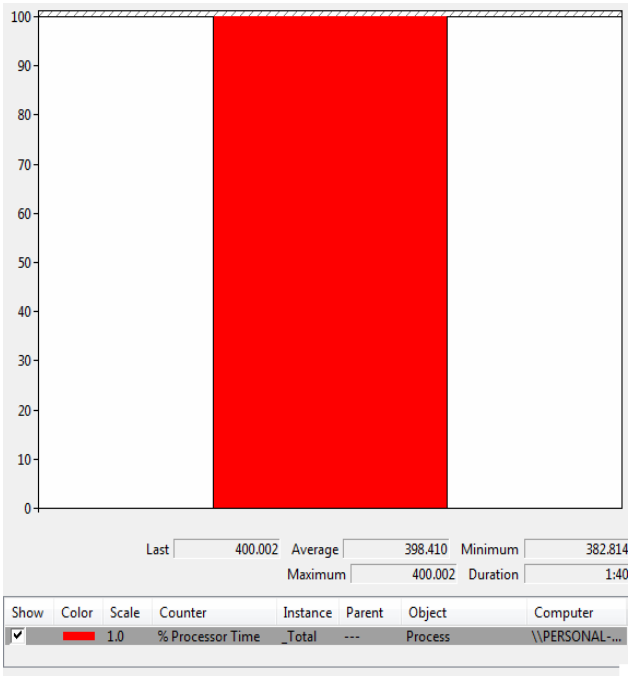

Figure 5: Processor time without encryption

5.4 Processor time with encryption

The fig 6 shows the processor time with encryption.

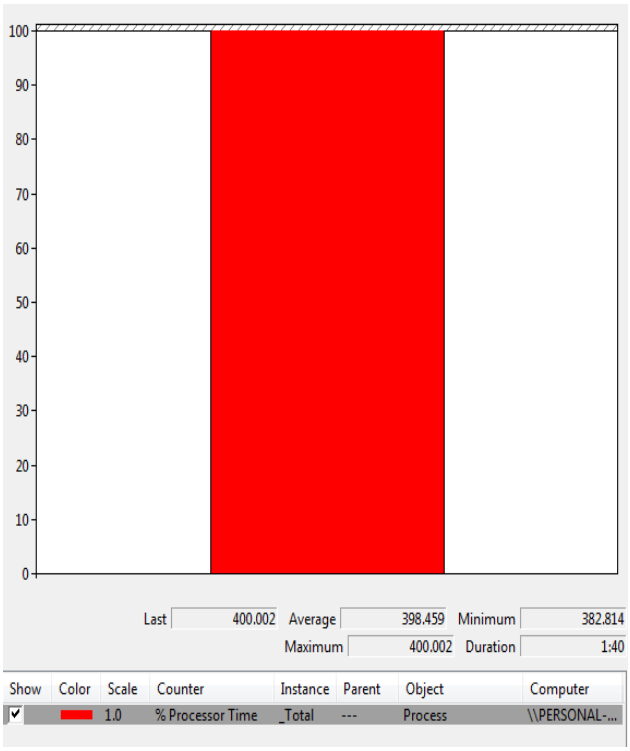

Figure 6: Processor time with encryption

5.5 Constraints of System

- **Mobile application(Client-Side) failed**
  Mobile user must have backup of client-side application in any case of failure of application that is installed on his mobile device.
- **GPRS not available in some areas**
  If worker is in that area where GPRS services are not available then he can save or update the data in the database that is locally available in his mobile device.
- **Mobile devices corrupted/not properly working**
  In any case if mobile devices get corrupted/not working properly then worker should have an extra mobile device with the feature of GPRS and Bluetooth

6. Conclusion and future work

Organizations can easily move towards automations,saves on human resources, increase net profit,saves on extra effort by using this proposed system and survey results shows that organizations are willing to pay for such proposed system/applications.For developing applications GPRS is the right solution and survey results also shows that people are satisfied with the results of this technology as it is a step forward technology then GSM and it provides secure mean for data transaction and also saves on network resources.As our proposed system is divided in to two application one is Client side application and other is server side application and both are connected with the central database.Survey results shows that use of databases cut down the paper work, increases performance by updating the databases via mobile phones rather than manually entering the data, encryption data before storing in the database is a viable solution for sceuring data.
Experimental results shows that there is a negligeable effect on the memory when using encryption/decryption and processor time with and without encryption/decryption is almost same.

Anyone can use different technology to implement the system other than GPRS. Secondly, anyone can use the same technology but can use different method to connect to the central database as here IP address in the URL is given to connect to the central database. Third, anyone can add the additional functionality that after delivering product can print the invoice through the Bluetooth mobile/devices by using the Bluetooth printer. Fourth, If GPRS service is not available in an area then the mobile user is provided with some mechanism that he save records locally in the database that is available in his mobile and when GPRS facility is available then he sinks the local

database with the central database. Last, anyone can embed the feature of the GPS (Global Positing system) so that to keep track of the current position of the employee.

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