

References

- [1] “Microfinance and Conflict in Sri Lanka - Towards a Sustainable Socio-Economic Development in the North and East,” p. 16.
- [2] S. Mullainathan and E. Shafir, “Savings Policy and Decisionmaking in Low-Income Households,” p. 4.
- [3] I. Matin, D. Hulme, and S. Rutherford, “Finance for the poor: from microcredit to microfinancial services,” *J. Int. Dev.*, vol. 14, no. 2, pp. 273–294, Mar. 2002.
- [4] T. H. Davenport and J. E. Short, “The new industrial engineering : information technology and business process redesign,” p. 46.
- [5] “About - Sampath Bank PLC.” [Online]. Available: <https://www.sampath.lk/en/about>. [Accessed: 20-Apr -2018].
- [6] J. Shaw, “Microenterprise Occupation and Poverty Reduction in Microfinance Programs: Evidence from Sri Lanka,” *World Dev.*, vol. 32, no. 7, pp. 1247–1264, Jul. 2004.
- [7] Department of Banking & Finance, Great Zimbabwe University, Zimbabwe, T. Mashamba, R. Magweva, and L. C. Gumbo, “Analysing the relationship between Banks’ Deposit Interest Rate and Deposit Mobilisation: Empirical evidence from Zimbabwean Commercial Banks (1980-2006),” *IOSR J. Bus. Manag.*, vol. 16, no. 1, pp. 64–75, 2014.
- [8] “RDB – Dorin Dora – Daily Collection System.” [Online]. Available: <http://www.rdb.lk/services/daily-collection-system-rdb-dorin-dora/>. [Accessed: 20-Apr -2018].
- [9] S. F. FEINER and D. K. BARKER, “Microcredit and Women’s Poverty,” p. 5.
- [10] M. W. Rahman, J. Luo, S. Ahmed, and W. Xiaolin, “The Synthesis of Grameen Bank, BRAC and ASA Microfinance Approaches in Bangladesh,” p. 8, 2012.
- [11] M. W. Rahman and J. Luo, “Comparison of microfinance models in China and Bangladesh: The implications for institutional sustainability,” *World Appl. Sci. J.*, vol. 14, no. 2, pp. 245–255, 2011.
- [12] A. Mohamad-Azahari, B. Joni-Tamkin, and others, “Success Factors of Successful Microcredit Entrepreneurs: Empirical Evidence from Malaysia,” *Int. J. Bus. Soc. Sci.*, vol. 4, no. 5, 2013.
- [13] S. R. K. MARK M.Pitt, “The Impact of Group-Based Credit Programs on Poor Households in Bangladesh: Does the Gender of Participants Matter?” *The Journal of Political Economy*, 1998.
- [14] P. Ren, C A., “Microfinance with Chinese characteristics,” *World Dev.*, 2001.
- [15] M. Mbogo, “The Impact of Mobile Payments on the Success and Growth of Micro-Business: The Case of M-Pesa in Kenya,” *J. Lang. Technol. Entrep. Afr.*, vol. 2, no. 1, pp. 182–203, Jan. 2010.
- [16] M. Salhab and A. A. Ali, “A Qualitative Analysis of People Views of Microfinance in Lebanon,” *Int. J. Econ. Manag. Sci.*, vol. 4, no. 10, 2015.
- [17] N. Md Saad, “Selecting high-income generating activities for micro-entrepreneurs: The case study of Amanah Ikhtiar Malaysia,” *Int. J. Humanit. Soc. Sci.*, vol. 1, no. 5, pp. 258–264, 2011.
- [18] F. Donou-Adonsou and K. Sylwester, “Financial development and poverty reduction in developing countries: New evidence from banks and microfinance institutions,” *Rev. Dev. Finance*, vol. 6, no. 1, pp. 82–90, Jun. 2016.
- [19] I. Weerasinghe and H. Dedunu, “Impact of Micro Finance on Living Standard With Reference to Microfinance Holders in Kurunegala District,” p. 8.
- [20] G. M. Tilakaratna and U. Wickramasinghe, “Microfinance in Sri Lanka: A Household Level Analysis of Outreach and Impact on Poverty,” p. 56.

- [21] T. K. B. D., O. W. L. T. K. L., and A. K. A., "Influence of microfinance services on entrepreneurial success of women in Sri Lanka," *Afr. J. Bus. Manag.*, vol. 11, no. 14, pp. 337–346, Jul. 2017.
- [22] "How Technology Is Transforming Microfinance." [Online]. Available: <https://thenextweb.com/dd/2014/11/02/technology-transforming-saving-microfinance/>. [Accessed: 20-Apr -2018].
- [23] "Finance for the poor: from microcredit to microfinancial services - Matin - 2002 - Journal of International Development - Wiley Online Library." [Online]. Available: <https://onlinelibrary.wiley.com/doi/full/10.1002/jid.874>. [Accessed: 20-Apr -2018].
- [24] M. Gugesan and S. Perampalam, "Understanding ICT's Role in Microfinance to Improve Financial Inclusion in Northern Sri Lanka," *SSRN Electron. J.*, 2017.
- [25] the M. Team, "Current Trends in Microfinance: The Growth of Commercial Microfinance," *MicroCapital*, 21-Sep-2005. .
- [26] R. M. Visconti and M. C. Quirici, "THE IMPACT OF INNOVATION AND TECHNOLOGY ON MICROFINANCE SUSTAINABLE GOVERNANCE," *Corp. Ownersh. Control*, vol. 11, no. 3, 2014.
- [27] F. Prior and X. Santomá, "The Use of Prepaid Cards for Banking the Poor," *SSRN Electron. J.*, 2008.
- [28] "What is CentOS ?," *CentOS Blog*. .
- [29] tutorialspoint.com, "Perl Introduction," www.tutorialspoint.com. [Online]. Available: https://www.tutorialspoint.com/perl/perl_introduction.htm. [Accessed: 20-Apr -2018].
- [30] "Common Gateway Interface," *Wikipedia*. 20-Apr -2018.
- [31] B. Mitchell, "An Overview of the Apache Web Server," *Lifewire*. [Online]. Available: <https://www.lifewire.com/definition-of-apache-816509>. [Accessed: 20-Apr -2018].
- [32] "PostgreSQL: About." [Online]. Available: <https://www.postgresql.org/about/>. [Accessed: 20-Apr -2018].
- [33] "Scratchcard," *Wikipedia*. 20-Apr -2018.
- [34] G. C. | April 2, 2001, and 12:00 Am Pst, "An introduction to the Simple Object Access Protocol (SOAP)," *TechRepublic*. [Online]. Available: <https://www.techrepublic.com/article/an-introduction-to-the-simple-object-access-protocol-soap/>. [Accessed: 20-Apr -2018].
- [35] "Intelligent Network," *Wikipedia*. 20-Apr-2018.
- [36] "HTTP Methods GET vs POST." [Online]. Available: https://www.w3schools.com/tags/ref_httpmethods.asp. [Accessed: 01-Jun-2018].
- [37] "Interactive voice response," *Wikipedia*. 12-Apr-2018.
- [38] "SIM Application Toolkit," *Wikipedia*. 09-Apr-2018.
- [39] "What is USSD (Unstructured Supplementary Service Data)? - Definition from WhatIs.com." [Online]. Available: <https://searchnetworking.techtarget.com/definition/USSD>. [Accessed: 09-Apr -2018].
- [40] "Mobile app," *Wikipedia*. 29-May-2018.
- [41] "Short Message service center," *Wikipedia*. 19-Mar-2018.
- [42] "SIM card File System Access · Issue #96 · CellularPrivacy/Android-IMSI-Catcher-Detector," *GitHub*. [Online]. Available: <https://github.com/CellularPrivacy/Android-IMSI-Catcher-Detector/issues/96>. [Accessed: 01-Jun-2018].
- [43] "Chapter 34. Automated Tasks." [Online]. Available: https://www.centos.org/docs/5/html/Deployment_Guide-en-US/ch-autotasks.html. [Accessed: 01-Jun-2018].
- [44] "Cisco ASA 5505 Adaptive Security Appliance (ASA5505-BUN-K9) - Datacomm Express." [Online]. Available: <http://www.datacommexpress.com/khxc/index.php?app=ecom&ns=prodshow&ref=ASA5505-BUN-K9>. [Accessed: 01-Jun-2018].

Appendix A - Configuration and installing modules

Install Apache web server on centos 6

1. Run the following command:
2. `sudo yum install httpd mod_ssl`
3. Because the server does not start automatically when you install Apache, you must start it manually.
4. `sudo /usr/sbin/apachectl start`

The following message is displayed:

```
Starting httpd: httpd: Could not reliably determine the server's fully qualified domain name, using 127.0.0.1 for ServerName
```

The IP address (shown in this example as 127.0.0.1) is used as the server name by default. In the following steps, set the server name for the next time the server is started.

5. Open the main Apache configuration file.
6. `sudo nano /etc/httpd/conf/httpd.conf`
7. Toward the end of the file, locate the section that starts with `ServerName` and gives an example.
8. `#ServerName www.example.com:80`
9. Enter your cloud server host name or a fully qualified domain name. In the following example, the host name is `demo`.
10. `ServerName demo`

Reload Apache.

11. `sudo /usr/sbin/apachectl restart`

Install PostgreSQL on centos 6

Open the CentOS repository configuration file in a text editor:

```
nano /etc/yum.repos.d/CentOS-Base.repo
```

At the bottom of the `[base]` section, add a line that excludes the postgres packages:

[base]

```
name=CentOS-$releasever - Base
mirrorlist=http://mirrorlist.centos.org/?release=$releasever&arch=$basearch&repo=os
#baseurl=http://mirror.centos.org/centos/$releasever/os/$basearch/
gpgcheck=1
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-6
exclude=postgresql*
```

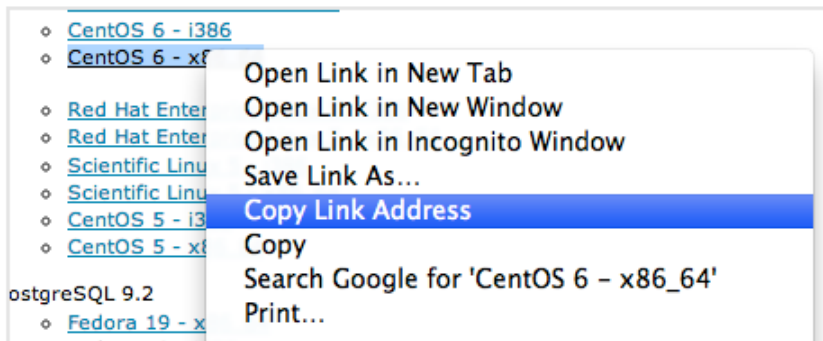
Add the same line to the bottom of the [updates] section to prevent yum from updating postgres from the default repositories:

[updates]

```
name=CentOS-$releasever - Updates
```

```
mirrorlist=http://mirrorlist.centos.org/?release=$releasever&arch=$basearch&repo=updates
#baseurl=http://mirror.centos.org/centos/$releasever/updates/$basearch/
gpgcheck=1
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-CentOS-6
exclude=postgresql*
```

Control-click or right-click on the link that matches the most recent version of postgres and your version of CentOS. Choose "copy link address" or whatever similar option is available.



Back in your droplet session, change to your home directory. Type curl -O and then paste the download link:

```
cd ~
```

```
curl -O http://yum.postgresql.org/9.3/redhat/rhel-6-x86_64/pgdg-centos93-9.3-1.noarch.rpm
```

Install the package you just downloaded by typing the following command:

```
rpm -ivh pgdg*
```

We can see that in this case, all of the packages have "93" for version 9.3. We want to download the "-server" packages:

```
yum install postgresql93-server
```

Appendix B – User interfaces for MBSCSS

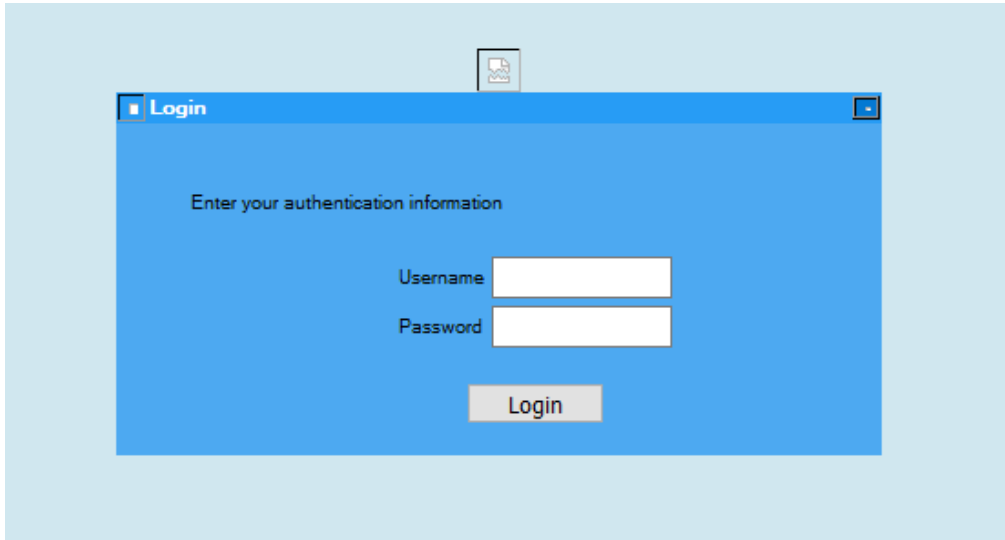


Figure 1 User Login

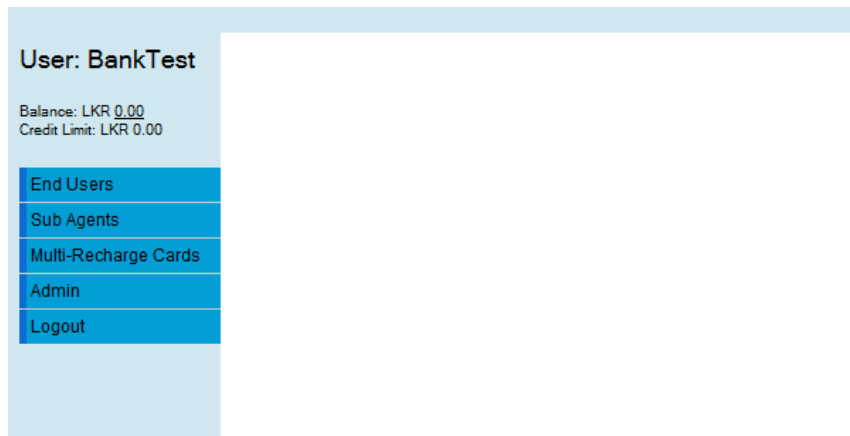


Figure 2 Bank Operators GUI

End-User Accounts:

Account# FirstName Surname CLI PageSize

Edit	Serial No	Auth.	Type	Customer Name	City	Country	Telephone	Account Group	Balance	Cur	VOIP Rate	Agent	Sub Agent	Status	Profile
Edit	109502	PIN: ***** CLI: 0789400012 Change	EndUser	Palitha Jayasekara	Anuradhapura		0789400012		0.0000	LKR		108872		Active	Profile
Edit	109139	PIN: ***** CLI: 0719329579 Change	EndUser	Mihiranga Alwis		Pannipitiya	0719329579		1.0000	LKR		108872		Active	Profile
Edit	109059	PIN: ***** CLI: 0789400088 Change	EndUser	Kasun Chandika	Gampaha		0789400088		0.0000	LKR		108872		Active	Profile
Edit	108994	PIN: ***** CLI: 078940092 Change	EndUser	Janani Gayanika	Jaela		078940092		0.0000	LKR		108872		Active	Profile
Edit	108956	PIN: ***** CLI: 0789400078 Change	EndUser	Jayasinghe stores Ranmal	Colombo	Sri Lanka	0789400078		0.0000	LKR		108872		Active	Profile
Edit	108955	PIN: ***** CLI: 0789400077 Change	EndUser	Yamuna Jayapala	Colombo	Sri Lanka	0789400077		0.0000	LKR		108872		Active	Profile

12 Records found. Showing page 1 of 2
12 - [Next](#)

Figure 3 End-user Search

End-User Accounts: Account# FirstName Surname CLI PageSize

Create New End-User Account

Title: Mr

First Name:

Last Name:

Company:

No.:

Street 1:

Street 2:

City:

Country:

NR Language: English

Bill Person:

Tel No. 1: (Primary/CLI)

Tel No. 2:

Figure 4 User registration

Ref.	Trans	Date	Time	Details	Debit	Credit	Balance	Status	By
10717757		2018-05-18	05:44:02+00	Paycorp Payment - Scratch to deposit		1.0000	2.0000	Completed	SMS-LC2
10717857	5697792 Receipt	2018-05-18	05:44:02+00	Paycorp Payment - Scratch to deposit		1.0000	3.0000	Completed	SMS-LC2
10717857	5697792 Receipt	2018-05-18	05:44:02+00	Paycorp Payment - Scratch to deposit		0.0000	3.0000	Completed	SMS-LC2
10724378	5701471 SendCredit	2018-05-18	12:36:02+00	Send Credit from AC:109139(0719329579) to AC:108958(0789400079)	1.0000		2.0000	Completed	App 0719329579

Figure 5 end user transaction reports

Create Calling Card Account

Value:

Prefix:

Number of PIN Digits:

Number of Accounts:

Scratch card Value

Number of Scratch cards

Figure 6 Scratch Card Generating GUI

Calling Card Accounts

Action	Account	PIN	Type	UserDetail	Balance	Cur	Reseller	Status
Delete	109140	64952731	EndUser	Call Card User	10.0000	LKR	topLife	Active
Delete	109140	90350664	EndUser	Call Card User	10.0000	LKR	topLife	Active
Delete	109140	75181282	EndUser	Call Card User	10.0000	LKR	topLife	Active
Delete	109140	71126954	EndUser	Call Card User	10.0000	LKR	topLife	Active
Delete	109140	12490300	EndUser	Call Card User	10.0000	LKR	topLife	Active
Delete	109268	923266594604	EndUser	Call Card User	0.0000	LKR	topLife	Active
Delete	109270	587950934496	EndUser	Call Card User	0.0000	LKR	topLife	Active

Scratch card PIN

Scratch card Value

Figure 7 Scratch Card Report

Appendix F – System Evaluation Forms

Evaluation of Usability – Bank web Application

Participants – Bank Operator

No. of Participants - 10

1 - Very poor, 2 – Poor, 3 – Average, 4 - Good, 5 – Excellent

		1	2	3	4	5
Evaluation criteria		Very	Poor	Average	Good	Excellent
1	Can you understand function of the System					
2	Can you rasy to learn system functions by your self					
3	Are you happy with the time taken to system feedback when execute function					
4	Are you happy with the information provided by the system					
5	Is system give proper feedback and massages to guide you to achieve your					

Table 1 - Usability – Bank web Application

Evaluation of Functionality – Bank web Application

Participants – Bank Operator

No. of Participants - 10

1 - Very poor, 2 – Poor, 3 – Average, 4 - Good, 5 – Excellent

		1	2	3	4	5
Evaluation criteria		Very	Poor	Average	Good	Excellent
1	Does system provide the proper navigation throughout the application					
2	Does system giving clear output for your input					
3	Base on the system functionalities how you rank the system					
4	Did system giving you enough functions to do complete tasks					
5	Rank your expectation and system					

Table 2 - Functionality – Bank web Application

Evaluation of Overall Impression – Bank web Application

Participants – Bank Operator

No. of Participants - 10

1 - Very poor, 2 – Poor, 3 – Average, 4 - Good, 5 – Excellent

Evaluation criteria		1	2	3	4	5
		Very	Poor	Average	Good	Excellent
1	Does system provide the final result within your expected time scope					
2	Does system provide the final result within your expected quality					
3	Overall satisfaction with this application					
4	Do you want to use this system regular basis					
5	Rank your expectation and system functionality					

Table 3 - Overall Impression – Bank web Application

Evaluation of Usability – Scratch Card Deposit

Participants – Customer

No. of Participants - 10

1 - Very poor, 2 – Poor, 3 – Average, 4 - Good, 5 – Excellent

Evaluation criteria		1	2	3	4	5
		Very	Poor	Average	Good	Excellent
1	Can you understand function of the Scratch Card Deposit					
2	Do you understand the SMS format of the Scratch Card Deposit					
3	Do you understand what is the Scratch Card and how to use it					
4	Do you understand how to send SMS to system SMS gateway					
5	Is system give proper feedback and messages to guide you to achieve your					

Table 4 - Usability – Scratch Card Deposit

Evaluation of Functionality – Scratch Card Deposit

Participants – Customer

No. of Participants - 10

1 - Very poor, 2 – Poor, 3 – Average, 4 - Good, 5 – Excellent

Evaluation criteria		1	2	3	4	5
		Very	Poor	Average	Good	Excellent
1	Does SMS Properly send to the gateway					
2	Does system giving clear output for your input					
3	Base on the system functionalities how you rank the system					
4	Did system giving you enough functions to do complete tasks					
5	Do you get conformation SMS correctly					

Table 5 - Functionality – Scratch Card Deposit

Evaluation of Overall Impression – Scratch Card Deposit

Participants – Customer

No. of Participants - 10

1 - Very poor, 2 – Poor, 3 – Average, 4 - Good, 5 – Excellent

Evaluation criteria		1	2	3	4	5
		Very	Poor	Average	Good	Excellent
1	Does Scratch Card Deposit to your account within your expected time scope					
2	Does Scratch Card Deposit final result within your expected quality					
3	Overall satisfaction with this application					
4	Are you happy with time taken to cash deposit to your account					
5	Rank your expectation and Scratch Card Deposit functionality					

Table 6 - Overall Impression – Scratch Card Deposit

Evaluation of Usability – Cash Withdrawal

Participants – Customer, Merchant

No. of Participants - 10

1 - Very poor, 2 – Poor, 3 – Average, 4 - Good, 5 – Excellent

		1	2	3	4	5
Evaluation criteria		Very	Poor	Average	Good	Excellent
1	Do you understand what is the merchant number					
2	Do you understand the SMS format for Cash Withdrawal					
3	Do you understand what is the Scratch Card and how to use it					
4	Do you understand how to send SMS to system SMS gateway					
5	Is system give proper feedback and messages to guide you to achieve your					

Table 7 - Usability – Cash Withdrawal

Evaluation of Functionality – Cash Withdrawal

Participants – Customer, Merchant

No. of Participants - 10

1 - Very poor, 2 – Poor, 3 – Average, 4 - Good, 5 – Excellent

		1	2	3	4	5
Evaluation criteria		Very	Poor	Average	Good	Excellent
1	Does SMS Properly send to the gateway					
2	Does system giving clear output for your input					
3	Base on the system functionalities how you rank the system					
4	Did system giving you enough functions to do complete tasks					
5	Do you get conformation SMS correctly					

Table 8 - Functionality – Cash Withdrawal

Evaluation of Overall Impression – Cash Withdrawal

Participants – Customer, Merchant

No. of Participants - 10

1 - Very poor, 2 – Poor, 3 – Average, 4 - Good, 5 – Excellent

Evaluation criteria		1	2	3	4	5
		Very	Poor	Average	Good	Excellent
1	Does cash withdrawal to your account within your expected time scope					
2	Does Scratch Card Deposit final result within your expected quality					
3	Overall satisfaction with this application					
4	Are you happy with time taken to cash deposit to your account					
5	Rank your expectation and Scratch Card Deposit functionality					

Table 9 - Overall Impression – Cash Withdrawal

Appendix G - Data Analysis - Evaluation of Bank web Application

Participants – Bank Operator

No. of Participants - 10

Usability

1 - Very poor, 2 – Poor, 3 – Average, 4 - Good, 5 – Excellent

	Evaluation criteria	Marks offered					Out of 100	%
		2 Very	4 Poor	6 Average	8 Good	10 Excellent		
1	Can you understand function of the System	0	0	30	24	20	74	
2	Can you rasy to learn system functions by your self	0	0	24	32	20	76	
3	Are you happy with the time taken to system feedback when execute function	0	0	12	32	40	84	
4	Are you happy with the information provided by the system	0	4	12	32	10	58	
5	Is system give proper feedback and massages to guide you to achieve your	0	0	18	24	40	82	
Usability							374	74.80

Participants – Bank Operator

No. of Participants - 10

Functionality

1 - Very poor, 2 – Poor, 3 – Average, 4 - Good, 5 – Excellent

	Evaluation criteria						Out of 100	%
		2 Very	4 Poor	6 Average	8 Good	10 Excellent		
1	Does system provide the proper navigation through out the application	0	0	30	24	20	74	
2	Does system giving clear out put for your input	0	0	12	40	30	82	
3	Base on the system functionalities how you rank the system	0	4	6	40	30	80	
4	Did system giving you enough functions to do	0	0	18	16	50	84	

	complete tasks								
5	Rank your expectation and system	0	0	24	40	10	74		
							Functionality	394	78.80

Table 2 - Data Analysis of Functionality – Bank web Application

Participants – Bank Operator

No. of Participants - 10

Overall Impression

1 - Very poor, 2 – Poor, 3 – Average, 4 - Good, 5 – Excellent

Evaluation criteria	2	4	6	8	10	Out of 100	%	
	Very	Poor	Average	Good	Excellent			
1 Does system provide the final result within your expected time scope	0	0	18	40	20	78		
2 Does system provide the final result within your expected quality	0	0	12	40	30	82		
3 Overall satisfaction with this application	0	4	18	32	20	74		
4 Do you want to use this system regular basis	0	0	18	24	40	82		
5 Rank your expectation and system functionality	0	0	24	24	30	78		
						Overall Impression	394	78.80

Table 3 - Data Analysis of Overall Impression – Bank web Application

Appendix H - Data Analysis - Evaluation of Scratch Card Deposit

Participants – Customer

No. of Participants - 10

Usability

1 - Very poor, 2 – Poor, 3 – Average, 4 -

Good, 5 – Excellent

	Evaluation criteria	2	4	6	8	10	Out of 100	%
		Very	Poor	Average	Good	Excellent		
1	Can you understand function of the Scratch Card Deposit	0	0	30	16	30	76	
2	Do you understand the SMS format of the Scratch Card Deposit	0	0	6	40	40	86	
3	Do you understand what is the Scratch Card and how to use it	0	0	6	48	30	84	
4	Do you understand hoe to send SMS to system SMS gateway	0	0	30	16	30	76	
5	Is system give proper feedback and massages to guide you to achieve your	0	0	18	24	40	82	
Usability							404	80.80

Table 4 - Data Analysis of Usability – Scratch Card Deposit

Participants – Customer

No. of Participants - 10

Functionality

1 - Very poor, 2 – Poor, 3 – Average, 4 -

Good, 5 – Excellent

	Evaluation criteria	2	4	6	8	10	Out of 100	%
		Very	Poor	Average	Good	Excellent		
1	Does SMS Properly send to the gateway	0	0	24	24	30	78	
2	Does system giving clear out put for your input	0	0	30	16	30	76	
3	Base on the system functionalities how you rank the system	0	4	12	24	40	80	
4	Did system giving you enough functions to do complete tasks	0	0	30	16	30	76	

5	Do you get conformation SMS correctly	0	0	18	24	40	82	
Functionality							392	78.40

Table 5 - Data Analysis of Functionality – Scratch Card Deposit
Participants – Customer
No. of Participants - 10

Overall Impression

1 - Very poor, 2 – Poor, 3 – Average, 4 - Good, 5 – Excellent

Evaluation criteria	2	4	6	8	10	Out of 100	%
	Very	Poor	Average	Good	Excellent		
1 Does Scratch Card Deposit to your account within your expected time scope	0	0	24	24	30	78	
2 Does Scratch Card Deposit final result within your expected quality	0	4	18	24	30	76	
3 Overall satisfaction with this application	0	0	36	16	20	72	
4 Are you happy with time taken to cash deposit to your account	0	0	12	24	50	86	
5 Rank your expectation and Scratch Card Deposit functionality	0	0	24	24	30	78	
Overall Impression						390	78.00

Table 6 - Data Analysis of Overall Impression – Scratch Card Deposit

Appendix I - Data Analysis - Evaluation of Cash Withdrawal

Participants – Customer,
Merchant

No. of Participants - 10

Usability

1 - Very poor, 2 – Poor, 3 – Average, 4 -
Good, 5 – Excellent

	Evaluation criteria	2	4	6	8	10	Out of 100	%
		Very	Poor	Average	Good	Excellent		
1	Do you understand what is the merchant number	0	0	30	16	30	76	
2	Do you understand the SMS format for Cash Withdrawal	0	0	18	24	40	82	
3	Do you understand what is the Scratch Card and how to use it	0	0	12	40	30	82	
4	Do you understand hoe to send SMS to system SMS gateway	0	0	18	32	30	80	
5	Is system give proper feedback and massages to guide you to achieve your	0	0	12	32	40	84	
Usability							404	80.80

Table 7 - Data Analysis of Usability – Cash Withdrawal

Participants – Customer,
Merchant

No. of Participants - 10

Functionality

1 - Very poor, 2 – Poor, 3 – Average, 4 -
Good, 5 – Excellent

	Evaluation criteria	2	4	6	8	10	Out of 100	%
		Very	Poor	Average	Good	Excellent		
1	Does SMS Properly send to the gateway	0	4	18	24	30	76	
2	Does system giving clear output for your input	0	0	36	16	20	72	
3	Base on the system functionalities how you rank the system	0	0	30	16	30	76	
4	Did system giving you enough functions to do complete tasks	0	0	18	32	30	80	

5	Do you get conformation SMS correctly	0	0	12	32	40	84		
							Functionality	388	77.6 0

Table 8 - Data Analysis of Functionality – Cash Withdrawal

Participants – Customer,
Merchant

No. of Participants - 10

Overall Impression

1 - Very poor, 2 – Poor, 3 – Average, 4 -
Good, 5 – Excellent

	Evaluation criteria	2	4	6	8	10	Out of 100	%	
		Very	Poor	Average	Good	Excellent			
1	Does cash withdrawal to your account within your expected time scope	0	4	24	16	30	74		
2	Does Scratch Card Deposit final result within your expected quality	0	0	18	32	30	80		
3	Overall satisfaction with this application	0	0	18	32	30	80		
4	Are you happy with time taken to cash deposit to your account	0	0	24	16	40	80		
5	Rank your expectation and Scratch Card Deposit functionality	0	0	24	24	30	78		
							Overall Impression	392	78.40

Table 9 - Data Analysis of Overall Impression – Cash Withdrawal

Appendix J – Source code for User Login

```
#!/usr/bin/perl -w
$| = 1;

$progname="login";

use CGI;
use DBI;
use Business::CreditCard;
use Authen::PIN;

print "Content-type: text/html\n\n";

##### READ IN PARAMS #####
$conf_file = "params/conf";
open (CONFFILE, "$conf_file" );

while (<CONFFILE>){
    $row = $_;
    chop $row;
    @pair = split (/=/, $row);
    $var = "$pair[0]";
    $value = "$pair[1]";
    $$var = "$value";
}
close (CONFFILE);
#####
##### Parse from web page (URL_)

@pairs = ();
@pairs = split(/&/, $ENV{'QUERY_STRING'});
foreach $pair (@pairs)
{
local($name, $value) = split(/=/, $pair);
$name =~ tr/+// ;
$name =~ s/%([a-fA-F0-9][a-fA-F0-9])/pack("C", hex($1))/eg;
$value =~ tr/+// ;
$value =~ s/%([a-fA-F0-9][a-fA-F0-9])/pack("C", hex($1))/eg;
$value =~ tr/,// ;
$value =~ s/<!--(.\n)*-->/g;
$INPUT{$name} = $value;
}

# Parse from the web form
#####
read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'});
@cgiPairs = split(/&/,$buffer);
foreach $cgiPair (@cgiPairs)
```

```

{
($name,$value) = split(/=/,$cgiPair);
$value =~ s/\+/ /g;
$value =~ s/%(..)/pack("c",hex($1))/ge;
$form{$name} .= "\0" if (defined($form{$name}));
$form{$name} .= "$value";
}

$remote_addr = $ENV{'REMOTE_ADDR'};
$remote_host = $ENV{'REMOTE_HOST'};

$timestamp = time();
$last_updated = localtime (time);

if ($INPUT{'submitttype'} eq "url"){
$form{'client'} = "$INPUT{'user'}";
$form{'password'} = "$INPUT{'pas'}";

#print qq! user=$form{'username'}, pass=$form{'passwd'} !;
}
## SPLIT TIME
#####
@time_updated = split (/ /, $last_updated);

$current_day=$time_updated[0];
$current_month=$time_updated[1];
$current_date=$time_updated[2];
$current_time=$time_updated[3];
$current_year=$time_updated[4];

@current_time = split (/:/, $current_time);
$current_time_hhmm = "@current_time[0]:@current_time[1]";

### if date is one character
if ($current_date eq "")
{
$current_date=$time_updated[3];
$current_time=$time_updated[4];
$current_year=$time_updated[5];

push (@current_date_dd, "0", $current_date); ### Add a 0 to front
$current_date = join ( "", @current_date_dd);
}
open (FILE, "path") || die print "cannot open database ";
$path = <FILE>;
chop $path;
close (FILE);

write_msg_log("=====");

```

```

write_msg_log("START $progname");

write_msg_log("=====");
open (FILE, "/var/www/cgi-bin/gdz/db_ip");
$db_ip = <FILE>;
close (FILE);

open (FILE, "/var/mhetc/db_ip") || die print "cannot ";
$db_ip = <FILE>;
chop $db_ip;
close (FILE);

open (FILE, "/var/mhetc/database") || die print "cannot open database ";
$dbdatabase = <FILE>;
chop $database;
close (FILE);

open (FILE, "/var/mhetc/usnm") || die print "cannot open Username ";
$username = <FILE>;
chop $username;
close (FILE);

open (FILE, "/var/mhetc/dwp") || die print "cannot open database ";
$pass = <FILE>;
chop $pass;
close (FILE);

my $db = 'DBI:Pg:host=' . $db_ip . ' dbname=' . $database;

my $dbh = DBI->connect($db,$username,$pass);

my $sth = $dbh->prepare("SELECT password, account_id, group_id,
user_type,id,reseller_id,reseller_discount,dealer_id,merchant,agent,bdo,reseller_iii_id FROM
webusers WHERE username = '$form{'client'}'");
$sth->execute;
my @array = $sth-> fetchrow_array;

#print "ddd = @array";
#####print "sddf@array ";
$sth->finish;

$accountid = $array[1];
$group_id = $array[2];
$user_type = $array[3];
$webuser_id = $array[4];
$reseller_id = $array[5];
$reseller_discount = $array[6];
$dealer_id = $array[7];
$reseller_III_id = $array[11];

```

```

$merchant = $array[8];
$agent = $array[9];
$bdo = $array[10];
#!;
write_msg_log("Read user data for :$form{'client'}, accountid:$array[1],
group_id:$array[2],user_type:$array[3], webuser_id:$array[4], reseller_id:$array[5], ");
##### check if user exists
#if (@array == () ){
if ($form{'client'} eq ""){
    $err_msg = "Please enter Username ";
    $login_fail = "yes";
}

if ($form{'password'} eq ""){
    $err_msg = "Please enter a password ";
    $login_fail = "yes";
}

if ($form{'client'}eq ""){
    $err_msg = "Username does not exist";
    $login_fail = "yes";
}else{
#print "ddd=$array[0]";
### check password
if ($array[0] ne "$form{'password'}"){
    $err_msg = "Password mismatch";
    $login_fail = "yes";
}
}

print qq!
<head><link rel="stylesheet" href="../../agent/style-post.css" type="text/css" /></head>
<body>

<form method=POST action="login.cgi" autocomplete=on target="_self">

<center>
<br><br><br>

<\!-- <font color=#ffffff size=5 face="MS Sans Serif"><strong>
$path</strong>
</font>
<br ><br >>
<div style="margin: auto;">

<table width=420 bordercolordark=#ffffff bordercolorlight=#000000 cellspacing=0
cellpadding=1 border=0 bgcolor=#4da9f1 >

```

```

        <tr>
        <td width="100%" colspan="3" bgcolor="#279cf5" class="CalcCaptionBack"><table
border="0"
        cellpadding="0" cellspacing="0" width="100%">
        <tr>
        <td width="17"></td>
        <td><font color=#ffffff size=1 face="MS Sans
Serif"><strong>Login</strong></font></td>
        <td align="right"><table border="0" cellpadding="0" cellspacing="0"
style="border: 1px outset">
        <tr>
        <td class="CalcTable" bgcolor="#0479d3" align="center"><a
href="../../$path/blank.html" target="_self"></a></td>
        </tr>
        </table>
        </td>
        </tr>
        </table>
        </td>
        </tr>
        <tr>
        <td>
        <ul><font size="1"face="MS sans serif" color=#fe1111><b>LoginFailure, $err_msg</b></font>
        <p><font size="1"face="MS sans serif">Enter your authentication information</font>
        <br>
        <br>
        <center>
        <table border="0">
        <tr>
        <td><center><font size="1"
        face="MS sans serif">Username</font></td>
        <td>
        <input name="client" type="text" size="12" maxlength="25">
        </td>
        </tr>
        <tr>
        <td><font size=1
        face="MS sans serif">Password</font></td>
        <td>
        <input name="password" type="password" size="12" maxlength="25">
        </td>

```

```

        </tr>
    </table>
    </center></div><p align="center"><input type="submit"
    name="pass" value=" Login " ></p>
</form>

</td>
</tr>
</table>
</body>

!;
die;
}

```

Appendix K – Source code for Message Log

```

#####
#####
##### session control log#####
write_msg_log("Session control logging..");
$session_log = "/var/log/webuser_acc/$current_date$current_month$current_year";
@session_log_row = ();
    ### generate session id
    $template = "PPHHHHHHHHHHHHHV";
    $mhpın = new Authen::PIN('PPHHHHHHHHHHHV');
    $mhpın = new Authen::PIN($template);
    $session_id = $mhpın->pin($last_updated, $form{'client'}); ##### we use prefix
+ acid serial
    # print "new_pın=$new_pın <br>";gent007

write_msg_log("Generated session_id:$session_id");

if ($login_fail ne "yes"){
push (@session_log_row, $last_updated, $form{'client'}, $user_type,
$remote_addr,$session_id,$timestamp,"Active",$group_id,$reseller_id,"EOL" ); #
}
    $session_log_row = join ("\\", @session_log_row);

#print "<br>$access_log_row";

##### > is delete existing data and write, >> is append to existing data
    #open (DATABASE, ">>$session_log") || die print "cp";
    open (DATABASE, ">>$session_log") || die print "cantn open $session_log";
    print DATABASE "$session_log_row\n";
    close (DATABASE);
##### end log #####

```



```

write_msg_log("Wrote to session Log");
#####access log #####

#print "ut=$user_type, gid=$group_id, rid=$reseller_id";
#### kill if auth fails

```

Appendix L – Source code for Enduser Application

```

#!/usr/bin/perl -w
$|= 1;

my $programe = "reseller_II_enduser_account_manager2";

use CGI;
use DBI;
use Business::CreditCard;
use Authen::PIN;

##### READ IN PARAMS #####
$conf_file = "params/conf";
open (CONFFILE, "$conf_file") ;

while (<CONFFILE>){
    $row = $_;
    chop $row;
    @pair = split (/=/, $row);
    $var = "$pair[0]";
    $value = "$pair[1]";
    $$var = "$value";
}
close (CONFFILE);
open (FILE, "path");
$path = <FILE>;
chop $path;
close (FILE);
##### Parse from web page (URL_)
@pairs = split(/&/, $ENV{'QUERY_STRING'});
foreach $pair (@pairs)
{
local($name, $value) = split(/=/, $pair);
$name =~ tr/+ / /;
$name =~ s/%([a-fA-F0-9][a-fA-F0-9])/pack("C", hex($1))/eg;
$value =~ tr/+ / /;
$value =~ s/%([a-fA-F0-9][a-fA-F0-9])/pack("C", hex($1))/eg;
$value =~ tr/, / /;
$value =~ s/<!--(.|\n)*-->/g;
$INPUT{$name} = $value;
}
# Parse from the web form
#####
read (STDIN, $buffer, $ENV{'CONTENT_LENGTH'});

```

```

@cgiPairs = split(/&/,$buffer);
foreach $cgiPair (@cgiPairs)
{
($name,$value) = split(/=/,$cgiPair);
$value =~ s/^+//g;
$value =~ s/%(..)/pack("c",hex($1))/ge;
$form{$name} .= "\0" if (defined($form{$name}));
$form{$name} .= "$value";
}
#$remote_addr = $ENV{'REMOTE_ADDR'};
$real_time_sourceip = $ENV{'REMOTE_ADDR'};
$remote_host = $ENV{'REMOTE_HOST'};

##### TIME #####

$last_updated =localtime (time);
## SPLIT TIME
#####
@time_updated = split (/\/, $last_updated);

$current_day=$time_updated[0];
$current_month=$time_updated[1];
$current_date=$time_updated[2];
$current_time=$time_updated[3];
$current_year=$time_updated[4];

### if date is one character
if ($current_date eq "")
{
$current_date=$time_updated[3];
$current_time=$time_updated[4];
$current_year=$time_updated[5];

push (@current_date_dd, "0", $current_date); ### Add a 0 to front
$current_date = join ( "", @current_date_dd);
}

@current_time = split (/:/, $current_time);
$current_time_hhmm = "$current_time[0]:$current_time[1]";
write_msg_log("=====");
write_msg_log("START: $progname") ;

write_msg_log("=====");

##### read in vars #####
if ($INPUT{'invokeby'} eq "url"){
$user= $INPUT{'user'};
$user_type = $INPUT{'user_type'};
$webuser_id = $INPUT{'webuser_id'};
$group_id = $INPUT{'group_id'};

```

```

$frun = $INPUT{'frun'};
$reseller_id = $INPUT{'reseller_id'};

$tg_id = $INPUT{'tg_id'};
$tg_description = $INPUT{'tg_desc'};
$ag_id = $INPUT{'ag_id'};
$ag_desc = $INPUT{'ag_desc'};
#$balance = $INPUT{'bal'};
#$balancelimit_reseller = $INPUT{'ballimit'};
#$currencysym_reseller = $INPUT{'cursym'};
$reseller_discount = $INPUT{'reseller_dis'};
$accountid = $INPUT{'accountid'};
$search_fn = $INPUT{'search_fn'};
$search_sn = $INPUT{'search_sn'};
$search_cli = $INPUT{'search_cli'};
$search_ac = $INPUT{'search_ac'};
#$sourceip = $INPUT{'sourceip'};
$session_id = $INPUT{'session_id'};
$func = $INPUT{'func'};
$resellerII_type = $INPUT{'resellerII_type'};
$r1_accountid = $INPUT{'r1_accountid'};

}else{
$user = $form{'user'};
$user_type = $form{'user_type'};
$group_id = $form{'group_id'};
$reseller_id = $form{'reseller_id'};

$tg_id = $form{'tg_id'};
$tg_description = $form{'tg_description'};
$ag_id = $form{'ag_id'};
$ag_desc = $form{'ag_desc'};
#$balance = $form{'balance'};
#$balancelimit_reseller = $form{'balancelimit_reseller'};
#$currencysym_reseller = $form{'currencysym_reseller'};
$reseller_discount = $form{'reseller_discount'};
$accountid = $form{'accountid'};
$search_fn = $form{'search_fn'};
$search_sn = $form{'search_sn'};
$search_cli = $form{'search_cli'};
$search_ac = $form{'search_ac'};
#$sourceip = $form{'sourceip'};
$session_id = $form{'session_id'};
$func = $form{'func'};
$resellerII_type = $form{'resellerII_type'};
$r1_accountid = $form{'r1_accountid'};

$new_cli = "$form{'new_cli'}";
}

#####

```

```
open (FILE, "/var/mhetc/db_ip") || die print "cannot ";
$db_ip = <FILE>;
chop $db_ip;
close (FILE);
```

```
open (FILE, "/var/mhetc/database") || die print "cannot open database ";
$database = <FILE>;
chop $database;
close (FILE);
```

```
open (FILE, "/var/mhetc/usrm") || die print "cannot open Username ";
$username = <FILE>;
chop $username;
close (FILE);
```

```
open (FILE, "/var/mhetc/dwp") || die print "cannot open database ";
$pass = <FILE>;
chop $pass;
close (FILE);
```

```
my $db = 'DBI:Pg:host=' . $db_ip . ' dbname=' . $database;
```

```
my $dbh = DBI->connect($db,$username,$pass);
print "Content-type: text/html\n\n";
print qq!
<!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Transitional//EN"
"http://www.w3.org/TR/xhtml1/DTD/xhtml1-transitional.dtd">
<html xmlns="http://www.w3.org/1999/xhtml" xml:lang="en" lang="en">
<head>
  <meta http-equiv="content-type" content="text/html;charset=UTF-8" />
<title>Godzila</title>

<link rel="stylesheet" href="../../css/style.css" type="text/css" />
<link rel="stylesheet" href="../../css/layouts.css" type="text/css" />
<link rel="stylesheet" href="../../css/mnlayout.css" type="text/css" media="screen" />
<link rel="stylesheet" href="../../css/mnprint.css" type="text/css" media="print" />

</head>
<body bgcolor="#FFFFFF" TOPMARGIN=0 LEFTMARGIN=0 MARGINWIDTH=0
MARGINHEIGHT=0>
<center>
<form method=POST action="reseller_II_enduser_account_manager2.cgi" autocomplete=on
target=_self>
<input type=hidden name=r1_accountid value=$r1_accountid>
!;
print qq!
```

```

<table cellpadding=2 width=100%><tr>
<td>
    <b>$resellerII_type Accounts: </b>
    <input name=new_ac2_disable value="Add" type="hidden">

<input name=new_ac value="Add" type="submit">
<input name=browse_ac value="Search " type="submit">
<!--<input name=browse_ac value="Search active" type="submit"-->
<!--<input name=browse_ac_incomp value="Search all" type="submit"-->
</td>
<td>

Account# <input type=text size=5 name=search_ac value=$search_ac>
FirstName <input type=text size=6 name=search_fn value=$search_fn>
Surname <input type=text size=6 name=search_sn value=$search_sn>
CLI <input type=text size=6 name=search_cli value=$search_cli>
PageSize <input type=text size=3 name=page_size value=$page_size>
</td>
!;
print qq!
<td bgcolor=#c0c0c0 align=right> New CLI <input type=text size=6 name=new_cli
value=$new_cli>
<input name=add_cli value="Add CLI" type="submit">
</td>
!;
print qq!
</tr>
</table>

<input type=$textorhidden name=tg_id value = $tg_id>
<input type=$textorhidden name=tg_description value=$tg_description>
<input type=$textorhidden name=ag_id value=$ag_id>
<input type=$textorhidden name=ag_desc value=$ag_desc>
<input type=$textorhidden ame=reseller_id value=$reseller_id>
<input type=hidden name=balancelimit_reseller value=$balancelimit_reseller>
<input type=hidden name=balance value=$balance>
<input type=hidden name=currencysym_reseller value=$currencysym_reseller>
<input type=hidden name=reseller_discount value=$reseller_discount>
<input type=$textorhidden name=accountid value=$accountid>
<input type=$textorhidden name=session_id value=$session_id>
<input type=$textorhidden name=resellerII_type value=$resellerII_type>
<input type=$textorhidden name=reseller_II_id value=$reseller_II_id>
<input type=$textorhidden name=r2_accountid value=$r2_accountid>

<input name=user value="$user" type="$textorhidden">
<input name=user_type value="$user_type" type="$textorhidden">

<input name=reseller_id value="$reseller_id" type="$textorhidden">

```

```

<input name=group_id value="$group_id" type="$textorhidden">

!;
print qq!

<div align="center"><center>

<table border="1" cellspacing="0" width="760" bgcolor="#C0C0C0"
bordercolordark="#FFFFFF" bordercolorlight="#000000">

    <tr>
        <td width="100%" colspan="3" bgcolor="#003399" class="CalcCaptionBack"><table
border="0"
        cellpadding="0" cellspacing="0" width="100%">
            <tr>
                <td width="17%"></td>
                <td><font color=#ffffff>
<strong>Create New Account </strong> </td>
                <td align="right"><table border="0" cellpadding="0" cellspacing="0"
style="border: 1px outset">
                    <tr>
                        <td class="CalcTable" bgcolor="#D4D0C8" align="center"><a
href="../../blank.html" target="_self"></a></td>
                    </tr>
                </table>
                </td>
            </tr>
        </table>
        </td>
    </tr>
</table>
</tr>
<tr>
    <td><div align="center"><center><table border="0"
cellpadding="0" cellspacing="1" width="660"
bgcolor="#C0C0C0">
        <tr>
            <td width="25%"> Customer No. </td>
            <td width="25%"> <input type="text" size="15"
name="Cus_No" value="$form{'Cus_No'}"> </td>
            <td width="25%"> Balance </td>
            <td width="25%"> <input type="text" size="4"
name="ac_balance" value="$form{'ac_balance'}"> </td>
        </tr>
        <tr>
            <td width="25%"> First Name </td>
            <td width="25%"> <input type="text" size="20"

```

```

name="firstname" value="$form{'firstname'}"> </td>
<td width="25%"> Balance Limit </td>
<td width="25%"> <input type="text" size="4"
name="ac_balance_limit" value="$form{'ac_balance_limit'}"> </td>
</tr>
<tr>
<td width="25%"> Last Name </td>
<td width="25%"> <input type="text" size="15"
name="surname" value="$form{'surname'}"> </td>
<td width="25%"> Currency </td>
<td width="25%"> <input type="text" size="4"
name="currency" value="$form{'currency'}"> </td>
</tr>
<tr>
<td width="25%"> Company </td>
<td width="25%"> <input type="text" size="15"
name="company" value="$form{'company'}"> </td>
<td width="25%"> Account Group
</td>
<td width="25%">
<select name=acctgrp_desc ><option>$form{'acctgrp_desc'}</option></select>

</td>
</tr>
<tr>
<td width="25%"> No. </td>
<td width="25%"> <input type="text" size="6"
name="Add_No" value=$form{'Add_No'}> </td>
<td width="25%"> Rate </td>
<td width="25%"><select name=rate_package
><option>$form{'rate_package'}</option></select></td>
</tr>
<tr>
<td width="25%"> Street 1 </td>
<td width="25%"> <input type="text" size="18"
name="Add_St1" value="$form{'Add_St1'}"> </td>
<td valign="top" rowspan="6" colspan="2"
width="50%">

<table border="1" cellpadding="0"
cellspacing="0" width="330" bgcolor="#C0C0C0"
bordercolordark="#FFFFFF"
bordercolorlight="#000000">
<tr><td>
<table border="0" cellpadding="3"
cellspacing="0" width="330" bgcolor="#C0C0C0"
bordercolordark="#FFFFFF"
bordercolorlight="#000000">
<tr>

<td width="50%" valign=center>

```

```

        <input type="text" size="4" maxlength="4" name="uid_prefix"
value="$form{'uid_prefix'}">

        <input type="text"
size="8" maxlength=8 name="pin" value="$form{'pin'}">

                <input type=submit name=add_uid_prefix value=" ">
                Add prefix

        </td>
</tr>
<tr>
        <td width="50%"> Web User ID $err_userid

                <td width="50%"> <input type="text"
size="10" name="webuserid" value="$form{'webuserid'}"> </td>
</tr>
<tr>
        <td width="50%"> Web Password $err_webpass </td>
        <td width="50%"> <input type="text"
size="10" name="webpassword" value="$form{'webpassword'}"> </td>
</tr>
<tr>
        <td width="50%"> </td>
        <td width="50%">
                </td>
</tr>
<tr>
        <td width="50%"> </td>
        <td width="50%"> <input type="hidden"
size="18" name="Email_Addr" value="$form{'Email_Addr'}"> </td>
</tr>
<tr>
        <td width="50%"> </td>
        <td width="50%"> </td>
</tr>
</table>
</td></tr>
</table>

```