



# Assignment Report – Financial Settlement System

Database Programming Autumn 2019  
FINANCIAL SETTLEMENT SYSTEM  
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## Table of Contents

Introduction .....	2
Methods Explained .....	3
A. Public Methods .....	3
B. Private Methods .....	4
Parameters Explanation .....	6
Reports Produced .....	8
1. Deskbank File .....	8
2. Daily Deskbank Summary .....	8
3. Terminal Usage Report .....	9
Entity Relationship Diagram .....	10
System Flow .....	11
Conclusion .....	13

## Introduction

This short report will give a brief explanation of a Financial Settlement System (Smartcard System). To be precise, the topics that will be covered in this report are the functions and the procedures with the explanation of its purpose and how it works, the parameters that have been stored in parameter table will also be explained per-category, the ERD diagram of the system, and finally the explanation of three reports produced by the system, which are Deskbank Report, Daily Banking Summary Report, and Terminal Usage Report. In addition, this report will also mention and discuss briefly about the system's capability to send email with the attached daily banking summary report.

## Methods Explained

### A. Public Methods

1. PROCEDURE DailySettlement

⇒ DailySettlement is a procedure where the purpose is to settle all of the unsettled transactions on FSS\_DAILY\_TRANSACTION. It will check FSS\_RUN\_TABLE to see if the procedure has run for the day, to avoid settling the same transaction again. If the program had not run on that day, it will update new transactions, and settle those new transactions. Next, it will generate Deskbank file, Daily Deskbank Summary report, and Terminal Usage Report.

2. PROCEDURE DailyBankingSummary

⇒ DailyBankingSummary is a procedure where the daily banking summary report is for the current date. It can also produce daily banking summary report from other dates by inserting it into the parameter. This procedure is called in DailySettlement.

3. PROCEDURE TerminalUsageReport

⇒ TerminalUsageReport is a procedure where it creates the terminal usage report, that includes the most used terminal in the system, and sort it from the highest total transaction amount to the lowest one. This procedure is called in DailySettlement.

4. PROCEDURE SendEmail

⇒ SendEmail is a procedure where it automatically sends an email, with the daily banking summary attached to the email, to a predetermined recipient. Alternatively, it also can send an email with daily banking summary from other dates through inserting it to the parameter. This procedure isn't called in DailySettlement, and have to be executed manually.

5. FUNCTION GET\_PARAM (separate function, not in package)

⇒ Get\_param is a function where it returns varchar2 value, and is used in nearly all other procedures and function, the reason this function exist is that the requirement to parametised all constants (varchar2).

6. FUNCTION f\_centre (from common package)

⇒ F\_centre function returns varchar2 value with automated LPAD value (half of the total length), it is used to formatting and centralise text.

7. PROCEDURE log (from common package)

- ⇒ Log procedure functionality is to send message to DBP\_MESSAGE\_LOG, every step of the program will be updated onto DBP\_MESSAGE\_LOG.

## B. Private Methods

Keep in mind these methods are not ordered. It is following the order of the forward declaration in the package.

1. PROCEDURE announceme

- ⇒ Announceme have log procedure inside of it, therefore it will send the message to DBP\_MESSAGE\_LOG through log procedure. Announceme can also be tinkered to show its messages on DBMS\_OUTPUT.

2. PROCEDURE run\_failed

- ⇒ Run\_failed procedure also has a log procedure, but in this case, it will update the DBP\_MESSAGE\_LOG on methods that failed to run or have errors or exception in it.

3. PROCEDURE debit\_transaction

- ⇒ Debit\_transaction procedure, as its name suggests, it updates the debit transaction from FSS\_ORGANISATION to FSS\_DAILY\_SETTLEMENT.

4. PROCEDURE upload\_lodgement\_ref

- ⇒ Upload\_lodgement\_ref procedure, updates the FSS\_DAILY\_TRANSACTION with lodgement reference number, it is done to prevent duplicated settlements.

5. PROCEDURE print\_deskbank

- ⇒ Print\_deskbank procedure's purpose is to create and print out the deskbank file.

6. PROCEDURE update\_new\_transactions

- ⇒ Update\_new\_transactions' purpose is to upload new transactions from FSS\_TRANSACTION to FSS\_DAILY\_TRANSACTION.

7. PROCEDURE settle\_transactions

- ⇒ Settle\_transactions' purpose is to settle the unsettled transactions from the FSS\_DAILY\_TRANSACTION to FSS\_DAILY\_SETTLEMENT.

8. PROCEDURE check\_run\_table

- ⇒ Check\_run\_table checks if the program had been run in the current day, if its been ran, then it cannot run again.

9. FUNCTION format\_bsb

⇒ Format\_bsb is to format the initial bsb format which is xxxxxx to xxx-xxx to fulfil the requirements. It will return the value of the new (formatted) bsb number.

10. FUNCTION get\_lodgement\_num

⇒ Get\_lodgement\_num generates a unique lodgement reference number based on the FSS\_LODGEEMENTNUM\_SEQ.

11. FUNCTION format\_currency

⇒ Format\_currency is able to change the format of the money, it will give a dot before its last two digits to show its cents, and it will give the money dollar symbol.

## Parameters Explanation

This part of the report will explain all of the parameter's categories in DBP\_PARAMETER. To make it easier to archive, most categories in parameter table is based on the methods they are used in.

1. Announceme
  - ⇒ Includes all of the parameter in announceme procedure. Which are the destination and the message.
2. BSB
  - ⇒ Includes all of the parameter in format\_bsb function. Which are the module name and the start message of the function
3. CHCKRUNTBL
  - ⇒ Includes all of the parameters in check\_run\_table procedure. Which are the module name, remarks of the run, run outcome, start message, module ran message and exception message.
4. Constant
  - ⇒ Includes all of the constants, such as dash (-), colon (:), space ( ), and other type of constants or symbols in the package.
5. Content
  - ⇒ Includes all of the parameter that used in send\_email procedure. Which mostly is the content of the email that will be send.
6. DBHeader
  - ⇒ Includes all of the parameter that will be used as a header in the daily banking summary report.
7. DEBIT
  - ⇒ Includes all of the parameter included in the debit\_transaction procedure, which are the module name, bankflag, etc. But there are 2 rows in this category which are used as error message on other methods too.
8. DailyBankingSummary
  - ⇒ Includes all of the parameter in daily\_banking\_summary, mostly it is parameters that will be called in the making of daily banking summary report.
9. Date\_Format
  - ⇒ Includes all formats of date, e.g. DD-MON-YYYY, MON-YYYY.

10. File

⇒ Include parameters to open the directory, but its not working so it is not used.

11. Format Currency

⇒ Includes all the parameters used in format\_currency, such as module name.

12. Header

⇒ Includes all the parameters in the header of deskbank file, such as the title of the deskbank file.

13. RUN FAILED

⇒ Includes all the parameters used in run\_failed, contains module name, parameter and the message.

14. SendEmail

⇒ Includes all the parameters used in SendEmail. Contains the sender, recipient, etc.

15. TUREP

⇒ Includes all the parameters used in Terminal Usage Report. Most of them are the parameters that are printed in the terminal usage report.

16. UPDATETRANS

⇒ Only includes one parameter that used in update\_new\_transactions and is called to show the module name.

17. UPLOADLODGENUM

⇒ Includes all the parameters used in upload\_lodgement\_number, which are the module name, and the start messages.

18. Deskbank

⇒ Includes all the parameters used in print\_deskbank.

19. Getlodgenum

⇒ Includes all the parameters used in get\_lodge\_num.

20. Settle

⇒ Includes all the parameters used in settle\_transactions.



## Reports Produced

### 1. Deskbank File

```

0          01WBC          S/CARD BUS PAYMENTS 034002
1015--01270249893 500000217194Cardorama          F 201906070000548032-797 001006SMARTCARD TRANS 00000000
1083--67995935822 500000204952Baulkham Hills Newsagency F 201906070000549032-797 001006SMARTCARD TRANS 00000000
1083--67004583680 500003369397Reino International Pty Ltd      F 201906070000550032-797 001006SMARTCARD TRANS 00000000
1032--27000892386 500000524350Telstra Payphones and Card Servi F 201906070000551032-797 001006SMARTCARD TRANS 00000000
1105--12954269240 500000653078The University of Technology, Sy F 201906070000552032-797 001006SMARTCARD TRANS 00000000
1083--00648518574 500000779570The Smith's Snackfood Co. Ltd      F 201906070000553032-797 001006SMARTCARD TRANS 00000000
1999--99999999999 500000218197Benkovich          F 201906070000554032-797 001006SMARTCARD TRANS 00000000
1034--00000136556 130005966738S/CARD BUS PMTS          N 201906070000555032-797 001006SMARTCARD TRANS 00000000
7999-999          000000000000059667380005966738          000008

```

Figure 1. Screenshot of the deskbank file.

Deskbank file is the file that meant to be read by bank computer system and will be processed to output a daily deskbank summary report that are meant to be read by human. This file is produced through print\_deskbank procedure or will be automatically produced by dailysettlement procedure.

### 2. Daily Deskbank Summary

```

SMARTCARD SETTLEMENT SYSTEM
DAILY DESKBANK SUMMARY
Date 07-JUN-2019                                     Page 1
Merchant ID      Merchant Name      Account Number      Debit      Credit
-----
700000100      Cardorama          015-01027024989      $2230.43
700001000      Baulkham Hills Newsagency 083-67599593582      $2105.29
700001100      Reino International Pty Ltd 083-67500458368      $34536.25
700000300      Telstra Payphones and Card Servi 032-27700089238      $5385.00
700000700      The University of Technology, Sy 105-12095426924      $6726.18
700000500      The Smith's Snackfood Co. Ltd 083-00164851857      $8007.93
700000900      Benkovich          999-99999999999      $2232.09
S/CARD BUS PMTS          034-00200013655      $61223.17
-----
BALANCE TOTAL          $61223.17      $61223.17
Deskbank file Name : 13002581_DS_07062019.dat
Dispatch Date      : 07 JUN 2019
***** End of Report *****

```

Figure 2. Screenshot of the daily banking summary file.

Daily deskbank summary is the polished version of the deskbank file that can be read and interpreted by human. This file shows merchant ID, merchant name, the account number, debit and credit. It will be produced automatically in dailysettlement procedure and dailybankingsummary procedure. In addition, this file can be sent through email with SendEmail procedure. User can also show daily deskbank summary on certain date by entering the date. The example of how to show daily deskbank summary in certain date is shown below.

```
exec Pkg_FSS_Settlement.DailyBankingSummary('06-JUN-2019');
```

### 3. Terminal Usage Report

SMARTCARD SETTLEMENT SYSTEM TERMINAL USAGE REPORT					
Report Date: 07-JUN-2019 Usage Month: JUN 2019				Page 1	
TerminalID	Terminal Type	TerminalType Description	Merchant Name	Number of Transactions	TotalTransaction Amount
0061001290	PMS	Parking Meter on Street	Reino International Pty Ltd	409	\$14125326.25
0061001240	PMS	Parking Meter on Street	Reino International Pty Ltd	406	\$14021717.50
0061001230	PMS	Parking Meter on Street	Reino International Pty Ltd	405	\$13987181.25
0061001190	PMS	Parking Meter on Street	Reino International Pty Ltd	405	\$13987181.25
0061001200	PMS	Parking Meter on Street	Reino International Pty Ltd	404	\$13952645.00
0061001170	PMS	Parking Meter on Street	Reino International Pty Ltd	403	\$13918108.75
0061001250	PMS	Parking Meter on Street	Reino International Pty Ltd	403	\$13918108.75
0061001180	PMS	Parking Meter on Street	Reino International Pty Ltd	403	\$13918108.75
0061001210	PMS	Parking Meter on Street	Reino International Pty Ltd	401	\$13849036.25
0061001160	PMS	Parking Meter on Street	Reino International Pty Ltd	399	\$13779963.75
0061001220	PMS	Parking Meter on Street	Reino International Pty Ltd	397	\$13710891.25
0061001260	PMS	Parking Meter on Street	Reino International Pty Ltd	393	\$13572746.25
0061001280	PMS	Parking Meter on Street	Reino International Pty Ltd	392	\$13538210.00
0061001340	PMS	Parking Meter on Street	Reino International Pty Ltd	391	\$13503673.75
0061001330	PMS	Parking Meter on Street	Reino International Pty Ltd	389	\$13434601.25
0061001310	PMS	Parking Meter on Street	Reino International Pty Ltd	388	\$13400065.00
0061001270	PMS	Parking Meter on Street	Reino International Pty Ltd	386	\$13330992.50
0061001300	PMS	Parking Meter on Street	Reino International Pty Ltd	383	\$13227383.75
0061001320	PMS	Parking Meter on Street	Reino International Pty Ltd	377	\$13020166.25
0061001150	PMS	Parking Meter on Street	Reino International Pty Ltd	359	\$12398513.75
0022000020	VMS	Snack Vending Machine	The Smith's Snackfood Co. Ltd	438	\$3507473.34
0022000030	VMS	Snack Vending Machine	The Smith's Snackfood Co. Ltd	435	\$3483449.55
0022000010	VMS	Snack Vending Machine	The Smith's Snackfood Co. Ltd	428	\$3427394.04
0022000100	VMS	Snack Vending Machine	The Smith's Snackfood Co. Ltd	428	\$3427394.04
0022000070	VMS	Snack Vending Machine	The Smith's Snackfood Co. Ltd	425	\$3403370.25
0022000110	VMS	Snack Vending Machine	The Smith's Snackfood Co. Ltd	418	\$3347314.74
0022000050	VMS	Snack Vending Machine	The Smith's Snackfood Co. Ltd	416	\$3331298.88
0022000120	VMS	Snack Vending Machine	The Smith's Snackfood Co. Ltd	415	\$3323290.95
0022000090	VMS	Snack Vending Machine	The Smith's Snackfood Co. Ltd	413	\$3307275.09
0022000040	VMS	Snack Vending Machine	The Smith's Snackfood Co. Ltd	412	\$3299267.16
0022000060	VMS	Snack Vending Machine	The Smith's Snackfood Co. Ltd	410	\$3283251.30
0022000080	VMS	Snack Vending Machine	The Smith's Snackfood Co. Ltd	387	\$3099068.91
0031000010	MSE	Merchant Store - Ecard	The University of Technology, Sy	396	\$2663567.28

Figure 3. Screenshot of Terminal Usage Report

Terminal usage report shows the traffic of the terminals, their ID, type, description name, and it will show the terminals with the greatest number of transaction and transaction amount on the top. This report is produced by terminalusagereport procedure and will be produced automatically in dailysettlement procedure.

## Entity Relationship Diagram

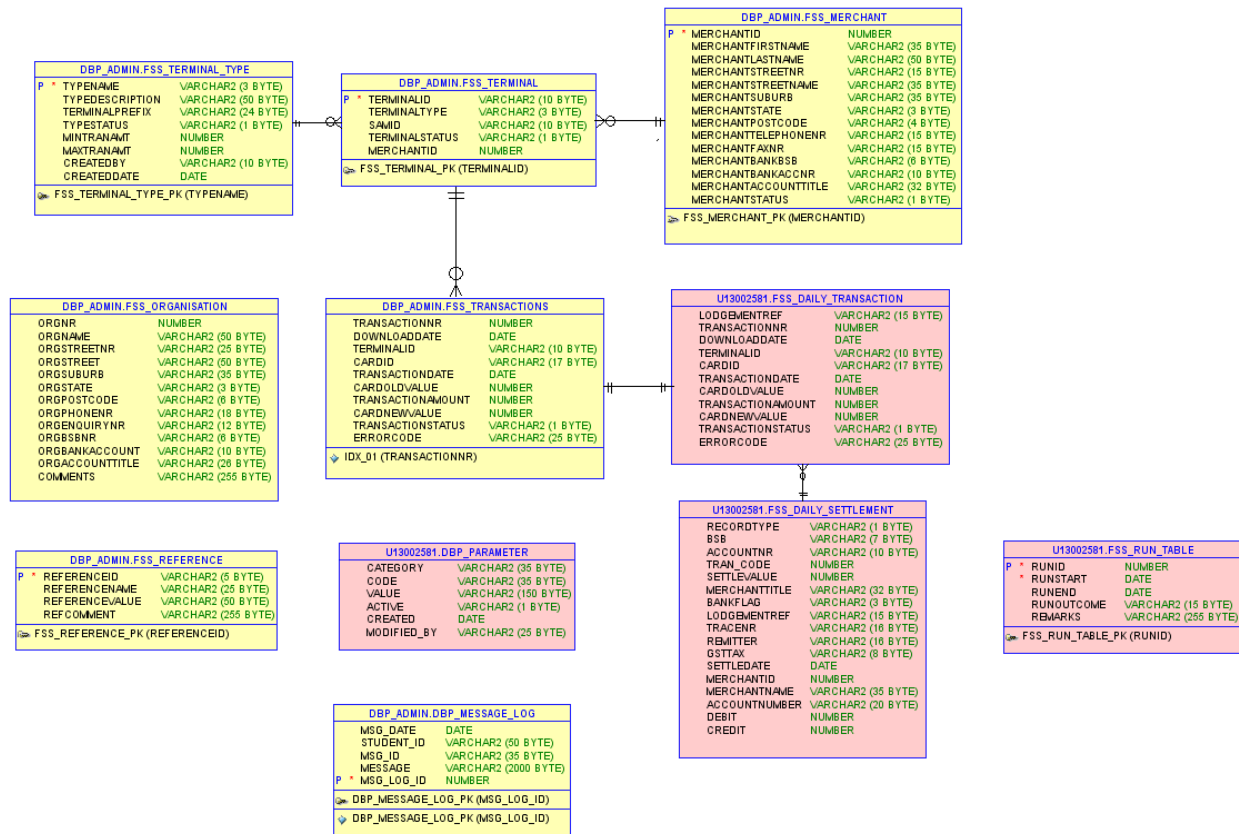


Figure 4. Entity Relationship Diagram of Financial Settlement System

This ERD shows the table related to the financial settlement system, the table in yellow is from DBP\_ADMIN user, while the pink is the table from U13002581 user. The ERD is produced by SQL developer data modeler, and it is made as similar as the assignment's specification ERD.

FSS\_DAILY\_TRANSACTION basically copies FSS\_TRANSACTION, with the additional of LODGEENTREF. FSS\_DAILY\_SETTLEMENT uses the data from FSS\_DAILY\_TRANSACTION to do daily settlement process. These actions message will be sent to DBP\_MESSAGE\_LOG through log procedure. The procedures and functions will get their parameters through get\_param function from DBP\_PARAMETER. And lastly, to check if the settlement program had run and to avoid duplications, FSS\_RUN\_TABLE is needed.

## System Flow

This part of the report will show how the system works through a simple flowchart.

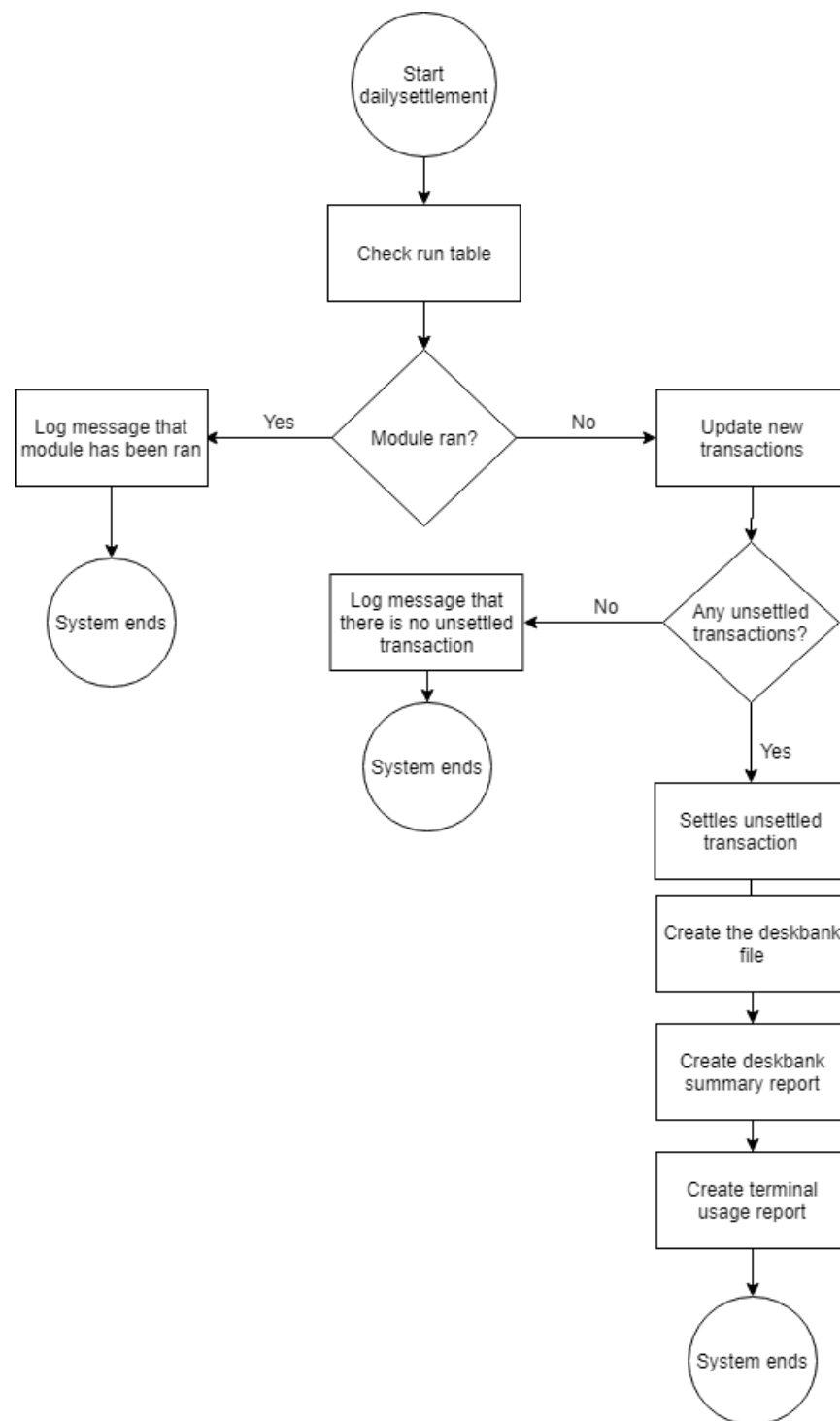


Figure 5. Flowchart of how procedure dailysettlement works

The flowchart above shows how the procedure dailysettlement works, which actually the whole system of Financial Settlement System. First when its ran, it will check the run table, if it's the system not ran yet, it will update new transactions, then it will check if there any unsettled transactions, if there are unsettled transactions, then it will settled the unsettled transactions then, create the deskbank file, deskbank summary report, and terminal usage report. Inside the deskbank file creation, deskbank summary report, and terminal usage, there are some other smaller functions and procedures called, the flowchart only show the main process.

## Conclusion

To conclude, the financial settlement system can create three files, which are the deskbank file, the deskbank summary report, and the terminal usage report. In addition, if user wants, it can also be used to send an email with deskbank summary report as its attachment. In addition, the parameters and the constants are called from DBP\_PARAMETER through `get_param` function, and all the process will be inserted into DBP\_MESSAGE\_LOG through `log` procedure. This financial settlement system would be used by banks to completes their business processes.