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BoF-PSS2 KNOWN BUGS

This document contains a list of known bugs of the Bank of Finland Payment and Settlement Simulator, BoF-PSS2.

The simulator is a very complex system and all combinations of system setups, algorithms, multi-system combinations etc are practically impossible to test completely beforehand. The user should therefore be attentive and carefully assess that the results are logical and close to what can be expected. The most common RTGS setup and algorithms in a one system setup are quite extensively used and tested. Multi-system combinations and DVP processing have been used and tested to a lesser degree.

The known bugs are listed below with possible ways to circumvent them. Please, report to Bank of Finland with details, when you find something that might be a bug so we can start the fixing process. We try to fix "critical" bugs as soon as possible and "cosmetic" bugs as part of the next general update. The implemented bug fixes are documented in BoF-PSS2 Change history.

Bugs related to command line interface (CLI) are reported in the CLI manual.

Known bugs

Version 410

- The support for DVP and PVP does not work with the simulator version 410.

In version 3.2.1h

- The version 3.2.1h is distributed with an deprecated java starting command parameter which leads to the failure of transactions' sort operations. The issue can be repaired by replacing the line :

```
"C:\Program Files\Java\jdk1.7.0_09\jre\bin\java" -Xms256m -Xmx1408m -classpath .;../BoF-PSS2.jar;../USERMODULES com.bof.pss2.core.SimEngine
```

in C:\BoF-PSS2\PROGRAM\Start-up.bat file with:

```
jre-1.7\bin\java -Xms256m -Xmx1408m -Djava.util.Arrays.useLegacyMergeSort=true -classpath .;../BoF-PSS2.jar;../USERMODULES com.bof.pss2.core.SimEngine
```

- Problem in resetting some of the runtime variables. Unreliable results in multiday simulations when bilateral limits and reservations are used.

In version 2.4.0 Minor bugs

- In simulation configuration screen selecting an existing simulation ID and then running cross -check without selecting data sets from the drop down menus causes the simulator to crash.

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- Some views in the simulator GUI do not scale correctly when resizing the simulator window.
- Entering zero or negative numbers as the sample period interval in Generate Networks menu crashes the simulator.
- Importing datasets where there are more than one empty field in a row leads to the dismissal of the rest of the row. For example, consider the following row to be imported:
"1234, CITI, BNP;;;REST;OF;FILE"
The part after ";;; " will be dropped during the import process.

In all versions before 2.4.0j6 Critical bugs

- Error in the sorting order of queued transactions. In situations and algorithms where transactions in waiting queues are sorted according to values of three different attributes, the value of the second attribute does not affect the resulting order. E.g. in algorithms purporting to sort the transactions according to priority (1st), introduction time (2nd) and transaction ID (3rd) the resulting order will actually be according to priority (1st) and transaction ID (2nd) only. Affected algorithms: All. Impact: Possibly erroneous results in simulations.

In version 2.4.0i12 Critical bugs

- The queue release algorithm GCQBPF12 doesn't compute correctly in situations where several transactions affect the balance of the same accounts inside one group. Minimum and maximum balance during the day in account statistics and sending and receiving account balances in the test statistics are corrupted.
- The selection "delete unsettled transactions and exclude from statistics" doesn't work properly. In multiday scenarios only the last day's acst statistics appear.

In Version 2.2.6 Critical bugs

- The settlement delay indicator value in the system level statistics (Y_SETDELAY) is calculated incorrectly. The values of the delay indicator in the account level statistics are correct and according to the definition. The value in the system level statistics is aggregated from account level values by scaling the delay indicator with the share of each account of the total number of queued transactions. This may give biased values depending on the data content.

The correct aggregated value for the system level delay indicator can be calculated directly from the transaction level data based on the definition of the indicator.

In Version 2.2.4 Critical bugs

- If the input database of a simulation project is placed in non-default location, the TEMP folder of the project is not automatically moved accordingly. As a result the simulator fails in data import to store backup of the active database table and a popup warning window with text "Undo information not saved" will be shown. If the import in such a situation contains critical errors and

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becomes interrupted, the target database table and all the data will be lost.

To circumvent the bug, a folder named TEMP must be created or moved manually to the same place where the folder of input database is located. Manual backup copies of the project data are also recommended (see chapter 3.3.3 in the user manual).

In Version 2.2.2 critical bugs

- In Receipt reactive gross settlement (RRGS) the received and sent balances for each participant are not updated correctly after each transaction. As a result subsequent transactions can be released during the same RRGS – queue release round and the value of sent transactions can exceed the value of received transactions.
- Transaction Id is not used correctly as sorting criteria for queues. As a result the settlement order of transactions can be incorrect with some QUE, QUB, PNS, BOS and BBS algorithms in some special cases.

When the queue is sorted, the transaction Id should define the order of transactions only as the third sorting criteria. Thus the problem can only be faced in such cases, where the two first sorting criteria are identical for some transactions. In Priority FIFO algorithms the primary sorting criteria are priority and submission time. In algorithms with user defined queue order primary criteria are the user defined fields 1 or 2.

In Version 2.2.1 close to critical bugs

- System statistics report, system time series report and some features in comparison reports may not function at all in version 2.2.1. The bug is data content dependent. It is caused by BoF-PSS2 report generation, which assumes that some data format conversions can be handled in the database. The updated version of Java-MySQL connector (only present since BoF-PSS v. 2.2.1) no longer performs these format conversions. The required output statistics are however saved in the output database and can be exported or accessed directly.

In Version 2.2.0 critical bugs

- In multi day simulations with receipt reactive gross settlement (RRGS) the ACST statistics (and possibly other queue statistics) may be incorrect. Because of the bug, whole days can be missing from the statistics for some participants. The reason is in incorrect order of end-of-day processing between the EOD and secondary queue (QU2) algorithms. This may cause negative queuing times for QU2 transactions settled at the end of day and as a result failure in writing of output statistics.

In Version 2.2.0 cosmetic bugs

- Definitions of END algorithms are not included in the online manual (i.e. in the built in help of the software) of version 2.2.0. These are included in the pdf-version available on the simulator home pages.
- Algorithms designed for receipt reactive gross settlement (RRGS) do not work with free intraday liquidity. This was not mentioned in the online manual.
- Definition for RRGS period-parameter format (hh:mm) was not included in the online manual.

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- Definitions of group code algorithms (GC) are not included in the "master list" of all algorithms in the manual.

In version 1.2.0 Critical bugs

- If data set of a simulation ID is changed so that new data contains smaller number of days and the simulation is re-executed after the change, transactions of the omitted days from previous simulations are not erased from output data. As a result there can be such transactions in output database, which did not exist in the input data, or some transactions twice.
To circumvent the bug define a new simulation ID in stead of updating the data of old simulations, when the simulated range of days is changed.
- Skipping the cross check may change the results with DVP processing.
- *Credit available without limits* function does not work correctly with DVP linked data. The bug can be circumvented by providing sufficient liquidity trough ICCL-input data.

Cosmetic bugs

- The proposed output filename is extended unnecessarily when system time series report is selected.
- In time series reports, the *end period* time is presented incorrectly for intervals which actually stand between 0:00 and 0:59:59. The reported statistics are however correct.
- *View data sets* functionality shows time 00:00 as 0.

In version 1.1.0 critical or close to critical bugs.

- Transactions can become duplicated within the Simulator and spoil the results if Non-DVP data is imported with template including column number for DVP-link code and simulations including such data are executed with "skip cross-check"-functionality.
- In multi system simulations where DVP-linked transactions are not submitted simultaneously, the link code is sometimes broken by MNSETTLC algorithm.
- INJ algorithms or end of day settlement (*settle on participant & settle on account* in account information) are not working with DVP-linked data.
- Transactions are missing from all output statistics in simulations where liquidity injections (INJ) are defined to be available for only some participants or accounts even when SET and QUE algorithms are present. Vanished transactions belong to accounts without access to liquidity injections.
- In data importing the date format stipulating YYYY can be used for reading dates with only two digits for the year. This results in years from the first century.
- In multi day simulations with *transfer balances to next day*-functionality the beginning of day balance of accounts is calculated as "balance transferred from previous day + possible value in DBAL data".

In version 1.0.0 critical or close to critical bugs

- Injection returns are not always according to transfer size parameter as specified for INJ-algorithms (sometimes too small amounts are returned). Fix in version 1.1.0

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- If the last data field is empty in a input CSV-file row or if there are multiple adjoining empty data fields, wrong data or no data is read (please, check that you do not have blanc fields in critical places in your input data)
- The module BOBASIC1 returns the settlement time of the next settlement occasion/transaction (the affect on statistics depend on the time elapsed before next settlement)

Cosmetic bugs:

- Sometimes inconsistent decimal separators in Account comparison and System comparison reports (use for eg Notepad to change separators) Fix in version 1.1.0
- The output-report name is extended unnecessarily for system time series report
- Time series reports in Excel-format can only be produced for simulations including one system. Time series can be generated by executing the systems one by one using the relevant settlement times from the multisystem simulations.