

BoF-PSS2

Technical structure and simulation features

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Bank of Finland Payment and Settlement Simulator



Simulating one system

- ▶ RTGS, CNS or DNS system
- ▶ Import PART, TRAN data and ICCL and DBAL as necessary
- ▶ Choose appropriate algorithms and system control data
- ▶ Cross-check
- ▶ Execute and analyze result



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Simulating multi-system environment

- ▶ Multiple RTGS, CNS and/or DNS systems
- ▶ Import PART, TRAN data and ICCL and DBAL as necessary for each system
- ▶ Choose appropriate algorithms and system control data for each system
- ▶ Check system-to-system transactions
- ▶ Check injections and end-of-day settlements
- ▶ Cross-check all systems together
- ▶ Execute and analyze result



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Simulating with DVP/PVP

- ▶ One or more RTGS, CNS or DNS system
- ▶ Import PART, TRAN data and ICCL and DBAL as necessary for the systems
- ▶ Choose appropriate algorithms and system control data for the systems
- ▶ Check DVP/PVP LINK-CODE relationships
- ▶ Check system-to-system transactions
- ▶ Check injections and end-of-day settlements
- ▶ Cross-check
- ▶ Execute and analyze result



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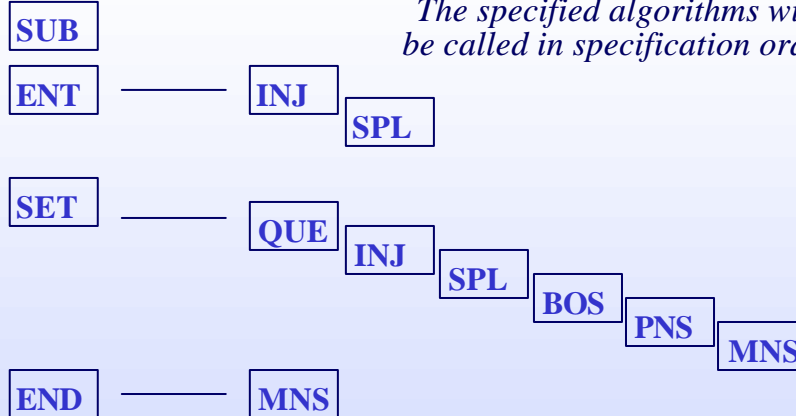


Algorithm flow

Main algorithms

Sub-algorithms

The specified algorithms will be called in specification order



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Main algorithms

Type	Name	Parameters	Description
SUB	SUBFOPR	None	Fetches the next transactions according to submission time and priority among all systems. Systems are prioritized based on a defined order.
ENT	ENBASIC1	None	Performs the basic entry processes on a specified transaction, checks the possibilities for booking, splits the transaction according to defined splitting algorithm when needed and passes the transaction or its parts for booking or into the waiting queue.
SET	SEBASIC1	None	Settle queued payments. It is invoked each time a new transaction is put into queue or if liquidity has been transferred to an account with queued transactions. It invokes specified sub-algorithms.
END	ENDRTGS1	None	Performs end-of-day processing for an RTGS system. All specified sub-algorithms are applied a final time before closing the system. Deleting, transferring to next day or forcing end-of-day settlement of unsettled transactions is performed as specified.
END	ENDCONS1	Time, date, time, date, time, date (near 12, 24 h HH:MM, date format YYYYMMDD)	Performs end-of-day/settlement cycle processing for continuous net settlement systems. All specified sub-algorithms are applied a final time before closing the system. Deleting, transferring to next day or forcing end-of-day settlement of unsettled transactions is performed as specified.
END	ENDCONS1	Time, date, time, date, time, date, time, date (near 12, 24 h HH:MM, date format YYYYMMDD)	Makes the end-of-day/settlement cycle processing for deferred net settlement systems. All specified sub-algorithms will be applied one last time before closing the system. Deleting, transferring to next day or forcing end-of-day settlement of unsettled transactions is performed as specified.



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Sub-algorithms1

Type	Name	Parameters	Description
QUE	QURIFOPR	None	Release transactions from waiting queues upon arrival of additional liquidity in priority and FIFO order.
QUE	QURIFAPR	None	Release transactions from waiting queues upon arrival of additional liquidity in priority and FIFO order, with the exception that if a transaction higher up in the queue cannot be settled, it is bypassed and payments lower in the queue are tested for settlement (in priority or FIFO order) until no more settleable transactions can be found.
SPL	SPLMVALU	Max. transaction value, positive amount with two decimals	Splits transactions into sub-transactions according to specified maximum transaction value. For example, if a max value of 500 is specified, a transaction of 1,350 is split into sub-transactions of 500, 500 and 350, with 350 the last to be processed.
SPL	SPLVLIQ1	None	Splits transactions using available liquidity. For example, when 450 is available on the account, a transaction of 1,350 is split into 450 and 900 of which the 450 is directly processed and 900 remains in the waiting queue.
INJ	INVALUE1	Positive value with two decimals	Injects the given value when required from the main system to the ancillary system account and releases the same amount when possible.
INJ	INPERCE1	Positive percentage (format: 100.00)	Injects an amount that corresponds to a given percentage of the credit limit available in the ancillary system.
BCS	BOBASICI	None	Performs bilateral offsetting of waiting queues in FIFO and priority order and using available liquidity. The algorithm is performed after each transaction queue entry, so caution is needed with large transaction volumes.



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Sub-algorithms 2

Type	Name	Parameters	Description
PS	PNFIFOPC	None	Performs partial multilateral net settlement of queued transactions in FIFO and priority order by including transactions that can be settled with available liquidity (the algorithm removes transactions one-by-one for participants unable to settle to see if a partial settlement is possible). The algorithm is performed after each transaction queue entry, so caution is needed with large transaction volumes.
PS	PNDQUEC, not yet available	None	Performs partial multilateral net settlement of queued transactions in defined order (ascending or descending user-defined field one and two and ascending transaction identifier in the TRAN data) by including transactions that can be settled with available liquidity (the algorithm removes transactions one-by-one for participants unable to settle to see if a partial settlement is possible). The algorithm is performed after each transaction queue entry, so caution is needed with large transaction volumes.
PS	PNFIFOCI	Minutes interval (1-60)	Performs partial net settlement of queued transactions at a given time interval during the day (in minutes) in FIFO and priority order by including transactions that can be settled with available liquidity (the algorithm removes transactions one-by-one for participants unable to settle to see if a partial settlement is possible).
PS	PNDQUEI, not yet available	Minutes interval (1-60)	Performs partial multilateral net settlement of queued transactions at the given time interval during the day (in minutes) in defined order (ascending or descending user-defined field one and two and ascending transaction identifier in the TRAN data) by including transactions that can be settled with available liquidity (the algorithm removes transactions one-by-one for participants unable to settle to see if a partial settlement is possible).
PS	PNFIFOCI	Time, date, time of day, date (max 12, 24 h HH MM, date format YYYYMMDD)	Performs partial net settlement of queued transactions at given occasions in FIFO and priority order by including transactions that are possible to settle with available liquidity (the algorithm removes transactions one-by-one for participants unable to settle to see if a partial settlement is possible).
PS	PNDQUEI, not yet available	Time, date, time of day, date, time of day, date (max 12, 24 h HH MM, date format YYYYMMDD)	Performs partial net settlement of queued transactions at defined occasions in defined order (ascending or descending user-defined field one and two and ascending transaction identifier) by including transactions that can be settled with available liquidity (the algorithm removes transactions one-by-one for participants unable to settle to see if a partial settlement is possible).



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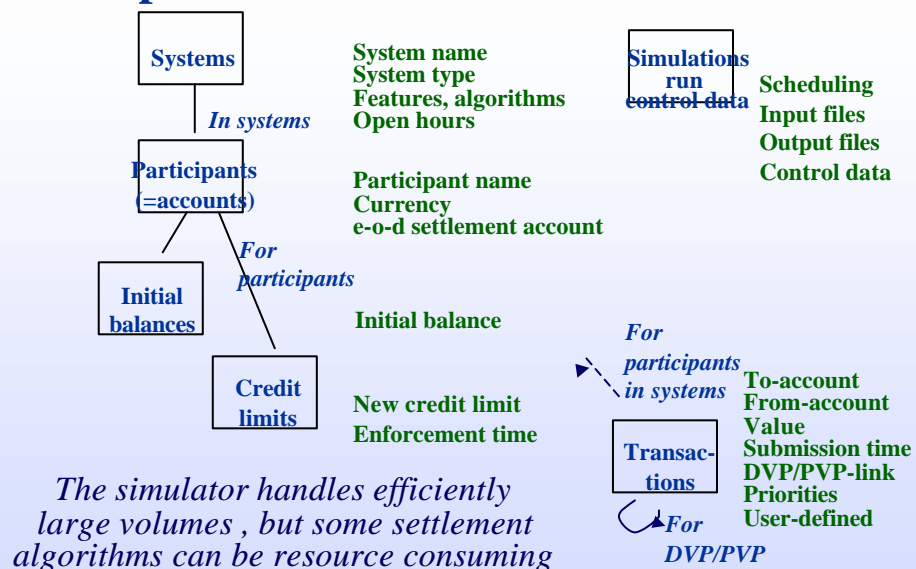
Sub-algorithms 3

Type	Name	Parameters	Description
MNS	MNSSETTL0	None	Performs total net settlement of all queued transactions when sufficient liquidity is available. Total net settlement implies that settlement is only performed in cases where all queues can be emptied (partial multilateral settlement not accepted). The algorithm is performed after each transaction queue entry, so caution is needed with large transaction volumes.
MNS	MNSSETTL1	Minutes interval (1-60)	Performs total net settlement of all queued transactions when sufficient liquidity is available at the given time interval during the day (in minutes).
MNS	MNSSETTL7	Time, date, time, date, time, date, time, date (max 12, 24 h HH:MM, date format YYYYMMDD)	Performs total net settlement of all queued transactions when sufficient liquidity is available at given defined occasion.



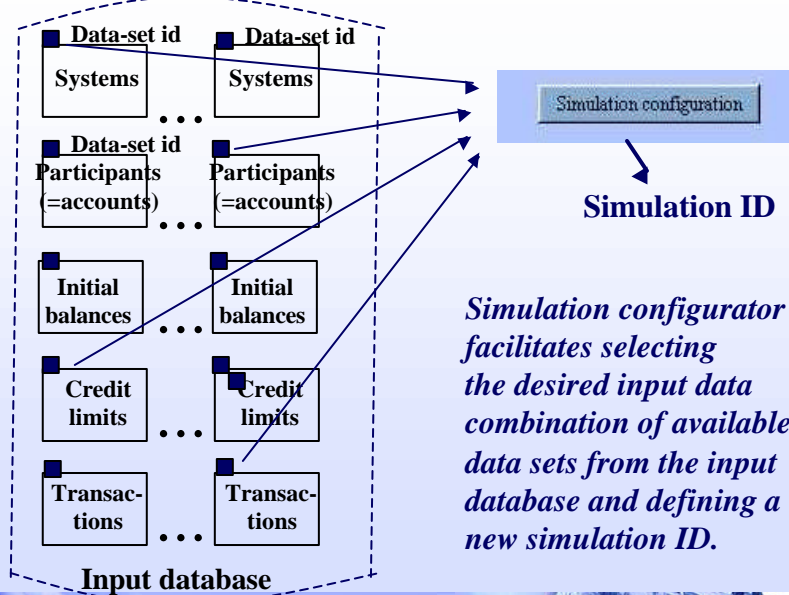
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Input data-structure for simulations



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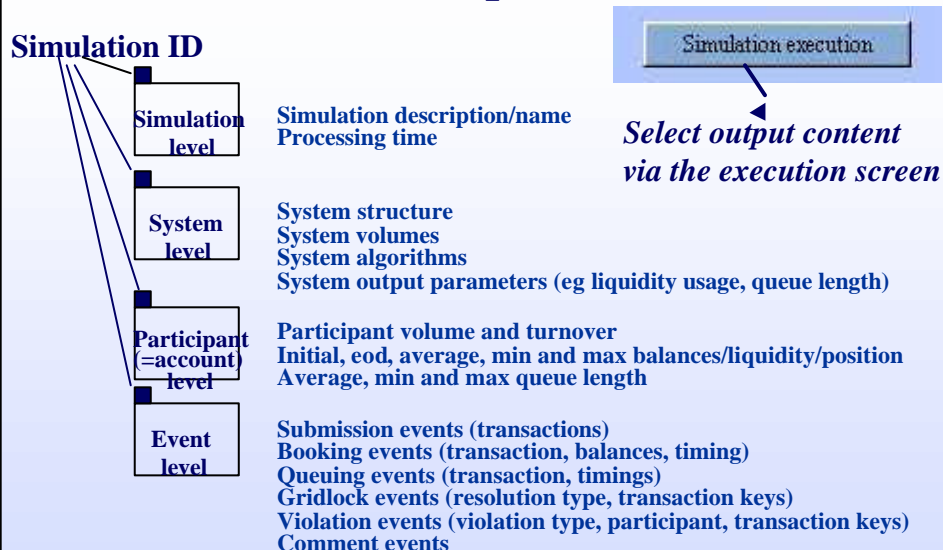
Data set ID / Simulation configuration



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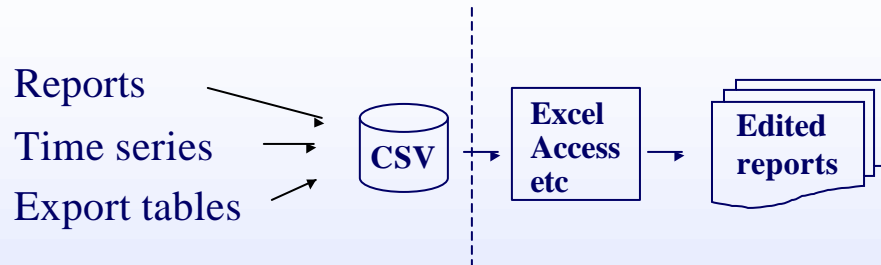
Simulation ID / Output data structure



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Output provided in CSV-files



The simulator provides “raw” data for edited reporting



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Projects, templates and back up:s

- ▶ Projects create separate directories and databases
 - good for keeping track of different simulation projects
- ▶ Templates for CSV-import and -export
 - can be reused
 - good to use same type of data formats continuously
- ▶ Back up:s
 - please remember to make back ups of your databases and input CSV-files
 - old CSV-files may be needed when databases are re-organized



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