

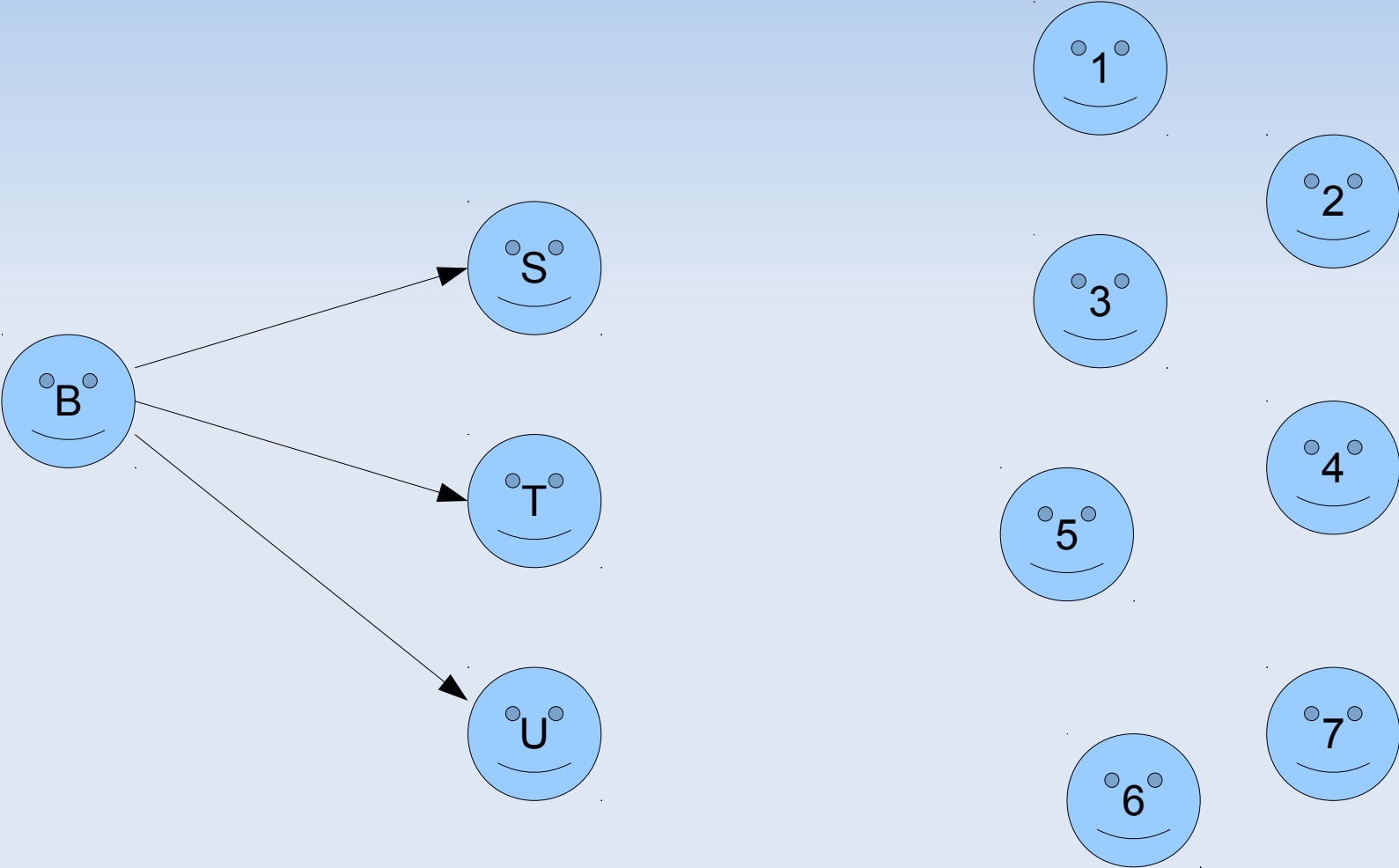
A Test Bed for Data Hiding in Financial Transactions

Dylan Leigh

Supervisor: Dr Ron van Schyndel

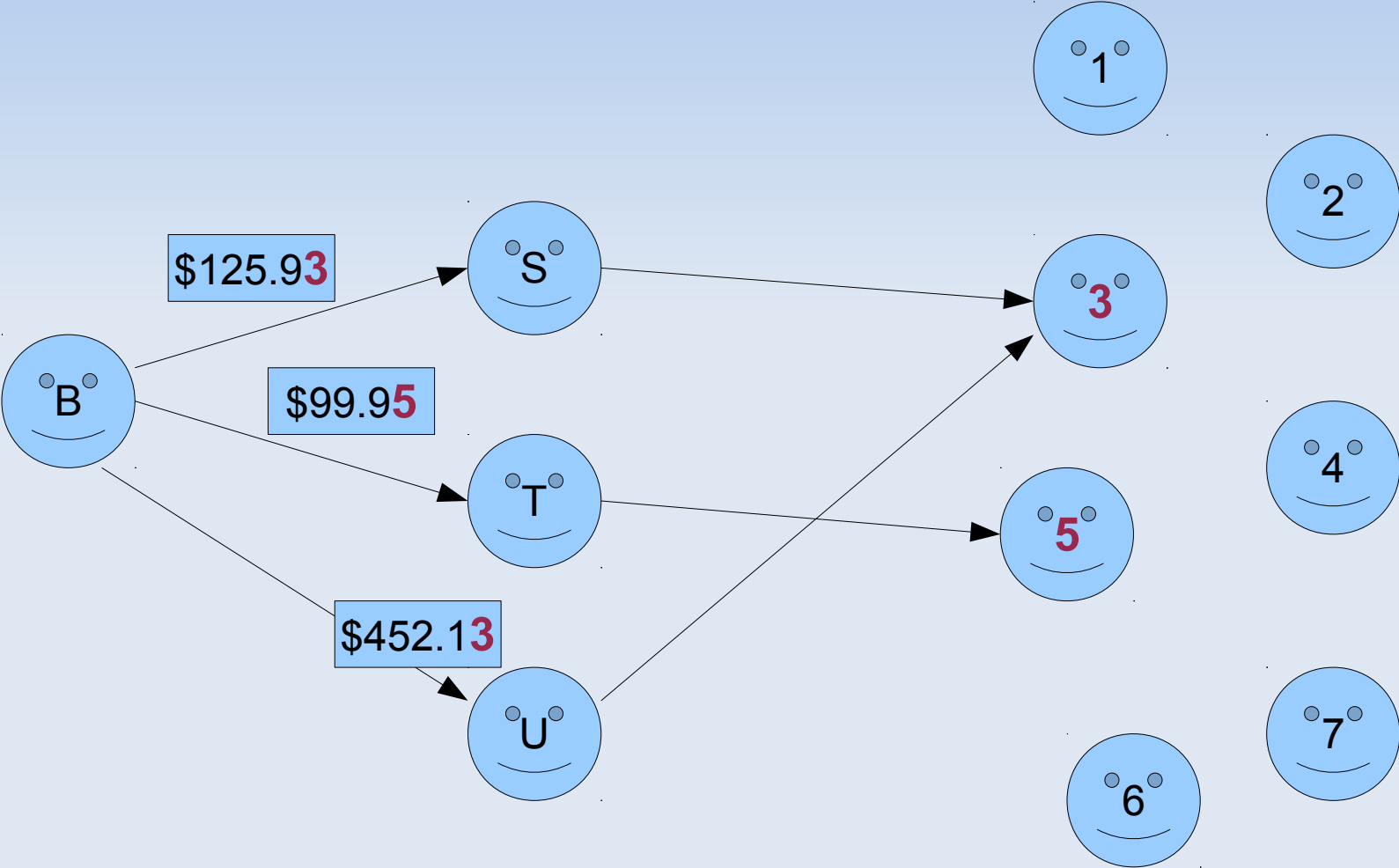
The aim of this project is to develop a framework to allow experiments with data hiding in financial transactions, and for detecting the use of information hiding in financial transactions.

Money Laundering Scenario



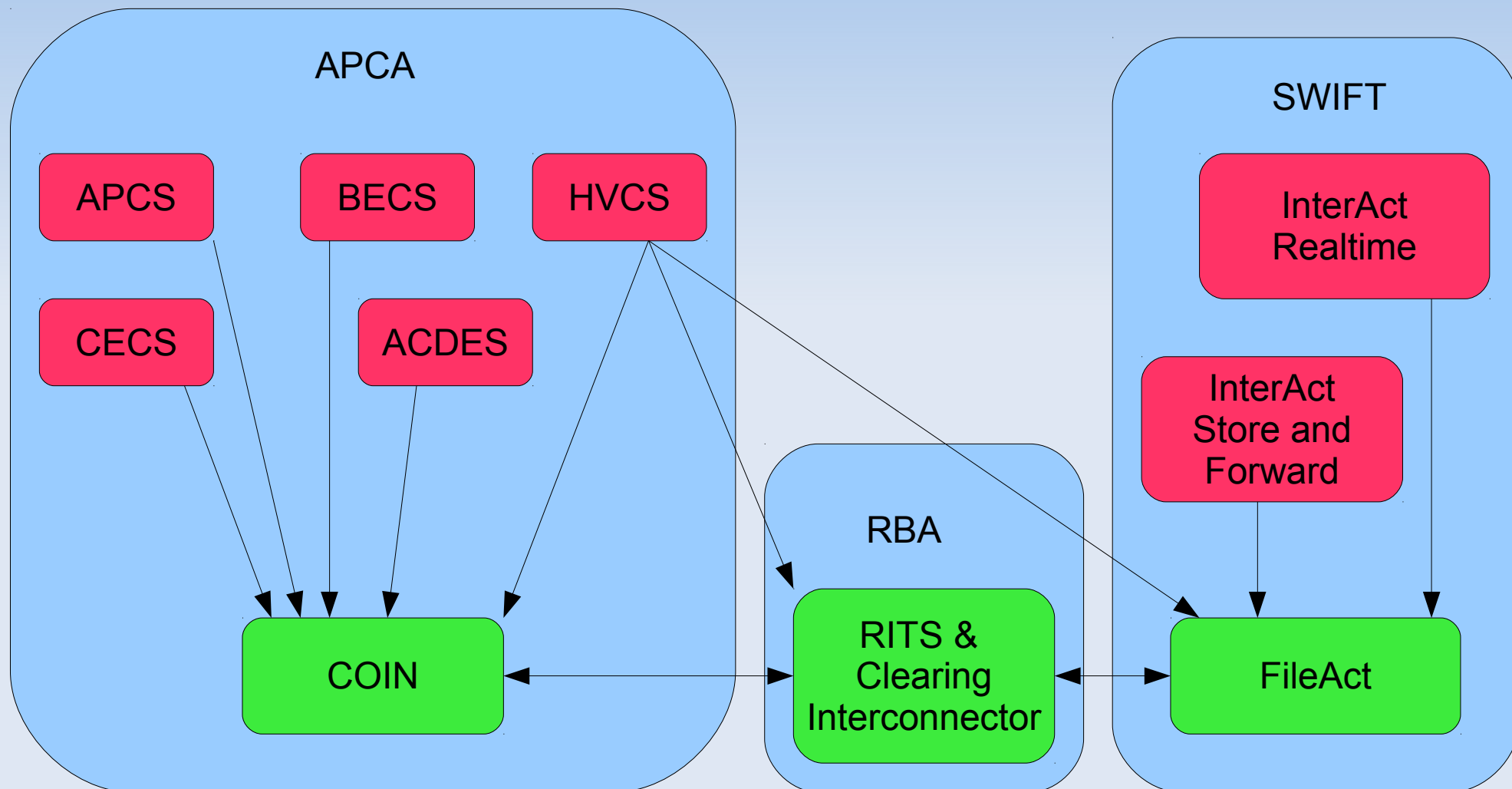
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Money Laundering Scenario



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Financial Networks



Model

Node

Define participants in simulation,
Protocols for each connection

Protocol

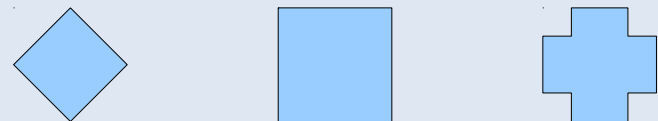
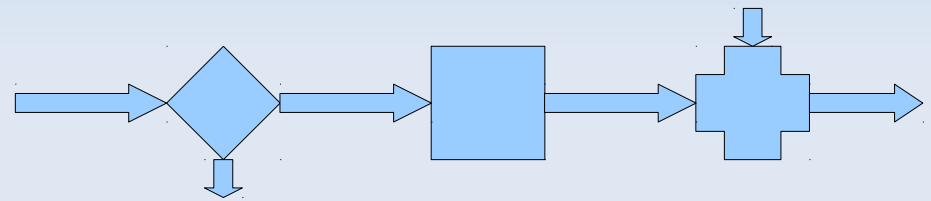
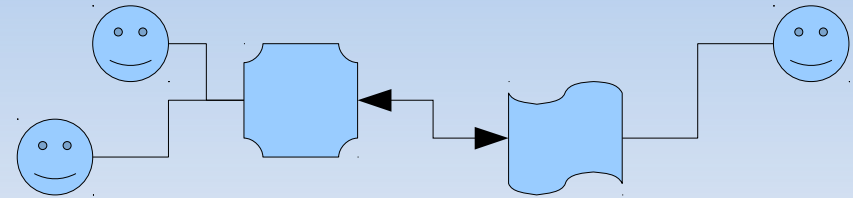
Connect operations to form
financial network protocol

Operations

Reusable operations on records,
transactions and files

Infrastructure

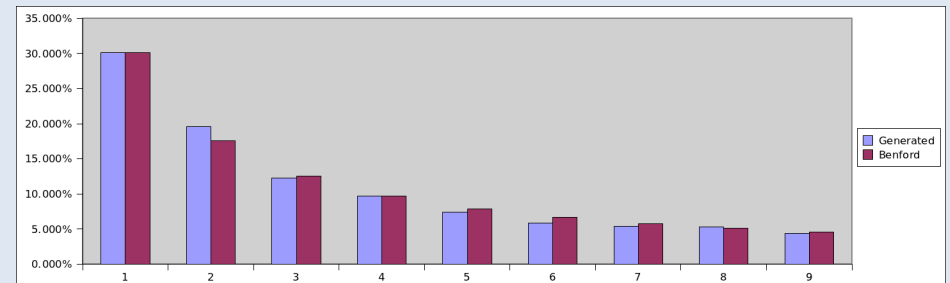
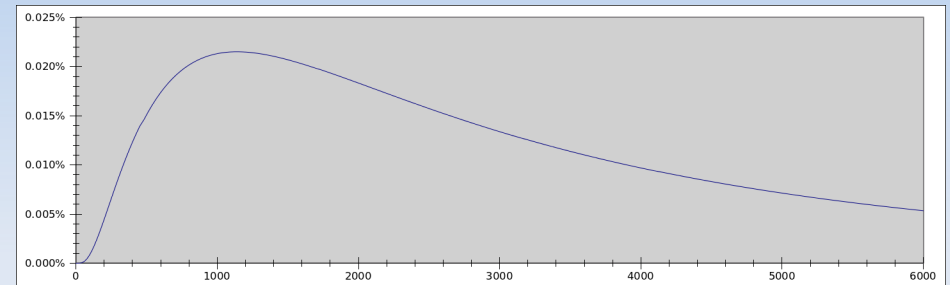
Format and transmission of files



1326279224, 61534798, 1601.75, 369
511, 50221859, 782261, 41585690

Transaction Generator

Timestamp	Trans. ID	Amount	Src BSB	Src Acct	Dest Acct	Dest BSB
1326790606	695022325	1943.07	435991	29295248	751106	32440249
1326267259	126081219	3654.64	639934	42896751	846321	64798697
1327256878	869222785	1661.69	171081	86481353	808795	70421316
1325623324	524257903	6587.51	133382	58673853	527595	51351513
1327850839	81293191	1360.24	623440	35999649	479134	31033644
1325771645	624799893	9569.84	547384	61343570	956880	32062517
1326459262	602892590	2292.07	606729	75250509	825187	24123803
1326245502	487995740	3045.51	179092	46676618	60046	5649766
1327373304	629282587	3753.95	26920	37594633	152568	85336284
1326579153	927487607	923.74	590300	95159997	527738	37395181
1327390931	438643625	4674.83	627028	98268195	780367	86310028
1325780303	857987148	5529.62	143981	60239583	146025	70656443
1325454662	853228059	14723.49	909435	44682039	746210	14127987
1326303867	465114283	13638.23	180887	48256630	704887	59000007
1326610544	391354837	5744.98	158520	1920249	606634	49871384
1325496935	524620042	1519.63	905947	91860196	423485	15673573
1325982179	257772325	2914.9	196067	44690994	197723	22986402
1325836371	329206382	6551.76	592833	821605	962009	10158072
1326581973	195817316	23706.36	45244	40193590	471034	64183437
1326340812	776894611	6192.75	648612	60670789	113859	26023758
1327612383	668863315	2441.73	727988	2285777	720418	9472259
1326449336	39069314	677.77	580866	908303	298299	99310853
1327570074	309706299	4519.79	708158	13847671	644383	99772672
1327673230	996012215	3632.6	416316	58094013	387044	45542437
1326889392	610493721	5109.95	422940	44964150	337458	74427106



Operations

- Insert
- Extract
- Sort
- Filter
- Mux

Combine operations to form complex protocols.

Data Hiding Modules

- Timestamp-LSD

```
> ./trans-gen.py 3
Timestamp, Trans. ID, Amount, Src BSB,
Src Acct, Dest Acct, Dest BSB
1326873450,108377283,3518.06,122021,14867
629,18797,54860426
1325673276,204996482,3202.1,493422,552635
11,245805,97876193
1327483531,633250232,1242.22,484894,27857
799,7756,82752331
> ./insert.py cc-time-1sd 47
1326873457,108377283,3518.06,122021,14867
629,18797,54860426
1325673274,204996482,3202.1,493422,552635
11,245805,97876193
1327483530,633250232,1242.22,484894,27857
799,7756,82752331
> ./extract.py cc-time-1sd
/tmp/2.$$
Code extracted: 47
```

- Amount-cents

```
> ./trans-gen.py 2 | tee /tmp/1.$$
Timestamp, Trans. ID, Amount, Src BSB,
Src Acct, Dest Acct, Dest BSB
1326307380,143760206,16287.89,917654,3493
2956,79322,37059718
1327010633,443511746,11091.68,304417,4179
60,752228,74559508
> ./insert.py cc-amount 47 /tmp/1.$$ |
tee /tmp/2.$$
1326307380,143760206,16287.07,917654,3493
2956,79322,37059718
1327010633,443511746,11091.14,304417,4179
60,752228,74559508
> ./extract.py cc-amount /tmp/2.$$
Code extracted: 47
```

- Split-ratio and more...

Applications

- Money Laundering
 - Detecting the use of Covert Channels
 - Countermeasures
- Money Laundering Detection
 - Watermarking to track suspicious transactions.
 - Determine degrees of separation of suspects

Challenges

- EFTN Documentation
 - Long, Complex and Classified
- Literature Searches
 - New and rapidly changing area
- Transaction Data
 - No real data available
 - Generated transactions

Future Work

- Steganographic analysis of transactions.
- Special purpose financial networks/operations.
- Support for unusual events (e.g. dishonour)
- Further data hiding algorithms and modules.
- More flexibility in generator and insert programs
- More realistic simulation of transaction time and date (requires more data on real transactions).
- Tools/GUI for constructing protocols and node networks.