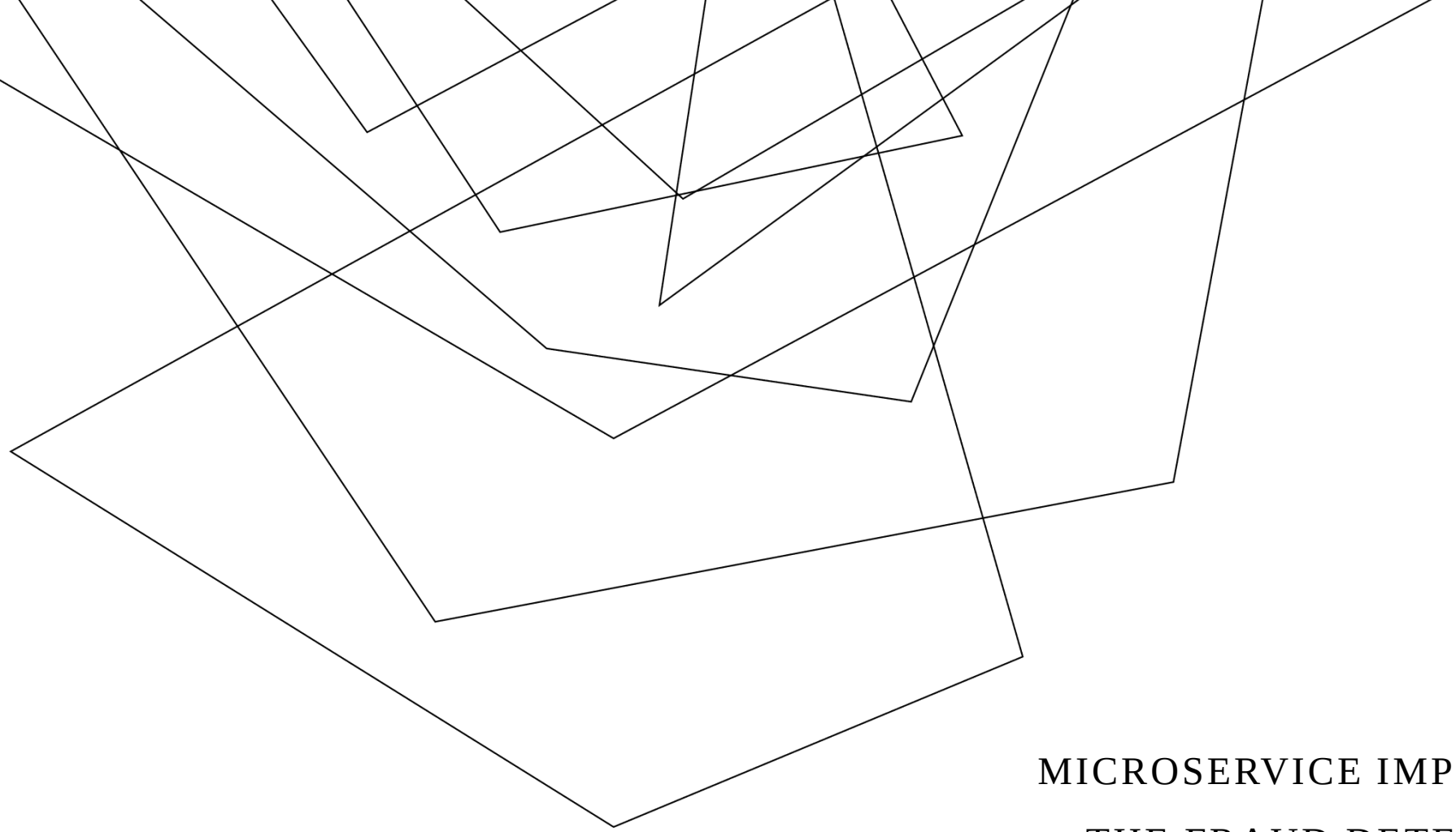

MICROSERVICE IMPLEMENTATION OF THE FRAUD DETECTION RING

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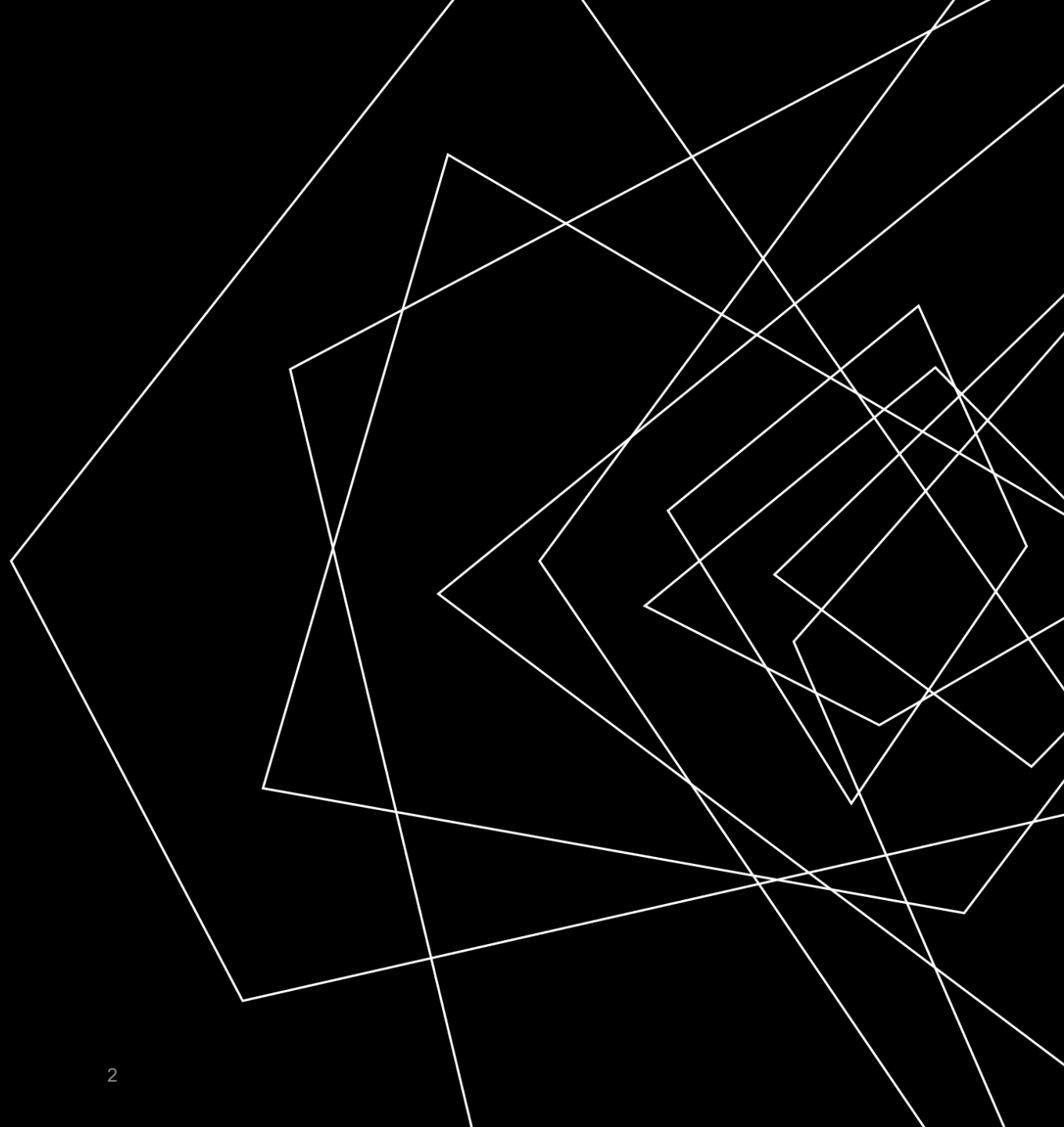
S.V.Vlasov

ABSTRACT

In face of valuable loss of funds by financial organizations around the world, the easy accessible tool for detection of financial fraud and money laundering is been developed and provided as microservice and API for public use. In this paper test data were used to display architecture and interface of the microservice.



Types of frauds and scenarios

There are many tricks used by fraudsters to achieve illegal income or privilege. It can be individual fraud with local bank account or insider information, but mostly it is an organized crime involving network of individuals supporting the fraud. In particular money laundering defined in Wikipedia as following: “Money laundering is the process of changing large amounts of money obtained from crimes, such as drug trafficking, into origination from a legitimate source. It is a crime in many jurisdictions with varying definitions. It is a key operation of organized crime and the underground economy”. Thus, a detection of fraud rings becomes the most important part of the fraud and money laundering detection.

Neo4j Database

The graph database become active development field in recent decade. Graph database stores information about connections or relations between nodes. Different graph analytics methods provide possibility for detection special unordinary connections and clustering of nodes. There are number of popular graph database tools, such as Neo4j, ArangoDb, Dgraph, Cassandra, Apache Giraph to name a few. In the present research we are using Neo4j graph database for building a service for fraud detection ring

TYPICAL SCENARIO

While the details behind each fraudulent collusion vary by operation, the following patterns illustrate how fraudulent gangs generally operate:

Fraud gang of two or more people.

Ring members share a subset of legitimate contact information, i.e., phone numbers, addresses and passport numbers, combining them to create many fictitious identities.

Ring members use these fictitious identities to open accounts.

New accounts are added to the original accounts: unsecured lines of credit, credit cards, personal loans, etc.

Account in normal use, regular purchases, and timely payments.

Banks increase credit lines over time as they observe normal credit behavior.

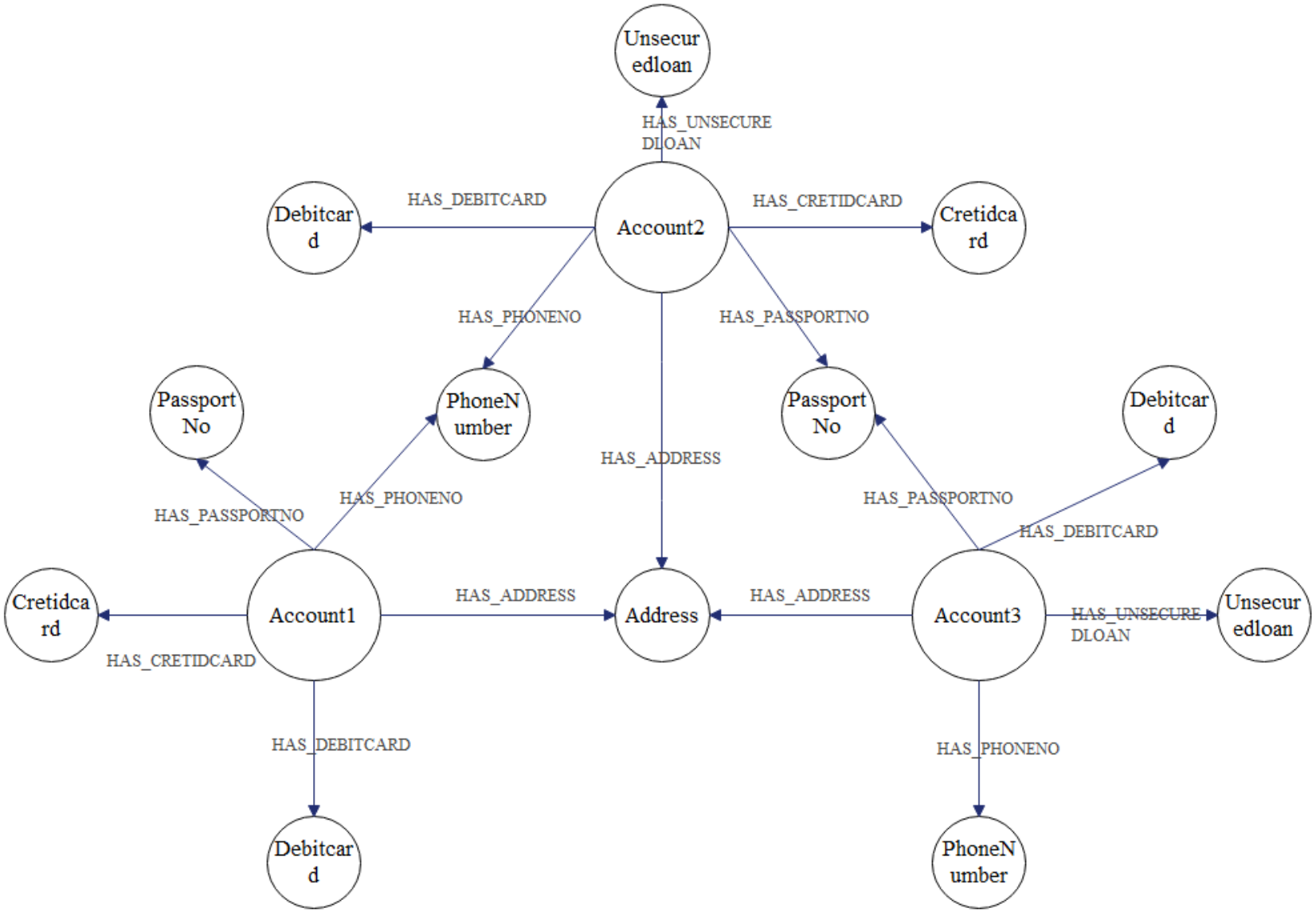
One day, swap members max out all their credits, then disappear.

Sometimes fraudsters go a step further and use fake checks to zero out all balances, doubling their losses.

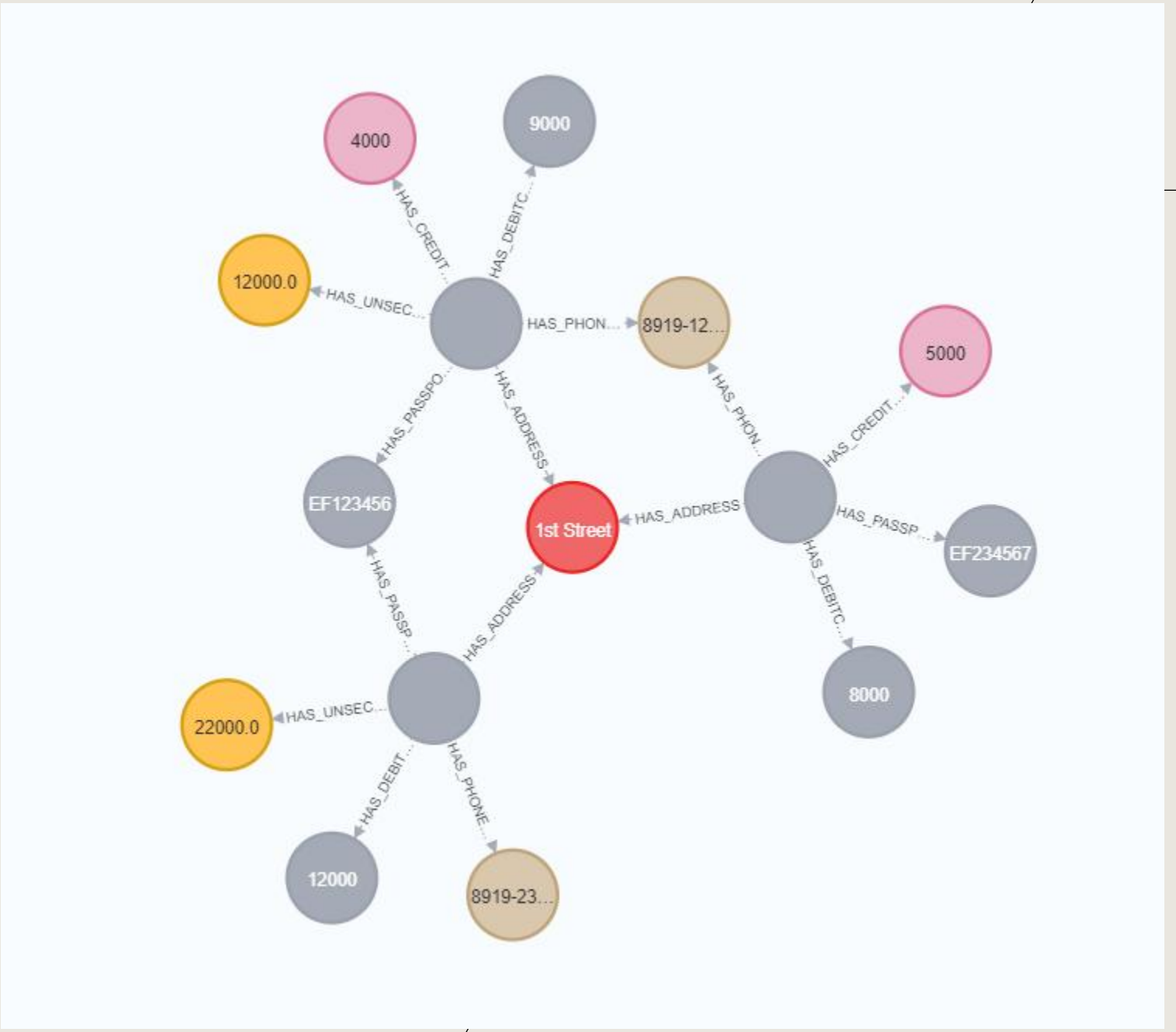
The collection process ensues, but the agent can never reach the fraudster.

Uncollectible debts are written off.

GRAPH DATA MODEL



SAMPLE DATA SET



QUERY STORAGE INFORMATION

Find account holders who share more than one piece of legitimate contact information.
Query 2

```
MATCH (account:Account)-[]->(contactInformation)
WITH contactInformation,
count(account) AS RingSize
MATCH (contactInformation)<-[]-(account)
WITH collect(account.FullName) AS AccountHolders,
contactInformation, RingSize
WHERE RingSize > 1
RETURN AccountHolders AS FraudRing,
labels(contactInformation) AS ContactType,
RingSize
ORDER BY RingSize DESC
```

	FraudRing	ContactType	RingSize
1	["MarryWilliams", "DanBrown", "JackSmith"]	["Address"]	3
2	["DanBrown", "JackSmith"]	["PhoneNumber"]	2
3	["MarryWilliams", "DanBrown"]	["PassportNo"]	2

QUERY TRANSFER INFORMATION

Determine the financial risk of a possible fraud ring.
Query 3

```
MATCH (account:Account)-[]->(contactInformation)
WITH contactInformation,
count(account) AS RingSize
MATCH (contactInformation)<-[]-(account),
(account)-[r:HAS_CREDITCARD|HAS_UNSECUREDLOAN]->(unsecuredAccount)
WITH collect(DISTINCT account.FullName) AS AccountHolders,
contactInformation, RingSize,
SUM(CASE type(r)
WHEN 'HAS_CREDITCARD' THEN unsecuredAccount.LIMIT
WHEN 'HAS_UNSECUREDLOAN' THEN unsecuredAccount.Balance
ELSE 0
END) AS FinancialRisk
WHERE RingSize > 1
RETURN AccountHolders AS FraudRing,
labels(contactInformation) AS ContactType,
RingSize,
round(FinancialRisk) AS FinancialRisk
ORDER BY FinancialRisk DESC
```

	FraudRing	ContactType	RingSize	FinancialRisk
1	["MarryWilliams", "DanBrown", "JackSmith"]	["Address"]	3	25342.0
2	["MarryWilliams", "DanBrown"]	["PassportNo"]	2	25342.0
3	["DanBrown", "JackSmith"]	["PhoneNumber"]	2	9000.0

RESULT

As the result, we can see the accounts of those public information, and you can also check the possible financial

risks of the fraud circle and predict the composition of the members in the fraud circle.

THANKS !