Grey Anatomy: Utilizing Big Data to Reveal Big Fraud

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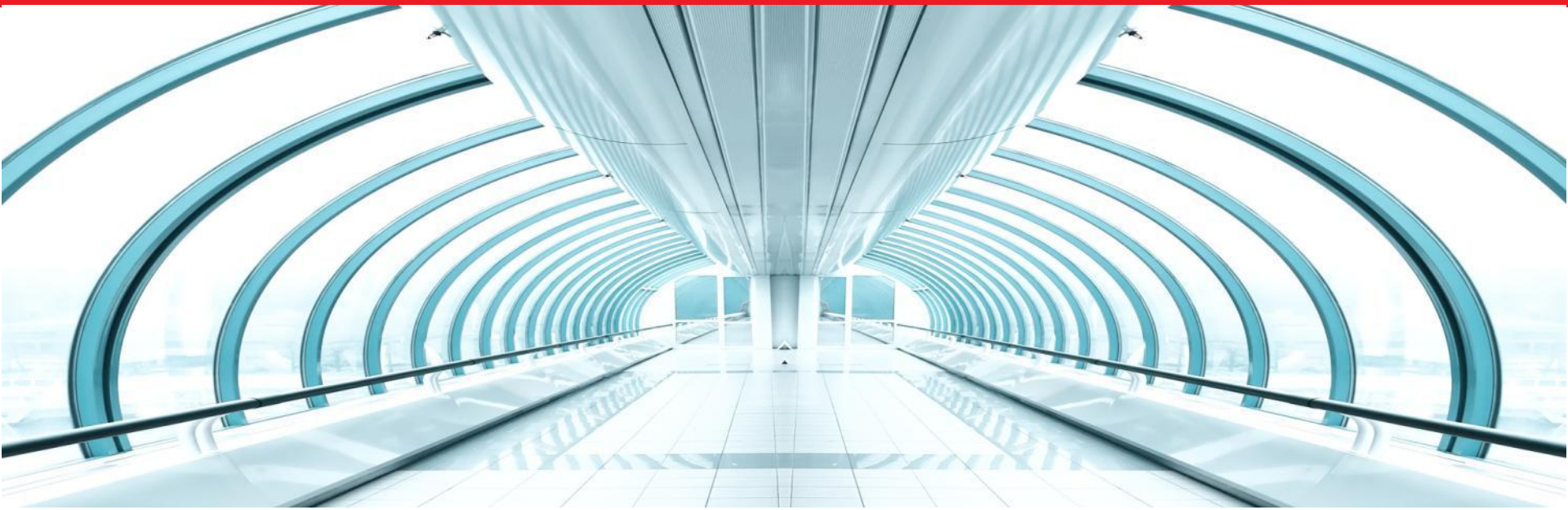
Risk Solutions

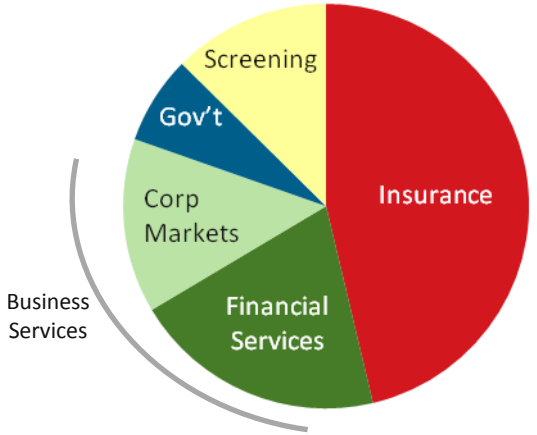
HPCC Systems

LexisNexis Risk Solutions is a leading global provider of content-enabled workflow solutions to help clients across multiple industries predict, assess and manage risk



- Total Revenue: $1.4B (2011)
- Industries Served: Insurance, Background Screening, Financial Services, Receivables Management, Health Care, Legal and Government
- Headquarters: Alpharetta, Georgia
- Number of offices: 27+
- Employees: 3,900

2011 LN Risk Solutions Revenue = $1,389m



Note: Chart excludes c. $100m law firm revenues included in Legal & Professional

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LexID℠ Overview

LexID℠

The fastest linking technology platform available with results that help you make intelligent information connections.

LexID℠ is the ingredient behind our products that turns disparate information into meaningful insights. This technology enables customers using our products to identify, link and organize information quickly with a high degree of accuracy.

LexID is the linking technology behind our products that helps customers:

Get a More Complete Picture.
Make intelligent information connections beyond the obvious by drawing insights from both traditional and new sources of data.

Better Results, Faster.
Use the fastest technology for processing large amounts of data to help you solve cases more quickly and confidently.

Protect private information.
Keep customer SSNs and FEINs secure and enjoy peace of mind knowing you are taking steps to observe the highest levels of privacy and compliance.

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Who does our technology serve?

- Approximately 70 percent of local governments
- Approximately 80 percent of federal agencies
- Approximately 90 percent of Fortune 500 corporations
- Thousands of smaller businesses
- Academia
- Research Centers

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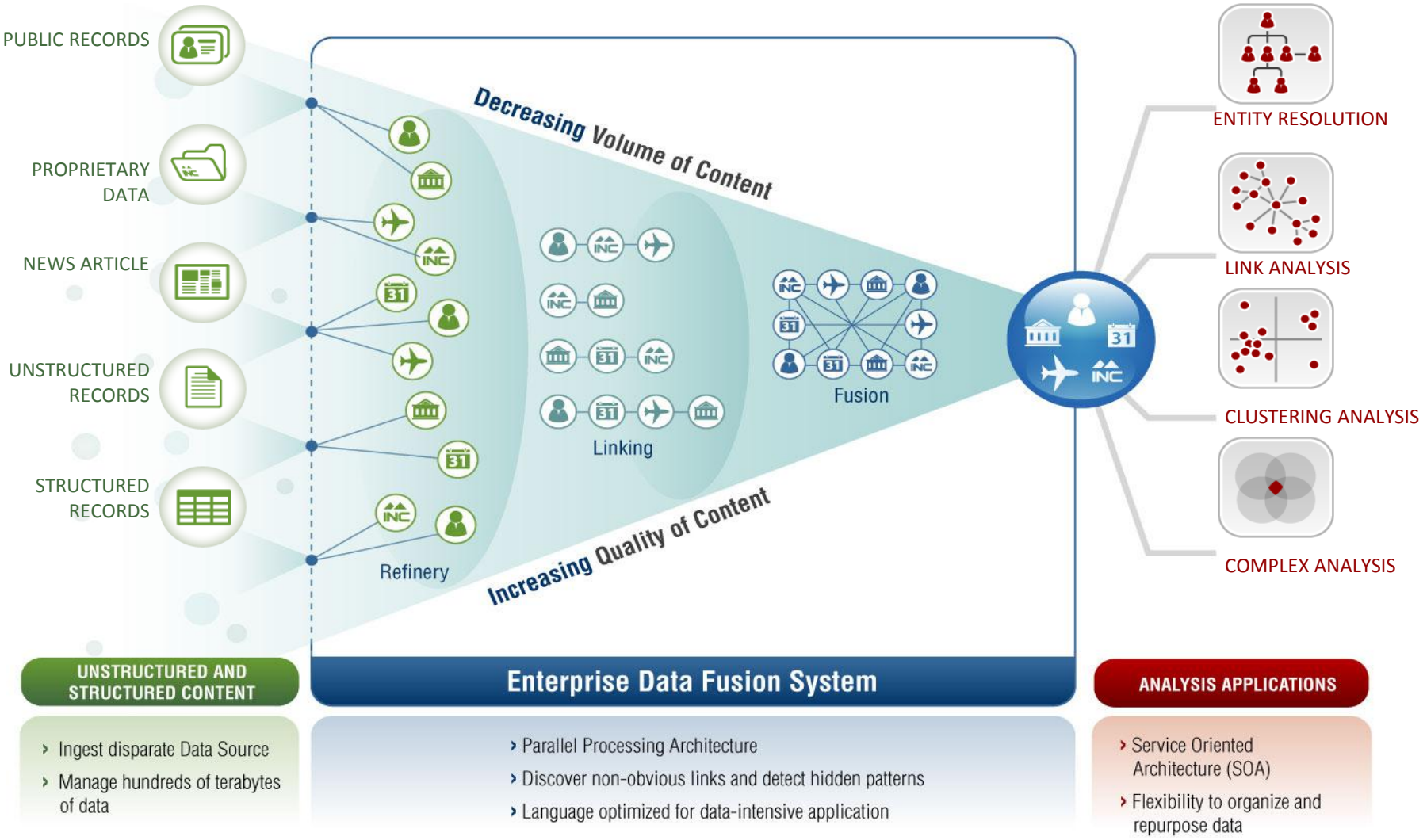
Each of you uses this platform.



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Types of data

- Structured
- Unstructured
- Semi Structured
- Free Text
- Big Endian
- Little Endian
- CSV
- XML
- CSV
- Fixed Width
- …
- and more

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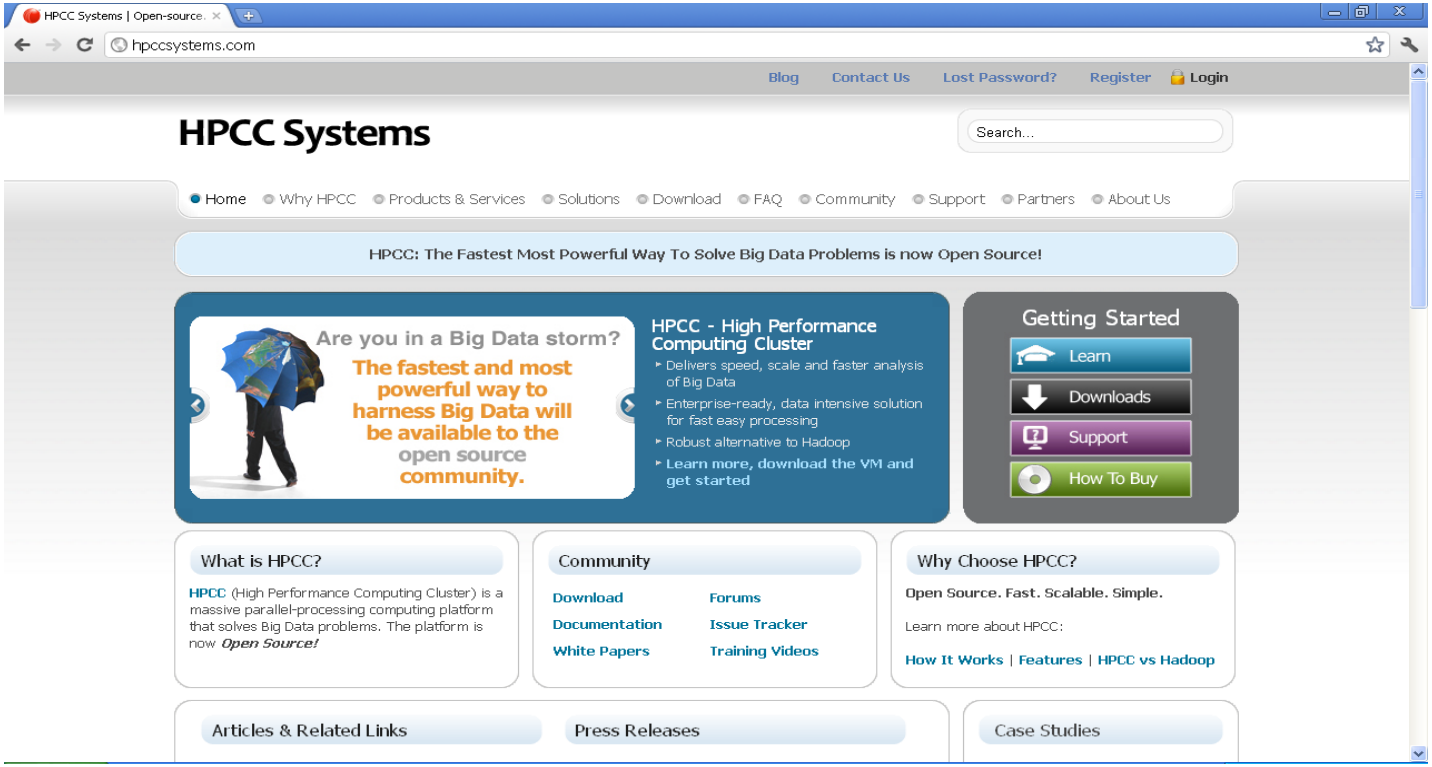
This platform is now available to you

http://hpccsystems.com
http://aws.hpccsystems.com

Take Note



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Free Training Available to Academia

Available to faculty and researchers based on availability.

Students included if faculty participate.

Contact:
Charles.Kaminski@LexisNexis.com

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Our Technical People
Who Continue to Improve the Platform

Data Intensive Computing

- HPC
- Machine Learning
- Programming Language Development
- NLP

Big Data Analytics

- Professors
- Researchers
- Students
- Seasoned Engineers
- Predictive Experts
- Modeling Experts

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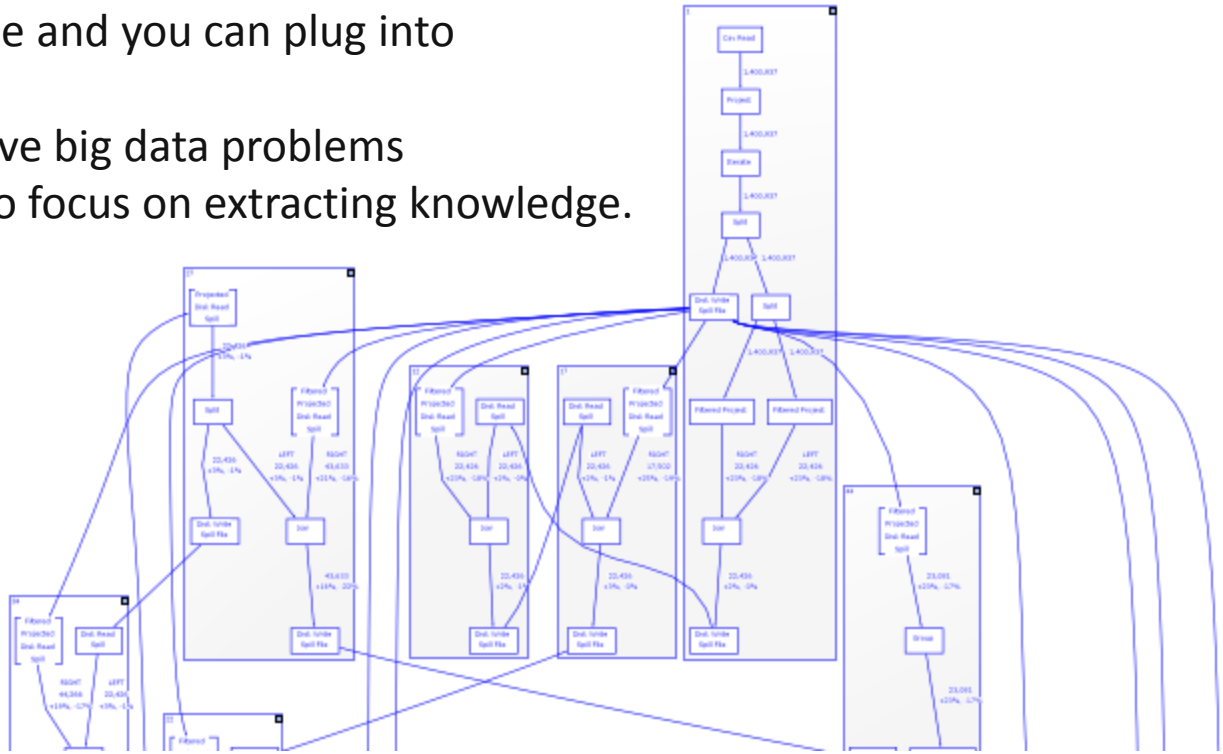
How are we different?

- We can solve problems difficult or impossible to solve with map reduce
- Engineering teams are smaller and faster
- Write fewer lines of code
- Technology stack is smaller and has fewer moving parts
- The language is extendable and you can plug into existing packages.
- Many researchers now have big data problems
- The platform allows you to focus on extracting knowledge.



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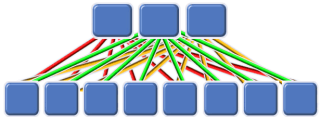
The Major Parts

Thor

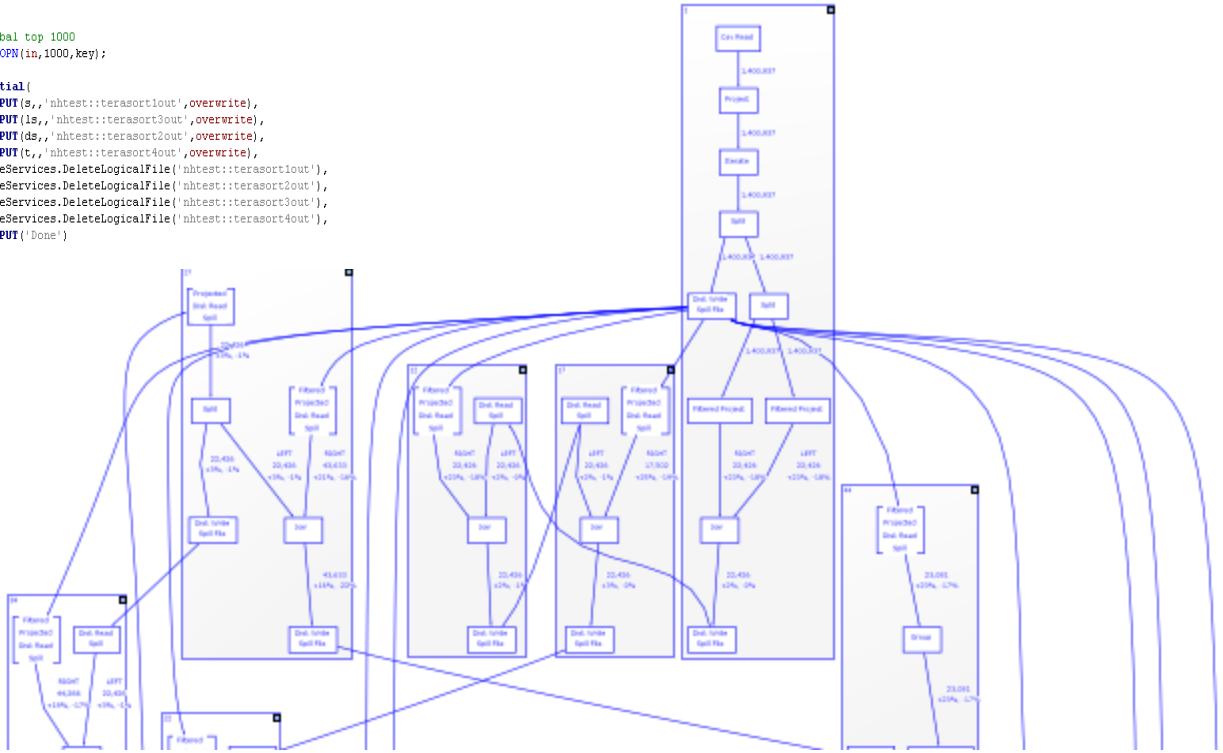
Roxie



ECL

1

```
// TeraByte Sort Benchmark
import lib_fileservices;

rec := record
     string10  key;
     string10  seq;
     string80  fill;
       end;

in := DATASET('nhtest::terasort1',rec,FLAT);

// global sort
s:= SORT(in,key);


// local sort
ls:= SORT(in,key,local);

// radix distribute/local sort
d := DISTRIBUTE(in,((((unsigned4)(>unsigned1<)key[1])-32)*95+(unsigned4)(>unsigned1<)key[2]-32) DIV 23);
ds := SORT(d,key,local);


// global top 1000
t := TOPN(in,1000,key);

sequential(
   OUTPUT(s,,'nhtest::terasort1out',overwrite),
   OUTPUT(ls,,'nhtest::terasort3out',overwrite),
   OUTPUT(ds,,'nhtest::terasort2out',overwrite),
   OUTPUT(t,,'nhtest::terasort4out',overwrite),
   FileServices.DeleteLogicalFile('nhtest::terasort1out'),
   FileServices.DeleteLogicalFile('nhtest::terasort2out'),
   FileServices.DeleteLogicalFile('nhtest::terasort3out'),
   FileServices.DeleteLogicalFile('nhtest::terasort4out'),
   OUTPUT('Done')
);
```



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How the platform makes it happen

- The right architectural decisions early on.
- Few moving parts.
- The Data Scientist have the power and control over the whole data lifecycle.
- Big data doesn’t mean big teams.

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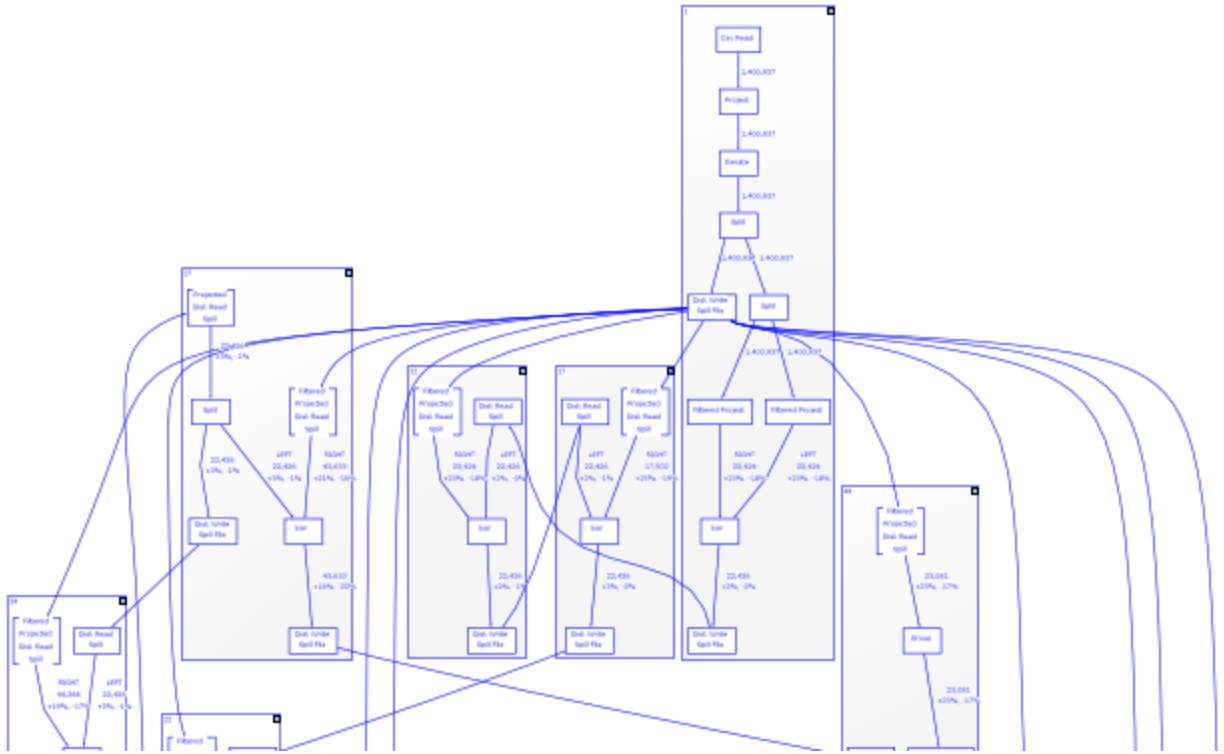
Bringing up a cluster with one click



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Big Data

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Opportunities for Payers to Leverage Big Data

- **Claims Processing**
  - Identify ineligible claims before payment is made
  - Implementing automated systems for fraud detection
  - Confirming accuracy and consistency of claims

- **Business Intelligence**
  - Creating contributory databases that allow participants to provide their own data in exchange for receiving a more robust set of aggregated data back that delivers insight into the broader marketplace.

- **Influencing a broad range of wellness activities**
  - Using patient behavior and sentiment data to influence individual adherence to treatment regimes, drug compliance and lifestyle changes.

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Challenge Facing Health Care Enterprises: Big data getting bigger

***Big Data*: Datasets whose size is beyond the ability of typical database software tools to capture, store, manage and analyze**

- Disparate data is spread across separate physical locations
- Scale of data Is huge…and growing every day
- Adding relationships exponentially expands the size of the Big Data analytics challenge.
- The amount of data available is more than the human mind can organize and use, but too valuable to ignore …$300B??

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Social Network Analytics Helps Make Sense of Big Data

- Social network analytics identifies relationship clusters leveraging “big data” and advanced linking to reveal relationships that would otherwise be hidden , enabling an understanding of who the individual is “in the world”

- Social network analytics can reveal
  - Provider and patient relationships with known perpetrators of health care fraud
  - Links between recipients, businesses, and assets, as well as relatives and associates
  - Understanding of support systems and stress factors
  - Stability and credibility

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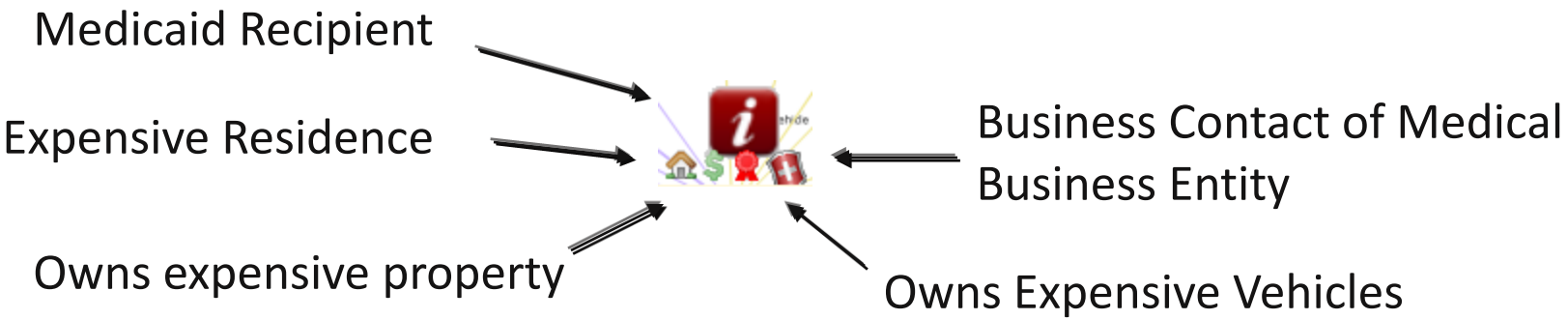
Cluster Visualization Introduction



1. Detection and visualization of a large cluster containing associated active Medicaid recipients who have unusual lifestyle data points. Note: Slick Willy and his icons for vehicle, residence and property.
2. Zoomed in view of Slick Willy to see his vehicles and his relationship to business contacts of Medical Business Entities and other Medicaid Recipients.
3. Prima Donna, lives at expensive residence, owns expensive property, owns expensive vehicles and is a business contact of a medical business entity. Her cluster is connected adjacently to the Slick Willy cluster.

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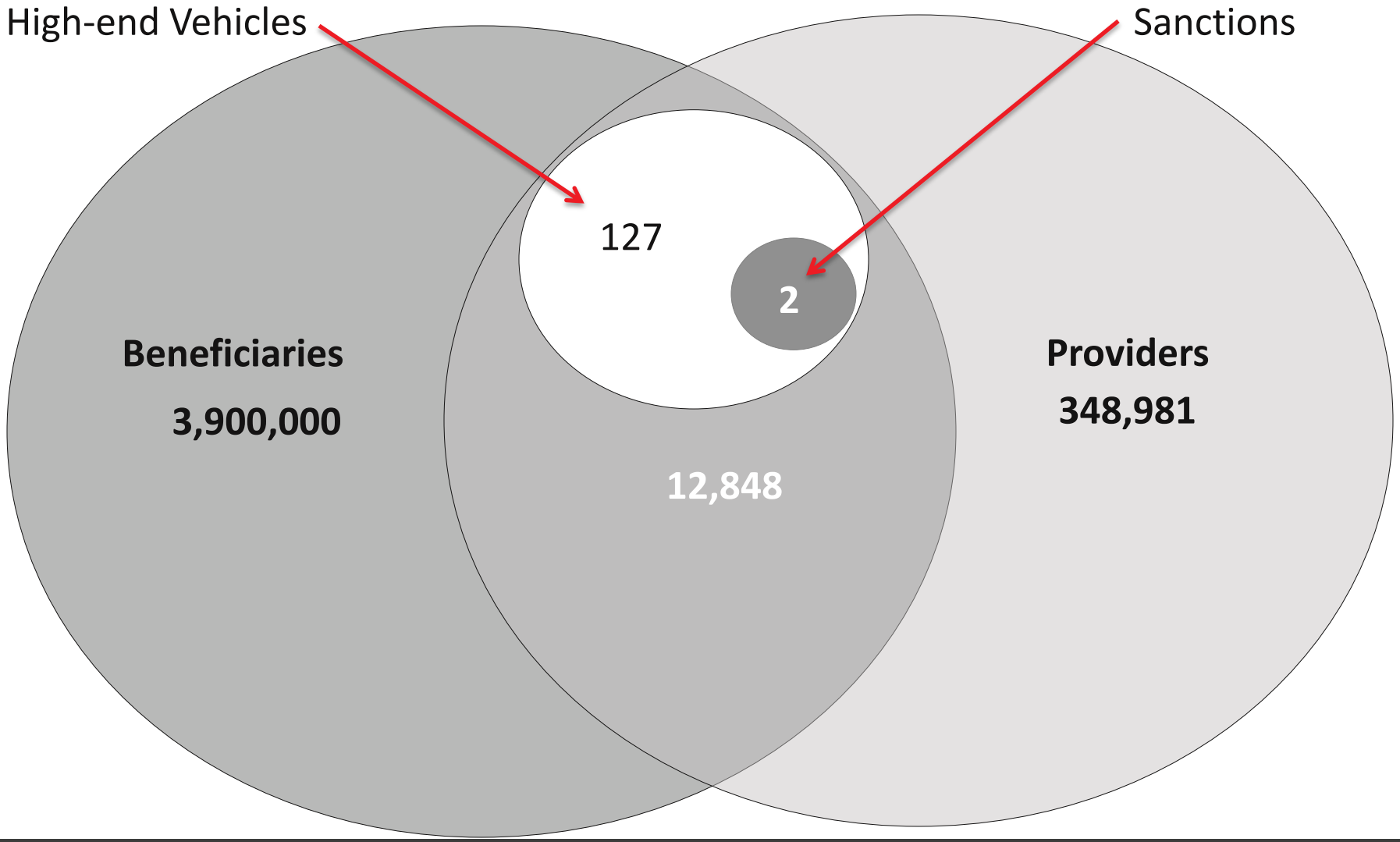
Social Network Analytics: Provider/Beneficiary Overlap



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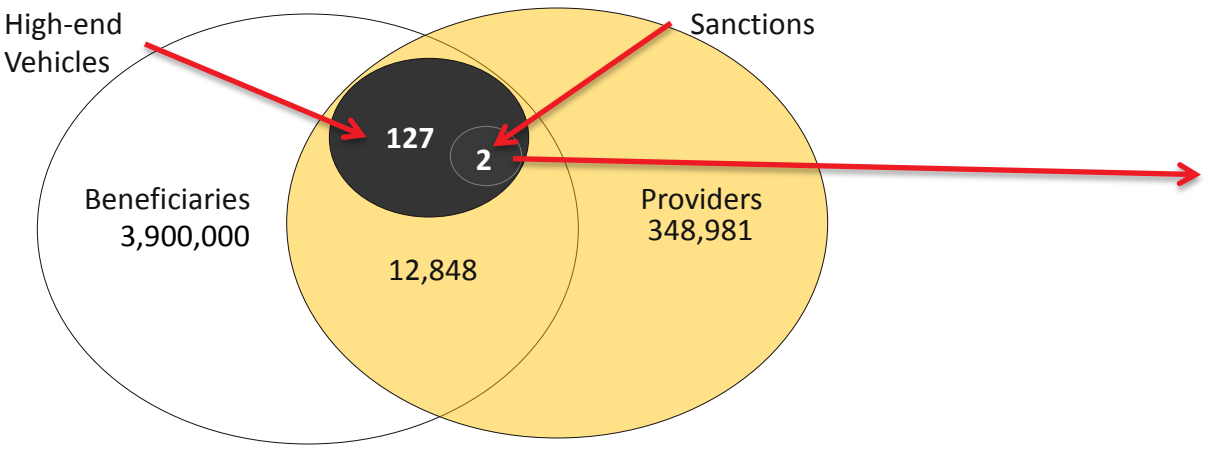
Social Network Analytics Example



Interesting Indicators

2009 Acura RL White (base price $50K)

Medicaid Beneficiary

Registered Provider

Numerous Medical Business Ownerships (discussed below)

Exclusions & Sanctions

02/20/2006 HHS: Debarred / Excluded

09/14/2006 OPM: Debarred / Suspended

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Multiple Businesses – Single Address

Name: A Plus Medicaid Services
Address: …

Name: A Plus Medicaid Services, Inc.
Address: …

Name: A Plus Medical Supplies Inc.
Address: …

Name: A Plus Pharmacy
Address: …

Name: AAA Diagnostic Center
Address: …

Name: A to A Mortgage
Address: …

Name: AA Pharmacy & Discount
Address: …

Name: A to Z Pharmacy
Address: …

Name: Little A Pharmacy Inc
Address: …

Name: A Plus Diagnostic Corp
Address: …

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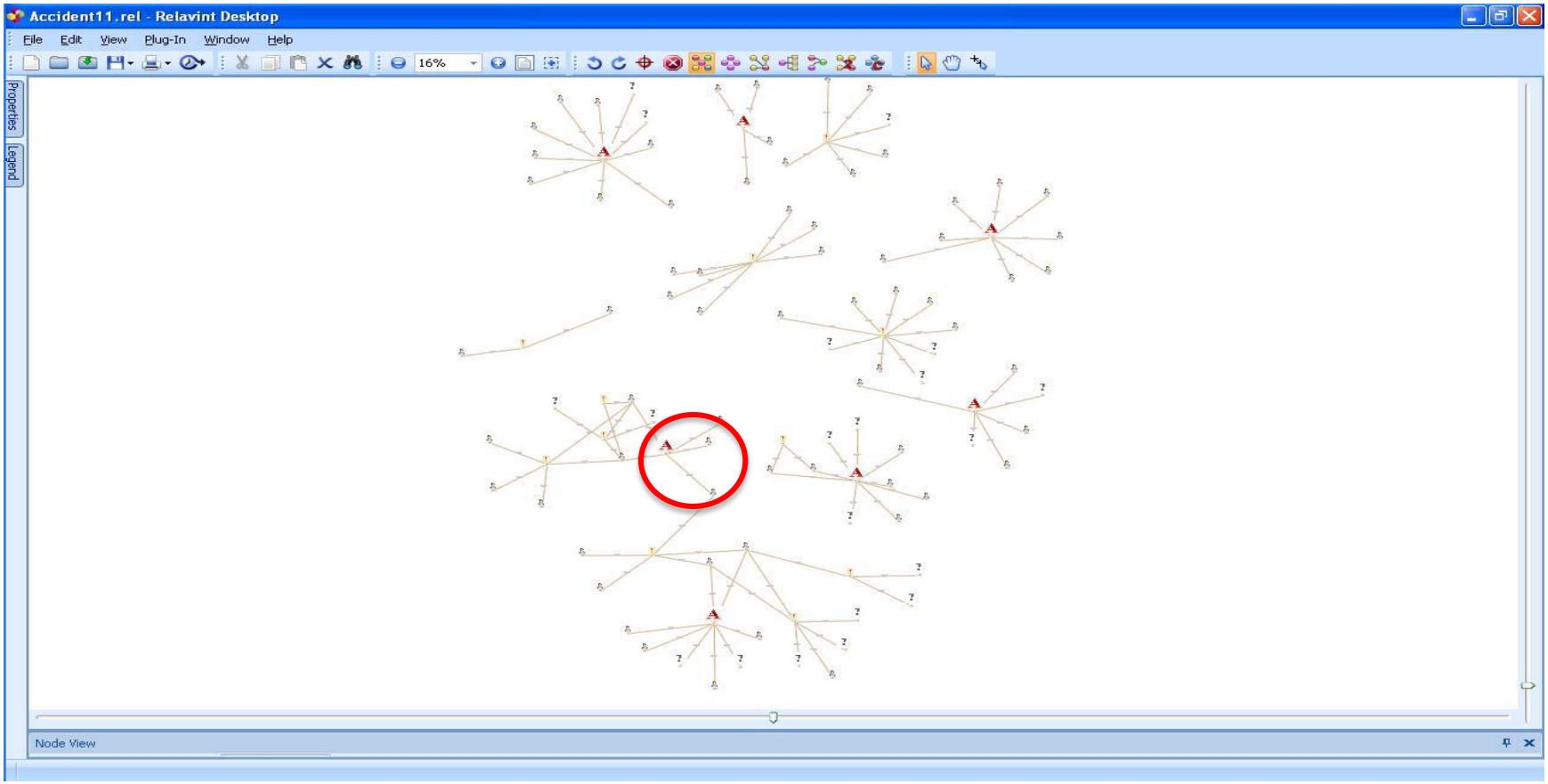
Social Network Analytics: Example 2
Case study *BEFORE* Linking

Started with 7 claims that a Top Insurer identified as "fraudulent claims"



Using the Carrier data, a connection was found between 2 of the 7 claims

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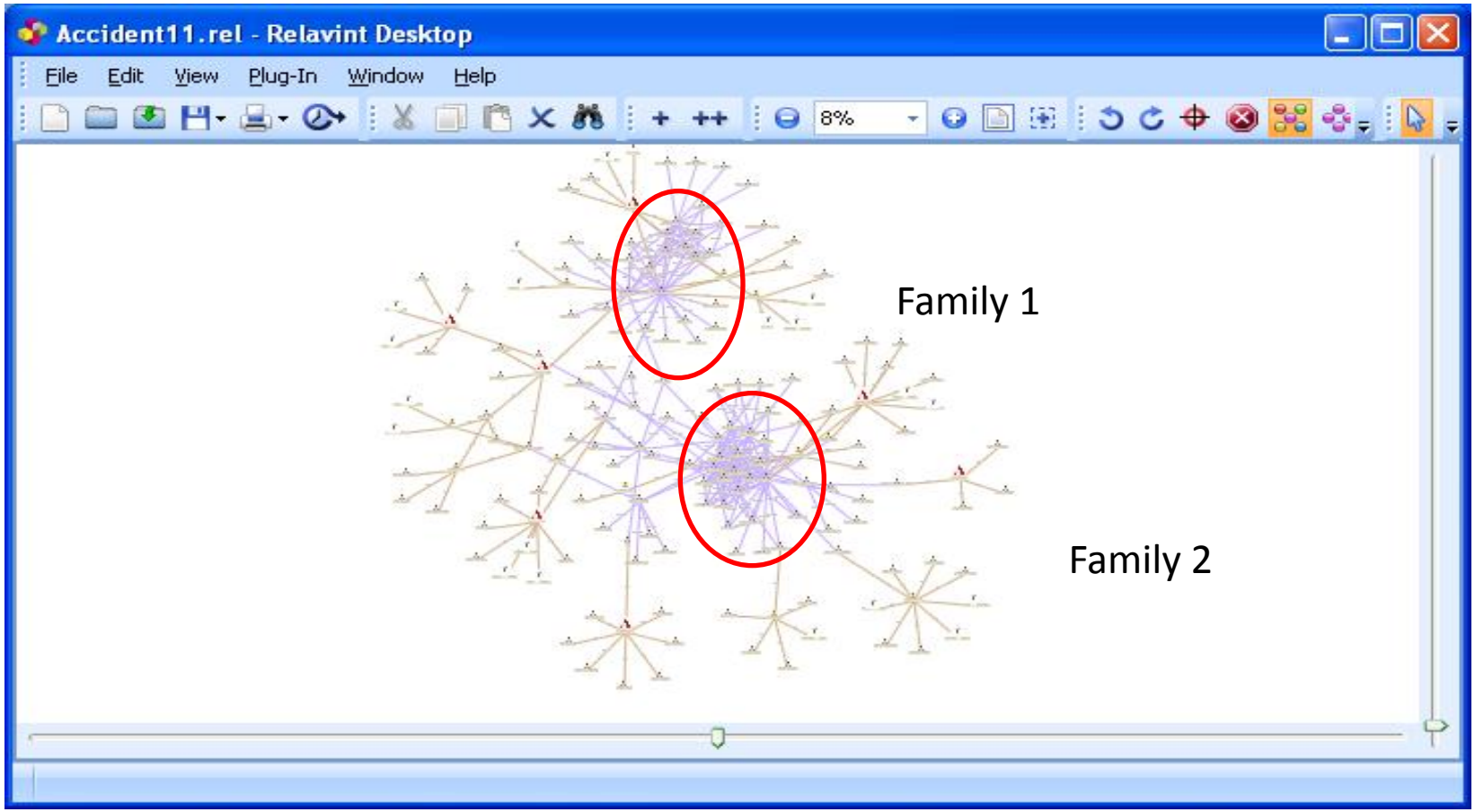
Social Network Analytics: Example 2
Case study *AFTER* Linking

Assigned unique ID to all parties and added 2 additional degrees of relative data



Revealed 2 family groups connected to the 7 original claims plus linked to 11 more claims

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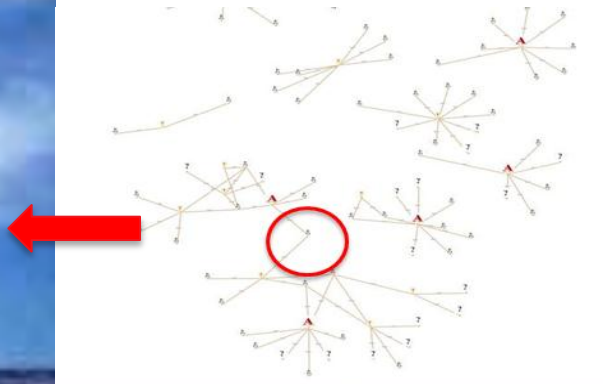
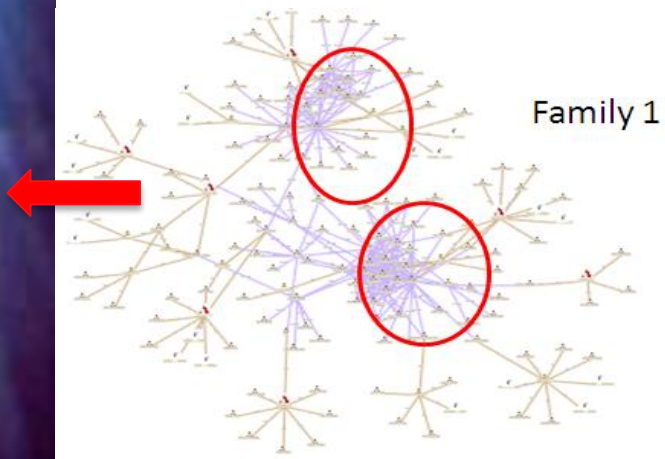
Social Network Analytics Get Below the Surface



Traditional investigation and relationship analytics tools without linking technology only scratch the surface of fraudulent activities.

7 claims @ an average of $200,000 each = $1.4M



Next generation relationship linking analytics allows you to get below the surface to find collusive behavior not otherwise visible, dramatically increasing potential for savings.

18 claims @ an average of $200,000 each = $3.6M

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Questions?

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In Summary: Key message

The HPCC Platform is an enterprise-ready platform for Big Data.

LexisNexis® solutions for health care payers deliver information-rich analytic tools that address key challenges including identity management, fraud, waste and abuse prevention, and data enrichment.

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