Big Data for Oracle Professionals

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Big Data Explorer

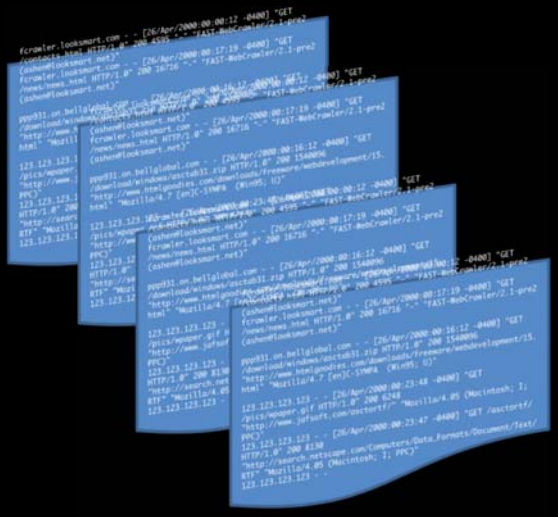
NoSQL
YARN
Hadoop
Map/Reduce
Spark
Flume.

YAHOO!

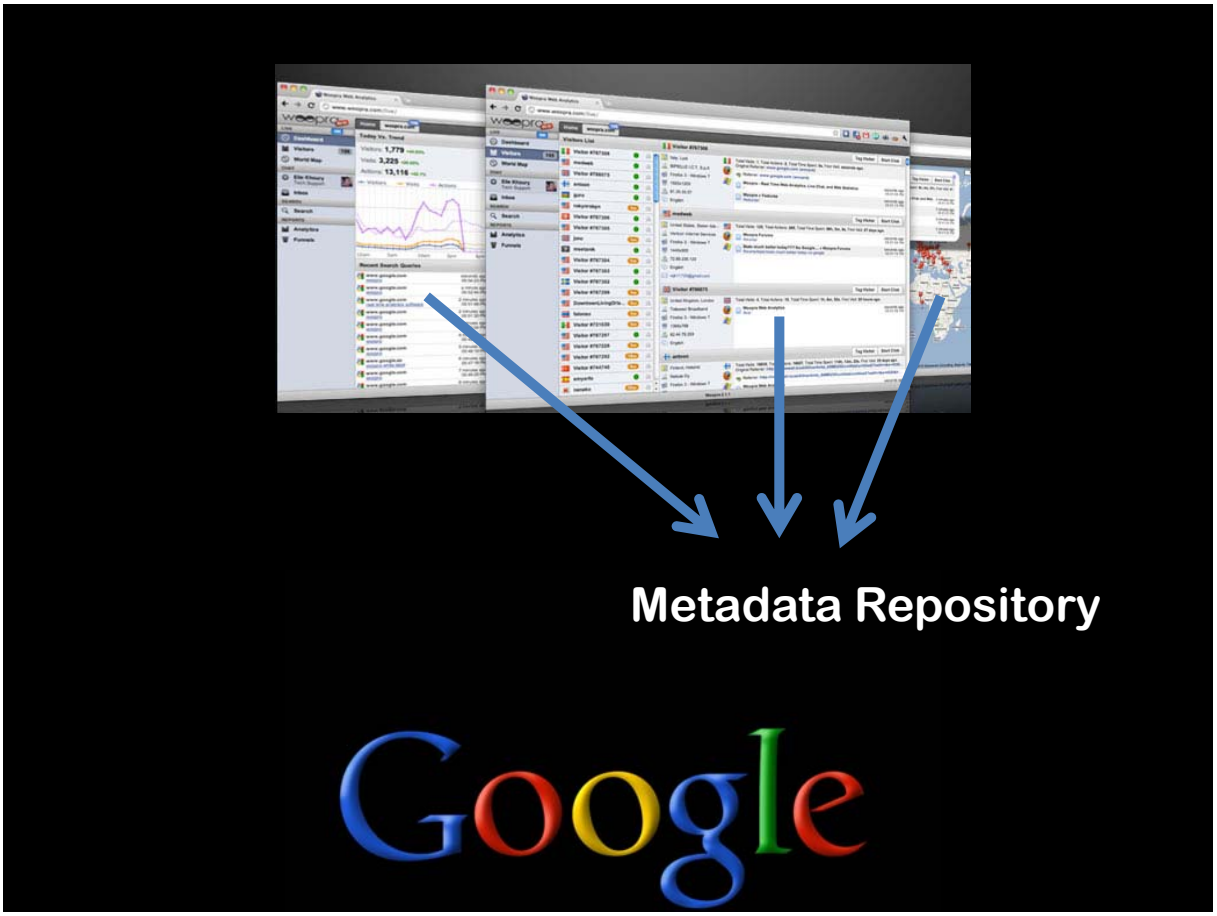
```
fcrawler.looksmart.com - - [26/Apr/2000:00:00:12 -0400] "GET /contacts.html
HTTP/1.0" 200 4595 "-" "FAST-WebCrawler/2.1-pre2 (ashen@looksmart.net)"
fcrawler.looksmart.com - - [26/Apr/2000:00:17:19 -0400] "GET /news/news.html
HTTP/1.0" 200 16716 "-" "FAST-WebCrawler/2.1-pre2 (ashen@looksmart.net)"

ppp931.on.bellglobal.com - - [26/Apr/2000:00:16:12 -0400] "GET
/download/windows/asctab31.zip HTTP/1.0" 200 1540096
"http://www.htmlgoodies.com/downloads/freeware/webdevelopment/15.html"
"Mozilla/4.7 [en]C-SYMPA  (Win95; U)"

123.123.123.123 - - [26/Apr/2000:00:23:48 -0400] "GET /pics/wpaper.gif HTTP/1.0"
200 6248 "http://www.jafsoft.com/asctortf/" "Mozilla/4.05 (Macintosh; I; PPC)"
123.123.123.123 - - [26/Apr/2000:00:23:47 -0400] "GET /asctortf/ HTTP/1.0" 200
8130 "http://search.netscape.com/Computers/Data_Formats/Document/Text/RTF"
"Mozilla/4.05 (Macintosh; I; PPC)"
123.123.123.123 - -
```

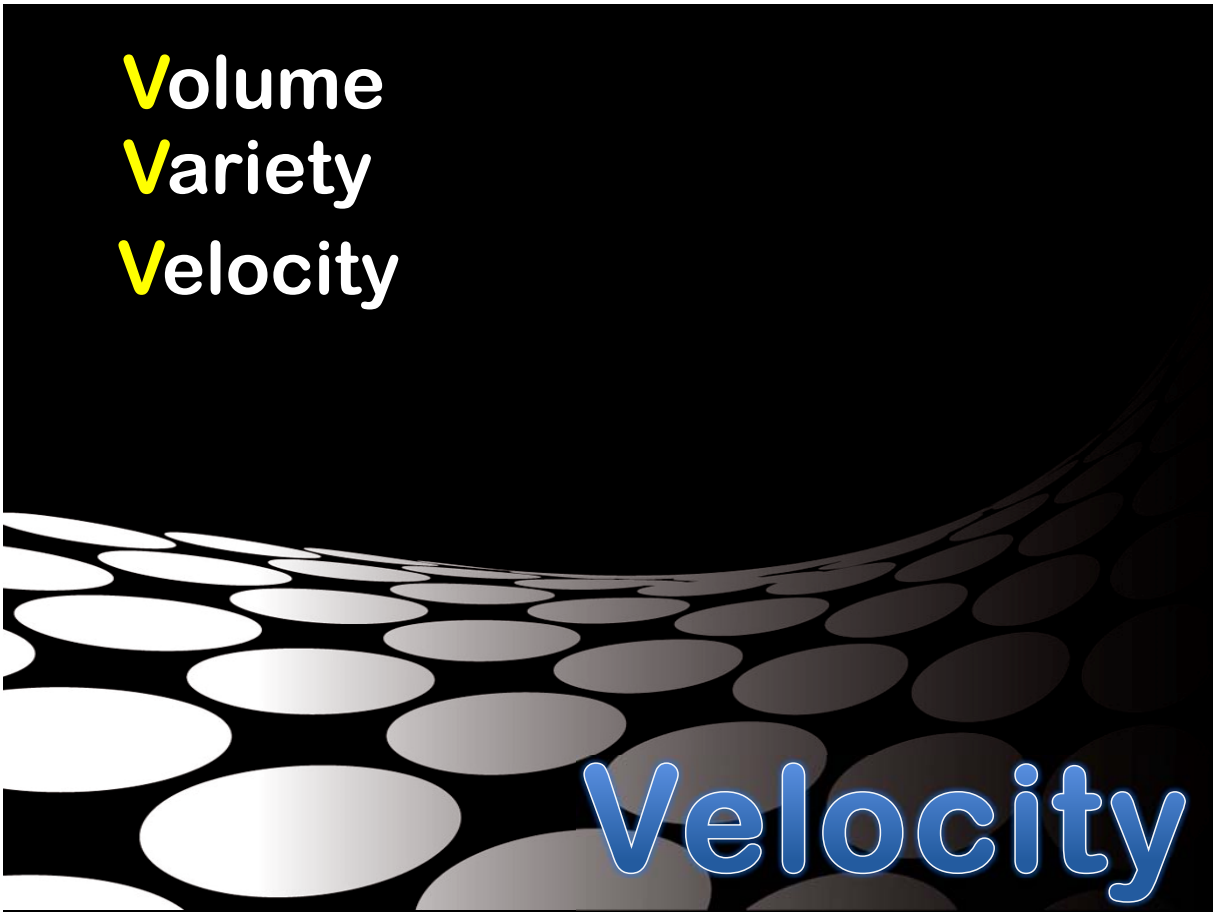


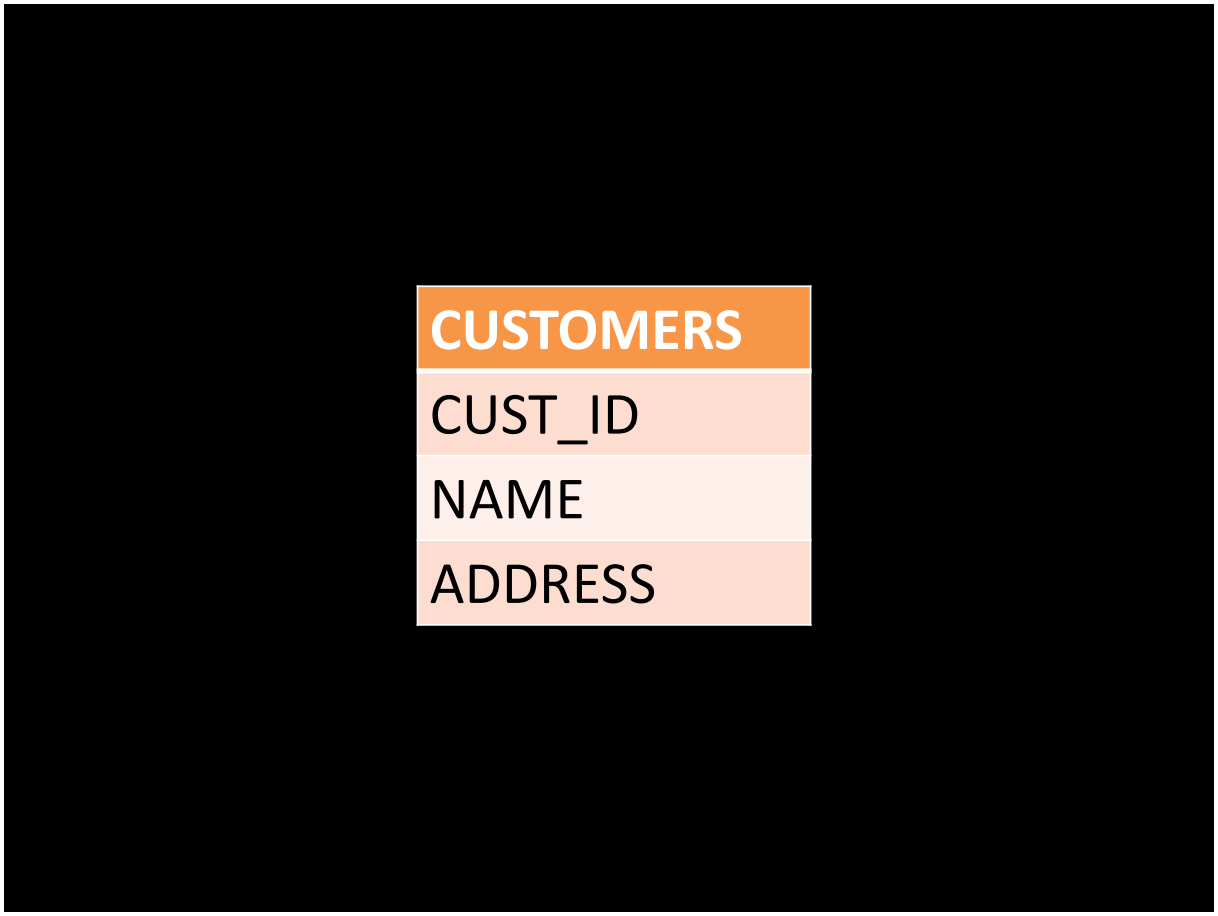
petabytes
unpredictable format
transient.

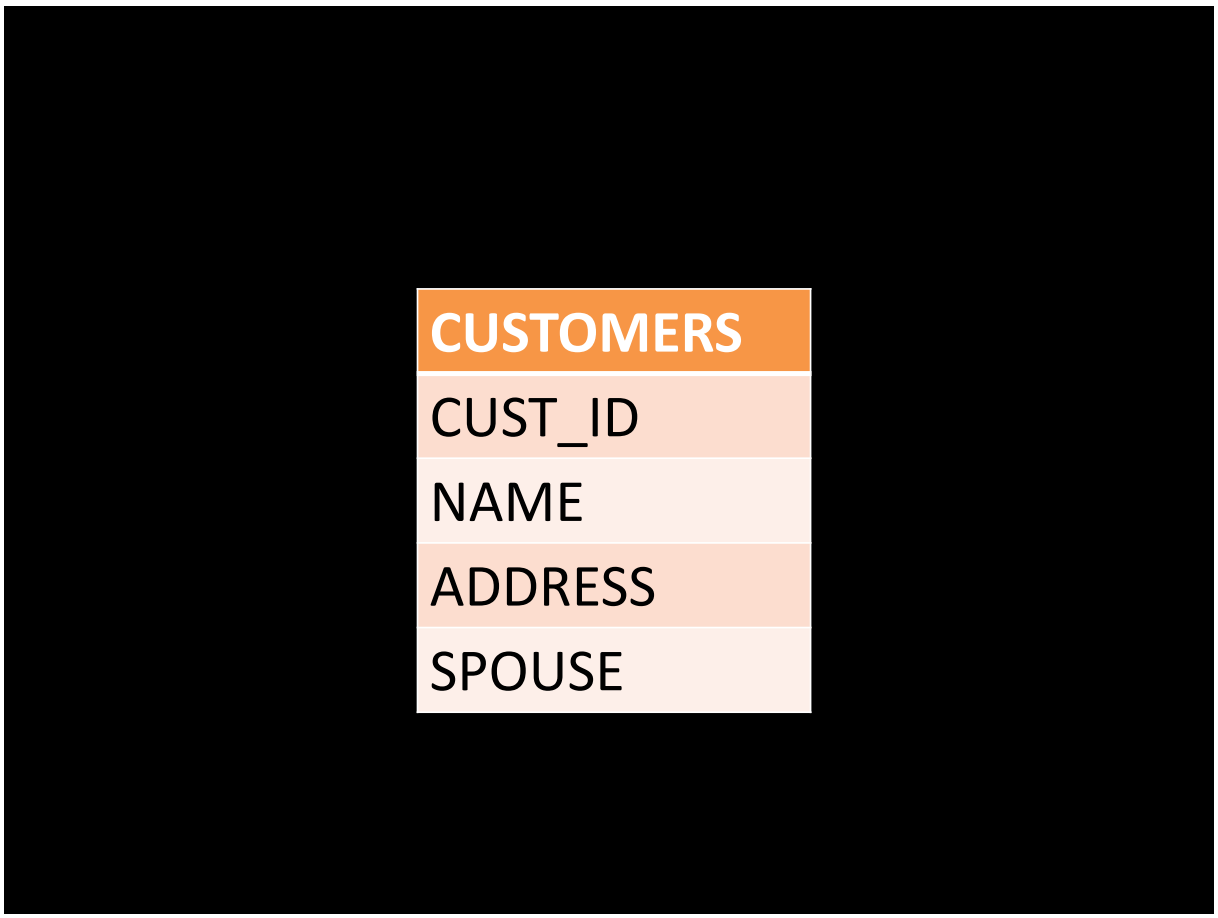

Metadata Repository
Google

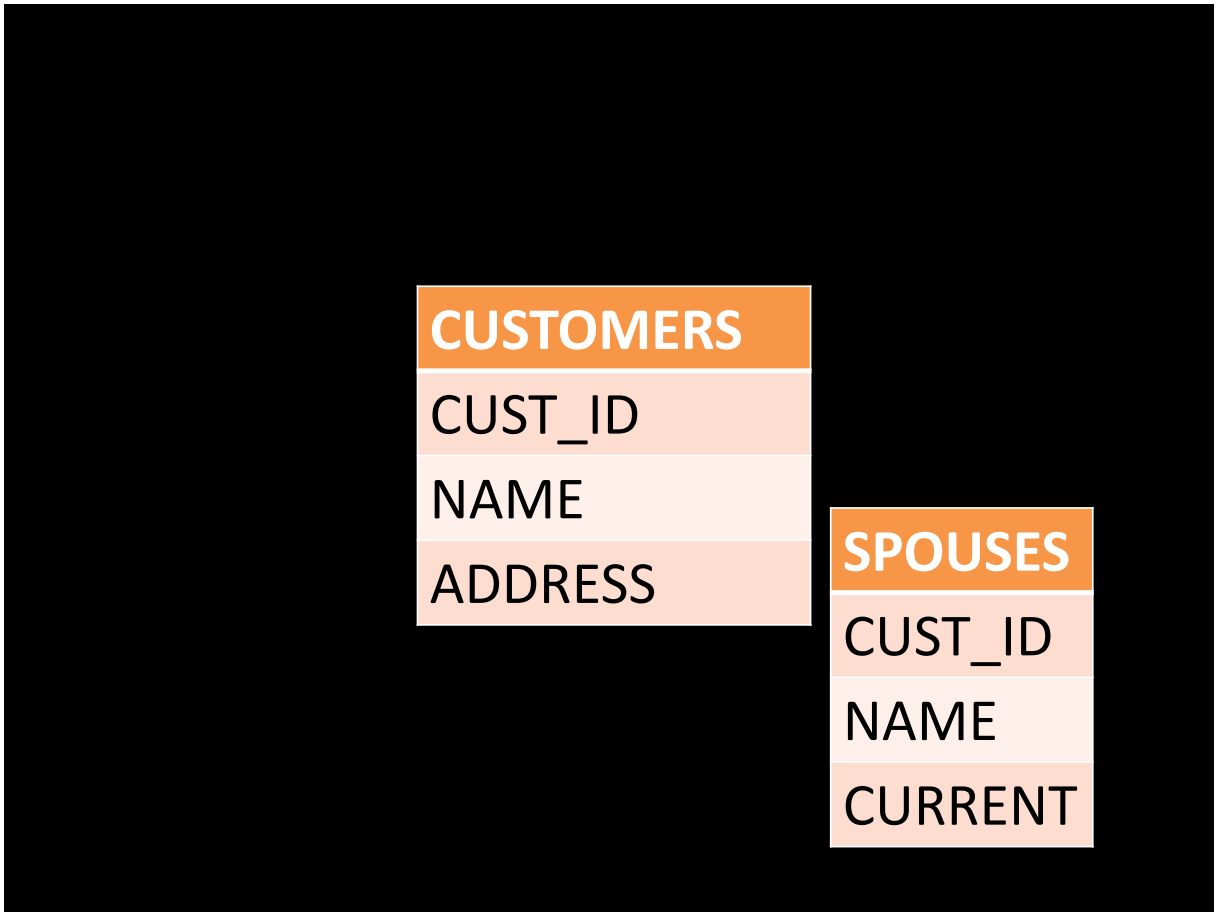

Volume

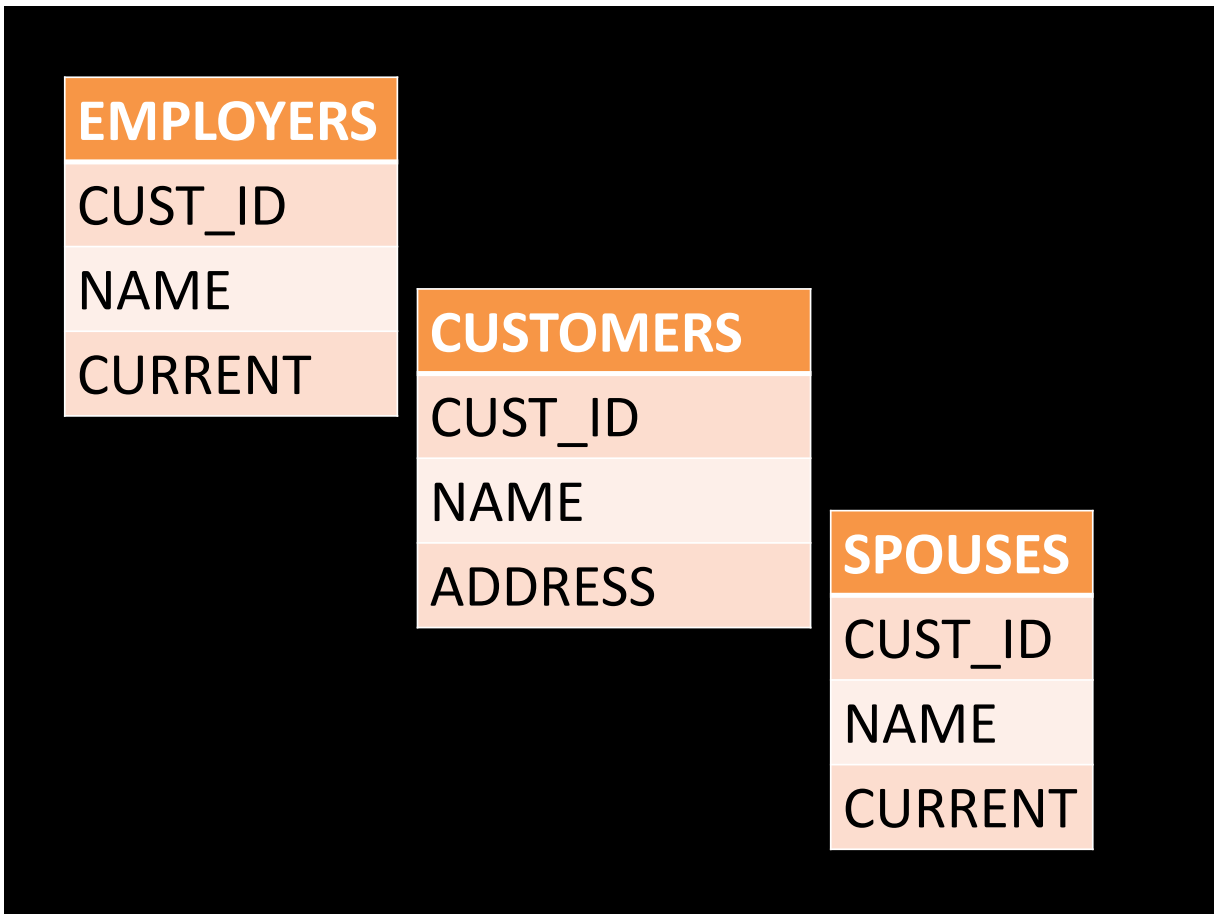
Volume
Variety
Velocity




CUSTOMERS
CUST_ID
NAME
ADDRESS


CUSTOMERS
CUST_ID
NAME
ADDRESS
SPOUSE

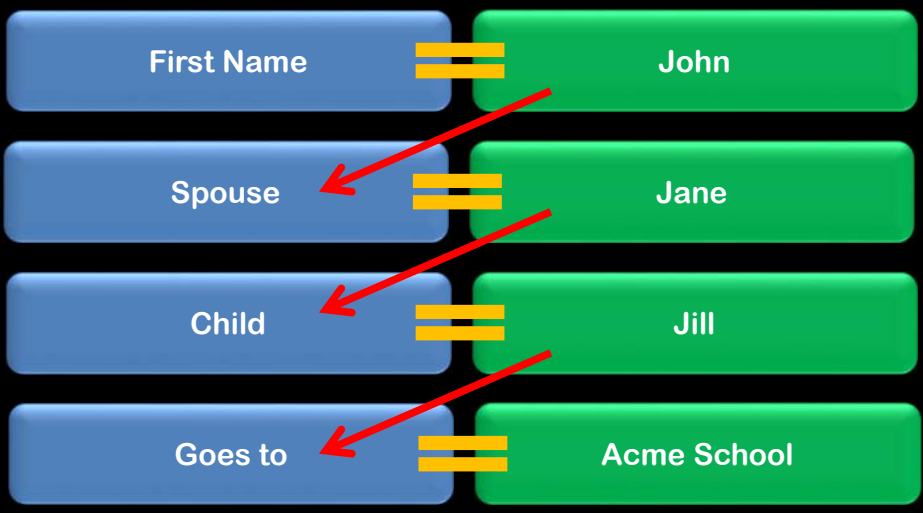

CUSTOMERS
CUST_ID
NAME
ADDRESS
SPOUSES
CUST_ID
NAME
CURRENT

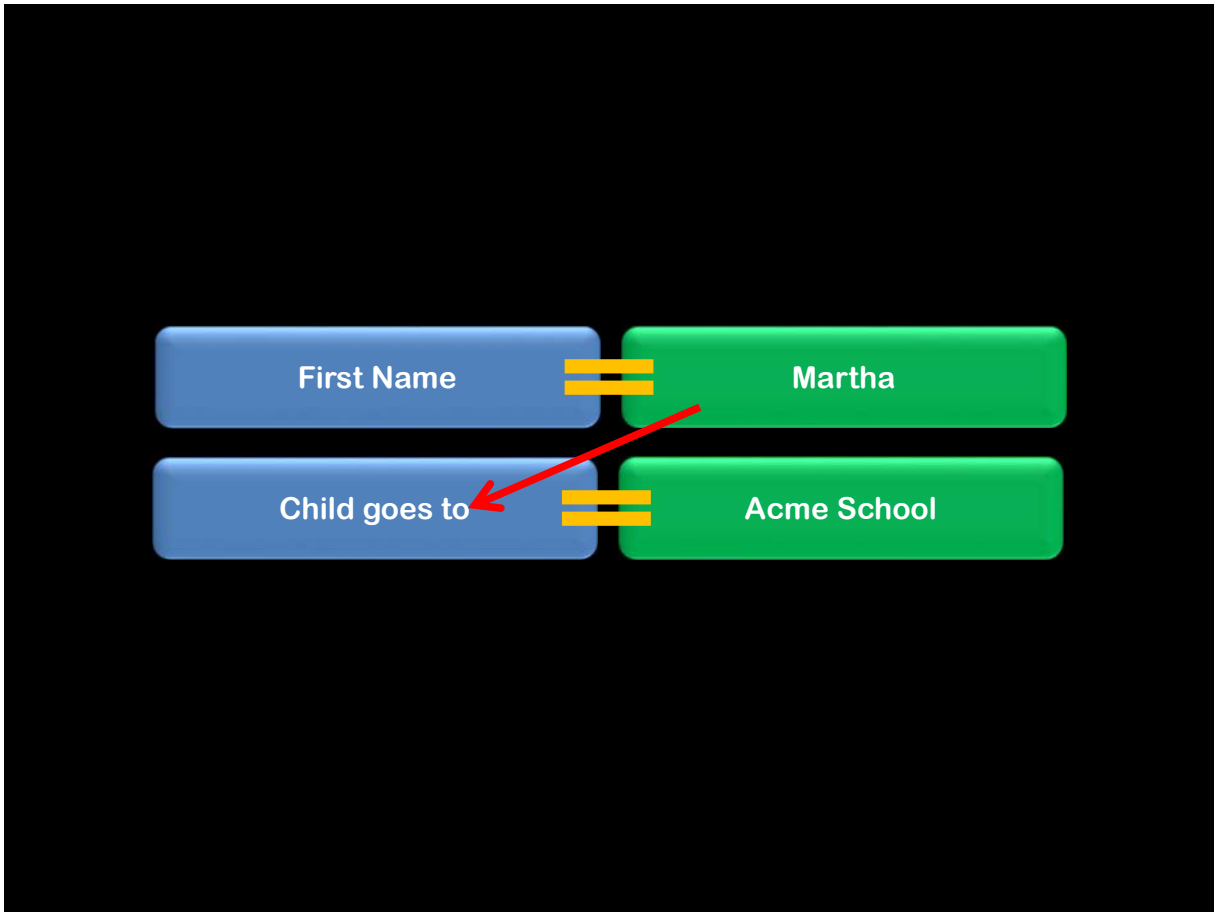

EMPLOYERS
CUST_ID
NAME
CURRENT
CUSTOMERS
CUST_ID
NAME
ADDRESS
SPOUSES
CUST_ID
NAME
CURRENT

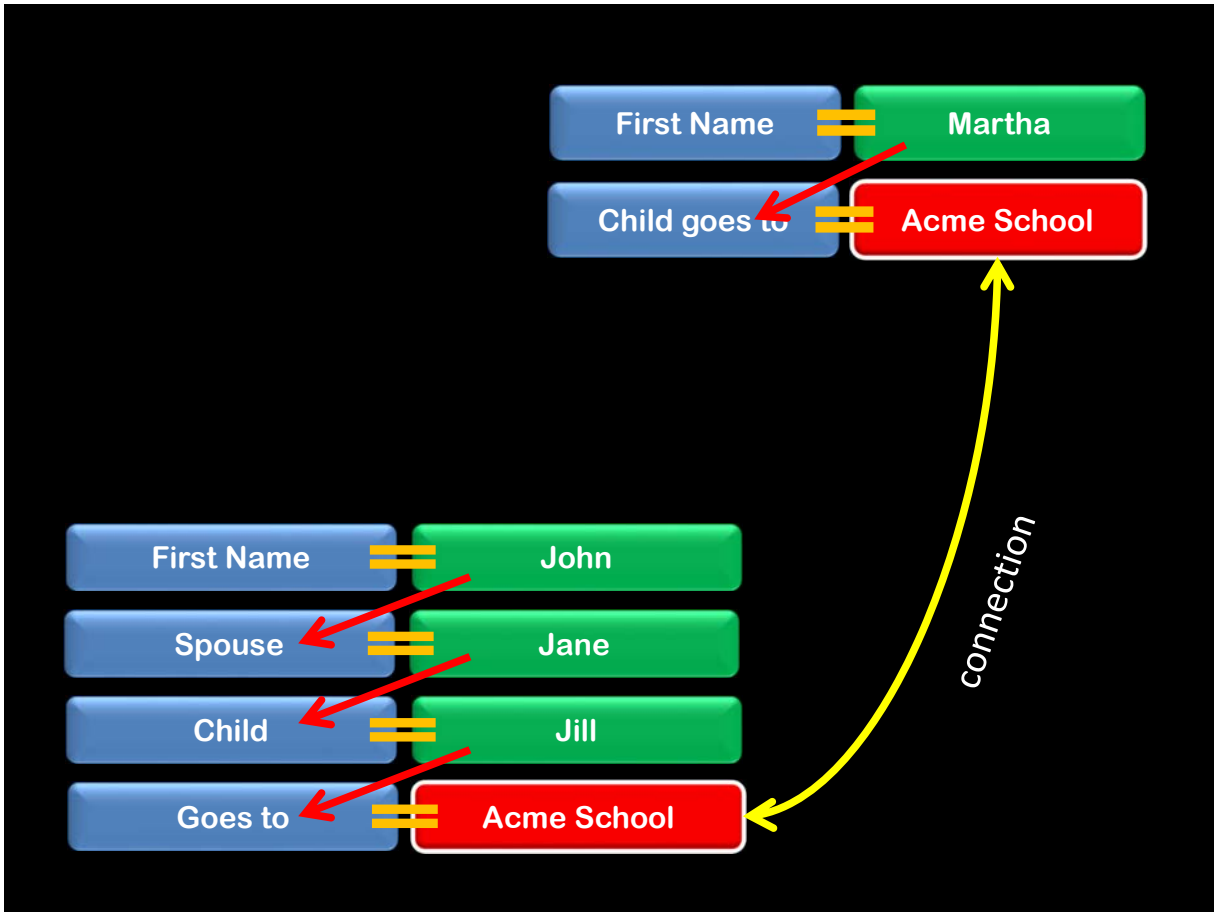
Mutually Exclusive, Maybe not?

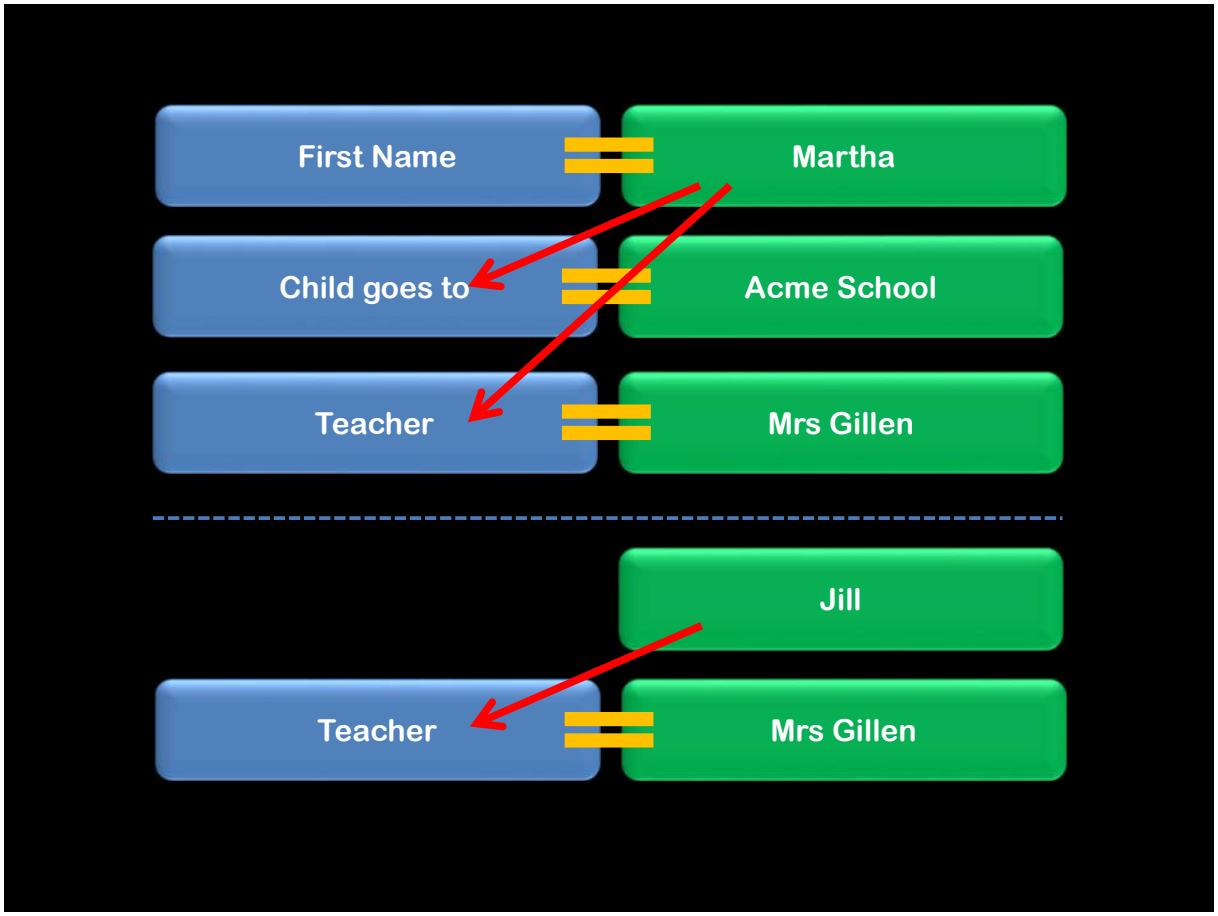
Name = Data
Relationship status = Data
Married to = Data
In a relationship with = Data
Friends = Data, Data, Data
Likes = Data, Data

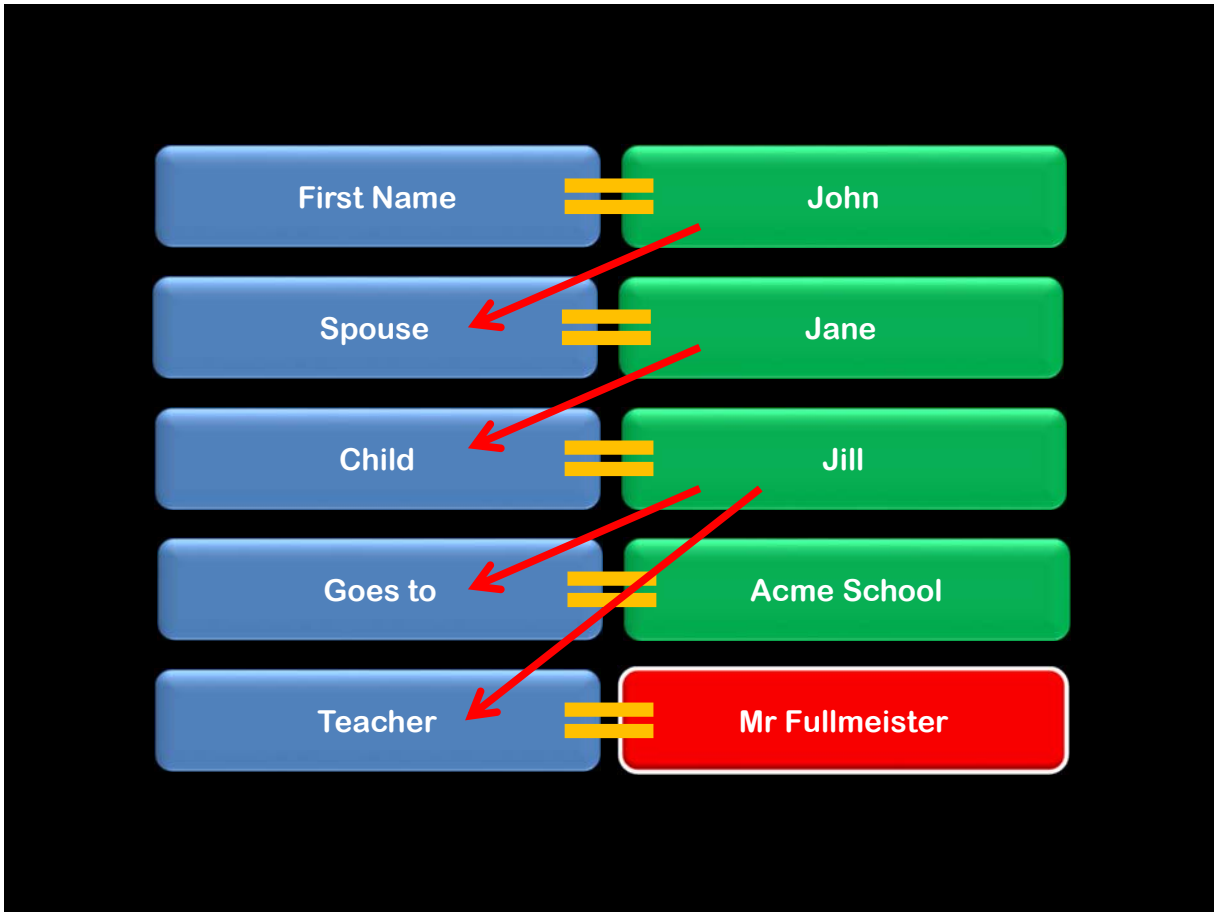
Multiple Data Points

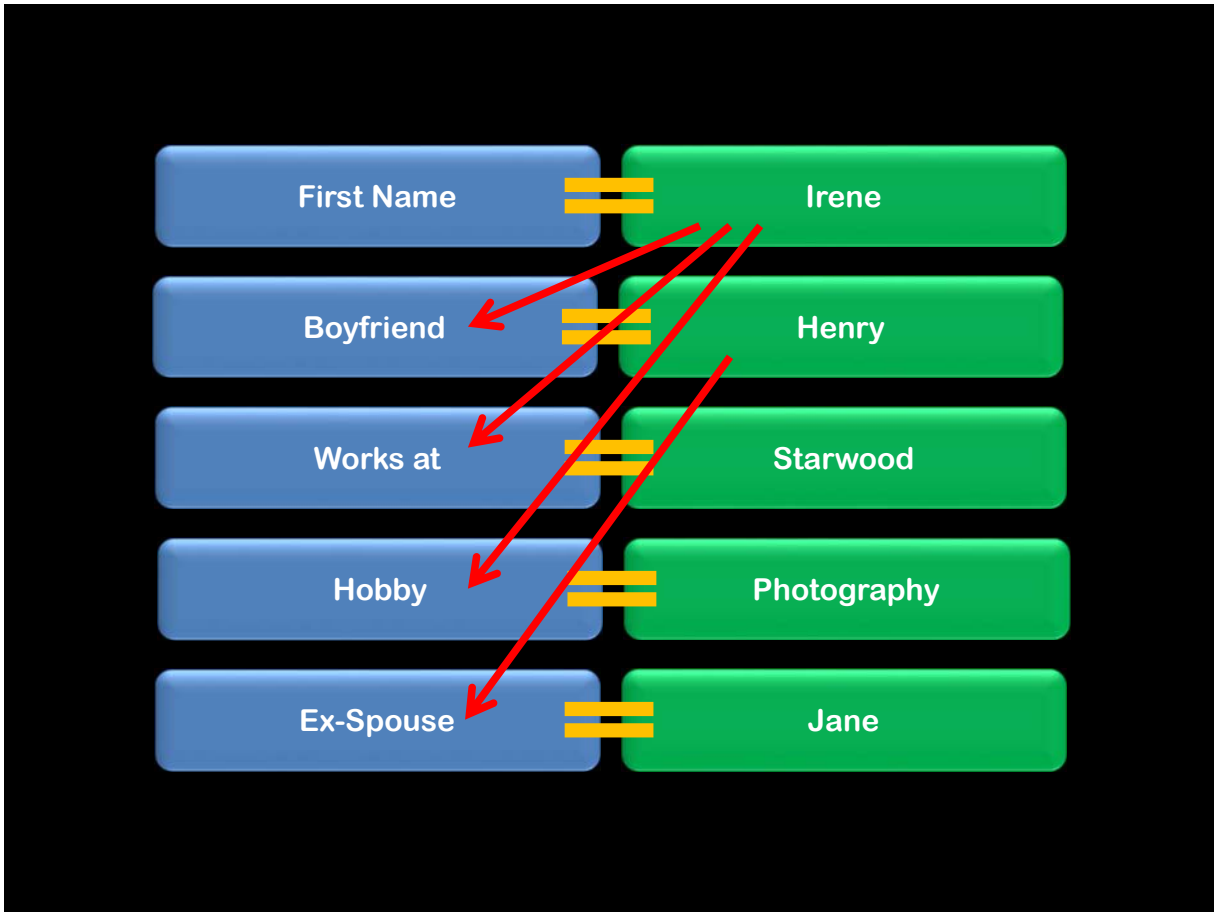


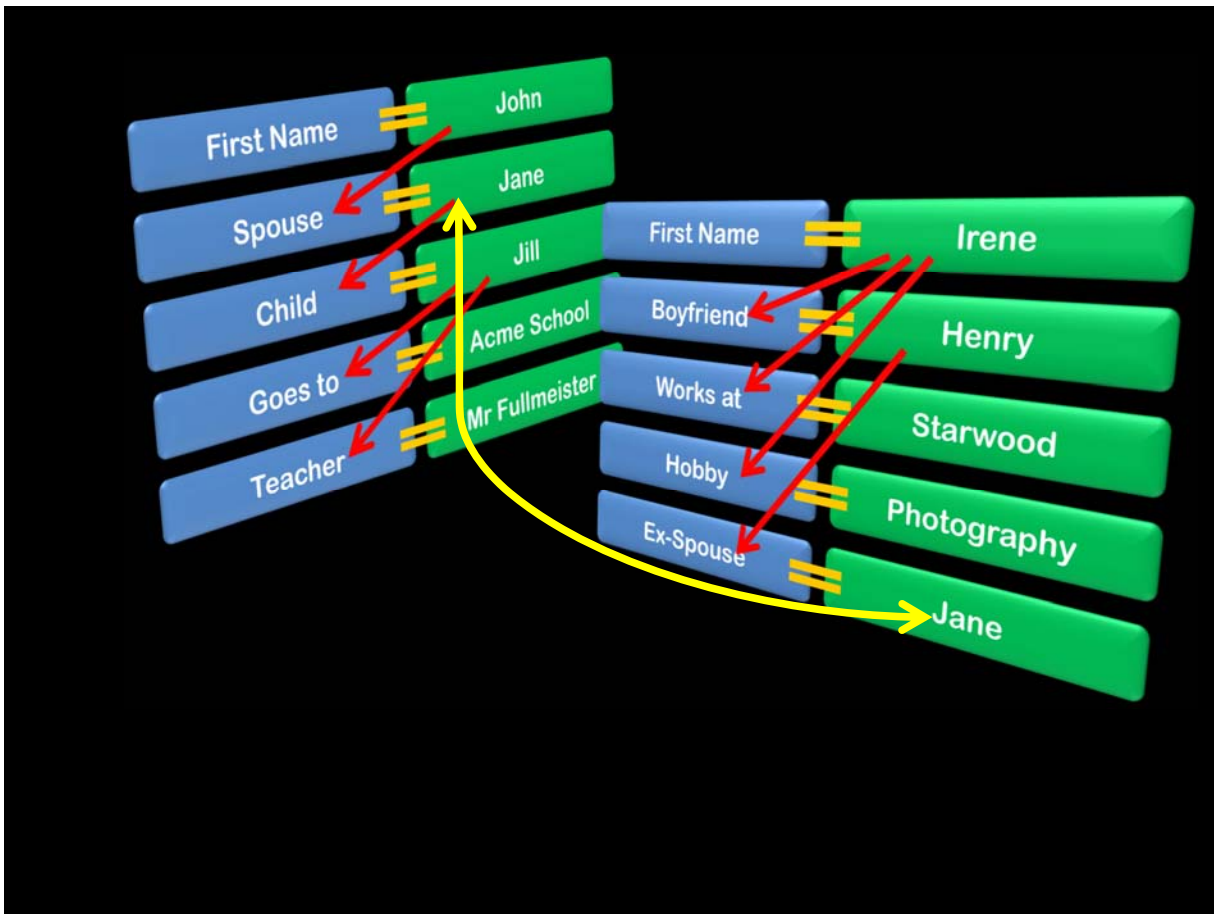

First Name
Martha
Child goes to
Acme School

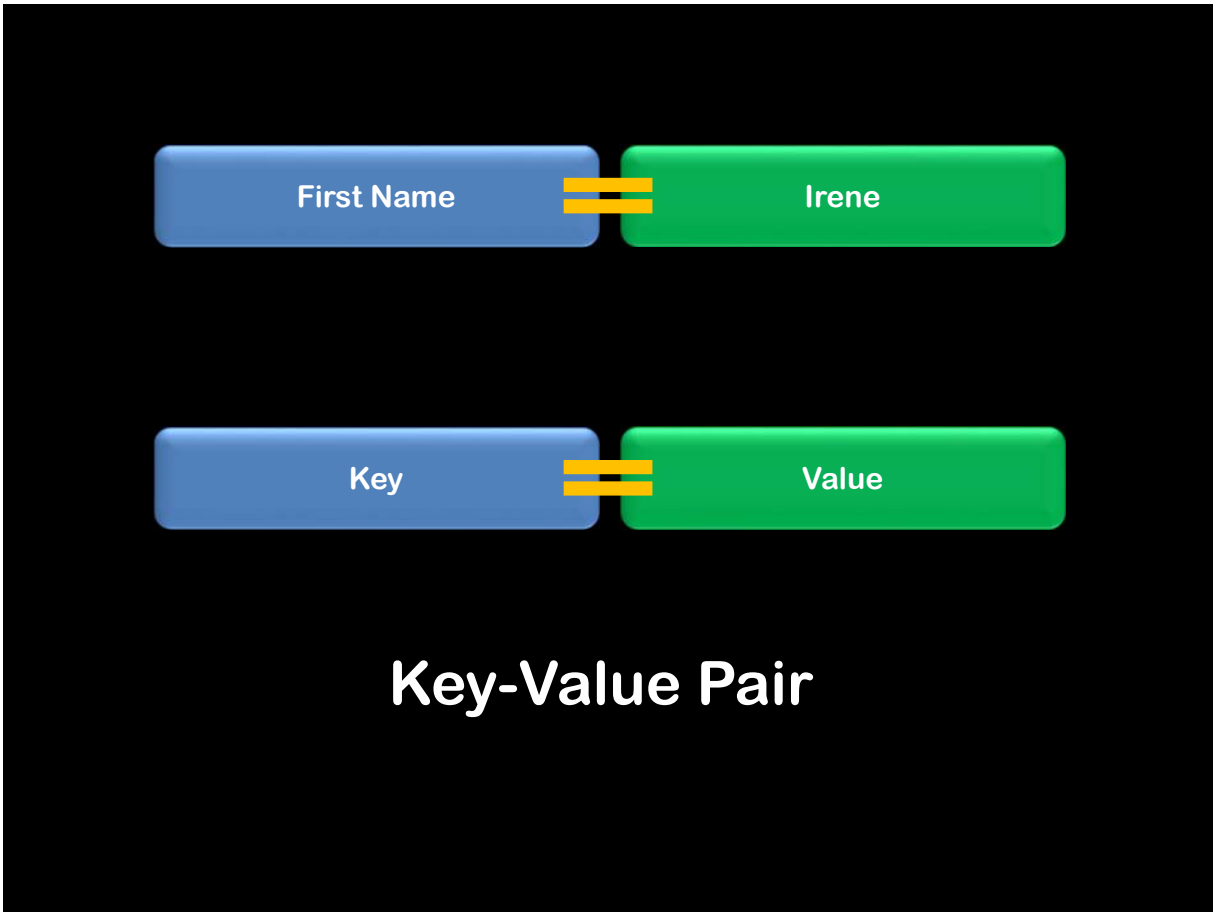

First Name
Martha
Child goes to
Acme School
First Name
John
Spouse
Jane
Child
Jill
Goes to
Acme School
connection

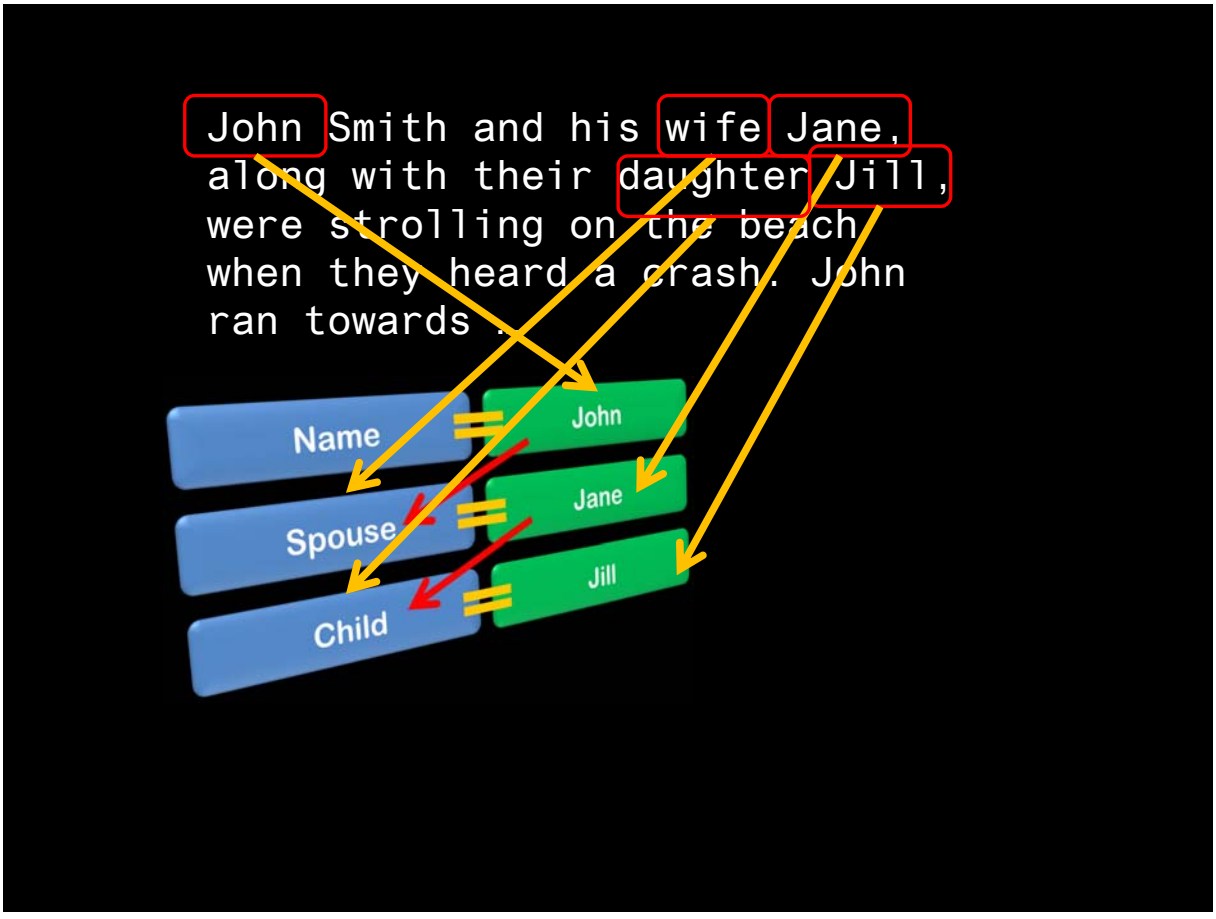

First Name
Martha
Child goes to
Acme School
Teacher
Mrs Gillen
Jill
Teacher
Mrs Gillen


First Name
John
Spouse
Jane
Child
Jill
Goes to
Acme School
Teacher
Mr Fullmeister


First Name
Irene
Boyfriend
Henry
Works at
Starwood
Hobby
Photography
Ex-Spouse
Jane

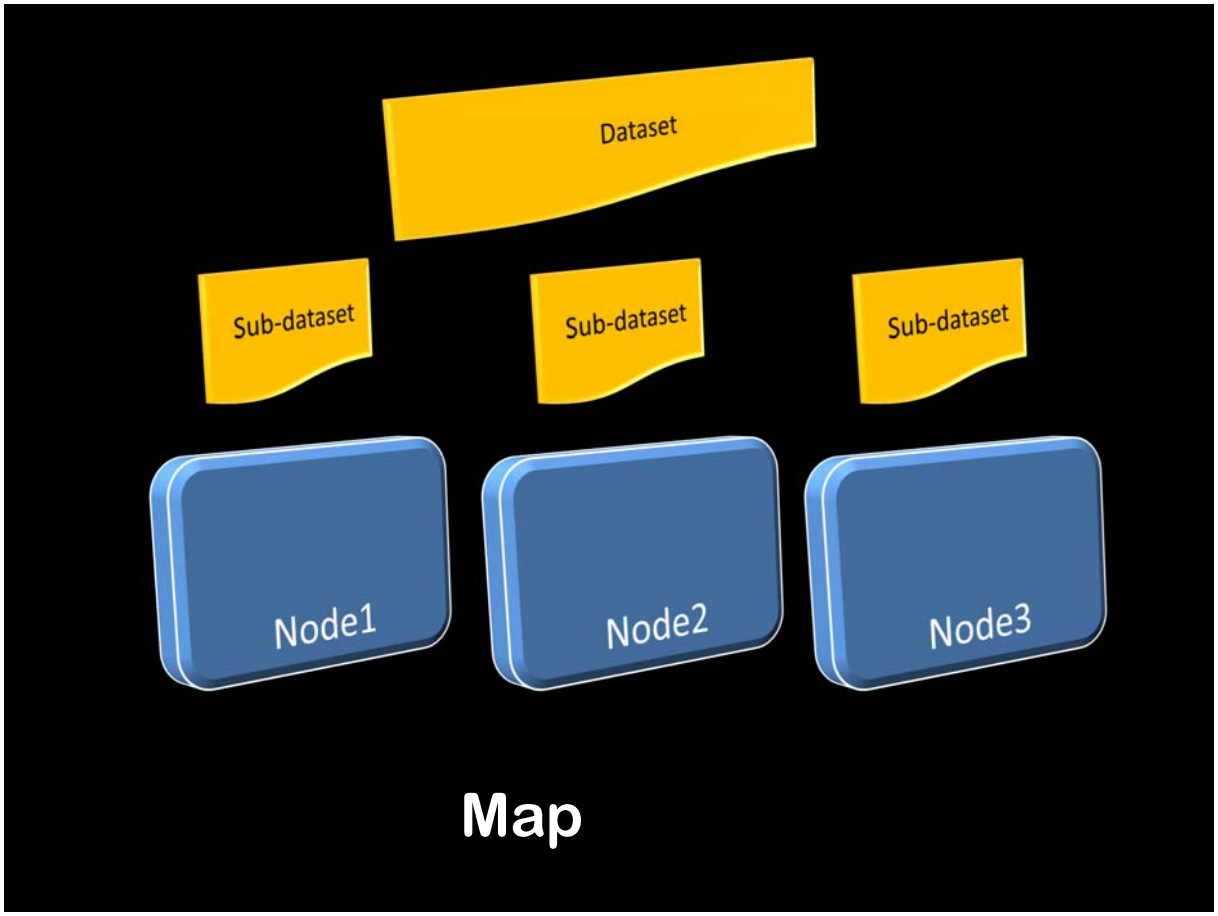

First Name
John
Spouse
Jane
Child
Jill
Goes to
Acme School
Teacher
Mr Fullmeister
First Name
Irene
Boyfriend
Henry
Works at
Starwood
Hobby
Photography
Ex-Spouse
Jane


First Name
Irene
Key
Value
Key-Value Pair


John Smith and his wife Jane,
along with their daughter Jill,
were strolling on the beach
when they heard a crash. John
ran towards
Name
John
Spouse
Jane
Child
Jill

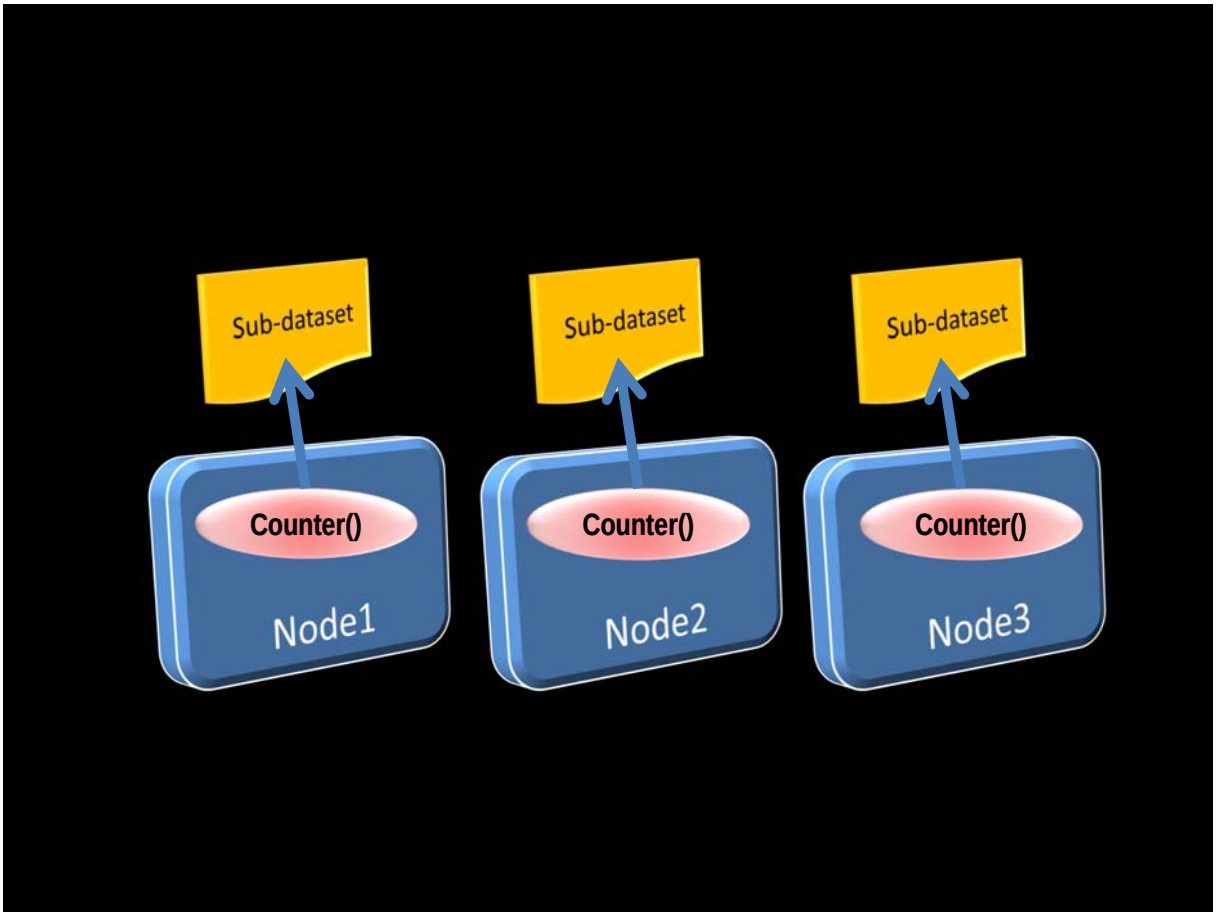
Scalability

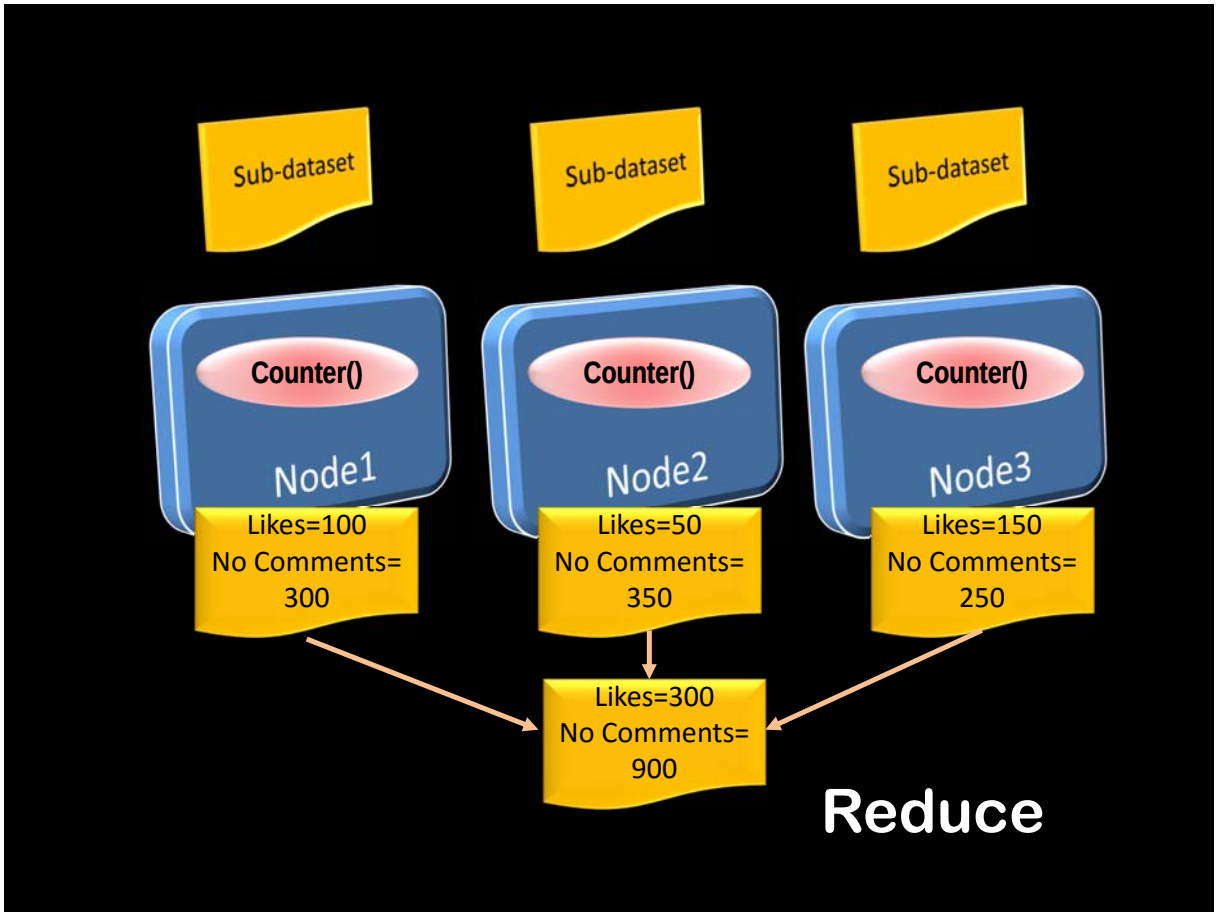
ACID Properties
Reliability at a cost
Large overhead in data processing



Counter()

```
begin
  get post
  while (there_are_remaining_posts) loop
     extract status of "like" for the specific post
     if status = "like" then
         like_count := like_count + 1
     else
         no_comment := no_comment + 1
     end if
  end loop
end
```

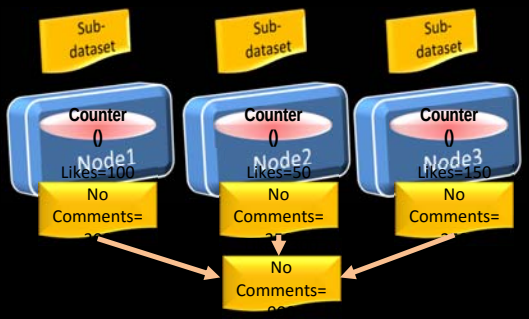




Dividing the work among different nodes

Map / Reduce

Collating the results to get final answer



- Divide the workload
- Submit and track the jobs
- If a job fails, restart it on another node
- ...

Hadoop

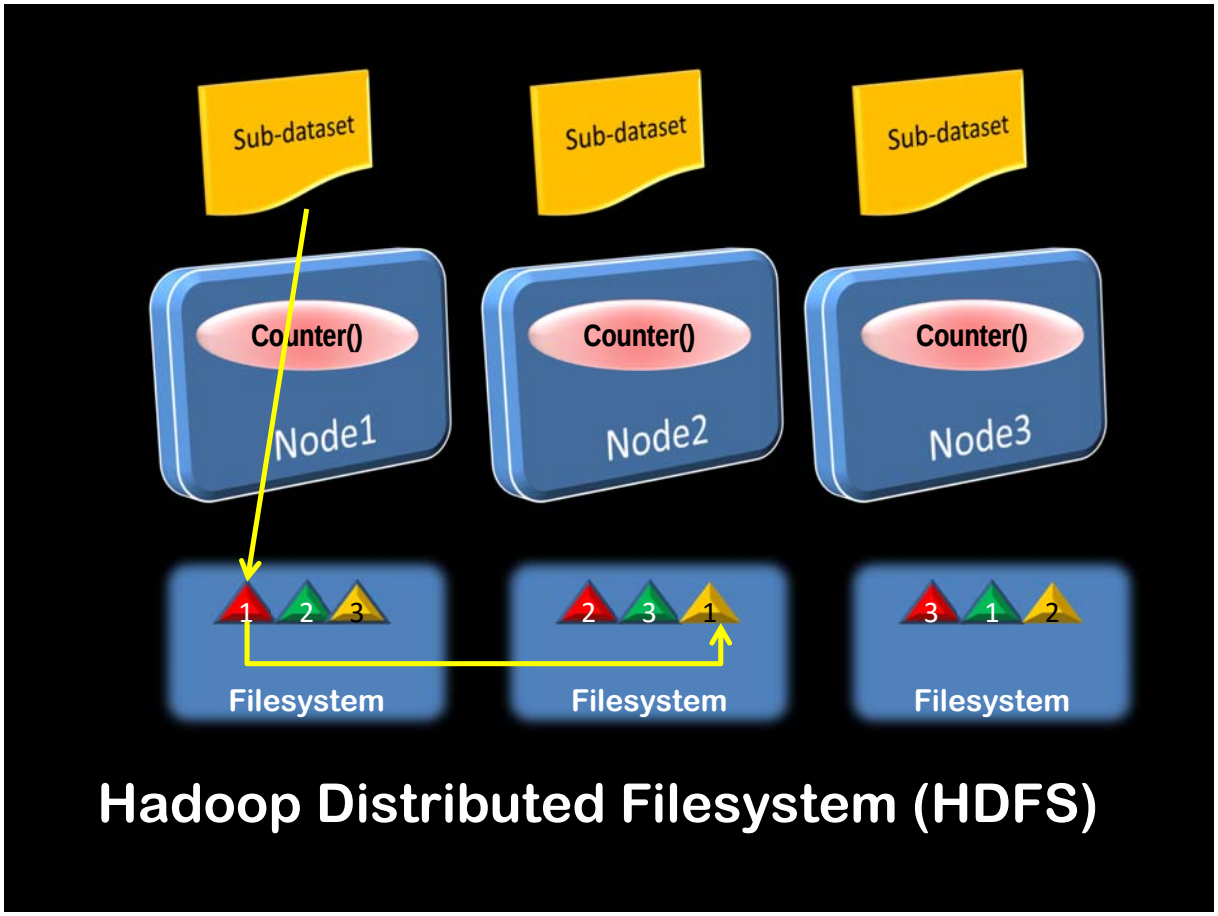
Resource Management

YARN

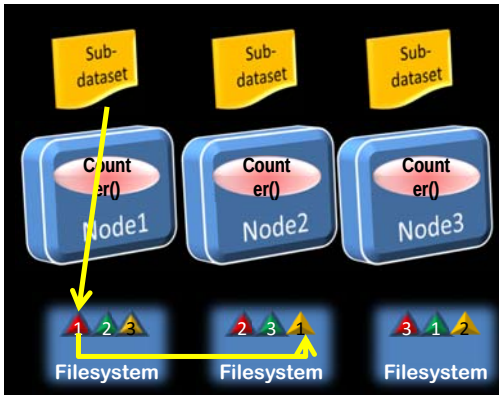
Yet Another Resource Negotiator

Map Reduce v2.

Applications

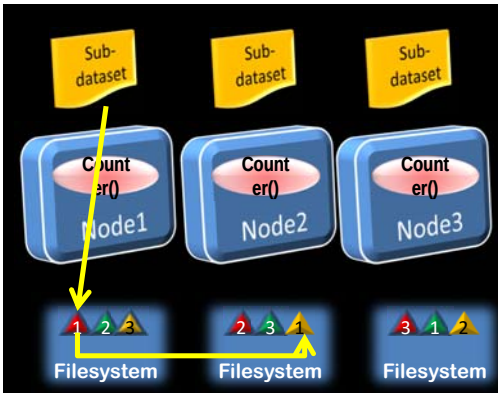


Hadoop Distributed Filesystem (HDFS)



Comparison with RAC

- *Not shared storage*
- *Data is discrete*
- *Version control not required*
- *Concurrency not required*
- *Transactional integrity across nodes not required.*



Advantages of Hadoop

- Processors need not be super-fast
- Immensely scalable
- Storage is redundant by design
- No RAID level required.

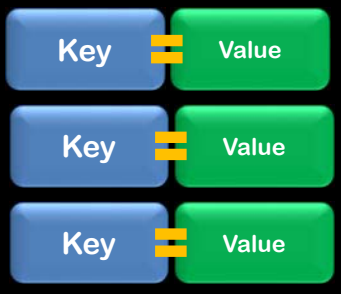
Website logs
Combine with structured data
SOAP Messages
Twitter, Facebook ...

Data Access: through programs

NoSQL Databases

Key Value DB

Document DB.




```
{
  empID:1,
  empName:Larry
  salary:infinity
}
```

SQL-interface required

Hive

HiveQL

Creating a Hive Table

```
create table accounts (
  accno        int,
  accname      string,
  balance      float
)
row format delimited
fields terminated by ‘\,’
stored as texfile
location '/user/hive/db1.db/accounts'
```

HiveQL

```
select count(*)
from store_sales ss
   join household_demographics hd on (ss.ss_hdemo_sk
          = hd.hd_demo_sk)
   join time_dim t on (ss.ss_sold_time_sk = t.t_time_sk)
   join store s on (s.s_store_sk = ss.ss_store_sk)
where
   t.t_hour = 8
   t.t_minute >= 30
   hd.hd_dep_count = 2
order by cnt;
```

Map/Reduce

Divide the work and collate the results } *Needs development in Java, Python, Ruby, etc.*

A framework to work on the dataset in parallel

Pig

Pig Latin

Scripting language for Pig

SQL

```
select category, avg(pagerank)
from urls
where pagerank > 0.2
group by category
having count(*) > 1000000
```

Pig Latin

```
good_urls = FILTER urls BY pagerank > 0.2;
groups = GROUP good_urls BY category;
big_groups = FILTER groups BY
COUNT(good_urls)>1000000;
output = FOREACH big_groups GENERATE category,
AVG(good_urls.pagerank);
```

HBase — A database built on Hadoop

HiveQL — An SQL-like (but not the same) query language

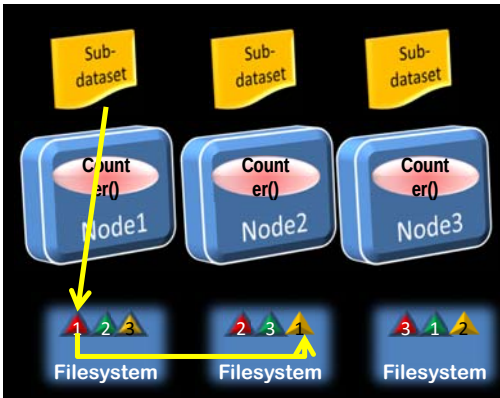
Pig — Procedural Logic without M/R Code.

normal programming languages, e.g. Python

Spark

Map/Reduce code in Java

YARN



Hadoop processing in files

Memory is cheaper

Interactive processing needs faster access.

SparkShell SparkSQL MLib SparkR PySpark

Can use Java, Python or Scala

Divide and conquer is the key
Non-shared division of data is important
- Local access
- Redundancy

Hadoop is a framework
- You have to write the programs

Big data is batch-oriented
Hive is SQL-like
Pig Latin is a 4GL-like scripting language
Spark uses memory

Thanks!

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