Big Data for Oracle DBAs

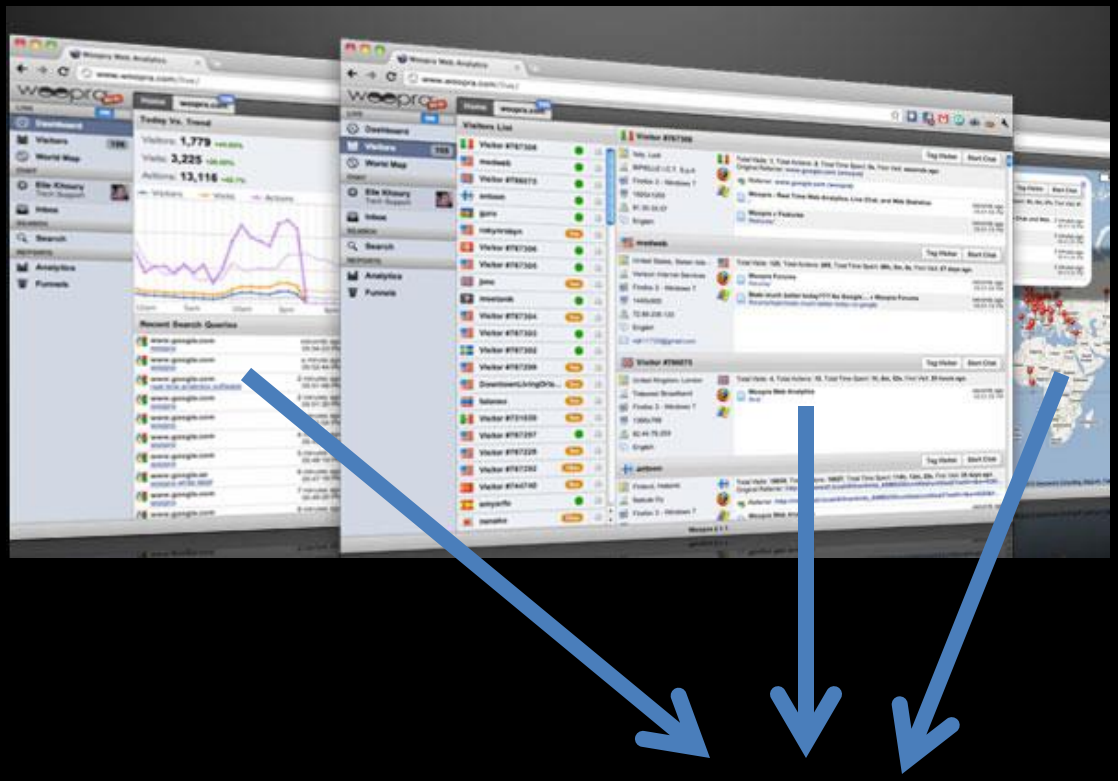
Arup Nanda

```
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



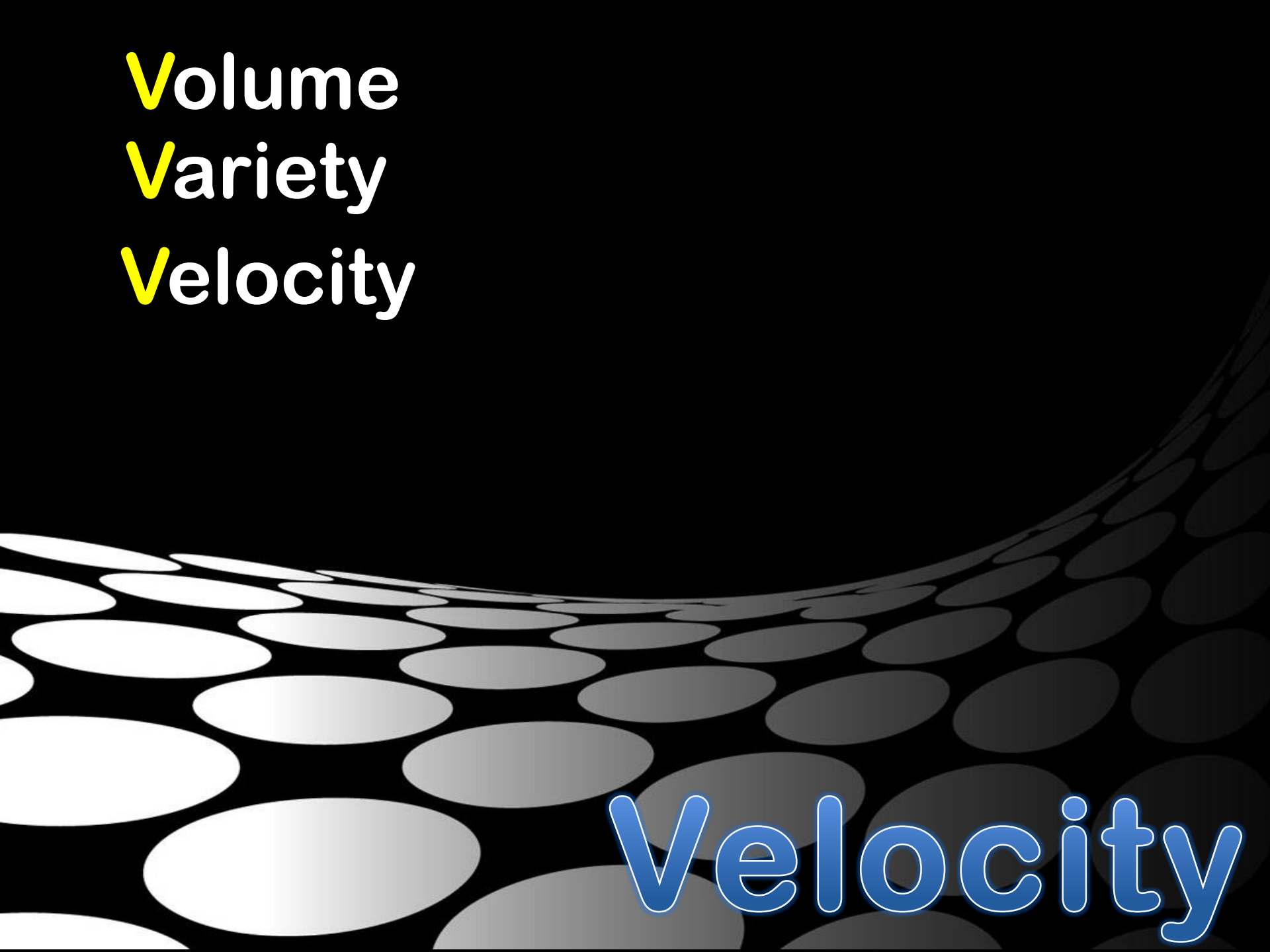
Metadata Repository

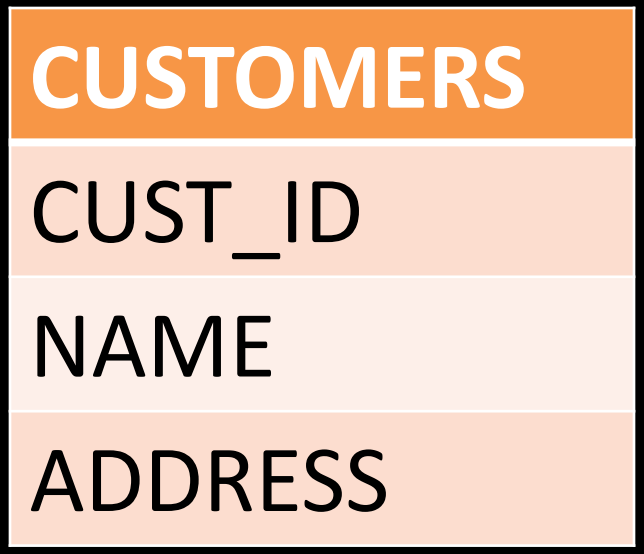
Google

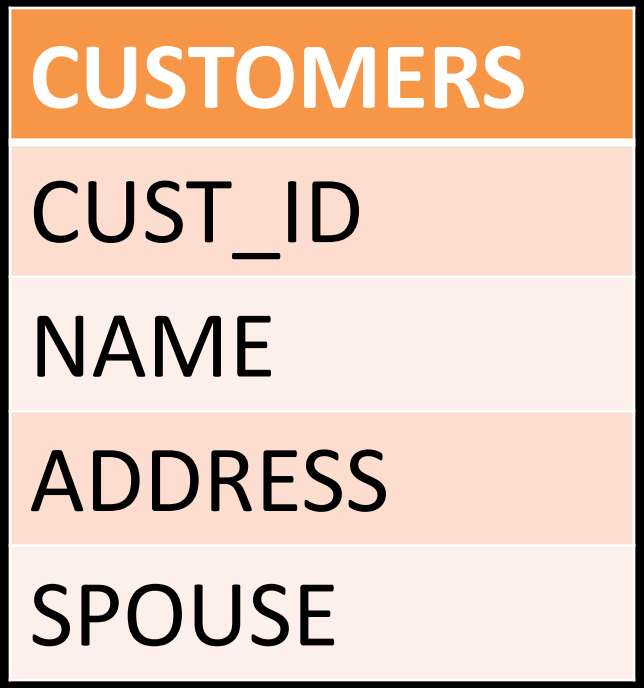

Volume

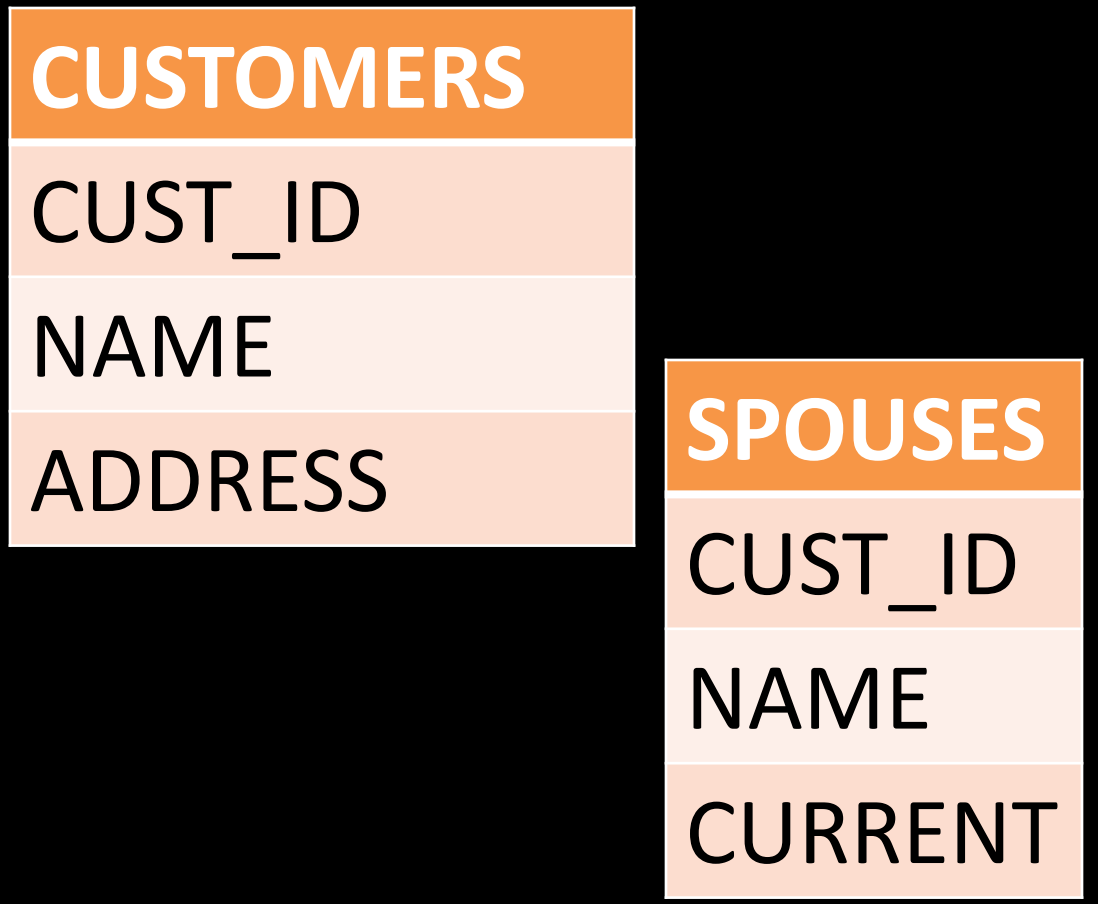

Variety

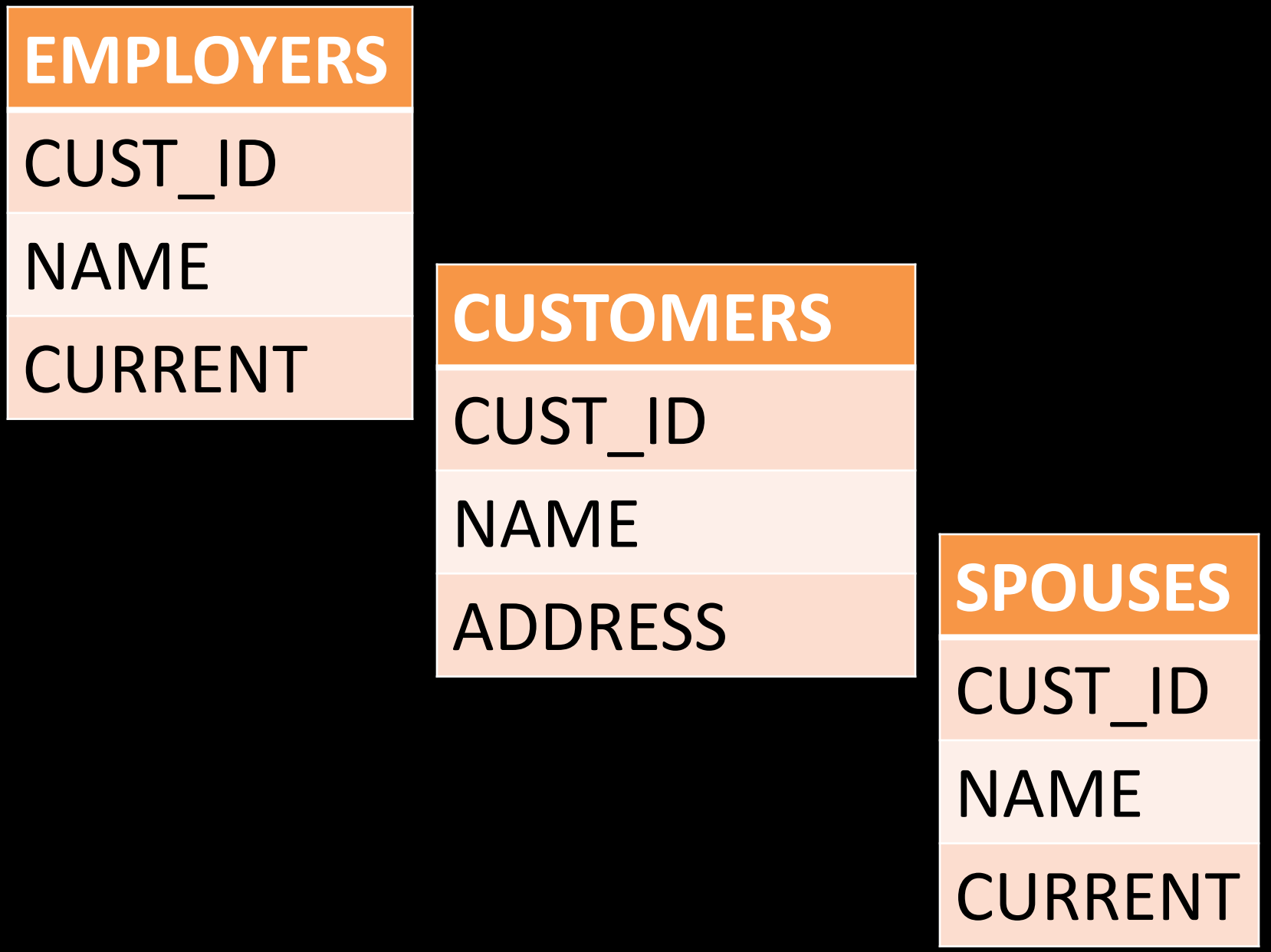
Volume
Variety
Velocity

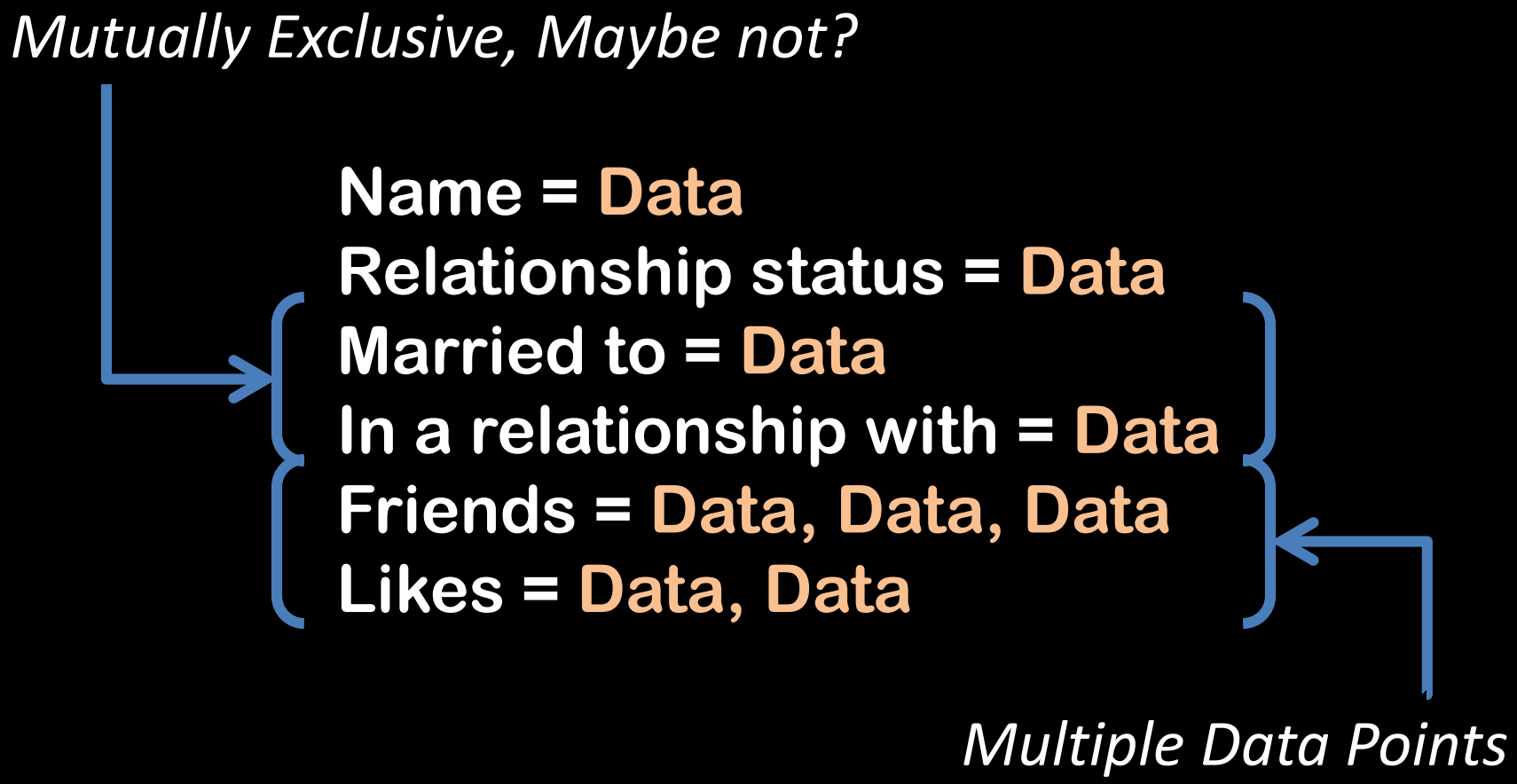


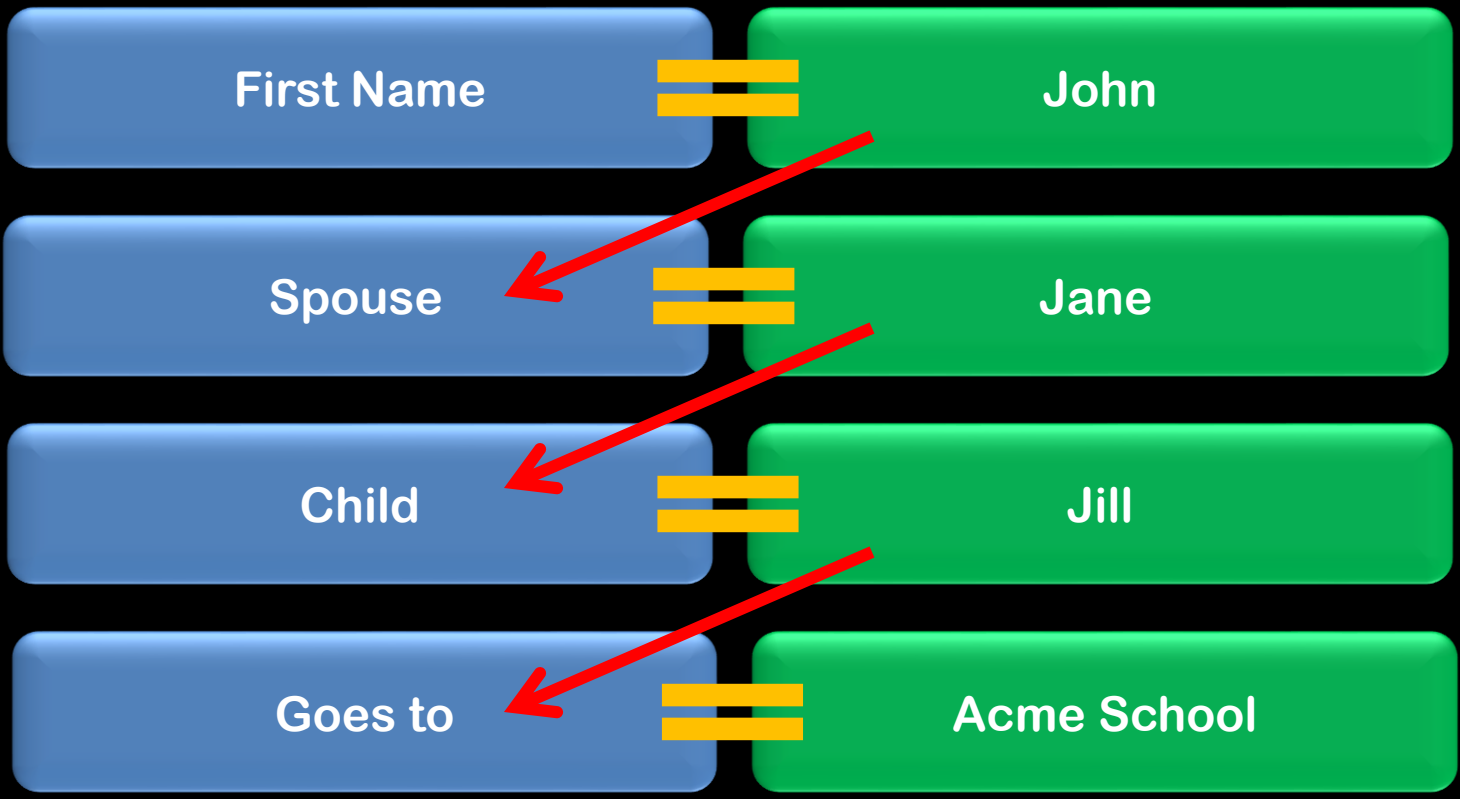

CUSTOMERS
CUST_ID
NAME
ADDRESS

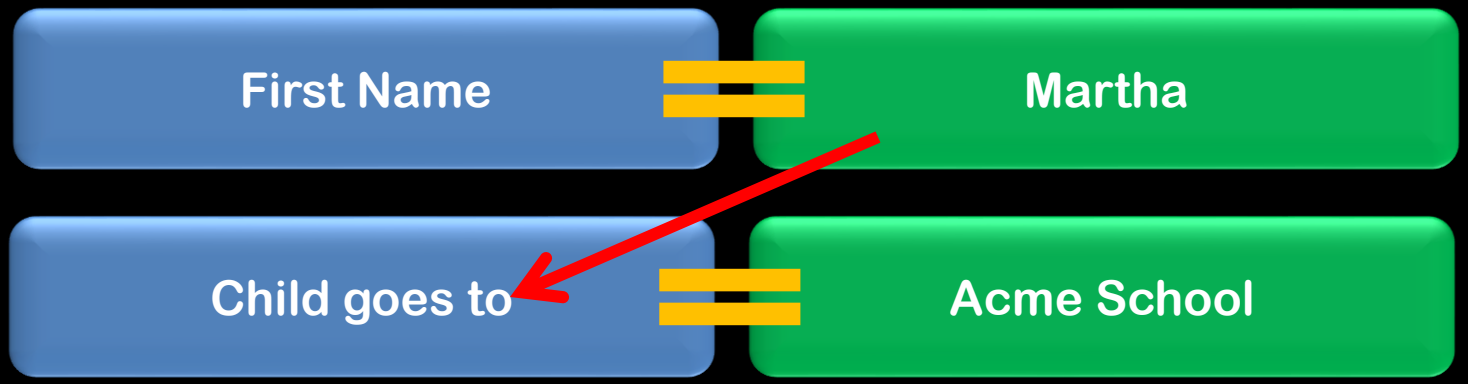

CUSTOMERS
CUST_ID
NAME
ADDRESS
SPOUSE

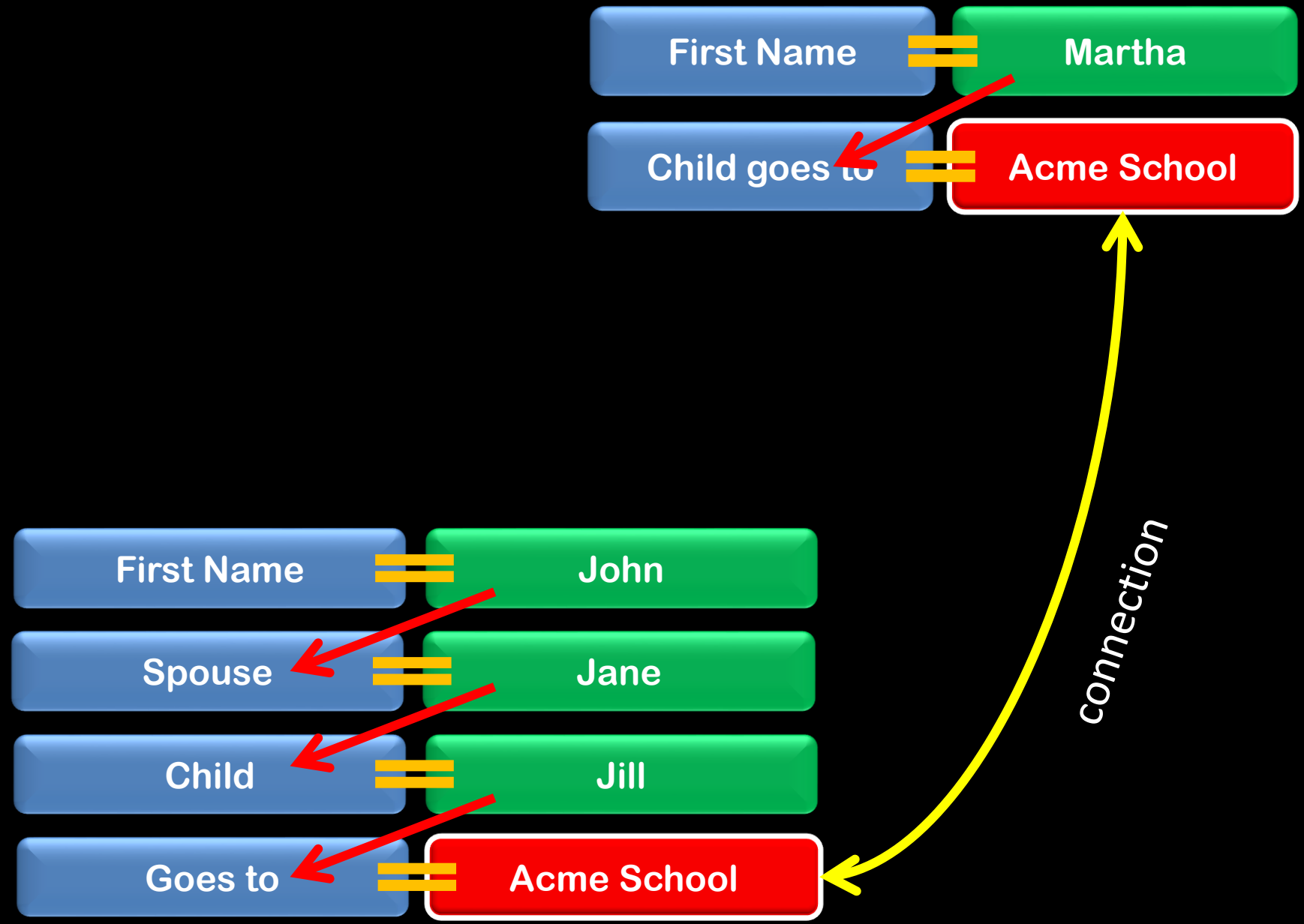

CUSTOMERS
CUST_ID
NAME
ADDRESS
SPOUSES
CUST_ID
NAME
CURRENT

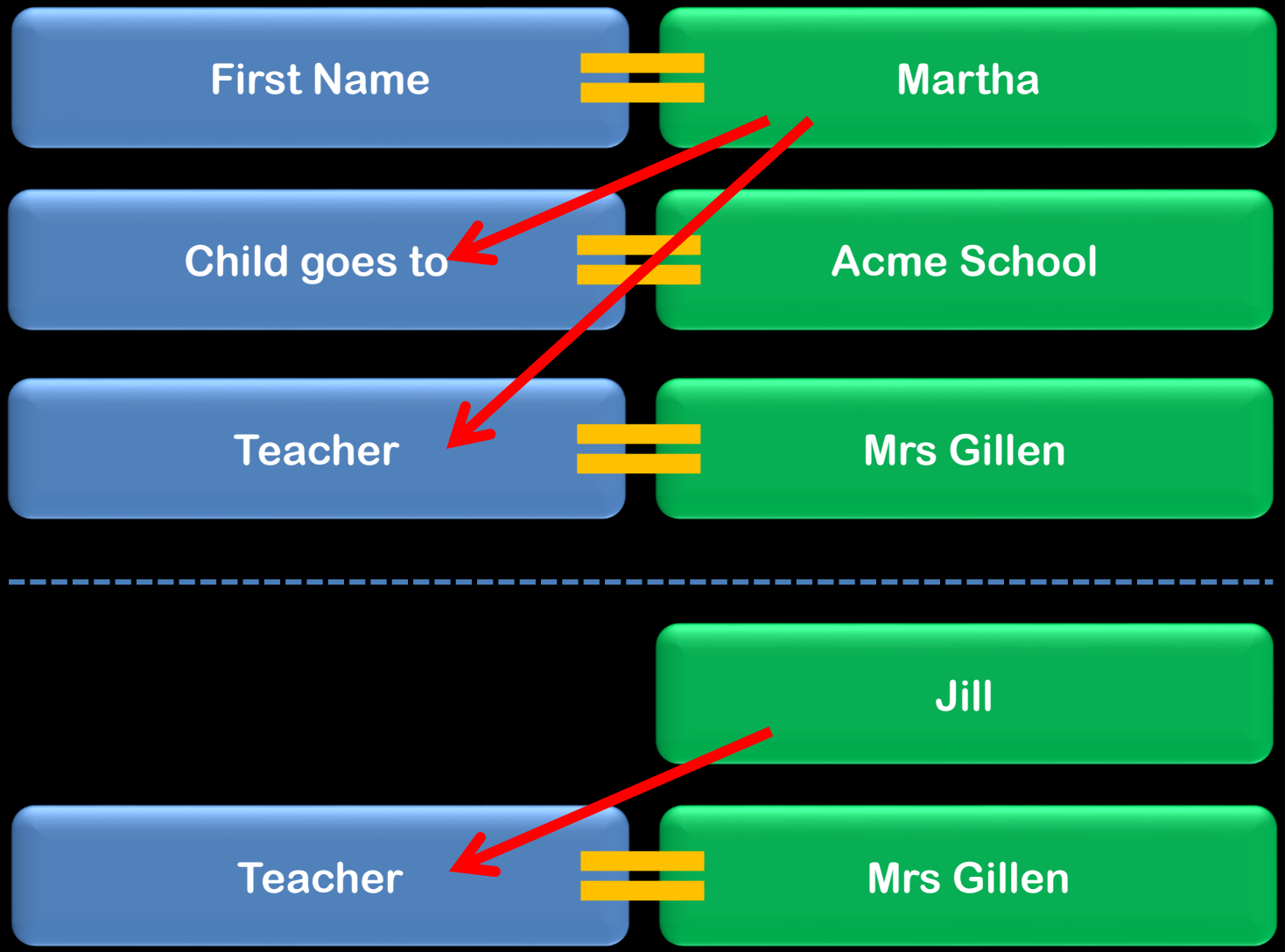

EMPLOYERS
CUST_ID
NAME
CURRENT
CUSTOMERS
CUST_ID
NAME
ADDRESS
SPOUSES
CUST_ID
NAME
CURRENT

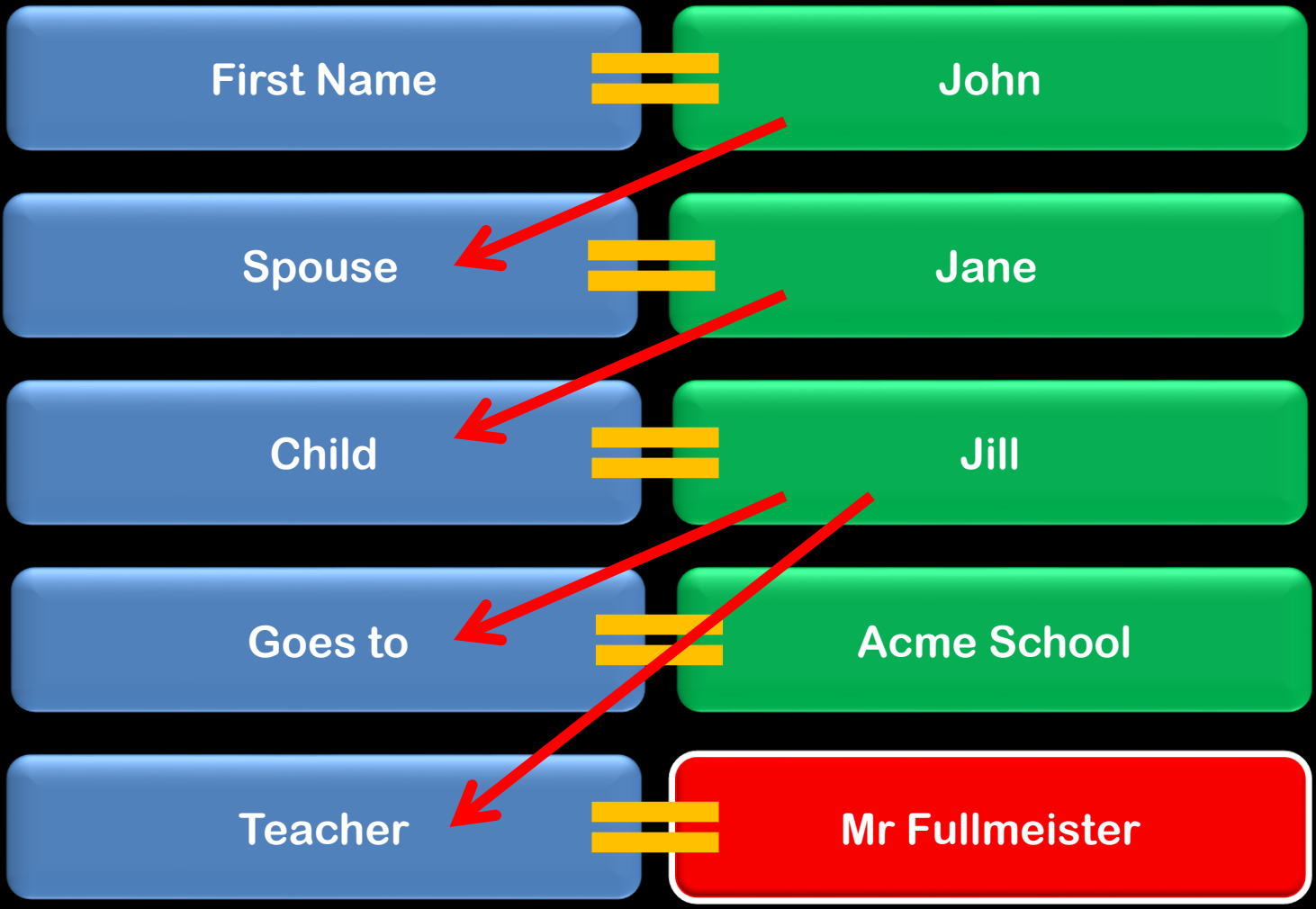

Mutually Exclusive, Maybe not?
Name = Data
Relationship status = Data
Married to = Data
In a relationship with = Data
Friends = Data, Data, Data
Likes = Data, Data
Multiple Data Points

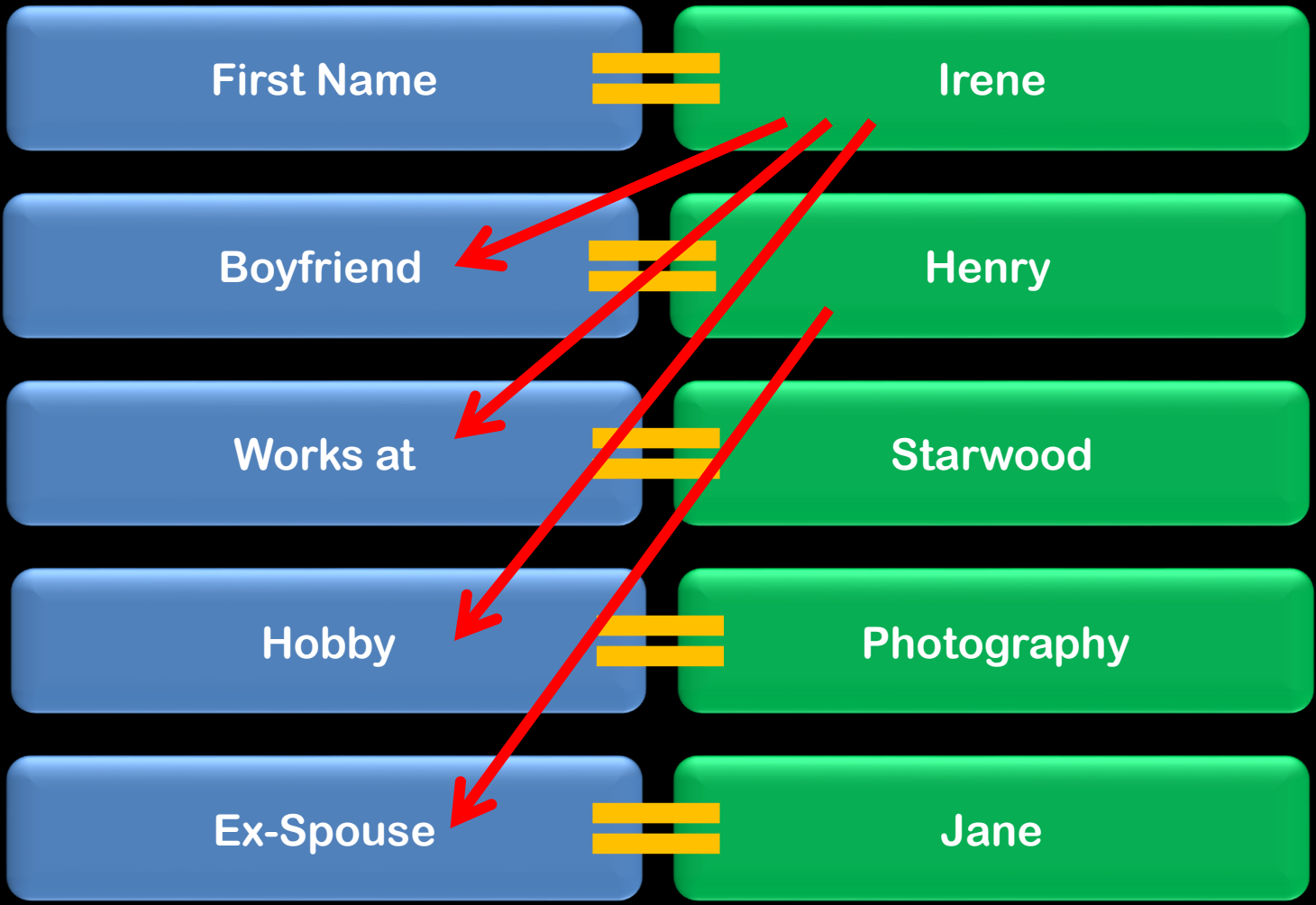

First Name
John
Spouse
Jane
Child
Jill
Goes to
Acme School

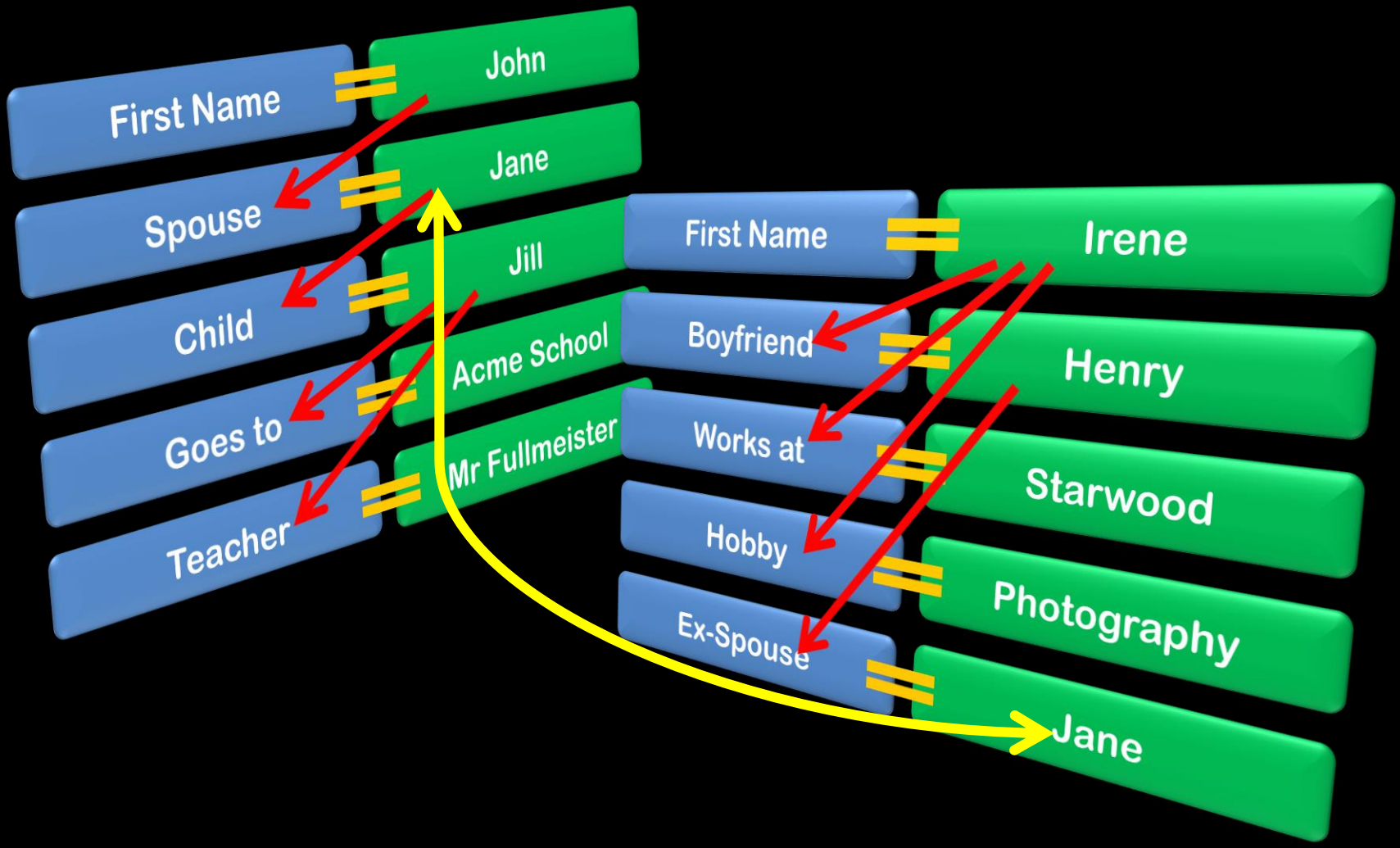

First Name
Martha
Child goes to
Acme School

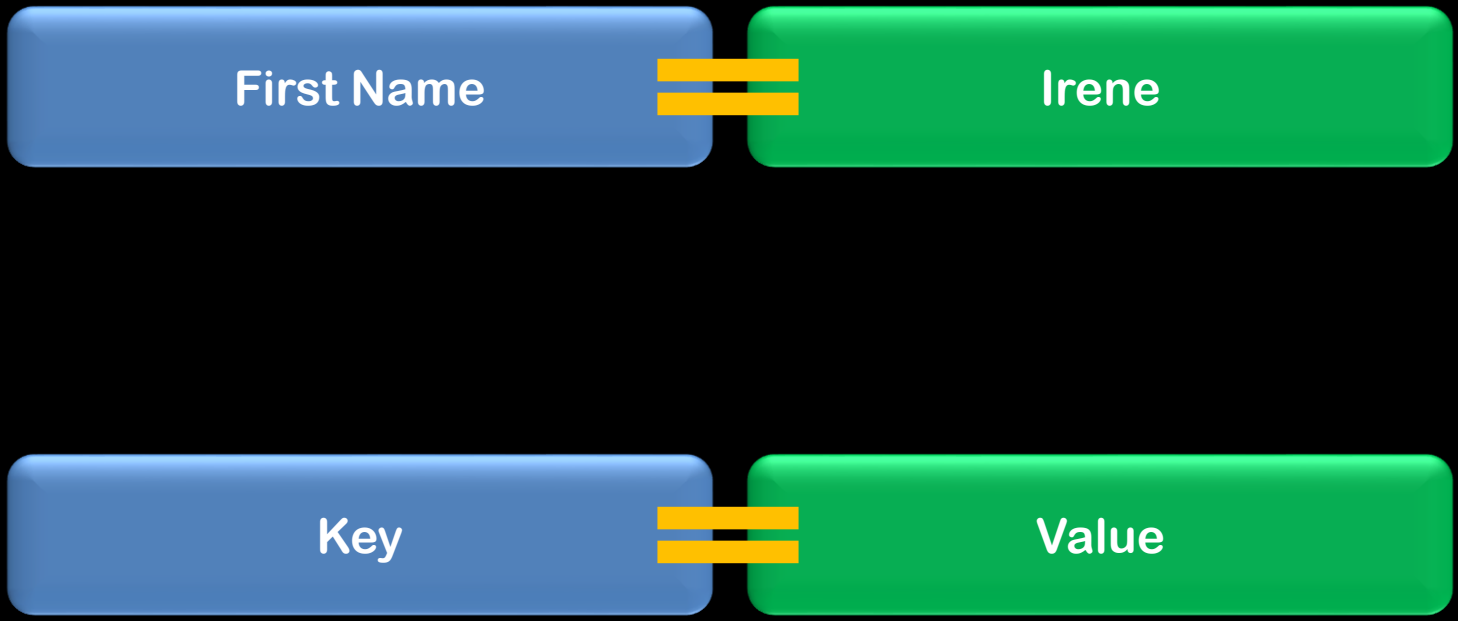

First Name
Martha
Child goes to
Acme School
connection
First Name
John
Spouse
Jane
Child
Jill
Goes to
Acme School


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

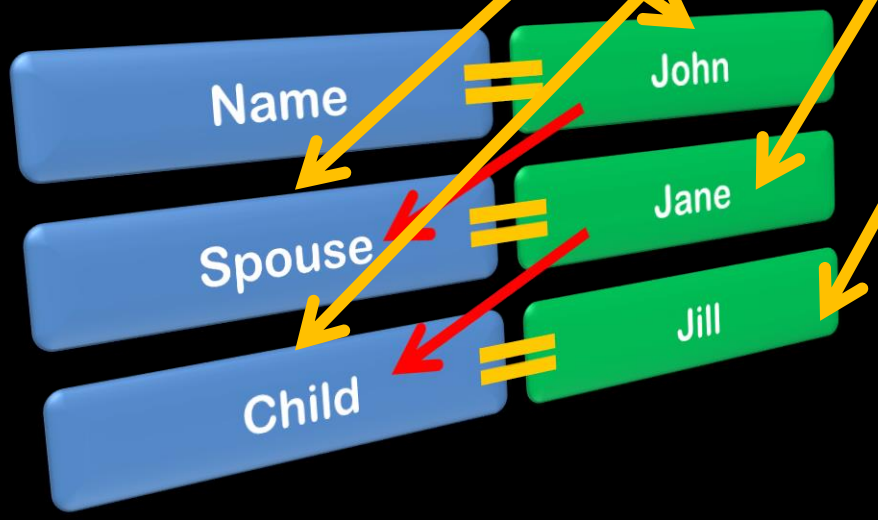

First Name
Irene
Boyfriend
Henry
Works at
Starwood
Hobby
Photography
Ex-Spouse
Jane


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



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 ...

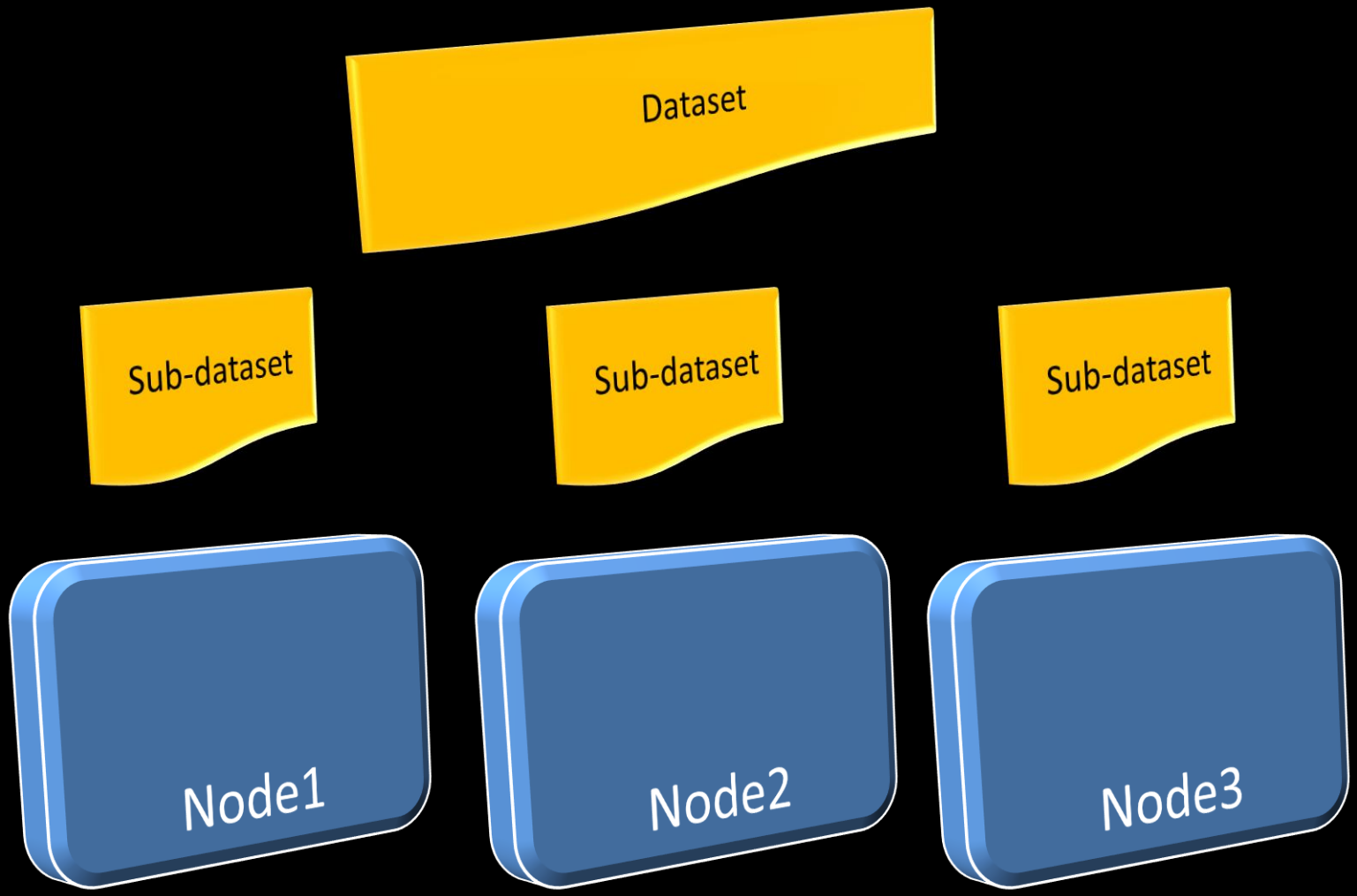


Scalability

ACID Properties

Reliability at a cost

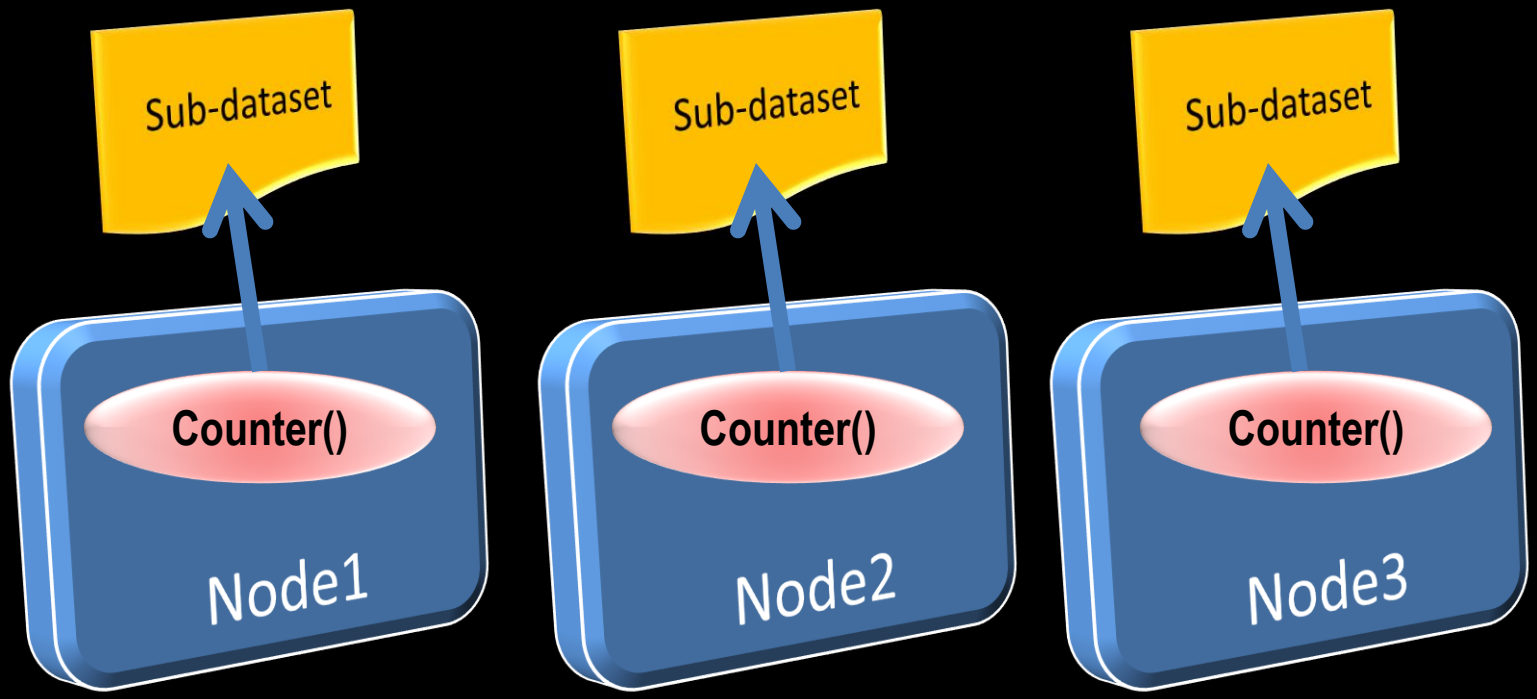
Large overhead in data processing

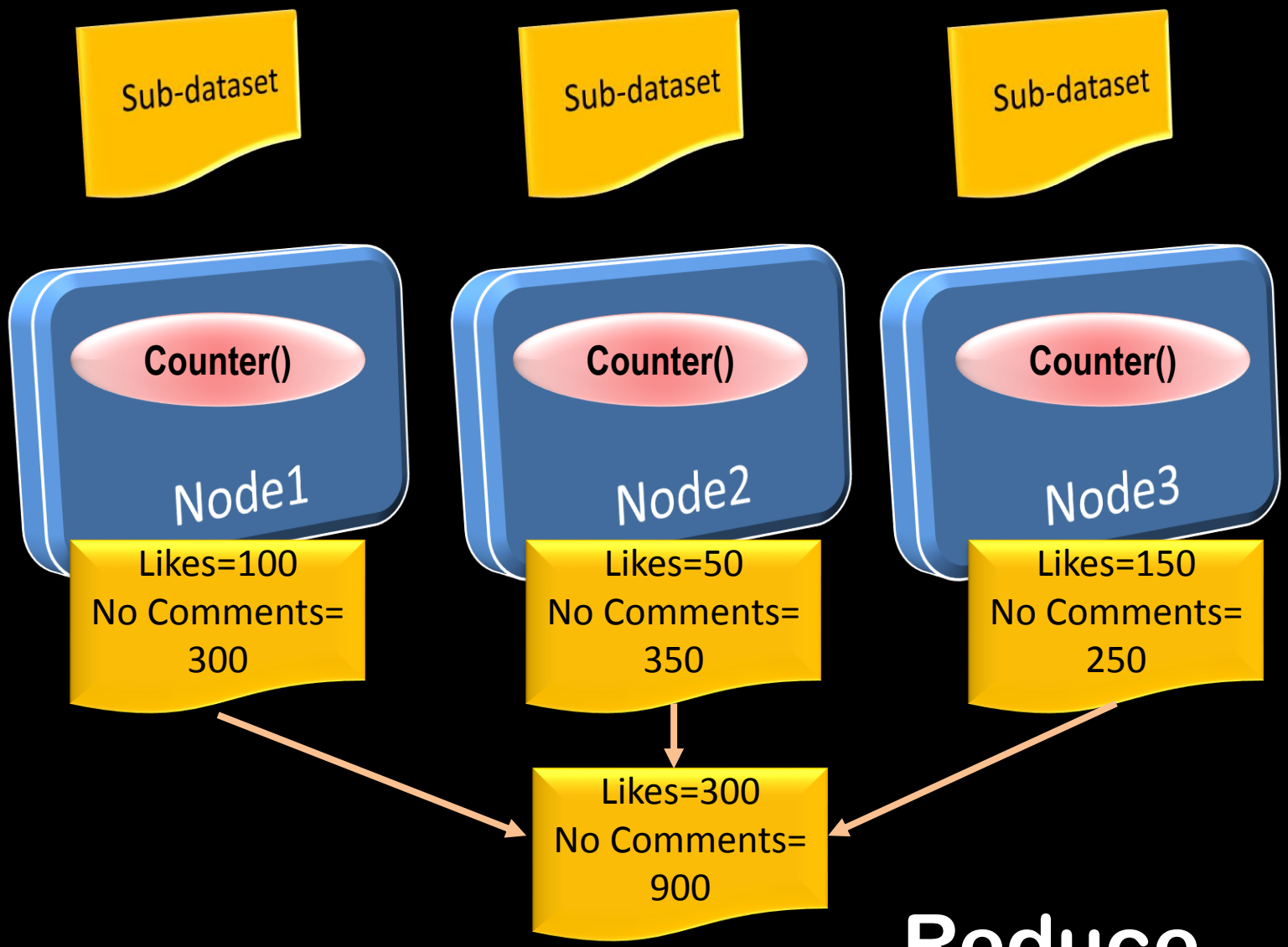

Dataset
Sub-dataset
Sub-dataset
Sub-dataset
Node1
Node2
Node3

Map

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
```

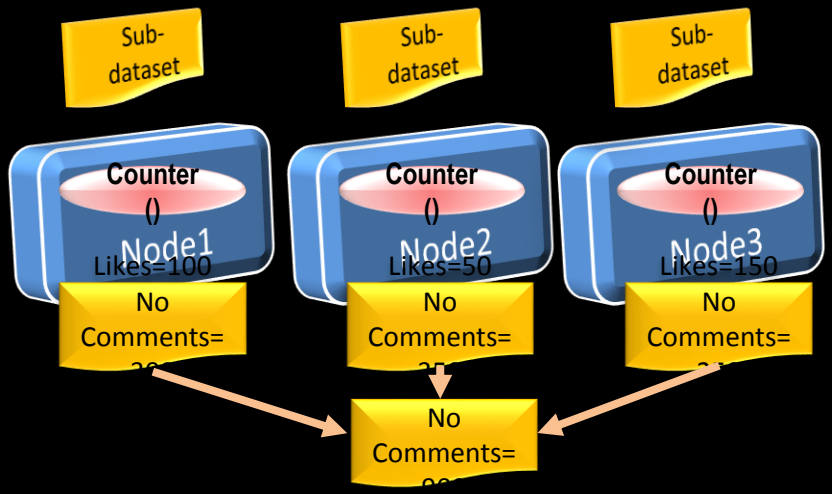

Sub-dataset
Sub-dataset
Sub-dataset
Counter()
Counter()
Counter()
Node1
Node2
Node3


Sub-dataset
Sub-dataset
Sub-dataset
Counter()
Node1
Counter()
Node2
Counter()
Node3
Likes=100
No Comments=
300
Likes=50
No Comments=
350
Likes=150
No Comments=
250
Likes=300
No Comments=
900
Reduce

Dividing the work among different nodes

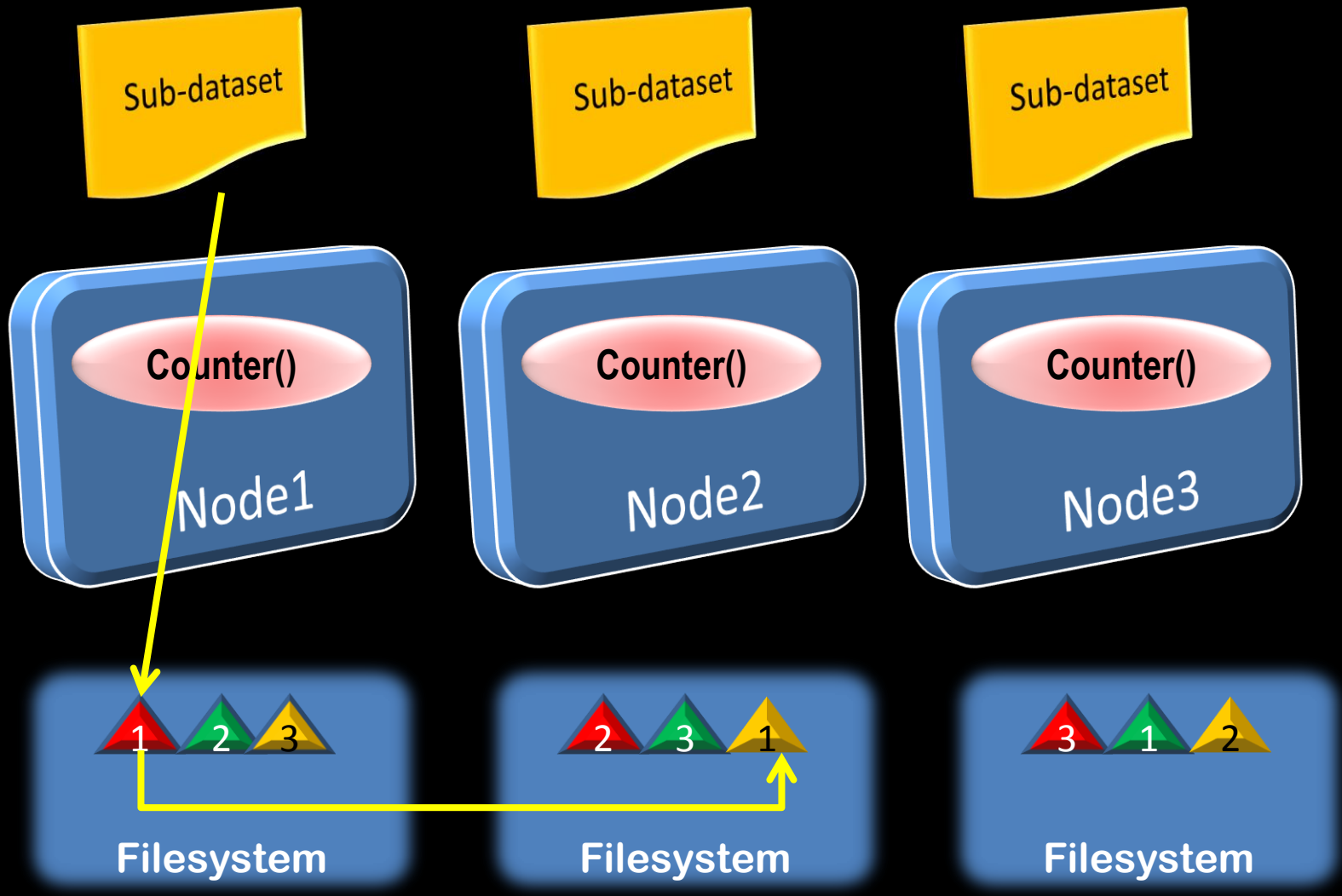
Map / Reduce

Collating the results to get final answer

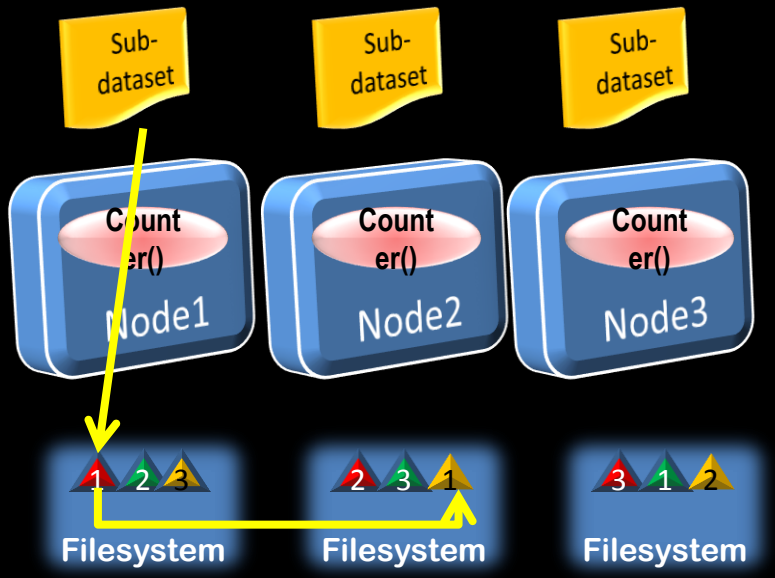


- Divide the workload
- Submit and track the jobs
- If a job fails, restart it on another node
- …

Hadoop

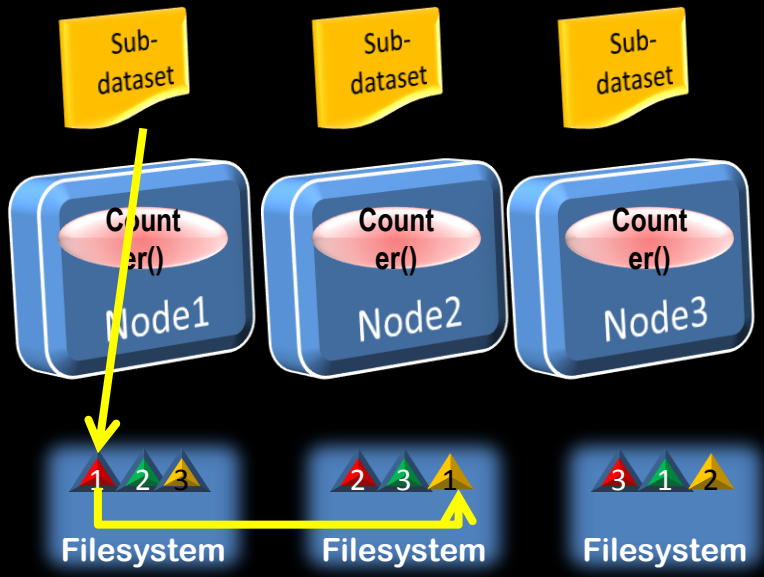


Hadoop Distributed Filesystem (HDFS)



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

SQL-interface required

Hive

HiveQL

HiveQL

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

A database built on Hadoop

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

A realtime SQL-interface to Hadoop

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);
```

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

Thanks!

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