



Relational Databases

in the Cloud

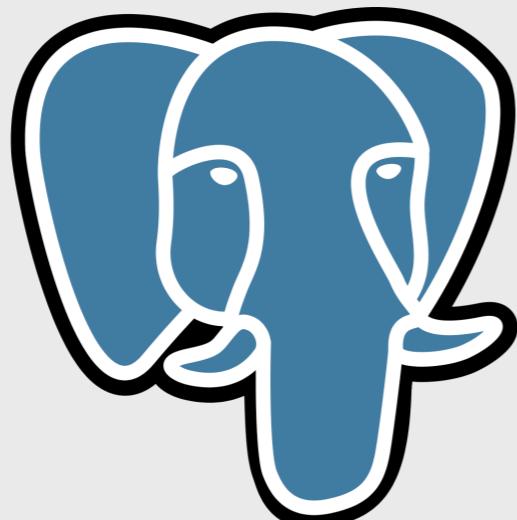


Inés Sombra

INES@ENGINEYARD.COM

@RANDOMMOOD

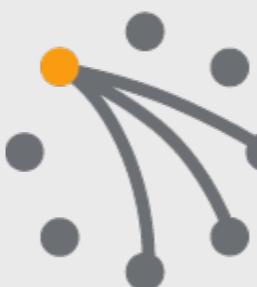
Engine Yard™



MySQL®



php



riak



mongoDB

Today's Agenda



- RELATIONAL DATABASES
 - MYSQL
 - POSTGRESQL

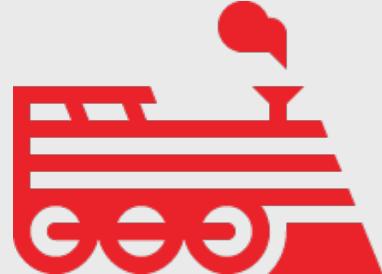
DEVELOPMENT
IN THE CLOUD
(AND A DASH OF OPS)



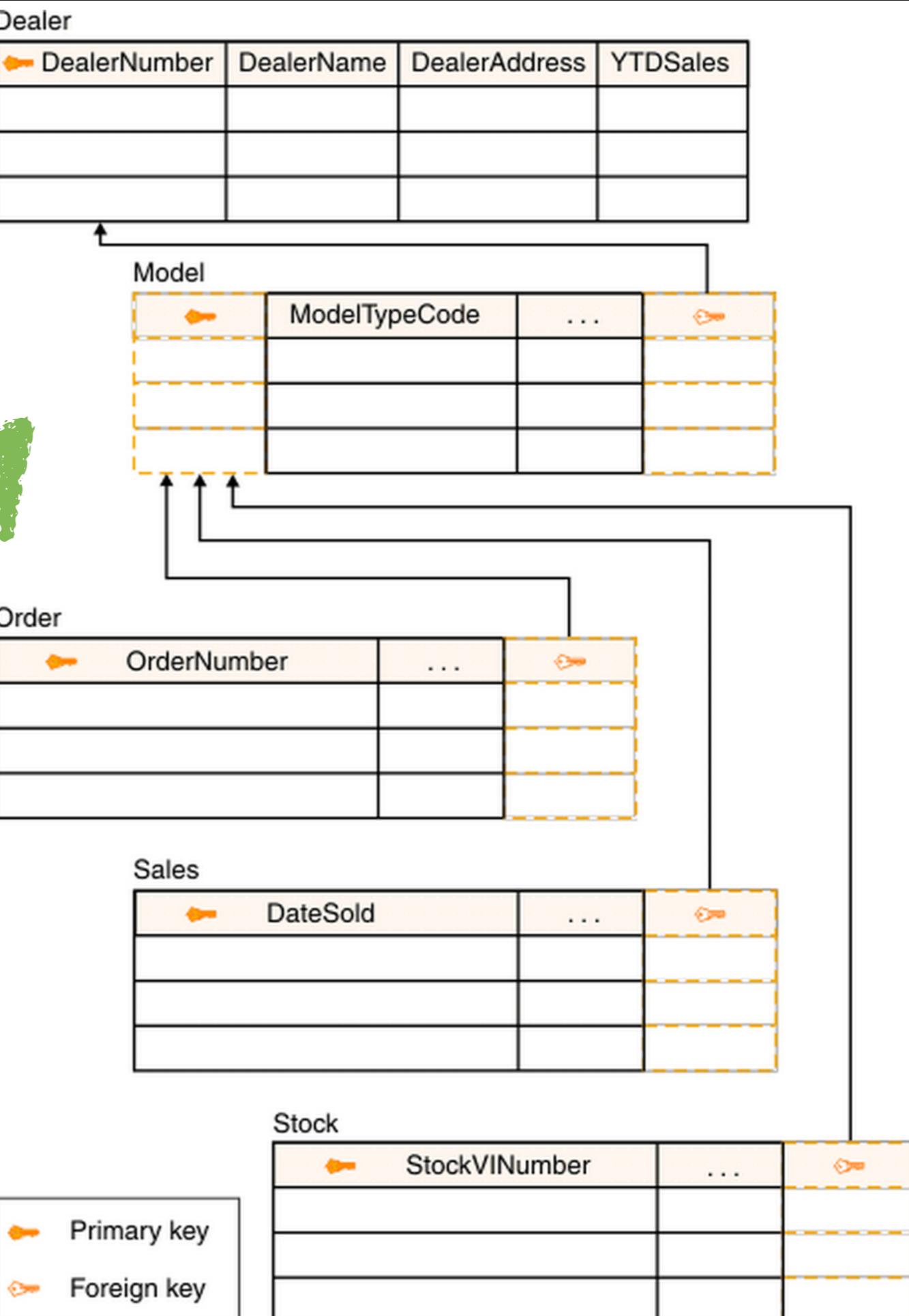
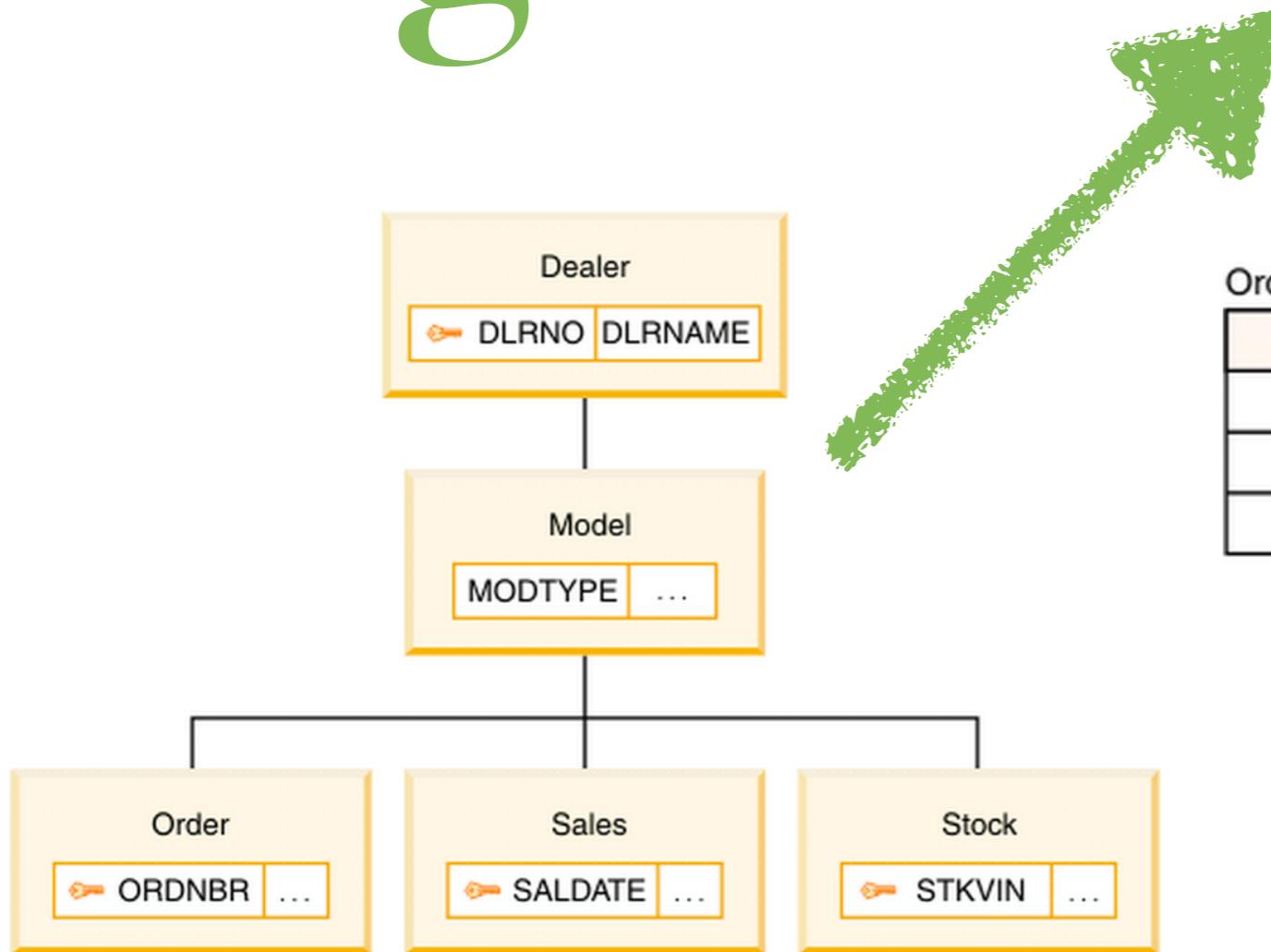
Let's
Get
Started!



Relational Intro & Tenets



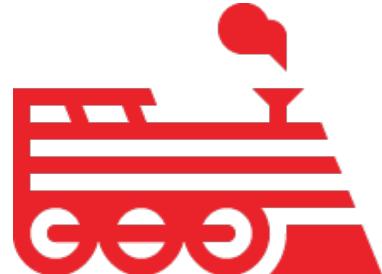
Relational Origin



Relational Databases

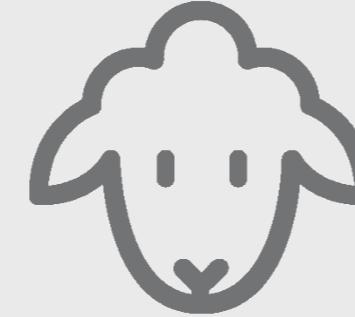
DATA PERCEIVED BY USERS
AS TABLES & ONLY TABLES

OPERATORS GENERATE
NEW TABLES FROM OLD



* Trivia Q1: Why 'Relation'?

Relational Concepts

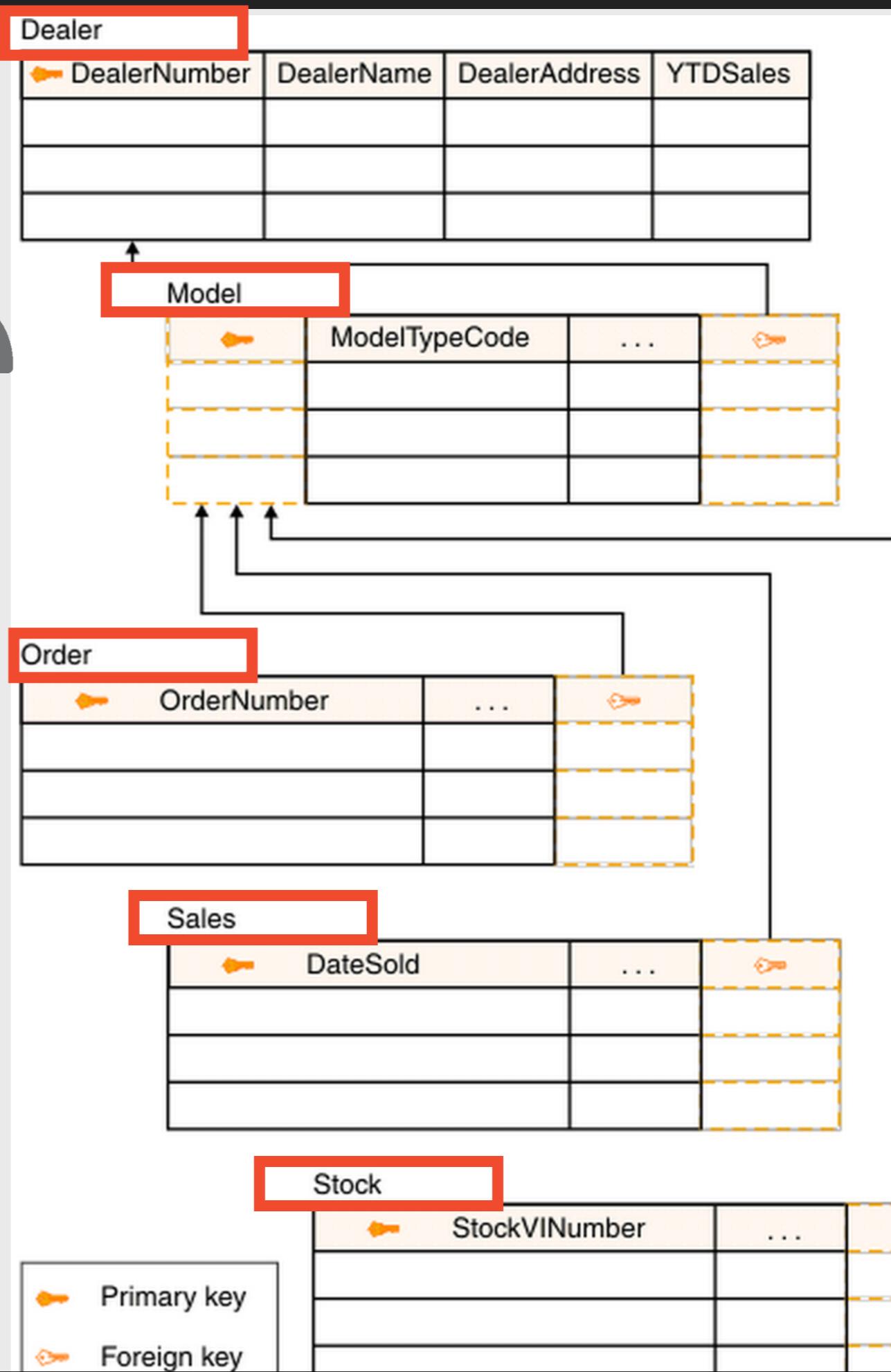


ENTITIES

ATTRIBUTES

RELATIONSHIPS

CONSTRAINTS



Primary key

Foreign key

Relational Concepts



ENTITIES

ATTRIBUTES

RELATIONSHIPS

CONSTRAINTS

Dealer

DealerNumber	DealerName	DealerAddress	YTDSales

Model

	ModelTypeCode	...	

Order

OrderNumber	...	

Sales

DateSold	...	

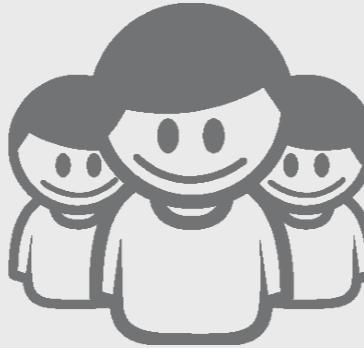
Stock

StockVINumber	...	

Primary key

Foreign key

Relational Concepts



ENTITIES

ATTRIBUTES

RELATIONSHIPS

CONSTRAINTS

Dealer

DealerNumber	DealerName	DealerAddress	YTDSales

Model

ModelTypeCode	...	

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OrderNumber	...	

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Relational Concepts



ENTITIES

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ModelTypeCode	...	Model

Order

OrderNumber	...	Order

Sales

DateSold	...	Sales

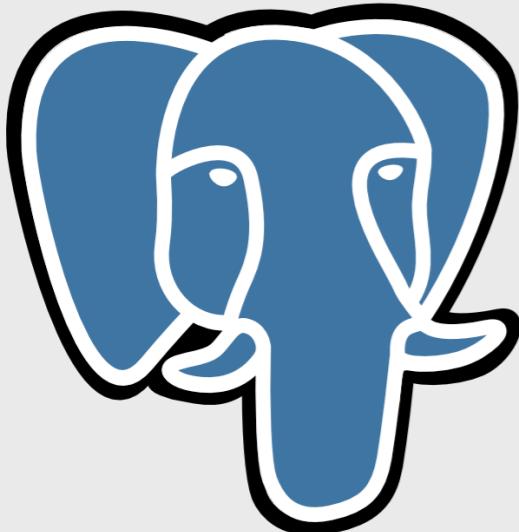
Stock

StockVINumber	...	Stock

Primary key

Foreign key

Relational Data Model



PostgreSQL

Table "public.tasks"		
Column	Type	
<code>id</code>	<code>integer</code>	<code>not null default</code>
<code>name</code>	<code>character varying(255)</code>	
<code>done</code>	<code>boolean</code>	
<code>created_at</code>	<code>timestamp without time zone</code>	<code>not null</code>
<code>updated_at</code>	<code>timestamp without time zone</code>	<code>not null</code>
<code>list_id</code>	<code>integer</code>	
Indexes:		
<code>"tasks_pkey" PRIMARY KEY, btree (id)</code>		

```
todo=# select id, name, done, created_at from tasks;
 id | name | done | created_at
---+-----+-----+-----+
 1 | Check out our docs https://support.cloud.engineyard.com/forums |    |
 2 | Follow @EngineYard http://twitter.com/#!/engineyard |    |
 3 | Follow @eycloud http://twitter.com/#!/eycloud |    |
 4 | We blog http://www.engineyard.com/blog/ |    |
 5 | Rock on! |    |
(5 rows)
```

Relational Data Model



```
mysql> show create table tasks;
+-----+
| Table | Create Table
+-----+
| tasks | CREATE TABLE `tasks` (
  `id` int(11) NOT NULL auto_increment,
  `name` varchar(255) default NULL,
  `done` tinyint(1) default NULL,
  `created_at` datetime NOT NULL,
  `updated_at` datetime NOT NULL,
  `list_id` int(11) default NULL,
  PRIMARY KEY (`id`)
) ENGINE=InnoDB AUTO_INCREMENT=6 DEFAULT CHARSET=utf8 |
+-----+
1 row in set (0.00 sec)
```

```
mysql> select id, name, done, created_at from tasks;
```

id name done created_at
1 Check out our docs https://support.cloud.engineyard.com/forums NULL 2012-12-08 01:43:34
2 Follow @EngineYard http://twitter.com/#!/engineyard NULL 2012-12-08 01:43:34
3 Follow @eycloud http://twitter.com/#!/eycloud NULL 2012-12-08 01:43:34
4 We blog http://www.engineyard.com/blog/ NULL 2012-12-08 01:43:34
5 Rock on! NULL 2012-12-08 01:43:34

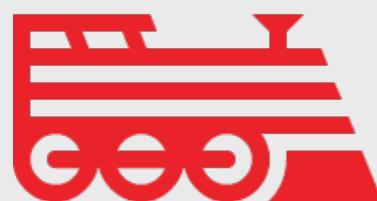
```
+-----+
5 rows in set (0.00 sec)
```

On SQL

DML: DATA MANIPULATION
(SELECT, INSERT, UPDATE...)

DDL: DATA DEFINITION
(CREATE, DROP, ALTER)

DCL: DATA CONTROL
(GRANT, REVOKE)



Relational Properties

ATOMICITY

CONSISTENCY

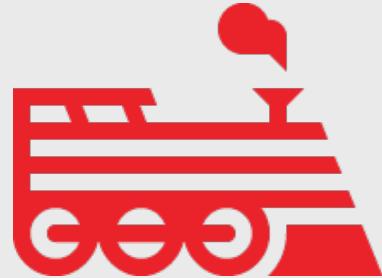
ISOLATION

DURABILITY



Our Databases





A Little Context

INTRODUCED 1994(ISH)

V5.6.17 CURRENT STABLE

VERY PERVERSIVE DUE TO
LAMP STACK & DEFAULTS



* *Trivia Q2: Why 'My'?*

Multi Masters



10/2005

ORACLE BUYS INNOBASE

02/2006

ORACLE BUYS SLEEPYCAT

01/2008

SUN BUYS MYSQL

04-08/2009

ORACLE BUYS SUN

ORACLE®

Pro: Storage Engines

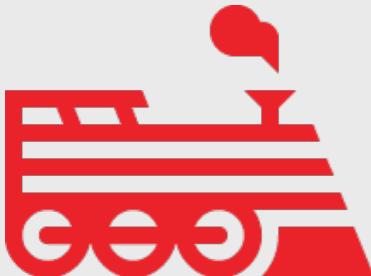
INNODB

CSV

MYISAM

ARCHIVE

MEMORY



* *Trivia Q3: Current Default?*

Pro: Distros & Clustering

XTRADB

TOKUDB

MARIADB

GALERA

WEBSCALEDDB



MariaDB



PERCONA



MySQL®

Pro: Extras



CRAZY MIGRATIONS
ON REPLICAS

COMMERCIAL ECOSYSTEM
REPLICATORS & CONNECTORS



Cons



**EXPLAIN & QUERY PLANNER
KINDA MEH**

**ORACLE RELATIONSHIP IS
PROBLEMATIC FOR ITS
COMMUNITY**



Common Mistakes



SIMPLE TURNS YOU LAZY

NOT USING INNODB

WEAK/MISSING VALIDATIONS



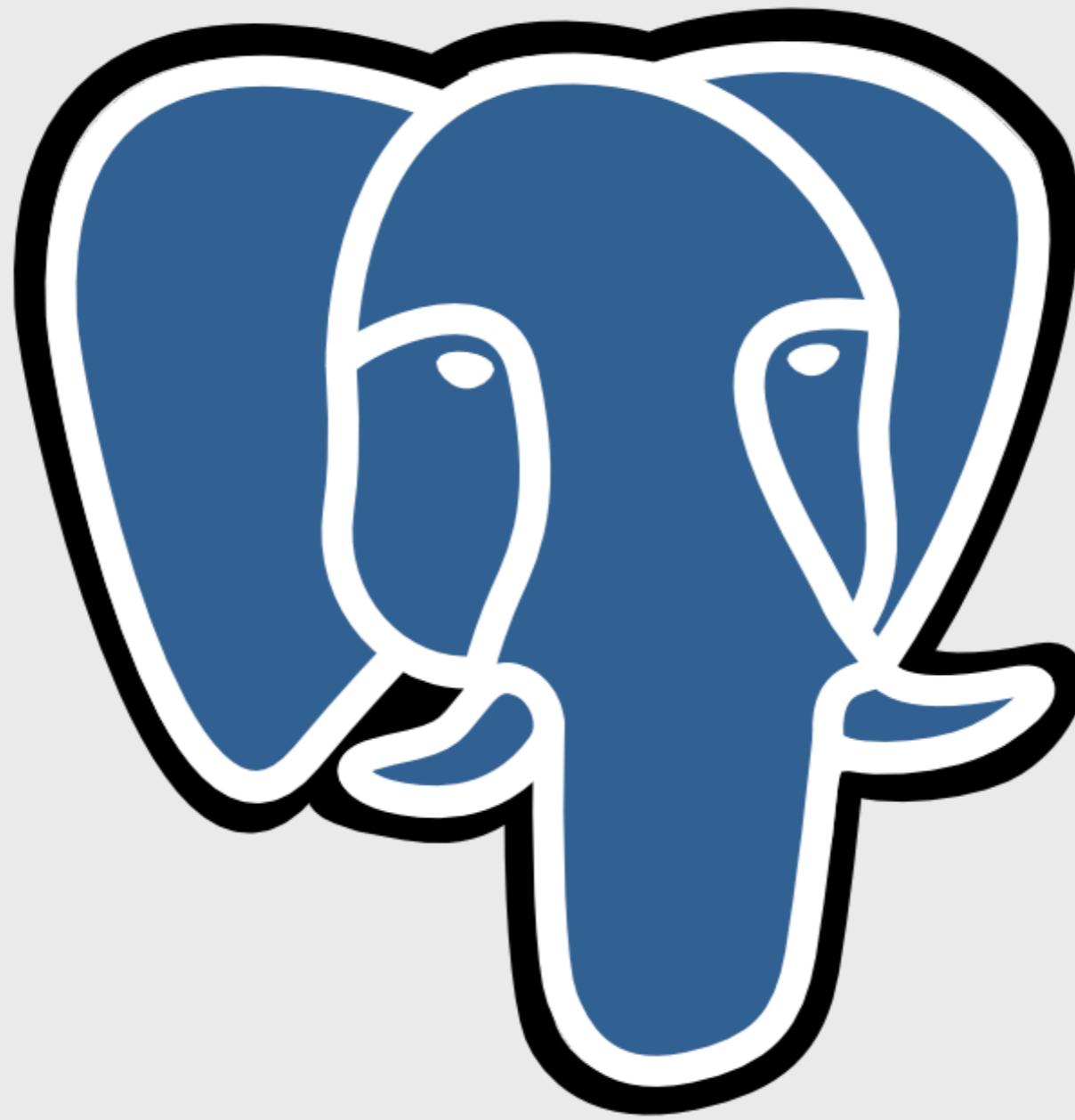
Best Use Case



When you need a
clustered RDBMS

*that works off the shelf and the option of commercial support

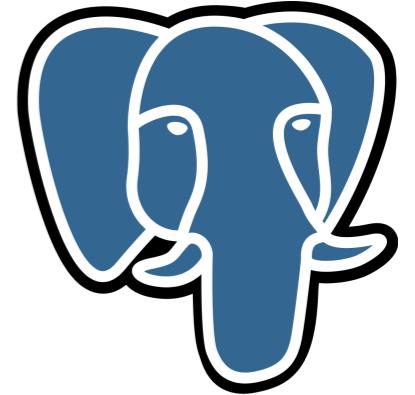




PostgreSQL



A Little Context



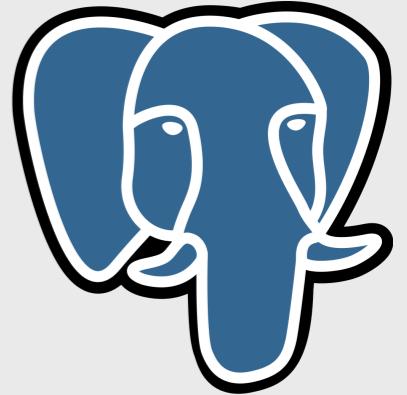
**DEEP ACADEMIC ROOTS
BERKELEY'S POSTGRES(95)**

**OBJECT DATABASE
COMMUNITY OWNED**



** Trivia Q: Why An Elephant?*

Pro: Versatile



MVCC

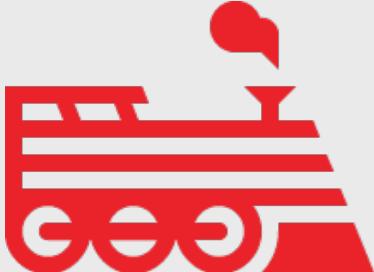
EXTENSIONS

FTS

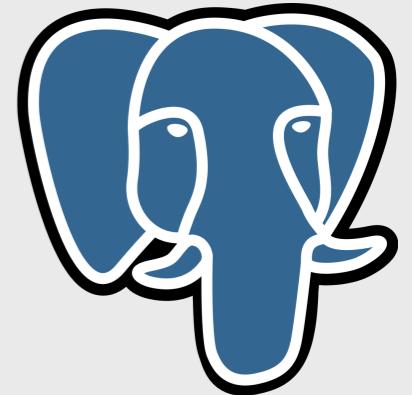
LANGUAGES

FDWS

FLEXIBLE DATA



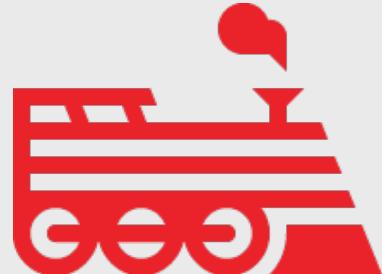
Pro: Versatile



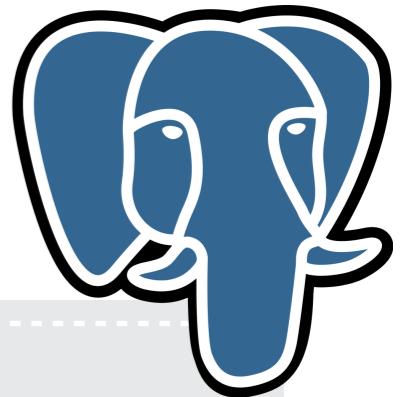
LISTEN/NOTIFY

FLEXIBLE INDEXES

**PER TRANSACTION
SYNCHRONOUS REPLICATION**



Many Indexes



B - TREES

DEFAULT. NUMERIC, TEXT, NULL

HASH

EQUALITY. DON'T USE

GIN

ARRAY VALUES & FTS

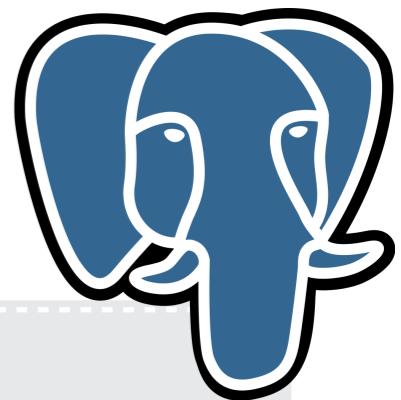
GIST

GEOMETRIC DATA & FTS

*They Can Be
Created
Concurrently!*



Many Indexes



PARTIAL INDEXES

INDEX + WHERE CLAUSE

EXPRESSION INDEXES

MATCH ON FUNCTION/MODIFICATION

UNIQUE INDEXES

PREVENTS DUPES

SORTED INDEXES

ALTER B-TREE FROM ASC TO DESC

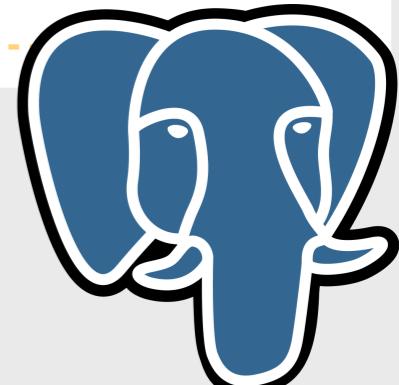


Cons



**CLUSTERING STORY IS NOT
QUITE THERE YET**

**MORE STRICT IN TERMS
OF TYPES. NO MORE
SHENANIGANS!**



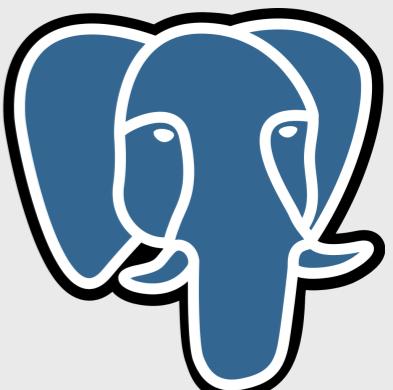
Common Mistakes



**UNNECESSARY INDEXES
(MULTI-COLUMN)**

OVERLOOK EXTENSIONS

GIVING UP ON INSTALL

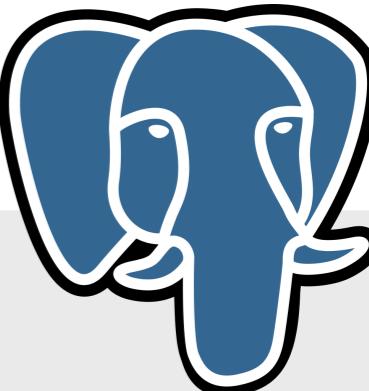


Best Use Case



When you need an
amazingly **versatile**
& powerful RDBMS

* and replica promotion is enough





Developing & Running



* DBS IN THE CLOUD

Know Your Replication

DB REPLICATION IS A MUST HAVE

USE DIFFERENT FAILURE DOMAINS

PRACTICE REPLICA PROMOTIONS

UNDERSTAND DR/HA OPTIONS

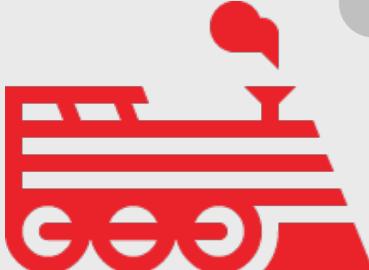


Expect Failures



BACKUPS ≠ DISASTER RECOVERY

HAVE A PLAN & PRACTICE IT!





Let's Wrap Up

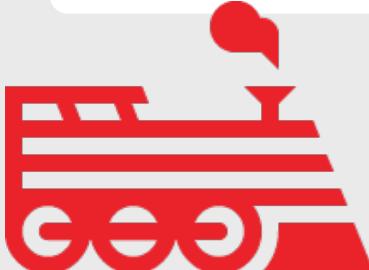
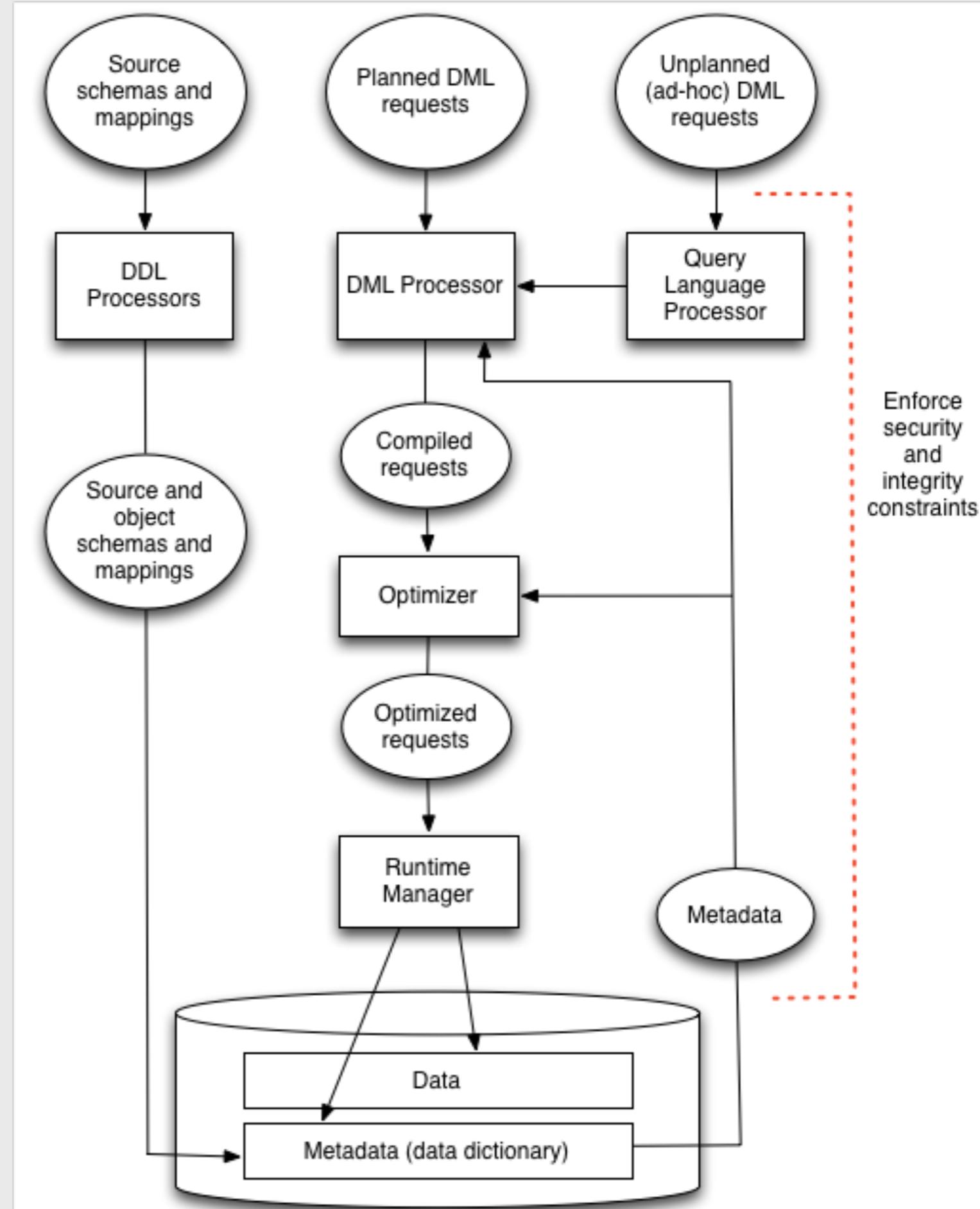
(+ RESOURCES & Q&A)



RDBMSs

COMPLICATED
BY DESIGN TO
MAKE YOUR
LIFE SIMPLER

LEVERAGE THEM
APPROPRIATELY



A photograph of a woman with long dark hair, wearing a grey cardigan over a black top. She has a large, dark, fake mustache applied to her upper lip. She is looking directly at the camera with a neutral expression. The background shows an office environment with cubicles and other people working.

Questions?

THANK YOU!

GITHUB.COM/RANDOMMOOD/
GREATWIDEOOPEN2014

