




**From Riding on Rails to Riding Camels:
Distribution Center Communication**

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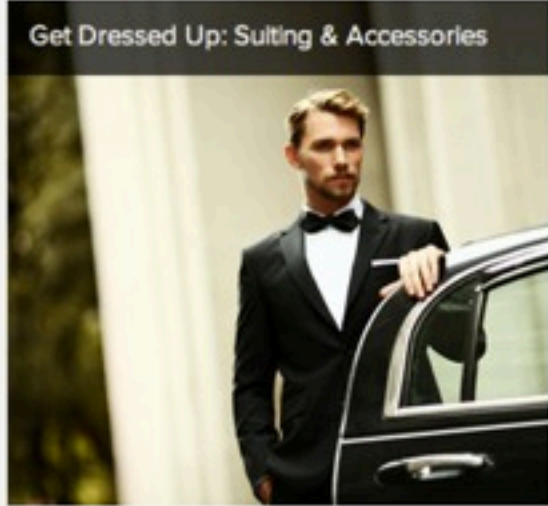
Cohesive & Co



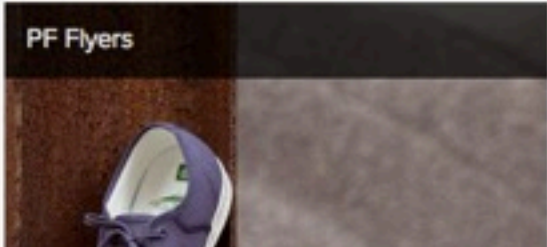
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WED THU FRI SAT

Wed 05/09

A BUNCH OF NUMBERS

- 1,200+** Employees
- 7** Offices (Ireland, NYC, Portland)
- 3** Distribution Centers
- 100+** Number of countries
- 10,000+** packages per day
- 303,000** square ft. - Louisville DC

FIRST, A GLOSSARY

WMS == Warehouse Management System

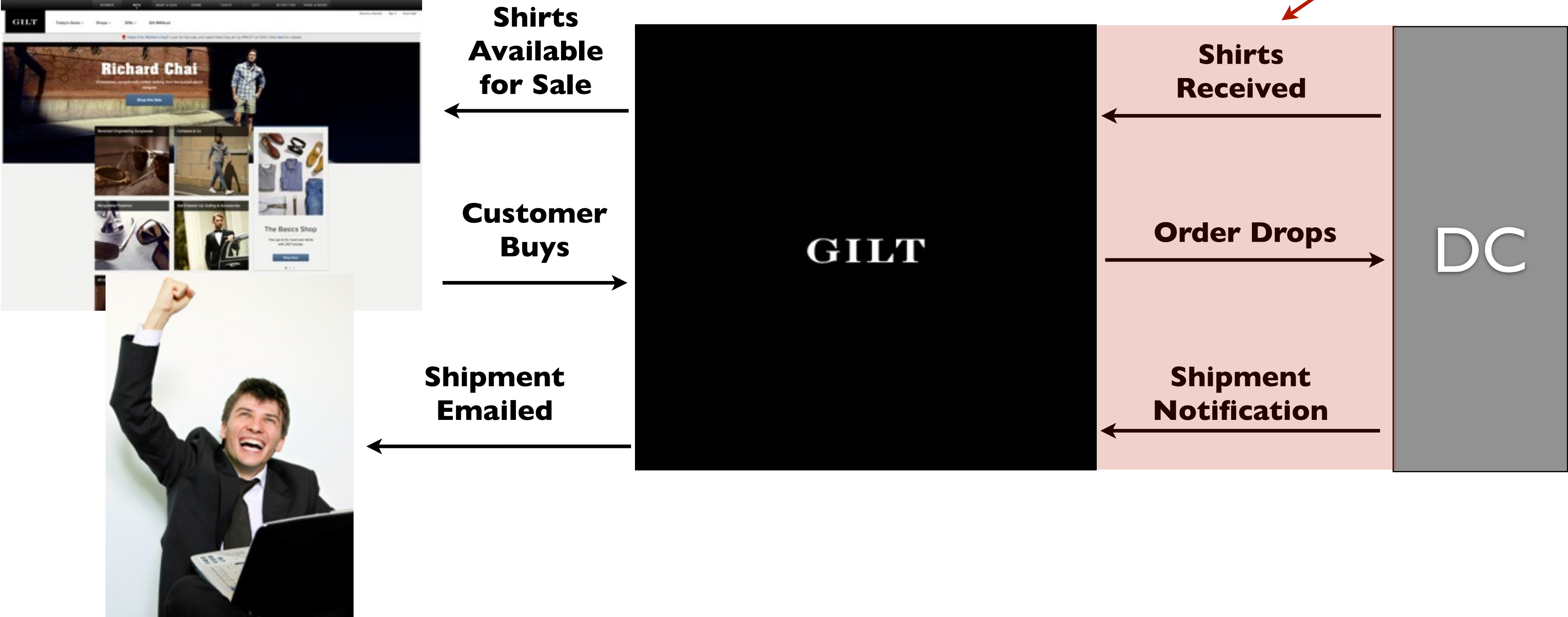
3PL == 3rd Party Logistics Provider

DC == Distribution Center

There is no DCMS.

A PRIMER ON ECOMMERCE DISTRIBUTION

*Distribution Center
Communications*

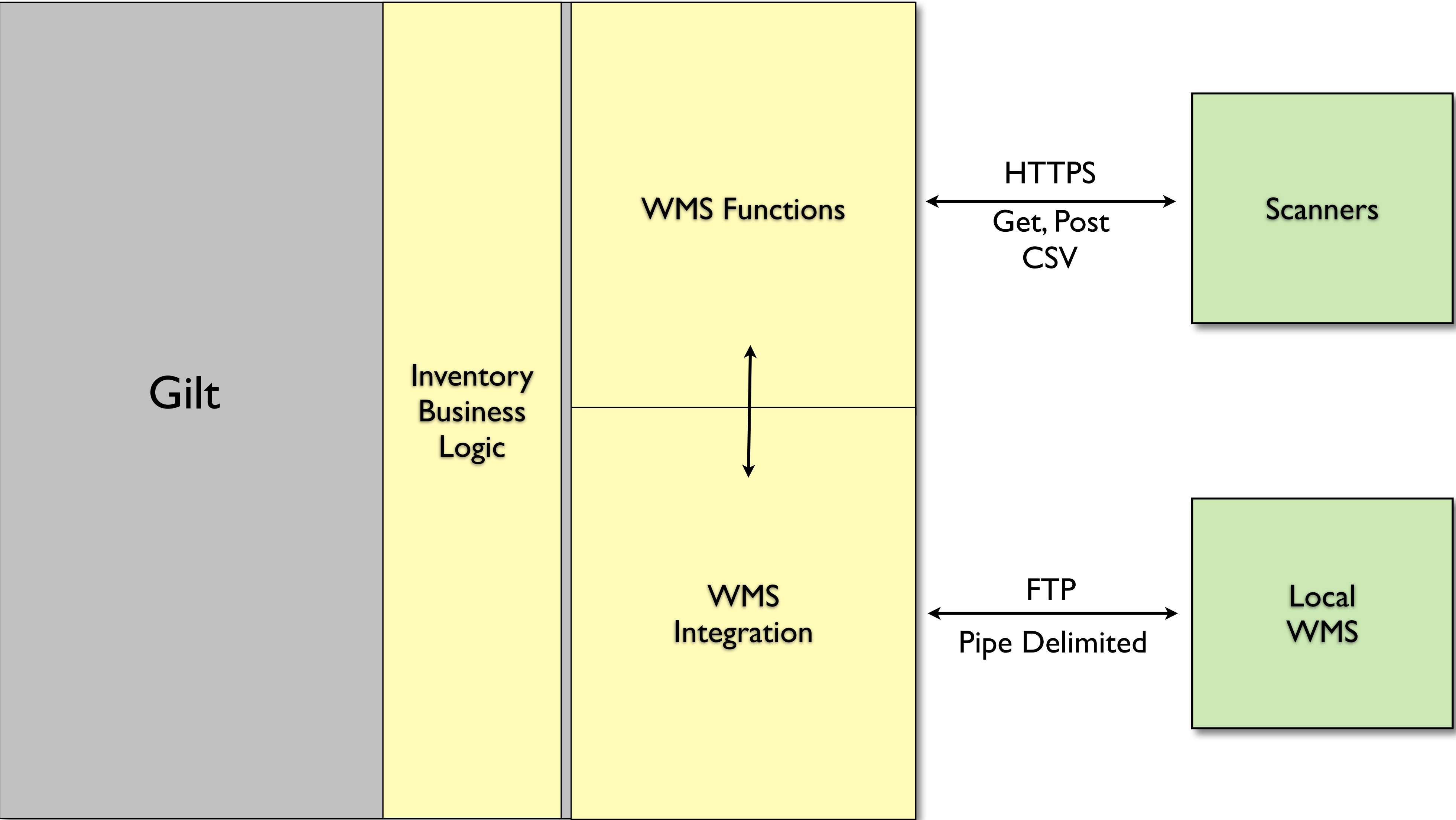


**TECHNICAL DEBT
GROWS ORGANICALLY**

2007

First Distribution Center opens in Brooklyn

OUR CODEBASE LOOKS LIKE THIS

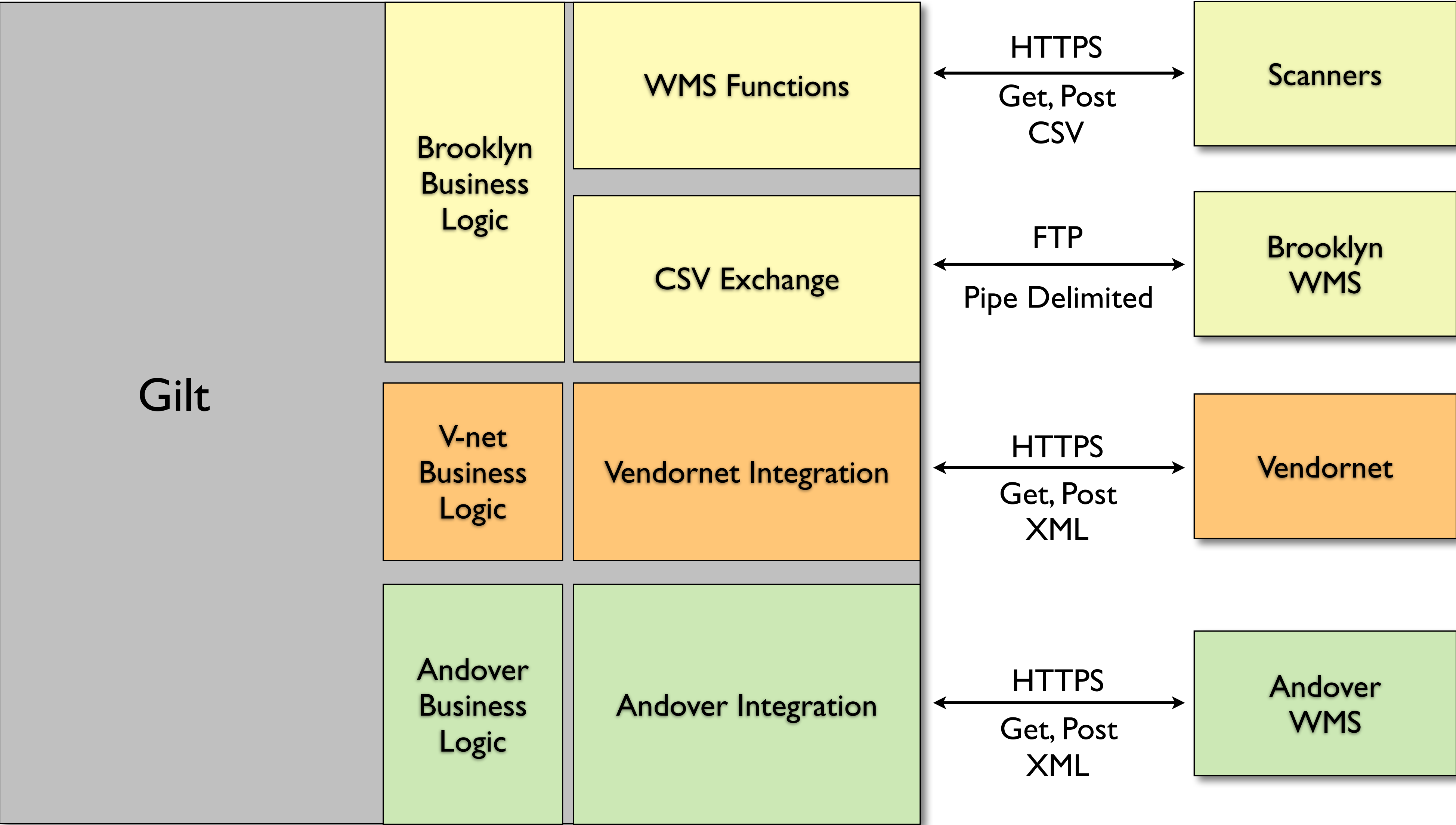


2009

That worked, but Brooklyn isn't enough

**So we expanded into Andover, MA and
added support for Vendornet**

OUR CODEBASE LOOKS LIKE THIS

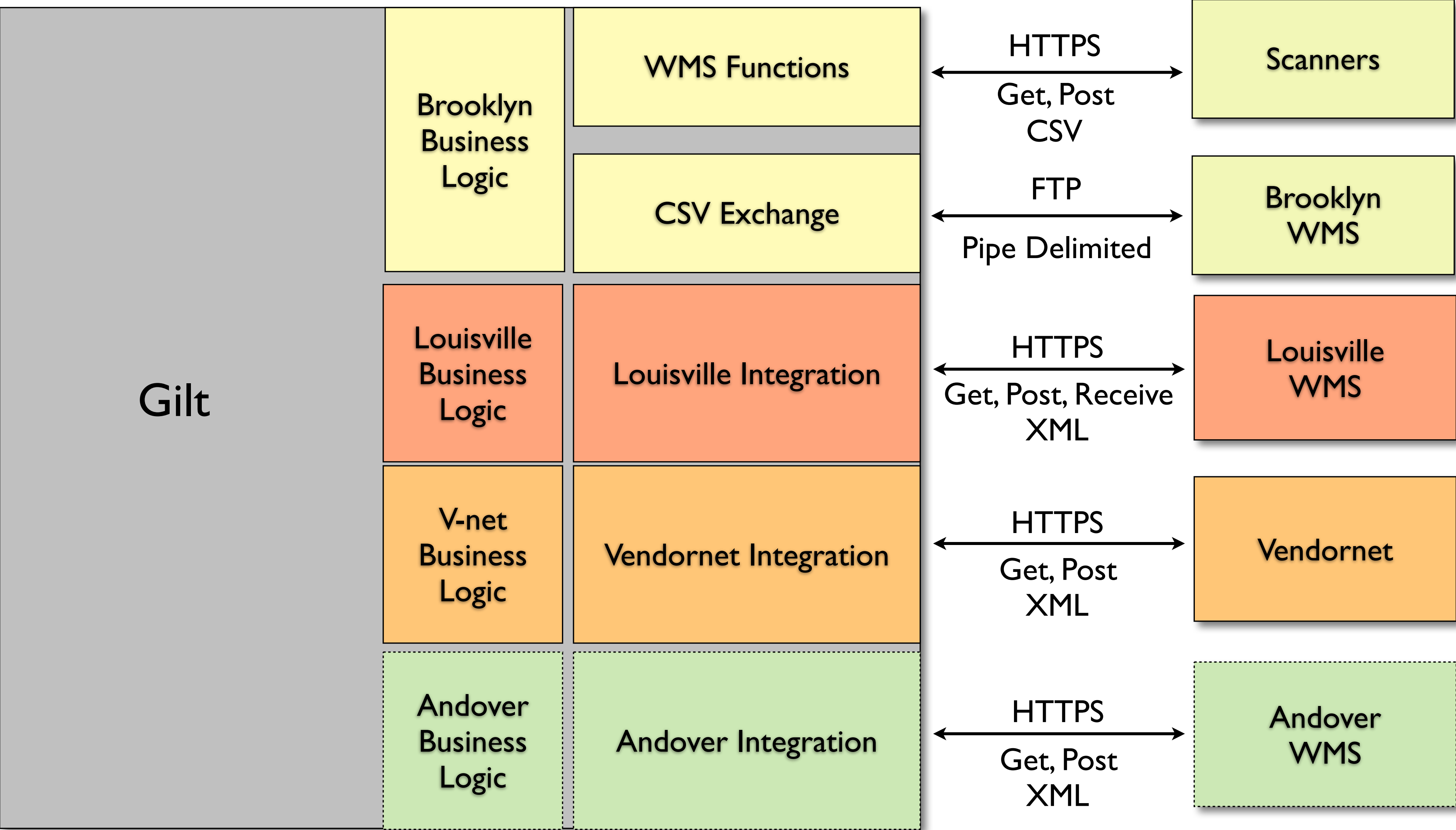


That worked too...

2010

So we move to Louisville
(bye, bye Andover)

OUR CODEBASE LOOKS LIKE THIS



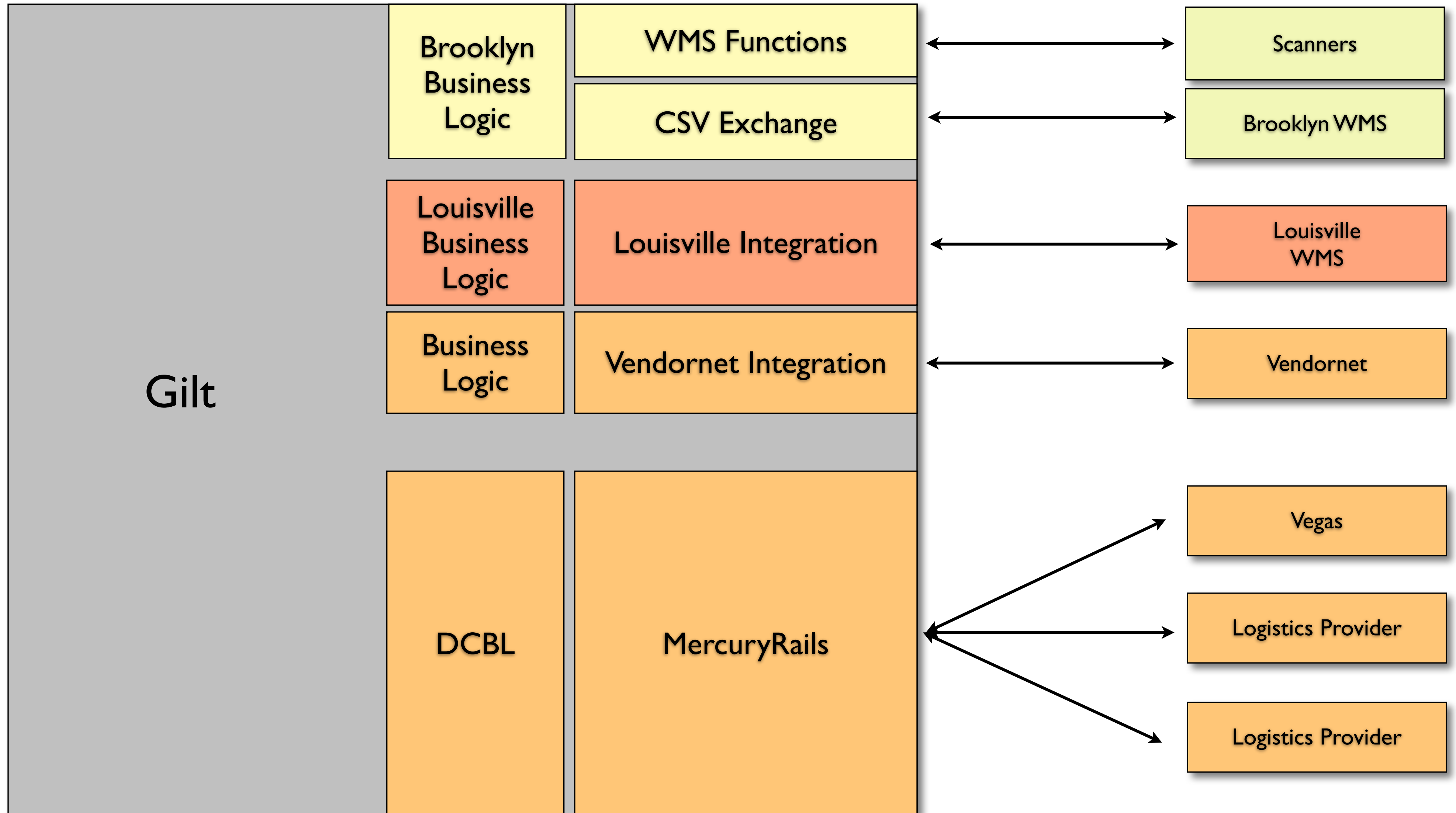

```
cp lib/warehouses/andover/* lib/warehouses/louisville/
```

**Louisville and Brooklyn are great,
but we can be more efficient.**

2011

We open our first West Coast DC in Vegas

OUR CODEBASE MAKES A LITTLE SENSE



We knew we could do better

Enter Mercury
(not the one in Rails)

The land of Rainbows and Puppies

REQUIREMENTS

Protocols

HTTPS / FTP / SFTP

Mixed Protocols at the Same Partner

Formats

XML, JSON, CSV, Pipe Delimited

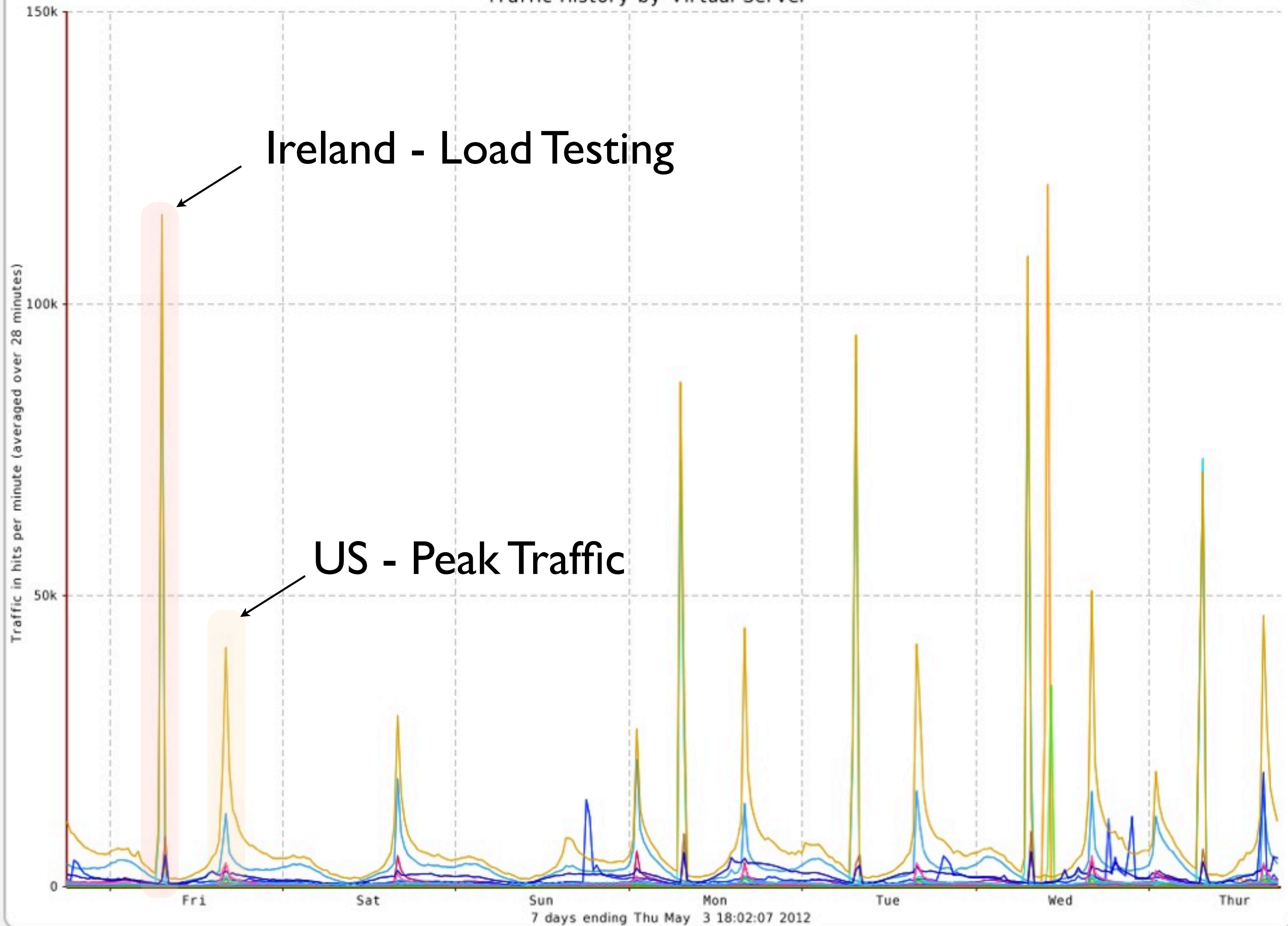
Header and Detail Files, Single Files

Hot Deploys

Any Format Can Be Reformatted into Another

Any Internal/External System Can Be a Source or a Destination

Semantic Mapping of Messages (Receiving == Receiving)



LOAD

100,000+ messages daily

3,000,000+ messages monthly

0 Tolerance for Loss

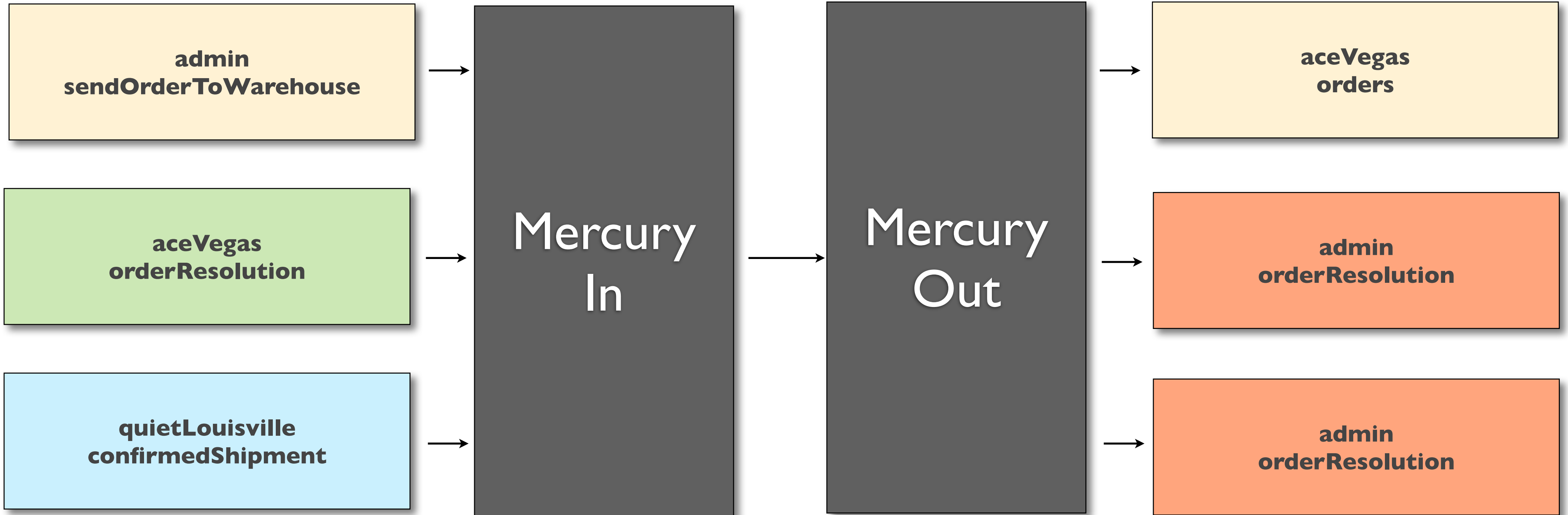
~0 Tolerance for Error

GENERAL ARCHITECTURE

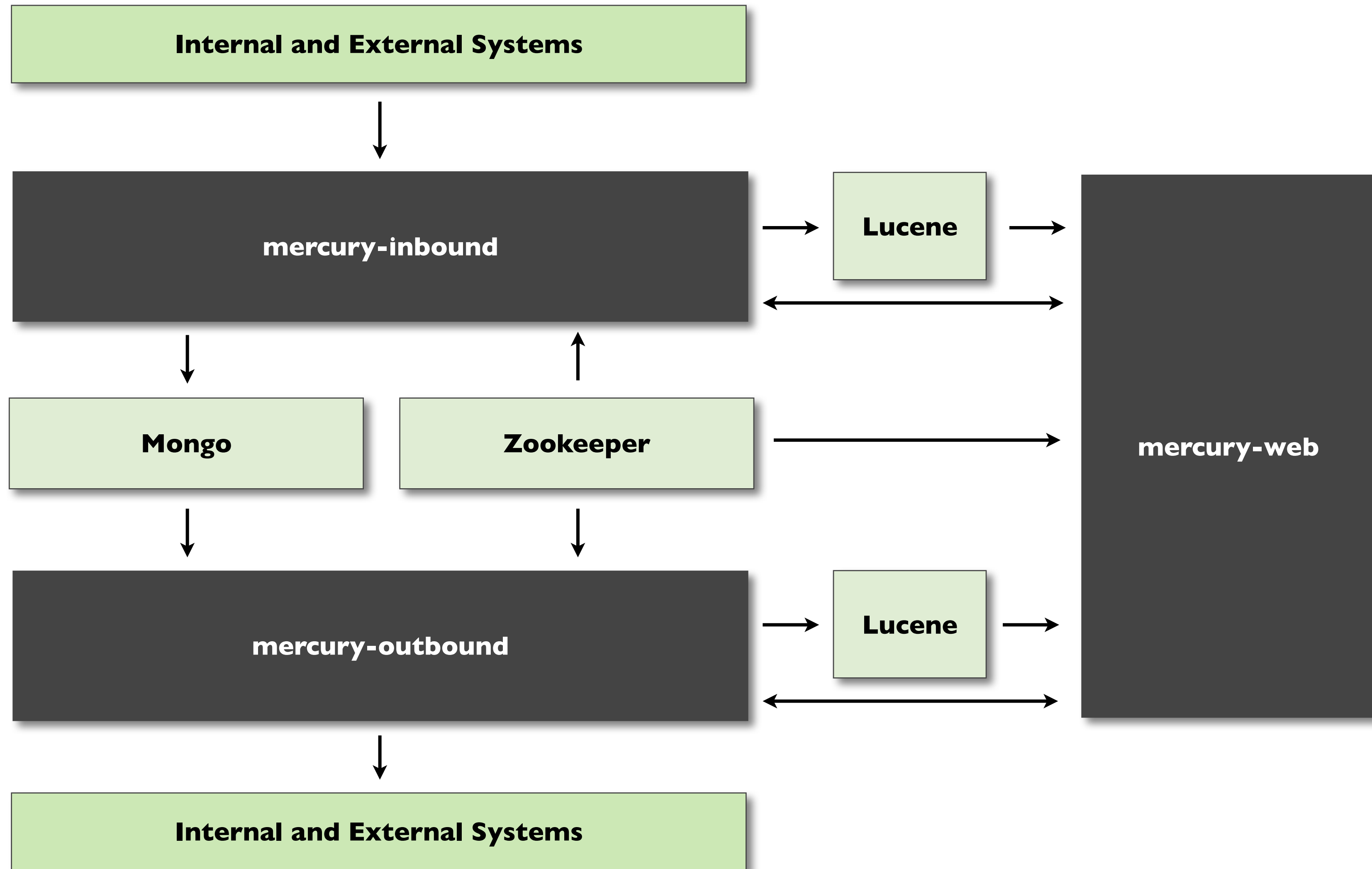
THE CONCEPT



NO RAINBOWS

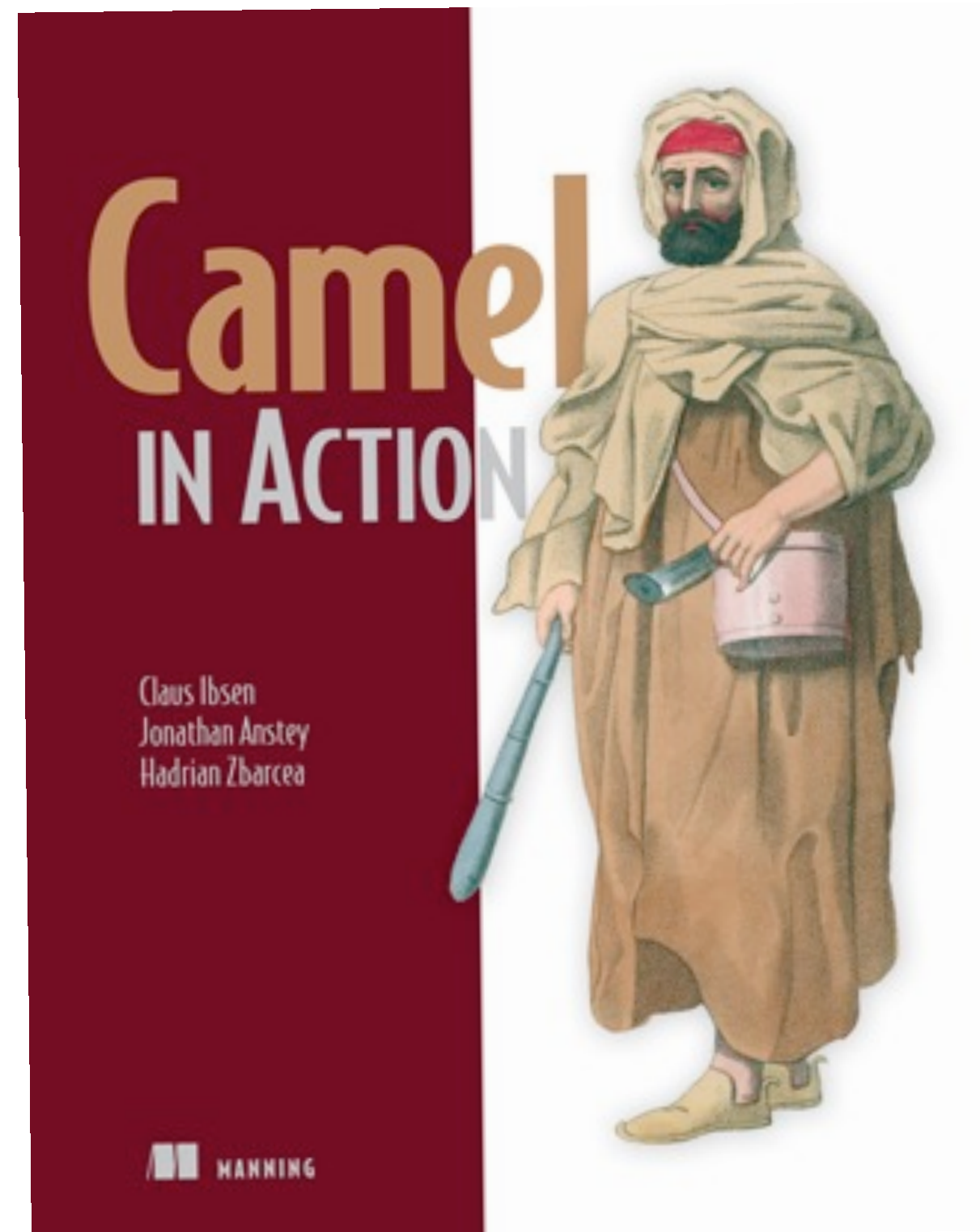


PRODUCTION SYSTEM



Why Camel?

OUR PRIMER



WHAT WE LIKED

Error Handling

DSL - Who doesn't like writing From and To

Free Stuff - like EIP's

WHY MONGO?

MQs were being evaluated by other teams

Mid-term persistence required

Reliable Messaging required

Mongo was tried and understood

NO MONGO COMPONENT?

Built one!

Using Morphia library to easily serialize/deserialize POJOs to mongo documents

Very bare bones. Not as featureful as the upcoming camel-mongo component.

CAMEL-MORPHIA

Writing:

```
.to("morphia://host:port/db?  
class=class.of.Foo")
```

Reading:

```
.from("morphia://host:port/db?  
class=class.of.Foo  
&queryOpts={name=Foo,type=Bar}")
```


ZOOKEEPER

“Highly Reliable Distributed Coordination”

“Nodes” storing arbitrary information

Can do other cool things like leader election

On update, clients are informed and can take actions.

WHY ZOOKEEPER?

Mercury is designed to run in parallel

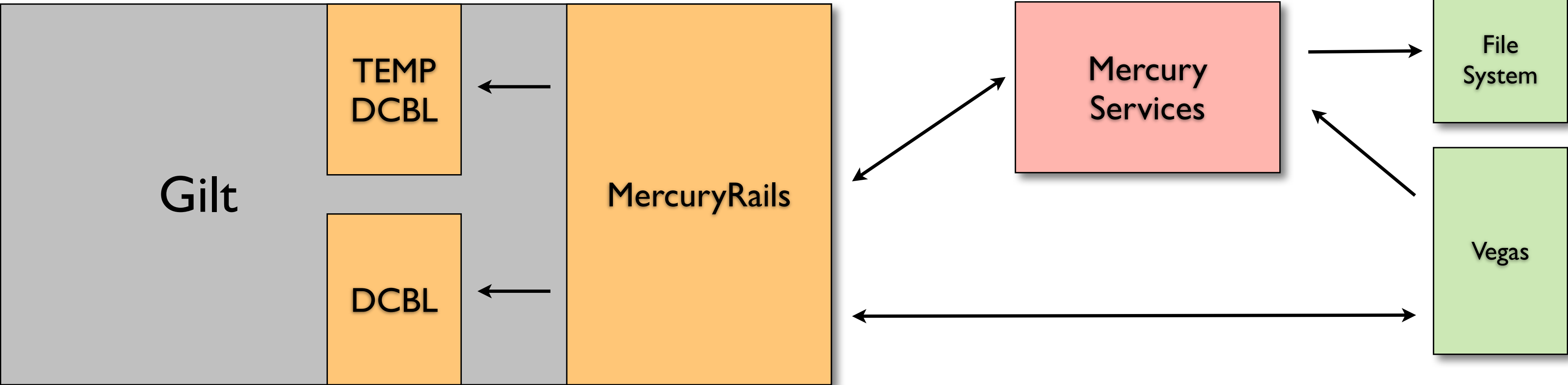
Config might be different for each node

Wanted to maintain config in one place

Eventually want to take advantage of things like leader election for routes

**How do you roll out a
service your business depends on without
stopping the business?**

RUN IN PARALLEL



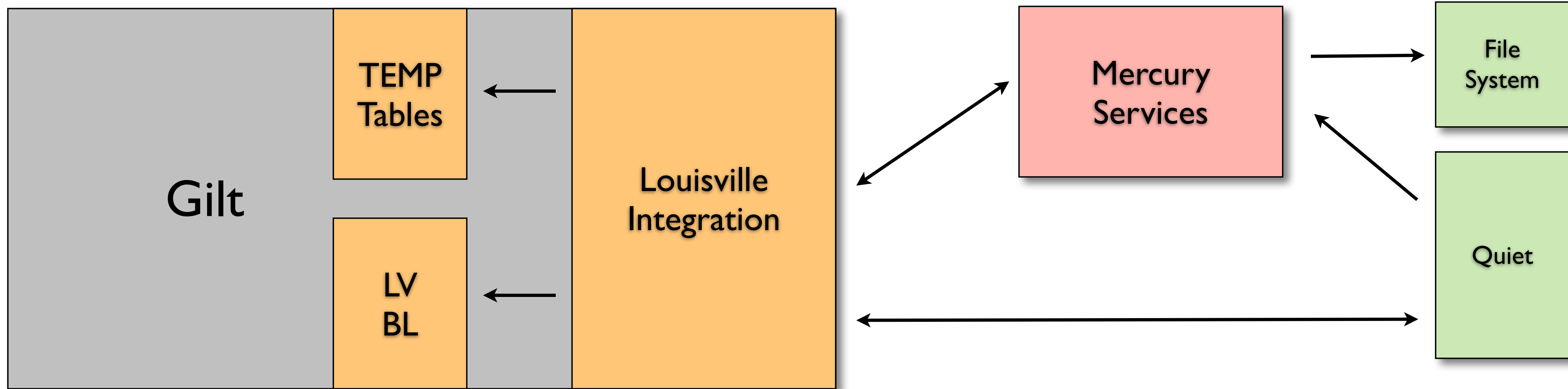
TEST THE TRANSITION

```
2012/03/27 18:47:59 INFO - Including: abstract_tests/ace_test.rb
2012/03/27 18:47:59 INFO - Including: abstract_tests/base_test.rb
2012/03/27 18:47:59 INFO - Including: abstract_tests/csv_concatenation.rb
2012/03/27 18:47:59 INFO - Including: abstract_tests/database_test.rb
2012/03/27 18:47:59 INFO - Including: abstract_tests/xml.rb
2012/03/27 18:47:59 INFO - Including: tests/ace_vegas/incoming_shipment_test.rb
2012/03/27 18:47:59 INFO - Including: tests/ace_vegas/inventory_snapshot_test.rb
2012/03/27 18:47:59 INFO - Including: tests/ace_vegas/inventory_update_test.rb
2012/03/27 18:47:59 INFO - Including: tests/ace_vegas/order_reconciliation_test.rb
2012/03/27 18:47:59 INFO - Including: tests/ace_vegas/order_resolutions_test.rb
2012/03/27 18:47:59 INFO - Including: tests/ace_vegas/order_test.rb
2012/03/27 18:47:59 INFO - Including: tests/ace_vegas/pack_details_test.rb
2012/03/27 18:47:59 INFO - Including: tests/ace_vegas/packing_list_test.rb
2012/03/27 18:47:59 INFO - Including: tests/ace_vegas/purchase_order_on_dock_test.rb
2012/03/27 18:47:59 INFO - Including: tests/ace_vegas/skus_test.rb
2012/03/27 18:47:59 START
2012/03/27 18:47:59 INFO - RUNNING TEST SUITE: all
2012/03/27 18:57:41 ERROR - AceVegasIncomingShipmentTest#test_generated_files: DISCREPANCY - Expected Value: 3409 Actual Value: 0
2012/03/27 18:57:41 ERROR - DEBUG STATEMENT
```

```
2012/03/27 18:57:41 ERROR - AceVegasIncomingShipmentTest#test_generated_files: DISCREPANCY - Differences:
```

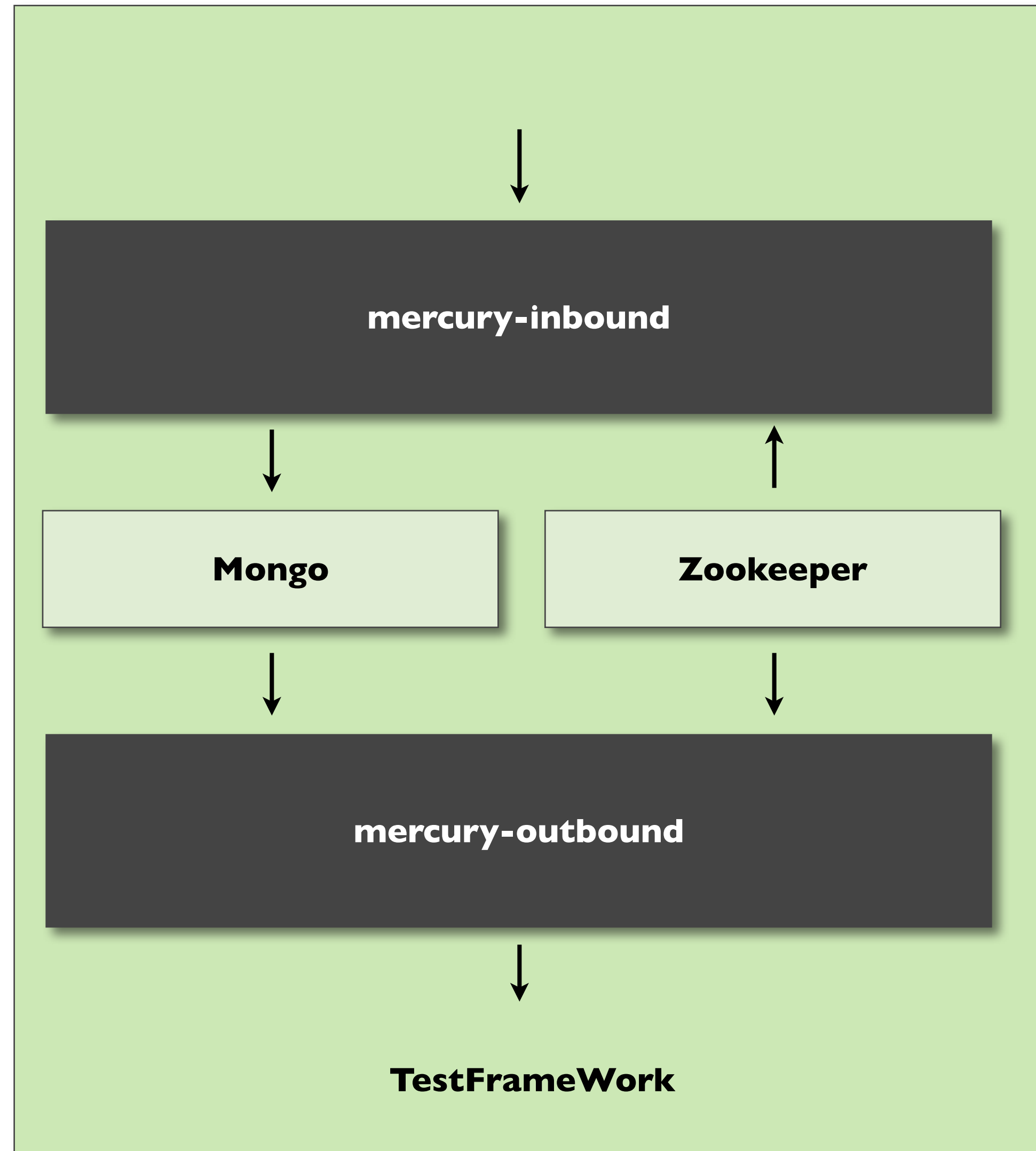
```
- 93832268,14488,ltl,other,vendor routed,SCHOLASTIC,JEFFERSON CITY,MT,US,2011-10-14 04:00:00 UTC,
- 98233563,14488,ltl,other,vendor routed,SCHOLASTIC,JEFFERSON CITY,MT,US,2011-10-14 04:00:00 UTC,
- 88585990,13098,ltl,ups,unknown-4,BENDON C/O MORRISON EXPRESS CORP,CARSON,CA,US,2011-08-26 04:00:00 UTC,
- 89314060,13099,ltl,ups,unknown-3,Classic Concepts Inc.,vernon,CA,US,2011-08-18 04:00:00 UTC,
- 85966839,13100,ltl,ups,unknown-2,FLIGHT001,ONTARIO,CA,US,2011-08-08 04:00:00 UTC,
- 92180204,13326,ltl,ups,k1957750050,GUPPIEZ,LOS ANGELES,CA,US,2011-09-15 04:00:00 UTC,
- 86722060,12224,ltl,ups,j2301729797,Siegelsisters, LLC,Los Angeles,CA,US,2011-08-11 04:00:00 UTC,J2301729804 J2301729813 J2301729788
- 102810059,16443,ltl,fedex,991376700104,KYOCERA ADVANCED CERAMICS,COSTA MESA,CA,US,2011-11-30 04:00:00 UTC,
- 141712029,20696,smallparcel,ups,9102927007687117204533,LOOG GUITARS,NEW YORK,NY,US,2012-03-26 04:00:00 UTC,
- 93810899,13735,ltl,other,8213830512,AVIVA STANOFF,CITY OF INDUSTRY,CA,US,2011-09-26 04:00:00 UTC,
- 136173250,19432,smallparcel,fedex,798063836164,ELEVEN ELEVEN WATCHES,CALABASAS,CA,US,2012-02-16 04:00:00 UTC,
- 86512461,12085,ltl,fedex,795044033548,Matiko,Carson,CA,US,2011-08-08 04:00:00 UTC,
- 90613763,13252,ltl,fedex,764749715026721,Barton Perreira,Irvine,CA,US,2011-09-13 04:00:00 UTC,
```


LATHER, RINSE, REPEAT



Integration Testing For Fun And Sanity

END TO END TESTING



WHY?

We also have a lot of unit tests that test routes end to end. BUT:

- Developers sometimes just test the best cases, forget some of those worst cases
- Mercury is split up into two parts. Unit tests are just testing routes of one part.

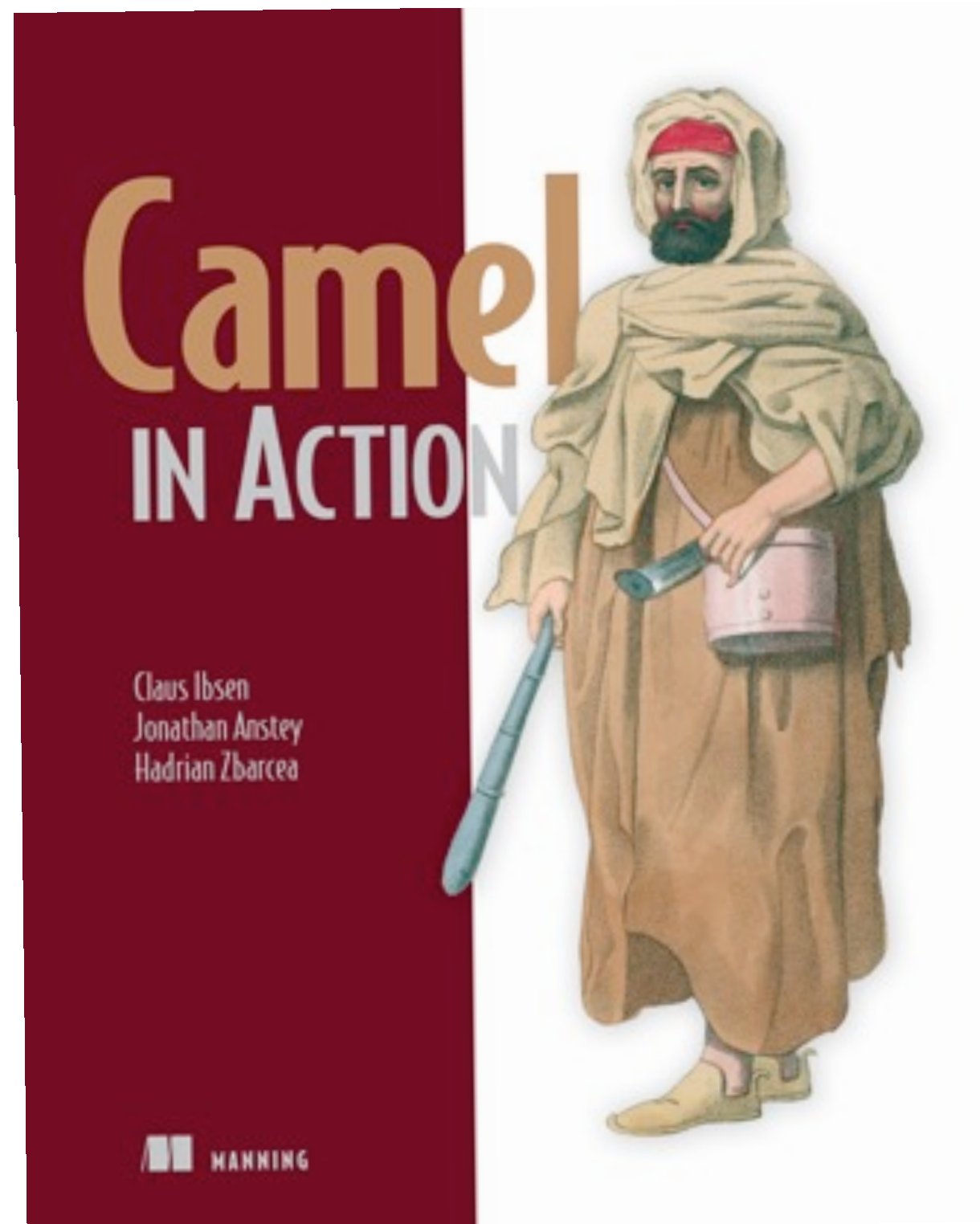
What did we learn?

Routes Are Awesome!

REMEMBER THESE?



Documentation is hard!



= Good, but slightly outdated

Camel 1 Documentation mixed with Camel 2 documentation

File vs File2

Camel evolving faster than the documentation

Lots of components (how to choose the right one)

Current Solutions?

svn co <https://svn.apache.org/repos/asf/camel/{version}> camel

Fusesource

Parsing CSV is hard!

Specifically:

The Bindy parser sucks when parsing CSV with quotes

Implementation:

```
String[] tokens = line.split(separator, -1);  
result = unquoteTokens(result, separator);
```

Current Solutions:

Don't use Bindy?

Possibly write something similar to Bindy, on top of a working CSV parsing library

Aggregation is hard!

Specifically:

When a message is aggregated, it is marked complete

Idempotency, File handling, etc no longer 'just work'

Current Solutions:

Use explicit actions rather than automatic actions

Just Getting Started with Camel

WHAT IS NEXT @ GILT

Contributing Back

- Morphia
- CSV

5 More 3rd Parties to Integrate

Monitoring, stress testing, and all that other fun stuff you do with an enterprise system.