From Riding on Rails to Riding Camels:
Distribution Center Communication
WHAT IS GILT?
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

Shirts Available for Sale

Customer Buys

Shipment Emailed

GILT

Shirts Received

Order Drops

Shipment Notification

DC
TECHNICAL DEBT GROWS ORGANICALLY
2007
First Distribution Center opens in Brooklyn
OUR CODEBASE LOOKS LIKE THIS

Gilt

Inventory Business Logic

WMS Functions

WMS Integration

Scanners

HTTPS
Get, Post
CSV

Local WMS

FTP
Pipe Delimited
2009
That worked, but Brooklyn isn’t enough
So we expanded into Andover, MA and added support for Vendornet
OUR CODEBASE LOOKS LIKE THIS

Gilt

- Brooklyn Business Logic
- CSV Exchange
- WMS Functions

Brooklyn WMS

- FTP
  - Pipe Delimited

- HTTPS
  - Get, Post CSV

- HTTPS
  - Get, Post XML

Andover Integration

- V-net Business Logic
- Vendornet Integration

Vendornet

- HTTPS
  - Get, Post XML

- HTTPS
  - Get, Post XML

Vendornet Integration

- Andover Business Logic
- Andover Integration

Andover WMS

- Scanners

- Scanners

- HTTPS
  - Get, Post CSV
That worked too...
So we move to Louisville
(bye, bye Andover)
OUR CODEBASE LOOKS LIKE THIS

Gilt

- Brooklyn Business Logic
- CSV Exchange
- WMS Functions

- Louisville Business Logic
- Louisville Integration

- V-net Business Logic
- Vendornet Integration

- Andover Business Logic
- Andover Integration

Scanners
- Brooklyn WMS
- Louisville WMS
- Vendornet
- Andover WMS

HTTPS
- Get, Post
- CSV

FTP
- Pipe Delimited

HTTPS
- Get, Post, Receive
- XML

HTTPS
- Get, Post
- XML

HTTPS
- Get, Post
- XML
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

- Scanners
- Brooklyn WMS
- Louisville WMS
- Vendornet
- Vegas
- Logistics Provider
- Logistics Provider

- Brooklyn Business Logic
- WMS Functions
- CSV Exchange
- Louisville Business Logic
- Louisville Integration
- Vendornet Integration
- Business Logic
- DCBL
- MercuryRails
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)
Ireland - Load Testing

US - Peak Traffic
LOAD

100,000+ messages daily

3,000,000+ messages monthly

0 Tolerance for Loss

~0 Tolerance for Error
GENERAL ARCHITECTURE
Varying stuff of varying quality goes in.

THE CONCEPT

MERCURY

Puppies and Rainbows come out.
NO RAINBOWS

admin sendOrderToWarehouse

aceVegas orderResolution

quietLouisville confirmedShipment

Mercury In

Mercury Out

aceVegas orders

admin orderResolution

admin orderResolution
Why Camel?
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}")
```
“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

Gilt

TEMP
DCBL

DCBL

MercuryRails

Mercury Services

File System

Vegas
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_resolution_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/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:
- 93832266,14488,ltt,other,vendor routed,SCHOLASTIC,JEFFERSON CITY,MT,US,2011-10-14 04:00:00 UTC,
- 96233569,14488,ltt,other,vendor routed,SCHOLASTIC,JEFFERSON CITY,MT,US,2011-10-14 04:00:00 UTC,
- 85585059,13906,ltt,ups,unknown-4,BENDON 6/9 MORMON EXPRESS CORP,CA,US,2011-08-26 04:00:00 UTC,
- 88014060,13909,ltt,ups,unknown-3,Classic Concepts Inc.,vernon,CA,US,2011-09-10 04:00:00 UTC,
- 85566399,13100,ltt,ups,unknown-2,FLIGHT001,ONTARIO,CA,US,2011-08-08 04:00:00 UTC,
- 92182020,13226,ltt,ups,k19577585850,GUPPIEZ,LOS ANGELES,CA,US,2011-09-15 04:00:00 UTC,
- 86722066,12709,ltt,ups,j3201729797,Siegelisters,LLC,Los Angeles,CA,US,2011-11-10 04:00:00 UTC,
- 102801059,16443,ltt,fedex,591376760104,KYOCERA ADVANCED CERAMICS,COSTA MESA,CA,US,2011-11-30 04:00:00 UTC,
- 143712059,20668,smallexport,ups,818029700756217204533,DOG GUITARS,NEW YORK,NY,US,2012-03-25 04:00:00 UTC,
- 93818999,13735,ltt,other,821398512,AVIVA STAMNOFF,CIY OF INDUSTRY,CA,US,2011-09-26 04:00:00 UTC,
- 136173250,19432,smallexport,fedex,798063636164,ELEVEN ELEVEN WATCHES,CALABASAS,CA,US,2012-02-16 04:00:00 UTC,
- 86512461,12085,ltt,fedex,79594883348,Matiko,Carson,CA,US,2011-08-08 04:00:00 UTC,
- 50613763,13252,ltt,fedex,7647497150267221,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

mercury-inbound

Mongo  Zookeeper

mercury-outbound

TestFrameWork
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:

```java
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.