Developing a Reliable Messaging System for an Unreliable and Diverse World

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Lynden, Inc.
Agenda

• Background on myself and Lynden
• Problem we are attempting to solve.
• Previous System
• Architecting a New System
• Results & Future Directions
I.T. just started beta testing our new software system. Beta must be greek for "Still doesn't work."

your ecards
someecards.com
• Application Architect at Lynden, Inc.

• Technical lead for our freight tracking project, “Cross Dock”
• Consolidates Freight
• Buys space on airlines
• Don’t own their own equipment

Not Our Airplane!
• Truck Service to Alaska from the Lower 48.

• Oil, Gas, Mining, and Seafood industries

• Own their own assets (trucks, trailers)
• Scheduled barge service from Seattle to S.E. Alaska

• Auto Dealers, Costco, US Postal Service
• Scheduled Alaska Service

• Charter Service Worldwide

• Lockheed L382 Hercules Aircraft
The Problem

Where’s my freight???
The Problem

Major Customer of Lynden Air Freight required “piece level” tracking of their freight.
The Story of Shiptrac

MISTAKES
It could be that the purpose of your life is only to serve as a warning to others.
The Story of Shiptrac

- Specifically designed for Lynden International
- Encountered major reliability issues
- Was becoming increasingly expensive to maintain
- Became known internally as “Shipwreck”
Update on the reliability of the shiptrac system.
Replacing Shiptrac

- Stable
- Maintainable
- Scalable
- Extensible
  - Lynden International
  - Lynden Transport
  - Lynden Air Cargo
  - Alaska Marine Lines
## Our Environment

![Database Interface](image)

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<th>Field Number</th>
<th>Field Definition</th>
<th>Conversion Code</th>
<th>Column Heading</th>
<th>Output Format</th>
<th>Depth &amp; Format</th>
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Press any key to continue...

Ready
Our Environment

Server Infrastructure

- Solaris 10

Glassfish v3 Application Server

- Web Applications
- Web Services
- RMI Services
Our Environment

Rich Clients
Our Environment

Windows CE Devices

Motorola MC9090  Motorola VC5090  Motorola WT4090
I'm running the unit tests in my mind.
Initial Design

- Universe
- Legacy UV/Basic Apps
- Glassfish Web Service
- ANC
- SEA

The Lynden Family of Companies
2 Major Issues

• Load on the database grew.
• Devices were getting data they didn’t care about.
Introducing Messaging

• Devices should only get data they care about
  • 1 Topic per location
• UniVerse DB and apps need to push messages.
  • DB trigger to write data to a UV file.
• The Bathroom problem
  • Subscriptions needed to be durable
Introducing Messaging

- UV/Basic Apps
- Universe
- Legacy UV/Basic Apps
- DB Trigger
- UV MQ-table
- Active MQ
  - ANC Topic
  - SEA Topic
- Glassfish
  - UV Messaging
  - Web Service
- ANC
- SEA
Can we go to lunch now?

I thought the 7-layer model referred to a burrito.
Not Quite…

• .Net OpenWire implementation of failover transport was flakey on Win CE.

• Next version of .Net OpenWire client library (NMS) was dropping support for Win CE.
Alternatives to NMS API?

- STOMP
  - Performance Issues
- REST API
  - No support for durable subscriptions
- MSMQ Bridge
  - MSMQ support for Win Mobile, but not CE
- Roll our own proxy server
• Buffers broker from frequent client disconnects
• ASCII protocol
  • Can develop clients for our other platforms (UV/Basic, Java desktop)
  • Developed using Apache Mina libraries
• JMX Monitoring
Messaging Proxy Server

ActiveMQ
- ANC Topic
- SEA Topic

Glassfish
- Messaging Proxy
- UV Messaging
- Web Service

Legacy UV/Basic Apps
- UV MQ-table
- DB Trigger

Universe

ANC

SEA
Messaging Proxy Server

Proxy Commands

- Info
- Client
- Subscribe
- Start
- Ack
- Stop
- Unsubscribe
- Quit
Messaging Proxy Server

```bash
###CONNECTED;GUID:connectSubscriberGUID;VERSION:1.1.3-SNAPSHOT;Build-Date:2012-04-06 12:51

client MyClientId 222
###OK;GUID:222

subscribe /com/lynden/crossdock/anc 222
###OK;GUID:222

start 222
###OK;GUID:222

info 222
###INFO: ClientID:MyClientId,State:Started,Connection:failover:(tcp://adak:61625>,Last access:1336712578721,Subscriptions:/com/lynden/crossdock/anc;GUID:222

ID:adak-30272-1336692402473-2:2:1:1::JMSCorrelationID=,JMSDeliveryMode=1,JMSDestination=topic://com/lynden/crossdock/anc,JMSEXpiration=0,JMSMessageID=ID:adak-30272-1336692402473-2:2:1:1,JMSPriority=0,JMSRedelivered=false,JMSTimestamp=13367125633382,JMSXGroupID=null::

stop 222
###OK;GUID:222

quit 222
###OK;GUID:222

Connection to host lost.
• Summary of Proxy related statistics
• Summary of client specific information
• Ability to reset a client’s connection to the proxy.
Next Steps

The Present
- 24 Warehouse locations
- 100 devices
- In production for Lynden Air Freight & Lynden Transport
- Message Traffic
  - Peak: 900,000 per day
  - Avg: 300,000 per day

The Future
- 50+ Warehouse locations
- 200+ devices
- Bringing Alaska Marine Lines & Lynden Air Freight online.
- Make piece-level tracking info available on Lynden.com
Questions?

It's QUESTION TIME!!

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