Oregon State University
Marine Technical Group

Ship's Underway Data System
2010

Into the Data Storm:
Achievements and Lessons
• OSU Marine Technicians
  o Supervisor: Daryl Swensen
  o Hardware: David O’Gorman
  o Software: Toby Martin

• Sponsor
  o National Science Foundation
System Overview

- Infrastructure
- Acquisition
- Data flow
- Data Volume

See examples at
<http://www.shipops.oregonstate.edu/martech/project/suds_2.0/presentation/rvtec2010/example/>
Infrastructure

- physically separate data network
- each backhaul has 3 pairs of fiber strands
- leverage the dark fiber in the 7 existing backhauls
- 2 new backhaul runs
- 6 new network switches
- 6 new power over ethernet injectors
- 1 new central network switch
- 1 new router
- 2 new DataNet data aggregation servers
- 2 new UserNet data aggregation servers
Acquisition

- Boards
  - POE Powered
  - Supply Local Power
  - Time Synced
  - Analog & Serial

- Physical Installation Details
Oregon State University
Ships Underway Data System

Acquisition

- 24 sensors being acquired
- 9 DataStorm DAS analog boards
- 9 DataStorm DAS serial boards
Sensor Meta Entry

Western_Analog_1
Channel 4 Meta Configuration

- Channel Mode: A2D 0-15V
- Channel Name: NH10_Battery
- Sensor Make: Werker Batteries
- Sensor Model: Wires Inc
- Sensor SN: 1
- Cal Date: 5-Oct-2010
- Equation: Unused
- Cal Coeff 1: 3.000000
- Cal Coeff 2: 100
Data Flow Design Concepts

• Stand-alone packets / files
  o self describing, atomic, asynchronous
• Provenance / Metadata (what, when, where, who)
• Non-blocking, free flowing
• Uni-directional flow (push / broadcast)
• Delay and fault tolerant
• Easier to have and not need (now), than to need and not have
(raw) Individual Sensor Readings

- UDP broadcasts to network
- Stand alone XML packets
  - analog
  - serial
  - diagnostic

See examples at:
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Aggregation

- collect stand alone raw (XML) packets (1.6 KB)
- log raw (XML) stream
- preprocess
- create the distributions
Preprocessing

- filter for elements of interest
- inject additional metadata: cruise, ship, source/sink
- sensor combinations: salinity, true winds, ...
- output as CSV

See examples at:
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On-Ship Distributions

real-time
  • stand alone raw (XML) packets

near real-time (within seconds)
  • preprocessed (CSV) files
  • visualization graphics (projected)
On-Shore Distributions

near real-time of preprocessed (CSV) files

- R2R near real-time
- VOS weather to NOAA
- public visualization graphics (projected)

end-of-cruise data set (R2R cruise compliant)

- Science Team
- R2R
# Oregon State University Ships Underway Data System

## Data Volume - Daily

<table>
<thead>
<tr>
<th></th>
<th>Raw</th>
<th>Zipped</th>
</tr>
</thead>
<tbody>
<tr>
<td>raw (XML)</td>
<td>11,328 MB</td>
<td>560 MB</td>
</tr>
<tr>
<td>preprocessed (CSV)</td>
<td>249 MB</td>
<td>32 MB</td>
</tr>
</tbody>
</table>

Sending preprocessed (CSVs) files to shore since March 2010
Summary

- Full Network Sensor Integration
- Increase Sample Frequency with Room for Expansion
- Simplification of User Interface
- R2R and SAMOS 2 Compliant
- Questions and Comments