



Oregon State University Marine Technical Group

Ship's Underway Data System
2010

Into the Data Storm:
Achievements and Lessons



Oregon State University Ships Underway Data System

- OSU Marine Technicians
 - Supervisor: Daryl Swensen
 - Hardware: David O’Gorman
 - Software: Toby Martin
- Sponsor
 - 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/

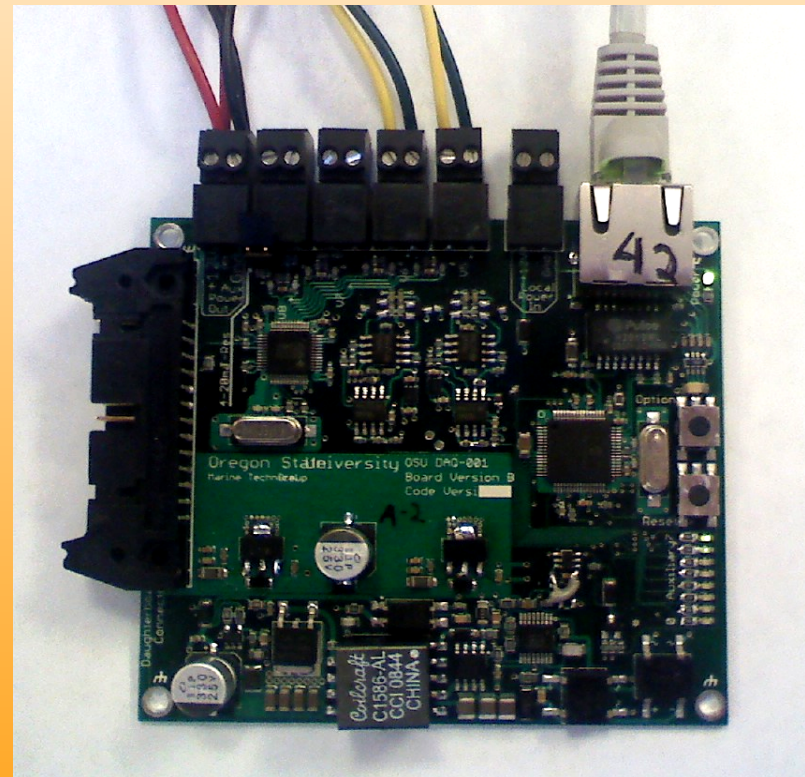
Infrastructure

- 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



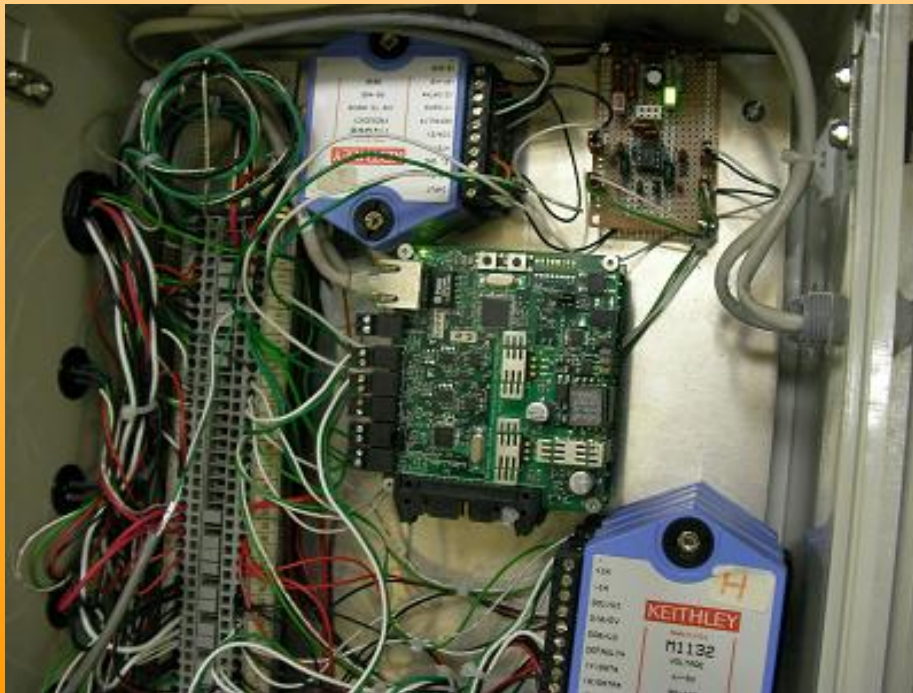
Acquisition

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



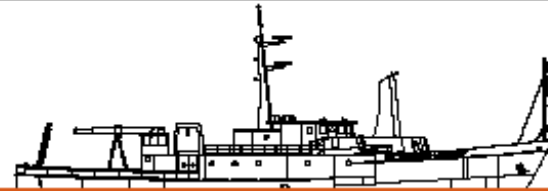
Acquisition

- 24 sensors being acquired
- 9 DataStorm DAS analog boards
- 9 DataStorm DAS serial boards





Sensor Meta Entry



MainPage

Unit Configuration

Ch1 Configuration

Ch2 Configuration

Ch3 Configuration

Ch4 Configuration

ADC Calibration

Western_Analog_1

Channel 4 Meta Configuration

Channel Mode:

Channel Name:

Sensor Make:

Sensor Model:

Sensor SN:

Cal Date:

Equation:

Cal Coeff 1:

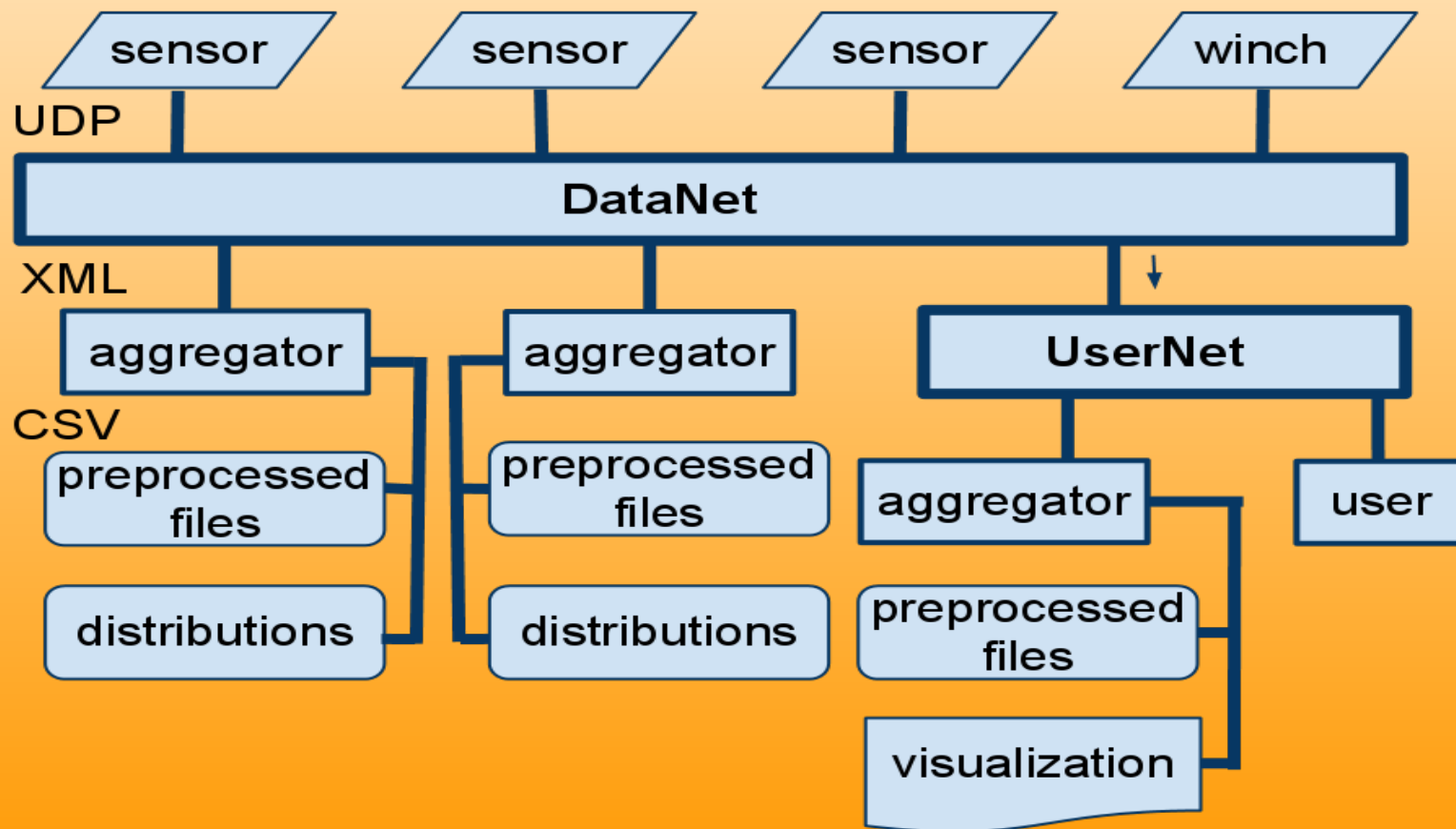
Cal Coeff 2:



Data Flow Design Concepts

- Stand-alone packets / files
 - 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

Data Flow



(raw) Individual Sensor Readings

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

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



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: `<http://
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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

Data Volume - Daily

	Raw	Zipped
raw (XML)	11,328 MB	560 MB
preprocessed (CSV)	249 MB	32 MB

Sending preprocessed (CSVs) files to shore since March 2010

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Summary

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