Some DataTurbine applications at MBARI

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Application #1: Real-time ship/ROV telemetry

Intermittent comms (Radio, microwave, or satellite)

Power, commands

Telemetry

GUI

GUI

shore
Real-time ship and ROV telemetry

• Operators want to know status of ship (e.g. location) and ROV (e.g. location, depth, science data...) in *near real-time*

• Latest telemetry values currently broadcast from ship via UDP

• Requirements
  – Users on ship and shore need access to telemetry time-series data (not just latest value)
  – Shore-side users need data access even when comm link to ship is disconnected
Mirror approach

UDP

Ship data

ROV data

Mirror RBNB sources (TCP/IP)

RDV

shore

Ship data

ROV data

RDV
UDP approach

UDP

Ship data

ROV data

UDP transfer

shore

Ship data

ROV data

RDV
Application #2: SIAM observatory middleware

• SIAM provides generic network interface for instruments, observatory management, etc

• Add DataTurbine to provide subscribe-publish “data push” mechanism

• Applications
  – User interfaces
  – Event detection and response
  – Control loops (e.g. CO₂ injection system)
TCP/IP network

Instrument controller

Node service

Seabird service

WETLabs service

Nortek service

Node events: Instrument installed, instrument removed, etc...

Instrument data channels, dynamic metadata

Seabird CTD

WETLabs Triplet

Nortek ADCP
Each kind of instrument service defines a *PacketParser*

- Parses “raw” instrument data into array of channels
- Channel consists of name, units, 64-bit value
- Instantiated by specific instrument service
Every instrument service instantiates a generic *Turbinator*

- **BaseInstrument Service**: creates **Turbinator**
- **Turbinator**: parses and writes data to **RBNB source**
- **PacketParser**: references **Turbinator**
- **RBNB source**: 1 channel for dynamic metadata
- **ZeroConf entry**: advertises RBNB source on network

**Instrument-specific**: parse raw data to channels
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**Channels assigned based on**
- PacketParser
- **ZeroConf entry**

**ZeroConf entry** sources network

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**RBNB**
**source**
**PacketParser**
**ZeroConf entry**
**Turbinator**
**BaseInstrument Service**
Free Ocean Carbon Enrichment (FOCE)

- Study effects of high-CO2 ocean on marine life
- CO2-enriched water injected at one end
- Fans control current velocity, mix water
- System controls CO₂ injection, fan velocity to maintain constant pH
FOCE

• GUI monitors and displays instrument streams
  – Use RDV “as is”, extend RDV, or modify our own GUI

• CO2 control loop application
  – Want to maintain constant pH in test chamber
  – Adjust CO2 injection rate based on measured pH, salinity, temperature, current speed

• Capable PC-104 computer, runs JSE 1.5; SIAM-DataTurbine to be deployed real soon…
MOOS mooring controller: DataTurbine not supported

- Limited to Linux 2.4 kernel
- IBM j9 jvm – compatible with JSE 1.3
- jamvm – compatible with JSE 1.4
- DataTurbine release requires JSE 1.5?
- Want single SIAM codebase for moored and cabled observatories – problematic...
- Interesting potential applications – immediate one is canyon turbidity flow detection