

NetBEAMS, Sensor Networks & java.net's JDDAC Community

Jim Wright and Gary Thompson
JDDAC Community Managers
Sun Microsystems, Inc.

February 1, 2005



JDDAC - A Community of Developers for Java Sensor Networks



JDDAC developers at JavaONE 2004

JDDAC Community Made Up of Companies, Academia and Individuals

- Develop open source Java sensor network software
 - Self-describing measurements
 - Plug 'n Play sensor integration
- Base on IEEE 1451 Standards
 - NIST supported
- Support different network types
 - Cellular, TCP/IP, Zigbee
- Deploy in real-world situations

JDDAC Board Members



Agilent Technologies

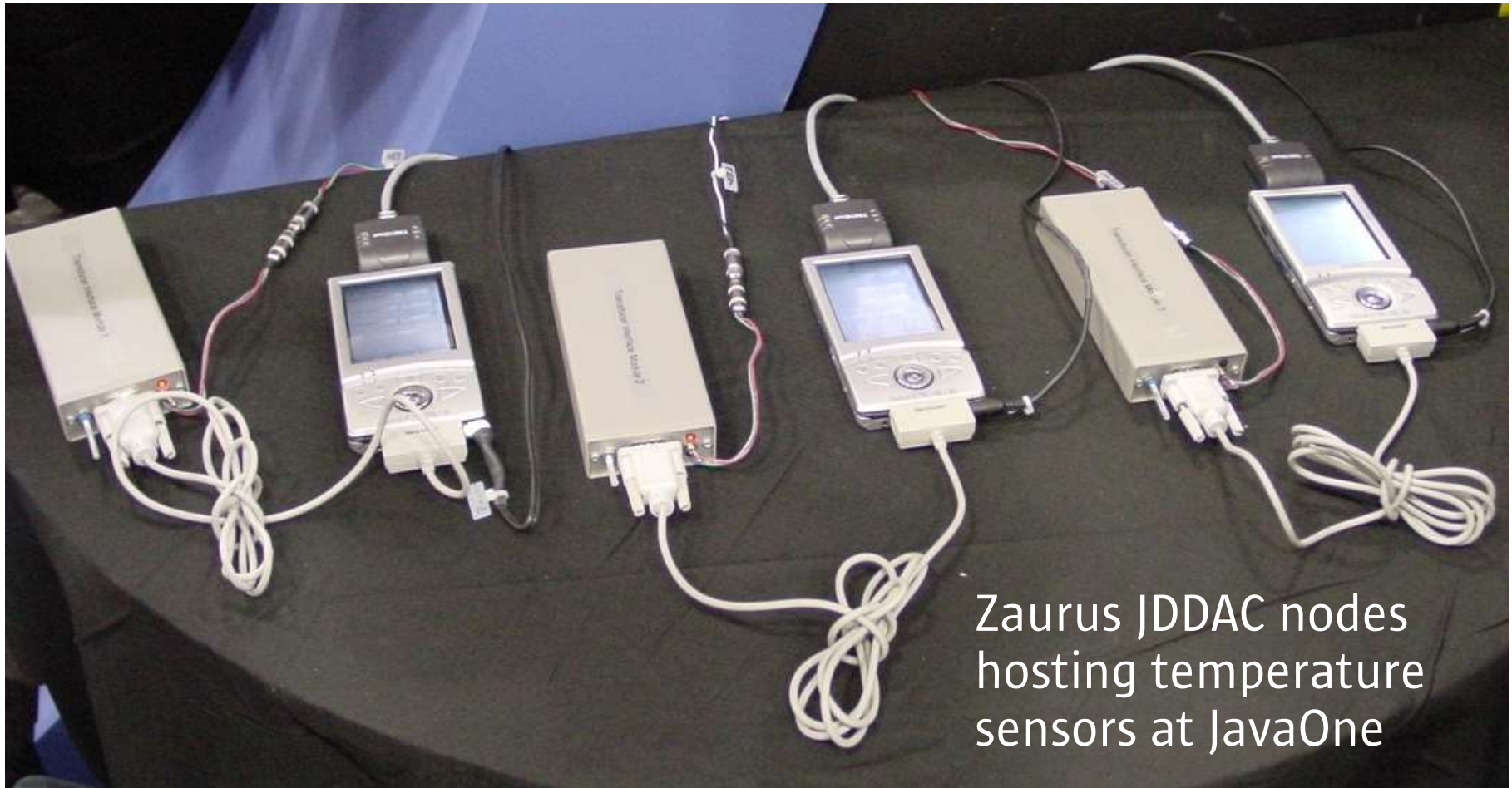


San Francisco
State University

accenture

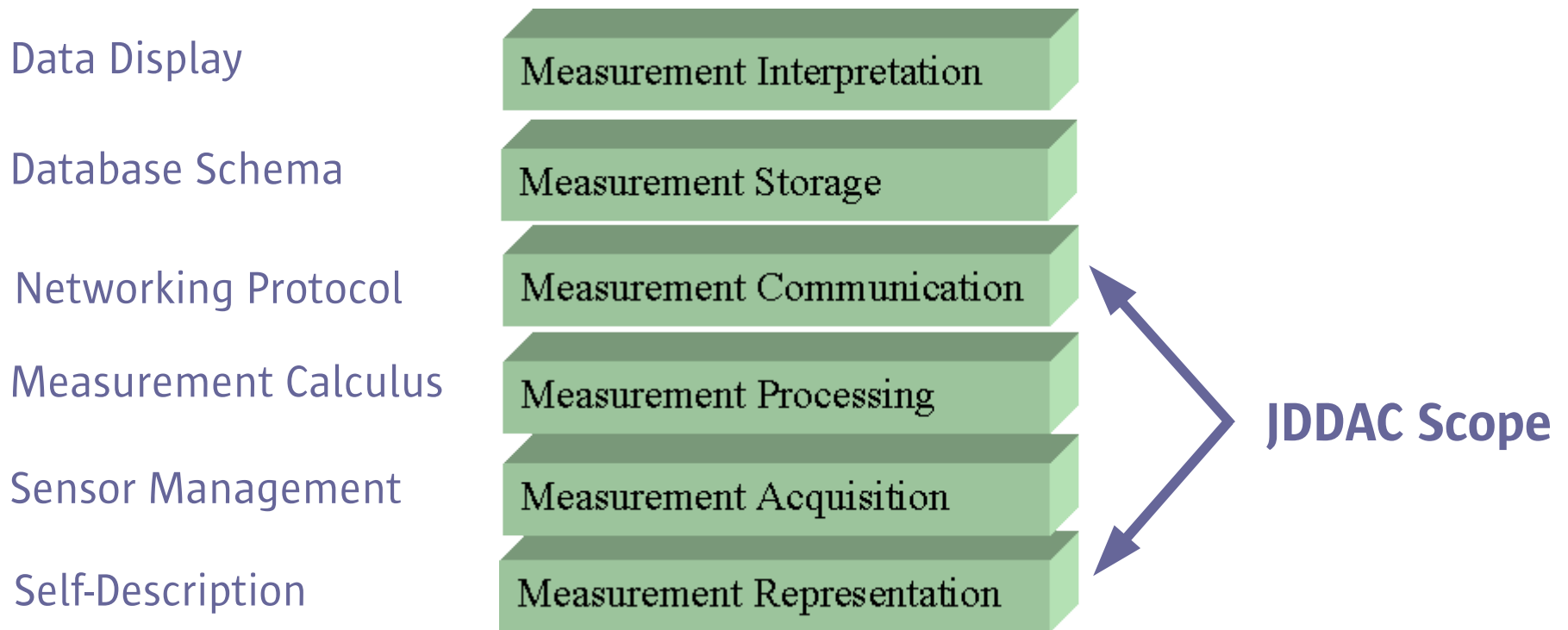
SYSTRONIX
Embedded Java Spoken Here

Distributed Data Acquisition and Control for Java Devices



Zaurus JDDAC nodes
hosting temperature
sensors at JavaOne

Anatomy of the Measurement Process



Need a dataflow oriented computation and communication framework...

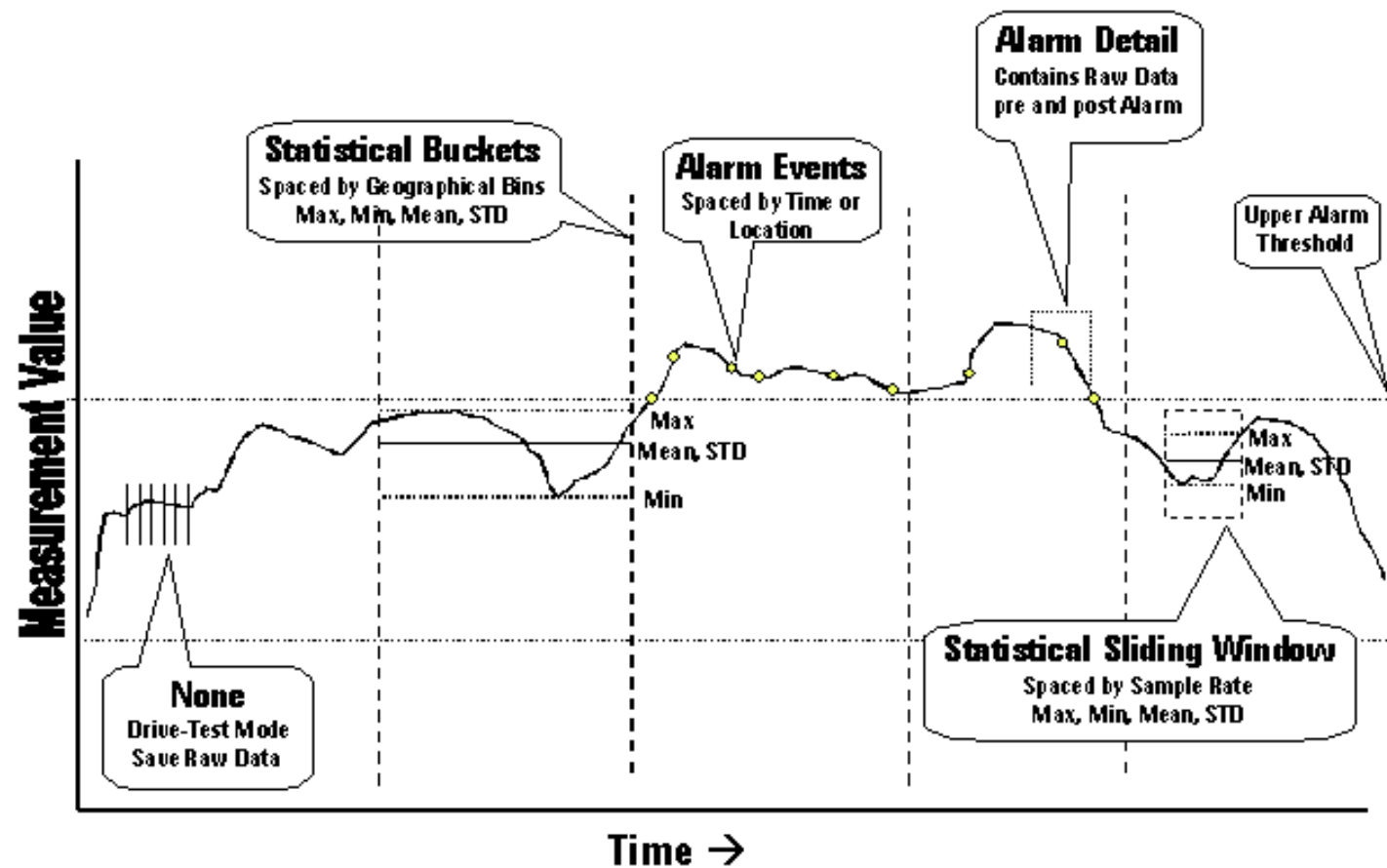
Self-Description – The Transducer Electronic Datasheet (TEDS)

- IEEE 1451.4 “Plug and play” capabilities for analog transducers
- Information needed by an instrument to identify, characterize, interface, and use the signal
- Embedded in the sensor

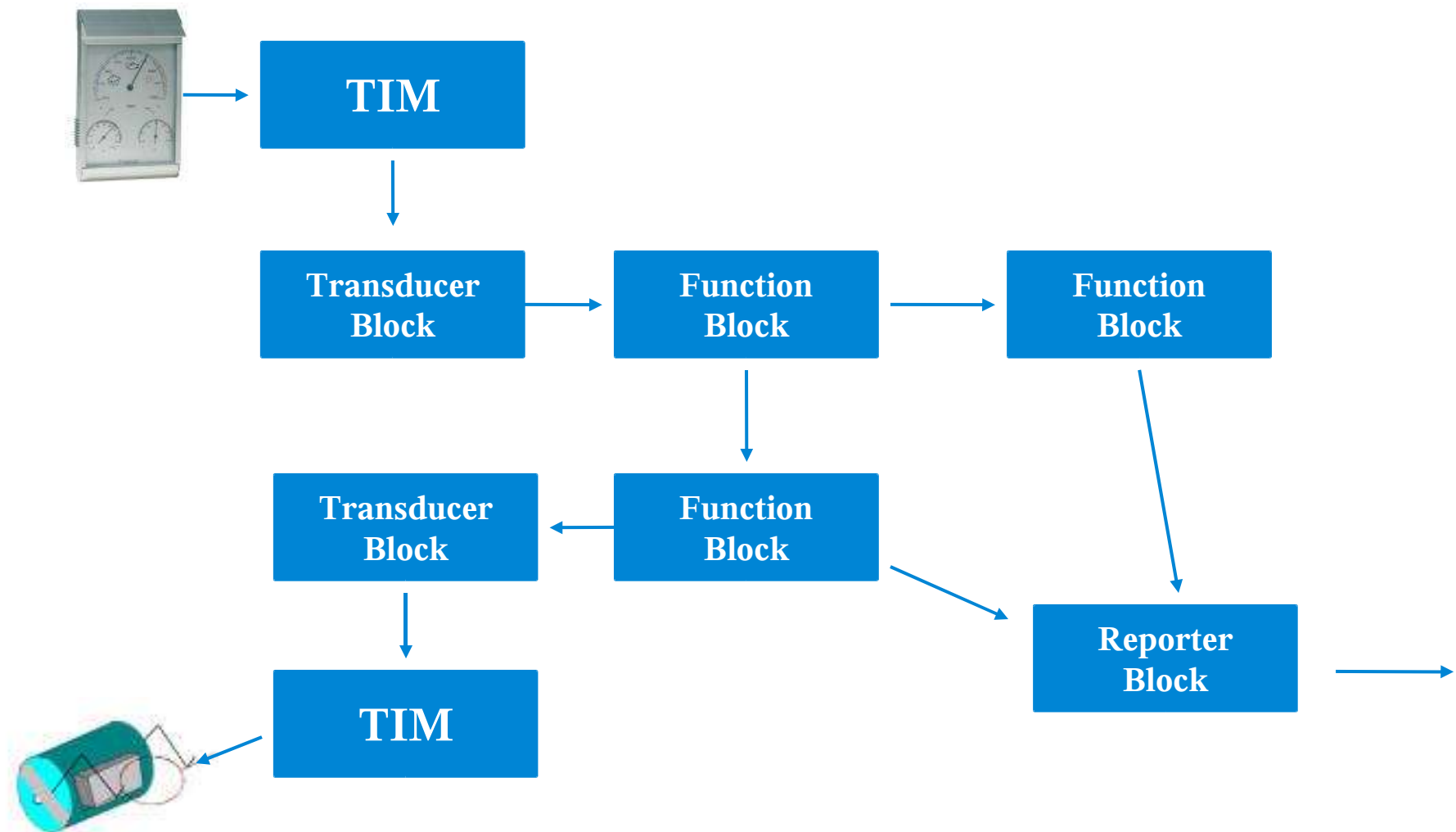
Figure 1. TEDS Examples

| a. Transducer with standard TEDS content | b. Transducer with standard TEDS and calibration table TEDS |
|--|---|
| Basic TEDS (64 bits) | Basic TEDS (64 bits) |
| Selector (2 bits) | Selector (2 bits) |
| Template ID (8 bits) | Template ID (8 bits) |
| Standard Template TEDS (ID=25 to 39) | Standard Template TEDS (ID=25 to 39) |
| Selector (2 bits) | Selector (2 bits) |
| User Data | Template ID (8 bits) |
| | Calibration TEDS Template (ID = 40 to 42) |
| | Selector (2 bits) |
| | User Data |

Things to Do to Measurements (or Why This Isn't Quite as Easy as it Looks...)



Putting it Together - Data Flow, Transformations and Reporting at the Node



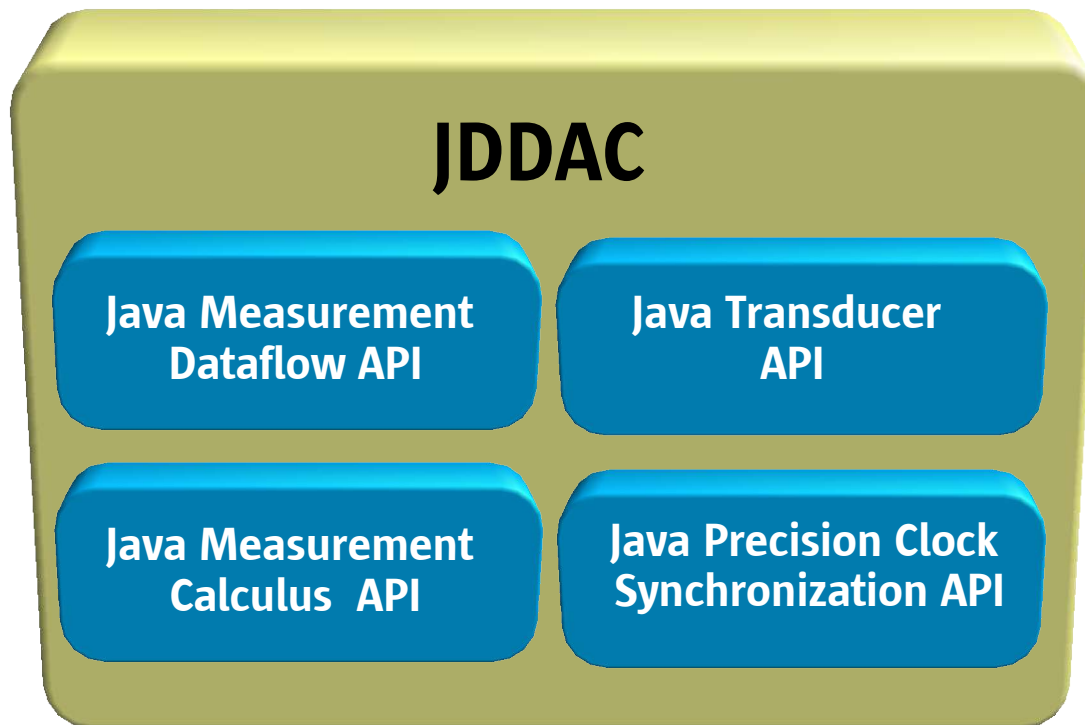
JDDAC Component Projects

JMDI Project

Dataflow framework where measurement data are processed and transformed

JMCI Project

Common data representation for all types of measurements and a measurement calculus to operate on the common data representation



JTI Project

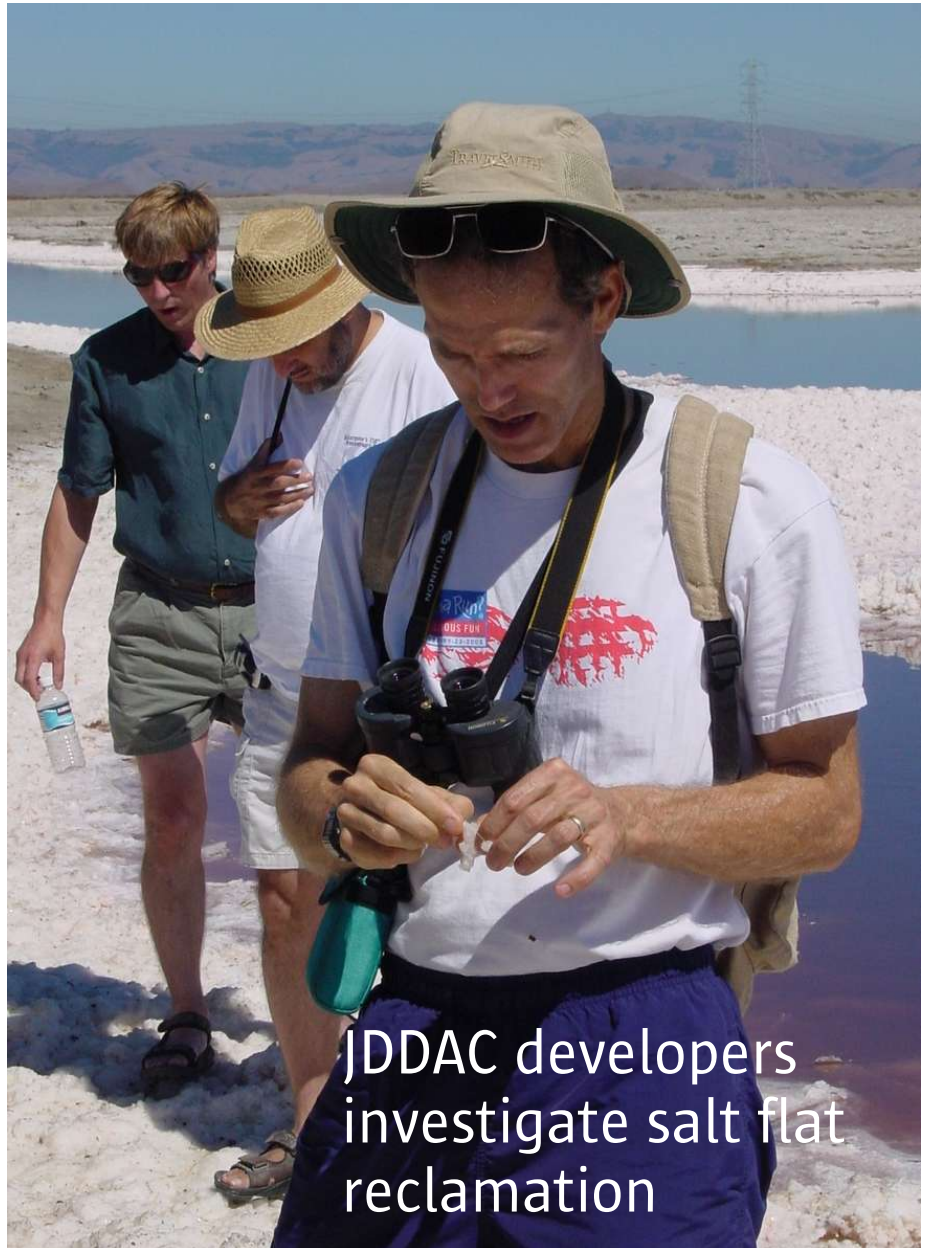
Interface for applications to address transducers and an electronic datasheet to characterize transducers and their measurements

JCPSI Project

Interface to manage and utilize synchronized clocks in a distributed system (IEEE 1588)

JDDAC Sensor Networks in the Real World

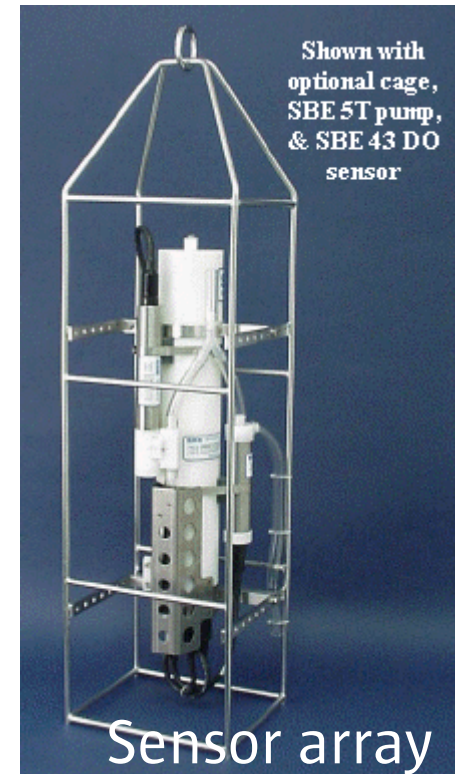
- Sensor network deployment means adding measurement node management, storage and display
- Applications
 - Environmental, seismic and tsunami monitoring
 - Building automation...



JDDAC developers investigate salt flat reclamation

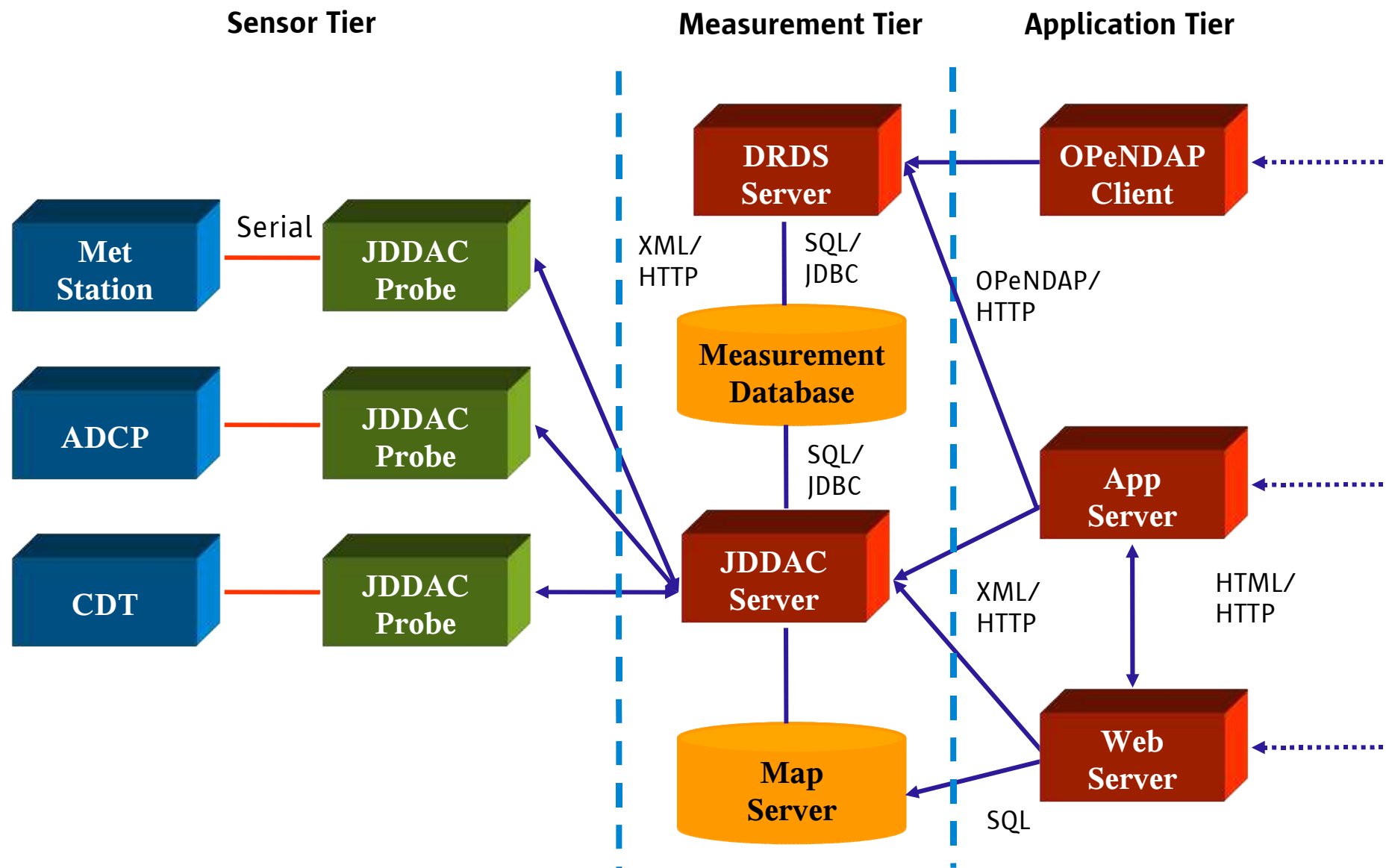
NetBEAMS - Networked Bay Environmental Assessment and Monitoring Stations

- Joint project with SFSU, Romberg Tiburon Institute, Agilent, Sun and the JDDAC community
- Monitor SF Bay water quality



Contributes to the environmental monitoring capabilities of CICORE, the Center for Integrative Coastal Observation, Research and Education in SF Bay and along the Pacific coast

NetBEAMS System Architecture



NetBEAMS - Storing and Presenting Data

Measurement Data

| | |
|------------------|---|
| Value | Actual data value |
| Timestamp | Time when a measurement was made |
| Location | Location where a measurement was made |
| Quality | Source of a measurement (measured, simulated, etc.) |

Measurement Metadata

| | |
|--------------------|-------------------------|
| Unit | Measurement Unit |
| Uncertainty | Measurement Uncertainty |
| Owner | Measurement Owner |

For More JDDAC Information...

<http://jddac.dev.java.net>

<http://netbeams.dev.java.net>

jim.wright@sun.com

gary.thompson@sun.com

February 1, 2005

