NetBEANS
Architecture Proposal

Jerry Liu **(jerry_liu@agilent.com)**

Agilent Laboratories

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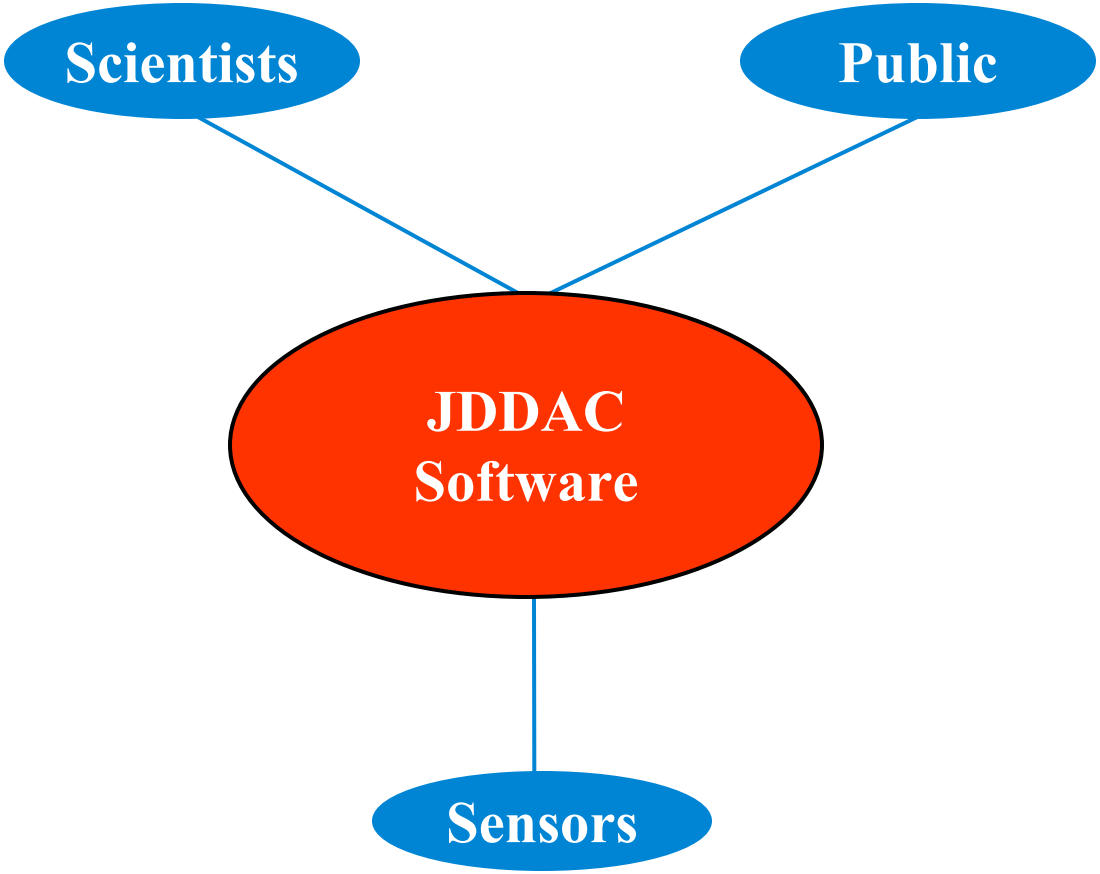
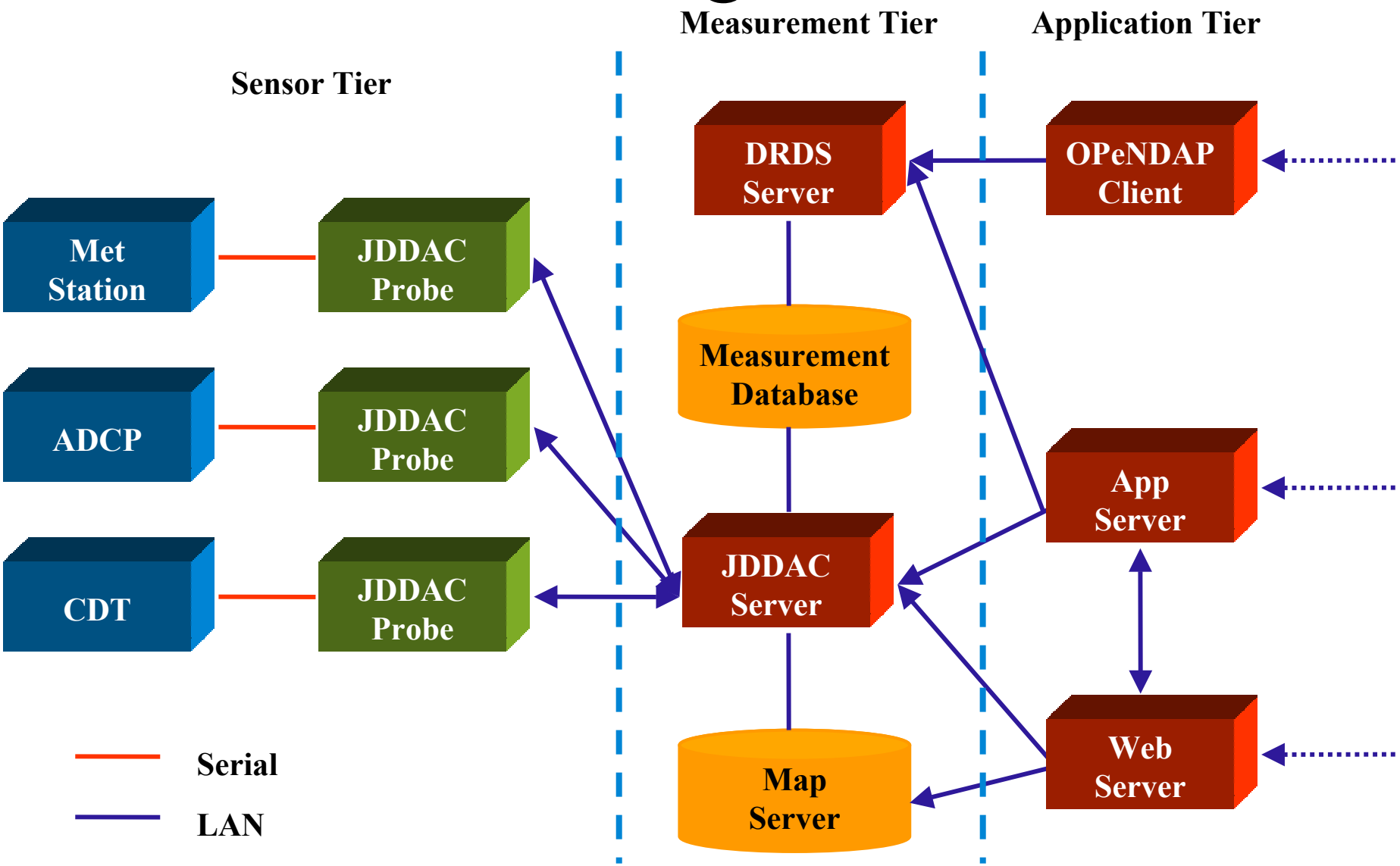
Contents

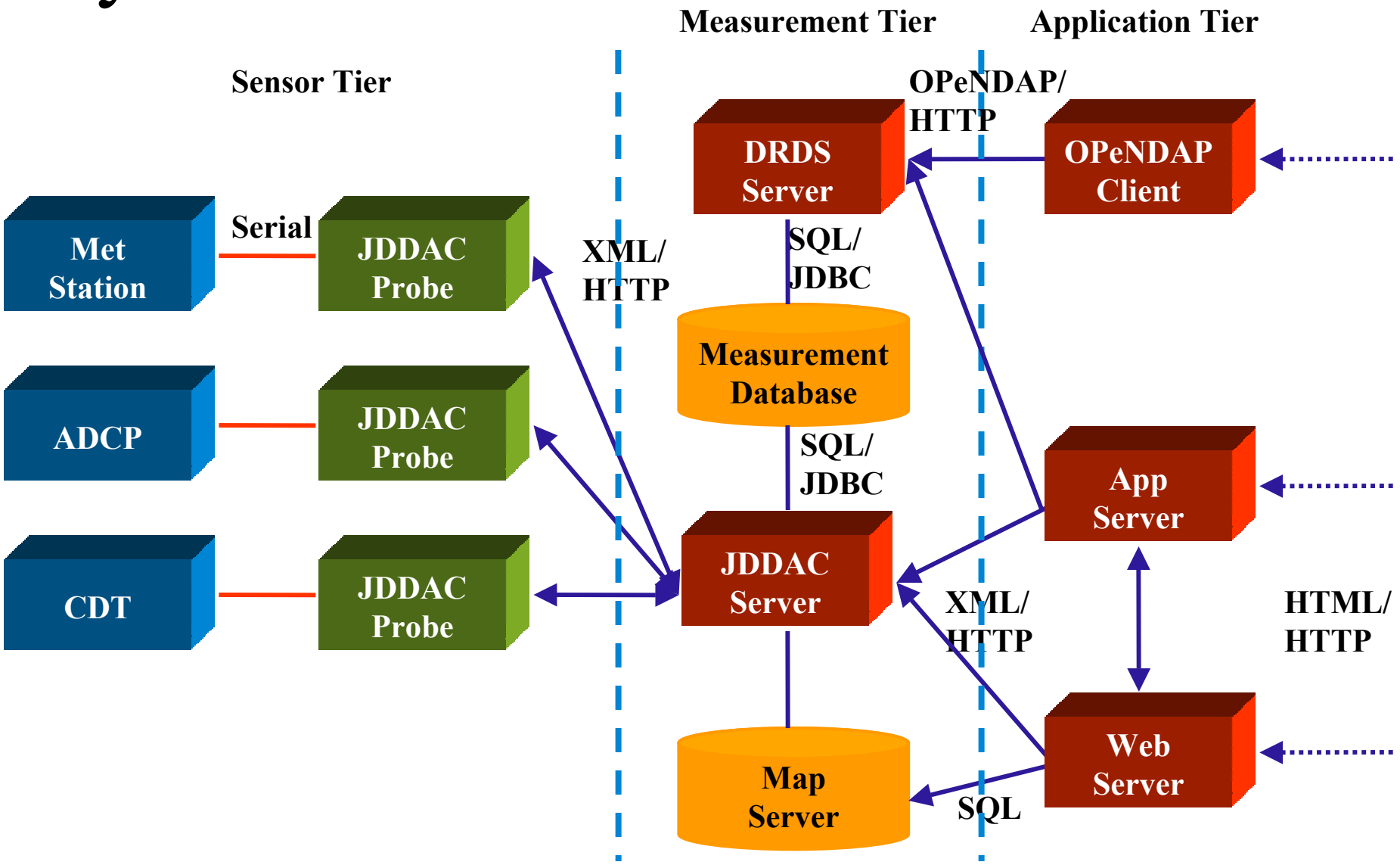
Usage Context



Phase 1 Block Diagram



System Interfaces



The Three Tiers

- **Sensor Tier**
  - **Generates measurement data.**
- **Measurement Tier**
  - **Manages Probes**
  - **Archives measurement data**
- **Application Tier**
  - **Domain specific data processing**
  - **User visualization**

JDDAC Probe

- **Responsibilities**
  - **Polls the instrument for sensor data.**
  - **Performs any in situ data processing and/or filtering.**
  - **Generates self-describing measurement data.**
  - **Performs any necessary local storage of measurement data.**
  - **Encodes and compresses data for transmission to server and/or other probes.**
  - **Receives messages from server and/or other probes.**
- **Contains TEDS (Transducer Electronic Data Sheet) for the instrument.**
- **Runs JMDI (Measurement Dataflow) and JTI (Transducer Interfacing) on J2ME. Platform TBD.**
- **Can be mobile or fixed in place.**

Probe Object Model Example

TIM

Transducer Block

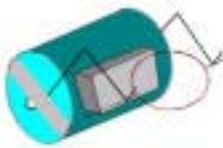
Function Block

Function Block

Transducer Block

Function Block

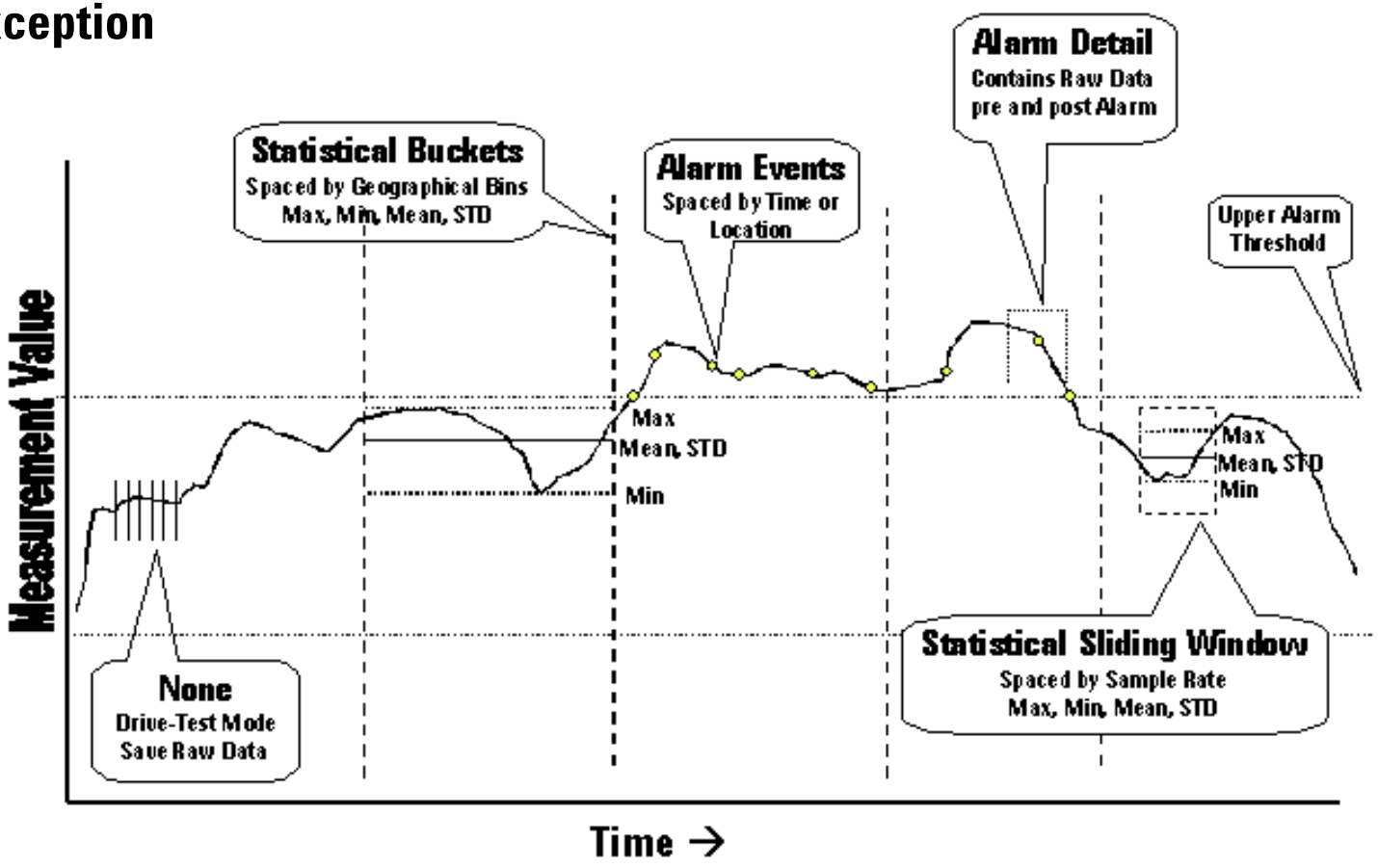
Reporter Block



TIM

Function Block Types

- **Report-by-Exception**
- **Filtering**
- **Statistics**
- **Alarming**



JDDAC Server

- **Manages JDDAC Probes**
  - **Probe identification and authentication**
  - **Communicates configuration changes to probes**
- **Manages metadata about probes and measurements.**
- **Performs basic data processing (filtering, alarming. Etc.).**
- **Aggregates measurement values into measurement data sets.**
- **Archives measurement data in database.**
- **Advertises measurement data sets.**
- **Provides system administrative functions.**
- **Runs JMDI (Measurement Dataflow) and JMCI (Measurement Calculus) on J2EE/Linux.**
- **Measurement Database runs on MySQL/Linux.**

JDDAC Server Interface

- **HTTP GET parameters and XML via HTTP POST commands**
- **Authentication/Compression available for XML communications.**
- **Allow users to**
  - **Defines measurement policies.**
  - **Manage probes.**
  - **Queries measurement data and metadata.**
  - **Perform simple data filtering.**

Additional Servers

- **Map Server**
  - **Based on open source MapServer software from U. of Minnesota.**
  - **Serves TIGER data from Census Bureau – streets and city data.**
- **Web Server**
  - **Generates user visualization based on measurement data and metadata from measurement database.**
- **DRDS Server**
  - **Interacts with measurement database to serve OPeNDAP data sets.**
- **Application Server**
  - **Performs domain specific data processing.**
- **OPeNDAP Clients**
  - **Visualization or data processing software packages.**

Data Model

- **Based on IEEE 1451.1 Data Model.**
  - **Loosely typed, name/value pairs.**
- **Used to represent measurement data and metadata.**
- **Represented as 'ArgArray' class in Java programs.**
- **Represented in XML for communication between JDDAC Server and clients.**
- **Represented in JDBC binary for communication between**
  - **JDDAC Server and Measurement Database,**
  - **Measurement Database and DRD Server.**

Measurement Data & Metadata

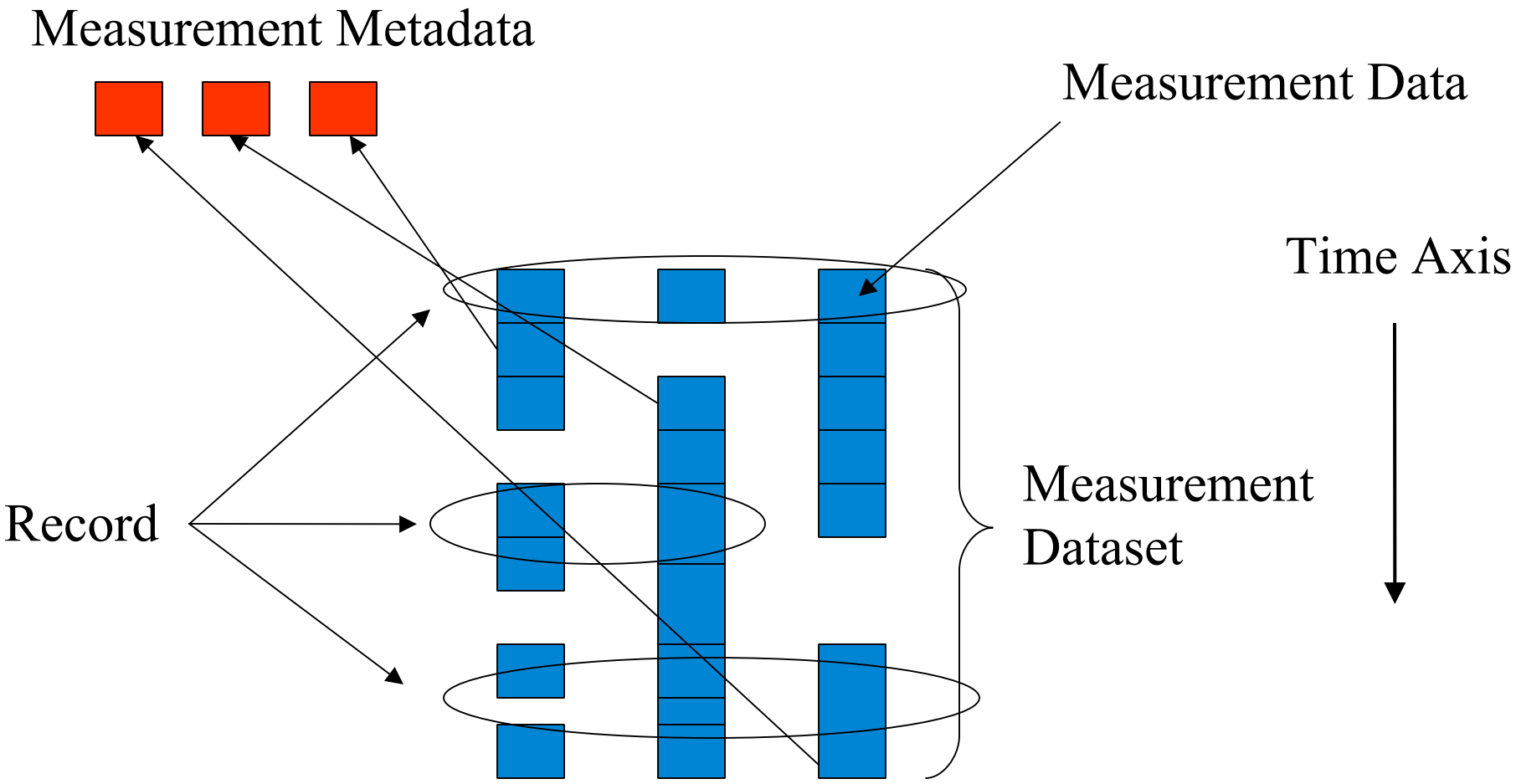
Measurement Data

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

Data Model



Subsystem Responsibilities

- **Sensor Tier – RTC, SFSU, Agilent.**
- **Measurement Tier – Agilent, SFSU, Sun.**
- **Application Tier – Sun, SFSU, RTC.**

Other Collaborations

- **Monterey Bay Aquarium Research Institute (MBARI) Monterey Accelerated Research System (MARS) program (http://www.mbari.org/mars/)**

Phase 2 Activities

- **Sensor Tier**
  - **Replace wired connections between Probe and Server with wireless connections.**
- **Measurement Tier**
  - **...**
- **Application Tier**
  - **...**