COMPONENTS OF NASA’S DATA ACQUISITION SYSTEM

Fall Internship, 2015

Melanie Schmocker
Overview

- Context
  - NDAS
- NOSS
  - Nodes
  - Form Validation
- NCAL
  - Calibration Report
- Other
- Questions
Overview

- **Context**
  - NDAS
- **NOSS**
  - Nodes
  - Form Validation
- **NCAL**
  - Calibration Report
- **Other**
- **Questions**
Context

- Stennis Space Center
Context

- Stennis Space Center
  - Test rocket engines
Context

- Stennis Space Center
  - Test rocket engines
Context

- Stennis Space Center
  - Test rocket engines
- NDAS – NASA’s Data Acquisition System
Context

- Stennis Space Center
  - Test rocket engines
- NDAS – NASA’s Data Acquisition System which can:
  - Calibrate (NCAL)
  - Record (NLOG)
  - Display (NDIS)
  - Export (NGATE)
and otherwise process data from tests
Overview

- Context
  - NDAS
- NOSS
  - Nodes
  - Form Validation
- NCAL
  - Calibration Report
- Other
- Questions
NOSS Database

- NASA’s One-Stop Shop
NOSS Database

- NASA’s One-Stop Shop
Nodes and Measurements

- Each Node represents a piece of hardware on the test stand
Nodes and Measurements

- Each Node represents a piece of hardware on the test stand
  - Sensors
  - Filters
  - Digitizers
Nodes and Measurements

- Each Node represents a piece of hardware on the test stand
  - Sensors
  - Filters
  - Digitizers
- Measurements are collections of Nodes
Nodes and Measurements

- Each Node represents a piece of hardware on the test stand
  - Sensors
  - Filters
  - Digitizers

- Measurements are collections of Nodes
  - Represent Nodes that are physically connected
Nodes and Measurements

- Each Node represents a piece of hardware on the test stand
  - Sensors
  - Filters
  - Digitizers
- Measurements are collections of Nodes
  - Represent Nodes that are physically connected
  - Enable intuitive interpretation of data
Adding Nodes

- How to handle new types of hardware?
Adding Nodes

- How to handle new types of hardware?
- Typical database method
Adding Nodes

- How to handle new types of hardware?
- Typical database method
  - Redesign database
Adding Nodes

- How to handle new types of hardware?
- Typical database method
  - Redesign database
- NOSS method
Adding Nodes

- How to handle new types of hardware?
  - Typical database method
    - Redesign database
  - NOSS method
    - Nodes stored as XML in database
Adding Nodes

- How to handle new types of hardware?
- Typical database method
  - Redesign database
- NOSS method
  - Nodes stored as XML in database
  - Dynamically creates pages to create/update
Adding Nodes

- How to handle new types of hardware?
- Typical database method
  - Redesign database
- NOSS method
  - Nodes stored as XML in database
  - Dynamically creates pages to create/update
  - All XML are text, so no redesign necessary
Adding Nodes

- How to handle new types of hardware?
- Typical database method
  - Redesign database
- NOSS method
  - Nodes stored as XML in database
  - Dynamically creates pages to create/update
  - All XML are text, so no redesign necessary
  - All Nodes stored in same table
Adding Nodes

- How to handle new types of hardware?
- Typical database method
  - Redesign database
- NOSS method
  - Nodes stored as XML in database
  - Dynamically creates pages to create/update
  - All XML are text, so no redesign necessary
  - All Nodes stored in same table
Node Form Updates

- XSD format
Node Form Updates

- XSD format
  XML Schema Definition
Node Form Updates

- XSD format
- XML Schema Definition
Node Form Updates

- XSD format
  - Before me: minimal validations
Node Form Updates

- XSD format
  - Before me: minimal validations
  - My tasks
    - Update XPath references
Node Form Updates

- **XSD format**
  - Before me: minimal validation done
  - My tasks
    - Update XPath references
    - Enforce all XSD validations in browser form
Node Form Updates

- XSD format
  - Restrictions
  - Extensions
Node Form Updates

- XSD format
  - Restrictions
    - Limit values stored
  - Extensions
Node Form Updates

- XSD format
  - Restrictions
    - Limit values stored
  - Extensions
    - Add attributes to XML
Node Form Updates

- **XSD format**
  - Restrictions
    - Limit values stored
  - Extensions
    - Add attributes to XML

- **Validations**
Validations

- No input
- Invalid input
  - `REGEX_PATTERN`
  - wrong input
  - `REGEX_PATTERN` is invalid. It should match the regex `^[a-zA-Z]*\s+[0-9]*\s*$`
- Valid input
  - `REGEX_PATTERN`
  - good input 1
Validations

- No input

- Invalid input

- Valid input
Overview

- Context
  - NDAS

- NOSS
  - Nodes
  - Form Validation

- NCAL
  - Calibration Report

- Other

- Questions
NCAL

- Calibrates Measurements
  - May also compare against a trusted prior calibration
NCAL

- Calibrates Measurements
  - May also compare against a trusted prior calibration
- Produces a Calibration Report
NCAL

- Calibrates Measurements
  - May also compare against a trusted prior calibration
- Produces a Calibration Report
  - Sensors calibrated at different points throughout the range of expected values
NCAL

- Calibrates Measurements
  - May also compare against a trusted prior calibration

- Produces a Calibration Report
  - Sensors calibrated at different points throughout the range of expected values
  - Report is HTML but must also be printable
Calibration Report Updates

- Prior format
Calibration Report Updates

- Prior format
- Refactor HTML
Calibration Report Updates

- Prior format
- Refactor HTML
- Add interactive data
Overview

- Context
  - NDAS
- NOSS
  - Nodes
  - Form Validation
- NCAL
  - Calibration Report
- Other
- Questions
Overview

- Context
  - NDAS
- NOSS
  - Nodes
  - Form Validation
- NCAL
  - Calibration Report
- Other
- Questions
Thank You