Networks, Telepresence, and Data Flows

Data Storage and Models

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Data Use and Characteristics

- Feedback for hybrid simulation models and processes (high sample rate and low latency).
- Streaming to observers and researchers (low sample rate, some latency)
- Capture for post-experiment analysis and archive (high sample rate and high latency).

Network Diagram
Data Flow: DAQ Data Capture to Files

- Mostly involves processes proprietary to the Pacific Instruments DAQ.
- Complete set of all readings.
- Could be large (depends on sample rate).
- Not available until acquisition run completes.
- "Export" post-run processing required.
- Likely exported data files are uploaded to NEEScentral.

Data Flow: DAQ Data Streamed to Internet

- Pacific Instruments DAQ writes readings to SCRAMNet.
- "SCRAMNet DAQ" (application based on Paul Hubbard's "Fake-DAQ") reads data and sends to Data Turbine (DT).
- Clients connect to DT with Real-Time Data Viewer (RDV).

Data Flow: NEES Telepresence

- Telepresence cameras stream Motion JPEG.
- NEES application "FlexTPS" gets MJPEG streams and serves them via web server.
- Clients view near real-time videos using their web browser.
Data Flow: Stream Video with DAQ Data (Synchronized)

- Telepresence cameras stream Motion-JPEG.
- NEES application "AxisSource" gets MJPEG stream and sends it to the Data Turbine.
- Clients view images (with numeric data) using the Real-Time Data Viewer.
- Images and numeric data are fairly synchronized.

Data Flow: Image Acquisition

- Most cameras have specialized control and image-capture applications that run on computers.
- At end of acquisition run, applications write images to computer disks in industry-standard image and video formats.
- Also capture image and video from tape (DVRs) and compact flash (still images).
- Files uploaded to computers for video editing.
- Likely files uploaded to NEEScentral.

Data Flow: Hybrid Simulation

- Simulation models interact with physical experiments using SCRAMNet to convey state information and commands.
- Models (we use MATLAB and OpenSEES) run on simulation computers.
- The simulation computers convey results to an intermediate computer (xPC running its predictor-corrector application) that divides large-sized simulation steps into substeps that match the rate of MTS system (1024 Hz).
NEES Central: Data Repository

Data from NEES experiments is ultimately archived on the NEES Central Data Repository
http://central.nees.org

NEES Central also maintains data about site equipment and some general site information
http://central.nees.org/?action=DisplayFacilities

User manual:

NEES Central: File Organization

NEES Central Data Model
Experiment Setup
NEES Central Data Model

Experiment Setup — Sensor Location Plan

Trial Setup

Thank you!

Development and operation of the nees@berkeley equipment site is sponsored by NSF.

http://nees.berkeley.edu