Computer Systems, MDSplus, Software Tools for NSTX-U Physics Operators

Bill Davis, Eliot Feibush, Paul Sichta, Greg Tchilinguirian, Gretchen Zimmer

Presented at the
Physics Operators’ Course, PPPL
Topics today

- Central Computing Overview
- MDSplus
- Data access tools
- EPICS
- Timing & Synchronization
- Display Wall
In the current PPPL network all inter-VLAN traffic goes through the iFw.
Major computer-related upgrades for NSTX-U

- Digital Coil Protection System (DCPS), a new real-time system
- Network trunks increased from 1 Gb/s to 10 Gb/s.
- 300 TB added to our Hitachi SAN array
  - Expecting a 2x increase in conventional signal data
  - Expecting a 4x increase in Fast 2-D and IR Camera data
- 4x increase in between-shot processing power, plus the ability to get results from TRANSP code between shots

After the construction phase is certified (DoE CD-4):

- Upgrade to RHEL 6
- Upgrade MDSplus server host(s)
- Support Multiple versions of MDSplus
  - Old - Currently used and well tested (v2)
  - Stable - Version 6, used on server and as default cluster module
  - Alpha - Most recent version (7) to support newest features.
Other configuration changes planned (after CD-4)

- Offload MDSplus event serving to a separate server and support the use of both UDP and TCP/IP events
- Develop Event Repeater to ensure all events delivered regardless of protocol
- Rewrite shot cycle control in C++ or Python (currently in IDL)
- Distribute data load across connections
- Move Operational code from /p/nstxusr to /p/nstxops
- Make default IDL version the latest (8.4)
- Change from a single 10 gigabit connection to pass all inter-VLAN traffic to putting “safe” VLANs in an “iScience” enclave (pending design review)
Logging on

you should “\texttt{ssh nstxpool}” (will need to be in Linux group “nstx”)

(can use “portal” but will get complaints about long-running jobs)

To get the recommended \texttt{MDSplus} and \texttt{IDL} environment:

\begin{verbatim}
module load nstx
\end{verbatim}

Users can get directories on /p/nstxusr, but for large needs (>100 GB), request a “project disk” through help.pppl.gov
• Overall throughput and timing is critical
• Setup parameters need to be entered into MDSplus before the Model Tree is copied (typically)
• Trees for the next shot are Created/Built from the model trees @ T(-60)
  o Timing modules loaded
  o Digitizers armed
• Data produced by some systems is needed by others (MEMS can help)
• Both automatic and interactive data analysis and visualization tools available
  o Scope panels update from an MDSPlus event issued by the STORE action.
MDSplus is a cornerstone. See http://mdsplus.org for more.

The same process using MDSplus to store ALL data related to the experiment. Data flow is drastically simplified and the same interface and same graphics routines can be used for all processes.

The relationship between a hierarchy of model trees and shot trees is shown. Each model contains the full structure along with setup data, calibrations and other information which is carried from shot to shot. Shot trees contain all of this information plus all the data. In addition to their internal structure, the model and shot trees themselves often have a hierarchical relationship.
MDStplus

- Expertise: Gretchen, Bill, Greg Tchilinguirian, John Schmitt
- Server – skylark.pppl.gov::8501
  - MDStplus serves DATA and EVENTS
  - NSTX event server is skylark.
    - An event client MEMS, waits for a set of events to produce a new event
  - Call mdsconnect to access the server (thin client) or rely on environmental variables (thick client)
  - server accounts on an as-needed basis
- Trees, branches, nodes, signals, tags, events, accessible remotely
- Tree write-permissions
  - write permission for trees through Linux groups
  - Incoming username & computer mapped to local account through mdsip.hosts file on skylark
  - Tree edits (e.g. add node) can only be done on the server.
Status of MDSplus

• MDSplus has had an extensive workout for DCPS testing

• We plan to minimize changes before CD-4 to reduce risk of delays

• Disks and CPUs will be beefed up before Physics Ops
  – CMOD is acquiring 15 GB/shot with straightforward architecture

• UDP events will be used (after CD-4) with a relay to TCP/IP when needed
Tools for accessing MDSplus

• Programming
  – General: IDL, python, Matlab, LabView, C++
  – Specialized languages: TCL, TDI, CTS

• Existing GUIs
  – dwscope, jScope
  – traverser, jTraverser
    – to use tools on nstxpool: module load nstx
    – Can install clients on Desktop/workstation and set local environment, but it is a lot of work, and maintenance.
  – Web Tools
MDSplus Events

- Used to convey status, regulate software flow and move small amounts of data between systems.

- Easy to use:
  - UNIX “setevent XX DATA”: Where XX is the event name and DATA is the payload (optional)
  - UNIX “wfevent XX -d”: XX is still the event name and the optional “-d” returns the data payload (if any)
  - Various API calls are similar for supported languages (Python, IDL, C++)

- Event Examples:
  - NSTX_SOC - A new NSTX-U shot cycle has started
  - NSTXINITDONE - The initialization phase of the NSTX-U shot cycle is complete
  - NSTX_ACQ_DONE - The shot cycle has completed storing NSTX-U rawdata (with some caveats)

- No regulation of client’s usage
  - Anyone can pick an event name and use it
  - Creates potential for conflict
  - List of in-use events available on NSTX-U SW page

- Two flavors, UDP and TCP/IP
- Configured through registry (Windows) or shell environment (UNIX/Linux)
- Cluster modules (nstx/mdsplus, nstx/mdsplus_alpha, etc.) sets the configuration

- Dedicated event server “mustang” services user events.
MEMS event-summation data flow

AandB = Test_a & Test_b
CorD/EPICS = Test_c | Test_d

Init File EVS.QCS

MonEvents.pro
123456  X  Test_a
123456  X  Test_b
0      0  Test_c
0      0  Test_d
0      0  CorD
123456  X  AandB

EPICS Displays
Alarm Handlers
Trending Plots
EPICS Events

MDSplus Event Server
Test_a.123456
Test_b.123456

ev2files.pro
sumEvents.pro

11:29:01 ev2files wrote EventShots/Test_a.123456
11:29:02 sumEvents saw event Test_a for shot 123456
11:29:13 ev2files wrote EventShots/Test_b.123456
11:29:13 sumEvents saw event Test_b for shot 123456
11:29:13 sumEvents declaring event AandB for shot 123456

Log File log/idlQCSserver.log

123456 123456
0 0
0 0
0 0
X X
X X

Event ‘Test_a’ for 123456
Event ‘Test_b’ for 123456

EPICS Distributed Database
Plan to offload MDSplus serving and use both UDP and TCP/IP events

- **DCPS-Datasrv**
- **Skylark**
- **MDSpc**

**Desktop Clients**

**Mustang**

- **MDS TCP events**
- **Legacy Clients**
- **Legacy Servers**

**Scope Clients**

- **Cluster Clients**
- **Legacy Hardware**
Plotting Options

• Scope family
  – DWScope (solid; many examples available to start from)
  – jScope (uses java; color, overlays, contours, animations)

• Web Tools
  – Now can run from file input
  – Actively maintained, e.g., Open Science options coming

• ReviewPlus from GA
  – Bugs will be fixed
  – Difficult to add features

• Custom written programs
  – IDL (most widely used here; $33K/year with questionable future)
  – Matlab (a more modern choice)
  – Python (free and being used more and more in fusion community)
jTraverser good for examining MDSplus tree hierarchy and signal expressions
jscope for plotting MDSplus signal expressions (start with someone else's file and customize)
Other Tools for Physics Ops

• EFITviewer
• Logbook
  o IDL> syb_entry
  o For display only:
    http://nstx.pppl.gov/nstx/Software/WebTools/weblogplus.html
• NoMachine for X-windows (session remains after leaving)
• Pecomp.pro – compares coil currents and magnetics signals as recorded
  by the real-time computer to those used for analysis between shots
•Fcplayer.pro – IDL routine for displaying Fast Camera cine files
• SigAlert.pro – can flag signal problems (see next slide)
• Between-shot TRANSP is coming!
SigAlert identifies signal problems

An automatic task reads specified signals after a shot, and sends email if:

1. The signal does not exist for the current shot.
2. (Optional) No part of the signal reaches a minimum required value.
3. (Optional) Any part of the signal exceeds a maximum allowed value.

Sample input file:

<table>
<thead>
<tr>
<th>Signal</th>
<th>email</th>
<th>checkEvent</th>
<th>nsMOOTH</th>
<th>max</th>
<th>min</th>
<th>idlCall</th>
<th>setEvent</th>
<th>epicsAlarm</th>
</tr>
</thead>
<tbody>
<tr>
<td>\wf::pnb</td>
<td>bdavis</td>
<td>NSTX_SOP</td>
<td>5</td>
<td>800</td>
<td>-10</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
<tr>
<td>\wf::prf</td>
<td>bdavis</td>
<td>NSTX_SOP</td>
<td>3</td>
<td>1e38</td>
<td>-1e38</td>
<td>none</td>
<td>none</td>
<td>none</td>
</tr>
</tbody>
</table>

- If you want an IDL routine to be executed before checking the min or max, you can specify it in the "idlCall" column with the "data" variable operated on, e.g.,

  ```
  data=smooth2d(data,/edge_truncate)
  ```

- If you want an MDSplus event declared when an alarm is raised by sigalert.pro, specify that in the "setEvent" column.

- See [http://nstx.pppl.gov/nstx/Software/Applications/SigAlert.html](http://nstx.pppl.gov/nstx/Software/Applications/SigAlert.html) for details
Documentation and Web Tools found at http://nstx.pppl.gov/nstx/Software

**LOOKING AT MDSplus DATA**

- **PLOTTING OPTIONS**
- **SEARCHING/COMPARING/LISTING**

**INFORMATION ABOUT DATA**

- **LOGBOOK** searching/viewing with Plot Summaries.
- **FINDING SIGNAL NAMES** from Label list
- **SHOT LISTS** by XP by XMP by Date of Calibration shots

**ACCESSING TRANSP data in MDSplus**

- List of some MDSplus events used on NSTX

**RELATIONAL DATABASE DATA**

- FISO Tools
- Find shots based on EFIT parameters
- TRANSP Run Listings
- EFIT and LRDfit runs by owner

**Documentation**

**Logbook** The NSTX-U Electronic Logbook is available on the web or from IDL on UNIX (as syb_entry).

**IDL** is a popular programming language for analyzing NSTX-U data. The PPPL IDL pages include an introduction to IDL and examples for MDSplus data access for NSTX-U.

**NOTE:** there might be vendor issues with IDL in the future; new users are encouraged to use other languages, like python or MATLAB.

**Need help? Ask the NSTX-U software support staff**

- Control Room Support, IDL database: Bill Davis
- MATLAB support: John Schmitt, Greg Bisello, Gretchen Zimmer
- Control Room Support, PCs, LabView: Unix Sys Admins, Elliot Feinlush
- Python, NX (NoMachine) Support: Keith Erickson, Roman Rosenthal, Greg Tejlingarian, NSTX-U TD Support Staff
- Real-time Computer Support (e.g., DCPS)
- Control Room Support, MDSplus:
NSTX-U Data

- How do I set up my computer account to use NSTX-U software? What needs to be defined?
- How do I know what data exist?
- How do I look at data?
- Do I have to restore data?
- How do I find out about how the machine was running for a certain shot?
- What if I want to add my own comments about a shot?
- For a particular diagnostic, how do I find out which shots have data or have valid data?
- What were the first and last shots for a run day? for an XP?
- How can I get a list of shots for today or a specific day along with timestamps?
- What is MDSplus? What are these "tags" and "nodes"?
- How do I find the full path of an MDSplus tag?
- How do I make my own Scope layout files?
- How do I add my favorite printer to the Scope menu?
- How do I print a Postscript file from Scope?
- Can I use jScope to display NSTX-U data on the Linux Cluster?
- What "canned" plotting, data display and other IDL routines are there?
- Is there a way I can let other physicists know about my tags and how to look at my data?
- Can I see the shotclock count down from my office?
- How can I make a test tree for MDSplus?
- How do I find the files that constitute an MDSplus tree?
- How do I find the Lithium deposition for a shot or shot range?
- How do I access Linux files on my Mac or PC using Samba?

NSTX-U Data Acquisition

- I want to put a new diagnostic on NSTX-U. How can I get the data into MDSplus?
- How do I control my acquisition starting time?
- I want to take another set of calibration shots; what shot number should I start with?
- Can I run CAMAC programs from any computer?

NSTX-U Data Analysis

- What is the easiest way to plot NSTX-U data?
- Is NSTX-U data available from the web?
- Do I have to use IDL to analyze the data? If I decide to learn IDL, where do I start?
- What TRANSP runs have been done, and how do I look at them?
- Is there anything like UNIX or LINUX on NSTX-U?
What’s New in WebTools

- Web Plotting Tool can read settings from a file
- IDL code can be called within a web plotting tool (like in ReviewPlus)
- Plot directly from search results output, e.g., http://nstx.pppl.gov/nstx/Software/WebTools/treesearch.html
- Fast Camera and Blob Tracking pages enhanced

**mdsPlotList**: Web Tool for Plotting Signals OR Listing MDSplus Data for NSTX (20-signal version).

*mdsplotfileinput.php* is a version that reads your inputs from a file! **NEW!**

You can also combine plots from different servers.

*mdsMultiSig* for Plotting Multiple MDSplus Signals on the same Frame. *(example)* (20-signal version). You may also use the version that reads and writes inputs from a file. **NEW!**

**NEW!** *mdsplotfast.html* should provide the fastest Web Tool plotting for signals from multiple shots. Or try the *version that reads inputs from a file.*

*mdsSignals_clean*: NSTX MDSplus Signal Plotting (doesn't remember previous settings)

*mdsPlot1*: NSTX MDSplus Plotting Tool (for various "canned" plots)

*mdsScopeAdj*: NSTX MDSplus Adjustable Scope Plotting Tool (plots in a new window) *(BEST for scopes)*

*mdsScope_clean*: NSTX MDSplus Scope Plotting Tool (doesn't remember previous settings)

*mdsCrossPlot*: Plot One MDSplus Signal vs. Another. Optionally display X-axis as HH:MM.

**Flux Cross-sections**: NSTX EFIT/LRDfit Flux and Thomson Data Plotting

*mpTsplots* (or *mptsColorCont (example)*): NSTX Multi-point Thomson Data Plotting

Create NSTX Fast Camera Movies, from 1 or 2 cameras with optional overlays of MDSplus signals. NSTX RGA Trend Data *(example)*
• Expertise: Sichta, Dong, Busillo
• EPICS = Experimental Physics and Industrial Control System
  – Open source, multi-OS, multi-CPU.
  – API for popular programming languages.
  – Distributed control & scalable.
  – Used at 100's of experiments; driven by large experiments’ needs; used on ITER.

● EPICS at NSTX-U
  – Interfaced with most engineering subsystems.
  – Provides: (slow) Integrated Control, operator displays, alarms, trending.
  – Input/Output via VME & CAMAC & PLC & PC's.

● Central Clock is an EPICS application
  – clock configuration displays, run-time database/record processing, sequence program.
  – CAMAC module I/O, VME module I/O.
  – 'soft' clock time and EPICS events for programs and displays.

● Parameters & Data Acq to MDSplus.
● Trending to Channel Archiver and MDSplus 'daily' trees.
EPICS GUI for NSTX-U

Alarm Handler

MEDM

Archive Viewer
EPICS on nstxpool

[Image of command line interface showing the loading of EPICS on nstxpool]

[Image of CE00 directory with various subdirectories listed]

[Image of EPICS clock showing the time 136729 - 2:20]
Timing & Synchronization

- Expertise: Wertenbaker, Sichta, Dong
- NSTX-U Shot Cycle configured on EPICS display CK02.
  - Clock system provides continuous NB Clock cycle (150 sec).
  - NSTX-U Clock cycle syncs to NB Clock cycle.
- CAMAC-based 1 MHz Facility Clock provides microsecond timing resolution
  - 16 ‘hardware’ clock events distributed using fiber optics and twisted pair.
  - About 10 microsecond site-wide synchronization.
  - H404A and other CAMAC modules in use since TFTR - early 1980's.
- FPGA-based systems in use since 2004; 3rd-generation “RTU” deployed for NSTX-U in 2014.
  - RTU programmed via EPICS; MDSplus and LabVIEW planned.
Clock Control Page

Shot #: 136729
Shot Time: -140

Load CAMAC

Total Cycle (poke selection)

Mode: HPP

- SingleShot
- No_NB_Sync

START | STOP

Kill-Cycle Requested
PreSequence Check Failed (check CK03)

Related Displays
## EPICS-perspective of the Shot Cycle

<table>
<thead>
<tr>
<th>Function</th>
<th>When</th>
</tr>
</thead>
<tbody>
<tr>
<td>Configure/run the Central Clock/shot cycle</td>
<td>Before SOP (Start of Pulse)</td>
</tr>
<tr>
<td>Clock Cycle Starts</td>
<td>by COE, or automated</td>
</tr>
<tr>
<td>PreSequence Check (commit shot#)</td>
<td>SOP +10</td>
</tr>
<tr>
<td>Initialize Timing &amp; Digitizers</td>
<td>varies, SOP thru T(-30)</td>
</tr>
<tr>
<td>PrePulse Check (commit SOP-T(0)-EOP)</td>
<td>T(-10)</td>
</tr>
<tr>
<td>Shot occurs</td>
<td>SOP, T(-1), T(0), NBI, EOP</td>
</tr>
<tr>
<td>Parameter Acquisition</td>
<td>two times: T(0), T(+25)</td>
</tr>
<tr>
<td>Data Acquisition</td>
<td>After EOP.</td>
</tr>
</tbody>
</table>
NSTX Timing and Synchronization System

Encoder Subsystem → Asynchronous Timing Events → Pre-Programmed Event Generator → Event Encoder → Manchester-Encoded Events → Control Room → NB Cntrl, Test Cell, DARM, Powr Conv → Event Decoder → Event Decoder → Event Decoder → Event Decoder → Event Decoder → Digitizer Trigger, Enable Gate, Ignitron Trigger, Beam Dump, Frame Grabber

Distribution Subsystem

Decoder Subsystem

EPICS Events

MDSplus Events

Events for Software, not real-time

Program A → Program B → Program C

Network
Reconfigurable Timing Unit
Layout of control room

Feibush/2003
Display Wall

- Expertise: Bill, Eliot, Greg T, other wall users
- *Application sharing software that allows individual windows to be replicated to other computers. Remote collaboration tool based on a modified VNC protocol.*
- Display wall can show windows from:
  - local windows (launched from nstxwindowspc)
  - remote windows (launched from your mac/win/linux)
  - Offsite collaborators can share/view windows, but this slows down the server's screen refresh rate (for all windows).
  - For remote apps to be displayed on the wall, the computer name must be in ~wall/bin/wall.enablex on nstxwindowspc (e.g. nstxmac23.pppl.gov).
- During the run day, the I&C staff usually setup/restart a 'standard' set of apps/windows on the display wall.
- Turning the projectors on/off (bulb replacement ~$800)
  - Power-on/off using remote control (2 in CR, all use same freq).
  - Can also power-off using projector's web-server.
Display Wall (cont)

- Client-Server: VNC & X-windows
  - \textit{SharedAppVNC} downloadable from SourceForge
  - Last updated in 2006 - developer no longer active.
  - Individual mouse color using \textit{ICE-MC} (SourceForge)

- User guides: http://nstx.pppl.gov/nstx/Software/Applications/SharedAppVNC.html
  - See experts and others who use it for individual help.
SharedAppVnc Beta by grantwallace

Application sharing software that allows individual windows to be replicated to other computers. Remote collaboration tool based on a modified VNC protocol. Its advantage is to keep some things, like email, private, while sharing other desktop apps.

Download Now! SharedAppVnc Windows bin... (1.0 MB)

http://shared-app-vnc.sourceforge.net

Ratings and Reviews

100% of 1 user recommends this project

Be the first to post a text review of SharedAppVnc. Rate and review a project by clicking thumbs up or thumbs down in the right column.
SharedAppVNC

- Description
- ScreenShots
- Download
  - Instructions for Linux
  - Instructions for Mac OS X
  - Instructions for Windows
- Future Work
- Acknowledgements
- Contact

Description

SharedAppVnc is a remote collaboration tool. It allows application sharing between remote participants. In a typical usage scenario, two or more remote collaborators would run SharedAppVnc on their desktop computers while participating in a phone or conference call. After establishing SharedAppVnc connections, possibly through ssh-tunnels, they would be able to share (replicate) windows between the remote desktops. The shared windows could optionally be controlled by the remote viewers, or they could be set to view-only.
vncviewer and SharedAppVnc for the Control Room Macs

1. To run a vncviewer of the display wall requires an ssh tunnel to nstxwindowspc:
   
   Click on the X11 icon to bring up an X terminal. Make sure the DISPLAY environment variable is set to your mac. Then run:
   
   xhost +nstxwindowspc
   ssh nstxwindowspc
   
   On nstxwindowspc set the DISPLAY environment variable to your mac. Then run:
   
   /usr/bin/vncviewer localhost
   
   Enter the p*sword (lab name in lowercase, followed by a 4-number sequence).
   
   This will bring up the vncviewer window on your mac and give you access to the display wall.

2. SharedAppVnc runs from the command line but not from the icon shortcut. To run it from the command line:

   cd /Applications/SharedAppVnc-OSX/SharedAppVnc.app/Contents/MacOS
   
   Then run:
   
   ./sharedAppVnc -connectHost nstxwindowspc

If you have additional questions, please send email to efeibush

updated: 19-Jun-2008
by: Bill Davis
# Sharing Applications to the NSTX Display Wall

Application programs started on a PC or a Macintosh can be shown on the Display Wall in the Control Room. A utility program running on the PC or Mac lets you choose the applications for sharing. You can also share your entire desktop.

## Run the application sharing utility

<table>
<thead>
<tr>
<th>Macintosh</th>
<th>PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Click the icon in the dock for Shared/AppVnc</td>
<td>Run C:\Program Files\Shared\appVnc\wsd\Shared\AppVnc</td>
</tr>
</tbody>
</table>

If you don’t have these on your Mac or PC, download it from [http://sourceforge.net/projects/shared-app-vnc/](http://sourceforge.net/projects/shared-app-vnc/).

This brings up the utility for sharing applications.

Go to the Clients page and connect to ntwindowspc9.

## Share Programs on the Display Wall

<table>
<thead>
<tr>
<th>Macintosh</th>
<th>PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Click on the Select Window to Share button and then click on the desired window.</td>
<td>The Windows page of Shared/AppVnc lists your current programs. Click an item and then click the down arrow button to share it.</td>
</tr>
<tr>
<td>To stop sharing a program and remove it from the Display Wall, click on its listing under Shared Applications. Then click the Unshare button.</td>
<td>Click on the name of a program being shared. Click on the up arrow to stop sharing it. Click the rightmost up arrow bar to stop sharing all programs.</td>
</tr>
<tr>
<td>Share your entire desktop to the Display Wall by checking the box.</td>
<td>The Mode page has a button for sharing the entire desktop.</td>
</tr>
</tbody>
</table>

Use your mouse cursor on your local screen to operate your shared programs. Click on Disconnect Client to end your session.

## Enable other users to interact with your shared programs

If you want other users to be able to interact with your shared programs on the Display Wall

<table>
<thead>
<tr>
<th>Macintosh</th>
<th>PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Go to Shared/AppVnc——&gt;Preferences—uncheck Enable Remote Keyboard/Pointer</td>
<td>Go to the symbol for Shared/AppVnc in the toolbar showing icons for each current program. Right click to pop up a menu and select Properties. Uncheck the box for Enable Remote Keyboard and Pointer.</td>
</tr>
</tbody>
</table>

## Mouse cursor for interacting with other people’s shared programs

<table>
<thead>
<tr>
<th>Macintosh</th>
<th>PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Click the icon in the dock for xお客 if you don’t have it, download it from Source Forge, if possible, or get this app (or xお客).</td>
<td>Click the icon on the desktop for xお客 or (if you don’t have it, download it from Source Forge, if possible, or right click here and Save Target As...)</td>
</tr>
<tr>
<td>Select an edge detection direction—the edge of your local screen that leads the cursor to an edge of the Display Wall.</td>
<td>Click within the xお客 window to control a mouse cursor on the Display Wall.</td>
</tr>
<tr>
<td>Click on Disconnect to end your remote cursor session.</td>
<td>To end using the cursor on the Display Wall and go back to using the mouse cursor on your PC: Hold down mouse button 1 and simultaneously click on mouse button 2.</td>
</tr>
</tbody>
</table>

This brings up a utility for controlling a mouse cursor on the Display Wall. Click on New Connection. Hostname is ntwindowspc9 and connection type is X11. Then click on Connect.

The cursor number selector sets your cursor color so you can distinguish your cursor from other users.
Bill Davis Display Wall Help File

http://w3.pppl.gov/~bdavis/swdoc/DisplayWallSetupSteps.txt

To display a scope display, from an existing xterm window:

1) exec xterm -T NSTXwindowsPC -n NSTXwindowsPC -sb -sl 2000 -e ssh nstxpool &
2) setenv DISPLAY nstxwindowspc:0.0
3) dwscope -def $NSTXUSR/util/scopes/wall_physics.scope &

Wall I/O-intensive programs should be most efficient running on nstxwindowspc.

run x2x-2wall.xs (or x2x-mc) on PC's or osx2x on Macs and click in window to rearrange windows on wall.
Questions to Bill Davis, x-2546, or bdavis@pppl.gov
Paul Sichta, x-3477, or psichta@pppl.gov
Greg Tchilinguirian, x-2669, or gtchilin@pppl.gov
Gretchen Zimmer, x-3133, or gzimmer@pppl.gov

For time-critical notification or questions, send email to nstxops@pppl.gov, unixadmin@pppl.gov

General support requests should be logged through help.pppl.gov
Creating an iScience Network can reduce iFw traffic
Search EFIT Database Table

http://nstx.pppl.gov/nstx/Software/WebTools/searchefitdb.html

Select shot, BETAN, IP, TAUMHD, TEMAX, TOI, TIME from EFIT

where shot>=136000 AND shot <=137000
AND IP>=500000 AND TOI='maxip' order by shot

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<th>TOI</th>
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EFITviewer (from GA) shows plasma flux in relation to vessel and diagnostic site lines

% efityviewer  # (entered at the Linux prompt)
EFITviewer - zoom in to see MPTS locations, strike points, e.g.

Ctl-clicking on the plot will print out the R and Z coordinates.
Output from Searching the NSTX Logbook

139491  XP# 1045  SESSION LEADER  Aug 03 2010 01:59PM  ekolomen
Problem with the reproduction of the x-point shot from friday.
Try to reload 137983.
OK but the beams were not the same. Ends at 450 ms.

139491  XP# 1045  SESSION LEADER  Aug 03 2010 02:00PM  VLAD
Try loading 137983, another SP-controlled shot.
Result: better, but still short.

139492  XP# 1045  SESSION LEADER  Aug 03 2010 02:00PM  ekolomen
Reload the same beams. Good match. We can start the XP.

139492  XP# 1045  SESSION LEADER  Aug 03 2010 02:01PM  VLAD
Repeat previous shot, with NBI from 137983.
Better.

139492  XP# 1058  BOLOMETRY  Aug 03 2010 02:15PM  spaul
Very high Prad with peaked profile, collapsing at .65 sec. Prad on wings rises
forming a hollow profile with edge power density exceeding .2 MW/m^3.
Total Prad about 1.5 MW and Te decreases after .6 sec.

139493  XP# 1045  SESSION LEADER  Aug 03 2010 02:04PM  ekolomen
Move the strik point inwards by 3 cm from 250 to 350 ms to 47 cm.
Overlaying Te Profiles from different shots

Can overlay different shots of same signal, different signals of same shot, etc.

Web Tools plotting has many options

http://nstx.pppl.gov/nstx/Software/WebTools/mdsplotlist.html

Shot Number: “139816+23”  Color Indices for lines: “findgen(24)/24*240”  Color Table: “10”
X-window Postscript Plot Control

XPC allows you to "scroll back" to earlier plots created from IDL, as well as print or save them, without having to resend all the plot commands.
Expertise: Keith, Roman, Lawson, Physics Operators

Details presented in other presentations.

The PCS computers are behind the NSTX-CS VLAN firewall, so most computers do not have access to these machines.
EPICS

- Main EPICS site: http://www.aps.anl.gov/epics/
- ITER CODAC Software: https://www.iter.org/org/team/chd/cid/codac/coresystem
- NSTX EPICS Site: http://nstx.pppl.gov/nstx/controls/epics.html