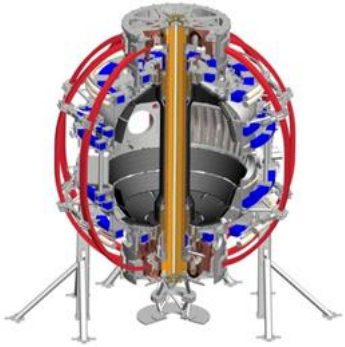
Computer Systems, MDSplus, Software Tools for NSTX-U Physics Operators

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

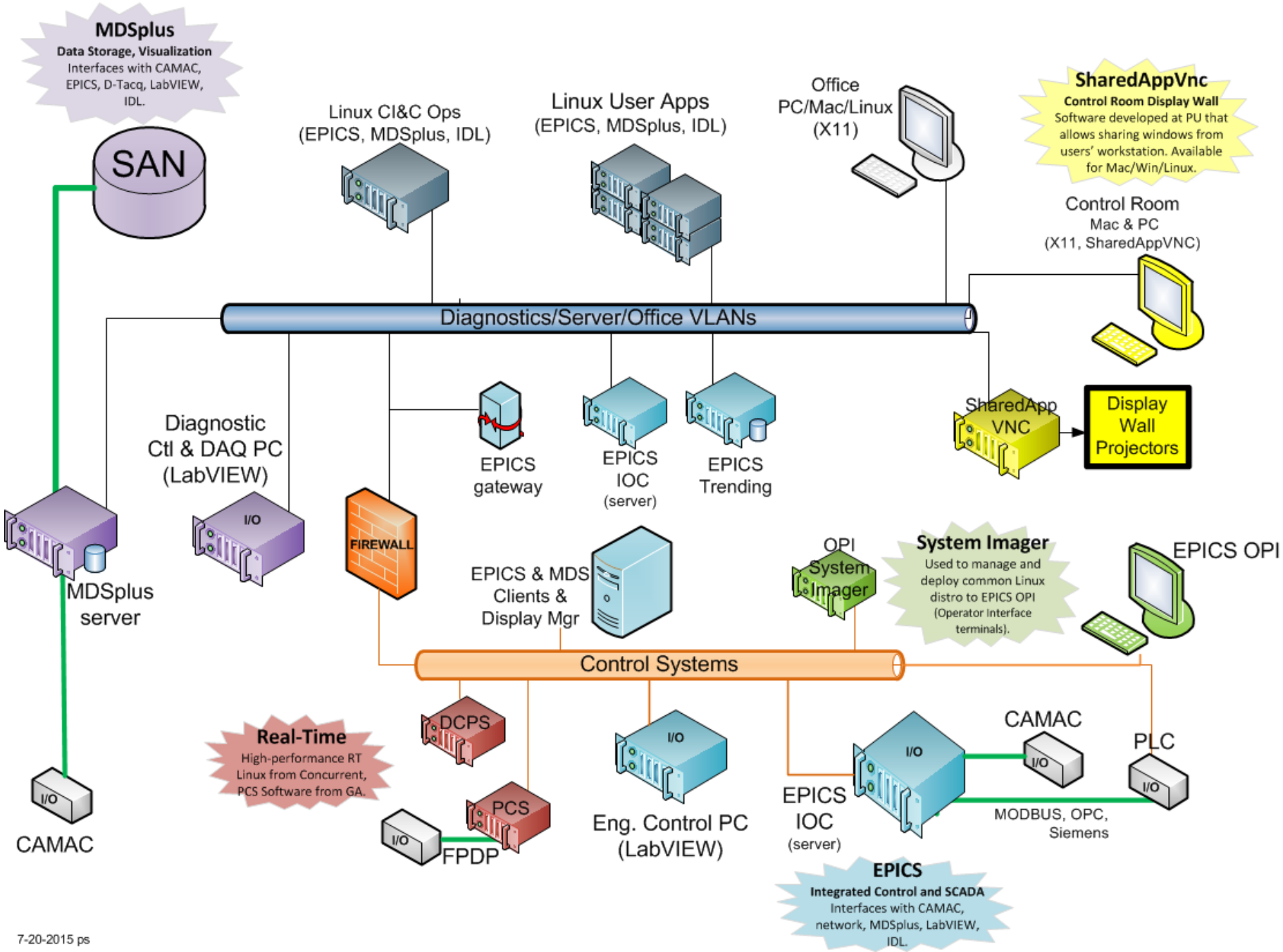
Presented at the
Physics Operators' Course, PPPL



Topics today

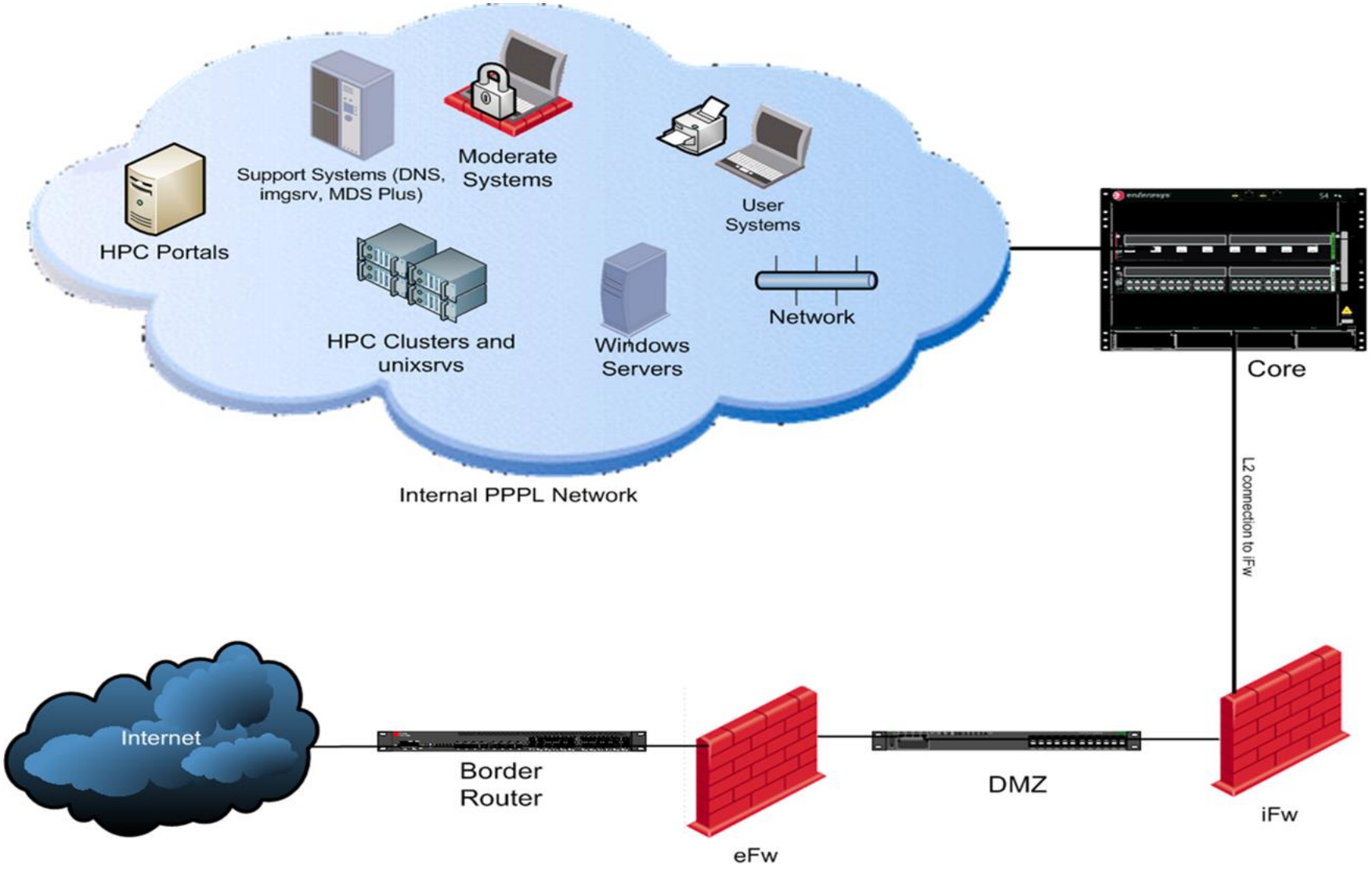
- Central Computing Overview
- MDSplus
- Data access tools
- EPICS
- Timing & Synchronization
- Display Wall

NSTX-U Central Computing



7-20-2015 ps

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

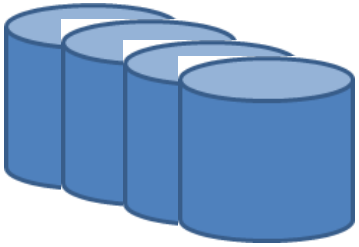
you should "**`ssh nstxpool`**" (will need to be in Linux group "nstx")

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

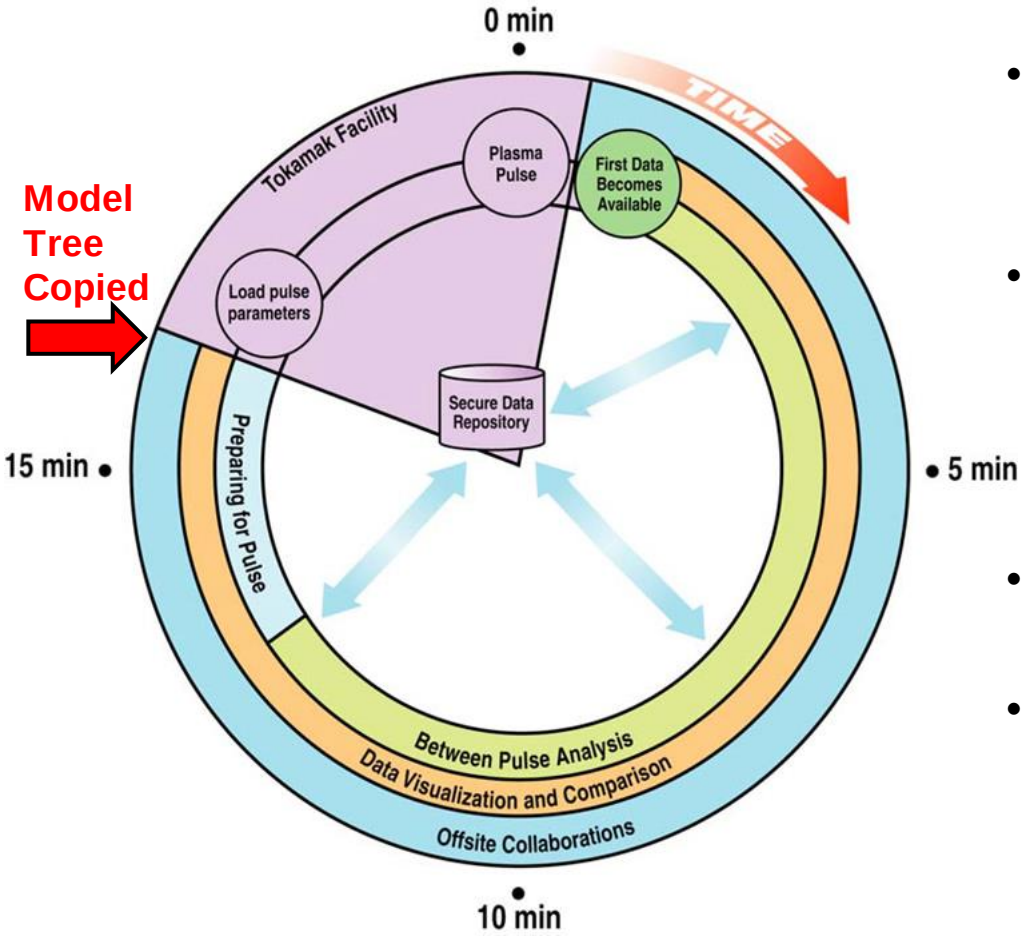
To get the recommended **MDSplus** and **IDL** environment:

`module load nstx`

Users can get directories on /p/nstxusr, but for large needs (>100 GB), request a "project disk" through help.pppl.gov

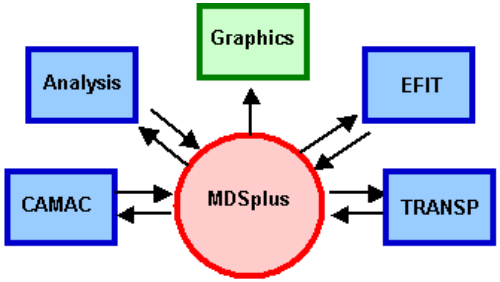


NSTX-U Pulse Cycle



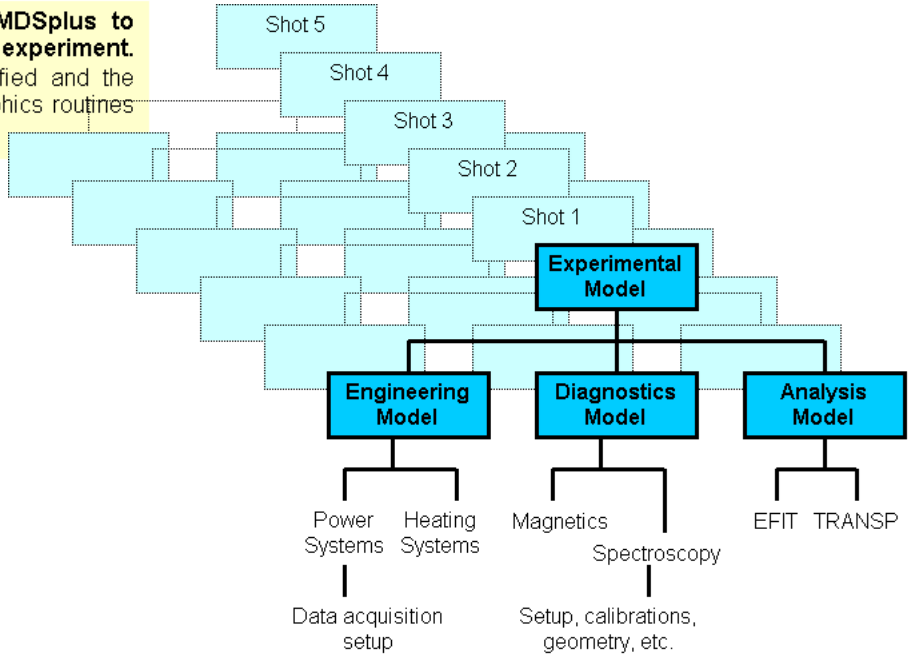
- Overall throughput and timing is critical
- Setup parameters need to be entered into MDSplus before the **Model Tree is copied** (typically)
- Trees for the next shot are Created/Built from the model trees @ T(-60)
  - Timing modules loaded
  - Digitizers armed
- Data produced by some systems is needed by others (MEMS can help)
- Both automatic and interactive data analysis and visualization tools available
  - Scope panels update from an MDSPlus event issued by the STORE action.

MDSplus is a cornerstone

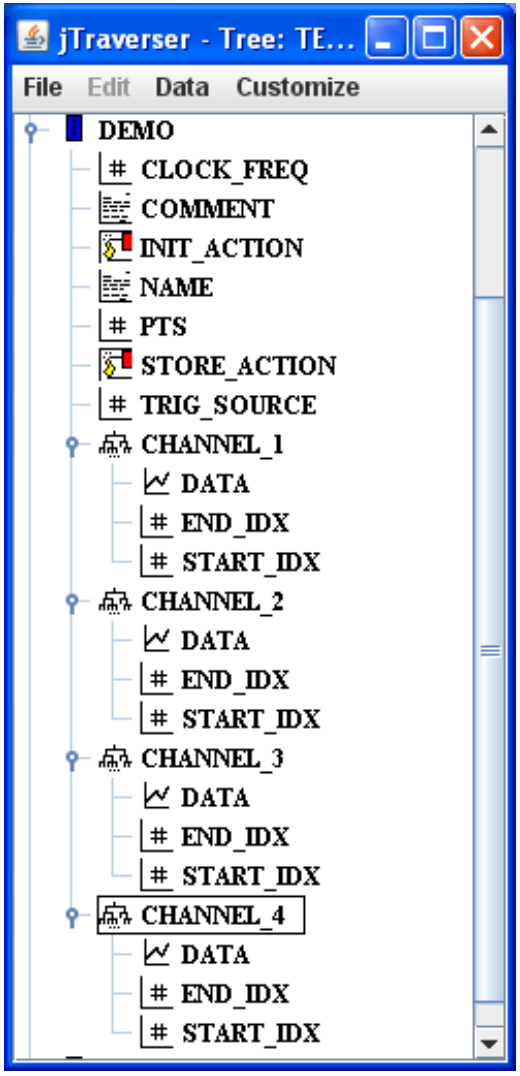


See http://mdsplus.org for more

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.



MDSplus

- Expertise: Gretchen, Bill, Greg Tchilinguirian, John Schmitt
- Server – skylark.pppl.gov::8501
  - MDSplus 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

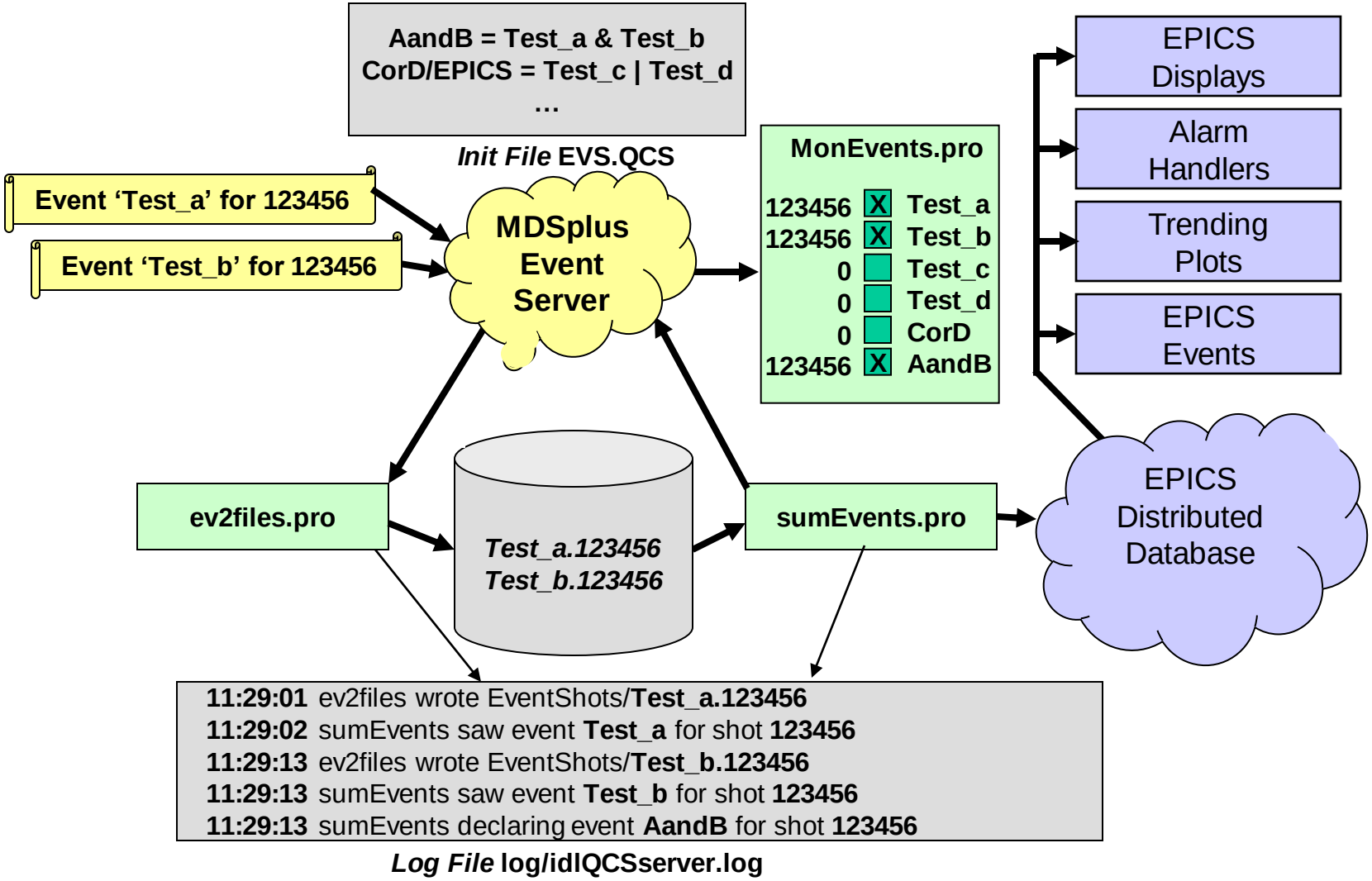
Tools for accessing MDSplus

- 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

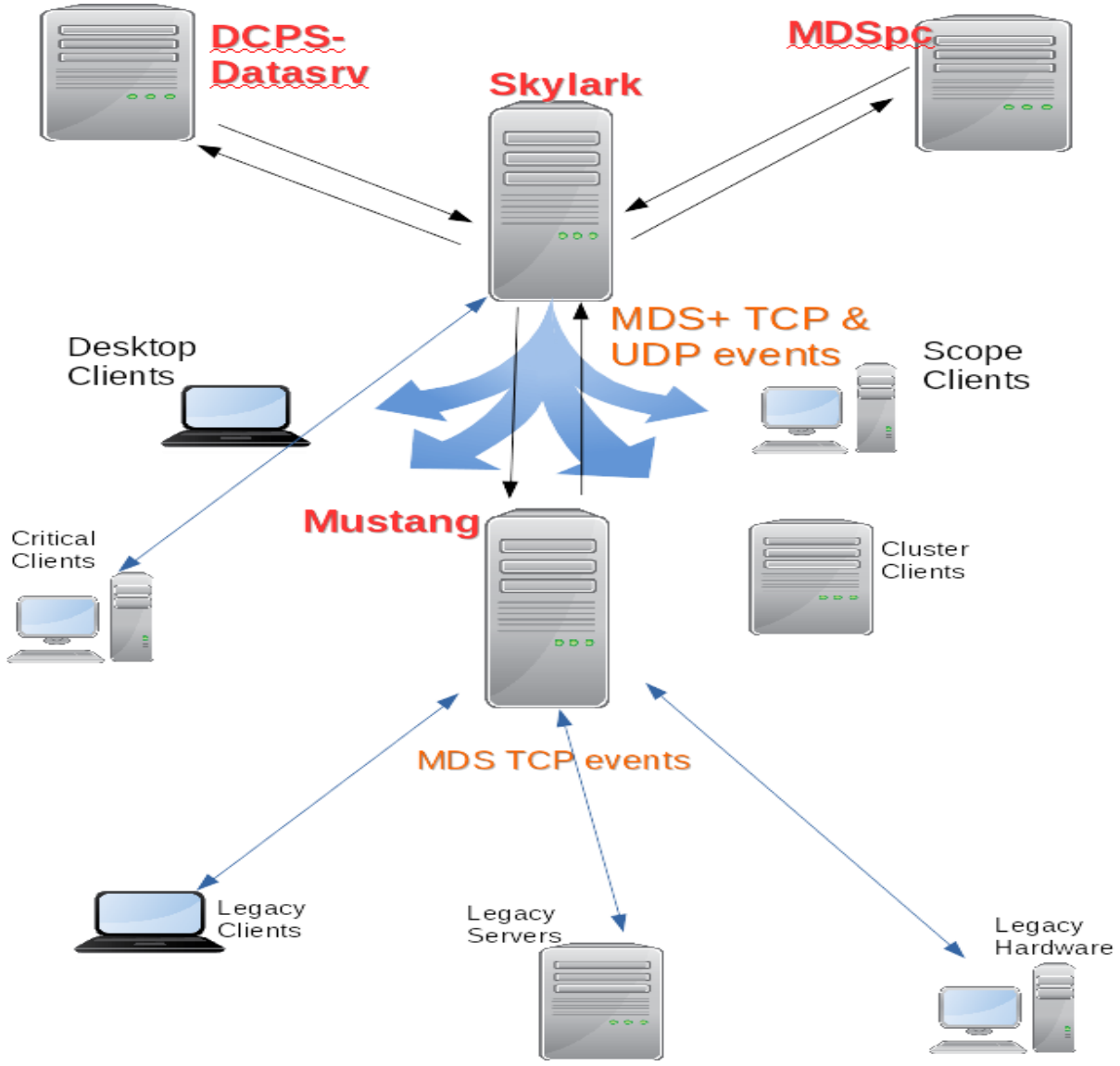
MDSplus Events

- 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



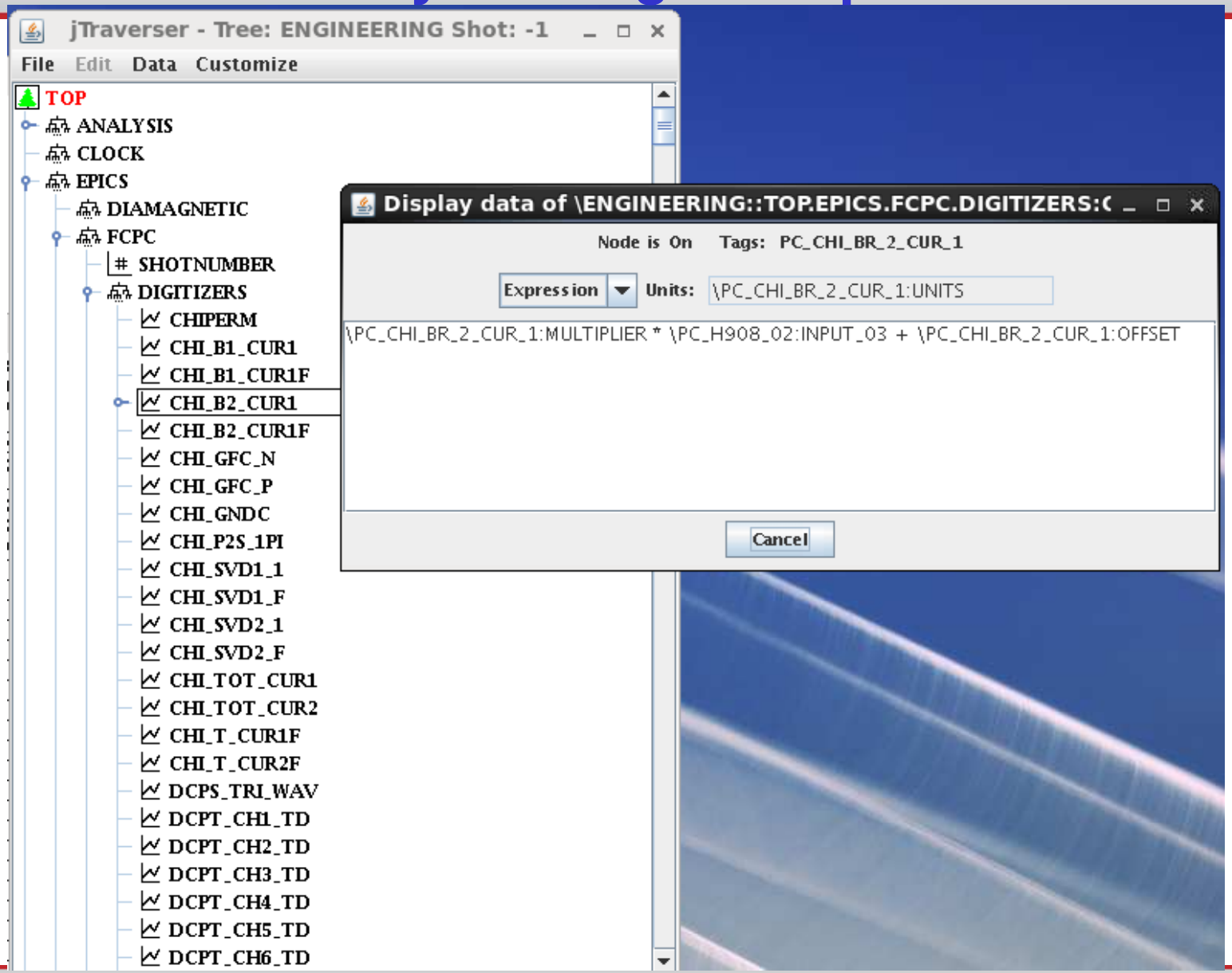
Plan to offload MDSplus serving and use both UDP and TCP/IP events



Plotting Options

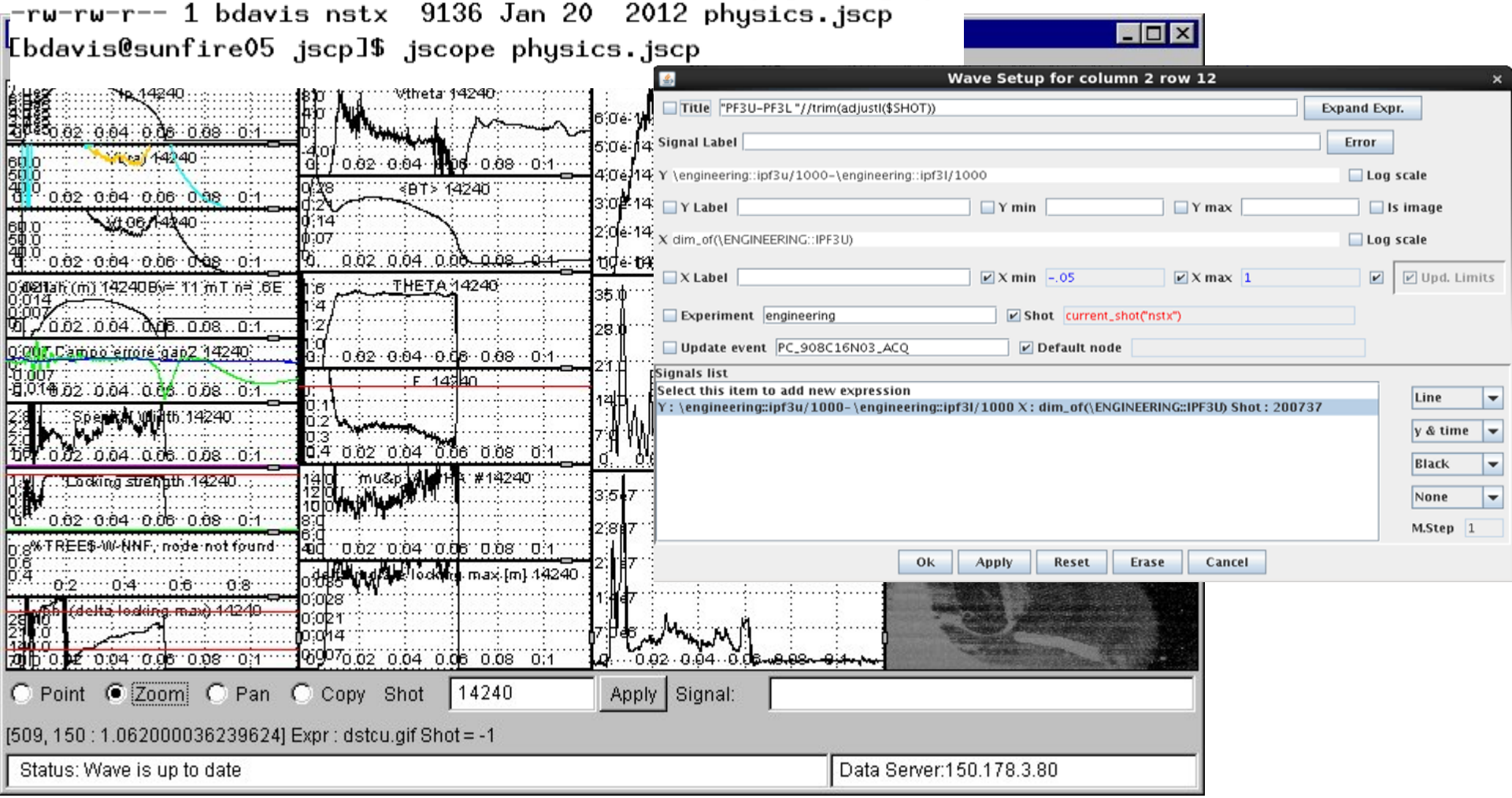
- Scope family
  - DWScope (solid; many examples available to start from)
  - jScope (uses java; color, overlays, contours, animations)
- Web Tools
  - Now can run from file input
  - Actively maintained, e.g., Open Science options coming
- ReviewPlus from GA
  - Bugs will be fixed
  - Difficult to add 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 heirarchy and signal expressions



jscope for plotting MDSplus signal expressions (start with someone else's file and customize)

```
[bdavis@sunfire05 jscp]$ cd /p/nstxops/util/jscp
/p/nstxops/util/jscp
[bdavis@sunfire05 jscp]$ ls *phys*
-rw-r--r-- 1 bdavis nstx 30434 May 25  2010 bd_physics.jscp
-rw-rw-r-- 1 bdavis nstx  9136 Jan 20  2012 physics.jscp
[bdavis@sunfire05 jscp]$ jscope physics.jscp
```



Other Tools for Physics Ops

- EFITviewer
- Logbook
  - `IDL> syb_entry`
  - 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:

Signal	email	checkEvent	nsmooth	max	min	idlCall	setEvent	epicsAlarm
\wf::pnb	bdavis	NSTX_SOP	5	800	-10	none	none	none
\wf::prf	bdavis	NSTX_SOP	3	1e38	-1e38	none	none	none

- 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 for details

Documentation and Web Tools found at http://nstx.pppl.gov/nstx/Software

NSTX-U software

Overview | Programming | Diagnostics | Applications
FAQ | Web Tools | UNIX & VMS | MDSplus

Search NSTX-U software pages (Now works well!)

What's New as of 23-Jan-2015

NSTX-U Status NSTX-U Run Schedule

FAQ The answers to a lot of Frequently Asked Questions are available. If you can't find what you need there, ask a programmer (list below).

MDSplus is a set of software tools for data acquisition and storage. NSTX-U data is organized according to the MDSplus paradigm, so users need to be familiar with it.

General Purpose Computers : Access to the NSTX-U MDSplus data is available at PPPL from the UNIX cluster, personal computers, or the Web. All access to the NSTX-U CAMAC highways must be done from skylark. IDL is now available on a[illegible] computers.

Web Tools provide the ability to plot data from the web, search for MDSplus signal names and locate shot lists by date and by experimental proposal.

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.

This site is maintained by the NSTX-U Software Support Staff (see below) for use by NSTX-U Scientists and Engineers. You will find links for analyzing NSTX-U data from the web, as well as documentation on software you may use from other computers. Click on the FAQ tab above for answers to the most frequently asked questions on data access and computer use, or browse through this site from the other links here, or try using the site map.

Need help? Ask the NSTX-U software support staff

Control Room Support, IDL, database	Bill Davis
MATLAB support	John Schmitt, Greg Busillo
Control Room Support, PCs, LabView	Gretchen Zimmer
Unix	Unix Sys Admins
Python, NX (NoMachine) Suppport	Eliot Feibush
Real-time Computer Support (e.g., DCPS)	Keith Erickson, Roman Rozenblat
Control Room Support, MDSplus	Greg Tchilinguirian, NSTX-U ITD Support Staff

NSTX-U software

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Search NSTX software pages

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 NEW!

MISCELLANEOUS

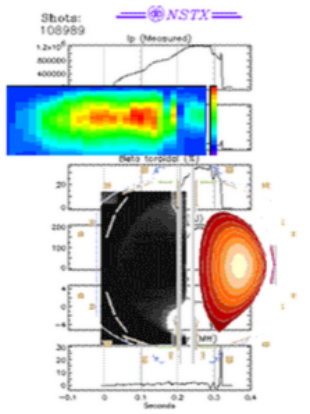
Setting up TRANSP runs

NSTX Controls Software Information

NSTX Status Page NEW

Launch EPICweb NEW

NSTX Control Room Monitoring NEW



Check out the FAQ!

nstx.pppl.gov/nstx/Software/FAQ/index.html

NSTX-U

Overview | Programming | Diagnostics | Applications

FAQ | Web Tools | UNIX & VMS | MDSplus

software

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

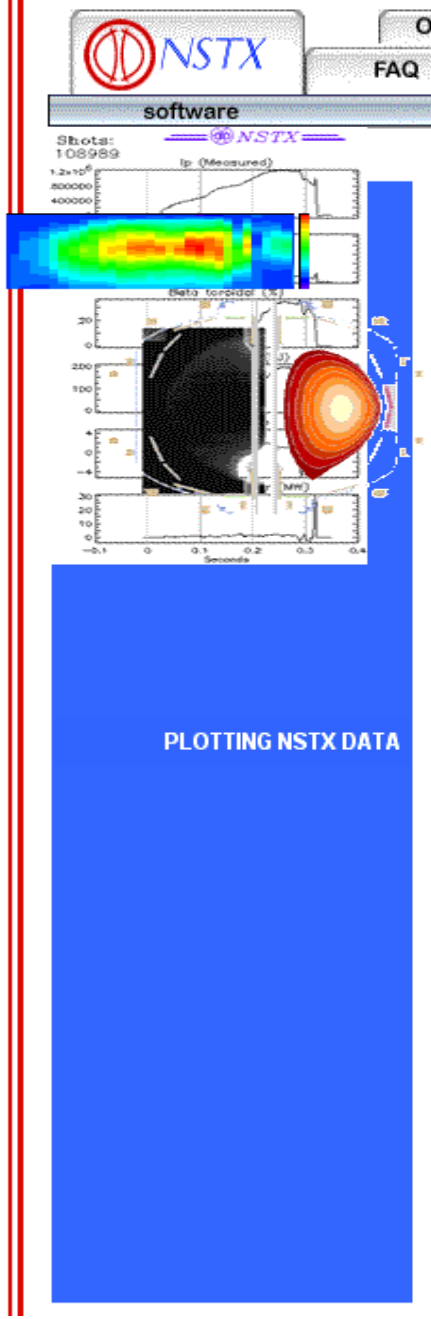
- I want to put a new diagnostic on NSTX-U. How can I get the data into MDSplus?
- How do I control my acquisition starting time?
- I want to take another set of calibration shots; what shot number should I start with?
- Can I run CAMAC programs from any computer?

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?

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!

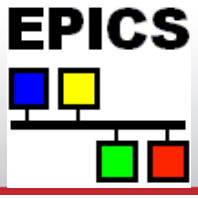
NEW! mdsplotfast.html should provide the fastest Web Tool plotting for signals from multiple shots.
Or try the version that reads inputs from a file.

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

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

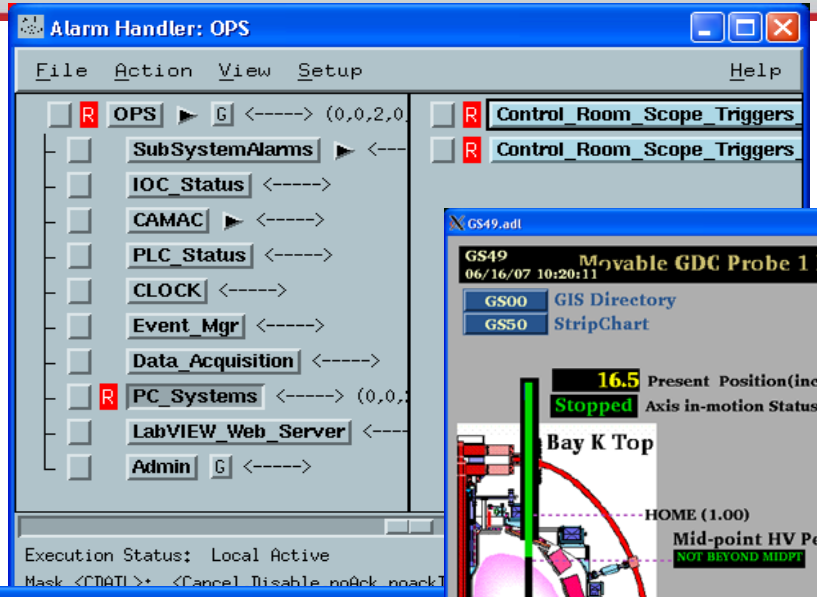
Flux Cross-sections: NSTX **EFIT/LRDfit** Flux and Thomson Data Plotting
MPTSplots (or mptsColorCont (example)): NSTX Multi-point Thomson Data Plotting
Create NSTX Fast Camera Movies, from 1 or 2 cameras with optional overlays of MDSplus signals.
NSTX RGA Trend Data (example)

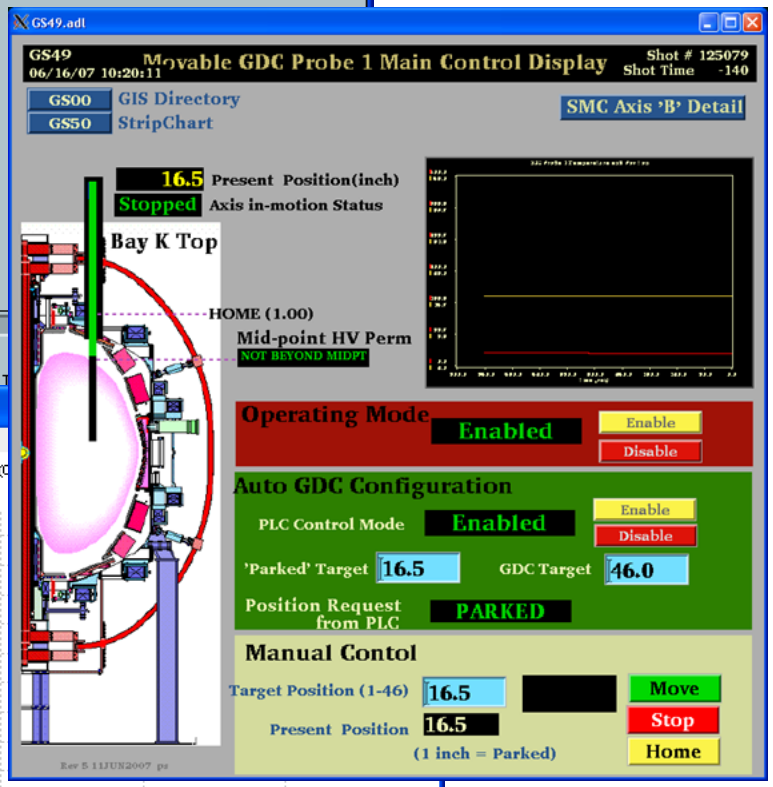


- Expertise: Sichta, Dong, Busillo
- EPICS = Experimental Physics and Industrial Control System
  - Open source, multi-OS, multi-CPU.
  - API for popular programming languages.
  - Distributed control & scalable.
  - Used at 100's of experiments; driven by large experiments' needs; used on ITER.
- EPICS at NSTX-U
  - Interfaced with most engineering subsystems.
  - Provides: (slow) Integrated Control, operator displays, alarms, trending.
  - Input/Output via VME & CAMAC & PLC & PC's.
  - (6) IOC's : vxWorks, Linux, Windows.
- 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.

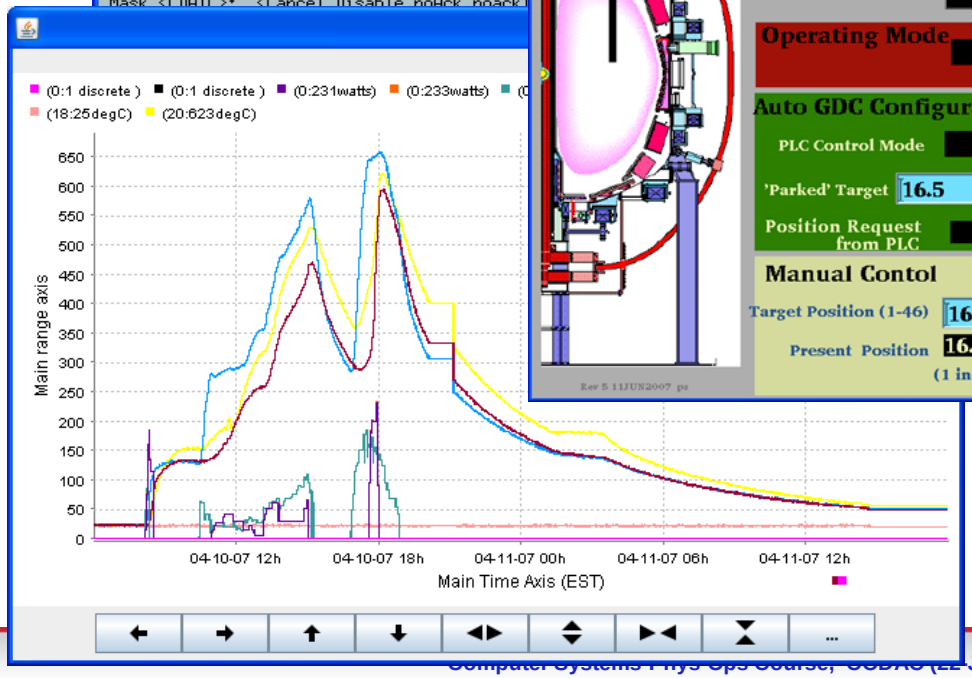
EPICS GUI for NSTX-U

Alarm Handler



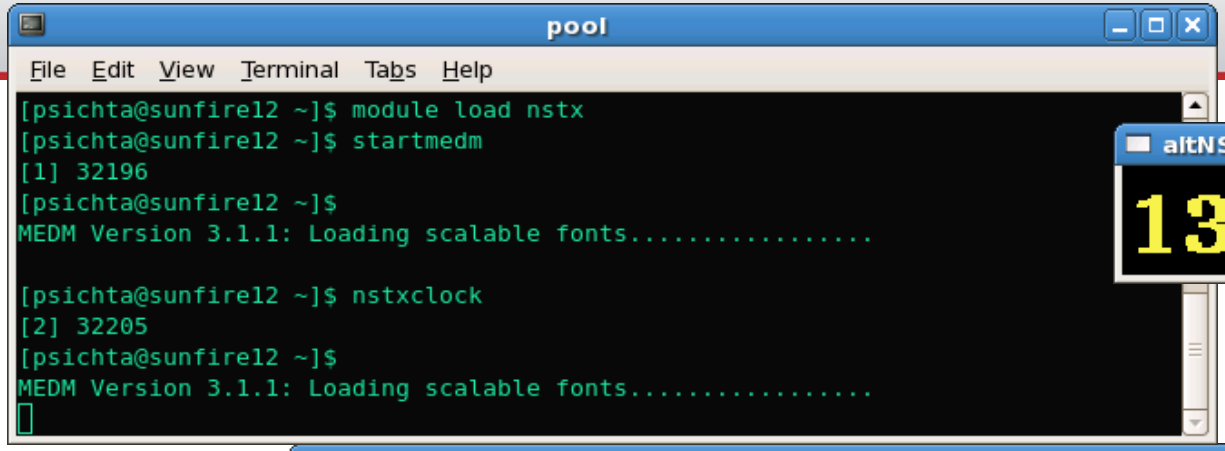


MEDM



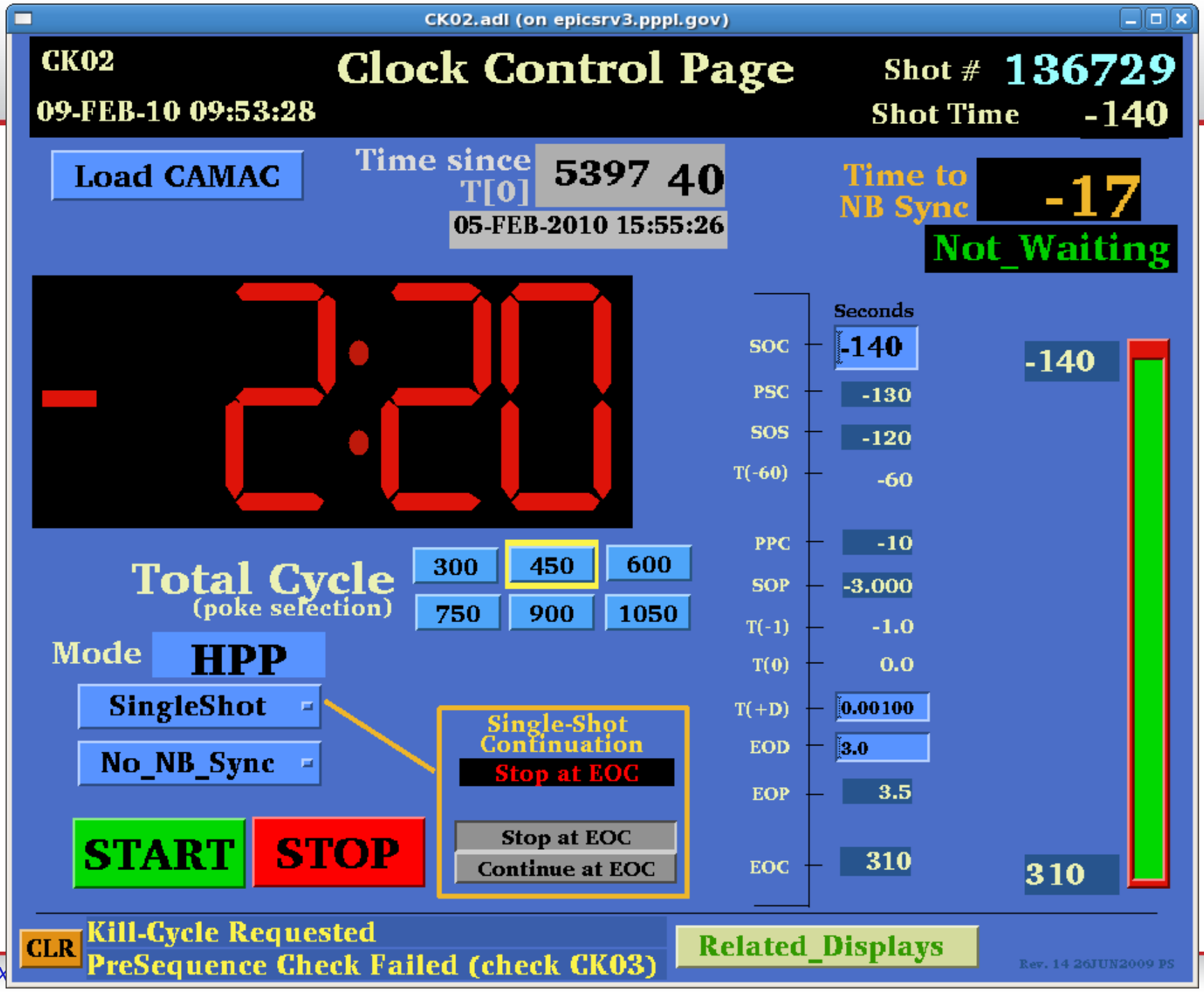
Archive Viewer

EPICS on *nstxpool*



Timing & Synchronization

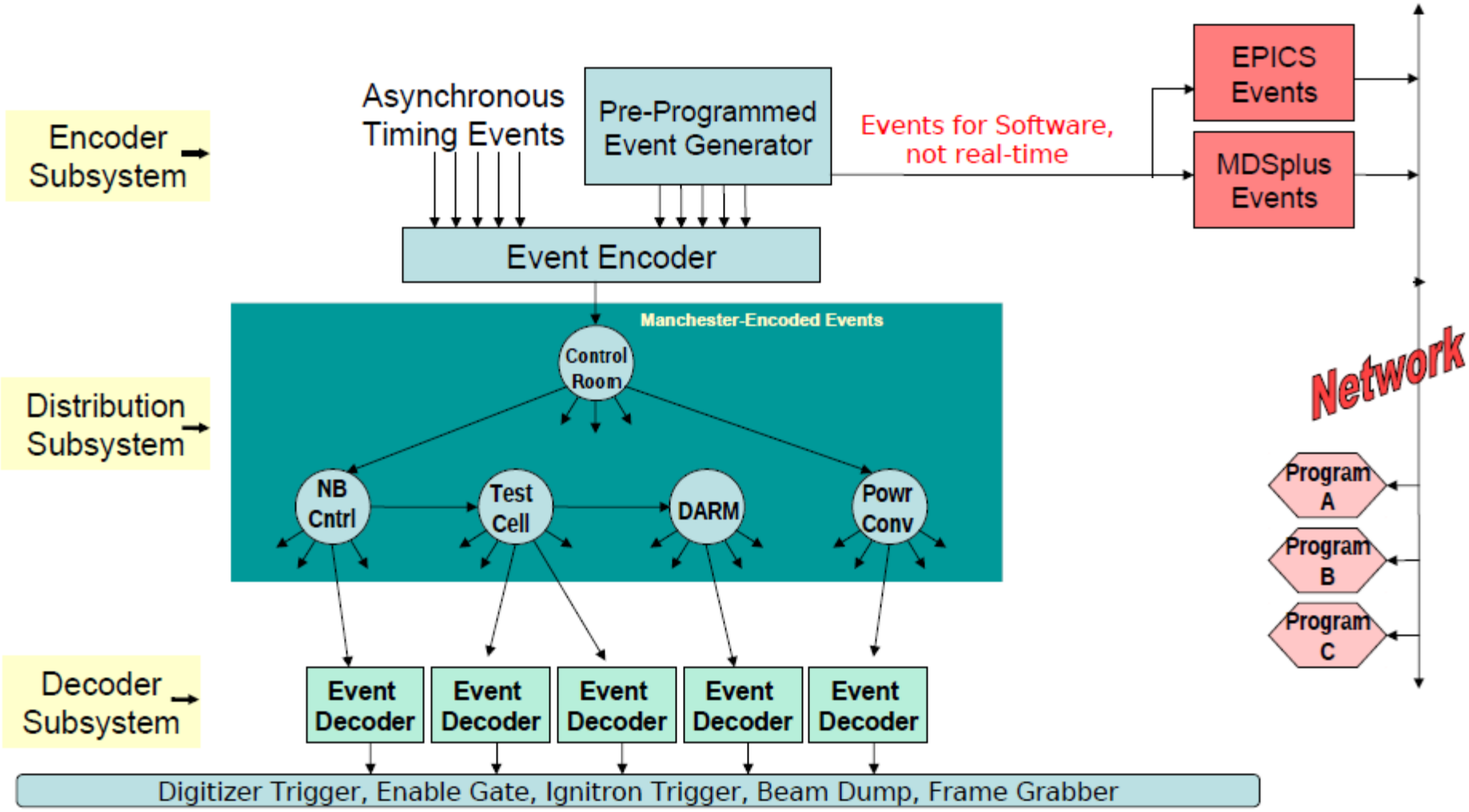
- Expertise: Wertenbaker, Sichta, Dong
- NSTX-U Shot Cycle configured on EPICS display CK02.
  - Clock system provides continuous NB Clock cycle (150 sec).
  - NSTX-U Clock cycle syncs to NB Clock cycle.
- CAMAC-based 1 MHz Facility Clock provides microsecond timing resolution
  - 16 ‘hardware’ clock 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.


CK02.adl (on epicsrv3.pppl.gov)
CK02
09-FEB-10 09:53:28
Clock Control Page
Shot # 136729
Shot Time -140
Load CAMAC
Time since T[0] 5397 40
05-FEB-2010 15:55:26
Time to NB Sync -17
Not_Waiting
-2:20
Seconds
SOC -140
PSC -130
SOS -120
T(-60) -60
PPC -10
SOP -3.000
T(-1) -1.0
T(0) 0.0
T(+D) 0.00100
EOD 3.0
EOP 3.5
EOC 310
-140
310
Total Cycle
(poke selection)
300
450
600
750
900
1050
Mode HPP
SingleShot
No_NB_Sync
Single-Shot Continuation
Stop at EOC
Stop at EOC
Continue at EOC
START
STOP
CLR
Kill-Cycle Requested
PreSequence Check Failed (check CK03)
Related_Displays
Rev. 14 26JUN2009 PS

EPICS-perspective of the Shot Cycle

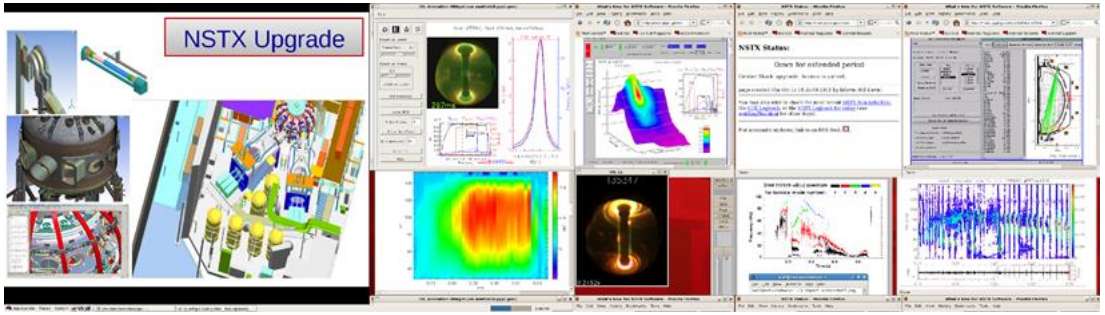
Function	When
Configure/run the Central Clock/shot cycle	Before SOP (Start of Pulse)
Clock Cycle Starts	by COE, or automated
PreSequence Check (commit shot#)	SOP +10
Initialize Timing & Digitizers	varies, SOP thru T(-30)
PrePulse Check (commit SOP-T(0)-EOP)	T(-10)
Shot occurs	SOP, T(-1), T(0), NBI, EOP
Parameter Acquisition	two times: T(0), T(+25)
Data Acquisition	After EOP.

NSTX Timing and Synchronization System



Reconfigurable Timing Unit

Layout of control room



nstxwindowspc
(RHEL_WS3)

PPPL
Network

(Other slaved Wall displays)

Clients -- Mac/Windows/Linux

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
  - *SharedAppVNC* downloadable from SourceForge
  - Last updated in 2006 - developer no longer active.
  - Individual mouse color using *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 | Get SharedAppVnc at SourceForge.net - Mozilla Firefox

File Edit View History Bookmarks Tools Help

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

Google NSTX Status Page PPPL PPPL Mail - Inbox Central I&C LogBook helpdeskticket

sourceforge FIND AND DEVELOP OPEN SOURCE SOFTWARE

Welcome, Guest! Log In | Create Account

Find Software | Develop | Create Project | Blog | Site Support | About

enter keyword Search

SourceForge.net > Find Software > SharedAppVnc

SharedAppVnc Beta by grantwallace

Share More

Summary | Files | Support | Develop

View screenshots

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) OR View all files

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

TAGS EDIT

Show project details

Ads by Google

Ratings and Reviews

Show: Everything

100% of 1 user recommends this project

Thumbs up: 1

Thumbs down: 0

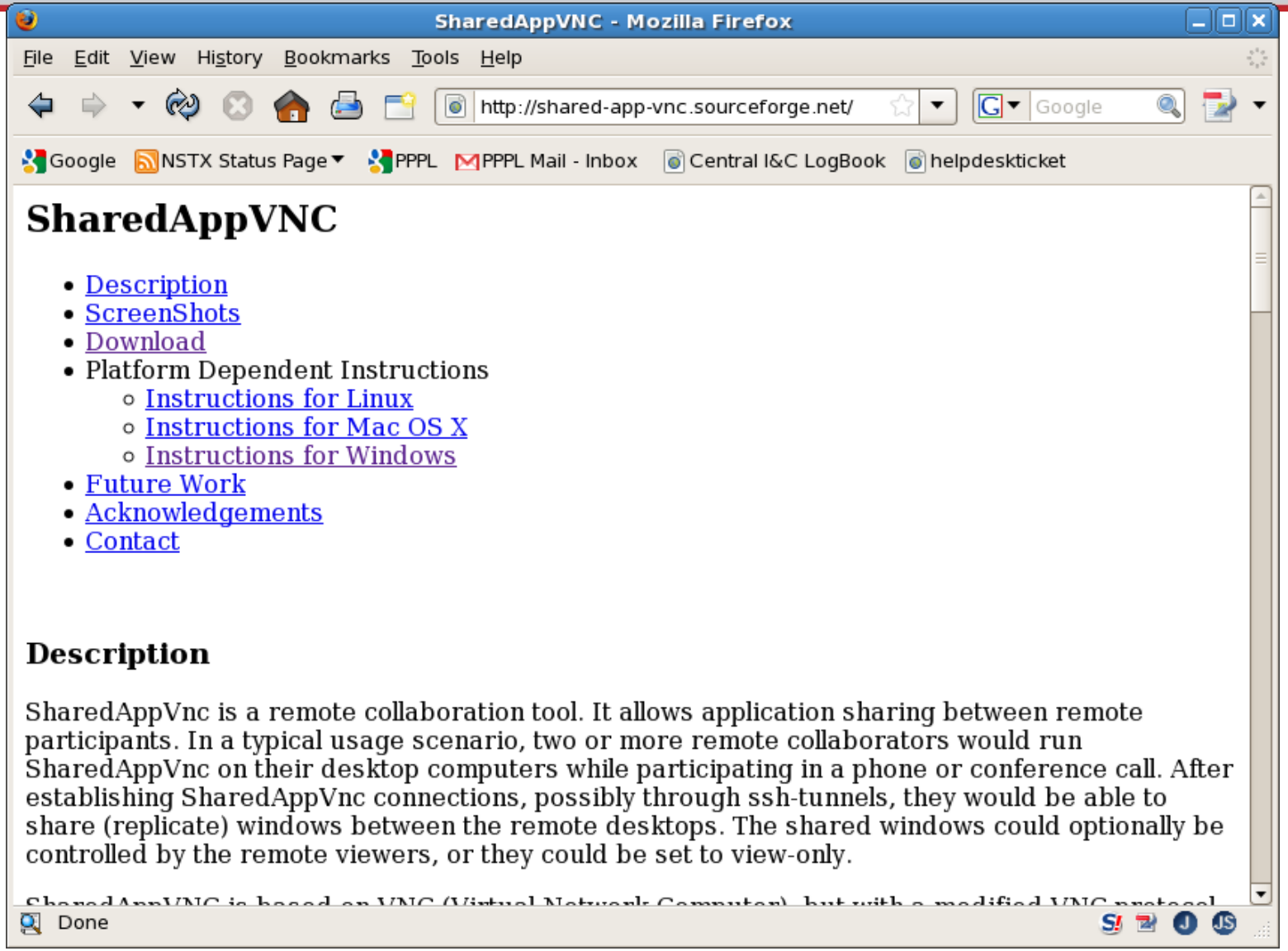
Be the first to post a text review of SharedAppVnc. Rate and review a project by clicking thumbs up or thumbs down in the right column.

Online Video Conferencing

High Quality Video Conferencing.Easy-to-use, Fast & Secure.

www.vsgi.com

Done


SharedAppVNC - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://shared-app-vnc.sourceforge.net/
Google
Google NSTX Status Page PPPL PPPL Mail - Inbox Central I&C LogBook helpdeskticket
SharedAppVNC
Description
ScreenShots
Download
Platform Dependent Instructions
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.
Done

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*ssword (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
   ```

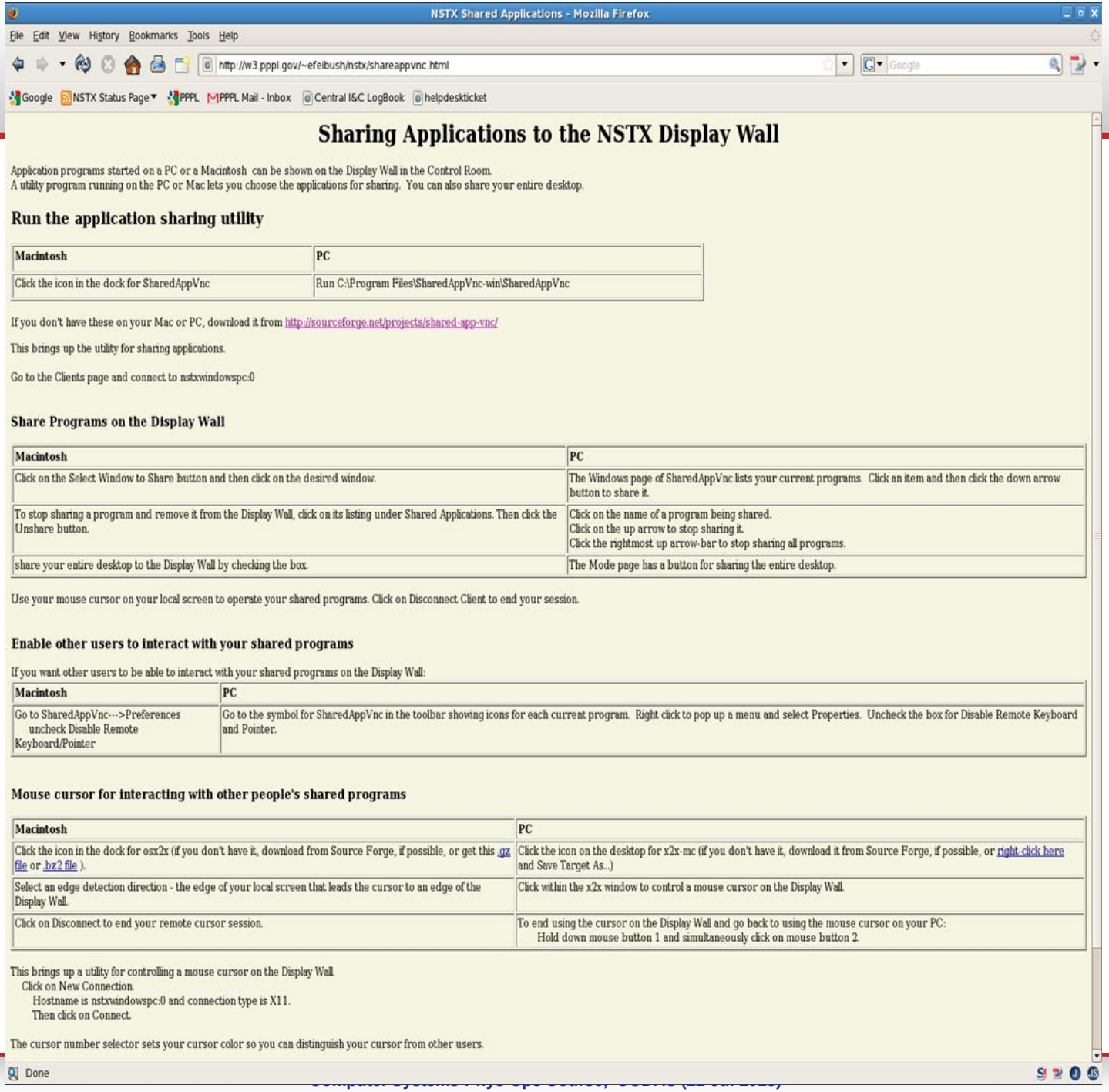
   Then run:

   ```
   ./SharedAppVnc -connectHost nstxwindowspc
   ```

If you have additional questions, please send email to efeibush

---

updated: 19-Jun-2008
by: Bill Davis


NSTX Shared Applications - Mozilla Firefox
File Edit View History Bookmarks Tools Help
http://w3.pppl.gov/~efeibush/nstx/shareappvnc.html
Google
Google NSTX Status Page PPPL PPPL Mail - Inbox Central I&C LogBook helpdesk ticket
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
Macintosh
PC
Click the icon in the dock for SharedAppVnc
Run C:\Program Files\SharedAppVnc-win\SharedAppVnc
If you don't have these on your Mac or PC, download it from http://sourceforge.net/projects/shared-app-vnc/
This brings up the utility for sharing applications.
Go to the Clients page and connect to nstxwindowspc:0
Share Programs on the Display Wall
Macintosh
PC
Click on the Select Window to Share button and then click on the desired window.
The Windows page of SharedAppVnc lists your current programs. Click an item and then click the down arrow button to share it.
To stop sharing a program and remove it from the Display Wall, click on its listing under Shared Applications. Then click the Unshare button.
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.
share your entire desktop to the Display Wall by checking the box.
The Mode page has a button for sharing the entire desktop.
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:
Macintosh
PC
Go to SharedAppVnc--->Preferences
uncheck Disable Remote Keyboard/Pointer
Go to the symbol for SharedAppVnc in the toolbar showing icons for each current program. Right click to pop up a menu and select Properties. Uncheck the box for Disable Remote Keyboard and Pointer.
Mouse cursor for interacting with other people's shared programs
Macintosh
PC
Click the icon in the dock for osx2x (if you don't have it, download from Source Forge, if possible, or get this .gz file or .bz2 file).
Click the icon on the desktop for x2x-mc (if you don't have it, download it from Source Forge, if possible, or right-click here and Save Target As...)
Select an edge detection direction - the edge of your local screen that leads the cursor to an edge of the Display Wall.
Click within the x2x window to control a mouse cursor on the Display Wall.
Click on Disconnect to end your remote cursor session.
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.
This brings up a utility for controlling a mouse cursor on the Display Wall.
Click on New Connection.
Hostname is nstxwindowspc:0 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.
Done

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.

THE END-for now
(Backup Slides Follow)

Questions to Bill Davis, x-2546, or bdavis@pppl.gov

Paul Sichta, x-3477, or psichta@pppl.gov

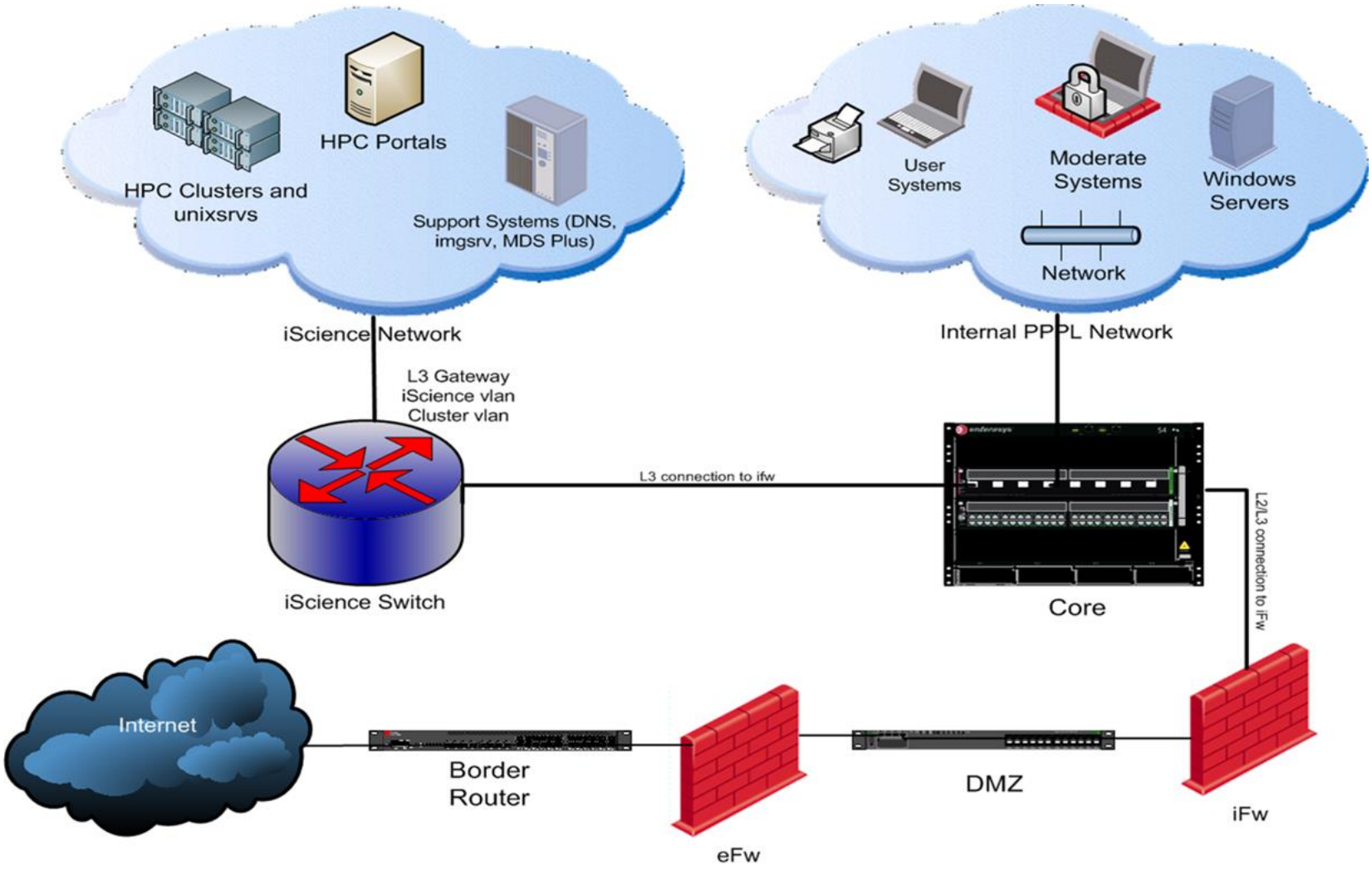
Greg Tchilinguirian, x-2669, or gtchilin@pppl.gov

Gretchen Zimmer, x-3133, or gzimmer@pppl.gov

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

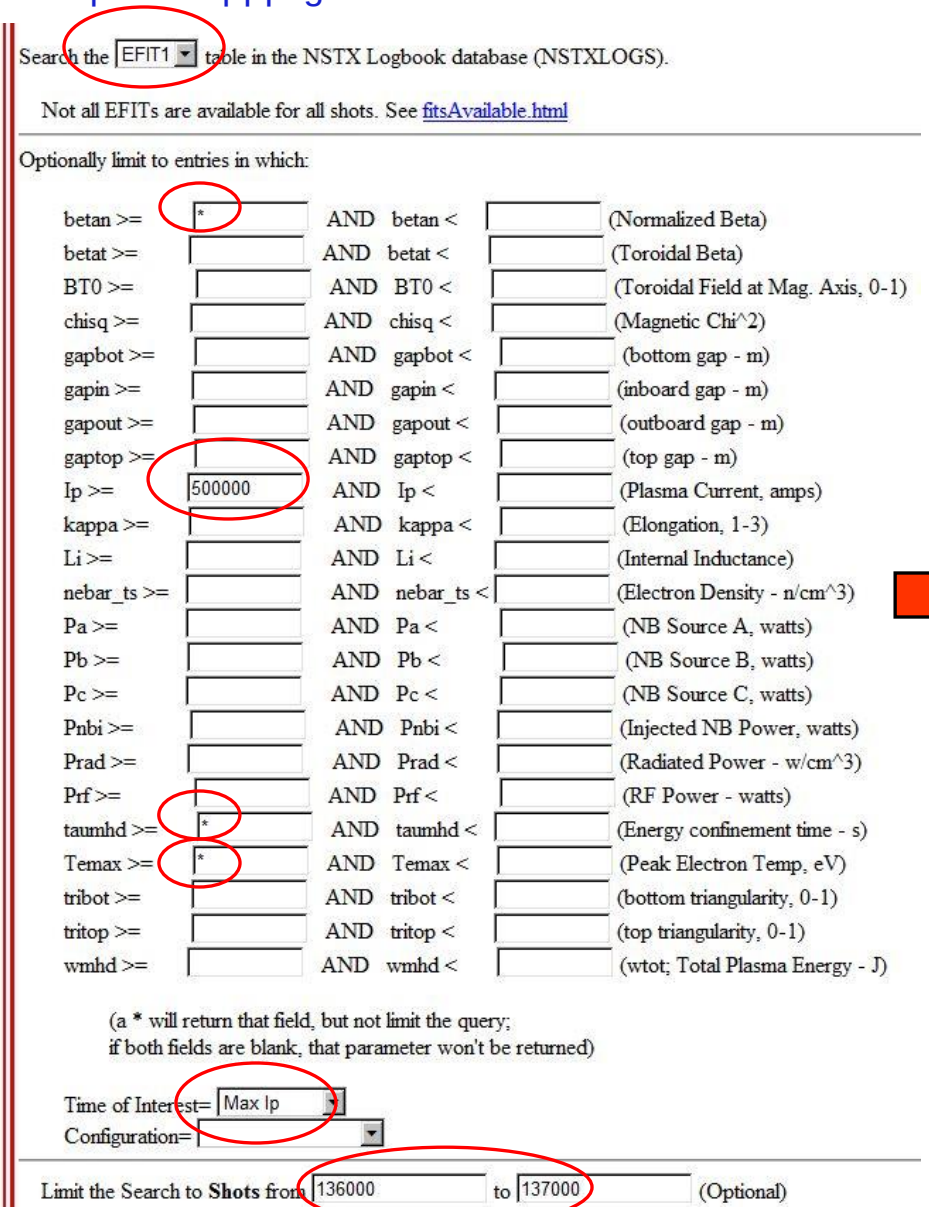
General support requests should be logged through help.pppl.gov

Creating an iScience Network can reduce iFw traffic



Search EFIT Database Table

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



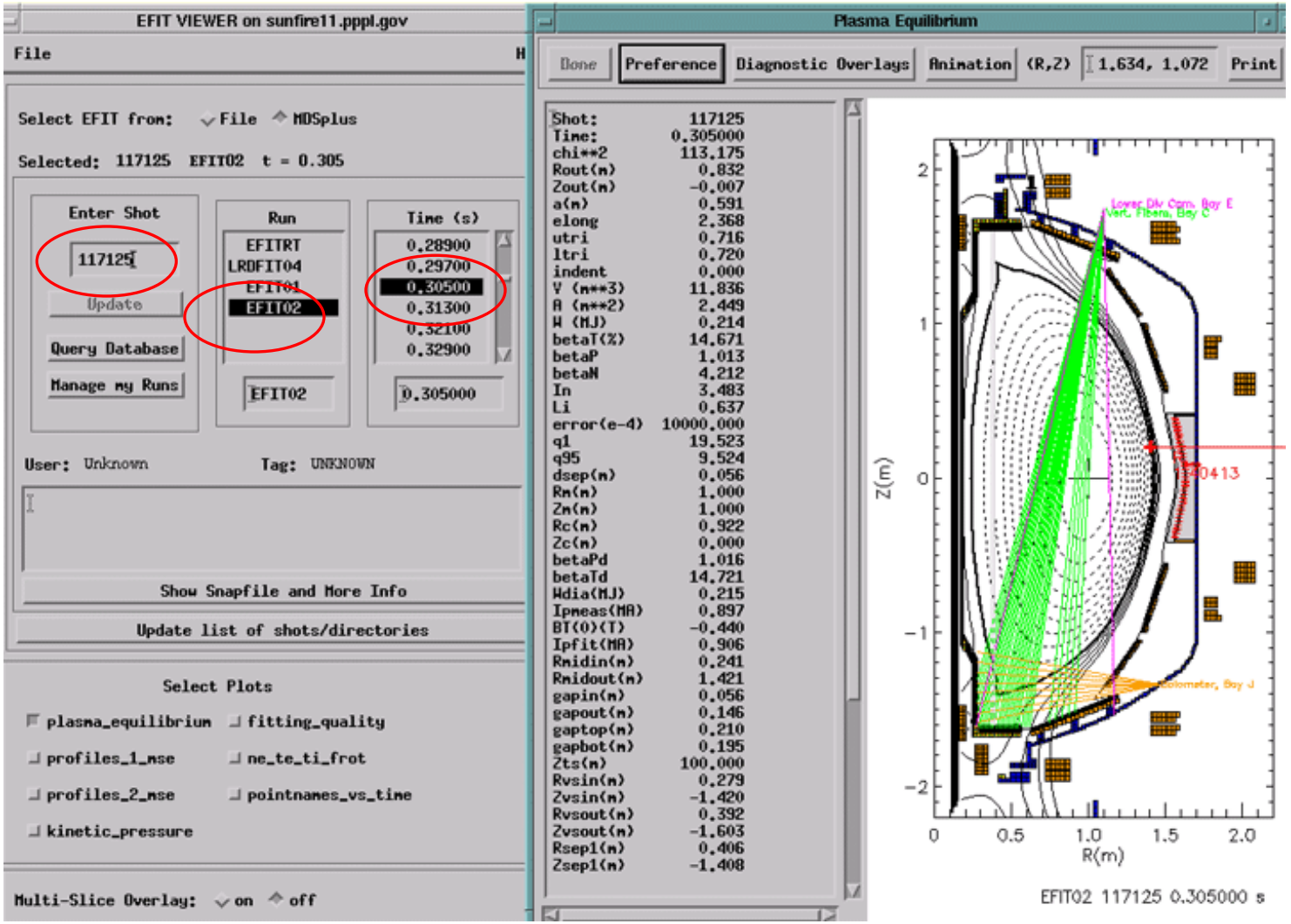
Select shot, BETAN, IP, TAUMHD, TEMAX, TOI, TIME from EFIT

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

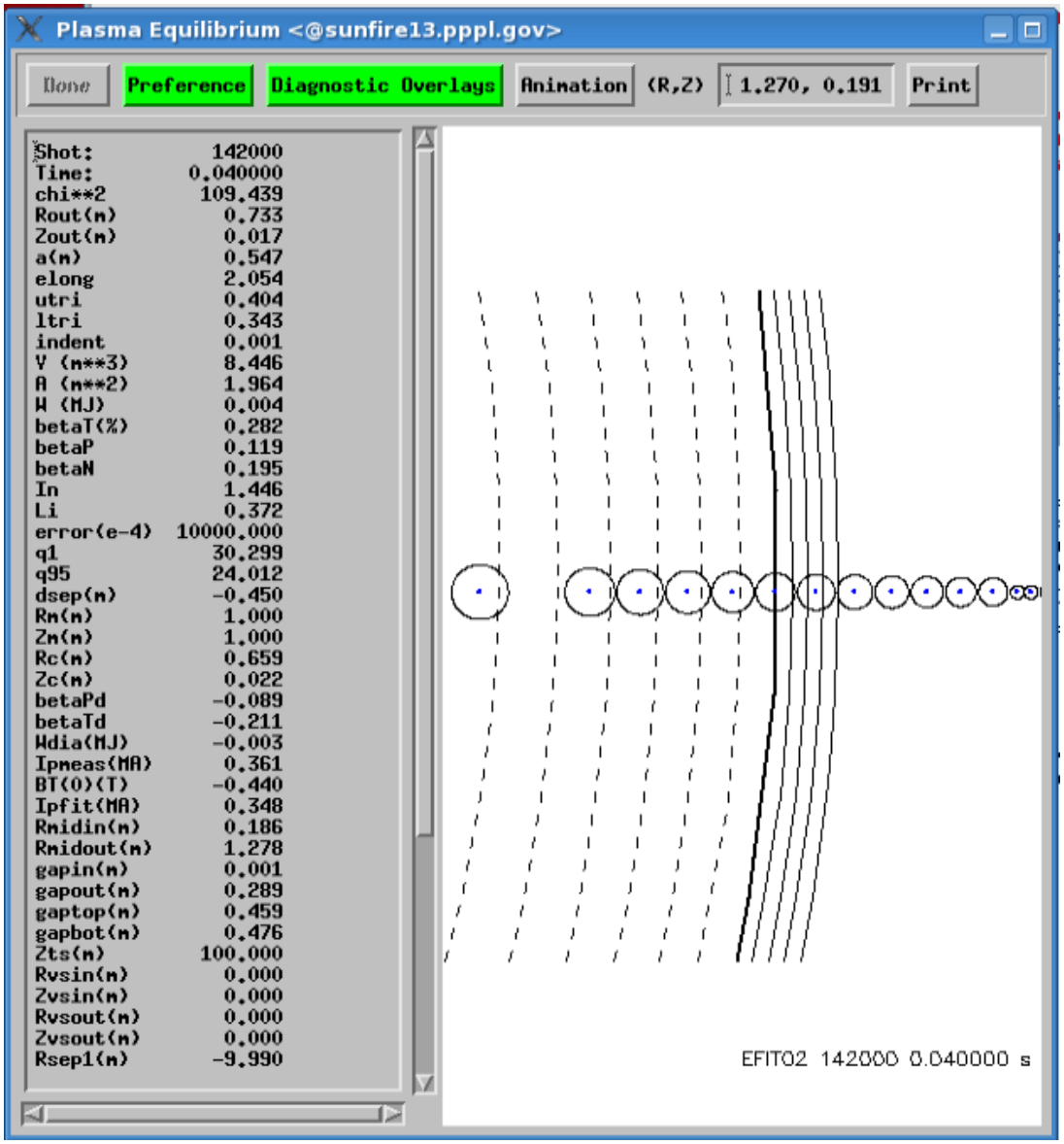
shot	BETAN	IP	TAUMHD	TEMAX	TIME
136000	5.14471	751026	-1.71009	177.696	0.553
136001	2.06752	775327	-0.006489	0.923537	0.265
136002	3.32942	768031	0.03963	405.139	0.217
136003	3.50953	761056	0.057189	155.196	0.304
136004	1.64804	751014	-0.021714	0.99357	0.249
136005	2.43354	775475	-0.056866	0.739999	0.175
136006	3.56997	788279	-0.077491	0.741862	0.193
136007	2.76261	781949	-0.088126	1.34959	0.185
136008	1.66388	734348	-0.048584	0.728282	0.583
136009	2.65181	779994	-0.060781	0.681013	0.181
136010	2.23641	768482	-0.067917	0.672851	0.169
136011	2.46628	772562	-0.063587	0.668319	0.175
136012	2.72194	785012	-0.053308	25.7932	0.18
136013	6.4532	744939	-0.051581	345.731	0.535
136014	2.5175	776437	-0.045682	238.921	0.175
136015	1.83123	757323	-0.035338	0.695359	0.49
136016	0.99563	721911	-0.019168	0.658756	0.41
136017	1.77389	760615	-0.03144	0.836369	0.285
136018	1.85509	766116	-0.065414	0.618252	0.169
136019	1.78315	767601	0.029537	1.18659	0.304
136020	2.95963	786564	-0.065389	1.46719	0.185

EFITviewer (from GA) shows plasma flux in relation to vessel and diagnostic site lines

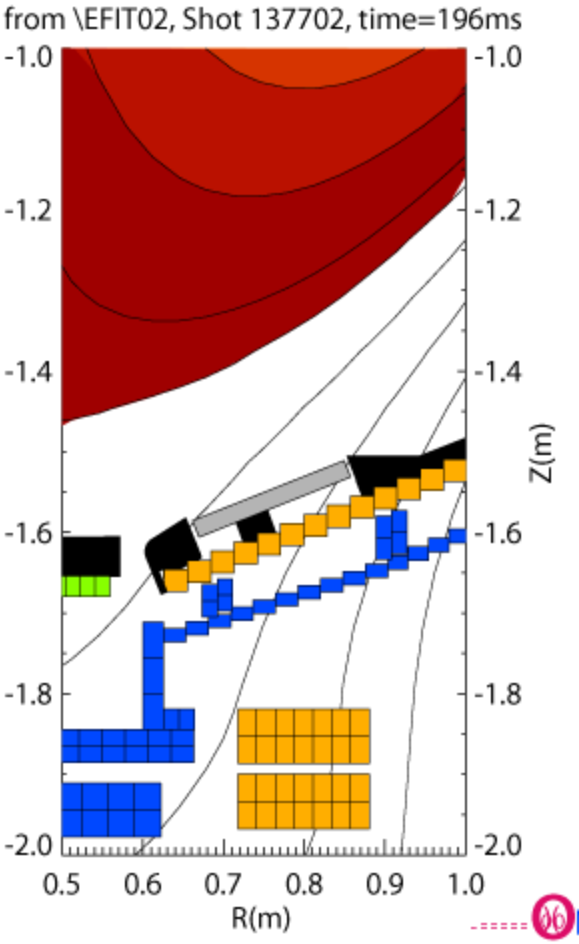
% efitviewer # (entered at the Linux prompt)



EFITviewer - zoom in to see MPTS locations, strike points, e.g.

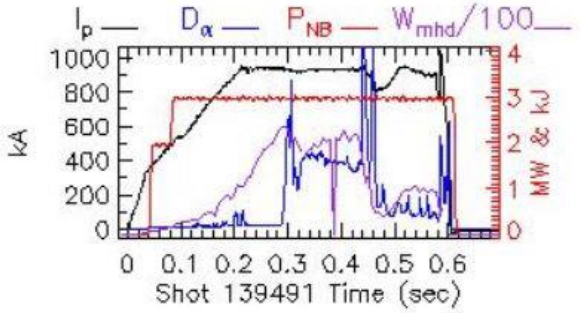


Ctl-clicking on the plot will print out the R and Z coordinates

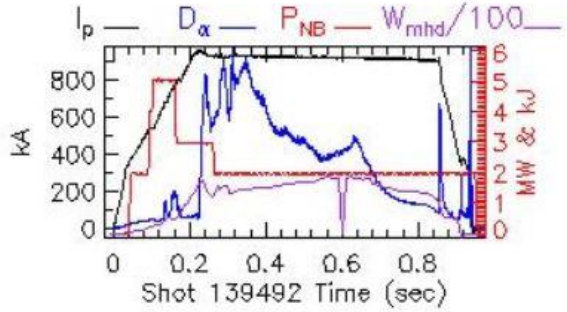


Output from Searching the NSTX Logbook

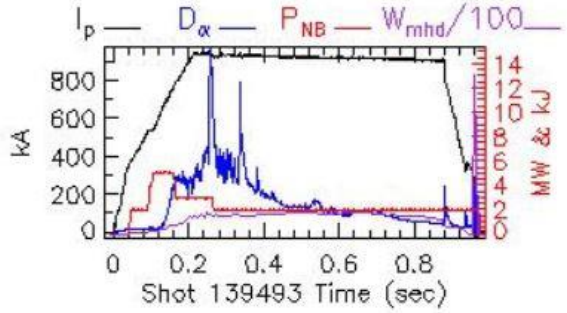
```
139491  XP# 1045   SESSION LEADER     Aug 03 2010 01:59PM   ekolemen
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
Problem with the reproduction of the x-point shot from friday.

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 loadin 137983, another SP-controlled shot.
Result: better, but still short.
--------------------------------------------------------------------------------
139492  XP# 1045   SESSION LEADER     Aug 03 2010 02:00PM   ekolemen
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
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   ekolemen
. . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . . .
Move the strik point inwards by 3 cm from 250 to 350 ms to 47 cm.
--------------------------------------------------------------------------------
```



Overlaying Te Profiles from different shots

NSTX MDSplus Multiple Signal Plotting

Plot different MDSplus Signals on the same plot frame. (example 1 example 2)
When math is performed on signals on different timebases, conversion to the coarser timebase is automatic.

Shot Number(s): < 127529-3 > (arrows plot shot before or after)
For tips on convenient shot entry methods, see ShotEntryHelp.html. (search for desired shot numbers)

Paste a Column of signals from the clipboard | Paste All 4 Columns | Help | All->1

Enter Signal(s) with tree name, e.g., \wf::ip	Y: (autoscale if blank)		Plot #
\activespec::tes[0.23,*]	from	to	1
	from	to	1
	from	to	1
	from	to	2
	from	to	2

-> For signal names see the NSTX Signals and Labels page or the MDSplus Tree Search Tool.

Plot Ranges: X: Autoscale from 0.0 to 0.8 (sec., points, etc.)

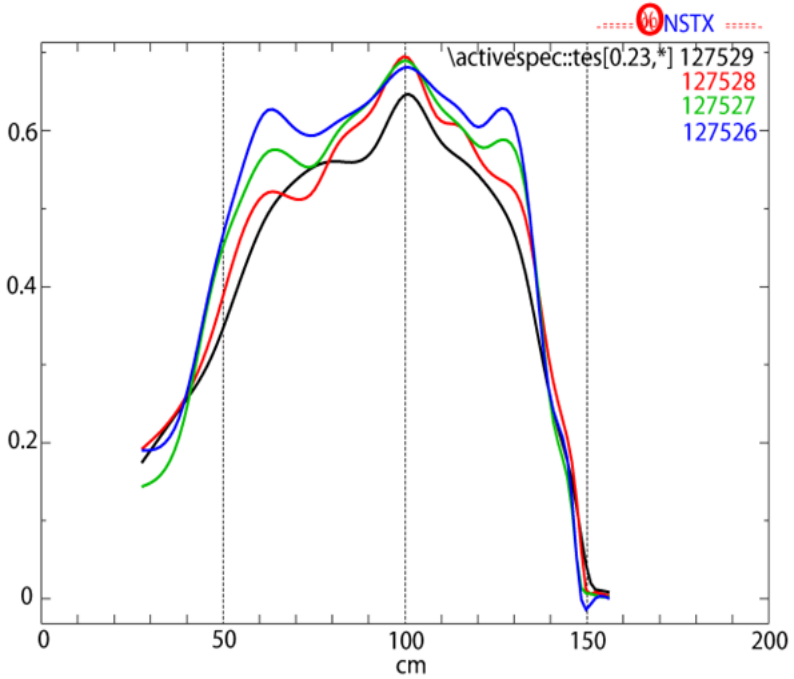
Plot Labels: From MDSplus Tag Names None

Size of Plot Window: Horizontal: 780 Vertical: 600 (pixels)

GO | Output Desired: Plots / Numerical Listing | Plot File: None Postscript PDF named: plot##### +ext | Output File Font: Default

E-mail file to: bdavis | keep aspect ratio same as plot window.

Reset



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

NSTX MDSplus Multiple Signal Plotting

Shot Number(s): < 127523-5 > (arrows inc. shot)

Paste signals or Paste All 4 Columns Help

Enter Signal(s) with tree name	Y:				Plot #
\usxr::usxr_hup_00	from		to		1
\usxr::usxr_hup_00+100	from		to		1
\usxr::usxr_hup_00+200	from		to		1
\usxr::usxr_hup_00+300	from		to		1
\usxr::usxr_hup_00+400	from		to		1
\usxr::usxr_hup_00+500	from		to		1

(See the MDSplus Tree Search to find signal names)

Plot Ranges: X: ○ Auto ◉ from 0.2 to 0.34 (sec., points, etc.)

Plot Labels: ◉ From MDSplus ○ Tag Names ○ None

Size of Plot Window: Horizontal: 780 Vertical: 600 (pixels)

Output type: ◉ Plots ○ Listing GO

Plot File: ◉ None ○ Postscript ○ PDF named: plot###### +ext

Output Font: Default

☐ E-mail file to: ☐ maintain aspect ratio

Signal Units Displayed: ○ None ◉ on Y-axis ○ append to Title

Median-Smoothing Neighborhood: (Default: no smoothing)

Layout of Plots: # of rows: # of columns: (Blanks OK)

Color Indices for Lines:

(in IDL style, e.g., [20,40,60,80,100] or findgen(20)*10, or use these)

IDL Color Table for Indices: 34

Styles for Lines: (Help)

Symbols for Points: (Help)

☐ No NSTX Logo on plot ☐ Display values of all X-axes

Optionally enter values 0-0.2 to adjust spacing between plots:

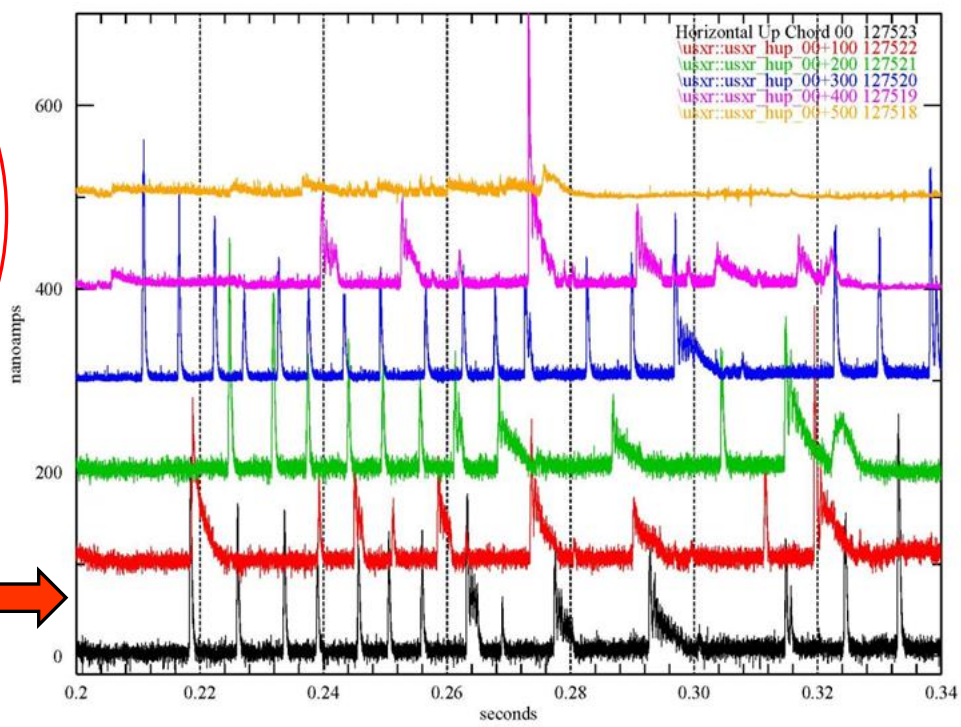
Fraction between columns: 0.08 Fraction between rows: 0.05

Fraction at top of page: 0.06 Fraction at bottom of plot: 0.08

Fraction to right of plots: 0.04 Fraction to left of plots: 0.13

Expert Entry: of plot keywords

e.g., (Click to see examples)



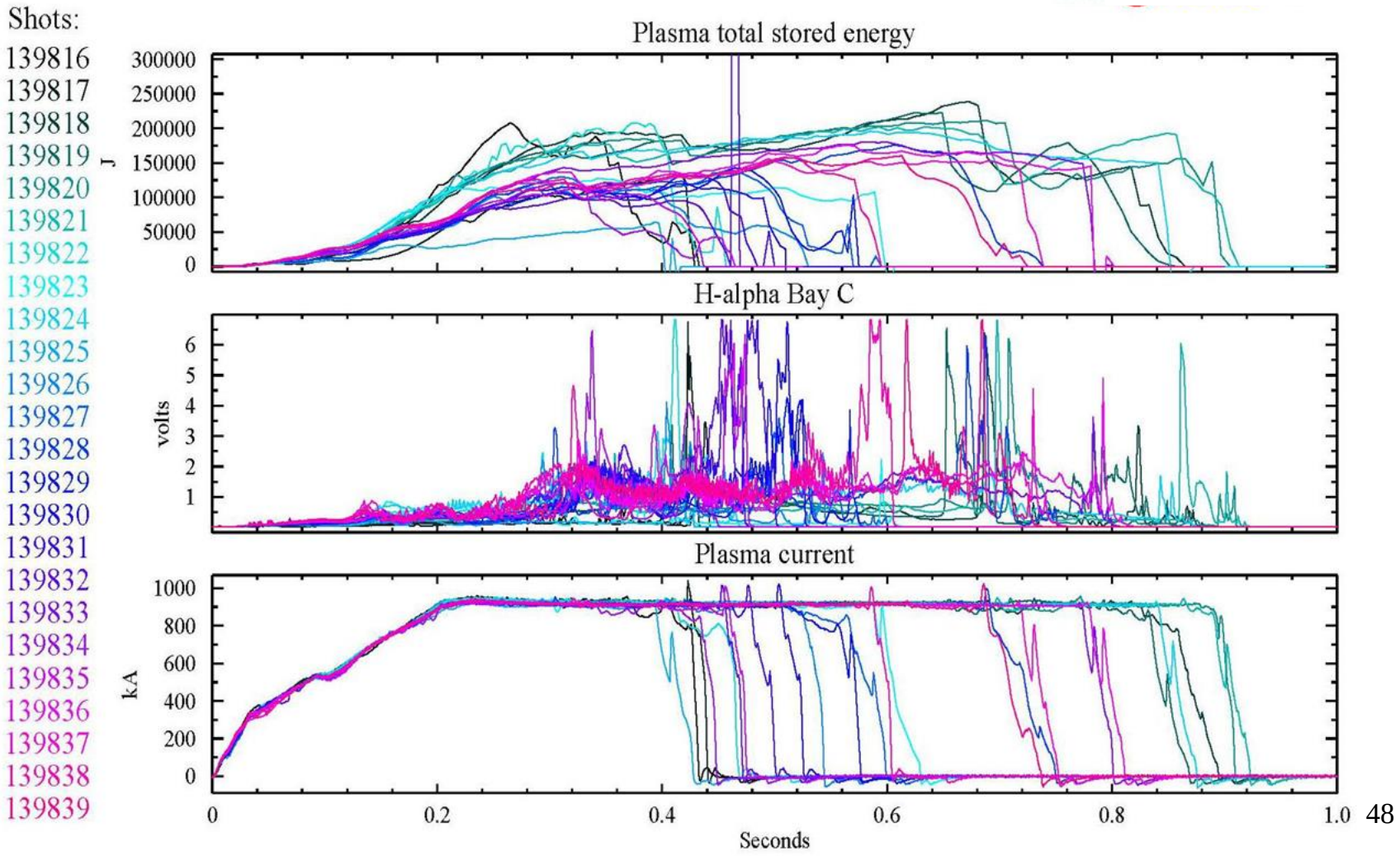
- Can overlay different shots of same signal, different signals of same shot, etc.

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

Web Tools plotting has many options

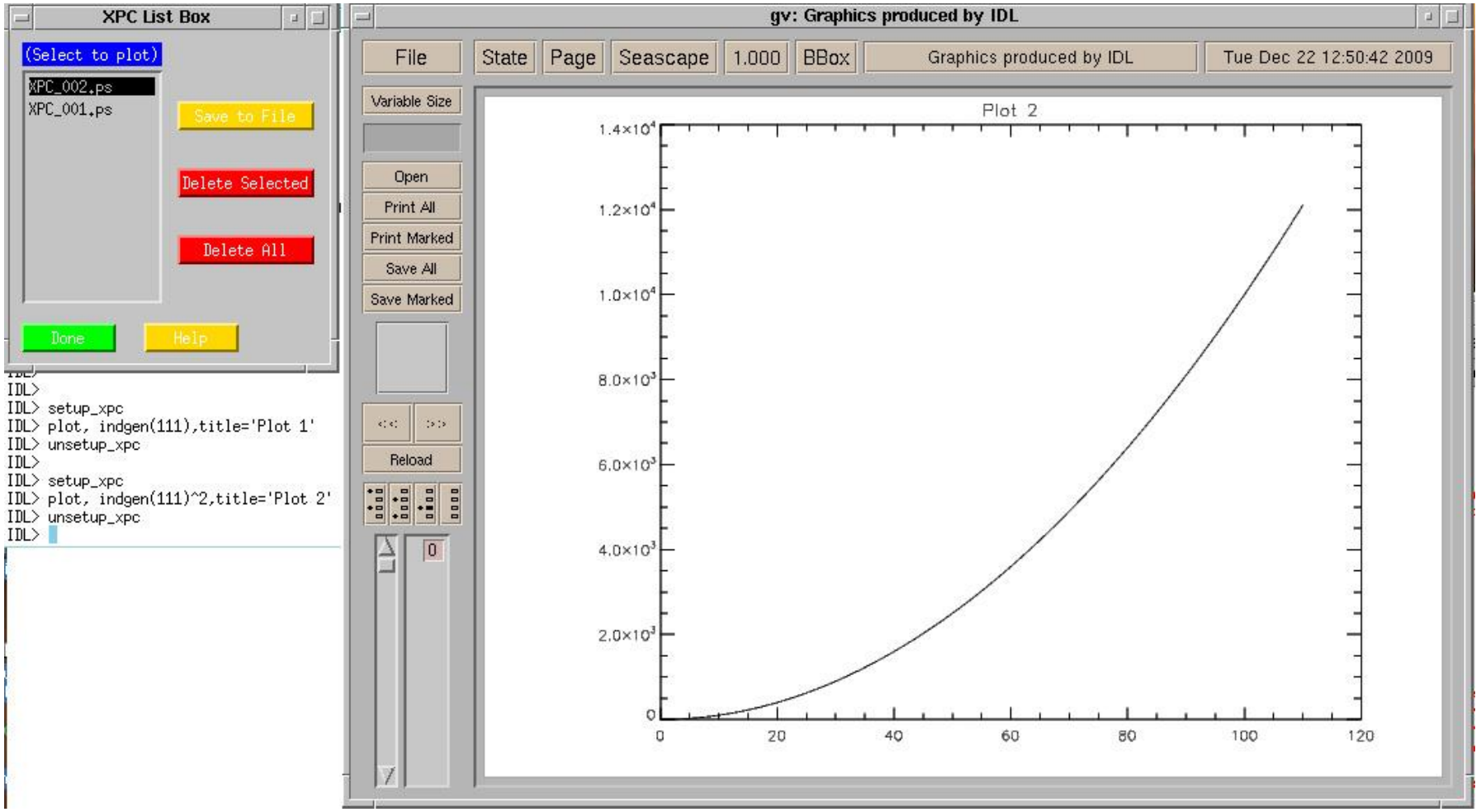
http://nstx.pppl.gov/nstx/Software/WebTools/mdsplotlist.html

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.



PCS

- 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
- EPICS Collaboration mtg presentation (2010) NSTX Computing & Controls