

Building Interactive Web Applications for HEP Using the Google Web Toolkit (GWT)



Scientific Computing Applications

Data Handling Group

SCA Data Handling: Web Apps

- Existing (traditional) web application
 - Initially developed for Fermi starting about 5+ years ago
 - Now being reused for other experiments (e.g. EXO, LSST, CDMS, ...)
- Next generation web applications using Google Web Toolkit (GWT)

Web Applications: Common Features

- Many independent web applications
 - Allows independent development
 - Shared application framework provides
 - authentication, authorization
 - CAS single sign-on
 - page decoration, site-wide menus, style-sheets,
 - Database utilities
 - Cross links, common look and feel, summary pages
 - Single user experience
- Java Server Pages (JSP)
 - Open Source and Custom tag libraries simplify development
 - DisplayTag for tabular data
 - Sorting, filtering, pagination
 - JAIDA tag library for plotting
 - Images generated dynamically on server
- Apache/Tomcat servers
 - Multiple servers for redundancy
 - Monitored using Nagios, JMX
- Data Access Tools
 - Oracle, Partitioning
 - Java Fits Library
 - FreeHEP Root IO library

Existing Web Applications

- Fermi Portal

- EXO Portal

Quick Links Data Processing Data Access Data Monitoring Science Shifts Mission Planning Contact Info Change Control Software Tools

Developer

Fermi LAT Portal

Version: 1.1
User: tonyj . (Switch/Logout)

- Quick Links**
 - Data Processing
 - Ops Log
 - Glast Ground Home
 - LAT Ops Home
 - ISOC Home
 - Downlink Countdown Clock
 - Workbook
- Data Processing**
 - Data Processing
 - Pipeline II
 - FASTCopy Data Monitoring
 - ISOC Reports
 - Data Processing Stats
 - History Processing
- Data Access**
 - Data Catalog
 - Data Portal
- Data Monitoring**
 - Data Quality
 - Run Summary
 - Run Quality
 - Real Time Telemetry
 - Telemetry Trending
 - Telemetry Monitor
 - Log Watcher
 - APIs Stats
 - Cross Trending
 - Reports
- Science**
 - Science Groups
 - Science Analysis Software
 - ASP Data Viewer
 - Burst Advocate Tool
 - Source Catalog
- Shifts**
 - Duty Scientist Checklist
 - Weekly Schedule
 - Sign Up
- Mission Planning**
 - Planning Checklist
 - Web View
 - Config Reports
 - Config Browser
- Contact Info**
 - Operations Experts
 - GRB Advocate
 - AGN Advocate
 - Contact List
 - Visitors
- Change Control**
 - Timescale for Changes
 - Classification of Problems
 - JIRA
 - Escalation Sequence
 - LAT CCB
- Software Tools**
 - Release Manager
 - Code Installer
 - System Tests
 - Speakers Bureau
- Developer**
 - JIRA
 - Confluence
 - CVS
 - Mailing Lists
 - Commons Documentation
 - Package Documentation
 - Login
 - Logout
 - Group Manager
 - Servers Monitoring
 - Nagios
 - Disk Space
 - Hudson
 - Ganglia
 - NetGenesis
 - Resources
 - Maven Projects

Quick Links DAQ/Online Slow Control Logbooks Offline Shifts/Users Status

EXO Portal

User: tonyj . (Switch/Logout) | Version: 1.0-SNAPSHOT | Help
Location: SLAC | WIPP

- Quick Links**
 - EXO Portal
 - Contact List
 - EXO elog
 - EXO Confluence
- WIPP Phone Numbers (Phonebook)**

575-234-8374
575-234-8239
575-234-8253
575-234-8810

575-234-6023 (emergency UG)
575-234-8252 (emergency surface)
Kevin McIlwee U/G office (575) 234-8133 Cell (575) 200-5091
- Points Of Contact (On Shift) (Shift Change Meeting)**

Exo Expert (Swing)	Jesse Wodin
Exo Non-Expert (Swing)	David Auty
Exo RC (Coordinator)	Tim Daniels
- DAQ/Online**
 - DAQ GUI
 - Config Viewer
 - Run History
 - Data Monitoring
 - Trending
 - Online Event Display
 - Data Mover
- WIPP Extension Location**

001	Clean Rooms Modules 1/2
002	Clean Rooms Module 4
003	Wessington Container
004	HFE Tent
005	Clean Room Module 6
006	Gowning Container
007	Underground Office
008	Staging Container
011	All Surface Office Lines
- Control Center Phone Number Control Center Name**

BERN Control Center Line 1	+41-31-631-4605
BERN Control Center Line 2	+41-31-631-4078
SLAC Control Center Line 1	650-926-4810
SLAC Control Center Line 2	650-926-2984
SLAC Control Center Line 3	650-926-8549
- Slow Control**
 - Control channel list
 - Data channel list
 - Download data
 - SNMP channel list
 - Software download
- Logbooks**
 - Daily logbook
 - Maintenance log
 - Shift work list
 - Compressor log
 - Refrigerator log
 - Rn trap log
 - Cold trap log
- Offline**
 - Data Catalog
 - Pipeline
 - Subversion
 - Hudson

- Some applications completely generic
 - Some inherit and extend generic project
- Some applications experiment specific

User/Group Manager

[Quick Links](#) |
 [DAQ/Online](#) |
 [Slow Control](#) |
 [Logbooks](#) |
 [Offline](#) |
 [Shifts/Users](#) |
 [Status](#)



EXO User and Group Manager

User: tonyj . ([Switch](#)|[Logout](#)) | Version: 1.17-SNAPSHOT
 Project: [SRS](#) | [EXO](#) | [LSST](#) | [CDMS](#) | [SCA](#)
 Database: [Prod](#) | [Dev](#)
[User Browser](#) | [Group Browser](#) | [Contact List](#)
[Admin](#)

111 Active EXO Users

(Show Not Active EXO Users)

Name contains

Name	Institution	E-mail	Username
Akimov, Dimitrii	ITEP Moscow	akimov_d@itep.ru	
Auger, Martin	Bern University	martin.tartin@gmail.com	marty
Auty, David	University of Alabama	dauty@bama.ua.edu	djauty
Barbeau, Phil	Stanford University	psbarbea@stanford.edu	psbarbea
Bartoszek, Larry	Stanford University	design@bartoszekeng.com	
Baussan, Eric	Bern University	eric.baussan@unine.ch	baussan
Beauchamp, Eric	Laurentian University	beau7790@gmail.com	beau7790
Belov, Vladimir	ITEP Moscow	belov@itep.ru	vbelov
Benitez-Medina, Julio Cesar	Colorado State University	benitez@lamar.colostate.edu	benitez
Bogart, Joanne	SLAC	jrb@slac.stanford.edu	jrb
Breidenbach, Martin	SLAC	mib@slac.stanford.edu	mib
Burenkov, Alexander	ITEP Moscow	alexander.burenkov@itep.ru	burenkov
Choi, Minkyoo	University of Seoul	minkyoo@uos.ac.kr	
Conley, Robert	SLAC	bobc@slac.stanford.edu	bobc
Cook, Jessica	University of Massachusetts	jlcook@physics.umass.edu	jlcook
Cook, Shon	Colorado State University	shoncook@lamar.colostate.edu	scook
Coppens, Alexander	Carleton University	acoppens@physics.carleton.ca	acoppens
Craddock, Wes	SLAC	wwc@slac.stanford.edu	wwc
Daniels, Tim	University of Massachusetts	tvdaniels@physics.umass.edu	tvdaniel
Danilov, Mikhail	ITEP Moscow	danilov@jaguar.itep.ru	
Davis, Clayton	Maryland University	claytongdavis@gmail.com	cgd8d
Davis, Jon	Stanford University	jondavis@stanford.edu	
DeVoe, Ralph	Stanford University	rgdevoe@stanford.edu	rgdevoe
Dobi, Attia	Maryland University	adobi@umd.edu	adobi
Dolgolenko, Anatolii	ITEP Moscow	dolgolenko@itep.ru	
Dolinski, Michelle	Stanford University	dolinski@stanford.edu	dolinski
Espic, Luc	University de Yverdon		
EXO Data Account, EXO Data Account		exodata@slac.stanford.edu	exodata
Fairbank, William	Colorado State University	fairbank@lamar.colostate.edu	fairbank
Farine, Jaques	Laurentian University	farine@snolab.ca	farine
Fierlinger, Peter	Munich Tech U	Peter.fierlinger@ph.tum.de	fierli
Franco, Domenico	Bern University	domenico.franco@hlep.unibe.ch	nico
Freytag, Dietrich	SLAC	drf@slac.stanford.edu	drf
Giroux, Guillaume	Bern University	guillaume.giroux@hlep.unibe.ch	ggiroux

[Quick Links](#) |
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 [Logbooks](#) |
 [Offline](#) |
 [Shifts/Users](#) |
 [Status](#)



EXO User and Group Manager

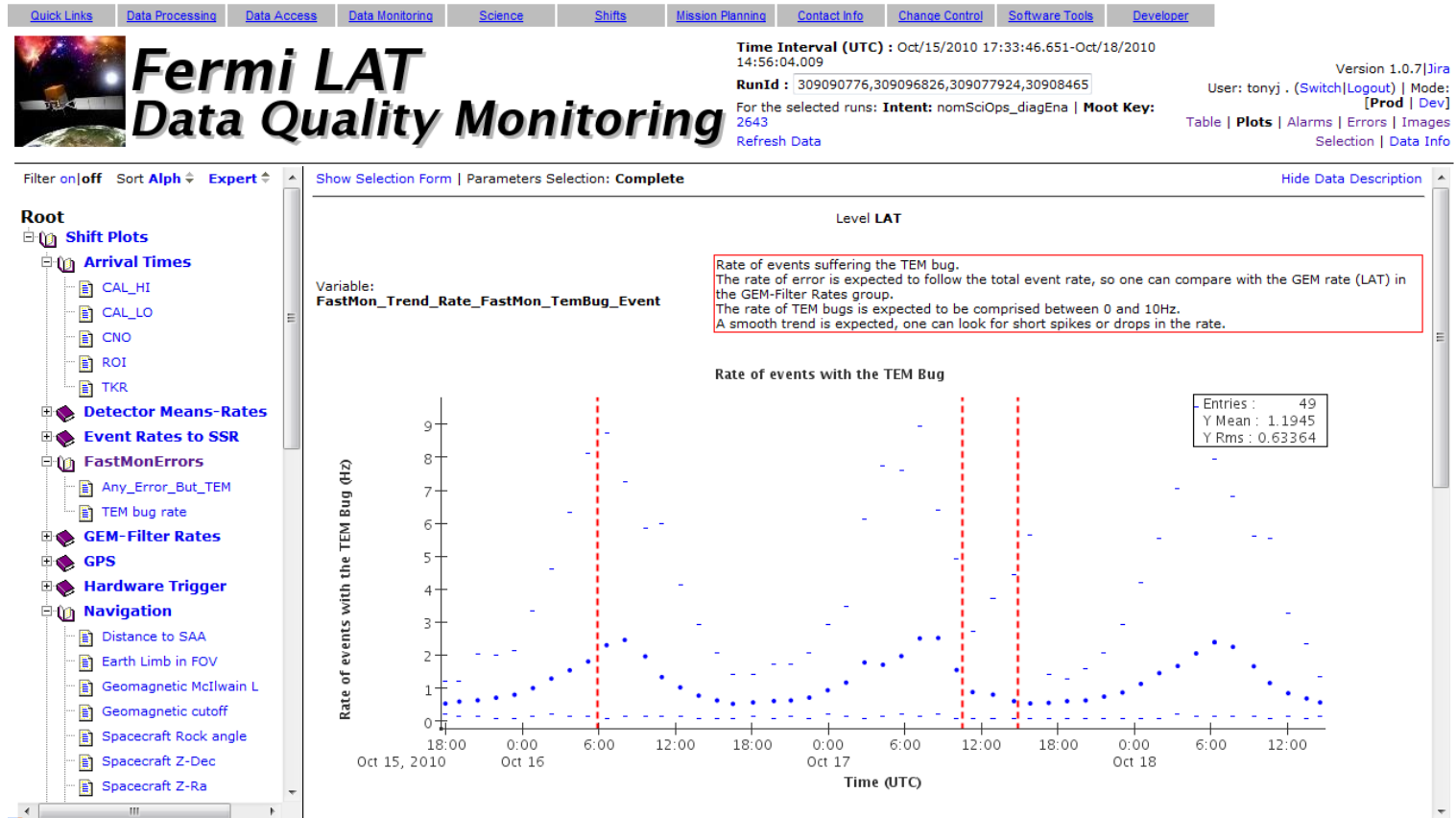
Groups

Add Group Name:

Group contains

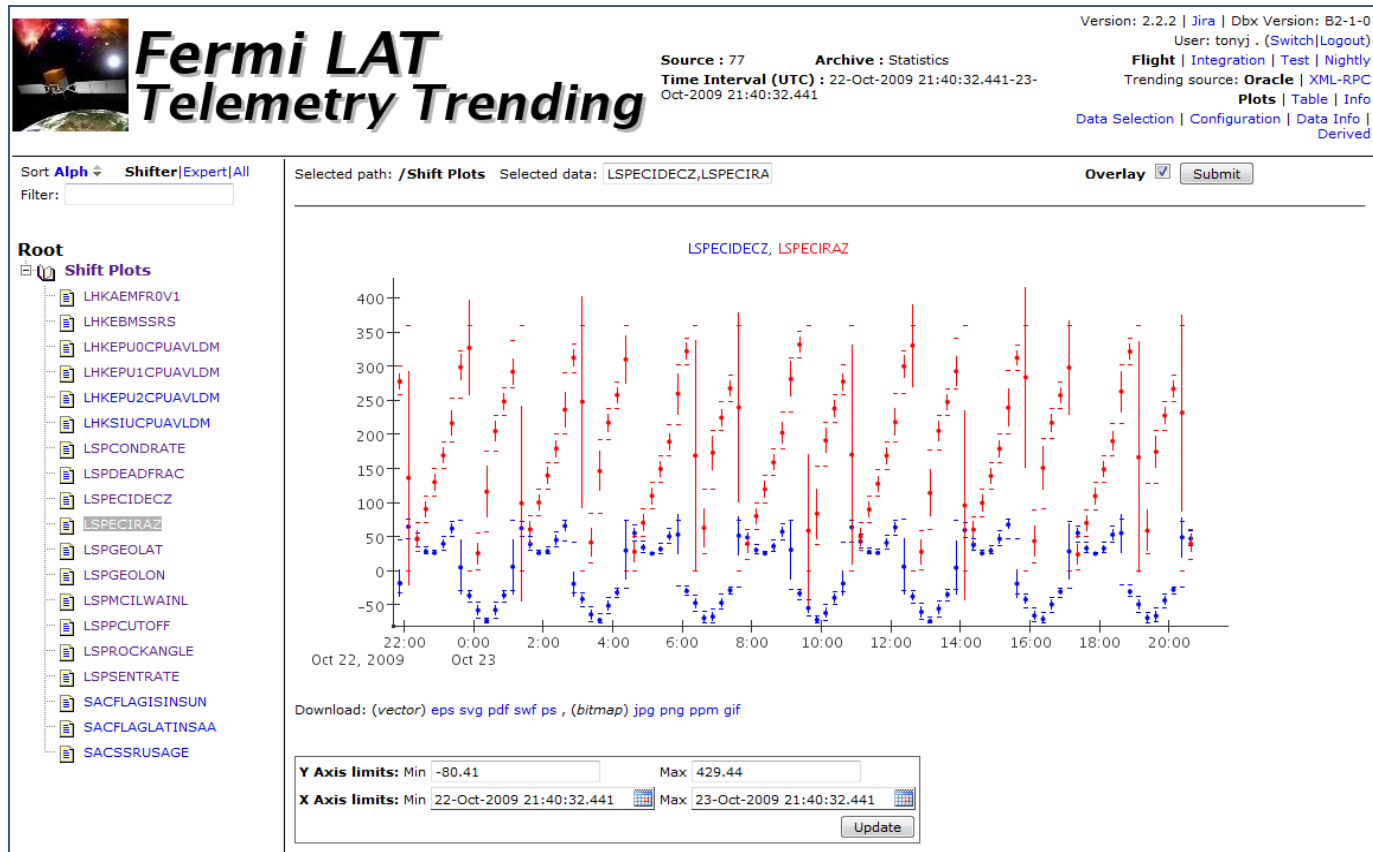
Group	Manager Group	Users	Sub-groups	Links
DaqConfigAdmin	GroupManagerAdmin	0	1	Del
DaqControl	GroupManagerAdmin	0	1	Del
DataCatalogAdmin	PipelineAdmin	1	1	Del
ExoDataMonitoringAdmin	GroupManagerAdmin	2	0	Del
ExoOwl	ShiftOther	69	0	Del
ExoRC	ShifterAdmin	10	0	Del
ExoShiftStats	ShifterAdmin	0	0	Del
ExoUsers	GroupManagerAdmin	109	0	Del
GroupManagerAdmin	GroupManagerAdmin	5	0	Del
ImageHandlerAdmin	GroupManagerAdmin	1	0	Del
NewUserEmailNotification	GroupManagerAdmin	5	0	Del
PipelineAdmin	PipelineAdminManager	17	0	Del
PipelineAdminManager	GroupManagerAdmin	1	0	Del
PortalAdmin	GroupManagerAdmin	3	0	Del
ShifterAdmin	GroupManagerAdmin	3	0	Del
ShiftExpert	ShifterAdmin	25	0	Del
ShiftNonExpert	ShifterAdmin	76	1	Del
ShiftOther	ShifterAdmin	76	0	Del
SundayShifts	ShifterAdmin	66	0	Del
SwissOwl	ShifterAdmin	16	0	Del
SystemTestsAdmin	GroupManagerAdmin	2	0	Del
Trainee	ShifterAdmin	94	0	Del
TrendingAdmin	GroupManagerAdmin	2	0	Del
UserAdmin	GroupManagerAdmin	6	0	Del

Data Quality Monitoring



- Web interface allows
 - Show data from single run or aggregate set of runs
 - View description of each plot
 - View/Print multiple plots
 - Customized tree to draw attention to important plots
 - Can be customized for individuals or groups

Telemetry Trending



- Web interface allows
 - Dynamic selection of time period
 - Dynamic overlay of quantities
 - Customized tree to draw attention to important plots
 - Can be customized for individuals or groups
- Cross trending of housekeeping and level 1 data

Pipeline/Data Catalog

Quick Links | Data Processing | Data Access | Data Monitoring | Science | Shifts | Mission Planning | Contact Info | Change Control

Software Tools | Developer



Version 2.8.3 | Jira (Front-End) (Server) | Help

Page updated: 10/18/2010 16:23:05

Start refreshing page every 60 secs [Start Refreshing](#)

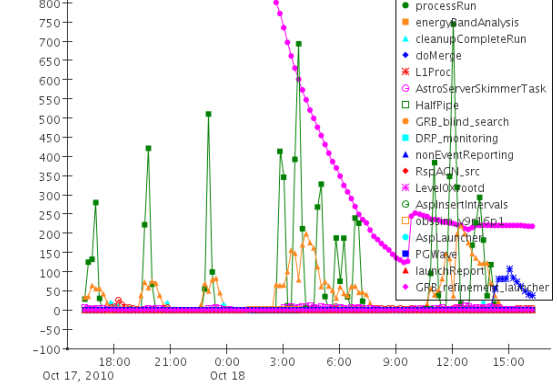
Login Mode: [**Prod** | Dev | Test]

[Task List](#) . [Message Viewer](#) . [Usage Plots](#) . [Fair Share Plot](#) . [Admin](#) . [JMX](#)

Task Summary

Task Filter: Regular Expression (?) Active in Last 30 days Latest Task Versions [Filter](#) [Reset Defaults](#)

Last Active	Task Name	Type	0	1	2	3	4	5	6	7	8	9	Total
2010-10-18 16:20	L1Proc	Data	0	0	1	404	2	0	0	0	0	0	407
2010-10-18 16:19	RspAGN_src	Data	0	0	3	11165	253	0	1	0	0	0	11422
2010-10-18 16:16	Level0Xroot	Data	0	0	0	630	6	0	0	0	0	0	636
2010-10-18 16:15	SkimmerTaskParallel	SKIM	0	0	2	861	86	0	2	0	0	0	951
2010-10-18 15:58	P116-FT1	Data	0	0	218	11625	1	0	0	0	0	0	11844
2010-10-18 15:14	rspmq7day	DATA	0	0	0	21	0	0	0	0	0	0	21
2010-10-18 14:40	GRB_blind_search	Data	0	0	0	316	0	0	0	0	0	0	316
2010-10-18 14:40	GRB_refinement_launcher	Data	0	0	0	588	5	0	0	0	0	0	588
2010-10-18 14:38	AspInsertIntervals	Data	0	0	0	273	44	0	0	0	0	0	317
2010-10-18 14:34	AstroServerSkimmerTask	SKIM	0	0	0	957	128	0	0	0	0	0	1085
2010-10-18 13:55	DRP_monitoring	Data	0	0	0	165	0	0	0	0	0	0	165
2010-10-18 13:25	PGWave	Data	0	0	0	165	0	0	0	0	0	0	165
2010-10-18 13:20	AspLauncher	Data	0	0	0	295	3	0	0	0	0	0	298
2010-10-18 12:55	HalfPipe	Data	0	0	0	6784	2	0	0	0	0	0	6786
2010-10-18 12:16	nonEventReporting	Data	0	0	0	34844	3315	0	4	0	0	0	38163
2010-10-18 09:25	launchReport	Data	0	0	0	941	0	0	0	0	0	0	941
2010-10-18 04:01	obssim_v9r16p1	MC	0	0	0	86	109	0	0	0	0	0	195
2010-10-18 00:00	GRB_refinement_launcher	Data	0	0	0	0	0	0	0	0	0	0	37



Quick Links | Data Processing | Data Access | Data Monitoring | Science | Shifts | Mission Planning | Contact Info

Change Control | Software Tools | Developer



Version 2.8.3 | Jira (Front-End) (Server) | Help

Page updated: 10/18/2010 16:31:42

Start refreshing page every 60 secs [Start Refreshing](#)

User: tonyj . (Switch|Logout) Mode: [**Prod** | Dev | Test] Preferences

[Task List](#) . [Message Viewer](#) . [Usage Plots](#) . [Fair Share Plot](#) . [Admin](#) . [JMX](#)

Task L1Proc Stream 100917001

[Rollback Stream](#)

Stream 100917001

Execution 1

Is Latest 1

Status Failed

Submitted 16-Sep-2010 17:49:20.335

Started 16-Sep-2010 17:49:34.071

Ended 16-Sep-2010 21:46:21.016

Variables

Name	Type	Value
DOWNLINK_ID	Integer	100917001
DOWNLINK_RAWDIR	String	/afs/slac/g/glast/ground/PipelineStaging6/halfPipe/100917001

Stream Processes

Show only latest execution

Process	Status	Type	Created	Submitted	Started	Ended	Job Id	CPU	Host	Links
findRunDirs	Success	Batch	16-Sep-2010 17:49:20	16-Sep-2010 17:49:23	16-Sep-2010 17:49:29	16-Sep-2010 17:49:38	961916	0	hequ0019	Messages : Log : Files
cleanupDI	Skipped	Batch	16-Sep-2010 17:49:20			16-Sep-2010 18:36:32				Messages
kludgeAsp	Success	Batch	16-Sep-2010 17:49:20	16-Sep-2010 19:32:08	16-Sep-2010 19:32:12	16-Sep-2010 19:33:58	976707	5	fell0182	Messages : Log : Files

[Select all](#) . [Deselect all](#) . [Toggle selection](#) [Rollback Selected](#)

- Pipeline web interface allows
 - Many views of data processing, down to log files of individual jobs
 - If jobs do fail they can be “rolled back” directly from the web interface

Future Goals

- Desire to provide more interactivity by exploiting
 - Higher quality, more interactive web based GUI's
 - Asynchronous (AJAX) functionality
 - Support upcoming HTML5 functionality
 - 2D, 3D Canvas
 - Local storage, “offline” web applications
 - Web workers, push technology
- In particular we have been exploring use of Google Web Toolkit (GWT) for building web applications



What is Google Web Toolkit

- Toolkit for writing “web 2.0” applications
 - Built in support for rich set of “widgets” (-> GWT Widget Gallery)
 - Wide range of GUI functionality
 - Resolution independent layout managers
 - Full control over browser resize behavior
 - Popup and pulldown menus
 - Drag and Drop
 - ...
 - Retains best of web features
 - Works with the web browser instead of fighting against it
 - (c.f. Embedded flash or Java Applets)
 - Embed HTML
 - Use CSS for look and feel (clean model-view-controller architecture)
 - Transparent support for different browsers
 - IE, Firefox, Chrome, Safari, Opera, iPhone, Android
 - Client and Server side code written in a single language (Java)
 - Same code can run in browser and on server
 - Objects can be transferred from server to client transparently
 - Serialize Java object and recompose it as equivalent JavaScript object or vice-versa
 - Completely transparent
 - Java compiled to JavaScript to run in browser

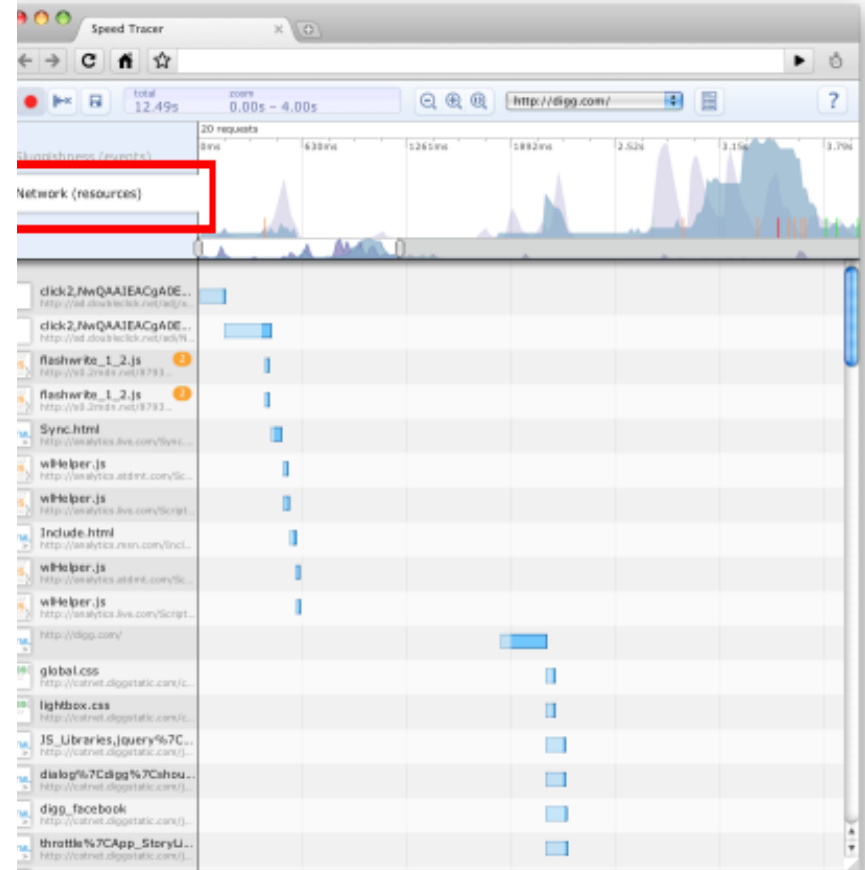
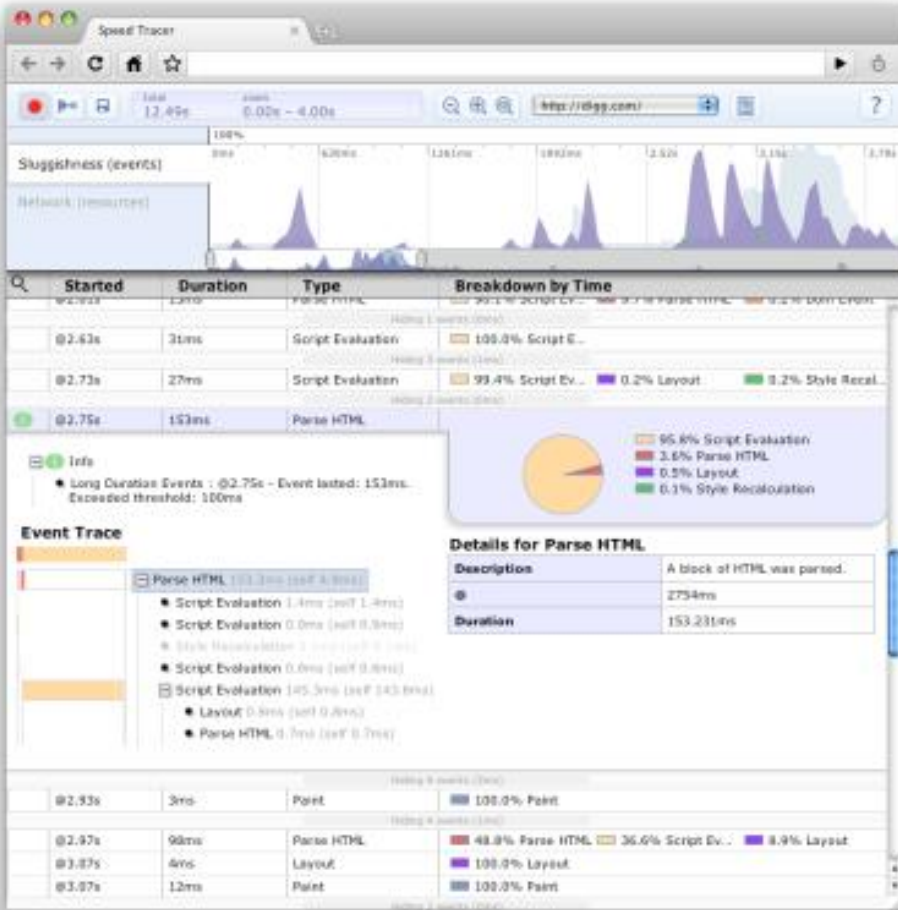
More on Java->JavaScript compiler

- Initial reaction “Yeah right, that’s really going to work well”
 - Actually it does – really well
 - Maybe because it was written by a compiler expert (not a physicist)
 - It not only **compiles** the code
 - It optimizes the Java
 - Type Tightening
 - Converting non-overridden methods to static
 - Finalizing
 - Pruning and Dead Code Elimination
 - Method Call Inlining
 - Then it optimizes the generated JavaScript code
 - Static Evaluation (DCE, but on JS AST)
 - Method Inliner
 - Unused Function Remover
 - Code Splitting
 - Clusters, Obfuscates and Compresses
 - Continually being improved
 - Better performance than handwritten JavaScript code
 - JavaScript XML parser, converted to Java and then compiled back to JavaScript gave 2x speed improvement

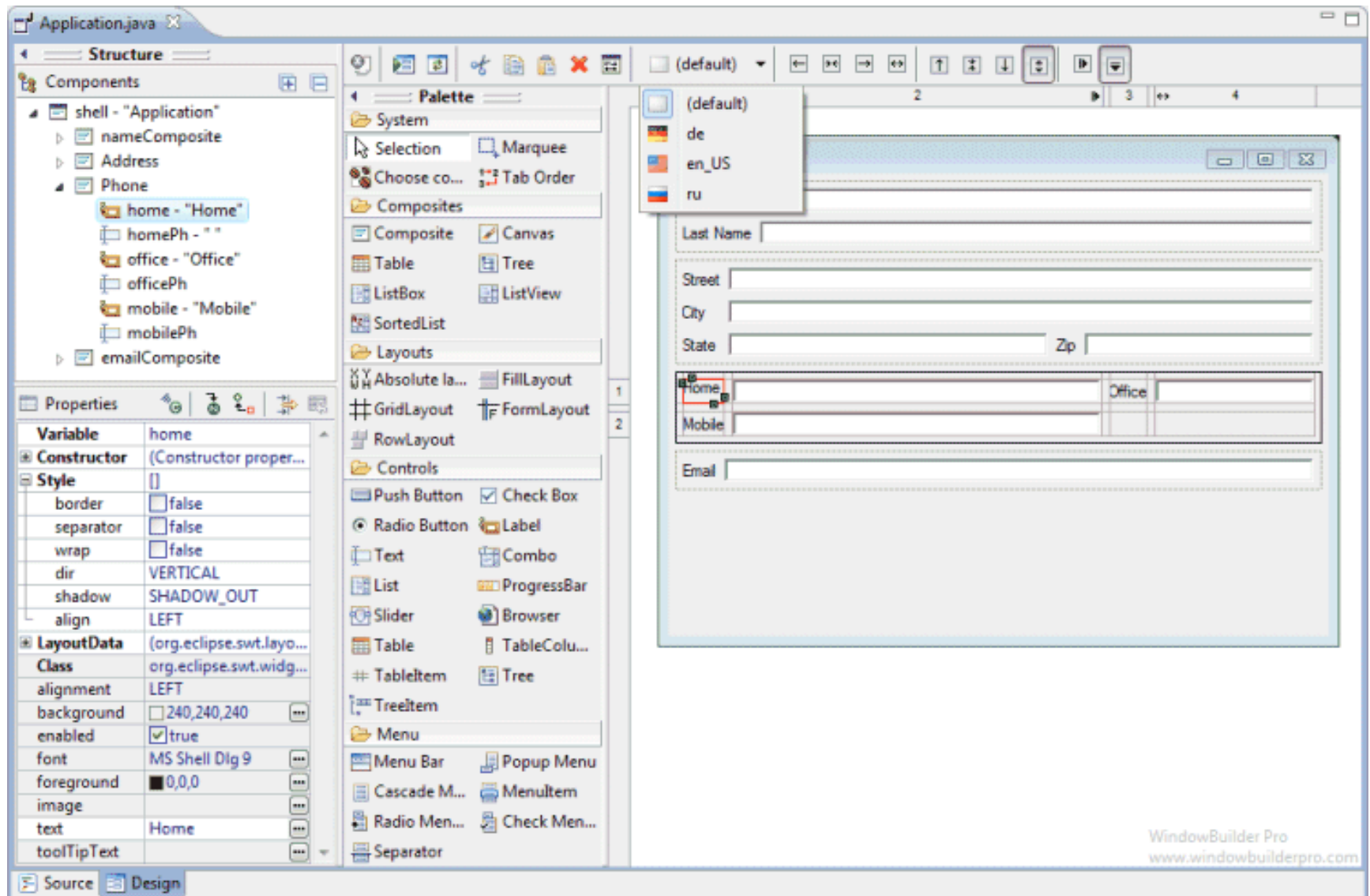
Why GWT

- Open source toolkit, active open-source community
 - Many third-party add-ons
- Good support from Google
 - Being used for Google's own applications
 - E.g. Google Wave (now cancelled ☹), others
 - Actively promoted as toolkit for use by others
 - Major track at google-IO (google developers conference) for last two years
- Keep investment in existing Java code and expertise
- Ability to use all existing Java tooling
 - Full IDE support: Eclipse, Netbeans, Idea ...
 - Editing, code completion and inline documentation viewing, refactoring, build tools
 - Project management (maven: good GWT support built-in)
 - Debug client and server code directly in Java IDE using GWT "Hosted Mode"
 - Changes to client code immediately reflected in browser
- New GWT specific tools:

SpeedTracer



GWT Designer



EXO DAQ GUI

- Fully distributed control of DAQ for EXO experiment

Standard JSP

GWT

EXO DAQ GUI

www.exo200.org/ExoDaqGuiGwt/?ignoreIpBasedRedirect=true

Quick Links DAQ Monitoring Tools Operations Documentation

Switched Xenon Observatory
EXO DAQ GUI

Version: 1.4-SNAPSHOT . Help
Location: SLAC | WIPP
DAQ Mode: [prod | dev] | User: tonyj . (Switch|Logout)

Run Control High Voltage

Current WIPP time: October 18, 2010 3:50:31 AM MDT
Ready

Run Options

Run Type: Data-Physics
Physics triggers: APD individual gas test
High voltage: TPC Gas Test High Voltage
Hardware: Enable all
Software: Maximal suppression
Comment: APD pies 1, 2, 3, 4, 5 bi
 Log data to disk
Reset

Run Status

Run state: run active
Run type: Data-Physics
Run: 402
Run start: October 16, 2010 11:47:58 AM MDT
Run started by: lianggy
Run ended by:
Triggers: 53,042
Events: 0
Exposure: 1d 16h 02m 16s
Dropped: 11,577

Run Control

Begin Pause Resume End Reset Ramp HV

Messages

October 18, 2010 3:46:26 AM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-019.dat
October 18, 2010 1:34:29 AM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-018.dat
October 17, 2010 11:29:17 PM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-017.dat
October 17, 2010 9:09:26 PM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-016.dat
October 17, 2010 6:31:49 PM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-015.dat
October 17, 2010 4:25:31 PM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-014.dat
October 17, 2010 2:27:06 PM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-013.dat
October 16, 2010 11:46:04 AM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-012.dat
October 17, 2010 8:29:58 AM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-011.dat
October 17, 2010 5:10:33 AM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-010.dat
October 17, 2010 2:14:39 AM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-009.dat
October 16, 2010 11:04:37 PM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-008.dat
October 16, 2010 8:43:21 PM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-007.dat
October 16, 2010 7:31:11 PM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-006.dat
October 16, 2010 6:34:59 PM MDT EDP-S-NEWFILE opening new output file /raid/dat1/run00000402-005.dat

More messages

- Ability to mix GWT into existing framework
 - Keep full resize behavior
- Fully distributed application
 - All state maintained on server
 - Multiple simultaneous browsers supported
 - Page updates in real time
- Compatible with all major browsers
 - Including Android, iPhone

EXO DAQ GUI

Animated dialogs

Confirm begin

Run Type: Data-Physics

Physics triggers: APD sum

High voltage: All off

Hardware: Enable all

Software: Maximal suppression

Comment: Test run

Log data to disk

OK Cancel

Confirm begin-with-ramp

Warning: Starting this run will result in HV being ramped.

OK Cancel

HV ramp in progress...

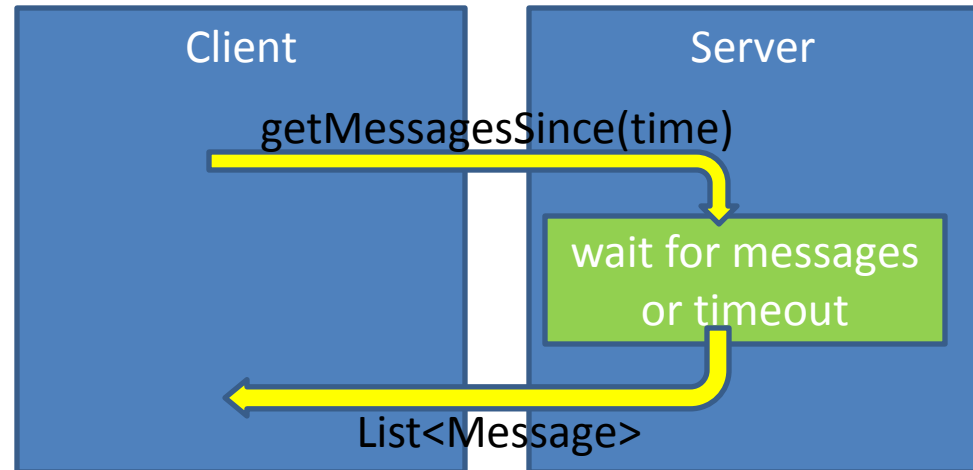
North HV FEC board supply voltage (ADC read back)	11.755	South HV FEC board supply voltage (ADC read back)	◆
North induction plane voltage (DAC set point)	-108.766	South induction plane voltage (DAC set point)	◆
North APD bias plane voltage (DAC set point)	-21.485	South APD bias plane voltage (DAC set point)	◆
North APD 0 trim voltage (DAC set point)	9.999	South APD 0 trim voltage (DAC set point)	◆
North APD 1 trim voltage (DAC set point)	20.000	South APD 1 trim voltage (DAC set point)	◆
North APD 2 trim voltage (DAC set point)	21.988	South APD 2 trim voltage (DAC set point)	◆
North APD 3 trim voltage (DAC set point)	21.988	South APD 3 trim voltage (DAC set point)	◆
North APD 4 trim voltage (DAC set point)	21.988	South APD 4 trim voltage (DAC set point)	◆
North APD 5 trim voltage (DAC set point)	21.988	South APD 5 trim voltage (DAC set point)	◆
North induction plane voltage (ADC read back)	-140.000	South induction plane voltage (ADC read back)	◆
North APD bias plane voltage (ADC read back)	-53.500	South APD bias plane voltage (ADC read back)	◆
North APD 0 trim voltage (A side) (ADC read back)	92.550	South APD 0 trim voltage (A side) (ADC read back)	◆
North APD 0 trim voltage (B side) (ADC read back)	93.100	South APD 0 trim voltage (B side) (ADC read back)	◆
North APD 1 trim voltage (A side) (ADC read back)	82.225	South APD 1 trim voltage (A side) (ADC read back)	◆
North APD 1 trim voltage (B side) (ADC read back)	85.175	South APD 1 trim voltage (B side) (ADC read back)	◆
North APD 2 trim voltage (A side) (ADC read back)	80.350	South APD 2 trim voltage (A side) (ADC read back)	◆
North APD 2 trim voltage (B side) (ADC read back)	84.625	South APD 2 trim voltage (B side) (ADC read back)	◆
North APD 3 trim voltage (A side) (ADC read back)	80.450	South APD 3 trim voltage (A side) (ADC read back)	◆
North APD 3 trim voltage (B side) (ADC read back)	84.100	South APD 3 trim voltage (B side) (ADC read back)	◆
North APD 4 trim voltage (A side) (ADC read back)	80.650	South APD 4 trim voltage (A side) (ADC read back)	◆
North APD 4 trim voltage (B side) (ADC read back)	85.000	South APD 4 trim voltage (B side) (ADC read back)	◆
North APD 5 trim voltage (A side) (ADC read back)	80.000	South APD 5 trim voltage (A side) (ADC read back)	◆
North APD 5 trim voltage (B side) (ADC read back)	83.925	South APD 5 trim voltage (B side) (ADC read back)	◆
North induction plane current	.000	South induction plane current	◆
North APD bias plane current	.000	South APD bias plane current	◆
North APD 0 trim current	.000	South APD 0 trim current	◆
North APD 1 trim current	.000	South APD 1 trim current	◆
North APD 2 trim current	.000	South APD 2 trim current	◆
North APD 3 trim current	.000	South APD 3 trim current	◆
North APD 4 trim current	.000	South APD 4 trim current	◆
North APD 5 trim current	.000	South APD 5 trim current	◆

Cancel Ramp

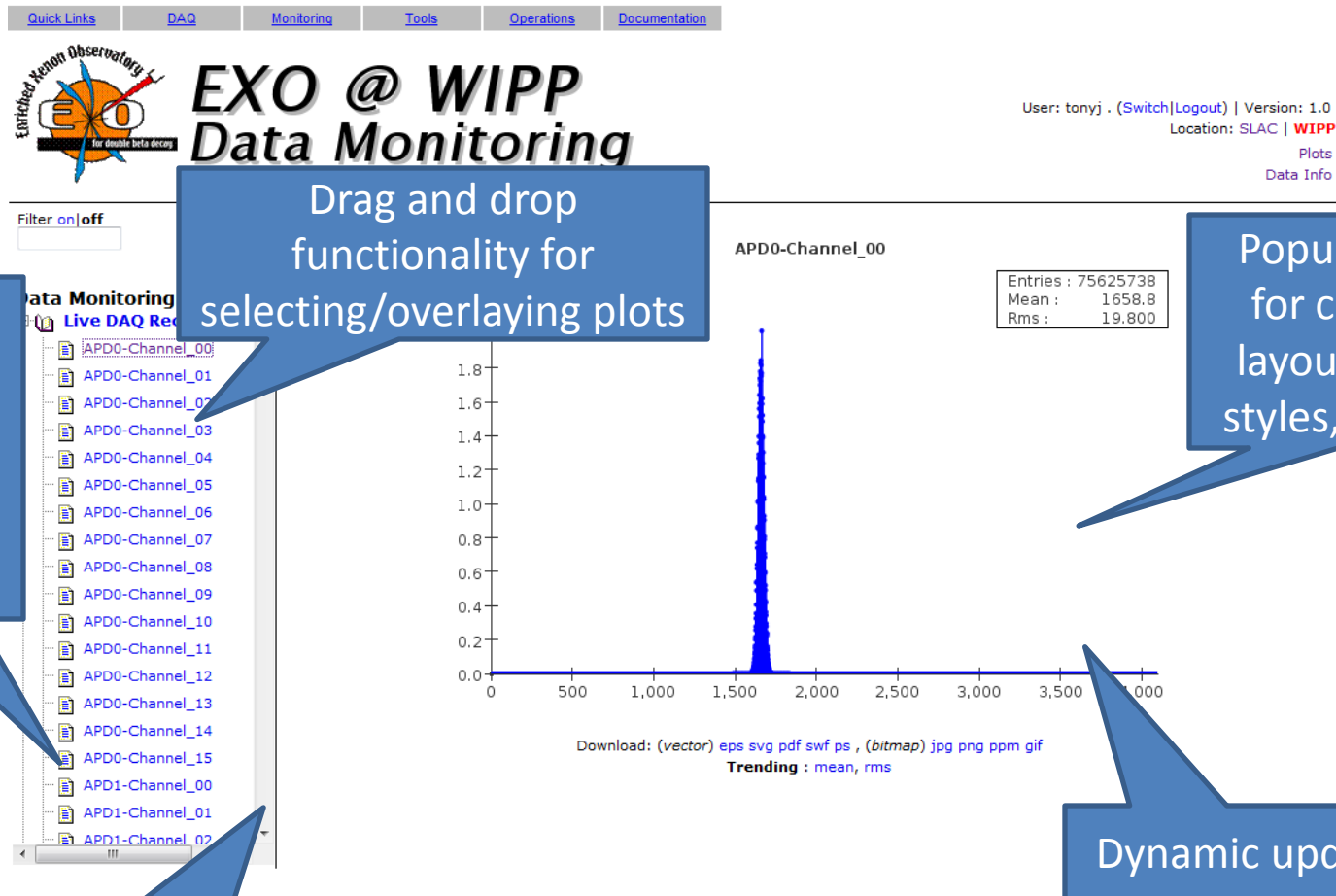
In production for several months

(Aside) Fetching Updates from Server

- Currently notification of events from server to client is a hack
 - Only client initiated communication possible
 - Client has to poll
 - Modified poll with server wait (Comet)
 - Doesn't scale to large number of clients
- HTML5 will make this much easier
 - http extensions to support
 - server-sent events (SSE)
 - Scalable
 - Reliable



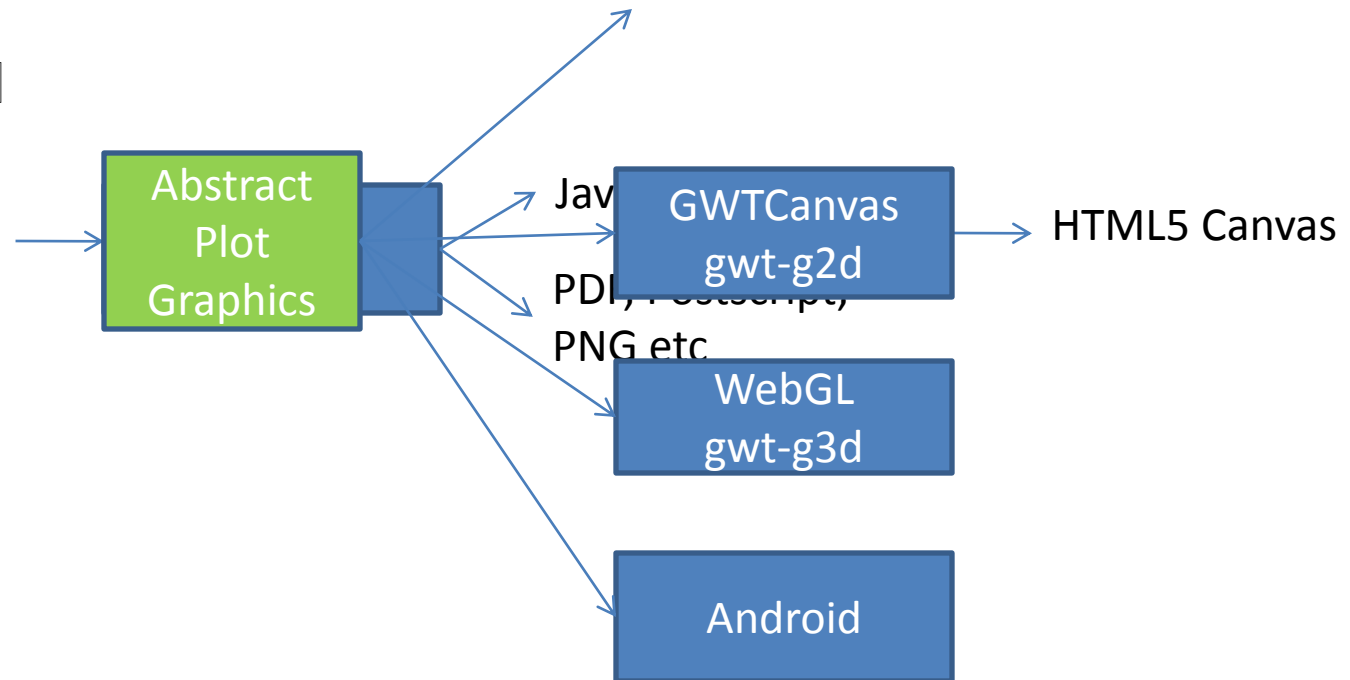
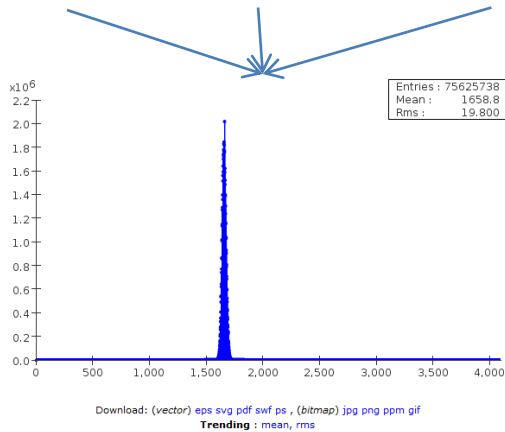
Improving online monitoring



- Plan to have this released by November
- Plotting will still be done on server, but...

Next Generation Plotter

Root Database Network



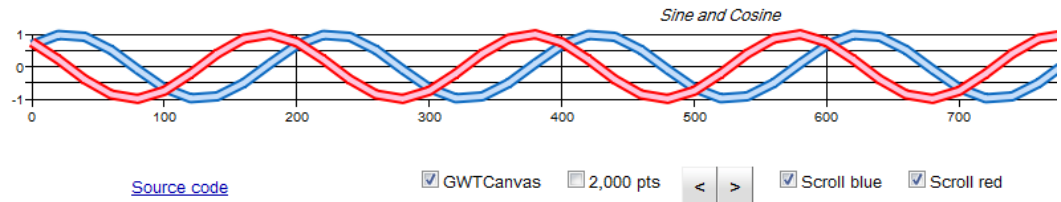
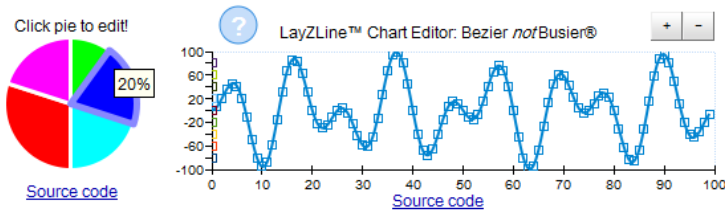
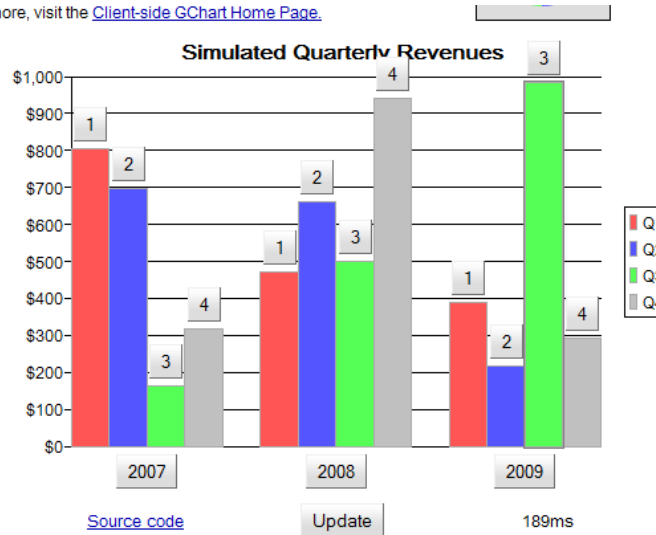
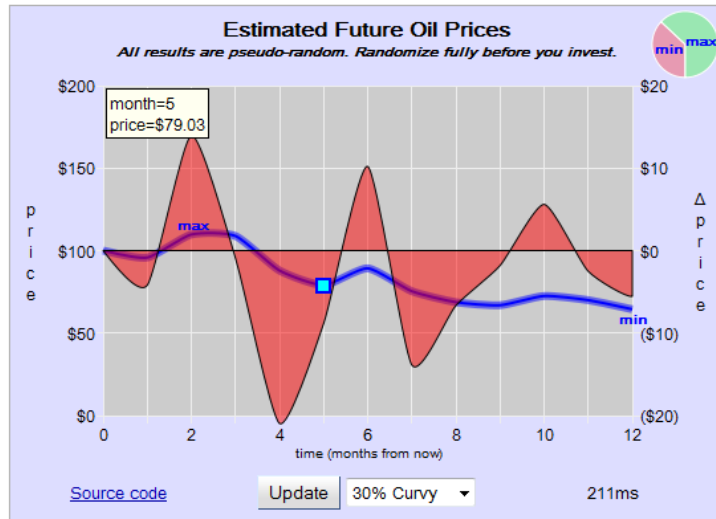
- Will give option of displaying plots directly in browser
 - More interactivity, smoother updates
 - Applicability may depend on overhead of transferring data

GWT issues

- GWT still developing rapidly
 - Many “old” deprecated features
 - <100% of Java JDK library available
 - In particular graphics
- Many important features not part of core library
 - Drag and drop
 - Popup menus
 - Canvas
 - Advanced widgets
- Cross-browser support very good
 - Not quite perfect, still need to test on different browsers
- HTML5 features (e.g. canvas) still being developed
 - Probably too early to be using these in production
- Long-term support?

Plotting using GWT+Canvas

The [Chart Gallery](#) has simpler examples more helpful to new users. For downloads, javadocs, and more, visit the [Client-side GChart Home Page](#).



See the [source code that assembles this page for the boilerplate](#) required to plug GChart into the [GWTCanvas](#) vector graphics library with [Catmull-Rom](#) splines.

Conclusions

- The advent of AJAX and HTML5 makes it possible to create dynamic, interactive web applications without requiring any third-party browser add ons
 - GWT is a toolkit which simplifies development of such web applications
 - Initial tests show that development is reasonably straightforward
 - We will use several GWT applications for EXO experiment and expect to use it more in future
 - Use of HTML5 features to improve plotting in future looks hopeful
 - Anyone interested in collaborating, warning us off?
 - GWT is successful enough that it is influencing other toolkits
 - Pyjamas – GWT “port” for python
 - Oracle: JavaFX – will compile to JavaScript in future (2012)
 - Many others...