



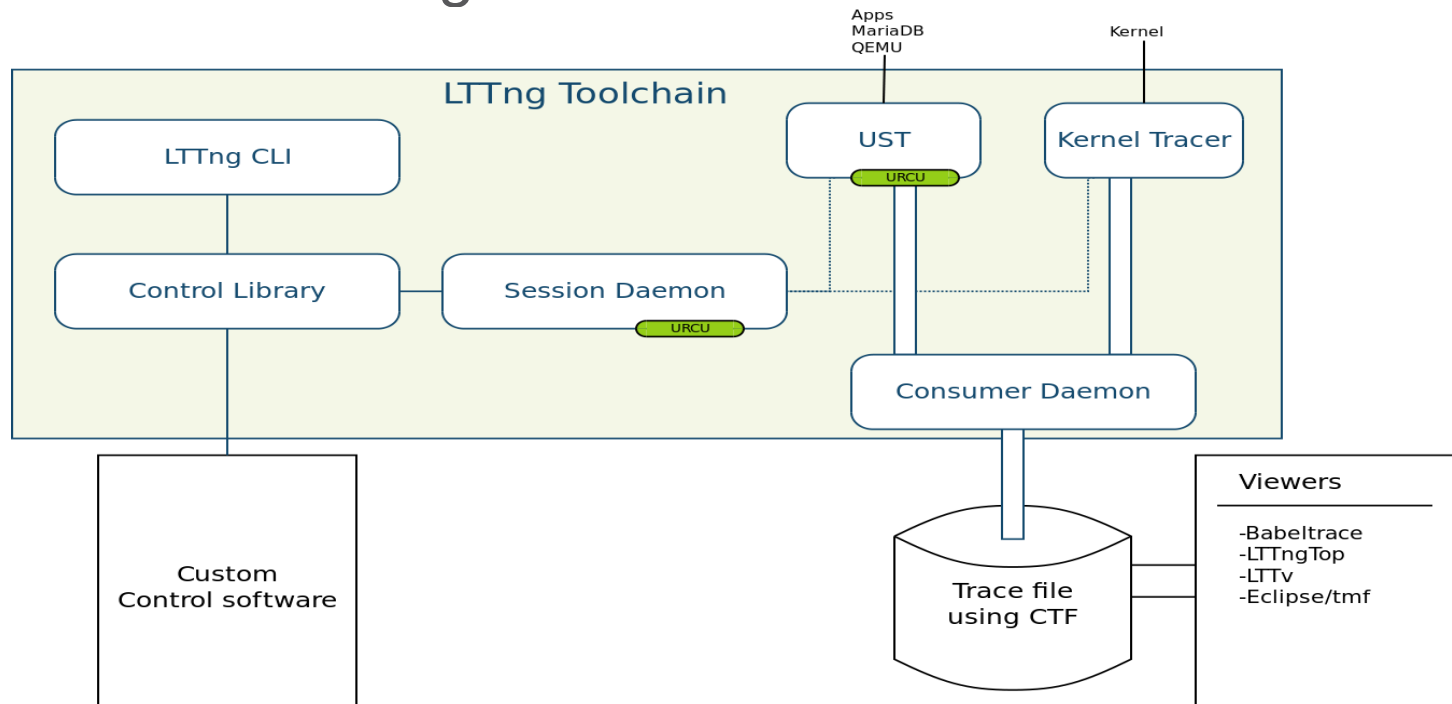
Tracing

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LTTng distinctive features

- › Multi-session support with per host or per user daemon
- › Algorithms based on RCU verified by model checking
- › Designed to meet real-time constraints
- › Supports live streaming of the trace data



Common Trace Format

- Ericsson and Linux Foundation CE Linux Workgroup



- Reviewed by Linux kernel developers and SystemTAP communities

- In collaboration with
Multi-Core Association Tool Infrastructure Workgroup

Freescale, Mentor Graphics, IBM, IMEC, National Instruments, Nokia Siemens Networks, Samsung, Texas Instruments, Tiler, Wind River, University of Houston, Polytechnique Montréal, University of Utah, ...



- Requirement, specification, reference implementation <http://www.ufficios.com/ctf>

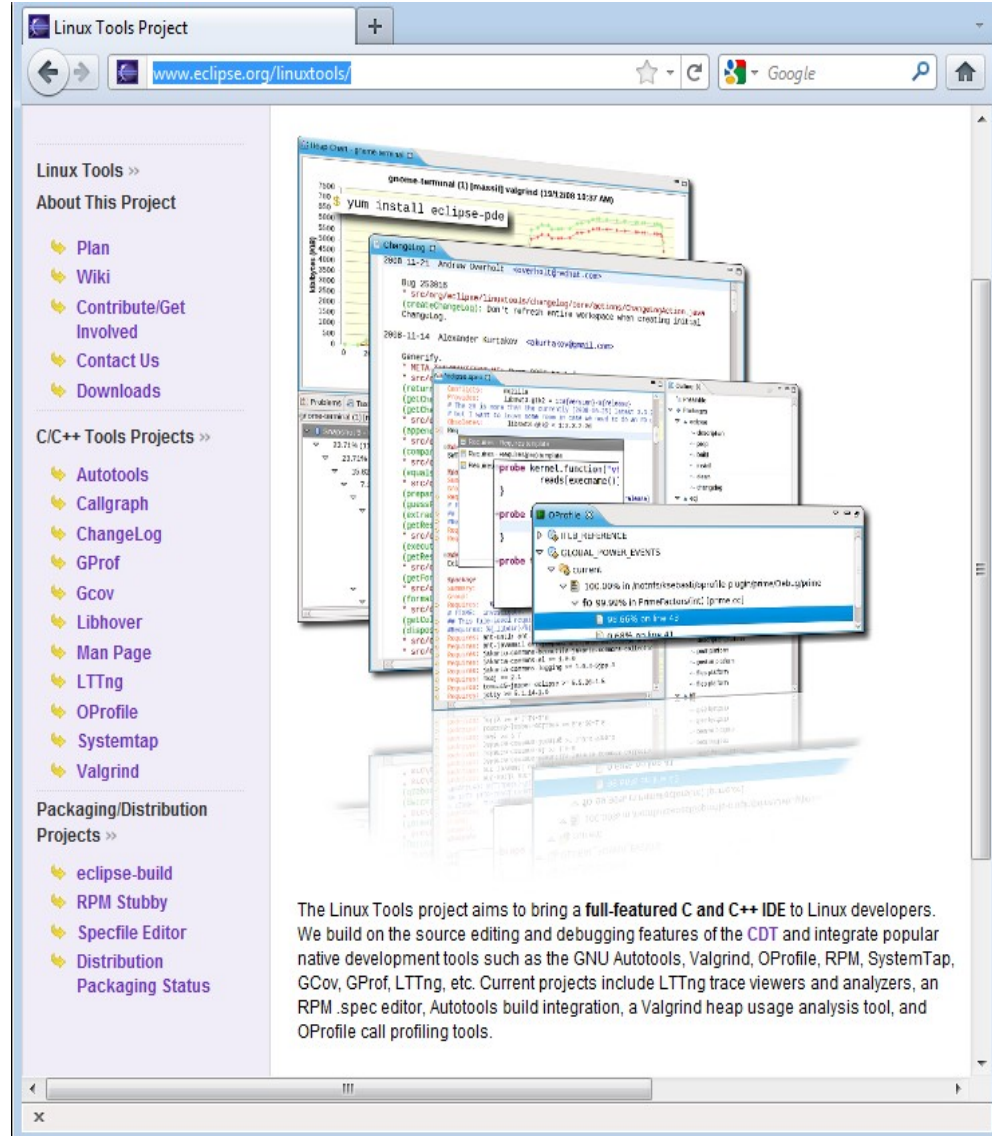


Common Trace Format

- Self describing
- Very compact binary trace format
- System-wide and multi-system trace representation in a common format, for integrated analysis:
 - Software traces
 - Across multiple CPUs
 - Across the software stack, e.g. hypervisor, kernel, library, applications
 - Hardware traces
 - DSPs, device-specific tracing components.
 - GPUs.

Eclipse Tracing monitoring framework (TMF)

- › Eclipse Linux Tools Project
- › Framework to build trace visualization and analysis tool
- › Scalability allows to handle traces exceeding memory
- › Enable trace analysis from different sources
- › LTTng Eclipse integration is an implementation on top of TMF



The Linux Tools project aims to bring a **full-featured C and C++ IDE** to Linux developers. We build on the source editing and debugging features of the **CDT** and integrate popular native development tools such as the GNU Autotools, Valgrind, OProfile, RPM, SystemTap, GCov, GProf, LTTng, etc. Current projects include LTTng trace viewers and analyzers, an RPM .spec editor, Autotools build integration, a Valgrind heap usage analysis tool, and OProfile call profiling tools.

What the framework provides

- › A trace and event data model
- › Extension point to add new trace types
- › Reusable views and widgets
- › Integration into common navigator framework (e.g. project explorer)
- › An event filter model
- › Time window and event synchronization
- › Ability to hook own analysis tools
- › Custom text & XML parser wizards (no code required!)
- › Trace control and streaming for LTTng 0.x (extra steps required)

Lttng perspective

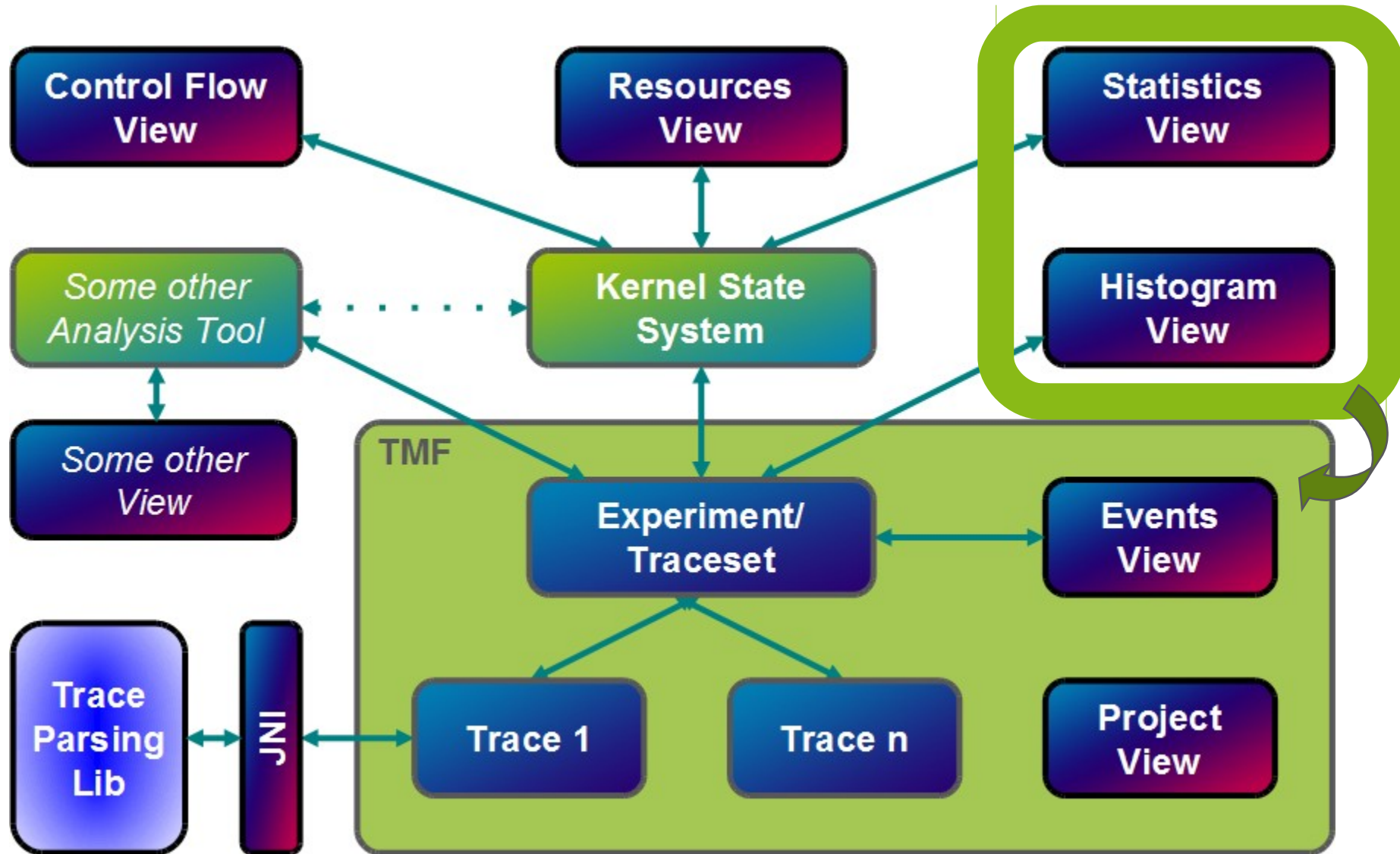
The screenshot displays the LTTng GUI interface. The top menu includes File, Edit, Refactor, Navigate, Search, Project, Run, Window, and Help. The main window is divided into several panes:

- Project Expl:** Shows a tree view of projects including MyCppProject, MyGdbTraceProject, MyJavaProject, MyLTTngProject (with sub-projects MyFirstExp [2] and MySecondExp [3]), and MyUstProject.
- Control Flow:** A table listing processes and their attributes.

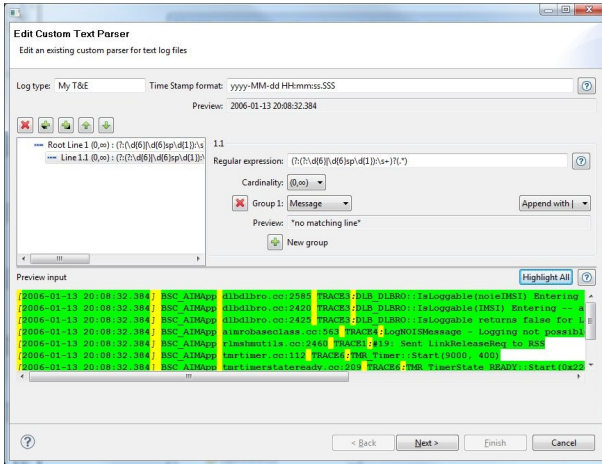
Process	Brand	PID	TGID	PPID	CPU	Birth sec	Birth nsec	TRACE
UNNAMED		0	0	0	1	0	000000000	trace_4MB
UNNAMED		9	0	0	0	0	000000000	trace_4MB
UNNAMED		2297	0	0	0	0	000000000	trace_4MB
UNNAMED		2347	0	0	1	0	000000000	trace_4MB
UNNAMED		12920	0	0	0	0	000000000	trace_4MB
UNNAMED		12931	0	0	1	0	000000000	trace_4MB
/bin/ping		12932	12932	12920	0	3011	522661781	trace_4MB
- Events - trace_4MB:** A table showing event details.

Timestamp	Trace	Marker	Content
<srch>	<srch>	<srch>	<srch>
3011.522545898	trace_4MB	mm/1/page_free	pfn:9544,order:1
3011.522550522	trace_4MB	mm/1/add_to_page_cache	sdev:21,inode:2097156
3011.522552078	trace_4MB	kernel/0/sched_migrate_task	dest_cpu:0,state:256,pid:12920
3011.522661781	trace_4MB	kernel/0/process_fork	child_pid:12932,child_tgid:12932,parent_pid:12920
3011.522665277	trace_4MB	kernel/0/sched_migrate_task	dest_cpu:0,state:256,pid:12932
3011.522669142	trace_4MB	kernel/0/sched_wakeup_new_task	cpu_id:0,state:0,pid:12932
3011.522674303	trace_4MB	kernel/0/process_exit	pid:12932
- Histogram:** A graph showing event frequency over time. The x-axis represents time in seconds, with markers at 3011.522311590 and 3011.527739286. The y-axis represents event count, with markers at 0 and 633. A vertical red line indicates the current event at 3011.522661781. The window span is set to 0.005497558 seconds.

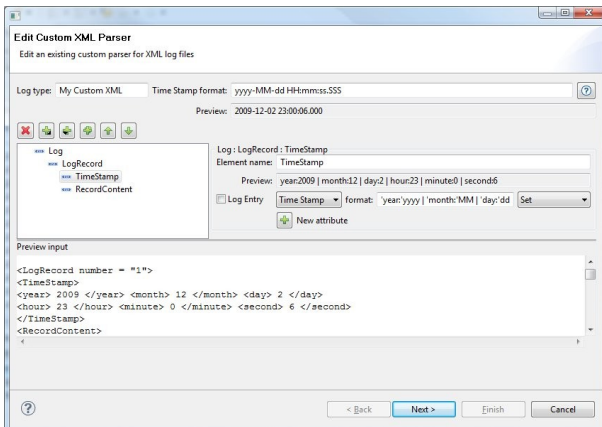
Eclipse Tracing Monitoring Framework & LTTNG architecture



Custom text Parser Wizards

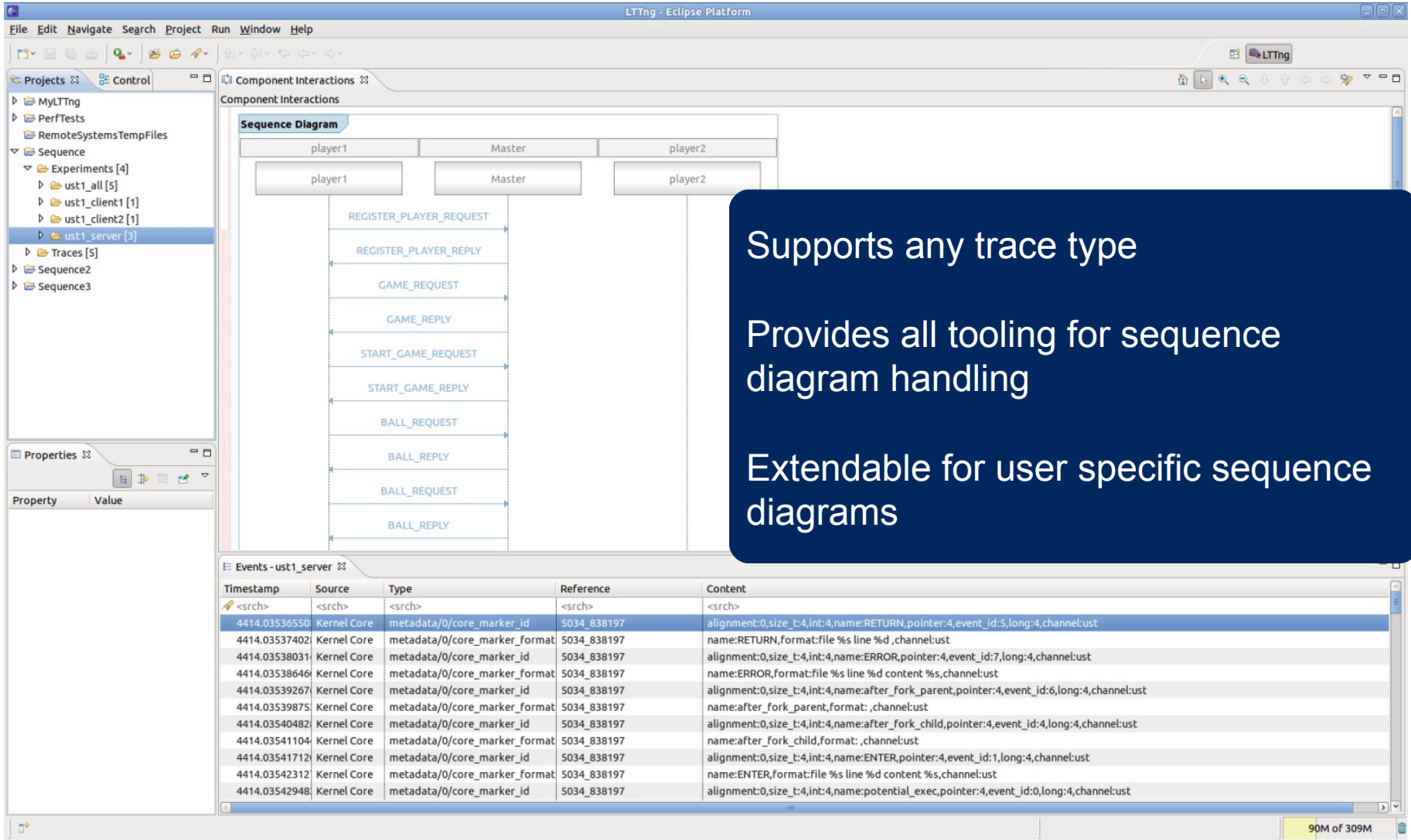


- › Custom Text Parsers
 - line based parser with regex
 - allows user to define own parser with extracted data and output fields
 - parser definition created and edited with a wizard
 - parser definitions can be shared by importing / exporting to file



- › Custom XML Parsers
 - XML based extracting data from XML elements and their attributes

Sequence diagram framework



The screenshot displays the LTTng Eclipse Platform interface. The main window shows a sequence diagram with three lifelines: player1, Master, and player2. The diagram illustrates a series of interactions: REGISTER_PLAYER_REQUEST, REGISTER_PLAYER_REPLY, GAME_REQUEST, GAME_REPLY, START_GAME_REQUEST, START_GAME_REPLY, BALL_REQUEST, BALL_REPLY, BALL_REQUEST, and BALL_REPLY. Below the diagram is an 'Events - ust1_server' table with the following data:

Timestamp	Source	Type	Reference	Content
<srch>	<srch>	<srch>	<srch>	<srch>
4414.03536550	Kernel Core	metadata/0/core_marker_id	5034_838197	alignment:0,size_t:4,int:4,name:RETURN,pointer:4,event_id:5,long:4,channel:ust
4414.03537402	Kernel Core	metadata/0/core_marker_format	5034_838197	name:RETURN,format:file %s line %d ,channel:ust
4414.03538031	Kernel Core	metadata/0/core_marker_id	5034_838197	alignment:0,size_t:4,int:4,name:ERROR,pointer:4,event_id:7,long:4,channel:ust
4414.03538646	Kernel Core	metadata/0/core_marker_format	5034_838197	name:ERROR,format:file %s line %d content %s,channel:ust
4414.03539267	Kernel Core	metadata/0/core_marker_id	5034_838197	alignment:0,size_t:4,int:4,name:after_fork_parent,pointer:4,event_id:6,long:4,channel:ust
4414.03539875	Kernel Core	metadata/0/core_marker_format	5034_838197	name:after_fork_parent,format: ,channel:ust
4414.03540482	Kernel Core	metadata/0/core_marker_id	5034_838197	alignment:0,size_t:4,int:4,name:after_fork_child,pointer:4,event_id:4,long:4,channel:ust
4414.03541104	Kernel Core	metadata/0/core_marker_format	5034_838197	name:after_fork_child,format: ,channel:ust
4414.03541712	Kernel Core	metadata/0/core_marker_id	5034_838197	alignment:0,size_t:4,int:4,name:ENTER,pointer:4,event_id:1,long:4,channel:ust
4414.03542312	Kernel Core	metadata/0/core_marker_format	5034_838197	name:ENTER,format:file %s line %d content %s,channel:ust
4414.03542948	Kernel Core	metadata/0/core_marker_id	5034_838197	alignment:0,size_t:4,int:4,name:potential_exec,pointer:4,event_id:0,long:4,channel:ust

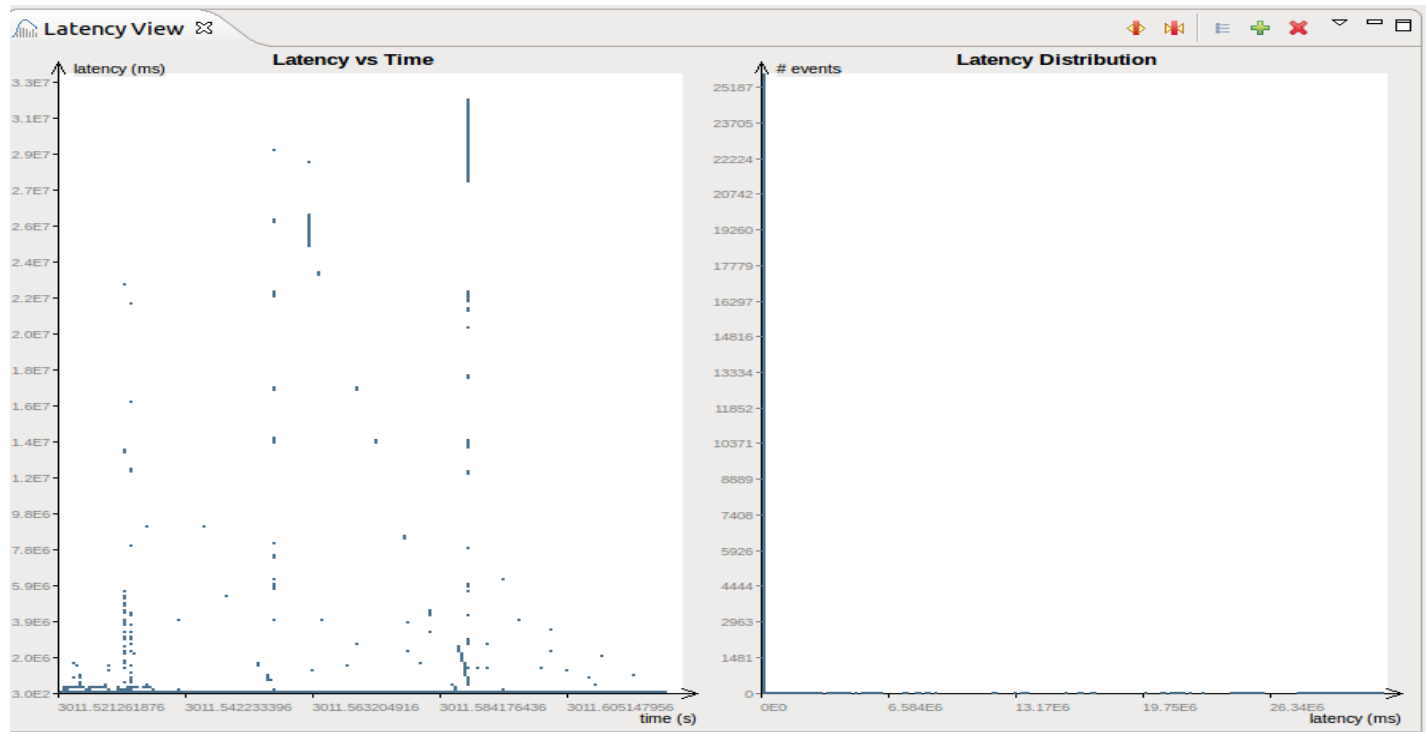
Supports any trace type

Provides all tooling for sequence diagram handling

Extendable for user specific sequence diagrams

Latency Analysis

- › For visualizing latency statistics between specific LTTng kernel trace events (Open source soon)



Current development

- › Support for LTTng 2.0
 - CTF-based Kernel and UST traces
 - Trace control
 - Session management
 - Support for multiple trace sessions
 - Streaming
- › Juno
 - Project graduation work (Linux Tools 1.0)
 - Uplift to Eclipse 4.X
- › More analysis tools
 - A better state system.
 - Clock adjustment, trace comparison, etc.

Therefore

- › The new state machine integrated into eclipse will allow a higher level of analysis with better abstraction. Saving YOUR time.
- › And of course 2012 will be the year of tracing....
 - And the Linux desktop!

Some References

› Linux Tools

- Linux Tools: <http://www.eclipse.org/linuxtools/index.php>
- Update Site: <http://download.eclipse.org/technology/linuxtools/update>

LTTng (Eclipse)

- LTTng Eclipse Project: <http://www.eclipse.org/linuxtools/projectPages/lttng>
- LTTng Eclipse Wiki: http://wiki.eclipse.org/Linux_Tools_Project/LTTng
- LTTng User Guide: http://wiki.eclipse.org/Linux_Tools_Project/LTTng/User_Guide
- TMF User Guide: http://wiki.eclipse.org/Linux_Tools_Project/TMF/User_Guide

› LTTng project: <http://lttng.org>

› For more info, questions, discussions:

- linuxtools-dev@eclipse.org

Q&A

