Linux Tools Update

EclipseCon Europe 2011

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Red Hat

Linux Tools **2009-2011**

12 releases

665 bugs fixed

many contributions

~**10** new committers

Present State

- C/C++ code completion and coverage (gcov)
- GNU Autotools plugins
- C/C++ profiling tools (OProfile, gprof, Valgrind)
- Tracing tools (LTTng, SystemTap)
- RPM development

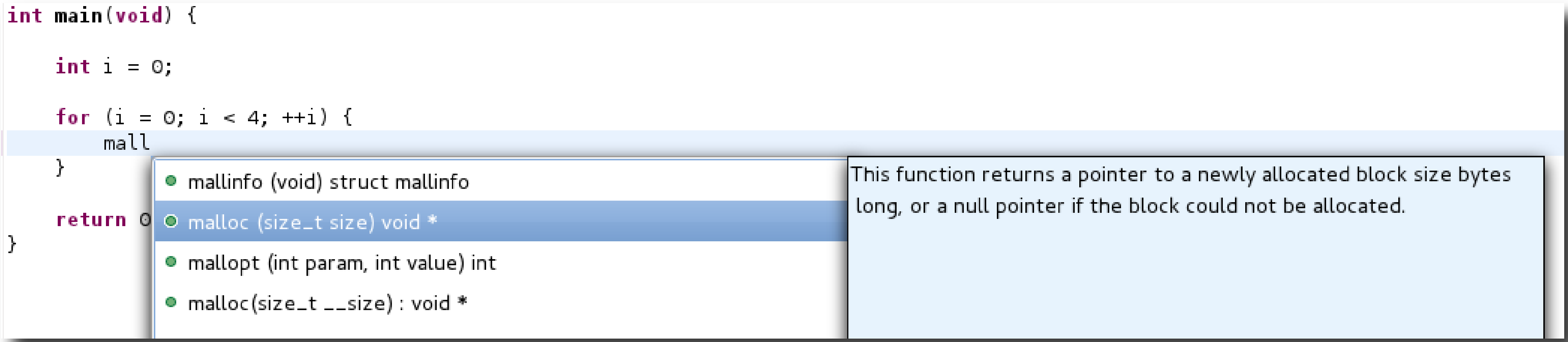
Adopters

- Ericsson
- IBM
- Red Hat
- Wind River
- Fedora community

C/C++ Tools

- Developer-focused
- Sane defaults
- Integrate with CDT functionality

Libhover

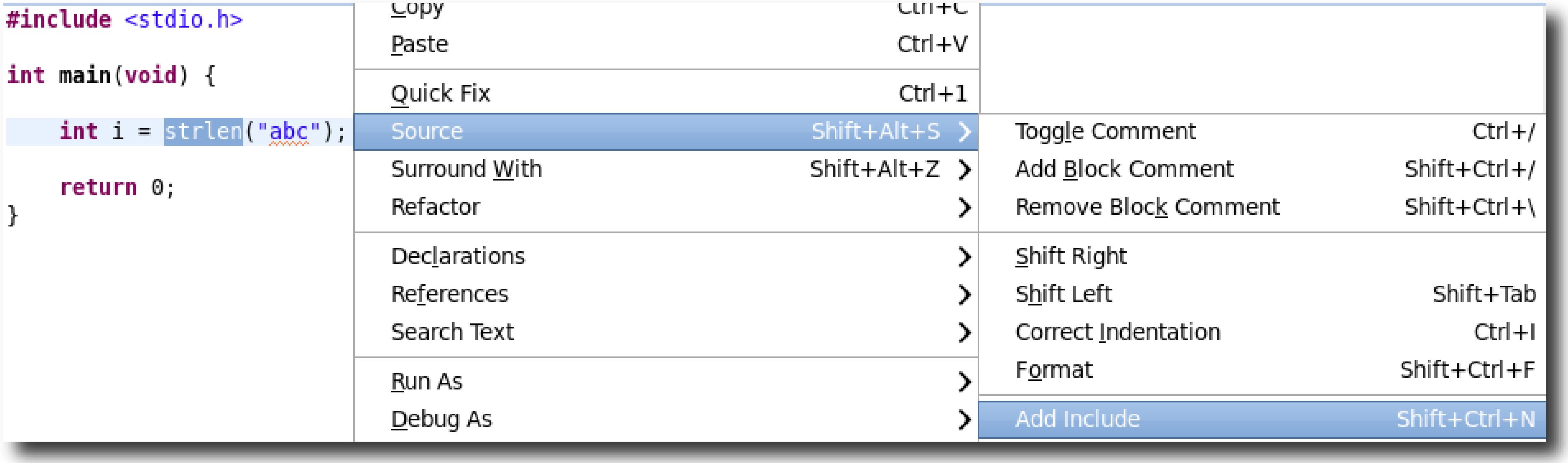


```
int main(void) {

    int i = 0;

    for (i = 0; i < 4; ++i) {
        mall
    }

    return 0
}
```

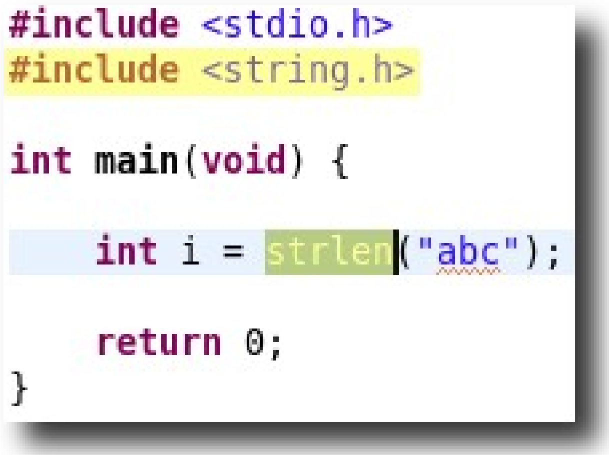
mallinfo (void) struct mallinfo
malloc (size_t size) void *
mallopt (int param, int value) int
malloc(size_t __size) : void *

This function returns a pointer to a newly allocated block size bytes long, or a null pointer if the block could not be allocated.

Add #include

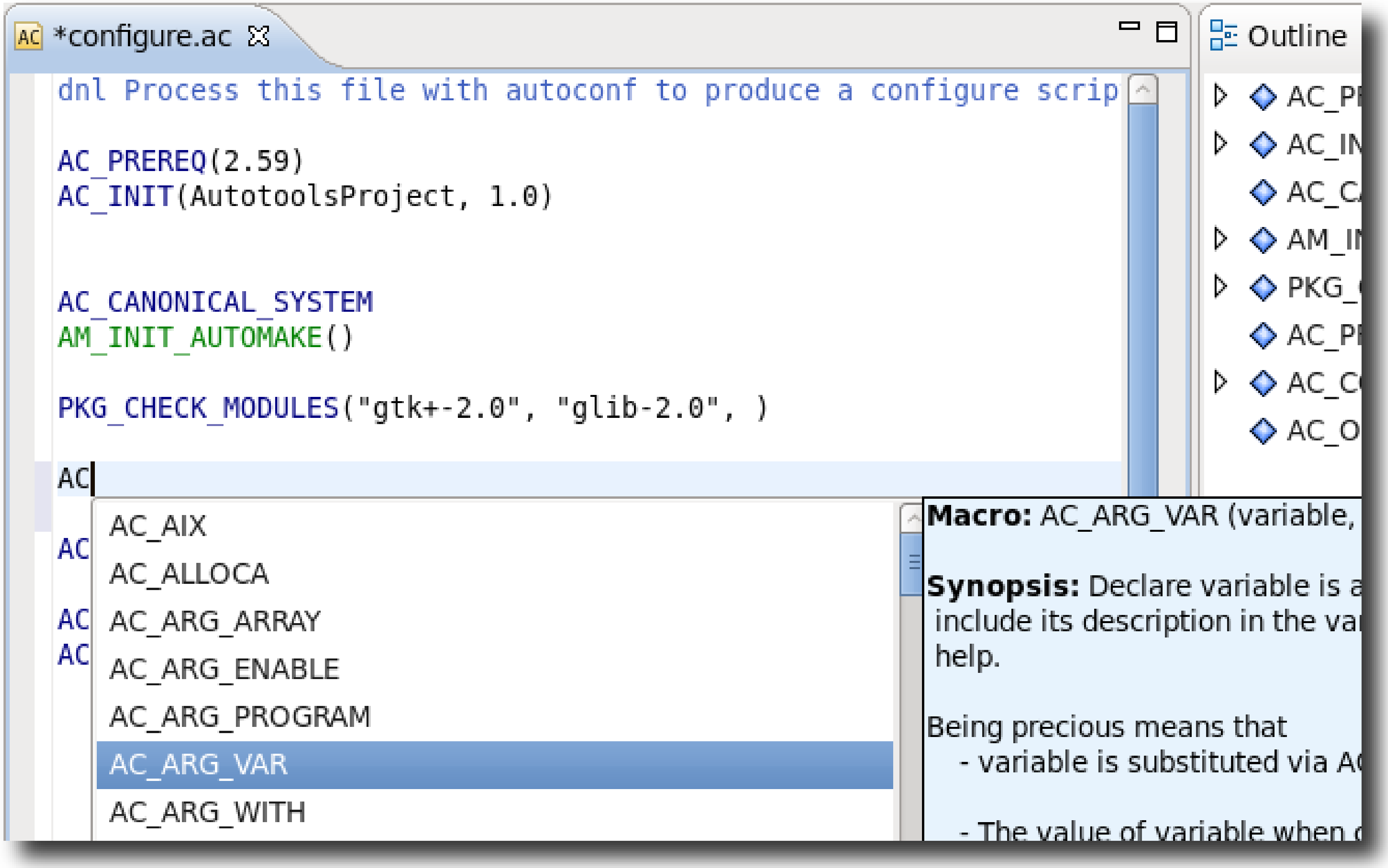


```
#include <stdio.h>

int main(void) {

    int i = strlen("abc");

    return 0;
}
```



```
#include <stdio.h>
#include <string.h>

int main(void) {

    int i = strlen("abc");

    return 0;
}
```

GNU Autotools



*configure.ac

```
dnl Process this file with autoconf to produce a configure scrip

AC_PREREQ(2.59)
AC_INIT(AutotoolsProject, 1.0)


AC_CANONICAL_SYSTEM
AM_INIT_AUTOMAKE()

PKG_CHECK_MODULES("gtk+-2.0", "glib-2.0", )

AC

AC

AC
AC
```

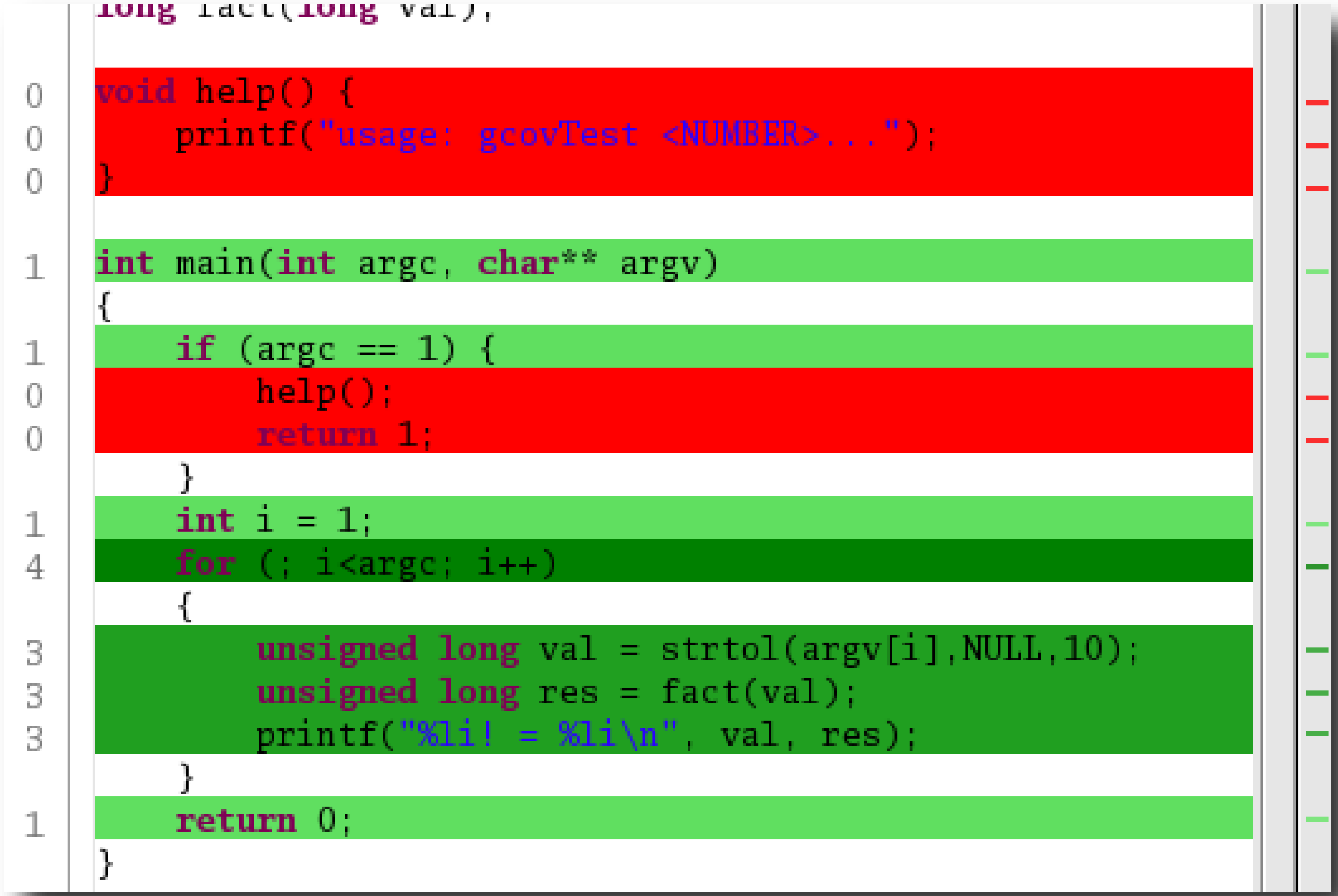
Macro: AC_ARG_VAR (variable,

Synopsis: Declare variable is a
include its description in the va
help.

Being precious means that
- variable is substituted via AC

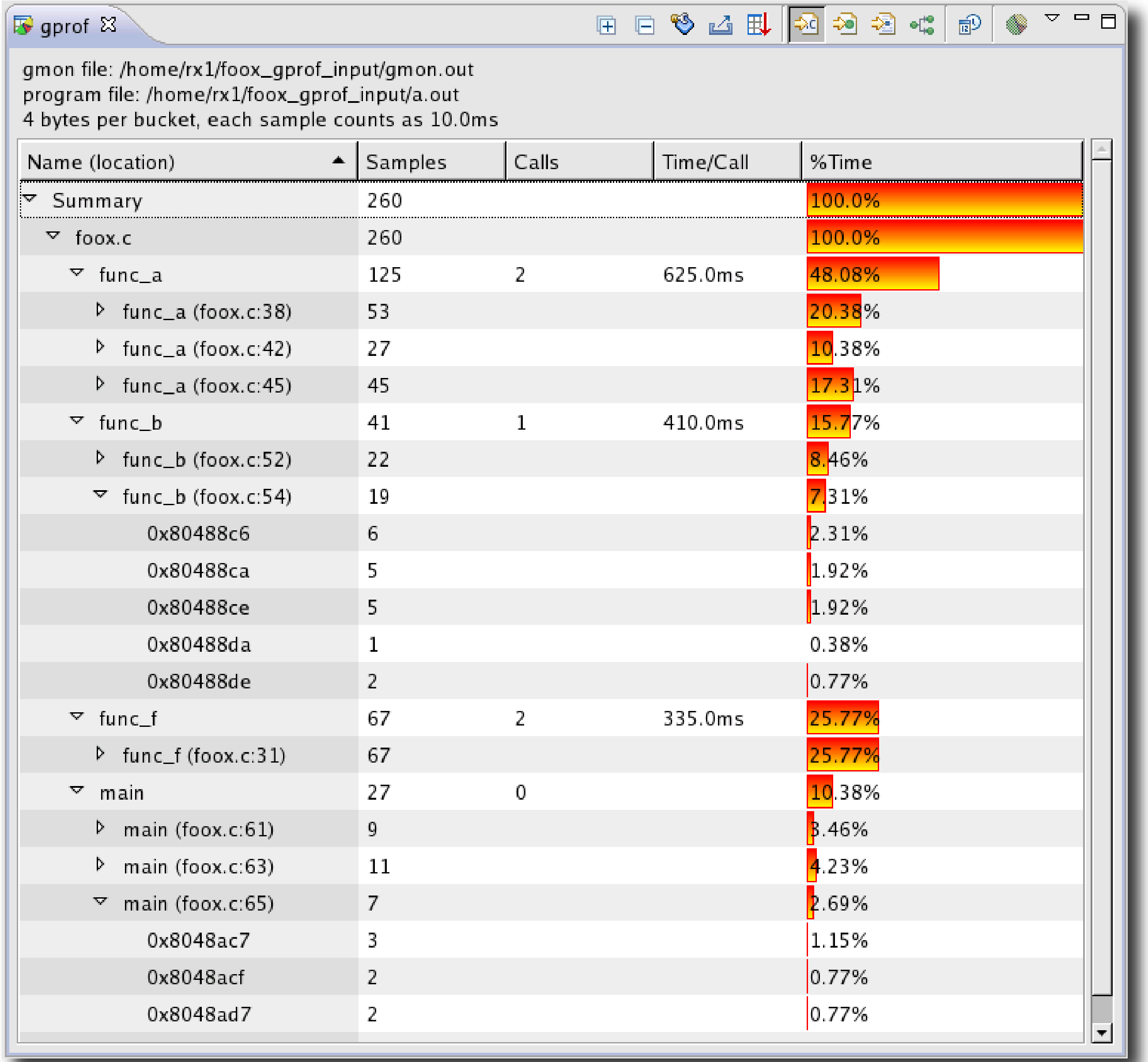
- The value of variable when c

gcov



```
     long fact(long val);

0    void help() {
0        printf("usage: gcovTest <NUMBER>...");
0    }

1    int main(int argc, char** argv)
     {
1        if (argc == 1) {
0            help();
0            return 1;
         }
1        int i = 1;
4        for (; i<argc; i++)
         {
3            unsigned long val = strtol(argv[i],NULL,10);
3            unsigned long res = fact(val);
3            printf("%li! = %li\n", val, res);
         }
1        return 0;
     }
```

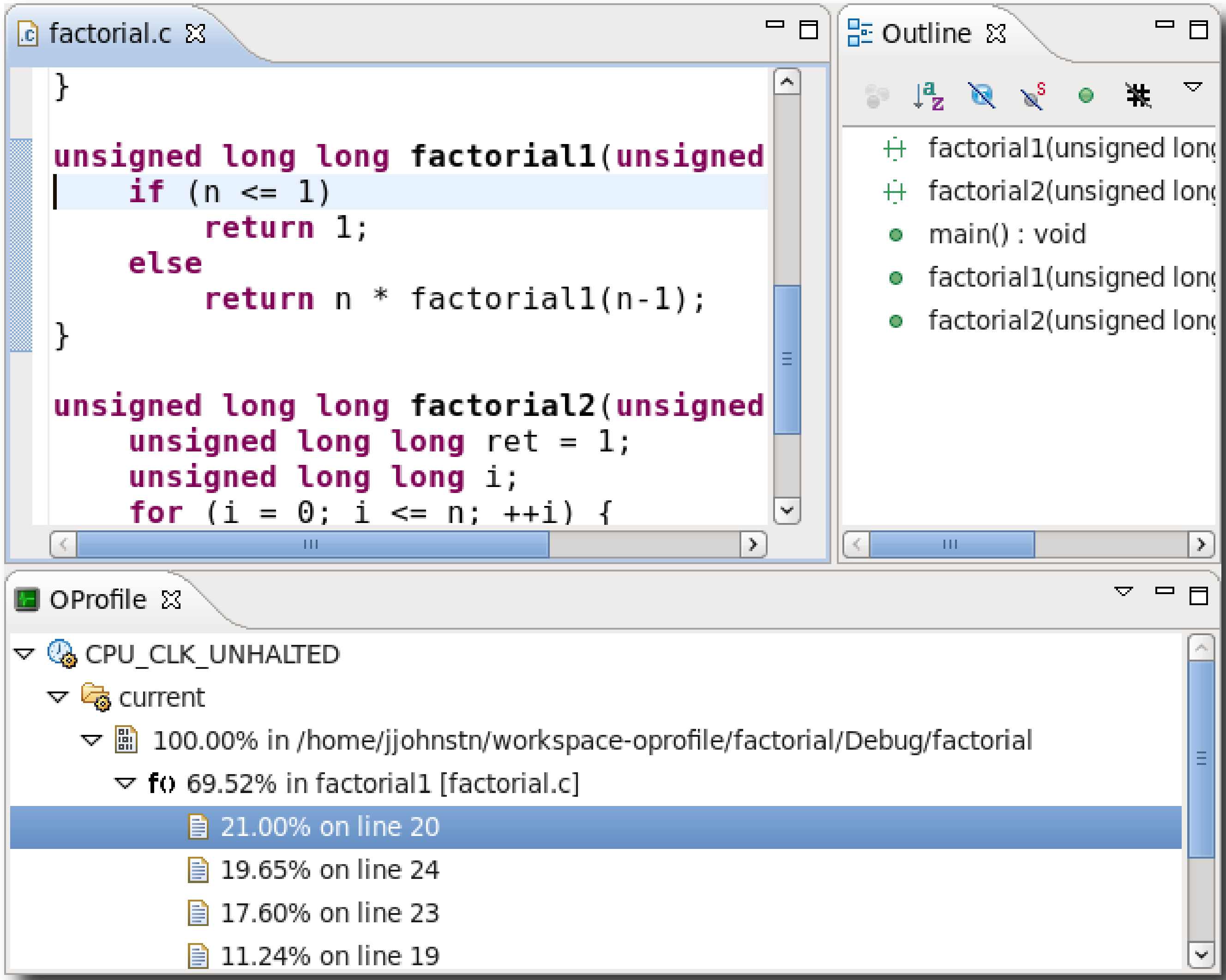
gprof



gmon file: /home/rx1/foox_gprof_input/gmon.out
program file: /home/rx1/foox_gprof_input/a.out
4 bytes per bucket, each sample counts as 10.0ms

Name (location)	Samples	Calls	Time/Call	%Time
Summary	260			100.0%
foox.c	260			100.0%
func_a	125	2	625.0ms	48.08%
func_a (foox.c:38)	53			20.38%
func_a (foox.c:42)	27			10.38%
func_a (foox.c:45)	45			17.31%
func_b	41	1	410.0ms	15.77%
func_b (foox.c:52)	22			8.46%
func_b (foox.c:54)	19			7.31%
0x80488c6	6			2.31%
0x80488ca	5			1.92%
0x80488ce	5			1.92%
0x80488da	1			0.38%
0x80488de	2			0.77%
func_f	67	2	335.0ms	25.77%
func_f (foox.c:31)	67			25.77%
main	27	0		10.38%
main (foox.c:61)	9			3.46%
main (foox.c:63)	11			4.23%
main (foox.c:65)	7			2.69%
0x8048ac7	3			1.15%
0x8048acf	2			0.77%
0x8048ad7	2			0.77%

OProfile

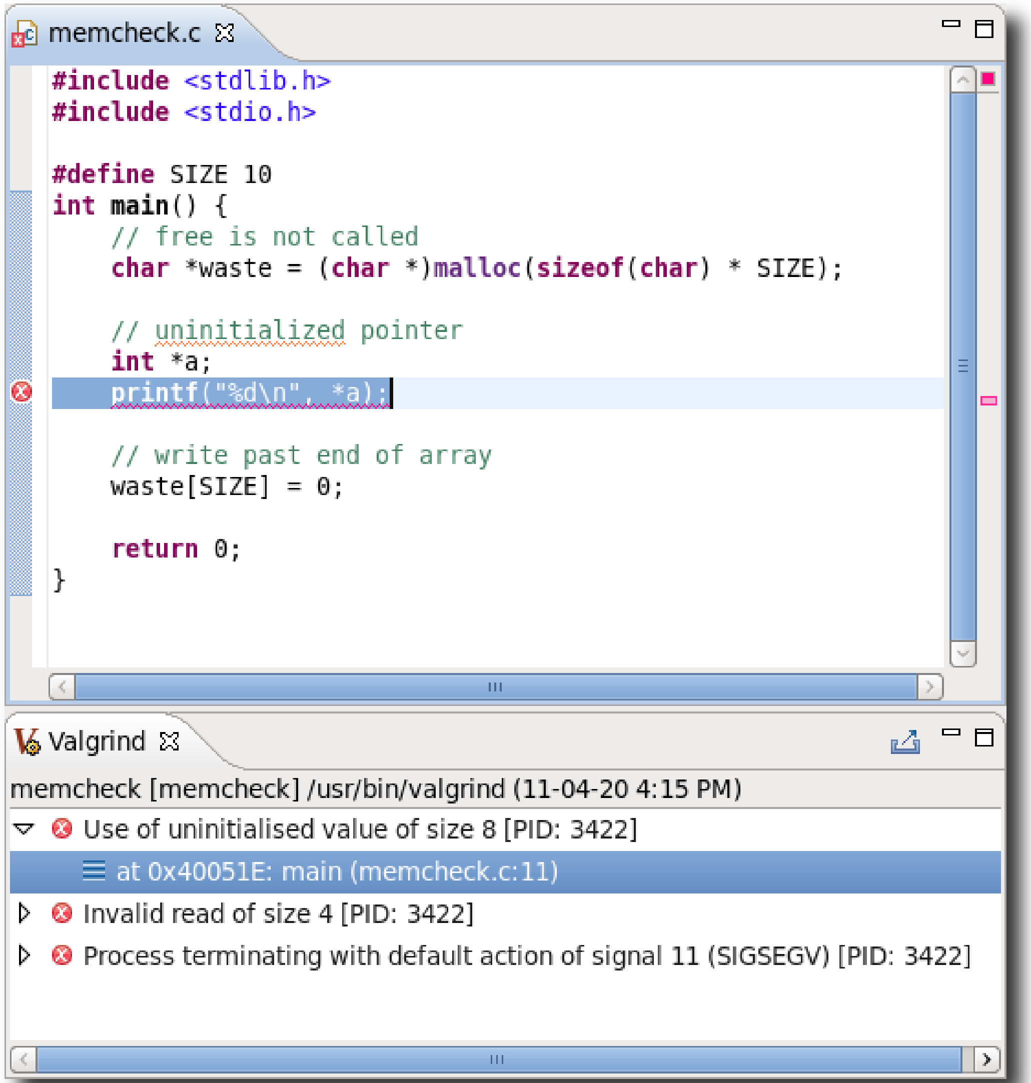


```
}

unsigned long long factorial1(unsigned
    if (n <= 1)
        return 1;
    else
        return n * factorial1(n-1);
}

unsigned long long factorial2(unsigned
    unsigned long long ret = 1;
    unsigned long long i;
    for (i = 0; i <= n; ++i) {
```

```
factorial1(unsigned lon
factorial2(unsigned lon
main() : void
factorial1(unsigned lon
factorial2(unsigned lon
```

```
CPU_CLK_UNHALTED
  current
    100.00% in /home/jjohnstn/workspace-oprofile/factorial/Debug/factorial
      f() 69.52% in factorial1 [factorial.c]
          21.00% on line 20
          19.65% on line 24
          17.60% on line 23
          11.24% on line 19
```

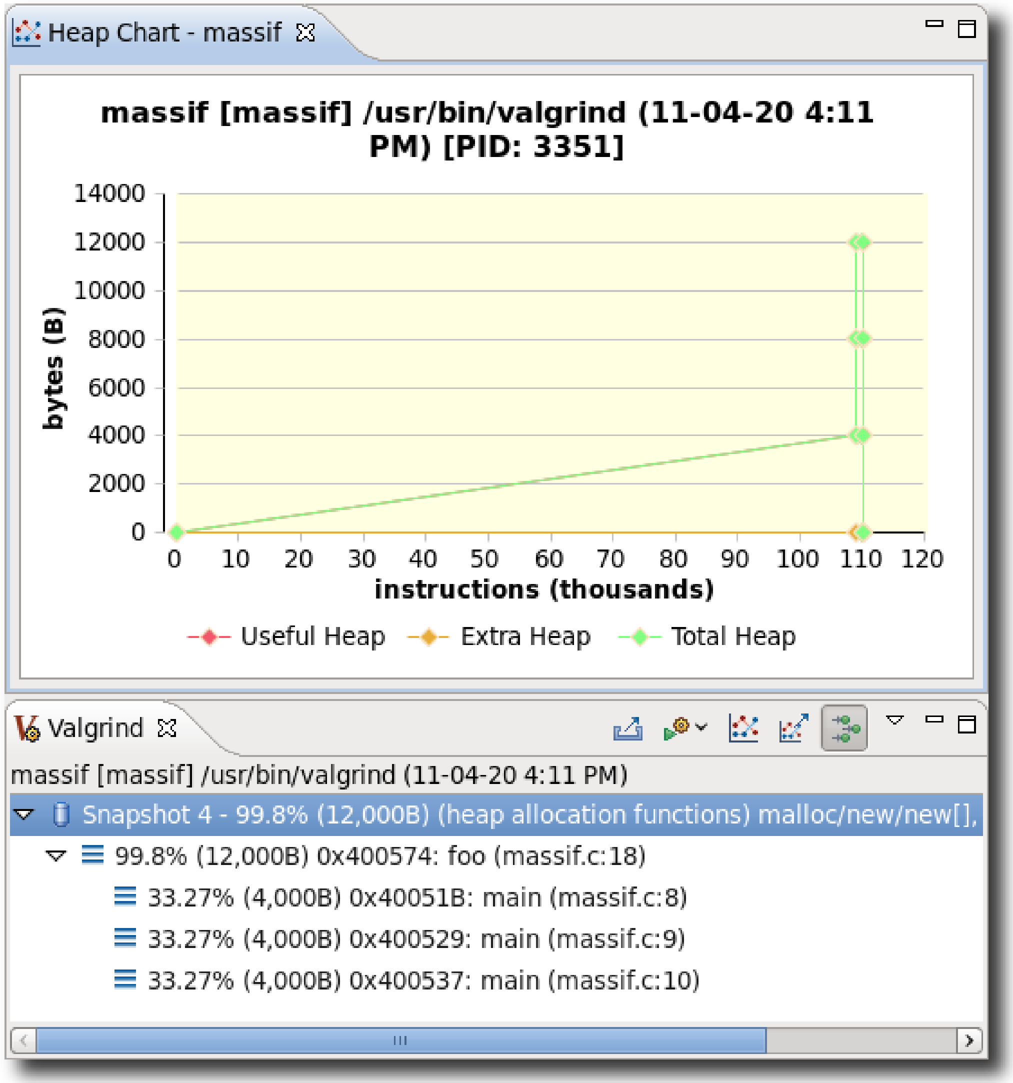
Valgrind memcheck



```
#include <stdlib.h>
#include <stdio.h>

#define SIZE 10
int main() {
    // free is not called
    char *waste = (char *)malloc(sizeof(char) * SIZE);

    // uninitialized pointer
    int *a;
    printf("%d\n", *a);

    // write past end of array
    waste[SIZE] = 0;

    return 0;
}
```

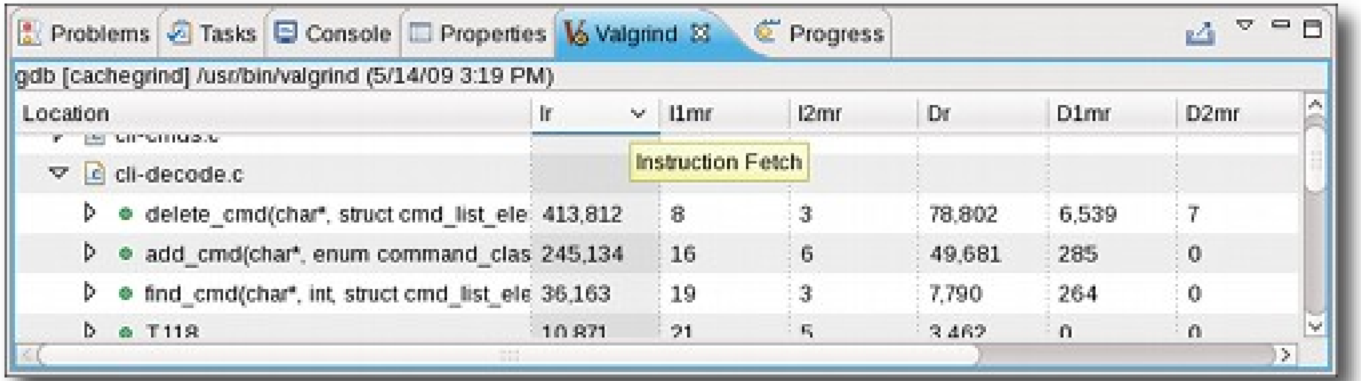
```
memcheck [memcheck] /usr/bin/valgrind (11-04-20 4:15 PM)
▽ Use of uninitialised value of size 8 [PID: 3422]
      at 0x40051E: main (memcheck.c:11)
▷ Invalid read of size 4 [PID: 3422]
▷ Process terminating with default action of signal 11 (SIGSEGV) [PID: 3422]
```

Valgrind massif



```
massif [massif] /usr/bin/valgrind (11-04-20 4:11 PM)
▽ Snapshot 4 - 99.8% (12,000B) (heap allocation functions) malloc/new/new[],
  ▽ 99.8% (12,000B) 0x400574: foo (massif.c:18)
      33.27% (4,000B) 0x40051B: main (massif.c:8)
      33.27% (4,000B) 0x400529: main (massif.c:9)
      33.27% (4,000B) 0x400537: main (massif.c:10)
```

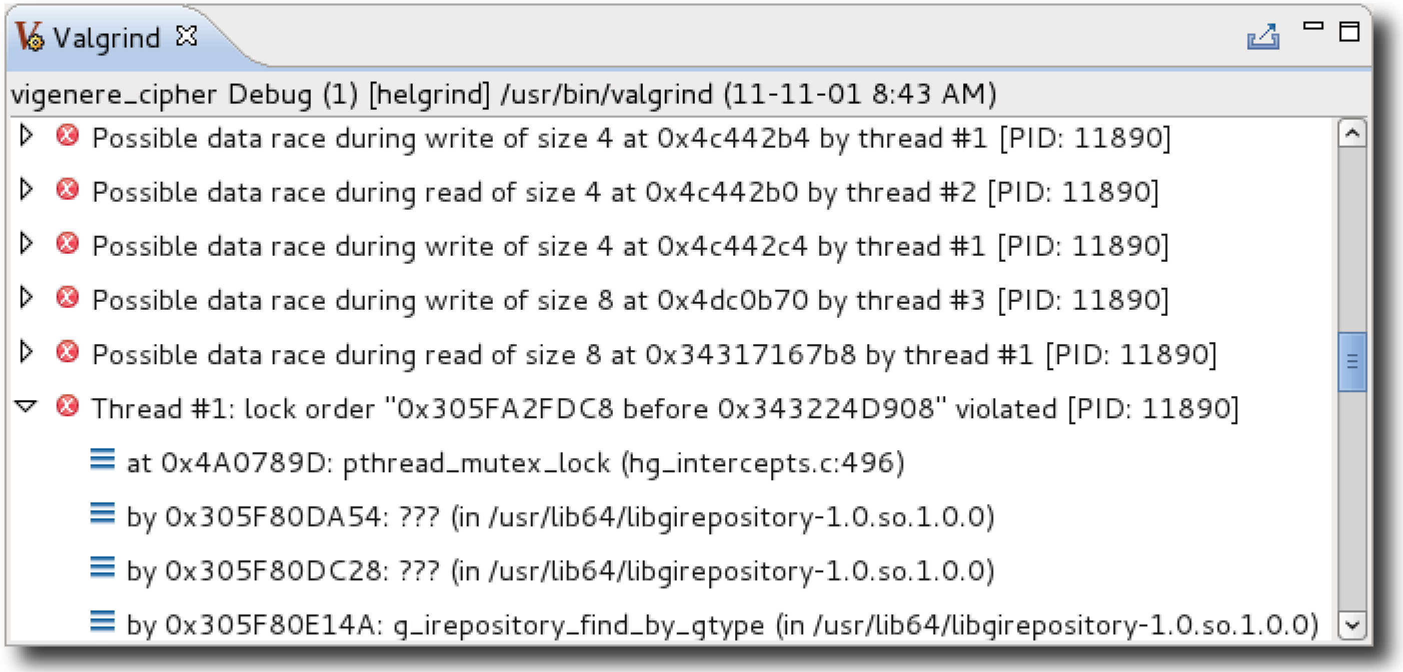
Valgrind cachegrind



gdb [cachegrind] /usr/bin/valgrind (5/14/09 3:19 PM)

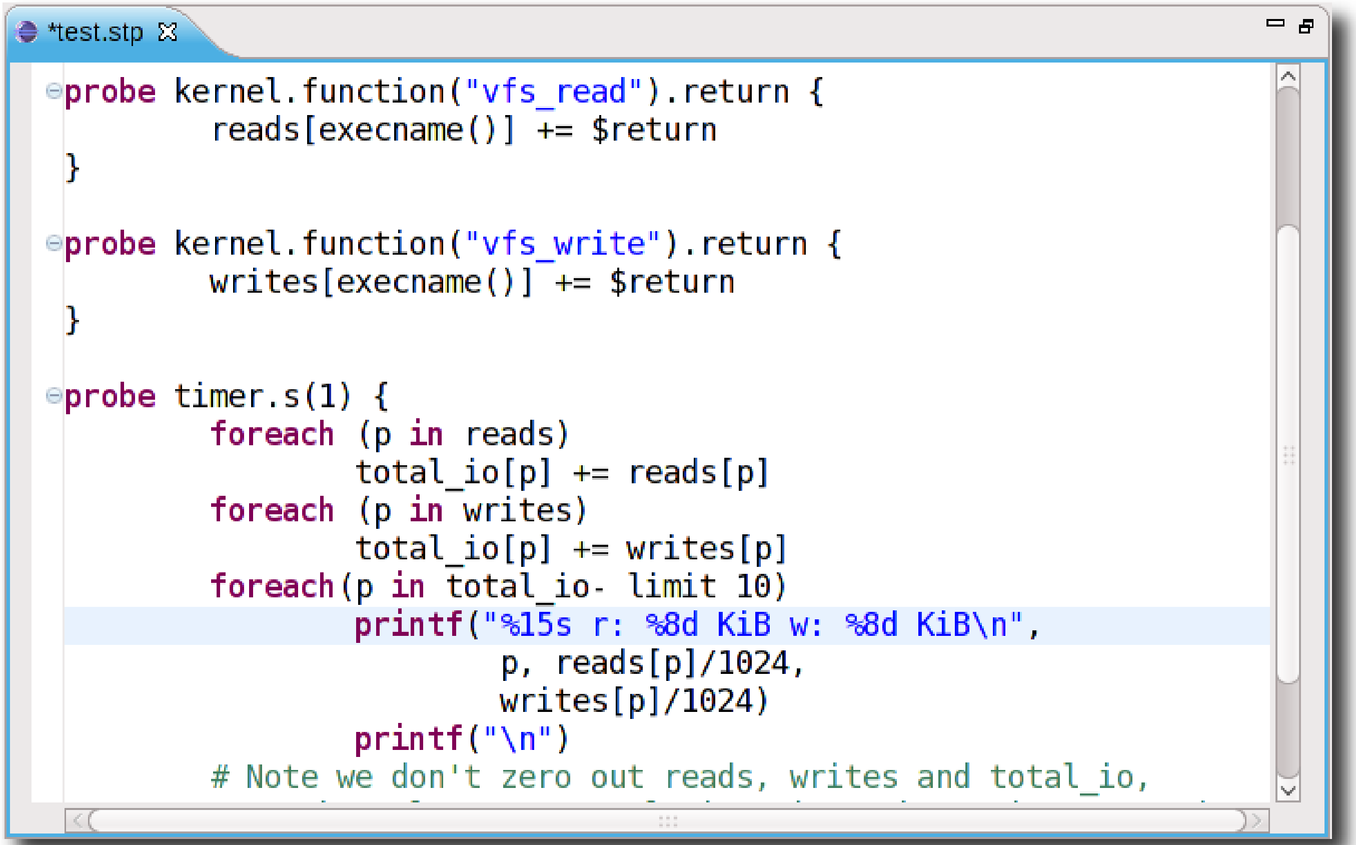
Location	Ir	I1mr	I2mr	Dr	D1mr	D2mr
cli-cmds.c						
cli-decode.c						
delete_cmd(char*, struct cmd_list_ele	413,812	8	3	78,802	6,539	7
add_cmd(char*, enum command_clas	245,134	16	6	49,681	285	0
find_cmd(char*, int, struct cmd_list_ele	36,163	19	3	7,790	264	0
T118	10,871	21	5	3,462	0	0

Valgrind helgrind



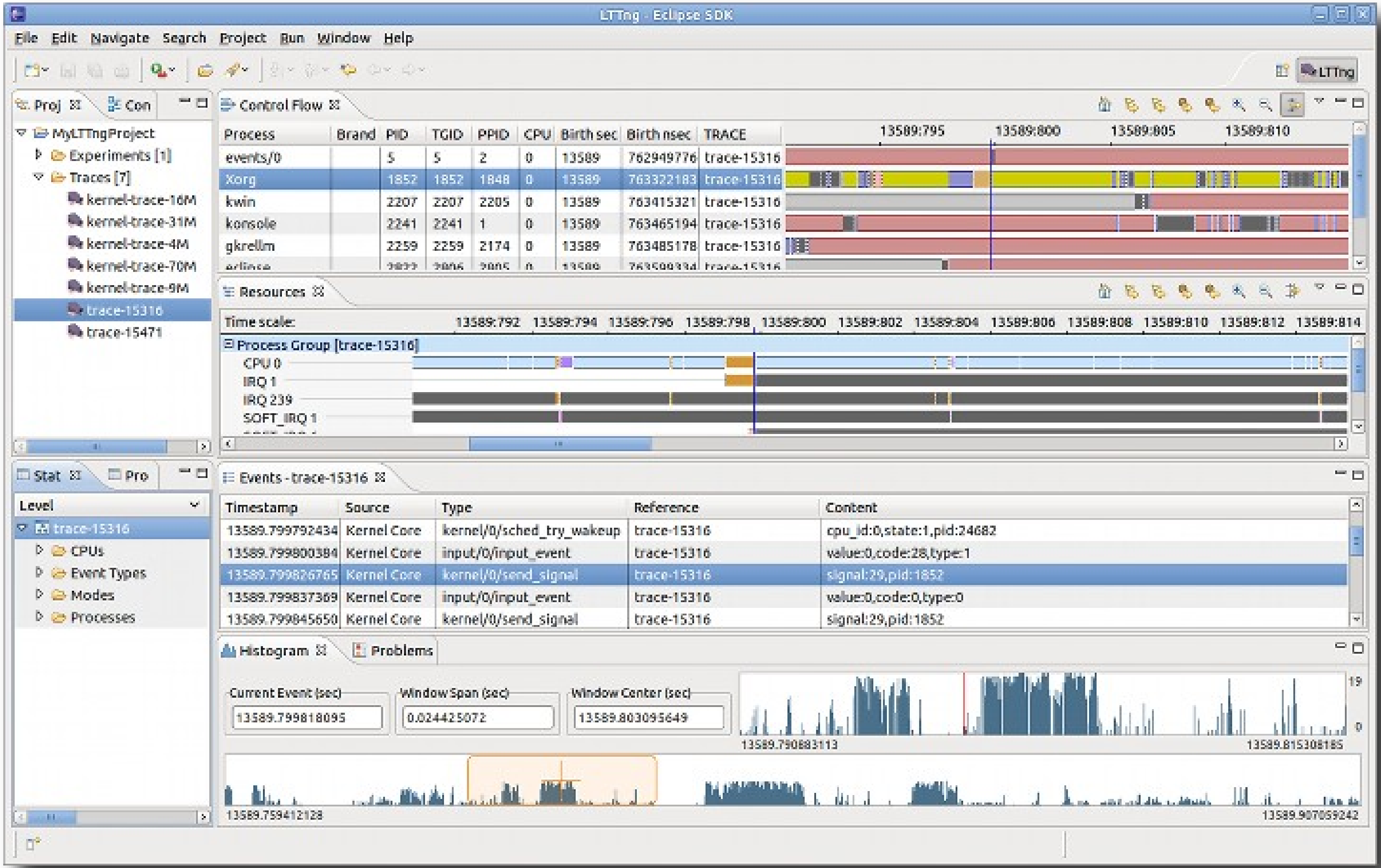
```
vigenere_cipher Debug (1) [helgrind] /usr/bin/valgrind (11-11-01 8:43 AM)
▷ Possible data race during write of size 4 at 0x4c442b4 by thread #1 [PID: 11890]
▷ Possible data race during read of size 4 at 0x4c442b0 by thread #2 [PID: 11890]
▷ Possible data race during write of size 4 at 0x4c442c4 by thread #1 [PID: 11890]
▷ Possible data race during write of size 8 at 0x4dc0b70 by thread #3 [PID: 11890]
▷ Possible data race during read of size 8 at 0x34317167b8 by thread #1 [PID: 11890]
▽ Thread #1: lock order "0x305FA2FDC8 before 0x343224D908" violated [PID: 11890]
      at 0x4A0789D: pthread_mutex_lock (hg_intercepts.c:496)
      by 0x305F80DA54: ??? (in /usr/lib64/libgirepository-1.0.so.1.0.0)
      by 0x305F80DC28: ??? (in /usr/lib64/libgirepository-1.0.so.1.0.0)
      by 0x305F80E14A: g_irepository_find_by_gtype (in /usr/lib64/libgirepository-1.0.so.1.0.0)
```

SystemTap



```
probe kernel.function("vfs_read").return {
        reads[execname()] += $return
}

probe kernel.function("vfs_write").return {
        writes[execname()] += $return
}

probe timer.s(1) {
        foreach (p in reads)
                total_io[p] += reads[p]
        foreach (p in writes)
                total_io[p] += writes[p]
        foreach(p in total_io- limit 10)
                printf("%15s r: %8d KiB w: %8d KiB\n",
                        p, reads[p]/1024,
                        writes[p]/1024)
                printf("\n")
        # Note we don't zero out reads, writes and total_io,
```

LTTng

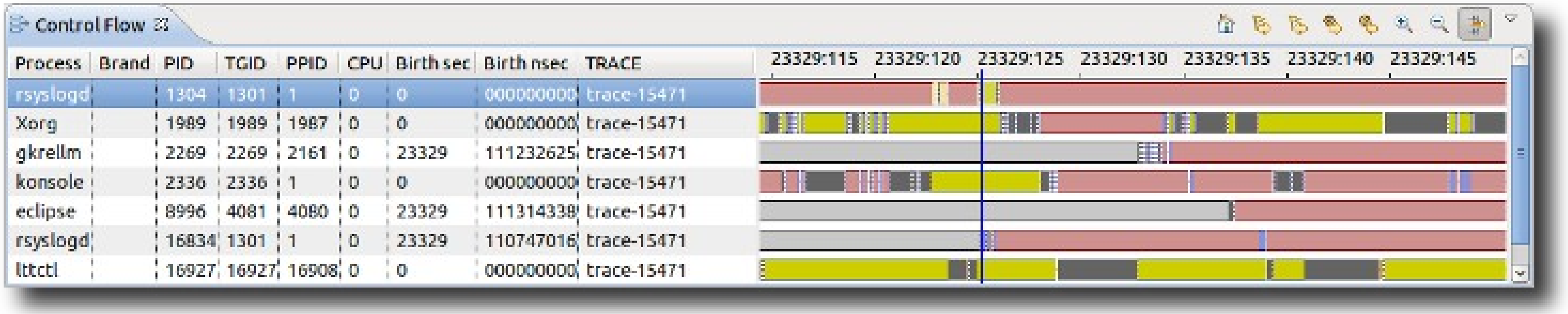


Process	Brand	PID	TGID	PPID	CPU	Birth sec	Birth nsec	TRACE
events/0		5	5	2	0	13589	762949776	trace-15316
Xorg		1852	1852	1848	0	13589	763322183	trace-15316
kwin		2207	2207	2205	0	13589	763415321	trace-15316
konsole		2241	2241	1	0	13589	763465194	trace-15316
gkrellm		2259	2259	2174	0	13589	763485178	trace-15316

Timestamp	Source	Type	Reference	Content
13589.799792434	Kernel Core	kernel/0/sched_try_wakeup	trace-15316	cpu_id:0,state:1,pid:24682
13589.799800384	Kernel Core	input/0/input_event	trace-15316	value:0,code:28,type:1
13589.799826765	Kernel Core	kernel/0/send_signal	trace-15316	signal:29,pid:1852
13589.799837369	Kernel Core	input/0/input_event	trace-15316	value:0,code:0,type:0
13589.799845650	Kernel Core	kernel/0/send_signal	trace-15316	signal:29,pid:1852

Current Event (sec): 13589.799818095
Window Span (sec): 0.024425072
Window Center (sec): 13589.803095649

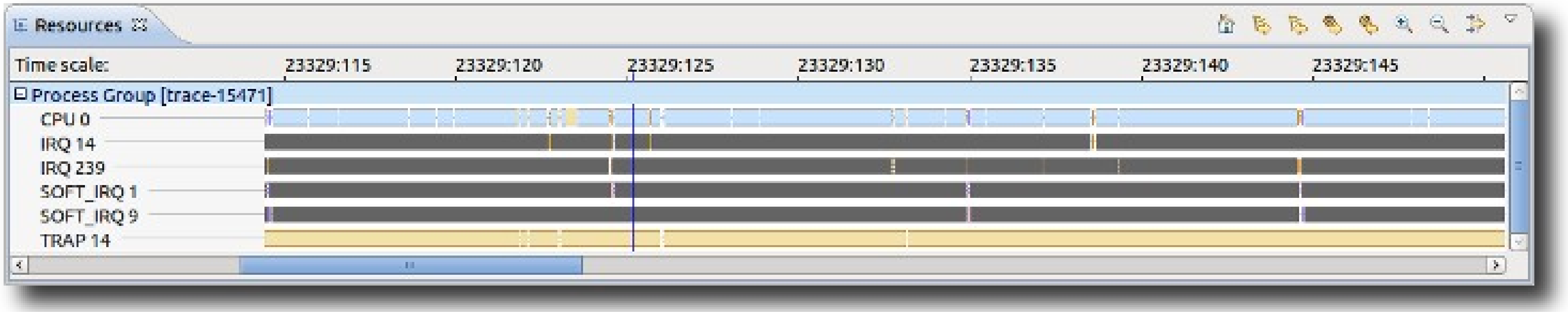
LTTng



Control Flow

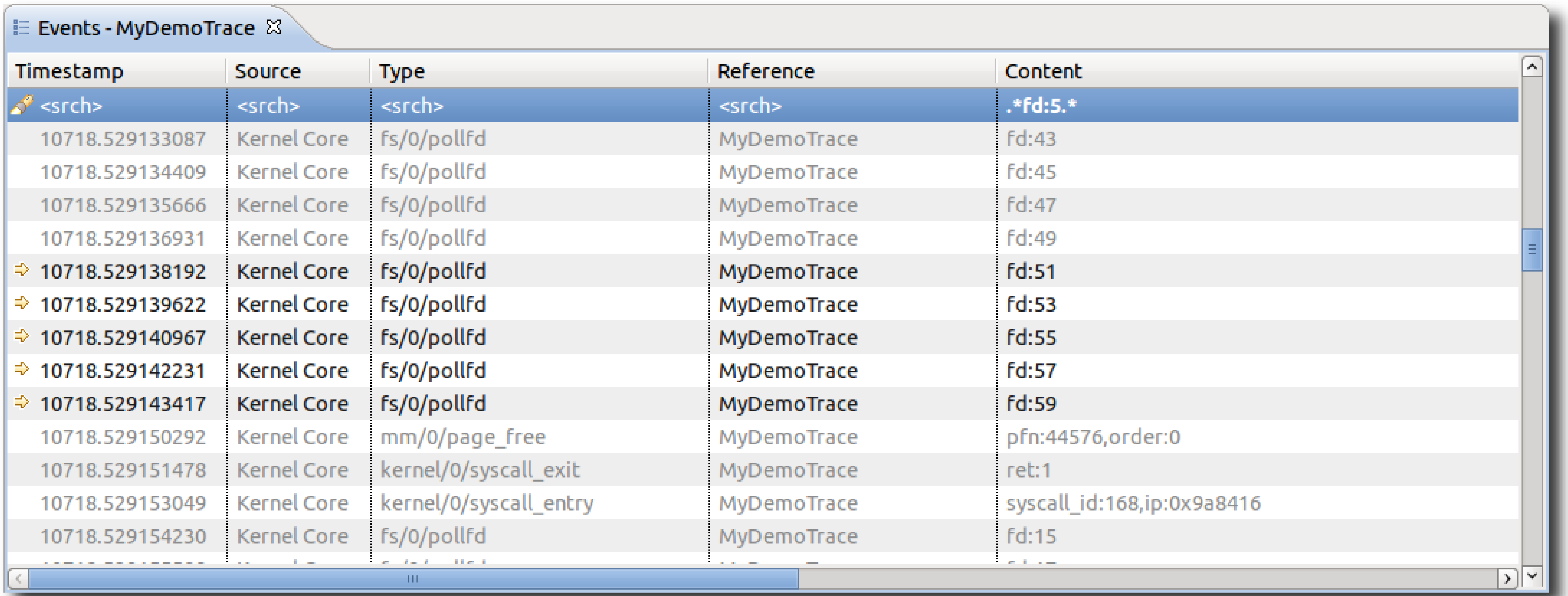
Process	Brand	PID	TGID	PPID	CPU	Birth sec	Birth nsec	TRACE
rsyslogd		1304	1301	1	0	0	000000000	trace-15471
Xorg		1989	1989	1987	0	0	000000000	trace-15471
gkrellm		2269	2269	2161	0	23329	111232625	trace-15471
konsole		2336	2336	1	0	0	000000000	trace-15471
eclipse		8996	4081	4080	0	23329	111314338	trace-15471
rsyslogd		16834	1301	1	0	23329	110747016	trace-15471
lttctl		16927	16927	16908	0	0	000000000	trace-15471

LTTng



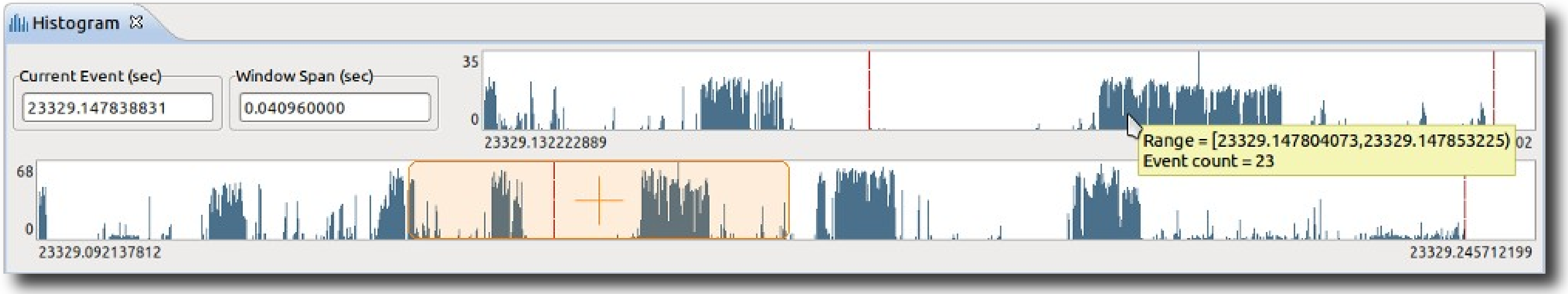
Resources
Time scale:
23329:115
23329:120
23329:125
23329:130
23329:135
23329:140
23329:145
Process Group [trace-15471]
CPU 0
IRQ 14
IRQ 239
SOFT_IRQ 1
SOFT_IRQ 9
TRAP 14

LTTng

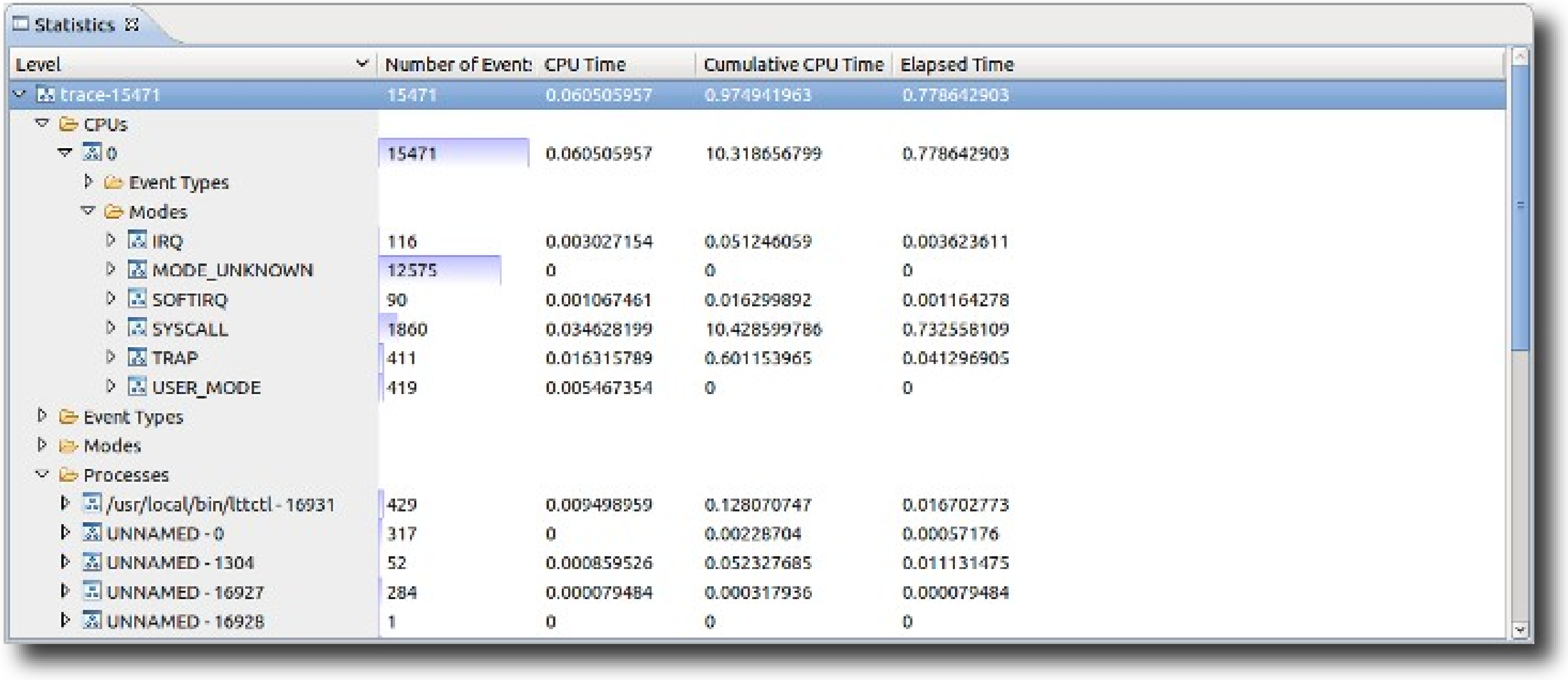

Events - MyDemoTrace

Timestamp	Source	Type	Reference	Content
<srch>	<srch>	<srch>	<srch>	.*fd:5.*
10718.529133087	Kernel Core	fs/0/pollfd	MyDemoTrace	fd:43
10718.529134409	Kernel Core	fs/0/pollfd	MyDemoTrace	fd:45
10718.529135666	Kernel Core	fs/0/pollfd	MyDemoTrace	fd:47
10718.529136931	Kernel Core	fs/0/pollfd	MyDemoTrace	fd:49
10718.529138192	Kernel Core	fs/0/pollfd	MyDemoTrace	fd:51
10718.529139622	Kernel Core	fs/0/pollfd	MyDemoTrace	fd:53
10718.529140967	Kernel Core	fs/0/pollfd	MyDemoTrace	fd:55
10718.529142231	Kernel Core	fs/0/pollfd	MyDemoTrace	fd:57
10718.529143417	Kernel Core	fs/0/pollfd	MyDemoTrace	fd:59
10718.529150292	Kernel Core	mm/0/page_free	MyDemoTrace	pfn:44576,order:0
10718.529151478	Kernel Core	kernel/0/syscall_exit	MyDemoTrace	ret:1
10718.529153049	Kernel Core	kernel/0/syscall_entry	MyDemoTrace	syscall_id:168,ip:0x9a8416
10718.529154230	Kernel Core	fs/0/pollfd	MyDemoTrace	fd:15

LTTng


Histogram
Current Event (sec)
23329.147838831
Window Span (sec)
0.040960000
35
0
23329.132222889
02
Range = [23329.147804073,23329.147853225)
Event count = 23
68
0
23329.092137812
23329.245712199

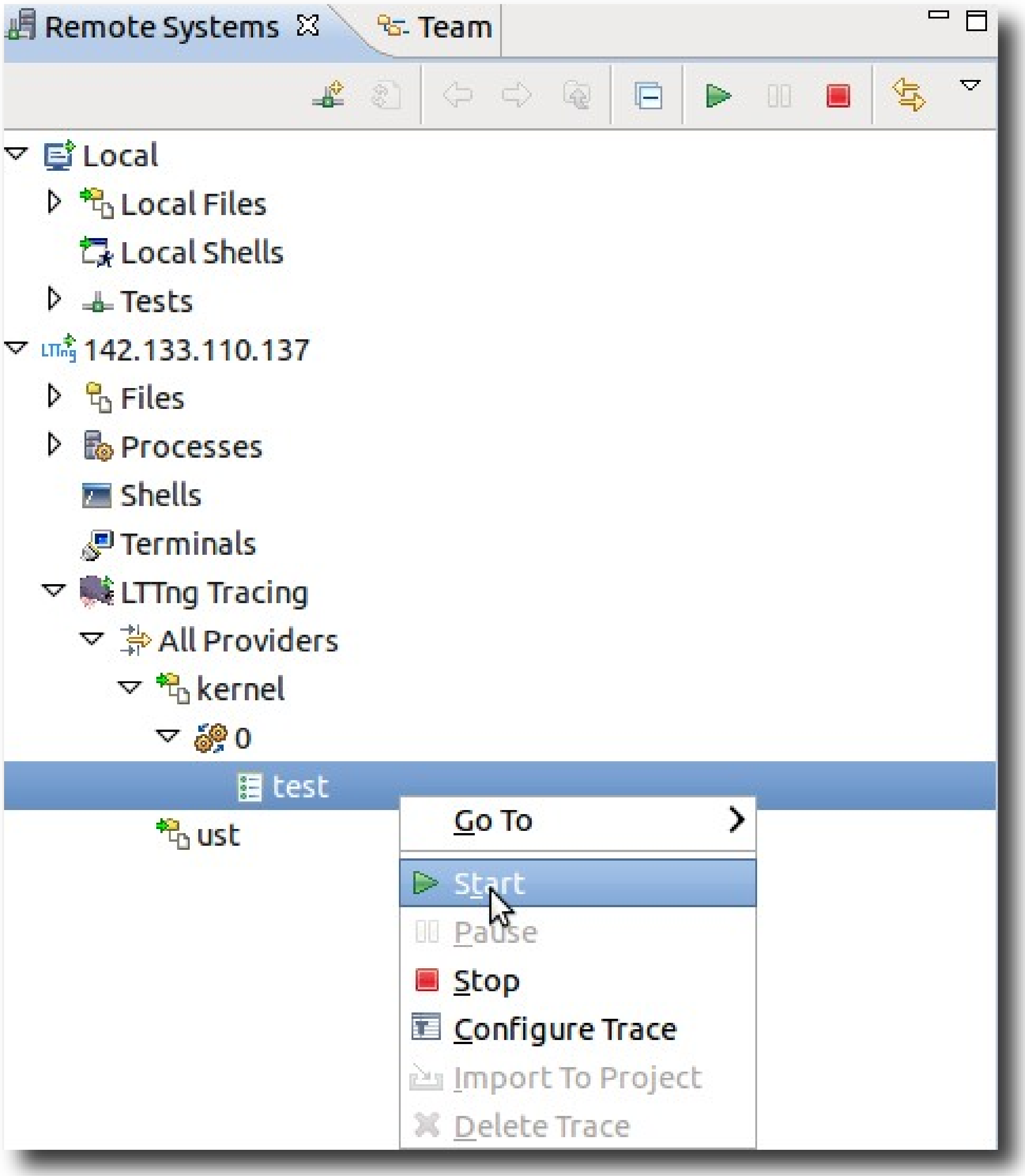
LTTng



Statistics

Level	Number of Event:	CPU Time	Cumulative CPU Time	Elapsed Time
trace-15471	15471	0.060505957	0.974941963	0.778642903
CPUs				
0	15471	0.060505957	10.318656799	0.778642903
Event Types				
Modes				
IRQ	116	0.003027154	0.051246059	0.003623611
MODE_UNKNOWN	12575	0	0	0
SOFTIRQ	90	0.001067461	0.016299892	0.001164278
SYSCALL	1860	0.034628199	10.428599786	0.732558109
TRAP	411	0.016315789	0.601153965	0.041296905
USER_MODE	419	0.005467354	0	0
Event Types				
Modes				
Processes				
/usr/local/bin/lttctl - 16931	429	0.009498959	0.128070747	0.016702773
UNNAMED - 0	317	0	0.00228704	0.00057176
UNNAMED - 1304	52	0.000859526	0.052327685	0.011131475
UNNAMED - 16927	284	0.000079484	0.000317936	0.000079484
UNNAMED - 16928	1	0	0	0

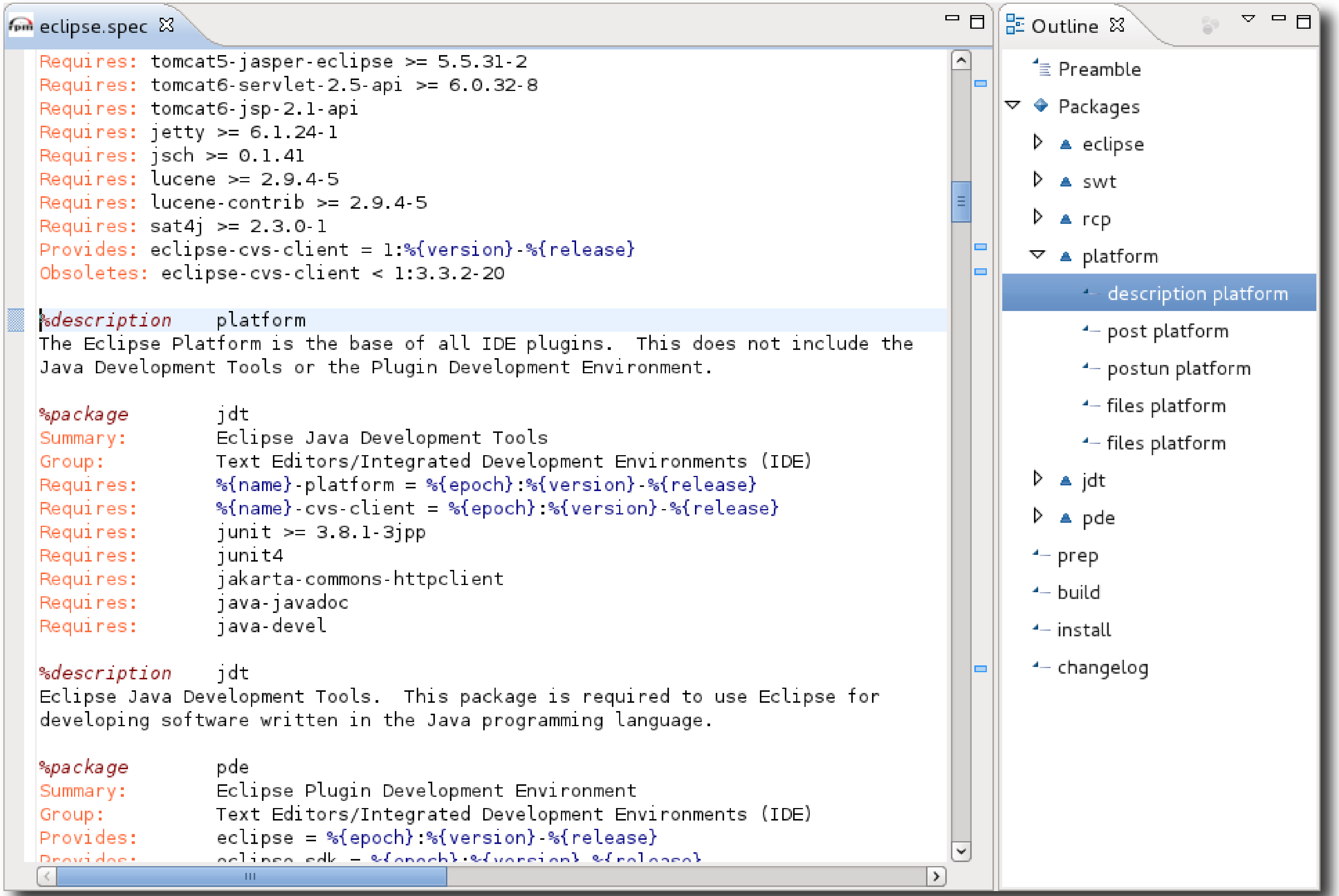
LTTng


Remote Systems
Team
Local
Local Files
Local Shells
Tests
142.133.110.137
Files
Processes
Shells
Terminals
LTTng Tracing
All Providers
kernel
0
test
ust
Go To
Start
Pause
Stop
Configure Trace
Import To Project
Delete Trace

Tools for Linux Packagers

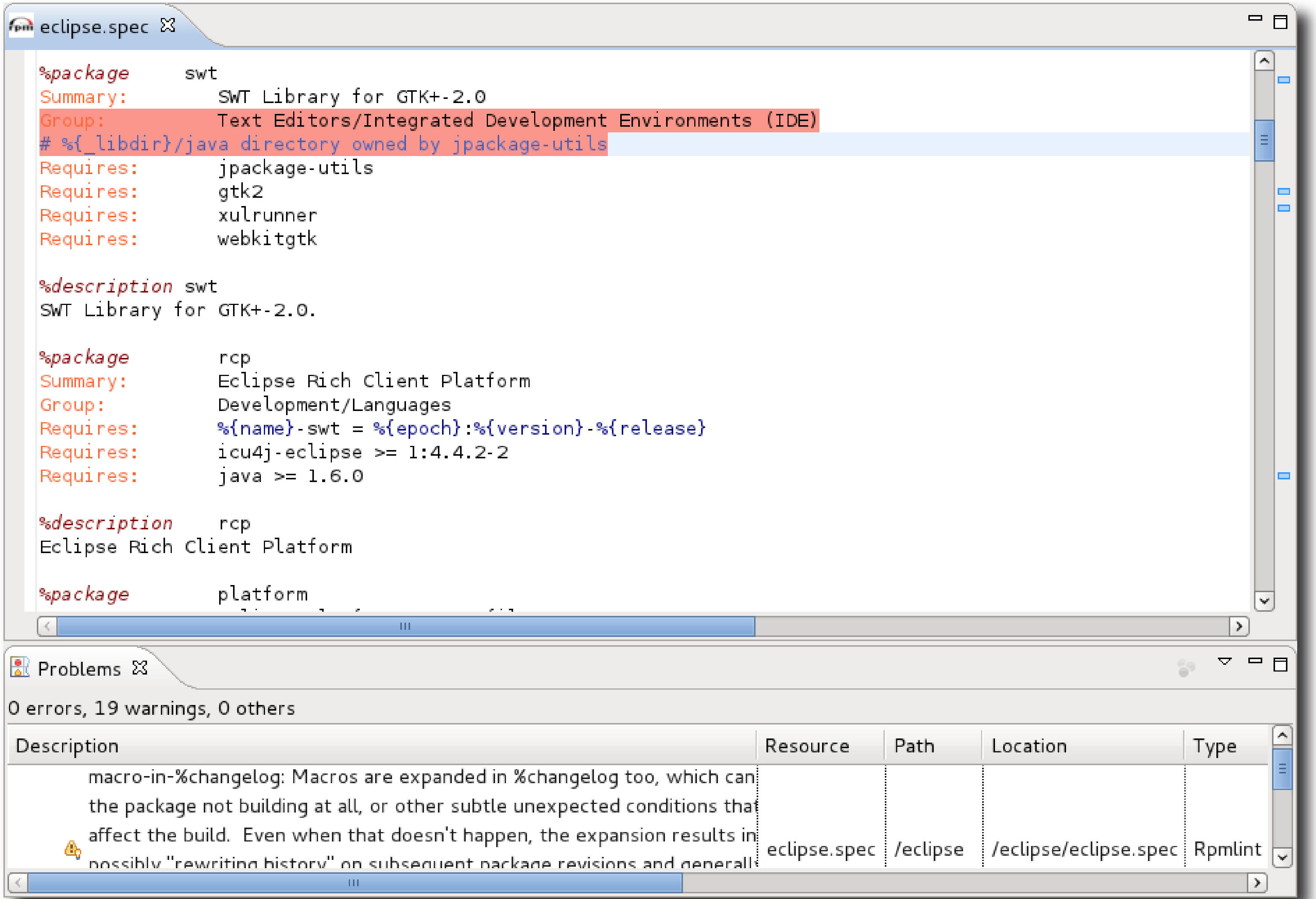
- RPM .spec editor
- Integrate with underlying build tools
- Adopter case study: Fedora

RPM .spec editor



```
Requires: tomcat5-jasper-eclipse >= 5.5.31-2
Requires: tomcat6-servlet-2.5-api >= 6.0.32-8
Requires: tomcat6-jsp-2.1-api
Requires: jetty >= 6.1.24-1
Requires: jsch >= 0.1.41
Requires: lucene >= 2.9.4-5
Requires: lucene-contrib >= 2.9.4-5
Requires: sat4j >= 2.3.0-1
Provides: eclipse-cvs-client = 1:%{version}-%{release}
Obsoletes: eclipse-cvs-client < 1:3.3.2-20

%description     platform
The Eclipse Platform is the base of all IDE plugins.  This does not include the
Java Development Tools or the Plugin Development Environment.

%package         jdt
Summary:         Eclipse Java Development Tools
Group:           Text Editors/Integrated Development Environments (IDE)
Requires:        %{name}-platform = %{epoch}:%{version}-%{release}
Requires:        %{name}-cvs-client = %{epoch}:%{version}-%{release}
Requires:        junit >= 3.8.1-3jpp
Requires:        junit4
Requires:        jakarta-commons-httpclient
Requires:        java-javadoc
Requires:        java-devel

%description     jdt
Eclipse Java Development Tools.  This package is required to use Eclipse for
developing software written in the Java programming language.

%package         pde
Summary:         Eclipse Plugin Development Environment
Group:           Text Editors/Integrated Development Environments (IDE)
Provides:        eclipse = %{epoch}:%{version}-%{release}
Provides:        eclipse-sdk = %{epoch}:%{version}-%{release}
```

rpmlint



eclipse.spec

```
%package     swt
Summary:        SWT Library for GTK+-2.0
Group:          Text Editors/Integrated Development Environments (IDE)
# %{_libdir}/java directory owned by jpackage-utils
Requires:       jpackage-utils
Requires:       gtk2
Requires:       xulrunner
Requires:       webkitgtk

%description swt
SWT Library for GTK+-2.0.

%package        rcp
Summary:        Eclipse Rich Client Platform
Group:          Development/Languages
Requires:       %{name}-swt = %{epoch}:%{version}-%{release}
Requires:       icu4j-eclipse >= 1:4.4.2-2
Requires:       java >= 1.6.0

%description    rcp
Eclipse Rich Client Platform

%package        platform
```

Problems

0 errors, 19 warnings, 0 others

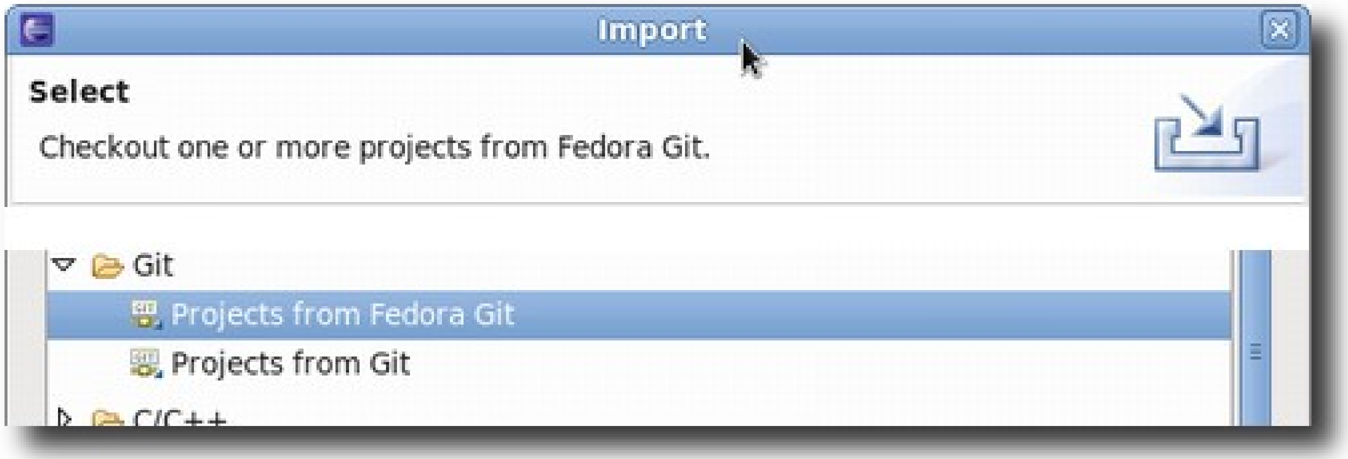
Description	Resource	Path	Location	Type
macro-in-%changelog: Macros are expanded in %changelog too, which can the package not building at all, or other subtle unexpected conditions that affect the build. Even when that doesn't happen, the expansion results in possibly "rewriting history" on subsequent package revisions and generall	eclipse.spec	/eclipse	/eclipse/eclipse.spec	Rpmlint

redhat.

Adopter case study

- Fedora Packager for Eclipse
- Extends RPM plugins with Fedora infrastructure integration

Fedora Packager

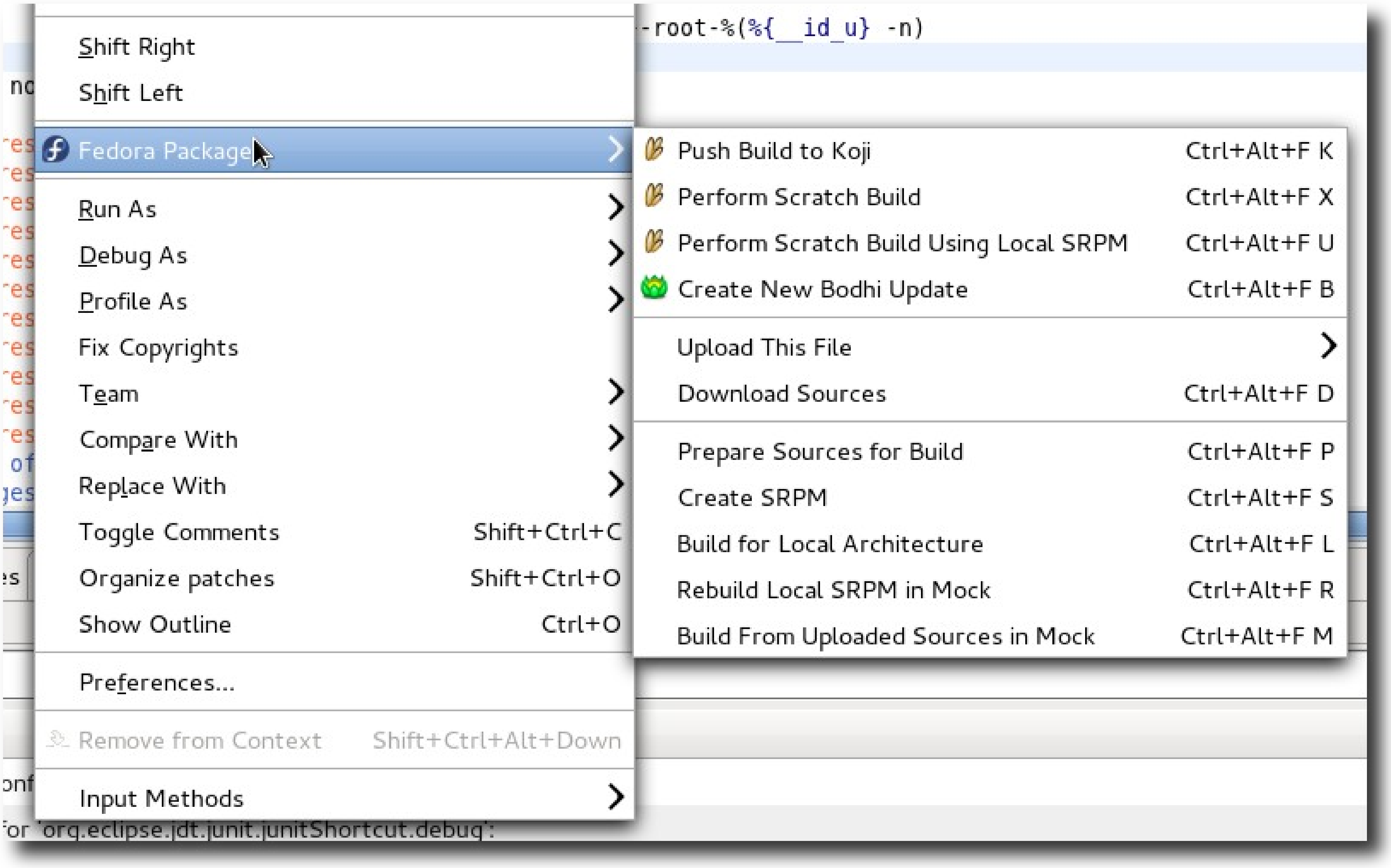


Import

Select

Checkout one or more projects from Fedora Git.

Fedora Packager



Shift Right
Shift Left
Fedora Packager
Run As
Debug As
Profile As
Fix Copyrights
Team
Compare With
Replace With
Toggle Comments Shift+Ctrl+C
Organize patches Shift+Ctrl+O
Show Outline Ctrl+O
Preferences...
Remove from Context Shift+Ctrl+Alt+Down
Input Methods
Push Build to Koji Ctrl+Alt+F K
Perform Scratch Build Ctrl+Alt+F X
Perform Scratch Build Using Local SRPM Ctrl+Alt+F U
Create New Bodhi Update Ctrl+Alt+F B
Upload This File
Download Sources Ctrl+Alt+F D
Prepare Sources for Build Ctrl+Alt+F P
Create SRPM Ctrl+Alt+F S
Build for Local Architecture Ctrl+Alt+F L
Rebuild Local SRPM in Mock Ctrl+Alt+F R
Build From Uploaded Sources in Mock Ctrl+Alt+F M

```
-root-%(%{__id_u} -n)
```

```
for 'org.eclipse.jdt.junit.junitShortcut.debug':
```

Near future

- 1.0 for Juno

Near future

- *perf* contribution from IBM

Near future

- Remote & virtual machine integration

Future

- <insert your ideas here>

Join us

- We welcome contributors of all forms
  - Plug-in testers
  - Plug-in developers
  - Web designers
  - Documentation authors
  - Graphic designers
  - Commercial adopters

http://eclipse.org/linuxtools