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
int main(void) {
    int i = 0;
    for (i = 0; i < 4; ++i) {
        mal
    }
    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`
GNU Autotools

dnl Process this file with autoconf to produce a configure script

AC_PREREQ(2.59)
AC_INIT(AutotoolsProject, 1.0)

AC_CANONICAL_SYSTEM
AM_INIT_AUTOMAKE()

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

Macro: AC_ARG_VAR (variable, ...

Synopsis: Declare variable is a...

Being precious means that
- variable is substituted via AC_ARG...
- The value of variable when do
```c
long fact(long val);

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

int main(int argc, char** argv)
{
    if (argc == 1)
    {
        help();
        return 1;
    }

    int i = 1;
    for (; i < argc; i++)
    {
        unsigned long val = strtol(argv[i], NULL, 10);
        unsigned long res = fact(val);
        printf("%li! = %li\n", val, res);
    }
    return 0;
}
```
### gprof

```
gprof 23

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

<table>
<thead>
<tr>
<th>Name (location)</th>
<th>Samples</th>
<th>Calls</th>
<th>Time/Call</th>
<th>%Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summary</td>
<td>260</td>
<td></td>
<td></td>
<td>100.0%</td>
</tr>
<tr>
<td>foxx.c</td>
<td>260</td>
<td></td>
<td></td>
<td>100.0%</td>
</tr>
<tr>
<td>func_a</td>
<td>125</td>
<td>2</td>
<td>625.0ms</td>
<td>48.08%</td>
</tr>
<tr>
<td>func_a (foxx.c:38)</td>
<td>53</td>
<td></td>
<td></td>
<td>20.38%</td>
</tr>
<tr>
<td>func_a (foxx.c:42)</td>
<td>27</td>
<td></td>
<td></td>
<td>10.38%</td>
</tr>
<tr>
<td>func_a (foxx.c:45)</td>
<td>45</td>
<td></td>
<td></td>
<td>17.51%</td>
</tr>
<tr>
<td>func_b</td>
<td>41</td>
<td>1</td>
<td>410.0ms</td>
<td>15.77%</td>
</tr>
<tr>
<td>func_b (foxx.c:52)</td>
<td>22</td>
<td></td>
<td></td>
<td>8.46%</td>
</tr>
<tr>
<td>func_b (foxx.c:54)</td>
<td>19</td>
<td></td>
<td></td>
<td>7.31%</td>
</tr>
<tr>
<td>0x80488c6</td>
<td>6</td>
<td></td>
<td></td>
<td>2.31%</td>
</tr>
<tr>
<td>0x80488ca</td>
<td>5</td>
<td></td>
<td></td>
<td>1.92%</td>
</tr>
<tr>
<td>0x80488ce</td>
<td>5</td>
<td></td>
<td></td>
<td>1.92%</td>
</tr>
<tr>
<td>0x80488dd</td>
<td>1</td>
<td></td>
<td></td>
<td>0.38%</td>
</tr>
<tr>
<td>0x80488de</td>
<td>2</td>
<td></td>
<td></td>
<td>0.77%</td>
</tr>
<tr>
<td>func_f</td>
<td>67</td>
<td>2</td>
<td>335.0ms</td>
<td>25.77%</td>
</tr>
<tr>
<td>func_f (foox.c:31)</td>
<td>67</td>
<td></td>
<td></td>
<td>25.77%</td>
</tr>
<tr>
<td>main</td>
<td>27</td>
<td>0</td>
<td></td>
<td>10.38%</td>
</tr>
<tr>
<td>main (foxx.c:61)</td>
<td>9</td>
<td></td>
<td></td>
<td>3.46%</td>
</tr>
<tr>
<td>main (foxx.c:63)</td>
<td>11</td>
<td></td>
<td></td>
<td>4.23%</td>
</tr>
<tr>
<td>main (foxx.c:65)</td>
<td>7</td>
<td></td>
<td></td>
<td>1.69%</td>
</tr>
<tr>
<td>0x8048ac7</td>
<td>3</td>
<td></td>
<td></td>
<td>1.15%</td>
</tr>
<tr>
<td>0x8048acf</td>
<td>2</td>
<td></td>
<td></td>
<td>0.77%</td>
</tr>
<tr>
<td>0x8048ed7</td>
<td>2</td>
<td></td>
<td></td>
<td>0.77%</td>
</tr>
</tbody>
</table>
```
Valgrind memcheck

```c
#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;
}
```

Valgrind output:

```
memcheck [memcheck]/usr/bin/valgrind (11-04-20 4:15 PM)

Use of uninitialized value of size 8 [PID: 3422]

Invalid read of size 4 [PID: 3422]
Process terminating with default action of signal 11 (SIGSEGV) [PID: 3422]
```
Valgrind massif
Valgrind cachegrind
Valgrind helgrind

- 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 0x4d0b70 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: q_repository_find_by_gtype (in /usr/lib64/libgirepository-1.0.so.1.0.0)
SystemTap

```plaintext
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,
```
LTTo
LTTng
LTTng
<table>
<thead>
<tr>
<th>Timestamp</th>
<th>Source</th>
<th>Type</th>
<th>Reference</th>
<th>Content</th>
</tr>
</thead>
<tbody>
<tr>
<td>10718.529133087</td>
<td>Kernel Core</td>
<td>fs/0/pollfd</td>
<td>MyDemoTrace</td>
<td>fd:43</td>
</tr>
<tr>
<td>10718.529134409</td>
<td>Kernel Core</td>
<td>fs/0/pollfd</td>
<td>MyDemoTrace</td>
<td>fd:45</td>
</tr>
<tr>
<td>10718.529135666</td>
<td>Kernel Core</td>
<td>fs/0/pollfd</td>
<td>MyDemoTrace</td>
<td>fd:47</td>
</tr>
<tr>
<td>10718.529136931</td>
<td>Kernel Core</td>
<td>fs/0/pollfd</td>
<td>MyDemoTrace</td>
<td>fd:49</td>
</tr>
<tr>
<td>10718.529138192</td>
<td>Kernel Core</td>
<td>fs/0/pollfd</td>
<td>MyDemoTrace</td>
<td>fd:51</td>
</tr>
<tr>
<td>10718.529139622</td>
<td>Kernel Core</td>
<td>fs/0/pollfd</td>
<td>MyDemoTrace</td>
<td>fd:53</td>
</tr>
<tr>
<td>10718.529140967</td>
<td>Kernel Core</td>
<td>fs/0/pollfd</td>
<td>MyDemoTrace</td>
<td>fd:55</td>
</tr>
<tr>
<td>10718.529142231</td>
<td>Kernel Core</td>
<td>fs/0/pollfd</td>
<td>MyDemoTrace</td>
<td>fd:57</td>
</tr>
<tr>
<td>10718.529143417</td>
<td>Kernel Core</td>
<td>fs/0/pollfd</td>
<td>MyDemoTrace</td>
<td>fd:59</td>
</tr>
<tr>
<td>10718.529150292</td>
<td>Kernel Core</td>
<td>mm/0/page_free</td>
<td>MyDemoTrace</td>
<td>pfn:44576, order:0</td>
</tr>
<tr>
<td>10718.529151478</td>
<td>Kernel Core</td>
<td>kernel/0/syscall_exit</td>
<td>MyDemoTrace</td>
<td>ret:1</td>
</tr>
<tr>
<td>10718.529153049</td>
<td>Kernel Core</td>
<td>kernel/0/syscall_entry</td>
<td>MyDemoTrace</td>
<td>syscall_id:168, ip:0x9a8416</td>
</tr>
<tr>
<td>10718.529154230</td>
<td>Kernel Core</td>
<td>fs/0/pollfd</td>
<td>MyDemoTrace</td>
<td>fd:15</td>
</tr>
</tbody>
</table>
LTTng
LTTng
LTTng
Tools for Linux Packagers

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

#description

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

%package
describe 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

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

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

Outline

- Preamble
  - Packages
    - eclipse
      - swt
      - rcp
      - platform
    - post platform
    - postun platform
    - files platform
    - files platform
  - jdt
  - pde
    - prep
    - build
    - install
    - changelog
rpmlint

```
%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

<table>
<thead>
<tr>
<th>Description</th>
<th>Resource</th>
<th>Path</th>
<th>Location</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>macro-in-%changelog: Macros are expanded in %changelog too, which can make</td>
<td>eclipse.spec</td>
<td>/eclipse</td>
<td>/eclipse/eclipse.spec</td>
<td>Rpmlint</td>
</tr>
</tbody>
</table>
Adopter case study

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