

Identification

Verification

Validation

of

Open Linux Tools on

Beagle Board

By

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## 1. NODEMON

Nodemon is a visualization tool for monitoring system resource utilization, which will run on systems ranging from a single-user desktop to NASA's 10,240-processor Columbia supercomputer.

- Monitoring and visualization components are developed using the "growler" distributed-object, modular plug-in architecture.
- Collects high-frequency statistics when possible, typically at 20Hz.
- Runs one growler-nodemon daemon per single-system image (SSI)
- Maintains ability to run viewers on any Linux workstation

**cpumon** and **cpusetmon** represent CPU activity information collected from /sys/devices and the cpuset kernel interface, organized in grid form (one cell per CPU).

- cpusets (CPU allocations) are represented by colored outlines.
- Cell colors indicate amount of activity

**pagemon** represents memory distribution information across processor nodes, collected from /sys/devices, organized in bar graph form.

**linkmon** represents NUMAlink traffic statistics, collected via the Performance Copilot (PCP) library, in a topology correct graph.

**netmon** represents IP and InfiniBand network collected from /sys and organized in bar graph form.

URL : [people.mas.masa.gov/~bgreen/nodeon/#documentation](http://people.mas.masa.gov/~bgreen/nodeon/#documentation)

also : <http://sourceforge.net/projects/nodemon/>

## 2. Linux Performance Monitoring

This is a family of monitoring tools which examined content of linux's **/proc** directory and shows it in human readable form.

Using this tools you can monitor current state of the system or you can collect data for system history.

This family consisting two classes of files.

- Linux Kernel Measurement Interface
- Monitoring applications

### Linux Kernel Measurement Interface (KMI)

This one contains code which retrieves data from **/proc** directory. And you can use these functions to incorporate into your applications without exploring and understanding **/proc** directory.

**Note:** Functionality of these functions are dependent on kernel version.

### Monitoring applications

These applications collects and shows system status data. They includes console (ncurses) or graphics (X windows + [lesstif](#)) environment.

### Linux Monitor

This is a console application which shows current system status and resource usage. And is able to initiate automatic action if some threshold is reached.

URL: [http://www.volny.cz/linux\\_monitor/](http://www.volny.cz/linux_monitor/)

### 3. SYSSAT

#### **Introduction to sysstat**

The **sysstat** package contains utilities to monitor system performance and usage activity. Sysstat contains various utilities, common to many commercial Unixes, and tools you can schedule via cron to collect and historize performance and activity data.

- [iostat\(1\)](#) reports CPU statistics and input/output statistics for devices, partitions and network filesystems.
- [mpstat\(1\)](#) reports individual or combined processor related statistics.
- [pidstat\(1\)](#) reports statistics for Linux tasks (processes) : I/O, CPU, memory, etc.
- [sar\(1\)](#) collects, reports and saves system activity information (CPU, memory, disks, interrupts, network interfaces, TTY, kernel tables, etc.)
- [sadc\(8\)](#) is the system activity data collector, used as a back end for sar.
- [sa1\(8\)](#) collects and stores binary data in the system activity daily data file. It is a front end to sadc designed to be run from cron.
- [sa2\(8\)](#) writes a summarized daily activity report. It is a front end to sar designed to be run from cron.
- [sadf\(1\)](#) displays data collected by sar in multiple formats (CSV, XML, etc.) This is useful to load performance data into a database, or import them in a spreadsheet to make graphs.

#### **Sysstat's main features:**

- Includes four groups of monitoring tools (sar / sadc / sadf, iostat, mpstat, pidstat) for global system performance analysis.
- Can monitor a huge number of different metrics:
  1. Input / Output and transfer rate statistics (global, per device, per partition, per network filesystem and per Linux task / PID)
  2. CPU statistics (global, per CPU and per Linux task / PID)
  3. Memory and swap space utilization statistics
  4. Virtual memory, paging and fault statistics
  5. Per-task (per-PID) memory and page fault statistics
  6. Global CPU and page fault statistics for tasks and all their children
  7. Process creation activity
  8. Interrupt statistics (global, per CPU and per interrupt, including potential APIC interrupt sources)
  9. Network statistics, for all network interfaces!
  10. NFS server and client activity
  11. Socket statistics
  12. Run queue and system load statistics
  13. Kernel internal tables utilization statistics
  14. System and per Linux task switching activity
  15. Swapping statistics
  16. TTY device activity
- Average statistics values are calculated over the sampling period.
- Works with every Linux kernel (from the old 2.0 to the newest 2.6 ones),

- Most system statistics can be saved in a file for future inspection.
- Allows to configure the length of data history to keep.
- On the fly detection of new devices (disks, network interfaces, etc.) that are created or registered dynamically.
- Support for UP and SMP machines, including machines with hyperthreaded or multi-core processors.
- Support for hotplug CPUs (it detects automatically CPUs that are disabled or enabled on the fly).
- Works on many different architectures, whether 32- or 64-bit.
- Needs very little CPU time to run (written in C).
- System statistics can be exported in various different formats (CSV, XML, etc.). DTD and XML Schema documents are included in sysstat package.
- Internationalization support (sysstat has been translated into numerous different languages). Sysstat is now part of the [Translation Project](#).
- Many programs available on the internet to use sysstat's data to make graphs (one of them, isag, is included in sysstat).

URL: <http://pagesperso-orange.fr/sebastien.godard/documentation.html>

## 4. RRDtool

**RRDtool** is a [round-robin database](#) tool. It is designed to handle [time series](#) data like [network bandwidth](#), [temperatures](#), [CPU](#) load etc. The data is stored in round-robin database so that system storage footprint remains constant over time.

It also includes tools to extract **RRD** data in a graphical format.

### Documentation:

#### [rrdtool](#)

Round Robin Database Tool

#### [rrdbuild](#)

Instructions for building RRDtool

#### [rrdcgi](#)

Create web pages containing RRD graphs based on templates

#### [rrdcreate](#)

Set up a new Round Robin Database

#### [rrddump](#)

dump the contents of an RRD to XML format

#### [rrdfetch](#)

Fetch data from an RRD.

#### [rrdfirst](#)

Return the date of the first data sample in an RRA within an RRD

#### [rrdgraph](#)

Round Robin Database tool grapher functions

#### [rrdgraph\\_data](#)

preparing data for graphing in rrdtool graph

#### [rrdgraph\\_examples](#)

Examples for rrdtool graph

#### [rrdgraph\\_graph](#)

rrdtool graph command reference

#### [rrdgraph\\_rpn](#)

About RPN Math in rrdtool graph

#### [rrdinfo](#)

extract header information from an RRD

#### [rrdlast](#)

Return the date of the last data sample in an RRD

#### [rrdlastupdate](#)

Return the most recent update to an RRD

#### [rrdresize](#)

alters the size of an RRA and creates a new .rrd file

#### [rrdrestore](#)

Restore the contents of an RRD from its XML dump format

#### [rrdtune](#)

Modify some basic properties of a Round Robin Database

URL: <http://oss.oetiker.ch/rrdtool/index.en.html>

also: <http://en.wikipedia.org/wiki/RRDtool>

## 5. Monitor your Linux computer with machine-generated music

There are many visually informative monitoring programs for assessing the health of your computer environment. Everything from simple text displays to real-time charts and 3-D colored graphs are available to help you diagnose issues with your personal, server, or network computing devices. **chordStats** adds a new channel of interface to the system monitoring setup -- information passed through tone, timbre, and harmony.

**chordStats** produces a similar sound environment with the addition of tones, instrument sound characteristics, and harmony creation based on system load. In this article, we create a simple Perl script to send note events to **FluidSynth**, force the various system events to be interpreted as a part of a harmonious interval, and discuss future options for enhancing your musical monitoring environment.

URL: [http://www.ibm.com/developerworks/library/os-linuxmusic/index.html?S\\_TACT=105AGY08&S\\_CMP=FEED](http://www.ibm.com/developerworks/library/os-linuxmusic/index.html?S_TACT=105AGY08&S_CMP=FEED)



## 6. NightStar LX

### Advanced Development And Analysis Tools For Linux

Unlike ordinary debuggers, NightStar LX doesn't leave one stranded in the dark. It's more than just a debugger, it's a whole suite of integrated diagnostic tools designed for complex Linux applications to reduce test time, increase productivity and lower costs. One can debug, monitor, analyze and tune with minimal intrusion, so one sees real execution behavior. And that's positively illuminating.

Time-critical applications require debugging tools that can handle the complexities of multiple processors, multi-task interaction and multi-threading. NightStar LX advanced features enable system builders to solve difficult problems quickly. The same tools proven by the automotive, aerospace and defense industries are now available.

#### Features

- Deterministic debugging, monitoring, tracing and tuning
- Ideal for time-critical applications
- Easy-to-use graphical user interface
- Support for any mix of GNU and Intel C/C++ and Fortran tasks
- Self-hosted or remote target system operation
- Comprehensive on-line help facilities
- **NightView™ Source-level Debugger**
  - Multi-system, multi-process, multi-thread debugging via single interface
  - Hot patches including breakpoints, monitorpoint and watchpoints
  - Application speed conditions
  - Dynamic memory debugging
  - Modification and display of variables during execution
- **NightTrace™ Event Analyzer**
  - Synchronized graphical or text display of system and application activity
  - User-defined event logging in single or multi-thread applications
  - Function call and parameter tracing
  - Data analysis API
- **NightProbe™ Data Monitor**
  - Sampling and recording of program data
  - Synchronous and asynchronous data capture
  - Flexible data display features
  - Sampling, recording and replay
- **NightTune™ Performance Tuner**
  - Dynamic display of system and application performance
  - Monitoring of CPU use, memory paging and network operation
  - Interactive control of processes, priorities, policies and interrupts
  - Dynamic CPU affinity control for processes, threads and interrupts
  - Detailed process and thread information

URL: [http://news.ccur.com/isd\\_solutions\\_nightstarlinux.asp](http://news.ccur.com/isd_solutions_nightstarlinux.asp)

## **7. Linux Monitor**

Linux Monitor is system monitoring software for Linux. Linux Monitor has client and server programs to monitor remote services (HTTP,SMTP,IMAP and NNTP). All "errors" are stored to database and viewed using cgi-scripts.

URL: <http://sourceforge.net/projects/linux-mon/>

## 8. Trinix: A Linux Security Toolkit

Trinix is a small ram-disk/floppy based Linux distribution that contains useful tools for mapping and monitoring TCP/IP networks (i.e. intrusion detection and vulnerability scanning)

Trinix was a ram-disk-based Linux distribution that boots from a single floppy or CD-ROM, loads its packages from an HTTP/FTP server, a FAT/NTFS/ISO filesystem, or additional floppies. Trinix contains the latest versions of popular Open Source network security tools for port scanning, packet sniffing, vulnerability scanning, sniffer detection, packet construction, active/passive OS fingerprinting, network monitoring, session-hijacking, backup/recovery, computer forensics, intrusion detection, and more. Trinix also provides support for Perl, PHP, and Python scripting languages. Remote Trinix boxes can be managed securely with OpenSSH.

Trinix gives you the power of Linux security tools without requiring a full-blown Linux install or the need to download, compile, install, and update a complete suite of security tools that are typically not found in mainstream distributions.

URL: <http://trinix.sourceforge.net/legacy/>  
also: <http://sourceforge.net/projects/trinix/>  
&: <http://code.google.com/p/ubuntu Trinix/>

## 9. PHPMyServer

PHPMyServer is a modular, webbased server monitoring system. Monitor multiple servers at the same time. In the future there will be many more features (client monitoring/administration tools/etc).

URL: <http://sourceforge.net/projects/phpmyserver/>

## 10. Checksuite resource monitoring tools

Checksuite is a suite of perl scripts to assist in day-to-day system administration tasks. The scripts are intended to monitor system resources and a few security-related aspects. This is intended for Linux and may work on other Unix platforms.

It monitors the system resources on a system and if one of the resources goes above the threshold, it will alert the sysadmin via e-mail and log it. It also will provide one with a weekly security summary report on your system.

It currently runs and has been tested on Linux.

URL: <http://checksuite.sourceforge.net/index.html>  
also: <http://sourceforge.net/projects/checksuite>

## **11. OProfile**

OProfile is a low-overhead, transparent profiler for Linux, capable of instruction-grain profiling of all processes, shared libraries, the kernel and device drivers, via the hardware performance counters.

OProfile is a system-wide profiler for Linux systems, capable of profiling all running code at low overhead. OProfile is released under the GNU GPL.

It consists of a kernel driver and a daemon for collecting sample data, and several post-profiling tools for turning data into information.

OProfile leverages the hardware performance counters of the CPU to enable profiling of a wide variety of interesting statistics, which can also be used for basic time-spent profiling. All code is profiled: hardware and software interrupt handlers, kernel modules, the kernel, shared libraries, and applications.

OProfile is currently in alpha status; however it has proven stable over a large number of differing configurations; it is being used on machines ranging from laptops to 16-way NUMA-Q boxes. As always, there is no warranty.

URL: <http://oprofile.sourceforge.net/about/>

also: <http://sourceforge.net/projects/oprofile/>

## **12. Linux Wifi Benchmark**

A TCP/UDP IP Benchmark tools which supports 3 Chariot testing cases used by Wi-Fi Alliance to certify Wi-Fi Logo. (3 cases : File transfer long, Inquiry long, Real Audio).

URL: <http://sourceforge.net/projects/wifi-bench/>

## **13. ClusterScores**

ClusterScores is a cluster benchmarking tool which automate compile, benchmark, and report benchmarking on cluster. This tool integrates other standard cluster benchmark tools such as HPL, Stream, Netpipe, Iperf, Bonnie, IOZone, etc...

URL: <http://sourceforge.net/projects/clusterscores/>

## 14. Hpcbench

Hpcbench is a Linux-based network benchmark evaluating the high performance networks such as Gigabit Ethernet, Myrinet and QsNet. Hpcbench measures the network latency and achievable throughput between two ends. Hpcbench is able to log the kernel information for each test, which includes the CPU and memory usage, interrupts, swapping, paging, context switches, network cards' statistics, etc.

Hpcbench consists of three independent packages that test UDP, TCP and MPI communications respectively. A kernel resources tracing tool "sysmon" is also included, whose output is similar to that of vmstat, but has more information of network statistics.

URL: <http://hpcbench.sourceforge.net/>

## 15. Dashboard Linux – DashPC

**The Dashboard Linux PC** Project is a Linux UI for automobile multimedia. To be used for MP3's, GPS, DVDs, CD, etc.

DashPC™ technology will work in virtually any vehicle. These DashPC™ prototype vehicles feature [Global Positioning and Navigation \(GPS\)](#), Digital Versatile Discs (DVDs), and an OBDII on-board engine interface. [Dashwerks™](#) technology includes such advanced features as Geocasting, AODV, VANETS, and V2V communication. Unlike other vehicle infotainment systems, the DashPC™ was designed to be simple to use in a vehicle environment, while simultaneously offering powerful expansion capability (because of our RTOS Linux core).

URL: <http://www.dashpc.com/>

Also: <http://sourceforge.net/projects/dashpc/>

## 16. **ibuta - a c++ multimedia framework**

**libuta** is a C++ framework for developing multimedia applications, especially games. Since it is based upon SDL (<http://www.devolution.com/~slouken/SDL>) it is platform independent, though it has only been tested on Win32 and Linux systems.

**ibuta** is a Graphical User Interface library for C++ that uses SDL (Simple Directmedia Layer) as its output layer. It allows application and game programmers to put together portable graphical applications easily. *libuta* has a range of already implemented widgets and uses libsigc++ as a signal dispatching system. It also performs resource management and has a sound system.

Font rendering is supported using FreeType, with pre-rendered characters, hence text can be blitted as fast as a bitmap font with all the benefits of scalable TrueType fonts.

The widgets include labels, single/multi line edit boxes, push/toggle buttons, list boxes, animation playback widgets (using SMPEG), progress dialogs and standard dialogs. Animated mouse cursors that can change their appearance depending on the position of the mouse are easily supported, and creating one's own widgets from scratch or by combining others is quickly done through use of inheritance.

URL: <http://libuta.sourceforge.net/>

also: <http://sourceforge.net/projects/libuta/>

## 17. \*nix Power Tools

Power Tools for Unix/Linux (\*nix)

### [MkBoot - generic boot loader installer](#)

generic boot loader installer that is versatile enough to satisfy your various needs (shell script)

### [IsoL2Grub - translate from isolinux.cfg to grub/menu.lst](#)

help easy the transition from booting with isolinux/syslinux to grub/grub4dos by automatic configure file translation. (shell/Perl script)

### [Persistent Storage - an alternative method to save changes for Slax](#)

It allows you to install Slax, selectively save changes and optionally use swap space to boost performance, all without altering your partition table. (shell script)

### [Meta Build - meta module building script](#)

download and build customized lzm modules automatically from simple meta module definition file. (shell script)

### [Slax Mini - a core Slax/Linux-Live foundation that all distros can based upon](#)

make building a Slax/Linux-Live based Live-CD easier for everyone (shell script)

### [Wiki Import - mediawiki auto import script](#)

import a whole folder of files into mediawiki, with the folder directory tree mapped as wiki category hierarchy. (shell script)

### [Latex Make - for Latex compiling](#)

build LaTeX files until all references (including BibTeX) are resolved, and all indexes are built. Can generate .dvi .ps .pdf .html .txt or .rtf files. (makefile)

### [Emacs AsciiDoc Mode](#)

Emacs mode for AsciiDoc fontlocking (elisp)

### [Emacs Brief Mode](#)

fully functional Brief simulation for Emacs (elisp)

### [DFW - Disk Free-space Watcher](#)

actively monitors your disk occupied level (Tk)

### [fileSimilar - Similar files locator](#)

pick similar-sized and similar-named files as suspicious duplicated files (Perl)

### [jot - print sequential or random data](#)

prints out increasing, decreasing, or random data (C)

### [CalciteCrystal - fluxbox theme that looks like calcite crystal growing in the dark](#)

dark-background and mild-contrast theme that is good for you when you need to look at it day and night (fluxbox theme)

URL: <http://xpt.sourceforge.net/>

also: <http://sourceforge.net/projects/xpt/>

## 18. WMPower

WMPower is a Window Maker dock application for Linux allowing the user to see (and set) the power management status of his laptop. Written in C, works with both APM and ACPI enabled kernels. It also interfaces directly to Toshiba hardware.

- Battery status display (you chose the battery)
- Both APM and ACPI kernels are supported
- On ACPI kernels you get fan status and a thermal sensor.
- Direct access to Toshiba hardware: you get fan status and LCD brightness management even without an ACPI kernel
- While on battery, it can stop your fan, HD, lin-seti service to make the battery last longer; if you have a Toshiba Laptop, it can also adjust your LCD brightness
- Fast battery charge mode: you can keep 'on battery' settings until your battery reaches 100%; this will make it recharge much faster -no-meddling option: if you want the program to display power manamenegt status, but not to take any action
- On Toshiba laptops you can use your mouse wheel to adjust the brightness of your lcd screen
- Support for Dell laptops -Support for Compal hardware (see README.compal) - Support for CPU frequency scaling

URL: <http://wmpower.sourceforge.net/>

also: <http://sourceforge.net/projects/wmpower/>



## **19. vcstools, set of virtual console gadgets**

This is set of tools fittable to almost any kind of linux platform. These tools allow You to continuously monitor state of: CPU, MEMORY, SWAP SPACE, BATTERY STATUS and TIME on your linux console. These tools are based on vcstime console-clock

URL: <http://sourceforge.net/projects/vcstools/>

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## **20. statusreport - Tools to generate reports**

Tools to generate reports on the status of your connectivity/services such as number of successful queries to your BIND DNS server, your Telstra BigPond monthly usage and status of internal or ISP server services.

URL: <http://sourceforge.net/projects/statusreport/>

## **21. Bandwidth Management Tools**

Bandwidth Management Tools is a total bandwidth management solution for Linux and can be used for firewalling, traffic graphing, and shaping. It is not based on any currently-available bandwidth management software some ver advanced features.

URL: <http://www.bwmtools.org/display.php?page=documentation>

also: <http://sourceforge.net/projects/bwm-tools/>

## 22. Lmbench – Tools for Performance Analysis

Lmbench is a suite of simple, portable, ANSI/C microbenchmarks for UNIX/POSIX. In general, it measures two key features: latency and bandwidth. Lmbench is intended to give system developers insight into basic costs of key operations.

Suite of simple, portable benchmarks

- Compares different systems performance
- Results available for most major vendors (SUN, HP, IBM, DEC, SGI, PCs including 200 Mhz P6's)
- Free software, covered by the GNU General Public License.
- Bandwidth benchmarks
  - Cached file read
  - Memory copy (bcopy)
  - Memory read
  - Memory write
  - Pipe
  - TCP
- Latency benchmarks
  - Context switching.
  - Networking: connection establishment, pipe, TCP, UDP, and RPC hot potato
  - File system creates and deletes.
  - Process creation.
  - Signal handling
  - System call overhead
  - Memory read latency
- Miscellaneous
  - Processor clock rate calculation

URL: <http://lmbench.sourceforge.net/>

also: <http://sourceforge.net/projects/lmbench/>

## 23. ClusterScores

ClusterScores is a cluster benchmarking tool which automate compile, benchmark, and report benchmarking on cluster. This tool integrates other standard cluster benchmark tools such as HPL, Stream, Netpipe, Iperf, Bonnie, IOZone, etc...

URL: <http://sourceforge.net/projects/clusterscores/>

## 24. Interactive Linux apps benchmarking

This project aims to provide tools for benchmarking the performance of various releases of Linux when running interactive applications, especially graphical applications.

URL: <http://sourceforge.net/projects/bench/>

## 25. Powertweak-Linux

Powertweak provides information about your computer hardware and linux kernel setup including:

- DMI BIOS interrogation (not only bios settings, but ports, cpu and events) **(NEW)**
- some 2.5 linux kernel proc settings **(NEW)**
- PCI configuration space tuning.
- Adjusting block device elevator algorithms.
- Changing /proc/sys entries.
- hdparm type features (Informational only right now)
- IDE SMART status.
- CPU Model specific register tuning
- CPU MTRR registers (Informational only right now)

Powertweak can be used to tune your kernel and hardware configuration for optimal performance, or for viewing hardware and kernel settings. It currently has a graphical GTK GUI, and a simple text based tree lister.

URL: <http://powertweak.sourceforge.net/>

also: <http://sourceforge.net/projects/powertweak/>

## 26. Beat It

A virtual synthesizer. Also contains a beat box tool, modulation tool (to make the sound less perfect, more real), stream to disk recording, real-time effects and response. Allows you to associate samples with keys and then tap out a beat.

URL: <http://sourceforge.net/projects/unixbench/>

## 27. Golden Cheetah PowerTap Software for Linux & MacOS X

The goal of the Golden Cheetah project is to develop a software package that:

- Downloads ride data from power measurement devices, such as the [CycleOps PowerTap](#), the [ergomo](#), the [Polar Electro](#), and the [SRM Training System](#)
- Helps athletes analyze downloaded data with features akin to commercial power analysis software, such as [Cycling Peaks](#)
- Works on non-Microsoft Windows-based systems, such as FreeBSD, Linux, and Mac OS X
- Is available under an [Open Source](#) license

URL: <http://goldencheetah.org/>

## 28. UnixBench

Suite for POSIX system benchmarking.

URL: <http://sourceforge.net/projects/unixbench/>

## 29. Eclipse – Oprofile

**Eclipse-OProfile is a graphical, Eclipse-based front-end to the powerful [OProfile](#) profiling tool. Eclipse-OProfile is integrated with the Eclipse [C/C++ Development Tools](#) (CDT) and aims to provide users with an easy-to-use interface for profiling C/C++ applications.**

**The OProfile back-end is required by Eclipse-OProfile and is only available on the Linux operating system. The OProfile back-end is a standalone, separately-maintained open source project and has no affiliation with Eclipse-OProfile.**

URL: <http://eclipseoprofile.sourceforge.net/>

also: <http://sourceforge.net/projects/eclipseoprofile/>

### 30. Kernprof (Kernel Profiling)

This page describes Kernprof, a set of facilities for profiling the Linux kernel. It consists of a kernel patch that implements a number of profiling data collection mechanisms, as well as a device driver for controlling them, plus the user level command **kernprof** that allows a user to configure and control the kernel profiling facilities. At this time it also includes a small gcc patch that is necessary to build correct i386 kernels when profiling is compiled in.

URL: <http://oss.sgi.com/projects/kernprof/>

also: <http://linuxperf.sourceforge.net/tools/tools.php>

### 31. Kernel Spinlock Metering for Linux

The Linux SMP kernel uses spinlocks to protect data structures from concurrent, potentially conflicting accesses. This patch allows you to build an i386, ia64, Alpha, Sparc64, or mips64 kernel that can perform simple "metering" (record-keeping) of spinlock usage. Also available is source for an associated new command, lockstat, that is used to instruct the kernel to turn this lock metering on or off, and to retrieve the metering data from the kernel and display it in a human-readable format.

Data displayed includes the number of lock attempts, per-spinlock per-caller, the number of those attempts that were immediately successful vs. those that required the attempting locker to wait for the current lock-holder to release; the mean and max hold-time, and the mean, max, and cumulative wait-time. Whenever possible, the locking caller and the spinlocks are identified by their symbolic names, not by their virtual addresses.

URL: <http://oss.sgi.com/projects/lockmeter/>

also: <http://linuxperf.sourceforge.net/tools/tools.php>

### 32. Gcov

Gcov is a test coverage program, which helps discover where your optimization efforts will best affect your code. Using gcov one can find out some basic performance statistics on a per source file level such as

- how often each line of code execute
- what lines of code are actually executed
- how much computing time each section of code uses

gcov is already available for user level applications. We implemented gcov support for the linux kernel, by providing coverage support infrastructure to the kernel and a dynamic module (gcov-prof.o) to produce the basic block profile information, which gives the statistics for the running kernel and modules.

URL: <http://linuxperf.sourceforge.net/tools/tools.php#Gcov>

also: [http://www-es.fernuni-hagen.de/cgi-bin/info2html?\(gcc\)Gcov](http://www-es.fernuni-hagen.de/cgi-bin/info2html?(gcc)Gcov)

### 33. Strace

Strace is a very useful tool for analyzing the system call activity on a system. A variety of options allows for detailed as well as summarized reports.

URL: <http://linuxperf.sourceforge.net/tools/tools.php#Strace>

### 34. The qprof project

This is a set of profiling utilities, currently targeting only linux. It includes a simple command line profiling tool, with the following characteristics:

- It is intended to be easy to install and use. No kernel modules or changes are required for basic use. It can be installed and used without root access.
- It supports profiling of dynamically linked code and includes information on time spent in dynamic libraries.
- It supports profiling of multithreaded applications.
- It generates profiles for all subprocesses started from a shell. Thus it easily can be used to profile application with multiple processes.
- It tries to generate symbolic output. This is usually successful for the main program, if that has debug information, i.e. was compiled with -g. If not, you may need a debugger to fully interpret the results. However the raw output will often give you a rough idea of where processor time is spent.
- It currently generates "flat" profiles. The output tells you roughly how much time was spent in a given instruction, line, or function  $f$ . By default this does not include time spent in functions called by  $f$ , but on platforms supported by [libunwind](#) a possible alternative is to include callees in profile counts, thus recovering some gprof-like functionality.
- Linux kernel functions are not profiled separately. By default, time spent in the kernel is credited to the library function which made the kernel call.
- On Itanium, it can be used to generate hardware-event-based profiles. For example, it can tell you where most of the cache misses occur.

URL: <http://www.hpl.hp.com/research/linux/qprof/>