

Project Topic

System Information with Open-Source Software

Submitted on partial fulfilment of the requirements for the award of degree of

Bachelor of Technology

In

Information Technology

Submitted to

Rajeshwar Sharma

LOVELY PROFESSIONAL UNIVERSITY

PHAGWARA, PUNJAB



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Project GitHub Link: - https://github.com/suhelkhan2001/Sys_Info_Open_Source.git

Q. Use any Open-Source Software displays details about various system information tools, like the CPU, motherboard, monitor, audio, network, and other components. Also display the current and average speed/rate of the memory, hard drive, and CPU.

Introduction

Description of the project: -

→ ASTRA32 is another free system information tool that shows amazing detail on numerous devices and other parts of the system.

There are several categories to separate the information it gathers on hardware, like that of a motherboard, storage, and monitor information.

A system summary section is perfect for seeing an overview of all the hardware and operating system details. Also, a dedicated section for live monitoring is included to show the temperature and current usage of various hardware components.

ASTRA32 works as a demo program, but it does not really mean much because it still provides lots of useful information.

It can be used on Windows 11, 10, 8, 7, Vista, XP, 2000, and Windows Server 2008 and 2003.

Objective of the project: -

The objective of the topic is to provide information about open-source software that can display system information and performance metrics. The topic suggests using a software called "hwinfo" to display details about various system information tools such as the CPU, motherboard, monitor, audio, network, and other components.

Additionally, the topic suggests using commands such as "mpstat", "free", and "iostat" to display current and average speed/rate of the memory, hard drive, and CPU.

The objective of this topic is to help users monitor their system performance and identify potential performance issues. By using open-source software, users can access detailed system information without having to purchase proprietary software.

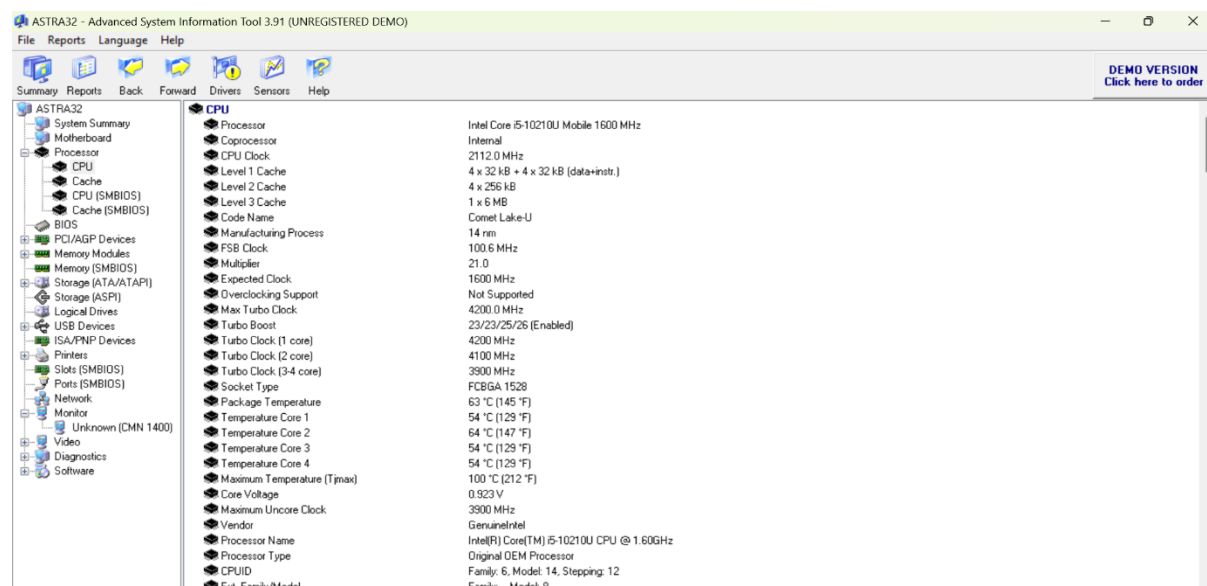
This can be particularly useful for individuals and organizations that need to monitor the performance of multiple systems, as open-source software is often free and can be installed on multiple systems.

Scope of the project: -

The scope of the project is to provide information about open-source software that can display system information and performance metrics. Specifically, the topic focuses on a software called "hwmfio" and commands such as "mpstat", "free", and "iostat" to display details about various system components and the current and average speed/rate of the memory, hard drive, and CPU.

The project does not cover other open-source software or proprietary software that can be used to monitor system performance. Additionally, the topic does not cover in-depth analysis of system performance or specific techniques for optimizing system performance. Instead, the topic provides a high-level overview of tools that can be used to monitor system performance and identify potential performance issues.

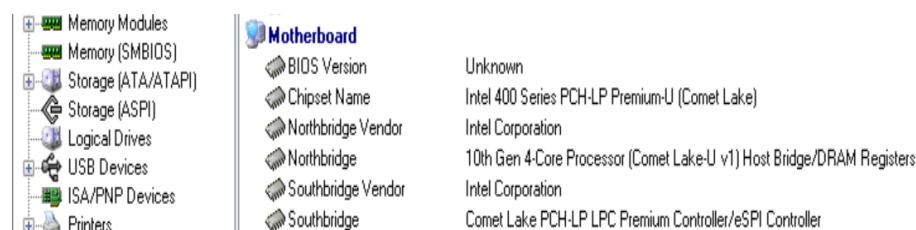
CPU Current Details



The screenshot displays the ASTRA32 software interface. The left sidebar shows a tree view of system components, with 'CPU' selected. The main pane shows detailed information for the CPU, including processor type, clock speeds, cache sizes, and temperatures.

Property	Value
Processor	Intel Core i5-10210U Mobile 1600 MHz
Coprocessor	Intel
CPU Clock	2112.0 MHz
Level 1 Cache	4 x 32 kB + 4 x 32 kB (data+instr.)
Level 2 Cache	4 x 256 kB
Level 3 Cache	1 x 6 MB
Code Name	Comet Lake-U
Manufacturing Process	14 nm
FSB Clock	100.6 MHz
Multiplier	21.0
Expected Clock	1600 MHz
Overclocking Support	Not Supported
Max Turbo Clock	4200.0 MHz
Turbo Boost	23/23/25/26 (Enabled)
Turbo Clock (1 core)	4200 MHz
Turbo Clock (2 core)	4100 MHz
Turbo Clock (3-4 core)	3900 MHz
Socket Type	FCBGA 1528
Package Temperature	63 °C (145 °F)
Temperature Core 1	54 °C (129 °F)
Temperature Core 2	64 °C (147 °F)
Temperature Core 3	54 °C (129 °F)
Temperature Core 4	54 °C (129 °F)
Maximum Temperature (Tjmax)	100 °C (212 °F)
Core Voltage	0.923 V
Maximum Uncore Clock	3900 MHz
Vendor	GenuineIntel
Processor Name	Intel(R) Core(TM) i5-10210U CPU @ 1.60GHz
Processor Type	Original OEM Processor
CPUID	Family: 6, Model: 14, Stepping: 12
Ext. Family/Model	Family: -, Model: 8

Motherboard Details



The screenshot displays the ASTRA32 software interface. The left sidebar shows a tree view of system components, with 'Motherboard' selected. The main pane shows detailed information for the motherboard, including BIOS version, chipset name, and northbridge/southbridge details.

Property	Value
Memory Modules	
Memory (SMBIOS)	
Storage (ATA/ATAPI)	
Storage (ASPI)	
Logical Drives	
USB Devices	
ISA/PNP Devices	
Printers	
Motherboard	
BIOS Version	Unknown
Chipset Name	Intel 400 Series PCH-LP Premium-U (Comet Lake)
Northbridge Vendor	Intel Corporation
Northbridge	10th Gen 4-Core Processor (Comet Lake-U v1) Host Bridge/DRAM Registers
Southbridge Vendor	Intel Corporation
Southbridge	Comet Lake PCH-LP LPC Premium Controller/eSPI Controller

Memory and Storage Details

Ports (SMBIOS)	Memory
Network	Memory Size 7.83 GB
Monitor	System Memory 8016 MB
Video	Memory Module 8 GB DDR4-2666 (1333 MHz) SDRAM (Samsung)
Diagnostics	Storage
Software	Disk Model WDC WD10SPZX-60Z10T0
	Disk Size 953869 MB (931.51 GB)
	Disk Model SK hynix BC501 HFM256GDJTG-8310A
	Disk Size 244198 MB (238.47 GB)

Video

Video	
Monitor Vendor	Chi Mei
Monitor Model	Unknown (CMN 1400)
Video Chip Vendor	Intel Corporation
Video Chip	UHD Graphics 620
Bus Type	CPU Integrated

Sound

ASTRA32 - Advanced System Information Tool 3.91 (UNREGISTERED DEMO)	
File Reports Language Help	
Summary Reports Back Forward Drivers Sensors Help	
ASTRA32	Sound
System Summary	Sound Chip Vendor Intel Corporation
Motherboard	Sound Chip Comet Lake PCH-LP cAVS (Audio, Voice, Speech)
Processor	AC'97/HDA Codec Name Realtek ALC236

OS and Modem Details

BIOS	Operating System
PCI/AGP Devices	Operating System MS Windows 10 Home Single Language x64 Edition (10.0.22621)
Memory Modules	Windows Folder C:\WINDOWS
Memory (SMBIOS)	Modem
Storage (ATA/ATAPI)	Modem Vendor Intel Corporation
Storage (ASPI)	Modem Model Comet Lake PCH-LP Management Engine Interface
Internal Drives	

Network Details

USB Devices	Network
ISA/PNP Devices	Network Name
Printers	Network Chip Vendor
Slots (SMBIOS)	Network Chip
Ports (SMBIOS)	Interface Description
Network	MAC Address
Monitor	Interface Description
Video	MAC Address
Diagnostics	Interface Description
Software	MAC Address
	Interface Description
	MAC Address
	Network Chip Vendor
	Network Chip
	Interface Description
	MAC Address
	Interface Description
	MAC Address
	Interface Description
	MAC Address
	Network Chip Vendor
	Network Chip

Monitor

ASTRA32 - Advanced System Information Tool 3.91 (UNREGISTERED DEMO)		
File Reports Language Help		
Summary Reports Back Forward Drivers Sensors Help		
ASTRA32	Monitor	
System Summary	Monitor Vendor	Chi Mei
Motherboard	Monitor Model	Unknown (CMN 1400)
Processor	Viewable Size	13.9" (35.4 cm)
BIOS	Serial Number	0
PCI/AGP Devices	Manufacture Date	November 2018
Memory Modules	EDID Version	1.4
Memory (SMBIOS)	Monitor ID	CMN1400
Storage (ATA/ATAPI)	Aspect Ratio	16:9
Storage (ASPI)	Horizontal Size	309 mm
Logical Drives	Vertical Size	173 mm
USB Devices	Gamma Factor	2.200
ISA/PNP Devices	Display Type	Non-RGB Multicolor
Printers	Input Signal	Digital
Slots (SMBIOS)	Current Resolution	1920x1080 32bpp @ 60 Hz
Ports (SMBIOS)	DPMS Features	
Network	Active Off	Not Supported
Monitor	Suspend	Not Supported
Unknown (CMN 1400)	Standby	Not Supported
Video	Supported Modes	
Diagnostics	Mode 1	1920x1080 @ 40 Hz
Software	Mode 2	1920x1080 @ 60 Hz (Recommended)
	Driver	
	Driver Status	The device is working properly
	Manufacturer	(Standard monitor types)
	Device Description	Generic PnP Monitor
	Friendly Name	Integrated Monitor
	Device Class	Monitor
	Driver Provider	Microsoft
	Driver Version	10.0.22621.900
	Driver Date	6-21-2006
	Inf File	monitor.inf

Another way to display all the system information of the device is with the help of some syntax in UBUNTU

One example of an open-source software that can display system information is "hwinfo".

To install hwinfo on Ubuntu-based systems, you can run the following command:

→ sudo apt-get install hwinfo

```
root@LAPTOP-LE2AKL35: ~ X + v
root@LAPTOP-LE2AKL35:~# sudo apt-get install hwinfo
Reading package lists... Done
Building dependency tree
Reading state information... Done
hwinfo is already the newest version (21.68-1).
0 upgraded, 0 newly installed, 0 to remove and 270 not upgraded.
root@LAPTOP-LE2AKL35:~#
```

Once installed, you can use the following command to display detailed system information:

→ sudo hwinfo

```
root@LAPTOP-LE2AKL35: ~ X + v
root@LAPTOP-LE2AKL35:~# sudo hwinfo
===== start debug info =====
libhd version 21.68 (x86-64) [7688]
using /var/lib/hardware
kernel version is 4.4
----- /proc/cmdline -----
BOOT_IMAGE=/kernel init=/init
----- /proc/cmdline end -----
debug = 0xff7ffff7
probe = 0x15938fcd aal7fcf9ffffe (+memory +pci +isapnp +net +floppy +misc +misc.serial +misc.par +misc.floppy +serial +cpu +bios +monit
or +mouse +scsi +usb -usb.mods +modem +modem.usb +parallel +parallel.lp +parallel.zip -isa -isa.isdn +isdn +kbd +prom +sbus +int +bra
ille +braille.alva +braille.fhp +braille.ht -ignx11 +sys -bios.vbe -isapnp.old -isapnp.new -isapnp.mod +braille.baum -manual +fb +ppp
oe -scan +pcmcia +fork -parallel.imm +s390 +cpemu -sysfs -s390disks +udev +block +block.cdrom +block.part +edd +edd.mod -bios.ddc -b
ios.fb -bios.mode +input +block.mods +bios.vesa -cpemu.debug -scsi.noserial +wlan -bios.crc -hal +bios.vram +bios.acpi -bios.ddc.por
ts=0 +modules.pata -net.eeprom +x86emu=dump -max -lxrc)
shm: attached segment 0 at 0x7f33e3f70000
>> hal.1: read hal data
>> floppy.1: get nvram
>> floppy.2: klog info
>> bios.1: cmdline
>> bios.1.1: apm
>> bios.2: ram
bios: 0 disks
>> bios.2: rom
>> bios.3: smp
----- BIOS data 0x00400 - 0x004ff -----
400 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
410 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
420 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
430 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
440 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
450 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
```

```

460 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
470 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
480 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
490 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
4a0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
4b0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
4c0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
4d0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
4e0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
4f0 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 00 "....."
----- BIOS data end -----
>> bios.4: vbe
>> bios.4.1: vbe info
=== bios setup ===
failed to read /dev/mem
x86emu: could not init vm
>> bios.5: 32
>> bios.6: acpi
>> sys.1: cpu
  hypervisor check: 0
  vm check: vm_1 = 0, vm_2 = 0
  is_vmware = 0, has_vmware_mouse = 0
>> misc.9: kernel log
>> misc.1: misc data
>> misc.1.1: open serial
>> misc.1.2: open parallel
----- exec: "/sbin/modprobe parport " -----
modprobe: FATAL: Module parport not found in directory /lib/modules/4.4.0-22621-Microsoft
----- return code: ? -----
----- exec: "/sbin/modprobe parport_pc " -----
modprobe: FATAL: Module parport_pc not found in directory /lib/modules/4.4.0-22621-Microsoft
----- return code: ? -----

```

```

>> misc.2.1: io
>> misc.2.2: dma
>> misc.2.3: irq
----- /proc/ioports -----
----- /proc/ioports end -----
----- /proc/interrupts -----
----- /proc/interrupts end -----
----- /proc/dma -----
----- /proc/dma end -----
>> misc.3: FPU
>> misc.3.1: DMA
>> misc.3.2: PIC
>> misc.3.3: timer
>> misc.3.4: RTC
>> cpu.1: cpufreq
----- /proc/cpufreq -----
processor      : 0
vendor_id     : GenuineIntel
cpu family    : 6
model         : 142
model name    : Intel(R) Core(TM) i5-10210U CPU @ 1.60GHz
stepping      : 12
microcode     : 0xffffffff
cpu MHz       : 2112.000
cache size    : 256 KB
physical id   : 0
siblings      : 8
core id       : 0
cpu cores     : 4
apicid        : 0
initial apicid : 0
fpu           : yes

```

```

cpuid level    : 6
wp             : yes
flags          : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm
pbe syscall nx pdpe1gb rdtscp lm pni pclmulqdq dtes64 monitor ds_cpl vmx est tm2 ssse3 fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic
movbe popcnt tsc_deadline_timer aes xsave osxsave avx f16c rdrand lahf_lm abm 3dnowprefetch fsgsbase tsc_adjust bmi1 avx2 smep bmi2 e
rms invpcid mpx rdseed adx smap clflushopt intel_pt ibrs ibpb stibp ssbd
bogomips      : 4224.00
clflush size   : 64
cache_alignment : 64
address sizes  : 36 bits physical, 48 bits virtual
power management:

processor      : 1
vendor_id     : GenuineIntel
cpu family    : 6
model         : 142
model name    : Intel(R) Core(TM) i5-10210U CPU @ 1.60GHz
stepping      : 12
microcode     : 0xffffffff
cpu MHz       : 2112.000
cache size    : 256 KB
physical id   : 0
siblings      : 8
core id       : 0
cpu cores     : 4
apicid        : 0
initial apicid : 0
fpu           : yes
fpu_exception : yes
cpuid level   : 6
wp            : yes
flags         : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm

```

```

pbe syscall nx pdpe1gb rdtscp lm pni pclmulqdq dtes64 monitor ds_cpl vmx est tm2 ssse3 fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic
movbe popcnt tsc_deadline_timer aes xsave osxsave avx f16c rdrand lahf_lm abm 3dnowprefetch fsgsbase tsc_adjust bmi1 avx2 smep bmi2 e
rms invpcid mpx rdseed adx smap clflushopt intel_pt ibrs ibpb stibp ssbd
bogomips      : 4224.00
clflush size  : 64
cache_alignm  : 64
address sizes : 36 bits physical, 48 bits virtual
power manage:

processor      : 2
vendor_id     : GenuineIntel
cpu family    : 6
model         : 142
model name    : Intel(R) Core(TM) i5-10210U CPU @ 1.60GHz
stepping      : 12
microcode     : 0xffffffff
cpu MHz       : 2112.000
cache size    : 256 KB
physical id   : 0
siblings      : 8
core id       : 1
cpu cores     : 4
apicid        : 0
initial apicid : 0
fpu           : yes
fpu_exception : yes
cpuid level   : 6
wp            : yes
flags         : fpu vme de pse tsc msr pae mce cx8 apic sep mtrr pge mca cmov pat pse36 clflush dts acpi mmx fxsr sse sse2 ss ht tm
pbe syscall nx pdpe1gb rdtscp lm pni pclmulqdq dtes64 monitor ds_cpl vmx est tm2 ssse3 fma cx16 xtpr pdcm pcid sse4_1 sse4_2 x2apic
movbe popcnt tsc_deadline_timer aes xsave osxsave avx f16c rdrand lahf_lm abm 3dnowprefetch fsgsbase tsc_adjust bmi1 avx2 smep bmi2 e
rms invpcid mpx rdseed adx smap clflushopt intel_pt ibrs ibpb stibp ssbd

```

```

01: None 00.0: 10105 BIOS
[Created at bios.186]
Unique ID: rdCR.LZF+r4EgHp4
Hardware Class: bios
BIOS Keyboard LED Status:
  Scroll Lock: off
  Num Lock: off
  Caps Lock: off
Config Status: cfg=new, avail=yes, need=no, active=unknown

02: None 00.0: 10107 System
[Created at sys.64]
Unique ID: rdCR.n_7QNeEnh23
Hardware Class: system
Model: "System"
Formfactor: "desktop"
Config Status: cfg=new, avail=yes, need=no, active=unknown

11: None 00.0: 10102 Main Memory
[Created at memory.74]
Unique ID: rdCR.CxwsZFjVASF
Hardware Class: memory
Model: "Main Memory"
Memory Range: 0x00000000-0x1f4e9cfff (rw)
Memory Size: 8 GB
Config Status: cfg=new, avail=yes, need=no, active=unknown

12: None 00.0: 10103 CPU
[Created at cpu.465]
Unique ID: rdCR.j8NaXDXtZ6
Hardware Class: cpu
Arch: X86-64

```

This will display information about various system components, including the CPU, motherboard, monitor, audio, network, and other components.

To display information about the current and average speed/rate of the memory, hard drive, and CPU, you can use the following commands:

To display CPU speed and usage:

→**sudo apt-get install sysstat**

```

root@LAPTOP-LE2AKL35:~# sudo apt-get install sysstat
Reading package lists... Done
Building dependency tree
Reading state information... Done
sysstat is already the newest version (12.2.0-2ubuntu0.2).
0 upgraded, 0 newly installed, 0 to remove and 270 not upgraded.
root@LAPTOP-LE2AKL35:~#

```


→sudo mpstat -P ALL

```
root@LAPTOP-LE2AKL35:~# sudo mpstat -P ALL
Linux 4.4.0-22621-Microsoft (LAPTOP-LE2AKL35) 04/08/23 _x86_64_ (8 CPU)

12:23:42 CPU %usr %nice %sys %iowait %irq %soft %steal %guest %gnice %idle
12:23:42 all 0.90 0.00 1.08 0.00 0.05 0.00 0.00 0.00 0.00 97.97
12:23:42 0 1.30 0.00 2.20 0.00 0.32 0.00 0.00 0.00 0.00 96.18
12:23:42 1 0.45 0.00 0.45 0.00 0.00 0.00 0.00 0.00 0.00 99.09
12:23:42 2 2.02 0.00 2.28 0.00 0.05 0.00 0.00 0.00 0.00 95.65
12:23:42 3 0.24 0.00 0.33 0.00 0.01 0.00 0.00 0.00 0.00 99.42
12:23:42 4 0.96 0.00 1.51 0.00 0.02 0.00 0.00 0.00 0.00 97.51
12:23:42 5 0.69 0.00 0.66 0.00 0.00 0.00 0.00 0.00 0.00 98.65
12:23:42 6 0.53 0.00 0.81 0.00 0.01 0.00 0.00 0.00 0.00 98.65
12:23:42 7 1.04 0.00 0.39 0.00 0.00 0.00 0.00 0.00 0.00 98.57
```

To display memory usage and speed:

→sudo free -m

```
root@LAPTOP-LE2AKL35:~# sudo free -m
              total        used         free      shared  buff/cache   available
Mem:           8014         6519         1271          17          223         1364
Swap:          24576           440        24135
root@LAPTOP-LE2AKL35:~#
```

To display hard drive usage and speed:

→sudo iostat -dx /dev/sda

```
root@LAPTOP-LE2AKL35:~# sudo iostat -dx /dev/sda
Linux 4.4.0-22621-Microsoft (LAPTOP-LE2AKL35) 04/08/23 _x86_64_ (8 CPU)

Device            r/s      kB/s    rrqm/s   %rrqm r_await rareq-sz    w/s      kB/s    wrqm/s   %wrqm w_await wareq-sz    d/s      kB/s
drqm/s  %drqm d_await dareq-sz  aqu-sz  %util
root@LAPTOP-LE2AKL35:~# |
```

Reference/ Bibliography

Some general references and resources related to the topic of open-source software for system information and performance monitoring:

"hwdmfo" official website: <https://www.hwdmfo.com/>

"mpstat" man page: <https://linux.die.net/man/1/mpstat>

"free" man page: <https://linux.die.net/man/1/free>

"iostat" man page: <https://linux.die.net/man/1/iostat>

"sysstat" official website: <https://github.com/sysstat/sysstat>

"Top 10 Linux Performance Monitoring Tools" by Ravi Saive, published on Tecmint: <https://www.tecmint.com/top-linux-performance-monitoring-tools/>

"10 Tools to Monitor Your Linux Server – Network and System Monitoring" by Magesh Maruthamuthu, published on LinuxTechi:
<https://www.linuxtechi.com/10-tools-monitor-linux-server-performance/>

"Linux System Monitoring: Top 12 Tools" by Jeffry R. Davis, published on Datamation: <https://www.datamation.com/open-source/linux-system-monitoring-tools.html>

"Linux Performance Monitoring and Tuning" by Brendan Gregg, published on the Oracle Technology Network:
https://docs.oracle.com/cd/E37670_01/E37355/html/ol_perfmon_tuning.html

"Linux Performance Monitoring with perf" by Brendan Gregg, published on his website: <http://www.brendangregg.com/linuxperf.html>

These resources can provide you with more information about the software and commands mentioned in the topic, as well as related topics in system monitoring and performance optimization. Please note that there may be other open-source software and tools available for system monitoring, and it is always recommended to research and evaluate multiple options before choosing a specific tool or solution.