

UNIVERSIDADE DO MINHO



GESTÃO DE REDES

MESTRADO INTEGRADO EM ENGENHARIA INFORMÁTICA

Trabalho prático 1

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1 Introdução

Neste relatório foram respondidos aos exercícios correspondentes ao trabalho prático número 1 realizado para a unidade curricular Gestão de Redes sobre a utilização do protocolo *Simple Network Management Protocol*(SNMP), bem como as Management Information Bases (MIBs).

2 Exercícios

2.1 Exercício 1

Qual o valor e significado da instância do objecto com o OID lexicograficamente a seguir a mib-2.2.2.1.1 da sua estação de trabalho?

Para sabermos o valor da instância do objecto a seguir temos de usar a primitiva **snmpgetnext**, como podemos ver pela **figura 1** o seu valor é 1, através por exemplo de um *browser* de mibs conseguimos saber que o OID(mib-2.2.2) corresponde ao grupo de interfaces e que o seu valor corresponde a um objeto tabela(coleção de objetos), o significado da instância do objecto com o OID lexicograficamente a seguir a mib-2.2.2.1.1 corresponde ao índice da coluna(ifIndex) da tabela e como seu valor é 1 este corresponde à interface 1 caso fizesse-mos um **snmpwalk**(figura 2) iríamos obter o valor para 2 interfaces sendo estas chaves da tabela, isto é, os valores presente nas tabela são relativos a estas interfaces.

```
tiago@tiago ~$ snmpgetnext localhost mib-2.2.2.1.1
IF-MIB::ifIndex.1 = INTEGER: 1
```

Figura 1: snmpgetnext.

```
tiago@tiago ~$ snmpwalk localhost mib-2.2.2.1.1
IF-MIB::ifIndex.1 = INTEGER: 1
IF-MIB::ifIndex.2 = INTEGER: 2
```

Figura 2: snmpwalk.

Assim se quisermos saber os valores da linha da tabela correspondente à interface 1 basta fazer o seguinte:

```

tiago@tiago ~$ snmpwalk -On localhost mib-2.2.2 | grep "^.\+.1\s"
.1.3.6.1.2.1.2.2.1.1.1 = INTEGER: 1
.1.3.6.1.2.1.2.2.1.2.1 = STRING: lo
.1.3.6.1.2.1.2.2.1.3.1 = INTEGER: softwareLoopback(24)
.1.3.6.1.2.1.2.2.1.4.1 = INTEGER: 65536
.1.3.6.1.2.1.2.2.1.5.1 = Gauge32: 10000000
.1.3.6.1.2.1.2.2.1.6.1 = STRING:
.1.3.6.1.2.1.2.2.1.7.1 = INTEGER: up(1)
.1.3.6.1.2.1.2.2.1.8.1 = INTEGER: up(1)
.1.3.6.1.2.1.2.2.1.9.1 = Timeticks: (0) 0:00:00.00
.1.3.6.1.2.1.2.2.1.10.1 = Counter32: 53442
.1.3.6.1.2.1.2.2.1.11.1 = Counter32: 427
.1.3.6.1.2.1.2.2.1.12.1 = Counter32: 0
.1.3.6.1.2.1.2.2.1.13.1 = Counter32: 0
.1.3.6.1.2.1.2.2.1.14.1 = Counter32: 0
.1.3.6.1.2.1.2.2.1.15.1 = Counter32: 0
.1.3.6.1.2.1.2.2.1.16.1 = Counter32: 53442
.1.3.6.1.2.1.2.2.1.17.1 = Counter32: 427
.1.3.6.1.2.1.2.2.1.18.1 = Counter32: 0
.1.3.6.1.2.1.2.2.1.19.1 = Counter32: 0
.1.3.6.1.2.1.2.2.1.20.1 = Counter32: 0
.1.3.6.1.2.1.2.2.1.21.1 = Gauge32: 0
.1.3.6.1.2.1.2.2.1.22.1 = OID: .0.0

```

Figura 3: snmpwalk com os valores da tabela para a interface 1.

2.2 Exercício 2

Usando o SNMP é possível calcular o número de pacotes IP com algum tipo de erro e que eram destinados ao seu sistema?

Através do SNMP não é possível calcular o número de pacotes IP com algum tipo de erro, como podemos ver pela figura 4 a seguir o objeto *ipInAddrErrors* apenas apresenta erros em que o endereço IP no cabeçalho do pacote não é válido para este sistema.

```
ipInAddrErrors OBJECT-TYPE
    SYNTAX Counter
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The number of input datagrams discarded because
        the IP address in their IP header's destination
        field was not a valid address to be received at
        this entity. This count includes invalid
        addresses (e.g., 0.0.0.0) and addresses of
        unsupported Classes (e.g., Class E). For entities
        which are not IP Gateways and therefore do not
        forward datagrams, this counter includes datagrams
        discarded because the destination address was not
        a local address."
 ::= { ip 5 }
```

Figura 4: ipInAddrErrors documentação.[1]

No entanto este não conta com erros no *checksum*, versão, etc, porém é possível calcular os pacotes com este tipo de erros mas não se consegue distinguir os pacotes que eram destinados ao meu sistema.

```
ipInHdrErrors OBJECT-TYPE
    SYNTAX Counter
    ACCESS read-only
    STATUS mandatory
    DESCRIPTION
        "The number of input datagrams discarded due to
        errors in their IP headers, including bad
        checksums, version number mismatch, other format
        errors, time-to-live exceeded, errors discovered
        in processing their IP options, etc."
 ::= { ip 4 }
```

Figura 5: ipInHdrErrors documentação.[1]

Ainda que o SNMP não tinha um objeto que responda diretamente à questão, com as informações obtidas pelo SNMP tais como: o objeto *ipInAddrErrors* (que

indica os pacotes que não eram destinados ao sistema) e com o objeto *ipHdrErrors* (que conta pacotes com erros como *checksum*, versão) podemos calcular o número de pacotes IP com algum tipo de erro e que eram destinados ao meu sistema através de $ipHdrErrors - ipInAddrErrors$.

```
tiago@tiago ~$ snmpget localhost .1.3.6.1.2.1.4.5.0
IP-MIB::ipInAddrErrors.0 = Counter32: 2
```

Figura 6: snmpget para obter número de pacotes IP com algum tipo de erro no cabeçalho ip que eram destinados ao sistema.

```
tiago@tiago ~$ snmpget localhost .1.3.6.1.2.1.4.4.0
IP-MIB::ipInHdrErrors.0 = Counter32: 0
```

Figura 7: snmpget para obter número de pacotes IP com algum tipo de erro no *checksum*, versão, etc.

2.3 Exercício 3

Quais os processos que estão a correr no seu sistema (utilize o SNMP para obter a resposta)?

Na *Host Resources* MIB há um grupo correspondente ao *software* que se encontra a correr na máquina e na qual existe uma tabela(OID=.1.3.6.1.2.1.25.4.2) com informações acerca dos processos a correr sendo que a segunda coluna da tabela(objecto *hrSWRunName*) indica os nomes dos processos como podemos ver a seguir:

```
tiago@tiago ~$ snmpwalk localhost .1.3.6.1.2.1.25.4.2.1.2
HOST-RESOURCES-MIB::hrSWRunName.1 = STRING: "systemd"
HOST-RESOURCES-MIB::hrSWRunName.2 = STRING: "kthreadd"
HOST-RESOURCES-MIB::hrSWRunName.3 = STRING: "rcu_gp"
HOST-RESOURCES-MIB::hrSWRunName.4 = STRING: "rcu_par_gp"
HOST-RESOURCES-MIB::hrSWRunName.6 = STRING: "kworker/0:0H-kblockd"
HOST-RESOURCES-MIB::hrSWRunName.8 = STRING: "mm_percpu_wq"
HOST-RESOURCES-MIB::hrSWRunName.9 = STRING: "ksoftirqd/0"
HOST-RESOURCES-MIB::hrSWRunName.10 = STRING: "rcuc/0"
HOST-RESOURCES-MIB::hrSWRunName.11 = STRING: "rcu_preempt"
HOST-RESOURCES-MIB::hrSWRunName.12 = STRING: "rcub/0"
HOST-RESOURCES-MIB::hrSWRunName.13 = STRING: "migration/0"
HOST-RESOURCES-MIB::hrSWRunName.14 = STRING: "idle_inject/0"
HOST-RESOURCES-MIB::hrSWRunName.16 = STRING: "cpuhp/0"
HOST-RESOURCES-MIB::hrSWRunName.17 = STRING: "cpuhp/1"
HOST-RESOURCES-MIB::hrSWRunName.18 = STRING: "idle_inject/1"
HOST-RESOURCES-MIB::hrSWRunName.19 = STRING: "migration/1"
HOST-RESOURCES-MIB::hrSWRunName.20 = STRING: "rcuc/1"
HOST-RESOURCES-MIB::hrSWRunName.21 = STRING: "ksoftirqd/1"
HOST-RESOURCES-MIB::hrSWRunName.23 = STRING: "kworker/1:0H-kblockd"
HOST-RESOURCES-MIB::hrSWRunName.24 = STRING: "cpuhp/2"
HOST-RESOURCES-MIB::hrSWRunName.25 = STRING: "idle_inject/2"
HOST-RESOURCES-MIB::hrSWRunName.26 = STRING: "migration/2"
HOST-RESOURCES-MIB::hrSWRunName.27 = STRING: "rcuc/2"
HOST-RESOURCES-MIB::hrSWRunName.28 = STRING: "ksoftirqd/2"
HOST-RESOURCES-MIB::hrSWRunName.30 = STRING: "kworker/2:0H-kblockd"
HOST-RESOURCES-MIB::hrSWRunName.31 = STRING: "cpuhp/3"
HOST-RESOURCES-MIB::hrSWRunName.32 = STRING: "idle_inject/3"
HOST-RESOURCES-MIB::hrSWRunName.33 = STRING: "migration/3"
HOST-RESOURCES-MIB::hrSWRunName.34 = STRING: "rcuc/3"
HOST-RESOURCES-MIB::hrSWRunName.35 = STRING: "ksoftirqd/3"
HOST-RESOURCES-MIB::hrSWRunName.37 = STRING: "kworker/3:0H-kblockd"
HOST-RESOURCES-MIB::hrSWRunName.38 = STRING: "cpuhp/4"
HOST-RESOURCES-MIB::hrSWRunName.39 = STRING: "idle_inject/4"
HOST-RESOURCES-MIB::hrSWRunName.40 = STRING: "migration/4"
HOST-RESOURCES-MIB::hrSWRunName.41 = STRING: "rcuc/4"
HOST-RESOURCES-MIB::hrSWRunName.42 = STRING: "ksoftirqd/4"
HOST-RESOURCES-MIB::hrSWRunName.44 = STRING: "kworker/4:0H-kblockd"
HOST-RESOURCES-MIB::hrSWRunName.45 = STRING: "cpuhp/5"
HOST-RESOURCES-MIB::hrSWRunName.46 = STRING: "idle_inject/5"
HOST-RESOURCES-MIB::hrSWRunName.47 = STRING: "migration/5"
HOST-RESOURCES-MIB::hrSWRunName.48 = STRING: "rcuc/5"
HOST-RESOURCES-MIB::hrSWRunName.49 = STRING: "ksoftirqd/5"
HOST-RESOURCES-MIB::hrSWRunName.51 = STRING: "kworker/5:0H-kblockd"
HOST-RESOURCES-MIB::hrSWRunName.52 = STRING: "cpuhp/6"
```

Figura 8: Snmpwalk.

O restantes processos podem ser vistos na secção anexos.

3 Conclusão

Com a realização deste trabalho foram assimilados conceitos como os de MIB, a utilização de primitivas do SNMP para acesso aos objetos de uma MIB bem como a importância da gestão/monitorização de equipamentos em rede.

4 Anexos

```
HOST-RESOURCES-MIB::hrSWRunName.53 = STRING: "idle_inject/6"
HOST-RESOURCES-MIB::hrSWRunName.54 = STRING: "migration/6"
HOST-RESOURCES-MIB::hrSWRunName.55 = STRING: "rcuc/6"
HOST-RESOURCES-MIB::hrSWRunName.56 = STRING: "ksoftirqd/6"
HOST-RESOURCES-MIB::hrSWRunName.58 = STRING: "kworker/6:0H-kblockd"
HOST-RESOURCES-MIB::hrSWRunName.59 = STRING: "cpuhp/7"
HOST-RESOURCES-MIB::hrSWRunName.60 = STRING: "idle_inject/7"
HOST-RESOURCES-MIB::hrSWRunName.61 = STRING: "migration/7"
HOST-RESOURCES-MIB::hrSWRunName.62 = STRING: "rcuc/7"
HOST-RESOURCES-MIB::hrSWRunName.63 = STRING: "ksoftirqd/7"
HOST-RESOURCES-MIB::hrSWRunName.65 = STRING: "kworker/7:0H-kblockd"
HOST-RESOURCES-MIB::hrSWRunName.66 = STRING: "cpuhp/8"
HOST-RESOURCES-MIB::hrSWRunName.67 = STRING: "idle_inject/8"
HOST-RESOURCES-MIB::hrSWRunName.68 = STRING: "migration/8"
HOST-RESOURCES-MIB::hrSWRunName.69 = STRING: "rcuc/8"
HOST-RESOURCES-MIB::hrSWRunName.70 = STRING: "ksoftirqd/8"
HOST-RESOURCES-MIB::hrSWRunName.72 = STRING: "kworker/8:0H-kblockd"
HOST-RESOURCES-MIB::hrSWRunName.73 = STRING: "cpuhp/9"
HOST-RESOURCES-MIB::hrSWRunName.74 = STRING: "idle_inject/9"
HOST-RESOURCES-MIB::hrSWRunName.75 = STRING: "migration/9"
HOST-RESOURCES-MIB::hrSWRunName.76 = STRING: "rcuc/9"
HOST-RESOURCES-MIB::hrSWRunName.77 = STRING: "ksoftirqd/9"
HOST-RESOURCES-MIB::hrSWRunName.79 = STRING: "kworker/9:0H-kblockd"
HOST-RESOURCES-MIB::hrSWRunName.80 = STRING: "cpuhp/10"
HOST-RESOURCES-MIB::hrSWRunName.81 = STRING: "idle_inject/10"
HOST-RESOURCES-MIB::hrSWRunName.82 = STRING: "migration/10"
HOST-RESOURCES-MIB::hrSWRunName.83 = STRING: "rcuc/10"
HOST-RESOURCES-MIB::hrSWRunName.84 = STRING: "ksoftirqd/10"
HOST-RESOURCES-MIB::hrSWRunName.86 = STRING: "kworker/10:0H-kblockd"
HOST-RESOURCES-MIB::hrSWRunName.87 = STRING: "cpuhp/11"
HOST-RESOURCES-MIB::hrSWRunName.88 = STRING: "idle_inject/11"
HOST-RESOURCES-MIB::hrSWRunName.89 = STRING: "migration/11"
HOST-RESOURCES-MIB::hrSWRunName.90 = STRING: "rcuc/11"
HOST-RESOURCES-MIB::hrSWRunName.91 = STRING: "ksoftirqd/11"
HOST-RESOURCES-MIB::hrSWRunName.93 = STRING: "kworker/11:0H-kblockd"
HOST-RESOURCES-MIB::hrSWRunName.94 = STRING: "kdevtmpfs"
HOST-RESOURCES-MIB::hrSWRunName.95 = STRING: "netns"
HOST-RESOURCES-MIB::hrSWRunName.96 = STRING: "rcu_tasks_kthre"
HOST-RESOURCES-MIB::hrSWRunName.97 = STRING: "rcu_tasks_rude_"
HOST-RESOURCES-MIB::hrSWRunName.98 = STRING: "kauditd"
HOST-RESOURCES-MIB::hrSWRunName.101 = STRING: "khungtaskd"
HOST-RESOURCES-MIB::hrSWRunName.102 = STRING: "oom_reaper"
HOST-RESOURCES-MIB::hrSWRunName.103 = STRING: "writeback"
HOST-RESOURCES-MIB::hrSWRunName.104 = STRING: "kcompactd0"
HOST-RESOURCES-MIB::hrSWRunName.105 = STRING: "ksmd"
```

Figura 9: ¹⁰Snmpwalk.

```

HOST-RESOURCES-MIB::hrSWRunName.106 = STRING: "khugepaged"
HOST-RESOURCES-MIB::hrSWRunName.149 = STRING: "kintegrityd"
HOST-RESOURCES-MIB::hrSWRunName.150 = STRING: "kblockd"
HOST-RESOURCES-MIB::hrSWRunName.151 = STRING: "blkcg_punt_bio"
HOST-RESOURCES-MIB::hrSWRunName.153 = STRING: "ata_sff"
HOST-RESOURCES-MIB::hrSWRunName.154 = STRING: "edac-poller"
HOST-RESOURCES-MIB::hrSWRunName.155 = STRING: "devfreq_wq"
HOST-RESOURCES-MIB::hrSWRunName.156 = STRING: "watchdogd"
HOST-RESOURCES-MIB::hrSWRunName.158 = STRING: "pm_wq"
HOST-RESOURCES-MIB::hrSWRunName.159 = STRING: "kswapd0"
HOST-RESOURCES-MIB::hrSWRunName.161 = STRING: "kthrotld"
HOST-RESOURCES-MIB::hrSWRunName.162 = STRING: "irq/123-pciehp"
HOST-RESOURCES-MIB::hrSWRunName.163 = STRING: "irq/124-pciehp"
HOST-RESOURCES-MIB::hrSWRunName.164 = STRING: "acpi_thermal_pm"
HOST-RESOURCES-MIB::hrSWRunName.165 = STRING: "nvme-wq"
HOST-RESOURCES-MIB::hrSWRunName.166 = STRING: "nvme-reset-wq"
HOST-RESOURCES-MIB::hrSWRunName.167 = STRING: "nvme-delete-wq"
HOST-RESOURCES-MIB::hrSWRunName.175 = STRING: "ipv6_addrconf"
HOST-RESOURCES-MIB::hrSWRunName.186 = STRING: "kstrp"
HOST-RESOURCES-MIB::hrSWRunName.191 = STRING: "zswap1"
HOST-RESOURCES-MIB::hrSWRunName.192 = STRING: "zswap1"
HOST-RESOURCES-MIB::hrSWRunName.193 = STRING: "zswap-shrink"
HOST-RESOURCES-MIB::hrSWRunName.195 = STRING: "charger_manager"
HOST-RESOURCES-MIB::hrSWRunName.230 = STRING: "sdhci"
HOST-RESOURCES-MIB::hrSWRunName.231 = STRING: "irq/19-mmci"
HOST-RESOURCES-MIB::hrSWRunName.232 = STRING: "irq/135-0000:00"
HOST-RESOURCES-MIB::hrSWRunName.245 = STRING: "jbd2/nvme0n1p6-"
HOST-RESOURCES-MIB::hrSWRunName.246 = STRING: "ext4-rsv-conver"
HOST-RESOURCES-MIB::hrSWRunName.247 = STRING: "kworker/4:1H-events_highpri"
HOST-RESOURCES-MIB::hrSWRunName.255 = STRING: "kworker/11:1H-events_highpri"
HOST-RESOURCES-MIB::hrSWRunName.280 = STRING: "systemd-journal"
HOST-RESOURCES-MIB::hrSWRunName.282 = STRING: "kworker/8:2-mm_percpu_wq"
HOST-RESOURCES-MIB::hrSWRunName.293 = STRING: "kworker/1:1H-events_highpri"
HOST-RESOURCES-MIB::hrSWRunName.294 = STRING: "kworker/7:1H-events_highpri"
HOST-RESOURCES-MIB::hrSWRunName.302 = STRING: "iprt-VBoxWQueue"
HOST-RESOURCES-MIB::hrSWRunName.303 = STRING: "systemd-udev"
HOST-RESOURCES-MIB::hrSWRunName.304 = STRING: "iprt-VBoxTscThr"
HOST-RESOURCES-MIB::hrSWRunName.329 = STRING: "kworker/2:1H-events_highpri"
HOST-RESOURCES-MIB::hrSWRunName.330 = STRING: "kworker/6:1H-events_highpri"
HOST-RESOURCES-MIB::hrSWRunName.333 = STRING: "lvmetad"
HOST-RESOURCES-MIB::hrSWRunName.373 = STRING: "tpm_dev_wq"
HOST-RESOURCES-MIB::hrSWRunName.379 = STRING: "kworker/5:1H-kblockd"
HOST-RESOURCES-MIB::hrSWRunName.380 = STRING: "kworker/0:1H-kblockd"
HOST-RESOURCES-MIB::hrSWRunName.384 = STRING: "irq/137-mei_me"
HOST-RESOURCES-MIB::hrSWRunName.387 = STRING: "kworker/3:1H-events_highpri"

```

Figura 10: Snmpwalk.

```
HOST-RESOURCES-MIB::hrSWRunName.388 = STRING: "kworker/9:1H-events_highpri"
HOST-RESOURCES-MIB::hrSWRunName.389 = STRING: "kworker/10:1H-events_highpri"
HOST-RESOURCES-MIB::hrSWRunName.395 = STRING: "irq/95-ELAN1200"
HOST-RESOURCES-MIB::hrSWRunName.414 = STRING: "cfg80211"
HOST-RESOURCES-MIB::hrSWRunName.438 = STRING: "cryptd"
HOST-RESOURCES-MIB::hrSWRunName.439 = STRING: "irq/138-iwlwifi"
HOST-RESOURCES-MIB::hrSWRunName.440 = STRING: "irq/139-iwlwifi"
HOST-RESOURCES-MIB::hrSWRunName.441 = STRING: "irq/140-iwlwifi"
HOST-RESOURCES-MIB::hrSWRunName.443 = STRING: "irq/141-iwlwifi"
HOST-RESOURCES-MIB::hrSWRunName.444 = STRING: "irq/142-iwlwifi"
HOST-RESOURCES-MIB::hrSWRunName.445 = STRING: "irq/143-iwlwifi"
HOST-RESOURCES-MIB::hrSWRunName.446 = STRING: "irq/144-iwlwifi"
HOST-RESOURCES-MIB::hrSWRunName.447 = STRING: "irq/145-iwlwifi"
HOST-RESOURCES-MIB::hrSWRunName.448 = STRING: "irq/146-iwlwifi"
HOST-RESOURCES-MIB::hrSWRunName.449 = STRING: "irq/147-iwlwifi"
HOST-RESOURCES-MIB::hrSWRunName.450 = STRING: "irq/148-iwlwifi"
HOST-RESOURCES-MIB::hrSWRunName.451 = STRING: "irq/149-iwlwifi"
HOST-RESOURCES-MIB::hrSWRunName.452 = STRING: "irq/150-iwlwifi"
HOST-RESOURCES-MIB::hrSWRunName.453 = STRING: "irq/151-iwlwifi"
HOST-RESOURCES-MIB::hrSWRunName.490 = STRING: "loop0"
HOST-RESOURCES-MIB::hrSWRunName.503 = STRING: "led_workqueue"
HOST-RESOURCES-MIB::hrSWRunName.521 = STRING: "loop1"
HOST-RESOURCES-MIB::hrSWRunName.557 = STRING: "loop2"
HOST-RESOURCES-MIB::hrSWRunName.580 = STRING: "loop3"
HOST-RESOURCES-MIB::hrSWRunName.608 = STRING: "loop4"
HOST-RESOURCES-MIB::hrSWRunName.622 = STRING: "loop5"
HOST-RESOURCES-MIB::hrSWRunName.625 = STRING: "spi0"
HOST-RESOURCES-MIB::hrSWRunName.690 = STRING: "avahi-daemon"
HOST-RESOURCES-MIB::hrSWRunName.691 = STRING: "crond"
HOST-RESOURCES-MIB::hrSWRunName.692 = STRING: "dbus-daemon"
HOST-RESOURCES-MIB::hrSWRunName.694 = STRING: "NetworkManager"
HOST-RESOURCES-MIB::hrSWRunName.697 = STRING: "polkitd"
HOST-RESOURCES-MIB::hrSWRunName.698 = STRING: "snapd"
HOST-RESOURCES-MIB::hrSWRunName.700 = STRING: "systemd-logind"
HOST-RESOURCES-MIB::hrSWRunName.701 = STRING: "avahi-daemon"
HOST-RESOURCES-MIB::hrSWRunName.711 = STRING: "kworker/8:1H-events_highpri"
HOST-RESOURCES-MIB::hrSWRunName.751 = STRING: "ntpd"
HOST-RESOURCES-MIB::hrSWRunName.772 = STRING: "ModemManager"
HOST-RESOURCES-MIB::hrSWRunName.782 = STRING: "snmpd"
HOST-RESOURCES-MIB::hrSWRunName.975 = STRING: "python3"
HOST-RESOURCES-MIB::hrSWRunName.976 = STRING: "lightdm"
HOST-RESOURCES-MIB::hrSWRunName.981 = STRING: "Xorg"
HOST-RESOURCES-MIB::hrSWRunName.982 = STRING: "accounts-daemon"
HOST-RESOURCES-MIB::hrSWRunName.1123 = STRING: "wpa_supplicant"
HOST-RESOURCES-MIB::hrSWRunName.1170 = STRING: "bluetoothd"
```

Figura 11: Snmpwalk.

```
HOST-RESOURCES-MIB::hrSWRunName.1276 = STRING: "upowerd"
HOST-RESOURCES-MIB::hrSWRunName.1306 = STRING: "cupsd"
HOST-RESOURCES-MIB::hrSWRunName.1308 = STRING: "lightdm"
HOST-RESOURCES-MIB::hrSWRunName.1313 = STRING: "systemd"
HOST-RESOURCES-MIB::hrSWRunName.1314 = STRING: "(sd-pam)"
HOST-RESOURCES-MIB::hrSWRunName.1326 = STRING: "i3"
HOST-RESOURCES-MIB::hrSWRunName.1333 = STRING: "dbus-daemon"
HOST-RESOURCES-MIB::hrSWRunName.1335 = STRING: "volumeicon"
HOST-RESOURCES-MIB::hrSWRunName.1337 = STRING: "polkit-gnome-au"
HOST-RESOURCES-MIB::hrSWRunName.1341 = STRING: "nm-applet"
HOST-RESOURCES-MIB::hrSWRunName.1345 = STRING: "pamac-tray"
HOST-RESOURCES-MIB::hrSWRunName.1347 = STRING: "clipit"
HOST-RESOURCES-MIB::hrSWRunName.1350 = STRING: "xautolock"
HOST-RESOURCES-MIB::hrSWRunName.1354 = STRING: "picom"
HOST-RESOURCES-MIB::hrSWRunName.1360 = STRING: "Discord"
HOST-RESOURCES-MIB::hrSWRunName.1369 = STRING: "xfce4-power-man"
HOST-RESOURCES-MIB::hrSWRunName.1382 = STRING: "polybar"
HOST-RESOURCES-MIB::hrSWRunName.1388 = STRING: "gvfsd"
HOST-RESOURCES-MIB::hrSWRunName.1400 = STRING: "dconf-service"
HOST-RESOURCES-MIB::hrSWRunName.1401 = STRING: "at-spi-bus-laun"
HOST-RESOURCES-MIB::hrSWRunName.1404 = STRING: "gvfsd-fuse"
HOST-RESOURCES-MIB::hrSWRunName.1419 = STRING: "dbus-daemon"
HOST-RESOURCES-MIB::hrSWRunName.1431 = STRING: "at-spi2-registr"
HOST-RESOURCES-MIB::hrSWRunName.1439 = STRING: "xfconfd"
HOST-RESOURCES-MIB::hrSWRunName.1440 = STRING: "Discord"
HOST-RESOURCES-MIB::hrSWRunName.1450 = STRING: "pulseaudio"
HOST-RESOURCES-MIB::hrSWRunName.1451 = STRING: "dunst"
HOST-RESOURCES-MIB::hrSWRunName.1458 = STRING: "Discord"
HOST-RESOURCES-MIB::hrSWRunName.1493 = STRING: "rtkit-daemon"
HOST-RESOURCES-MIB::hrSWRunName.1508 = STRING: "Discord"
HOST-RESOURCES-MIB::hrSWRunName.1516 = STRING: "Discord"
HOST-RESOURCES-MIB::hrSWRunName.1557 = STRING: "gsettings-helpe"
HOST-RESOURCES-MIB::hrSWRunName.1602 = STRING: "Discord"
HOST-RESOURCES-MIB::hrSWRunName.1618 = STRING: "firefox"
HOST-RESOURCES-MIB::hrSWRunName.1699 = STRING: "Web Content"
HOST-RESOURCES-MIB::hrSWRunName.1780 = STRING: "Privileged Cont"
HOST-RESOURCES-MIB::hrSWRunName.1833 = STRING: "WebExtensions"
HOST-RESOURCES-MIB::hrSWRunName.1879 = STRING: "Web Content"
HOST-RESOURCES-MIB::hrSWRunName.2168 = STRING: "gvfsd-metadata"
HOST-RESOURCES-MIB::hrSWRunName.2394 = STRING: "redshift-gtk"
HOST-RESOURCES-MIB::hrSWRunName.2397 = STRING: "redshift"
HOST-RESOURCES-MIB::hrSWRunName.2404 = STRING: "geoclue"
HOST-RESOURCES-MIB::hrSWRunName.4119 = STRING: "kworker/u24:0-ext4-rsv-conversion"
HOST-RESOURCES-MIB::hrSWRunName.6347 = STRING: "kworker/u24:1-cfg80211"
HOST-RESOURCES-MIB::hrSWRunName.6614 = STRING: "RDD Process"
```

Figura 12: Snmpwalk.


```
HOST-RESOURCES-MIB::hrSWRunName.8097 = STRING: "gvfs-udisks2-vo"
HOST-RESOURCES-MIB::hrSWRunName.8100 = STRING: "udisksd"
HOST-RESOURCES-MIB::hrSWRunName.8112 = STRING: "gvfs-mtp-volume"
HOST-RESOURCES-MIB::hrSWRunName.8116 = STRING: "gvfs-afc-volume"
HOST-RESOURCES-MIB::hrSWRunName.8121 = STRING: "gvfs-gphoto2-vo"
HOST-RESOURCES-MIB::hrSWRunName.8125 = STRING: "gvfsd-trash"
HOST-RESOURCES-MIB::hrSWRunName.8136 = STRING: "gvfsd-network"
HOST-RESOURCES-MIB::hrSWRunName.8216 = STRING: "gvfsd-dnssd"
HOST-RESOURCES-MIB::hrSWRunName.8286 = STRING: "kworker/9:0-events"
HOST-RESOURCES-MIB::hrSWRunName.8641 = STRING: "kworker/4:0-events"
HOST-RESOURCES-MIB::hrSWRunName.9042 = STRING: "kworker/10:0-events"
HOST-RESOURCES-MIB::hrSWRunName.9385 = STRING: "Web Content"
HOST-RESOURCES-MIB::hrSWRunName.10177 = STRING: "Web Content"
HOST-RESOURCES-MIB::hrSWRunName.10492 = STRING: "kworker/u24:3-i915"
HOST-RESOURCES-MIB::hrSWRunName.11306 = STRING: "kitty"
HOST-RESOURCES-MIB::hrSWRunName.11313 = STRING: "zsh"
HOST-RESOURCES-MIB::hrSWRunName.11677 = STRING: "kworker/11:2-events"
HOST-RESOURCES-MIB::hrSWRunName.11763 = STRING: "kworker/7:0-events"
HOST-RESOURCES-MIB::hrSWRunName.11842 = STRING: "kworker/6:0-events"
HOST-RESOURCES-MIB::hrSWRunName.12107 = STRING: "anacron"
HOST-RESOURCES-MIB::hrSWRunName.12311 = STRING: "kitty"
HOST-RESOURCES-MIB::hrSWRunName.12317 = STRING: "zsh"
HOST-RESOURCES-MIB::hrSWRunName.12384 = STRING: "kworker/0:0-events"
HOST-RESOURCES-MIB::hrSWRunName.12687 = STRING: "kworker/5:2-events"
HOST-RESOURCES-MIB::hrSWRunName.13045 = STRING: "kworker/3:0-events"
HOST-RESOURCES-MIB::hrSWRunName.13244 = STRING: "kworker/9:2-events"
HOST-RESOURCES-MIB::hrSWRunName.13305 = STRING: "kworker/7:1-events"
HOST-RESOURCES-MIB::hrSWRunName.13414 = STRING: "kworker/u25:0-rb_allocator"
HOST-RESOURCES-MIB::hrSWRunName.13837 = STRING: "kworker/2:2-events"
HOST-RESOURCES-MIB::hrSWRunName.13977 = STRING: "kworker/6:2-events"
HOST-RESOURCES-MIB::hrSWRunName.14015 = STRING: "kworker/8:0-events"
HOST-RESOURCES-MIB::hrSWRunName.14023 = STRING: "kworker/u25:1-rb_allocator"
HOST-RESOURCES-MIB::hrSWRunName.14051 = STRING: "kworker/10:2-mm_percpu_wq"
HOST-RESOURCES-MIB::hrSWRunName.14074 = STRING: "kworker/5:0-events"
HOST-RESOURCES-MIB::hrSWRunName.14080 = STRING: "kworker/0:1-events"
HOST-RESOURCES-MIB::hrSWRunName.14123 = STRING: "kworker/3:2-mm_percpu_wq"
HOST-RESOURCES-MIB::hrSWRunName.14302 = STRING: "kworker/11:1-mm_percpu_wq"
HOST-RESOURCES-MIB::hrSWRunName.14461 = STRING: "Discord"
HOST-RESOURCES-MIB::hrSWRunName.14523 = STRING: "kitty"
HOST-RESOURCES-MIB::hrSWRunName.14529 = STRING: "zsh"
HOST-RESOURCES-MIB::hrSWRunName.14617 = STRING: "kworker/2:1-events"
HOST-RESOURCES-MIB::hrSWRunName.14660 = STRING: "kworker/4:1-rcu_gp"
HOST-RESOURCES-MIB::hrSWRunName.14803 = STRING: "kworker/1:3-events"
HOST-RESOURCES-MIB::hrSWRunName.14817 = STRING: "kworker/1:4-events"
HOST-RESOURCES-MIB::hrSWRunName.14879 = STRING: "Web Content"
```

Figura 13: Snmpwalk.

```
HOST-RESOURCES-MIB::hrSWRunName.12311 = STRING: "kitty"
HOST-RESOURCES-MIB::hrSWRunName.12317 = STRING: "zsh"
HOST-RESOURCES-MIB::hrSWRunName.12384 = STRING: "kworker/0:0-events"
HOST-RESOURCES-MIB::hrSWRunName.12687 = STRING: "kworker/5:2-events"
HOST-RESOURCES-MIB::hrSWRunName.13045 = STRING: "kworker/3:0-events"
HOST-RESOURCES-MIB::hrSWRunName.13244 = STRING: "kworker/9:2-events"
HOST-RESOURCES-MIB::hrSWRunName.13305 = STRING: "kworker/7:1-events"
HOST-RESOURCES-MIB::hrSWRunName.13414 = STRING: "kworker/u25:0-rb_allocator"
HOST-RESOURCES-MIB::hrSWRunName.13837 = STRING: "kworker/2:2-events"
HOST-RESOURCES-MIB::hrSWRunName.13977 = STRING: "kworker/6:2-events"
HOST-RESOURCES-MIB::hrSWRunName.14015 = STRING: "kworker/8:0-events"
HOST-RESOURCES-MIB::hrSWRunName.14023 = STRING: "kworker/u25:1-rb_allocator"
HOST-RESOURCES-MIB::hrSWRunName.14051 = STRING: "kworker/10:2-mm_percpu_wq"
HOST-RESOURCES-MIB::hrSWRunName.14074 = STRING: "kworker/5:0-events"
HOST-RESOURCES-MIB::hrSWRunName.14080 = STRING: "kworker/0:1-events"
HOST-RESOURCES-MIB::hrSWRunName.14123 = STRING: "kworker/3:2-mm_percpu_wq"
HOST-RESOURCES-MIB::hrSWRunName.14302 = STRING: "kworker/11:1-mm_percpu_wq"
HOST-RESOURCES-MIB::hrSWRunName.14461 = STRING: "Discord"
HOST-RESOURCES-MIB::hrSWRunName.14523 = STRING: "kitty"
HOST-RESOURCES-MIB::hrSWRunName.14529 = STRING: "zsh"
HOST-RESOURCES-MIB::hrSWRunName.14617 = STRING: "kworker/2:1-events"
HOST-RESOURCES-MIB::hrSWRunName.14660 = STRING: "kworker/4:1-rcu_gp"
HOST-RESOURCES-MIB::hrSWRunName.14803 = STRING: "kworker/1:3-events"
HOST-RESOURCES-MIB::hrSWRunName.14817 = STRING: "kworker/1:4-events"
HOST-RESOURCES-MIB::hrSWRunName.14879 = STRING: "Web Content"
HOST-RESOURCES-MIB::hrSWRunName.14918 = STRING: "Web Content"
HOST-RESOURCES-MIB::hrSWRunName.14993 = STRING: "kworker/u25:2"
HOST-RESOURCES-MIB::hrSWRunName.15054 = STRING: "Web Content"
HOST-RESOURCES-MIB::hrSWRunName.15095 = STRING: "kworker/7:2"
HOST-RESOURCES-MIB::hrSWRunName.15113 = STRING: "kworker/u24:2"
HOST-RESOURCES-MIB::hrSWRunName.15126 = STRING: "kworker/5:1-events"
HOST-RESOURCES-MIB::hrSWRunName.15145 = STRING: "sudo"
HOST-RESOURCES-MIB::hrSWRunName.15150 = STRING: "sh"
HOST-RESOURCES-MIB::hrSWRunName.15152 = STRING: "java"
HOST-RESOURCES-MIB::hrSWRunName.15196 = STRING: "kworker/8:1-events"
HOST-RESOURCES-MIB::hrSWRunName.15281 = STRING: "kitty"
HOST-RESOURCES-MIB::hrSWRunName.15288 = STRING: "zsh"
HOST-RESOURCES-MIB::hrSWRunName.15338 = STRING: "kitty"
HOST-RESOURCES-MIB::hrSWRunName.15345 = STRING: "zsh"
HOST-RESOURCES-MIB::hrSWRunName.15761 = STRING: "Web Content"
HOST-RESOURCES-MIB::hrSWRunName.15814 = STRING: "kworker/11:0-events"
HOST-RESOURCES-MIB::hrSWRunName.15852 = STRING: "kworker/0:2"
HOST-RESOURCES-MIB::hrSWRunName.15938 = STRING: "kworker/4:2"
HOST-RESOURCES-MIB::hrSWRunName.16017 = STRING: "snmpwalk"
```

Figura 14: Snmpwalk.

Referências

- [1] <https://tools.ietf.org/html/rfc1213>
- [2] <https://tools.ietf.org/html/rfc2790>