

Linux Ubuntu 18.10, terminal komande (6)

Agenda

- Softver, aplikacije i upravljanje softverom
- Hardver, upravljanje hardverom

Linux korišćenje softvera

- Ubuntu koristi **Ubuntu Software Center** za instaliranje potrebnog softvera koji se nalazi u arhivama; postoji 5 softverskih skladišta (repozitorijuma):
 - **Main** (svi softverski paketi koji se podrazumevano instaliraju)
 - **Restricted** (softverski paketi sa ograničenim licencnim pravima)
 - **Backports** (novije softverske verzije)
 - **Universe** (softverski paketi koje održava Ubuntu zajednica)
 - **Multiverse** (softverski paketi koji nisu slobodni)

Linux korišćenje softvera

Termini

- **APT** (*Advanced Package Tool*) je napredni alat za softverske pakete; opisuje online skladišta softvera i delove sa kojih se softver preuzima sa interneta i instalira
- Ubuntu koristi skladišta softvera ili softverske kanale
- Softverske aplikacije se čuvaju u paketima podataka
- **dpkg** (*Debian package tool*) se koristi za rad sa softverskim paketima zasnovanim na Debian OS-u (na kojem je zasnovan i Ubuntu)

Ažuriranje softvera

- Ubuntu vrši podrazumevano ažuriranje softvera jednom dnevno ali pre pretrage i instaliranja softvera potrebno je ažurirati postojeći softver
- Komanda **sudo apt update**
- Ubuntu proverava svaki od repozitorijuma i samo downloaduje one softverske pakete koji su ažurirani od njihovog poslednjeg pokretanja
- Alternativne komande su:
sudo apt-get upgrade ime_paketa1 ime_paketa2...
sudo apt-get upgrade (ažuriranje svih paketa)

Ažuriranje softvera

```
dc@dc-virtual-machine: ~  
Hit http://security.ubuntu.com trusty-security/universe Sources  
Ign http://extras.ubuntu.com trusty/main Translation-en_US  
Hit http://security.ubuntu.com trusty-security/multiverse Sources  
Ign http://extras.ubuntu.com trusty/main Translation-en  
Hit http://rs.archive.ubuntu.com trusty-backports InRelease  
Hit http://security.ubuntu.com trusty-security/main amd64 Packages  
Hit http://rs.archive.ubuntu.com trusty Release.gpg  
Hit http://security.ubuntu.com trusty-security/restricted amd64 Packages  
Get:2 http://rs.archive.ubuntu.com trusty-updates/main Sources [242 kB]  
Hit http://security.ubuntu.com trusty-security/universe amd64 Packages  
Hit http://security.ubuntu.com trusty-security/multiverse amd64 Packages  
Hit http://security.ubuntu.com trusty-security/main i386 Packages  
Hit http://security.ubuntu.com trusty-security/restricted i386 Packages  
Hit http://security.ubuntu.com trusty-security/universe i386 Packages  
Hit http://security.ubuntu.com trusty-security/multiverse i386 Packages  
Hit http://security.ubuntu.com trusty-security/main Translation-en  
Get:3 http://rs.archive.ubuntu.com trusty-updates/restricted Sources [4722 B]  
Hit http://security.ubuntu.com trusty-security/multiverse Translation-en  
Get:4 http://rs.archive.ubuntu.com trusty-updates/universe Sources [143 kB]  
Hit http://security.ubuntu.com trusty-security/restricted Translation-en  
Hit http://security.ubuntu.com trusty-security/universe Translation-en  
Get:5 http://rs.archive.ubuntu.com trusty-updates/multiverse Sources [5145 B]  
Get:6 http://rs.archive.ubuntu.com trusty-updates/main amd64 Packages [639 kB]  
94% [6 Packages 24,5 kB/639 kB 4%]
```

Ažuriranje softvera

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Pretraga softvera

- Ubuntu sadrži preko 70.000 softverskih paketa
- Pretraga softvera nije jednostavna jer su imena paketa često vrlo slična
- Pretraga iz konzole je često brži način nego korišćenjem GUI pretrage
- Komande su:

\$ apt search ime_paketa

\$ apt-cache search ime_paketa1 ime_paketa2 ...

\$ apt search ime_paketa | less

\$ apt show ime_paketa

\$ apt-cache policy ime_paketa

Pretraga softvera

```
dc@dc-virtual-machine: ~  
dc@dc-virtual-machine:~$ apt-cache policy firefox  
firefox:  
  Installed: 41.0.2+build2-0ubuntu0.14.04.1  
  Candidate: 41.0.2+build2-0ubuntu0.14.04.1  
  Version table:  
*** 41.0.2+build2-0ubuntu0.14.04.1 0  
    500 http://rs.archive.ubuntu.com/ubuntu/ trusty-updates/main amd64 Pack  
ges  
    500 http://security.ubuntu.com/ubuntu/ trusty-security/main amd64 Packa  
es  
    100 /var/lib/dpkg/status  
    28.0+build2-0ubuntu2 0  
    500 http://rs.archive.ubuntu.com/ubuntu/ trusty/main amd64 Packages  
dc@dc-virtual-machine:~$
```

```
dc@dc-virtual-machine: ~  
dc@dc-virtual-machine:~$ apt-cache policy chromium-browser  
chromium-browser:  
  Installed: (none)  
  Candidate: 45.0.2454.101-0ubuntu0.14.04.1.1099  
  Version table:  
    45.0.2454.101-0ubuntu0.14.04.1.1099 0  
    500 http://rs.archive.ubuntu.com/ubuntu/ trusty-updates/universe amd64 P  
ackages  
    500 http://security.ubuntu.com/ubuntu/ trusty-security/universe amd64 Pa  
ckages  
    34.0.1847.116-0ubuntu2 0  
    500 http://rs.archive.ubuntu.com/ubuntu/ trusty/universe amd64 Packages  
dc@dc-virtual-machine:~$
```

Instalacija novog softvera

- Instalacija novog softvera vrši se iz Ubuntu repozitorijuma
- Ako tačno znamo koji programski paket treba da instaliramo koristimo komandu **\$ sudo apt install**
- Ovom komandom automatski će se preuzeti najnovija verzija i program će se instalirati; komanda se obavezno unosi preko SUDO

\$ sudo apt install chromium-browser

- Pošto se zahteva instalacija dodatnih paketa, zahteva se odobrenje daljeg nastavka instalacije softvera; apt će preuzeti i instalirati dodatne pakete koji unapređuju funkcionalnost programa, a prikazaće se podatak o potrebnom prostoru na hard-disku

Instalacija novog softvera

```
dc@dc-virtual-machine: ~  
dc@dc-virtual-machine:~$ sudo apt install chromium-browser  
[sudo] password for dc:  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following packages were automatically installed and are no longer required:  
  linux-headers-3.19.0-25 linux-headers-3.19.0-25-generic  
  linux-image-3.19.0-25-generic linux-image-extra-3.19.0-25-generic  
Use 'apt-get autoremove' to remove them.  
The following extra packages will be installed:  
  chromium-browser-l10n chromium-codecs-ffmpeg-extra  
Suggested packages:  
  webaccounts-chromium-extension unity-chromium-extension adobe-flashplugin  
The following NEW packages will be installed:  
  chromium-browser chromium-browser-l10n chromium-codecs-ffmpeg-extra  
0 upgraded, 3 newly installed, 0 to remove and 0 not upgraded.  
Need to get 58,7 MB of archives.  
After this operation, 233 MB of additional disk space will be used.  
Do you want to continue? [Y/n]
```

Instalacija grupe softvera

\$ sudo apt-get install gimp inkscape vlc ubuntu-restricted-extras

- Pošto se zahteva instalacija svih ovih programskih paketa istovremeno, vreme za instalaciju se skraćuje
- Nema potrebe vršiti instalaciju preko Ubuntu Software Centra
- **Verzije komande za instalaciju:**

\$ apt-get -d install ime_paketa

\$ apt-get -d upgrade ime_paketa

(opcija **-d** znači da će komanda **apt-get** samo preuzeti softverski paket bez njegovog instaliranja; nakon sledećeg pokretanja paketa iz konzole ili ažuriranja program se neće ponovo preuzimati, sve do sledećeg ažuriranja)

Uklanjanje softvera

- Za uklanjanje softverskog paketa iz Ubuntu instalacije koristi se komanda

\$ sudo apt-get remove ime_paketa1 ime_paketa2....

- Opcija istovremenog brisanja konfiguracionih fajlova i pridruženih direktorijuma vrši se komandom

\$ sudo apt-get remove --purge ime_paketa1 ime_paketa2...

- Opcija automatskog brisanja svih paketa koje softverski paket ne koristi ili mu nisu pridruženi; dobar način da se izbrišu sve nepotrebne biblioteke i nepotrebni programi koji se ne koriste

\$ sudo apt-get autoremove

- Kombinacija komandi

\$ sudo apt-get purge --auto-remove ime_paketa

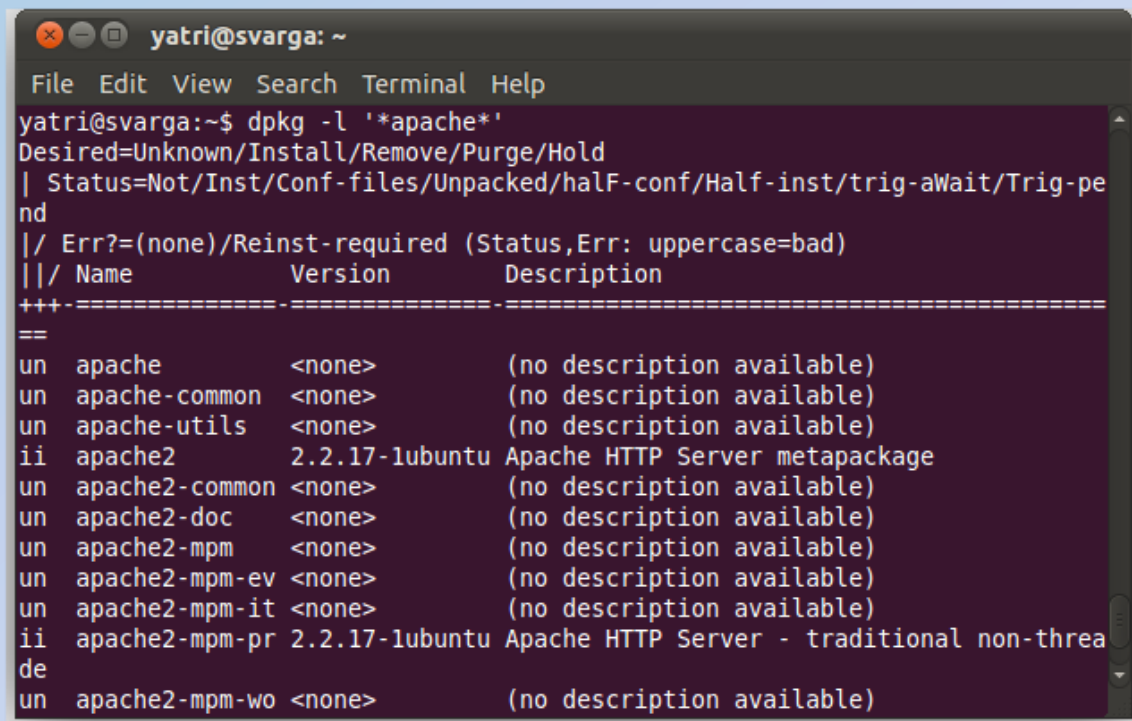
Lista instaliranih paketa

- Da bi se viidela lista svih instaliranih softverskih paketa koristi se komande:

\$ sudo dpkg --list sudo dpkg --list | less

- Opcija naprednijeg ili kompaktinijeg metoda prikaza instaliranih paketa moguća je komandama

\$ dpkg -l 'search_term'



```
yatri@svarga: ~  
File Edit View Search Terminal Help  
yatri@svarga:~$ dpkg -l '*apache*'  
Desired=Unknown/Install/Remove/Purge/Hold  
| Status=Not/Inst/Conf-files/Unpacked/halF-conf/Half-inst/trig-aWait/Trig-pe  
nd  
|/ Err?=(none)/Reinst-required (Status,Err: uppercase=bad)  
||/ Name Version Description  
+++-----+-----+-----+  
==  
un apache <none> (no description available)  
un apache-common <none> (no description available)  
un apache-utils <none> (no description available)  
ii apache2 2.2.17-1ubuntu Apache HTTP Server metapackage  
un apache2-common <none> (no description available)  
un apache2-doc <none> (no description available)  
un apache2-mpm <none> (no description available)  
un apache2-mpm-ev <none> (no description available)  
un apache2-mpm-it <none> (no description available)  
ii apache2-mpm-pr 2.2.17-1ubuntu Apache HTTP Server - traditional non-threa  
de  
un apache2-mpm-wo <none> (no description available)
```

Preuzimanje install foldera sa sajta

- Uvek postoji mogućnost da se instalacija preuzme direktno sa sajta i zatim pokrene u terminalu
- GNU wget je komanda za preuzimanje fajlova sa weba koriscenjem HTTP, HTTPS ili FTP protokola
- Ako wget nije instaliran, onda to uraditi sa komandom

\$ sudo apt install wget

- Po defaultu, wget će preuzeti arhivu u tekući radni direktorijum

\$ wget https://cdn.kernel.org/pub/linux/kernel/v4.x/linux-4.17.2.tar.xz

- Da bi se promenilo ime preuzetog fajla, koristi se opcija **-O**:

wget -O latest-hugo.zip https://github.com/gohugoio/hugo/archive/master.zip

- Da bi se promenio odredišni folder gde će se preuzeti arhiva, koristi se opcija **-P**:

\$ wget -P /mnt/iso http://mirrors.mit.edu/centos/7/isos/x86_64/CentOS-7-x86_64-Minimal-1804.iso

Synaptic

- Ubuntu koristi grafički alat za upravljanje softverskim paketima (aplikacije, sistemske biblioteke, drugi softver)
- Koristi se za kontrolu i precizan rad sa instalacijom/deinstalacijom softverskih paketa
- Synaptic omogućava veći stepen kontrole jer detaljno prikazuje kako se izvršava upravljanje softverskim paketima

Synaptic

The screenshot shows the Synaptic Package Manager window. The top toolbar includes icons for Reload, Mark All Upgrades, Apply, Properties, a Quick filter input, and a Search icon. The left sidebar has a list of categories with 'Databases' selected, and buttons for Sections, Status, Origin, Custom Filters, Search Results, and Architecture. The main pane displays a table of packages with columns for S, Package, Installed Version, and Latest Version. The package 'db5.3-util' is selected, and a context menu is open over it, showing options like Unmark, Mark for Installation, Mark for Reinstallation, Mark for Upgrade, Mark for Removal, Mark for Complete Removal, Properties, Mark Recommended for Installation, and Mark Suggested for Installation. Below the table, the description for 'Berkeley' is visible, including a 'Get Screen Shots' button and a list of package features.

Reload Mark All Upgrades Apply Properties Quick filter Search

All
Amateur Radio (universe)
Communication
Communication (multiverse)
Communication (universe)
Cross Platform
Cross Platform (multiverse)
Cross Platform (universe)
Databases
Databases (universe)

Sections
Status
Origin
Custom Filters
Search Results
Architecture

S	Package	Installed Version	Latest Version
☒	db5.3-util		5.3.28-3ubuntu3
☐	libre...		ubuntu2
☐	libre...		ubuntu2
☐	libre...		ubuntu2

Berkeley
Get Screen Shots
This package...
in the Ber...
- db5.3_archive: write the pathnames of the log files no longer in use.
- db5.3_checkpoint: daemon process to monitor the database log and checkpoint it periodically.
- db5.3_deadlock: traverse the database environment lock region and abort lock requests when a deadlock is detected.
- db5.3_load: loads (and creates) a database from standard input.
- db5.3_dump: read a database file and write it in a format understood by db4.{2..8}_load.
- db5.3_printlog: dump log files in human readable format.

24 packages listed, 1715 installed, 0 broken. 0 to install/upgrade, 0 to remove

Synaptic

- Synaptic prvo instalirati: **sudo apt-get install synaptic**

```
dc@dc-virtual-machine: ~  
dc@dc-virtual-machine:~$ sudo apt-get install synaptic  
[sudo] password for dc:  
Reading package lists... Done  
Building dependency tree  
Reading state information... Done  
The following packages were automatically installed and are no longer required:  
  linux-headers-3.19.0-25 linux-headers-3.19.0-25-generic  
  linux-image-3.19.0-25-generic linux-image-extra-3.19.0-25-generic  
Use 'apt-get autoremove' to remove them.  
The following extra packages will be installed:  
  docbook-xml libcairo-perl libept1.4.12 libglib-perl libgtk2-perl  
  libpango-perl librarian0 rarian-compat sgml-data  
Suggested packages:  
  docbook docbook-dsssl docbook-xsl docbook-defguide libfont-freetype-perl  
  libgtk2-perl-doc perlsgml w3-recs opensp libxml2-utils dwww menu deborphan  
  tasksel  
The following NEW packages will be installed:  
  docbook-xml libcairo-perl libept1.4.12 libglib-perl libgtk2-perl  
  libpango-perl librarian0 rarian-compat sgml-data synaptic  
0 upgraded, 10 newly installed, 0 to remove and 0 not upgraded.  
Need to get 3441 kB of archives.  
After this operation, 17,4 MB of additional disk space will be used.  
Do you want to continue? [Y/n] y
```

Synaptic

- Pokretanje Synaptic softvera: **sudo synaptic**
- Nakon pronalaženja softverskog paketa koji želimo da instaliramo, potvrdimo polje desno od naziva paketa i izaberemo „Mark for instalation“ (obično će se pojaviti dodatni prozor koji prikazuje šta je još dodatno potrebno da se instalira); pritiskom na Apply softverski paket će početi sa instalacijom
- Za uklanjanje softverskog paketa pritisnuti odgovarajući zeleni okvir i izabrati „Mark for removal“
- Ako je potrebno ukloniti i sve konfiguracione fajlove treba izabrati „Mark for Complete Removal“
- Pretraga softverskog paketa vrši se preko polja Search ili kombinacijom tastera CTRL+F

Synaptic

The screenshot shows the Synaptic Package Manager window. The top toolbar includes buttons for 'Reload', 'Mark All Upgrades', 'Apply', 'Properties', a 'Quick filter' text box, and a 'Search' button. On the left, a list of categories is shown, with 'Networking' highlighted. Below the categories are buttons for 'Sections', 'Status', 'Origin', 'Custom Filters', 'Search Results', and 'Architecture'. The main pane displays a table of installed and available packages. The 'avahi-autoipd' package is selected, and a context menu is open over it, showing options like 'Unmark', 'Mark for Installation', 'Mark for Reinstallation', 'Mark for Upgrade', 'Mark for Removal', 'Mark for Complete Removal', 'Properties', 'Mark Recommended for Installation', and 'Mark Suggested for Installation'. The package details for 'Avahi IPv4LL' are visible below the table.

S	Package	Installed Version	Latest Version
☐	apache2-mpm-prefork		2.4.7-1ubuntu4.8
☐	apache2-mpm-worker		2.4.7-1ubuntu4.8
☐	apache2-utils		2.4.7-1ubuntu4.8
☒	avahi-autoipd	0.6.31-4ubuntu1	0.6.31-4ubuntu1

Avahi IPv4LL

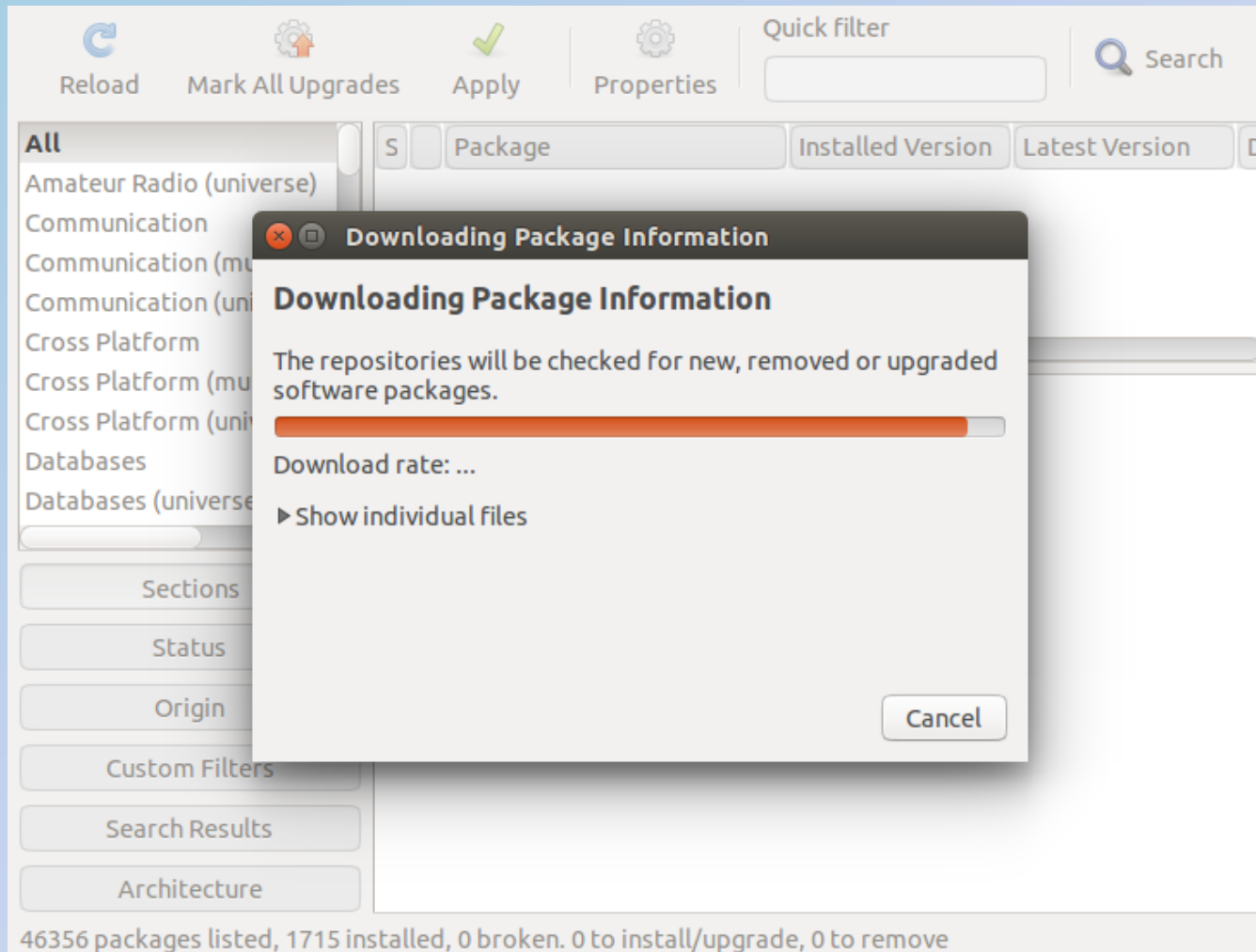
Avahi is a fully L...
It allows program...
running on a loca...
example you can...
print to, files to...

This tool implements IPv4LL, "Dynamic Configuration of IPv4 Link-Local Addresses" (IETF RFC3927), a protocol for automatic IP address configuration from the link-local 169.254.0.0/16 range without the need for a central server. It is primarily intended to be used in ad-hoc networks which lack a DHCP server.

261 packages listed, 1715 installed, 0 broken. 0 to install/upgrade, 0 to remove

Synaptic

- Klikom na Reload proveravaju se softverske dopune; nakon završetka pritisnuti „Mark all upgrades“



uname komanda - Linux System

- Osnovne komande o Linux Shell-u

\$ uname

```
File Edit View Search  
sana@linux:~$ uname  
Linux
```

\$ uname -s

\$ uname -r

```
sana@linux:~$ uname -r  
4.15.0-23-generic
```

\$ uneme -v

```
sana@linux:~$ uname -v  
#25-Ubuntu SMP Wed May 23 18:02:16 UTC 2018
```

\$ uname -n

\$ uname --nodename

```
sana@linux:~$ uname -n  
linux
```

Podaci o Linux kernelu

Ime mrežnog čvora

uname komanda

\$ uname --m

```
sana@linux:~$ uname -m  
x86_64
```

Hardverska arhitektura

\$ uname -p

```
sana@linux:~$ uname -p  
x86_64
```

Arhitektura procesora,
hardverska platforma

\$ uname -i

\$ uname -a

```
sana@linux:~$ uname -a  
Linux linux 4.15.0-23-generic #25-Ubuntu SMP Wed May 23 18:02:16 UTC 2018 x86_64  
x86_64 x86_64 GNU/Linux
```

\$ sudo lshw

```
sana@linux: ~  
File Edit View Search Terminal Help  
sana@linux:~$ sudo lshw  
[sudo] password for sana:  
linux  
  description: Notebook  
  product: HP ProBook 4530s (XU015UT#ABA)  
  vendor: Hewlett-Packard  
  version: A0001D02  
  serial: CNU139052F  
  width: 64 bits  
  capabilities: smbios-2.6 dmi-2.6 smp vsyscall32  
  configuration: boot=normal chassis=notebook family=103C_5336AN sku=XU015UT#A  
  BA uuid=CED82483-BD34-E111-AF05-39E12F03C056  
*-core  
  description: Motherboard  
  product: 167C  
  vendor: Hewlett-Packard  
  physical id: 0  
  version: KBC Version 22.1A  
  serial: PCCAEE00QE1L7TE  
*-firmware  
  description: BIOS  
  vendor: Hewlett-Packard  
  physical id: a  
  version: 685BB Ver. 5.00
```

uname komanda

\$ lshw -short

Kraći prikaz hardvera

```
sana@linux: ~  
File Edit View Search Terminal Help  
Configuration: answericon=5 status=notsc  
sana@linux:~$ sudo lshw -short  
H/W path          Device          Class          Description  
=====
```

		system	HP ProBook 4530s (XU015UT#ABA)
/0		bus	167C
/0/a		memory	64KiB BIOS
/0/0		processor	Intel(R) Core(TM) i3-2310M CPU @ 2.1
/0/0/4		memory	3KiB L3 cache
/0/0/3		memory	256KiB L2 cache
/0/0/2		memory	32KiB L1 cache
/0/1		memory	32KiB L1 cache
/0/5		memory	4GiB System Memory
/0/5/0		memory	DIMM [empty]
/0/5/1		memory	4GiB SODIMM DDR3 Synchronous 1333 MH
/0/100		bridge	2nd Generation Core Processor Family
/0/100/2		display	2nd Generation Core Processor Family
/0/100/16		communication	6 Series/C200 Series Chipset Family
/0/100/1a		bus	6 Series/C200 Series Chipset Family
/0/100/1a/1	usb1	bus	EHCI Host Controller
/0/100/1a/1/1		bus	Integrated Rate Matching Hub
/0/100/1a/1/1/1		generic	VFS471 Fingerprint Reader
/0/100/1b		multimedia	6 Series/C200 Series Chipset Family
/0/100/1c		bridge	6 Series/C200 Series Chipset Family
/0/100/1d		bridge	6 Series/C200 Series Chipset Family

Podaci o procesoru

- Da bi se videli podaci o CPU čipu računara može se koristiti neka od komandi :
 - **arch**
 - **lspcu**
 - **cat /proc/cpuinfo**
- Fajl `/proc/cpuinfo` sadrži flegove (flags) koji opisuju osnovne karakteristike CPU čipa
- Postoje komande za detaljan prikaz podataka o procesoru računara

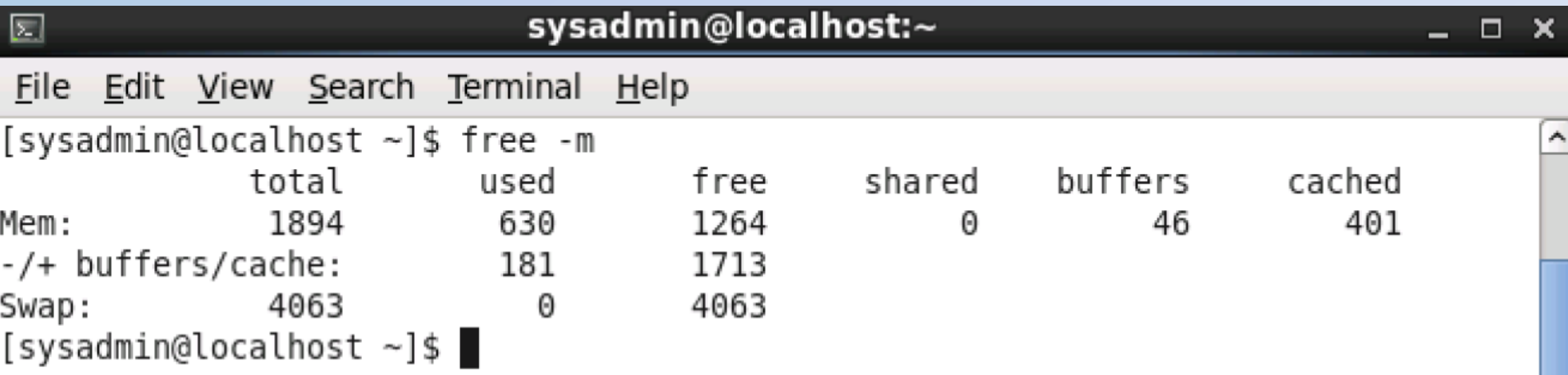
Podaci o procesoru

\$ lscpu

```
File Edit View Search Terminal Help
sana@linux:~$ lscpu
Architecture:          x86_64
CPU op-mode(s):        32-bit, 64-bit
Byte Order:            Little Endian
CPU(s):                4
On-line CPU(s) list:   0-3
Thread(s) per core:    2
Core(s) per socket:    2
Socket(s):             1
NUMA node(s):          1
Vendor ID:             GenuineIntel
CPU family:            6
Model:                42
Model name:            Intel(R) Core(TM) i3-2310M CPU @ 2.10GHz
Stepping:              7
CPU MHz:               798.250
CPU max MHz:           2100.0000
CPU min MHz:           800.0000
BogoMIPS:              4190.81
Virtualization:        VT-x
```

Podaci o RAM memoriji

- Random Access Memory (RAM) čuva programe i podatke koji se izvršavaju
- Virtual memory (swap space) je prostor na hard-disku koji se koristi kada ne postoji dovoljno slobodne RAM memorije
- Komanda **free** prikazuje podatke o korišćenju memorije:



```
sysadmin@localhost:~  
File Edit View Search Terminal Help  
[sysadmin@localhost ~]$ free -m  
              total        used        free      shared    buffers     cached  
Mem:           1894          630        1264           0          46         401  
-/+ buffers/cache:          181        1713  
Swap:          4063           0        4063  
[sysadmin@localhost ~]$
```

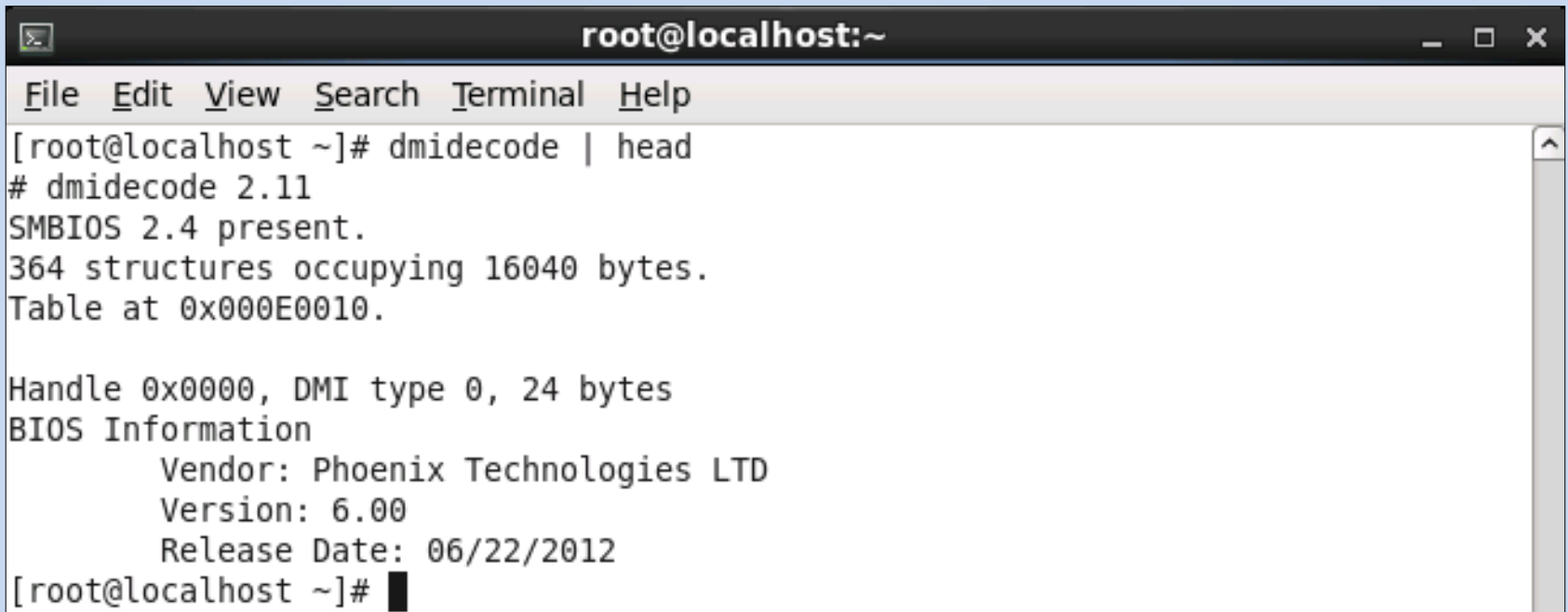
The terminal window displays the output of the `free -m` command. The output shows memory usage in megabytes. The 'Mem' section shows a total of 1894 MB, with 630 MB used and 1264 MB free. There are 0 MB shared, 46 MB buffers, and 401 MB cached. The '-/+ buffers/cache' section shows 181 MB used and 1713 MB free. The 'Swap' section shows a total of 4063 MB, with 0 MB used and 4063 MB free.

Matična ploča i sabirnice

- Hardver komunicira preko matične ploče i sabirnica (magistrala)
- Basic Input and Output System (BIOS) proverava ispravnost hardvera/softvera tokom podizanja OS-a (boot) i
- System Management BIOS (SMBIOS) je standard kojim se definiše struktura podataka koji se koriste tokom komunikacije

Matična ploča i sabirnice

- Komande **sudo dmidecode | head**
sudo dmidecode | less
prikazuju podatke o SMBIOS-u i BIOS-u:

A terminal window titled 'root@localhost:~' with a menu bar (File, Edit, View, Search, Terminal, Help). The terminal shows the command '[root@localhost ~]# dmidecode | head' and its output. The output includes the version of dmidecode (2.11), the presence of SMBIOS 2.4, the number of structures (364) and their size (16040 bytes), the location of the table (0x000E0010), and BIOS information for Phoenix Technologies LTD, version 6.00, released on 06/22/2012. The prompt '[root@localhost ~]#' is followed by a cursor.

```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# dmidecode | head  
# dmidecode 2.11  
SMBIOS 2.4 present.  
364 structures occupying 16040 bytes.  
Table at 0x000E0010.  
  
Handle 0x0000, DMI type 0, 24 bytes  
BIOS Information  
    Vendor: Phoenix Technologies LTD  
    Version: 6.00  
    Release Date: 06/22/2012  
[root@localhost ~]#
```

Periferni uređaji

- Nisu direktno povezani sa matičnom pločom
 - Dva osnovna tipa:
 - Peripheral Component Interconnect Express (PCIe)
 - Universal Serial Bus (USB)
- \$ lsblk -a** (daje podatke o svim storage uređajima u računaru)

```
File Edit View Search Terminal Help
sana@linux:~$ lsblk
NAME        MAJ:MIN RM   SIZE RO TYPE MOUNTPOINT
loop0       7:0      0    13M  1 loop /snap/gnome-characters/103
loop1       7:1      0   86.9M  1 loop /snap/core/4917
loop2       7:2      0    1.6M  1 loop /snap/gnome-calculator/154
loop3       7:3      0   12.2M  1 loop /snap/gnome-characters/69
loop4       7:4      0    3.7M  1 loop /snap/gnome-system-monitor/51
loop5       7:5      0    3.7M  1 loop /snap/gnome-system-monitor/45
loop6       7:6      0   14.5M  1 loop /snap/gnome-logs/37
loop7       7:7      0   140M  1 loop /snap/gnome-3-26-1604/59
loop8       7:8      0  139.5M  1 loop /snap/gnome-3-26-1604/64
loop9       7:9      0   86.6M  1 loop /snap/core/4486
loop10      7:10     0    2.3M  1 loop /snap/gnome-calculator/178
loop11      7:11     0   34.7M  1 loop /snap/gtk-common-themes/319
loop12      7:12     0    21M  1 loop /snap/gnome-logs/25
loop13      7:13     0  140.9M  1 loop /snap/gnome-3-26-1604/70
loop14      7:14     0    2.3M  1 loop /snap/gnome-calculator/180
loop15      7:15     0    13M  1 loop /snap/gnome-characters/101
loop16      7:16     0    3.3M  1 loop /snap/gnome-system-monitor/36
sda         8:0      0  298.1G  0 disk 
└─sda1      8:1      0   300M  0 part
```

PCIe uređaji

- Koristi se komanda **\$ lspci**

```
00:00.0 Host bridge: Intel Corporation 440BX/ZX/DX - 82443BX/ZX/DX Host bridge (rev 01)
00:01.0 PCI bridge: Intel Corporation 440BX/ZX/DX - 82443BX/ZX/DX AGP bridge (rev 01)
00:07.0 ISA bridge: Intel Corporation 82371AB/EB/MB PIIX4 ISA (rev 08)
00:07.1 IDE interface: Intel Corporation 82371AB/EB/MB PIIX4 IDE (rev 01)
00:07.3 Bridge: Intel Corporation 82371AB/EB/MB PIIX4 ACPI (rev 08)
00:07.7 System peripheral: VMware Virtual Machine Communication Interface (rev 10)
00:0f.0 VGA compatible controller: VMware SVGA II Adapter
00:10.0 SCSI storage controller: LSI Logic / Symbios Logic 53c1030 PCI-X Fusion-MPT Dual Ultra320 SCSI (rev 01)
02:00.0 Ethernet controller: Intel Corporation 82545EM Gigabit Ethernet Controller (Copper) (rev 01)
```

USB uređaji

- USB uređaji su „hot-plug“ jer se mogu povezati sa računarom tokom njegovog rada
- Prikaz USB uređaja komandom **\$lsusb**
- Opcija **-v** daje „verbose“ prikaz uređaja

```
ubuntu@ubuntuvm:~$ lsusb
Bus 001 Device 002: ID 0951:1666 Kingston Technology DataTraveler G4
Bus 001 Device 001: ID 1d6b:0002 Linux Foundation 2.0 root hub
Bus 002 Device 004: ID 0e0f:0008 VMware, Inc.
Bus 002 Device 003: ID 0e0f:0002 VMware, Inc. Virtual USB Hub
Bus 002 Device 002: ID 0e0f:0003 VMware, Inc. Virtual Mouse
Bus 002 Device 001: ID 1d6b:0001 Linux Foundation 1.1 root hub
```

HDD diskovi

- Mogu biti direktno povezani sa matičnom pločom, ali i preko PCIe ili USB konekcije
- Podeljeni su na particije
- Dva tipa particija:
 - Master Boot Record (MBR)
 - GUID Partitioning Table (GPT)

MBR

- Starija tehnologija
- Još uvek se koristi
- Komande za prikaz ili izmenu MBR particija:

fdisk

cfdisk

sfdisk

GPT

- Novija tehnologija
- Omogućava kreiranje većih particija nego kod MBR
- Komande za prikaz i izmenu GPT particija:

gdisk

cgdisk

sgdisk

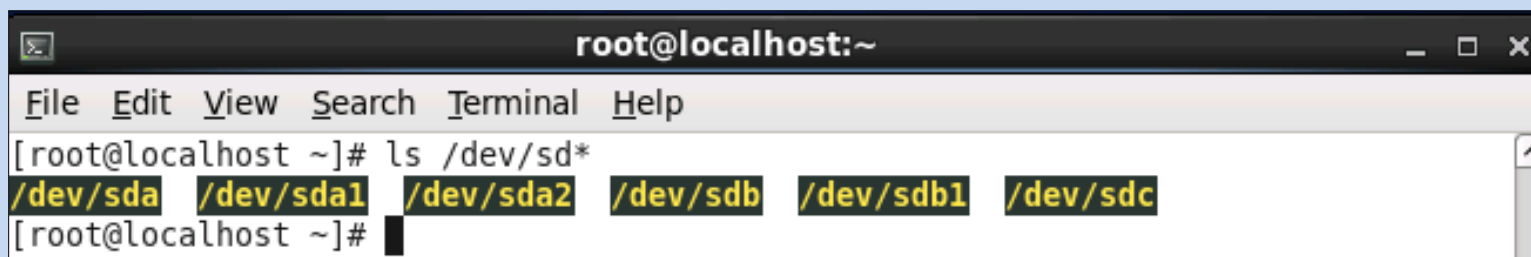
Imena uređaja

- IDE dražvovima se dodeljuju imena fajlova koja počinju slovima **hd** i čuvaju se u direktorijumu **/dev**
- USB, SATA i SCSI dražvovima se dodeljuju imena koja počinju sa slovima **sd**
- Prvi dražv dobija slovo **a**, drugi dobija slovo **b**, itd.
- Primeri:
 - Prvi IDE dražv: **/dev/hda**
 - Prvi SATA dražv: **/dev/sda**
 - Drugi SATA dražv: **/dev/sdb**

Imena particija

- Particijama se dodeljuju numeričke vrednosti 1, 2, 3, itd.
- Primeri:
 - Prva particija na prvom IDE drajvu: **/dev/hda1**
 - Druga particija na drugom SATA drajvu: **/dev/sdb2**
- Prikaz particija drajvova komandom:

ls /dev/sd* ls /dev/hd*

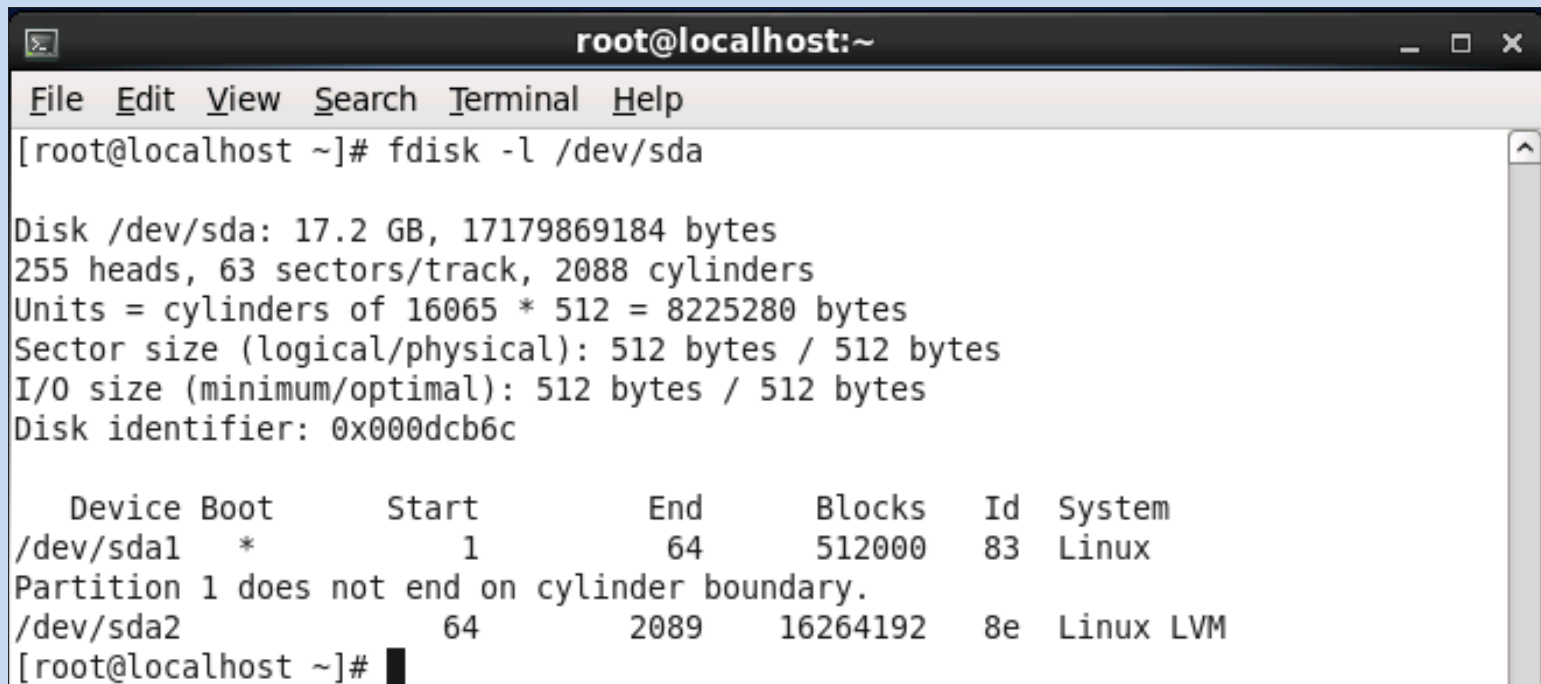


```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# ls /dev/sd*  
/dev/sda /dev/sda1 /dev/sda2 /dev/sdb /dev/sdb1 /dev/sdc  
[root@localhost ~]#
```

Podaci o particijama

- Opcija **-l** komande **fdisk** command može se koristiti za prikaz podataka o particijama:

fdisk -l /dev/sda



```
root@localhost:~  
File Edit View Search Terminal Help  
[root@localhost ~]# fdisk -l /dev/sda  
  
Disk /dev/sda: 17.2 GB, 17179869184 bytes  
255 heads, 63 sectors/track, 2088 cylinders  
Units = cylinders of 16065 * 512 = 8225280 bytes  
Sector size (logical/physical): 512 bytes / 512 bytes  
I/O size (minimum/optimal): 512 bytes / 512 bytes  
Disk identifier: 0x000dcb6c  
  
   Device Boot      Start         End      Blocks   Id  System  
/dev/sda1  *           1           64       512000   83   Linux  
Partition 1 does not end on cylinder boundary.  
/dev/sda2           64        2089      16264192   8e   Linux LVM  
[root@localhost ~]#
```