Ellhniko CD-Writing HOWTO

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To keimeno ayto asxoleitai me thn diadikasia eggrafhs CDs katw apo Linux.

Contents

1 Eisagwgh

H prwth moy empeiria me Eggrafeis CD (CD Writers) jekinhse me to "Linux CD Writer mini-HOWTO" toy Matt Cutts <cutts@cs.unc.edu>. Eyxaristw Matt!

Parolo poy h pro8esh moy htan mono na anaba8misw to keimeno toy, to janaegraca apo thn arxh, afou syneidhtopoihsa posa polla allajan apo to 1994.

1.1 Apokhryjh Dikaiwmatwn

EGW (O Winfried Truemper) APARNOYMAI OPOIADHPOTE EGGYHSH SXETIKA ME AYTO TO KEIMENO, SYMPERILAMBANOMENWN KAI TWN EMMESWN EGGYHSEWN PERI EMPOREYSIMOTHTAS KAI KALHS LEITOYRGIAS GIA KAPOION SKOPO. SE KAMIA PERIPTWSH DEN 8A EIMAI YPOLOGOS GIA KAMIA EIDIKH, EMMESH H SYNEPAGOMENH BLABH, H OPOIADHPOTE BLABH GENIKOTERA POY ODHGEI SE APWLEIA XRHSHS, DEDOMENWN H KERDWN, EITE APO PRA3H SYMBOLAIOY, AMELEIA H ALLH PRA3H EPIZHMIA KAI PROKYPTEI APO H SE SYNDYASMO ME TH XRHSH AYTOY TOY KEIMENOY.

En syntomia: Diabaste to kai xrhsimopoihste to me diko sas risko.

1.2 Proteinomeno Diabasma

To *CD-R FAQ* `<http://www.cd-info.com/CDIC/Technology/CD-R/FAQ.html>` einai ena geniko FAQ gia compact-disk recordables (CD-R).

To *Linux CD-ROM HOWTO* ejhgei ta panta poy prepei na jerei kaneis gia toys odhgous CD-ROM katw apo Linux. San symplhrwma, mporei na 8elhsete na rijete mia matia sto *Linux SCSI HOWTO* kai sto *Linux Kernel HOWTO*.

1.3 Orologia... lasers at maximum ... fire (Shm. ametafrasto)!

To *CD-ROM* einai akrwnumio gia *Compact Disc Read Only Memory* (Mnhmh Mono Anagnwshs Sympagous Diskoy), ena meso apo8hkeyshs poy xrhsimopoiei ena optiko laser gia na entopisei mikroskopikes opes se enan ashmenio astraftero disko. (To astraftero ashmenio proerxetai apo mia epistrwsh aloyminioy poy einai to feron (carrier).) Oi trupes antiproswpeuoyn ta bits ths plhroforias (me kapoio tropo) kai einai toso mikra poy merika disekatommuria apo ayta xwrane panw sto disko. Etsi, to CD einai ena meso mazikhs apo8hkeyshs (mass-storage medium).

O oros *CD-R* einai mia suntmhsh gia to *CD-ROM recordable* (eggracimo CD) kai anaferetai se ena CD poy den exei aytes tis "mikroskopikes opes" sthn epifaneia toy... kai gi' ayto einai adeio.

Anti gia thn aloyminenia epistrwsh (ashmenia), ena CD-R exei mia eidikh tainia (film) (xrwmatisth) sthn opoia oi "mikroskopikes opes" mporoun na dhmioyrgh8oun me kacimo. Ayto ginetai dynato sto laser, to opoio fysiologika mono anagnwrizei tis opes, ligh perissoterh dunamh wste na kacei nees opes. Ayth h energeia mporei na ginei mono **mia** fora ana a CD-R.

Mporeite na afhsete ejw merikes perioxes gia metepeita eggrafh, parola ayta, dhmioyrgwntas ena multi-session CD.

Ayto to mini-HOWTO asxoleitai me th diadikasia eggrafhs enos CD-R. Loipon "Kalws epibibasthkate, kapetanie".

1.4 Yposthrizomena CD-Writers

H leptomerhs lista twn montelwn poy anaferontai pws (de) doyleuoyn epityxws einai dia8esimh sto

`<http://www.shop.de/cgi-bin/winni/lsc.pl>`

H lista 8a symperilambanetai se mellontikes ekdoseis aytou toy mini-HOWTO. Ta perissotera SCSI cd-writers yposthrizontai kai oi newteres ekdoseis toy cdrecord yposthrizoyn akoma kai ATAPI cd-writers.

An to yliko sas den yposthrizetai, mporeite kai pali na xrhsimopoihsete to Linux gia na dhmioyrghsete mia eikona (image) toy metepeita CD alla 8a prepei na xrhsimopoihsete logismiko DOS gia na gracete thn eikona sto CD-R. [Mporei na 8elete na to kanete ayto, epeidh ta perissotera logismika gia DOS de mporoun na antimetwpisoyn ta megala onomata arxeiwn (long filenames) poy yparxoyn sto Linux.]

Se ayth thn periptwsh mporeite na parakamcete ola ta 8emata sxetika me to yliko (ayta gia tis *Syskeyes SCSI genikou tupoy* kai ta `cdwrite/cdrecord`).

1.5 Yposthrizomena "xarakthristika"

Pros to paron, to logismiko gia na kaiei CDs katw apo Linux (den) yposthrizei ta parakatw kuria xarakthristika :

```
Feature         cdwrite-2.1     cdrecord-1.7
--------------------------------------------
ATAPI support   no              yes
Multisession    only partial    yes
```

```
RockRidge       yes (mkisofs)   yes (mkisofs)
El Torito       yes (mkisofs)   yes (mkisofs)
HFS             yes (mkhybrid)  yes (mkhybrid)
Joliet          yes (mkhybrid)  yes (mkhybrid)
```

To *RockRidge* einai mia epektash gia na epitrepei megalutera onomata arxeiwn kai ba8uterh ierarxhsh directory . To *El Torito* mporei na xrhsimopoih8ei gia thn paragwgh ekkinhsimwn (bootable) CDs. Parakalw deite th synodeytikh tekmhriwsh gia perissoteres leptomereies gia ayta ta eidika xarakthristika. To *HFS* epitrepei se ena macintosh na diabasei to CD-ROM san na htan mia perioxh (volume) tupoy HFS. To *Joliet* dinei megala onomata arxeiwn (metaju allwn pragmatwn) se merikes ekdoseis Windows (95, NT).

To tmhma 2.8 anaferei th dia8esimothta twn parapanw logismikwn.

1.6 Mailinglists

An 8elete na symmetasxete sthn omada anaptyjhs (me pro8esh na toys _boh8hsete_ energa), steilte ena e-mail sto

cdwrite-request@pixar.com

kai balte th lejh `subscribe` sto kurio meros (body) toy mhnumatos message.

1.7 Dia8esimothta

Oi newteres ekdoseis aytou toy keimenoy einai panta dia8esimes sto

`<http://www.shop.de/~winni/linux/cdr/>`

1.8 Peri ths Ellhnikhs Metafrashs

Gia sxolia, parathrhseis, dior8wseis, enhmerwseis peri ths Ellhnikhs metafrashs aytou toy HOWTO, steilte email sthn Boula Sanida : `voulariba@hellug.gr` h ston Eyripidh Papakwsta : `evris@hellug.gr` kai enallaktika : `ep@rocketmail.com`

2 Etoimasia toy Linux-koytiou sas gia eggrafh CD-ROMs

Prin to Noembrio toy 1997, to logismiko gia Linux den yposthrize ATAPI cd-writers. San apotelesma, h trexoysa ekdosh aytou toy HOWTO epikentrwnetai sthn antimetwpish twn syskeywn SCSI.

Ta kala nea einai, pws h antimetwpish twn syskeywn ATAPI einai polu eykoloterh kai mporeite akoma na xrhsimopoieite ayto to HOWTO an jexasete tis "Syskeyes SCSI genikou tupoy".

Gia na breite pws apey8uneste se syskeyes ATAPI mporeite na dwsete thn entolh `cdrecord -scanbus`.

Mellontikes ekdoseis aytou toy HOWTO 8a periexoyn perissoteres leptomereies gia antimetwpish twn ATAPI cd-writers.

2.1 Egkatastash toy ylikou (hardware)

Katebaste ton H/Y sas, kleiste ton kai kremaste to CD writer sto diaylo SCSI. Bebaiw8eite pws o diaylos SCSI einai termatismenos (terminated) katallhla kai dialejte mia eleu8erh taytothta 8eshs SCSI (SCSI-ID) gia ton eggrafea. Koitajte to Linux SCSI-HOWTO an den eisaste sigoyroi. An den exete apolutws kamia idea gia ayta, rwthste enan eidiko.

Trofodothste jana me reuma kai elegjte ta mhnumata poy to BIOS toy elegkth (controller) SCSI typwnei amesws meta to anoigma toy reumatos.

An den anagnwrisei to writer sas, phgainete pali pisw sto bhma (b). 8a prepei na deite ena mhnyma san

[leipei h eikona ; exei kaneis kapoio stigmiotypo o8onhs (screenshot) apo ayto;]

2.2 Shmeiwsh sthn eggrafh CDs katw apo Linux

Se anti8esh me kapoies fhmes, o pyrhnas toy Linux-kernel _den_ apaitei dior8wsh (patch) gia na gracei se CDs. Parolo poy to arxeio `drivers/scsi/scsi.c` apo ton kwdika toy pyrhna periexei tis grammes

```
case TYPE_WORM:
case TYPE_ROM:
 SDpnt->writeable = 0;
```

Ayto shmainei mono pws ta CDs kai ta WORMs den einai eggracima mesw twn klassikwn syskeywn (devices) `/dev/sda`-`/dev/sdh` - pragma to opoio einai entajei.

Anti na xrhsimopoihsete aytes tis syskeyes gia eggrafh twn CDs ginetai mesw twn apokaloumenwn *Syskeywn SCSI genikou tupoy* poy epitrepoyn sxedon ta panta - akoma kai thn eggrafh se CDs.

2.3 Dhmioyrghste tis genikes syskeyes

The *Linux SCSI-HOWTO* says about generic SCSI-devices:

> O odhgos Genikwn syskeywn SCSI parexei ena interface gia apostolh entolwn SCSI pros oles tis syskeyes SCSI - diskoys, tainies, CDROMs, mhxanikes syskeyes allaghs meswn (media changer robots), klp.

Milwntas gia tis genikes syskeyes (devices) san *interfaces* shmainei pws parexoyn enan enallaktiko tropo prospelashs sto SCSI yliko, anti mesw twn koinwn devices.

O enallaktikos tropos apaiteitai giati ta koina devices sxediasthkan gia na diabazoyn dedomena kata kommatia (block-wise) apo ena disko, tainia h cd-rom Se sugkrish me ayto, to na odhgeis ena cd-writer (h ena sarwth (scanner)) einai pio ejwtiko, p.x. prepei na do8oun entoles gia topo8ethsh toy laser . An exeis mia ka8arh (kai gi' ayto grhgorh) ylopoihsh twn koinwn syskeywn (devices), oles aytes oi ejwtikes energeies prepei na ginoyn mesw twn genikwn syskeywn SCSI.

Mia poy ola mporoun na ginoyn sto SCSI yliko mesw twn genikwn syskeywn, den exoyn ftiaxtei gia ena sygkekrimeno skopo - gi' ayto kai to onoma *genikes (generic)*.

Phgainete sto `/dev`-directory kai tsekarete gia genikes syskeyes SCSI. H entolh `ls` 8a prepei na deijei `sga-sgh`:

```
bash> cd /dev
bash> ls -l sg*
crw-------   1 root   sys    21,   0 Jan  1  1970 sga
crw-------   1 root   sys    21,   1 Jan  1  1970 sgb
crw-------   1 root   sys    21,   2 Jan  1  1970 sgc
crw-------   1 root   sys    21,   3 Jan  1  1970 sgd
crw-------   1 root   sys    21,   4 Jan  1  1970 sge
crw-------   1 root   sys    21,   5 Jan  1  1970 sgf
```

```
crw-------   1 root   sys     21,   6 Jan  1  1970 sgg
crw-------   1 root   sys     21,   7 Jan  1  1970 sgh
```

An den exete tetoia arxeia-syskeywn, dhmioyrghste ta xrhsimopoiwntas to `/dev/MAKEDEV`-script:

```
bash> cd /dev/
bash> ./MAKEDEV sg
```

Twra ta arxeia syskeywn 8a prepei na emfanistoun.

2.4 Energopoihste th xrhsh twn *genikwn syskeywn SCSI* kai ths syskeyhs *loop-back*

O pyrhnas toy Linux xreiazetai ena module poy toy parexei thn dynatothta na antimetwpizei SCSI syskeyes. An o trexwn pyrhnas yposthrizei ayto to xarakthristiko, 8a prepei na emfanizetai sto ceydo-arxeio `/proc/devices`:

```
bash> cat /proc/devices
Character devices:
 1 mem
 2 pty
 3 ttyp
 4 ttyp
 5 cua
 7 vcs
21 sg          <----- stands for "SCSI Generic device"
30 socksys

Block devices:

 2 fd
 7 loop        <----- we even can use the loop-devices
 8 sd
11 sr          <----- stands for "SCSI cd-Rom"
```

Isws prepei na dwsete tis entoles `insmod sg`, `insmod loop` h `insmod sr_mod` gia na fortwsete ta modules ston pyrhna. Elegjte jana afou to dokimasete. An kapoio apo ayta den petuxei, prepei na janary8misete ton pyrhna sas kai na ton janametaglwttisete (re-compile).

```
bash> cd /usr/src/linux
bash> make config
[..]
*
* Additional Block Devices
*
Loopback device support (CONFIG_BLK_DEV_LOOP) [M/n/y/?] M
[..]
*
* SCSI support
*
SCSI support (CONFIG_SCSI) [Y/m/n/?] Y
*
* SCSI support type (disk, tape, CD-ROM)
```

```
*
SCSI disk support (CONFIG_BLK_DEV_SD) [Y/m/n/?] Y
SCSI tape support (CONFIG_CHR_DEV_ST) [M/n/y/?] M
SCSI CD-ROM support (CONFIG_BLK_DEV_SR) [M/n/y/?] M
SCSI generic support (CONFIG_CHR_DEV_SG) [M/n/y/?] M
[..]
ISO9660 cdrom filesystem (CONFIG_ISO9660_FS) [Y/m/n/?] M
```

Shmeiwste pws pareleica tis oxi polu shmantikes erwthseis.

2.5 Xtisimo kai egkatastash toy pyrhna

Ean exete erwthseis sxetika me ayto, to Linux Kernel-HOWTO einai to proteinomeno diabasma sas. Epipleon, h dianomh Linux sas, 8a prepei na erxetai me kapoia tekmhriwsh gia ayto to 8ema.

[Ypodeijh: otan kanete jana compile, mporeite na synexisete me ta bhmata 2.7-2.9]

2.6 Epanekkinhste ton ypologisth gia na egkyropoih8oun oi allages.

Mhn panikoblh8eite ean o pyrhnas toy Linux typwsei ta mhnumata grhgorotera apo oso mporeite na diabasete, toylaxiston h arxikopoihsh twn syskeywn SCSI mporei na epanemfanistei me thn entolh `dmesg`:

```
scsi0 : NCR53c{7,8}xx (rel 17)
scsi : 1 host.
scsi0 : target 0 accepting period 100ns offset 8 10.00MHz
scsi0 : setting target 0 to period 100ns offset 8 10.00MHz

  Vendor: FUJITSU   Model: M1606S-512        Rev: 6226
  Type:   Direct-Access                      ANSI SCSI
Detected scsi disk sda at scsi0, channel 0, id 0, lun 0

  Vendor: NEC       Model: CD-ROM DRIVE:84   Rev:  1.0a
  Type:   CD-ROM                             ANSI SCSI
Detected scsi CD-ROM sr0 at scsi0, channel 0, id 4, lun 0

scsi : detected 1 SCSI disk total.
SCSI device sda: hdwr sector= 512 bytes. Sectors= 2131992
```

Parapanw fainetai mono to kommati ekeino twn mhnymatwn arxikopoihshs poy anaferoyn ton entopismo ths fysikhs paroysias mias syskeyhs SCSI.

2.7 Dhmioyrgia twn syskeywn *loopback*

Phgainete sto directory `/dev` kai koitajte gia syskeyes *loopback*. Den einai krisimo, to na mhn exete tetoies syskeyes, alla einai boliko an yparxoyn (deite to 3.5). An hdh tis exete, h entolh `ls` 8a prepei na deijei `loop0-loop7`:

```
bash> cd /dev
bash> ls -l loop*
brw-rw----   1 root  disk    7,   0 Sep 23 17:15 loop0
brw-rw----   1 root  disk    7,   1 Sep 23 17:15 loop1
brw-rw----   1 root  disk    7,   2 Sep 23 17:15 loop2
```

```
brw-rw----   1 root  disk    7,   3 Sep 23 17:15 loop3
brw-rw----   1 root  disk    7,   4 Sep 23 17:15 loop4
brw-rw----   1 root  disk    7,   5 Sep 23 17:15 loop5
brw-rw----   1 root  disk    7,   6 Sep 23 17:15 loop6
brw-rw----   1 root  disk    7,   7 Sep 23 17:15 loop7
```

An den exete ayta ta arxeia syskeywn, dhmioyrghste ta xrhsimopoiwntas to script `/dev/MAKEDEV`:

```
bash> cd /dev/
bash> ./MAKEDEV loop
```

H teleytaia entolh epitygxanei mono an exete to `loop`-module ston pyrhna sas (des to 2.4 gia th xrhsh twn modules). An h `insmod loop` den boh8hsei, 8a prepei na perimenete mexri o kainourgios pyrhnas na egkatasta8ei kanonika (des to 2.5).

2.8 Promh8eyteite to logismiko gia eggrafh twn CDs

2.8.1 Roytines grammhs-entolwn

Ta akoloy8a paketa apaitountai gia thn paragwgh prwtotupwn gia CD-Rs:

`<ftp://tsx-11.mit.edu/pub/linux/packages/mkisofs/>` (mkisofs) `<ftp://ftp.ge.ucl.ac.uk/pub/mkhfs>` (mkhybrid)

Analoga me to montelo toy cd-writer sas (des 1.3), apaiteitai ena apo ta akoloy8a logismika gia eggrafh twn prwtotupwn se CD-Rs:

`<ftp://ftp.fokus.gmd.de/pub/unix/cdrecord/>` (cdrecord) `<ftp://sunsite.unc.edu/pub/Linux/utils/disk-management/>` (cdwrite)

Xrhsimopoihste to kontinotero mirror apo aytous toys ftp-Servers h parte ta apo CD. Na eisaste apolutws sigoyros pws exete thn ekdosh 2.0 toy `cdwrite`, h newterh ths. Kamia palaioterh bhta ekdosh den 8a doylecei kanonika! Mhn empisteueste thn selida-boh8eias (man-page) toy (paliou) `mkisofs` poy dhlwnei pws xreiazeste thn ekdosh

1.5 toy `cdwrite`.

Gia plhrofories gia metafores toy logismikou (ports) toy cdwrite se Irix kai AIX episkef8eite to URL :

`<http://lidar.ssec.wisc.edu/~forrest/>`

Ean xrhsimopoieite pyrhna prin thn ekdosh 2.0.31, mporei na 8elete na dior8wsete to `mkisofs` gia na jeperasete ena bug ston kwdika toy systhmatos arxeiwn toy Linux. H dianomh ths Debian perilambanei ena dior8wtiko (patch) gia thn ekdosh 1.05 toy `mkisofs` (gia 1.11 8a prepei na doyleuei, epishs) poy toy pros8etei thn epilogh '-K' (des to 3.4). Einai dia8esimo apo to

`<ftp://ftp.debian.org/pub/debian/bo/source/otherosfs/mkisofs_1.11-1.diff.gz>`

H dior8wsh ayth einai anagkaia mono ean 8elete na prosarthsete to CD-image mesw ths syskeyhs loopback (deite to 3.5.).

2.8.2 Ena grafiko user interface (proairetiko).

To X-CD-Roast einai ena programma eggrafhs CD basizomeno apokleistika sta X, kai einai o apogonos twn `cdwtools-0.93`. Einai dia8esimo sto

<http://www.fh-muenchen.de/home/ze/rz/services/projects/xcdroast/e_overview.html>

Pros to parwn to X-CD-Roast basizetai se mia dior8wmenh ekdosh toy cdwrite-2.0 kai gi' ayto erxetai me akribws ta idia xarakthristika (deite to 1.4). Oi mellontikes toy ekdoseis mporei na basizontai sto enallaktiko logismiko cdrecord.

3 "Ean streceis ton eayto soy pros ton kapno, den 8a stamathsw na to diaskedazw oso 8a kaigesai."

(O Aytokratoras Nerwnas gia to kacimo twn klassikwn toy CDs [AD64]. To eixe parejhghsei entelws).

Synh8ws h eggrafh enos CD katw apo Linux ginetai se 2 bhmata:

- paketarisma toy epi8ymhtou logismikou se ena megalo arxeio, xrhsimopoiwntas to `mkisofs/mkhybrid`-utility
- eggrafh toy megaloy arxeioy sto the CD-R me to `cdwrite` h to `cdrecord`

Einai epishs dynato na syndyasete ta 2 bhmata mesw diaswlhnwshs (pipe) alla sas apo8arrunoyme apo to na to dokimasete giati den einai ajiopisto. Deite parakatw.

3.1 Ka8oriste se pia genikh syskeyh scsi (scsi device) einai proskollhmenos o eggrafeas

[Shmeiwste : to trexon sxhma onomatologias twn syskeywn scsi devices sto Linux einai polu mplegmeno xwris logo kai oxi kai arketa ajiopisto. To gegonos pws to perigrafw se megalh leptomereia, den 8a prepei na eklhf8ei la8os san apodoxh aytou toy sxhmatos. Oi an8rwpoi me ATAPI cd-writer mporoun na dokimasoyn thn "cdrecord -scanbus" gia na entopisoyn thn swsth syskeyh kai na paraleicoyn to ypoloipo aytou toy tmhmatos.]

Afou akoloy8hsete ola ta bhmata toy deuteroy kefalaioy to susthma sas 8a prepei na einai ikano na antimetwpizei th diadikasia ths eggrafhs twn CDs. Ayto to tmhma mporei na xrhsimopoih8ei ws apodeijh pws ola doyleuoyn kata pws prepei.

Dwste thn entolh `dmesg`. 8a prepei na anaferei ta mhnumata toy pyrhna toy Linux, symperilambanomenwn kai ekeinwn poy typw8hkan kata thn ekkinhsh (periorismos: mono ta teleytaia l200) kai na periexei kapoies plhrofories gia to CD-Writer poy einai syndedemeno sto diaylo SCSI.

Aplo paradeigma:

```
  Vendor: YAMAHA  Model: CDR100       Rev: 1.11
  Type:   WORM                        ANSI SCSI revision: 02
Detected scsi CD-ROM sr1 at scsi0, channel 0, id 3, lun 0
```

H mhxanh ayth exei 4 syskeyes SCSI syndedemenes panw ths (den mporeite na to deite kai etsi sas to lew egw), me taytothtes (SCSI-id) apo 0 ews 3. O eggrafeas einai h 4h fysika parousa syskeyh SCSI kai gi' ayto einai syndedemenh sto `/dev/sgd` (h tetarth genikh syskeyh SCSI,opoy h metrhsh arxizei apo to gramma a). Se ayth thn periptwsh, h entolh:

```
cdwrite  --eject  --device /dev/sgd
```

anoigei ton ypodoxea (tray) kai einai enas elegxos gia to an ola exoyn egkatasta8ei swsta. Ena pio sun8eto paradeigma:

```
scsi0 : AdvanSys SCSI 1.5: ISA (240 CDB)
scsi1 : Adaptec 1542
scsi : 2 hosts.

  Vendor: HP      Model: C4324/C4325  Rev: 1.20
  Type:   CD-ROM                      ANSI SCSI revision: 02
Detected scsi CD-ROM sr0 at scsi0, channel 0, id 2, lun 0

  Vendor: IBM     Model: DPES-31080   Rev: S31Q
  Type:   Direct-Access               ANSI SCSI revision: 02
Detected scsi disk sda at scsi1, channel 0, id 0, lun 0

scsi : detected 1 SCSI cdrom 1 SCSI disk total.
SCSI device sda: hdwr sector= 512 bytes.
```

Se ayto to paradeigma dyo elegktes SCSI filojenoun apo 1 syskeyh SCSI o ka8enas. Ti spatalh ((mia poy mporoun na filojenoun mexri kai 7 syskeyes o ka8enas). Den einai h dikia moy egkatastash, opote stamathste na rwtate an exw toso polla lefta. ... Telos pantwn, sthn periptwsh aytou toy amelhteoy aytou paradeigmatos, h egkatastash ayth einai mia xara. :-)

Sto parapanw paradeigma to CD-Writer exei taytothta SCSI 2 alla einai sysxetismeno me thn prwth genikh syskeyh SCSI `/dev/sga` giati den einai h prwth fysika parousa syskeyh SCSI poy to Linux entopise. Elpizw pws ayto deixnei ka8ara pws h taytothta SCSI mias syskeyhs, den exei na kanei me thn antistoixh genikh syskeyh.

Dyo erwthseis menoyn: ti symbainei an antistoixisete la8os syskeyh; An de deijei oute thn epilogh "–<MANUFACTURER>" oute gracei dedomena se aythn, synh8ws ena typwnetai proeidopoihtiko mhnyma kai den symbainei kai tipota kako::

```
bash> cdwrite  --eject  --device /dev/sgb
Unknown CD-Writer; if this model is compatible with any
supported type, please use the appropriate command line
flag.

Manufacturer:  IBM
Model:         DPES-31080
Revision:      S31Q
```

Se aythn thn periptwsh h syskeyh `/dev/sbg` einai enas sklhros diskos SCSI (ths IBM).

An gracete dedomena se la8os syskeyh, grafete panw apo to arxiko periexomeno ths kai pi8anws blaptete anepanor8wta to susthma sas. Na prosexete, se mena to atuxhma exei symbei.

3.2 Mazecte to logismiko

Synh8ws pairnei perissotero apo to anamenomeno. 8ymh8eite pws arxeia poy sas leipoyn den mporoun na proste8oun afou graftei to CD. :-)

Epishs, krathste pws kapoio pososto toy eleu8eroy xwroy toy CD xrhsimopoieitai gia na fylajei tis plhrofories toy systhmatos arxeiwn iso9660 (synh8ws liga MB).

3.3 Apo8hkeysh twn dedomenwn sto CD.

O oros *iso9660* anaferetai sto format me to opoio ta dedomena organwnontai sto CD. Gia na eimai pio akribhs: Einai to susthma arxeiwn toy CD.

Fysika, h emfanish twn arxeiwn poy apo8hkeuontai se ayto to format omogenopoieitai apo ton pyrhna toy Linux opws kai gia ka8e allo susthma arxeiwn, epishs. Etsi, an prosarthsete ena CD sto dentro twn directory, den 8a mporeite na jexwrisete ta arxeia toy apo alla arxeia ... ektos toy gegonotos pws den einai eggracima... akoma kai gia ton root. :-)

(O mhxanismos poy xrhsimopoieitai gia na omogenopoihsei thn emfanish twn arxeiwn kaleitai *eikoniko susthma arxeiwn (virtual filesystem)*, kai en syntomia *VFS*.)

Ta xarakthristika toy systhmatos arxeiwn iso9660 den einai toso plousia se sugkrish me ayta toy systhmatos arxeiwn extended-2 poy kanonika xrhsimopoieitai apo to Linux. Apo thn allh, to CD einai eggracimo mono mia fora kai etsi merika xarakthristika den exoyn nohma etsi ki alliws. Oi periorismoi toy systhmatos arxeiwn iso9660 einai:

- Mono 8 epipeda apo ypo-katalogoys epitrepontai (metrwntas apo to ychlotero epipedo directory toy CD) (xrhsimopoieiste ta RockRidge Extensions gia na megalwsete ayto ton ari8mo)
- Megisto mhkos xarakthrwn gia ta onomata twn arxeiwn: 32 xarakthres
- 650 MB xwrhtikothta

3.4 Dhmioyrghste ena susthma arxeiwn iso9660

Prin mporesei na xrhsimopoih8ei opoiodhpote meso apo8hkeyshs (p.x. malakos diskos (floppy disk), sklhros diskos (harddisk) h CD), prepei na apokthsei ena susthma arxeiwn (se glwssa DOS : na ginei format). Ayto to susthma arxeiwn einai ypeu8yno gia thn organwsh kai enswmatwsh twn arxeiwn, poy prepei na apo8hkey8oun sto meso.

Loipon, ena eggracimo CD einai eggracimo mono mia fora, kai etsi an grafame ena adeio susthma arxeiwn se ayto, den 8a ginotan format - alla 8a paremene entelws adeio gia panta. :-)

Etsi, ayto poy xreiazomaste einai ena ergaleio poy dhmioyrgei to susthma arxeiwn oso antigrafei ta arxeia sto CD. Ayto to ergaleio legetai `mkisofs`. Mia xrhsh toy gia logoys epideijhs moiazei me thn parakatw:

```
mkisofs  -r   -o cd_image   private_collection/
              ‘---------’   ‘------------------’
                   |                |
      grace thn ejodo sto    xrhsimopoihse san eisodo to directory
```

H epilogh '-r' 8etei ta dikaiwmata olwn twn arxeiwn sto CD wste na einai anagnwsima apo oloys kai energopoiei tis epektaseis Rock Ridge. Ayto einai poy synh8ws 8eloyme kai synistoume thn xrhsh ayths ths epiloghs mexri poy pragmatika na jerete ti kanete (ypodeijh: xwris thn '-r' to shmeio prosarthshs (mount-point) pairnei dikaiwmata `idiwtikhs_sylloghs (private_collection)`!).

An trexete pyrhna Linux prin ton 2.0.31, 8a prepei na pros8esete thn epilogh '-K' gia na jeperasete ena la8os toy kwdika toy systhmatos arxeiwn. 8a xreiasteite thn dior8wmenh ekdosh toy mkisofs. Ayth h epilogh einai isodunamh me thn epilogh '-P' toy `cdwrite`. Deite parakalw th selida boh8eias toy `mkisofs` gia leptomereies. Oi xrhstes mias pio prosfaths ekdoshs toy Linux den xreiazetai na anhsyxoun gia tipota apo ta parapanw.

To `mkisofs` 8a prospa8hsei na antistoixisei ola ta onomata arxeiwn sto 8.3-format poy xrhsimopoieitai apo to DOS gia na ejasfalisei thn megaluterh dynath symbatothta. Se periptwsh sugkroyshs onomatologias ((diaforetika arxeia exoyn to idio 8.3-name), xrhsimopoiountai ari8moi sta onomata arxeiwn kai plhrofories sxetika me to onoma typwnetai sto STDERR (synh8ws sthn o8onh).

MHN PANIKOBALLESTE:

> Katw apo Linux de 8a deite pote ayta ta 8.3 onomata arxeiwn, epeidh to Linux kanei xrhsh twn epektasewn Rock Ridge poy periexoyn thn arxikh plhroforia twn arxeiwn (dikaiwmata, onoma arxeiwn, klp.).

Twra mporei na anarwtieste giati h ejodos toy `mkisofs` de stelnetai apey8eias sth syskeyh eggrafhs. Ayto ginetai gia duo logoys:

- To `mkisofs` den jerei tipota gia ton elegxo twn CD-writers (des to tmhma 2.3.)
- Den 8a htan ajiopisto (des to tmhma 4.)

Epeidh o xronismos toy CD-writer einai ena krisimo shmeio, den to trofodotoume apey8eias apo to `mkisofs` (8ymh8eite pws to Linux den einai ena leitoyrgiko susthma pragmatikou xronoy (real-time operating system) kai oi diergasies mporei na xronizontai asxhma). Anti8eta, synistatai na apo8hkeuete thn ejodo toy `mkisofs` se ena jexwristo arxeio sto sklhro disko. Ayto to arxeio einai mia 1:1 eikona toy CD kai sthn oysia 8a graftei sto CD me to ergaleio `cdwrite` se deutero bhma.

H 1:1 eikona apo8hkeuetai se ena terastio arxeio kai etsi xreiazeste allo toso eleu8ero xwro sto disko me ayton poy to logismiko pros antigrafh hdh xrhsimopoiei. Ayto einai ena meionekthma.

8a mporousate na dhmioyrghsete mia epipleon katatmhsh (partition) gia ayto kai na gracete thn eikona se ekeinh thn katatmhsh anti se ena arxeio. Yhfizw kata mias tetoias strathgikhs giati an gracete se la8os katatmhsh (ejaitias enos typografikou la8oys), mporei na xasete entelws to Linux susthma sas. Epipleon, einai megaluterh spatalh xwroy, giati to CD-image einai proswrina dedomena poy mporoun na diagrafoun meta thn eggrafh toy CD.

3.5 Elegjte to CD-image

To Linux exei thn dynatothta na prosarta arxeia san na htan katatmhseis diskwn. Ayto to xarakthristiko einai xrhsimo gia na elegjete thn or8othta ths domhs toy katalogoy ths eikonas toy CD (CD-image). Gia na prosarthsete to arxeio `cd_image` poy dhmioyrgh8hke parapanw ston katalogo `/cdrom`, dwste thn entolh

```
mount -t iso9660 -o ro,loop=/dev/loop0 cd_image /cdrom
```

Twra mporeite na epi8ewrhsete ta arxeia sto `/cdrom` - emfanizontai akribws opws an 8a htan panw se ena pragmatiko CD. Gia na apodesmeusete to CD-image, apla peite `umount /cdrom`. Proeidopoihsh: An den xrhsimopoihsate thn epilogh '-K' sto mkisofs tote to teleytaia arxeio sto `/cdrom` mporei na mhn einai plhrws anagnwsimo.

Shmeiwsh:

> Merikes arxaies ekdoseis toy `mount` den einai ikanes na antimetwpisoyn tis loopback-devices. An exete mia tetoia palia ekdosh toy `mount` einai mia ypodeijh gia na anaba8misete to Linux susthma sas.Polloi an8rwpoi hdh proteinan na baloyn plhrofories gia to pws na parete tis neoteres efarmoges mount se ayto to mini-HOWTO. Panta arnoumai. An h dianomh Linux sas erxetai me ena arxaio `mount`: anaferete to san problhma (bug). An h dianomh Linux sas den einai eukola anaba8misimh : anaferete to san problhma (bug).

An enswmatwsw oles tis plhrofories poy apaitountai gia na jeperastoun ta problhmata (bugs) twn kakosxediasmenwn dianomwn Linux, ayto to mini-HOWTO 8a htan kata polu megalutero kai dyskolotero na diabastei.

3.6 Sxolia gia ta kena diskakia CD-Recordable

To germaniko periodiko gia ypologistes "c't" exei mia lista ypodeijewn poy aforoun sta kena CDs sto teuxos toy Noembrioy 1996:

- Ta "anwnyma (no-name)" diskakia einai genika oxi ths kaluterhs poiothtas kai 8a prepei na mhn xrhsimopoiountai
- An ena eggracimo CD einai elattwmatiko, ayto pi8anon na symbainei se ola (an agorasate perissotera apo ena, mazemena). Isws na eisaste tyxeros kai na mporesete na xrhsimopoihsete ta prwta 500MB tetoiwn CDs ...
- Mhn aggizete ta CDs apo thn lamperh epifaneia prin thn eggrafh.

3.7 Eggrafh toy CD-image se ena CD

Den exoyn meinei kai polla na ginoyn. Prin sas deijoyme thn teleytaia entolh, afhste me na sas proeidopoihsw pws ta CD-writers 8eloyn na trofodotountai me mia sta8erh roh dedomenwn epeidh exoyn mikrous buffers dedomenwn. Etsi, h diadikasia ths eggrafhs ths eikonas toy CD sto CD den prepei na diakopei, se tetoia periptwsh to apotelesma 8a einai ena diabrwmeno (xalasmeno) CD.

Gia na eisaste sigoyros pws tipota den 8a diakocei thn diadikasia, petajte ejw oloys toys xrhstes toy systhmatos kai bgalte to kalwdio toy ethernet ... Diabaste to *Bastard operator fromhell* gia na ma8ete ton swsto tropo, gia na kanete kati tetoio. ;-)

An eisaste pneymatika etoimoi, foreste mia asprh rompa, pollaplasiaste thn taytothta SCSI-id toy CD-writer me ton ari8mo ana8ewrhshs toy SCSI, anacte osa pio polla keria ginetai, apaggeilete duo strofes apo to ASR-FAQ kai telika gracte:

```
cdwrite  --device /dev/sgd  cd_image
or
cdrecord -v speed=2 dev=4,0 cd_image
```

analoga me to pio logismiko 8elete na xrhsimopoihsete. Fysika 8a antikatasthsete th syskeyh SCSI toy paradeigmatos me thn syskeyh poy o eggrafeas sas einai syndedemenos. Parakalw shmeiwste pws kanenas eggrafeas den mporei na epana8esei to laser toy kai na synexisei apo ekeino to shmeio toy CD, an enoxlh8ei. Gi' ayto, ka8e isxyrh donhsh h kai sok 8a katastrecei pantelws to CD poy grafete.

3.8 An kati paei straba...

... na 8ymaste pws panta mporeite na xrhsimopoieite ta xalasmena CDs san soyber. :-)

4 Syxna Diatypwmenes Erwthseis kai Apanthseis

4.1 "Poso eyais8hth einai h diadikasia toy kacimatos;"

Apanthsh: ejartatai apo to CD-writer. Ta monterna 8a prepei na exoyn buffer dedomenwn toy 1MB h kapoy ekei kai mporoun na zhsoyn 1-2 deyterolepta xwris dedomena. Deite ta egxeiridia h rwthste ton kataskeyasth, an 8elete na ma8ete tis leptomereies.

Anejarthta apo to mege8os twn buffers dedomenwn prepei na eggyaste mia synexh roh twn 300kb/s h 600kb/s kata th diarkeia ths diadikasias.

Oi diergasies poy kanoyn entatikh xrhsh toy diskoy opws h enhmerwsh ths bashs dedomenwn *locate* xamhlwnoyn to megisto dynato ry8mo rohs kai 8a xalasoyn sigoyra to CD; kalutera elegjte tetoies diergasies na mhn jekinane mesw `cron`, `at` h `anacron` oso kaite CD-Rs. Apo thn allh, kapoioi aneferan pws ekanan compile ena pyrhna ka8ws kaigane ena CD xwris kamia enoxlhsh. Xreiazeste bebaia mia grhgorh mhxanh gia tetoia peiramata.

4.2 "Exei h diaspora (fragmentation) asxhmo antiktypo sto ry8mo rohs;"

H diaspora einai synh8ws toso xamhlh poy oi epiptwseis ths den einai parathrhsimes. An eisaste abebaioi peri aytou, koitajte ta mhnumata poy typwnontai kata thn ekkinhsh, to pososto ths diasporas anaferetai kata ton elegxo twn systhmatwn arxeiwn. Mporeite na elegjete gia ayth thn timh me thn polu epikindynh entolh

```
bash> e2fsck -n  /dev/sda5        # '-n' is important!
[stuff deleted - ignore any errors]
/dev/sda5: 73/12288 files (12.3% non-contiguous)
```

Se ayto to paradeigma h diaspora fainetai na einai polu megalh, alla yparxoyn mono 73 mikra arxeia se ayto to susthma arxeiwn (xrhsimopoieitai ws `/tmp`) kai etsi h timh den einai anhsyxhtikh.

4.3 "Einai dynaton na apo8hkeusw to CD-image se ena susthma arxeiwn UMSDOS;"

Nai. To mono susthma arxeiwn poy den einai ajiopisto kai arketa grhgoro gia eggrafes CDs apo ayto, einai to *diktyako susthma arxeiwn* (*NFS*). Xrhsimopoiw o idios ena UMSDOS gia na moirasw to xwro toy diskoy metaju toy Linux kai toy DOS/Win se ena PC (486/66) afierwmeno sthn eggrafh twn CDs.

4.4 "Den yparxei kapoios tropos na jeperasw toys periorismous toy iso9660;"

Nai. Mporeite na balete opoio susthma arxeiwn 8elete sto CD. Alla opoiodhpote leitoyrgiko susthma ektos toy Linux den 8a mporesei na antimetwpisei to CD.

Na kai h syntagh:

- Dhmioyrghste ena adeio arxeio me mege8os 650MB.

  ```
  dd if=/dev/zero of="empty_file" bs=1024k count=650
  ```

- Dhmioyrghste ena susthma arxeiwn extended-2 sto arxeio ayto

  ```
  bash> /sbin/mke2fs  empty_file
  empty_file is not a block special device.
  Proceed anyway? (y,n) y
  ```

- Prosarthste to adeio arxeio mesw twn syskeywn loopback

  ```
  mount -t ext2 -o loop=/dev/loop1 empty_file /mnt
  ```

- Antigracte ta arxeia sto /mnt kai apodesmeuste to (umount) meta.

- Xrhsimopoihste thn `cdwrite` h thn `cdrecord` sto empty_file (poy pleon den einai adeio) san na htan ena iso9660-image.

An 8elete na balete mia eggrafh sto `/etc/fstab` gia ena tetoio CD, apenergopoihste ton elegxo toy, p.x.:

```
/dev/cdrom  /cdrom  ext2  defaults,ro  0 0
```

To prwto 0 shmainei "mhn symperilhf8ei sta dumps", to deutero (=shmantiko) shmainei "mhn tsekareis gia la8h kata thn ekkinhsh" (to fsck 8a apotuxei na elegjei to CD gia la8h).

4.5 "Pws na diabasw kai na gracw CD Hxoy;"

Parte ta paketa "cdda2wav" kai "sox", dia8esima apo to sunsite kai ta mirrors toy:

<ftp://sunsite.unc.edu/pub/Linux/apps/sound/cdrom/cdda2wav0.71.src.tar.gz>
<ftp://sunsite.unc.edu/pub/Linux/apps/sound/convert/sox-11gamma-cb3.tar.gz>

To `cdda2wav` sas epitrepei na parete kapoio sygkekrimeno diasthma (h ena oloklhro kommati (track)) apo to CD hxoy sas kai to metatrepei se arxeio .wav. To `sox` metatrepei ta arxeia wav pali se (CD hxoy) cdda-format wste na mporoun na epaneggrafoun sto CD-R xrhsimopoiwntas to `cdwrite`.

4.6 "Pws na cajw gia tis syskeyes SCSI meta thn ekkinhsh;"

To arxeio `drivers/scsi/scsi.c` periexei tis plhrofories

```
/*
 * Usage: echo "scsi add-single-device 0 1 2 3" >/proc/scsi/scsi
 * with  "0 1 2 3" replaced by your "Host Channel Id Lun".
 * Consider this feature BETA.
 *     CAUTION: This is not for hotplugging your peripherals. As
 *     SCSI was not designed for this you could damage your
 *     hardware !
 * However perhaps it is legal to switch on an
 * already connected device. It is perhaps not
 * guaranteed this device doesn't corrupt an ongoing data transfer.
 */
```

4.7 "Einai dynato na kanw 1:1 antigrafh enos CD;"

Nai. Alla 8a prepei na hsaste enhmeros toy gegonotos pws ka8e la8os anagnwshs toy arxikou prwtotupoy (logo skonhs h gratzoyniwn) 8a odhghsei se elattwmatiko antigrafo.

Prwth periptwsh: exete jexwrista CD-writer kai CD-ROM . Dinontas thn entolh:

```
cdwrite -v -D /dev/sgc --pad -b  $(isosize  /dev/scd0) /dev/scd0
or
cdrecord -v dev=3,0 speed=2 -isosize /dev/scd0
```

diabazete th roh dedomenwn apo ton odhgo CD-ROM poy einai prosarthmeno san `/dev/scd0` kai grafete apey8eias mesw toy `/dev/sgc` sto CD-R.

Deuterh periptwsh: Den exete jexwristo odhgo CD-ROM. 8a prepei na xrhsimopoihsete ton eggrafea gia na diabasete kai to CD-ROM:

```
dd if=/dev/scd0 of=cdimage bs=1c count=`isosize  /dev/scd0`
```

H entolh ayth einai isodunamh me to apotelesma ths `mkisofs`, kai etsi 8a prepei na proxwrhsete opws sto kefalaio 3. Shmeiwste pws ayth h me8odos 8a apotuxei gia ta CD hxoy!

4.8 "Mporei to Linux na diabasei Joliet CDs;"

Nai. Alla xreiazetai na dior8wsete ton pyrhna kai na ton janametaglwttisete. Gia perissoteres plhrofories, deite

<http://www-plateau.cs.berkeley.edu/people/chaffee/joliet.html>

4.9 "Pws diabazw/prosartw CD-ROMs me to CD-writer;"

Opws kai me ena kanoniko odhgo CD-ROM. Kanena kolpo. Shmeiwste pws 8a prepei na xrhsimopoihsete tis syskeyes scd (SCSI CD-ROM) gia na prosarthsete CDs gia diabasma. Eggrafh-paradeigma sto /etc/fstab:

```
/dev/scd0  /cdrom  iso9660  ro,user,noauto  0  0
```

5 Epilysh Problhmatwn

5.1 De doyleuei: katw apo Linux

Parakalw elegjte prwta an o eggrafeas doyleuei katw apo alla leitoyrgika. Sygkekrimena:

- O Elegkths SCSI anagnwrizei ton eggrafea san egkyrh syskeyh SCSI;
- To logismiko anagnwrizei ton eggrafea;
- Mporeite na kanete ena CD me to synodeytiko logismiko;

Ean "de doyleuei" akoma kai se alla leitoyrgika. Exete mia sugkroysh ylikou (hardware conflict) h elattwmatiko yliko.

5.2 De doyleuei: katw apo DOS kai filoys toy

Prospa8hste na xrhsimopoihsete Linux. H egkatastash kai ru8mish twn odhgwn SCSI sto DOS einai h kolash. Einai to Linux yperbolika sun8eto; Xa!

5.3 La8h toy SCSI kata th fash ths eggrafhs (kacimatos)

Pi8anotera, ta la8h ayta ofeilontai se

- mh yposthrijh toy xarakthristikou dis-/reconnect toy diayloy SCSI
- mh ikanopoihtika cyxwmeno yliko
- elattwmatiko yliko (8a prepei na entopizetai apo to 5.1.)

Katw apo diafores katastaseis, oi syskeyes SCSI aposyndeontai kai janasyndeontai (hlektronika) apo to diaylo SCSI. An ayto to xarakthristiko den einai dia8esimo (elegjte tis parametroys toy elegkth kai toy pyrhna) merikoi eggrafeis antimetwpizoyn problhma otan kaine h kleinoyn to CD-R.

Eidika, o odhgos NCR 53c7,8xx SCSI exei proka8orismena to xarakthristiko apenergopoihmeno, kai ara loipon isws na 8elete na to tsekarete:

```
NCR53c7,8xx SCSI support                  [N/y/m/?] y
   always negotiate synchronous transfers [N/y/?] (NEW) n
   allow FAST-SCSI [10MHz]                [N/y/?] (NEW) y
   allow DISCONNECT                       [N/y/?] (NEW) y
```

6 Eyxaristies

Ston Andreas Erdmann <erdmann@zpr.uni-koeln.de>

poy edwse to paradeigma me to YAMAHA-writer

Ston Art Stone <stone@math.ubc.ca>

poy eixe thn idea na balei mh-iso9660 systhmata arxeiwn se CD

Ston Bartosz Maruszewski <B.Maruszewski@zsmeie.torun.pl>

poy anefere ta or8ografika la8h

Ston Bernhard Gubanka <beg@ipp-garching.mpg.de>

poy proseje thn anagkh mias prosfaths ekdoshs toy mount gia na kanei xrhsh ths syskeyhs loopback

Ston Brian H. Toby

gia ton ekleptysmo twn ekfrasewn.

StonBruce Perens <bruce@pixar.com>

poy edwse plhrofories gia thn cdwrite-mailinglist

Ston Dale Scheetz <dwarf@polaris.net>

poy boh8hse thn kalytereysh toy tmhmatos gia dhmioyrgia cdimage.

Sto "Don H. Olive" <don@andromeda.campbellsvil.edu>

URL toy ergaleioy mkhybrid

Ston Edwin H. Kribbs

poy anefere pws to '-K' apaitei dior8wsh gia to mkisofs

Ston Gerald C Snyder <gcsnyd@loop.com>

poy testare thn eggrafh enos ext2 CD-ROM (see 4.4)

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poy pareixe to paradeigma me toys duo elegktes poy filojenoun duo syskeyes.

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poy edeije thn dior8wsh ston pyrhna gia na diabazei Joliet CDs

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gia plhrofories gia to cdrecord

Ston Jos van Geffen <jos@tnj.phys.tue.nl>

poy proseje to problhma sto 4.9.

Ston Pierre Pfister <pp@uplift.fr>

poy boh8hse sthn anaptyjh ths syntaghs gia antigrafa 1:1.

Ston Rick Cochran <rick@msc.cornell.edu>

gia ypodeijeis gia to oti h epanasundesh/aposundesh einai apenergopoihmenh apo default ston odhgo ncr

Ston Stephan Noy <stnoy@mi.uni-koeln.de>

gia plhrofories kai empeiria sthn eggrafh CD hxoy.

Ston Stephen Harris <sweh@mpn.com>

poy syneisfere ypodeijeis gia eggrafh CD hxoy.

Sthn Sheepy One <kero@escape.com>

poy proteinan na xrhsimopoiountai ta elattwmatika CDs san soyber potwn

Ston Volker Kuhlmann <kuhlmav@elec.canterbury.ac.nz>

poy proseje pws to paketo "cdwrite" den periexei to `mkisofs`

Telos toy Ellhnikou CD-Writing mini-HOWTO