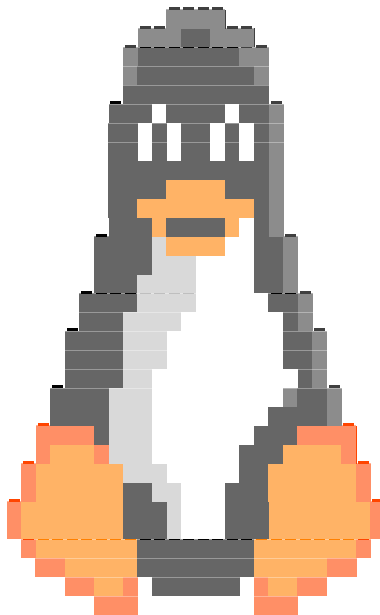

ΠΑΝΕΠΙΣΤΗΜΙΟ ΚΥΠΡΟΥ
ΣΧΟΛΗ ΘΕΤΙΚΩΝ ΚΑΙ ΕΦΑΡΜΟΣΜΕΝΩΝ ΕΠΙΣΤΗΜΩΝ
ΤΜΗΜΑ ΦΥΣΙΚΗΣ

ΦΥΣ 140 Εισαγωγή στην Επιστημονική Χρήση Υπολογιστών (15821)
Χειμερινό Εξάμηνο 2023

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Φροντιστήριο 1

12 Σεπτεμβρίου 2023
15:00 - 17:00



Φροντιστήριο 1

Παράδειγμα 1 Εντολές κελύφους που χρησιμοποιούνται σε λειτουργικά συστήματα παρόμοια με το Unix, συμπεριλαμβανομένων των Linux και macOS. Αυτές οι εντολές συνήθως εισάγονται σε μια διεπαφή γραμμής εντολών, όπως ένα τερματικό ή μια γραμμή κελύφους/εντολών (command/shell prompt). Αποτελούν μέρος του συνόλου εντολών του κελύφους του Unix και είναι γραμμένα στη γλώσσα προγραμματισμού C:

tutorial1/ex1.sh

```
1 # Use 'mkdir' command to create a new directory named 'tutorial1':
2 mkdir lab01
3
4 # Use 'cd' command to change directory to 'tutorial1':
5 cd lab01
6
7 # Use 'pwd' to return the working directory name. Use 'man pwd' to display the
  online manual documentation for any command. You can use man for ANY linux
  command:
8 pwd
9
10 # Check that the files were created:
11 ls
12
13 # Create files with name 'v.log', 'w.log', 'x.log', 'y.log', 'z.log' under
  current working directory. The touch utility sets the modification and
  access times of files. If any file does not exist, it is created with
  default permissions:
14 touch v.log w.log x.log y.log z.log
15
16 # Check that the directory has been created:
17 ls -lt
18
19 # Redirect output of command 'ls' to a file. The operator '>' replaces file
  contents:
20 ls -lt > ls.txt
21
22 # Use 'sort' to sort or merge records (lines) of text and binary files:
23 ls | sort
24
25 # Use 'grep' as a file pattern searcher:
26 ls | sort | grep f
27
28 # Use 'grep' as a file pattern searcher. The --invert-match (-v) flag means
  that the selected lines are those not matching any of the specified patterns
  :
29 ls | sort | grep -v f
30
31 # Use 'mkdir' command to create directory. NOTE: mkdir test1/test2 fails!:
32 mkdir test1
33
34 # Use 'mkdir -p' to create intermediate directories as required):
35 mkdir -p test1/test2/test3
```

Παράδειγμα 1 συνεχίζεται...

```
36
37 # Use 'rm' command to remove the directory 'test3' and all its contents
    recursively! NOTE: Use with caution!:
38 rm -rf test1/test2/test3
39
40 # Create new file with name 'myfile.txt' under directory test1. If the command
    is successful (&&) list the contents of directory 'test1':
41 touch test1/myfile.txt && ls -lt test1
42
43 # Use 'mv' command to move/rename a file or directory:
44 mv test1/myfile.txt test1/test2/myfile.txt
45
46 # Use 'cp' to create a copy of a file under a different name:
47 cp test1/test2/myfile.txt test1/myfile.txt
48
49 # List the contents of directory 'test1/' to check that the copied file is
    where you expect it to be:
50 ls test1/
51
52 # List any file with extension '.txt' under directory 'test1/':
53 ls test1/*.txt
54
55 # Use 'rm -rf' to remove directory test1 and all files and directories inside
    it! Since we use the '-f' flag, no prompt will appear asking you to confirm
    deletion for each file or folder.:
56 rm -rf test1
57
58 # Concatenate (silenwse) and print files (Type your name and exit by pressing
    Ctrl+D).:
59 cat > newfile.txt
60
61 # Print file contents on the display:
62 cat newfile.txt
63
64 # Use 'echo' command to write arguments to the standard output. This can be
    redirected to a file as well:
65 echo 'pink' > file1.txt
66
67 # Use 'echo' command to write 'pink' in new file 'file2.txt':
68 echo 'pink' > file2.txt
69
70 # Compare again the contexts of the two files. No identical anymore!:
71 diff file1.txt file2.txt
72
73 # Use 'echo' command to write ' floyd' in new file 'file2.txt':
74 echo ' floyd' >> file2.txt
75
76 # Write the contents of the folder in file 'view.txt':
77 ls -lt > view.txt
78
79 # View the contents of the newly-created file:
80 cat view.txt
81
```

Παράδειγμα 1 συνεχίζεται...

```
82 # Use the pipe (|) to connect the output of one command to the input of another
    command, allowing you to create a data stream from one command to another.:
83 cat view.txt | more
84
85 # View the contents of the text file in the terminal The 'less' allows you to
    view text files one screen at a time, providing a convenient way to read and
    navigate through large or lengthy files.:
86 less view.txt
87
88 # Use 'tail -1' to display the last line of a file:
89 tail -1 view.txt
90
91 # Use 'tail -3' to display the last 3 lines of a file:
92 tail -3 view.txt
93
94 # Use 'tail' to display the last 10 lines of a file:
95 tail view.txt
96
97 # Use 'head -1' to display first line of a file:
98 head -1 view.txt
99
100 # Use 'head -3' to display first 3 lines of a file:
101 head -3 view.txt
102
103 # Use 'head' to display first 10 lines of a file:
104 head view.txt
105
106 # List all files ending with extension '.txt':
107 ls f*.txt
108
109 # List all files and directories (in the current directory) and then filter the
    output to display only the lines that contain the letter 'f' in their names
    using the 'grep' command:
110 ls * | grep f
111
112 # List all files and directories (in the current directory) and then filter the
    output to display only the lines that do NOT contain the letter 'f' in
    their names:
113 ls * | grep -v f
114
115 # Create file and then remove it with prompt for confirmation:
116 touch myfile.txt && rm -i myfile.txt
117
118 # Create file and then remove it without asking verification:
119 touch myfile.txt && rm -f myfile.txt
120
121 # Use 'echo' command and '>>' operator to create a new file with content 'mark
    knopfler':
122 echo 'mark knopfler' >> legend1.txt
123
124 # Use 'echo' command and '>>' operator to create a new file with content 'david
    gilmour':
125 echo 'david gilmour' >> legend2.txt
```

```

126
127 # Use 'history' command to display a list of previously executed commands in
    the current user's session:
128 history
129
130 # Redirect the output of the history command to a file using standard output
    redirection:
131 history > history.log
132
133 # Create a compressed archive file named tutorial1.tgz containing all files and
    directories in the current directory. The options and flags used with the
    command(-cvzf) are broken down below. Use the manual command 'man tar' to
    see explanations for the flags used.:
134 tar -cvzf tutorial1.tgz *
```

Αποτέλεσμα:

tutorial1/ex1

```

1 mkdir lab01
2
3 cd lab01
4
5 pwd
6 /phys140/autumn2023/tutorials/python3/lab01
7
8 ls
9 file1.txt      history.log     legend2.txt     newfile.txt     v.log
10              w.log          y.log
11 file2.txt      legend1.txt     ls.txt          tutorial1.tgz    view.txt
12              x.log          z.log
13
14 touch v.log w.log x.log y.log z.log
15
16 ls -lt
17 total 64
18 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 z.log
19 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 y.log
20 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 x.log
21 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 w.log
22 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 v.log
23 -rw-r--r--  1 attikis  staff  489 Sep 13 12:57 tutorial1.tgz
24 -rw-r--r--  1 attikis  staff    0 Sep 13 12:57 history.log
25 -rw-r--r--  1 attikis  staff   14 Sep 13 12:57 legend2.txt
26 -rw-r--r--  1 attikis  staff   14 Sep 13 12:57 legend1.txt
27 -rw-r--r--  1 attikis  staff  557 Sep 13 12:57 view.txt
28 -rw-r--r--  1 attikis  staff   12 Sep 13 12:57 file2.txt
29 -rw-r--r--  1 attikis  staff    5 Sep 13 12:57 file1.txt
30 -rw-r--r--  1 attikis  staff   12 Sep 13 12:57 newfile.txt
31 -rw-r--r--  1 attikis  staff  372 Sep 13 12:57 ls.txt
```

```
30
31 ls -lt > ls.txt
32
33 ls | sort
34 file1.txt
35 file2.txt
36 history.log
37 legend1.txt
38 legend2.txt
39 ls.txt
40 newfile.txt
41 tutorial1.tgz
42 v.log
43 view.txt
44 w.log
45 x.log
46 y.log
47 z.log
48
49 ls | sort | grep f
50 file1.txt
51 file2.txt
52 newfile.txt
53
54 ls | sort | grep -v f
55 history.log
56 legend1.txt
57 legend2.txt
58 ls.txt
59 tutorial1.tgz
60 v.log
61 view.txt
62 w.log
63 x.log
64 y.log
65 z.log
66
67 mkdir test1
68
69 mkdir -p test1/test2/test3
70
71 rm -rf test1/test2/test3
72
73 touch test1/myfile.txt && ls -lt test1
74 total 0
75 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 myfile.txt
76 drwxr-xr-x  2 attikis  staff   64 Sep 13 14:27 test2
77
78 mv test1/myfile.txt test1/test2/myfile.txt
79
80 cp test1/test2/myfile.txt test1/myfile.txt
```

```

81
82 ls test1/
83 myfile.txt      test2
84
85 ls test1/*.txt
86 test1/myfile.txt
87
88 rm -rf test1
89
90 cat > newfile.txt
91 John Clseese
92
93 cat newfile.txt
94 John Cleese
95
96 echo 'pink' > file1.txt
97
98 echo 'pink' > file2.txt
99
100 diff file1.txt file2.txt
101
102 echo ' floyd' >> file2.txt
103
104 ls -lt > view.txt
105
106 cat view.txt
107 total 56
108 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 view.txt
109 -rw-r--r--  1 attikis  staff   12 Sep 13 14:27 file2.txt
110 -rw-r--r--  1 attikis  staff    5 Sep 13 14:27 file1.txt
111 -rw-r--r--  1 attikis  staff   12 Sep 13 14:27 newfile.txt
112 -rw-r--r--  1 attikis  staff  795 Sep 13 14:27 ls.txt
113 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 z.log
114 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 y.log
115 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 x.log
116 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 w.log
117 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 v.log
118 -rw-r--r--  1 attikis  staff  489 Sep 13 12:57 tutorial1.tgz
119 -rw-r--r--  1 attikis  staff    0 Sep 13 12:57 history.log
120 -rw-r--r--  1 attikis  staff   14 Sep 13 12:57 legend2.txt
121 -rw-r--r--  1 attikis  staff   14 Sep 13 12:57 legend1.txt
122
123 cat view.txt | more
124 total 56
125 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 view.txt
126 -rw-r--r--  1 attikis  staff   12 Sep 13 14:27 file2.txt
127 -rw-r--r--  1 attikis  staff    5 Sep 13 14:27 file1.txt
128 -rw-r--r--  1 attikis  staff   12 Sep 13 14:27 newfile.txt
129 -rw-r--r--  1 attikis  staff  795 Sep 13 14:27 ls.txt
130 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 z.log
131 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 y.log

```

```

132 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 x.log
133 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 w.log
134 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 v.log
135 -rw-r--r-- 1 attikis staff 489 Sep 13 12:57 tutorial1.tgz
136 -rw-r--r-- 1 attikis staff 0 Sep 13 12:57 history.log
137 -rw-r--r-- 1 attikis staff 14 Sep 13 12:57 legend2.txt
138 -rw-r--r-- 1 attikis staff 14 Sep 13 12:57 legend1.txt
139
140 less view.txt
141 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 view.txt
142 -rw-r--r-- 1 attikis staff 12 Sep 13 14:27 file2.txt
143 -rw-r--r-- 1 attikis staff 5 Sep 13 14:27 file1.txt
144 -rw-r--r-- 1 attikis staff 12 Sep 13 14:27 newfile.txt
145 -rw-r--r-- 1 attikis staff 795 Sep 13 14:27 ls.txt
146 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 z.log
147 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 y.log
148 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 x.log
149 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 w.log
150 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 v.log
151 -rw-r--r-- 1 attikis staff 489 Sep 13 12:57 tutorial1.tgz
152 -rw-r--r-- 1 attikis staff 0 Sep 13 12:57 history.log
153 -rw-r--r-- 1 attikis staff 14 Sep 13 12:57 legend2.txt
154 -rw-r--r-- 1 attikis staff 14 Sep 13 12:57 legend1.txt
155
156 tail -1 view.txt
157 -rw-r--r-- 1 attikis staff 14 Sep 13 12:57 legend1.txt
158
159 tail -3 view.txt
160 -rw-r--r-- 1 attikis staff 0 Sep 13 12:57 history.log
161 -rw-r--r-- 1 attikis staff 14 Sep 13 12:57 legend2.txt
162 -rw-r--r-- 1 attikis staff 14 Sep 13 12:57 legend1.txt
163
164 tail view.txt
165 -rw-r--r-- 1 attikis staff 795 Sep 13 14:27 ls.txt
166 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 z.log
167 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 y.log
168 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 x.log
169 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 w.log
170 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 v.log
171 -rw-r--r-- 1 attikis staff 489 Sep 13 12:57 tutorial1.tgz
172 -rw-r--r-- 1 attikis staff 0 Sep 13 12:57 history.log
173 -rw-r--r-- 1 attikis staff 14 Sep 13 12:57 legend2.txt
174 -rw-r--r-- 1 attikis staff 14 Sep 13 12:57 legend1.txt
175
176 head -1 view.txt
177 total 56
178
179 head -3 view.txt
180 total 56
181 -rw-r--r-- 1 attikis staff 0 Sep 13 14:27 view.txt
182 -rw-r--r-- 1 attikis staff 12 Sep 13 14:27 file2.txt

```



```

183
184 head view.txt
185 total 56
186 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 view.txt
187 -rw-r--r--  1 attikis  staff   12 Sep 13 14:27 file2.txt
188 -rw-r--r--  1 attikis  staff    5 Sep 13 14:27 file1.txt
189 -rw-r--r--  1 attikis  staff   12 Sep 13 14:27 newfile.txt
190 -rw-r--r--  1 attikis  staff  795 Sep 13 14:27 ls.txt
191 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 z.log
192 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 y.log
193 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 x.log
194 -rw-r--r--  1 attikis  staff    0 Sep 13 14:27 w.log
195
196 ls f*.txt
197 file1.txt          file2.txt
198
199 ls * | grep f
200 file1.txt
201 file2.txt
202 newfile.txt
203
204 ls * | grep -v f
205 history.log
206 legend1.txt
207 legend2.txt
208 ls.txt
209 tutorial1.tgz
210 v.log
211 view.txt
212 w.log
213 x.log
214 y.log
215 z.log
216
217 touch myfile.txt && rm -i myfile.txt
218 remove myfile.txt? y
219
220 touch myfile.txt && rm -f myfile.txt
221
222 echo 'mark knopfler' >> legend1.txt
223
224 echo 'david gilmour' >> legend2.txt
225
226 history
227
228 history > history.log
229
230 tar -cvzf tutorial1.tgz *
231 a file1.txt
232 a file2.txt
233 a history.log

```

Παράδειγμα 1 συνεχίζεται...

```
234 a legend1.txt
235 a legend2.txt
236 a ls.txt
237 a newfile.txt
238 a tutorial1.tgz: tutorial1.tgz: Can't add archive to itself
239
240 a v.log
241 a view.txt
242 a w.log
243 a x.log
244 a y.log
245 a z.log
```

Παράδειγμα 2 Ας αρχίσουμε με το πρώτο μας παράδειγμα με τη χρήση Python ως υπολογιστική:

tutorial1/ex2.py

```
1  #!/usr/bin/python3
2  '''
3  USAGE:
4      chmod +x <filename>.py
5      python3 <filename>.py
6      script -q <filename>.log python3 -i <filename>.py
7
8
9  DESCRIPTION:
10 Python as a calculator
11 '''
12
13 # Anathesi timis (1) se metavliti (x)
14 x=1
15
16 # Ektipwsi tis timis tis metavlitis x stin othoni
17 print("x=", x)
18
19 x=x+1
20 print("x=x+1=", x)
21
22 x+=1
23 print("x+=1=", x)
24
25 x-=1
26 print("x-=1=", x)
27
28 x=x*2
29 print("x=x*2=", x)
30
31 x*=2
32 print("x*=2=", x)
33
34 x**=2
35 print("x**=2 =", x)
36
37 x/=2 # floating-point division (dieresis - arithmoi kinitis diastolis)
38 print("x/=2=", x)
39
40 x//=2 # integer division (akeraio meros diairesis - apokopi dekadikwn psifiwn)
41 print("x//=2=", x)
42
43 y=7//2
44 print("y=7//2=", y)
45
46
47 # Pollaples anatheseis metavlitwn
48 a=10; b=2; c=3
49 print("\na,b,c=", a, b, c)
```

Παράδειγμα 2 συνεχίζεται...

```
50
51 y=a % b # modulo operator (a % b είναι το υπόλοιπο της ακέραιας διαίρεσης του a
    me to b)
52 print("y=a % b=", y)
53
54 # modulo operator (a % c είναι το υπόλοιπο της ακέραιας διαίρεσης του a me to c)
55 print("y=a % c=", a % c)
56
57
58 quit(0) # exit program with a status code of 0 (= success)
```

Αποτέλεσμα:

```
x= 1
x=x+1= 2
x+=1= 3
x-=1= 2
x=x*2= 4
x*=2= 8
x**=2 = 64
x/=2= 32.0
x//=2= 16.0
y=7//2= 3

a,b,c= 10 2 3
y=a % b= 0
y=a % c= 1
```

Παράδειγμα 3 Ας δούμε ένα απλό παράδειγμα για τη χρήση σταθερών χαρακτήρων (strings) :

tutorial1/ex3.py

```
1  #!/usr/bin/python3
2  '''
3  USAGE:
4      chmod +x <filename>.py
5      python3 <filename>.py
6      script -q <filename>.log python3 -i <filename>.py
7
8
9  DESCRIPTION:
10 Simple introduction to strings
11 '''
12 print("Hello World!")
13
14
15 # Anathesi timis ("pink") se metavliti (band)
16 msg1="pink"
17 msg2="floyd"
18 band=msg1 + " " + msg2
19 print(band)
20
21
22
23 quit(0) # exit program with a status code of 0 (= success)
```

Αποτέλεσμα:

```
band =  pink floyd
```

| | | | | |
|--|---|---|---|--|
| Emacs Emacs and its derivatives are a family of text editors that are characterized by their extensibility | | | | |
| Lingo | | | | |
| C | control key (CTRL) | C-x , C-f | find file | |
| M | meta key (ALT or ESC) | C-x , C-s | save file | |
| | | C-x , C-c | exit Emacs | |
| Cutting and Pasting | | | | |
| C | Set mark | Files and Buffers | | |
| SPC | | C-x , C-f | Find file (or create if not existing) | |
| C-w | Cut (after setting mark and moving to end point) | C-x , C-s | Save file | |
| M-w | Copy (after setting mark and moving to end point) | C-x , C-w | Write file | |
| C-y | Yank (paste) most recently killed (cut or copied) | C-x , s | Save modified buffers | |
| M-y | Yank next most recently killed | C-x , b | Select buffer | |
| Searching and Replacing | | | | |
| C-s | Incremental search forward | C-x , C-b | List buffers | |
| C-r | Incremental search backward | C-x , k | Kill buffer | |
| C-M-s | Regex search forward | Help | | |
| C-M-r | Regex search backward | C-h , k | Show command documentation | |
| M-x , <replace-strings> , RET | String replace from here to end of buffer | C-h , a | "Command apropos" | |
| | | C-h , c | Show command name on message line | |
| M-x , <query-replace> , RET | String replace from here to end of buffer, querying for each occurrence | C-h , f | Describe function | |
| M-x , <grep> , RET | Prompts for a grep command, shows hits in a buffer | C-h , i | Info browser | |
| C-x , ` | Visit next grep hit | | | |
| Cursor Motion | | | | |
| C-f | Move forward by a character | C-a | Move to the start of a line | |
| C-b | Move backward by a character | C-e | Move to the end of a line | |
| M-f | Move forward by a word | M-< | Move to the start of a buffer | |
| M-b | Move backward by a word | M-> | Move to the end of a buffer | |
| C-n | Move forward by a line | M-g , g , # | Go to line number # | |
| C-p | Move backward by a line | | | |
| M-e | Move forward by a sentence | | | |
| M-a | Move backward by a sentence | | | |
| M-} | Move forward by a paragraph | | | |
| M-{ | Move backward by a paragraph | | | |
| C-M-f | Move forward by an expression | | | |
| C-M-b | Move backward by an expression | | | |
| Editing | | | | |
| C-d | Delete a character (forward) | Misc | | |
| DEL | Delete a character (backward) | C-_ | Undo/redo | |
| M-d | Delete a word (forward) | C-x , u | Undo/redo (alternative) | |
| M-DEL | Delete a word (backward) | C-q | Quoted insert | |
| C-k | Delete a line (forward) | C-z | Suspend/contify emacs (type "%emacs" to return) | |
| C-SPC , C-a , C-w | Delete a line (backward) | C-x , C-c | Exit emacs | |
| M-k | Delete a sentence (forward) | M-x , <shell-strip-ctrl-tab> , RET | Flush *M at end of line | |
| C-x , DEL | Delete a sentence (backward) | | | |
| C-M-k | Delete an expression (forward) | | | |
| C-M-DEL | Delete an expression (backward) | | | |
| Command-Related Stuff | | | | |
| ESC , ESC , ESC | Leave current location | | | |
| C-u , # | Prefix numeric argument # to next command | | | |
| C-g | Stop running command, or cancel partially entered command | | | |

Σχήμα 1: Κάρτα αναφοράς για το λεκτικό επεξεργαστή Emacs. Περισσότερες πληροφορίες μπορείτε να βρείτε στην ιστοσελίδα του μαθήματος.