

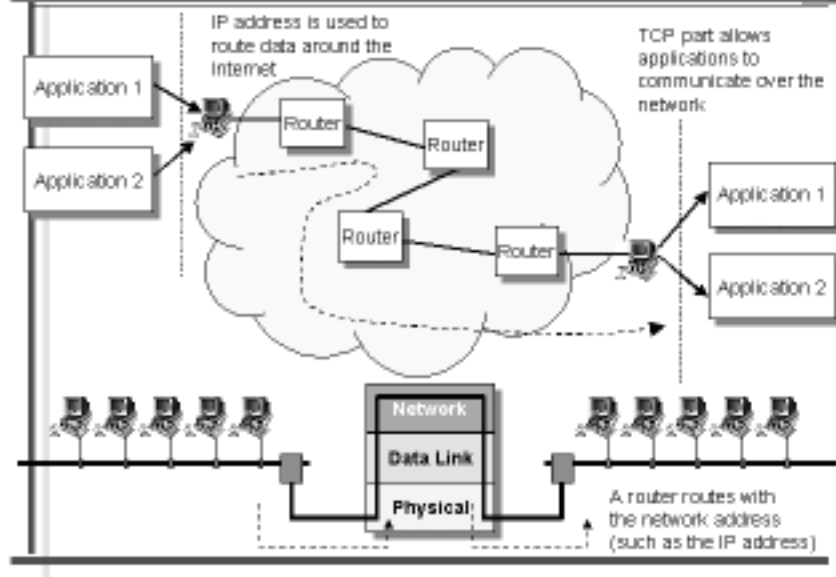
Εισαγωγή στην Υπολογιστική Βιολογία

Διάλεξη 5η :

Εισαγωγή στα δίκτυα : TCP/IP, Ευρέως διαδεδομένα πρωτόκολλα επικοινωνίας : dns, smtp, http, ssh, ftp και σχετικά προγράμματα του Unix : Mail, ssh, sftp, ftp, Εισαγωγή στο πρωτόκολλο http και τη γλώσσα html.

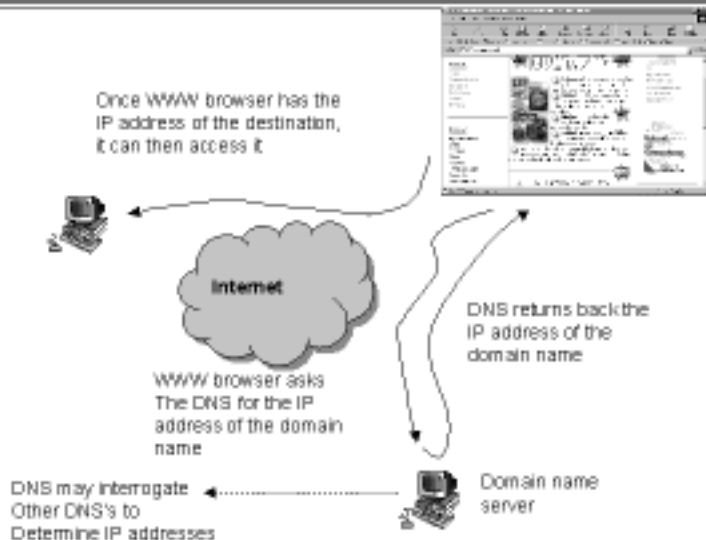
TCP/IP

5.2 IP and TCP



TCP/IP

5.16 Domain name server



Πρωτόκολλα

```
$ cat /etc/services
```

```
.....  
ftp          21/tcp  
ftp          21/udp      fsp fspd  
ssh         22/tcp      # SSH Remote Login Protocol  
ssh         22/udp      # SSH Remote Login Protocol  
telnet      23/tcp  
telnet      23/udp  
smtp        25/tcp      mail  
smtp        25/udp      mail  
.....  
domain      53/tcp      # name-domain server  
domain      53/udp  
.....  
http        80/tcp      www www-http # WorldWideWeb HTTP  
http        80/udp      www www-http # HyperText Transfer Protocol  
.....  
sftp        115/tcp  
sftp        115/udp  
.....  
imap        143/tcp     imap2        # Interim Mail Access Proto  
.....  
https       443/tcp
```

DNS

Παράδειγμα χρήσης DNS

```
$ nslookup webmail.duth.gr
```

```
Server:          127.0.0.1
```

```
Address:         127.0.0.1#53
```

```
Non-authoritative answer:
```

```
webmail.duth.gr canonical name = mail.duth.gr.
```

```
Name:   mail.duth.gr
```

```
Address: 192.108.114.110
```

```
$
```

```
$ nslookup www.google.com
```

```
Server:          193.92.110.1
```

```
Address:         193.92.110.1#53
```

```
Non-authoritative answer:
```

```
www.google.com canonical name = www.google.akadns.net.
```

```
Name:   www.google.akadns.net
```

```
Address: 216.239.59.99
```

```
Name:   www.google.akadns.net
```

```
Address: 216.239.59.104
```

smtp

Το πρωτόκολλο smtp

```
$ telnet crystal2.imbb.forth.gr 25
Trying 147.52.170.102...
Connected to crystal2.imbb.forth.gr (147.52.170.102).
Escape character is '^]'.
220 crystal2.imbb.forth.gr ESMTP Sendmail ; Tue, 16 Nov 2004 13:10:21 +0200 (
EET)
ehlo pppl-62.axd.forthnet.gr
250-crystal2.imbb.forth.gr Hello pppl-62.axd.forthnet.gr [213.16.225.62],
pleased to meet you
250-ENHANCEDSTATUSCODES
250-8BITMIME
250-SIZE 20000000
250-DSN
250-ONEX
250-ETRN
250-XUSR
250 HELP
help
214-2.0.0 This is sendmail
214-2.0.0 Topics:
214-2.0.0          HELO          EHLO          MAIL          RCPT          DATA
```

smtp

Το πρωτόκολλο smtp

```
MAIL FROM: glykos@mbg.duth.gr
250 2.1.0 glykos@mbg.duth.gr... Sender ok
RCPT TO: guest
250 2.1.5 guest... Recipient ok
DATA
354 Enter mail, end with "." on a line by itself

Hello. This is a test.

.
250 2.0.0 iAGBBQq13795 Message accepted for delivery
quit
221 2.0.0 crystal2.imbb.forth.gr closing connection
Connection closed by foreign host.
$
```

smtp

Unix Mail : αποστολή μηνύματος

```
$  
$ Mail glykos@mbg.duth.gr  
Subject: Test
```

```
Hi! This is a test. Please ignore.
```

```
.  
Cc: glykos@imbb.forth.gr  
$  
$
```


smtp

Unix Mail : απλή χρήση για ανάγνωση μηνυμάτων

\$ Mail

Mail version 8.1 6/6/93. Type ? for help.

"/var/mail/glykos": 3 messages 3 new

```
>N 1 glykos@aspera.cluste Wed Nov 17 18:23 14/433 "Test 1"  
  N 2 glykos@aspera.cluste Wed Nov 17 18:23 14/433 "Test 2"  
  N 3 glykos@aspera.cluste Wed Nov 17 18:23 14/433 "Test 3"
```

&

Message 1:

```
From glykos Wed Nov 17 18:23:31 2004  
Date: Wed, 17 Nov 2004 18:23:31 +0200  
From: Nicholas M Glykos <glykos@aspera.cluster.mbg.gr>  
To: glykos@aspera.cluster.mbg.gr  
Subject: Test 1
```

Test 1

&

Message 2:

```
From glykos Wed Nov 17 18:23:39 2004  
.....
```

smtp

Unix Mail : απλή χρήση για ανάγνωση μηνυμάτων

&

Message 3:

From glykos Wed Nov 17 18:23:49 2004

Date: Wed, 17 Nov 2004 18:23:49 +0200

From: Nicholas M Glykos <glykos@aspera.cluster.mbg.gr>

To: glykos@aspera.cluster.mbg.gr

Subject: Test 3

Test 3

&

At EOF

& h

```
1 glykos@aspera.cluste Wed Nov 17 18:23 14/433 "Test 1"
2 glykos@aspera.cluste Wed Nov 17 18:23 14/433 "Test 2"
> 3 glykos@aspera.cluste Wed Nov 17 18:23 14/433 "Test 3"
```

& s 2 test2.txt

"test2.txt" [New file]

smtp

Unix Mail : απλή χρήση για ανάγνωση μηνυμάτων

& d 2

& h

1 glykos@aspera.cluste Wed Nov 17 18:23 14/433 "Test 1"

> 3 glykos@aspera.cluste Wed Nov 17 18:23 14/433 "Test 3"

& 1

Message 1:

From glykos Wed Nov 17 18:23:31 2004

Date: Wed, 17 Nov 2004 18:23:31 +0200

From: Nicholas M Glykos <glykos@aspera.cluster.mbg.gr>

To: glykos@aspera.cluster.mbg.gr

Subject: Test 1

Test 1

&

Message 3:

From glykos Wed Nov 17 18:23:49 2004

.....

smtp

Unix Mail : απλή χρήση για ανάγνωση μηνυμάτων

```
& h
  1 glykos@aspera.cluste Wed Nov 17 18:23 14/433 "Test 1"
> 3 glykos@aspera.cluste Wed Nov 17 18:23 14/433 "Test 3"
& r 3
To: glykos@aspera.cluster.mbg.gr glykos@aspera.cluster.mbg.gr
Subject: Re: Test 3
```

```
~m
Interpolating: 3
(continue)
```

Thank you for your message.

```
.
Cc:
```

smtp

Unix Mail : απλή χρήση για ανάγνωση μηνυμάτων

```
& h
  1 glykos@aspera.cluste Wed Nov 17 18:23 14/433 "Test 1"
> 3 glykos@aspera.cluste Wed Nov 17 18:23 14/433 "Test 3"
& d 1-3
& h
No applicable messages
& q
New mail has arrived.
$
$ Mail
Mail version 8.1 6/6/93. Type ? for help.
"/var/mail/glykos": 1 message 1 new
>N 1 glykos@aspera.cluste Wed Nov 17 18:26 23/676 "Re: Test 3"
```

smtp

Unix Mail : απλή χρήση για ανάγνωση μηνυμάτων

& l

Message 1:

From glykos Wed Nov 17 18:26:36 2004
Date: Wed, 17 Nov 2004 18:26:36 +0200
From: Nicholas M Glykos <glykos@aspera.cluster.mbg.gr>
To: glykos@aspera.cluster.mbg.gr
Subject: Re: Test 3

From glykos Wed Nov 17 18:23:49 2004
Date: Wed, 17 Nov 2004 18:23:49 +0200
From: Nicholas M Glykos <glykos@aspera.cluster.mbg.gr>
To: glykos@aspera.cluster.mbg.gr
Subject: Test 3

Test 3

Thank you for your message.

& d l

& q

.

smtp

Άλλα Unix MUAs : pine

```
PINE 4.58  MAIN MENU                               Folder: INBOX  74 Messages

?  HELP                -  Get help using Pine
C  COMPOSE MESSAGE     -  Compose and send a message
I  MESSAGE INDEX       -  View messages in current folder
L  FOLDER LIST         -  Select a folder to view
A  ADDRESS BOOK        -  Update address book
S  SETUP               -  Configure Pine Options
Q  QUIT                -  Leave the Pine program

Copyright 1989-2003.  PINE is a trademark of the University of Washington.
[Sorting "INBOX" | 100% | ]
Help          PreVcnd      ReINotes
OTHER CMDS [ListFlds]  NextCnd      KBLock
```

smtp

Αλλα Unix MUAs : pine

```
PINE 4.58 MESSAGE INDEX Folder: INBOX Message 58 of 74
```

50	Oct 22	ealert@iucr.org	<21K>	Contents of Journal of Synchrotron Rad
51	Oct 22	ScienceDirect Mess	<39K>	ScienceDirect Alert: Journal of Molecu
52	Oct 26	ealert@iucr.org	<36K>	Contents of Acta Crystallographica Sec
53	Oct 26	pnas-mailer@ionta	<28K>	PNAS Table of Contents for 26 October
54	Oct 26	biophysj-mailer@11	<22K>	Biophys. J. Table of Contents for 1 No
55	Oct 28	Cell	<45K>	Cell Volume 119 Issue 3 Annotated Tabl
56	Oct 28	science-mailer@11o	<15K>	Science Table of Contents: 386 (5697)
57	Nov 2	ScienceDirect Mess	<42K>	ScienceDirect Alert: Journal of Molecu
58	Nov 2	ScienceDirect Mess	<34K>	ScienceDirect Alert: Journal of Struct
59	Nov 2	pnas-mailer@ionta	<21K>	PNAS Table of Contents for 2 November
60	Nov 2	Nature Structural	<8976>	Nature Structural & Molecular Biology
61	Nov 3	oupjournals-mailer	<6134>	Protein Engineering, Design and Select
62	Nov 4	science-mailer@11o	<15K>	Science Table of Contents: 386 (5698)
63	Nov 9	ScienceDirect Mess	<42K>	ScienceDirect Alert: Journal of Molecu
64	Nov 9	pnas-mailer@ionta	<28K>	PNAS Table of Contents for 9 November
65	Nov 10	ScienceDirect Mess	<37K>	ScienceDirect Alert: Structure, Vol. 1
66	Nov 11	Jawahar Swaminatha	<4842>	[ccp4bb]: Announcing bioibar - A toolba
67	Nov 11	science-mailer@11o	<15K>	Science Table of Contents: 386 (5698)
68	Nov 11	Cell	<68K>	Cell Volume 119 Issue 4 Annotated Tabl

Help OTHER CMDS FldrList [ViewMsg] PrevMsg NextMsg PrevPage NextPage Delete Undelete Reply Forward

Σύνδεση με άλλους υπολογιστές

telnet ... και (αν)ασφάλεια δικτύων

```
$ telnet server.cluster.mbg.gr
Trying 190.100.100.100...
Connected to server.cluster.mbg.gr (190.100.100.100).
Escape character is '^]'.
Red Hat Linux release 7.3 (Valhalla)
Kernel 2.4.22-openmosix3 on an i686
login: glykos
Password:
Last login: Thu Nov 18 11:41:05 from aspera
```

```
Programs installed :
```

```
  - CCP4 4.2.1
  .....
```

```
$ hostname
```

```
server.cluster.mbg.gr
```

Σύνδεση με άλλους υπολογιστές

Secure shell : ssh

```
$ ssh crystal3.imbb.forth.gr
glykos@crystal3.imbb.forth.gr's password:
Last login: Wed Nov 17 18:19:45 2004 from
ppp1-86.axd.forthnet.gr
```

Programs installed :

```
  - CCP4 4.2.1
  .....
```

```
$
$ exit
logout
Connection to crystal3.imbb.forth.gr closed.
$
$
```

Σύνδεση με άλλους υπολογιστές

File transfer protocol (ftp) ... και (αν)ασφάλεια δικτύων

```
$ ftp server
Connected to server.cluster.mbg.gr.
220 server.cluster.mbg.gr FTP server (Version wu-2.6.2-5) ready.
504 AUTH GSSAPI not supported.
504 AUTH KERBEROS_V4 not supported.
KERBEROS_V4 rejected as an authentication type
Name (server:glykos): glykos
331 Password required for glykos.
Password:
230 User glykos logged in. Access restrictions apply.
Remote system type is UNIX.
Using binary mode to transfer files.
ftp> pwd
257 "/" is current directory.
```

Σύνδεση με άλλους υπολογιστές

File transfer protocol (ftp) ... και (αν)ασφάλεια δικτύων

```
ftp> ls
227 Entering Passive Mode (190,100,100,100,26,21)
150 Opening ASCII mode data connection for directory listing.
total 22512
drwxrwxr-x   5 500      500      4096 Feb 20  2004 GNUstep
drwxrwxr-x   2 500      500      4096 Nov 13  03:22 download
-rw-rw-r--   1 500      500        243 Jun  1  2004 eln.ini
drwx-----  2 500      500      4096 Mar 15  2004 mail
-rw-----   1 500      500 11478549 Oct  1  19:58 namd-tutorial.pdf
drwxr-xr-x  17 500      500      4096 Sep 18  13:21 server
drwxrwxr-x   3 500      500      4096 Oct 31  12:26 tmp
226 Transfer complete.
ftp> cd server
250 CWD command successful.
ftp> pwd
257 "/server" is current directory.
ftp> cd ..
250 CWD command successful.
```

Σύνδεση με άλλους υπολογιστές

File transfer protocol (ftp) ... και (αν)ασφάλεια δικτύων

```
ftp> binary
200 Type set to I.
ftp> get namd-tutorial.pdf
local: namd-tutorial.pdf remote: namd-tutorial.pdf
227 Entering Passive Mode (190,100,100,100,216,150)
150 Opening BINARY mode data connection for namd-tutorial.pdf (11478549
bytes) .
226 Transfer complete.
11478549 bytes received in 1.3 seconds (8.5e+03 Kbytes/s)
```

Σύνδεση με άλλους υπολογιστές

File transfer protocol (ftp) ... και (αν)ασφάλεια δικτύων

```
ftp> put 5.mgp
local: 5.mgp remote: 5.mgp
227 Entering Passive Mode (190,100,100,100,98,14)
150 Opening BINARY mode data connection for 5.mgp.
226 Transfer complete.
11014 bytes sent in 0.00011 seconds (1e+05 Kbytes/s)
ftp> ls
227 Entering Passive Mode (190,100,100,100,207,30)
150 Opening ASCII mode data connection for directory listing.
total 22536
-rw-r--r--  1 500      500      11014 Nov 18 12:33 5.mgp
drwxrwxr-x  5 500      500      4096 Feb 20  2004 GNUstep
drwxrwxr-x  2 500      500      4096 Nov 13 03:22 download
-rw-rw-r--  1 500      500        243 Jun  1  2004 eln.ini
drwx----- 2 500      500      4096 Mar 15  2004 mail
-rw-----  1 500      500     11478549 Oct  1 19:58 namd-tutorial.pdf
drwxr-xr-x 17 500      500      4096 Sep 18 13:21 server
drwxrwxr-x  3 500      500      4096 Oct 31 12:26 tmp
226 Transfer complete.
```

Σύνδεση με άλλους υπολογιστές

File transfer protocol (ftp) ... και (αν)ασφάλεια δικτύων

```
ftp> del 5.mgp
250 DELE command successful.
ftp> ls
227 Entering Passive Mode (190,100,100,100,123,181)
150 Opening ASCII mode data connection for directory listing.
total 22512
drwxrwxr-x   5 500      500      4096 Feb 20  2004 GNUstep
drwxrwxr-x   2 500      500      4096 Nov 13  03:22 download
-rw-rw-r--   1 500      500        243 Jun  1  2004 eln.ini
drwx-----  2 500      500      4096 Mar 15  2004 mail
-rw-----  1 500      500 11478549 Oct  1  19:58 namd-tutorial.pdf
drwxr-xr-x  17 500      500      4096 Sep 18  13:21 server
drwxrwxr-x   3 500      500      4096 Oct 31  12:26 tmp
drwxrwxr-x   2 500      500      4096 Mar 19  2004 viky
226 Transfer complete.
ftp> bye
221-You have transferred 11489563 bytes in 2 files.
221-Total traffic for this session was 11490951 bytes in 2 transfers.
221-Thank you for using the FTP service on server.cluster.mbg.gr.
221 Goodbye.
```

Σύνδεση με άλλους υπολογιστές

Secure ftp : sftp

```
$ sftp glykos@origin.imbb.forth.gr
Connecting to origin.imbb.forth.gr...
The authenticity of host 'origin.imbb.forth.gr (147.52.170.139)' can't be
established.
DSA key fingerprint is 0a:17:31:c4:7c:58:56:e9:00:c5:88:12:5b:0d:53:b9.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added 'origin.imbb.forth.gr' (DSA) to the list of
known hosts.
glykos@origin.imbb.forth.gr's password:
sftp>
sftp> cd tmp
```


Σύνδεση με άλλους υπολογιστές

Secure ftp : sftp

```
sftp> ls
drwxr-xr-x  6 glykos  user           61 Mar 22  2003 ./
drwxr-xr-x 18 glykos  user          4096 Nov  5 11:03 ../
drwxr-xr-x  2 glykos  user          4096 Mar 22  2003 10-4/
drwxr-xr-x  2 glykos  user          4096 Feb 28  2003 12-4/
drwxr-xr-x  2 glykos  user          4096 Mar 22  2003 12-5/
drwxr-xr-x  2 glykos  user          4096 Feb 13  2003 15-4/
sftp> put test.txt
Uploading test.txt to /usr/people/glykos/tmp/test.txt
sftp> ls
drwxr-xr-x  6 glykos  user           78 Nov 18 15:24 ./
drwxr-xr-x 18 glykos  user          4096 Nov  5 11:03 ../
drwxr-xr-x  2 glykos  user          4096 Mar 22  2003 10-4/
drwxr-xr-x  2 glykos  user          4096 Feb 28  2003 12-4/
drwxr-xr-x  2 glykos  user          4096 Mar 22  2003 12-5/
drwxr-xr-x  2 glykos  user          4096 Feb 13  2003 15-4/
-rw-r--r--  1 glykos  user           40 Nov 18 15:24 test.txt
sftp> exit
$
```

http

[h]yper[t]ext [t]ransfer [p]rotocol : το πρωτόκολλο ...

```
$ telnet www.mbg.duth.gr 80
```

```
Trying 192.108.114.44...
```

```
Connected to utopia.duth.gr (192.108.114.44).
```

```
Escape character is '^'.
```

```
GET /~glykos/ HTTP/1.0
```

```
HTTP/1.1 200 OK
```

```
Date: Thu, 18 Nov 2004 14:50:54 GMT
```

```
Server: Apache/1.3.26 (Unix) Debian GNU/Linux
```

```
Last-Modified: Wed, 07 Jul 2004 14:16:26 GMT
```

```
ETag: "4e803f-813-40ec05ba"
```

```
Accept-Ranges: bytes
```

```
Content-Length: 2067
```

```
Connection: close
```

```
Content-Type: text/html; charset=iso-8859-1
```

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 3.2//EN">
```

```
<HTML>
```

```
<HEAD>
```

```
.....
```

http & html

[h]yper[t]ext [m]arkup [l]anguage

```
<html>
<head>
<title>Per aspera ad astra</title>
</head>
<body bgcolor="#CC9944" >
<center>
<h1>Chapter 1</h1>
<h2>Section 1</h2>
</center>
```

This is normal text.

The appearance of the text on the web page is the responsibility of the browser.

You can

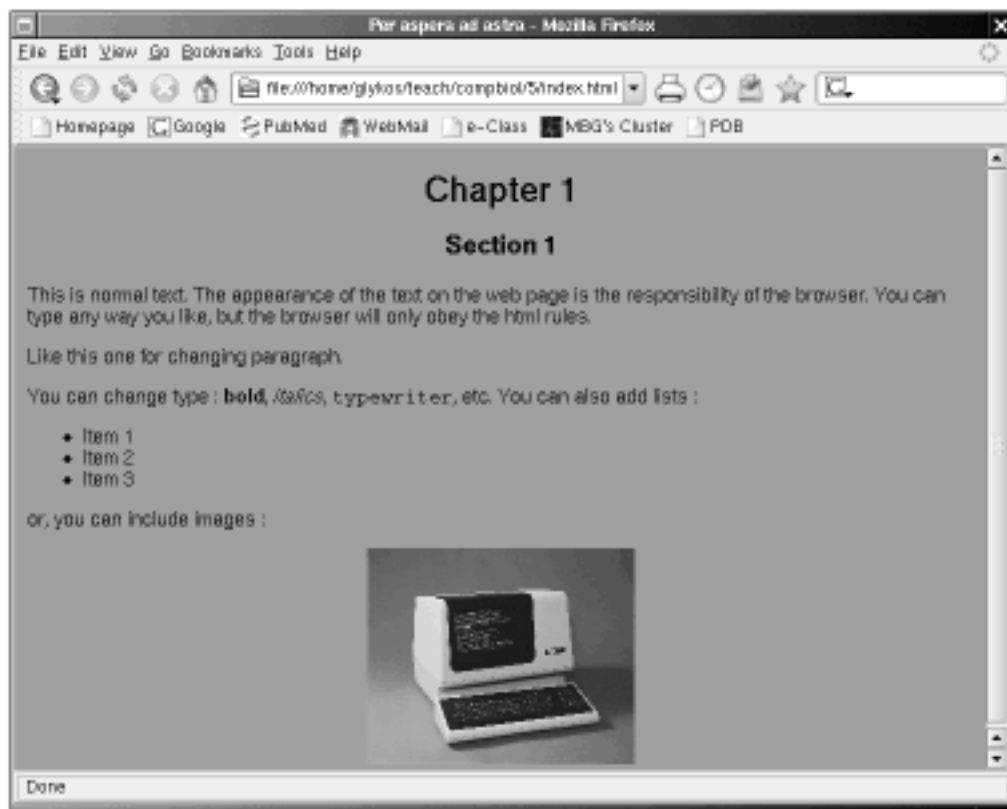
type any way you like, but the browser will only obey the html rules.

```
<p>Like this one for changing paragraph.</p>
```

.....

http & html

[h]yper[t]ext [m]arkup [l]anguage



Per aspera ad astra - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

file://home/glykos/teach/compbiol/5/index.html

Homepage Google PubMed WebMail e-Class MBG's Cluster PDF

Chapter 1

Section 1


This is normal text. The appearance of the text on the web page is the responsibility of the browser. You can type any way you like, but the browser will only obey the html rules.

Like this one for changing paragraph.

You can change type: **bold**, *italics*, typewriter, etc. You can also add lists :

- Item 1
- Item 2
- Item 3

or, you can include images :



Done

http & html

[h]yper[t]ext [m]arkup [l]anguage

Per aspera ad astra

Chapter 1

Section 1

This is normal text. The appearance of the text on the web page is the responsibility of the browser. You can type any way you like, but the browser will only obey the html rules.

Like this one for changing paragraph.

You can change type : **bold**, italics, typewriter, etc. You can also add lists :

- * Item 1
- * Item 2
- * Item 3

or, you can include images :

[vt100.jpg]

Commands: Use arrow keys to move, '?' for help, 'q' to quit, '<' to go back.

html

```
<html>
<head>
<title>Per aspera ad astra</title>
</head>
<body bgcolor="#CC9944" >
<center>
<h1>Chapter 1</h1>
<h2>Section 1</h2>
</center>
This is normal text.
The appearance of the text on the web page is the
responsibility of the browser.
```

You can

type any way you like, but the browser will only obey the html rules.

```
<p>Like this one for changing paragraph.</p>
```

html

Par aspera ad astra - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

file:///home/glykos/teach/compbiol/5/index.html

Homepage Google PubMed WebMail e-Class MBG's Cluster PDF

Chapter 1

Section 1


This is normal text. The appearance of the text on the web page is the responsibility of the browser. You can type any way you like, but the browser will only obey the html rules.

Like this one for changing paragraph.

You can change type: **bold**, *italics*, typewriter, etc. You can also add lists :

- Item 1
- Item 2
- Item 3

or, you can include images :



Done

html

You can change type : `bold`, `<i>italics</i>`,
`<tt>typewriter</tt>`, etc.

You can also add lists :

```
<ul>
  <li>Item 1</li>
  <li>Item 2</li>
  <li>Item 3</li>
</ul>
```

`<p>or, you can include images :</p>`

```
<center>

</center>
</html>
```


html

Par aspera ad astra - Mozilla Firefox

File Edit View Go Bookmarks Tools Help

file:///home/glyks/teach/compbiol/5/index.html

Homepage Google PubMed WebMail e-Class MBG's Cluster PDF

Chapter 1

Section 1


This is normal text. The appearance of the text on the web page is the responsibility of the browser. You can type any way you like, but the browser will only obey the html rules.

Like this one for changing paragraph.

You can change type: **bold**, *italics*, typewriter, etc. You can also add lists :

- Item 1
- Item 2
- Item 3

or, you can include images :



Done