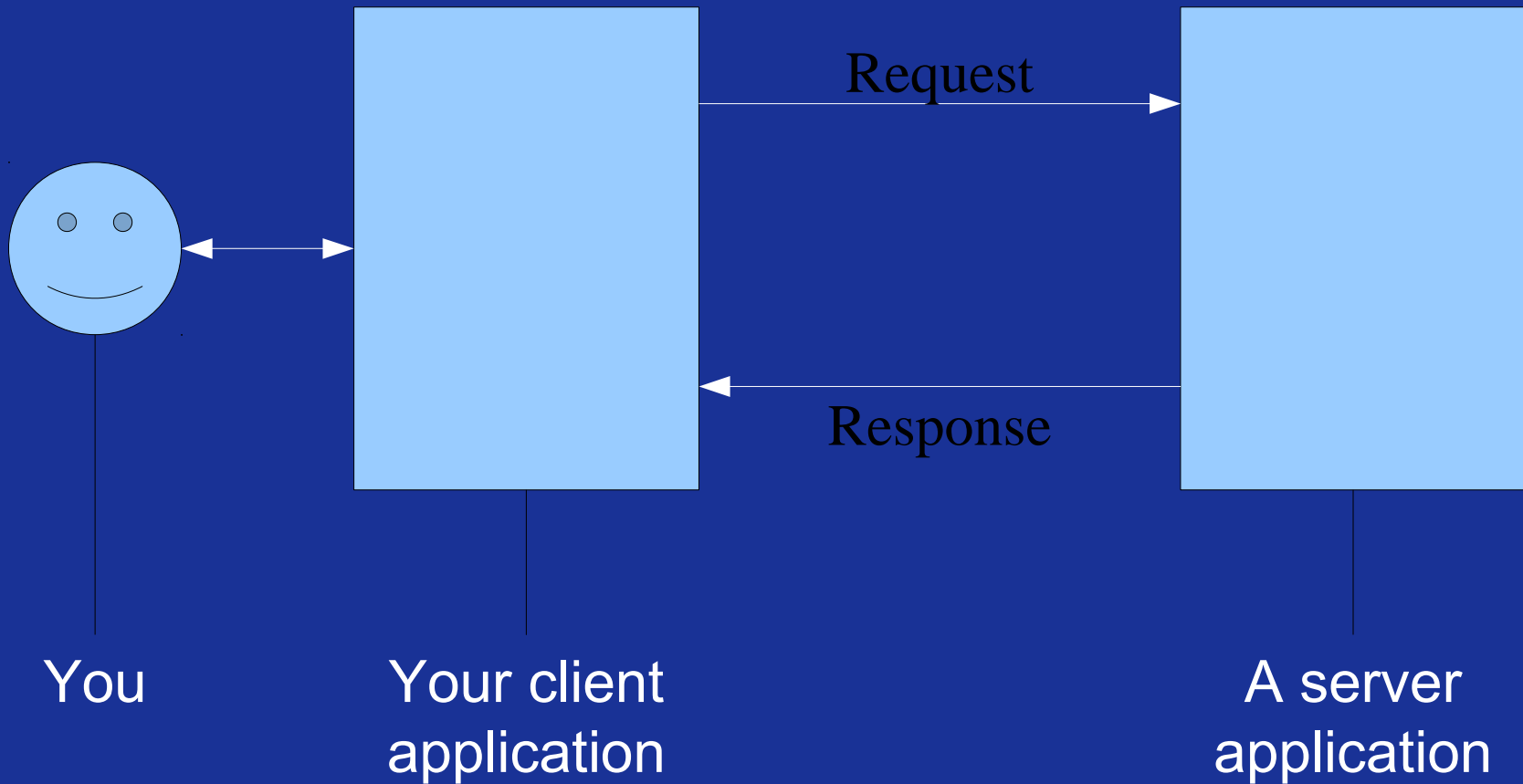


## 02 – Internet != Web

# The client-server model

- When you use an Internet-based service, your connection follows the so-called *client-server* model:
  - The machine which provides the service is called *server*
  - The machine which accesses the service is called *client*
  - *NOTE:* this definition is often used both for the *machines* and for the *applications* involved
- This model holds independently from the specific type of service you are accessing:
  - Games (i.e. WOW) connect to game servers
  - Email clients (i.e. MacOSX "mail") connect to email servers
  - Web clients (i.e. Firefox) connect to Web servers
  - ... what about Peer-to-Peer? We'll see this model later in this course, for now just know that in p2p we are both clients and servers!

# Architectural perspective of the c-s model



# Where are client and server?

- Five-minutes quiz game: which is the client and which is the server when
  - You browse the Internet
  - You check your email from an application
  - You check your email from gmail
  - You stream audio/video from your computer
  - You run the Opera Unite browser
  - You IM
  - You receive a Skype call on your mobile phone
  
- Conclusions
  - Any machine can be a client and a server at the same time
  - As any client can connect to many servers at once, any machine can run different servers at once (i.e. web+mail)
  - ... *but the TCP/IP connection is only one: how is it possible?*

- **Sockets** can be considered as “virtual locations” used by software applications to exchange data
- A socket is comprised of:
  - the **IP address** of a network card
  - a **TCP port**, which may be regarded as a virtual location at which data are delivered (note that a port is a software entity, not a physical device!)

For example, socket

**195.176.39.49:80**

combines the IP address **195.176.39.49** (which identifies a network card) and the TCP port **80**, typically used by the **http protocol** to deliver the requests of transmission of Web pages

# Standard ports for well-known services

- Usually services can be configured to run on any port, however they are also characterized by having a standard one
- Knowing the standard port for services allows us to:
  - Develop software which connects by default to the standard port (allowing users to access the server without even knowing what a port is)
  - Understand what services are running on a server (or at least suppose it) – see the *nmap* application
  - Nerd fun: manually connect to a service using the *telnet* application (... and then? Well, read the RFC to know how to “talk” with the server!)
- Some standard ports:
  - HTTP: 80 (443 for HTTPS)
  - POP3: 110
  - SMTP: 25

# Internet != Web

- After reading the history of the Internet and understanding how many different services and protocols it relies on, you should now be aware of the fact that

INTERNET != WEB

- To explain it in details:
  - The World Wide Web is just a network of computers using one (HTTP) of the many protocols available on the Internet
  - Internet existed before the Web (it is more than 20 years older)
  - Internet will (should?) exist after the Web
- QUESTION: can the Web exist without the Internet?

# Alternatives to the Web

- Actually, we should say “alternative protocols to HTTP”, as none of these can replace the Web as a whole... however, *some* functionalities are (also) available through channels that are not HTTP-based, such as:
  - Instant Messaging
  - Online gaming
  - E-Mail
  - File Transfer Protocol (FTP)
  - Secure Shell (SSH)
  - Internet Relay Chat (IRC)
  - Usenet



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# Instant Messaging

- IM tools like ICQ, MSN, Jabber, and Skype use protocols which do not rely on HTTP to allow users to exchange messages
  - They often do not even rely on TCP!
- Same holds for voice applications (VoIP)

- Many multiplayer games can be played online, often adopting proprietary protocols
  - If the protocol is closed, it is harder to create **unofficial servers** (players are bound to the commercial one)

**PLAY ONLINE**

**MESSAGE OF THE DAY**  
Welcome to Wolfenstein Enemy Territory

**FILTERS** 1  
Source: Internet 2  
Game Type: All 3

4  
Filter Disabled  
Filter Disabled  
Filter Disabled  
Filter Disabled

5  
**SERVER BROWSER**

SERVER NAME	MAP NAME	#PLRS	TYPE	PING	FILTERS	FAV
.. SCRANA.8-Link ET Priv	fueldump	0/14	SW	26	Fr	去
BOD ET Server	fueldump	0/20	Cmpgn	26	Fr	去
TEAM-ZENITH ET TESTSERVER	fueldump	0/14	Cmpgn	26	Fr	去
NDG.com (R) ET-linux	fueldump	0/26	SW	27	Fr	去
Multiplay.co.uk :: ET Test Publ	fueldump	32/32	Cmpgn	28	Fr	去
Splash Damage's Server	fueldump	19/20	Cmpgn	34	Fr	去
-= OB15* EnemyTerritory APC's	fueldump	18/18	Cmpgn	34	Fr	去
[GoD] Grand Old Daddies	fueldump	0/14	Cmpgn	35	Fr	去
=] [=k T	fueldump	8/20	Cmpgn	35	Fr	去
]UD[Underground <#UD #Q-Net> ::	fueldump	0/20	Cmpgn	35	Fr	去
eXtreme-Players.de - The War -	fueldump	1/16	Cmpgn	36	Fr	去
.. SCRANA.8-Link ET FFA	fueldump	16/16	Cmpgn	43	Fr	去
[DarkSoldiers] == Public	fueldump	13/15	Cmpgn	48	Fr	去
-37th EnemyTerritory	fueldump	0/16	Cmpgn	48	Fr	去
GAME.NET - Enemy Territory [1]	fueldump	20/20	Cmpgn	49	Fr	去
FraggersHeaven nOlame	fueldump	14/14	Cmpgn	49	Fr	去

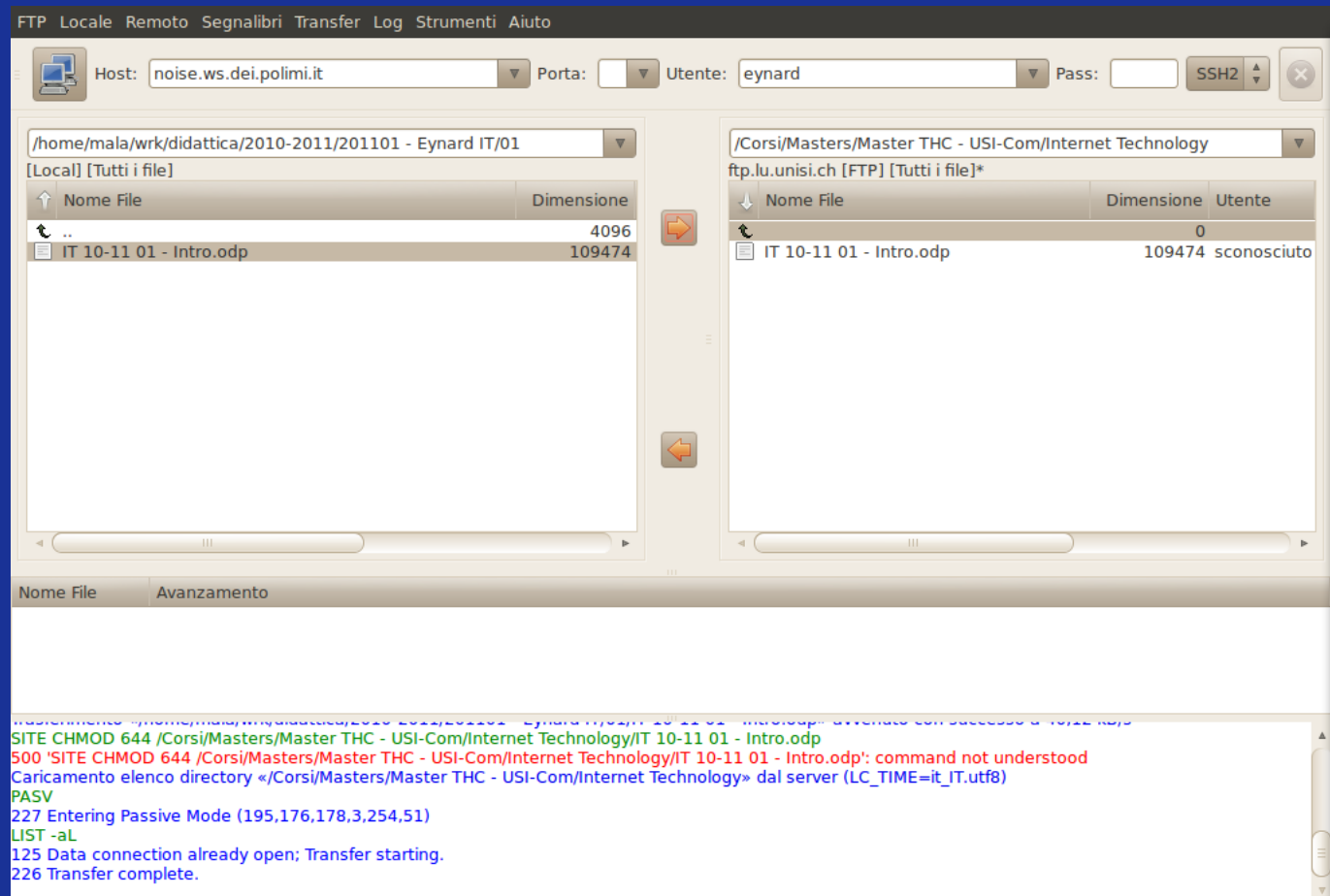
6 REFRESH LIST 7 CONNECT TO IP 8 SERVER INFO 9 DISABLE PUNKBUSTER

10 BACK 11 JOIN SERVER

- E-Mail relies on POP3 and IMAP to *read* emails and on SMTP to *send* emails
- “Classical” mail applications do not connect to the Web
- Main advantage: (somehow) *push* technology (i.e. you can receive updates by mail without requesting them each time)
- Historical (but somehow still useful) services:
  - Web by mail (<http://www.faqs.org/faqs/internet-services/access-via-email/>)
  - Webpage change detection (<http://www.changedetection.com/>)

# File Transfer Protocol

- Used to transfer files from one machine to another
- Available as a command-line tool, but plenty of graphical applications are available (typical appearance shown in picture)

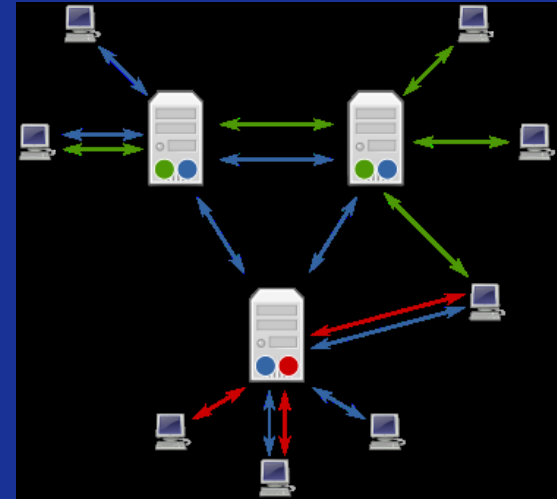


- Used to remotely connect to another machine's *command line*
- The interface is barebones and text-only, but usually all server applications can be run from here
  - result: easy and powerful way to manage a remote machine
- The “Secure” in the name means that all the information is encrypted along the way

# Internet Relay Chat

- The grandpa of today's chats (born in 1988)
- Application-layer protocol, runs over TCP (+TLS for encryption)
- Mainly designed for group communication, but also allows “private” chats and file transfer between two users
- Bots are widely used to maintain channels, serve files, and kick/ban users

- A worldwide distributed discussion system
  - ... but probably this is not enough, let's see that "live" to better understand it!



- Pros (see [Brad Templeton's page](#)):
  - Better readers, local access, offline reading, decentralized efficiency, decentralized control, legacy and community, simple experience
- Cons:
  - Older readers, decentralized pockets of centralized control, not in web results, follow the community, search for richer text

- Here is another five-minutes quiz game:
  - find web alternatives to the technologies we have just seen (IM, E-mail, FTP, SSH, IRC, Usenet)
  - are they real alternatives or just Web interfaces to these technologies?
  - if they are alternatives, do you think they will replace the older technologies? Why?



# Pros and cons of the Web

## ■ Pros

- Easy: everyone which “uses Internet” knows how to use the Web (the opposite is not true)
- Convenient: with only one application (the browser) we can do anything
- Provides a very *rich experience*

## ■ Cons

- The HTTP protocol adds some overhead to communications
- Access to a website is centralized, if a website goes down there is no way to access its contents

## ■ Some Web references:

- Connected: an Internet Encyclopedia

<http://freesoft.org/CIE/index.htm>

- Access your email with Telnet:

<http://davide.eynard.it/?p=108>

- Request for Comments: learn Internet standards by reading the documents that gave them birth

<http://davide.eynard.it/?p=147>

## ■ Some tools:

- FileZilla, an FTP client for Windows, Linux, and Mac:

<http://filezilla-project.org/>

- Xchat, a multiplatform IRC client: <http://xchat.org/>

<http://xchataqua.sf.net> (Mac OSX version)