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SECOND ICTP - URSI - ITU/BDT SCHOOL ON THE USE OF RADIO FOR DIGITAL COMMUNICATIONS IN DEVELOPING COUNTRIES, INCLUDING SPECTRUM MANAGEMENT

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INTRODUCTION TO NETCFG

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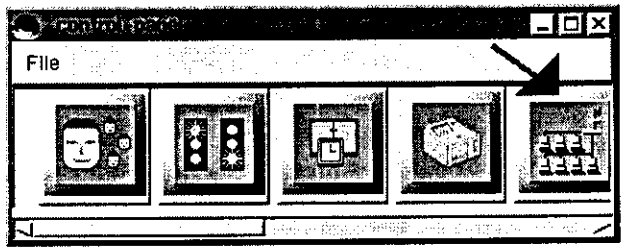
What is NETCFG ?

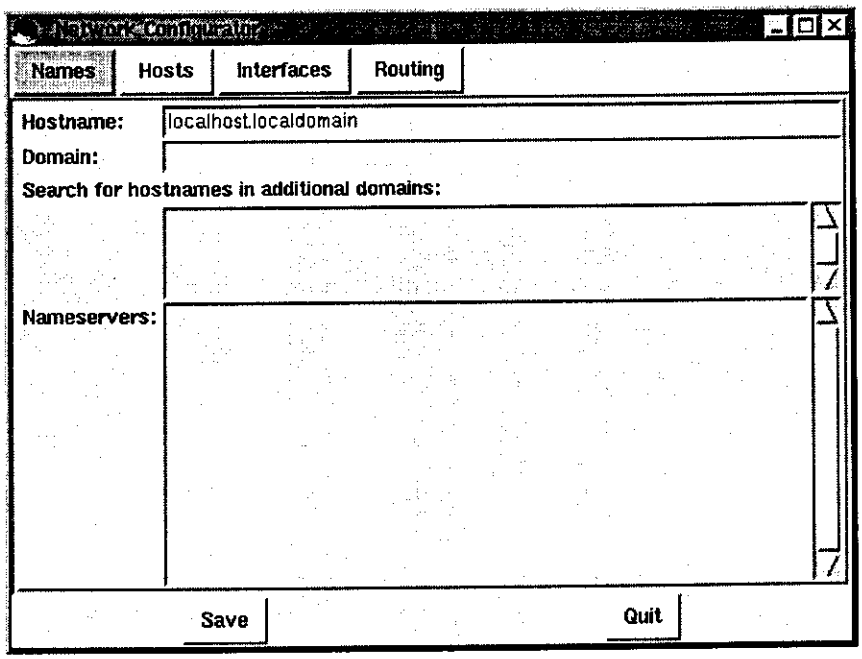
Netcfg is a tool that can be used to configure the network.
This tool is available with the RedHat Linux distribution by default, which means that if you are using another distributin it can be absent.

How to run it

You can start it at the comman line by tipyng "netcfg" or from the control panel :
(if the control panel is not on the desktop, you can start it by tipyng "control-panel")



This is the main window of netcfg :



As you can see on the top of the window, four are the the windows we have to fill in.
Let's start from the first one.

By the way, this is an example of table with all the data needed :

Host name	spaghetti
Domain name	pasta.food.it
Domain Name Server (DNS)	1.2.3.4
IP address	1.2.3.100
netmask	255.255.255.240

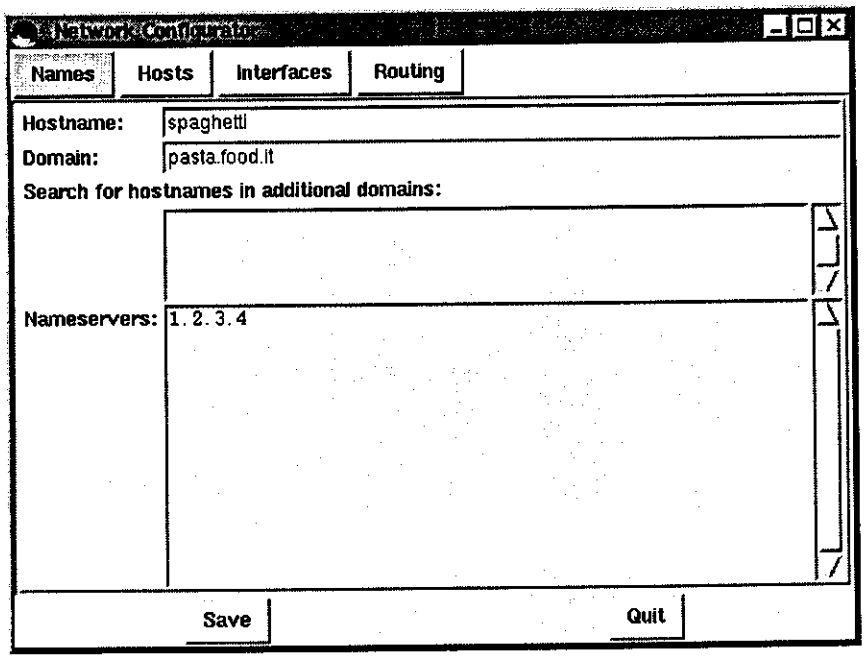
Table 1

Network/s connected to the machine I am configuring

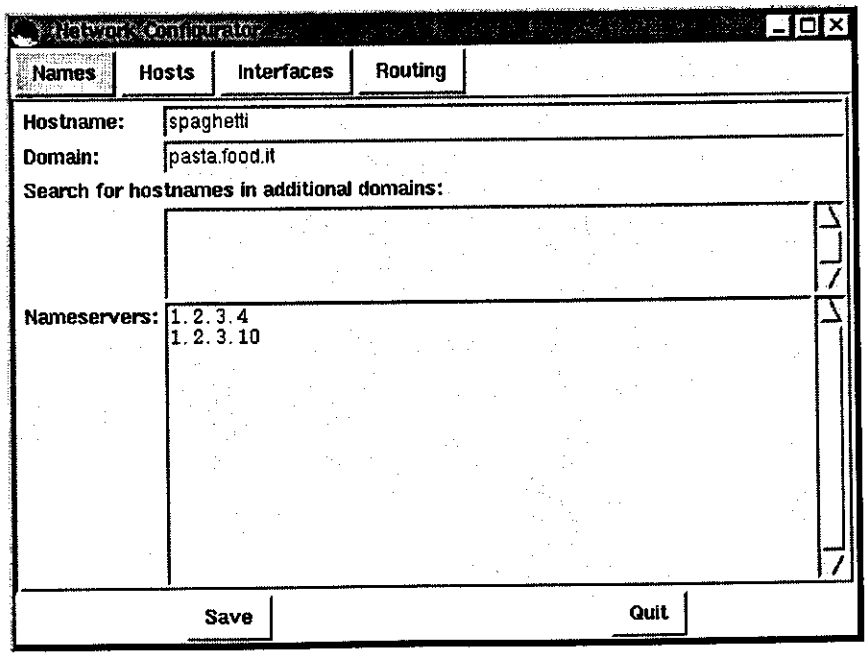
Device	Network	Nemask
ethernet card	1.2.3.96	255.255.255.240

Table 2

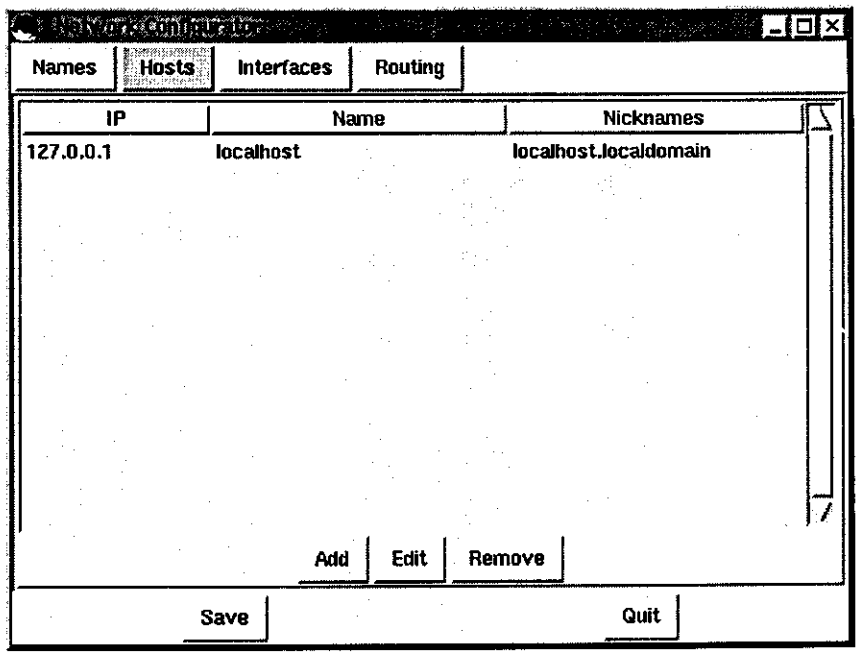
Let's continue with the exercise.
The table 1 contains all I need to fill the first window :



Because I have only one DNS (1.2.3.4) I have put only it, but I can put there as many DNS as I want (If they exist), this is an example with 2 DNS



We can then jump to the following windows, by clicking on the "Hosts" button on the top of the window.



The window is not empty as you can see.

Ad you know, each network card has to be given an IP address which MUST be unique (at least within the network you are connected to. If you are connected to the internet then it has to be world wide unique IP).

The IP address 127.0.0.1 is not referred to any network card , and "localhost" is a nickname for the machine.
NB : this couple "127.0.0.1 and localhost" is not a name or an address you can use when data is sent throught the network, because for technical reason each machine has that name and address too.

Hosts is a file placed into the directory "/etc/" that is used by the system when there is need to resolve a domain-name
(this because computers prefers number to strings!).

Many are the ways that can be done, and one of them is to look into that file to see wheather there is a line that contain the answer.

Imagine this the "/etc/hosts" file :

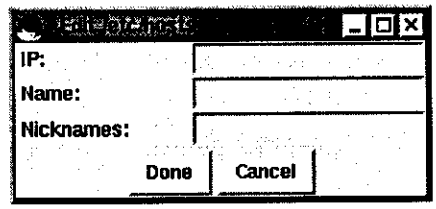
127.0.0.1	localhost	localhost.localdomain
100.110.120.1	workstation-1	workstation-1.ictp.trieste.it
100.110.120.2	workstation-2	workstation-2.ictp.trieste.it
100.110.120.3	workstation-3	workstation-3.ictp.trieste.it
200.50.90.1	**pc-1**	**pc-1.csr.unibo.it**
200.50.90.2	pc-2	pc-2.csr.unibo.it

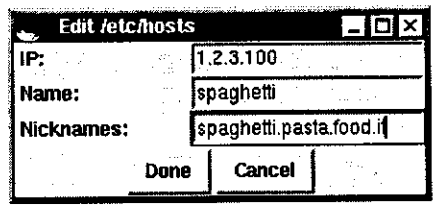
If for as given reason the system needs to know the IP address of the machine called **pc-1.csr.unibo.it** , by scrolling this file it can find out the IP **200.50.90.1**.

The system administrator can decide whether the system should consult this file or not, and in case a DNS is setup , I can also decide which one between the DNS and the file "/etc/hosts" should be asked first.
The sequence order is written into the file "/etc/host.conf".

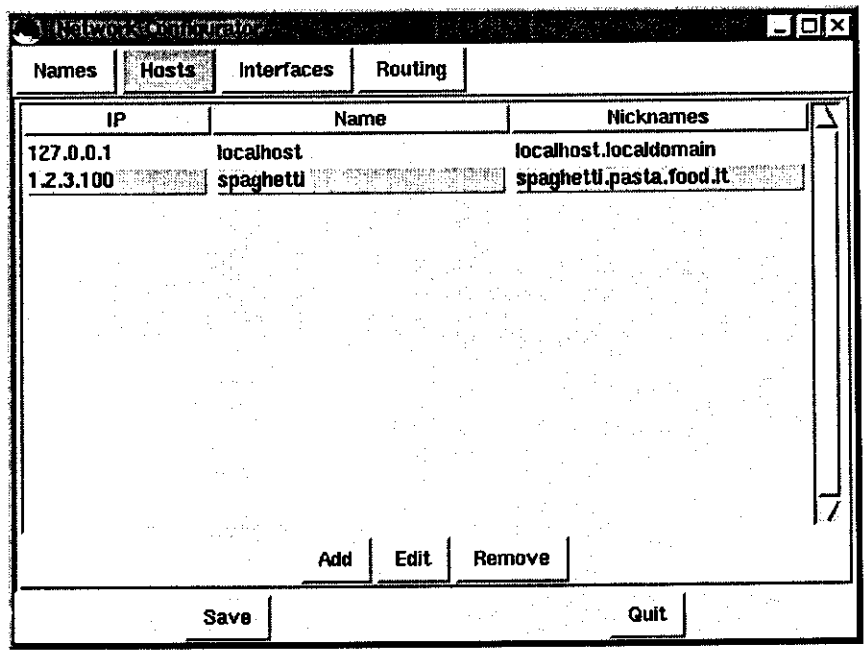
What and when I edit that file
If there is a mchine whose address is needed often , I can put its address in this file, saving the time requested by a query to the DNS.

We can now fill in the second window, again using the parameters reported in table 1.
By clicking on the button "add" , a new window to fill in get printed on the screen :



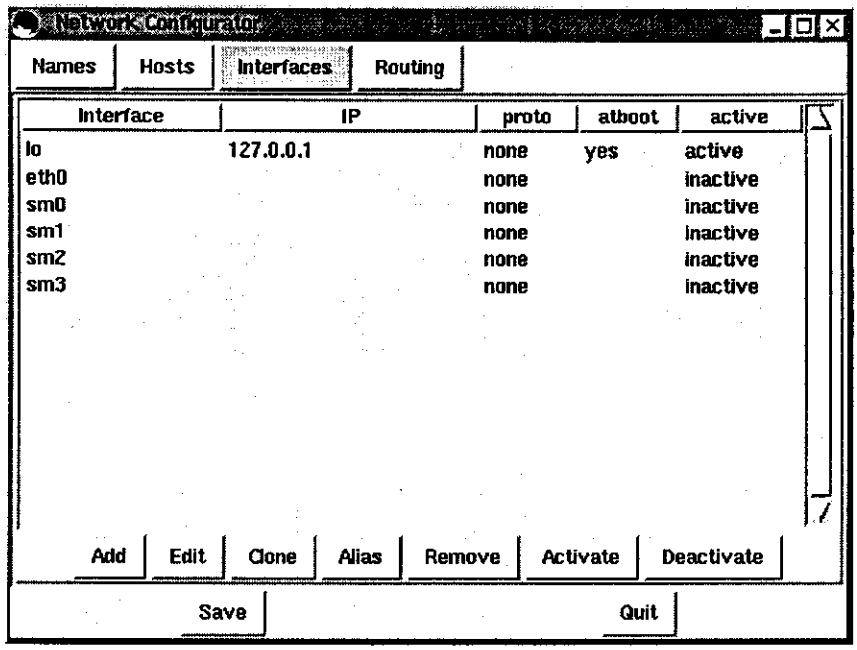


Click on "Done" and that's it.

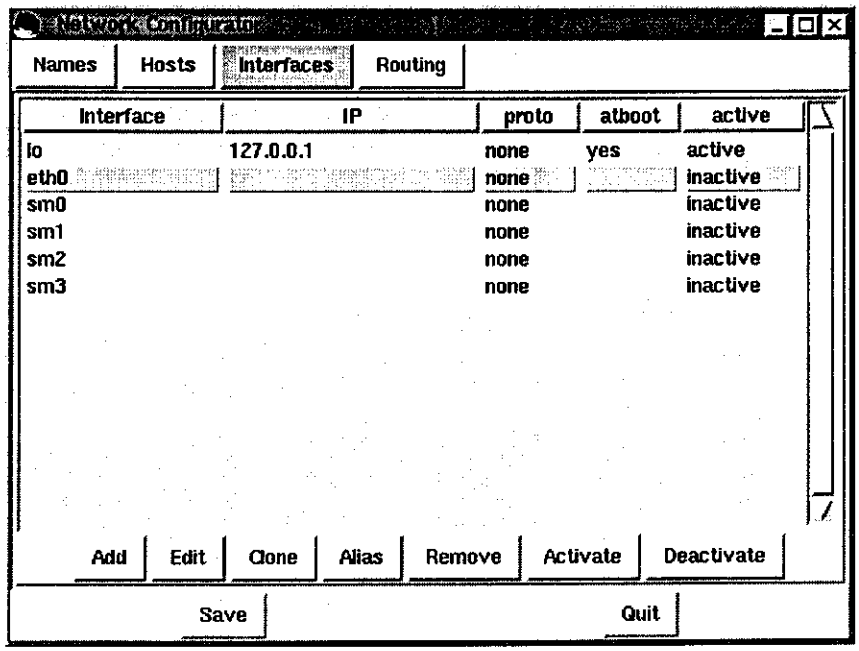


If you have made a mistake, you can select the wrong line and click on "edit" to correct it. (or remove it directly with the button "Remove")

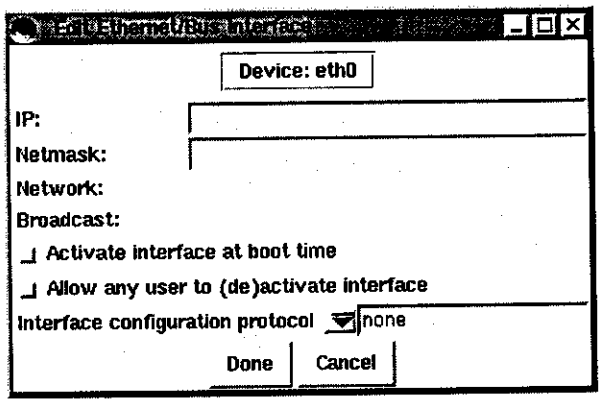
Now it is time for the following window.
I click on the button "interface" on the top of the window.



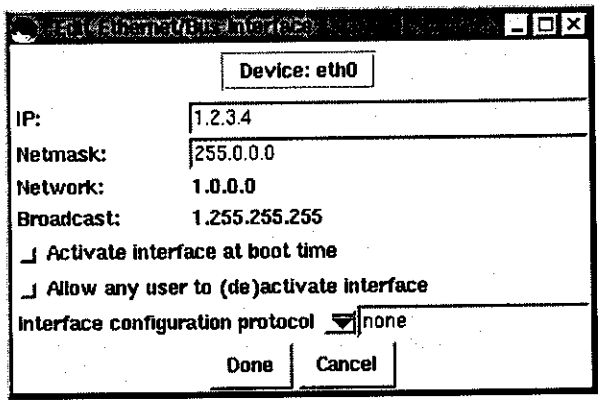
The card we have to configure is an ethernet, and Linux call them eth0 (the first) , eth2 (the second) , ...
In the above window I can see a line with the interface eth0 , which is the one I want to configure (and in this case the only one too) , so I click on that line .....



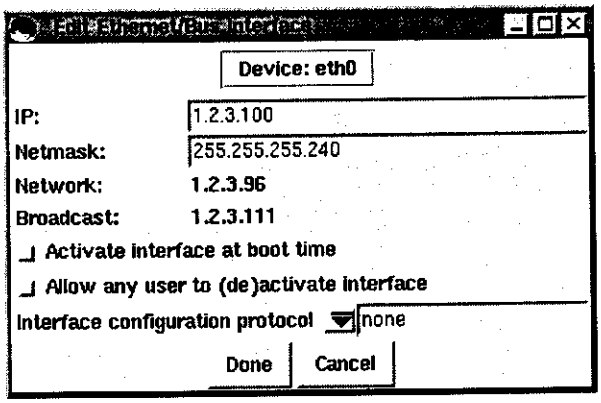
..... and once it has got selected I can click on "edit" at the bottom of the window.



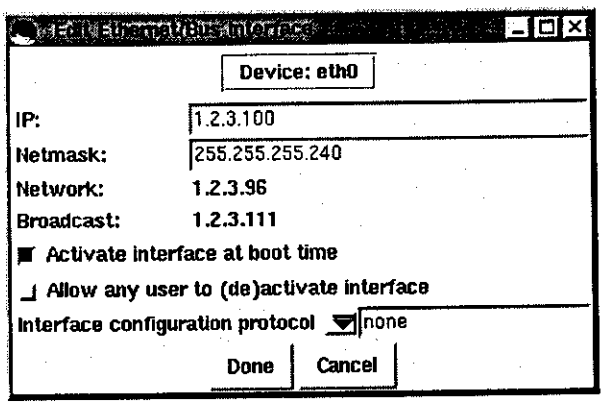
I type the IP and the netmask (from table 1) and the program suggests me the netmask 255.0.0.0 that in our case is wrong....



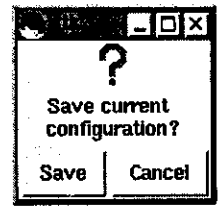
... so I correct it with the right value.
As you can see , the Network and Broadcast lines update themselves automaticly.



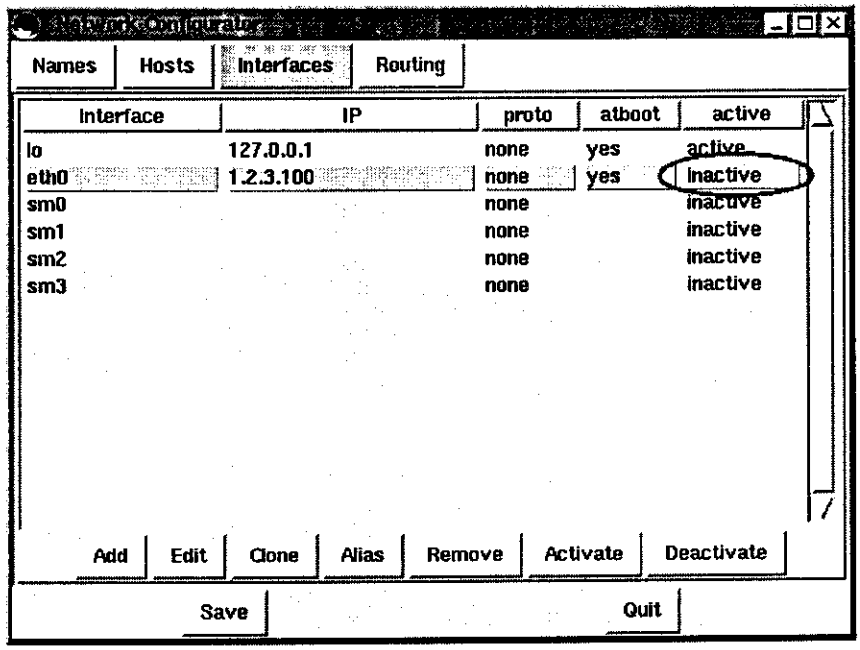
Given that I want the network card to be up and running at boot time,
I also select the option "Activate interface at boot time".

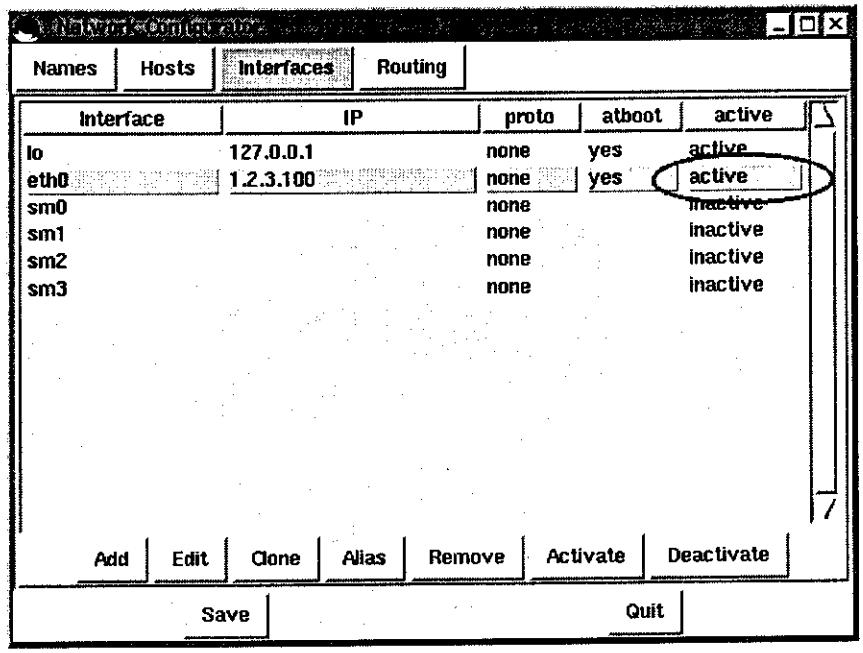


When clicking on "Done" to go back to the main window , you are asked to confirm
before to save the new configuration :

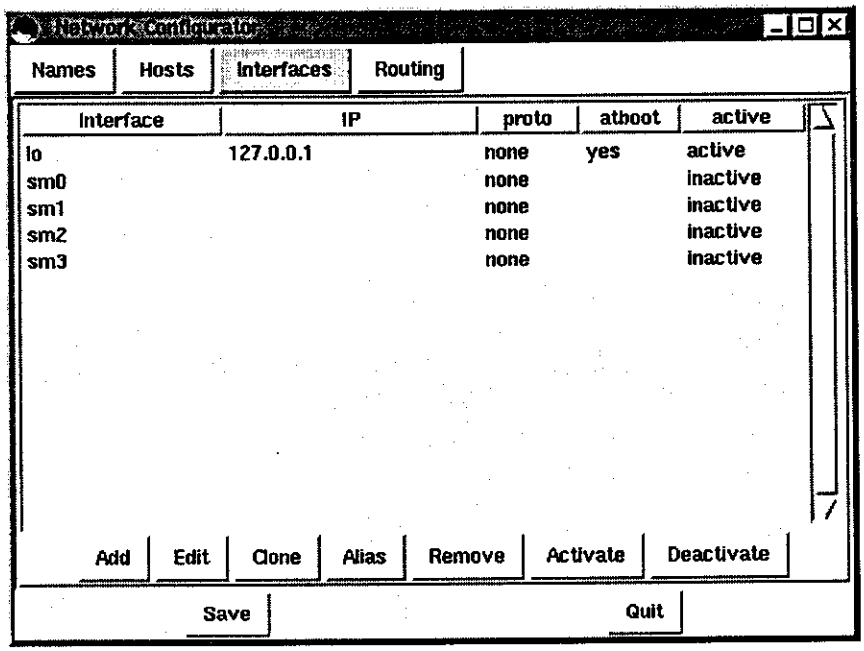


You have introduced all was needed for that interface, but now you have to activate it with the button "Activate" on the bottom of the window.
(before clicking, select the line with the interface to activate)

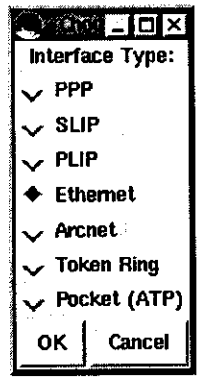




If you know you have more than one network carsd, but on the window only one is listed, (or you have one and no one is listed) ...



.... click on "Add" ....



... and select the type of interface to add.

Now the system knows :

- the name of the machine ,
- its IP number/s ,
- the domain it belongs to ,
- the IP of the DNS ,

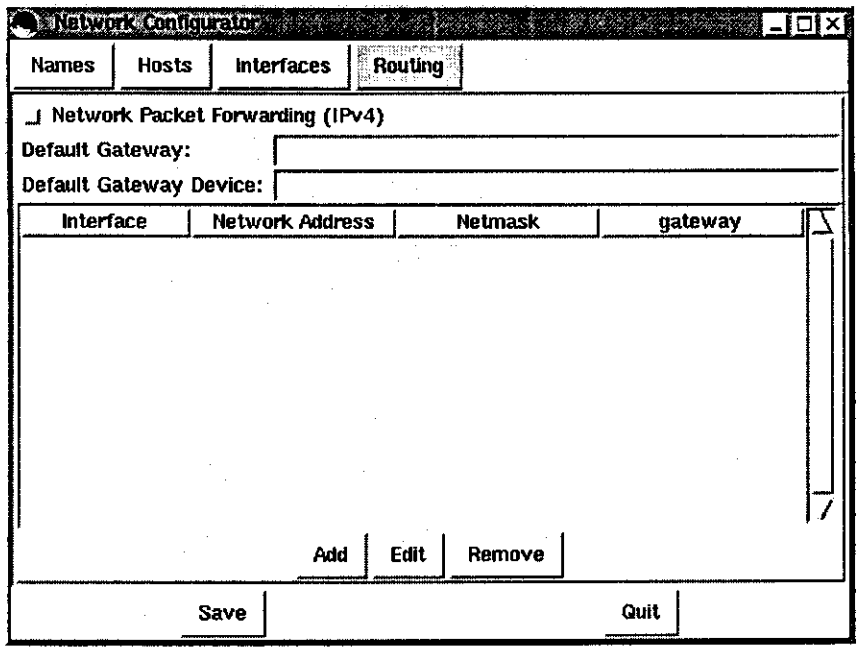
.....,

but there is something missing!

How does the system know what are the machines directly connected to itself (remember we are talking about ethernet), and how to reach destinations not directly connected ?

This is what is missing. The system does not know the route to follow to reach a given IP address.

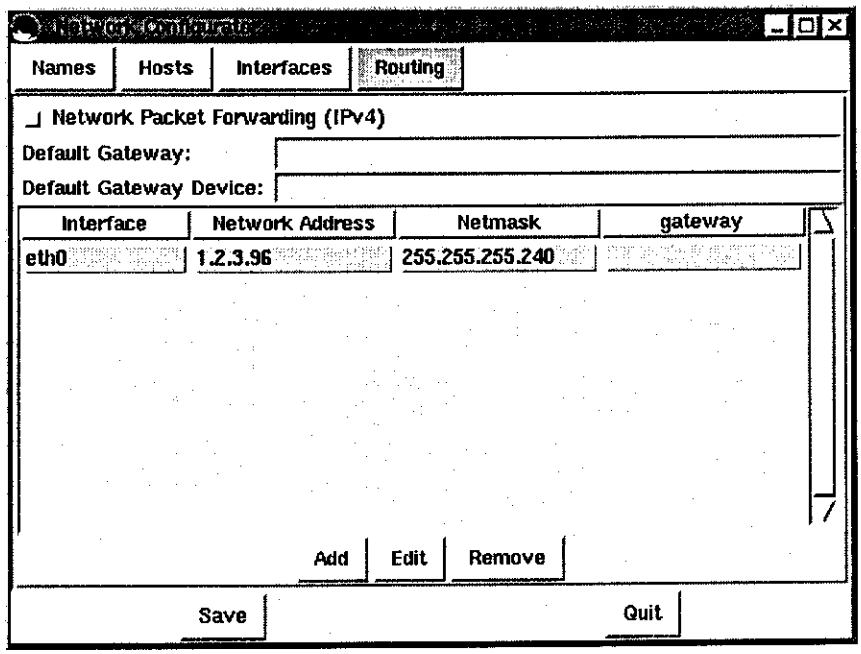
Last window : Routing.



Here we have to specify two things :

- what is/are the network/s directly connected to each card ,
- and what is the IP of the machine to which send packets when the routing table is not enought to find out the path.

First I add the network "1.2.3.96" to the network-card eth0 (see table 2) :



Exercize

- What the field "gateway" (on the right) stands for ?
- Why is it empty ?
- What are the IP - addresses I am directly connected to throught the interface eth0 ?

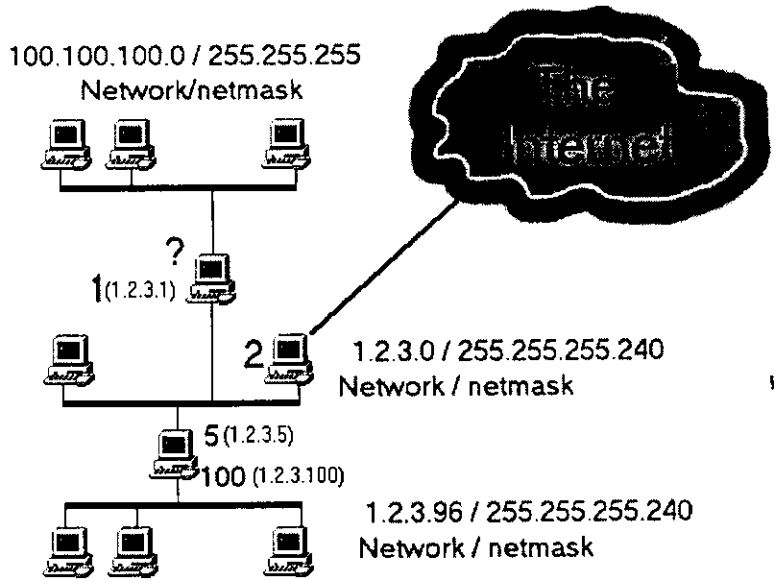
Let's make the example a little bit more complex.

Imagine we have two network cards ....

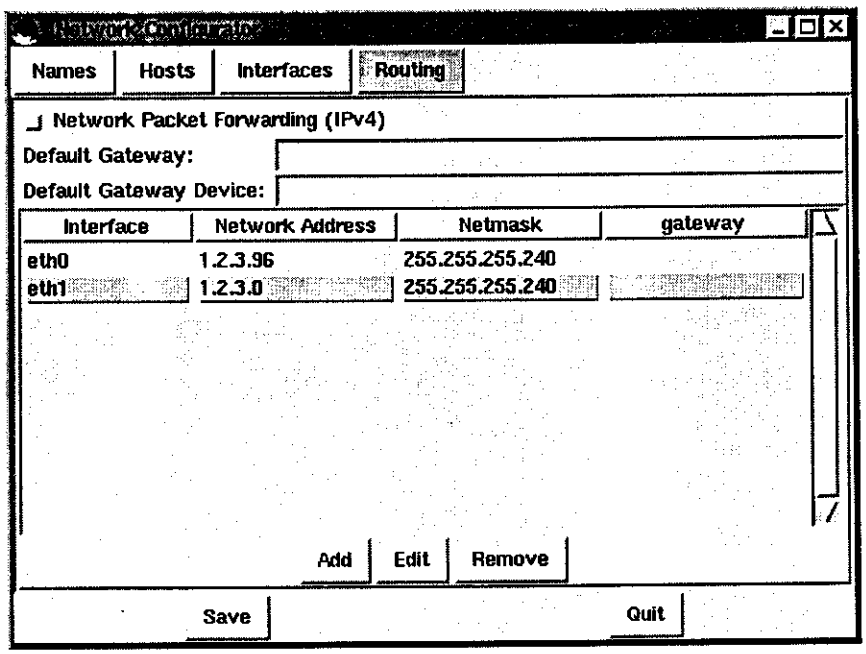
Device	IP address	Network	Nemask
ethernet card	1.2.3.100	1.2.3.96	255.255.255.240
ethernet card	1.2.3.5	1.2.3.0	255.255.255.240

Table 3

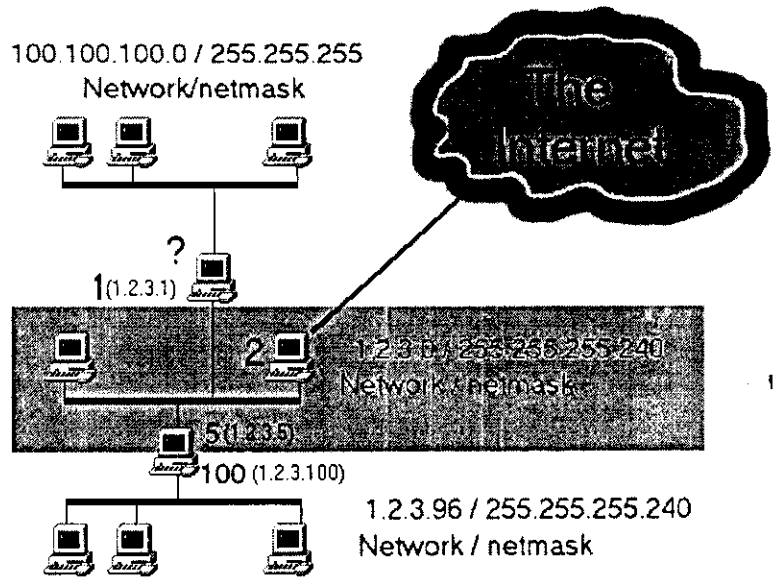
.... and the network topology is the following :



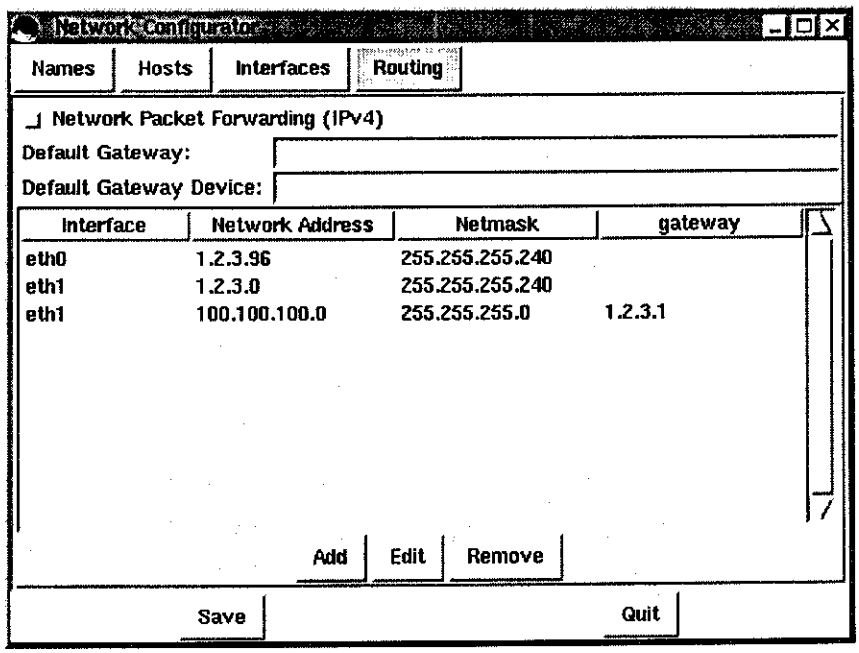
This would have been the associate entry :



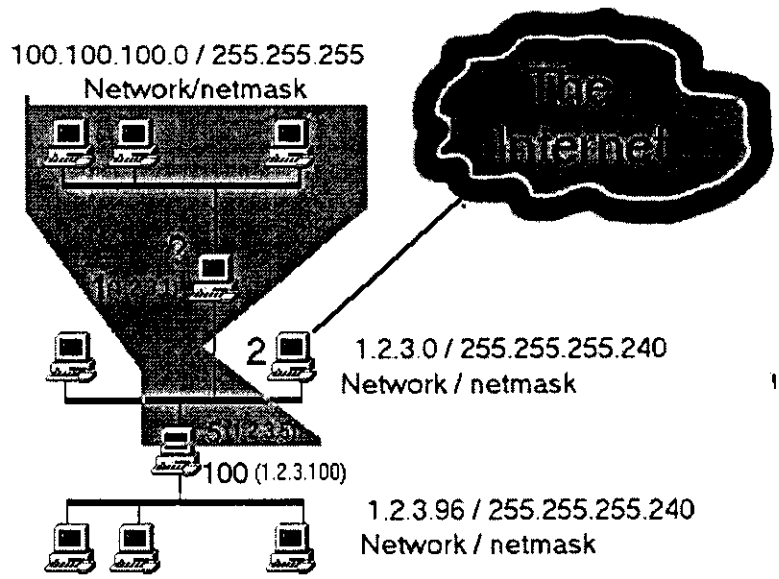
to map this :



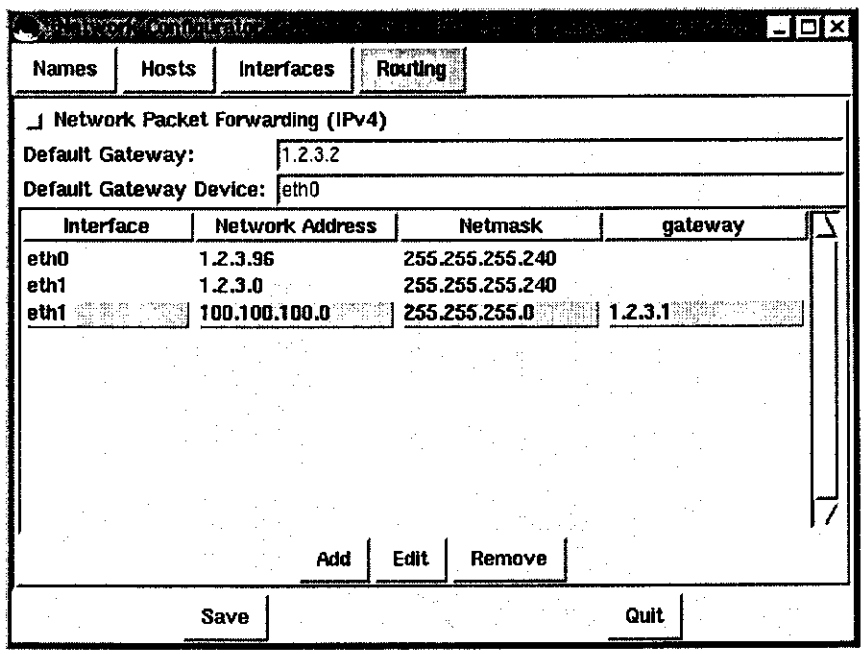
and this :



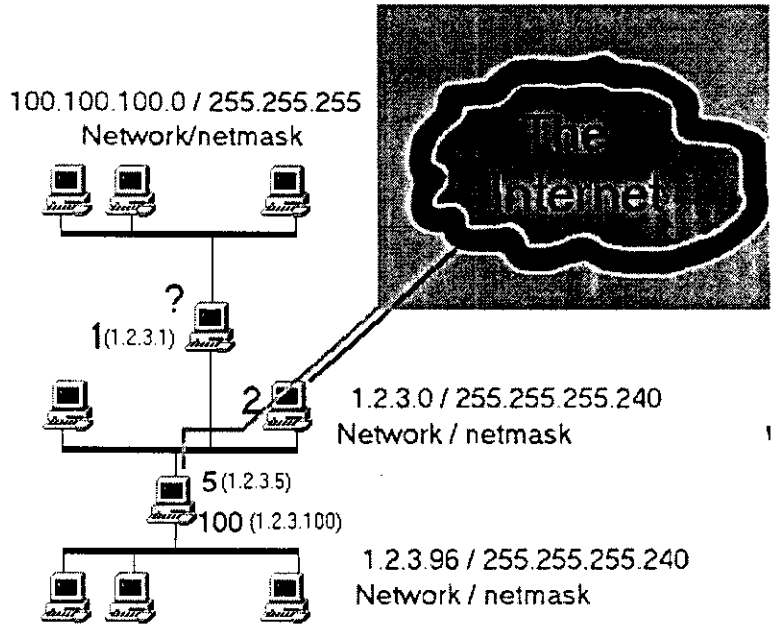
to map this :



The last option (default gateway) :



which maps this :


100.100.100.0 / 255.255.255
Network/netmask
The Internet
?
1(1.2.3.1)
2
1.2.3.0 / 255.255.255.240
Network / netmask
5(1.2.3.5)
100 (1.2.3.100)
1.2.3.96 / 255.255.255.240
Network / netmask