

# Lab 1: Installing the Fedora OS on a Virtual Machine

## Learning outcome

Upon successful completion of this lab, you will be able to

- Setup the VMware-workstation 8.0.0
- Setup the Fedora Core 11 (a Linux-based operating system) on VMWare
- Install and use the Midnight Commander (MC), an external tool to the Fedora.
- Install the Fedora Eclipse and use it to develop C/C++ programs in the Fedora

## Requirement

Capture all windows for showing that you installed successfully the Fedora, MC, Fedora Eclipse and two programs demonstrated in this tutorial to file (PDF format is recommended) and upload it to the CMS. You must give an explanation to the program 1 about processes.

## Content

- 1- What is a virtual machine and why it should be installed?
- 2- Steps to install the Fedora.
- 3- Install and use the Midnight Commander.
- 4- Install and use the Fedora Eclipse.

### **1- What is a virtual machine and why it should be installed?**

- Virtual machine is a software running in a specific computer that will simulate a physical computer.
- When a specific operating system(OS) is being used in a computer but the owner wants studying another OS, a virtual machine is needed to separate the current system with a new OS will be installed.

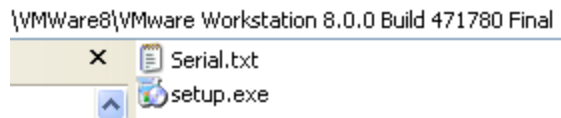
### **2- Steps to install the Fedora**

Suppose that your computer is running under the MS Windows OS. The following two steps help installing the Fedora:

- Step 1: Install the VM (VMware Workstation 8.0.0 is introduced, it is supplied)
- Step 2: Install a new OS (Fedora 11 is introduced, it is supplied)

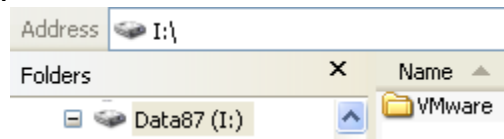
#### **2.1- Install the VMware Workstation 8.0.0**

- *Installing software*



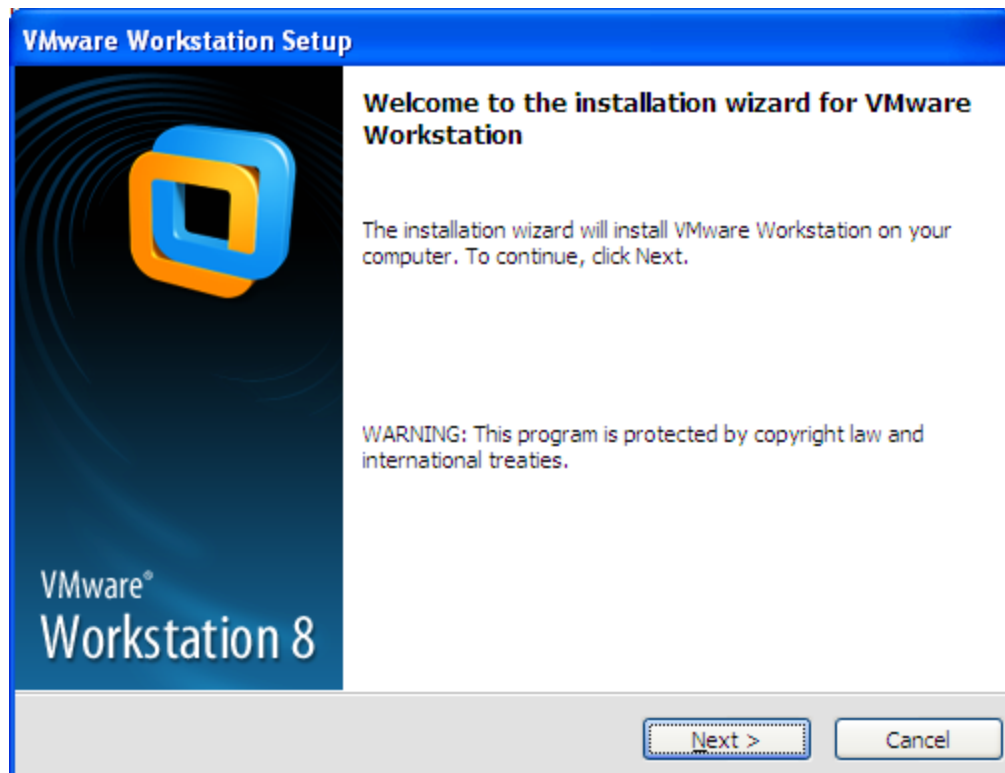
- **Preparation**

VMware must be installed to a sub-directory of a root directory. You can install it to the Program Files folder or another such as:

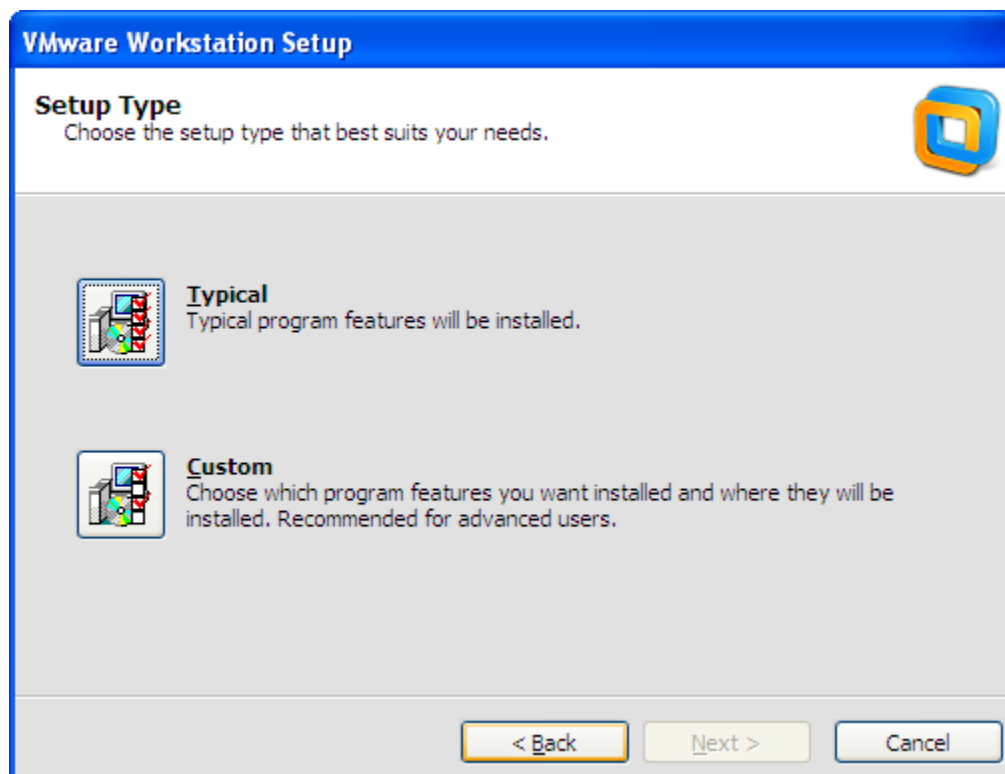


- **Run the setup.exe and give it parameters**

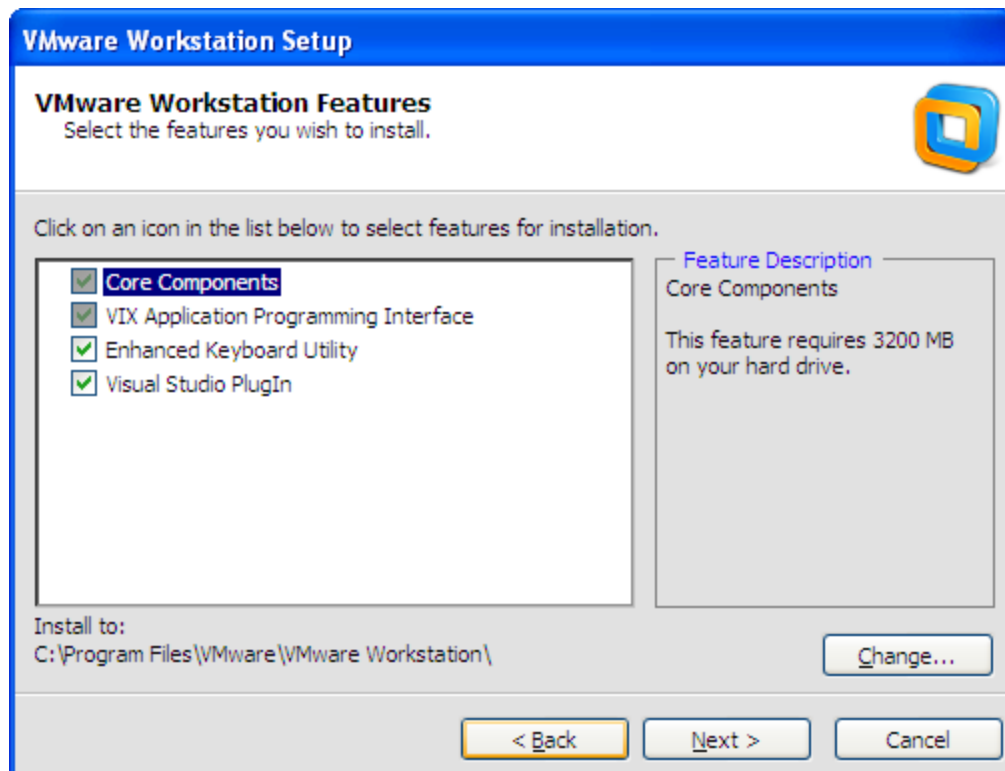




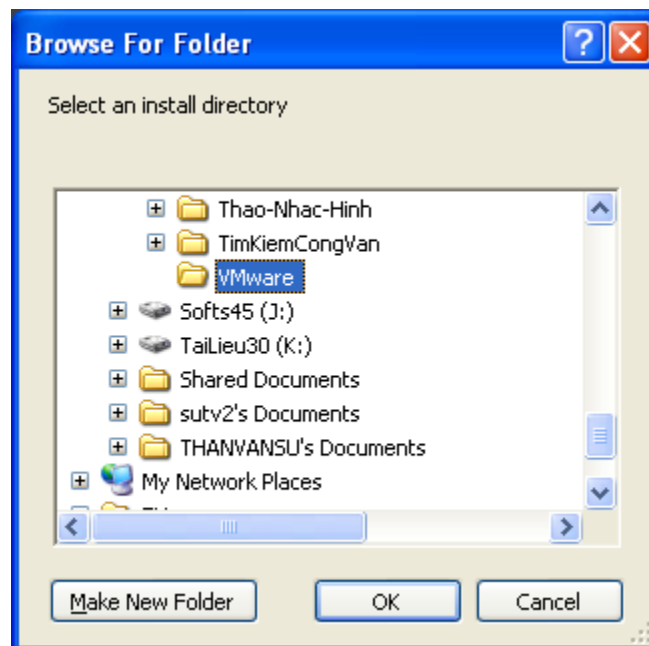
Click the **Next** button.



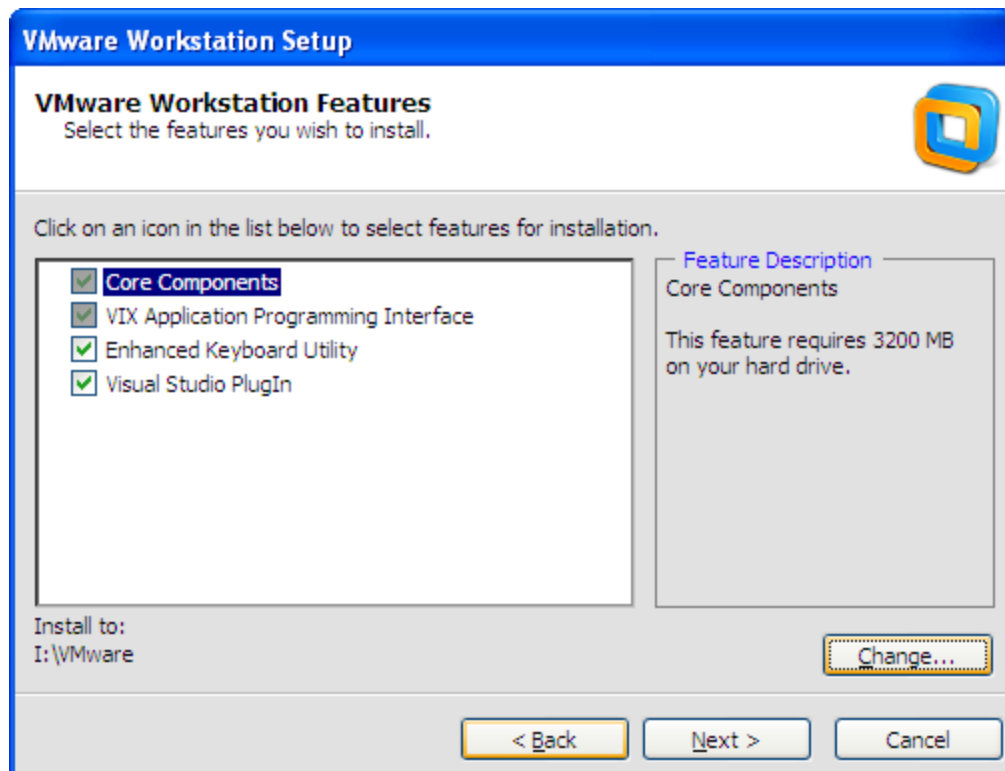
Click the **Custom** choice.



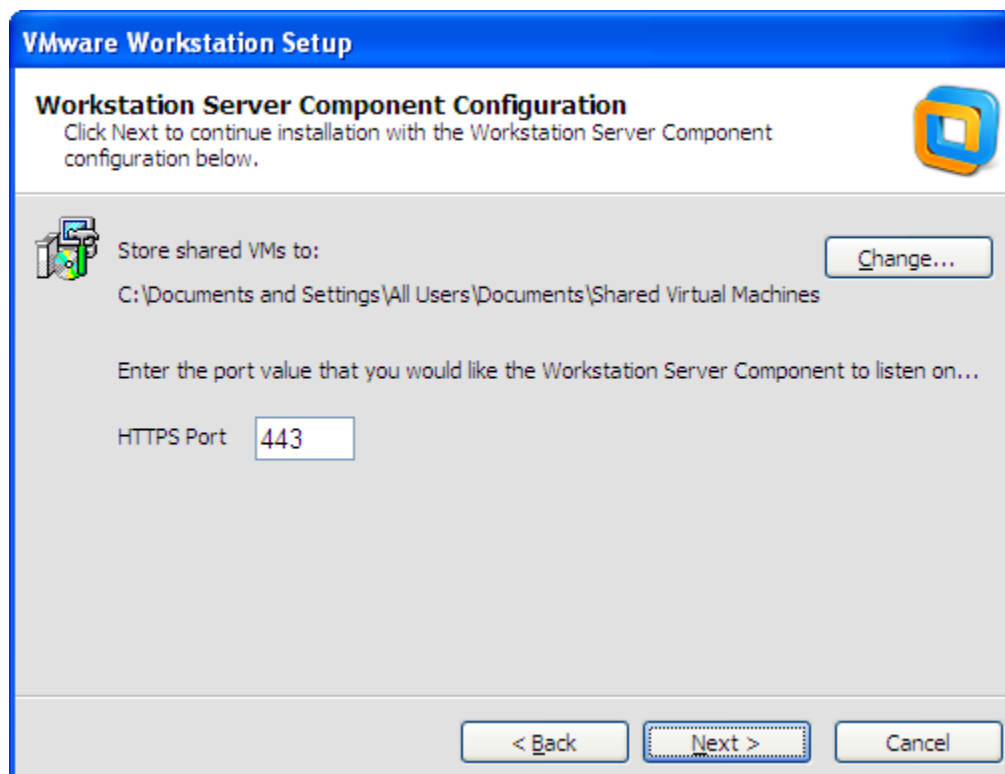
Tick to the **Enhanced Keyboard Utility**, then click the **Change** button to specify the install folder if you want.



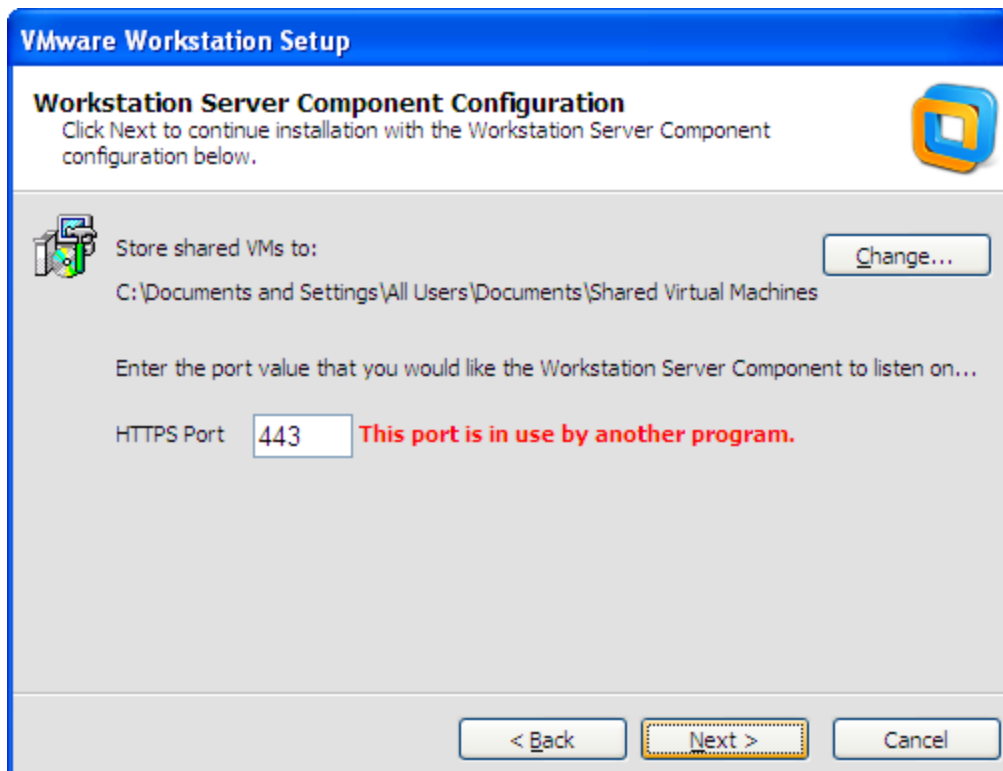
Click the **OK** button



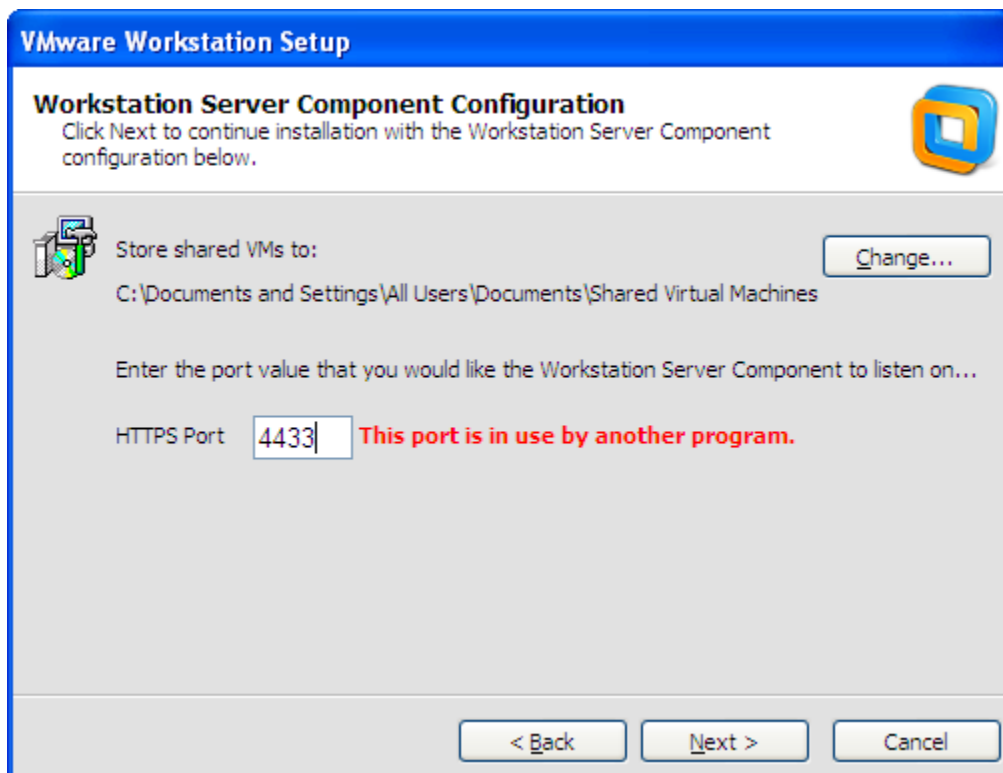
Click the **Next** button



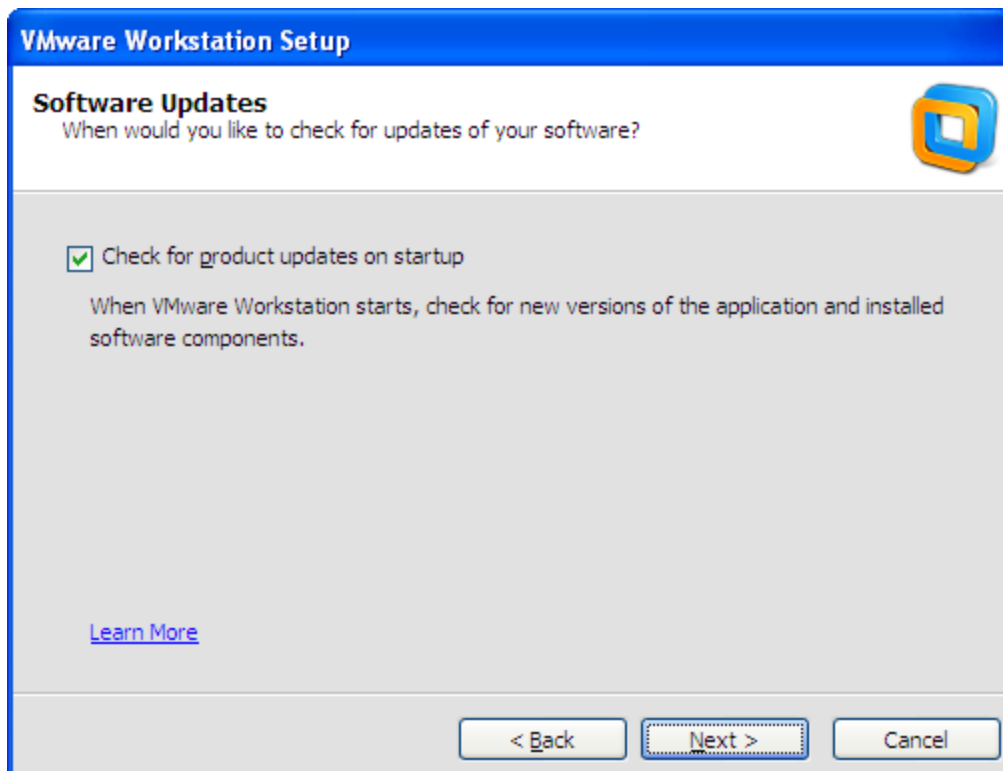
Click the **Next** button



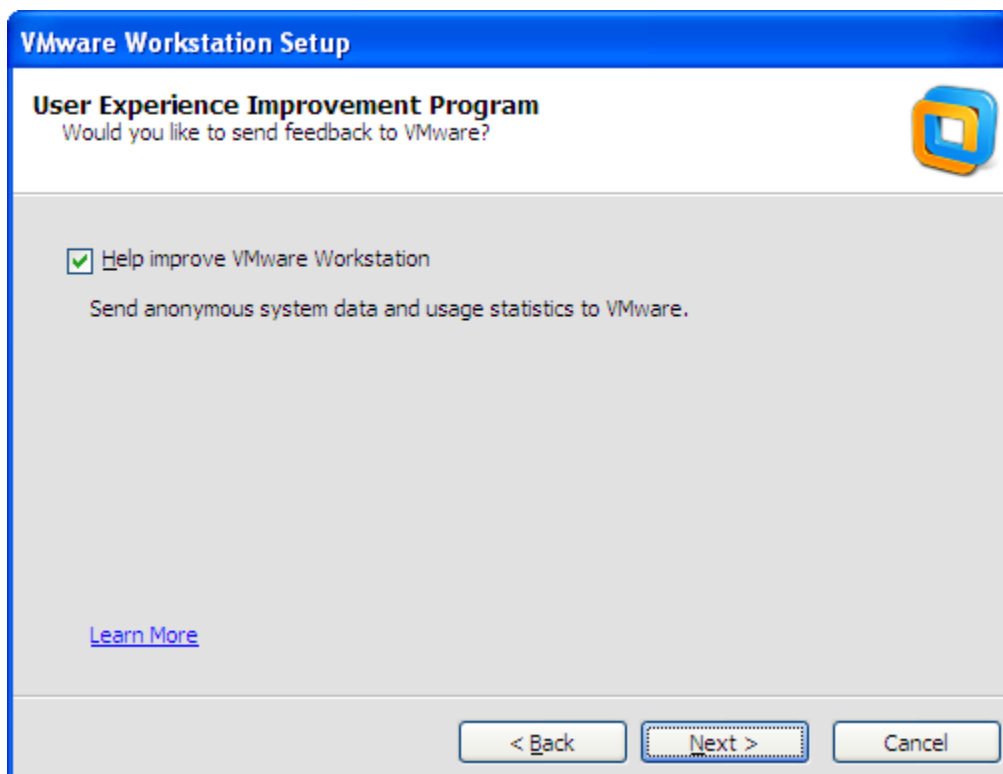
You may receive a message about a portal conflict happen.  
Give another port number such as:



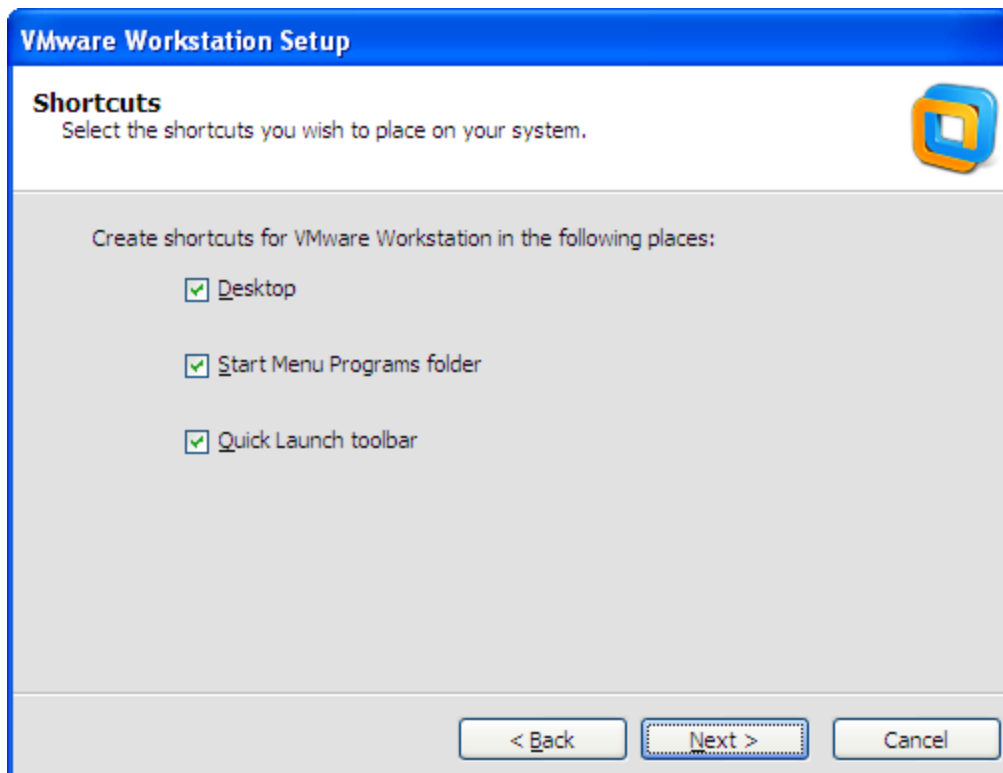
Click the **Next** button



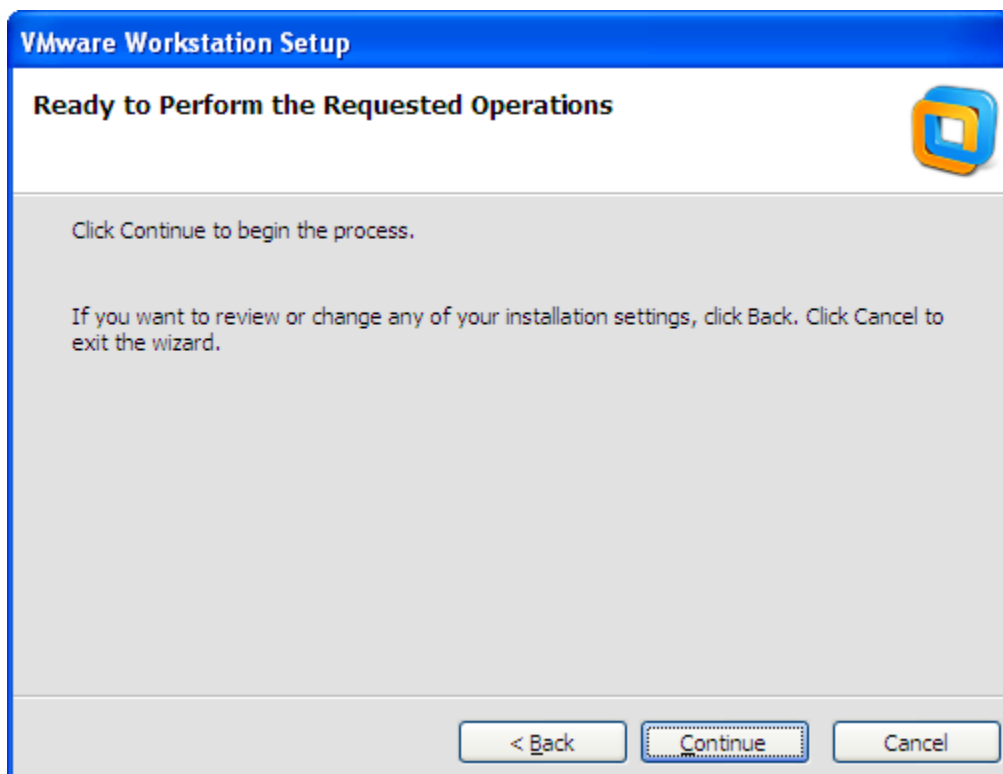
Click the **Next** button



Click the **Next** button

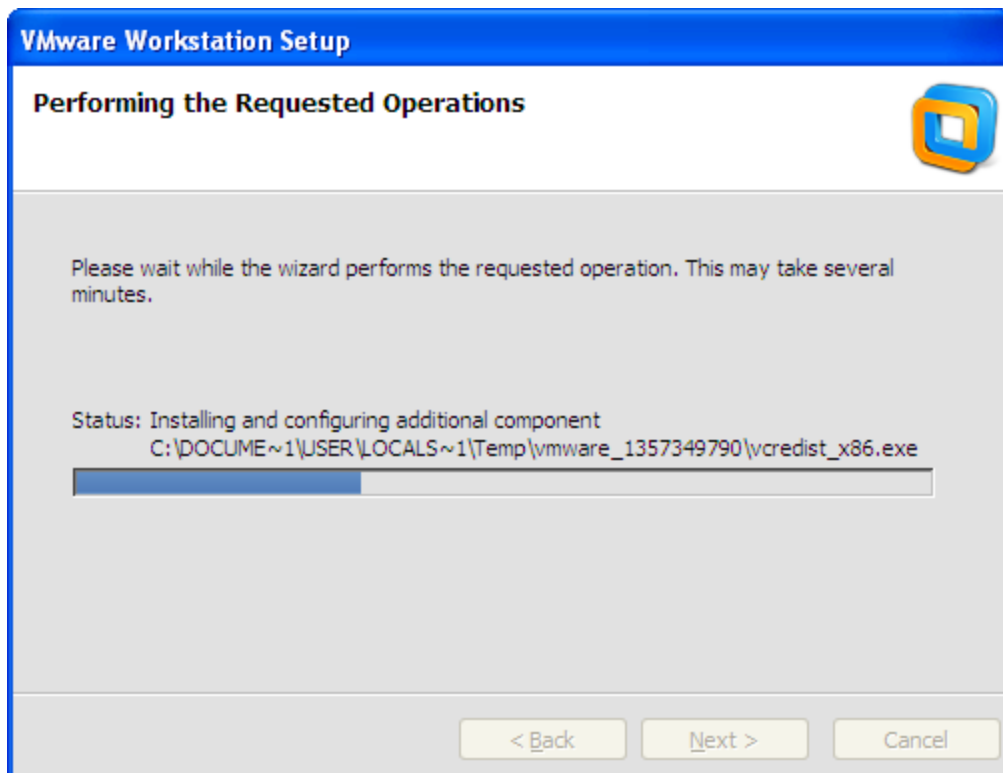


Click the **Next** button

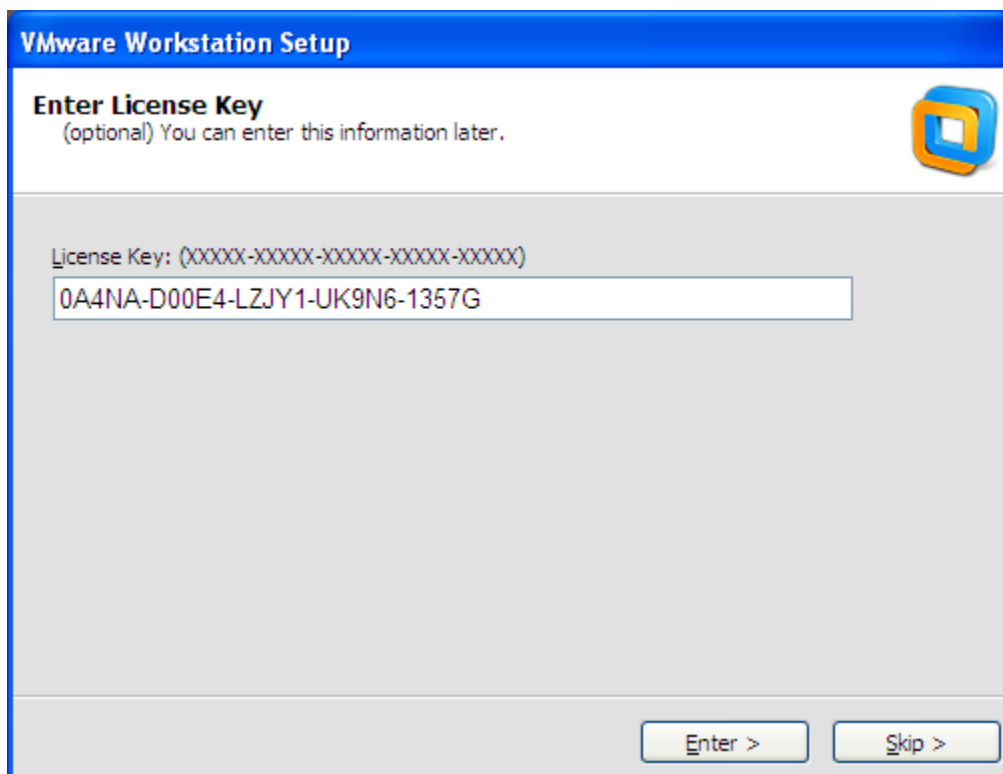


Click the **Continue** button

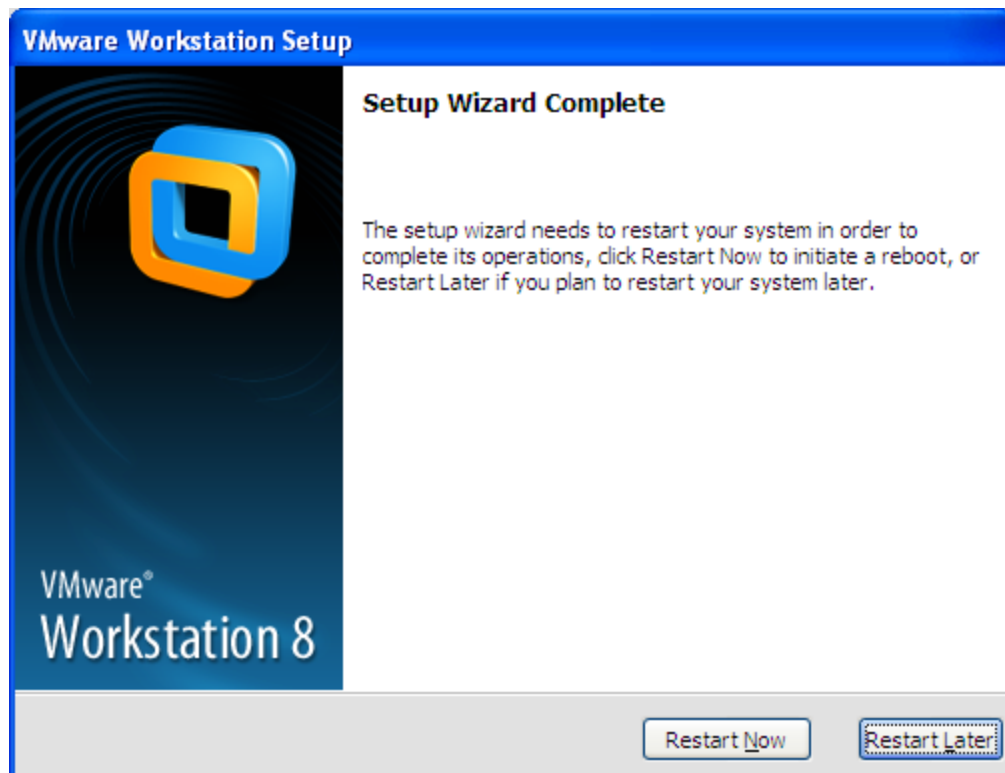




Wait the setup process executing.



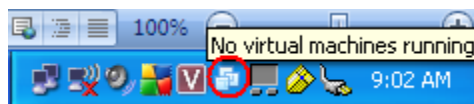
Enter the key (supplied) than click the **Enter** button



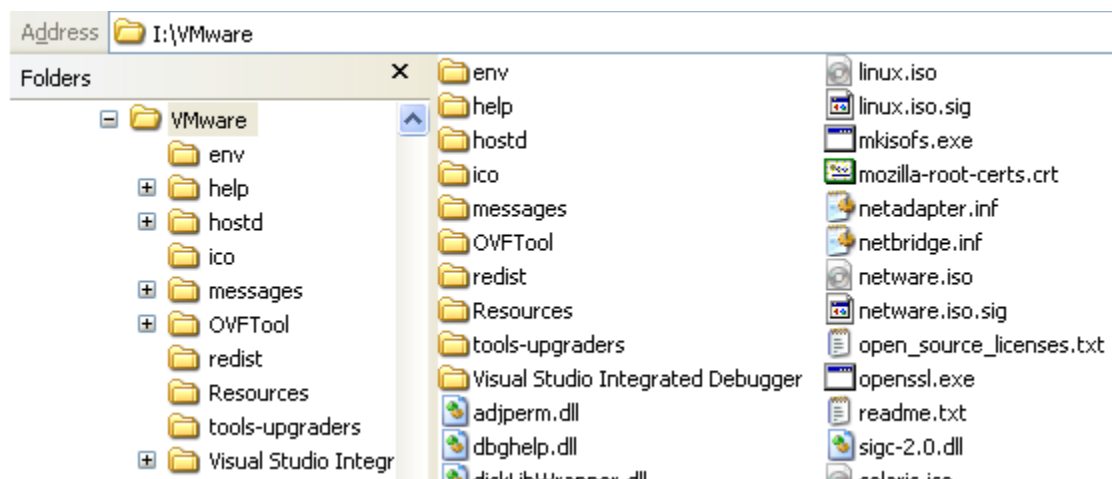
Click the **Restart Now** button to terminate the setup process.

**After restarting the computer:**


*On the Taskbar:*



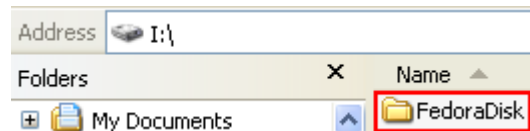
*You can see what are installed in the installing folder?*



## 2.2- Setup the Fedora 11 on the VMware

- **Setup DVD (supplied):**  Fedora-11-i386-DVD.iso 3,597,490 KB Image Files

- **Preparation:** A folder that will store all needed file of the Fedora on a disk that remains greater than 10 GB empty space, such as:



- **Start-up the VM to install the Fedora**

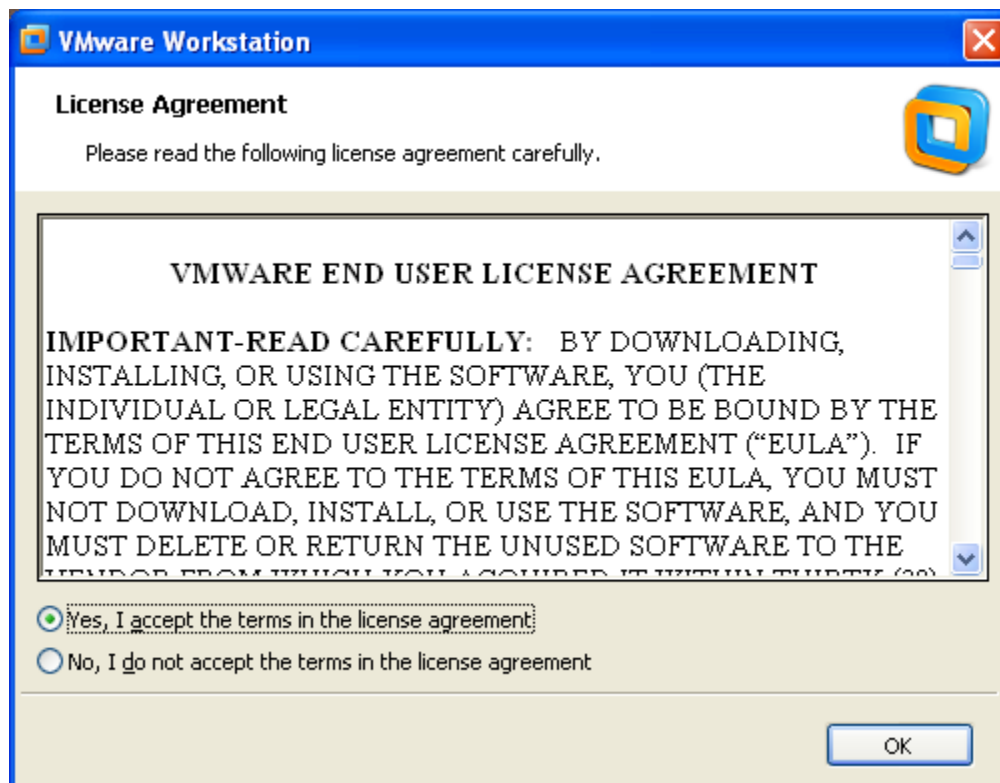


Click the icon on the desktop :

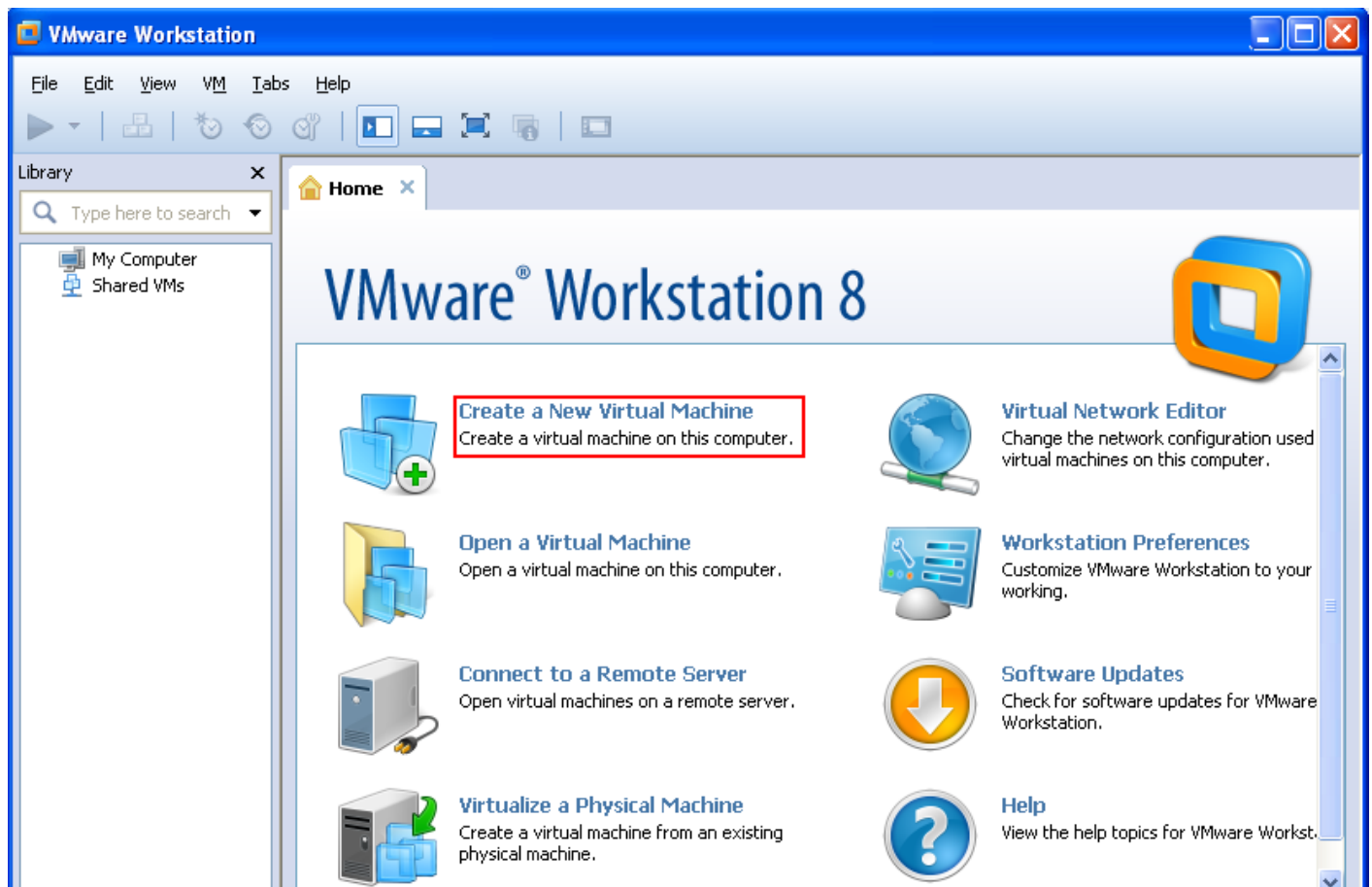


Or

from the menu **Start/All Programs/VMware**



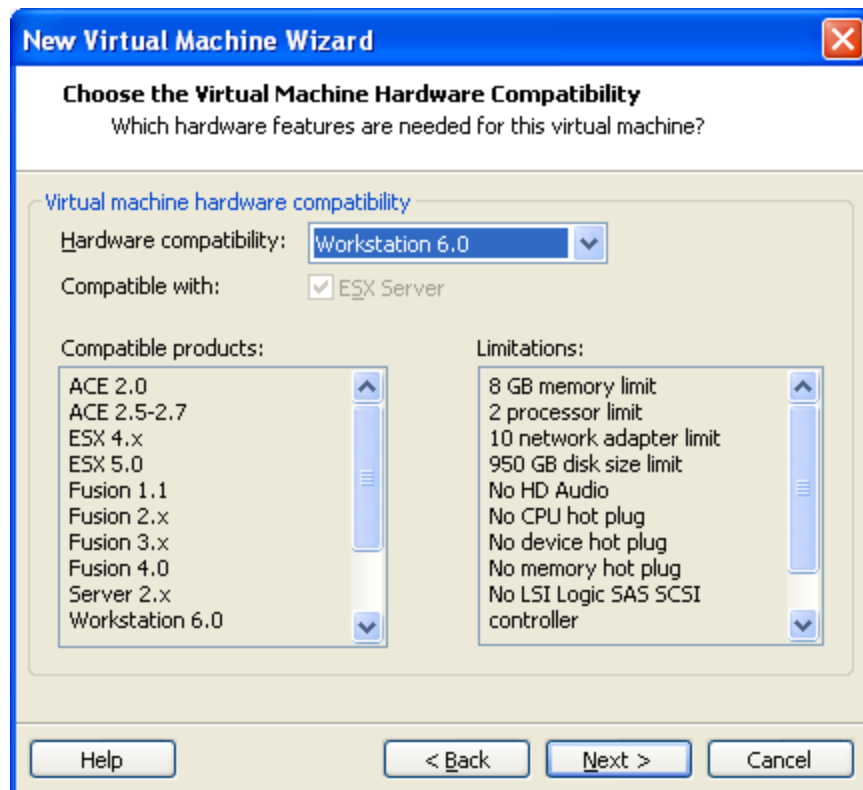
Tick to the **Yes** option then click the **OK** button



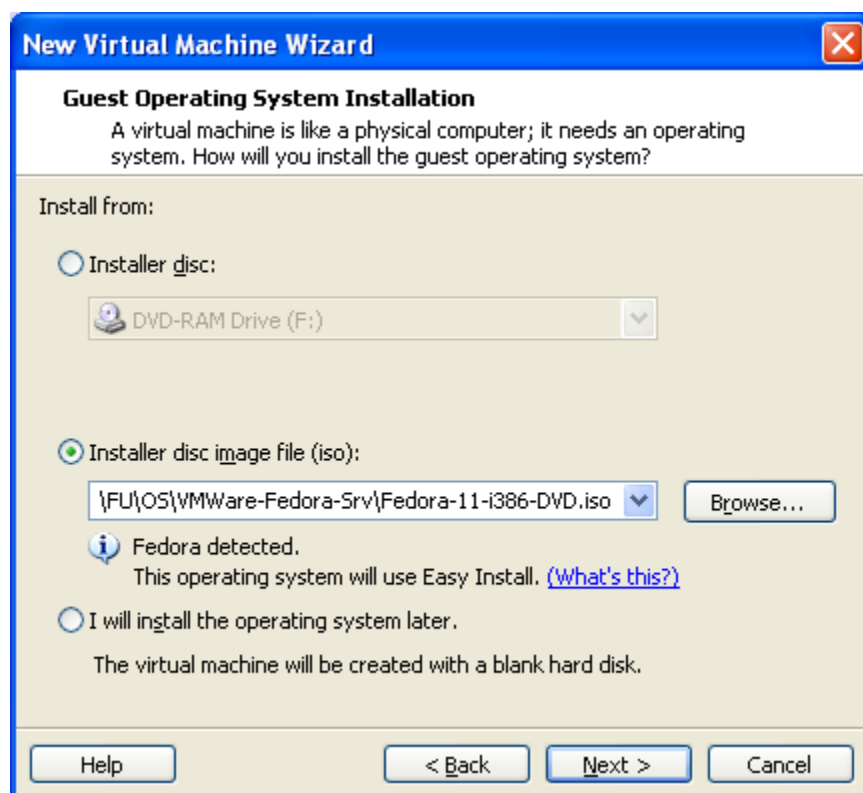
Click the link **Create a New Virtual Machine**



Tick to the **Custom** option then click the **Next** button



You should choose the **Workstation 6.0** option to limit resources.  
See limits on tables then click the **Next** button



Tick to the **Installer disc image** file option then click the **Browse** button to specify the supplied an iso file, then click the **Next** button.



**New Virtual Machine Wizard**

**Easy Install Information**  
This is used to install Fedora.


Personalize Linux

Full name:

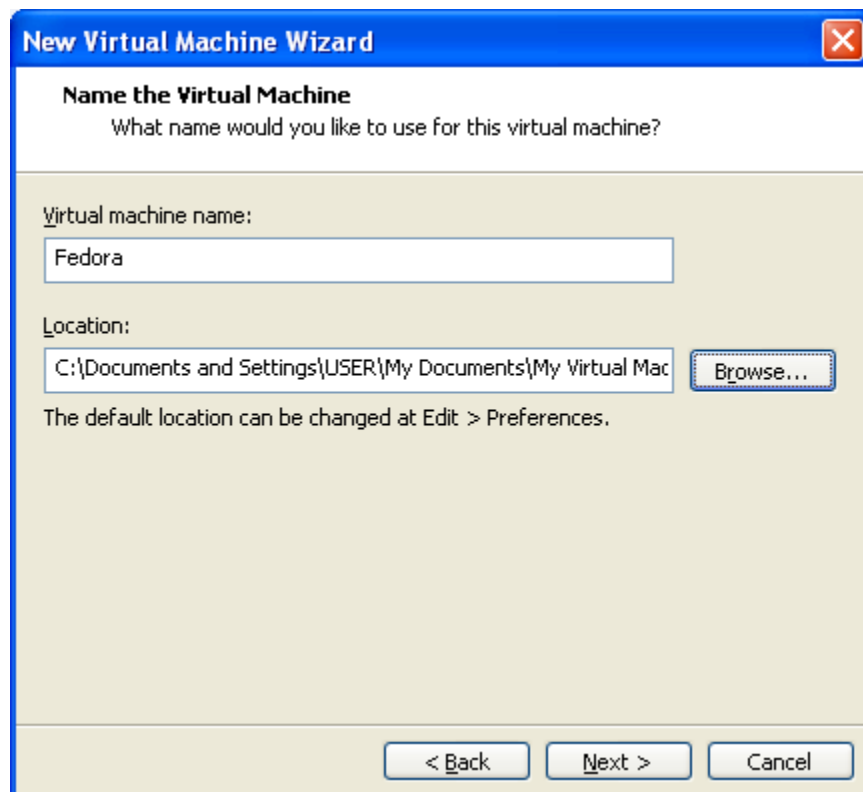
User name:

Password:

Confirm:

 This password is for both user and root accounts.

Fill personal details then click the **Next** button



**New Virtual Machine Wizard**

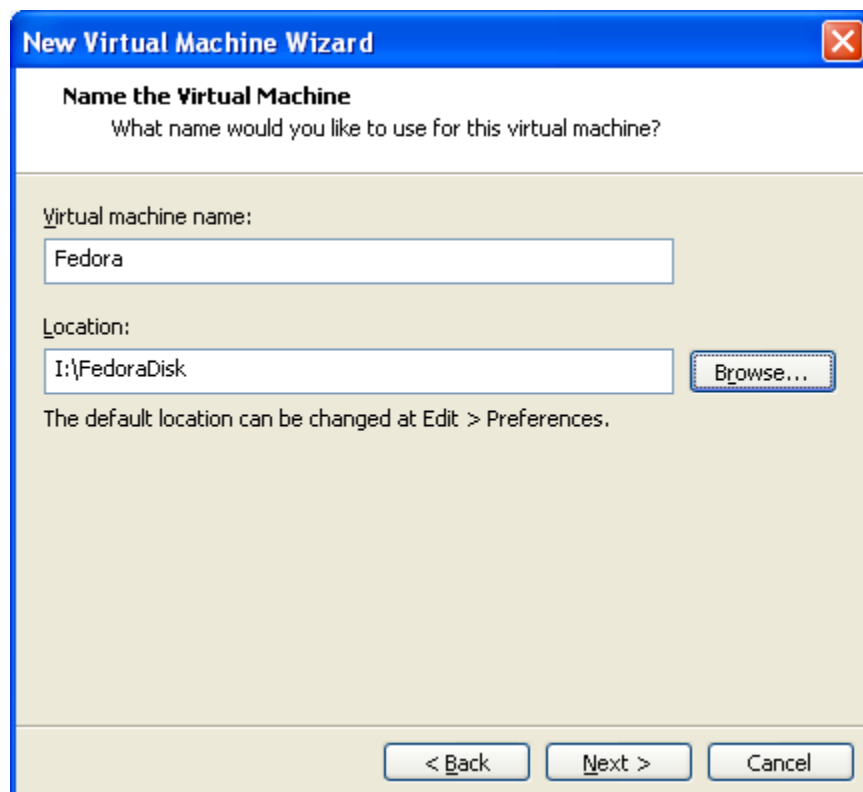
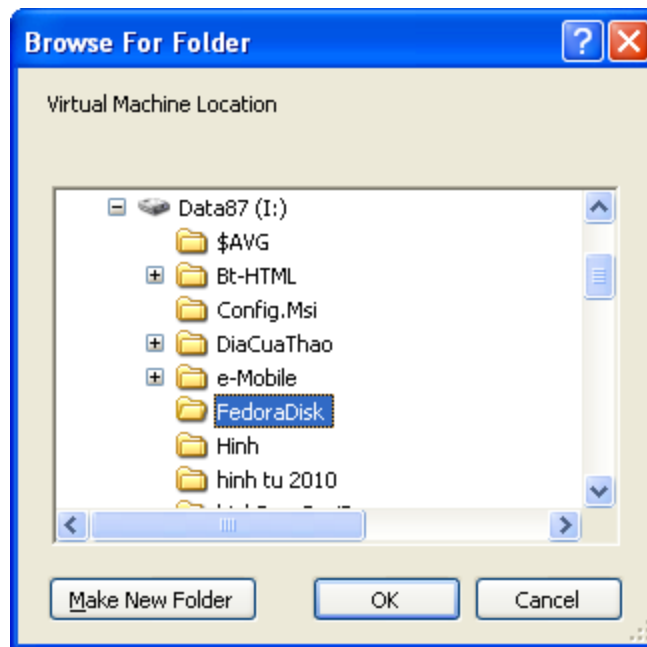
**Name the Virtual Machine**  
What name would you like to use for this virtual machine?

Virtual machine name:

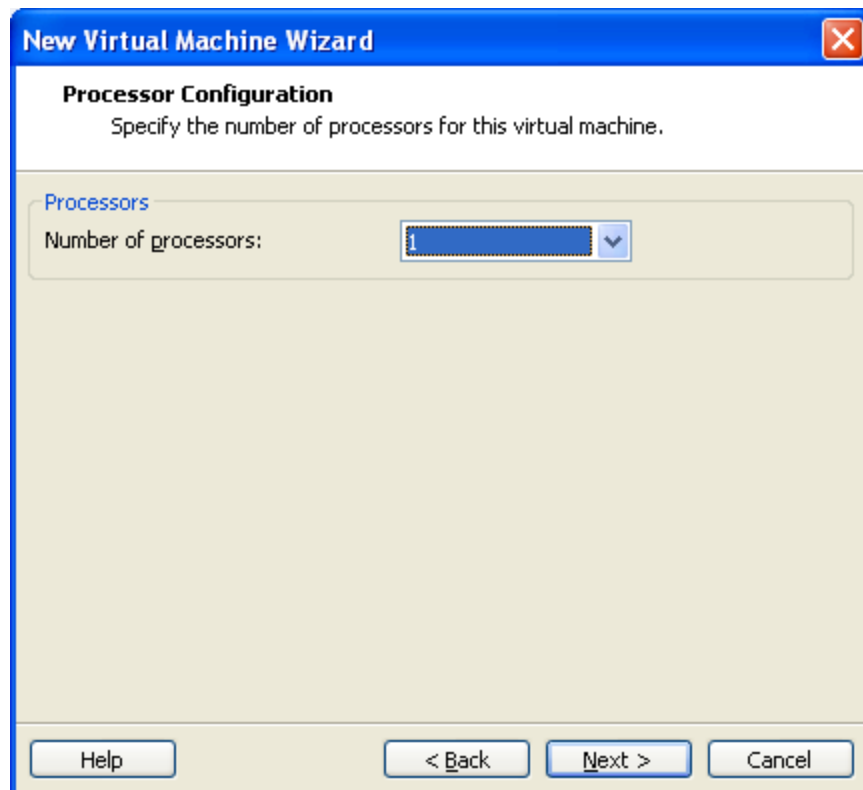
Location:

The default location can be changed at Edit > Preferences.

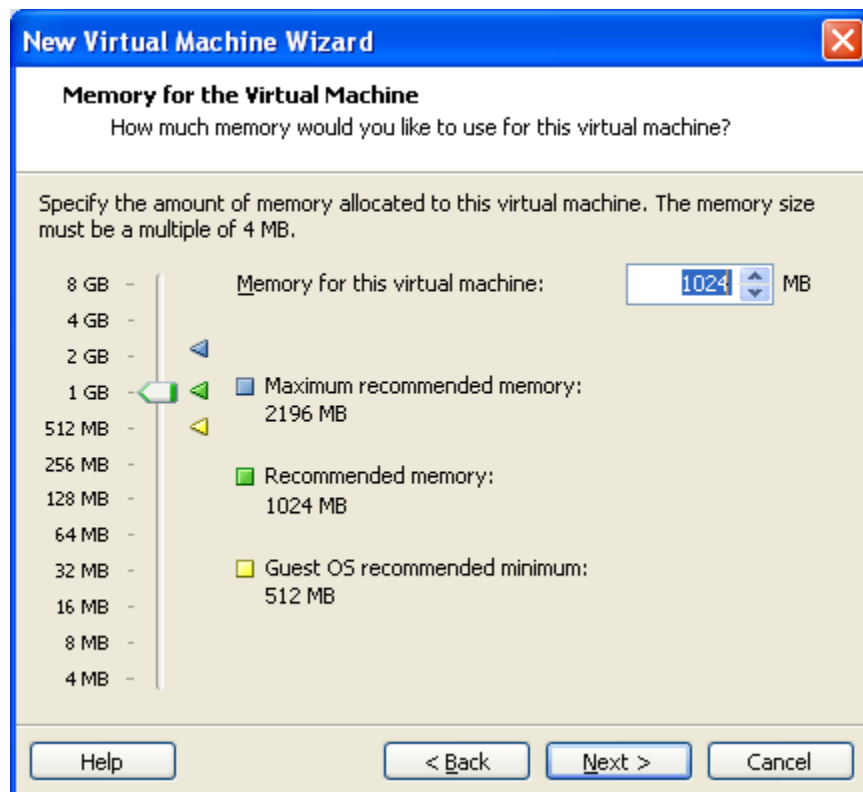
Click the **Browse** button to specify the prepared storing folder such as:



Give a name to the VM and specify the OS location then click the **Next** button.

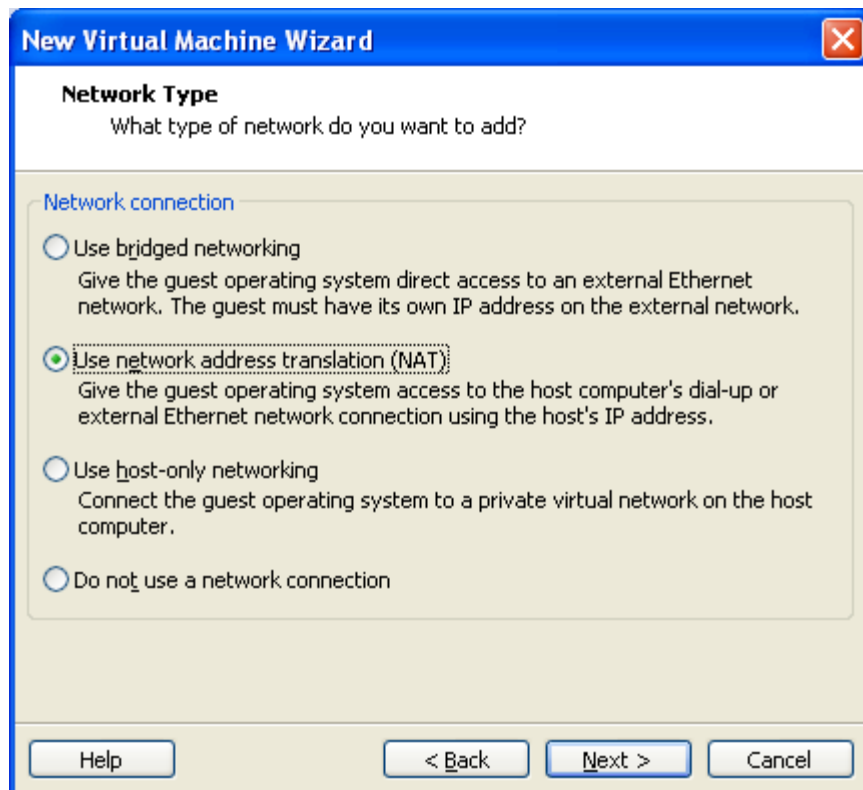


Specify number of CPUs then click the **Next** button

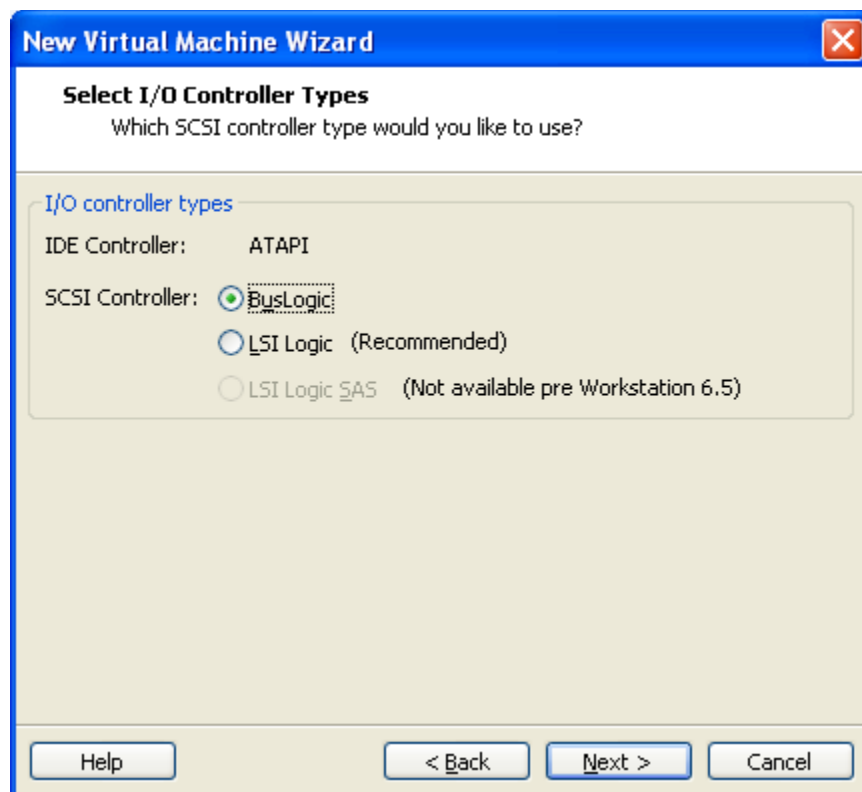


You can specify RAM capacity (minimum: 512MB, default: 1024 MB)  
then click the **Next** button

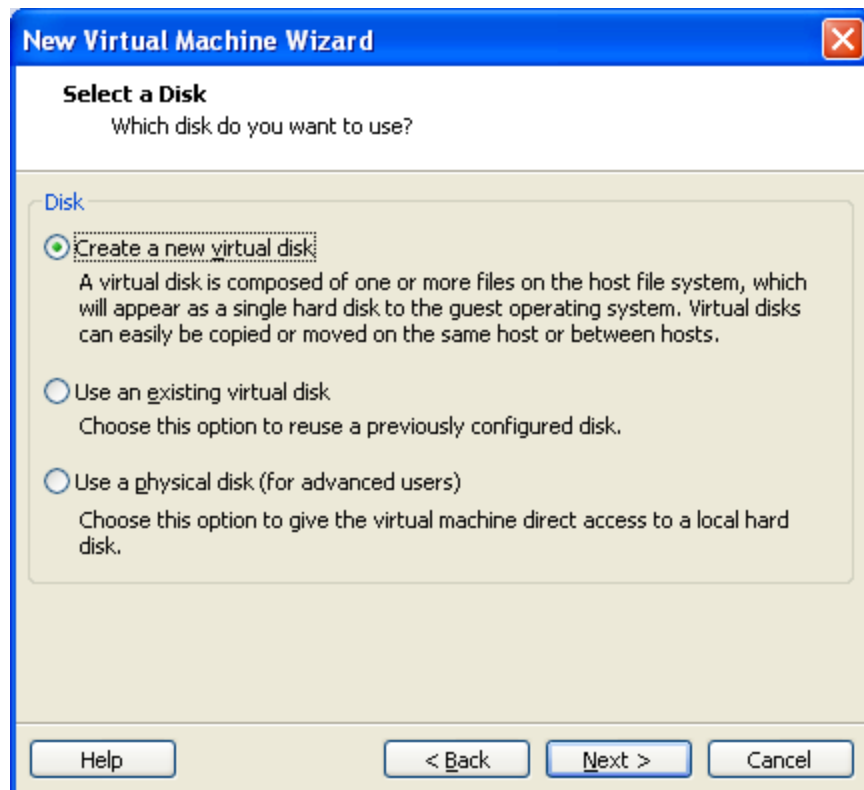




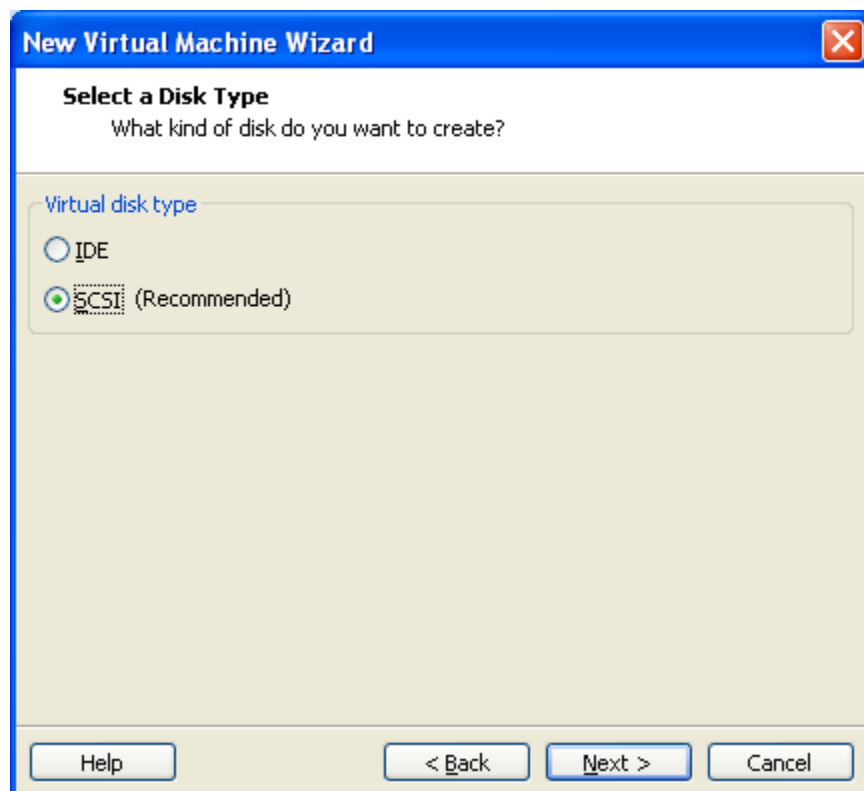
You should choose the **NAT** option for easy to connect to the internet without domain configuration then click the **Next** button



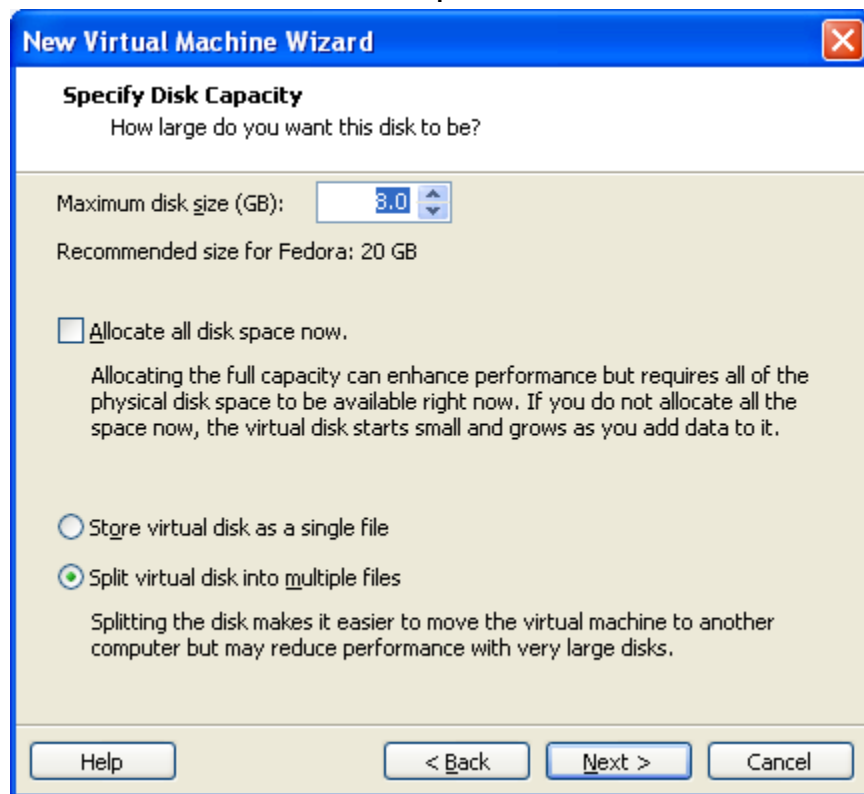
Specify a type of IO controller then click the **Next** button



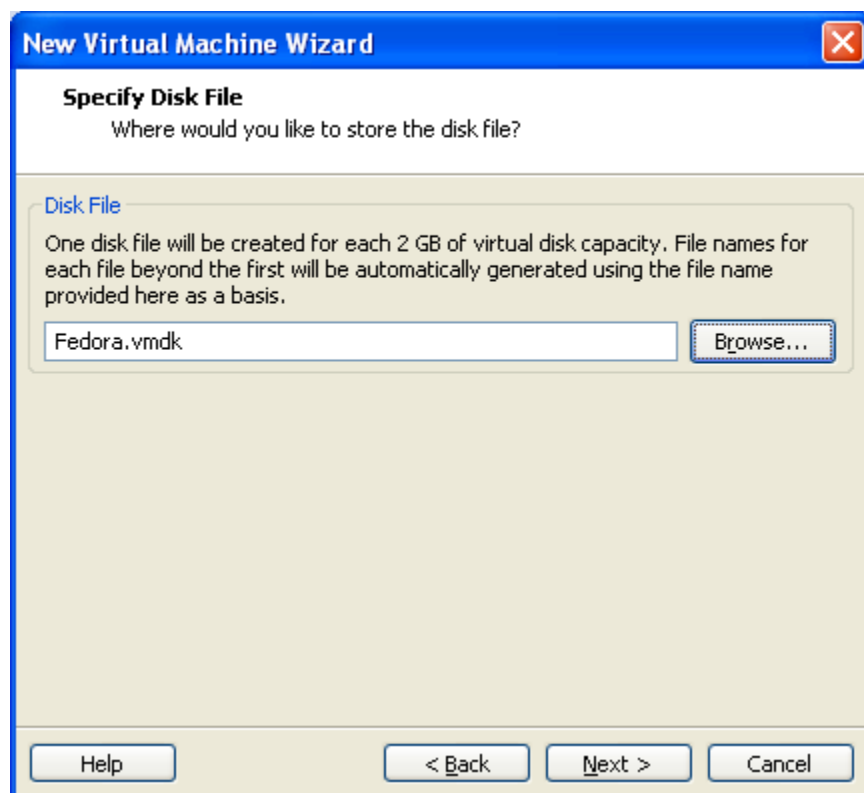
Tick to the **Create a new virtual disk** option then click the **Next** button.  
Don't worry about that. Virtual disk is a file only on the physical disk  
but it will be presented as a structure to users.  
So, your system is not be affected.



Choose a type of virtual disk then click the **Next** button.



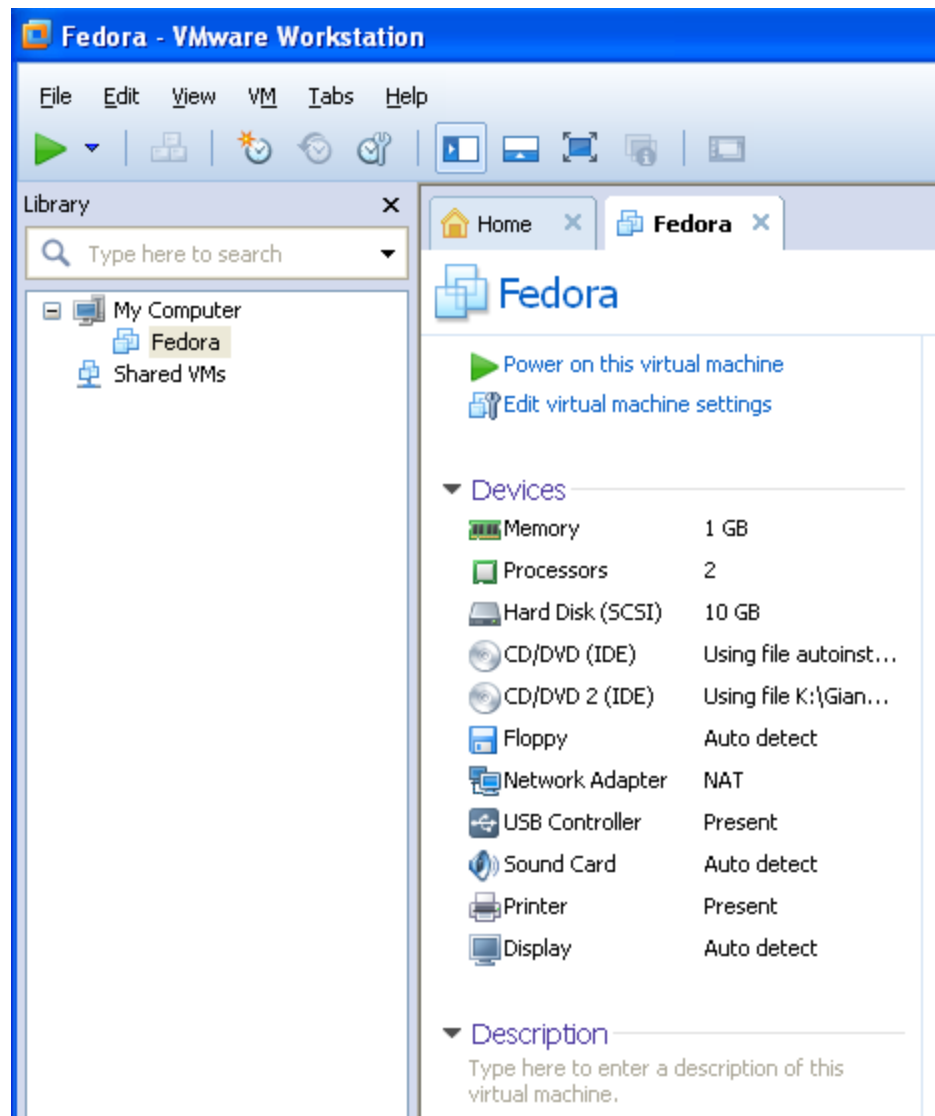
Specify the maximum disk size (multiple of 2GB).  
The **Split virtual disk into multiple files** option should be selected.  
Click the **Next** button..



Specify the basic name for the virtual disk then click the **Next** button.

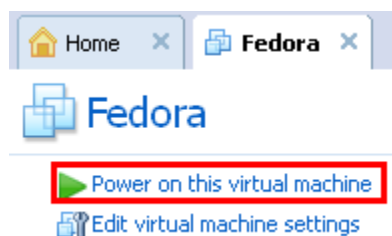


If you choose the **Power on this virtual machine after creation** then click the **Finish** button:  
The virtual machine will be created and it starts immediately and then the Fedora will be installed.  
Else, if you do not choose the option and click the **Finish** button only, you must power on the machine after it is created (this tutorial used this way)..

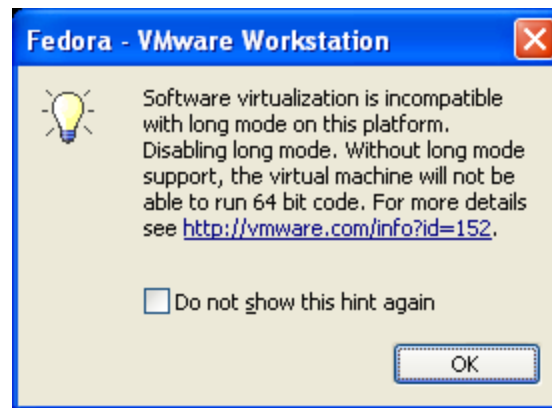


The virtual machine data are presented in VMware

Click the link **Power on this virtual machine**



You may receive the following message because the Fedora 11 will run on the 32-bit CPU. Click the **OK** button.

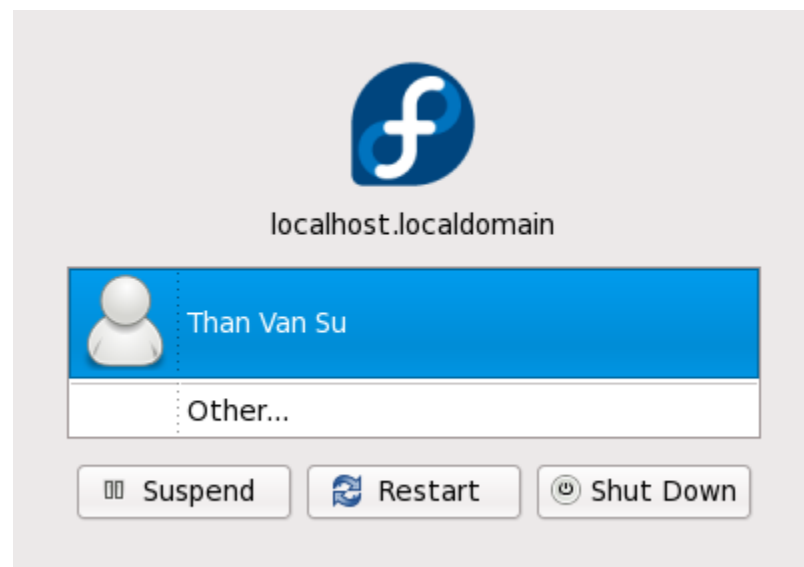


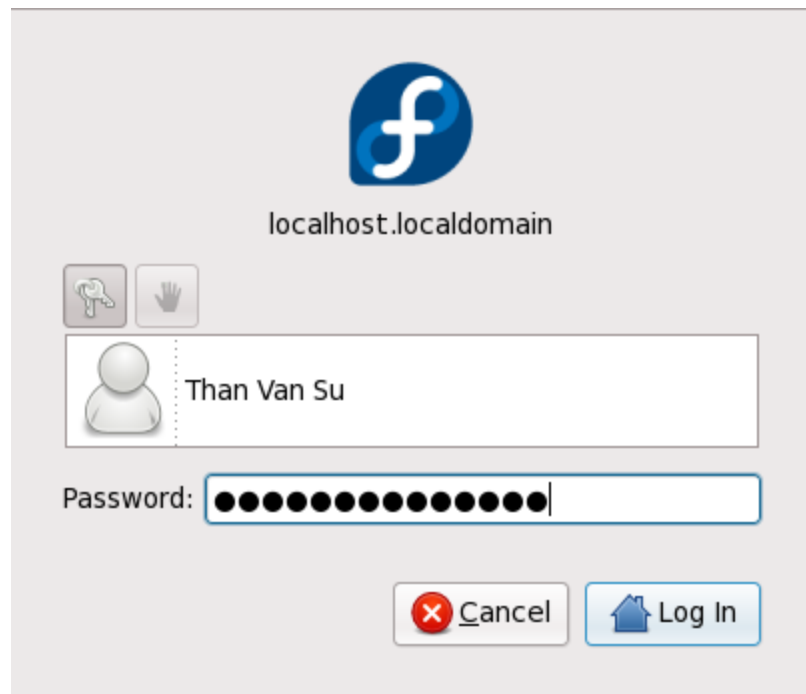
VMware is loading the Fedora installing program

Be patient! About 2 hours for setting up the Fedora

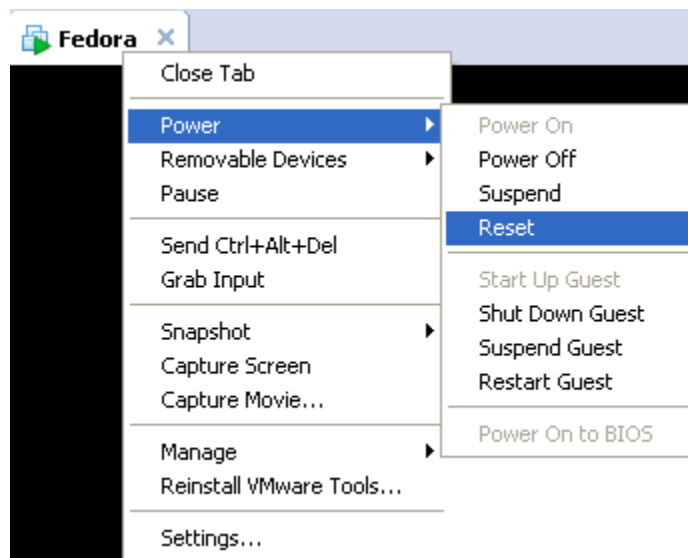
After the Fedora started up:

Login

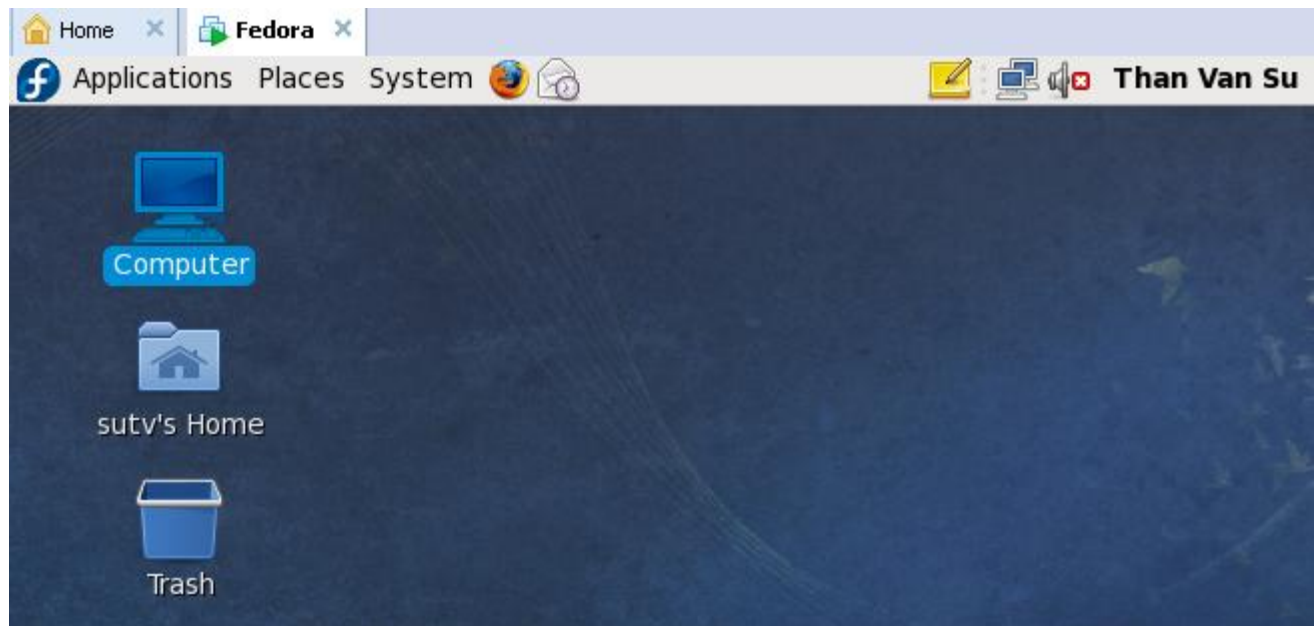




**Power on/off/ Shut down:**

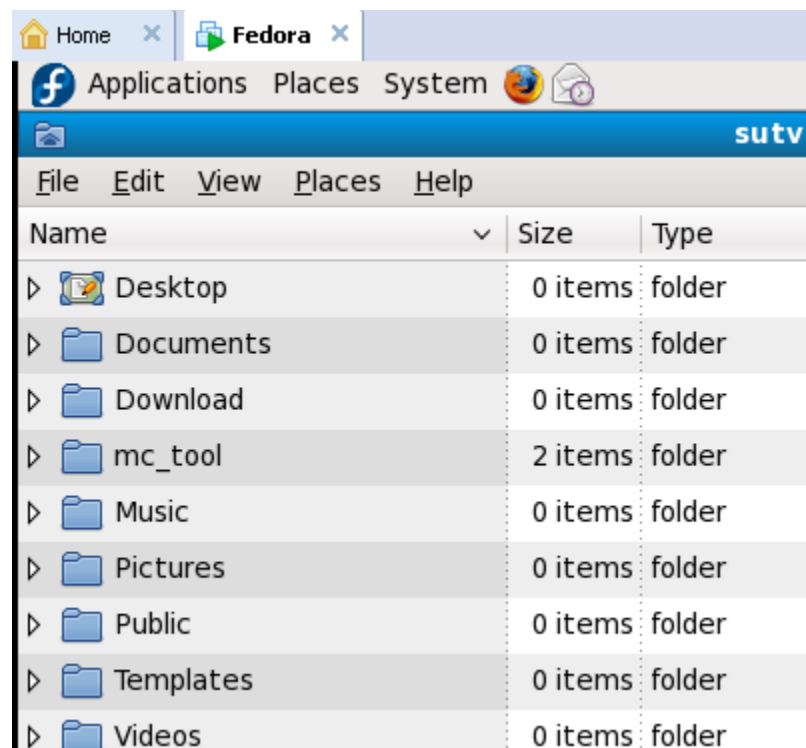
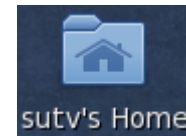


**Fedora GUI**



**Open the file system of the current user:**

Double click on the Home icon of the user on the desktop.



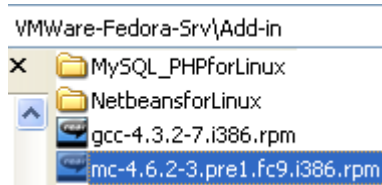
### **3- Install and use the Midnight Commander**



Midnight Commander (mc) makes utilities when users interact with the file system of the Fedora easily. It's user interface is similar with the Norton Commander interface in DOS. It covers almost all basic operations on the file system of the Fedora.

### **3.1- Install the Midnight Commander**

*Install package (supplied)*



*Steps of installation:*

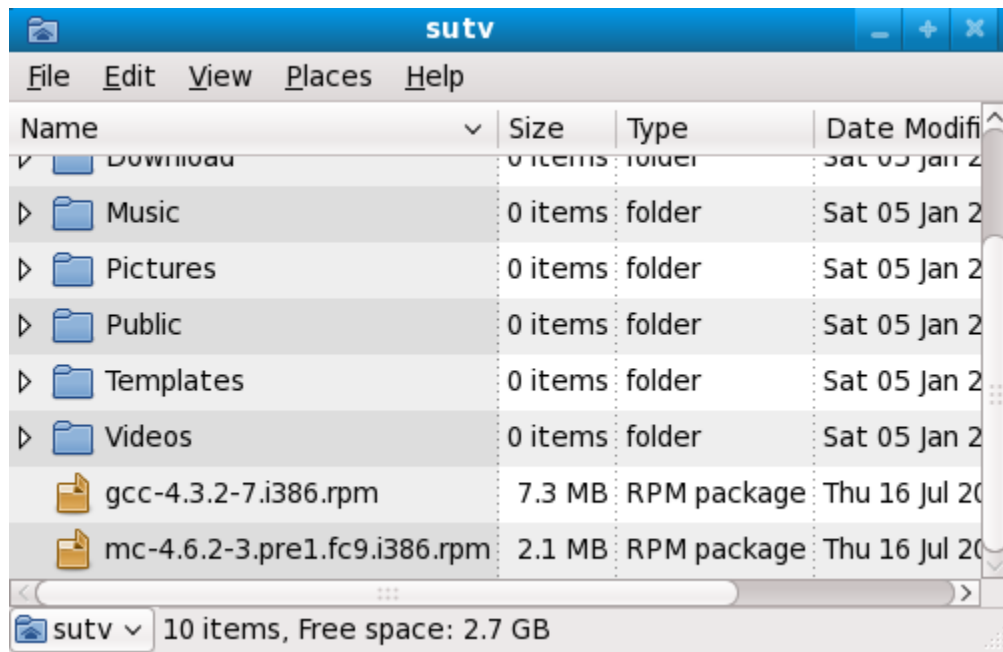
- 1- Copy the package to the user's directory
- 2- Install the package

#### **Step 1: Copy the package to the user's directory**

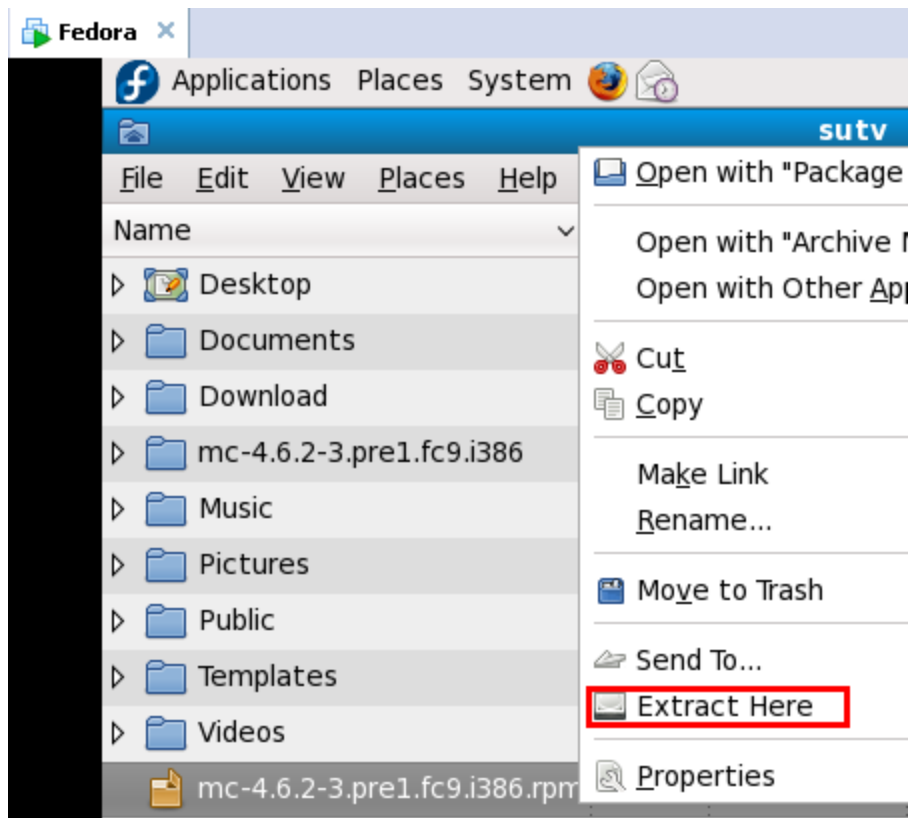
Step 1.1: Insert the DVD disk or the USB flash drive containing this package. The VM will recognize it automatically.

Step 1.2: Open the device, right click to the package, choose **Copy**

Step 1.3: Open the user directory, Paste it to the user's directory.



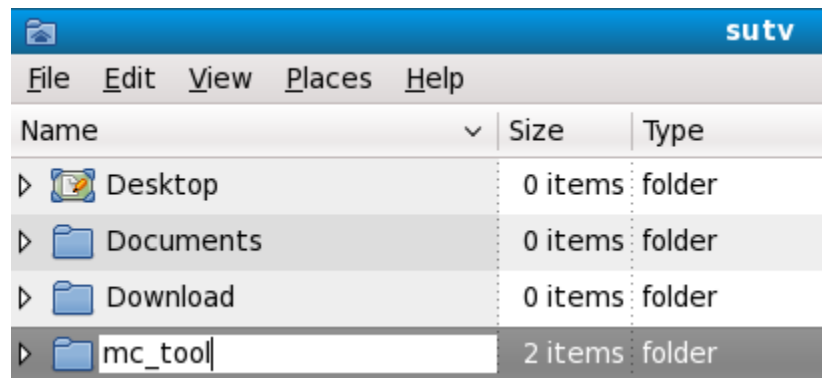
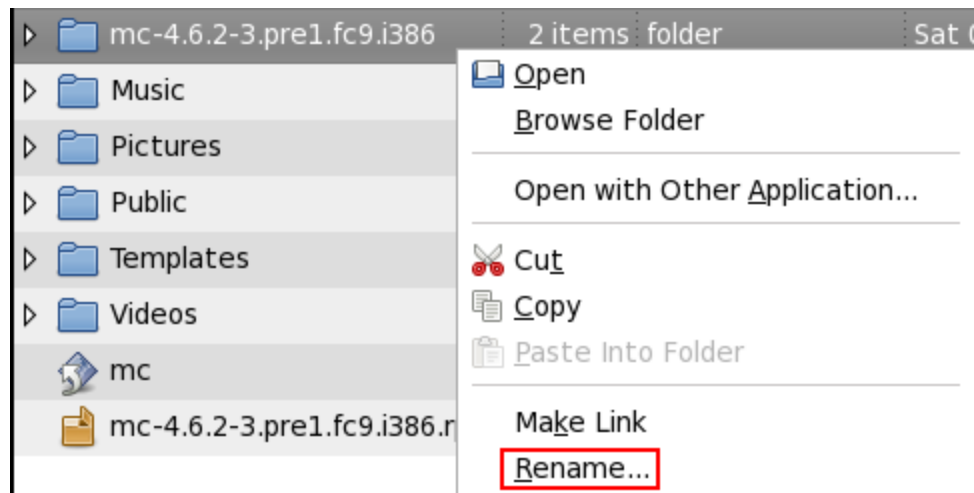
#### **Step 2: Install the Midnight Commander package**



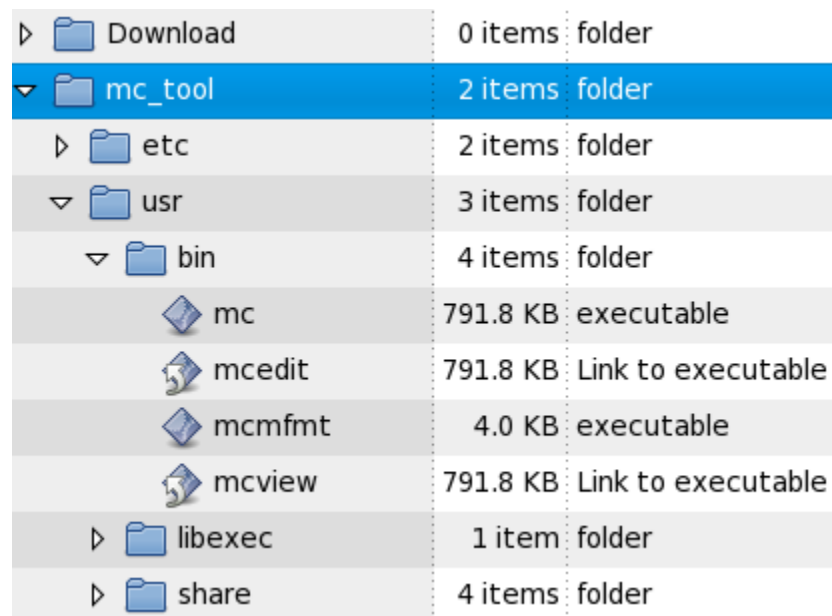
Result:

sutv			
File Edit View Places Help			
Name	Size	Type	
Desktop	0 items	folder	
Documents	0 items	folder	
Download	0 items	folder	
mc-4.6.2-3.pre1.fc9.i386	2 items	folder	
Music	0 items	folder	
Pictures	0 items	folder	
Public	0 items	folder	
Templates	0 items	folder	
Videos	0 items	folder	
mc-4.6.2-3.pre1.fc9.i386.rpm	2.1 MB	RPM package	

The directory name is so long. It should be renamed to a shorter one:



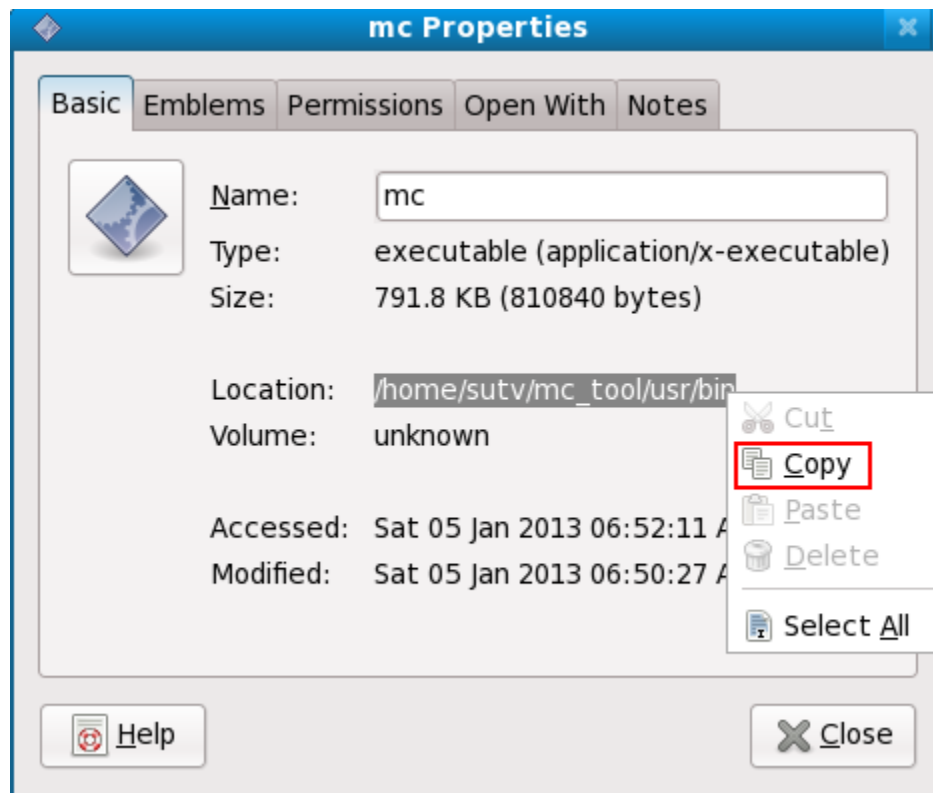
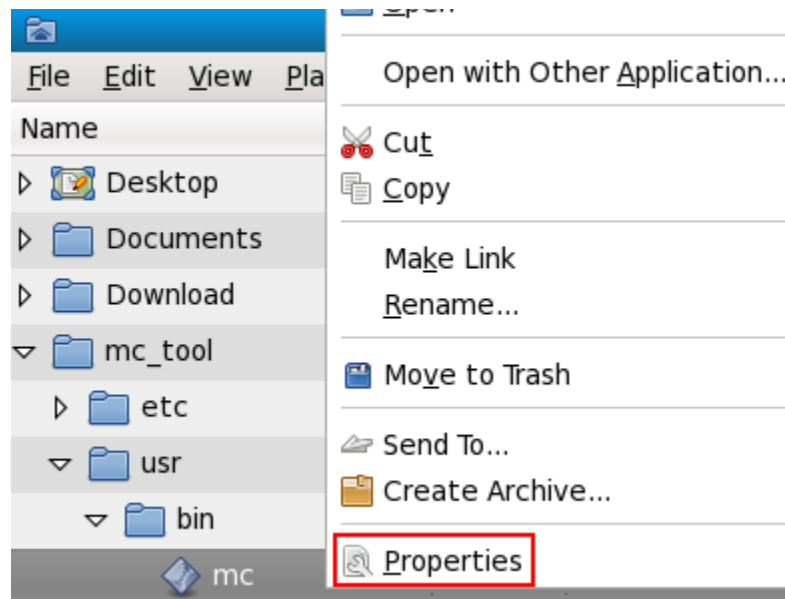
You can view the structure of the package in the user directory. Click to the triangle in front of each name.



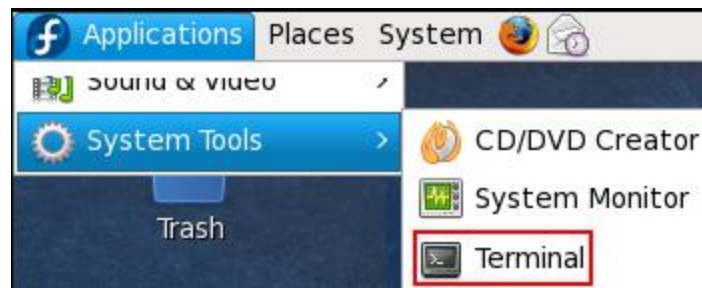
### **3.2- Use the Midnight Commander**

The executable file of the Midnight Commander has the name **mc**. It will run only in the console mode. So, you should run it in a terminal window using command prompt.

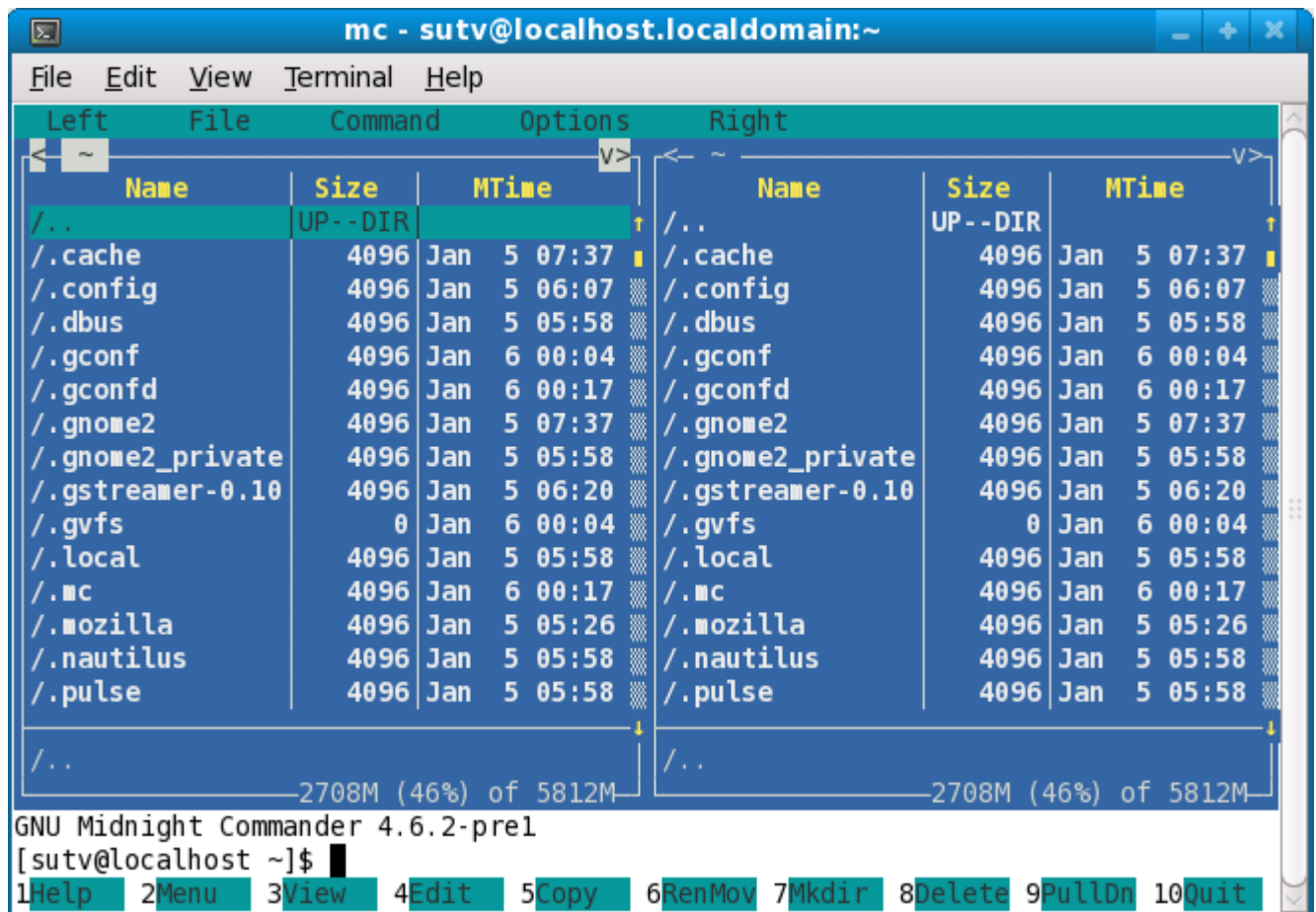
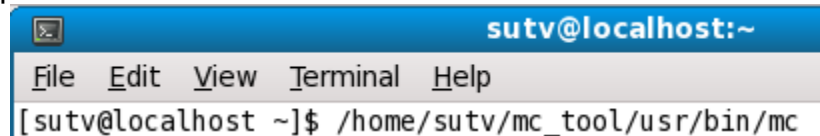
*Step 1: Get the path of the file*



*Step 2: Open the terminal window*



Paste the copied path to the terminal window then enter the command name: **mc**.



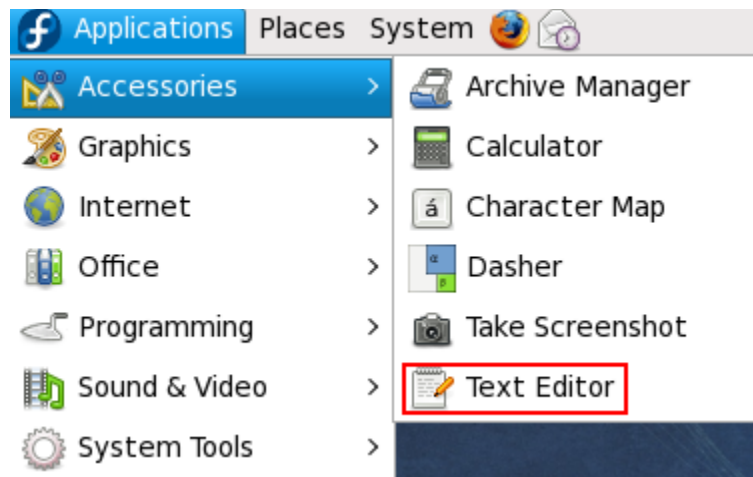
The user interface of the MC includes two panels (left and right).

- At a time, the highlight panel is the source panel and the other is the destination. Each panel is presenting the content of a directory.
- Users will use it's menu or hot keys they are introduced at the bottom of the interface such as: **5Copy** means that use the F5 key to copy a selected object (directory or file) from the source to the destination.
- Operations with hot keys F4, F7, F8 affect on the source directory (current panel) only.

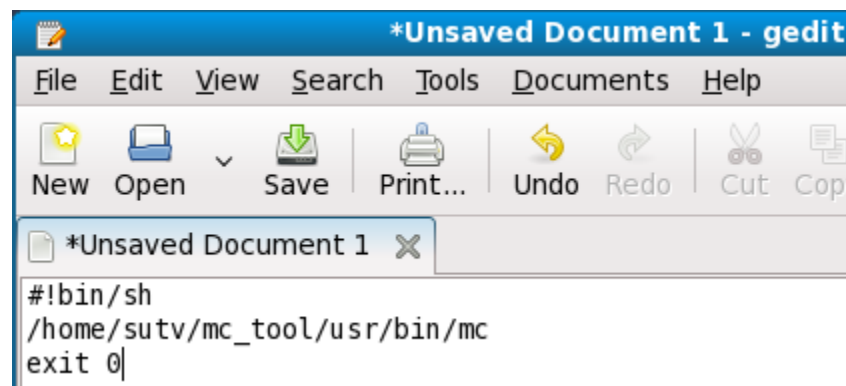
**Create your own script file to run the mc easily**

Linux supports **shell** script (**file.sh**) containing commands as **bat file** of DOS and Windows OS. Now, we want to create a script file to run **mc** more simply.

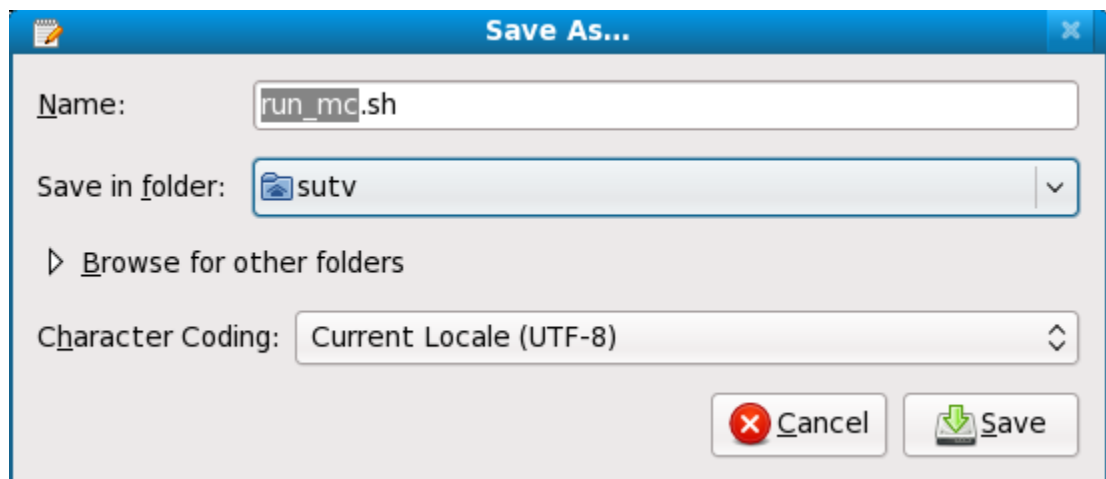
Step 1- Create the file **run\_mc.sh**, stored in the user's root directory using Text Editor



Enter the file content:



Click the **Save** button, give it a name



sutv			
File Edit View Places Help			
Name	Size	Type	
Desktop	0 items	folder	
Documents	0 items	folder	
Download	0 items	folder	
mc_tool	2 items	folder	
Music	0 items	folder	
Pictures	0 items	folder	
Public	0 items	folder	
Templates	0 items	folder	
Videos	0 items	folder	
mc	46 bytes	link (broken)	
mc-4.6.2-3.pre1.fc9.i386.rpm	2.1 MB	RPM package	
run_mc.sh	46 bytes	shell script	

Step 2- Run **run\_mc.sh** in the Terminal window:

```
sutv@localhost:~
File Edit View Terminal Help
[sutv@localhost ~]$ /bin/sh run_mc.sh
```

The program **sh** of the Linux will interpret the content of the script file then execute commands listed in this script file.

mc - sutv@localhost.localdomain:~											
File Edit View Terminal Help											
Left				File				Command			

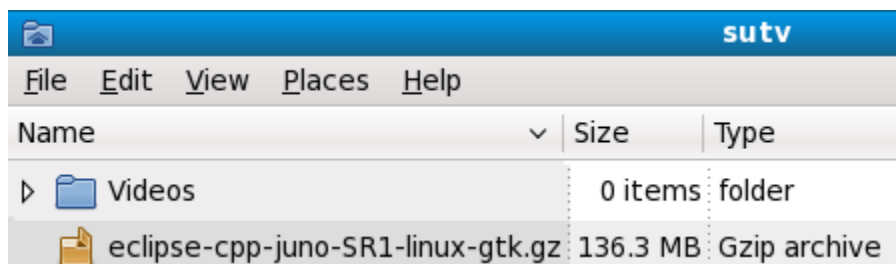
Two packages(32 bit and 64 bit):

```
FedoraEclipse-CC++  
eclipse-cpp-juno-SR1-linux-gtk.gz  
eclipse-cpp-juno-SR1-linux-gtk-x86_64.tar.gz
```

#### **4.1- Install the Fedora Eclipse**

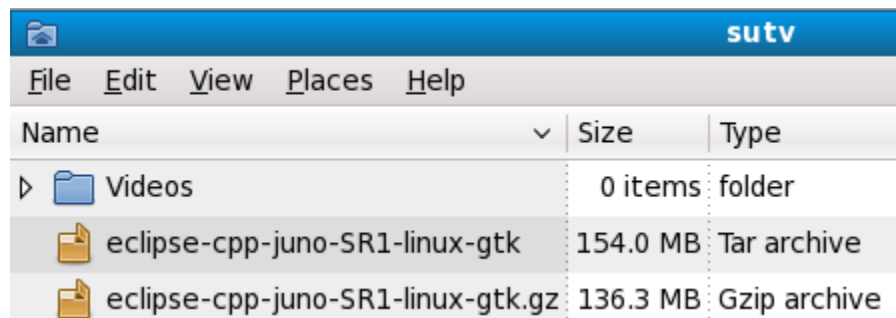
Do the same as done for the Midnight Commander

*Step 1: Copy the package **eclipse-cpp-juno-SR1-linux-ght.gz** ( 32 bit) to user's directory using USB.*



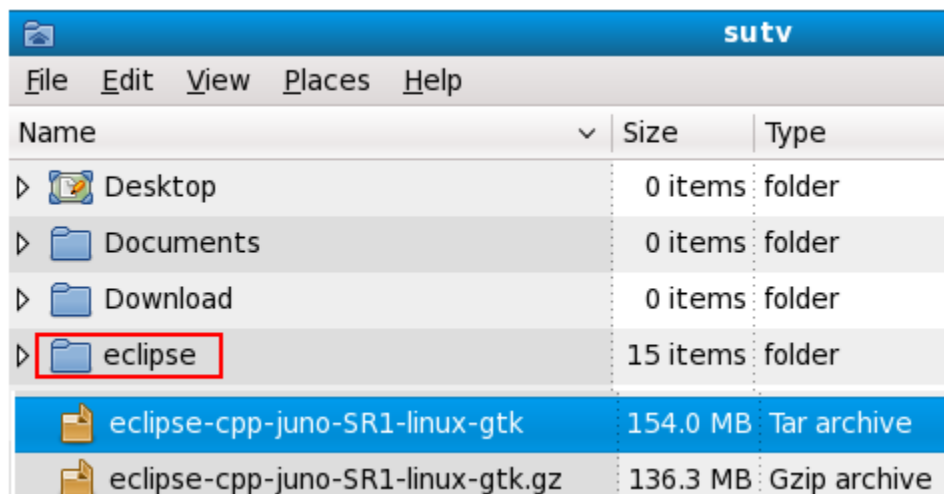
Name	Size	Type
Videos	0 items	folder
eclipse-cpp-juno-SR1-linux-gtk.gz	136.3 MB	Gzip archive

*Step 2: Extract this package*



Name	Size	Type
Videos	0 items	folder
eclipse-cpp-juno-SR1-linux-gtk	154.0 MB	Tar archive
eclipse-cpp-juno-SR1-linux-gtk.gz	136.3 MB	Gzip archive

*Extract more time to **eclipse-cpp-juno-SR1-linx-gtk***



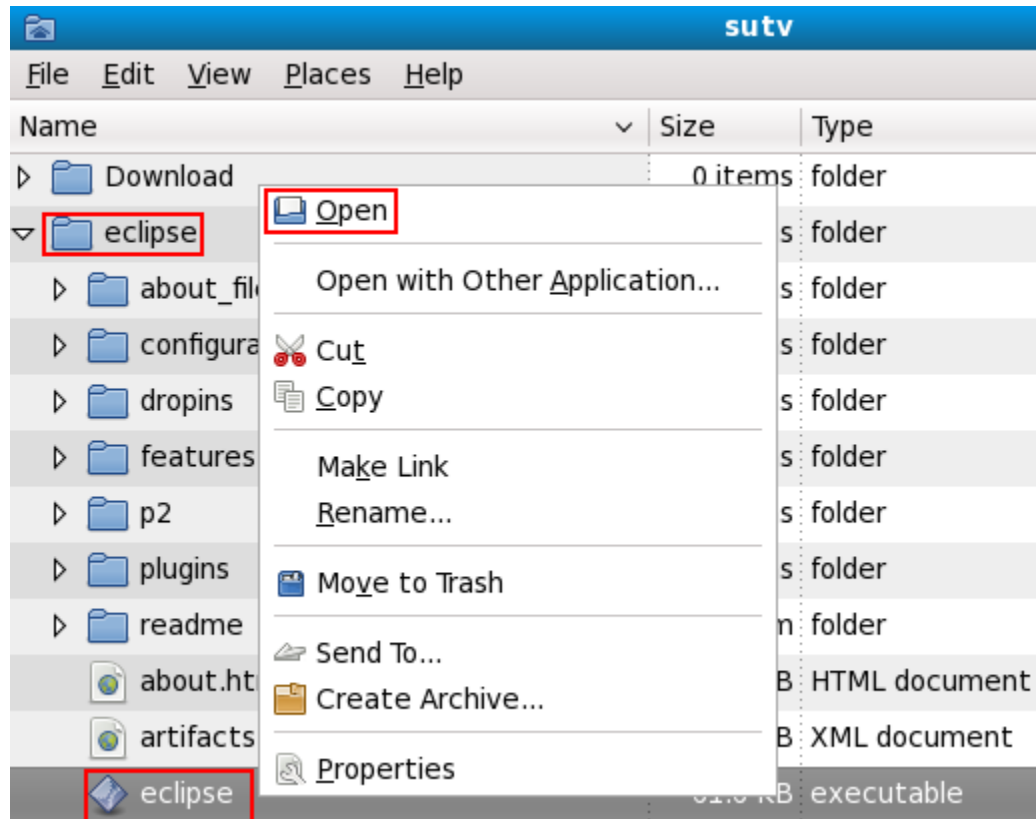
Name	Size	Type
Desktop	0 items	folder
Documents	0 items	folder
Download	0 items	folder
eclipse	15 items	folder
eclipse-cpp-juno-SR1-linux-gtk	154.0 MB	Tar archive
eclipse-cpp-juno-SR1-linux-gtk.gz	136.3 MB	Gzip archive

You can remove source packages for de-allocating disk size  
(Right click the removed object/ Move to Trash)

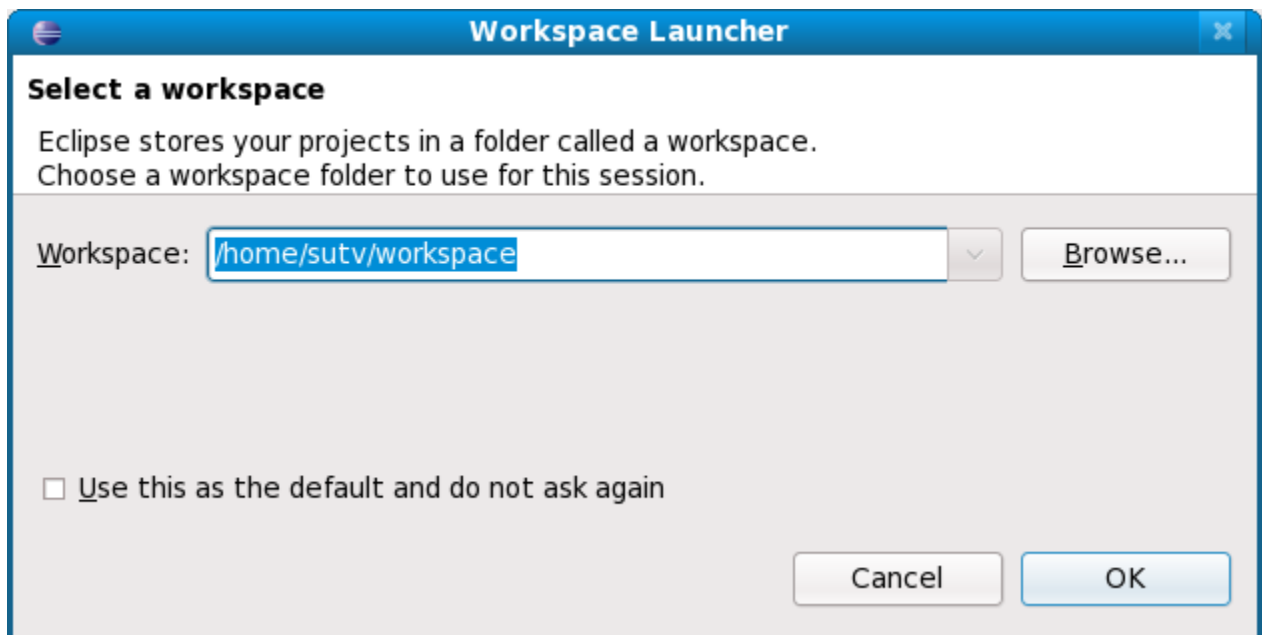


## 4.2- Use the Fedora Eclipse

### Run Eclipse

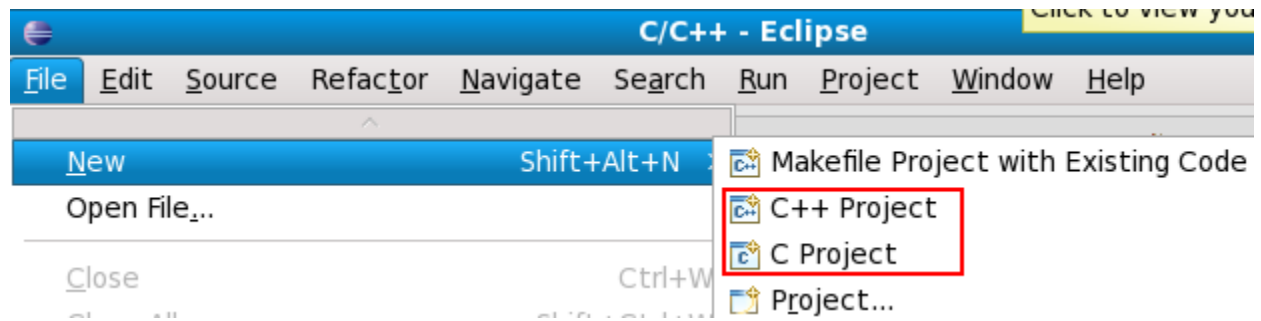


You may right click to the **eclipse/ Make Link** then cut and paste it to the desktop.

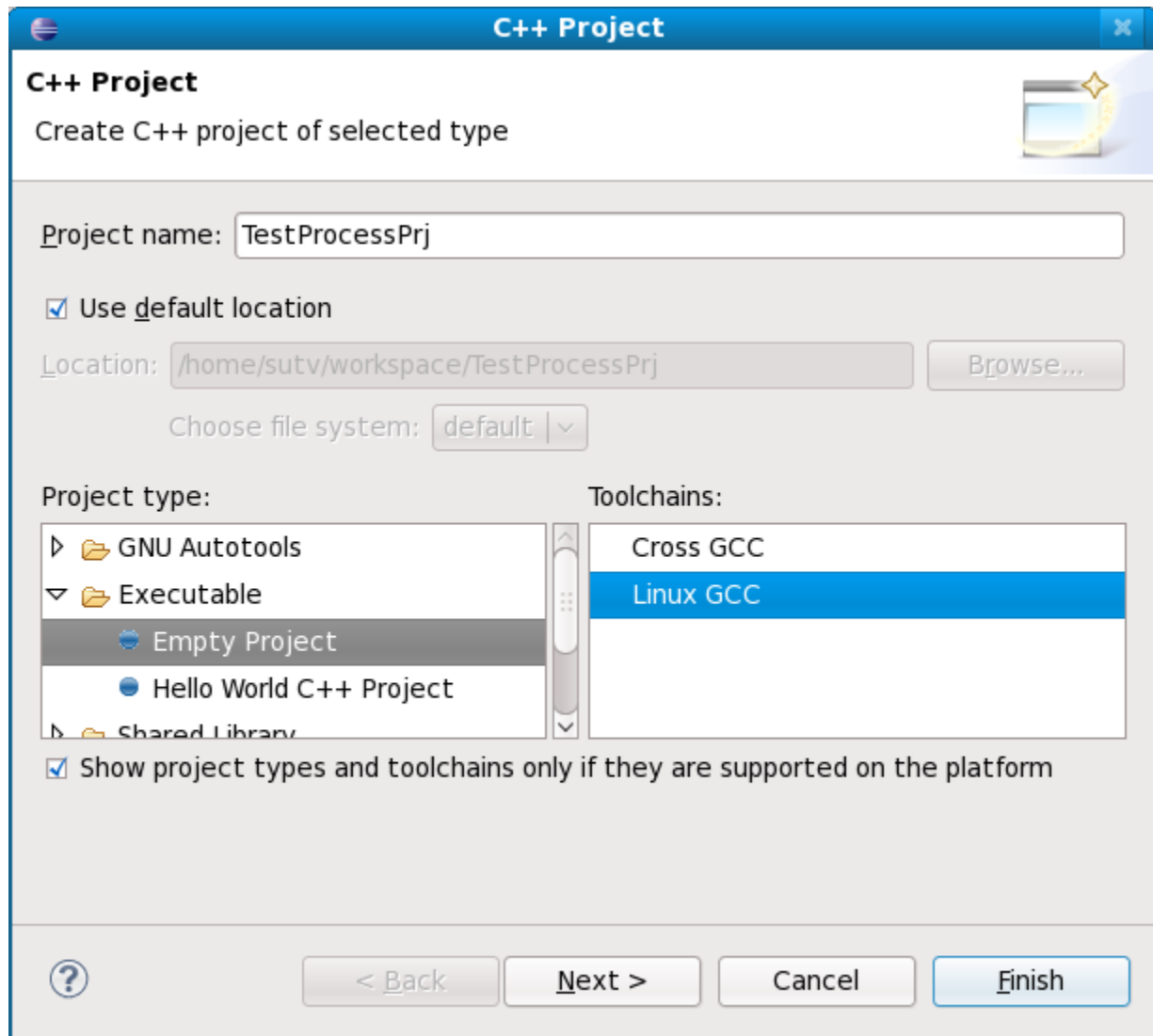


Click the **OK** button

### Open a new project

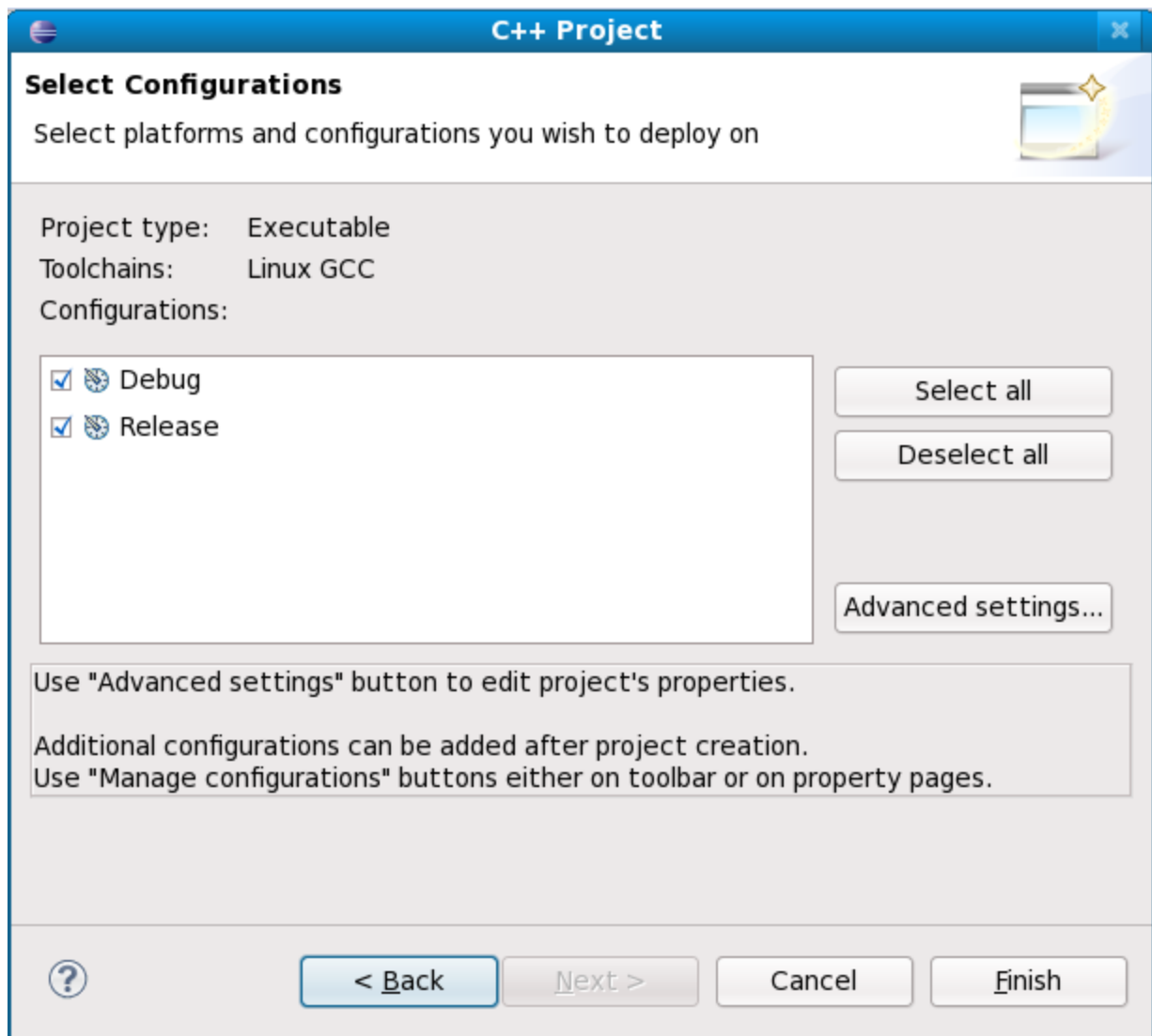


Choose **C++ Project**



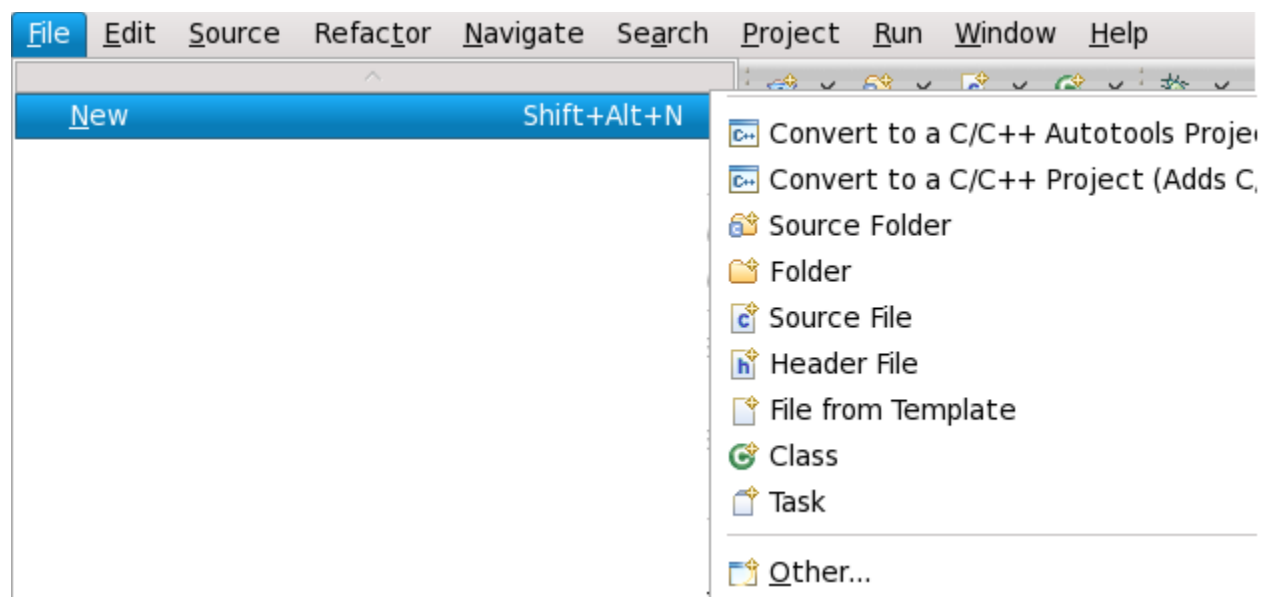
Give the project a name, it will be sub-directory of the workspace directory.  
Select a tool chain (chain of tools: Compiler, linker, assembler).  
Click the **Next** or **Finish** button

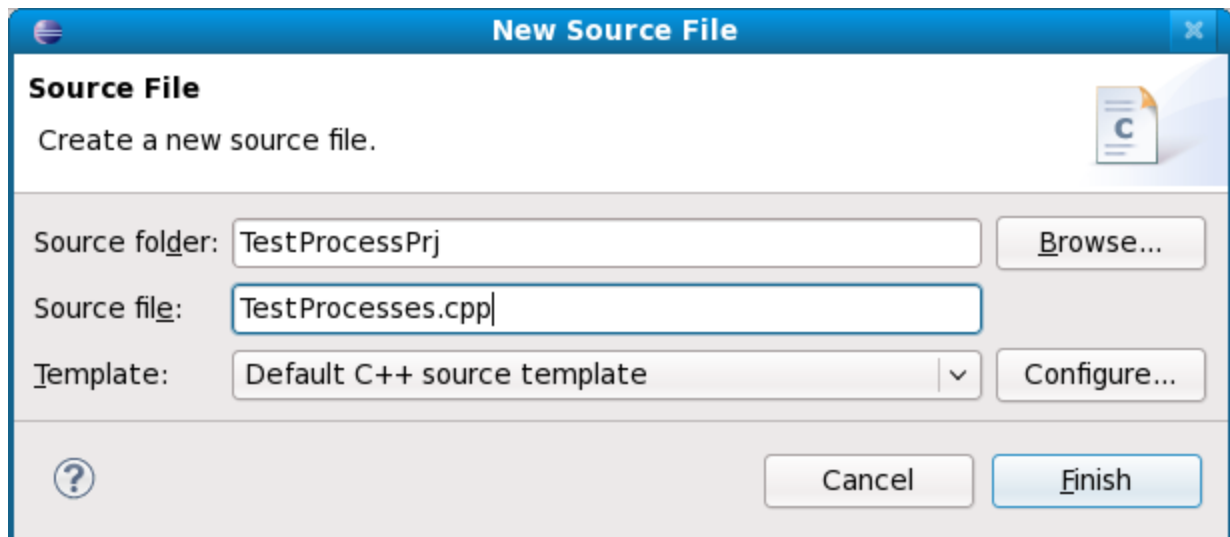
If you click the **Next** button:



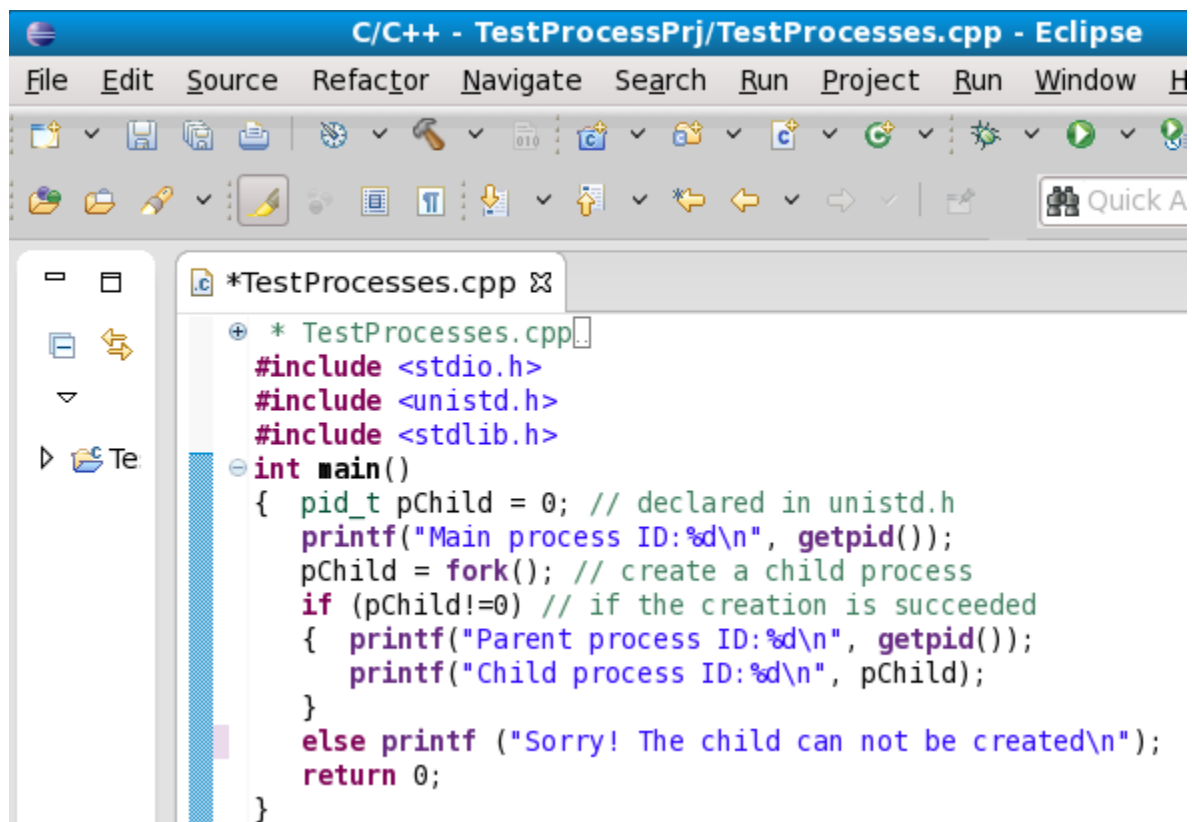
You may configure you project then click the **Finish** button.

### **Add a file to project**



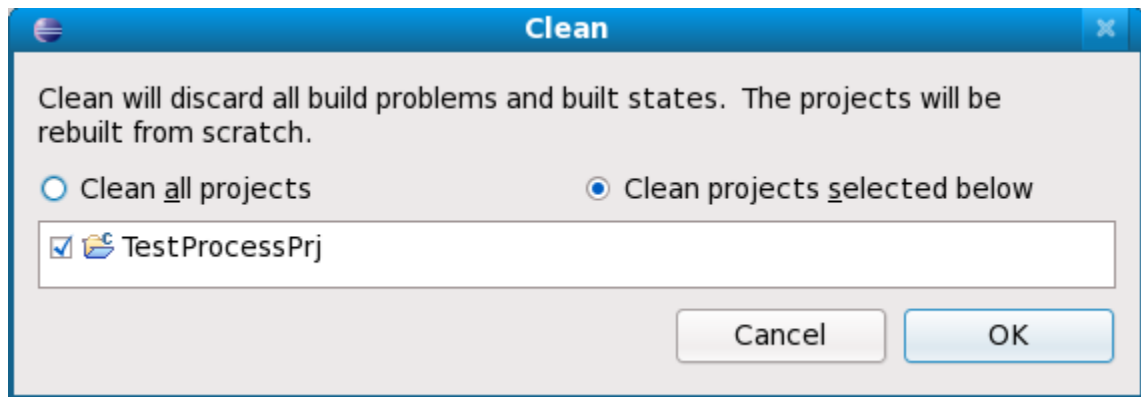
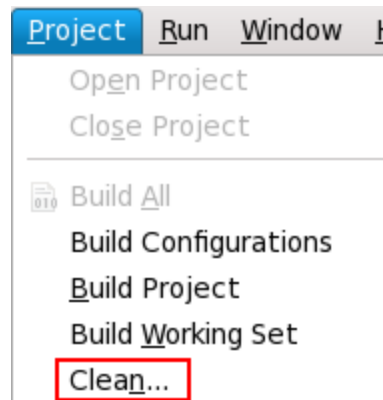


### Write code:



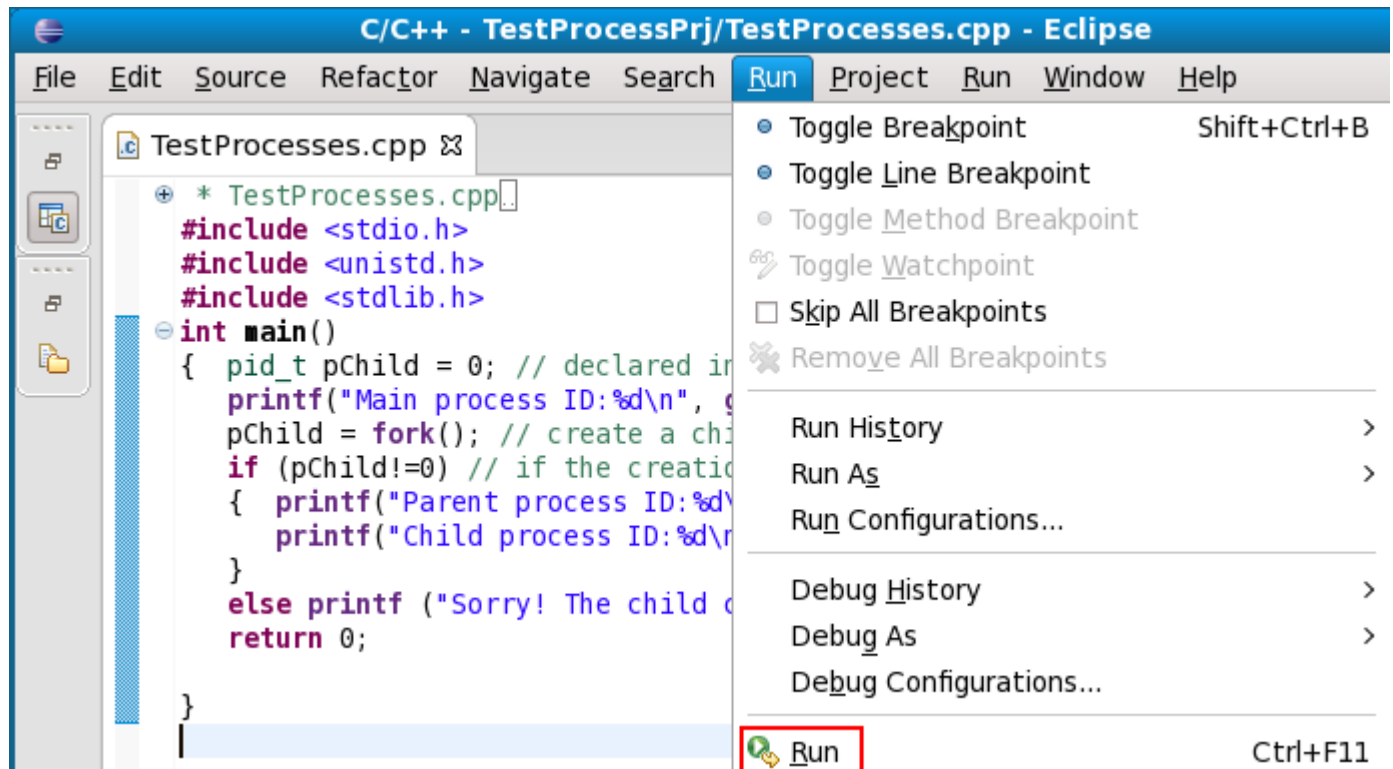
### Compile

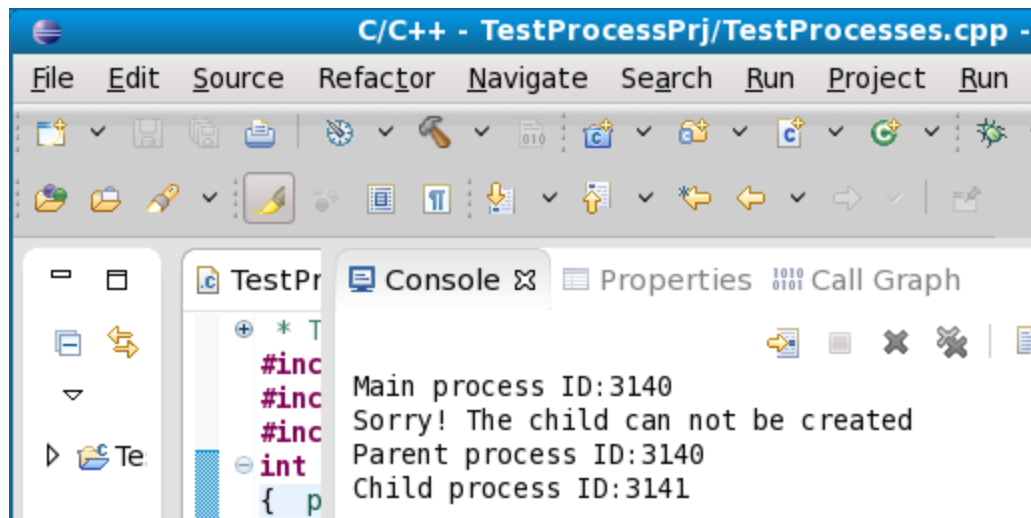
When errors occur, Eclipse remember them and remove them only when they are cleaned:



If the compilation succeeds, no message is presented.

### Run the program in Eclipse





Try to explain why the line 2 is printed (Use OS concepts about processes and multi-threading).

### Project's structure

sutv			
File Edit View Places Help			
Name	Size	Type	
workspace	1 item	folder	
TestProcessPrj	2 items	folder	
Debug	7 items	folder	
makefile	1.3 KB	Makefile	
objects.mk	231 bytes	plain text document	
sources.mk	526 bytes	plain text document	
subdir.mk	681 bytes	plain text document	
TestProcesses.d	54 bytes	D source code	
TestProcesses.o	39.6 KB	object code	
TestProcessPrj	43.3 KB	executable	
TestProcesses.cpp	514 bytes	C++ source code	

### Run your program out side the Eclipse

Your program is a console application. So, you should run it in the Terminal window.

```
sutv@localhost:~  
File Edit View Terminal Help  
[sutv@localhost ~]$ /home/sutv/workspace/TestProcessPrj/Debug/TestProcessPrj  
Main process ID:3178  
Sorry! The child can not be created  
Parent process ID:3178  
Child process ID:3179  
[sutv@localhost ~]$
```

## Exercise

Create a object-oriented Project with the following structure:

The screenshot shows an IDE with a project named 'Object1Prj'. The project structure in the left sidebar is as follows:

- Object1Prj
  - Includes
  - Box.cpp
  - Box.h
  - Main.cpp
  - Rectangle.cpp
  - Rectangle.h

The main editor displays the code for 'Rectangle.h' and 'Rectangle.cpp'.

**Rectangle.h**

```
* Rectangle.h  
  
#ifndef RECTANGLE_H_  
#define RECTANGLE_H_  
  
class Rectangle  
{  
protected:  
    double length, width;  
public:  
    Rectangle(double l, double w);  
    double area();  
};  
  
#endif /* RECTANGLE_H_ */
```

**Rectangle.cpp**

```
* Rectangle.cpp  
#include "Rectangle.h"  
  
Rectangle::Rectangle (double l, double w)  
{  
    length= l>0? l : 0;  
    width= w>0? w: 0;  
}  
  
double Rectangle::area()  
{  
    return length*width;  
}
```

```
*Box.h

#ifndef BOX_H_
#define BOX_H_
#include "Rectangle.h"
class Box: public Rectangle
{ protected:
    double height;
public:
    Box(double l, double w, double h);
    double volume();
};
#endif /* BOX_H_ */
```

```
*Box.cpp

#include "Box.h"
Box::Box(double l, double w, double h):Rectangle(l,w)
{ height= h>0? h: 0;
}
double Box::volume()
{ return length*width*height;
}
```

```
Main.cpp

#include <iostream>
#include "Rectangle.h"
#include "Box.h"
using namespace std;
int main()
{ Rectangle r(5,3);
  Box b (5,3,3);
  cout << "Rectangle's area:"<< r.area() << "\n";
  cout <<"Box's volume:"<< b.volume() << "\n";
  return 0;
}
```

Result of the program:

```
Console

Rectangle's area:15
Box's volume:45
```

END