Practical Networking

Introduction to Virtual Machines (VM Player / VirtualBox) V 1.0

> By Martin Melendez CTI-RUM

PN-Virtual Machines: Agenda

Introduction

- Virtual Machine Monitor
- VM Resources
- VM is a File

Oracle Virtualbox

- Download
- Installation
- VM creation Wizard
- VM Customize
- VM Path and Disk
- VM Network
- VM Start / Suspend / Resume
- VM Export

VMware VMPlayer

- Download
- Installation
- VM creation Wizard
- VM Customize
- VM Path and Disk
- VM Network
- VM Start / Suspend / Resume
- VM Files



In computing, a **virtual machine** (**VM**) is an emulation of a particular computer system.

Virtual machines operate based on the computer architecture and functions of a real or hypothetical computer, and their implementations may involve specialized hardware, software, or a combination of both.



Type-1: Native Hypervisor

Run directly on the hardware, the guest OS runs on top of them.





Type-2: Hosted Hypervisor

Runs on top of an existing OS, guests OS run on a third level.

Ex. VM Player Ex. VirtualBox



Shared Resources

- CPUs
- Memory
- Network
- Disks

Other Resources

- Monitor
- Keyboard
- USB Ports
- Sound Card



Entire VM is a File

- OS, applications, data
- Memory
- Device state

Snapshots and Clones

- Capture VM State
- Restore to point in time
- System Provisioning
- Backup

Content Distribution

- Pre-Configure apps
- Demos
- Virtual Appliances

https://www.virtualbox.org/wiki/Downloads



File Machine Help	Oracle VM VirtualBox Manager	↔ _ □	 VM Name OS Type
New Settings Discard Sta Centos6 Saved	art Image: Centos6 Operating System: Red Hat (64-bit) Image: System Base Memory: 2048 MB Boot Order: Optical, Hard Disk Acceleration: VT-x/AMD-V, Nested Paging, PAE/NX, KVM Paravirtualization Image: Display Video Memory: 12 MB Remote Desktop Server: Disabled Video Capture: Disabled Image: Storage		shots Shots Create Virtual Machine Create Virtual Machine Name and operating system Please choose a descriptive name for the new virtual machine and select the type of operating system you intend to install on it. The name you choose will be used throughout VirtualBox to identify this machine.
	Controller: IDE IDE Secondary Master: [Optical Drive] Empty Controller: SATA SATA Port 0: centos6.vdi (Normal, 10.00 GB) Audio Host Driver: Windows DirectSound Controller: ICH AC97 Network Adapter 1: Intel PRO/1000 MT Desktop (Bridged Adapter, Intel(tent))	R) Ethernet Connection I217-LM)	Name: Centos 7 Type: Linux ▼ Version: Red Hat (64-bit) ▼
			Expert Mode Next Cancel

? ×
Create Virtual Machine
Memory size
Select the amount of memory (RAM) in megabytes to be allocated to the virtual machine.
The recommended memory size is 768 MB.
768 🖨 MB
4 MB 8192 MB
<u>N</u> ext Cancel

New VM Wizard

- Memory Size
- New/Old Hard Disk

?	×
Create Virtual Machine	
Hard disk	
If you wish you can add a virtual hard disk to the new machine. You can either create a new hard disk file or select one from the list or from another location using the folder ic	: on.
If you need a more complex storage set-up you can skip this step and make the changes to the machine settings once th machine is created.	s e
The recommended size of the hard disk is 8.00 GB .	
O Do not add a virtual hard disk	
Oreate a virtual hard disk now	
○ Use an existing virtual hard disk file	
centos6.vdi (Normal, 10.00 GB) 👻	
Create Cancel	

	? ×
Create Virtual Hard Disk	
Hard disk file type	
Please choose the type of file that you wo hard disk. If you do not need to use it with can leave this setting unchanged.	uld like to use for the new virtual o other virtualization software you
 VDI (VirtualBox Disk Image) 	
○ VMDK (Virtual Machine Disk)	
VHD (Virtual Hard Disk)	
 HDD (Parallels Hard Disk) 	
O QED (QEMU enhanced disk)	
O QCOW (QEMU Copy-On-Write)	
Expert Mo	ode <u>N</u> ext Cancel

VM Hard DiskFile type

- VMDK Vmware
- VHD Microsoft
- HDD Parallels
- QED Linux QEMU
- QCOW Linux QEMU

?

Create Virtual Hard Disk

Storage on physical hard disk

Please choose whether the new virtual hard disk file should grow as it is used (dynamically allocated) or if it should be created at its maximum size (fixed size).

A **dynamically allocated** hard disk file will only use space on your physical hard disk as it fills up (up to a maximum **fixed size**), although it will not shrink again automatically when space on it is freed.

A fixed size hard disk file may take longer to create on some systems but is often faster to use.

Next

Cancel

Dynamically allocated

<u>
 Fixed size
 </u>

 (ϵ)

VM Hard Disk

Allocation

Dynamic

- Will grow as needed
- Consume more resources
- Is slower while growing

Fixed

Separate all the defined space at the disk creation.

 Create Virtual Hard Disk File location and size 	VM Hard Disk • Name • Size • Location
Please type the name of the new virtual hard disk file into the box below or click on the folder icon to select a different folder to create the file in. Centos 7	
Select the size of the virtual hard disk in megabytes. This size is the limit on the amount of file data that a virtual machine will be able to store on the hard disk.	Please choose a location for new virtual hard disk file Please choose a location for new virtual hard disk file Second Caster 7
4.00 MB 2.00 TB	Organize New folder Desktop Documents Downloads m (mm) Marisela (mia) Music Pictures Videos
Create Cancel	System Reserved DOWNLOADS (D DATA (E:) Vault 4T (I:) Save as type: VDI (*.vdi) Hide Folders Save Cancel

VM Settings

0				Centos 7 -	Settings			?	×
	General	Genera	I						
F	System	Basic	A <u>d</u> vanced	D <u>e</u> scription	Encryption				
	Display	N <u>a</u> me:	Centos 7						
\mathbf{S}	Storage	<u>Type</u> :	Linux					-	
	Audio	Version:	Red Hat (64	-bit)				•	
₽	Network								
	Serial Ports								
Ø	USB								
	Shared Folders								
	User Interface								
						OK	Cancel	He	lp



VM StorageSelect ISO

0		Centos 7 - Setti	ings ? ×
	General	Storage	
	System Display	Storage Tree	Attributes Optical <u>D</u> rive: IDE Secondary Master ▼ ⊙
\bigcirc	Storage	CentOS-7.0-1406-x86_64-DVD	Information
	Audio Network	Centos 7.vdi	Iype: Image Size: 3.86 GB Location: E:\install\CentOS-7.0-1406-x86 6
	Serial Ports		Attached to:
	USB		
	Shared Folders User Interface		
		2 🖨 🕹	
			OK Cancel <u>H</u> elp

	Centos 7 - Settings	 Configure Network Bridge NAT Internal Network Host-Only
General	Network	
🛒 System	Adapter <u>1</u> Adapter <u>2</u> Adapter <u>3</u> Adapter <u>4</u>	
Display	✓ Enable Network Adapter	
Storage	Attached to: Bridged Adapter Not attached	
┣ Audio	NAT ection 1217-LM	
Network	Internal Network Host-only Adapter	
Serial Port	Generic Driver	
DSB 🖉		
Shared Fo	Iders	
User Inter	face	
		DK Cancel <u>H</u> elp

									Ne	אאב //	M Wit	zar	h	
2				Centos 7	[Running]	- Oracle	e VM Virt	tualBox	•	VM	Root	fro	u m ISC)
File	Machine	View	Input	Devices	Help					• • • •	DOOL			1
					Cen	tOS 7								
	I	nstal	l Cent	:0S 7										
	T	est tl	his me	edia & i	install Ce	ntOS 7	1							
	T	rouble	eshoot	ing						>				
		Press	Tab f	or full	l configur	ation	options	on men	u it	ems.				
				Automa	tic boot	in 29 :	seconds							
									_ d		Disks of	1		
							20	ן 💴 🖉 יין			Right Ct	·		



NOTE:

Keyboard Escape

To Escape the Keyboard from Guest VM to Host Press the **right Ctrl Key**

> Backspace in sec Home o 0 Enter Page Red Down Û. Ctrl Alt

Right CRTL Key

9		Oracle VM VirtualBox Manager	- 🗆 🗙
File	Machine Help		
6	Virtual Media Manager	. Ctrl+D	
n	Import Appliance	Ctrl+I	tails 💿 Snapshots
R	Export Appliance	Ctrl+E	
Þ	Preferences	Ctrl+G	
\bigtriangledown	Exit	Ctrl+Q : Ubuntu (64 bit)	
X	Powered On	🔝 System	
64	Win81	Base Memory: 2048 MB Boot Order: Floppy, CD/DVD, Hard Disk Acceleration: VT-x/AMD-V, Nested Paging	KA IIII
X	OVT XP		
64	Observium () Powered Off	Display	
		Video Memory: 12 MB Remote Desktop Server: Disabled Video Capture: Disabled	
		Storage	
		Controller: IDE IDE Secondary Master: [CD/DVD] VBoxGuestAdditions.iso (61.65 MB) Controller: SATA	
		SATA Port 0: VRA.vmdk (Normal, 20.00 GB)	
		🕞 Audio	
		Host Driver: Windows DirectSound Controller: ICH AC97	
			`

Import Appliance

 Import Virtual Appliance 			Import A	ppli	ance	
Appliance to import VirtualBox currently supports importing appliances saved in the Open Virtualization Format (OVF). To continue, select the file to import below.						
		Please choose a virtual a	appliance file to imp	ort		×
	► This	PC → Documents	v C	Search D	ocuments	Q
	folder				☷ ▾ 🔟	0
	/e ^	Name	Date mod	ified	Туре	Size
		퉬 My PDFill	12/29/201	4 8:45 AM	File folder	
	jn C	퉬 My PowerTerm	4/13/2015	10:23 AM	File folder	
	C E	鷆 My PSP Files	10/23/201	5 7:45 AM	File folder	
	FI	🛗 My Shapes	9/4/2014 1	1:34 AM	File folder	
		퉬 NetSarang	5/5/2015 4	17 PM	File folder	
		PDF Architect 2	10/9/2014	4:20 PM	File folder	
		퉬 SolarWinds	1/27/2015	5:03 PM	File folder	
Hide Description Next Concel		🍌 Updater5	2/25/2015	3:34 PM	File folder	
		uideoPad Projects	9/10/2014	12:00 PM	File folder	
besktop		📙 Virtual Machines	2/28/2014	4:21 PM	File folder	
Documents		🤟 QVT XP	5/14/2015	10:53 AM	Open Virtualizatio	. 1,693
Downloads	~ <					>
	File <u>n</u> am	ne: QVT XP	~	Open Vii	tualization Format (*.	o ¥
		L		Ope	en Cancel	

Appliance to import I VirtualBox currently supports importing appliances saved in the Open Virtualization Format (OVF). To continue, select the file to import below. C:\Users\Martin\Documents\QVT XP.ova C:\Users\Martin\Documents\QVT XP.ova These are the virtual machines contained in the appliance settings of the imported VirtualBox machines. You can char properties shown by double-clicking on the items and disat check boxes below. Description Configuration Virtual System 1 Name QVT XP_1 Guest QS Type Windows XP	? The appliance and the suggeste s. You can change many of the items and disable others using th nfiguration
C:\Users\Martin\Documents\QVT XP.ova	the appliance and the suggeste s. You can change many of the items and disable others using th nfiguration
Description Configuration Virtual System 1 Virtual System 1 Name QVT XP_1 Guest OS Type Windows XP	nfiguration
Virtual System 1 Virtual System 1 Virtual System 1 QVT XP_1 Guest OS Type	
₩ Name QVT XP_1 ■ Guest OS Type ₩ Nindows XP	
🚍 Guest OS Type 🛛 🛃 Windows XP	T XP_1
	Windows XP (32 bit)
CPU 1	MD
Hide Description Next Cancel	MD
USB Controller	

Importing Appliance: Importing appliance 'C:\ Importing virtual disk image 'QVT XP-disk1.vmdk' Importing virtual disk image 'QVT XP-disk1.vmdk' 21% 27 seconds remaining	. (2/3)	Import Ap	opliance
	File Machine Help Image: New Settings Start Disc New Settings Start Disc Image: Settings Start Disc Image: Settings Powered Off Image: Settings Image: Settings Image: Settings Image: Settings </th <th>Oracle VM VirtualBox Manager ard Image: Colspan="2">Operating System: Windows XP (32 bit) Image: Colspan="2">Operating System: Windows XP (32 bit) Image: System Windows XP (32 bit) Image: System Windows XP (32 bit) Image: System Base Memory: 512 MB Boot Order: Hard Disk Acceleration: VT-x/AMD-V, Nested Paging Image: Display Wideo Memory: 64 MB Remote Desktop Server: Disabled Wideo Capture: Disabled Image: Storage Controller: IDE Image: Display Controlle</th> <th>Preview</th>	Oracle VM VirtualBox Manager ard Image: Colspan="2">Operating System: Windows XP (32 bit) Image: Colspan="2">Operating System: Windows XP (32 bit) Image: System Windows XP (32 bit) Image: System Windows XP (32 bit) Image: System Base Memory: 512 MB Boot Order: Hard Disk Acceleration: VT-x/AMD-V, Nested Paging Image: Display Wideo Memory: 64 MB Remote Desktop Server: Disabled Wideo Capture: Disabled Image: Storage Controller: IDE Image: Display Controlle	Preview
		Audio Host Driver: Windows DirectSound Controller: ICH AC97 Network	

9		Oracle VM VirtualBox Manager		- • ×	Export Appliance
File Machine Help		1			
Virtual Media Manager.	Ctrl+D				
Import Appliance	Ctrl+l		l	Details Snapshots	
R Export Appliance	Ctrl+E				
🖉 Preferences	Ctrl+G	OVT VP 1	Preview		
🤝 Exit	Ctrl+Q	1: Windows XP (32 bit)			
xp: W Powered On	፤ System	-			
Win81	Base Memory: 9 Boot Order: 1 Acceleration: 9	512 MB Hard Disk VT-x/AMD-V, Nested Paging	4		? ×
OVT XP				Export Virtual Ap	pliance
Observium	📃 Display			∀ir tual machines	to export
OVT XP_1 Powered Off	Video Memory: Remote Desktop Video Capture:	64 MB Server: Disabled Disabled		Please select the virtual	machines that should be added to the appliance. You
	🙆 Storage			off before they can be	exported.
	Controller: IDE IDE Primary Mas IDE Secondary	ster: QVT XP-disk1.vmdk (Normal, 6.13 GB) Master: [CD/DVD] Empty		Observium	
	┣ Audio				
	Host Driver: Wi	ndows DirectSound		VRA	
	Network	1027		📆 Win81	
Export one or more VirtualBox	virtual machines	as an appliance		🛃 XP	

Next

	? 🗙
Exp	port Virtual Appliance
Storag	je settings
Please c	hoose a filename to export the OVF/OVA to.
If you u Virtualiza	se an <i>ova</i> extension, then all the files will be combined into one Open ation Format Archive.
If you u	se an <i>ovf</i> extension, several files will be written separately.
Other e:	xtensions are not allowed.
<u>F</u> ile:	C:\Users\Martin\Documents\Observium.ova
F <u>o</u> rmat:	OVF 1.0 -
🗌 Write	Manifest file
	Create a Manifest file for
	<u>N</u> ext Cancel

Export Appliance

OVF 1.0 Widely adopted international standard (adopted by ISO/IEC in 2011).

OVF 2.0 Enhanced set of capabilities, include support for network configuration along with the ability to encrypt the package to ensure safe delivery.

Export Virtual	Appliance	?	×
Appliance setti	ngs		
This is the descriptive You can change it by	e information which will be added to the virtu double clicking on individual lines.	al applia	ance.
Description	Configuration		^
Virtual System 1			
🍪 Name	Observium		
🥥 Product			
🥥 Product-Uf	RL		
🥥 Vendor			
🥥 Vendor-UR	L		
🥥 Version			
Decemination			~
	Restore Defaults Export	Cano	el:

Export Appliance



https://my.vmware.com/web/vmware/downloads



Other

https://my.vmware.com/web/vmware/downloads



Download and double-click





🖞 VMwa	re Workstation 12 Player Setup 🛛 🗕 🔍 🗙	
	Completed the VMware Workstation 12 Player Setup Wizard	
WORKSTATION PLAYER	Click the Finish button to exit the Setup Wizard.	
	Press the License button below if you want to enter a license key now.	
		Welcome to VMware Workstation 12 Play
		Wware Workstation 12 Player
		Use VMware Workstation 12 Player for free for non-commercial use
vmware		Enter a valid email address. You agree to receive promotional emails from VMware related to Player.
	<u>L</u> icense <u>Finish</u>	martin.melendez@upr.edu
		<u>View our privacy policy</u>
		○ <u>E</u> nter a license key to allow commercial use:
		Buy a commercial use license

Continue

Cancel



New Virtual Machine Wizard Welcome to the New Virtual Machine Wizard A virtual machine is like a physical computer; it needs an operating system. How will you install the guest operating system?	×				VM Wi • Inst • ISO	zard aller Dise location	с	
Install from: O Installer <u>d</u> isc: DVD RW Drive (D:)								
	ъ.			Brows	se for ISO Image			×
Installer disc image file (iso):	\odot	- î 📔	his F	PC → Desktop	~	Search Deskt	ор	Q,
	Organize	 New f 	folder				:≕ ▼ []	0
Select the installer disc image to continue.	📃 Des	ktop	^	Name	A	Date modified	Туре	
◯ I will in <u>s</u> tall the operating system later.	📕 Dov 📃 Rec	vnloads ent places		🕑 CentOS-7.0-1406-x	86_64-DVD	3/25/2015 10:40 P	M Disc Imag	e File
The virtual machine will be created with a blank hard disk. Help < Back Next >	This F Control This F Control This F Control This F Control This F This F Control This F This F	eC uments vnloads sic ures eos al Disk (C:) JLT-A (E:)						
		Fi	ile nam	e:		CD-ROM im	ages (*.iso)	~ ´
						Open	Can	cel

New Virtual Machine Wizard	×
Welcome to the New Virtual Machine Wizard A virtual machine is like a physical computer; it needs an operating system. How will you install the guest operating system?	
Install from:	
◯ Installer <u>d</u> isc:	
🔮 DVD RW Drive (D:) 🗸	
Installer disc image file (iso):	
C:\Users\CTI\Desktop\CentOS-7.0-1406-x86_64-DVD V Browse	
 CentOS 64-bit detected. This operating system will use Easy Install. (What's this?) 	
◯ I will install the operating system later.	
The virtual machine will be created with a blank hard disk.	
Help < <u>B</u> ack <u>N</u> ext > Cance	

Easy install

- ISO OS detected
- User credentials

×

New Virtual Machine Wizard

Easy Install Information

This is used to install CentOS 64-bit.

Personalize Linux

 Full name:
 Martin Melendez

 User name:
 martin

 Password:
 ••••

 Confirm:
 ••••

This password is for both user and root accounts.

< Back

Next >

Cancel

Help

New Virtual Machine Wizard × Name the Virtual Machine What name would you like to use for this virtual machine? Virtual machine name: •	 Location and Disk Size VM Files path Disk Size Single / Mutiple files
CentOS7	
C:\Users\CTI\Documents\Virtual Machines\CentOS7 Browse Browse	New Virtual Machine Wizard
	Specify Disk Capacity How large do you want this disk to be?
	The virtual machine's hard disk is stored as one or more files on the host computer's physical disk. These file(s) start small and become larger as you add applications, files, and data to your virtual machine. Maximum disk <u>size</u> (GB): 20.0 = Recommended size for CentOS 64-bit: 20 GB
< <u>B</u> ack <u>N</u> ext > Cancel	Store virtual disk as a single file
	Split virtual disk into <u>m</u> ultiple files Splitting the disk makes it easier to move the virtual machine to another computer but may reduce performance with very large disks.
	Help < Back Next > Cancel

Custom the VM New Virtual Machine Wizard × Memory Ready to Create Virtual Machine • Click Finish to create the virtual machine and start installing CentOS 64-bit CPUs and then VMware Tools. ٠ The virtual machine will be created with the following settings: USB • Sound Card Name: CentOS7 • Location: C:\Users\CTI\Documents\Virtual Machines\CentOS7 Version: Workstation 12.0 Hardware Operating System: CentOS 64-bit Memory Device Summary Hard Disk: 20 GB Specify the amount of memory allocated to this virtual Memory machine. The memory size must be a multiple of 4 MB. Memory: 1024 MB Processors 1 New CD/DVD (... Using file C:\Users\CTI\Desktop\C... 1024 📥 MB Network Adapter: NAT Memory for this virtual machine: Network Adapter NAT Other Devices: CD/DVD, USB Controller, Printer, Sound Card ω. USB Controller Present 64 GB Sound Card Auto detect 32 GB Printer Present Customize Hardware... 16 GB Display Auto detect Maximum recommended memory 8 GB (Memory swapping may 4 GB Power on this virtual machine after creation occur beyond this size.) 2 GB 2920 MB 1 GB (1) 512 MB \triangleleft Recommended memory 256 MB 1024 MB Finish < Back Cancel 128 MB 64 MB Guest OS recommended minimum 32 MB 512 MB 16 MB 8 MB 4 MB 💮 Add... Remove Close

Help

	Har	dware ×	Network Interface
Device Memory Processors New CD/DVD (Network Adapter USB Controller	Summary 1 GB 1 Using file C:\Users\CTI\Desktop\C NAT Present	Device status	 Bridge NAT Host-Only Custom
V Sound Card	Auto detect Present Auto detect	Replicate physical network connection state Replicate physical network connection state NAT: Used to share the host's IP address Host-only: A private network shared with the host Custom: Specific virtual network VMnet0 LAN segment: LAN Segments	
	Add		Automatic Bridging Settings Select the host network adapter(s) you want to automatically bridge: Broadcom NetXtreme 57xx Gigabit Controller Broadcom 802. 11n Network Adapter Microsoft Wi-Fi Direct Virtual Adapter
		Close Help	OK Cancel Help



	CentOS7 - VMware Workstation 12 Player (Non-commercial use only)	Suspend / Power Off
Player 🕶 📔 🕶 🖶 🖂 🔯		the Virtual Machine
Applications Places	●) QŽ Tue 1	E Contraction of the second
home		
U	VMware Workstation 12 Player	
Trash	How do you want to close the virtual machine? Suspending will preserve your environment and data for later use. If powering off, make sure that the virtual machine is in a safe state for shutdown. Suspend Power Off Cancel	
	Activat Go to PC	CENTOS Te Windows settings to activate Windows



NOTE:

Resume / Edit the Virtual Machine

To Escape the Keyboard from Guest VM to Host Press the **Ctrl + Alt Keys**



Hame Sha Hame Sha H → ↑	re View V This PC → Documents → Virtual Mach	CentOS7 hines ▶ CentOS7 ▶	- د ا	Search CentOS7	×	V •	M Files vmdk – vmx –	Disk Configuratio	n
🔶 Equaritar	Name		Date modified	Туре	Size				
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Downloads	CentOS7 vmdk lck	Subcola All Milenlick	10/20/2015 5:44 PM	File folder					
Recent places	CentOS7.vmv.lck		10/20/2015 5:44 PM	File folder					
in the contracts	564d93ea-8111-50e6-94cd-ae85	Sd5c5147f.vmem	10/20/2015 5:44 PM	VMEM File	1 048 576 KB				
📕 This PC	autoinst	Juses I 4 million	10/20/2015 5:44 PM	Disc Image File	53 992 KB				
Pesktop	CentOS7.nvram		10/20/2015 5:44 PM	NVRAM File	9 KB				
Documents	A CentOS7		10/20/2015 5:45 PM	VMware virtual dis	2 624 KB				
Downloads	CentOS7.vmsd		10/20/2015 5:44 PM	VMSD File	0 KB				
Music	CentOS7		10/20/2015 5:44 PM	VMware virtual m	3 KB				
Pictures	CentOS7.vmxf		10/20/2015 5:44 PM	VMXF File	1 KB				
Videos	vmware	-		C114		2.22			×
bocal Disk (C:)		C:A.		C:\W	indows\syst	tem32\0	cma.exe		
📬 Network		Volume in Volume Ser	drive C has ial Number	s no label. is 9E4A-28	DD				Ľ
11 items		Directory	of C:\Users	s\CTI\Docum	ents∖Virtu	ual Mac	hines\CentOS	7	
Thems (Disk free space: If		10/20/2015 10/20/2015 10/20/2015 10/20/2015 10/20/2015 10/20/2015 10/20/2015 10/20/2015	06:10 PM 06:10 PM 06:10 PM 05:44 PM 06:10 PM 06:10 PM 06:09 PM 06:10 PM 6 File 2 Dir(s	<pre></pre>	8,684 Cen 98,400 Cen 2,839 Cen 369 Cen 14,632 umw 124,924 by ,970,816 b achines\Ce	it0\$7.m it0\$7.w it0\$7.w it0\$7.w it0\$7.w it0\$7.w it0\$7.w it0\$7.w it0\$7.w	ivram undk unsd unx unxf ug ree		