

ESXi Hosts

Maximums (per host): Logical CPUs (incl HT) = 160 vCPUs = 2048 RAM = 2TB vCPUs per core = 25 VMs = 512

Logs: All logs in `/var/log/` directory (sym links from `/var/run/log/`). View host logs via: • DCUI • ESXi Shell • Extract `vm-support` bundle: <http://hostname/host/vcl/vifs> • vSphere Client connected to host

auth.log ESXi Shell authentication
esxupdate.log ESXi patches/updates
fdm.log HA logs
hostd.log Host management (VM & host events; Client, vpxa, SDK connections)
shell.log ESXi Shell usage (enable/disable & commands)
sysboot.log VMkernel & module startup
syslog.log Management service initialization, watchdogs, scheduled tasks, DCUI
vmkernel.log Core VMkernel logs (devices, storage/network device/driver events & VM startup)
vmkwarning.log VMkernel warnings & alerts
vmksunmary.log ESXi startup/shutdown, uptime, VMs running, service usage
vpxa.log vCenter vpxa agent

Shell Commands

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--help for esxcli namespaces & commands relative to location. localcli bypasses hostd
Startup level for management services (& lists all services): chkconfig --list
Restart all management services: /sbin/service.sh restart
Restart single service (& start/stop/status available): /etc/init.d/<service> restart
Common services: • hostd (primary ESXi daemon) • vpxa (vCenter agent) • vmware-fdm (HA)
Backup host configuration: vifcfg-cfbackup -s /tmp/<hostname>.cfbak
                        (restore -l, force restore to different build number -f)
Export detailed configuration file: esxcli info -o /tmp/esxcli-info.txt
Gather debugging report: esxcli vm process list
List running VMs (before maintenance): esxcli vm process list
Resource usage: esxtop (Shell) resxtop (VCL). Customize & save: W (updates esxtop50rc file)
List CPU details: esxcli hardware cpu list
Show CPU supported functions: esxcli hardware cpu global get
Show memory and NUMA nodes: esxcli hardware memory get
List free memory allocated to ramdisks: esxcli system vsorfs ramdisk list
Show version information for ESXi: esxcli system version get
Show the host's acceptance level: esxcli software acceptance get
Show all the installed VIBs: esxcli software vib list
Detailed information on installed VIBs: esxcli software vib get
Show syslog configuration: esxcli system syslog config get
Show logging config for each log: esxcli system syslog config logger get
Show remote coredump config: esxcli system coredump network get
Lists firewall status & actions: esxcli network firewall get
Lists firewall rulesets: esxcli network firewall ruleset list
Refresh firewall after adding new ruleset: esxcli network firewall refresh
Show description of VMkernel error: vmkerrcode <error_code_number>
Lists drivers loaded at startup: esxcli system module list
List advanced options: esxcli system settings advanced -l
```

ESXi Power management policies: • Not Supported - no host support or disabled in BIOS • High Performance - only used when BIOS warning • Balanced (default) - conservative, shouldn't affect performance • Low Power - aggressive power management, can lower performance • Custom

Memory: Host reclaim memory from VM by: • TPS (Transparent Page Sharing) • "RAM dedupe" • PSHARE in esxtop • Balloon driver (vmemctl) - forces guest to use native algorithms (guest swap) • Memory compression - `vswp file` (host level swapping). Local or networked SSD is tagged by VMkernel as optimal swap location to reduce impact. During contention, host memory allocated based on shares & working set size (recent activity). Idle memory is taxed progressively to prevent VM hoarding. Guest swap should be < (vRAM - Reservation) x 65%, or balloon driver can cause guest kernel panic. Memory faults can be detected & quarantined to reduce chance of a PSDO (hardware dependent).

NUMA (Non-Uniform Memory Access): CPUs have localized memory. NUMA scheduler controls VM distribution across host memory to dynamically optimize CPU load & memory locality for VMs.

Firewall: Define service's port/protocol ruleset: `/etc/vmware/firewall/service -<name>.xml` (then refresh)

PAM (Pluggable Authentication Modules) plugins: `/etc/pam.d/vmware-authd`. Default password compliance plugin: `pam_passwdqc.so`. No restrictions on root password. Defaults for non-root users: password retries = 3, minimum password length = 8, shorter passwords if Characters Classes mixed (upper, lower, digits & other) 1 or 2 CC - min 8, 3 CC - min 7, 4 CC - min 6. First character as upper is last character as digit not counted.

DCUI (Direct Console UI): • Configures host defaults • Sets up administrative access • Troubleshooting. High contrast video mode `F4`. Can redirect DCUI to serial cable via Client or boot option (`Shift + O`). Restarting Mgt agents effects `/etc/init.d/processes: hostd (mgmt-vmware), ntpd (time), sfcbd (CIM broker), sldp (discover/advertise services), wsman (share mgt info via SOAP), vobd (error reporting) & fdm (HA agent) if installed. To isolate ESXi host from DRS/HA cluster, disable management network. Management Network Test: pingf, DC, primary DNS nameserver, secondary DNS, resolves hostname. VIBs: can update image profiles or 3rd party extensions. Updates firewall ruleset & refreshes host.`

Repair mode: On ESXi Installable CD, overwrites all configuration data. Serial number lost on repair, but restored when backup configuration applied. Configuration reset deletes root password, removes configuration & reboots host. Storage needs reconfigured & re-register VMs.

Recovery Mode: Invoked during boot with `Shift + R`. Reverts to previous image before last update.

SNMP agent embedded in hostd (disabled by default). Enable via `vifcfg-snmpp`. Can send traps & receive polling (GET) requests. **Syslog service** is `vmvsylogd`.

Host certificates: `/etc/vmware/sr/ssl.crt` (public key) & `ssl.key` (private key).
Recreate: `/sbin/generate-certificates`

Lockdown mode: Forces operations via vCenter. Mode available only when host connected to vCenter. Enabling/disabling via DCUI wipes host permissions - set via vCenter. DCUI restricted to root, Shell & SSH disabled for all users, vSphere client & CIM monitoring only via vCenter not direct to host. **Normal Mode:** DCUI, Shell, SSH & CIM access allowed to root & Admin role users. vSphere Client access based on ESXi permissions. **Total lockdown mode:** also disables root access to the DCUI, if vCenter access is lost you must reinstall ESXi to regain control. root & vpxuser are only users not assigned No Access role on hosts by default, but have same rights as the Administrator role.

Firewall Ports <http://kb.vmware.com/kb/1012382>
Location of ESXi 5.0 log files <http://kb.vmware.com/kb/2004201>
Video: Restarting management agents on an ESX/ESXi server <http://kb.vmware.com/kb/1003490>
Interpreting esxtop Statistics <http://communities.vmware.com/docs/DC0C-9279>
Firewall Ports <http://kb.vmware.com/kb/1010705>
Collecting diagnostic info using the vm-support command <http://kb.vmware.com/kb/1010705>
Decoding Machine Check Exception output after purple screen <http://kb.vmware.com/kb/1005184>

vCenter

Maximums (per vCenter): Hosts = 1000 VMs = 15000 Running VMs = 10000 Clients = 100
MAC address = 65536 Datastore clusters = 256 **Maximums (per datastore):** Hosts = 500
Clients = 500
Maximums (Linked mode): vCenters = 10 VMs = 50000 Running VMs = 30000 Hosts = 3000

HW: Min - 2 CPU cores, 4GB RAM, 4GB disk space • Medium >50 hosts/500 VMs - 2 cores, 4GB RAM • Large >300 hosts/3000 VMs - 4 cores, 8GB RAM • Extra large >1000 hosts/10000 VMs - 8 cores, 16GB RAM
SW: • 64bit VM (x86_64) • 2008 SP2/R2 • 2008 SP2/R2 • 64bit DSN (SQL Native driver) • hostname <15 characters
Databases: • SQL 2008 Express (<5 hosts/50 VMs) • SQL 2005 SP3 • SQL 2008 SP1 or 2 • Oracle 10g R2 or 11g R1 • IBM DB2 9.5 fix pack 6 or 9.7 fix pack 2 • VCenter 5.0 only supports Oracle & Microsoft
Users: needs DB rights. Default of max 50 simultaneous DB connections. MS SQL don't use master DB.

vCenter Virtual Appliance (VCA): Min 7GB disk, max 80GB. Supported DBs: • embedded (< 100 hosts & 1000 VMs) • Oracle. RAM sizing: >4GB for <10 hosts/100 VMs, >8GB for 100-1000 hosts/1000-1000 VMs, >13GB for 1000-4000 hosts/1000-4000 VMs, >17GB for >4000 hosts/4000 VMs. Limits: no IPv6, Linked Mode, MS SQL, DB2. Default username: root, password: vcenter

Extra vCenter DVD tools: • vSphere Update Manager (VUM) - needs 64bit OS but 32bit DSN • syslog server • ESXi Dump collector (no DVS support) - collects PSDO memory dump, useful for Auto Deploy host without local diagnostic partition • Authentication Proxy (see below) • Pre-Upgrade checker - checks for potential host issues • Auto Deploy server (see ESXi Install section) • Web Client server (see below)

FW Port	Source	Destination	Protocol	Description
80	Clients	vCenter	TCP	Redirect to HTTPS
389	Clients	vCenters	TCP	Linked Mode LDAP
443	Clients	vCenter	TCP	vSphere Client access
443	vCenter	ESXi	TCP	vCenter agent
902	ESXi	vCenter	UDP	Heartbeat
902	vCenter	ESXi	UDP	Host management, heartbeat
903	ESXi	vCenter	TCP	Heartbeat

Example extras: 25(SMTP), 53(DNS), 80(443/623(DPM), 88(AD), 161/162(SNMP), 636(Linked vCenters), 1433(MSSQL), 1521(Oracle), 5988/5989(CIM), 6000/6000(Dump Collector), 8000(VCenter), 8080/8443/60099(webservers), 9443(Web Client), 10109/10111/10443(Inventory service), 51915(Auth proxy)

Logs: DB upgrade: `%TEMP%\VCDatabaseUpgrade.log` vCenter agent: `/var/log/vmware/vpx/vpxa.log` (Win XP, 2000, 2003): `%ALLUSERSPROFILE%\Application Data\VMware\VMware vCenter\Logs\` (Win 7, 2008): `%ALLUSERSPROFILE%\VMware\VMware vCenter\Logs` (see KB in links below for description of different log files) VCA logs: `/var/log/vmware/vcenter/` Windows Client installed: `%TEMP%\vmsmi-log` Windows Client service: `%USERPROFILE%\Local Settings\Application Data\vmx\vmxclient_x.log (<0-9)`
Guest customization - Win: `%WINDIR%\temp\vmware-vmc` - Linux: `/var/log/vmware-vmc/toolsdeplkg.log`

Default roles (System roles) - permanent, cannot edit privileges, ESXi & vCenter. Sample roles - just vCenter:
No access System - Default except users in Admin Group. Cannot view or change.
Read only System - View state & details except console task.
Administrator System - All privileges. Default for members of the Admin Group, & AD ESX Admins.
VM power user Sample - Interact with, change VM HW settings, snapshots & schedule tasks.
VM user Sample - Interact with, insert media & power ops. Cannot change VM HW settings.
Resource pool admin Sample - Create, modify child pools & assign VMs, but not RP itself.
Datastore consumer Sample - Allow space consumption of the datastore.
Network consumer Sample - Allows hosts or VMs to be assigned to network.

Permissions: user/group/role with r & associate with object. Role - predefined set of privileges. Users initially granted No Access role on new objects including datastores/networks. Logged in users removed from domain keep permissions until next validation period (default 24 hrs). Tasks - activities that don't complete immediately. All roles allow full control. Can schedule tasks if user has permission when task created. vCenter Local Admins have Administrator role by default. Propagation is per permission, not universal. Child permissions override those propagated. User permissions override Group ones. Use No Access role to mask areas from users. Moving objects needs permission on object, source & destination parent

License: Essential Essential+ Standard Enterprise Enterprise+
vRAM (per socket license) 32GB 8-way 96GB 32-way 96GB

vpxa, Thin pro, VUM, VADP Yes Yes Yes Yes Yes
vMotion, HA, VDR Yes Yes Yes Yes Yes
SLES (SUSE Linux Ext Server) for VMware DRS, DPM, Storage vMotion, FT, VA, Hot add, Linked mode, Shared MPP, Orchestrator, vShield Zones, Serial port concentrator, DVS, NIOC, SIOC, Host Profiles, Auto Deploy, Policy-driven Storage, Storage DRS
vSphere configured on all powered-on VMs. Consumed vRAM capped at 96GB per VM. Only Essential & Essential+ has hard vRAM limit. CPU licenses from same license level are pooled across linked mode vCenters. Keys in vCenter not deployed add to entitlement. Add vRAM by adding licenses or upgrading existing. Consumed vRAM is 12 month average. Can create related vCenter. VM assigned to host via vCenter is persistent. vSphere Hypervisor - free, no connection to vCenter. <32GB vRAM, only servers <32GB physical RAM, limited/read-only vCLI & PowerCLI support, no SNMP support. vSphere Desktop - for VDI, functionality of Enterprise+ & unlimited vRAM. Per powered-on desktops. Expired licenses: vCenter - hosts are disconnected. ESXi - VMs continue to run, cannot power-on new VMs. Status: CPU memory, storage, network, power, DRS, HA, mgmt agents, system & VM ops. Collection Intervals (time period stats archived in DB) frequency/retention is 5 mins - 1 day, 30 mins - 1 week, 2 hrs - 1 month, 1 day - 1 year. Real-time stats (just performance charts) flat file on hosts & vCenter memory (not in DB), frequency/retention is 20 secs - 30 mins, only powered-on hosts & VMs. Collection level "4" for each interval, most counters 1s (default 1). Reports & PMS updated every 30 mins. VMware Tools adds perform objects to Windows guests. Alarms: notifications of selected events, conditions & states. Composed of Trigger & Action. Triggers: condition, state or event. Actions: responses to triggered alarms. Default alarms don't have actions set. Can disable action without disabling alarm, but effects actions on all alarms. Disable for selected object, child continents. Default alarms not preconfigured with actions. Acknowledging alarm stops action, but alarm still visible. Reduce alarms with tolerance range (default 5 mins). Disabling alarm stops action, but alarm still visible. **Linked mode:** joins VCS. Global data: IP & ports, certificates, licensing, user roles. Uses ADAM (AD App Mode) to store & sync data. Instances can run under different domain accounts. Installed by domain user who is admin on both machines. Requirements: DNS, 2-way trust if different domains, time sync, DNS name matches hostname. Roles are replicated, assignments of roles are not. Server settings: Licenses (vCenter statistics intervals & DB size), Runtime Settings (unique ID, managed IP, name), AD (timeouts, query limit, validation period), Mail, SNMP receivers, Ports - (h/s), client timeouts, Logging detail, DB connections (default 50), DB retention, SSL host verification, Advanced Settings. **Host Profiles:** Policy to centrally configure & check compliance of hosts. Set at host or cluster level. Reference host - host which created profile. Exported profile format: `vpl`. When profile is detached, settings persist on host/cluster. Answer file contains host specific input required by Auto Deploy - 1 per host. Must be in Maintenance Mode to apply profile, Auto Deploy hosts need reboot. **Authentication Proxy:** No AD credentials on ESXi, just domain name & proxy IP. Installer creates AD account prefixed with CAM. Authenticate proxy to ESXi by importing SSL certificate, or push via Host Profiles. **Web Client server:** Alternative to Windows Client. Cross-platform & cross-browser (Adobe Flex plugin). Connects to vCenter (not to hosts directly), registers client server first. Subset of Windows Client functionality. Monitoring & deployment, no host configuration network configuration. Admin tool <https://localhost:9443/admin-app> Web client <https://servername:9443/vsphere-client> Guest Customization: Guest OS must be on SCSI node 0. Requires Perl in Linux guests. Windows guest Admin password must be blank for customization to change it. vService: Service dependency for vApps or VMs. vService Manager monitors health. • Red - issue needs fixed (extension) • Yellow - vService Manager is repairing • Green - OK

Resolution Path Troubleshooting Licensing <http://communities.vmware.com/docs/DOC-16082>
Collecting diagnostic information for vCenter <http://kb.vmware.com/kb/1011641>
Location of vCenter Server log files <http://kb.vmware.com/kb/1021804>
Installing vCenter Server 5.0 best practices <http://kb.vmware.com/kb/2003790>
Upgrading to vCenter Server 5.0 best practices <http://kb.vmware.com/kb/2003866>
Sysprep file locations and versions <http://kb.vmware.com/kb/1005593>
Firewall Ports <http://kb.vmware.com/kb/1010705>
vCenter client shortcuts <http://www.jume.nl/articles/vmware/143-vcenter-client-shortcuts>
vSphere 5 Licensing, Pricing & Packaging http://www.vmware.com/files/pdf/vsphere_pricing.pdf

Links

Cluster Resources

Maximums (per DRS cluster): Hosts = 32 VMs (powered on) = 3000 (512 per host)
Maximums (per Resource Pool): Children = 1024 Tree depth = 8
Maximums (other): Hosts per datastore = 500 RPs per host = 1600 RPs per cluster = 1600

Terminology: Datacenters - mark organizational & vMotion boundaries. Clusters - gather host resources. Resource Pools - apply policies to clusters. DRS cluster is implicitly a resource pool. Resources include CPU, memory, power, storage & networking. EVC (Enhanced vMotion) - masks CPU features that prevent vMotions. Storage DRS, Profiles & Datastore Clusters - see Storage section. NIOC & Network Resource Pools - see Networking section.

• List resource group settings: `esxcli resgroup -l`

Resource pools: Shares - low, normal, high & custom • Reservations - MHz/CPU/MB/RAM • Limits - MHz/MB • Expandable reservation - yes (can grow from parent's pool) • no (only from own pool)
Shares - only apply during contention. Shares are relative to siblings (VMs or Resource Pool). Reservations - guarantee a minimum, can be allocated more. Only checked when VM is powered on. Limits - upper bound, never exceeded; manager user expectations but can waste idle resources. Resource Pool Admission Control - prevents violations when VM is powered on or child pool created. Fixed reservations create strict isolation. Expandable reservations can borrow resources, don't automatically hunt upwards, but defines if admission control considers the reservation. More flexible but provides less protection. Child pools actively reserve resources from parent even if VMs are powered off. Hierarchical resource pools require DRS enabled. DRS - Manual / Partial (Initial VM placement) • Fully Automated (Initial VM placement & Dynamic balancing). Migration threshold slider sets allowable host load imbalance. Current Host Load Standard Deviation - load imbalance (higher number increases priority level). Current < Target unless recommended unsupplied. Priority levels 1-5 (1 is highest). Prioritized from pools created with adding host to DRS cluster & keeping host's resource pool hierarchy. Maintenance mode only clears VMs off host if DRS cluster is fully automated. Disabling DRS deletes resource pools & affinity rules - set DRS to manual to keep settings. DRS can be overcommitted/yellow (host failure) or invalid/red (usually direct agent changes). Affinity Rules: VM-VM keep together/apart. VM-Host keep VMs on/off specific hosts. Should rule is best effort. Must be kept intact (no deletions). Do not conflict - older wins, newer rule disabled. Obeying affinity ranks over affinity disabled rule ignored. DPM: uses IPMI, iLO or WOL (in that order). DRS & DPM thresholds are independent. Verify host's DPM Last Time Extended Standby, DPM level: • Off • Manual (makes recommendations) • Automatic. DRS Deep Dive <http://www.yellow-bricks.com/drs-deepdive> EVC (Enhanced vMotion Compatibility) FAQ <http://kb.vmware.com/kb/1005764> EVC CPU compatibility <http://kb.vmware.com/kb/1003212>

VMs

Maximums (per VM): VMs = 32 RAM = 1TB (64GB FT VMs) Virtual swap file (.vswp) = 1TB SCSI adapters = 4 Devices per SCSI adapter = 15 IDE devices (Disk/CD) = 4 VMOK = 2TB-512B VMsCs = 10 USB Floppy drives = 2 Parallel ports = 4 Remote consoles = 40 VMDirect/Floppy devices = 4 Video RAM = 128MB

Files: `hlog` vMotion log file `vmsnd` Snapshot metadata
`.lck-XXX` Locking file on NFS datastore `vmsn` Snapshot state file
`hlog` VM activity log `vmsss` Suspended state file
`-hlog` Old VM log `vmxt` Template header
`nvram` RDS or old settings `vmx` Primary configuration file
`rdm` RDM in Virtual Compatibility mode `vmxf` Extra configuration file for VMs in a team
`vmdisk` RDM in Physical Compatibility mode `vswp` Swap file for overcommitted memory
`vmxk` Disk descriptor (also raw virtual disk for hosted products)
`-flat.vmdk` Raw pre-allocated virtual disk `-000000.vmdk` Snapshot child disk
`-cik.vmdk` Changed Block Tracking file `-000000-delta.vmdk` Snapshot differential file

Shell Commands

`--help` for esxcli namespaces & commands relative to location. localcli bypasses hostd
List running VMs (before maintenance): `vmxcli vm process list`
List registered VMs (& displays <vmid>): `vim-cmd /vmsvc/getallvms`
Show VM's power state: `vim-cmd /vmsvc/power.getstate <vmid>`
Power on VM: `vim-cmd /vmsvc/power.on <vmid>`
Power off VM: `vim-cmd /vmsvc/power.off <vmid>`
Unregister VM: `vim-cmd /solo/register /vms/volumes/vmname/vmname.vmx Unregister <vmid>`
vCenter VMs: `vim-cmd /vmsvc/vms/vmname/vmname.vmx Unregister <vmid>`
Forcibly kill VM: `esxcli vm process kill -t type <soft/hard/force> -w world-id <id>`
Create/Delete/Modify VMDKs, RDMs, VMFS volumes & storage devices: `vmkfstools`

Power Off: hard off • Shut Down = soft with VMware tools • Reset = hard • Restart = soft
VM HW: Memory/CPU Hotplug - VMware Tools required. Multicore requires HW v8. BIOS based VM min 4MB RAM. EFI min 96MB. Mac OS X VMs must run on Apple HW. CPU or Memory (NUMA) affinity not available in DRS cluster. Guest OS must be on NUMA 0. Guest swap = Configured vRAM - Reservation) x 65%. otherwise balloon driver could cause guest kernel panic.
HT sharing modes: • Any - vCPUs can share cores with other VMs • None - vCPUs have exclusive use when scheduled • Internal - can share core itself if VM has 2 vCPUs, not 2 vCPUs then same as None.
Disk types: • Thick Provision Lazy Zeroed, default, pre-allocates. • Thick Provision Eager Zeroed - pre-allocates & zeros, better performance, slower create • Thin Provision - allocates on demand, monitor with "datastore usage" alarm. NES - with HW acceleration supports all 3 types - without only Thin.
RDM: can use SAN Snapshots, vMotion, SAN mgmt agents & NPIV. Needs whole LUN. Physical RDMs no VM snapshots, clones, templates, only migrates mapping file. Virtual RDMs clones/templates copied into vmdk. Snapshots, capture memory state, settings, disks. Can't snapshot physical RDMs or independent disks. Independent Disks: no snapshots. Persistent changes immediate & permanent. Nonpersistent changes lost on power-off or reset.
Snapshot Manager: Delete commits snapshot to parent. Delete all commits all snapshots before you are here. Go to revert to that snapshot. Revert to snapshot back to parent's snapshot you are here
VM Direct Path: allows guest OS to access physical PCI/PCIe devices directly. vMotion to reservation to VIM. Requires VM HW v7 & Intel VT-d or AMD (GMMU). Restrictions no vMotion (can on Cisco UCS with Cisco DVFS), FT, HA, DRS (cluster allowed or not), snapshots, hot add/remove, suspend, reload/replay. USB passthrough: Only VM can connect to each device. Autoconnect uses physical port location. Supported: DRS, vMotion. Not Supported: DPM, FT. Initial connection when powering on/unsuspending must be local (pre-vMotion). To connect vMotioned host to vMotioned host: • vMotion • vMotion • vMotion • vMotion (SCSI controllers) • BusLogic Parallel • LSI Logic SAS • LSI Logic Parallel • PVSCSI (IDE is ATAPI) PVSCSI (Paravirtual SCSI); at least HW v7, high-performance storage adapter. Not recommended for DAS. Guests: Win 2003, 2008, RHEL5. Not Supported: Record/Replay, FT, MSCS, RHEL5 boot disks. NPIV (N-Port ID Virtualization): share FC HBA port as multiple virtual ports, each with unique IDs. VMs associated with VMs. Allows per-VM LUN access. Disks: WWPN & WWNN to vpx file. Limitations: requires NPIV enabled FC switch, only RDMs, Host HBA's WWNs also need access to LUN, NPIV capable HBAs, no Storage vMotion. VM can't power on if WWNs in use. vMotion requires all RDM files on same datastore.
vNICs: Flexible 1-32-bit guests, vance without VMware Tools or vmxnet with VMware Tools • e1000 • Emulates F100 net card, default for 64-bit guests • vmxnet3 (enhanced) • vmxnet with enhanced performance. Requires VMware Tools • vmxnet2 (enhanced performance) & networking features, requires VMware Tools & at least HW v7. WOL supported on vmxnet, vmxnet2 or vmxnet3.
VMXNET: can manually assign in `vmx: ethernet.number=, addressType="static" & ethernet.number=, address=00:50:56:XX:XX:XX:22 (XX only 00-3F)`
ISO (TCP Segmentation Offload): enabled in VMkernel by default, must be enabled at VM level. Needs enhanced vmxnet, might change MAC. Jumbo frames: requires vmxnet2/3 or e1000. VDF: templates imported from local file system or web server. VDF files are compressed. Client validates VDF before importing. Can contain multiple VMs. OVA is single file & is cloned.
App: container containing one or more VMs, can power on/off, & be cloned. Metadata in VC's DB. Control: network control by vApp, vApp assigned to vApp. vApp assigned to vApp. Policies: Fixed - manual configuration • Transient - allocated from pool on vApp power on • DHCP

Resolution Path - Troubleshooting VMs <http://communities.vmware.com/docs/DOC-15963>
Recreate missing virtual disk (VMDK) header/description file <http://kb.vmware.com/kb/1002511>
Consolidating snapshots in vSphere 5 <http://kb.vmware.com/kb/2003638>

Links