





# 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+VCLVifs> • 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)  
**syslog.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

`--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/systemctl 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: `vicfg-cfgbackup -s /tmp/<hostname>.cfgbak` (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 reclaims 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 PSOD (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-auth`. Default password compliance plugin: `pam_passwdqdc.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 name server, 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 `vicfg-snmp`. Can send traps & receive polling (GET) requests. **Syslog** service is `vmyslogd`.

**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/DOC-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>

Shell Commands

# vCenter

**Maximums (per vCenter):** Hosts = 1000 VMs = 15000 Running VMs = 10000 Clients = 100  
 MAC addresses = 65536 Datastore clusters = 256 Maximums (per datastore) Hosts = 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 (2003 SP2/R2/SP1, 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 R2 • Oracle 10g R2 or 11g R1 • IBM DBP 5 fix pack 6 or 9.7 • Microsoft SQL Server 2005 or 2008  
**Users:** needs DBO 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 (<=5 hosts & <=50 VMs) • Oracle. RAM sizing: >=4GB for <=10 hosts/100 VMs, >=8GB for 10-100 hosts/100-1000 VMs, >=13GB for 100-400 hosts/1000-4000 VMs, >=17GB for >=400 host/4000 VMs. Limits: no IPv6, Linked Mode, MS SQL, Deb. Default username: root default 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 PSDM 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	VM console

Optional 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(VMTools), 8080/8443/60099(webservices), 9443 (Web Client), 10109/10111/10443(Inventory service), 51915(Auth proxy)

**Logs:** DB upgrade: `%TEMP%\CDDatabaseUpgradeLog 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) `Default log files: /VCVA/logs/var/log/vmware/vcenter/` `Windows Client installed: %TEMP%\vmmislog\` `Windows Client service: %USERPROFILE%\Local Settings\Application Data\VMware\VMware vCenter\` (log (0-9)) `Guest customization - Win: %WINDIR%\temp\vmware-vmc - Linux: /var/log/vmware-vmc/toolsdebug/PkgLog`

**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.  
 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.  
 Storage space consumer Sample - Allow space consumption of the datastore.  
 Network consumer Sample - Allows hosts or VMs to be assigned to network.

**Permissions:** user/group with role & 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 tasks by default. 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

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

vpxa, Thin pro, VUM, VADP Yes Yes Yes Yes Yes Yes  
 vMotion, HA, VDR Yes Yes Yes Yes Yes Yes  
 SLES (SUSE Linux Ext Server) for VMware Yes Yes Yes Yes Yes Yes  
 DRS, DPM, Storage vMotion, FT, VAH, Hot add, Linked mode, VM Console Orchestrator, Shield Zone, Serial port concentrator Yes Yes Yes Yes  
 DVS, NIC/0, SIOC, Host Profiles, Auto Deploy, Policy-driven Storage, Storage DRS Yes Yes Yes Yes  
 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. Key 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.  
**Expanding licenses:** vCenter - hosts are disconnected. ESXi - VMs continue to run, cannot power-on new VMs. Status: CPU, memory, datastore, 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. Can disable action without disabling alarm, but effects actions on all alarms. Disable for selected object, child continues. Default alarms not preconfigured with actions. Acknowledging alarm stops action, but alarm still visible. Reduce alarms with tolerance range & trigger frequency (default 5 mins). Monitor configuration  
**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:** Licensing (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 - which 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. Installer. 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. In host 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 & vMotion 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 healths. • 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/2003886>  
 Sysprep file locations and versions <http://kb.vmware.com/kb/1005593>  
 Firewall Ports <http://kb.vmware.com/kb/1010705>  
 vCenter client shortcuts <http://www.june.pl/articles/vmware/143-vcenter-client-shortcuts>  
 vSphere 5 Licensing, Pricing & Packaging [http://www.vmware.com/files/pdf/vsphere\\_pricing.pdf](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. NIC & 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; manage 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 recommendations are applied. Priority levels 1-5 (1 is highest). Derived from pools created within 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 manual 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 (not suspended)*. Red conflicts - 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  
 VMCs = 16 USB Floppy drives = 2 Parallel ports = 4 Serial ports = 4  
 Remote consoles = 40 VMDirect/Flash drives = 4 Video RAM = 128MB

**Files:** `log` vMotion log file `vmsd` Snapshot metadata  
`.lck-XXX` Locking file on NFS datastore `vmns` Snapshot state file  
`log` VM activity log `vmss` Suspended state file  
`-log` Old VM log file `vmxk` Template header  
`nvram` BIOS or EFI settings `vmxv` Primary configuration file  
`rdm` RDM or Virtual Compatibility mode `vmxf` Extra configuration file for VMs in a team  
`rdmp` RDM in Physical Compatibility mode `vswp` Swap file for overcommitted memory  
`.vmdk` Disk descriptor (also raw virtual disk for hosted products)  
`-flat.vmdk` Raw pre-allocated virtual disk `-00000#.vmdk` Snapshot child disk  
`-ctk.vmdk` Changed Block Tracking file `-00000#.delta.vmdk` Snapshot differential file

`esxcli vm process list` for esxcli namespaces & commands relative to location. `localcli` bypasses hostd

**Shell Commands**  
 List running VMs: `esxcli vm process list`  
 List registered VMs (& displays <vmid>): `vim-cmd /vsmsvc/getallvms`  
 Show VM's power state: `vim-cmd /vsmsvc/power.getstate <vmid>`  
 Power on VM: `vim-cmd /vsmsvc/power.on <vmid>`  
 Power off VM: `vim-cmd /vsmsvc/power.off <vmid>`  
 Register VM: `vim-cmd /solo/register /vms/volumes/vmname/vmname.vmx Unregister VM: vim-cmd /vsmsvc/destroy <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 • **Shutdown** = 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 clusters. vMotion of VMs must be back on host. 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 creation. 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 Disk Modes 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. `gov` reverts to that snapshot. Revert to snapshot back to parent's snapshot you are here  
**VM Direct Path:** allows guest OS to access physical PCI/PIC device directly. vMotion to reservation to vMotion. 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 VM, snapshots, hot add/remove, suspend, reload/replay. USB passthrough: Only 1 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 (no vMotion). To reconnect vMotion, to reconnect vMotion, to reconnect 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/Reply, 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 WWNNs 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 Ethernet NIC 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.  
**MAC address:** can manually assign in `vmx: ethernet.number>.addressType=static" & ethernet.number>.address=00:50:56:xx:yy:zz` (XX only 00-3F)  
**ISO (TCP Segmentation Offload):** enabled in VMkernel by default, must be enabled at VM level. Needs enhanced vmxnet, might change the MAC. **Jumbo frames:** requires vmxnet2/3 or e1000.  
**OVF:** templates imported from local file system or web server. OVF files are compressed. Client validates OVF file before importing. Can contain multiple VMs. OVA is single file & is cloned.  
**vApp:** container containing one or more VMs, can power on/off & be cloned. Metadata in VC's DB.  
**Control:** network control by vApp, vMotion assigned by vApp. vMotion PEs to VMs. 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