Getting the Most Out of Virtualization of Your Progress OpenEdge Environment

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Agenda

- Virtualization
  - Terms, benefits, vendors, supportability, etc.

- Best practices
  - Disk layout, network, snapshots, etc.

- High Availability
  - Clustering, fault tolerance, backup, etc.

- Replication
  - vSphere SRM
Virtualization
Virtualization – What is it?

- Way of running multiple OS and applications on a single computer
- Each OS runs within its own Virtual Machine (VM)
  - (virtual) CPU, memory, disk allocation
- Global resource control governed by hypervisor
  - controls the host processor and resources
  - ensures that VMs are isolated from each other
Virtualization – Benefits

- Lets you utilize your hardware more effectively
- Allows you to centrally manage your infrastructure
- Speeds up new deployment
- Supports legacy OS and applications
- Permits encapsulation and isolation
- Reduces overall IT expenses
- … and so on
Virtualization – Vendors

- VMware
  - Workstation, ESXi, vSphere
- Microsoft
  - Hyper-V
- Oracle
  - Virtual Box, Solaris zones
- RedHat
  - Xen, RHEV
- IBM
  - LPAR, WPAR
Virtualization – Progress Support

- Common questions
  - Does Progress support VMware version X.Y?
  - Does Progress support VEEAM backup?
- No – we don’t
  - The hypervisor vendor does.
- So what does Progress support then?
  - The underlying OS running as VM on the hypervisor
Virtualization – Vocabulary

Abbreviations
- VM = virtual machine
- HA = high availability
- DR = disaster recovery
- OE = OpenEdge
- DRS = distributed resource scheduler
- LUN = logical unit number
- SAN = storage area network
- SRM = site recovery manager
- FT = fault tolerance
- vDisk = virtual disk
- vCPU, vMem = virtual CPU, virtual memory
Best Practices
Best Practices

- In a nutshell VM is a set of files
  - configuration - .vmx
    - CPU, memory, NIC.. allocation
  - disk(s) - .vmdk
  - RAM - .vmem
  - VM swap file - .vswp
  - log, BIOS …
- Possible to scale up or down resource allocation after VM creation
- Always install VMTools, Synthetic drivers for your VM
Best Practices – VM CPU Allocation

- More vCPUs do not always guarantee best performance
- Remember that your VM is not the only VM on the host!
- Example
  - Dual quad with HT enabled
  - 16 cores available
  - 8 vCPUs assigned for my database VM
  - Other VMs using 10 cores at the moment
  - My VM has to wait for a time slice till 8 cores are free
- Make sure that DBA has an access to host performance stats
Best Practices – VM Memory Allocation

- Generally more memory – better
  - Larger –B/-B2 makes your database faster
  - Do not go over memory allocated for the VM

- ESX host creates a .vswp file equal to the amount of allocated physical memory
  - Not entirely true if reservation is in play
  - 64GB memory allocation creates 64GB .vswp file
  - For 10 VMs that’s 640GB disk space

- Unnecessary memory allocation can lead to disk space issues
  - Hard to track
Best Practices – CPU & Memory Allocation

- CPU/Memory “hot plug”
  - If supported by the host OS
- Rule of thumb
  - Start with less resources
  - Scale up for performance if needed
Best Practices – VM Disk Allocation

- Considerations when creating a virtual disk
  - How the disk is created
  - When the space is allocated

- 3 types of disk provisioning
  - Thick lazy zeroed
    - vDisk not zeroed upfront
  - Thick eager zeroed
    - Entire vDisk zeroed out before becoming accessible
  - Thin provision
    - Instant access, allocation on demand

- Database VM does not belong on thinly provisioned vDisk
Best Practices – VM Disk allocation

- RAW device mapping (RDM)
  - vDisk in native OS format directly on SAN
  - Benefits from SAN snapshots and replication
  - Native SAN optimization
  - Configure with care
    - Use virtual compatibility as opposite to physical
    - LUN has to have same LUN ID across all the hosts
    - Test before going live!
Best Practices – NIC Configuration

- Several network adapters available
  - usage depends on the guest OS
  - vmxnet2, vmxnet3, e1000, e1000e …
- Usually selected by default on VM creation
  - vmxnet3 – paravirtualized NIC
  - e1000e – emulation of Intel Gb Ethernet Controller
- Whenever possible use vmxnet3
  - Less CPU intensive
  - Gives better throughput
Best Practices – NIC Configuration

- VMDirectPath I/O “passthrough”
  - In case of “network intensive” applications
    - Hundreds of AppServer clients
    - Hundreds of Client-Server connections
- Has to be enabled on the device level first
  - Then it becomes available for the vNIC
- While it improves performance, there are limitations
  - Complicates HA
  - Up to 6 devices
Best Practices – Snapshots

- Copy of the virtual machine's disk file (VMDK) at a given point in time
  - Offline and online
- Great when installing OS, app patch or a new version
- Snapshots are NOT backups!
- Not for prolonged use
  - Can and will cause performance issues
- Careful when taking it while having a database running
  - Use a quiet point
  - Verify that a quiet point’s been enabled
  - … Unless you like playing Russian roulette
Best Practices – Snapshots

- Taking snapshot “willy-nilly” could cause DBDOWN with
  - bkioRead: Insufficient disk space during .... (9450)
  - SYSTEM ERROR: read wrong dbkey at offset ... (9445)

- VMware provides hooks
  - Requires VMTools
  - Pre-freeze-script & post-thaw-script

- General solution for any tool using snapshots under the hood
  - Pre-freeze-script: proquiet db –C enable
  - Post-thaw-script: proquiet db –C disable
Best Practices – Snapshots

- **Independent vDisk**
  - Not affected by snapshots

- **Non-persistent**
  - Content of non-persistent vDisk is discarded on power off
  - Do NOT place your database on non-persistent vDisk
  - Application/client temporary files
    - dbi, lbi, rcd, srt ....

- **Persistent**
  - Any static part of your application
  - Database backed up by online probkup
Best Practices – DRS

- Distributed resource scheduler
  - Optimizes workload with available resources
    - Based on CPU, memory & storage load of a host
    - Live migration to a less utilized host
  - Resource prioritization per VM (application)
  - Isolation based on business
    - Resource pools
    - Production, QA, development, testing, etc.
  - Affinity rules
    - Where and how VMs can run
    - Both Application server VM and database VM have to start
    - OE Replication source and replication target VMs always on different hosts
    - At least one failover cluster node have to be on a different host than the rest
High Availability
High Availability

- Progress HA/DR solutions
  - Failover clusters
  - OE Replication
  - (NameServer) load balancing
- VMware provides their own on the VM level
  - vMotion
  - Storage vMotion
  - Fault tolerance
  - Cluster
    - HA
    - DRS
High Availability

- VMware High Availability features can enhance resilience and uptime of OpenEdge processes
  - Database
  - AdminServer
  - OE Management & Explorer
  - AppServer & WebSpeed brokers
  - OE Application itself
- Let’s drill down
High Availability – vMotion

- vMotion
  - Migration of a VM between 2 different hosts
  - Cold
    - Offline
  - Live
    - Online

- Live vMotion
  - Quick way of offloading a VM from a busy host (while VM is powered on)
  - Can be automated on ESX cluster level to balance server utilization
  - Minimum or no business disruption
High Availability – Storage vMotion

- **Storage vMotion**
  - Enables live migration of virtual disks on the fly
  - Way of offloading an online VM from a busy disk subs
  - Performance considerations

- **Cannot prevent VM or ESX host failure**
  - It will bring the VM up and running
  - There will be a business disruption
High Availability – Fault Tolerance

- Fault tolerance
  - Not a load balancing solution
  - Protects VM against ESX host failure
  - Prevents un-planned downtime
  - Requires 2 ESX hosts
  - Dedicated network
  - Synchronous replication
High Availability – Fault Tolerance

- Considerations
  - Additional CPU/Memory allocation might be required
  - Fast network
  - Best suited for:
    - Webserver/JSE VM
    - OE Management/Explorer VM
    - AppServer VM
    - VM hosting your application
  - Always test and evaluate results
Replication
### Replication

- **vSphere SRM**
  - SRM – Site Recovery Manager
  - Provides replication of powered on VM to a secondary site
  - Provides tools for failure testing
    - Encapsulation
  - Can replicate all vDisks or some
  - Does not require 2 SANs
  - Requires
    - 2 vCenters
    - Extra appliances
Replication

- vSphere replication
  - Not “online”
  - Minimum RPO is 15 minutes
  - Done by using vDisk deltas
    - Similar to after imaging
  - Use case: AppServer, WebSpeed and application VMs

- Storage replication
  - Online
  - Based on EMC SRDF technology
  - Disk level replication
  - Use case: Database VM
vSphere SRM Replication

SRM Demo
Summary
Summary

- Virtualization is here
  - Whether you like it or not
- Excellent QA/testing capabilities
- Rapid deployment of new servers
- DR/HA solution out of the box
- Application isolation
- Extends the life of legacy apps
- Not a “free lunch” universal solution
  - Hypervisor still has and will have a performance overhead
- Sometimes real (physical) hardware is better
  - YMMV, test!