HERAFLUX TECHNOLOGIES

SQL Server High Availability: After Virtualization

SQL PASS Virtualization Virtual Chapter
September 11, 2013

About David Klee

vmware vEXPERT 2013

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Database Administrator 2008
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About Heraflux Technologies

- Consulting services focused around business-critical data
- Areas of Focus:
  - Health and Stability
  - Performance Optimization
  - Virtualization and Cloud Enablement
  - Infrastructure Architecture
  - Risk Assessments
  - High Availability
  - Disaster Recovery
  - Capacity Management
  - Training and Education
- www.heraflux.com

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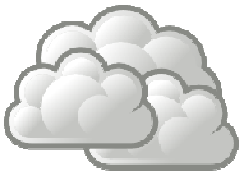
Agenda

- Goal: Less late night phone calls for you! How?
- Define High Availability (HA)
- Review SQL Server HA features
- Virtualization HA features
- How to select and combine the right features
- Virtualization-layer HA configuration tips



What is High Availability?

- "…system design approach and associated service implementation that ensures a prearranged level of operational performance that will be met during a contractual measurement period." – Wikipedia at http://tinyurl.com/mlhud8
- Distinguish between planned and unplanned downtime
- Metrics to care about:
  - Mean Time to Recovery (MTTR)
  - Recovery Time Objective (RTO)
- High Availability is not Disaster Recovery

SQL Server High Availability Options

- No HA (stand-alone instance)
- Traditional shared-storage clustering with WSFC
- Database-level mirroring
- AlwaysOn Availability Groups
- Replication
- Log shipping

Microsoft® SQL Server®

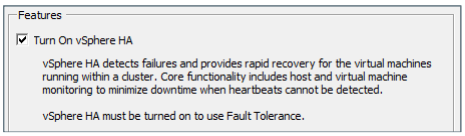
Why Use SQL Server HA Features?

- Pros
  - Reduce downtime for unplanned outages
  - Reduce downtime for planned outages, such as maintenance or upgrades
  - Reduce / eliminate single points of failure

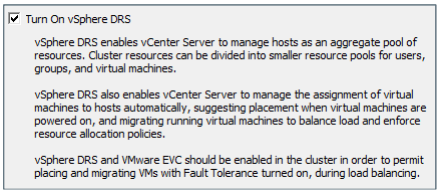
- Cons
  - Complexity
  - Application compatibility
  - Cost / Budget
  - Internal supportability
  - Potential performance impact

Virtualization High Availability

- VMware vSphere and Microsoft Hyper-V
- Use VM HA to buffer hardware component failures
- You probably already have it!
- Host-level HA features - resiliency
  - VMware vSphere High Availability (HA)
  - Microsoft Hyper-V failover cluster & SCVMM

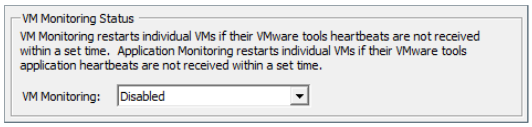


- VM-level HA features
  - VMware vSphere Distributed Resource Scheduler (DRS)
    - Automatic placement of VMs on remaining hosts for resource maximization
  - VMware Fault Tolerance (FT) *



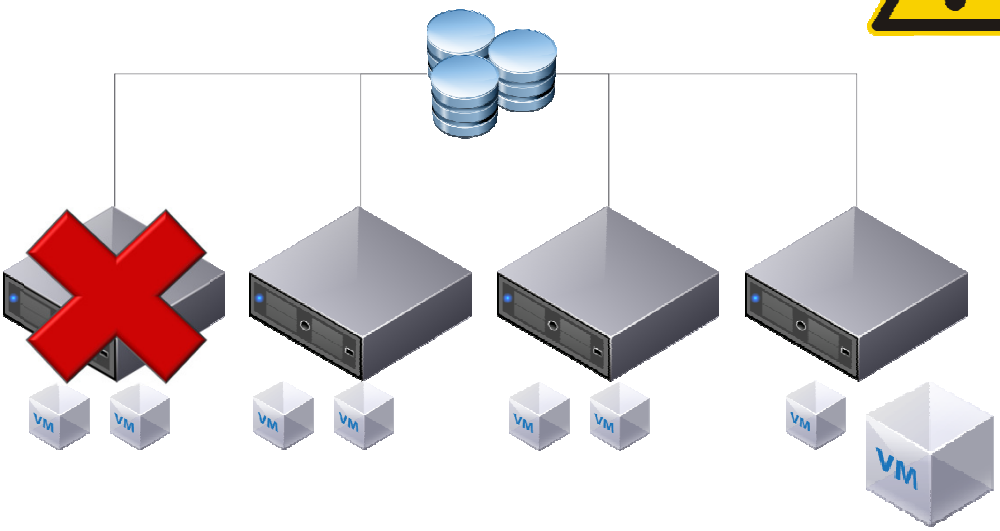
What does VM HA *not* do?

- Will not buffer against required reboots
- Will not automatically reboot VMs that have guest failures (i.e. BSOD)
  - But additional features or products can help you!
  - VMware VM HA Heartbeat even includes a screenshot of the console before it resets your VM
  - Third-party utilities can help monitor for VM OS failures



- Will not *eliminate* downtime from hardware failures
  - VMware Fault Tolerance – only VMs with 1vCPU
- Will not completely protect you from the architecture
  - i.e. blade chassis failure, path down, SAN failure

Virtualization High Availability



What Level of Protection?

- Criticality of the application?
- What is the cost of an outage?
- Planned downtime window duration?
- Unplanned downtime MTTR for all reasonable scenarios?
- Organizational downtime SLAs / RTOs?
- Available hardware in reserve for host failures?
- Edition of SQL Server / budget limitations?

Your PC ran into a problem and needs to restart. We're just collecting some error info, and then we'll restart for you. (0% complete)

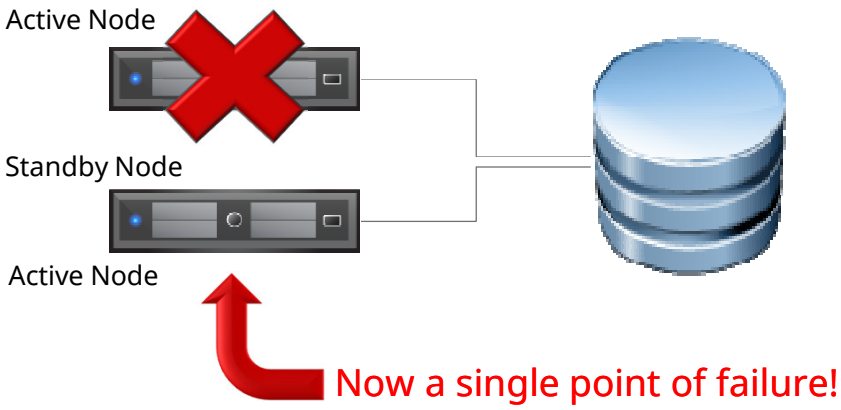
If you'd like to know more, you can search online later for this error: HAL_INITIALIZATION_FAILED

How To Select The Right Level

- Let the demand and numbers drive the technology!
- Examine the criticality of the system
- Determine unplanned outage MTTR / RTO
- Determine average window of time for planned outages
- Examine how you normally do things today
  - Is it time to overhaul your processes?
- Don't overcomplicate the design!

Reduce Risk

- Single best example from my years as a DBA…
  Two-Node SQL Server Cluster

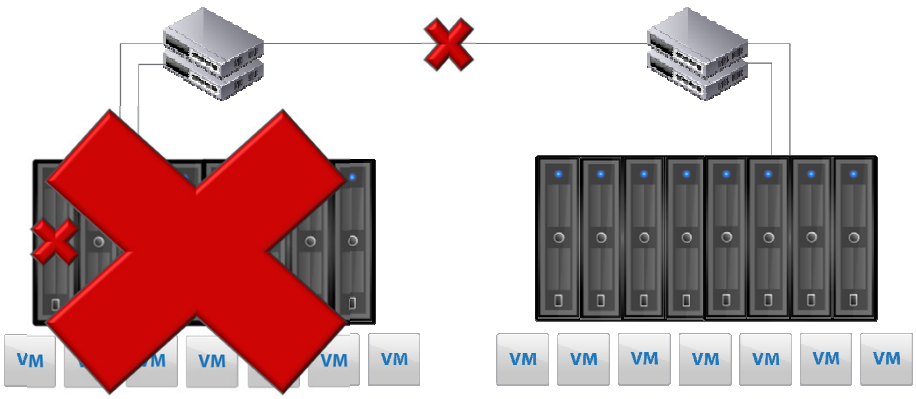


Common Scenarios

- VM HA + Single instance SQL Server for pre-production
- VM HA + SQL Server Cluster for production (pre-v2012)
- VM HA + SQL Server AlwaysOn Availability Groups (v2012+)
- VM HA + Single instance SQL Server for production Tier-2 applications (i.e. corporate antivirus, utility, etc. DBs)
- Tiers of criticality and tested HA solutions
  - Tier 1 (30 seconds): VM HA + Sync Availability Groups
  - Tier 2 (5 minutes): VM HA + Async Availability Groups
  - Tier 3 (30 minutes): VM HA Single Instance

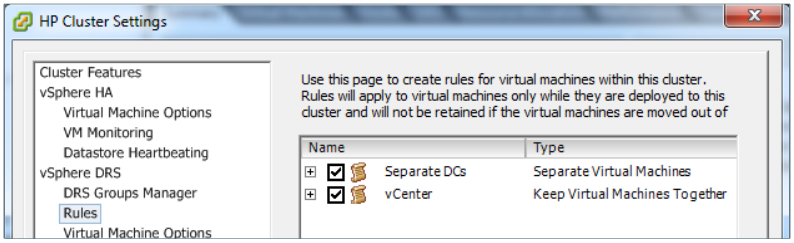
Failure Domains

- N+1 physical hosts does not always work
- Example: 16-node virtualized cluster – two blade chassis



Virtual Machine Placement Rules

- Pin VMs to certain hosts
  - Ex. vCenter, SCVMM, hardware dependency, SSD read-caching
- Keep VMs together
  - Ex. Application middle tier & database servers
- Separate VMs
  - Ex. Multiple nodes in a SQL Server Availability Group



Virtualization HA Configuration Tips

- Use cluster-level affinity / anti-affinity rules to group or separate critical VMs
- Set VM-level startup options
  - Ex. Database server before the application server
- Set startup priorities so business-critical VMs come up before secondary priority VMs
- Ensure that you have the right amount of spare resources to handle host failure scenarios

Demonstration

VMware vSphere HA Configuration

Conclusions

- Augment your SQL Server HA strategy with VM-level HA to reduce the hardware failure risk
- Enable VM-level HA through the hypervisor cluster-wide
- Ensure you have available resources to handle host failures
- Keep the architecture as simple as possible
- Work with your infrastructure admins to ensure no (reasonable) single points of failure
- ***Better resiliency means less unplanned late nights for you (and outages for your users)!***


Any Questions?
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21