* Diagnosing Performance Problems
  + Check Host and Guest CPU Problems
    - User Perfmon
    - vCenter console download
    - ESX top (task manager)
      * % used column is over 75% add CPU
  + Check Host for CPU Thrashing
  + Check Host and Guest for Disk IO latency
    - Identify what host is reporting on the LUN
* Balloon Memory Driver
  + Used by host OS to request memory back from the guest OS
    - Happens when host is out of RAM and needs it
  + Random process eating memory via Task Manager
  + Keep balloon memory driver turned on for memory allocation
  + Would see it in Host OS on vSphere
  + Won’t take SS memory if it is at the min memory level
  + Setting for balloon memory driver in VM properties
  + Take lock pages in memory off
    - Tells OS to page everything to disk
  + Balloon memory driver releases memory once it is done
  + Memory really needed is the reserve setting
    - Reserve setting is what is needed to run the applications
  + Found in Host machine
* Memory Duplication Options
  + Great for OS memory
  + If there are multiple copies of the same file, the host will pick one and get rid of the others creating pointers to the main file
  + Essentially provides more RAM
  + Doesn’t work at all for SQL Server
    - Unless…multiple SQL Servers have the same pages in cache
  + This will run constantly to dedup so patching will not be affected by this
* Storage Configuration Options
  + IO is the same if the disks are physical or virtual
  + Monitoring pools on the SAN - !Get them!
  + Use automatic tier adjusting technology if possible
    - Gives ability to buy a flash of drive that you can put in a pool
    - Not good for T-logs and tempdb
    - Check blog article on SQLMag.com
  + 3 ways to present storage to VMs
    - VM decay
    - iSCSI
    - pass thru disks
  + Keep OS, data, logs, tempdb on separate disks if possible
* Storage De-duplication
  + Can greatly improve overall performance
  + By de-duplicating OS virtual disks, we save much less data to the array
* VMware Para-virtualization Driver
  + Optional driver for vSphere VMs
  + Recommended for high IO workloads
  + Configured via VM properties
    - Select SCSI Controller
    - Change Type
* Monitor, Monitor, Monitor
  + Did I mention that you need to monitor
  + Watch all levels of the environment
    - SQL Server
    - Guest
    - Hypervisor
    - Host
    - Storage
* Some Pefmon Counters to Monitor
  + Reads/Writes per second
  + Seconds per Reads/Writes
  + Disk Queue
  + Page Life Expectency
  + System Processor Queue
  + VM Disk
  + VM Memory
* Right choice, by accident or your decision
* Data growth is huge
  + Companies storing more
  + Consumers create more i.e. Pics, email, text
* Who will manage the data?
* Who will analyze the data?
* Data roles
  + DBAs
  + Data analysts
  + Database developers
  + BI/Data Scientists
* #1 DBA Task – Backups
  + Protect the data!
    - Validate a good backup exists for all production databases
    - Without the data, applications useless/companies exposed
  + Backup Types
    - Full
    - Differential – changes since the last full backup
    - Transaction log – records every database change
    - File and file group
  + Recovery Models – change can be made to model database
    - Full
    - Simple
    - Bulk Logged
* SQL Power Doc
  + Discover, Document, & Diagnose SQL Server Services
  + <https://sqlpowerdoc.codeplex.com>
* What it documents
  + Service details for all installed SQL Server Services
  + Database Engine
    - Configuration, security, server objects
    - Databases
      * Configuration, database objects, service broker, storage, security
    - SQL Agent
      * Configuration, Jobs, Alerts, Operators
    - Windows
      * Machine, Operating System, Software, & Services
* What it works with
  + SQL Server
    - All editions
    - All versions 2000 and higher
  + Windows Azure SQL Database
  + Windows
    - All editions
    - Server: 2000 and higher
    - Client: XP and higher
* How it works
  + Step 1
    - Discover SQL Server Services
    - Collect Information
    - Persist to Disk
  + Step 2
    - Generate Reports
* What do you need
  + Powershell 2.0
  + Server Management Objects
  + Excel 2007 or higher
  + Windows: Admin, SQL: sysadmin
* What you get
  + Database Engine Configuration Report
    - Services, Server, Database, Agent
  + Database Engine Database Object Report
    - Tables, Views, Procedures, Function, Types
  + Database Engine Assessment Report
    - 100+ checks against common configuration issues that cause problems
  + Windows Configuration Report
    - Machine, Operating System, Software, and Services details