VirtualCenter 2 Diagnostics

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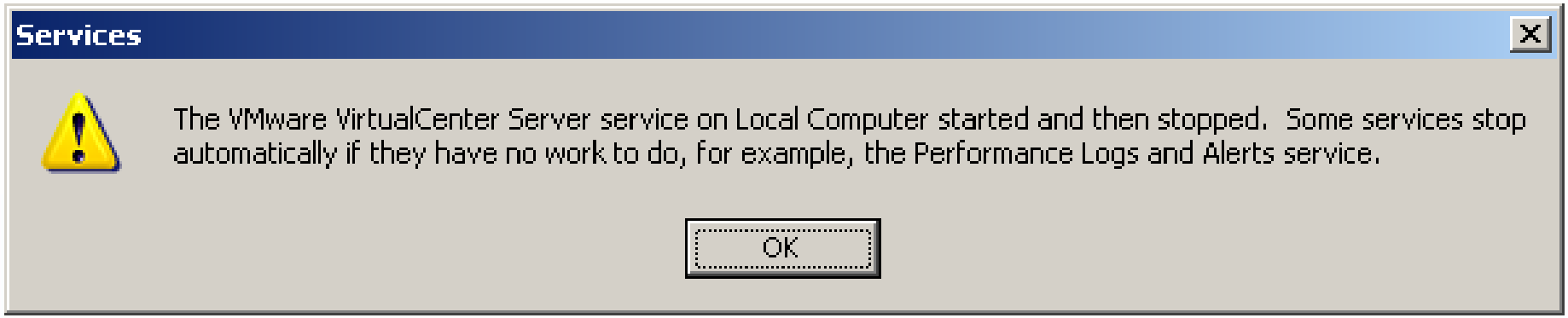
VMWORLD 2006

Purpose

- Overview of VirtualCenter 2 diagnostic data sources
  - Maximize VC availability and uptime
  - Understand data needed by VMware technical support to diagnose and resolve issues

Has This Happened To You?



Agenda

- Windows OS
  - Event logs
  - Environment variables
- VirtualCenter Server
  - Events and Alarms
  - Log files
    - Types
    - Locations
    - Tuning and tweaking
- Advanced topics
  - Managed Object Browser
  - VPX Operational Dashboard
- Troubleshooting Walk-through

Warning

- The configuration changes mentioned in this presentation are not appropriate for all environments
- Please do not arbitrarily modify any of these settings without thoroughly testing and understanding the impact on your production systems
- Many of the operations discussed here should only be performed when working directly with VMware technical support

About VPX

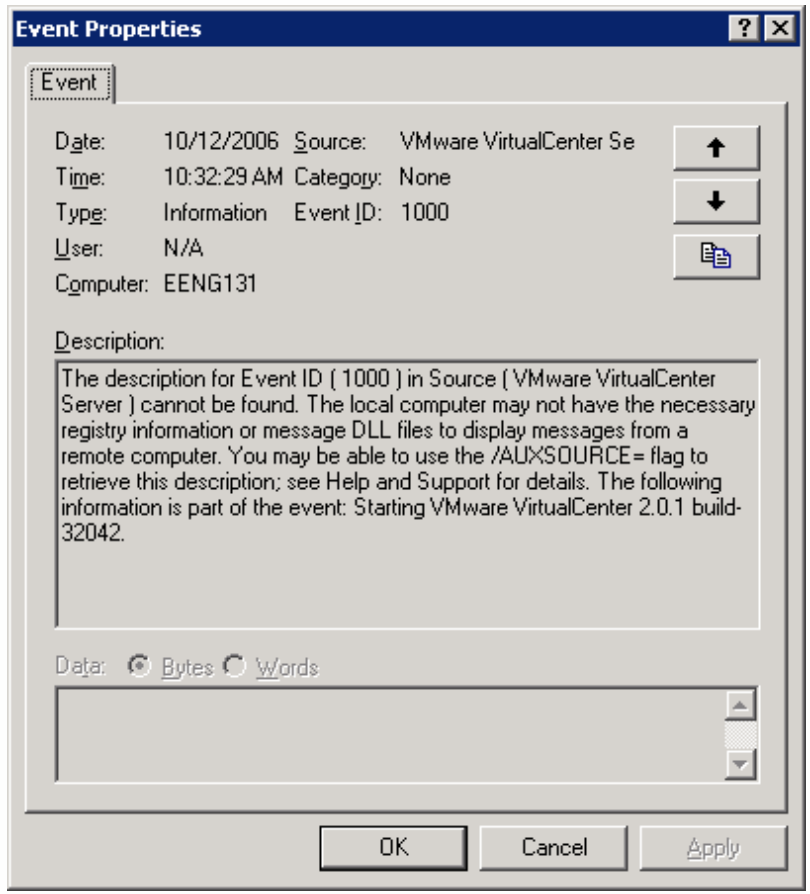
- VPX is the internal VMware name for VirtualCenter
- Many of the executables and configuration files are based on this name:
  - **`vpxd.exe`** VirtualCenter Server service
  - **`vpxd.cfg`** VirtualCenter Server configuration
  - **`vpxa`** VirtualCenter Agent

Windows OS

- Event logs
  - Application events
  - System events
- Environment variables
  - Local SYSTEM account
  - User accounts

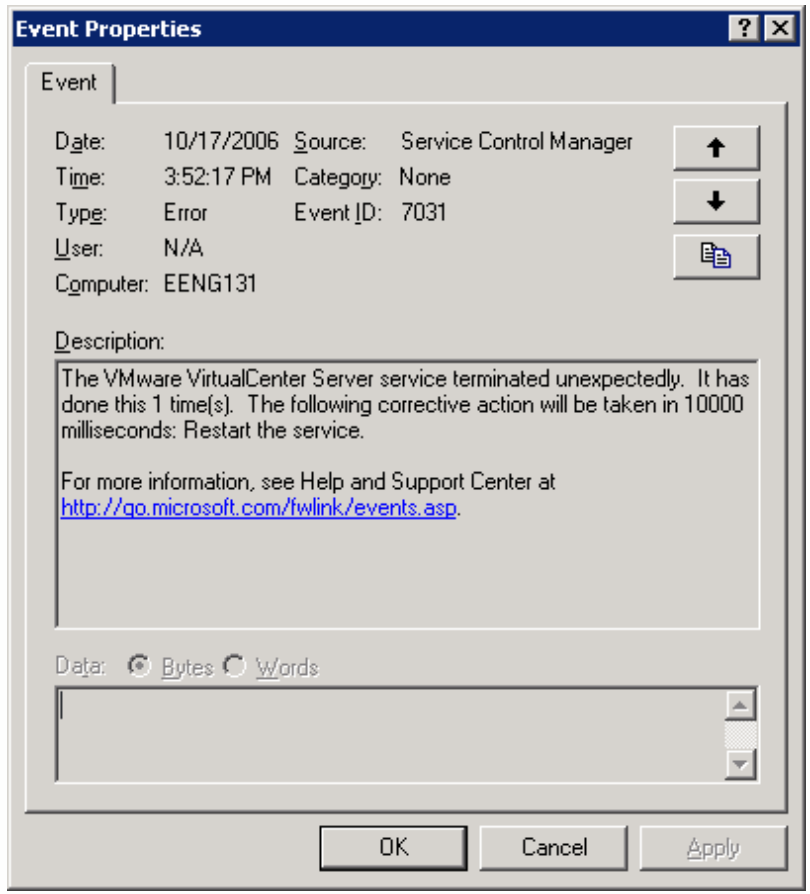
Windows Application Event Log

- VirtualCenter Server writes events to the **application** event log
  - Always Event ID 1000
  - Always prefixed with warning about the event description missing



Windows System Event Log

- The Service Control Manager logs events to the **system** log
  - Start, Stop, Recovery
- VirtualCenter Server service recovery properties are set to restart on first failure
- The primary value of the event logs are to identify problems with the operating system, hardware, or required services such as a database



Windows Environment Variables

- Certain aspects of VirtualCenter Server are affected by environment variables
  - Configuration files
  - Log files
- Values vary depending on system configuration
  - Regular user account
  - Local SYSTEM account

Windows Environment Variables - SYSTEM

Variable Name	Typical Value
%ALLUSERSPROFILE%	C:\Documents and Settings\All Users
%USERPROFILE%	C:\Documents and Settings\Default User
%SYSTEMROOT%	C:\WINDOWS
%TMP% %TEMP%	%SYSTEMROOT%\TEMP

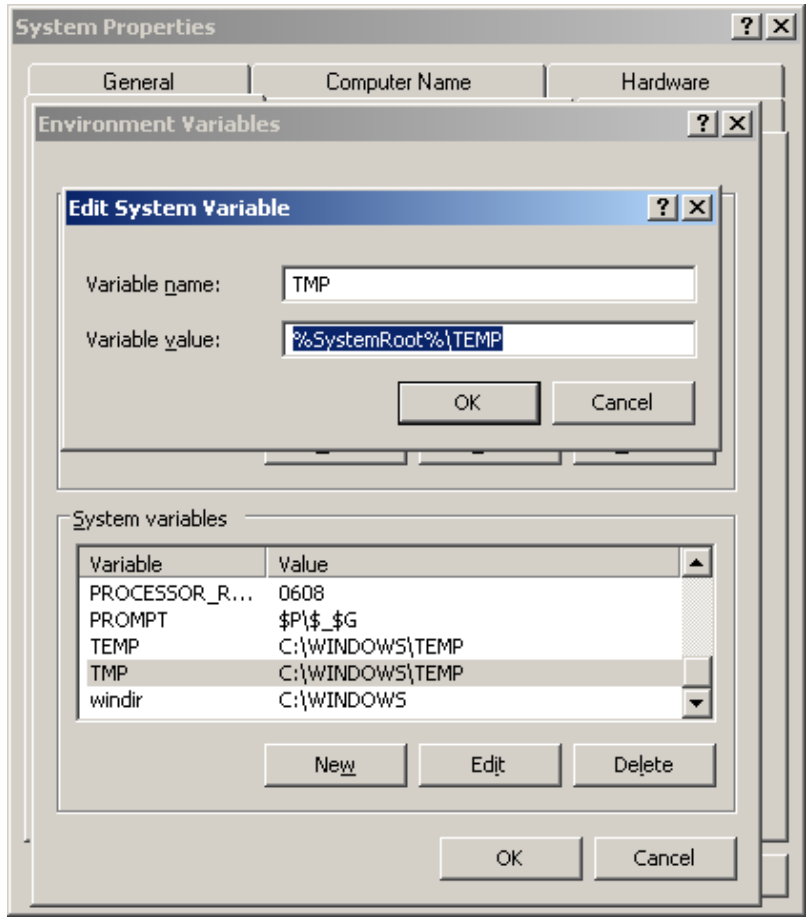
Windows Environment Variables – User Account

- User accounts have a private temp directories
- Remote Desktop sessions use numbered subdirectory
  - Deleted after logout
  - Look into **`flattemp.exe`** for more details
  - **`mstsc /console /v:<server name>`**

Variable Name	Typical Value
`%USERPROFILE%`	`C:\Documents and Settings\%USERNAME%`
`%TMP% %TEMP%`	`%USERPROFILE%\Local Settings\Temp` `%USERPROFILE%\Local Settings\Temp\#`

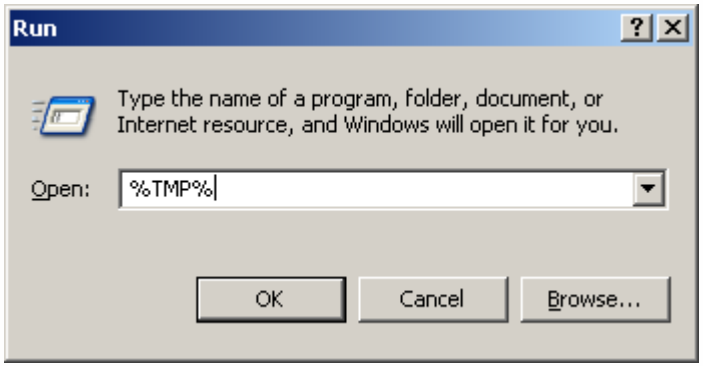
Check or Modify Environment Variables

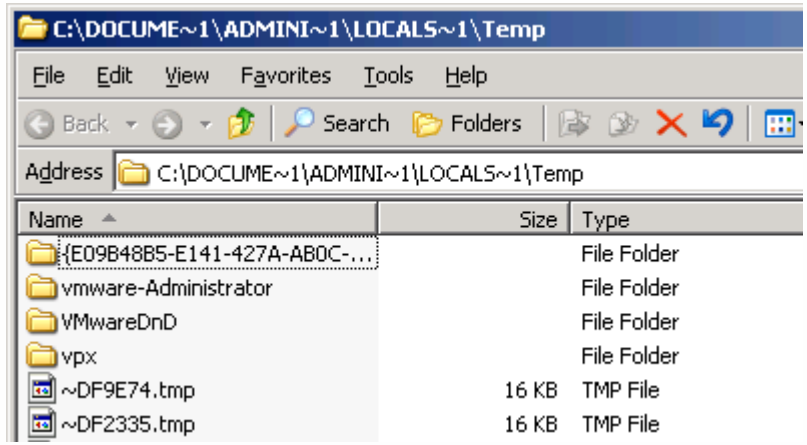
- System Properties, Advanced tab
  - Environment Variables button
- For the currently logged-in user, run **`set`**



Finding the Temp Directory

- A quick way to open the current user's temp directory is to use Start > Run and enter **%TMP%**



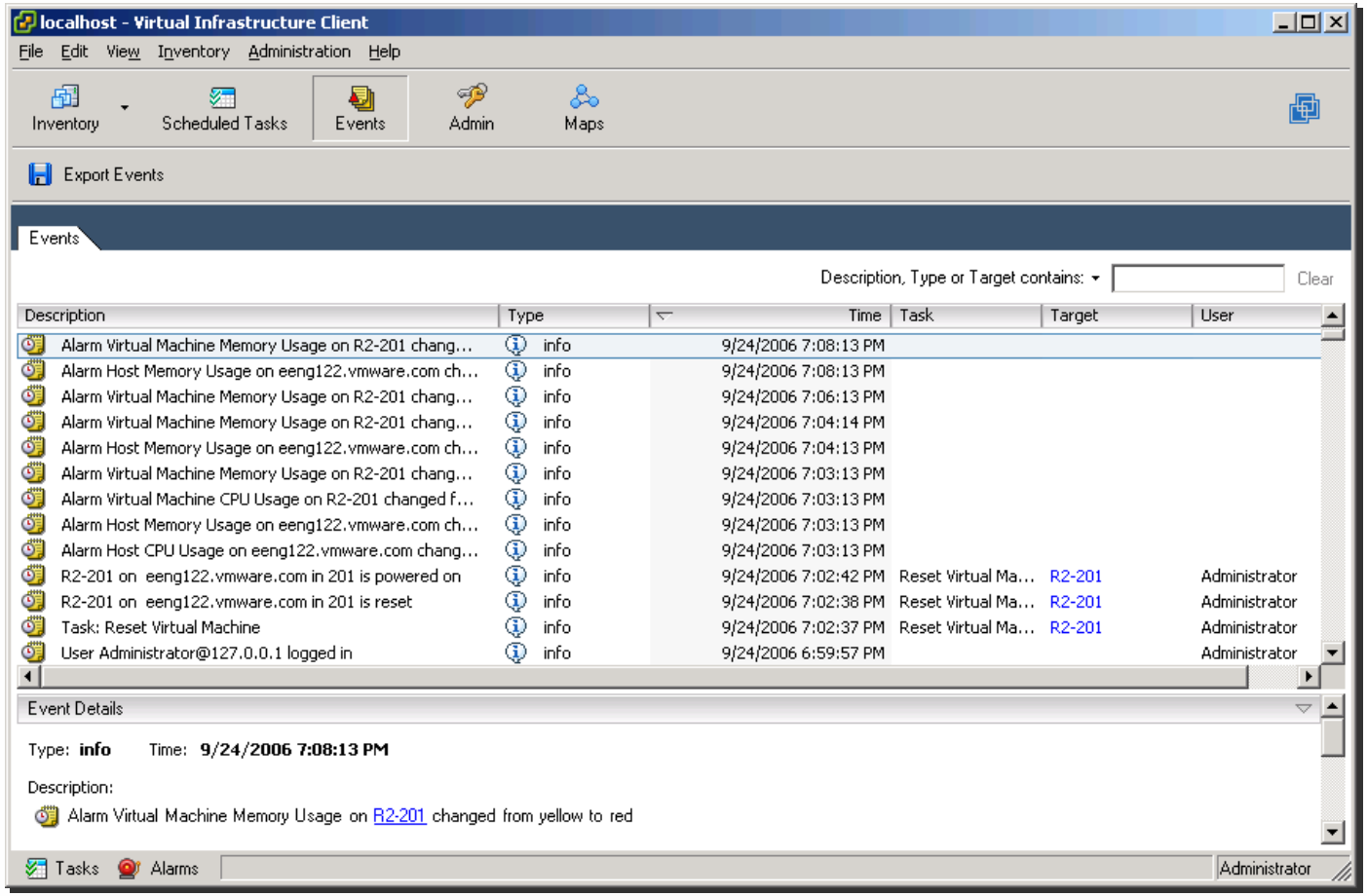


VirtualCenter Server

- Events and Alarms
- Log files
  - Types
  - Locations
  - Tuning and tweaking

VirtualCenter Events and Alarms

- VirtualCenter Server logs events and alarms
  - VI Client logins
  - VM power operations
  - Memory and CPU utilization alarms
- Events can also be exported to a file for analysis
  - CSV, Excel, HTML formats
- Click the Events button in VI Client

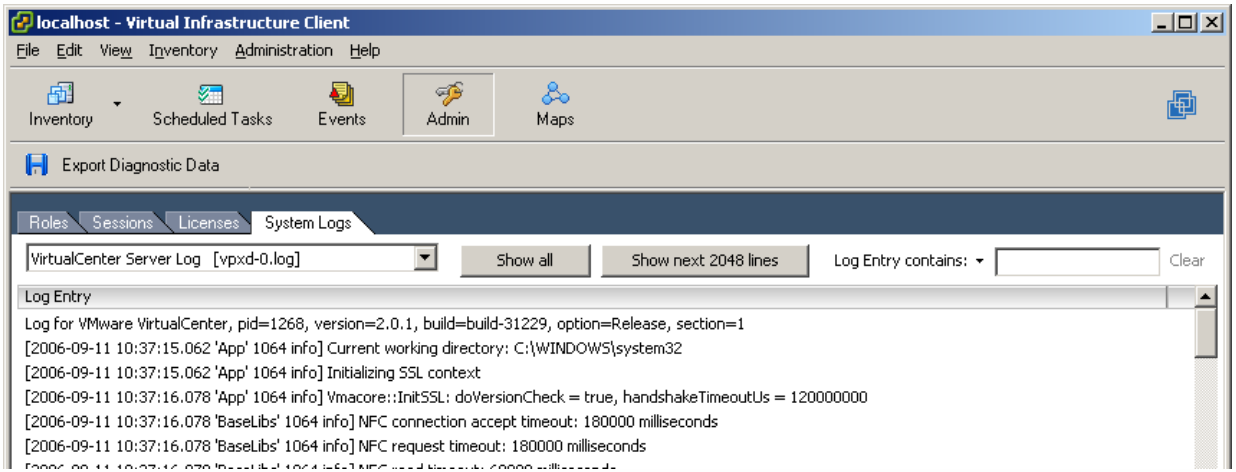

localhost - Virtual Infrastructure Client
File Edit View Inventory Administration Help
Inventory
Scheduled Tasks
Events
Admin
Maps
Export Events
Events
Description, Type or Target contains:
Clear
Description Type Time Task Target User
Alarm Virtual Machine Memory Usage on R2-201 chang... info 9/24/2006 7:08:13 PM
Alarm Host Memory Usage on eeng122.vmware.com ch... info 9/24/2006 7:08:13 PM
Alarm Virtual Machine Memory Usage on R2-201 chang... info 9/24/2006 7:06:13 PM
Alarm Virtual Machine Memory Usage on R2-201 chang... info 9/24/2006 7:04:14 PM
Alarm Host Memory Usage on eeng122.vmware.com ch... info 9/24/2006 7:04:13 PM
Alarm Virtual Machine Memory Usage on R2-201 chang... info 9/24/2006 7:03:13 PM
Alarm Virtual Machine CPU Usage on R2-201 changed f... info 9/24/2006 7:03:13 PM
Alarm Host Memory Usage on eeng122.vmware.com ch... info 9/24/2006 7:03:13 PM
Alarm Host CPU Usage on eeng122.vmware.com chang... info 9/24/2006 7:03:13 PM
R2-201 on eeng122.vmware.com in 201 is powered on info 9/24/2006 7:02:42 PM Reset Virtual Ma... R2-201 Administrator
R2-201 on eeng122.vmware.com in 201 is reset info 9/24/2006 7:02:38 PM Reset Virtual Ma... R2-201 Administrator
Task: Reset Virtual Machine info 9/24/2006 7:02:37 PM Reset Virtual Ma... R2-201 Administrator
User Administrator@127.0.0.1 logged in info 9/24/2006 6:59:57 PM Administrator
Event Details
Type: info Time: 9/24/2006 7:08:13 PM
Description:
Alarm Virtual Machine Memory Usage on R2-201 changed from yellow to red
Tasks Alarms
Administrator

Log files

- Richest source of diagnostic information
- Plain text files
- Several ways to access and analyze
  - VI Client built-in log viewer
  - Export Diagnostic Data
  - Manually locate and open the logs

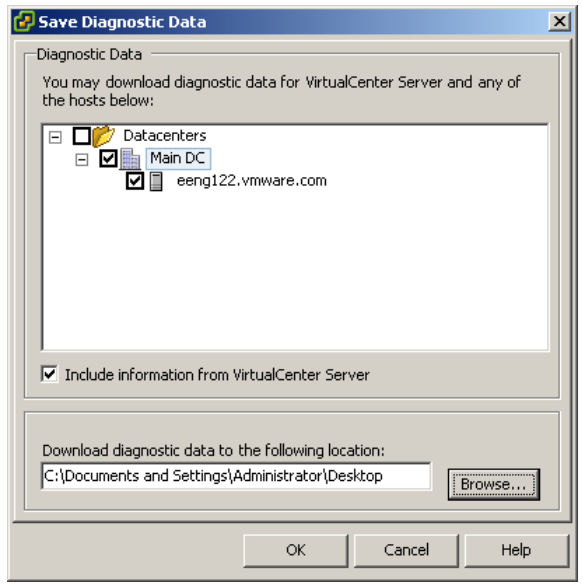
VI Client Built-in Log Viewer

- Click the Admin button, System Logs tab
- Works with VirtualCenter Server or ESX Server
- A filtering option is available to restrict the log entries
- This viewer is limited, especially for large log files



Export Diagnostic Data (EDD)

- Totally new feature in VirtualCenter 2
- Easiest and best way to get logs and other diagnostic data
- Downloads support bundles to the VI Client machine
- Also runs and downloads **`vm-support`** from ESX Servers

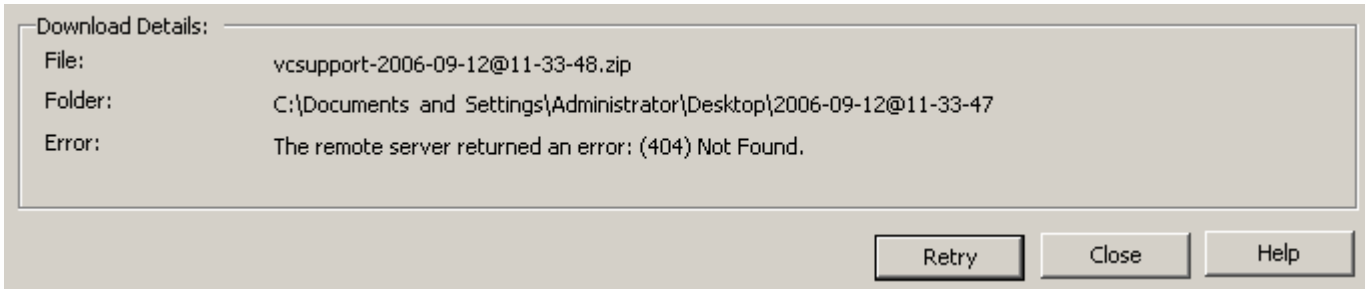


Export Diagnostic Data – Downloading

- VI Client must resolve the DNS names
- System (IE) proxy settings are used
- Connections use SSL encryption
  - Default certificates are self-signed
  - VI Client prompts with warning dialogs
  - Replace the certificates on ESX and VirtualCenter
    - See details in the Server Configuration Guide

Export Diagnostic Data – 404 Errors

- A (404) Not Found error may be seen when downloading
- VirtualCenter bundles are cleaned up after 10 minutes
  - One cause is waiting too long to dismiss the certificate warning
  - Must repeat the bundle generation process
- Troubleshoot by checking:
  - **`%ALLUSERSPROFILE%\Application Data\VMware\VMware VirtualCenter\docRoot\diagnostics`**

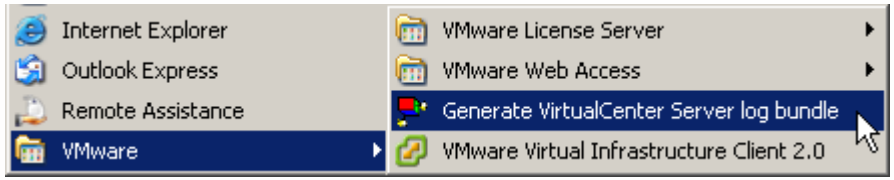


Export Diagnostic Data – ESX Server

- Bundles are not automatically cleaned up on ESX Server
- They are given cryptic names to prevent brute-force guessing
- If VI Client cannot download a bundle for some reason, it is possible to manually **`scp`** it from the ESX Server
  - **`/var/lib/vmware/hostd/docroot/downloads/`**

Generating VirtualCenter Log Bundle Manually

- Export Diagnostic Data may not always work
  - VirtualCenter Server will not start
  - VI Client cannot connect
- Generate the bundle manually
  - Start menu shortcut in the VMware program group
- The zipped bundle is saved to the current user's desktop
- This technique can also gather installation/upgrade logs



`vc-support` Script

- EDD and the Start menu shortcut both run **`vc-support.wsf`**
- The script intelligently gathers a variety of diagnostic data
  - VirtualCenter Server log files (**`vpxd`**)
  - Installation/upgrade logs
  - Windows event logs
  - Certain registry keys (VMware, ODBC, License Server)
  - VirtualCenter config file (**`vpxd.cfg`**)
  - Crash dumps, if present
  - DRS logs
- Can also execute manually from a command prompt:
  - **`cscript.exe "C:\Program Files\VMware\VMware VirtualCenter 2.0\scripts\vc-support.wsf" /z`**
- Read through the script to learn more

Manually Checking Logs

- Open logs in a text editor or other utility
- Logs may not be where you expect

Installation / Upgrade Logs

- Very useful for troubleshooting initial startup problems
- Located in the user's **%TMP%** directory
  - Avoid installing over Remote Desktop

Filename	Purpose
vmlic.log	License file test results
redist.log	MDAC QFE rollup install results
vmmsde.log	MSDE installation log
vmls.log	License Server installation log
vmosql.log	Database/transaction log initial disk allocation info
vminst.log	Majority of installation logging – check date stamps
vmmsi.log	VI Client installation log
VCDatabaseUpgrade.log	If DB was upgraded from VC 1.x
vpx\vpxd-0.log	Small stub log created during brief startup; do not confuse with actual vpxd logs located elsewhere

VI Client Logs

- Located in **`%TEMP%\vpx`**
- Named **`viclient-#.log`**, where # ranges from 0-9
- Logs rotate each time VI Client is started
- No way to control log file location, size, or retention

VI Client Log Verbosity

- If you are experiencing an issue that seems to be VI Client-related, enable the most verbose level of debugging and reproduce the issue
  - **`vpxClient.exe –log +sd`**
- Send the resulting logs to VMware technical support

```
usage: C:\Program Files\VMware\VMware Virtual Infrastructure Client
2.0\vpxClient.exe [-v | --reportversion] [-log <type>]

   -v or --reportversion sends a string to stdout and exits

   -log <type> defines the type of info to log; type can be any
combination of the letters ewcqsd, representing errors, warnings,
critical info, quick info, server messages and detailed info
respectively; it can be preceded by a + to add to the default
setting ewcq
```

VirtualCenter Server Service Logs

- Log location is relative to the **`vpxd.exe`** user's temp directory
  - **`%TMP%\vpx`**
- By default, **`vpxd.exe`** runs under local SYSTEM
  - **`C:\windows\temp\vpx`**
- **`vpxd.exe`** may run under a user account
  - SQL Server using Windows authentication
  - Corporate security policy
  - **`C:\Documents and Settings\username\Local Settings\Temp\vpx`**

Log Rotation

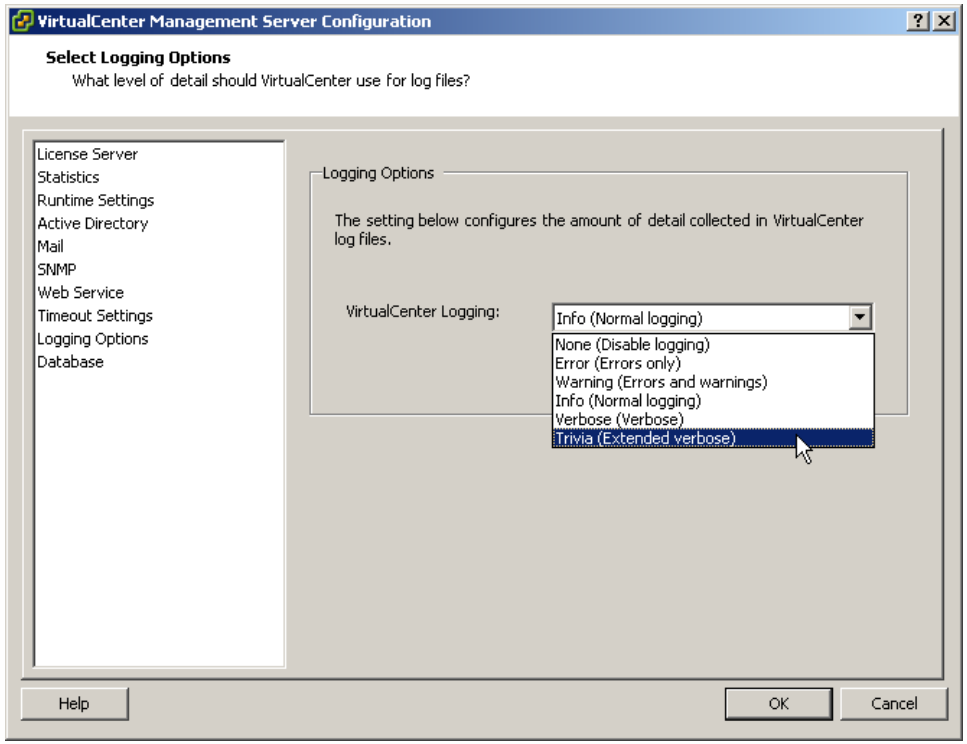
- Files are named **`vpxd-#.log`** (0-9 by default)
- Rotate on startup and when size limit is reached
- Circular logging
  - Starts over again with **`vpxd-0.log`**
- **`vpxd-index`** file contains the current log number
  - Easier just to sort by date

Controlling Logging

- Several knobs and levers to control log files
  - Detail level (none, error, warning, **info**, verbose, trivia)
  - Size of each log
  - Number of logs retained
  - Location (not recommended)
- Several ways to specify
  - VI Client GUI – can only set detail level
  - Configuration files
  - Database

Log Detail Level

- Use the VI Client to change the Logging Options
  - Administration > VirtualCenter Management Server Configuration…
- This method takes effect right away; does not require a restart

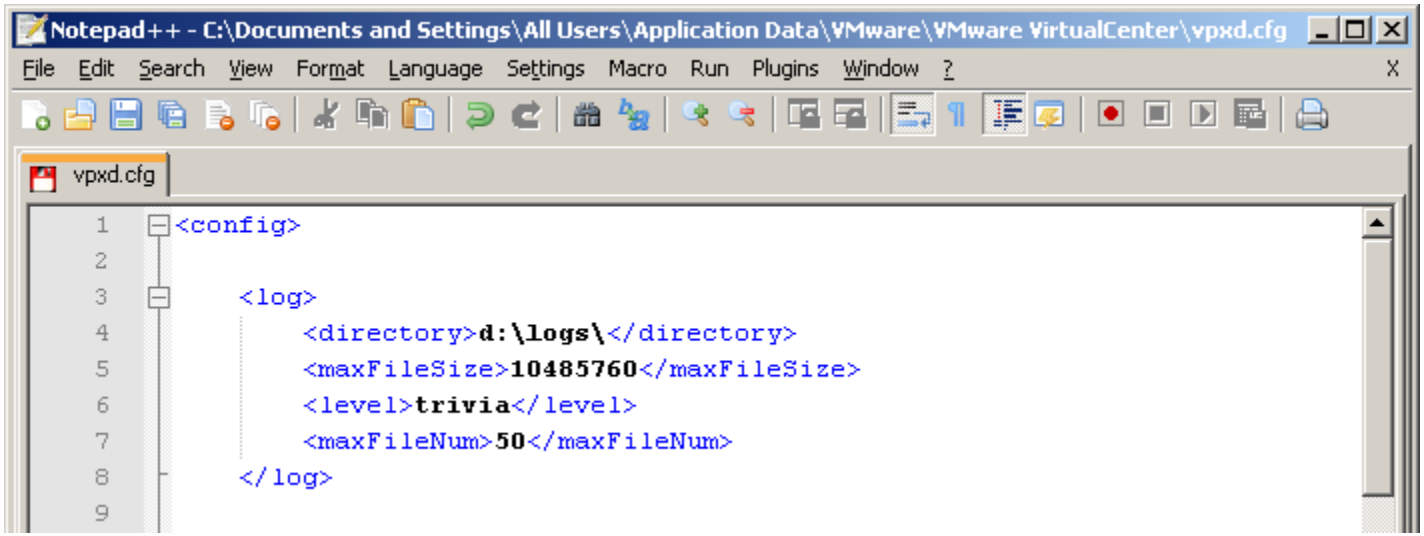


The VirtualCenter Server Configuration File

- VirtualCenter Server reads **`vpxd.cfg`** on startup
- Various advanced settings can be specified in this XML file
  - Not limited to the settings discussed today
- These configuration options override equivalent DB settings
- Location:
  - **`%ALLUSERSPROFILE%\Application Data\VMware\VMware VirtualCenter\vpxd.cfg`**
- Edit the file with Notepad or any text editor
  - **Make a backup copy** of the file before editing
- Changes take effect the next time VirtualCenter Server starts
- **Important**
  - Ensure you know ***why*** you are making any config file changes

Advanced Log Settings

- Add a **<log>** element as a child of the **<config>** element
- Advanced log elements are children of the **<log>** element



Log Detail Level

- Most useful when troubleshooting VirtualCenter startup issues
  - VI Client not available
- Remove when finished to avoid confusion with GUI setting
  - This setting will overwrite the database value on startup

```
<config>
   <log>
      <level>trivia</level>
   </log>
...
```

Log File Size

- By default, VirtualCenter Server logs rotate at 5MB
- This can be changed with the **<maxFileSize>** option
- Size is in bytes
  - Actual size will be number specified + 24 bytes for the string:

    `Log is being rotated....`
- The example below will create 10MB log files
  - 1 MB = 1024 bytes x 1024 = 1048576 bytes

```
<config>
   <log>
      <maxFileSize>10485760</maxFileSize>
   </log>
...
```

Log File Retention

- By default, VirtualCenter Server retains 10 log files
- This can be changed with the **<maxFileNum>** option

```
<config>
    <log>
        <maxFileNum>20</maxFileNum>
    </log>
...
```

Log Directory Location

- By default, VirtualCenter Server logs to **%TMP%\vpx**
- This can be changed with the **<directory>** option
- The location specified must exist before starting the service
- Caveats:
  - This change should only be made for very specific reasons
  - Export Diagnostic Data will notice this location change
  - The Start menu shortcut will not know how to find this directory
    - Specify with **vc-support.wsf** option: **/v:d:\logs**
  - DRS logs will not be relocated by this change

```
<config>
   <log>
      <directory>d:\logs\</directory>
   </log>
...
```

Log Level Database Setting

- The log level is stored in the database
- Read when the VirtualCenter Server service is started
- Advantage: no conflicts later between config file and DB

```
C:\>osql -E -D "VMware VirtualCenter"
1> update VPX_PARAMETER
2> set value = 'trivia' where name = 'log.level'
3> go
```

Enable Database Tracing

- Logs SQL statements to help diagnose database problems
- Add a **<trace>** element as a child of the **<config>** element
- The log level must also be set to verbose or trivia

```
<config>
    <trace>
        <db>
            <verbose>true</verbose>
        </db>
    </trace>
    <log>
        <level>trivia</level>
    </log>
...
```

Database Trace

- Example SQL statement in log file

```
[2006-09-15 15:45:59.328 'App' 2716 verbose]
[VdbStatement]Executing SQL: SELECT SCHEDULEDTASK_ID, NAME,
DESCRIPTION, ENABLED, NOTIFICATION, ENTITY_ID, ENTITY_TYPE,
LASTMODIFIEDTIME, LASTMODIFIEDUSER, NEXTRUNTIME, PREVRUNTIME,
COMPLETE_STATE, ERROR_DATA, RESULT_DATA, TASK_ID FROM
VPX_SCHEDULEDTASK
[2006-09-15 15:45:59.328 'App' 2716 verbose]
[VdbStatement]Executing SQL: SELECT SCHEDULEDTASK_ID,
SCHEDULER_TYPE, ACTIVE_TIME, EXPIRE_TIME, RUN_AT, INTERVAL,
SCHEDULE_MINUTE, SCHEDULE_HOUR, SCHEDULE_DAY, SCHEDULE_SUNDAY,
SCHEDULE_MONDAY, SCHEDULE_TUESDAY, SCHEDULE_WEDNESDAY,
SCHEDULE_THURSDAY, SCHEDULE_FRIDAY, SCHEDULE_SATURDAY FROM
VPX_SCHED_SCHEDULER
[2006-09-15 15:45:59.343 'App' 2716 verbose]
[VdbStatement]Executing SQL: SELECT SCHEDULEDTASK_ID, ACTION_TYPE,
ACTION_DATA FROM VPX_SCHED_ACTION
```

Send the VCDB to Tech Support

- VMware may need to analyze the actual SQL database
- Take a backup of the database using Enterprise Manager
- If the evaluation MSDE database is being used, the command below will create a backup
- Zip the backup file

```
C:\>osql -E -D "VMware VirtualCenter"
1> backup database vcdb to disk = 'c:\vcdb.bak'
2> go
Processed 42032 pages for database 'vcdb', file 'VCDB_dat' on file 1.
Processed 21 pages for database 'vcdb', file 'VCDB_log' on file 1.
BACKUP DATABASE successfully processed 42053 pages in 58.651 seconds
(5.873 MB/sec).
```

Running vpxd.exe from the Console

- As a last resort, **vpxd.exe** can be run “by hand” with **-s**
- Useful primarily if the VirtualCenter Server service is shutting down before anything helpful is even written to the log file
- To log onto this server, an additional user right is needed
  - “Act as part of the operating system”; see KB 2184

```
>vpxd.exe -h
Usage: vpxd.exe [FLAGS]
Flags:
      -r      Register VMware VirtualCenter Server
      -u      Unregister VMware VirtualCenter Server
      -s      Run as a standalone server rather than a Service
      -c      Print vmdb schema to stdout
      -o port Listens on the specified port instead of 902
      -b      Recreate database repository
      -p      Reset the database password
      -v      Print the version number to stdout
```

VirtualCenter Logs on ESX Server

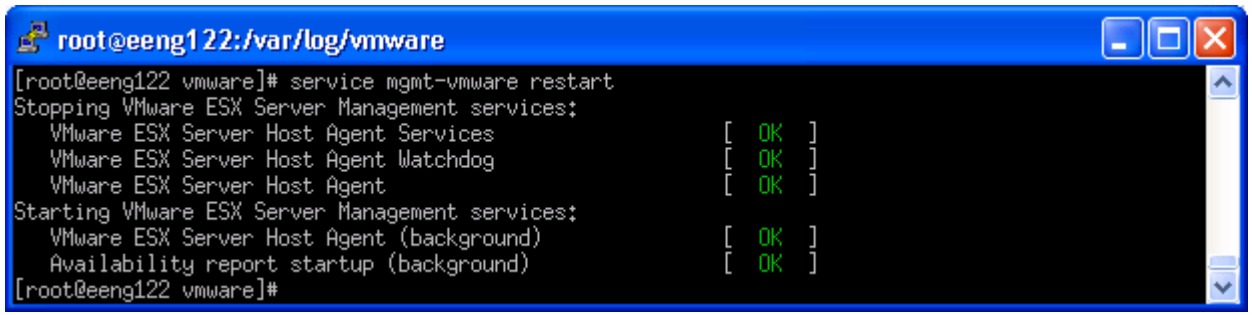
- Some VirtualCenter diagnostics are on ESX Server hosts
- VirtualCenter Agent (**`vpxa`**)
  - Installed by VirtualCenter Server on the host when it is added
  - **`/var/log/vmware/vpx/vpxa-#.log`**
- Host Agent (**`hostd`**)
  - Present even on stand-alone ESX Servers
  - Among many other things, license activity is logged here
  - **`/var/log/vmware/hostd-#.log`**
- Both of these logs are collected by **`vm-support`**

VirtualCenter Agent Settings

- **vpxa** logging can be modified with **vpxa.cfg**
  - **/etc/vmware/vpxa.cfg**
- Restart required for changes to take effect
  - **service vmware-vpxa restart**
- The **<log>** element already exists; add any of the following:
  - **<level>**
  - **<maxFileSize>**
  - **<maxFileNum>**

Host Agent Settings

- **`hostd`** logging can be modified as well:
  - **`/etc/vmware/hostd/config.xml`**
- Restart required for changes to take effect
  - **`service mgmt-vmware restart`**
- The **`<log>`** element already exists; add any of the following:
  - **`<level>`** (exists, default is verbose; modify if needed)
  - **`<maxFileSize>`**
  - **`<maxFileNum>`**



VirtualCenter Agent Installation Log

- When an ESX Server is added to VirtualCenter, several RPMs are pushed to the host and installed
  - The results are logged to **`/var/log/vmware/vpx-iupgrade.log`**
- When removing an ESX Server host from VirtualCenter, the reverse process is logged as well
  - **`vpx-rupgrade.log`**

VMware License Server Log

- Reset each time the License Server starts
- **`%ALLUSERSPROFILE%\Application Data\VMware\VMware License Server\lmgrd.log`**
- Due to a bug in the VC 2.0.1 License Server installer, **`lmgrd.log`** will be located in the **`%TMP%`** directory of the user that installed it
  - See KB 8019937
  - File is still gathered by EDD, though
    - Location is queried from the registry

Other Logs

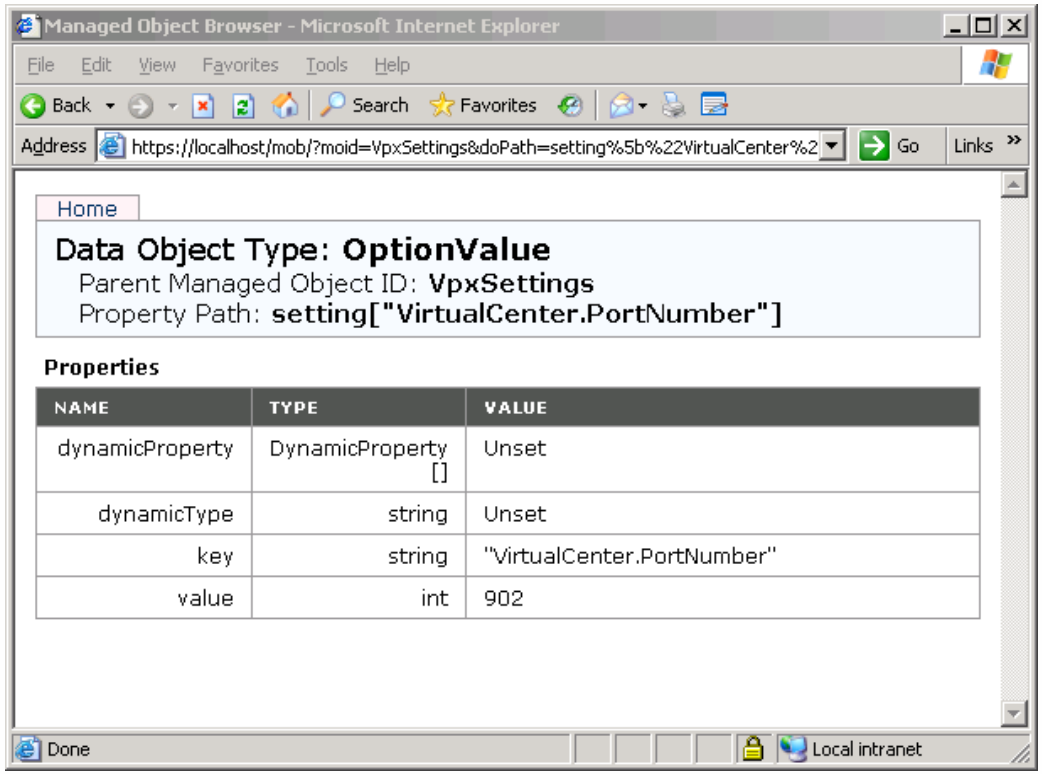
- VMware DRS Logs
  - Primarily useful only when working with VMware engineering
  - One set of log files per DRS cluster
    - **`%TMP%\vpx\drmdump\cluster#\`**
  - Control log directory size with DRS > Advanced Options …
    - Enter DumpSpace and a value for the log dir size in MB
    - Default is 20 MB
- VMware Virtual Infrastructure Web Access
  - Uses a Tomcat server installed on the VirtualCenter Server
  - **`C:\Program Files\VMware\VMware VirtualCenter 2.0\tomcat\logs\`**

Advanced Topics

- Managed Object Browser (MOB)
- VPX Operational Dashboard (VOD)

Managed Object Browser (MOB)

- Hierarchy of objects in VirtualCenter
- Mostly interesting to SDK developers

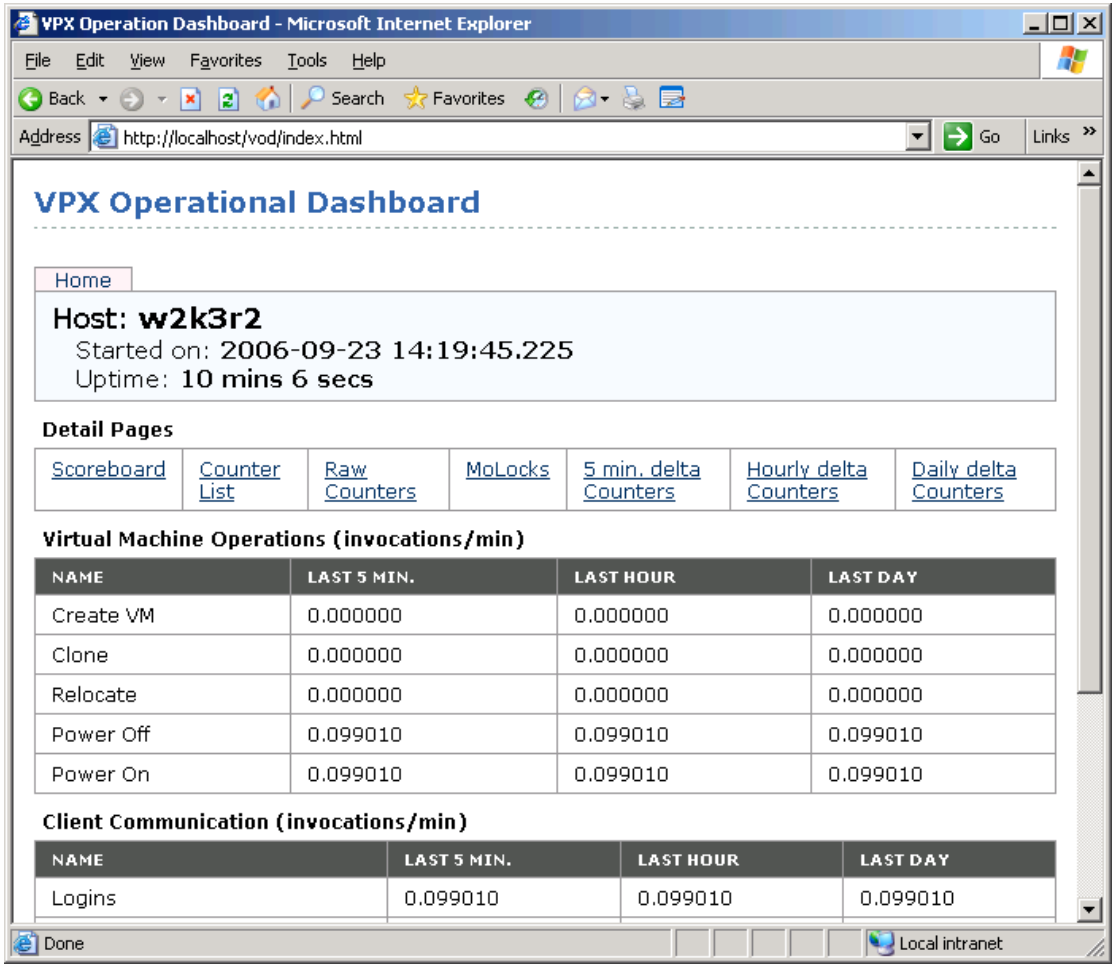


VPX Operational Dashboard (VOD)

- Brand new for VC 2.0.1
- Not enabled by default
- Provides VirtualCenter performance statistics
- Experimental feature; not formally supported or documented
  - Useful when working closely with VMware
- VOD is enabled through **`vpxd.cfg`**
  - Add the following element as a child of **`<vpx>`**

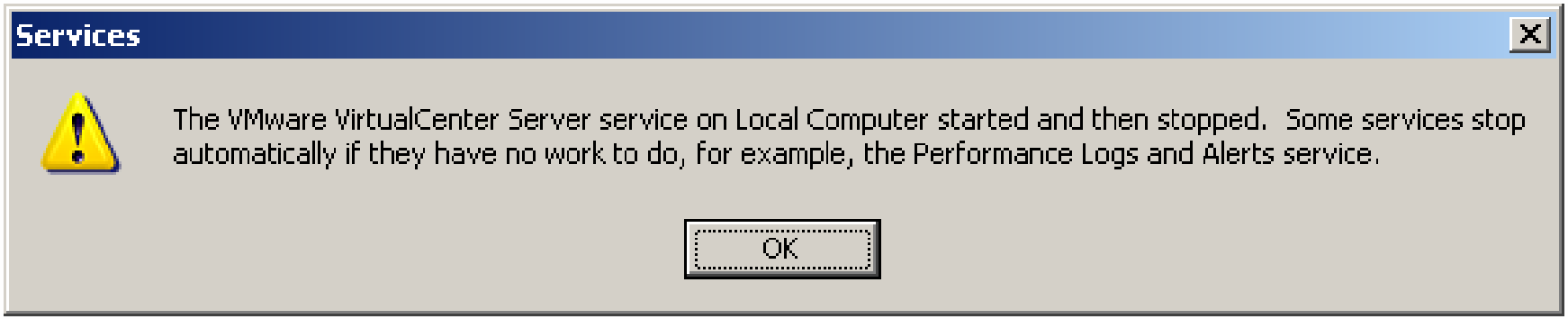
```
<vod>
    <enabled>true</enabled>
</vod>
```

VOD Example


VPX Operation Dashboard - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites
Address http://localhost/vod/index.html
Go Links
VPX Operational Dashboard
Home
Host: w2k3r2
Started on: 2006-09-23 14:19:45.225
Uptime: 10 mins 6 secs
Detail Pages
Scoreboard
Counter List
Raw Counters
MoLocks
5 min. delta Counters
Hourly delta Counters
Daily delta Counters
Virtual Machine Operations (invocations/min)
NAME
LAST 5 MIN.
LAST HOUR
LAST DAY
Create VM 0.000000 0.000000 0.000000
Clone 0.000000 0.000000 0.000000
Relocate 0.000000 0.000000 0.000000
Power Off 0.099010 0.099010 0.099010
Power On 0.099010 0.099010 0.099010
Client Communication (invocations/min)
NAME
LAST 5 MIN.
LAST HOUR
LAST DAY
Logins 0.099010 0.099010 0.099010
Done
Local intranet

Troubleshooting Walk-through

- When attempting to start the VirtualCenter Server service:



- First thing to check is the VirtualCenter Server log files

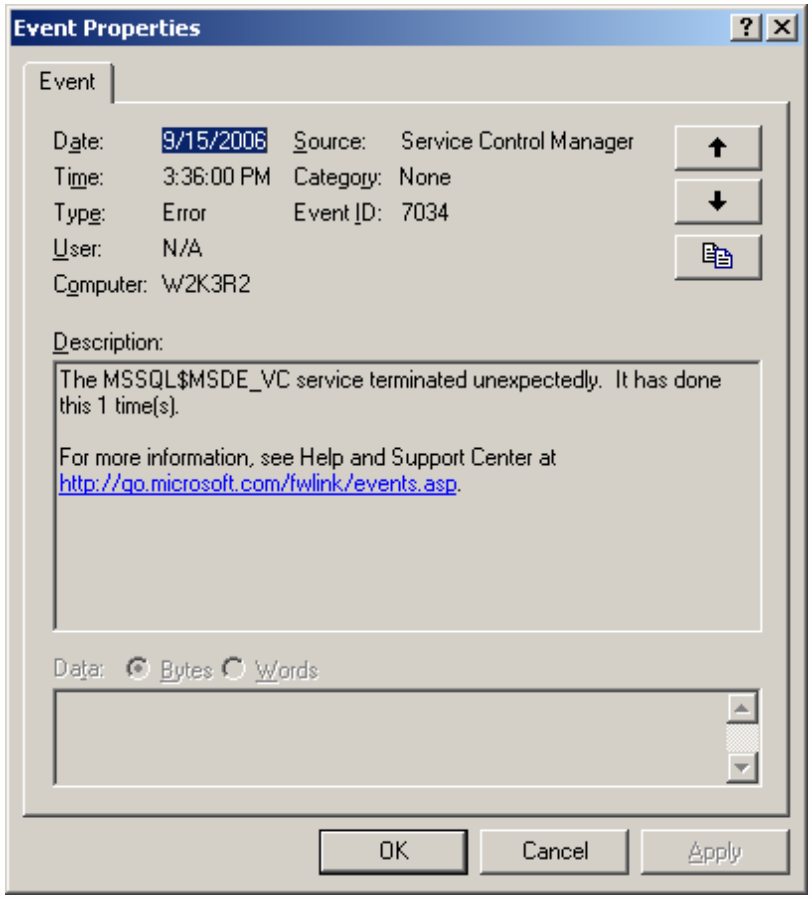
Check the Log File

- Open the latest vpxd log file and look at the last few lines

```
[2006-09-15 15:39:15.546 'App' 1796 error] ODBC error: (08001) -
[Microsoft][ODBC SQL Server Driver][DBMSLPCN]SQL Server does not
exist or access denied.
[2006-09-15 15:39:15.546 'App' 1796 error] Failed to intialize
VMware VirtualCenter. Shutting down...
[2006-09-15 15:39:15.546 'App' 1796 info] Shutting down VMware
VirtualCenter now
```

Check the Event Log

- Look at the Windows event log for database problems



Take Corrective Action

- Restart the database and check for errors
- MSDE evaluation database has an error log in this directory:
  - `C:\Program Files\Microsoft SQL Server\MSSQL$MSDE_VC\`
- If the database starts correctly, start the VirtualCenter Server
- Monitor log files to verify proper startup

Summary

- This information should help you maximize your uptime
- There are multiple types of VirtualCenter Server diagnostic data
  - Windows OS
  - VirtualCenter and ESX log files
- Knowing what to check will get you back up and running
- If it is necessary to work with VMware technical support:
  - Generate support bundles as soon as possible
  - Upload bundles when opening the service request
- Thank you!

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