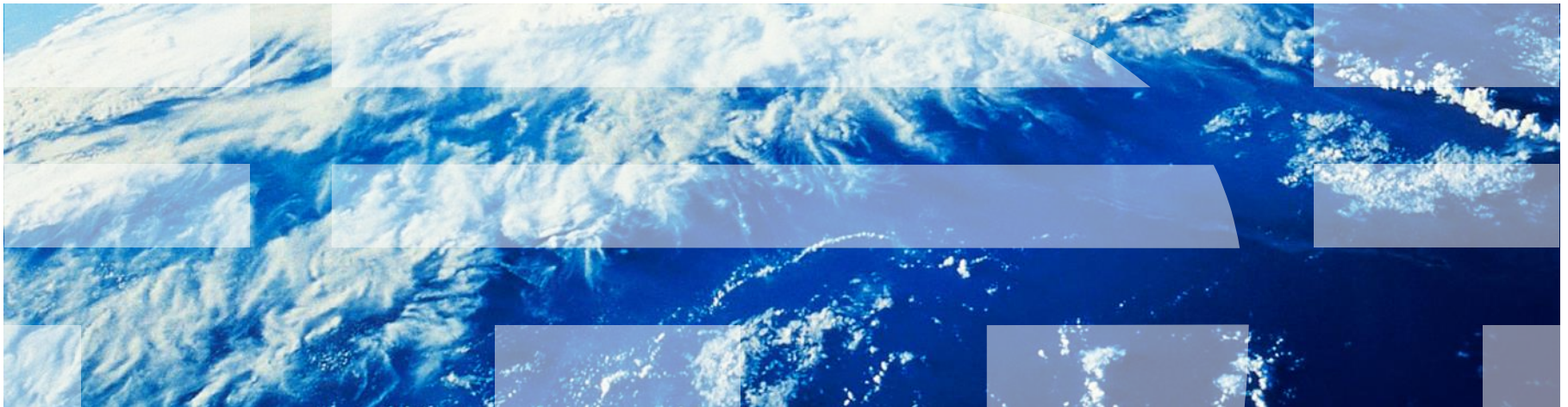# InfoSphere DataStage

Diagnosing a hung Information Server DataStage Parallel Job

Objectives

- Rule out known issues

- Determine the job is hung

- Environment variables to set

- Collecting information during a hang

- The following technote covers guidelines for configuring Windows 2003 and Windows 2008
    - Configuring a Microsoft Windows Server to run InfoSphere Information Server
        http://www.ibm.com/support/docview.wss?uid=swg21419242

- The following technotes cover guidelines for anti-virus software
    - Guidelines for anti-virus programs and security software for InfoSphere Information Server
        http://www.ibm.com/support/docview.wss?uid=swg21566611

    - InfoSphere Information Server guidelines for McAfee HIPS
        http://www.ibm.com/support/docview.wss?uid=swg21576550

- DataStage 8 Only
  - MKS Toolkit can be the source of job hangs
  - Check for Nutcracker errors in the Windows application event log
    - Global critical section Nut4SemIdC is being cleaned up with waiter count 1. [nutsrv4.exe (.\globcs.c:767) PID=pppp TID=tttt]
    - Process pppp appears to have hung. Cleaning up global critical sections held by this process. [nutsrv4.exe (sem.cpp:1160) PID=pppp TID=tttt]
    - Failed to create fork() child process. [forktest.exe (fork.c:719) PID=5780 TID=5088]
  - Upgrading to MKS Toolkit 9.4 FP1 + HotFix CFS31959

| Level	Date and Time	Source	Event ID	Task Category
Error	9/10/2013 11:32:06 AM	NuTCRACKER 4	16000	NuTCCleanup
Error	9/10/2013 11:30:46 AM	NuTCRACKER 4	16004	NuTCCleanup
Error	9/10/2013 11:28:46 AM	NuTCRACKER 4	16005	NuTCCleanup
Error	9/10/2013 11:28:46 AM	NuTCRACKER 4	16004	NuTCCleanup
Error	9/10/2013 11:29:06 AM	NuTCRACKER 4	16004	NuTCCleanup
Error	9/10/2013 11:29:26 AM	NuTCRACKER 4	16004	NuTCCleanup
Error	9/10/2013 11:29:06 AM	NuTCRACKER 4	16005	NuTCCleanup
Error	9/10/2013 11:28:26 AM	NuTCRACKER 4	16005	NuTCCleanup

Event 16000, NuTCRACKER 4

General | Details

Global critical section Nut4LockNo is being cleaned up with waiter count 1. [nutsrv4.exe (.\globcs.c:767) PID=1196 TID=1268]

- Check the version of MKS Toolkit on the engine tier
  - Select Control Panel > Configure MKS Toolkit
  - Select the Support Information tab
  - Click on the Category drop down list
  - Select File Versions
  - Find the version for the nutsys4.dll for 64 and 32 bit
  - Version after FP1 + HotFix CFS31959 is applied
    - nutsys4.dll 64 and 32 bit => 4.69.0104
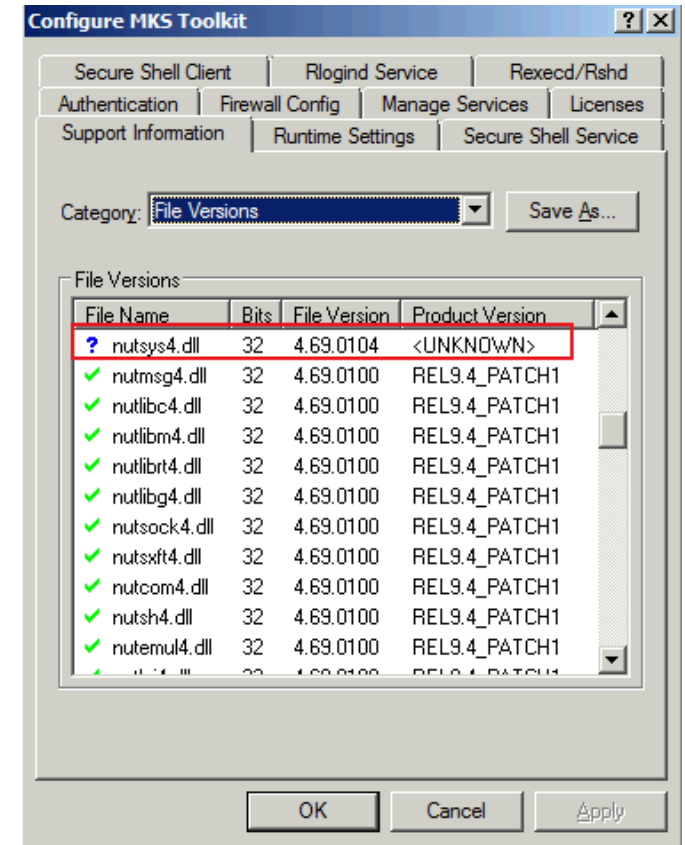
- To upgrade to MKS Version 9.4 FP1 + Hotfix CFS31959

- IS 9.1 and later
  – MKS Version 9.4 FP1 + Hotfix CFS31959 is included

- IS 8.7FP1
  – Where the 8.7 media includes FP1 (Not IS 8.7 with FP1 applied) MKS Version 9.4 FP1 + Hotfix CFS31959 is included

- IS 8.5 and 8.7
  – JR41641: UPDATE MKS TOOLKIT TO VERSION 9.4 FP1 + Hotfix
    http://www.ibm.com/support/docview.wss?uid=swg1JR41641
  – Available on Fix Central

- IS 8.0.1 and 8.1
  – JR41654: UPGRADE INFORMATION SERVER 8.0.1 AND 8.1 TO MKS TOOLKIT 9.4FP1 WITH HOTFIX CFS31959
  – http://www.ibm.com/support/docview.wss?uid=swg1JR41654
  – Request from IBM Support

- The following errors are normal for a busy system
  - Cleaning up process table entry 358 for process pppp, exit code 0x000000ff, name unknown. [nutsrv4.exe (.\process.c:347) PID=pppp TID=ttt]
  - SIGKILL signal has not caused process to die. Child watcher committing suicide. [osh.exe (.\ncchild.c:544) PID=pppp TID=tttt]

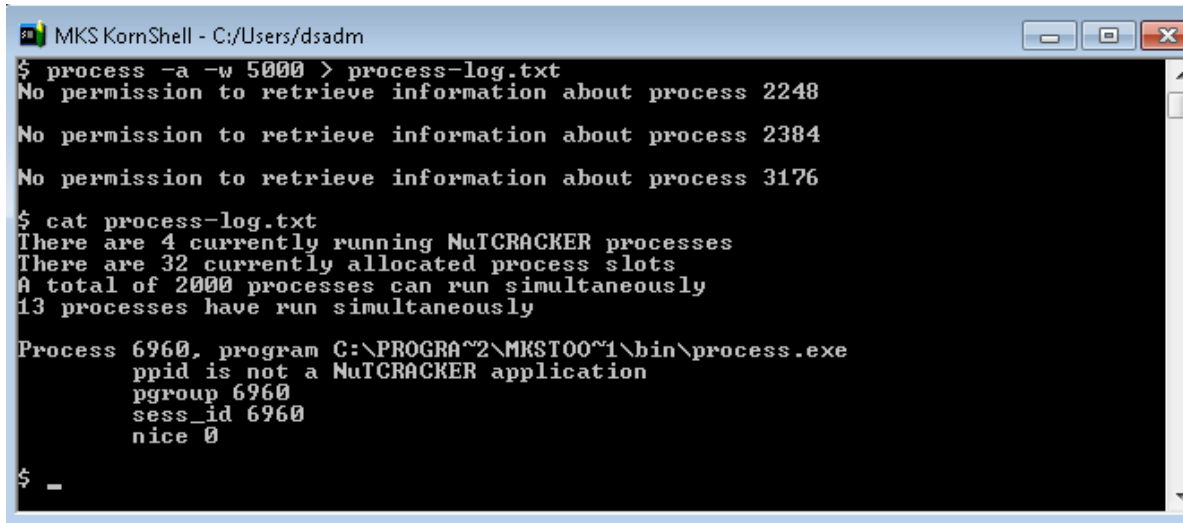| Level	Date and Time	Source	Event ID	Task Category
Error	9/10/2013 3:27:30 PM	NuTCRACKER 4	11033	Service
Error	9/10/2013 3:27:30 PM	NuTCRACKER 4	11033	Service
Error	9/10/2013 3:27:30 PM	NuTCRACKER 4	11033	Service
Error	9/10/2013 3:27:42 PM	NuTCRACKER 4	11033	Service
Error	9/10/2013 3:27:30 PM	NuTCRACKER 4	11033	Service
Error	9/10/2013 3:27:30 PM	NuTCRACKER 4	11033	Service
Error	9/10/2013 3:27:30 PM	NuTCRACKER 4	11033	Service
Error	9/10/2013 3:27:30 PM	NuTCRACKER 4	11033	Service

Event 11033, NuTCRACKER 4

General | Details

Cleaning up process table entry 36 for process 264, exit code 0x00000001, name unknown. [nutsrv4.exe (.\process.c:347) PID=1196 TID=1268]

- MKS Toolkit Security ID Setting Causes Windows System Lockup
  - The DataStage parallel engine may lock up and you cannot start or compile parallel jobs
  - Existing parallel jobs keep running
  - You can start server jobs
  - Window functionality like Task Manager, Explorer still works
  - MKS shell commands hang
  - Each process created by the DataStage client on a Windows Server requires a Security ID token in the MKS Toolkit
  - On very busy systems increase the number of SSIDs above the default

- Diagnosing the issue
  - Obtain an MKS NuTCRACKER process report dump.
    - Open a Korn shell by clicking **Start->Run->ksh**
    - From the Korn shell enter the following command:
      process –a –w 5000
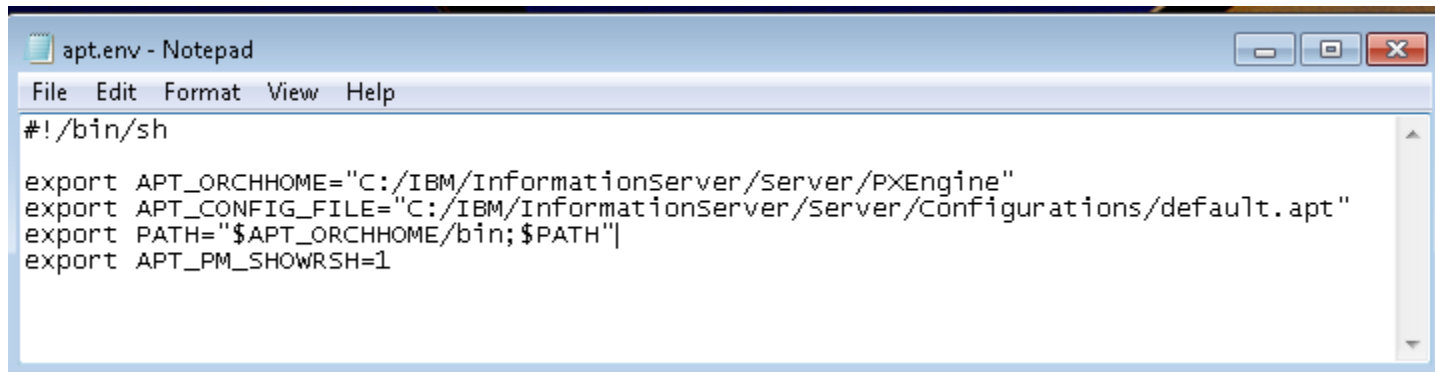
Note: it is possible this command may hang and not produce results

Known Issues (8 of 13)

- Check that you can successfully run a parallel job as follows:
  - Create an environment file in the PXEngine directory
  - Use an editor such as notepad
 - Save the file as apt.env

```
apt.env - Notepad
File   Edit   Format   View   Help
#!/bin/sh

export APT_ORCHHOME="C:/IBM/InformationServer/Server/PXEngine"
export APT_CONFIG_FILE="C:/IBM/InformationServer/Server/Configurations/default.apt"
export PATH="$APT_ORCHHOME/bin;$PATH"|
export APT_PM_SHOWRSH=1
```

Known Issues (9 of 13)

- Test the parallel engine by executing a simple parallel job as follows:

- Invoke Korn shell select Start> Run> ksh

- Change to the PXEngine directory
  cd C:/IBM/InformationServer/Server/PXEngine

- Source the apt.env environment file
  . ./apt.env

- Run a test
 **osh "generator –schema record(a:int32) | peek"**

```
MKS KornShell - C:/IBM/InformationServer/Server/PXEngine
$ cd c:/ibm/informationserver/server/pxengine
$ pwd
C:/IBM/InformationServer/Server/PXEngine
$ . ./apt.env
$ osh "generator –schema record(a:int32) | peek"
```

NuTCRACKER fatal error

Security initialisation failed

OK
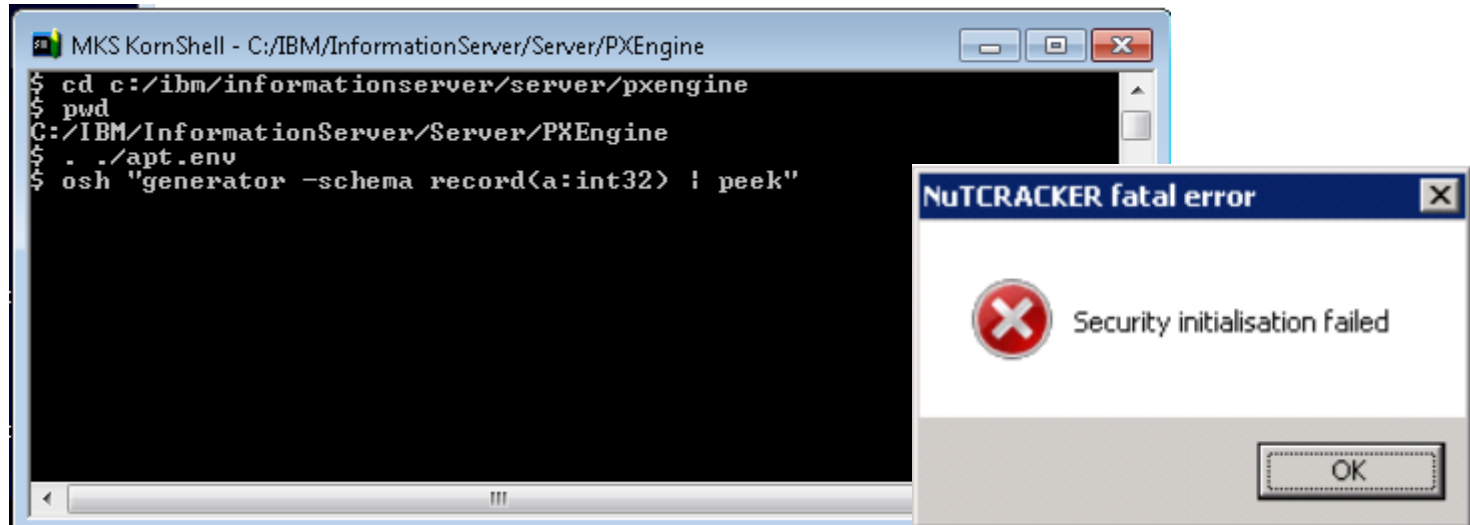
- Resolving the issue

- The problem can be avoided by changing a parameter in the MKS Control Panel
  - Follow these steps
    - Make sure there are no uvsh.exe or osh.exe processes running on the server
      - This will prevent changed settings from taking effect
    - Stop all the DataStage services
      - InfoSphere Engine Resource Service
      - DataStage Telnet Service
   - DSRPC Service

- Resolving the issue continued
  - Open Microsoft Windows control panel
  - Click Configure MKS Toolkit
  - Select the 'Manage Services' tab
  - Starting with the bottom service shown in the dropdown, Stop each MKS Service.
  - Click the 'Refresh' button
   - 'Active Processes' box should display zero
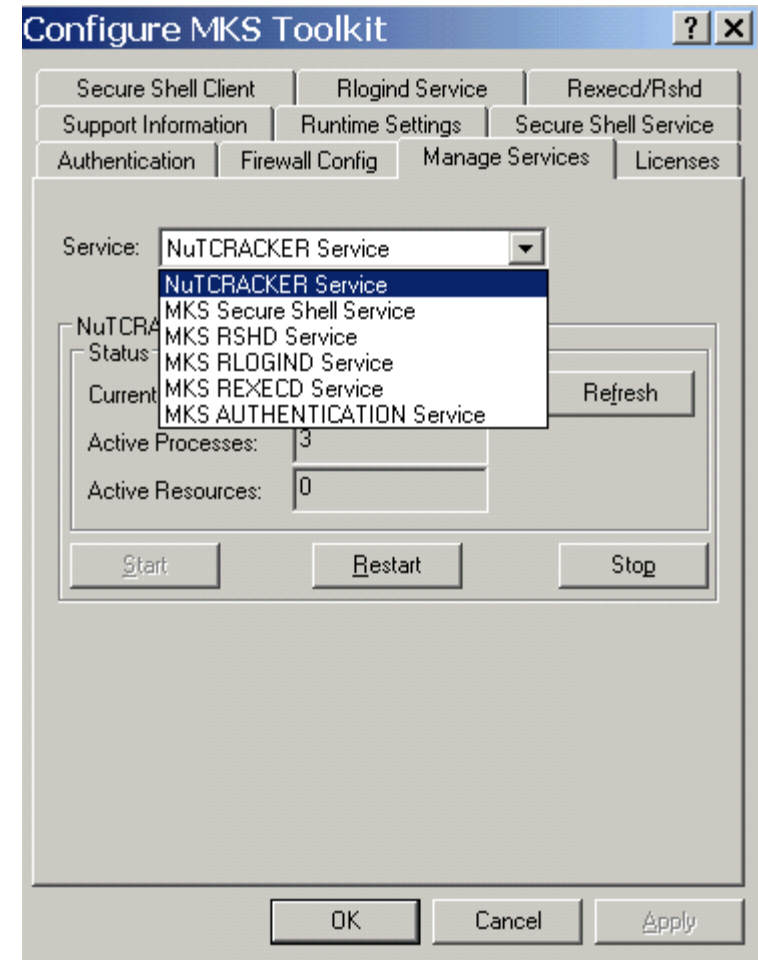
- Resolving the issue continued
  - Select the "Runtime Settings" tab
  - Select 'Miscellaneous Settings' from the Category dropdown
  - Set Max Number of Security IDs' to 5000
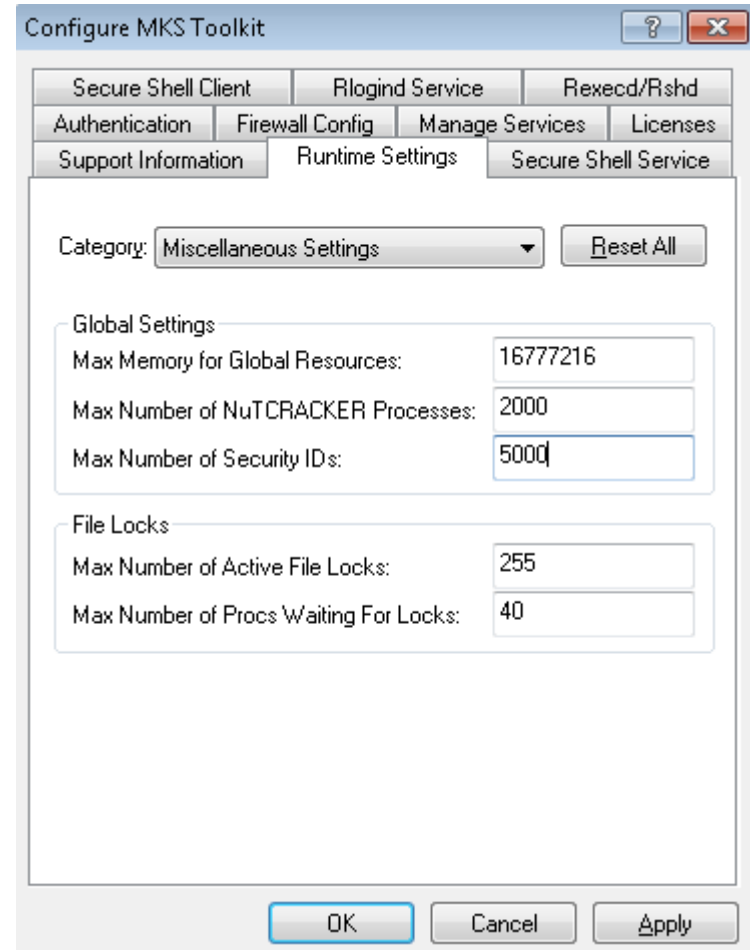
Known Issues (13 of 13)

- Resolving the issue continued
  - Select the 'ManageServices' tab
  - Restart the services in the order shown in the dropdown, starting at the top
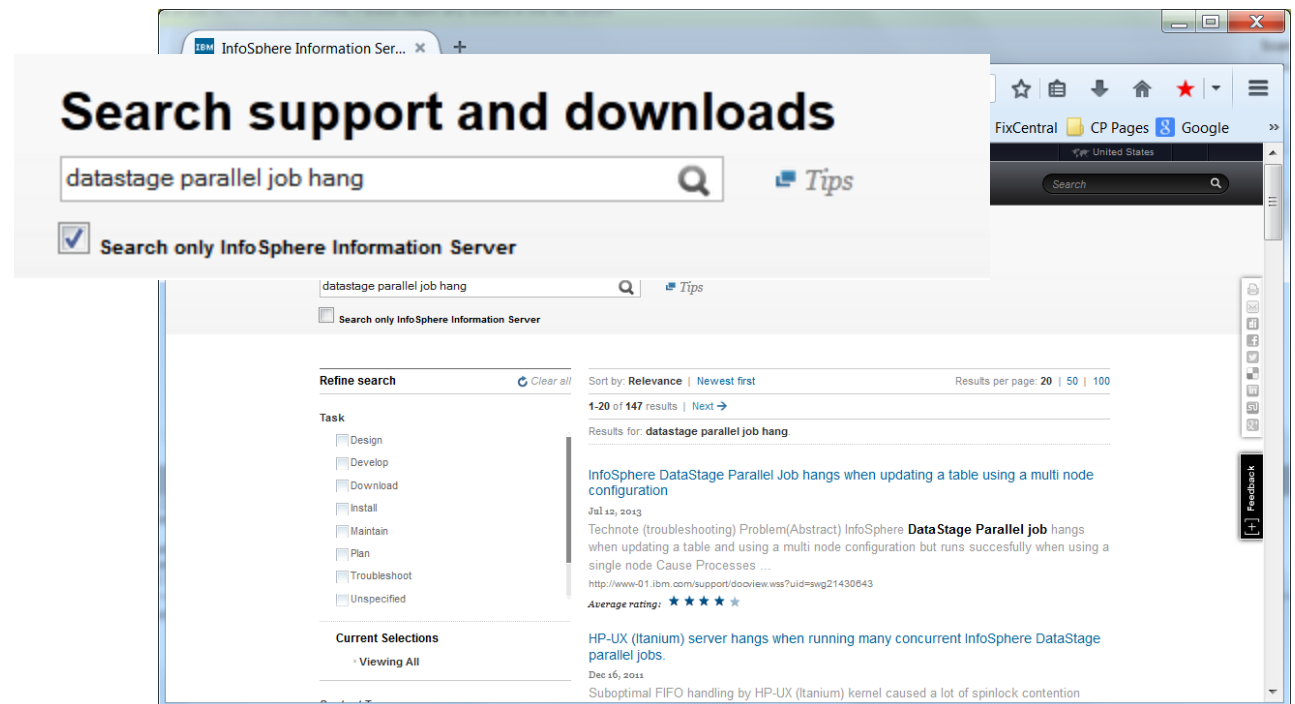 - Restart the DataStage Services
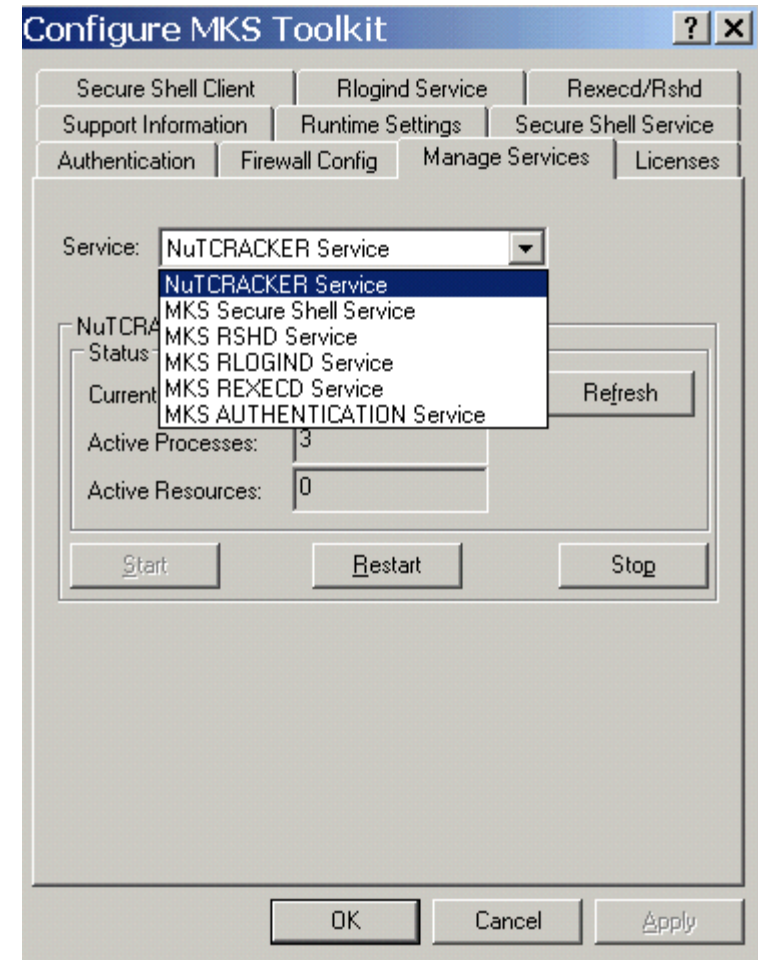
Searching the Knowledge Base

- Search the support portal for known issues
  http://www.ibm.com/support/entry/portal/Overview/Software/Information_Management/InfoSphere_Information_Server
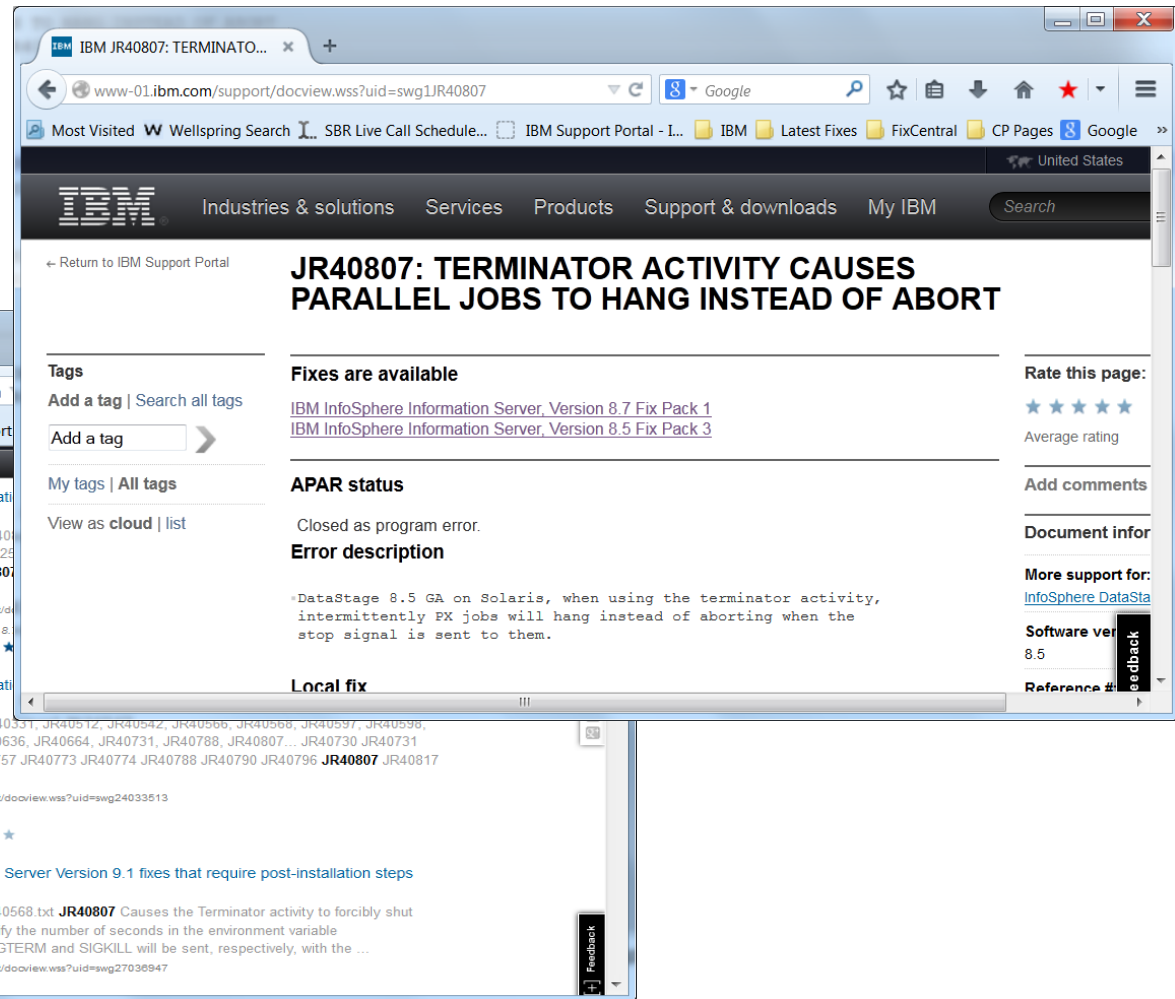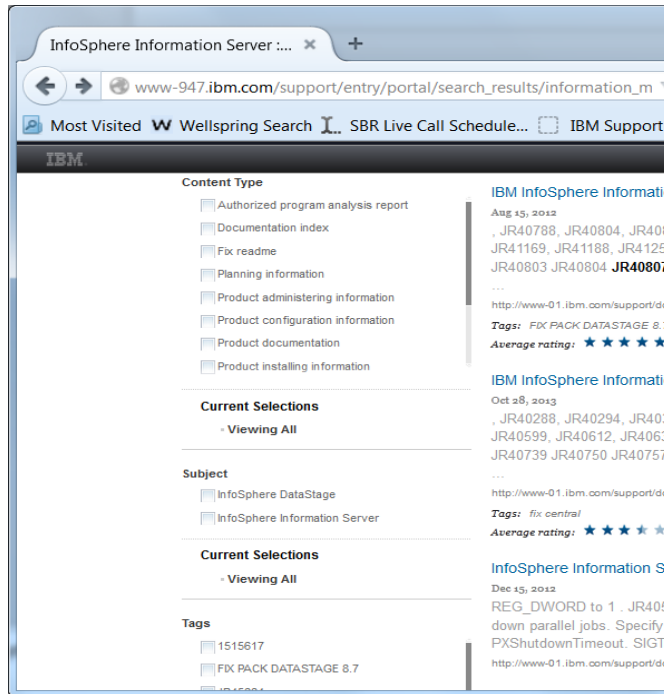
- Types of results
  - Technotes
  - APARs
  - Fix lists
  - Documentation
  - Redbooks

Searching the Knowledge Base

- Search on an APAR number

- This will provide Fix Lists that include the APAR.

Notifications

- Click the Subscribe button to be notified when an APAR changes status

Notifications – Updated

- New simpler My notifications user interface

- This is the product level subscription page where you can manage your subscriptions

Notifications – Updated

- The APAR tab lists the APARs you have subscribed to

Determining the parallel job is hung (1 of 8)

- Status in DataStage Director Client is running

- No progress being made
  - Select Tools > New Monitor

On Windows

- Check for processes at operating system level

- Open Task Manager on the engine tier and look for
  – osh.exe
  – uvsh.exe

- Aborted job
  – No osh processes seen
  – Status file not updated
    • Clear status file from Director

- Difficult to associate osh processes with a particular running job
  – Show PIDs for jobs
    • Set APT_PM_SHOW_PIDS
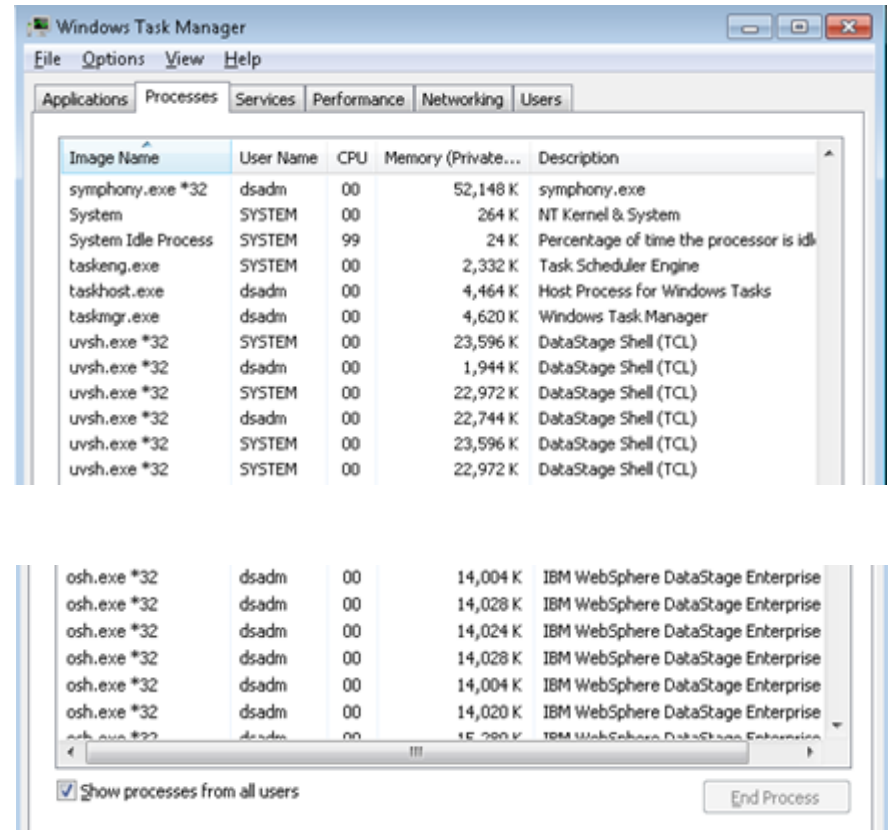
- Check for processes at the OS level on Unix/Linux
  - Telnet into the Engine tier
  - Execute:
    ```
    ps –ef | grep DSD
    ```

```
$ ps –ef | grep DSD
dsadm    30982 11196 14 11:33 ?        00:00:00 phantom DSD.RUN RowGenToDataSet 0/50/1/0/0/
0/0
dsadm    31017 30982  7 11:33 ?        00:00:00 phantom DSD.OshMonitor RowGenToDataSet 3101
6 MSEVENTS.FALSE
$
```

- Look for the entries with the job name
  - This example - job name is RowGenToDataSet

- If no processes are running, the job has aborted

- Refer to the following technotes for further information

  How to get a stack trace for failing processes in a DataStage Parallel Job, AIX platform
  http://www.ibm.com/support/docview.wss?uid=swg21461160
  How to get a stack trace for failing processes in a DataStage Parallel Job, Linux platforms
  http://www.ibm.com/support/docview.wss?rs=0&uid=swg21461167
  DataStage Parallel Job Tracing
  http://www.ibm.com/support/docview.wss?uid=swg27023686

- Check for osh processes
  - Telnet into the Engine tier
  - Execute:
    ```
    ps -ef | grep osh
    ```

- It is difficult to tell which osh processes are for the hung job If other jobs are running Set APT_PM_SHOW_PIDS

- If no osh processes are seen, the job aborted

Determining the parallel job is hung (5 of 8)

- If failure can be reproduced at 9.1 and above use new feature to generate stack trace

- Add the following user defined environment variables:

  - **APT_DUMP_STACK** - Setting this to 1 will enable basic stack trace dump

  - **APT_DUMP_STACK_DIRECTORY -** Dump files will be created in the specified directory

- After setting APT_DUMP_STACK the feature is automatically invoked when an unrecoverable exception occurs

- Dump files named: px_engine_dump_YYYY_MM_DD_HH_MM_SS_PID

- Technote:
  A new feature to generate stack traces for Parallel jobs at version 9.1 of DataStage
  http://www.ibm.com/support/docview.wss?uid=swg21639558

- Find the PIDs using Monitor
  - Right click and select Show instances

- To find the PID
  - Right click on the stage instance and select Detail
  - PID is listed under User
  - Repeat this for each instance

- Use Task Manager on Windows or the "ps" command on Unix/Linux to see the processes

- Other reasons for leftover osh processes
  - DataStage Engine stopped while parallel jobs running
  - Information Services Director (ISD) job not undeployed
  - Parallel job stopped from DataStage Director when still in startup/handshake phase
  - Clean up left over processes using Task Manager or Kill command

Environment variables to set (1 of 3)

- Set the following environment variables at job or project level
  - APT_PM_SHOW_PIDS=True
  - APT_DUMP_SCORE=True

- Variables listed under the Parallel > Reporting section

Environment Variables

The following categorized environment variables are defined in this project. Either set a default value for an existing env
a new environment variable to the user defined category. When you export or import environment variables, values are i

Categories:

- General
  - Customize
- Parallel
  - Operator Specific
  - Reporting
  - Compiler
- User Defined

Details:

Name	Prompt	Value
APT_DUMP_SCORE	Report score	False
APT_MSG_FILELINE	Extra logging information	False
APT_NO_JOBMON	Disable job monitor	False
APT_PERFORMANCE_DATA	Performance data directo	
APT_PM_PLAYER_MEMORY	Report player memory allc	False
APT_PM_PLAYER_TIMING	Report player calls	False
APT_PM_SHOWRSH	Show RSH commands	False
APT_PM_SHOW_PIDS	Show internal PIDs	False
APT_RECORD_COUNTS	Report record counts	False
APT_SHOW_COMPONENT_CALLS	User-overloadable functic	False
APT_STARTUP_STATUS	Extra startup messages	False
OSH_DUMP	Report step description	False
OSH_ECHO	Report step specification	False
OSH_EXPLAIN	Report terse step descripl	False
OSH_PRINT_SCHEMAS	Report schemas	False

Environment variables to set (2 of 3)

- Create user defined environment variable using DataStage Administrator
  - On non-production environments create
    - DS_PXDEBUG
      - Leave the default value blank at the project level
      - Set the default value to 1 at the job level
  - On Production environment
    - If there is the ability to compile a job, set DS_PXDEBUG to 1 at the job level

Environment variables to set (3 of 3)

- Create the following user defined environment variable using DataStage Administrator
  - APT_NO_PM_SIGNAL_HANDLERS
  - Set to 1 at the project level
  - Allows the Unix/Linux system to terminate all associated processes caused by a database client core dump

- Ensure the Unix/Linux system will permit core files to be created
  - Set ulimit -c unlimited

- See the following technotes for additional information:

  How to get a stack trace for failing processes in a DataStage Parallel Job, AIX platform
  http://www.ibm.com/support/docview.wss?uid=swg21461160
  How to get a stack trace for failing processes in a DataStage Parallel Job, Linux platforms
  http://www.ibm.com/support/docview.wss?rs=0&uid=swg21461167

- Send export of detailed job log

- Send export of job design
  – For example, *.dsx, *.isx, *.xml

- If DS_PXDEBUG is set, zip and send Debugging/<job_name> directory found under the project directory.

- Send ISALite Basic System Summary.
  – May be done at any time before or after the hang
  – For additional information see the Technote:
    http://www.ibm.com/support/docview.wss?uid=swg24022700

- **Alternately** at IS 8.5 and later send ISALite Job Log Collection
  – Includes
    • Job logs and job design in *.isx format
    • Version.xml, .odbc.ini, dsenv, uvconfig
    • DSParams file
  – Run from Engine tier
  – Doesn't require Designer or Director client

- On Windows
  - Send an export of the Windows application and system event log

- On Unix/Linux
  - If APT_NO_PM_SIGNAL_HANDLERS is set and core file is produced
    - Gather a stack trace on the core file
  - If APT_NO_PM_SIGNAL_HANDLERS is set but no core is produced
    - Capture and send output from ps
      - Execute: `ps -eaf > /tmp/ps_mmddyyyy.out`

      Note: /tmp/ps_mmddyyyy.out is used as an example select a location and file name appropriate for your system

- Collect stack trace on each process ID (PID) seen in job log
  - APT_PM_SHOW_PIDS writes PIDs to job log

- One parallel job can have large number of osh processes
  - Script to collect stack trace on all PIDs available for AIX, Linux and Windows 64 bit
  - Script assumes all osh processes are on same machine
  - On Windows
    - Script requires windbg utility from Microsoft be installed on the engine tier.
  - On Unix/Linux
    - Use pstack/procstack OR debugger to collect the stack trace
      - For example dbx or gdb

- Scripts are included on the IBM Education Assistant website
  - AIX
    http://publib.boulder.ibm.com/infocenter/ieduasst/imv1r0/topic/com.ibm.iea.infosphere_is/infosphere_is/8.5/ProbDeter/PXOSHCallStackCollectorAIX.tar?dmuid=20131104155019013432
  - Linux
    http://publib.boulder.ibm.com/infocenter/ieduasst/imv1r0/topic/com.ibm.iea.infosphere_is/infosphere_is/8.5/ProbDeter/PXOSHCallStackCollectorLinux.tar?dmuid=201311041550 30348921
  - Windows
    http://publib.boulder.ibm.com/infocenter/ieduasst/imv1r0/topic/com.ibm.iea.infosphere_is/infosphere_is/8.5/ProbDeter/PXOSHCallStackCollectorWin64.zip?dmuid=20140806110 135386302

Collecting information during a hang (5 of 5)

- Use pstack on Solarix/Linux and procstack on AIX.
  - pstack <pid>
  - procstack <pid>

- Example:

```
$ pstack 14059 > /tmp/pid_14059.out
$ cat > /tmp/pid_14059.out
#0  0xffffe402 in __kernel_vsyscall ()
#1  0x00b1edf3 in __read_nocancel () from /lib/libpthread.so.0
#2  0x0810bd0a in api_pipe_read ()
#3  0x08100927 in main ()
```

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Questions

Additional Information - APARs

DataStage Parallel Engine

- JR40807: Terminator activity causes parallel jobs to hang instead of abort
  http://www.ibm.com/support/docview.wss?uid=swg1JR40807
    - Fix available in 8.5 Fix Pack 3
    - 8.7 Fix Pack 1
    - 9.1 GA and later

- JR47614: Fix problems with threaded tsort stage shutdown on windows
  http://www.ibm.com/support/docview.wss?uid=swg1JR47614
    - Supercedes: JR45272, JR44056

- JR39834: A job that reads from a data set and uses a copy stage to distribute the data to multiple funnel stages can hang
  http://www.ibm.com/support/docview.wss?uid=swg1JR39834
    - Fix available in 8.5 FP2
    - 8.7 GA and later

- JR49663: Job with surrogate key generator operator hangs when $APT_NO_JOBMON=1
  http://www.ibm.com/support/docview.wss?uid=swg1JR49663
    - Contact support for patch

Additional Information - APARs

Connectivity

- JR45325: Oracle OCI bulk load plugin may hang or crash
  http://www.ibm.com/support/docview.wss?uid=swg1JR45325
  - Fix available in 9.1.2

- JR47461: Oracle connector: uninitialized variable causes memory corruption that may cause job to hang or crash http://www.ibm.com/support/docview.wss?uid=swg1JR47461
  - Fix available in 11.3

- JR36567: Multiple orawrite stages in job corrupt work files and job fails
  http://www.ibm.com/support/docview.wss?uid=swg1JR36567
  - Fix available in 8.1 Fix Pack 2
  - 8.5 Fix Pack 1
  - 8.7 and later

- JR37099: Length of CLOB data has to be greater than 2 bytes in order to process data (DRS Oracle) http://www.ibm.com/support/docview.wss?uid=swg1JR37099
  - Fix available in 8.5 Fix Pack 1
  - 8.7 and later

Additional Information - APARs

Connectivity Cont'd

- JR39892: Information Server 8.5 parallel jobs that use the Netezza stage show a status of Running even though they have finished. (Windows)
  http://www.ibm.com/support/docview.wss?uid=swg1JR39892
  - Fix available in 8.5 FP2
  - 8.7 and later

- JR44676: Netezza connector server canvas jobs hang intermittently on windows platform when they process zero rows. (Windows)
  http://www.ibm.com/support/docview.wss?rs=14&uid=swg1JR44676
  - Fix available in 9.1.2

- JR48857: Provision to set load unload timeout in Netezza Connector
  http://www.ibm.com/support/docview.wss?uid=swg1JR48857
  - Fix available in 11.3 contact IBM Support

- JR44156: Netezza connect jobs hang intermittently trying to open the pipe second time
  http://www.ibm.com/support/docview.wss?rs=14&uid=swg1JR44156
  - Fix available in 8.7 Fix Pack 2
  - 9.1 FP1

Additional Information - APARs

Connectivity Cont'd

- JR44156: Netezza connect jobs hang intermittently trying to open the pipe second time
  http://www.ibm.com/support/docview.wss?rs=14&uid=swg1JR44156
    - Fix available in 8.7 Fix Pack 2
    - 9.1 FP1

- JR37958: Job does not finish, if non-existing table name is specified to "exception table name" in DB2 connector
  http://www.ibm.com/support/docview.wss?rs=14&uid=swg1JR37958
    - Fix available in 8.5 Fix Pack 1
    - 8.7 and later

- JR46530: DB2 connector in db2 for z/os (a) hangs/slow loading partitioned table, (b) does not read partitioned table in parallel
  http://www.ibm.com/support/docview.wss?uid=swg1JR46530
    - Fix available in 9.1.2

- JR50856: Greenplum connector parallel unload intermittently hangs
  http://www.ibm.com/support/docview.wss?uid=swg1JR50856
    - Patch available for 11.3 contact IBM Support

Additional Information - Technotes

Design Issues

- InfoSphere DataStage Parallel Job hangs when updating a table using a multi node configuration
  http://www.ibm.com/support/docview.wss?uid=swg21430643

- DataStage Job hangs while performing Oracle Update (Upsert) in Parallel
  http://www.ibm.com/support/docview.wss?uid=swg21430589

- DataStage Job with MQ stage hangs after end-of-data message put on queue
  http://www.ibm.com/support/docview.wss?uid=swg21600044

Additional Information - Technotes

DataStage Parallel Engine

- Information Server DataStage Jobs intermittently Hang on GRID
  http://www.ibm.com/support/docview.wss?uid=swg21590910

- DataStage sequence jobs hang with no error when using Grid Toolkit
  http://www.ibm.com/support/docview.wss?uid=swg21654563

- DataStage jobs hung in a project in IBM InfoSphere DataStage
  http://www.ibm.com/support/docview.wss?uid=swg21390366

- DataStage jobs running SQL Server Enterprise stage in parallel on multiple nodes may hang during bulk write if primary key for table defined
  http://www.ibm.com/support/docview.wss?uid=swg21504442

Additional Information - Technotes

Windows

- Teradata connector bulk access jobs fail using Teradata Client v13.10 on Windows
  http://www.ibm.com/support/docview.wss?uid=swg21567580

- Information Server DataStage Parallel Jobs on Windows are hanging or showing faults with KERNELBASE.dll in Event Log
  http://www.ibm.com/support/docview.wss?uid=swg21567108

- DataStage Parallel Jobs on Windows fail to start or show random failures
  http://www.ibm.com/support/docview.wss?uid=swg21669421

- General recommendations to run InfoSphere Information Server DataStage parallel jobs on Windows Platforms
  http://www.ibm.com/support/docview.wss?uid=swg21684610

- Alternatively use a debugger to capture the stack trace
  - AIX - **_dbx_**
  - Linux/Solaris - **_gdb_**

- Set environment variables
  - **APT_ORCHHOME**
    - Default is /opt/IBM/InformationServer/Server/PXEngine
  - **APT_CONFIG_FILE**
    - Set to the configuration file listed in the job log
  - **PATH**=$APT_ORCHHOME/bin:$APT_ORCHHOME/osh_wrappers:$PATH
  - Set the library path:
    - On AIX
      LIBPATH=$APT_ORCHHOME/lib:.:/usr/lib:/lib:$LIBPATH
    - On Linux/Solaris:
      LD_LIBRARY_PATH=$APT_ORCHHOME/lib:.:/usr/lib:/lib:$LD_LIBRARY_PATH

- Export the environment variables

- Run the command "`which osh`" this should return osh from $APT_ORCHOME/bin

- dbx example

  Change to the directory chosen to store the generated files and execute the following:

  ```
  dbx -a <pid> $APT_ORCHHOME/bin/osh
  ```
  - once at the "dbx" prompt run the following commands:
    ```
    thread
    where > dbx_<pid>.out       * Results will be displayed and sent to the file
    detach          * Use detach to exit the dbx command shell without stopping the job
    ```

- gdb example

  Change to the directory chosen to store the generated files and execute the following:

  ```
  gdb –p <pid>
  ```

  – once at the "gdb" prompt execute:
  ```
  set logging file gdb_<pid>.out   *specify file for output
  set logging on
  thread
  where           * display back trace
  detach          * detach without killing the job
  quit            * quit
  ```