

IBM User Group Days

Migrating and Upgrading to Informix 14 or the Cloud

The easy way and the hard way

by Lester Knutsen

IBM Informix Champion

Thursday, May 19, 2020

Advanced DataTools

Lester Knutsen



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There are several easy procedures to upgrade and migrate Informix. We will look at the easy way (in-place upgrades, dbexport, cdr migrate, backup/restore), but sometimes they may not work for you, and you need to create a custom process. We will go over a set of procedures and scripts using HPL, external tables, and parallel unloads/loads that I have used over the last few years to migrate from small systems up through terabyte-sized databases to VMs, new hardware, and the cloud.

Agenda

- Upgrading to Informix 14
 - Informix Upgrade Project Plan
 - Setting up InformixHQ
- Migrating to the Cloud or Virtual Machine
 - The Easy Way
 - ***The Hard Way***
 - ***Seven Example Scripts***

Resources on Our Website

- <https://advanceddatatools.com/presentation/migrating-and-upgrading-to-informix-14/>

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Migrating and Upgrading to Informix 14 and Migrating to the cloud. The easy and the hard way.

Published on May 19, 2020 by [Lester Knutsen](#)

I am doing a presentation on this topic at the IBM User Group Day on May 19, at 1:30 pm EST.

There are several easy procedures to upgrade and migrate Informix. We will look at the easy way (in-place upgrades, dbexport, cdr migrate, backup/restore), but sometimes they may not work for you, and you need to create a custom process. We will go over a set of procedures and scripts using HPL, external tables, and parallel unloads/loads that I have used over the last few years to migrate from small systems up through terabyte-sized databases to VMs, new hardware, and the cloud.

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Migrating and Upgrading to Informix 14 or the Cloud

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Migrating and Upgrading to Informix 14 or the cloud. The easy and the hard way.

Resources for this presentation:

- Link to the presentation at the IBM User Group Day: <http://ibm.biz/usergroupday>
- Slides from this presentation: [Informix14_Migrating_and_Upgrading_LesterKnutsen.pdf](#)
- [Example Scripts from this presentation – Using SQL to Generate SQL](#)
- [Informix Upgrade Project Plan Template: Advanceddatatools_Informix_Upgrade_ProjectPlan.pdf](#)
- [Informix Migration Project Plan Template: Advanceddatatools_Informix_Migration_ProjectPlan.pdf](#)
- [Informix Webcast 2019 – Installing and Upgrading to the New Informix version 14 and an introduction Informix HQ](#)
- [Informix Webcast 2020 – Informix Tutorials – Configuring a New Informix Server \(and Example Scripts\)](#)

Informix 14 Feature Summary

(from IBM Informix 14 Announcement)

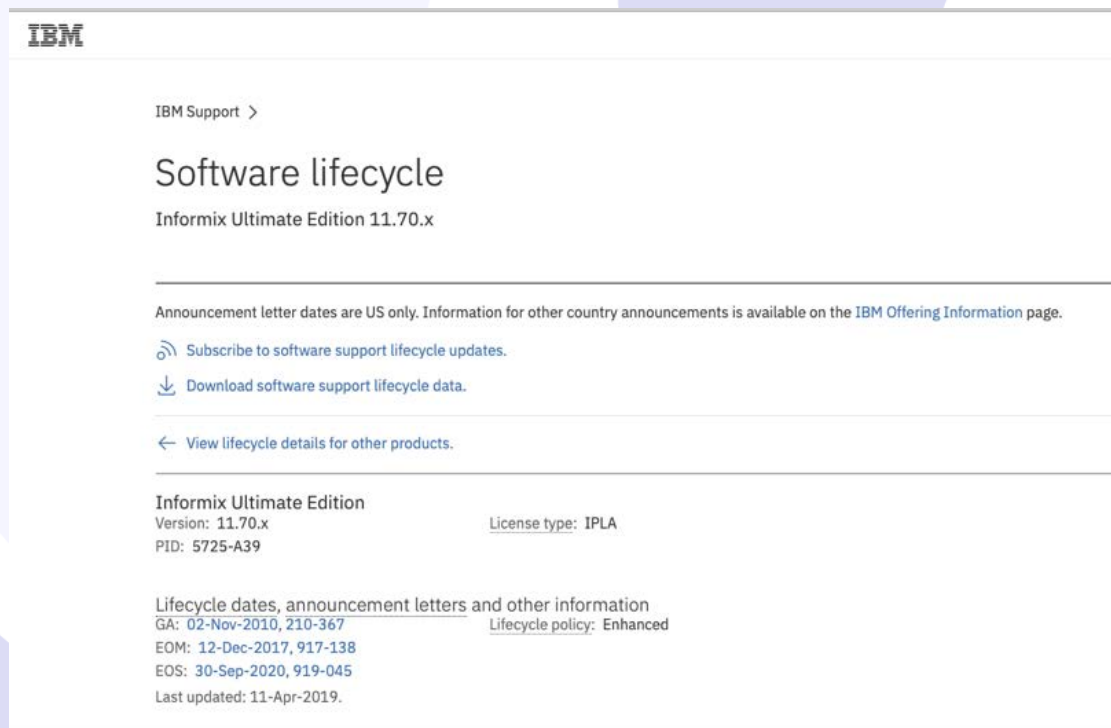
- Informix 14.10 is Faster
- More Secure
- Enhancements for Usability, Administration, and Increased Uptime
- InformixHQ
- Cloud and Containerization
- Extensibility and IoT

Upgrading to Informix 14

- Informix Upgrade Project Plan
- Setting up InformixHQ

Why Upgrade

- IBM End of Support for Informix 11.70 on 9/30/2020



The screenshot shows the IBM Support page for Informix Ultimate Edition 11.70.x. The page includes the IBM logo, a breadcrumb trail 'IBM Support >', and the title 'Software lifecycle' for 'Informix Ultimate Edition 11.70.x'. Below the title, there is a note: 'Announcement letter dates are US only. Information for other country announcements is available on the IBM Offering Information page.' There are three links: 'Subscribe to software support lifecycle updates.', 'Download software support lifecycle data.', and 'View lifecycle details for other products.' The product details section lists 'Informix Ultimate Edition', 'Version: 11.70.x', 'License type: IPLA', and 'PID: 5725-A39'. A section for 'Lifecycle dates, announcement letters and other information' lists: 'GA: 02-Nov-2010, 210-367', 'EOM: 12-Dec-2017, 917-138', 'EOS: 30-Sep-2020, 919-045', and 'Last updated: 11-Apr-2019.' The 'Lifecycle policy' is noted as 'Enhanced'.

Installing and Updrading Informix 14.10

- Informix Webcast 2019 – Installing and Upgrading to the New Informix version 14 and an introduction to Informix HQ by Lester Knutsen on April 30, 2019

<https://advanceddatatools.com/webcasts/informix-webcast-2019-installing-and-upgrading-to-the-new-informix-version-14-and-an-introduction-informix-hq/>

New Installer

- One binary - multiple edition installers
 - Advanced Enterprise Edition (aee)
 - Advanced Developer Edition (ade)
 - Advanced Enterprise Time Limited Edition (aetl)
 - Enterprise Edition (ee)
 - Time Limited Edition (tl)
 - Workgroup Edition (we)
 - Express Edition (e)
 - Innovator-C Edition (ie)
 - Developer Edition (de)

Informix Edition Installer

- Run the Informix edition installer to switch the 14.10 Informix installation from one edition to another
- Requires Java 1.8.0 to install
- `java -jar ee_edition.jar -i <console/gui>`
- The `ids_install` or `iwa_install` installer will invoke the edition installer for you in the same directory as `ids_install`

Install Changes

- New InformixHQ software included
 - \$INFORMIXDIR/hq
- No JBDC directory
- ClientSDK not included
- ESQL not included
- Connection Manager not included
- Must download and install the Informix SDK separately

Upgrade Project Plan Preparation

1. Create a new directory for the Informix 14 software
2. Install the Informix Software
3. Create new ONCONFIG and sqlhosts files
4. Re-compile any UDRs
5. Check and fix “in-place alters”

In-Place Alters

- Informix uses in-place alters to speed up database schema changes whenever possible
- New rows adopt the new schema definition, old rows do not change, therefore conversion is faster
- Recommend resolving in-place alters before an upgrade

In-Place Alter Example

Alter char(15) to char(30)

```
SQL: [ ] New Run Modify Use-editor Output Choose Save Info Drop Exit
Run the current SQL statements.

----- benchmark1@train1 ----- Press CTRL-W for Help -----

-- Alter zip table to create an inplace alter
info columns for zip;
alter table zip modify city      char(30);
info columns for zip;
```

In-Place Alter Example

711 pages at oldest version of table

```
BLSpace Usage Report for benchmark1:informix.zip
```

Type	Pages	Empty	Semi-Full	Full	Very-Full
Free	84				
Bit-Map	1				
Index	0				
Data (Home)	711				
<hr/>					
Total Pages	796				
Unused Space Summary					
Unused data slots				51	
Home Data Page Version Summary					
Version				Count	
0 (oldest)				711	
1 (current)				0	

In-Place Alter Example

Insert 1 row

```
SQL: [ ] New Run Modify Use-editor Output Choose Save Info Drop Exit
Run the current SQL statements.

----- benchmark1@train1 ----- Press CTRL-W for Help -----

insert into zip ( zip, city, state, price )
values ( 99999, "NEW CITY WITH LONG NAME", "NS", 0 );

select * from zip where zip = 99999;
```

In-Place Alter Example

711 pages old version

1 page new version

```
BLspace Usage Report for benchmark1:informix.zip
```

Type	Pages	Empty	Semi-Full	Full	Very-Full
Free	83				
Bit-Map	1				
Index	0				
Data (Home)	712				

Total Pages	796				
Unused Space Summary					
Unused data slots				91	
Home Data Page Version Summary					
Version				Count	
0 (oldest)				711	
1 (current)				1	

In-Place Alter Example

Fix with dummy update

```
SQL: [ ] New Run Modify Use-editor Output Choose Save Info Drop Exit
Run the current SQL statements.

----- benchmark1@train1 ----- Press CTRL-W for Help -----

update zip set city = city where 1=1;
```

In-Place Alter Example

All rows at current version

TBLspace Usage Report for benchmark1:informix.zip

Type	Pages	Empty	Semi-Full	Full	Very-Full
Free	225				
Bit-Map	1				
Index	0				
Data (Home)	1058				
Total Pages	1284				

Unused Space Summary

Unused data slots 1479

Home Data Page Version Summary

Version	Count
0 (oldest)	0
1 (current)	1058

Verify Data Pages

6. Verify integrity of Data Pages

- Check Reserved Pages
 - oncheck –pr or oncheck -cc
- Check Extents
 - oncheck –ce
- Check System Catalog Tables
 - oncheck –cc <database name>
- Check Data and Indexes
 - oncheck –cDI <Database name>
- Check Smart Large Objects
 - oncheck –cs <Sbospace name>
 - oncheck –cS <Sbospace name>

Rollback Contingency Plan

7. Perform Level 0 Backup
8. Validate the Backup
9. Create a Rollback Contingency Plan

Perform Upgrade

1. Ensure No User Access and Stop All Daily Processing
2. Bring Server to Single User Mode
3. Completely Shutdown the Informix Server
4. Create Symbolic Link to New Software
5. Check the ONCONFIG and sqlhosts File

Perform Upgrade

6. Start the Informix Server (new version) and allow it to perform the internal upgrade
7. Finish the upgrade and monitor progress – bring the Server online to multi-user mode
8. Test the installation

Perform Upgrade

9. Update Statistics Low on All Databases
10. Update Statistics for Procedures and Functions
11. Update Statistics High on All Databases
12. Enable User Access

Post Upgrade Processing

1. Test the Upgrade
2. Update Statistics High on All Databases (if this was not done earlier)
3. Enable Daily Processing and Ensure Users Can Connect
4. Perform Level 0 Backup

Post Upgrade Processing

5. Verify Integrity of Data Pages

- Check Reserved Pages
 - `oncheck -pr` or `oncheck -cc`
- Check Extents
 - `oncheck -ce`
- Check System Catalog Tables
 - `oncheck -cc <database name>`
- Check Data and Indexes
 - `oncheck -cDI <Database name>`
- Check Smart large objects
 - `oncheck -cs <Sbpace name>`
 - `oncheck -cS <Sbpace name>`

Simple In-Place Upgrade Demo

- Install Informix 14.X
- Shutdown Informix 12.X
 - `onmode -yuk`
- Change \$INFORMIXDIR
 - `rm /opt/Informix`
 - `ln -s /opt/informix14.10.FC3/ /opt/informix`
- Copy ONCONFIG and SQLHOSTS
 - `cd /opt/informix/etc/`
 - `cp /opt/informix12.10.FC13/etc/sqlhosts`
 - `cp /opt/informix12.10.FC13/etc/$ONCONFIG .`
- Startup Informix 14.X
 - `oninit -vw`
- Monitor Conversion
 - `tail -F /opt/informix/train1_online.log`

InformixHQ

InformixHQ

Login

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InformixHQ

- Modern web console for visualizing, monitoring, and managing your Informix server instances
- InformixHQ Guide:
 - https://www.ibm.com/support/knowledgecenter/en/SSGU8G_14.1.0/com.ibm.ifxhq.doc/informixhq.htm

Setting up InformixHQ Server

- Set up InformixHQ Server Properties File
 - Example:
 - `informixhq-server-example.properties`
- Start the Server
 - Example:
 - `java -jar informixhq-server.jar informixhq-server.properties`

Adding an Informix Server to HQ

The screenshot displays the Informix HQ web interface. The top navigation bar includes the InformixHQ logo and a user profile for 'admin'. The breadcrumb trail indicates the current location: 'All Servers > Training Tigers > tiger2tcp > Setup'. The left sidebar contains a search bar and a list of navigation items: 'tiger2tcp', 'Setup', 'Monitoring', 'Alerting', 'Permissions', 'Incidents', 'Configuration', 'Performance', 'Storage', 'System Info', 'SQL', 'SQL Tracing', 'Logs', and 'Privileges'. The main content area is titled 'Setup' and has two tabs: 'Server' (selected) and 'Agent'. Under the 'Server Information' section, the following fields are visible: 'Server ID' (12), 'Server Name' (tiger2tcp), 'Hostname' (tiger2), and 'Port' (9088). Below this are sections for 'Monitoring Credentials' and 'Admin Credentials', each with a 'Username' field (informix) and a 'Password' field (masked with dots). At the bottom, there is a 'Connection Properties' section with a '+ Add Connection Property' button and a 'Save' button.

InformixHQ – Deploy Agent

The screenshot displays the InformixHQ web interface. The top navigation bar shows the InformixHQ logo and a user profile for 'admin'. The breadcrumb trail indicates the current location: 'All Servers > Training Tigers > tiger2tcp > Setup'. The left sidebar contains a search bar and a list of navigation items: 'tiger2tcp', 'Setup', 'Monitoring', 'Alerting', 'Permissions', 'Incidents', 'Configuration', 'Performance', 'Storage', 'System Info', 'SQL', 'SQL Tracing', 'Logs', and 'Privileges'. The main content area is titled 'Setup' and has two tabs: 'Server' and 'Agent'. The 'Agent' tab is active. Under 'Agent Information', the 'Repository' field shows 'No repository selected.' with a 'Select...' button. A 'Save' button is located below. The 'Agent Status' section features a red-bordered box with the text 'The agent is offline.'. Below this is an unchecked checkbox for 'Overwrite existing agent'. The 'Username' field is an empty text input. The 'Password' field is a dropdown menu. The 'Remote directory' field contains the text 'Example: /opt/informixhq-agent'. A 'Deploy agent' button is positioned at the bottom of the form.

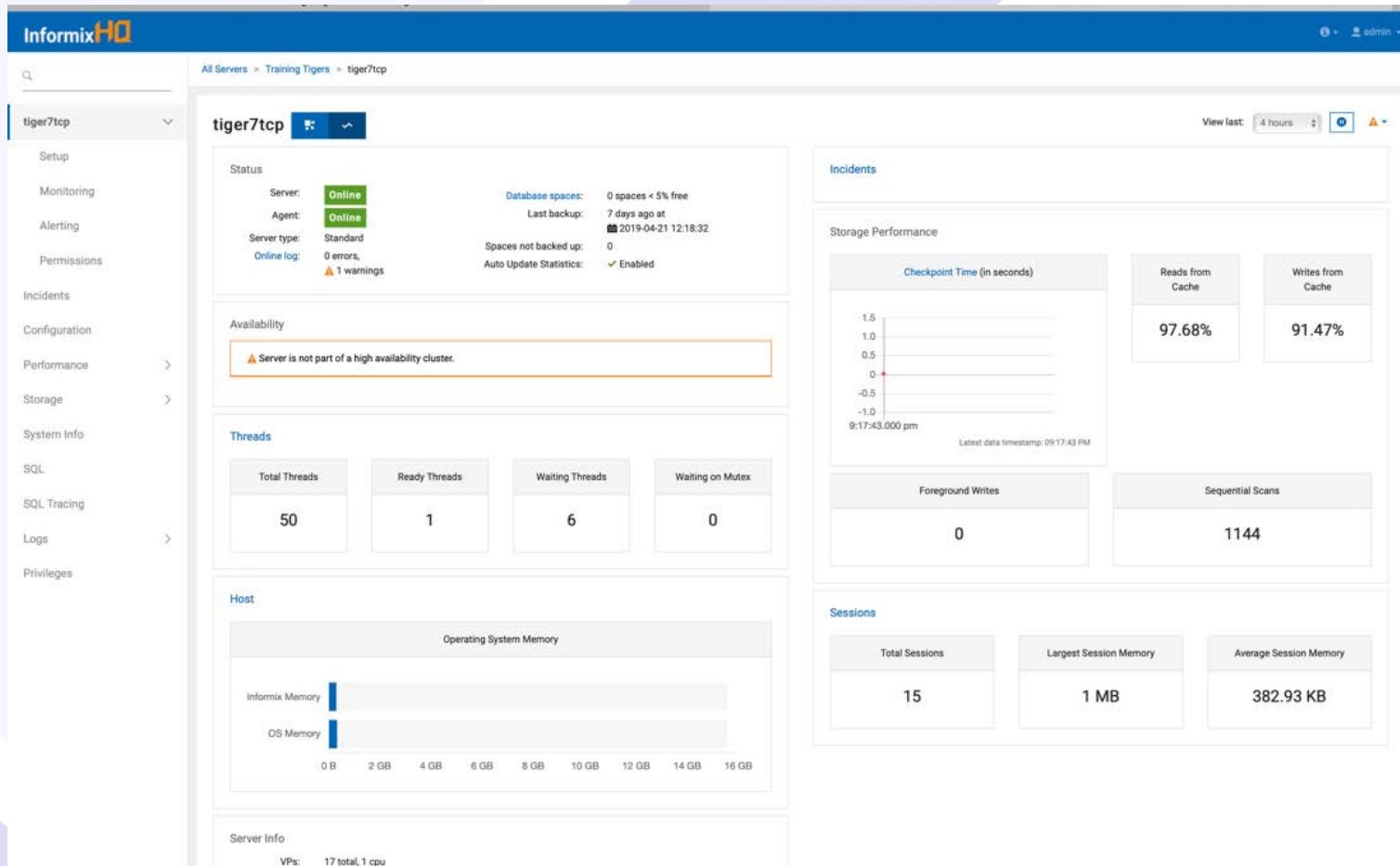
Setting up InformixHQ Client

- Set up InformixHQ Agent Properties
 - Example:
 - `informixhq-agent-example.properties`
- Start the Agent
 - Example:
 - `java -jar informixhq-agent.jar agent.properties`

InformixHQ - Servers

The screenshot displays the InformixHQ web interface for server management. The top navigation bar includes the InformixHQ logo and a user profile for 'admin'. A left sidebar contains menu items for 'Monitoring', 'Alerting', and 'Permissions'. The main content area, titled 'All Servers', is divided into two sections: 'Groups (2)' and 'Servers (1)'. The 'Groups (2)' section contains two cards: 'Training Servers' and 'Training Tigers', both showing 'Servers: 8 (8)'. The 'Training Tigers' card includes a red warning icon. The 'Servers (1)' section contains one card for 'tiger7tcp', which shows 'Server Status' as unknown (question mark) and 'Monitoring Agent' as active (red dot). 'Add Group' and 'Add Server' buttons are located on the right side of their respective sections.

InformixHQ - Server



InformixHQ – Monitor DBspaces

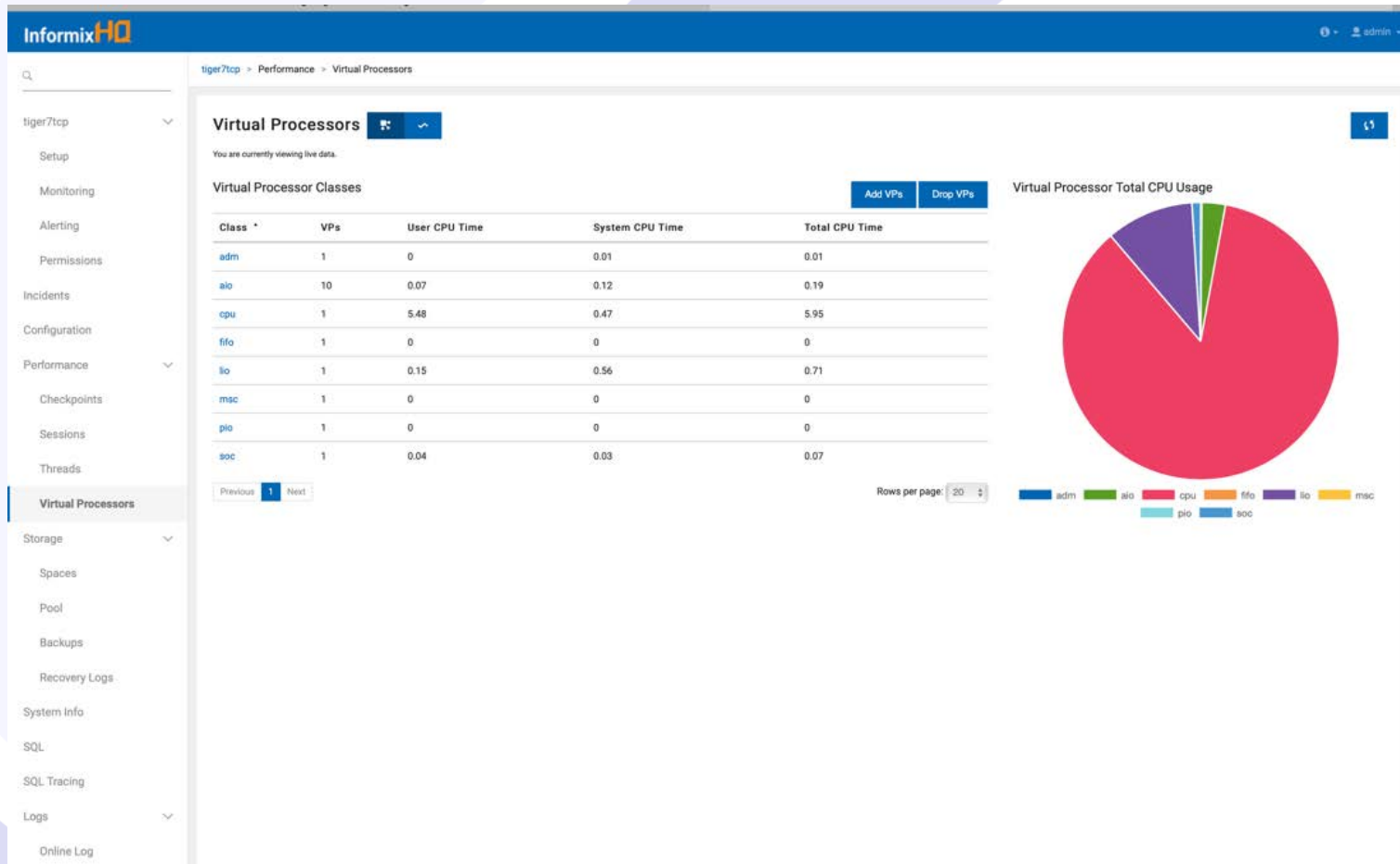
InformixHQ tiger7tcp > Storage > Spaces

Search name or type...

Number	Name	Status	Type	% Used	Size	Page Size	Expandable	Create Size	Extend Size	Last Backup	Actions
2	plogdbs	●	dbspace	<div style="width: 100%;"></div>	1.91 GB	2 KB	✓	10%	9.77 MB	2019-04-21 12:18:32	Action
3	logdbs	●	dbspace	<div style="width: 10%;"></div>	1.91 GB	2 KB	✓	10%	9.77 MB	2019-04-21 12:18:32	Action
1	rootdbs	●	dbspace	<div style="width: 20%;"></div>	390.63 MB	2 KB	✓	10%	9.77 MB	2019-04-21 12:18:32	Action
4	datadbs	●	dbspace	<div style="width: 38%;"></div>	3.81 GB	2 KB	✓	10%	9.77 MB	2019-04-21 12:18:32	Action
8	blobdbs	●	blobdbspace	<div style="width: 19%;"></div>	19.53 MB	4 KB	✓	10%	0%	2019-04-21 12:18:32	Action
9	idxdbs	●	dbspace	<div style="width: 19%;"></div>	1.91 GB	16 KB	✓	10%	9.77 MB	2019-04-21 12:18:32	Action
7	tmp3dbs	●	temporary dbspace	<div style="width: 48%;"></div>	488.28 MB	2 KB	✓	10%	9.77 MB	2019-04-21 11:43:23	Action
6	tmp2dbs	●	temporary dbspace	<div style="width: 48%;"></div>	488.28 MB	2 KB	✓	10%	9.77 MB	2019-04-21 11:43:23	Action
5	tmp1dbs	●	temporary dbspace	<div style="width: 48%;"></div>	488.28 MB	2 KB	✓	10%	9.77 MB	2019-04-21 11:43:23	Action

Previous 1 Next Rows per page: 10

InformixHQ – Monitor Oninits



InformixHQ – Monitor Logs

Physical Log

Location: 2_53
 DbSpace: plogdbs
 Size: 1.72 GB
 Used: 3.19 MB
 Used %: 0.18%
 Start Offset: 65.86 MB
 Buffer Size: 128 KB

Log Usage

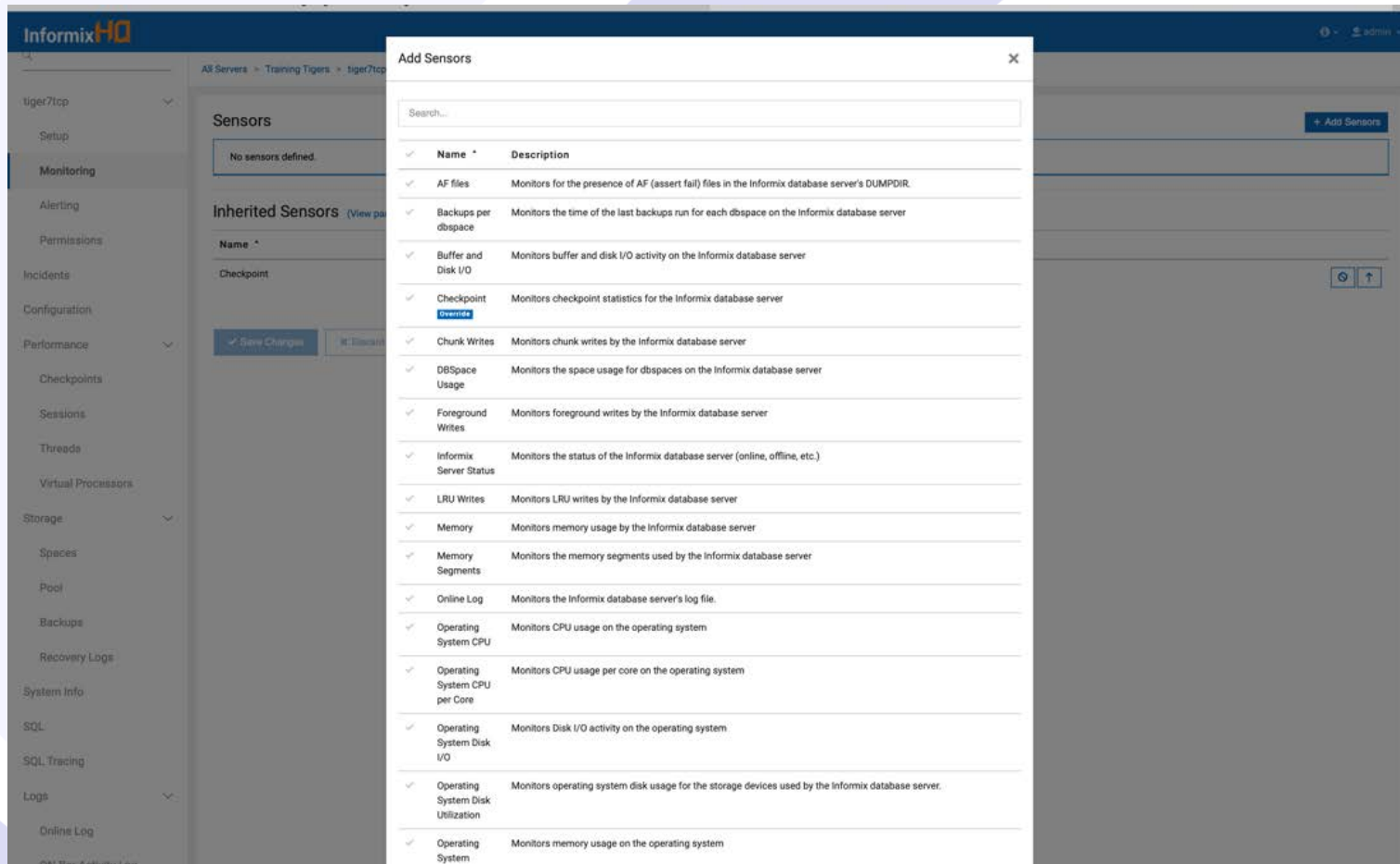
Physical Log: [Green bar representing Free space]

Logical Log: [Green bar representing Free space, Blue bar representing Backed Up space]

Logical Logs

Number	Unique ID	Size	Used	Location	Last Filled	Notes	Fill Rate
1	0	9.77 MB	0%	1_25263	2019-04-21 11:43:40		N/A
2	0	9.77 MB	0%	1_30263	2019-04-21 11:43:40		N/A
3	0	9.77 MB	0%	1_35263	2019-04-21 11:43:41		N/A
4	0	9.77 MB	0%	1_40263	2019-04-21 11:43:41		N/A
5	0	9.77 MB	0%	1_45263	2019-04-21 11:43:42		N/A
6	0	9.77 MB	0%	1_50263	2019-04-21 11:43:44		N/A
7	0	9.77 MB	0%	3_53	2019-04-21 11:43:46		N/A
8	0	9.77 MB	0%	3_5053	2019-04-21 11:43:48		N/A
9	0	9.77 MB	0%	3_10053	2019-04-21 11:43:49		N/A
10	0	9.77 MB	0%	3_15053	2019-04-21 11:43:52		N/A
11	0	9.77 MB	0%	3_20053	2019-04-21 11:43:54		N/A
12	0	9.77 MB	0%	3_25053	2019-04-21 11:43:56		N/A

InformixHQ – Set Up Alerts



The screenshot shows the InformixHQ web interface. A modal dialog titled "Add Sensors" is open, displaying a list of sensors. The background interface shows a sidebar with navigation options like "Monitoring", "Alerting", and "Permissions", and a main content area with "Sensors" and "Inherited Sensors" sections.

Name	Description
<input checked="" type="checkbox"/> AF files	Monitors for the presence of AF (assert fail) files in the Informix database server's DUMPPDIR.
<input checked="" type="checkbox"/> Backups per dbspace	Monitors the time of the last backups run for each dbspace on the Informix database server
<input checked="" type="checkbox"/> Buffer and Disk I/O	Monitors buffer and disk I/O activity on the Informix database server
<input checked="" type="checkbox"/> Checkpoint	Monitors checkpoint statistics for the Informix database server
<input checked="" type="checkbox"/> Chunk Writes	Monitors chunk writes by the Informix database server
<input checked="" type="checkbox"/> DBSpace Usage	Monitors the space usage for dbspaces on the Informix database server
<input checked="" type="checkbox"/> Foreground Writes	Monitors foreground writes by the Informix database server
<input checked="" type="checkbox"/> Informix Server Status	Monitors the status of the Informix database server (online, offline, etc.)
<input checked="" type="checkbox"/> LRU Writes	Monitors LRU writes by the Informix database server
<input checked="" type="checkbox"/> Memory	Monitors memory usage by the Informix database server
<input checked="" type="checkbox"/> Memory Segments	Monitors the memory segments used by the Informix database server
<input checked="" type="checkbox"/> Online Log	Monitors the Informix database server's log file.
<input checked="" type="checkbox"/> Operating System CPU	Monitors CPU usage on the operating system
<input checked="" type="checkbox"/> Operating System CPU per Core	Monitors CPU usage per core on the operating system
<input checked="" type="checkbox"/> Operating System Disk I/O	Monitors Disk I/O activity on the operating system
<input checked="" type="checkbox"/> Operating System Disk Utilization	Monitors operating system disk usage for the storage devices used by the Informix database server.
<input checked="" type="checkbox"/> Operating System	Monitors memory usage on the operating system

InformixHQ – SQL Commands

The screenshot displays the InformixHQ SQL Console interface. The left sidebar contains a navigation menu with categories like tiger7tcp, Setup, Monitoring, Alerting, Permissions, Incidents, Configuration, Performance, Checkpoints, Sessions, Threads, Virtual Processors, Storage, Spaces, Pool, Backups, Recovery Logs, System Info, SQL, SQL Tracing, and Logs. The main content area shows the 'SQL Console' with a user 'sysadmin' and a 'Query' input field. Below the input, the command 'sysadmin: onstat -p' is entered and executed. The output is a detailed system status report for IBM Informix Dynamic Server Version 14.10.FC1.

```

onstat

IBM Informix Dynamic Server Version 14.10.FC1 -- On-Line -- Up 00:04:34 -- 335668 Kbytes

Profile
dskreads  pagreads  bufreads  %cached  dskwrits  pagwrits  bufwrits  %cached
7111      13239     307699   97.70    4873      7195     57220    91.48

iasmtot   open       start     read      write     rewrite   delete    commit   rollbk
454598    53366     49336    104587   9199      6390     1041     7002     0

gp_read   gp_write   gp_revrt  gp_del    gp_alloc  gp_free   gp_curs
0         0         0         0         0         0         0

orlock    ovuserthrd  ovbuff    usercpu   syscpu    numckpts  flushes
0         0         0         5.82     1.27     1         2

bufwrits  lokwaits   lockreqs  deadlks   ditouts   ckpwait   compress  segscans
71        0         176732   0         0         0         1848     1162

ixda-RA   idx-RA     da-RA     logrec-RA  RA-pgused  lchwaits
857       271       348       2         529       123
  
```

Migrating to the Cloud or a Virtual Machine

- The Easy Way
 - dbexport/dbimport
 - backup/restore
 - ifxclone
 - cdr migrate server
 - myexport
- The Hard Way

Dbexport and Dbimport

- To unload a whole database
- Creates ASCII files with all the data and the schema
- Portable to other systems
- Locks the database during an export
- Database may be exported to a directory or tape

Backup/Restore

- Same Operating System
- Same Version of Informix
- Using Ontape or OnBar
- Perform a Backup
- Perform a Restore
- Roll Forward the Logs

CDR Migrate Server

- Enterprise Replication – New Command
 - Automates data migration between two or more servers
 - Automates setting up of Enterprise Replication between two servers
 - Creates storage spaces using storage pool
 - Migrate schema and data in parallel
 - Synchronizes data using ER
 - ***No Down Time***
- IBM Informix Documentation Guide -
https://www.ibm.com/support/knowledgecenter/SSGU8G_14.1.0/com.ibm.erep.doc/ids_erp_cdr_migrate_server.htm

ifxclone Utility

- **ifxclone** utility to create a server clone from a snapshot of an existing database server
- IBM Informix Documentation Guide -
https://www.ibm.com/support/knowledgecenter/SSGU8G_12.1.0/com.ibm.adref.doc/ids_adr_1093.htm

Myexport by Art Kagel

The screenshot shows the ASK Database Management website. At the top right, there is a navigation bar with links for HOME, ABOUT, ART'S BLOG, MORE..., LOG IN, REGISTER, and CART (0). A search bar and social media icons for LinkedIn and email are also present. The main content area is titled "Art's Utilities Download Page Latest Gamma Level Releases". It features two prominent blue buttons: "Download the latest Utils2_AK package" and "Download the latest myexport package". Below these buttons, a paragraph states: "Utils2_ak is my primary package of utilities. This is the May 15, 2020 release." Underneath, a section titled "Included:" lists several utilities with their descriptions:

- dbping.ec** - Tests connections and reports connection time as well as the actual host and servename connected as well as which alias was used for the connection. These reports are important for testing DBPATH, connection groups, and Connection Manager behavior as well as verifying server failover.
- dbcopy.ec** - Copy data from table to table directly across databases, servers, instances, versions, even between databases at different logging levels without worrying about long transaction rollbacks.
- dbdelete.ec** - Delete large amounts of data from a table FAST without risking long transaction rollbacks.
- dbmove.ec** - Another data copy utility using the methods the dbdelete uses. Can copy some data that dbcopy cannot.
- dbavail.ec** - Summary dbspace report. Reports used and free space in pages, KB, and percent. Optional chunk detail.

- Myexport is my replacement for dbexport and dbimport. These scripts optionally use external tables or the Informix High Performance Loader to unload and load data much faster than dbexport/dbimport without locking the database. Options include parallel export and import, NOVALIDATE data loading, constraint filtering, user selected isolation level, running dostats after the load, compressed unload files, dbexport & dbimport compatibility, dbspace mapping.
- <https://www.askdbmgt.com/my-utilities.html>

The Hard Way

- Migrating to different Server Hardware or Operating Systems
 - AIX to Red Hat on the Cloud
 - Solaris or HPUX to the Cloud or VM
- Need to Restructure Large Tables or Update Partitioning
- Database Code Set Change
- Minimize Down Time – Need to Parallelize the Process

Project Plan: Migration VM or Cloud

- Build a Project Plan
- First – Test Migrate Scripts in Single Thread
 - Goal is to execute and unit test each script in single thread runs
- Second – Test Migrate Scripts in Parallel
 - Goal is to stress test all scripts in parallel and validate production times
- Third – Final Production Server Migration

Build a Project Plan



Project Plan: Migration from Old Server to VM Linux Informix

Update 2/17/2020

Row Num	Tasks	Description	Estimated hours	Staff Category	Planned Start Date	Finished Date	Complete Date	Assigned To	Complete Status	Status Comments
1	1. Migration	Project Planning								
2		Review the current Informix Server Configurations	8	Principal DBA						
		Run informixcheck.sh scrip to collect data		Principal DBA						
		Load the data into Excel Worksheets		Principal DBA						
		Identify Job Streams for Parallel loads based on usage		Principal DBA						
		Identify ONCONFIG changes for New Server		Principal DBA						
3		Plan New Linux VM Configurations	16	Principal DBA						
		Identify and plan VM Configuration Settings		Principal DBA						
		Identify and Size the Filesystems		Principal DBA						
		Identify and Size the Space for Informix DBSpaces		Principal DBA						
		Identify the Kernal Configuration Changes		Principal DBA						
		Identify the temp filesystem for Import/Export Data		Principal DBA						
		Identify and define the Backup method		Principal DBA						
		Identify Linux software to install and additional packages		Principal DBA						
		Identify and define printers to install		Principal DBA						
		Identify and define the ports for Informix Connections		Principal DBA						
4	2. Migrate	First Test/Development - Goal is to run and unit test all scripts in single thread run								
5		Develop scripts to export and import data and capture QA metrics	16	Principal DBA						
		Create onpload jobs scripts for the unload - 1 per table		Principal DBA						
		Create onpload job streams script		Principal DBA						
		Create the external table scripts for the load - 1 per table		Principal DBA						
		Create the load job stream		Principal DBA						
		Create the QA scripts to count rows and sum key dollar amounts		Principal DBA						
		Create script - createdb		Principal DBA						
		Create script - create_tables		Principal DBA						
		Create script - create_tables_large_parallel		Principal DBA						
		Create script - create_external		Principal DBA						
		Create script - create_permissions		Principal DBA						
		Create script - create_procedures		Principal DBA						
		Create script - create_synonyms		Principal DBA						
		Create script - create_triggers		Principal DBA						
		Create script - create_indexes		Principal DBA						
		Create script - create_indexes_large_parallel		Principal DBA						
		Create the create and load job stream		Principal DBA						
6		Export the data from the Informix Server and capture QA metrics	16	Senior DBA						
		Restore a backup of production on to a test system		MN Sysadmin						

Webcast: Configure a New Server - Target

- Informix Tutorials – Configuring a New Informix Server Presented by Lester Knutsen on February 27, 2020
- <https://advanceddatatools.com/webcasts/informix-tutorial-configuring-a-new-informix-server/>

Ten Scripts to Configure a Large Informix Server

- 01makerootdbs.sh - create directories and links for all dbspaces
- 02setupServer.sh - initialize the server and rootdbs
- 03makeplogdbs.sh - move the physical log to a new dbspace
- 04makelogsdbs.sh - create two dbspaces for logical logs
- 05makeaddlogs.sh - create the logical logs
- 06maketempdbs.sh - create the temp dbspaces
- 07makesysadmin dbs.sh - create and move the sysadm dbspace
- 08makedatadb s.sh - create the dbspaces for data
- 09makeindexdbs.sh - create the dbspaces for indexes
- 10extendablechunks.sh - make the dbspaces and chunks extendable
- cleanup.sh - remove everything and start over
- informix.env - set the Informix environment variables
- onconfig.newserver - configure the server properties
- sqlhosts - configure the network settings

Define Parallel Job Streams

- How many Large Tables > 2 GB?
- Tables that require special Partitioning?
- How many CPUs and CPU VPs are available?
- Limit Parallel Jobs to number of CPU VPs
- Limit PDQ Priority based on number of Jobs
- Divide tables and indexes into two groups
 - Normal Tables and Indexes < 2 GB
 - Parallel Tables and Indexes > 2GB

Webcast: Re-Organizing and Partitioning Tables

- Informix Webcast 2018 – Automatic Informix Range Interval Partitioning and Rolling Windows to Organize your data
 - <https://advanceddatatools.com/webcasts/informix-webcast-2018-automatic-informix-range-interval-partitioning-and-rolling-windows-to-organize-your-data/>

Dissect DBschema

- Run DBschema -d -ss database to a file and then ...
- Split the result file into 9 separate SQL scripts
 1. SQL to create most tables (Normal Tables)
 2. SQL to create selected large tables for Parallel Loads
 3. SQL to create External tables
 4. SQL to create permissions
 5. SQL to create procedures and functions
 6. SQL to create synonyms
 7. SQL to create triggers
 8. SQL to create most indexes (Normal Indexes)
 9. SQL to create selected large table indexes for Parallel builds

Unloading the Data

- Create External Tables
- Lock the Database for the unloads
- Unload all tables < 2 GB in one job stream
- Unload all tables > 2 GB in parallel job streams
- Run QA Script to check the data (the database should be locked)

Building the New Database

- Create the database in selected Dbspace with No Logging - createdb.sql
- Create all the normal tables - create_tables.sql
- Create the large tables for parallel loads - create_tables_large_parallel.sql
- Create the External Tables to load from - create_external.sql
- Load the Normal base tables - load base tables.sql
- Run Parallel Load Jobs for the large tables - load large tables.sql
- Create the Permissions - create_permissions.sql
- Create Procedures and Functions - create_procedures.sql
- Create Synonyms - create_synonyms.sql
- Create Triggers - create_triggers.sql
- Create Indexes for normal tables - create_indexes.sql
- Run Parallel Index creation jobs - create_indexes_large_parallel.sql
- **Turn Database Logging On when done!**

Checking the Data

- Check Row counts
- Sum One Key Metrics per table
- Save the data in a table so you can automatically compare it on both servers

Example Scripts

Using SQL to Generate SQL

1-tabselect.sql - Identify Large Tables (>2GB)

2-mk_external_tables.sql - Make External Tables

3-mk_drop_external_tabels.sql - Drop External Tables

4-mk_unloads.sql - Make SQL to Unload the Database

5-mk_loads.sql - Make SQL to Load the Database

6-mk_truncate.sql - Make SQL to Truncate Tables (for Testing)

7-mk_qa_loads.sql - Make SQL to QA the Data (Row counts and Sums)

Script - Identify Large Tables (>2GB)

```
-- Module: @(#)tableselect.sql 1.0      Date: 2019/04/01
-- Author: Lester Knutsen  Email: lester@advancedatools.com
--       Advanced DataTools Corporation
-- Description: New Table Information Script - Unload the output to a file
--       Tested with Informix 11.70 and Informix 12.10, 14.10
-----

database sysmaster;

unload to all_tableinfo.uld
select
    systabnames.dbsname      database,
    systabnames.tabname     tabname,
    ( dbinfo('dbspace', ti_partnum ) ) dbspace,
    systabnames.partnum,
    ti_rowsize      row_size,
    ti_pagesize     page_size,
    ti_nptotal      pages_total,
    ti_npused       pages_used,
    ti_npdata       pages_data,
    ( ti_npdata * ti_pagesize ) total_bytes
from systabnames, systabinfo, outer sysptprof
where  systabinfo.ti_partnum = systabnames.partnum
and    systabinfo.ti_partnum = sysptprof.partnum
and    systabnames.dbsname not in ( "sysmaster", "sysuser", "sysutils", "sysadmin" )
and    systabnames.tabname not in ( select tabname from systables where tabid <=99 )
and    ti_npdata > 0 -- remove partitions with no data pages
and    ( ti_npdata * ti_pagesize ) > 1000000000
order by total_bytes desc;
```

Script – Make External Tables

```
#####  
-- ## Module: @(#)mk_external_tables.sql      1.0      Date: 02/14/2018  
-- ## Author: Lester Knutsen  Email: lester@advancedatools.com  
-- ##           Advanced DataTools Corporation  
-- #####  
  
-- #####  
-- Run this for each database you need to migrate  
-- #####  
  
unload to "create_external_tables.sql"  
delimiter ";"  
select "create external table _ext_" || trim(tabname) || " sameas " || trim(tabname) || " " ||  
"using ( " ||  
"DATAFILES('DISK:/tmp/" || trim(tabname) || ".uld'), " ||  
"FORMAT 'INFORMIX'," ||  
"REJECTFILE '/tmp/" || trim(tabname) || ".reject'" ||  
") "  
from systables  
where tabid > 99  
and tabtype ="T";
```

Script – Drop External Tables

```
#####  
-- ## Module: @(#)mk_drop_external_tables.sql      1.0      Date: 02/14/2018  
-- ## Author: Lester Knutsen  Email: lester@advancedatools.com  
-- ##           Advanced DataTools Corporation  
-- #####  
  
-- #####  
-- Run this for each database you need to migrate  
-- #####  
  
unload to "drop_external_tables.sql"  
delimiter ";"  
select "drop table " || trim(tabname)  
from systables  
where tabid > 99  
and tabtype = "E"  
and tabname matches "_ext_*";
```

Script – Make SQL to Unload the Database

```
#####  
-- ## Module: @(#)mk_unloads.sql      1.0      Date: 02/14/2018  
-- ## Author: Lester Knutsen  Email: lester@advancedatools.com  
-- ##           Advanced DataTools Corporation  
-- #####  
  
output to "unload_small_tables.sql" without headings  
select "insert into _ext_" || trim(tabname) || " select * from " || trim(tabname) || ";"  
from systables  
where tabid > 99  
and tabtype ="T"  
and tabname in ( select tabname  
                  from sysmaster:systabnames, sysmaster:systabinfo  
                  where sysmaster:systabinfo.ti_partnum = sysmaster:systabnames.partnum  
                    and ( ti_npdata * ti_pagesize ) < 1000000000  
                    and dbsname = ( select dbinfo('dbname') from systables where tabid =1 ) )  
;  
  
output to "unload_big_tables.sql" without headings  
select "insert into _ext_" || trim(tabname) || " select * from " || trim(tabname) || ";"  
from systables  
where tabid > 99  
and tabtype ="T"  
and tabname in ( select tabname  
                  from sysmaster:systabnames, sysmaster:systabinfo  
                  where sysmaster:systabinfo.ti_partnum = sysmaster:systabnames.partnum  
                    and ( ti_npdata * ti_pagesize ) >= 1000000000  
                    and dbsname = ( select dbinfo('dbname') from systables where tabid =1 ) )  
;
```

Script – Make SQL to Load the Database

```
#####
-- ## Module: @(#)mk_loads.sql      1.0      Date: 02/14/2018
-- ## Author: Lester Knutsen  Email: lester@advancedatools.com
-- ##                Advanced DataTools Corporation
-- #####

output to "load_small_tables.sql" without headings
select "insert into " || trim(tabname) || " select * from _ext_" || trim(tabname) || ";"
from systables
where tabid > 99
and tabtype ="T"
and tabname in ( select tabname
                  from sysmaster:systabnames, sysmaster:systabinfo
                  where sysmaster:systabinfo.ti_partnum = sysmaster:systabnames.partnum
                    and ( ti_npdata * ti_pagesize ) < 1000000000
                    and dbsname = ( select dbinfo('dbname') from systables where tabid =1 ) )
;

output to "load_bigl_tables.sql" without headings
select "insert into " || trim(tabname) || " select * from _ext_" || trim(tabname) || ";"
from systables
where tabid > 99
and tabtype ="T"
and tabname in ( select tabname
                  from sysmaster:systabnames, sysmaster:systabinfo
                  where sysmaster:systabinfo.ti_partnum = sysmaster:systabnames.partnum
                    and ( ti_npdata * ti_pagesize ) >= 1000000000
                    and dbsname = ( select dbinfo('dbname') from systables where tabid =1 ) )
;
```


Script – Make SQL to Truncate Tables (for Testing)

```
-- #####  
-- ## Module: @(#)mk_truncate.sql      1.0      Date: 02/14/2018  
-- ## Author: Lester Knutsen  Email: lester@advancedatools.com  
-- ##           Advanced DataTools Corporation  
-- #####  
  
output to "truncat_table.sql" without headings  
select "truncate  " || trim(tabname) || ";"  
from systables  
where tabid > 99  
and tabtype ="T"  
;
```

Script – Make SQL for QA (Row counts and Sums)

```
-- ## Module: @(#)mk_qa_check.sql      1.0      Date: 02/14/2018
-- ## Author: Lester Knutsen  Email: lester@advancedatools.com
-- ##          Advanced DataTools Corporation
-- #####

-- Create a table to identify one decimal column per table to sum for QA
drop table if exists tmp_key_columns;
create temp table tmp_key_columns(
    t_name  varchar(128),
    t_id    integer,
    c_name  varchar(128)
);

-- Identify all tables and any decimal columns
insert into tmp_key_columns
select unique tabname, systables.tabid, syscolumns.colname
from systables, outer syscolumns
where systables.tabid = syscolumns.tabid
and systables.tabid > 99
and syscolumns.coltype = 5
and tabtype = "T";

-- Update any columns which are null
update tmp_key_columns set c_name = "0" where c_name is null;

-- Identify one decimal column per table
select t_name, t_id, max (c_name) c_name
from tmp_key_columns
group by 1, 2
into temp tmp_key_columns2 ;

-- Build a QA script to count rows and sum the decimal columns
output to "qa_data_check.sql" without headings
select "select ' " || trim(tabname) || "', count(*), sum( " ||
    trim((select c_name from tmp_key_columns2 where t_id = tabid) )
    || " ) from " || trim(tabname) || ";"
from systables
where tabid > 99
and tabtype ="T";
```

Questions?



Send follow-up questions to
Lester@advanceddatatools.com

Advanced DataTools

International Informix User Group:

<http://www.iiug.org>

The screenshot shows the homepage of the International Informix User Group. At the top left is the IIUG logo. A navigation menu includes links for Informix, News, Insider, Events, Resources, Get Engaged, About IIUG, and Membership Area. An IBM logo is in the top right. The main heading is 'Informix SOFTWARE' with the 'ix' in a stylized font. Below this are four columns: News, Blog, Insider, and Upcoming Events. The News column lists articles about 2020 webcasts and website migration. The Blog column lists articles about IBM Informix editions, PHP drivers, and license changes. The Insider column lists IIUG Insider issues. The Upcoming Events column lists tech days in Bengaluru and Chennai, and IBM Think 2020 in San Francisco.

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- IIUG Insider (Issue #233) December 2019
- IIUG Insider (Issue #232) November 2019
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IIUG Informix Tech Day – Bengaluru, India
March 24 @ 8:00 am - 5:00 pm

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- **Basic Informix Server Monitoring - August 20, 2020 at 2:00 pm EDT**

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