THE IBM INFORMIX V.14.10.XC6 DEEP DIVE STARTS AT 10 AM CDT

PLEASE MUTE YOUR AUDIO DEVICE, THANKS!

IBM

IBM Informix v.14.10.xC6 Technical Deep Dive Webcast series

Session 2: IHQ and backup from RS secondaries

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Session 2: IHQ and backup from RS secondaries

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IBM INFORMIX V.14.10.XC6 - INFORMIX HQ 1.5.0

IBM Informix 14.10

v.2

Agenda

- Changes to start and stop script functionality

- Test connection

- Schema Manager enhancements

- ISAM error reporting

- Incident reporting and other enhancements

Changes to the start and stop script

Changes to the start and stop script

- Starting with IHQ 1.2.0, a shell script that makes starting, stopping and managing server and agent services was introduced
  - With 1.4.0, there have been numerous changes to the functionality

  - First, in addition to a Windows and c shell (most Unixs/Linuxs) script there is now a Korn shell version of the script for AIX

```
Ifmx: pwd
/opt/IBM/informix/14_10/hq
Ifmx:
Ifmx: ls -x
agent.log4j.xml                    h2db.mv.db                  h2db.trace.db
informixhq-agent-example.properties informixhq-agent.jar        informixhq-agent.log
informixhq-agent.properties        InformixHQ.bat              InformixHQ.ksh  ←
informixhq-server-example.properties informixhq-server.jar      informixhq-server.log
informixhq-server.properties       InformixHQ.sh               server.log4j.xml
Ifmx:
```

Changes to the start and stop script

- Using the `help` option displays the new format for the command options

```
Ifmx: InformixHQ.sh help
Command: InformixHQ
This command starts/stops InformixHQ Server and Agent.

Syntax:
InformixHQ [startserver|startagent] [encoding=<value>] [jvmmemx=<value>] [jarfile=<value>] [propfile=<value>]
InformixHQ [stop <processid>]
InformixHQ [list]

startserver              : Starts InformixHQ Server service
startagent               : Starts InformixHQ Agent service
stop                     : Stops InformixHQ Server/Agent service with processId
list                     : Lists InformixHQ running processes
encoding (Optional)      : Default value is utf-8
jvmmemx (Optional)       : JVM's default value will be used If not specified
jarfile (Optional)       : Default is informixhq-server.jar for startserver option and informixhq-agent.jar for startagent option.
                           For user provided filename, it must contain keyword 'informixhq' and it should end with .jar
propfile (Optional)      : Default is informixhq-server.properties for startserver option and informixhq-agent.properties for startagent option.
                           User can provide any custom name to properties file

Ifmx:
```

- All the parameters are now lower rather than mixed case

- The ability to "name" a process for identification within a listing has been removed because AIX doesn't support process naming

  - For example in 1.2.0 . . . `startServer i_svr_1 encod.` . . . . . .

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encoding (Optional)   : Default value is utf-8
jvmmemx (Optional)    : JVM's default value will be used If not specified
jarfile (Optional)    : Default is informixhq-server.jar for startserver option and informixhq-agent.jar for startagent option.
                        For user provided filename, it must contain keyword 'informixhq' and it should end with .jar
propfile (Optional)   : Default is informixhq-server.properties for startserver option and informixhq-agent.properties for startagent option.
                        User can provide any custom name to properties file

Ifmx:
```

- You can rename the jar and properties files and pass those new file names to the script with the `jarfile` and `propfile` parameters
  - Note - the `jar` file name must still contain `informixhq` in it and have a `.jar` suffix

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list                    : Lists InformixHQ running processes
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jvmmemx (Optional)      : JVM's default value will be used If not specified
jarfile (Optional)      : Default is informixhq-server.jar for startserver option and informixhq-agent.jar for startagent option.
                          For user provided filename, it must contain keyword 'informixhq' and it should end with .jar
propfile (Optional)     : Default is informixhq-server.properties for startserver option and informixhq-agent.properties for startagent option.
                          User can provide any custom name to properties file

Ifmx:
```

- The properties file no longer must have a `.properties` suffix to it
  - For example, in 1.2.0 for multiple agents you had to name the files `informixhq-agent-1.properties`, `informixhq-agent-2.properties` etc., now you can name them `agent.properties_1`, `agent.prop_2` or what ever you want
  - The property file name is returned in the `list` output as illustrated next to distinguish services to stop

Changes to the start and stop script

- Using the `help` option displays the new format for the command options

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                         For user provided filename, it must contain keyword 'informixhq' and it should end with .jar
propfile (Optional)    : Default is informixhq-server.properties for startserver option and informixhq-agent.properties for startagent option.
                         User can provide any custom name to properties file

Ifmx:
```

- There is a `list` option that displays the active IHQ processes on the server with its configuration file

```
Ifmx: InformixHQ.sh list
ProcessId  Name  Jar  Properties
5385 java informixhq-server.jar informixhq-server.properties
5882 java informixhq-agent.jar informixhq-agent.properties

INFO: In case, process is not listed after startserver/startagent command, please check the log files.
```

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Changes to the start and stop script

- Using the `help` option displays the new format for the command options

```
Ifmx: InformixHQ.sh help
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Syntax:
InformixHQ [startserver|startagent] [encoding=<value>] [jvmmemx=<value>] [jarfile=<value>] [propfile=<value>]
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                         For user provided filename, it must contain keyword 'informixhq' and it should end with .jar
propfile (Optional)    : Default is informixhq-server.properties for startserver option and informixhq-agent.properties for startagent option.
                         User can provide any custom name to properties file

Ifmx:
```

- The default locale encoding is still `utf-8` which might or might not work for your instance environments
  - If it doesn't, make sure to include the `encoding=xxxxxx` clause in your start commands

```
Ifmx: InformixHQ.sh startserver encoding=en_us819
```

Changes to the start and stop script

- One quick note on starting the IHQ server and agent(s)
  - An XML configuration file (`server.log4j.xml`) should (but doesn't necessarily have to) exist in the HQ directory
  - If it does, the startup messages displayed earlier appear when starting IHQ processes

  - If the file is moved, deleted, renamed so it's not "available", some logging messages will appear when starting services
    - This indicates the configured file is missing
    - The services will start correctly and function properly

```
informix@LP1-AP-51927916:/log4js_test$ ./InformixHQ.sh startserver
2021-04-21 16:09:22,536 main INFO Log4j appears to be running in a Servlet environment, but there's no log4j-web module availab
le. If you want better web container support, please add the log4j-web JAR to your web archive or server lib directory.
2021-04-21 16:09:22,541 main INFO Log4j appears to be running in a Servlet environment, but there's no log4j-web module availab
le. If you want better web container support, please add the log4j-web JAR to your web archive or server lib directory.

INFO: Please use list command to verify the process.

informix@LP1-AP-51927916:/log4js_test$
```

Changes to the start and stop script

- The stop process has been changed and improved as well
  - A processID and not a service name is used
  - The script now checks to make sure the processID is actually an IHQ process and aborts if it isn't

```
Ifmx: InformixHQ.sh list
ProcessId  Name  Jar  Properties
5385 java informixhq-server.jar informixhq-server.properties
5882 java informixhq-agent.jar informixhq-agent.properties

INFO: In case, process is not listed after startserver/startagent command, please check the log files.
```

- Attempting to stop an incorrect processID produces this error

```
Ifmx: InformixHQ.sh stop 5386
ERROR: Process 5386 is not one of the running InformixHQ processes.
INFO: Use list option to see InformixHQ processes.
```

Changes to the start and stop script

- Otherwise, when the correct processID is used, the IHQ service (agent or server) is stopped

```
Ifmx: InformixHQ.sh stop 5882
SUCCESS: The process with PID 5882 has been terminated.

Ifmx:
Ifmx: InformixHQ.sh list
ProcessId  Name  Jar  Properties
5385 java informixhq-server.jar informixhq-server.properties

INFO: In case, process is not listed after startserver/startagent command, please check the log files.

Ifmx:
```
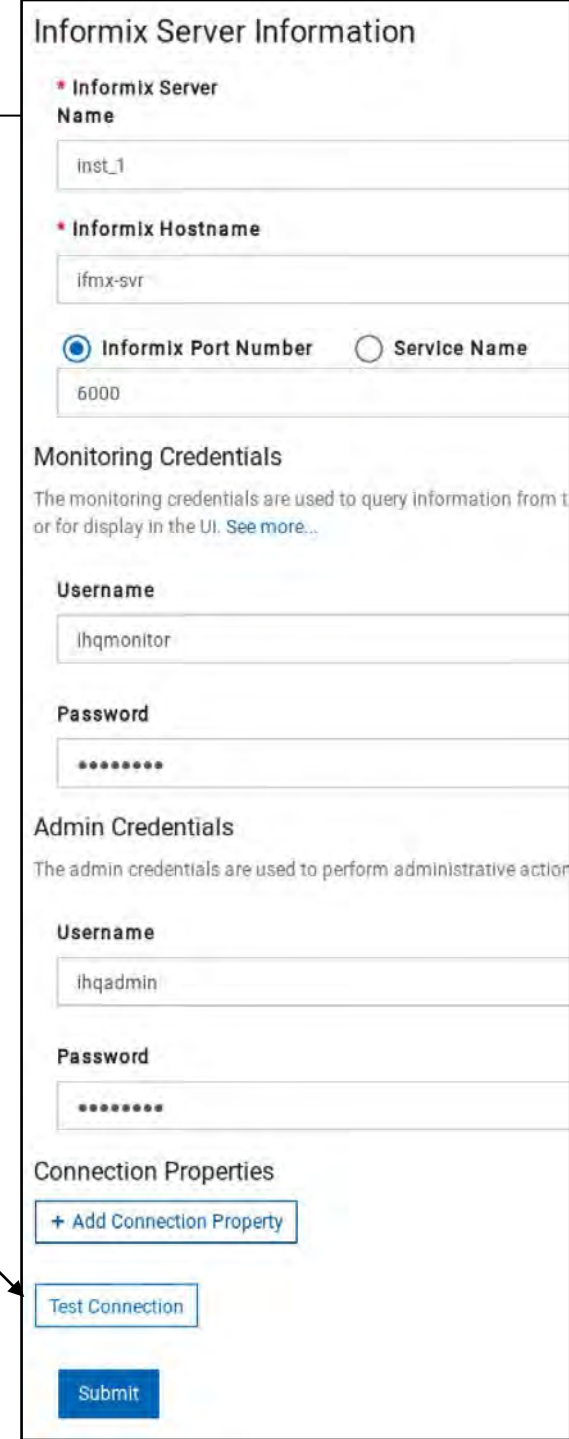
Test connection and agent connection properties

Test connection, agent connection properties

- Several enhancements have been made to defining and operating instance connections
  - First is the ability to test the validity of the instance definition as well as the monitor and administration credentials
  - After entering instance connection information, a **Test Connection** button becomes active

Informix Server Information

* Informix Server Name

inst_1

* Informix Hostname

ifmx-svr

○ Informix Port Number   ○ Service Name

6000

Monitoring Credentials

The monitoring credentials are used to query information from t or for display in the UI. See more...

Username

ihqmonitor

Password

••••••••

Admin Credentials

The admin credentials are used to perform administrative action

Username

ihqadmin

Password

••••••••

Connection Properties

+ Add Connection Property

Test Connection

Submit

Test connection, agent connection properties

- If you enter incorrect server or port information, an error is returned

> ⊗ Could not connect to Informix: jdbc:informix-sqli://ifmx-svr:6000: sysmaster. Socket connection to server (ifmx-svr:6000) failed. Check your server is reachable from this client on the host:port specified.

- If you make a mistake with either the monitor or administration credentials, the error indicates which ID has the problem

> ⊗ Could not connect to Informix: jdbc:informix-sqli://ifmx-svr:60000: sysmaster. Incorrect password or user com.informix.asf.IfxASFRemoteException: ihqmonitor@localhost[ifmx-svr] is not known on the database server.

> ⊗ Could not connect to Informix: jdbc:informix-sqli://ifmx-svr:60000: sysmaster. Incorrect password or user com.informix.asf.IfxASFRemoteException: ihqadmin@localhost[ifmx-svr] is not known on the database server.
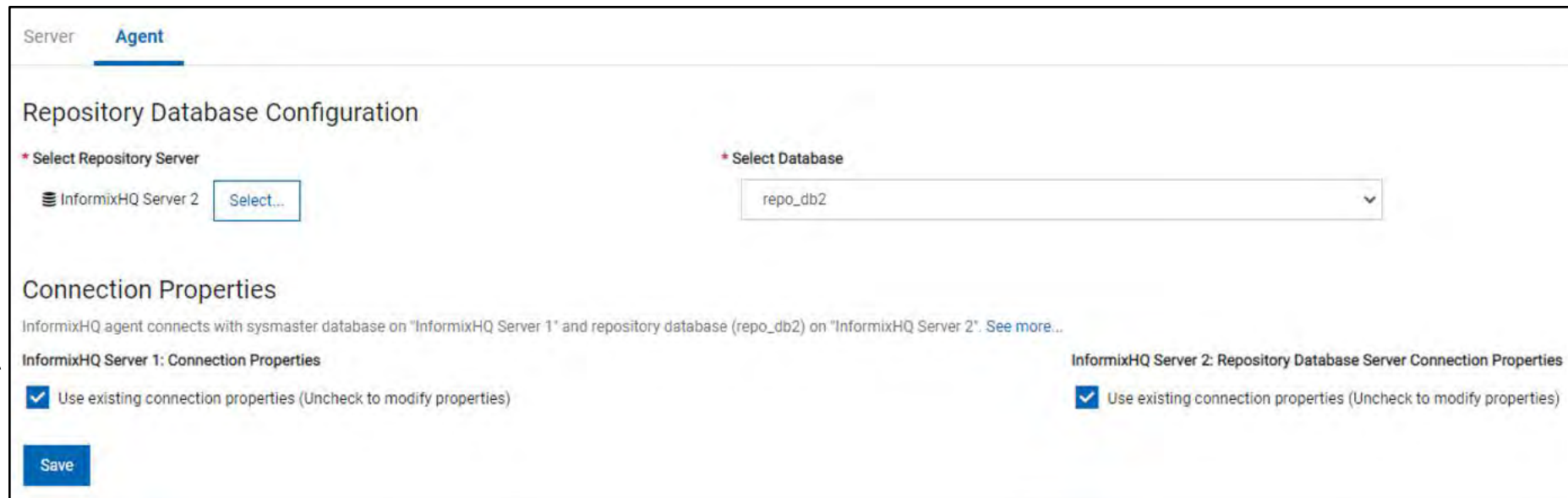
Test connection, agent connection properties

- If everything is properly configured, a successful connection message is returned and you can add the instance to the group
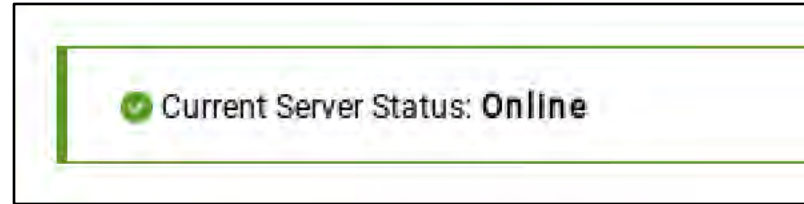
Test connection, agent connection properties

- The ability to define specific connection properties for both the server and agent processes has existed for quite a while
  - In IHQ 1.5.0, the agent property configuration has moved to the Agent setup page

- You can use the same properties as the server or modify them as needed for that specific instance agent
  - When unchecked, the server properties are copied to the agent and are available for modification

Test connection, agent connection properties

- Similarly, if the IHQ repository database is located in a remote instance, you can specify connection properties for that instance / database
  - When unchecked, the existing properties are copied to the agent and are available for modification

Test connection, agent connection properties

- Using this option, you can
  - Specify different communication encryption keystore paths if necessary
  - Define other parameters as needed

Schema Manager enhancements

Schema manager

- With IHQ 1.2.0, there was a significant overhaul of the IHQ Schema Manger component
  - A lot of new and very useful functionality was added
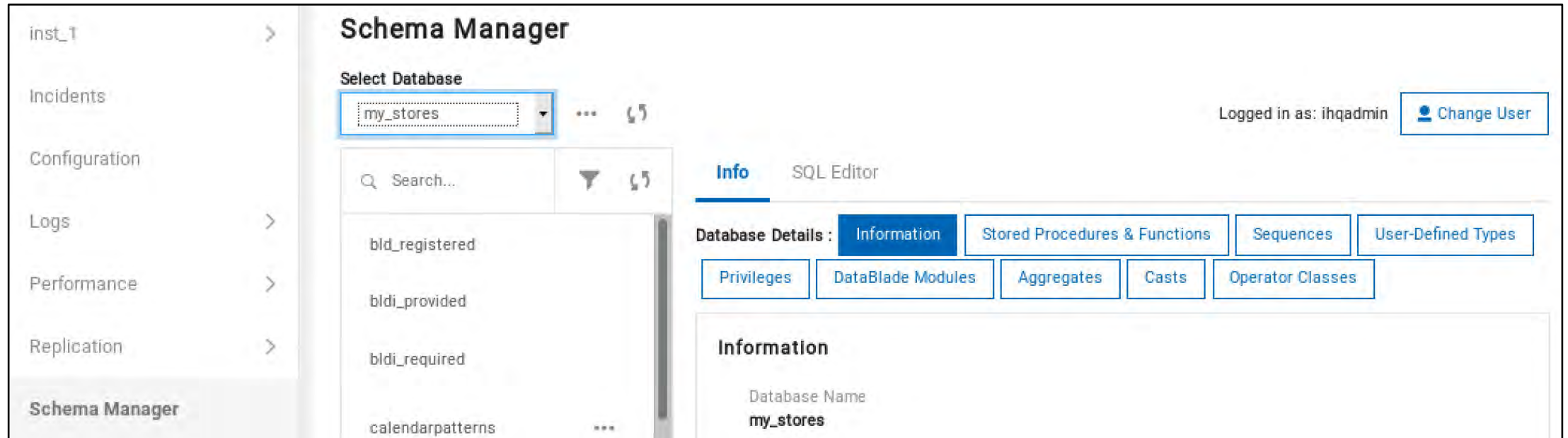
- In IHQ 1.5.0, there are new cosmetic and functional enhancements

Schema manager

- For example, selecting a database within Schema Manager used to display information in a columnar format requiring you to scroll up and down the window to find information
  - Now the information is readily available in a tabular format

Schema manager

- A new **Create Table** option is now available from the switch by the database dropdown
  - It is both intelligent and fully featured
    - Intelligent — you can go back to make changes preserving other configured values rather than having to cancel and restart
    - Fully featured — it provides options for almost any table configuration you need
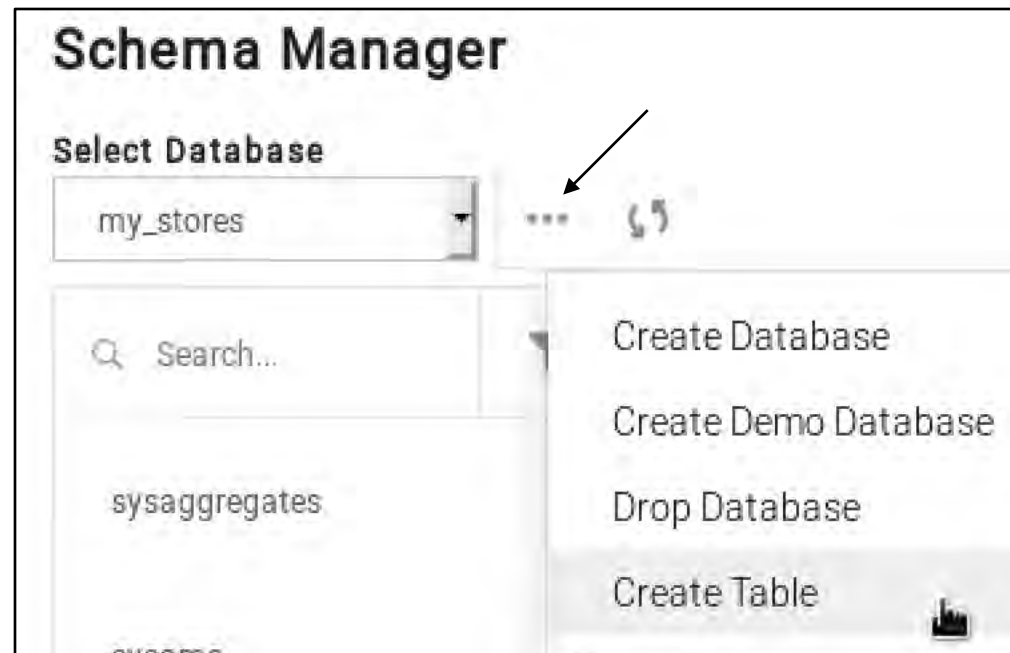
Schema manager

- As the creation process occurs, hovering over a field displays basic documentation for that field

- You can create standard, raw or externally stored tables

Schema manager

- When adding columns, almost any data type can be selected including JSON/BSON
  - You can also enforce a check constraint on values as well as null / not null

Schema manager

• Once all the columns are added, the next screen provides the ability to add primary, unique or foreign key constraints

Schema manager

- Clicking the **Advanced Table Options** button allows you to specify extent sizing, update statistics parameters, table lock mode, index storage configuration and other options

Table Advance Options

Lock Mode   ○ Page   ● Row

Table Options

☐ Row versions columns (VERCOLS)   ☐ Primary key columns for ER (ERKEY)

☐ Conflict resolution columns for ER (CRCOLS)   ☐ Selective row-level auditing (AUDIT)

☐ Consistency checking columns for ER (REPLCHECK)   ☐ Automatic compression (COMPRESSED)

Auto Update Statistics Options

Specify the minimum change threshold: ● Use the system setting   ○ Set the threshold

Enter the Extent Size or use Extent Size Estimator

Extent Size Estimator

Expected number of rows   Growth Rate

[   ]   [Static   ▾]   [Estimate]

Extent Size(KB)

First Extent   Next Extent

[   ]   [   ]

Index Storage Options   ● Follow the table storage scheme   ○ Specify the storage scheme

[Back]   [View Query & Create]   [Cancel]

Schema manager

- At almost every step, you can select an option to see the raw creation statement to verify the table creation statement based on choices made
  - You can either create the table or move back to make changes then create
    - If you move back, your selections are saved, you don't have to restart again

View Query (Review the SQL statement that creates the table)

```
CREATE STANDARD TABLE 'informix'.my_test_tab
(
col_1 INTEGER DEFAULT NULL,
col_2 VARCHAR(25) DEFAULT NULL
)


;

ALTER TABLE 'informix'.my_test_tab LOCK MODE(row);
```

Schema manager

- There is field level verification at each step of the process instead of at the end to identify errors early and quickly
    - For example, the `my_test_tab` table was created, I get a field-level verification error if I attempt to create another table with the same name

Schema manager

- There is now a **Drop table** option as well
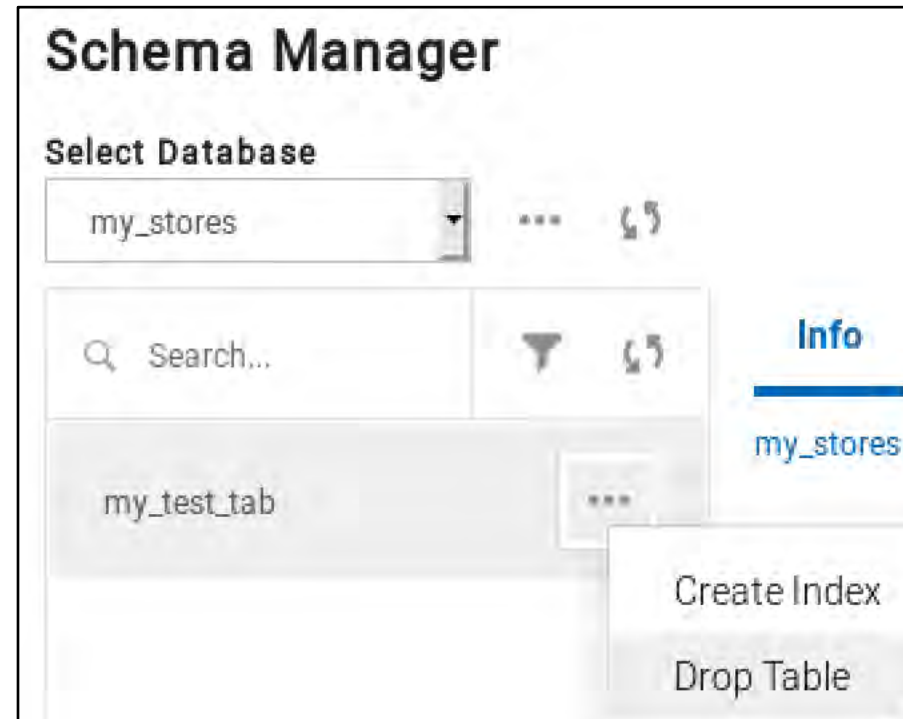
ISAM error reporting
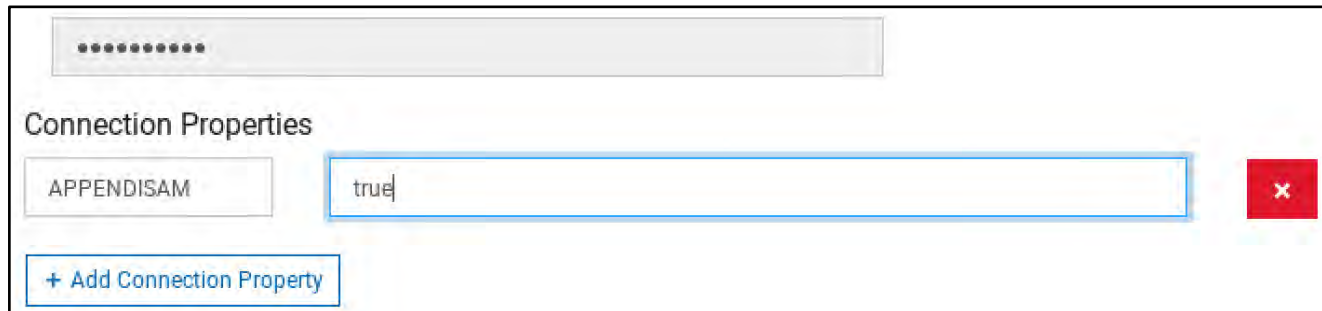
ISAM error reporting

- As illustrated briefly earlier in the presentation, the **Add Connection Property** button can append parameters that affect how IHQ operates
    - One of this is whether or not ISAM errors are returned when executing SQL operations through the **SQL Editor**

    - For example, the `my_test_tab` table exists in the `my_stores` database
        - I try to select from it but am connected to the incorrect database
            - The query fails as expected with basic error information returned

Schema Manager

Select Database

ihq_repository

Q Search...

s_1_dbspace_usage

s_1_os_disk_usage

Info   **SQL Editor**

select * from my_test_tab

Run   Query History

-206: The specified table (my_test_tab) is not in the database.
Near character position 25
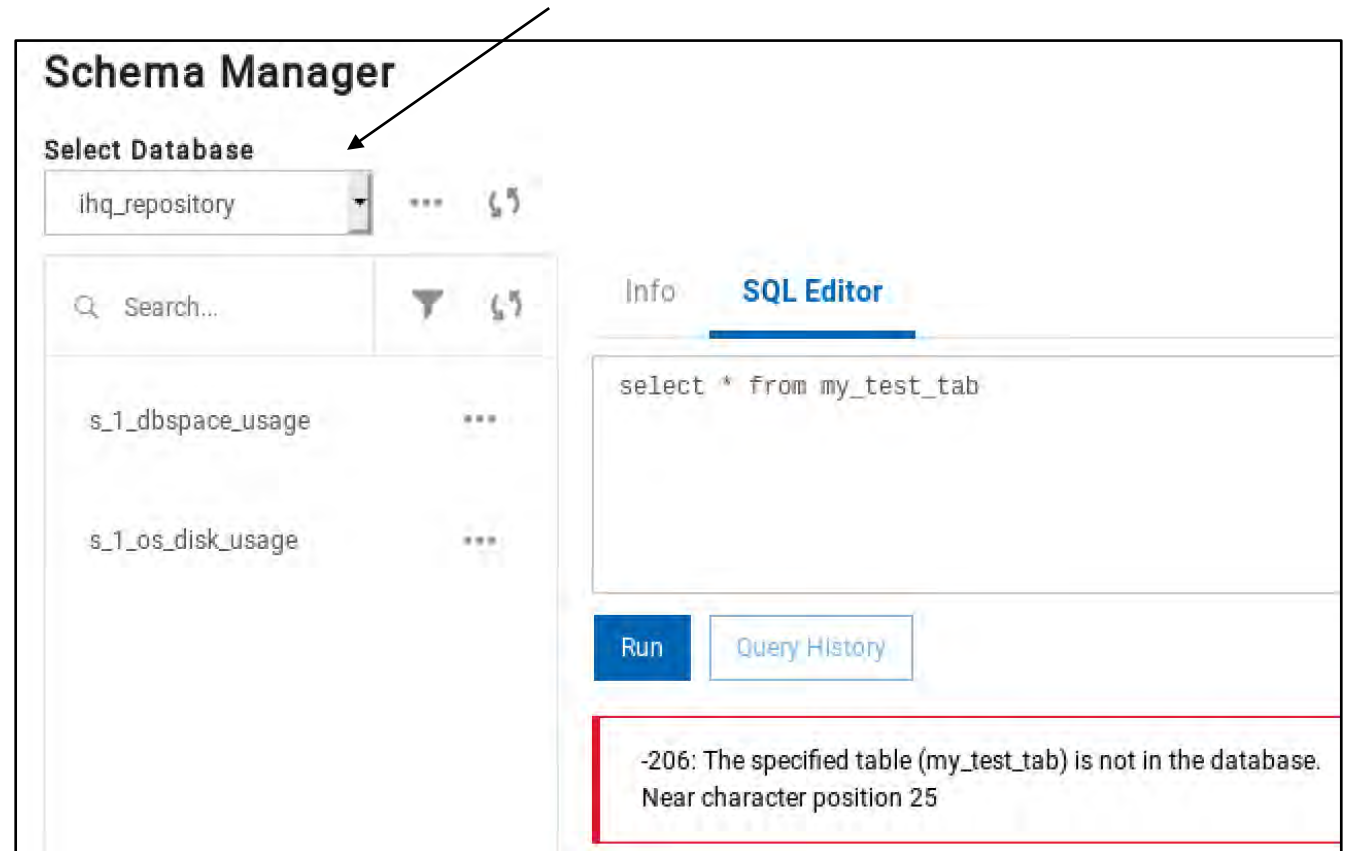
ISAM error reporting

- To include the ISAM error, add the `APPENDISAM = true` property to the instance connection, click **Save**, then re-execute the query

- Granted, this is a basic query but more complicated operations will benefit from the additional information

Incident reporting
and other enhancements

Incident reporting and other features

- The **Incidents** menu option has been enhanced as well
  - You can filter by instance
  - You can filter by date and time range
  - Incident results are collated into well defined page ranges enabling easier access to sub-sets of data
  - You can acknowledge and/or dismiss notifications by group or range
  - Automatic suppression of repeating incidents with the same value to reduce clutter
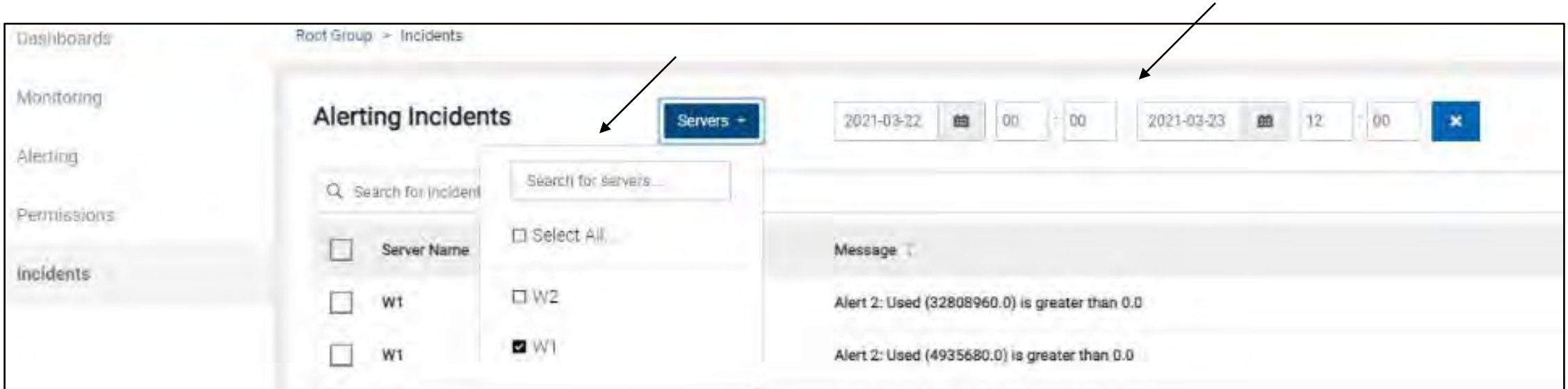
Incident reporting and other features

- The **Incidents** menu option has been enhanced as well
  - A list of specific incidents / incident types, scattered among the pages can be viewed in a consolidated list using the **show selected only** option

Incident reporting and other features

- The Java logging mechanism has been changed to `log4j2` which is the latest logging framework
  - It is from this logging mechanism that the server / agent startup error message is coming from
    - As already mentioned, development is working to suppress that warning

- All open source libraries have been upgraded to the latest available

- All potential vulnerabilities reported by white source scan have been addressed

- Other user reported defects have been addressed

Questions

IBM INFORMIX V.14.10.XC6 - RSS BACKUPS

IBM Informix 14.10

v.1a

Technical correction

- Hold on just a minute!
  - Technical correction coming!!!!
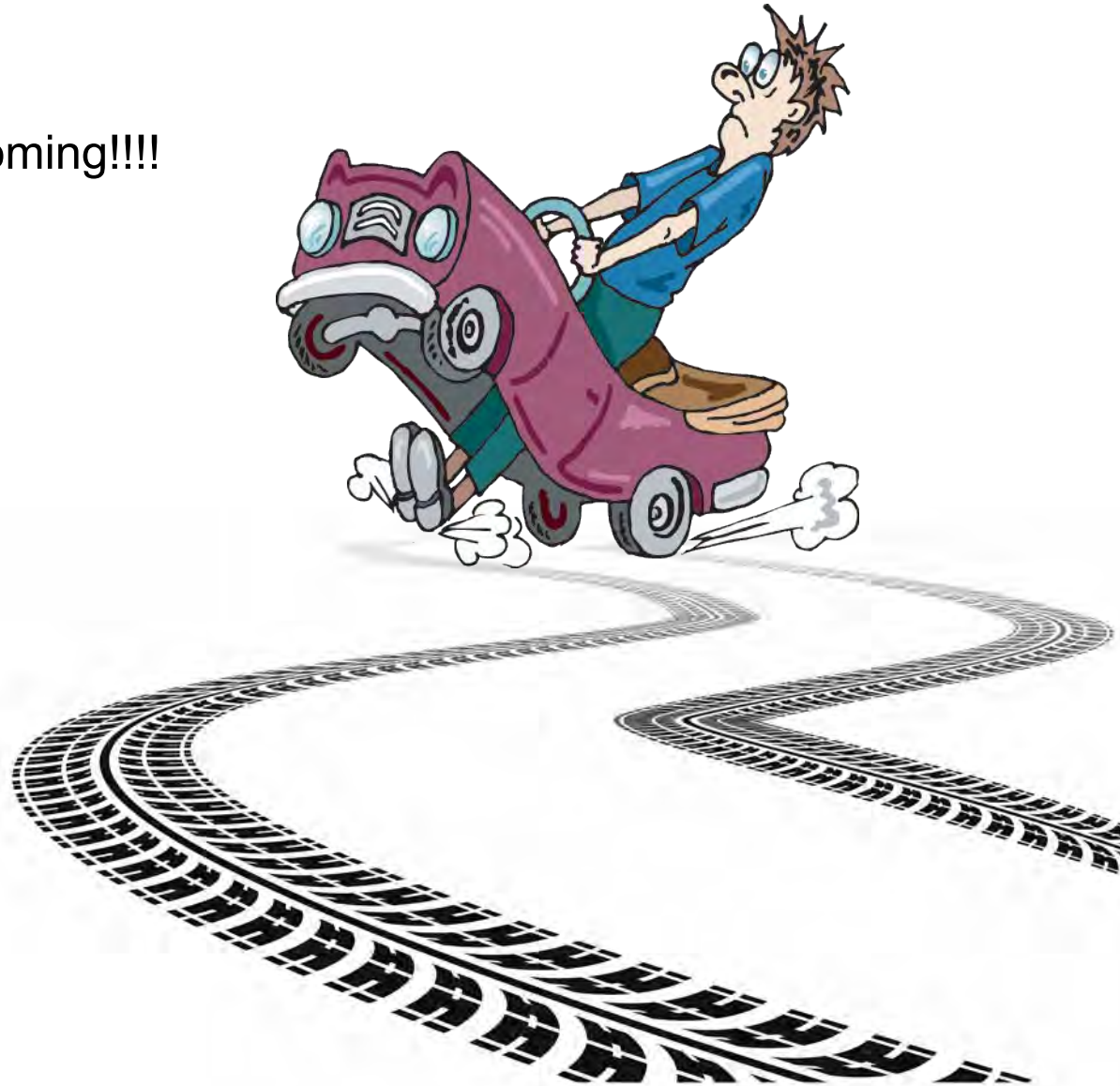
Technical correction

- In the first xC6 webcast I said that system changes occurred requiring an outage to H/A and ER clusters to upgrade
  - I gave instructions that indicated a full H/A cluster outage was required for the upgrade
    - This was not *entirely* correct

  - You can also leverage the offline secondary conversion functionality released with Informix v.14.10.xC4

Technical correction

- To migrate an H/A cluster to xC6 you can follow my earlier instructions

  OR

  - Install xC6 binaries on all servers in a separate directory
    - Update all configuration files with correct values
  - Create / update SLAs to use secondary instances, if the SLAs exist
  - Turn off FOC if enabled in the Connection Manager / Primary
    - So the cluster doesn't convert to a new primary in the next step
  - Turn off the cluster primary
    - Secondaries can still process queries but DML is blocked
  - Update Primary paths to use xC6 binary, restart instance, let it upgrade and come on-line
    - Secondaries will not reconnect due to version conflict rules
    - Primary begins processing transactions
  - One at a time, turn off each secondary instance, update paths, restart secondary instance
    - It will upgrade and reconnect to primary automatically
  - Re-set FOC and SLAs

  - This way, partial cluster functionality is always available during the upgrade

RSS Backups

- The ability to backup an H/A cluster from a node other than the cluster primary has been a customer request dating back many years

- With Informix v.14.10xC6 it is now possible — from an RS secondary

- There are two use cases for this technology and, depending on the use case, different instance configuration settings and operations are required

  - I want to backup my cluster / primary from the RS secondary
    - All backups occur here, instance *and* logical log
      - aka "cluster" mode

  - I want a localized backup *in addition to* the instance/cluster backup occurring on the primary
    - Why?
      - Maybe to decrease the time to create another secondary instance close by
        - It takes too long to transfer from the primary
      - A bunker backup of your backups
        - aka "local" mode

RSS Backups

- Both `ontape` and `ON-Bar` backups are supported

- Backups can occur on RS secondary nodes with or without `UPDATABLE_SECONDARY` enabled
  - That said, development does have guidance on this parameter setting
    - Turning it on (`1`) enables the execution of the `onsmsync` utility
      - Synchronizes the RS `sysutils` / boot file with the primary instance copies

- Backups can occur on RS nodes with `DELAYED_APPLY` configured _however_
  - The backup process is . . . . funky
    - Best practice, do not back up from RS nodes with `DELAYED_APPLY`

RSS Backups

- To enable RS backups, the `BAR_SEC_ALLOW_BACKUP` `$ONCONFIG` parameter must be set
    - It is NOT included in `$ONCONFIG` at this time
    - It is NOT dynamically tunable, an instance restart required

    - Potential values
        - `0` — RS backups are disabled
        - `1` (one) — "local" RS backup mode, no updates to the `sysutils` database for `ON-Bar` operations
        - `2` (two) — "cluster" RS backup mode, `sysutils` database is updated for `ON-Bar` operations

- The `sysutils` database is not intended to be updated by more than one `ON-Bar` location
    - Doing so will lead to corruption
        - Do not set `BAR_SEC_ALLOW_BACKUP` to `2` and run OnBar backups on the primary and RS secondary
    - Let the Informix process handle any changes to this database

RSS Backups

- Executing RS backups has an impact on the `LTAPEDEV` parameter

  - When executing in local mode (`BAR_SEC_ALLOW_BACKUP = 1`)

    - `LTAPEDEV` (primary) is unchanged so log backups are triggered and execute on the primary by full logical logs

    - `LTAPEDEV` (RSS / HDR) is set to `/dev/null` since they aren't used

      - Obviously if one of these nodes is promoted to primary, `LTAPEDEV` must be updated so log backups occur

  - When executing in cluster mode (`BAR_SEC_ALLOW_BACKUP = 2`)

    - `LTAPEDEV` (primary / HDR) are set to `/dev/null` since they aren't used

    - `LTAPEDEV` (RSS) is set to a valid value so log backups are triggered and execute on the RS by full logical logs

RSS Backups

- Executing RS backups has an impact on the ability to have non-logged objects in your instance or database(s)
  - RS backups are blocked if these objects exist:
    - Non-logged SLOBspace
    - Raw table in a logged database
    - Non-logged database in an instance
    - Non-logged SLOB in the database, even if stored in a logged SLOBspace

  - But wait, I thought everything had to be logged to be in an H/A cluster?
    - Not true
      - You can have non-logged SLOBspaces and SLOBs on the primary
        - A backup from the primary works without an issue
      - According to development, even if the SLOBspace is non-logged, in an H/A cluster (only) the objects are logged therefore sent to the secondaries as well
        - To support failover continuity without data loss
      - Non-logged databases or raw tables can exist as well but they don't get replicated to the secondaries
        - These get backed up on the primary

RSS Backups

- Finally, executing RS backups may have an impact on the RS `DBSPACETEMP` parameter
  - In a properly configured primary instance there is at least one temp dbspace as well as a temp SLOBspace
    - The spaces are listed in `$ONCONFIG`

  - Since cluster secondary instances are "clones" of the primary, the same temp spaces *should* be configured in all the secondary instances
    - In truth, they aren't required
      - Boo! Hiss! Create them!!! 😇

  - When executing RS backups (local or cluster), at least one temp dbspace MUST be properly configured
    - Exist and configured with default page size in `$ONCONFIG`
    - Supports caching of modified pages during the backup operation

RSS Backups

- Before continuing, let's talk about temporary objects in a H/A cluster
  - When an explicit temp table is created, you can specify with logging (default) or `with no log`, an explicit extra step
    - STRONGLY recommend using the `with no log` syntax
  - If left to default (logging), the temp tables are created in `rootdbs`
  - `with no log` creates them in the `DBSPACETEMP` spaces

  - Trying to create logged temp tables in `rootdbs` is NOT supported for H/A cluster secondary instances and becomes an issue if the secondary is used for operations
    - As a result, the `TEMPTAB_NOLOG` parameter should be set to `1` (one) on secondary instances supporting operations
    - This parameter forces all temp tables to be non-logged and created in `DBSPACETEMP` spaces
      - See next slide for new, xC6 functionality

  - Currently, this parameter value is NOT being validated within secondary instances
    - Can operations occur?
      - Yes but you run the risk of getting -140 ISAM errors at any time

RSS Backups

- New functionality in xC6 — `TEMPTAB_NOLOG = 2`
  - Support for automatic switching of logged temp table support when a node moves from secondary to primary status

  - Prior to this setting, if a secondary node became primary, the original `NOLOG` setting persisted and logged temp table support was not available
    - Now it will change as the node's role changes from secondary to primary

RSS Backups

• For the purposes of the examples which follow, here is the active H/A cluster

inst_1 - primary

inst_2 - SD secondary

inst_3 - HDR secondary

inst_4 - RS secondary

inst_5 - RS secondary
  for DELAYED_APPLY
  operations (not
  active)

```
Inst_1: onstat -g cluster

IBM Informix Dynamic Server Version 14.10.FC6DE -- On-Line (Prim) -- Up 00:39:3
 -- 234176 Kbytes
2021-04-13 17:24:14

Primary Server:inst_1
Current Log Page:19,95
Index page logging status: Enabled
Index page logging was enabled at: 2021/04/12 17:52:07


Server ACKed Log       Applied Log   Supports     Status
         (log, page)   (log, page)   Updates
inst_2 19,95           19,95         No           SYNC(SDS),Connected,Active
inst_3 19,95           19,95         Yes          NEAR_SYNC(HDR),Connected,On
inst_5 0,0             0,0           No           ASYNC(RSS),Disconnected,Defined
inst_4 19,95           19,95         Yes          ASYNC(RSS),Connected,Active

Inst_1:
```

RSS Backups

- Example #1 - local mode from `inst_4`

  - `LTAPEDEV` is set to `/dev/null`

  - `BAR_SEC_ALLOW_BACKUP = 1`

  - The instance is restarted

```
LTAPEDEV                    /dev/null
# LTAPEDEV /opt/IBM/informix/backup/
LTAPEBLK            32
```

```
### RS backup option
BAR_SEC_ALLOW_BACKUP 1
```

  - The backup timestamps on the primary and RS nodes are identical

```
        Validating PAGE_1ARCH & PAGE_2ARCH...              Chunk offset                    0 (p)
              Using archive page PAGE_2ARCH.               Chunk size                      5000 (p)
                                                           Number of free pages            268
        Archive Level           0                          DBspace number                  7
        Real Time Archive Began    04/13/2021 17:36:27
        Time Stamp Archive Began   0xfaf7a                 Validating PAGE_1ARCH & PAGE_2ARCH...
        Logical Log Unique Id      19                            Using archive page PAGE_2ARCH.
        Logical Log Position       0x75018
                                                           Archive Level           0
        DR Ckpt Logical Log Id     19                      Real Time Archive Began    04/13/2021 17:36:27
        DR Ckpt Logical Log Pos    0x221018                Time Stamp Archive Began   0xfaf7a
        DR Last Logical Log Id     19                      Logical Log Unique Id      19
        DR Last Logical Log Page   545                     Logical Log Position       0x75018
        DR Last Mode Change        7          Primary mode
Inst_1:                                                    DR Last Mode Change        0
Inst_1:                                          Inst_4:
```

RSS Backups

- An `ontape` backup is attempted but fails
  - Why? There's a non-logged space in the instance
    - Not that backup error message helps you understand this

```
Inst_4: ontape -s -L 0
Archive failed - (-83380) An archive checkpoint could not be completed in the secondary server.

Program over.
Inst_4:
Inst_4:
Inst_4: finderr -83380
-83380  An archive checkpoint could not be completed in the secondary server.

An archive checkpoint was attempted on a secondary server but we failed. Possible
causes include the LOG_STAGING_DIR configuration parameter not being set, or not
receiving a checkpoint from the primary server within the time interval specified
by the BAR_CKPSEC_TIMEOUT configuration parameter

ACTION
Check the online message log for more information and correct the problem.
If the checkpoint timed out you can increase the value of the BAR_CKPTSEC_TIMEOUT
configuration parameter.
```
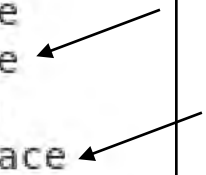
RSS Backups

- Checking the instance log provides an accurate reason why the backup failed

```
18:02:52   The storage space, 'slob_space', is preventing the backup on the secondary server.
18:02:53   (-83380) An archive checkpoint could not be completed in the secondary server.
Informix:
```

- There are two non-logged SLOBspaces in the instance

```
IBM Informix Dynamic Server Version 14.10.FC6DE -- Updatable (RSS) -- Up 00:37:17 -- 234176 Kbytes
2021-04-13 18:34:14

Dbspaces
address          number   flags       fchunk    nchunks  pgsize    flags    owner      name
4595d028         1        0x20801     1         1        2048      NL BA    informix rootdbs
45a76470         2        0x801       2         1        2048      NL BA    informix data_space_1
45a766b0         3        0x801       3         1        2048      NL BA    informix log_space
45a768f0         4        0x2001      4         1        2048      N TBA    informix work_space
45a76b30         5        0x8801      5         1        2048      NLSBA    informix slob_space
45a76d70         6        0xa001      6         1        2048      N UBA    informix slob_temp
4696c028         7        0x28801     7         1        2048      NLSBA    informix no_log_space
 7 active  2047 maximum
```

RSS Backups

- Both spaces are dropped
    - Since they are smart objects, a backup is required to complete the operation
        - A fake backup is executed
        - The backup timestamps are updated on both the primary and RS instances and are identical

```
Validating PAGE_1ARCH & PAGE_2ARCH...              Number of free pages        102347
     Using archive page PAGE_1ARCH.               DBspace number              6

Archive Level                 0                   Validating PAGE_1ARCH & PAGE_2ARCH...
Real Time Archive Began       04/13/2021 18:39:31      Using archive page PAGE_2ARCH.
Time Stamp Archive Began      0xfd0cd
Logical Log Unique Id         19                  Archive Level                 0
Logical Log Position          0x24a018            Real Time Archive Began       04/13/2021 18:39:31
                                                  Time Stamp Archive Began      0xfd0cd
DR Ckpt Logical Log Id        19                  Logical Log Unique Id         19
DR Ckpt Logical Log Pos       0x24e198            Logical Log Position          0x24a018
DR Last Logical Log Id        19
DR Last Logical Log Page      590                 DR Last Mode Change           0
DR Last Mode Change           7          Primary mode  Inst_4: ▉
Inst 1: ▢
```

RSS Backups

- Another RS `ontape` backup is executed, this time successfully
  - The **backup timestamp** on the RS is different than the primary because it reflects when _the RS_ pages were backed up

```
Inst_4: ontape -s -L 0
100 percent done.
File created: /opt/IBM/informix/backup/inst4_L0

Please label this tape as number 1 in the arc tape sequence.
This tape contains the following logical logs:

  19


Program ov
```

```
Validating PAGE_1ARCH & PAGE_2ARCH...
        Using archive page PAGE_2ARCH.

Archive Level               0
Real Time Archive Began     04/13/2021 18:39:31
Time Stamp Archive Began    0xfd0cd
Logical Log Unique Id       19
Logical Log Position        0x24a018

DR Ckpt Logical Log Id      19
DR Ckpt Logical Log Pos     0x252018
DR Last Logical Log Id      19
DR Last Logical Log Page    594
DR Last Mode Change         7           Primary mode
Inst_1:
```

```
Validating PAGE_1ARCH & PAGE_2ARCH...
        Using archive page PAGE_1ARCH.

Archive Level               0
Real Time Archive Began     04/13/2021 18:42:45
Time Stamp Archive Began    0xfd18f
Logical Log Unique Id       19
Logical Log Position        0x252018

DR Last Mode Change         0
Inst_4:
```

RSS Backups

- Just to verify that the utility doesn't matter, an `ON-Bar` backup is created using the PSM
  - The difference in backup timestamps continues

```
Inst_4: onbar -b -w
```

```
Validating PAGE_1ARCH & PAGE_2ARCH...          DBspace number                6
     Using archive page PAGE_2ARCH.
                                               Validating PAGE_1ARCH & PAGE_2ARCH...
                                                     Using archive page PAGE_1ARCH.
Archive Level              0
Real Time Archive Began    04/13/2021 18:39:31
Time Stamp Archive Began   0xfd0cd             Archive Level                0
Logical Log Unique Id      19                  Real Time Archive Began      04/13/2021 18:50:10
Logical Log Position       0x24a018            Time Stamp Archive Began     0xfd1b2
                                               Logical Log Unique Id        19
```

RSS Backups

- Just to verify another non-logged restriction, a raw table is created in the database and a RS backup attempted
  - Yes, it fails with a message in the instance log indicating why

```
---------------------- stores@inst_1

create raw table foo
(col1 int,
 col2 varchar(12)
);
```

```
Inst_4: ontape -s -L 0
Archive failed - (-83380) An archive checkpoint could not be completed in the secondary server.

Program over.
Inst_4:
Inst_4: tail -f /opt/IBM/informix/logs/inst4.log
12:44:48   Booting Language <spl> from module <>
12:44:48   Loading Module <SPLNULL>
12:44:48   Checkpoint Completed:  duration was 0 seconds.
12:44:48   Wed Apr 14 - loguniq 21, logpos 0x19018, timestamp: 0x1121a9 Interval: 131

12:44:48   Maximum server connections 0
12:44:48   Checkpoint Statistics - Avg. Txn Block Time 0.000, # Txns blocked 0, Plog used 34, Llog used 0

12:44:49   The raw table 'stores':'foo' is preventing the backup in the secondary server.
12:44:50   (-83380) An archive checkpoint could not be completed in the secondary server.
```

```
Table created.
```

RSS Backups

- Example #2 - cluster mode backup from `inst_4`
  - Primary `LTAPEDEV` is set to `/dev/null`
  - RS `BAR_SEC_ALLOW_BACKUP = 2` and `LTAPEDEV` is set to a valid value
  - The instance is restarted

```
### RS backup option
BAR_SEC_ALLOW_BACKUP 2
```

```
# LTAPEDEV                    /dev/null
LTAPEDEV /opt/IBM/informix/backup/
LTAPEBLK                     32
```

  - The backup timestamps on the primary and RS nodes are identical

```
Validating PAGE_1ARCH & PAGE_2ARCH...
      Using archive page PAGE_1ARCH.

Archive Level                0
Real Time Archive Began      04/14/2021 13:02:48
Time Stamp Archive Began     0x1136cc
Logical Log Unique Id        21
Logical Log Position         0xa7018

DR Ckpt Logical Log Id       21
DR Ckpt Logical Log Pos      0xbd018
DR Last Logical Log Id       21
DR Last Logical Log Page     189
DR Last Mode Change          7         Primary mode
Inst_1:
```

```
DBspace number               6

Validating PAGE_1ARCH & PAGE_2ARCH...
      Using archive page PAGE_1ARCH.

Archive Level                0
Real Time Archive Began      04/14/2021 13:02:48
Time Stamp Archive Began     0x1136cc
Logical Log Unique Id        21
Logical Log Position         0xa7018

DR Last Mode Change          0
Inst_4:
```

RSS Backups

- An RS `ontape` and an `ON-Bar` backup is executed
  - Both execute successfully
  - However the reserved page timestamps are not synchronized after either operation
    - Again, it reflects when the RS pages were backed up

```
Validating PAGE_1ARCH & PAGE_2ARCH...          Number of free pages        102347
        Using archive page PAGE_2ARCH.          DBspace number              6

Archive Level                    0              Validating PAGE_1ARCH & PAGE_2ARCH...
Real Time Archive Began          04/14/2021 13:02:48      Using archive page PAGE_1ARCH.
Time Stamp Archive Began         0x1136cc
Logical Log Unique Id            21             Archive Level                    0
Logical Log Position             0xa7018        Real Time Archive Began          04/14/2021 13:32:37
                                                Time Stamp Archive Began         0x1137ac
DR Ckpt Logical Log Id           21             Logical Log Unique Id            21
DR Ckpt Logical Log Pos          0xc7018        Logical Log Position             0xc7018
DR Last Logical Log Id           21
DR Last Logical Log Page         199            DR Last Mode Change              0
DR Last Mode Change              7      Primary mode  Inst_4:
Inst 1:
```

RSS Backups

- What about the logical logs?
  - With the primary `LTAPEDEV = /dev/null` and `RS BAR_SEC_ALLOW_BACKUP = 2` and RS `LTAPEDEV` is set to a valid value

| inst_1 primary | | inst_4 RS | |

```
address          number    flags      uniqid  address          number    flags      uniqid
45a92f88         9         U---C-L- 21        45a92f88         9         U---C-L- 21
4587bf80         12        U-B----- 10        4587bf80         12        F------- 0
4595df38         13        U-B----- 11        4595df38         13        F------- 0
4595dfa0         14        U-B----- 12        4595dfa0         14        F------- 0
45a76050         15        U-B----- 13        45a76050         15        F------- 0
45a760b8         16        U-B----- 14        45a760b8         16        F------- 0
45a76120         17        U-B----- 15        45a76120         17        F------- 0
45a76188         18        U-B----- 16        45a76188         18        F------- 0
45a761f0         19        U-B----- 17        45a761f0         19        U-B----- 17
45a76258         20        U-B----- 18        45a76258         20        U-B----- 18
45a762c0         21        U-B----- 19        45a762c0         21        U-B----- 19
45a76328         22        U-B----- 20        45a76328         22        U-B----- 20
 12 active, 12 total                           12 active, 12 total
```

RSS Backups

- Several logical logs are "rolled" from the primary

```
Inst_1: onmode -c ; onmode -l;
Inst_1: onmode -c ; onmode -l;
Inst_1: onmode -c ; onmode -l;
```

- The primary "sees" them as backed up and available but the RS sees them as used, requiring backup

`inst_1` **primary**   `inst_4` RS

address	number	flags	uniqid	address	number	flags	uniqid
45a92f88	9	U-B-----	21	45a92f88	9	U-------	21
4587bf80	12	U-B-----	22	4587bf80	12	U-------	22
4595df38	13	U-B---L-	23	4595df38	13	U-----L-	23
4595dfa0	14	U---C---	24	4595dfa0	14	U---C---	24
45a76050	15	U-B-----	13	45a76050	15	F-------	0
45a760b8	16	U-B-----	14	45a760b8	16	F-------	0
45a76120	17	U-B-----	15	45a76120	17	F-------	0
45a76188	18	U-B-----	16	45a76188	18	F-------	0
45a761f0	19	U-B-----	17	45a761f0	19	U-B-----	17
45a76258	20	U-B-----	18	45a76258	20	U-B-----	18
45a762c0	21	U-B-----	19	45a762c0	21	U-B-----	19
45a76328	22	U-B-----	20	45a76328	22	U-B-----	20
12 active, 12 total				12 active, 12 total			

RSS Backups

- A continuous logical log backup is started on the RS
  - The logs are backed up and the RS logical log information is updated

```
Inst_4: ontape -c

Performing continuous backup of logical logs.

File created: /opt/IBM/informix/backup/inst4_Log0000000021
File created: /opt/IBM/informix/backup/inst4_Log0000000022
File created: /opt/IBM/informix/backup/inst4_Log0000000023
```

```
address          number    flags       uniqid
45a92f88         9         U-B-----    21
4587bf80         12        U-B-----    22
4595df38         13        U-B---L-    23
4595dfa0         14        U---C---    24
45a76050         15        F-------    0
45a760b8         16        F-------    0
45a76120         17        F-------    0
45a76188         18        F-------    0
45a761f0         19        U-B-----    17
45a76258         20        U-B-----    18
45a762c0         21        U-B-----    19
45a76328         22        U-B-----    20
 12 active   12 total
```

RSS Backups

- Activity occurs on the primary, in this case creating the `stores` database in logged mode
  - It executes successfully though in being created, multiple logical logs are used
    - They are backed up on the RS secondary as expected

On the primary

```
Inst_1: dbaccessdemo stores -dbspace data_space_1 -log

DBACCESS   Demonstration Database Installation Script


Dropping existing stores database ....


Creating stores database ....


Lockmode set.

Database created.
```

```
address          number     flags        uniqi
45a92f88         9          U-B----- 21
4587bf80         12         U-B----- 22
4595df38         13         U-B----- 23
4595dfa0         14         U-B----- 24
45a76050         15         U-B---L- 25
45a760b8         16         U-B----- 26
45a76120         17         U-B----- 27
45a76188         18         U-B----- 28
45a761f0         19         U-B----- 29
45a76258         20         U-B----- 30
45a762c0         21         U-B----- 31
45a76328         22         U---C--- 32
 12 active, 12 total
```

RSS Backups

- Logical log activity on the RS while the `stores` database was built on the primary
  - Full logical logs are backed up

```
Inst_4: ontape -c

Performing continuous backup of logical logs.

File created: /opt/IBM/informix/backup/inst4_Log0000000021
File created: /opt/IBM/informix/backup/inst4_Log0000000022
File created: /opt/IBM/informix/backup/inst4_Log0000000023
File created: /opt/IBM/informix/backup/inst4_Log0000000024
File created: /opt/IBM/informix/backup/inst4_Log0000000025
File created: /opt/IBM/informix/backup/inst4_Log0000000026
File created: /opt/IBM/informix/backup/inst4_Log0000000027
File created: /opt/IBM/informix/backup/inst4_Log0000000028
File created: /opt/IBM/informix/backup/inst4_Log0000000029
File created: /opt/IBM/informix/backup/inst4_Log0000000030
n
File created: /opt/IBM/informix/backup/inst4_Log0000000031
```

address	number	flags	uniqid
45a92f88	9	U-B-----	21
4587bf80	12	U-B-----	22
4595df38	13	U-B-----	23
4595dfa0	14	U-B-----	24
45a76050	15	U-B---L-	25
45a760b8	16	U-B-----	26
45a76120	17	U-B-----	27
45a76188	18	U-B-----	28
45a761f0	19	U-B-----	29
45a76258	20	U-B-----	30
45a762c0	21	U-B-----	31
45a76328	22	U---C---	32

```
 12 active, 12 total
```

RSS Backups

- Other RS backup nuances - `On-Bar`
  - As mentioned earlier, when `BAR_SEC_ALLOW_BACKUP = 2` (cluster mode) and a backup occurs, `sysutils` on the primary and RS are updated as expected


```
---------------------- sysutils@inst_1
act_aid      4
act_oid      1
act_type     5
act_status   0
act_start    2021-04-14 15:51:31
act_end      2021-04-14 15:51:33

act_aid      4
act_oid      2
act_type     5
act_status   0
act_start    2021-04-14 15:51:31
act_end      2021-04-14 15:51:34

act_aid      4
act_oid      3
act_type     5
act_status   0
act_start    2021-04-14 15:51:31
act_end      2021-04-14 15:51:34

act_aid      4
act_oid      4
act_type     5
act_status   0
act_start    2021-04-14 15:51:31
act_end      2021-04-14 15:51:34

 12 row(s) retrieved.
```

```
---------------------- sysutils@inst_4
act_aid      4
act_oid      1
act_type     5
act_status   0
act_start    2021-04-14 15:51:31
act_end      2021-04-14 15:51:33

act_aid      4
act_oid      2
act_type     5
act_status   0
act_start    2021-04-14 15:51:31
act_end      2021-04-14 15:51:34

act_aid      4
act_oid      3
act_type     5
act_status   0
act_start    2021-04-14 15:51:31
act_end      2021-04-14 15:51:34

act_aid      4
act_oid      4
act_type     5
act_status   0
act_start    2021-04-14 15:51:31
act_end      2021-04-14 15:51:34

 12 row(s) retrieved.
```

inst_1 primary

inst_4 RS

RSS Backups

- Other RS backup nuances - `On-Bar`
  - When `BAR_SEC_ALLOW_BACKUP = 1` (local mode) and a backup occurs, no `sysutils` updates occur on either instance
  - The `ixbar` file is updated however
    - Notice the timestamps
    - This has restore implications


```
inst_1 primary                                    inst_4 RS

---------------------- sysutils@inst_1 ---------------------- sysutils@inst_4

act_aid     4                        act_aid     4
act_oid     1                        act_oid     1
act_type    5                        act_type    5
act_status  0                        act_status  0
act_start   2021-04-14 15:51:31      act_start   2021-04-14 15:51:31
act_end     2021-04-14 15:51:33      act_end     2021-04-14 15:51:33

act_aid     4                        act_aid     4
act_oid     2                        act_oid     2
act_type    5                        act_type    5
act_status  0                        act_status  0
act_start   2021-04-14 15:51:31      act_start   2021-04-14 15:51:31
act_end     2021-04-14 15:51:34      act_end     2021-04-14 15:51:34

act_aid     4                        act_aid     4
                                     act_oid     3
                                     act_type    5
                                     act_status  0
                15:51:31             act_start   2021-04-14 15:51:31
                15:51:34             act_end     2021-04-14 15:51:34

                                     act_aid     4
                                     act_oid     4
                                     act_type    5
                                     act_status  0
                15:51:31             act_start   2021-04-14 15:51:31
                15:51:34             act_end     2021-04-14 15:51:34

12 row(s) retrieved.                 12 row(s) retrieved.
```

```
Inst_4: more ixbar.4
.
.
.
inst_4 rootdbs        R  1 4 0 0 29 2021-04-14 15:51:31 1
inst_4 data_space_1 ND 1 4 0 0 30 2021-04-14 15:51:31 1
inst_4 slob_space    ND 1 4 0 0 32 2021-04-14 15:51:31 1
inst_4 log_space     CD 1 4 0 0 31 2021-04-14 15:51:31 1
inst_4 rootdbs        R  1 0 0 0 36 2021-04-14 15:55:19 1
inst_4 data_space_1 ND 1 0 0 0 37 2021-04-14 15:55:19 1
inst_4 slob_space    ND 1 0 0 0 39 2021-04-14 15:55:19 1
inst_4 log_space     CD 1 0 0 0 38 2021-04-14 15:55:19 1
```

RSS Backups

- What about restoring from an RS backup? Is it possible and to which nodes and under what conditions?

  - Yes you can restore from an RS backup but there are nuances

    - Whether you use `ON-Bar` or `ontape` affects the process

RSS Backups

- With `ontape`

  - Copy the instance and logical log backup files to the target server
  - Change the file names to match the naming convention specified by the `IFX_ONTAPE_FILE_PREFIX` environment variable for the target instance, if set

  - From here, you can
    - Execute a full restore to create a standalone instance or an instance to participate in an ER cluster
      - Will need to perform a data sync ER operation however
    - Execute a physical restore to create an HDR or RS secondary to link (or re-link) the node [into | back into] the cluster

RSS Backups

- With `ON-Bar` the process is slightly more complicated
  - Were the backups created in local or cluster mode?
    - In cluster mode, `sysutils` is synchronized across the cluster
      - You may / probably will have to copy (and rename) the `ixbar` file to the target server for a cold restore
      - You may have to update the storage manager system for that server to use the backup objects created on another instance

    - In local mode
      - You need to copy (and rename) `ixbar` to the target server
      - If the instance is partially available, execute `onsmsync` to update the `sysutils` database with `ixbar` information
        - For a cold restore, just use the `ixbar` file directly
      - You may have to update the storage manager system for that server to use the backup objects created on another instance

  - With access to the backup objects and either an updated `sysutils` database or the `ixbar` boot file, you can
    - Execute cold, warm or partial restores as allowed by `On-Bar`

Questions

Grazie
ITALIAN

धन्यवाद
HINDI

Merci
FRENCH

ありがとうございました
JAPANESE

Obrigado
BRAZILIAN PORTUGUESE

多谢
SIMPLIFIED CHINESE

Thank You

多謝
TRADITIONAL CHINESE

Gracias
SPANISH

Спасибо
RUSSIAN

நன்றி
TAMIL

ขอบคุณ
THAI

Danke
GERMAN

شكراً
ARABIC