Upgrade with Success from Informix 11.70 to Informix 14.10

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Upgrade your database from 11.70 to 14.10

1) Why you want to upgrade.
- ✓To get more features
- ✓To improve performance
- ✓To secure your data
- ✓To manage your database through new GUI using Informix HQ
- ✓To get maximum out of your replication
- ✓Bug fixes
- ✓End of support on 30-Sept-2020

2) How you can upgrade.

Ensure that you meet the operating system and hardware requirements for Informix 14.10.

(https://www.ibm.com/support/pages/informix-server-system-requirements)

There are 2 ways to upgrade/migrate
- ✓Upgrading (In-place migration)
- ✓Migrating (Non-in-place migration)
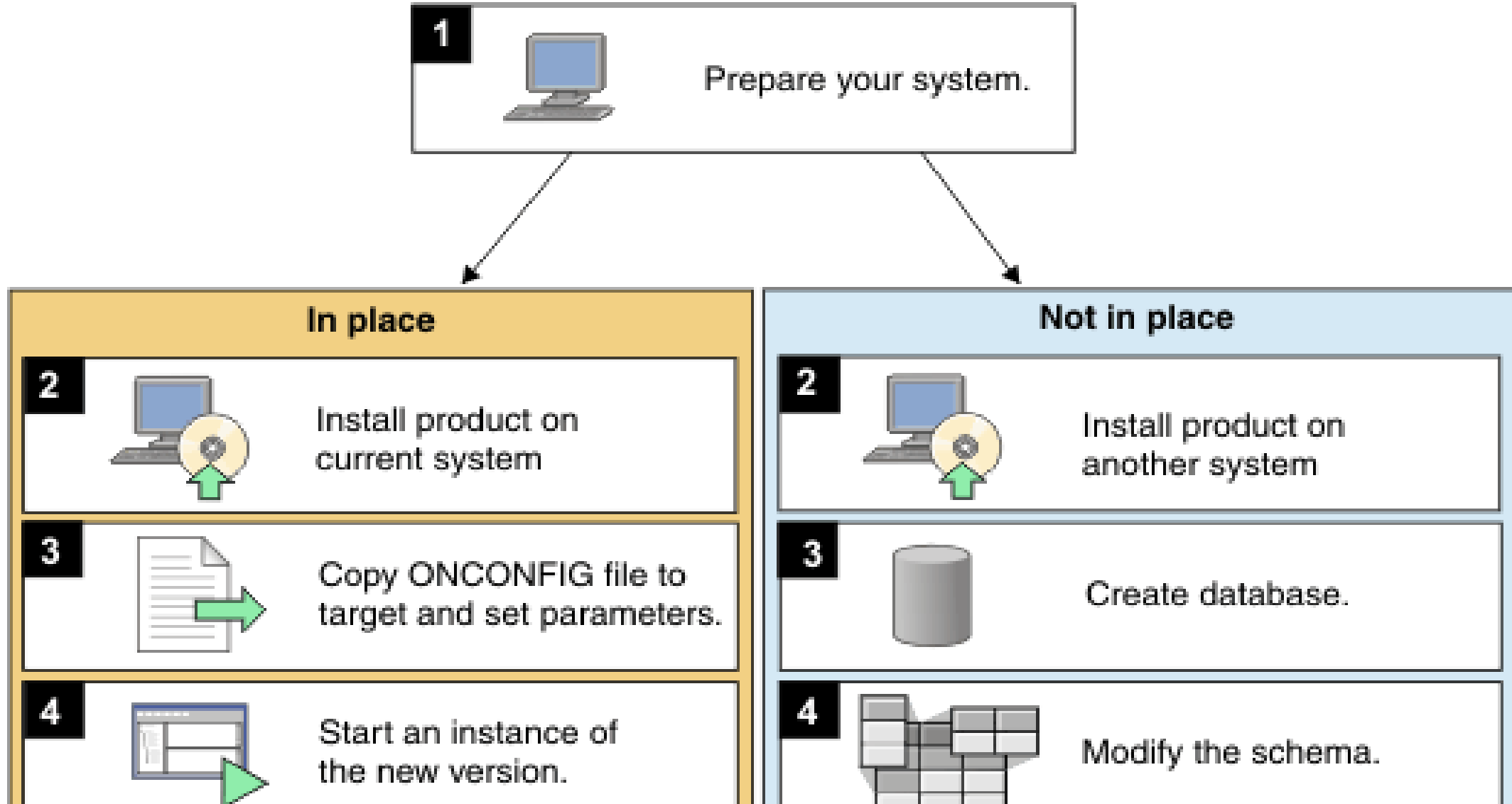
Upgrading v/s Migrating

- **Upgrading (In-place migration)**
  - ✓ uses your existing hardware and operating system
  - ✓ You install the new version in a different location on the same server.
  - ✓ Make changes to $ONCONFIG and $INFORMIXSQLHOSTS
  - ✓ And start the instance, your instance will be automatically converted

- **Migrating (Non-in-place migration)**
  - ✓ The process of "switching over" your environment from one computer to another.
  - ✓ This type of migration requires more planning and setup time compared to upgrading on your existing computer.
  - ✓ Non-in-place migration requires that you modify and copy the database schema, user data, and user objects from one server to another server.
  - ✓ Use this type of migration if you are moving to Informix Version 14.10 from an early version of Informix that has a different architecture, page size, re-architect of dbspaces, and extent allocations

The following illustration shows the differences between in-place and non-in-place migration.

1 Prepare your system.

In place

2 Install product on current system

3 Copy ONCONFIG file to target and set parameters.

4 Start an instance of the new version.

Not in place

2 Install product on another system

3 Create database.

4 Modify the schema.

14.10 New Installer

✓One binary with multiple edition (license) installers

✓New InformixHQ software included with the server – $INFORMIXDIR/hq

✓What was removed from the Engine installer (ids_install):

      - JBDC

      - CSDK

      - ESQL

✓Download Informix CSDK from Passport Advantage and install separately.

✓Connection manager is provided within the CSDK

14.10 New Installer

You can download Informix product from IBM website (developer edition for free of cost) and later based on your License type you can download License/edition file from Passport advantage

– 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)

14.10 New Installer

There are two ways to start the installation:

1) Download 14.10 DE and run ./ids_install
   – You can change the edition of the installed engine by running the jar file aee_edition.jar
   $INFORMIXDIR/jvm/jre/bin/java -jar aee_edition.jar -i console

2) Download 14.10 DE and download the edition.jar file in $INFORMIXDIR and then just run ./ids_install, this will install ids and also invokes applying the license file

14.10 New Installer

First way:

```
IBM Informix Dynamic Server Version 14.10.FC4W1DE -- On-Line -- Up 00:00:09 -- 156676 Kbytes

informix@COMP-1081-1:/data1/gaurav/spaces_1410FC4 $ oninit -version
Program Name:          oninit
Build Version:         14.10.FC4W1DE
Build Number:          N001
Build Host:            njdc-lxibm01
Build OS:              Linux 3.10.0-693.el7.x86_64
Build Date:            Tue Jun 16 03:27:59 CDT 2020
Build Timestamp:       2020-06-16T03:09:11-05
GLS Version:           glslib-7.00.FC4
```

14.10 New Installer

Copy aee_edition.jar in new 14.10 $INFORMIXDIR

```
drwxr-xr-x.  3 informix informix      4096 Jul  1 09:46 snmp
-rwxr-xr-x.  1 root     root        197468 Jul  1 09:46 IBM_Informix_14.10_Install_07_01_2020_09_45_54.log
drwxrwxr-x.  4 informix informix      4096 Jul  1 09:46 uninstall
drwxrwxr-x.  3 root     root          4096 Jul  1 09:46 jvm
drwxr-xr-x.  5 informix informix      4096 Jul  1 09:46 bin
drwxrwx---.  2 informix informix      4096 Jul  1 09:46 ssl
drwxr-xr-x.  3 informix informix      4096 Jul  1 09:46 isa
drwxr-xr-x.  2 informix informix      4096 Jul  1 09:46 gskit
drwxr-xr-x.  3 informix informix      4096 Jul  1 09:46 lib
-rwxr-xr-x.  1 root     root         14429 Jul  1 09:46 IBM_Informix_Software_Bundle_Install_07_01_2020_09_45_31.log
-rw-r--r--.  1 informix informix  11804679 Jul  1 10:01 aee_edition.jar
drwxr-xr-x.  2 root     root          4096 Jul  1 10:03 aee_license
-rwxr-xr-x.  1 root     root          5601 Jul  1 10:03 Informix_Edition_Installer_Install_07_01_2020_10_03_22.log
drwxrwx---.  2 informix informix      4096 Jul  1 10:04 tmp
-rwxr-xr-x.  1 informix informix      5812 Jul  1 10:09 Informix_Edition_Installer_Install_07_01_2020_10_09_40.log
drwxrwxr-x.  4 informix informix      4096 Jul  1 10:11 etc
```

14.10 New Installer

- Run **$INFORMIXDIR/jvm/jre/bin/java -jar aee_edition.jar -i console**
- This will invoke ids_install and will change your version

```
informix@COMP-1081-1:/informix/products/14.10.FC4 $ oninit -version
Program Name:           oninit
Build Version:          14.10.FC4W1AEE
Build Number:           N001
Build Host:             njdc-lxibm01
Build OS:               Linux 3.10.0-693.el7.x86_64
Build Date:             Tue Jun 16 03:27:59 CDT 2020
Build Timestamp:        2020-06-16T03:09:11-05
GLS Version:            glslib-7.00.FC4
```

Preparing for migration

1) Create a new $INFORMIXDIR for 14.10.

2) Create new ONCONFIG based on your ONCONFIG.std and your older 11.70 onconfig and sqlhosts files

3) Run ./ids_install

4) Re-compile any UDRs

5) Check for any pending "in-place alter" on your 11.70. Why?

Why "In-place" alter is so important?

- 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

- Resolve in-place alter before an upgrade

- Example.

How to identify outstanding 'in-place' alter

- Connect to sysmaster database and run the below query:

  - *SELECT ta.dbsname, ta.tabname, pt.partnum, HEX(pt.flags) flag*
    FROM sysmaster:systabnames ta, sysmaster:sysptnhdr pt
    WHERE ta.partnum = pt.partnum
    AND BIT_AND(HEX(pt.flags),'00800000'::BINARYVAR) = '00800000';

For more information, please refer below URL:

https://www.ibm.com/support/pages/identifying-outstanding-place-alters

```
dbsname    stores_demo
tabname    t1
partnum    1049095
flag       0x00800901

dbsname    stores_demo
tabname    t2
partnum    1049096
flag       0x00800901

dbsname    stores_demo
tabname    t3
partnum    1049097
flag       0x00800901
```

How to fix "In-Place" alter

```
TBLspace Usage Report for stores_demo:informix.migration

    Type                    Pages       Empty   Semi-Full       Full  Very-Full
    ---------------- ---------- ---------- ---------- ---------- ----------
    Free                        6
    Bit-Map                     1
    Index                       0
    Data (Home)                 1
                       ----------
    Total Pages                 8

    Unused Space Summary

        Unused data slots                               242
        Unused bytes per data page                        4
        Total unused bytes in data pages                  4

    Home Data Page Version Summary

            Version                             Count

            0 (current)                             1
```

✓ add new column

✓ Insert data

How to fix "In-Place" alter

```
TBLspace Usage Report for stores_demo:informix.migration

    Type                     Pages        Empty   Semi-Full         Full   Very-Full
    --------------- ---------- ---------- ---------- ---------- -----------
    Free                          5
    Bit-Map                       1
    Index                         0
    Data (Home)                   2
    Data (Remainder)              0          0          0          0          0
                            ----------
    Total Pages                   8

    Unused Space Summary

        Unused data bytes in Home pages                  3946
        Unused data bytes in Remainder pages                0

    Home Data Page Version Summary

                    Version                         Count

                    0 (oldest)                       1
                    1 (current)                      1
```

How to fix "In-Place" alter

Run dummy update on the table. And Beware of Long Transaction

Update TABNAME set PKEY=PKEY where 1=1;

```
informix@COMP-1081-1:/data1/gaurav/spaces $ echo "update migration set id=id where 1=1"| dbaccess stores_demo

Database selected.


11 row(s) updated.


Database closed.
```

How to fix "In-Place" alter

```
TBLspace Usage Report for stores_demo:informix.migration

    Type                      Pages      Empty  Semi-Full        Full  Very-Full
    ---------------- ---------- ---------- ---------- ---------- ----------
    Free                          5
    Bit-Map                       1
    Index                         0
    Data (Home)                   2
    Data (Remainder)              0          0          0          0          0
                         ----------
    Total Pages                   8

    Unused Space Summary

        Unused data bytes in Home pages                3926
        Unused data bytes in Remainder pages              0

    Home Data Page Version Summary

                Version                            Count

                0 (oldest)                           0
                1 (current)                          2
```

Preparing for migration

6) Verify the integrity of the instances allocated and used pages using the oncheck utility

-Check Reserved Pages
- oncheck –pr
– 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 <Sbspace name>
- oncheck –cS <Sbspace name>

Preparing for migration

7) Perform Whole system Backup

8) Create a Rollback Plan. Just in case if upgrade/migration fails.

What if Upgrade fails!!!

▪ Before starting an upgrade, make sure you have enabled CONVERSION_GUARD configuration parameter and a temporary directory is specified in the RESTORE_POINT_DIR configuration parameter.

▪ These configuration parameters specify information that Informix® can use if an upgrade fails.

▪ **Prerequisites**: The directory specified in the RESTORE_POINT_DIR configuration parameter must be empty before the upgrade begins, but not when recovering from a failed update.

▪ After a failed upgrade, do not empty the RESTORE_POINT_DIR directory before you attempt to run the **onrestorept** utility. The server must be offline after a failed upgrade.

▪ The **onrestorept** utility, which you can run to undo changes made during a failed upgrade

▪ For more details please check this URL:
▪ https://www.ibm.com/support/knowledgecenter/SSGU8G_14.1.0/com.ibm.mig.doc/ids_mig_255.htm

Perform Upgrade

- Once you are done with your pre-checks. You are ready to perform an upgrade.

- Shutdown all your apps

- Check there is no connection to the database

- onmode –l to switch to next logical log and then onmode –c to do a checkpoint.

- HIGHLY recommended to shutdown using "onmode -uky" to terminate any open transactions that may be present.

- Make changes in your environment file for $INFORMIXDIR='new_directory_14.10_path'

- Start your instance and keep an eye on online.log until it says "conversion completed".

Post upgrade

- Recommended running your update statistics strategy on all databases.

- Start your apps and make sure users gets connected to database

- Take 0 level backup

- Again verify the integrity of pages using onchecks

14.10 Upgrade – A short Summary

- Create a new directory for the Informix 14.10.

- Untar Informix tar file and the License file into the new $INFORMIXDIR

- Use new $ONCONFIG based off the new onconfig.std and amend it to reflect you previous versions $ONCONFIG settings. And you may copy the old $INFORMIXSQLHOSTS file to the 14.10 $INFORMIXDIR.

- make changes in your environment file for $INFORMIXDIR='new_directory_14.10_path'

- And start ids as normal using oninit -vy

- Check the online.log and check if reports "converted successfully"

Online.log showing successful conversion

16:10:06 Physical Recovery Started at Page (1:2025).

16:10:06 Physical Recovery Complete: 13 Pages Examined, 13 Pages Restored.

16:10:06 Logical Recovery Started.

16:10:06 10 recovery worker threads will be started.

16:10:06 Going to conv

16:10:07 Physical recovery completed, continuing Conversion

16:10:07 Conv/rev: Started check phase of conversion for component RSAM

16:10:07 *** numVersions=7 targetVersion=30 ***

16:10:07 *** entity_ver=26 targetVersion=30 indexVersion= 0 ***

16:10:07 *** FromVersion=16 ToVersion=18 entity_ver=26 targetVersion=30 indexVersion=0 ***

16:10:07 *** RSAM 1 12.10.xC1 ***

………………

16:10:26 Conversion Completed Successfully

How to upgrade/migrate in cluster environment?

- If we want to upgrade cluster we can use the same way as we have just done. One server by one server.

- For migration (it's different from in-place upgrade) you can use below techniques:
  - -Rolling upgrade
  - -cdr migrate server

- And we have some more very old utilities which take more time.

  - Dbexport/dbimport
  - Load/unload
  - HPL

- Will be covering only basic of rolling upgrade and cdr migrate server.

Rolling Upgrade

- Only basic of 'Rolling upgrade' as it is all together a different topic.

- What is Rolling upgrade ?

- What is the need of Rolling Upgrade?

- How it works?

Rolling Upgrade

- **What is Rolling upgrade ?**

  – Rolling upgrade is a feature which helps upgrade Informix high availability clusters Online.

  – Easy to migrate between different OS flavors and different IDS versions

  – Zero or minimum downtime

  – Provides a way to transform an HA pair to an ER pair

Rolling Upgrade

- **What is the need of Rolling Upgrade**?

  – Provide a server side infrastructure to support rolling upgrade of HDR or RSS system

- **Main usages of this feature:**

  – Ability to convert HDR or RSS pair to ER and setup replicate for every table in the system automatically.

  – Uses ERKEY on tables with no primary key.

  – One of the nodes continue to be online and allow queries including DML while the other undergo product upgrade

Rolling Upgrade

How it Works?

The feature is implemented with 2 new cdr commands:

- **cdr check sec2er [-c primary] [--print] <secondary>**

✓Examines the primary and secondary nodes if split is possible

✓Displays warning and error messages

✓Displays the commands to be executed during split (optional)

- **cdr start sec2er [-c primary] <secondary>**

✓Performs the actual split (using rss2er function in syscdr)

✓Always prints the commands being executed

✓HDR pair will be internally converted to RSS first

✓If successful, 2 stand alone servers will be created replicating via ER

https://www.ibm.com/support/knowledgecenter/SSGU8G_14.1.0/com.ibm.mig.doc/ids_mig_271.htm

Cdr migrate server

- Only basic of 'cdr migrate server' as it is all together a different topic

- What is cdr migrate server ?

- What is the need of cdr migrate server?

- How it works?

Cdr migrate server

- **What is cdr migrate server?**

  – Cdr migrate server is a feature which helps upgrade Informix high availability clusters Online.

  – Easy to migrate between different OS flavors and different IDS versions

  – Zero or minimum downtime

  – Provides a way to transform an HA pair to an ER pair

Cdr migrate server

- **What is the need of cdr migrate server?**

  - Automates data migration task between two or more servers across OS and across IDS versions.

  - Automates setting up of ER between two Informix server instances.

  - Create storage spaces using storage pool.

  - Migrate schema and data in parallel.

  - Resynchronize data using Enterprise Replication

  - Zero downtime

cdr migrate server

How it Works?

- cdr migrate server -s source -t target -p phase [-d database] [--exec]

- This will print commands to stdout i.e which all phases this utility have:
cdr migrate server -s source -t target --phase all

- To execute commands:
cdr migrate server -s source -t target --phase all –exec

- https://www.ibm.com/support/knowledgecenter/SSGU8G_14.1.0/com.ibm.erep.doc/ids_erp_cdr_migrate_server.htm

Questions

Goodbye Panther (11.70)