



**IDUG**

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## Database Upgrade Step by Step Procedure for Db2 pureScale

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Session Code: CLOUD1 | Platform: LUW

# Agenda

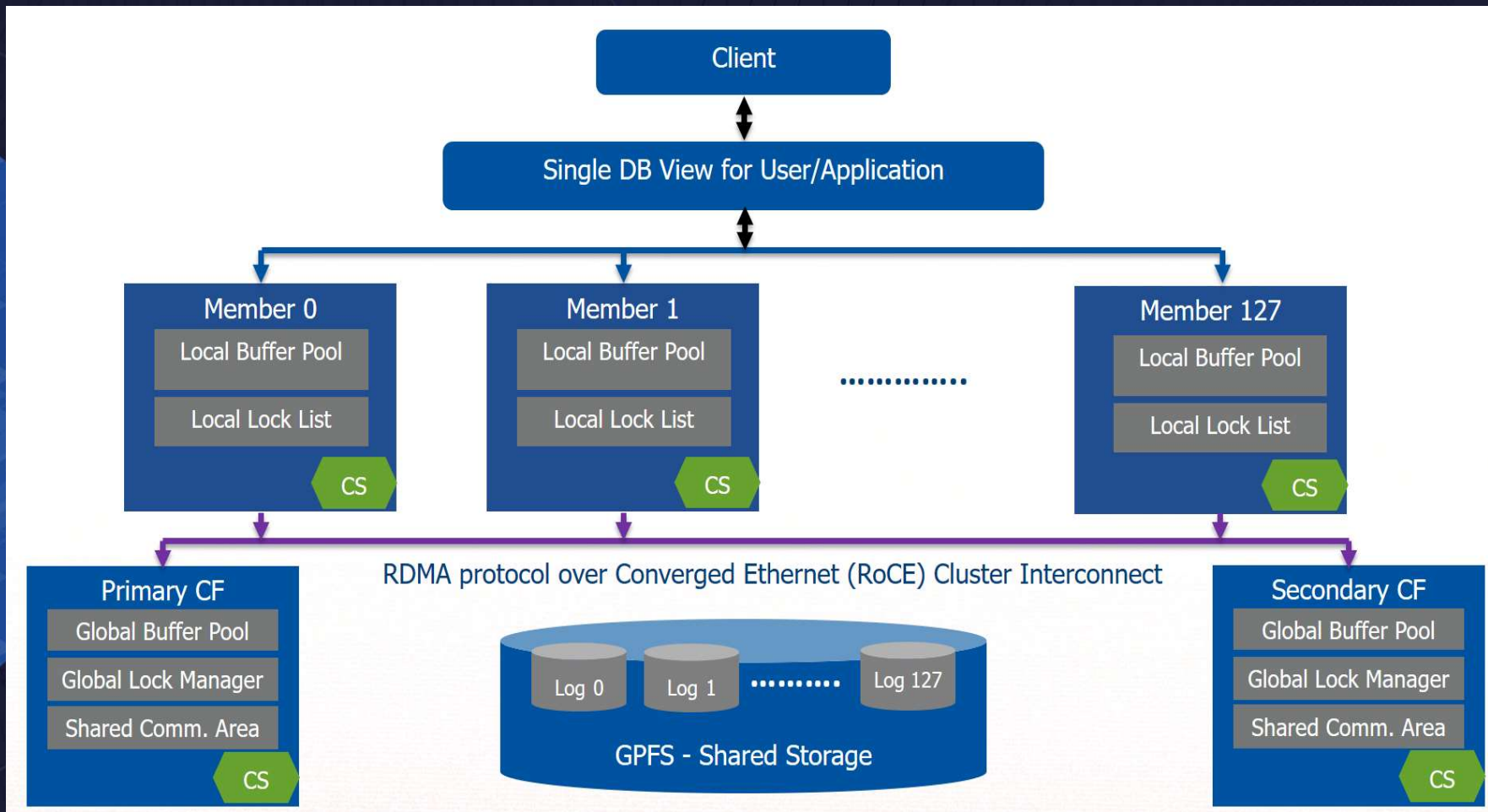
- An introduction to Db2 pureScale
- Fix Pack and Mod Pack Updates
- Db2 Version Upgrade
- Post-Upgrade Steps



# Introduction to pureScale

# Db2 pureScale

- Extreme capacity
  - Add compute resources or members as your need arises
- Continuous Availability
  - No single point of failure
  - 24x7 availability
- Application Transparency
  - No changes to application code or configuration
  - Load balancing logic is within Db2
- Connection Rebalance
  - Use db2dsdriver.cfg
  - Use F5/Big Fix Load balancer
  - Use Multi-Home DNS concept



# What is a Db2 pureScale Member? (1|2)

A Db2 member is the core processing engine within the pureScale cluster. Like single partition Db2, it contains: a Db2 system controller process (db2sysc) and a watch dog process (db2wdog), Local buffer pools, lock list, database heap, log buffer, sort heap and application heap etc.

New Engine Dis-patchable Units (EDU's) within pureScale are:

<b>db2castructevent</b>	<b>db2LLMn1</b>	<b>db2LLMn2</b>
db2LLMng	db2LLMrl	db2LLMrc
db2XInot	db2LLMrf	db2LLMehl
db2ehl	db2ExtMovHelper	db2sysc (3 additional processes on each member)

# What is a Db2 pureScale Member? (1|2)

No concept of catalog node (admin node), data nodes

Db2 engine address space

- A db2sysc process and its threads
- 3 additional db2sysc processes (idle in nature) will be allocated on each member along with one active db2sysc. The idle db2sysc processes pre-allocated for Member Crash Recovery and Restart Light of a guest member on a host quickly and without competing with the resident member for resources.

EDU's:

db2pclnr – Buffer pool page cleaners

db2loggr/db2loggw – Transaction log processing and recovery

db2dlock – Deadlock detection

db2glock – Co-ordinate deadlock information between multiple members

# What is a Db2 pureScale CF? (1|2)

A pureScale cluster facilitates data sharing and concurrency control between its multiple database members, using the concept of a cluster caching facility (CF). The CF is a software application managed by Db2 cluster services to facilitate centralized coordination of locking through a Global Lock Manager (GLM) and centralized page caching through a Group Buffer Pool (GBP).

The services includes:

- Group Buffer pool Management (GBP)
- Global Lock Management (GLM)
- Shared Communication Area (SCA)



## What is a Db2 pureScale CF? (2|2)

The Local Lock Manager (LLM), the lock manager within each DB2 member, requests the physical lock from the GLM before granting a logical lock to a transaction. The purpose of the Global Lock List is to track the lock requests made by the LLMs of active database members.

The Shared Communication Area (SCA) contains database wide control block information for table tables, indexes, table spaces and catalogs.



# Online Fix Pack and Mod Pack Updates

# Prerequisites

Task No	Task
1	Review the Flashes and open Authorized Problem Analysis Reports (APARs) <a href="https://www.ibm.com/support/pages/node/318421">https://www.ibm.com/support/pages/node/318421</a>
2	Check the recent cumulative build and the fixes to identify the right build for your environment <a href="https://www.ibm.com/support/pages/db2-v1159-published-cumulative-special-build-downloads">https://www.ibm.com/support/pages/db2-v1159-published-cumulative-special-build-downloads</a>
3	Validate you have sufficient space available. (a) Image copy location (b) /tmp and /var (c) Db2 installation file system (d) Execute permission for the /tmp or use <b>DB2TMPDIR</b> <a href="https://www.ibm.com/docs/en/db2/11.5?topic=servers-disk-memory-requirements">https://www.ibm.com/docs/en/db2/11.5?topic=servers-disk-memory-requirements</a>
4	Ensure that your system meets all the installation requirements. Run the <b>db2prereqcheck</b> command to determine if your system satisfies the Db2 installation prerequisites. <a href="https://www.ibm.com/docs/en/db2/11.5?topic=servers-checking-installation-prerequisites-by-using-db2prereqcheck-command">https://www.ibm.com/docs/en/db2/11.5?topic=servers-checking-installation-prerequisites-by-using-db2prereqcheck-command</a>
5	Backup the following: (a) Databases (b) DB CFG, DBM CFG, db2look, Db2 Registry Variables
6	Download Db2 Activation Kit (license keys) via IBM Passport Advantage
7	Validate the /etc/hosts file (avoid any duplicate entries)

# Release levels in Db2 pureScale

**Command:** `db2pd -rustatus` OR **Table Function:** `SYSPROC.ENV_GET_INSTANCE_CODE_LEVELS()`

**Code Level:** Refers to the specific version and fix pack level of the Db2 software installed on the system. This includes the base version, applied fix packs, and any interim fixes.

**Architecture Level:** During the update process, architecture level will be same as code level.

**Current Effective Code Level (CECL):**

This is the actual running version of the Db2 code on each member of the pureScale cluster. This can sometimes differ from the installed code level if certain patches or fixes have not yet been activated.

**Current Effective Architecture Level (CEAL):**

This indicates the version of the cluster's architecture that is actively in use. This can include the configuration and versioning of cluster-wide components and features.

**Section Level:**

Refers to the level of the database sections (plans or compiled SQL statements) that are being executed within the database. It's often tied to the execution plan and optimization settings of the database queries.

# How to extract the release level information? (1|2)

```
SELECT RECORD_TYPE, ID, SUBSTR(ARCHITECTURE_LEVEL_DISK,1,28) AS ARCHITECTURE_LEVEL,  
SUBSTR(SECTION_LEVEL_DISK,1,26) AS SECTION_LEVEL, SUBSTR(CODE_LEVEL_DISK,1, 28) AS CODE_LEVEL, LAST_UPDATED  
FROM TABLE (SYSPROC.ENV_GET_INSTANCE_CODE_LEVELS())
```

RECORD_TYPE	ID	ARCHITECTURE_LEVEL	SECTION_LEVEL	CODE_LEVEL
INSTANCE	-	V:11 R:5 M:8 F:0 I:0 SB:0	-	V:11 R:5 M:8 F:0 I:0 SB:4256
MEMBER	0	V:11 R:5 M:8 F:0 I:0 SB:0	V:11 R:5 M:9 F:0 I:0 SB:0	V:11 R:5 M:8 F:0 I:0 SB:4256
MEMBER	1	V:11 R:5 M:8 F:0 I:0 SB:0	V:11 R:5 M:9 F:0 I:0 SB:0	V:11 R:5 M:8 F:0 I:0 SB:4256
MEMBER	2	V:11 R:5 M:8 F:0 I:0 SB:0	V:11 R:5 M:9 F:0 I:0 SB:0	V:11 R:5 M:8 F:0 I:0 SB:4256
CF	128	V:11 R:5 M:8 F:0 I:0 SB:0	-	V:11 R:5 M:8 F:0 I:0 SB:4256
CF	129	V:11 R:5 M:8 F:0 I:0 SB:0	-	V:11 R:5 M:8 F:0 I:0 SB:4256

==> **db2pd -rustatus**

```
ROLLING UPDATE STATUS:  Disk Value                               Memory Value  
  
Record Type             = INSTANCE  
ID                       = 0  
Code Level               = V:11 R:5 M:8 F:0 I:0 SB:42563 (0x0B05090000A64300) Not Applicable  
Architecture Level      = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05090000000000)      Not Applicable  
State                   = [NONE]  
Last updated             = 2024/05/28:18:40:20
```

# How to extract the release level information? (2|2)

```
Record Type      = MEMBER
ID               = 0
Code Level       = V:11 R:5 M:8 F:0 I:0 SB:42563 (0x0B05090000A64300) V:11 R:5 M:8 F:0 I:0 SB:42563 (0x0B05090000A64300)
CECL             = V:11 R:5 M:8 F:0 I:0 SB:42563 (0x0B05090000A64300) V:11 R:5 M:8 F:0 I:0 SB:42563 (0x0B05090000A64300)
Architecture Level = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05090000000000) V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05090000000000)
CEAL             = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05090000000000) V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05090000000000)
Section Level    = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05090000000000) V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05090000000000)
Target Code Level = V:11 R:5 M:8 F:0 I:0 SB:42563 (0x0B05090000000000) Not Applicable
State            = [NONE]
Last updated     = 2024/05/28:17:09:06
```

...  
...  
...

```
Record Type      = CF
ID               = 128
Code Level       = V:11 R:5 M:8 F:0 I:0 SB:42563 (0x0B05090000A64300) Not Applicable
Architecture Level = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05090000000000) Not Applicable
Target Code Level = V:11 R:5 M:8 F:0 I:0 SB:42563 (0x0B05090000000000) Not Applicable
State            = [NONE]
Last updated     = 2024/05/28:17:47:12
```

```
Record Type      = CF
ID               = 129
Code Level       = V:11 R:5 M:8 F:0 I:0 SB:42563 (0x0B05090000A64300) Not Applicable
Architecture Level = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05090000000000) Not Applicable
Target Code Level = V:11 R:5 M:8 F:0 I:0 SB:42563 (0x0B05090000000000) Not Applicable
State            = [NONE]
Last updated     = 2024/05/28:18:28:05
```

# Check the alerts within the cluster and clear if any

```
==> db2instance -list
```

ID	TYPE	STATE	HOME_HOST	CURRENT_HOST	ALERT	PARTITION_NUMBER	LOGICAL_PORT	NETNAME
0	MEMBER	STARTED	ibmdb2st301	ibmdb2st301	NO	0	0	ibmdb2st301-roce0,ibmdb2st301-roce1
1	MEMBER	STARTED	ibmdb2st302	ibmdb2st302	NO	0	0	ibmdb2st302-roce0,ibmdb2st302-roce1
2	MEMBER	STARTED	ibmdb2st303	ibmdb2st303	NO	0	0	ibmdb2st303-roce0,ibmdb2st303-roce1
128	CF	PRIMARY	ibmdb2cf301	ibmdb2cf301	NO	-	0	ibmdb2cf301-roce0,ibmdb2cf301-roce1
129	CF	PEER	ibmdb2cf302	ibmdb2cf302	NO	-	0	ibmdb2cf302-roce0,ibmdb2cf302-roce1

HOSTNAME	STATE	INSTANCE_STOPPED	ALERT
ibmdb2cf302	ACTIVE	NO	NO
ibmdb2cf301	ACTIVE	NO	NO
ibmdb2st303	ACTIVE	NO	NO
ibmdb2st302	ACTIVE	NO	NO
ibmdb2st301	ACTIVE	NO	NO

```
==> db2cluster -cm -list -alert
```

```
There are no alerts
```

If there are alerts, clear the alerts using the command

```
==> db2cluster -clear -alert
```

```
There are no alerts that need to be manually cleared.
```

# Perform cluster verification

```
==> db2cluster -verify
```

```
Cluster manager resource states for the DB2 instance are consistent.
```

```
Check 1: Verifying cluster manager resources. result: PASS
```

```
-----
```

```
The shared file system cluster has been setup properly for DB2 usage.
```

```
Check 2: Verifying cluster file system configuration. result: PASS
```

```
-----
```

```
Check 3: Verifying cluster topology. result: PASS
```

```
-----
```

```
Check 4: Verifying SSH configuration. result: PASS
```

```
-----
```

```
Check 5: Verifying RDMA connectivity. result: PASS
```

```
-----
```

```
Check 6: Verifying replicated file systems configuration. result: PASS
```

```
-----
```

```
Check 7: Verifying db2ssh configuration. result: PASS
```



# RSCT and TSA Version Check

1. Perform the prerequisites check for TSAMP

```
`${DB2_INSTALLATION_IMAGE_DIRECTOY}/server_dec/db2/linuxamd64/tsamp/prereqSAM  
`${DB2_INSTALLATION_IMAGE_DIRECTOY}/server_dec/db2/linuxamd64/install/db2cktsa -v install  
`${DB2_INSTALLATION_IMAGE_DIRECTOY}/server_dec/db2/linuxamd64/install/db2cktsa -v media
```

2. Make sure to set umask 022

3. Validate the TSA version based on Db2 version

<https://www.ibm.com/docs/en/db2/11.5?topic=faq-what-versions-tivoli-sa-mp-rsct-spectrum-scale-are-bundled-in-each-db2-fix-pack-mod-pack>

# Perform the Rolling Update – Members (1|3)

```
${DB2_IMAGE_DIRECTORY}/v11.5.8/universal/db2/linuxamd64/install/installFixPack -p  
/opt/IBM/db2/V11.5/M8FP0 -I db2inst1 -online -l /tmp/M8FP0_online.member0.log -t  
/tmp/M8FP0_online.member0.trc
```

DB2 pureScale online update evaluation:

=====

Hostname: ibmdb2st301

Instance name:db2inst1

Target Installation path:/opt/IBM/db2/V11.5/M8FP0

Target Code level = Version:11 Release:5 Modification:8 Fixpack:0 Interim:0 Special  
Build:23839

Target Architecture level = Version:11 Release:5 Modification:8 Fixpack:0

TSA version installed on this host : 4.1.0.7

TSA version present on the media : 4.1.0.7

TSA version after update : 4.1.0.7


GPFS version installed on the host: 5.0.5.8

GPFS version present on the media : 5.1.2.5.4

GPFS version after update : 5.1.2.5.4

Total number of tasks to be performed: 9

Total estimated time for all tasks to be performed: 2616 second(s)



Perform rolling  
update one  
member at a time

# Perform the Rolling Update – Members (2|3)

Task #1 start

Description: Installing DB2 database product binaries

Estimated time 1485 second(s)

Task #1 end

Task #2 start

Description: Stopping the DB2 member on the local host

Estimated time 10 second(s)

Task #2 end

Task #3 start

Description: Stopping the instance on the local host

Estimated time 10 second(s)

Task #3 end

Task #4 start

Description: Entering cluster file system into maintenance mode

Estimated time 6 second(s)

Task #4 end

Task #5 start

Description: Updating cluster software TSA and GPFS

Estimated time 650 second(s)

Task #5 end

# Perform the Rolling Update – Members (3|3)

Task #6 start

Description: Exiting cluster management software out of maintenance mode

Estimated time 6 second(s)

Task #6 end

Task #7 start

Description: Exiting cluster file system out of maintenance mode

Estimated time 6 second(s)

Task #7 end

Task #8 start

Description: Updating the DB2 database manager instance configuration

Estimated time 429 second(s)

Task #8 end

Task #9 start

Description: Starting the instance on the local host

Estimated time 10 second(s)

Task #9 end

Task #10 start

Description: Starting the DB2 member on the local host

Estimated time 10 second(s)

Task #10 end

The execution completed successfully.

# Perform the Rolling Update – CF Secondary (1|2)

```
${DB2_IMAGE_DIRECTORY}/v11.5.8/universal/db2/linuxamd64/install/installFixPack -p  
/opt/IBM/db2/V11.5/M8FP0 -I db2inst1 -online -l /tmp/M8FP0_online.CF129.log -t  
/tmp/M8FP0_online.CF129.trc
```

DB2 pureScale online update evaluation:

=====

Hostname: ibmdb2cf302

Instance name:db2inst1

Target Installation path:/opt/IBM/db2/V11.5/M8FP0

Target Code level = Version:11 Release:5 Modification:8 Fixpack:0 Interim:0 Special  
Build:23839

Target Architecture level = Version:11 Release:5 Modification:8 Fixpack:0

TSA version installed on this host : 4.1.0.7

TSA version present on the media : 4.1.0.7

TSA version after update : 4.1.0.7

GPFS version installed on the host: 5.0.5.8

GPFS version present on the media : 5.1.2.5.4

GPFS version after update : 5.1.2.5.4

Total number of tasks to be performed: 9

Total estimated time for all tasks to be performed: 2616 second(s)

# Perform the Rolling Update – CF Secondary (2|2)

Tasks needed for performing Fix pack update :

=====

- 1 : Installing Db2 database product binaries
- 2 : Stopping the cluster caching facility (CF) on the local host
- 3 : Stopping the instance on the local host
- 4 : Entering cluster file system into maintenance mode
- 5 : Updating cluster software TSA and GPFS
- 6 : Exiting cluster file system out of maintenance mode
- 7 : Updating the Db2 database manager instance configuration
- 8 : Starting the instance on the local host
- 9 : Starting the cluster caching facility on the local host

# Failover the CF from 128 to 129

Once the CF secondary was updated successfully, wait for it to be in PEER state.

## How to check the CF state and SYNC percentage?

**Method #1:** Run `db2instance -list` command

**Method #2:** Use ADMIN View

```
db2 "SELECT CURRENT_TIMESTAMP, ID, SUBSTR(CURRENT_HOST,1,20) AS CURRENT_HOST,  
SUBSTR(STATE,1,20) AS STATE, SUBSTR(ALERT,1,8) AS ALERT FROM SYSIBMADM.DB2_CF WITH UR"
```

CURRENT_TIMESTAMP	ID	CURRENT_HOST	STATE	ALERT
2024-06-19-14.50.01.898873	128	ibmdb2cf301	PRIMARY	NO
2024-06-19-14.50.01.898873	129	ibmdb2cf302	CATCHUP (85%)	NO
...				
CURRENT_TIMESTAMP	ID	CURRENT_HOST	STATE	ALERT
2024-06-19-14.50.01.898873	128	ibmdb2cf301	PRIMARY	NO
2024-06-19-14.50.01.898873	129	ibmdb2cf302	PEER	NO

## Failover CF using the command: `db2stop CF 128`

CURRENT_TIMESTAMP	ID	CURRENT_HOST	STATE	ALERT
2024-06-20-19.34.35.851541	128	ibmdb2cf301	STOPPED	NO
2024-06-20-19.34.35.851541	129	ibmdb2cf301	PRIMARY	NO

# Perform the Rolling Update – CF Old Primary

```
${DB2_IMAGE_DIRECTORY}/v11.5.8/universal/db2/linuxamd64/install/installFixPack -p  
/opt/IBM/db2/V11.5/M8FP0 -I db2inst1 -online -l /tmp/M8FP0_online.CF128.log -t  
/tmp/M8FP0_online.CF128.trc
```

DB2 pureScale online update evaluation:

=====

Hostname: ibmdb2cf301

Instance name:db2inst1

Target Installation path:/opt/IBM/db2/V11.5/M8FP0

Target Code level = Version:11 Release:5 Modification:8 Fixpack:0 Interim:0 Special  
Build:23839

Target Architecture level = Version:11 Release:5 Modification:8 Fixpack:0

TSA version installed on this host : 4.1.0.7

TSA version present on the media : 4.1.0.7

TSA version after update : 4.1.0.7

GPFS version installed on the host: 5.0.5.8

GPFS version present on the media : 5.1.2.5.4

GPFS version after update : 5.1.2.5.4

Total number of tasks to be performed: 9

Total estimated time for all tasks to be performed: 2616 second(s)



# Verify the cluster before the committing the level

**==> db2instance -list**

ID	TYPE	STATE	HOME_HOST	CURRENT_HOST	ALERT	PARTITION_NUMBER	LOGICAL_PORT	NETNAME
0	MEMBER	STARTED	ibmdb2st301	ibmdb2st301	NO	0	0	ibmdb2st301-roce0,ibmdb2st301-roce1
1	MEMBER	STARTED	ibmdb2st302	ibmdb2st302	NO	0	0	ibmdb2st302-roce0,ibmdb2st302-roce1
2	MEMBER	STARTED	ibmdb2st303	ibmdb2st303	NO	0	0	ibmdb2st303-roce0,ibmdb2st303-roce1
128	CF	PEER	ibmdb2cf301	ibmdb2cf301	NO	-	0	ibmdb2cf301-roce0,ibmdb2cf301-roce1
129	CF	PRIMARY	ibmdb2cf302	ibmdb2cf302	NO	-	0	ibmdb2cf302-roce0,ibmdb2cf302-roce1

HOSTNAME	STATE	INSTANCE_STOPPED	ALERT
ibmdb2cf302	ACTIVE	NO	NO
ibmdb2cf301	ACTIVE	NO	NO
ibmdb2st303	ACTIVE	NO	NO
ibmdb2st302	ACTIVE	NO	NO
ibmdb2st301	ACTIVE	NO	NO

**==> db2cluster -cm -list -alert**

There are no alerts

Review the db2diag.log files to see if there were any errors or issues reported.

# Heterogenous Instance State - Restricted Operations

The following restrictions apply to instances in heterogeneous state:

- Cannot add a member or CF
- Cannot create a database from a member that has a code level higher than the current effective code level
- Cannot drop the cluster
- Cannot update the monitor event tables with the **SYSPROC.EVMON\_UPGRADE\_TABLES** procedure
- Cannot update the database system catalog with the **db2updv115** command

# CHECK\_COMMIT and COMMIT\_LEVEL (1|5)

**-check\_commit:** Verifies whether the Db2 pureScale instance is ready for a commit.

**-commit\_level:** Updates the pureScale instance to a new level of code. This option is mandatory for an online fix pack update and its scope is limited to Db2 pureScale environments.

```
./installFixPack -check_commit -I db2dsg01 -t /tmp/M8FP0_check_commit.trc -l  
/tmp/M8FP0_check_commit.log
```

```
DBI1446I The installFixPack command is running.
```

```
The pre-commit verification process for an online fix pack update has started....
```

```
The checks for the pre-commit verification process have been completed successfully.
```

```
If you perform a commit, the new level will be =
```

```
Version:11 Release:5 Modification:8 Fixpack:0 Interim:0 Special Build:23839
```

```
The execution completed successfully.
```

# CHECK\_COMMIT and COMMIT\_LEVEL (2|5)

Operating system information: Linux 3.10.0-1160.66.1.el7.x86\_64.#1 SMP Wed Apr 27 20:34:34 UTC 2022 x86\_64

ROLLING UPDATE STATUS: Disk Value

Memory Value

```
Record Type      = INSTANCE
ID               = 0
Code Level       = V:11 R:5 M:7 F:0 I:0 SB:13804 (0x0B0507000035EC00) Not Applicable
Architecture Level = V:11 R:5 M:7 F:0 I:0 SB:0 (0x0B05070000000000) Not Applicable
State            = [UPDATE IN PROGRESS] [ONLINE UPDATE INITIATED]
Last updated     = 2022/08/06:21:39:37
```

```
Record Type      = MEMBER
ID               = 0
Code Level       = V:11 R:5 M:8 F:0 I:0 SB:23839 (0x0B050800005D1F00) V:11 R:5 M:8 F:0 I:0 SB:23839
(0x0B050800005D1F00)
CECL             = V:11 R:5 M:7 F:0 I:0 SB:13804 (0x0B0507000035EC00) V:11 R:5 M:7 F:0 I:0 SB:13804
(0x0B0507000035EC00)
Architecture Level = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05080000000000) V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05080000000000)
CEAL             = V:11 R:5 M:7 F:0 I:0 SB:0 (0x0B05070000000000) V:11 R:5 M:7 F:0 I:0 SB:0 (0x0B05070000000000)
Section Level     = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05080000000000) V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05080000000000)
Target Code Level = V:11 R:5 M:8 F:0 I:0 SB:23839 (0x0B05080000000000) Not Applicable
State            = [NONE]
Last updated     = 2022/11/13:14:13:24
```

# CHECK\_COMMIT and COMMIT\_LEVEL (3|5)

```
Record Type      = CF
ID               = 128
Code Level       = V:11 R:5 M:8 F:0 I:0 SB:23839 (0x0B0508000005D1F00) Not Applicable
Architecture Level = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B050800000000000) Not Applicable
Target Code Level = V:11 R:5 M:8 F:0 I:0 SB:23839 (0x0B050800000000000) Not Applicable
State            = [NONE]
Last updated     = 2022/11/13:16:14:52
```

```
Record Type      = CF
ID               = 129
Code Level       = V:11 R:5 M:8 F:0 I:0 SB:23839 (0x0B0508000005D1F00) Not Applicable
Architecture Level = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B050800000000000) Not Applicable
Target Code Level = V:11 R:5 M:8 F:0 I:0 SB:23839 (0x0B050800000000000) Not Applicable
State            = [NONE]
Last updated     = 2022/11/13:15:24:56
```

# CHECK\_COMMIT and COMMIT\_LEVEL (4|5)

```
./installFixPack -commit_level -I db2dsg01 -t /tmp/M8FP0_commit.trc -l  
/tmp/M8FP0_commit.log
```

```
DBI1446I The installFixPack command is running.  
The execution completed successfully.
```

ROLLING UPDATE STATUS: Disk Value

Memory Value

```
Record Type = INSTANCE  
ID = 0  
Code Level = V:11 R:5 M:8 F:0 I:0 SB:23839 (0x0B050800005D1F00) Not Applicable  
Architecture Level = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05080000000000) Not Applicable  
State = [NONE]  
Last updated = 2022/11/13:16:49:06
```

```
Record Type = MEMBER  
ID = 0  
Code Level = V:11 R:5 M:8 F:0 I:0 SB:23839 (0x0B050800005D1F00) V:11 R:5 M:8 F:0 I:0 SB:23839  
(0x0B050800005D1F00)  
CECL = V:11 R:5 M:8 F:0 I:0 SB:23839 (0x0B050800005D1F00) V:11 R:5 M:8 F:0 I:0 SB:23839  
(0x0B050800005D1F00)  
Architecture Level = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05080000000000) V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05080000000000)  
CEAL = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05080000000000) V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05080000000000)  
Section Level = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05080000000000) V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05080000000000)  
Target Code Level = V:11 R:5 M:8 F:0 I:0 SB:23839 (0x0B05080000000000) Not Applicable  
State = [NONE]  
Last updated = 2022/11/13:14:13:24
```

# CHECK\_COMMIT and COMMIT\_LEVEL (5|5)

```
Record Type      = CF
ID               = 128
Code Level       = V:11 R:5 M:8 F:0 I:0 SB:23839 (0x0B050800005D1F00) Not Applicable
Architecture Level = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05080000000000) Not Applicable
Target Code Level = V:11 R:5 M:8 F:0 I:0 SB:23839 (0x0B05080000000000) Not Applicable
State            = [NONE]
Last updated     = 2022/11/13:16:14:52
```

```
Record Type      = CF
ID               = 129
Code Level       = V:11 R:5 M:8 F:0 I:0 SB:23839 (0x0B050800005D1F00) Not Applicable
Architecture Level = V:11 R:5 M:8 F:0 I:0 SB:0 (0x0B05080000000000) Not Applicable
Target Code Level = V:11 R:5 M:8 F:0 I:0 SB:23839 (0x0B05080000000000) Not Applicable
State            = [NONE]
Last updated     = 2022/11/13:15:24:56
```

# How to cancel an online fix pack/mod pack update?

One can cancel an online fix pack update that was applied on a member or cluster caching facility (CF) to fall back to the same release as the current effective code level if the new level has not been committed.

```
media-dir/installFixPack -p FP-installed-path -f level -I instance-name -online -l log-file-name -t trace-  
file-name
```

## Example to cancel the update from Db2 11.5.8.0 to Db2 11.5.7.0:

```
${DB2_INSTALLATION_DIRECTORY}/v11.5.7/universal/db2/linuxamd64/install/installFixPack -p  
/opt/IBM/db2/V11.5/M7FP0 -f level -I db2inst1 -online -l /tmp/M7FP0_online.member0.log -t  
/tmp/M7FP0_online.member0.trc
```

...

...

```
${DB2_INSTALLATION_DIRECTORY}/v11.5.7/universal/db2/linuxamd64/install/installFixPack -p  
/opt/IBM/db2/V11.5/M7FP0 -f level -I db2inst1 -online -l /tmp/M7FP0_online.member2.log -t  
/tmp/M7FP0_online.member2.trc
```

### **CF's:**

```
${DB2_INSTALLATION_DIRECTORY}/v11.5.7/universal/db2/linuxamd64/install/installFixPack -p  
/opt/IBM/db2/V11.5/M7FP0 -f level -I db2inst1 -online -l /tmp/M7FP0_online.CF128.log -t  
/tmp/M7FP0_online.CF128.trc
```

```
${DB2_INSTALLATION_DIRECTORY}/v11.5.7/universal/db2/linuxamd64/install/installFixPack -p  
/opt/IBM/db2/V11.5/M7FP0 -f level -I db2inst1 -online -l /tmp/M7FP0_online.CF127.log -t  
/tmp/M7FP0_online.CF127.trc
```



# Concurrent Online Fix Pack and Mod Pack Updates

One can update multiple hosts to a higher code level fix pack or special build, in parallel, on a Db2 pureScale instance. These updates can be applied to both members and cluster caching facilities, and are done without impacting availability.

It is up to you how many hosts you want to update at the same time. However, the max number to apply the online fix pack update at the same time is NO more than HALF of the hosts.

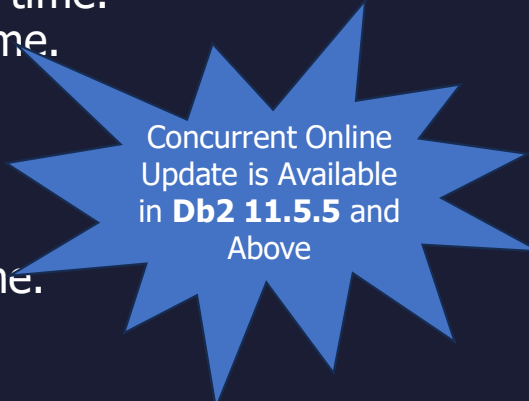
It is recommended to apply concurrent online fix pack updates for one CF and half of the members at a time. For example, if you have 4 members and 2 CFs, you can apply the online fix pack update using two options:

## Option 1:

Apply online fix pack update on member 0, 1, and secondary CF at the same time.  
Apply online fix pack update on member 2, 3, and primary CF at the same time.

## Option 2:

Apply online fix pack update on member 0 and member 1 at the same time.  
Apply online fix pack update on member 2 and secondary CF at the same time.  
Apply online fix pack update on member 3 and primary CF at the same time.



Concurrent Online Update is Available in **Db2 11.5.5** and Above

# Online Fix Pack/Mod Pack Updates in an HADR Environment

In an HADR environment, you can update one or more members or cluster caching facilities (CFs) while the remaining members and CFs continue to process transactions. You must update all members and CFs in both the primary and standby clusters before you can commit the changes and update the Db2 pureScale instance.

Step (1): Stop HADR on primary

Step (2): Stop HADR on standby

Step (3): Perform an ONLINE update on standby cluster and commit the code level

Step (4): Perform an ONLINE update on primary cluster and commit the code level

Step (5): Start HADR on standby

Step (6): Start HADR on primary

**Note:** It is not necessary to stop HADR between primary and secondary. Whenever you're updating the REPLAY MASTER member for a specific database on the standby cluster, you can start the REPLAY MASTER on another member by stopping HADR standby and starting it on another member.

# Post-Update Tasks

## 1. Update Database Catalog

```
db2updv115 -d ${DBNAME}
```

## 2. Bind and REBIND

```
db2rbind ${DBNAME} -l /tmp/${DBNAME}.BIND.Log all
```

```
db2 CONNECT TO ${DBNAME}
```

```
db2 BIND $HOME/sql/lib/bnd/db2schema.bnd BLOCKING ALL GRANT PUBLIC SQLERROR CONTINUE
```

```
db2 BIND $HOME/sql/lib/bnd/@db2ubind.lst BLOCKING ALL GRANT PUBLIC ACTION ADD
```

```
db2 BIND $HOME/sql/lib/bnd/@db2cli.lst BLOCKING ALL GRANT PUBLIC ACTION ADD
```

```
# If you're using Federation
```

```
db2 bind $HOME/sql/lib/bnd/db2dsproc.bnd blocking all grant public
```

```
db2 bind $HOME/sql/lib/bnd/db2stats.bnd blocking all grant public
```

```
# If you're using spatial
```

```
db2 BIND $HOME/sql/lib/bnd/@db2gse.lst
```



# Version Upgrade of a pureScale Cluster

# Upgrading the Cluster

Task No	User	Task Description and Commands
1	Db2 Instance	Stop the entire cluster by forcing all connections and issuing db2stop
2	Root	Place cluster manager and cluster file system into maintenance on all members and CF <b>\${OLD_DB2_INSTALL_DIR}/bin/db2cluster -cm -enter -maintenance -all</b> <b>\${OLD_DB2_INSTALL_DIR}/bin/db2cluster -cfs -enter -maintenance -all</b>
3	Root	Install new Db2 version code on all members and CF. The installation path should match between all the members and CF. Install Db2 license key after the installation. <b>db2_install -y -b &lt;install-path&gt; -p SERVER -f PURESCALE</b>
4	Root	Exit maintenance - cluster manager and cluster file system <b>\${OLD_DB2_INSTALL_DIR}/bin/db2cluster -cm -exit -maintenance -all</b> <b>\${OLD_DB2_INSTALL_DIR}/bin/db2cluster -cfs -exit -maintenance -all</b>
5	Root	Commit changes to cluster manager and cluster file system (cluster wide – one time) <b>\${NEW_DB2_INSTALL_DIR}/bin/db2cluster -cfs -commit</b> <b>\${NEW_DB2_INSTALL_DIR}/bin/db2cluster -cm -commit</b>
6	Db2 Instance	Restart the Db2 instance processes on all members and CFs in any order with updated resources for the cluster management software and the cluster file system software by issuing the <b>db2start instance on \${hostname}</b> command on any node, where the hostname is the name of each member or CF in the cluster.

# Upgrading the pureScale Instance

Task No	User	Task Description and Commands
1	Db2 Instance	Perform the <b>db2ckupgrade</b> to verify that your databases are ready for Db2 upgrade
2	Db2 Instance	Stop Db2 instance on the cluster
3	Db2 Instance	Upgrade the instance globally across the cluster (members and CF) <b>`\${NEW_DB2_INSTALL_DIR}/instance/db2iupgrade -d -g [-u fencedID] InstName</b>
4	Db2 Instance	Start Db2 instance by issuing <b>db2start</b> command
5	Db2 Instance	Validate the instance level by issuing <b>db2level</b> command

# Upgrading the Database

1. Login as Db2 instance user
2. Upgrade each local (indirect) database using

```
db2 "UPGRADE DATABASE ${DBNAME}"
```

3. Activate Databases

4. Bind and REBIND

```
db2rbind ${DBNAME} -l /tmp/${DBNAME}.BIND.Log all
```

```
db2 CONNECT TO ${DBNAME}
```

```
db2 BIND $HOME/sqlib/bnd/db2schema.bnd BLOCKING ALL GRANT PUBLIC SQLERROR CONTINUE
```

```
db2 BIND $HOME/sqlib/bnd/@db2ubind.lst BLOCKING ALL GRANT PUBLIC ACTION ADD
```

```
db2 BIND $HOME/sqlib/bnd/@db2cli.lst BLOCKING ALL GRANT PUBLIC ACTION ADD
```

# If you're using Federation

```
db2 bind $HOME/sqlib/bnd/db2dsproc.bnd blocking all grant public
```

```
db2 bind $HOME/sqlib/bnd/db2stats.bnd blocking all grant public
```

<https://www.ibm.com/docs/en/db2/11.5?topic=windows-upgrading-databases>

<https://www.ibm.com/docs/en/db2/11.5?topic=servers-post-upgrade-tasks>

## uDAPL (RHEL 7.x) and VERBS (RHEL 8.x)

Db2 11.5.8 introduces new support for Db2 pureScale with RDMA on RHEL 8.6. This requires an offline update of the entire cluster to move to Db2 11.5.8 and RHEL 8.6. **It is not possible to perform an online update from a lower Db2 11.5 version to Db2 11.5.8 when moving to RHEL 8.6 with RDMA.** An existing cluster RDMA running Db2 11.5 on RHEL 7 can be upgraded to Db2 11.5.8 on RHEL 7, using online update.

### **What is the change between RHEL 7.x and 8.x?**

RHEL 7.x leverages uDAPL (User Direct Access Programming Library) for Remote Direct Memory Access (RDMA), a technology that allows data to be transferred directly from the memory of one computer to another without involving the CPU, thereby reducing latency and CPU overhead.

RHEL 8.x leverages VERBS (libibverbs) for RDMA. Verbs are a set of low-level functions that allow applications to perform direct memory access operations over a network.





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## Database Upgrade Step by Step Procedure for Db2 pureScale

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