



Database and Middleware Automation

Ultimate Edition

Software Version: 10.50

Workflows for IBM DB2

Document Release Date: June 2016

Software Release Date: June 2016



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Contents

IBM DB2	7
DB2 - Compliance Audit	8
Prerequisites for this Workflow	9
How this Workflow Works	10
How to Run this Workflow	13
Sample Scenarios	16
Parameters for DB2 - Compliance Audit	20
DB2 - Configure HADR Database	21
Prerequisites	22
How this Workflow Works	24
How to Run this Workflow	26
Parameters for DB2 - Configure HADR Database	30
DB2 - Configure Tivoli SAMP on HADR Database	31
Prerequisites	32
How this Workflow Works	33
How to Run this Workflow	36
Parameters for Configure Tivoli SAMP on HADR Database	39
DB2 - Provision Software v2	42
Prerequisites	42
How this Workflow Works	43
How to Run this Workflow	44
Parameters for DB2 - Provision Instance	47
DB2 - Provision Instance	50
Prerequisites	51
How this Workflow Works	52
How to Run this Workflow	53
Parameters for DB2 - Provision Instance	57
DB2 - Provision Database	60
Prerequisites	61
How this Workflow Works	61
How to Run this Workflow	63

Parameters for DB2 - Provision Database	70
DB2 - Patch Fixpack v2	76
Prerequisites	77
Additional requirements	78
How this Workflow Works	78
How to Run this Workflow	79
Parameters for DB2 - Patch Fixpack v2	82
DB2 - Rollback Fixpack v2	84
Prerequisites	84
Additional requirements	85
How this Workflow Works	86
How to Run this Workflow	87
Parameters for DB2 - Rollback Fixpack v2	92
DB2 - Offline HADR Fixpack Parent Flow	95
Prerequisites	96
Additional requirements	97
How this Workflow Works	97
How to Run this Workflow	99
Parameters for DB2 - Offline HADR Fixpack Parent Flow	102
DB2 - Offline HADR Apply Fixpack	103
Prerequisites	104
Additional requirements	105
How this Workflow Works	106
How to Run this Workflow	109
Parameters for DB2 - Offline HADR Apply Fixpack	113
DB2 - Offline HADR Rollback Fixpack	115
Prerequisites	116
Additional requirements	117
How this Workflow Works	118
How to Run this Workflow	121
Parameters for DB2 - Offline HADR Rollback Fixpack	125
DB2 - Rollback Helper	127
Prerequisites	128
Additional requirements	129
How this Workflow Works	129

How to Run this Workflow	133
Parameters for DB2 - Rollback Helper	137
DB2 - Fixpack Validator	139
Prerequisites	140
Additional requirements	141
How this Workflow Works	141
How to Run this Workflow	144
Parameters for DB2 - Fixpack Validator	146
DB2 - Upgrade Instance and Database	146
Prerequisites	147
How this Workflow Works	148
How to Run this Workflow	150
Parameters for DB2 - Upgrade Instance and Database	156
Send documentation feedback	161

IBM DB2

Workflow type	Workflow name
Compliance	"DB2 - Compliance Audit" on the next page
HADR	"DB2 - Configure HADR Database" on page 21
	"DB2 - Configure Tivoli SAMP on HADR Database" on page 31
	"DB2 - Offline HADR Fixpack Parent Flow" on page 95
	"DB2 - Offline HADR Apply Fixpack" on page 103
	"DB2 - Offline HADR Rollback Fixpack" on page 115
Provisioning	"DB2 - Provision Software v2" on page 42
	"DB2 - Provision Instance" on page 50
	"DB2 - Provision Database" on page 60
Patching Patching	"DB2 - Patch Fixpack v2" on page 76
	"DB2 - Rollback Fixpack v2" on page 84
Upgrading	"DB2 - Upgrade Instance and Database" on page 146

DB2 - Compliance Audit

The "DB2 - Compliance Audit" workflow enables you to audit a IBM DB2 LUW instance for compliance with the following security benchmark requirements:

- Center for Internet Security (CIS) security configuration benchmarks for DB2 Database Server 8, 9, 9.5 version 1.1.0, December 2009
- Payment Card Industry (PCI) data security standard version 2.0, October 2010
- Sarbanes-Oxley (SOX) requirements Sarbanes-Oxley Act of 2002 Section 302

The workflow performs CIS Level 1 and Level 2 auditing and identifies compliance related problems with a DB2 instance.

The workflow performs the checks included in the CIS benchmark and then maps those CIS checks to the benchmark type that you specify in the Compliance Type parameter. The audit summary email will match the Compliance Type that you specify.

Although this workflow runs at the database level, the compliance report is generated only at the DB2 instance level; hence, in such cases, if the same workflow runs for another database created on the same DB2 instance, then there will be redundant results in the instance level compliance check report.

To use this workflow in your environment, see the following information:

Topic	Information Included
"Prerequisites for this Workflow"	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works"	Information about what the workflow does, including validation checks performed, steps executed, and step descriptions
"How to Run this Workflow"	Instructions for running this workflow in your environment
"Sample Scenarios"	Examples of typical parameter values for this workflow
Parameters	List of input parameters for this workflow

Prerequisites for this Workflow

Be sure that the following prerequisites are satisfied before you run the "DB2 - Compliance Audit" workflow:

- The latest HPE DMA solution packs require the latest HPE DMA platform. To use the latest solution packs, update the HPE DMA platform. HPE DMA10.20 solution packs are supported on HPE DMA10.20 (and later).
- You have installed the Database Compliance solution pack.

The workflow, which by default runs against a DB2 database, requires the following:

- The user (typically root) has unchallenged `sudo` access and can access all required files and directories.
- The DB2 instance and database must exist on the target machine, and the user running the workflow must have sufficient privileges to run the required DB2 commands and queries against the DB2 system table on the target machine.
- Login credentials must be stored in metadata.
- Certain DB2 feature compliance checks require a DB2 license (as recommended by IBM) to ensure that the workflow runs.
- DB2 Admin Server related checks are performed only if the Admin server is found on the target DB2 machine (it may have been attached to any DB2 Instance). There cannot be more than one DB2 Admin Server on the target machine.

How this Workflow Works

This workflow performs the following actions:

- Prepares to run the workflow by gathering information about the target DB2 instance and validating parameter values.
- Audits the various configuration settings specified in the pertinent CIS, SOX, or PCI benchmark.
- Composes and sends an email containing the results of the audit.

Note: The emails are sent through the mail server configured on the HPE DMA server. You can configure the mail server in the path below:

DMA setup > Configuration > Outgoing Mail > Server.

Validation Checks Performed show

This workflow validates the following conditions:

1. Any Excluded Checks specified by the user refer to actual CIS, SOX, or PCI benchmark checks.
 - a. Any email addresses specified are valid addresses.
2. The workflow can create the temporary file that will store the compliance check results.

Steps Executed show

The "DB2 - Compliance Audit" workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure and all subsequent steps are skipped.

Steps Used by Run DB2 Compliance Audit

Workflow Step	Description
Gather Parameters for DB2 Compliance	This step sets the default values for all the DB2 configurable parameters used in the compliance audit and in subsequent workflow steps.
Gather Advanced Parameters for DB2 Compliance	This step sets the default values all the DB2 advanced configurable parameters used in the compliance audit and in subsequent workflow steps.
Prepare DB2 Call Wrapper	This step constructs the commands that will be used to execute subsequent workflow steps as either the OS administrative user (root) or the owner of the DB2

Steps Used by Run DB2 Compliance Audit, continued

Workflow Step	Description
	instance.
Validate DB2 Compliance Parameters	This step accepts input and default parameters and validates them for the DB2 database.
Check if DB2 Admin Server Exists	This step verifies that there is a DB2 Admin Server on the target machine. If the DAS name is found, then a string is returned with the name.
Discover DB2 Target Configuration	This step discovers any DB2 configurations that have been set up on the target server and uses that information to run the workflow.
Audit DB2 Installation and Patches	This step audits the recommendations in Section 1, Installation and Patches, of the Center for Internet Security (CIS) Configuration Benchmarks for DB2.
Audit DB2 Directory and File Permissions	This step audits the recommendations in Section 2.x , DB2 Directory and File Permissions, of the Center for Internet Security (CIS) Configuration Benchmarks for DB2.
Audit DB2 Configuration Parameters	This step audits the recommendations in Sec 3.x.x, DB2 Configurations, of the Center for Internet Security (CIS) Configuration Benchmarks for DB2.
Audit DB2 Label Based Access Controls	This step audits the recommendations in Section 4.x, Auditing and Logging, of the Center for Internet Security (CIS) Security Configuration Benchmarks for DB2.
Audit DB2 Database Maintenance	This step audits the recommendations in Section 5.x, Database Maintenance, of the Center for Internet Security (CIS) Configuration Benchmarks recommendations for DB2.
Audit DB2 Database Objects Security	This step audits the recommendations in Section 6.x, Securing Database Objects, of the Center for Internet Security (CIS) Security Configuration Benchmarks for DB2.
Audit DB2 Entitlements	This step audits the recommendations in Section 7.x, Entitlements, of the Center for Internet Security (CIS) Security Configuration Benchmarks for DB2.
Audit DB2 General Policy and Procedures	This step audits the recommendations in Section 8.x, General Policy and Procedures, of the Center for Internet Security (CIS) Security Configuration Benchmarks for DB2.

Steps Used by Run DB2 Compliance Audit, continued

Workflow Step	Description
Audit DB2 Utilities and Tools	This step audits the recommendations in Section 9.x, DB2 Utilities and Tools, of the Center of Internet Security (CIS) Configuration Benchmarks for DB2.
Validate Post-Compliance Checks	This step reads the temporary file that contains the results of the compliance audit and prints the audit results to the HPE DMA Console. If email addresses were specified, then it also creates a report in HTML format that will be emailed to those addresses by a later step in the workflow.
Send Compliance Email	This step sends the previously generated compliance audit report to the specified email addresses.
Delete File	This step deletes the specified file on the target server.

How to Run this Workflow

The following instructions show you how to customize and run the ["DB2 - Compliance Audit"](#) workflow in your environment.

For detailed instructions to run HPE DMA workflows—using the Oracle - Compliance Audit workflow as an example—see HPE DMA Quick Start Tutorial.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in [Parameters for DB2 - Compliance Audit](#).

Note: Before following this procedure, review the ["Prerequisites for this Workflow"](#), and ensure that all requirements are satisfied.

To use the Run DB2 Compliance Audit workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

Parameters Defined in this Step: Gather Parameters for DB2 Compliance

Parameter Name	Default Value	Required	Description
Compliance Type	CIS	optional	Type of compliance report that will be generated by the workflow. Supported types are: CIS = Center for Internet Security (CIS) Security Configuration Benchmark PCI = Payment Card Industry (PCI) Data Security Standard SOX = Sarbanes-Oxley (SOX) sections 302.2, 302.4b, 302.4c, and 302.5 requirements
DB2 Latest Fixpack Number	no default	required	The latest DB2 UDB Fixpack Number for the specific DB2 version against which the DB2 Compliance workflow is running.
Excluded Compliance Checks	no default	optional	Comma-separated list of compliance checks to exclude from the audit. For example: 1.2, 2, 3.*, 5*, 6.1.2

Parameters Defined in this Step: Gather Parameters for DB2 Compliance , continued

Parameter Name	Default Value	Required	Description
			Make sure that the checks specified here correspond with the compliance audit type (CIS, PCI, or SOX) that you are running.

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Compliance

Parameter Name	Default Value	Required	Description
Email Addresses to Receive Report	no default	optional	The email address (or multiple email addresses separated by commas without spaces) to which the compliance test results are sent.

Note: This is the minimum set of parameters required to run this workflow. You may need to expose additional parameters depending on your objectives.

- In the workflow editor, expose any additional parameters that you need. You will specify values for those parameters when you create the deployment.
- Save the changes to the workflow (click **Save** in the lower right corner).
- Create a new deployment.
- On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed. You do not need to specify values for those parameters whose default values are appropriate for your environment.
- On the Targets tab, specify one or more targets for this deployment.
- Save the deployment (click **Save** in the lower right corner).
- Run the workflow using this deployment.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Information about each compliance check is displayed in the step output on the Console (and the History page) for each of the audit steps.

A summary of the compliance audit is also displayed in the step output for the Validate Post Compliance Checks step.

To view the reports:

A compliance audit summary in HTML format is emailed to all parties on the Email Addresses to Receive Report list.

After you run this workflow, you can generate two types of compliance reports on the Reports page:

- Database Compliance Report
- Database Compliance Detail Report

To access the Database Compliance reports:

1. Go to the Reports page.
2. At the bottom of the page, specify the following settings:

For the Database Compliance Report:

- a. Select the Database Compliance report.
- b. Select the organization where your target resides.
- c. Because this report lists the latest compliance audit reports for all targets in the specified organization, you do not specify a Server, Database, or Time span.

For the Database Compliance Detail Report:

- a. Select the Database Compliance Details report.
- b. Select the organization where your target resides.
- c. Specify the Server and Instance that you selected when you created your deployment.

3. Click **Run report**.

Sample Scenarios

This topic shows you how to use various parameters to achieve the following compliance audit scenarios in your environment using the "DB2 - Compliance Audit" workflow.

Scenario 1: Perform a Partial CIS Compliance Audit and Email the Results show

In the scenario, the following checks are excluded from the audit:

- Section 7: Entitlements
- Section 9: DB2 Utilities and Tools

A summary report is sent to the three parties listed in the Email Addresses to Receive Report parameter.

Parameter Name	Example Value	Description
Compliance Type	CIS	Type of compliance report that will be generated by the workflow. Supported types are: CIS = Center for Internet Security (CIS) Security Configuration Benchmark PCI = Payment Card Industry (PCI) Data Security Standard SOX = Sarbanes-Oxley (SOX) sections 302.2, 302.4b, 302.4c, and 302.5 requirements
DB2 Latest Fixpack Number	8	The latest DB2 UDB Fixpack Number for the specific DB2 version against which the DB2 Compliance workflow is running.
Excluded Compliance Checks	7.*,9.*	Comma-separated list of compliance checks to exclude from the audit. For example: 1.2, 2, 3.*, 5*, 6.1.2 Note: Make sure that the checks specified here correspond with the compliance audit type (CIS, PCI, or SOX) that you are running.

Parameter Name	Example Value	Description
Email Addresses to Receive Report	DB2DBAdminTeam@mycompany.com, DB2DBAdminMgr@mycompany.com, CustomerSupportTeam@mycompany.com	Comma-separated list of email addresses for those individuals or groups who will receive a copy of the compliance audit report.

Note: Some of these parameters are not exposed by default in the deployment.

Be sure that the default values for all remaining input parameters are appropriate for your environment.

Scenario 2: Perform a Full PCI Compliance Audit and Email the Results show

A summary report is sent to the three parties listed in the Email Addresses to Receive Report parameter.

Parameter Name	Example Value	Description
Compliance Type	PCI	Type of compliance report that will be generated by the workflow. Supported types are: CIS = Center for Internet Security (CIS) Security Configuration Benchmark PCI = Payment Card Industry (PCI) Data Security Standard SOX = Sarbanes-Oxley (SOX) sections 302.2, 302.4b, 302.4c, and 302.5 requirements
DB2 Latest Fixpack Number	8	The latest DB2 UDB Fixpack Number for the specific DB2 version against which the DB2 Compliance workflow is running.
Email Addresses to Receive Report	DB2DBAdminTeam@mycompany.com, DB2DBAdminMgr@mycompany.com, CustomerSupportTeam@mycompany.com	Comma-separated list of email addresses for those individuals or groups who will receive a copy of the compliance audit report.

Note: Some of these parameters are not exposed by default in the deployment.

Be sure that the default values for all remaining input parameters are appropriate for your environment.

Scenario 3: Perform a Full SOX Compliance Audit and Email the Results show

A summary report is sent to the three parties listed in the Email Addresses to Receive Report parameter.

Parameter Name	Example Value	Description
Compliance Type	SOX	Type of compliance report that will be generated by the workflow. Supported types are: CIS = Center for Internet Security (CIS) Security Configuration Benchmark PCI = Payment Card Industry (PCI) Data Security Standard SOX = Sarbanes-Oxley (SOX) sections 302.2, 302.4b, 302.4c, and 302.5 requirements
DB2 Latest Fixpack Number	8	The latest DB2 UDB Fixpack Number for the specific DB2 version against which the DB2 Compliance workflow is running.
Email Addresses to Receive Report	DB2DBAdminTeam@mycompany.com, DB2DBAdminMgr@mycompany.com, CustomerSupportTeam@mycompany.com	Comma-separated list of email addresses for those individuals or groups who will receive a copy of the compliance audit report.

Note: Some of these parameters are not exposed by default in the deployment.

Be sure that the default values for all remaining input parameters are appropriate for your environment.

Scenario 4: Perform a Full CIS Compliance Audit and Display the Results on the HPE DMA Consoleshow

In the scenario, all scorable checks are performed, and the compliance audit report is displayed only on the HPE DMA Console. In this case, a summary report is not emailed. This scenario would be appropriate for initial testing.

It is not necessary to specify any input parameters in this scenario unless the DB2 inventory file is located in a non-standard directory.

Parameter Name	Example Value	Description
Compliance Type	CIS	Type of compliance report that will be generated by the workflow. Supported types are: CIS = Center for Internet Security (CIS) Security Configuration Benchmark PCI = Payment Card Industry (PCI) Data Security Standard SOX = Sarbanes-Oxley (SOX) sections 302.2, 302.4b, 302.4c, and 302.5 requirements

Note: Some of these parameters are not exposed by default in the deployment.

Be sure that the default values for all remaining input parameters are appropriate for your environment.

Parameters for DB2 - Compliance Audit

The following tables describe the required and optional input parameters for this workflow. Some of these parameters are not initially visible in a deployment. For most parameters, if you do not specify a value for a parameter, a default value is assigned

For information about which steps use which parameters, see ["How this Workflow Works"](#).

Parameters Defined in this Step: Gather Parameters for DB2 Compliance

Parameter Name	Default Value	Required	Description
Compliance Type	CIS	optional	Type of compliance report that will be generated by the workflow. Supported types are: CIS = Center for Internet Security (CIS) Security Configuration Benchmark PCI = Payment Card Industry (PCI) Data Security Standard SOX = Sarbanes-Oxley (SOX) sections 302.2, 302.4b, 302.4c, and 302.5 requirements
DB2 Latest Fixpack Number	no default	required	The latest DB2 UDB Fixpack Number for the specific DB2 version against which the DB2 Compliance workflow is running.
Excluded Checks	no default	optional	Comma-separated list of compliance checks to exclude from the audit. For example: 1.2, 2, 3.*, 5*, 6.1.2 Note: Make sure that the checks specified here correspond with the compliance audit type (CIS, PCI, or SOX) that you are running.

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Compliance

Parameter Name	Default Value	Required	Description
Email Addresses to Receive Report	no default	optional	The email address (or multiple email addresses separated by commas without spaces) to which the compliance test results are sent.
Latest Patch	no default	optional	The latest DB2 UDB Fixpack Number for the specific DB2 version against which the DB2 Compliance workflow is running.

DB2 - Configure HADR Database

This workflow configures IBM DB2 High Availability Disaster Recovery (HADR) on the existing DB2 setup.

This workflow configures DB2 database(s) for IBM DB2 LUW (Linux, UNIX, and Windows) on the target source and destination servers where this workflow is deployed. It currently supports DB2 versions 10.1 and 10.5 on Red Hat Linux and AIX servers. This is an instance level workflow. It validates that DB2 installations exist on primary node and standby node and that they have the prerequisites. It configures the database with the HADR feature. This workflow is supported on Red Hat Enterprise Linux and AIX operating system platforms.

This workflow supports the following:

1. To generate the default primary and standby HADR database configuration and to configure HADR.
2. To deploy a user specified golden template of the DB2 HADR database configuration on the primary and to use a default standby configuration for HADR.

3. To deploy a user specified golden template of the DB2 HADR database configuration on the standby and to use a default primary configuration for HADR.
4. To use a user specified golden template of the primary and standby HADR database configuration for HADR.

To use this workflow in your environment, see the following information:

Topic	Information Included
"Prerequisites" below	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on page 24	Information about what the workflow does, including validation checks performed, steps executed, and step descriptions
"How to Run this Workflow" on page 26	Instructions for running this workflow in your environment
"Parameters for DB2 - Configure HADR Database" on page 30	List of input parameters for this workflow

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- SSH service must be turned on for both primary and standby host computers.
- The source and destination host computer is configured with SSH password-less login across the nodes (primary to standby and vice versa).
- A TCP/IP interface must be available between the HADR host computers, and a high-speed, high-capacity network is recommended.
- Use identical host computers for the HADR primary and standby databases. That is, they should be from the same vendor and have the same architecture.
- Both the primary and standby host computers must run one of the following operating systems (that is supported by IBM DB2 10.1 or 10.5 and HPE DMA):
 - Linux
 - AIX

See the HPE DMA *Support Matrix* for specific operating system versions, available at: <https://softwaresupport.hpe.com/>.

- The operating system on the primary and standby host computer must be the same version, including patches.
- DB2 software must be provisioned on both the primary and standby host computer.

Tip: You can use DB2 - Provision Software workflow to accomplish this.

- The DB2 instance must be provisioned on both primary and standby host computer.

Tip: You can use DB2 - Provision Instance workflow to accomplish this.

- The DB2 database must be created on the instance at the primary host computer on which the workflow will be deployed.

Tip: You can use DB2 - Provision Database workflow to accomplish this.

- DB2 instance on primary host computer must be up and running on both the primary and standby host computer.
- Installation media:

The DB2 server installation software binary file from IBM.

Installation software binary file must be available locally or available for download from the software repository.

- Storage:

4-6 GB to provision the DB2 software.

1 GB for each DB2 instance.

1 GB for each DB2 database (more may be required for your configuration).

At least 1 GB for Catalog tablespace.

If automatic storage is on, 1 GB on the default directory where the default tablespace will be created.

- Unchallenged ability to become the DB2 database user.
- The operating system kernel parameters and shared memory is properly configured.
- License for HPE DMA.
- License for DB2 Database version 9.5, 9.7, 10.1, or 10.5.

Note: You have 90 days before you are required to purchase a DB2 license.

- The following workflow requirements:

Workflow	Requirements
DB2 - Configure HADR Database	The sudo package is installed on the target servers. The target servers have the <code>gunzip</code> and <code>tar</code> utilities in the environment path.

Refer to the [IBM Documentation](#) for the following:

- Complete installation and infrastructure requirements for IBM DB2.
- Acceptable types and range of values when using HPE DMA advanced parameters to configure IBM DB2 HADR settings.

How this Workflow Works

This workflow performs the following actions:

Configures IBM DB2 HADR on the existing DB2 setup.

Steps Executed

The DB2 - Configure HADR Database workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure and all subsequent steps are skipped.

Steps Used by DB2 - Configure HADR Database

Workflow Step	Description
Gather DB2 Source and Destination Instances	This step gathers data on DB2 source and destination HADR instances.
Gather Parameters for Configure DB2 HADR	This step accepts mandatory parameters for the workflow.
Gather Advanced Parameters for Configure DB2 HADR	This step accepts optional parameters for the workflow.
Validate DB2	This step prepares the call wrappers (server, instance) level as needed to

Steps Used by DB2 - Configure HADR Database , continued

Workflow Step	Description
Compliance Parameters	become the owner of the DB2 Server or Instance owner user and perform the appropriate task as necessary.
Validate Parameters for Configure DB2 HADR On Primary Node	This step validates all the input parameter values received in the gather and advanced gather input parameter steps, validate the DB2 target and make sure it meets all the necessary criteria to setup the HADR Database on the given targets.
Download Software	This step automates the transfer of files from the HPE SA Software Library to individual managed servers for use in downstream workflow steps. Verifies checksum of each file transferred.
Configure DB2 HADR Network Service Port On Primary Node	This step checks for unused DB2 HADR port and service on primary cluster node and sets it based on user input values.
Configure DB2 HADR Database On Primary Node	This step prepares the database configuration and deploys on the primary cluster node instance database to enable HADR feature.
Backup DB2 HADR Database On Primary Node	This step sets up the database on archive log mode and takes backup of the database.
Stop DB2 Instance	This step stops the DB2 HADR instance.
Restart DB2 Instance	This step restarts the DB2 HADR instance.
Backup Online DB2 HADR Database On Primary Node	This step takes the online backup for the database at primary cluster node instance database.
Transfer DB2 HADR Database Backup To Standby Node	This step transfers the online database backup file from primary cluster node to standby cluster node.
Configure DB2 HADR Service Network Port On Standby Node	This step checks for unused DB2 HADR port and service on standby cluster node and sets it based on user input values.
Cleanup On Failure For Standby Node	This step checks for unused DB2 HADR port and service on standby cluster node and sets it based on user input values.
Restore DB2	This step restores online database backup taken at the primary cluster node

Steps Used by DB2 - Configure HADR Database , continued

Workflow Step	Description
HADR Database On Standby Node	and brings up the database.
Configure DB2 HADR Database On Standby Node	This step prepares the database configuration and deploys on the standby cluster node instance database to enable HADR feature.
Startup DB2 HADR Service on Standby Node	This step runs the DB2 command to activate/startup the HADR service on database.
Cleanup On Failure For Primary Node	This step cleans up the HADR service port and database configuration files from primary cluster node machine.
Verify DB2 HADR Service On Primary Node	This step verifies if the HADR service is up and running on primary node of HADR database.
Discover DB2 Databases	This step audits the server's physical environment looking for DB2 databases.

Results Verification

- The workflow uses the IBM utility “db2pd -d <database name> -hadr” and runs it on the primary and standby nodes. It verifies the results by parsing the resultset and looks up for the specific parameter values to confirm that the HADR setup is complete and it is up and running.
- Run the "db2 “takeover hadr on database <HADR Database Name>” command on the standby node machine as an instance user. This performs the failover test and verifies that the takeover was performed and it switches the standby to primary and the primary to standby database.
- The workflow runs Discovery and updates the instance(s) and databases(s) information in DMA database for future reference.

How to Run this Workflow

The following instructions show you how to customize and run the DB2 - Configure HADR Database workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows, see *HPE DMA Quick Start Tutorial*.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the

deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in ["Parameters for DB2 - Configure HADR Database" on page 30](#).

Note: Before following this procedure, review the ["Prerequisites" on page 22](#), and ensure that all requirements are satisfied.

To use the DB2 - Configure HADR Database workflow:

1. Create a deployable copy of the workflow (see "Create a Deployable Workflow" in *HPE DMA Quick Start Tutorial*)

- a. Determine the values that you will specify for the following parameters.

Parameters Defined in this Step: Gather DB2 Source and Destination Instances

Parameter Name	Example Value	Description
DB2 Destination HADR Instance	hadr105 [aixom02.mycompany.com]	The standby node instance name of the remote server. Administration tools, such as the DB2 Control Center, use this parameter to contact the remote server. In the bridge execution workflow, this instance will be used at the run time to run the specific steps configured to run on the standby instance node. The value will be set at the run time.
DB2 Source HADR Instance	hadr105 [aixom01.mycompany.com]	The primary node instance name of the local server. Administration tools, such as the DB2 Control Center, use this parameter to contact the local server. In the bridge execution workflow, this instance will be used at the run time to run the specific steps configured to run on the primary instance node. The value will be set at the run time.

Parameters Defined in this Step: Gather Parameters for Configure DB2 HADR

Parameter Name	Example Value	Description
DB2 HADR Database Name	DB2_HADR	The database name for which the High Availability Disaster Recovery will be configured. The database name must be available on the primary instance node.
DB2 HADR Local Service Name	DB2_HADR_SERVICE_P1	This parameter specifies the TCP service name for which the local high availability disaster recovery (HADR) process accepts.
DB2 HADR Port Number	58234	This parameter specifies the TCP service port number for which the high availability disaster recovery (HADR) process accepts connections. The same port will be used in the primary and standby node for HADR communication.
DB2	hadr105	This parameter specifies the instance name of the

Parameters Defined in this Step: Gather Parameters for Configure DB2 HADR, continued

Parameter Name	Example Value	Description
HADR Remote Instance Name		remote server. Administration tools, such as the DB2 Control Center, use this parameter to contact the remote server. High availability disaster recovery (HADR) also checks whether a remote database requesting a connection belongs to the declared remote instance.
DB2 HADR Remote Service Name	DB2_HADR_SERVICE_P1	This parameter specifies the TCP service name for which the remote high availability disaster recovery (HADR) process accepts connections.
DB2 HADR Standby Host Name	aixom2.mycompany.com	This parameter specifies the TCP/IP host name or IP address of the remote high availability disaster recovery (HADR) database server.

2. In the workflow editor, expose any additional parameters that you need. You will specify values for those parameters when you create the deployment or at runtime.
3. Save the changes to the workflow (click **Save** in the lower right corner).
4. Create a new deployment. See "Create a Deployment" in *HPE DMA Quick Start Tutorial* for instructions.
5. On the Parameters tab, specify values (or set the type to Runtime Value) for the required parameters listed in step 2 and any additional parameters that you have exposed. You do not need to specify values for those parameters whose default values are appropriate for your environment.
6. On the Targets tab, specify one or more targets for this deployment.
7. Save the deployment (click **Save** in the lower right corner).
8. Run the workflow using this deployment, specifying any runtime parameters. See "Run Your Workflow" in *HPE DMA Quick Start Tutorial* for instructions.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Parameters for DB2 - Configure HADR Database

The following tables describe the required and optional input parameters for this workflow.

Parameters Defined in this Step: Gather DB2 Source and Destination Instances

Parameter Name	Example Value	Description
DB2 Destination HADR Instance	hadr105 [aixom02.mycompany.com]	Required: The standby node instance name of the remote server. Administration tools, such as the DB2 Control Center, use this parameter to contact the remote server. In the bridge execution workflow, this instance will be used at the run time to run the specific steps configured to run on the standby instance node. The value will be set at the run time.
DB2 Source HADR Instance	hadr105 [aixom01.mycompany.com]	Required: The primary node instance name of the local server. Administration tools, such as the DB2 Control Center, use this parameter to contact the local server. In the bridge execution workflow, this instance will be used at the run time to run the specific steps configured to run on the primary instance node. The value will be set at the run time.

Parameters Defined in this Step: Gather Parameters for Configure DB2 HADR

Parameter Name	Example Value	Description
DB2 HADR Database Name	DB2_HADR	Required: The database name for which the High Availability Disaster Recovery will be configured. The database name must be available on the primary instance node.
DB2 HADR Local Service Name	DB2_HADR_SERVICE_P1	Required: This parameter specifies the TCP service name for which the local high availability disaster recovery (HADR) process accepts connections.
DB2 HADR Port Number	58234	Required: This parameter specifies the TCP service port number for which the high availability disaster recovery (HADR) process accepts connections. The same port will be used in the primary and standby node for HADR communication.

Parameters Defined in this Step: Gather Parameters for Configure DB2 HADR, continued

Parameter Name	Example Value	Description
DB2 HADR Remote Instance Name	hadr105	Required: This parameter specifies the instance name of the remote server. Administration tools, such as the DB2 Control Center, use this parameter to contact the remote server. High availability disaster recovery (HADR) also checks whether a remote database requesting a connection belongs to the declared remote instance.
DB2 HADR Remote Service Name	DB2_HADR_SERVICE_P1	Required: This parameter specifies the TCP service name for which the remote high availability disaster recovery (HADR) process accepts connections.
DB2 HADR Standby Host Name	aixom2.mycompany.com	Required: This parameter specifies the TCP/IP host name or IP address of the remote high availability disaster recovery (HADR) database server.

DB2 - Configure Tivoli SAMP on HADR Database

This workflow configures IBM DB2 High Availability Disaster Recovery (HADR) with Tivoli System Automation for Multiplatforms (TSAMP) using db2haicu utility.

This workflow configures DB2 database(s) for IBM DB2 LUW (Linux, UNIX, and Windows) on the target source and destination servers with TSAMP where this workflow is deployed. It currently supports DB2 versions 10.1 and 10.5 on Red Hat Linux and AIX servers. This is an instance level workflow. It validates DB2 installation exist on primary and standby cluster nodes. It configures the HADR database with TSAMP. This workflow supports cluster network configuration.

This workflow supports the following:

1. To generate the default primary and standby TSAMP XML configuration files and configure HADR database with TSAMP.

2. To deploy a user specified golden template of the DB2 HADR TSAMP XML configuration file on primary and to use a default standby configuration for TSAMP.
3. To deploy a user specified golden template of the DB2 HADR TSAMP XML configuration file on standby and to use a default primary configuration for TSAMP.
4. To use a user specified golden template of the primary and standby TSAMP XML configuration files and configure TSAMP on HADR Database.

To use this workflow in your environment, see the following information:

Topic	Information Included
"Prerequisites" below	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on the next page	Information about what the workflow does, including validation checks performed, steps executed, and step descriptions
"How to Run this Workflow" on page 36	Instructions for running this workflow in your environment
"Parameters for Configure Tivoli SAMP on HADR Database" on page 39	List of input parameters for this workflow

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- SSH service must be turned on for both primary and standby host computers.
- The source and destination host computer is configured with SSH password-less login across the nodes (primary to standby and vice versa).
- DB2 software must be provisioned on both the primary and standby host computer.

Tip: You can use DB2 - Provision Software workflow to accomplish this.

- The DB2 instance must be provisioned on both primary and standby host computer.

Tip: You can use DB2 - Provision Instance workflow to accomplish this.

- The DB2 database must be available on primary and standby instance cluster node with primary and standby HADR configuration state.
- DB2 instance on primary host computer must be up and running on both the primary and standby host computer.
- Tivoli System Automation for Multiplatforms (TSAMP) must be installed and on both primary and standby cluster nodes.
- Valid license to activate the TSAMP on primary and standby cluster nodes.
- Guidelines from IBM to provide the correct input parameter values for the steps Gather Parameters For Configure Tivoli SAMP on HADR Database and Gather Advanced Parameters For Configure Tivoli SAMP on HADR Database in order to prepare correct XML file for TSAMP.
- The following workflow requirements:

Workflow	Requirements
DB2 - Configure Tivoli SAMP on HADR Database	<p>The sudo package is installed on the target servers.</p> <p>The target servers have the gunzip and tar utilities in the environment path.</p>

Refer to the [IBM Documentation](#) for the following:

- Complete installation and infrastructure requirements for IBM DB2.
- Acceptable types and range of values when using HPE DMA advanced parameters to configure IBM DB2 HADR settings.

How this Workflow Works

This workflow performs the following actions:

Configures IBM DB2 HADR with Tivoli System Automation for Multiplatforms (TSAMP) using db2haicu utility.

Steps Executed

The DB2 - Configure Tivoli SAMP On HADR Database workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure and all subsequent steps are skipped.

Steps Used by DB2 - Configure Tivoli SAMP On HADR Database

Workflow Step	Description
Gather DB2 Source and Destination Instances	This step gathers data on DB2 source and destination HADR instances.
Gather Parameters For Configure Tivoli SAMP on HADR Database	This step accepts mandatory parameters for the workflow.
Gather Advanced Parameters For Configure Tivoli SAMP on HADR Database	This step accepts optional parameters for the workflow.
Validate Parameters For Configure Tivoli SAMP On Primary Node	This step validates all the input parameter values received in the gather and advanced gather input parameter steps, validate the DB2 target and make sure it meets all the necessary criteria to setup the Tivoli SAMP on the given targets.
Validate Parameters For Configure Tivoli SAMP On Standby Node	This step validates all the input parameter values received in the gather and advanced gather input parameter steps, validate the DB2 target and make sure it meets all the necessary criteria to setup the Tivoli SAMP on the given targets.
Download Software	This step automates the transfer of files from the HPE SA Software Library to individual managed servers for use in downstream workflow steps. Verifies checksum of each file transferred.
Setup ACR On Primary Cluster Node	This step configures the HADR database to activate for automatic client rerouting feature in the event of failover.
Setup Peer Cluster Domain On Primary Node	This step configures the hosts to activate with Reliable Scalable Cluster Technology for each node.
Cleanup On Failure For Tivoli SAMP Primary Node	This step deconfigures the TSA if configured partially with some failure or in the event of any step failure. It also clears up all the temporary files that is being generated during the Tivoli SAMP setup.
Setup ACR On Standby Cluster Node	This step configures the HADR database to activate for automatic client rerouting feature in the event of failover.
Cleanup On Failure For Tivoli SAMP Standby Node	This step deconfigures the TSA if configured partially with some failure or in the event of any step failure. It also clears up all the temporary files that is being generated during the Tivoli SAMP setup.
Setup Peer Cluster Domain On Standby Node	This step configures the hosts to activate with Reliable Scalable Cluster Technology for each node.

Steps Used by DB2 - Configure Tivoli SAMP On HADR Database , continued

Workflow Step	Description
Configure HA Instance On Standby Node	This step prepares the XML configuration file based on user input parameters and runs it using db2haicu IBM utility to configure the Tivoli SAMP with cluster domain for standby cluster node.
Verify Cluster Resources On Standby Node	This step verifies if the target instance and database is configured for HADR and set with automatic failover in the event of failure. It checks for all the possible resources and prints those out on the steplog for the user information.
Configure HA Instance On Primary Node	This step prepares the XML configuration file based on user input parameters and runs it using db2haicu IBM utility to configure the Tivoli SAMP with cluster domain for primary cluster node.
Cleanup On Failure For Tivoli SAMP Primary Node	This step deconfigures the TSA if configured partially with some failure or in the event of any step failure. It also clears up all the temporary files that is being generated during the Tivoli SAMP setup.
Verify Cluster Resources On Primary Node	This step verifies if the target instance and database is configured for HADR and set with automatic failover in the event of failure. It checks for all the possible resources and prints those out on the steplog for the user information.
Cleanup On Failure For Tivoli SAMP Standby Node	This step deconfigures the TSA if configured partially with some failure or in the event of any step failure. It also clears up all the temporary files that is being generated during the Tivoli SAMP setup.

Results Verification

- The workflow uses the IBM utility “db2pd -d <database name>” and runs it on the primary and standby nodes. It verifies the results by parsing the resultset and looks up for the specific parameter values to confirm that the HADR setup is complete and TSAMP is setup. It also runs the command “db2pd -ha” to identify the cluster resources configured for HADR.
- The workflow uses the IBM utility “lssam” to find out the “online” and “offline” status of the primary or standby nodes.
- The user can manually run the "db2 takeover hadr on database <HADR Database Name>" command on the standby node machine as an instance user. This performs the failover test and verifies that the takeover was performed and it switches the standby to primary and the primary to standby database.
- The user can run the “db2_kill” command on primary cluster node machine as an instance user and verify the status of cluster nodes after few mins to make sure failover is performed successfully.

How to Run this Workflow

The following instructions show you how to customize and run the DB2 - Configure Tivoli SAMP On HADR Database workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows, see *HPE DMA Quick Start Tutorial*.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in ["Parameters for Configure Tivoli SAMP on HADR Database" on page 39](#).

Note: Before following this procedure, review the ["Prerequisites" on page 32](#), and ensure that all requirements are satisfied.

To use the DB2 - Configure Tivoli SAMP On HADR Database workflow:

1. Create a deployable copy of the workflow (see "Create a Deployable Workflow" in *HPE DMA Quick Start Tutorial*)

- a. Determine the values that you will specify for the following parameters.

Parameters Defined in this Step: Gather DB2 Source and Destination Instances

Parameter Name	Example Value	Description
DB2 Destination HADR Instance	hadr105 [aixom02.mycompany.com]	The standby node instance name of the remote server. Administration tools, such as the DB2 Control Center, use this parameter to contact the remote server. In the bridge execution workflow, this instance will be used at the run time to run the specific steps configured to run on the standby instance node. The value will be set at the run time.
DB2 Source HADR Instance	hadr105 [aixom01.mycompany.com]	The primary node instance name of the local server. Administration tools, such as the DB2 Control Center, use this parameter to contact the local server. In the bridge execution workflow, this instance will be used at the run time to run the specific steps configured to run on the primary instance node. The value will be set at the run time.

Gather Parameters For Configure Tivoli SAMP on HADR Database

Parameter Name	Example Value	Description
Database Name	DB2HADR	The database name for which the High Availability Disaster Recovery will be configured. The database must be available on the primary and standby instance cluster nodes.
IP Of Primary Cluster Node	16..0.0.1	Internet Protocol Address (IP address) for primary cluster node machine where the HADR Instance and database is configured.
IP Of Standby Cluster Node	16.0.0.2	Internet Protocol Address (IP address) for primary cluster node machine where the HADR Instance and database is configured.
Local Instance	DB2_105HADR_SVC1	This parameter specifies the instance name of

Gather Parameters For Configure Tivoli SAMP on HADR Database, continued

Parameter Name	Example Value	Description
Name		the local cluster node. Administration tools, such as the DB2 Control Center, use this parameter to contact the local server. High availability disaster recovery (HADR) also checks whether a local database requesting a connection belongs to the declared local instance. Default, it is configured to use the instance name on which this workflow is deployed.)
Local Instance Port Number	51000	DB2 connection port number for the local instance on primary cluster node where HADR database is mounted.
Primary Cluster Node Name	aixom01.mycompany.com	This parameter specifies the local host (primary cluster node name) name for high availability disaster recovery (HADR) TCP communication.
Quorum Device Name	16.0.1.1	A network quorum is an IP address that can be pinged from both the primary and the standby nodes. In the event of a site failure, the quorum decides which node serves as the active node and which node goes offline. When you are choosing the network quorum, ensure that the IP remains active all the time. The DNS server IP is always a good choice for the network quorum.
Remote Instance Name	hadr105	This parameter specifies the instance name of the remote cluster node (server). Administration tools, such as the DB2 Control Center, use this parameter to contact the remote server. High availability disaster recovery (HADR) also checks whether a remote database requesting a connection belongs to the declared remote instance.
Remote Instance Port Number	51000	DB2 connection port number for the remote instance on standby cluster node where HADR database is mounted.
Standby Cluster	aixom02.mycompany.com	This parameter specifies the remote host (standby cluster node name) name for high

Gather Parameters For Configure Tivoli SAMP on HADR Database, continued

Parameter Name	Example Value	Description
Node Name		availability disaster recovery (HADR) TCP communication.
Subnetmask Of Primary Cluster	255.255.240.0	Subnet Mask Address(IP address) for primary cluster node machine where the HADR Instance and database is configured.
Subnetmask Of Standby Cluster	255.255.240.0	Subnet Mask Address(IP address) for standby cluster node machine where the HADR Instance and database is configured.

2. In the workflow editor, expose any additional parameters that you need. You will specify values for those parameters when you create the deployment or at runtime.
3. Save the changes to the workflow (click **Save** in the lower right corner).
4. Create a new deployment. See "Create a Deployment" in *HPE DMA Quick Start Tutorial* for instructions.
5. On the Parameters tab, specify values (or set the type to Runtime Value) for the required parameters listed in step 2 and any additional parameters that you have exposed. You do not need to specify values for those parameters whose default values are appropriate for your environment.
6. On the Targets tab, specify one or more targets for this deployment.
7. Save the deployment (click **Save** in the lower right corner).
8. Run the workflow using this deployment, specifying any runtime parameters. See "Run Your Workflow" in *(HPE DMA Quick Start Tutorial* for instructions.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Parameters for Configure Tivoli SAMP on HADR Database

The following tables describe the required and optional input parameters for this workflow.

Parameters Defined in this Step: Gather DB2 Source and Destination Instances

Parameter Name	Example Value	Description
DB2 Destination HADR Instance	hadr105 [aixom02.mycompany.com]	Required: The standby node instance name of the remote server. Administration tools, such as the DB2 Control Center, use this parameter to contact the remote server. In the bridge execution workflow, this instance will be used at the run time to run the specific steps configured to run on the standby instance node. The value will be set at the run time.
DB2 Source HADR Instance	hadr105 [aixom01.mycompany.com]	Required: The primary node instance name of the local server. Administration tools, such as the DB2 Control Center, use this parameter to contact the local server. In the bridge execution workflow, this instance will be used at the run time to run the specific steps configured to run on the primary instance node. The value will be set at the run time.

Gather Parameters For Configure Tivoli SAMP on HADR Database

Parameter Name	Example Value	Description
Database Name	DB2HADR	Required: The database name for which the High Availability Disaster Recovery will be configured. The database must be available on the primary and standby instance cluster nodes.
IP Of Primary Cluster Node	16..0.0.1	Required: Internet Protocol Address (IP address) for primary cluster node machine where the HADR Instance and database is configured.
IP Of Standby Cluster Node	16.0.0.2	Required: Internet Protocol Address (IP address) for primary cluster node machine where the HADR Instance and database is configured.
Local Instance Name	DB2_105HADR_SVC1	Required: This parameter specifies the instance name of the local cluster node. Administration tools, such as the DB2 Control Center, use this parameter to contact the local server. High availability disaster recovery (HADR) also checks whether a local database requesting a

Gather Parameters For Configure Tivoli SAMP on HADR Database, continued

Parameter Name	Example Value	Description
		connection belongs to the declared local instance. Default, it is configured to use the instance name on which this workflow is deployed.)
Local Instance Port Number	51000	Required: DB2 connection port number for the local instance on primary cluster node where HADR database is mounted.
Primary Cluster Node Name	aixom01.mycompany.com	Required: This parameter specifies the local host (primary cluster node name) name for high availability disaster recovery (HADR) TCP communication.
Quorum Device Name	16.0.1.1	Required: A network quorum is an IP address that can be pinged from both the primary and the standby nodes. In the event of a site failure, the quorum decides which node serves as the active node and which node goes offline. When you are choosing the network quorum, ensure that the IP remains active all the time. The DNS server IP is always a good choice for the network quorum.
Remote Instance Name	hadr105	Required: This parameter specifies the instance name of the remote cluster node (server). Administration tools, such as the DB2 Control Center, use this parameter to contact the remote server. High availability disaster recovery (HADR) also checks whether a remote database requesting a connection belongs to the declared remote instance.
Remote Instance Port Number	51000	Required: DB2 connection port number for the remote instance on standby cluster node where HADR database is mounted.
Standby Cluster Node Name	aixom02.mycompany.com	Required: This parameter specifies the remote host(standby cluster node name) name for high availability disaster recovery (HADR) TCP communication.
Subnetmask Of Primary Cluster	255.255.240.0	Required: Subnet Mask Address(IP address) for primary cluster node machine where the HADR Instance and database is configured.

Gather Parameters For Configure Tivoli SAMP on HADR Database, continued

Parameter Name	Example Value	Description
Subnetmask Of Standby Cluster	255.255.240.0	Required: Subnet Mask Address(IP address) for standby cluster node machine where the HADR Instance and database is configured.

DB2 - Provision Software v2

This workflow installs IBM DB2 LUW (Linux, Unix, Windows) software on the target where this workflow is deployed. It currently supports the DB2 Versions 9.5, 9.7, 10.1, 10.5 on Red Hat Linux and AIX servers. It will provision the software at the location specified by required input parameters in the workflow deployment.

This workflow installs IBM DB2 Software at the specified location on the target server using silent install method. To use this workflow, you must provide the DB2 software Staging Directory either on the server or in a location where it can be downloaded by the workflow. This workflow will perform a typical installation using default values for IBM DB2 response file setup parameters. The workflow will create the response file based on specified default values.

To use this workflow in your environment, see the following information:

Topic	Information Included
"Prerequisites" below	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on the next page	Information about what the workflow does, including validation checks performed, steps executed, and step descriptions
"How to Run this Workflow" on page 44	Instructions for running this workflow in your environment
Parameters for DB2 - Provision Software v2	List of input parameters for this workflow

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- The workflow must have the unchallenged ability to become the OS administrator user (typically root on UNIX systems).
- LIC_AGREEMENT parameter value for DB2 License is defaulted and set as ACCEPT. After installing the software binaries on your target machine, the license has to be activated for the instances you are going to create.
- The workflow must have access to the IBM DB2 installation binaries, either on a network drive, on a DVD (which must be in the DVD drive) or from SA repository to deploy the software binaries.
- The following prerequisites must be satisfied before you run this workflow:
 - The infrastructure required for provisioning should be in place.
 - The operating system platform is certified for the pertinent DB2 specific version.
 - The operating system kernel parameters and shared memory is properly configured.
- There should be adequate available disk space on the target servers.
- On Linux or AIX platforms, the sudo package must be installed on the target servers.
- The target servers must have the gunzip and tar utilities in the environment path.

Refer to the [IBM Documentation](#) for other DB2 provisioning requirements.

How this Workflow Works

This workflow performs the following actions:

Installs IBM DB2 Software at the specified location on the target server using silent install method.

Steps Executed

The DB2 - Provision Software v2 workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure and all subsequent steps are skipped.

Steps Used by DB2 - Provision Software v2

Workflow Step	Description
Gather Parameters V2 for Provision DB2 Software	This step sets all the DB2 advanced configurable parameters for DB2 Provision Software that are used in subsequent workflow steps.

Steps Used by DB2 - Provision Software v2 , continued

Workflow Step	Description
Gather Advanced Parameters for Provision DB2 Software V3	This step sets all the DB2 advanced configurable parameters for DB2 Provision Software that are used in subsequent workflow steps.
Validate Provision DB2 Software V2	This step validates the disk space requirements, OS virtual memory, kernel parameters setting and appropriate OS version the specific DB2 software is supported on.
Stage DB2 Software Archive	This step validates the input staging path and binary archive file to unpack(unzip) to install the software. Depending upon the file extensions(.tar, .gz),, it chooses the right library to unzip the software binary file.
Download Software	This step automates the transfer of files from the HPE SA Software Library to individual managed servers for use in downstream workflow steps. Verifies checksum of each file transferred.
Install DB2 Software V3	This step runs db2prereqcheck utility provided by IBM to ensure that the target meets all the pre-requisite before installing software. This step generates response file based on DB2 input binary version found and use it along with db2_setup utility to install DB2 software.
Verify Provision DB2 Software V3	This step runs verifies the installation location by checking the "db2" utility executable presents. It also verifies the installation location directory size and make sure DB2 is installed. It looks for the error file if any generated during installation to make sure installation has not been failed. It executes the 'db2val' to identify if DB2 is successfully installed on the target machine.
Clean Failed DB2 Software Install	This step cleans up the archive, staging, and installation location in case of DB2 provisioning fails.
Cleanup Downloaded Files	This step removes all downloaded files and archives.

How to Run this Workflow

The following instructions show you how to customize and run the DB2 - Provision Software v2 workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows, see *HPE DMA Quick Start Tutorial*.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in [Parameters for DB2 - Provision Software v2](#).

Note: Before following this procedure, review the ["Prerequisites" on page 42](#), and ensure that all requirements are satisfied.

To use the DB2 - Provision Software workflow:

1. Create a deployable copy of the workflow (see "Create a Deployable Workflow" in *HPE DMA Quick Start Tutorial*)
 - a. Determine the values that you will specify for the following parameters.

The following tables describe the required and optional input parameters for this workflow.

Parameters Defined in this Step: Gather Parameters V2 for Provision DB2 Software

Parameter Name	Example Value	Description
DB2 Installation Location	/opt/ibm/db2/V10.5	Fully-qualified path where DB2 will be installed.
DB2 Software Binaries	v10.5_aix64_server_t.tar.gz	Name of the DB2 installer archive file. Obtained from IBM. If the file is not found in Staging Directory (the default is /tmp/db2_stage), it will be downloaded from the software repository.

Parameters Defined in this Step: Gather Advanced Parameters for Provision DB2 Software V3

Parameter Name	Example Value	Description
Clean on Failure	Yes	Specifies whether to clean up on workflow failure. If set to 'Yes', the workflow will clean up the downloaded files, installation location and the staging location. Valid values are 'Yes' and 'No'.

Parameters Defined in this Step: Gather Advanced Parameters for Provision DB2 Software V3, continued

Parameter Name	Example Value	Description
		The default value is 'Yes'
Clean on Success	Yes	Specifies whether to clean up on workflow success. If set to 'Yes', the workflow will clean up the downloaded files. The default value is 'Yes'.
DB2 Installation Type	TYPICAL	The type of DB2 installation supported by IBM. It can be either COMPACT, TYPICAL, or CUSTOM. The default value is 'TYPICAL'. If CUSTOM is set, provide the DB2 installation response file with the custom parameter values.
DB2 Product Edition	DB2_SERVER_EDITION	The edition of the product that you want to install. For example: DB2 Workgroup Edition, DB2 Enterprise Edition, etc. The default value is set to 'DB2_SERVER_EDITION' for DB2 version 10.5. Use 'ENTERPRISE_SERVER_EDITION' for DB2 versions 9.7 and 10.1.
DB2 Product Installation Language	EN	The language(s) for installing your product. If no language option is specified, English language (EN) will be installed by default.
DB2 Product License	ACCEPT	Indicate acceptance of license agreement as specified in the file in "db2/license" directory on the installation media. Default value is 'ACCEPT'.
DB2 Software User Resource File	Defaultv97.rsp Defaultv101.rsp	User specified resource file to be used during DB2 software installation.
Install Tivoli System Automation Multiplatforms	NO	Installs IBM Tivoli System Automation for Multiplatforms (SAMP) with required components, if value is set to Yes. This parameter is supported only for DB2 versions 9.5 and 9.7. Default value is NO.

Parameters Defined in this Step: Gather Advanced Parameters for Provision DB2 Software V3, continued

Parameter Name	Example Value	Description
Staging Directory	/tmp/db2_stage	Fully-qualified path of the directory where the DB2 installer will be extracted from archive. Will be cleaned up at end of workflow execution. Default: If no input is provided /tmp/db2_stage will be created.

- In the workflow editor, expose any additional parameters that you need. You will specify values for those parameters when you create the deployment or at runtime.
- Save the changes to the workflow (click **Save** in the lower right corner).
- Create a new deployment. See "Create a Deployment" in *HPE DMA Quick Start Tutorial* for instructions.
- On the Parameters tab, specify values (or set the type to Runtime Value) for the required parameters listed in step 2 and any additional parameters that you have exposed. You do not need to specify values for those parameters whose default values are appropriate for your environment.
- On the Targets tab, specify one or more targets for this deployment.
- Save the deployment (click **Save** in the lower right corner).
- Run the workflow using this deployment, specifying any runtime parameters. See "Run Your Workflow" in *(HPE DMA Quick Start Tutorial)* for instructions.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Parameters for DB2 - Provision Instance

The following tables describe the required and optional input parameters for this workflow.

Parameters Defined in this Step: Gather Parameters V2 for DB2 Provision Instance

Parameter Name	Required	Example Value	Description
DB2 Installation Location	required	/opt/ibm/db2/V10.5 <i>Use the same value</i>	Fully-qualified path of the DB2 installation where the new instance will be created.

Parameters Defined in this Step: Gather Parameters V2 for DB2 Provision Instance, continued

Parameter Name	Required	Example Value	Description
		<i>specified for the DB2 Installation Location parameter for the DB2 - Provision Software deployment.</i>	
DMA Password	required	●●●	Password for the HPE DMA user.
DMA URL	required	DMA.Url	URL of the HPE DMA server.
DMA User	required	dmauser	The HPE DMA user name.
Trust SSL Certificates	required	True	If "True", this step will trust any SSL used to connect to the DMA web service.

Parameters Defined in this Step: Gather Advanced Parameters V2 for DB2 Provision Instance

Parameter Name	Required	Example Value	Description
Autostart Instance	optional	yes	Enables or disables the autostart of an instance after each time system restarts. YES or NO option.
DB2 Connection Port	optional	50000	DB2 connection port number for the new instance. Not required if instance type is client.
DB2 Connection Protocol	optional	?	Communication protocol for the DB2 connection. It should always be tcp/ip
DB2 Connection Service Comment	optional	?	Comment for the DB2 connection service. This will be added when the service will be added in to the /etc/services file for non client instance type
DB2 Fenced User	optional	fusr105	The fenced user is used to run user defined functions (UDFs) and stored procedures outside of the address space used by the DB2 database. The default user is db2fenc1.

Parameters Defined in this Step: Gather Advanced Parameters V2 for DB2 Provision Instance, continued

Parameter Name	Required	Example Value	Description
			If any of the fenced user fields have a value, then all fenced user fields must contain values. This value is available only for Linux.
DB2 Fenced User Groups	optional	fgrp105	The fenced group is used to add the DB2 Fenced User. The default group is db2fadm1. If any of the fenced user fields have a value, then all fenced user fields must contain values. This value is available only for Linux.
DB2 Fenced User Home Directory	optional	/home/fusr105	The home directory of the DB2 Fenced User. If no value is specified, the instance user home directory is used. If any of the fenced user fields have a value, then all fenced user fields must contain values. This value is available only for Linux.
DB2 Fenced User Password	optional		The password for the DB2 Fenced User. If no value is specified, the instance user password is used. If any of the fenced user fields have a value, then all fenced user fields must contain values.
DB2 Instance Home	optional	/home/v105user	The home directory of the DB2 instance owner. This value is available only for Linux.
DB2 Instance Owner	optional	v105user	The OS user id of the DB2 instance owner. It will be the name of the instance. It is also

Parameters Defined in this Step: Gather Advanced Parameters V2 for DB2 Provision Instance, continued

Parameter Name	Required	Example Value	Description
			used to construct some default values. ¹
DB2 Instance Owner Groups	optional	v105grp	The primary group of the DB2 instance owner.
DB2 Instance Owner Password	optional		The password for the DB2 Instance Owner.
DB2 Instance Type	optional	ese	Type of the instance to be created. By default, workflow creates 'Enterprise' edition Instance. Valid values are: ese, wse, client, standalone.
Diagnostic Log Path	optional	/home/v105user/sql1lib/db2dump/	The fully-qualified path for the diagnostic log. By default, DB2 sets the log path to the default database path during database creation.
Service Name	optional	db2_v105	The TCP/IP connection service name to associate with the DB2 network connection port and be configured in the /etc/services file. ²

DB2 - Provision Instance

This workflow creates IBM DB2 LUW (Linux, Unix, Windows) instance on the target server where this workflow is deployed. It currently supports the DB2 Versions 9.5, 9.7, 10.1, 10.5 on Red Hat Linux and AIX servers. It will create the DB2 Instance at the user specified DB2 instance home from the DB2

¹This parameter is hidden by default and must be exposed when you make a copy of the workflow.

²This parameter is hidden by default and must be exposed when you make a copy of the workflow.

Installation Location specified by required input parameters in the workflow deployment. This workflow support to create client, standalone, enterprise, workgroup edition type of DB2 Instance. Network port and TCP/IP service will be associated for all the instances except the client instance.

This workflow creates IBM DB2 Instance at the specified location on the target server using db2icrt utility provided by IBM along with the DB2 software installation. To use this workflow, you must provide the DB2 software Installation Location (DB2 Installation Directory) on the server where you are deploying this workflow.

To use this workflow in your environment, see the following information:

Topic	Information Included
"Prerequisites" below	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on the next page	Information about what the workflow does, including validation checks performed, steps executed, and step descriptions
"How to Run this Workflow" on page 53	Instructions for running this workflow in your environment
"Parameters for DB2 - Provision Instance" on page 57	List of input parameters for this workflow

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- The workflow must have the unchallenged ability to become the OS administrator user (typically root on UNIX systems).
- LIC_AGREEMENT parameter value for DB2 License is defaulted and set as ACCEPT. After creating the instances, License has to be activated for it to use.
- The user who runs the workflow with the server wrapper must have the access to update the /etc/service file to configure the TCP/IP services for the DB2 network port.
- The following prerequisites must satisfied before you run this workflow:
 - The infrastructure required for provisioning should be in place.
 - The operating system platform is certified for the pertinent DB2 specific version.
 - The operating system kernel parameters and shared memory is properly configured.

Refer to the [IBM Documentation](#) for other DB2 requirements.

How this Workflow Works

This workflow performs the following actions:

Creates IBM DB2 instance at the specified location on the target server using db2icrt utility provided by IBM along with the DB2 software installation.

Steps Executed

The DB2 - Provision Instance workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure and all subsequent steps are skipped.

Steps Used by DB2 - Provision Instance

Workflow Step	Description
Gather Parameters V2 for DB2 Provision Instance	This step sets all the DB2 advanced configurable parameters for DB2 Provision Instance that are used in subsequent workflow steps.
Gather Advanced Parameters for Provision DB2 Instance	This step sets all the DB2 advanced configurable parameters for DB2 Provision Instance that are used in subsequent workflow steps.
Prepare DB2 Call Wrapper	Prepare the call wrappers(server, instance) level as needed to become the owner of the DB2 Server or Instance owner user and perform the appropriate task as necessary.
Validate Provision V2 DB2 Instance Parameters	This step validates all the input parameter values received in the gather and advanced gather input parameters step, validate the DB2 target and make sure it meets all the criteria to provision DB2 instance.
Create OS User	This step create an OS user using specified information and add to an existing user group. It also creates and user group is the specified group does not exist. This step must be run as the root user.
Check DB2 Instance Type	This step checks if DB2 instance type is CLIENT from the input parameters.
DB2 Create Instance	This step creates a DB2 instance using the db2icrt command from within the DB2 installation location on the target server.
Create OS User	This step create an OS user using specified information and add to an existing user group. It also creates and user group is the specified group does not exist. This step must be run as the root user.

Steps Used by DB2 - Provision Instance , continued

Workflow Step	Description
Configure V2 For DB2 Instance	This step configures the basic configuration parameters and start the DB2 Instance based on provided input parameters.
Add Service For DB2 Instance	This step adds a TCP/IP service entry for the DB2 network port to services file.
Verify V2 For Provision DB2 Instance	This step verifies if the DB2 instance is created successfully and functionally available for usage.

How to Run this Workflow

The following instructions show you how to customize and run the DB2 - Provision Instance workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows, see *HPE DMA Quick Start Tutorial*.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in ["Parameters for DB2 - Provision Instance" on page 57](#).

Note: Before following this procedure, review the ["Prerequisites" on page 51](#), and ensure that all requirements are satisfied.

To use the DB2 - Provision Instance workflow:

1. Create a deployable copy of the workflow (see "Create a Deployable Workflow" in *HPE DMA Quick Start Tutorial*)
 - a. Determine the values that you will specify for the following parameters.

The following tables describe the required and optional input parameters for this workflow.

Parameters Defined in this Step: Gather Parameters V2 for DB2 Provision Instance

Parameter Name	Example Value	Description
DB2 Installation Location	/opt/ibm/db2/V10.5	Fully-qualified path of the DB2 installation where the new instance will be created.

Parameters Defined in this Step: Gather Parameters V2 for DB2 Provision Instance, continued

Parameter Name	Example Value	Description
	<i>Use the same value specified for the DB2 Installation Location parameter for the DB2 - Provision Software deployment.</i>	
DMA Password	●●●	Password for the HPE DMA user.
DMA URL	DMA.Url	URL of the HPE DMA server.
DMA User	dmauser	The HPE DMA user name.
Trust SSL Certificates	True	If "True", this step will trust any SSL used to connect to the DMA web service.

Parameters Defined in this Step: Gather Advanced Parameters V2 for DB2 Provision Instance

Parameter Name	Example Value	Description
Autostart Instance	yes	Enables or disables the autostart of an instance after each time system restarts. YES or NO option.
DB2 Connection Port	50000	DB2 connection port number for the new instance. Not required if instance type is client.
DB2 Connection Protocol	?	Communication protocol for the DB2 connection. It should always be tcp/ip
DB2 Connection Service Comment	?	Comment for the DB2 connection service. This will be added when the service will be added in to the /etc/services file for non client instance type
DB2 Fenced User	fusr105	The fenced user is used to run user defined functions (UDFs)

Parameters Defined in this Step: Gather Advanced Parameters V2 for DB2 Provision Instance, continued

Parameter Name	Example Value	Description
		<p>and stored procedures outside of the address space used by the DB2 database. The default user is db2fenc1.</p> <p>If any of the fenced user fields have a value, then all fenced user fields must contain values. This value is available only for Linux.</p>
DB2 Fenced User Groups	fgrp105	<p>The fenced group is used to add the DB2 Fenced User. The default group is db2fadm1.</p> <p>If any of the fenced user fields have a value, then all fenced user fields must contain values. This value is available only for Linux.</p>
DB2 Fenced User Home Directory	/home/fusr105	<p>The home directory of the DB2 Fenced User. If no value is specified, the instance user home directory is used.</p> <p>If any of the fenced user fields have a value, then all fenced user fields must contain values. This value is available only for Linux.</p>
DB2 Fenced User Password		<p>The password for the DB2 Fenced User. If no value is specified, the instance user password is used.</p> <p>If any of the fenced user fields have a value, then all fenced user fields must contain values.</p>
DB2 Instance Home	/home/v105user	The home directory of the DB2 instance owner. This value is available only for Linux.
DB2 Instance Owner	v105user	The OS user id of the DB2 instance owner. It will be the name of the instance. It is also used to construct some default

Parameters Defined in this Step: Gather Advanced Parameters V2 for DB2 Provision Instance, continued

Parameter Name	Example Value	Description
		values.
DB2 Instance Owner Groups	v105grp	The primary group of the DB2 instance owner.
DB2 Instance Owner Password		The password for the DB2 Instance Owner.
DB2 Instance Type	ese	Type of the instance to be created. By default, workflow creates 'Enterprise' edition Instance. Valid values are: ese, wse, client, standalone.
Diagnostic Log Path	/home/v105user/sql1lib/db2dump/	The fully-qualified path for the diagnostic log. By default, DB2 sets the log path to the default database path during database creation.
Service Name	db2_v105	The TCP/IP connection service name to associate with the DB2 network connection port and be configured in the /etc/services file.

2. In the workflow editor, expose any additional parameters that you need. You will specify values for those parameters when you create the deployment or at runtime.
3. Save the changes to the workflow (click **Save** in the lower right corner).
4. Create a new deployment. See "Create a Deployment" in *HPE DMA Quick Start Tutorial* for instructions.
5. On the Parameters tab, specify values (or set the type to Runtime Value) for the required parameters listed in step 2 and any additional parameters that you have exposed. You do not need to specify values for those parameters whose default values are appropriate for your environment.

6. On the Targets tab, specify one or more targets for this deployment.
7. Save the deployment (click **Save** in the lower right corner).
8. Run the workflow using this deployment, specifying any runtime parameters. See "Run Your Workflow" in *(HPE DMA Quick Start Tutorial* for instructions.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Parameters for DB2 - Provision Instance

The following tables describe the required and optional input parameters for this workflow.

Parameters Defined in this Step: Gather Parameters V2 for DB2 Provision Instance

Parameter Name	Required	Example Value	Description
DB2 Installation Location	required	<code>/opt/ibm/db2/V10.5</code> <i>Use the same value specified for the DB2 Installation Location parameter for the DB2 - Provision Software deployment.</i>	Fully-qualified path of the DB2 installation where the new instance will be created.
DMA Password	required	●●●	Password for the HPE DMA user.
DMA URL	required	DMA.Url	URL of the HPE DMA server.
DMA User	required	dmauser	The HPE DMA user name.
Trust SSL Certificates	required	True	If "True", this step will trust any SSL used to connect to the DMA web service.

Parameters Defined in this Step: Gather Advanced Parameters V2 for DB2 Provision Instance

Parameter Name	Required	Example Value	Description
Autostart Instance	optional	yes	Enables or disables the autostart of an instance after each time system restarts.

Parameters Defined in this Step: Gather Advanced Parameters V2 for DB2 Provision Instance, continued

Parameter Name	Required	Example Value	Description
			YES or NO option.
DB2 Connection Port	optional	50000	DB2 connection port number for the new instance. Not required if instance type is client.
DB2 Connection Protocol	optional	?	Communication protocol for the DB2 connection. It should always be tcp/ip
DB2 Connection Service Comment	optional	?	Comment for the DB2 connection service. This will be added when the service will be added in to the /etc/services file for non client instance type
DB2 Fenced User	optional	fusr105	The fenced user is used to run user defined functions (UDFs) and stored procedures outside of the address space used by the DB2 database. The default user is db2fenc1. If any of the fenced user fields have a value, then all fenced user fields must contain values. This value is available only for Linux.
DB2 Fenced User Groups	optional	fgrp105	The fenced group is used to add the DB2 Fenced User. The default group is db2fadm1. If any of the fenced user fields have a value, then all fenced user fields must contain values. This value is available only for Linux.
DB2 Fenced User Home Directory	optional	/home/fusr105	The home directory of the DB2 Fenced User. If no value is specified, the instance user home directory is used. If any of the fenced user fields have a value, then all fenced

Parameters Defined in this Step: Gather Advanced Parameters V2 for DB2 Provision Instance, continued

Parameter Name	Required	Example Value	Description
			user fields must contain values. This value is available only for Linux.
DB2 Fenced User Password	optional		The password for the DB2 Fenced User. If no value is specified, the instance user password is used. If any of the fenced user fields have a value, then all fenced user fields must contain values.
DB2 Instance Home	optional	/home/v105user	The home directory of the DB2 instance owner. This value is available only for Linux.
DB2 Instance Owner	optional	v105user	The OS user id of the DB2 instance owner. It will be the name of the instance. It is also used to construct some default values. ¹
DB2 Instance Owner Groups	optional	v105grp	The primary group of the DB2 instance owner.
DB2 Instance Owner Password	optional		The password for the DB2 Instance Owner.
DB2 Instance Type	optional	ese	Type of the instance to be created. By default, workflow creates 'Enterprise' edition Instance. Valid values are: ese, wse, client, standalone.
Diagnostic Log Path	optional	/home/v105user/sql1lib/db2dump/	The fully-qualified path for the diagnostic log. By default, DB2 sets the log path to the default database path during database creation.

¹This parameter is hidden by default and must be exposed when you make a copy of the workflow.

Parameters Defined in this Step: Gather Advanced Parameters V2 for DB2 Provision Instance, continued

Parameter Name	Required	Example Value	Description
Service Name	optional	db2_v105	The TCP/IP connection service name to associate with the DB2 network connection port and be configured in the /etc/services file. ¹

DB2 - Provision Database

This workflow creates a IBM DB2 LUW (Linux, UNIX, and Windows) Database on the target server where this workflow is deployed. It currently supports the DB2 Versions 9.5, 9.7, 10.1, 10.5 on RedHat Linux and AIX servers. It will create the DB2 Database on the instance where it is deployed with the user specified DB2 Database name required input parameters in the workflow deployment. This workflow creates databases on standalone, enterprise, workgroup edition types of DB2 Instances. This workflow is currently creates databases using automatic storage or non-automatic storage type and tablespace (catalog tablespace, user tablespace, and database tablespace) creation along with the database managed by system.

This workflow creates an IBM DB2 Database on the instance where it is deployed. It creates the directory structure for data storage under the specified directory locations on the target server using DDL (based on the input parameter values specified by user). It also creates the database using user defined DDL scripts provided in the input file. The scripts will be executed against the DB2 instance where the workflow has been deployed.

To use this workflow in your environment, see the following information:

Topic	Information Included
"Prerequisites" on the next page	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on the next page	Information about what the workflow does, including validation checks performed, steps executed, and step descriptions

¹This parameter is hidden by default and must be exposed when you make a copy of the workflow.

Topic	Information Included
"How to Run this Workflow" on page 63	Instructions for running this workflow in your environment
"Parameters for DB2 - Provision Database" on page 70	List of input parameters for this workflow

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- The workflow must have the unchallenged ability to become the OS administrator user (typically root on UNIX systems).
- LIC_AGREEMENT parameter value for DB2 License is defaulted and set as ACCEPT. After creating the instances, License has to be activated for it to use.
- The user who runs the workflow with the server wrapper must have the access to update the /etc/service file to configure the TCP/IP services for the DB2 network port.
- The following prerequisites must be satisfied before you run this workflow:
 - The infrastructure required for provisioning should be in place.
 - The operating system platform is certified for the pertinent DB2 specific version.
 - The operating system kernel parameters and shared memory is properly configured.
- The DMA database metadata must be up-to-date for the DB2 Instance where the workflow is deployed.
- The workflow currently does not support any raw device for provisioning database and tablespaces.
- The workflow currently does not support tablespaces (for creating catalog, user, database) managed by Database. You cannot provide the number of pages to be allocated for the tablespace sizes.
- Refer to the [IBM Documentation](#) for the complete installation and infrastructure requirements for IBM DB2.

How this Workflow Works

This workflow performs the following actions:

Creates an IBM DB2 Database on the instance where it is deployed.

Steps Executed

The DB2 - Provision Instance workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure and all subsequent steps are skipped.

Steps Used by DB2 - Provision Instance

Workflow Step	Description
Gather Parameters for DB2 Provision Database	This step sets the default values for call wrapper and all the DB2 Provision Database parameters for Database Creation that are used in subsequent workflow steps.
Gather Advanced Parameters for Provision DB2 Database	This step sets all the DB2 advanced configurable parameters for DB2 Provision Database that are used in subsequent workflow steps. If these parameters value provided by user, then override the user provided values for them.
Prepare DB2 Call Wrapper	Prepare the call wrappers (server, instance) level as needed to become the owner of the DB2 Server or Instance owner user and perform the appropriate task as necessary.
Validate DB2 Provision Database Parameters	This step validates all the input parameter values received in the gather and advanced gather input parameters step, validate the DB2 target and make sure it meets all the criteria to provision DB2 database.
Construct DB2 Create Database DDL	This step constructs the logic for the DDL SQL script which will then be executed in a later step to create the database or tablespaces along with the database.
Download Software	This step automates the transfer of files from the HP SA Software Library to individual managed servers for use in downstream workflow steps. Verifies checksum of each file transferred.
Create DB2 Database	This step creates DB2 Database using the DDL SQL generated in the previous step based on input parameters specified.
Run DB2 User Defined Command Line Processor Scripts	This step runs the user specified DB2 Command Line Processor (CLP) script without any pre-validations and post verifications.
Verify DB2 Provision Database	This step verifies if the specified database has been created and displays the details about the database and tablespaces.
Cleanup Downloaded Files	This step removes all downloaded files and archives.

Steps Used by DB2 - Provision Instance , continued

Workflow Step	Description
Discover DB2 Databases	<p>This step audits the server's physical environment looking for DB2 databases.</p> <p>Note: Discovery is ONLY additive. It will not remove instances or databases currently in your environment. It is the end-user's responsibility to delete content that is no longer in use.</p> <p>In cluster situations where one node is active while other nodes are inactive, Discovery will only find instances and databases on the active node. Nothing will be added to inactive nodes.</p>

How to Run this Workflow

The following instructions show you how to customize and run the DB2 - Provision Database workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows, see *HPE DMA Quick Start Tutorial*.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in "[Parameters for DB2 - Provision Database](#)" on page 70.

Note: Before following this procedure, review the "[Prerequisites](#)" on page 61, and ensure that all requirements are satisfied.

To use the DB2 - Provision Database workflow:

1. Create a deployable copy of the workflow (see "Create a Deployable Workflow" in *HPE DMA Quick Start Tutorial*)
 - a. Determine the values that you will specify for the following parameters.

The following tables describe the required and optional input parameters for this workflow.

Parameters Defined in this Step: Gather Parameters for DB2 Provision Database

Parameter Name	Example Value	Description
Database Name	cloud_db	Name of the DB2 database that you want to create. The name has a maximum of 8

Parameters Defined in this Step: Gather Parameters for DB2 Provision Database, continued

Parameter Name	Example Value	Description
		characters without any special characters. There is no default. This parameter is used if the database is created using user provided CLP scripts.
DB2 Installation Location	/opt/ibm/db2/V10.5	Fully-qualified path where DB2 is installed on the target machine.
DMA Password	●●●	Password for the HPE DMA user.
DMA URL	DMA.Url	URL of the HPE DMA server.
DMA User	dmauser	The HPE DMA user name.
Instance Home	?	Physical path of the DB2 Instance creation directory from where all the DB2 Instance level commands can be run. The instance name can be of 8 charset size.
Trust SSL Certificates	True	If "True", this step will trust any SSL used to connect to the DMA Web Service.

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Provision Database

Parameter Name	Example Value	Description
Auto Configure Key	?	String to pass to AUTOCONFIGURE option. It calculates and displays initial values for the buffer pool size, database configuration and database manager configuration parameters, with the option of applying these reported values.
Auto Configure Value	?	This parameter value is mandatory if you want to enable the "CONFIGURE" parameters for the database. This is a configuration key for the "AUTOCONFIGURE" parameter to set the memory, workload, priority types of Database Manager configuration parameters.
Automatic Storage	YES	Automatic storage should be enabled for the new database or not. (YES, NO). This will

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Provision Database, continued

Parameter Name	Example Value	Description
		enable the database with the ability to support automatic storage management. Default value is set 'YES' for this.
Automatic Storage Paths	/home/db2inst/db206 , /home/db2inst/db208	Comma-separated list of the fully-qualified paths for the automatic storage. ¹
Catalog Tablespace Path		Specifies the definition of the table space that will hold the catalog tables, SYSCATSPACE. If not specified and automatic storage is not enabled for the database, SYSCATSPACE is created as a System Managed Space (SMS) table space with NUMSEGS number of directories as containers, and with an extent size of DFT_EXTENTSIZE. For example: /NODE0000/SQL00001/SQLT000
Code Set	utf8	The code set to be used for data entered into this database. After you create the database, you cannot change the specified code set. ²
Collating Sequence	system	This parameter value is to identifies the type of collating sequence to be used for the database. Once the database has been created, the collating sequence cannot be changed.
Comment String	"My Development database"	This parameter describes the database entry in the database directory. Any comment that helps to describe the database can be entered. Maximum length is 30 characters. A carriage return or a line feed character is not permitted. The comment text must be enclosed by single or double quotation marks. For example: "My test database". ¹
Database Alias	tstcloud	This parameter sets an alias for the database in the system database directory (maximum of 8 characters). If no alias is provided, the

¹This parameter is hidden by default and must be exposed when you make a copy of the workflow.

²This parameter is hidden by default and must be exposed when you make a copy of the workflow.

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Provision Database, continued

Parameter Name	Example Value	Description
		specified database name is used. 1
Database Creation Script	?	Fully qualified path of the DB2 script to create the database. If this script is provided, database is created using this script and all the other options are ignored. The script may contain <instance.name> and/or <database.name>, which will get replaced by actual instance name and database name.
Database Path	?	Fully qualified path on which to create the database. Defaults to the instance home. DBPATH ON parameter has to be used when automatic storage is enabled to keep the database information separate from the database data.
Default Extent Size	4	Specifies the number of PAGESIZE pages that will be written to a container before skipping to the next container. The extent size value can also be specified as an integer value followed by K (for kilobytes) or M (for megabytes). The default value is provided by the dft_extent_sz database configuration parameter, which has a valid range of 2-256 pages.
Download Location	/tmp	Fully-qualified directory path where the user specified command-line processing scripts will be downloaded to use for provisioning the database.
Extent Size	?	Specifies the number of PAGESIZE pages that will be written to a container before skipping to the next container. The extent size value can also be specified as an integer value followed by K (for kilobytes) or M (for megabytes). If specified in this way, the floor of the number of bytes divided by the page size is used to determine the value for the extent size. The database manager cycles repeatedly through the containers as data is stored. This is used for the tablespace creation along with the database creation.

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Provision Database, continued

Parameter Name	Example Value	Description
Is Catalog Tablespace	Y	Specify "Y" to create "catalog tablespace" along with the database explicitly. By default, it doesn't set the value "Y" so no explicit catalog tablespace will be created besides what DB2 system creates.
Is Temporary Tablespace	Y	Specify "Y" to create "temporary tablespace" along with the database explicitly. By default, it doesn't set the value "Y" so no explicit temporary tablespace will be created besides what DB2 system creates.
Is User Tablespace	Y	Specify "Y" to create "user tablespace" along with the database explicitly. By default, it doesn't set the value "Y" so no explicit user tablespace will be created besides what DB2 system creates.
Overhead	?	The I/O controller overhead and disk seek and latency time (in number of milli-seconds). This value is used to determine the cost of I/O during query optimization. For a database that was created in Version 9 or later, the default I/O controller usage and disk seek and latency time is 7.5 milliseconds. For a database that was upgraded from a previous version of DB2 to Version 9 or later, the default is 12.67 milliseconds.
Page Size	8 K	<p>The page size of the default buffer pool and the initial table spaces (SYSCATSPACE, TEMPSPACE1, USERSPACE1) when the database is created. Also the default page size for all future CREATE BUFFERPOOL and CREATE TABLESPACE statements. 1</p> <p>The format is <n> or <n> K, where <n> is an integer. Valid values are: 4096, 8192, 16384, 32768, 4 K, 8 K, 16 K, or 32 K. If you use the <n> K format, there must be at least one space between the integer and K.</p> <p>The default is 4096 bytes (or 4 K).</p>

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Provision Database, continued

Parameter Name	Example Value	Description
Prefetch Size	32	Specifies the number of PAGESIZE pages that will be read from the table space when data prefetching is being performed. The prefetch size value can also be specified as an integer value followed by K (for kilobytes), M (for megabytes), or G (for gigabytes). If specified in this way, the floor of the number of bytes divided by the page size is used to determine the number of pages value for prefetch size. Default value is 32.
Restrictive	YES	Restrict access to PUBLIC or not. If the RESTRICTIVE parameter is present it causes the restrict_access database configuration parameter to be set to YES and no privileges or authorities are automatically granted to PUBLIC. If the RESTRICTIVE parameter is not present then the restrict_access database configuration parameter is set to NO and privileges are automatically granted to PUBLIC.
Temporary Tablespace Path	?	Specifies the definition of the initial system temporary table space, TEMPSPACE1. If not specified and automatic storage is not enabled for the database, TEMPSPACE1 is created as an SMS table space with NUMSEGS number of directories as containers and with an extent size of DFT_EXTENTSIZE. For example: /NODE0000/SQL00001/. This parameter value is mandatory if "Is Temporary Tablespace" = "Y"
Territory	US	The territory or locale identifier to be used for data entered into this database. After you create the database, you cannot change the specified territory. The combination of the code set and territory must be valid. For example: US1
Transfer Rate	?	Time to read one page into memory (in

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Provision Database, continued

Parameter Name	Example Value	Description
		milliseconds). Specifies the time to read one page into memory. This value is used to determine the cost of I/O during query optimization. The value of number-of-milliseconds is any numeric literal (integer, decimal, or floating point). If this value is not the same for all containers, the number should be the average for all containers that belong to the table space. For a database that was created in Version 9 or later, the default time to read one page into memory is 0.06 milliseconds. For a database that was upgraded from a previous version of DB2 to Version 9 or later, the default is 0.18 milliseconds.
User Tablespace Path	?	Specifies the definition of the initial system user tablespace, USERTABLESPACE. If not specified and automatic storage is not enabled for the database, USERTABLESPACE is created as an SMS table space with NUMSEGS number of directories as containers and with an extent size of DFT_EXTENTSIZE.(ex. /u/smith/smith/NODE0000/SQL00001/). This parameter value is mandatory if "Is UserTablespace" = "Y"

2. In the workflow editor, expose any additional parameters that you need. You will specify values for those parameters when you create the deployment or at runtime.
3. Save the changes to the workflow (click **Save** in the lower right corner).
4. Create a new deployment. See "Create a Deployment" in *HPE DMA Quick Start Tutorial* for instructions.
5. On the Parameters tab, specify values (or set the type to Runtime Value) for the required parameters listed in step 2 and any additional parameters that you have exposed. You do not need to specify values for those parameters whose default values are appropriate for your environment.
6. On the Targets tab, specify one or more targets for this deployment.

7. Save the deployment (click **Save** in the lower right corner).
8. Run the workflow using this deployment, specifying any runtime parameters. See "Run Your Workflow" in *(HPE DMA Quick Start Tutorial* for instructions.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Parameters for DB2 - Provision Database

The following tables describe the required and optional input parameters for this workflow.

Parameters Defined in this Step: Gather Parameters for DB2 Provision Database

Parameter Name	Required	Example Value	Description
Database Name		cloud_db	Name of the DB2 database that you want to create. The name has a maximum of 8 characters without any special characters. There is no default. This parameter is used if the database is created using user provided CLP scripts.
DB2 Installation Location	required	/opt/ibm/db2/V10.5	Fully-qualified path where DB2 is installed on the target machine.
DMA Password	required	●●●	Password for the HPE DMA user.
DMA URL	required	DMA.Url	URL of the HPE DMA server.
DMA User	required	dmauser	The HPE DMA user name.
Instance Home		?	Physical path of the DB2 Instance creation directory from where all the DB2 Instance level commands can be run. The instance name can be of 8 charset size.

Parameters Defined in this Step: Gather Parameters for DB2 Provision Database, continued

Parameter Name	Required	Example Value	Description
Trust SSL Certificates	optional	True	If "True", this step will trust any SSL used to connect to the DMA Web Service.

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Provision Database

Parameter Name	Required	Example Value	Description
Auto Configure Key	optional	?	String to pass to AUTOCONFIGURE option. It calculates and displays initial values for the buffer pool size, database configuration and database manager configuration parameters, with the option of applying these reported values.
Auto Configure Value	optional	?	This parameter value is mandatory if you want to enable the "CONFIGURE" parameters for the database. This is a configuration key for the "AUTOCONFIGURE" parameter to set the memory, workload, priority types of Database Manager configuration parameters.
Automatic Storage	optional	YES	Automatic storage should be enabled for the new database or not. (YES, NO). This will enable the database with the ability to support automatic storage management. Default value is set 'YES' for this.
Automatic Storage Paths	optional	/home/db2inst/db206 , /home/db2inst/db208	Comma-separated list of the fully-qualified paths for the automatic storage. ¹
Catalog Tablespace Path	optional		Specifies the definition of the table space that will hold the catalog tables, SYSCATSPACE. If not specified and automatic storage is not enabled for the database, SYSCATSPACE is created as a System Managed Space (SMS) table space with NUMSEGS number of directories as containers, and with an extent size of DFT_

¹This parameter is hidden by default and must be exposed when you make a copy of the workflow.

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Provision Database, continued

Parameter Name	Required	Example Value	Description
			EXTENTSIZE. For example: /NODE0000/SQL00001/SQLT000
Code Set	optional	utf8	The code set to be used for data entered into this database. After you create the database, you cannot change the specified code set. ¹
Collating Sequence	optional	system	This parameter value is to Identifies the type of collating sequence to be used for the database. Once the database has been created, the collating sequence cannot be changed.
Comment String	optional	"My Development database"	This parameter describes the database entry in the database directory. Any comment that helps to describe the database can be entered. Maximum length is 30 characters. A carriage return or a line feed character is not permitted. The comment text must be enclosed by single or double quotation marks. For example: "My test database". ¹
Database Alias	optional	tstcloud	This parameter sets an alias for the database in the system database directory (maximum of 8 characters). If no alias is provided, the specified database name is used. ¹
Database Creation Script	optional	?	Fully qualified path of the DB2 script to create the database. If this script is provided, database is created using this script and all the other options are ignored. The script may contain <instance.name> and/or <database.name>, which will get replaced by actual instance name and database name.
Database Path	optional	?	Fully qualified path on which to create the database. Defaults to the instance home. DBPATH ON parameter has to be used when automatic storage is enabled to keep the database information separate from the database data.

¹This parameter is hidden by default and must be exposed when you make a copy of the workflow.

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Provision Database, continued

Parameter Name	Required	Example Value	Description
Default Extent Size	optional	4	Specifies the number of PAGESIZE pages that will be written to a container before skipping to the next container. The extent size value can also be specified as an integer value followed by K (for kilobytes) or M (for megabytes). The default value is provided by the <code>dft_extent_sz</code> database configuration parameter, which has a valid range of 2-256 pages.
Download Location	optional	/tmp	Fully-qualified directory path where the user specified command-line processing scripts will be downloaded to use for provisioning the database.
Extent Size	optional	?	Specifies the number of PAGESIZE pages that will be written to a container before skipping to the next container. The extent size value can also be specified as an integer value followed by K (for kilobytes) or M (for megabytes). If specified in this way, the floor of the number of bytes divided by the page size is used to determine the value for the extent size. The database manager cycles repeatedly through the containers as data is stored. This is used for the tablespace creation along with the database creation.
Is Catalog Tablespace	optional	Y	Specify "Y" to create "catalog tablespace" along with the database explicitly. By default, it doesn't set the value "Y" so no explicit catalog tablespace will be created besides what DB2 system creates.
Is Temporary Tablespace	optional	Y	Specify "Y" to create "temporary tablespace" along with the database explicitly. By default, it doesn't set the value "Y" so no explicit temporary tablespace will be created besides what DB2 system creates.
Is User Tablespace	optional	Y	Specify "Y" to create "user tablespace" along with the database explicitly. By default, it doesn't set the value "Y" so no explicit user tablespace will be created besides what DB2 system creates.

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Provision Database, continued

Parameter Name	Required	Example Value	Description
Overhead	optional	?	The I/O controller overhead and disk seek and latency time (in number of milliseconds). This value is used to determine the cost of I/O during query optimization. For a database that was created in Version 9 or later, the default I/O controller usage and disk seek and latency time is 7.5 milliseconds. For a database that was upgraded from a previous version of DB2 to Version 9 or later, the default is 12.67 milliseconds.
Page Size	optional	8 K	The page size of the default buffer pool and the initial table spaces (SYSCATSPACE, TEMPSPACE1, USERSPACE1) when the database is created. Also the default page size for all future CREATE BUFFERPOOL and CREATE TABLESPACE statements. 1 The format is <n> or <n> K, where <n> is an integer. Valid values are: 4096, 8192, 16384, 32768, 4 K, 8 K, 16 K, or 32 K. If you use the <n> K format, there must be at least one space between the integer and K. The default is 4096 bytes (or 4 K).
Prefetch Size	optional	32	Specifies the number of PAGESIZE pages that will be read from the table space when data prefetching is being performed. The prefetch size value can also be specified as an integer value followed by K (for kilobytes), M (for megabytes), or G (for gigabytes). If specified in this way, the floor of the number of bytes divided by the page size is used to determine the number of pages value for prefetch size. Default value is 32.
Restrictive	optional	YES	Restrict access to PUBLIC or not. If the RESTRICTIVE parameter is present it causes the restrict_access database configuration parameter to be set to YES and no privileges or authorities are automatically granted to PUBLIC. If the RESTRICTIVE parameter is not present then the restrict_

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Provision Database, continued

Parameter Name	Required	Example Value	Description
			access database configuration parameter is set to NO and privileges are automatically granted to PUBLIC.
Temporary Tablespace Path	optional	?	Specifies the definition of the initial system temporary table space, TEMPSPACE1. If not specified and automatic storage is not enabled for the database, TEMPSPACE1 is created as an SMS table space with NUMSEGS number of directories as containers and with an extent size of DFT_EXTENTSIZE. For example: /NODE0000/SQL00001/. This parameter value is mandatory if "Is Temporary Tablespace" = "Y"
Territory	optional	US	The territory or locale identifier to be used for data entered into this database. After you create the database, you cannot change the specified territory. The combination of the code set and territory must be valid. For example: US1
Transfer Rate	optional	?	Time to read one page into memory (in milliseconds). Specifies the time to read one page into memory. This value is used to determine the cost of I/O during query optimization. The value of number-of-milliseconds is any numeric literal (integer, decimal, or floating point). If this value is not the same for all containers, the number should be the average for all containers that belong to the table space. For a database that was created in Version 9 or later, the default time to read one page into memory is 0.06 milliseconds. For a database that was upgraded from a previous version of DB2 to Version 9 or later, the default is 0.18 milliseconds.
User Tablespace Path	optional	?	Specifies the definition of the initial system user tablespace, USERTABLESPACE. If not specified and automatic storage is not enabled for the database,

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Provision Database, continued

Parameter Name	Required	Example Value	Description
			USERTABLESPACE is created as an SMS table space with NUMSEGS number of directories as containers and with an extent size of DFT_EXTENTSIZE.(ex. /u/smith/smith/NODE0000/SQL00001/). This parameter value is mandatory if "Is UserTablespace" = "Y"

DB2 - Patch Fixpack v2

This workflow applies fixpack for IBM DB2 LUW (Linux, UNIX, and Windows) instances on the target server where this workflow is deployed. It currently supports the DB2 Versions 9.5, 9.7, 10.1, 10.5 on RedHat Linux and AIX servers. This is a server level workflow. It will apply the fixpack to the DB2 Home (also known as the DB2 Installation Directory, for example: /opt/ibm/db2/V10.5) installed on the target machine where this workflow is deployed. It updates all the instances with the fixpack of DB2 that are created against the specific DB2 Installation.

This workflow shuts down all the DB2 instances, DB2 Admin Server, and licensing daemons that are running for all the instances that are provisioned against a specific DB2 home (DB2 Installation Location). It kills all the application user connections with DB2 instances that are to be patched. It validates the eligibility for the fixpack to apply by comparing the current fixpack level on the installed DB2 against the fixpack level that user is trying to apply.

Note: This workflow applies the DB2 fix pack to the DB2 software installation directory and all instances associated with the DB2 software installation directory. (You cannot use this workflow to apply a fix pack to a subset of the instances associated with a DB2 software installation directory.)

This workflow does not update the DB2 databases with the newly applied DB2 fix pack. You will need to do that manually after you run the workflow.

The examples given are appropriate for applying a DB2 10.5 fix pack on an AIX server.

To use this workflow in your environment, see the following information:

Topic	Information Included
"Prerequisites" below	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on the next page	Information about what the workflow does, including validation checks performed, steps executed, and step descriptions
"How to Run this Workflow" on page 79	Instructions for running this workflow in your environment
"Parameters for DB2 - Patch Fixpack v2" on page 82	List of input parameters for this workflow

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- A server running AIX 6.1 or 7.1 or Red Hat Enterprise Linux 5 or 6. The operating system platform must be certified for the pertinent DB2 fix pack version.
- DB2 server software—version 9.5, 9.7, 10.1, or 10.5—is installed on the target and is ready to be patched.
- The infrastructure required for applying the fix pack is in place.
- All DB2 Instances are on the same initial fix pack version.
- Patch media:

The DB2 server fix pack file from IBM.

Patch installation files must be available locally or available for download from the software repository.

Note: HPE DMA only applies DB2 server fix packs, not universal fix packs.

- Storage: A staging directory with 7-8 gigabytes available to unpack the binary file and to apply the fix pack and archive—requires about double the size of the current DB2 installation on the disk.
- The operating system kernel parameters and virtual and shared memory are properly configured to avoid any failure while applying the DB2 fix pack.
- License for HPE DMA.
- License for DB2 Database version 9.5, 9.7, 10.1, or 10.5.

Additional requirements

For additional requirements, see the following IBM documentation:

DB2 version	IBM documentation
9.5	DB2 Version 9.5 Fix Pack
9.7	DB2 Version 9.7 Fix Pack
10.1	DB2 Version 10.1 Fix Pack
10.5	DB2 Version 10.5 Fix Pack

How this Workflow Works

This workflow performs the following actions:

Applies the fixpack for DB2 Installations.

Steps Executed

The DB2 - Patch Fixpack v2 workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure and all subsequent steps are skipped.

Steps Used by DB2 - Patch Fixpack v2

Workflow Step	Description
Gather Parameters to Patch Fixpack	This step accepts parameters for the workflow. All the parameters are mandatory in this step.
Gather Advanced Parameters to Patch Fixpack v2	This step accepts parameters for advanced DB2 Install Fixpack workflow step and sets defaults.
Validate Parameters for Patch Fixpack	This step validates all the input parameter values received in the gather and advanced gather input parameters steps, validates the DB2 target and makes sure it meets all the criteria to apply fixpack.
Stage Fixpack Software Archive	This step uncompresses the archive file if compressed and then extracts the files from it (tar file) under staging path.

Steps Used by DB2 - Patch Fixpack v2 , continued

Workflow Step	Description
Download Software	This step automates the transfer of files from the HPE SA Software Library to individual managed servers for use in downstream workflow steps. Verifies checksum of each file transferred.
Shutdown DB2 Instances For Patch	This step stops DB2 instances prior to applying the patch.
Apply DB2 Fixpack To DB2 Installation	This step applies DB2 fixpack to the DB2 installation location as specified by user input parameter.
Update DB2 Instances	This step updates all the instances with the newly installed fixpack executable.
Verify Patch Fixpack	This step verifies if the fixpack is applied successfully as expected on the DB2 Installation location and all the instances have been updated well.
Restart DB2 Instances For Fixpack	This step restarts all the DB2 instances and processes provisioned against the user specified input DB2 installation location.
Discover DB2 Databases	<p>This step audits the server's physical environment looking for DB2 databases.</p> <p>Note: Discovery is ONLY additive. It will not remove instances or databases currently in your environment. It is the end-user's responsibility to delete content that is no longer in use.</p> <p>In cluster situations where one node is active while other nodes are inactive, Discovery will only find instances and databases on the active node. Nothing will be added to inactive nodes.</p>
Bind Packages To Database	This step binds various DB2 packages to databases for each instance created against current DB2 installation.
Cleanup Downloaded Files v2	This step removes all downloaded files and archives.

How to Run this Workflow

The following instructions show you how to customize and run the DB2 - Patch Fixpack v2 workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows, see *HPE DMA Quick Start Tutorial*.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in ["Parameters for DB2 - Patch Fixpack v2" on page 82](#).

Note: Before following this procedure, review the ["Prerequisites" on page 77](#), and ensure that all requirements are satisfied.

To use the DB2 - Patch Fixpack v2 workflow:

1. Create a deployable copy of the workflow (see ["Create a Deployable Workflow" in HPE DMA Quick Start Tutorial](#))

Determine the values that you will specify for the following parameters.

The following tables describe the required and optional input parameters for this workflow.

Parameters Defined in this Step: Gather Parameters to Patch Fixpack

Parameter Name	Example Value	Description
DB2 Installation Location	<code>/opt/ibm/db2/V10.5</code>	Fully qualified path where DB2 is installed on the target server.
Fixpack Patch Archive	<code>v10.1fp3_linuxx64_server.tar.gz</code>	Fully qualified file name of DB2 fixpack archive. If the file is not found in Staging Directory), it will be downloaded from the software repository.

Parameters Defined in this Step: Gather Advanced Parameters to Patch Fixpack v2

Parameter Name	Example Value	Description
Download Location	<code>/tmp/archive</code>	Fully qualified directory path where the user specified fixpack file will be downloaded to use it for applying fixpack.
Rebind Packages To Database	Yes	Flag to enable or disable binding capability of workflow step for various packages to databases for each instance created against current DB2 installation. Default value is "false" which will not bind any packages. Valid values are "yes", "y", "true", "false", "n", and "no".
Staging Location	<code>/tmp/staging</code>	Fully qualified path of the directory where DB2 installer will be extracted from archive. Will be cleaned up at end of workflow execution.
Web Service Password	●●●	Password for the HPE DMA Discovery web service API.
Web Service URL		URL for the HP DMA Discovery web service API to discover and update metadata in DMA.
Web Service User	<code>dmawebuser</code>	User who is capable of modifying the

Parameters Defined in this Step: Gather Advanced Parameters to Patch Fixpack v2, continued

Parameter Name	Example Value	Description
		managed environment by using the HPE DMA Discovery web service API.

- In the workflow editor, expose any additional parameters that you need. You will specify values for those parameters when you create the deployment or at runtime.
- Save the changes to the workflow (click **Save** in the lower right corner).
- Create a new deployment. See "Create a Deployment" in *HPE DMA Quick Start Tutorial* for instructions.
- On the Parameters tab, specify values (or set the type to Runtime Value) for the required parameters listed in step 2 and any additional parameters that you have exposed. You do not need to specify values for those parameters whose default values are appropriate for your environment.
- On the Targets tab, specify one or more targets for this deployment.
- Save the deployment (click **Save** in the lower right corner).
- Run the workflow using this deployment, specifying any runtime parameters. See "Run Your Workflow" in *(HPE DMA Quick Start Tutorial* for instructions.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Parameters for DB2 - Patch Fixpack v2

The following tables describe the required and optional input parameters for this workflow.

Parameters Defined in this Step: Gather Parameters to Patch Fixpack

Parameter Name	Required	Example Value	Description
DB2 Installation Location	required	/opt/ibm/db2/V10.5	Fully qualified path where DB2 is installed on the target server.
Fixpack Patch Archive	required	v10.1fp3_linuxx64_server.tar.gz	Fully qualified

Parameters Defined in this Step: Gather Parameters to Patch Fixpack, continued

Parameter Name	Required	Example Value	Description
			file name of DB2 fixpack archive. If the file is not found in Staging Directory), it will be downloaded from the software repository.

Parameters Defined in this Step: Gather Advanced Parameters to Patch Fixpack v2

Parameter Name	Required	Example Value	Description
Download Location	optional	/tmp/archive	Fully qualified directory path where the user specified fixpack file will be downloaded to use it for applying fixpack.
Rebind Packages To Database	optional	Yes	Flag to enable or disable binding capability of workflow step for various packages to databases for each instance created against current DB2 installation. Default value is "false" which will not bind any packages. Valid values are "yes", "y", "true", "false", "n", and "no".
Staging Location	optional	/tmp/staging	Fully qualified path of the directory where DB2 installer will be extracted from archive. Will be cleaned up at end of workflow execution.
Web Service Password	optional	●●●	Password for the HPE DMA Discovery web service API.
Web Service URL	optional		URL for the HP DMA Discovery web service API to discover and update metadata in DMA.
Web Service User	optional	dmawebuser	User who is capable of modifying the managed environment by using the HPE DMA Discovery web service API.

DB2 - Rollback Fixpack v2

This workflow can roll back server or universal fixpack for IBM DB2 LUW (Linux, UNIX, and Windows) instances on the target server where this workflow is deployed. It currently supports the DB2 Versions 9.5, 9.7, 10.1, 10.5 on RedHat Linux and AIX servers. This is a server level workflow. It will rollback fixpack to the DB2 Home (also known as the DB2 Installation Directory, for example: /opt/ibm/db2/V10.5) installed on the target machine where this workflow is deployed. It updates all the instance(s) by restoring the backup provided by the user.

This workflow shuts down all the DB2 instances, DB2 Admin Server, and licensing daemons that are running for all the instances that are provisioned against a specific DB2 home (DB2 installation location). It kills all the application user connections with DB2 instances that are to be rolled back. It validates the eligibility for the fixpack to rollback by comparing the current fixpack level on the installed DB2 against the fixpack level that user is trying restore from the backup.

The workflow also rebinds the OS packages with databases for each instance, if exists.

To use this workflow in your environment, see the following information:

Topic	Information Included
"Prerequisites" below	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on page 86	Information about what the workflow does, including validation checks performed, steps executed, and step descriptions
"How to Run this Workflow" on page 87	Instructions for running this workflow in your environment
"Parameters for DB2 - Rollback Fixpack v2" on page 92	List of input parameters for this workflow

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- A server running AIX 6.1 or 7.1 or Red Hat Enterprise Linux 5 or 6. The operating system platform must be certified for the pertinent DB2 fix pack version.

- DB2 server software—version 9.5, 9.7, 10.1, or 10.5—is installed on the target and fixpack applied.
- The workflow must have the unchallenged ability to become the OS administrator user (typically root on UNIX systems).
- For all the instances on the target machine, the license has to be activated to use; otherwise the workflow will not be able to restart the instances after the fixpack is rolled back and database connection may not be possible again.
- The user who runs the workflow with the server wrapper must have the access to create or modify the directory structure for instances and databases.
- As stated in the IBM DB2 release bulletin, the following prerequisites must be satisfied before this workflow is run:
 - DB2 software must be already installed on the target machine.
 - The infrastructure required for rollback fixpack must be in place. Make sure the target server has adequate available disk space to rollback and restore DB2 installation. By default, it is expected to have about double the size of current DB2 Installation on the disk.
 - The operating system platform is certified for the pertinent DB2 specific fixpack version.
 - The operating system kernel parameters and virtual and shared memory is properly configured to avoid any failure while applying the DB2 fixpack.
- All DMA database metadata must be up-to-date on the target server where the workflow is deployed.

Additional requirements

For additional requirements, see the following IBM documentation:

DB2 version	IBM documentation
9.5	DB2 Version 9.5 Fix Pack
9.7	DB2 Version 9.7 Fix Pack
10.1	DB2 Version 10.1 Fix Pack
10.5	DB2 Version 10.5 Fix Pack

How this Workflow Works

This workflow performs the following actions:

Rolls back fixpack from DB2 installations.

Steps Executed

The DB2 - Patch Rollback Fixpack v2 workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure and all subsequent steps are skipped.

Steps Used by DB2 - Patch Fixpack v2

Workflow Step	Description
Gather Parameters for Rollback Fixpack	This step accepts parameters for the workflow DB2 Rollback Fixpack from the user. All the parameters are mandatory in this step.
Gather Advanced Parameters for Rollback Fixpack v2	This step accepts optional parameter values for DB2 Rollback Fixpack and set them up.
Validate Parameters For Rollback Fixpack v2	This step validates all the input parameter values received in the gather and advanced gather input parameters steps, validates the DB2 target and makes sure it meets all the criteria to rollback fixpack.
Stage Fixpack Software Archive v2	This step uncompresses the archive file if compressed and then extracts the files from it (tar file) under staging path.
Download Software	This step automates the transfer of files from the HPE SA Software Library to individual managed servers for use in downstream workflow steps. Verifies checksum of each file transferred.
Shutdown Instances and Admin Server	This step scans for all the running instances and active databases against the specified DB2 installation location and shuts them down.
Backup Current Installation v2	This step takes backup of the current DB2 installation before the rollback process for the fixpack.
Restore Installation From Backup v2	This step swaps the existing DB2 installation with the user provided backed up copy of DB2 installation and restores it.
Deinstall Fixpack Patch	This step rolls back fix pack from DB2 installations.

Steps Used by DB2 - Patch Fixpack v2 , continued

Workflow Step	Description
Restart DB2 Instances For Fixpack	This step restarts all the DB2 instances and processes provisioned against the user specified input DB2 installation location.
Copy Directory	This step creates a backup copy of the entire DB2 installation folder.
Update Instances To Rollback Fixpack	This step updates all the instances with the restored fixpack executables.
Restart Instances and Admin Server	This step restarts all the DB2 instances and processes provisioned against the user specified input DB2 installation location.
Verify Rollback Fixpack	This step verifies if the fixpack is rolled back successfully as expected for DB2 server.
Discover DB2 Databases	<p>This step audits the server's physical environment looking for DB2 databases.</p> <p>Note: Discovery is ONLY additive. It will not remove instances or databases currently in your environment. It is the end-user's responsibility to delete content that is no longer in use.</p> <p>In cluster situations where one node is active while other nodes are inactive, Discovery will only find instances and databases on the active node. Nothing will be added to inactive nodes.</p>
Bind Packages To Database	This step binds various DB2 packages to databases for each instance created against current DB2 installation.

How to Run this Workflow

The following instructions show you how to customize and run the DB2 - Rollback Fixpack v2 workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows, see *HPE DMA Quick Start Tutorial*.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in ["Parameters for DB2 - Rollback Fixpack v2" on page 92](#).

Note: Before following this procedure, review the ["Prerequisites" on page 84](#), and ensure that all

requirements are satisfied.

To use the DB2 - Rollback Fixpack v2 workflow:

1. Create a deployable copy of the workflow (see "Create a Deployable Workflow" in *HPE DMA Quick Start Tutorial*)

Determine the values that you will specify for the following parameters.

The following tables describe the required and optional input parameters for this workflow.

Parameters Defined in this Step: Gather Parameters for Rollback Fixpack

Parameter Name	Example Value	Description
Backup Location For Installation	/opt/apps/db2/bkp/v10.5_bkp	Absolute directory path for DB2 Installation location where you want to create the backup copy of the current DB2 installation.
Backup Location to Restore	/opt/apps/db2/bkp/v10.5_bkp_to_restore	Absolute directory path for DB2 Installation location that you would like to restore for the rollback of the fixpack. Default value is False.
DB2 Installation Location	/opt/ibm/db2/v10.5	Absolute directory path for DB2 Installation location on the target machine.

Parameters Defined in this Step: Gather Advanced Parameters for Rollback Fixpack v2

Parameter Name	Example Value	Description
Clean On Success	Yes	Flag that determines whether to clean up after workflow is run successfully. The default value is 'Yes'.
Clean on Failure	Yes	Flag that determines whether to clean up after workflow failed. The default value is 'Yes'.
DB2 Fixpack Or Software Archive		This is used if the parameter "Is delInstall FixPack" is set to "Yes", "True", or "Y". For example: v10.1fp3_

Parameters Defined in this Step: Gather Advanced Parameters for Rollback Fixpack v2, continued

Parameter Name	Example Value	Description
		linuxx64_server.tar.gz
Download Location		Specifies the location to download the binary from SA.
Is Restore Fixpack From Backup		Specifies whether the rollback is accomplished by restoring the DB2 installation from a backup folder. Valid values are "Yes", "Y", "True", "False", "N", or "No".
Is deinstall Fixpack		Specifies whether the rollback is accomplished by using installFixPack tool, part of software binary. Valid values are "Yes", "Y", "True", "False", "N", or "No".
Rebind Packages To Database	False	Enables or disables binding capability of workflow step for various packages to database(s) for each instance(s) created against current DB2 installation. Valid values are "Yes", "Y", "True", "False", "N", or "No". Default value is "False" which will not bind any packages.
Staging Location	/tmp/staging	Specifies a location to stage the rollback binary. Default value is /tmp/staging.
Web Service Password		Password for the discovery web service API. If password is not

Parameters Defined in this Step: Gather Advanced Parameters for Rollback Fixpack v2, continued

Parameter Name	Example Value	Description
		provided, the DMA token is used as the password.
Web Service URL	dma.url	URL for the HPE DMA Discovery web service API to discover and update metadata in DMA. Default value is DMA.URL.
Web Service User	dma.user	User capable of modifying the managed environment through the discovery web service API.

2. In the workflow editor, expose any additional parameters that you need. You will specify values for those parameters when you create the deployment or at runtime.
3. Save the changes to the workflow (click **Save** in the lower right corner).
4. Create a new deployment. See "Create a Deployment" in *HPE DMA Quick Start Tutorial* for instructions.
5. On the Parameters tab, specify values (or set the type to Runtime Value) for the required parameters listed in step 2 and any additional parameters that you have exposed. You do not need to specify values for those parameters whose default values are appropriate for your environment.
6. On the Targets tab, specify one or more targets for this deployment.
7. Save the deployment (click **Save** in the lower right corner).
8. Run the workflow using this deployment, specifying any runtime parameters. See "Run Your Workflow" in *(HPE DMA Quick Start Tutorial)* for instructions.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Parameters for DB2 - Rollback Fixpack v2

The following tables describe the required and optional input parameters for this workflow.

Parameters Defined in this Step: Gather Parameters for Rollback Fixpack

Parameter Name	Required	Example Value	Description
Backup Location For Installation	required	/opt/apps/db2/bkp/v10.5_bkp	Absolute directory path for DB2 Installation location where you want to create the backup copy of the current DB2 installation.
Backup Location to Restore	required	/opt/apps/db2/bkp/v10.5_bkp_to_restore	Absolute directory path for DB2 Installation location that you would like to restore for the rollback of the fixpack. Default value is False.
DB2 Installation Location	required	/opt/ibm/db2/v10.5	Absolute directory path for DB2 Installation location on the target machine.

Parameters Defined in this Step: Gather Advanced Parameters for Rollback Fixpack v2

Parameter Name	Required	Example Value	Description
Clean On Success	optional	Yes	Flag that determines whether to clean up after workflow is run successfully. The default value is 'Yes'.
Clean on Failure	optional	Yes	Flag that determines

Parameters Defined in this Step: Gather Advanced Parameters for Rollback Fixpack v2, continued

Parameter Name	Required	Example Value	Description
			whether to clean up after workflow failed. The default value is 'Yes'.
DB2 Fixpack Or Software Archive	optional		This is used if the parameter "Is deInstall FixPack" is set to "Yes", "True", or "Y". For example: v10.1fp3_linuxx64_server.tar.gz
Download Location	optional		Specifies the location to download the binary from SA.
Is Restore Fixpack From Backup	optional		Specifies whether the rollback is accomplished by restoring the DB2 installation from a backup folder. Valid values are "Yes", "Y", "True", "False", "N", or "No".
Is deinstall Fixpack	optional		Specifies whether the rollback is accomplished by using installFixPack tool, part of software binary. Valid values are "Yes", "Y", "True", "False",

Parameters Defined in this Step: Gather Advanced Parameters for Rollback Fixpack v2, continued

Parameter Name	Required	Example Value	Description
			"N", or "No".
Rebind Packages To Database	optional	False	Enables or disables binding capability of workflow step for various packages to database(s) for each instance(s) created against current DB2 installation. Valid values are "Yes", "Y", "True", "False", "N", or "No". Default value is "False" which will not bind any packages.
Staging Location	optional	/tmp/staging	Specifies a location to stage the rollback binary. Default value is /tmp/staging.
Web Service Password	optional		Password for the discovery web service API. If password is not provided, the DMA token is used as the password.
Web Service URL	optional	dma.url	URL for the HPE DMA Discovery web service API to discover and update metadata in DMA. Default

Parameters Defined in this Step: Gather Advanced Parameters for Rollback Fixpack v2, continued

Parameter Name	Required	Example Value	Description
			value is DMA.URL.
Web Service User	optional	dma.user	User capable of modifying the managed environment through the discovery web service API.

DB2 - Offline HADR Fixpack Parent Flow

This section describes how to use DMA to create a repeatable, standardized method to quickly and accurately apply IBM DB2 fixpack for DB2 installations across an enterprise to keep fix packs current.

This workflow is a wrapper or parent workflow which launches subflows to validate and apply fixpacks on a DB2 Installation. A deployment of this workflow has to be created and appropriate values have to be provided. These deployment values will be automatically passed on to the subflows that this workflow triggers.

To use this workflow in your environment, see the following information:

Topic	Information Included
"Prerequisites" on the next page	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on page 97	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
"How to Run this Workflow" on page 99	Instructions for running this workflow in your environment
"Parameters for DB2 - Offline HADR Fixpack Parent Flow" on page 102	List of input parameters for this workflow

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- The source and destination servers must be configured with SSH password-less login across all the nodes.
- A server running AIX 6.1 or 7.1 or Red Hat Enterprise Linux 5 or 6. The operating system platform must be certified for the pertinent DB2 fix pack version.
- DB2 server software—version 9.5, 9.7, 10.1, or 10.5—is installed on the target and is ready to be patched.
- The infrastructure required for applying the fix pack is in place.
- All DB2 Instances are on the same initial fix pack version.
- Patch media:

The DB2 server fix pack file from IBM.

Patch installation files must be available locally or available for download from the software repository.

- Storage: A staging directory with 7-8 gigabytes available to unpack the binary file and to apply the fix pack and archive—requires about double the size of the current DB2 installation on the disk. By default, it is expected to have about double the size of current DB2 Installation on the disk.
- The operating system platform is certified for the pertinent DB2 specific fixpack version.
- The operating system kernel parameters and virtual and shared memory are properly configured to avoid any failure while applying the DB2 fix pack.
- License for HPE DMA.
- License for DB2 Database version 9.5, 9.7, 10.1, or 10.5.
- The workflow must have the unchallenged ability to become the OS administrator user (typically root on UNIX systems).
- For all the instances on the target server, the license has to be activated to use; otherwise the workflow will not be able to restart the instances after the fixpack is applied and database connection may not be possible again.
- The user who runs the workflow with the server wrapper must have the access to create or modify the directory structure for instances and databases.

- All the DMA database metadata must be up-to-date on the target server where the workflow is deployed.
- For clusters, currently only IBM Tivoli is supported.

Additional requirements

For additional requirements, see the following IBM documentation:

DB2 version	IBM documentation
9.5	DB2 Version 9.5 Fix Pack
9.7	DB2 Version 9.7 Fix Pack
10.1	DB2 Version 10.1 Fix Pack
10.5	DB2 Version 10.5 Fix Pack

How this Workflow Works

The following information describes how DB2 - Offline HADR Fixpack Parent Flow workflow works:

Overview

This workflow does the following things in the order shown:

- First, the workflow prepares to apply the patch. It prepares the server, determines the DB2 home, prepares the DB2 instance, and validates the input parameters. If the fixpack files do not already exist they are downloaded from HPE SA. It determines all the pertinent fixpack information.
- Fetches the standby server details for a given primary server in the HADR environment.
- The workflow validates all the input parameters.
- The cluster automation software disabled.
- Launches the "[DB2 - Offline HADR Apply Fixpack](#)" on page 103 workflow to apply provided fixpack on both the primary and standby servers.
- The cluster automation software is enabled.

Validation Checks Performed

Much of the validation centers on the input parameters:

- The input parameters have the proper syntax (no special characters or spaces).
- Files exist or have valid specifications.
- The supplied fixpack update applies to the current version.

Workflow Steps

Steps Used in DB2 - Offline HADR Fixpack Parent Flow

Workflow Step	Description
Gather Parameters Patch Fixpack Offline HADR In Parent	This step accepts parameters for the workflow.
Fetch Standbys from Primary For Offline HADR In Parent	This step fetches the standby server information in the HADR environment for a given primary server. Currently, only one standby server is supported for a primary server.
Validate Parameters for Patch Fixpack Offline HADR In Parent	This step validates if all the input parameter values received in the gather input parameters steps and launches the sub workflow "DB2 - Fixpack Validator" on page 139 .
Disable Automation and HADR	This step disables the cluster automation and brings the peer domain offline.
Apply DB2 Fixpack To Offline HADR DB2 Installation	This step launches the "DB2 - Offline HADR Apply Fixpack" on page 103 workflow to apply provided fixpack on both the primary and standby servers.
Enable Automation and HADR	This step enables the cluster automation and brings the peer domain online.

For parameter descriptions and defaults, see ["Parameters for DB2 - Offline HADR Fixpack Parent Flow" on page 102](#).

How to Run this Workflow

The following instructions show you how to customize and run the DB2 - Offline HADR Fixpack Parent Flow workflow in your environment.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in "[Parameters for DB2 - Offline HADR Fixpack Parent Flow](#)" on page 102.

Note: Before following this procedure, review the [Prerequisites](#), and ensure that all requirements are satisfied.

To use the DB2 - Offline HADR Fixpack Parent Flow workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

Input parameters in the step: Gather Parameters Patch Fixpack Offline HADR In Parent

Parameter Name	Default Value	Required	Description
Current Fixpack Archive	no default	required	Fully qualified file name of DB2 fixpack archive which is currently applied to the DB2 Installation. (Example v10.1fp2_linuxx64_server.tar.gz)
DB2 HADR Database Name	no default	required	The name of the DB2 database configured for HADR.
DB2 HADR Instance Name	no default	required	The name of the DB2 instance configured for HADR.
DB2 Installation Location	no default	required	Fully qualified path where DB2 is installed on the target server.
Download Location	/tmp/archive	optional	Fully qualified directory path where the user specified fixpack file will be downloaded to use it for applying fixpack.
Offline Backup Location	no default	optional	Fully qualified path where the offline database backup will be stored on the target server. Please note that the path

Input parameters in the step: Gather Parameters Patch Fixpack Offline HADR In Parent, continued

Parameter Name	Default Value	Required	Description
			should have requisite permissions so it can be accessible from all DB2 instances.
Primary Server	no default	required	The primary server hostname or IP address in the HADR pair.
Rebind Packages To Database	false	optional	Flag to enable or disable binding capability of workflow step for various packages to database(s) for each instance(s) created against current DB2 installation. Default is false. Valid values are "yes", "y", "true", "false", "n", and "no".
Required Fixpack Archive	no default	required	Fully qualified file name of DB2 fixpack archive which is intended to be applied to the DB2 installation.
Staging Directory	/tmp/staging	optional	Fully qualified path of the directory where DB2 installer will be extracted from archive. Will be cleaned up at end of workflow execution.

Note: See "[Parameters for DB2 - Offline HADR Fixpack Parent Flow](#)" on page 102 for detailed descriptions of all input parameters for this workflow, including default values.

3. In the workflow editor, expose any additional parameters that you need . You will specify values for those parameters when you create the deployment.
4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment.
6. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed. You do not need to specify values for those parameters whose default values are appropriate for your environment.
7. On the Targets tab, specify one or more targets for this deployment.

Note: The target for this workflow is an instance.

8. Save the deployment (click **Save** in the lower right corner).

9. Run the workflow using this deployment.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Parameters for DB2 - Offline HADR Fixpack Parent Flow

The following tables describe the required and optional input parameters for this workflow. Several of these parameters are not initially visible in a deployment. For many parameters, if you do not specify a value for a parameter, a default value is assigned.

Parameters in the step: Gather Parameters Patch Fixpack Offline HADR In Parent

Parameter Name	Default Value	Required	Example Value	Description
Current Fixpack Archive	no default	required	/opt/ibm/db2/V10.5	Fully qualified file name of DB2 fixpack archive which is currently applied to the DB2 Installation. (Example v10.1fp2_linuxx64_server.tar.gz)
DB2 HADR Database Name	no default	required		The name of the DB2 database configured for HADR.
DB2 HADR Instance Name	no default	required		The name of the DB2 instance configured for HADR.
DB2 Installation Location	no default	required	opt/ibm/db2/V10.5	Fully qualified path where DB2 is installed on the target server.
Download Location	/tmp/archive	optional	/tmp/archive	Fully qualified directory path where the user specified fixpack file will be downloaded to use it for applying fixpack.
Offline Backup Location	no default	optional	/tmp/backup	Fully qualified path where the offline database backup will be stored on the target server. Please note that the path should have requisite permissions so it can be accessible from all DB2 instances.
Primary Server	no default	required		The primary server hostname or IP address in the HADR pair.

Parameters in the step: Gather Parameters Patch Fixpack Offline HADR In Parent, continued

Parameter Name	Default Value	Required	Example Value	Description
Rebind Packages To Database	false	optional	false	Flag to enable or disable binding capability of workflow step for various packages to database(s) for each instance (s) created against current DB2 installation. Default is false. Valid values are "yes", "y", "true", "false", "n", and "no".
Required Fixpack Archive	no default	required	v10.1fp3_linuxx64_server.tar.gz	Fully qualified file name of DB2 fixpack archive which is intended to be applied to the DB2 installation.
Staging Directory	/tmp/staging	optional	/tmp/staging	Fully qualified path of the directory where DB2 installer will be extracted from archive. Will be cleaned up at end of workflow execution.

DB2 - Offline HADR Apply Fixpack

This section describes how to use DMA to create a repeatable, standardized method to quickly and accurately apply IBM DB2 fixpack for Offline DB2 HADR installations across an enterprise to keep fix packs current.

This workflow applies fixpack for IBM DB2 Linux, UNIX, and Windows (LUW) instances on the target server where this workflow is deployed. It currently supports the DB2 versions 9.5, 9.7, 10.1, and 10.5 on RedHat Linux and AIX servers. This is a server level workflow. It applies the fixpack to the DB2 home (also known as the DB2 installation directory) installed on the target machine where this workflow is deployed. The workflow currently applies the fixpack to all the instances against the specific DB2 Installation.

To use this workflow in your environment, see the following information:

Topic	Information Included
"Prerequisites" below	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on page 106	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
How to Run this Workflow	Instructions for running this workflow in your environment
"Parameters for DB2 - Offline HADR Apply Fixpack" on page 113	List of input parameters for this workflow

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- A server running AIX 6.1 or 7.1 or Red Hat Enterprise Linux 5 or 6. The operating system platform must be certified for the pertinent DB2 fix pack version.
- DB2 server software—version 9.5, 9.7, 10.1, or 10.5—is installed on the target and is ready to be patched.
- The infrastructure required for applying the fix pack is in place.
- All DB2 Instances are on the same initial fix pack version.

- Patch media:

The DB2 server fix pack file from IBM.

Patch installation files must be available locally or available for download from the software repository.

- Storage: A staging directory with 7-8 gigabytes available to unpack the binary file and to apply the fix pack and archive—requires about double the size of the current DB2 installation on the disk. By default, it is expected to have about double the size of current DB2 Installation on the disk.
- The operating system platform is certified for the pertinent DB2 specific fixpack version.
- The operating system kernel parameters and virtual and shared memory are properly configured to avoid any failure while applying the DB2 fix pack.

- License for HPE DMA.
- License for DB2 Database version 9.5, 9.7, 10.1, or 10.5.
- The workflow must have the unchallenged ability to become the OS administrator user (typically root on UNIX systems).
- For all the instances on the target server, the license has to be activated to use; otherwise the workflow will not be able to restart the instances after the fixpack is applied and database connection may not be possible again.
- The user who runs the workflow with the server wrapper must have the access to create or modify the directory structure for instances and databases.
- All the DMA database metadata must be up-to-date on the target server where the workflow is deployed.
- If an instance update fails, you must manually bind the packages (for each database) using the command **DB2DIR/instance/db2iupdt** *instance name*.
- If DB2 admin server is installed and the update fails during fixpack, you must manually update the DB2 admin server by using the following commands:
 - **DB2DIR/instance/dasupdt** and start up the DB2 administrator server by using **su - instance name** and **db2admin start** commands
- If the database uses federation, perform the following additional binds:
 - **db2 BIND INSTHOME\sqllib\bnd\db2dsproc.bnd** blocking all grant public
 - **db2 BIND INSTHOME\sqllib\bnd\db2stats.bnd** blocking all grant public

Additional requirements

For additional requirements, see the following IBM documentation:

DB2 version	IBM documentation
9.5	DB2 Version 9.5 Fix Pack
9.7	DB2 Version 9.7 Fix Pack
10.1	DB2 Version 10.1 Fix Pack
10.5	DB2 Version 10.5 Fix Pack

How this Workflow Works

The following information describes how the DB2 - Offline HADR Apply Fixpack workflow works:

Overview

This workflow does the following things in the order shown:

- First, the workflow prepares to apply the patch. It prepares the server, determines the DB2 home, prepares the DB2 instance, and validates the input parameters. If the fixpack files do not already exist they are downloaded from HPE SA. It determines all the pertinent fixpack information.
- Offline HADR software archives are staged, database configuration is backed up, and DB2 instances are shutdown.
- Fixpack is applied for offline HADR installation, DB2 instances, and system catalog for each database are updated.
- The workflow verifies the fixpack.
- The DB2 instances are restarted and packages are bound to the databases.
- The DB2 databases are discovered.
- Finally, the workflow cleans up files that are no longer needed.

Validation Checks Performed

Much of the validation centers on the input parameters:

- The input parameters have the proper syntax (no special characters or spaces).
- Files exist or have valid specifications.
- The supplied fixpack update applies to the current version.

Workflow Steps**Steps Used in DB2 - Offline HADR Apply Fixpack**

Workflow Step	Description
Gather Parameters to Patch Offline HADR Fixpack	This step accepts parameters for the workflow. All the parameters are mandatory in this step.
Gather Advanced Parameters to Patch Offline HADR Fixpack	This step sets all the DB2 advanced configurable parameters that are used in subsequent workflow steps.
Validate Parameters for Patch Offline HADR Fixpack	This step validates all the input parameter values received, validates the DB2 target, and ensures it meets all the criteria to apply fixpack.
Stage Offline HADR Fixpack Software Archive	This step validates the input staging path and binary archive files to unpack (unzip or extract) to install the software. Depending upon the file extensions (.tar, .gz), it chooses the right library to unpack the software binary file. It also validates the disk space availability before it unpacks the binary file.
Download Software	This step automates the transfer of files from the HPE SA software library to individual managed servers for use in downstream workflow steps. Verifies checksum of each file transferred.
Capture Configuration and take full Offline Backup	This step capture various configuration details of DB2 database on the target. It also takes the offline database backup of the database.
Shutdown DB2 Instances For Offline HADR Patch	This step shuts down the DB2 processes like DAS, fault monitor, and licensing daemon before applying the fixpack.
Apply DB2 Fixpack To Offline HADR Installation	This step runs the installFixpack utility from DB2 and apply the fixpack for the existing DB2 installation. This will not be installing the DB2 software but just apply the patch. As part of installFixpack run, it also updates all the instances against the DB2 installation which is patched. It does not update any database on the fixpack level that we applied. That has to be performed manually for all the databases that are created under the instances that have been patched.
Update DB2 Instances For Offline HADR	This step scans the target server and discovers all the instances eligible to update with the newly installed fixpack. It will then update each instance(s) with the new fixpack installation pointing to it.
Restore to Original State	This step restores the installation to its previous state. The restore is at 3 stages: 1. Installation

Steps Used in DB2 - Offline HADR Apply Fixpack , continued

Workflow Step	Description
	<p>2. Instance</p> <p>3. Database using restore from backup</p> <p>This step runs the installFixPack command at the location where Current Fixpack Archive is unpacked to revert the fixpack to its original state.</p>
Verify Offline HADR Patch Fixpack	<p>This step runs the db2level utility from DB2 and verifies if the existing DB2 installation is on the same fixpack level that is applied in this workflow. It also verifies if all the instances provided against the DB2 installation location are also on the same patch level as expected.</p>
Discover DB2 Databases	<p>This step audits the server's physical environment looking for DB2 databases.</p> <p>Discovery is only additive. It will not remove instances or databases currently in your environment. It is the end-user's responsibility to delete content that is no longer in use.</p> <p>In cluster situations where one node is active while other nodes are inactive, Discovery will only find instances and databases on the active node. Nothing will be added to inactive nodes.</p>
Restart DB2 Instances For Fixpack	<p>This step restarts all the DB2 instances and processes provisioned against the user specified input DB2 installation location.</p>
Cleanup Downloaded Files	<p>This step removes files and archives that were downloaded to the target system during previous workflow steps.</p>
Bind Packages To Database	<p>This step binds various packages to database(s) for each instance(s) created against current DB2 installation. The default value is set to "false" which will not bind any packages. If it is set to "true", binding will occur for all the database eligible for new package bindings post applying the fixpack. By doing this, databases can use the features of newly applied fixpack.</p>

For parameter descriptions and defaults, see ["Parameters for DB2 - Offline HADR Apply Fixpack" on page 113](#).

How to Run this Workflow

The following instructions show you how to customize and run the DB2 - Offline HADR Apply Fixpack workflow in your environment.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in ["Parameters for DB2 - Offline HADR Apply Fixpack" on page 113](#).

Note: Before following this procedure, review the ["Prerequisites" on page 104](#), and ensure that all requirements are satisfied.

To use the the DB2 - Offline HADR Apply Fixpack workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

Input parameters in the step: Gather Parameters to Patch Offline HADR Fixpack

Parameter Name	Default Value	Required	Description
Current Fixpack Archive	no default	required	Fully qualified file name of DB2 fixpack archive which is currently applied to the DB2 Installation.
DB2 Installation Location	no default	required	Fully qualified path where DB2 is installed on the target server.
Required Fixpack Archive	no default	required	Fully qualified file name of DB2 fixpack archive which is intended to be applied to the DB2 Installation.

Input parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fixpack

Parameter Name	Default Value	Required	Description
Clean on Success	False	optional	Determines whether to remove downloaded and extracted files as well as cleans up installed directory on successful execution of workflow. Default is set to False.

Input parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fixpack, continued

Parameter Name	Default Value	Required	Description
DB2 Installation Location	no default	required	Fully qualified path where DB2 is installed on the target server.
Download Location	/tmp/archive	optional	Fully qualified directory path where the user specified fixpack file will be downloaded to use it for applying fixpack.
Fixpack Install Folder	no default	optional	The folder where the fixpack will be installed. If left blank, it will be installed on the DB2 installation.
Offline Backup Location	no default	optional	Fully qualified path where the offline database backup will be stored on the target server. Please note that the path should have requisite permissions so it can be accessible from all DB2 instances.
Rebind Packages To Database	False	optional	Flag to enable or disable binding capability of workflow step for various packages to database(s) for each instance(s) created against current DB2 installation. The default value is set to "false" which will not bind any packages. Valid values are "yes", "y", "true", "false", "n", or "no".
Staging Directory	/tmp/staging	optional	Fully qualified path of the directory where DB2 installer will be extracted from archive. Will be cleaned up at end of workflow execution. Default value is /tmp/staging.
Instance SSL Port	no default	optional	Comma separated list of values corresponding to an instance name. This will be used to initialize the listener port in the SSL configuration file. For

Input parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fix-pack, continued

Parameter Name	Default Value	Required	Description
			example, if Instance Name Parameter value is http_instance1,http_instance2, the port values can be 1234,4321 where 1234 belongs to http_instance1 and 4321 belongs to http_instance2.
Web Service Password	no default	optional	Password for the DMA Discovery web service API to discover and update the metadata in DMA.
Web Service URL	no default	optional	URL for the DMA Discovery web service API to discover and update metadata in DMA.
Web Service User	no default	optional	User for the DMA Discovery web service API to discover and update metadata in DMA.

Note: See "[Parameters for DB2 - Offline HADR Apply Fixpack](#)" on page 113 for detailed descriptions of all input parameters for this workflow, including default values.

3. In the workflow editor, expose any additional parameters that you need . You will specify values for those parameters when you create the deployment.
4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment.
6. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed. You do not need to specify values for those parameters whose default values are appropriate for your environment.
7. On the Targets tab, specify one or more targets for this deployment.

Note: The target for this workflow is an instance.

8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Parameters for DB2 - Offline HADR Apply Fixpack

The following tables describe the required and optional input parameters for this workflow. Several of these parameters are not initially visible in a deployment. For many parameters, if you do not specify a value for a parameter, a default value is assigned.

Parameters in the step: Gather Parameters to Patch Offline HADR Fixpack

Parameter Name	Default Value	Required	Example Value	Description
Current Fixpack Archive	no default	required	v10.1fp2_linuxx64_server.tar.gz	Fully qualified file name of DB2 fixpack archive which is currently applied to the DB2 Installation.
DB2 Installation Location	no default	required	/opt/ibm/db2/V10.5	Fully qualified path where DB2 is installed on the target server.
Required Fixpack Archive	no default	required	v10.1fp3_linuxx64_server.tar.gz	Fully qualified file name of DB2 fixpack archive which is intended to be applied to the DB2 Installation.

Parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fixpack

Parameter Name	Default Value	Required	Example Value	Description
Clean on Success	True	optional	False	Determines whether to remove downloaded and extracted files as well as cleans up installed directory on successful execution of workflow. Default is set to False.
DB2 Installation Location	no default	required	/opt/ibm/db2/V10.5	Fully qualified path where DB2 is installed on the target server.
Download Location	/tmp/archive	optional	/tmp/archive	Fully qualified directory path where the user specified fixpack file will be downloaded to use it for applying fixpack.
Fixpack Install Folder	no default	optional	/opt/ibm/db2/V10.5/fp2	The folder where the fixpack will be installed. If left blank, it will be installed

Parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fixpack, continued

Parameter Name	Default Value	Required	Example Value	Description
				on the DB2 installation.
Offline Backup Location	no default	optional	/tmp/backup	Fully qualified path where the offline database backup will be stored on the target server. Please note that the path should have requisite permissions so it can be accessible from all DB2 instances.
Rebind Packages To Database	False	optional	False	Flag to enable or disable binding capability of workflow step for various packages to database(s) for each instance(s) created against current DB2 installation. The default value is set to "false" which will not bind any packages. Valid values are "yes", "y", "true", "false", "n", or "no".
Staging Directory	/tmp/staging	optional	/tmp/staging	Fully qualified path of the directory where DB2 installer will be extracted from archive. Will be cleaned up at end of workflow execution. Default value is /tmp/staging.
Instance SSL Port	no default	optional		Comma separated list of values corresponding to an instance name. This will be used to initialize the listener port in the SSL configuration file. For example, if Instance Name Parameter value is http_instance1,http_instance2, the port values can be 1234,4321 where 1234 belongs to http_instance1 and 4321 belongs to http_instance2.

Parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fixpack, continued

Parameter Name	Default Value	Required	Example Value	Description
Web Service Password	no default	optional		Password for the DMA Discovery web service API to discover and update the metadata in DMA.
Web Service URL	no default	optional		URL for the DMA Discovery web service API to discover and update metadata in DMA.
Web Service User	no default	optional		User for the DMA Discovery web service API to discover and update metadata in DMA.

DB2 - Offline HADR Rollback Fixpack

This section describes how to use DMA to create a repeatable, standardized method to quickly and accurately roll back IBM DB2 fixpack from a standalone Enterprise Server Edition DB2.

This workflow rolls back fixpack for IBM DB2 LUW (Linux, UNIX, and Windows) instances on the target server where this workflow is deployed. It currently supports the DB2 versions 9.5, 9.7, 10.1, 10.5 on RedHat Linux and AIX servers. This is a server level workflow. It will rollback the fixpack to the DB2 home (also known as the DB2 installation directory, for example: /opt/ibm/db2/V10.5) installed on the target machine where this workflow is deployed. It updates all the instances with the fixpack of DB2 that are created against the specific DB2 Installation.

This workflow shuts down all the DB2 instances, DB2 admin server, and licensing daemons that are running for all the instances that are provisioned against a specific DB2 home (DB2 installation location). It kills all the application user connections with DB2 instances that are to be patched. It validates the eligibility for the fixpack to apply by comparing the current fixpack level on the installed DB2 against the fixpack level that user is trying to apply.

To use this workflow in your environment, see the following information:

Topic	Information Included
"Prerequisites" below	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on page 118	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
"How to Run this Workflow" on page 121	Instructions for running this workflow in your environment
"Parameters for DB2 - Offline HADR Rollback Fixpack" on page 125	List of input parameters for this workflow

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- A server running AIX 6.1 or 7.1 or Red Hat Enterprise Linux 5 or 6. The operating system platform must be certified for the pertinent DB2 fix pack version.
- DB2 server software—version 9.5, 9.7, 10.1, or 10.5—is installed on the target and is ready to be patched.
- The infrastructure required for applying the fix pack is in place.
- All DB2 Instances are on the same initial fix pack version.
- Patch media:

The DB2 server fix pack file from IBM.

Patch installation files must be available locally or available for download from the software repository.

- Storage: A staging directory with 7-8 gigabytes available to unpack the binary file and to apply the fix pack and archive—requires about double the size of the current DB2 installation on the disk. By default, it is expected to have about double the size of current DB2 Installation on the disk.
- The operating system platform is certified for the pertinent DB2 specific fixpack version.
- The operating system kernel parameters and virtual and shared memory are properly configured to avoid any failure while applying the DB2 fix pack.

- License for HPE DMA.
- License for DB2 Database version 9.5, 9.7, 10.1, or 10.5.
- The workflow must have the unchallenged ability to become the OS administrator user (typically root on UNIX systems).
- For all the instances on the target server, the license has to be activated to use; otherwise the workflow will not be able to restart the instances after the fixpack is applied and database connection may not be possible again.
- The user who runs the workflow with the server wrapper must have the access to create or modify the directory structure for instances and databases.
- All the DMA database metadata must be up-to-date on the target server where the workflow is deployed.
- If an instance update fails, you must manually bind the packages (for each database) using the command **DB2DIR/instance/db2iupdt** *instance name*.
- If DB2 admin server is installed and the update fails during fixpack, you must manually update the DB2 admin server by using the following commands:
 - **DB2DIR/instance/dasupdt** and start up the DB2 admin server by using **su - instance name** and **db2admin start** commands
- If the database uses federation, perform the following additional binds:
 - **db2 BIND INSTHOME\sqllib\bnd\db2dsproc.bnd** blocking all grant public
 - **db2 BIND INSTHOME\sqllib\bnd\db2stats.bnd** blocking all grant public

Additional requirements

For additional requirements, see the following IBM documentation:

DB2 version	IBM documentation
9.5	DB2 Version 9.5 Fix Pack
9.7	DB2 Version 9.7 Fix Pack
10.1	DB2 Version 10.1 Fix Pack
10.5	DB2 Version 10.5 Fix Pack

How this Workflow Works

The following information describes how the DB2 - Offline HADR Rollback Fixpack workflow works:

Overview

This workflow does the following things in the order shown:

- First, the workflow prepares to rollback the patch. It prepares the server, determines the DB2 home, prepares the DB2 instance, and validates the input parameters. If the fixpack files do not already exist they are downloaded from HPE SA. It determines all the pertinent fixpack information.
- Offline HADR software archives are staged, database configuration is backed up, and DB2 instances are shutdown.
- Fixpack is rolled back for offline HADR installation and DB2 instances are updated.
- The workflow verifies the fixpack.
- The DB2 instances are restarted and packages are bound to the databases.
- The DB2 databases are discovered.
- Finally, the workflow cleans up files that are no longer needed.

Validation Checks Performed

Much of the validation centers on the input parameters:

- The input parameters have the proper syntax (no special characters or spaces).
- Files exist or have valid specifications.
- The supplied fixpack update applies to the current version.

Workflow Steps**Steps Used in DB2 - Offline HADR Apply Fixpack**

Workflow Step	Description
Gather Parameters to Patch Offline HADR Fixpack	This step accepts parameters for the workflow. All the parameters are mandatory in this step.
Gather Advanced Parameters to Patch Offline HADR Fixpack	This step sets all the DB2 advanced configurable parameters that are used in subsequent workflow steps.
Validate Parameters for Patch Offline HADR Fixpack	This step validates all the input parameter values received, validates the DB2 target, and ensures it meets all the criteria to rollback fixpack.
Stage Offline HADR Fixpack Software Archive	This step validates the input staging path and binary archive files to unpack (unzip or extract) to install the software. Depending upon the file extensions (.tar, .gz), it chooses the right library to unpack the software binary file. It also validates the disk space availability before it unpacks the binary file.
Download Software	This step automates the transfer of files from the HPE SA software library to individual managed servers for use in downstream workflow steps. Verifies checksum of each file transferred.
Capture Configuration and take full Offline Backup	This step capture various configuration details of DB2 database on the target. It also takes the offline database backup of the database.
Shutdown DB2 Instances For Offline HADR Rollback	This step shuts down the DB2 processes like DAS, fault monitor, and licensing daemon before rolling back the fixpack.
DeInstall DB2 Fixpack To Offline HADR Installation	This step runs the installFixpack utility from DB2 and rolls back the fixpack using the -f level parameter of installFixPack command for the existing DB2 Installation. As part of installFixpack run, it also updates all the instances against the DB2 installation which are patched. It does not update any database on the fixpack level that we applied. That has to be performed manually for all the databases that are created under the instances that have been patched.
Update DB2 Instances For Offline HADR	This step scans the target server and discovers all the instances eligible to update with the newly installed fixpack. It will then update each instance(s) with the new fixpack installation pointing to it.
Restore to Original State	This step restores the installation to its previous state. The restore is at 3 stages: 1. Installation

Steps Used in DB2 - Offline HADR Apply Fixpack , continued

Workflow Step	Description
	<p>2. Instance</p> <p>3. Database using restore from backup</p> <p>This step runs the installFixPack command at the location where Current Fixpack Archive is unpacked to revert the fixpack to its original state.</p>
Verify Offline HADR Patch Fixpack	<p>This step runs the db2level utility from DB2 and verifies if the existing DB2 installation is on the same fixpack level that is applied in this workflow. It also verifies if all the instances provided against the DB2 installation location are also on the same patch level as expected.</p>
Discover DB2 Databases	<p>This step audits the server's physical environment looking for DB2 databases.</p> <p>Discovery is only additive. It will not remove instances or databases currently in your environment. It is the end-user's responsibility to delete content that is no longer in use.</p> <p>In cluster situations where one node is active while other nodes are inactive, Discovery will only find instances and databases on the active node. Nothing will be added to inactive nodes.</p>
Restart DB2 Instances For Fixpack	<p>This step restarts all the DB2 instances and processes provisioned against the user specified input DB2 installation location.</p>
Cleanup Downloaded Files	<p>This step removes files and archives that were downloaded to the target system during previous workflow steps.</p>
Bind Packages To Database	<p>This step binds various packages to database(s) for each instance(s) created against current DB2 installation. The default value is set to "false" which will not bind any packages. If it is set to "true", binding will occur for all the database eligible for new package bindings post applying the fixpack. By doing this, databases can use the features of newly applied fixpack.</p>

For parameter descriptions and defaults, see ["Parameters for DB2 - Offline HADR Rollback Fixpack"](#) on page 125.

How to Run this Workflow

The following instructions show you how to customize and run the DB2 - Offline HADR Apply Fixpack workflow in your environment.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in ["Parameters for DB2 - Offline HADR Rollback Fixpack" on page 125](#).

Note: Before following this procedure, review the ["Prerequisites" on page 116](#), and ensure that all requirements are satisfied.

To use the the DB2 - Offline HADR Apply Fixpack workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

Input parameters in the step: Gather Parameters to Patch Offline HADR Fixpack

Parameter Name	Default Value	Required	Description
Current Fixpack Archive	no default	required	Fully qualified file name of DB2 fixpack archive which is currently applied to the DB2 Installation.
DB2 Installation Location	no default	required	Fully qualified path where DB2 is installed on the target server.
Required Fixpack Archive	no default	required	Fully qualified file name of DB2 fixpack archive which is intended to be applied to the DB2 Installation.

Input parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fixpack

Parameter Name	Default Value	Required	Description
Clean on Success	True	optional	Determines whether to remove downloaded and extracted files as well as cleans up installed directory on successful execution of workflow. Default is set to True, which will clean up on failure.

Input parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fix-pack, continued

Parameter Name	Default Value	Required	Description
DB2 Installation Location	no default	required	Fully qualified path where DB2 is installed on the target server.
Download Location	/tmp/archive	optional	Fully qualified directory path where the user specified fixpack file will be downloaded to use it for applying fixpack.
Fixpack Install Folder	no default	optional	The folder where the fixpack will be installed. If left blank, it will be installed on the DB2 installation.
Offline Backup Location	no default	optional	Fully qualified path where the offline database backup will be stored on the target server. Please note that the path should have requisite permissions so it can be accessible from all DB2 instances.
Rebind Packages To Database	False	optional	Flag to enable or disable binding capability of workflow step for various packages to database(s) for each instance(s) created against current DB2 installation. The default value is set to "false" which will not bind any packages. Valid values are "yes", "y", "true", "false", "n", or "no".
Staging Directory	/tmp/staging	optional	Fully qualified path of the directory where DB2 installer will be extracted from archive. Will be cleaned up at end of workflow execution. Default value is /tmp/staging.
Instance SSL Port	no default	optional	Comma separated list of values corresponding to an instance name. This will be used to initialize the listener port in the SSL configuration file. For

Input parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fix-pack, continued

Parameter Name	Default Value	Required	Description
			example, if Instance Name Parameter value is http_instance1,http_instance2, the port values can be 1234,4321 where 1234 belongs to http_instance1 and 4321 belongs to http_instance2.
Web Service Password	no default	optional	Password for the DMA Discovery web service API to discover and update the metadata in DMA.
Web Service URL	no default	optional	URL for the DMA Discovery web service API to discover and update metadata in DMA.
Web Service User	no default	optional	User for the DMA Discovery web service API to discover and update metadata in DMA.

Note: See "[Parameters for DB2 - Offline HADR Rollback Fixpack](#)" on page 125 for detailed descriptions of all input parameters for this workflow, including default values.

3. In the workflow editor, expose any additional parameters that you need . You will specify values for those parameters when you create the deployment.
4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment.
6. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed. You do not need to specify values for those parameters whose default values are appropriate for your environment.
7. On the Targets tab, specify one or more targets for this deployment.

Note: The target for this workflow is an instance.

8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Parameters for DB2 - Offline HADR Rollback Fixpack

The following tables describe the required and optional input parameters for this workflow. Several of these parameters are not initially visible in a deployment. For many parameters, if you do not specify a value for a parameter, a default value is assigned.

Parameters in the step: Gather Parameters to Patch Offline HADR Fixpack

Parameter Name	Default Value	Required	Example Value	Description
Current Fixpack Archive	no default	required	v10.1fp2_linuxx64_server.tar.gz	Fully qualified file name of DB2 fixpack archive which is currently applied to the DB2 Installation.
DB2 Installation Location	no default	required	/opt/ibm/db2/V10.5	Fully qualified path where DB2 is installed on the target server.
Required Fixpack Archive	no default	required	v10.1fp3_linuxx64_server.tar.gz	Fully qualified file name of DB2 fixpack archive which is intended to be applied to the DB2 Installation.

Parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fixpack

Parameter Name	Default Value	Required	Example Value	Description
Clean on Success	True	optional	True	Determines whether to remove downloaded and extracted files as well as cleans up installed directory on successful execution of workflow. Default is set to True, which will clean up on failure.
DB2 Installation Location	no default	required	/opt/ibm/db2/V10.5	Fully qualified path where DB2 is installed on the target server.
Download Location	/tmp/archive	optional	/tmp/archive	Fully qualified directory path where the user specified fixpack file will be downloaded to use it for applying fixpack.
Fixpack Install Folder	no default	optional	/opt/ibm/db2/V10.5/fp2	The folder where the fixpack will be installed. If

Parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fixpack, continued

Parameter Name	Default Value	Required	Example Value	Description
				left blank, it will be installed on the DB2 installation.
Offline Backup Location	no default	optional	/tmp/backup	Fully qualified path where the offline database backup will be stored on the target server. Please note that the path should have requisite permissions so it can be accessible from all DB2 instances.
Rebind Packages To Database	False	optional	False	Flag to enable or disable binding capability of workflow step for various packages to database(s) for each instance(s) created against current DB2 installation. The default value is set to "false" which will not bind any packages. Valid values are "yes", "y", "true", "false", "n", or "no".
Staging Directory	/tmp/staging	optional	/tmp/staging	Fully qualified path of the directory where DB2 installer will be extracted from archive. Will be cleaned up at end of workflow execution. Default value is /tmp/staging.
Instance SSL Port	no default	optional		Comma separated list of values corresponding to an instance name. This will be used to initialize the listener port in the SSL configuration file. For example, if Instance Name Parameter value is http_instance1,http_instance2, the port values can be 1234,4321 where 1234 belongs to http_instance1 and 4321 belongs to http_

Parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fixpack, continued

Parameter Name	Default Value	Required	Example Value	Description
				instance2.
Web Service Password	no default	optional		Password for the DMA Discovery web service API to discover and update the metadata in DMA.
Web Service URL	no default	optional		URL for the DMA Discovery web service API to discover and update metadata in DMA.
Web Service User	no default	optional		User for the DMA Discovery web service API to discover and update metadata in DMA.

DB2 - Rollback Helper

This workflow is used for rolling back fixpacks on an offline DB2 HADR installation. This workflow is invoked from within the parent workflow, "[DB2 - Offline HADR Fixpack Parent Flow](#)" on page 95.

This workflow rolls back fixpack for IBM DB2 LUW (Linux, UNIX, and Windows) instances on the target server. It currently supports the DB2 Versions 9.5, 9.7, 10.1, 10.5 on Red Hat Linux and AIX servers. This is a server level workflow. It will rollback the fixpack to the DB2 Home (also known as the DB2 installation directory, for example: /opt/ibm/db2/V10.5) installed on the target machine where this workflow is deployed. It updates all the instances with the fixpack of DB2 that are created against the specific DB2 installation.

This workflow shuts down all the DB2 instances, DB2 Admin Server, and licensing daemons that are running for all the instances that are provisioned against a specific DB2 home (DB2 Installation Location). It kills all the application user connections with DB2 instances that are to be patched. It validates the eligibility for the fixpack to apply by comparing the current fixpack level on the installed DB2 against the fixpack level that user is trying to apply.

To use this workflow in your environment, see the following information:

Topic	Information Included
"Prerequisites" below	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on the next page	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
"How to Run this Workflow" on page 133	Instructions for running this workflow in your environment
"Parameters for DB2 - Rollback Helper" on page 137	List of input parameters for this workflow

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- To use this workflow, you must provide the DB2 fixpack archive file which is downloaded either on the target server, or where it can be downloaded by the workflow.
- The workflow must have the unchallenged ability to become the OS administrator user (typically root on UNIX systems).
- For all the instances on the target machine, the license has to be activated to use; otherwise the workflow will not be able to restart the instances after the fixpack is applied and database connection may not be possible again.
- The user who runs the workflow with the server wrapper must have the access to create or modify the directory structure for instances and databases.
- As stated in the IBM DB2 release bulletin, the following prerequisites must be satisfied before this workflow is run:
 - DB2 software must be already installed on the target machine.
 - The infrastructure required for applying fixpack should be in place. Make sure the target server has adequate available disk space to unpack the binary file and apply the fixpack. By default, it is expected to have about double the size of current DB2 Installation on the disk.
 - The operating system platform is certified for the pertinent DB2 specific fixpack version.

- The operating system kernel parameters and virtual and shared memory is properly configured to avoid any failure while applying the DB2 fixpack.
- All DMA database metadata must be up-to-date on the target server where the workflow is deployed.
- The workflow currently applies the fixpack to all the instances against the specific DB2 Installation. It does not currently support to apply the fixpack for a specific instance.
- If an instance update fails, you must manually bind the packages (for each database) using the command **DB2DIR/instance/db2iupdt***instance name*.
- If DB2 admin server is installed and the update fails during fixpack, you must manually update the DB2 admin server by using the following commands:
 - **DB2DIR/instance/dasupdt** and start up the DB2 admin server by using **su - instance name** and **db2admin start** commands
- If the database uses federation, perform the following additional binds:
 - **db2 BIND INSTHOME\sqllib\bnd\db2dsproc.bnd** blocking all grant public
 - **db2 BIND INSTHOME\sqllib\bnd\db2stats.bnd** blocking all grant public

Additional requirements

For additional requirements, see the following IBM documentation:

DB2 version	IBM documentation
9.5	DB2 Version 9.5 Fix Pack
9.7	DB2 Version 9.7 Fix Pack
10.1	DB2 Version 10.1 Fix Pack
10.5	DB2 Version 10.5 Fix Pack

How this Workflow Works

The following information describes how the DB2 - Rollback Helper workflow works:

Overview

This workflow does the following things in the order shown:

- First, the workflow prepares to rollback the patch. It prepares the server, determines the DB2 home, prepares the DB2 instance, and validates the input parameters. If the fixpack files do not already exist they are downloaded from HPE SA. It determines all the pertinent fixpack information.
- Fixpack binaries are staged and DB2 instances are shutdown.
- Fixpack is rolled back and DB2 instances are updated.
- The workflow verifies the fixpack.
- The DB2 instances are restarted and packages are bound to the databases.
- The DB2 databases are discovered.
- Finally, the workflow cleans up files that are no longer needed.

Validation Checks Performed

Much of the validation centers on the input parameters:

- The input parameters have the proper syntax (no special characters or spaces).
- Files exist or have valid specifications.
- The supplied fixpack update applies to the current version.

Workflow Steps**Steps Used in DB2 - Rollback Helper**

Workflow Step	Description
Gather Parameters to Patch Offline HADR Fixpack	This step accepts parameters for the workflow. All the parameters are mandatory in this step.
Gather Advanced Parameters to Patch Offline HADR Fixpack	This step sets all the DB2 advanced configurable parameters that are used in subsequent workflow steps.
Stage Offline HADR Fixpack Software Archive	This step validates the input staging path and binary archive files to unpack (unzip or extract) to install the software. Depending upon the file extensions (.tar, .gz), it chooses the right library to unpack the software binary file. It also validates the disk space availability before it unpacks the binary file.
Prepare Binaries List	This step accepts the current and required fixpack binaries and formats them.
Shutdown DB2 Instances For Rollback	This step shuts down the DB2 processes like DAS, fault monitor, and licensing daemon before rolling back the fixpack.
DeInstall DB2 Fixpack in Rollback	This step runs the installFixpack utility from DB2 and rolls back the fixpack using the -f level parameter of installFixPack command for the existing DB2 Installation. As part of installFixpack run, it also updates all the instances against the DB2 installation which are patched. It does not update any database on the fixpack level that we applied. That has to be performed manually for all the databases that are created under the instances that have been patched.
Update DB2 Instances For Offline HADR	This step scans the target server and discovers all the instances eligible to update with the newly installed fixpack. It will then update each instance(s) with the new fixpack installation pointing to it.
Verify Offline HADR Patch Fixpack	This steps runs the db2level utility from DB2 and to verifies if the existing DB2 installation is on the same fixpack level that is applied in this workflow. It also verifies if all the instances provided against the DB2 installation location are also on the same patch level as expected.
Restart DB2 Instances For Fixpack	This step restarts all the DB2 instances and processes provisioned against the user specified input DB2 installation location.
Discover DB2 Databases	This step audits the server's physical environment looking for DB2 databases. Discovery is only additive. It will not remove instances or

Steps Used in DB2 - Rollback Helper , continued

Workflow Step	Description
	<p data-bbox="662 331 1341 401">databases currently in your environment. It is the end-user's responsibility to delete content that is no longer in use.</p> <p data-bbox="662 436 1317 569">In cluster situations where one node is active while other nodes are inactive, Discovery will only find instances and databases on the active node. Nothing will be added to inactive nodes.</p>
Cleanup Downloaded Files	This step removes files and archives that were downloaded to the target system during previous workflow steps.

For parameter descriptions and defaults, see ["Parameters for DB2 - Rollback Helper" on page 137](#).

How to Run this Workflow

The following instructions show you how to customize and run the DB2 - Rollback Helper workflow in your environment.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in ["Parameters for DB2 - Rollback Helper" on page 137](#).

Note: Before following this procedure, review the ["Prerequisites" on page 128](#), and ensure that all requirements are satisfied.

To use the the DB2 - Offline HADR Apply Fixpack workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

Input parameters in the step: Gather Parameters to Patch Offline HADR Fixpack

Parameter Name	Default Value	Required	Description
Current Fixpack Archive	no default	required	Fully qualified file name of DB2 fixpack archive which is currently applied to the DB2 Installation.
DB2 Installation Location	no default	required	Fully qualified path where DB2 is installed on the target server.
Required Fixpack Archive	no default	required	Fully qualified file name of DB2 fixpack archive which is intended to be applied to the DB2 Installation.

Input parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fixpack

Parameter Name	Default Value	Required	Description
Clean on Success	True	optional	Determines whether to remove downloaded and extracted files as well as cleans up installed directory on successful execution of workflow. Default is set to True, which will clean up on failure.

Input parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fix-pack, continued

Parameter Name	Default Value	Required	Description
DB2 Installation Location	no default	required	Fully qualified path where DB2 is installed on the target server.
Download Location	/tmp/archive	optional	Fully qualified directory path where the user specified fixpack file will be downloaded to use it for applying fixpack.
Fixpack Install Folder	no default	optional	The folder where the fixpack will be installed. If left blank, it will be installed on the DB2 installation.
Offline Backup Location	no default	optional	Fully qualified path where the offline database backup will be stored on the target server. Please note that the path should have requisite permissions so it can be accessible from all DB2 instances.
Rebind Packages To Database	False	optional	Flag to enable or disable binding capability of workflow step for various packages to database(s) for each instance(s) created against current DB2 installation. The default value is set to "false" which will not bind any packages. Valid values are "yes", "y", "true", "false", "n", or "no".
Staging Directory	/tmp/staging	optional	Fully qualified path of the directory where DB2 installer will be extracted from archive. Will be cleaned up at end of workflow execution. Default value is /tmp/staging.
Instance SSL Port	no default	optional	Comma separated list of values corresponding to an instance name. This will be used to initialize the listener port in the SSL configuration file. For

Input parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fix-pack, continued

Parameter Name	Default Value	Required	Description
			example, if Instance Name Parameter value is http_instance1,http_instance2, the port values can be 1234,4321 where 1234 belongs to http_instance1 and 4321 belongs to http_instance2.
Web Service Password	no default	optional	Password for the DMA Discovery web service API to discover and update the metadata in DMA.
Web Service URL	no default	optional	URL for the DMA Discovery web service API to discover and update metadata in DMA.
Web Service User	no default	optional	User for the DMA Discovery web service API to discover and update metadata in DMA.

Note: See "[Parameters for DB2 - Rollback Helper](#)" on page 137 for detailed descriptions of all input parameters for this workflow, including default values.

3. In the workflow editor, expose any additional parameters that you need . You will specify values for those parameters when you create the deployment.
4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment.
6. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed. You do not need to specify values for those parameters whose default values are appropriate for your environment.
7. On the Targets tab, specify one or more targets for this deployment.

Note: The target for this workflow is an instance.

8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Parameters for DB2 - Rollback Helper

The following tables describe the required and optional input parameters for this workflow. Several of these parameters are not initially visible in a deployment. For many parameters, if you do not specify a value for a parameter, a default value is assigned.

Parameters in the step: Gather Parameters to Patch Offline HADR Fixpack

Parameter Name	Default Value	Required	Example Value	Description
Current Fixpack Archive	no default	required	v10.1fp2_linuxx64_server.tar.gz	Fully qualified file name of DB2 fixpack archive which is currently applied to the DB2 Installation.
DB2 Installation Location	no default	required	/opt/ibm/db2/V10.5	Fully qualified path where DB2 is installed on the target server.
Required Fixpack Archive	no default	required	v10.1fp3_linuxx64_server.tar.gz	Fully qualified file name of DB2 fixpack archive which is intended to be applied to the DB2 Installation.

Parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fixpack

Parameter Name	Default Value	Required	Example Value	Description
Clean on Success	True	optional	True	Determines whether to remove downloaded and extracted files as well as cleans up installed directory on successful execution of workflow. Default is set to True, which will clean up on failure.
DB2 Installation Location	no default	required	/opt/ibm/db2/V10.5	Fully qualified path where DB2 is installed on the target server.
Download Location	/tmp/archive	optional	/tmp/archive	Fully qualified directory path where the user specified fixpack file will be downloaded to use it for applying fixpack.
Fixpack Install Folder	no default	optional	/opt/ibm/db2/V10.5/fp2	The folder where the fixpack will be installed. If

Parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fixpack, continued

Parameter Name	Default Value	Required	Example Value	Description
				left blank, it will be installed on the DB2 installation.
Offline Backup Location	no default	optional	/tmp/backup	Fully qualified path where the offline database backup will be stored on the target server. Please note that the path should have requisite permissions so it can be accessible from all DB2 instances.
Rebind Packages To Database	False	optional	False	Flag to enable or disable binding capability of workflow step for various packages to database(s) for each instance(s) created against current DB2 installation. The default value is set to "false" which will not bind any packages. Valid values are "yes", "y", "true", "false", "n", or "no".
Staging Directory	/tmp/staging	optional	/tmp/staging	Fully qualified path of the directory where DB2 installer will be extracted from archive. Will be cleaned up at end of workflow execution. Default value is /tmp/staging.
Instance SSL Port	no default	optional		Comma separated list of values corresponding to an instance name. This will be used to initialize the listener port in the SSL configuration file. For example, if Instance Name Parameter value is http_instance1,http_instance2, the port values can be 1234,4321 where 1234 belongs to http_instance1 and 4321 belongs to http_

Parameters in the step: Gather Advanced Parameters to Patch Offline HADR Fixpack, continued

Parameter Name	Default Value	Required	Example Value	Description
				instance2.
Web Service Password	no default	optional		Password for the DMA Discovery web service API to discover and update the metadata in DMA.
Web Service URL	no default	optional		URL for the DMA Discovery web service API to discover and update metadata in DMA.
Web Service User	no default	optional		User for the DMA Discovery web service API to discover and update metadata in DMA.

DB2 - Fixpack Validator

This section describes how to use DMA to create a repeatable, standardized method to quickly and accurately apply IBM DB2 fixpack for DB2 installations across an enterprise to keep fix packs current.

This workflow is a wrapper or parent workflow which launches subflows to validate and apply fixpacks on a DB2 Installation. A deployment of this workflow has to be created and appropriate values have to be provided. These deployment values will be automatically passed on to the subflows that this workflow triggers.

To use this workflow in your environment, see the following information:

Topic	Information Included
"Prerequisites" below	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on the next page	Information about what the workflow does, including validation checks performed, steps executed, and a high-level process flow
"How to Run this Workflow" on page 144	Instructions for running this workflow in your environment
"Parameters for DB2 - Fixpack Validator" on page 146	List of input parameters for this workflow

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- A server running AIX 6.1 or 7.1 or Red Hat Enterprise Linux 5 or 6. The operating system platform must be certified for the pertinent DB2 fix pack version.
- DB2 server software—version 9.5, 9.7, 10.1, or 10.5—is installed on the target and is ready to be patched.
- The infrastructure required for applying the fix pack is in place.
- All DB2 Instances are on the same initial fix pack version.
- Patch media:

The DB2 server fix pack file from IBM.

Patch installation files must be available locally or available for download from the software repository.

Note: HPE DMA only applies DB2 server fix packs, not universal fix packs.

- Storage: A staging directory with 7-8 gigabytes available to unpack the binary file and to apply the fix pack and archive—requires about double the size of the current DB2 installation on the disk. By default, it is expected to have about double the size of current DB2 Installation on the disk.
- The operating system platform is certified for the pertinent DB2 specific fixpack version.

- The operating system kernel parameters and virtual and shared memory are properly configured to avoid any failure while applying the DB2 fix pack.
- License for HPE DMA.
- License for DB2 Database version 9.5, 9.7, 10.1, or 10.5.
- The workflow must have the unchallenged ability to become the OS administrator user (typically root on UNIX systems).
- For all the instances on the target server, the license has to be activated to use; otherwise the workflow will not be able to restart the instances after the fixpack is applied and database connection may not be possible again.
- The user who runs the workflow with the server wrapper must have the access to create or modify the directory structure for instances and databases.
- All the DMA database metadata must be up-to-date on the target server where the workflow is deployed.

Additional requirements

For additional requirements, see the following IBM documentation:

DB2 version	IBM documentation
9.5	DB2 Version 9.5 Fix Pack
9.7	DB2 Version 9.7 Fix Pack
10.1	DB2 Version 10.1 Fix Pack
10.5	DB2 Version 10.5 Fix Pack

How this Workflow Works

The following information describes how DB2 - Fixpack Validator workflow works:

Overview

This workflow does the following things in the order shown:

- First, the workflow prepares to validate the patch. It determines the DB2 home, staging directory, checks for existing and checks for required fixpack archives, and validates the input parameters. If the fixpack files do not already exist they are downloaded. It determines all the pertinent fixpack information.
- The workflow prepares the staging directory by unpacking (unzipping or extracting) binary archive file and transfers files from the HPE SA software library to individual managed servers for use in downstream workflow steps.
- Finally, validates fixpack binary levels of the current and required fixpack files.

Validation Checks Performed

Much of the validation centers on the input parameters:

- The input parameters have the proper syntax (no special characters or spaces).
- Files exist or have valid specifications.
- The supplied fixpack update applies to the current version.

Workflow Steps**Steps Used in DB2 - Fixpack Validator**

Workflow Step	Description
Gather Parameters To Validate Patch Fixpack	This step accepts parameters for the workflow. All the parameters are mandatory in this step.
Validate Parameters for Patch Fixpack Validator	This step validates all the input parameter values received in the gather input parameters step, validates the DB2 target, and make sure it meets all the criteria to apply fixpack.
Stage Offline HADR Fixpack Software Archive	This step validates the input staging path and binary archive file to unpack (unzip or extract) to install the software. Depending upon the file extensions (.tar or .gz), it chooses the right library to unpack the software binary file. It also validates the disk space availability before it unpacks the binary file.
Download Software	This step automates the transfer of files from the HPE SA Software Library to individual managed servers for use in downstream workflow steps. It also verifies checksum of each file transferred.
Validate Fixpack Binaries and Level	This step validates the fixpack level of the current DB2 installation with the fixpack level of the required fixpack binary file.

For parameter descriptions and defaults, see ["Parameters for DB2 - Fixpack Validator" on page 146](#).

How to Run this Workflow

The following instructions show you how to customize and run the DB2 - Offline HADR Fixpack Parent Flow workflow in your environment.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in ["Parameters for DB2 - Fixpack Validator" on page 146](#).

Note: Before following this procedure, review the ["Prerequisites" on page 140](#), and ensure that all requirements are satisfied.

To use the DB2 - Offline HADR Fixpack Parent Flow workflow:

1. Create a deployable copy of the workflow.
2. Determine the values that you will specify for the following parameters:

Input parameters in the step: Gather Parameters Patch Fixpack Offline HADR In Parent

Parameter Name	Default Value	Required	Description
Current Fixpack Archive	no default	required	Fully qualified file name of the required fixpack archive that will be applied.
DB2 Installation Location	no default	required	Fully qualified path where DB2 is installed on the target server.
Download Location	/tmp	required	Fully qualified directory path where the user specified fixpack file will be downloaded.
Required Fixpack Archive	no default	required	Fully qualified file name of the required fixpack archive that will be applied.
Staging Directory	no default	required	Fully qualified path of the directory where DB2 installer will be extracted from archive.

Note: See ["Parameters for DB2 - Fixpack Validator" on page 146](#) for detailed descriptions of all input parameters for this workflow, including default values.

3. In the workflow editor, expose any additional parameters that you need . You will specify values for those parameters when you create the deployment.

4. Save the changes to the workflow (click **Save** in the lower right corner).
5. Create a new deployment.
6. On the Parameters tab, specify values for the required parameters listed in step 2 and any additional parameters that you have exposed. You do not need to specify values for those parameters whose default values are appropriate for your environment.
7. On the Targets tab, specify one or more targets for this deployment.

Note: The target for this workflow is an instance.

8. Save the deployment (click **Save** in the lower right corner).
9. Run the workflow using this deployment.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Parameters for DB2 - Fixpack Validator

The following tables describe the required and optional input parameters for this workflow. Several of these parameters are not initially visible in a deployment.

Parameters in the step: Gather Parameters To Validate Patch Fixpack

Parameter Name	Default Value	Required	Example Value	Description
Current Fixpack Archive	no default	required	v10.1fp4_linuxx64_server.tar.gz	Fully qualified file name of the required fixpack archive that will be applied.
DB2 Installation Location	no default	required	opt/ibm/db2/V10.5	Fully qualified path where DB2 is installed on the target server.
Download Location	/tmp	required	/tmp	Fully qualified directory path where the user specified fixpack file will be downloaded.
Required Fixpack Archive	no default	required	v10.1fp4_linuxx64_server.tar.gz	Fully qualified file name of the required fixpack archive that will be applied.
Staging Directory	no default	required		Fully qualified path of the directory where DB2 installer will be extracted from archive.

DB2 - Upgrade Instance and Database

This workflow upgrades DB2 instance(s) and database(s) for IBM DB2 LUW (Linux, UNIX, and Windows) on the target server where this workflow is deployed. It currently supports the DB2 Versions 9.5, 9.7, 10.1, 10.5 on Red Hat Linux and AIX servers. This is a server level workflow. It will install the software and upgrade the existing DB2 Home (also known as the DB2 Installation Directory, for example: /opt/ibm/db2/V10.5) installed on the target machine where this workflow is deployed. It upgrades all instances and databases that exist for each respective DB2 setup.

This workflow supports the following upgrade use cases:

- DB2 9.5 to 9.7
- DB2 9.5 to 10.1

- DB2 9.7 to 10.1
- DB2 9.7 to 10.5
- DB2 10.1 to 10.5

This workflow shuts down all DB2 instances, DB2 Admin Server, and licensing daemons that are running for all the instances that are provisioned against a specific DB2 home (DB2 Installation Location). It kills all application user connections with DB2 instances that are to be upgraded. It validates the eligibility for the instance(s) and database(s) to be upgraded by comparing the current DB2 installation or fixpack level on the installed DB2 against the DB2 installation or fixpack level that user desires to upgrade to.

Note: This workflow support DB2 version 10.1 or 10.5 on a Red Hat Linux or AIX server.

Before running the DB2 - Upgrade Instance and Database workflow, the DB2 license must be activated for the instances that you create.

To use this workflow in your environment, see the following information:

Topic	Information Included
"Prerequisites" below	List of prerequisites that must be satisfied before you can run this workflow
"How this Workflow Works" on the next page	Information about what the workflow does, including validation checks performed, steps executed, and step descriptions
"How to Run this Workflow" on page 150	Instructions for running this workflow in your environment
"Parameters for DB2 - Upgrade Instance and Database" on page 156	List of input parameters for this workflow

Prerequisites

Before performing the procedures in this section, your environment must meet the following minimum requirements:

- A server running one of the following operating systems (any version that is supported by IBM DB2 and HPE DMA):
 - Linux

- AIX

See the *HPE DMA Support Matrix* for specific operating system versions, available at:

<http://hpln.hp.com/group/database-and-middleware-automation>.

- Installation media:

The DB2 server installation software binary file from IBM.

Installation software binary file must be available locally or available for download from the software repository.

- DB2 software must already be installed on the target server.
- Target server has available disk space to unpack the binary file and apply fixpack.
- Unchallenged ability to become the OS administrator user (typically root on UNIX systems).
- The following workflow requirements:

Workflow	Requirements
DB2 - Upgrade Instance and Database	<p>The user who runs the workflow with the server wrapper must have access to create or modify the directory structure for instances and databases.</p> <p>After creating the instances, the license must be activated before the database can use the instance.</p> <p>The HPE DMA database metadata is up-to-date for the DB2 Instance where the workflow is deployed.</p>

Refer to the [IBM Documentation](#) for the following:

- Complete installation and infrastructure requirements for IBM DB2.
- Acceptable types and range of values when using HPE DMA advanced parameters to configure IBM DB2 settings.

How this Workflow Works

This workflow performs the following actions:

Upgrades DB2 instances and databases.

Steps Executed

The DB2 - Upgrade Instance and Database workflow includes the following steps. Each step must complete successfully before the next step can start. If a step fails, the workflow reports a failure and all subsequent steps are skipped.

Steps Used by DB2 - Upgrade Instance and Database

Workflow Step	Description
Gather Parameters for DB2 Upgrade Instance and Database	This step accepts input parameters for the workflow.
Gather Advanced Parameters for DB2 Upgrade Instance and Database	This step accepts optional parameter values for the workflow.
Validate Parameters for DB2 Upgrade Instance and Database	This step validates all the input parameter values received in the gather and advanced gather input parameters steps, validate the DB2 target, and makes sure it meets all the necessary criteria to start the upgrade process.
Stage DB2 Software Archive	This step uncompresses the archive file if compressed and then extracts the files from it (tar file) under staging path.
Download Software	This step automates the transfer of files from the HPE SA Software Library to individual managed servers for use in downstream workflow steps. Verifies checksum of each file transferred.
Install DB2 Software to Upgrade Instance and Database	This step installs DB2 Software on the specified location specified in the input parameter.
Cleanup Failed DB2 Upgrade	This step removes files and archives that were downloaded to the target system during previous workflow steps.
Configure DB2 Upgrade Permissions	This step checks for the permission level of the existing DB2 installation for the users and groups and migrates that to the new DB2 installation where the instances and databases will be upgraded.
Cleanup Downloaded Files v2	This step removes files and archives that were downloaded to the target system during previous workflow steps.
Backup DB2 Server Configuration	This step backs up the existing DB2 setup environment and configuration before attempting to upgrade the instance and databases.
Prerequisites Checks for DB2 Instance and Database Upgrade	This step checks for the DB2 database upgrade eligibility.
Shutdown DB2	This step scans for all the running instances and active databases against

Steps Used by DB2 - Upgrade Instance and Database , continued

Workflow Step	Description
Instances	the specified DB2 installation location and shuts them down.
Upgrade DB2 Instances	This step upgrades the DB2 instances.
Startup DB2 Instances	This step restarts DB2 instances.
Verify DB2 Upgrade Instances	This step verifies the DB2 instances post the upgrade from the existing DB2 installation to new DB2 installation.
Upgrade DB2 Databases v2	This step upgrades DB2 databases from the existing DB2 installation to new DB2 installation.
Verify DB2 Upgrade Databases	This step verifies the DB2 databases post the upgrade from the existing DB2 installation to new DB2 installation for the respective instances.
Cleanup Downloaded Files v2	This step removes files and archives that were downloaded to the target system during previous workflow steps.
Discover DB2 Databases	<p>This step audits the server's physical environment looking for DB2 databases.</p> <p>Note: Discovery is ONLY additive. It will not remove instances or databases currently in your environment. It is the end-user's responsibility to delete content that is no longer in use.</p> <p>In cluster situations where one node is active while other nodes are inactive, Discovery will only find instances and databases on the active node. Nothing will be added to inactive nodes.</p>

How to Run this Workflow

The following instructions show you how to customize and run the DB2 - Upgrade Instance and Database workflow in your environment.

Tip: For detailed instructions to run HPE DMA workflows, see *HPE DMA Quick Start Tutorial*.

The workflow provides default values for some parameters. These default values are usually sufficient for a "typical" installation. You can override the defaults by specifying parameter values in the deployment. You can also expose additional parameters in the workflow, if necessary, to accomplish more advanced scenarios. Any parameters not explicitly specified in the deployment will have the default values listed in ["Parameters for DB2 - Upgrade Instance and Database" on page 156](#).

Note: Before following this procedure, review the ["Prerequisites"](#) on page 147, and ensure that all requirements are satisfied.

To use the DB2 - Upgrade Instance and Database workflow:

1. Create a deployable copy of the workflow (see "Create a Deployable Workflow" in *HPE DMA Quick Start Tutorial*)

Determine the values that you will specify for the following parameters.

The following tables describe the required and optional input parameters for this workflow.

Parameters Defined in this Step: Gather Parameters for DB2 Upgrade Instance and Database

Parameter Name	Example Value	Description
DB2 Existing Installation Location	/opt/ibm/db2/v10.1	The fully-qualified absolute directory path where the current version of DB2 software is already installed and set up with instances and databases.
DB2 Installation Location	/opt/ibm/db2/v10.1_to_v10.5	The fully-qualified absolute directory path where the upgrade version of DB2 software will be installed to upgrade the instances and databases.
DB2 Software Binaries	v10.5_aix64_server_t.tar.gz	Name of the DB2 installer archive file. Obtained from IBM. If the file is not found in DB2 Archive Location (/tmp/dma/archive), It will be downloaded from the SA repository.

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Upgrade Instance and Database

Parameter Name	Example Value	Description
Staging Directory	/tmp/software/staging	Fully-qualified path of the directory where the DB2 installer will be extracted from archive. Will be cleaned up at end of workflow execution. Default: If no input is provided /tmp/software/staging will be created.
Clean on Failure	Yes	Flag that determines whether to clean up on workflow failure. If set to 'yes', the workflow will clean up the downloaded files, installation location and the staging location.

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Upgrade Instance and Database, continued

Parameter Name	Example Value	Description
		Valid values are 'Yes' and 'No'. The default value is 'Yes'.
Clean on Success	Yes	Flag that determines whether to clean up on workflow success. If set to 'yes', the workflow will clean up the downloaded files. The default value is 'Yes'.
DB2 Archive Location	/tmp/dma/archive	Location on the target machine where the DB2 binaries will be stored prior to the installation. The default value is /tmp/dma/archive.
DB2 Configuration Backup Location	/tmp/dma/config_bkp	Directory location where the DB2 Server, instance and database level configuration will be backed up in different files. The default value is set '/tmp/dma/config_bkp'.
DB2 Installation Type	TYPICAL	The type of DB2 installation supported by IBM. It can be either COMPACT, TYPICAL or CUSTOM. The default value is 'TYPICAL'. If set the CUSTOM, you should provide the DB2 installation responsefile with the custom parameter values.
DB2 Product Edition	DB2_SERVER_EDITION	The product that you want to install, for example, DB2 Workgroup Edition, DB2 Enterprise Edition only, or other editions. The default value is set to 'DB2_SERVER_EDITION' for DB2 10.5 in this step. If upgrading to DB2 version 9.7 or 10.1 then you should use 'ENTERPRISE_SERVER_EDITION'.
DB2 Product Installation Language	EN	The language(s) you want installed. If you do not enable any language keywords, then the

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Upgrade Instance and Database, continued

Parameter Name	Example Value	Description
		English language (EN) will be installed by default. Please refer IBM install guide for the more details.
DB2 Product License	ACCEPT	Modify the value of the following LIC_AGREEMENT keyword to indicate that you have read and agreed to the license agreement file in the db2/license directory on the installation media. Default value is set to 'ACCEPT'
DB2 Staging Location	/tmp/software/staging	Location on the target machine where the DB2 software installation binaries will be extracted. The default value is /tmp/dma/staging.
DB2 Upgrade Check Logfile Location	/tmp	Directory location on target machine where the pre-upgrade check logfile will be created if it runs. The default location value is '/tmp'. The only valid values are /tmp or /var/tmp.
Install Tivoli System Automation Multiplatforms	NO	If set to "YES", IBM Tivoli System Automation for Multiplatforms (SA MP) is installed with required components. Do not specify any value if installing DB2 10.1 (or higher version) since this option is deprecated.
Trust SSL Certificates	True	If 'True', this step will trust any SSL used to connect to the DMA Web Service.
User Defined Responsefile		The user response file that will be used to provision DB2 Software. If the user response file is not specified, the workflow will use the deployment parameters and create a default response file

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Upgrade Instance and Database, continued

Parameter Name	Example Value	Description
		using the default configuration set. If responsefile is provided, workflow will use the user specified responsefile parameter values.
Web Service Password	--	Password for the HPE DMA Discovery web service API to discover and update the metadata in DMA.
Web Service URL	--	URL for the HPE DMA Discovery web service API to discover and update metadata in DMA.
Web Service User	--	User for the HPE DMA Discovery web service API to discover and update metadata in DMA.

2. In the workflow editor, expose any additional parameters that you need. You will specify values for those parameters when you create the deployment or at runtime.
3. Save the changes to the workflow (click **Save** in the lower right corner).
4. Create a new deployment. See "Create a Deployment" in *HPE DMA Quick Start Tutorial* for instructions.
5. On the Parameters tab, specify values (or set the type to Runtime Value) for the required parameters listed in step 2 and any additional parameters that you have exposed. You do not need to specify values for those parameters whose default values are appropriate for your environment.
6. On the Targets tab, specify one or more targets for this deployment.
7. Save the deployment (click **Save** in the lower right corner).
8. Run the workflow using this deployment, specifying any runtime parameters. See "Run Your Workflow" in *(HPE DMA Quick Start Tutorial)* for instructions.

To verify the results:

The workflow will complete and report SUCCESS on the Console if it has run successfully. If an error occurs during workflow execution, the error is logged, and the workflow terminates in the FAILURE state.

Parameters for DB2 - Upgrade Instance and Database

The following tables describe the required and optional input parameters for this workflow.

Parameters Defined in this Step: Gather Parameters for DB2 Upgrade Instance and Database

Parameter Name	Required	Example Value	Description
DB2 Existing Installation Location	required	/opt/ibm/db2/v10.1	The fully-qualified absolute directory path where the current version of DB2 software is already installed and set up with instances and databases.
DB2 Installation Location	required	/opt/ibm/db2/v10.1_to_v10.5	The fully-qualified absolute directory path where the upgrade version of DB2 software will be installed to upgrade the instances and databases.
DB2 Software Binaries	required	v10.5_aix64_server_t.tar.gz	Name of the DB2 installer archive file. Obtained from IBM. If the file is not found in DB2 Archive Location (/tmp/dma/archive), It will be downloaded from the SA repository.

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Upgrade Instance and Database

Parameter Name	Required	Example Value	Description
Staging Directory	optional	/tmp/software/staging	Fully-qualified path of the directory where the DB2 installer will be extracted from archive. Will be cleaned up at end of workflow execution. Default: If no input is provided /tmp/software/staging will be created.
Clean on Failure	optional	Yes	Flag that determines whether to clean up on workflow failure. If set to 'yes', the workflow will clean up the downloaded files, installation location and the staging location. Valid values are 'Yes' and 'No'. The default value is 'Yes'.
Clean on Success	optional	Yes	Flag that determines whether to clean up on workflow success. If set to 'yes', the workflow will clean up the downloaded files. The default value is 'Yes'.
DB2 Archive Location	optional	/tmp/dma/archive	Location on the target machine where the DB2 binaries will be stored prior to the installation. The default value is /tmp/dma/archive.
DB2 Configuration Backup Location	optional	/tmp/dma/config_bkp	Directory location where the DB2 Server, instance and database level

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Upgrade Instance and Database, continued

Parameter Name	Required	Example Value	Description
			configuration will be backed up in different files. The default value is set '/tmp/dma/config_bkp'.
DB2 Installation Type	optional	TYPICAL	The type of DB2 installation supported by IBM. It can be either COMPACT, TYPICAL or CUSTOM. The default value is 'TYPICAL'. If set the CUSTOM, you should provide the DB2 installation responsefile with the custom parameter values.
DB2 Product Edition	optional	DB2_SERVER_EDITION	The product that you want to install, for example, DB2 Workgroup Edition, DB2 Enterprise Edition only, or other editions. The default value is set to 'DB2_SERVER_EDITION' for DB2 10.5 in this step. If upgrading to DB2 version 9.7 or 10.1 then you should use 'ENTERPRISE_SERVER_EDITION'.
DB2 Product Installation Language	optional	EN	The language(s) you want installed. If you do not enable any language keywords, then the English language (EN) will be installed by default. Please refer IBM

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Upgrade Instance and Database, continued

Parameter Name	Required	Example Value	Description
			install guide for the more details.
DB2 Product License	optional	ACCEPT	Modify the value of the following LIC_AGREEMENT keyword to indicate that you have read and agreed to the license agreement file in the db2/license directory on the installation media. Default value is set to 'ACCEPT'
DB2 Staging Location	optional	/tmp/software/staging	Location on the target machine where the DB2 software installation binaries will be extracted. The default value is /tmp/dma/staging.
DB2 Upgrade Check Logfile Location	optional	/tmp	Directory location on target machine where the pre-upgrade check logfile will be created if it runs. The default location value is '/tmp'. The only valid values are /tmp or /var/tmp.
Install Tivoli System Automation Multiplatforms	optional	NO	If set to "YES", IBM Tivoli System Automation for Multiplatforms (SA MP) is installed with required components. Do not specify any value if installing DB2 10.1 (or higher version) since this option is deprecated.

Parameters Defined in this Step: Gather Advanced Parameters for DB2 Upgrade Instance and Database, continued

Parameter Name	Required	Example Value	Description
Trust SSL Certificates	optional	True	If 'True', this step will trust any SSL used to connect to the DMA Web Service.
User Defined Responsefile	optional		The user response file that will be used to provision DB2 Software. If the user response file is not specified, the workflow will use the deployment parameters and create a default response file using the default configuration set. If responsefile is provided, workflow will use the user specified responsefile parameter values.
Web Service Password	optional	--	Password for the HPE DMA Discovery web service API to discover and update the metadata in DMA.
Web Service URL	optional	--	URL for the HPE DMA Discovery web service API to discover and update metadata in DMA.
Web Service User	optional	--	User for the HPE DMA Discovery web service API to discover and update metadata in DMA.

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