**Infrastructure Installation Guide**

**LMS Ultron DB: Microsoft SQL DB**

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1. **Introduction**
   1. **Purpose**

This document is to describe the outline of the installation and configuration required for setting up the LMS Application for Non-Production/Production environment.

1. **Product Inventory**

This section lists all the products and their associated information that are being installed and configured in the system.

**LMS Ultron DB (Windows Server 2016)**

| Ref # | Product Name | Product Version | Remarks |
| --- | --- | --- | --- |
|  | .NET Framework (Web Server - Application Development with ASP .NET) | 4.6 |  |
|  | Microsoft SQL Server 2016 | Standard Edition |  |
|  |  |  |  |

1. **LMS** **Ultron DB – Microsoft SQL Server 2016**
   1. **Product Installation**

This is a new installation of Microsoft SQL Server 2016 Standard Edition on a Windows Server 2016.

|  |  |
| --- | --- |
| Ref # | Action Description |
| 1 | Execute the MSSQL installer: |
| 2 | Enter the correct Product Key: |
| 3. | Accept license terms |
| 4 | Apply Windows updates (if required): |
| 5 | Apply Product Updates, Setup Files and Rules (if required) : |
| 6 | Update if any. |
| 7 | Click Next once done.    Note: skip a warning rule once verified that it is fine to ignore. |
| 8 | Select Feature to Install: |
| 9 | Create Instance (Instance name): |
| 10 | SQL Services account (Leave as default): |
| 11 | SQL Server configuration. Set a strong password for sa DB admin user:  Include other users to grant them admin privileges |
| 12 | Set the data directories if you requires different path than the default: |
| 13 | Analysis Services:   * Add in admin users for admin permission to this services |
| 14 | Reporting services (Leave as default): |
| 15 | Distributed Replay services:   * Leave as default or add in users to have permission to this service |
| 16 | Installation verification and completion.        Installation Completed. |
|  |  |

* 1. **Configuring Windows Failover Clustering**

This steps is to be done on Production clustered environment.

|  |  |
| --- | --- |
| Ref # | Action Description |
| 1 | On the Server Manager. Go to Tools - Failover Cluster Manager |
| 2 | Click on ‘Validate Configuration’ in the Actions tab. |
| 3 | Click Next. |
| 4 | Insert both MS SQL Servers that will be clustered. |
| 5 | Select ‘Run all tests’ and ‘Next’ |
| 6 | Verify warnings. Below warnings are ignorable.  Select ‘Create the cluster now using the validated nodes’. Click Finish. |
| 7 |  |
| 8 | Key in the intended cluster name and the network address details. Click ‘Next’ once done. |
| 9 | Select ‘Add all eligible storage to the cluster’. Click Next |
| 10 | Windows Failover cluster setup completed. Click Finish. |
| 11 | Create Quorum storage. Right-click on the cluster – ‘More Actions’ – ‘Configure Cluster Quorum Settings…’ |
| 12 | Click Next. |
| 13 | Choose the ‘Select the quorum witness’. Click Next. |
| 14 | Select ‘Configure a file share witness’ |
| 15 | Insert the path where the quorum will be placed. Ensure this path is accessible by both nodes at all times. Click Next. |
| 16 | Verify and click Next |
| 17 | Click Finish |

* 1. **Configuring MS SQL Basic AlwaysOn High Availability Group**

|  |  |
| --- | --- |
| Ref # | Action Description |

|  |  |
| --- | --- |
| 1 | Ensure to perform a full backup of the respective DB instance first |
| 2. | Right-click on “AlwaysOn High Availability” -> “New Availability Group Wizard…” |
| 3. | Click ‘Next’ on the wizard’s ‘Introduction’. |
| 4. | Specify a specific availability group name for the DB instance |
| 5. | Select the respective DB to be grouped. |
| 6. | On the ‘Specify Replica’ page - Add another replica/server instance. Then enable/check the “Automatic Failover” and “Synchronous Commit” for the both Primary & Secondary Server Instance. |
| 7. | Leave the ‘Endpoint’ tab as it is. |
| 8. | Leave the ‘Backup Preferences’ as it is. |
| 9. | Select the ‘Create an availability group listener’ in ‘Listener’ tab.  Add in the ‘Subnet’ and ‘IP Address’ of the Listener. |
| 10. | In the ‘Select Data Replication’ tab; Select the ‘Full’ data synchronization preference.  Note: Make sure the location is accessible, readable & writable by the DB. |
| 11. | Proceed to validate the configurations in ‘Validation’. |
| 12. | On the ‘Summary’ page, ensure all is correct before proceed. |
| 13. | Finish off the creation. |
| 14. | Check the DB is now synchronized with Availability Group. |

* 1. **Configuring LogShipping Replication to DRC**

|  |  |
| --- | --- |
| Ref # | Action Description |
| 1 | Login to DB – connect to any AG listener to auto connect to Primary DB. |
| 2 | Right Click on the DB > Tasks > Ship Transaction Logs… |
| 3 | If there was logshipping config set before, Click ‘YES’ to disable it. And click OK. |
| 4 | Go back to the ‘Ship Transaction Logs…’ > Enable this as a primary database in a log shipping configuration’ option. |
| 5 | On the ‘Transaction Log Backup Settings’ window > Click on ‘Backup Settings…’ button and set the required paths.     |  | | --- | | IIBDB  \\lms-fs-02.lppsa.gov.my\fileshareprd\LMSUltronDB\ultrdb-backup\dr-log-ship-backup\lms-iib-prd  WEBDB  \\lms-fs-02.lppsa.gov.my\fileshareprd\LMSUltronDB\ultrdb-backup\dr-log-ship-backup\lms-webbds-prd | |
| 6 | Set the schedules > click ‘OK’. |
| 7 | Verify the settings > click ‘OK’ to complete |
| 8 | Click ‘Add’ to add secondary instance/database |
| 9 | Connect to DRC DB Instance as sa user |
| 10 | On the ‘Initialize Secondary Database’ tab > check the 1st Option (Yes, to backup on primary and restore in secondary) |
| 11 | On the ‘Copy Files’ tab > Fill in the path for DRC’s destination location for secondary server. And set the schedule, verify and click ‘OK’.     |  | | --- | | IIBDB  \\lms-fs-drcl.lppsa.gov\fileshareprd\LMSUltronDB\log-ship-prd-copy\lms-iib-drc  WEBDB  \\lms-fs-drcl.lppsa.gov\fileshareprd\LMSUltronDB\log-ship-prd-copy\lms-webbds-drc | |
| 12 | On ‘Restore Transaction Log’ tab > Set the state as ‘Standby mode’ > check the ‘Disconnect users in the database when restoring backups’. Set the schedules and click ‘OK’ |
| 13 | Verify the overall setup and click ‘OK’.    Note: if an alert pops-up to replace an existing configuration. Click ‘Yes’. |
| 14 | To use a SQL agent to monitor the job, check the monitor server instance. |
| 15 | Connect to the server instance. |
| 16 | Select the 1st option to use SQL Server agent. |
| 17 | Once confirm all setup, click ‘OK’ |
| 18 | Ensure all actions ran successfully. |
| 19 | Check in Prod & DR that the logshipping jobs was created.   |  |  | | --- | --- | |  |  | |
| 20 | Right-click on the backup job > Properties |
| 21 | Go to ‘Steps’ > double-click on the log shipping backup job step > in the command box change the server to point to listener name. |
| 22 | Click ‘OK’ once complete. |
| 23 | Execute the job to ensure it is running successfully.  Backup Job: |
| 24 | Copy Job: |
| 25 | Restore Job: |
| 26 | Repeat for the other instance. |

* 1. **Create MS SQL DB User**

|  |  |
| --- | --- |
| Ref # | Action Description |
| 1. | Login to DB – connect to any AG listener to auto connect to Primary DB. |
| 2. | Go to Security > Logins > New Login… |
| 3. | Key in the username to be created, select the ‘SQL Server authentication’ and untick ‘Enforce password policy’. |
|  | Go to ‘User Mapping’ page. A notification will popup. Click ‘OK’. |
|  | Assign the intended DB for the user to access and its role.  You can refer to role details by click here -> [Roles](https://docs.microsoft.com/en-us/sql/relational-databases/security/authentication-access/database-level-roles?view=sql-server-ver15) |
|  | Verify user permission to connect and login. Click ‘OK to confirm the user creation. |

1. **References**

Microsoft SQL Server 2016

1. <https://www.quackit.com/sql_server/sql_server_2016/tutorial/sql_server_2016_installation_with_screenshots.cfm>
2. <https://docs.microsoft.com/en-us/sql/database-engine/install-windows/install-sql-server-from-the-installation-wizard-setup?view=sql-server-2017>
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5. <https://docs.microsoft.com/en-us/sql/database-engine/availability-groups/windows/configure-backup-on-availability-replicas-sql-server?view=sql-server-2017>
6. <https://docs.microsoft.com/en-us/sql/relational-databases/security/authentication-access/database-level-roles?view=sql-server-ver15>