Data Warehouse Operation Guide

Document Data

Project Name	SCFHS Transformation into a Data Driven Organization Phase I
Project Number	
Document type	Data Warehouse Operation Guide
First issued	09/06/2022
Current Version	0.04

Basic Information

Project Name	**SCFHS Transformation into a Data Driven Organization Phase I**		
Estimate Start Date		**Actual Start Date**	
Project Manager	Nabil Mostafa		

Purpose

Data Warehouse Operation Guide Document

Table of Contents

Basic Information 1
Purpose 1
Table of Contents 2
Introduction 3
Data Warehouse Solution Diagram 4
1- Metadata Management 5
-١ Add new MSSQL data source 5
-٢ Add new Oracle data source 7
-٣ Add new MySQL data source (one45) 10
-٤ Add new data source (MySQL or PostgreSQL) 11
2- Data Quality Management 13
-١ Data Quality – Completeness Check 13
-٢ Data Quality – Correctness Check 14
-٣ Data Quality – Consistency Check 17
-٤ Data Quality – Accuracy Check19
-٥ Data Quality – Integrity Check 21
-٦ Data Quality – Uniqueness Check 23
-٧ Data Quality – Validity Check 25
3- Data Warehouse Management 28
-١ Build and Load (ODS/Landing, HUB/Staging) layers 28
-٢ Build and Load EDW layer 29
-٣ Reference Data Management (LKP_UN) 30
-٤ New Data Tables (LKP_UT) 32
-٥ New derived Data Tables (LKP_VW) 33
-٦ New PL Table 34
-٧ Full data loads 35
.1) List of Scheduled Jobs (MSSQL, SSIS, Tableau) 36
.2) Daily Job Schedule 41
.3) Weekly Job Schedule 42
4- Data Warehouse Daily Routines 43
-١ Check Last night activities 43
-٢ Check last database backup 44
-٣ Check Monitor Issues 45
.1) Error inserting or updating a column due to data type or nullability 45
.2) Error creating table using the autogenerated procedures 'Build_' 46
.3) Error enabling foreign key constraints after data load 47
.4) Error refreshing reference data for mapped values 48
.5) Found empty tables in the data warehouse, this indicates a problem 49
.6) Connection lost to one of the data sources 49
-٤ Check Alerted Emails 50
.1) Email Alert from Operation Manager (IT Infrastructure) indicating server issue 50
.2) Email Alert from MSSQL failed jobs 51
.3) Email Alert from Tableau Server failed extract 51
-٥ Check un-mapped reference data 52

Internal Restricted | داخلي مقيّد

Introduction

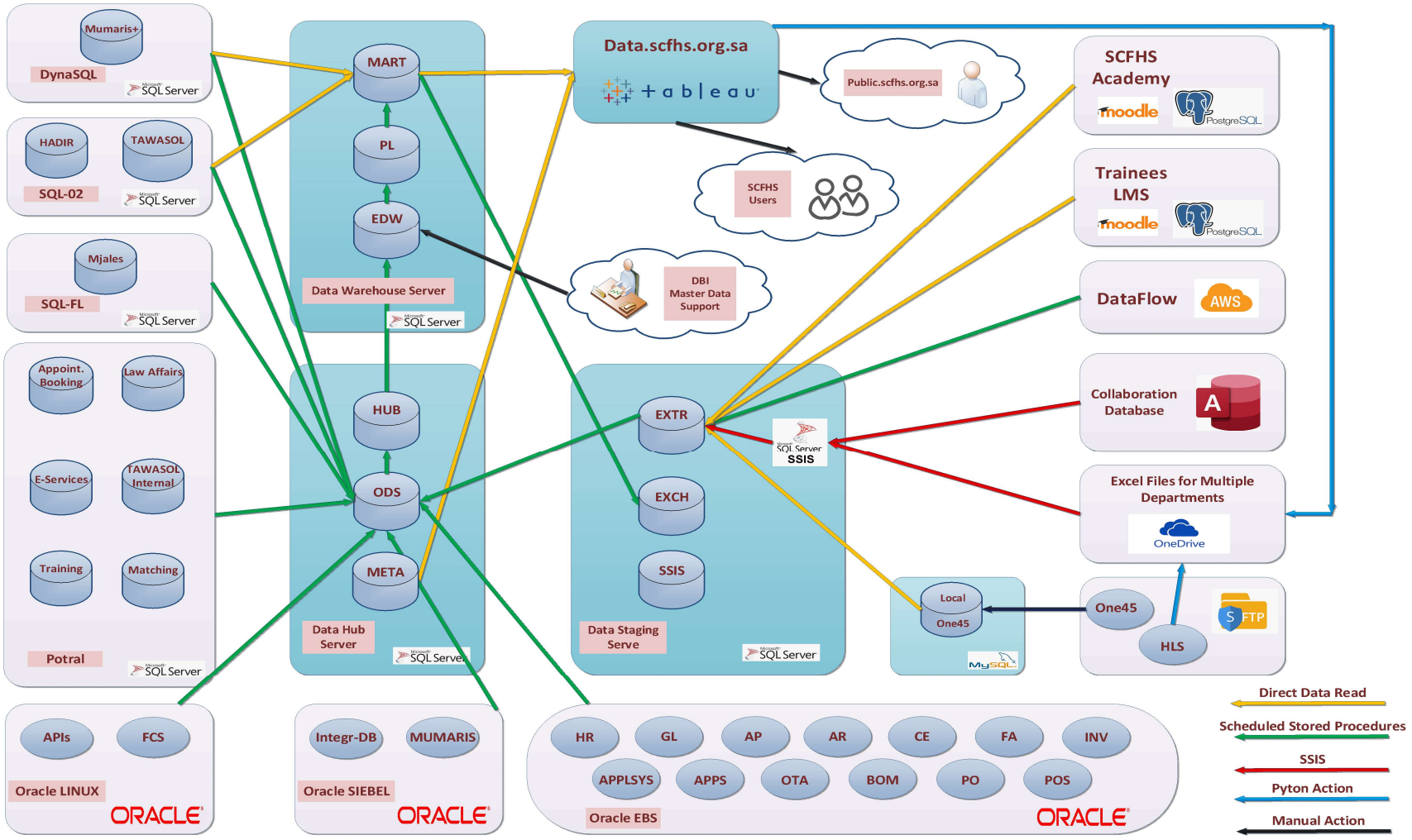
- The Data warehouse contains historical data that will be derived and extracted from data sources to help make decisions for the Saudi Commission for Health Specialties.

- **Microsoft SQL Server** is the selective technology for data warehouse' databases with 3 Production Servers, each server contains multiple databases with specified purpose per database

	Server	Database	Description
1	**Data Hub Server** **172.20.121.49** **RUH-DHSQL-01**	SCFHS-DDO-META	Data Management database handles 3 main tasks (Metadata Management – Data Quality Management – Data Warehouse Support), all these tasks are fully monitored and logged with detailed issues reporting
		SCFHS-DDO-ODS	Staging tier is created to define the data changes for all data sources (Inserts – Updates -Deletes) Filling this tier done using Merge Statements
		SCFHS-DDO-HUB	Staging tier is created to define the data changes for all data sources (Inserts – Updates -Deletes) Filling this tier done using Merge Statements
2	**Data Warehouse Server** **172.20.121.50** **RUH-DWSQL-01**	SCFHS-DDO-EDW	Normalized database where a single Unified database is used to consolidate, clean, integrate the data and apply Data Quality actions
		SCFHS-DDO-PL	De-Normalized database where a single Unified database is created for star schema modeling (Dimension & Facts) with all derived business values.
		SCFHS-DDO-MART	Data Marts physically located as Indexed tables and database views used extract business intelligence reports and allow business users to build their reports easily without the need of advanced technical skills.
3	**Data Staging Server** **172.20.121.48** **RUH-SSIS-02**	SCFHS-DDO-EXTR	Collect data from other external sources like Excel files and access Works as a bridge for data for other technology like MySQL and PostgreSQL
		SCFHS-DDO-EXCH	Collect data from services which require interactions and transactional operations like GSB & APIs And works as source for data sharing with other systems
		SSIS	Serves SQL Server Integration Services repository

Internal Restricted | داخلي مقيّد

Data Warehouse Solution Diagram



1- Metadata Management

1- Add new MSSQL data source

New database and new data schema to be added to metadata database
Some actions have to be done manually to initiate the metadata collection tool

	Business	Technical
1	**Create new database link if needed** **If the server already connected through a previously created DB link then skip this step**	EXEC sp_dropserver @server=N'DB-LINK-DYNASQL', @droplogins='droplogins'; EXEC sp_addlinkedserver @server=N'DB-LINK-DYNASQL', @srvproduct=N'', @provider=N'SQLNCLI', @datasrc=N'LISTN-DYNASQL'; EXEC master.dbo.sp_addlinkedsrvlogin @rmtsrvname = N'DB-LINK-DYNASQL', @locallogin = N'dbi_admin', @useself = N'False', @rmtuser = N'dbi_admin', @rmtpassword = N'password'; SELECT top 10 * FROM [DB-LINK-DYNASQL].[Mumaris_MSCRM].[dbo].[AccountBase];
2	**Insert new record in data bases table for the new database**	INSERT INTO [dbo].[mdm_Data_Bases] ([Db_Database_Name] --Exact Db Name ,[Db_Link_Name] -- Created Db Link ,[Db_Name_En] -- English Business Name ,[Db_Name_Ar] -- Arabic Business Name ,[Db_Provider_Type] -- Internal/External ,[Db_Source_Type] -- DB Technology (Oracle, MSSQL,..) ,[Same_Db] -- Y If Can Be Accessed By Meta Database ,[Database_Type] -- Data Source/Data Warehouse ,[Db_Server_Alias] -- 5 Chars alias for server ,[Db_Server_Description] -- Server business given name ,[Db_Server_Name] -- Actual Server Name ,[Db_Server_IP] -- Server IP ,[Db_Server_Port] -- Server Port) VALUES ('Mumaris_MSCRM' , 'DB-LINK-DYNASQL ' , 'Mumaris+' , 'نظام ممارس بلس' , 'External'

1- Add new MSSQL data source

		, 'Microsoft SQL Server' , 'LISTN-DYNASQL' , 'Y' , 'Data Source' , ' MUMRS' , ' Mumaris Plus' , ' 172.20.118.25' , '1433');
3	Insert new record in data sources table for the new schema	INSERT INTO [dbo].[mdm_Data_Sources] ([Ds_Code] -- *Exact Db Name And Schema Name* ,[Ds_Name_En] -- *English Business Name* ,[Ds_Name_Ar] -- *Arabic Business Name* ,[Is_Used] -- *'Y' For Active Ds* ,[Add_Views] -- *Set to 'Y' if needed to collect views metadata* ,[Db_Link_Name] -- *FK for DB Link* ,[Db_Database_Name] -- *FK for DB Name* ,[Db_Schema_Name] -- *Physical Schema Name* ,[Dwh_Ds_Code] -- *3 Chars unique for data source used later as Prefix*) VALUES ('Mumaris_MSCRM.dbo' ,'Mumaris+ Main' ,'ممارس بلس الرئيسي' ,'Y' ,'N' , 'DB-LINK-DYNASQL ' ,'Mumaris_MSCRM' ,'dbo' ,'mpd');
4	Run prepare procedures to gather basic meta data information	EXEC [DDO-SCFHS-META].[dbo].prepare_tables 'Mumaris_MSCRM.dbo'; EXEC [DDO-SCFHS-META].[dbo].prepare_views 'Mumaris_MSCRM.dbo'; EXEC [DDO-SCFHS-META].[dbo].prepare_columns 'Mumaris_MSCRM.dbo';
5	Run fill info procedures to gather secondary meta data information	EXEC [DDO-SCFHS-META].[dbo].fill_info_tb_counts 'Mumaris_MSCRM.dbo'; EXEC [DDO-SCFHS-META].[dbo].fill_info_counts 'Mumaris_MSCRM.dbo'; EXEC [DDO-SCFHS-META].[dbo].fill_info_sample_data 'Mumaris_MSCRM.dbo'; EXEC [DDO-SCFHS-META].[dbo].fill_info_fk_reference 'Mumaris_MSCRM.dbo';
6	Check results	Select * from mdm_Data_Tables where ds_code = 'Mumaris_MSCRM.dbo'; Select * from mdm_Data_Columns where ds_code = 'Mumaris_MSCRM.dbo';
7	Monitor Execution with monitor tables	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_main] ORDER BY START_TIME desc; SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_sub] ORDER BY START_TIME desc;
8	Check issues table in case of failures	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_issues] WHERE Issue_Status = 'Current' AND Issue_Type ='Error';

Internal Restricted | داخلي مقيّد

2- Add new Oracle data source

New database and new data schema to be added to metadata database
Some actions have to be done manually to initiate the metadata collection tool

	Business	Technical
1	Install Oracle Database Client 64 on Server	/*** Install Oracle Client 12 (64-bit) on Server **/
2	Update TNS names file $ORACLE_HOME \NETWORK\ADMIN	PRDSBL= (DESCRIPTION = (ADDRESS = (PROTOCOL = TCP) (HOST =172.20.111.201) (PORT = 1521)) (CONNECT_DATA = (SERVER = DEDICATED) (SID = PRDSBL1)))
3	Create ODBC 64 System DSN	/*** Configure ODBC 64-bit System DSN ***/
4	Create new database link if needed	-- Configure ORAOLEDB.Oracle provider so that runs in process within SQL Server exec master.dbo.sp_MSset_oledb_prop 'ORAOLEDB.Oracle', N'AllowInProcess', 1; exec master.dbo.sp_MSset_oledb_prop 'ORAOLEDB.Oracle', N'DynamicParameters', 1 EXEC sp_dropserver @server=N'DB-LINK-ORA-SBL', @droplogins='droplogins'; exec master.dbo.sp_addlinkedserver @server = 'DB-LINK-ORA-SBL', @srvproduct = 'Oracle', @provider = 'OraOLEDB.Oracle', @datasrc = 'PRDSBL'; -- Same name Added in ODBC exec master.dbo.sp_addlinkedsrvlogin @rmtsrvname = 'DB-LINK-ORA-SBL', @useself = 'False', @locallogin = N'dbi_admin', @rmtuser = 'dbi_admin', @rmtpassword ='password'; Select Top 10 * From [DB-LINK-ORA-SBL]..[INTEGPRD].[DWH_EXAM_PROFILER_HMV]; SELECT * FROM Openquery([DB-LINK-ORA-SBL], 'Select * from INTEGPRD.DWH_EXAM_PROFILER_HMV');

Internal Restricted | داخلي مقيّد

2- Add new Oracle data source

3	Restart MSSQLSERVER Service	/*** It is important to restart the SQL Server Service after creating new Oracle database link **/
4	Insert new record in data bases table for the new database	INSERT INTO [dbo].[mdm_Data_Bases] ([Db_Database_Name] --Exact Db Name ,[Db_Link_Name] -- Created Db Link ,[Db_Name_En] -- English Business Name ,[Db_Name_Ar] -- Arabic Business Name ,[Db_Provider_Type] -- Internal/External ,[Db_Source_Type] -- DB Technology (Oracle, MSSQL,..) ,[Same_Db] -- Y If Can Be Accessed By Meta Database ,[Database_Type] -- Data Source/Data Warehouse ,[Db_Server_Alias] -- 5 Chars alias for server ,[Db_Server_Description] -- Server business given name ,[Db_Server_Name] -- Actual Server Name ,[Db_Server_IP] -- Server IP ,[Db_Server_Port] -- Server Port) VALUES ('Oracle Siebel' , 'DB-LINK-ORA-SBL , 'Integration Database' , 'نظام التكامل للخدمات' , 'Internal' , 'Oracle' , 'Y' , 'Data Source' , 'SEBEL' , 'Oracle Siebel' , 'SBL-PRD-DB-CLUSTER-SCAN' , '172.20.111.201' , '1521');

Internal Restricted | داخلي مقيّد

2- Add new Oracle data source		
5	Insert new record in data sources table for the new schema	INSERT INTO [dbo].[mdm_Data_Sources] ([Ds_Code] -- Exact Db Name And Schema Name ,[Ds_Name_En] -- English Business Name ,[Ds_Name_Ar] -- Arabic Business Name ,[Is_Used] -- 'Y' For Active Ds ,[Add_Views] -- Set to 'Y' if needed to collect views metadata ,[Db_Link_Name] -- FK for DB Link ,[Db_Database_Name] -- FK for DB Name ,[Db_Schema_Name] -- Physical Schema Name ,[Dwh_Ds_Code] -- 3 Chars unique for data source used later as Prefix) VALUES ('INTEGPRD' ,'Integration Schema' ,'نظام التكامل للخدمات' ,'Y' ,'N' ,'DB-LINK-ORA-SBL' ,'Oracle Siebel' ,'INTEGPRD' ,'ing');
6	Run prepare procedures to gather basic meta data information	EXEC [DDO-SCFHS-META].[dbo].prepare_tables 'INTEGPRD'; EXEC [DDO-SCFHS-META].[dbo].prepare_views 'INTEGPRD'; EXEC [DDO-SCFHS-META].[dbo].prepare_columns 'INTEGPRD';
7	Run fill info procedures to gather secondary meta data information	EXEC [DDO-SCFHS-META].[dbo].fill_info_tb_counts 'INTEGPRD'; EXEC [DDO-SCFHS-META].[dbo].fill_info_counts 'INTEGPRD'; EXEC [DDO-SCFHS-META].[dbo].fill_info_sample_data 'INTEGPRD'; EXEC [DDO-SCFHS-META].[dbo].fill_info_fk_reference 'INTEGPRD';
8	Check results	Select * from mdm_Data_Tables where ds_code = 'INTEGPRD'; Select * from mdm_Data_Columns where ds_code = 'INTEGPRD';
9	Monitor Execution with monitor tables	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_main] ORDER BY START_TIME desc; SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_sub] ORDER BY START_TIME desc;
10	Check issues table in case of failures	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_issues] WHERE Issue_Status = 'Current' AND Issue_Type ='Error';

Internal Restricted | داخلي مقيّد

3- Add new MySQL data source (one45)

The new database will be restored into Local MySQL

	Business	Technical
1	**Collect the one45 database dump**	- Collect the new one45 database backup file (.gz archive) from the SFTP server provided by one45 representatives (WinSCP tool can be used for it). Connection details and credentials are provided separately. - Transfer the file to the server .49 (Data Hub VM server)
2	**Prepare the backup file for restoring**	- Connect to the .49 VM server via RDP - Unpack the .gz file to any drive other than C: drive. Make sure that drive can accommodate the unpacked sql dump. Typically, the unpacked .sql dump is 10x times larger than the .gz archive - Make sure the C: drive can accommodate the database files after it's restored. Typically, the restored database is 2x times larger than the unpacked .sql dump
3	**Prepare the MySQL environment for restoring**	- Run the Windows command line tool cmd as an admin, i.e. press Win key + X on keyboard and pick "Command Prompt (Admin)". "PowerShell (Admin)" will also suffice. - When in cmd, change current directory to a directory where MySQL executables are stored, for example: *cd "C:\mysql-5.6.50-winx64\bin"* - Connect to the local MySQL server instance by running mysql tool with the **special MySQL "dbi_admin" user**, and provide the password when asked (credentials are provided separately): *mysql -u dbi_admin -p* - Once connected to the server show the current databases: *show databases;* - If the local_one45 database is already there, drop it: *drop database local_one45;* - Create local_one45 database again, as it's going to be a destination container for the to-be restored dump: *create database local_one45;* - Exit the mysql console: *exit;*
4	**Run the import**	- While staying in the same cmd session, run the .sql dump import process via mysql. The parameters are: user dbi_admin, database local_one45, and the full path for the sql backup file: *mysql -u dbi_admin -D local_one45 -p < C:\mysql-5.6.50-winx64\scfhs_20200828.sql* - The process will take around 2 hours. Do some random checks on the corresponding views in the MS SQL server. They should be available now and should return the actual data - Close the cmd window. You can also clean up the .sql dump file and the .gz archive, at your convenience.

Internal Restricted | داخلي مقيّد

4- Add new data source (MySQL or PostgreSQL)

Accessing Sources that have non-Oracle non-MSSQL sources can be established through data links and creating bridge views

	Business	Technical
1	Install Driver on Server	/*** Install the right driver on server (MySQL or PostgreSQL) on Staging Server 48 **/
2	Create ODBC 64 System DSN	/*** Configure ODBC 64-bit System DSN ***/
3	Use Script to generate Create Views on EXTR Database	SELECT /*** Sample for One45 MySQL DB ***/ CONCAT('CREATE VIEW [one45].[',TABLE_NAME,'] AS Select * from OPENQUERY([DB-LINK-MYSQL], ''select * from local_one45.',TABLE_NAME,'''); GO ') FROM INFORMATION_SCHEMA.TABLES WHERE TABLE_SCHEMA = 'Test' and TABLE_NAME <> 'event_log' and Table_Name <> 'user_activity'; --- SELECT /*** Sample for LMS PostgrSQL DB ***/ CONCAT('CREATE VIEW [lms].[',TABLE_NAME,'] AS Select * from OPENQUERY([DB-LINK-LMS-TRAINEES], ''select * from public.',TABLE_NAME,'''); GO ') FROM INFORMATION_SCHEMA.TABLES WHERE TABLE_SCHEMA = 'public';
4	Create new database link if needed	EXEC sp_dropserver @server=N'DB-LINK-MYSQL', @droplogins='droplogins'; EXEC sp_addlinkedserver @server=N'DB-LINK-MYSQL', @srvproduct=N'MYSQL', @provider=N'MSDASQL', @datasrc=N'One45MYSQL'; EXEC master.dbo.sp_addlinkedsrvlogin @rmtsrvname = N'DB-LINK-MYSQL', @locallogin = N'dbi_admin', @useself = N'False', @rmtuser = N'dbi_admin', @rmtpassword = N'Password'; select * from OPENQUERY([DB-LINK-MYSQL], 'select * from local_one45.people');
٥	Restart MSSQLSERVER Service	/*** It is important to restart the SQL Server Service after creating new database link **/

Internal Restricted | داخلي مقيّد

4- Add new data source (MySQL or PostgreSQL)		
6	Insert new record in data sources table for the new schema	INSERT INTO [dbo].[mdm_Data_Sources] ([Ds_Code] -- *Exact Db Name And Schema Name* ,[Ds_Name_En] -- *English Business Name* ,[Ds_Name_Ar] -- *Arabic Business Name* ,[Is_Used] -- *'Y' For Active Ds* ,[Add_Views] -- *Set to 'Y' if needed to collect views metadata* ,[Db_Link_Name] -- *FK for DB Link* ,[Db_Database_Name] -- *FK for DB Name* ,[Db_Schema_Name] -- *Physical Schema Name* ,[Dwh_Ds_Code] -- *3 Chars unique for data source used later as Prefix*) VALUES ('DDO-SCFHS-EXTR.one45' ,'One45' ,'نظام وان ٤٥' ,'Y' ,'Y' ,'DB-LINK-DS' ,'DDO-SCFHS-EXTR' ,'one45' ,'eon');
7	Run prepare procedures to gather basic meta data information	EXEC [DDO-SCFHS-META].[dbo].prepare_tables 'DDO-SCFHS-EXTR.one45'; EXEC [DDO-SCFHS-META].[dbo].prepare_views ' DDO-SCFHS-EXTR.one45'; EXEC [DDO-SCFHS-META].[dbo].prepare_columns 'DDO-SCFHS-EXTR.one45';
8	Run fill info procedures to gather secondary meta data information	EXEC [DDO-SCFHS-META].[dbo].fill_info_tb_counts 'DDO-SCFHS-EXTR.one45'; EXEC [DDO-SCFHS-META].[dbo].fill_info_counts 'DDO-SCFHS-EXTR.one45'; EXEC [DDO-SCFHS-META].[dbo].fill_info_sample_data 'DDO-SCFHS-EXTR.one45'; EXEC [DDO-SCFHS-META].[dbo].fill_info_fk_reference 'DDO-SCFHS-EXTR.one45';
9	Check results	Select * from mdm_Data_Tables where ds_code = 'DDO-SCFHS-EXTR.one45'; Select * from mdm_Data_Columns where ds_code = 'DDO-SCFHS-EXTR.one45';
10	Monitor Execution with monitor tables	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_main] ORDER BY START_TIME desc; SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_sub] ORDER BY START_TIME desc;
11	Check issues table in case of failures	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_issues] WHERE Issue_Status = 'Current' AND Issue_Type ='Error';

Internal Restricted | داخلي مقيّد

2- Data Quality Management

1- Data Quality – Completeness Check

Definition: The proportion of stored data against the potential of "100% complete"
Reference: Measurements consider either the percentage of instances of data you have recorded versus the total available
Completeness = non-blanked filed/total mandatory field*100
Unit of Measure: Percentage

Example:

- Non-blank fields: 6
- Blank fields: 4
- Completeness = 6/10*100= 60%
- Total mandatory fields are 10 fields

Perquisites:

- Run prepare tables & prepare columns to collect Metadata
- Run fill info counts to update column level non-blank elements

	Business	Technical
1	Identify the column needed to be checked Convert the column to CDE (Critical Data Element)	/*** Test Case to check the completeness of practitioners' mobile numbers, these mobile numbers should be 100% complete ***/ UPDATE mdm_Data_Columns SET CDE_FLAG = 'Y' -- Only Set to 'Y' if needed to affect main DQ Health Index WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'MobilePhone';
2	Put score for completeness (1-5) This will be used to calculate DQ health Index	UPDATE mdm_Data_Columns SET dq_completeness = 1 WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'MobilePhone';
3	Run	/** No need to run any procedure as all required data to calculate completeness score already collected during metadata collection **/
4	Check results	/** Results from Data Quality View based on mdm_Data_Columns **/ SELECT completeness_score, -- Calculated score 0-100 dq_completeness, -- Assigned weight col_records_not_null, --Number of non-blank fields tb_records_count -- Number of table records FROM dm_data_quality WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'MobilePhone';

Internal Restricted | داخلي مقيّد

2- Data Quality – Correctness Check

Definition: Data are Correct if checked against common profile rules
Reference: Predefined Common profile rules (Ability to add new rules whenever required)
like Birth dates should be within normal ages (not less than 15 and not more than 100)
Saudi Mobile Numbers should be in the format (05XXXXXXXX or 5XXXXXXXX or 9665XXXXXXXX or +9665XXXXXXXX or 009665XXXXXXXX)
Correctness= No. of valid values/No. of total values*100
Unit of Measure: Percentage

Example:

- valid fields: 45
- bad fields: 5
- Correctness = 45/50*100= 90%

Perquisites:

- Run prepare tables & prepare columns to collect Metadata

	Business	Technical
1	Identify the column needed to be checked Convert the column to CDE (Critical Data Element)	/*** Test Case to check the correctness of practitioners' mobile numbers, these mobile numbers should be validated against common profile rule of Saudi mobile numbers ***/ UPDATE mdm_Data_Columns SET CDE_FLAG = 'Y' -- Only Set to 'Y' if needed to affect main DQ Health Index WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'MobilePhone';
2	Put score for correctness (1-5) This will be used to calculate DQ health Index	UPDATE mdm_Data_Columns SET dq_correctness = 5 WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'MobilePhone';
3	Select profile rule for the CDE element	UPDATE mdm_Data_Columns SET pf_id = 2 WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'MobilePhone';
4	Run procedure check profiles	EXEC [DDO-SCFHS-META].[dbo].check_profiles 'Mumaris_MSCRM.dbo', 'ContactBase'

Internal Restricted | داخلي مقيّد

2- Data Quality – Correctness Check		
5	**Check results**	SELECT correctness_score, -- Calculated score 0-100 dq_correctness, -- Assigned weight col_records_not_null, --Number of non-blank fields pf_auto_bad_count, -- Number of incorrect values pf_auto_bad_sample -- Sample of incorrect values FROM dm_data_quality WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'MobilePhone';
6	**To Report all incorrect results**	SELECT a.scfhs_ApplicantId, a.MobilePhone FROM [DB-LINK-DYNASQL].[Mumaris_MSCRM].[dbo].[ContactBase] a WHERE a.MobilePhone is not null AND [DDO-SCFHS-META].dbo.dq_fn_apply_rule_char (a.MobilePhone, 2 ,null, null) is null;
7	**Monitor Execution with monitor tables**	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_main] ORDER BY START_TIME desc; SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_sub] ORDER BY START_TIME desc;
8	**Check issues table in case of failures**	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_issues] WHERE Issue_Status = 'Current' AND Issue_Type ='Error';

Internal Restricted | داخلي مقيّد

Id	Rule Name	Rule Description	Data Type
1	Saudi Land Phone	Saudi Land Phones starts with (00966 or +9661 or 9661 or 01 or 1) and 8 digits	char
2	Saudi Mobile	Saudi Mobile Phones starts with (009665 or +9665 or 9965 or 05 or 5) and 8 digits	char
3	Birth Date	Birth dates must comply with ages between15 years old and 100 years old	date
4	Date from 10 years till today	Date from 10 years till today	date
5	Date from 20 years till today	Date from 20 years till today	date
6	Date from 30 years till today	Date from 30 years till today	date
7	Date from 40 years till today	Date from 40 years till today	date
8	Date from 50 years till today	Date from 50 years till today	date
9	Email	Check correct Email Format	char
10	National ID	Length of National ID or Iqama is 10 digits and starts with 1 or 2	char
11	Generic Phone	Generic Phones starts with (00 or +) and 12 digits	char
12	Bank Number	IBAN bank account starts with SA then 4 digits then length 18 mixed digits and chars	char
13	File Path	Full File path for example c:\myfolder\myfile.docx	char
14	URL Path	Full URL for example www.google.com or https://myportal.org	char
15	Arabic Only	The field should contain Arabic letters only. English and Special characters not allowed	char
16	English Only	The field should contain English letters only. Arabic and Special characters not allowed	char
17	Numbers Only	The field should contain digits only 0-9	char
18	Postal Code/ Zip Code	Zip Codes with length of 5 digits and starts with a digit 1-8	char
19	Gregorian Date	Date from 100 years till 15 years after today	date
20	Hijri Year	Valid Hijri Years from 1370 to 1455	char
21	Percent	Percentage between 0 and 100	char
22	Image File Path	Full image File path for example c:\myfolder\myfile.jpg and restricts file types to (jpg, gif , png ,bmp)	char
23	Gregorian Year	Valid Gregorian Years from 1970 and 2030	char
24	File expression	File expression for example myfile.docx	char
25	Hijri Date in date	Hijri dates stored in Fields with date data type between range from 100 years till 15 years after today	date
26	Hijri Date in Char	Hijri dates stored in Fields with char data type between range from 100 years till 15 years after today	char
27	File expression with path	Full File network path for example \\shared Folder\myfile.docx	char
28	Text Only	The field should contain Arabic and English letters only . Special characters not allowed ($#@%^&!~)	char
29	Birth Date Hijri in date	Birth Hijri dates which stored in date data type must comply with ages between15 years old and 100 years old	date
30	Birth Date Hijri in char	Birth Hijri dates which stored in char data type must comply with ages between15 years old and 100 years old	char
31	No Special Characters	The field should contain Arabic Letters or English letters or Digits. Special characters not allowed ($#@%^&!~)	char

3- Data Quality – Consistency Check

Definition: Data that exists in multiple locations is similar

Reference: Measurements consider the number of different values when stored in multiple applications, datasets or records. For example, if the customer master data exists in multiple locations, does it have same values?

Consistency= No. of matched values/No of matched reference *100

Unit of Measure: Percentage

Example:

- No of base fields: 900
- No of reference fields: 33
- No of Matched values:4
- No of unmatched values:10
- Consistency = 4/14*100= 28%
- Total matched reference is 14

Perquisites:

- Run prepare tables & prepare columns to collect Metadata

	Business	Technical
1	Identify the column needed to be checked Convert the column to CDE (Critical Data Element)	/*** Test Case to check the consistency of birth dates from the main database (Mumaris+) referencing trainees' data in (Training System), those birth dates for the same person by (Identity Number) should be matched between both base and reference data tables ***/ UPDATE mdm_Data_Columns SET CDE_FLAG = 'Y' -- Only Set to 'Y' if needed to affect main DQ Health Index WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'BirthDate';
2	Put score for consistency (1-5) This will be used to calculate DQ health Index	UPDATE mdm_Data_Columns SET dq_consistency = 2 WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'BirthDate';
3	Set the consistency information reference Schema, table, Column and the join condition to detect match & non-match	UPDATE mdm_Data_Columns SET col_is_consistency = 'Y', col_contcy_schema = 'Trainees_DB.dbo', col_contcy_table = 'tbl_TraineesRecords', col_contcy_column = 'dtDateBirthGer', col_contcy_condition ='base.scfhs_SaudiNationalID = ref.strNationalIqamID or base.scfhs_iqama = ref.strNationalIqamID ' WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'BirthDate';
4	Run procedure to check consistency	EXEC [DDO-SCFHS-META].[dbo].check_consistency 'Mumaris_MSCRM.dbo','ContactBase'

3- Data Quality – Consistency Check		
5	**Check results**	/** Results from Data Quality View based on MDM_DATA_COLUMNS **/ SELECT consistency_score, -- Calculated score 0-100 dq_consistency, -- Assigned weight col_records_not_null, --Number of non-blank fields col_contcy_match_count, -- Number of matched values col_contcy_bad_count, -- Number of unmatched values col_contcy_bad_sample -- Sample of unmatched values FROM dm_data_quality WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'BirthDate';
6	**To Report all inconsistent results**	SELECT * FROM [DDO-SCFHS-META].[dbo].[mdm_Records_Consistency] WHERE Base_Ds_Code = 'Mumaris_MSCRM.dbo' AND Base_Tb_Code = 'ContactBase' AND Base_Col_Code = 'BirthDate' AND Match_Flag = 'N';
7	**Monitor Execution with monitor tables**	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_main] ORDER BY START_TIME desc; SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_sub] ORDER BY START_TIME desc;
8	**Check issues table in case of failures**	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_issues] WHERE Issue_Status = 'Current' AND Issue_Type ='Error';

Internal Restricted | داخلي مقيّد

4- Data Quality – Accuracy Check

Definition: The degree to which data correctly describes the "real world" object or event being described. Can be derived from whether a given value is the same as in the 'master' dictionary

Reference: Missing data is not included in this measurement. For example, does the university reflect the actual university name stored in the qualification data set. This accuracy is measured for fact data using dimensions

Accuracy= No. of matched values/No of non-blanked values *100

Unit of Measure: Percentage

Example:

- invalid values for dimension: 1
- this invalid value is used 10 times with fact table
- total fact records are 200
- Accuracy = 190/200*100= 95%

Perquisites:

- Run prepare tables & prepare columns to collect Metadata
- Finish Master Data Management procedures

	Business	Technical
1	**Identify the column needed to be checked** **Convert the column to CDE (Critical Data Element)**	/*** Test Case to check the accuracy of Nationalities based on trainees' records, in this case Countries are considered a master data table in EDW layer and mapped from Mumaris+ database and other data sources. Considering Master Countries table to reflect the real data, how much accurate of trainee's Nationalities ***/ UPDATE mdm_Data_Columns SET CDE_FLAG = 'Y' -- Only Set to 'Y' if needed to affect main DQ Health Index WHERE ds_code = 'Trainees_DB.dbo' AND tb_code = 'tbl_TraineesRecords' AND col_code = 'intNationality';
2	**Put score for accuracy (1-5)** **This will be used to calculate DQ health Index**	UPDATE mdm_Data_Columns SET dq_accuracy = 1 WHERE ds_code = 'Trainees_DB.dbo' AND tb_code = 'tbl_TraineesRecords' AND col_code = 'intNationality';
3	**Select the master mapping ID to be used**	UPDATE mdm_Data_Columns SET map_id = 4 WHERE ds_code = 'Trainees_DB.dbo' AND tb_code = 'tbl_TraineesRecords' AND col_code = 'intNationality';
4	**Run procedure to store accuracy**	EXEC [DDO-SCFHS-META].[dbo].check_accuracy 'Trainees_DB.dbo','tbl_TraineesRecords'

Internal Restricted | داخلي مقيّد

4- Data Quality – Accuracy Check		
5	**Check results**	/** Results from Data Quality View based on MDM_DATA_COLUMNS **/ SELECT accuracy_score, -- Calculated score 0-100 dq_accuracy, -- Assigned weight col_records_not_null, --Number of non-blank fields accurate_count , -- Number of accurate values non_accurate_count -- Number of non-accurate values FROM dm_data_quality WHERE ds_code = 'Trainees_DB.dbo' AND tb_code = 'tbl_TraineesRecords' AND col_code = 'intNationality';
6	**To Report all non-accurate results**	SELECT * FROM [DDO-SCFHS-META].[dbo].[mdm_Records_Accuracy] WHERE map_id = 4 AND dwh_tb_code = 'trd_tbl_TraineesRecords' AND dwh_col_code = 'intNationality' AND Match_Flag = 'N' ;
7	**Monitor Execution with monitor tables**	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_main] ORDER BY START_TIME desc; SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_sub] ORDER BY START_TIME desc;
8	**Check issues table in case of failures**	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_issues] WHERE Issue_Status = 'Current' AND Issue_Type ='Error';

Internal Restricted | داخلي مقيّد

5- Data Quality – Integrity Check

Definition: All relationships between data in multiple tables are intact, Referential integrity
Reference: Measurements consider the existence and correctness of linkages to and from a record. For example, how many employee records have birth country not stored in country data set
Integrity = No. of valid relationship values/No of non-blanked values *100
Unit of Measure: Percentage

Example:

- Non-blank fields: 8
- No of invalid values: 2
- Integrity = 6/8*100= 75%

Perquisites:

- Run prepare tables & prepare columns to collect Metadata

	Business	Technical
1	**Identify the column needed to be checked** **Convert the column to CDE (Critical Data Element)**	/*** Test Case to check the integrity of trainees' records to have a valid training center, this training center must be present in data source as long as its trainees' record exists. Trainees records with training center codes not present training center data set is considered violating integrity check ***/ UPDATE mdm_Data_Columns SET CDE_FLAG = 'Y' -- Only Set to 'Y' if needed to affect main DQ Health Index WHERE ds_code = 'Trainees_DB.dbo' AND tb_code = 'tbl_TraineesRecords' AND col_code = 'intTrainingCenter';
2	**Put score for integrity (1-5)** **This will be used to calculate DQ health Index**	UPDATE mdm_Data_Columns SET dq_integrity = 2 WHERE ds_code = 'Trainees_DB.dbo' AND tb_code = 'tbl_TraineesRecords' AND col_code = 'intTrainingCenter';
3	**Set the referential integrity information reference Schema, table, Column to detect bad records**	UPDATE mdm_Data_Columns SET col_is_FK = 'N', col_fk_name = 'FK_Trainees_Records_center', col_ref_schema = 'Trainees_DB.dbo', col_ref_table = 'tbl_TrainingCenter', col_ref_column = 'intTrainingCenterID' WHERE ds_code = 'Trainees_DB.dbo' AND tb_code = 'tbl_TraineesRecords' AND col_code = 'intTrainingCenter';
4	**Run procedure to check integrity**	EXEC [DDO-SCFHS-META].[dbo].check_fk_errors 'Trainees_DB.dbo','tbl_TraineesRecords'

Internal Restricted | داخلي مقيّد

5- Data Quality – Integrity Check		
5	**Check results**	/** Results from Data Quality View based on MDM_DATA_COLUMNS **/ SELECT integrity_score, -- Calculated score 0-100 dq_integrity, -- Assigned weight col_records_not_null, -- Number of non-blank fields col_fk_bad_count, -- Number of bad FK records col_fk_bad_sample -- Sample of bad FK values FROM dm_data_quality WHERE ds_code = 'Trainees_DB.dbo' AND tb_code = 'tbl_TraineesRecords' AND col_code = 'intTrainingCenter';
6	**To Report all bad integrity results**	SELECT * FROM [DB-LINK-RUH-SQLFL-01].[Trainees_DB].[dbo].[tbl_TraineesRecords] a Where a.intTrainingCenter is not null and dbo.dq_fn_apply_fk_validation (a.intTrainingCenter, 'Trainees_DB.dbo', 'tbl_TraineesRecords', 'intTrainingCenter') is null
7	**Monitor Execution with monitor tables**	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_main] ORDER BY START_TIME desc; SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_sub] ORDER BY START_TIME desc;
8	**Check issues table in case of failures**	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_issues] WHERE Issue_Status = 'Current' AND Issue_Type ='Error';

Internal Restricted | داخلي مقيّد

6- Data Quality – Uniqueness Check

Definition: Nothing will be recorded more than once based upon how that thing is identified
Reference: National Id is unique in a single data set and there should not exist duplication
Uniqueness= No. of values without duplication/No. of non-blank records*100
Unit of Measure: Percentage

Example:

- Non-blank fields: 8
- No of duplicate values: 3
- Uniqueness= 5/8*100= 62%

Perquisites:

- Run prepare tables & prepare columns to collect Metadata
- Run fill info counts to update column level non-blank elements and number of distinct values

	Business	Technical
1	**Identify the column needed to be checked** **Convert the column to CDE (Critical Data Element)**	/*** Test Case to check the uniqueness of health practitioners National IDs, these National IDs should be 100% unique ***/ UPDATE mdm_Data_Columns SET CDE_FLAG = 'Y' -- Only Set to 'Y' if needed to affect main DQ Health Index WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'scfhs_SaudiNationalID';
2	**Put score for uniqueness (1-5)** **This will be used to calculate DQ health Index**	UPDATE mdm_Data_Columns SET dq_uniqueness = 1 WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'scfhs_SaudiNationalID';
3	**Run**	/** No need to run any procedure as all required data to calculate uniqueness score already collected during metadata collection **/
4	**Check results**	/** Results from Data Quality View based on MDM_DATA_COLUMNS **/ SELECT uniqueness_score, -- Calculated score 0-100 dq_uniqueness, -- Assigned weight col_records_not_null, --Number of non-blank fields col_records_distinct -- Number of distinct values FROM dm_data_quality WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'scfhs_SaudiNationalID';

Internal Restricted | داخلي مقيّد

6- Data Quality – Uniqueness Check		
5	**To Report all bad uniqueness results**	SELECT a.scfhs_SaudiNationalID , Count(1) FROM [DB-LINK-DYNASQL].[Mumaris_MSCRM].[dbo].[ContactBase] a WHERE a.scfhs_SaudiNationalID is not null group by a.scfhs_SaudiNationalID HAVING count(1) > 1;

Internal Restricted | داخلي مقيّد

7- Data Quality – Validity Check

Definition: Data conforms to defined business rules and falls into allowable parameters
Reference: Relation between fields in the same data set should comply with some business rules and data for a specific field should comply with some business rules. For Example, expiry date should be greater the issue date and any payment in the system should not be less than 100SAR
Validity = No. of valid records/No. of Fields*100
Unit of Measure: Percentage

Example:

- Non-blank fields: 15
- No of invalid values: 6
- Validity = 9/15*100= 60%

Perquisites:
Run prepare tables & prepare columns to collect Metadata

	Business	Technical
1	**Identify the column needed to be checked** **Convert the column to CDE (Critical Data Element)**	/*** Test Case to check the validity of CME Hours in practitioners' profile, CME hours should be between 0 and 60 (Business rule) ***/ UPDATE mdm_Data_Columns SET CDE_FLAG = 'Y' -- Only Set to 'Y' if needed to affect main DQ Health Index WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'scfhs_RequiredCMEHours';
2	**Put score for validity (1-5)** **This will be used to calculate DQ health Index**	UPDATE mdm_Data_Columns SET dq_validity = 2 WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'scfhs_RequiredCMEHours';
3	**Set the column validity condition** UPDATE mdm_Data_Columns SET -- Flag this column to be tested with validity Col_Is_Validity = 'Y', -- Set Validity Rule Name Col_Validity_Name = 'Check CME Hours validity', -- Set description for the business rule Col_Validity_Description = 'CME Hours Acquired by practitioner should be between 0 and 60', -- Identify the column or pattern for the generated sample data col_validity_Sample_Column = 'cast(scfhs_ApplicantId as nvarchar(50))+''(''+cast(scfhs_RequiredCMEHours as nvarchar(50))+'')''', -- Add where condition for the data subset to be tested Col_Validity_Tested_Condition = 'year(createdon) >= ''2019''', -- The SQL condition for the Valid records	

Internal Restricted | داخلي مقيّد

7- Data Quality – Validity Check

```
col_validity_condition = 'scfhs_RequiredCMEHours <=60 AND scfhs_RequiredCMEHours >=0'
WHERE ds_code = 'Mumaris_MSCRM.dbo'
 AND tb_code = 'ContactBase'
 AND col_code = 'scfhs_RequiredCMEHours';
```

4	**Run procedure to check validity**	`EXEC [DDO-SCFHS-META].[dbo].check_validity_columns;`

5	**Check results**	`/** Results from Data Quality View based on MDM_DATA_COLUMNS **/`
		`SELECT`
		`validity_score, -- Calculated score 0-100`
		`dq_validity, -- Assigned weight`
		`Validity_Tested_Count, --Number of tested records`
		`Validity_Invalid_Count, -- Number of invalid values`
		`Validity_Sample_Data -- Sample of invalid records`
		`FROM dm_data_quality`
		`WHERE ds_code = 'Mumaris_MSCRM.dbo'`
		`AND tb_code = 'ContactBase'`
		`AND col_code = 'scfhs_RequiredCMEHours';`

5	**Monitor Execution with monitor tables**	`SELECT *`
		`FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_main]`
		`ORDER BY START_TIME desc;`
		
		`SELECT *`
		`FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_sub]`
		`ORDER BY START_TIME desc;`

6	**Check issues table in case of failures**	`SELECT *`
		`FROM [DDO-SCFHS-META].[dbo].[dm_data_issues]`
		`WHERE Issue_Status = 'Current'`
		`AND Issue_Type ='Error';`

Add more complex business rule against the Table level, Multiple Business rules can be added

1	**Identify the Business Rule needed to be checked**	`/** Need to check that Physicians Practitioners Registration expiry should be greater than issue date **/`

2	**Set the table validity condition**	`INSERT INTO [dbo].[mdm_Data_Tables_Validity]`
		`([Ds_Code]`
		`,[Tb_Code]`
		`,[Tb_Validity_Id]`
		`,[Tb_Validity_Name] -- Set Validity Rule Name`
		`,[Tb_Validity_Description] -- Set description for the business rule`
		`,[Tb_Validity_Sample_Column] -- Identify the column or pattern for generated sample data`
		`,[Tb_Validity_Tested_Condition] -- Add where condition for the data subset to be tested`
		`,[Tb_Validity_Condition] -- The SQL condition for the Valid records`
		`,[Dq_Validity]) -- Set score for validity (1-5) for DQHI`

Internal Restricted | داخلي مقيّد

		VALUES ('Mumaris_MSCRM.dbo' ,'ContactBase' ,1 ,'Check Registration dates' ,'Registration expiry should be greater than issue date' ,'scfhs_ApplicantId' ,null ,'scfhs_RegistrationExpirydate > scfhs_registrationissuedate' ,3);
3	Run procedure to check validity	EXEC [DDO-SCFHS-META].[dbo].check_validity_tables;
4	Check results	/** Results from Data Quality View based on MDM_DATA_COLUMNS and MDM_DATA_TABLES **/ SELECT validity_score, -- Calculated score 0-100 dq_validity, -- Assigned weight Validity_Tested_Count, --Number of tested records Validity_Invalid_Count, -- Number of invalid values Validity_Sample_Data -- Sample of invalid records FROM dm_data_quality WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code like '--%';
5	Monitor Execution with monitor tables	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_main] ORDER BY START_TIME desc; SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_sub] ORDER BY START_TIME desc;
6	Check issues table in case of failures	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_issues] WHERE Issue_Status = 'Current' AND Issue_Type ='Error';

Internal Restricted | داخلي مقيّد

3- Data Warehouse Management

1- Build and Load (ODS/Landing, HUB/Staging) layers

Number of activities to easily build ODS layer and full load it with data from data source and easily build HUB layer and data compared against ODS to detect inserts, updates and deletes Using Build Generators for autogenerate tables and stored procedures

Perquisites:

- Run prepare tables & prepare columns to collect Metadata
- Pre-Analysis for data source to identify which tables needed to be loaded into data warehouse

	Business	Technical
1	Identify which data source table needed to move into DWH	UPDATE mdm_Data_Tables SET checked_by = 1 WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase';
2	Run procedure to build ODS&HUB tables & procedures	-- Run Build procedure to build tables & procedures at ODS & HUB EXEC [DDO-SCFHS-META].[dbo].build_all; -- Or run specific build for ODS & HUB EXEC [DDO-SCFHS-META].[dbo].build_all 'DH', 0 ;
3	Run procedure to truncate and full load ODS&HUB tables	EXEC [DDO-SCFHS-ODS].[dbo].[sp_mpd_ContactBase]; EXEC [DDO-SCFHS-HUB].[dbo].[sp_mpd_ContactBase];
4	Check results	SELECT * FROM [DDO-SCFHS-ODS].[dbo].[mpd_ContactBase]; SELECT * FROM [DDO-SCFHS-HUB].[dbo].[mpd_ContactBase];
5	Monitor Execution with monitor tables	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_main] ORDER BY START_TIME desc; SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_sub] ORDER BY START_TIME desc;
6	Check issues table in case of failures	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_issues] WHERE Issue_Status = 'Current' AND Issue_Type ='Error';
7	Check issues table for empty ODS tables	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_issues] WHERE Issue_Status = 'Current' AND Issue_Type ='Empty';

Internal Restricted | داخلي مقيّد

2- Build and Load EDW layer

Number of activities to help build EDW layer and help load it with data from HUB layer
EDW layer is Automated built but not auto maintained
Data loaded using one stored procedure per table

Perquisites:

- Run prepare tables & prepare columns to collect Metadata
- ODS and HUB built and loaded for selected tables
- Complete assign of profile rules (PF_ID) at (mdm_Data_Columns)
- Complete assign of Mappings (MAP_ID) at (mdm_Data_Columns)
- Complete identified of missing foreign keys information at (mdm_Data_Columns)

	Business	Technical
1	Identify columns needed in EDW layer Selective columns	/* This step is optional, by default all non-empty columns will be selected */ UPDATE mdm_Data_Columns SET col_edw = 'Y' WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code in (/** Column list **/);
2	Assign an EDW name	UPDATE mdm_Data_Tables SET base_edw_table = 'mpd_Practitioners' WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase';
3	Run procedure to build EDW tables & procedures	-- Run Build procedure to build table & procedure at EDW EXEC [DDO-SCFHS-META].[dbo].build_all; -- Or run specific build for EDW EXEC [DDO-SCFHS-META].[dbo].build_all 'DW', 0 ;
4	Run procedure to generate and run merge for loading EDW tables	EXEC [DDO-SCFHS-EDW].[dbo].[sp_mpd_Practitioners];
5	Monitor Execution with monitor tables	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_main] ORDER BY START_TIME desc; SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_sub] ORDER BY START_TIME desc;
6	Check issues table in case of failures	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_issues] WHERE Issue_Status = 'Current' AND Issue_Type ='Error';
7	Check issues table for empty HUB tables	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_issues] WHERE Issue_Status = 'Current' AND Issue_Type ='Empty';

Internal Restricted | داخلي مقيّد

3- Reference Data Management (LKP_UN)

New unified tables in EDW layer hold reference data for multiple data sources
These reference data tables have a unified prefix **LKP_UN**

	Business	Technical
1	**Identify the Reference Data sets**	/** Data from multiple sources needs to be integrated into single source in the EDW layer like Countries, Cities, Universities, Genders, Religions and Specialties **/
2	**Manually create a new table with LKP_UN prefix**	/** Skip this step if table already exists **/ CREATE TABLE [DDO-SCFHS_EDW].[dbo].[lkp_un_Country]([Country_Id] [int] NOT NULL, [Country_Name] [nvarchar](250) NULL, [Country_Arabic_Name] [nvarchar](250) NULL, [Country_Code] [nvarchar](250) NULL, [ISD_Code] [nvarchar](250) NULL, [IS_GCC_Country] [nvarchar](250) NULL CONSTRAINT [PK_lkp_un_Country] PRIMARY KEY CLUSTERED ([Country_Id])
3	**Load the Master Data Set (UN Table)**	Use manual scripting to manually load the new table from the most reliable source
4	**Add new mapping column into UN table**	ALTER TABLE [DDO-SCFHS_EDW].[dbo].[lkp_un_Country] ADD [Map_mpd_Mumaris_CountryId] [nvarchar](250) NULL
5	**Fill the mapping column**	Use manual scripting to manually fill the mapping column or use manually data entry Entries should be encapsulated with '$' and separated by ','
6	**Record the master data mapping information**	INSERT INTO [DDO-SCFHS-META].[dbo].[mdm_Mappings]([Map_Id] -- pk for mapping information ,[System_Desc] -- System name for Data Source ,[Entity_Desc] -- Name Of Master Data Entity ,[New_Table] -- Table name UN on EDW layer ,[New_Id] -- Column pk in UN table ,[New_Name] -- Column Description for UN table ,[Mapping_Column] -- Column stores map data in UN table ,[Old_Table] -- Table Name for source data at HUB ,[Old_Id] -- Column pk in HUB table ,[Old_Name]) -- Column Description for HUB table VALUES(3 ,'Mumaris P' ,'Countries' ,'lkp_un_Country' ,'Country_Id' ,'Country_Name' ,'Map_mpd_Mumaris_CountryId' ,'mpd_scfhs_countryBase' ,'scfhs_CountryId' ,'scfhs_Name');

Internal Restricted | داخلي مقيّد

3- Reference Data Management (LKP_UN)		
7	Run procedure to store all valid map data	EXEC [DDO-SCFHS-META].[dbo].dq_store_map_data;
8	Select the master mapping ID to be used	UPDATE mdm_Data_Columns SET map_id = 3 WHERE ds_code = 'Mumaris_MSCRM.dbo' AND tb_code = 'ContactBase' AND col_code = 'scfhs_birthcountries';
9	Check results of Valid mapped values	SELECT * FROM [DDO-SCFHS-META].[dbo].[mdm_Records_Valid_Map] WHERE Map_Id = 3;
10	Check results of unmapped values	SELECT * FROM [DDO-SCFHS-META].[dbo].[mdm_Records_Valid_Unmap] WHERE Map_Id = 3;
11	Monitor Execution with monitor tables	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_main] ORDER BY START_TIME desc; SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_monitoring_sub] ORDER BY START_TIME desc;
12	Check issues table in case of failures	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_issues] WHERE Issue_Status = 'Current' AND Issue_Type ='Error';
13	Check issues table for summarizing missing mappings	SELECT * FROM [DDO-SCFHS-META].[dbo].[dm_data_issues] WHERE Issue_Status = 'Current' AND Issue_Type ='Missing';

Internal Restricted | داخلي مقيّد

4- New Data Tables (LKP_UT)

New unified tables in EDW layer hold some information non-existent on data sources
These new tables have a unified prefix **LKP_UT**

	Business	Technical
1	**Recognize a business need for new table**	Mumaris+ case status holds more than 30 case status and we need to recognize a general status with less varieties like Open, Completed, aborted–Canceled
2	**Manually create a new table with LKP_UT prefix**	CREATE TABLE [dbo].[lkp_ut_Status_Group_Category]([Status_Group_Category_Id] [int] NOT NULL, [Status_Group_Category_Name_Ar] [nvarchar](50) NULL, [Status_Group_Category_Name_En] [nvarchar](50) NULL, CONSTRAINT [PK_lkp_ut_Status_Group_Category] PRIMARY KEY CLUSTERED ([Status_Group_Category_Id] ASC) ON [PRIMARY]) ON [PRIMARY] GO
5	**Use manually data entry to fill the new table**	Results Messages Status_Group_Category_Id | Status_Group_Category_Name_Ar | Status_Group_Category_Name_En 1 | 0 | غير معروف | Unknown 2 | 1 | مكتملة | Completed 3 | 2 | تم الإلغاء أو التوقيف | Aborted–Canceled 4 | 3 | مفتوحة | Open

Internal Restricted | داخلي مقيّد

5- New derived Data Tables (LKP_VW)

New tables in EDW layer hold some information not in a data source table but can be driver from the source using SQL statement
These new tables have a unified prefix **LKP_VW**

	Business	Technical
1	**Recognize a business need for derived table**	There is no Exam Provider lookup in Mumaris+ but using the application uses a special table string Base to hold all lookup values
2	**Create a DB view at HUB layer for the required data**	CREATE view [dbo].[V_mpd_Exam_Provider_Name] AS SELECT Exam_Provider_Name_Code , [1025] AS [Exam_Provider_Name_Ar], [1033] AS [Exam_Provider_Name_En],[load_date],[edw_action],[control_flag] FROM (SELECT m.AttributeValue as Exam_Provider_Name_Code , [LangId] , Value, m.load_date,m.edw_action,m.control_flag FROM [DDO-SCFHS-HUB].[dbo].[mpd_StringMapBase] m , [DDO-SCFHS-HUB].[dbo].[mpm_Entity] e where e.BaseTableName = 'scfhs_examBase' and m.AttributeName='scfhs_providername' and e.ObjectTypeCode = m.ObjectTypeCode) D PIVOT (MAX([value]) FOR [LangId] IN ("1025", "1033")) AS PVT GO
3	**Manually create a new table with LKP_VW prefix**	CREATE TABLE [dbo].[lkp_vw_mpd_Exam_Provider_Name]([Exam_Provider_Name_Code] [int] NOT NULL, [Exam_Provider_Name_Ar] [nvarchar](4000) NULL, [Exam_Provider_Name_En] [nvarchar](4000) NULL, [Loading_Date] [datetime] NOT NULL, CONSTRAINT [PK_lkp_vw_mpd_Exam_Provider_Name] PRIMARY KEY CLUSTERED ([Exam_Provider_Name_Code] ASC) ON [PRIMARY]) ON [PRIMARY] GO
4	**Create stored procedure to manage data loads for the EDW table**	This Stored Procedure is not automated as stored procedures reading data from HUB table to EDW table, as it reads data from HUB view Copy one of previous Stored procedures starts with 'sp_lkp_vw_' and use as a template for the new view, you will need to change source and destination table
5	**Add new record to be used for unknown** **Only if needed and no Unknown record exists**	/********* insert unknown record *******/ Declare @v_id_found int = 0; SELECT @v_id_found = COUNT(1) FROM [DDO-SCFHS-EDW].[dbo].[lkp_vw_mpd_Resident_Type] WHERE Resident_Type_Code = 0 ; if @v_id_found = 0 INSERT INTO [DDO-SCFHS-EDW].[dbo].[lkp_vw_mpd_Resident_Type] ([Resident_Type_Code], [Resident_Type_AR], [Resident_Type_EN], Loading_Date) select 0, 'غير معرف', 'Unknown',GETDATE() ;

Internal Restricted | داخلي مقيّد

6- New PL Table

New tables in PL Layer can be created using 'Select Into' statement and the filling stored procedure is created using structured template
PL table will hold dimensions or facts and will be derived from one or more EDW tables
PL column names must be related to business names, usually we alias columns as needed

	Business	Technical

1	Build the required query	`SELECT q.[Queueid] AS [Group_Id]`
		`,q.[Queuename] AS [Group_Name]`
		`,q.[Queuedescription] AS [Group_Description]`
		`,i.[Organization_Id]`
		`,d.[Organization_En]`
		`,d.[Organization_Ar]`
		`,i.[SLA] AS [Group_SLA]`
		`,q.[Ciid] AS [Configuration_Id]`
		`,c.[Ciname] AS [Configuration_Name]`
		`,Case when q.[Isdeleted] = 0 then 'Current' Else 'Deleted' end As [Group_Status]`
		`,s.[Organization_Id1] AS [Organization_Id1]`
		`,s.[Organization_En1] AS [Organization_En1]`
		`,s.[Organization_Ar1] AS [Organization_Ar1]`
		`,GetDate() AS [Loading_Date]`
		`FROM [DDO-SCFHS-EDW].[dbo].[lkp_tb_twd_Queue_Definition] q`
		`LEFT OUTER JOIN [DDO-SCFHS-EDW].[dbo].[lkp_ut_twd_Groups_Info] i`
		`ON (q.[Queueid] = i.[Queueid])`
		`LEFT OUTER JOIN [DDO-SCFHS-EDW].[dbo].[lkp_un_Organization_Units] d`
		`ON (i.[Organization_Id] = d.[Organization_Id])`
		`LEFT OUTER JOIN [DDO-SCFHS-EDW].[dbo].[V_Organizational_Structure] s`
		`ON (i.[Organization_Id] = s.[Organization_Id5])`
		`LEFT OUTER JOIN [DDO-SCFHS-EDW].[dbo].[lkp_tb_twd_CI] c`
		`ON (q.[Ciid] = c.[Ciid]);`

2	Create PL table	Use the query to create the table using 'Select Into' Statement in PL layer
3	Add Primary Key	Add primary key manually to the created PL table
4	Use the Template and replace table name	Use the template 'Sp_Dim_AP_Terms' and replace 'Dim_AP_Terms' With new table name 'Dim_Tawasol_Groups'

	Change the Insert Part using same column names in created table	`INSERT INTO [#Dim_Tawasol_Groups]`
		`([Group_Id]`
		`,[Group_Name]`
		`,[Group_Description]`
		`,[Organization_Id]`
		`,[Organization_En]`
		`,[Organization_Ar]`
		`,[Group_SLA]`
		`,[Configuration_Id]`
		`,[Configuration_Name]`
		`,[Group_Status]`
		`,[Organization_Id1]`
		`,[Organization_En1]`
		`,[Organization_Ar1]`
		`,[Loading_Date])`

	Use same SQL	Same SQL used to create the table should be placed after the Insert Part
5	Run the stored procedure	`EXEC [DDO-SCFHS-PL].[dbo].[Sp_Dim_Tawasol_Groups'];`

Internal Restricted | داخلي مقيّد

7- Full data loads

List of procedures for full data activities

	Business	Technical
1	Run Batch for Daily Data Load	-- Run at Data HUB Server EXEC [DDO-SCFHS-META].[dbo].prepare_all; EXEC [DDO-SCFHS-META].[dbo].build_all; EXEC [DDO-SCFHS-META].[dbo].load_ods_tables; EXEC [DDO-SCFHS-META].[dbo].load_hub_tables; EXEC [DDO-SCFHS-META].[dbo].monitor_all; EXEC [DDO-SCFHS-META].[dbo].dq_store_map_data; -- Run at Data Warehouse EXEC [DDO-SCFHS-EDW].[dbo].load_edw_tables; EXEC [DDO-SCFHS-EDW].[dbo].load_pl_tables; EXEC [DDO-SCFHS-EDW].[dbo].load_mart_tables;
2	Run Batch for Weekly metadata collection (Friday)	-- Run at Data HUB Server EXEC [DDO-SCFHS-META].[dbo].prepare_all; EXEC [DDO-SCFHS-META].[dbo].fill_info_counts; EXEC [DDO-SCFHS-META].[dbo].fill_info_sample_data; EXEC [DDO-SCFHS-META].[dbo].fill_info_fk_reference;
3	Run Batch for Weekly Data Quality Checks (Saturday)	-- Run at Data HUB Server EXEC [DDO-SCFHS-META].[dbo].prepare_all; EXEC [DDO-SCFHS-META].[dbo].build_all; EXEC [DDO-SCFHS-META].[dbo].check_all;

Data Monitoring Details

Batch Number	Start Time	Action Category	Action Group	Main Status	Period Minutes	Total Tables	Total Rows	New Records	Updated Records	Deleted Records	Failed Records
1505	03 May 2020 , 04:41	Load Data	Load MART Data	Finished	35	12	7,817,019	25,256	26,076	23,773	0
1504	03 May 2020 , 04:09	Load Data	Load PL Data	Finished	32	140	32,127,879	38,780	131,724	1,476	0
1503	03 May 2020 , 04:00	Load Data	Load EDW Data	Finished	8	165	92,423	40,078	52,319	26	0
1502	03 May 2020 , 01:55	Refresh Data	Refresh Mappings	Finished	8	50	20,184	20,184	1,994	20,184	0
1501	03 May 2020 , 01:29	Load Data	Load HUB Data	Finished	25	244	36,391,283	40,881	55,728	1	2
1500	03 May 2020 , 00:24	Load Data	Load ODS Data	Finished	65	246	36,391,365	36,391,365	0	36,350,516	0
1499	03 May 2020 , 00:13	MetaData	Prepare Columns	Finished	10	7,928	147,122	7	147,115	0	0
1498	03 May 2020 , 00:00	MetaData	Prepare Tables	Finished	13	7,932	7,932	0	7,932	0	0

Internal Restricted | داخلي مقيّد

.1) List of Scheduled Jobs (MSSQL, SSIS, Tableau)

Job	Description & Schedule	Actions
SCFHS Prepare Tableau Lineage	SSIS Job, Daily on DS Server at 6:00 pm to load data from Tableau Server metadata	- **\SSISDB\Scfhs_DDO\Load Excel\Pkg_Load_EXTR_Tableau_Main.dtsx** - Using Python Script to download Tableau workbooks from Tableau Server into DS Server 48 - Using Python Script to read metadata from TWB files into csv files - Using SSIS to load data from csv files into tables [DDO-SCFHS-EXTR].dbo , These tables starts with 'rec_dbi_Tableau_' - Using SQL Script called inside SSIS to update [DDO-SCFHS-META].[dbo].[mdm_Backup_Databases], this script is using merge statement to inset, update and delete
Data Refresh	MSSQL Job, Daily on DS Server at 8:00 pm to load data from DataFlow AWS on Internet and update Exam Results data for Exchange	- **Data_Refresh_Data_Flow:** Loading data from DataFlow DB on Internet AWS into Dataflow schema on [DDO-SCFHS-EXTR] EXEC [DDO-SCFHS-EXTR].[dbo].[Sp_Load_DataFlow]; - **Data_Refresh_Exam_Results:** Loading data from Exam Results data mart into Matching schema on [DDO-SCFHS-EXCH], this data will be used by Matching system as data exchange EXEC [DDO-SCFHS-EXCH].[matching].[Sp_Load_Exam_Results]; - **Apply_Security:** [DDO-SCFHS-EXCH] database has 2 schemas (dbo & matching), and to ensure the security is applied on schema level we use SQL scripts to ensure gsb_usr access only dbo schema with read/write permission and exd_usr access only matching schema with read permission EXEC [DDO-SCFHS-EXCH].[dbo].[Apply_Security];
SCFHS Load External	SSIS Job, Daily on DS Server at 8:00 pm to load data from Excel & Access files	- **Load Excel: \SSISDB\Scfhs_DDO\Load Excel\Pkg_Load_EXTR_Main.dtsx** Using SSIS to load multiple Excel files from OneDrive into [DDO-SCFHS-EXTR].dbo schema - **Load Collaboration: \SSISDB\Scfhs_DDO\Load Excel\Pkg_Collaboration.dtsx** Using SSIS to load multiple Tables from Access file into [DDO-SCFHS-EXTR].collaborate schema - **Load Leadership: \SSISDB\Scfhs_DDO\Load Excel\Pkg_Leadership.dtsx** Using SSIS to load multiple tables from MS Access data into [DDO-SCFHS-EXTR].Leadership schema - **Load Elham: \SSISDB\Scfhs_DDO\Load Excel\Pkg_Extr_rec_Elham_Files.dtsx** Using SSIS to load Elham Excel file from OneDrive into [DDO-SCFHS-EXTR].Elham schema - **Load Procurement: \SSISDB\Scfhs_DDO\Load Excel\Pkg_Extr_rec_ Procurement.dtsx** Using SSIS to load Procurement Excel file from OneDrive into [DDO-SCFHS-EXTR].dbo schema

Job	Description & Schedule	Actions
DB-BackupJob-Daily	MSSQL Job, daily 3 Jobs on All 3 database servers (DH, DW, DS) at 9:30 pm to perform full database backups	- **Create Code Backup:** Insert snapshot from all program units (views, stored procedures, functions) into the code backups [DDO-SCFHS-META].[dbo].[mdm_Backup_Code] Exec [DDO-SCFHS-META].[dbo].[provide_backup_code]; - **Delete Old Backups:** With different setting to decide how many previous backups to hold, if desired to hold 4 latest daily backups then delete old backups except latest 3 backups taking into considerations that the 4th backup will be executed after. Some databases like META will keep 4 daily backups, others like ODS & HUB will not hold any daily backups Every delete backup action will be reflected in [mdm_Backup_Databases] table with backup status change - **DB-BackupStep-Daily:** Full backup from all databases in the 3 servers (DH, DW, DS), every backup activity is recorded into [mdm_Backup_Databases], the recorded action includes start & end time, period, backup size, backup file location and backup status
DB-BackupJob-Weekly	MSSQL Job, weekly 3 Jobs on All 3 database servers (DH, DW, DS) on Fridays at 9:30 pm to perform full database backups	- **Create Code Backup:** Insert snapshot from all program units (views, stored procedures, functions) into the code backups [DDO-SCFHS-META].[dbo].[mdm_Backup_Code] Exec [DDO-SCFHS-META].[dbo].[provide_backup_code]; - **Delete Old Backups:** With different setting to decide how many previous backups to hold, if desired to hold 8 latest weekly backups then delete old backups except latest 7 backups taking into considerations that the 8th backup will be executed after. Some databases like META will keep 8 weekly backups, others like ODS & HUB will hold only 3 weekly backups Every delete backup action will be reflected in [mdm_Backup_Databases] table with backup status change - **DB-BackupStep-Weekly:** Full backup from all databases in the 3 servers (DH, DW, DS), every backup activity is recorded into [mdm_Backup_Databases], the recorded action includes start & end time, period, backup size, backup file location and backup status
DB-Performance-Tuning	MSSQL Job, daily on 12:30 pm & 07:30 pm on DW Server, daily on 06:30 pm on DH Server, perform performance tuning	- **Rebuild-Indexes:** Script performs rebuild for all database indexes - **Shrink DB:** Script performs DBCC shrinkfile action on all database and log files

Internal Restricted | داخلي مقيّد

Job	Description & Schedule	Actions
Build-Prepare Job	MSSQL Job, daily on 10:00 pm, perform daily metadata operations on all data sources	- **Prepare All:** Run 3 activities to refresh metadata (prepare tables, prepare views, prepare columns) EXEC [DDO-SCFHS-META].[dbo].prepare_all; - **Build All:** After updating the metadata, build all action is to run reflecting changes over the ODS/HUB tables & stored procedures and autogenerating of load batches EXEC [DDO-SCFHS-META].[dbo].build_all;
Multiple Parallel Jobs (Mumaris, DS, ERP, Others Job)	MSSQL Job, daily on 12:00 am, perform daily data loads from data sources into ODS and HUB layers	Running 4 parallel jobs to load from data sources Running batches (one batch per server), each server uses one DB link Server batches are autogenerated and updated through build all - **Load Mumaris+:** EXEC [DDO-SCFHS-META].[dbo].[Load_SRV_MUMRS_tables]; - **Load Oracle EBS:** EXEC [DDO-SCFHS-META].[dbo].[Load_SRV_ORARP_tables]; - **Load Data Stage Server: (Excel, Collaborate, LMS, Academy, One45, DataFlow)** EXEC [DDO-SCFHS-META].[dbo].[Load_SRV_DDODS_tables]; - **Load All Other Sources:** EXEC [DDO-SCFHS-META].[dbo].[Load_SRV_SEBEL_tables]; EXEC [DDO-SCFHS-META].[dbo].[Load_SRV_LINUX_tables]; EXEC [DDO-SCFHS-META].[dbo].[Load_SRV_PORTL_tables]; EXEC [DDO-SCFHS-META].[dbo].[Load_SRV_SQL02_tables];
DH-Data-Load-Post-Actions Job	MSSQL Job, daily on 2:00 am, perform follow-up procedures which needs to be run after loading ODS & HUB	- **Refresh Mapping data for Reference entities** This procedure reads data from mapping configuration and lkp_un tables and refresh valid mapping table EXEC [DDO-SCFHS-META].[dbo].dq_store_map_data; - **Run Monitor All:** EXEC monitor_all_empty; -- Check if any table in EDW truncated EXEC monitor_all_errors; -- Group similar errors adding records to issues data set EXEC monitor_all_infos; -- Snapshot stats about data sources & DWH EXEC monitor_all_missing; -- Generate issue record for current un-map status per map id EXEC monitor_all_warnings; -- Checks for specific items as expiry date for SSL EXEC monitor_all_lineage; -- Refreshing for monitor information EXEC monitor_all_data_sets; -- Update last dates for automated data sets

Internal Restricted | داخلي مقيّد

Job	Description & Schedule	Actions

DW-Data-Load Job	MSSQL Job, daily on 3:00 am, perform daily data loads from data Hub Server into EDW, PL & MART layers	- **Load Data:**
		`EXEC [DDO-SCFHS-EDW].[dbo].load_edw_tables;`
		`EXEC [DDO-SCFHS-EDW].[dbo].load_pl_tables;`
		`EXEC [DDO-SCFHS-EDW].[dbo].load_mart_tables;`
		- **Shrink DB:**
		Script performs DBCC shrinkfile action on all database and log files

Load-DWH-Hourly	MSSQL Job, Hourly From 7:00 am to 7:00 pm daily excluding Friday & Saturday, calling full load batches for specific sources	Running customizable batches for data sources required to be loaded hourly to have recent updates reflected into dashboards, the execution will be followed by another refresh schedule in the Tableau server side
		The load batches are created manually and contains 2 parts
		1- Calling of autogenerated batches for specific data source or specific database
		2- Calling of EDW, PL and MART stored procedures needed for the data source update
		
		- **Load Data:**
		`EXEC [DDO-SCFHS-EDW].[dbo].[Load_DWH_Matching];`
		`EXEC [DDO-SCFHS-EDW].[dbo].[Load_DWH_Tawasol];`
		`EXEC [DDO-SCFHS-EDW].[dbo].[Load_DWH_Supply_Chain];`

Extract Refresh-Morning	Tableau Schedule, daily on 6:00 am preforming full refresh for the majority of workbooks published on Server	- Full refresh for majority of workbooks published on Tableau production server - The extract refresh is scheduled to start on time expected the database load job to be finished - The priority for the extract refresh is set to minimum (100) to avoid adding extra load on Tableau Server - The refresh is set to be Serial not Parallel to avoid impact on connected users to Tableau Server
Extract Refresh-Night	Tableau Schedule, daily on 1:00 am preforming full refresh for the specified big sized workbooks published on Server	- Full refresh for specified big sized workbooks on Tableau production server (Profiles' information timeline, Practitioners' timeline) - The priority for the extract refresh is set to minimum (100) to avoid adding extra load on Tableau Server - The refresh is set to be Serial not Parallel to avoid impact on connected users to Tableau Server
Extract Refresh-Hourly	Tableau Schedule, hourly starting from 7:00 am to 8:30 preforming full refresh for the majority of workbooks published on Server	- Full refresh for specified workbooks on Tableau production server (TAWASOL, SCM & Matching) - The extract refresh is scheduled to start on time expected the database load job to be finished - The priority for the extract refresh is set to minimum (100) to avoid adding extra load on Tableau Server - The refresh is set to be Serial not Parallel to avoid impact on connected users to Tableau Server
DW-Data-Refresh Job	MSSQL Job, weekly on Saturday 6:00 am preforming EDW layer refresh	- **Load Data:** Run of autogenerated procedure with a list of EDW procedures contains reference mapping, these procedures are called with parameter 'Update' - `EXEC [DDO-SCFHS-EDW].[dbo].Refresh_EDW_tables;`

Internal Restricted | داخلي مقيّد

Job	Description & Schedule	Actions
Tableau Daily Backup	Windows Schedule, daily on 3:00 am on Tableau Production Server running Python Script performing full Tableau Server backup	- Python Script at (C:\Tableau-Admin\tableau_backups.py) - The script performs full Tableau Server backup into folder (M:\Shared-Tableau\Backup) - The script has setting schedule params: sp = {'recentdays':5, 'recentweeks': 9, 'dayofweek':6} - This allows keeping the recent 5 days backup and 9 weekly backups on Saturday, old backups will be deleted through same script
Metadata	MSSQL Job, weekly on Friday 6:00 am preforming full metadata refresh (Tables rows counts, Column's value counts, Column level sample data, Foreign Keys Information FKs)	- **Prepare All:** Run 3 activities to refresh metadata (prepare tables, prepare views, prepare columns) EXEC [DDO-SCFHS-META].[dbo].prepare_all; - **Fill Table Row Counts:** Loops on all collected tables' metadata to update table row count EXEC [DDO-SCFHS-META].[dbo].fill_info_tb_counts; - **Fill Column Value Counts:** Loops on all collected columns' metadata to update number of non-blank values, number of blank values and number of distinct values EXEC [DDO-SCFHS-META].[dbo].fill_info_counts; - **Fill Column Sample Data:** Loops on all collected columns' metadata to update sample data for maximum 50 value concatenated, this apply to column types that can be casted to text format only EXEC [DDO-SCFHS-META].[dbo].fill_info_sample_data; - **Fill FK information:** scans data sources' data dictionaries for all foreign keys filling this info into columns' metadata and foreign keys data sets EXEC [DDO-SCFHS-META].[dbo].fill_info_fk_reference;

CheckData	MSSQL Job, weekly on Saturday 6:00 am preforming Data Quality inspection against data sources	- **Check ALL DQ:** Perform all data quality checks against data sources
		`EXEC check_profiles;`
		`EXEC check_fk_errors;`
		`EXEC check_validity_tables;`
		`EXEC check_validity_columns;`
		`EXEC check_accuracy;`
		`EXEC check_consistency;`

Internal Restricted | داخلي مقيّد

.2) Daily Job Schedule

TIME	SSIS (172.20.121.48)	DH (172.20.121.49)	DW (172.20.121.50)	Tableau (172.20.102.42)
18:00-18:30	Scfhs_Prepare_Tableau_Lineage		Load-DWH-Hourly	Extract Refresh- Hourly
18:30-19:00		DB-Performance-Tuning		
19:00-19:30	Data_Refresh		Load-DWH-Hourly	Extract Refresh- Hourly
19:30-20:00			DB-Performance-Tuning	
20:00-20:30	Scfhs_Load_External and LoadMSAccessDB			
20:30-21:00	DB-BackupJob-Daily	DB-BackupJob-Daily		
21:00-21:30		Build-Prepare Job		
21:30-22:00			DB-BackupJob-Daily	
22:00-22:30				
22:30-23:00				
23:00-23:30				
23:30-00:00		Multiple Parallel Jobs (Mumaris, DS, ERP, Others Job)		
00:00-00:30				
00:30-01:00				
01:00-01:30				Extract Refresh- Night
01:30-02:00				
02:00-02:30		DH-Data-Load-Post-Actions Job		
02:30-03:00				
03:00-03:30			DW-Data-Load Job	Tableau Daily Backup
03:30-04:00				
04:00-04:30				
04:30-05:00				
05:00-05:30				
05:30-06:00				
06:00-06:30				
06:30-07:00				
07:00-07:30				Extract Refresh- Morning
07:30-08:00				
08:00-08:30			Load-DWH-Hourly	
08:30-09:00				Extract Refresh- Hourly
09:00-09:30			Load-DWH-Hourly	
09:30-10:00				Extract Refresh- Hourly
10:00-10:30			Load-DWH-Hourly	
10:30-11:00				Extract Refresh- Hourly
11:00-11:30			Load-DWH-Hourly	
11:30-12:00				Extract Refresh- Hourly
12:00-12:30			Load-DWH-Hourly	
12:30-13:00			DB-Performance-Tuning	Extract Refresh- Hourly
13:00-13:30			Load-DWH-Hourly	
13:30-14:00				Extract Refresh- Hourly
14:00-14:30			Load-DWH-Hourly	
14:30-15:00				Extract Refresh- Hourly
15:00-15:30			Load-DWH-Hourly	
15:30-16:00				Extract Refresh- Hourly
16:00-16:30			Load-DWH-Hourly	
16:30-17:00				Extract Refresh- Hourly
17:00-17:30			Load-DWH-Hourly	
17:30-18:00				Extract Refresh- Hourly

.3) Weekly Job Schedule

TIME	SSIS (172.20.121.48)	DH (172.20.121.49)	DW (172.20.121.50)
Sunday			
Monday			
Thuesday			
Wednesday			
Thursday			
Friday	- DB-BackupJob-Weekly at 9:30 pm	- **Metadata at 6:00 am** - DB-BackupJob-Weekly at 9:30 pm	- DB-BackupJob-Weekly at 9:30 pm
Saturday		- **CheckData at 6:00 am**	- **DW-Data-Refresh Job at 6:00 am**

Internal Restricted | داخلي مقيّد

4- Data Warehouse Daily Routines

1- Check Last night activities

In data warehouse environment, set of various activities run everyday (Load Data, Data Refresh, Data Quality and Metadata). It is recommended to check the monitor of these activities on daily bases.

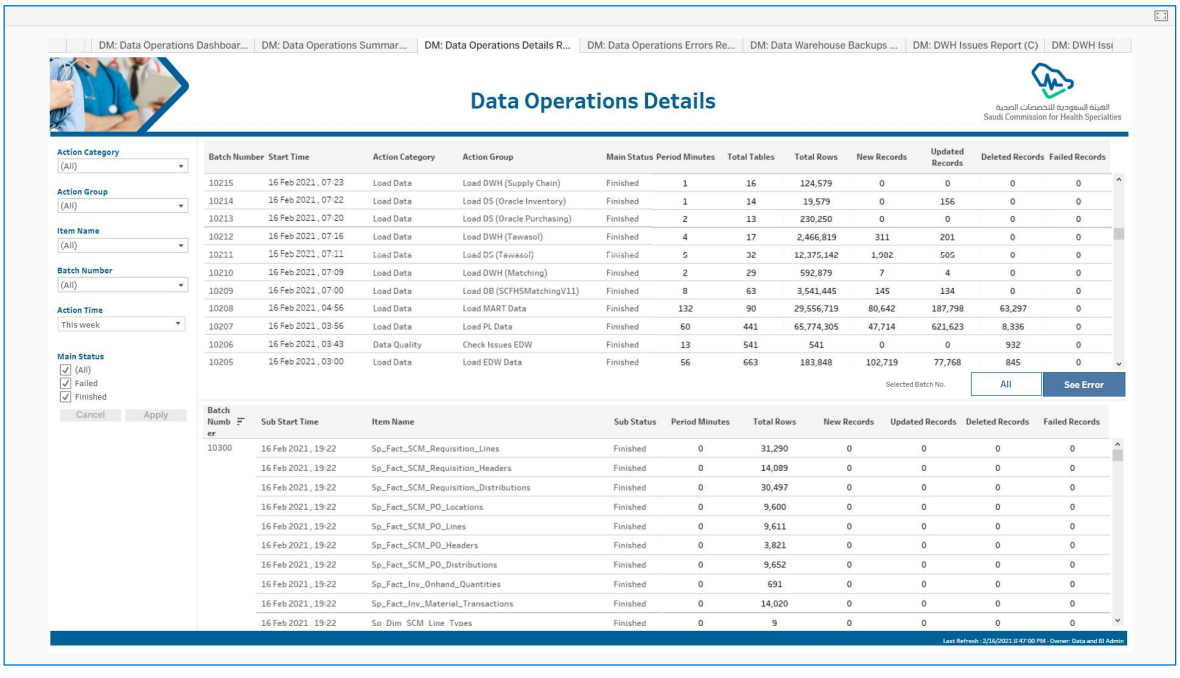
Checking the monitor can be through Tableau dashboard (003-DM - Data Warehouse Operations) or through data marts (dm_data_monitoring_main, dm_data_monitoring_sub)

Logged actions includes activities with start time, period minutes, Number of processed rows, Number of new records, Number of updated records, Number of deleted records and Number of failed records

Activities displayed on both levels main level and sub level

Checking this monitor will indicate healthy activities which have been finished execution in the normal time range as planned, and will indicated also the activities that failed to finish

Some Activates can have finished status but with some failed records, these records can be displayed by a sub data set for monitored issues



Internal Restricted | داخلي مقيّد

2- Check last database backup

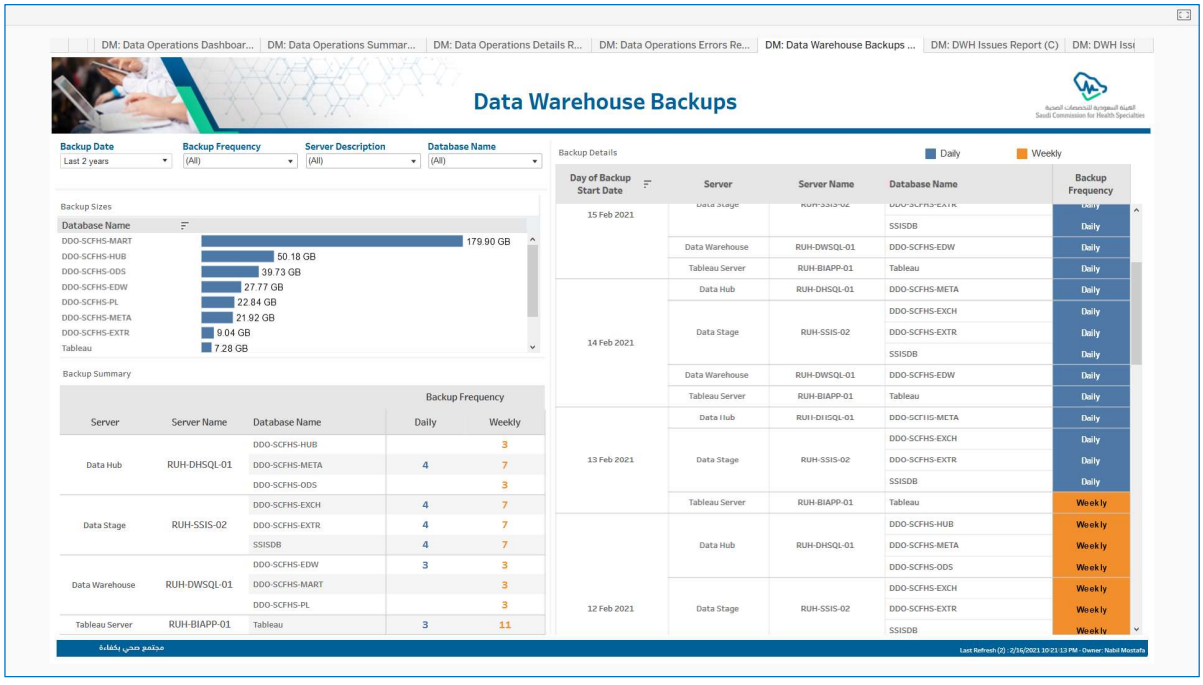
In data warehouse environment, set of full database backups for MSSQL & Tableau is being taken on daily bases and on weekly bases

It is recommended to check the monitor of these backups on daily bases.

Checking the monitor can be through Tableau dashboard (003-DM - Data Warehouse Operations) or through data mart (dm_data_backups_databases)

Expected behaviour of backups is shown in the following table
The settings for these backups are planned utilizing the available server storage

Server	Database Name	Expected Daily backups	Expected Weekly backups
Data Hub	DDO-SCFHS-HUB		3
	DDO-SCFHS-META	4	7
	DDO-SCFHS-ODS		3
Data Stage	DDO-SCFHS-EXCH	4	7
	DDO-SCFHS-EXTR	4	7
	SSISDB	4	7
Data Warehouse	DDO-SCFHS-EDW	3	3
	DDO-SCFHS-MART		3
	DDO-SCFHS-PL		3
Tableau	Tableau	3	11



Internal Restricted | داخلي مقيّد

3- Check Monitor Issues

In data warehouse environment, all issues are logged for support team action, these issues might be errors resulted from metadata, data quality, data loads and data refresh

It is recommended to check the monitor of these issues if found any on daily bases.

Checking the monitor can be through Tableau dashboard (003-DM - Data Warehouse Operations) or through data mart (dm_data_issues)

```
SELECT *
FROM [DDO-SCFHS-META].[dbo].[dm_data_issues]
WHERE Issue_Status = 'Current'
 AND Issue_Type ='Error';
```

After checking and solving the resulted error then update the status from 'Current' to 'Fixed'
But if the issue to be expected one time occurrence and not expected to appear again then update the status to 'Skipped'

Check the following sample issues that can be found in the monitor issues with action plan to resolve

.1) Error inserting or updating a column due to data type or nullability	
Issue Unit Name	Load EDW Data - - Update Statement
Issue Log	Update Statement (1) Error ********** (Feb 17 2021 3:03AM) >>>>> [DDO-SCFHS-EDW] Sp_lkp_tb_eac_Course Cannot insert the value NULL into column 'Enddate', table 'DDO-SCFHS-EDW.dbo.lkp_tb_eac_Course'; column does not allow nulls. UPDATE fails.
Issue Cause	Some changes in data sources data or data source structure which should be reflected into data warehouse, these changes will result as issue to work on by DWH Support team to alter the required changes in EDW environment. Generated issue log will contain the details needed to highlight the exact location of the error and the affected procedure
Action Plan	- Go to the mentioned column in the error message and alter the column data type as needed Alter Table lkp_tb_eac_Course Alter Column Enddate Date Null;
Post Actions	- Re-Run the affected failed stored procedure to make sure the problem resolved Exec [DDO-SCFHS-EDW].dbo.Sp_lkp_tb_eac_Course; - Update the issue status to 'Fixed'

Internal Restricted | داخلي مقيّد

.2) Error creating table using the autogenerated procedures 'Build_'	
Issue Unit Name	Create Tables in EDW
Issue Log	Create Tables in EDW (1) Error ********** (Feb 7 2021 11:05PM) >>>>> mpd_scfhs_qualificationequalanceBase mpd_Qualification_Equalance USE [DDO-SCFHS-EDW] CREATE TABLE mpd_Qualification_Equalance) Scfhs_Qualificationequalanceid uniqueidentifier NOT NULL , Createdon datetime , Createdby uniqueidentifier , Modifiedon datetime , Modifiedby uniqueidentifier , Ownerid uniqueidentifier NOT NULL , Loading_Date Datetime not null (ALTER TABLE mpd_Qualification_Equalance ADD CONSTRAINT mpd_PK_scfhs_qualificationequalanceBase PRIMARY KEY CLUSTERED (scfhs_qualificationequalanceId) Could not create constraint or index. See previous errors.
Issue Cause	Table creation is automated in ODS, HUB and EDW. In order to create a foreign key, the Primary key is essential and needs to be created, must have unique name and the PK columns must be not null
Action Plan	- Go to the mentioned pk information in mdm_Data_Columns and update PK info (pk name and nullability
Post Actions	- Re-Run the affected failed regeneration EXEC [DB-LINK-DW].[DDO-SCFHS-EDW].[dbo].build_edw_tables; - Update the issue status to 'Fixed'

Internal Restricted | داخلي مقيّد

.3) Error enabling foreign key constraints after data load	
Issue Unit Name	Load EDW Data - - Constraints Enable in EDW
Issue Log	Constraints Enable in EDW (4) Error ********** (Feb 14 2021 3:26AM) >>>>> [DDO-SCFHS-EDW] dbo.lkp_tb_mpd_Certificate_Type_Base ALTER TABLE [DDO-SCFHS-EDW].dbo.lkp_tb_mpd_Certificate_Type_Base WITH CHECK CHECK CONSTRAINT FK_dbo_lkp_tb_mpd_Certificate_Type_Base_scfhs_university The ALTER TABLE statement conflicted with the FOREIGN KEY constraint "FK_dbo_lkp_tb_mpd_Certificate_Type_Base_scfhs_university". The conflict occurred in database "DDO-SCFHS-EDW", table "dbo.lkp_un_University", column 'University_Id.' Select Distinct a.[scfhs_university] From [DDO-SCFHS-EDW].dbo.[lkp_tb_mpd_Certificate_Type_Base] a Where not exists (Select 1 From [DDO-SCFHS-EDW].dbo.[lkp_un_University] b Where a.[scfhs_university] = b.[University_Id];(---------- (Feb 14 2021 3:26AM) >>>>> [DDO-SCFHS-EDW] dbo.mpd_Exam_Eligibility_Request ALTER TABLE [DDO-SCFHS-EDW].dbo.mpd_Exam_Eligibility_Request WITH CHECK CHECK CONSTRAINT FK_dbo_mpd_Exam_Eligibility_Request_scfhs_InternshipUniversityId The ALTER TABLE statement conflicted with the FOREIGN KEY constraint "FK_dbo_mpd_Exam_Eligibility_Request_scfhs_InternshipUniversityId". The conflict occurred in database "DDO-SCFHS-EDW", table "dbo.lkp_un_University", column 'University_Id.' Select Distinct a.[Scfhs_Internshipuniversityid] From [DDO-SCFHS-EDW].dbo.[mpd_Exam_Eligibility_Request] a Where not exists (Select 1 From [DDO-SCFHS-EDW].dbo.[lkp_un_University] b Where a.[Scfhs_Internshipuniversityid] = b.[University_Id];(----------
Issue Cause	Foreign Keys are added to EDW & PL layers for two reasons (Data Modeling & Quality Assurance), these FKs are disabled most of the time and being enabled one time per day after data loading for EDW & PL layers. Enabling these foreign keys is through SP (Constraints_Enable) which uses looping for all FKs trying to enable and apply the integrity check. If the check FK fails then a log error is generated the Error log will contain a pre generated SQL statement to help detecting Integrity violations
Action Plan	- Use the pre-generated SQL statement to detect the integrity violations - Check same records existence in HUB to identify the reason (deletion or insertion) - Solve the integrity by inserting or deleting the violations - If the violation is related to reference tables 'lkp_un', then update the mapping information and re-call the required stored procedure with 'Update' parameter
Post Actions	- Re-Run the affected failed command of constraint enable ALTER TABLE [DDO-SCFHS-EDW].dbo.lkp_tb_mpd_Certificate_Type_Base WITH CHECK CHECK CONSTRAINT FK_dbo_lkp_tb_mpd_Certificate_Type_Base_scfhs_university - Re disable all constraints to avoid affecting any data loads EXEC [DDO-SCFHS-EDW].[dbo].[constraints_disable] '[DDO-SCFHS-EDW]'; - Update the issue status to 'Fixed'

Internal Restricted | داخلي مقيّد

.4) Error refreshing reference data for mapped values	
Issue Unit Name	Refresh Mappings
Issue Log	Refresh Mappings (2) Error ********** (Jan 21 2021 8:57AM) >>>>> lkp_un_Medical_Field ١١٣ INSERT INTO dbo.MDM_RECORDS_VALID_UNMAP (map_id, mapping_title, old_id_val , old_name_val ,view_name(SELECT map_id, mapping_title, old_id_val , old_name_val , 'Unmapped_113_External_Medical_Fields ' FROM dbo.Unmapped_113_External_Medical_Fields With (NoLock) Violation of PRIMARY KEY constraint 'PK_MDM_RECORDS_VALID_UNMAP'. Cannot insert duplicate key in object 'dbo.mdm_Records_Valid_Unmap'. The duplicate key value is.(١١٣, ابن سينا الأهلية للعلوم الطبية-طب وجراحة الفم والأسنان) --- (Jan 21 2021 9:02AM) >>>>> lkp_un_Medical_Field ١١٣ INSERT INTO dbo.MDM_RECORDS_VALID_UNMAP (map_id, mapping_title, old_id_val , old_name_val ,view_name(SELECT map_id, mapping_title, old_id_val , old_name_val , 'Unmapped_113_External_Medical_Fields ' FROM dbo.Unmapped_113_External_Medical_Fields With (NoLock) Violation of PRIMARY KEY constraint 'PK_MDM_RECORDS_VALID_UNMAP'. Cannot insert duplicate key in object 'dbo.mdm_Records_Valid_Unmap'. The duplicate key value is (113, ابن سينا الأهلية للعلوم الطبية-طب وجراحة الفم والأسنان).
Issue Cause	Reference data management requires mapping for Old values from data sources into new values in 'lkp_un' tables, only this comes with an important condition that one old value can be mapped to one new value so the mapping function will be able to substitute old values into new ones from reference. Sometimes by mistake can one value placed twice in the mapping column, the generated error clearly identify the information you need to solve the error (mapping Id & the old value that failed to be mapped because being added more than once)
Action Plan	- Using the map id (113) you identify the table (lkp_un_Medical_Field) and the column (Map_exd_MOE_College_Id) from the mdm_Mappings - Filter the lkp_un_Medical_Field with Map_exd_MOE_College_Id like '%ابن سينا الأهلية للعلوم الطبية-طب وجراحة الفم والأسنان%' - Edit data to make sure having the value mapped only one time
Post Actions	- Re-Run the affected failed command of refresh mapping EXEC [DDO-SCFHS-META].[dbo].[dq_store_map_data] 113 - Update the issue status to 'Fixed'

Internal Restricted | داخلي مقيّد

.5) Found empty tables in the data warehouse, this indicates a problem	
Issue Unit Name	Empty Tables in EDW
Issue Log	Empty Tables in EDW (1) table ********** ato_Another_Personal_Information
Issue Cause	Quality assurance option added to the daily load using monitor Empty procedure, for sure you will get another error indicating the loading problem but you get another error for the empty state of the table also Only ODS layer has the truncate option, but EDW might have empty tables resulted from not being loaded with data in the first place or sometimes the data is deleted from source, this will trigger the delete statement in EDW This worse checking to identify the reason of the error
Action Plan	- Identify the reason for the error (missed initial data load or data deleted from data source) - Take action to make sure there is no empty table exists in the data warehouse, you might need to remove the table from EDW and nullify the Base_EDW_Column in metadata
Post Actions	- Re-Run the affected failed command of refresh mapping EXEC [DDO-SCFHS-META].[dbo].[monitor_all_empty] - Update the issue status to 'Fixed' (optional as the procedure will update to 'Skipped' if the problem already fixed)

.6) Connection lost to one of the data sources	
Issue Unit Name	Prepare Tables
Issue Log	Prepare Tables (2) Error ********** (Jan 4 2021 10:00PM) >>>>> FCSWS Insert into [#TEMP_DATA_TABLES] (tb_object_type, ds_code, tb_code, tb_name_en, tb_name_ar, tb_desc, tb_records_count) SELECT dbo.initcap(OBJECT_TYPE), 'FCSWS', TABLE_NAME , TABLE_NAME , TABLE_NAME ,null , 0 FROM OPENQUERY([DB-LINK-ORA-LINUX],'SELECT ''TABLE'' OBJECT_TYPE, TABLE_NAME FROM SYS.ALL_TABLES WHERE OWNER = ''FCSWS''') Cannot initialize the data source object of OLE DB provider "OraOLEDB.Oracle" for linked server "DB-LINK-ORA-LINUX." --- (Jan 4 2021 10:00PM) >>>>> WSO2AS_ANALYTICS_DB Insert into [#TEMP_DATA_TABLES] (tb_object_type, ds_code, tb_code, tb_name_en, tb_name_ar, tb_desc, tb_records_count) SELECT dbo.initcap(OBJECT_TYPE), 'WSO2AS_ANALYTICS_DB', TABLE_NAME , TABLE_NAME , TABLE_NAME ,null , 0 FROM OPENQUERY([DB-LINK-ORA-LINUX],'SELECT ''TABLE'' OBJECT_TYPE, TABLE_NAME FROM SYS.ALL_TABLES WHERE OWNER = ''WSO2AS_ANALYTICS_DB''') Cannot initialize the data source object of OLE DB provider "OraOLEDB.Oracle" for linked server "DB-LINK-ORA-LINUX".
Issue Cause	Sometimes connection to data source is lost due to multiple reasons (network, source server down, …), all these reasons usually out of our ability to fix. In daily metadata we use prepare procedure to update the metadata identifying any issue with connection then auto build will update the loading batches to skip this source and error message will be generated to inform DWH team to the issue
Action Plan	- Check the source connection, if still missed then communicate source owner
Post Actions	- Re-Run the affected failed command of prepare EXEC [DDO-SCFHS-META].[dbo].[prepare_tables] - Update the issue status to 'Fixed'

Internal Restricted | داخلي مقيّد

4- Check Alerted Emails

In data warehouse environment, multipe email alerts is sent to adminstraort by Email

Check each email for issue source server or scheduled job

Check the following Sample email alerts that can with action plan to resolve

.1) Email Alert from Operation Manager (IT Infrastructure) indicating server issue

Email Log

Critical - ruh-dwsql-01.scfhs.org.sa - Partition Details of the Device(%) for C: is 96, threshold value for this monitor is 95

OPmanager@scfhs.org
Yesterday, 11:44 AM
Syed M. Sharfudeen; nmostafa@master-works.sa; Nouf F. Alqublan; Khalid A. Alzahrani; Data and BI Admin

Reply all

Title

Critical - ruh-dwsql-01.scfhs.org.sa - Partition Details of the Device(%) for C: is 96, threshold value for this monitor is 95

Message

Message: Partition Details of the Device(%) for C: is 96, threshold value for this monitor is 95
Device: ruh-dwsql-01.scfhs.org.sa
Category: Server
Error Condition: Critical
Generated at: 17 Feb 2021 11:44:44 AM AST

Alarm Details

Message	Partition Details of the Device(%) for C: is 96, threshold value for this monitor is 95
Device Name	ruh-dwsql-01.scfhs.org.sa
Category	Server
Error Condition	Critical

Generated at 17 Feb 2021 11:44:44 AM AST

Reported by : OpManager

Email Cause

The Operation manager is monitoring 3 main items (CPU, Memory, Storage), email alert sent to admin email

Action Plan

- First check the root cause, the running procedure/job caused the issue
- For memory issues, action can be made to limit MSSQL running on server to limit the memory usage by the query
- For CPU alerts, work first on optimization of the running activity to avoid this error or else request more CPUs
- For CPU alerts (Tableau Server), Adding more CPUs is limited by license (8 core license) but running jobs can be changed from parallel execution into serial and minimize the priority to minimum (100)
- For Storage alerts, relocation of database is an option, limiting the backup strategy to a smaller number of daily and weekly backups

Post Actions

- Follow up for same action that resulted the error taking alternative solution

Internal Restricted | داخلي مقيّد

.2) Email Alert from MSSQL failed jobs	
Email Log	[The job failed.] SQL Server Job System: 'Data_Refresh' completed on \\RUH-SSIS-02. DBI SSIS Database <dbi_admin@scfhs.org.sa> Reply all Tue 2/16, 8:00 PM Data and BI Admin JOB RUN: 'Data_Refresh' was run on 2/16/2021 at 8:00:00 PM DURATION: 0 hours, 0 minutes, 21 seconds STATUS: Failed MESSAGES: The job failed. The Job was invoked by Schedule 22 (Everyday on 8:00 pm). The last step to run was step 1 (Data_Refresh_Data_Flow).
Email Cause	All MSSQL jobs are set to send email alerts if they fail to finish or face compilation error
Action Plan	- Go to the mentioned MSSQL job for the mentioned server - Check the Job Activity Monitor for the error log - Usually, the failure compilation error or connection lost, trying to re-execute would be a good option
Post Actions	- Follow up for same action that resulted the error taking alternative solution

.3) Email Alert from Tableau Server failed extract	
Email Log	Extract Refresh Failed Site: Default Workbook: 075-PP - CME Recognition Processes (I) The scheduled extract refresh for a data source included in the workbook named above was not completed successfully. See the error details below and select **View affected workbook** to take suggested actions. You can run a manual refresh to confirm that your changes resolve the issue. This is failure 3. After 5 consecutive failures, refreshes are suspended until you take an action to resolve the issue. **Affected data source**: Embedded in workbook **Error message**: Connectionless Failure (status code = 10000, Missing password. Invalid username or password.) **Failed at**: 2021-02-09 06:07:36 UTC+03:00 (Arabian Standard Time) **Last successful refresh**: 2021-02-07 06:52:38 UTC+03:00 (Arabian Standard Time) **Suggested action**: Check the Data Connection page for necessary updates to an access token or embedded credentials.
Email Cause	Whenever Tableau Server fails to refresh extract of any published workbook, Tableau server will send email alert to dbi_admin with the error. The Email indicates outdated data in the workbook but it is not critical as the workbook will work fine until the error is solved
Action Plan	- Check the error message, if connection to solve the issue - Common error is missed saved credentials for the database connections
Post Actions	- Follow up for same action that resulted the error taking alternative solution

Internal Restricted | داخلي مقيّد

5- Check un-mapped reference data

In data warehouse environment, we have reference data management to help integrating reference entities across all

It is recommended to check the monitor of these issues if found any on daily bases.

Checking the monitor can be through Tableau dashboard (003-DM - Data Warehouse Operations) or through data mart (dm_data_issues)
Alternative through Tableau dashboard (037-DM - Master Data Management) or through the data mart (dm_data_master)

```
SELECT *
FROM [DDO-SCFHS-META].[dbo].[dm_data_issues]
WHERE Issue_Status = 'Current'
 AND Issue_Type =Missing;
```

This is how the result will look like in monitor issues, listing all unmapped records for a specific mapping id with old ids & values from source to be used finding suitable mapped values in reference data

```
Unmapped_040_Training_Training_Center (1) missing mapping
**************************************
Map Id:40 ----->>>>Training Center From Training
**************************************
mapping_column:map_trd_training_center_id
new_table:lkp_un_Training_Center
old_table:trd_tbl_TrainingCenter
**************************************
old_id:"200147"
old_name:"Prince Mohammed bin Naif Medical Center"
    ---
```

Use the given information with mapping record information mdm_Mappings
The mapping information enclosed with ‘$’ will be used by valid map generator

```
EXEC [DDO-SCFHS-META].[dbo].[dq_store_map_data] 40
```

Status of the issue will be changed to ‘Skipped’ and removed from the results automatically

Internal Restricted | داخلي مقيّد