

LAPORAN TUGAS BESAR PERGUDANGAN DATA MISI 2



Oleh :

Kelompok 10

- 1. Fadhil Fitra Wijaya - 122450082**
- 2. Ali Aristo Muthahhari Parisi - 123450088**
- 3. Benget Sidabutar - 123450047**
- 4. Nobel Nizam Fathirizkii - 123450117**

5.

Misi 2 Pergudangan Data

Kelompok 8

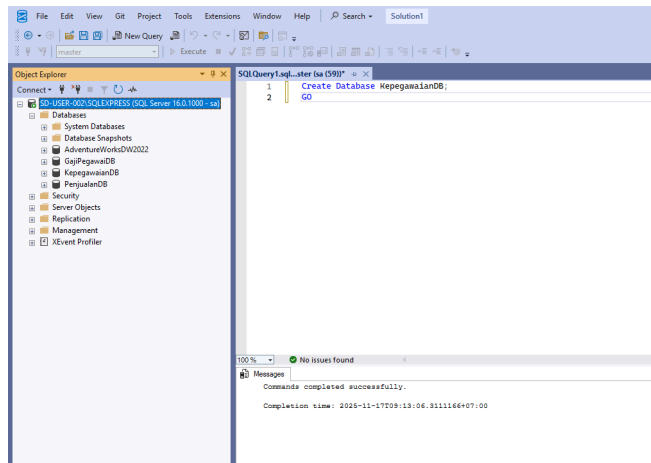
Anggota

- Fadhil Fitra Wijaya - 122450082
- Benget Sidabautar - 123450047
- Nobel Nizam - 123450117
- Ali Aristo Aristo Muthahhari Parisi - 123450088

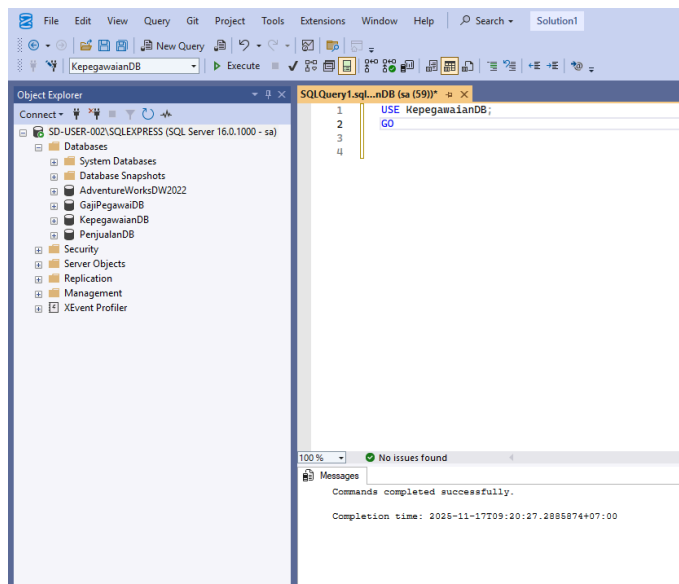
Progres Misi 2

A. DATABASE KEPEGAWAIAN

1. Membuat Database Kepegawaian

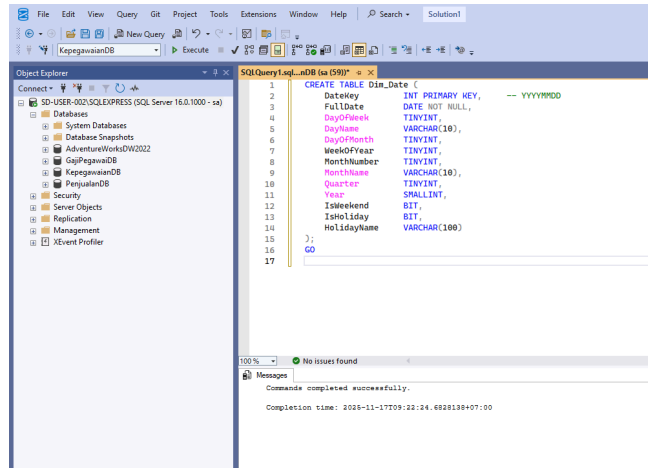


2. Menggunakan Database Kepegawaian

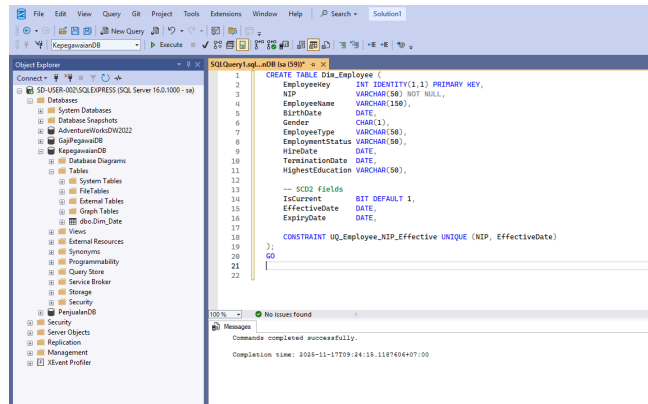


3. Membuat Dimensi Tabel

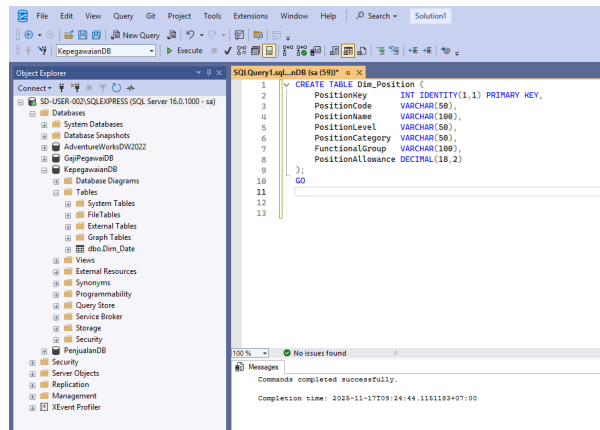
- Tabel 1 (Dim_Date)



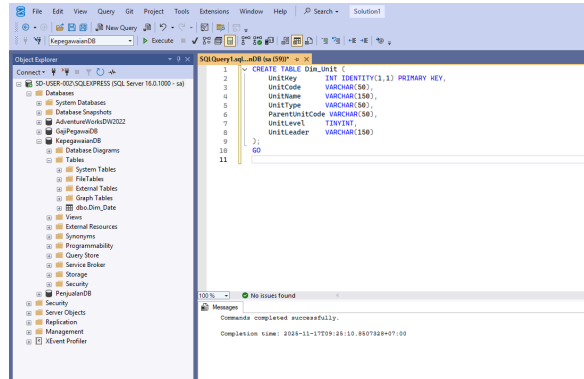
- Tabel 2 (Dim_Employee)



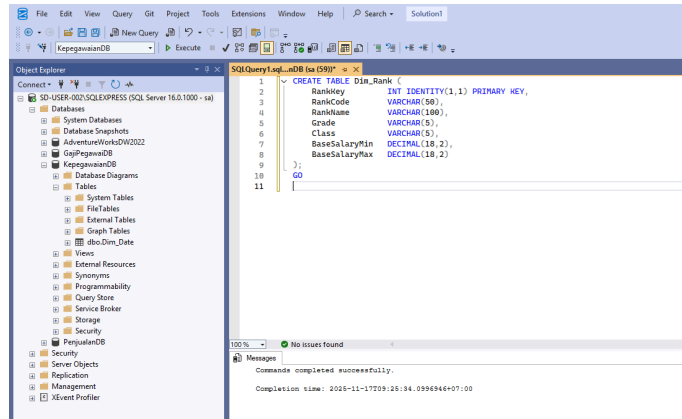
- Tabel 3 (Dim_Position)



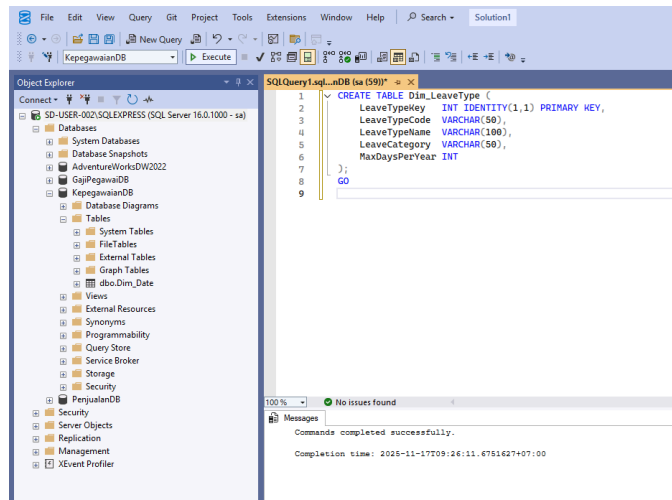
- Tabel 4 (Dim_Unit)



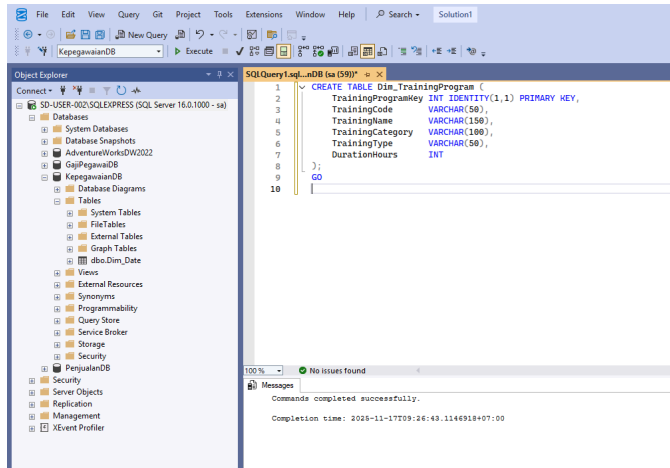
- Tabel 5 (Dim_Rank)



- Tabel 6 (Dim_LeaveType)

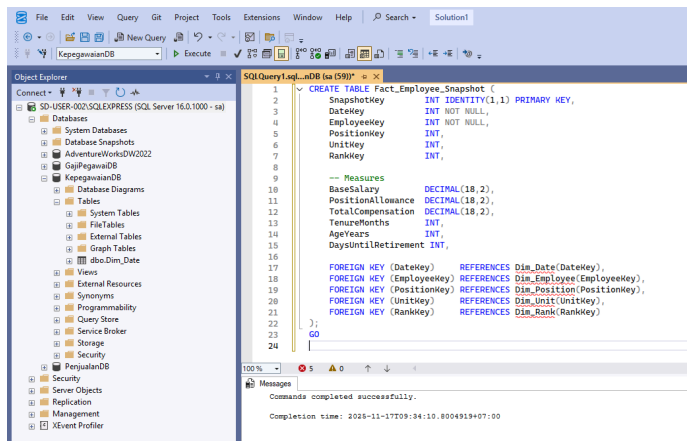


- Tabel 7 (Dim_Training Program)

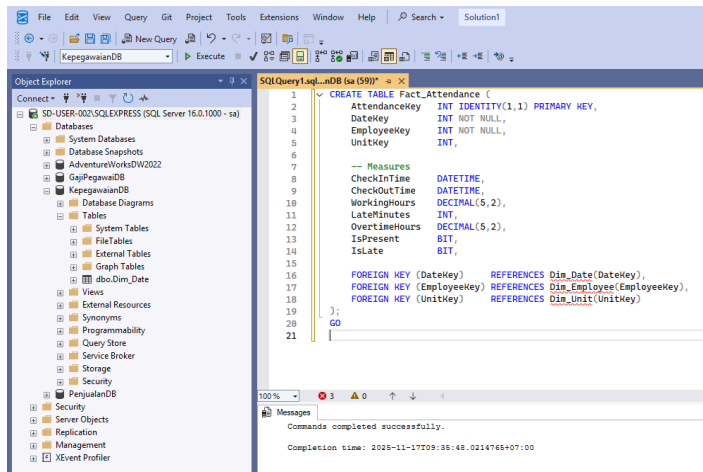


4. Tabel Fact

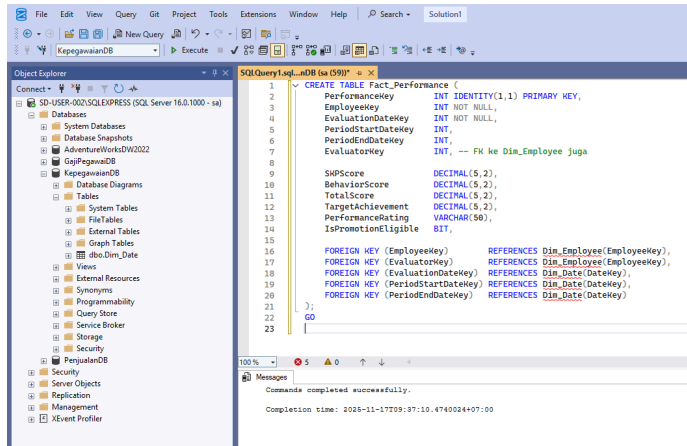
• Fact_Employee_Snapshot



• Fact_Attendance

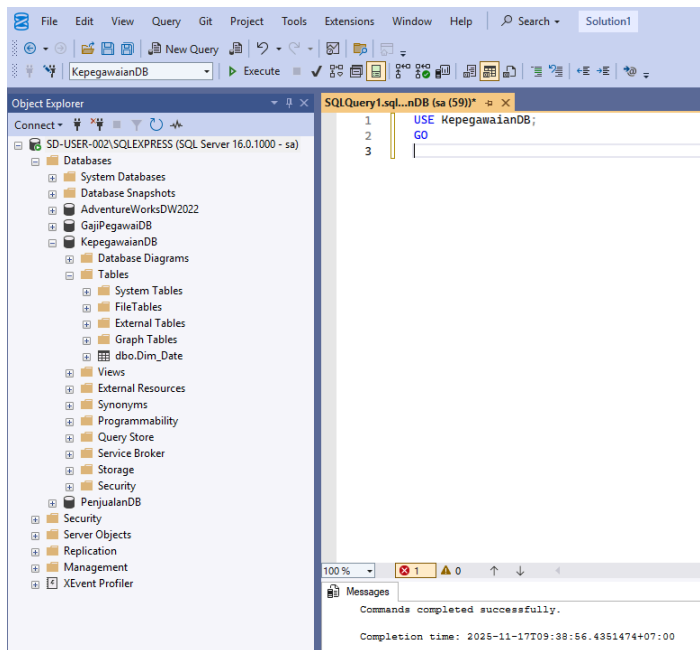


• Fact_Performance



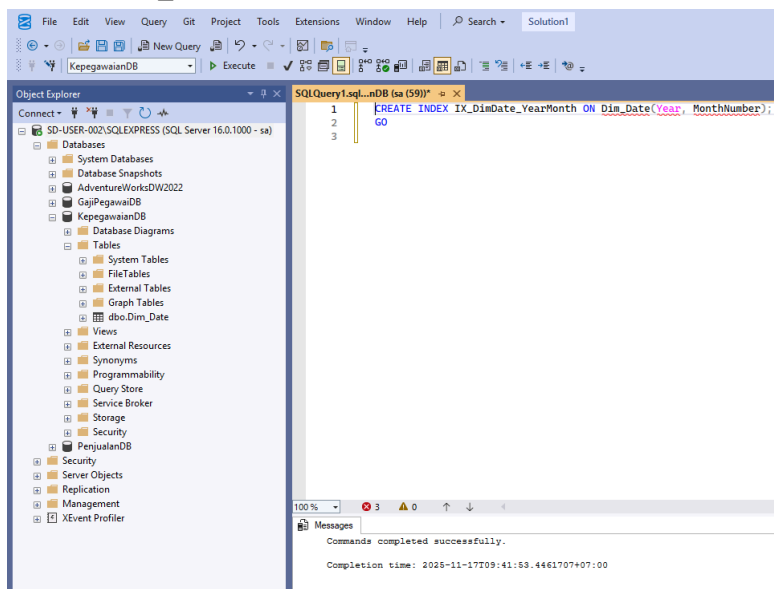
B. MELAKUKAN INDEXES

1. INDEXES FOR KepegawaianDB

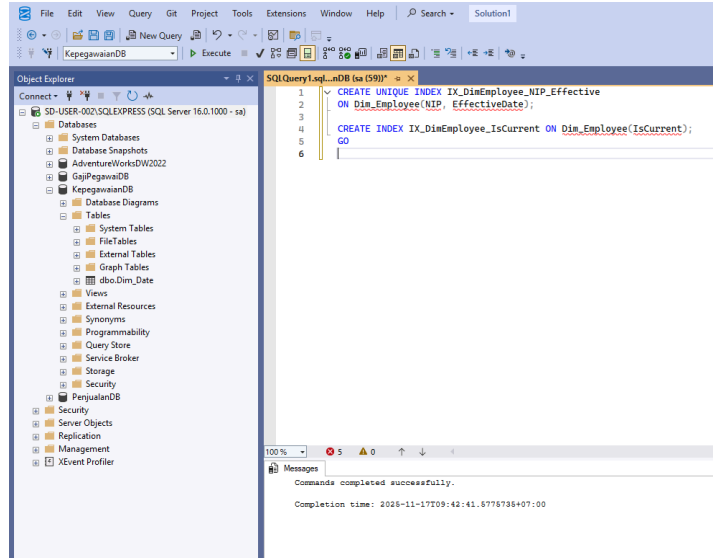


A. INDEX UNTUK DIMENSION TABLES

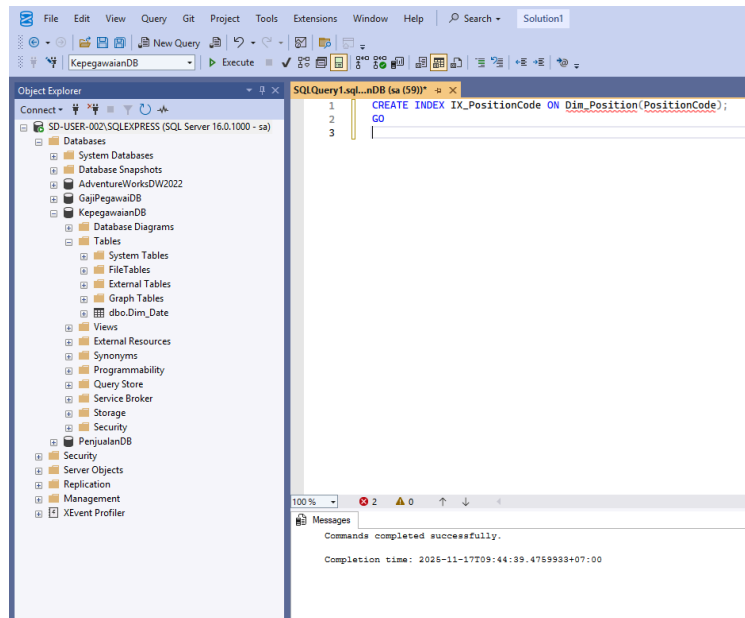
- Dim_Date



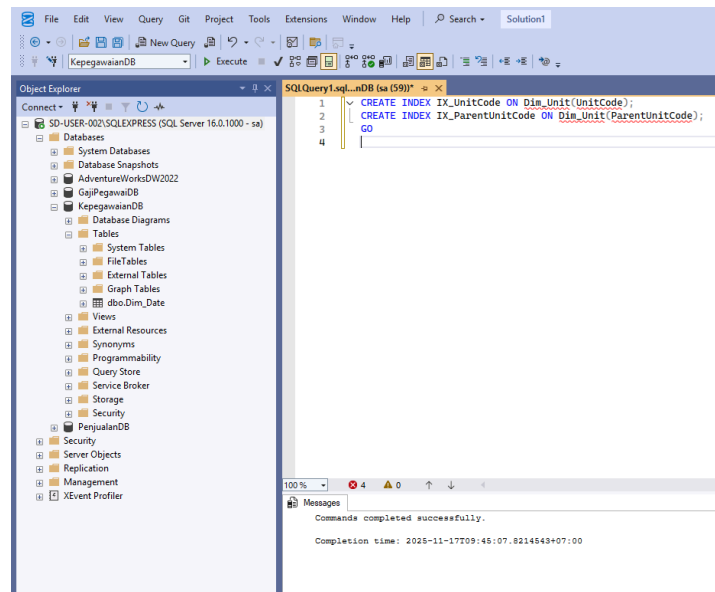
- Dim_Employee



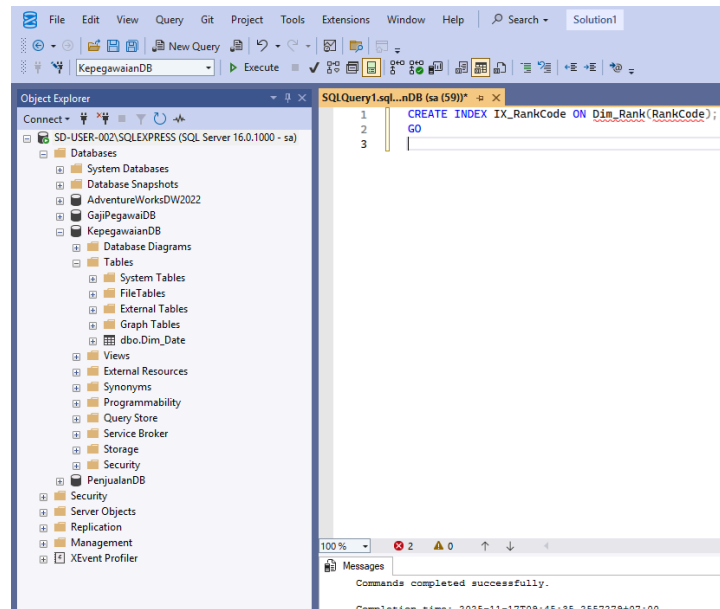
- **Dim_Position**



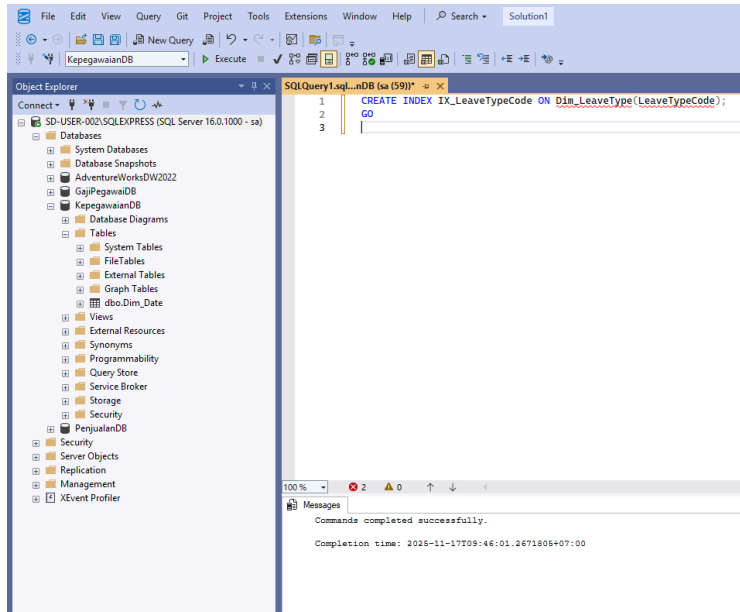
- Dim_Unit



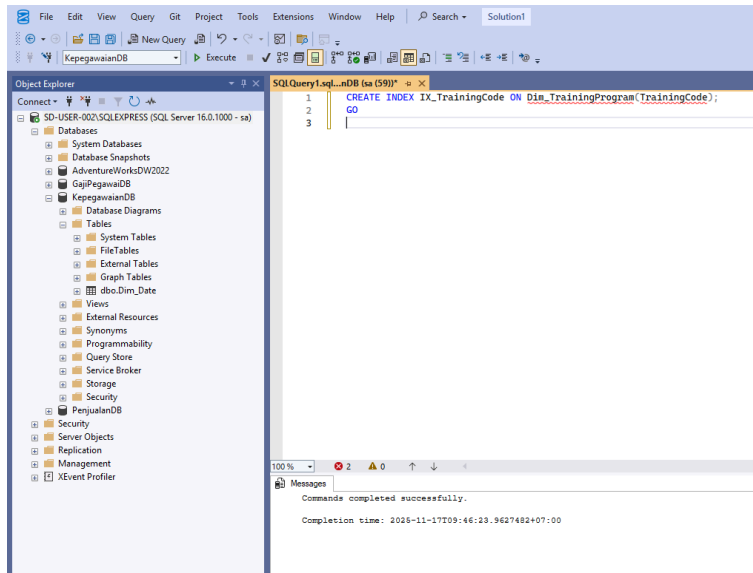
- Dim_Rank



- Dim_LeaveType

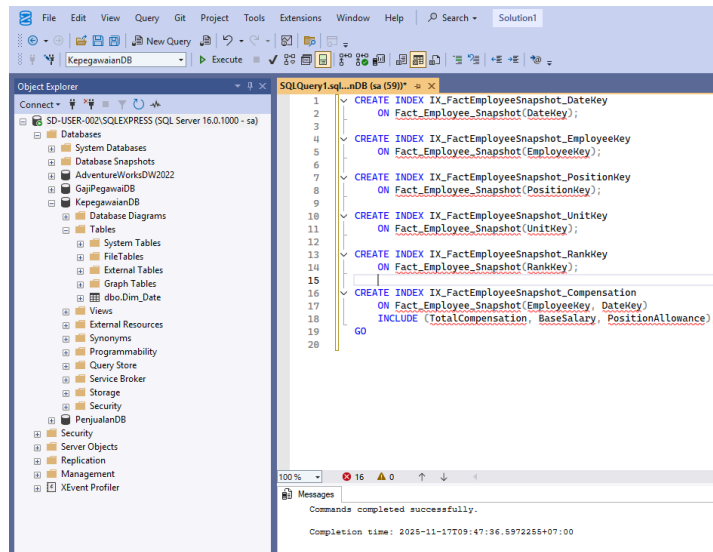


- Dim_TrainingProgram

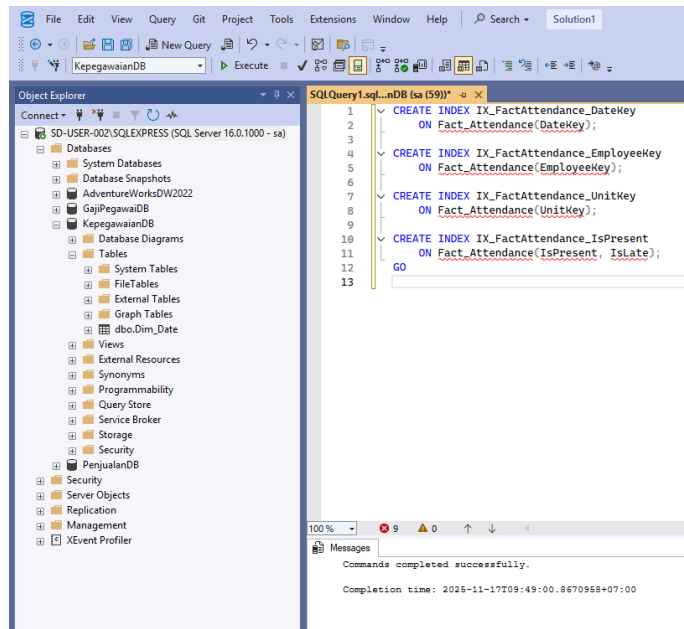


B. INDEX UNTUK FACT TABLES (FK + Query Fields)

- Fact_Employee_Snapshot



- Fact_Attendance



- Fact_Performance

The screenshot shows the SQL Server Enterprise Manager interface. On the left, the Object Explorer displays the database structure for 'KepegawaianDB'. The right pane shows a SQL query window with the following code:

```

1 CREATE INDEX IX_FactPerformance_EmployeeKey
2 ON Fact_Performance(EmployeeKey);
3
4 CREATE INDEX IX_FactPerformance_EvaluationDateKey
5 ON Fact_Performance(EvaluationDateKey);
6
7 CREATE INDEX IX_FactPerformance_PeriodStartDateKey
8 ON Fact_Performance(PeriodStartDateKey);
9
10 CREATE INDEX IX_FactPerformance_PeriodEndDateKey
11 ON Fact_Performance(PeriodEndDateKey);
12
13 CREATE INDEX IX_FactPerformance_EvaluatorKey
14 ON Fact_Performance(EvaluatorKey);
15
16 -- covering index
17 CREATE INDEX IX_FactPerformance_TotalScore
18 ON Fact_Performance(EmployeeKey)
19 INCLUDE (TotalScore, SHPScore, BehaviorScore, PerformanceRating);
20
21 GO

```

The Messages pane at the bottom indicates that the commands were completed successfully.

C. MELAKUKAN PARTITIONING

a. Memuat Skema dan Fungsi Partisi

The screenshot shows the SQL Server Enterprise Manager interface. The right pane displays a SQL query window with the following code:

```

1 --=====
2 -- 1. SIAPKAN SKEMA & FUNGSI PARTISI (Tahun)
3 --=====
4 PRINT '>>> 1. Membuat Function & Scheme...';
5
6 -- Range: Data < 2023, 2023, 2024, 2025, > 2025
7 IF NOT EXISTS (SELECT * FROM sys.partition_functions WHERE name = 'PF_TahunKepegawaian')
8 CREATE PARTITION FUNCTION PF_TahunKepegawaian (INT)
9 AS RANGE RIGHT FOR VALUES (20230101, 20240101, 20250101, 20260101);
10
11 IF NOT EXISTS (SELECT * FROM sys.partition_schemes WHERE name = 'PS_TahunKepegawaian')
12 CREATE PARTITION SCHEME PS_TahunKepegawaian
13 AS PARTITION PF_TahunKepegawaian
14 ALL TO ([PRIMARY]);
15
16 GO
17

```

The Messages pane at the bottom shows the following output:

```

>>> 1. Membuat Function & Scheme...
Partition scheme 'PS_TahunKepegawaian' has been created successfully. 'PRIMARY' is marked as the next used filegroup in partition scheme 'PS_TahunKepegawaian'.
Completion time: 2025-11-24T20:18:46.0686812+07:00

```

b. Partisi Tabel Fakta

```
SQLQuery1.sql...Fadhil (72))* X
1  -- 2. PARTISI TABEL: Fact_Attendance (Absensi)
2  -- =====
3
4  PRINT '>>> 2. Mempartisi Tabel Fact_Attendance...';
5
6  DECLARE @TableName_Att NVARCHAR(100) = 'dbo.Fact_Attendance';
7  DECLARE @OldPK_Att NVARCHAR(100);
8  DECLARE @SQL_Att NVARCHAR(MAX);
9
10 -- A. Hapus Duplikat (Jaga-jaga)
11 WITH CTE_Clean AS (
12     SELECT AttendanceKey, DateKey, ROW_NUMBER() OVER (PARTITION BY AttendanceKey, DateKey ORDER BY (SELECT NULL)) AS RN
13     FROM dbo.Fact_Attendance
14 ) DELETE FROM CTE_Clean WHERE RN > 1;
15
16 -- B. Cari & Hapus PK Lama
17 SELECT TOP 1 @OldPK_Att = name FROM sys.key_constraints WHERE type = 'PK' AND parent_object_id = OBJECT_ID(@TableName_Att);
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c. Cek Validasi

```
SQLQuery1.sql...Fadhil (72))*
2  -- 4. VERIFIKASI HASIL
3  -- =====
4  PRINT '=== HASIL SEBARAN DATA ===';
5
6  SELECT
7      t.name AS [Nama Tabel],
8      p.partition_number AS [No Partisi],
9      rv.value AS [Batas Bawah Tanggal],
10     p.rows AS [Jumlah Data]
11  FROM sys.partitions p
12  JOIN sys.tables t ON p.object_id = t.object_id
13  JOIN sys.indexes i ON p.object_id = i.object_id AND p.index_id = i.index_id
14  JOIN sys.partition_schemes ps ON i.data_space_id = ps.data_space_id
15  JOIN sys.partition_functions pf ON ps.function_id = pf.function_id
16  LEFT JOIN sys.partition_range_values rv ON pf.function_id = rv.function_id AND rv.boundary_id = p.partition_number - 1
17  WHERE t.name IN ('Fact_Attendance', 'Fact_Performance')
18  ORDER BY t.name, p.partition_number;
19
20 GO
```

110 % No issues found Ln: 20 C

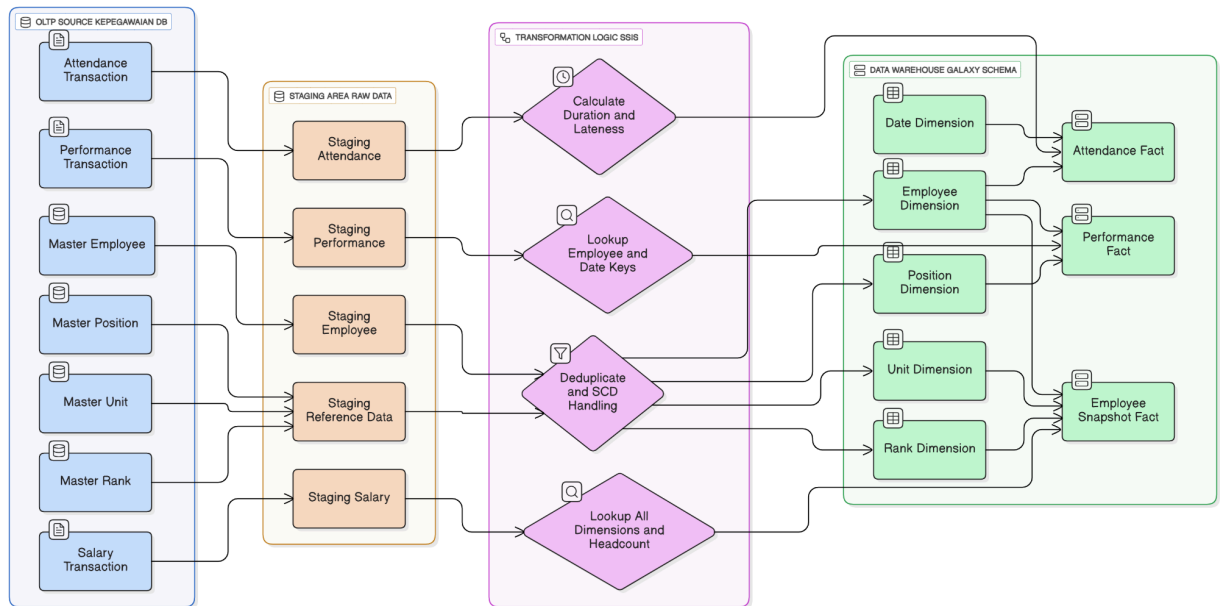
	Nama Tabel	No Partisi	Batas Bawah Tanggal	Jumlah Data
1	Fact_Attendance	1	NULL	0
2	Fact_Attendance	2	20230101	0
3	Fact_Attendance	3	20240101	0
4	Fact_Attendance	4	20250101	10
5	Fact_Attendance	5	20260101	0
6	Fact_Performance	1	NULL	0
7	Fact_Performance	2	20230101	0
8	Fact_Performance	3	20240101	0
9	Fact_Performance	4	20250101	10
10	Fact_Performance	5	20260101	0

Data masih banyak yang null karena masih menggunakan data dummy.

D. MEMBUAT STAGING TABLES

```
SQLQuery1.sql...Fadhil (72))*
1  -- =====
2  -- MEMBUAT STAGING TABLES
3  -- =====
4
5  -- Buat Schema khusus Staging agar rapi
6  CREATE SCHEMA Staging;
7  GO
8
9  -- Buat tabel Staging (Strukturnya mirip OLTP tapi tidak ada FK/Constraint ketat)
10 CREATE TABLE Staging.MsPegawai (
11     NIP VARCHAR(20),
12     NamaLengkap VARCHAR(150),
13     TglLahir DATE,
14     JenisKelamin VARCHAR(10),
15     StatusPegawai VARCHAR(50),
16     KodeUnit VARCHAR(10),
17     KodeJabatan VARCHAR(10),
18     KodeGolongan VARCHAR(10)
19 );
20
21 CREATE TABLE Staging.TrAbsensi (
22     NIP VARCHAR(20),
23     Tanggal DATE,
24     JamMasuk TIME(0),
25     JamKeluar TIME(0),
26     StatusKehadiran VARCHAR(20)
27 );
28
29 CREATE TABLE Staging.TrGaji (
30     NIP VARCHAR(20),
31     Bulan INT,
32     Tahun INT,
33     GajiPokok DECIMAL(18,2)
34 );
35
36 CREATE TABLE Staging.TrPenilaian (
37     NIP VARCHAR(20),
38     TglEvaluasi DATE,
39     TotalSkor DECIMAL(5,2),
40     Grade VARCHAR(5)
41 );
42 GO
43
```

E. ETL DESIGN



Strategi ETL menggunakan Script, menggunakan bahasa **T-SQL (Transact-SQL)** yang spesifik untuk lingkungan **Microsoft SQL Server** Berikut adalah rincian perintah dan logika kunci yang digunakan dalam *script*:

a. Control Flow:

- CREATE OR ALTER PROCEDURE:** Membungkus seluruh logika dalam satu objek yang mudah dieksekusi ulang atau diperbarui.
- SET NOCOUNT ON:** Mengoptimalkan kinerja jaringan dengan mencegah pengiriman pesan "x rows affected" yang tidak perlu.
- DECLARE ... GETDATE():** Digunakan untuk *logging* durasi proses.

b. Data Manipulation (DML):

- TRUNCATE TABLE:** Membersihkan tabel *Staging* dengan cepat sebelum data baru dimuat (Reset log).
- INSERT INTO ... SELECT:** Memindahkan data secara massal (*bulk insert*).
- MERGE:** Digunakan pada **Dim_Employee** untuk menangani logika *Upsert* (Update jika ada, Insert jika baru).
- DELETE:** Menghapus data spesifik pada Fact Table sebelum insert ulang untuk mencegah duplikasi.

c. Transformasi & Fungsi:

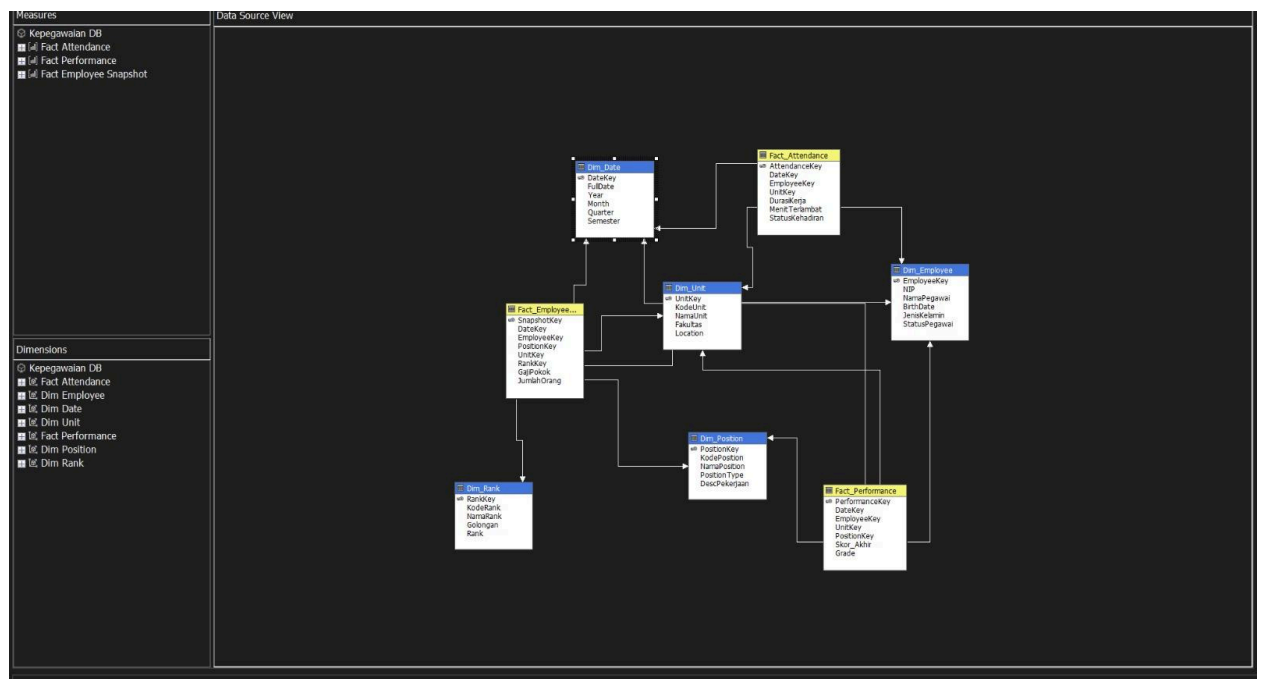
- DATEDIFF:** Menghitung durasi kerja dan keterlambatan (dalam menit).

- ii. **CAST/CONVERT**: Mengubah format tanggal menjadi **DateKey** (format integer **YYYYMMDD**).
- iii. **ISNULL**: Menangani nilai **NULL** dengan memberikan nilai *default* (biasanya **-1** untuk *Unknown Member*).
- iv. **CASE WHEN**: Logika bisnis untuk menentukan apakah pegawai terlambat (setelah 07:30).

Alur Data (Data Flow):

1. **Source (OLTP)**: Data transaksional mentah (tabel **Ms...** dan **Tr...**).
2. **Staging Area**: Tempat pendaratan sementara (**Staging.MsPegawai**, dll). Data di sini adalah salinan persis dari Source tetapi di-*truncate* setiap kali proses berjalan.
3. **Data Warehouse (OLAP)**: Tujuan akhir dengan skema **Galaxy Schema**.
 - o **Dimensions**: Tabel referensi (**Dim_Unit**, **Dim_Employee**).
 - o **Facts**: Tabel transaksi bisnis yang berisi metrik (**Fact_Attendance**, **Fact_Performance**, **Fact_Employee_Snapshot**).

F. ETL DESIGN TERIMPLEMENTASI



Design ETL terimplementasi menggunakan SSIS Datacube Visual Studio, walaupun ETL yang kami gunakan menggunakan Script untuk Proses ETL nya.

GENERATOR-SCR...\Fadhil (53) 08_Data_Quali...\Fadhil (52) 09_Perform

1 EXEC ETL_Master_Load;

100 % No issues found

Messages

```
=== MULAI PROSES ETL ===  
1. Loading Staging Tables...  
2. Loading Dimensions...  
3. Loading Facts...  
=== ETL SELESAI ===  
Durasi: 1186 ms  
  
Completion time: 2025-11-24T21:19:34.3106918+07:00
```

ETL Berjalan dengan lancar menggunakan Script T-Sql + Staging.

G. DATA LOADED SUCCESFULLY

a. Dim_Date

SQLQuery2.sql - Fadhil (69)* [05_Partition_1_EE\Fadhil (72)]

1 | select * from Dim_Date

83 % 1 0

Results Messages

	DateKey	FullDate	Year	Month	Quarter	Semester
7	2000108	2000-01-08	2000	1	1	1
8	2000107	2000-01-07	2000	1	1	1
9	2000106	2000-01-06	2000	1	1	1
10	2000105	2000-01-05	2000	1	1	1
11	2000104	2000-01-04	2000	1	1	1
12	2000111	2000-01-11	2000	1	1	1
13	2000112	2000-01-12	2000	1	1	1
14	2000113	2000-01-13	2000	1	1	1
15	2000114	2000-01-14	2000	1	1	1
16	2000115	2000-01-15	2000	1	1	1
17	2000116	2000-01-16	2000	1	1	1
18	2000117	2000-01-17	2000	1	1	1
19	2000118	2000-01-18	2000	1	1	1
20	2000119	2000-01-19	2000	1	1	1
21	2000120	2000-01-20	2000	1	1	1
22	2000121	2000-01-21	2000	1	1	1
23	2000122	2000-01-22	2000	1	1	1
24	2000123	2000-01-23	2000	1	1	1
25	2000124	2000-01-24	2000	1	1	1
26	2000125	2000-01-25	2000	1	1	1
27	2000126	2000-01-26	2000	1	1	1
28	2000127	2000-01-27	2000	1	1	1
29	2000128	2000-01-28	2000	1	1	1
30	2000129	2000-01-29	2000	1	1	1
31	2000130	2000-01-30	2000	1	1	1
32	2000131	2000-01-31	2000	1	1	1
33	2000001	2000-02-01	2000	2	1	1
34	2000002	2000-02-02	2000	2	1	1
35	2000003	2000-02-03	2000	2	1	1
36	2000004	2000-02-04	2000	2	1	1
37	2000005	2000-02-05	2000	2	1	1
38	2000006	2000-02-06	2000	2	1	1
39	2000007	2000-02-07	2000	2	1	1
40	2000008	2000-02-08	2000	2	1	1
41	2000009	2000-02-09	2000	2	1	1
42	2000010	2000-02-10	2000	2	1	1
43	2000011	2000-02-11	2000	2	1	1
44	2000012	2000-02-12	2000	2	1	1
45	2000013	2000-02-13	2000	2	1	1

Query executed successfully.

EPWEE\MSSQLSERVER01 (16.0 RTM) EPWEE\Fadhil (69) Kepegawain_DB 00:00:00 4.019

b. Dim_Employee

SQLQuery2.sql - Fadhil (69)* [05_Partition_1_EE\Fadhil (72)]

1 | select * from Dim_Employee;

83 % 1 0

Results Messages

	EmployeeKey	NIP	NamaPegawai	BirthDate	JenisKelamin	StatusPegawai
2	1	P001	Dr. Budi Santoso	1980-01-01	L	PNS
3	2	P002	Siti Aminah, M Si	1990-05-05	P	PNS
4	3	P003	Rudi Hermawan, S.Kom	1985-03-10	L	PNS
5	4	P004	Andi Pratama	1995-07-07	L	Kontrak
6	5	P005	Ir. Joko Susilo	1975-09-09	L	PNS
7	6	P006	Rina Wati, A.Md	1998-01-01	P	Kontrak
8	7	P007	Dewi Lestari, M.Sc	1992-12-12	P	Tetap Non-PNS
9	8	P008	Fajar Nugraha, Ph.D	1988-08-08	L	PNS
10	9	P009	Maya Sari	1996-04-04	P	Kontrak
11	10	P010	Eko Prasetyo	1993-11-11	L	Tetap Non-PNS
12	11	AUTO-00001	Dinda Reza Nasution	1986-11-24	L	Tetap
13	12	AUTO-00002	Hendra Bunga Pratama	1979-11-24	P	Tetap
14	13	AUTO-00003	Bagas Setia Utama	1998-11-24	L	Tetap
15	14	AUTO-00004	Rizky Hadi Wijaya	1986-11-24	L	Tetap
16	15	AUTO-00005	Zainal Feri Hidayat	1999-11-24	P	Tetap
17	16	AUTO-00006	Oki Dian Siregar	1989-11-24	P	Tetap
18	17	AUTO-00007	Agus Aj Kusuma	2001-11-24	P	Tetap
19	18	AUTO-00008	Agus Akbar Pohan	1994-11-24	L	Tetap
20	19	AUTO-00009	Dinda Ayu Santoso	1977-11-24	P	Tetap
21	20	AUTO-00010	Zainal Tri Saputra	2000-11-24	L	Tetap
22	21	AUTO-00011	Siti Dian Ramadnan	1995-11-24	P	Tetap
23	22	AUTO-00012	Vina Sari Setiawan	1963-11-24	P	Tetap
24	23	AUTO-00013	Oltra Aj Sihombing	1967-11-24	P	Tetap
25	24	AUTO-00014	Nur Bayu Ramadnan	1985-11-24	P	Tetap
26	25	AUTO-00015	Muhammad Bagus Permana	1996-11-24	L	Tetap
27	26	AUTO-00016	Yusuf Kiki Utama	1999-11-24	P	Tetap
28	27	AUTO-00017	Indah Sari Susanto	1978-11-24	L	Tetap
29	28	AUTO-00018	Tio Bagus Permana	1974-11-24	L	Tetap
30	29	AUTO-00019	Oki Akbar Saputra	1988-11-24	L	Tetap
31	30	AUTO-00020	Ratna Dian Wijaya	1986-11-24	L	Tetap
32	31	AUTO-00021	Indah Nur Permana	1981-11-24	P	Tetap
33	32	AUTO-00022	Vina Jaya Kusuma	1981-11-24	P	Tetap
34	33	AUTO-00023	Joko Sari Hidayat	1977-11-24	P	Tetap
35	34	AUTO-00024	Ahmad Feri Wibowo	1997-11-24	P	Tetap
36	35	AUTO-00025	Ratna Kusuma Lesmana	1984-11-24	L	Tetap
37	36	AUTO-00026	Nur Lia Pohan	1990-11-24	L	Tetap
38	37	AUTO-00027	Nur Kusuma Siregar	1992-11-24	L	Tetap
39	38	AUTO-00028	Oki Bunga Pohan	1997-11-24	P	Tetap

Query executed successfully.

c. Dim_Position

SQLQuery2.sql...Fadhil (69))* 05_Partition_I...EE\Fadhil (72))

1 select * from Dim_Position;

100 % 1 0

Results Messages

	PositionKey	KodePosition	NamaPosition	PositionType	DescPekerjaan
1	1	AA	Asisten Ahli	Fungsional	Pengajar Junior
2	2	KBG	Kepala Bagian	Struktural	Pimpinan Unit
3	3	LBR	Laboran	Fungsional	Teknis Lab
4	4	LEC	Dosen Lektor	Fungsional	Pengajar Senior
5	5	STF	Staff Administrasi	Struktural	Administrasi

d. Dim_Rank

SQLQuery2.sql...Fadhil (69))* 05_Partition_I...EE\Fadhil (72))

1 Select * from Dim_Rank

100 % 1 0

Results Messages

	RankKey	KodeRank	NamaRank	Golongan	Rank
1	1	III-A	Penata Muda	III/a	NULL
2	2	III-B	Penata Muda Tk. I	III/b	NULL
3	3	III-C	Penata	III/c	NULL
4	4	IV-A	Pembina	IV/a	NULL
5	5	IV-B	Pembina Tk. I	IV/b	NULL

e. Dim_Unit

SQLQuery2.sql...Fadhil (69))* 05_Partition_I...EE\Fadhil (72))

1 select * from Dim_Unit

100 % No issues found

Results Messages

	UnitKey	KodeUnit	NamaUnit	Fakultas	Location
1	1	BIO	Biologi	Fakultas Sains	Gedung E
2	2	HUM	Biro SDM & Umum	Rektorat	Gedung A
3	3	IF	Teknik Informatika	Fakultas Teknologi	Gedung F
4	4	SD	Sains Data	Fakultas Sains	Gedung E
5	5	TIP	Teknik Industri Pertanian	Fakultas Teknologi	Gedung F

H. DATA QUALITY CHECK

- Apakah jumlah baris di Source sama dengan Target?
- Apakah ada EmployeeKey yang -1 (Unknown)? Jika ada, berarti NIP di transaksi tidak ada di Master Pegawai.
- Validasi Perhitungan Measure Pastikan DurasiKerja masuk akal.

SQLQuery2.sql...Fadhil (69)* 05_Partition_I...EE\Fadhil (72)

```
1  -- Cek 1: Apakah jumlah baris di Source sama dengan Target?
2  SELECT
3      (SELECT COUNT(*) FROM TrAbsensi) AS Source_Absensi,
4      (SELECT COUNT(*) FROM Fact_Attendance) AS Target_Absensi;
5
6  -- Cek 2: Apakah ada EmployeeKey yang -1 (Unknown)?
7  -- Jika ada, berarti NIP di transaksi tidak ada di Master Pegawai
8  SELECT * FROM Fact_Attendance WHERE EmployeeKey = -1;
9
10 -- Cek 3: Validasi Perhitungan Measure
11 -- Pastikan DurasiKerja masuk akal
12 SELECT TOP 5 * FROM Fact_Attendance ORDER BY DurasiKerja DESC;
```

100 % 1 0

Results Messages

	Source_Absensi	Target_Absensi
1	20000	20000

	AttendanceKey	DateKey	EmployeeKey	UnitKey	DurasiKerja	MenitTerlambat	StatusKehadiran
1	14	20251119	18	5	9.00	0	Hadir
2	22	20250917	18	5	9.00	0	Hadir
3	30	20250826	18	5	9.00	0	Hadir
4	35	20250801	18	5	9.00	0	Hadir
5	69	20250926	18	5	9.00	0	Hadir

I. PERFORMANCE TESTING

```
SQLQuery2.sql...Fadhil (69))* 05_Partition_I...EE\Fadhil (72))

1  USE Kepegawaian_DB;
2  GO
3
4  PRINT '--- START PERFORMANCE TEST: ETL PROCESS ---';
5  DECLARE @StartTime DATETIME = GETDATE();
6
7  -- Jalankan Proses ETL Utama
8  EXEC ETL_Master_Load;
9
10 DECLARE @EndTime DATETIME = GETDATE();
11 DECLARE @DurationMs INT = DATEDIFF(MILLISECOND, @StartTime, @EndTime);
12
13 PRINT '-----';
14 PRINT 'Waktu Mulai   : ' + CONVERT(VARCHAR, @StartTime, 121);
15 PRINT 'Waktu Selesai  : ' + CONVERT(VARCHAR, @EndTime, 121);
16 PRINT 'Total Durasi    : ' + CAST(@DurationMs AS VARCHAR) + ' milidetik';
17 PRINT '-----';
```

100 % 1 0

Messages

```
--- START PERFORMANCE TEST: ETL PROCESS ---
=== MULAI PROSES ETL ===
1. Loading Staging Tables...
2. Loading Dimensions...
3. Loading Facts...
=== ETL SELESAI ===
Durasi: 1250 ms

-----
Waktu Mulai   : 2025-11-24 21:05:34.230
Waktu Selesai  : 2025-11-24 21:05:35.600
Total Durasi   : 1370 milidetik
-----

Completion time: 2025-11-24T21:05:35.6308128+07:00
```