

LAPORAN
UJIAN AKHIR SEMESTER
DATA WAREHOUSE

“Warehousing Data Employee Performance and Salary”



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BAB I

PENDAHULUAN

1.1 Latar Belakang

Manajemen sumber daya manusia merupakan elemen vital dalam kesuksesan organisasi. Oleh karena itu, perlu dibangun sistem analitik berbasis data warehouse untuk mendukung pengambilan keputusan terkait performa dan efisiensi karyawan.

1.2 Tujuan Proyek

Membangun sistem Data Warehouse berbasis star schema dari dataset "*Employee Performance and Salary*" untuk mengevaluasi dan menganalisis kinerja karyawan melalui pendekatan ETL menggunakan Pentaho Data Integration.

1.3 Ringkasan Eksekutif

Laporan ini membahas pembangunan sistem **Data Warehouse** untuk menganalisis performa dan gaji karyawan berdasarkan dataset *Employee Performance and Salary* dari Kaggle. Tujuan utama dari proyek ini adalah menyediakan sistem analitik yang membantu perusahaan dalam:

- 1.3.1 Menilai kinerja individu dan departemen
- 1.3.2 Mengukur efisiensi gaji terhadap produktivitas
- 1.3.3 Mengevaluasi pengaruh pengalaman kerja terhadap performa
- 1.3.4 Menentukan lokasi kerja paling produktif

Sistem dibangun menggunakan tools Pentaho Data Integration (Spoon) yang melakukan proses ETL (Extract, Transform, Load) dari file CSV ke dalam Data Warehouse berbasis skema bintang (Star Schema). Skema ini terdiri dari satu tabel fakta factemployeeperformance dan empat tabel dimensi: dimemployee, dimdepartement, dimlocation, dan dimdate.

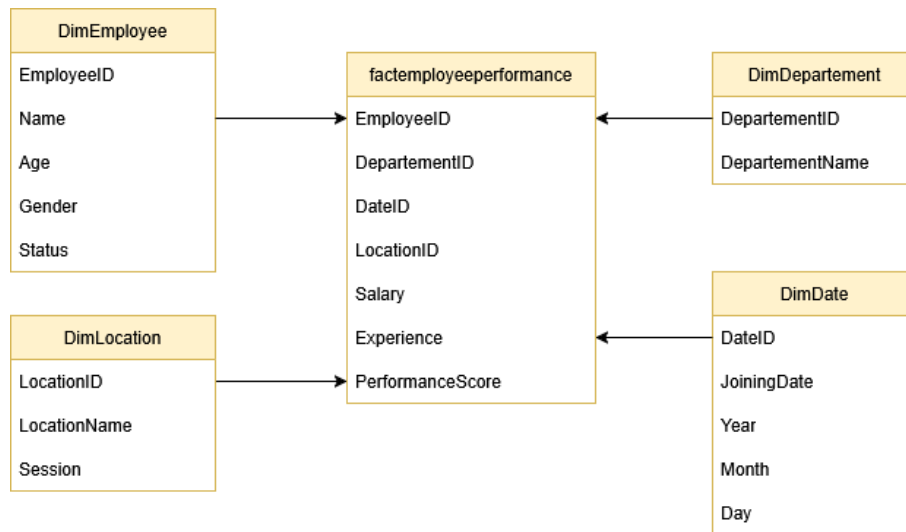
Analisis dilakukan menggunakan lima indikator kinerja utama (Key Performance Indicators/KPI) yang menghasilkan insight strategis untuk pengambilan keputusan, termasuk promosi, alokasi SDM, dan efisiensi departemen.

Hasil akhir proyek ini berupa sistem data warehouse yang bersih, terstruktur, dan siap digunakan untuk membangun laporan dashboard atau sistem Business Intelligence di masa depan.

BAB II

PENYUSUNAN DAN PROSES EXTRACT, TRANSFORM, LOAD (ETL)

2.1 Star Schema



Star Schema ini terdiri dari 1 tabel fakta dan 4 tabel dimensi, yang membentuk struktur seperti bintang. Tujuan dari skema ini adalah untuk menyederhanakan query analitik dan mempercepat pemrosesan data untuk analisis performa dan gaji karyawan.

2.1.1 Dimensi 1: DimEmployee

Berisi informasi deskriptif tentang karyawan.

Kolom	Deskripsi
EmployeeID	Primary key
Name	Nama lengkap
Age	Umur
Gender	Jenis kelamin
Status	Status kerja (aktif/tidak, kontrak/tetap, dll)

Tabel 1 Struktur Tabel Dimensi DimEmployee

2.1.2 Dimensi 2: DimDepartment

Berisi informasi mengenai departemen kerja.

Kolom	Deskripsi
DepartementID	Primary key

DepartementName	Nama departemen (HR, Finance, IT, dll)
------------------------	--

Tabel 2 Struktur Tabel Dimensi DimDepartement

2.1.3 Dimensi 3: DimLocation

Berisi informasi lokasi kerja.

Kolom	Deskripsi
LocationID	Primary key
LocationName	Nama lokasi (cabang/kota/kantor pusat)
Session	Bisa diartikan sebagai shift atau jadwal kerja.

Tabel 3 Struktur Tabel Dimensi DimLocation

2.1.4 Dimensi 4: DimDate

Berisi informasi tanggal, untuk mendukung analisis waktu.

Kolom	Deskripsi
DateID	Primary key
JoiningDate	Tanggal bergabung
Year	Tahun gabung
Month	Bulan gabung
Day	Hari gabung

Tabel 4 Struktur Tabel Dimensi DimDate

2.1.5 Tabel Fakta: factemployeeperformance

Tabel ini berisi data transaksional atau peristiwa utama yang ingin dianalisis, yaitu performa dan gaji karyawan.

Kolom	Deskripsi
EmployeeID	ID unik karyawan, foreign key dari DimEmployee
DepartementID	ID departemen, foreign key dari DimDepartement
DateID	Tanggal bergabung, foreign key dari DimDate
LocationID	Lokasi kerja, foreign key dari DimLocation
Salary	Gaji karyawan
Experience	Lama kerja atau pengalaman

PerformanceScore	Nilai performa karyawan
-------------------------	-------------------------

Tabel 5 Struktur Tabel Dimensi factemployeeperformance

2.2 Proses Pembangunan Proyek ETL

2.2.1 Create Database uas_dw

```
CREATE DATABASE uas_dw;
```

```
USE uas_dw;
```

2.2.2 Create Table

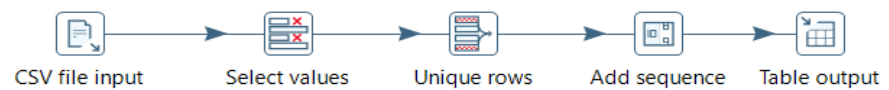
Table	Action
<input type="checkbox"/> dimdate	★ Browse Structure Search Insert Empty Drop
<input type="checkbox"/> dimdepartment	★ Browse Structure Search Insert Empty Drop
<input type="checkbox"/> dimemployee	★ Browse Structure Search Insert Empty Drop
<input type="checkbox"/> dimlocation	★ Browse Structure Search Insert Empty Drop
<input type="checkbox"/> factemployeeperformance	★ Browse Structure Search Insert Empty Drop

Gambar 1 Create Table

2.2.3 Create Dimensi Tabel

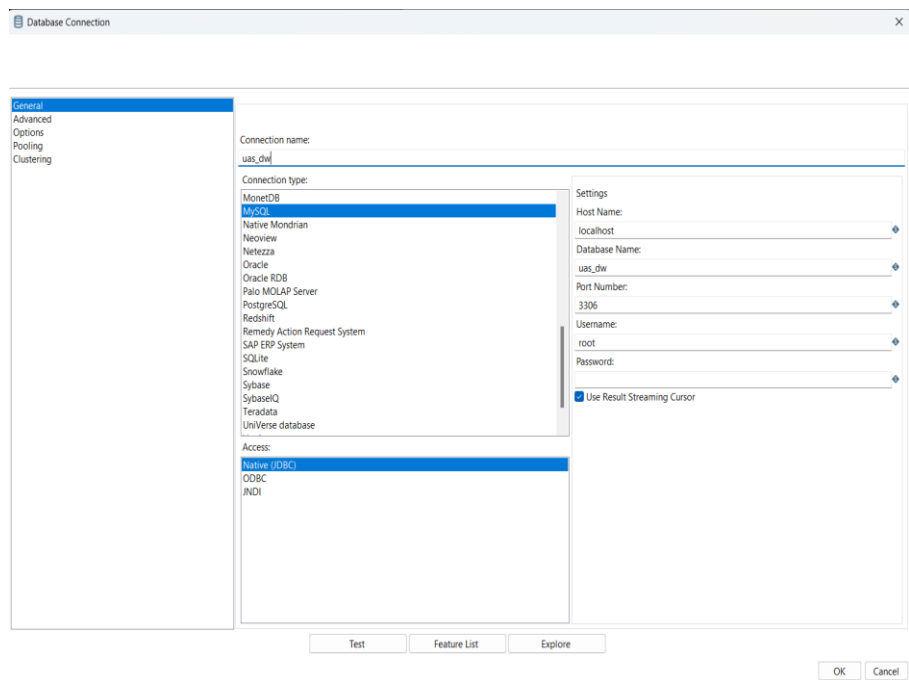
1) Tabel Dimensi uasdimdepartement

a) Elemen yang dibutuhkan:



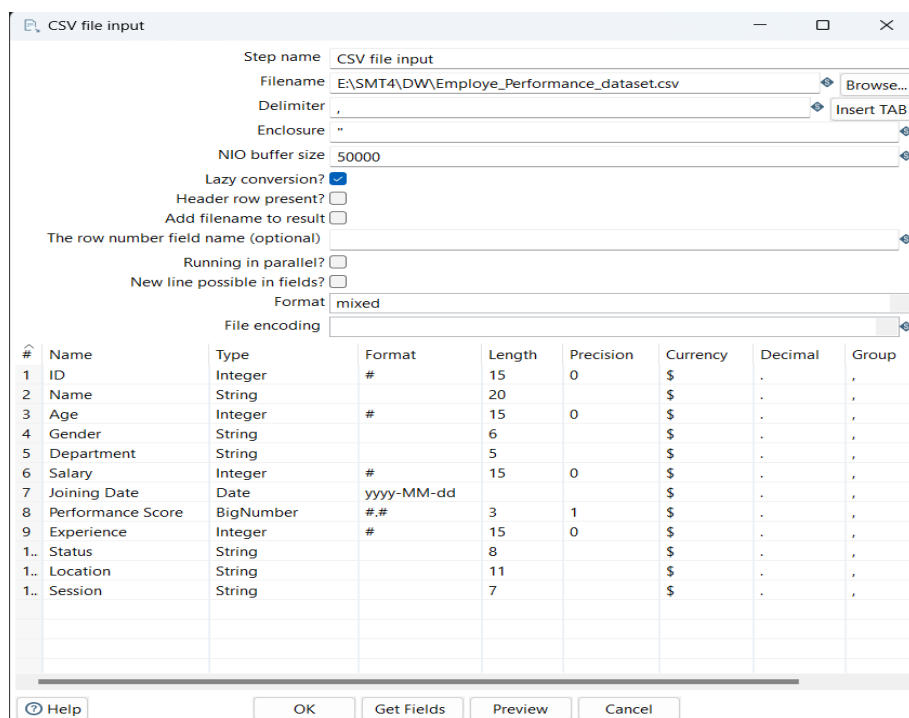
Gambar 2 Elemen uasdimdepartement

b) Tambahkan Connection ke Database uas_dw:



Gambar 3 Connection ke uas_dw

c) Masukkan file dataset ke table input:



Gambar 4 Input CSV

d) Preview

Examine preview data

Rows of step: CSV file input (1000 rows)

#	ID	Name	Age	Gender	Department	Salary	Joining Date	Performance Score	Experience	Status	Location	Session	
1	1	Cory Escobar	48	Female	HR	5641	2015-05-03	<null>	2	16	Active	New York	Night
2	2	Timothy Sanchez	25	Other	Sales	4249	2020-11-09	<null>	2	2	Inactive	Los Angeles	Evening
3	3	Chad Nichols	57	Other	Sales	3058	2019-02-12	<null>	2	1	Inactive	New York	Morning
4	4	Christine Williams	58	Female	IT	5895	2017-09-08	<null>	2	13	Inactive	Los Angeles	Evening
5	5	Amber Harris	35	Other	IT	4317	2020-02-15	<null>	5	16	Inactive	New York	Evening
6	6	Ashley Howe	29	Female	HR	2591	2016-06-24	<null>	1	6	Active	Chicago	Evening
7	7	David Olson	39	Female	Sales	6826	2023-05-11	<null>	4	Active	New York	Night	
8	8	Amanda Baker	52	Other	HR	6285	2015-04-01	<null>	8	Inactive	Chicago	Evening	
9	9	Jeremy Wright	63	Male	Sales	9862	2024-02-07	<null>	3	Inactive	New York	Night	
10	10	Brian Faulkner	30	Male	IT	8202	2018-05-26	<null>	1	9	Active	Los Angeles	Morning
11	11	Nicole Bell	42	Female	Sales	5336	2015-01-28	<null>	3	7	Active	Los Angeles	Evening
12	12	Rodney Richardson	60	Other	HR	6908	2015-03-14	<null>	4	19	Active	Chicago	Night
13	13	Joshua Robinson	61	Male	IT	5688	2020-06-21	<null>	4	Inactive	Chicago	Night	
14	14	Benjamin Callahan	34	Male	IT	5593	2019-06-23	<null>	2	Inactive	Los Angeles	Night	
15	15	Matthew Collins MD	31	Female	Sales	8568	2020-06-01	<null>	20	Inactive	Los Angeles	Evening	
16	16	Gary Cooley	62	Male	HR	5386	2017-07-25	<null>	2	Inactive	Chicago	Morning	
17	17	Jonathan Perez	59	Male	HR	6586	2019-02-19	<null>	3	7	Inactive	Los Angeles	Evening
18	18	Jacqueline Randall	31	Female	HR	3519	2018-05-18	<null>	4	6	Active	New York	Morning
19	19	Nancy Stephens	38	Male	HR	9061	2017-07-16	<null>	5	16	Inactive	Chicago	Night
20	20	Victoria Fox	57	Female	HR	7251	2023-06-07	<null>	10	Active	Los Angeles	Evening	
21	21	Heather Jones	35	Male	Sales	4565	2018-02-07	<null>	9	Active	Chicago	Night	
22	22	Stacie Porter	61	Female	HR	4071	2020-05-04	<null>	2	9	Inactive	Chicago	Night
23	23	Bryce Carter	35	Female	Sales	9598	2015-12-16	<null>	4	Inactive	New York	Night	
24	24	Marissa Stewart	31	Female	HR	5386	2021-01-30	<null>	3	Active	Los Angeles	Evening	
25	25	Tracy Carlson	21	Male	HR	9275	2022-04-09	<null>	4	12	Active	New York	Morning
26	26	Tara Blackwell	30	Other	HR	6120	2020-02-20	<null>	5	7	Active	New York	Evening
27	27	Austin Long	20	Female	IT	4899	2024-05-01	<null>	5	8	Inactive	Chicago	Night
28	28	Jordan Warren	55	Female	HR	4608	2018-07-07	<null>	18	Inactive	Los Angeles	Morning	
29	29	Vickie Campbell	65	Female	IT	9109	2019-10-28	<null>	12	Inactive	Chicago	Morning	
30	30	Rachel Ramsey	22	Male	Sales	9661	2016-08-18	<null>	2	17	Inactive	Chicago	Night
31	31	Brandt Smith	21	Other	IT	4780	2020-01-20	<null>	1	7	Inactive	New York	Night

Close

Show Log

Gambar 5 Preview Input

e) Setting kolom yang akan digunakan pada elemen select values yaitu Departement:

[illegible]

Gambar 6 Select Values

f) Masukkan kolom unique pada unique rows

Unique rows

Step name: Unique rows

Settings

Add counter to output? ☐ Counter field:

Redirect duplicate row ☐ Error description:

Fields to compare on (no entries means: compare complete row)

#	Fieldname	Ignore case
1	DepartmentName	Y

Buttons: Help, OK, Cancel, Get

Gambar 7 Unique Rows

- g) Tambahkan kolom baru yang berisi nilai berurutan pada Add sequence

Add sequence

Step name: Add sequence

Name of value: DepartmentID

Use a database to generate the sequence

Use DB to get sequence? ☐

Connection: dimdepartement Edit... New... Wizard...

Schema name: Schemas...

Sequence name: SEQ_ Sequences...

Use a transformation counter to generate the sequence

Use counter to calculate sequence? ☒

Counter name (optional):

Start at value: 1

Increment by: 1

Maximum value: 999999999

Buttons: Help, OK, Cancel

Gambar 8 Add Sequence

- h) Isi tabel output dengan menggunakan target tabel dimdepartment sesuai dengan tabel yang ada pada database uas_dw

[illegible]

Gambar 9 Table Output

- i) Kemudian Running atau jalankan pentaho yang sudah kita buat

Run Options

Run configuration: **Pentaho local**

Options

☒ Clear log before running Log level: **Basic**

☐ Enable safe mode

☒ Gather performance metrics

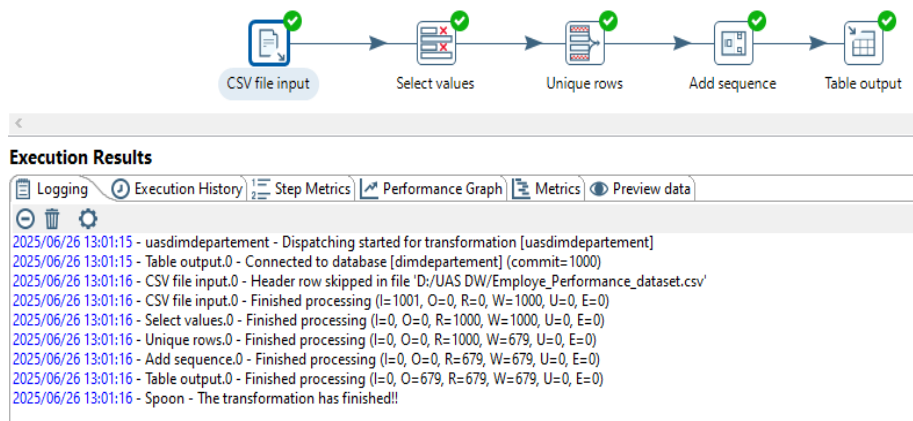
Parameters Variables

Parameter	Default value	Value	Description

☒ Always show dialog on run

Help **Run** **Cancel**

Gambar 10 Running



Gambar 11 Running berhasil

- j) Setelah berhasil running data, maka data akan masuk kedalam tabel dimdepartement pada database uas_dw

The screenshot shows a database interface with the following details:

- Server: localhost:3306
- Database: uas_dw
- Table: dimdepartement
- Showing rows 0 - 24 (679 total, Query took 0.0045 seconds.)
- SQL query: `SELECT * FROM 'dimdepartement'`
- Number of rows: 25
- Filter rows: Search this table
- Sort by key: None

DepartmentID	DepartmentName
1	HR
2	Sales
3	IT
4	HR
5	Sales
6	HR
7	Sales
8	IT
9	Sales
10	HR
11	IT
12	Sales
13	HR
14	Sales
15	HR

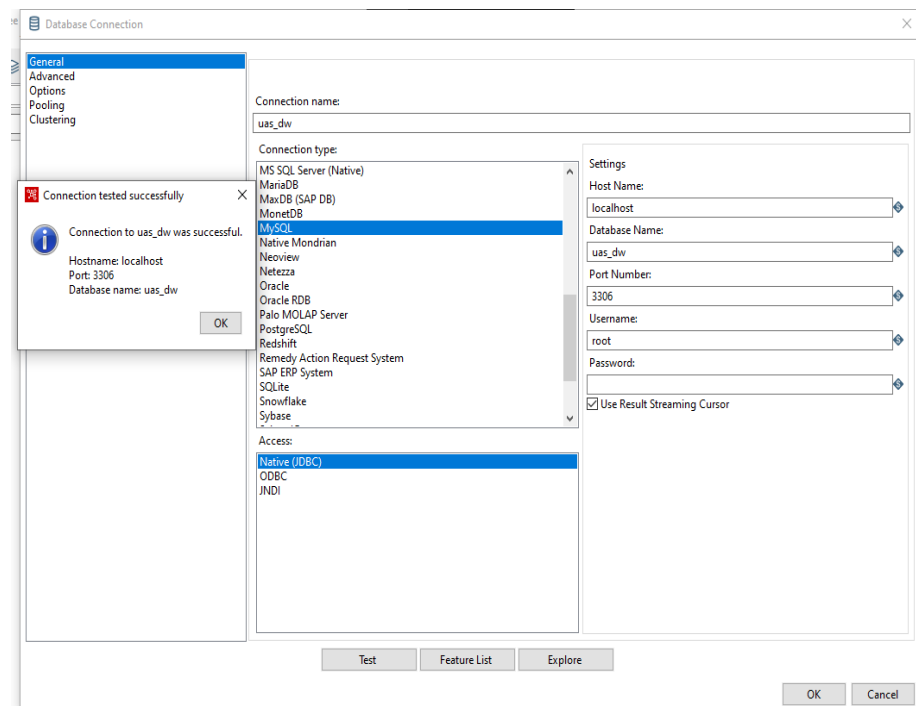
Gambar 12 Data berhasil transformasi ke database

- 2) Tabel Dimensi uasdimemployee
a) Elemen yang dibutuhkan



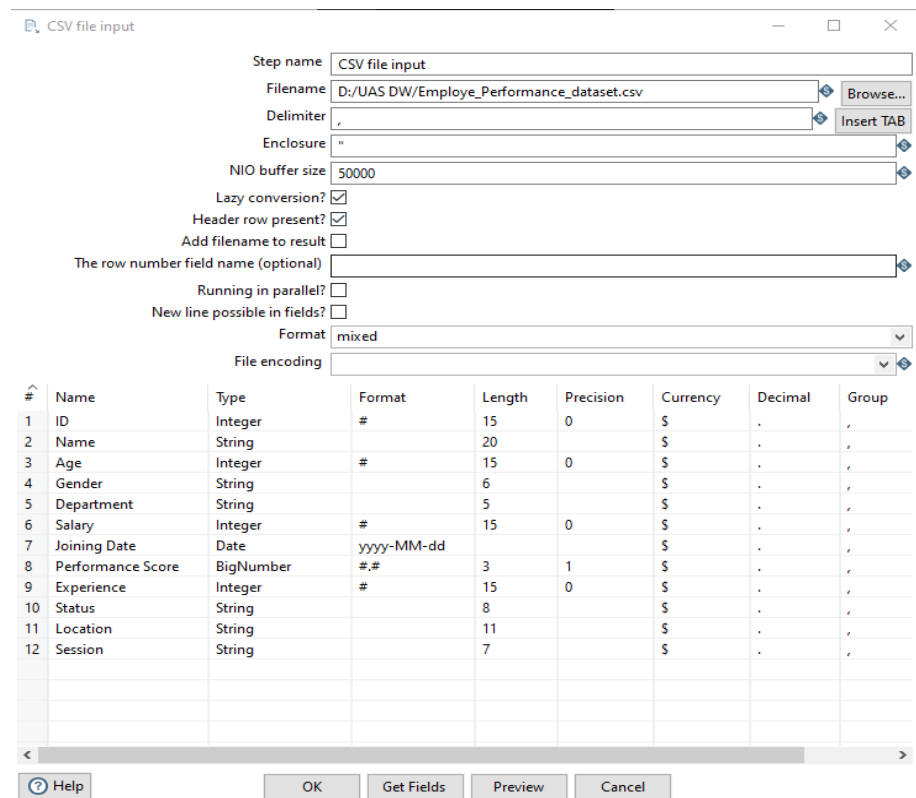
Gambar 13 Elemen dalam Transformasi uasdimemployee

b) Tambahkan Connection ke Database uas_dw:



Gambar 14 Connection (2)

c) Masukkan file dataset pada tabel input CSV



Gambar 15 Input CSV (2)

d) Preview data input

Examine preview data

Rows of step: CSV File input (1000 rows)

#	ID	Name	Age	Gender	Department	Salary	Joining Date	Performance Score	Experience	Status	Location	Session
1	1	Cory Escobar	48	Female	HR	5641	2015-05-03	2	16	Active	New York	Night
2	2	Timothy Sanchez	25	Other	Sales	4249	2020-11-09	2	11	Inactive	Los Angeles	Evening
3	3	Chad Nichols	37	Other	Sales	3058	2019-02-12	< null>	1	Inactive	New York	Morning
4	4	Christine Williams	58	Female	IT	5895	2017-09-08	2	13	Inactive	Los Angeles	Evening
5	5	Ambur Harris	35	Other	IT	4317	2020-02-15	5	16	Inactive	New York	Evening
6	6	Ashley Moore	28	Female	HR	2591	2016-06-24	1	6	Active	Chicago	Evening
7	7	David Olson	39	Female	Sales	6826	2023-05-11	< null>	4	Active	New York	Night
8	8	Amanda Baker	52	Other	HR	6385	2015-04-01	< null>	8	Inactive	Chicago	Evening
9	9	Jeremy Wright	63	Female	Sales	9862	2024-02-07	< null>	3	Inactive	New York	Night
10	10	Brian Faulkner	30	Male	IT	8202	2019-05-28	1	9	Active	Los Angeles	Morning
11	11	Nicole Bell	42	Female	Sales	5336	2015-01-28	3	7	Active	Los Angeles	Evening
12	12	Rodney Richardson	60	Other	HR	6908	2015-03-14	4	19	Active	Chicago	Night
13	13	Joshua Robinson	61	Male	IT	5688	2020-06-21	< null>	4	Inactive	Chicago	Night
14	14	Benjamin Callahan	34	Male	IT	5593	2019-06-23	< null>	2	Inactive	Los Angeles	Night
15	15	Matthew Collins MD	21	Female	Sales	8568	2020-06-01	< null>	20	Inactive	Los Angeles	Evening
16	16	Gary Conley	62	Male	HR	5386	2017-07-25	< null>	2	Inactive	Chicago	Morning
17	17	Jonathan Perez	59	Male	HR	6586	2019-02-19	3	7	Inactive	Los Angeles	Evening
18	18	Jacqueline Randall	31	Female	HR	3519	2019-05-18	4	6	Active	New York	Morning
19	19	Nancy Stephens	38	Male	HR	9061	2017-07-16	5	16	Inactive	Chicago	Night
20	20	Victoria Fox	57	Female	HR	7251	2023-06-07	< null>	10	Active	Los Angeles	Evening
21	21	Heather Jones	25	Male	Sales	4565	2018-02-07	< null>	9	Active	Chicago	Night
22	22	Stacie Porter	61	Female	HR	4071	2020-05-04	2	9	Inactive	Chicago	Night
23	23	Byrce Carter	35	Female	Sales	9588	2015-12-16	4	4	Inactive	New York	Night
24	24	Melissa Stewart	31	Female	HR	5386	2021-01-30	< null>	3	Active	Los Angeles	Evening
25	25	Yacy Carlson	21	Male	HR	9275	2022-04-09	4	12	Active	New York	Morning
26	26	Tara Blackwell	30	Other	HR	6120	2020-02-20	5	7	Active	New York	Evening
27	27	Austin Long	20	Female	IT	4899	2024-05-01	5	8	Inactive	Chicago	Night
28	28	Jordan Warren	55	Female	HR	4608	2018-07-07	< null>	18	Inactive	Los Angeles	Morning
29	29	Vickie Campbell	65	Female	IT	9190	2019-10-28	< null>	12	Inactive	Chicago	Morning
30	30	Rachel Ramsey	22	Male	Sales	9661	2016-08-18	2	17	Inactive	Chicago	Night
31	31	Brandt Smith	21	Other	IT	4780	2020-01-20	1	7	Inactive	New York	Night

Close Show Log

Gambar 16 Preview (2)

e) Setting kolom yang akan digunakan pada elemen select values

Select values

Step name:

Select & Alter Remove Meta-data

Fields:

#	Fieldname	Rename to	Length	Precision
1	ID	EmployeeID		
2	Name			
3	Age			
4	Gender			
5	Status			

Get fields to select Edit Mapping

Include unspecified fields, ordered by name ☐

Help OK Cancel

Gambar 17 Select Values (2)

- f) Isi tabel output dengan menggunakan target tabel dimemployee sesuai dengan tabel yang ada pada database uas_dw

Table output

Step name: Table output

Connection: dim_employee

Target schema: uas_dw

Target table: dimemployee

Commit size: 1000

Truncate table: ☐

Ignore insert errors: ☐

Specify database fields: ☒

Main options Database fields

Fields to insert:

#	Table field	Stream field
1	EmployeeID	EmployeeID
2	Name	Name
3	Age	Age
4	Gender	Gender
5	Status	Status

Get fields

Enter field mapping

Help OK Cancel SQL

Gambar 18 Table Output (2)

- g) Kemudian Running atau jalankan pentaho yang sudah kita buat

Run Options

Run configuration: Pentaho local

Options

☒ Clear log before running

☐ Enable safe mode

☒ Gather performance metrics

Log level: Basic

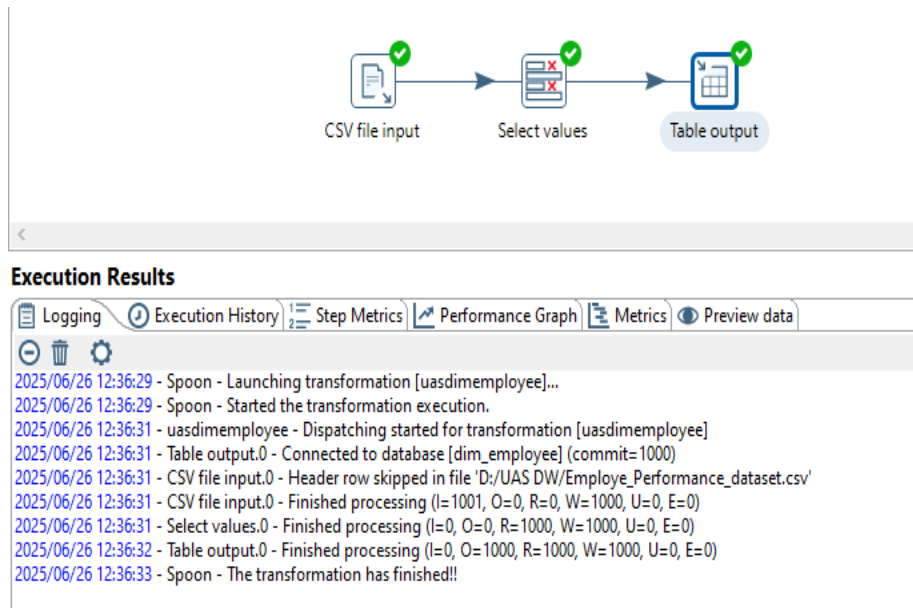
Parameters Variables

Parameter	Default value	Value	Description

☒ Always show dialog on run

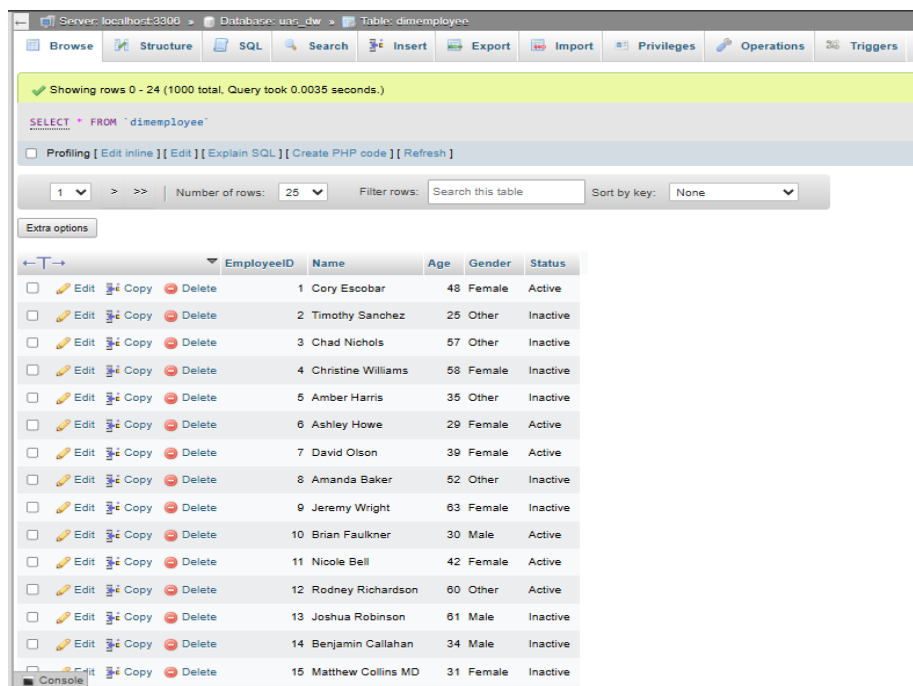
Help Run Cancel

Gambar 19 Running (2)



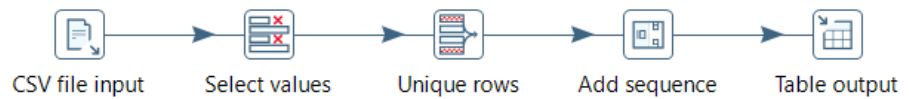
Gambar 20 Running berhasil (2)

- h) Setelah berhasil running data, maka data akan masuk kedalam tabel dimemployee pada database uas_dw



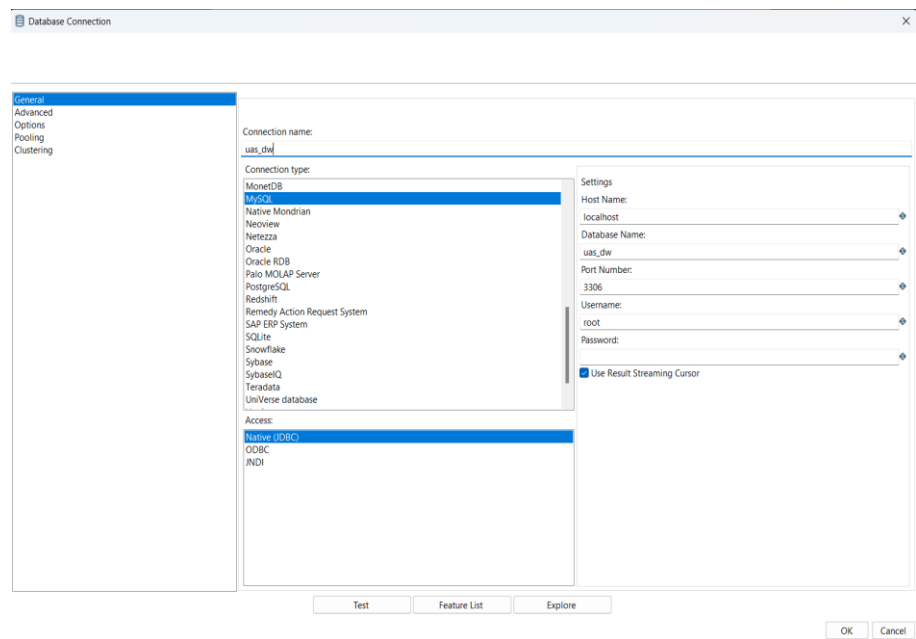
Gambar 21 Berhasil di Transformasi ke Tabel dimemployee

- 3) Tabel Dimensi uasdimlocation
a) Elemen yang dibutuhkan



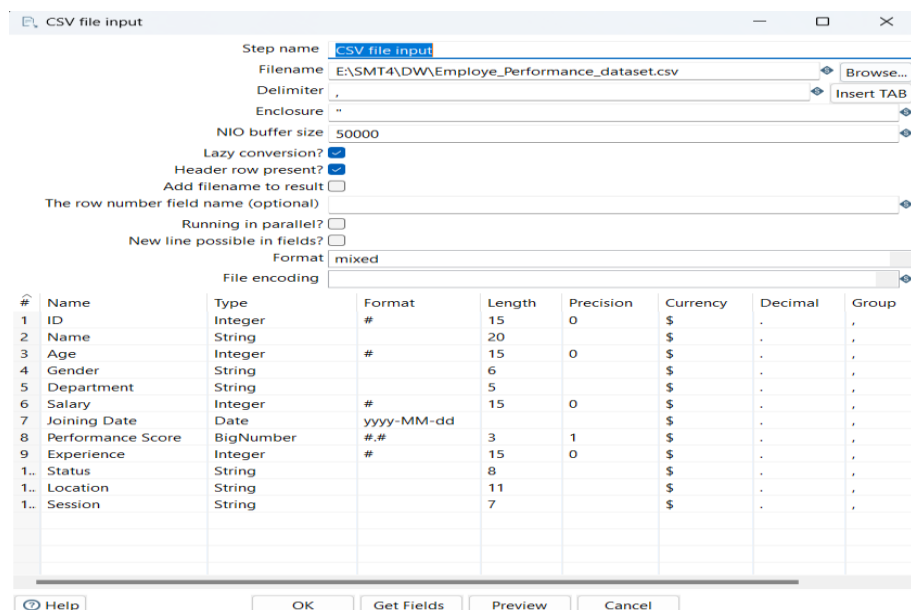
Gambar 22 Elemen dimlocation

b) Tambahkan Connection ke Database uas_dw:

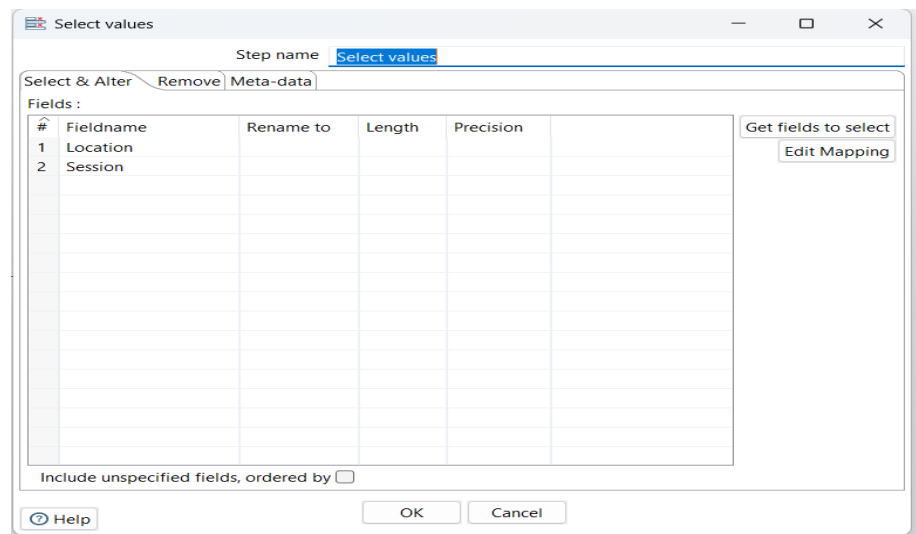


Gambar 23 Connection (3)

c) Masukkan file dataset ke table input:

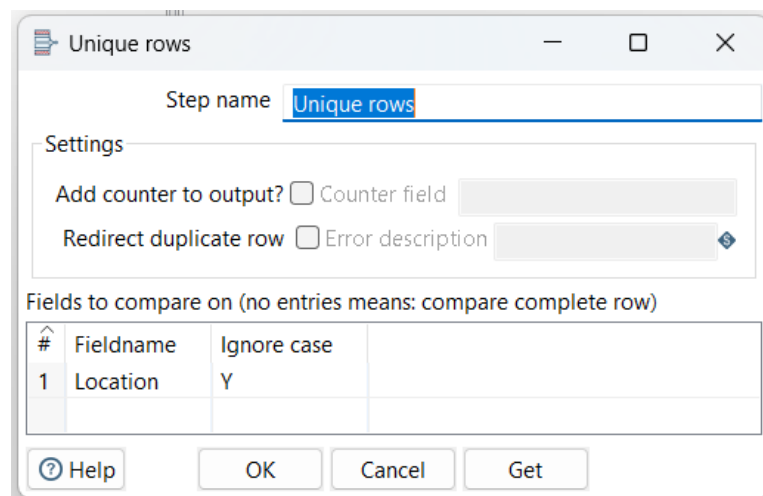


- d) Setting kolom yang akan digunakan pada location select values



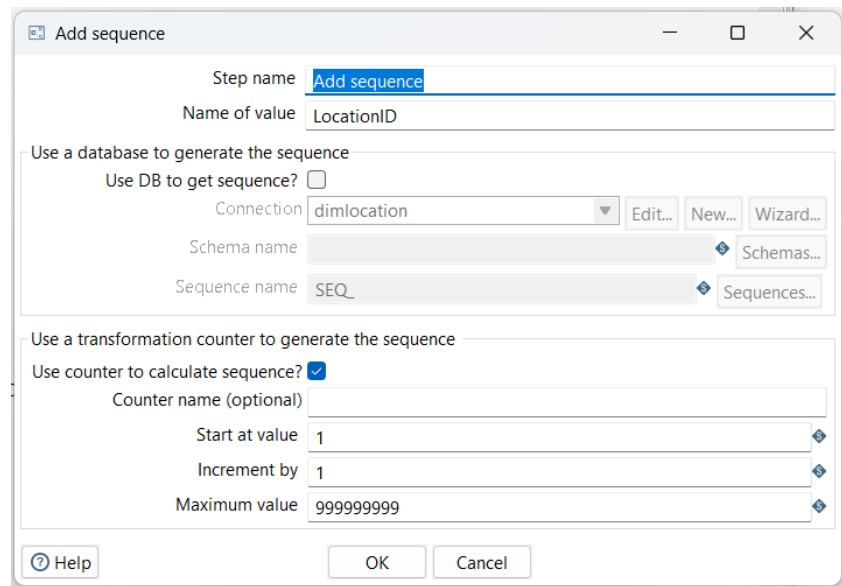
Gambar 25 Select Values (3)

- e) Setelah berhasil running data, maka data akan masuk kedalam tabel factemployeefomance pada database uas_dw
- f) Masukkan kolom unqi pada unique rows



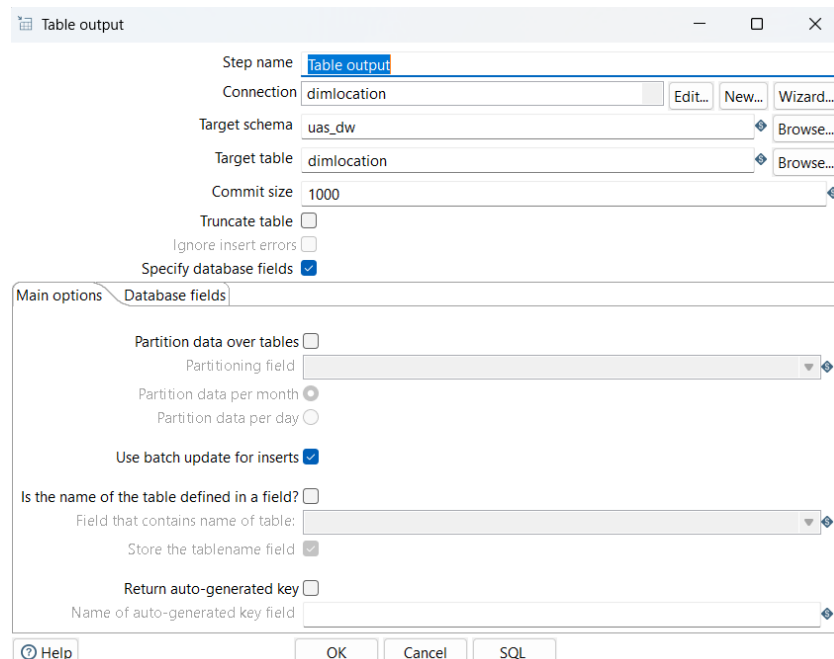
Gambar 26 Unique Rows (3)

- g) Tambahkan kolom baru yang berisi nilai berurutan pada Add sequence



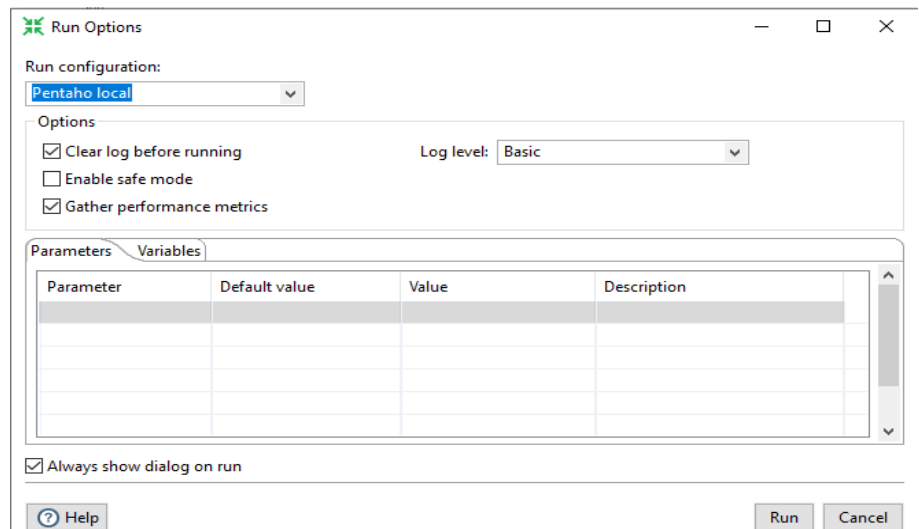
Gambar 27 Add Sequence (3)

- h) Isi tabel output dengan menggunakan target tabel dimlocation sesuai dengan tabel yang ada pada database uas_dw

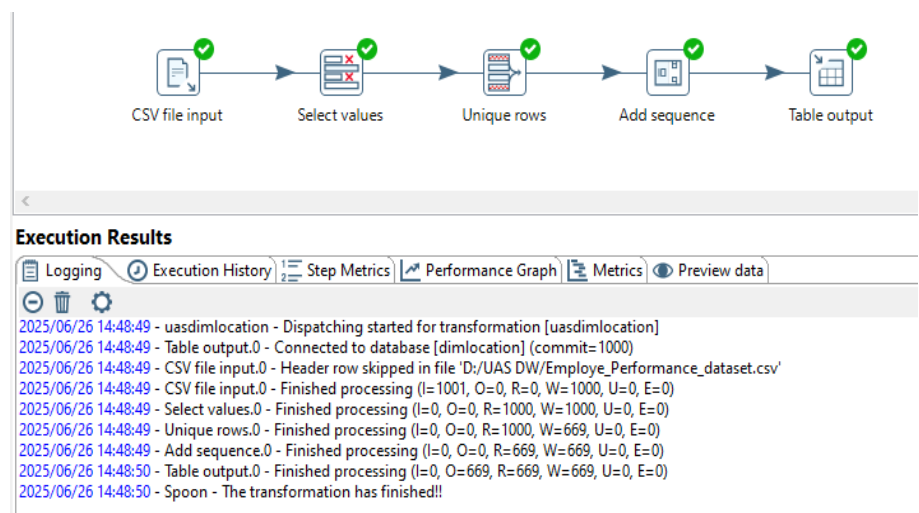


Gambar 28 Table Output (3)

- i) Kemudian Running atau jalankan pentaho yang sudah kita buat

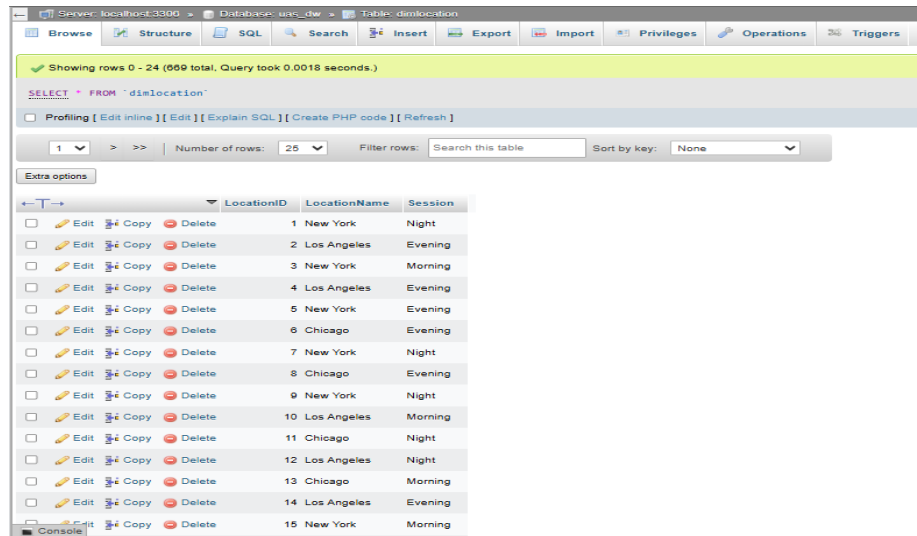


Gambar 29 Running (3)



Gambar 30 Berhasil Running (3)

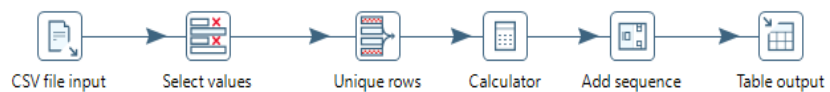
- j) Setelah berhasil running data, maka data akan masuk kedalam tabel dimdate pada database uas_dw



LocationID	LocationName	Session
1	New York	Night
2	Los Angeles	Evening
3	New York	Morning
4	Los Angeles	Evening
5	New York	Evening
6	Chicago	Evening
7	New York	Night
8	Chicago	Evening
9	New York	Night
10	Los Angeles	Morning
11	Chicago	Night
12	Los Angeles	Night
13	Chicago	Morning
14	Los Angeles	Evening
15	New York	Morning

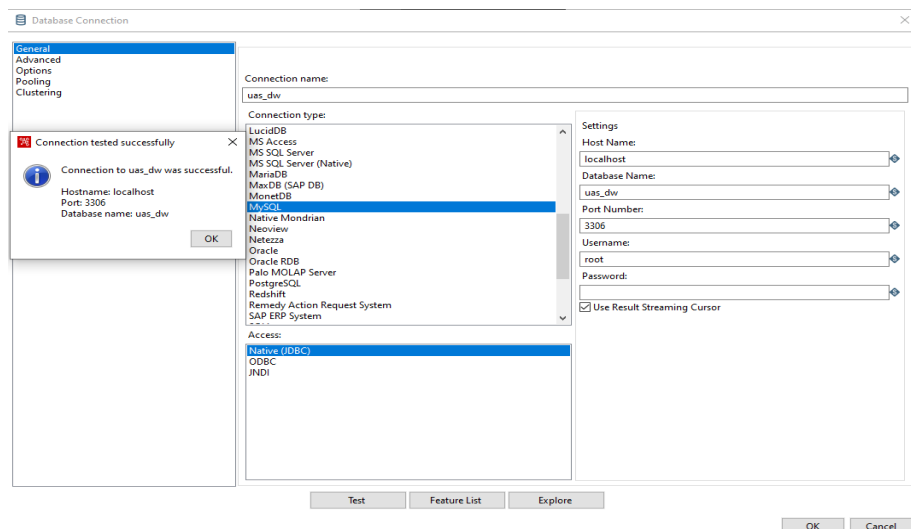
Gambar 31 Data Berhasil di Transformasi ke tabel dimdate

- 4) Tabel Dimensi uasdimdate
a) Elemen yang dibutuhkan



Gambar 32 Elemen uasdimdate

- b) Tambahkan Connection ke Database uas_dw:



Gambar 33 Connection (4)

c) Masukkan file dataset pada tabel input CSV

#	Name	Type	Format	Length	Precision	Currency	Decimal	Group
1	ID	Integer	#	15	0	\$	.	,
2	Name	String		20		\$	.	,
3	Age	Integer	#	15	0	\$	.	,
4	Gender	String		6		\$	.	,
5	Department	String		5		\$	.	,
6	Salary	Integer	#	15	0	\$	.	,
7	Joining Date	Date	yyyy-MM-dd			\$	.	,
8	Performance Score	BigNumber	#,.	3	1	\$	.	,
9	Experience	Integer	#	15	0	\$	.	,
10	Status	String		8		\$	.	,
11	Location	String		11		\$	.	,
12	Session	String		7		\$	.	,

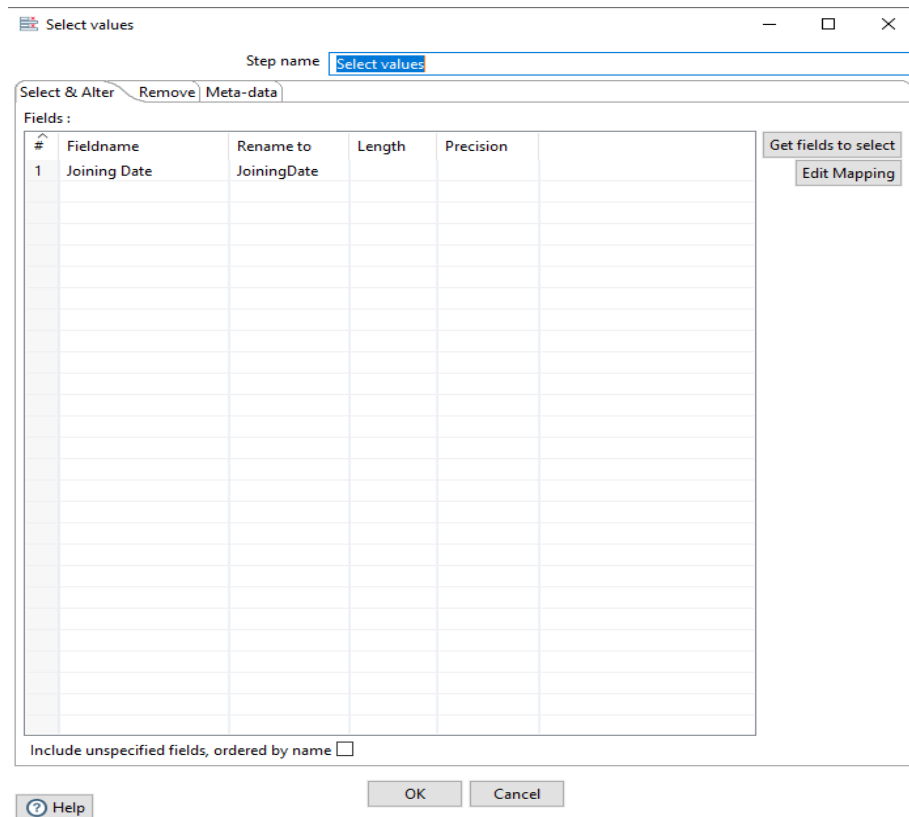
Gambar 34 Input CSV (4)

d) Preview

#	ID	Name	Age	Gender	Department	Salary	Joining Date	Performance Score	Experience	Status	Location	Session
1	1	Cory Escobar	48	Female	HR	5641	2015-05-03	2	16	Active	New York	Night
2	2	Timothy Sanchez	25	Other	Sales	4249	2020-11-09	2	11	Inactive	Los Angeles	Evening
3	3	Chad Nichols	57	Other	Sales	3058	2019-02-12	<null>	1	Inactive	New York	Morning
4	4	Christine Williams	58	Female	IT	5895	2017-09-08	2	13	Inactive	Los Angeles	Evening
5	5	Amber Harris	35	Other	IT	4317	2020-02-15	5	16	Inactive	New York	Evening
6	6	Ashley Howe	29	Female	HR	2591	2016-06-24	1	6	Active	Chicago	Evening
7	7	David Olson	39	Female	Sales	6826	2023-05-11	<null>	4	Active	New York	Night
8	8	Amanda Baker	52	Other	HR	6285	2015-04-01	<null>	8	Inactive	Chicago	Evening
9	9	Jeremy Wright	63	Female	Sales	9862	2024-02-07	<null>	3	Inactive	New York	Night
10	10	Brian Faulkner	30	Male	IT	8202	2018-05-26	1	9	Active	Los Angeles	Morning
11	11	Nicole Bell	42	Female	Sales	5336	2015-01-28	3	7	Active	Los Angeles	Evening
12	12	Rodney Richardson	60	Other	HR	6908	2015-03-14	4	19	Active	Chicago	Night
13	13	Joshua Robinson	61	Male	IT	5688	2020-06-21	<null>	4	Inactive	Chicago	Night
14	14	Benjamin Callahan	34	Male	IT	5593	2019-06-23	<null>	2	Inactive	Los Angeles	Night
15	15	Matthew Collins MD	31	Female	Sales	8568	2020-06-01	<null>	20	Inactive	Los Angeles	Evening
16	16	Gary Cooley	62	Male	HR	5386	2017-07-25	<null>	2	Inactive	Chicago	Morning
17	17	Jonathan Perez	59	Male	HR	6586	2019-02-19	3	7	Inactive	Los Angeles	Evening
18	18	Jacqueline Randall	31	Female	HR	3519	2018-05-18	4	6	Active	New York	Morning
19	19	Nancy Stephens	38	Male	HR	9061	2017-07-16	5	16	Inactive	Chicago	Night
20	20	Victoria Fox	57	Female	HR	7251	2023-06-07	<null>	10	Active	Los Angeles	Evening
21	21	Heather Jones	35	Male	Sales	4565	2018-02-07	<null>	9	Active	Chicago	Night
22	22	Stacie Porter	61	Female	HR	4071	2020-02-04	2	9	Inactive	Chicago	Night
23	23	Bryce Carter	35	Female	Sales	9598	2015-12-16	4	4	Inactive	New York	Night
24	24	Marissa Stewart	31	Female	HR	5386	2021-01-30	<null>	3	Active	Los Angeles	Evening
25	25	Tracy Carlson	21	Male	HR	9275	2022-04-09	4	12	Active	New York	Morning
26	26	Tara Blackwell	30	Other	HR	6120	2020-02-20	5	7	Active	New York	Evening
27	27	Austin Long	20	Female	IT	4899	2024-05-01	5	8	Inactive	Chicago	Night
28	28	Jordan Warren	55	Female	HR	4608	2018-07-07	<null>	18	Inactive	Los Angeles	Morning
29	29	Vickie Campbell	65	Female	IT	9190	2019-10-28	<null>	12	Inactive	Chicago	Morning
30	30	Rachel Ramsey	22	Male	Sales	9661	2016-08-18	2	17	Inactive	Chicago	Night
31	31	Brandi Smith	21	Other	IT	4780	2020-01-20	1	7	Inactive	New York	Night

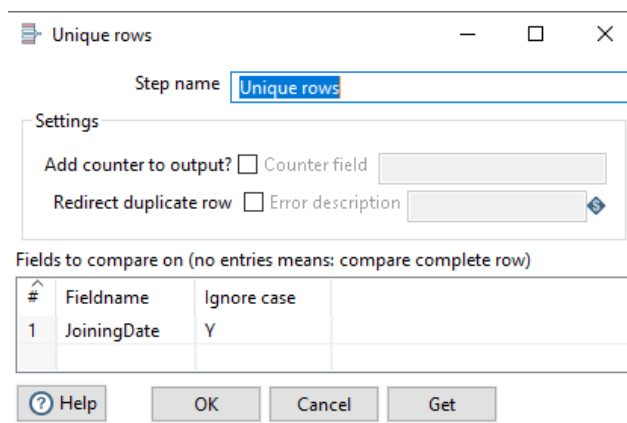
Gambar 35 Preview (4)

e) Setting kolom yang akan digunakan pada elemen select values



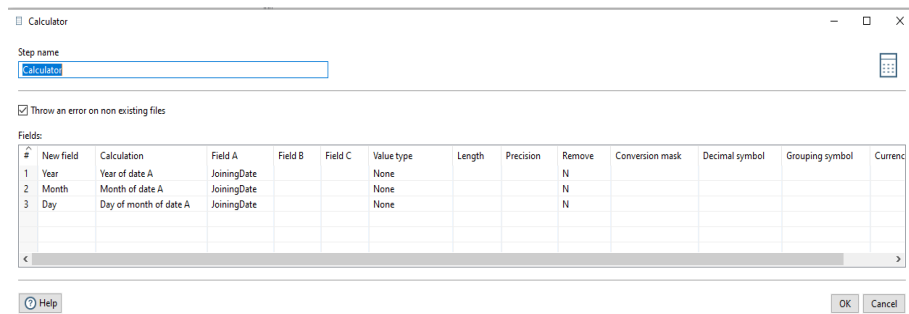
Gambar 36 Select Values (4)

f) Masukkan kolom unique pada unique rows



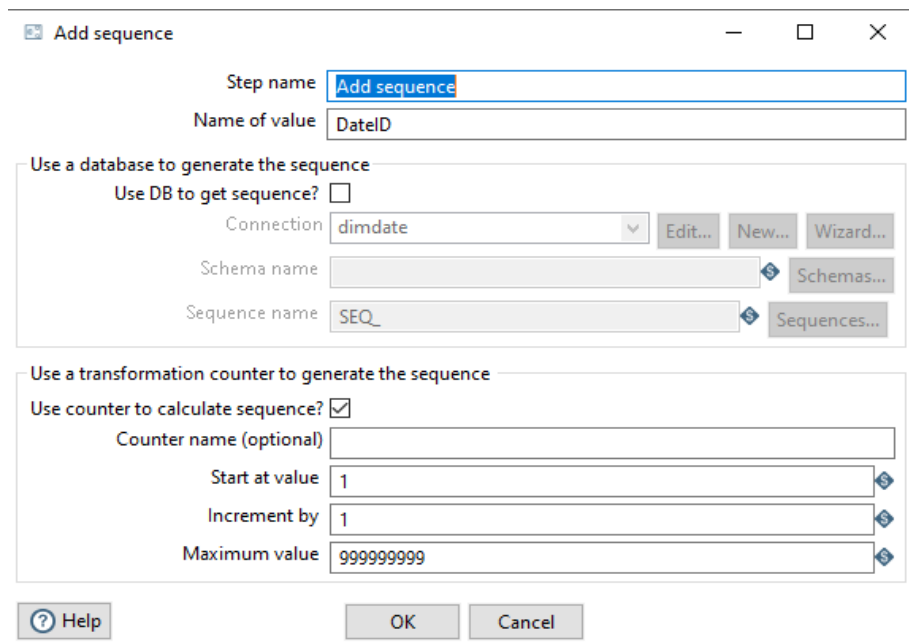
Gambar 37 Unique rows (4)

g) Lakukan perhitungan atau manipulasi data antar kolom dalam data stream menggunakan calculator pada pentaho



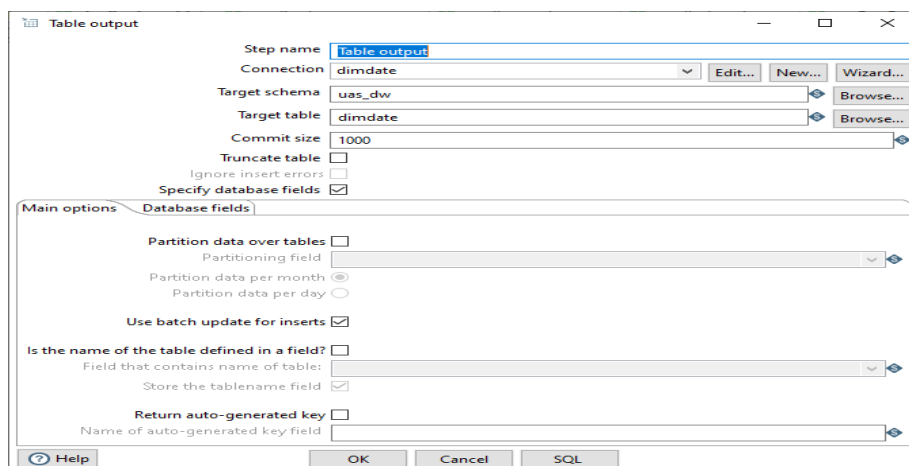
Gambar 38 Calculator

- h) Tambahkan kolom baru yang berisi nilai berurutan pada Add sequence



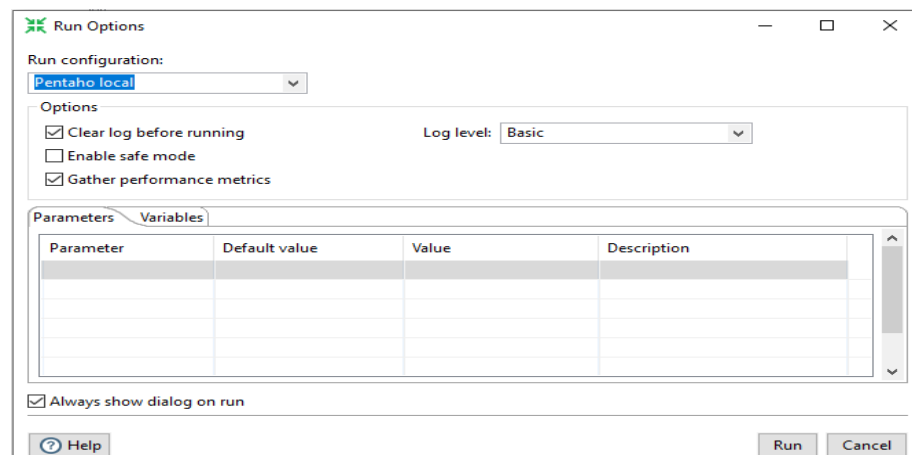
Gambar 39 Add Sequence (4)

- i) Isi tabel output dengan menggunakan target tabel dimdepartment sesuai dengan tabel yang ada pada database uas_dw

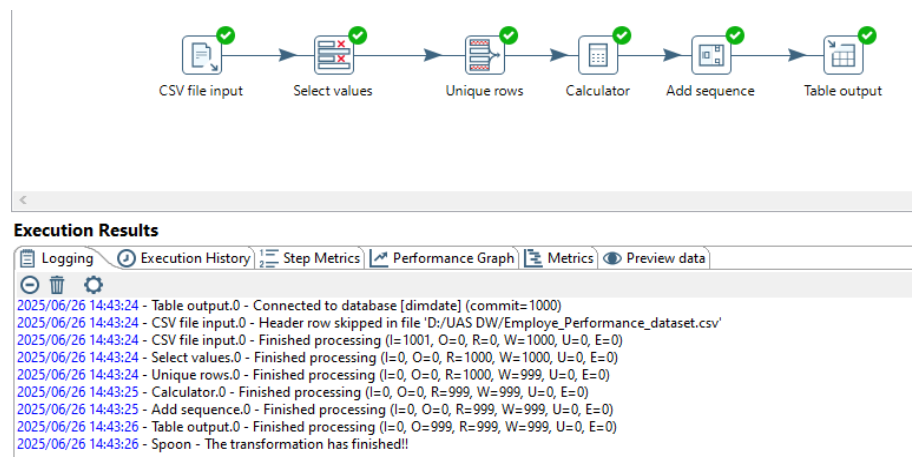


Gambar 40 Table Output (4)

j) Kemudian Running atau jalankan pentaho yang sudah kita buat

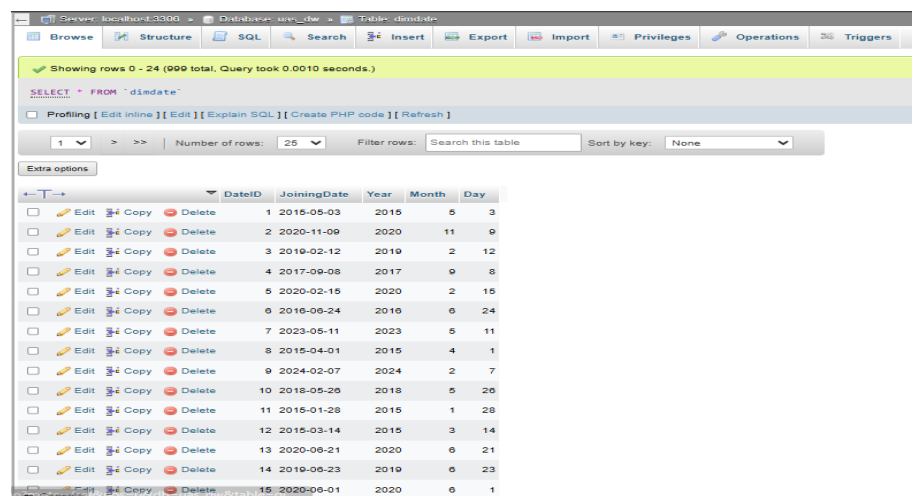


Gambar 41 Running (4)



Gambar 42 Running Berhasil (4)

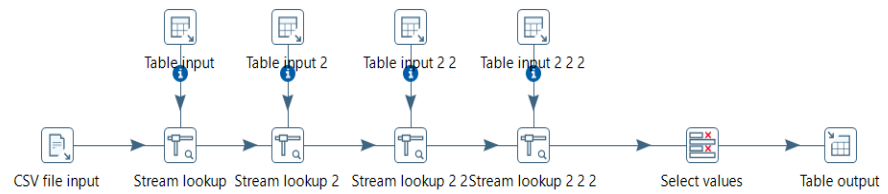
k) Setelah berhasil running data, maka data akan masuk kedalam tabel dimdate pada database uas_dw



Gambar 43 Data berhasil di transformasi ke tabel dimdate

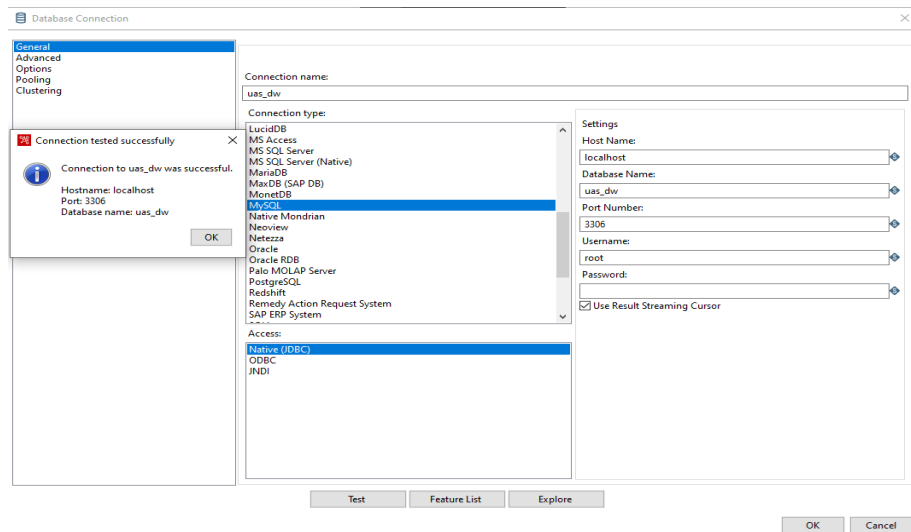
5) Tabel Dimensi uasFactEmployeePerformance

a) Elemen yang dibutuhkan



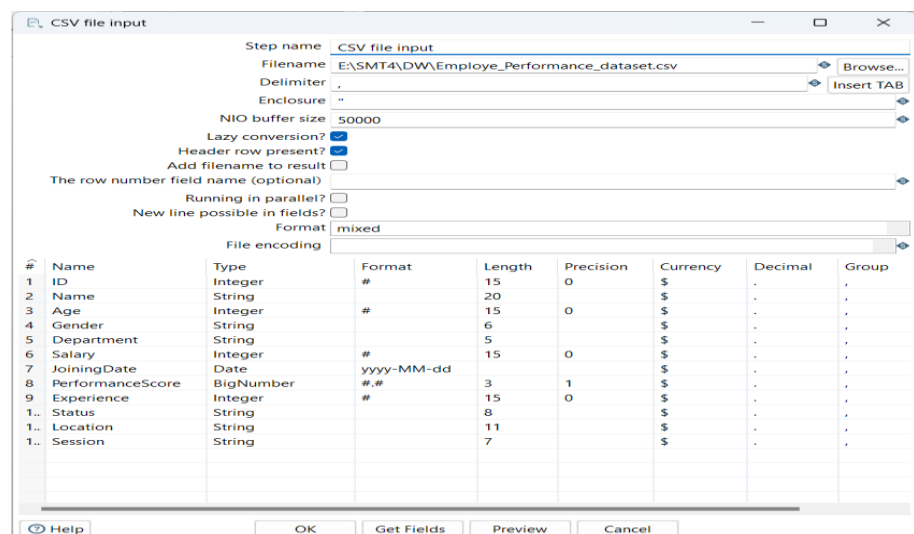
Gambar 44 Elemen uasFactEmployeePerformance

b) Tambahkan Connection ke Database uas_dw:



Gambar 45 Connection (5)

c) Masukkan file dataset pada tabel input CSV



Gambar 46 Input CSV (5)

d) Preview

Examine preview data

Rows of step: CSV file input (1000 rows)

#	ID	Name	Age	Gender	Department	Salary	JoiningDate	PerformanceScore	Experience	Status	Location	Session
1	1	Cory Escobar	48	Female	HR	5641	2015-05-03	2	16	Active	New York	Night
2	2	Timothy Sanchez	25	Other	Sales	4249	2020-11-09	2	11	Inactive	Los Angeles	Evening
3	3	Chad Nichols	57	Other	Sales	3058	2019-02-12	<null>	1	Inactive	New York	Morning
4	4	Christine Williams	58	Female	IT	5895	2017-09-08	2	13	Inactive	Los Angeles	Evening
5	5	Amber Harris	35	Other	IT	4317	2020-02-15	5	16	Inactive	New York	Evening
6	6	Ashley Howe	29	Female	HR	2591	2016-06-24	1	6	Active	Chicago	Evening
7	7	David Olson	39	Female	Sales	6826	2023-05-11	<null>	4	Active	New York	Night
8	8	Amanda Baker	52	Other	HR	6285	2015-04-01	<null>	8	Inactive	Chicago	Evening
9	9	Jeremy Wright	63	Female	Sales	9862	2024-02-07	<null>	3	Inactive	New York	Night
10	10	Brian Faulkner	30	Male	IT	8202	2018-05-26	1	9	Active	Los Angeles	Morning
11	11	Nicole Bell	42	Female	Sales	5336	2015-01-28	3	7	Active	Los Angeles	Evening
12	12	Rodney Richardson	60	Other	HR	6908	2015-03-14	4	19	Active	Chicago	Night
13	13	Joshua Robinson	61	Male	IT	5688	2020-06-21	<null>	4	Inactive	Chicago	Night
14	14	Benjamin Callahan	34	Male	IT	5593	2019-06-23	<null>	2	Inactive	Los Angeles	Night
15	15	Matthew Collins MD	31	Female	Sales	8568	2020-06-01	<null>	20	Inactive	Los Angeles	Evening
16	16	Gary Cooley	62	Male	HR	5386	2017-07-25	<null>	2	Inactive	Chicago	Morning
17	17	Jonathan Perez	59	Male	HR	6586	2019-02-19	3	7	Inactive	Los Angeles	Evening
18	18	Jacqueline Randall	31	Female	HR	3519	2018-05-18	4	6	Active	New York	Morning
19	19	Nancy Stephens	38	Male	HR	9061	2017-07-16	5	16	Inactive	Chicago	Night
20	20	Victoria Fox	57	Female	HR	7251	2023-06-07	<null>	10	Active	Los Angeles	Evening
21	21	Heather Jones	35	Male	Sales	4565	2018-02-07	<null>	9	Active	Chicago	Night
22	22	Stacie Porter	61	Female	HR	4071	2020-05-04	2	9	Inactive	Chicago	Night
23	23	Bryce Carter	35	Female	Sales	9598	2015-12-16	4	4	Inactive	New York	Night
24	24	Marissa Stewart	31	Female	HR	5386	2021-01-30	<null>	3	Active	Los Angeles	Evening
25	25	Tracy Carlson	21	Male	HR	9275	2022-04-09	4	12	Active	New York	Morning
26	26	Tara Blackwell	30	Other	HR	6120	2020-02-20	5	7	Active	New York	Evening
27	27	Austin Long	20	Female	IT	4899	2024-05-01	5	8	Inactive	Chicago	Night
28	28	Jordan Warren	55	Female	HR	4608	2018-07-07	<null>	18	Inactive	Los Angeles	Morning
29	29	Vickie Campbell	65	Female	IT	9190	2019-10-28	<null>	12	Inactive	Chicago	Morning
30	30	Rachel Ramsey	22	Male	Sales	9661	2016-08-18	2	17	Inactive	Chicago	Night
31	31	Brandi Smith	21	Other	IT	4780	2020-01-20	1	7	Inactive	New York	Night

Close Show Log

Gambar 47 Preview (5)

e) Mengambil data dari database menggunakan sql melalui tabel input 1 DimEmployee

Table input

Step name: Table input

Connection: DimEmployee

SQL:

```
SELECT
EmployeeID,
Name,
Age,
Gender,
Status
FROM DimEmployee;
```

Line 1 Column 0

Store column info in step meta data ☐

Enable lazy conversion ☐

Replace variables in script? ☐

Insert data from step ☐

Execute for each row? ☐

Limit size: 0

Help OK Preview Cancel

Gambar 48 Table Input (5)

Step name: Stream lookup

Lookup step: Table input

The key(s) to look up the value(s):

#	Field	LookupField
1	Name	Name
2	Age	Age
3	Gender	Gender
4	Status	Status

Specify the fields to retrieve :

#	Field	New name	Default	Type
1	EmployeeID			None

Preserve memory (costs CPU) ☒

Key and value are exactly one integer field ☐

Use sorted list (i.s.o. hashtable) ☐

? Help OK Cancel Get Fields Get lookup fields

Gambar 49 Stream Lookup

- f) Mengambil data dari database menggunakan sql melalui tabel input 2 DimDepartment

Step name: Table input 2

Connection: DimDepartement

Get SQL select statement...

SQL

```
SELECT
  DepartmentID,
  DepartmentName
FROM DimDepartment;
```

Line 1 Column 0

Store column info in step meta data ☐

Enable lazy conversion ☐

Replace variables in script? ☐

Insert data from step

Execute for each row? ☐

Limit size: 0

? Help OK Preview Cancel

Gambar 50 Table Input 2 (5)

Step name: Stream lookup 2

Lookup step: Table input 2

The key(s) to look up the value(s):

#	Field	LookupField
1	Department	DepartmentName

Specify the fields to retrieve :

#	Field	New name	Default	Type
1	DepartmentID			None

Preserve memory (costs CPU) ☒

Key and value are exactly one integer field ☐

Use sorted list (i.s.o. hashtable) ☐

Buttons: Help, OK, Cancel, Get Fields, Get lookup fields

Gambar 51 Stream lookup 2

- g) Mengambil data dari database menggunakan sql melalui tabel input 2 DimDate

Step name: Table input 2 2

Connection: DimDate

SQL: SELECT DateID, JoiningDate FROM DimDate;

Line 1 Column 0

Store column info in step meta data ☐

Enable lazy conversion ☐

Replace variables in script? ☐

Insert data from step

Execute for each row? ☐

Limit size: 0

Buttons: Help, OK, Preview, Cancel

Gambar 52 Table input 2/2

Stream lookup

Step name: Stream lookup 2 2

Lookup step: Table input 2 2

The key(s) to look up the value(s):

#	Field	LookupField
1	JoiningDate	JoiningDate

Specify the fields to retrieve :

#	Field	New name	Default	Type
1	DatelD			None

Preserve memory (costs CPU) ☒

Key and value are exactly one integer field ☐

Use sorted list (i.s.o. hashtable) ☐

Help OK Cancel Get Fields Get lookup fields

Gambar 53 Stream Lookup 2/2

- h) Mengambil data dari database menggunakan sql melalui tabel input 3 DimLocation

Table input

Step name: Table input 2 2 2

Connection: DimLocation Edit... New... Wizard...

SQL

Get SQL select statement...

```
SELECT
  LocationID,
  LocationName,
  Session
FROM DimLocation;
```

Line 5 Column 17

Store column info in step meta data ☐

Enable lazy conversion ☐

Replace variables in script? ☐

Insert data from step

Execute for each row? ☐

Limit size 0

Help OK Preview Cancel

Gambar 54 Table input 2/2/2

Step name: Stream lookup 2 2 2

Lookup step: Table input 2 2 2

The key(s) to look up the value(s):

#	Field	LookupField
1	Location	LocationName
2	Session	Session

Specify the fields to retrieve :

#	Field	New name	Default	Type
1	LocationID			None

Preserve memory (costs CPU) ☒

Key and value are exactly one integer field ☐

Use sorted list (i.s.o. hashtable) ☐

Buttons: Help, OK, Cancel, Get Fields, Get lookup fields

Gambar 55 Stream lookup 2/2/2

- i) Setting kolom yang akan digunakan pada elemen select values

Step name: Select values

Select & Alter Remove Meta-data

Fields:

#	Fieldname	Rename to	Length	Precision
1	Salary			
2	PerformanceScore			
3	Experience			
4	EmployeeID			
5	DepartmentID			
6	DateID			
7	LocationID			

Buttons: Get fields to select, Edit Mapping

Include unspecified fields, ordered by ☐

Buttons: Help, OK, Cancel

Gambar 56 Select Values (5)

- i) Isi tabel output dengan menggunakan target tabel dimdepartment sesuai dengan tabel yang ada pada database uas_dw

Table output

Step name: Table output

Connection: FactEmployeePerformance [Edit... New... Wizard...]

Target schema: uas_dw [Browse...]

Target table: factemployeeperformance [Browse...]

Commit size: 1000

Truncate table: ☒

Ignore insert errors: ☐

Specify database fields: ☒

Main options Database fields

Partition data over tables: ☐
 Partitioning field: []

Partition data per month: ☐
 Partition data per day: ☐

Use batch update for inserts: ☒

Is the name of the table defined in a field?: ☐
 Field that contains name of table: []
 Store the tablename field: ☒

Return auto-generated key: ☐
 Name of auto-generated key field: []

[?] Help [OK] [Cancel] [SQL]

Gambar 57 Table Output (5)

j) Kemudian Running atau jalankan pentaho yang sudah kita buat

Run Options

Run configuration: Pentaho local

Options

☒ Clear log before running Log level: Basic

☐ Enable safe mode

☒ Gather performance metrics

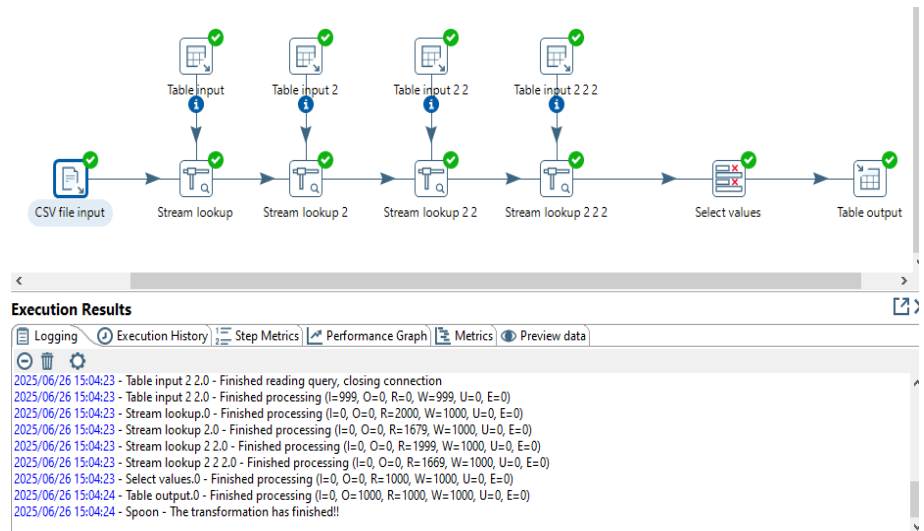
Parameters Variables

Parameter	Default value	Value	Description

☒ Always show dialog on run

[?] Help [Run] [Cancel]

Gambar 58 Running (5)



Gambar 59 Running Berhasil (5)

- k) Setelah berhasil running data, maka data akan masuk kedalam tabel factemployeeperformance pada database uas_dw

Server: localhost:3306 » Database: uas_dw » Table: factemployeeperformance

Current selection does not contain a unique column. Grid edit, checkbox, Edit, Copy and Delete features are not available.

Showing rows 0 - 24 (1000 total, Query took 0.0019 seconds.)

`SELECT * FROM `factemployeeperformance``

Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

Number of rows: 25 Filter rows: Search this table Sort by key: None

EmployeeID	DepartmentID	DateID	LocationID	Salary	Experience	PerformanceScore
1	676	1	661	5641	16	2
2	678	2	668	4249	11	2
3	678	3	669	3058	1	NULL
4	679	4	668	5895	13	2
5	679	5	656	4317	16	5
6	676	327	657	2591	6	1
7	678	7	661	6826	4	NULL
8	676	373	657	6285	8	NULL
9	678	9	661	9862	3	NULL
10	679	10	635	8202	9	1
11	678	11	668	5336	7	3
12	676	12	665	6908	19	4
13	679	885	665	5688	4	NULL
14	679	14	658	5593	2	NULL
15	678	803	668	8568	20	NULL
16	676	16	660	5386	2	NULL

Gambar 60 Data berhasil di transformasi ke factemployeeperformance

BAB III

PEMBANGUNAN DATA WAREHOUSE

3.1 Perancangan Struktur Database

Perancangan data warehouse menggunakan pendekatan Star Schema, yang terdiri dari satu tabel fakta factemployeeperformance dan empat tabel dimensi: dimemployee, dimdepartement, dimlocation, dan dimdate.

3.1.1 Pemilihan Star Schema dilakukan karena:

3.1.2 Memiliki struktur sederhana dan mudah dipahami.

3.1.3 Mempermudah pembuatan query analitik dan pelaporan.

3.1.4 Cocok untuk data historis dan analisis kinerja.

Diagram Star Schema ditampilkan pada Bab II, yang menunjukkan hubungan antar tabel melalui foreign key.

3.2 Pembuatan Tabel Dimensi

Setiap dimensi menyimpan informasi deskriptif yang relevan untuk mendukung analisis dari tabel fakta.

1) Tabel dimemployee

Berisi informasi dasar karyawan: EmployeeID, Name, Age, Gender, dan Status.

Tabel ini dibangun dari hasil ekstraksi file CSV dan transformasi menggunakan Select Values, Add Sequence, dan Unique Rows di Spoon.

2) Tabel dimdepartement

Berisi data departemen tempat karyawan bekerja, seperti DepartmentID dan DepartmentName. Data ini diambil dari kolom “Department” di dataset utama.

3) Tabel dimlocation

Berisi informasi lokasi kerja, seperti LocationID dan LocationName. Setiap lokasi dibuat unik dan diberi ID melalui Add Sequence.

4) Tabel dimdate

Dibuat berdasarkan kolom tanggal masuk karyawan (JoinDate), lalu diturunkan menjadi kolom Day, Month, dan Year menggunakan kalkulasi otomatis di Spoon.

3.3 Pembuatan Tabel Fakta

Tabel factemployeeperformance merupakan inti dari skema, berisi informasi kuantitatif seperti:

- a) PerformanceScore : skor kinerja
- b) Salary : gaji karyawan
- c) Experience : tahun pengalaman

Tabel ini juga menyimpan foreign key ke semua dimensi (EmployeeID, DepartmentID, LocationID, DateID). Proses join dilakukan pada transformasi terakhir uasFactEmployeePerformance.ktr.

3.4 Tools yang Digunakan

Berikut adalah beberapa tools yang digunakan:

Tools	Fungsi
Pentaho Spoon	Alat utama untuk ETL
MySQL / phpMyAdmin	Menyimpan dan mengelola data warehouse
Microsoft Excel	Meninjau dan membersihkan dataset awal
Draw.io / Lucidchart	Membuat diagram star schema (opsional)

Tabel 6 Tabel Tools

BAB IV

IMPLEMENTASI DAN INTEGRASI SISTEM

4.1 Implementasi Pipeline ETL

Seluruh file .ktr dijalankan satu per satu dengan urutan sebagai berikut:

- 1) uasdimdepartement.ktr
- 2) uasdimemployee.ktr
- 3) uasdimlocation.ktr
- 4) dwdimdate.ktr
- 5) uasFactEmployeePerformance.ktr

Setiap transformasi memuat data ke dalam database uas_dw menggunakan komponen Table Output setelah proses Extract dan Transform selesai.

4.2 Validasi dan Integritas Data

Beberapa langkah yang dilakukan untuk menjamin integritas:

- 1) Seluruh foreign key yang digunakan valid dan memiliki referensi di tabel dimensi.
- 2) Tidak ditemukan data NULL pada kolom ID penting.
- 3) Tidak terdapat duplikasi pada tabel dimensi.
- 4) Kolom tanggal dan numeric disesuaikan dengan format standar (yyyy-MM-dd, Integer, dll).

4.3 Kendala dan Solusi

Kendala	Solusi
Format tanggal tidak terbaca	Gunakan komponen Calculator untuk memformat ulang
Duplikasi pada kolom Department	Terapkan Unique Rows di Spoon
Penggabungan antar tabel dimensi tidak tepat	Lakukan Join berdasarkan ID yang konsisten dan validasi hasil preview
Beberapa nilai kosong di kolom pengalaman	Isi dengan nilai default (0) atau hitung dari tanggal join jika tersedia

Tabel 7 Kendala dan Solusi

BAB V ANALISIS KPI

5.1 Rata-rata Skor Kinerja per Karyawan

KPI: Rata-rata PerformanceScore per karyawan

```
SELECT EmployeeID, AVG(PerformanceScore) AS AvgPerformance  
FROM factemployeeperformance  
GROUP BY EmployeeID;
```

Showing rows 0 - 24 (1000 total, Query took 0.0003 seconds.)

```
SELECT EmployeeID, AVG(PerformanceScore) AS AvgPerformance FROM factemployeeperformance GROUP BY EmployeeID;
```

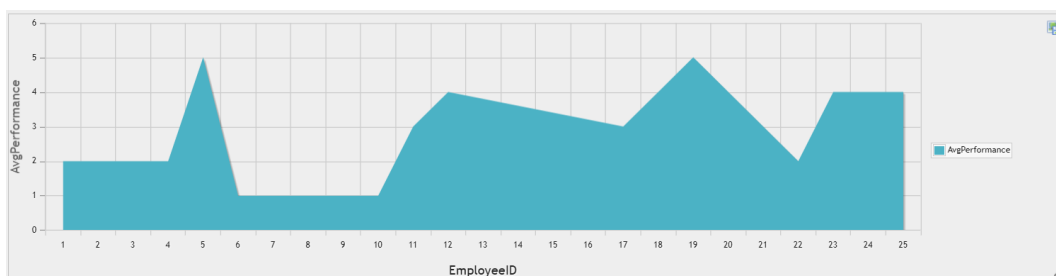
☐ Profiling [[Edit inline](#)] [[Edit](#)] [[Explain SQL](#)] [[Create PHP code](#)] [[Refresh](#)]

1 > >> | Number of rows: 25 Filter rows:

Extra options

EmployeeID	AvgPerformance
1	2
2	2
3	NULL
4	2
5	5
6	1
7	NULL
8	NULL
9	NULL
10	1
11	3
12	4
13	NULL
14	NULL

Gambar 61 Hasil Query Rata-rata Skor Kinerja per Karyawan



Gambar 62 Grafik Rata-rata Skor Kinerja per Karyawan

5.2 Rata-rata Skor Kinerja per Departemen

KPI: Menilai kinerja per departemen

```
SELECT      DepartmentID,      AVG (PerformanceScore)      AS  
DeptAvgPerformance  
FROM FactEmployeePerformance  
GROUP BY DepartmentID;
```

Showing rows 0 - 2 (3 total, Query took 0.0011 seconds.)

`SELECT DepartmentID, AVG(PerformanceScore) AS DeptAvgPerformance FROM FactEmployeePerformance GROUP BY DepartmentID;`

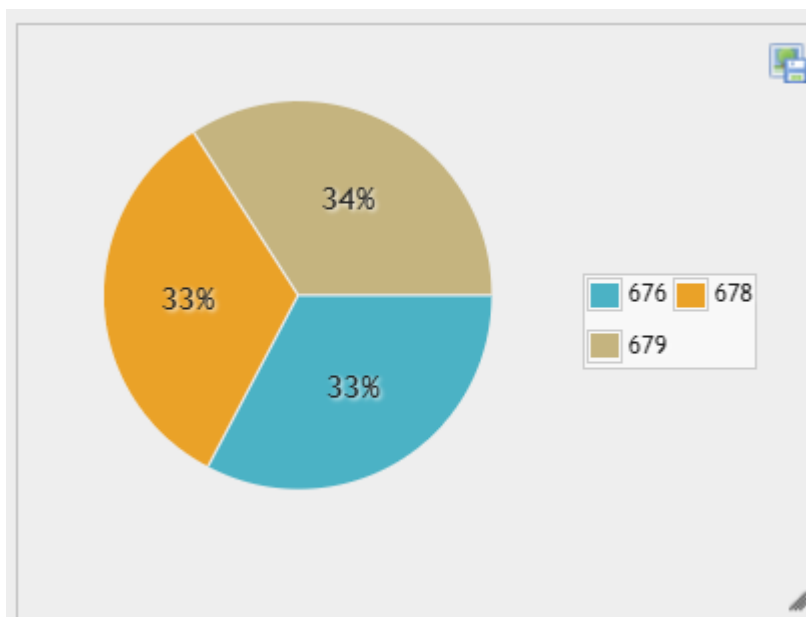
☐ Profiling [[Edit inline](#)] [[Edit](#)] [[Explain SQL](#)] [[Create PHP code](#)] [[Refresh](#)]

☐ Show all | Number of rows: 25 | Filter rows:

Extra options

DepartmentID	DeptAvgPerformance
676	2.856287425149701
678	2.9
679	2.9757575757575756

Gambar 63 Hasil Query Rata-rata Skor Kinerja per Departemen



Gambar 64 Pie Chart Rata-rata Skor Kinerja per Departemen

5.3 Efisiensi Gaji vs Kinerja per Departemen

KPI: Efisiensi gaji terhadap output kinerja

```
SELECT DepartmentID,  
SUM(Salary) AS TotalSalary,  
SUM(PerformanceScore) AS TotalPerformance,  
SUM(PerformanceScore) / SUM(Salary) AS  
PerformancePerSalary
```

```
FROM FactEmployeePerformance
GROUP BY DepartmentID;
```

Showing rows 0 - 2 (3 total, Query took 0.0887 seconds.)

```
SELECT DepartmentID, SUM(Salary) AS TotalSalary, SUM(PerformanceScore) AS TotalPerformance, SUM(PerformanceScore) / SUM(Salary) AS PerformancePerSalary FROM FactEmployeePerformance GROUP BY DepartmentID;
```

☐ Profiling [\[Edit inline \]](#) [\[Edit \]](#) [\[Explain SQL \]](#) [\[Create PHP code \]](#) [\[Refresh \]](#)

☐ Show all | Number of rows: 25 | Filter rows:

Extra options

DepartmentID	TotalSalary	TotalPerformance	PerformancePerSalary
676	1932314	477	0.00024685428972723896
678	1961782	493	0.00025130213244896734
679	2023278	491	0.00024267549985716247

Gambar 65 Hasil Query Efisiensi Gaji vs Kinerja per Departemen

Interpretasi: Semakin tinggi rasio PerformancePerSalary, semakin efisien departemen tersebut.

5.4 Pengalaman vs Skor Kinerja

KPI: Apakah pengalaman berkorelasi dengan kinerja?

```
SELECT Experience, AVG(PerformanceScore) AS AvgPerformance
FROM FactEmployeePerformance
GROUP BY Experience;
```

Showing rows 0 - 19 (20 total, Query took 0.0412 seconds.)

```
SELECT Experience, AVG(PerformanceScore) AS AvgPerformance FROM FactEmployeePerformance GROUP BY Experience;
```

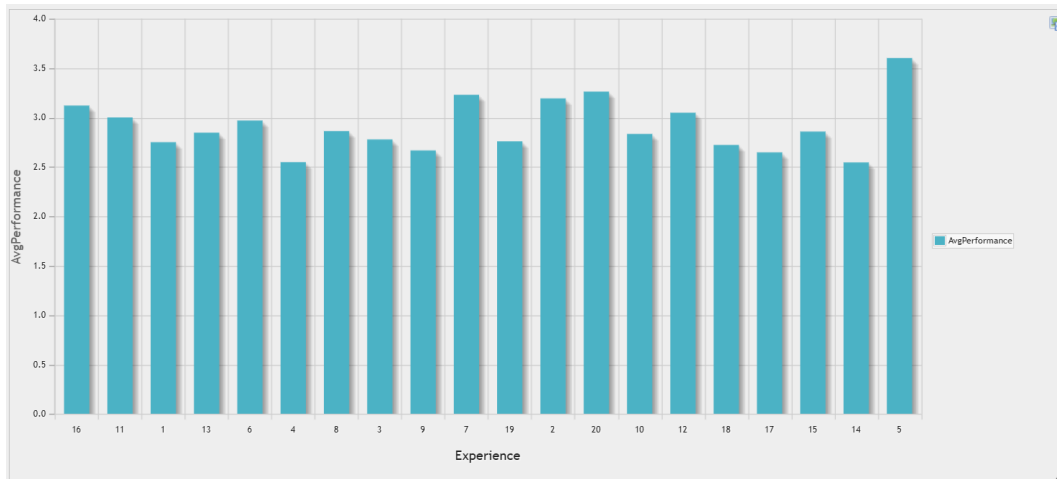
☐ Profiling [\[Edit inline \]](#) [\[Edit \]](#) [\[Explain SQL \]](#) [\[Create PHP code \]](#) [\[Refresh \]](#)

☐ Show all | Number of rows: 25 | Filter rows:

Extra options

Experience	AvgPerformance
16	3.12
11	3
1	2.75
13	2.8461538461538463
6	2.96875
4	2.5483870967741935
8	2.8620689655172415
3	2.7777777777777777
9	2.6666666666666665
7	3.2285714285714286
19	2.7586206896551726
2	3.1923076923076925
20	3.260869565217391
10	2.8333333333333335

Gambar 66 Hasil Query Pengalaman vs Skor Kinerja



Gambar 67 Grafik Batang Pengalaman vs Skor Kinerja

5.5 Skor Kinerja Berdasarkan Lokasi

KPI: Lokasi mana yang paling produktif?

```
SELECT      LocationID,      AVG (PerformanceScore)      AS
AvgLocationPerformance
FROM FactEmployeePerformance
GROUP BY LocationID;
```

✓ Showing rows 0 - 8 (9 total, Query took 0.0019 seconds.)

```
SELECT LocationID, AVG(PerformanceScore) AS AvgLocationPerformance FROM FactEmployeePerformance GROUP BY LocationID;
```

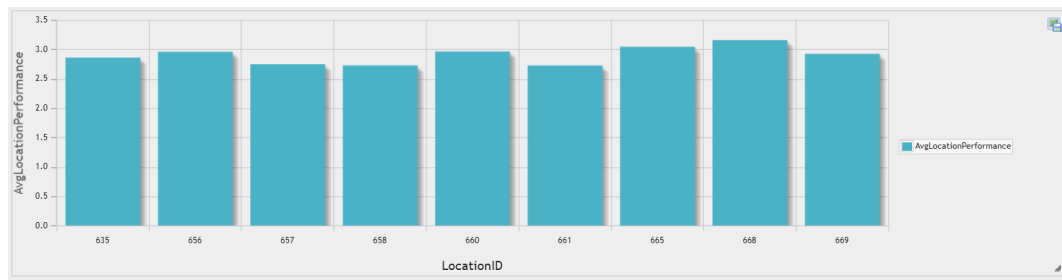
☐ Profiling [Edit inline] [Edit] [Explain SQL] [Create PHP code] [Refresh]

☐ Show all | Number of rows: 25 | Filter rows: Search this table

Extra options

LocationID	AvgLocationPerformance
635	2.857142857142857
656	2.9555555555555557
657	2.744186046511628
658	2.7241379310344827
660	2.9607843137254903
661	2.7222222222222223
665	3.0405405405405403
668	3.1538461538461537
669	2.9206349206349205

Gambar 68 Hasil Query Skor Kinerja Berdasarkan Lokasi



Gambar 69 Grafik Batang Skor Kinerja Berdasarkan Lokasi

BAB VI

KESIMPULAN DAN PENUTUP

Berdasarkan hasil pembangunan data warehouse dan analisis yang dilakukan, dapat disimpulkan bahwa sistem ini mampu menyediakan informasi yang relevan dan strategis bagi perusahaan untuk mengevaluasi kinerja karyawan secara efisien. Dengan menggunakan pendekatan ETL dan skema bintang, data yang semula tidak terstruktur dapat diolah menjadi sumber informasi yang terpusat dan siap dianalisis.

Lima KPI yang dihasilkan memberikan gambaran menyeluruh mengenai produktivitas karyawan, efisiensi departemen, pengaruh pengalaman, serta kinerja berdasarkan lokasi. Sistem ini sangat bermanfaat untuk mendukung pengambilan keputusan manajerial, seperti promosi, pembinaan SDM, dan perencanaan anggaran.

Updating lebih lanjut dapat diarahkan pada integrasi yang interaktif dan penambahan data historis agar bisa digunakan untuk analisis tren jangka panjang.