

# Business Intelligence & Decision Support System

*Topic: Human Resources*



PRESENTATION - 2024

# GROUP MEMBER

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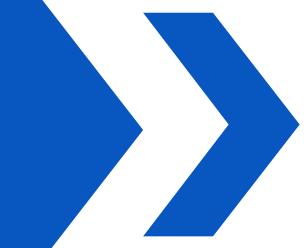
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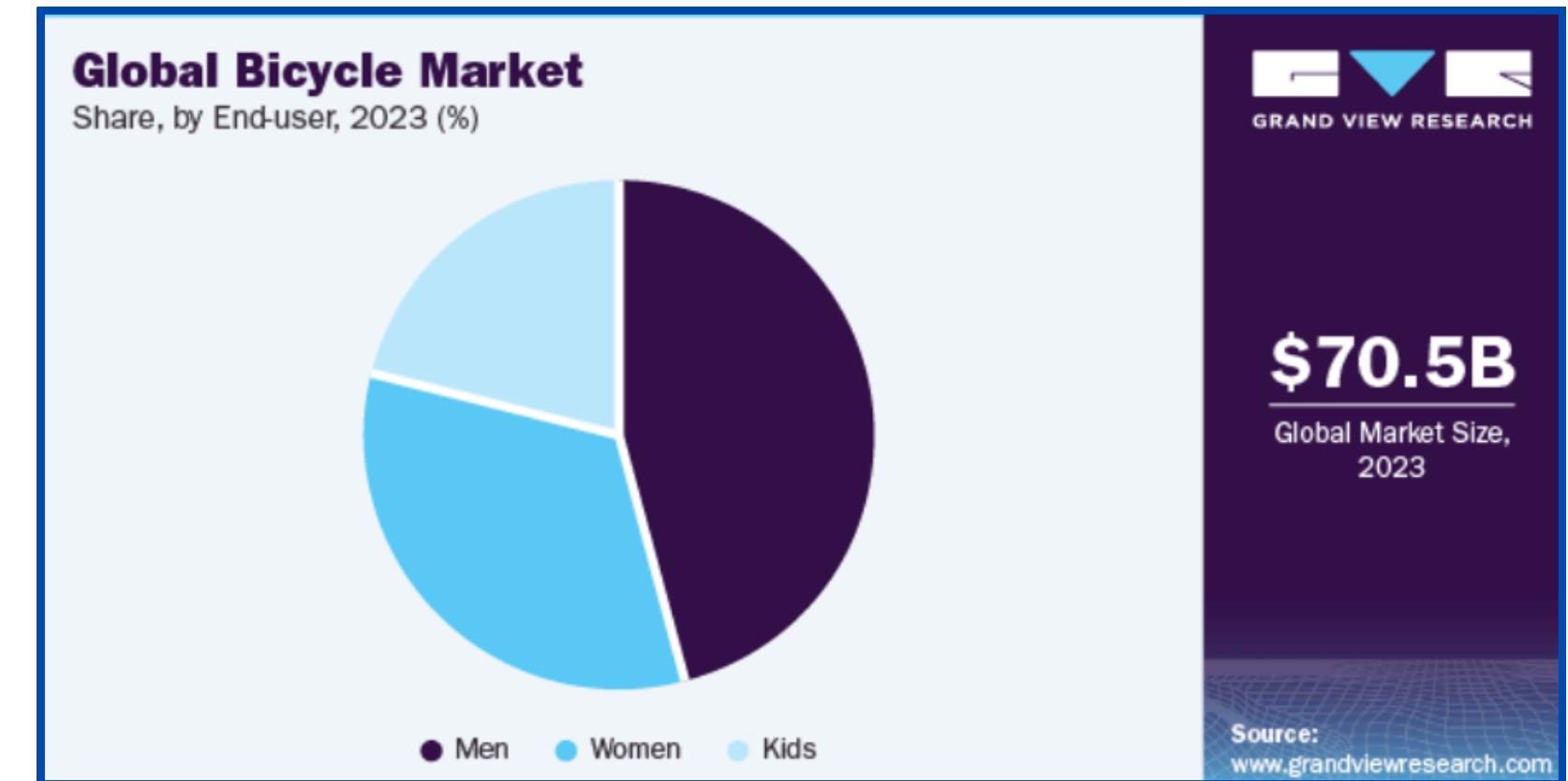
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# CHAPTER 1:

# Project overview



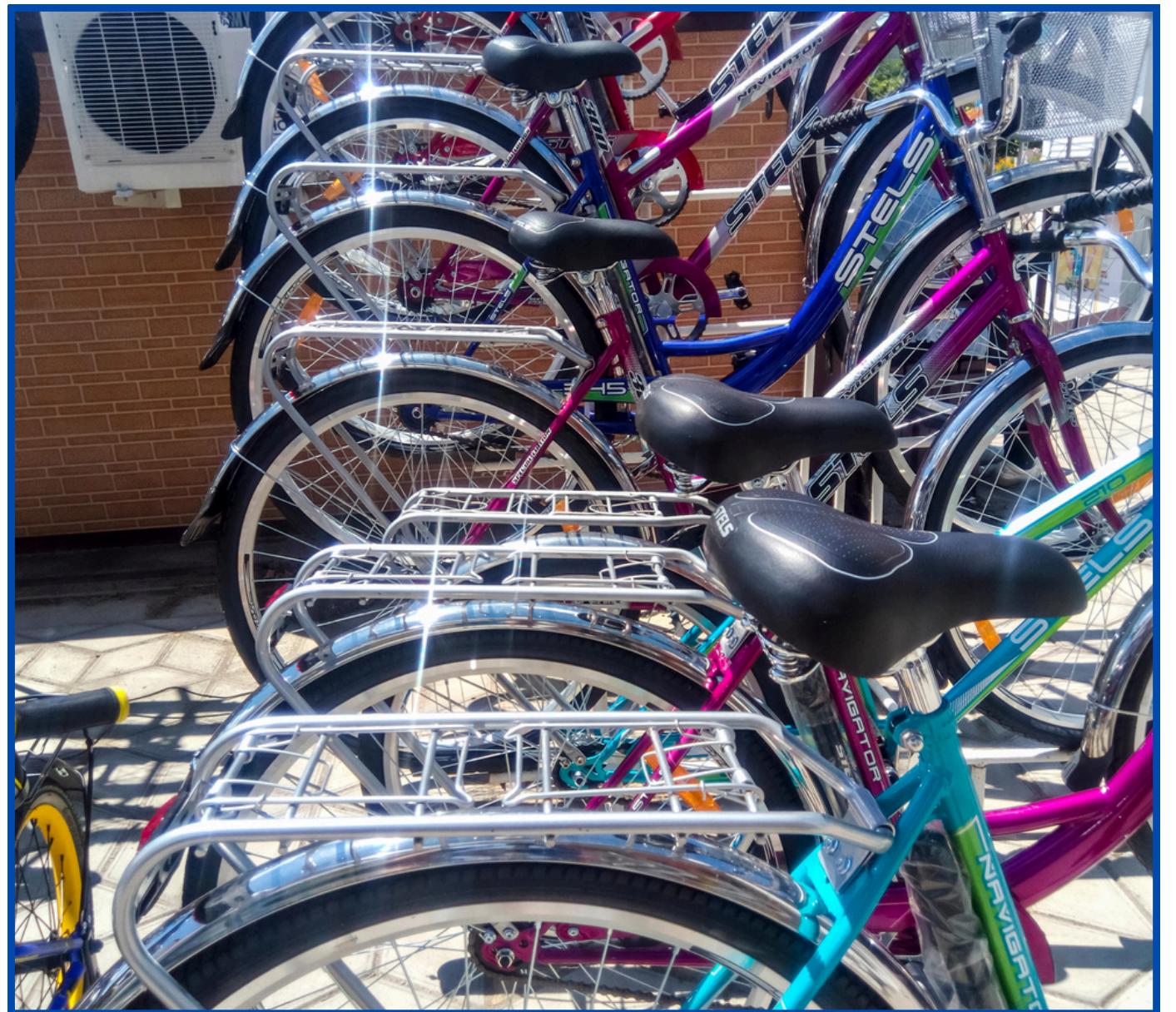
## 1.1 Overall bicycle industry in the global market



- The global bicycle market size (Grand View Research, 2023): **USD 70,497.5 million.**
- Expected to expand at a compound annual growth rate (CAGR) of **9.7%** from 2023 to 2030.

## 1.2 Overview of the bicycle industry in Vietnam

- Revenue from the Bicycle market: **USD 88.85 million** (2024).
- Revenue have a compound annual growth rate (CAGR 2024–2028) of **2.98%**, leading to a projected market value of **\$99.94 million** by 2028.
- The bicycle market unit sales: **0.54 million** bicycles (2028)
- The average price by volume of the Bicycle market: **159.30 USD** (2024).



## 1.3 Business Case for the project



- **Adventure Works Cycles:** a fictional company, with headquarters in Bothell, Washington, and a global bicycle manufacturing and distribution network.
- **Objective:** expand market share through effective advertising strategies, expanded online presence & cost-optimized manufacturing products.

## 1.4 Business demands/problems



### Business demands

Need for competition and development

Internal systems, production, distribution effectively

# 1.5 Objectives of the project

## General Objective

- Utilizes Microsoft's AdventureWorks database for HR analytics: database understanding, ....
- Facilitating informed decision-making.

## Specific Objectives

- Integrate AdventureWorks databases into business processes: review decision support models, design a data warehouse, ...

## Scope of the project

- **Space scope:** Production and sale of bicycle, **a staff of 290 employees.**
- **Time scope:** Database for Microsoft SQL Server **2008 to 2014;** Project from March 2 to May 10, 2024.

# 1.5 Objectives of the project

## Question 1

What is the average salary across different departments? Are there any gender pay gaps within the company?

## Question 2

How does the workforce demand vary across different departments? Are there any departments that are overstaffed or understaffed based on their current and projected workforce demand?

## Question 3

How does the time-off usage vary across different departments? Are there any correlations between time-off usage and employee satisfaction or productivity?

## Question 4

What are the most important KPIs for measuring HR performance and effectiveness and how do they align with organizational goals and objectives?

## 1.6 Objectives of the project

The value of the project	Outcome of the BI project
<ul style="list-style-type: none"><li>• Gain insights into HR processes.</li><li>• Analyze company data for a comprehensive data warehouse.</li><li>• Facilitate proactive identification of trends.</li><li>• Drive organizational growth by aligning HR strategies with business goals.</li></ul>	<ul style="list-style-type: none"><li>• Centralize HR data for streamlined management.</li><li>• Ensure accurate visualization</li><li>• Enable quick information access, facilitate timely decision-making, and optimize resources.</li><li>• Drive efficiency across HR processes and enhance organizational performance.</li></ul>

## 1.7 Project Budget

<b>One-time costs</b>	<b>Estimated Cost</b>
Procurement of advanced data analytics software and licenses	\$50,000
Purchase of high-performance servers and hardware infrastructure	\$30,000
Development and customization of data visualization tools	\$20,000
.....	....
Implementation and configuration of database management systems	\$20,000
Other incurred costs (10%)	\$20,000
<b>Total</b>	<b>\$210,000</b>

# CHAPTER 2:

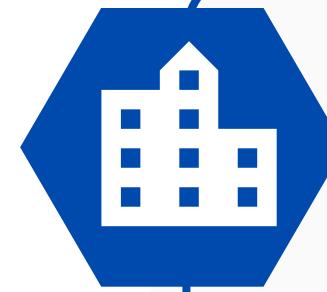
## Defining requirements business/KPIs, data & quality



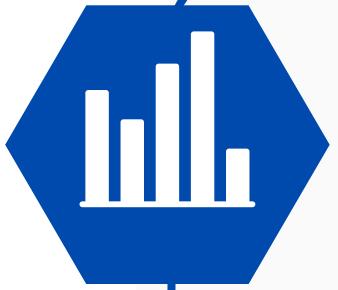
## 2.1 Business requirements



Employee Information Management



Recruitment



Leave and Attendance Management



Reporting and Analytics

## 2.2 Key Performance Indicators

$$\text{Average Pay Rate} = \frac{\text{Sum of Pay Rate}}{\text{Total number of Transactions}} \times 100$$

### KPI 1: Pay rate management

- **Main requirement:** calculate the average pay rate for each department in an organization.
- **Objective:** analyze and compare the average pay rates across different departments in order to understand the distribution of salaries within the organization.
- **Input:** Sum of Pay Rate & Total number of Transactions.
- **Output:** Average Pay Rate.

## 2.2 Key Performance Indicators

$$\text{Ratio of days off and sick} = \frac{\text{Time off Hours}}{\text{Actual Work Hours}} \times 100$$

### KPI 2: Time off hours management

- **Main requirement:** Measure the ratio of days off and sick in relation to actual work hours.
- **Objective:** Measure and monitor the utilization of time off and sick leave compared to actual work hours.
- **Input:** Time off Hours & Actual Work Hours.
- **Output:** Ratio of days off and sick.

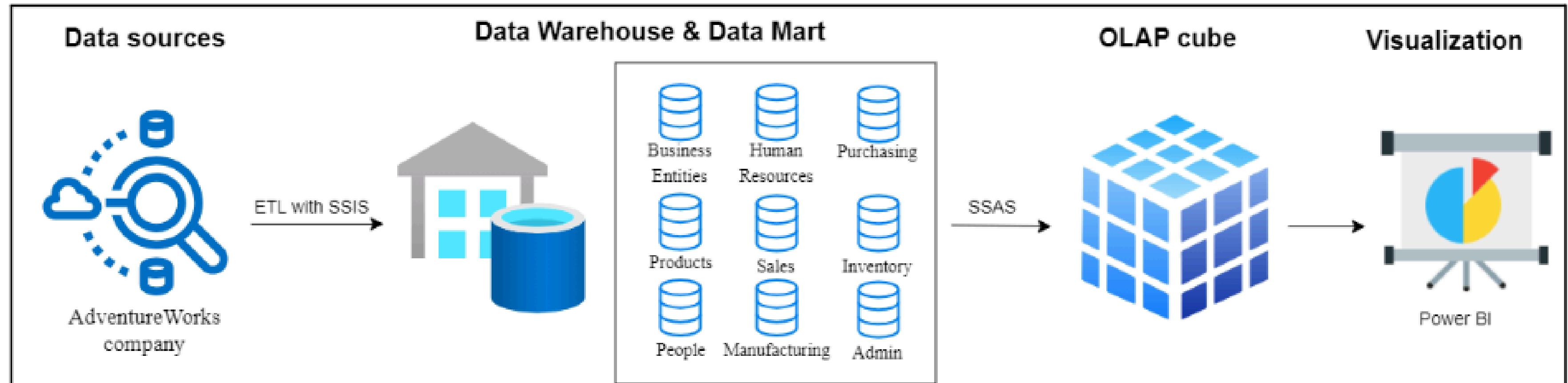
## 2.2 Key Performance Indicators

*New Hire Employee = Count of Employees with Start Date per year*

### *KPI 3: New hire employees management*

- **Main requirement:** Calculate the number of new employees hired in the organization in a specific period of time.
- **Objective:** Track and monitor the number of new hires to understand recruitment rates and organizational growth.
- **Input:** Departmental employee history data & Year.
- **Output:** The number of new hires each year by department.

## 2.3 Business Intelligence Solution



*BI solution proposal*

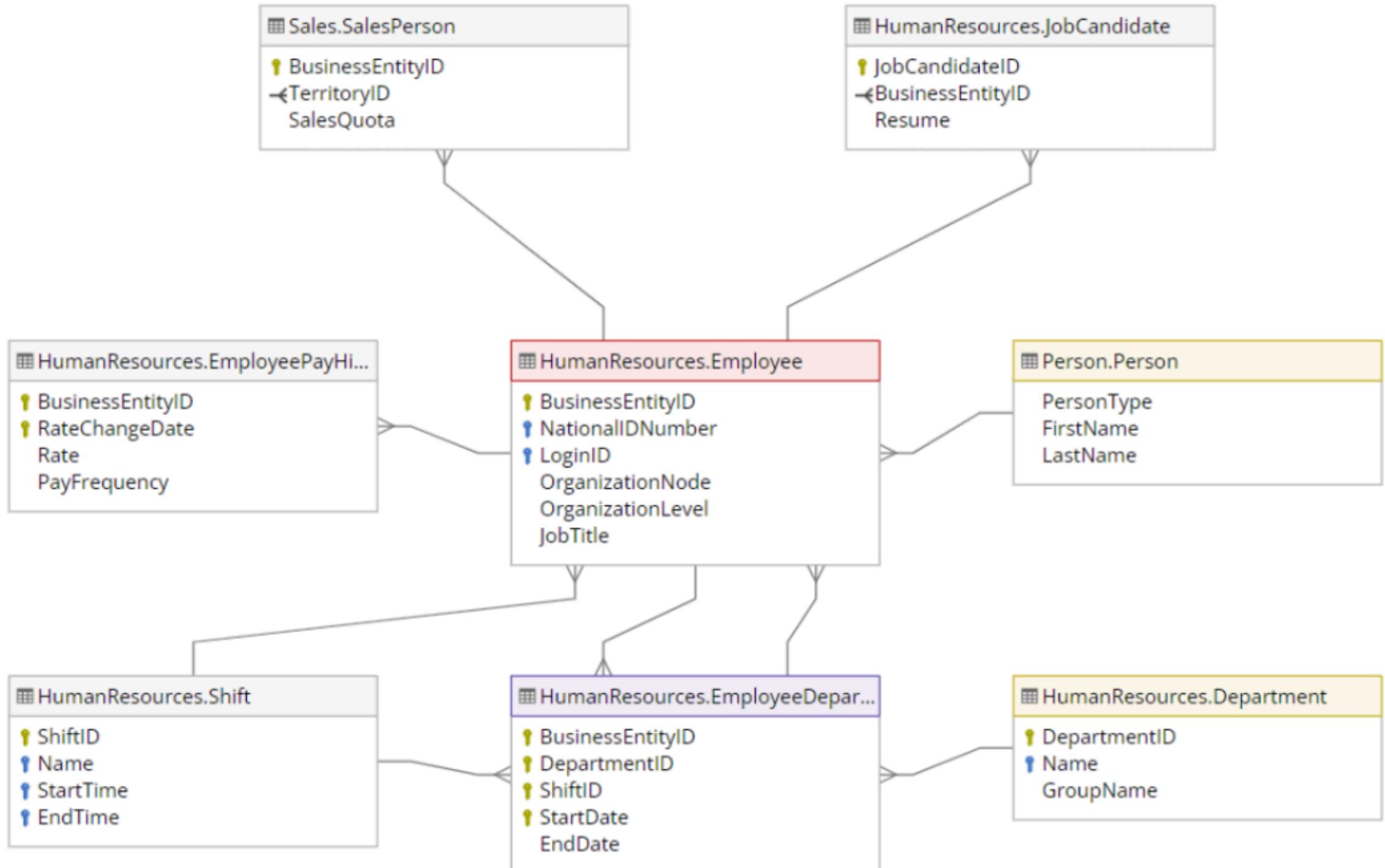


# CHAPTER 3: Data preparation & Data modeling

### 3.1. Data warehouse

- 1. Business Entities
- 2. People
- 3. Admin
- 4. Products
- 5. Manufacturing
- 6. Sales
- 7. Purchasing
- 8. Inventory
- 9. Human Resources

## 3.2. Data mart of HR module



### Challenge:

- Poor data quality
- Data retrieval difficulties
- Unclear time attributes
- Lack of employee departure insights

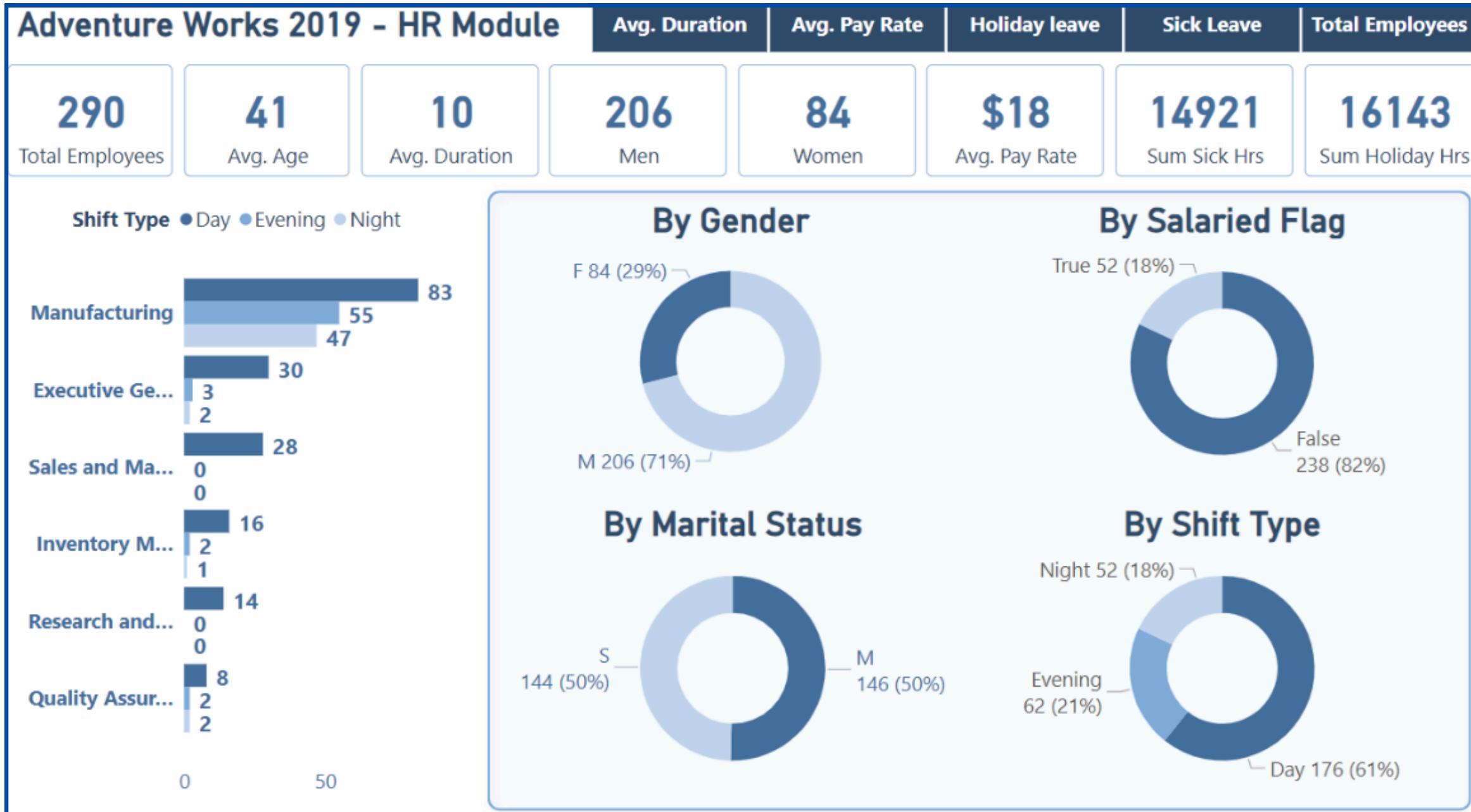
## 3.3. EDA database

### 3.3.1. Descriptive statistics

<b>Table</b>	<b>Total Rows in table</b>	<b>Total Missing Values</b>	<b>Total Duplicate Rows</b>
Department	16	0	0
Employee	290	2	0
EmployeeDepartmentHistory	296	290	0
JobCandidate	13	11	0
EmployeePayHistoy	316	0	0
Shift	3	0	0

## 3.3. EDA database

### 3.3.2. Employee Analysis



**71%** Male

**50%** Married

**82%** Paid hourly

**61%** Day shift

## 3.3. EDA database

### 3.3.2. Employee Analysis



Top Department with the **highest** Pay Rate

1. Research and Development
2. Executive
3. Sales & Marketing

## 3.3. EDA database

### 3.3.2. Employee Analysis



Top Department with the **most** employees

1. Manufacturing
2. Executive
3. Sales & Marketing

## 3.3. EDA database

### 3.3.2. Employee Analysis



Duration is generally quite **high**  
=> good for experience but bad for creativity.

## 3.4. Designing Data Warehouse

### 3.4.1. Bus Matrix

<b>Business process/Business Requirements</b>	<b>Common Dimension</b>						
	<b>Date</b>	<b>Department</b>	<b>Pay history</b>	<b>Manager</b>	<b>Rate</b>	<b>Shift</b>	<b>Time off hours</b>
Recruitment	x	x			x	x	x
Training requisition	x	x		x		x	x
Work time management	x	x		x	x	x	x
Absence day management	x	x	x	x	x	x	x
Payroll for staff	x	x	x	x	x	x	x
Changing departments for employees	x	x	x	x		x	x
Employee leave management	x	x	x	x	x	x	x
Salary forecast	x	x	x	x	x	x	x
Forecast of employees about to leave work	x	x	x	x	x	x	x
Forecast of the number of employees to hire.	x	x	x	x	x	x	

## 3.4. Designing Data Warehouse

### 3.4.2. Master Data and Transaction Data

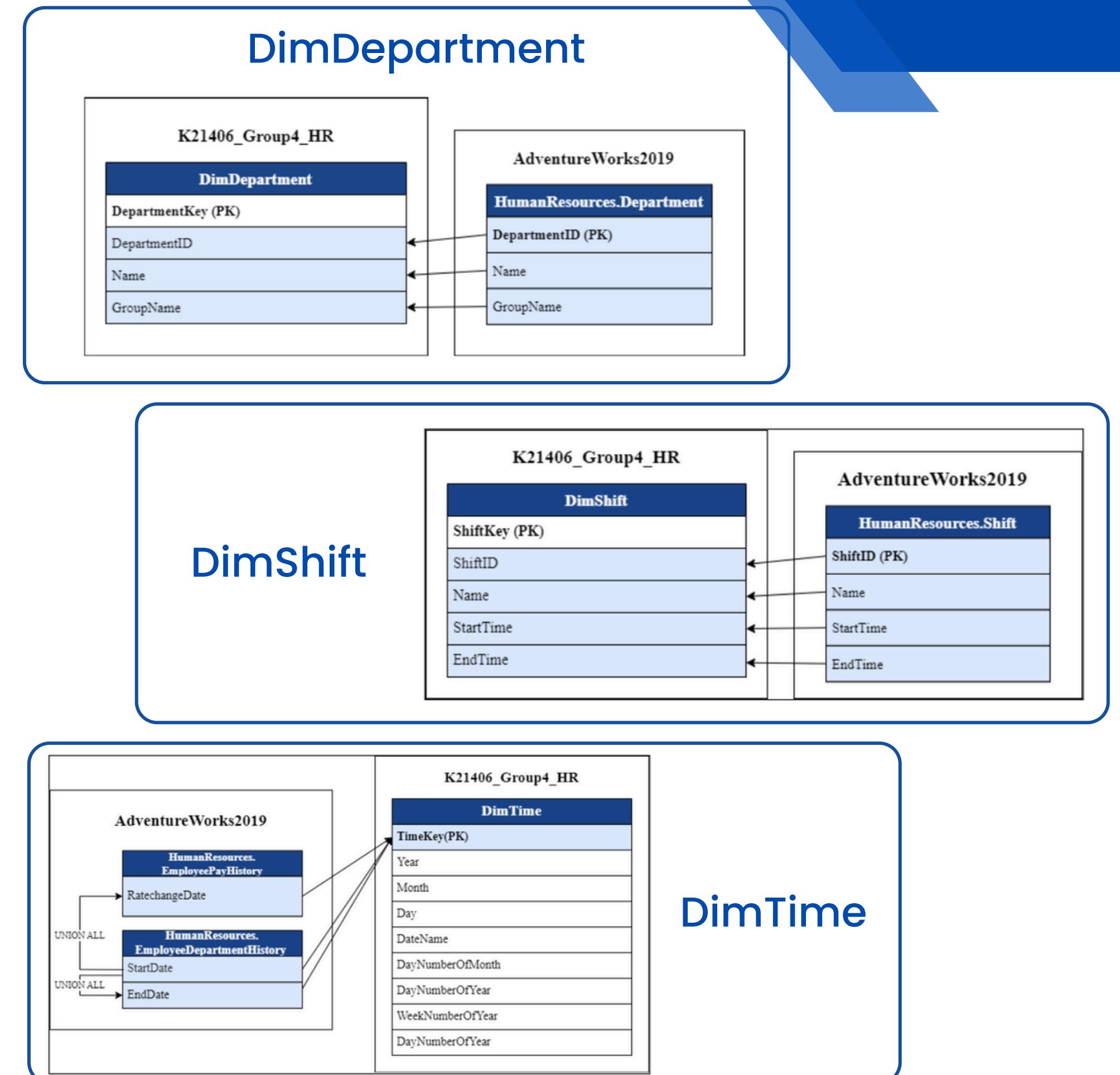
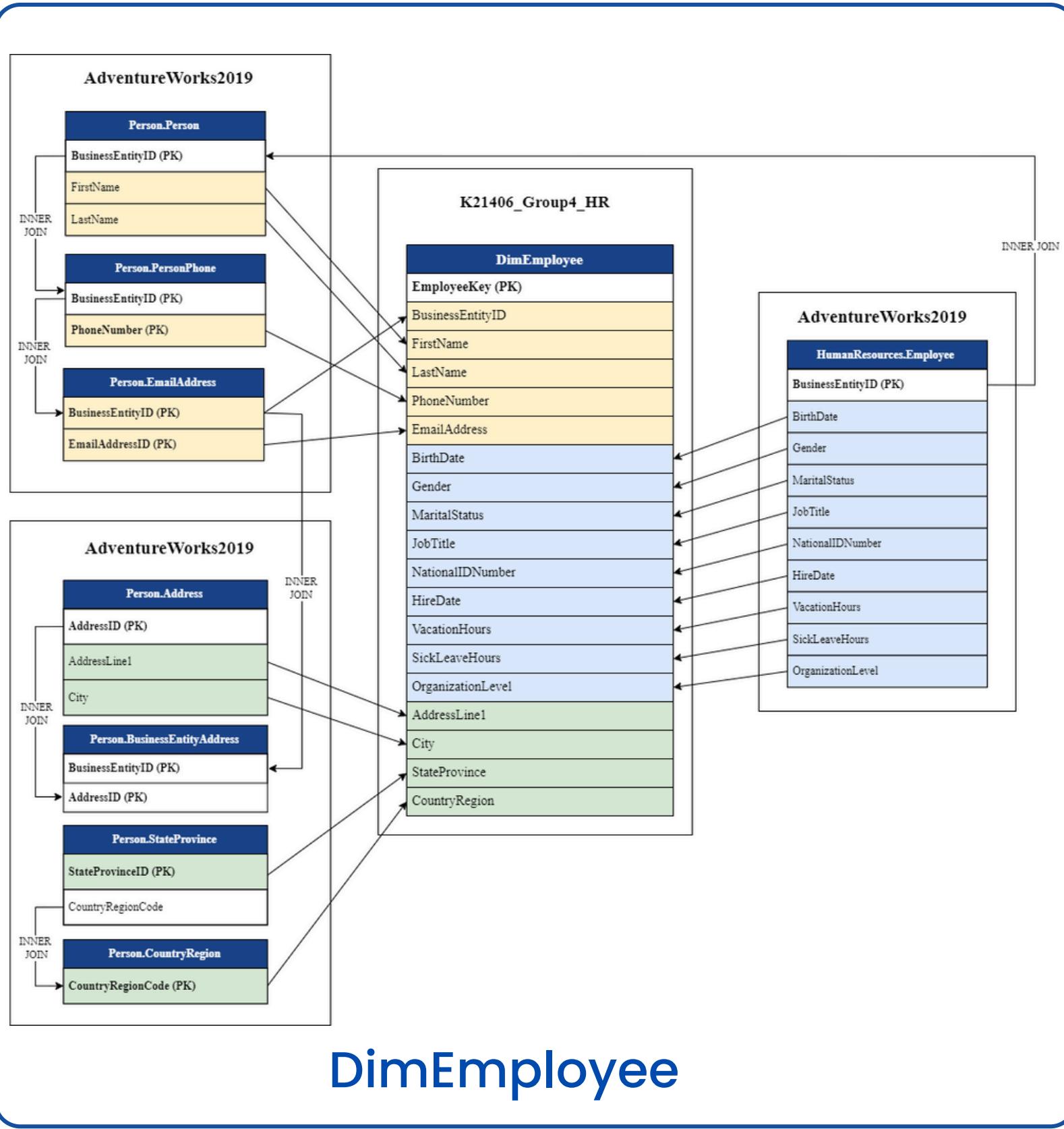
#### Master Data

Object	Description
Employee name	The information of the employee.
Department	The information of the department.
Hire date	Date the employee was hired.
Shift	The information of shift.
Job title	Name of the job in the company.

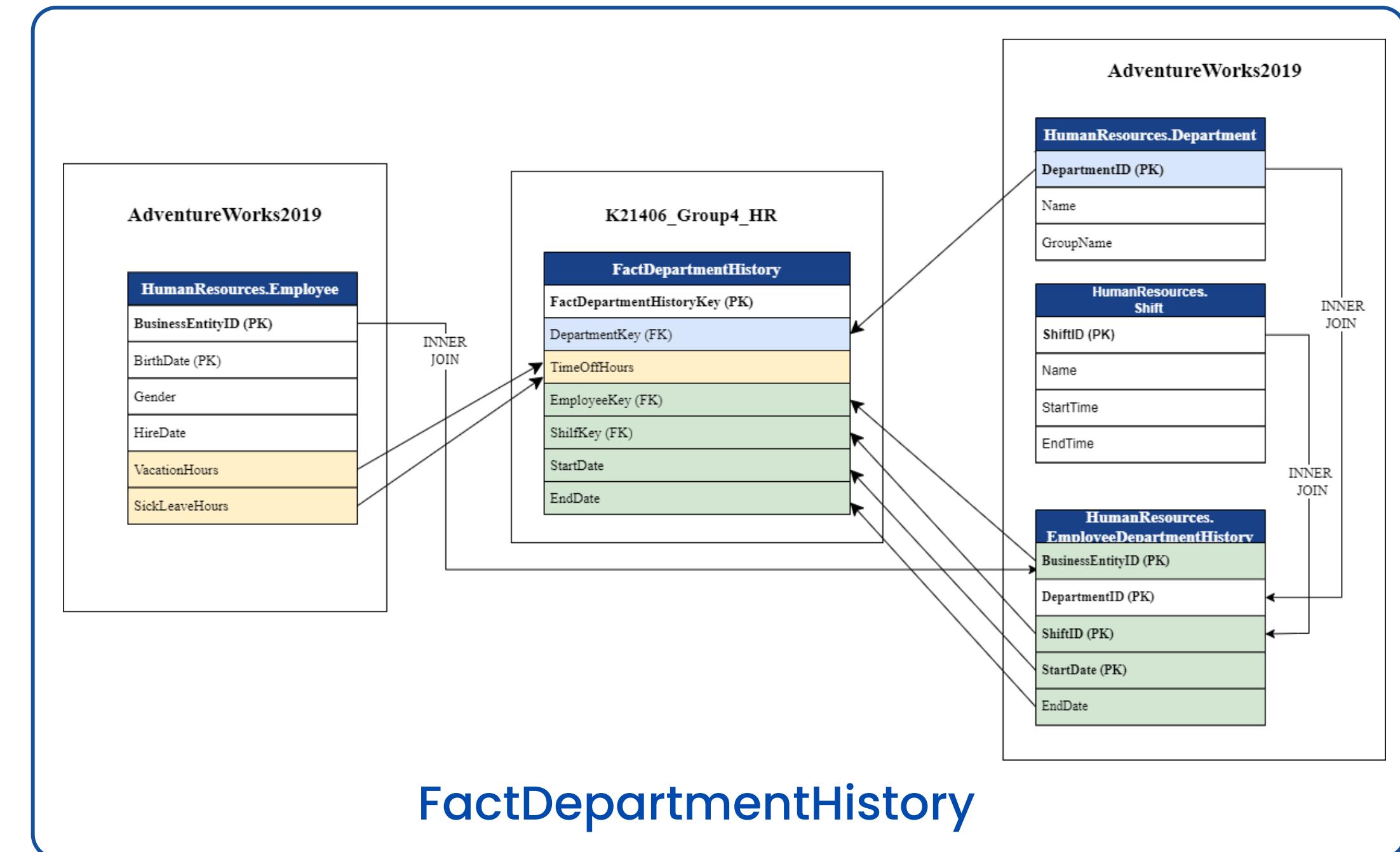
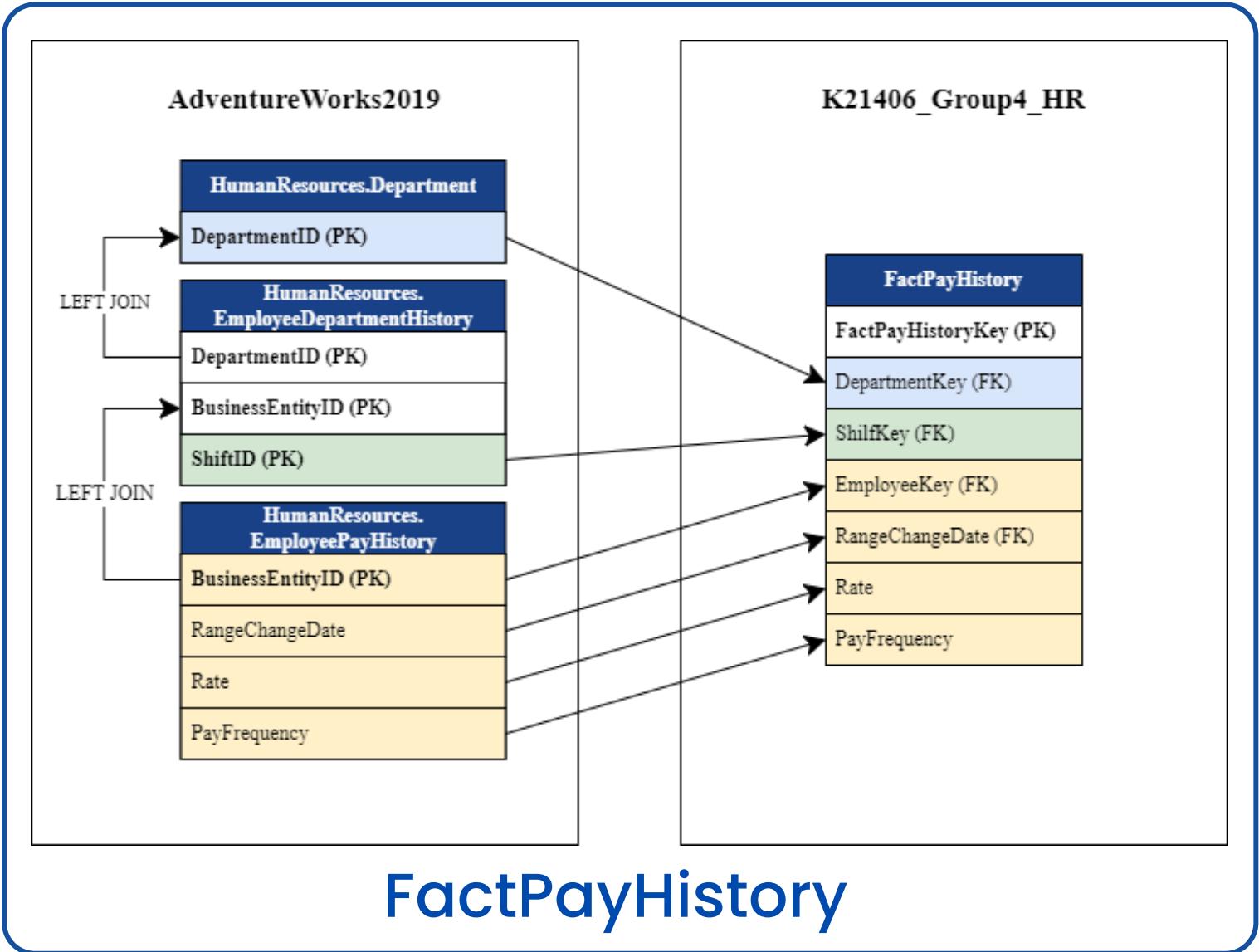
#### Transaction Data

Object	Description
StartDate	Date the employee started work in the department.
EndDate	Date the employee finished work in the department.
Rate	Salary hourly rate.
RateChangeDate	Date the change in pay is effective.
TimeOffHours	Number of break hours per employee.

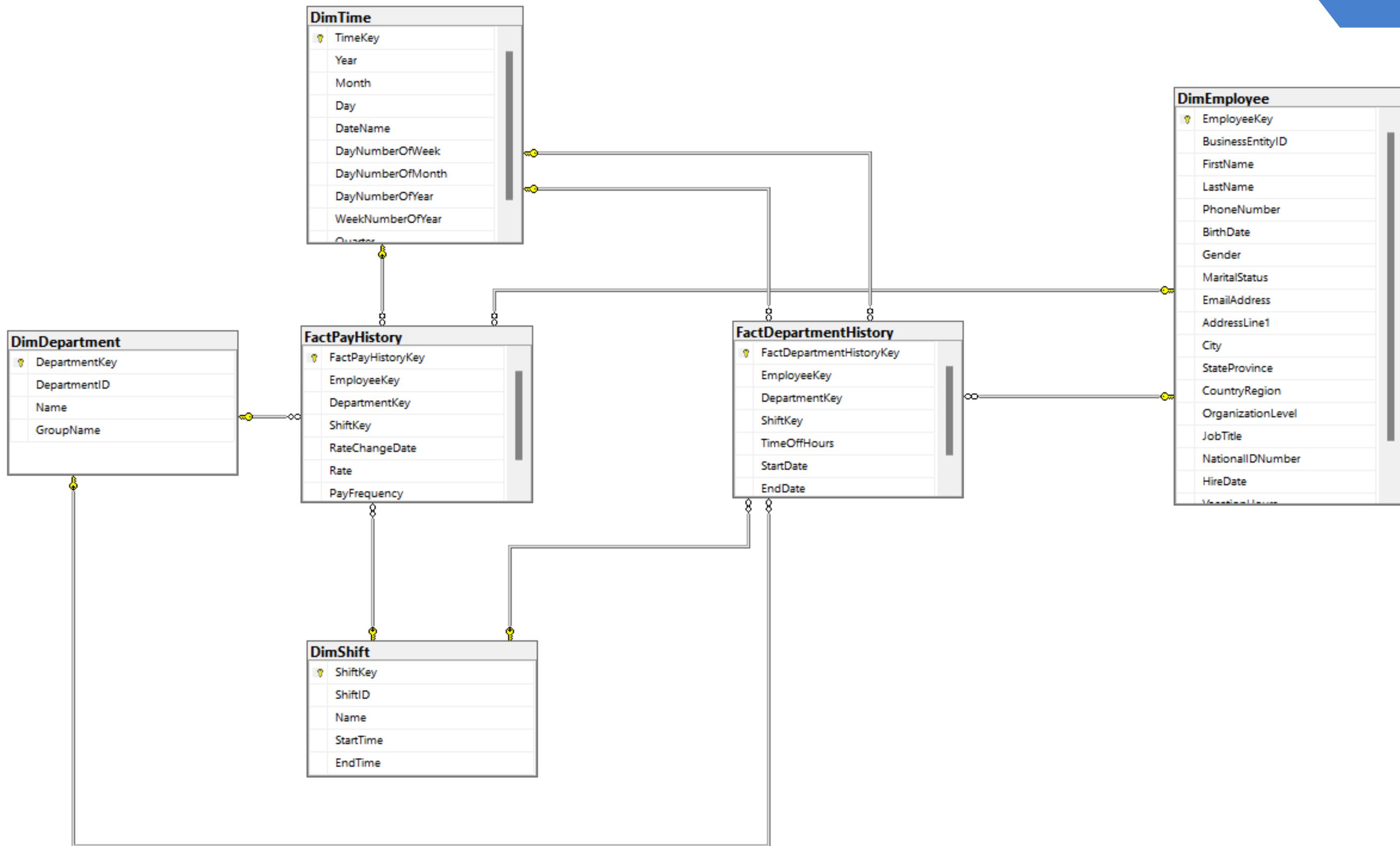
## 3.5. Dimension tables



## 3.6. Fact tables



## 3.7. Data Warehouse model

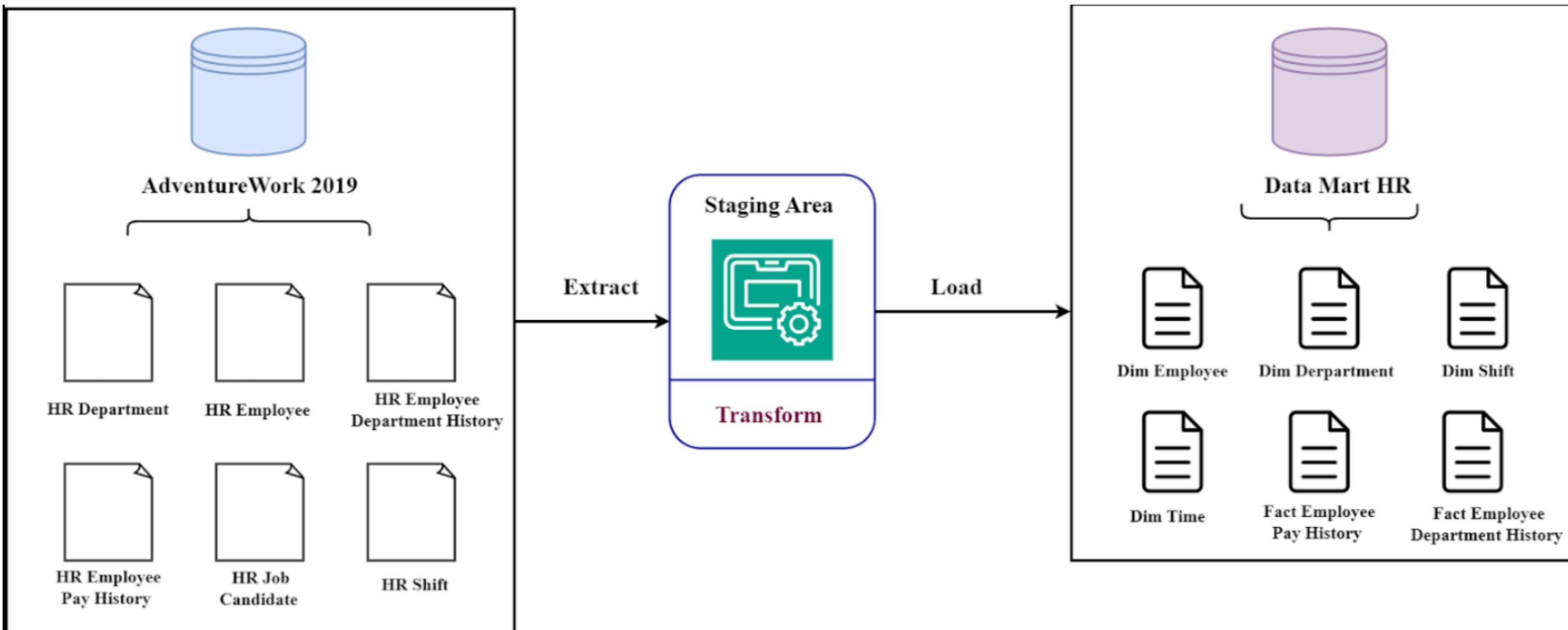


# CHAPTER 4:

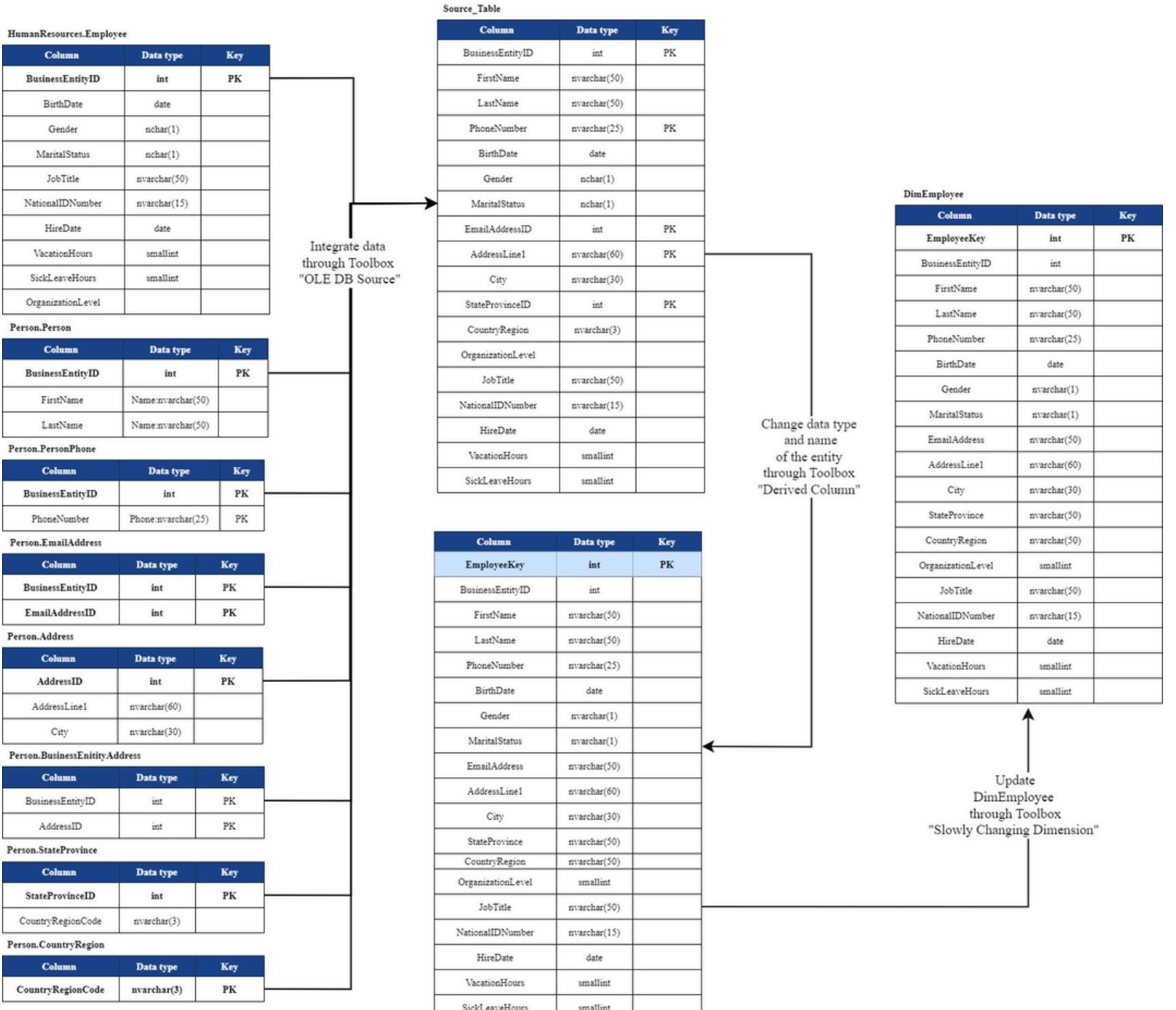
## Data Integration



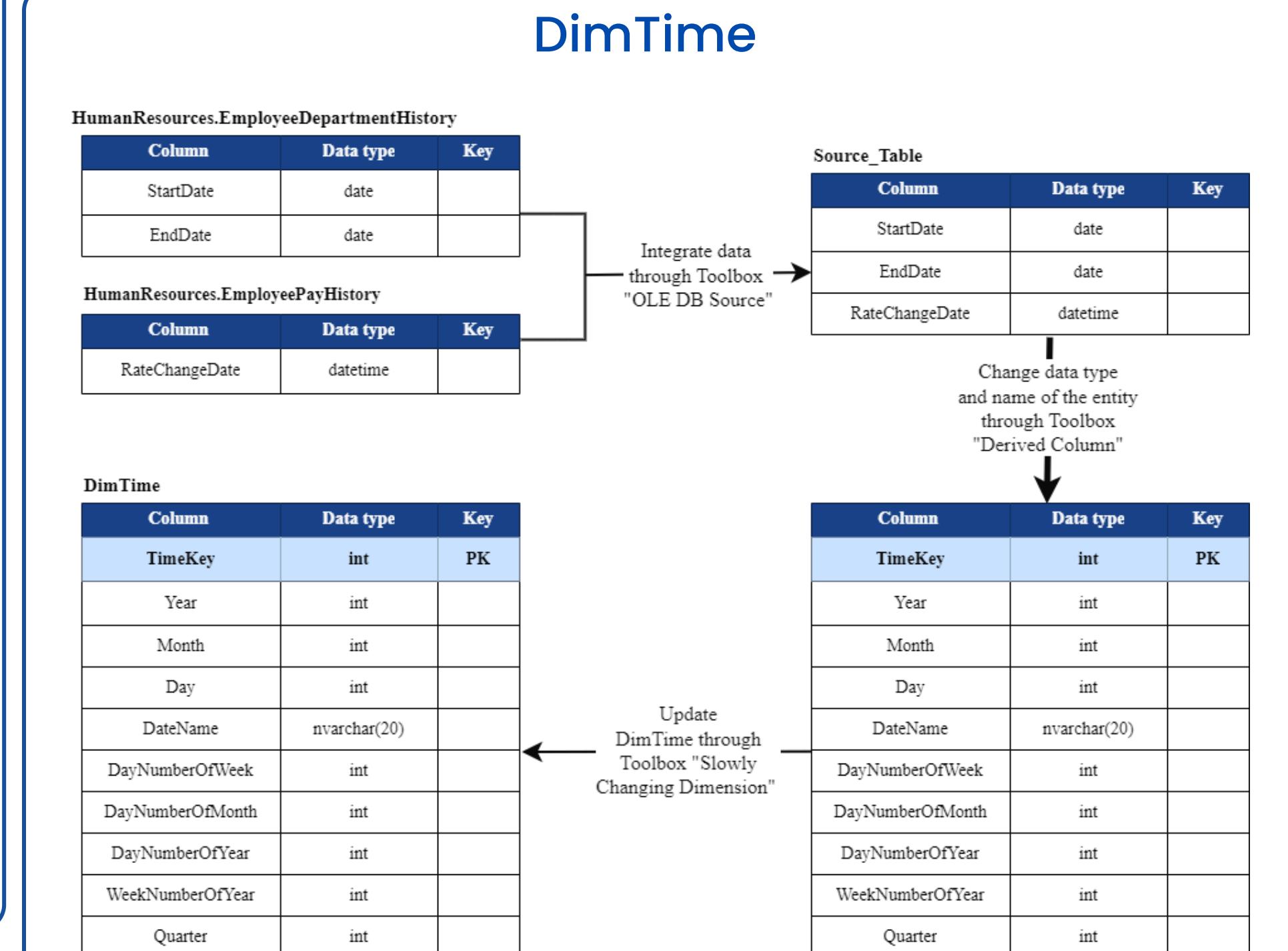
## 4.1. ETL pipeline for data mart Human resources



## 4.2. Dimension Table's ETL Process

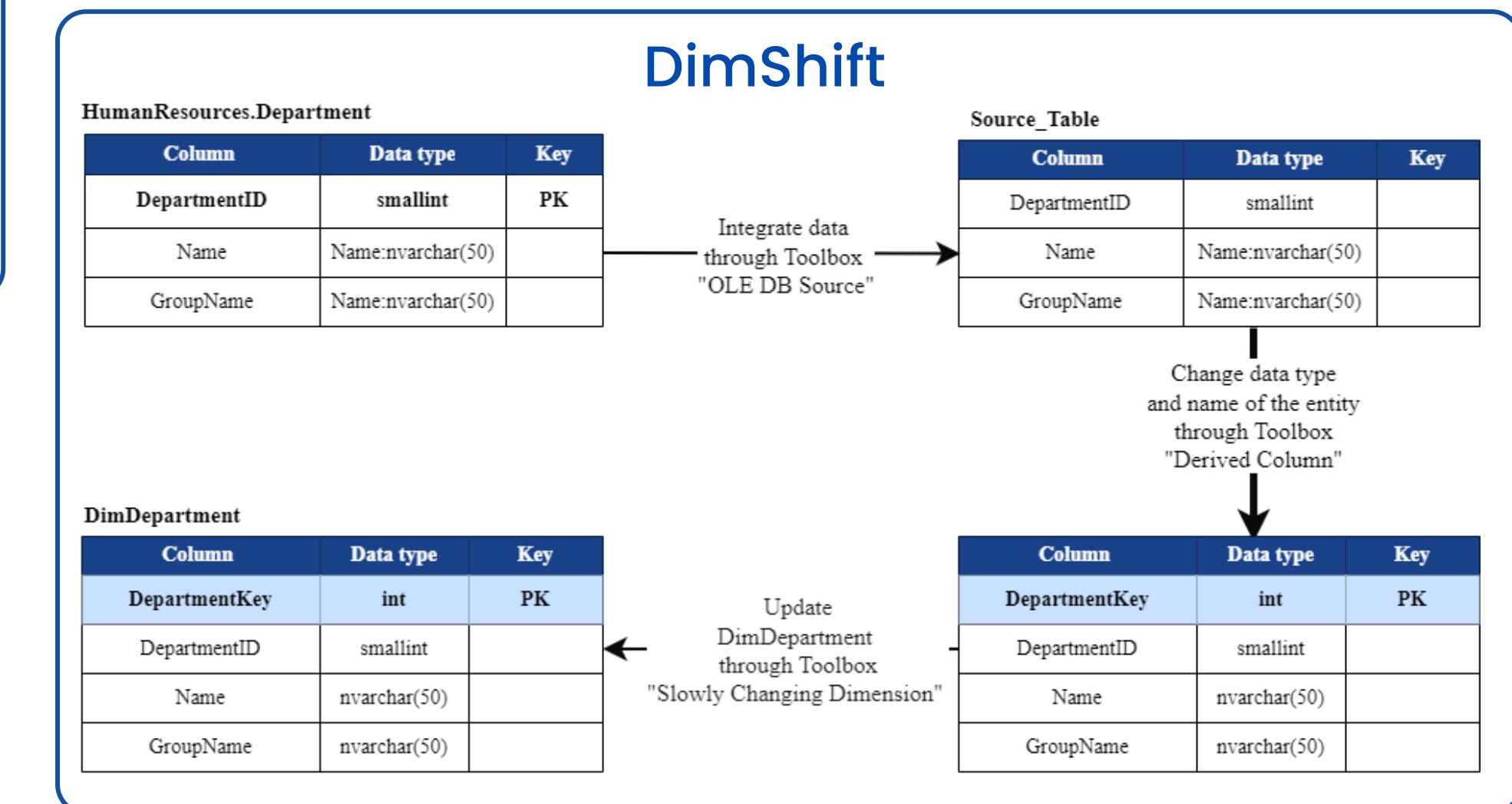
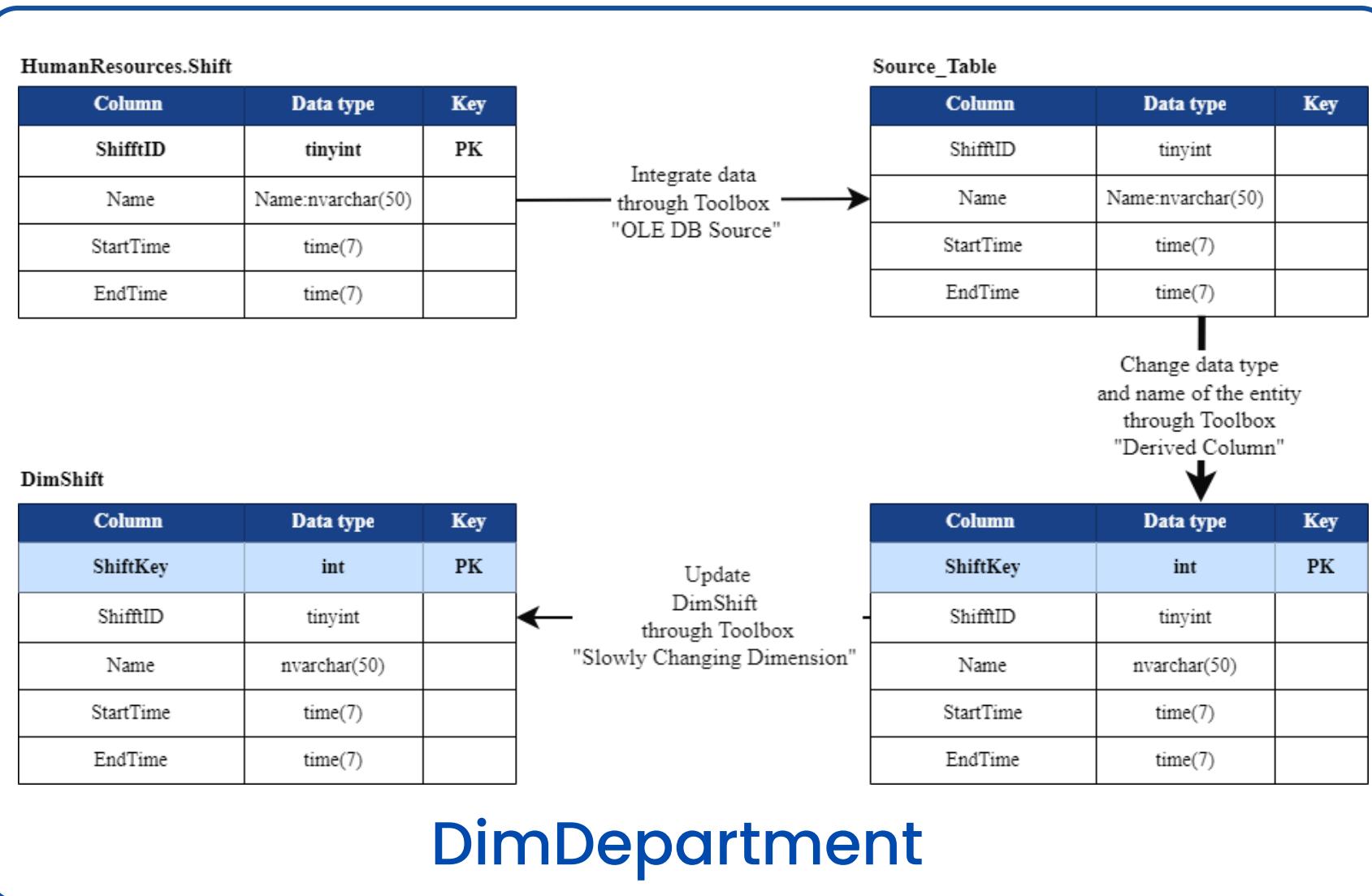


**DimEmployee**



**DimTime**

## 4.2. Dimension Table's ETL Process



## 4.2. Dimension Table's ETL Process

HumanResources.EmployeePayHistory

Column	Data Type	Key
BusinessEntityID	int	PK
RangeChangeDate	datetime	
Rate	money	
PayFrequency	tinyint	

HumanResources.Department

Column	Data Type	Key
DepartmentID	int	PK

HumanResources.EmployeeDepartmentHistory

Column	Data Type	Key
ShiftID	int	PK

FactPayHistory

Column	Data Type	Key
FactPayHistoryKey	int	PK
EmployeeKey	int	FK
DepartmentKey	int	FK
ShiftKey	int	FK
RangeChangeDate	int	FK
Rate	money	
PayFrequency	tinyint	

FactPayHistory

Integrate data through Toolbox "OLE DB Source"

Source\_Table

Column	Data Type	Key
BusinessEntityID	int	FK
DepartmentID	int	FK
ShiftID	int	FK
RangeChangeDate	datetime	FK
Rate	money	
PayFrequency	tinyint	

Change data type and name of the entity through Toolbox "Derived Column"

Column	Data Type	Key
EmployeeKey	int	FK
DepartmentKey	int	FK
ShiftKey	int	FK
RangeChangeDate	int	FK
Rate	money	
PayFrequency	tinyint	

Create FactPayHistoryKey through Toolbox "Script Component" and update FactPayHistory through "Slowly changing dimension"

FactDepartmentHistory

FactDepartmentHistory

HumanResources.EmployeeDepartmentHistory

Column	Data Type	Key
BusinessEntityID	int	PK
DepartmentID	smallint	
ShiftID	tinyint	
StartDate	date	
EndDate	date	

Integrate data through Toolbox "OLE DB Source"

HumanResources.Department

Column	Data Type	Key
DepartmentID	int	PK
Name	nvarchar(50)	
GroupName	nvarchar(50)	

Source\_Table

Column	Data Type	Key
BusinessEntityID	int	FK
DepartmentID	int	FK
ShiftID	int	FK
TimeOffHours	smallint	FK
StartDate	date	
EndDate	date	

Change data type and name of the entity through Toolbox "Derived Column"

HumanResources.Employee

Column	Data Type	Key
BusinessEntityID	int	PK
BirthDate	date	
ShiftID	int	
Gender	nchar(1)	
HireDate	date	
VacationHours	smallint	
SickLeaveHours	smallint	

Create FactDepartmentHistoryKey through Toolbox "Script Component" and update FactDepartmentHistory through "Slowly changing dimension"

FactDepartmentHistory

Column	Data Type	Key
FactDepartmentHistoryKey	int	PK
DepartmentKey	int	FK
ShiftKey	int	FK
TimeOffHours	smallint	FK
EmployeeKey	int	FK
StartDate	date	
EndDate	date	

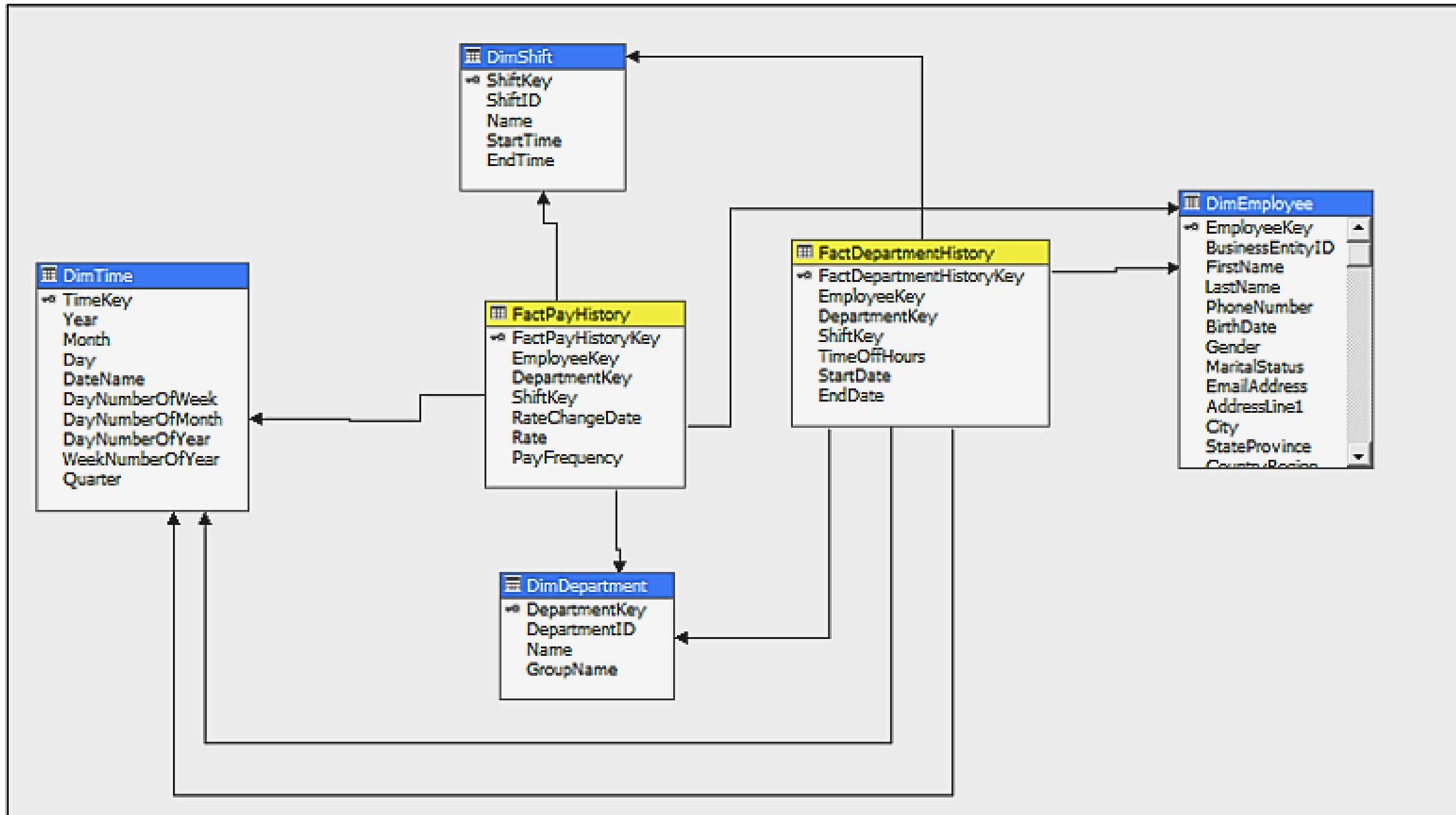
Column	Data Type	Key
EmployeeKey	int	FK
DepartmentKey	int	FK
ShiftKey	int	FK
TimeOffHours	smallint	FK
StartDate	date	
EndDate	date	



# **CHAPTER 5:** **Multi-dimensional** **data analysis**

## 5.2. Data analytics with SSAS technology

CUBE MODEL



## 5.3. Report on the situation

### 5.3.1. Situation of personnel in the department

#### Situation of personnel in the department from 2006 to 2009

Dimension	Hierarchy	Operator	Filter Expression	Parameters
Start Date	# Start Date.Year	Equal	{ All, 2006, 2007, 2008, 2009 }	
<Select dimension>				
Year	Group Name	Name	Fact Department History Count	
2008	Executive General and Administration	Facilities and Maintenance	1	
2008	Executive General and Administration	Finance	2	
2008	Executive General and Administration	Human Resources	3	
2008	Executive General and Administration	Information Services	3	
2008	Inventory Management	Shipping and Receiving	3	
2008	Manufacturing	Production	52	
2008	Manufacturing	Production Control	2	
2008	Quality Assurance	Document Control	1	
2008	Quality Assurance	Quality Assurance	2	
2008	Research and Development	Engineering	3	
2008	Research and Development	Research and Development	1	
2008	Sales and Marketing	Marketing	1	
2009	Executive General and Administration	Executive	1	
2009	Executive General and Administration	Facilities and Maintenance	2	
2009	Executive General and Administration	Finance	9	
2009	Executive General and Administration	Human Resources	3	
2009	Executive General and Administration	Information Services	7	
2009	Inventory Management	Purchasing	3	
2009	Inventory Management	Shipping and Receiving	3	
2009	Manufacturing	Production	104	
2009	Manufacturing	Production Control	3	
2009	Quality Assurance	Document Control	4	
2009	Quality Assurance	Quality Assurance	3	
2009	Research and Development	Research and Development	3	
2009	Sales and Marketing	Marketing	4	

#### Situation of personnel in the department from 2010 to 2013

Dimension	Hierarchy	Operator	Filter Expression
Start Date	# Start Date.Year	Equal	{ 2010, 2011, 2012, 2013 }
<Select dimension>			
Year	Group Name	Name	Fact Department History Count
2010	Executive General and Administration	Facilities and Maintenance	4
2010	Inventory Management	Purchasing	8
2010	Manufacturing	Production	22
2010	Quality Assurance	Quality Assurance	1
2010	Research and Development	Engineering	1
2010	Research and Development	Tool Design	3
2011	Manufacturing	Production Control	1
2011	Quality Assurance	Quality Assurance	1
2011	Research and Development	Engineering	1
2011	Sales and Marketing	Marketing	4
2011	Sales and Marketing	Sales	11
2012	Inventory Management	Purchasing	1
2012	Sales and Marketing	Sales	4
2013	Executive General and Administration	Executive	1
2013	Sales and Marketing	Sales	3

## 5.3. Report on the situation

### 5.3.2. Situation of time off hours in each department

The status of employee absenteeism in each department during the period spanning from 2006 to 2009.

Dimension	Hierarchy	Operator	Filter Expression
Start Date	Start Date.Year	Equal	{ 2006, 2007, 2008, 2009 }
<b>Year</b>			
2006	Manufacturing	51	
2007	Inventory Management	80	
2007	Manufacturing	143	
2007	Research and Development	184	
2007	Sales and Marketing	83	
2008	Executive General and Administration	1028	
2008	Inventory Management	494	
2008	Manufacturing	5413	
2008	Quality Assurance	418	
2008	Research and Development	190	
2008	Sales and Marketing	87	
2009	Executive General and Administration	2529	
2009	Inventory Management	806	
2009	Manufacturing	9527	
2009	Quality Assurance	972	
2009	Research and Development	305	
2009	Sales and Marketing	345	

The status of employee absenteeism in each department during the period spanning from 2010 to 2013

Dimension	Hierarchy	Operator	Filter Expression
Start Date	Start Date.Year	Equal	{ 2010, 2011, 2012, 2013 }
<b>Year</b>			
2010	Executive General and Administration	616	
2010	Inventory Management	803	
2010	Manufacturing	2110	
2010	Quality Assurance	147	
2010	Research and Development	214	
2011	Manufacturing	87	
2011	Quality Assurance	93	
2011	Research and Development	26	
2011	Sales and Marketing	983	
2012	Inventory Management	93	
2012	Sales and Marketing	275	
2013	Executive General and Administration	20	
2013	Sales and Marketing	196	

## 5.3. Report on the situation

### 5.3.3. List of Job Transfers Between Departments

#### List of Job Transfers Between Departments

Dimension	Hierarchy	Operator	Filter Expression		
End Date	End Date.Year	Equal	{ 2013, 2012, 2011, 2006, 2007, 2008, 2009, 2010 }		
<Select dimension>					
Year	Month	Group Name	Job Title	Fact Department History Count	Time Off Hours
2009	7	Inventory Management	Marketing Manager	1	80
2010	5	Research and Development	Senior Tool Designer	1	128
2011	7	Sales and Marketing	Purchasing Manager	1	93
2011	8	Manufacturing	Scheduling Assistant	1	87
2012	7	Quality Assurance	Purchasing Manager	1	93
2013	11	Executive General and Administration	Chief Financial Officer	1	20

## 5.4. Building the KPIs system

### 5.4.1. KPI 1: Pay rate management

`[Measures].[Rate] / [Measures].[Fact Pay History Count]`

Calculation of Average Pay Rate

```
AVG(
    [Dim Time].[Year].Members,
    [Measures].[Rate] / [Measures].[Fact Pay History Count]
)
```

Calculation of KPI Average Pay Rate

CASE

WHEN `[Measures].[AvgPayRate] / [Measures].[GoalPayRate] >= 1` THEN 1

WHEN `[Measures].[AvgPayRate] / [Measures].[GoalPayRate] >= 0.9` AND

`[Measures].[AvgPayRate] / [Measures].[GoalPayRate] < 1` THEN 0

ELSE -1

END

Status of KPI Average Pay Rate

KPI Average Pay Rate

Dimension	Hierarchy	Operator	Filter Expression
Start Date	# Start Date.Year	Equal	{ All, 2006, 2007, 2008, 2009, 2010, 2011, 20...
<Select dimension>			
Name	KPI Pay Rate Value	KPI Pay Rate Goal	KPI Pay Rate Status
Document Control	14.38846	14.99807	0
Engineering	35.6407571428571	34.6568114285714	1
Executive	125.5	125.5	1
Facilities and Maintenance	13.0316	14.9021375	-1
Finance	25.3100818181818	26.8201420875421	0
Human Resources	18.0248166666667	18.0248166666667	1
Information Services	34.15863	34.6577163492063	0
Marketing	17.1463636363636	18.8895522727273	0
Production	13.5285948979592	13.6600991389897	0
Production Control	18.6794833333333	18.6794833333333	1
Purchasing	17.8269	19.246375	0
Quality Assurance	15.64355	15.0345733333333	1
Research and Development	43.6731	43.0491666666667	1
Sales	29.9719444444444	30.1332499368687	0
Shipping and Receiving	10.8718	10.8718	1
Tool Design	26.48248	26.79602	0

Result of KPI Average Pay Rate

## 5.4. Building the KPIs system

### **5.4.1. KPI 2: Time off hours management**

$[Measures].[Time Off Hours] / ([Measures].[Employee Key] * 8 * (365 - 2 * 412) - [Measures].[Time Off Hours])$

## Calculation of Rate Time Off Hours

```
WITH MEMBER [Measures].[Average TimeOffHours] AS  
    AVG([Measures].[RateTimeOffHrs])*100  
SELECT  
    {[Measures].[Average TimeOffHours]} ON COLUMNS  
FROM [HRModule]
```

136 %

 Messages  Results

Average TimeOffHours  
4.75324038794015

## Calculation of KPI Rate Time Off Hour

KPI

Name:

## KPITimeOffHours

## Associate

<All>

### Value Expression

## Measur

## SQL Expression

[measures], [

 No issues found

## KPI Rate Time Off Hours

▲ Status

Status indicator:  Faces

Status expression:

```
IIF([Measures].[RateTimeOffHrs] <= [Measures].[GoalRateTimeOffHrs], 1, 0)
```

No issues found

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## Status of KPI Rate Time Off Hours

Dimension	Hierarchy	Operator	Filter Expression
Start Date	Start Date.Year	Equal	{ All }
<Select dimension>			
Name	KPITimeOffHours Value	KPITimeOffHours Goal	KPITimeOffHours Status
Document Control	0.0670368901229671	0.0475324038794015	0
Engineering	0.0188015690518058	0.0475324038794015	1
Executive	0.0456754130223518	0.0475324038794015	1
Facilities and Maintenance	0.0766921592452291	0.0475324038794015	0
Finance	0.0491977661554827	0.0475324038794015	0
Human Resources	0.0472019464720195	0.0475324038794015	1
Information Services	0.0611439842209073	0.0475324038794015	0
Marketing	0.0418784797869765	0.0475324038794015	1
Production	0.0453452505282588	0.0475324038794015	1
Production Control	0.0426356589147287	0.0475324038794015	1

## Result of KPI Average Pay Rate

## 5.4. Building the KPIs system

### 5.4.3. KPI 3: New hire employees management

[Measure].[Fact Department History Count]

KPI value Number of New Hire Employee

Goal Expression

```
[Executive] THEN 4
WHEN [Dim Department].[Name] is [Dim Department].[Name].&
[Facilities and Maintenance] THEN 9
WHEN [Dim Department].[Name] is [Dim Department].[Name].&[Finance]
THEN 3
WHEN [Dim Department].[Name] is [Dim Department].[Name].&[Human
Resources] THEN 6
WHEN [Dim Department].[Name] is [Dim Department].[Name].&
[Information Services] THEN 10
WHEN [Dim Department].[Name] is [Dim Department].[Name].&
[Marketing] THEN 12
WHEN [Dim Department].[Name] is [Dim Department].[Name].&
[Production] THEN 100
WHEN [Dim Department].[Name] is [Dim Department].[Name].&
[Production Control] THEN 9
WHEN [Dim Department].[Name] is [Dim Department].[Name].&
[Purchasing] THEN 12
WHEN [Dim Department].[Name] is [Dim Department].[Name].&[Quality
Assurance] THEN 12
```

No issues found

KPI Goal Number of New Hire Employee

Status

Status indicator: Faces

Status expression:

```
case when
KPIVALUE ("KPINewEmployee") / KPIGOAL( "KPINewEmployee" ) >0.9 then 1
when
KPIVALUE ("KPINewEmployee") / KPIGOAL ( "KPINewEmployee" ) <=0.9 and
KPIVALUE ("KPINewEmployee") / KPIGOAL( "KPINewEmployee" ) >0.7 then 0
else -1
end
```

No issues found

KPI status Number of New Hire Employee

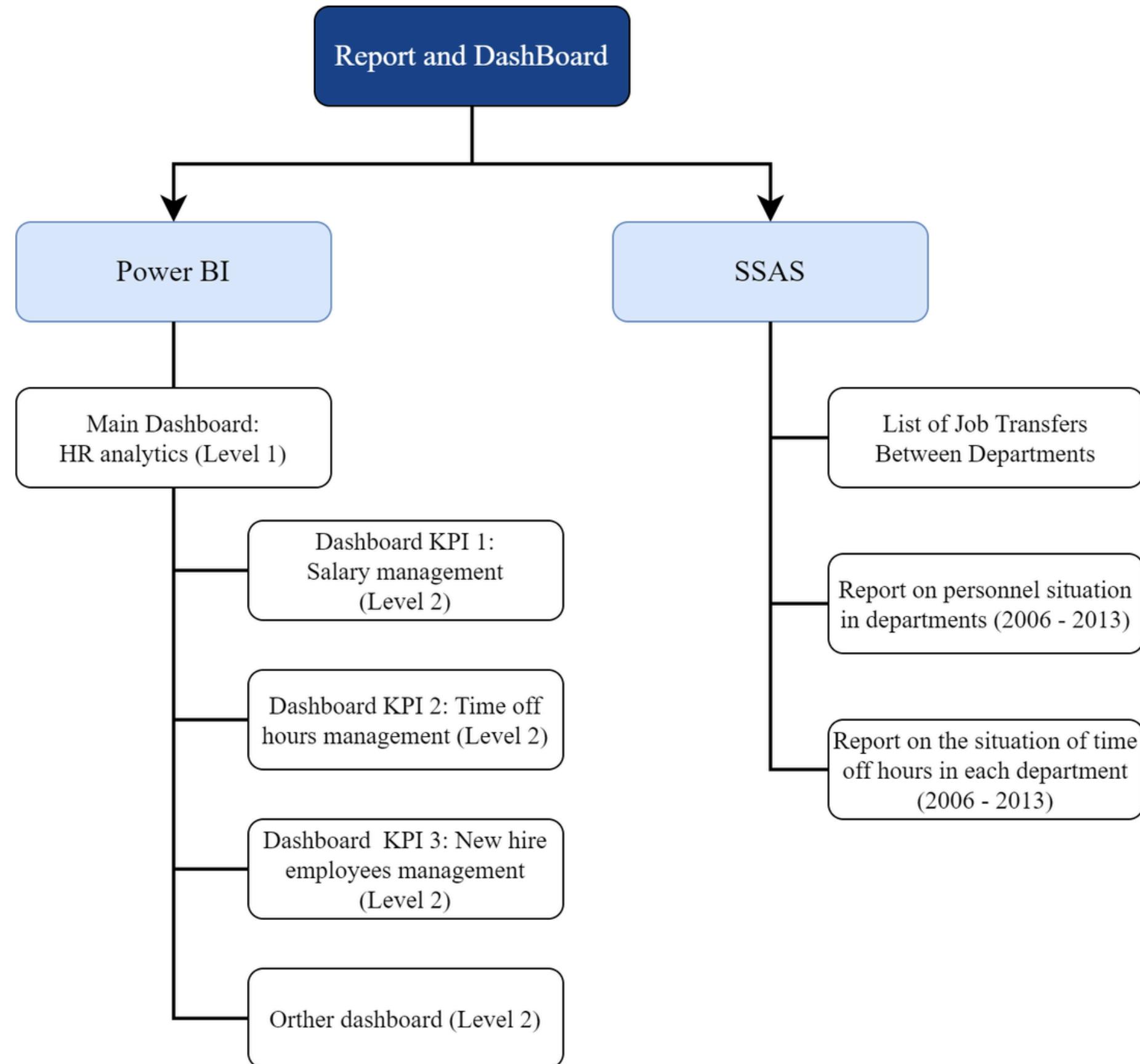
Dimension	Hierarchy	Operator	Filter Expression	Param...
Start Date	# Start Date.Year	Equal	{ All }	
<Select dimension>				
Name	KPINewEmployee Val...	KPINewEmployee Goal	KPINewEmployee...	KPINewEmployee Tre...
Document Control	5	4	1	0
Engineering	7	8	0	0
Executive	2	4	-1	0
Facilities and Mainten...	7	9	0	0
Finance	11	3	1	0
Human Resources	6	6	1	0
Information Services	10	10	1	0
Marketing	10	12	0	0
Production	180	100	1	0
Production Control	6	9	-1	0
Purchasing	13	12	1	0
Quality Assurance	7	12	-1	0

Result KPI Number of New Hire Employee

# CHAPTER 6: Visualization and Discussion

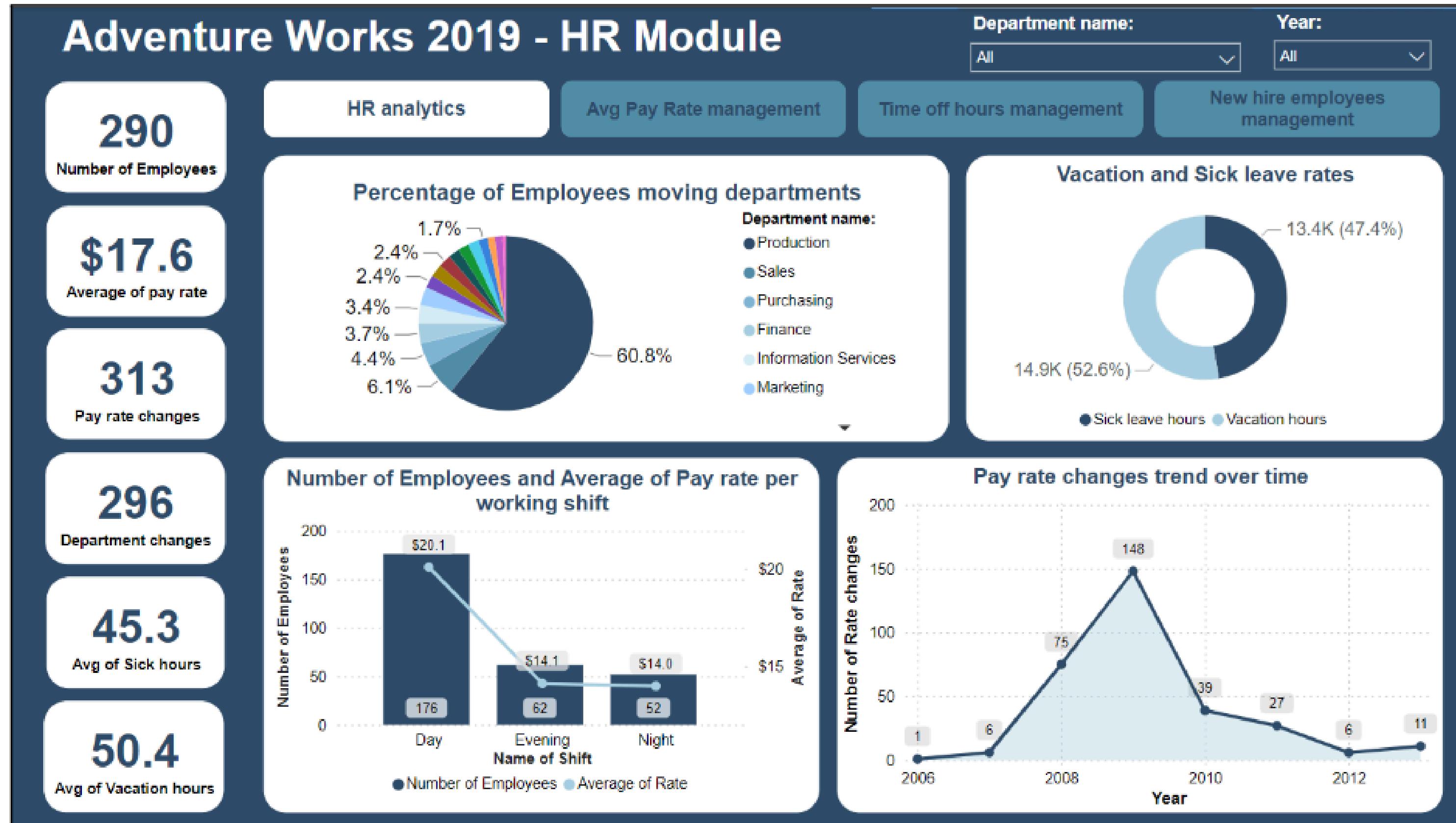


## 6.1. Structure of the Report and dashboard



## 6.2. Dashboard

### 6.2.1. HR Analytics Dashboard



## 6.2. Dashboard

### 6.2.1. HR Analytics Dashboard

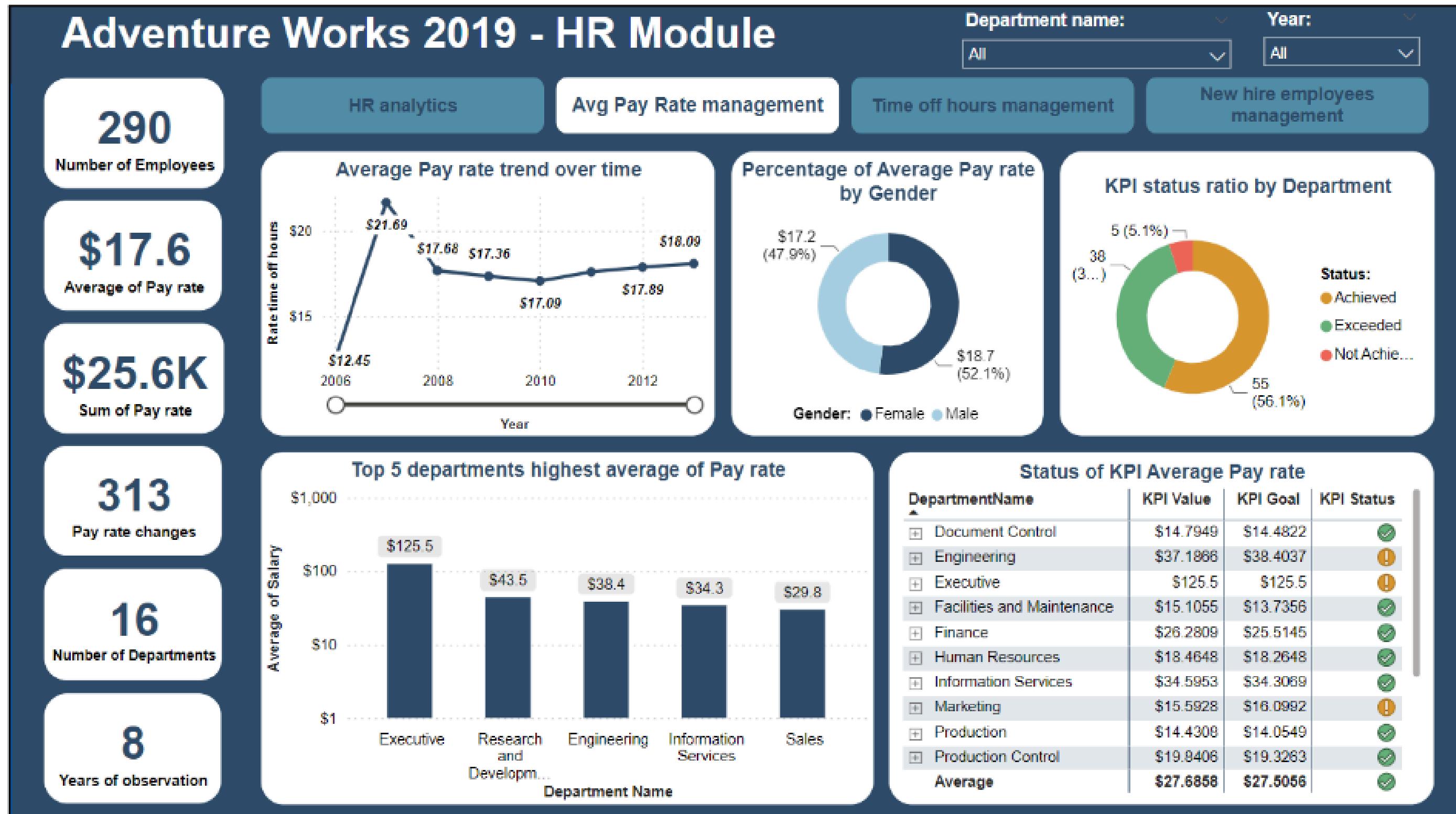
#### Question 4

What are the most important KPIs for measuring HR performance and effectiveness and how do they align with organizational goals and objectives?

- The most important KPIs: **payroll ratio, employee absence patterns, and new hiring trends.**
- The focus should be on ensuring that KPIs are closely related to **strategic decision-making goals** and improving organizational performance.
- A deeper analysis of the **limitations and challenges** in KPI implementation will help **optimize organizational assessment** and adaptation in a changing business environment.

## 6.2. Dashboard

### 6.2.2. Average rate management Dashboard



- **Insights:** Salary patterns, departments, time periods.
- **Benefits:** Fair compensation, morale boost, operational efficiency.

## 6.2. Dashboard

### 6.2.2. Average rate management Dashboard

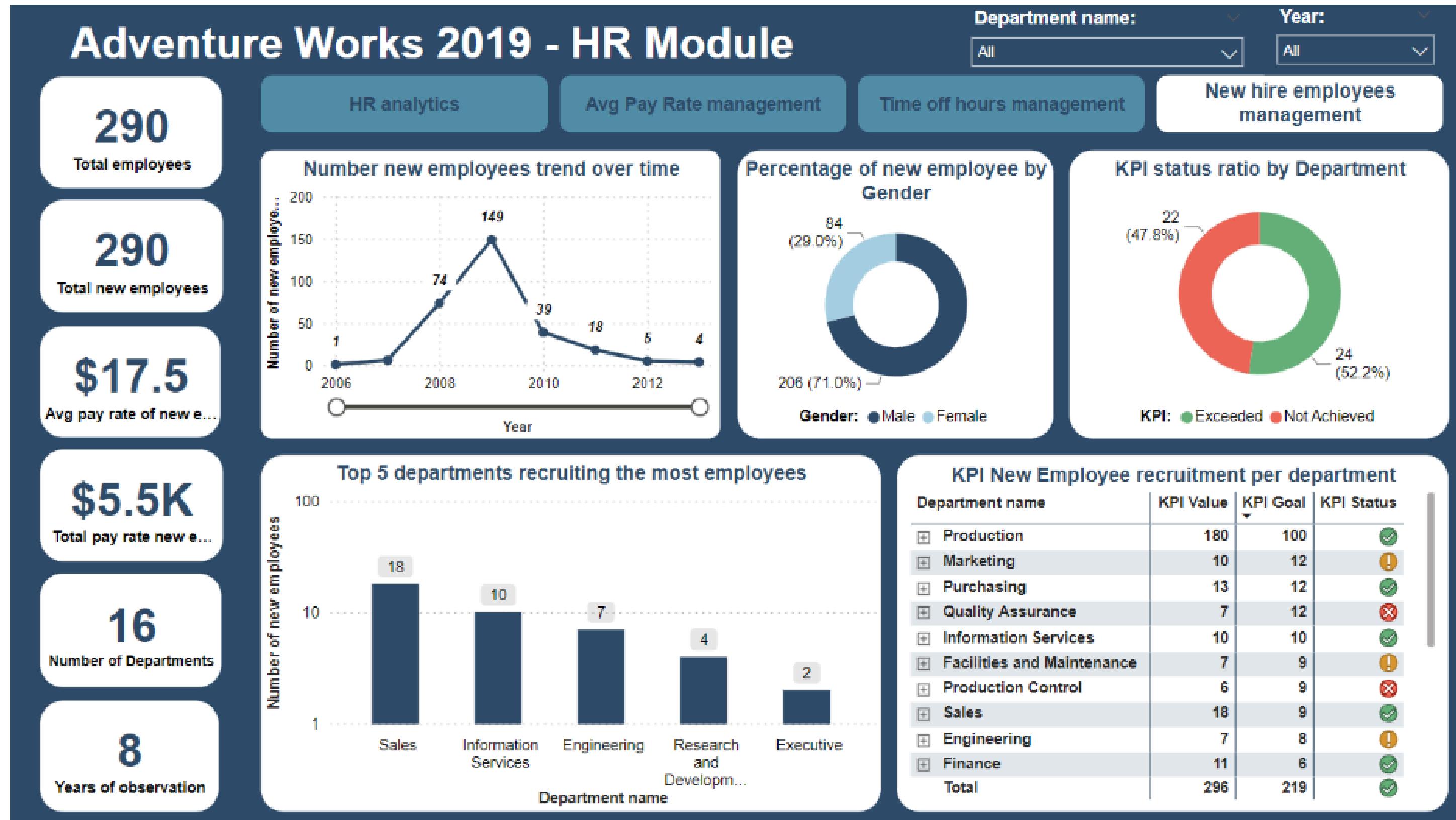
#### Question 1

What is the average salary across different departments? Are there any gender pay gaps within the company?

- Data from the Adventure Works Cycles salary table from 2006 to 2013 shows that Operations (\$125.5), Research (\$43.5), Engineering (\$38.4), Information Services (\$34.3) and Sales (\$29.8) has the **highest salary payout ratio**.
- Female employees are paid more on average than male employees ( $\$18.7 > \$17.2$ ), suggesting **a gender gap in pay**.
- Emphasize the importance of considering factors such as **gender and marital status** to ensure equality in the work environment.

## 6.2. Dashboard

### 6.2.3. New hire employees management Dashboard



## 6.2. Dashboard

### 6.2.3. New hire employees management Dashboard

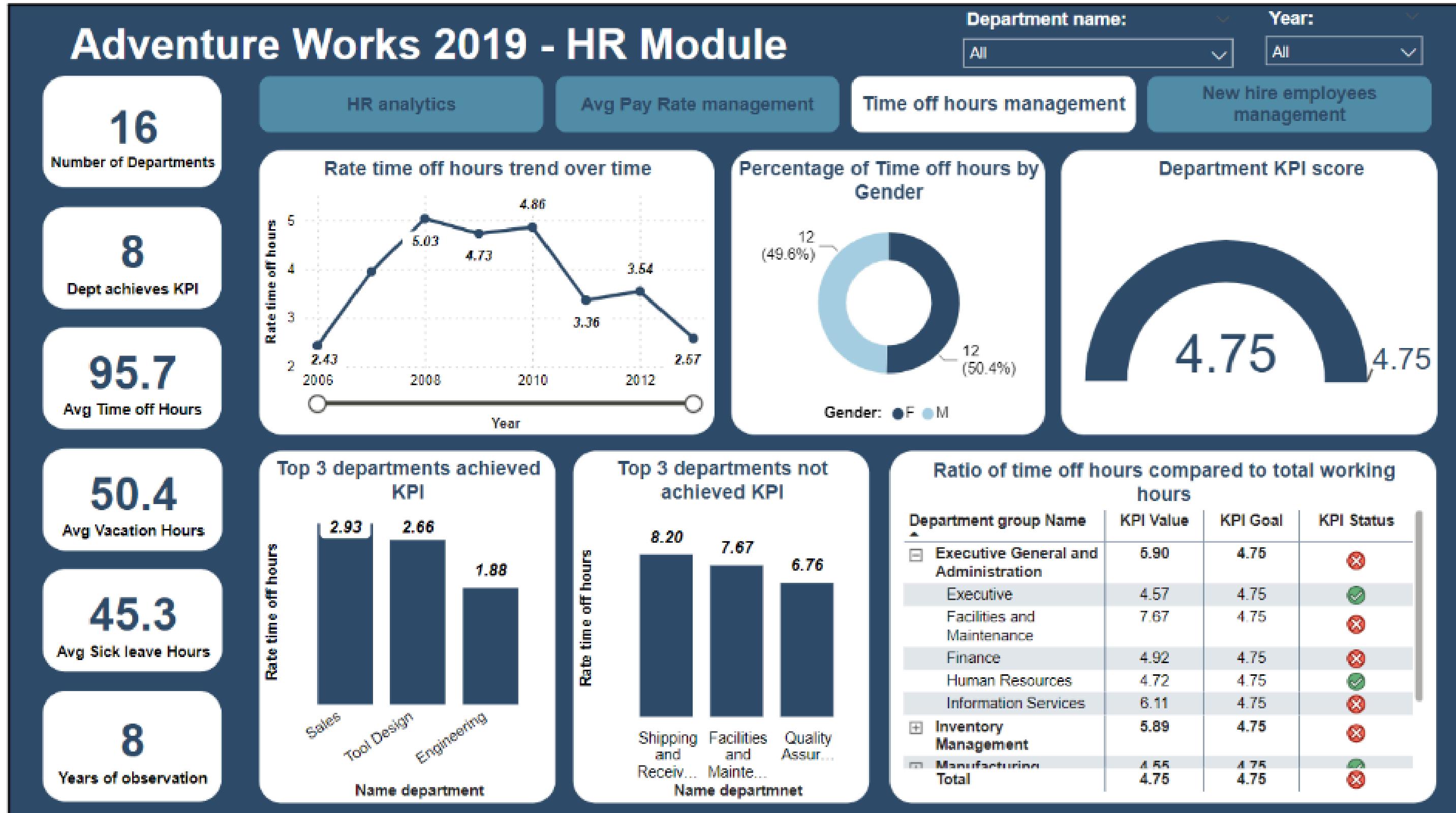
#### Question 2

How does the workforce demand vary across different departments? Are there any departments that are overstaffed or understaffed based on their current and projected workforce demand?

- From 2006 to 2013, Manufacturing accounted for the **largest** number of employees (104 employees in 2009); Operations with a total of 35 employees, the Sales (28 employees),...
- 6 departments with a **turnover rate** of 1 employee per year (Inventory Management, Research, Sales, Production, Quality)'
- Based on the available KPI values, all departments tend to **lack personnel** and it is forecast that this number will **increase even higher** in each department due to workload and customer needs.

## 6.2. Dashboard

### 6.2.4. Time off hours management Dashboard



- Insights:**  
Absenteeism patterns, root causes.
- Benefits:**  
Healthier work environment, operational efficiency.

## 6.2. Dashboard

### 6.2.4. Time off hours management Dashboard

#### Question 3

How does the time-off usage vary across different departments? Are there any correlations between time-off usage and employee satisfaction or productivity?

- There is a significant difference in the number of hours off between departments, Transportation Department has the **highest rate** of time off at 8.2%, while Engineering Department only has a rate of 1.8%, this difference is **4.5 times**.
- Conduct employee satisfaction surveys or conduct interviews to gain a deeper understanding of how vacation use impacts employee satisfaction.



# CHAPTER 7: Conclusion and Future Works

## 7.1 Result



Effectively apply theories & practices to analyze data, focusing on Workflow to demonstrate the effectiveness of BI solutions.



Meticulously analyze AdventureWorks sample data, build a Data Warehouse and determine KPIs to measure business performance.



By integrating BI solutions evaluated workforce productivity and generated analytical reports to make management decisions.

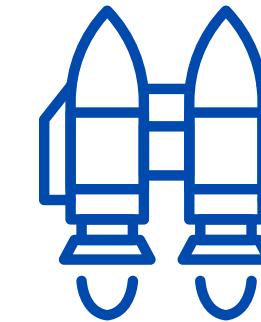
## 7.2 Limitations & Future Work

### Limitations



- Face challenges such as defining dimensions and fact tables, aligning data to criteria, and learning data analysis tools.

### Future Work



- Integrate additional modules like Sales for comprehensive insights.
- Expand tool usage (Python, Tableau, VPA, Excel) for stronger research foundations.
- Develop a recruitment database for streamlined hiring processes.

**Thank  
You**