📊 HR Attrition Analysis Using SQL (SSMS)

📌 Problem Statement

Employee attrition significantly affects organizational stability, productivity, and operational costs. High turnover leads to increased recruitment expenses, loss of institutional knowledge, and reduced team performance.

The organization needs data-driven insights to:

- Determine the overall attrition rate
- Identify demographic segments with high turnover
- Analyze attrition trends by gender and age group
- Evaluate department and job role impact
- Support strategic HR retention decisions

Without structured analysis, management cannot identify patterns or implement effective retention strategies.

🎯 Aim of the Project

The aim of this project is to analyze HR employee data using Microsoft SQL Server (SSMS) to:

- Measure total workforce and attrition levels
- Calculate attrition rate percentage
- Identify high-risk demographic groups
- Analyze attrition across departments, education fields, and job roles
- Provide actionable insights for HR decision-making

🛠 Tools Used

- Microsoft SQL Server (SSMS)
- Excel (Raw HR Dataset)
- T-SQL

📂 Data Source

```
SELECT * FROM dbo.HRDATA
```

📊 SQL Analysis Queries

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1. Total Employees

```
SELECT COUNT(*) AS Total_Employees
FROM HRDATA
```

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2. Total Attrition (Employees Who Left)

```
SELECT COUNT(*) AS Total_Attrition
FROM HRDATA
WHERE Attrition = 1
```

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3. Attrition Rate %

```
SELECT
   CAST(
      SUM(CASE WHEN Attrition = '1' THEN 1 ELSE 0 END) * 100.0
      / COUNT(*)
   AS DECIMAL(5,2)) AS Attrition_Rate_Percentage
FROM HRDATA;
```

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4. Current Employees

```
SELECT COUNT(*) AS Current_Employees
FROM HRDATA
WHERE Attrition = 0
```

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5. Average Staff Age

```
SELECT AVG(AGE) AS Average_Age
FROM HRDATA
```

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6. Attrition by Gender

```
SELECT
   Gender,
   COUNT(*) AS Total_Employees,
   SUM(CASE WHEN Attrition = '1' THEN 1 ELSE 0 END) AS Attrition_Count,
   CAST(
      SUM(CASE WHEN Attrition = '1' THEN 1 ELSE 0 END) * 100.0
      / COUNT(*)
   AS DECIMAL(5,2)) AS Attrition_Rate
FROM HRDATA
GROUP BY Gender
ORDER BY Attrition_Rate DESC;
```

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7. Attrition by Department

```
SELECT
   Department,
   COUNT(*) AS Total_Employees,
   SUM(CASE WHEN Attrition = '1' THEN 1 ELSE 0 END) AS Attrition_Count,
   CAST(
      SUM(CASE WHEN Attrition = '1' THEN 1 ELSE 0 END) * 100.0
      / COUNT(*)
   AS DECIMAL(5,2)) AS Attrition_Rate
FROM HRDATA
GROUP BY Department
ORDER BY Attrition_Rate DESC;
```

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8. Attrition by Education Field

```
SELECT
   Education_Field,
   COUNT(*) AS Total_Employees,
   SUM(CASE WHEN Attrition = '1' THEN 1 ELSE 0 END) AS Attrition_Count,
```

```
  CAST(
    SUM(CASE WHEN Attrition = '1' THEN 1 ELSE 0 END) * 100.0
    / COUNT(*)
  AS DECIMAL(5,2)) AS Attrition_Rate
FROM HRDATA
GROUP BY Education_Field
ORDER BY Attrition_COUNT DESC;
```

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9. Age Group Analysis

```
SELECT
  CASE
    WHEN Age BETWEEN 18 AND 25 THEN '18-25'
    WHEN Age BETWEEN 26 AND 35 THEN '26-35'
    WHEN Age BETWEEN 36 AND 45 THEN '36-45'
    WHEN Age BETWEEN 46 AND 55 THEN '46-55'
    ELSE '55+'
  END AS Age_Group,
  COUNT(*) AS Total_Employees,
  SUM(CASE WHEN Attrition = '1' THEN 1 ELSE 0 END) AS Attrition_Count,
  CAST(
    SUM(CASE WHEN Attrition = '1' THEN 1 ELSE 0 END) * 100.0
    / COUNT(*)
  AS DECIMAL(5,2)) AS Attrition_Rate
FROM HRDATA
GROUP BY
  CASE
    WHEN Age BETWEEN 18 AND 25 THEN '18-25'
    WHEN Age BETWEEN 26 AND 35 THEN '26-35'
    WHEN Age BETWEEN 36 AND 45 THEN '36-45'
    WHEN Age BETWEEN 46 AND 55 THEN '46-55'
    ELSE '55+'
  END
ORDER BY Age_Group;
```

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10. Job Role Attrition

```
SELECT
   Job_Role,
   COUNT(*) AS Total_Employees,
   SUM(CASE WHEN Attrition = '1' THEN 1 ELSE 0 END) AS Attrition_Count,
   CAST(
      SUM(CASE WHEN Attrition = '1' THEN 1 ELSE 0 END) * 100.0
      / COUNT(*)
   AS DECIMAL(5,2)) AS Attrition_Rate
FROM HRDATA
GROUP BY Job_Role
ORDER BY Attrition_Rate DESC;
```

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11. Attrition by Gender and Age Group

```
SELECT
   Gender,
   CASE
      WHEN Age < 25 THEN 'Under 25'
      WHEN Age BETWEEN 25 AND 34 THEN '25-34'
      WHEN Age BETWEEN 35 AND 44 THEN '35-44'
      WHEN Age BETWEEN 45 AND 54 THEN '45-54'
      ELSE 'Over 54'
   END AS Age_Group,
   COUNT(*) AS Total_Employees,
   SUM(CASE WHEN Attrition = '1' THEN 1 ELSE 0 END) AS Attrition_Count,
   CAST(
      SUM(CASE WHEN Attrition = '1' THEN 1 ELSE 0 END) * 100.0
      / COUNT(*)
   AS DECIMAL(5,2)) AS Attrition_Rate_Percentage
FROM HRDATA
GROUP BY
   Gender,
   CASE
      WHEN Age < 25 THEN 'Under 25'
      WHEN Age BETWEEN 25 AND 34 THEN '25-34'
      WHEN Age BETWEEN 35 AND 44 THEN '35-44'
      WHEN Age BETWEEN 45 AND 54 THEN '45-54'
```

```
        ELSE 'Over 54'
    END
ORDER BY Gender, Age_Group;
```

📈 Business Impact

This analysis enables HR teams to:

- Identify high-risk age groups and departments
- Understand gender-based attrition trends
- Improve workforce planning
- Develop targeted retention strategies
- Reduce turnover-related costs