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DATA PROCESSING IN INDUSTRIAL SYSTEMS

Project Name: Human Resource Database

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INDEX

1.EXPLANATION OF THE SYSTEM

1.1 Brief Information about the System and Processes.....	3
1.2 Process.....	6
1.2.1 Flowchart for the System.....	8
1.3 Aims of the System.....	14
1.4 Expected Benefits of the Database.....	14

2. DESIGN OF THE DATABASE

2.1 Data types, fields and definitions.....	15
2.1.1. Company.....	15
2.1.2. Department.....	15
2.1.3. Employee.....	15
2.1.4. Countries.....	16
2.1.5. Jobs.....	17
2.1.6. Records.....	17

2.2. Entity Relationships Diagram.....23

2.3 Table Design.....23

2.3.1 Relationships.....	23
2.3.2 Relationships and Definitions.....	24
2.3.2.3. Company – Jobs.....	24
2.3.2.4. Company – Countries	24
2.3.2.5. Employee – Departments	24
2.3.2.6. Employee - Jobs	24
2.3.2.7. Employee – Records.....	25
2.3.2.8. Departments – Jobs	25

2.4. Query & Report

2.4.1. Query.....	25
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2.4.1.1. Absenteeism Query.....	25
2.4.1.2. County Customer Query.....	25
2.4.1.3. Department Efficiency Query.....	25
2.4.1.4. Employee Qualification Query.....	25
2.4.1.5. Employee Distribution Query.....	25
2.4.2. Report.....	26
2.4.2.1. Absenteeism Report.....	26
2.4.2.2. County Customer Report.....	26
2.4.2.3. Department Efficiency Report	26
2.4.2.4. Employee Qualification Report.....	26
2.4.2.5. Employee Distribution Report.....	27
3. REFERENCES.....	27

1. EXPLANATION OF THE SYSTEM

1.1 BRIEF INFORMATION ABOUT SYSTEM AND PROCESS

All of the various public institutions or the companies wants to use their labor more effective and the systematic. Therefore they need a database that includes all information like employee engagement level, salary competitive rates, average working time and many data which they need for the company. The system where all data is stored is called Human Resource Database.

At the end of 2018, the Economist Intelligence Unit reports that 82% of companies in the world (taking samples) plan to start using or increasing the use of a human resource database. These companies also realize the importance of good management of human resource data by implementing an employee database (Madyatmadja et al., 2019).

The critical role of human resource management (HRM) in businesses is to manage and maximize human capital in order to accomplish organizational objectives.

Using a database in human resources is essential for centralizing, organizing, and securing employee information. It ensures data accuracy, maintains data integrity and supports informed decision-making for organizational success.

The information we receive from the data is transferred to the database and processed. The information is used to help the company decide on the actions to be taken by the company. The company use this information in 5 basis actions:

A) Promotion

Companies use data for the promotions of employees who performs her job properly. It provides the promotion of the employees who deserved and be more qualified. For the promotion there are 4 data needs:

-Total work experience

- How many projects were made
- How many reports have been prepared
- Foreign language status
- Attendance to the meetings

B) Salary increase

Companies use data for the salary increase of employees who performs her job properly. It provides the employees to be more motivated and rewarding for they labor. Salary increase encourages them to work more efficiently. For salary increase there are 5 data needs:

- Suitable budget for payrise
- Years of service in the company
- How many projects were made
- How many reports have been prepared
- Attendance at meetings

C) Changing the organizational structure

Organizational change is a challenging task, with structural organizational change being among the most challenging to implement effectively. In the tech sector, this is particularly true. New opportunities, leadership changes, and the desire to promote accountability or cultural change are frequently the causes of change. Although it necessitates careful planning, changing an organization's structure might be the biggest success factor. These actions can be done more objectively with the use of databases. For changing the organizational structure there are 4 data needs:

- Extra employees in a department
- Employees shortage in a department
- Employees who wants to change their department
- Employees area of expertise

D) Firing employees

Firing an employee is a better decision when made based on data and not under the influence of emotions. If there are extra employees in a department or employee has not enough qualification in his work manager should fire employees for the hiring better employee to preserve the efficiency. Therefore the company needs 5 data:

- Check-in and check-out time average
- Absenteeism records
- Attendance to the meetings
- Failed projects and reports
- Profitability of his department

E) Monitoring

Managers monitor their employees for ensuring organizational success and employee well-being. Effective monitoring gives feedback to manager for maintaining work flow and identifying problems in organization. There are 6 data needs for monitoring:

- Profitability of the departments
- Check-in and check-out time average
- Absenteeism records
- Attendance to the meetings
- Number of employees in departments
- Gender distribution in departments

1.2. Process

1-If user choose change in organizational structure

A-System check the department which have employee shortage and some departments have extra employees. System lists the candidates who want to change their department and check their ability adaptability.

B-If there is no extra employee system recommend hiring new employee.

2-If user choose promote an employee. System checks the vacant manager positions.

A-If there is no 10 years experienced employee. System does eliminate from 5 years experienced employees.

B-If there is no at least 5 years experienced employee. System will eliminate from at least 3 years experienced employees.

C- If there is no employee at least 3 years experienced. System recommend hiring a new manager.

3-If user choose give payrise to an employee

A-System checks available budget for payrise

B-If there is available budget systems list the employees according to their performances and department average wage.

4-If user choose the monitor employees performance.

A-I user choose to monitor managers performance. System lists the managers performance records.

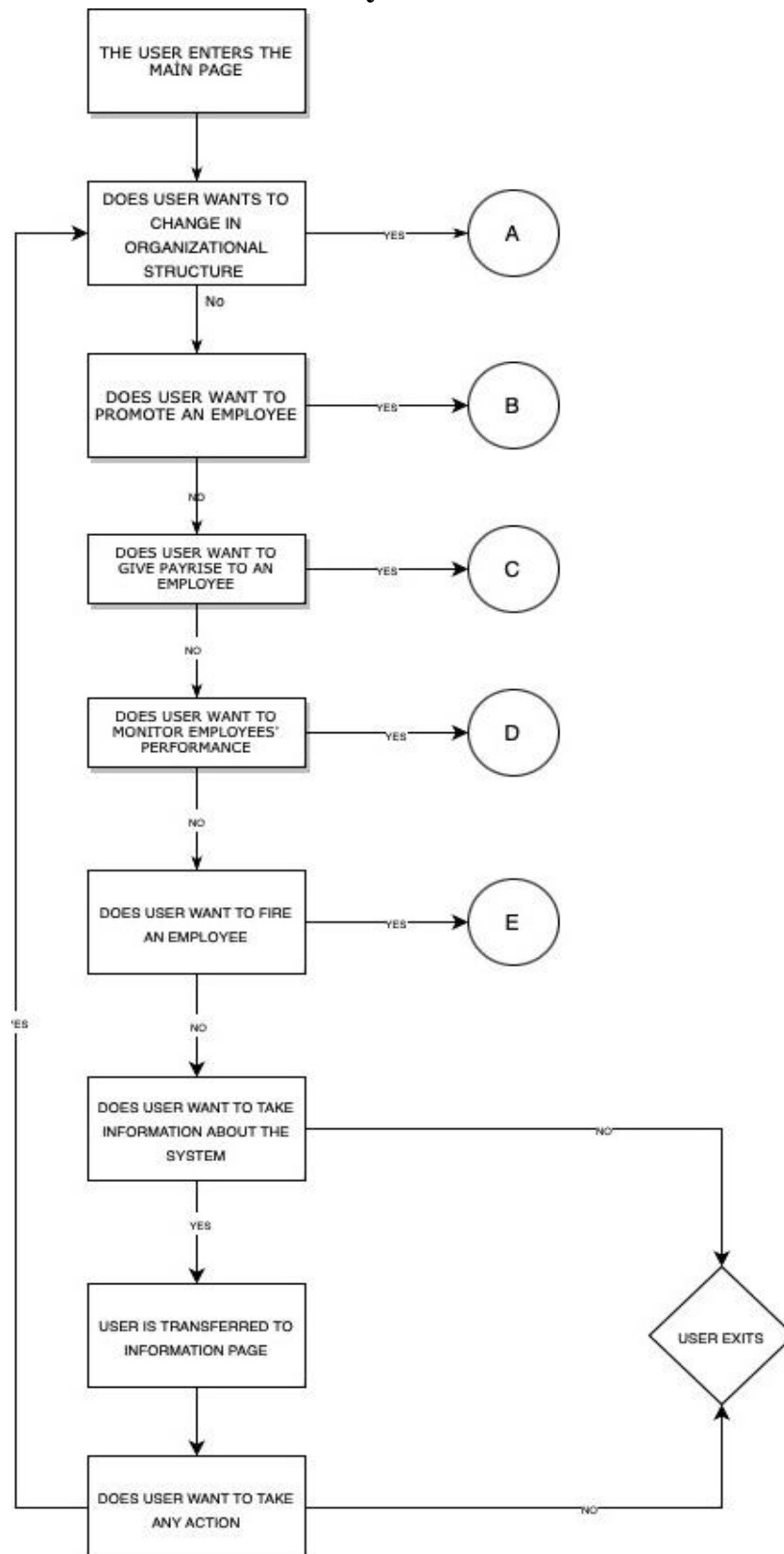
B-If user choose to monitor employees performance. System lists the employees performance records.

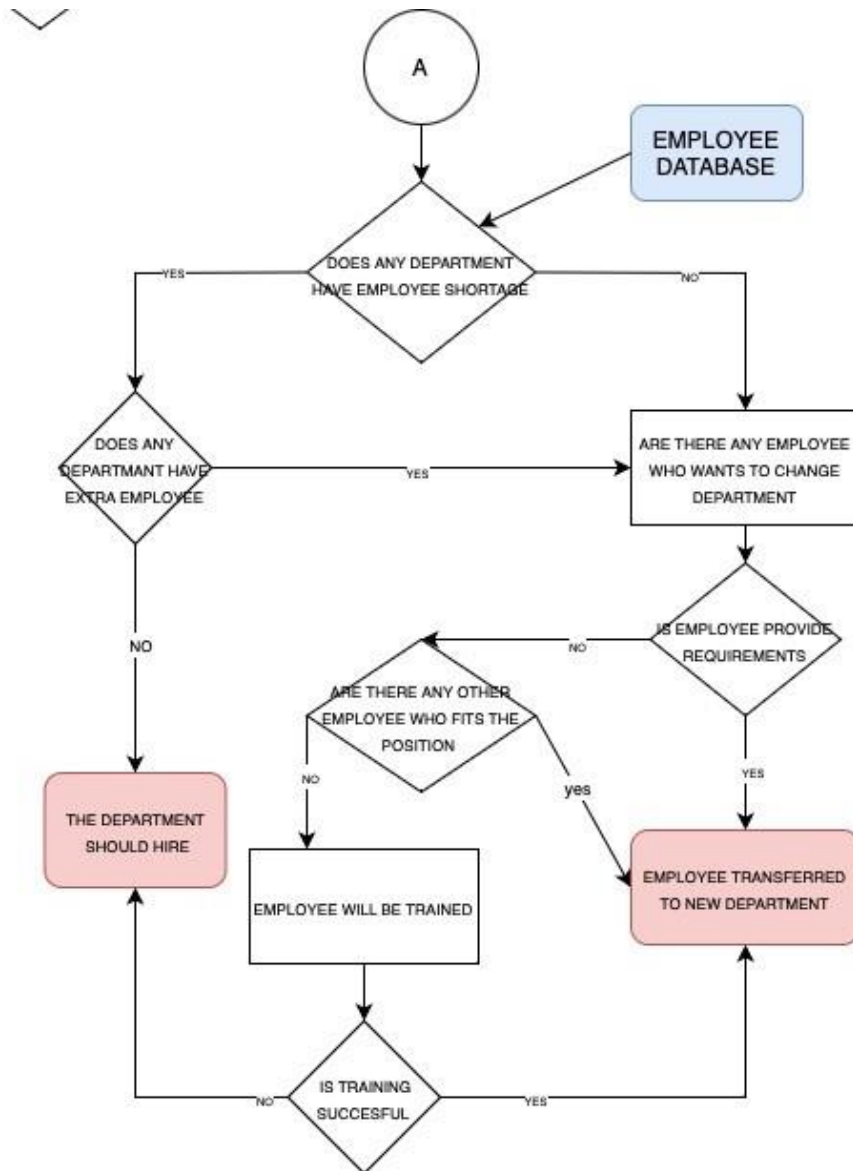
5-If user choose fire an employee

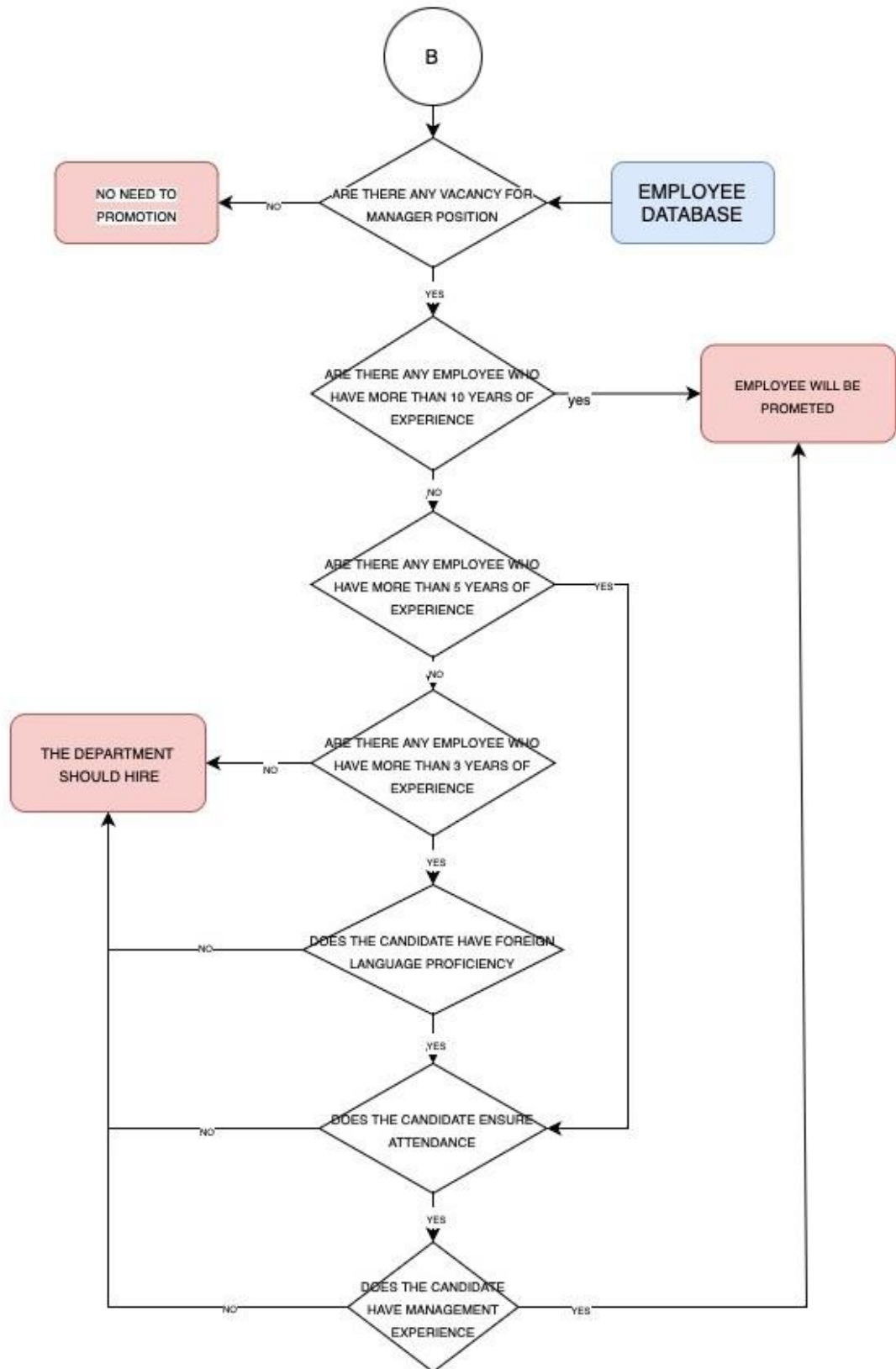
A-If there is a budget shortage in company. System checks the departments which making losses. Then list the performances employees of the department.

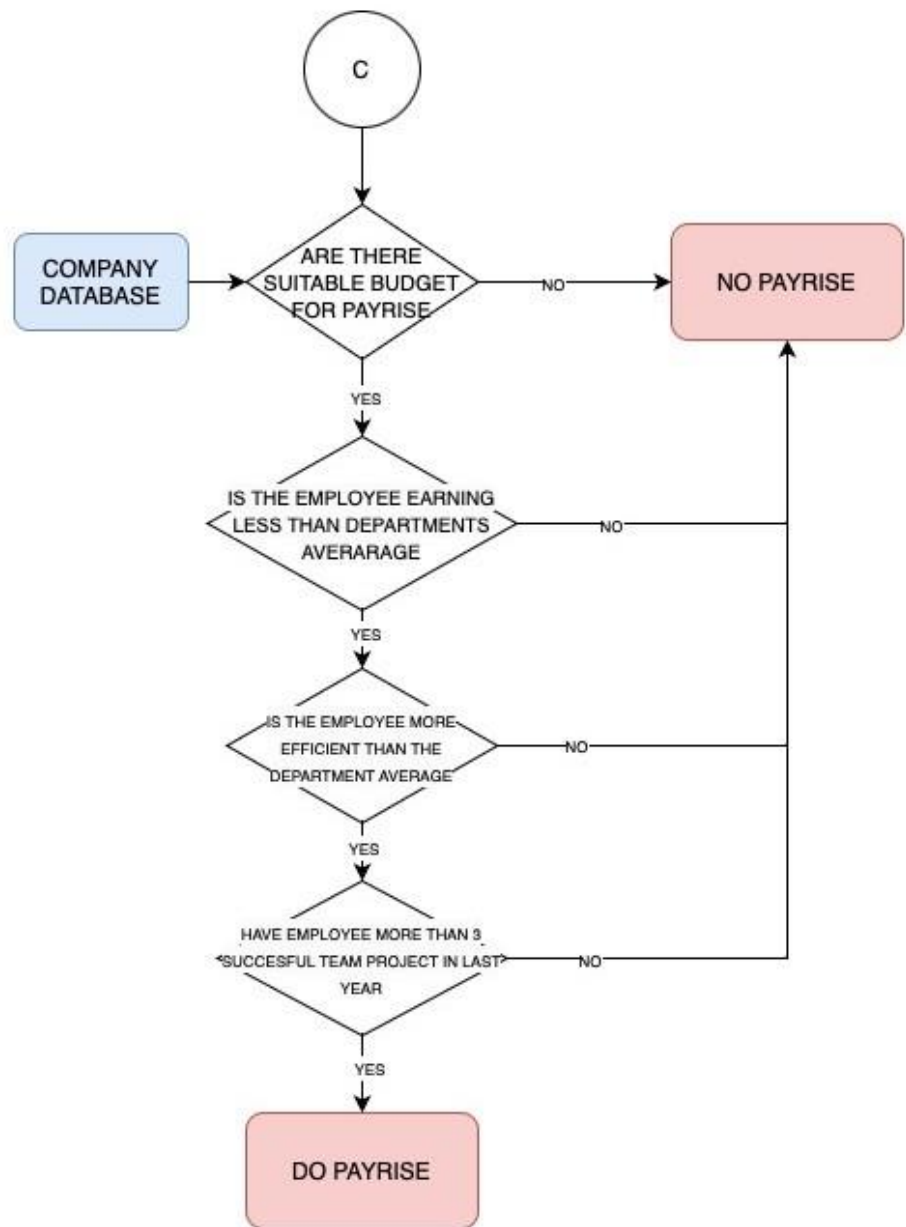
B-If there is no budget shortage system checks for the employees who have more than 30 nonattendance in company.

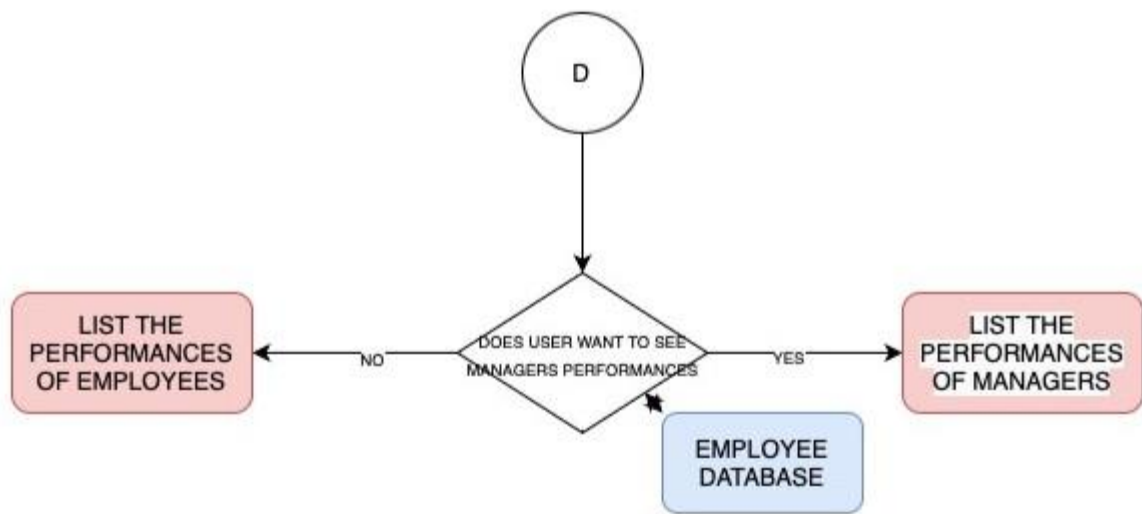
1.2.1.Flowchart of the System

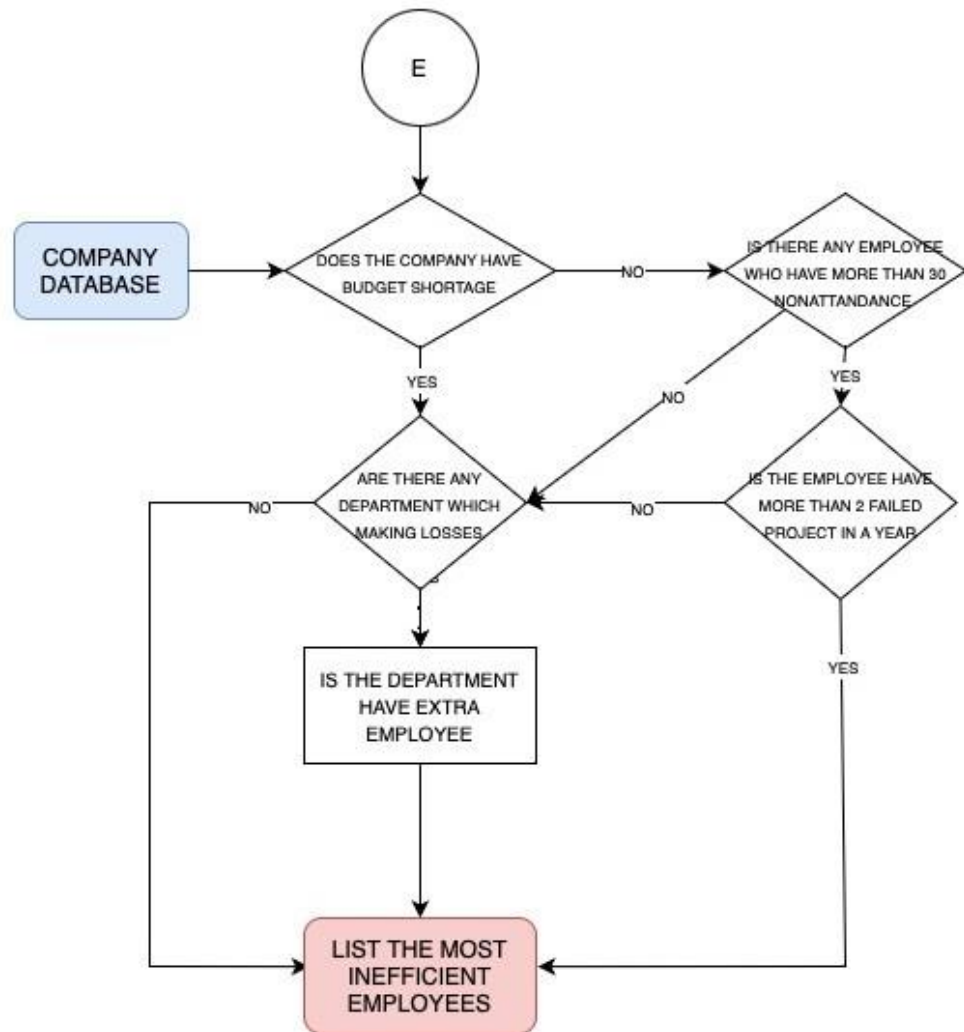












1.3.AIMS OF THE SYSTEM

A Human Resource Information System is a systematic procedure for collecting, storing, maintaining, retrieving, and validating data needed by an organization about its human resources, personnel activities, and organization unit characteristics (Kovach, et al., 1999). The human resources information system may be computerized or non-computerized. The purpose of this article is to explain how information related to human resources is processed in computerized systems with database programs on the computer and how it is used beneficially for the system. Human resources information systems are used from small businesses to large organizations such as banks and governments, and all these systems; It speeds up the decision-making process and ensures that the decisions are made in the most objective way possible because they are based on data. The human resources information system serves many purposes such as workforce planning, equal employment, separations and qualifications of the applicant, provision of personnel knowledgeable about the new/existing project, job evaluation of interns, and providing predictions about whether they will be hired or not. The human resources information system can also support compensation programs with information about salary increases, salary estimates, and salary budgets; and worker/employee relations, which includes information about contract negotiations and employee assistance needs. In all cases, the goal is to provide objective data that human resources stakeholders need or that most accurately supports human resources decisions.

1.4.EXPECTED BENEFITS OF THE SYSTEM

The database described in the text has large-scale concrete benefits for all systems, simple or complex, that involve the human element. Managers aim to use resources in the most appropriate way and get the most output with minimum input. When it comes to people, the aim is to decide on the distribution of resources among people and to get the highest efficiency from employees. Using analytics in human resources ensures that decisions are made entirely based on analytics when making decisions about people. It limits any emotional factor that would disrupt the process and lead to consequences against the system. However analytics don't work directly on data. Data has to be extracted from the database using a specific language and then pass it to analytical tools . (ISSN 2069-3230 (Online) | Database Systems Journal | the ISSN Portal, 2022)

The processes that a company's decision-making mechanism is concerned with are the promotion to be given to the employee, the raise to be given, work to improve the organizational structure, which employee should be dismissed and monitoring. Carrying out these processes objectively and completing them without being exposed to emotional effects is only possible when decisions are made based on data. The database, which is the subject of the research, stores many data about employees such as absenteeism, meeting attendance, unsuccessful projects and reports, and work completion time, providing great benefits to the person managing the relevant process in making the right decision when a decision needs to be made.

2.DESIGN OF THE DATABASE

2.1.DATA TYPES, FIELDS AND DEFINITIONS

2.1.1 Company

COMPANY_ID(PK): It is a special and unique number that our database assigns to each company in order to distinguish existing companies from each other. Data type is short text.

COMPANY_INCOME: It refers to the earnings of the company from its trade that year. Data type is number.

COMPANY_OUTCOME: It is the figure that indicates all the expenses made by the company that year. Data type is number.

NUMBER_OF_EMPLOYEE: It is the expression that gives the total number of people working in the company. Data type is number.

COMPANY_DEPARTMENTS: It is the name given to the departments specialized to organize the business. Data type is short text.

COMPANY_OFFICES: The physical environment in which the company conducts its business. Data type is short text.

2.1.2 Departments

DEPARTMENT_ID: It is a unique number that will distinguish the department from other departments. Data type is number.

DEPARTMENT_NAME: The department name must be known to determine for which department the raise amount will be higher. Data type is short text.

DEPARTMENT_EMPLOYEE_NUMBER: It refers to the total number of employees in a department. Data type is number.

DEPARTMENT_INCOME: It is the amount that gives the income earned by the department by doing its part of the total work. Data type is number.

CONTRIBUTION_TO_TOTAL_INCOME: It is a measure of a department's contribution to the total business. The department's contribution to the total work is one of the factors that determine the raise to be given to that department. Data type is long text.

DEPARTMENT_EFFICIENCY: It is the measure of how effectively the department achieves the work under its responsibility with the resources provided to the department.

2.1.3 Employee

EMPLOYEE_ID(PK): It is a unique identification number given to each employee. Data type is short text. Data type is number.

EMPLOYEE_NAME: Employee name information must be included in our system. Data type is short text.

EMPLOYEE_SURNAME: Employee surnames must be available in our system in order to distinguish employees with the same name and to prevent potential confusion in the system. Data type is short text.

EMPLOYEE_GENDER: When determining employee salary increases, we record the gender of our employees in our database in order to provide flexibility in the amount of raises for female employees who have to care for children during their working life. Data type is short text.

EMPLOYEE_NUMBER: Phone number information, which is the shortest way to reach our employees, should be in our database. Data type is number.

EMPLOYEE_MAIL: Email information must be available in our database in order to officially forward various files and everything related to work to the employee. Data type is short text.

EMPLOYEE_DEPARTMENT: Since some decisions regarding raises will be determined by department, we must have information about the department where the employee works. Data type is short text.

EMPLOYEE_TOTAL_EXPERIENCE: The employee's experience in that job; Since it affects all the benefits that the employee can bring to that job, especially his productivity, it also affects the amount of raise to be given to the employee by the company. Data type is long text.

EMPLOYEE_EXPERIENCE_IN_COMPANY: The years the employee spends in that company is generally directly proportional to the value the employee represents for the company. As the value we give to our employees increases, the raise we will give will also increase. Data type is long text.

EMPLOYEE_QUALIFICATION: The more equipped the employee is, the better he can do the job and thus the more valuable he is for the company. It is one of the factors affecting the amount of raise to be made. Data type is long text.

EMPLOYEE_FOREIGN_LANGUAGE: Foreign language knowledge is very critical, especially for a company that has branches in other countries. An employee who is fluent in a foreign language is worth investing in because of what he or she can bring to the company during his or her employment. Data type is short text.

2.1.4. Countries

COUNTRY_ID(PK): We assign a unique number to each country where we have branches and offices. Data type is number.

COUNTRY_NAME: Country name; It should be in our database to store the data we collect about the country. Data type is short text.

COUNTRY_REGION: Since the social, economic and political situation of the region in which the country is located may affect the company's revenues and therefore the amount of raise to be determined, the region and conditions of the country should be mastered. Data type is short text.

COUNTRY_CURRENCY: Currency information; It is among the factors affecting the price hike as it directly affects trade volume and income.

COUNTRY_AVERAGE_CUSTOMER: Average number of customers in the country; It affects the potential investment to be made, total income, number of employees and therefore the amount of raise to be given to the employee. Data type is number.

2.1.5 Jobs

JOB_ID: It is a unique number assigned to each job performed. Data type is number.

JOB_NAME: The name of the job performed is registered in our system together with the ID information of the job. Data type is short text.

JOB_EMPLOYEE_NUMBER: The number of people working in that job group can affect the amount of raises given to those people, so this information is recorded in our database. Data type is number.

2.1.6 Records

RECORD_ID: Many records about various subjects are available in the company's database. There is a different number for each record. Data type is number.

EMPLOYEE_ID(FK): The most basic information that should be kept on record is the employee-specific number. The unknown identity of the employee causes uncertainty in the raise. Data type is number.

RECORD_HEALTH: Recording that employee absence is due to a valid reason affects the employee performance report. The information in this report will affect the amount of raise given to the employee. Data type is short text.

RECORD_ABSENTEEISM: Attendance at work; Not being absent except in cases of necessity is part of employee performance. Data type is number.

RECORD_ATTENDANCE_MEETINGS: Being involved in meetings and providing active participation allows us to evaluate that employee. We determine the amount of the raise with such evaluations. Data type is number.

RECORD_PROJECTS: Projects and new idea generation are the factors that make an employee more valuable. These can contribute greatly to the company. The amount of raise given to an employewho produces new projects will not be equal to an employee who does not produce new projects. Data type is short text.

TABLE NAME	DATA FIELD	DATA TYPE	DEFINITION
COMPANY	COMPANY_ID(PK)	Autonumber	It is an unique number to define our company.
	COMPANY_INCOME	Number	The amount of money that company earns each year.
	COMPANY_OUTCOME	Number	The amount of money that company spends each year.
	NUMBER_OF_EMPLOYEE	Number	Amount of workers that company has.
	COMPANY_DEPARTMENTS	Short text	Parts of the company specialized for each task.
	COMPANY_OFFICES	Short text	Company's physical environments.

DEPARTMENT	DEPARTMENT_ID	Autonumber	It is an unique number to define our department.
	DEPARTMENT_NAME	Short text	It gives the information of the name of the
	DEPARTMENT_EMPLOYEE_NUMBER	Number	Department. The information of how many workers do the department has.
	DEPARTMENT_INCOME	Number	It gives the information of how much income department earns each year.
	CONTRIBUTION_TO_TOTAL_INCOME	Long text	It is a measure of how much one contributes to the company.
	DEPARTMENT_EFFICIENCY	input/output	It is a measure of how high output is achieved through the use of resources for each department.

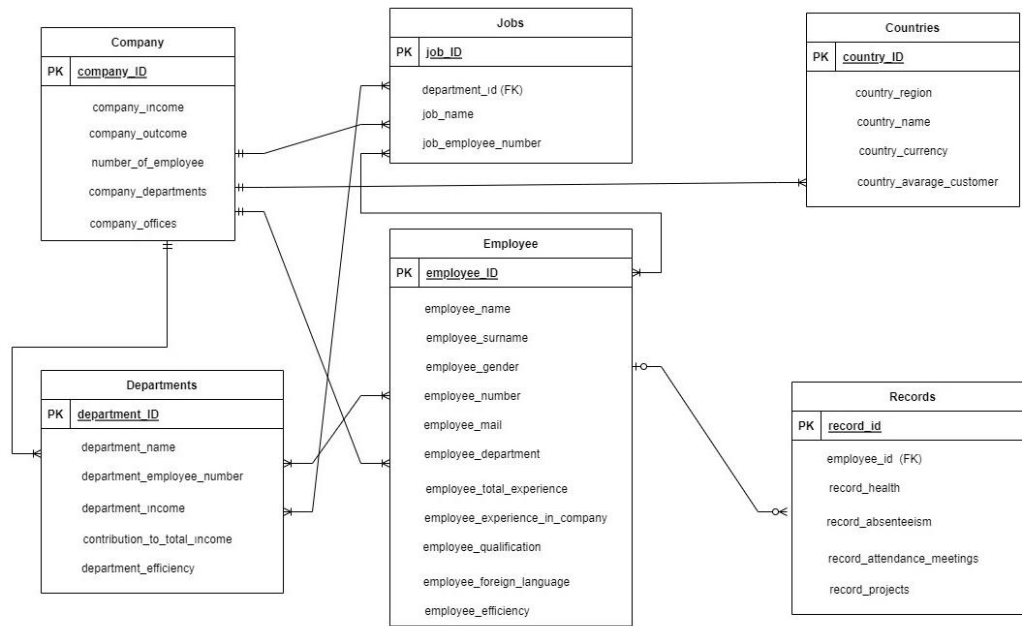
EMPLOYEE	EMPLOYEE_ID(PK)	Autonumber	It is an unique number to define our workers.
	EMPLOYEE_NAME	Short text	It gives the information of the name of the worker.
	EMPLOYEE_SURNAME	Short text	It gives the information of the surname of the worker.
	EMPLOYEE_GENDER	Short text	It gives the information of the gender of the worker.
	EMPLOYEE_NUMBER	Number	It gives the information of the phone number of the worker.
	EMPLOYEE_MAIL	Short text	It gives the information of the mail of the worker.
	EMPLOYEE_DEPARTMENT	Short text	It gives the information of the which department the employee works.
	EMPLOYEE_TOTAL_EXPERIENCE	Long text	It gives the information employee's past experience.
	EMPLOYEE_EXPERIENCE_IN_COMPANY	Long text	It gives the information employee's past experience in current company.
	EMPLOYEE_QUALIFICATION	Long text	It indicates the employee's abilities and skills.

	EMPLOYEE_FOREIGN_LANGUAGE	Short text	It provides information about foreign language which employee has
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COUNTRY	COUNTRY_ID(PK)	Autonumber	It is an unique number to define countries that company has its branches.
	COUNTRY_NAME	Short text	It gives the information which countries the company has its branches.
	COUNTRY_REGION	Short text	It gives information about the regions where sales are made.
	COUNTRY_CURRENCY	Number	It provides information about the value of the currency of the trading country.
	COUNTRY_AVERAGE_CUSTOMER	Number	It indicates the average number of customers in that country.
JOBS	JOB_ID	Autonumber	It is an unique number to define each job.
	JOB_NAME	Short text	It gives the information of the name of the jobs.
	JOB_EMPLOYEE_NUMBER	Number	It indicates the number of workers working in that job.

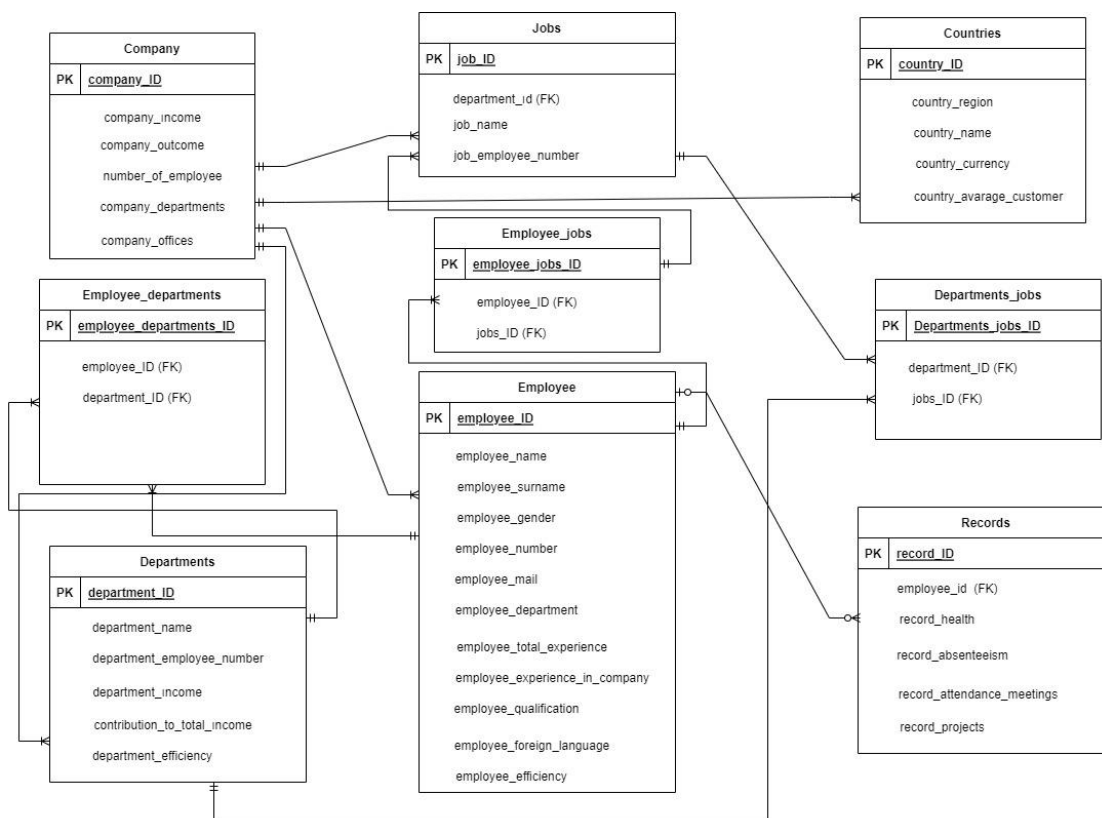
RECORDS	RECORD_ID	Autonumber	It is an unique number to define every kind of the records of the company.
	EMPLOYEE_ID(FK)	Autonumber	It is an unique number to define our workers.
	RECORD_HEALTH	Short text	It provides information about the health status of employees.
	RECORD_ABSENTEEISM	Number	It provides information about employee attendance.
	RECORD_ATTENDANCE_MEETINGS	Number	It provides information about employee participation in meetings.
	RECORD_PROJECTS	Long text	It informs employees about new project ideas.

2.2. ENTITY RELATIONSHIP DIAGRAM



2.3. TABLE DESIGN

2.3.1. RELATIONSHIPS



2.3.2. RELATIONSHIPS AND DEFINITIONS

2.3.2.1. COMPANY – DEPARTMENTS (1-M)

The relationship between company and departments are one to many relationships. It gives information about the departments that company contains.

2.3.2.2. COMPANY – EMPLOYEE (1-M)

The relationship between company and employees are one to many relationships. It presents the data of the employee who works in the company. Moreover, it helps monitoring employees.

2.3.2.3. COMPANY – JOBS (1-M)

The relationship between company and jobs are one to many relationships. It shows the jobs that company provides.

2.3.2.4. COMPANY – COUNTRIES (1-M)

The relationship between company and countries are one to many relationships. It indicates in which countries the company has offices. In this way, company can supervise and decides to keep operations or not.

2.3.2.5. EMPLOYEE – DEPARTMENTS (M-M)

The relationship between employee and departments are many to many relationships. It gives information about employees who works in specific departments and vice versa. Therefore, it helps to keeps the efficiency of the departments.

2.3.2.6. EMPLOYEE- JOBS (M-M)

The relationship between employee and jobs are many to many relationships. It shows what job employee work in. It helps to decide whether it is effective to continue working in that job or not. employee_ID is presented as foreign key in jobs table.

2.3.2.7. EMPLOYEE – RECORDS (1-M)

The relationship between employee and records are one to many relationships. It gives information about the records of the employee. It helps in actions which will company take about the employee. These actions may be promotions, firing the employees or other variations.

2.3.2.8. DEPARTMENTS – JOBS (M-M)

The relationship between departments and jobs are many to many relationships. It presents the jobs which department contains. It helps when company needs to change the organizational structure. department_ID is presented as foreign key in departments table.

2.4. QUERY& REPORTS

2.4.1. QUERY

2.4.1.1 ABSENTEEISM QUERY

Dataset includes all informations about employees record in the company like absenteeism and more. It allows managers to check employees and take actions according to data.

2.4.1.2 COUNTRY CUSTOMER QUERY

In this query, the company can determine the number of customers in the countries where it is active. In this way, it can be determined whether the market is efficient or not, whether the investments made in this market and the labor spent are necessary, and action can be taken accordingly

2.4.1.3 DEPARTMENT EFFICIENCY CONTROL

Department efficiency control refers to the procedures and policies put in place by a company to keep an eye on, oversee, and improve the performance of its several departments. Ensuring that every department functions at its best and makes a meaningful contribution to the organization's overall performance is the aim.

2.4.1.4 EMPLOYEE QUALIFICATION QUERY

In this query the database list employee's experinces. For total experience less than 7 years and for experience in the company less then 4 years. So user can use that information to give bonus or payrise to employee.

2.4.1.5 EMPLOYEE DISTRIBUTION QUERY

This query serves as a decision-making tool when making adjustments to the company's organizational structure. Decision making is enabled by learning the number of employees and employee type distribution in departments.

2.4.2. REPORT

2.4.2.1. ABSENTEEİSM REPORT

Employee_ID	Employee_Name	Employee_Surname	Record_Absenteeism	Record_Health
1	Mahmut	Kaya	12	6
2	Ismail	Kaplan	7	3
3	Mehmet	Tekdemir	2	0
4	Fatih	Kaplan	1	5
5	Mustafa	Özen	3	2
6	Fatih	Buran	0	0
7	Fatma	Doğu	2	3
8	Zeynep	Gündoğan	1	0
9	Deniz	Oğuz	16	10
10	Ali	Korkmaz	8	0

In the report , it shows the absenteeism and health record of the employees. Managers will take actions according to limit of absenteeism which company allows. Finally, the company will choose which decision to make accordingly.

2.4.1.2 COUNTRY CUSTOMER REPORT

Country_ID	Country_Na	Country_Region	Country_Currency	Country_Average_Customer
1	Germany	Europe	Euro	110
2	France	Europe	Euro	80
4	United Kingdo	Europe	Sterlin	130
5	China	Asia	Yuan	260
9	Spain	Europe	Euro	100

This report shows the average number of employees country by country. Data is provided by country table . When the sample is examined carefully, countries with low customer numbers are taken into consideration when taking action.

2.4.1.3 DEPARTMENT EFFICIENCY REPORT

Department_ID	Department_Name	Department_Employee_Number	Department_Income	Contribution_to_total_Incom	Department_Efficiency
2	Accounting	1	70000 30000		70000
3	Producing	3	225000 170000		75000
5	Marketing	2	270000 250000		135000

According the data, managers will decide whether to change the organizational structure or not. Optimal efficiency of the departments determined as 140000. Therefore, departments with efficiency less than 10 are shown.

2.4.1.4 EMPLOYEE QUALIFICATION REPORT

Employee_ID	Employee_Name	Employee_Surname	Employee_Total_Experis	Employee	Employee_Gender	Employee_Number	Employee_Mail	Employee_Department_ID	Employee_Qualification	Employ
1	Mehmet	Tekdemir	18	12	M		102 3@gmail.com	2	Bachelor	3
4	Fatih	Kaplan	4	1	M		103 4@gmail.com	3	Graduate	2
8	Zeynep	Gündoğan	4	3	F		107 8@gmail.com	4	Undergraduate	1
9	Deniz	Oğuz	2	2	F		108 9@gmail.com	5	Undergraduate	0

The query brings to user 4 employee who provides constraints. According to results Mehmet and Zeynep who the more experienced ones should take payrise or bonus.

2.4.1.5 EMPLOYEE DISTRIBUTION REPORT

Employee_ID	Employee_Name	Employee_Surname	Department_ID	Department_Name	Employee_Number	Employee_Mail
1	Mahmut	Kaya	1	Sales	100	1@gmail.com
2	Ismail	Kaplan	1	Sales	101	2@gmail.com
3	Mehmet	Tekdemir	2	Accounting	102	3@gmail.com
4	Fatih	Kaplan	3	Producing	103	4@gmail.com
5	Mustafa	Özen	3	Producing	104	5@gmail.com
6	Fatih	Buran	3	Producing	105	6@gmail.com
7	Fatma	Doğu	4	Transport	106	7@gmail.com
8	Zeynep	Gündoğan	4	Transport	107	8@gmail.com
9	Deniz	Oğuz	5	Marketing	108	9@gmail.com
10	Ali	Korkmaz	5	Marketing	109	10@gmail.com

This report shows the distribution of employees in departments. An idea can be obtained about the organization of the company by examining the type of employee and the necessary information. In addition, employee contact information is also displayed.

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