Payroll Management System Database Design

Nicolás Guevara Herrán

Adiel Valentin Hernández

Systems Engineering School

Universidad Distrital Francisco José de Caldas

Bogotá D.C, Colombia

nguevarah@udistrital.edu.co

Avhernandezm@udistrital.edu.co

Abstract—This document will give shape to the formulation and development of a project, which aims to solve a legal problem presented by the Trimeca company, industrial and mechanical works, where the main object is the administrative management of both consultations. as an edition of the payroll and everything that it brings with it. Its purpose is to propose and execute the theoretical and practical solution to the problem presented, through specific objectives such as the creation of relational models and everything that this entails, as well as the use of relational algebra to raise possible queries that may arise, whether for consultation or editing, and so on until reaching a concrete solution.

Keywords— Payroll Management System, Database Design, Compliance

PROJECT DESCRIPTION

For this project, we are presented with a problem related to the mismanagement of information adjacent to the hiring, as well as what this brings with it for each individual such as the position, salary allocation, type of contract, contract time, as well Underlying the mishandling of this, the government has made a legal request towards the company Trimeca SA in the name of the company's lack of compensation to its employees for the hours required by Law 50, which states:
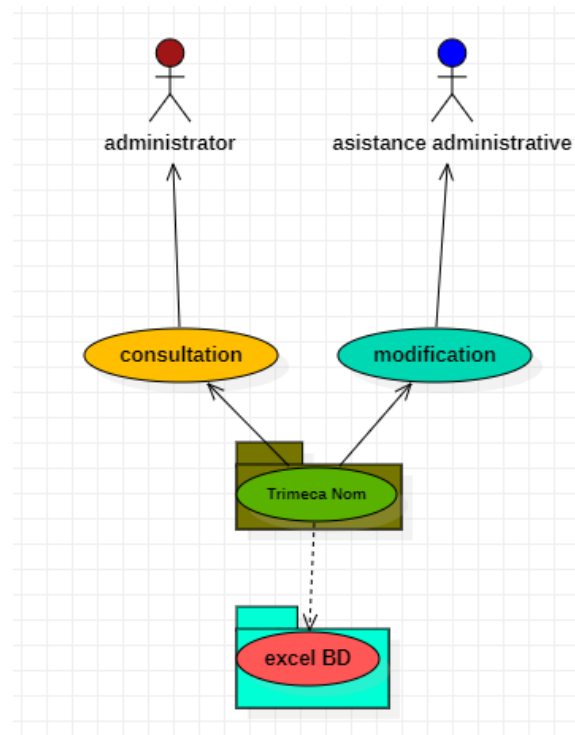
> "ARTICLE 21. Regulated by Decree 1127 of 1991. Add the following article to Chapter II of Title VI, Part One of the Substantive Labor Code:
> Exclusive dedication to certain activities. In companies with more than fifty (50) workers who work forty-eight (48) hours a week, they will have the right to have two (2) hours of said day, at the expense of the employer, be dedicated exclusively to recreational activities, cultural, sports or training."

being clear about article 21 of Law 50, the Trimeca company has raised the need for monetary compensation for the hours not given to employees through monetary payments corresponding to individual salary assignments, taking into account that in a month there are approximately 8 hours, which is equivalent to a working day, the accounts are made on this and in compensation the units will be days, that is, the total number of law 50 hours that must be divided into 8 multiplied by the equivalent daily salary allocation of each employee respectively, they will give us the corresponding monetary compensation.

To carry out this task and the entire general operation, data compendiums managed by the company in Excel will be used, making available the existing contracting data through our program that manages all the data from the entry and exit of a employee, the position, the salary assignment, giving medina formulation outputs so that he has the legal benefits, in addition to providing the monetary compensation for the 50 hours of law not given to the employee through the contracted time and the salary adjustment

USER STORIES

- As a payroll manager, I want to see the employees by department, so that it's easier to handle all the payrolls.

As a payroll manager, I want to know the extra hours an employee has worked, so that the money given to him is in compliance.

As a payroll manager, I want to see the status of each employee, to know if they are active, on vacation, etc..., so that I can decide whether to pay or not.

As an employee, I want to know the deductions being made to my payroll, so that i know my finances.

As an employee, I want to know my allowance, so that I can track my finances.

As an employee, I want to be able to see my pay slip so that i have all the information in one place.

As a payroll manager, I want to know the position of each student, so that I know the amount that corresponds to the employee.

As a Director, I want the app to be for employees and the administration, so that it's easier to handle information.

CONCEPTUAL MODEL

Step 0. Components

User, Role, Employee, Status, Allowance, Payroll, Deductions, Position, Department.

Step 1. Entities

Employee, Payroll, Department, Position, Allowances, Deductions, Employee Allowances, Employee Deductions, User, Role, Pay Slip, Status, Payroll Type, Employee_Extra_Hours

Step 2. Attributes

E1. Employee: UUID, employee_code, name, department_FK, position_FK, salary, email, status_FK.

E2. Payroll: ID, reference_number, date_from, date_to, payroll_type_FK, status, date_created.

E3. Department: ID, name, description.

E4. Position: ID, department_FK, name, description.

E5. Allowance: ID, deduction_name, description.

E6. Deduction: ID, deduction_name, description.

E7. Employee_Allowances: ID, employee_FK, Allowance_FK, Payroll_Type_FK, amount, effective_date, date_created.

E8. Employee_Deduction: ID, employee_FK, deduction_FK, payroll_type_FK, amount, effective_date, date_created.

E9. User: ID, name, username, password, role_FK

E10. Role: ID, name, permissions.

E11. PaySlip: ID, payroll_FK, employee_FK, present, absent, salary, allowance_amount, deduction, deduction_amount, net, date_created.

E12. Status: ID, name, comments.

E13. Payroll_type: ID, name.

E14. Employee_Extra_Hours: ID, Employee_FK, hours, Payroll_Type_FK, amount, Effective_Date, Date_Created

Step 3. Relations

With respect to the relations between entities, the next image describes all the relations.

	e1	e2	e3	e4	e5	e6	e7	e8	e9	e10	e11	e12	e13	e14
e1	■		X	X			X	X			X	X		X
e2		■									X		X	
e3	X		■	X										
e4	X		X	■										
e5					■		X							
e6						■		X						
e7	X				X		■					X		
e8	X					X		■				X		
e9									■	X				
e10									X	■				
e11	X	X									■			
e12	X											■		
e13		X					X	X					■	X
e14	X											X		■

Step 4. Relationships Types

E1	nx-x1	E3	E2	nx-x1	E13
E1	nx-x1	E4	E3	1x-xn	E4
E1	1x-xn	E7	E5	1x-xn	E7
E1	1x-xn	E8	E6	1x-xn	E8
E1	1x-xn	E11	E7	nx-x1	E13
E1	nx-x1	E12	E8	nx-x1	E13
E2	1x-xn	E11	E9	nx-x1	E10
E1	1x-xn	E14	E13	1x-xn	E14

By having all these information, we can now proceed and make the Entity Relationship Model, and define all the variable types, and constraints.

In relation with some of the relational algebra queries that will be useful for getting the solution for Trimeca S.A. We propose the following queries:

Project Managers

$$\rho_{(projectManagers)}(\pi\ name(\sigma\ Bposition = \text{proyect} \backslash \text{manager}(employee)))$$

Coordinators

$$\rho_{(coordinator)}(\pi\ name(\sigma\ Bposition = \text{coordinator}(employee)))$$

Assistants

$$\rho_{(assistaces)}(\pi\ name(\sigma\ Bposition = \text{assistats}(employee)))$$

employees for work

$$\rho_{(employesFwork)}(\pi\ name(\sigma\ type = \text{forWork}(payrollType)))$$

employees for an indefinite period

$$\rho_{(indefinite)}(\pi\ name(\sigma\ type = \text{indefinite}(payrollType)))$$
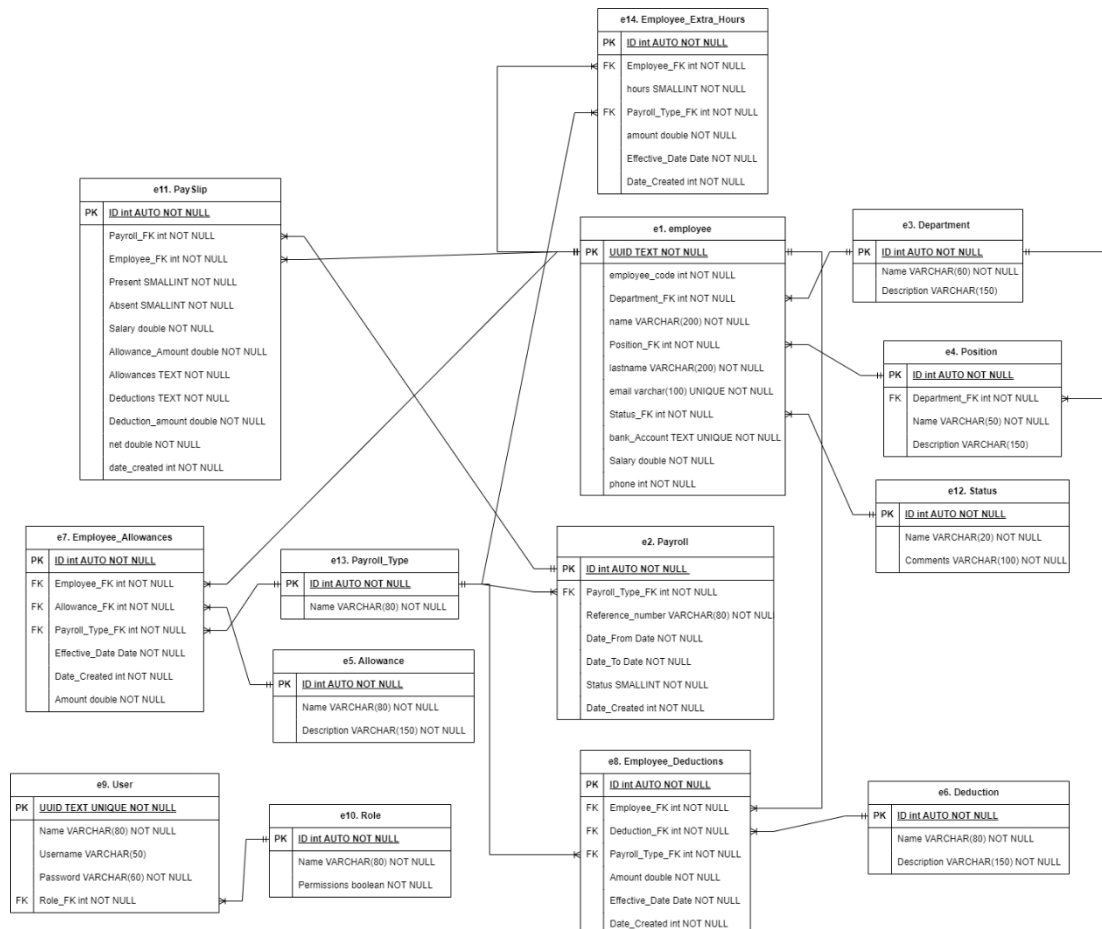
As data source to feed the database, we found an excel of the company, which we can work with. Here are some images of the data in the excel, which is related to payrolls.

	CODIGO VACANTE	C.C. / C.E.	EXPEDIDA EN	NOMBRES	APELLIDOS	SEXO	NUMERO DE CUENTA BANCARIA	BANCO	EPS	FONDO DE PENSIONES	CAJA DE COMPENSACION	A
	2	3	4	5	6	36	37	38	39	40	41	
HCC-014	N/A	1.026.251.123	BOGOTA	RICARDO ANDRES	MARIÑO DAVILA	M	570055970006379	DAVIVIENDA	SANITAS	PORVENIR	COMFAMILIAR	EJECU SU CA
HCC-021	N/A	73.215.240	CARTAGENA	CARLOS ENRIQUE	FERIA MORALES	M		DAVIVIENDA	SURA	PORVENIR	COMFAMILIAR	EJECU SU CA
HCC-022	1626117001-64	8.565.695	BARRANQUILLA	ESTEBAN DARIO	TORREGROSA MENDOZA	M	004252003344	COLPATRIA	SANITAS	PROTECCION	COMFAMILIAR	TERMI
HCC-023	1626117001-41	9.299.707	TURBACO	RAFAEL IGNACIO	PACHECO SAN JUAN	M	78743098578	BANCOLOMBIA	SALUD TOTAL	PORVENIR	COMFAMILIAR	TERMI
HCC-024	1626117001-55	1.050.968.962	TURBACO	DELMER ENRIQUE	ALTAMAR SERPA	M	50909108567	BANCOLOMBIA	MUTUAL SER	PORVENIR	COMFAMILIAR	EJECU SU CA constr
HCC-025	1626117001-55	1.047.377.728	CARTAGENA	RAFAEL	MORALES OLIVO	M	056100672973	DAVIVIENDA	SALUD TOTAL	COLFONDOS	COMFAMILIAR	EJECU SU CA constr
HCC-026	1626117001-54	73.577.200	CARTAGENA	EISON	SALAS AHUMEDO	M	17508744609	BANCOLOMBIA	NUEVA EPS	PORVENIR	COMFAMILIAR	TERMI
HCC-027	1626117001-63	79.474.064	BOGOTA	CLOVIS	BARINAS CRUZ	M	67369375358	BANCOLOMBIA	SANITAS	PORVENIR	COMFAMILIAR	TERMI
HCC-030	1626117001-62	85.270.073	BANCO MAGDALENA	ELKIN	PONTON MARTINEZ	M	50783508190	BANCOLOMBIA	MUTUAL SER	COLPENSIONES	COMFAMILIAR	TERMI
HCC-031	1626117001-65	91.004.709	SABANA DE TORRES	FELIX	PACHECO PORRAS	M	21610840598	BANCOLOMBIA	NUEVA EPS	PROTECCION	COMFAMILIAR	TERMI
HCC-032	1626117001-69	13.539.020	BUCARAMANGA	LUIS FERNANDO	JUANDIÑO CALDERON	M	67896720349	BANCOLOMBIA	COOMEVA	COLPENSIONES	COMFAMILIAR	SU CA constr

4	DIRECTO	173	FORANEO	20	10
5	CIVIL	135	DIRECTO	4	
6	OBRERO	92	INDIRECTO	16	
7	ALBAÑIL	38	LOCAL	189	90
8	CAPATAZ CIVIL	3	DIRECTO	169	
9	AYUDANTE TECNICO ELECTRICISTA	1	INDIRECTO	20	
10	ELECTRICISTA 1A	1	Total general	209	100
11	LOGISTICA	19			
12	ALMACENISTA	1			
13	APAREJADOR	2			
14	AYUDANTE TECNICO	1			
15	OPERADOR DE GRUA DE HASTA 70 TN	2			
16	OPERADOR DE TRACTO CAMION / CAMA BAJA O CAMA ALTA	2			
17	AUXILIAR DE BODEGA	2			
18	CONDUCTOR VEHICULO LIVIANO	4			
19	CONDUCTOR VEH MAS DE 3 TN	1			
20	OPERADOR DE PAJARITA	2			
21	OPERADOR DE MOTONIVELADORA	1			
22	AUXILIAR DE MATERIALES II	1			
23	TOPOGRAFIA	4			
24	CADENERO	2			

CONTEO | Base de Datos