

# Leave management system (Group 6)

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# LMS TABLES

Staff
emp_id
first_name
middle_name
last_name
gender
designation
job_code
dob
door_no
Street_name
City
State
Pin_code
hired_date
dept_code
branch_name
marital_status
no_of_days_worked

Leave_history
emp_id
Month_year
Permitted_no_of_leaves
leaves_approved
leaves_rejected
leaves_taken
Effect_on_payroll

Dept_details
dept_name
dept_code
no_of_employees
no_of_employees_on_leave
No_of_working_ays
salary

Hourly_employee
no_of_hours
salary_per_hour
Emp_id

Salaried_employee
salary
Emp_id

Staff
Mail_id
Emp_id

System_admin
system_code
Emp_id
Employee
Emp_id
Processed by
Leave_id
Month_year
Emp_id
Manager_id
Login
Login_id
emp_id
password
User_type

Pay_roll
emp_id
payment_id
salary
payment_type
pay_roll_id
tax
insurance_type
dept_code
insurance_id
Leave_details
emp_id
leave_id
leave_type
leave_type_code
start_date
end_date
reason
status
Date_of_feedback
Admin_feedback
leave_pay
Belongs to
Join_date
Dept_code
Emp_id
Calculated based on
Payroll_id
Dent_code

## **Attributes of LMS Database:**

emp\_id, first\_name, last\_name, middle\_name, gender, designation, job\_code, dob, door\_no, street\_name, city, state, pincode, hired\_date, dept\_code, branch\_name, marital\_status, no\_of\_days\_worked, month\_year, permitted\_no\_of\_leaves, leave\_type\_code, leaves\_approved, leaves\_rejected, leaves\_taken, effect\_on\_payroll, dept\_name, no\_of\_employees, no\_of\_employees\_on\_leaves, no\_of\_working\_days, salary, payment\_id, payment\_type, payroll\_id, tax, insurance\_id, insurance\_type, leave\_id, leave\_type, start\_date, end\_date, reason, status, date\_of\_feedback, admin\_feedback, leave\_pay, login\_id, password, user\_type, system\_code, manager\_id, no\_of\_hours, salary\_per\_hour, phone\_number, mail\_id, join\_date

# Functional Dependencies

emp\_id  $\rightarrow$  first\_name, middle\_name, last\_name, gender, designation, job\_code, dob, door\_no, street\_name, marital\_status, no\_of\_days\_worked, dept\_code, dept\_name, pincode, payroll\_id, login\_id

pincode  $\rightarrow$  city, state

City  $\rightarrow$  state

emp\_id, phone\_number  $\rightarrow$  phone\_number

emp\_id, mail\_id  $\rightarrow$  mail\_id

designation  $\rightarrow$  job\_code

job\_code  $\rightarrow$  designation

emp\_id, dept\_code  $\rightarrow$  hired\_date, join\_date, branch\_name

dept\_code  $\rightarrow$  dept\_name, permitted\_no\_of\_leaves, no\_of\_employees, no\_of\_working\_days

dept\_code, month\_year  $\rightarrow$  no\_of\_employees\_on\_leave

emp\_id, month\_year  $\rightarrow$  leaves\_approved, leaves\_rejected, leaves\_taken

leave\_type\_code  $\rightarrow$  leave\_type, leave\_pay

Leave\_type  $\rightarrow$  leave\_type\_code

Payroll\_id, month\_year  $\rightarrow$  payment\_type, payment\_id, tax, salary, effect\_on\_payroll

Payroll\_id  $\rightarrow$  insurance\_id, insurance\_type, dept\_code

Leave\_id  $\rightarrow$  leave\_type, start\_date, end\_date, reason, status, admin\_feedback, date\_of\_feedback

login\_id  $\rightarrow$  password, user\_type

Emp\_id, payroll\_id  $\rightarrow$  salary\_per\_hour, no\_of\_hours

Emp\_id, user\_type  $\rightarrow$  system\_code, manager\_id

# Canonical cover

emp\_id --> first\_name  
emp\_id --> last\_name  
emp\_id --> middle\_name  
emp\_id --> gender  
emp\_id --> job\_code  
emp\_id --> dob  
emp\_id --> door\_no  
emp\_id --> street\_name  
emp\_id --> marital\_status  
emp\_id --> no\_of\_days\_worked  
emp\_id --> pincode  
emp\_id --> payroll\_id  
emp\_id --> login\_id  
pincode --> city  
city --> state  
designation --> job\_code  
job\_code --> designation  
emp\_id --> hired\_date  
emp\_id --> branch\_name  
emp\_id --> join\_date  
dept\_code --> dept\_name  
dept\_code --> permitted\_no\_of\_leaves  
dept\_code --> no\_of\_employees  
dept\_code --> no\_of\_working\_days  
dept\_code,month\_year --> no\_of\_employees\_on\_leaves  
emp\_id,month\_year --> leaves\_approved

emp\_id,month\_year --> leaves\_rejected  
emp\_id,month\_year --> leaves\_taken  
leave\_type\_code --> leave\_type  
leave\_type\_code --> leave\_pay  
leave\_type --> leave\_type\_code  
payroll\_id,month\_year --> payment\_type  
payroll\_id,month\_year --> payment\_id  
payroll\_id,month\_year --> tax  
payroll\_id,month\_year --> salary  
payroll\_id,month\_year --> effect\_on\_payroll  
payroll\_id --> insurance\_id  
payroll\_id --> dept\_code  
payroll\_id --> insurance\_type  
leave\_id --> leave\_type  
leave\_id --> start\_date  
leave\_id --> end\_date  
leave\_id --> reason  
leave\_id --> status  
leave\_id --> date\_of\_feedback  
leave\_id --> admin\_feedback  
login\_id --> password  
login\_id --> user\_type  
emp\_id --> salary\_per\_hour  
emp\_id --> no\_of\_hours  
emp\_id --> system\_code  
emp\_id --> manager\_id

# Canonical cover

- ❖ emp\_id --> first\_name , last\_name , middle\_name , gender , job\_code , dob , door\_no , street\_name , marital\_status , no\_of\_days\_worked , pincode , payroll\_id , login\_id, hired\_date , branch\_name , join\_date, salary\_per\_hour , no\_of\_hours , system\_code , manager\_id
- ❖ pincode --> city
- ❖ city --> state
- ❖ designation --> job\_code
- ❖ dept\_code --> dept\_name , permitted\_no\_of\_leaves , no\_of\_employees , no\_of\_working\_days
- ❖ dept\_code,month\_year --> no\_of\_employees\_on\_leaves
- ❖ emp\_id,month\_year --> leaves\_approved , leaves\_rejected , leaves\_taken
- ❖ leave\_type\_code --> leave\_type , leave\_pay
- ❖ leave\_type --> leave\_type\_code
- ❖ payroll\_id,month\_year --> payment\_type , payment\_id , tax , salary , effect\_on\_payroll
- ❖ payroll\_id --> insurance\_id , dept\_code , insurance\_type
- ❖ leave\_id --> leave\_type , start\_date , end\_date , reason , status , date\_of\_feedback , admin\_feedback
- ❖ login\_id --> password , user\_type

## Candidate keys

emp\_id

month\_year

leave\_id

mail\_id

phone\_number

# Closure

Emp\_id+ = {emp\_id, first\_name, middle\_name, last\_name, gender, designation, job\_code, dob, door\_no, street\_name, marital\_status, no\_of\_days\_worked, dept\_code, dept\_name, pincode, payroll\_id, login\_id, city, state, hired\_date, join\_date, branch\_name, permitted\_no\_of\_leaves, no\_of\_employees, no\_of\_working\_days, insurance\_id, insurance\_type, password, user\_type, salary\_per\_hour, no\_of\_hours, system\_code, manager\_id}

Leave\_id+ = {leave\_id, leave\_type, start\_date, end\_date, reason, status, admin\_feedback, date\_of\_feedback, leave\_type\_code, leave\_pay}

Month\_year+ = {month\_year}

Emp\_id, month\_year+ = {emp\_id, month\_year, first\_name, middle\_name, last\_name, gender, designation, job\_code, dob, door\_no, street\_name, marital\_status, no\_of\_days\_worked, dept\_code, dept\_name, pincode, payroll\_id, login\_id, city, state, hired\_date, join\_date, branch\_name, permitted\_no\_of\_leaves, no\_of\_employees, no\_of\_working\_days, insurance\_id, insurance\_type, password, user\_type, salary\_per\_hour, no\_of\_hours, system\_code, manager\_id, leaves\_approved, leaves\_rejected, leaves\_taken, no\_of\_employees\_on\_leave, payment\_type\_payment\_id, tax, salary, effect\_on\_payroll}

Emp\_id, leave\_id+ = {emp\_id, first\_name, middle\_name, last\_name, gender, designation, job\_code, dob, door\_no, street\_name, marital\_status, no\_of\_days\_worked, dept\_code, dept\_name, pincode, payroll\_id, login\_id, city, state, hired\_date, join\_date, branch\_name, permitted\_no\_of\_leaves, no\_of\_employees, no\_of\_working\_days, insurance\_id, insurance\_type, password, user\_type, salary\_per\_hour, no\_of\_hours, system\_code, manager\_id, leave\_id, leave\_type, start\_date, end\_date, reason, status, admin\_feedback, date\_of\_feedback, leave\_type\_code, leave\_pay}

Leave\_id, month\_year+ = {month\_year, leave\_id, leave\_type, start\_date, end\_date, reason, status, admin\_feedback, date\_of\_feedback, leave\_type\_code, leave\_pay}`

# Not in 1NF

- ❖ emp\_id, phone\_number -> phone\_number
- ❖ emp\_id, mail\_id -> mail\_id

Decomposing into 1NF:

Master table (excluding phone\_number, mail\_id)

emp_id	phone_number
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emp_id	mail_id
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# Not in 2NF

- ◆  $\text{emp\_id} \rightarrow \text{first\_name}, \text{middle\_name}, \text{last\_name}, \text{gender}, \text{designation}, \text{job\_code}, \text{dob}, \text{door\_no}, \text{street\_name}, \text{marital\_status}, \text{no\_of\_days\_worked}, \text{dept\_code}, \text{dept\_name}, \text{pincode}, \text{payroll\_id}, \text{login\_id}$
- ◆  $\text{emp\_id}, \text{month\_year} \rightarrow \text{leaves\_approved}, \text{leaves\_rejected}, \text{leaves\_taken}$
- ◆  $\text{leave\_id} \rightarrow \text{leave\_type}, \text{start\_date}, \text{end\_date}, \text{reason}, \text{status}, \text{admin\_feedback}, \text{date\_of\_feedback}$

# Decomposing into 2NF

Emp_id	Pincode	Leave_pay	Payroll_id	State	City	Designation	Job_code	Dept_code	Hired_date	Join_date	Branch_name	Dept_name	Permitted_no_of_leaves	No_of_employees	No_of_working_days	No_of_employees_n_Leave	Payment_type
User_type	Salary_per_hour	No_o_f_hours	System_code	Manager_id	Tax	Salary	Effect_on_payroll	Insurance_id	Insurance_type	Login_id	Passwo_rd	Leave_type_code	Leave_type	Payment_id			

emp_id	mail_id
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emp_id	phone_number
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Emp_id	First_name	Middle_name	Last_name	Gender	designation	Job_code	Dob	Door_no	Street_name	Marital_status	No_of_days_worked	Dept_code	Dept_name	pincode	Payroll_id	Login_id
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Emp_id	month_year	leaves_approved	leaves_rejected	leaves_taken
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Leave_id	leave_type	start_date	end_date	reason	status	admin_feedback	date_of_feedback
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# Already in 3NF

- emp\_id, phone\_number -> phone\_number
- emp\_id, mail\_id -> mail\_id
- emp\_id -> first\_name, middle\_name, last\_name, gender, designation, job\_code, dob, door\_no, street\_name, marital\_status, no\_of\_days\_worked, dept\_code, dept\_name, pincode, payroll\_id, login\_id
- emp\_id, month\_year -> leaves\_approved, leaves\_rejected, leaves\_taken
- leave\_id -> leave\_type, start\_date, end\_date, reason, status, admin\_feedback, date\_of\_feedback

emp_id	phone_number
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emp_id	mail_id
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Emp_id	First_name	Middle_name	Last_name	Gender	Job_code	Do b	Door_no	Street_name	Marital_status	No_of_days_worked	Dept_code	pincode	Payroll_id	Dept_name	designation	Log in_id
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Emp_id	month_year	leaves_approved	leaves_rejected	leaves_taken
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Leave_id	leave_type	start_date	end_date	reason	status	admin_feedback	date_of_feedback
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# Not in 3NF

- ❖ pincode -> city, state
- ❖ City -> state
- ❖ designation -> job\_code
- ❖ job\_code ->designation
- ❖ emp\_id, dept\_code -> hired\_date, join\_date, branch\_name
- ❖ dept\_code ->dept\_name, permitted\_no\_of\_leaves, no\_of\_employees, no\_of\_working\_days,
- ❖ dept\_code,month\_year -> no\_of\_employees\_on\_leaves
- ❖ leave\_type\_code -> leave\_type, leave\_pay
- ❖ Leave\_type -> leave\_type\_code
- ❖ Payroll\_id, month\_year -> payment\_type, payment\_id, tax, salary, effect\_on\_payroll
- ❖ Payroll\_id -> insurance\_id, insurance\_type, dept\_code
- ❖ login\_id -> password, user\_type
- ❖ Emp\_id, payroll\_id -> salary\_per\_hour, no\_of\_hours
- ❖ Emp\_id, user\_type ->system\_code, manager\_id

# Decomposing into 3NF

Pincode	city
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City	state
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Emp_id	Dept_code	Hire_date	Join_date	Branch_name
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Designation	Job_code
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Dept_code	Dept_name	Permitted_no_of_leaves	No_of_employees	No_of_working_days
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Dept_code	Month_year	no_of_employees_on_leaves	Leave_pay	Leave_type	Leave_type_code
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Payroll_id	month_year	effect_on_payroll	salary	tax	payment_id	payment_type
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Payroll_id	Dept_code	Insurance_id	Insurance_type	Emp_id	Payroll_id	Salary_per_hour	No_of_hours
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Login_id	User_type	password	Emp_id	User_type	System_code	Manager_id
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Emp_id	Leave_id	Month_year	Mail_id	Phone_number
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# Normalized tables

Pincode	city
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Emp_id	Dept_code	Hire_date	Join_date	Branch_name
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Designation	Job_code
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Dept_code	Dept_name	Permitted_no_of_leaves	No_of_employees	No_of_working_days
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Payroll_id	month_year	effect_on_payroll	salary	tax	payment_id	payment_type
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Emp_id	Payroll_id	Salary_per_hour	No_of_hours
--------	------------	-----------------	-------------

Emp_id	User_type	System_code	Manager_id
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Login_id	User_type	password
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Emp_id	Leave_id	Month_year	Mail_id	Phone_number
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Dept_code	Month_year	no_of_employees_on_leaves
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# Normalized tables

