

DATABASE MANAGEMENT SYSTEMS ASSIGNMENT

WORKPLACE SAFETY AND ERGONOMICS IMPROVEMENT

Workplace Safety and Ergonomics Improvement refers to the process of identifying, assessing, and implementing measures to enhance the safety of the work environment and optimize the ergonomic conditions for employees. The intention is to create a work environment that fosters comfort, productivity, and general well-being while preventing mishaps, injuries, and health problems.

Workplace Safety and Ergonomics Improvement is essential in a software development firm for many reasons, including the direct effects it has on employee health and organizational effectiveness. The following are some primary reasons demonstrating the importance of these factors:

- Employee Health and Well-being:
 - Prioritizing workplace safety and ergonomics helps prevent work-related injuries, musculoskeletal disorders, and other health issues.
 - Employees who are comfortable and in good health are more likely to be engaged, productive, and happy in their jobs.
- Productivity and Performance:
 - A safe and ergonomic work environment contributes to increased productivity.
 - Developers can concentrate on their job without interruptions or physical strain when their workspaces are designed with comfort and fatigue reduction in mind.
- Quality of Work:
 - A comfortable and safe work environment promotes better focus and attention to detail.
 - Employees are more likely to produce high-quality work when they are not distracted by discomfort or safety concerns.
- Team Collaboration:
 - Ergonomic workspaces are designed to facilitate collaboration and communication among team members.

- A well-organized and safe workspace contributes to a positive team culture.
- Risk Mitigation:
 - Early detection and resolution of possible safety issues lowers the likelihood of mishaps and the resulting legal obligations.
 - Ergonomic upgrades lessen the possibility of long-term health problems brought on by unsuitable workplace layout.

NORMALISATION

Database normalization is the process of structuring a relational database in accordance with a series of so-called normal forms to reduce data redundancy and improve data integrity.

TYPES OF NORMALISATIONS

- First Normal Form (1NF)
- Second Normal Form (2NF)
- Third Normal Form (3NF)

Tables that will be used for performing Normalisation are as given below: -

- Employees
- Workstations
- Equipment
- Safety Incidents
- Ergonomics Assessments

FIRST NORMAL FORM (1NF)

Statement – A relation is in first normal form if every attribute in that relation is single-valued attribute.

A table is in 1NF if:

- There are only Single Valued Attributes.
- Attribute Domain does not change.
- There is a unique name for every Attribute/Column.
- The order in which data is stored does not matter.

Table Employees

employee_id INT [PK]

employee_name VARCHAR

department_name VARCHAR

supervisor_name VARCHAR

job_title VARCHAR

Table Workstations

workstation_id INT [PK]

workstation_name VARCHAR

department_name VARCHAR

Table Equipment

equipment_id INT [PK]

equipment_name VARCHAR

equipment_type VARCHAR

Table SafetyIncidents

incident_id INT [PK]
employee_id INT [FK]
workstation_id INT [FK]
equipment_id INT [FK]
incident_date DATE
incident_description VARCHAR

Table ErgonomicsAssessments

assessment_id INT [PK]
employee_id INT [FK]
workstation_id INT [FK]
assessment_date DATE
posture_score INT
repetition_score INT
force_score INT
recommendations VARCHAR

Here all the attributes are atomic (contains only single values). Hence, we can say that these tables satisfy First Normal Form.

SECOND NORMAL FORM (2NF)

Statement - A relation that is in First Normal Form and every non-primary-key attribute is fully functionally dependent on the primary key, then the relation is in Second Normal Form.

The above tables do not satisfy 2NF because:

- In the "Employees" table, "department_name" partially depends on "employee_id". While "employee_id" uniquely identifies an employee, changing only their job title within the same department wouldn't necessarily affect their department. This creates a partial dependency.
- Similarly, "supervisor_name" also has a partial dependency on "employee_id". Changing an employee's job title might not affect their supervisor.
- The "department_name" in the "Workstations" table partially depends on "workstation_id". While unique, a workstation assigned to a different department within the same building wouldn't change its inherent properties.

To make it satisfy 2NF, we can:

- Create new tables for "Departments" and "Supervisors", each with their own primary key.
- Move "department_name" to the "Departments" table and link it to "Employees" with a foreign key referencing "department_id". Similarly, move "supervisor_name" to the "Supervisors" table and link it to "Employees" with a foreign key referencing "supervisor_id".
- This ensures both "department_name" and "supervisor_name" fully depend on their respective full primary keys, eliminating the partial dependencies.

Tables after performing Second Normal Form:

Table Employees

employee_id INT [PK]
employee_name VARCHAR
department_name VARCHAR
supervisor_name VARCHAR
job_title VARCHAR

Table Workstations

workstation_id INT [PK]
workstation_name VARCHAR

department_name VARCHAR

Table Equipment

equipment_id INT [PK]

equipment_name VARCHAR

equipment_type VARCHAR

Table Departments

department_id INT [PK]

department_name VARCHAR

Table Supervisors

supervisor_id INT [PK]

supervisor_name VARCHAR

Table JobTitles

job_title_id INT [PK]

job_title VARCHAR

Table SafetyIncidents

incident_id INT [PK]

employee_id INT [FK]

workstation_id INT [FK]
equipment_id INT [FK]
incident_date DATE
incident_description VARCHAR

Table ErgonomicsAssessments

assessment_id INT [PK]
employee_id INT [FK]
workstation_id INT [FK]
assessment_date DATE
posture_score INT
repetition_score INT
force_score INT
recommendations VARCHAR

THIRD NORMAL FORM (3NF)

Statement: A relation is in the third normal form if there is no transitive dependency for non-prime attributes and in the second normal form.

The above tables do not satisfy 3NF because supervisor_name depends on supervisor_id. To solve this issue, we create an EmployeeAssignments table: (employee_assignments_id(PK), employee_id (FK), supervisor_id (FK), job_title_id (FK)). This table explicitly captures the assignment of employees to supervisors and job titles, eliminating the transitive dependency in Employees.

Tables after performing Third Normal Form:

Table Employees

employee_id INT [PK]
employee_name VARCHAR
department_id INT [FK]

Table Workstations

workstation_id INT [PK]
workstation_name VARCHAR
department_id INT [FK]

Table Equipment

equipment_id INT [PK]
equipment_name VARCHAR
equipment_type VARCHAR

Table Departments

department_id INT [PK]
department_name VARCHAR

Table Supervisors

supervisor_id INT [PK]

supervisor_name VARCHAR

Table JobTitles

job_title_id INT [PK]

job_title VARCHAR

Table EmployeeAssignments

employee_assignments_id INT [PK]

employee_id INT [FK]

supervisor_id INT [FK]

job_title_id INT [FK]

Table SafetyIncidents

incident_id INT [PK]

employee_id INT [FK]

workstation_id INT [FK]

equipment_id INT [FK]

incident_date DATE

incident_description VARCHAR

Table ErgonomicsAssessments

assessment_id INT [PK]

employee_id INT [FK]

workstation_id INT [FK]
assessment_date DATE
posture_score INT
repetition_score INT
force_score INT
recommendations VARCHAR

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