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A Report on the

SAP- ERP IMPLEMENTATION & ITS EFFECTIVENESS IN ONGC

at

M/s. OIL AND NATURAL GAS CORPORATION LIMITED

(ONGC)

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Introduction and Background of ONGC

ONGC is one of Asia's and World's largest and most active companies involved in exploration and production of oil. Oil and Natural Gas Corporation Limited (ONGC) was set up as a Commission on August 14, 1956 at Dehradun - with strategic national objective to explore and exploit hydrocarbon resources of the country. ONGC which is India's number one corporate with significant contribution in industrial and economic growth of the country, has been a leading National oil company of India engaged mainly in exploration, development and production of crude oil, natural gas and some value added products. ONGC explores and produces oil and natural gas, both on land and offshore in diverse logistic condition, from rugged mountains to deserts and deep oceans. It is involved in exploring for and exploiting hydrocarbons in 26 sedimentary basins of India. It produces about 30% of India's crude oil requirement. It owns and operates more than 11,000 kilometers of pipelines in India. The principal activities of ONGC include acquisition of mineral interests in properties, exploration (including prospecting), development, production, transportation and marketing crude oil and natural gas. Focuses on domestic and international oil & gas exploration and production business opportunities . ONGC today, is endeavoring to become a world-class oil and gas company in pursuit of E&P (exploration and production) business in both domestic and international arena and related opportunity specific energy business.

DATABASE MANAGEMENT SYSTEM

Database

Database is a collection of related data that helps in efficient retrieval, insertion and deletion of data. Data refers to facts that can be recorded and that have an implicit meaning.

For example: university database organises data about student, faculty, admin staff etc, which helps in efficient retrieval, insertion and deletion of data.

Database Management System

The software which is used to manage database is called Database Management System (DBMS).

For example: SAP, MySQL, Oracle etc.

Benefits of Database Management System

1. Data Definition-
   It helps in creation, modification and removal of definitions that define the organisation of data in database.
2. Data Updation-
   It helps in insertion, modification and deletion of the actual data in database
3. Data Retrieval-
   It helps in retrieval of data from the database which can be used by applications for various purposes.
4. Data Administration-
   It helps in registering and monitoring users, enforcing data security, monitoring performance, maintaining data integrity, dealing with concurrency control and recovering information corrupted by unexpected failure.

Comparison between DBMS and File Processing

	DBMS	FILE PROCESSING
Data redundancy & inconsistency	Reduced by ensuring a physical piece of data is available to all programs	Data is often duplicated causing higher storage and access cost, poor data integrity and data inconsistency

Accessing data	Allow flexible access to data	Allow pre-determined access to data
Concurrent access	Designed to coordinate multiple users accessing same data at same time	Designed to allow a file to be accessed by two programs concurrently only if both have 'read only' access to file
Data security and integrity	High, enforced	Loose, not enforced

Characterstics of Database System

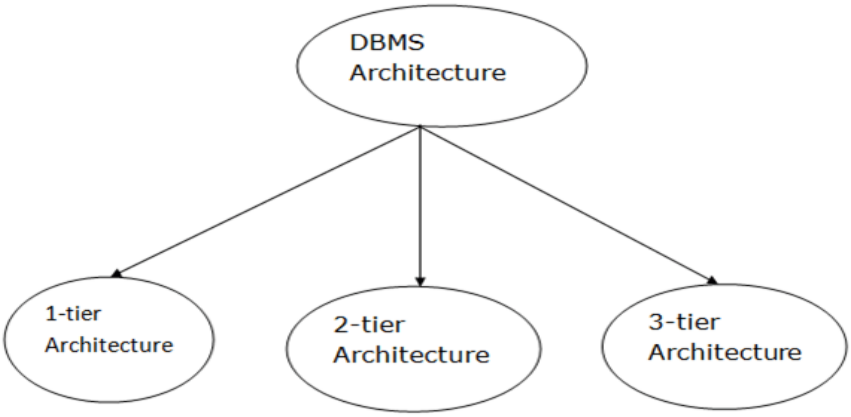
1. Self describing nature-
   The database system contains not only the database itself but also a complete definition or description of the database structure and constraints. This definition is stored in the DBMS catalog, which contains information such as the structure of each file, the type and storage format of each data item, and various constraints on the data.
2. Insulation between programs and data-
   The structure of data files is embedded in the application programs, so any changes to the structure of a file may require changing all programs that access that file. By contrast, DBMS access programs do not require such changes in most cases. The characteristic that allows program-data independence and program-operation independence is called data abstraction.
   - Structure of data files is stored in the DBMS catalog separately from the access programs. We call this property program-data independence.
   - User application programs can operate on the data by invoking these operations through their names and arguments, regardless of how the operations are implemented. This may be termed program-operation independence.
3. Support of multiple views of data
   A database typically has many users, each of whom may require a different perspective or view of the database. A multiuser DBMS whose users have a variety of distinct applications must provide facilities for defining multiple views.
4. Sharing of data and multiuser transaction processing
   The DBMS has a concurrency control software to ensure that several users

trying to update the same data do so in a controlled manner so that the result of the updates is correct. Online Transaction Processing is thus used to ensure that concurrent transactions operate correctly and efficiently.

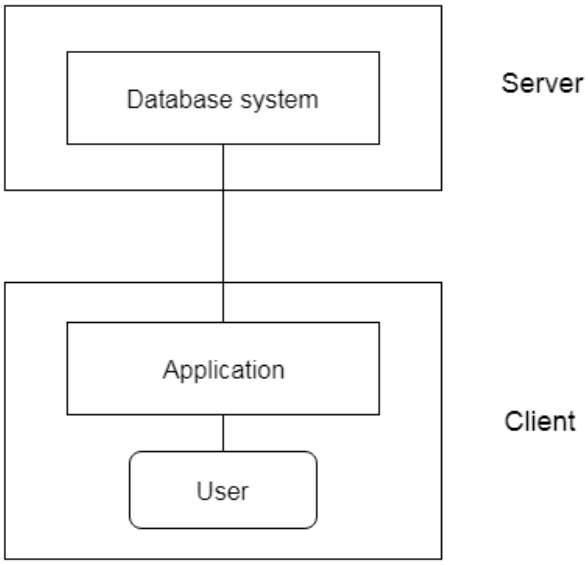
Schemas and Instances

- Description of database is called Schema.
- Data in database at a particular moment in time is called a database state or instances.

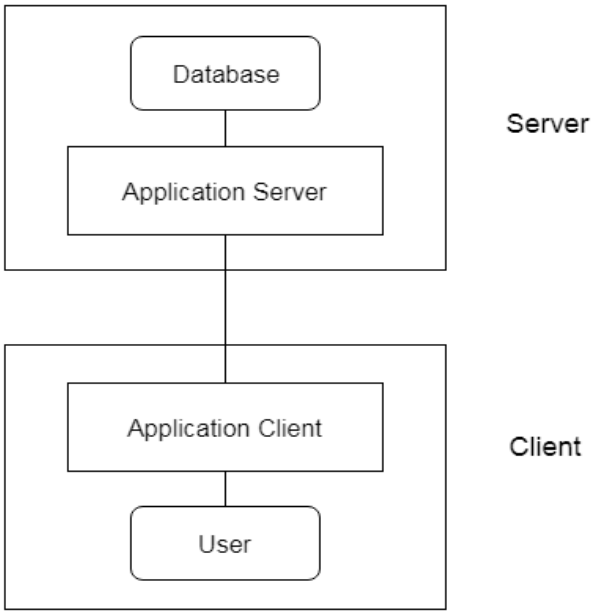
DBMS Architechture



- 1-tier Architecture- In this, the database is directly available to the user. It means the user can directly sit on the DBMS and uses it. Also, any changes done here will directly be done on the database itself. It doesn't provide a handy tool for end users.
- 2-tier-Architecture- In this, applications on the client end can directly communicate with the database at the server side. The user interfaces and application programs are run on the client-side. The server side is responsible to provide the functionalities like: query processing and transaction management.

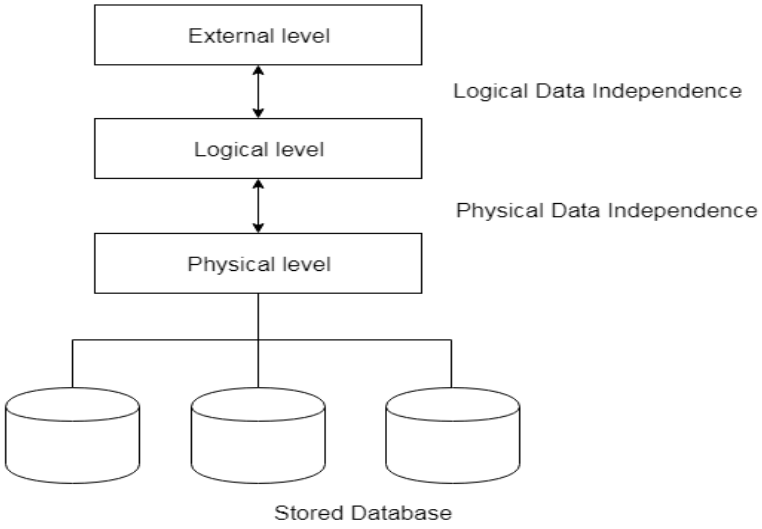


- 3-tier-Architecture- In this, client can't directly communicate with the server. The application on the client-end interacts with an application server which further communicates with the database system. End user has no idea about the existence of the database beyond the application server. The database also has no idea about any other user beyond the application.



Data Independence

It is defined as the capacity to change the schema at one level of a database system without having to change the schema at the next higher level.



DBMS Language

1. Data definition language- Specify conceptual and internal schema. Store schema description in catalog.
2. Storage definition language- Specify internal schema.
3. View definition language- To specify user views and their mappings.
4. Data manipulation language- Retrieval, insertion, deletion and modification of the data.

DBMS Interfaces

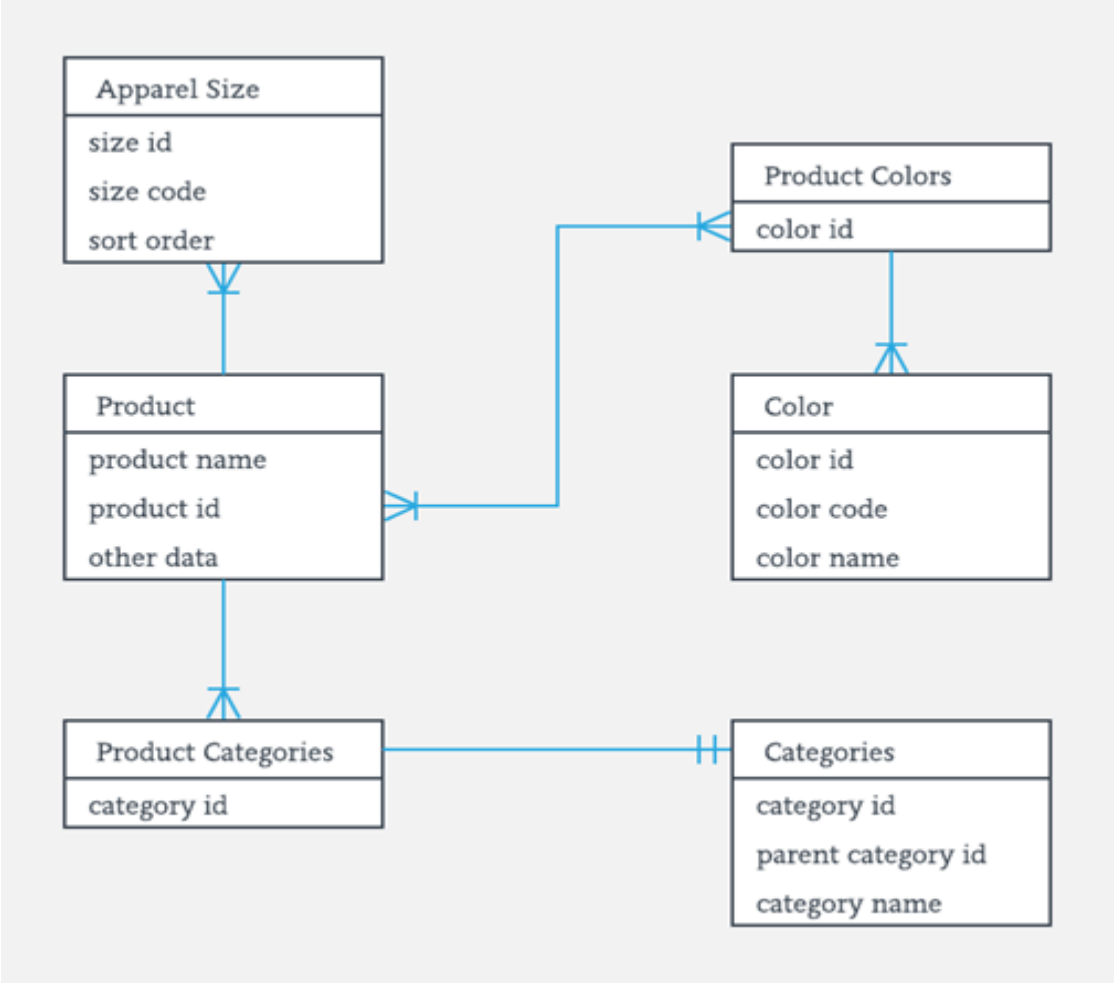
1. Memo-based interface- The interfaces present the user with list of options that lead the user through the formulation of a request.
2. Form-based interface- These interfaces displays a form to each other. Forms can be used to insert data or fill certain entries.
3. Graphical-user interface- The interface displays a schema to the user in diagrammatic form. The user then can specify a query by manipulating the diagram.
4. Natural language interface- These interfaces accept requests written in some language and attempt to understand them.
5. Speech input and output- Limited use of speech as an input query and speech as an answer to a question or result of a request is becoming commonplace.
6. Interface for parametric users- Parametric users, such as bank tellers, often have a small set of operations that they must perform repeatedly.
7. DBA interface- These include commands for creating accounts, setting system parameters, granting account authorization, changing a schema, and reorganizing the storage structures of a database.

E-R Model

The ER or (Entity Relational Model) is a high-level conceptual data model diagram. Entity-Relation model is based on the notion of real-world entities and the relationship between them.
ER modeling helps you to analyze data requirements systematically to produce a well-designed database. So, it is considered a best practice to complete ER modeling before implementing your database.

E-R DIAGRAM

Entity relationship diagram displays the relationships of entity set stored in a database. In other words, we can say that ER diagrams help you to explain the logical structure of databases. At first look, an ER diagram looks very similar to the flowchart. However, ER Diagram includes many specialized symbols, and its meanings make this model unique.



Sample of ER Diagram

Facts about ER Diagram Model

- ER model allows you to draw Database Design
- It is an easy to use graphical tool for modeling data
- Widely used in Database Design
- It is a GUI representation of the logical structure of a Database
- It helps you to identifies the entities which exist in a system and the relationships between those entities

Use of ER Diagram

Here, are prime reasons for using the ER Diagram

- Helps you to define terms related to entity relationship modeling
- Provide a preview of how all your tables should connect, what fields are going to be on each table
- Helps to describe entities, attributes, relationships
- ER diagrams are translatable into relational tables which allows you to build databases quickly
- ER diagrams can be used by database designers as a blueprint for implementing data in specific software applications
- The database designer gains a better understanding of the information to be contained in the database with the help of ERP diagram
- ERD is allowed you to communicate with the logical structure of the database to users

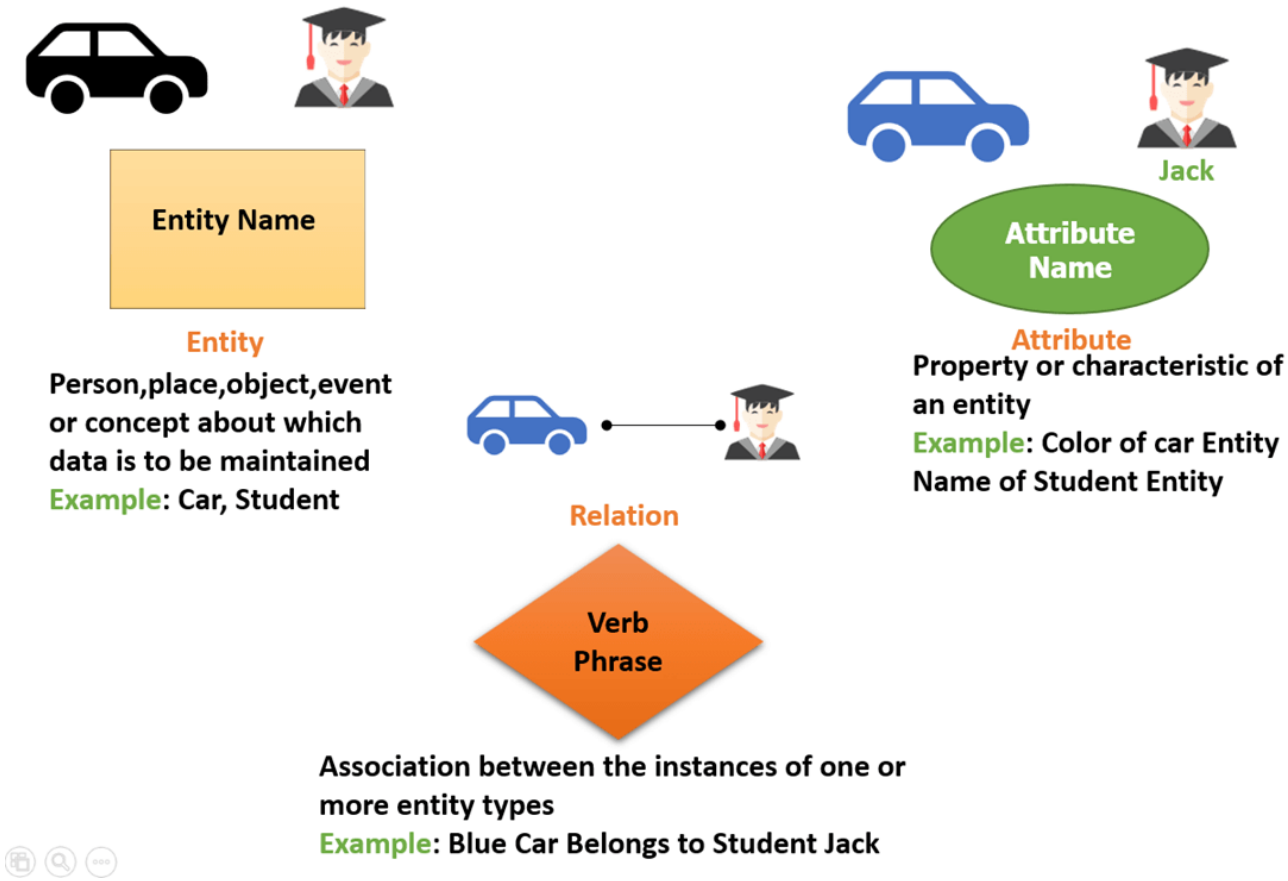
Components of the ER Diagram

This model is based on three basic concepts:

- Entities
- Attributes
- Relationships

Example

For example, in a University database, we might have entities for Students, Courses, and Lecturers. Students entity can have attributes like Rollno, Name, and DeptID. They might have relationships with Courses and Lecturers.



ENTITY

A real-world thing either living or non-living that is easily recognizable and nonrecognizable. It is anything in the enterprise that is to be represented in our database. It may be a physical thing or simply a fact about the enterprise or an event that happens in the real world.

An entity can be place, person, object, event or a concept, which stores data in the database. The characteristics of entities are must have an attribute, and a unique key. Every entity is made up of some 'attributes' which represent that entity.

Examples of entities:

- **Person:** Employee, Student, Patient
- **Place:** Store, Building
- **Object:** Machine, product, and Car
- **Event:** Sale, Registration, Renewal
- **Concept:** Account, Course

Notation of an Entity

Entity set:

Student

An entity set is a group of similar kind of entities. It may contain entities with attribute sharing similar values. Entities are represented by their properties, which also called attributes. All attributes have their separate values. For example, a student entity may have a name, age, class, as attributes.

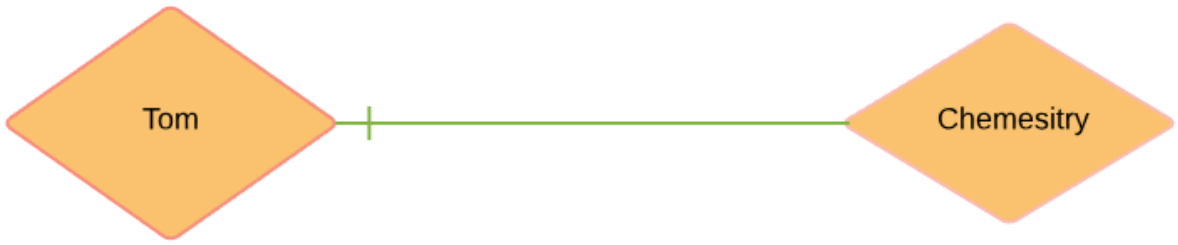
Examples of Entities:

A university may have some departments. All these departments employ various lecturers and offer several programs.

Some courses make up each program. Students register in a particular program and enroll in various courses. A lecturer from the specific department takes each course, and each lecturer teaches a various group of students.

Relationship

Relationship is nothing but an association among two or more entities. E.g., Tom works in the Chemistry department.



Entities take part in relationships. We can often identify relationships with verbs or verb phrases.

For example:

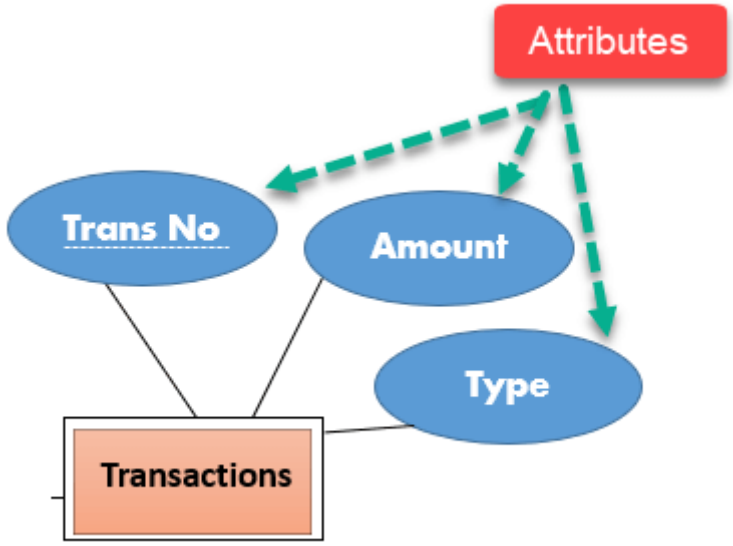
- You are attending this lecture
- I am giving the lecture
- Just loke entities, we can classify relationships according to relationship-types:
- A student attends a lecture
- A lecturer is giving a lecture.

Difference between Strong entity key and weak entity key

Strong entity key	Weak entity key
Strong entity set always has a primary key	Weak entity key does not have enough attribute to build primary key
It is represented by rectangle symbol	It is represented by double rectangle symbol
It contains a Primary key represented by the underline symbol.	It contains a Partial Key which is represented by a dashed underline symbol.
Its member is called strong entity set	Its member is called subordinate entity set.
The connecting line of strong entity and relationship is single	The connecting line of weak entity and relationship is double.
Primary Key is one of its attributes which helps to identify its member.	In a weak entity set, it is a combination of primary key and partial key of the strong entity set.
The ER diagram relationship between two strong entity shown by using diamond symbol.	The ER diagram relationship between a strong entity and a weak entity is shown by a double diamond symbol.

Attributes

It is a single-valued property of either an entity-type or a relationship-type.
For example, a lecture might have attributes: time, date, duration, place, etc.
An attribute is represented by an Ellipse

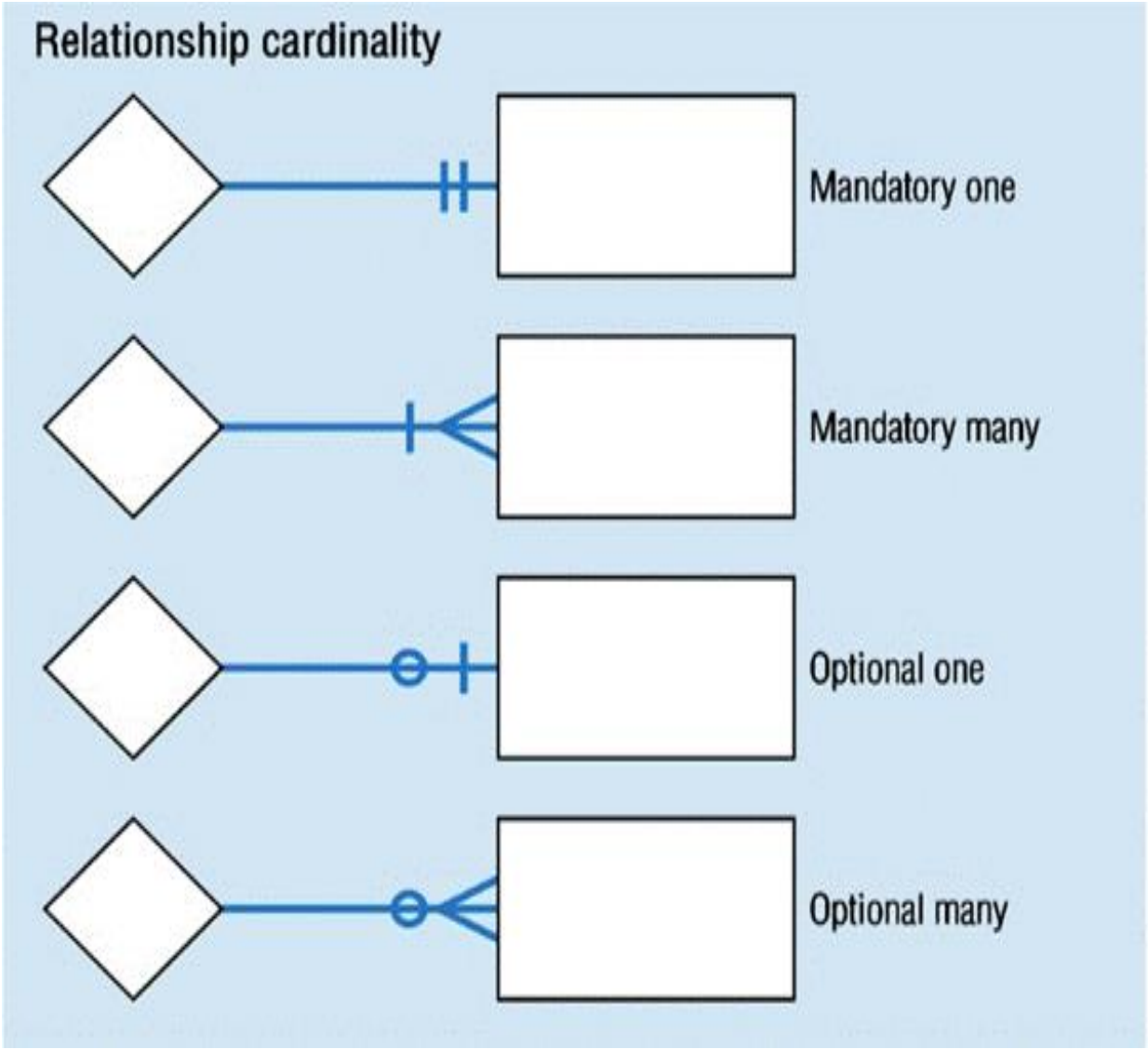


Types of Attributes	Description
Simple attribute	Simple attributes can't be divided any further. For example, a student's contact number. It is also called an atomic value.
Composite attribute	It is possible to break down composite attribute. For example, a student's full name may be further divided into first name, second name, and last name.
Derived attribute	This type of attribute does not include in the physical database. However, their values are derived from other attributes present in the database. For example, age should not be stored directly. Instead, it should be derived from the DOB of that employee.
Multivalued attribute	Multivalued attributes can have more than one values. For example, a student can have more than one mobile number, email address, etc.

Cardinality

Defines the numerical attributes of the relationship between two entities or entity sets.
Different types of cardinal relationships are:

- One-to-One Relationships
- One-to-Many Relationships
- May to One Relationships
- Many-to-Many Relationships



1. One-to-one:

One entity from entity set X can be associated with at most one entity of entity set Y and vice versa.

Example: One student can register for numerous courses. However, all those courses have a single line back to that one student.

2.One-to-many:

One entity from entity set X can be associated with multiple entities of entity set Y, but an entity from entity set Y can be associated with at least one entity.

For example, one class is consisting of multiple students.

3. Many to One

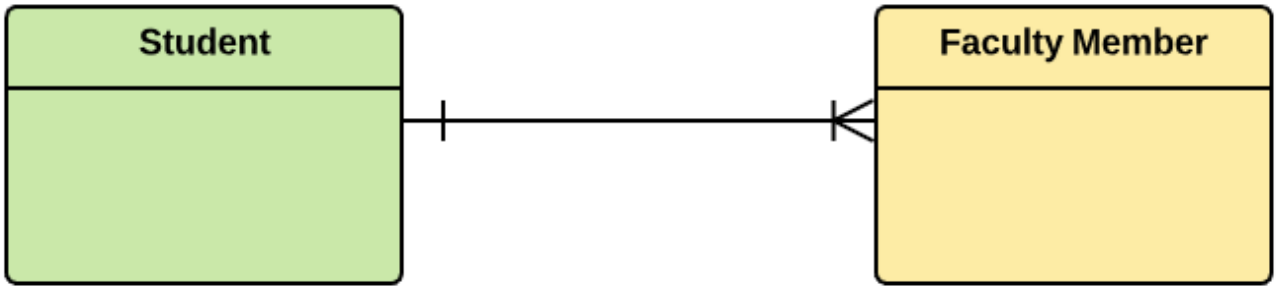
More than one entity from entity set X can be associated with at most one entity of entity set Y. However, an entity from entity set X may or may not be associated with more than one entity from entity set X.

For example, many students belong to the same class.

4. Many to Many:

One entity from X can be associated with more than one entity from Y and vice versa.

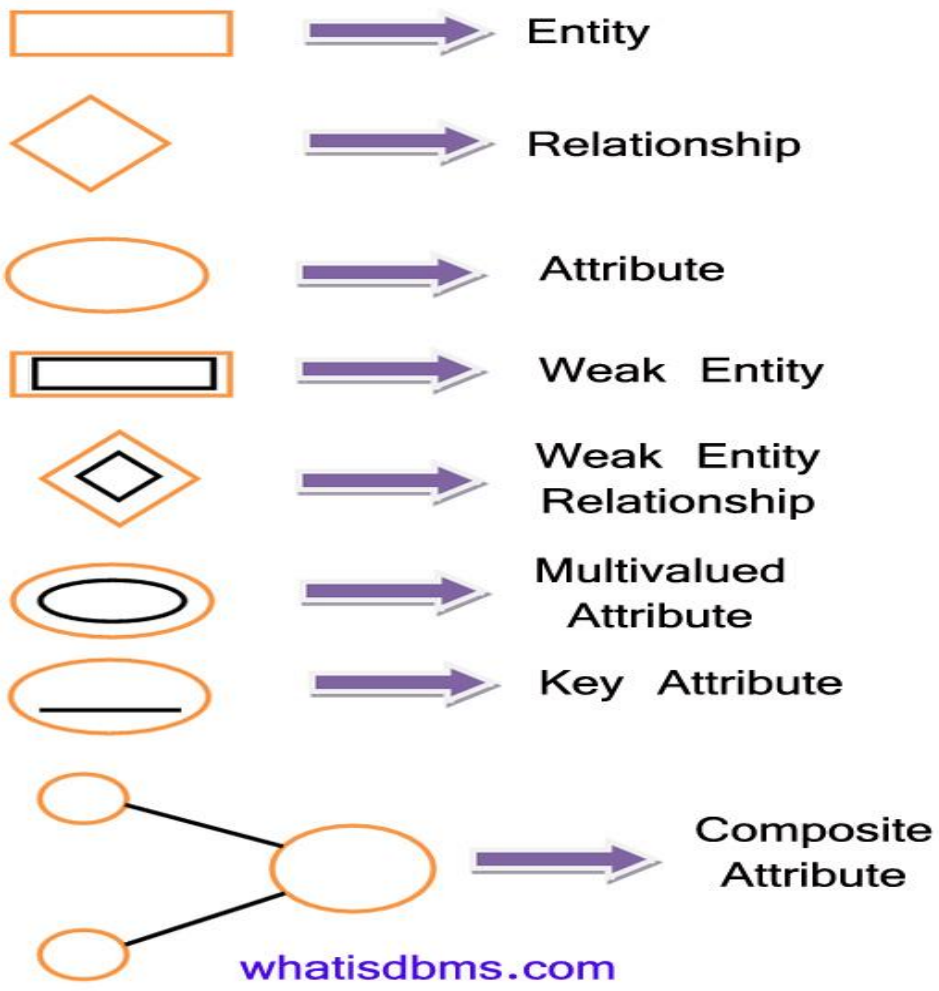
For example, Students as a group are associated with multiple faculty members, and faculty members can be associated with multiple students.



ER- Diagram Notations

ER- Diagram is a visual representation of data that describe how data is related to each other.

- **Rectangles:** This symbol represent entity types
- **Ellipses :** Symbol represent attributes
- **Diamonds:** This symbol represents relationship types
- **Lines:** It links attributes to entity types and entity types with other relationship types
- **Primary key:** attributes are underlined
- **Double Ellipses:** Represent multi-valued attributes



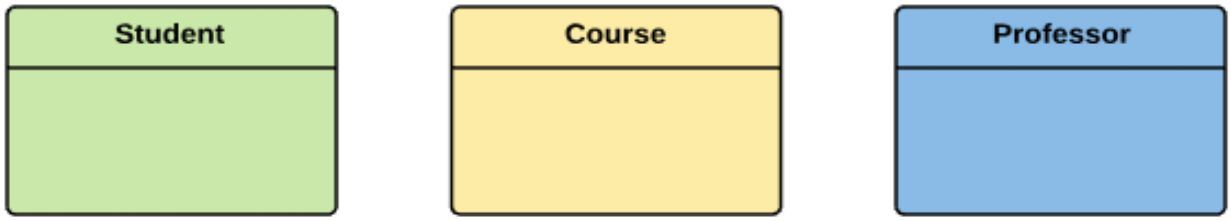
Steps to Create an ERD

Following are the steps to create an ERD.

Step 1) Entity Identification

We have three entities

- Student
- Course
- Professor



Step 2) Relationship Identification

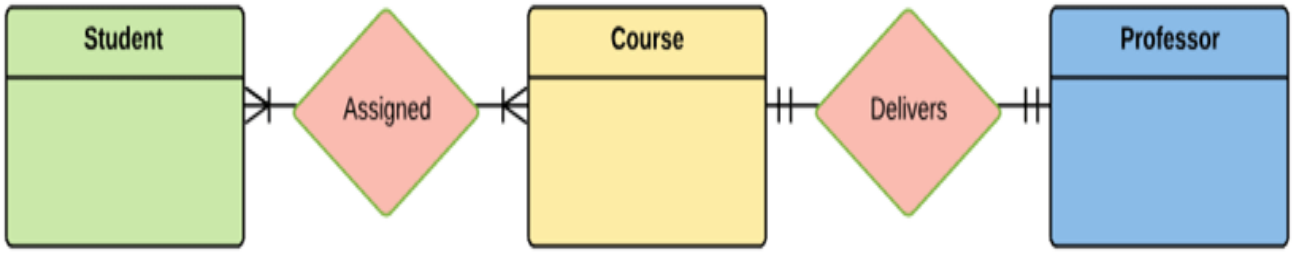
We have the following two relationships

- The student is **assigned** a course
- Professor **delivers** a course

Step 3) Cardinality Identification

For them problem statement we know that,

- A student can be assigned **multiple** courses
- A Professor can deliver only **one** course



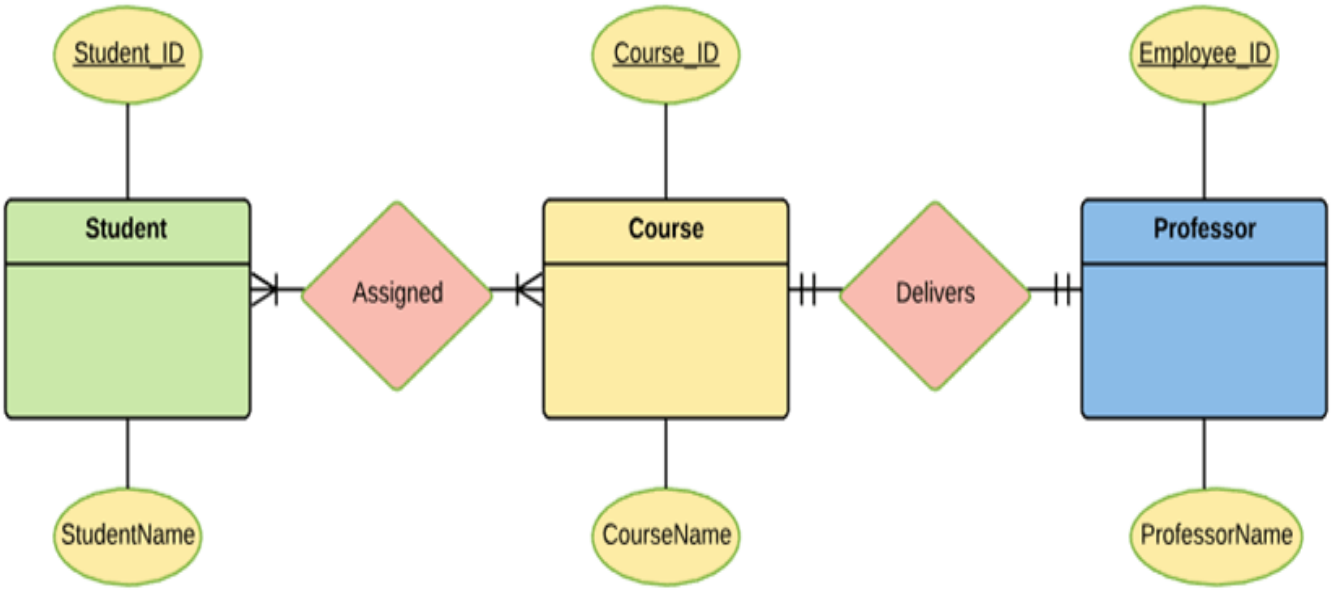
Step 4) Identify Attributes

You need to study the files, forms, reports, data currently maintained by the organization to identify attributes. You can also conduct interviews with various stakeholders to identify entities. Initially, it's important to identify the attributes without mapping them to a particular entity.

Once, you have a list of Attributes, you need to map them to the identified entities. Ensure an attribute is to be paired with exactly one entity. If you think an attribute should belong to more than one entity, use a modifier to make it unique.

Once the mapping is done, identify the primary Keys. If a unique key is not readily available, create one.

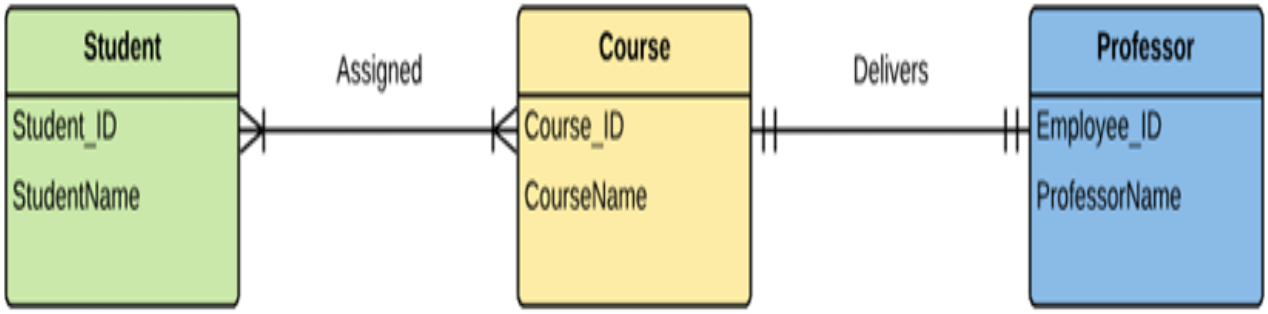
Entity	Primary Key	Attribute
Student	Student_ID	StudentName
Professor	Employee_ID	ProfessorName
Course	Course_ID	CourseName



For Course Entity, attributes could be Duration, Credits, Assignments, etc. For the sake of ease we have considered just one attribute.

Step 5) Create the ERD

A more modern representation of ERD Diagram



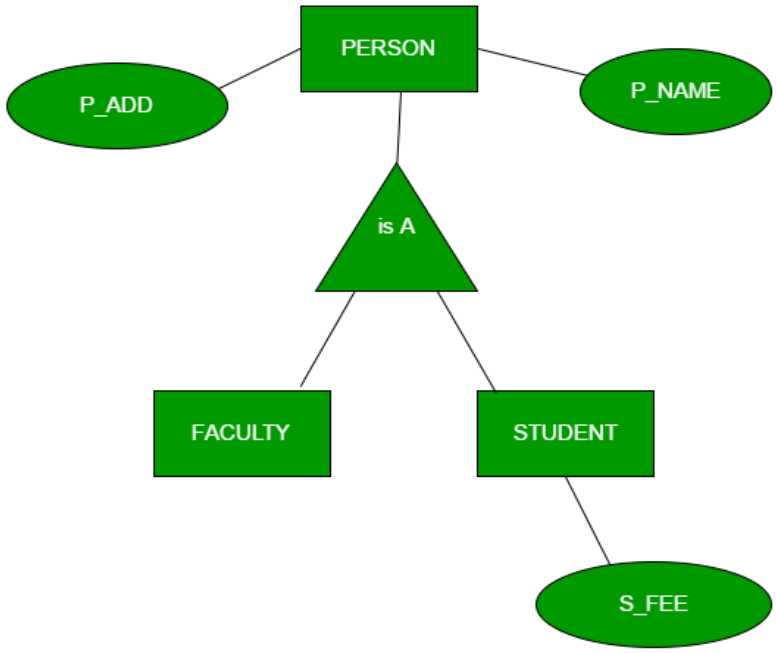
ER Model

Generalization, Specialization and Aggregation in ER model are used for data abstraction in which abstraction mechanism is used to hide details of a set of objects.

Generalization –

Generalization is the process of extracting common properties from a set of entities and create a generalized entity from it. It is a bottom-up approach in which two or more entities can be generalized to a higher level entity if they have some attributes in common.

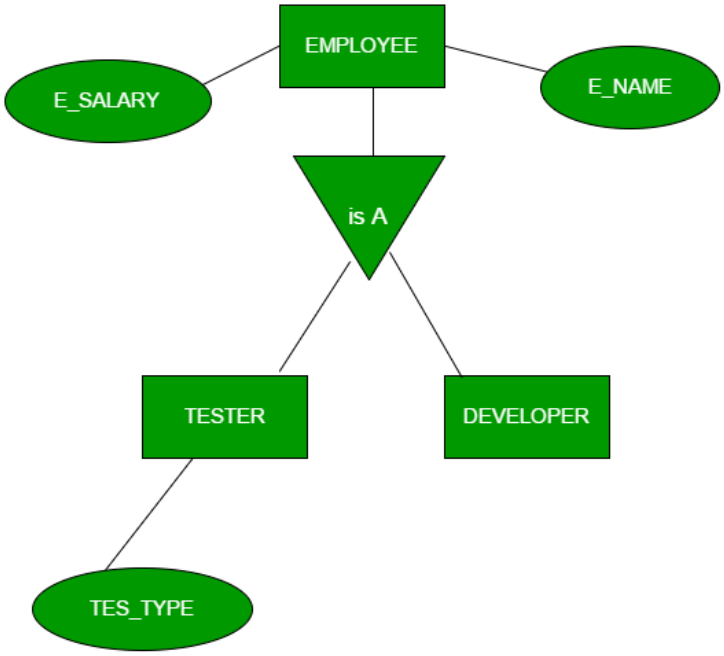
For Example, STUDENT and FACULTY can be generalized to a higher level entity called PERSON as shown in Figure 1. In this case, common attributes like P_NAME, P_ADD become part of higher entity (PERSON) and specialized attributes like S_FEE become part of specialized entity (STUDENT).



Specialization –

In specialization, an entity is divided into sub-entities based on their characteristics. It is a top-down approach where higher level entity is specialized into two or more lower level entities.

For Example, EMPLOYEE entity in an Employee management system can be specialized into DEVELOPER, TESTER etc. as shown in Figure 2. In this case, common attributes like E_NAME, E_SAL etc. become part of higher entity (EMPLOYEE) and specialized attributes like TES_TYPE become part of specialized entity (TESTER).

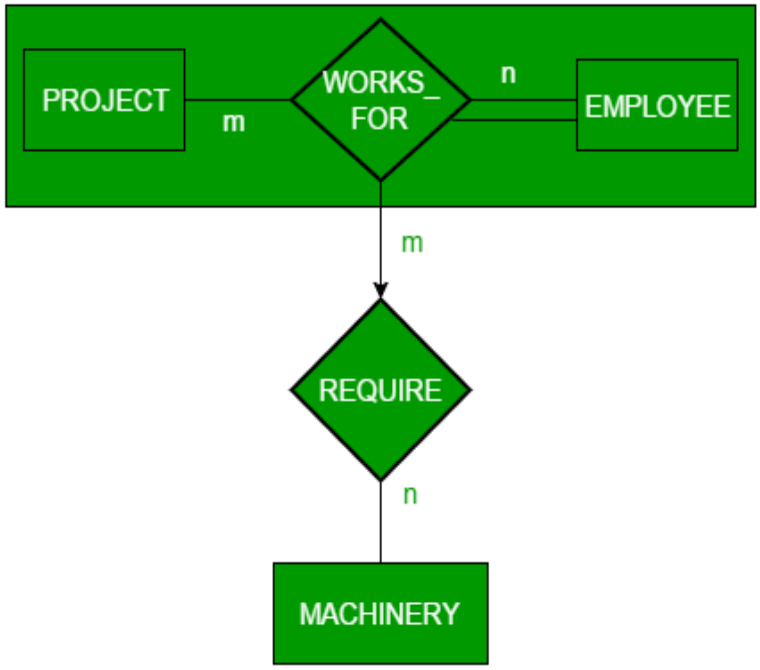


Specialization

Aggregation –

An ER diagram is not capable of representing relationship between an entity and a relationship which may be required in some scenarios. In those cases, a relationship with its corresponding entities is aggregated into a higher level entity.

For Example, Employee working for a project may require some machinery. So, REQUIRE relationship is needed between relationship WORKS_FOR and entity MACHINERY. Using aggregation, WORKS_FOR relationship with its entities EMPLOYEE and PROJECT is aggregated into single entity and relationship REQUIRE is created between aggregated entity and MACHINERY.



Aggregation

EXTENDED E-R FEATURES

- Specialization – The process of designating to sub grouping within an entity set is called specialization. In above figure, the "person" is distinguishing in to whether they are "employee" or "customer".
- Generalization – generalization is relationship that exist between higher level entity set and one or more lower level entity sets. Generalization synthesizes these entity sets into single entity set.
- Higher level and lower level entity set – This property is created by specialization and generalization. The attributes of higher-level entity sets are inherited by lower level entity sets.
- Attribute inheritance - When given entity set is involved as a lower entity set in only one "ISA" (is a) relationship, it is referred as a single attribute inheritance. If lower entity set is involved in more than one ISA (is a) relationship, it is referred as a multi attribute inheritance.
- Aggregation - There is a one limitation with E-R model that it cannot express relationships among relationships. So aggregation is an abstraction through which relationship is treated as higher level entities.

Relational Model

The relational model represents the database as a collection of relations. A relation is nothing but a table of values. Every row in the table represents a collection of related data values. These rows in the table denote a real-world entity or relationship.

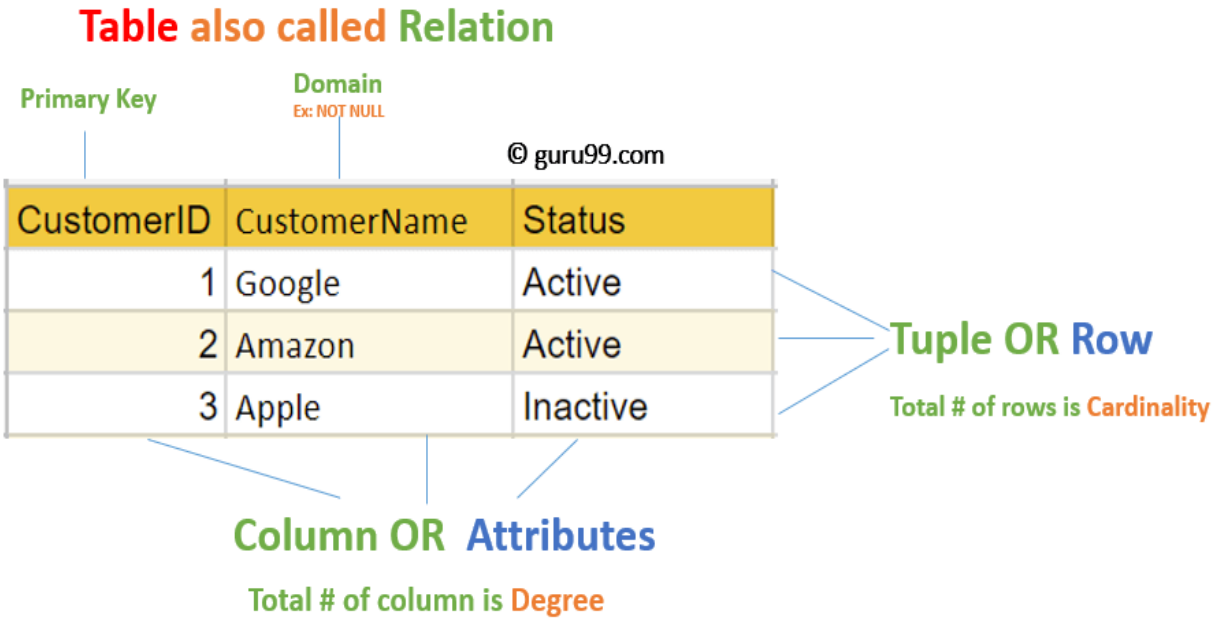
The table name and column names are helpful to interpret the meaning of values in each row. The data are represented as a set of relations. In the relational model, data are stored as tables. However, the physical storage of the data is independent of the way the data are logically organized.

Some popular Relational Database management systems are:

- DB2 and Informix Dynamic Server - IBM
- Oracle and RDB – Oracle
- SQL Server and Access - Microsoft

Relational Model Concepts

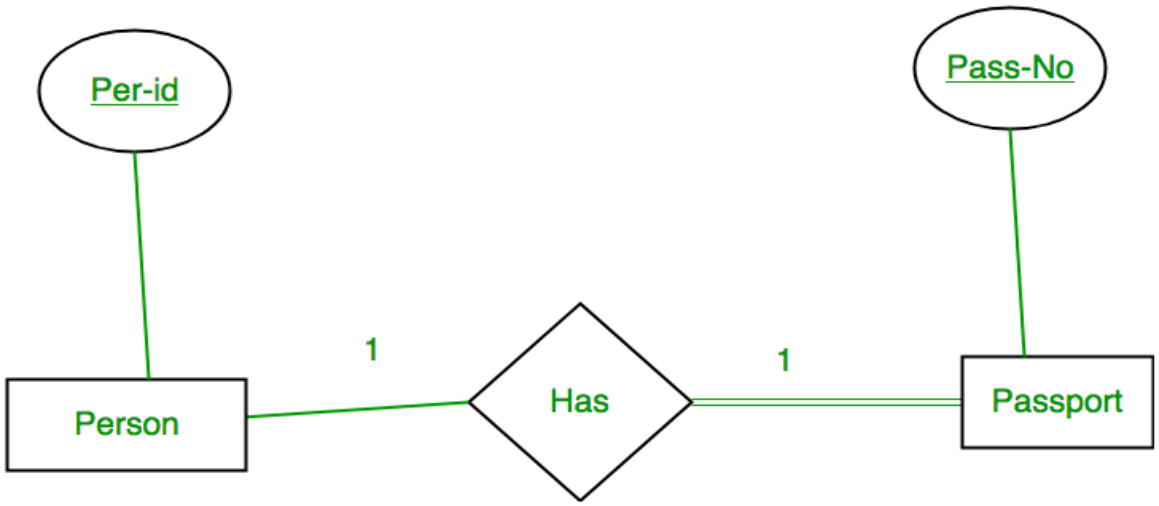
1. **Attribute:** Each column in a Table. Attributes are the properties which define a relation. e.g., Student_Rollno, NAME,etc.
2. **Tables** – In the Relational model the, relations are saved in the table format. It is stored along with its entities. A table has two properties rows and columns. Rows represent records and columns represent attributes.
3. **Tuple** – It is nothing but a single row of a table, which contains a single record.
4. **Relation Schema:** A relation schema represents the name of the relation with its attributes.
5. **Degree:** The total number of attributes which in the relation is called the degree of the relation.
6. **Cardinality:** Total number of rows present in the Table.
7. **Column:** The column represents the set of values for a specific attribute.
8. **Relation instance** – Relation instance is a finite set of tuples in the RDBMS system. Relation instances never have duplicate tuples.
9. **Relation key** - Every row has one, two or multiple attributes, which is called relation key.
10. **Attribute domain** – Every attribute has some pre-defined value and scope which is known as attribute domain



E-R diagram to Relational Model

After designing the ER diagram of system, we need to convert it to Relational models which can directly be implemented by any RDBMS like Oracle, MySQL etc. In this article we will discuss how to convert ER diagram to Relational Model for different scenarios.

Case 1: Binary Relationship with 1:1 cardinality with total participation of an entity



A person has 0 or 1 passport number and Passport is always owned by 1 person. So it is 1:1 cardinality with full participation constraint from Passport.

First Convert each entity and relationship to tables. Person table corresponds to Person Entity with key as Per-Id. Similarly Passport table corresponds to Passport Entity with key as Pass-No. Has Table represents relationship between Person and Passport (Which person has which passport). So it will take attribute Per-Id from Person and Pass-No from Passport.

Person			**Has**			**Passport**	
Per-Id	**Other Person Attribute**		**Per-Id**	**Pass-No**		**Pass-No**	**Other PassportAttribute**
PR1	–		PR1	PS1		PS1	–
PR2	–		PR2	PS2		PS2	–
PR3	–						

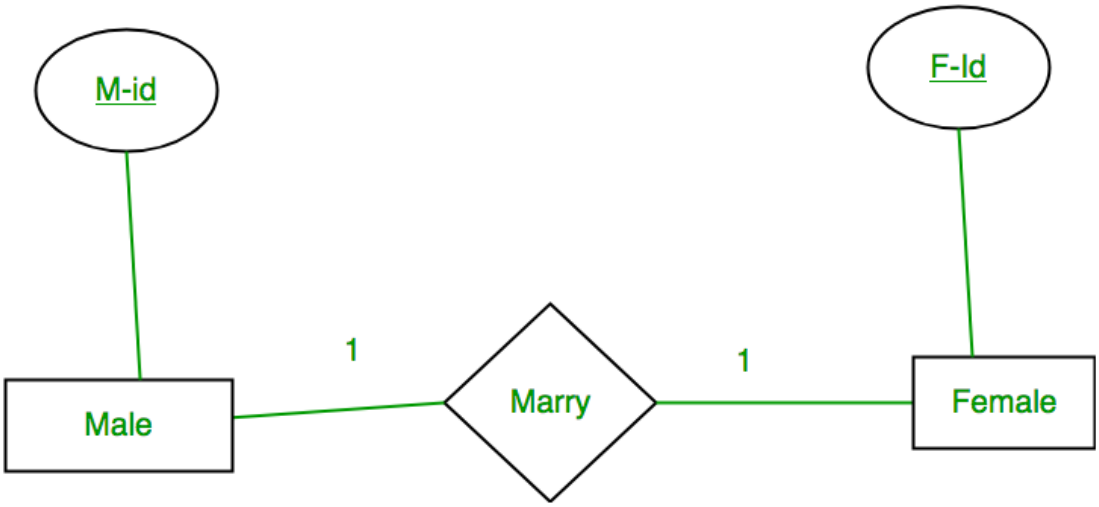
Table 1

As we can see from Table 1, each Per-Id and Pass-No has only one entry in **Has** table. So we can merge all three tables into 1 with attributes shown in Table 2. Each Per-Id will be unique and not null. So it will be the key. Pass-No can't be key because for some person, it can be NULL.

Per-Id	Other Person Attribute	Pass-No	Other PassportAttribute

Table 2

Case 2: Binary Relationship with 1:1 cardinality and partial participation of both entities



A male marries 0 or 1 female and vice versa as well. So it is 1:1 cardinality with partial participation constraint from both. First Convert each entity and relationship to tables. Male table corresponds to Male Entity with key as M-Id. Similarly Female table corresponds to Female Entity with key as F-Id. Marry Table represents relationship between Male and Female (Which Male marries which female). So it will take attribute M-Id from Male and F-Id from Female.

Male			**Marry**			**Female**	
M-Id	Other Male Attribute		M-Id	F-Id		F-Id	Other FemaleAttribute
M1	–		M1	F2		F1	–
M2	–		M2	F1		F2	–
M3	–					F3	–

Table 3

As we can see from Table 3, some males and some females do not marry. If we merge 3 tables into 1, for some M-Id, F-Id will be NULL. So there is no attribute which is always not NULL. So we can't merge all three tables into 1. We can convert into 2 tables. In table 4, M-Id who are married will have F-Id.

associated. For others, it will be NULL. Table 5 will have information of all females. Primary Keys have been underlined.

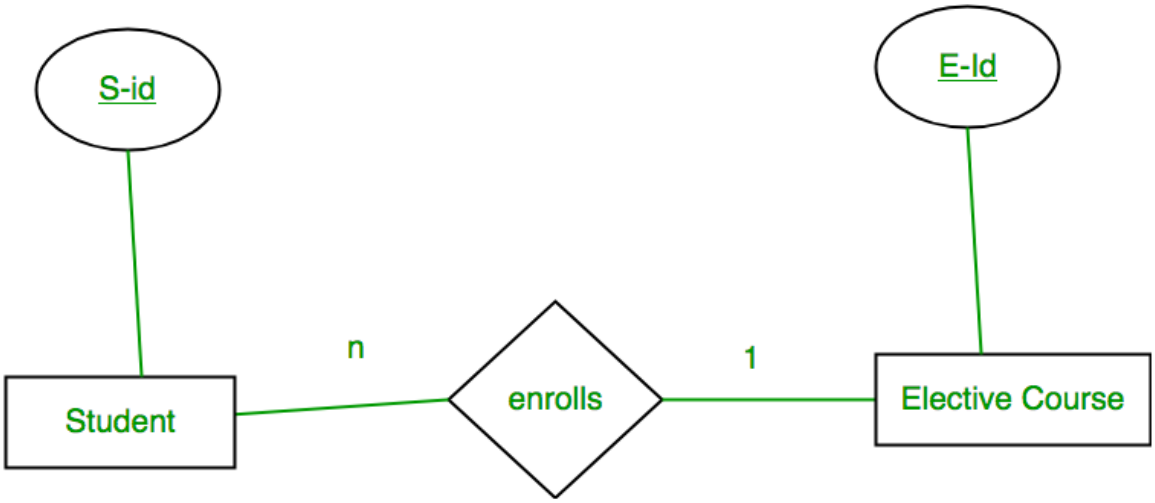
M-Id	Other Male Attribute	F-Id

Table 4

F-Id	Other FemaleAttribute

Table 5

Case 3: Binary Relationship with n: 1 cardinality



In this scenario, every student can enrol only in one elective course but for an elective course there can be more than one student. First Convert each entity and relationship to tables. Student table corresponds to Student Entity with key as S-Id. Similarly Elective Course table corresponds to Elective Course Entity with key as E-Id. Enrols Table represents relationship between Student and Elective Course (Which student enrols in which course). So it will take attribute S-Id from and Student E-Id from Elective Course

Student			**Enrolls**			**Elective_Course**	
S-Id	Other Student Attribute		S-Id	E-Id		E-Id	Other Elective CourseAttribute

S1	–		S1	E1		E1	–
S2	–		S2	E2		E2	–
S3	–		S3	E1		E3	–
S4	–		S4	E1			

Table 6

As we can see from Table 6, S-Id is not repeating in Enrolls Table. So it can be considered as a key of Enrolls table. Both Student and Enrolls Table's key is same; we can merge it as a single table. The resultant tables are shown in Table 7 and Table 8. Primary Keys have been underlined.

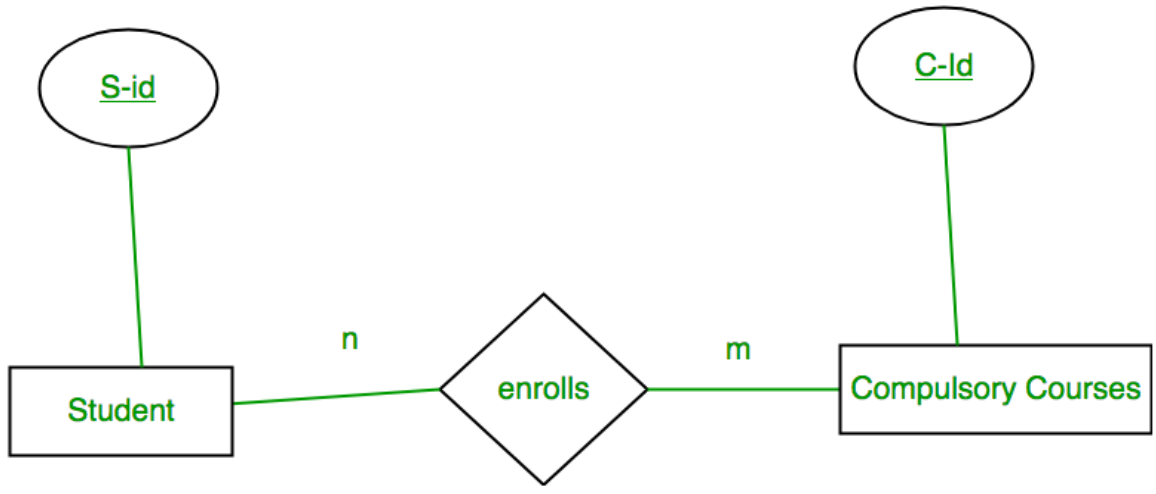
S-Id	Other Student Attribute	E-Id

Table 7

E-Id	Other Elective CourseAttribute

Table 8

Case 4: Binary Relationship with m: n cardinality



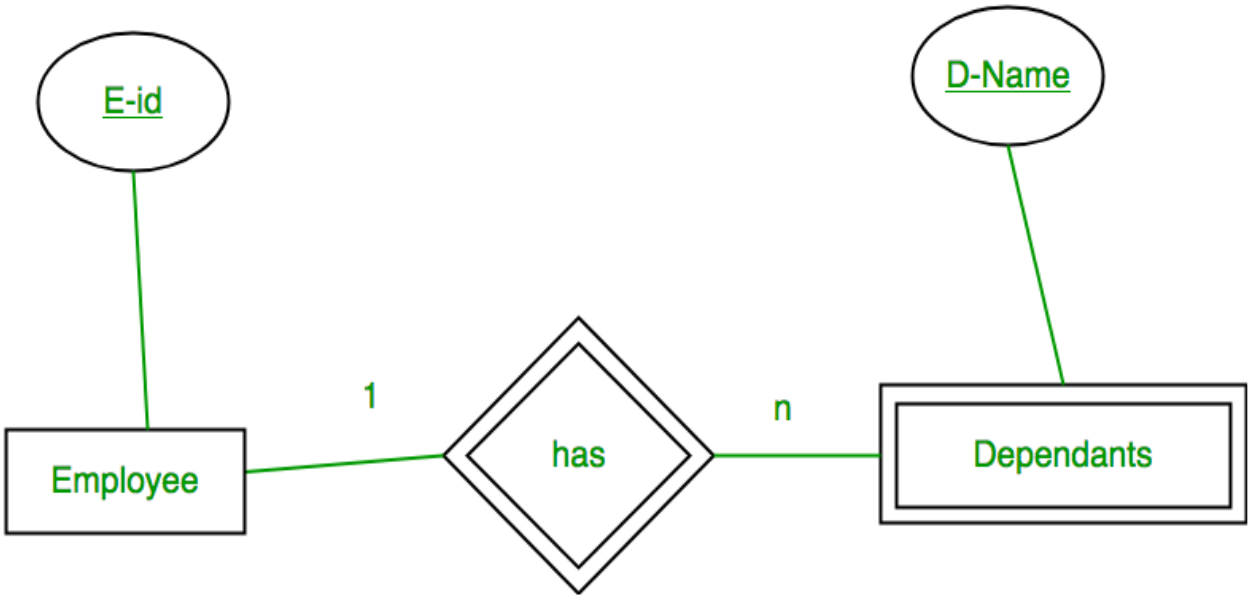
In this scenario, every student can enroll in more than 1 compulsory course and for a compulsory course there can be more than 1 student. First Convert each entity and relationship to tables. Student table corresponds to Student Entity with key as S-Id. Similarly Compulsory_Courses table corresponds to Compulsory Courses Entity with key as C-Id. Enrolls Table represents relationship between Student and Compulsory_Courses (Which student enrolls in which course). So it will take attribute S-Id from Person and C-Id from Compulsory_Courses.

Student			**Enrolls**			**Compulsory_Courses**	
S-Id	Other Student Attribute		S-Id	C-Id		C-Id	Other Compulsory Course Attribute
S1	–		S1	C1		C1	–
S2	–		S1	C2		C2	–
S3	–		S3	C1		C3	–
S4	–		S4	C3		C4	–
			S4	C2			
			S3	C3			

Table 9

As we can see from Table 9, S-Id and C-Id both are repeating in Enrolls Table. But its combination is unique; so it can be considered as a key of Enrolls table. All tables' keys are different, these can't be merged. Primary Keys of all tables have been underlined.

Case 5: Binary Relationship with weak entity



In this scenario, an employee can have many dependants and one dependant can depend on one employee. A dependant does not have any existence without an employee (e.g; you as a child can be dependant of your father in his company). So it will be a weak entity and its participation will always be total. Weak Entity does not have key of its own. So its key will be combination of key of its identifying entity (E-Id of Employee in this case) and its partial key (D-Name).

First Convert each entity and relationship to tables. Employee table corresponds to Employee Entity with key as E-Id. Similarly Dependants table corresponds to Dependant Entity with key as D-Name and E-Id. Has Table represents relationship between Employee and Dependants (Which employee has which dependants). So it will take attribute E-Id from Employee and D-Name from Dependants.

Employee			**Has**			**Dependants**		
E-Id	Other Employee Attribute		E-Id	D-Name		D-Name	E-Id	Other Dependants Attribute

E1	–		E1	RAM		RAM	E1	–
E2	–		E1	SRINI		SRINI	E1	–
E3	–		E2	RAM		RAM	E2	–
			E3	ASHISH		ASHISH	E3	–

Table 10

As we can see from Table 10, E-Id, D-Name is key for **Has** as well as Dependants Table. So we can merge these two into 1. So the resultant tables are shown in Tables 11 and 12. Primary Keys of all tables have been underlined.

E-Id	Other Employee Attribute

Table 11

D-Name	E-Id	Other DependantsAttribute

Table 12

SAP

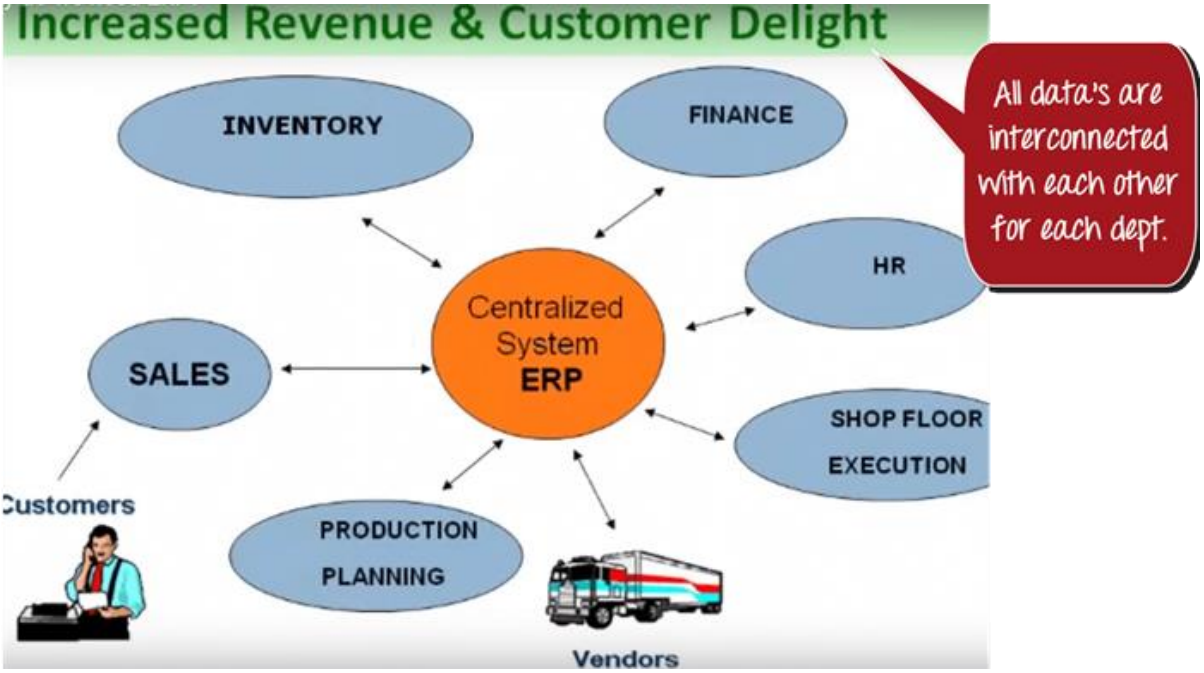
SAP stands for **S**ystems **A**pplications and **P**roducts in Data Processing.

SAP Software was Founded in 1972 by Wellenreuther, Hopp, Hector, Plattner and Tschira. SAP system consists of a number of fully integrated modules, which covers virtually every aspect of the business management. SAP by definition is also named of the ERP (Enterprise Resource Planning) software as well the name of the company.

SAP ERP

SAP ERP is an enterprise resource planning software developed by the German company SAP SE. SAP ERP incorporates the key business functions of an organization. The latest version (SAP ERP 6.0) was made available in 2006. 31

SAP ERP consists of several modules, including Financial Accounting (FI), Controlling (CO), Asset Accounting (AA), Sales & Distribution (SD), Material Management (MM), Production Planning (PP), Quality Management (QM), Project System (PS), Plant Maintenance (PM), Human Resources (HR). SAP ERP collects and combines data from the separate modules to provide the company or organization with enterprise resource planning.



Advantages of ERP

- Allows easier global integration (barriers of currency exchange rates, language, and culture can be bridged automatically)
- Updates only need to be done once to be implemented company-wide
- Provides real-time information, reducing the possibility of redundancy errors
- User interface is completely customizable allowing end users to dictate the operational structure of the product.

Disadvantages of ERP

- Locked into relationship by contract and manageability with vendor – a contract can hold a company to the vendor until it expires and it can be unprofitable to switch vendors if switching costs are too high
- Inflexibility – vendor packages may not fit a company's business model well and customization can be expensive and/or lead to version lock-in, since customized code may not fit future versions and would then need to be redeveloped at great expense
- Return on Investment may take too long to be profitable

ERP Implementation in ONGC

When Oil and Natural Gas Corporation Limited – India's largest Oil Exploration And Production Company – set out to completely transform its business, it turned to SAP solutions and services. As a result, the company was able to overcome the challenge of standardizing business process across its 500-plus locations.

Key Challenges For ERP Implementation in ONGC

• Standardize than 200 business process of 13,000 users across a total of more than500 offshore and onshore locations – all in under 30 months
• Cleanup and migration of huge amount data from legacy systems and creation of data from hard copies
• Create one of the largest data centers in Asia Pacific.

Objectives of ERP Implementation in ONGC

- Optimization and standardization of business process
- Higher visibility of operations to improve productivity
- More efficient processes with higher visibility of costs
- Integration and extension of value chain

Solutions and Services

• SAP Project Management service of the SAP Consulting organization
• my SAP Business Suite family of business solutions
• SAP for Oil & Gas solution portfolio

Why SAP Solutions and Services

• SAP has experience with global oil and gas production companies
• Solutions and services complemented existing SAP finance and human resource & applications

ERP Implementation Highlights

• SAP Consulting blended expertise with ability to improvise as complexities of project required
• Excellent knowledge transfer from collaboration with SAP consultants
• Project team consultants from SAP played critical role in rollout and education of users

ERP Implementation in ONGC: A Phased Method Approach

- Modular Implementation
- Geographic Implementation
- Business Functions Implementation

The method of modular implementation goes after one ERP module at a time or one geographic region at a time. This limits the scope of implementation usually to one functional department. This approach suits companies that do not share many common processes across departments or business units.

In modular implementation approach, each module of SAP was installed step by step in ONGC. Initially, **IMMS** i.e. Material Management Module was installed in ONGC where all functions of MM department was managed. This module was not fully operational Online. Some of the activities were performed manually like purchase requests and orders. After this module was successfully implemented, **Kuber** i.e. financial module was implemented. This module was operated independently without integrating it with MM module. Some of the financial activities were being performed manually during earlier stages. After this, **Shramik** i.e.HR module was implemented were all the HR activities were handled like recruitment, payroll, etc. Thus each module was working in isolated form. Then the Project Manager of ICE, Mr. Jamestin decided to integrate all these modules and also introduced all other SAP modules simultaneously. He then introduced Project Monitoring, IMPETUS, etc. Thus finally all the modules were integrated and simultaneously introduced in the system.

They chose to implement their first module in toughest location of India i.e. Mumbai. Since Mumbai was big challenge in terms of Infrastructure, hardware, number of PC, etc. Also Mumbai being most profit making center among other locations, it was most cumbersome to implement ERP initially in Mumbai.

Also, Mumbai has most skilled & experienced number of employees among all the locations. In Mumbai, there was large infrastructure with large number of PC's. Also there was sufficient amount of training required to be given to all ONGC employees. End user training needed to be given to all the employees for SAP.

Geographically, ERP(SAP) post implementation in Mumbai was implemented in Assam location. After that, SAP was implemented in Delhi which was a dedicated server. A backup server was then installed in Vadodara. Thus a strong security measures were taken to install SAP system successfully over all Indian location.

In ONGC, there many joint ventures with most renowned companies. Thus post ERP implementation, it has enhanced business function implementation which has increased overall profitability of ONGC.

Key Benefits Post ERP Implementation in ONGC

• Improved, disciplined approach to accounting. Procurement and financial systems
• Rapid acceptance and improved performance by workers
• Improved visibility of business process across different business functions from exploration to production to sales and offshore joint ventures
• The implementation also included other SAP solution, such as the Collaboration Projects suite, as well as supplier relationship management and upstream oil and gas exploration and production solutions.
• SAP solutions support ONGC's exploration, production, maintenance, procurement, finance, payroll, sales, offshore, logistics, joint ventures, treasury, and quality management processes, including the monitoring of key performance indicators
• Meeting the logistical challenge connecting hundreds of sites across India-even on nomadic drilling rigs and seismic field parties.
• Huge investments in planning – from integration testing with more than 400 power users to the codification of a huge number of materials and services. Providing support to 3,000 initial users.
• Processes and actions had to be documented in a standardized format and recorded in a timebound period.
• Paper-bases contracts and vendor payments were complemented by electronic transaction workers had to begin using the new system.
• Implemented built-in checks to make sure users followed the correct procedures when entering data and identifying them.
• System design included detailed transaction monitoring reports.
• Creates high visibility for critical data. Critical operational data is available online for all levels of management.

• “ERP package will enable the availability of information on a real-time basis and the elimination of duplicate activities across business process by capturing data at the source point. This will, in turn, facilitate decision support, better operation control, and efficient cost management”.
• Information sharing quickly, reliably, and effortlessly.
• Implementation of my SAP Business Suite and the SAP for Oil & Gas solution portfolio.

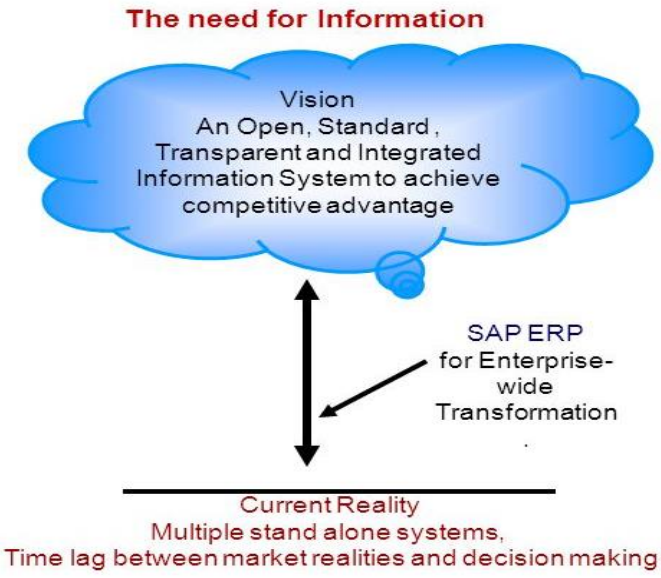
Implementation Partner
SAP Consulting organization

Environment before ERP implementation
PC based legacy system for material management. Project monitoring and maintenance planning

Database Used
Oracle

Hardware Used
HP, Compaq, IBM, and Sun

Operating System
Microsoft, Windows NT, Sun Solaris and UNIX



• New capabilities for designing and conducting end use training, in-house competencies for mapping new business processes to the SAP system managing business expectations, managing critical area during data migration, and the management of post-go-live issues and queries.
• A new IT tool and the flexibility to adopt new business innovation, along with an in-house leadership capability, prepare ONGC to explore new frontiers, including joint ventures overseas

Applying 21st century to a complex business is a challenge, but a timetable of less than 30 months adds new complications. Modernizing one of the worlds largest oil exploration and production companies was a personal and professional goal of Chairman & Managing Director ,Mr.Subir Raha. His vision for Oil and Natural Gas Corporation Limited(ONGC) involved bringing about quantum improvements in daily work processes for personal separated by thousands of miles on land and at sea on offshore drilling platforms.

With a market capitalization over US $ 2O billion, ONGC contributes more than 80% of India's Oil & Natural Gas. Over decades, ONGC, evolved from being a commission to a state-run corporation. Today, it is a publicly traded company with the Indian government owing an 84% stake. It must comply with unique regulations as a state enterprise, yet be flexible enough to complete against other global gas and oil companies in the wake of deregulation and globalization of the economy.

Challenge: To Transform Business Organization

In 2001, CMD of ONGC ,Mr. Raha announced plans for "One Organization ,One Information, One Data" to integrate data and transform operations. According to Mr.Raha, "The ERP package will enable availability of information on a real time basis and the elimination of duplicate activities across business process by capturing data at the source point. This will in turn, facilitate decision support, better operation control and efficient cost management.

To ONGC information is as valuable as oil and sometimes harder to locate. Collation, consolidation and analysis of operational data was difficult and time consuming. Mr.Raha unveiled Project ICE – Information Consolidation for Efficiency to achieve global standards in operations and introduce new business

processes. It would require retraining thousands of people all without interrupting daily work that spans 10 countries outside India from Russia to Venezuela.

By 2005, Mr.Raha's vision was a reality for ONGC's 36000 plus employees. The result took shape in less than 30 months using the mySAP Business Suite Family of business solutions that enables information sharing quickly, reliably and effortlessly.

SCOPE

The scope of the project is to give major focus on actual operation of Finance, Human Resource, Material Management & Project System modules with respect to post -ERP implementation in ONGC.

OBJECTIVE

• To understand various operations in 'Finance, Human Resource and Material Management in O.N.G.C and study its functionality through ERP implementation.
• To know about the ERP system Implemented in ONGC.

Finance: ERP(SAP) Module in ONGC

In O.N.G.C, every functional module have direct/indirect relationship with financial module.

Financial module is designed to collect all the data needed to support the preparation of financial statements for external users. It is used for 2 types of users: internal viz. executives, senior management, accounts, employees, etc. in order to provide information in making decisions. The other users are external viz. legal authorities, banks, auditors, shareholders, taxing authorities, financial analysts, etc. Managerial Accounting or controlling module is designed to collect data for the preparation and analysis of reports for use by internal users. It is basically for the executives, senior management, department managers, controllers and accountants.
In O.N.G.C organization structure, availability of financial statements at each company code level and Business area level, all balance sheet items to be available business area wise and profit and loss items by grouping of profit centers at business area like drilling services, logging services, etc. level are key benefits. Availability of consolidated financial statements for O.N.G.C. and authorization Controls at company code level & Business Area Level.

General-Ledger(G/L) Integration Process

With help of ERP (SAP) system, G/L integration helps in all logistics transactions which were earlier made through direct entry, to now flow from respective modules.
• It helps in online and real time update of account balances.
• Standardization of Business processes across Company Codes
• Better control on G/L postings through authorization groups.
• Acceptance of services and invoice verification. Debit: Expenses
Credit: Service Account
• Receipt of inventory & Logistics invoice verification. Debit: Inventory
Credit: Vendor Account
• Issue of materials to cost center, process orders, maintenance orders and projects.

• Invoice acceptance at other company Debit: Expenditure Credit: Originating plant
• Stock transfer from storage locations Debit: Receiving plant Credit: Sending plant

Accounting of Gross Revenue and components like Excise Duty, Sales Tax, CESS etc.
With help of SAP system, inventory account in O.N.G.C has been modified as per valuation of classes. Inventory Accounts created for semi finished goods. Loans and investments accounts have been rationalized. Forex receipts account added to track foreign currency receipts.

Changes in accounting due to ERP(SAP)

Due to integrated ERP system, FI entries will be generated directly from Logistics module and account assignment will be controlled by Finance. Automatic clearing of GR/IR accounts & Incidental accounts relating to purchase order. MM posting to accounting period to be controlled by Finance. Logistics posting affecting inventory are Sales Invoice, Post Goods Issue and Inventory Transactions. For transactions flowing from Sales & Distribution(S&D), there are Post Goods issue on delivery at standard price where account is Debited by Cost of Goods and Credited to Inventory. Also Sales of Crude Gas and standard services like training where account is Debited by expenses and Credited to liability Taxes. In view of integrated scenario, FI entries would be generated directly from Logistics module. However, account assignment for the same would be controlled by Finance. Automatic clearing of GR/IR Accounts & Incidental accounts based on Purchase Order. MM posting to accounting period to be controlled by Finance. Regrouping Goods Received (GR/IR) account at period end wherein classification of Invoice & receipt received is done in the system. Logistics posting affecting Inventory are Sales Invoice (SD), Post Goods issue and Inventory Management (MM)

Accounts Payable

Accounts payable in O.N.G.C is used to record accounts payable when materials received or when materials passed on to O.N.G.C or when services are utilized in accordance with accrual accounting principles. It also provides real time accounts payable balances to facilitate timely cash disbursements and accurately forecast cash flow. It is also used to increase accuracy of payments,

withholdings and tax calculations. The accounts payable application component records and manages accounting data. It is also an integral part of purchasing. Deliveries and invoices are managed according to vendors. The system supplies cash management application component with invoice figures from invoices in order to optimize liquidity planning.

Payables are paid with the payment program. The payment program supports all standard payment methods (Such as checks and transfers) in printed form as well as in electronics form. Postings made in Accounts Payable are simultaneously recorded in the General Ledger where different G/L accounts are updated based on the transaction involved (payables and down payments). The system contains due date forecasts and other standard reports that we can use to help we monitor open items. We can design balance confirmations, accounts statements, and other form of reports to suit requirements in business correspondence with vendors. There are balance lists, journals, balance audit trials and other internal evaluations available for documenting transactions in Accounts Payable

Vendor Master Data

Vendor name, address, language, phone numbers, tax number, bank details, payment method. Control data like G/L Reconciliation account, purchasing data and credit limit. Vendor master records are divided into the following areas so that each company code and each purchasing organization can stores its own information for doing business with vendors.

Account Receivables

In O.N.G.C, account receivable standardizes processes across the organization. It helps in real time accounting of transaction, availability of information and for effective analysis of information.
Accounts receivable application component records and manages accounting data of all customers. It is also an integral part of sales accounting. All postings in accounts receivable are also recorded directly in the General Ledger. Different G/L accounts are updated depending on the transaction involved. For example: receivables, down payments and bills of exchange.

Customer master record To record and process business transaction you must create a master for each account. The master records the data that controls how business transactions are recorded and processed by the system.

Specifications you make in the master rerecords are:
a) As default values when post items to account, for example terms of payment.
b) For processing business transactions – reconciliation account
c) For working with master records
d) For communication with customer
e) For the sales department – order processing, shipping and billing data
Customer

Business partner from whom receivables are due as a result of services rendered or goods supplied, for example Goods delivered, services performed, rights transferred. A customer is represented in the SAP System by means of a master record.

Accounting

List of processes involved in accounting in O.N.G.C are:-
• Cash and bank transactions where cash and bank officer alone have authority to post cash and bank documents
• Automatic payment program for creating payment documents against both employee liability and outside vendor payments. The SAP system then prints cheques against payment documents and clears vendor open items
• Cheque deposits from various sources like customers vendors, employees, etc. Pay in slips will be generated by the system only for receipts in Indian currency.
• Bank reconciliation is done for bank clearing account to main account
• Cheque management for automatic payments and automatic cheque creation

Funds Managment

Initially Budgetary details are entered into SAP system. Budget entry will be on decentralized basis. Budget is at G/L level i.e. Stocks/Materials and expenses GL accounts. Logical level at which budgets should be controlled.
The processes involved in Fund Management are: • Initial Budget Entry where budgets are made immediately available • Budget re-appropriation which is made on transferred transactionsBudget Consumption through logistics for procurement of material/services.

Human Resource (HR): ERP(SAP) Module in O.N.G.C

Human resource management(HR) module basically includes following functionalities in ONGC:-

- Recruitment
- Time Management
- Payroll
- Performance Appraisal Report (PAR)
- Personal Information
- Promotion
- Transfer
- Travel Management
- Employee Self Service Portal (E.S.S.)
- SAMPARC objectives and functions
- Loans and Reimbursements
- Training

Recruitment

The ability to meet personnel requirements is key for enterprise. The success of O.N.G.C depends on such factors as the quality and availability of right employees. It is important for the development and success of expanding organization that they have skilled and appropriate employees. The ERP(SAP) system component has all the functions needed for working through the entire recruitment procedure, from creating applicant data to filling vacant positions. The Recruitment component contains an entire range of powerful, flexible functions that can be used to implement an effective and largely automated recruitment strategy.

The Recruitment component can be used to recruit human resources according to requirements, at any time. Applicants data can be stored that is not suitable for a particular vacancy in Applicants Pool thus they can be considered for other or future vacancies. This component enables to define a recruitment procedure that suits the needs of ONGC. Tasks and responsibilities can be distributed to different people, involved in the recruitment process. Recruitment supports in dividing and assigning administrative and decision-making areas. Many tasks can be processed via mass processing. The Recruitment component provides dynamic actions to enable to automate many processes. For example, when initial data for applicant is entered, the system creates a confirmation of receipt

in the form of an applicant activity and a letter confirming receipt of application. This reduces the administrative tasks required of the HR department for applicant correspondence.

Time Managment

The Time Management offers the support in performing all human resources processes involving the planning, recording and valuation of internal and external employees work performed. Time Management has a user-oriented interface that supports entry and administration of time and labor data. Data can be processed centrally by administrators in the human resources department or else in individual departments by time administrators such as supervisors, secretaries, and employees themselves.

Daily Work Schedule

In employee work schedule each and every employee is supposed to register his/her entry and exit time during arrival/departure from ONGC. Each employee is supposed to swipe his Identity Card during entry/exit. This time is automatically recorded by system and employee work schedule gets registered in the system In work schedules. In daily work schedule are also defined.

Planned Working Time

In planned working time, every employee has restricted entry time and exit time in O.N.G.C. Thus every employee has fixed amount of working hours example 8-9 hours. Also every employee has certain number of Casual Leaves (CL) granted on yearly basis. Every employee is allowed to take leaves within given amount.

Payroll

The Payroll document contains the configuration details of the module. As part of business process mapping following configuration has been carried out in this module.

The employee grouping for the personnel calculation rule is required in Payroll Accounting. The collective agreement provisions grouping are required for indirect valuation of wage types in the HR Payroll, Finance Department of the O.N.G.C also approved by Financial Department of O.N.G.C and after verification the amount is transferred to Bank in employee’s account.

Pay Scale groupings and allowances

In this activity, we define pay scale groupings for allowances to differentiate between employee groups. These groupings determine which benefits apply to a particular group of employees.

1. Identify the different benefits each person is entitled too.
2. Create groupings for each category, and assign the privileges

Housing

In O.N.G.C, a particular group of employees are given facility to stay in O.N.G.C quarters depending upon the benefits he/she is entitled to.

Conveyance

Conveyance in terms car eligibility, allowances, etc are given to class1/Q1 level employees. These conveyances given to the employees will be added in their salary.

Payroll Periods

The period for which payroll regularly runs. Payroll period is given to the interval such as weekly or monthly payroll periods. For each period parameter that is assigned to a payroll area, the system requires the following date specifications:

• Start date and end date of each payroll period (Ex: 01.04.2007 – 31.04.2007)
• Payment date of each payroll period (Ex: Payment date for April 2007 is 30.04.2007)

Personal Information

In Employee Service Portal i.e. WEBICE, every active employee has his/her personal information stored like Bio-Data, latest education, family details, transferred made up to present, number of promotions, PAN card number, joining details, etc. Also every employee has facility to make primary nomination and secondary nomination in case of his death. Also medical reimbursement are made to the employee and his family members based on medical policies.

Webice Objectives

• Uniformity in application of company policies
• Simplification and Streamlining of the Processes
• Transparency & Faster decision making
• Automated business processes
• Primary Objective is Towards Paperless transactions

Key Benefits of Webice

Key benefits are:

• Reducing inquiries to HR personnel
• Web-based way to cut HR administrative expenses,
• Reduced HR business process cycle times
• Enhances Employee satisfaction
• Applications & Approvals
• Encashment & Claims
• Reimbursements
• Training history
• Leave Application
• Tour Programs
• Transfer Application
• SAP Authorization
• Loan & Advances Except HBA & Conveyance

Webice Functions

• Travel & Hospitality Management
• Telephone Reimbursement
• Loans and Advances
• SAP Authorizations
• Transfer Options
• Travel Concession for Children – CEA
• Medical Reimbursement/ Advance
• Leave Application/ Cancellation
• Vehicle Insurance
• Children Education
• Medical
• Professional Memberships
• Holiday Home
• Telephone

Loans and Reimbursements

O.N.G.C employees can opt for loan to the company for various purposes such as Housing loan, Children education loan, Car loan, etc. They need to apply for loan online on Employee Service Portal (E.S.S) from where they download application form and submit their personal details and documents.

Also O.N.G.C provides reimbursements for medical, telephone, spectacles, mobile handsets, vehicle insurance, etc. These reimbursements are applicable for particular time period in a year. The employees can claim their reimbursements through Employee Self Service Portal (E.S.S).

Leave Encashment

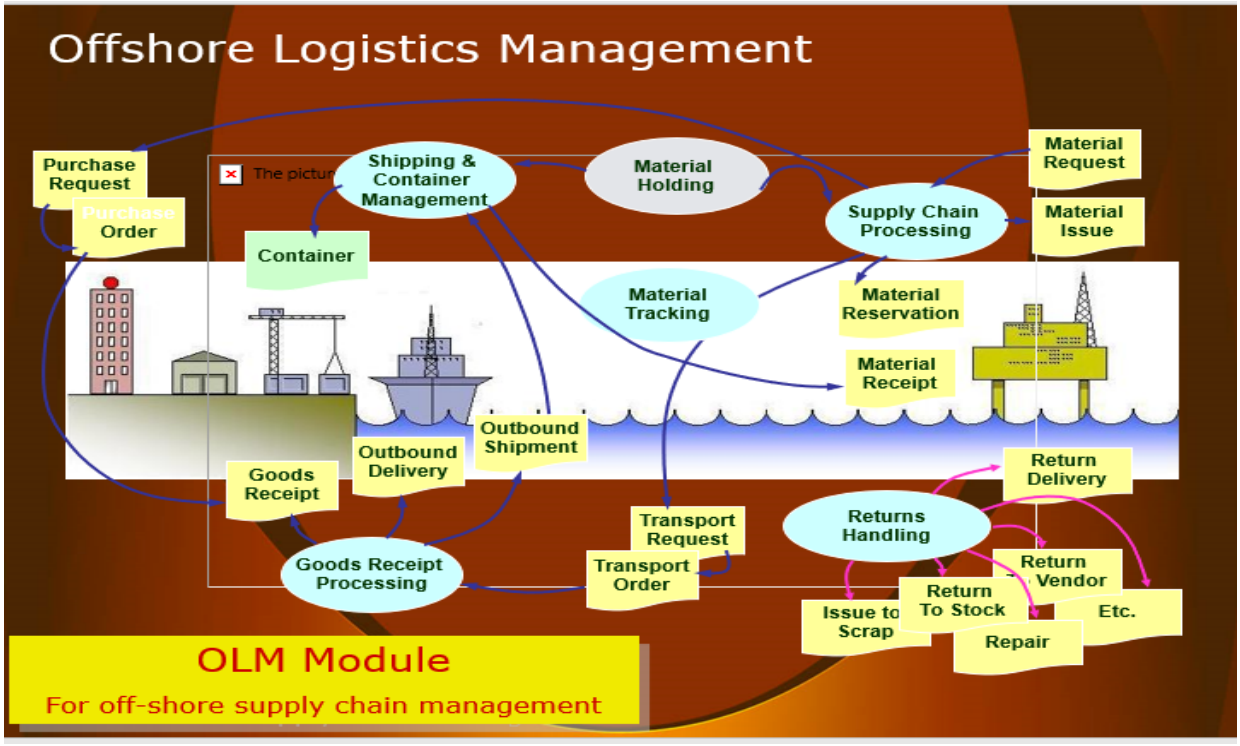
A typical flow of how leave encashment is given to which are given to employees. An employee is able to claim on 75% amount of leaves which he needs to do for encashment and 25% are reserved in HR department. Thus an employee can claim on certain a of leaves which he has for encashment in ONGC.

Training

Training to the O.N.G.C staff employees is given based on the organization requirements. The total number of employees involved in the training, the training officer in in the training, etc comes under training activity. In training activities, various quizzes, examinations, etc are conducted for employee selection and their performance is measured accordingly.

Material Management: ERP(SAP) Module in O.N.G.C

A typical flow diagram of **OFFSHORE LOGISTICS MANAGEMENT(OLM) in O.N.G.C** is shown below:



A typical scenario of Material Management (MM) is shown as:

Initially purchase request is made (PR) by the vendor which goes to the Material Management(MM) department. The purchase request (PR) is handled by Indenting Section. In MM department, two types of functionalities are looked upon i.e. commercial which includes taxes, duties, laws, rules, etc and te purchase.

After this step, the tendering is done online where each vendor is given unique id and password(e tendering).After this step the final materials are selected and an official agreement is made. If the t conditions of the vendor are matching with the company then an agreement is made.

After the agreement is made, the purchase order is made. Payment is made to the contractor and it gets reflected in Service Entry Sheet.(SES). Online payment is do

Purchase Requisition:

The procurement process starts with the receipt of a purchase requisition. MM Department will check the following details of PR for completeness and correctness of PRs before taking further actions:

• PR document type. From PR documents, the users can come to know that what type of further actions to be taken.
• The materials and their specifications demanded.
• The delivery schedules.
• Whether the PR has been duly released by competent authority. This can be seen from the strategy tab at the header level.
• Total value of the PR.
• Any special Instructions to be followed such as board

The purchase requisition order consists of purchase order based on following:

• Equipment
• Budgetary estimates
• Scope of the work
• Period of Completion of request

The purchase requisition order is verified by following level of management hierarchy according to the amount of quantity and price of the materials ordered as follows:

• Initially it is verified by purchase requisition team for small orders
• Upper level manager then verifies the purchase order for larger quantity
• Then financial management team verifies the order for huge sum of money involved
• Ultimately for large amount of orders involving huge sum of amount is undertaken for verification by senior level authority

The purchase requisition is about consolidation of requirements. For example, in INFOCOM DEPARTMENT in O.N.G.C. there is consolidation of materials like printers, computers, scanners, etc.

They prepare following with the purchase requisition document:

• Preparing requirement specification
• List of vendors
• Time frame in which order should be fulfilled
• Cost estimates

LEARNING EXPERIENCES BUSINESS/TECHNOLOGY

Understanding of SAP System Architecture in ONGC

In ONGC, there is central i.e. Main Server of ERP (SAP) system located at DELHI. A Backup Server i.e. Disaster Management Server is located at Vadodara (Gujarat). This helps in security issues in terms of failure at main server at DELHI.

For accessing SAP system in ONGC, every user has been given an unique username and password in ONGC. Only registered users can access the SAP system . This is important in terms o security. In O.N.G.C. There is multilevel data security for application, database and development.

There are two firewalls of CISCO and NORTEL. Their Algorithms and Security Architecture are also different. Even in case a Hacker succeeds in breaking Firewall, the same technique would not do for the second wall. This additional protection is the feature of Multi-level Data Security Architecture
There are 64 Servers, 152 RISC & 115 Intel CPU's installed at data center. Storage capacity i 240 TB of memory in data center.

Moreover, there are two way lease lines installed from various locations. For example there are independent two way lease lines installed from Mumbai to Main Data Center. This helps in prevention of external intruder and helps in data security in the system.

When a SAP user accesses the system, the data gets transferred through both internet router from one location to other and within one location itself. Data transfer within the location is comparatively secured than travelling through internet router. Thus there are two different firewalls are installed for this purpose having different algorithms. And finally the user can access the servers from data centers.

Understanding functions of Finance Department

Before integration of all modules of SAP system, the finance department was working independently. Managing all financial transactions, profit and loss statements, balance sheets, etc. was done manually and there was no proper co-ordination among various transactions with other functional departments .Also there was data redundancy and inaccuracy due to manual entries. Since finance department is backbone of any business, there was much overload of work due to various transactions from HR department, MM department, Production Planning Department, S&D Department, etc.

With introduction of SAP system, data accuracy was increased, redundancy was reduced and there was enhanced work efficiency. In SAP system, General Ledger Integration process due to Logistics transactions was studied. It helps in online and real time update of account balances. In this inventory and invoice receipt is debited by inventory account and credited to vendor account. This process was learnt in SAP system.

In Accounts Payable (A/P), accounts which are to be paid to various vendors based on Logistics and MM department purchased was studied in SAP system. The vendor's Data plays a major role in this process. Similarly, in Accounts Receivable, the payments which is yet to be received from the customers was studied and customers data is most important.

Asset Accounting was studied where all the costs involved in Fixed Assets and its depreciation was included. In Funds Management, budgetary consumption, appropriation was studied which was required by logistics module.

In Financial Controlling, Profit centre and Cost centre accounting helps in analyzing profit/loss of the company. Which particular centre involves what amount of cost and which centre generates maximum amount of profit is analyzed from the report. For instance, O.N.G.C has various centers across India. From these, which is more profitable and less profitable is analyzed with help of SAP system. Accordingly the business is expanded or shut down from less profitable region involving more cost.

Understanding functions of Human Resource Department

Before SAP introduction, all HR activities such as recruitment, payroll, performance appraisal, loans & reimbursements, etc were done manually. With introduction of SAP system, the efficiency of HR activities were increased and data redundancy was reduced.

In ONGC, e-recruiting where applicants profile is stored in database and is filtered, ranked, sorted, etc. This helps in appropriate selection of candidates for the job. Also there is Employee Self Service Portal (ESS) named as WEBICE. It helps in keeping employees personal information; keep the track of payments, Performance Approval Report(PAR) made by employees. PAR, the amount is credited to employee's basic pay based on marks obtained to that employee by senior officer.

Travel allowance is given to employees based on official tour done by the employee. Appropriate amount is reimbursed to the employees based on relevant document shown. Also ESS helps in finding employees who have been transferred from one region to other and who has been promoted to senior level. ONGC employees can claim Loans and reimbursements on ESS based on available facilities.

Moreover there is specific time duration in which employees can enter ONGC and leave ONGC. Each employee needs to swipe this identity card during entry and exit. These timings gets automatically recorded in the system and thus Work Schedule of employees is recorded. This is done under time management. Thus the HR module basically is dependent on Employee Self Service Portal where major functions of HR activities are done.

Understanding functions of Material Management Department

Material Management Department basically handles all the logistics & Supply-Chain activities. Initially purchase request is made (PR) by the vendor which goes to the Material Management(MM) department. The purchase request (PR) is handled by Indenting Section. In MM department, two types of functionalities are looked upon i.e. commercial which includes taxes, duties, laws, rules, etc and techno- commercial which includes types of purchase.

After this step, the tendering is done online where each vendor is given unique id and password(etendering).After this step the final materials are selected and an official agreement is made. If the terms and conditions of the vendor are matching with the company then an agreement is made.

After the agreement is made, the purchase order is made. Payment is made to the contractor and it gets reflected in Service Entry Sheet.(SES). Online payment is done to vendor.

CONCLUSION

Performance of ONGC Post ERP Implementation

The cornerstone of Project ICE i.e. Information Consolidation for Efficiency was a comprehensive implementation of mySAP Business Suite and the SAP for Oil & Natural Gas Solution portfolio, including the SAP Strategic Enterprise Management application, SAP business information warehouse component and SAP portal technology. The implementation also included other SAP solutions such as Collaboration Projects suite and Supplier relationship management and upstream Oil and Gas exploration and production solutions.

ONGC's new computing platform i.e. SAP system introduced technology to many job functions that had relied on paper or legacy computing applications. More than 200 end to end daily business processes were replaced yielding unparalleled insights into operations, real time reporting on oil exploration and production, inventory, financial analysis, and accurate and efficiently delivered date. Solutions had to meet stringent regulatory controls considering its state ownership, yet remain adaptable enough for users throughout the company. Redefinition of work roles and duties meant greater transparency and accountability for expenditures. Daily and weekly reports replaced quarterly data and facilitated real time reconciliation.

One crucial area was ensuring the adoption of new processes at remote sites such as offshore drilling, platforms and field parties. The project management group quickly grasped the importance of training employees to use the single window views of daily reporting activities. However, merely shifting existing reports on surveys, drilling and well services to new tools would not be enough; achieving acceptable adoption rates would depend on consistent use and ensuring that workers could not bypass the new tools. The project management group also excited in meeting the logistical challenge of connecting hundreds of sites cross India.

A key benefit of the new solution is that it creates high visibility for critical data. The new solution ensures that critical operational data is available online for all levels of management. Benefits extended well beyond the bottom line to new capabilities for designing and conducting end user training, in house competencies for mapping new business processes to the SAP system, managing business expectations and management of post-go-live issues and queries.

The potent combination of a new business culture supported by a new IT tool and the flexibility to adopt new business innovations along with an in-house leadership capability prepares ONGC to explore new frontiers. ONGC has also implemented the employee self service (ESS) functionality of the mySAP ERP solution, thereby expanding its to reach to cover 36000 users, making it one of the largest ESS implementation in India. ESS- christened "SAMPARC" meaning "connect facilities employees to apply for leave, submit their claims and view their payment details online. For ONGC, SAP solutions have equipped the world's second largest Oil Exploration and Production Company with the reliable available data it needs to manage the magnitude of 21st century challenges it will face.

ONGC was conferred Maharatna Status by Central Govt in November 2010. The Maharatna status ensures more empowerment in decision making and encourages becoming globally competitive.

Effectiveness of ERP Implementation in ONGC

With implementation of ERP, an employee feedback was obtained about effectiveness of ERP implementation in ONGC. The majority of employees responded that Post ERP implementation, the paperwork is greatly reduced in ONGC. With ERP implementation, data redundancy is largely reduced and there has been "One Data, One Information". Also Financial Efficiency is enhanced and financial risks are greatly reduced Post ERP implementation in ONGC. Also Data Security is enhanced and Data is available timely. Moreover, data accuracy is improved since redundancy has been greatly reduced.

From Business/Financial point of view, the profitability and turnover of ONGC has been greatly inflated. There have tremendous reductions in Costs involved in business aspects. Also the Vendor-Client relations has been enhanced due to their satisfaction with Business Deals with ONGC.

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