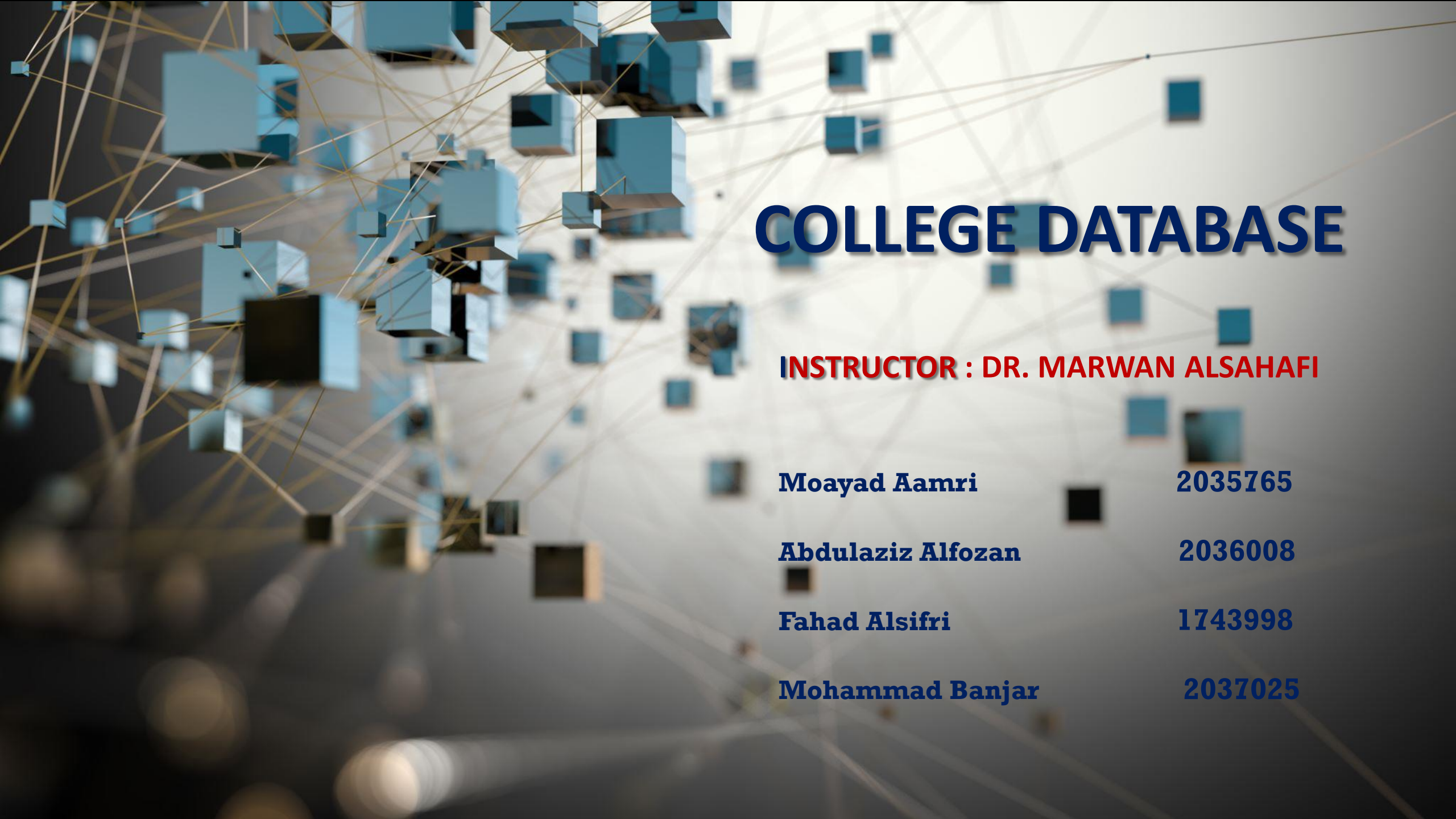

COLLEGE DATABASE

INSTRUCTOR : DR. MARWAN ALSAHAFI

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INTRODUCTION

We designed a special database for a college system considering the characteristics and stages to build an ideal database environment for the college.

The database contains information related to several entities such as students, departments, sections, and courses taught within these sections, instructors with courses taken, and other relationships between database tables.

DATABASE ENVIRONMENT

A relational database with high maintainability and services will be needed to establish a college database, which will be a sizable database. We will use Oracle SQLplus 11g enterprise edition, which is supported by the windows 10 operating system used in the organization. This database offers outstanding performance, the ability to scale the database in case the storage becomes almost full, and the capacity to accommodate the enormous amount of data required for a college.Given that Oracle is one of the most well-known DBMSs and that SQLplus 11g includes a large range of tools for creating and administering databases, there are many experts who are proficient in using and managing Oracle DBMSs.

DATA AND STORAGE AND MANAGEMENT

The storage space required for our database is calculated as follow: assuming that page size is 2048 bytes for all tables and page header is 48 bytes for all tables.

EX:

Department Table

DName = 30 Bytes, DCode = 6 Bytes, DOffice = 6 Bytes, DPhone = 15 Bytes

Bytes Row size = 30 + 6 + 6 + 15 = 57

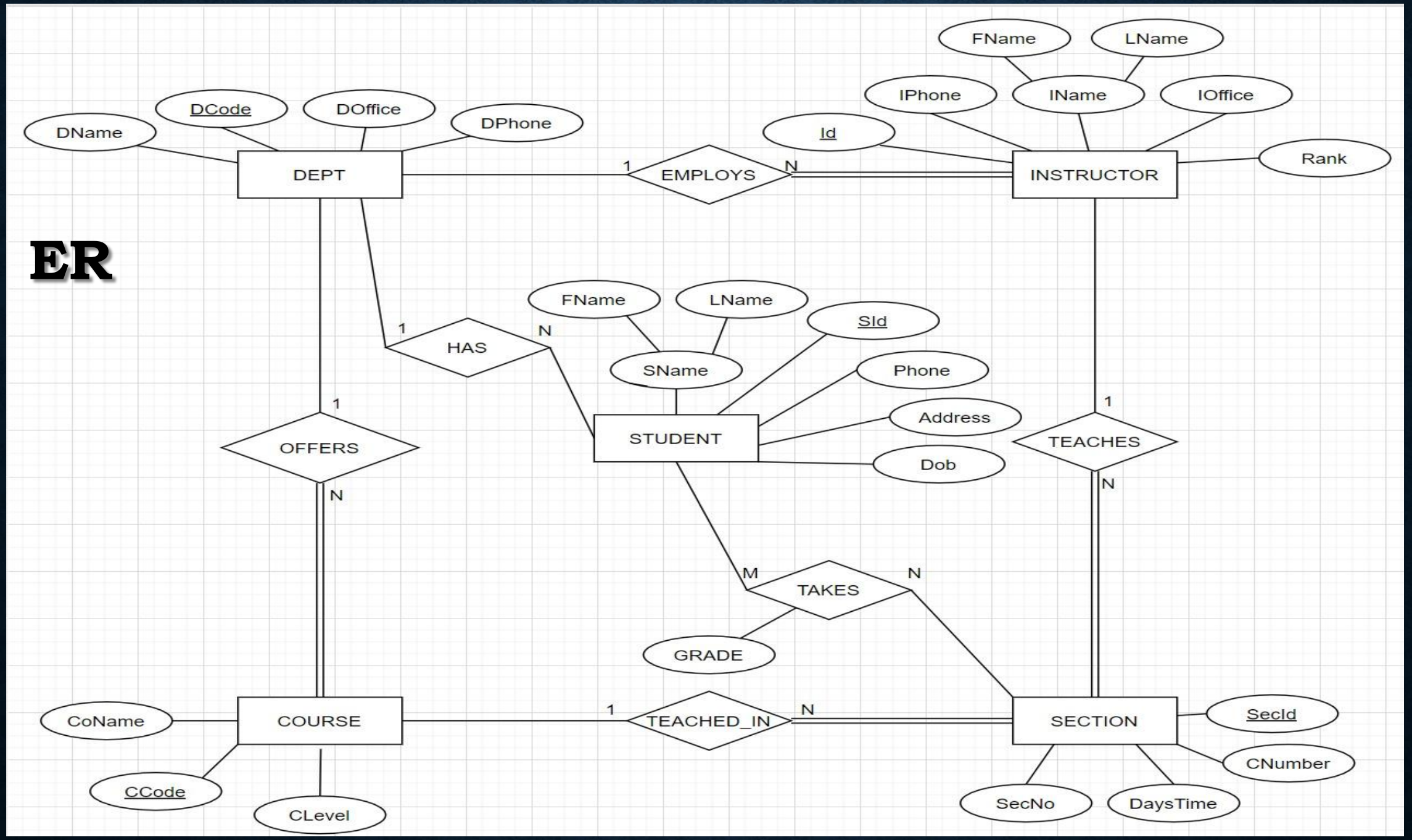
Bytes Rows Per Page = 2048 – 48 = 2000 / 57 = 35

Table size = (300 / 35) * 2048 = 17554Bytes

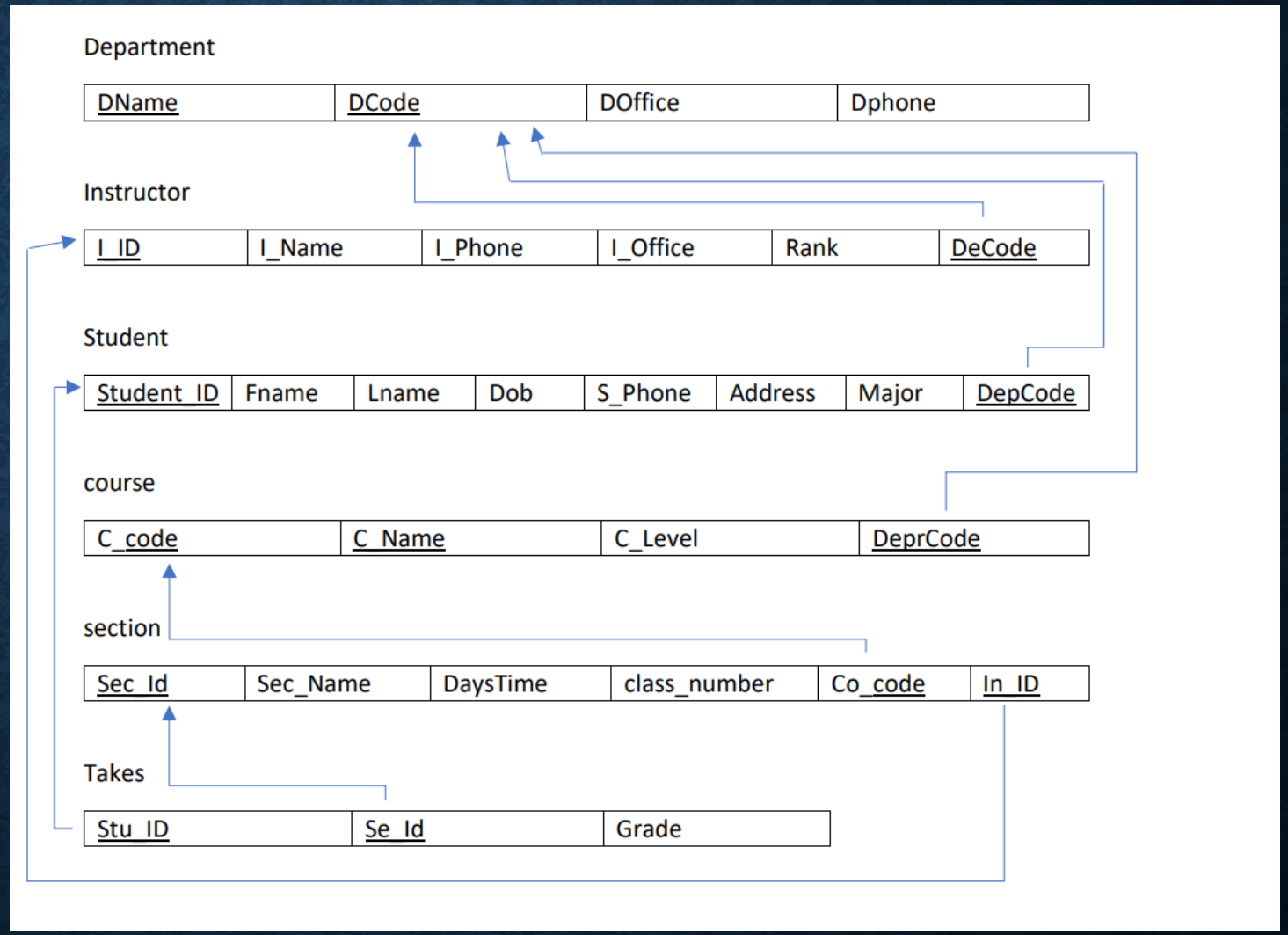
Instructor Table

- Id= 15 Bytes, IPhone = 15 Bytes, Fname = 12 Bytes, Lname = 12 Bytes, IOffice = 6 Bytes,
- Rank = 20 Bytes
- Bytes Row size = 15 + 15 + 12 + 12 + 6 + 20 = 80
- Bytes Rows Per Page = 2048 – 48 = 2000 / 80 = 25
- Table size = (250 / 25) * 2048 = 20480 Bytes

ER


FName
LName
IPhone
IName
IOffice
DCode
DOffice
DName
DPhone
Id
Rank
DEPT
1
EMPLOYS
N
INSTRUCTOR
FName
LName
SId
1
HAS
N
SName
Phone
1
Address
STUDENT
TEACHES
OFFERS
Dob
1
N
N
M
TAKES
N
GRADE
CoName
COURSE
1
TEACHED_IN
N
SECTION
SecId
CNumber
CCode
SecNo
DaysTime
CLevel

RELATIONAL SCHEMA:



METADATA

Technology metadata

Business metadata

Department

Field Name	Description	Type
DCode(PK)	Department code	Varchar2(30)
DName	Department name	Varchar2(6)
DOffice	Department office	Varchar2(6)
DPhone	Phone number	Integer

DATABASE CONNECTIVITY

The database will be stored in a distributed client/server architecture, Specifically multi-level architecture.
In this architecture, separate two or more servers will house both the database and the application. the client will handle all the presentation logic. Therefore, it is regarded as a thin client because the client side handles the presentation while the server side handles the logic.
Because the data is not stored on a single server, the distributed architecture will be able to fulfill the database's requirements for high availability and scalability while also minimizing data loss in the event of hardware failure.
To make it easier for clients to access data on the database server, We had to create a website to allow customers to use the functions and access the data.

DATABASE SECURITY

There will be 4 users in the database with different roles:

DBA: the DBA will have full access to create, insert, update, or delete in the database.

Department Manager: the department manager will have the access to retrieve, insert, update, and delete from instructors, students, courses, sections, and grades but only if it belongs to the department.

Instructor: the instructor will have the access to retrieve, insert, update, and delete from the grades and only retrieve from instructor, student, course, and section.

Student: the student will have the ability to retrieve and insert to takes(his courses) and only retrieve from section.

BACKUP AND RECOVERY PLAN

We will maintain backups for 25 years to ensure that data is secure and recoverable. The plan is to execute a full backup on both the database objects and the log file on Fridays and incremental backups once per day from Sunday to Thursday.

Two types of recovery will be used in our database:

- Recover to Current

- Off-site disaster Recovery

In the event of a hardware malfunction, the **recover to current** will be used. In the event of a natural disaster (earthquake, fire , etc…)or other accident , where the primary location is inaccessible, the **off-site disaster recovery** will be used.

DISASTER RECOVERY PLANNING

Disasters and crises can occur at any time, and they frequently happen without notice. So, taking in advantage the team set the stage and direction for the plan to determining the amount of preparedness in the recovery team to reduce data loss, speed up service recovery, limits of disruption and when an incident becomes an emergency. The Disaster recovery team has tested the recovery plan as a crucial part, which they do twice a year in the beginning of February and August. Its an important to update the Disaster recovery plan which should be done before each testing. The strategy that used for disaster recovery backup is a storage management software. Such an approach greatly simplifies disaster recovery preparation and execution, but this strategy may require a significant system outage to accomplish correctly.

PERFORMANCE MANAGEMENT

The rise in workload, which is a collection of online transactions and commands directed via the system at any moment, is one of many elements that affects our database performance.

We employed the subsequent techniques to combat it:

- Reducing system downtime by doing routine maintenance while they are still active.

- Offer database servers with the quickest network connections for users.

Database performance was also affected by optimization, which is the creating efficient data access routes through the process of evaluating database requests.

DATA MOVEMENT AND DISTRIBUTION

Based on the importance of saving data, we have chosen a method to prevent data loss, which is replication as it allows you to continue working by switching to a replica of your data to prevent critical data loss.

We chose this method because of accessibility to several hosts or data centers and simplification of data sharing between systems on a large scale by dividing the network load between heterogeneous systems.

As we expect the following advantages:

- Data Reliability and Availability-
- Disaster Recovery- Server Performance
- - Better Network Performance
- - Data Analytics Support- Enhanced Test System Performance

THANK YOU FOR LISTENING