**THE HONG KONG
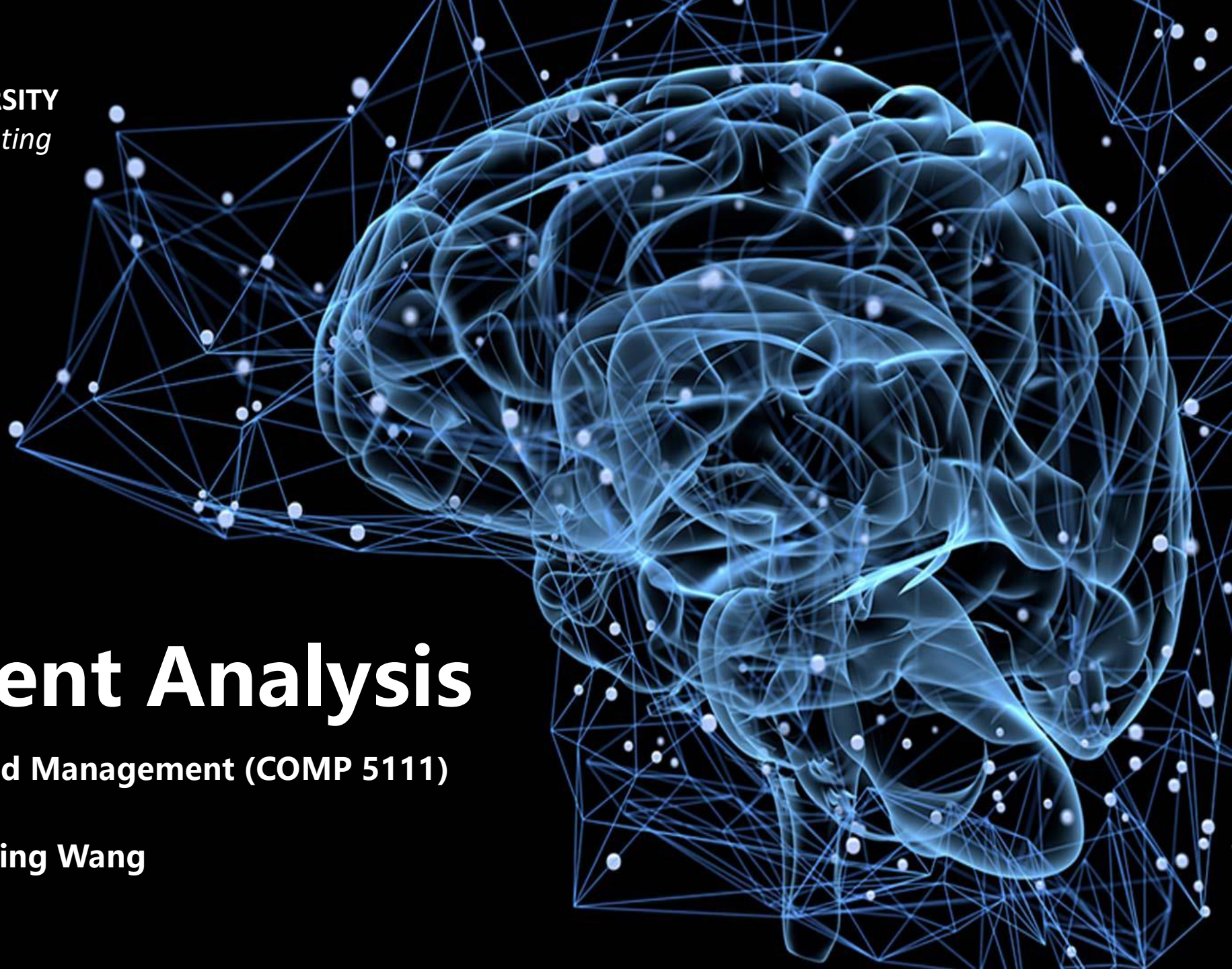POLYTECHNIC UNIVERSITY**
Department of Computing

Assessment Analysis

Database Systems and Management (COMP 5111)

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Outlines

- Key Term Review
- Visio
- Homework 1
- Homework 2
- Access

Key Term Review

Key Terms 1

1. Data

2. Information

3. Metadata

4. Database application

5. Data warehouse

Key Terms 2

6. Constraint

7. Database

8. Entity

9. Database management system

10. Client/server architecture

Key Terms 3

11. Systems development life cycle(SDLC)

12. Agile software development

13. Enterprise data model

14. Conceptual data model

15. Logical data model

Key Terms 4

16. Physical data model

17. Entity type

18. Entity-relationship model

19. Entity instance

20. Attribute

Key Terms 5

21. Relationship type

22. Identifier

23. Multivalued attribute

24. Associate entity

25. Cardinality constraint

Key Terms 6

26. Weak entity

27. Identifying relationship

28. Derived attribute

29. Business rule

30. Supertype

Key Terms 7

31. Subtype

32. Specialization

33. Entity cluster

34. Completeness constraint

35. Enhanced entity-relationship (EER) model

Key Terms 8

Key Terms 9

41. Partial specialization rule

42. Universal data model

43. Determinant

44. Functional dependency

45. Transitive dependency

Key Terms 10

46. Recursive foreign key

47. Normalization

48. Composite key

49. Relation

50. Normal form

Key Terms 11

51. Partial functional dependency

52. Enterprise key

53. Surrogate primary key

Key Term Exercises 1

Matching the key terms and definitions

_____ data

_____ database application

_____ constraint

_____ repository

_____ metadata

_____ data warehouse

_____ information

_____ user view

_____ database management system

_____ data independence

a. data placed in context or summarized
b. application program(s)
c. facts, text, graphics, images, etc.
d. a graphical model that shows the high-level entities for the organization and the relationships among those entities
e. organized collection of related data
f. includes data definitions and constraints
g. centralized storehouse for all data definitions
h. separation of data description from programs
i. a business management system that integrates all functions of the enterprise
j. logical description of portion of database

_____ database

_____ enterprise resource planning (ERP)

_____ systems development life cycle (SDLC)

_____ prototyping

_____ enterprise data model

_____ conceptual schema

_____ internal schema

_____ external schema

k. a software application that is used to create, maintain, and provide controlled access to user databases
l. a rule that cannot be violated by database users
m. integrated decision support database
n. consist of the enterprise data model and multiple user views
o. a rapid approach to systems development
p. consists of two data models: a logical model and a physical model
q. a comprehensive description of business data
r. a structured, step-by-step approach to systems development

Key Term Exercises 2

Matching the key terms and definitions

_____ composite attribute	a. uniquely identifies entity instances
_____ associative entity	b. relates instances of a single entity type
_____ unary relationship	c. specifies maximum and minimum number of instances
_____ weak entity	
_____ attribute	d. relationship modeled as an entity type
_____ entity	e. association between entity types
_____ relationship type	f. collection of similar entities
_____ cardinality constraint	g. number of participating entity types in relationship
_____ degree	h. property of an entity
_____ identifier	i. can be broken into component parts
_____ entity type	j. depends on the existence of another entity type
_____ ternary	k. relationship of degree 3
_____ bill-of-materials	l. many-to-many unary relationship
	m. person, place, object, concept, event

Key Term Exercises 3

Matching the key terms and definitions

Term		Definition
_____ supertype	a.	subset of supertype
_____ entity cluster	b.	entity belongs to two subtypes
_____ subtype	c.	subtype gets supertype attributes
_____ specialization	d.	generalized entity type
_____ subtype discriminator	e.	creating subtypes for an entity type
_____ attribute inheritance	f.	a group of associated entity types and relationships
_____ overlap rule	g.	locates target subtype for an entity

Key Term Exercises 4

Matching the key terms and definitions

_____ well-structured relation	a. constraint between two attributes
	b. functional dependency between the primary key and a nonkey attribute via another nonkey attribute
_____ anomaly	
_____ functional dependency	c. references the primary key in the same relation
_____ determinant	d. multivalued attributes removed
_____ composite key	e. inconsistency or error
_____ 1NF	f. contains little redundancy
_____ 2NF	g. contains two (or more) attributes
_____ 3NF	h. contains no partial functional dependencies
_____ recursive foreign key	i. transitive dependencies eliminated
_____ relation	j. attribute on left side of functional dependency
_____ transitive dependency	k. named two-dimensional table of data

Visio

Homework 1

Homework 1

Draw an ERD for the following situation.

A company has a number of employees. The attributes of EMPLOYEE include Employee ID (identifier), Name, Address, and Birthdate. The company also has several projects. Attributes of PROJECT include Project ID (identifier), Project Name, and Start Date. Each employee may be assigned to one or more projects or may not be assigned to a project. A project must have at least one employee assigned and may have any number of employees assigned. An employee's billing rate may vary by project, and the company wishes to record the applicable billing rate (Billing Rate) for each employee when assigned to a particular project. Do the attribute names in this description follow the guidelines for naming attributes? If not, suggest better names. Do you have any associative entities on your ERD? If so, what are the identifiers for those associative entities? Does your ERD allow a project to be created before it has any employees assigned to it? Explain. How would you change your ERD if the Billing Rate could change in the middle of a project?

Homework 1

Thinking with an example:

Lots of people note like this:

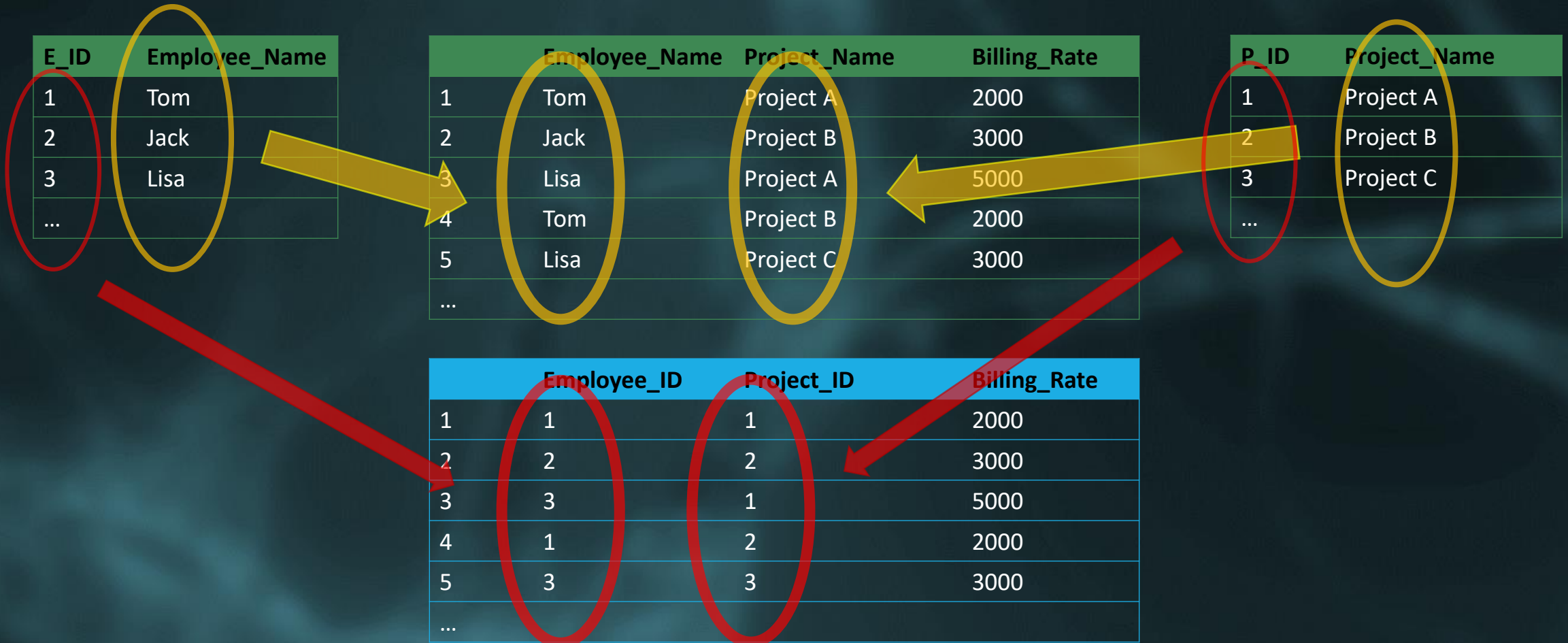|	Employee Name	Project Name
1	Tom	Project A, B
2	Jack	Project B
3	Lisa	Project A, C
…		

Question:
1. How to distinguish different projects?

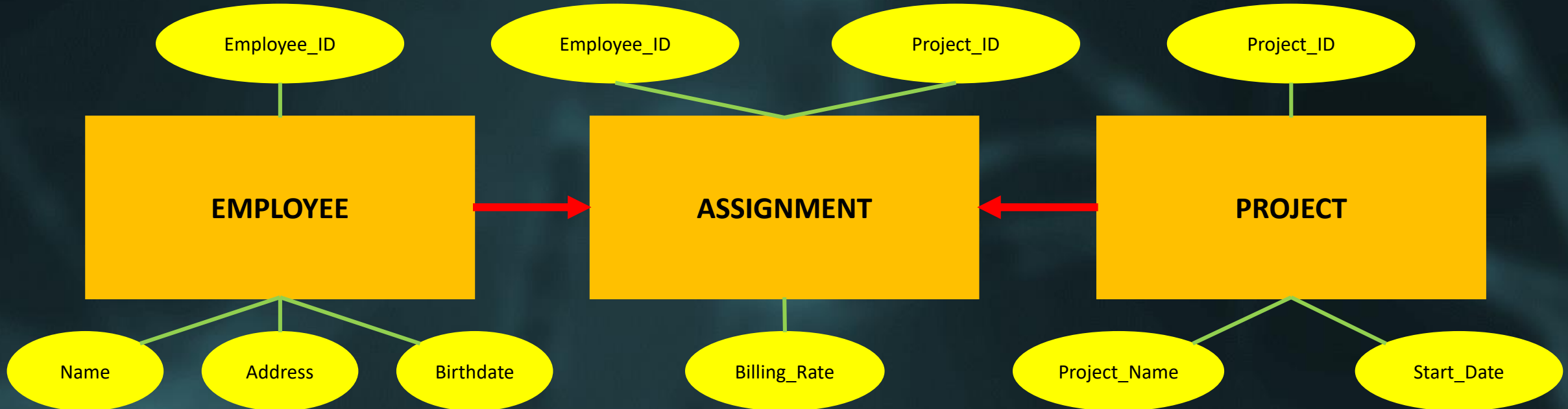2. How to make a comment of billing rate to each project for every employee?
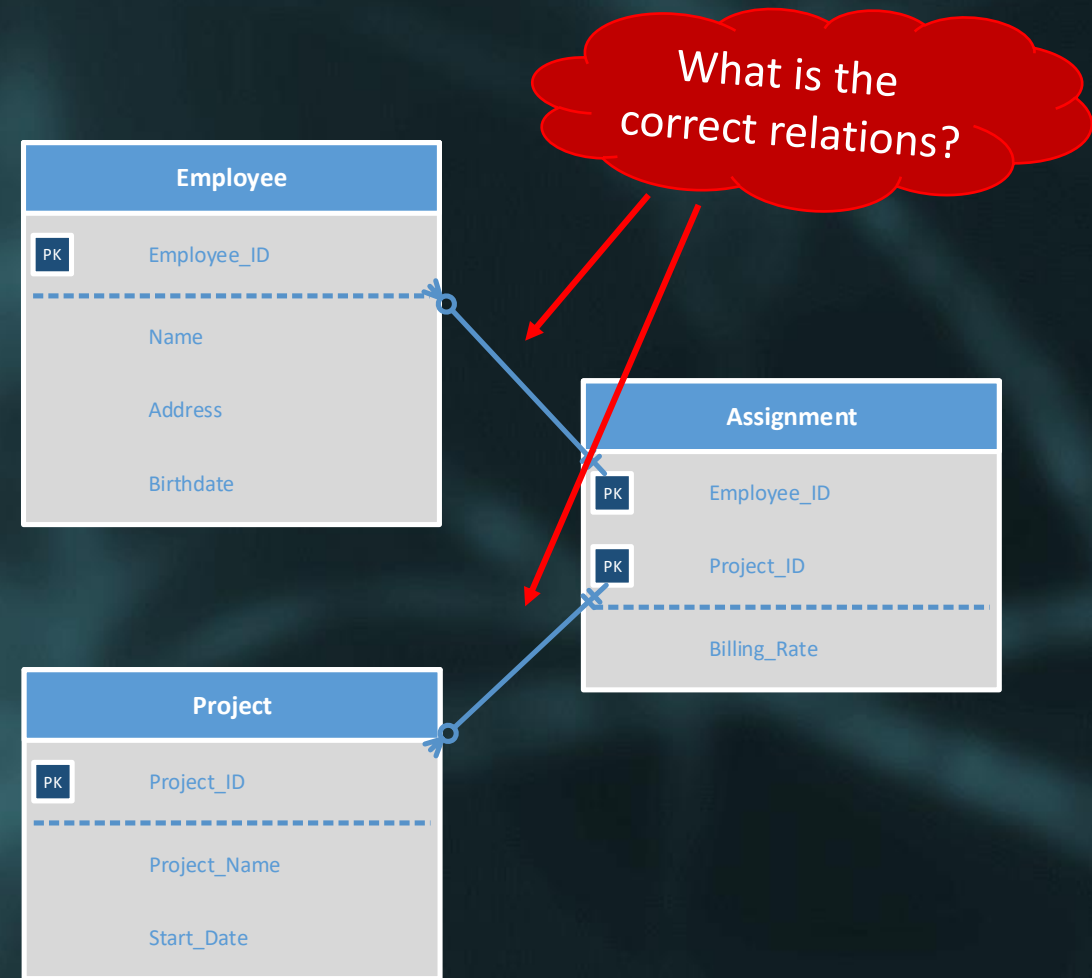
Homework 1

Thinking with an example:

E_ID	Employee_Name
1	Tom
2	Jack
3	Lisa
...	

	Employee_Name	Project_Name	Billing_Rate
1	Tom	Project A	2000
2	Jack	Project B	3000
3	Lisa	Project A	5000
4	Tom	Project B	2000
5	Lisa	Project C	3000
...			

P_ID	Project_Name
1	Project A
2	Project B
3	Project C
...	

	Employee_ID	Project_ID	Billing_Rate
1	1	1	2000
2	2	2	3000
3	3	1	5000
4	1	2	2000
5	3	3	3000
...			

Homework 1

ER Diagram:

Homework 1

Thinking again:

The company also has several departments, each employee belongs to only one department. A department has at least one or more than one employee. How to draw ERD?

Homework 2

Homework 2

Explain the following terms:

1) functional dependency,

2) normalization.

Discuss the goals and steps of normalization.

Homework 2

functional dependency

The value of one attribute (the determinant) determines the value of another attribute.

Functional Dependency is a constraint between two attributes or two sets of attributes.

The Functional Dependency of Attribute B on Attribute A,
means the value of B is strictly determined by A, as follows: A→B.

Homework 2

normalization

Normalization is the process of successively reducing relations with anomalies to produce smaller, well-structured relations.

1NF

2NF: remove partial functional dependencies

3NF: remove transitive functional dependencies

BCNF: remove all anomalies from any functional dependencies

Homework 2

goals of normalization

1. Minimize data redundancy, thereby avoiding anomalies and conserving storage space

2. Simplify the enforcement of referential integrity constraints

3. Make it easier to maintain data (insert, update, and delete)

4. Provide a better design that is an improved representation of the real world and a stronger basis for future growth

steps of normalization
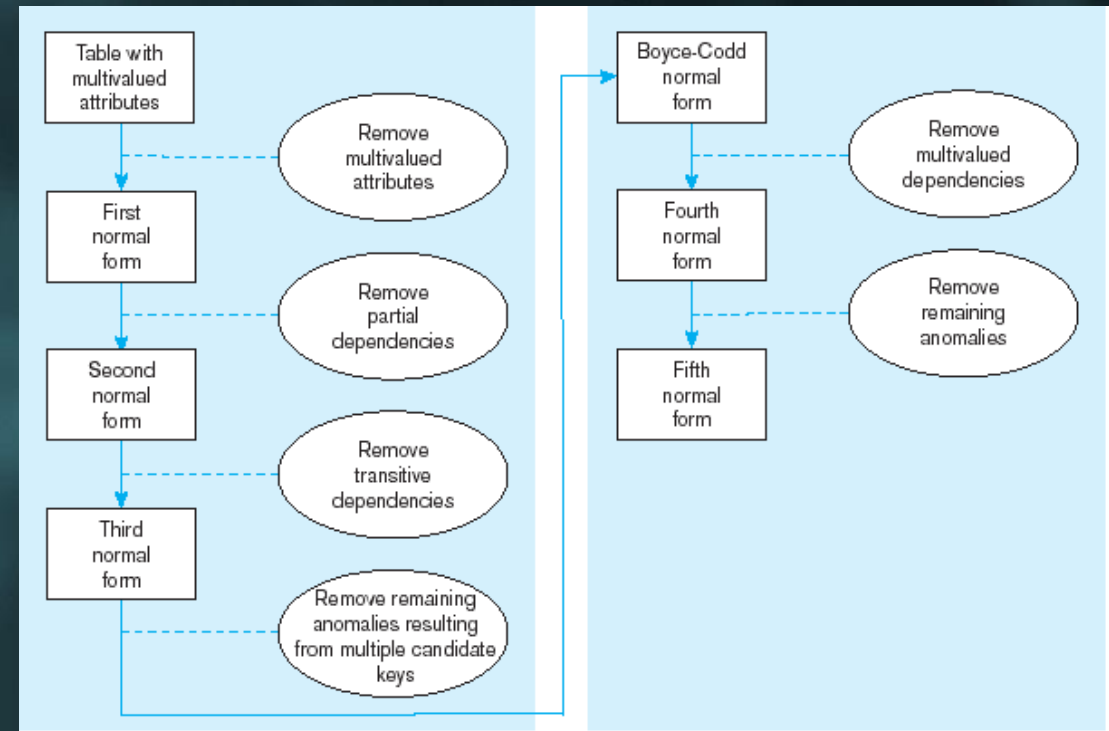
Projects

Project Topic 1

Interview one person from a key business function, such as finance, human resources, or marketing. Concentrate your questions on the following items: How does he or she retrieve data needed to make business decisions? From what kind of system (personal database, enterprise system, or data warehouse) are the data retrieved? How often are these data accessed? Is this person satisfied with the data available for decision making? If not, what are the main challenges in getting access to the right data?

Project Topic 2

Interview a database analyst or a system analyst. How do they extract business rules for ER modeling? Ask for specific sources. Are they all listed in the text? Did they purchase an ER model and customize it or design it on their own? How did they decide on naming entity types? Ask the analyst or administrator to show one or two ER diagrams of the primary databases. Study the diagram carefully to see if there are any multiple relationships in the diagram. How have they been modeled? What is the role of identifiers here?

Project Topic 3

Research various graphics and drawing packages (e.g., Microsoft Office, SmartDraw) and compare the E-R diagramming capabilities of each. Is each package capable of using the notation found in this text? Is it possible to draw a ternary or higher-order relationship with each package?

Project Topic 4

There are other extensions to ER notation than just supertype/subtype relationships. Use the Internet to search for such extensions. One such mentioned in the text is Aggregation. Look for its examples on the Internet. Report your findings stating the extensions, what they are intended for, some examples and what you understood from the same.

Project Topic 5

Obtain an EER diagram from a database administrator or system designer. Using your understanding from the text, convert this into a relational schema in 3NF. Now interview the administrator on how they convert the diagram into relations? How do they impose integrity constraints? What was the need for the same? How do they identify candidate keys and are there any usage of surrogate primary keys? Did they face any issue of merging relations? How did they overcome it?

Project Topic 6

Big data has been one of the most frequently covered concepts in the popular business press during the last few years. Look for its discussion on the Internet. Describe the meaning and significance of big data and the demands big data will place on data management technology.

Project Topic 7

Arrange an interview with a database administrator in an organization in your area. When you interview the database administrator, familiarize yourself with one application that is actively used in the organization. Focus your interview questions on determining end users' involvement with the application and understanding the extent to which end users must be familiar with SQL. For example, if end users are using SQL, what training do they receive? Do they use an interactive form of SQL for their work, or do they use embedded SQL? How have the required skills of the end users changed over the past few years, as the database user interfaces have changed?

Project Topic 8

Research on a local company and study how database approach can help the company to achieve high performance.

Access

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The End

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