THE HONG KONG
POLYTECHNIC UNIVERSITY
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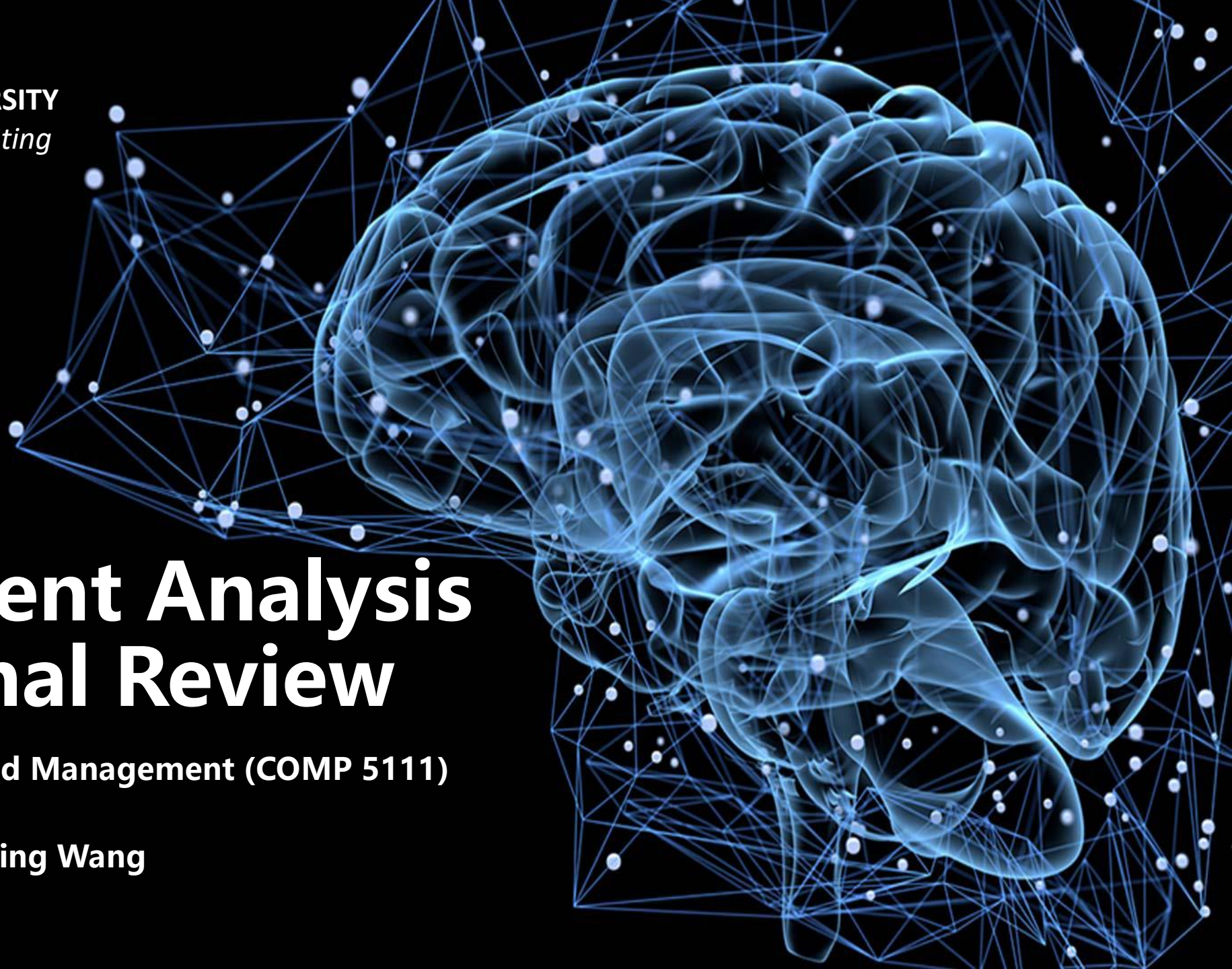

# Assessment Analysis and Final Review

**Database Systems and Management (COMP 5111)**

**Ting Wang**

# Outlines

- Key Term Review
- Final Review

# Key Term Review

# Key Terms 1

- **RDBMS:**
  A database management system that manages data as a collection of tables in which all relationships are represented by common values in related tables

- **Catalog:**
  A set of schemas that constitute the description of a database

- **Schema:**
  The structure that contains descriptions of objects created by a user (base tables, views, constraints)

# Key Terms 2

- **Data Definition Language (DDL):**
  Commands that define a database, including creating, altering, and dropping tables and establishing constraints

- **Data Manipulation Language (DML):**
  Commands that maintain and query a database

- **Data Control Language (DCL):**
  Commands that control a database, including administering privileges and committing data

# Key Terms 3

- **Dynamic View:**
  A "virtual table" created dynamically upon request by a user; No data actually stored; instead data from base table made available to user; Based on SQL SELECT statement on base tables or other views.

- **Materialized View:**
  Copy or replication of data; Data actually stored; Must be refreshed periodically to match the corresponding base tables.

- **Scalar aggregate:**
  single value returned from SQL query with aggregate function

- **Vector aggregate:**
  multiple values returned from SQL query with aggregate function

# Key Terms 4

- **Join:**
  a relational operation that causes two or more tables with a common domain to be combined into a single table or view

- **Equi-join**
  a join in which the joining condition is based on equality between values in the common columns; common columns appear redundantly in the result table

- **Natural join:**
  an equi-join in which one of the duplicate columns is eliminated in the result table

# Key Terms 5

- **Outer join:**
  a join in which rows that do not have matching values in common columns are nonetheless included in the result table (as opposed to *inner* join, in which rows must have matching values in order to appear in the result table)

- **Union join:**
  includes all columns from each table in the join, and an instance for each row of each table

# Key Terms 6

- **Correlated subqueries:**
  Make use of data from the outer query; Execute once for each row of the outer query; Can use the EXISTS operator

- **Functions:**
  routines that return values and take input parameters

- **Procedures:**
  routines that do not return values and can take input or output parameters

- **Triggers:**
  Routines that execute in response to a database event (INSERT, UPDATE, or DELETE)

# Key Terms 7

- **Embedded SQL:**
  Including hard-coded SQL statements in a program written in another language such as C or Java

- **Dynamic SQL:**
  Ability for an application program to generate SQL code on the fly, as the application is running

- **Client:**
  Workstation (usually a PC) that requests and uses a service

- **Server:**
  Computer (PC/mini/mainframe) that provides a service

# Key Terms 8

- **Thin Client :**
  PC just for user interface and a little application processing. Limited or no data storage (sometimes no hard drive)

- **Fat Client:**
  All processing is done at the PC that requested the data

- **Application Partitioning:**
  Placing portions of the application code in different locations (client vs. server), Advantages: Improved performance; Improved interoperability; Balanced workloads

- **Middleware:**
  Software that allows an application to interoperate with other software, Accomplished via Application Program Interface (API)

# Key Terms 9

- **Three-Tier Architectures:**
  A client/server configuration that includes three layers: a client layer and two server layers: application server and database server

- **ODBC:**
  Open Database Connectivity: Most DB vendors support this

- **OLE-DB:**
  Microsoft enhancement of ODBC

- **JDBC:**
  Java Database Connectivity: Special Java classes that allow Java applications/applets to connect to databases

# Key Terms 10

- **World Wide Web (WWW):**
  The total set of interlinked hypertext documents residing on Web servers worldwide

- **Browser:**
  Software that displays HTML documents and allows users to access files and software related to HTML documents

- **Web Server:**
  Software that responds to requests from browsers and transmits HTML documents to browsers

# Key Terms 11

- **Static Web pages:**
  content established at development time

- **Dynamic Web pages:**
  content dynamically generated, usually by obtaining data from database

- **Hypertext Transfer Protocol (HTTP):**
  Communication protocol used to transfer pages from Web server to browser

- **Uniform Resource Locator (URL):**
  Mnemonic Web address corresponding with IP address, also includes folder location and html file name

# Key Terms 12

- **Hypertext Markup Language (HTML):**
  Markup language specifically for Web pages

- **Standard Generalized Markup Language (SGML):**
  Markup language standard

- **Extensible Markup Language (XML):**
  Markup language allowing customized tags

- **XHTML:**
  XML-compliant extension of HTML

# Key Terms 13

- **Java:**
  Object-oriented programming language for applets

- **JavaScript/VBScript** :
  Scripting languages that enable interactivity in HTML documents

- **Cascading Style Sheets (CSS):**
  Control appearance of Web elements in an HML document

- **XSL and XSLT:**
  XMS style sheet and transformation to HTML

# Key Terms 14

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# Key Terms 15

- **Web Services:**
  XML-based standards that define protocols for automatic communication between applications over the Web.

- **Semantic Web:**
  W3C project using Web metadata to automate collection of knowledge and storing in easily understood format.

- **Data Warehouse:**
  A subject-oriented, integrated, time-variant, non-updatable collection of data used in support of management decision-making processes.

# Key Terms 16

- **Data Administration:**
  A high-level function that is responsible for the overall management of data resources in an organization, including maintaining corporate-wide definitions and standards

- **Database Administration:**
  A technical function that is responsible for physical database design and for dealing with technical issues such as security enforcement, database performance, and backup and recovery

- **Database Security:**
  Protection of the data against accidental or intentional loss, destruction, or misuse

# Key Term Exercises 1

**Matching the key terms and definitions**

| | | | |
|---|---|---|---|
| ____ | view | a. | list of values |
| ____ | referential integrity constraint | b. | description of a database |
| | | c. | view materialized as a result of a SQL query that uses the view |
| ____ | dynamic view | d. | logical table |
| | | e. | missing or nonexistent value |
| ____ | materialized view | f. | descriptions of database objects of a database |
| ____ | SQL:200n | g. | programming language in which SQL commands are embedded |
| ____ | null value | | |
| ____ | scalar aggregate | h. | established in relational data models by use of foreign keys |
| ____ | vector | i. | view that exists as a table |
| ____ | aggregate | j. | currently proposed standard relational query and definition language |
| ____ | catalog | | |
| ____ | schema | | |
| ____ | host language | k. | single value |

# Key Term Exercises 2

**Matching the key terms and definitions**

| | | | |
|---|---|---|---|
| ____ | equi-join | a. | undoes changes to a table |
| ____ | natural join | b. | user-defined data type |
| ____ | outer join | c. | SQL:1999 extension |
| ____ | trigger | d. | returns all records of designated table |
| ____ | procedure | e. | keeps redundant columns |
| ____ | embedded SQL | f. | makes changes to a table permanent |
| ____ | UDT | g. | process that includes SQL statements within a host language |
| ____ | COMMIT | h. | process of making an application capable of generating specific SQL code on the fly |
| ____ | SQL/PSM | i. | does not keep redundant columns |
| ____ | Dynamic SQL | j. | set of SQL statements that execute under stated conditions |
| ____ | ROLLBACK | k. | stored, named collection of procedural and SQL statements |

# Final Review

# Final Review 1: Choose right answer

1. Key to represent relationship between tables is called

A. primary key.

B. secondary key.

C. foreign key.

D. none of the above.

# Final Review 2: Choose right answer

2. In the architecture of a database system, external level is the

A. physical level.

B. logical level.

C. conceptual level.

D. view level.

# Final Review 3: Choose right answer

3. In the first normal form,

A. a composite attribute is converted to individual attributes.

B. non key attributes are functionally dependent on key attributes.

C. non key attributes are functionally dependent on not a part of key attributes.

D. all of the above.

# Final Review 4: Choose right answer

4.In relational database the column of relation is called

A. relation.

B. attribute.

C. table.

D. entity.

# Final Review 5: Choose right answer

5.In a large database

A. each user can access every subschema.

B. each user can "see" only a small part of the entire database.

C. each subschema contains every field in the logical schema.

D. none of the above.

# Final Review 6: Choose right answer

6.Eliminating modification anomalies is a(n) _____ of normalization.

A. advantage

B. disadvantage

C. either an advantage or disadvantage

D. neither an advantage nor disadvantage

# Final Review 7: Choose right answer

7.If a table has been normalized so that all determinants are candidate keys, then that table is in

A. 1NF

B. 2NF

C. 3NF

D. BCNF

# Final Review 8: Choose right answer

8.In a SQL query, which SQL keyword is used with GROUP BY to select groups meeting specified criteria?

A. BETWEEN

B. HAVING

C. EXISTS

D. WHERE

# Final Review 9: Choose right answer

9.The entity integrity rule states that

A. no primary key attribute may be null.

B. no primary key can be composite.

C. no primary key may be unique.

D. no primary key may be equal to a value in a foreign key.

# Final Review 10: Choose right answer

10.Which of the following indicates the minimum number of entities that can be involved in a relationship?

A. Minimum cardinality

B. Maximum cardinality

C. ERD

D. Smaller Entity Count

# Final Review 11: Question 1

A database schema includes the following five relations, Movie (movie information), MovieStar (actor/actress information), MovieProducer (producer information), Studio (Studio information) and StarsIn (movie and stars appearing in it).

Movie(title, year, length, inColor, studioName, producerName)

MovieStar(name, address, gender, birthdate)

MovieProducer(name, address, netWorth)

Studio(name, address, prescription)

StarsIn(movieTitle, movieYear, starName)

Write the SQL statements to finish the following tasks.

# Final Review 12: Question 1

1.Find the address of all studios.

2.Find birthdate of the star whose name is Sandra Bullock.

3.Find the names of all the stars that appear in a movie with "Love" in the title.

# Final Review 13: Question 1

4.Find all the stars' names who either are male or live in Miami ( have Miami as a part of their address).

5.What are the names of the male stars in the movie *Terms of Endearment*.

6.Find the titles of the movies which are longer than the movie *Gone With the Wind*?

# Final Review 14: Question 1

7.Find the names of the stars appearing in the movies by studios locating in London

8.Add a movie to the table Movie. (You determine the attribute values).

9.Delete the information of the stars whose first name is Smith from the table MovieStar.

# Final Review 15: Question 1

10.Create the table StarsIn.

# Final Review 16: Question 2

**For the following scenario:**

- Patients are identified by an SSN, and their names, addresses, and ages must be recorded.
- Doctors are identified by an SSN. For each doctor, the name, specialty and years of experience must be recorded.
- Each pharmacy has a name, address and phone number. A pharmacy must have a manager.
- A pharmacist is identified by an SSN, he/she can only work for one pharmacy. For each pharmacist, the name, qualification must be recorded.
- For each drug, the trade name and formula must be recorded.
- Every patient has a primary doctor. Every doctor has at least one patient.
- Each pharmacy sells several drugs, and has a price for each. A drug could be sold at several pharmacies, and the price could vary between pharmacies.
- Doctors prescribe drugs for patients. A doctor could prescribe one or more drugs for several patients, and a patient could obtain prescriptions from several doctors. Each prescription has a date and quantity associated with it.

# Final Review 17: Question 2

1. Prepare an E-R diagram. Identity the needed entities (including attributes and identifiers), relationships, and cardinalities.

# Final Review 18: Question 2

2. Convert the E-R diagram into a relation schema. Underline the primary keys and asterisk (*) the foreign keys.

# Final Review 19: Question 3

Consider the following relation for published books:

BOOK(BookTitle, BookTvpe, ListPrice, AuthorName, AuthorAffiliation, Publisher)

Suppose the following dependencies exist:

BookTitle→ BookType, Publisher
BookType→ ListPrice
AuthorName→ AuthorAffiliation

# Final Review 20: Question 3

1. Identify a candidate key.

2. In what normal form is this relation? Explain your answer.

3. Develop a set of 3NF relations from this relation, and show the primary keys, and foreign keys in each of the 3NF relations.

# Final Review 20: Question 4

The table shown in the following is used to record the appointments of patents and dentists. The table is susceptible to update anomalies. Provide examples of insertion, deletion and modification anomalies.

| Dentist No | Appointment Date | Appointmemt Time | Dentist Name | Patient No | Patient Name | Surgery No |
|---|---|---|---|---|---|---|
| **S1011** | 12-Aug-03 | 10:00 | Tony Smith | P100 | Gillian White | S10 |
| **S1011** | 12-Aug-03 | 12:00 | Tony Smith | P105 | Jill Bell | S15 |
| **S1024** | 12-Sept-03 | 10:00 | Helen Pearson | P108 | lan MacKay | S10 |
| **S1024** | 14-Sept-03 | 10:00 | Helen Pearson | P108 | lan MacKay | S10 |
| **S1032** | 14-Sept-03 | 10:00 | Bobin Plevin | P105 | Jill Bell | S15 |
| **S1032** | 15-0ct-03 | 18:00 | Bobin Plevin | P110 | John Walker | S13 |

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# The End

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