Republic of the Philippines

**SOUTHERN LEYTE STATE UNIVERSITY-BONTOC**

San Ramon, Bontoc, Southern Leyte

Website: www.slsuonline.edu.ph

Telefax: (053) 382-3121; Email: slsubc@yahoo.com

**ANSWER SHEET**

**Advanced Database**

*First Semester AY: 2020-2021*

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| **Name:** | **Jeca G. Calope** | | | **Rating:** |  |
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| **Course/Year/Section:** | | **BSIT-3-A** | **Date Submitted:** | |  |

**MODULE 2**

**PRE-TEST**

1. What are the origins of the object-oriented approach?

**Answer:**

The first object–oriented language was Simula (Simulation of real systems) that was developed in 1960 by researchers at the Norwegian Computing Center. In the 1990s, Coad incorporated behavioural ideas to object-oriented methods.

2. What primary characteristics should an OID possess?

**Answer:**

Object identifier should have characteristic of object means it will tell more about object so that it can be identified by the system.

3. Discuss the various type constructors. How are they used to create complex object structures?

**Answer:**

It is **used** to represent all basic atomic values such as integers, real number, and character string Booleans and other basic data **types** that system supports directly. Tuple: It is of the form where an attribute name is and each is an OID.

4. Discuss the concept of encapsulation, and tell how it is used to create abstract data types.

**Answer:**

The set of operations are only defined by their inputs and outputs.  The ADT does not specify how the data type will be implemented, all of the ADT's details are hidden from the user of the ADT.  This process of hiding the details is called encapsulation.  If we extend the example for the integer data type to an abstract data type, the operations might be delete an integer, add an integer, print an integer, and check to see if a certain integer exists.  Notice that we do not care how the operation will be done but simply how do invoke the operation.

5. Explain what the following terms mean in object-oriented database terminology: method, signature, message, collection, extent.

**Answer:**

Method in object oriented database defines that which type of function has been used like procedures, or functions. Signature in object oriented database is used for searching anything from database in fast and flexible way. Messages are the information used to request from other object to execute methods. Collection is the set of database in object oriented database. Extent defines the limit for any query and it means it is used to set the protocol in object oriented database.

6. What is the relationship between a type and its subtype in a type hierarchy?

**Answer:**

Type hierarchy is the process in which different types of DBMS are included like, network model, relational model, and tree hierarchy. The relationship between type and subtype is that type is about the process means it will tell that which type of transaction is going to take place and subtype means a more explanative operation and behaviour which is going to take place during operation are being committed.

7. What is the constraint that is enforced on extents corresponding to types in the type hierarchy?

**Answer:**

Sub type includes all the functions that are defined for its type (super type) some additional that are specific to sub type. Subtype can inherit all of the functions and their implementation of type.

8. What is the difference between persistent and transient objects? How persistence handled in typical OO database systems?

**Answer:**

Persistent means that the object has been saved to the database whereas transient means that it hasn't been saved yet. So for example when you get an entity from a repository, that entity is persistent. When you create a new entity, it is transient until persisted. These objects are created and stored in any Objected Oriented database and persistent in nature i.e. their instance exists even after the program is terminated. These objects persist unitl they are deleted explicitly by the user.

9. How do regular inheritance, multiple inheritance, and selective inheritance differ?

**Answer:**

In single inheritance, we do have only one base class which is inherited by only one derived class. In multiple inheritance, we have more than two base classes which are combinely inherited by only one derived class.Single inheritance is one derived class having a single base class whereas, in multiple inheritance, has two or more than two base classes, but single derived class. Multiple inheritance is quite confusing as here a single derived class inherit two or more base class. Multiple inheritance occurs when a certain subtype T is a subtype of two (or more) types and hence inherits the functions (attributes and methods) of both supertypes. Selective inheritance occurs when a subtype inherits only some of the functions of a supertype. Other functions are not inherited. In this case, an EXCEPT clause may be used to list the functions in a supertype that are not to be inherited by the subtype.

10. Discuss the concept of polymorphism/operator overloading.

**Answer:**

Polymorphism (or operator overloading) is a manner in which OO systems allow the same operator name or symbol to be used for multiple operations. That is, it allows the operator symbol or name to be bound to more than one implementation of the operator. A simple example of this is the “+” sign.

11. Discuss how each of the following features is realized in SQL 2008: object identifier, type inheritance, encapsulation of operations, and complex object structures.

**Answer:**

12. In the traditional relational model, creating a table defined both the table type (schema or attributes) and the table itself (extension or set of current tuples). How can these two concepts be separated in SQL 2008?

**Answer:** Both the table type and the table itself is defined in creation of a table in the rational database. In rational database management system, there are some features in which are recognized by vendors. The newer versions of relational systems and the object database are proposed to use these features. The database systems are characterized as object relational DBMS using this features. A recent version of the SQL standard 2008 for relational database management system is also known as SQL/Foundation. This includes many features known as SQL/Object.

13. Describe the rules of inheritance in SQL 2008.

**Answer:**

Type inheritance: specified with UNDER keyword. The phase NOT FINAL must be included in UDT if subtypes are allowed under that UDT. All attributes and operations are inherited. UNDER clause determines inheritance hierarchy. A subtype can refine any function defined in its supertype (signatures must be the same). Dynamic linking considers runtime types.

14. What are the differences and similarities between objects and literals in the

ODMG object model?

**Answer:**

Objects and literals are the basic building blocks of the object model. The main difference between the two is that an object has both an object identifier and a state (or current value), whereas a literal has a value (state) but *no object identifier.* In either case, the value can have a complex structure. The object state can change over time by modifying the object value. A literal is basically a constant value, possibly having a complex structure, but it does not change

15. List the basic operations of the following built-in interfaces of the

16. ODMG object model: Object, Collection, Iterator, Set, List, Bag, Array, and

17. Dictionary

**Answer:**

Object in ODMG model can be fixed or variable too based on requirement. It shows the behaviour of the model and program. Object can be represented by OId’s. Collection: - It is the set of the data in model and all the data has storage in different locations in system. Iterator: - Iterator is used to show and make changes in collection. Set:-ODMG model is has predefined set of input which is used to perform any operations. List: - List in ODMG model helps in performing any operation link wise. Bag: - Bag has different set of values and in ODMG model it has main use to set behaviour and inheritance property Array: - There is a function in which set of inputs are performed in one input. Dictionary: - ODMG model has some fixed input and whose meaning can be looked up in dictionary.

18. Describe the built-in structured literals of the ODMG object model and the operations of each.

**Answer:**

The ODMG Object Model is intended to allow portability of applications among object database products. It provides a common model for these products by defining extensions to the OMG object model that support object database requirements. In particular, the ODMG model extends the OMG core to provide for persistent objects, object properties, more specific object types, queries and transactions.

19. What are the differences and similarities of attribute and relationship properties of a user-defined (atomic) class?

**Answer:**

The difference between literals and objects of ODMG object model is, it can be atomic or it can be structured means. The similarities between objects and literal of ODMG Object model is both are represented by id if any object is to be represented it will be represented by OID’s and if a literal is to be represented it will be represented by LID’S.

20. What the differences and similarities of class inheritance are via extends and interface inheritance via “:” in the ODMG object model?

**Answer:**

An interface is a specification of the abstract behavior of an object type, which specifies the operation signatures. Although an interface may have state properties as part of specifications, these cannot be inherited from the interface. An interface is also non-instantiable-that is, one cannot create object that correspond to interface definition. Because instances are non-intantiable they are mainly used to specify abstract operations that can be inherited by classes or by other interfaces. This is called behavior inheritance end is specified by colon (:) notation.

21. Why are the concepts of extents and keys important in database applications?

**Answer:**

In ODMG object model, the database designers can declare an extent for any object type that is defied via a class declaration. The extent is given a name, and it will contain all persistent object of class. Hence, the extent behaves as a set of object that holds all persistent object of class.

22. Describe the following OQL concepts: database entry points, path expressions, iterator variables, named queries (views), aggregate functions, grouping, and quantifiers.

**Answer:**

**Database entry point:**The entry point for any database is required for every query, which can be any named persistent object. For many queries, the entry point is the name of the extent of a class.

**Path expressions:** The concept of path expression can be used to specify a path to related attributes and objects. A path expression typically starts at a persistent objects name, or at the iterator variable that ranges over individual objects in a collection. This name will be followed by zero or more relationship names or attribute names. Whenever a collection is referenced in an OQL query, we should define an iterator variable—*D* in Q0—that ranges over each object in the collection. The define keyword is used to specify an identifier of the named query, which must be a unique name among all named objects, class names, method names, and function names in the schema. Collection Operators (Aggregate Functions, Quantifiers). Because many query expressions specify collections as their result, a number of operators have been defined that are applied to such collections. These include aggregate operators as well as membership and quantification (universal and existential) over a collection. The Grouping Operator. The group by clause in OQL, although similar to the corresponding clause in SQL, provides explicit reference to the collection of objects within each *group* or *partition.*

23. What is meant by the type orthogonality of OQL?

**Answer:**

The orthogonality of OQL means attributes, relationships and operation name scan is used interchangeably within a path expression, as long as the type system of OQL is not compromised. For example, one can write the following queries to retrieve the grade point average of all senior students majoring Computer Science, with the result ordered by GPA, within that by last name and first name.

24. What are the main differences between designing a relational database and an object database?

**Answer:**

When compared to a relational database management system, an object-oriented database stores complex data and relationships between data directly, without mapping to relational rows and columns whereas a relational database stores information in tables with rows and columns.

25. Describe the steps of the algorithm for object database design by EER-to OO mapping.

**Answer:**

* Create ODL class for each EER entity type
* Add relationship properties for each binary relationship
* Include appropriate operations for each class
* ODL class that corresponds to a subclass in the EER schema
  + Inherits type and methods of its superclass in ODL schema
* Weak entity types
  + Mapped same as regular entity types
* Categories (union types)
  + Difficult to map to ODL
* An n-ary relationship with degree n > 2
  + Map into a separate class, with appropriate references to each

participating class