

SQL AND NOSQL

MIDTERM EXAM

1) Choice questions:

i) NoSQL databases is used mainly for handling large volumes of _____ data.

- a) Unstructured
- b) Structured
- c) Semi-structured
- d) All of the mentioned

ANSWER - a) Unstructured

ii) The _____ operation, denoted by $-$, allows us to find tuples that are in one relation but are not in another.

- a) Union
- b) Set-difference
- c) Difference
- d) Intersection

ANSWER - b) Set-difference

iii) In which of the following can many entity instances of one type be related to many entity instances of another type?

- a) One-to-One Relationship
- b) One-to-Many Relationship
- c) Many-to-Many Relationship
- d) Composite Relationship

ANSWER - c) Many-to-Many

Relationship

iv) Relational Algebra does not have

- a) Selection operator
- b) Projection operator
- c) Aggregation operators
- d) Division operator

ANSWER - c) Aggregation operators

- v) Normal form which only includes indivisible values or single atomic values is classified as
- a) Third normal form
 - b) First normal form
 - c) Second normal form
 - d) Fourth normal form

ANSWER - b) First normal form

- vi) Which of the SQL statements is correct?
- a) SELECT Username AND Password FROM Users
 - b) SELECT Username, Password FROM Users
 - c) SELECT Username, Password WHERE Username = 'user1'
 - d) None of these

ANSWER - b) SELECT Username, Password FROM

Users vii) A UNION query is which of the following?

- a) Combines the output from no more than two queries and must include the same number of columns.
- b) Combines the output from no more than two queries and does not include the same number of columns.
- c) Combines the output from multiple queries and must include the same number of columns.
- d) Combines the output from multiple queries and does not include the same number of columns.

ANSWER - c) Combines the output from multiple queries and must include the same number of columns.

viii) Disadvantages of DTD are

- (i) DTDs are not extensible
- (ii) DTDs are not in to support for namespaces
- (iii) There is no provision for inheritance from one DTDs to another

- a) (i) is correct
- b) (i),(ii) are correct
- c) (ii),(iii) are correct
- d) (i),(ii),(iii) are correct

ANSWER - d) (i),(ii),(iii) are correct

ix) Which of the following XML documents are well-formed?

- a) <firstElement>some text goes here
 <secondElement>another text goes here</secondElement>
 </firstElement>
- b) <firstElement>some text goes here</firstElement>
 <secondElement> another text goes here</secondElement>
- c) <firstElement>some text goes here
 <secondElement> another text goes here</firstElement>
 </secondElement>
- d) </firstElement>some text goes here
 </secondElement>another text goes here
 <firstElement>

ANSWER - b) <firstElement>some text goes here</firstElement>
 <secondElement> another text goes here</secondElement>

x) Why do we use exist method in Xquery?

- a) To determine if the XML data contains a certain node
- b) To examine the XML and return back a scalar value
- c) To Shred the XML nodes of the XML data into relational columns
- d) To search inside xml data types

ANSWER - a) To determine if the XML data contains a certain node

2) Consider the following two tables:

Table Name: Employee

Attributes: Employee_id, First_name, Last_name, Salary, Joining_date, Department

Table Name: Incentives

Attributes: Employee_id, Incentive_date, Incentive_amount

Write SQLs for the following scenarios:

- a) Get First_Name from employee table in upper case

ANSWER - Select upper(First_name) from Employee

b) Get unique DEPARTMENT from employee table

ANSWER - Select distinct Department from Employee

c) Select first 3 characters of FIRST_NAME from EMPLOYEE

ANSWER - Select substr(First_name,0,3) from

Employee

d) Get length of FIRST_NAME from employee table

ANSWER - Select length(First_name) from Employee

e) Get FIRST_NAME, Joining year, Joining Month and Joining Date from employee table

ANSWER - Select First_name, year(Joining_date), month(Joining_date), day(Joining_date) from Employee

f) Get all employee details from the employee table order by First_Name Ascending and Salary descending

ANSWER - Select * from Employee order by First_name asc, Salary desc

g) Get employee details from employee table whose employee name are not “John” and “Roy”

ANSWER - Select * from Employee where First_name not in ('John','Roy')

h) Get employee details from employee table whose Salary between 500000 and 800000

ANSWER - Select * from Employee where Salary between 500000 and 800000

i) Get employee details from employee table whose joining month is “January”

ANSWER - Select * from Employee where month(Joining_date)='01'

j) Get department, total salary with respect to a department from employee table order by total salary descending

ANSWER - Select Department, sum(Salary) as Totalsalary from Employee group by Department order by Totalsalary descending

3) Write the DTD for the following XML file:

```
<?xml version="1.0"?>
<!DOCTYPE DatabaseInventory SYSTEM "DatabaseInventory.dtd">

<DatabaseInventory>

  <DatabaseName>
    <GlobalDatabaseName>production.iDevelopment.info</GlobalDatabaseName>
    <OracleSID>production</OracleSID>
    <DatabaseDomain>iDevelopment.info</DatabaseDomain>
    <Administrator EmailAlias="jhunter" Extension="6007">Jeffrey Hunter</Administrator>
    <DatabaseAttributes Type="Production" Version="9i"/>
    <Comments>
      The following database should be considered the most stable for
      up-to-date data. The backup strategy includes running the database
      in Archive Log Mode and performing nightly backups. All new accounts
      need to be approved by the DBA Group before being created.
    </Comments>
  </DatabaseName>

  <DatabaseName>
    <GlobalDatabaseName>development.iDevelopment.info</GlobalDatabaseName>
    <OracleSID>development</OracleSID>
    <DatabaseDomain>iDevelopment.info</DatabaseDomain>
    <Administrator EmailAlias="jhunter" Extension="6007">Jeffrey Hunter</Administrator>
    <Administrator EmailAlias="mhunter" Extension="6008">Melody Hunter</Administrator>
    <DatabaseAttributes Type="Development" Version="9i"/>
    <Comments>
      The following database should contain all hosted applications. Production
      data will be exported on a weekly basis to ensure all development environments
      have stable and current data.
    </Comments>
  </DatabaseName>

  <DatabaseName>
    <GlobalDatabaseName>testing.iDevelopment.info</GlobalDatabaseName>
    <OracleSID>testing</OracleSID>
    <DatabaseDomain>iDevelopment.info</DatabaseDomain>
    <Administrator EmailAlias="jhunter" Extension="6007">Jeffrey Hunter</Administrator>
    <Administrator EmailAlias="mhunter" Extension="6008">Melody Hunter</Administrator>
    <Administrator EmailAlias="ahunter">Alex Hunter</Administrator>
    <DatabaseAttributes Type="Testing" Version="9i"/>
    <Comments>
      The following database will host more than half of the testing
      for our hosting environment.
    </Comments>
  </DatabaseName>

</DatabaseInventory>
```

ANSWER -

```
<?xml version="1.0" encoding="UTF-8"?>
<!ELEMENT DatabaseInventory (DatabaseName+)>
<!ELEMENT DatabaseName ( GlobalDatabaseName
    , OracleSID
    , DatabaseDomain
    , Administrator+
    , DatabaseAttributes
```

```

, Comments)
>
<!ELEMENT GlobalDatabaseName (#PCDATA)>
<!ELEMENT OracleSID          (#PCDATA)>
<!ELEMENT DatabaseDomain     (#PCDATA)>
<!ELEMENT Administrator      (#PCDATA)>
<!ELEMENT DatabaseAttributes EMPTY>
<!ELEMENT Comments           (#PCDATA)>
<!ATTLIST Administrator      EmailAlias CDATA #REQUIRED>
<!ATTLIST Administrator      Extension CDATA #IMPLIED>
<!ATTLIST DatabaseAttributes Type      (Production|Development|Testing) #REQUIRED>
<!ATTLIST DatabaseAttributes Version   (7|8|9i) "9i">

```

4) Write XML schema for the following XML file:

```

<?xml version="1.0"?>
<x:books xmlns:x="urn:books">
  <book id="bk001">
    <author>Writer</author>
    <title>The First Book</title>
    <genre>Fiction</genre>
    <price>44.95</price>
    <pub_date>2000-10-01</pub_date>
    <review>An amazing story of nothing.</review>
  </book>

  <book id="bk002">
    <author>Poet</author>
    <title>The Poet's First Poem</title>
    <genre>Poem</genre>
    <price>24.95</price>
    <review>Least poetic poems.</review>
  </book>
</x:books>

```

ANSWER -

```

<?xml version="1.0" encoding="UTF-8"?>
<xs:schema attributeFormDefault="unqualified" elementFormDefault="qualified"
xmlns:xs="http://www.w3.org/2001/XMLSchema">
  <xs:element name="pub_date" type="xs:string"/>
  <xs:element name="author" type="xs:string"/>
  <xs:element name="price" type="xs:string"/>
  <xs:element name="review" type="xs:string"/>
  <xs:element name="book">
    <xs:complexType>
      <xs:sequence>
        <xs:element ref="author"/>
        <xs:element ref="title"/>

```

```

    <xs:element ref="genre"/>
    <xs:element ref="price"/>
    <xs:element ref="pub_date" minOccurs="0"/>
    <xs:element ref="review"/>
  </xs:sequence>
  <xs:attribute type="xs:string" name="id" use="optional"/>
</xs:complexType>
</xs:element>
<xs:element name="genre" type="xs:string"/>
<xs:element name="title" type="xs:string"/>
</xs:schema>

```

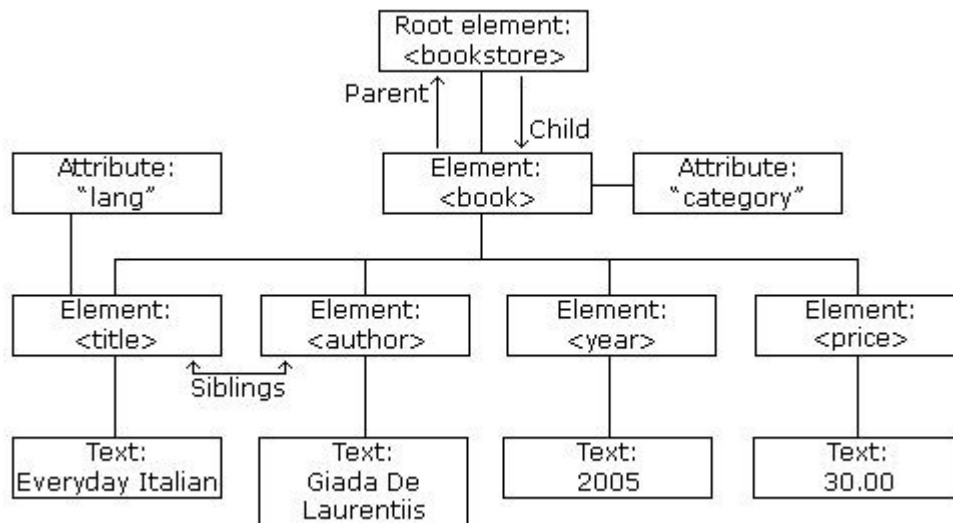
5) Write XML tree for the following XML file:

```

  <author>J K. Rowling</author>
  <year>2005</year>
  <price>29.99</price>
</book>
<book category="web">
  <title lang="en">Learning XML</title>
  <author>Erik T. Ray</author>
  <year>2003</year>
  <price>39.95</price>
</book>
</bookstore>

```

ANSWER -



6) For the xml below, answer the questions:

```
<?xml version="1.0" encoding="UTF-8"?>
```

```
<bookstore>
```

```
<book category="cooking">
  <title lang="en">Everyday Italian</title>
  <author>Giada De Laurentiis</author>
  <year>2005</year>
  <price>30.00</price>
</book>
```

```
<book category="children">
  <title lang="en">Harry Potter</title>
  <author>J K. Rowling</author>
  <year>2005</year>
  <price>29.99</price>
</book>
```

```
<book category="web">
  <title lang="en">XQuery Kick Start</title>
  <author>James McGovern</author>
  <author>Per Bothner</author>
```



```

<author>Kurt Cagle</author>
<author>James Linn</author>
<author>Vaidyanathan Nagarajan</author>
<year>2003</year>
<price>49.99</price>
</book>

<book category="web">
  <title lang="en">Learning XML</title>
  <author>Erik T. Ray</author>
  <year>2003</year>
  <price>39.95</price>
</book>

</bookstore>

```

Write XPath for the following scenarios:

- a) Select the first book element that is the child of the bookstore element

ANSWER - /bookstore/book[1]

- b) Selects the last but one book element that is the child of the bookstore element

ANSWER - /bookstore/book[last()-1]

- c) Select the first two book elements that are children of the bookstore element

ANSWER - /bookstore/book[position()<3]

- d) Select all the title elements that have a "lang" attribute with a value of "en"

ANSWER - //title[@lang='en']

- e) Select all the title elements of the book elements of the bookstore element that have a price element with a value greater than 35.00

ANSWER - /bookstore/book[price>35.00]/title

7) General SQL and NoSQL questions:

a) What is the difference between JOIN and UNION?

JOIN: JOIN in SQL is used to combine data from many tables based on a matched condition between them. The data combined using JOIN statement results into new columns.

UNION: UNION in SQL is used to combine the result-set of two or more SELECT statements. The data combined using UNION statement is into results into new distinct rows.

JOIN combines data from many tables	
based on a matched condition between them.	SQL combines the result-set of two or more SELECT statements.
It combines data into new columns.	It combines data into new rows
Number of columns selected from each table may not be same.	Number of columns selected from each table should be same.
Datatypes of corresponding columns selected from each table can be different.	Datatypes of corresponding columns selected from each table should be same.
It may not return distinct columns.	It returns distinct rows.

b) What are aggregate and scalar functions? Give examples

Aggregate Functions: These functions are used to do operations from the values of the column and a single value is returned.

Examples: AVG(), COUNT(), FIRST(), MAX()

Scalar Functions: These functions are based on user input, these too returns single value.

Examples: UCASE(), LEN(), ROUND(), FORMAT()

c) What is the difference between NoSQL & Mysql DBs'?

Key Areas	SQL	NoSQL
Type of database Schema	Relational Database Pre-defined Schema	Non-relational Database Dynamic Schema
Database Categories	Table based Databases	Document-based databases, Key-value stores, graph stores, wide column stores
Complex Queries	Good for complex queries	Not a good fit for complex queries
Hierarchical Data Storage	Not the best fit	Fits better when compared to SQL
Scalability	Vertically Scalable	Horizontally Scalable
Language	Structured Query language	Unstructured Query language
Online Processing	Used for OLTP	Used for OLAP
Base Properties	Based on ACID Properties	Based on CAP Theorem
External Support	Excellent support is provided by all SQL vendors	Rely on community support.

d) When should a NoSQL database be used instead of a relational database?

- NoSQL solutions are usually meant to solve a problem that relational databases are either not well suited for, too expensive to use (like Oracle) or require you to implement something that breaks the relational nature of your database anyway.
- NoSQL databases are often better suited to storing and modeling structured, semi-structured, and unstructured data in one database.