

APJ Abdul Kalam Technological University

Ernakulam II Cluster

Second Semester M.Tech Degree Examination May 2017

Time: 3 hrs. **05CS 6002 - MODERN DATABASES** Max. Marks: 60

I.

a) Write the DTD for the validation of the below mentioned XML document.

```
- <collection>
  <description> Recipe suggested </description>
- <recipe id="r01">
  <title> Food </title>
  <date> 20 wed 90 </date>
  <ingredient name="sugar" amount="2" unit="tablespoon"/>
  <ingredient name="rice" amount="1" unit="cup"/>
- <preparation>
  <step>
    Combine these components
  </step>
</preparation>
</recipe>
</collection>
```

(4 Marks)

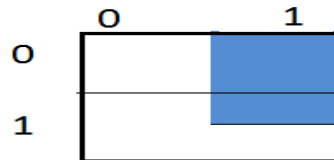
b) Draw the architecture of SQLite Database and discuss in short. (5 Marks)

c) Write the JSON format for the XML document mentioned below. (3 Marks)

```
<application>
  <debug> on </debug>
  <window title="Calculus">
    <name> Maths </name>
    <height> 400 </height>
  </window>
</application>
```

II.

- a) Justify the statement “Hilbert curves can be used to efficiently manage Multidimensional data”. (2 Marks)
- b) Use quad tree decomposition to obtain the Z values of the dark region in the following figure. (2 Marks)



- c) Consider a relation $R(A,B)$ at site 1 and a relation $S(C,D)$ at site 2.
- Compute $R \bowtie_{A=C} S$ using semijoin.
 - Apply Bloom join with hash function $h(\prod_{A \in R}) = \prod_{A \in R} \text{mod } 7$ and discuss the benefits.

R	A	B
	3	4
	5	2
	6	8
	9	1

S	C	D
	4	3
	3	1
	2	6
	8	8
	6	7

(8 Marks)

III.

- a) How Hinted Handoff works in Cassandra. (6 Marks)
- b) Explain the architecture and data management of Google’s BigTable.

(12 Marks)

OR

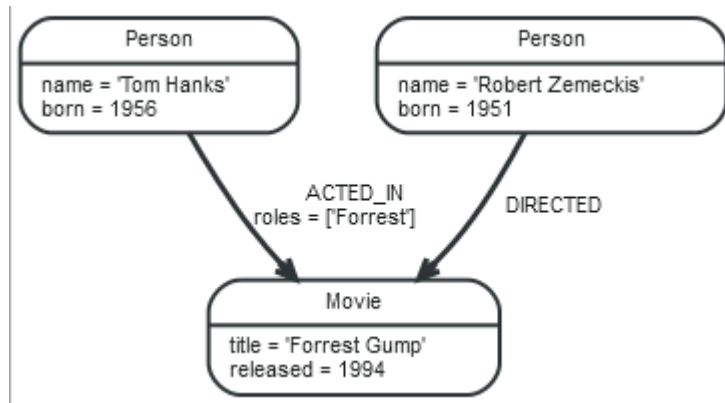
IV.

- a) Explain how horizontal scaling is implemented in MongoDB. Describe with a neat sketch MongoDB cluster architecture. (10 Marks)
- b) How vector clocks help in distributed coordination? How is it better than global clocks? Explain the meaning of the vector clock $[(S_x,3), (S_y,1), (S_z,2)]$

if there are three servers S_x , S_y and S_z . Represent the evolution of data diagrammatically showing the different versions of data. (8 Marks)

V.

- a) Briefly explain with example various clauses in cypher query. (6 Marks)
- b) Write the cypher query for the graph given below.



- i) List the movie titles Tom Hanks acted in and roles he played.
- ii) List how often an actor and director work together. (12 Marks)

OR

VI.

- a) Which are the various components of a mobile database systems. (12 Marks)
- b) Explain various issues in mobile database transactions. (6 Marks)