INSTITUTE OF TECHNOLOGY TRALEE

WINTER EXAMINATIONS AY 2014-2015

Advanced Database Programming

DBMS 81001
CRN 48064

External Examiner: Mr. Sean McHugh

Internal Examiner: Mr Peter Given

Duration: 2 Hours

Instructions to Candidates:

i) Answer any **three** questions.

ii) All questions carry equal marks. Submit all your rough-work, marks may be lost otherwise.

Question 1:

i) Explain Master-Master Replication in CouchDB and explain using an example how conflicts are dealt with. **(16 marks)**

ii) CouchDB is made "*of the web, for the web*". Discuss. **(9 marks)**

iii) Discuss the strengths and weaknesses of CouchDB **(8 marks)**

Question 2:

i) Explain the programming model used in the code below. Explain what the code below achieves and show some sample output, noting that there is a collection of 100,000 phone numbers (with "country", "area", "prefix" and "number" fields) between 1-800-555-0000 and 8-800-565-9999 in the '***phones'*** collection and that ***distinctDigits*** is a function that extracts an array of all distinct numbers **(16 marks)**

```
m = function() {
var digits = distinctDigits(this);
emit({digits : digits, country : this.components.country},
{count : 1});
}

r = function(key, values) {
var total = 0;
for(var i=0; i<values.length; i++) {
    total += values[i].count;
  }
return { count : total }; }

results = db.runCommand({ mapReduce: 'phones',
map: m,
reduce: r,
out: 'phones.report' })
```

ii) Using a diagram, discuss the use of replica sets and explain why Mongo prefers an odd number of nodes in a replica set (**9 marks)**

iii) Using a diagram, explain how Mongo handles very large data sets **(8 marks)**

Question 3:

i) Appendix 1 shows a graph database. Explain how the following Gremlin queries arrive at a result (13 marks)

a. g.V.filter{it.name=='Wine Expert Monthly'}.outE.inV.name

b. ***alice***.bothE('friends').bothV.name (Note ***alice*** is a reference to the Vertex named "Alice")

c. ***alice***.bothE('friends').bothV.except([alice]).loop(3){it.loops <= 2}.name (Note ***alice*** is a reference to the Vertex named "Alice")

d.
```
wines_count = [:]
g.V.outE('likes').outV.name.groupCount( wines_count)
wines_count
```

ii) Using a diagram, discuss Neo4J's distribution models and compare it to MongoDB's distribution model. **(12 marks)**

iii) Discuss the strengths and weaknesses of Neo4J **(8 marks)**

Question 4:

i) "***It can be a bit difficult to classify exactly what Redis is***." Discuss this statement using examples where appropriate **(16 marks)**

ii) Discuss the durability options in Redis and say when they might be used (9 marks)

iii) Discuss four features which Redis provides that Memcachd doesn't (8 marks)