INSTITUTE OF TECHNOLOGY TRALEE

AUTUMN EXAMINATIONS AY 2015-2016

Advanced Database Programming

Module Code DMDS 81001

CRN 48065

External Examiner: Mr Sean McHugh

Internal Examiner: Mr. P 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, using an example, how mapreduce queries are written in CouchDB and explain how mapreduce works. **(13 marks)**

ii) Why might you choose CouchDB as the database for a project? Support your answer with examples. **(10 marks)**

iii) Discuss replication in CouchDB and say how conflicts are resolved. **(10 marks)**

Question 2:

i) Describe an installation architecture in MongoDB which includes both replication and sharding and discuss the benefits of replication and sharding **(13 marks)**

ii) Compared to Relational Databases, MongoDB has a flexible data model. Discuss, giving examples where appropriate. **(10 marks)**

iii) Compare and contrast CouchDB and MongoDB's differing approaches to the CAP theorem. **(10 marks)**

Question 3:

i) Discuss, using examples, the Redis List and Blocking List data structures and explain, using examples, how Lists can be used to create queues and stacks.

(10 marks)

ii) Compare and contrast Redis and CouchDB showing examples where appropriate

(10 marks)

iii) Discuss the following aspects of durability in Redis; no durability, snapshotting, append-only file and discuss the advantages and disadvantages of each

(13 marks)

Question 4

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

a.
```
g.V.filter{it.name=='Irish Pride Bread
Company'}.outE.inV.name
```

b. ***jane***`.bothE('friends').bothV.name` (note ***jane*** points to the Vertex with name "Jane")

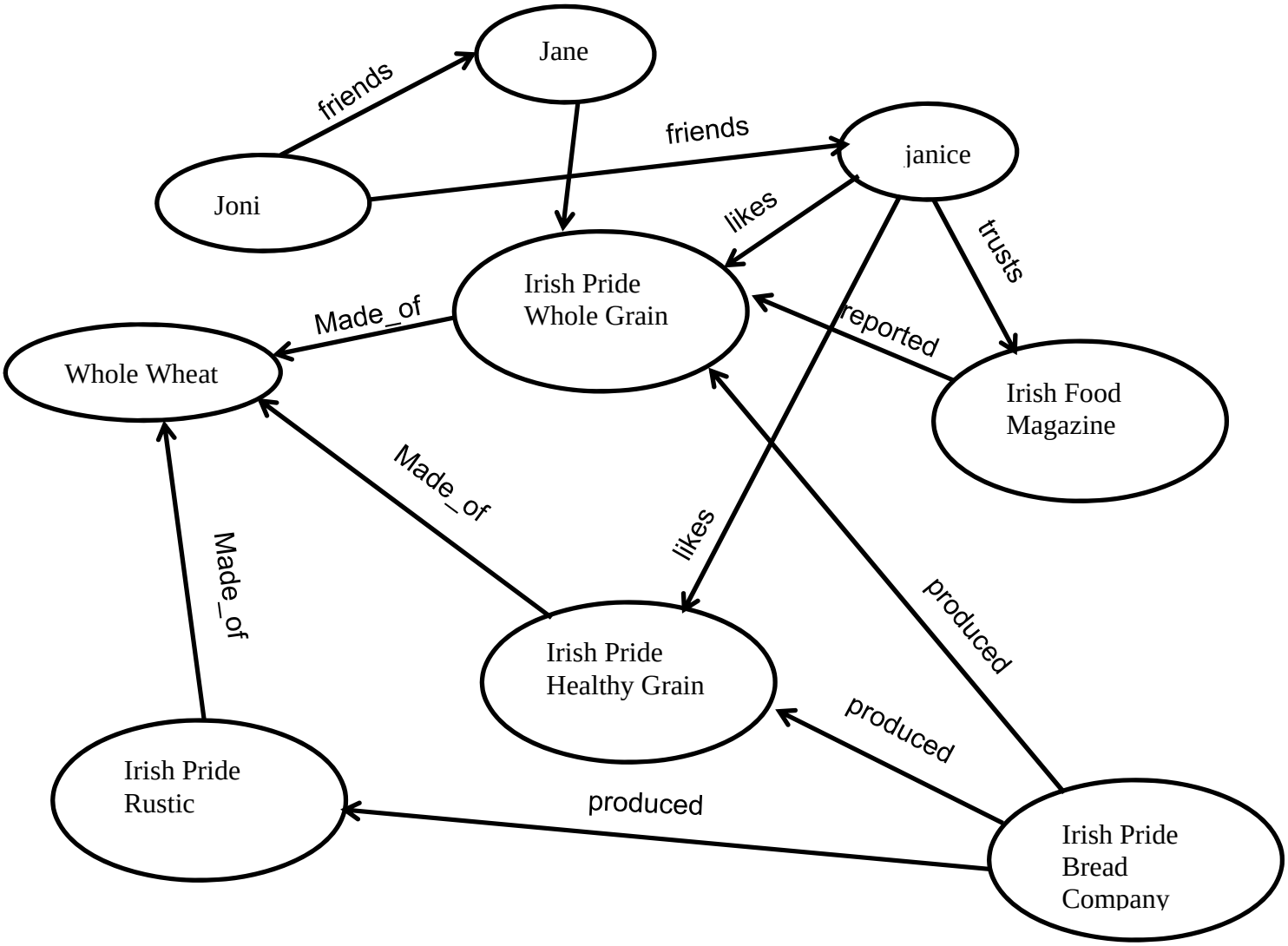
c. ***jane***`.bothE('friends').bothV.except([jane]).loop(3){i t.loops <= 2}.name` (Note ***jane*** points to the Vertex with name "Jane")

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

ii) Discuss, using an example, the architecture of HBase tables and discuss the advantage of using column families. **(12 marks)**

iii) Riak allows us to control reads and writes into the cluster by altering three values: N, W, and R. Describe these three parameters and discuss a scenario where the R parameter can be used. **(8 marks)**

Appendix 1:


Jane
friends
friends
Joni
janice
likes
trusts
Irish Pride
Whole Grain
Made_of
reported
Whole Wheat
Irish Food
Magazine
Made_of
likes
Made_of
produced
Irish Pride
Healthy Grain
produced
Irish Pride
Rustic
produced
Irish Pride
Bread
Company