Weekly exercises IN3020 and IN4020
Week 13

April 29, 2022

1 Security

1. Discuss some of the issues we deal with in database security
2. Discuss some threats to databases
3. What is the trade-off between security and precision?
4. Discuss *discretionary security* and *mandatory security control (MAC)*. What are the differences, what are the advantages/disadvantages of the two systems.
5. What do we mean by inference control? Give one example where this is important.
6. What is flow control?

2 NoSQL DBMS

1. Name a few reasons why we NoSQL databases (e.g., why can't we just use existing relational databases?)
2. Name some of the challenges we try to solve using NoSQL databases?
3. What is the CAP theorem, why is this relevant for NoSQL databases?
4. Describe what a document-based database system is. Give one example of such a system
5. Describe what a key-value based database system is and give one example.
6. What is a column-based NoSQL database system? Give an example.

3 Try MongoDB (optional)

Setup:

1. To install MongoDB on your computer, follow the instructions for you system here: `https://www.mongodb.com/docs/manual/tutorial/`.
2. Load data into the database with:
   `$ mongoload --db counties --collection places --file municipalities.json`
3. After installing and starting the service, you should be able to connect to the database with:
   `$ mongosh`
4. There is a nice overview of operations here: `https://www.mongodb.com/developer/quickstart/cheat-sheet/`.

Try out:

1. Start the shell
2. Show which databases you have:
3. Show which collections you have in the database:
4. List all data
5. List data about Akershus
6. Remove the entry "Oslo"
7. Insert the entry "Oslo"
8. Find the county with the municipality "Hamar" (do a projection)

4 Graphs

1. What is a knowledge graph?
2. Give examples of knowledge graphs technologies?

5 RDF graphs

1. What are some of the W3C certified standards for semantic technologies?
2. What is RDF?
3. What is an RDF triple?

4. What is an RDF graph?
5. An RDF graph is often visualized as a directed graph. It is, however, not really a graph. Why?
6. Why do you think we use URIs to represent concepts in RDF?
7. What is a literal in an RDF graph?
8. Why do you think we need blank nodes?
9. How would you express the following concepts in RDF?
   (a) IN3020 is a university course
   (b) IN3020 has a lecturer
   (c) IN3020 has a lecturer with the name "Egor", he is a person.
10. Draw a graph representing the following RDF graph:

```
_:x rdf:type foaf:Person ;
    foaf:name ‘‘Bob’’ ;
    foaf:age   38 .
```

11. What is reification?