Data & Information – Test 1: Solutions

12 May 2017, 13:45–15:15

Question 1 (Requirements) (30 points)

If the digital learning environment would contain student's grades, that would necessitate certain security requirements: In that case integrity would be crucial, confidentiality a legal requirement. But for the normal Blackboard functions much less so.

Highest priority could be

- Availability – teaching and learning get seriously disrupted when the system is down

Other high priority quality characteristics could be the following – depending on your motivation

- Capacity (simultaneous access by thousands of students)
- Time behaviour (many people experience Blackboard as being too slow)
- Accessability (should be OK for visually impaired students)
- Interoperability (data exchange with Osiris)
- Authenticity (user IDs cannot be tampered with)

Life is made easier with the following qualities

- Functional completeness (decreases the number of other systems we need)
- Learnability
- Operability
- Recoverability
- Maturity (not too many bugs please)

For examples of quality requirements, see the leture slides.

Question 2 (Web programming) (30 points)

a) Similarities: (i) both are executed at the server side; (ii) both are Servlets (JSP is actually a form of Servlet)
Differences: (i) Java Servlets are Java code, JSP is HTML code; (ii) Java Servlets are meant for business logic (processing), while JSPs are meant for presentation (layout); (iii) Java Servlets are supposed to be used by programmer, while JSPs are supposed to be used by page designers; (iv) Java Servlets are compiled before deployment, while JSPs are compiled when the first request meant for this page arrives (when the page is 'used' for the first time).

b) Giving the steps according to the order in which they happen:

1. Servlet is created when the web application starts. [Could be mentioned separately.]
2. End user sends an HTTP request to the server.
3. HTTP request arrives at the application server and is forwarded to the Servlet.
4. Servlet queries the database.
5. Servlet possibly creates the Java Bean (if it was not created before) and populates the Java Bean with data from the database.
6. Servlet forwards the Java Bean (together with the HTTP request) to the JSP.
7. JSP is possibly compiled (if used for the first time) and executes, so that an HTTP response message is created. This HTTP response message contains an HTML page derived from the JSP that shows the employee information.
8. HTTP response is sent back to the end user

Question 3 (Database queries) (40 points)

a) Give a list of directors who co-directed a movie together with Steven Spielberg

```
SELECT DISTINCT p2.name
FROM Directs d1, Directs d2, Person p1, Person p2
WHERE  p1.name = 'Steven Spielberg'
  AND  d1.pid = p1.pid
  AND  d2.pid = p2.pid
  AND  d1.mid = d2.mid
  AND  d1.pid <> d2.pid
```

b) Give a list of movies directed by the Coen brothers (Joel and Ethan Coen) in which George Clooney does not act

```
SELECT m.name
FROM Movie m, Directs d1, Directs d2, Person p1, Person p2
WHERE  p1.name = 'Joel Coen'
  AND  p2.name = 'Ethan Coen'
  AND  d1.pid = p1.pid
  AND  d2.pid = p2.pid
  AND  d1.mid = m.mid
  AND  d2.mid = m.mid
  AND NOT EXISTS (
     SELECT p.name
     FROM Person p, Acts a
     WHERE p.name = 'George Clooney'
       AND p.pid = a.pid
       AND a.mid = m.mid )
```

c) Movies may have a different runtime in different countries where they are released.
Give a list of movies with a difference of a least 10 minutes in the runtime across countries.
For each of these movies, give the name, the shortest and the longest runtime. Sort the list by average runtime, from longest to shortest.

```
SELECT m.name, MIN(r.runtime), MAX(r.runtime)
FROM Movie m, Runtime r
WHERE m.mid = r.mid
GROUP BY m.name
HAVING MAX(r.runtime) - MIN(r.runtime) >= 10
ORDER BY AVG(r.runtime) DESC
```