SWA midterm exam

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Comment: midterm grade = A

Part 1 of 1 96.0 / 100.0 Points

Question 1 of 8	10.0	10.0 Points

[10 minutes]

a. What are the 3 main problems of a relational database that NoSQL databases do not have?

b. We learned that in a distributed database we always get data duplication. Explain clearly why we cannot avoid duplication in a distributed database. Note: duplication of data is different that data replication. This question is not about replication. The question is about why we have find the same data in different tables/collections?

a.
1. Hard to scale write operations
2. the schema is fixed
3. relational database doesn't work well with nonstructured and semi-structured data

b. when we distribute the data through multiple nodes and when we query those data, we need all data placed on that not so the query can be fast. that's why we will have data duplication through multiple node

Question 2 of 8	10.0	10.0 Points

[10 minutes]

Suppose you need to decide between a component based monolith (also called a modular monolith) or a microservice architecture for a certain application. Select all statements that are correct.

- [ ] A. In a microservice architecture it is easier to add new functionality compared to a component based architecture
- [ ] B. In a microservice architecture the service is simpler compared to a component in a component based architecture
- [x] C. In a microservice architecture it is easier to try new technology compared to a component based architecture
- [ ] D. In a microservice architecture the performance is better compared to performance in a component in a component based architecture
- [ ] E. In a microservice architecture it is easier to reuse existing functionality compared to a component based architecture
- [x] F. In a microservice architecture we can deploy functionality faster compared to deployment in a component based architecture
- [ ] G. When multiple agile/scrum teams need to implement the required functionality then a microservice architecture fits much better than a component based architecture
- [x] H. In a microservice architecture we can scale individual functionality easier compared to scaling in a component based architecture
- [x] I. A microservice architecture fits better when the scope of the functionality is large.
- [ ] J. In a microservice architecture it is easier to use different types of databases compared to a component based architecture

Answer Key:C, F, H, I

Question 3 of 8	9.0	10.0 Points

[10 minutes]

Suppose you need to decide between a Service Oriented Architecture (SOA) or a microservice architecture for a certain application. Select all statements that are correct.

- [ ] A. A service in a SOA is always a monolith
- [x] B. When the scope of the functionality is small, then a SOA fits equally as well as a microservice architecture.
- [ ] C. When the scope of the functionality is large, then a SOA fits better than a microservice architecture.
- [x] D. When the scope of the functionality is large, then a microservice architecture fits better than a SOA.
- [ ] E. If multiple agile/scrum teams are needed to implement the functionality, than a SOA fits better than a microservice architecture.
- [x] F. If multiple agile/scrum teams are needed to implement the functionality, than a SOA fits as well as a microservice architecture.
- [ ] G. In a microservice architecture it is easier to try new technology compared to a SOA
- [x] H. In a microservice architecture it is easier to scale up individual services compared to a SOA
- [ ] I. In a microservice architecture it is easier to add new services compared to a SOA
- [ ] J. In a SOA the performance will be much better compared to a microservice architecture.

Answer Key:B, D, F

Question 4 of 8	15.0	15.0 Points

[15 minutes]

The question is given in the attached PDF.

Open the attached PDF in the browser. Write your solution here in sakai.

Interface design question.pdf 394 KB

Question 5 of 8	10.0	10.0 Points

[25 minutes]

The question is given in the attached PDF.

Open the attached PDF in the browser. Draw your solution in StarUML and upload your solution as JPEG picture.

Make sure you upload the JPEG picture. In StarUML select File->Export Diagram As -> JPEG (or JPG). This question cannot be graded if you upload the StarUML mdj file.

Tool Rental application as monolith.pdf 504 KB

Question 6 of 8	22.0	25.0 Points

[30 minutes]

The question is given in the attached PDF.

Open the attached PDF in the browser. Draw your solution in StarUML and upload your solution as JPEG picture.

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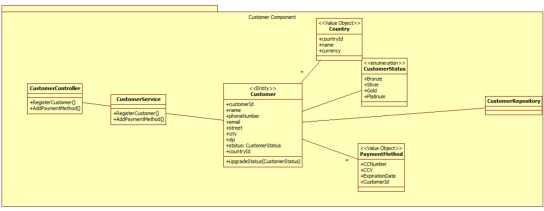
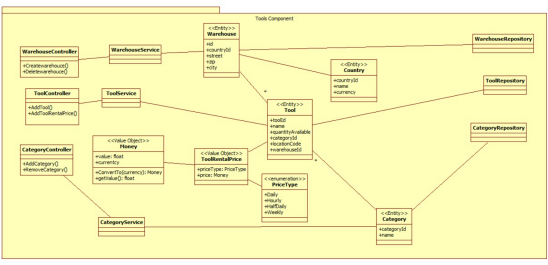
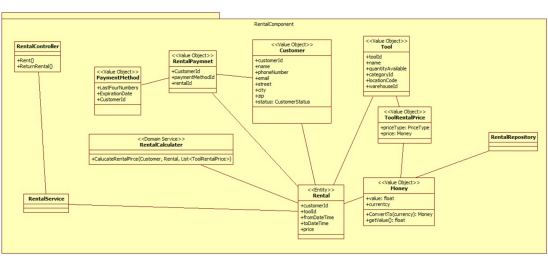
Tool Rental application as component based architecture.pdf 506 KB







Question 7 of 8	15.0	15.0 Points

[10 minutes]

Explain clearly what a partition key means in a Cassandra database and explain **why** we need a partition key in Cassandra. What problem does the partition key solve?

A partition key is a key to be used in the hashing to decide where the record will be inserted, we need the partition key in Cassandra to decide to which not we will store the record; the partition key solve a lot of data problem which all data can't fit in one node

Question 8 of 8	5.0	5.0 Points

[10 minutes]

Describe how **a No-SQL database** relates to one or more of the SCI principles you know. Your answer should be about 2 till 3 paragraphs. The number of points you get for this question depends on how well you explain the relationship between **a No-SQL database** and the principles of SCI.

The best principle I can think of is harmony exists in diversity; no SQL databases are schema-less and we can see the diversity of the data being stored but on the other hand, they are all related together to achieve better performance.