Distributed Information Systems: Spring Semester 2015

Quiz 5: Structured P2P + Mobile Data Broadcast

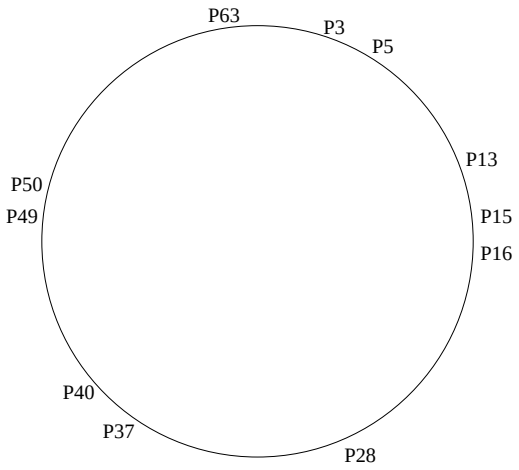
Student Name: _____ Date: 30 April 2015

Student ID: _____ Time: 11:15AM to 11:30AM

Total number of questions: 8

Each question has a single answer!

Let's consider a Chord overlay network with 11 peers and a key length of 6, where Px is the peer at key x, as illustrated below.



1. How many different peers occur in the routing table of P5?

☐ *a*) 2 ☐ *b*) 3 ☒ *c*) 4 ☐ *d*) 5

2. P3 searches for the key 55. Which one of the following routes is used for this search?

☐ *a*) $P3 \rightarrow P28 \rightarrow P63$

☐ *b*) $P3 \rightarrow P37 \rightarrow P63$

☐ *c*) $P3 \rightarrow P28 \rightarrow P49 \rightarrow P50 \rightarrow P63$

☒ *d*) $P3 \rightarrow P37 \rightarrow P49 \rightarrow P50 \rightarrow P63$

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3. Which statement about CAN is **wrong**?

☐ *a*) For a fixed size CAN network the dimensionality can be chosen such that the expected search time is lower than the search time in a Chord network of the same size.

☒ *b*) The average search cost is $\frac{1}{4}d \cdot n^{1/d}$, where d is the number of realities.

☐ *c*) Adding more realities increases the update costs.

☐ *d*) Resilience in CAN can be improved by increasing the number of realities.

4. Which statement about FreeNet is **true**?

☒ *a*) When an answer arrives, its key-value pair replaces the least recently used one.

☐ *b*) When a search request arrives, it is forwarded to all the neighbors, until TTL is reached.

☐ *c*) Over time, the popular data items reaches the same replication factor than less popular ones.

☐ *d*) FreeNet uses a breadth-first search with a large TTL (e.g. TTL=500).

5. Consider the optimal schedule `A,B,D,E,C,B,A,E,D,B,C,E`. Which of the following disks with their respective access probabilities were used by the Broadcast Scheduling Algorithm to generate it? (hint: $f_{min} = 2$)

☐ *a*) $D_1 = A, B, C$ and $D_2 = D, E$ with $p_1 = 9/30$ and $p_2 = 4/30$ resp.

☐ *b*) $D_1 = A, D, C$ and $D_2 = B, E$ with $p_1 = 9/30$ and $p_2 = 4/30$ resp.

☒ *c*) $D_1 = A, D, C$ and $D_2 = B, E$ with $p_1 = 4/30$ and $p_2 = 9/30$ resp.

☐ *d*) $D_1 = A, B, C$ and $D_2 = D, E$ with $p_1 = 4/30$ and $p_2 = 9/30$ resp.

6. Consider `A,B,C,D,E,A,B,C,F,G` as a broadcast schedule, and a client with cache size of 2. The number of time units taken by the client, using the LRU cache policy, to access `A,D,A,C,E` is:

☐ *a*) 5 ☐ *b*) 8 ☐ *c*) 10 ☒ *d*) 15

7. The PIX value used in the PIX strategy is smaller for:

☐ *a*) smaller broadcast frequency and smaller access probability

☐ *b*) larger broadcast frequency and larger access probability

☒ *c*) larger broadcast frequency and smaller access probability

☐ *d*) smaller broadcast frequency and larger access probability

8. Which of the following statements is **true** in the context of mobile data broadcast?

☐ *a*) It is always possible to obtain a broadcast schedule with an equal spacing of data items.

☐ *b*) The Most Probable Accessed caching strategy accounts for the availability of the data items.

☐ *c*) A data item that is less frequently available will always be prioritized by the the Cost-based cache replacement (PIX) over another item that is more frequently available.

☒ *d*) One reasons why PIX is not practical is the high cost for scanning all the cache items at each data item access.