CS 425 Distributed Systems, Fall 2010, University of Illinois at Urbana-Champaign

Midterm: Solution

1. (Multiple Choice) 1(b), 2(c), 3(c), 4(a), 5(d), 6(b), 7(d), 8(a), 9(c), 10(a).
2. (Timestamps and Ordering)
   (a) For P1: 1, 2, 3 ($e2$), 5, 6, 11.
   For P2: 1 (e1), 3, 4, 5, 6 ($e3$), 8, 9, 10.
   For P3: 2, 3 ($e4$), 4, 6, 7, 10.
   (b) $e2$ and $e4$ are concurrent, with same timestamps of 3. $e1$ and $e2$ are concurrent, with different timestamps of 1 and 3 respectively.
3. (Global Snapshots)
   (a) $p_1 : e_1^3$, $p_2 : e_2^4$. $C_{12} = \{b\}$, $C_{23} = \{c, d\}$, remaining channels empty.
   (b) Draw a cut through the points e_1^3, e_2^4, e_3^1 and passing through messages b, c, d.
4. (MapReduce)

Function 1 MAP ($URL\text{-}a$, $URL\text{-}b$)

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1: return "URL-b, URL-a"
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Function 2 REDUCE (key, $list\ of\ values$)

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1: if count(list of values) ≥ 100 then
2:     return key
3: end if
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