308-612A Database Programming Principles

Supplementary Questions and Exercises

Computations

1. The logical operator, **xor** is defined as follows.
   a **xor** b = (**not** a **and** b) **or** (a **and not** b)
   The truth table for $c = a$ **xor** b is shown at right.
   Note that the number of `1`s in each row is even.
   Write a computation, $xor(a, b, c)$, which can accept the most possible subsets of $\{a, b, c\}$ as inputs.

a	b	c
0	0	0
0	1	1
1	0	1
1	1	0

2. Write a computation which gives all possible results from the relationship among the integers *dividend, divisor, quotient,* and *remainder*.

3. a) and b) Write two computations, one for each of the relationships

$$d = d_0 + v_0 \times t + a \times t \times t/2$$

   and

$$v = v_0 + a \times t$$

   c) Discuss how these might be combined, in a future implementation of Aldat, to solve the two equations together: discuss each possible invocation.

4. Write the **post** update handlers that will display "Trigger" and "New" for the code
   update R **change** X <− `"c"` **using ijoin** P;
   update R **add** Q;
   update R **delete** S;
   and show the results produced by relix for

$R(X$	$Y)$
a	1
a	2
b	1

$P(X$	$Y)$
a	1

$Q(X$	$Y)$
a	3

$S(X$	$Y)$
b	1

5. Define a computation, **comp** $X(R, S, T, B, C, D)$, which puts in T all pairs of values, B from R and D from S, which are associated with the same sets of values of C from both R and S. Invoke your computation on the relations $R(A, B, C)$ and $S(C, D, E)$. Write a second **alt** block in your computation which constructs as much of S as possible given R and T.

6. Write an event handler which prints out a sequence of consecutive integers from 4 to 1 then stops, using only a relation *counter* which is always a singleton. Write the code to invoke it.

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