Problem	1	2	3	4	Total
Points:	25	25	30	20	100
Score:					

This homework assignment has 4 problems, for a total of 100 points.

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1. (a) (5 points) The following is **not** a shortcoming of RosettaNet Partner Interface Processes (PIPs)
   - A. PIPs provide no special support for interactions involving more than two parties.
   - B. PIPs are typically request-response pairs.
   - C. Several PIPs are (being) supported by major application vendors.
   - D. PIPs do not capture the semantics of the interactions they describe.

   (b) (5 points) The following is the main difference between orchestration and choreography
   - A. Orchestration views a process as a partial order, but choreography views a process as a total order.
   - B. Orchestration captures the messages exchanged among business partners whereas choreography specifies the global steps to be taken.
   - C. Orchestration views a process like a workflow whereas choreography views a process as a set of conversations.
   - D. Orchestration is global whereas choreography is local.

   (c) (5 points) Name the three main primitive patterns of interoperability among workflows.

   (d) (5 points) Name three of the main constituents of a process description in BPEL4WS.

   (e) (5 points) Describe the main steps involved in applying ebXML to achieve interoperation among two business partners (about 3-5 steps, depending on how you break them up).

2. (25 points) Consider the following supply-chain scenario:

   - When an assembly is ordered, order a valve and order a hose. The valve and hose orders must both succeed for the assembly to succeed.
   - As soon as the hose is received, order elbow joints, except that if the valve is aborted before elbow joints are ordered, do not order elbow joints.
   - If the valve is aborted but elbow joints have been ordered, cancel the order for elbow joints.

   Specify the above supply-chain scenario in a DOM-like extended transaction model.

   To systematically answer this question, assume that each task (subtransaction or activity) has three significant events: start, commit, abort. Specify which tasks are vital, specify what compensating transactions exist, state ordering constraints among the events of different tasks.

   Your solution should be a diagram involving nodes and edges of different types, with a legend for the different types (e.g., round nodes means ..., dotted edges mean ..., solid edges means ..., and so on). Based on this, it should be obvious what tasks are vital, contingencies for other tasks, or compensates for other tasks, as necessary. Label all nodes. Further, if an edge involves specific significant events of the tasks it connects, identify those events (e.g., an edge from X to Y may be explained by stating that "abort of X precedes start of Y," and so on).

3. (30 points) Consider the following supply-chain scenario for BTP:

   - When an assembly is ordered, matching valves and hoses are ordered.
   - If exactly one of the hose and valve requests is aborted, cancel the one that committed.
   - If the hose and valve requests both commit, but the assembly finds that the hoses and valves fail to match, reorder the hoses (for simplicity, assume the reordering is guaranteed to succeed and ignore subsequent steps).

   Describe the parties involved and the messages exchanged among them when the above supply chain is executed using BTP, and it turns out that hoses and valves commit, but do not match.

4. (20 points) Describe a compositional transaction scenario that satisfies compositional serializability with the additional condition that if the various sites use 2PL, a deadlock would ensue and at least one of the local schedules would not be obtained.

   You can specify this compositional transaction scenario by listing

   - Its local sites and their data items.
   - The composed and the local transactions at each site (if any).
   - The schedules that would be obtained at each site if there were no locking.
   - A point in the above schedules where deadlock occurs when 2PL is used by all the sites.