

# EXAM BUSINESS PROCESS SUPPORT

## Solutions 2<sup>nd</sup> part

### Part I

**Answer Q1:** see “Actor diagram Question 1” in the published model

**Answer Q2:** see “process model Question2” in the published model

#### **Answer Q3-a:**

*The real time processing is more efficient in terms of completion time: batch-processing may increase unnecessarily the duration of many instances of the process to one week. Especially, if we take into account the fact that in particular (designer) rugs are rather (long life) expensive items, we may infer that the number of incoming orders in a week may not be very high.*

*Batch processing is more efficient in terms of costs: processing multiple orders in one pass is more cost-efficient (under the condition that the volume of incoming orders is fairly high) than the alternative since it allows the grouping and totalling of transactions, and thus decreases the workload in the order handling process.*

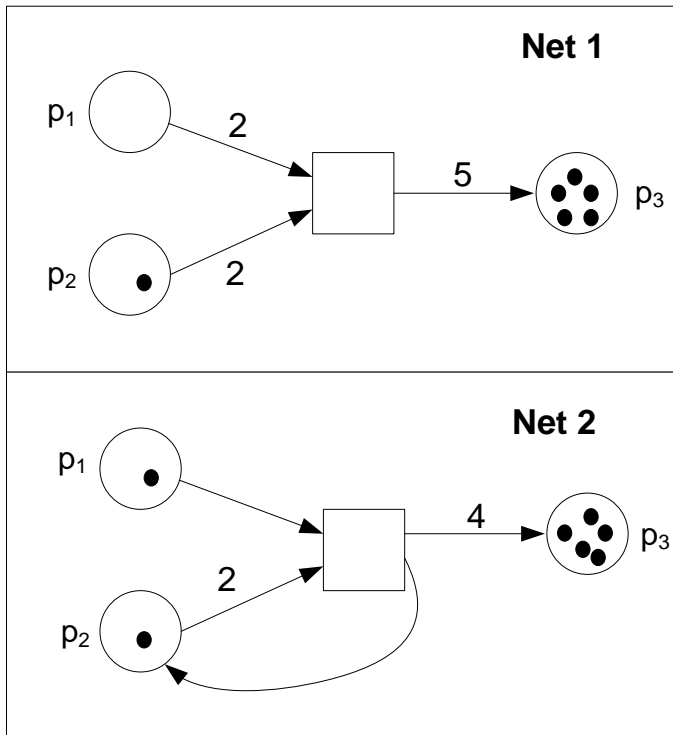
**Answer Q3b:** see “process model Question3” in the published model

#### **Answer Q3c:**

*Designer rugs are produced in the US. However according to the case description all rugs are first deposited in the U.S. warehouse and then shipped to the customers. In order to reduce the completion time of the process, i.e. to achieve shorter delivery times, stocks of designer rugs could be kept in storage at the suppliers and just maintained by CarpetOnline. Thus, these rugs could be shipped directly from supplier to the customer without passing through the US warehouse and be shipped twice (from supplier to US warehouse and from US warehouse to customer).*

**Question 4 (12 points)**

Net resulting after firing



**Net 3**

Transition cannot fire  
 $\text{capacity}(p_2) = 3 < 3 - 1 + 2$

### Question 5 (20 points)

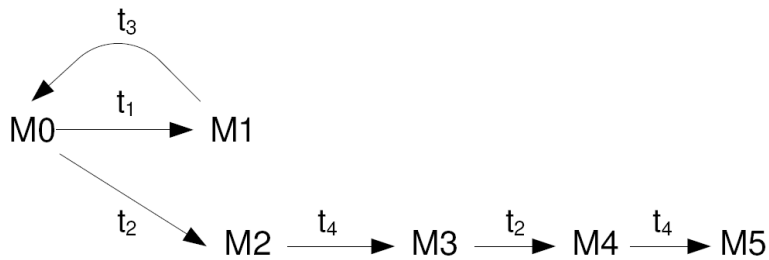
#### Question 5-a (12 points)

Reachability analysis

Marking	p <sub>1</sub>	p <sub>2</sub>	p <sub>3</sub>	p <sub>4</sub>	p <sub>5</sub>	Enabled Transitions
M0	2	2	0	0	0	t <sub>1</sub> → M1, t <sub>2</sub> → M2
M1	0	2	1	0	0	t <sub>3</sub> → M0
M2	1	0	0	1	1	t <sub>4</sub> → M3
M3	1	2	0	1	0	t <sub>2</sub> → M4
M4	0	0	0	2	1	t <sub>4</sub> → M5
M5	0	2	0	2	0	Deadlock!

#### Question 5-b (5 points)

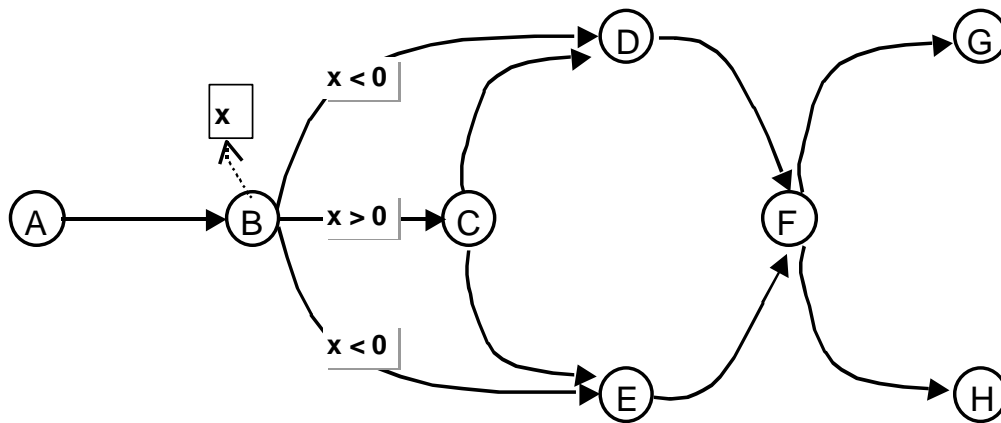
Reachability graph



#### Question 5-c (3 points)

The Petri net is not deadlock-free. When M5 is reached no transition can fire; i.e., M5 = (0,2,0,2,0) describes a marking where a deadlock is present.

**Question 6 (28 points)**



**Question 6-a (4 points)**

Activities A and B will be always executed. Note that when B delivers  $x = 0$  as result, the following deadpath elimination will lead to completion of the respective workflow instance.

**Question 6-b (4 points)**

Activities D and E are concurrently processed during runtime on condition that  $x < 0$  holds. Furthermore, after completing F the two activities G and H are executed concurrently.

**Question 6-c (16 points)**

Execution log of workflow instance  $I_1$ :

START(A)	END(A)	START(B)
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Instance  $I_1$

Activity	Current Execution State
A	<i>completed</i>
B	<i>running</i>
C	<i>not_activated</i>
D	<i>not_activated</i>
E	<i>not_activated</i>
F	<i>not_activated</i>
G	<i>not_activated</i>
H	<i>not_activated</i>

Execution log of workflow instance  $I_2$ :

START(A)	END(A)	START(B)	END(B) [x=1]
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Instance  $I_2$

Activity	Current Execution State
A	<i>completed</i>
B	<i>completed</i>
C	<i>activated</i>
D	<i>not_activated</i>
E	<i>not_activated</i>
F	<i>not_activated</i>
G	<i>not_activated</i>
H	<i>not_activated</i>

Execution log of workflow instance  $I_3$ :

START(A)	END(A)	START(B)	END(B) [x=-1]
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Instance  $I_3$

Activity	Current Execution State
A	<i>completed</i>
B	<i>completed</i>
C	<i>skipped</i>
D	<i>activated</i>
E	<i>activated</i>
F	<i>not_activated</i>
G	<i>not_activated</i>
H	<i>not_activated</i>

Execution log of workflow instance  $I_4$ :

START(A)	END(A)	START(B)	END(B) [x=0]
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Instance  $I_4$

Activity	Current Execution State
A	<i>completed</i>
B	<i>completed</i>
C	<i>skipped</i>
D	<i>skipped</i>
E	<i>skipped</i>
F	<i>skipped</i>
G	<i>skipped</i>
H	<i>skipped</i>

**Question 6-d (4 points)**

When adding control connector  $F \rightarrow C$  to the net we would obtain cycle  $F \rightarrow C \rightarrow D \rightarrow F$ . This, in turn, could lead to a deadlock during runtime. Therefore this change is not allowed!

## **PART II. MULTIPLE CHOICE QUESTIONS (3 POINTS PER QUESTION)**

**Answer Q1: b, see comparison table TQM/BPR on slide 24 in lecture 2**

**Answer Q2: c, as indicated in slide about BPR risks (lecture 2)**

**Answer Q3: b, using web technology for workflow execution is not the goal of BPMS. It is merely one enabling technology. The goals of BPMSs are described at a.**

**Answer Q4: d**

**Answer Q5: e, all of them can be found in at least one other notation as well; e.g.: actor – UML, interaction - RAD, activity replication – BPMN, Process loops – BPMN, UML activity diagram etc.**

**Answer Q6: d. RAD does not cover the informational perspective.**

**Answer Q7: c – see guest lecture 3, sheets 47-48.**

**Answer Q8: a, as mentioned during lecture 4 (see slides 52-64) and the BPE handbook on p. 137. However, b is also not completely wrong. The model type also has a certain influence on the choice - some types of models occur more often in conjunction with a particular strategy. However, the modelling goal always prevails because you can always design virtually any type of model regardless of the chosen strategy. Therefore, if you chose b you will still get half of the points for this question.**

**Answer Q9: b, completion time analysis is not a qualitative technique!**

**Answer Q10: d – a, b, c are all sources of ideas for extreme design, as indicated in slide 51 and 52 of lecture 5.**

### **Question 11**

- a. The workflow reference model provides interfaces for accessing audit trails (i.e., execution logs).
- b. The workflow reference model provides interfaces for dynamic changes of workflow instances during runtime.**
- c. The workflow reference model provides interfaces which allow workflow enactment services to interact with each other.
- d. The workflow reference model provides interfaces for implementing worklist applications.

### **Question 12**

- a. **A particular user worklist contains at least one work item for each running workflow instance.**
- b. A worklist may contain more than one work item related to the same workflow instance.
- c. A worklist may contain work items related to multiple workflow instances of the same or of different workflow types
- d. When a workflow activity becomes activated more than one work item may be created and added to different worklists.

### Question 13

- a. simple merge
- b. **exclusive choice**
- c. parallel split
- d. XOR-join

### Question 14

- a. **Both transitions A and B are concurrently enabled!**
- b. Both transitions A and B can be concurrently executed!
- c. None of the two transitions A and B can fire under the current marking!
- d. The Petri-Net is deadlock-free!

### Question 15

Consider the status of activity 'assess risk'. This status information constitutes ...

- a. workflow application data
- b. workflow participant data
- c. **workflow control data**
- d. workflow relevant data



## Question 16

Consider the data item 'amount'. This data item constitutes ...

- a. workflow application data
- b. workflow participant data
- c. workflow control data
- d. workflow relevant data**

## Question 17

- a. { U<sub>1</sub>, U<sub>2</sub>, U<sub>4</sub> }
- b. { U<sub>3</sub>, U<sub>4</sub>, U<sub>5</sub> }
- c. { U<sub>1</sub>, U<sub>2</sub>, U<sub>3</sub>, U<sub>4</sub>, U<sub>5</sub> }**
- d. { U<sub>1</sub>, U<sub>2</sub>, U<sub>3</sub>, U<sub>4</sub>, U<sub>5</sub>, U<sub>6</sub> }

## Question 18

- a. { U<sub>2</sub> }
- b. { U<sub>3</sub> }
- c. { U<sub>2</sub>, U<sub>3</sub> }**
- d. { U<sub>2</sub>, U<sub>3</sub>, U<sub>5</sub> }

## Question 19

- a. { U<sub>1</sub>, U<sub>2</sub>, U<sub>3</sub>, U<sub>4</sub>, U<sub>5</sub>, U<sub>6</sub> }**
- b. { U<sub>6</sub> }
- c. { U<sub>4</sub>, U<sub>5</sub> }
- d. { U<sub>1</sub>, U<sub>2</sub>, U<sub>3</sub> }

## Question 20

- a. model the circulation of an electronic folder through an organization
- b. access documents when working on a particular activity
- c. integrate arbitrary application components**
- d. connect applications with document types