VU UNIVERSITY AMSTERDAM

Department of Computer Science

Exam Business Process Management (FEW_X_405115_2014_110),
Tuesday January 7th, 18:30 - 21:15 hours.

R E A D T H I S

For this written exam a maximum number of 10 points can be obtained. It is NOT allowed to use the book, notes, or any other course-related material during the examination. It is, however, allowed to use a basic calculator and a dictionary. The solutions for the assignments should be formulated in ENGLISH, concisely, and list any assumptions that are not explicitly stated in the assignment. Only use the pre-printed forms for your solutions and stay within the text boxes or pages assigned to the assignments – only those inputs will be corrected. Also, fill out your name ON ALL FORMS please. Note the mnemonic appendix at the end of the exam for your convenience.

Assignment 1 (2.5 points)

a) *Business Process Redesign* (or *Business Process Reengineering*) was introduced during the 1990s, but its popularity faded away at the end of that decade. What were the three main reasons for this? Briefly explain each of these (0.5 points).

b) One of the phases of the BPM lifecycle relates to *process identification.* During this phase, a decision is made which processes need to be targeted for improvement, consolidation or elimination. Which are the three most important criteria used for the evaluation of the identified processes? Briefly explain each of these (0.5 points).

c) Process analysts and domain experts have complementary roles during the phase of *process discovery*. What are the two most important aspects in which they differ and how do these roles score on each of these aspects? (0.5 points).

d) In the case on the healthcare institution, as discussed during the lectures and described in Chpater 8, one redesign scenario involves the team leader directly assigning new patients instead of waiting for the periodic meeting to do so. Which is the redesign heuristic that is applied here? (0.5 point).

e) The alpha-algorithm for process mining has various limitations. Mention two problems that are explicitly discussed in Chapter 10 and briefly explain these (0.5 points).

Assignment 2 (2.5 points)

Webber is a company that creates and maintains web sites for clients. The process for setting up a website for a client is as follows. Clients can send in requests for new web sites through an electronic form available at Webber's website. This triggers an action by an account manager of Webber to buy the desired domain name for the new web site. Next, three concurrent activities are started up. The first activity is concerned with determining the specifications for the hardware that is to support the website in case it is decided at a later stage to host the website internally. This specification is made by a technical specialist of Webber, who stores this information in a database. The second task is done by the account manager: It concerns an inquiry for a quotation to have the entire website hosted externally. Webber works with a preferred supplier for external hosting, to whom this inquiry is sent. Thirdly, an initial design for the web site is created by an internal web designer.

As soon as the hardware specifications are ready and the quote for the external hosting has been received, the account manager decides to either support the website internally or to have it hosted externally by its partner, i.e. the supplier providing the quote. In the latter case, the account manager sends out a formal subscription to the supplier. If the website will be hosted internally, a dedicated web server is installed by a technical specialist of Webber in accordance with the specifications determined earlier.

Meanwhile, as soon as the initial design for the web site is completed, it is sent for feedback to the client requesting the website. The idea is that the designer processes the feedback as quickly as it comes in to create a final design, but if no feedback is received within five days this is interpreted that the initial design is *OK* (it needs not be updated).

When the design is final and all other actions have been completed for the client's new website, the account manager sends the contract to the client.

Model the above process in BPMN. Hint: first sketch for yourself the different lanes/pools that you may want to use before putting down your final solution down in the answer sheet; there's space for this at the back of the answer form.

Assignment 3 (2.5 points)

Consider the business process as shown in Figure 1.

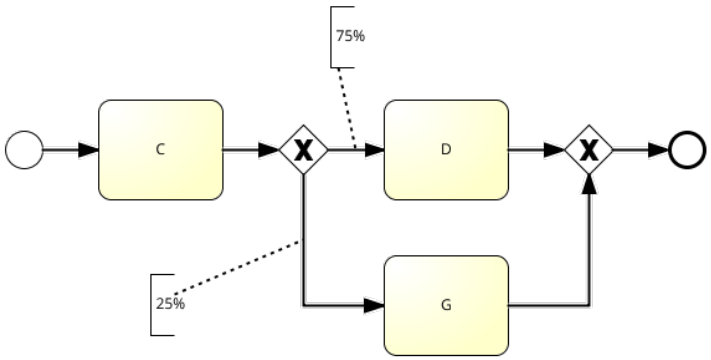

Figure 1: Grant decision making process – Design I

This is the simple process used by the TU Kampen[1] to decide whether a student is granted full financial support for an international semester abroad. After executing an extensive check C, a decision is either made to grant the application (activity G) or to deny it (activity D). Check C considers three aspects of a student's performance, each of which could lead to a positive decision, i.e. (1) the student's average course grade, (2) the quality of his/her motivation letter, and (3) the result from an assessment. Assume that the arrival process is Poisson, with an average arrival of 2.5 cases per hour. For each of the activities, exactly one dedicated resource is available. The execution time for each activity has a negative exponential distribution. The average service times for activities C, D, and G are respectively 20, 20 and 30 minutes.

The board of the TU Kampen is not satisfied with the performance of the process. Too few students receive funding and both the average cycle time and the average processing time for cases are considered to be too high. Bigtime Consulting[2] is asked for advice and their management consultants suggest to split up the extensive activity C into three smaller parts, one for each of the criteria mentioned, and to assign a dedicated resource to each of these. The redesigned process is shown in Figure 2.

[1] http://www.tukampen.nl
[2] http://en.wikipedia.org/wiki/Bigtime_Consulting

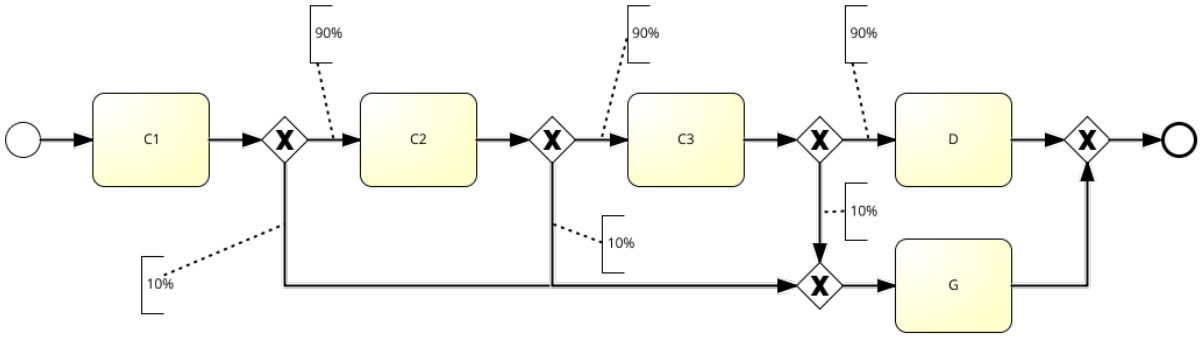

Figure 2: Grant decision making process – Design II

Assume that each of the separate checks C1, C2, and C3 has a negative exponential distribution time with an average of 10 minutes. Routing probabilities are as shown in the figure. Also, assume that the rest of the process stays the same and that there is one dedicated resource available for each activity.

a) What is the name of the most important redesign heuristic that is applied to derive design II from design I? (0.25 points)
b) The sum of the average service times of tasks C1, C2 and C3 (design II) exceeds the average service time of task C (design I). Why is it reasonable that executing C1, C2, and C3 separately will – on average – last longer than executing C, even though essentially the same work is involved? (0.25 points)
c) Is the redesign (design II) an improvement of the existing situation (design I) with respect to the *fraction* of applications being approved? Motivate your answer. (0.5 points)
d) Is the redesign (design II) an improvement of the existing situation (design I) with respect to the average *processing time* of cases? Motivate your answer. (0.5 points)
e) Is the redesign (design II) an improvement of the existing situation (design I) with respect to the average *cycle time* of cases? Motivate your answer. (1.0 points)

Assignment 4 (2.5 points)

a) Consider the workflow log L = [<*a, e, d, f, g*>, <*b, c, g*>, <*a, d, e, f, g*>]. Provide the set T_I of first tasks, the set T_O of last tasks, and the footprint matrix (1 point).

b) Provide a workflow log that contains all possible execution sequences for design II of the grant decision making process, as referred to in the previous assignment (see Figure 2) (0.5 points).

c) Consider the footprint represented in the matrix below (see Figure 3). Assume that only task *a* is in the set T_I of first tasks and that only task *j* is in the set T_O of last tasks. Construct the process model in BPMN according to the α–algorithm (1 point).

	a	*b*	*c*	*d*	*e*	*f*	*g*	*h*	*i*	*j*
a	#	→	→	→	#	#	#	#	#	#
b	←	#	#	#	→	#	#	#	#	#
c	←	#	#	#	→	#	#	#	#	#
d	←	#	#	#	→	#	#	#	#	#
e	#	←	←	←	#	#	→	→	#	#
f	#	#	#	#	#	#	#	#	#	#
g	#	#	#	#	←	#	#	||	→	#
h	#	#	#	#	←	#	||	#	→	#
i	#	#	#	#	#	#	←	←	#	→
j	#	#	#	#	#	#	#	#	←	#

Figure 3: Footprint matrix

Appendix

M/M/1-queue

$\rho=\lambda/\mu$, $L = \rho/(1-\rho)$, $Wq = \rho/(\mu-\lambda)$, $W = 1/(\mu-\lambda)$.

Redesign heuristics

Control relocation
Contact reduction
Integration
Case types
Activity elimination
Case-based work
Triage
Activity composition
Resequencing
Parallelism
Knock-out
Exception
Case assignment
Flexible assignment
Centralization
Split responsibilities
Customer teams
Numerical involvement
Case manager
Extra resources
Specialist-generalist
Empower
Control addition
Buffering
Activity automation
Integral technology
Trusted party
Outsourcing
Interfacing