

MTAT.03.231 – Business Process Management

Regular Exam

2 June 2015

Task 1. (35 points)

Implement the following Equipment Rental Process using Bizagi. Submit a “.bpm” file and the Bizagi database backup of your project (“.bak” file).

BuildIT is a construction company specialized in public works (roads, bridges, pipelines, tunnels, railroads, etc.). Within BuildIT, it often happens that engineers working at a construction site (called *site engineers*) need a piece of equipment, such as a truck, an excavator, a bulldozer, a water pump, etc. BuildIT owns very little equipment and instead it rents most of its equipment from specialized suppliers.

The equipment rental process starts when a site engineer fills in an “Equipment Rental Request” containing the following details:

- Identifier of the site engineer who initiates the request
- Requested start date & time of the equipment rental
- Expected end date & time of the equipment rental
- Project for which the equipment is to be rented
- Construction site where the equipment will be used
- Description of the required equipment
- Expected rental cost per day (optional)
- Preferred supplier (optional)
- Supplier’s equipment reference number (optional)
- Comments to the supplier (optional)

The rental request is handled by one the clerks at the company’s depot. The clerk consults the catalogues of the equipment suppliers and calls or sends e-mails to one or multiple supplier(s) in order to find the most cost-effective available equipment that complies with the request. Once the clerk has found a suitable piece of equipment available for rental, she recommends that it be rented. At this stage, the clerk must add the following data to the equipment rental request: (i) Selected supplier; (ii) Reference number of the selected equipment; and (iii) Cost per day.

Equipment rental requests have to be approved by a works engineer (who also works at the depot). In some cases, the works engineer rejects the equipment rental request, meaning that no equipment will be hired. Of course, before rejecting a request in this way, the works engineer should first discuss their decision with the site engineer and also add an explanatory note to the equipment rental request. In other cases, the works engineer rejects the recommended equipment (but not the entire request) and asks the clerk to find an alternative equipment. Again, in this case the works engineer should communicate their decision to the clerk and add an explanatory note.

Rental requests for which the rental cost per day is less than or equal to 100 are automatically approved, without going through a works engineer.

Once a request is approved, a purchase order is automatically generated from the data contained in the approved rental request. The purchase order includes:

- Supplier's equipment identification
- Cost per day
- Construction site where the plant is to be delivered
- Delivery date & time
- Pick-up date & time
- Comments to the supplier (optional).

The supplier delivers the equipment to the construction site at the required date. The site engineer inspects the equipment. If everything is in order, they accept the equipment, add the date of delivery to the purchase order and optionally a note to indicate any issues found during the inspection. Similarly, when the equipment is picked up by the supplier at the end of the renting period, another inspection is performed, and the supplier marks the pick-up date in the purchase order (possibly with a pick-up note).

Until the scheduled pick-up date, the site engineer may request an extension of the rental period. In this case, the site engineer records the extended pick-up time into the PO and the revised PO is automatically re-sent to the supplier by the system. Prior to doing this change, the site engineer is expected to call the supplier in order to agree on the change of pick-up date.

The process completes after the equipment is picked up by the supplier. (Eventually an invoice for the rental is received and paid, but invoice handling and payment is outside the scope of this exam).

Note. In the above process, the task of creating a PO is automatic. For the purpose of this exercise, you may replace this automatic task with a task where the clerk enters the data required to create the PO. Also, you do not need to implement the tasks of sending or re-sending the PO to the supplier.

Task 2. (15 points)

This task is based on event logs of processes for handling building permit applications at three Dutch municipalities. The cases in the log contain information on the main permit application as well as objection procedures in various stages.

The processes in the three municipalities are supposed to be basically identical, but they may differ slightly. Especially when changes are made to procedures, rules or regulations, the time at which these changes are implemented in the three municipalities may differ.

Using ProM5 and/or Disco, perform the following analysis:

- Filter the logs related to Municipality 1, 2 and 3, and extract only the cases with a frequency higher than or equal to 4; export the filtered logs and provide them with your submission. How many cases, events, event classes and originators are there in each filtered log? (3 point)
- Mine the filtered log related to Municipality 1 using the Heuristic Miner (using the long distance dependency heuristics) and export the Heuristic net as a png file. Convert the Heuristic net into a Petri net and export it as a pnml file. Provide these files with your submission. (2 points)
- Compute the fitness of the filtered logs of Municipalities 2 and 3 with respect to the Petri net discovered from the filtered log of Municipality 1. Can you say if the process performed by Municipality 2 or by Municipality 3 is the closest to the one performed by Municipality 1 (highest fitness)? (3 points)
- Which Municipality has the highest throughput time for the entire process (use the filtered logs for this analysis)? (2 points)
- Now, consider only Municipality 1 and the throughput time for the entire process (derived using the filtered log) for this Municipality and perform a critical path analysis. Filter again the log and consider only the cases with a throughput time higher than the average. (2 point)
- Mine this new log with the heuristic miner. What are the bottlenecks in the process execution? (3 points)

You should submit a short analysis report containing the answers to the questions as well as any screenshots requested above.