Name: _____ Nº

Second Test

Métodos de Desenvolvimento de Software
2016/2017
14th of December 2016
16h30
Departamento de Informática
Universidade Nova de Lisboa
(duration 2h00)

NOTE: This test, with some exceptions that should be answered in this questions booklet, is mainly composed by multiple choice questions. Both the multiple choice and open questions should be answered in this group of sheets (no extra sheets should be added by the student).
To select wrong answers will impact negatively in the mark of the corresponding question. On multiple choice you have to select just one answer, if wrong it will discount in the overall grade 1/3 of the value of the correct answer.

All the questions should be answered in the akindi solutions sheet or in the questions booklet. It is not allowed to remove the staple.

If the answer sheets are not identified with a name and student number it automatically will not be considered for evaluation.

The solution can be marked using pencil or pen.

You can withdraw 45 minutes after starting the test. In a case of withdrawal, please write and sign this cover page with a statement: "I declare that I give up", by this informing the teacher about your decision.

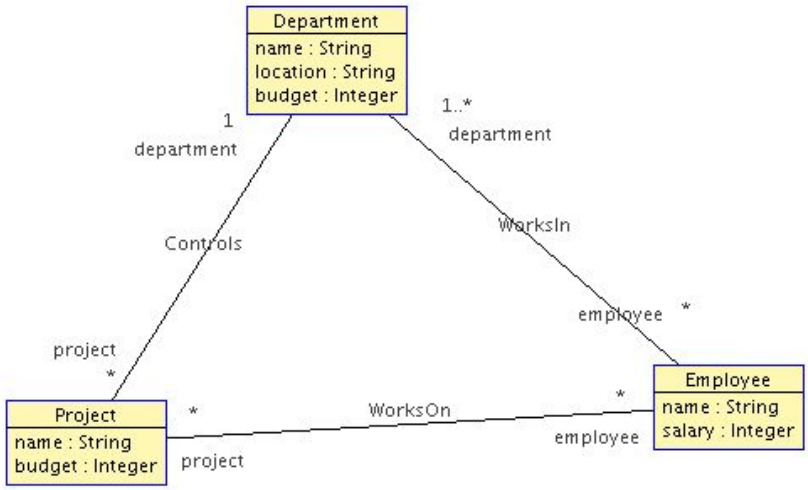
After 2h00 from starting the test the teachers will collect all the answer sheets.

Rules

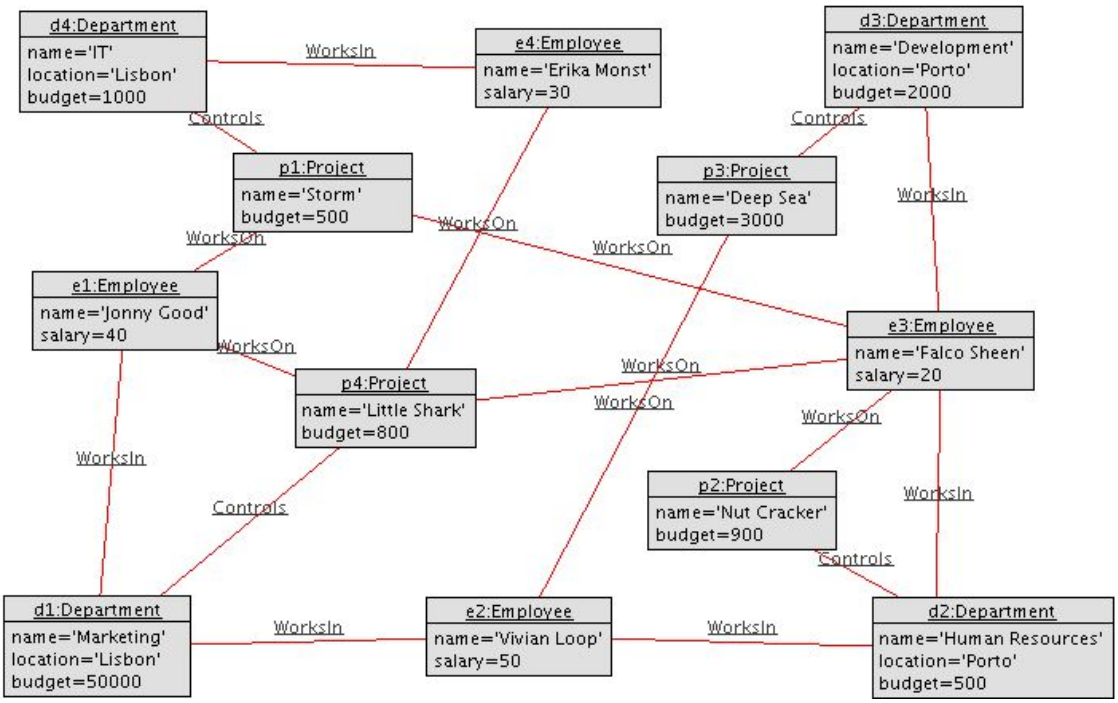
- **Duration of 2h**.
- **You can not exit during the test.**
- Can only enter during the first 30 minutes.
- Must stay 45 minutes even if intended to quit.
- No device allowed.
- Fraud attempt means to fail the course.
- Do not forget to identify with name and number your test.
- can use pencil and pen.
- Do not unstaple.
- Answer giving your best interpretation.
- Visually confusing answers will not be corrected.

GROUP I - OCL

Suppose that a System Analyst, after doing a domain analysis, designs the following class diagram related to a specific company:



Consider that we have the following object diagram (instances of conformant to the previous model):



Taking into consideration the previous diagrams:

(bulletin) 1- Consider the following OCL expression:
Department.allInstances->select(x\| x.budget < 1000).name

The result of evaluating the previous expression is (**choose the one that applies**):

A. Set{'Human Resources'} : Set(String)
B. Syntax Error - badly formed sentence
C. Bag{'Human Resources'} : Bag(String)
D. 'Human Resources' : String
E. @d2: Department

(bulletin) 2- Given the following OCL expressions identify which is **true**, in the context of the previous diagrams:

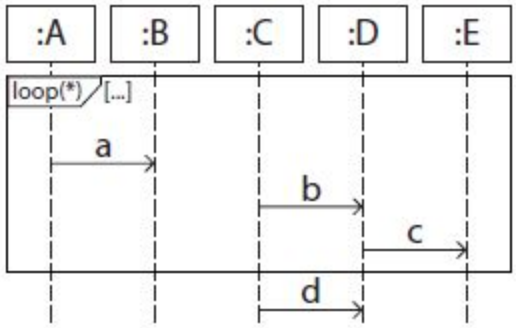
A. context Project inv g: (self.budget <= self.department.budget)
B. context Department inv e: (self.employee->size > self.project->size)
C. context Departament inv: not self.employee.select(salary<50)->forAll(v|v.salary>30)
D. context Department inv: not Department.allInstances->forAll(d1,d2| d1.budget<>d2.budget)
E. context Department inv: not Department.allInstances->exists(d1,d2| d1<>d2 implies d1.budget<>d2.budget)

(open box) A - Consider that the Class Department has the operation Department::withdraw(amount: Real). Define in OCL this operation obeying to the following business rules:
The amount to be removed to the Department's budget is greater than zero;
After the operation executes, the amount shall have been removed from the budget.

(open box) B - Write OCL invariant rules that specify that If a given department has more than 4 projects, this department has to have at least one employee fully dedicated to this department. This employee cannot be working in any other project.

GROUP II - Interaction/Sequence diagrams

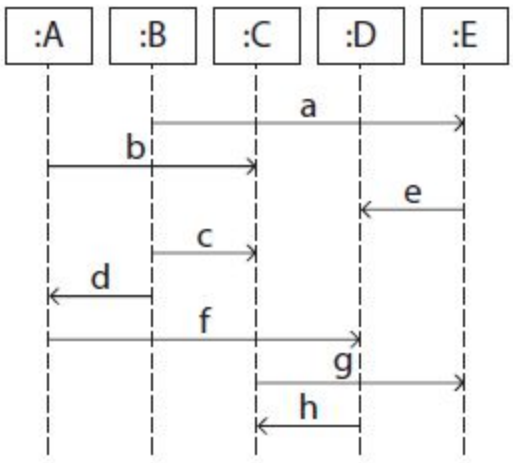
(bulletin) 3 - Consider the following Interaction Diagram (Sequence Diagram):



Which of the following message sequences is **incorrect**:

A. a → b → c → b → a → c → d
B. b → a → c → d
C. b → c → a → a → b → c → d
D. a → b → c → d
E. None of the above

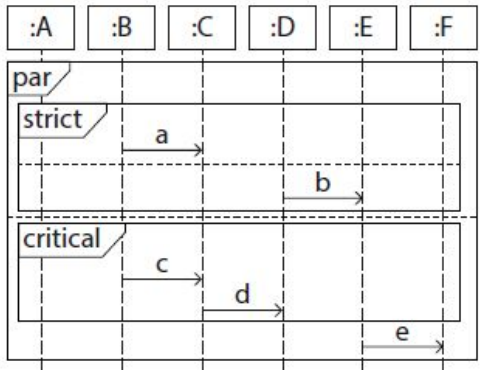
(bulletin) 4 - Consider the following Interaction Diagram (Sequence Diagram):



Which of the following message sequences is **incorrect**:

A. b → a → c → d → e → f → g → h
B. a → b → c → d → e → f → g → h
C. a → c → b → e → d → f → g → h
D. a → b → c → e → d → g → f → h
E. None of the above

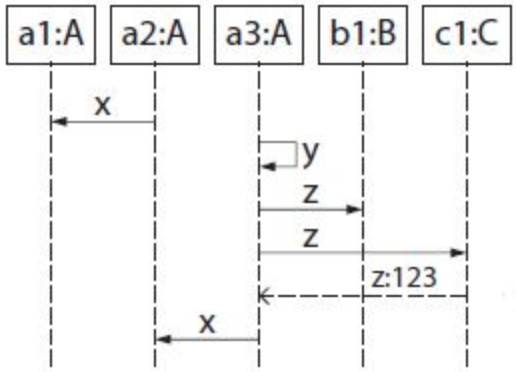
(bulletin) 5- Consider the following Interaction Diagram (Sequence Diagram):



Which of the following sequences is incorrect?

A. c → d → a → e → b
B. c → d → a → b → e
C. a → c → d → b → e
D. e → a → b → c → d
E. None of the above

(bulletin) 6- consider the following Interaction Diagram (Sequence Diagram):



Which operation does class A have according to the diagram?

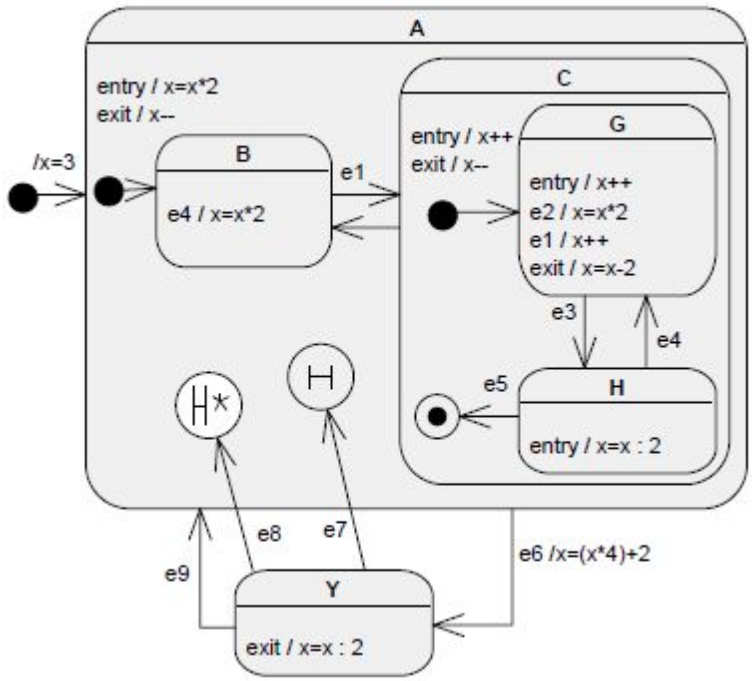
A. x():int
B. y():void
C. x():String
D. y(int):void
E. z():int

(open box) C - In a travel agency there is a need to model the use case for "Selling Travel". The use case begins with the client specifying the details of the trip, including transportation and accommodation. With the gathered information with all the alternatives, the system shows them to the client, which should analyze them and make a decision. This decision may be: i) re-planning of the trip (destination, transport and / or dates); ii) confirmation; iii) cancellation. If the possibility signaled by the client is of replanning, you must reconfigure the details about the trip for the system to be able to find new alternatives. If there is confirmation by the customer, the system must confirm his choices with the respective partner systems (transportation companies (air or ground) and hotels). The process ends when the customer makes the payment with a credit card and receives a receipt.

Design a sequence diagram for the "Selling Travel" use case.

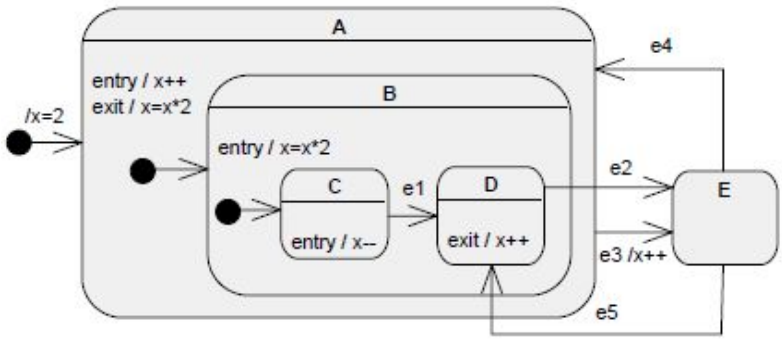
GROUP III - State Charts

(open box) D - You are given the following state machine diagram. What is the value of x after the occurrence of the event chain: **e1 e3 e6 e8 e5 e4**?



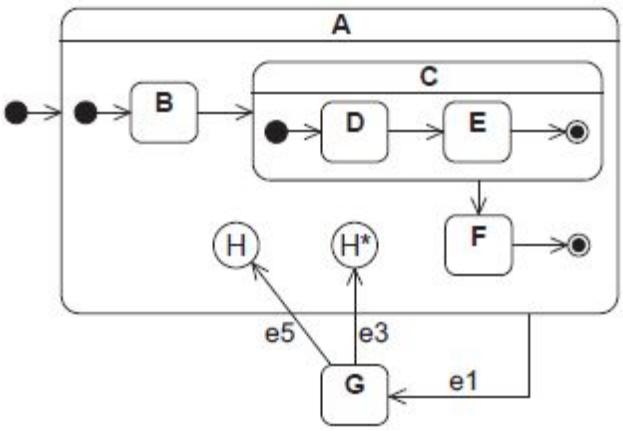
X=

(open box) E - You are given the following state machine diagram. What is the value of x after the occurrence of the event chain: **e1 e3 e5 e2**?



X=

(bulletin) 7 - You are given the following state machine diagram. Which of the following statements is correct?



A. Assuming state E is active and the event e1 occurs, then G becomes the next active state. As soon as e5 occurs, C and more specifically D becomes active.

B. It is possible, that C and F are active at the same time.

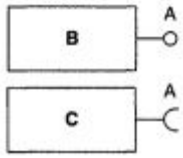
C. Assuming state E is active and the event e1 occurs, G becomes the next active state. If now e3 occurs, C and more concretely D becomes the next active state.

D. Assuming state G is active and the event e5 occurs, then B becomes the next active state - regardless of which substate was active before.

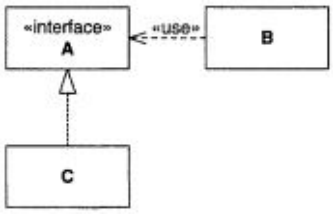
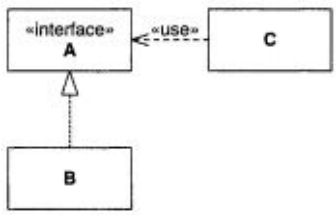
E. None of the above.

GROUP IV - Component Diagrams

(Bulletin) 8 - Which of the following solutions shows the configuration of the component interface?



Choose the correct answer:

<table>
<tr>
<td>A)
 
</td>
<td>B)
 
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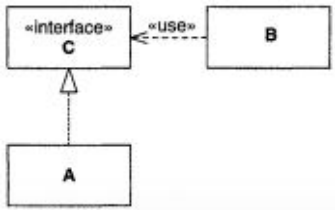
<td>C)
 
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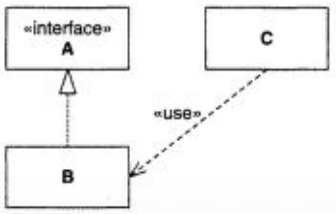
<tr>
<td>D)
 
</td>
<td>E) None</td>
<td></td>
</tr>
</table>

(open box) F - You are responsible for developing a system for buying and selling second-hand products online (Olx like). To sell an item you have to give a title, choose a category, add a photo (or not), give your contacts (email and/or phone) and establish the price, but give the option to be negotiable or not. To buy an item you search for a product or select the category and then a particular product. Once chosen you can contact the announcer. Once selected, the product must not be available anymore. You should also update info about or remove the product you want to sell. In case of problems you can also report the company about the advertising specifying the nature of the problem. Depending on the case that announcer should be banned from the system. General feedback on the transaction can also be given.

Based on that description design a component diagram where the components represent the main functionalities. Structure the diagram using the 3-tier architectural pattern (Interface, control and data).