Unit 12 - Week 10

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Assignment 10

The due date for submitting this assignment has passed.
As per our records you have not submitted this assignment.

Due on 2019-10-09, 23:59 IST.

Topics: Introduction: Rule Based Expert Systems, Inference Engine, Rete Algorithm

NOTE: Wherever you are required to type in the answer (instead of clicking on a button) please DO NOT ENTER ANY BLANKS. This assessment is evaluated by a program that does exact string matching. An extra blank in the answer will result in even a correct answer being evaluated as wrong.

This "no blanks" policy will hold THROUGHOUT this course.

Note that WME stands for Working Memory Element.

1) From the lectures what can you recall about XCON? ***1 point***

☐ It was a rule based system designed to assist physicians in the diagnosis of patients with bacterial infections
☐ It was a backward chaining rule based system
☐ It was a rule-based expert system designed to help automatically configure computer systems
☐ It was a forward chaining rule based system

No, the answer is incorrect.
Score: 0

Accepted Answers:
It was a rule-based expert system designed to help automatically configure computer systems
It was a forward chaining rule based system

2) A rule-based system makes inferences using either Forward Chaining or Backward Chaining. Forward chaining corresponds to ______ approach and backward chaining corresponds to ______ approach ***1 point***

☐ Goal-directed, Data-driven
☐ Eager, Lazy
☐ Lazy, Eager
☐ Data-driven, Goal-directed

No, the answer is incorrect.
Score: 0

Accepted Answers:
Eager, Lazy
Data-driven, Goal-directed

3) A rule-based system has two types of memory components - long term memory and short term memory. The former corresponds to ______ and the latter corresponds to ______ ***1 point***

○ WMEs, Rules
○ Rules, WMEs
○ Alpha nodes, Beta nodes
○ Antecedent, Consequent

No, the answer is incorrect.
Score: 0

Accepted Answers:
Rules, WMEs

4) Which of the following is the most expensive phase in the working of a rule-based system? ***1 point***

○ Matching WMEs with rules
○ Resolving conflict set to select a rule with its data
○ Execute the rule selected from the conflict set
○ Generating the Rete network of rules

No, the answer is incorrect.
Score: 0

Accepted Answers:
Matching WMEs with rules

5) The motivation behind employing Rete algorithm is ***1 point***

○ to generate the Rete network of rules
○ to reduce the space complexity of long term memory
○ to select a rule with its data from the conflict set
○ to improve upon the process of matching WMEs with rules

No, the answer is incorrect.
Score: 0

Accepted Answers:
to improve upon the process of matching WMEs with rules

6) Which of the following is/are true about *conflict* set? ***1 point***

☐ The *conflict* set contains a set of rules that are ready to fire along with their matching WMEs
☐ The *conflict* set contains the set of contradictory rules in a rule based system
☐ The *conflict* set is the output of the Match routine in Match-Resolve-Execute cycle
☐ A *conflict set* is generated from scratch in every Match-Resolve-Execute cycle

No, the answer is incorrect.
Score: 0

Accepted Answers:
The conflict set contains a set of rules that are ready to fire along with their matching WMEs
The conflict set is the output of the Match routine in Match-Resolve-Execute cycle

7) Consider the following rule in an OPS5 like language: ***1 point***

```
(p some-operation
    (array ^index <i> ^value<n>) )
    (array ^index <j> > <i> ^value <m> < <n>)
    →
    (modify 1 ^value<m>) )
    (modify 2 ^value<n>)
)
```

○ It sorts an array in descending order
○ It swaps every two subsequent elements in an array
○ It swaps two elements that are in an incorrect order in an array
○ It traverses the array once, swapping every two elements that are in an incorrect order

No, the answer is incorrect.
Score: 0

Accepted Answers:
It swaps two elements that are in an incorrect order in an array

8) Which of the following is/are true regarding alpha and beta nodes in the Rete Net? ***1 point***

☐ Alpha nodes are discriminative in nature while beta nodes are assimilative in nature
☐ An alpha node can have a beta node as its parent
☐ An alpha node can have only one parent
☐ A beta node can have only one parent

No, the answer is incorrect.
Score: 0

Accepted Answers:
Alpha nodes are discriminative in nature while beta nodes are assimilative in nature
An alpha node can have only one parent

9) Consider the following rule in an OPS5 like language ***2 points***

```
(p thread-management-rule
          (thread ^name <x> ^hasTimeout <yes>)
           →
          (remove (thread_Alive <x> ))
)
```

Assuming that the working memory contains the data element *(thread ^name t ^hasTimeout no)* and assuming that the above rule is the only rule in the program, which of the following statements hold true?

☐ The program will execute the above rule at least once and keeps firing the same rule as the data matches the rule
☐ The program will execute the above rule as the data matches the rule
☐ The program will execute the above rule exactly once due to the property of *Refractoriness*
☐ The program will not execute the above rule as the data does not match the rule

No, the answer is incorrect.
Score: 0

Accepted Answers:
The program will execute the above rule as the data matches the rule
The program will execute the above rule exactly once due to the property of Refractoriness

10) Consider the same OPS5 rule given in Q9. and working memory contains the following data elements, ordered by increasing timestamps: ***1 point***

1. (thread ^name t1 ^hasTimeout yes)
2. (thread ^name t2 ^hasTimeout no)
3. (thread ^name t3 ^hasTimeout no)

The <rule, data> pair(s) present in the conflict set after the match phase of the inference engine is/are

☐ <thread-management-rule,1>
☐ <thread-management-rule,2>
☐ <thread-management-rule,3>
☐ None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
<thread-management-rule,1>
<thread-management-rule,2>
<thread-management-rule,3>

11) Assuming *recency* as the conflict resolution strategy, what conclusion would be made when a rule is selected and executed from the conflict set in the answer to the previous question? ***1 point***

○ remove(thread_Alive t1)
○ remove(thread_Alive t2)
○ remove(thread_Alive t3)
○ None of the above

No, the answer is incorrect.
Score: 0

Accepted Answers:
remove(thread_Alive t3)

12) Consider the following rules in a rule based system: ***1 point***

```
    (p thread-management-rule1
       (thread ^name <x>)
       →
       (make (process ^name <x>  ^isAlive yes))
)
    (p thread-management-rule2
       (thread ^name <x>)
       (killed ^name <x>)
        →
     (make (process ^name <x> ^isAlive no))
)
```

Now consider the following set of WMEs -
1. (thread ^name t1)
2. (thread ^name t2)
3. (killed ^name t2)

Which of the following <rule, data> pairs would be present in the conflict set after the match phase of the inference engine?

☐ <thread-management-rule1,1>
☐ <thread-management-rule1,2>
☐ <thread-management-rule1,3>
☐ <thread-management-rule2,1,2>
☐ <thread-management-rule2,1,3>
☐ <thread-management-rule2,2,3>

No, the answer is incorrect.
Score: 0

Accepted Answers:
<thread-management-rule1,1>
<thread-management-rule1,2>
<thread-management-rule2,2,3>

13) If *specificity* is employed as the conflict-resolution strategy in the answer to Q12, what conclusion would be made when one rule is selected and executed? Note that the WMEs are stored in the increasing order of their timestamp values in the memory as indicated ***1 point***

○ make (process ^name t1 ^isAlive yes)
○ make (process ^name t1 ^isAlive no)
○ make (process ^name t2 ^isAlive yes)
○ make (process ^name t2 ^isAlive no)

No, the answer is incorrect.
Score: 0

Accepted Answers:
make (process ^name t2 ^isAlive no)

14) If *recency* is employed as the conflict-resolution strategy in the answer to Q12, what conclusion would be made when one rule is selected and executed? Note the WMEs are stored in increasing order of their timestamp values in the memory as indicated ***1 point***

○ make (process ^name t1 ^isAlive yes)
○ make (process ^name t1 ^isAlive no)
○ make (process ^name t2 ^isAlive yes)
○ make (process ^name t2 ^isAlive no)

No, the answer is incorrect.
Score: 0

Accepted Answers:
make (process ^name t2 ^isAlive no)

For answering Q15-Q19 , consider the following set of rules used for giving loans in a bank:

```
(p N
    (applicant ^name <n> ^salary < 35000 ^status NIL)
    →
    (modify 1 ^status No)
)
(p LC1
   (applicant ^name <n> ^salary >100000 ^status NIL)
   (stocks ^holder <n> ^worth >20000 )
   →
   (modify 1 ^status C1)
)
(p LC2
   (applicant ^name <n> ^salary > 85000 ^status NIL)
   (stocks ^holder <n> ^worth >50000 )
   (credit ^user <n>  ^score >150)
   →
   (modify 1 ^status C2)
)
```

Consider the following set of working memory elements:
1. (applicant ^name a ^salary 5000 ^status NIL)
2. (applicant ^name b ^salary 1035000 ^status NIL)
3. (applicant ^name c ^salary 95000 ^status NIL)
4. (credit ^user b ^score 100)
5. (credit ^user c ^score 155)
6. (stocks ^holder a ^worth 10000)
7. (stocks ^holder c ^worth 60000)
8. (stocks ^holder b ^worth 25000)

15) If the strategy used by inference engine is *Recency* then enter the element from the conflict set that will be selected for the execution. The rule data must be entered as a comma separated rule-name followed by the timestamps of matching WMEs (in the increasing order of the timestamps). For example: If <LC1,1,2> is the selected rule-data then your answer should be: LC1,1,2

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: String) LC1,2,8
(Type: String) LC1, 2, 8

1 point

16) If the strategy used by inference engine is *Specificity* then enter the element from the conflict set that will be selected for the execution. The rule data must be entered as a comma separated rule-name followed by the timestamps of matching WMEs (in the increasing order of the timestamps). For example: If <LC1,1,2> is the selected rule-data then your answer should be: LC1,1,2

No, the answer is incorrect.
Score: 0

Accepted Answers:
(Type: String) LC2,3,5,7
(Type: String) LC2, 3, 5, 7

1 point

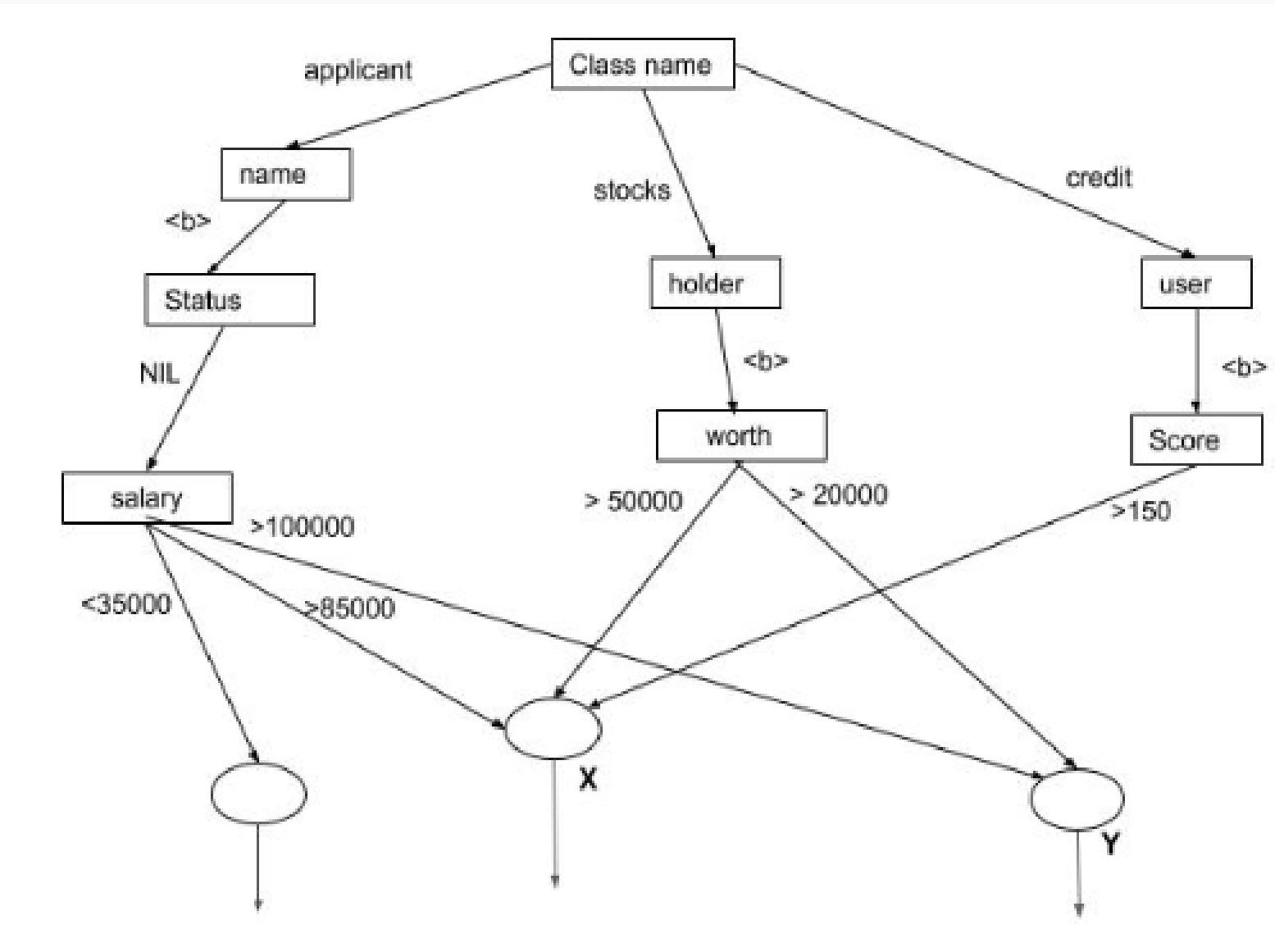
17) Which of the following rule-data combinations will NOT be in the Conflict Set? ***1 point***

☐ <N,1>
☐ <LC2,3,5,7>
☐ <LC2,3,5>
☐ <LC1,2,4,8>

No, the answer is incorrect.
Score: 0

Accepted Answers:
<LC2,3,5>
<LC1,2,4,8>

18) For the Rete network shown below, which of the above rules correspond to the beta node marked X? ***1 point***



○ Rule N
○ Rule LC1
○ Rule LC2

No, the answer is incorrect.
Score: 0

Accepted Answers:
Rule LC2

19) Which of the following rules along with WMEs corresponding to the beta node Y are part of the Conflict Set for the given data? ***1 point***

○ <N,1>
○ <LC2,3,5,7>
○ <LC2,3,5>
○ <LC1,2,8>

No, the answer is incorrect.
Score: 0

Accepted Answers:
<LC1,2,8>