

Task

Subtask 1

- Define a SPARQL query that queries the direct and indirect instances of metaclass <CLASS/JITAI/CLASS> together with their descriptions and average duration.
- Expected result

class	description	avgDuration
<CLASS/JITAI>		16.89
<CLASS/RunningJITAI>		40.0
<CLASS/HillRunningJITAI>	"Vigorous running."	
<CLASS/BaseRunningJITAI>	"Moderate running."	40.0
<CLASS/RecoveryRunningJITAI>	"Light running"	
<CLASS/ExerciseSnackingJITAI>	"Do some physical exercise anywhere and anytime."	3.4
<CLASS/WalkingJITAI>		31.67
<CLASS/NordicWalkingJITAI>	"Walking with sticks."	
<CLASS/BriskWalkingJITAI>	"Moderate walking."	31.67
<CLASS/PowerWalkingJITAI>	"Vigorous walking."	

Task

Subtask 2

- Define a SPARQL query that counts for each JITAI class the number of individual JITAI occurrences (considering direct and indirect instances and also considering JITAI classes that have no instances).
- Use the appropriate meta class in your query.
- Expected result

class	numberOfJITAI
<CLASS/NordicWalkingJITAI>	0
<CLASS/HillRunningJITAI>	0
<CLASS/BriskWalkingJITAI>	3
<CLASS/JITAI>	9
<CLASS/PowerWalkingJITAI>	0
<CLASS/BaseRunningJITAI>	1
<CLASS/RecoveryRunningJITAI>	0
<CLASS/WalkingJITAI>	3
<CLASS/RunningJITAI>	1
<CLASS/ExerciseSnackingJITAI>	5

Task

Subtask 3

- Define a SPARQL query that selects WalkingJITAI classes (use the appropriate meta class) that are also instances of meta class <byIntensity>.
- Expected result

```
-----  
| class |  
=====  
| <CLASS/NordicWalkingJITAI> |  
| <CLASS/BriskWalkingJITAI> |  
| <CLASS/PowerWalkingJITAI> |  
-----
```

Task

Subtask 4

- Define a SPARQL query that identifies for each JITAI class the limitations on <duration> made by SHACL property shapes using sh:minInclusive and sh:maxInclusive.
- Expected result

class	minInclusive	maxInclusive
<CLASS/JITAI>	1	
<CLASS/RunningJITAI>	20	60
<CLASS/HillRunningJITAI>		
<CLASS/BaseRunningJITAI>		
<CLASS/RecoveryRunningJITAI>		15
<CLASS/ExerciseSnackingJITAI>		5
<CLASS/WalkingJITAI>	10	60
<CLASS/NordicWalkingJITAI>		
<CLASS/BriskWalkingJITAI>		
<CLASS/PowerWalkingJITAI>		

Task

Subtask 5

- We have introduced various concepts of MLM using <duration>. Now we focus on regularity properties for <intensity>.
- Add SHACL property shapes for <minIntensity> and for <maxIntensity> at the appropriate powertype, specifying that <minIntensity> and <maxIntensity> have multiplicity 0..1 and datatype integer.
- You can evaluate these constraints by manually violating them.

Task

Subtask 6

- Add SHACL rules for transforming a JITAI class' value for `<minIntensity>` and `<maxIntensity>` into property shapes with `sh:minInclusive` and `sh:maxInclusive`.
- You may use the rules that transform `<minDuration>` and `<maxDuration>` into property shapes as a template.
- Expected result, e.g., for `<CLASS/RunningJITAI>`



The screenshot shows a SHACL editor interface with a 'Default View' dropdown and a 'Synchronize' button. The main area displays SHACL rules. A red box highlights the rule for `<CLASS/RunningJITAI#intensity>`, which is defined as a property shape with `sh:maxInclusive 15 ;` and `sh:path <intensity> .`. Below this, the rule for `<CLASS/RunningJITAI#duration>` is shown, defined as a property shape with `sh:maxInclusive 60 ;`, `sh:minInclusive 20 ;`, and `sh:path <duration> .`. The bottom section contains the class definition for `<CLASS/RunningJITAI>`, including its `rdf:type`, `rdfs:subClassOf`, `ddo:leafs`, `ddo:modeledClass`, `ddo:name`, `ddo:parent`, `ddo:specializationOf`, `n:CLASS`, `sh:property`, `<avgDuration>`, `<maxDuration>`, `<maxIntensity>`, and `<minDuration>`.

```
Default View Synchronize

<CLASS/RunningJITAI#intensity>
  sh:maxInclusive 15 ;
  sh:path <intensity> .

<CLASS/RunningJITAI#duration>
  sh:maxInclusive 60 ;
  sh:minInclusive 20 ;
  sh:path <duration> .

<CLASS/RunningJITAI> rdf:type <CLASS/RunningJITAI/CLASS> , <byCategory> , ddo:AbstractClass , ddo:ModeledClass , ddo:OccurrenceClass ;
  rdfs:subClassOf <CLASS/JITAI> ;
  ddo:leafs ddo:AbstractClass ;
  ddo:modeledClass <CLASS/RunningJITAI> ;
  ddo:name "RunningJITAI" ;
  ddo:parent <CLASS> ;
  ddo:specializationOf n:JITAI ;
  n:CLASS <CLASS/RunningJITAI/CLASS> ;
  sh:property <CLASS/RunningJITAI#duration> , <CLASS/RunningJITAI#intensity> ;
  <avgDuration> 40.0 ;
  <maxDuration> 60 ;
  <maxIntensity> 15 ;
  <minDuration> 20 .
```

Task

Subtask 7

- Compute the average intensity <avgIntensity> as resultant property for each JITAI class by defining a SHACL rule at the appropriate meta class.
- You may use the rule that computes <avgDuration> as a template.
- Expected result, e.g., for <CLASS/ExerciseSnackingJITAI>



```
Default View Synchronize

<CLASS/ExerciseSnackingJITAI#duration>
  sh:maxInclusive 5 ;
  sh:path <duration> .

<CLASS/ExerciseSnackingJITAI#intensity>
  sh:maxInclusive 13 ;
  sh:path <intensity> .

<CLASS/ExerciseSnackingJITAI>
  rdf:type <byCategory> , ddo:ModeledClass , <CLASS/ExerciseSnackingJITAI/CLASS> , ddo:OccurrenceClass , ddo:ConcreteClass ;
  rdfs:subClassOf <CLASS/JITAI> ;
  ddo:leafs ddo:ConcreteClass ;
  ddo:modeledClass <CLASS/ExerciseSnackingJITAI> ;
  ddo:name "ExerciseSnackingJITAI" ;
  ddo:parent <CLASS> ;
  ddo:specializationOf n:JITAI ;
  n:CLASS <CLASS/ExerciseSnackingJITAI/CLASS> ;
  sh:property <CLASS/ExerciseSnackingJITAI#duration> , <CLASS/ExerciseSnackingJITAI#intensity> ;
  <avgIntensity> 10.4 ;
  <description> "Do some physical exercise anywhere and anytime." ;
  <isActive> true ;
  <maxDuration> 5 ;
  <maxIntensity> 13 .
```

Task

Subtask 8

- Detect conflicts between <minIntensity> and <maxIntensity> within the class hierarchy using SHACL SPARQL-based constraints at the appropriate meta class.
- You may use the shape that detects conflicts between <minDuration> and <maxDuration> as a template.
- Expected result (additional validation result, Domain Model > Validate ...)

