Papers and researchers: An example of an unsatisfiable UML/OCL model

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<table>
<thead>
<tr>
<th>Paper</th>
<th>1 Writes 1..2</th>
</tr>
</thead>
<tbody>
<tr>
<td>title: String</td>
<td>manuscript</td>
</tr>
<tr>
<td>wordCount: int</td>
<td>author</td>
</tr>
<tr>
<td>studentPaper: boolean</td>
<td>submission</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Researcher</th>
<th>1 Reviews 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>name: String</td>
<td>isStudent</td>
</tr>
</tbody>
</table>

context Researcher inv NoSelfReviews:
{ Nobody can review his own paper }
self.submission ->excludes(self.manuscript)

context Paper inv PaperLength:
{ Papers should have less than 10000 words }
self.wordCount < 10000

context Paper inv AuthorsOfStudentPaper:
{ A paper is a student paper iff any of its authors is a student }
self.studentPaper = self.author ->exists(x | x.isStudent)

context Paper inv NoStudentReviewers:
{ Students cannot review papers }
self.referee ->forall(r | not r.isStudent)

context Paper inv LimitsOnStudentPapers:
{ There must be at least one student paper and at most four }
Papers::allInstances() ->exists(p | p.studentPaper) and
Papers::allInstances() ->exists(p | p.studentPaper) ->size() < 5

This class diagram annotated with OCL constraints models the relationships between researchers participating in a conference and the papers being submitted and reviewed. Authors are classified depending on whether they are students or not. If any author of a paper is an student, the paper will be classified as an student paper.

This model is not strongly satisfiable (it is not possible to create a finite non-empty instantiation of the model) due to two different reasons:

1. The multiplicities of the associations do not allow the creation of a finite and non-empty instance even if OCL constraints are ignored.
2. The OCL constraints and the multiplicities create a contradiction: there must be one student paper, with an student author, and it must be a reviewer, even though students cannot review any paper.