A systematic identification of consistency rules for UML diagrams

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1. **Specific Area /Sub-area of the paper**

Finding a specific pattern of coordination processes in the interrelated topics.

1. **The problem (s) specifically addressed by the paper / Research Questions**

There are no Uniform UML consistency rules

RQ1) What are the existing UML consistency rules?

RQ2) Which types of consistency problems are tackled in the existing rules?

RQ3) What types of UML diagrams are involved in UML consistency rules?

RQ4) For what software engineering activities are UML consistency rules used?

RQ5) Which UML diagram elements are involved in UML consistency rules?

RQ6) What software development phases are involved with UML consistency rules?

1. **Approach, Techniques, Models, Methodology used to tackle the problem (s)**

They used a systematic procedure for a wide range of consistency rules and ultimately selected 119 rules to be studied extensively.

1. **Results Obtained / Evaluation**

RQ1) What are the existing UML consistency rules?

Table 6 clarifies the existing rules as well as shows the type of coverage of consistency for you, whether it be Horizontal, Vertical, Evolution, Invocation, or Observation.

RQ2) Which types of consistency problems are tackled in the existing rules?

The results showed that most of the consistency rules were of the type: Horizontal and Syntactic. The problem is that syntactic rules are easier to specify than semantic rules.

RQ3) What types of UML diagrams are involved in UML consistency rules?

1) Class Diagram (CD);

2) Communication Diagram (COMD) or Collaboration Diagram (COD);

3) Use Case Diagram (UCD);

4) State Machine Diagram (SMD) or Protocol State Machine Diagram (PSMD);

5) Sequence Diagram (SD);

6) Object Diagram (OD);

7) Activity Diagram (AD);

8) Deployment Diagram (DD)

RQ4) For what software engineering activities are UML consistency rules used?

Verification

Management

Model Refinement and Transformation

Safety and Security consistency

Impact Analysis

Model formalization

Model understanding

RQ5) Which UML diagram elements are involved in UML consistency rules?

60 UML element names already presented in Table 4

RQ6) What software development phases are involved with UML consistency rules?

analysis (88.7%) and design (83.26%) for SDM#1,

interaction model (48.74%), dynamic model (35.56%), and logical model (61.51%) for SDM#2,

and object model (88.7%) and dynamic model (83.26%) for SDM#3.

1. **Strengths of the Paper**

Reviewing a large number of previous works related to the topic.

The process of filtering the results thoroughly to get a good number of rules of consistency.

1. **Weaknesses of the Paper**

Not explaining the rules well.

Reliance heavily on tables with no key reading of tables

1. **Potential Improvements**

Trying to research and read in depth in the rules of consistency that have been established and try to reduce them to a smaller number or try to combine some with each other