Automatic Recognition of Suitable Design Pattern

SDD Presentation
8/3/2020

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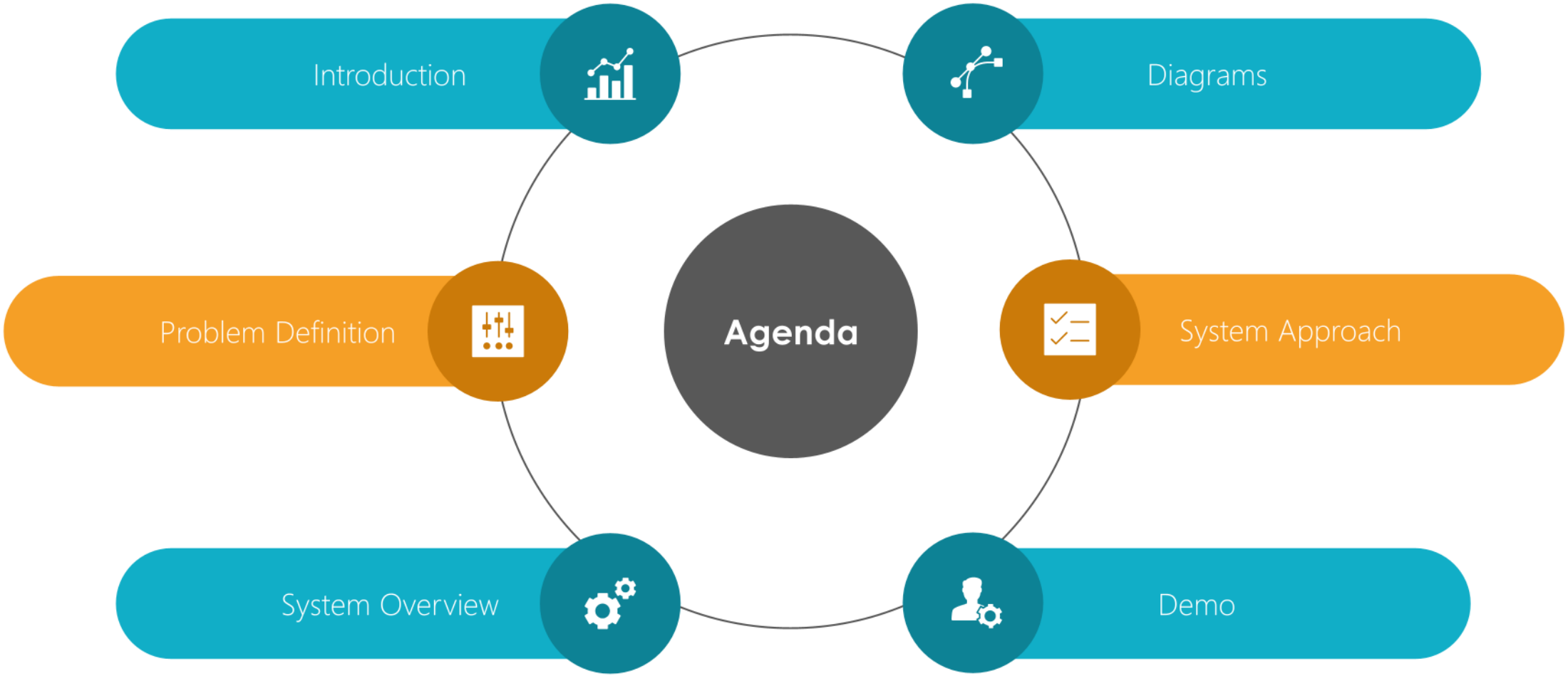
SDD Presentation



Introduction

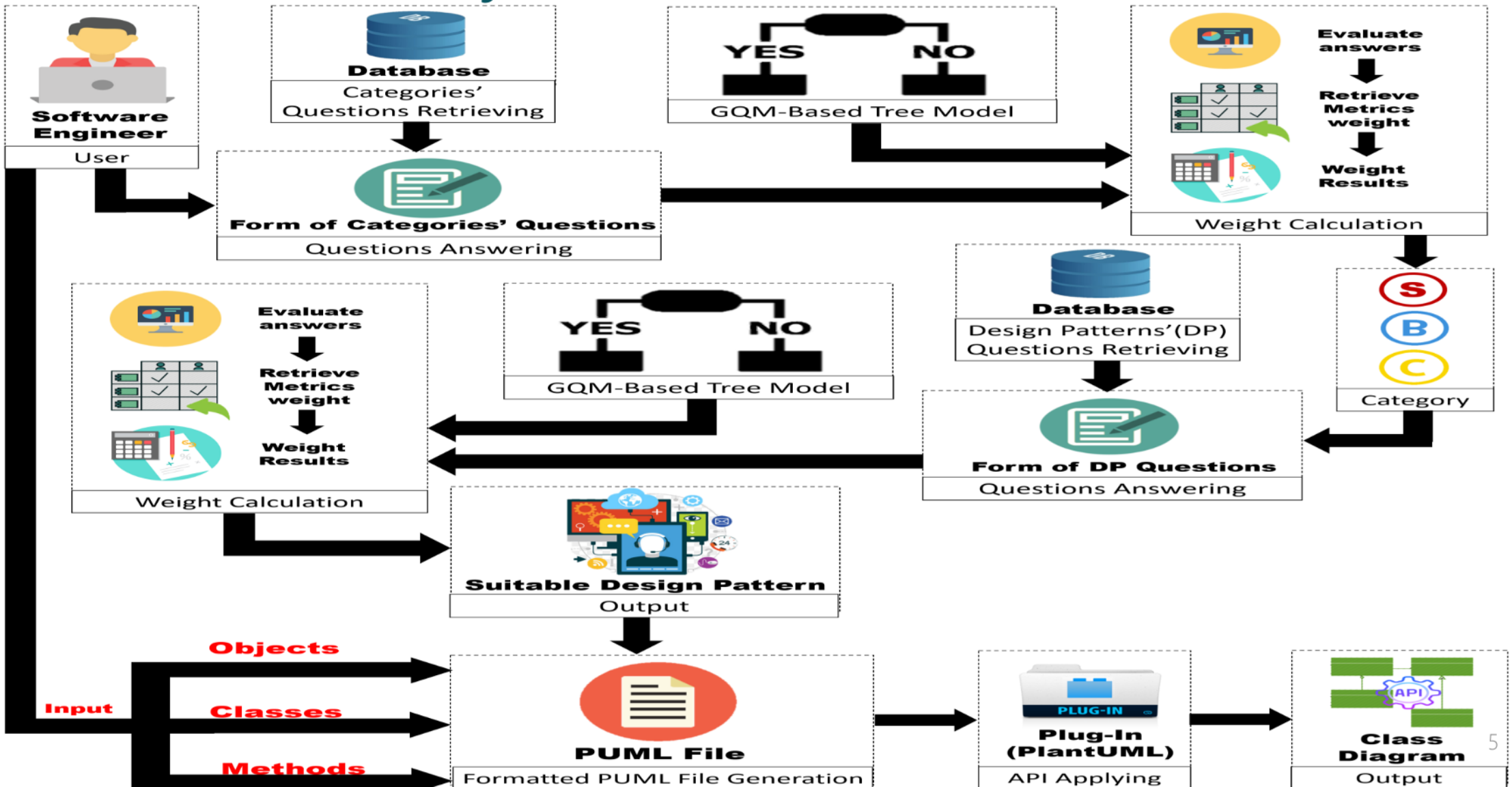
- **Design Patterns** are reusable solutions to commonly occurring software design problems.
- They are ready-made templates but not used directly in a machine code.
- Was first initiated in 1994 by four software engineers in their book "Elements of Reusable Object-Oriented Software"

Problem Definition

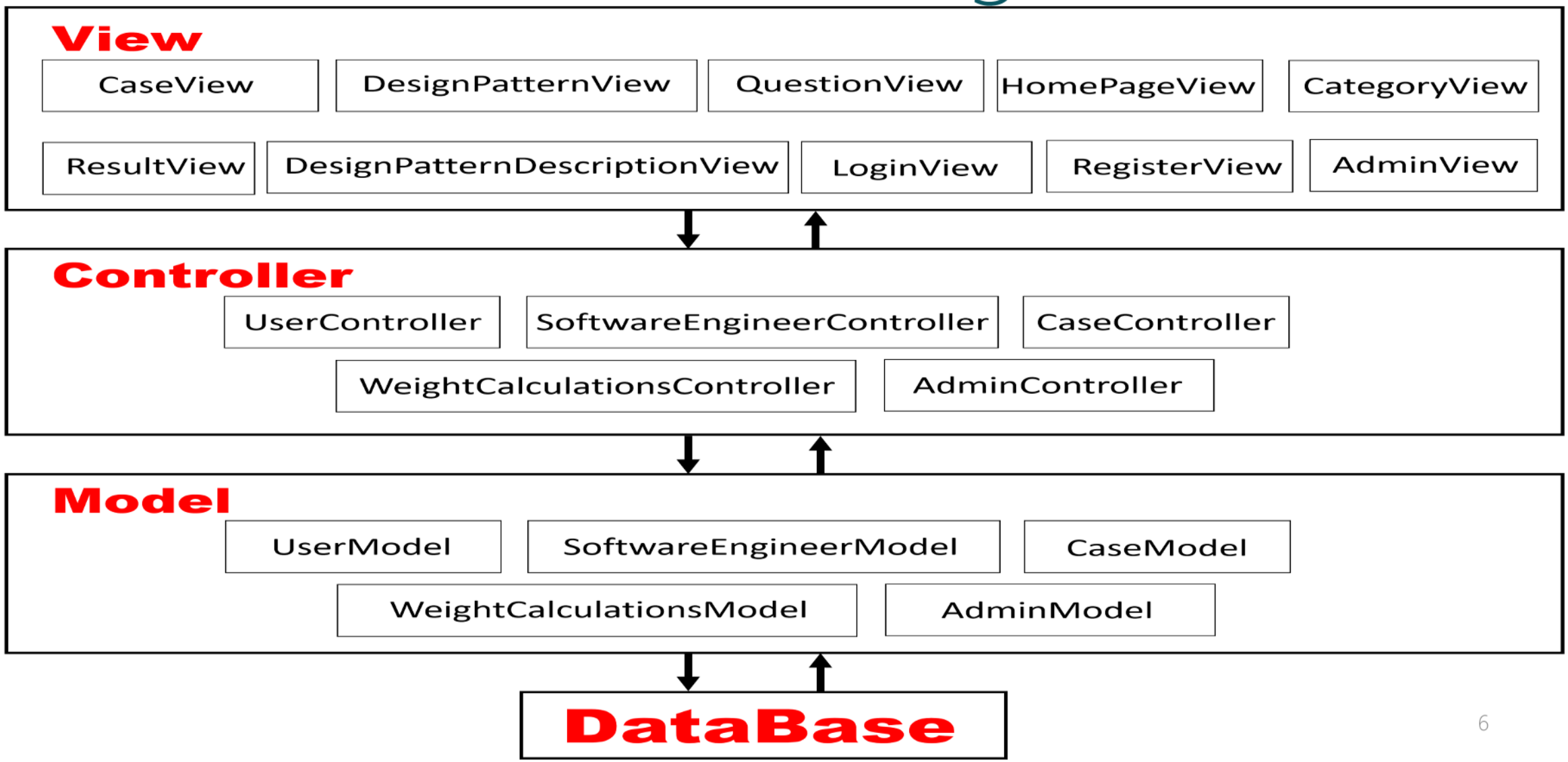
The proposed approach will help software engineers to find the suitable design pattern for a specific problem scenario and generate the class diagram to avoid:

- Anti-patterns problem
- Complicated Code
- Confusion of novice engineers during selection

System Overview



Architecture Diagram



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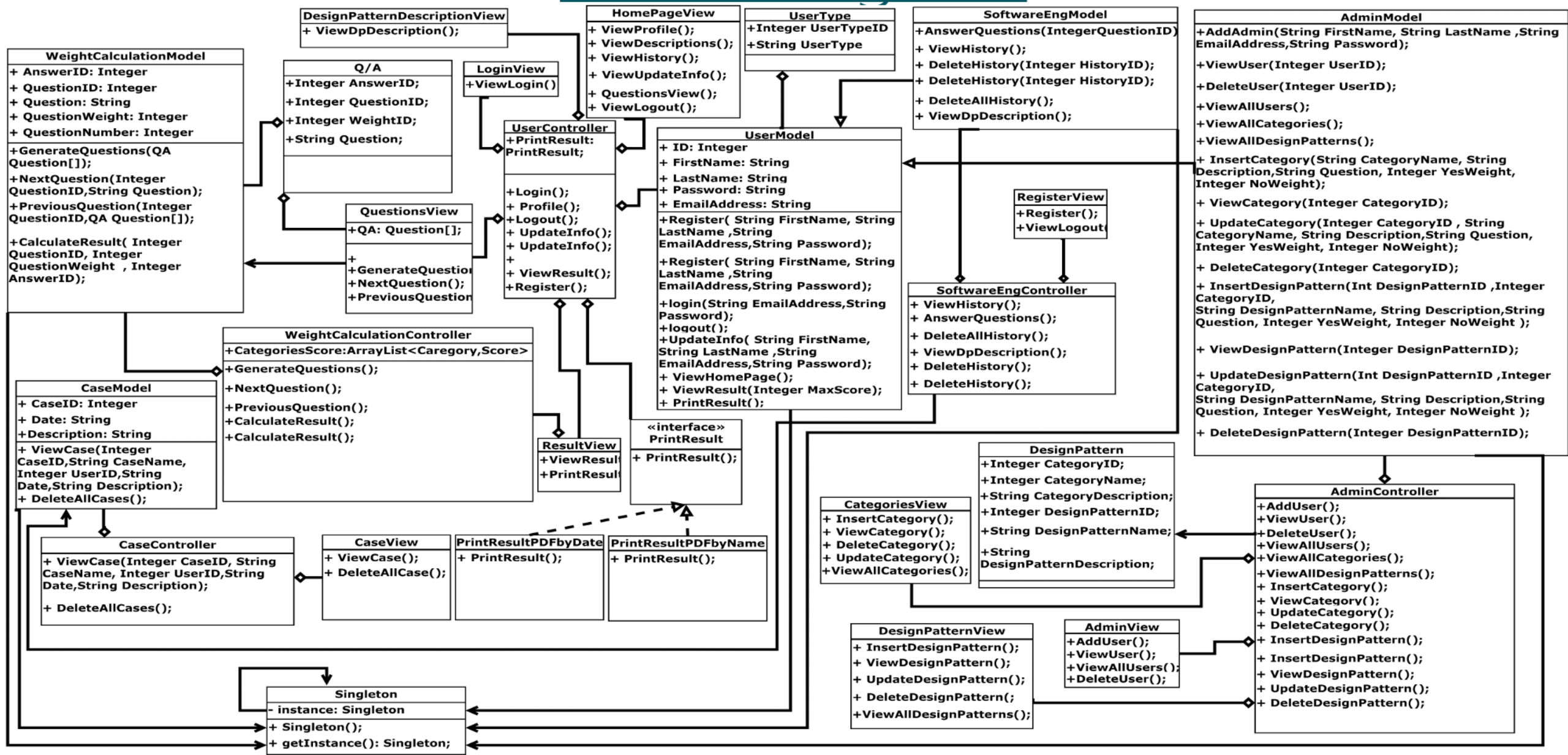
Class Diagram



Design Patterns Applied

MVC:

- Presentation, Data and Functionality separation.
- Flexibility for modifications.
- Code reusability.

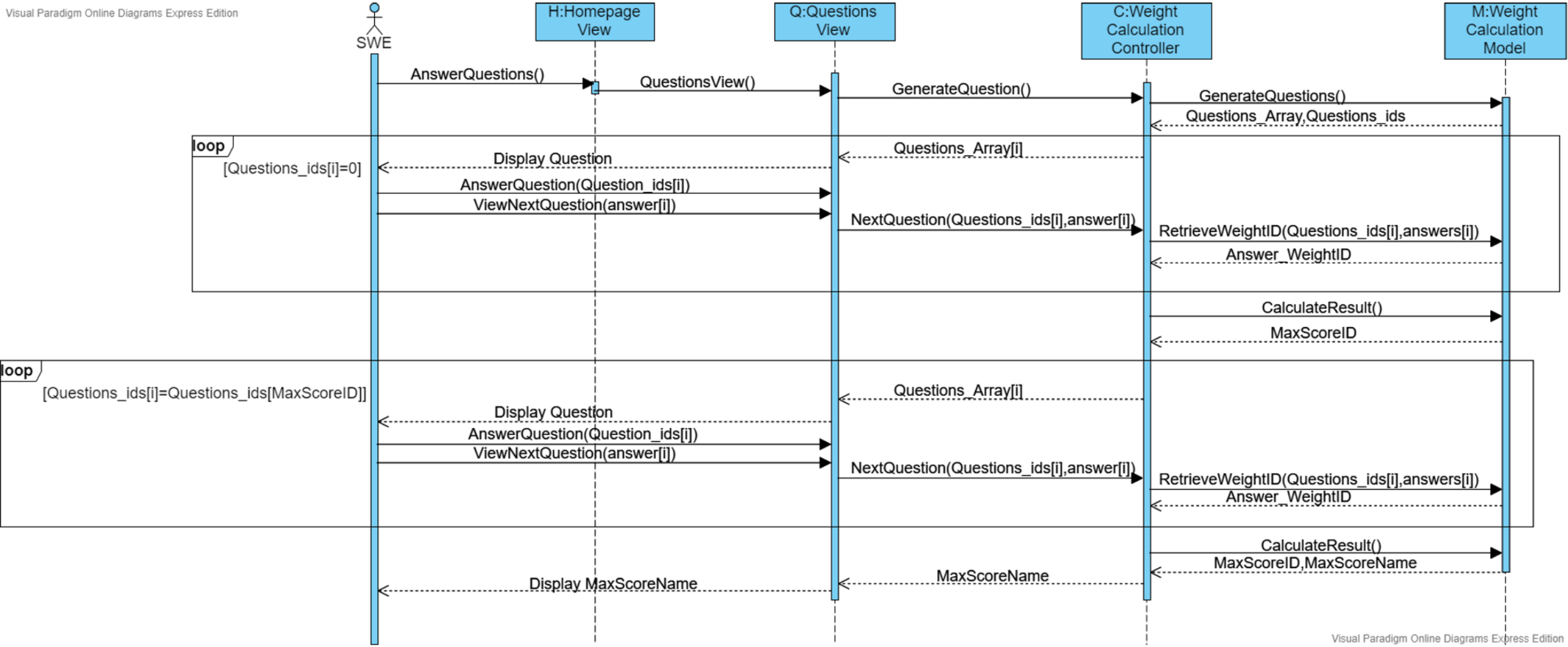
Singleton:

- One Instance per execution.

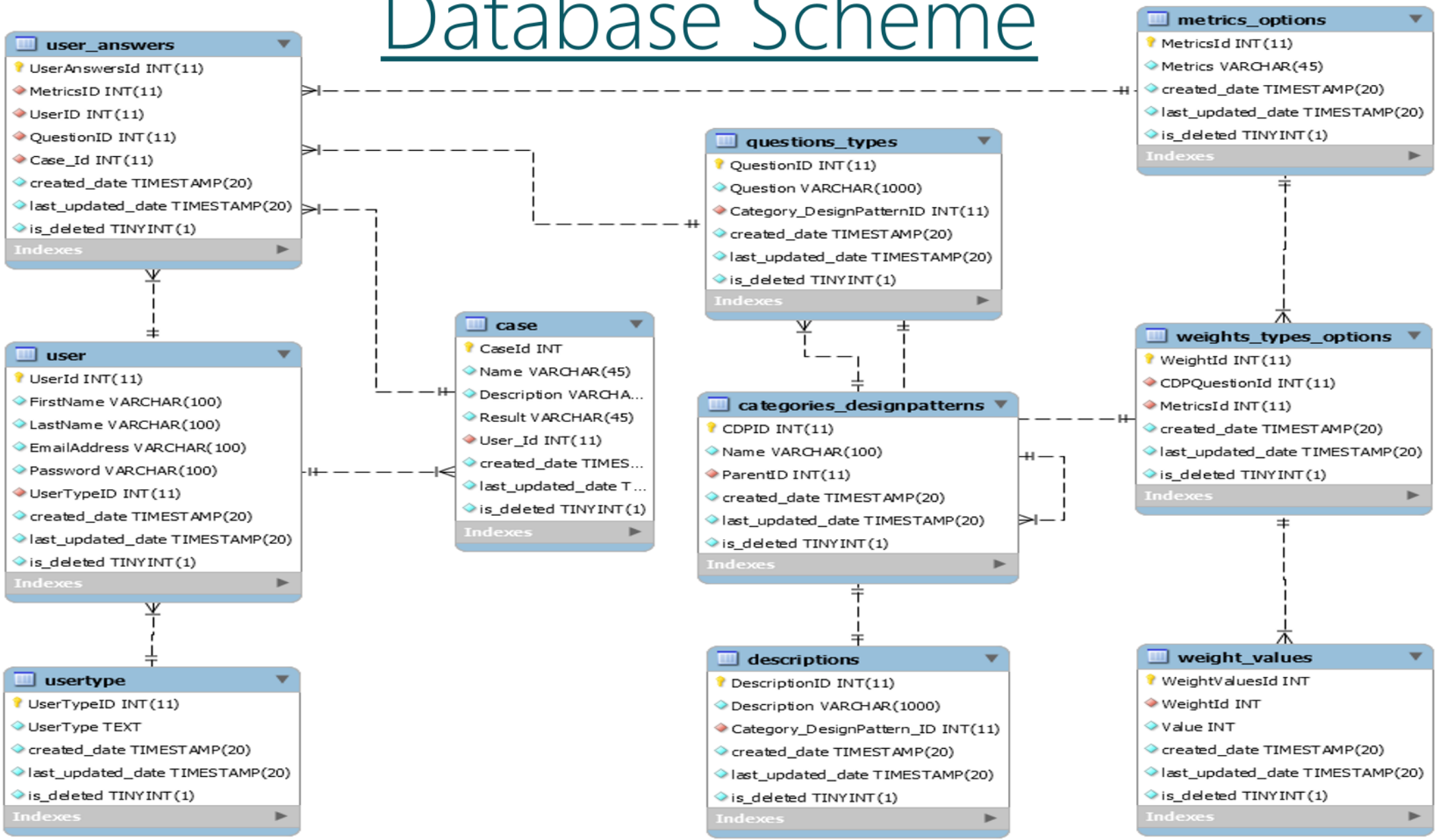
Strategy:

- PDF files generation in different formats.

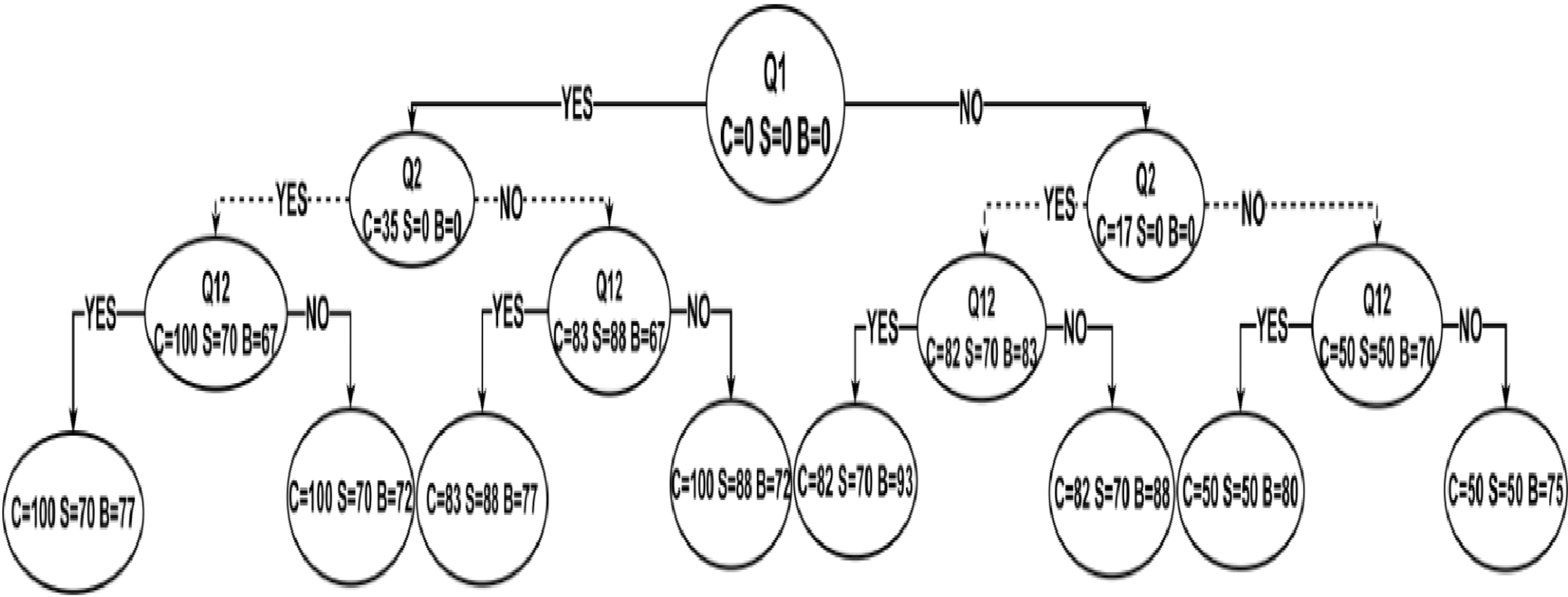
Sequence Diagram



Database Scheme



System Approach (1)



System Approach (2)

Our approach uses a GQM-Based Tree Model

- **Decision tree** to fully analyze the possible consequences of an answer that finally leads to the decision which is the "Suitable Design Pattern " in our case.

- **GQM** to support our system with a weighted balanced Score.

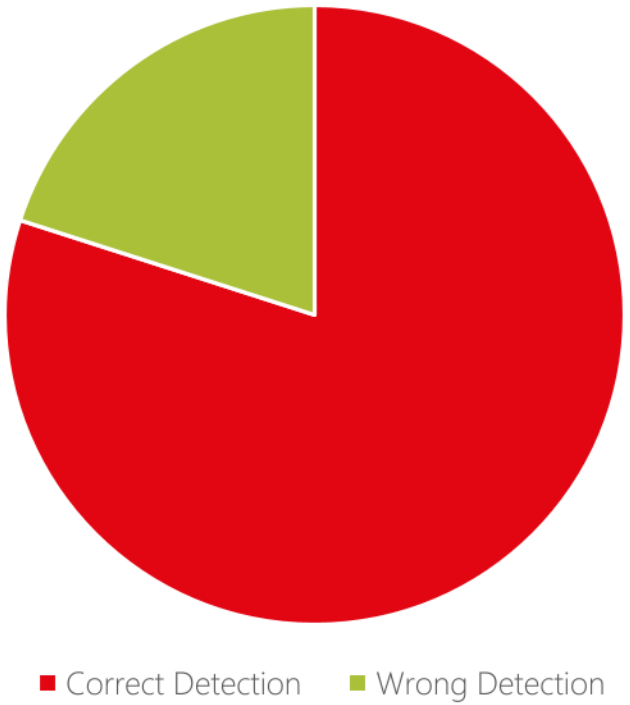
Questions Designing

1. Extract them from the definitions and the most common problems that each category/DP solves.
2. Two answers for each question: 'Yes' or 'No'
3. For each Category/DP:
   Total weight of the 'Yes' answers =100
   Total weight of the 'No' answers =50
4. 'Yes' weight=depends on the importance of the question
   'No' weight =half of its corresponding 'Yes' value

Experiments (1)

- 10 test cases on Category Detection

Category	True Positive Percentage	False Positive Percentage
Creational Category	75%	25%
Structural Category	66%	34%
Behavioral Category	100%	0%

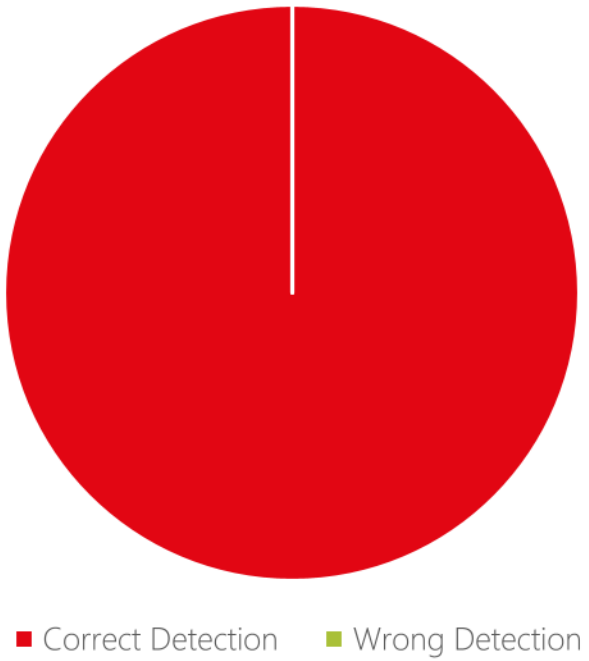


Experiments (2)

- 5 test cases on Design Pattern Detection

  Example:

  Consider a graphics designer add an image to the canvas in Photoshop. Then, he adds a border to it. Then, a bevel effect and finally, sets its transparency to 50%. Now, he wants to apply the same design to another 20 images.



- Result: Prototype

Statistics

80% Precision

Approach	Precision	Specialization
NLP	93%	Class diagrams generation to case studies from Information Systems and Object-Oriented Analysis books.
NLP	87%	Use Cases generation from Web Company online dataset.
GQM	50%	3 DPs recognition on cases from Gof book
LRNN	99.6%	2 DPs recognition on collected dataset.
NLP	65.5%	14 DPs recognition on collected dataset.
NLP	72%	23 DPs recognition on collected dataset.
Ours	80%	3 DP Category recognition on cases from Gof book

Demo

Thank You

Paper Acceptance

Notification of Acceptance of ICSIE 2020-E057

icsieconf Tue, Feb 18, 12:07 PM

to me, farida1602793, hashem1600638, veronia1606845, nada.ayman, taraggy.ghanim

Dear Clara Kamal, Farida Mohamed, Hashem Mohamed, Veronia Emad, Nada Shorim and Taraggy Ghanim,

Thank you for your waiting.

After reviewing, the reviewer recommend that your paper can be included and published into the following journal. **International Journal of Machine Learning and Computing (IJMLC), which will be indexed by** Scopus (since 2017), Inspec (IET), Google Scholar, Crossref, ProQuest, Electronic Journals Library. **Web**: http://www.ijmlc.org/

But if you don't want to publish the paper in the journal, you can choose include and publish your paper into ICSIE 2020 conference proceeding by International Conference Proceedings Series by ACM (ACM (978-1-4503-7721-8). Which will be indexed by **Ei Compendex** and **Scopus**.

For more information, pelase refer to the attached notification of acceptance.

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Thanks & Best Regards

Conference Secretary: Ms. Teri Zhang

E-mail:icsieconf@163.com

Web: http://www.icsie.org/

2020 9th International Conference on Software and Information Engineering

ICSIE 2020

Paper Reviews

- We got the acceptance from both of the 2 reviewers.

Strengths
- The literature review presents a wide collection of related systems.
- The authors present experimental results on their proposed system.

Reviewer 1 Comment

This paper introduces an automatic approach that supports the suitable selection of the design patterns categories. The paper is well written and structure.

Reviewer 2 Comment

Paper Reviews

- Both Reviewers Evaluations:

Evaluation:					
	Poor	Fair	Good	Very Good	Outstanding
Originality	☐	☐	☐	☒	☐
Innovation	☐	☐	☐	☒	☐
technical merit	☐	☐	☐	☒	☐
applicability	☐	☐	☐	☒	☐
Presentation and English	☐	☐	☒	☐	☐
Match to Conference Topic	☐	☐	☐	☐	☒
Recommendation to Editors					
	Strongly Reject	Reject	Marginally Accept	Accept	Strong Accept
Recommendation	☐	☐	☐	☒	☐

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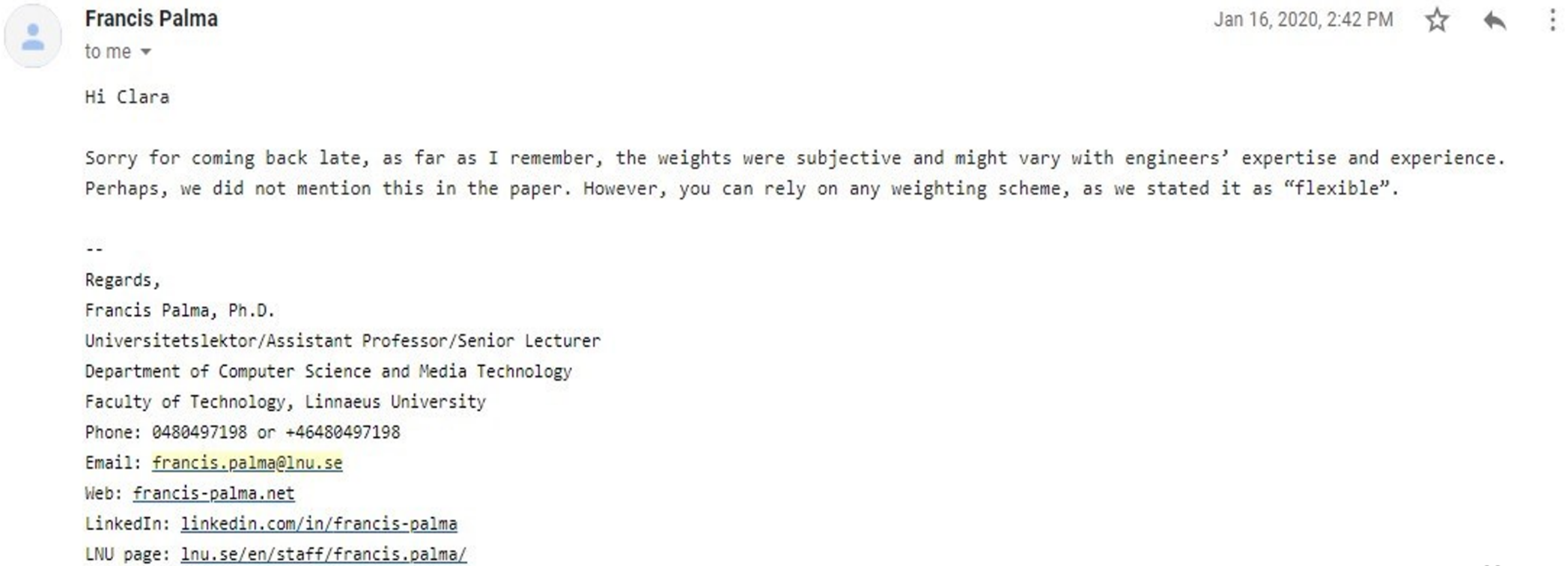
Recommendation to Editors					
	Strongly Reject	Reject	Marginally Accept	Accept	Strong Accept
Recommendation	☐	☐	☒	☐	☐

Appendix

- An Email from the author of the most similar system that uses GQM about the weights assigning:



Francis Palma Jan 16, 2020, 2:42 PM

to me

Hi Clara

Sorry for coming back late, as far as I remember, the weights were subjective and might vary with engineers' expertise and experience. Perhaps, we did not mention this in the paper. However, you can rely on any weighting scheme, as we stated it as "flexible".

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Regards,

Francis Palma, Ph.D.

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LinkedIn: linkedin.com/in/francis-palma

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Appendix

Francis Palma Jan 22, 2020, 11:43 AM

to me

Hi

Surely you can apply any weighting scheme, however, we did not want to substitute the “No” values because the total weight might get negative and there would be a large polarity between the “Yes” and “No” total weights. Actually, this was one of the very first work on recommending design patterns to the developers, we could go further..., unfortunately, we did not follow up our work after 2012.

Regards,

Francis