

Solutions to the SQL questions from the term project GenCluE

Question 9

We assume that the relational model of GenCluE contains the following relation schemas:

```
article(id, ...)
publication(id, title, date, ...)
gene(id, name, ...)
publication_gene(publ_id, gene_id)
```

where `article` is a subclass entity of `publication` in the entity-relationship model of GenCluE from and `publication_gene` is a result from the many-to-many relation between the entities `gene` and `publication` in the relational model.

```
SELECT article.id, publication.title
FROM article, publication
WHERE article.id = publication.id
AND publication.date
    BETWEEN '01-01-2001' AND '31-12-2004'
AND publication.id IN
    SELECT publ_id
    FROM publication_gen
    WHERE gen_id =
        SELECT id
        FROM gene
        WHERE name = 'TP53';
```

Question 10

We assume the following relational schemas in the GenCluE RM model:

```
keyword(id, word, ...)
keyword_gene(keyword_id, gene_id)
gene(id, sequence, ...)
```

where `keyword_gene` is a result of the many-to-many relationship between the entities `keyword` and `gene` in the ER model.

```
SELECT word
FROM keyword
WHERE id IN
    SELECT keyword_id
    FROM keyword_gene
    WHERE gen_id IN
        SELECT id
        FROM gene
        WHERE sequence LIKE '%ATTAGT%';
```

An alternative (shorter but less efficient) solution is to make a triple join of all three tables which are involved in the query.

```
SELECT keyword.word
FROM keyword, keyword_gene, gene
WHERE keyword.id = keyword_gene.keyword_id
AND keyword_gene.gene_id = gene.id
AND gene.sequence LIKE '%ATTAGT%'
```

Question 11

We assume the following relational schemas in the GenCluE RM model:

```
experiment(id, description,...)
experment_gene(experiment_id, gene_id)
gene(id, name,...)
experiment_member(experiment_id, member_id)
member(id, name,... )
```

where experment_gene and experiment_member are present in the RM model because of the corresponding many-to-many relationships in the ER model between the entities experiment, gene and member.

```
SELECT id, description
FROM experiment
WHERE date BETWEEN '01-04-2004' AND '01-10-2004'
AND id IN
    (SELECT experiment_id
     FROM experiment_gen
     WHERE gene_id =
         SELECT id
         FROM gene
         WHERE name = 'UBE3A'
    )
AND id IN
    (SELECT experiment_id
     FROM experiment_member
     WHERE member_id IN
         SELECT id
         FROM member
         WHERE name = 'Jansen'
    );
```