

Exercise #1

Provide a relational schema in 3NF following bubble diagrams. The name given to tables should be more significant.

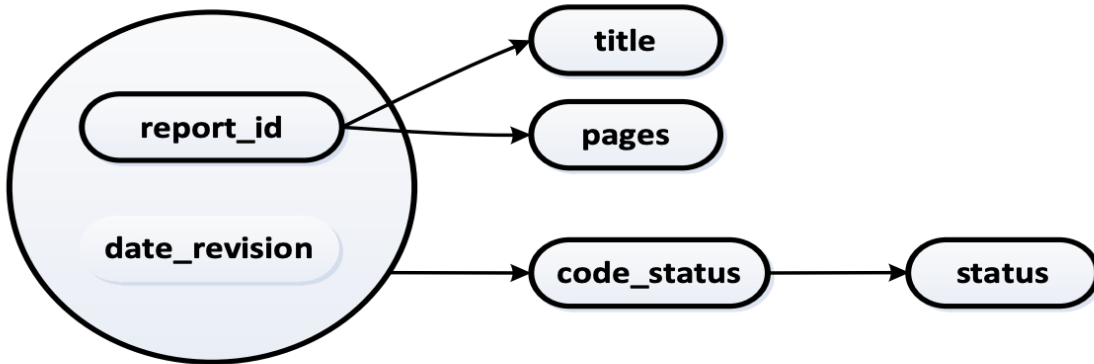
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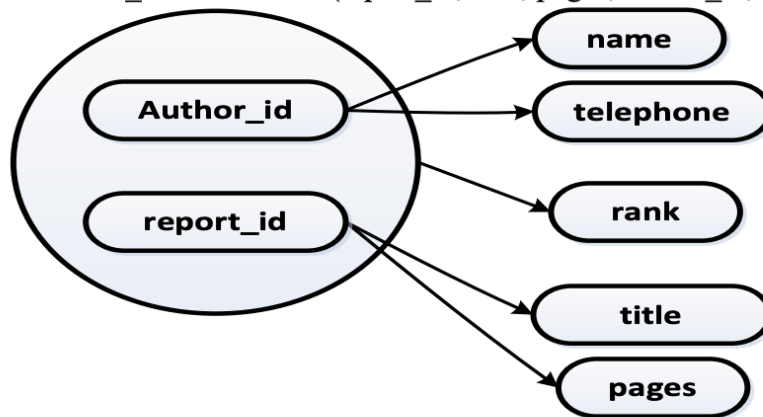


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Answer:

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Exercise #2

1) What are the dates of the concert of Lionel Richie at the Bell Center?

```
SELECT date
FROM Concert C, Show S, Hall H
WHERE C.show_id = S.show_id
AND S.hall_id = H.hall_id
AND S.singer = 'Lionel Richie'
AND H.name = 'Bell Center'
```

Answer: $\pi_{\text{date}} (\sigma_{\text{singer} = \text{'Lionel Richie'} \wedge \text{name} = \text{'Bell Center'}} (\text{Concert} \bowtie \text{Show} \bowtie \text{Hall}))$

2) What are the singers who have never scheduled the concert at Saint-Denis 2?

```
SELECT singer
FROM Show
WHERE singer NOT IN (SELECT singer
                     FROM Show S, Hall H
                     WHERE S.hall_id = H.hall_id
                     AND H.name = 'Saint-Denis 2')
```

Answer: $\pi_{\text{singer}} (\text{Show} - (\pi_{\text{singer}} (\sigma_{\text{name} = \text{'Saint-Denis 2'}} (\text{Show} \bowtie \text{Hall}))))$

3) What are the singers who performed at least one concert in all halls using the division operator?

```
SELECT singer
FROM Show S1
WHERE NOT EXISTS
  (SELECT *
   FROM Hall H
   WHERE NOT EXISTS
     (SELECT *
      FROM Show S2
      WHERE S2.singer = S1.singer
      AND H.hall_id = S2.hall_id))
```

Answer: $\pi_{\text{singer}} ((\pi_{\text{singer}} (\text{Show})) \div (\pi_{\text{hall_id}} (\text{Hall})))$