Project Topics Presentation

Stéphane Bressan

- Register your team of up to five members by **Friday 11 March 2022, 21:30**.
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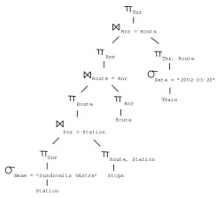
Design and implementation of a relational algebra graphical editor and its compiler or interpreter (translate into SQL) for PostgreSQL.

$\pi_{g.name}(\sigma_{c.country='Singapore'}(\rho(customers, c)) \bowtie_{d.customerid=c.customerid} \rho(downloads, d) \bowtie_{d.name=g.name \wedge d.version=g.version} \rho(games, g))$.

```
1 SELECT g.name
2 FROM customers c, downloads  d, games g
3 WHERE c.country='Singapore' AND d.customerid = c.customerid  AND d.name = g.name AND d.version = g.
      version;
```



Design and implementation of a tuple or a domain relational calculus compiler or interpreter (translate into SQL) for PostgreSQL.

$$\{T \mid \exists C\ \exists D\ \exists G\ (T.firstname = C.firstname\ \wedge\ T.lastname = C.lastname\ \wedge\ T.price = G.price \wedge C \in customers\ \wedge\ D \in download\ \wedge\ G \in games \wedge D.customerid = C.customerid\ \wedge\ D.name = G.name\ \wedge\ D.version = G.version)\}$$

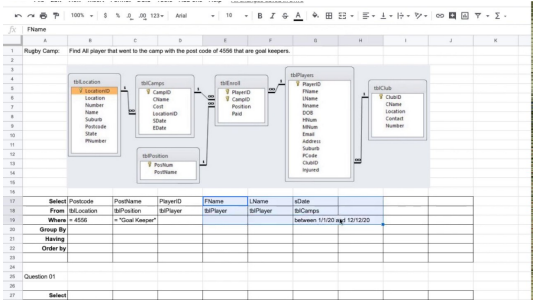
```
1 SELECT c.firstname, c.lastname, g.price
2 FROM customers c, downloads d, games g
3 WHERE d.customerid = c.customerid
4 AND d.name = g.name
5 AND d.version = g.version;
```

Design and implementation of a Datalog compiler (translate into SQL) for PostgreSQL.

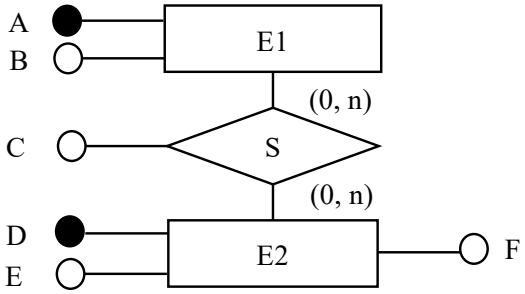
```
mycustomers(F, L, E) :-
    customer(F, L, E, C, D, S, 'Singapore'),
    download(C, N, V),
    games(N, V, P), N =' Aerified'.
mycustomers(F, L, E) :-
    customer(F, L, E, C, D, S, 'Malaysia'),
    download(C, N, V),
    games(N, V, P), N =' Aerified'.
```

```
SELECT c.firstname, c.lastname, c.email
FROM customers c , downloads d , games g
WHERE d.customerid = c.customerid
AND d.name = g.name
AND d.version = g.version
AND (c.country = 'Singapore' OR c.country='Malaysia')
AND g.name = 'Aerified'
```

Design and implementation of a Query-by-Example graphical editor and interpreter for the interactive exploration of star schema databases with PostgreSQL.



Design and implementation of a tool that generates realistic random data for an entity-relationship design considering participation constraints, join selectivity, probability distributions, and joint probability distributions.



Design and implementation of a CHECK constraint compiler for PostgreSQL that translates CHECK constraints in SQL into triggers and stored functions.

```
1  CREATE OR REPLACE FUNCTION r21()
2  RETURNS TRIGGER AS $$
3  BEGIN
4  IF EXISTS (SELECT  c.customerid
5  FROM customers c NATURAL JOIN downloads d
6  WHERE d.name = 'Domainer' AND age(c.dob) < 21)
7  THEN RAISE EXCEPTION 'An underaged customer cannot download Domainer';
8  ELSE RETURN NEW;
9  END IF;
10 END; $$
11 LANGUAGE PLPGSQL;
```

```
1  CREATE CONSTRAINT TRIGGER tr21c
2  AFTER UPDATE
3  ON customers
4  DEFERRABLE INITIALLY DEFERRED
5  FOR EACH ROW
6  EXECUTE PROCEDURE r21();
```

Design and implementation of a leader board Web service for the submission and automatic evaluation (according to performance or results) of SQL queries with PostgreSQL.

#	Team Name	Notebook	Team Members	Score	Entries	Last
1	Shun_PI+colun			0.01836	75	3h
2	Yirun Zhang			0.01837	77	8h
3	Bruno G. do Amaral			0.01844	36	4d
4	Mike Pegnam			0.01845	24	1d
5	Alexander Larko			0.01845	53	3h
6	Paul Chen			0.01849	66	9h
7	Fatih			0.01849	18	3d
8	Hamza			0.01849	47	13h
9	MoAla			0.01849	69	8h
10	Peng Wang			0.01851	18	6h
11	在宅勤務したい			0.01851	24	3d
12	Kuroki_A			0.01852	58	10h
13	XAQA			0.01852	33	18h

Comparative feature and performance analysis and evaluation of object relational Mapping toolkits for Python.

Comparative performance analysis and evaluation of PostgreSQL levels of transaction isolation.

Isolation Level	Dirty reads	Non-repeatable reads	Phantoms
Read Uncommitted	May occur	May occur	May occur
Read Committed	Don't occur	May occur	May occur
Repeatable Read	Don't occur	Don't occur	May occur
Serializable	Don't occur	Don't occur	Don't occur

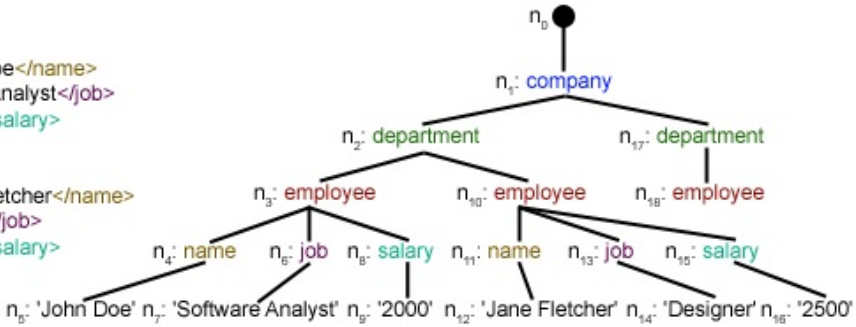
Design and implementation of a compiler for an XPath dialect for JSON and MongoDB.

```
{"employees":[
  { "firstName":"John", "lastName":"Doe" },
  { "firstName":"Anna", "lastName":"Smith" },
  { "firstName":"Peter", "lastName":"Jones" }
]}
```

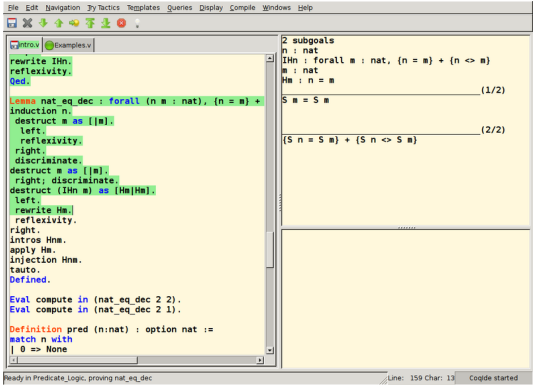
```
<employees>
  <employee>
    <firstName>John</firstName> <lastName>Doe</lastName>
  </employee>
  <employee>
    <firstName>Anna</firstName> <lastName>Smith</lastName>
  </employee>
  <employee>
    <firstName>Peter</firstName> <lastName>Jones</lastName>
  </employee>
</employees>
```

Design and implementation of an XML graphical interactive exploration tool with XPath support with eXistDB.

```
<company>
  <department>
    <employee>
      <name>John Doe</name>
      <job>Software Analyst</job>
      <salary>2000</salary>
    </employee>
    <employee>
      <name>Jane Fletcher</name>
      <job>Designer</job>
      <salary>2500</salary>
    </employee>
  </department>
  <department>
    <employee>
    </employee>
  </department>
</company>
```



Design and implementation of an interactive theorem prover for functional and multivalued dependency.



Counting functional dependencies minimal covers and normal forms. You may try and prove analytical bounds or use Monte Carlo methods to compute empirical results.

How many schemas R with Σ in BCNF are there?

The number of schemas R with n attributes in BCNF is the number of possible sets of candidate keys. This is the number of non-empty sets of subsets of R such that the none of the subset strictly contain each others (non-empty antichains in the inclusion lattice or Sperner families). There are $M(n) - 1$ schemas R in BCNF, where $M(n)$ is the Dedekind number.
There is no known closed-form expression for $M(n)$ and its value is very rapidly growing. Exact values of M(n) have been found only for n $\leq$ 8: 2, 3, 6, 20, 168, 7581, 7828354, 2414682040998, 56130437228687557907788.

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