***Step 1**: Fetching raw data from DB*

SELECT * FROM nba_games INTO g;

Home	Away	Score
Celtics	Warriors	92-88
Bucks	Lakers	98-100
...	...	...

(a)

***Step 2**: Applying the transform function*

Adding canvas coordinates

Home	Away	Score	x	y
Celtics	Warriors	92-88	400	300
Bucks	Lakers	98-100	200	50
...	...	...	...	...

(b)

***Step 3**: Applying the placement function*

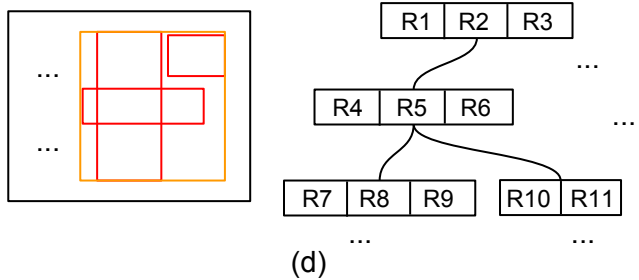
ALTER TABLE g ADD COLUMN bbox geometry;

Home	Away	Score	x	y	bbox
Celtics	Warriors	92-88	400	300	RECT1
Bucks	Lakers	98-100	200	50	RECT2
...	...	...	...	...	...

(c)

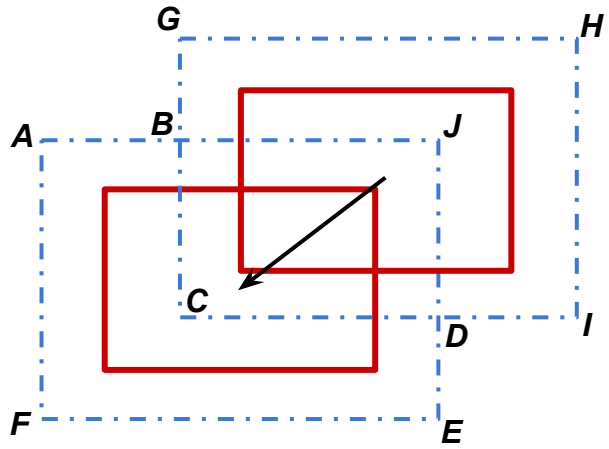
***Step 4**: Creating R-tree spatial index on bbox column*

CREATE INDEX on g USING gist (bbox);



(d)

Offline Indexing



Fetching Scheme

Caching. The frontend maintains a box (dashed blue) slightly larger than the viewport (solid red).

Incremental View Maintenance. As the viewport changes, the frontend fetches new data (polygon ABCDEF), and removes stale data (polygon BGHIDJ).

Spatial Query

SELECT * from g where ST_Intersects(bbox, Polygon(A, B, C, D, E, F));

Online Data Fetching