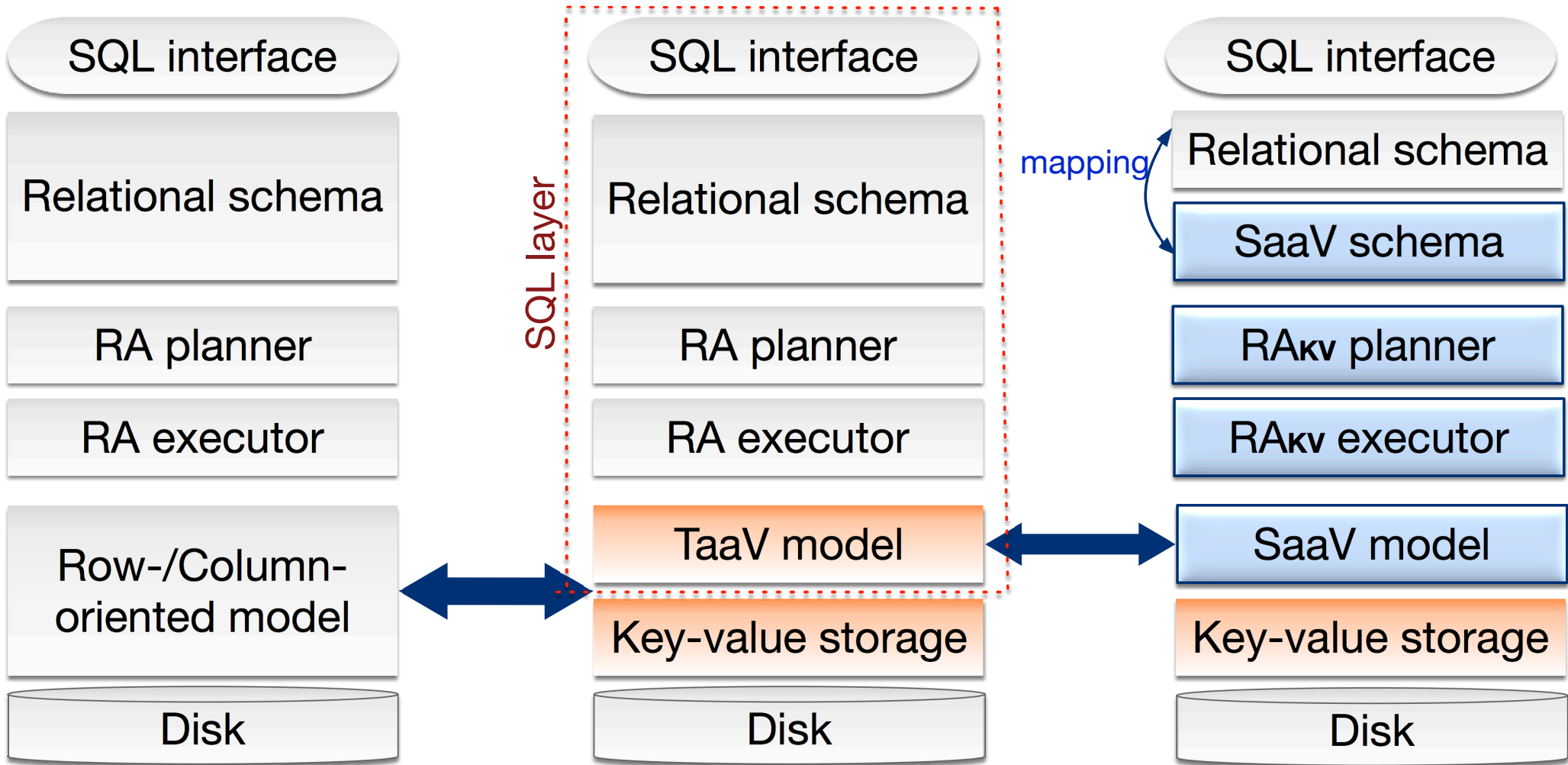


- ▶ A new data model for “SQL-on-KV”
 - from TaaV to SaaV (Set-as-a-Value)



Sav:anewadanel



(a) RDBMS

(b) SQL layers@KV

(c) Zidian

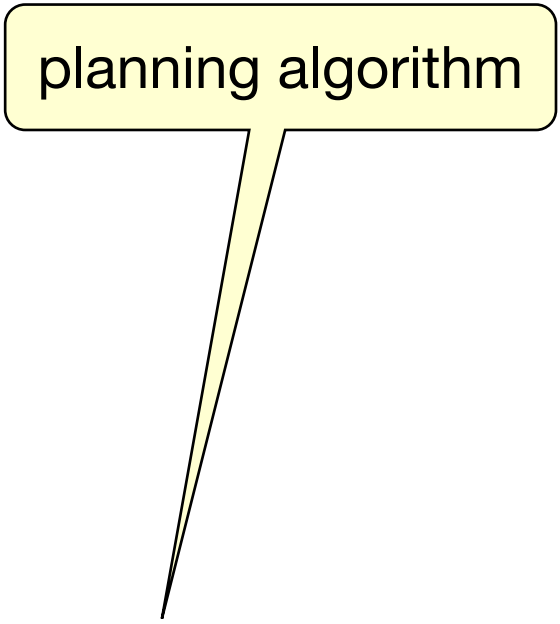
a new *Normal Form* for relational DB

A yellow speech bubble with a black outline, pointing downwards and to the right. The bubble contains the text "a new *Normal Form* for relational DB". The words "a new" and "for relational DB" are in black, while "Normal Form" is in blue and italicized. The bubble has a long tail pointing towards the bottom right corner of the image.



an *algebra* for *SaaV*

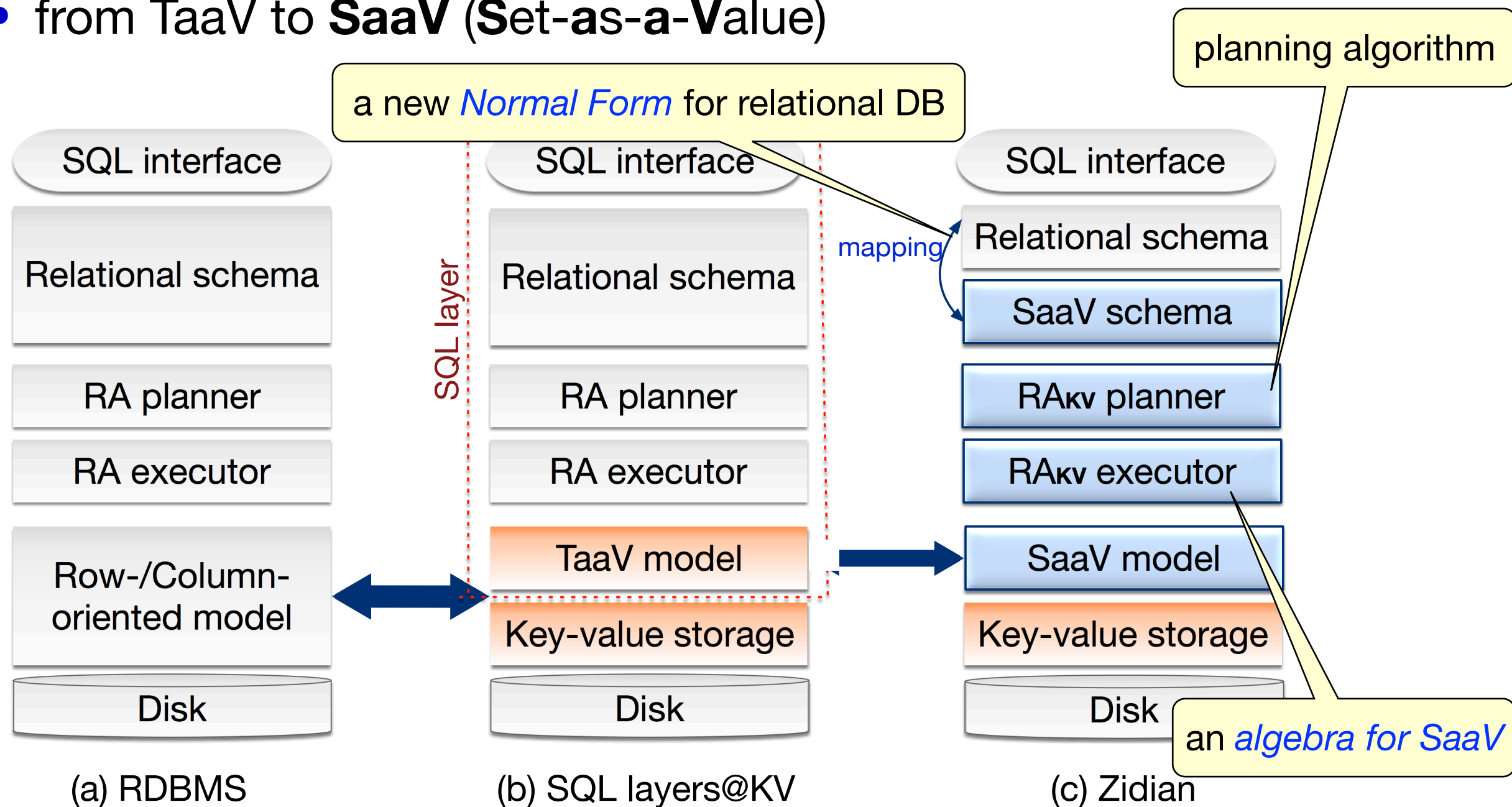
planning algorithm



SaaV allows more efficient algebra operators and avoids scans

SaaV: a new data model

- ▶ A new data model for “SQL-on-KV”
 - from TaaV to **SaaV (Set-as-a-Value)**



SaaV allows more efficient algebra operators and avoids scans

Effectiveness

Baidu

Query	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15	Q16	Q17	Q18	Q19	Q20	Q21	Q22
Zidian	3.5×10^1	2.8	2.1×10^1	4.9	1.4×10^1	0.13	1.3×10^2	5.8×10^1	8.6×10^1	1.4×10^1	0.12	2.6	3.9×10^1	4.0	0.24	6.3	0.046	1.1×10^1	0.061	1.3×10^1	2.6×10^1	1.8
Cockr.	4.2×10^2	N/A	1.6×10^2	N/A	8.8×10^2	1.3×10^2	7.3×10^2	MAX	MAX	8.3×10^2	4.1×10^1	1.6×10^2	1.3×10^3	2.0×10^2	3.0×10^2	2.3×10^1	ERR	6.1×10^2	N/A	N/A	N/A	N/A
MyRo.	1.9×10^2	3.6	1.2×10^2	3.1×10^1	7.2×10^1	6.7×10^1	2.5×10^2	1.9×10^2	1.3×10^3	4.6×10^1	2.2×10^2	1.3×10^2	N/A	7.3×10^1	1.2×10^2	9.3	7.1×10^2	7.4×10^1	8.5×10^1	1.2×10^2	7.0×10^2	MAX

Evaluation time (s: seconds) of TPC-H queries (N/A: *syntax not supported*; ERR: *run-time error*; MAX: *> 1 hour*)

Facebook

(10GB TPC-H benchmark testing)

- Zidian outperforms Myrocks (Facebook) and CockroachDB (Baidu) on *each and every* of the TPC-H benchmark query on 10GB data;
- On average is 33.5X and 20.5X faster than Cockr. and MyRocks, up to 1.3×10^3 and 1.5×10^4 , respectively.