Database System Lab 9

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Theory 1. Consider a 3-level index (level-3 is a single block) with index field the ordering field of relation R. The block size is 4096 Bytes, the index field is DATETIME type of 8 Bytes, each pointer takes 8 Bytes, too. Let f be the maximum number of pointers an internal node (a block) of the index can contain (a block must be able to accommodate f pointers and f − 1 keys because the key of the first index entry does not need to be stored). Please answer the following questions.

(a) What is the value of f? [2 marks]

f= (4096/8)/2 = 256.

(b) If the root node of the index contains only 2 pointers while for all other internal nodes of the index,

each internal node contains ⌈f /2⌈ pointers, what is the size of the file of R? [2 marks]

(ROOT LEVEL 3) 2->(LEVEL 2) 128*2-> (LEVEL 1) 128*2*128-> (FILE) 128*128*128*2 = 4,194,304

(c) If each internal node (including the root) of the index contains f pointers, what is the size of the file of R? What is the scale of the file, KB, MB, or GB? [2 marks]

SIZE of file R: 256*256*256*256= 4,294,967,296

The scale of the file will be in GB.

Pratice 3. Install PostgreSQL (https://www.postgresql.org/) on your own computer (we will use this database in the next lab as well). Watch Lab_9_demo.mp4 at Panopto and then play with the database system with the following commands. [4 marks]

CREATE TABLE mytable (staffid INTEGER PRIMARY KEY,

staffname VARCHAR (25) NOT NULL, salary FLOAT NOT NULL);

INSERT INTO MYTABLE VALUES(1, 'Tom', 100398);

INSERT INTO MYTABLE VALUES(2, 'Jerry', 100398);

INSERT INTO MYTABLE VALUES(3, 'Tony', 100398);

INSERT INTO MYTABLE VALUES(4, 'Pony', 100398);

SELECT CTID, * FROM MYTABLE;

Data Output | Explain | Messages | Notifications

	ctid tid	staffid [PK] integer	staffname character varying (25)	salary double precision
1	(0,1)	1	Tom	100398
2	(0,2)	2	Jerry	100398
3	(0,3)	3	Tony	100398
4	(0,4)	4	Pony	100398

DELETE FROM MYTABLE WHERE STAFFID = 2;

SELECT CTID, * FROM MYTABLE;

Data Output | Explain | Messages | Notifications

	ctid tid	staffid [PK] integer	staffname character varying (25)	salary double precision
1	(0,1)	1	Tom	100398
2	(0,3)	3	Tony	100398
3	(0,4)	4	Pony	100398

VACUUM FULL;

SELECT CTID, * FROM MYTABLE;

Data Output | Explain | Messages | Notifications

	ctid tid	staffid [PK] integer	staffname character varying (25)	salary double precision
1	(0,1)	1	Tom	100398
2	(0,2)	3	Tony	100398
3	(0,3)	4	Pony	100398

ALTER TABLE mytable ADD salary_deci DECIMAL;

UPDATE mytable SET salary_deci=salary;

SELECT * FROM MYTABLE;

Data Output | Explain | Messages | Notifications

	staffid [PK] integer	staffname character varying (25)	salary double precision	salary_deci numeric
1	1	Tom	100398	100398
2	3	Tony	100398	100398
3	4	Pony	100398	100398

UPDATE mytable SET salary=salary * 1.00000000000000000000000001;

SELECT * FROM MYTABLE;

Data Output | Explain | Messages | Notifications

	staffid [PK] integer	staffname character varying (25)	salary double precision	salary_deci numeric
1	1	Tom	100398	100398
2	3	Tony	100398	100398
3	4	Pony	100398	100398

UPDATE mytable SET salary_deci=salary_deci * 1.00000000000000000000000001;

SELECT * FROM MYTABLE;

Data Output | Explain | Messages | Notifications

	staffid [PK] integer	staffname character varying (25)	salary double precision	salary_deci numeric
1	1	Tom	100398	100398.000000000000000000000100398
2	3	Tony	100398	100398.000000000000000000000100398
3	4	Pony	100398	100398.000000000000000000000100398

CREATE INDEX nameindex ON mytable USING BTREE (staffname);

Submit the result of each selection query.