Εργασία - Μέρος Α

Σχεδιασμός Βάσεων Δεδομένων

Δανοπούλου Αιμιλία - 3170033

Ζήτημα Πρώτο

1.

```
CREATE INDEX IX_Bibrecs_title
ON bibrecs(title)
```

Εξήγηση: Δημιουργούμε ένα (non-clustered)δείκτη με όνομα IX_Bibrecs_title στη στήλη title του πίνακα bibrecs , με σκοπό να επιταχύνουμε το query καθως με αυτο τον τρόπο θα δημιουργηθεί μια δομή που θα περιέχει τις διευθυνσεις ταξινομημένες με βάση το title και δείκτες που θα δείχνουν στον πραγματικό πίνακα με τις εγγραφές.

Statistics IO

Χωρίς το index:

Scan count :**1** , logical reads: **864**, physical reads **2**, read-ahead reads **867**.

Με το index :

Scan count :**1** , logical reads: **5**, physical reads **2**, read-ahead reads **2**.

2.a

```
SELECT title
FROM bibrecs
WHERE title like '%Πληροφορική%'
```

Rows: 78

Εξήγηση:

Το ευρετήριο του ερωτήματος 1 επιτυχάνει και εδώ την εκτέλεση του επερωτήματος καθώς ζητάμε μόνο τα εγγραφές του πεδίου title οι οποίες ικανοποιούν την τρέχουσα συνθήκη.

Statistics IO

Χωρίς το index έχουμε:

Scan count :**1** , logical reads: **864**, physical reads **2**, read-ahead reads **867**.

Με το index έχουμε:

Scan count :**1** , logical reads: **485**, physical reads **1**, read-ahead reads **500**.

b.
SELECT title, material
FROM bibrecs
WHERE title like 'Economics'

Rows: 63

Εξήγηση:
Ομοίως, το ευρετήριο επιτυγχάνει την εκτέλεση του παραπάνω επερωτήματος , καθώς η συνθήκη αφορά πάλι την στήλη title στην οποία έχει δημιουργηθεί. Μια καλύτερη λύση όμως σε αυτη την περίπτωση θα ήταν το ίδιο ευρετήριο με μια εντολή INCLUDE (material) (για αποφυγή του Key Lookup)

Statistics IO
Χωρίς το index έχουμε:
Scan count :**1** , logical reads: **864**, physical reads **2**, read-ahead reads **867**.

Με το index έχουμε:
Scan count :**1** , logical reads: **356**, physical reads **3**, read-ahead reads **288**.

c.
SELECT title, material
FROM bibrecs
WHERE title like 'Economics%'

Rows: 513

Εξήγηση:
Παρατηρούμε πως εδώ το ευρετήριο δέν επιταχύνει το query καθώς θα ήταν καλύτερο να δημιουργούσαμε ενα ευρετηριο που θα περιλάμβανε και το INCLUDE (material).

Statistics IO
Χωρίς index έχουμε:
Scan count :**1** , logical reads: **864**, physical reads **2**, read-ahead reads **867**.

Με το index έχουμε:
Scan count :**1** , logical reads: **864**, physical reads **2**, read-ahead reads **867**.

Ζήτημα Δεύτερο

1.a
SELECT title, lang
FROM bibrecs AS B
INNER JOIN publishers
ON B.pubid = publishers.pubid
  AND publishers.pubname = 'Κλειδάριθμος'

Rows: 97

Statistics IO
Χωρίς index έχουμε:
Table bibrecs : Scan count **1** , logical reads **864** , physical reads **2** , read-ahead reads **867**.
Table publishers : Scan count **1** , logical reads **17** , physical reads **1** , read-ahead reads **22**.

Με το index έχουμε:
Table bibrecs : Scan count **1** , logical reads **4** , physical reads **3** , read-ahead reads **0**.
Table publishers : Scan count **1** , logical reads **2** , physical reads **2** , read-ahead reads **0**.

b.

```
SELECT depname, count(lid)
FROM loanstats AS L,departments AS D,borrowers AS B
WHERE B.depcode = D.depcode
   AND L.bid = B.bid
   AND L.loandate LIKE '2000%'
GROUP BY depname
```

Rows : 10

Statistics IO
Χωρίς index :
Table borrowers : Scan count **1** , logical reads **51** , physical reads **1** , read-ahead reads **56**.
Table loanstats : Scan count **1** , logical reads **320** , physical reads **1** , read-ahead reads **325**.
Table departments : Scan count **1** , logical reads **2** , physical reads **1** , read-ahead reads **0**.

Με τα index :
Table borrowers : Scan count **10** , logical reads **49** , physical reads **1** , read-ahead reads **27**.
Table loanstats : Scan count **1** , logical reads **198** , physical reads **1** , read-ahead reads **204**.
Table departments : Scan count **1** , logical reads **2** , physical reads **1** , read-ahead reads **0**.

c.

```
SELECT title, lang , author
FROM bibrecs AS BR, bibauthors BA, authors AS A, bibterms AS BT, sterms AS S
WHERE BR.bibno = BA.bibno
   AND BT.bibno = BR.bibno
   AND BT.tid = S.tid
   AND S.term = 'Databases'
   AND BA.aid = A.aid
```

Rows: 1263

Statistics IO
Χωρίς index :

```
(1263 rows affected)
Table 'authors'. Scan count 0, logical reads 2971, physical reads 9, read-ahead reads 120, lob log
Table 'bibauthors'. Scan count 779, logical reads 2330, physical reads 11, read-ahead reads 104, l
Table 'bibrecs'. Scan count 0, logical reads 3774, physical reads 1, read-ahead reads 784, lob log
Table 'Workfile'. Scan count 0, logical reads 0, physical reads 0, read-ahead reads 0, lob logical
Table 'Worktable'. Scan count 0, logical reads 0, physical reads 0, read-ahead reads 0, lob logica
Table 'bibterms'. Scan count 1, logical reads 839, physical reads 2, read-ahead reads 841, lob log
Table 'sterms'. Scan count 1, logical reads 79, physical reads 1, read-ahead reads 84, lob logical

Completion time: 2020-04-25T01:36:55.3027988+03:00
```

Με τα index :

```
(1263 rows affected)
Table 'authors'. Scan count 0, logical reads 3153, physical reads 10, read-ahead reads 112, lob logical
Table 'bibauthors'. Scan count 779, logical reads 2413, physical reads 10, read-ahead reads 72, lob logi
Table 'bibrecs'. Scan count 0, logical reads 3001, physical reads 1, read-ahead reads 496, lob logical r
Table 'bibterms'. Scan count 1, logical reads 4, physical reads 3, read-ahead reads 0, lob logical reads
Table 'sterms'. Scan count 1, logical reads 2, physical reads 2, read-ahead reads 0, lob logical reads 0

Completion time: 2020-04-25T01:40:22.3378884+03:00
```

2.

Indexes για το πρώτο query

CREATE INDEX IX_bibrecs
ON bibrecs(pubid)
INCLUDE (title,lang)

CREATE INDEX IX_publishers
ON publishers(pubname)

Indexes για το δεύτερο query

CREATE INDEX IX_loanstats
ON loanstats(bid,loandate)

CREATE INDEX IX_borrowers
ON borrowers(depcode)

Indexes για το τρίτο query

CREATE INDEX IX_bibterms
ON bibterms(tid)

```
CREATE INDEX IX_sterms
ON sterms(term)

CREATE INDEX IX_bibauthors
ON bibauthors(bibno)
INCLUDE (aid)


CREATE INDEX IX_bibrecs_2
ON bibrecs(bibno)
INCLUDE (title,lang)
```

Ζήτημα Τρίτο

1.

Query 1:

```
SELECT B.bibno, title
FROM bibrecs AS B, copies AS C
WHERE B.bibno = C.bibno
AND  C.copyloc = ANY (SELECT copyloc FROM copies WHERE copyloc = 'OPA')
INTERSECT
SELECT B.bibno, title
FROM bibrecs AS B, copies AS C
WHERE B.bibno = C.bibno
AND  C.copyloc = ANY (SELECT copyloc FROM copies WHERE copyloc = 'ANA')
```

Query 2:

```
SELECT B.bibno, title
FROM bibrecs AS B
INNER JOIN copies AS C
ON B.bibno = C.bibno AND C.copyloc = 'OPA'
INTERSECT
SELECT B.bibno, title
FROM bibrecs AS B
INNER JOIN copies AS C
ON B.bibno = C.bibno AND C.copyloc = ‘ANA'
```

Query 3:

```
SELECT DISTINCT B.bibno, title
FROM bibrecs AS B
INNER JOIN copies AS C
ON B.bibno = C.bibno AND C.copyloc = 'OPA'
WHERE EXISTS(
        SELECT bibno
        FROM copies
        WHERE C.bibno =copies.bibno AND copies.copyloc = ANY (SELECT copyloc
       FROM copies WHERE copyloc = 'ANA'));
```

2. Index για το Query 2

```
CREATE INDEX IX_Copies_copyloc
ON copies(bibno,copyloc)

CREATE INDE IX_bibrecs_bibno
ON bibrecs(bibno)
INCLUDE(title)
```

Statistics IO

Χωρίς index :

Table bibrecs : Scan count **2** , logical reads **1728** , physical reads **2** , read-ahead reads **867**.
Table copies : Scan count **2** , logical reads **512** , physical reads **1** , read-ahead reads **261**.

Με τα index :

Table bibrecs : Scan count **2** , logical reads **954** , physical reads **1** , read-ahead reads **475**.
Table copies : Scan count **2** , logical reads **452** , physical reads **1** , read-ahead reads **224**.

Ζήτημα Τέταρτο

1.

```
CREATE TABLE words(
wid INT PRIMARY KEY,
word VARCHAR(200)
);

CREATE TABLE bibwords(
wid INT PRIMARY KEY FOREIGN KEY REFERENCES words(wid),
bibno INT FOREIGN KEY REFERENCES bibrecs(bibno)
);
```

2.

```
CREATE INDEX ix_words
ON words(word)

CREATE INDEX ix_bibwords
ON bibwords(bibno)
```