

ECKERT Fred res 144 E Cotton.....	1149
ECKERT Orville res 545 N Main.....	4278
ECKERT Richard res 284 Dixie.....	4396
ECKERT W R res 300 Arlington av.....	6378
ECKROSH J res 322 W Division.....	4529
EDER Otto res 475 S Main.....	6317
EDGELL Mrs Jeannie res 225 Elm.....	1016
EDGERTON Allan L ofc 20 Forest av.....	1951
EDGERTON Allan L res 12 Amory.....	4555
EDGERTON D C res 276 E 1st.....	5534
EDGERTON D S res R 5.....	824-R-5
EDKINS Chas E res 83-6th.....	7267
EDWARDS Albert res 44-6th.....	6706
EDWARDS Fred D res 115-5th.....	6816
EDWARDS Wm res 273 Fond du Lac av.....	1627
EGAN Mrs Theresa res 146 S Marv.....	6915
EGELHOFF Aug C res 70 E Johnson.....	2797
EGELHOFF Bros shoe dept 87 S Main.....	1960
EGELHOFF Mrs G A res 90 E 1st.....	2139
EGELHOFF O G res 77-6th.....	2275
EGGERS Frank res 270 N Seymour.....	7520
EGGERS Herbert C res 15 W 11th.....	4782
EGGERS Hubert res 261 N Seymour.....	2635
EGGERS Mrs Katherine res 32 E Cotton.....	5583
EGGERS Mrs Mary res 38 3rd.....	4266
EGGERS William res 174 E 11th.....	932
EGGERT J W res 305 Linden.....	653
EHLEN Henry res 456 W Scott.....	6045
EHLENBECK W D res 51 S Hickory.....	1230
EHLERS Anna D res 375 Linden.....	2536
EHLERT Paul C res 475 S Military.....	7631
EHRET Geo H res 427 N Main.....	1316
EHRHARDT Ed res 414-4th.....	6263
EHRlich Joseph res 248 Bischoff.....	4876
EICHER J H res 429 Walker.....	6533-J
EICHSTEADT Erna res 242 S Park av.....	7268
EIDEMILLER A G res 142 Central av.....	4711
EIGENBRODT Mrs W res 77 Vincent.....	6530-R
EILERS Wm R res 174 Rose av.....	4791
EITEUNER Mrs Peter res 345 S Military.....	4308
EITNER Kenneth F res 355 S Military.....	7261
EKERN Wm L res 12 E 13th.....	4338
ELCAR Agency 36 W 2nd.....	70
ELDRED Harry G res 132-5th.....	3298
ELDRIDGE Erwin res 94 E 11th.....	6543-W
ELIOTT Floyd res 719 Mich av N F D L.....	5408
ELKS Club 38 Sheboygan.....	57
ELLIOTT Bert res 131-3rd.....	1876
ELLIOTT Roy C res 90 W Arndt.....	7649
ELLIOTT'S Ladies Shop Inc 59 S Main.....	4103
ELLISON I res 56 E Follett.....	974
ELLSWORTH Chas res 551 W Scott.....	3380
ELLSWORTH F S res 115 E McWilliam.....	3532
ELY Co The 80 N Main.....	1363
EMERGENCY Relief Depot 55 Forest av.....	7510
EMERY Mike res R 1 Peebles.....	9601-F-12
ENDEAVOR Information Systems Des Plaines...	5693
ENDEJAN Herman elec contr 428 Linden.....	2924
ENDTHOFF Lorraine res 308 N Park av.....	7437
ENGEL Co 22 N Main.....	2000
ENGEL Frank res 22 N Main.....	5672
ENGEL Frank C res 279 Gillett.....	6895
ENGEL Frank H res 150 Central av.....	6496-W
ENGEL Harry J res R 8.....	9633-F-12

USING INDEXED FIELDS EFFECTIVELY IN ACCESS QUERIES

Alan Manifold

**Systems Implementation Manager
Purdue University Libraries**

European Endeavor Users Group 2005

Parallel sessions III

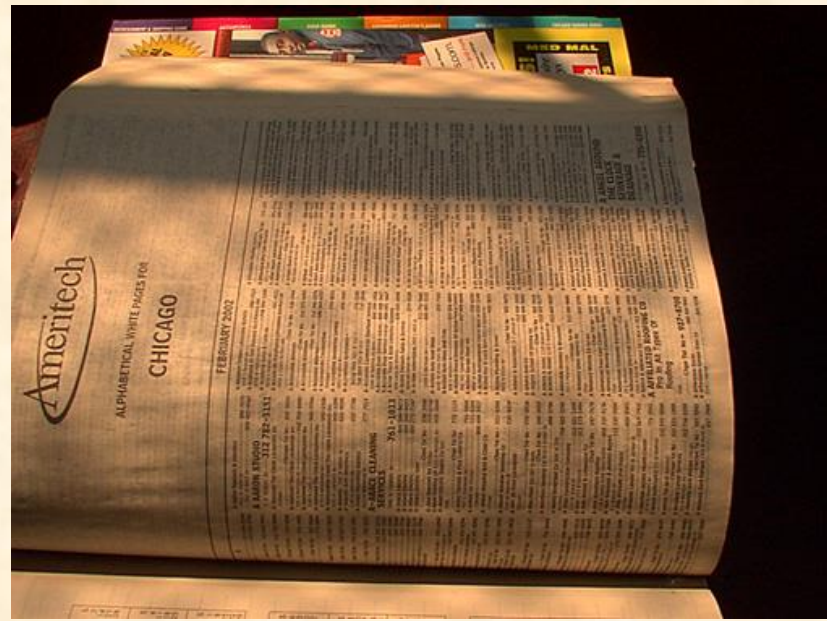
10 June 2005

12.00 - 12.45



A phonebook is an index, but not the efficient kind you would want your computer to use.

The basic lookup process is a scan from beginning to end, looking at the index tabs at the top of each page.



EDGEWATER A G see 145 Central ex.....4711
 EDGEMOUNT see W see 17 Thru.....4538 B
 EHLERS Wm B see 174 See ex.....4731
 EISENBERG Roy Peter see 145 S. Wilbur.....4506
 EITNER Kenneth F see 353 S. Millard.....7903
 ELDERS Wm L see 15 E. 10th.....4518
 ELCAR Agency 28 W. DuSable.....70
 ELDER Henry G see 132 1/2 S.....2888
 ELDRIDGE Edwin see 24 S. 31st.....6543 W
 ELLIOTT Fred see 113 N. 24th St. P. O.....5406
 ELLIS Chas. B. See.....27
 ELLIOTT Fred C see 35 W. Arden.....7649
 ELLIOTT Lillian Ethel see 13 S. Main.....4253
 ELLISON I see 24 S. Polk.....974
 ELLSWORTH Chas see 251 W. DuSable.....3380
 ELLSWORTH F B see 113 E. McWilliam.....3538
 ELY G. see 80 S. Main.....3363
 EMERGENCY Help Dept. 35 Penn. ave.....7510
 EMERY Mina see B 1. Polk.....9604 F 13
 ENCAP Information Systems One Plaza.....3683
 ENGELBACH Herman see near 433 Linden.....2904
 ENTHROP Lonnie see 243 S. 24th St.....7437
 ENGEL C. 25 S. Main.....3000
 ENGEL Frank see 12 S. Main.....2979
 ENGEL Frank C see 519 Gillett.....6895
 ENGEL Frank H see 133 Ontario St.....6959 W
 ENGEL Harry J see 8 S. DuSable.....3633 F 12

PHONEBOOKS

ABCDEFGHIJKLMNOPQRSTUVWXYZ

ABCDEFGHIJKLM

NOPQRSTUVWXYZ

ABCDEF GHIJKLM

NOPQRS TUVWXYZ

ABC DEF GHI JKLM

NOP QRS TUV WXYZ

A BC D EF G HI

N OP Q RS T UV

B C E F H IJK LM

O P R S U VWX YZ

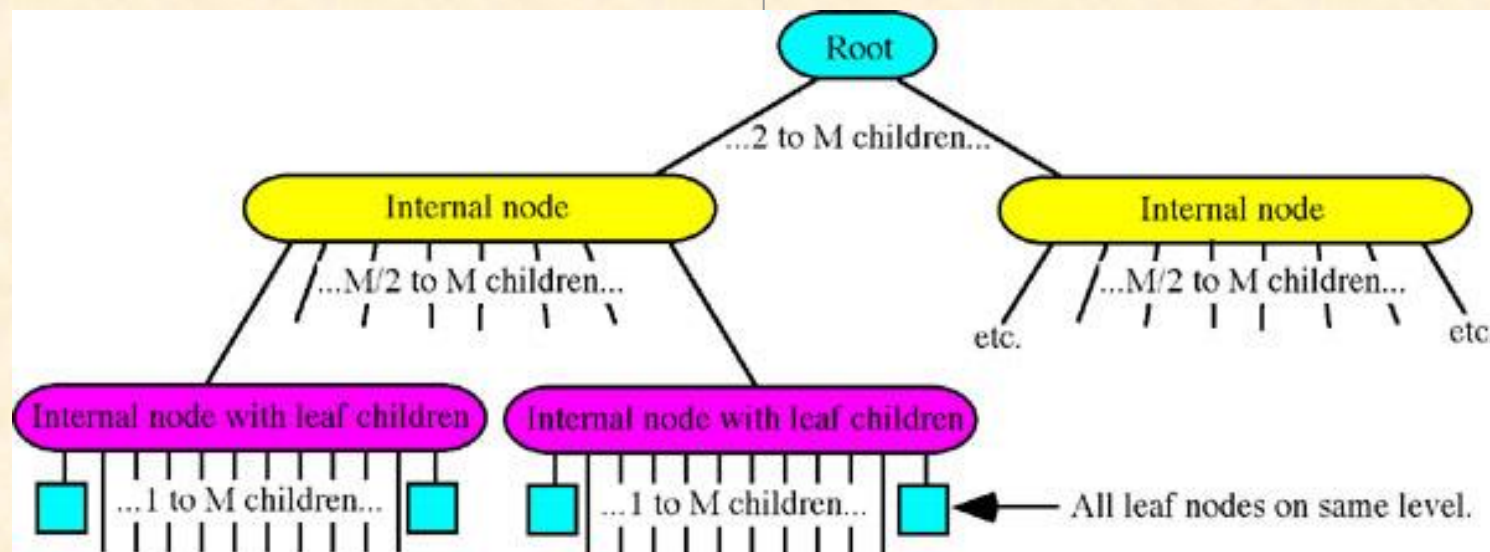
J K L M

W X Y Z

This index gets to any letter in a max of 6 tries

AN IMPROVEMENT

EDGEHILLER A G see 145 Central see.....4711
 EDGEMOUNT see W see 17 Thru.....6306-B
 EHLERS Wm B see 174 See str.....4733
 EISENBERG Eric Huber see 145 S Military.....4306
 EITNER Kenneth F see 353 S Military.....7903
 ELDERS Wm L see 12 E 28th.....4328
 ELGAR Agency 28 W 28th.....
 ELGHERD Henry G see 128 10th.....70
 ELDRIDGE Edwin see 24 S 31st.....6543W
 ELLIOTT Fred see 215 30th av 31st D.....3406
 ELLIS Club 25 31st.....57
 ELLIOTT Ray G see 35 W 40th.....7649
 ELLIOTT Lillian Ethel see 19 S Main.....4253
 ELLISON I see 28 E 10th.....374
 ELLSWORTH Clara see 451 W 2nd.....3360
 ELLSWORTH F B see 115 E McWilliam.....3538
 ELY Co The 80 S Main.....3363
 EMERGENCY Relief Dept 25 Penna av.....7510
 EMERY Mina see B 1 Penna.....3602-133
 ENDEAVOR Information Systems One Plaza.....1683
 ENGLISHMAN Herman also see 433 51st.....2904
 ENTHAHOFF Leonard see 245 S 70th.....7437
 ENGEL Co 25 S Main.....3000
 ENGEL Frank see 12 S 28th.....2979
 ENGEL Frank C see 219 41st.....6815
 ENGEL Frank M see 120 40th av.....6916
 ENGEL Harry J see 8 S.....3633-12



In a B-Tree, each node can point to a number of child nodes, so the disk access is minimized.

Nodes are (ideally) sized to make maximum use of memory, which is fast.

EVEN BETTER

We don't have to worry about how indexes work, because Oracle provides them for us. We just want to make sure we use them.



NOT OUR PROBLEM

EDGEMILLER A G see 145 Central4711
 EISENHARTZ see We see 17 Thru.....4526
 EILERS Wm B see 174 See4721
 EISENBERG see Fisher see 145 S. Military.....4506
 EITNER Kenneth F see 353 S. Military.....3963
 ELDERS Wm L see 12 E. 28th.....4438
 ELGAR Agency 28 W. 2nd.....70
 ELIASH Henry G see 128 1/2.....2886
 ELDRIDGE Edwin see 24 S. 13th.....6543W
 ELLIOTT Fred see 215 1/2 N. 3rd W. P. O. Box.....3406
 ELLIS Chas 25 1/2 1/2.....27
 ELLIOTT Roy G see 35 W. 2nd.....7649
 ELLIOTT Lillian Ethel see 12 S. Main.....4253
 ELLISON I see 24 S. 1st.....374
 ELLSWORTH Chas see 411 W. 2nd.....3360
 ELLSWORTH F B see 115 E. McWilliam.....3538
 ELY Dr The 80 S. Main.....3363
 EMERGENCY Head. Dept. 35 Penna. ave.....7510
 EMERY Mina see B 1. P. O. Box.....3602F13
 ENGLAND Information Systems One Plaza.....1683
 ENGELAK Herman also under 483 Linden.....2904
 ENTHOFF Loraine see 415 S. 2nd7437
 ENGEL Dr 21 S. Main.....3000
 ENGEL Frank see 12 S. Main.....2979
 ENGEL Frank C see 219 1/2 1/2.....6815
 ENGEL Frank H see 120 Omaha St.....6919 W
 ENGEL Harry J see S. 2nd.....3633F12

```
SELECT BIB_ID
FROM BIB_TEXT
WHERE TITLE
LIKE "*turtles*";
```

*"Let's see... Does record
1 have this? Nope. How
about record 2? Nope.
Record 3? Hmmm..."*

The alternative to using an index is a "full table scan". This means looking at each record in the database in turn. Depending on the size of the table, this can be very slow.

WITHOUT INDEXES

EDGEWILLER A G see 145 Central4711
 EDGEMOUNT see W see 17 Thousand.....4826
 EILERS Wm B see 174 See4731
 EITZINGER Ben Peter see 145 S. Willow.....4306
 EITNER Kenneth F see 353 S. Willow.....3961
 ELDERS Wm L see 15 S. Willow.....4328
 ELGAR Agency 28 W. Willow.....470
 ELGHER Henry G see 132 1/22888
 ELDRIDGE Edwin see 24 S. 13th4543W
 ELLIOTT Fred see 123 1/2 W. 31st5406
 ELLIS Chas 25 Brookgreen.....27
 ELLIOTT Ray G see 35 W. Arden7649
 ELLIOTT Lillian Ann see 19 S. Main.....4252
 ELLISON I see 24 S. Forest.....374
 ELLSWORTH Chas see 411 W. Main.....3360
 ELLSWORTH F B see 113 S. McWilliam.....3538
 ELY G. The 80 S. Main.....3363
 EMERGENCY Head. Dept. 35 Forest7510
 EMERY Mina see B 1. Parkside3602F13
 ENGLAND Information Systems One Plaza1683
 ENGELMAN Herman also see 483 Linden.....2904
 ENTHOFF Loraine see 415 S. Park7437
 ENGEL C. 25 S. Main.....3000
 ENGEL Frank see 12 S. Main.....2979
 ENGEL Frank C see 119 1/2 1st6815
 ENGEL Frank M see 133 Orange St.3694 W
 ENGEL Harry J see 9 S. Willow.....3633F12

Use the query on the following slide in SQL*Plus to identify what indexes there are in the Voyager database.



EDGEMILLER A G see 145 Central4711
 EDGEMILLER see W see 17 Thru.....4828
 EHLERS Wm B see 174 See4731
 EITZINGER see Fisher see 145 S. Millway.....4806
 EITNER Kenneth F see 353 S. Millway.....3963
 ELDERS Wm L see 15 E. 38th.....4438
 ELDON Agency 28 W. 2nd.....4438
 ELDRIDGE Henry G see 132 1/2.....3988
 ELDRIDGE Erwin see 24 S. 31st.....6543W
 ELLIOTT Fred see 215 30th or 21 P. D.3406
 ELLS Club 25 3rd.....4716
 ELLIOTT Roy G see 35 W. Arden.....7649
 ELLIOTT Lillian Marie see 19 S. Main.....4253
 ELLISON I see 24 S. Polaris.....374
 ELLSWORTH Oak see 451 W. 2nd.....3360
 ELLSWORTH F B see 115 E. McWilliam.....3538
 ELY Co The 80 S. Main.....3363
 EMERGENCY Help Dept 25 Penna7510
 EMERY Mina see B 1. Polaris.....3602F13
 EMPORION Information Systems One Plaza3683
 ENGELAK Herman see near 433 Linden.....2904
 ENTHOFF Loraine see 215 S. 2nd or7437
 ENGEL Co 25 S. Main.....3000
 ENGEL Frank see 12 S. Main.....2979
 ENGEL Frank C see 219 41st.....6895
 ENGEL Frank M see 133 O'Connell6959 W
 ENGEL Harry J see S.3633P12

IDENTIFYING INDEXES

SELECT

```
USER_INDEXES.INDEX_NAME,  
USER_INDEXES.TABLE_NAME,  
COLUMN_POSITION,  
SUBSTR(COLUMN_NAME,1,40) COL_NAME
```

FROM

```
USER_INDEXES,  
USER_IND_COLUMNS
```

```
WHERE USER_INDEXES.INDEX_NAME =  
USER_IND_COLUMNS.INDEX_NAME;
```

IDENTIFYING INDEXES

EDGEMILLER A G see 145 Central see.....4711
EDGEMILLER B W see 17 Thru.....4826
EHLERS Wm B see 174 See also.....4733
EISENBERG Ben Fisher see 145 S. Wilbur.....4806
EITNER Kenneth F see 353 S. Hilltop.....3963
EIKEN Wm L see 15 E. 10th.....4838
ELCAR Agency 28 W. 10th.....4838
ELDRIDGE Henry G see 132 1/2 B.....4838
ELDRIDGE Erwin see 24 S. 13th.....4840
ELLIOTT Fred see 215 1/2 N. 3rd P. O. Box.....4846
ELLSB Club 25 Broadway.....47
ELLIOTT Ben see 173 1/2 N. 3rd.....4846
ELLIOTT Roy G see 35 W. Arden.....4849
ELLIOTT Lillian Ethel see 19 S. Main.....4853
ELLISON I see 24 S. 10th.....4874
ELLWORTH Gene see 451 W. 2nd.....3980
ELLWORTH F B see 115 E. McWilliam.....3538
ELY Dr The 80 S. Main.....3363
EMERGENCY Relief Chapel 25 Penna. ave.....7510
EMERY Mina see B 1. Pikes.....3604-713
EMERSON Information Systems One Pikes.....3683
ENGELAK Herman also see 433 Linden.....2904
ENZYKLOP. Lorraine see 24 S. 3rd.....7437
ENGLER Co 25 S. Main.....3000
ENGLER Frank see 25 S. Main.....2979
ENGLER Frank C see 219 1/2 1st.....6895
ENGLER Frank M see 133 O'Connell St.....6895
ENGLER Harry J see 8 S. 1st.....3833-12

TABLE_NAME	INDEX_NAME	#	COLUMN_NAME
ELINK_INDEX	ELINK_INDEX_ELINK_ID	1	ELINK_ID

In this simplest case, the index covers only one field. The COLUMN_POSITION field is 1, and there is no 2.

If you add criteria to the ELINK_ID field or link from this table to another by it, the index will be used and access will be fast.

EDGEWORTH F B ... 3538
 ELY Dr The 80 N Main ... 3550
 EMERGENCY Head Quarters ... 7510
 EMERY Mine ... 3600
 ENGINEERING Information Systems ... 3650
 ENGLISH ... 3700
 ENGLISH ... 3750
 ENGLISH ... 3800
 ENGLISH ... 3850
 ENGLISH ... 3900
 ENGLISH ... 3950
 ENGLISH ... 4000
 ENGLISH ... 4050
 ENGLISH ... 4100
 ENGLISH ... 4150
 ENGLISH ... 4200
 ENGLISH ... 4250
 ENGLISH ... 4300
 ENGLISH ... 4350
 ENGLISH ... 4400
 ENGLISH ... 4450
 ENGLISH ... 4500
 ENGLISH ... 4550
 ENGLISH ... 4600
 ENGLISH ... 4650
 ENGLISH ... 4700
 ENGLISH ... 4750
 ENGLISH ... 4800
 ENGLISH ... 4850
 ENGLISH ... 4900
 ENGLISH ... 4950
 ENGLISH ... 5000

THE SIMPLEST CASE

TABLE_NAME	INDEX_NAME	#	COLUMN_NAME
FUND	FUND_IDX	1	LEDGER_ID
FUND	FUND_IDX	2	FUND_ID

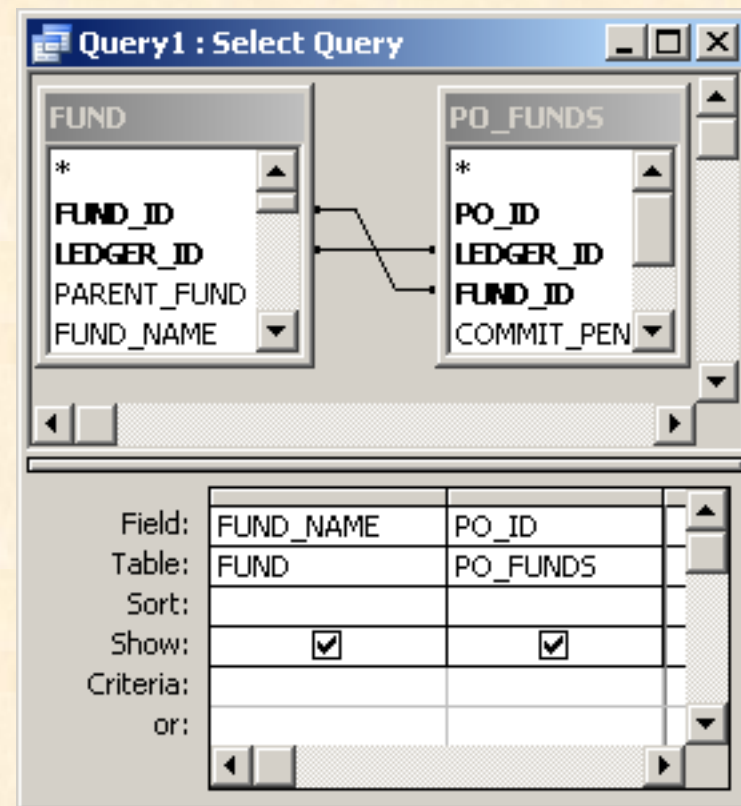
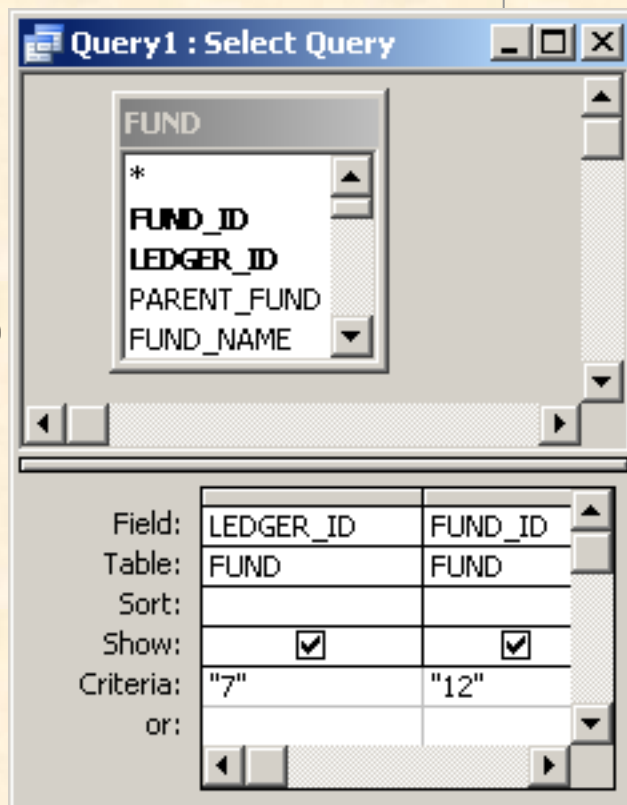
In this case, you can see there is a COLUMN_POSITION (#) field value of 2, as well as one of 1.

If you search this field by FUND_ID without LEDGER_ID, it will do a full table scan. You must have the field with position 1 before it can use the index for the field in position 2.

A BIT HARDER

EDGEMILLER A G see 145 Central av.....4711
 EDGEMOUNT see W see 17 Thru.....6326 B
 ELLERS Wm B see 174 Elm st.....4733
 ELLIOTT see Fisher see 145 S Millway.....4306
 EFTNER Kenneth F see 353 S Millway.....7263
 ELDERS Wm L see 12 E 10th.....4328
 ELGAR Agency 28 W 10th.....2888
 ELIOT Henry G see 118 10th.....6543 W
 ELIOT Fred see 215 10th av 21 S D.....3406
 ELIOT George Edwin see 24 S 11th.....6543 W
 ELIOTT Fred see 118 10th av 21 S D.....3406
 ELIOT Chas B 10th.....27
 ELIOTT Fred see 118 10th av 21 S D.....3406
 ELIOTT Ray G see 35 W 10th.....7649
 ELLIOTT Lillian see 19 S Main.....4253
 ELLISON I see 24 S 10th.....974
 ELLSWORTH Chas see 411 W 10th.....3380
 ELLSWORTH F B see 118 E McWilliam.....3538
 ELY G of The 80 S Main.....3363
 EMERGENCY Dept. Dept 35 Penna av.....7510
 EMERY Mina see B 1 10th.....3602 F 13
 ENGINEER Information Systems One Plaza.....1683
 ENIGAN Herman see near 433 Linden.....2904
 ENTHOFF Loraine see 615 S 10th av.....7437
 ENGEL Co 21 S Main.....3000
 ENGEL Frank see 12 S Main.....2879
 ENGEL Frank C see 219 10th.....6815
 ENGEL Frank H see 133 O'Connell.....6815 W
 ENGEL Harry J see 8 S.....3633 F 12

These two queries could both use the **FUND_IDX** index, as they use the **LEDGER_ID** as well as the **FUND_ID**



... BUT THESE CAN

EDGEMILLER A G see 145 Central 4711
 EISENHARDT see W see 11 Thru 4508-9
 EILERS Wm B see 174 See 4732
 EITZINGER Roy Peter see 145 S. Wilbur 4506
 EITNER Kenneth F see 353 S. Wilbur 7903
 ELDERS Wm L see 15 E. 10th 4326
 ELDON Agency 28 W. Polk 2886
 ELDREDGE Edwin see 24 S. 13th 6943W
 ELLIOTT Fred see 119 30th or 31 S. D 3406
 ELLIS Chas B See 27
 ELLIOTT Roy G see 35 W. Aradell 7649
 ELLIOTT Larkin Shaw see 12 S. Main 4513
 ELLISON I see 28 S. Polk 374
 ELLSWORTH Shaw see 181 W. Main 3380
 ELLSWORTH F B see 115 E. McWilliam 3538
 ELY G. The 80 S. Main 3363
 EMERY Mina see B 1 Polk 3602-713
 ENGINEERING Informat. Systems One Plaz 1683
 ENGLISH Herman see east 433 Linden 2904
 ENTHOFF Loraine see 616 S. 7th or 7437
 ENGEL Co 25 S. Main 3000
 ENGEL Frank see 12 S. Main 2979
 ENGEL Frank C see 219 4th 6815
 ENGEL Frank H see 133 O'Connell 6919 W
 ENGEL Henry J see S. 3633-12

TABLE_NAME	INDEX_NAME	#	COLUMN_NAME
FINE_FEE	FINE_FEE_IDX1	1	ITEM_ID
FINE_FEE	FINE_FEE_IDX1	2	FINE_FEE_TYPE
FINE_FEE	FINE_FEE_IDX1	3	PATRON_ID
FINE_FEE	FINE_FEE_IDX1	4	FINE_FEE_BALANCE
FINE_FEE	FINE_FEE_IDX1	5	FINE_FEE_ID

To use this index, you need an ITEM_ID, then a FINE_FEE_TYPE, then a PATRON_ID, then the FINE_FEE_BALANCE, then the FINE_FEE_ID.

You don't have to use all of these fields, but you must use at least the ones with smaller numbers than the field you're interested in.

A HARDER ONE YET

EDGEWILLER A G see 145 Central see.....4711
 EDGEMUNDY see W see 17 Thru.....4836 R
 ELLERS Wm B see 174 See str.....4731
 ELLIOTT see Fisher see 145 S. Wilbur.....4306
 EITNER Kenneth F see 353 S. Wilbur.....3763
 ELDERS Wm L see 12 E. 31st.....4328
 ELDON Agency 28 W. 31st.....70
 ELDRIDGE Henry G see 128 1/2 B.....2888
 ELDRIDGE Edwin see 24 S. 31st.....6543 W
 ELLIOTT Fred see 123 30th av 31 S. P. D.....3468
 ELLIS Chas 25 31st.....57
 ELLIOTT Earl see 123 30th av 31 S. P. D.....1876
 ELLIOTT Ray G see 35 W. Arden.....7649
 ELLIOTT LAGAN John see 12 S. Main.....4253
 ELLISON I see 24 S. Polaris.....974
 ELLSWORTH Chas see 411 W. 31st.....3380
 ELLSWORTH F B see 113 E. McWilliam.....3538
 ELY G. The 80 S. Main.....3363
 EMERGENCY Head. Dept. 25 Penna. av.....7510
 EMERY Mina see 8 1/2 Penna.3604 F 13
 EMERSON Information Systems Div. Plaza.....3683
 ENGELMAN Herman also see 413 Linden.....2904
 ENGLISHOFF Lorraine see 413 S. Park av.....7427
 ENGEL Co. 21 S. Main.....3000
 ENGEL Frank see 12 S. Main.....2979
 ENGEL Frank C see 219 1/2 1st.....6815
 ENGEL Frank M see 123 O'Connell av.....6919 W
 ENGEL Harry J see 8 S.3638 F 12

This query can use the FINE_FEE_IDX1 index since the first three fields in the index (ITEM_ID, FINE_FEE_TYPE, and PATRON_ID) are all being used for links.

Overdue fines for an item and patron : Select Query

Field:	ITEM_BARCODE	PATRON_BARCODE	FINE_FEE_DESC
Table:	ITEM_BARCODE	PATRON_BARCODE	FINE_FEE_TYPE
Sort:			
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:	[Item barcode:]	[Patron barcode:]	"F1"
or:			

USING THE INDEX

EDGEMILLER A G see 145 Central 4711
 EISENHARTZ Mrs W see 17 Young 4526
 EILERS Mrs B see 174 See 4731
 EITZINGER Mrs Peter see 145 S. Wilbur 4586
 EITNER Kenneth F see 353 S. Wilbur 3983
 ELDON Mrs L see 15 E. 10th 4528
 ELDON Agency 28 W. 10th 70
 ELDRIDGE Edwin see 24 S. 11th 6543W
 ELLIOTT Fred see 113 10th or 21 P. St 5466
 ELLIS Chas 25 10th 57
 ELLIOTT Rev G see 35 W. 10th 7649
 ELLIOTT Lillian see 19 S. Main 4523
 ELLISON I see 24 E. 10th 374
 ELLSWORTH Chas see 411 W. Main 3360
 ELLSWORTH F B see 113 E. McWilliam 3538
 ELY Dr The 80 S. Main 3363
 EMERGENCY Relief Dept 35 Penn 7510
 EMERY Miss see 11 P. St 3604F13
 ENGINEERING Information Systems Div 1683
 ENGLISH Herman see 243 S. 10th 2904
 ENTHOFF Loraine see 243 S. 10th 7437
 ENGEL Dr 21 S. Main 3000
 ENGEL Frank see 12 S. Main 6879
 ENGEL Frank C see 219 10th 6895
 ENGEL Frank H see 133 10th 6895 W
 ENGEL Harry J see 8 S. Main 3633F12

Exact criteria such as:
“reference”

and

“ref main” Or “ref branch”

**appear to work faster
 than fuzzy criteria such
 as:**

Like “ref*”

**Indexes are left-
 anchored, so criteria
 such as:**

Like “*refe”

can't use the indexes

CRITERIA NOTES

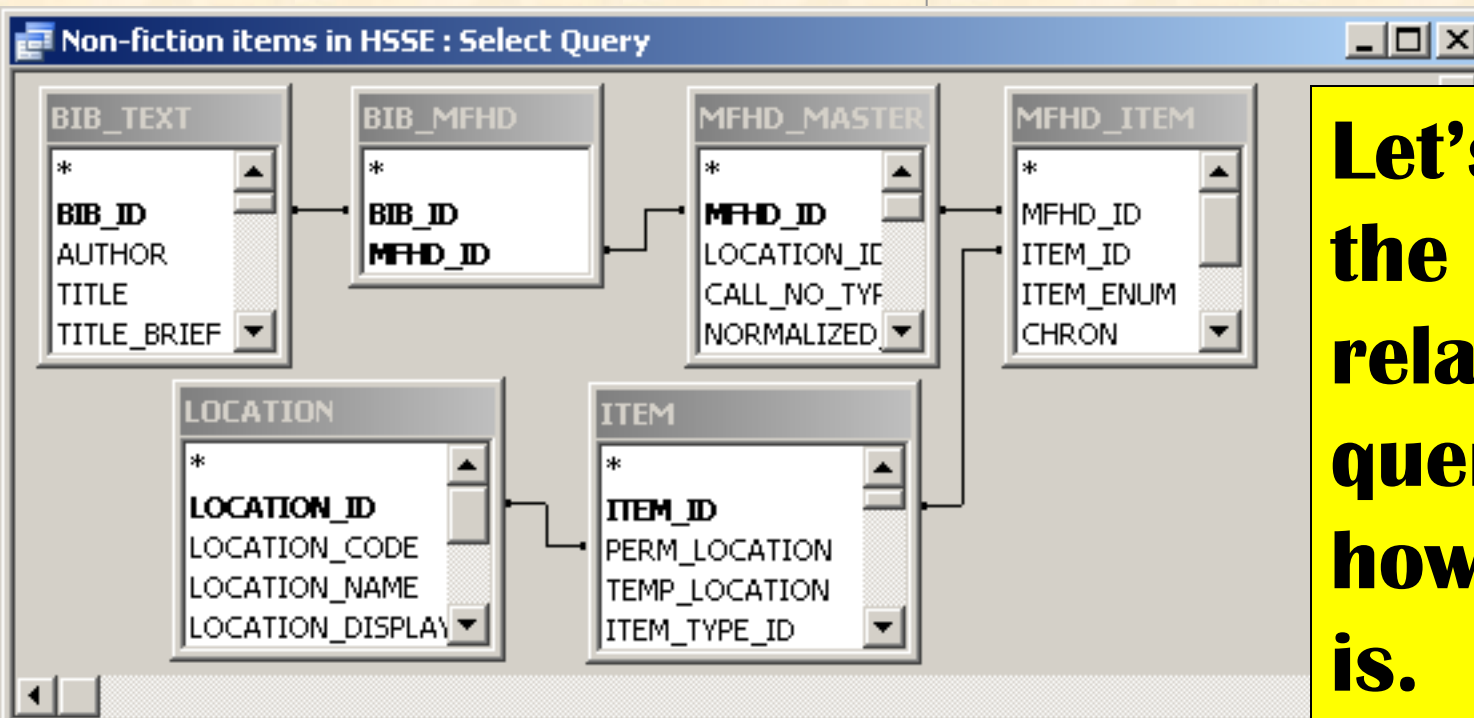
EDSMILLER A G see 145 Central 4711
 EDWARDSOT Roy W see 17 Thru..... 4326-8
 EILERS Wm B see 174 See 4733
 EITZINGER Roy Fisher see 145 S. Wilbur..... 4306
 EITNER Kenneth F see 353 S. Hillway..... 3763
 ELDERS Wm L see 152 E. 38th..... 4438
 ELGAR Agency 28 W. 3rd..... 4638
 ELIASH Henry G see 132 1/2..... 4700
 ELDRIDGE Edwin see 24 S. 31st..... 4543W
 ELLIOTT Fred see 123 30th av 31 P. D..... 3466
 ELLIS Chas 25 3rd..... 4777
 ELLIOTT Roy G see 35 W. Arden..... 7649
 ELLIOTT Lillian Ethel see 19 S. Main..... 4453
 ELLISON I see 24 S. Pollock..... 374
 ELLSWORTH Chas see 411 W. Main..... 3360
 ELLSWORTH F B see 113 E. McWilliam..... 3538
 ELY G. The 80 S. Main..... 3363
 EMERGENCY Help. Dept. 35 Penn..... 7510
 EMERY Mina see R. 1. Park..... 3604-133
 ENGINEER Information Systems Div. Plank..... 3683
 ENGLISH Herman see east 433 Linden..... 2904
 ENTHOFF Loraine see 615 S. Park av..... 7437
 ENGEL Co. 21 S. Main..... 3000
 ENGEL Frank see 12 S. Main..... 3679
 ENGEL Frank C see 519 41st..... 6895
 ENGEL Frank H see 133 O'Connell..... 6949 W
 ENGEL Harry J see 8..... 3633-12



Where I have shown examples of queries, I have said the query “could” or “can” use the index. Whether it does or not is up to Oracle and the ODBC drivers.

THE FUDGE FACTOR

EDGEMILLER A G res 145 Central av.....4711
 EDGENHURST Res W res 17 Toward.....6326 R
 EILERS Wm B res 114 Sme str.....4733
 EITZINGER Res Haber res 145 S. Millway.....4306
 EITNER Kenneth F res 353 S Millway.....3763
 ELDERS Wm L res 12 E. 12th St.....4328
 ELDON Agency 28 W. 12th.....6543 W
 ELDRIDGE Henry G res 128 1/2 S.....3888
 ELDRIDGE Erwin res 24 S 13th.....6543 W
 ELLIOTT Fred res 115 1/2 N. 3rd St.....3466
 ELLIS Chas B 2nd Ave.....27
 ELLIOTT Fred res 121 1/2 N. 3rd St.....1876
 ELLIOTT Ray C res 35 W. 1st Ave.....7649
 ELLIOTT Lillian Elsie res 12 S. Main.....4253
 ELLISON I res 28 E. 1st St.....374
 ELLSWORTH Chas res 411 W. 1st St.....3360
 ELLSWORTH F B res 113 E. McWilliam.....3538
 ELY G. O. The 80 S. Main.....3363
 EMERGENCY Head. Dept. 35 Penna av.....7510
 EMERY Mina res R 1. Poshes.....3602 F 13
 ENDEAVOR Information Systems One Plaza.....1683
 ENGELMAN Herman also near 483 Linden.....2904
 ENTHOFF Loraine res 618 S. 2nd St.....7437
 ENGEL C. 21 S. Main.....3000
 ENGEL Frank res 12 S. Main.....2879
 ENGEL Frank C res 219 1/2 1st St.....6815
 ENGEL Frank H res 123 Omaha St.....6616 W
 ENGEL Harry J res S. B.....3633 P 12



Let's look at the indexes related to this query and see how good it is.

Field:	TITLE	AUTHOR	CALL_NO_TYPE	DISPLAY_CALL_NO	LOCATION_NAME
Table:	BIB_TEXT	BIB_TEXT	MFHD_MASTER	MFHD_MASTER	LOCATION
Sort:					
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:			"1"	Not Like "8*"	Like "HSSE*"
or:					

EXAMPLE #1

BIB_TEXT	BIB_TEXT_BIB_ID_IDX	1	BIB_ID
BIB_MFHD	BIB_MFHD_BIBID_MFHDID_IDX	1	BIB_ID
BIB_MFHD	BIB_MFHD_BIBID_MFHDID_IDX	2	MFHD_ID
BIB_MFHD	BIB_MFHD_MFHDID_BIBID_IDX	1	MFHD_ID
BIB_MFHD	BIB_MFHD_MFHDID_BIBID_IDX	2	BIB_ID
MFHD_MASTER	MFHD_MASTER_MFHD_ID_IDX	1	MFHD_ID
MFHD_ITEM	MFHD_ITEM_ITEM_IDX	1	ITEM_ID
MFHD_ITEM	MFHD_ITEM_MFHD_IDX	1	MFHD_ID
ITEM	ITEM_IDX	1	ITEM_ID
ITEM	ITEM_TEMPLOC_PERMLOC_IDX	1	TEMP_LOCATION
ITEM	ITEM_TEMPLOC_PERMLOC_IDX	2	PERM_LOCATION
LOCATION	LOCATION_LOC_ID_IDX	1	LOCATION_ID

Most of the links we used were on indexed fields.

THE LINKS WE USED

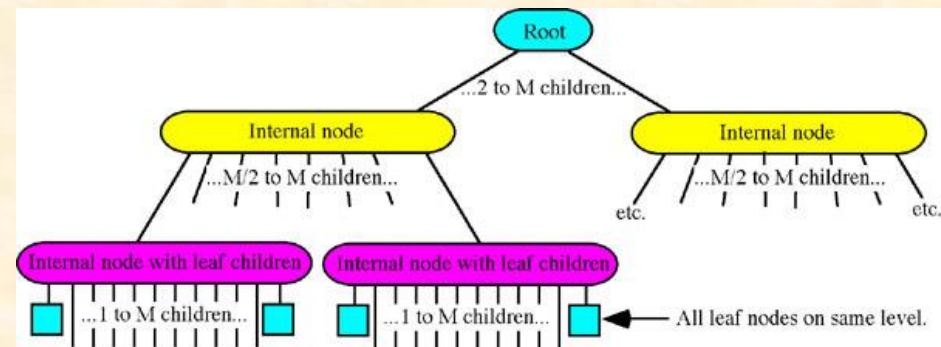
EDGEHILLER A G see 145 Central see.....4711
 EDGEMOUNT see W see 17 Thru.....4538-9
 EHLERS Wm B see 174 See.....4731
 EISENER see Fisher see 145 S. W. Hwy.....4586
 EITNER Kenneth F see 155 S. Hillway.....3961
 ELDON Wm L see 15 S. Hillway.....4528
 ELGAR Agency 28 W. Hillway.....370
 ELGROD Henry G see 155 Hillway.....3888
 ELKINS Edwin see 14 S. Hillway.....4543W
 ELLIOTT Fred see 115 Hillway see 17 S. Hillway.....3546
 ELLIS Club 28 Hillway.....37
 ELLIOTT Ray G see 38 W. Hillway.....7649
 ELLIOTT LAGAN John see 17 S. Hillway.....4213
 ELLISON I see 28 S. Hillway.....374
 ELLSWORTH Sam see 151 W. Hillway.....3389
 ELLSWORTH F B see 115 S. Hillway.....3538
 ELY Dr The 80 S. Hillway.....3363
 EMERGENCY Dept 28 Hillway.....7210
 EMERY Mina see 17 Hillway.....3604F13
 EMERSON Information Systems 28 Hillway.....3683
 ENGELMAN Herman see 28 S. Hillway.....3904
 ENGLISH Lorraine see 28 S. Hillway.....7437
 ENGLISH Co 28 S. Hillway.....3900
 ENGEL Frank see 15 S. Hillway.....3979
 ENGEL Frank C see 17 Hillway.....3979F13
 ENGEL Frank C see 17 Hillway.....3979F13
 ENGEL Frank H see 155 Hillway.....3979F13
 ENGEL Harry J see 155 Hillway.....3979F13

MFHD_MASTER	MFHD_MASTER_NORM_TYPE_LOC_IDX	1	NORMALIZED_CALL_NO
MFHD_MASTER	MFHD_MASTER_NORM_TYPE_LOC_IDX	2	CALL_NO_TYPE
MFHD_MASTER	MFHD_MASTER_NORM_TYPE_LOC_IDX	3	LOCATION_ID
MFHD_MASTER	MFHD_MASTER_NORM_TYPE_LOC_IDX	4	SUPPRESS_IN_OPAC
MFHD_MASTER	MFHD_MASTER_NORM_TYPE_LOC_IDX	5	MFHD_ID
MFHD_MASTER	MFHD_MASTER_NORM_TYPE_LOC_IDX	6	DISPLAY_CALL_NO
MFHD_MASTER	MFHD_MASTER_TYPE_IDX	1	CALL_NO_TYPE
MFHD_MASTER	MFHD_MASTER_TYPE_IDX	2	MFHD_ID

CALL_NO_TYPE is indexed, but NORMALIZED_CALL_NO would be a better choice for criteria than DISPLAY_CALL_NO. In the LOCATION table, only the LOCATION_ID is indexed.

THE CRITERIA WE USED

EDGEWELLER A G see 145 Central see.....4711
 EDENHURST see W see 17 Thru.....4536
 ELLERS Wm B see 174 See4731
 ELLIOTT see Peter see 145 S. Wilbur.....4506
 EFTNER Kenneth F see 353 S. Millard.....3903
 EGGERS Wm L see 12 E. 28th.....4528
 ELGAR Agency 28 W. 2nd.....70
 ELIHOOD Henry G see 128 1/2 S.....3888
 ELIHOOD Edwin see 24 S. 31st.....6543W
 ELLIOTT Fred see 215 1/2 S. 2nd W. 2nd.....5406
 ELIOT Club 25 1/2 1/2.....57
 ELLIOTT see 121 1/2 S.....1876
 ELLIOTT Roy C see 35 W. 2nd.....7649
 ELLIOTT Lillian see 12 S. 2nd.....4253
 ELLISON I see 24 S. 2nd.....374
 ELLSWORTH Sam see 141 W. 2nd.....3380
 ELLSWORTH F B see 113 E. McWilliam.....3538
 ELY G. see 80 S. Main.....3363
 EMERGENCY see 2nd 25 1/2 1/2.....7310
 EMERY Mina see B 1. 1/2.....900713
 ENGLAND Information Systems see 1/2.....1683
 ENGELMAN Herman see east 433 1/2 1/2.....2904
 ENTHOFF Loraine see 24 S. 2nd W. 2nd.....7437
 ENGEL Co 24 S. 2nd.....3000
 ENGEL Frank see 12 S. 2nd.....6979
 ENGEL Frank C see 219 1/2 1/2.....6915
 ENGEL Frank M see 120 1/2 1/2.....6919 W
 ENGEL Henry J see S. 2nd.....953312



In a B-Tree structure, the nodes are relatively large, so they have lots of records in them. For a small table, a full-table scan is equivalent to an index lookup.

Although neither the LOCATION_CODE nor the LOCATION_NAME are indexed in LOCATION, it makes very little difference in speed. The shorter field (LOCATION_CODE) is preferable for criteria.

DOES LOCATION MATTER?

EDGEWILLER A G see 145 Central see.....4711
 EISENHOWER see W see 11 Thru.....6308
 EILERS Wm B see 114 See etc.....4703
 EITZINGER Roy Peter see 145 S Military.....4306
 EITNER Kenneth F see 101 S Military.....7903
 ELDERS Wm L see 112 E 10th.....4328
 ELCAR Agency 28 W 10th.....70
 ELDRIDGE Henry G see 112 10th.....2888
 ELDRIDGE Erwin see 24 S 11th.....6543W
 ELLIOTT Fred see 112 10th or 11 P D.....2406
 ELLIS Chas B Biological.....27
 ELLIOTT Roy G see 38 W Arden.....7649
 ELLIOTT LAFAYETTE see 112 S Main.....4213
 ELLISON I see 24 S Polk.....374
 ELLSWORTH Chas see 111 W Main.....3280
 ELLSWORTH F B see 112 E McWilliam.....3538
 ELY Gd The 80 S Main.....3363
 EMERGENCY Head Quarters 10 Front.....7510
 EMERY Mina see B 1 Polk.....3602F13
 ENGELBORN Information Systems One Polk.....1683
 ENGELMAN Herman also near 433 Linden.....2904
 ENGLISHY Louise see 112 S 10th or.....7437
 ENGEL Cu 21 S Main.....3000
 ENGEL Frank see 112 S Main.....6919
 ENGEL Frank C see 119 10th.....6919
 ENGEL Frank M see 110 Central see.....6919 W
 ENGEL Harry J see S.....3633P12

All the links are on indexed fields except to PO_STATUS and INVOICE_STATUS, which are too small to count.

The criterion on the INVOICE_STATUS_DESC field from the INVOICE_STATUS table is okay, too.

	INVOICE_STATUS	INVOICE_STATUS_DESC
▶	0	Pending
	1	Approved
	4	Complete
	5	Canceled

Record: 1 of 4

	PO_STATUS	PO_STATUS_DESC
▶	0	Pending
	1	Approved/Sent
	3	Received Partial
	4	Received Complete
	5	Complete
	6	Canceled

Record: 1 of

ANALYSIS

EDSMILLER A G see 145 Central4711
 EISENHARDT W see 17 Thousand6336
 EILERS W see 174 See4731
 EITZINGER see 145 S. Wilbur4306
 EITNER Kenneth F see 153 S. Wilbur7903
 ELDERS W see 15 E. 10th4326
 ELDON Agency 24 W. 10th70
 ELDREDGE Henry G see 112 10th2888
 ELDREDGE Edwin see 24 S. 11th6543W
 ELLIOTT Fred see 112 10th or 21 S. D.2406
 ELLIS Chas 25 10th57
 ELLIOTT see 112 10th1876
 ELLIOTT Roy G see 35 W. 10th7649
 ELLIOTT Lillian see 11 S. Main4253
 ELLISON I see 24 S. 10th374
 ELLSWORTH Chas see 141 W. 10th3380
 ELLSWORTH F B see 112 E. McWilliam3538
 ELY G see 80 S. Main3363
 EMERGENCY Dept 25 Penn7510
 EMERY Mina see B 1. Penn3604F13
 ENGINEER Information Systems Div Penn1683
 ENGLISH Herman see 24 S. 10th2904
 ENTHOFF Loraine see 141 W. 10th7437
 ENGEL Co 24 S. Main3000
 ENGEL Frank see 12 S. Main6979
 ENGEL Frank C see 119 10th6915
 ENGEL Frank H see 110 10th6915
 ENGEL Henry J see 8 S. Main3633F12

BIB_INDEX	BIB_INDEX_BIB_ID_IDX	1	BIB_ID
BIB_INDEX	BIB_INDEX_CODE_NORM_DISP_IDX	1	INDEX_CODE
BIB_INDEX	BIB_INDEX_CODE_NORM_DISP_IDX	2	NORMAL_HEADING
BIB_INDEX	BIB_INDEX_CODE_NORM_DISP_IDX	3	BIB_ID
BIB_INDEX	BIB_INDEX_CODE_NORM_DISP_IDX	4	DISPLAY_HEADING

To use BIB_INDEX to get all titles by an author (100 or 700 fields), specify the INDEX_CODE field as well as the NORMAL_HEADING field.

INDEX_CODE	NORMAL_HEADING
BIB_INDEX	BIB_INDEX
<input type="checkbox"/>	<input type="checkbox"/>
"100H" Or "700H"	"HATCHER WILLIAM S"

0 secs

INDEX_CODE	NORMAL_HEADING
BIB_INDEX	BIB_INDEX
<input type="checkbox"/>	<input type="checkbox"/>
Like "100*" Or Like "700*"	"HATCHER WILLIAM S"

4 secs

NORMAL_HEADING
BIB_INDEX
<input type="checkbox"/>
"HATCHER WILLIAM S"

>5 mins

EXAMPLE #3

EDGEMILLER A G see 145 Central see.....4711
 EISENHOWER see W see 17 Thru.....4838
 EILERS Wm B see 174 See also.....4731
 EISENBERG see Haber see 145 S. Wilson.....4386
 EITNER Kenneth F see 353 S. Wilson.....3961
 EISEN Wm L see 12 S. Wilson.....4328
 ELGAR Agency see W. Wilson.....70
 ELDRIDGE Henry G see 128 S. Wilson.....3888
 ELDRIDGE Edwin see 24 S. Wilson.....6543W
 ELLIOTT Fred see 128 S. Wilson see 20 S. Wilson.....3468
 ELLIS Chas B see Wilson.....57
 ELLIOTT Fred see 128 S. Wilson.....3876
 ELLIOTT Roy G see 36 W. Arnold.....7649
 ELLIOTT Sarah Ann see 12 S. Wilson.....4253
 ELLISON I see 24 S. Wilson.....374
 ELLSWORTH Chas see 121 W. Wilson.....3380
 ELLSWORTH F B see 121 S. Wilson.....3538
 ELY G. The 80 S. Wilson.....3363
 EMERGENCY Head Dept 25 Penna see.....7510
 EMERY Mina see B. 1. P. Wilson.....3604F13
 EMERSON Information Systems Dist. Fla. see.....3683
 ENGELMAN Herman also see 433 S. Wilson.....2904
 ENGLISH Landon see 121 S. Wilson.....7427
 ENGEL C. 24 S. Wilson.....3000
 ENGEL Frank see 12 S. Wilson.....3678
 ENGEL Frank C see 121 S. Wilson.....6815
 ENGEL Frank H see 121 S. Wilson.....3694 W
 ENGEL Henry J see 8 S. Wilson.....3633F12

Items on reserve for an instructor : Select Query

Field:	LAST_NAME	FIRST_NAME	TITLE	ON_RESERVE
Table:	INSTRUCTOR	INSTRUCTOR	BIB_TEXT	ITEM
Sort:			Ascending	
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>
Criteria:	[Instructor last name?]	[Instructor first name?]		"Y"
or:				

Not only does this query not use the normalized last name for its criterion, it also requires the user to enter the names in mixed case.

EXAMPLE #5

Using indexed fields in queries is mostly a matter of common sense, and is not difficult. But it can make a major difference in the speed of queries.



EDGEMILLER A G see 145 Central4711
 EDWARDSHOOT see W see 17 Thru.....6336-8
 EILERS Wm B see 174 See4733
 EITZINGER Roy Peter see 145 S. Wilbur.....4306
 EITNER Kenneth F see 353 S. Millar.....3963
 ELDERS Wm L see 15 E. 10th.....4328
 ELCAR Agency 28 W. 10th.....70
 ELDRIDGE Henry G see 118 10th.....2888
 ELDRIDGE Erwin see 24 S. 11th.....6543W
 ELLIOTT Fred see 118 10th or 31 S. D.....3468
 ELDRIDGE Erwin see 24 S. 11th.....6543W
 ELLIOTT Fred see 118 10th or 31 S. D.....3468
 ELLIOTT Roy G see 38 W. Arden.....7649
 ELLIOTT Larkin 280 see 19 S. Main.....4253
 ELLISON I see 24 S. 10th.....374
 ELLSWORTH Chas see 411 W. 2nd.....3380
 ELLSWORTH F B see 118 E. McWilliam.....3538
 ELY G. The 80 S. Main.....3363
 EMERGENCY Head. Dept. 35 Forest7510
 EMERY Mina see B. 1. Park.....3602-733
 ENGLAND Information Systems the Plains3683
 ENGELAK Herman also see 418 Linden.....2904
 ENTHOFF Loraine see 418 S. Park7437
 ENGEL C. 21 S. Main.....3000
 ENGEL Frank see 12 S. Main.....2979
 ENGEL Frank C see 519 41st.....6815
 ENGEL Frank H see 120 O'Connell6919 W
 ENGEL Harry J see 8 S. Main.....3538-12

SUMMARY