INLS 623 – Assignment 4: Indexing

Software issues:

If you feel there are mistakes in this assignment, check Piazza for corrections, and report them to us if they have not been made.
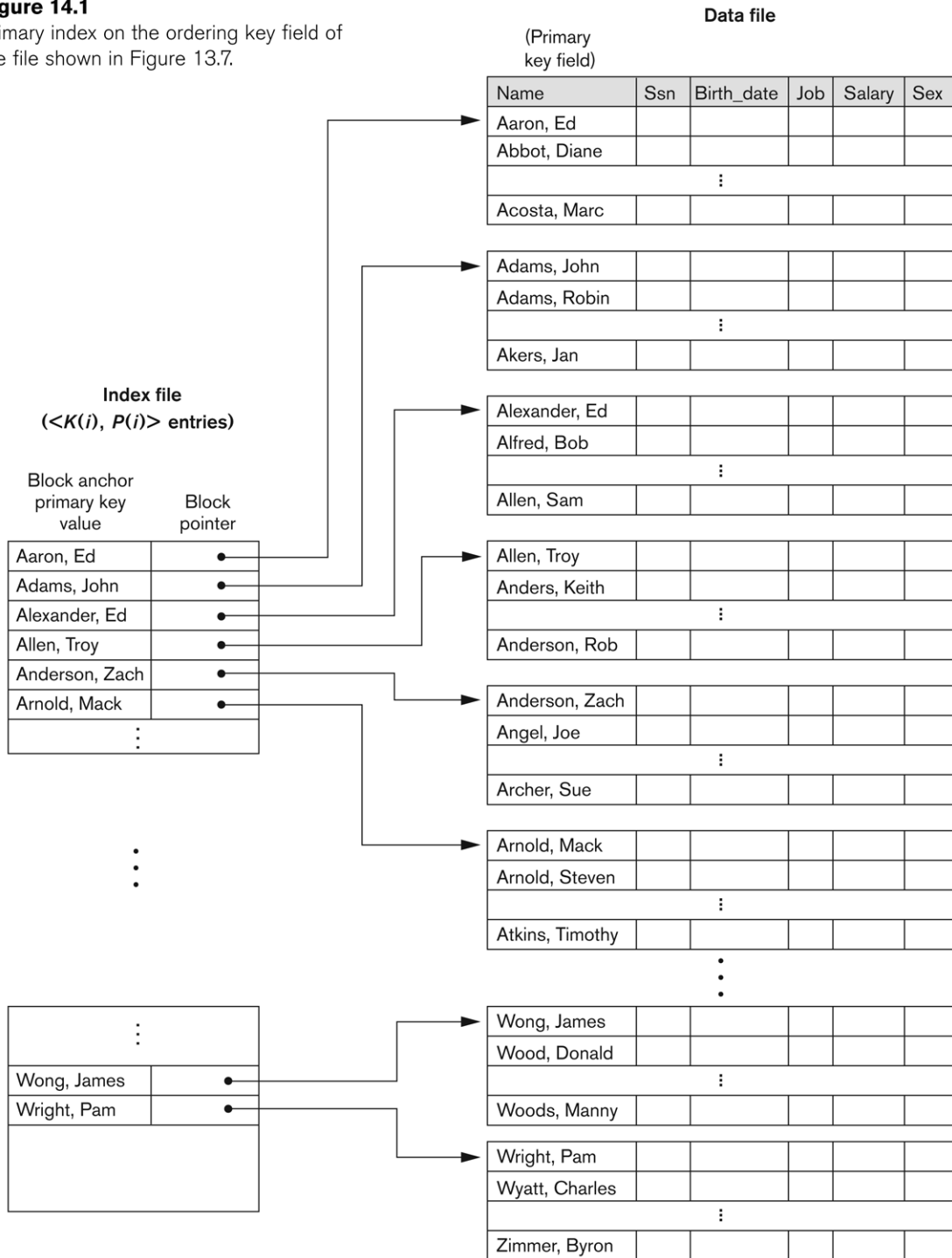
Assignment

Index Data Structures

1. Given Table 1, with the customerNumber column as the **primary key**, illustrate how an index would be stored using a **one-dimensional** array. At a **minimum** the length of the array should be the number of rows shown in the table. Your illustration should be similar to the one in Figure 14.1, except you will replace the following figure with your array and use Table 1. Do not store the columns (customerName, contactLastName, contactFirstName, phone, addressLine1) in the array, only store a block pointer as shown in figure 14.1) The block pointer should point to the correct record. Label your index with numbers. An array index starts with the zero.

customerNumber	customerName	contactLastName	contactFirstName	phone	addressLine1	
112	Signal Gift Stores	King	Jean	7025551838	8489 Strong St.	
114	Australian Collectors, Co.	Ferguson	Peter	03 9520 4555	636 St Kilda Road	
119	La Rochelle Gifts	Labrune	Janine	40.67.8555	67, rue des Cinquante Otages	
121	Baane Mini Imports	Bergulfsen	Jonas	07-98 9555	Erling Skakkes gate 78	
124	Mini Gifts Distributors Ltd.	Nelson	Susan	4155551450	5677 Strong St.	
125	Havel & Zbyszek Co	Piestrzeniewicz	Zbyszek	(26) 642-7555	ul. Filtrowa 68	
128	Blauer See Auto, Co.	Keitel	Roland	+49 69 66 90 2555	Lyonerstr. 34	
129	Mini Wheels Co.	Murphy	Julie	6505555787	5557 North Pendale Street	
131	Land of Toys Inc.	Lee	Kwai	2125557818	897 Long Airport Avenue	
141	Euro+ Shopping Channel	Freyre	Diego	(91) 555 94 44	C/ Moralzarzal, 86	
144	Volvo Model Replicas, Co	Berglund	Christina	0921-12 3555	Berguvsvägen 8	
145	Danish Wholesale Imports	Petersen	Jytte	31 12 3555	Vinbæltet 34	
146	Saveley & Henriot, Co.	Saveley	Mary	78.32.5555	2, rue du Commerce	
148	Dragon Souveniers, Ltd.	Natividad	Eric	+65 221 7555	Bronz Sok.	
151	Muscle Machine Inc	Young	Jeff	2125557413	4092 Furth Circle	
157	Diecast Classics Inc.	Leong	Kelvin	2155551555	7586 Pompton St.	
161	Technics Stores Inc.	Hashimoto	Juri	6505556809	9408 Furth Circle	
166	Handji Gifts& Co	Victorino	Wendy	+65 224 1555	106 Linden Road Sandown	
167	Herkku Gifts	Oeztan	Veysel	+47 2267 3215	Brehmen St. 121	
168	American Souvenirs Inc	Franco	Keith	2035557845	149 Spinnaker Dr.	
169	Porto Imports Co.	de Castro	Isabel	(1) 356-5555	Estrada da saºde n. 58	
171	Daedalus Designs Imports	Rancé	Martine	20.16.1555	184, chaussée de Tournai	

Table 1

Figure 14.1
Primary index on the ordering key field of the file shown in Figure 13.7.

Data file

(Primary key field)

Index file
(<*K*(*i*), *P*(*i*)> entries)

Block anchor primary key value	Block pointer
Aaron, Ed	●
Adams, John	●
Alexander, Ed	●
Allen, Troy	●
Anderson, Zach	●
Arnold, Mack	●
⋮	

| Wong, James | ● |
| Wright, Pam | ● |

Name	Ssn	Birth_date	Job	Salary	Sex
Aaron, Ed					
Abbot, Diane					
⋮					
Acosta, Marc					

Adams, John					
Adams, Robin					
⋮					
Akers, Jan					

Alexander, Ed					
Alfred, Bob					
⋮					
Allen, Sam					

Allen, Troy					
Anders, Keith					
⋮					
Anderson, Rob					

Anderson, Zach					
Angel, Joe					
⋮					
Archer, Sue					

Arnold, Mack					
Arnold, Steven					
⋮					
Atkins, Timothy					

Wong, James					
Wood, Donald					
⋮					
Woods, Manny					

Wright, Pam					
Wyatt, Charles					
⋮					
Zimmer, Byron					

You can answer question one on this page.

2. The following row is inserted into Table 1.

customerNumber	customerName	contactLastName	contactFirstName	phone	addressLine1
142	La Corne D'abondance, Co.	Betrand	Marie	(1) 42.34.2555	265, boulevard Charonne

Draw an array to illustrate the index with this new row. **Remember**, the data must be sorted.

3. Given that the row with customerNumber 142 was inserted into Table 1, list the steps you followed to insert the new row into your array. Your list should consist of things such as adding more elements to the array, moving data from one index in the array to another index, inserting information into a particular index, and/or creating a new array.

4. Given Table 1, with the customerNumber column as the primary key, illustrate how an index would be stored using a hash table/dictionary. Your illustration should be similar to the illustration you drew in question 1, except you should draw a hash table. **Do not include the row inserted in question 3.**

5. The following row is inserted into Table 1.

customerNumber	customerName	contactLastName	contactFirstName	phone	addressLine1
142	La Corne D'abondance, Co.	Betrand	Marie	(1) 42.34.2555	265, boulevard Charonne

Draw a hash table to illustrate the index with this new row. Hash tables are not sorted and they have a key and a value. (You do not have to worry about a hash function).

6. Given that the row with customerNumber 142 was inserted into Data File Table 1, list the steps you followed to insert the new row into your hash table. Your list should consist of things such as creating a key for the row, and storing column names and their values in the hash table.

7. Which data structure, the array or the hash table is better to use for indexing? Your answer to this question should compare inserting and retrieving information into both data structures, and the design decisions made. Design decisions are how you chose to represent the data structure as an index. For example, how you stored the pointer to the data in the array and hash table.

Index Types

1. What is a clustered index?

2. What is a non-clustered/unclustered index?

3.

4. What is the difference between a clustered and non-clustered/unclustered index?

5. What are advantages and disadvantages of a clustered index?

6. What are advantages and disadvantages of a non-clustered/unclustered index?

Getting Help

If you have trouble, please post a question on Piazza before contacting me. Before posing a question, please check if this question has been asked before. This will reduce post clutter and reduce our burden. Repeat questions will be ignored by the instructors.

Piazza allows anyone to respond. So if you see a question that you think you can respond to, please do so, as that will reduce our burden and help you "teach" your fellow students.

Good luck!