INLS 623 – Assignment: Indexing

Date Assigned: October 22, 2015

Completion Date: Thurs. November, 5 2015 (midnight)

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

An index is a data structure that makes finding data faster. They are sorted in ascending order and hold a field value and a pointer to the record the index relates to. Figure 14.1 (below) illustrates an index for a table with the Name column as the primary key. One way to implement an index is using the b tree data structure. However, there are many different types of data structures such as arrays, hash tables/dictionaries, objects, lists, graphs, and different types of trees.

1. Given Data File Table 1, with the customerNumber column as the primary key, illustrate how an index would be stored using an array (one dimensional). 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 Data File Table 1. Make sure you label your index with numbers. An array index starts with the zero.

Index file $(\langle K(i), P(i) \rangle$ entries)

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

Signal Gift Stores Australian Collectors, Co. La Rochelle Gifts Baane Mini Imports Mini Gifts Distributors Ltd. Havel & Zbyszek Co Blauer See Auto, Co. Mini Wheels Co. Land of Toys Inc. Euro+ Shopping Channel	King Ferguson Labrune Bergulfsen Nelson Piestrzeniewicz Keitel Murphy Lee	Jean Peter Janine Jonas Susan Zbyszek Roland Julie Kwai	7025551838 03 9520 4555 40.67.8555 07-98 9555 4155551450 (26) 642-7555 +49 69 66 90 2555 6505555787	8489 Strong St. 636 St Kilda Road 67, rue des Cinquante Otages Erling Skakkes gate 78 5677 Strong St. ul. Filtrowa 68 Lyonerstr. 34 5557 North Pendale Street	1
La Rochelle Gifts Baane Mini Imports Mini Gifts Distributors Ltd. Havel & Zbyszek Co Blauer See Auto, Co. Mini Wheels Co. Land of Toys Inc.	Labrune Bergulfsen Nelson Piestrzeniewicz Keitel Murphy Lee	Janine Jonas Susan Zbyszek Roland Julie	40.67.8555 07-98 9555 4155551450 (26) 642-7555 +49 69 66 90 2555 6505555787	67, rue des Cinquante Otages Erling Skakkes gate 78 5677 Strong St. ul. Filtrowa 68 Lyonerstr. 34	
Baane Mini Imports Mini Gifts Distributors Ltd. Havel & Zbyszek Co Blauer See Auto, Co. Mini Wheels Co. Land of Toys Inc.	Bergulfsen Nelson Piestrzeniewicz Keitel Murphy Lee	Jonas Susan Zbyszek Roland Julie	07-98 9555 4155551450 (26) 642-7555 +49 69 66 90 2555 6505555787	Erling Skakkes gate 78 5677 Strong St. ul. Filtrowa 68 Lyonerstr. 34	
Mini Gifts Distributors Ltd. Havel & Zbyszek Co Blauer See Auto, Co. Mini Wheels Co. Land of Toys Inc.	Nelson Piestrzeniewicz Keitel Murphy Lee	Susan Zbyszek Roland Julie	4155551450 (26) 642-7555 +49 69 66 90 2555 6505555787	5677 Strong St. ul. Filtrowa 68 Lyonerstr. 34	
Havel & Zbyszek Co Blauer See Auto, Co. Mini Wheels Co. Land of Toys Inc.	Piestrzeniewicz Keitel Murphy Lee	Zbyszek Roland Julie	(26) 642-7555 +49 69 66 90 2555 6505555787	ul. Filtrowa 68 Lyonerstr. 34	
Blauer See Auto, Co. Mini Wheels Co. Land of Toys Inc.	Keitel Murphy Lee	Roland Julie	+49 69 66 90 2555 6505555787	Lyonerstr. 34	
Mini Wheels Co. Land of Toys Inc.	Murphy Lee	Julie	6505555787	•	
Land of Toys Inc.	Lee			5557 North Pendale Street	
		Kwai			
Euro+ Shopping Channel		111100	2125557818	897 Long Airport Avenue	
	Freyre	Diego	(91) 555 94 44	C/ Moralzarzal, 86	
Volvo Model Replicas, Co	Berglund	Christina	0921-12 3555	Berguvsvägen 8	
Danish Wholesale Imports	Petersen	Jytte	31 12 3555	VinbÃltet 34	
Saveley & Henriot, Co.	Saveley	Mary	78.32.5555	2, rue du Commerce	
Dragon Souveniers, Ltd.	Natividad	Eric	+65 221 7555	Bronz Sok.	I
Muscle Machine Inc	Young	Jeff	2125557413	4092 Furth Circle	1
Diecast Classics Inc.	Leong	Kelvin	2155551555	7586 Pompton St.	
Technics Stores Inc.	Hashimoto	Juri	6505556809	9408 Furth Circle	
Handji Gifts& Co	Victorino	Wendy	+65 224 1555	106 Linden Road Sandown	:
Herkku Gifts	Oeztan	Veysel	+47 2267 3215	Brehmen St. 121	I
American Souvenirs Inc	Franco	Keith	2035557845	149 Spinnaker Dr.	:
Porto Imports Co.	de Castro	Isabel	(1) 356-5555	Estrada da saúde n. 58	
	PancÃ@	Martine	20.16.1555	184, chaussée de Tournai	
	Diecast Classics Inc. Technics Stores Inc. Handji Gifts& Co Herkku Gifts American Souvenirs Inc Porto Imports Co.	Diecast Classics Inc. Technics Stores Inc. Hashimoto Handji Gifts& Co Victorino Herkku Gifts Oeztan American Souvenirs Inc Porto Imports Co. Leong Hashimoto Victorino Franco de Castro	Diecast Classics Inc. Leong Kelvin Technics Stores Inc. Hashimoto Juri Handji Gifts& Co Victorino Wendy Herkku Gifts Oeztan Veysel American Souvenirs Inc Franco Keith Porto Imports Co. Leong Kelvin Veynel Franco Keith Isabel	Diecast Classics Inc. Leong Kelvin 2155551555 Technics Stores Inc. Hashimoto Juri 6505556809 Handji Gifts& Co Victorino Wendy +65 224 1555 Herkku Gifts Oeztan Veysel +47 2267 3215 American Souvenirs Inc Franco Keith 2035557845 Porto Imports Co. de Castro Isabel (1) 356-5555	Diecast Classics Inc. Leong Kelvin 2155551555 7586 Pompton St. Technics Stores Inc. Hashimoto Juri 6505556809 9408 Furth Circle Handji Gifts& Co Victorino Wendy +65 224 1555 106 Linden Road Sandown Herkku Gifts Oeztan Veysel +47 2267 3215 Brehmen St. 121 American Souvenirs Inc Franco Keith 2035557845 149 Spinnaker Dr. Porto Imports Co. de Castro Isabel (1) 356-5555 Estrada da saðde n. 58

Data File Table 1

Figure 14.1 Data file Primary index on the ordering key field of (Primary the file shown in Figure 13.7. key field) Name Ssn Birth_date Job Salary Sex Aaron, Ed Abbot, Diane ÷ Acosta, Marc Adams, John Adams, Robin ÷ Akers, Jan Index file Alexander, Ed $(\langle K(i), P(i) \rangle$ entries) Alfred, Bob ÷ Block anchor Allen, Sam Block primary key pointer value Aaron, Ed Allen, Troy Adams, John Anders, Keith Alexander, Ed : Allen, Troy Anderson, Rob Anderson, Zach Anderson, Zach Arnold, Mack Angel, Joe ŧ Archer, Sue Arnold, Mack Arnold, Steven ŧ Atkins, Timothy Wong, James Wood, Donald Wong, James ŧ Wright, Pam Woods, Manny Wright, Pam Wyatt, Charles ÷ Zimmer, Byron

2. The following row is inserted into Data File Table 1.

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

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

Draw a hash table to illustrate the index with this new row. Hash tables are not sorted.

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.

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!