Department of Computing

**Hong Kong Polytechnic University**

**Comp 5527 Mobile Computing and Data Management**

**Tutorial Three**

1. In data broadcast, we usually have the following performance metrics:

**The Average Waiting Time for an object (****)** is equal to the half of the broadcast period of the object (). .

**The Overall Average Waiting Time (******)** is equal to the sum of products of the average waiting time for an object and its access probability ().

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**The Overall Average Access Time (******)** is equal to the overall average waiting time plus one. .

Given the following data set, compute the overall average access time in a flat broadcast program.

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Data | 2 | 5 | 8 | 1 | 12 | 15 | 18 | 22 | 25 | 28 | 31 |
| 9 | 6 | 10 | 3 | 13 | 16 | 19 | 23 | 21 | 29 | 32 |
| 26 | 7 | 11 | 4 | 14 | 17 | 20 | 24 | 27 | 30 | 33 |
| Access probability | 4/21 | 1/21 | 1/21 | 1/168 | 1/168 | 1/168 | 1/168 | 1/168 | 1/168 | 1/168 | 1/168 |

1. The regular non-flat broadcast program is an item-based broadcast method which improves the flat broadcast program by taking the access frequency into account. The rationale of it is to schedule the data’s broadcast period according to their access frequencies. Moreover, the copies of a data item should have equal space. Using the data set in question 1, design a data broadcast schedule.
2. Item-based broadcast program is expensive to generate especially when there are many items. The items can be organized into disks called broadcast disks. Organize the data set in question 1 into multiple broadcast disks and design a broadcast schedule for it. (After class exercise)
3. There are different methods to index broadcasting data. Simple indexing associates an index of all data items at the beginning of a file. (1, m) indexing provides *m* copies of the index in the file, interleaved with data items. It has the problem of large overhead on the length of index. Distributed indexing solves this problem by associating relevant index with different data items.



Distributed indexing works as follows: considering two index buckets B and B’, it is enough to replicate just the path from the least common ancestor of B and B’, just before the occurrence of B’, provided we add some additional index information for navigation.

Given the following data items and index, describe how distributed index works. We assume that a client requires a record in bucket 66 and makes the initial probe at data bucket 3.

