**Unit IV-hashing and set**

**Session 1:**

**Time :20 minutes**

**Topic:** Hashing

**Activity:** quiz

**Description:** The question were raised to introduce the concept.

1.How will you find a word in a Dictionary?

2. what is Hashing?

3.What is Hash table?

4. what is data structure used for hashing?

**Time: 20 minutes**

**Topic:** Hash Function

**Activity:** WritingBoard

**Description:Hash function is introduced by writing concept on board.**

The ideal hash table data structure is merely an array of

some fixed size, containing the keys. Typically, a key is a string with

an associated value (for instance, salary information).

hash( char \*key, unsigned int H\_SIZE )

{

unsigned int hash\_val = 0;

/\*1\*/ while( \*key != '\0' )

/\*2\*/ hash\_val += \*key++;

/\*3\*/ return( hash\_val % H\_SIZE );

}

Figure: A simple hash function

**Time: 10 minutes**

**Topic:** Conclusion

**Activity:** Show and tell

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**Website Links:**

1. en.wikipedia.org/wiki/**Hash**\_table‎
2. [www.telerik.com/documents/telerik.../18.%20**Hash**-Tables-and-**Sets**.ppt](http://www.telerik.com/documents/telerik.../18.%20Hash-Tables-and-Sets.ppt)
3. www.cs.princeton.edu/~rs/AlgsDS07/10**Hashing**.pdf‎

**Session 2:**

**Time :10 minutes**

**Topic:** Recap: Hashing

**Activity:** Question and Answers

**Description:** The question were raised to discuss previous concepts.

1.How will you find a word in a Dictionary?

2. what is Hashing?

3.What is Hash table?

4. what is data structure used for hashing?

5. What is hash function?

**Time: 30 minutes**

**Topic:** Separate chaining

**Activity:** Writing Board

**Description:Concept was highlighted on board.**

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The first strategy, commonly known as either open hashing,or separate chaining, is to keep a list of all elements that hash to the same value. For convenience, our lists have headers. This makes the list implementation. If space is tight, it might be preferable to avoid their use. The hashing function is simply hash(x) = x mod 10. (The table size is not prime, but is used here for simplicity.

**Time: 10 minutes**

**Topic:** Conclusion

**Activity:** Puzzle

**Website Links:**

1. www.cse.unt.edu/~rada/CSCE3110/Lectures/Hashing.**ppt**‎
2. www.cs.sfu.ca/CC/225/jmanuch/lec/13-1.**ppt**‎
3. people.cs.clemson.edu/~pargas/courses/cs212/.../**ppt**/12Hashing.**ppt**‎

**Session 3:**

**Time: 20 minutes**

**Topic:** open addressing

**Activity:** Presentation unspoken words

**Description:** Ppt slides were presented.

Closed hashing, also known as open addressing, is an alternative to

resolving collisions with linked lists. In a closed hashing system, if a

collision occurs, alternate cells are tried until an empty cell is

found.

**Time: 20 minutes**

**Topic:** Linear Probing

**Activity:** Presentation and unspoken words

**Description:**

More formally, cells h0(x), h1(x), h2(x), are tried in succession where

hi(x) = (hash(x) + (i)) mod H\_SIZE, with h(0) = 0. The function is the

collision resolution strategy

**Time: 10 minutes**

**Topic:** Conclusion

**Activity:** Recall by keywords

**Description:**

* Collision resolving technique
* Alternate cells are tried
* hi(x) = (hash(x) + (i)) mod H\_SIZE, with h(0) = 0.
* Linear probing’
* Closed hashing

**Website Links:**

1. www.cse.unt.edu/~rada/CSCE3110/Lectures/**Hashing**.**ppt**‎

 2. users.cis.fiu.edu/~taoli/class/COT5407-F09/lecture/**hashing**.**ppt**‎

3. ocw.metu.edu.tr/mod/resource/view.php?id=1439&redirect=1‎

**Session 4:**

**Time: 20 minutes**

**Topic:** Quadratic Probing

**Activity:** Board activity

**Description:**

More formally, cells h0(x), h1(x), h2(x), are tried in succession where hi(x) = (hash(x) + (i)) mod H\_SIZE, with h(0) = 0. The function is the collision resolution strategy. Because all the data goes inside the table, a bigger table is needed for closed hashing than for open hashing.

 **Time: 20 minutes**

**Topic:** Double Hashing

**Activity:** Presentation and Discussion

**Description:**

More formally, cells h0(x), h1(x), h2(x), are tried in succession where hi(x) = (hash(x) + (i)) mod H\_SIZE, with h(0) = 0. The function is the collision resolution strategy. Because all the data goes inside the table, a bigger table is needed for closed hashing than for open hashing.

**Time: 10 minutes**

**Topic:** Conclusion

**Activity:** Learner Led presentation

**Description:learners were allowed to explain the concepts on the board for recapping the concepts.**

**Website Links:**

1. www.cse.unt.edu/~rada/CSCE3110/Lectures/**Hashing**.**ppt**‎

 2. users.cis.fiu.edu/~taoli/class/COT5407-F09/lecture/**hashing**.**ppt**‎

3. ocw.metu.edu.tr/mod/resource/view.php?id=1439&redirect=1‎

**Session 5:**

**Time :20 minutes**

**Topic:** Introduction

**Activity:** Board activity

**Description:** the concept was introduced to the learners.

**Time: 20 minutes**

**Topic:** Rehashing

**Activity:** Analogy

**Description:**

If the table gets too full, the running time for the operations will start taking too long and

inserts might fail for closed hashing with quadratic resolution. This can happen if there

are too many deletions intermixed with insertions.

 A solution, then, is to build another table that is about twice as big (with associated new hash function) and scan down the entire original hash table, computing the new hash value for each (non-deleted) element and inserting it in the new table.

**Time: 10 minutes**

**Topic:** Conclusion

**Activity:** Presentation Unspoken words

Description: Ppt was presented.

**Website Links:**

1. [www.thefreedictionary.com/**rehash**](http://www.thefreedictionary.com/rehash)
2. stackoverflow.com/questions/14276449/**rehashing**-in-hashtable‎
3. en.wikipedia.org/wiki/Double\_hashing‎

**Session 6:**

**Time :05minutes**

**Topic:** Introduction

**Activity:** Brainstorming

**Description:** The concept was introduced to the students by raising questions and recapping about previous topics.

1. What is hashing?

2. What are techniques of hashing?

3. How can we introduce extendible hashing?

**Time: 20 minutes**

**Topic:** Extendible Hashing

**Activity:** Board activity

**Description:**

Each leaf has up to m = 4 elements. It happens that in each leaf the first two

bits are identical; this is indicated by the number in parentheses. To be more

formal, D will represent the number of bits used by the root, which is

sometimes known as the directory.

 The number of entries in the directory is thus 2 powers D. d1 is the number of

leading bits that all the elements of some leaf 1 have in common. d1 will

depend on the particular leaf, and d1 D.

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**Time: 10 minutes**

**Topic:** Conclusion

**Activity:** Board activity

**Website Links:**

1. en.wikipedia.org/wiki/**Extendible**\_**hashing**
2. www.site.uottawa.ca/~lucia/courses/2131-02/lect18.pdf‎
3. zgking.com:8080/home/donghui/.../books/e\_ds\_**extendiblehashing**.pdf‎
4. by D Zhang - ‎[Related articles](https://scholar.google.co.in/scholar?gs_rn=26&gs_ri=psy-ab&pq=rehashing&cp=15&gs_id=25p&xhr=t&bav=on.2,or.r_qf.&bvm=bv.52288139,d.bmk&biw=1024&bih=629&dpr=1&um=1&ie=UTF-8&lr&q=related:t1SyWNOZpAVzkM:scholar.google.com/)
5. cs.kangwon.ac.kr/~ysmoon/courses/2005\_1/.../**Extendible**\_**Hashing**.pdf‎

**Session 7:**

**Time :20 minutes**

**Topic:** Disjoint set ADT

**Activity:** Presentation and Board activity

**Description:** PPt was presented.

**Time: 30 minutes**

**Topic:** Dynamic Equivalence Problem

**Activity:** Presentation and Board activity

**Description:PPt was presented**

Eight elements, initially in different sets

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After union (5, 6)

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After union (7, 8)

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After union (5, 7)

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**Time: 10 minutes**

**Topic:** Conclusion

**Activity:** Recall by keywords

1.disjoint set

2. dynamic equivalence problem

3. find and union operation

4.implicit representation

**Website Links:**

1. en.wikipedia.org/wiki/**Disjoint**-**set**\_data\_structure‎
2. www.cdf.toronto.edu/~csc263h/winter/utm/lectures/**disjointSets**.pdf‎
3. www.cs.sjsu.edu/faculty/lee/cs146/YQLei\_presentation.ppt‎
4. tuvalu.santafe.edu/~aaronc/courses/.../csci5454\_spring2013\_CSL1.pdf‎

**Session 8:**

**Time: 20 minutes**

**Topic:** Introduction

**Activity:** Presentation andUnspoken words

**Description:** PPt was presented

**Time: 20 minutes**

**Topic:** Smart Union Algorithms

**Activity:** Learner Led Presentation

**Description: Learner was facilitated to present the topic.**

**Time: 10 minutes**

**Topic:** Conclusion

**Activity:** Show and tell

Result of union-by-size

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Result of union-by-height

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**Website Links:**

1. en.wikipedia.org/wiki/**Disjoint**-**set**\_data\_structure‎
2. www.cdf.toronto.edu/~csc263h/winter/utm/lectures/**disjointSets**.pdf‎
3. www.cs.sjsu.edu/faculty/lee/cs146/YQLei\_presentation.ppt‎
4. tuvalu.santafe.edu/~aaronc/courses/.../csci5454\_spring2013\_CSL1.pdf‎

**Session 9:**

**Time :20 minutes**

**Topic:** Path compression

**Activity:** Writing Board

**Description:** concept was explained on the board.

Path compression is performed during a find operation and is independent of the strategy used to perform unions. Suppose the operation is find(x). Then the effect of path compression is that every node on the path from x to the root has its parent changed to the root.



**Time: 20 minutes**

**Topic:** Application of Sets

**Activity:** Writing Board

**Description: the points were highlighted on the board**

We have a network of computers and a list of bidirectional connections; each of these connections allows a file transfer from one computer to another. An extra restriction is that the problem must be solved on-line. Thus, the list of connections is presented one at a time, and the algorithm must be prepared to give an answer at any point.

**Time: 10 minutes**

**Topic:** Conclusion

**Activity:** Recall by keywords

1. **Compressing paths**
2. **Parent changed to root**
3. **Networks**
4. **Bidirectional connection**

**Website Links:**

1. courses.cs.washington.edu/courses/cse326/00wi/handouts/.../sld035.htm‎
2. web.njit.edu/~leung/cis435dl/topic12.pdf‎