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DAA Assignment 2

* Aim: Write a program to solve optimal storage problem using greedy approach.

* Theory:

Optimal Storage Problem:

- Given n programs stored on a computer tape and length of each program is l_i or L_i where $1 <= i <= n$, find the order in which programs should be stored on the tape for which mean retrieval time is minimum.

- A magnetic tape provides only sequential access of data. In an audio tape/cassette, the 5th song can't be directly played. The length of the first 4 songs must be traversed to play the 5th song. So to access certain data, head of the type should be positioned accordingly.

Example: n = 3

L[] = {5, 3, 10}

Order should be {3, 5, 10}

MRT = 29/3

Mean Retrieval Time

- Retrieval time of the data is the time taken to retrieve / access that data in its entirety.

- Considering that all programs in a magnetic tape are retrieved equally often and the type head points to the front of the head a new term can be defined called as Mean Retrieval Time (MRT)

$$MRT = \frac{1}{n} \sum_{i=1}^{n} \sum_{j=1}^{i} L_j$$

Example: Suppose there are 3 programs of lengths 2, 5, 4 respectively. So there $3! = 6$ possible orders of storage.

no	order	TRT	MRT
1	123	20	20/3
2	132	19	19/3
3	213	23	23/3
4	231	25	25/3
5	312	21	21/3
6	321	24	24/3

Algorithm

Input: No of files / programs n, their lengths, no of tapes m

Output: Storage of files to particular tape so that MRT is minimum

Algorithm of storage (n, m)

```
{
    Sort files in ascending order of length

    k = 0

    for i=1 to n do

    {
        write (i,k);
        k = (k+1) mod m;
    }
}
```

* Conclusion: Optimal storage on tapes problem using Gereedy approach has been understood & implemented successfully.