Linear Search in an array

CS10003 PROGRAMMING AND DATA STRUCTURES

Searching

Check if a given element (called key) occurs in the array.

- Example: array of student records; rollno can be the key.

Two methods to be discussed:

a) If the array elements are unsorted.
   - Linear search

b) If the array elements are sorted.
   - Binary search

Basic Concept of Linear Search

Basic idea

- Start at the beginning of the array.
- Inspect elements one by one to see if it matches the key.
- If a match is found, return the array index where the match was found.
- If no match is found, a special value is returned (like –1).

Linear Search (contd.)

Function `linear_search` returns the array index where a match is found.

It returns –1 if there is no match.

```
int linear_search (int a[], int size, int key)
{
    int pos = 0;
    while ((pos < size) && (key != a[pos]))
       pos++;
    if (pos < size)
       return pos;              /* Return the position of match */
    return -1;                  /* No match found */
}
```

Time Complexity of Linear Search

A measure of how many basic operations an algorithm needs to perform before terminating.

Example of basic operation: match / compare two elements.

- If there are *n* elements in the array:
  - Best case:
    match found in first element (1 search operation)
  - Worst case:
    no match found, or match found in the last element (n search operations)
  - Average case: (n + 1) / 2 search operations