***Inventory Management System:***

Add Product: O(1) – Constant time complexity for insertion in a hash table.

Update Product: O(1) – Constant time complexity for updating an entry in a hash table.

Delete Product: O(1) – Constant time complexity for deletion in a hash table.

***Search Functionality:***

Linear Search:

Best Case: O(1) – Instant find if the target is the first element.

Average Case: O(n) – Linear time as it might need to search through half of the elements on average.

Worst Case: O(n) – Linear time if the target is the last element or not found.

Binary Search:

Best Case: O(1) – Instant find if the target is the middle element.

Average Case: O(log n) – Logarithmic time due to repeated halving of the search interval.

Worst Case: O(log n) – Logarithmic time if the target is not present and the entire search interval is processed.

**Order Sorting:**

Bubble Sort:

Best Case: O(n) – Linear time if the array is already sorted.

Average Case: O(n^2) – Quadratic time due to nested loops for comparison.

Worst Case: O(n^2) – Quadratic time if the array is sorted in reverse order.

Quick Sort:

Best Case: O(n log n) – Log-linear time when the pivot divides the array into nearly equal halves.

Average Case: O(n log n) – Log-linear time on average with good pivot selection.

Worst Case: O(n^2) – Quadratic time if the pivot selection is poor, though this can be mitigated.

**Employee Management System:**

Add Employee: O(1) – Constant time for adding an employee at the next available position.

Search Employee: O(n) – Linear time to check each employee in the worst case.

Traverse Employees: O(n) – Linear time to visit each employee once.

Delete Employee: O(n) – Linear time to find and delete the employee in the worst case.

***Task Management System:***

Add Task: O(1) – Constant time for inserting a task at the beginning.

Search Task: O(n) – Linear time to find a task in the worst case.

Traverse Tasks: O(n) – Linear time to visit each task node.

Delete Task: O(n) – Linear time to locate and delete a task in the worst case.

***Library Management System:***

Linear Search:

Best Case: O(1) – Constant time if the desired book is the first one checked.

Average Case: O(n) – Linear time as it may check half of the books on average.

Worst Case: O(n) – Linear time if the book is the last one or not present.

Binary Search:

Best Case: O(1) – Constant time if the desired book is in the middle.

Average Case: O(log n) – Logarithmic time due to repeated halving of the search range.

Worst Case: O(log n) – Logarithmic time if the book is found after several halving steps.

**7.Financial Forecasting Tools:**

Time Complexity of Recursive Method: O(n) – Linear time as each call processes one period at a time.