DSA GROUP PROJECT: Phonebook Application

1. Modules

- **Insert contact**: Adds a new contact to the phonebook.
- **Search contact**: Searches for a contact by name or number.
- **Display contacts**: Displays all contacts in the phonebook.
- **Delete contact**: Deletes a contact by name or number.
- **Update contact**: Updates an existing contact's details.
- **Sort contacts**: Sorts contacts for optimized search.
- **Analyze search efficiency**: Analyzes the time complexity of the search algorithm.

2. Functions

Insert contact (phonebook, name, number):

- **Input**: phonebook (list or array), name (string), number (string)
- **Functionality**: Adds a new contact (name and number) to the phonebook.

Search contact (phonebook, search term):

- **Input**: phonebook (list or array), search term (string)
- **Functionality**: Searches for the contact using a linear search or binary search (if sorted).

Display contacts (phonebook):

- **Input**: phonebook (list or array)
- **Functionality**: Displays all contacts stored in the phonebook in a user-friendly format.

Delete contact (phonebook, name):

- **Input**: phonebook (list or array), name (string)
- **Functionality**: Removes the contact that matches the given name.

Update contact (phonebook, name, new number):

- **Input**: phonebook (list or array), name (string), new number (string)
- **Functionality**: Updates the number for a contact identified by the name.

Sort contacts (phonebook):

- **Input**: phonebook (list or array)
- **Functionality**: Sorts the contacts alphabetically by name to optimize searching.

Analyze search efficiency (phonebook, search term):

- **Input**: phonebook (list or array), search term (string)

- **Functionality**: Analyzes and prints the time complexity of search for linear vs. binary search.

3. Pseudocode

Insert contact:

Function insert_contact (phonebook, name, number):

    Create new contact as {name: name, number: number}

    Append new contact to phonebook

    End

Search contact:

Function search_contact (phonebook, search_term):

    For each contact in phonebook:

        If contact name or number matches search_term:

            Return contact

        End If

    End For

    If no contact found:

        Return "Contact not found"

    End

Display contacts:

Function display_contacts (phonebook):

    If phonebook is empty:

        Print "No contacts available"

    Else:

        For each contact in phonebook:

Print contact name and number

 End For

 End

Delete contact:

Function delete_contact(phonebook, name):

 For each contact in phonebook:

  If contact name matches name:

   Remove contact from phonebook

   Return "Contact deleted"

  End If

 End For

 Return "Contact not found"

 End

Update contacts:

Function update_contact (phonebook, name, new_number):

 For each contact in phonebook:

  If contact name matches name:

   Update contact number with new_number

   Return "Contact updated"

  End If

 End For

 Return "Contact not found"

 End

Sort contacts:

Function sort_contacts (phonebook):

 Sort phonebook by contact name alphabetically

 End

Analyze search efficiency:

Function analyze_search_efficiency (phonebook, search_term):

   If phonebook is sorted:

      Perform binary search and calculate time complexity

   Else:

      Perform linear search and calculate time complexity

   End

   Print time complexity for the search

   End

4. FLOWCHART