<u>Phonebook Class</u>

- Attributes:
    - contacts : A list of contacts.

Methods:

1. Phonebook Constructor
    - Initialize contacts as an empty list.

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2. insertContact(name, phone)
    - Create a new contact with the given name and phone.
    - Add the new contact to the list contacts.
    - Show a message: "Contact [name] added."

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3. searchContact(name)
    - For each contact in contacts:
        - If the contact’s name matches the given name (case-insensitive):
            - Return the contact.
    - If no contact is found, return null.

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4. deleteContact(name)
    - Initialize toRemove as null.
    - For each contact in contacts:
        - If the contact’s name matches the given name (case-insensitive):
            - Assign the contact to toRemove.
            - Break out of the loop.
    - If toRemove is not null, remove the contact from contacts.
        - Show a message: "Contact [name] deleted."

    - Otherwise, show a message: "Contact [name] not found."

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5. updateContact(name, newName, newPhone)
    - For each contact in contacts:
        - If the contact’s name matches the given name (case-insensitive):
            - If newName is not empty or null, update the contact's name.
            - If newPhone is not empty or null, update the contact's phone number.
            - Show a message: "Contact [name] updated."
            - Exit the method.
    - If no matching contact is found, show a message: "Contact [name] not found."

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6. getContacts()
    - Return the list of contacts.

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7. sortContacts()
    - Sort contacts alphabetically by the contact name.
    - Show a message: "Contacts sorted."

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8. analyzeSearchEfficiency()
    - Return the string: "The search operation is O(n), where n is the number of contacts."

The Contact class is a simple data structure to hold the contact's name and phone number. Here's the breakdown in pseudocode:

<u>Contact Class</u>

- **Attributes:**
    - name: The contact's name.
    - phone: The contact's phone number.

Methods:

1. **Contact Constructor (name, phone)**
    - Set the name attribute to the given name.
    - Set the phone attribute to the given phone.

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2. **toString()**
    - Return a string in the format: [name]: [phone].

PhonebookApp Class (extends JFrame)

- **Attributes:**
    - phonebook: Instance of Phonebook class to store contacts.
    - displayArea: A text area to display the list of contacts.

Constructor: PhonebookApp()

1. Initialize the phonebook object.
2. Set up the application window:
    - Title: "Phonebook Application"
    - Size: 400x400 pixels
    - Default close operation: EXIT_ON_CLOSE
    - Layout: BorderLayout
3. **Set the background color of the app to aqua.**
4. **Title Panel:**
    - Create a title panel with the text "Namibian Phonebook" centered.
    - Set background color and font styling.

    - Add the title panel to the top of the window.

5. **Display Area:**
    - Create a non-editable text area to display contacts.
    - Set font and background styling.
    - Add a scroll pane to the center of the window containing the text area.
6. **Button Panel:**
    - Create a grid layout for the buttons (two columns, dynamic rows).
    - Add space around the panel using padding.

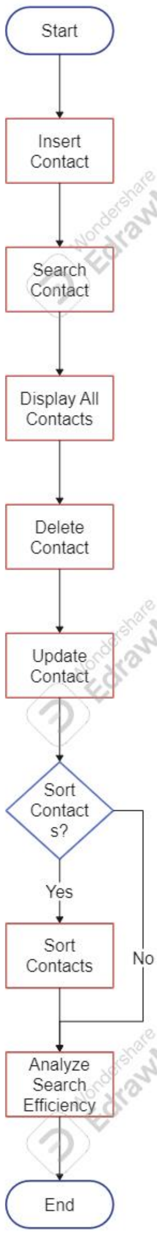
Buttons and Actions:

- **Insert Contact:**
    - Show dialogs to input contact name and phone number.
    - Insert the contact into the phonebook.
- **Search Contact:**
    - Show a dialog to input the name to search.
    - Display the contact if found, or show "Contact not found."
- **Display All Contacts:**
    - Clear the display area.
    - Retrieve all contacts from the phonebook.
    - If the phonebook is empty, display "Phonebook is empty."
    - Otherwise, display each contact.
- **Delete Contact:**
    - Show a dialog to input the name of the contact to delete.
    - Remove the contact from the phonebook.
- **Update Contact:**
    - Show dialogs to input the name of the contact to update.
    - Optionally enter a new name or phone number (leave empty to keep unchanged).

- **Sort Contacts:**
    - Sort the contacts alphabetically by name.
- **Analyze Efficiency:**
    - Display the search efficiency analysis (O(n)).

Main Method

- Use SwingUtilities.invokeLater to ensure the app's GUI is created on the Event Dispatch Thread (EDT).
- Create an instance of PhonebookApp and make it visible.



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