STRUCTURE Contact

STRING name

STRING phoneNumber

END STRUCTURE

DECLARE phonebook AS List of Contacts

FUNCTION Main

INITIALIZE phonebook as an empty list

WHILE (true) DO

DISPLAY "Phonebook Menu:"

DISPLAY "1. Insert Contact"

DISPLAY "2. Search Contact"

DISPLAY "3. Display All Contacts"

DISPLAY "4. Delete Contact"

DISPLAY "5. Update Contact"

DISPLAY "6. Sort Contacts"

DISPLAY "7. Analyze Search Efficiency"

DISPLAY "8. Exit"

DISPLAY "Choose an option:"

GET option

IF (option==1) THEN

DISPLAY "Enter name:"

GET name

DISPLAY "Enter phone number:"

GET phoneNumber

CALL InsertContact(phonebook, name, phoneNumber)

ELSE IF (option==2) THEN

DISPLAY "Enter name to search:"

GET name

result = CALL SearchContact(phonebook, name)

IF (result != null) THEN

DISPLAY "Contact found: Name =", result.name, ", Phone Number =", result.phoneNumber

ELSE

DISPLAY "Contact not found"

END IF

ELSE IF (option==3) THEN

CALL DisplayAllContacts(phonebook)

ELSE IF (option==4) THEN

DISPLAY "Enter name to delete:"

GET name

CALL DeleteContact(phonebook, name)

ELSE IF (option==5) THEN

DISPLAY "Enter name to update:"

GET name

DISPLAY "Enter new phone number:"

GET newPhoneNumber

CALL UpdateContact(phonebook, name, newPhoneNumber)

ELSE IF (option==6) THEN

CALL SortContacts(phonebook)

ELSE IF (option==7) THEN

CALL AnalyzeSearchEfficiency()

ELSE IF (option==8) THEN

DISPLAY "Exiting..."

ELSE

DISPLAY "Invalid option, please try again."

END IF

END WHILE

END FUNCTION

FUNCTION InsertContact(phonebook, name, phoneNumber)

DECLARE newContact AS Contact

newContact.name = name

newContact.phoneNumber = phoneNumber

ADD newContact TO phonebook

DISPLAY "Contact added:", name

END FUNCTION

FUNCTION SearchContact(phonebook, name) RETURNS Contact

FOR EACH contact IN phonebook DO

IF (contact.name == name) THEN

RETURN contact

END IF

END FOR

RETURN null

END FUNCTION

FUNCTION DisplayAllContacts(phonebook)

THEN

DISPLAY "Phonebook is empty."

ELSE

FOR EACH contact IN phonebook DO

DISPLAY "Name:", contact.name, ", Phone Number:", contact.phoneNumber

END FOR

END IF

END FUNCTION

FUNCTION DeleteContact(phonebook, name)

DECLARE contactToRemove AS Contact

contactToRemove = CALL SearchContact(phonebook, name)

IF (contactToRemove != null) THEN

REMOVE contactToRemove FROM phonebook

DISPLAY "Contact deleted:", name

ELSE

DISPLAY "Contact not found."

END IF

END FUNCTION

FUNCTION UpdateContact(phonebook, name, newPhoneNumber)

DECLARE contactToUpdate AS Contact

contactToUpdate = CALL SearchContact(phonebook, name)

IF (contactToUpdate != null) THEN

contactToUpdate.phoneNumber = newPhoneNumber

DISPLAY "Contact updated:", name

ELSE

DISPLAY "Contact not found."

END IF

END FUNCTION

FUNCTION SortContacts(phonebook)

SORT(phonebook, contact.name)

DISPLAY "Contacts sorted."

END FUNCTION

FUNCTION AnalyzeSearchEfficiency()

DISPLAY "Search Time Complexity: O(n)"

END FUNCTION