
CS19003 : Programming and Data Structures Laboratory

Assignment 7 : Structures in C

Date: 15-Jun-2021

Problem Statement:

After a detailed interrogation of the potential suspects on the murder case over past several weeks, Detective Bakshi asked Police to arrest some of these criminals and put them into the bars, as per the evidences found while the interrogations were made. However, due to the elongated process of investigation, different suspects are arrested on different dates and also shifted to different places (police stations) at varied locations. The reason behind such a choice of distributing the suspects under various P.S. (police stations) is that – (a) the security can be strengthened for each of them, and (b) the court will take over the cases in a fast manner operating in a distributed way, rather than stacking all cases of these suspects to run under one local court. Now, Police Headquarters used to maintain the criminal records in a written ledger and they update that manually. Now, due to sudden spike in the number of suspects and their inclusion and release after interrogation in this murder case, Police authority now needs to create and maintain a structured computerized database for this.

Can you help them to create a Criminal Record Database with suitable access mechanisms by automating the same through C-program? In particular, your program will do the following:

- First, create the following structures in your program:
 - a structure for storing the **date**, containing day, month and year details (all as integers),
 - a structure for storing the **address**, containing place (city or town), district, state (all as strings) and the pincode (as a 6 character string).
 - a structure to store **criminal** details, containing name (as a string), date of birth (under **date** structure), gender (as a character, M=male, F=female, O=others), height (as real value in cm), residential address (under **address** structure), crime information (as a character, M=murder, T=theft, R=robbery, A=anti-social, O=others), date of arrest (under **date** structure), police station (P.S.) and court location (both as separate strings) and address of the P.S. (under **address** structure).

You may define an array of **criminal** structures to keep the information of various criminals together.

- Your program shall show a menu containing 5 options and shall ask user to enter one choice (a, b, c, d, e). Any other invalid choice will flag a warning to the user and allows them to re-enter their choice. The menu items and operations to be performed upon entering each of the choices are described below.
 - (a) **Add Criminal Record.** Selecting this option will prompt the user to enter a criminal details (name, DOB, gender, height, residence, crime information, arrest-date, P.S. location, court location and P.S. address where being arrested). Note that, the dates may be added in DD/MM/YYYY format. This will add as an entry in the array of structures storing the information of the criminals and then organize the array by sorting the details as per criminal name (in lexicographical ascending order of names). You may use *insertion sort* to sort the data after each new addition/insertion in the record database. Finally, the original menu containing the 5 options will be displayed.
 - (b) **Delete Criminal Record.** Selecting this option will prompt the user to enter the details of a criminal (name, committed crime information, arrest date and P.S. location where arrested) to delete/release. It will remove the the corresponding entry from the array of structures storing the information of the criminals. Then, it will print the deleted criminal record and shift the remaining entry filling the deleted spot to make the array contiguous again with a decrease in the total number of criminals under the database. Additionally, it will prompt 'No Records Found' message if either the corresponding criminal information provided does not match with any entry, or there are no entry left there to be deleted. Finally, the original menu containing the 5 options will be displayed.
 - (c) **Search Criminal Record.** Selecting this option will prompt the user to enter the name of a criminal. Then, it will perform a *linear search* in the record/database of all the criminals to find all possible entries those which match with the provided name. Then, it will print all the matching records. Additionally, it will prompt 'No Records Found' message if either the corresponding criminal information provided does not match with any entry, or there are no entry left there to be searched. Finally, the original menu containing the 5 options will be displayed.
 - (d) **Print Criminal Record.** Selecting this option will print all the criminal details (with name, DOB, gender, height, residence, crime information, arrest-date, P.S. location, court location and P.S. address where being arrested) present in the database in a formatted manner. Finally, the original menu containing the 5 options will be displayed.
 - (e) **Exit.** Selecting this option will terminate the program with a 'Thank You' message.

Example Execution Details:

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++++ !! Welcome to Confidential Criminal Database !! ++++
-- Database Operation Menu:
  (a) Add Criminal Record,
  (b) Delete Criminal Record,
  (c) Search Criminal Record,
  (d) Print Criminal Record,
  (e) Exit.
-- Enter your Choice: a

++ Add Criminal Information ++
  -- Enter Criminal Name: Md. Muftasar Alam
  -- Enter Date of Birth (in DD/MM/YYYY Format): 17/8/1980
  -- Enter Gender (M=male, F=female, O=others): M
  -- Enter Height (in cm): 167.5
  -- Enter Residence (in Place District State PIN Format): Nodarma Vistara Talinda 123456
  -- Enter Committed Crime (M=murder, T=theft, R=robbery, A=anti-social, O=others): M
  -- Enter Date of Arrest (in DD/MM/YYYY Format): 14/12/2019
  -- Enter Police Station Name: Kodiana
  -- Enter Jurisdiction Court Name: Jamuas
  -- Enter P.S. Address (in Place District State PIN Format): Kodiana Rubedia Talinda 123654

++++ !! Welcome to Confidential Criminal Database !! ++++
-- Database Operation Menu:
  (a) Add Criminal Record,
  (b) Delete Criminal Record,
  (c) Search Criminal Record,
  (d) Print Criminal Record,
  (e) Exit.
-- Enter your Choice: a

++ Add Criminal Information ++
  -- Enter Criminal Name: Jupitar Midahansi
  -- Enter Date of Birth (in DD/MM/YYYY Format): 14/2/1976
  -- Enter Gender (M=male, F=female, O=others): O
  -- Enter Height (in cm): 165
  -- Enter Residence (in Place District State PIN Format): Gogolia Ramich Docutar 321123
  -- Enter Committed Crime (M=murder, T=theft, R=robbery, A=anti-social, O=others): A
  -- Enter Date of Arrest (in DD/MM/YYYY Format): 23/8/2020
  -- Enter Police Station Name: Saturnia
  -- Enter Jurisdiction Court Name: Saturnia
  -- Enter P.S. Address (in Place District State PIN Format): Saturnia Worldivilla Earthonia 654321

++++ !! Welcome to Confidential Criminal Database !! ++++
-- Database Operation Menu:
  (a) Add Criminal Record,
  (b) Delete Criminal Record,
  (c) Search Criminal Record,
  (d) Print Criminal Record,
  (e) Exit.
-- Enter your Choice: a

++ Add Criminal Information ++
  -- Enter Criminal Name: Kojhi Subbana
  -- Enter Date of Birth (in DD/MM/YYYY Format): 6/1/1987
  -- Enter Gender (M=male, F=female, O=others): F
  -- Enter Height (in cm): 155.6
  -- Enter Residence (in Place District State PIN Format): Sumukta Luvapur Badampahar 987654
  -- Enter Committed Crime (M=murder, T=theft, R=robbery, A=anti-social, O=others): T
  -- Enter Date of Arrest (in DD/MM/YYYY Format): 15/11/2018
  -- Enter Police Station Name: Luvapur
  -- Enter Jurisdiction Court Name: Luvapur HC
  -- Enter P.S. Address (in Place District State PIN Format): Luvapur Luvapur Badampahar 987645

++++ !! Welcome to Confidential Criminal Database !! ++++
-- Database Operation Menu:
  (a) Add Criminal Record,
  (b) Delete Criminal Record,
  (c) Search Criminal Record,
  (d) Print Criminal Record,
  (e) Exit.
-- Enter your Choice: a

++ Add Criminal Information ++
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-- Enter Criminal Name: Almohan Fernandesi
-- Enter Date of Birth (in DD/MM/YYYY Format): 28/2/1984
-- Enter Gender (M=male, F=female, O=others): M
-- Enter Height (in cm): 179.4
-- Enter Residence (in Place District State PIN Format): Tribenia Mukulsolang Nainavedi 666666
-- Enter Committed Crime (M=murder, T=theft, R=robbery, A=anti-social, O=others): R
-- Enter Date of Arrest (in DD/MM/YYYY Format): 19/1/2021
-- Enter Police Station Name: Pukuska
-- Enter Jurisdiction Court Name: Katula
-- Enter P.S. Address (in Place District State PIN Format): Pukuska Katula Gogolia 333333

++++ !! Welcome to Confidential Criminal Database !! +++++
-- Database Operation Menu:
  (a) Add Criminal Record,
  (b) Delete Criminal Record,
  (c) Search Criminal Record,
  (d) Print Criminal Record,
  (e) Exit.
-- Enter your Choice: d

++ Print Criminal Information ++
== Criminal No. 1 ==
  ** Name: Almohan Fernandesi
  ** Date of Birth: 28/2/1984
  ** Gender: Male
  ** Height: 179.400000 cm
  ** Residential Address: Tribenia, Mukulsolang, Nainavedi, PIN - 666666.
  ** Committed Crime: Robbery
  ** Date of Arrest: 19/1/2021
  ** Police Station Name: Pukuska
  ** Jurisdiction Court Name: Katula
  ** P.S. Address: Pukuska, Katula, Gogolia, PIN - 333333.
== Criminal No. 2 ==
  ** Name: Jupitar Midahansi
  ** Date of Birth: 14/2/1976
  ** Gender: Others
  ** Height: 165.000000 cm
  ** Residential Address: Gogolia, Ramich, Docutar, PIN - 321123.
  ** Committed Crime: Anti-social Activity
  ** Date of Arrest: 23/8/2020
  ** Police Station Name: Saturnia
  ** Jurisdiction Court Name: Saturnia
  ** P.S. Address: Saturnia, Worldivilla, Earthonia, PIN - 654321.
== Criminal No. 3 ==
  ** Name: Kojhi Subbana
  ** Date of Birth: 6/1/1987
  ** Gender: Female
  ** Height: 155.600000 cm
  ** Residential Address: Sumukta, Luvapur, Badampahar, PIN - 987654.
  ** Committed Crime: Theft
  ** Date of Arrest: 15/11/2018
  ** Police Station Name: Luvapur
  ** Jurisdiction Court Name: Luvapur HC
  ** P.S. Address: Luvapur, Luvapur, Badampahar, PIN - 987645.
== Criminal No. 4 ==
  ** Name: Md. Muftasar Alam
  ** Date of Birth: 17/8/1980
  ** Gender: Male
  ** Height: 167.500000 cm
  ** Residential Address: Nodarma, Vistara, Talinda, PIN - 123456.
  ** Committed Crime: Murder
  ** Date of Arrest: 14/12/2019
  ** Police Station Name: Kodiana
  ** Jurisdiction Court Name: Jamuas
  ** P.S. Address: Kodiana, Rubedia, Talinda, PIN - 123654.

++++ !! Welcome to Confidential Criminal Database !! +++++
-- Database Operation Menu:
  (a) Add Criminal Record,
  (b) Delete Criminal Record,
  (c) Search Criminal Record,
  (d) Print Criminal Record,
  (e) Exit.
-- Enter your Choice: c

++ Search Criminal Information ++

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-- Enter Criminal Name: Jupitar Midahansi
~~ Searched Record Details ~~
== Criminal No. 2 ==
** Name: Jupitar Midahansi
** Date of Birth: 14/2/1976
** Gender: Others
** Height: 165.000000 cm
** Residential Address: Gogolia, Ramich, Docutar, PIN - 321123.
** Committed Crime: Anti-social Activity
** Date of Arrest: 23/8/2020
** Police Station Name: Saturnia
** Jurisdiction Court Name: Saturnia
** P.S. Address: Saturnia, Worldivilla, Earthonia, PIN - 654321.

++++ !! Welcome to Confidential Criminal Database !! +++++
-- Database Operation Menu:
  (a) Add Criminal Record,
  (b) Delete Criminal Record,
  (c) Search Criminal Record,
  (d) Print Criminal Record,
  (e) Exit.
-- Enter your Choice: b

++ Delete Criminal Information ++
-- Criminal Name: Almohan Fernandes
-- Committed Crime (M=murder, T=theft, R=robbery, A=anti-social, O=others): R
-- Date of Arrest (in DD/MM/YYYY Format): 19/1/2021
-- Police Station Name: Pukuska
~~ Deleted Record Details ~~
== Criminal No. 1 ==
** Name: Almohan Fernandes
** Date of Birth: 28/2/1984
** Gender: Male
** Height: 179.400000 cm
** Residential Address: Tribenia, Mukulsolang, Nainavedi, PIN - 666666.
** Committed Crime: Robbery
** Date of Arrest: 19/1/2021
** Police Station Name: Pukuska
** Jurisdiction Court Name: Katula
** P.S. Address: Pukuska, Katula, Gogolia, PIN - 333333.

++++ !! Welcome to Confidential Criminal Database !! +++++
-- Database Operation Menu:
  (a) Add Criminal Record,
  (b) Delete Criminal Record,
  (c) Search Criminal Record,
  (d) Print Criminal Record,
  (e) Exit.
-- Enter your Choice: c

++ Search Criminal Information ++
-- Enter Criminal Name: Almohan Fernandes
~~ Searched Record Details ~~
** NO Such Record Found!

++++ !! Welcome to Confidential Criminal Database !! +++++
-- Database Operation Menu:
  (a) Add Criminal Record,
  (b) Delete Criminal Record,
  (c) Search Criminal Record,
  (d) Print Criminal Record,
  (e) Exit.
-- Enter your Choice: c

++ Search Criminal Information ++
-- Enter Criminal Name: Rubina Parkaza
~~ Searched Record Details ~~
** NO Such Record Found!

++++ !! Welcome to Confidential Criminal Database !! +++++
-- Database Operation Menu:
  (a) Add Criminal Record,
  (b) Delete Criminal Record,
  (c) Search Criminal Record,
  (d) Print Criminal Record,
  (e) Exit.

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-- Enter your Choice: b

++ Delete Criminal Information ++
-- Criminal Name: Md. Muftasar Alam
-- Committed Crime (M=murder, T=theft, R=robbery, A=anti-social, O=others): M
-- Date of Arrest (in DD/MM/YYYY Format): 14/12/2019
-- Police Station Name: Kodiana
~~ Deleted Record Details ~~
== Criminal No. 3 ==
** Name: Md. Muftasar Alam
** Date of Birth: 17/8/1980
** Gender: Male
** Height: 167.500000 cm
** Residential Address: Nodarma, Vistara, Talinda, PIN - 123456.
** Committed Crime: Murder
** Date of Arrest: 14/12/2019
** Police Station Name: Kodiana
** Jurisdiction Court Name: Jamuas
** P.S. Address: Kodiana, Rubedia, Talinda, PIN - 123654.

++++ !! Welcome to Confidential Criminal Database !! +++++
-- Database Operation Menu:
(a) Add Criminal Record,
(b) Delete Criminal Record,
(c) Search Criminal Record,
(d) Print Criminal Record,
(e) Exit.
-- Enter your Choice: d

++ Print Criminal Information ++
== Criminal No. 1 ==
** Name: Jupitar Midahansi
** Date of Birth: 14/2/1976
** Gender: Others
** Height: 165.000000 cm
** Residential Address: Gogolia, Ramich, Docutar, PIN - 321123.
** Committed Crime: Anti-social Activity
** Date of Arrest: 23/8/2020
** Police Station Name: Saturnia
** Jurisdiction Court Name: Saturnia
** P.S. Address: Saturnia, Worldivilla, Earthonia, PIN - 654321.
== Criminal No. 2 ==
** Name: Kojhi Subbana
** Date of Birth: 6/1/1987
** Gender: Female
** Height: 155.600000 cm
** Residential Address: Sumukta, Luvapur, Badampahar, PIN - 987654.
** Committed Crime: Theft
** Date of Arrest: 15/11/2018
** Police Station Name: Luvapur
** Jurisdiction Court Name: Luvapur HC
** P.S. Address: Luvapur, Luvapur, Badampahar, PIN - 987645.

++++ !! Welcome to Confidential Criminal Database !! +++++
-- Database Operation Menu:
(a) Add Criminal Record,
(b) Delete Criminal Record,
(c) Search Criminal Record,
(d) Print Criminal Record,
(e) Exit.
-- Enter your Choice: g
** Warning: Wrong Choice Entered! Re-enter choice ... **

++++ !! Welcome to Confidential Criminal Database !! +++++
-- Database Operation Menu:
(a) Add Criminal Record,
(b) Delete Criminal Record,
(c) Search Criminal Record,
(d) Print Criminal Record,
(e) Exit.
-- Enter your Choice: e

** !! Thank you. Keep the Information Confidential !! **

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Submit a single C source file. Do not use global/static variables.