Homework 1 - Red Shirt Hypothesis

Background: it the year 2267. Starfleet Ensign Ricky has noticed that when the captain and the first officer of their starship go out to explore a new planet, they usually take a member of the operations division. Lately, Ricky has gotten a bit scared since a lot of times only the captain and his first officer return from these missions. In addition, Ricky thinks it a bit strange that the captain goes out onto unexplored planets so keenly and often with his pointy-eared first officer. He decides to start collecting data of those going out on explorations and of those returning to support his red shirt hypothesis.

To support his hypothesis, Ricky needs data on the period of service and seniority of the crew members. Your task is to help Ricky and implement a small program that can be asked information on the crew members seniority. That is, the program can tell who is the longest serving crew member, the freshest recruit and others in between. The rank, name, date of birth, date enlisted and the "shirt color"which is either gold, blue or red. For example: Captain James Tiberius Kirk, born 2230, enlisted 2250, short color gold, rank Captain. As the result of the query the information affecting seniority (date of birth, year enlisted) is printed. In addition, the rank, name and shirt color are printed. The comparison takes age into account: if the time enlisted is the same, age decides.

Your implementation should be as efficient as possible. The goal is that the search is on average linear to the size of input. At least the search should be kept in *nlogn*. Note! You may not make such implemenation choices that cause the overall efficiency of the program to exceed those mentioned here.

0.1 Seniority

The first criterion to determine seniority is the year the person got enlisted in Starfleet. For example:

Name	Enlisted
Captain James T. Kirk	2250
Commander Montgomery Scott	2241

which makes Commander Scott more senior than Captain Kirk as he has enlisted earlier. If the year enlisted is the same, age decides. For example:

Name	Enlisted	Date of Birth
Commander Spock	2250	2230
Captain James T. Kirk	2250	2233

makes Commander Spock senior as he is older than Captain Kirk.

0.2 Functionality

Command	Description
A <a> <s> <l> <v> <n>	Adds a person into the data structure, Rank <a>, born <s>, enlisted <l>, shirt color <v> and name <n>.
R <t>	Reads data from file <t>.
F <n>	Searches for the <n>:th person based on seniority and prints them.
X (old|young)	Prints the longest serving (old) or the freshest reqruit (young) information
E	Empties the data structure
G <lkm>	Generates <lkm> amount of input for testing purposes.
Q	Quits the program.

The rank is on word, year of birth and year enlisted are `unsigned int` natural numbers. The shirt color is on of the three: Gold, Blue, Red. Name is a character string that can contain spaces and one to several words.
The main program uses additional commands for testing and producing the output. You do not need to care about them.

Given Parts

The goal of the homework assignment is to practice using a selected algorithm in a practical problem scenario. This is done by implementing the interface of a datastructure class.
As given, completed parts of the program, you get the main program, that takes care of handling input, creating the datastructure object and calling its interface functions. The task of the main program is to test the given implementation. You do not need to and should not change the main program.
datastructure.hh defines the `datastructure` class and its interface. You must implement the interface functions and the member functions needed on the private side. You can modify the file but it defines the public interface the class must have. You may not change the public interface.
The given parts are available in the student's kurssiSVN-repository.

Example

```
> A Captain 2233 2250 Gold James T. Kirk
> A Commander 2230 2250 Blue Spock
> A Commander 2222 2241 Red Montgomery Scott
> A MedicalOfficer 2227 2251 Blue Leonard McCoy
> A Lieutenant 2237 2255 Gold Hikaru Sulu
> A Lieutenant 2239 2257 Red Nyota Uhura
> A Lieutenant 2232 2250 Gold Lee Kelso
> A Ensign 2245 2263 Gold Pavel Chekov
> F 1
 Montgomery Scott Commander 2222 2241 Red
> F 2
 Spock Commander 2230 2250 Blue
> F 3
 Lee Kelso Lieutenant 2232 2250 Gold
> F 4
 James T. Kirk Captain 2233 2250 Gold
> F 5
 Leonard McCoy MedicalOfficer 2227 2251 Blue
> F 6
 Hikaru Sulu Lieutenant 2237 2255 Gold
> F 7
 Nyota Uhura Lieutenant 2239 2257 Red
> F 8
 Pavel Chekov Ensign 2245 2263 Gold
> X young
 Pavel Chekov Ensign 2245 2263 Gold
> X old
 Montgomery Scott Commander 2222 2241 Red
> Q
```

Note that the most senior member of Starfleet is first in the order of seniority and the freshest recruit the last.
You do not need to take into account situations were the seniority is not unique.