

SRC Assignment: **Blood Donation**

Part A: CS0 assignment

Part B: CS1 assignment

What is SRC?

The “Socially Responsible Computing” assignments are designed to introduce ethics and social impact topics broadly to students so that students are familiar with these concepts when you are eventually faced with ethical design decisions further down your CS journey.

Learning Objectives

The following learning objectives are addressed by this assignment:

- L2: At the end of this assignment students should be able to evaluate computational artifacts to maximize their beneficial effects and minimize harmful effects on society.
- L3: At the end of this assignment students should be able to evaluate the ways computing impacts personal, ethical, social, economic, and cultural practices
- L7: At the end of this assignment students should be able to reflect on the ways that computing can offer opportunities for achieving communal goals (and be able to define the ways computing can be used to reach these goals)

Pre reading and Discussions

Every two seconds, someone in the United States needs blood and Approximately 29,000 units of red blood cells are needed every day in the U. S. So, blood donation can make a difference to millions of Americans, including people in your own community. The Red Cross provides about 40% of our nation’s blood and blood components, all from generous volunteer donors. But supply can’t always meet demand because only about 3% of age-eligible people donate blood yearly.

Please watch the following YouTube video, to notice why blood donation matters.



- <https://youtu.be/TfwqvJHwT8>.

To ensure the safety of both patients and donors, there are some requirements, donors must meet to be eligible to donate blood. To explore the whole eligibility list, please refer to:

- *https :
//www.redcrossblood.org/donate-blood/how-to-donate/eligibility-requirements/eligibility-criteria-alphabetical.html.*

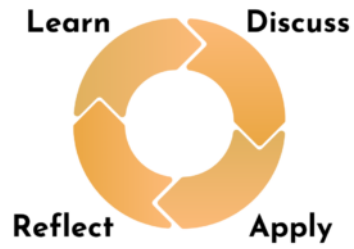
A part of the eligibility criteria is summarized below:

- **Weight:** You must weigh at least 110 lbs to be eligible for blood donation for your own safety.
- **Age:** You must be at least 17 years old to donate to the general blood supply
- **Blood Pressure:** Acceptable as long as your blood pressure is below 180 and more than 90 systolic (first number) and below 100 and more than 50 diastolic (second number) at the time of donation.
- **Pregnancy:** Persons who are pregnant are not eligible to donate. Wait 6 weeks after giving birth.
- **COVID-19 Vaccine and COVID-19 Booster Shot**
 1. Acceptable if you were vaccinated with a non-replicating, inactivated, or RNA-based COVID-19 vaccine manufactured by AstraZeneca, J& J, Moderna, Novavax, or Pfizer providing you are symptom-free and fever-free.
 2. Wait 2 weeks if you were vaccinated with a live attenuated COVID-19 vaccine.
 3. Wait 2 weeks if you were vaccinated with a COVID-19 vaccine but do not know if it was a non-replicating, inactivated, RNA based vaccine or a live attenuated vaccine
- **Antibiotics:** A donor with an acute infection can not donate. Acceptable after finishing oral antibiotics for an infection (bacterial or viral).
- **Ebola Virus:** You are not eligible to donate if you have ever had Ebola virus infection or disease

Assignment - Part A

Question 1: Draw a flowchart to check whether the blood donor is eligible or not.

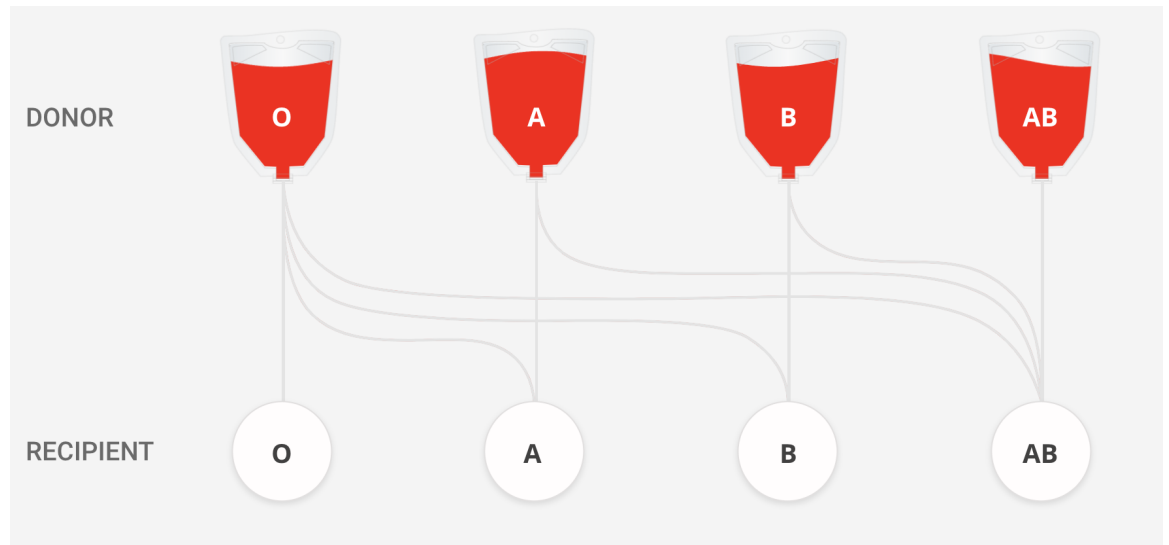
Question 2: Write a code to ask the user to enter the age, weight and blood pressure and output the eligibility just based on these three factors.



Question 3: Now that you are aware about the importance of blood donation, do you have any plan to donate blood in case you are age eligible? Please give an honest YES/NO answer. The purpose of the question is to compare the results with the community statistics. (We learned that only about 3% of age-eligible people donate blood yearly.)

Pre reading and Discussions

Before the discovery of blood types in 1901, people were receiving blood transfusions regardless of blood type. These transfusions were the cause of many deaths due to the incompatibilities. We have come a long way since 1901. Research and understanding of blood type compatibility safeguards patients today against adverse reactions. There are four major blood groups determined by the presence or absence of two antigens, A and B, on the surface of red blood cells. In addition to the A and B antigens, there is a protein called the Rh factor, which can be either present (+) or absent (-), creating the 8 most common blood types (A+, A-, B+, B-, O+, O-, AB+, AB-). There are very specific ways in which blood types must be matched for a safe transfusion. The right blood transfusion can mean the difference between life and death. Use the interactive graphic below to learn more about matching blood types for transfusions.



Assignment - Part B

Question 4: Write a java code to implement blood donation system in a very small scale. There are four classes, namely:

1. blood bank
2. admin
3. donor
4. patient

Description of Classes:

- The blood bank class contains an array of static int variable named blood group which stores the number of packets available in each blood group currently.
- The Administrators can see the number of packets of blood available for each blood group through the admin class by entering the password.
- Donors can login to enter their details and can donate one, two or three blood packets.
- Patients can login and borrow 1 packet at a time. Patients can borrow any of the compatible blood groups.

Output

Welcome Menu

```
Enter 1 if you are the admin ,
2 if you are a donor ,
3 if you are a patient or
4 if you want to exit:█
```

Donors

```
Enter 1 if you are the admin ,
2 if you are a donor ,
3 if you are a patient or
4 if you want to exit:2
welcome donor!!!
Please enter 1 if you want to enter your information:1
Enter your name:tony
Enter your sex:male
Enter date(DD MM YY):28 05 2000
Enter type of blood group you are donating:
0 = A positive
1 = O positive
2 = B positive
3 = AB positive
4 = A negative
5 = O negative
6 = B negative
7 = AB negative
2
how many packets of blood are you donating:2
Do you want your information to be displayed now(Y/N)N
```

```
Enter 1 if you are the admin ,
  2 if you are a donor ,
  3 if you are a patient or
  4 if you want to exit:2
welcome donor!!!
Please enter 1 if you want to enter your information:1
Enter your name:natasha
Enter your sex:female
Enter date(DD MM YY):26 05 2000
Enter type of blood group you are donating:
0 = A positive
1 = O positive
2 = B positive
3 = AB positive
4 = A negative
5 = O negative
6 = B negative
7 = AB negative
1
how many packets of blood are you donating:3
Do you want your information to be displayed now(Y/N)Y
name:natasha
Date(DD MM YY):26 5 2000
Blood group:1 = O positive
Packets of blood:3
```

Admin

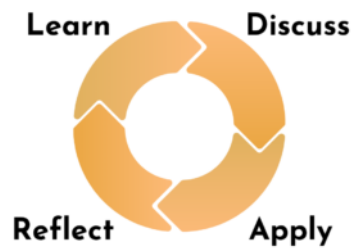
```
Enter 1 if you are the admin ,
  2 if you are a donor ,
  3 if you are a patient or
  4 if you want to exit:1
Enter password: sahar
welcome!!!
A +ve:0
O +ve:3
B +ve:2
AB +ve:0
A -ve:0
O -ve:0
B -ve:2
AB -ve:0
```

Patient (when the blood group is present in the blood bank)

```
Enter 1 if you are the admin ,
2 if you are a donor ,
3 if you are a patient or
4 if you want to exit:3
Welcome patient!!!
Enter your name:groot
Enter type of blood group you are looking for:
0 = A positive
1 = O positive
2 = B positive
3 = AB positive
4 = A negative
5 = O negative
6 = B negative
7 = AB negative
0
you will be donated with 1 blood packet
Please login again to get 1 more blood packet
Available blood groups compatible with the entered blood group:
A +ve:0
A -ve:0
O +ve:3
O -ve:0
```

Patient (when the blood group is not present in the blood bank)

```
Enter 1 if you are the admin ,
2 if you are a donor ,
3 if you are a patient or
4 if you want to exit:3
Welcome patient!!!
Enter your name:loki
Enter type of blood group you are looking for:
0 = A positive
1 = O positive
2 = B positive
3 = AB positive
4 = A negative
5 = O negative
6 = B negative
7 = AB negative
5
you will be donated with 1 blood packet
Please login again to get 1 more blood packet
Available blood groups compatible with the entered blood group:
B -ve:0
O -ve:0
Compatible blood group not availableEnter 1 if you are the admin ,
2 if you are a donor ,
3 if you are a patient or
4 if you want to exit:█
```



Question 5: You already implemented a simple blood donation system. How can we improve the system? What are the other functionalities that we can add to our implementation to make it more similar to the real blood donation system?

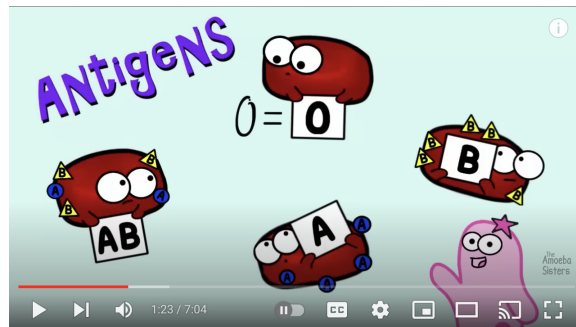
Group project: Blood Type Inheritance

Pre reading and Discussions

In 1930 Dr. Karl Landsteiner won the Nobel Prize in Physiology and Medicine for his discovery of human blood types. Landsteiner dedicated his career to studying blood groups. He was the first to classify all human blood groups into A, B, AB and O types.



Dr. Landsteiner's work made safe blood transfusions possible and transformed the medical industry. How do blood types work? They are inherited. Like eye color, blood type is passed genetically from your parents. Not all blood is alike. There are eight common blood types and many rare ones. Your blood type is determined by your ABO type and a negative or positive Rh factor. But you may be wondering why you have the blood type that you have and what it means to your health. To learn about blood inheritance, please watch the following video:



- <https://youtu.be/9O5JQqlngFY>.

Group project: You need to make a group of 3 or 4 to write a program that require the user to input the blood type and the rhesus factor of the parents. The output will consist of probabilities that suggest what the offspring's blood type can be.

validation of the results: Please validate the results by comparing them to your own and your parent's blood type.