

Level: 2nd Year Bachelor's in Computer Science (2025/2026)

Module: Databases

TP 3: Relational Algebra (Part I)

Connect your **Blood-Donation** database to the RAT tool and execute the following queries using Relational **Algebra** based on the following schema:

Donor (**Donor_ID**, First_Name, Last_Name, Gender, Date_Of_Birth, Blood_Type, Phone)

Donation (**Donation_ID**, Donation_Date, Volume_ML, Donation_Type, #***Donor_ID***)

Blood_Inventory (**Unit_ID**, Blood_Type, Collection_Date, Expiration_Date, Status, #***Donation_ID***)

Recipient(**Recipient_ID**, First_Name, Last_Name, Gender, Date_Of_Birth, Blood_Type, Hospital_name, Town)

Transfusion (**Transfusion_ID**, Transfusion_Date, #***Recipient_ID***, #***Unit_ID***)

- 1- Get the first and last names of all donors.

$\Pi\{\text{First_Name}, \text{Last_Name}\}(\text{Donor})$

- 2- Find all donors who have donated more than 450 mL of blood.

$\Pi\{\text{Donor_ID}\}(\sigma\{\text{Volume_ML} > 450\}(\text{Donation}))$

- 3- List the first names and last names of recipients from Algiers.

$\Pi\{\text{First_Name}, \text{Last_Name}\}(\sigma\{\text{Town} = \text{'Algiers'}\}(\text{Recipient}))$

- 4- List the blood inventory that expired before 2025.

$\sigma\{\text{Expiration_Date} < \text{'2025-01-01'}\}(\text{Blood_Inventory})$

- 5- Find all recipients who have blood type A+ or O+ using the union

$[\sigma\{\text{Blood_Type} = \text{'A+'}\}(\text{Recipient})] \cup [\sigma\{\text{Blood_Type} = \text{'O+'}\}(\text{Recipient})]$

- 6- The same question but using the OR operator

$\sigma\{\text{Blood_Type} = \text{'A+'} \vee \text{Blood_Type} = \text{'O+'}\}(\text{Recipient})$

- 7- List all the donations made in January 2025.

$\sigma\{\text{Donation_Date} \geq \text{'2025-01-01'} \wedge \text{Donation_Date} \leq \text{'2025-01-31'}\}(\text{Donation})$