Problem Solving – Robot Santa

Assume that a robot is being built that will grab toys from a bin, and hand them to kids. You need to implement a component of the software part (not the physical robot).

The 'presents' are given as strings: each present is a string with the present description. E.g. : "xylophone", "car", "doll house", "Lego set 1", "sword".

**Version 1** (easiest): Assume there are two kids: Bob and Alice. The robot starts by giving the first present to Alice and then the next one to Bob and then to Alice and so on. It takes turns handing out presents to each kid. Print what presents each kid gets. (E.g.: Bob gets: ....... Alice gets: .........)

Work in GROUPS

Problem solving steps:

  Decide how you will organize your code. Use separate methods (NOT all in main() ).

1) **Do you understand the problem?** CAN YOU SOLVE IT ‘ON PAPER’? What presents do Bob and Alice each get in the above example?

2) **DATA:**
   a) **GIVEN**
      i) What is the given data/information?
      ii) How will you represent that data? (Variable type and name)
      iii) What can be hardcoded and what should not be hardcoded.
   b) **TO BE COMPUTED** (final answer data, and ‘maintenance’ data)
      i) What is the data/information you must COMPUTE to solve the problem?
         Trick: Make the problem HUGE (to where as a human you need several days of people and therefore you need to record ‘where you left-off’ so that you can resume later.)
      ii) How will you represent that data? (Variable type and name)
   c) Draw ON PAPER all of the data for the given example. Be truthful to their Java types.

3) **ALGORITHM**
   a) How would you use the data (in your representation) to solve the problem?
   b) CHECK your algorithm on the given example. USE the drawing as well: follow how the data changes.
   c) Write CODE/PSEUDO-CODE
   d) TEST for special cases (paths other than the "happy path")
      i) Based on logic of solution: Are you making any assumptions? (E.g. not empty string)
      ii) Based on written code: How many paths are there through your program? Does any of them crash?

4) **Version 2:** Give the presents ‘at random’ to the two kids (flip a coin).
   - What from the solution for version 1 can be kept and what needs to change?
   - Would you benefit if you change how you represent the data?

**Version 3:** Generalize to any number, K, of kids.
- What from the solution for version 1 can be kept and what needs to change?
- Would you benefit if you change how you represent the data?
- Can you return the data (if this version was solved by a method)?

*Robot Santa is a ‘gift wrap’ of a GENERAL, ‘abstract’, type of problem/data manipulation.*

*What is the general problem? (Hint: the real-world part of the problem is part of the wrap, not the core problem.)*

*Can you give another ‘gift wrap’ example of this general problem? It can use another scenario, or another type of collection.*

*Reverse problem:* merge two (or more) arrays into one. DRAW PICTURE for both versions (Santa and Reverse).