Revision Thu:

You are aware that sustainability is very important to leave a better world for the future. Due to this reason, while evaluating projects, you decided to consider how many of the 17 sustainable goals are supported by the project, which was determined by the United Nation as the 2030 target.[4] And also, in this hackathon, you can invest at most $4,000,000. Thus, you will evaluate projects by considering the budget constraint and number of goals supported by the project as well as existing indicators.

Add a new static data member `MAX_INVESTABLE_AMOUNT` to the `Hackathon` class.

Add new two indicators which denote the required amount and number of goals supported, respectively. Update indicator weights as (%10, %15, %20, %20, %30, %5) respectively. (**Hint 1**: Do not forget to update related data members.)

The updated information table is shown below.

Project ID	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5	Indicator 6
A1	100	240	15	26	67991	12
A2	20	407	13	11	860657	1
A3	100	281	13	39	193696	9
A4	80	1264	4	38	382208	7
A5	20	1020	12	11	958624	1
A6	100	1162	17	34	1140003	6

Scale new indicators and update credibility statement conditions as follows.

Indicator 5. $(0 < x \le 1000000)$ $\rightarrow x = 100$
$(1000000 < x \le 1500000)$ $\rightarrow x = 80$
$(1500000 < x)$ $\rightarrow x = 20$

Indicator 6. $(0 < x \le 2)$ $\rightarrow$ REMOVED
$(2 < x \le 5)$ $\rightarrow x = 20$
$(5 < x \le 10)$ $\rightarrow x = 80$
$(10 < x)$ $\rightarrow x = 100$

Project Segment = A+ **AND** Scaled Indicator 5 = 100 **OR** 80 **OR** 20
AND Scaled Indicator 6 = 100 **OR** 80 **OR** 20 $\rightarrow$ INVEST
= A **AND** Scaled Indicator 5 = 100 **OR** 80 **OR** 20
AND Scaled Indicator 6 = 100 **OR** 80 **OR** 20 $\rightarrow$ INVEST
= B **AND** Scaled Indicator 5 = 100 **OR** 80
AND Scaled Indicator 6 = 100 **OR** 80 $\rightarrow$ INVEST
= C **AND** Scaled Indicator 5 = 100
AND Scaled Indicator 6 = 100 $\rightarrow$ INVEST
= D $\rightarrow$ DO NOT INVEST

After deciding to add new indicators, you have noticed that the remaining 3 projects you did not add to your list may be considerable. Because you do not want to miss any investment chance, you decide to add a new method to compare existing projects with others. Create a new `Hackathon` object named the

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[4] "THE 17 GOALS". https://sdgs.un.org/goals [Accessed 11 Dec 2021]

`restHackathon` and add the following projects into this object. Then, print out final tables for new projects as well as existing projects.

Project ID	Indicator 1	Indicator 2	Indicator 3	Indicator 4	Indicator 5	Indicator 6
A7	80	772	15	31	75924	10
A8	80	753	8	25	914601	9
A9	80	1201	1	25	1459662	11

If the credibility statement of the project in the existing `Hackathon` object is not `INVEST,` and if the credibility statement of the project in the `restHackathon` object is `INVEST` swap these projects. Continue to do this until no project in the existing `Hackathon` object, which has a credibility statement other than `INVEST,` or no project in `restHackathon` object, which has credibility statement `INVEST`. (**Hint 2.** You can run this process in the `main` method.) Then, print out the final table for the existing `Hackathon` object.

Create a `makeDecision` method in `Hackathon` class. It includes two tasks.
First, create a 2D array that holds information about all investable projects. It gets projects with the credibility statement "INVEST", and adds their ids, required investment amounts, payback rates, number of supported goals, and durations of projects to the created array. And the last row of the 2D array is a summary of the total amount required to invest in all investable projects, the total payback amount if all investable projects have been invested, the maximum numbers of goals supported, and the maximum duration remaining to the payback period. In this row, the element of the Project ID column is "TOTAL/MAX:", the Capital column is the total required investment amount, the Payback column is the amount expected to be earned from projects, the Goals column is the maximum number of goals supported and the Duration column is the maximum duration of projects. Then print out the created array as the "Investable Projects" table.
Second, if the total required amount of all investable projects is more than your budget, you have to decide which projects you will invest in and create a portfolio. In portfolio creation, you will use the priority of project segments. Starting from an investable project that has the segment A+ to C you will invest until your budget does not afford one more project. If the total required amount of all investable projects is less than your budget you can invest all the investable projects. Then, in both cases print out the final portfolio, total invested amount, expected payback amount, rest of the budget, the maximum number of months to payback period will start, and the maximum number of goals supported.
Lastly, call the `makeDecision` method in the `main` method to show the completed decision-making process results.

Hint 3: Do not forget to add the necessary accessor and mutator methods to the `Project` class.
Hint 4: Arrays consist of the same type of elements.
Note: For the *"Investable Projects"* table you can only use the `System.out.print()` method to print the table name and asterixis at the beginning and the end. The rest of the table must come from the 2D array created as the first task in the `Decision` method.

Sample run:

```
EXISTING PROJECTS
Final Table
*********************************************************************************
Project ID      Indicator 1     Indicator 2     Indicator 3     Indicator 4     Indicator 5     Indicator 6     Weighted Mean   Segment         Credibility
A1              100             20              20              100             100             100             72.0            C               INVEST
A2              20              20              20              80              100             1               55.05           D               REMOVED
A3              100             20              20              100             100             80              71.0            C               DO NOT INVEST
A4              80              100             100             100             100             80              97.0            A               INVEST
A5              20              100             80              80              100             1               79.05           B               REMOVED
A6              100             100             20              100             80              80              77.0            B               INVEST
*********************************************************************************


NEW PROJECTS
Final Table
*********************************************************************************
Project ID      Indicator 1     Indicator 2     Indicator 3     Indicator 4     Indicator 5     Indicator 6     Weighted Mean   Segment         Credibility
A7              80              80              20              100             100             80              78.0            B               INVEST
A8              80              80              80              100             100             80              90.0            A               INVEST
A9              80              100             100             100             80              100             92.0            A               INVEST
*********************************************************************************


FINAL PROJECT LIST
Final Table
*********************************************************************************
Project ID      Indicator 1     Indicator 2     Indicator 3     Indicator 4     Indicator 5     Indicator 6     Weighted Mean   Segment         Credibility
A1              100             20              20              100             100             100             72.0            C               INVEST
A7              80              80              20              100             100             80              78.0            B               INVEST
A8              80              80              80              100             100             80              90.0            A               INVEST
A4              80              100             100             100             100             80              97.0            A               INVEST
A9              80              100             100             100             80              100             92.0            A               INVEST
A6              100             100             20              100             80              80              77.0            B               INVEST
*********************************************************************************


TASK 1
Investable Projects
************************************************************************
ProjectID       Capital         Payback         Goals           Duration
A1              67991           26%             12              15
A7              75924           31%             10              15
A8              914601          25%             9               8
A4              382208          38%             7               4
A9              1459662         25%             11              1
A6              1140003         34%             6               17
------------------------------------------------------------------------
TOTAL/MAX:      4040389         1167618         12              17
************************************************************************
```

TASK 2
We cannot invest in all projects, we have to discard some of them.
Final Portfolio: A8 A4 A9 A7 A6
Invested Amount: 3972398
Expected Payback Amount: 1149941
Rest of Budget: 27602
Payback period will start at most 17 months later.
We will support at most 11 sustainable goals.