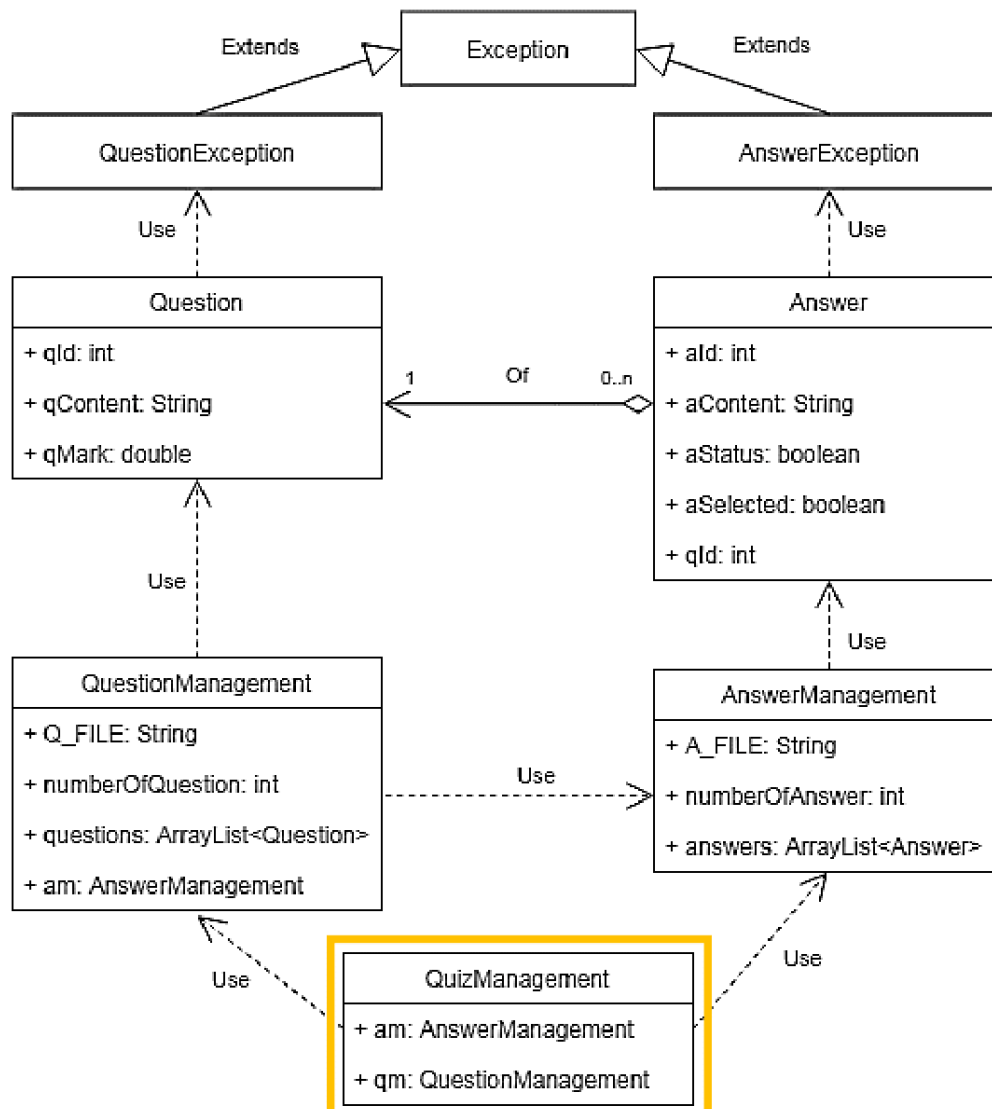# Session 08
Basic IO (2)

A. STEPS BY STEPS
I.   Problem definition

Multiple choice testing is an effective way to get students' level. Your task is to build a simple testing system as below:

Special requirements:

- The data of questions and answers must be **saved** after each run and **reloaded** at the next run **automatically**.
- User can add new question and answer, view question bank and testing.
- Questions and answers of quiz can be **shuffled**.

In this session, you will create the last part of **QuizManagement** Project includes:

- **QuizManagement**

QuizManagement.java

```java
package quizmanagement;

import java.util.ArrayList;
import java.util.Scanner;


/**
 * The class QuizManagement is used to manage quiz
 * @author KhanhVH@fe.edu.vn
 */
public class QuizManagement {
    private static AnswerManagement am;
    private static QuestionManagement qm;

    /**
     * @param args the command line arguments
     */
    public static void main(String[] args) {
        try {
            am = new AnswerManagement("src/data/answers.txt");        //Loads answer bank
            am.loadAnswers();

            qm = new QuestionManagement("src/data/questions.txt", am); //Loads question bank
            qm.loadQuestions();

            Scanner cin = new Scanner(System.in); //Creates a scanner
            int     func;                         //The function that seleted by user
            do {
                //Shows menu
                System.out.println("\n---------- QUIZ MANAGEMENT ----------");
                System.out.println("1. Add question.");
                System.out.println("2. Show question bank.");
                System.out.println("3. Create quiz.");
                System.out.println("4. Quit.\n");
```

```java
//Gets function that selected by user
System.out.print("    Please select a function: ");
func = cin.nextInt(); cin.nextLine();

String strUserEntered = "";
switch (func) {
    case 1:
        System.out.println("----- QUIZ MANAGEMENT [ADD NEW QUESTION] -----");
        String qContent = "";
        double qMark = 0.0;

        //Gets the content of question
        do {
            System.out.print("Please enter content of question: ");
            qContent = cin.nextLine();
            if (qContent.equals("")) {
                System.out.println("Error: Question content can't be empty!");
            }
        } while (qContent.equals(""));

        //Gets the mark of question
        do {
            System.out.print("Please enter mark of question: ");
            qMark = cin.nextDouble(); cin.nextLine();
            if (qMark<0 || qMark>10) {
                System.out.println("Error: Question mark must be from 0 to 10!");
            }
        } while (qMark<0 || qMark>10);

        //Creates new question and get it's id
        int qId = qm.addQuestion(qMark, qContent);

        System.out.println("Your question is created!");
        System.out.println("+++ [ADD ANSWERS FOR QUESTION] +++");

        //Adds answers for this question
        int aNo = 0;
        do {
            aNo++;
            System.out.println("... Answer " + aNo + " ...");
```

```java
            String aContent = "";
            boolean aStatus = false;

            //Gets the content of answer
            do {
                System.out.print("Please enter content of answer " + aNo + ": ");
                aContent = cin.nextLine();
                if (aContent.equals("")) {
                    System.out.println("Error: Answer content can't be empty!");
                }
            } while (aContent.equals(""));

            //Gets the status of answer
            do {
                System.out.print("Is this answer True or False? (True/False) ");
                strUserEntered = cin.nextLine();
                if (strUserEntered.equals("True")) {
                    aStatus = true;
                } else if(strUserEntered.equals("False")) {
                    aStatus = false;
                } else {
                    System.out.println("Error: You must type 'True' or 'False'!");
                }
            } while (!(strUserEntered.equals("True") || strUserEntered.equals("False")));

            am.addAnswer(aContent, aStatus, qId); //Creates new answer

            do {
                System.out.print("Do you want to add more answer? (Yes/No) ");
                strUserEntered = cin.nextLine();
                if ((!(strUserEntered.equals("Yes") || strUserEntered.equals("No")))) {
                    System.out.println("Error: You must type 'Yes' or 'No'!");
                }
            } while (!(strUserEntered.equals("Yes") || strUserEntered.equals("No")));
        } while (strUserEntered.equals("Yes"));
        break;
    case 2:
        System.out.println("----- QUIZ MANAGEMENT [QUESTION BANK] (" + qm.getSize() +
                        " questions) -----");
        qm.showQuestionBank();
        break;
```

```
case 3:
    // examination
    int     totalQuestionNumbers = qm.getSize();
    int     qNumbers             = 0;
    boolean isRandom             = false;
    double  mark                 = 0.0;
    double  totalMark            = 0.0;
    int     correctCount         = 0;

    System.out.println("----- QUIZ MANAGEMENT [EXAMINATION] (" + totalQuestionNumbers +
                        " questions) -----");

    //Gets number of question of the test
    do {
        System.out.print("How many question of the test: ");
        qNumbers = cin.nextInt(); cin.nextLine();

        if (qNumbers < 1 || totalQuestionNumbers < qNumbers) {
            System.out.println("Number of question must be from 1 to " +
                                totalQuestionNumbers);
        }
    } while (qNumbers < 1 || totalQuestionNumbers < qNumbers);

    //Turn on/off the random mode
    do {
        System.out.print("Do you want to shuffle the test? (True/False) ");
        strUserEntered = cin.nextLine();
        if (strUserEntered.equals("True")) {
            isRandom = true;
        } else if(strUserEntered.equals("False")) {
            isRandom = false;
        } else {
            System.out.println("Error: You must type 'True' or 'False'!");
        }
    } while (!(strUserEntered.equals("True") || strUserEntered.equals("False")));

    //Generates the test
    System.out.print("+++ The test is generating... ");
    ArrayList<Question> qList = qm.getQuestionBank(qNumbers, isRandom);
    System.out.println("Done! +++");
```

```java
System.out.println("\n##################");
System.out.println("#      TESTING      #");

ArrayList<Answer> aList;
Question q;
int qNo = 1;
char ans, last;
for (int i = 0; i < qList.size(); i++, qNo++) {
    q = qList.get(i);
    qId = q.getQId();
    aList = am.getAnswers(qId, isRandom);

    System.out.println("###################");
    System.out.print(qNo + ". " + qm.showQuestion(qId, aList));

    do {
        //Gets the answer of user
        System.out.print("   >>> Please select answer: ");
        ans = (cin.nextLine()).charAt(0);
        last = (char)('a'+aList.size()-1);

        if (ans<'a' || last<ans) {
            System.out.println("Error: Your answer must be from 'a' to '" +
                                    last + "'!");
        } else {
            aList.get(ans-'a').setASelected(true);
        }
    } while (ans<'a' || last<ans);

    boolean isUserCorrect = qm.isQuestionCorrect(qId, aList);

    totalMark += q.getQMark();
    if (isUserCorrect) {
        mark += q.getQMark();
        correctCount++;
        System.out.println("   +++ Congratulation! Your answer is CORRECT!!!");
    } else {
        System.out.println("   --- So sad! Your answer is WRONG!!!");
    }
    cin.nextLine();
}
```

```java
            System.out.println("+++++++++++++++++++");
            System.out.println("You are FINISH!!!");
            System.out.println("Correct rate is " + correctCount + "/" + qList.size() +
                " (" + String.format("%.2f", ((double)correctCount*100/qList.size())) + "%)");
            System.out.println("Total mark is " + String.format("%.2f", mark) + "/" +
                            String.format("%.2f", totalMark) +
                            " (" + String.format("%.2f", ((double)mark*100/totalMark)) + "%)");

            cin.nextLine();
            break;
        case 4:
            System.out.println("\n--------------------");
            System.out.println("Thank for using our software!\n" +
                            "See you again!");
            break;
        default:
            System.out.println("Error: The function must be from 1 to 3!");
        }
    } while (func != 4);
} catch (Exception e) {
    System.out.println(e.getMessage());
} finally {
    try {
        am.saveAnswers(); //Saves answers
    } catch (Exception e) {
        System.out.println("Exception: Can't save answers!");
    }

    try {
        qm.saveQuestions(); //Saves questions
    } catch (Exception e) {
        System.out.println("Exception: Can't save questions!");
    }
}
}

}
```

Example of runtime

```
run:

The data file answers.txt is found. Data of answers is loading...Done! [28 answers]

The data file questions.txt is found. Data of questions is loading...Done! [7 questions]


---------- QUIZ MANAGEMENT ----------

1. Add question.

2. Show question bank.

3. Create quiz.

4. Quit.


   Please select a function: 1

----- QUIZ MANAGEMENT [ADD NEW QUESTION] -----

Please enter content of question: What is the HTML element to display an image?

Please enter mark of question: 1

Your question is created!

+++ [ADD ANSWERS FOR QUESTION] +++

... Answer 1 ...

Please enter content of answer 1: <image>

Is this answer True or False? (True/False) False
```

```
Do you want to add more answer? (Yes/No) Yes

... Answer 2 ...

Please enter content of answer 2: <picture>

Is this answer True or False? (True/False) False


Do you want to add more answer? (Yes/No) Error: You must type 'Yes' or 'No'!

Do you want to add more answer? (Yes/No) Yes

... Answer 3 ...

Please enter content of answer 3: <pic>

Is this answer True or False? (True/False) fal

Error: You must type 'True' or 'False'!

Is this answer True or False? (True/False) False

Do you want to add more answer? (Yes/No) Yes

... Answer 4 ...

Please enter content of answer 4: <img>

Is this answer True or False? (True/False) True

Do you want to add more answer? (Yes/No) No


---------- QUIZ MANAGEMENT ----------

1. Add question.
```

2. Show question bank.

3. Create quiz.

4. Quit.

   Please select a function: 2

----- QUIZ MANAGEMENT [QUESTION BANK] (8 questions) -----

1. Which of the following is an example of web browser?

   a. Google

   b. Bing

   c. Baidu

   d. Opera

2. Which of the following HTML tag is used to link the URL?

   a. <style>

   b. <link>

   c. <a>

   d. <hyperlink>

3. Link URL in HTML is specified using _____ attribute

   a. src

b. link

c. rel

d. href

4. HTML is considered as

a. High Level Language

b. OOP Language

c. Programming Language

d. Markup Language

5. _____ attribute is used to specify where to open the linked document

a. target

b. coords

c. rel

d. none of the others

6. Which of the anchor attribute is used to specify the language of the linked document?

a. alang

b. lang

c. hreflang

d. all of the others

7. Which of the following is used to open the document in new window?

    a. Link

    b. Link

    c. Link

    d. Link

8. What is the HTML element to display an image?

    a. <image>

    b. <picture>

    c. <pic>

    d. <img>

---------- QUIZ MANAGEMENT ----------

1. Add question.

2. Show question bank.

3. Create quiz.

4. Quit.

```
   Please select a function: 3

----- QUIZ MANAGEMENT [EXAMINATION] (8 questions) -----

How many question of the test: 3

Do you want to shuffle the test? (True/False) True

+++ The test is generating... Done! +++


###################
#    TESTING    #
###################

1. Which of the following HTML tag is used to link the URL?

   a. <style>

   b. <a>

   c. <hyperlink>

   d. <link>

   >>> Please select answer: b

   +++ Congratulation! Your answer is CORRECT!!!


###################
2. _____ attribute is used to specify where to open the linked document
```

a. target

b. rel

c. coords

d. none of the others

>>> Please select answer: a

+++ Congratulation! Your answer is CORRECT!!!

####################

3. Which of the following is used to open the document in new window?

a. Link

b. Link

c. Link

d. Link

>>> Please select answer: d

+++ Congratulation! Your answer is CORRECT!!!

++++++++++++++++++++

You are FINISH!!!

Correct rate is 3/3 (100.00%)

Total mark is 3.00/3.00 (100.00%)

```
---------- QUIZ MANAGEMENT ----------

1. Add question.

2. Show question bank.

3. Create quiz.

4. Quit.


    Please select a function: 4

--------------------

Thank for using our software!

See you again!

Answers is saving into data file answers.txt...Done! [32 answers]

Questions is saving into data file questions.txt...Done! [8 questions]

BUILD SUCCESSFUL (total time: 2 minutes 39 seconds)
```