

Lab Exercise 1: Array List, Composite Classes

B

- This lab exercise is divided into four stages – Stage 1, Stage 2, Stage 3 and Stage 4.
- You need to complete Stage 1 without errors before you can proceed to Stage 2, and complete Stage 2 without errors before you can proceed to Stage 3 and Stage 4.
- For reference (e.g., list of methods in ArrayList class that you can use), you may refer to the following Java documentation:
 - ArrayList (Java Platform SE 8):
<https://docs.oracle.com/javase/8/docs/api/java/util/ArrayList.html>

Question:

TVAsia is a TV station which offers TV programs across a few channels. A specific channel has a list of TV programs which are aired at specific times. A channel has attributes such channel number (eg: 101, 102, 119, 575, 707, etc.), channel name (eg: History, Discovery, Cartoon, Anime, etc), and type (eg: Normal or HD). A TV program has attributes such as name (eg: Storage Wars, SpongeBob, etc.), season (1, 2, etc), episode (1, 2, etc.), airtime (10:00-12:00, 14:00-15:30) and number of viewers.

Task:

The CEO of TVAsia hires you to develop a program to find out the statistics of viewers of each channel and TV programs to make decision on which TV programs will be continued for the next season. If the viewers exceed 1000 per month the TV program will be continued, otherwise it will be discontinued.

Stage 1:

1. Create a Java project named Lab1-B-Stage1.
2. Copy file TVAsiaTester1.java into your project.

Define a class named TVProgram (in file TVProgram.java) that has:

- i. *Instance variables* to represent a name, season, episode, airtime and number of viewers.

Define a class named Channel (in file Channel.java) that has:

- i. *Instance variables* to represent the channel number, name, type and a list of TV program.

- ii. *Constructor* method which receives three parameters, and
 - assigns the parameters to the instance variables of class `Channel`.
 - creates an array list of `TVProgram` objects and assigns the array list to the instance variable that represents a channel's list of TV programs.

Define a class named `ChannelRegister` (in file named `ChannelRegister.java`) that has:

- i. *Instance variable* to represent a list of TV channels offered (declare an array list of `Channel` objects).
- ii. *Constructor* method which will create an array list to register `Channel` objects

Check your answer by invoking the `main` method in class `TVAsiaTester1` (just run project as Java Application) and your output should be as follows:

Total number of Channels offered by TVAsia : 0
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*Proceed to Stage 2 only after you have completed Stage 1 without errors.

Stage 2:

1. Create a Java project named `Lab1-B-Stage2`.
2. Copy file `TVAsiaTester2.java` into your project.
3. Copy files `TVProgram.java`, `Channel.java` and `ChannelRegister.java` from Stage 1 into your Stage 2 Java project.

Add into the `TVProgram` class:

- i. A method named `getName` that returns the instance variable that represents a program's name.
- ii. A method named `getSeason` that returns the instance variable that represents the program's season.
- iii. A method named `getEpisode` that returns the instance variable that represents the program's episode.
- iv. A method named `getAirtime` that returns the instance variable that represents the program's airtime.
- v. A method named `getNoOfViewers` that returns the instance variable that represents the program's number of viewers.

Add into the Channel class:

- i. A method named `getNumber` that returns the instance variable that represents a channel's number.
- ii. A method named `getName` that returns the instance variable that represents channel's name.
- iii. A method named `getType` that returns the instance variable that represents channel's type.
- iv. A method named `getProgramList` that returns the instance variable that represents the list of program for the channel.

Check your answer by invoking the main method in class `TVAsiaTester2` and your output should be as follows:

```
Channel number : 303
Channel name : Anime
Channel type : Normal

Channel number : 507
Channel name : Discovery
Channel type : HD

Channel number : 515
Channel name : Cartoon
Channel type : HD
```

*Proceed to Stage 3 only after you have completed Stage 2 without errors.

Stage 3:

1. Create a Java project named `Lab1-B-Stage3`.
2. Copy file `TVAsiaTester3.java` into your project.
4. Copy files `TVProgram.java`, `Channel.java` and `ChannelRegister.java` from Stage 2 into your Stage 3 Java project.

Add into the Channel class:

- i. A void method named `addTVProgram` that receives a `TVProgram` object as a parameter, and add it to the end of the channel's list of aired TV programs.
- ii. A method named `listAiredTVPrograms` that will print a list of TV program(s)'s details

Check your answer by invoking the main method in class TVAsiaTester3 and your output should be as follows:

```
Channel : 303 Anime Normal
Programs aired in Channel : 303

Program name : Dragon Ball
Season : 5
Episode : 1
Airtime : 17:00-18:00
No of viewers : 890

Program name : Trickster
Season : 2
Episode : 7
Airtime : 19:00-20:00
No of viewers : 1201

Program name : Fuuka
Season : 1
Episode : 12
Airtime : 11:00-12:00
No of viewers : 1307

Channel : 507 Discovery HD
Programs aired in Channel : 507

Program name : How It's Made
Season : 10
Episode : 1
Airtime : 17:00-18:00
No of viewers : 1200

Program name : Ultimate Survival
Season : 1
Episode : 12
Airtime : 13:00-14:00
No of viewers : 567

Channel : 393 One TV Asia HD
Programs aired in Channel : 393

Program name : Hwarang: The Poet Warrior Youth
Season : 1
Episode : 12
Airtime : 21:00-22:00
No of viewers : 2001

Program name : Innocent Defendant
Season : 1
Episode : 19
Airtime : 11:00-12:00
No of viewers : 900
```

*Proceed to Stage 3 only after you have completed Stage 2 without errors.

Stage 4: (Bonus)

3. Create a Java project named Lab1-B-Stage4.
4. Copy file TVAsiaTester4.java into your project.
5. Copy files TVProgram.java, Channel.java and ChannelRegister.java in Stage 3 into your Stage 4 Java project.

Add method `listTVProgramFuture` in Class `Channel` that will determine which TV programs will be continued for the next season. If the viewers exceed 1000 the TV program will be continued, otherwise it will be discontinued/stopped.

Check your answer by invoking the main method in class `TVAsiaTester4` and your output should be as follows:

```
Channel : 303 Anime Normal
Program name : Dragon Ball, Verdict : Stopped
Program name : Trickster, Verdict : Continue
Program name : Fuuka, Verdict : Continue

Channel : 507 Discovery HD
Program name : How It's Made, Verdict : Continue
Program name : Ultimate Survival, Verdict : Stopped

Channel : 393 One TV Asia HD
Program name : Hwarang: The Poet Warrior Youth , Verdict : Continue
Program name : Innocent Defendant, Verdict : Stopped
```