2주차 실습 보고서

강의명	객체지향프로그래밍및실습
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학번	202220209
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2025. 9.11.

□ 1

```java
public static void handle_quit(){
  System.out.println(x:"Good Bye!");
  System.exit(-1);
}
```

```
lwj@lwj-code:~/workspace/JAVA/2$ javac HCTS.java
lwj@lwj-code:~/workspace/JAVA/2$ java HCTS
Enter a command: t 1 30
Enter a command: l
car no. = 1111, car position = 120.000000
car no. = 2222, car position = 150.000000
car no. = 3333, car position = 180.000000
Enter a command: q
Good Bye!
lwj@lwj-code:~/workspace/JAVA/2$
```

□ 2

기존 방식

```java
115     // 차량 정보(차종사 번호, 및 현재 위치)를 출력한다
116     public static void print_car_info(Car c)
117     {
118         System.out.printf(format:"car no. = %d, car position = %f%n", c.no, c.position);
119         //System.out.println(toString(c));
120     }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
lwj@lwj-code:~/workspace/JAVA/2$ javac HCTS.java
lwj@lwj-code:~/workspace/JAVA/2$ java HCTS
Enter a command: t 1 30
Enter a command: l
car no. = 1111, car position = 120.000000
car no. = 2222, car position = 150.000000
car no. = 3333, car position = 180.000000
Enter a command:
```

변형 방식

```
115     // 차량 정보(자동차 번호, 및 현재 위치)를 출력한다
116     public static void print_car_info(Car c)
117     {
118         //System.out.printf("car no. = %d, car position = %f%n", c.no, c.position);
119         System.out.println(toString(c));
120     }
121
122     public static String toString(Car c){
123         return "car no. = " + c.no + ", car position = " + c.position;
124     }
125 } // end of CarManager class
```

```
PROBLEMS  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

lwj@lwj-code:~/workspace/JAVA/2$ javac HCTS.java
lwj@lwj-code:~/workspace/JAVA/2$ java HCTS
Enter a command: t 1 30
Enter a command: l
car no. = 1111, car position = 120.0
car no. = 2222, car position = 150.0
car no. = 3333, car position = 180.0
Enter a command:
```

☐ 3

```
34      // 자동차 정보와 현재 시간을 초기화한다.
35      public static void initialize()
36      {
37        car_list = new Car[3];
38        in = new Scanner(System.in);
39        // try{
40        //     inf = new Scanner(new File("in.txt"));
41        // }
42        // catch(FileNotFoundException e){
43        //     System.out.println(e.getMessage());
44        // }
45
46        for(int i=0; i<car_list.length; i++){
47            car_list[i] = new Car();
48            car_list[i].no = in.nextInt();
49            car_list[i].speed = in.nextInt();
50            car_list[i].position = in.nextInt();
51        }
52        current_time = new Time();
53        current_time.hour = 0;
54        current_time.minute = 0;
55      }
```

```
PROBLEMS 1  OUTPUT  DEBUG CONSOLE  TERMINAL  PORTS

lwj@lwj-code:~/workspace/JAVA/2$ javac HCTS.java
lwj@lwj-code:~/workspace/JAVA/2$ java HCTS
1111 80 0 2222 100 0 3333 120 0
Enter a command: t 1 30
Enter a command: l
car no. = 1111, car position = 120.0
car no. = 2222, car position = 150.0
car no. = 3333, car position = 180.0
Enter a command:
```

입력값 변경 후

```
32      // 자동차 정보와 현재 시간을 초기화한다.
33      public static void initialize()
34      {
35          car_list = new Car[3];
36          in = new Scanner(System.in);
37
38          for(int i=0; i<car_list.length; i++){
39              car_list[i] = new Car();
40              car_list[i].no = in.nextInt();
41              car_list[i].speed = in.nextInt();
42              car_list[i].position = in.nextInt();
43          }
44          current_time = new Time();
45          current_time.hour = 0;
46          current_time.minute = 0;
47      }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
lwj@lwj-code:~/workspace/JAVA/2$ javac HCTS.java
lwj@lwj-code:~/workspace/JAVA/2$ java HCTS
1111 100 20 2222 120 30 3333 80 50
Enter a command: t 1 30
Enter a command: l
car no. = 1111, car position = 170.0
car no. = 2222, car position = 210.0
car no. = 3333, car position = 170.0
Enter a command:
```

4

```
33
34      // 자동차 정보와 현재 시간을 초기화한다.
35      public static void initialize()
36      {
37        car_list = new Car[3];
38        in = new Scanner(System.in);
39        try{
40            inf = new Scanner(new File(pathname:"in.txt"));
41        }
42        catch(FileNotFoundException e){
43            System.out.println(e.getMessage());
44        }
45
46        for(int i=0; i<car_list.length; i++){
47            car_list[i] = new Car();
48            car_list[i].no = inf.nextInt();
49            car_list[i].speed = inf.nextInt();
50            car_list[i].position = inf.nextInt();
51        }
52        current_time = new Time();
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
lwj@lwj-code:~/workspace/JAVA/2$ javac HCTS.java
lwj@lwj-code:~/workspace/JAVA/2$ java HCTS
Enter a command: t 1 30
Enter a command: l
car no. = 1111, car position = 120.0
car no. = 2222, car position = 180.0
car no. = 3333, car position = 150.0
Enter a command:
```

파일 변경 후

```
34      // 자동차 정보와 현재 시간을 초기화한다.
35      public static void initialize()
36      {
37        car_list = new Car[3];
38        in = new Scanner(System.in);
39        try{
40            inf = new Scanner(new File(pathname:"in.txt"));
41        }
42        catch(FileNotFoundException e){
43            System.out.println(e.getMessage());
44        }
45
46        for(int i=0; i<car_list.length; i++){
47            car_list[i] = new Car();
48            car_list[i].no = inf.nextInt();
49            car_list[i].speed = inf.nextInt();
50            car_list[i].position = inf.nextInt();
51        }
52        current_time = new Time();
53        current_time.hour = 0;
54        current_time.minute = 0;
55      }
```

PROBLEMS OUTPUT DEBUG CONSOLE TERMINAL PORTS

```
lwj@lwj-code:~/workspace/JAVA/2$ cat in.txt
1111 100 20
2222 120 30
3333 80 50
lwj@lwj-code:~/workspace/JAVA/2$ java HCTS
Enter a command: t 1 30
Enter a command: l
car no. = 1111, car position = 110.0
car no. = 2222, car position = 210.0
car no. = 3333, car position = 140.0
Enter a command:
```

□ 5

기존

```
lwj@lwj-code:~/workspace/JAVA/2$ javac HCTS.java
lwj@lwj-code:~/workspace/JAVA/2$ java HCTS
Enter a command: t 1 30
Enter a command: l
car no. = 1111, car position = 120.0
car no. = 2222, car position = 180.0
car no. = 3333, car position = 150.0
Enter a command:
```

변경 후

```
 99      // 주어진 시간(min) 만큼 이동한 자동차 위치를 조정한다
100      public static void move_all_cars(int min)
101      {
102          for(int i=0; i<car_list.length; i++)
103          {
104              //car_list[i].position += (double) car_list[i].speed/60*min;
105              car_list[i].position += (double) (car_list[i].speed/60*min);
106              if(car_list[i].position > 500.0)
107                  car_list[i].position = 500.0;   // 목적지에 도착
108          }
109      }
```

```
PROBLEMS   OUTPUT   DEBUG CONSOLE   TERMINAL   PORTS

lwj@lwj-code:~/workspace/JAVA/2$ javac HCTS.java
lwj@lwj-code:~/workspace/JAVA/2$ java HCTS
Enter a command: t 1 30
Enter a command: l
car no. = 1111, car position = 90.0
car no. = 2222, car position = 180.0
car no. = 3333, car position = 90.0
Enter a command:
```

JAVA에서 연산자 우선순위의 경우 ()와 같이 Type casting에 사용되는 연산자는 우선순위가 가장 높다. 따라서 기존 방식대로 실행할 경우 (double) car_list[i].speed가 먼저 실행된 후에 /60*min이 먼저 실행된다. 수정한 방식의 경우 형변환 뒤에 위치한 연산과정이 ()로 감싸져 있기 때문에 계산 이후 형변환이 진행된다. 따라서 예를 들어 1111번 차량은 Speed가 80으로, initial- position은 0으로 설정되어있는데 이를 int 형식에서만 계산할 경우 80/60 = 1이 나오게 되므로 결과는 1*90인 90이 나오게 된다. 결론적으로 수정된 코드는 잘못된 코드이다.

□ 코드 전문

```
// HCTS.java
import java.util.*;
import java.io.*;

public class HCTS
{
      static Car[] car_list;
      static Time current_time;
      static Scanner in;
      static Scanner inf;

      public static void main(String[] args)
      {
            initialize();

            do {
               char cmd = read_command();
               if(cmd=='t')
                   handle_setting_time();
               else if(cmd=='l')
                   handle_locating_cars();
               else if(cmd=='q')
                    handle_quit();
               else
                   System.out.printf("command error: %s%n", cmd);
            } while(true);
      } // end of main()

      public static void handle_quit(){
        System.out.println("Good Bye!");
        System.exit(-1);
      }

      // 자동차 정보와 현재 시간을 초기화한다.
      public static void initialize()
      {
        car_list = new Car[3];
        in = new Scanner(System.in);
        try{
            inf = new Scanner(new File("in.txt"));
        }
        catch(FileNotFoundException e){
            System.out.println(e.getMessage());
        }
```

```
        for(int i=0; i<car_list.length; i++){
            car_list[i] = new Car();
            car_list[i].no = inf.nextInt();
            car_list[i].speed = inf.nextInt();
            car_list[i].position = inf.nextInt();
        }
        current_time = new Time();
        current_time.hour = 0;
        current_time.minute = 0;
    }

    // 명령어를 읽어들인다
    public static char read_command()
    {
          System.out.printf("Enter a command: ");
          String s = in.next();
          return s.charAt(0);  // 읽어들인 스트링의 첫번째 문자를 명령어로 인식
    }

    // 현재 시간 설정 명령('t') 처리
    public static void handle_setting_time()
    {
          Time t = new Time();
          t.hour = in.nextInt();
          t.minute = in.nextInt();

          int min = calculate_time_difference(t);
          set_current_time(t);
          move_all_cars(min);

    }

    // 차량 정보 출력 명령('s')  처리
    public static void handle_locating_cars()
    {
         for(int i=0; i<car_list.length; i++){
             print_car_info(car_list[i]);
             toString(car_list[i]);
          }
    }

    // 새로운 current_time 을 설정한다
    public static void set_current_time(Time t)
    {
         current_time = t;
    }

    // 시간의 차이(분단위) t - current_time 를 계산한다
```

```
      public static int calculate_time_difference(Time t)
      {
           return  (t.hour-current_time.hour)*60 + (t.minute-
current_time.minute);
      }

      // 주어진 시간(min) 만큼 이동한 자동차 위치를 조정한다
      public static void move_all_cars(int min)
      {
           for(int i=0; i<car_list.length; i++)
           {
                car_list[i].position += (double) car_list[i].speed/60*min;
                //car_list[i].position += (double) (car_list[i].speed/60*min);
                if(car_list[i].position > 500.0)
                    car_list[i].position = 500.0;   // 목적지에 도착
           }
      }

      // 차량 정보(자동차 번호, 및 현재 위치)를 출력한다
      public static void print_car_info(Car c)
      {
           //System.out.printf("car no. = %d, car position = %f%n", c.no,
c.position);
            System.out.println(toString(c));
      }

    public static String toString(Car c){
        return "car no. = " + c.no + ", car position = " + c.position;
    }
} // end of CarManager class

class Time
{
    int hour;
    int minute;
}

class Car
{
    int no;
    int speed;
    double position;
}
```