Part 2: Solar System Example

When our virtual Solar System is running, this menu is displayed as shown in **Figure 1**

```
Welcome to The Virtual Solar System
----------------
Available Command:
V - View the current position of every planet in this Solar System
E - Add Earth to the Solar System
S - Add Saturn to the Solar System
O - Orbit every planet in this Solar System
Q - Quit from this Solar System
----------------
Input Command : |
```

Figure 1: Main Menu

▪ Option "V" - View the current position of every planet in this Solar System

▪ Option "E" - Add Earth to the Solar System

▪ Option "S" - Add Saturn to the Solar System

▪ Option "O" - Orbit every planet in this Solar System

▪ Option "Q" - Quit from this Solar System

For option "V", the map of our Solar System will be printed. In **Figure 2**, "x" denotes the center of the orbit for every planet (this is a fixed position at 0,0) that will be added later on and "O" denotes all the available positions; note that the map will only be from (-2,-2)

```
----------------
Input Command : V
----------------
O-O-O-O-O
| | | | |
O-O-O-O-O
| | | | |
O-O-x-O-O
| | | | |
O-O-O-O-O
| | | | |
O-O-O-O-O
----------------
```

Figure 2: Our Solar System map

For option "E", the Earth will be added if it doesn't exist in the Solar System. If the Earth exists, error message will appear as shown in **Figure 4**. After successfully added the Earth, the map of our Solar System will be printed; note that every planet can orbit clockwisely to only 4 positions as shown in **Figure 3** but it will be at different position depends on the orbit radius (Earth is set to 1 and Saturn is set to 2).
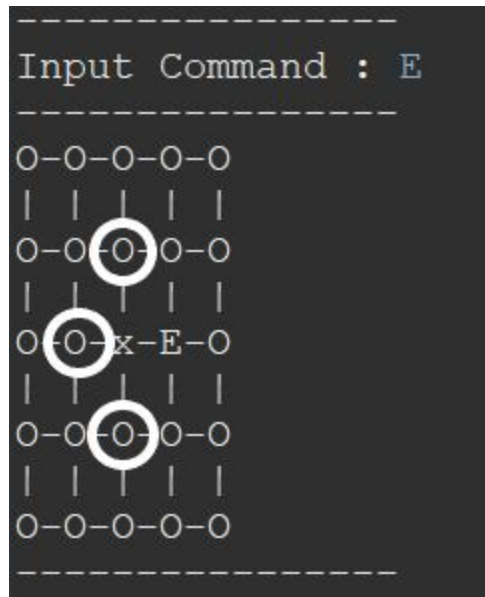

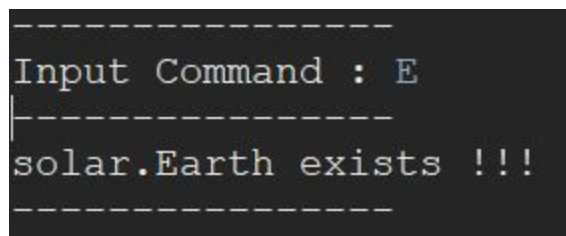**Figure 3: Add Earth to the Solar System**

Figure 4: Error occurred when Earth exists

For option "S", the Saturn will be added if it doesn't exist in the Solar System. If the Saturn exists, error message will appear as shown in **Figure 6**. Then, you have to specified the speed of the Saturn which means the number of times the Saturn will orbit if the orbit command is executed. After successfully added the Saturn, the map of our Solar System will be printed as shown in **Figure 5**.

```
-----------------
Input Command : S
-----------------
Input Speed : 1
O-O-O-O-O
| | | | |
O-O-O-O-O
| | | | |
O-O-x-E-S
| | | | |
O-O-O-O-O
| | | | |
O-O-O-O-O
-----------------
```

Figure 5: Add Saturn to the Solar System

```
-----------------
Input Command : S
-----------------
solar.Saturn exists !!!
-----------------
```

Figure 6: Error occurred when Saturn exists

For option "O", this command will make every planet in the Solar System orbits around the center (0,0) clockwisely. Assumed that the Saturn speed is one, Earth and Saturn will orbit around as shown in the printed map in **Figure 7**.

```
----------------
Input Command : O
----------------
O-O-O-O-O
| | | | |
O-O-O-O-O
| | | | |
O-O-x-O-O
| | | | |
O-O-E-O-O
| | | | |
O-O-S-O-O
----------------
```

Figure 7: Orbit every planet in the Solar System

For option "Q", let's say goodbye to our Solar System, the program will said goodbye to you as shown in **Figure 8**.

```
----------------
Input Command : Q
|---------------
Have fun in other galaxies !
----------------
```

Figure 8: Exit the Solar System

Unfortunately, this Virtual Solar System has not complete yet. The Saturn is still a floating idea. Therefore, let's create the Saturn.

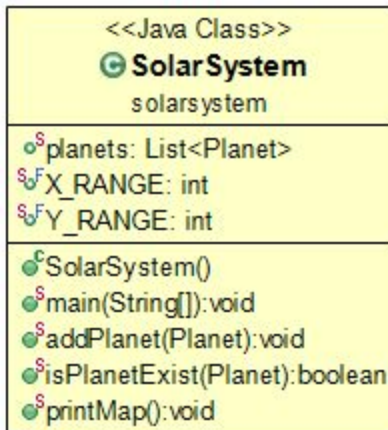The class-package is summarized below

Figure 9 Class diagram

Package solarsystem

Class *SolarSystem*

Field

- **+ List<Planet> planets -** A list of planets in solar system.

- **+ int X_RANGE -** The final size of map on x-axis from -X_RANGE to X_RANGE

- **+ int Y_RANGE -** The final size of map on y-axis from -Y_RANGE to Y_RANGE

Method

- **+ void main()** - Start our virtual Solar System that wait for input command and display results.

- **+ void addPlanet(Planet planet)** - Add planet to the list of planets only when this planet does not exist in the list of planets.

- **+ boolean isPlanetExist(Planet planet)** - Check whether this planet exists in the list of planets. Return true if exists otherwise return false.

- **+ void printMap()** - Print the map using X_RANGE and Y_RANGE as a size. All the coordinate will be printed as "O" and the orbit center will be printed as "X". If there are any planets on the map, print the first letter of the planet instead at the planet's coordinate.