Java Desktop Application Development
CST3613
Fall 2022

EXAM

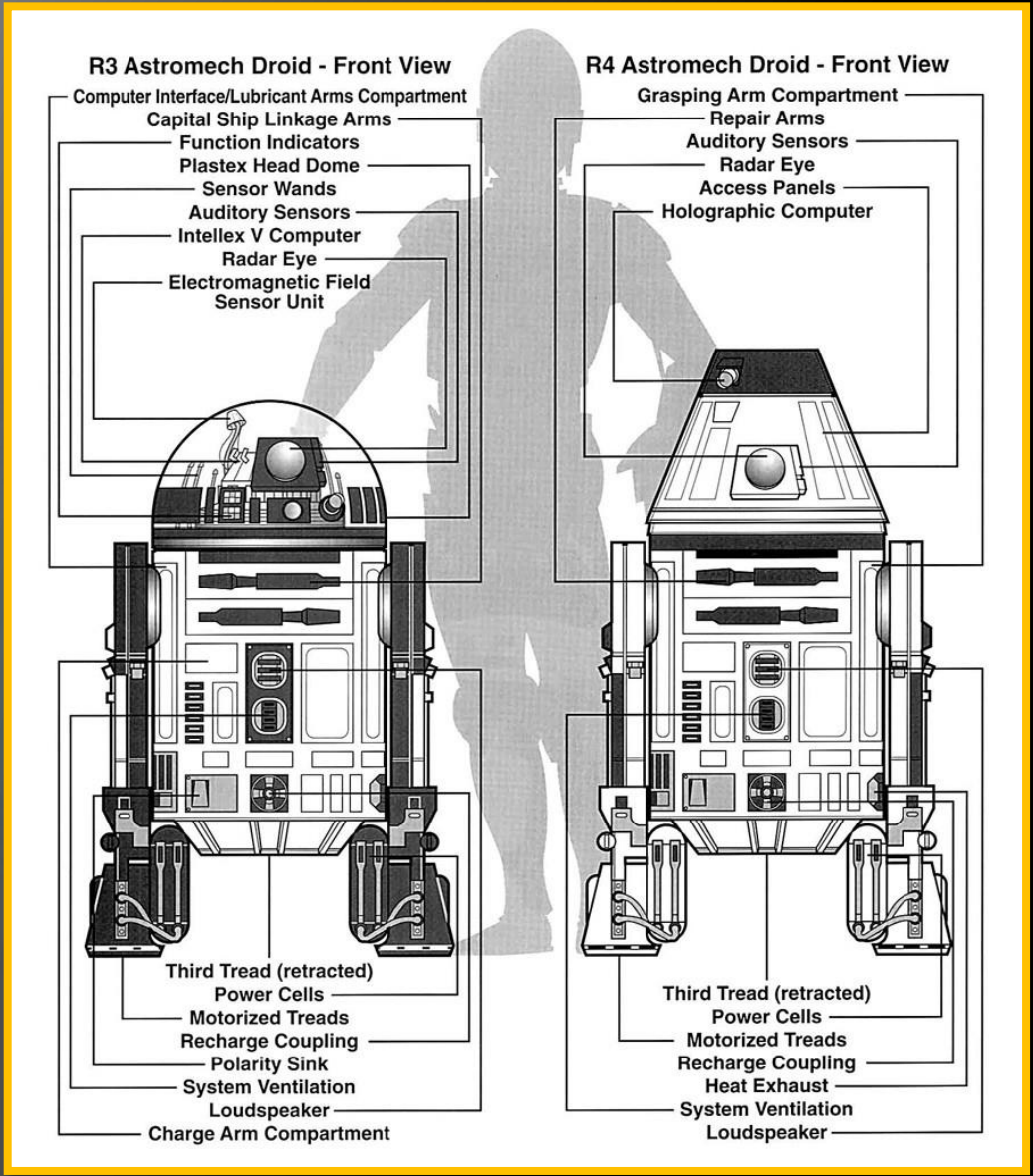
MIDTERM EXAM

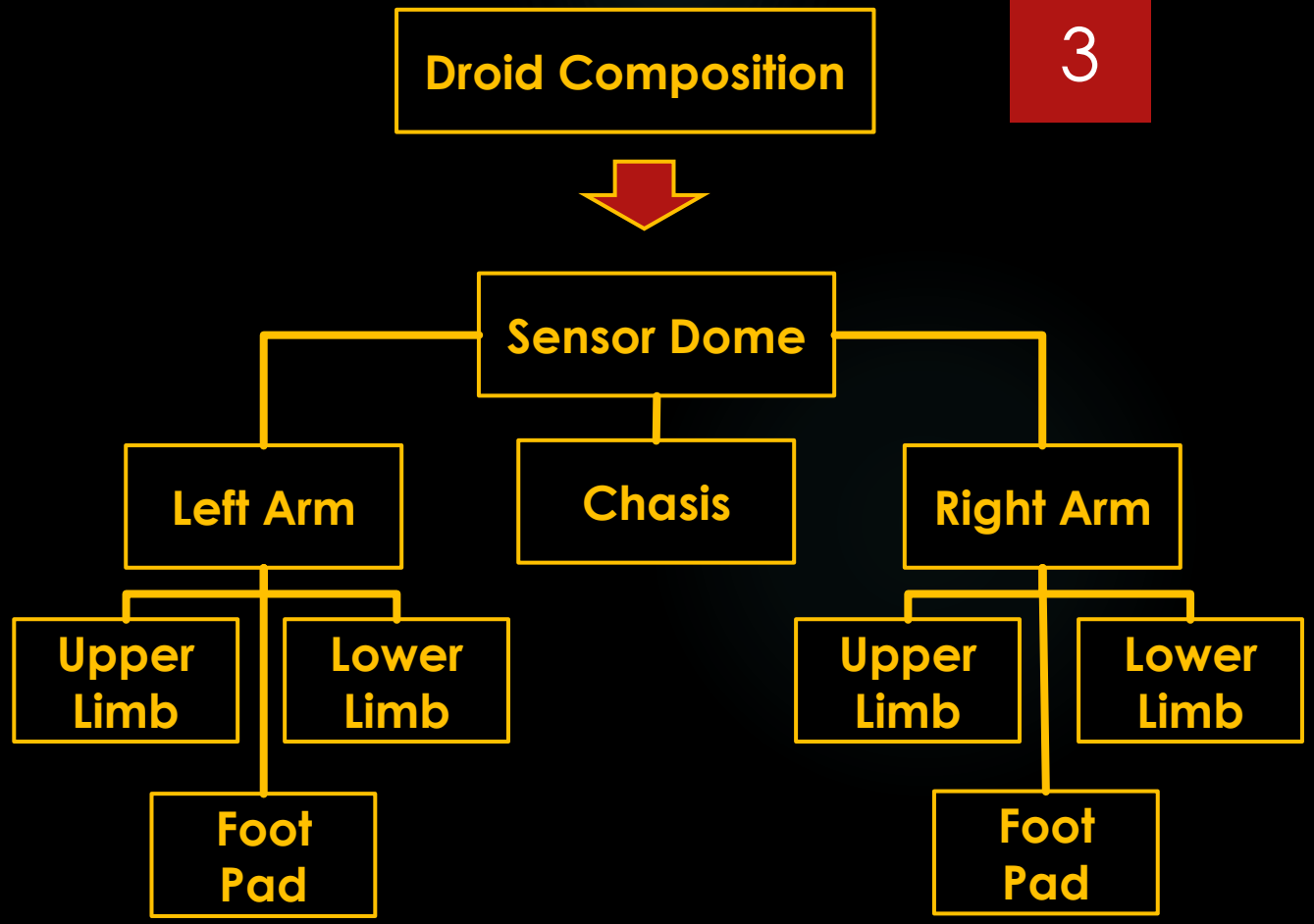
COMPREHENSIVE OOP

Exam Instructions

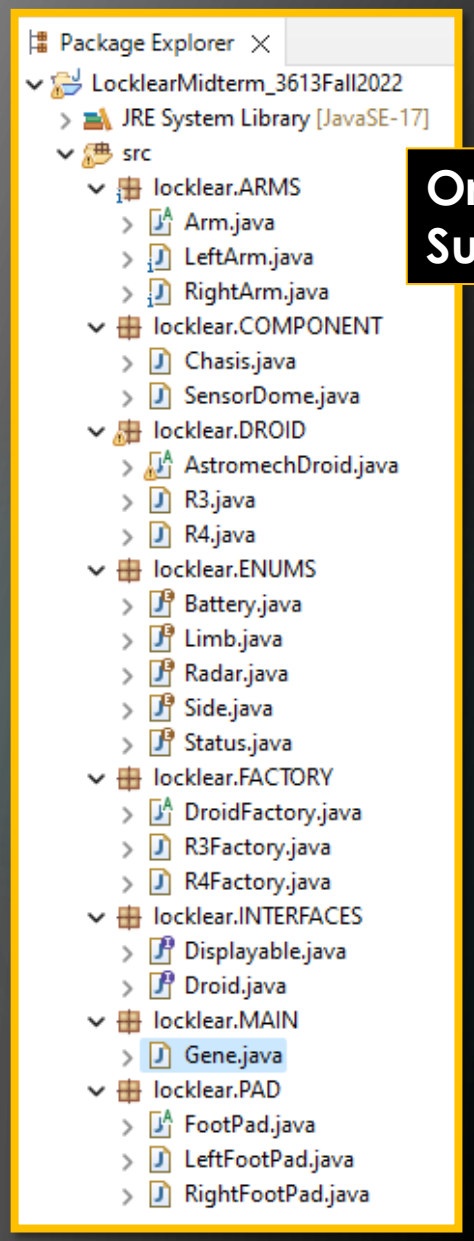
- This is your Midterm Exam it is worth 30 points and is designed to evaluate your understanding of Java OOP.
- Grading of this exam is binary.
  - 30 points if program follow specifications and produces expected output.
  - 10 points otherwise.
- Read all UML diagrams, context boxes, and method specification charts carefully.
- **YOU MUST BE PRESENT IN CLASS TO TAKE THE EXAM.**
- You have the entire class period to complete the exam.
- You must submit before the deadline of 9:40 to receive any points.
- Your submission must be a Compressed Eclipse project.
- You may use any resources you have during the exam.
- You may not communicate with anyone during the exam.
- Include the provided Gene.java file for testing of your program.

General


R3 Astromech Droid - Front View
Computer Interface/Lubricant Arms Compartment
Capital Ship Linkage Arms
Function Indicators
Plastex Head Dome
Sensor Wands
Auditory Sensors
Intellex V Computer
Radar Eye
Electromagnetic Field Sensor Unit
Third Tread (retracted)
Power Cells
Motorized Treads
Recharge Coupling
Polarity Sink
System Ventilation
Loudspeaker
Charge Arm Compartment
R4 Astromech Droid - Front View
Grasping Arm Compartment
Repair Arms
Auditory Sensors
Radar Eye
Access Panels
Holographic Computer
Third Tread (retracted)
Power Cells
Motorized Treads
Recharge Coupling
Heat Exhaust
System Ventilation
Loudspeaker

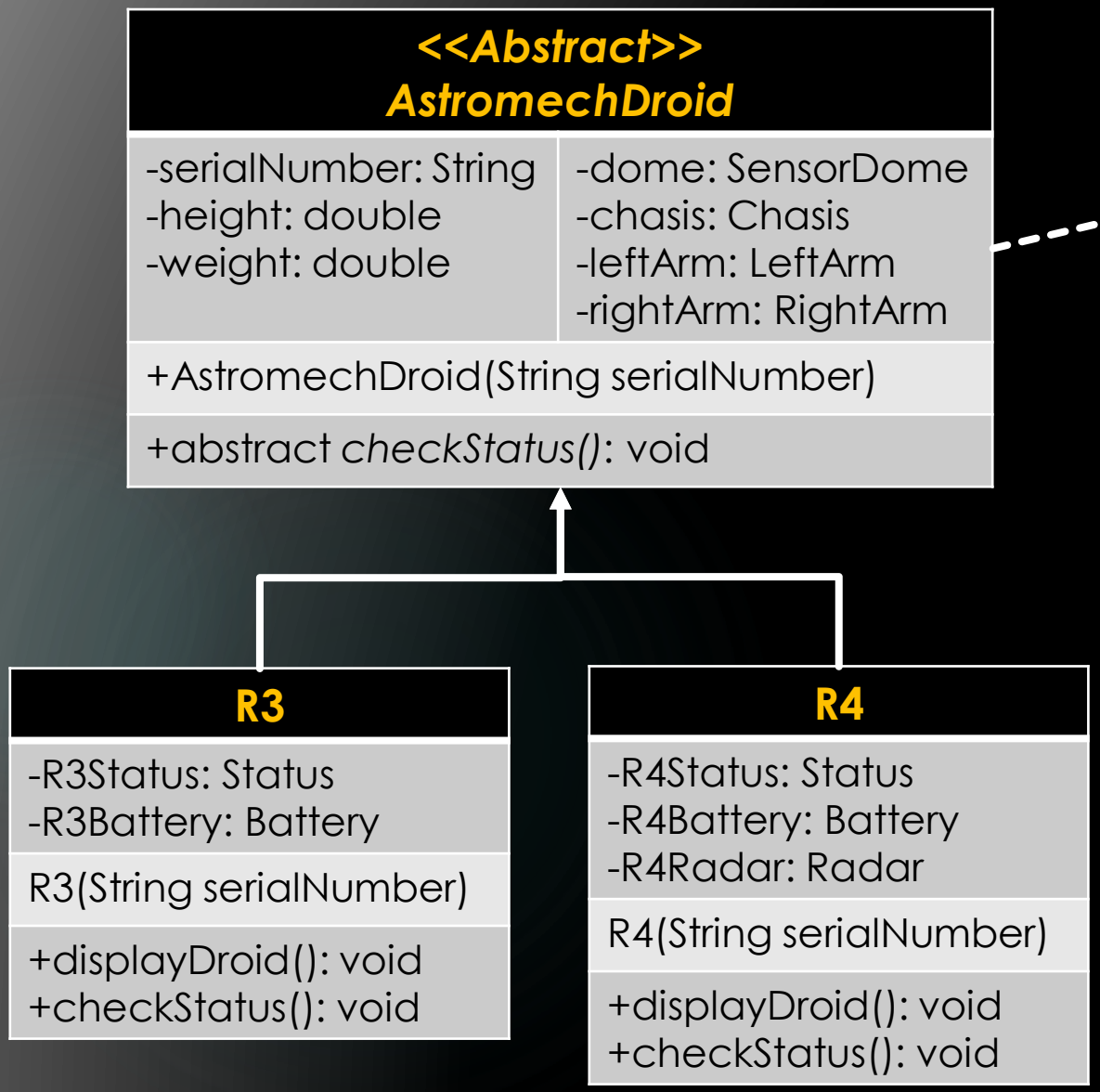

Droid Composition
Sensor Dome
Left Arm
Chasis
Right Arm
Upper Limb
Lower Limb
Foot Pad
Upper Limb
Lower Limb
Foot Pad

Program Structure



Organize your program exactly as shown.
Substitute your name where you see mine.

AstromechDroid Class



AT INITILIZATION:
R3 Height is **SensorDome Height + Chasis Height**
R4 Height is **SensorDome Height + Chasis Height**
R3 Weight is **SensorDome Weight + Chasis Height**
R4 Weight is **SensorDome Weight + Chasis Weight**
R3Status and R4Status are '**ONLINE**'
R3Battery is **R3**
R4Battery is **R4**
R4Radar is **R4R**

ALL subclasses **must use** their superclass constructor.

The initialization of **ALL** Object State **must occur** inside the subclass constructor.

Chasis Class

Chasis
-serialNumber: String -height: double -weight: double -status: Status
+Chasis(String serialNumber)
+chasisCheck(): boolean

AT INITILIZATION:
Status is **ONLINE**

serialNumber = serialNumber of the AstromechDroid

AstromechDroid	Height	Weight
R3	4	400
R4	5	500

SensorDome Class

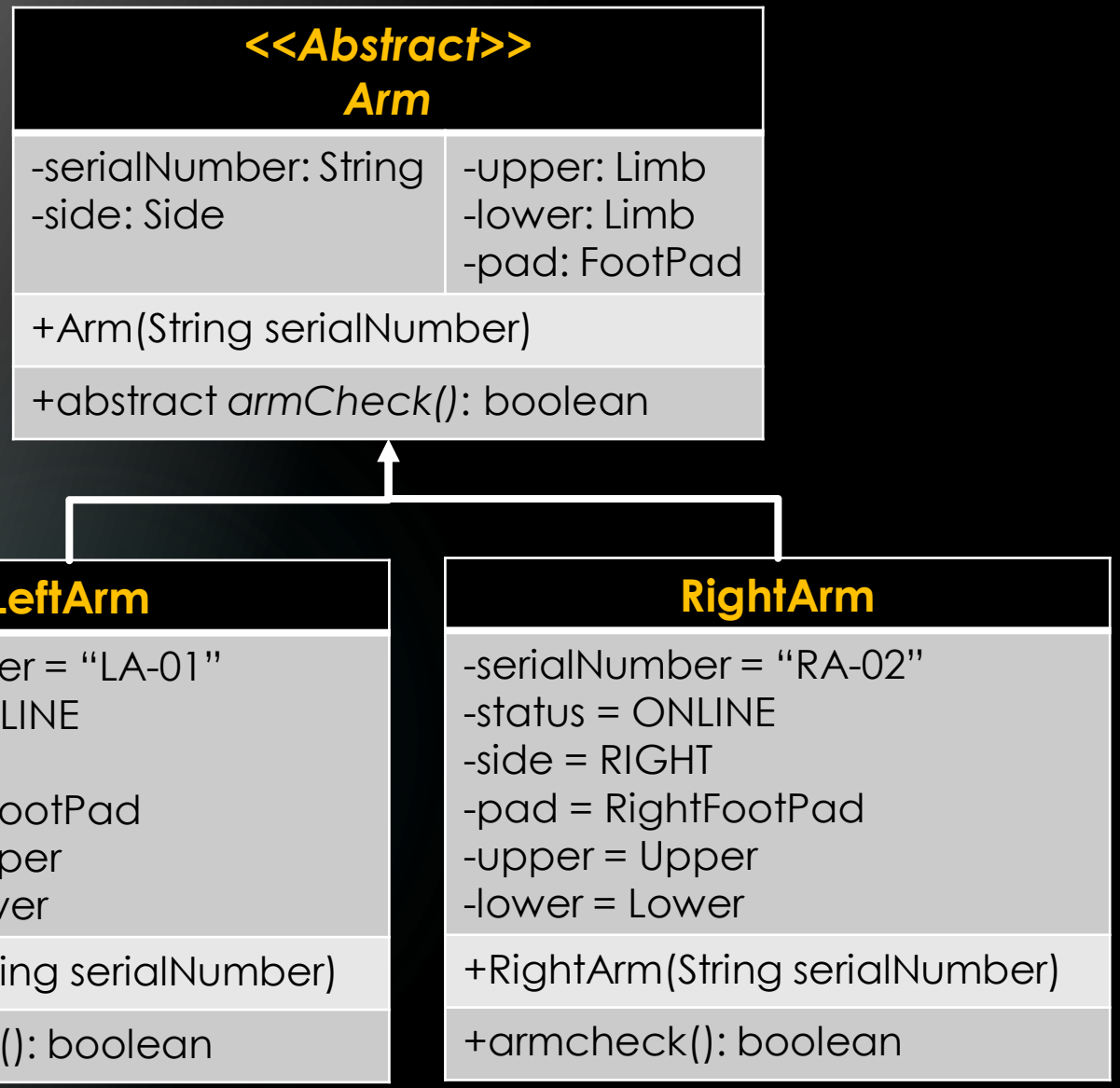
SensorDome
-serialNumber: String -height: double -weight: double -status: Status
+SensorDome(String serialNumber)
+sensorDomeCheck(): boolean

AT INITILIZATION:
Status is **ONLINE**

serialNumber = serialNumber of the AstromechDroid

AstromechDroid	Height	Weight
R3	2	200
R4	2	150

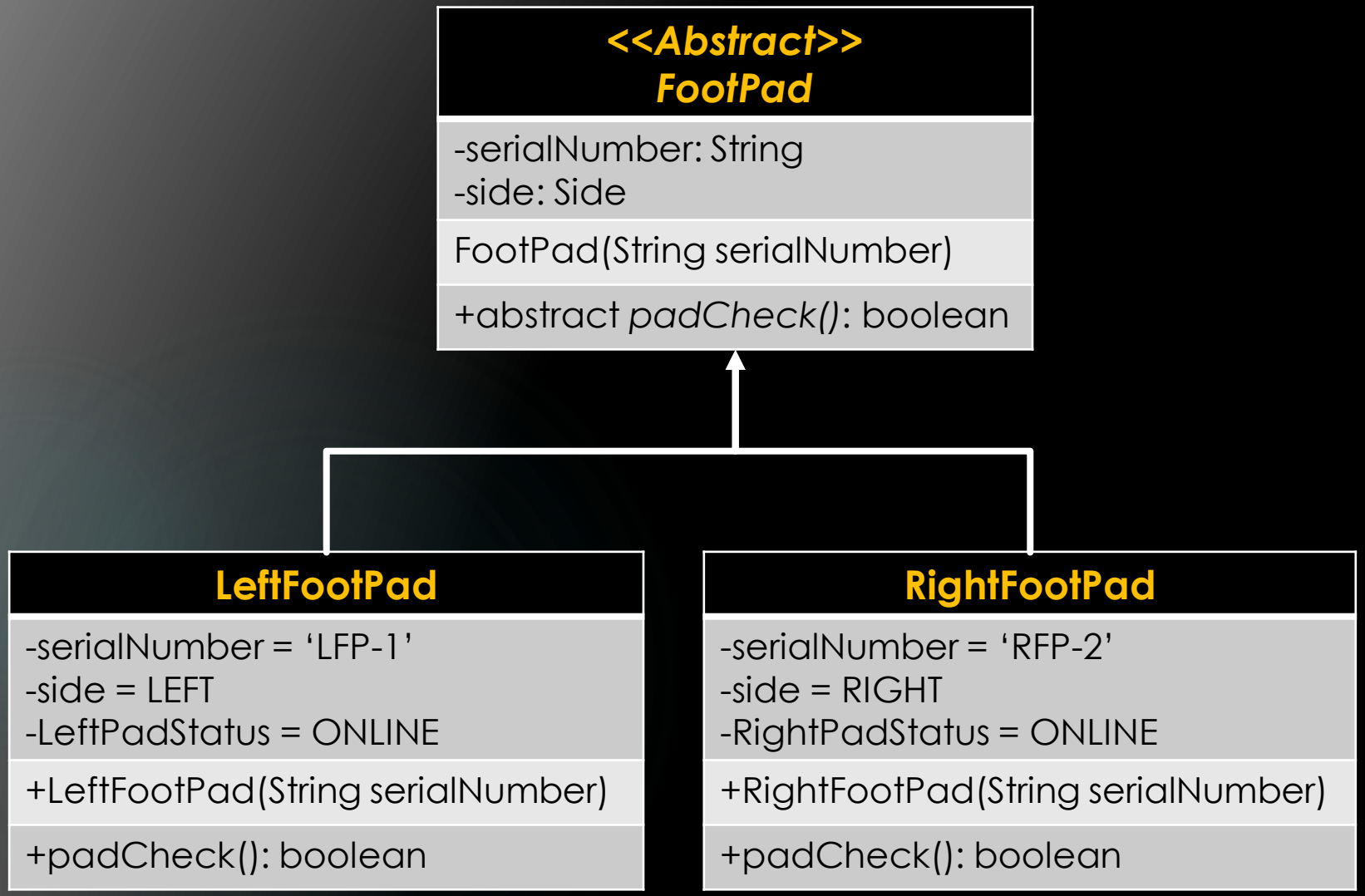
Arm Class



ALL subclasses **must use** their superclass constructor.

The initialization of **ALL** Object State **must occur** inside the subclass constructor.

FootPad Class



ALL subclasses **must use** their superclass constructor.

The initialization of **ALL** Object State **must occur** inside the subclass constructor.

Enumerations

Side
LEFT,RIGHT

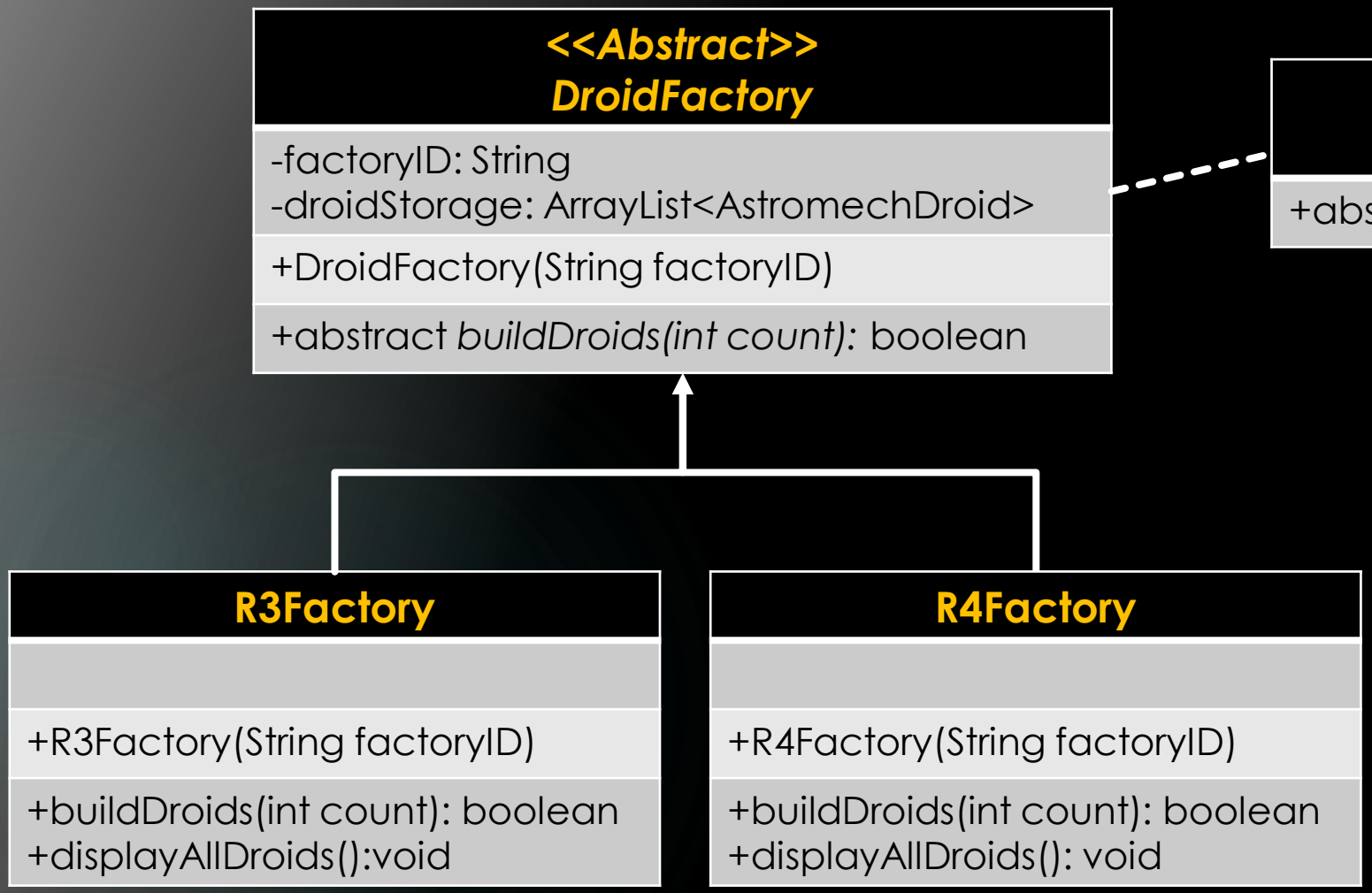
Status
ONLINE,OFFLINE

Limb
Upper("Upper",1) Lower("Lower",2) -type: String -value: int
-Limb(String type, int value)

Battery
R3("Lithium",1000) R4("Trithium",2000) -type: String -amps: int
-Battery(String type, int amps)

Radar
R4R("Doppler",500) -type: String -range: int
-Radar(String type, int range)

DroidFactory Class



ALL subclasses **must use** their superclass constructor.

The initialization of **ALL** Object State **must occur** inside the subclass constructor.

AstromechDroid serial numbers start with **R3-000** and **R4-000** respectively and **increment by one** for each R3 and R4 droid created.

Method Specifications

Class	Method	Input	Processing
R3	displayDroid	None	Displays as information about the R3 as shown in the Expected Console Output
R4	displayDroid	None	Displays as information about the R4 as shown in the Expected Console Output
R3	checkStatus	None	Checks that the status of the SensorDome, Chasis, Left Arm, and Right Arm are ONLINE if true sets the status of the R3 to ONLINE and prints "R3 Astromech is ONLINE“ to the Log if false sets the status of the R3 to OFFLINE and prints "R3 Astromech is OFFLINE"
R4	checkStatus	None	Checks that the status of the SensorDome, Chasis, Left Arm, and Right Arm are ONLINE if true sets the status of the R4 to ONLINE and prints "R4 Astromech is ONLINE“ to the Log if false sets the status of the R4 to OFFLINE and prints "R4 Astromech is OFFLINE"
LeftArm	armCheck	None	Checks that status of the LeftArmStatus is ONLINE and the status of the its pad is also ONLINE if so, returns true otherwise sets the LeftArmStatus to OFFLINE and returns false.
RightArm	armCheck	None	Checks that status of the RightArmStatus is ONLINE and the status of the its pad is also ONLINE if so, returns true otherwise sets the RightArmStatus to OFFLINE and returns false.
LeftFootPad	padCheck	None	Checks that status of the LeftPadStatus is ONLINE and the status of the its pad is also ONLINE if so, returns true otherwise sets the LeftPadStatus to OFFLINE and returns false.
RightFootPad	padCheck	None	Checks that status of the RightPadStatus is ONLINE and the status of the its pad is also ONLINE if so, returns true otherwise sets the RightPadStatus to OFFLINE and returns false.

Method Specifications

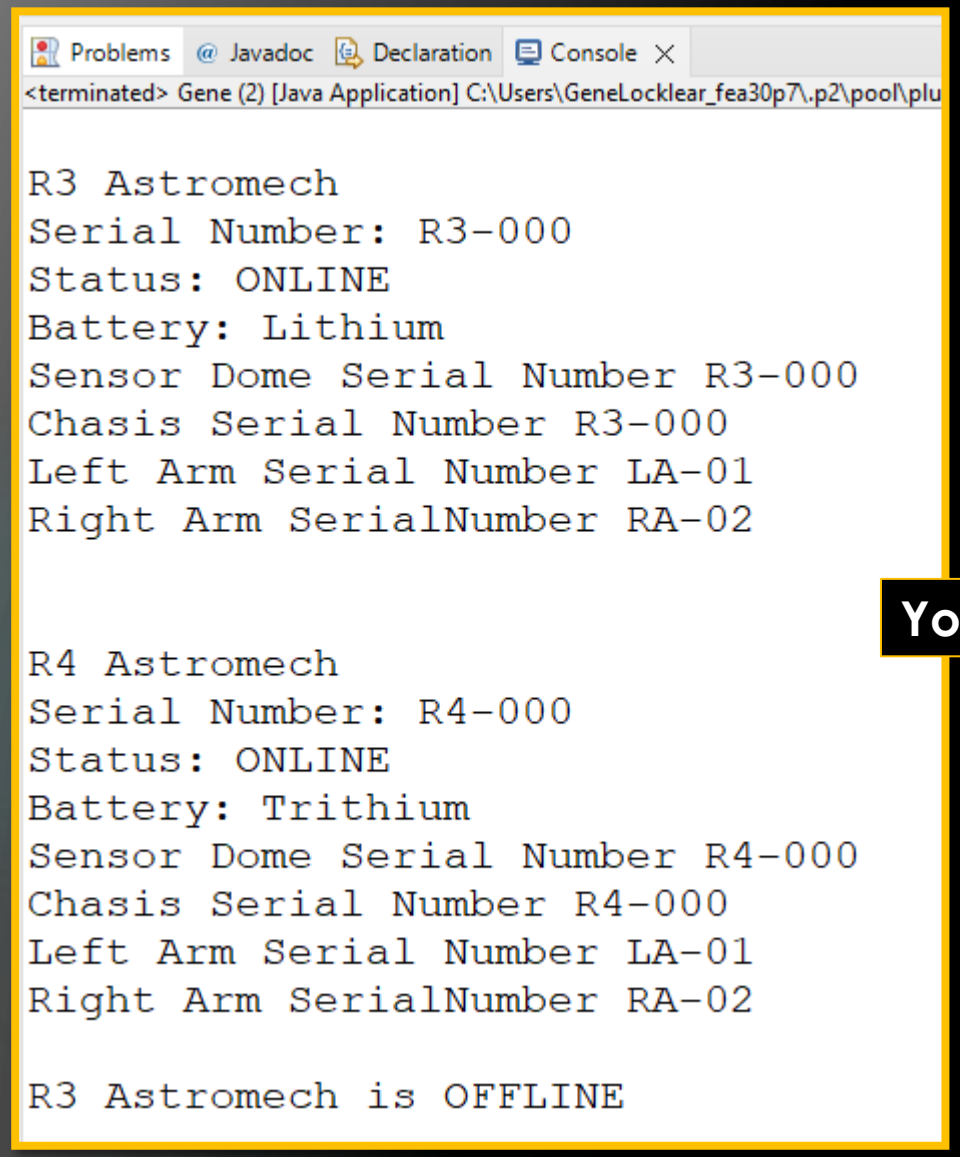
Class	Method	Input	Processing
SensorDome	sensorDomeCheck	None	Checks that the status is ONLINE and if so, returns true otherwise returns false.
Chasis	chasisCheck	None	Checks that the status is ONLINE and if so, returns true otherwise returns false.
R3Factory	buildDroids	count	Creates the specified number of R3s and adds them to the droidStorage attribute and returns true
R4Factory	buildDroids	count	Creates the specified number of R4s and adds them to the droidStorage attribute and returns true
R3Factory	displayAllDroids	None	Call the displayDroid method for all R3s in the droidStorage attribute
R4Factory	displayAllDroids	None	Call the displayDroid method for all R4s in the droidStorage attribute

Gene Class


```
 6 public class Gene {
 7
 8     public static void main(String[] args) {
 9         R3Factory R3F = new R3Factory("R3FAC");
10         R4Factory R4F = new R4Factory("R4FAC");
11
12         System.out.println();
13         R3F.buildDroids(1);
14         R4F.buildDroids(1);
15
16         R3F.displayAllDroids();
17         System.out.println();
18         R4F.displayAllDroids();
19
20         R3F.getDroidStorage().get(0).getLeftArm().setLeftArmStatus(Status.OFFLINE);
21         R3F.getDroidStorage().get(0).checkStatus();
22
23     }
24
25 }
```

Use the **Gene.java** file provided substitute your name where you see mine. Otherwise, **Do not alter** the code or add any additional code to this file.

Expected Output



Your **Console Output** should look **exactly** as shown.