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1  """
2  -----
3  UNIT 5: Polymorphism ePortfolio Component
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5  -----
6
7  This program demonstrates the concept of polymorphism in Python
8  through a humanoid robot scenario. Each robot inherits from the
9  HumanoidRobot base class but overrides certain methods to perform
10 unique actions.
11
12 Polymorphism allows the same method to behave differently depending
13 on the object that calls it. This is especially useful when designing
14 systems that can handle multiple object types through a shared interface.
15 """
16
17 class HumanoidRobot:
18     """
19     A base class representing a generic humanoid robot.
20     """
21
22     def __init__(self, name, model):
23         """
24         Initialise the robot with a name and model.
25         """
26         self.name = name
27         self.model = model
28
29     def greet(self):
30         """
31         Display a generic greeting.
32         """
33         print(f"{self.name} (model {self.model}) says: Hello!")
34
35     def perform_task(self):
36         """
37         Perform a generic task – intended to be overridden by subclasses.
38         """
39         print(f"{self.name} is performing a generic humanoid task.")
40
```

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40
41     def make_sound(self):
42         """
43         Produce a basic robot sound.
44         """
45         print(f"{self.name} emits a simple robotic beep.")
46
47
48     class CleaningRobot(HumanoidRobot):
49         """
50         A subclass of HumanoidRobot that represents a cleaning robot.
51         """
52
53         def perform_task(self):
54             """
55             Override to perform a cleaning-specific task.
56             """
57             print(f"{self.name} is vacuuming and mopping the floor efficiently.")
58
59         def make_sound(self):
60             """
61             Override to produce cleaning-related sound.
62             """
63             print(f"{self.name} makes a soft sweeping sound: Whoosh!")
64
65
66     class CompanionRobot(HumanoidRobot):
67         """
68         A subclass of HumanoidRobot that represents a social companion robot.
69         """
70
71         def perform_task(self):
72             """
73             Override to perform an interactive, social task.
74             """
75             print(f"{self.name} is playing music and engaging in friendly conversation.")
76
77         def make_sound(self):
78             """
79             Override to produce a friendly vocal sound.
80             """
81             print(f"{self.name} says: Beep-boop! How are you feeling today?")
82
83
84     # --- Polymorphism Demonstration ---
85
86     # Create robot objects
87     robot1 = CleaningRobot("Cleany", "CR-2025")
88     robot2 = CompanionRobot("Buddy", "CP-1010")
89
90     # Store robots in a list
91     robots = [robot1, robot2]
92
93     # Demonstrate polymorphic behaviour
94     for robot in robots:
95         robot.greet()
96         robot.perform_task()
97         robot.make_sound()
98         print("----")

```

