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class Building:
    def __init__(self, area, occupants, building_type, outdoor_temp, indoor_temp):
        self.area = area
        self.occupants = occupants
        self.building_type = building_type
        self.outdoor_temp = outdoor_temp
        self.indoor_temp = indoor_temp

    def calculate_cooling_load(self):
        if self.building_type == "residential":
            cooling_load = 100 * self.occupants
        elif self.building_type == "commercial":
            cooling_load = 150 * self.occupants
        else:
            raise ValueError("Invalid building type. Supported types are 'residential' and 'commercial'.")

        overall_heat_transfer_coefficient = 30 # W/m²°C
        q_conduction = overall_heat_transfer_coefficient * self.area * (self.outdoor_temp - self.indoor_temp)
        sensible_cooling_load = q_conduction + cooling_load
        return sensible_cooling_load

def get_float_input(prompt):
    while True:
        try:
            value = float(input(prompt))
            return value
        except ValueError:
            print("Invalid input. Please enter a valid number.")

def get_int_input(prompt):
    while True:
        try:
            value = int(input(prompt))
            return value
        except ValueError:
            print("Invalid input. Please enter a valid integer.")

def get_building_type_input():

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while True:
    building_type = input("Enter the type of building (residential or commercial): ").lower()
    if building_type in ["residential", "commercial"]:
        return building_type
    else:
        print("Invalid building type. Supported types are 'residential' and 'commercial'.")

def main():
    buildings = []
    while True:
        print("\nCooling Load Calculator")
        print("1. Calculate cooling load for a building")
        print("2. Calculate cooling load for multiple buildings")
        print("3. Exit")
        choice = get_int_input("Enter your choice (1/2/3): ")

        if choice == 1:
            area = get_float_input("Enter the area of the building (in square meters): ")
            occupants = get_int_input("Enter the number of occupants in the building: ")
            building_type = get_building_type_input()
            outdoor_temp = get_float_input("Enter the outdoor temperature (in Celsius): ")
            indoor_temp = get_float_input("Enter the indoor desired temperature (in Celsius): ")

            try:
                building = Building(area, occupants, building_type, outdoor_temp, indoor_temp)
                cooling_load = building.calculate_cooling_load()
                print(f"The sensible cooling load for the building is: {cooling_load} W")
            except ValueError as e:
                print(e)

        elif choice == 2:
            num_buildings = get_int_input("Enter the number of buildings: ")
            for i in range(num_buildings):
                print(f"\nBuilding {i + 1}:")
                area = get_float_input("Enter the area of the building (in square meters): ")
                occupants = get_int_input("Enter the number of occupants in the building: ")
                building_type = get_building_type_input()
                outdoor_temp = get_float_input("Enter the outdoor temperature (in Celsius): ")
                indoor_temp = get_float_input("Enter the indoor desired temperature (in Celsius): ")

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        try:
            building = Building(area, occupants, building_type, outdoor_temp, indoor_temp)
            cooling_load = building.calculate_cooling_load()
            print(f"The sensible cooling load for Building {i + 1} is: {cooling_load} W")
            buildings.append(building)
        except ValueError as e:
            print(e)

    elif choice == 3:
        print("Exiting the program.")
        break

    else:
        print("Invalid choice. Please select a valid option.")

if __name__ == "__main__":
    main()

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