Method Dispatch in Java

Principles of Software System Construction
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How does a Method Call Execute?

Example call: `x.foo(5);`

- **Step 1 (compile time):** determine what class to look in
  - Look at the static type of the receiver (x in the example above)

- **Step 2 (compile time):** determine the method signature
  - Find all methods in the class with the right name
    - Includes inherited methods
  - Keep only methods that are **accessible**
    - E.g. a private method is not accessible to calls from outside the class
  - Keep only methods that are **applicable**
    - The types of the actual arguments (e.g. 5 has type int above) must be subtypes of the corresponding formal parameter type
  - Select the most specific method
    - m1 is more specific than m2 if each argument of m1 is a subtype of the corresponding argument of m2
  - Keep track of the method’s signature (argument types) for run-time
How does a Method Call Execute?

• Step 3 (run time): Determine the run-time type of the receiver
  – Look at the object in the heap to find out what its run-time type is

• Step 4 (run time): Locate the method to invoke
  – Starting at the run-time type, look for a method with the right name and argument types that are identical to those in the method found statically (step 2)
  – If it is found in the run-time type, invoke it.
  – Otherwise, continue the search in the superclass of the run-time type
  – This procedure will always find a method to invoke, due to the checks done during static typechecking
More Details


• For practice, try the algorithm given above on the inheritance question discussed in class