CSCI 334:
Principles of Programming Languages

Lecture 21: OO III & Tech. communication

Instructor: Dan Barowy

Williams

Topics

Topics

Virtual dispatch

Topics

Virtual dispatch

How to give a good talk

Topics

Virtual dispatch

How to give a good talk

Project Q&A

SWELL user testing

This weekend, 30-40 minutes.

`https://bit.ly/2EgWKgi`

It would be a real help if you have the time!

Refresher: Dynamic Dispatch

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c.honk()
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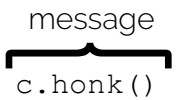

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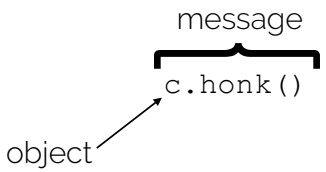

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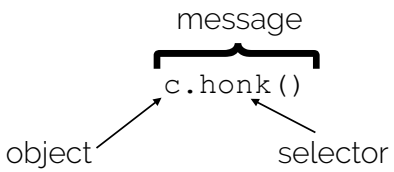

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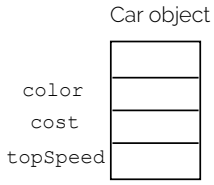

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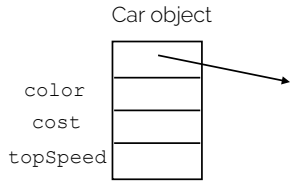

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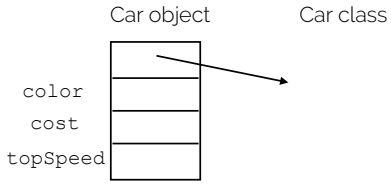

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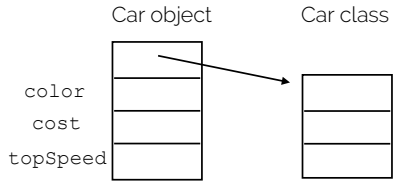

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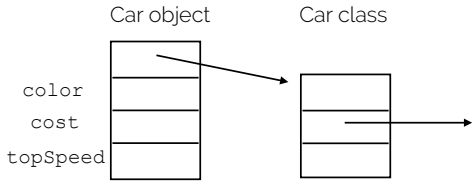

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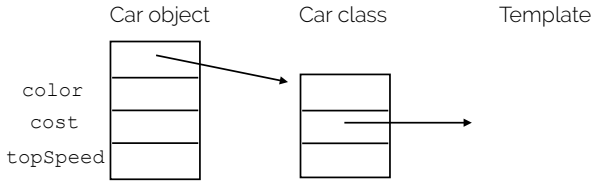

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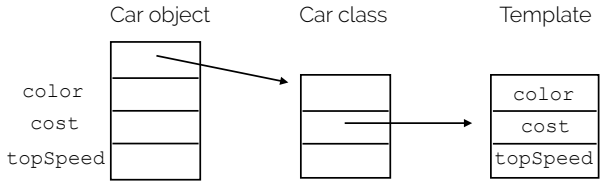

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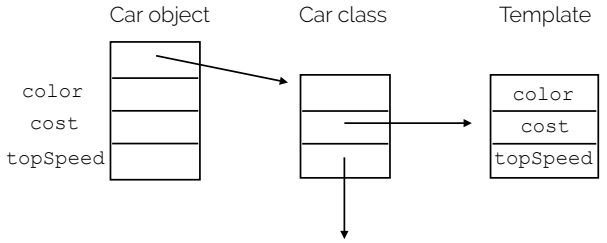

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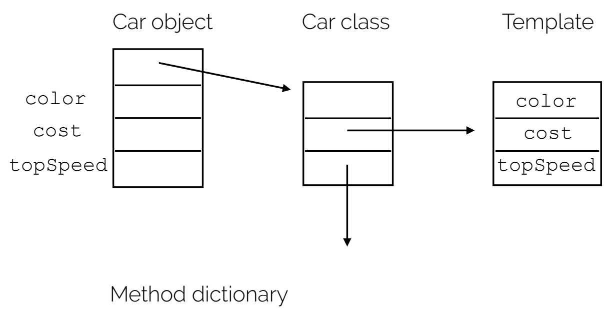

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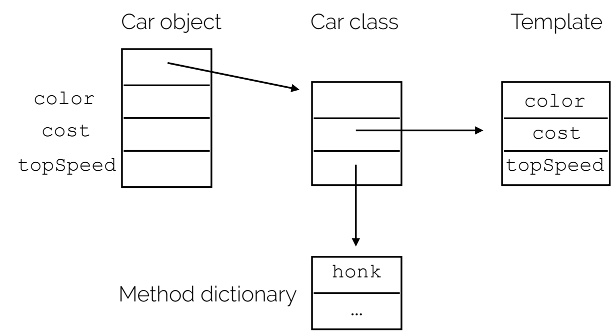

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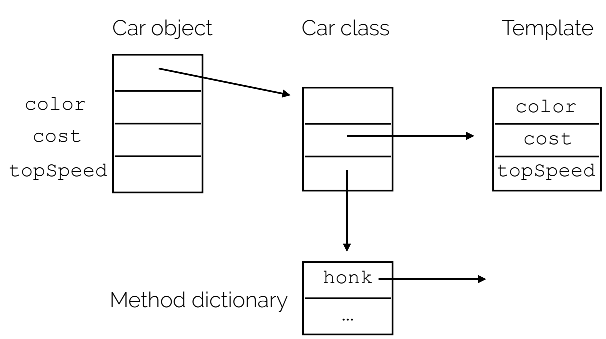

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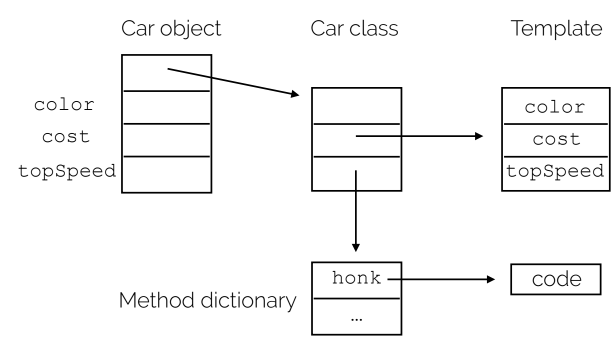

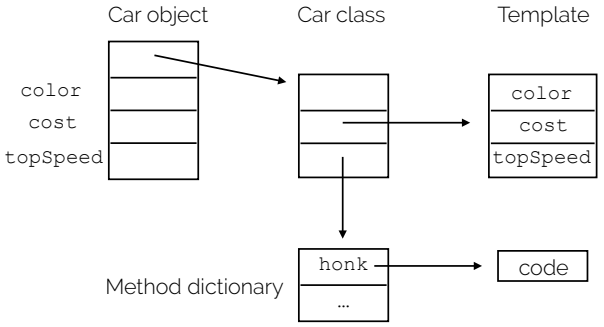

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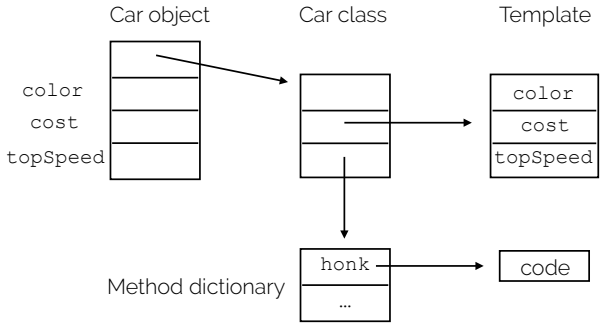

1 Call `c.honk();`

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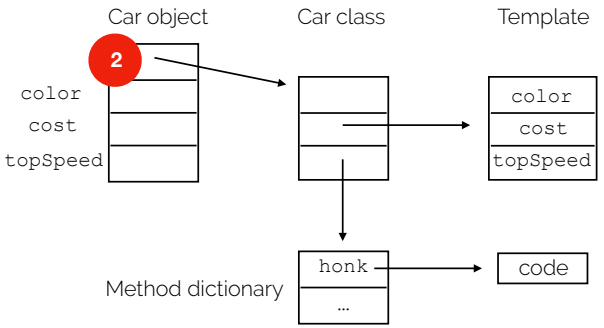

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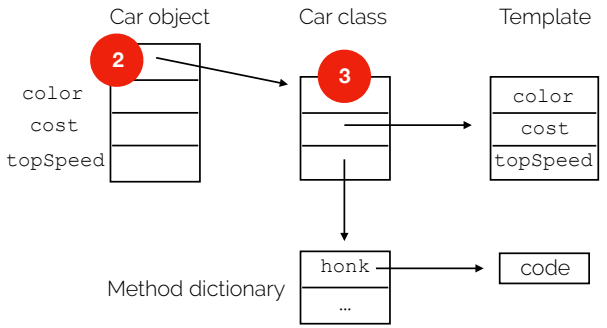

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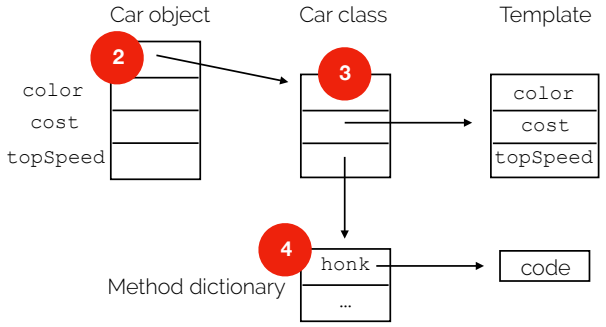

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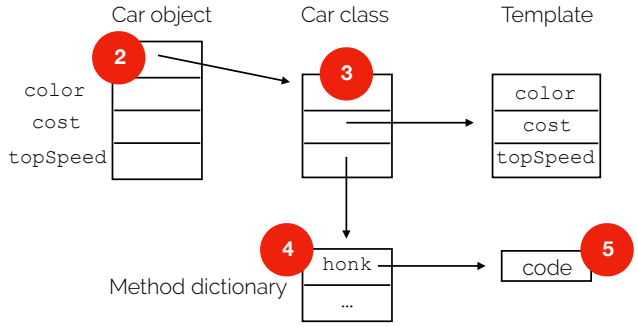
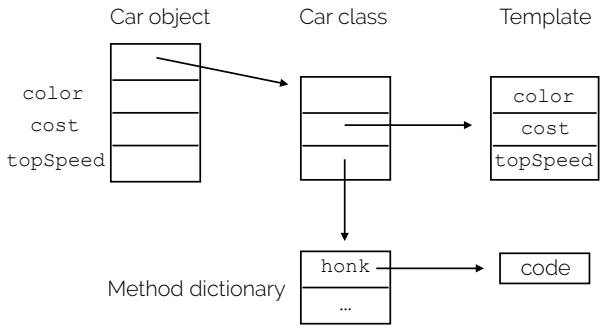


Inheritance

- One small change enables inheritance.



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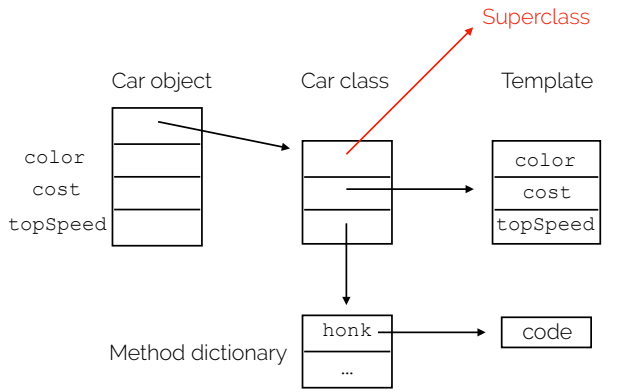

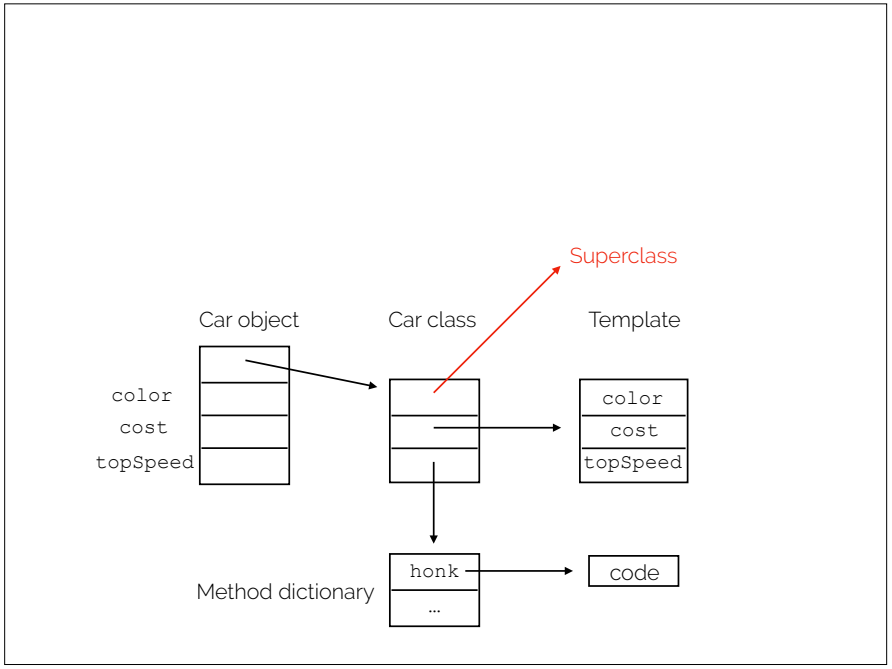
Superclass
Car object
Car class
Template
color
cost
topSpeed
color
cost
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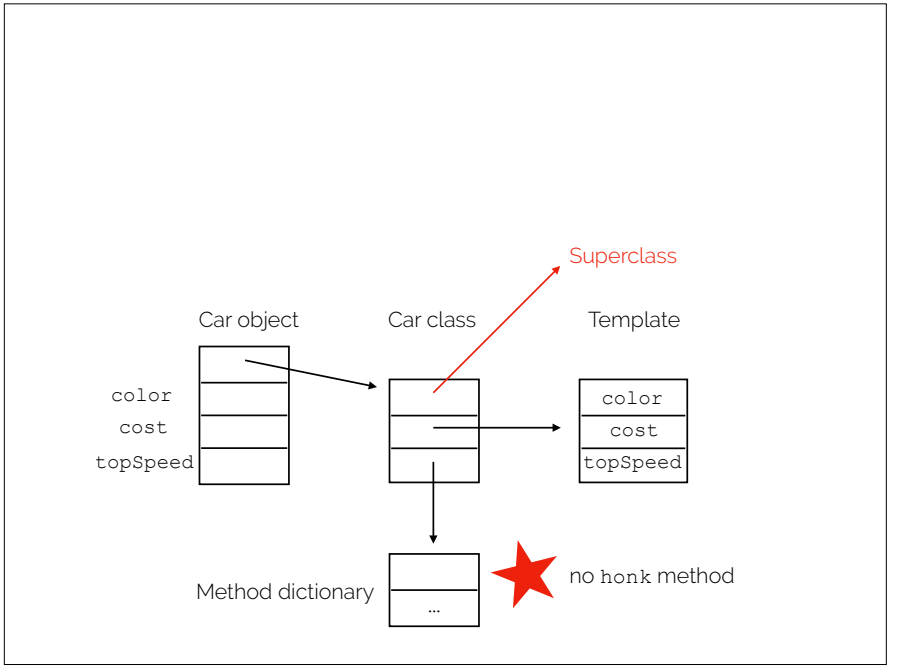
Method dictionary
honk
...
code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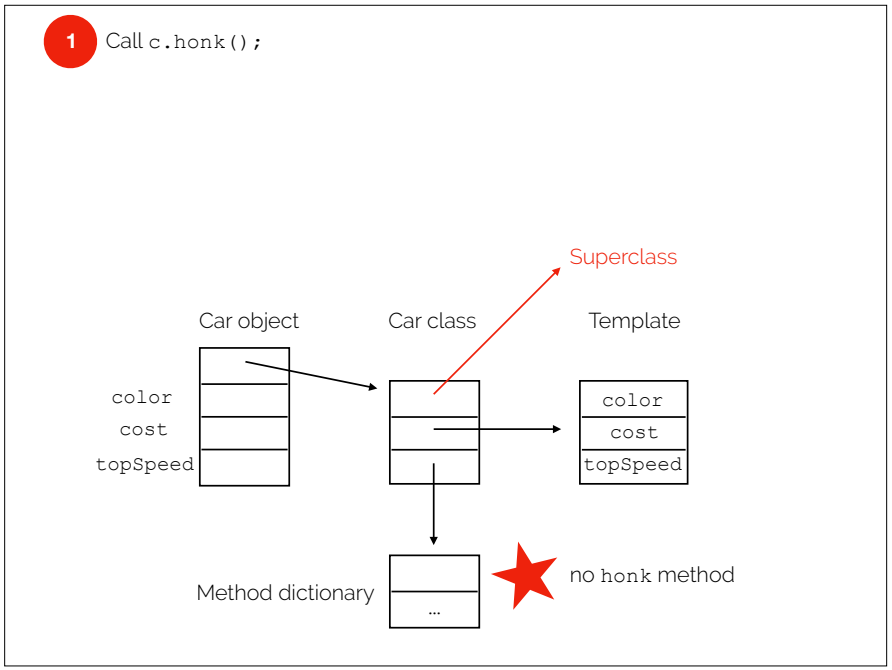
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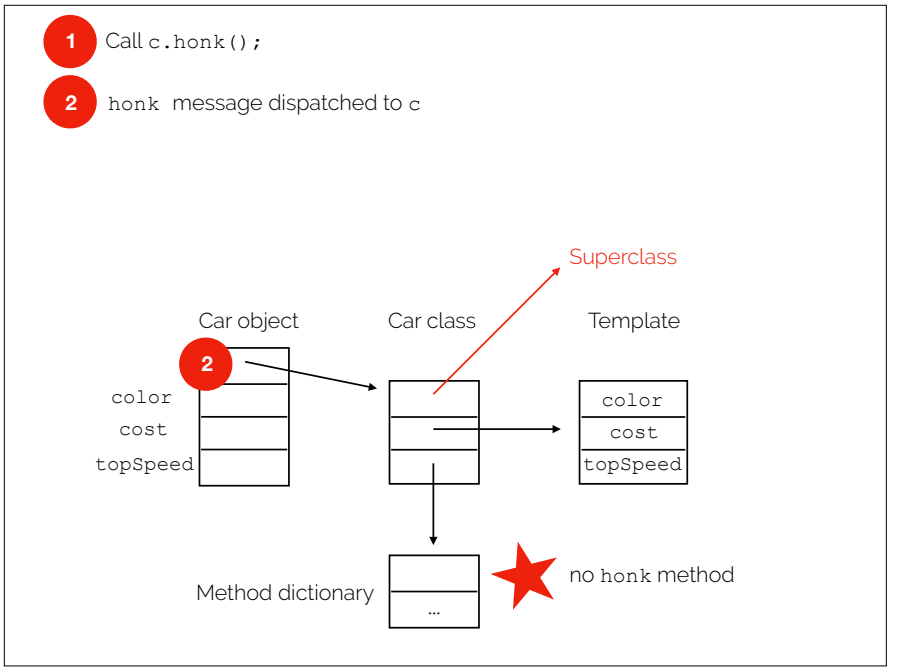
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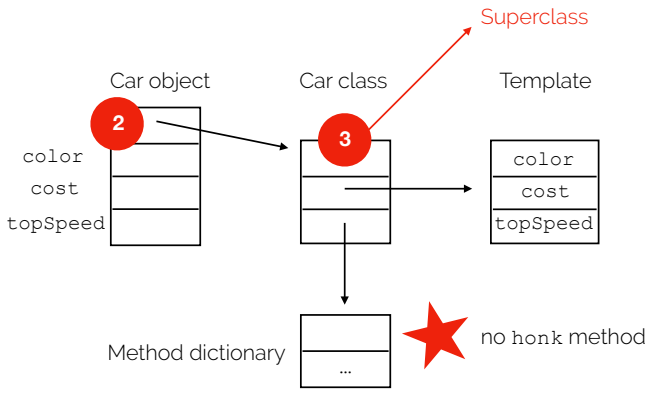

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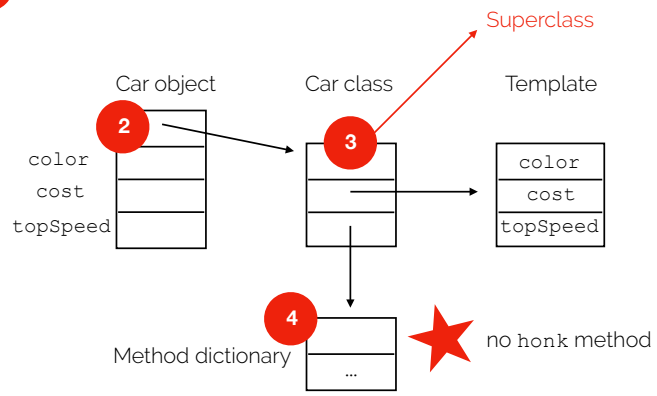

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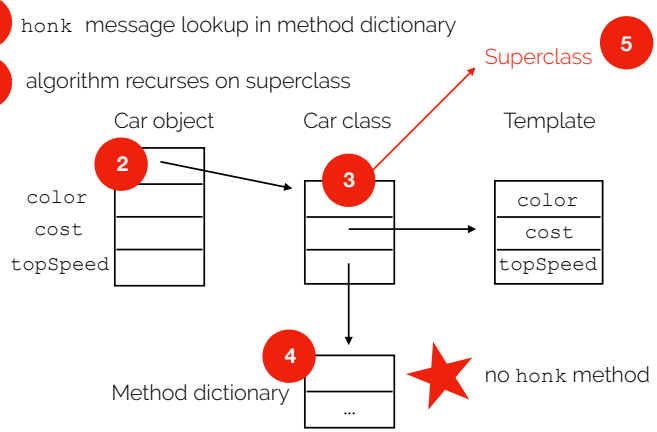
5. algorithm recurses on superclass



Question

How expensive is dynamic dispatch?

Cost

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1.dereference object

Cost

1.dereference object
2.defererence class

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O(n) method lookup

C++

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   b. periodically run the garbage collector
   c. run the JIT constantly, in a separate thread

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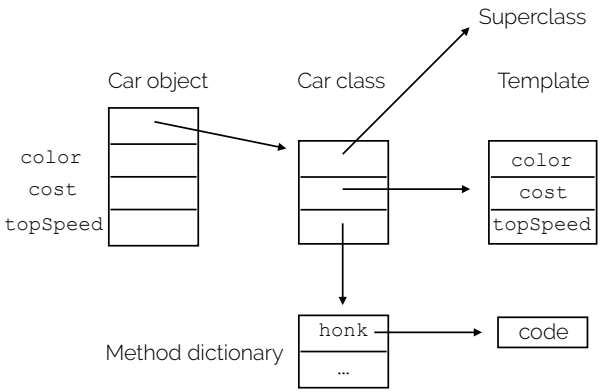
Without classes, C++ is basically C

C++ does OO efficiently



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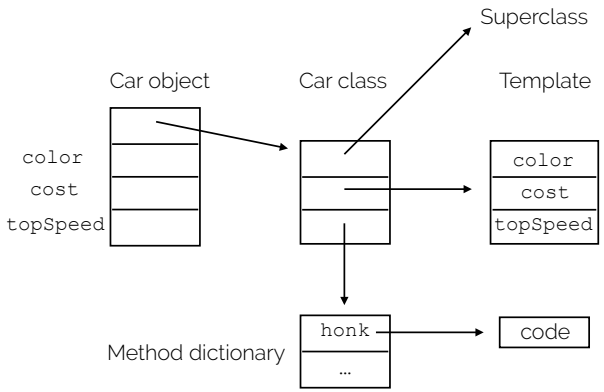

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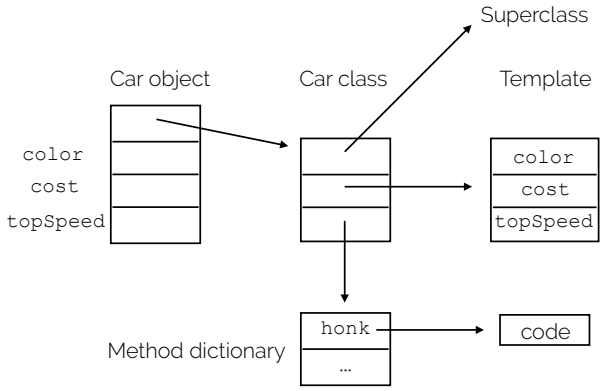
C++ eliminates lookups by computing locations at compile-time.



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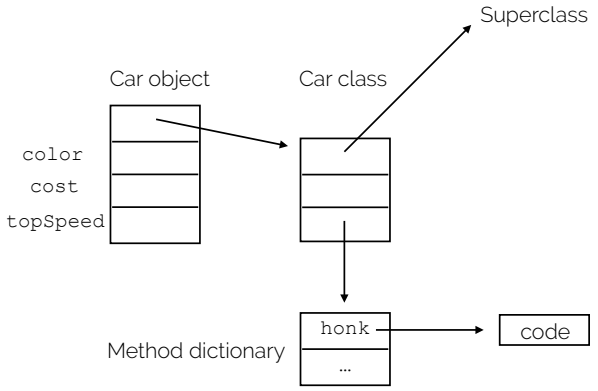

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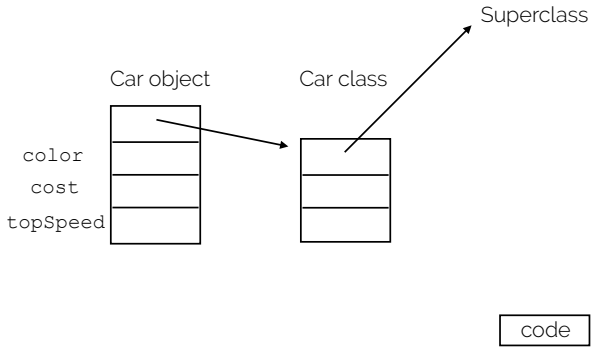

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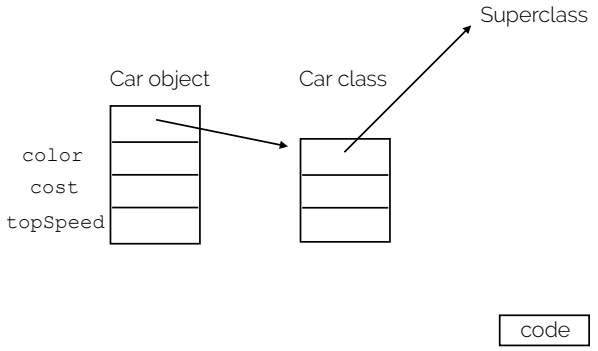
C++ also copies any needed superclass method pointers into class



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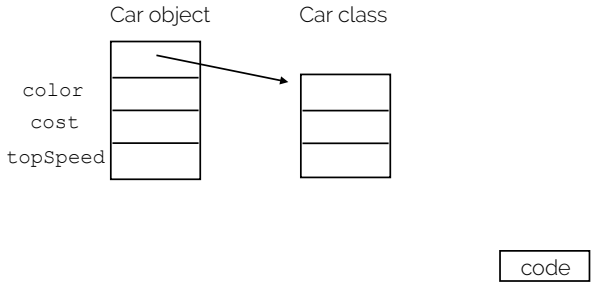
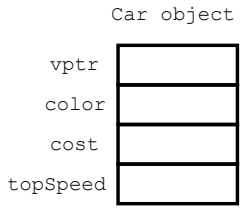


Virtual Dispatch

Virtual Dispatch

Car object

Virtual Dispatch



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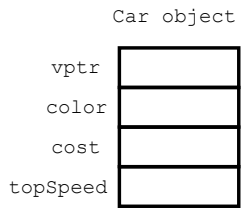

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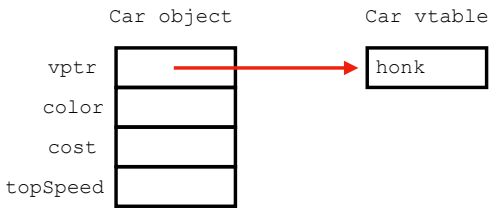

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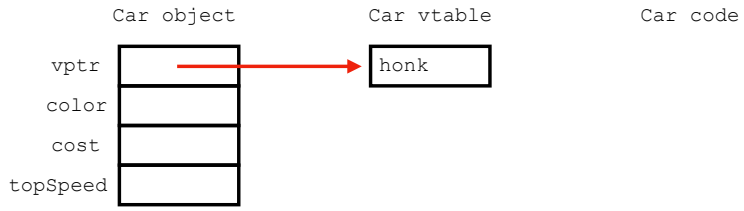

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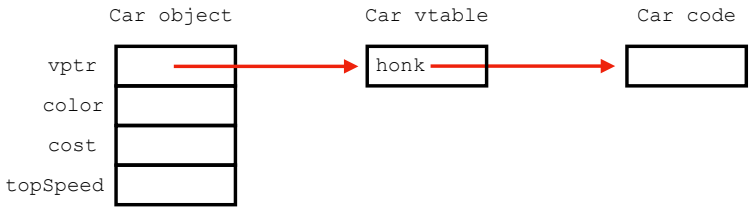

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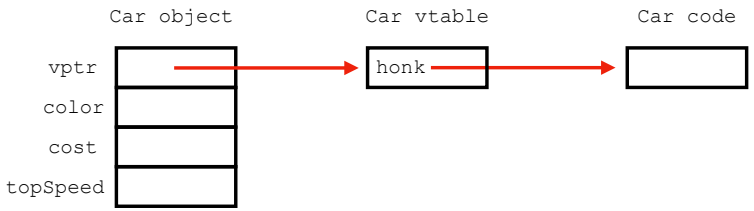
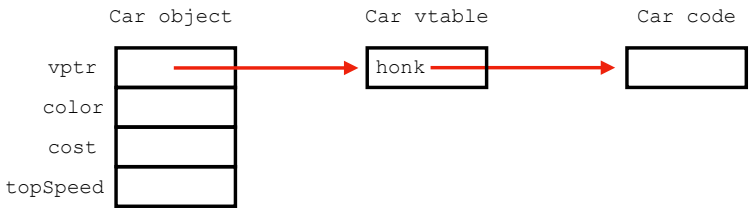


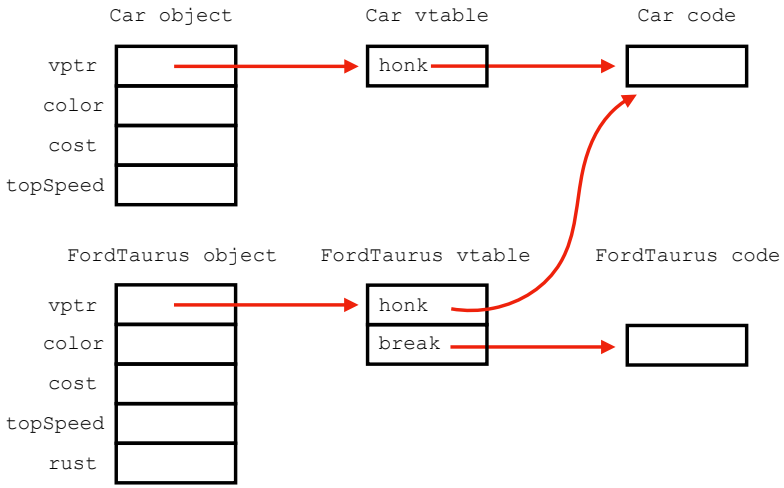
- Functions without the `virtual` keyword are just regular C functions (that also have access to class instance data).

Virtual Dispatch



- Functions without the `virtual` keyword are just regular C functions (that also have access to class instance data).
- C++ virtual dispatch does *never searches* as in SmallTalk; vtable/instance variable offsets known at compile-time.

Virtual Dispatch



Cost

Cost

1.dereference object

Cost

1.dereference object
2.defererence class

Cost

1.dereference object
2.defererence class
3.dereference method dictionary

Cost

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2.defererence class
~~3.dereference method dictionary~~

Cost

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for each class or superclass

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O(1) method lookup

How to give a good talk

Five tips

1. Have a story

2. Don't "bury the lede"

3. Don't make your audience read

4. Show by example

5. Stay on script

5.1. Finish on time

Project Q&A