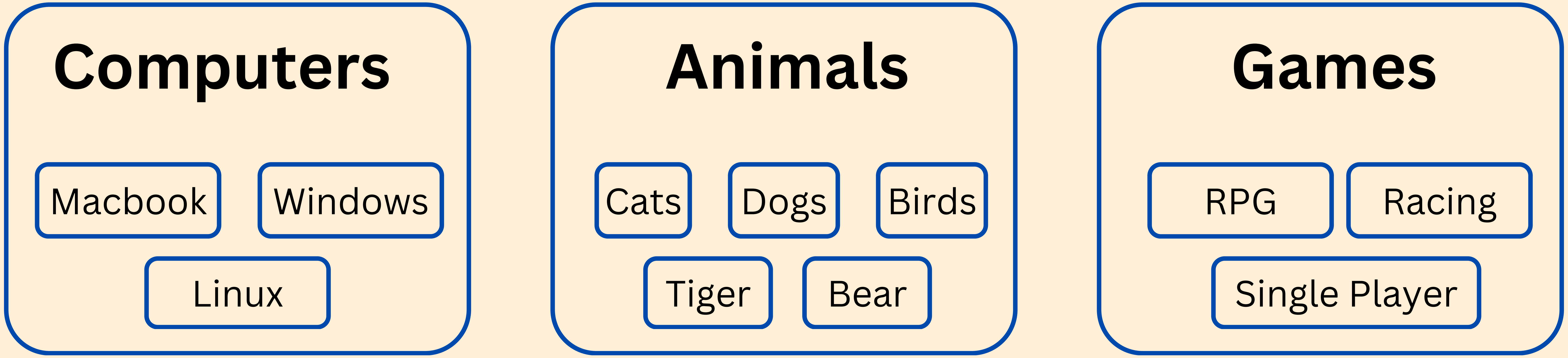
The Path to Class Inheritance

Think of Inheritance, what do you think about?
Well it's probably the same for Python too!

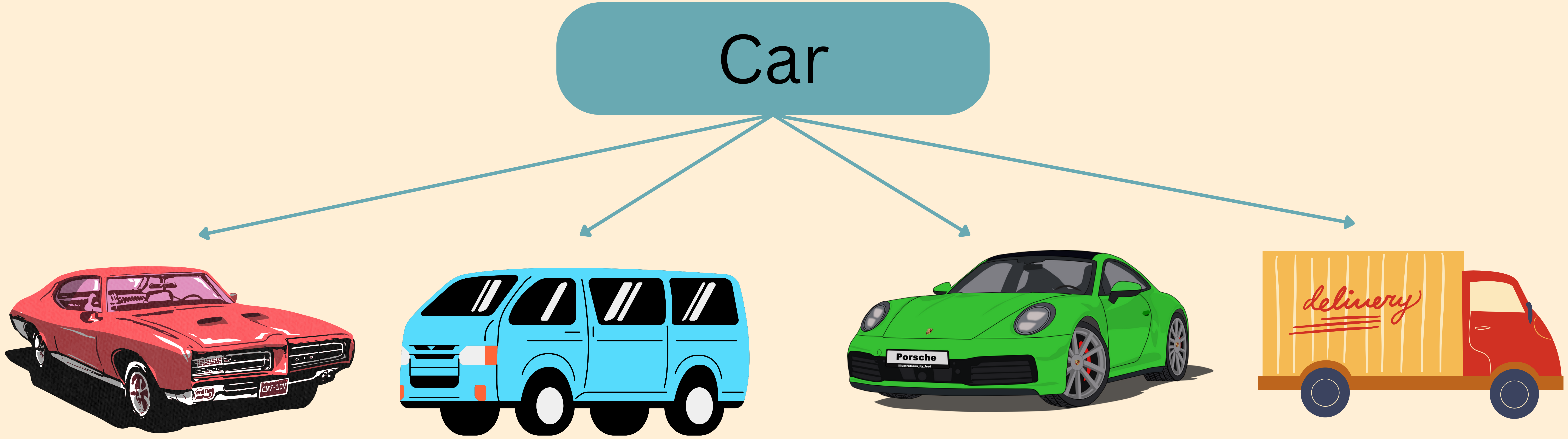
What we already know:



Example: Computers -> **Computers is a Class** (Family), while **MacBook, Windows & Linux are all Objects**. We could create a Class **for each** type of Computer as well, **taking key data from the parent**.

What we currently know:

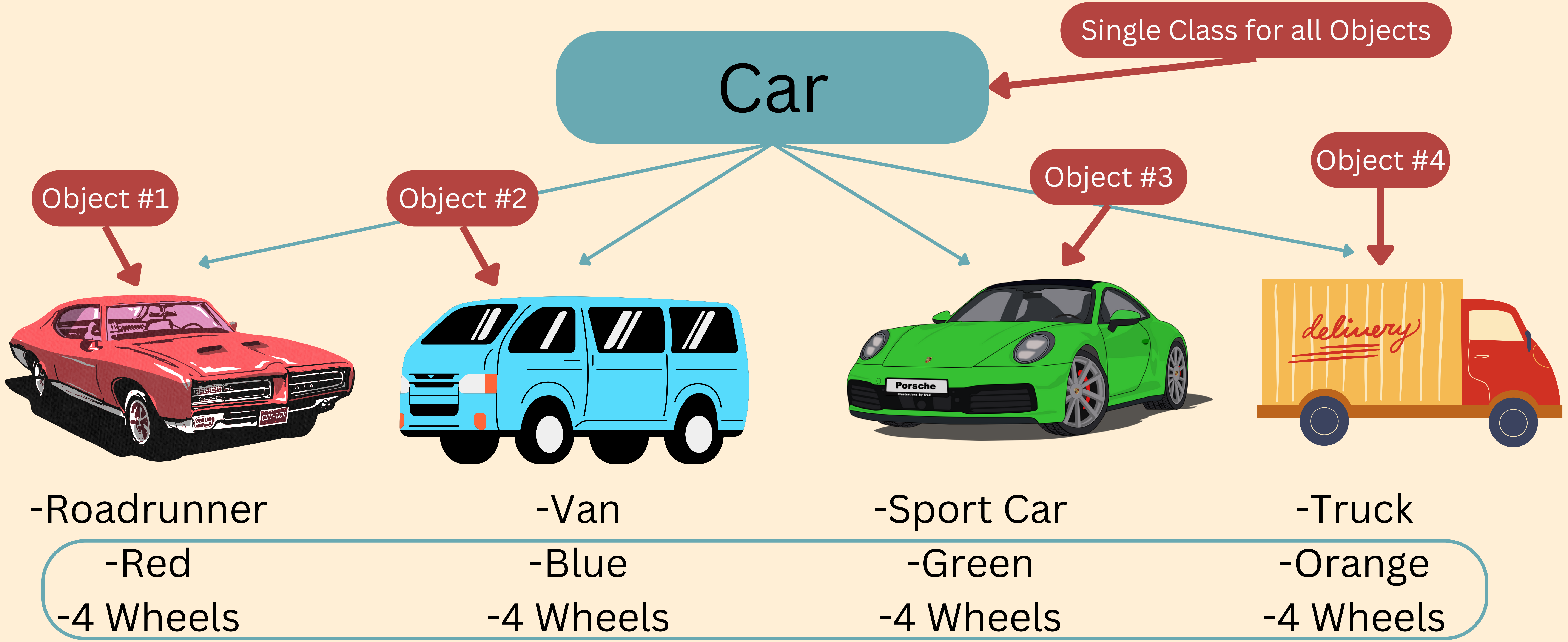
Here is a **car class**. There are **4 objects**, each with **3 properties**.



-Roadrunner	-Van	-Sport Car	-Truck
-Red	-Blue	-Green	-Orange
-4 Wheels	-4 Wheels	-4 Wheels	-4 Wheels

What we currently know:

Here is a **car class**. There are **4 objects**, each with **3 properties**.



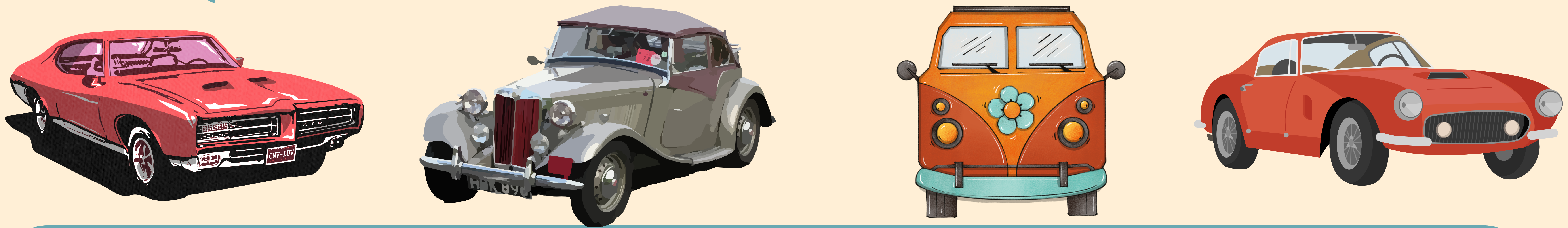
Creating a derived class (child class)

A **new Class** with the name Vintage. This is **Inheriting the car class**. This is an example of **Class Inheritance** in Python

New class (Child Class)

Vintage(Car)

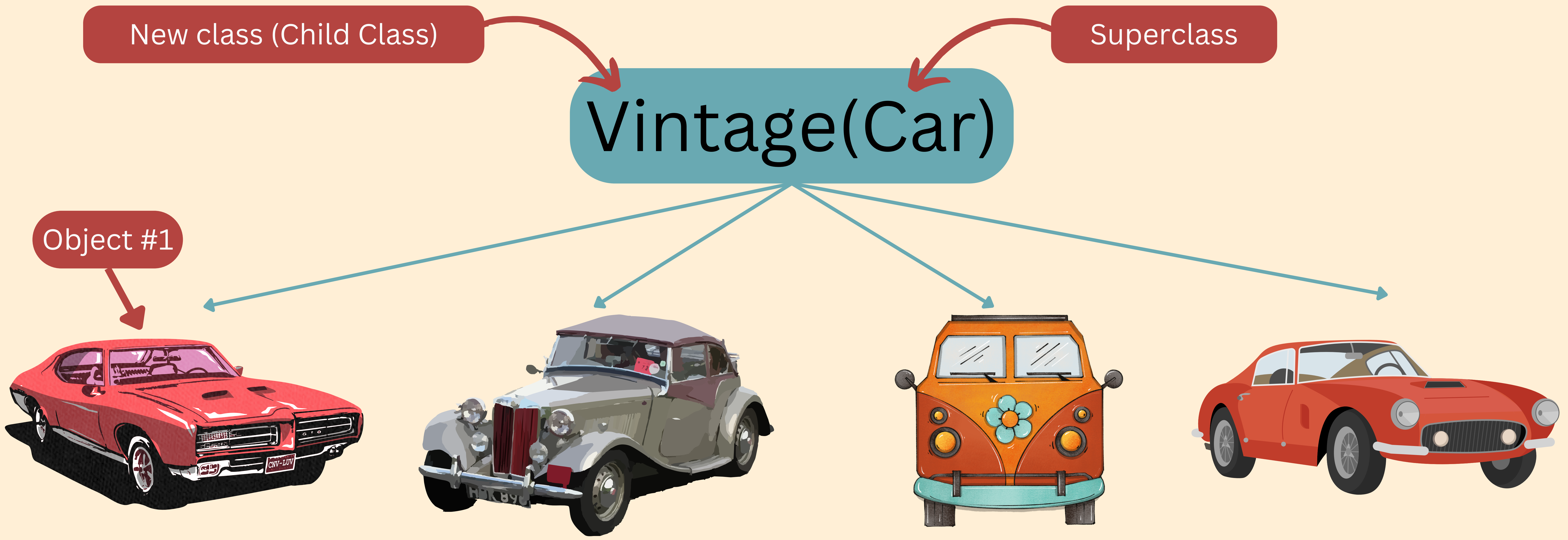
Everything is **inherited from** the **car class**.
-All Properties
-All Methods



-Roadrunner	-Old Car	-VW Bus	-Jaguar
-Red	-Gray	-Orange	-Red/Orange
-4 Wheels	-4 Wheels	-4 Wheels	-4 Wheels
-$30,000	-$65,000	-$55,000	-$90,000

Creating a derived class (child class)

This new class also has a **new property** that is only found here



-Roadrunner	-Old Car	-VW Bus	-Jaguar
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Superclasses & Derived Classes:

All Audi's **are** Cars

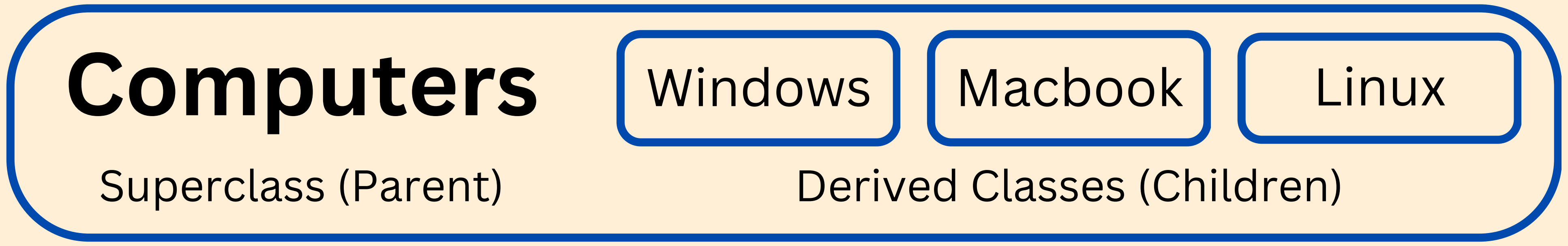
All sofas **are** furniture

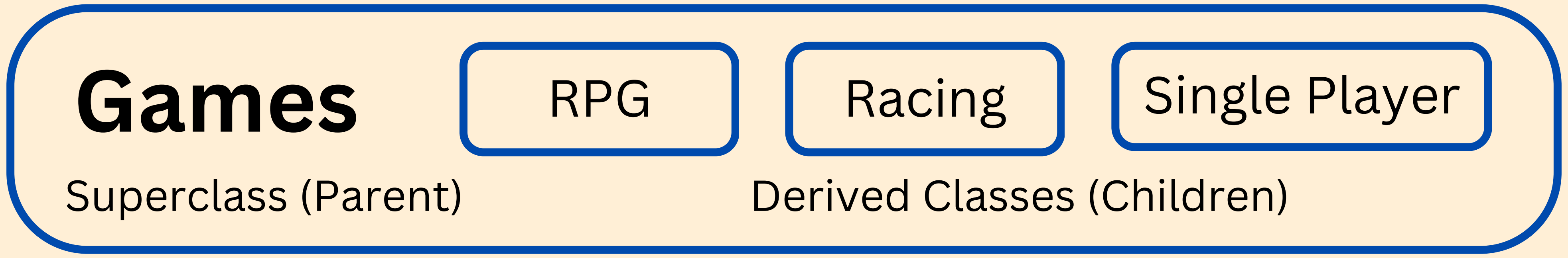
All dogs **are** animals

All jeans **are** pants

Route	Inheritance Type	Note
Route One	The Child Class is given **only given new methods**, **no new properties** are given	We **do not need a Constructor** Method (__init__). We will **use the Superclass constructor**
Route Two	The Child Class is given **both new properties** and **new methods**	A **new constructor is needed**, and we must **activate the superclass constructor** as well

Superclass and Inheritance:





Example: Computers -> **Computers is a Class** (Parent), while **MacBook, Windows & Linux are all a sub-class of their own**. We can now create more specific objects using our derived classes (child class).

Inheritance - Route #1

Inheriting everything from a super class

Creating a child class ~ Routes #1:

Creating a Child Class that **only needs new methods** not properties

When we make an instance of a child class, the superclass constructor (__init__) will be **called and used in the child class**

```
class Main:
    def __init__(self, para1, para2):
        self.property1 = para1
        self.property2 = para2
    def method_one(self):
        #run this code
```

```
class Child_Class(Main):
    def method_one(self, parameter1):
        x = self.property1 + parameter1
        return x
    def method_two(self, parameter1):
        #run this code
```

Creating a child class ~ Routes #1:

1. When creating a Child class, **pass the Superclass in as a parameter** to the Child Class
2. Add any new methods

```
class Main:
    def __init__(self, para1, para2):
        self.property1 = para1
        self.property2 = para2
    def method_one(self):
        #run this code
```

```
class Child_Class(Main):
    def method_one(self, parameter1):
        x = self.property1 + parameter1
        return x
    def method_two(self):
        #run this code
```

How inheritance works in our code:

```
class Main:
    def __init__( self, name, age, location ):
        self.name = name
        self.age = int( age )
        self.location = location

    def user_info(self):
        print("Welcome," , self.name )
        print("You are:", self.age )
        print("You live in:", self.location )
```

*We created a **child class called "UserScore"**. This will be a class which **uses the superclass properties**. We **inherit all the properties from our superclass**, which we can <u>use throughout methods in our child class</u>

```
class UserScore( Main ):
    def calc_score(self, number ):
        score = self.age * number
        return score

    def check_age(self):
        if self.age >= 70:
            return "Senior"
        elif self.age <= 17:
            return "Minor"
        else:
            return "Normal"
```

How inheritance works in our code:

```
class Main:
    def __init__( self, name, age, location ):
        self.age= int( age )
        self.name = name
        self.location = location

    def user_info(self):
        print("Welcome," , self.name )
        print("You are:", self.age )
        print("You live in:", self.location )
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*We created a **child class called "UserScore"**. This will be a class which **uses the superclass properties**. We **inherit all the properties from our superclass**, which we can <u>use throughout methods in our child class</u>

Inheritance - Route #2

Using the super() function to inherit while creating!

Creating a child class ~ Routes #2:

1. When creating a Child class, pass the Superclass in as a parameter
2. Add old & new properties
3. Add new methods

```
class UserScore( Main ):
    def __init__(self, name, age, location, score):
        super().__init__( name,  age,  location)
        self.score = int( score )

    def checkAvg(self, list1 ):
        x = self.score / len(list1) * 100
        return x
```

The constructor in a child class **takes the properties of the superclass** and any **new properties we create**

super() allows us to **inherit all the properties and methods** from the superclass (parent class)

Creating a child class ~ Routes #2:

1. When creating a Child class, pass the Superclass in as a parameter
2. Add any new methods

```
class Child_Class( Main ):
        def __init__(self, x , y , z , name , age):
            super().__init__( x , y , z )
            self.name = name
            self.age = int( age )
        def method_two(self, parameter1):
            #run this code
```

The constructor in a child class **takes the properties of the superclass** and any **new properties we create**

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Creating a child class ~ Routes #2:

1. When creating a Child class, pass the Superclass in as a parameter
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        super().__init__(x , y , z)
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```

The constructor in a child class **takes the properties of the superclass** and any **new properties we create**

super() allows us to **inherit all the properties and methods** from the superclass (parent class)

When we create an object of the child class, the superclass constructor (__init__) is **automatically called** and used.

Creating a child class ~ Routes #2:

```
class Main:
    def __init__( self, name, age, location ):
        self.name = name
        self.age = int( age )
        self.location = location

    def user_info(self):
        print("Welcome," , self.name )
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        print("You live in:", self.location )
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```
class UserScore( Main ):
    def __init__(self, name, age, location, score):
        super().__init__( name,  age,  location)
        self.score = int( score )

    def checkAvg(self, list1 ):
        x = self.score / len(list1) * 100
        print("Results:", x)
```

We are **initializing the properties from the Superclass** by using the **super()** function as well as creating **1 new property** for the child class.

Creating a child class ~ Routes #2:

```
class Main:
    def __init__( self, name, age, location ):
        self.name = name
        self.age = int( age )
        self.location = location

    def user_info(self):
        print("Welcome," , self.name )
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```

```
class UserScore(Main):
    def __init__(self, name, age, location, score):
        super().__init__( name,  age,  location)
        self.score = int( score)

    def checkAvg(self, list1 ):
        x = self.score / len( list1 ) * 100
        print("Results:", x )

test_list = [4, 5, 5, 4, 3, 5, 5, 4]

user = UserScore("Josh", 25, "HCMC", 5)
user.checkAvg( test_list )
```

Output in Terminal

```
Results: 5
```

*__Never use__ self outside of the class