Lecture 15: Inheritance and Interfaces

7/17/2014

Guest Lecturer: Marvin Zhang

Some (a lot of) material from these slides was borrowed from John DeNero.

Announcements

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- 61A Hackathon tomorrow, 7/18, 5pm-12am

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- Mid-semester survey due tonight, 11:59pm

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class <new class>(<base class>):
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```

- The new class *shares* attributes with the base class, and *overrides* certain attributes
- Implementing the new class is now as simple as specifying how it's *different* from the base class

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    ...
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```
class SavingsAccount(Account):
    deposit_fee = 2
    def deposit(self, amount):
        return Account.deposit(self, \
                amount - self.deposit_fee)
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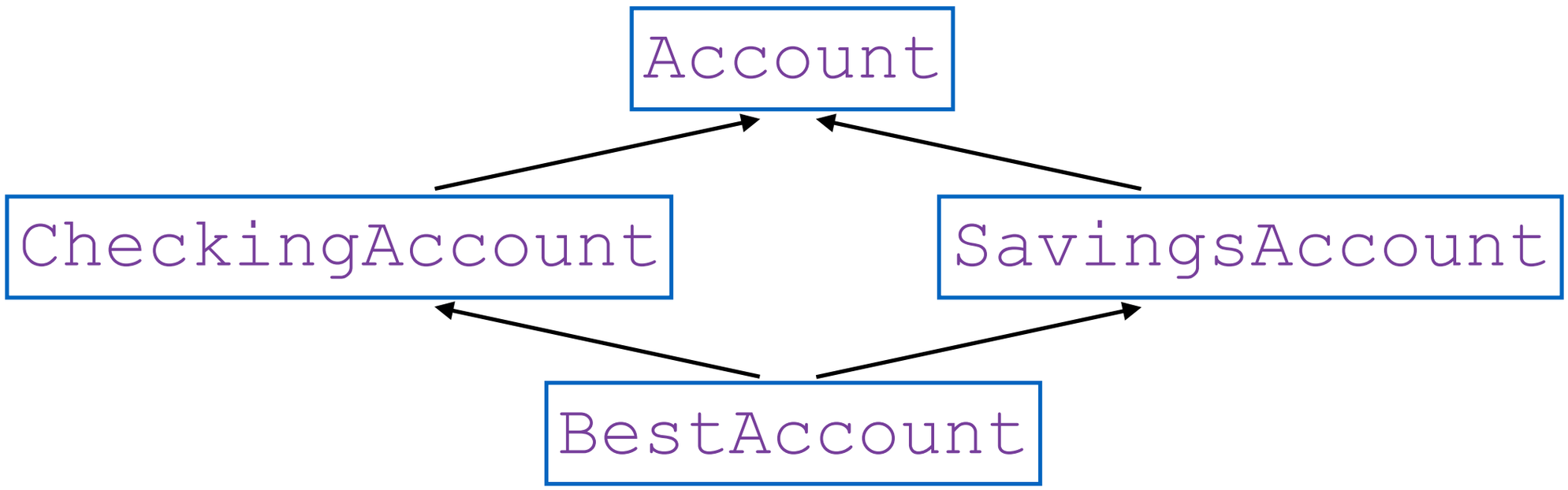
```
class BestAccount(CheckingAccount, SavingsAccount):
    def __init__(self, account_holder):
        self.holder = account_holder
        self.balance = 1  # best deal ever
```

Multiple Inheritance Example



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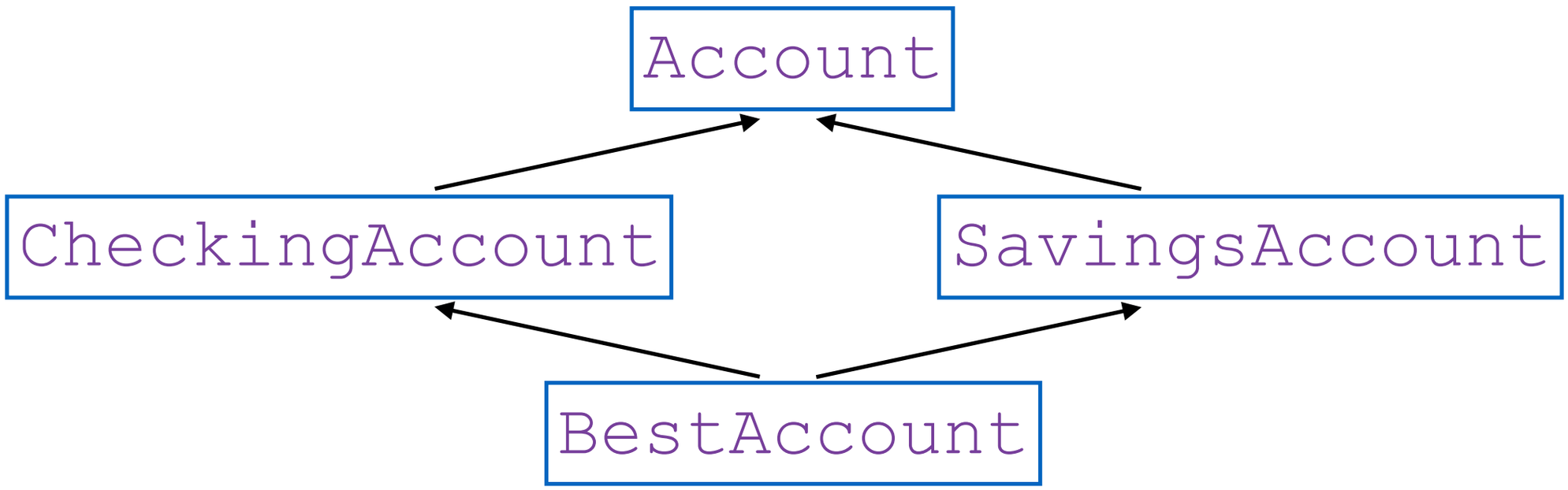


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>>> such_a_deal = BestAccount('Marvin')
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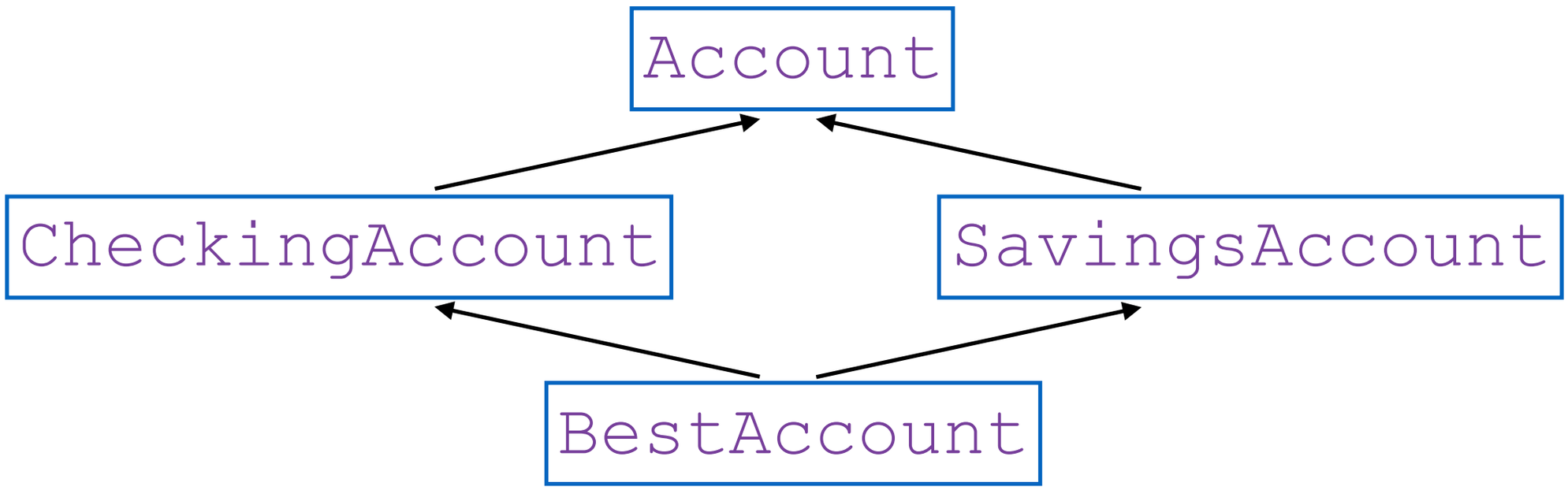


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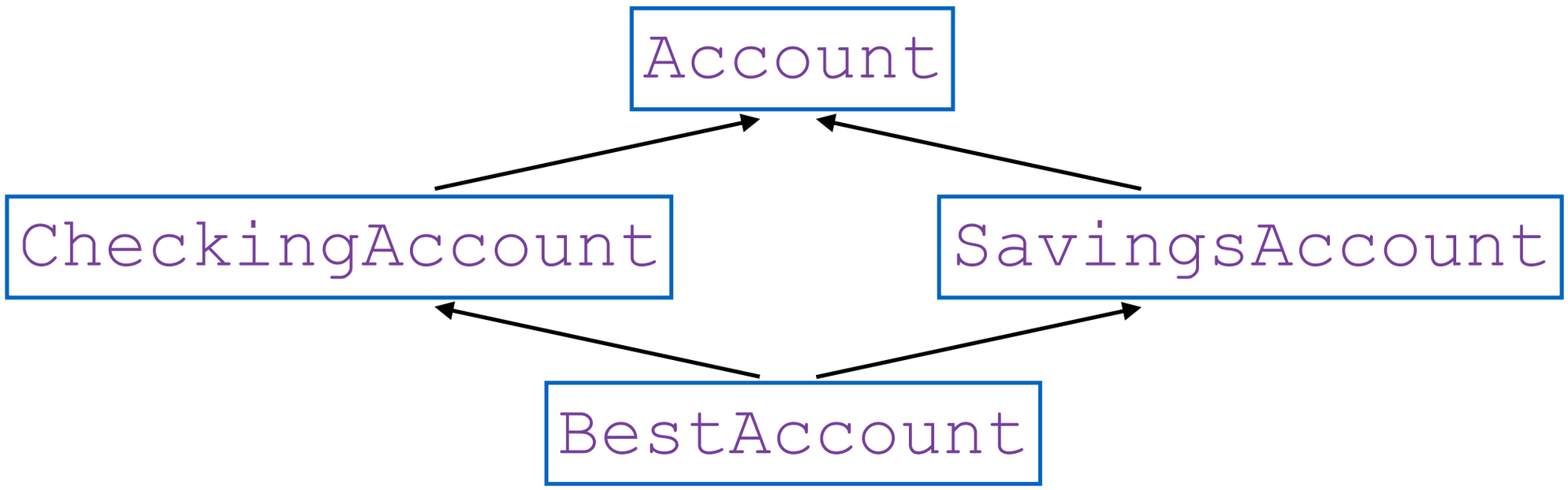


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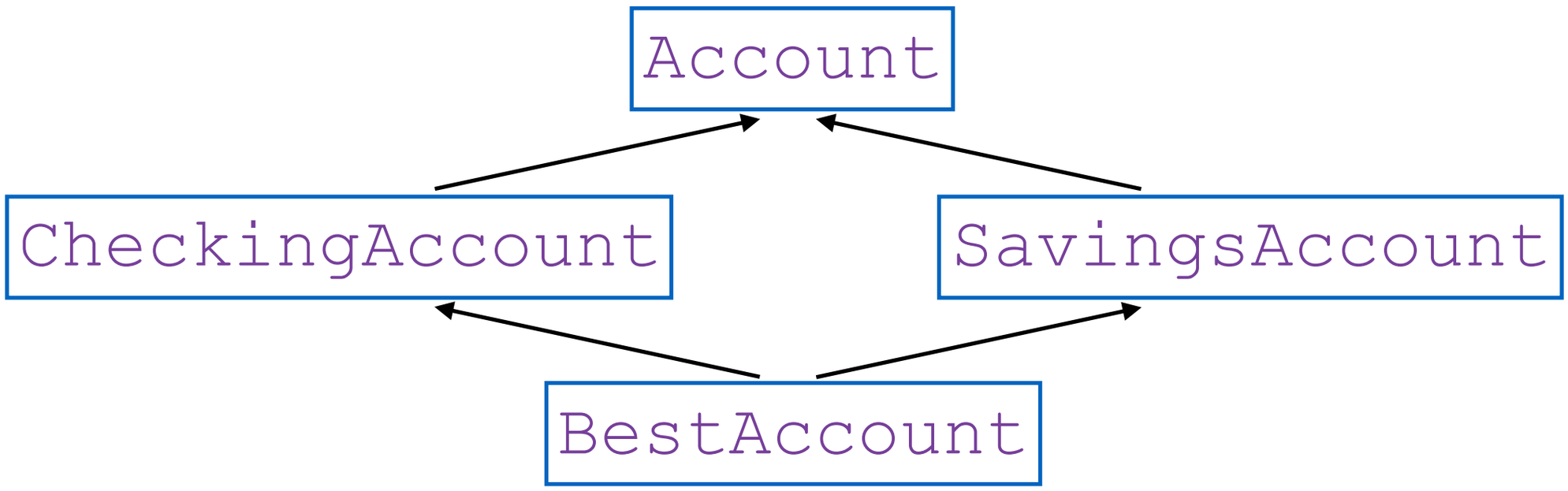


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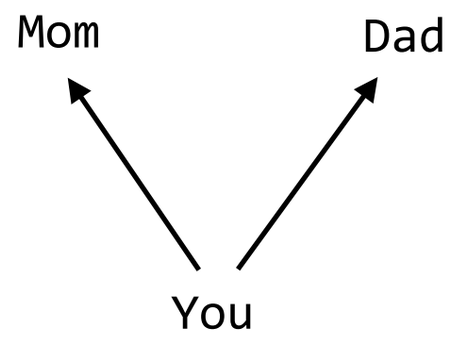

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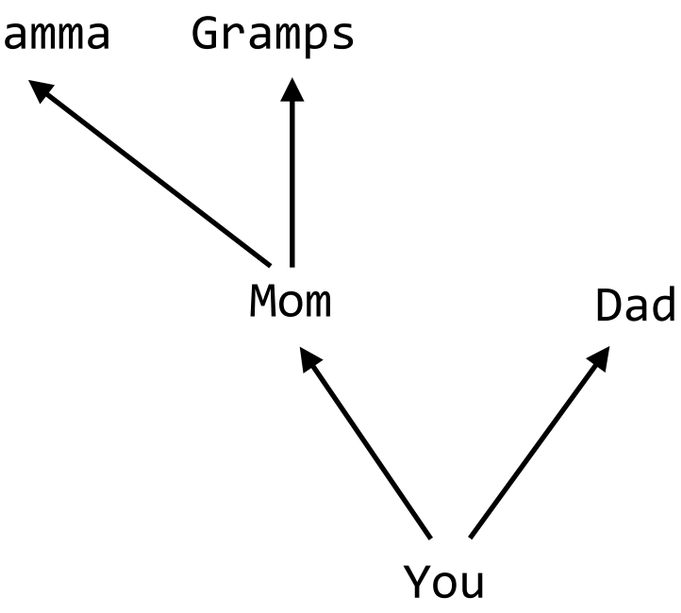

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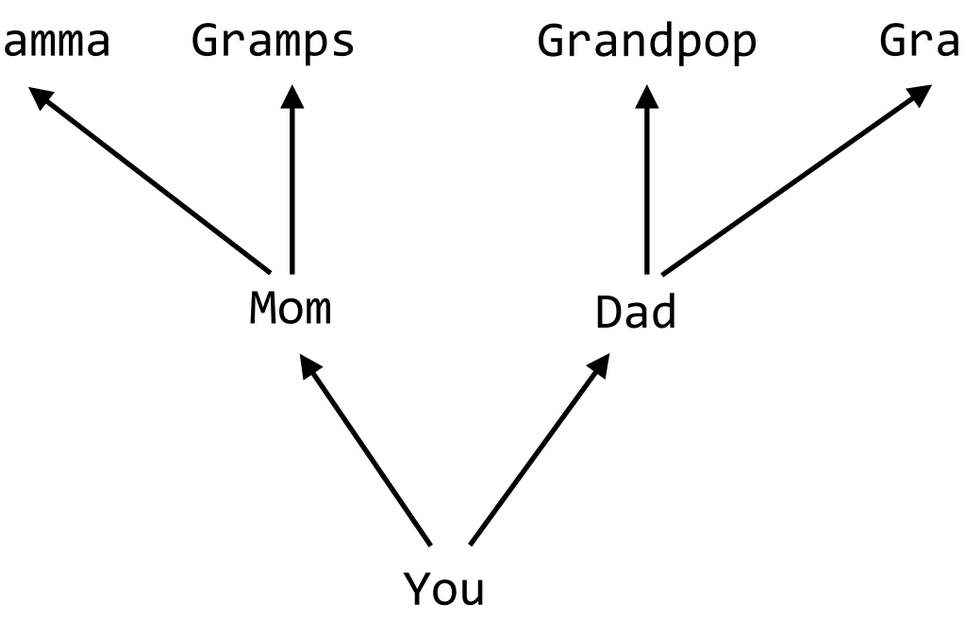

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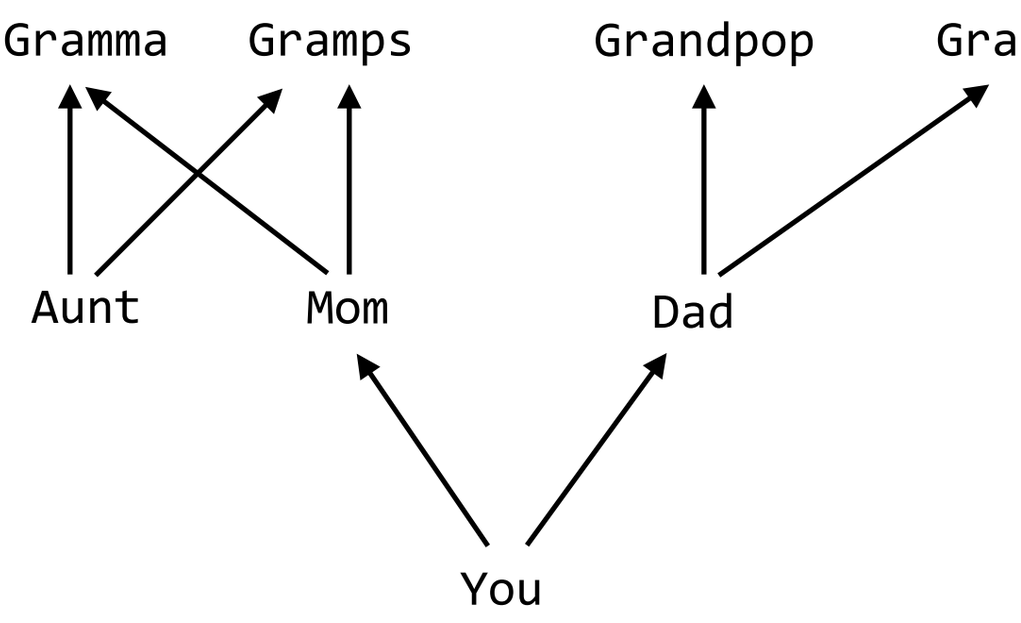

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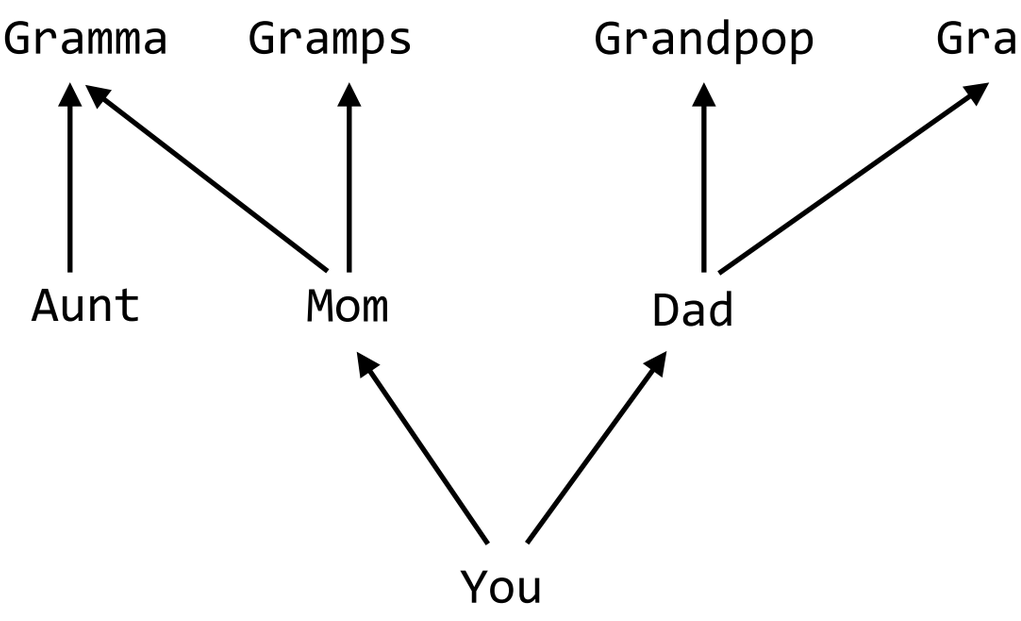

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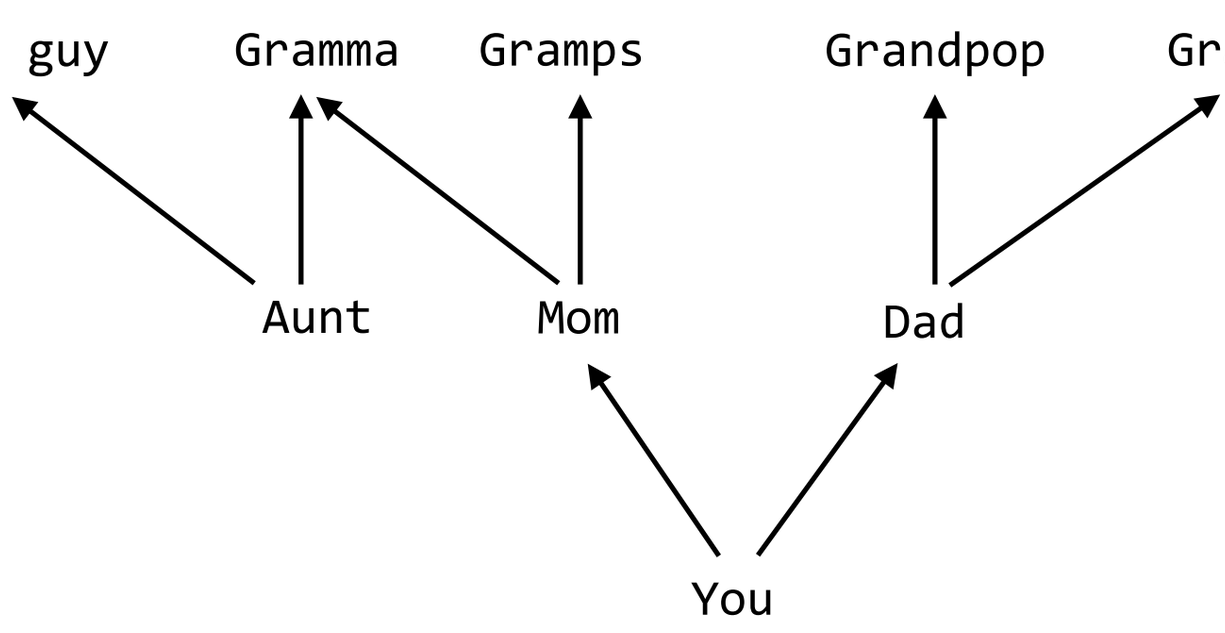

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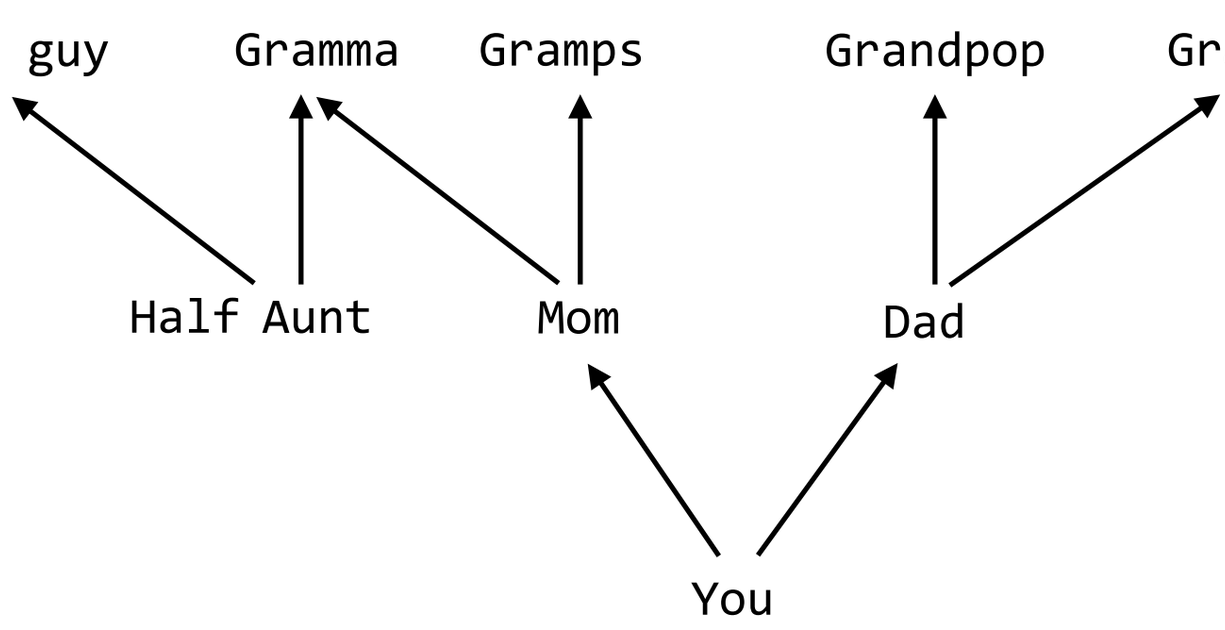

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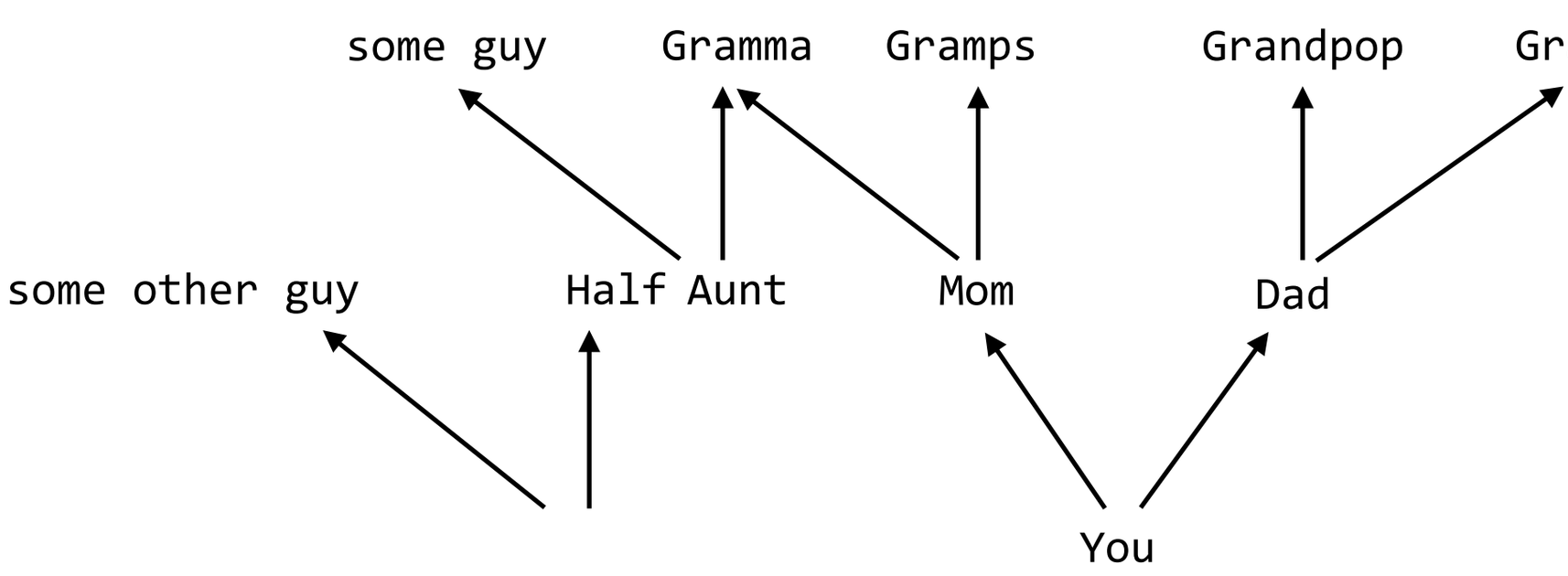

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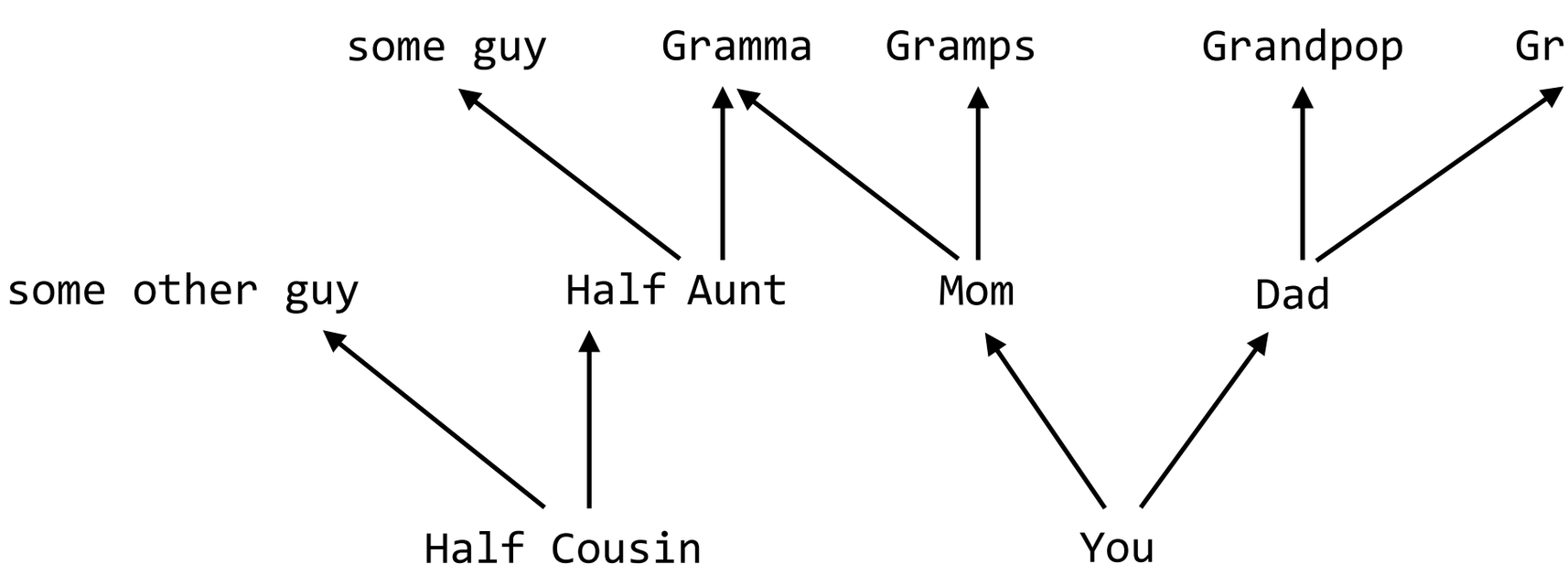

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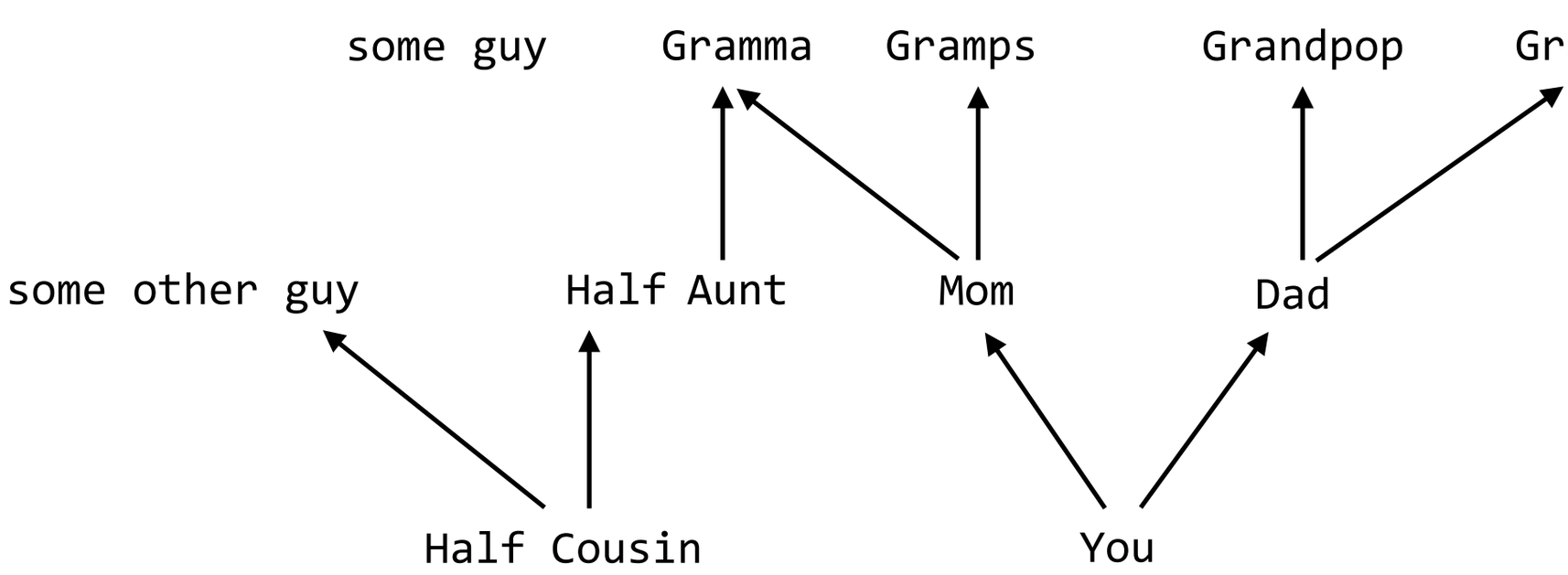

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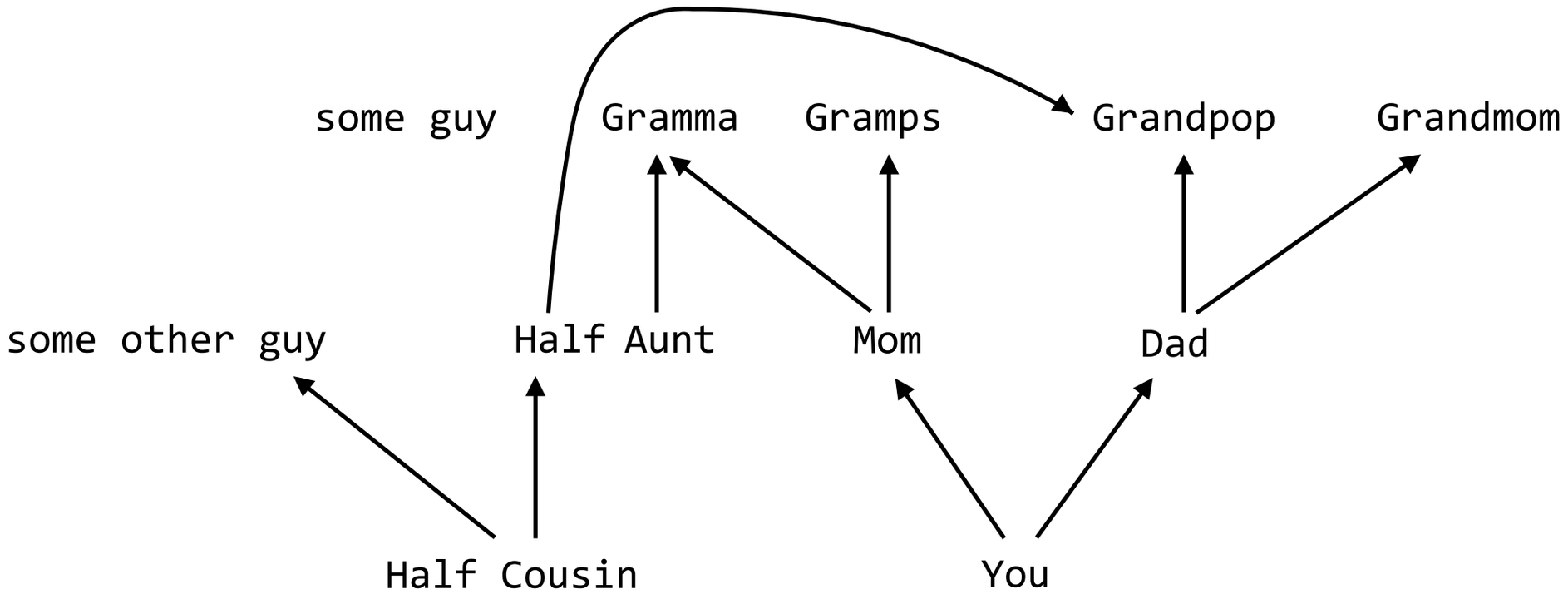

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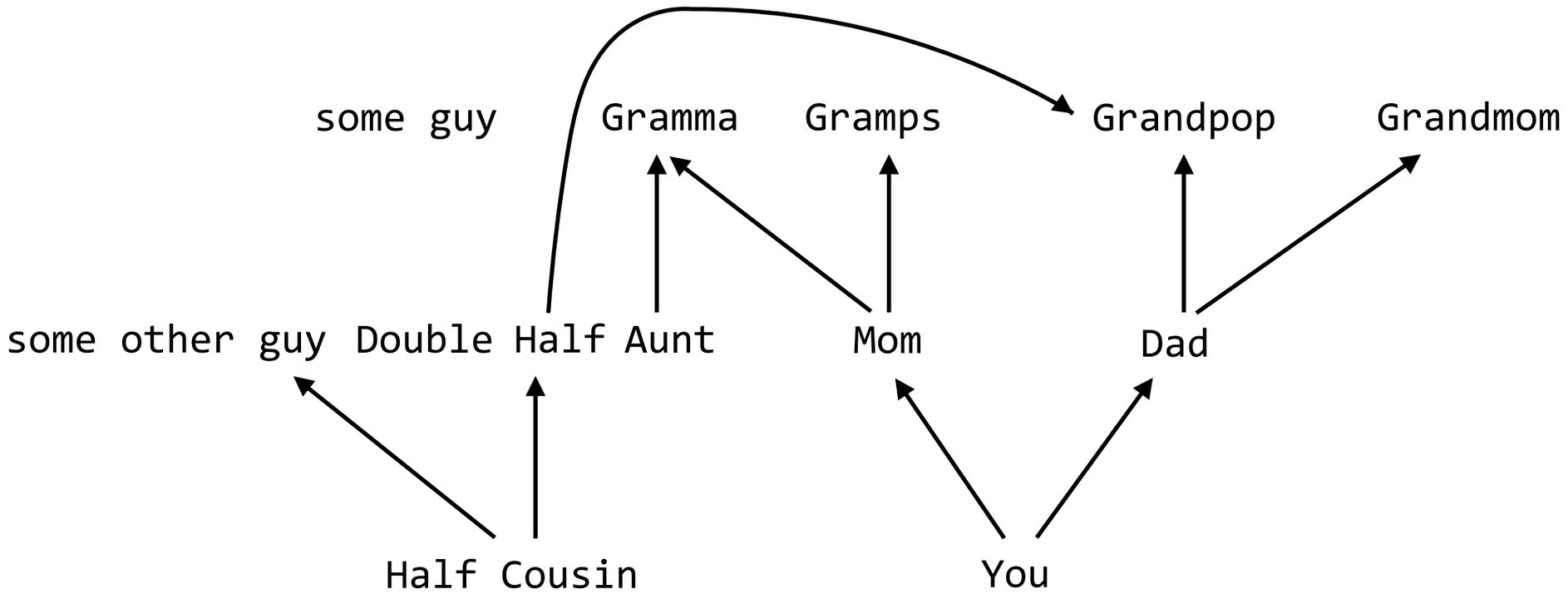

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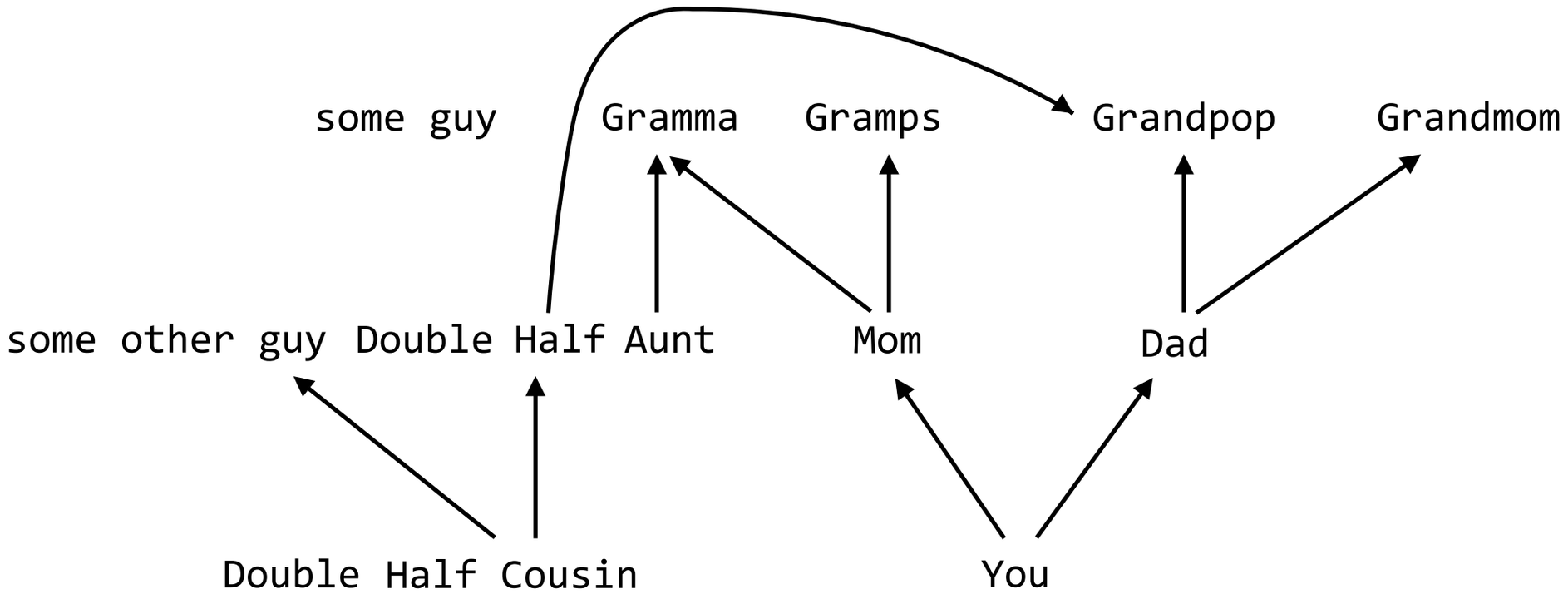

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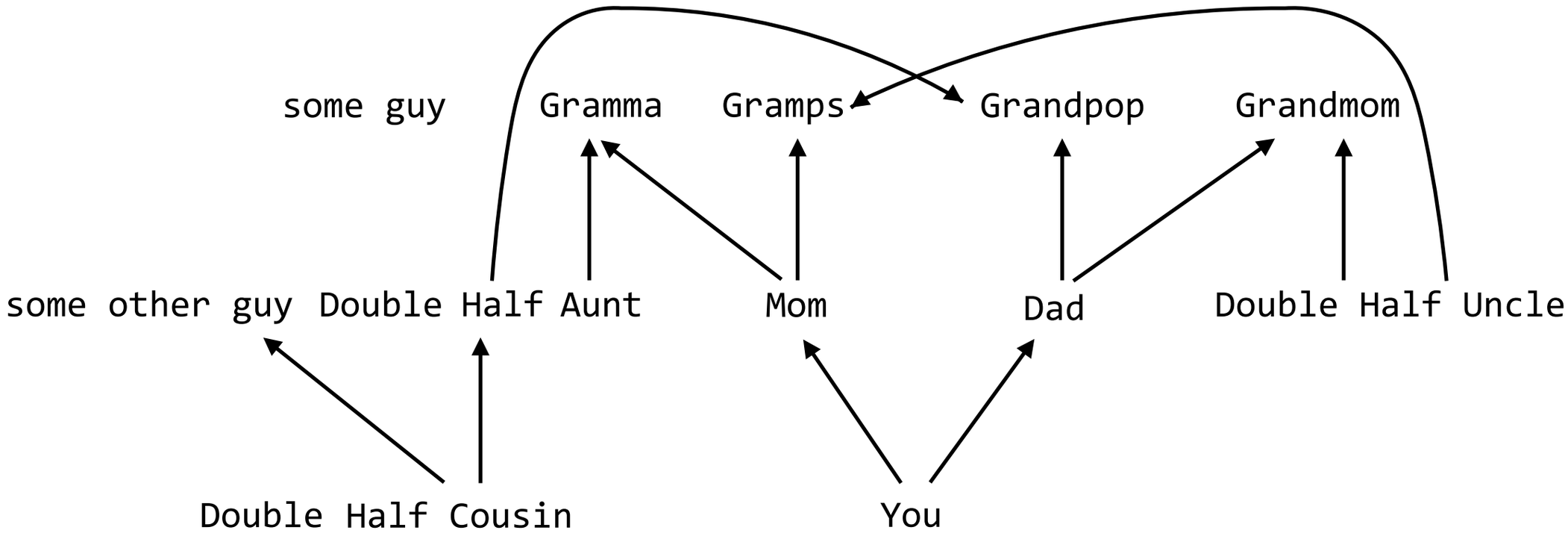

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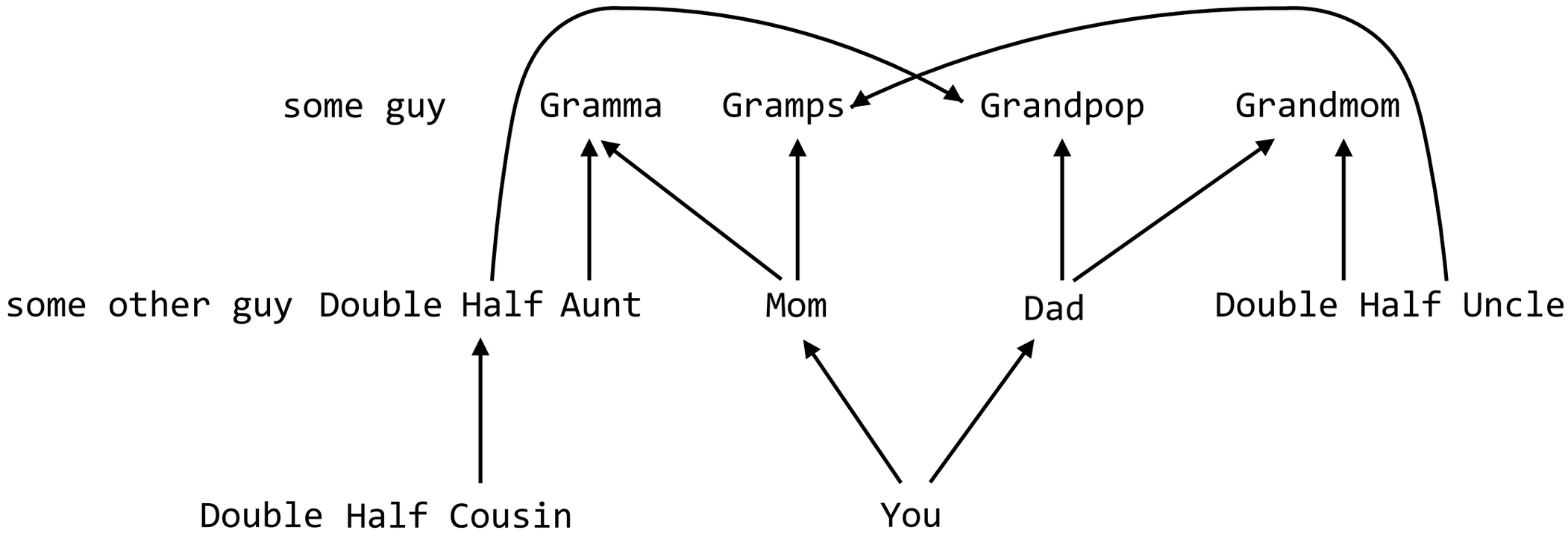

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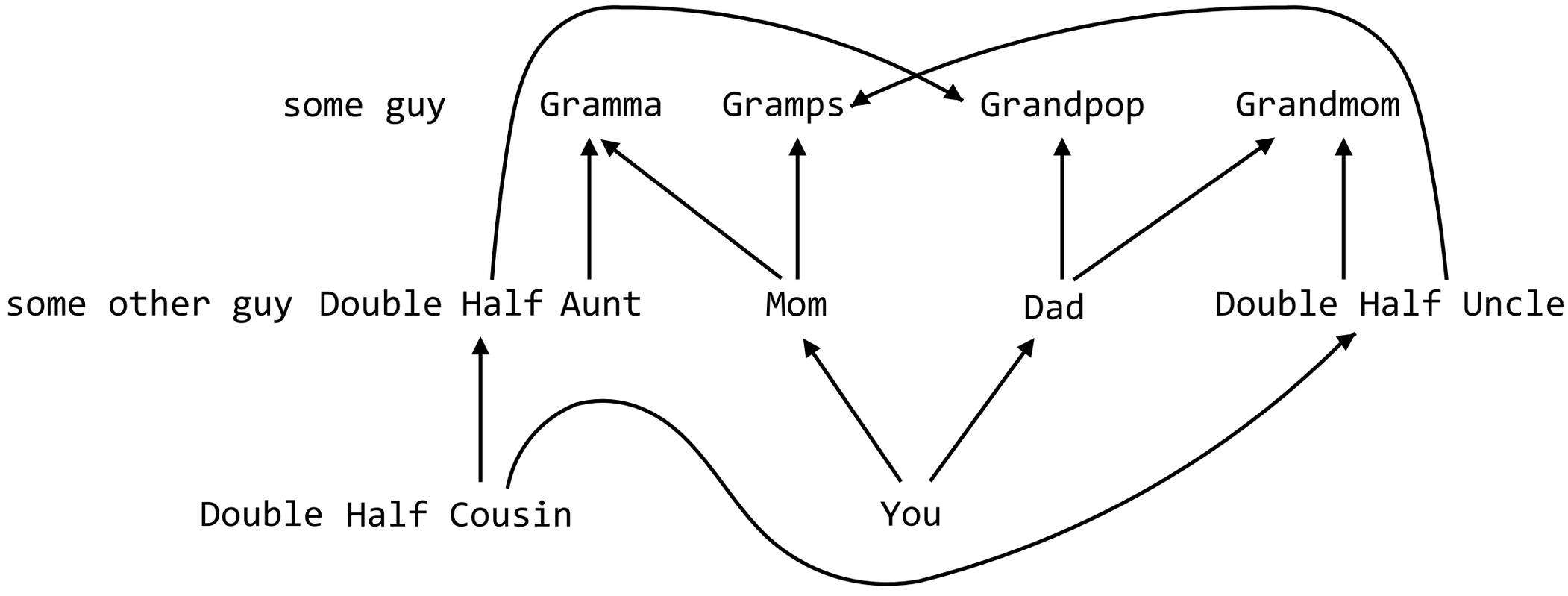

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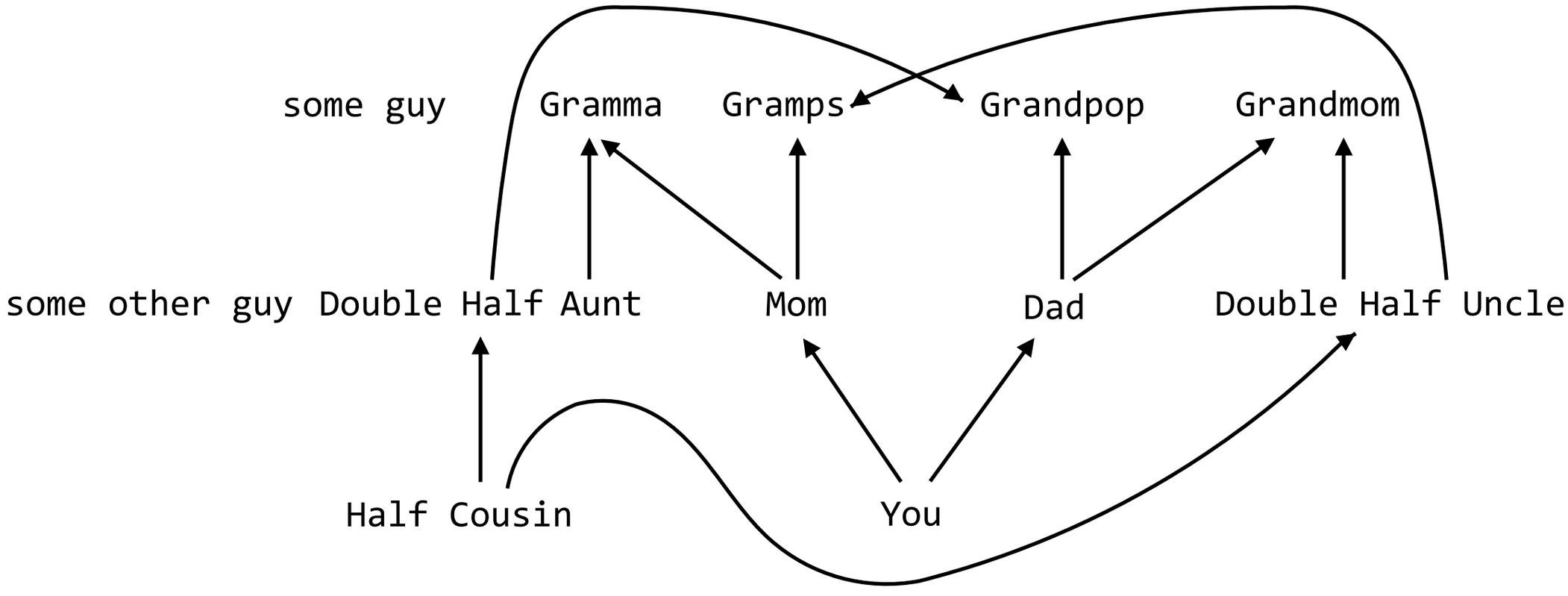

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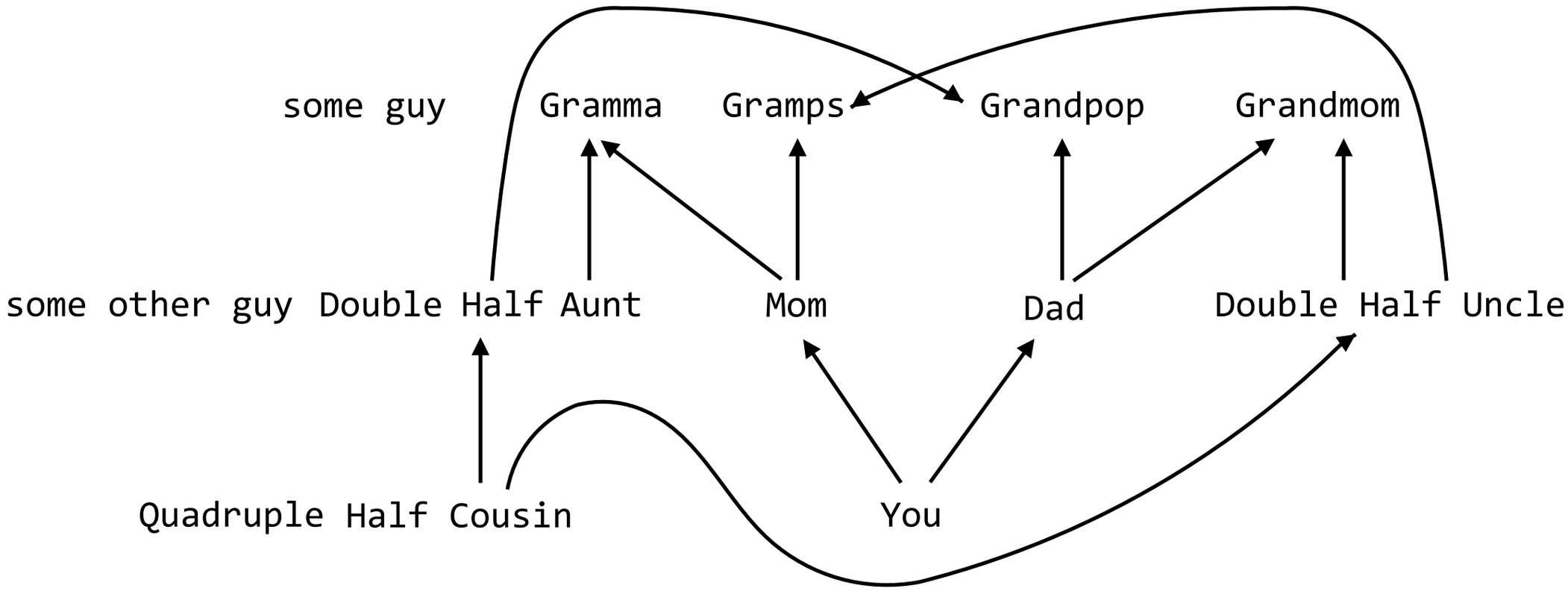

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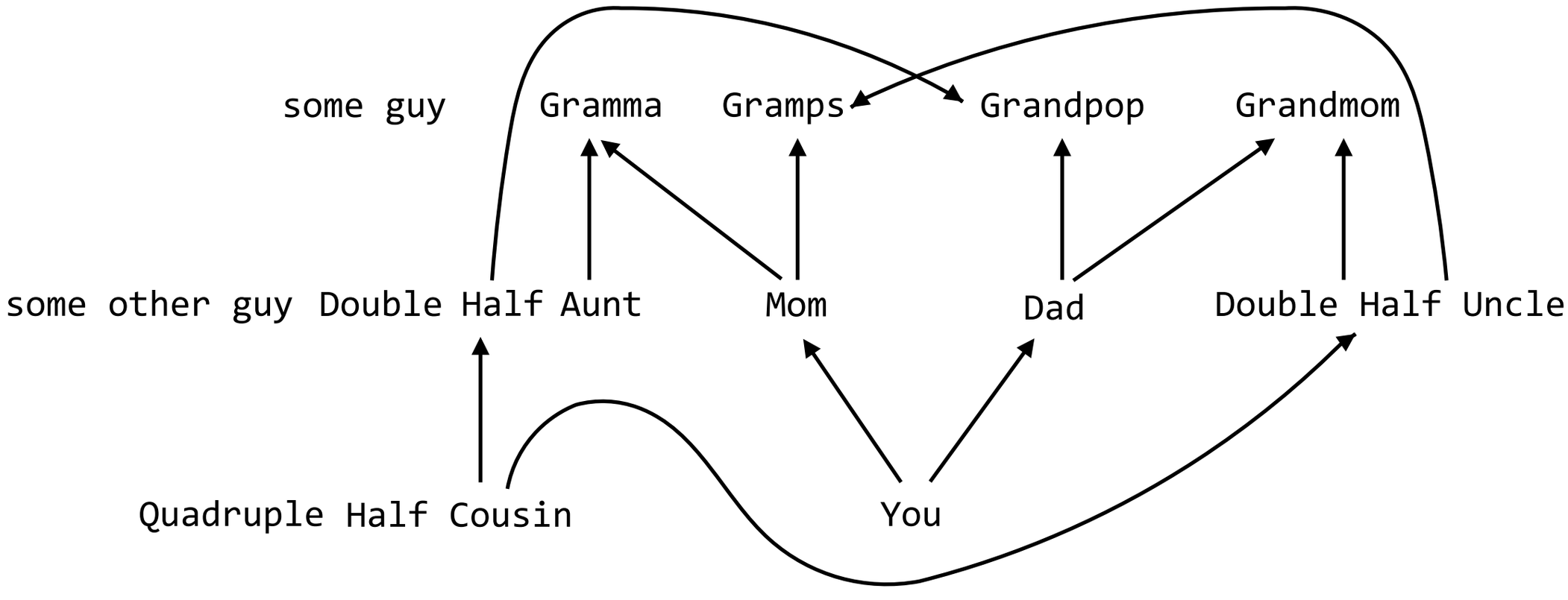

Moral of the story: inheritance (especially multiple inheritance) is complicated and weird. Use it carefully!

Break

Interfaces

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- In OOP, interfaces are defined by what the object has to *implement* (attributes, methods, etc.)

Two (Three) Examples

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- To implement a protocol, objects typically need to have a certain set of attributes. In Python, these attributes are usually a collection of *magic methods*

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- API’s are incredibly important in the real world - almost every application depends on some other application

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- We'll look at an example of a program built using this API: ytadventure.com

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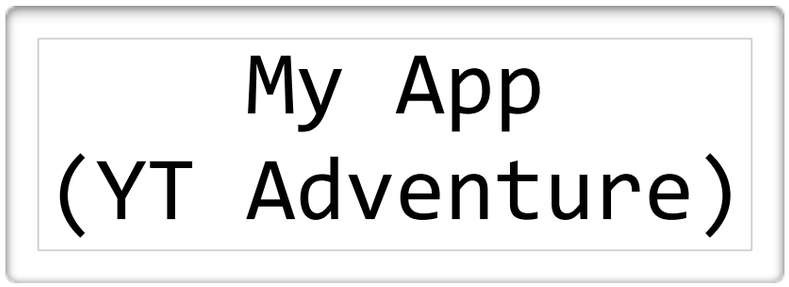

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My App
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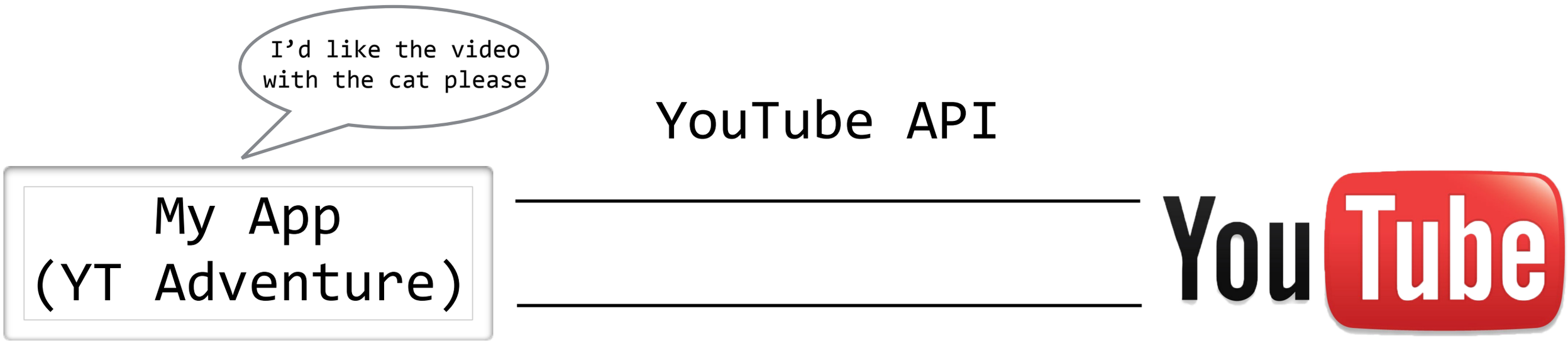

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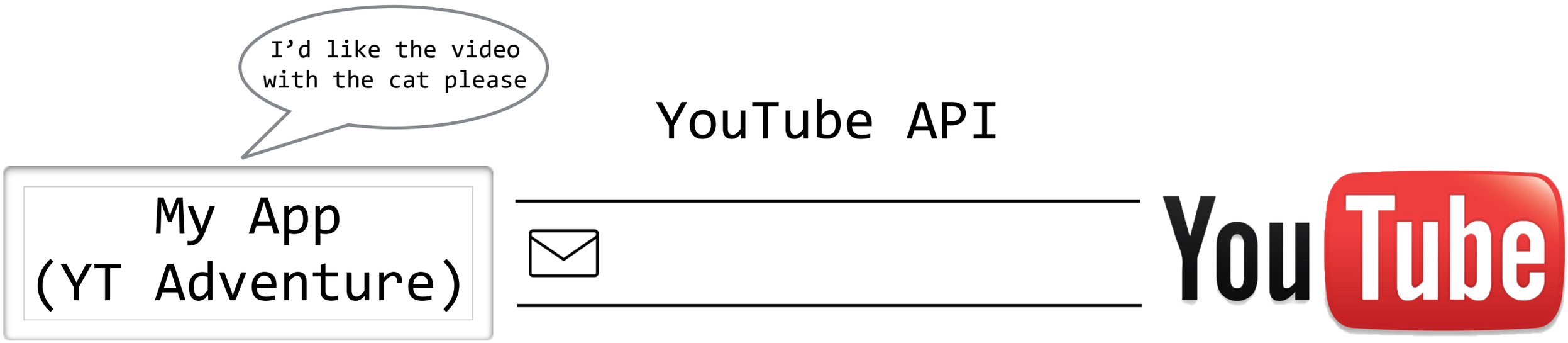

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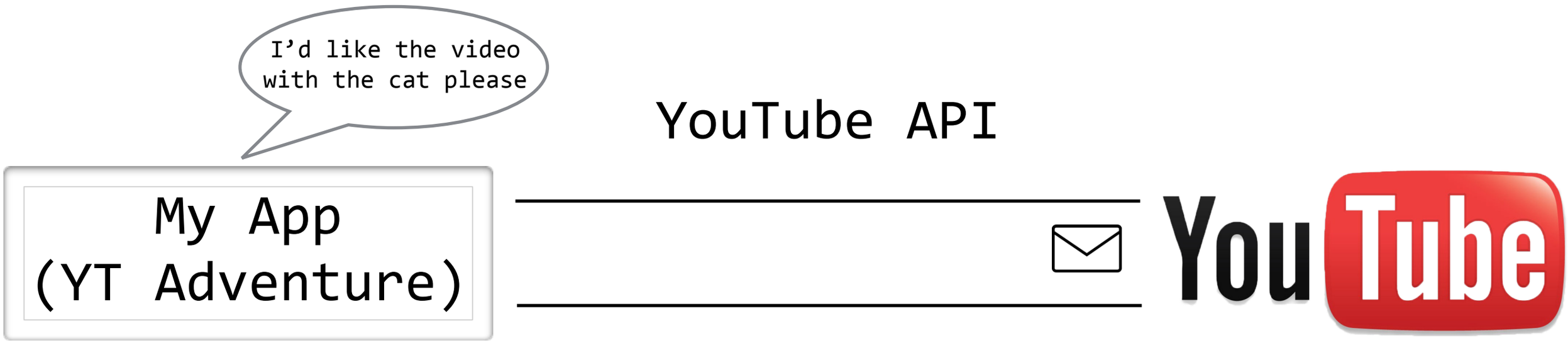

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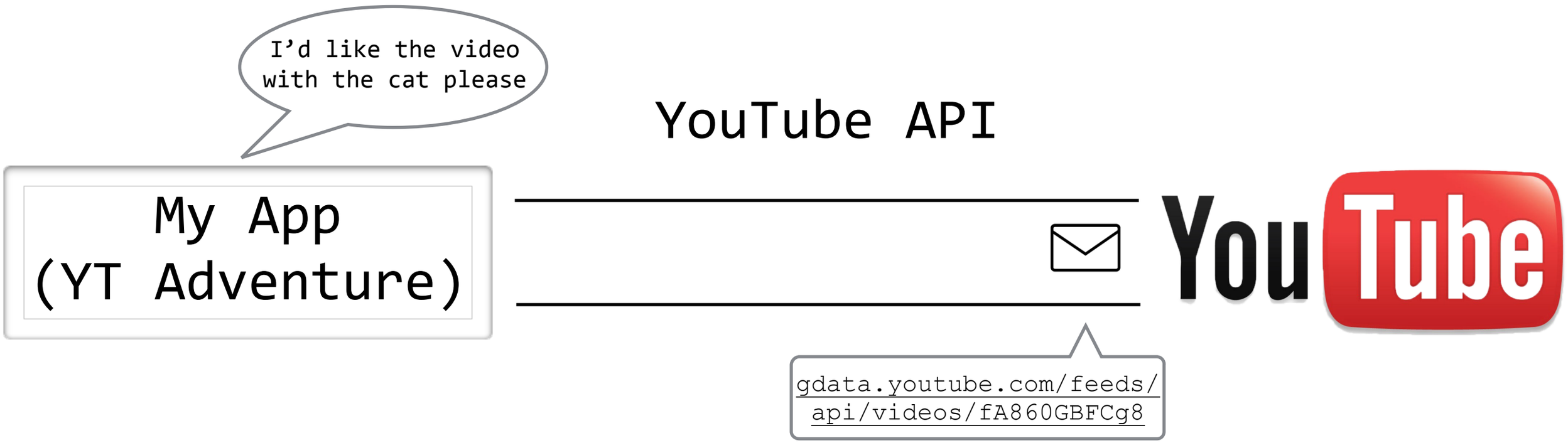

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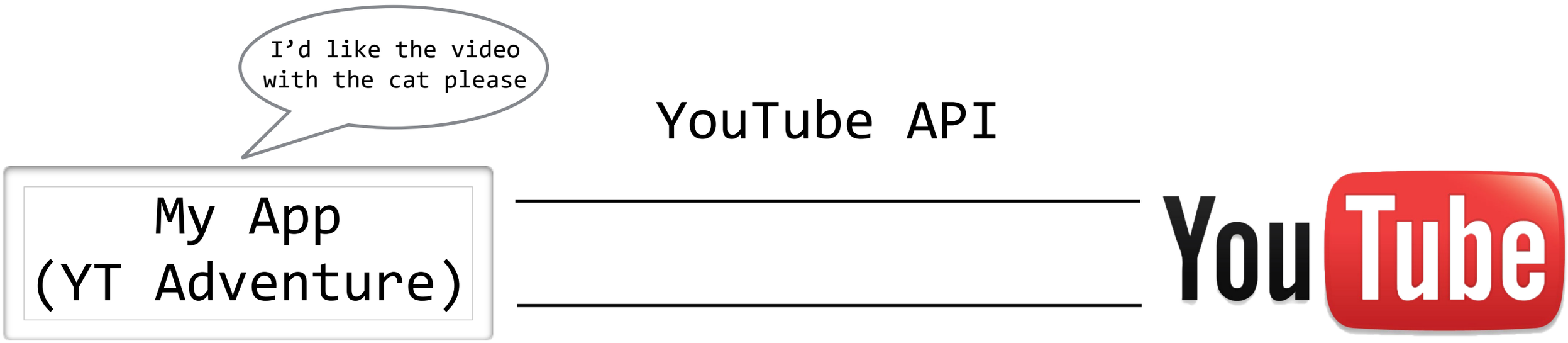

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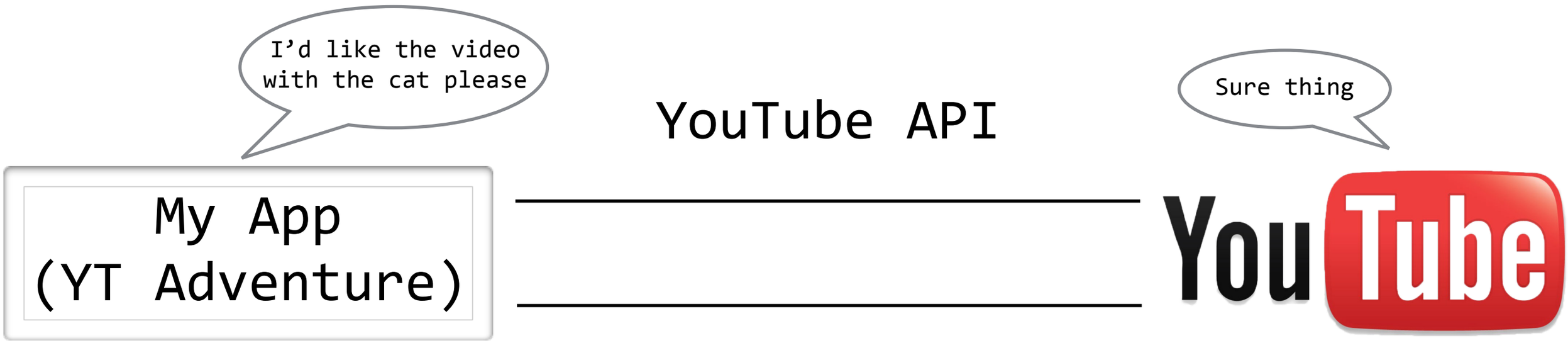

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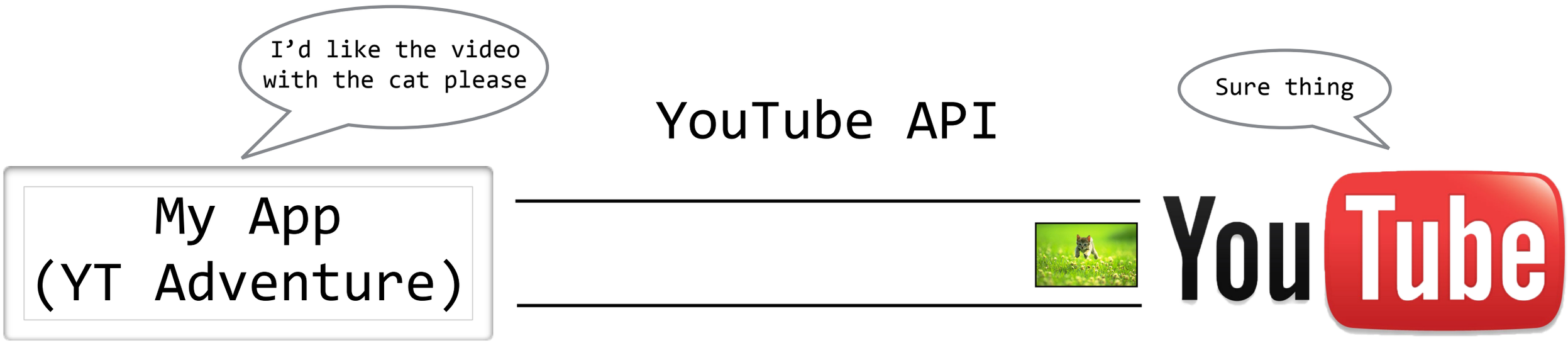

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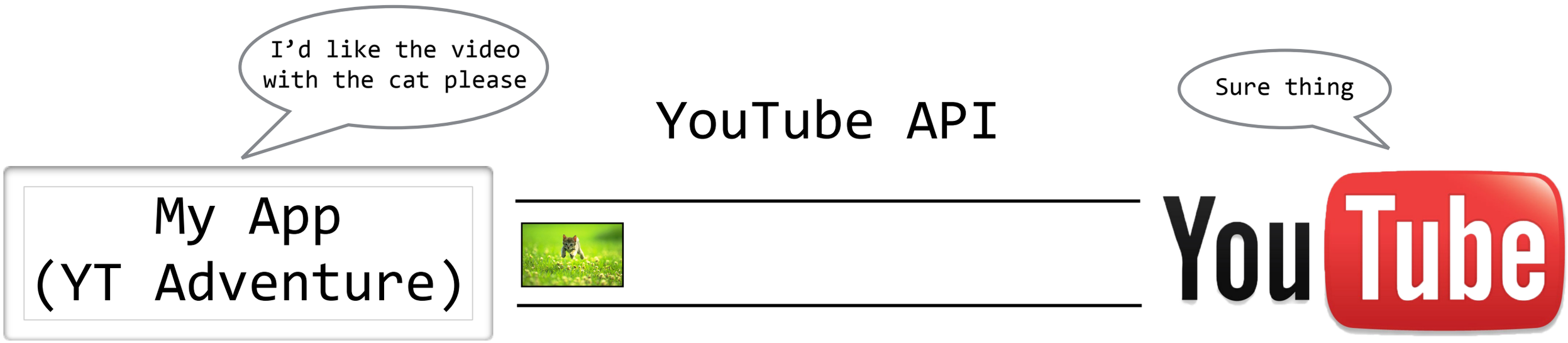

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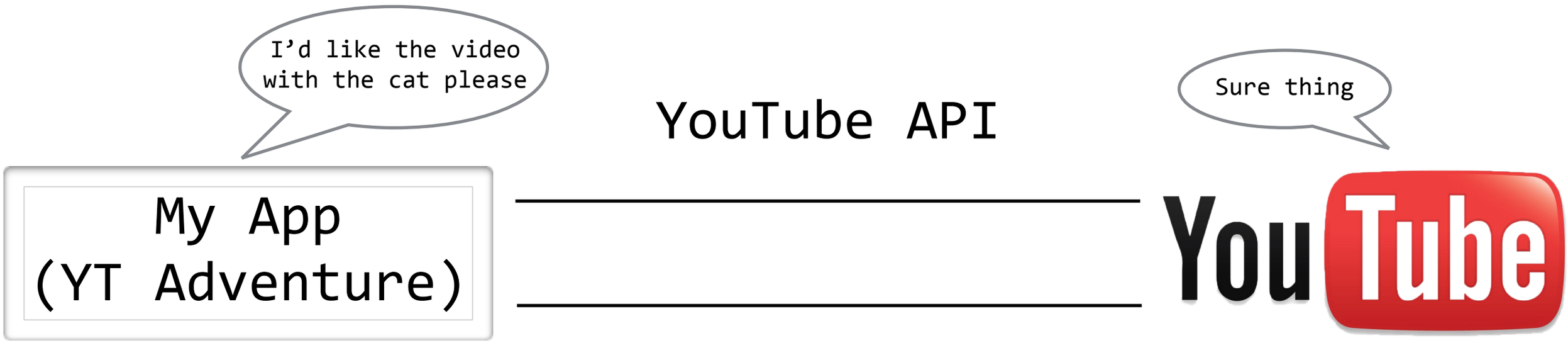

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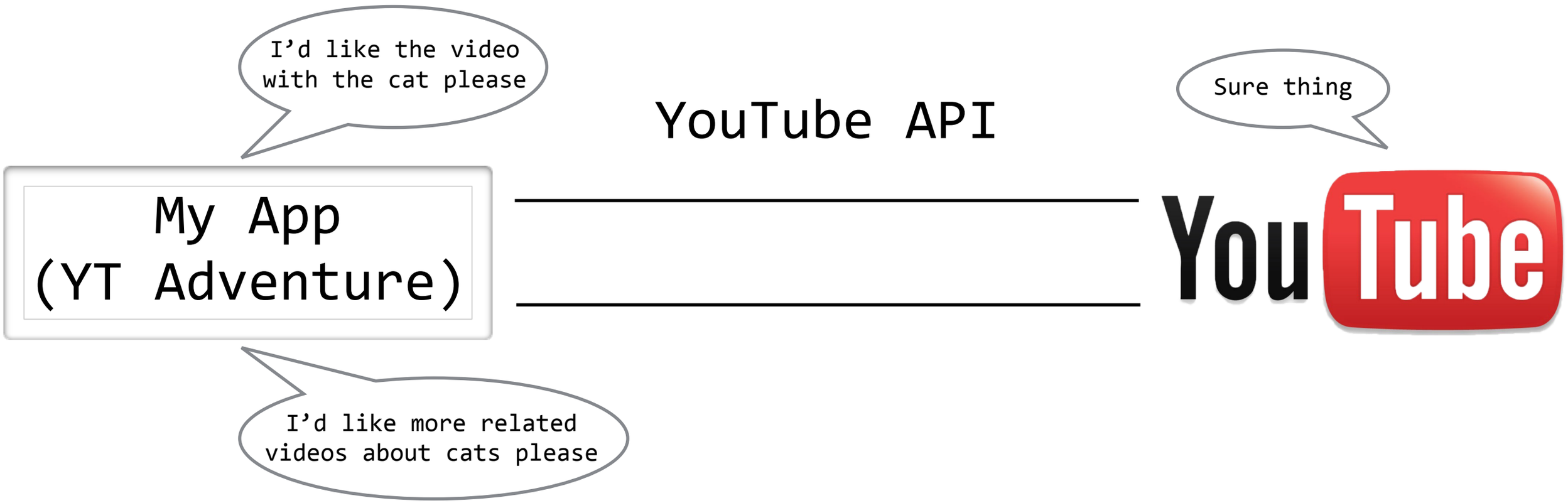

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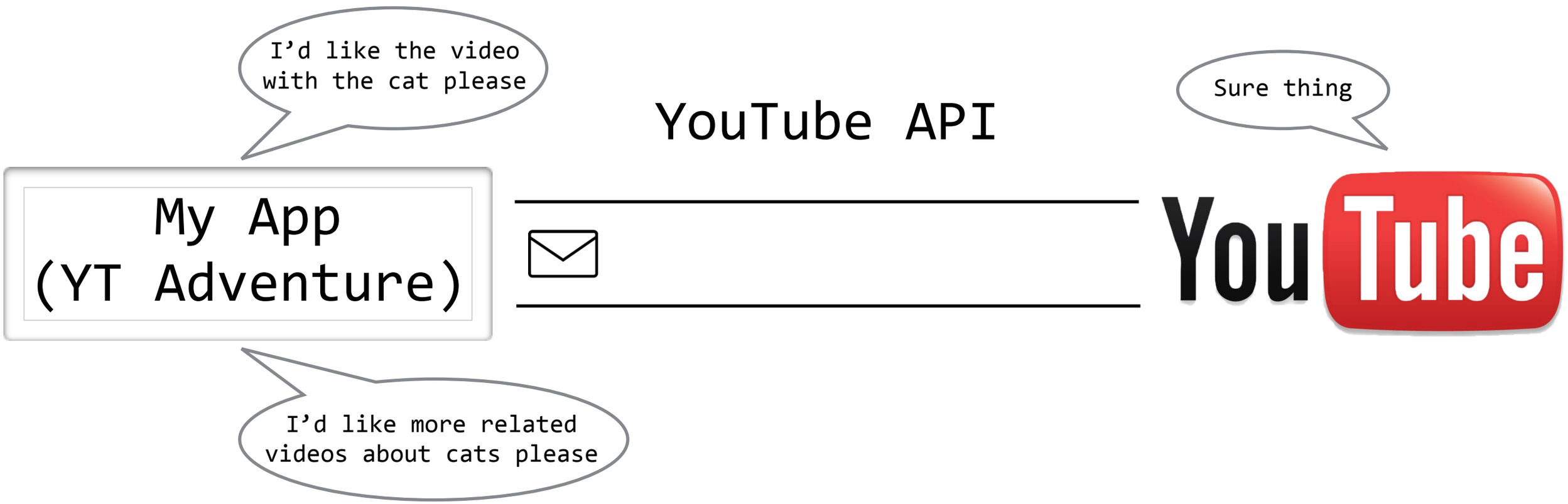

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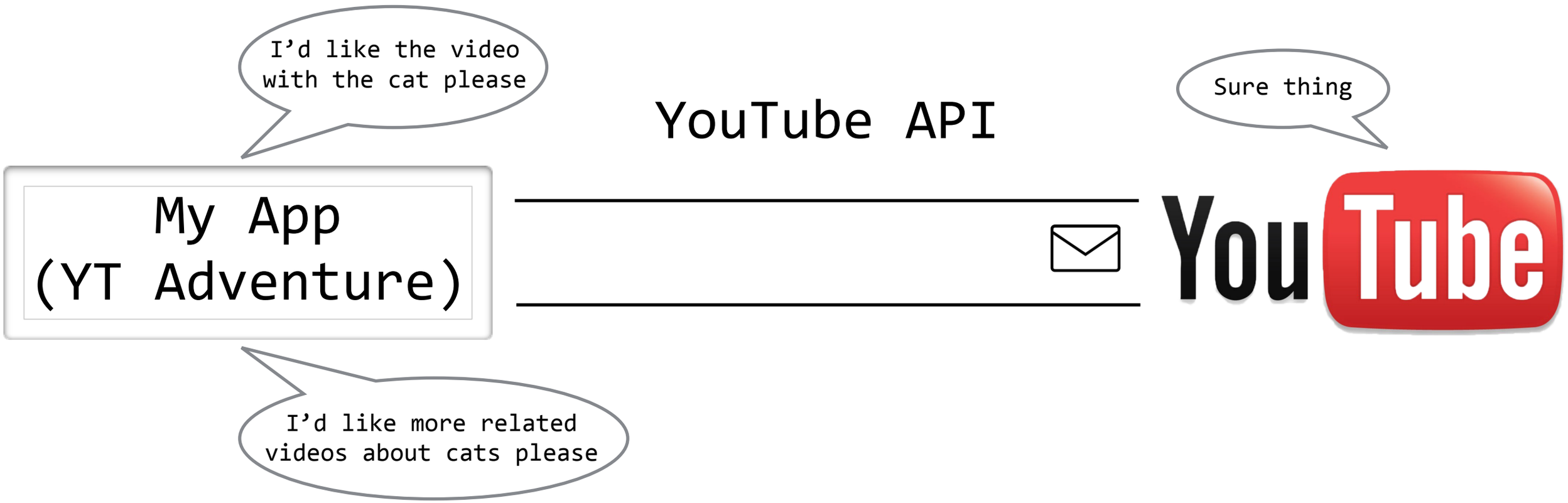

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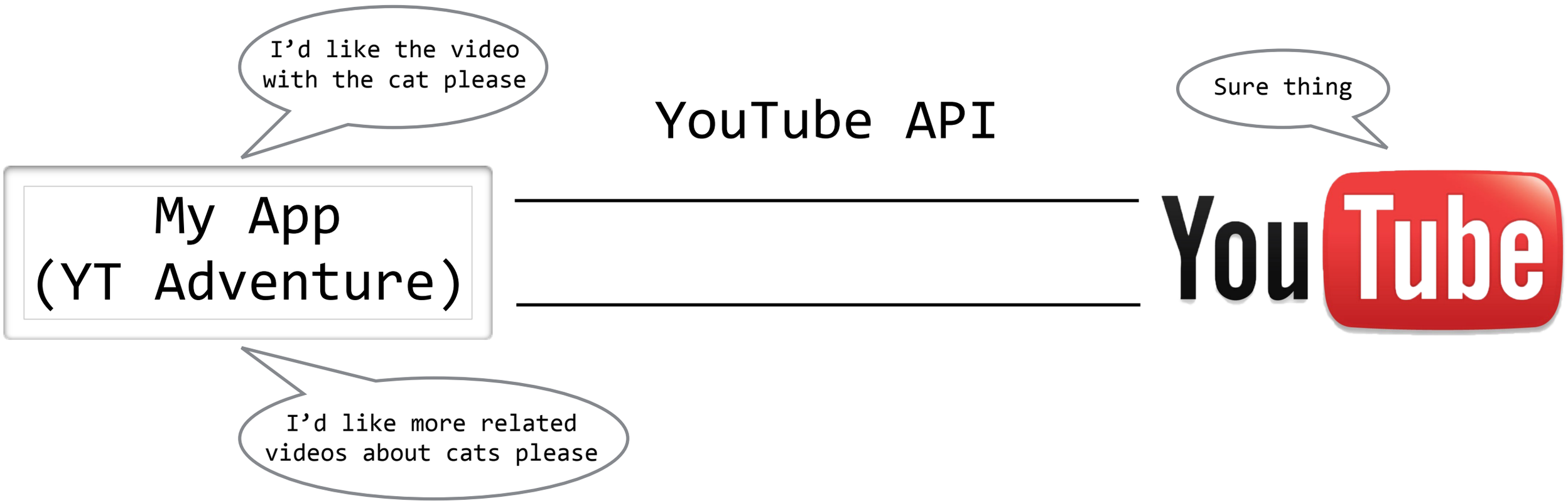

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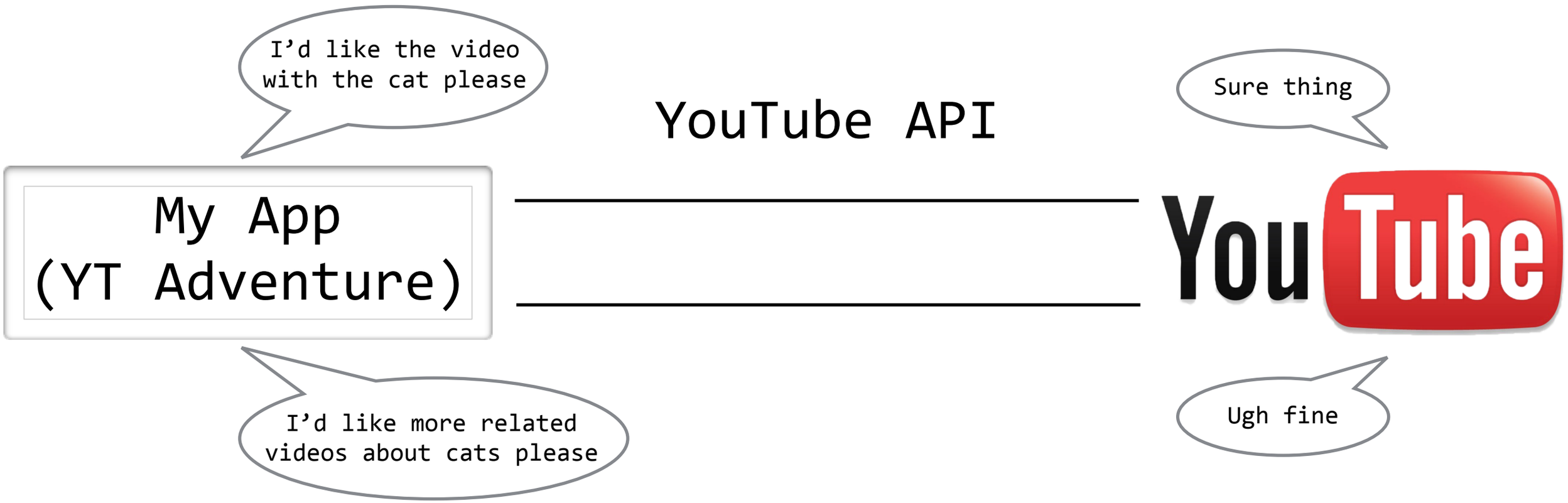

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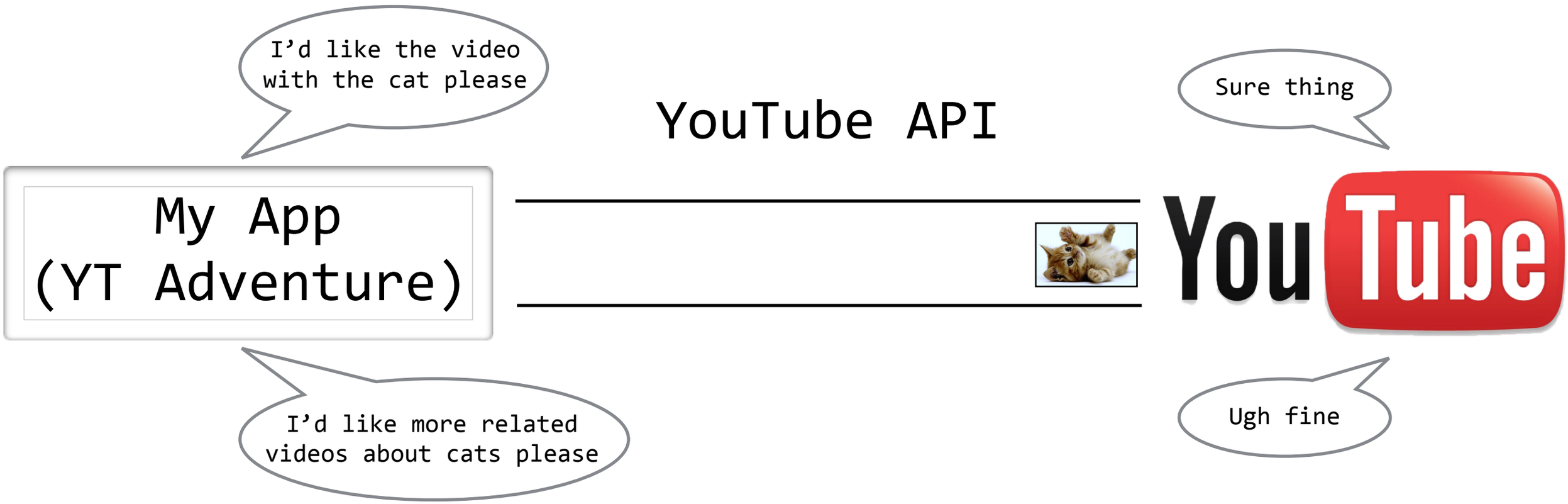

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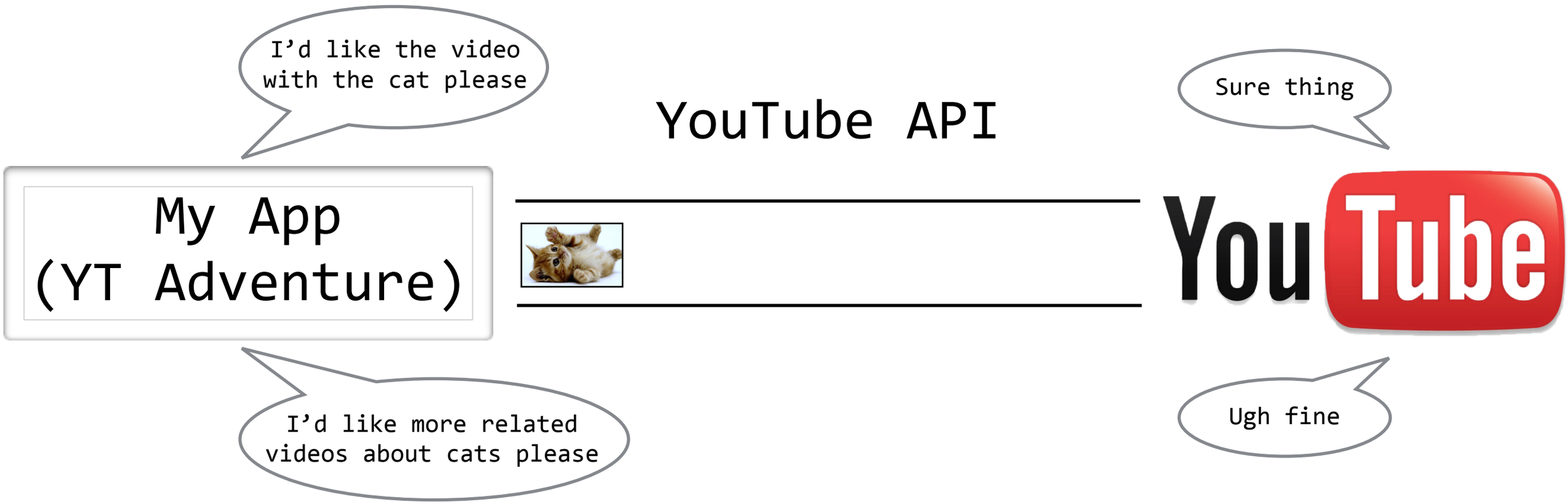

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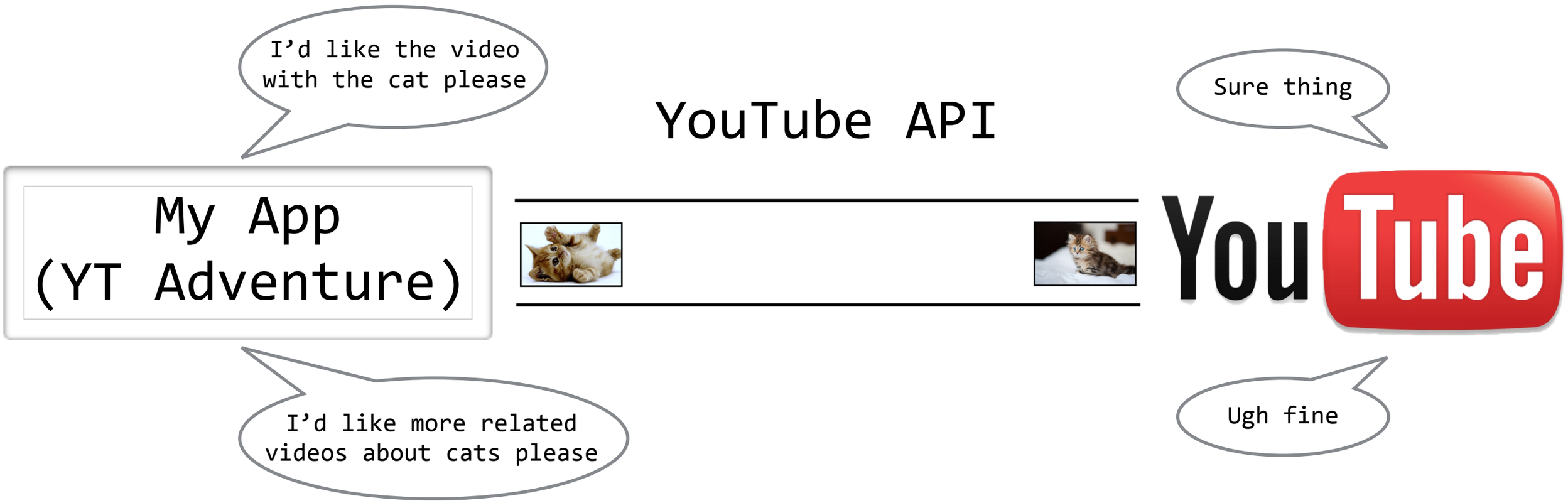

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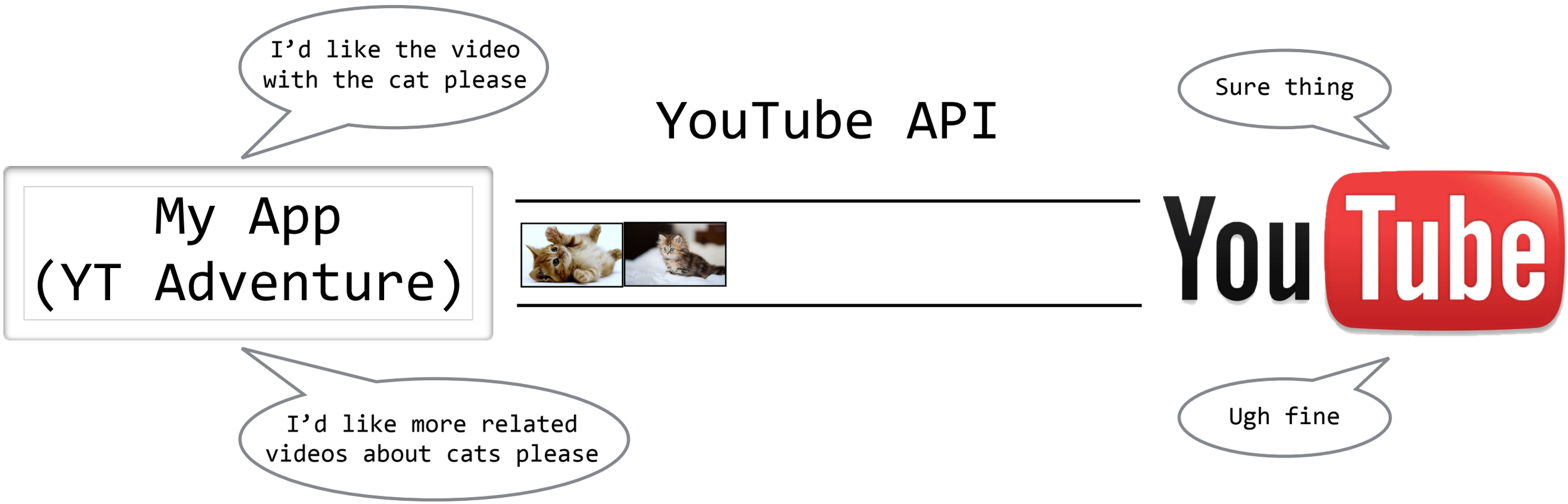

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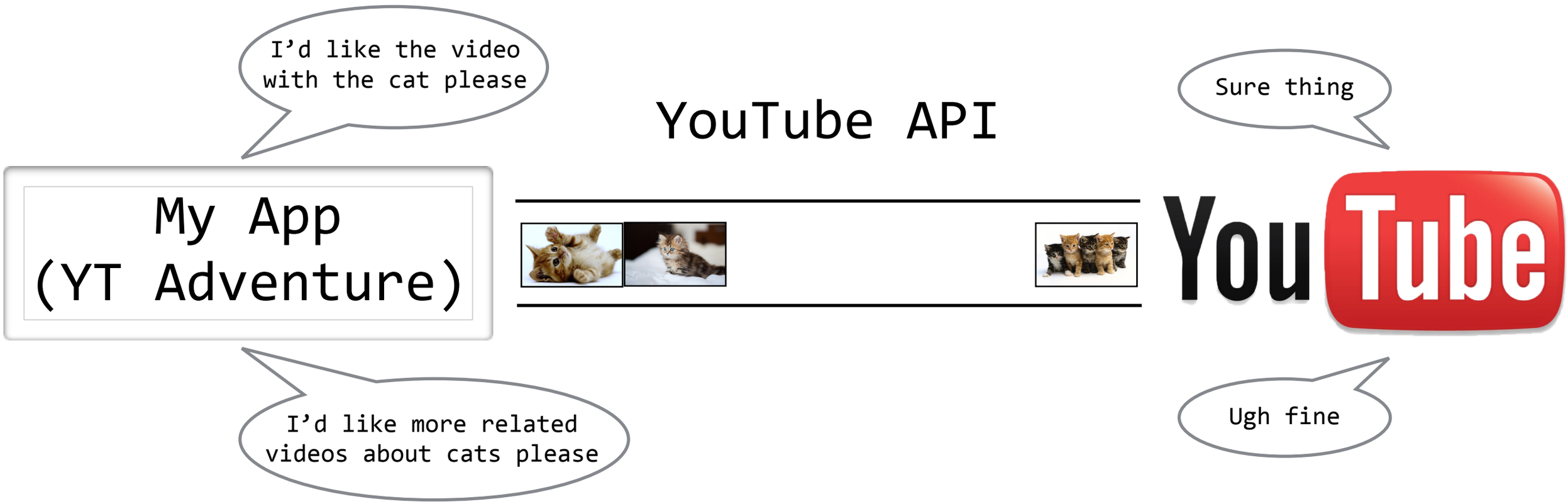

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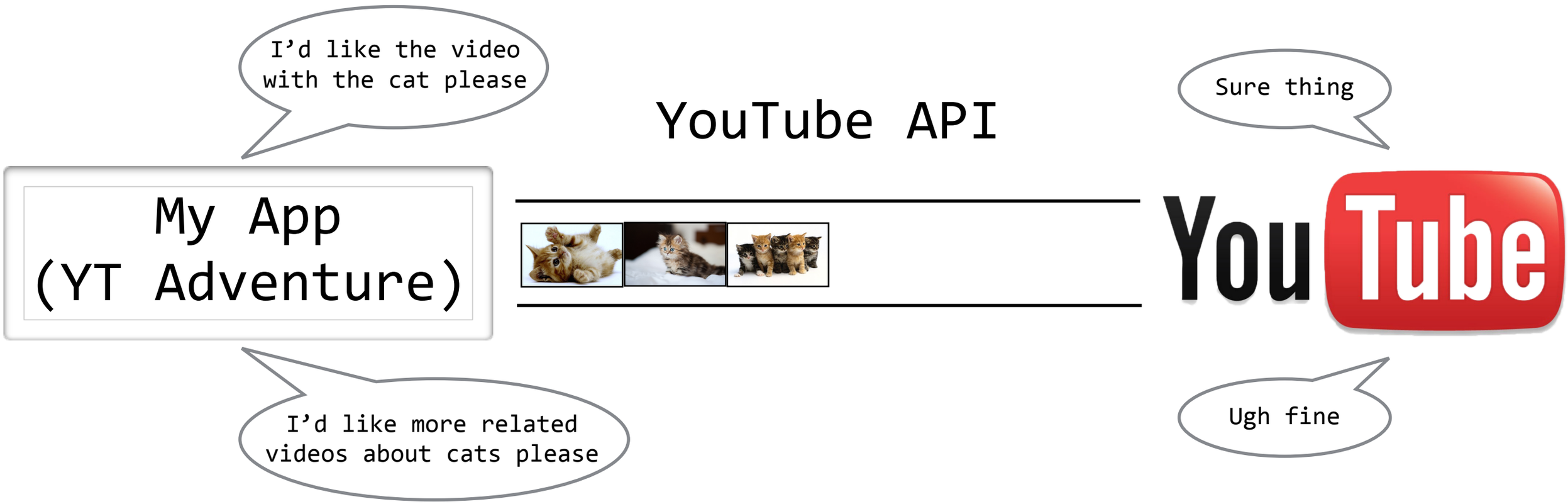

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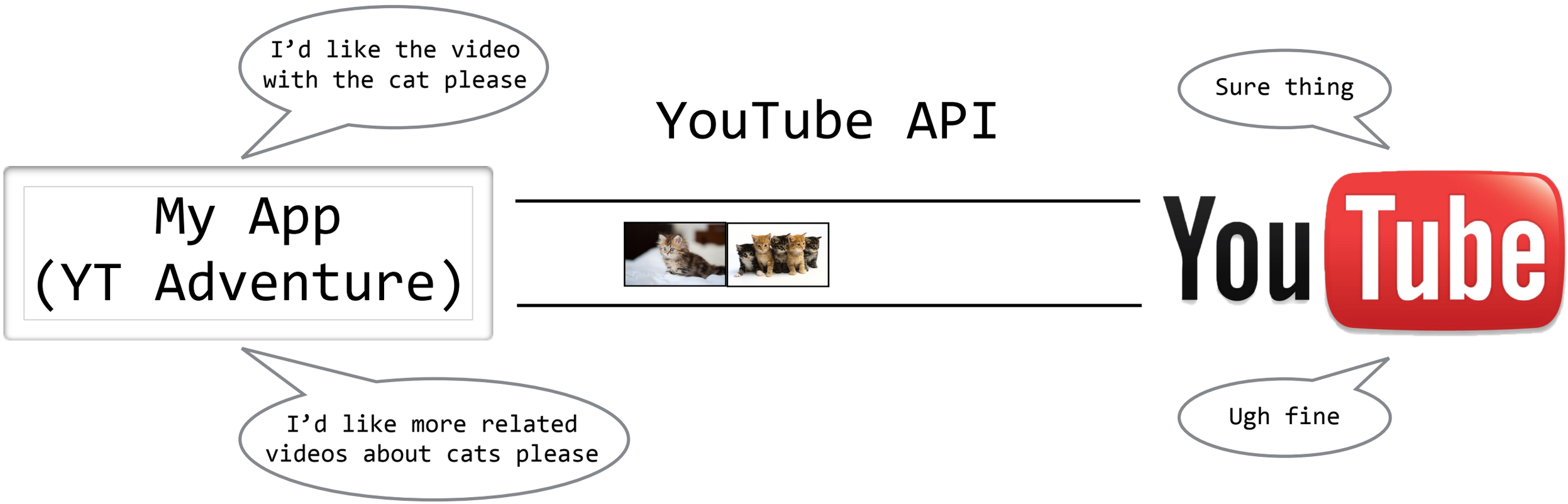

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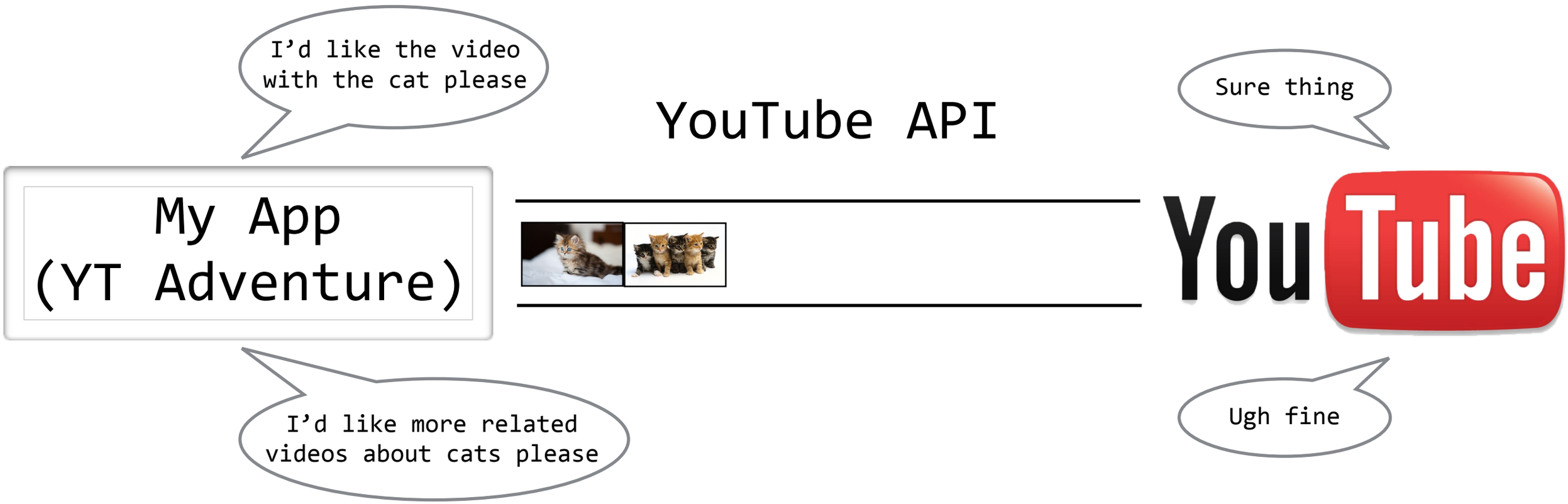

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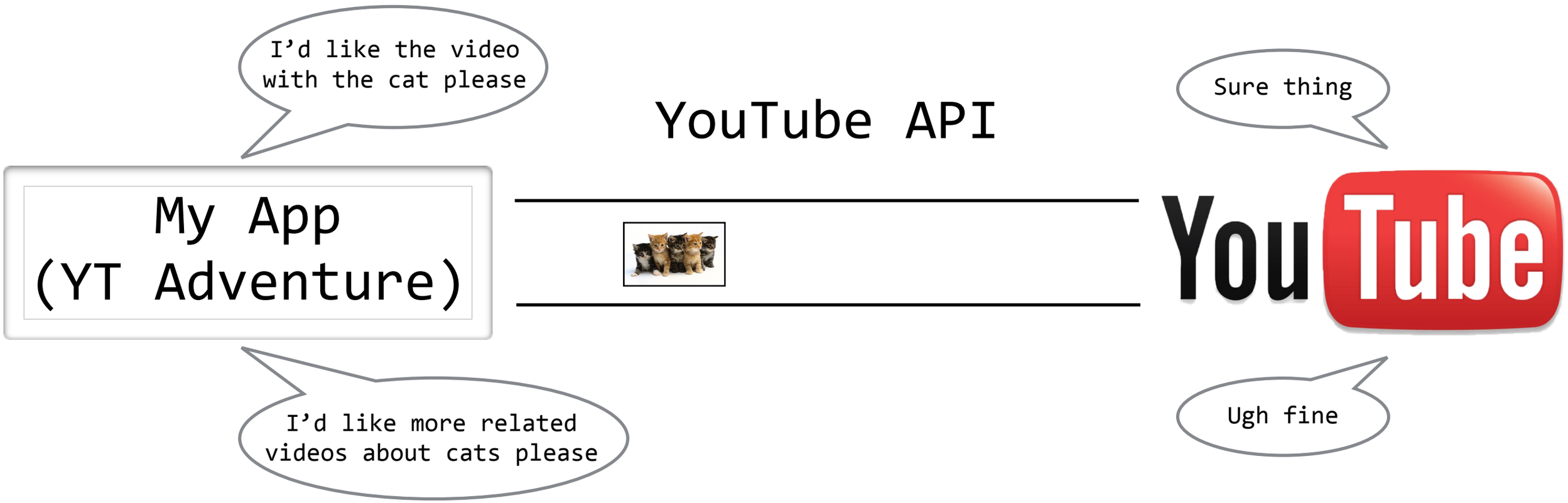

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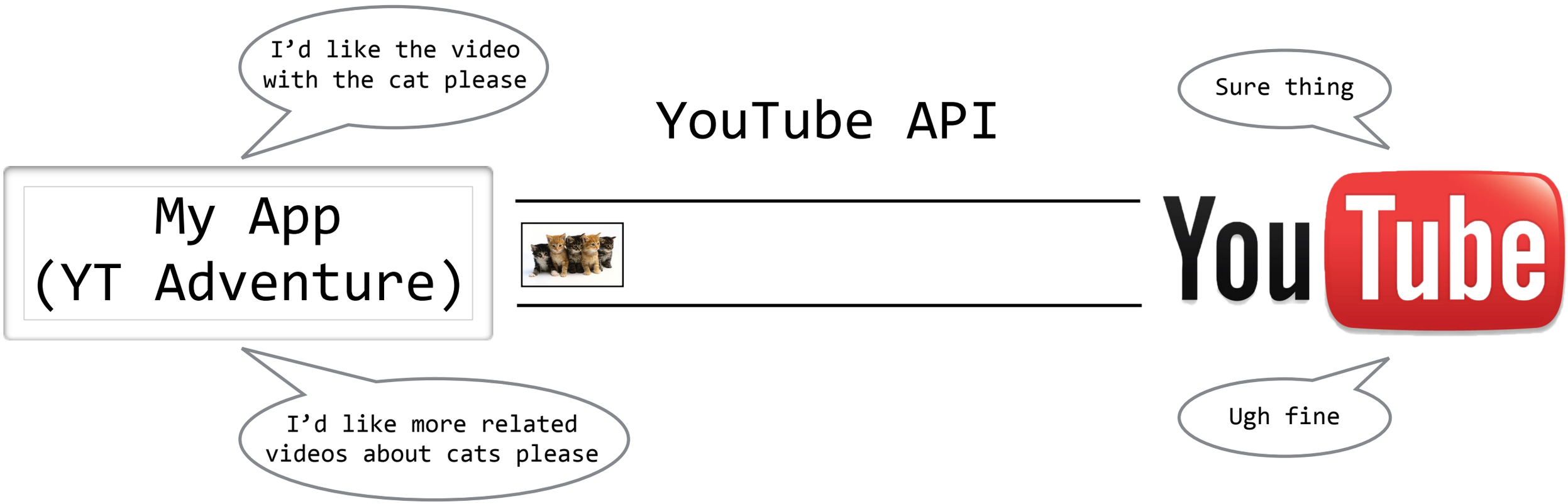

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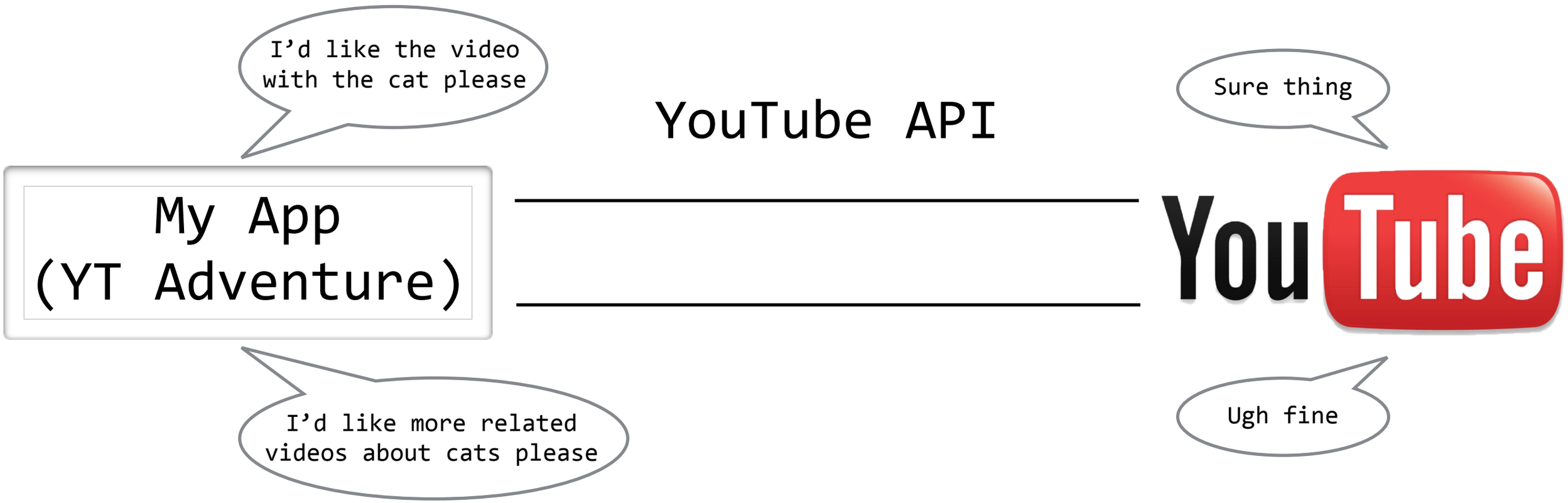

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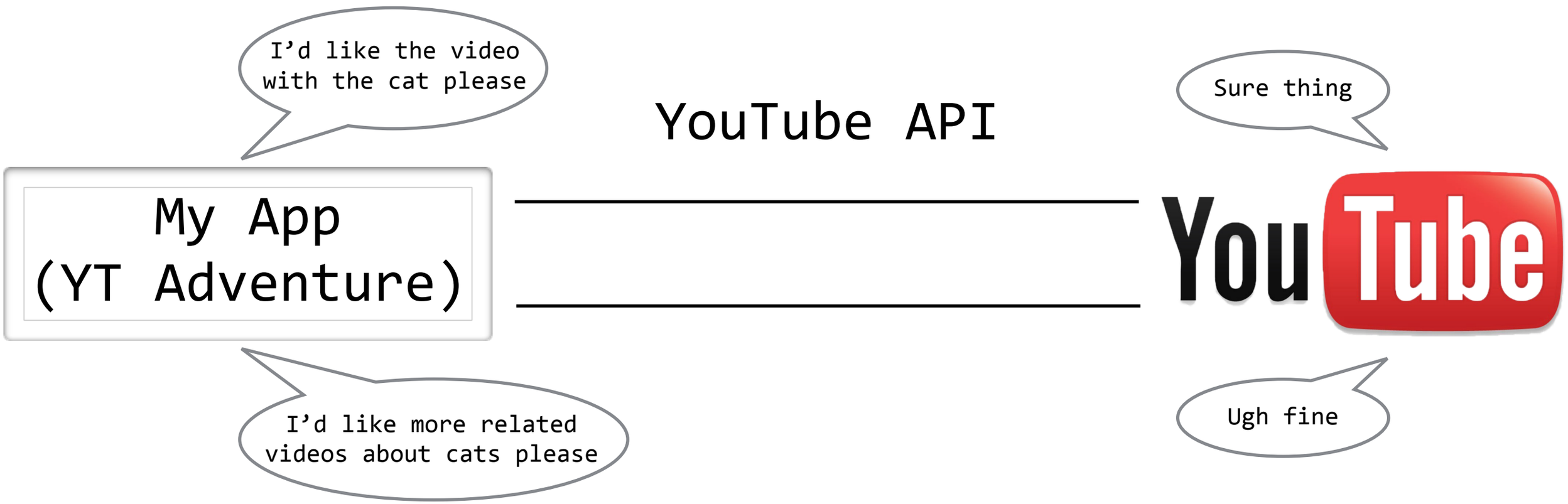

This is, of course, drastically simplified - check out the actual API for more details and actual code!

https://developers.google.com/youtube/v3/getting-started

How the YouTube API Works (demo)

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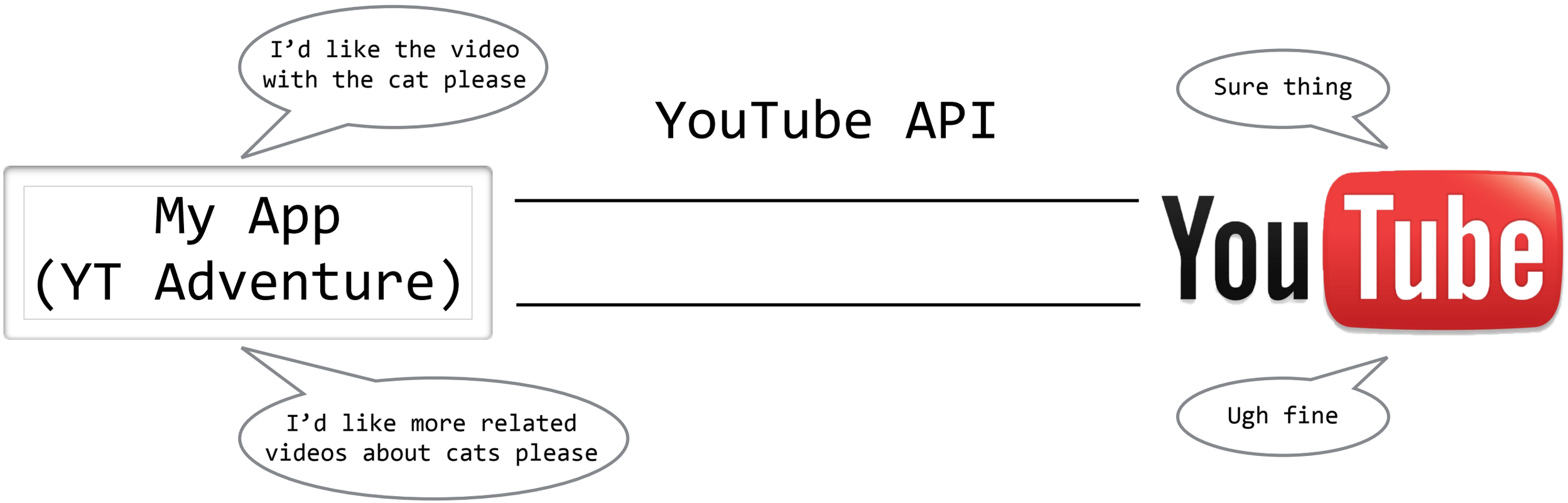

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- The thing to remember is that interfaces are always about *defining the rules for communication*

- Python protocols are interfaces for Python objects, as they allow communication with custom classes and objects through *specific magic methods*

- API's are interfaces for applications, as they allow communication with the application through a *library and/or remote function calls*

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- Learning these ideas well is one of the keys to becoming a great programmer