

# Lecture 25: Coroutines

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Marvin Zhang  
08/03/2016

# Announcements

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# Roadmap

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Introduction

Functions

Data

Mutability

Objects

Interpretation

Paradigms

Applications

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  - To study examples of paradigms that are very different from what we have seen so far

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Objects

Interpretation

Paradigms

Applications

- This week (Paradigms), the goals are:
  - To study examples of paradigms that are very different from what we have seen so far
  - To expand our definition of what counts as programming

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  - We have seen one example of this: interactive interpreters wait for the user to type in code before it can execute that code and produce a result
- This style of programming is called *event-driven*, because different *events*, such as user input, trigger different parts of our program to execute

# Generators and Generator Functions

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Revisiting lazy evaluation

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```
def naturals():
    curr = 0
    while True:
        yield curr
        curr += 1

>>> n = naturals()
>>> n
<generator object naturals at ...>
>>> next(n)
0
>>> next(n)
1
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Generalizing generators

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producer

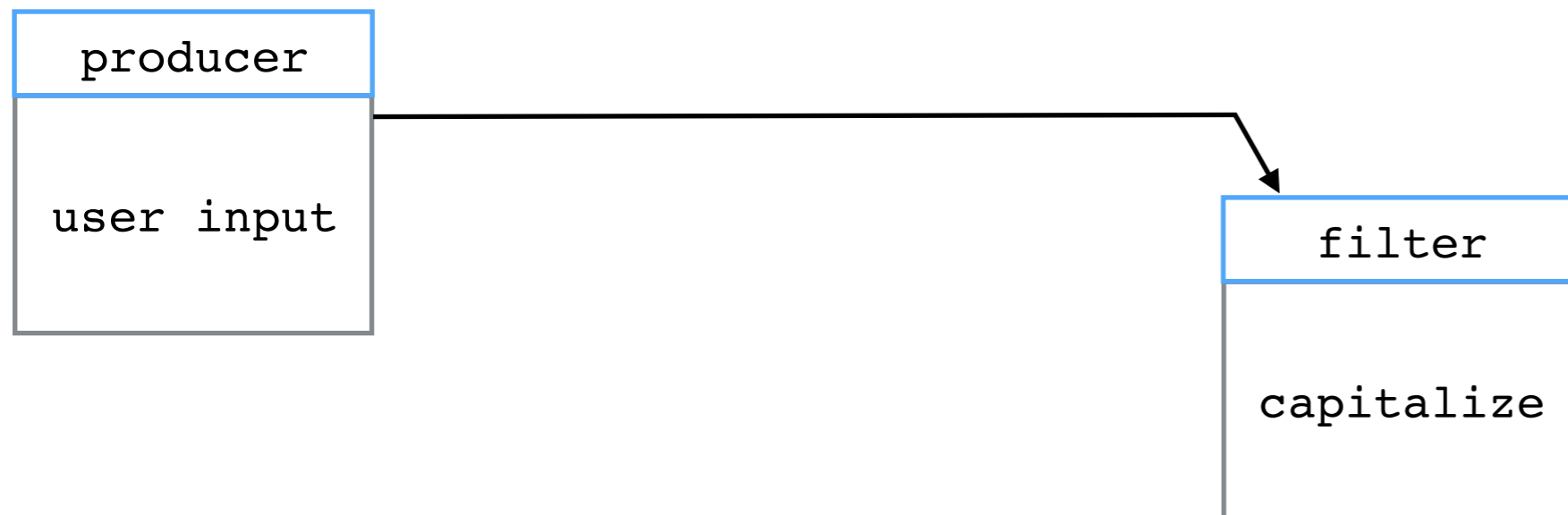
user input



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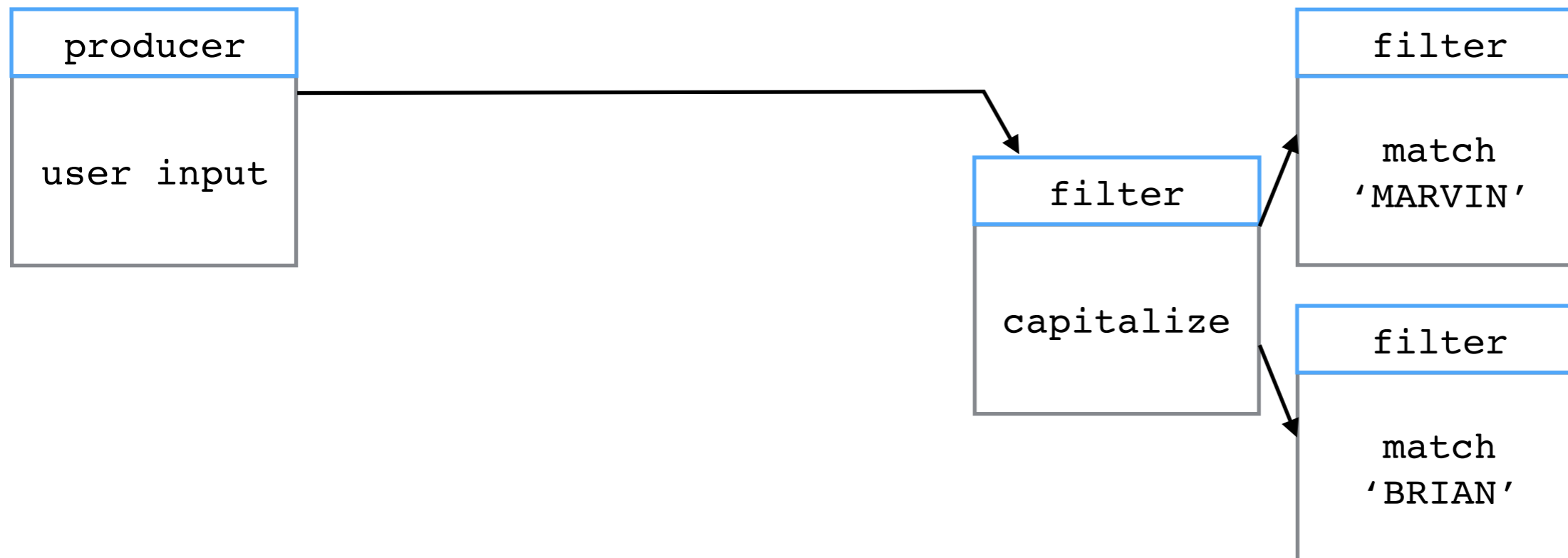
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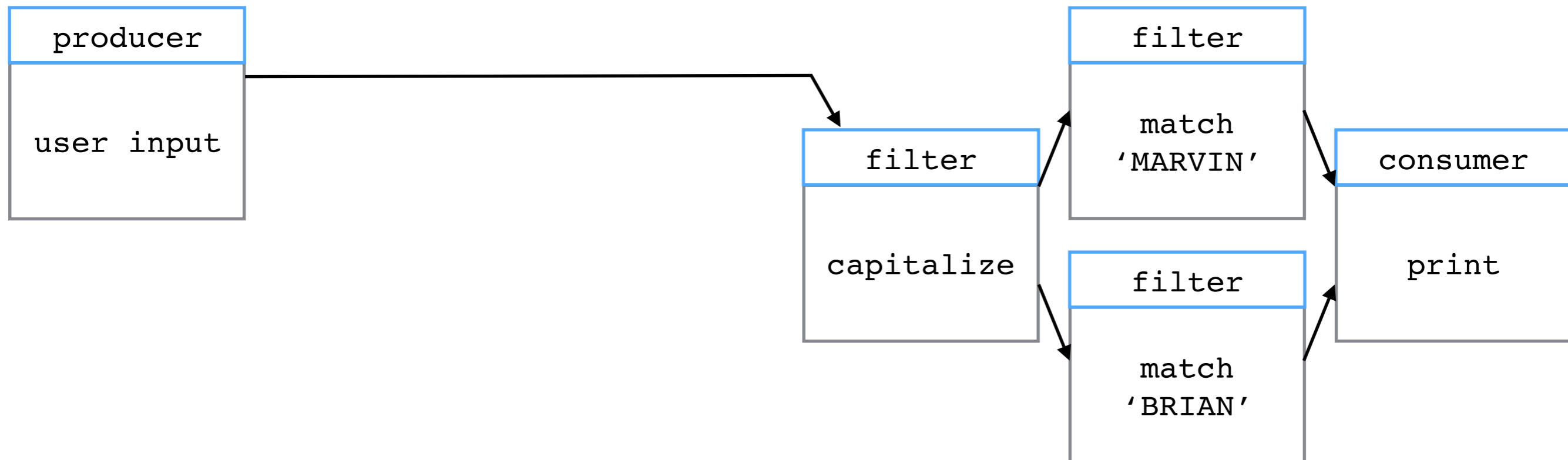
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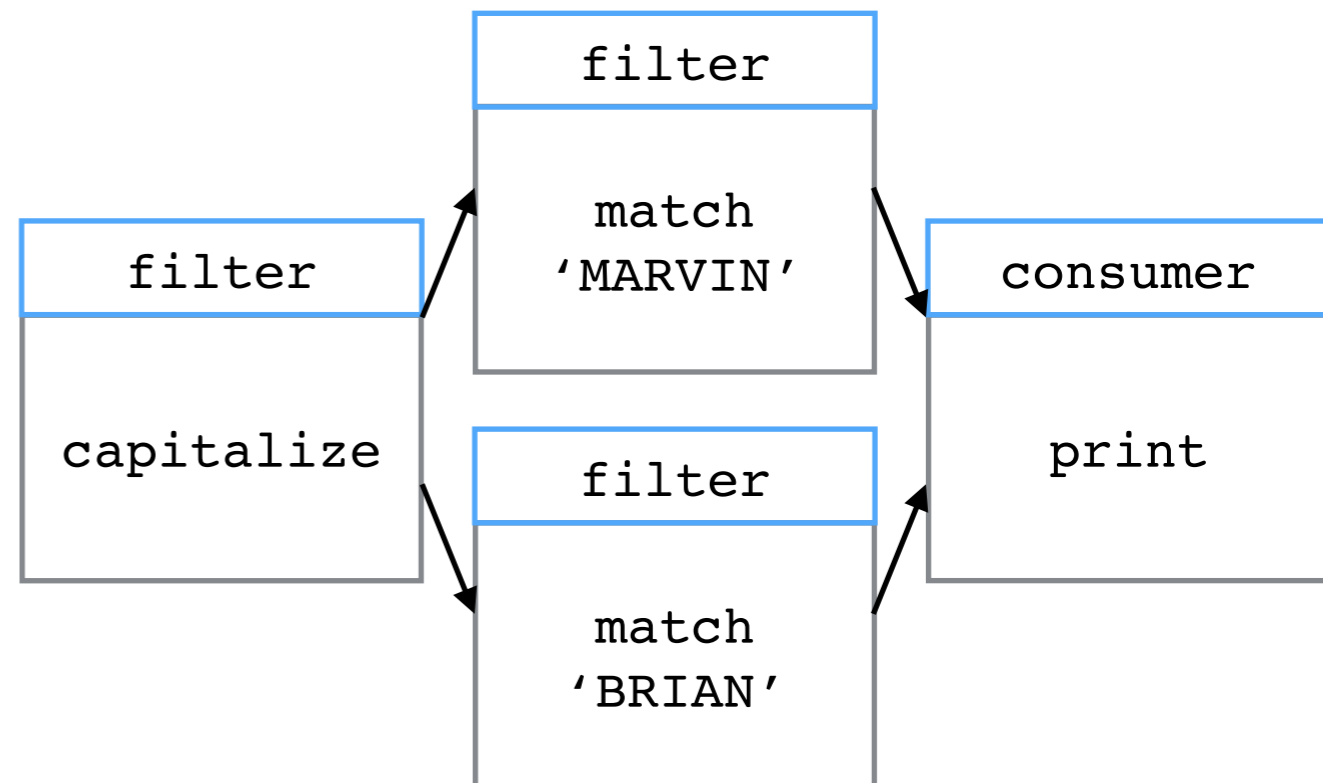
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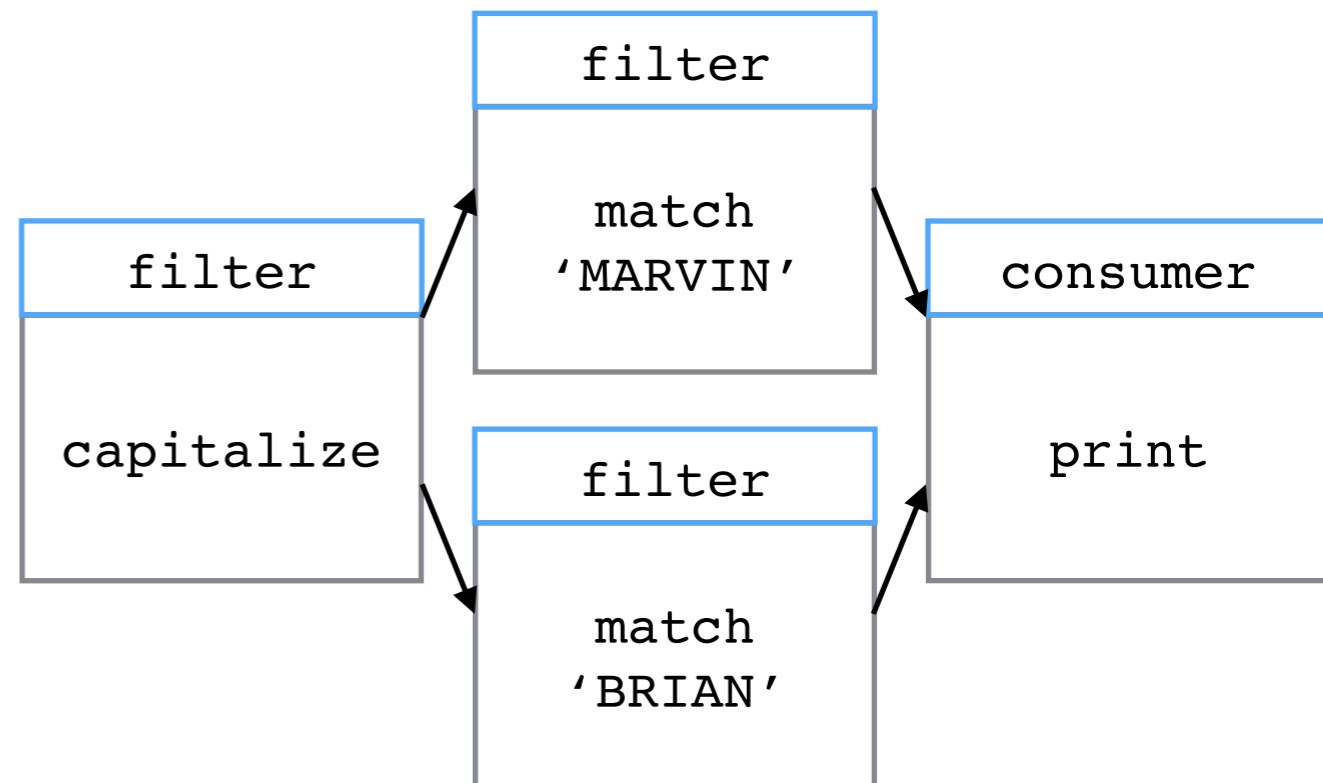
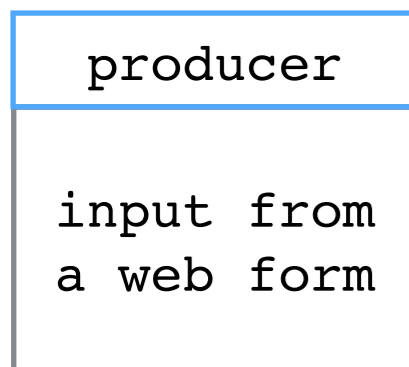
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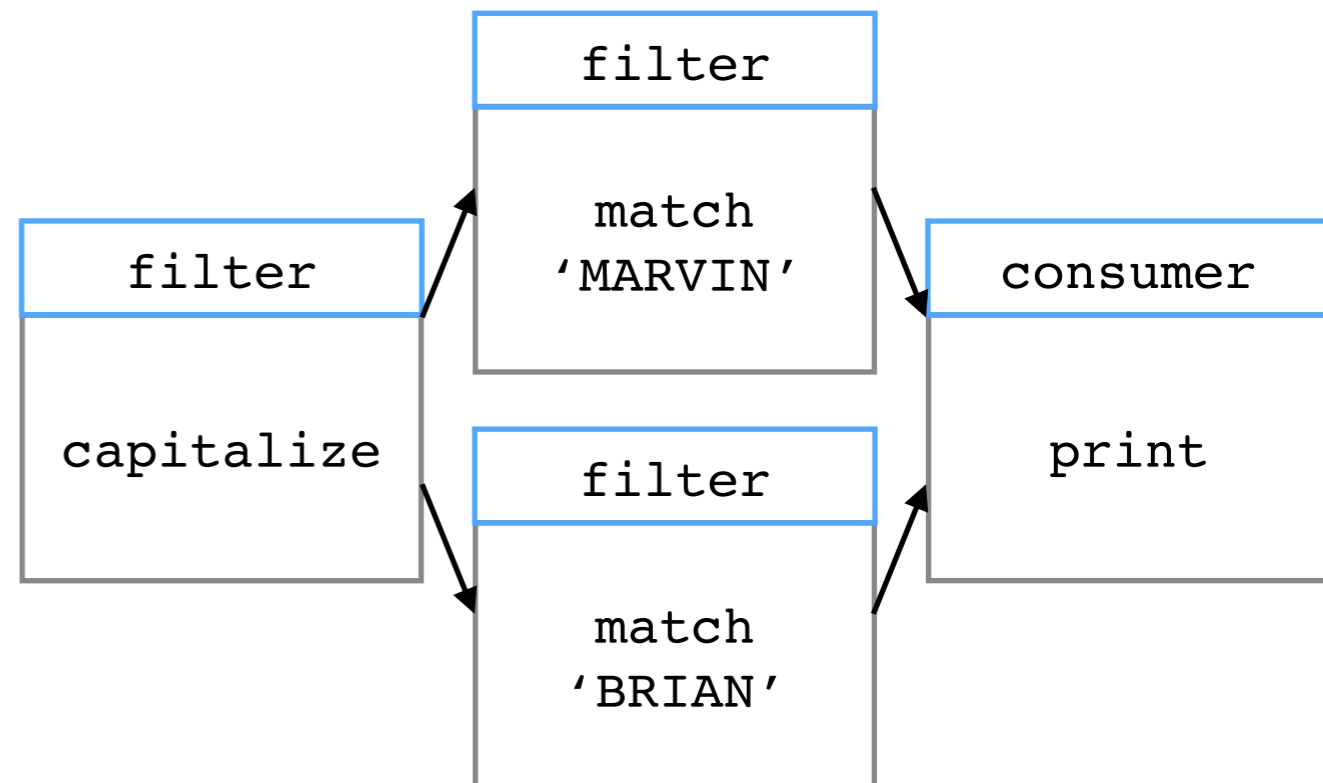
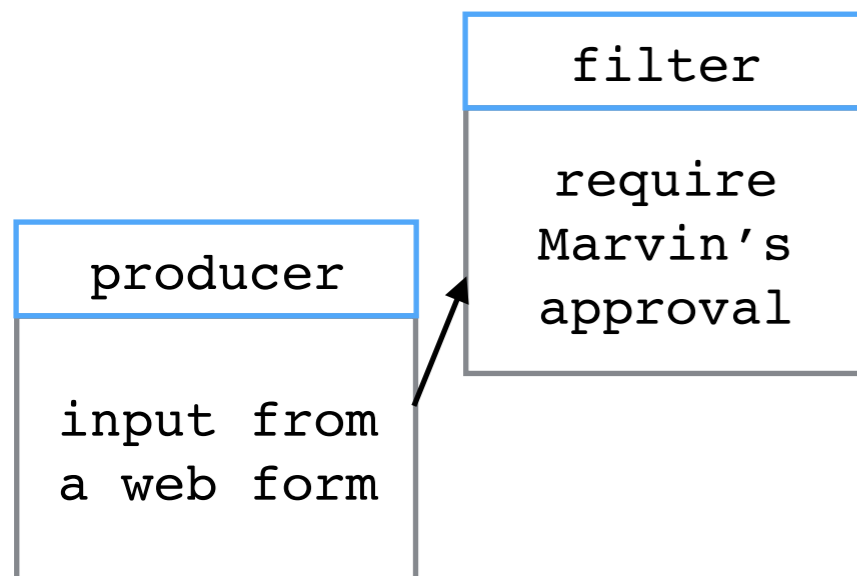
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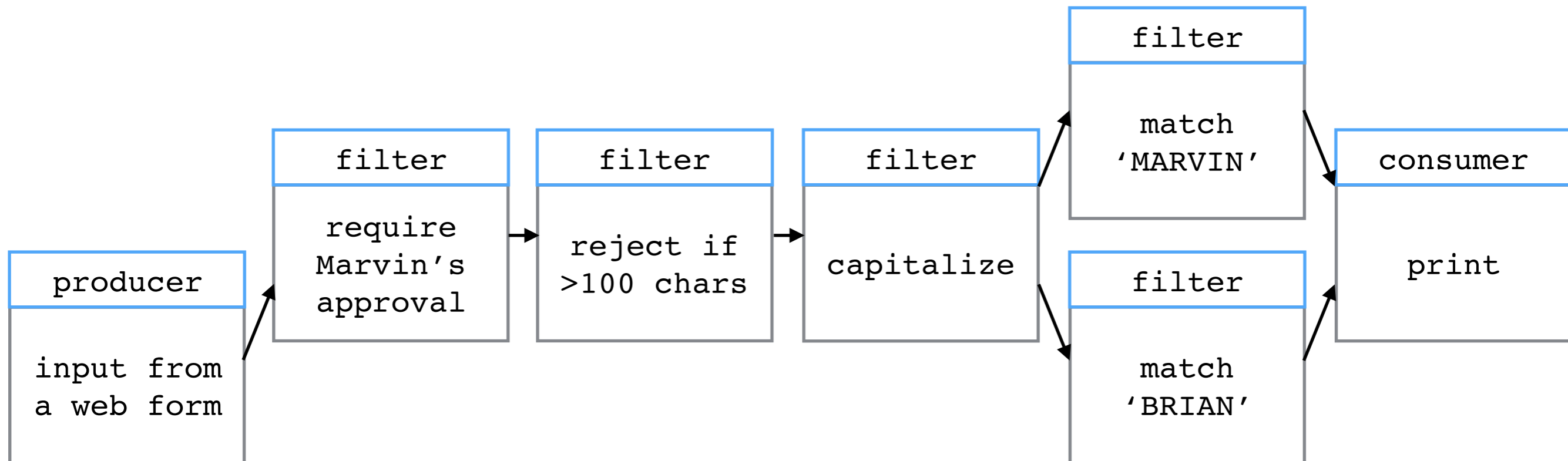
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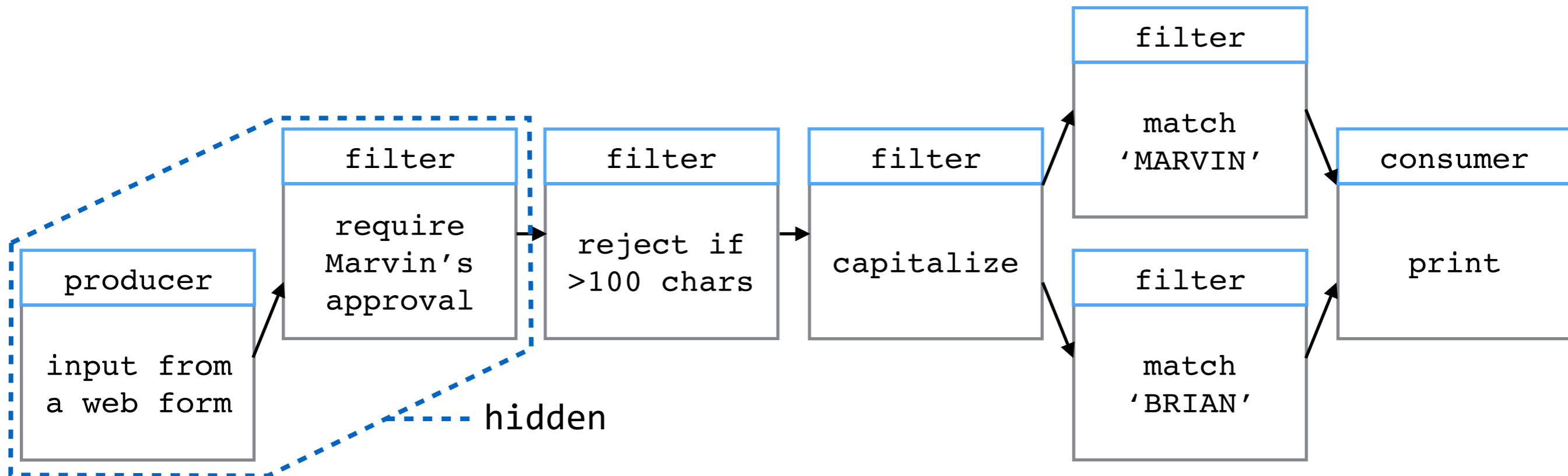
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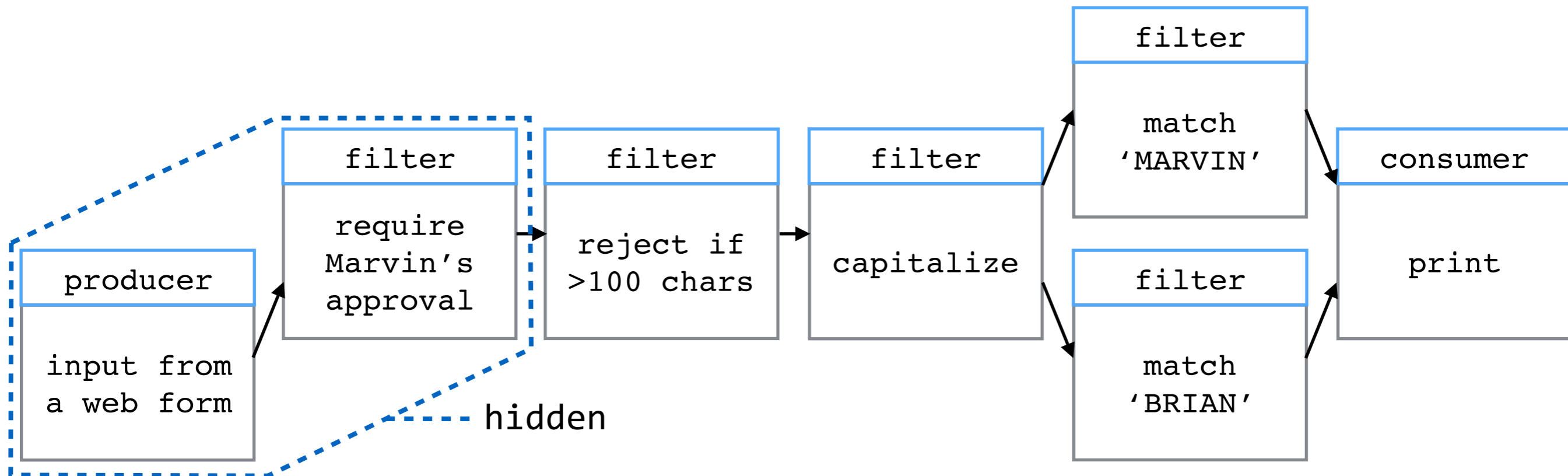




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With and without coroutines

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- Interactive interpreters is another example, where user input is the event
- In event-driven programming, an *event loop* waits for events, and handles them by dispatching them to a *callback function*

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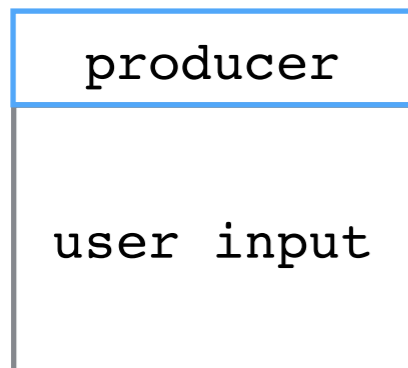
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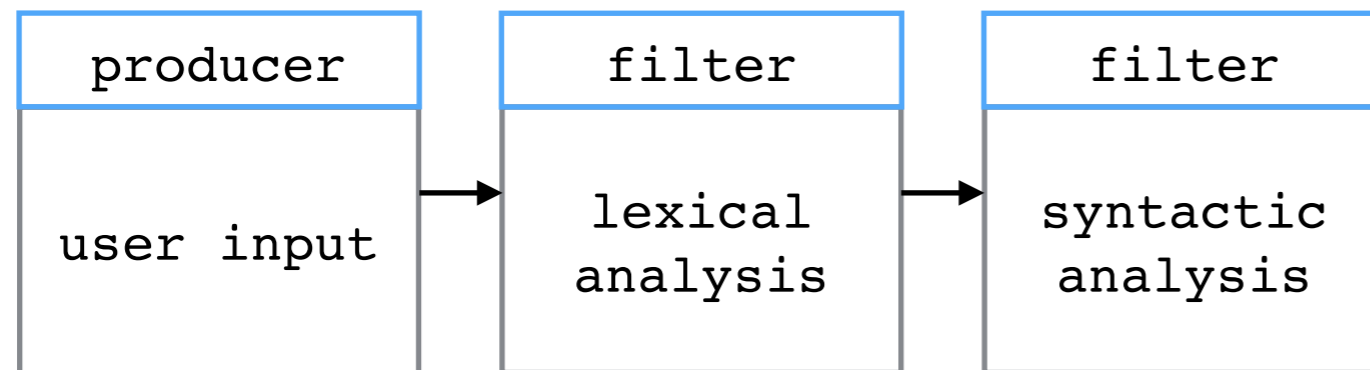
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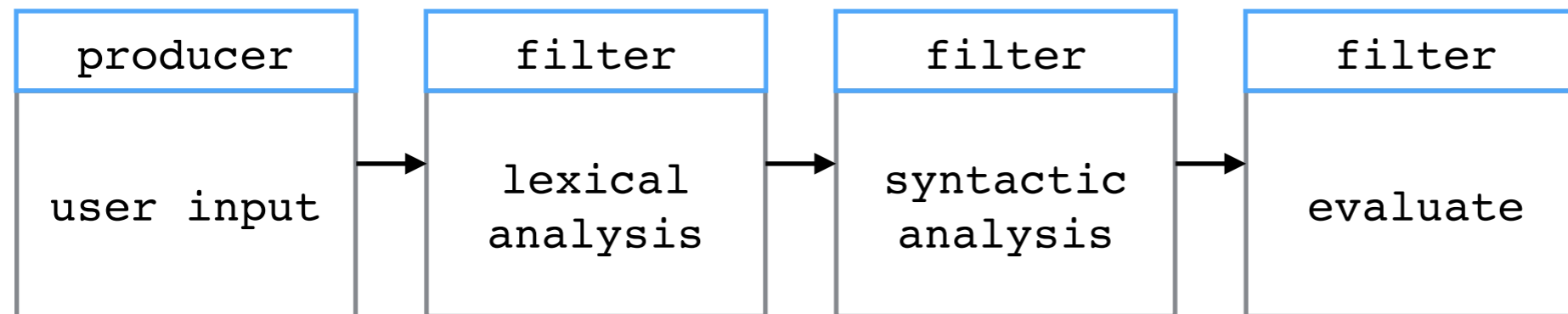
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- Both generators and coroutines maintain their own state, and this is highly useful for particular applications
- Though coroutines by themselves are not a paradigm, they are useful for the paradigm of event-driven programming
  - However, it is important to understand when using coroutines may just be unnecessarily complicated

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  - If the event-driven application has callback functionality that:
    - Is complex and easily made modular,
    - Naturally fits into a processing pipeline, or
    - Involves state that changes over time,
  - Then coroutines are probably the way to go