

Combining Filters (static, dynamic and state)

Pseudocode

Start

snum = 0

max = 0

while (Pile1 has more cards AND snum < 3)

Pick the first card X from Pile1

Move X to Pile2

```

    if (snum == 2 AND
        X.partOfSpeech == "Noun" AND
        X.letterCount > max) then

```

```

        max = X.letterCount

```

```

    end if

```

```

    if (X.word ends with ".") then
        snum = snum + 1
    end if

```

end while

Display max

End



Find the Longest Noun in the Third Sentence

ELI10: We read words one by one.
We only look at the third sentence.
Among its nouns, we find the longest one.

1 Three Filter Types

Static condition (Fixed)

- Select only nouns.

```
X.partOfSpeech == "Noun"
```



Dynamic condition (Changing)

- Check if the current noun is longer than the longest noun found so far.

```
X.letterCount > max
```



State condition (Progress)

- Process only the third sentence.

```
snum == 2
```

Sentence 1
Sentence 2
Sentence 3

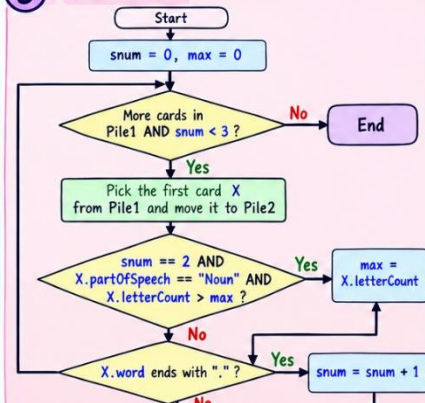
2 Updated Pseudocode

```

Start
snum = 0 // sentence number
max = 0 // longest noun length
while (Pile1 has more cards AND snum < 3) do
    Pick the first card X from Pile1
    Move X to Pile2
    // Check all three conditions
    if (snum == 2 AND
        X.partOfSpeech == "Noun" AND
        X.letterCount > max) then
        max = X.letterCount
    end if
    // Update sentence number after full stop
    if (X.word ends with ".") then
        snum = snum + 1
    end if
end while
Display max
End

```

3 Flowchart



4 Example Walkthrough

Input text (words with part of speech):

- The/Det cat/Noun is/Verb small/Adj ./.
- A/Det big/Adj dog/Noun runs/Verb ./.
- My/Det friend/Noun has/Verb a/Det laptop/Noun ./.

Step	Word (X)	POS	snum (before)	Check conditions?	max (after)	snum (after)
...	My	Det	2	Not a noun	0	2
	friend	Noun	2	6 > 0 → Yes	6	2
	has	Verb	2	Not a noun	6	2
	a	Det	2	Not a noun	6	2
	laptop	Noun	2	6 > 6 → No	6	2
	.	.	2	End of sentence	6	3

The third sentence nouns are
"friend" (6 letters) and
"laptop" (6 letters).
Longest length = 6.

Final Answer:

6
(Length of the longest noun in the third sentence)

5 Key Points to Remember

1 Static filter: Select only nouns.

2 State filter: Process only the third sentence.

3 Dynamic filter: Check if current noun is longer.

4 Increment snum when a word ends with "."
This ensures we move to the next sentence after the full stop.

5 Stop the loop after the third sentence.

Condition: Pile1 has more cards AND snum < 3

Sentence number (snum)
First sentence → 0
Second sentence → 1
Third sentence → 2
After third ends → 3

If no noun in third sentence, max remains 0.

Combining Filter Types

A filtering condition can combine **static**, **dynamic**, and **state** conditions. This is useful when we need to select records based on a fixed property, a changing value, and the position or history of the iteration.

1. Three filter types

Filter type	What it compares	Example
Static	A field with a fixed value	<code>X.partOfSpeech == "Noun"</code>
Dynamic	A field with a changing variable	<code>X.letterCount > max</code>
State	The current phase or history of iteration	<code>sentenceNumber == 2</code>

A **static condition** does not change during the loop. A **dynamic condition** changes because a variable such as `max` changes. A **state condition** remembers where we are in the process, such as which sentence we are currently reading.

2. Why combine them?

Sometimes one condition is not enough.

For example:

Find the longest noun in the third sentence.

This requires:

1. Select only nouns – **static filter**.
2. Track that we are in the third sentence – **state filter**.
3. Compare each noun's length with the longest noun found so far – **dynamic filter**.

All three conditions must be true before updating `max`.

3. Variables needed

Variable	Purpose	Type of information
<code>snum</code>	Tracks the current sentence number	State
<code>max</code>	Stores the longest noun length found so far	Dynamic
<code>X.partOfSpeech</code>	Checks whether the word is a noun	Static
<code>X.letterCount</code>	Gives the length of the current word	Dynamic

Initially:

snum = 0

max = 0

Here, snum = 0 means we are in the first sentence, snum = 1 means second sentence, and snum = 2 means third sentence.

4. Pseudocode

Start

snum = 0

max = 0

```
while (Pile1 has more cards AND snum < 3) {  
    Pick the first card X from Pile1  
    Move X to Pile2
```

```
    if (snum == 2 AND  
        X.partOfSpeech == "Noun" AND  
        X.letterCount > max) {  
        max = X.letterCount  
    }
```

```
    if (X.word ends with full stop) {  
        snum = snum + 1  
    }
```

```
}
```

End

5. Explanation of the conditions

Static condition

X.partOfSpeech == "Noun"

This selects only nouns. It does not change during the loop.

State condition

snum == 2

This ensures that we process only words from the third sentence.

Dynamic condition

X.letterCount > max

This checks whether the current noun is longer than the longest noun found so far.

Combined condition

snum == 2

AND X.partOfSpeech == "Noun"

AND X.letterCount > max

Only when all three are true does the algorithm update max.

6. Updating the state

The sentence number must increase when a sentence ends.

```
if (X.word ends with full stop) {  
    snum = snum + 1  
}
```

For example:

- First sentence: snum = 0
- Second sentence: snum = 1
- Third sentence: snum = 2
- After the third sentence ends: snum = 3

The loop condition is:

Pile1 has more cards AND snum < 3

So the iteration stops after the third sentence is completed.

7. Another example

Find the bill with the highest spend for a particular customer, say N.

```
if (X.customerName == "N" AND X.billAmount > max) {  
    max = X.billAmount  
    maxCardID = X.uniqueId  
}
```

Here:

- X.customerName == "N" is a **static** condition.
- X.billAmount > max is a **dynamic** condition.

Only bills belonging to customer N are considered, and among them, the highest bill amount is tracked.

Remember

- Use a **static filter** to select a fixed category.
- Use a **dynamic filter** to compare with a changing value.
- Use a **state filter** to track progress or past events.
- Combine them using AND when all conditions must be true.
- Update state variables, such as sentence number, at the correct point in the loop.