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How to Reverse a List in LISP

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Given a list: (s1 s2 s3 ... sn), whose elements are all S-expressions, I want to have the list reversed into: (sn ... s3 s2 s1). There are two ways to do it.

Method 1: built-in function

While I was struggling to come up with a solution, I was delighted to find this built-in function, (reverse L), in Common LISP.

So, the output of (reverse (list 1 2 3 4)) would be:
(4 3 2 1)

Method 2: implement your own “reverse” in LISP

It's a mission possible. But I have to write two functions. Here is a brief descriptino of them:

REV [L]: the main entry of this algorithm

CAT [L1, L2]: concatenate two lists into a single list.

Let's first write the body of REV:

```
1. (defun REV (L)
2.   (cond
```

```

3.      ((null L) NIL)
4.      (T (CAT (REV (cdr L)) (list (car L))))
5.      )
6.      )

```

Explanations to Line 4:

(REV (cdr L)) will give you a list, with the rest elements of L in reverse order; and you just need to append the first element to its end.

But you have to construct a list with the first element, because the two arguments of function CAT both have to be list.

Then the body of CAT:

```

1.      (defun CAT (L1 L2)
2.      (cond
3.      ((null L1) L2)
4.      ((atom (cdr L1)) (cons (car L1) L2))
5.      (T (cons (car L1) (CAT (cdr L1) L2))
6.      )
7.      )

```

Explanations:

Line 3: if L1 is null, just return L2

Line 4: if (cdr L1) is an atom, then (car L1) must be the last element of a list.

#Note: function CAT does not check if L1 and L2 are lists or not. So within the function body, it assumes they are both lists.

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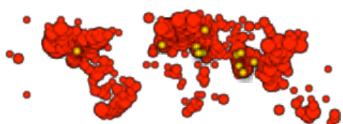
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