CSE 259 - Logic in Computer Science Fall 2024

Recitation-6

List in Prolog

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Lists

- Similar to Python lists
- Important to understand so that we can use it on project-3

Lists

- Lists in Prolog is specified using square brackets
- Example: [mia, vincent, jules, yolanda]

Lists

- All sorts of Prolog objects can be elements of a list
- Example: [mia, car(toyota), X, 2]

Lists

- Lists can be empty
- Example: [ ]

Lists

- Lists can contain other lists as elements
- Example: [mia, [apple, banana], [toyota, honda]]

Lists

- Lists have two parts: **head** and **tail**. The first element is head, and the rest of the part is tail

```
| ?- [Head | Tail] = [mia, vincent, jules, yolanda].

Head = mia
Tail = [vincent,jules,yolanda]

yes
```

Lists

- The head and the tail can have any name like variables.

```
| ?- [X | Y] = [1, 2, 5, []].

X = 1
Y = [2,5,[]]

yes
```

Lists

- Only non-empty lists have head and tail

```
| ?- [X | Y] = [].

no
```

Lists

- If there's only one element in the list then it is assigned to head

```
| ?- [X | Y] = [1].

X = 1
Y = []

yes
```

Lists

- Extracting the first two elements from a list

```
| ?- [X, Y | W] = [[], dead(z), [2, [b, c]], [], Z].

W = [[2,[b,c]],[],Z]
X = []
Y = dead(z)

yes
```

Lists

- Suppose we want to get the 2nd and the 4th element of the list!

```
yes
| ?- [X1, X2, X3, X4 | Tail] = [[], dead(z), [2, [b, c]], [], Z].

Tail = [Z]
X1 = []
X2 = dead(z)
X3 = [2,[b,c]]
X4 = []

yes
```

Lists

- Instead of binding the values to so many variables, we can use Anonymous variables.

```
| ?- [_, X2, _, X4 | _] = [[], dead(z), [2, [b, c]], [], Z].

X2 = dead(z)
X4 = []

yes
```

Lists

- Extracting elements from a list that is inside another list. Suppose inside a list the 5th member is another list and we want to extract the 1st and 3rd member of that list.

```
| ?- [_, _, _, _, [X1, _, X3 | _] | _] = [[], 1, 2, 5, [90, 93, 94, 97, 99], 100, dead(monkey)].

X1 = 90
X3 = 94

yes
```