Logic for Systems - Lab 1

Opt-in research questions for lab 1. Please finish the survey even if you don't plan on providing responses.

* Required

1. **Please provide your full brown email. We will only use this to make sure you receive credit; answers to further questions will be optional and anonymous.** *

Kitty Bacon and the Cool Cat Club

It turns out that there is a cool cat club where Kitty Bacon's connections are the exclusive members. The Alloy code below defines the club, who its members are, and a simple predicate so you can take a look at some examples.

Add the following alloy code to your lab file, run SomeClubs, and look at some examples of the Cool Cat Club.

```
one sig CoolCatClub {
  members : set Cat
}
fact CoolKitties {
  CoolCatClub.members = connectionsOf[KittyBacon]
}
pred SomeClubs {
  some CoolCatClub.members
}
run SomeClubs for exactly 4 Cat
```

Skip to question 2.

Force Kitty Bacon into club

Alternatively to asking why Kitty Bacon is not in the club, we can just write a simple pred to force him into the club, since that is our desired outcome.

Add the following Alloy code to your lab file, and run KittyBaconIsCool.

```
pred KittyBaconIsCool {
```

```
  KittyBacon in CoolCatClub.members
}
run KittyBaconIsCool for exactly 4 Cat
```

No instance found! Kitty Bacon is uncool? How can this be?!

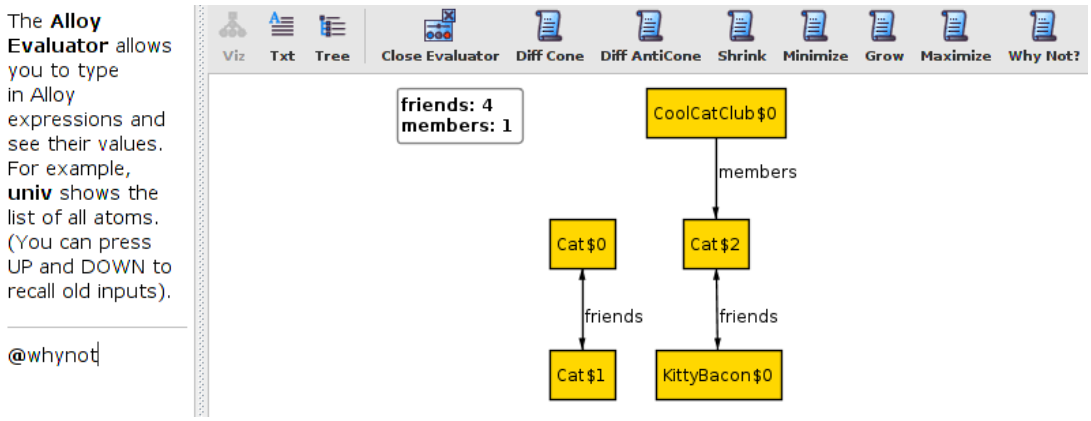
As you've seen in class, Alloy can produce an "unsat core", highlighting the parts of your specification that lead to Kitty Bacon's coolness being an impossibility. Click on the blue highlighted word "core" in the right panel to view the highlighting. Try and make sense of the red core highlighting, like you did with the green why highlighting.

Skip to question 4.

Ask why Kitty Bacon is not in the club

As you may have noticed, Kitty Bacon does not seem to be a member of the club in any of the examples. Now, it is possible we just did not look hard enough, but instead of exhaustively searching, let us ask Alloy for exactly what we want: why is Kitty Bacon not in the club? To do so, we are going to use a new feature of the evaluator to produce a highlighted explanation, similar to the UNSAT cores you've seen in class. Please follow the walk-through below to ask this question in the evaluator. Since we are still quite early in the class, we do not expect you to look at the textual output---you only need to examine the green highlighting that the command produces. If you're having trouble getting highlighting to appear, ask a TA to assist you.

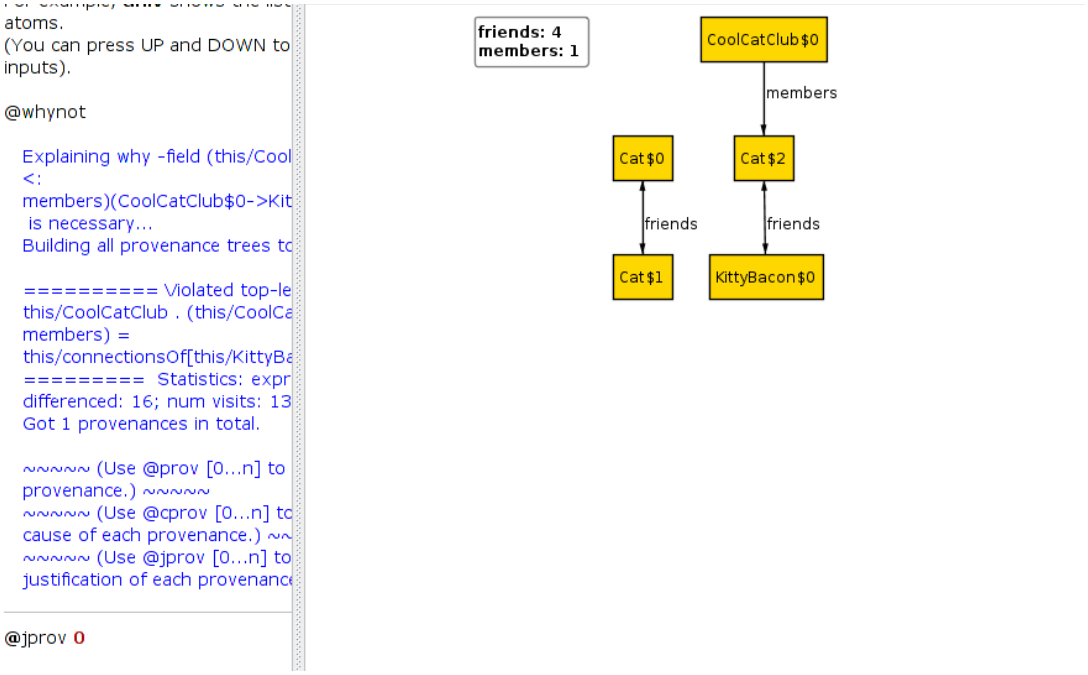
Run SomeClubs, show the first example, click on Open Evaluator in the toolbar, type '@whynot' in the evaluator on the left, and press Enter.



A window will pop up asking what relation our question is about. We care about the CoolCatClub's members field. (Don't worry about the "<:" or "this/"; we'll talk about those in a future lecture.) Select the option shown below and press Ok.

Another window will pop up asking which particular entry we want to ask about. To ask 'why is KittyBacon not a member of CoolCatClub' select the following option and press Ok.

A bunch of output will appear in the evaluator. Since today we only care about the highlighting, ignore it. Type '@jprov 0' into the evaluator, and press Enter. Multi-shaded green highlighting should appear on your specification. The highlighting is meant to be read from light to dark: the darker the highlighting, the more specific justification for Kitty Bacon's social exclusion. After taking some time trying to understand the highlighting, answer the questions below.



2. **Based only on the green why highlighting, explain in your own words why it is impossible for Kitty Bacon to be in the Cool Cat Club.**

3. **Out of the following possible high level edits, how would you change your specification to allow Kitty Bacon into the Cool Cat Club? (Please do not attempt any of these edits; we want your raw impression)**
   Mark only one oval.

   - I have absolutely no idea how to fix this problem.
   - Remove the '-cat' portions of the friendsOfFriendsOfFriendsOf and friendsOfFriendsOf functions
   - Add '+ KittyBacon' to the CoolKitties fact
   - Remove the OutsideFriends fact entirely
   - Add '+ KittyBacon' to the friendsOf function

Skip to "Force Kitty Bacon into club."

Why Highlighting versus Core Highlighting

Now that you've seen both the Green Why Highlighting, and the Red Core Highlighting, give us your impressions of their usefulness in explaining why Kitty Bacon is not in the CoolCatClub.

4. **How useful was the Green Why Highlighting for explaining why KittyBacon was not in the CoolCatClub?**
Mark only one oval.

	1	2	3	4	5	
Useless	◯	◯	◯	◯	◯	Extremely Useful

5. **How useful was the Red Core Highlighting for explaining why KittyBacon was not in the CoolCatClub?**
Mark only one oval.

	1	2	3	4	5	
Useless	◯	◯	◯	◯	◯	Extremely Useful

6. **Do you have any additional comments about either highlighting?**