During a game of tag, Ethan [chased/ran from] Luke because he was “It”.

Who was “it”?

Answer: Ethan/Luke

In order to answer this the program will require additional knowledge and reasoning principles, primarily about the game of tag. We will first consider the knowledge that the program will need.

A large part of the knowledge are the rules of tag. First, tag is a game that multiple people play, and in tag you have exactly one person who is labelled as “it”. If the person who is labelled as “it” touches another person then that label transfers, so the original person no longer has the label “it” and the touched person does have the label “it”. Furthermore, if someone has the label “it” then they will try and give it away.

The other important part of knowledge that must be taught are the meanings of ‘chased’ and ‘ran from’. If one person chases another then the first person is trying to touch the second. If one person runs from another then the first person is trying to not be touched by the second.

There are also reasoning principles that must be taught. It can be assumed, that if all people involved are playing a game of tag, then one person chasing another means the first person is trying to touch the second and hence is “it”. If the first person is running away from the second then this conclusion switches around and the second person is “it”.

If the sentence has the option ‘chased’ in it, then the program should give the answer Ethan. This is because Ethan chased Luke, so Ethan is trying to touch Luke and therefore Ethan is trying to give his “it” away. Hence Ethan is currently “it”.

Alternatively, it the sentence has the option ‘ran from’ in it, then the program should give the answer Luke, as Ethan is trying to not get touched by Luke therefore Luke is “it”.

Logical Formula

In order to represent the two sentences in logical formula it is first required to define the constants, predicates and relations we need to build up the sentences. There are only two constants required for this, Ethan and Luke. There are also only two predicates required, we will take these as T(x) to represent ‘x is playing tag’ and IT(x) to represent ‘x is “it”’. Finally, we also require two relations. R(x,y) represents ‘x runs from y’ and C(x,y) represents ‘x chases y’. Using these we can then form the following two sentences.

(T(Ethan) & T(Luke) & C(Ethan,Luke)) -> IT(Ethan)

(T(Ethan) & T(Luke) & R(Ethan,Luke)) -> IT(Luke)

We will now represent some of the facts that are required to know the answer in logical formula. In order to do this we need to define one more relation, Tou(x,y) will represent ‘x is trying to touch y’. Now we can define the following sentences.

If two people play tag and one chases the other then the chaser is trying to touch the person being chased.

All x All y ((T(x) & T(y) & C(x,y)) -> Tou(x,y))

If two people play tag and one is running from the other the second person is trying to touch the first person.

All x All y ((T(x) & T(y) & R(x,y)) -> Tou(y,x))

If one person is trying to touch another the first person is “it”.

All x All y ((T(x) & T(y) & Tou(x,y)) -> IT(x))

Conclusion

This problem, under the conditions stated above, can be solved by knowledge, representation and reasoning methods. The condition required is that in a game of tag, you only run from the person who is “it” and you only chase people if you are “it”. Whilst this is true in the rules of the game it is not necessarily true in life and often in tag the players may not know who is “it” and run from any other players. Therefore, a possible answer to the original question is that neither Ethan or Luke are “it”. However, as we are given with the problem that either Ethan or Luke are “it”, it can be assumed by both humans and the computer program that the required condition holds.

To conclude, this exact problem can be solved by knowledge, representation and reasoning methods. However, it would be difficult, due to nuances of the game, to scale the solution up to answering any tag related questions.