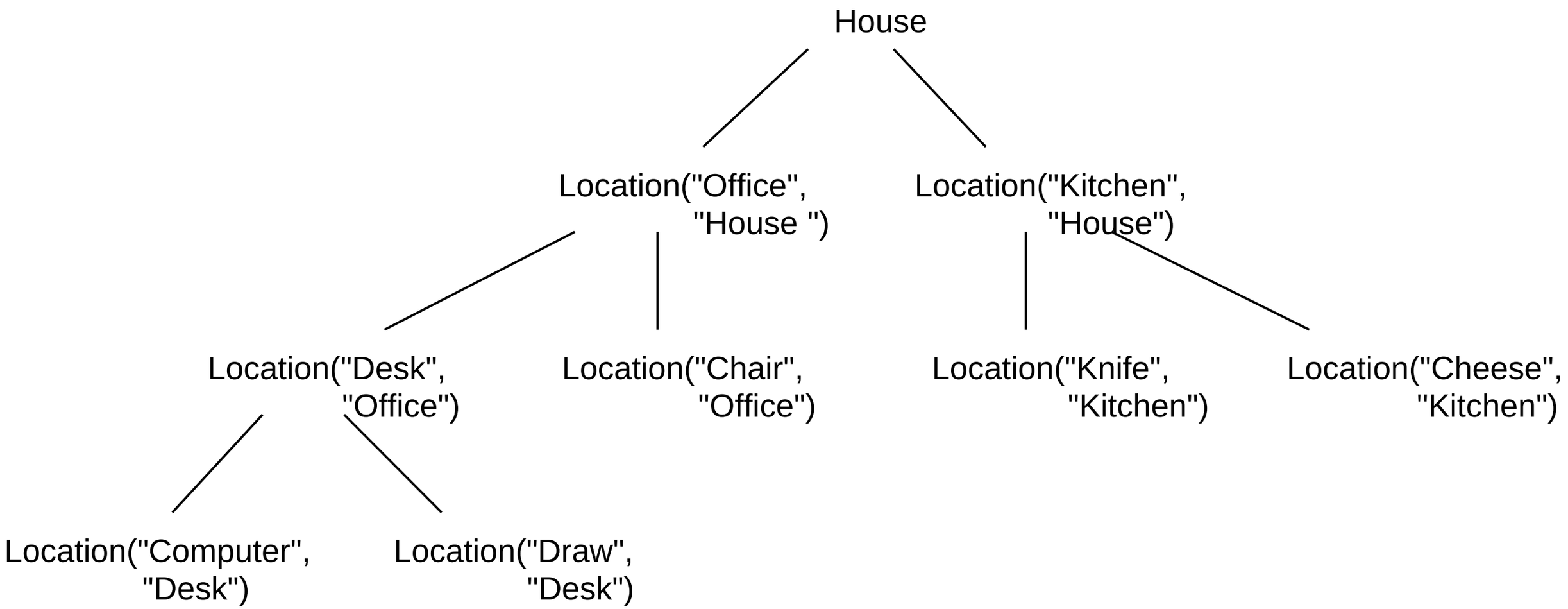
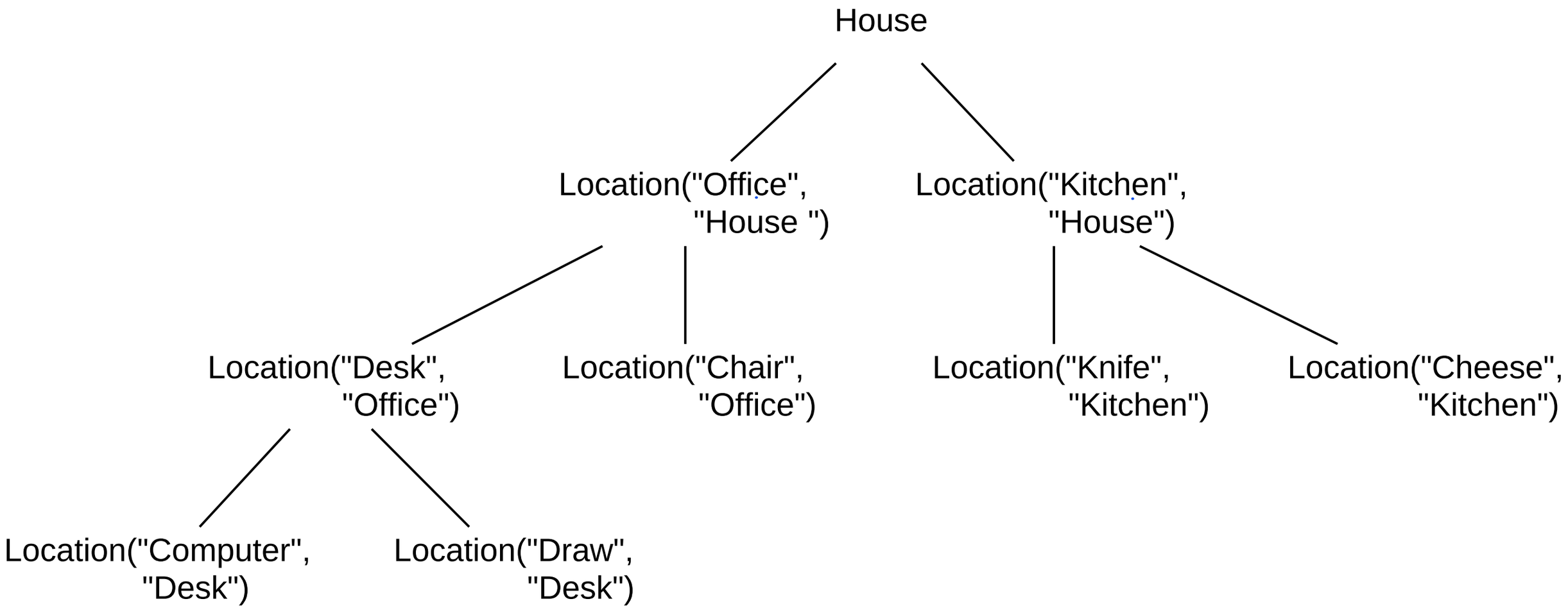
Reasoning with Graphs



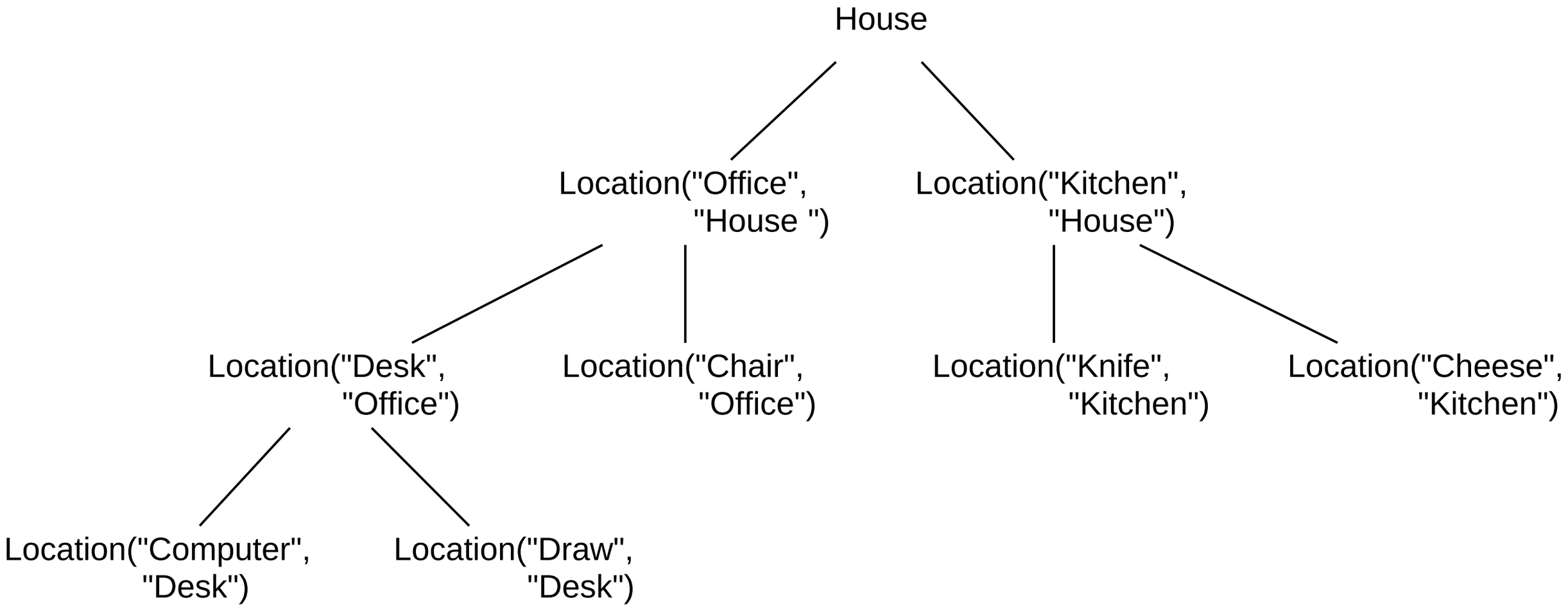
Backward Chaining

```
query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```



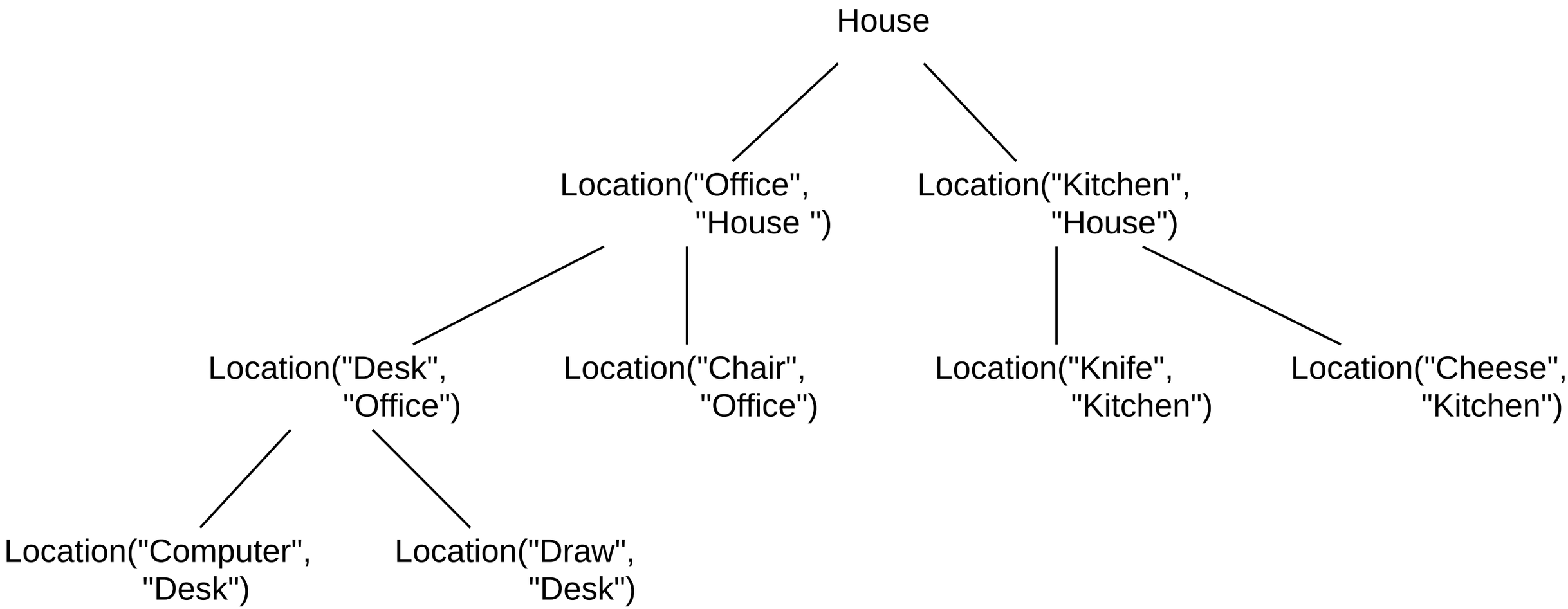
Backward Chaining

```
ksession.insert( new Location("Office", "House") );
ksession.insert( new Location("Kitchen", "House") );
ksession.insert( new Location("Knife", "Kitchen") );
ksession.insert( new Location("Cheese", "Kitchen") );
ksession.insert( new Location("Desk", "Office") );
ksession.insert( new Location("Chair", "Office") );
ksession.insert( new Location("Computer", "Desk") );
ksession.insert( new Location("Draw", "Desk") );
```



Backward Chaining

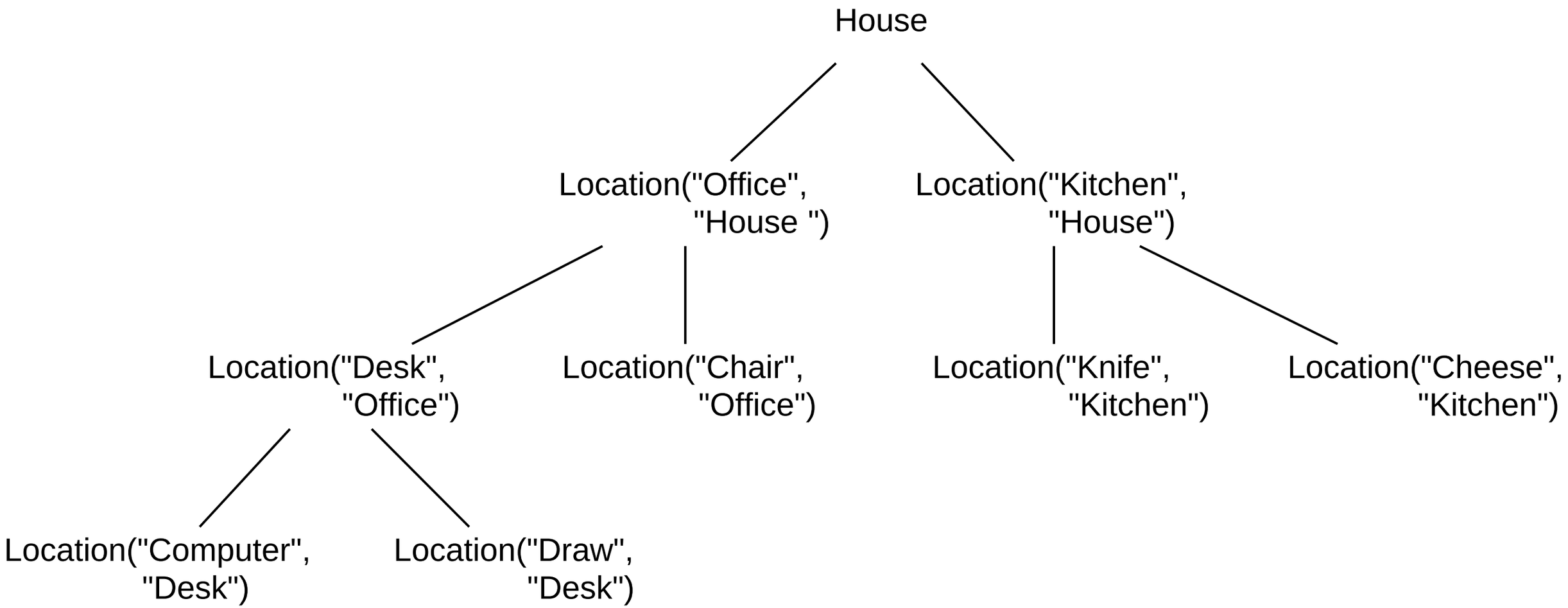
```
rule "go" salience 10
when
    $s : String(  )
then
    System.out.println( $s );
end
```



Backward Chaining

```
rule "go" salience 10
when
    $s : String(  )
then
    System.out.println( $s );
end
```

```
rule "go1"
when
    String( this == "go1" )
    isContainedIn("Office", "House"; )
then
    System.out.println( "office is in the house" );
end
```

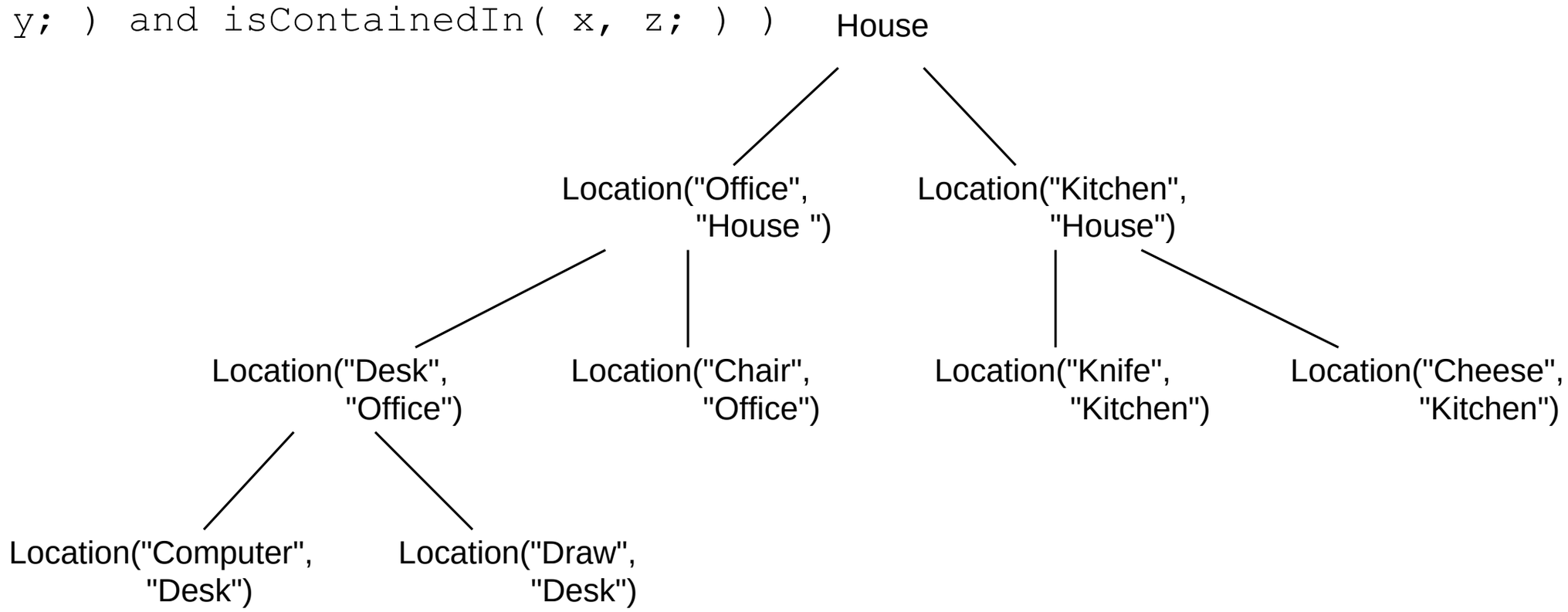


Backward Chaining

```
rule "go" salience 10
when
    $s : String(  )
then
    System.out.println( $s );
end
```

```
rule "go1"
when
    String( this == "go1" )
    isContainedIn("Office", "House"; )
then
    System.out.println( "office is in the house" );
end
```

```
query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```



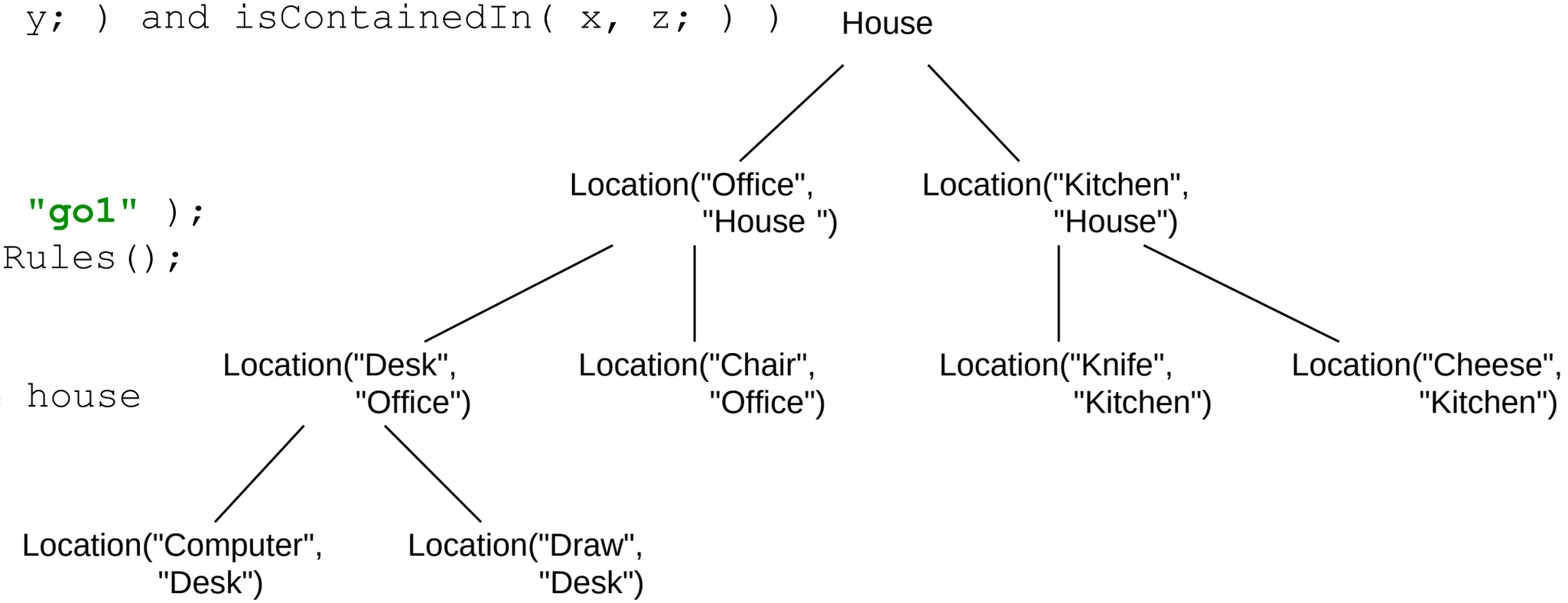
Backward Chaining

```
rule "go" salience 10
when
    $s : String(  )
then
    System.out.println( $s );
end
```

```
rule "go1"
when
    String( this == "go1" )
    isContainedIn("Office", "House"; )
then
    System.out.println( "office is in the house" );
end
```

```
query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```

```
ksession.insert( "go1" );
ksession.fireAllRules();
---
go1
office is in the house
```



Backward Chaining

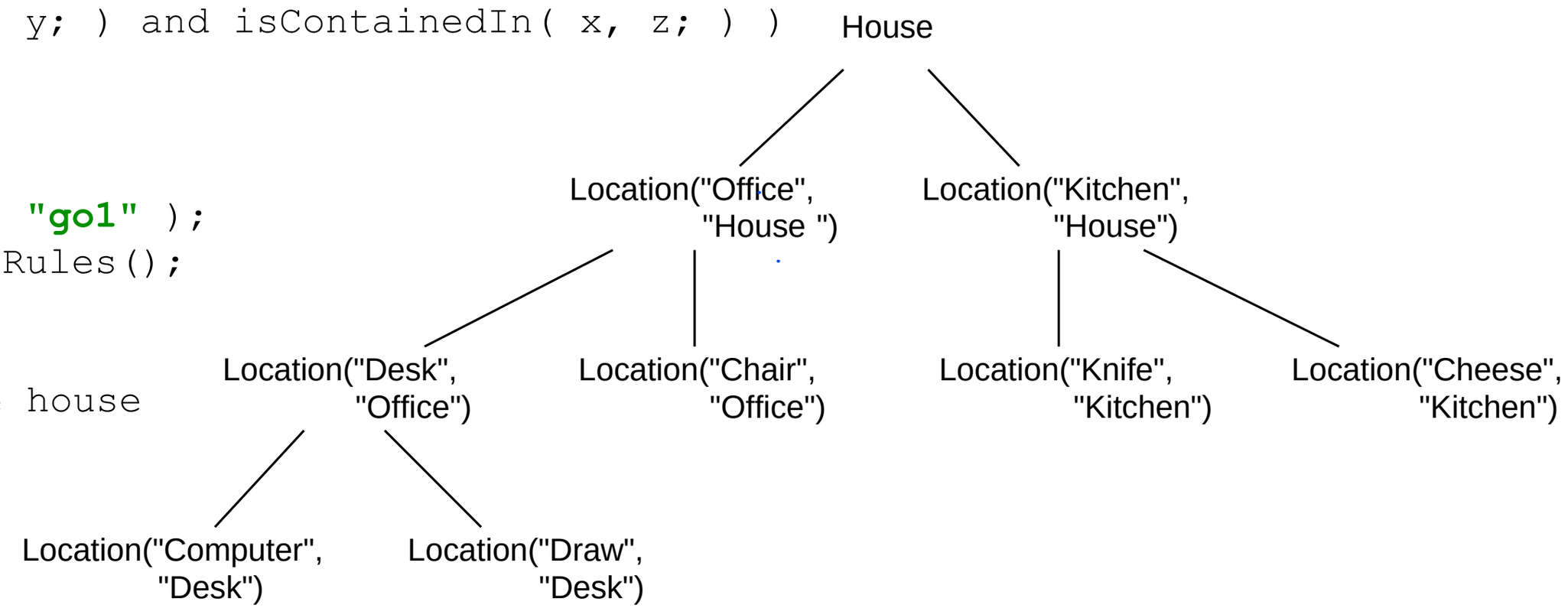
```
rule "go" salience 10
when
    $s : String(  )
then
    System.out.println( $s );
end
```

```
rule "go1"
when
    String( this == "go1" )
    isContainedIn("Office", "House"; )
then
    System.out.println( "office is in the house" );
end
```

```
query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```

isContainedIn(x==Office, y==House)

```
ksession.insert( "go1" );
ksession.fireAllRules();
---
go1
office is in the house
```



Backward Chaining

```
rule "go" salience 10
when
    $s : String(  )
then
    System.out.println( $s );
end
```

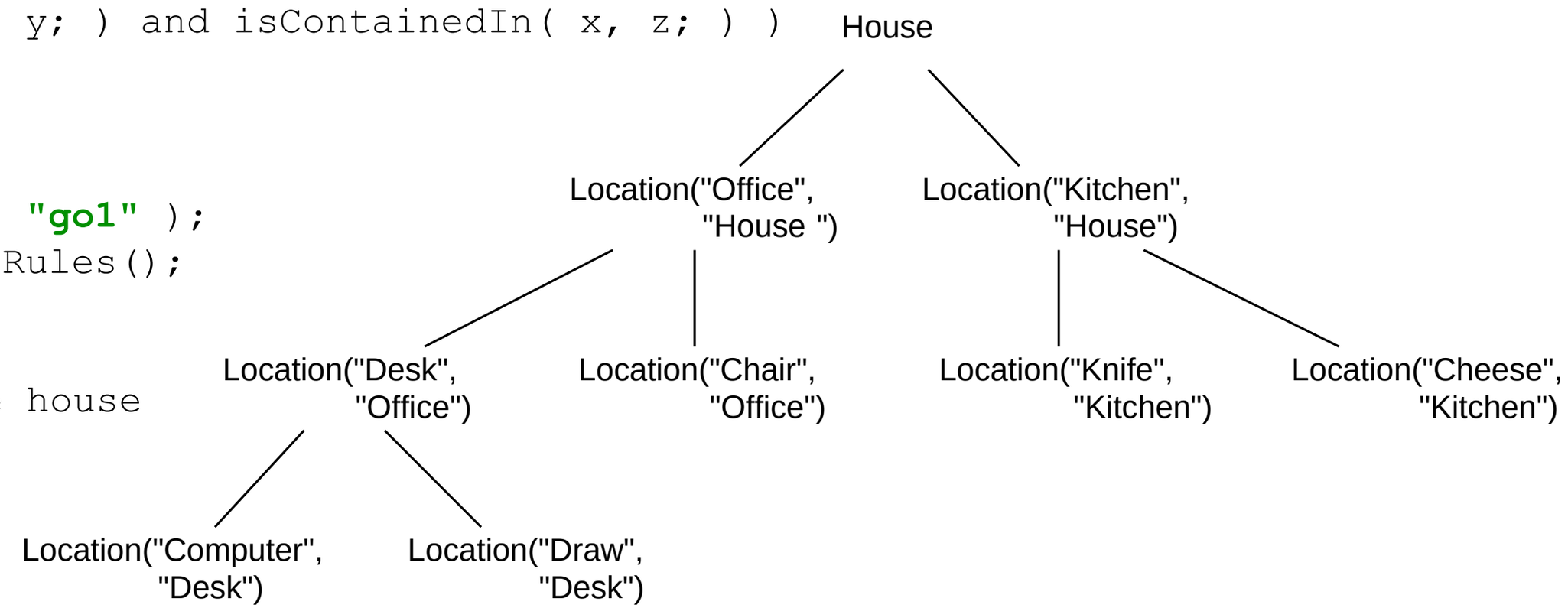
```
rule "go1"
when
    String( this == "go1" )
    isContainedIn("Office", "House"; )
then
    System.out.println( "office is in the house" );
end
```

```
query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```

```
ksession.insert( "go1" );
ksession.fireAllRules();
---
go1
office is in the house
```

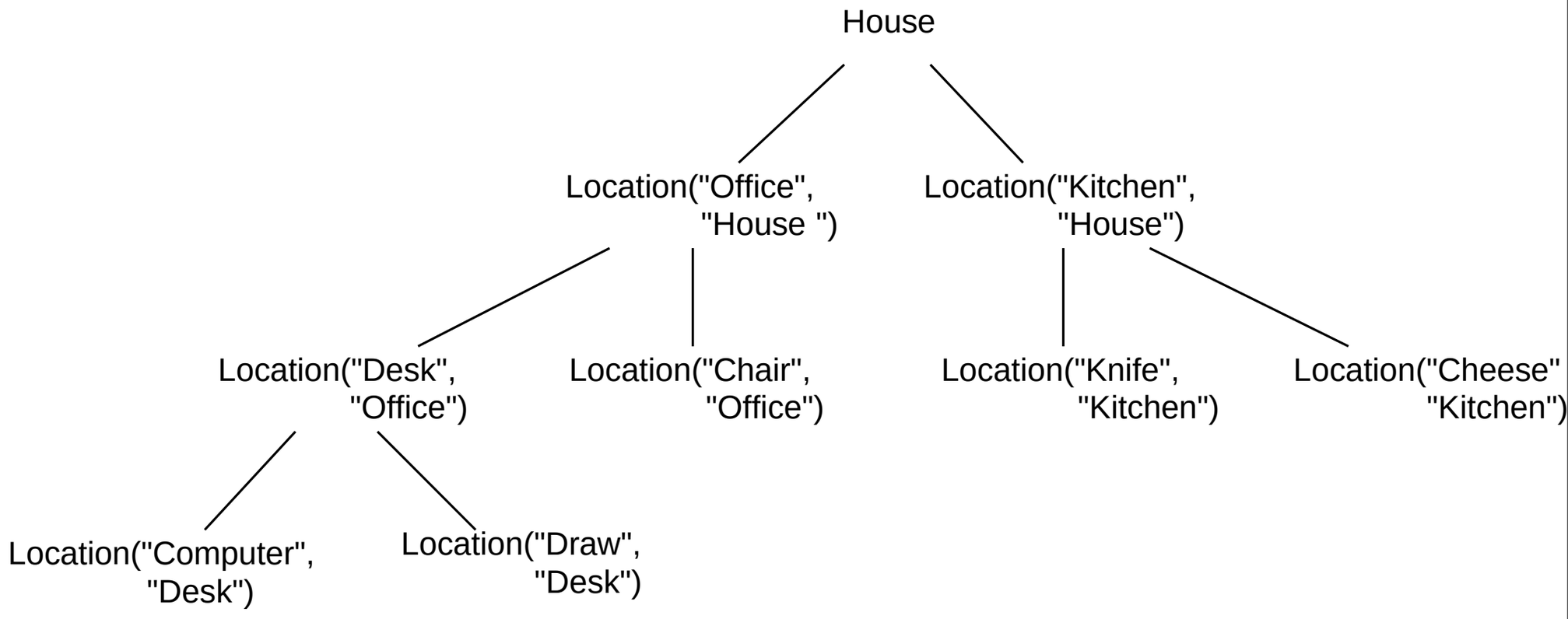
isContainedIn(x==Office, y==House)

Location(x==Office, y==House)



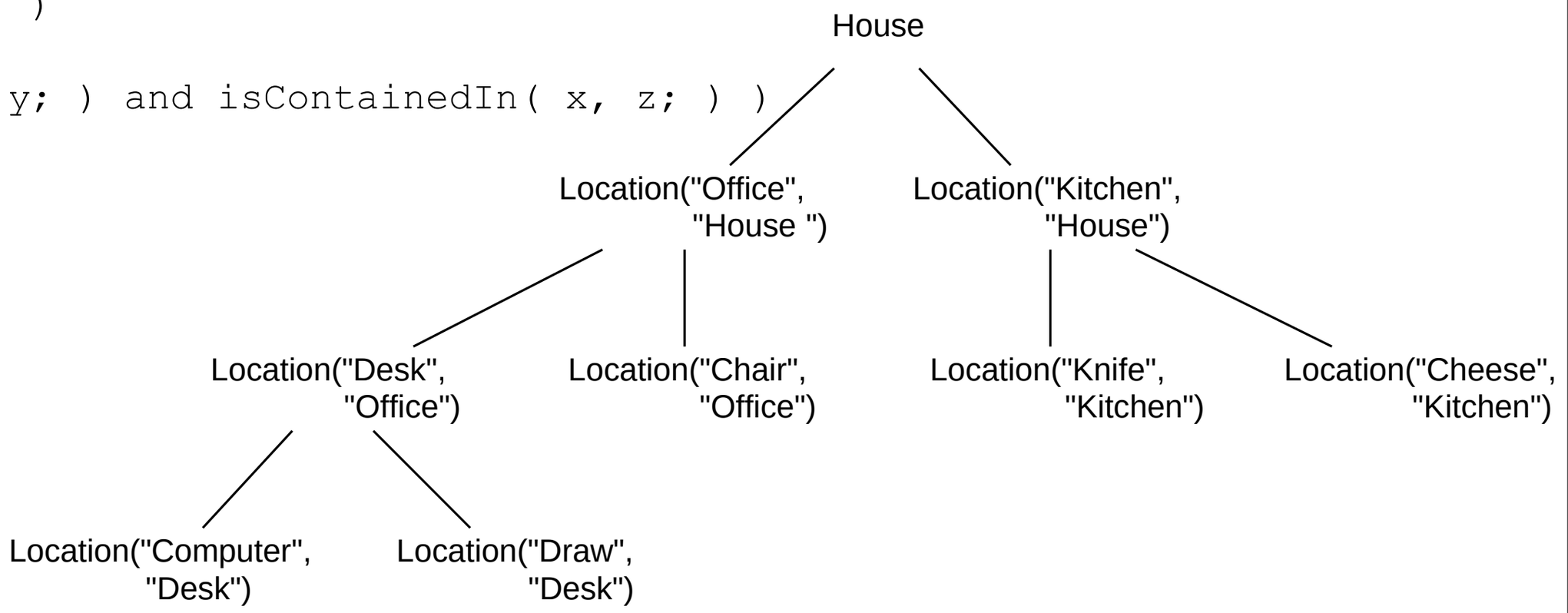
Backward Chaining

```
rule "go2"
when
    String( this == "go2" )
    isContainedIn("Draw", "House"; )
then
    System.out.println( "Draw in the House" );
end
```



Backward Chaining

```
rule "go2"
when
    String( this == "go2" )
    isContainedIn("Draw", "House"; )
then
    System.out.println( "Draw in the House" );
end


query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```

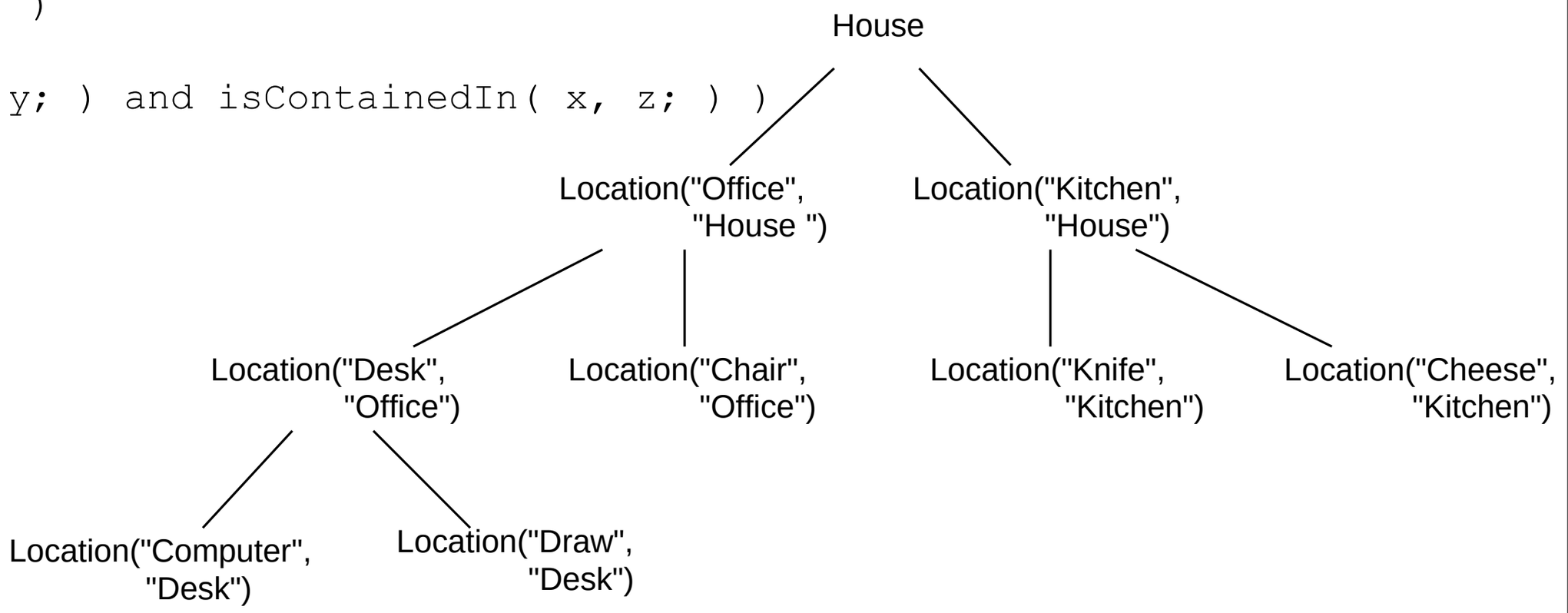


Backward Chaining

```
rule "go2"
when
    String( this == "go2" )
    isContainedIn("Draw", "House"; )
then
    System.out.println( "Draw in the House" );
end
```

```
ksession.insert( "go2" );
ksession.fireAllRules();
---
go2
Draw in the House
```

```
query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```



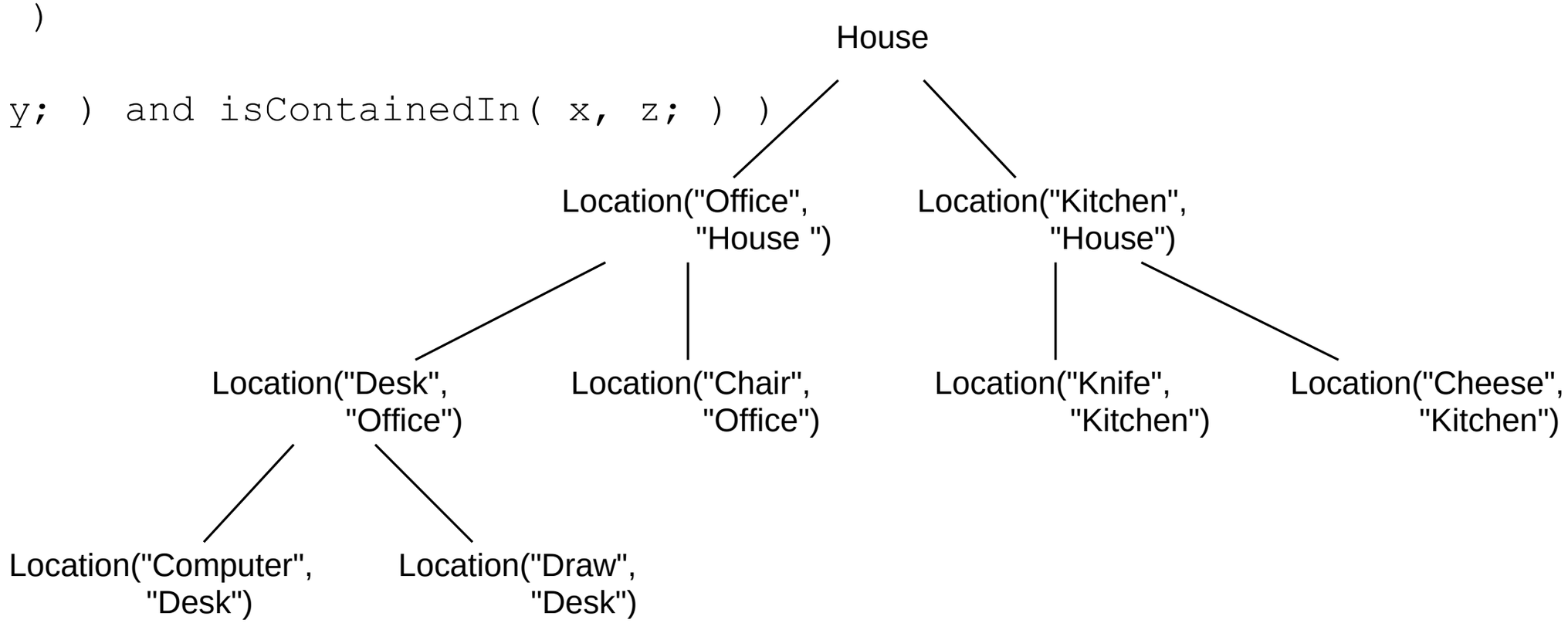
Backward Chaining

```
rule "go2"
when
    String( this == "go2" )
    isContainedIn("Draw", "House"; )
then
    System.out.println( "Draw in the House" );
end
```

```
ksession.insert( "go2" );
ksession.fireAllRules();
---
go2
Draw in the House
```

```
query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```

isContainedIn(x==Draw, y==House)

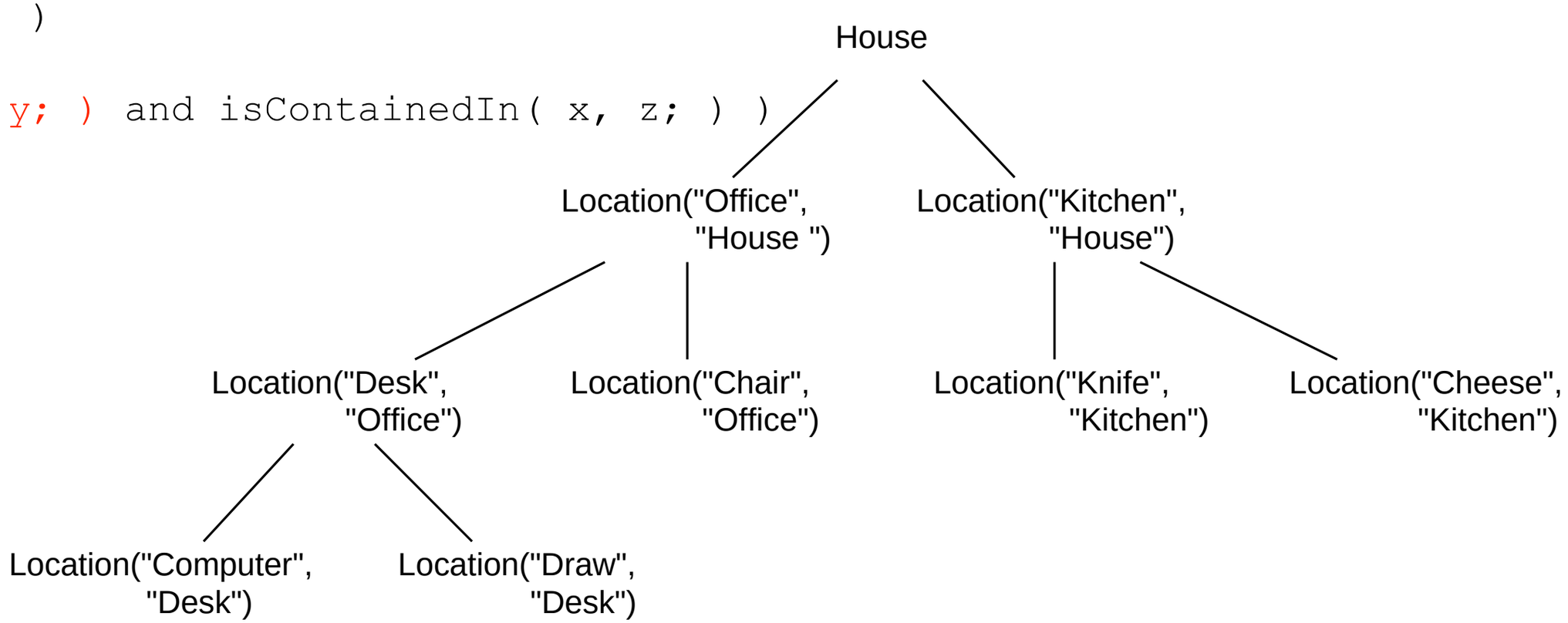


Backward Chaining

```
rule "go2"
when
    String( this == "go2" )
    isContainedIn("Draw", "House"; )
then
    System.out.println( "Draw in the House" );
end


query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```

```
ksession.insert( "go2" );
ksession.fireAllRules();
---
go2
Draw in the House
```

```
isContainedIn(x==Draw, y==House)
Location(z==Office, y==House)
```



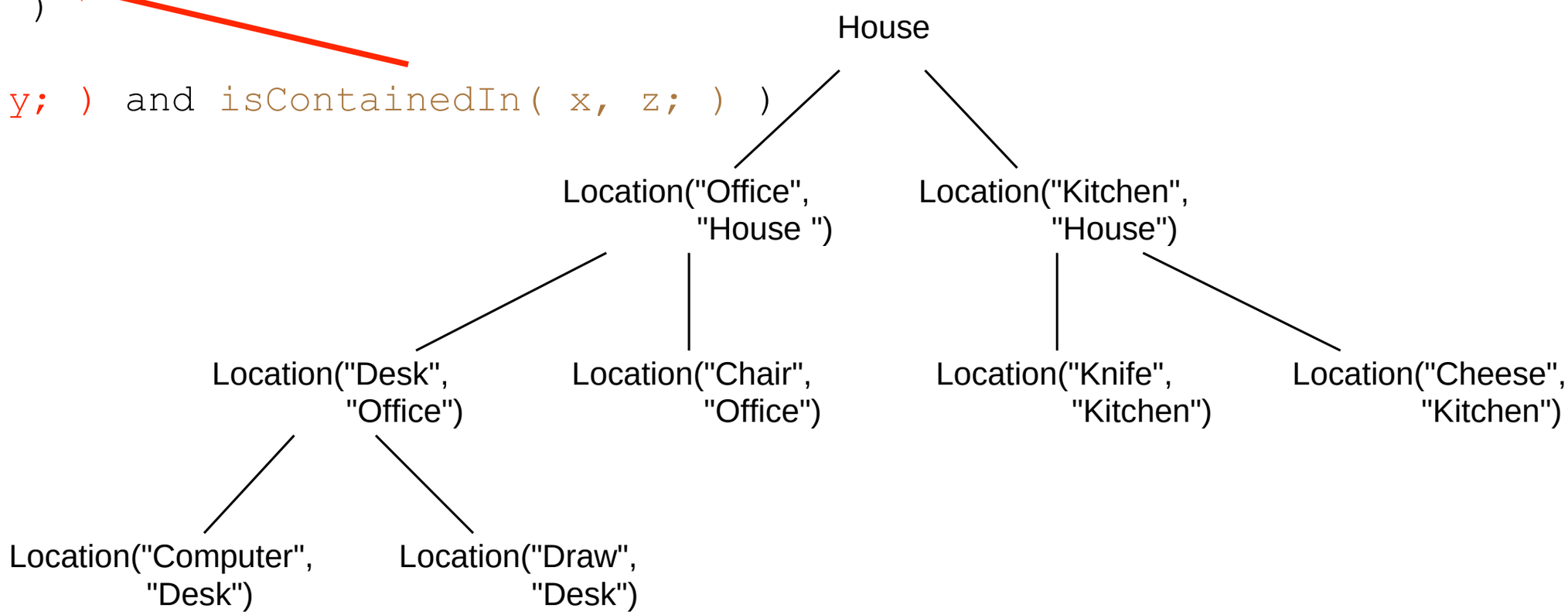
Backward Chaining

```
rule "go2"
when
    String( this == "go2" )
    isContainedIn("Draw", "House"; )
then
    System.out.println( "Draw in the House" );
end
```

```
query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```

```
ksession.insert( "go2" );
ksession.fireAllRules();
---
go2
Draw in the House
```

```
isContainedIn(x==Draw, y==House)
Location(z==Office, y==House)
isContainedIn(x==Draw, z==Office)
```

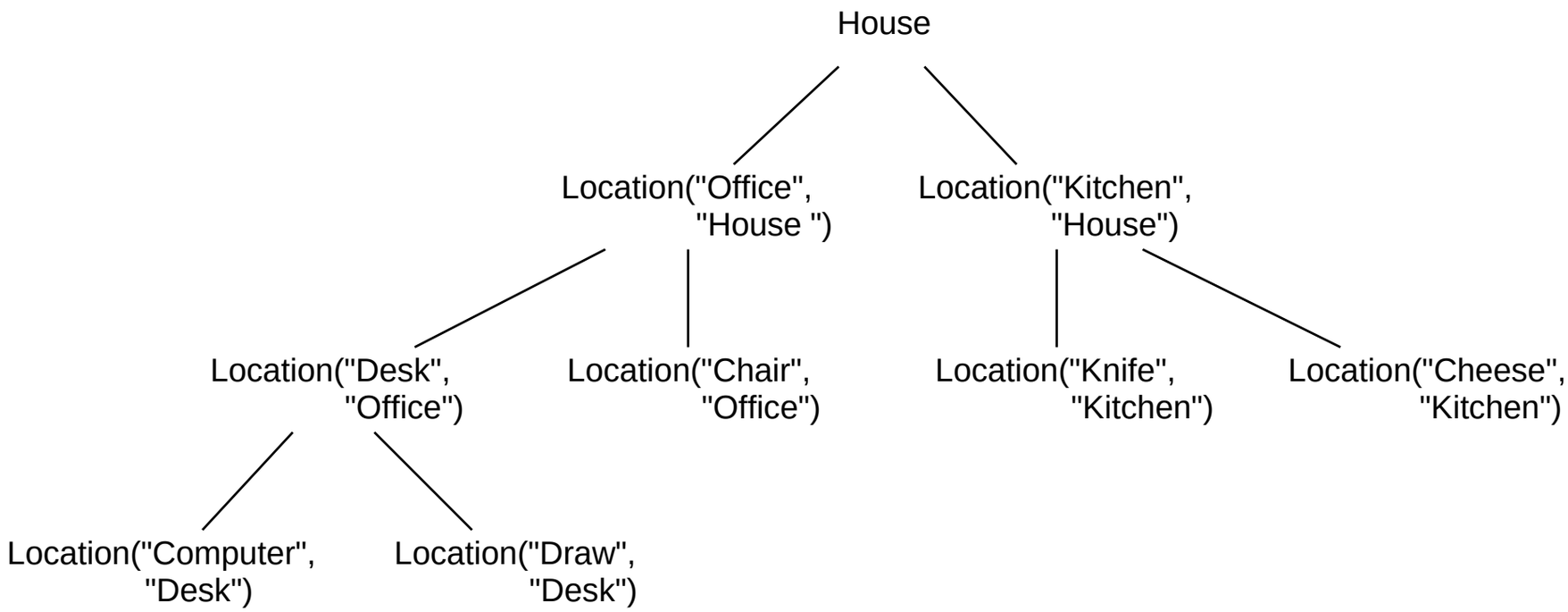


Backward Chaining

```
rule "go2"
when
    String( this == "go2" )
    isContainedIn("Draw", "House"; )
then
    System.out.println( "Draw in the House" );
end


query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```

```
ksession.insert( "go2" );
ksession.fireAllRules();
---
go2
Draw in the House
```

```
isContainedIn(x==Draw, y==House)
Location(z==Office, y==House)
isContainedIn(x==Draw, z==Office)
Location(z==Kitchen, y==House)
isContainedIn(x==Draw, z==Kitchen)
```



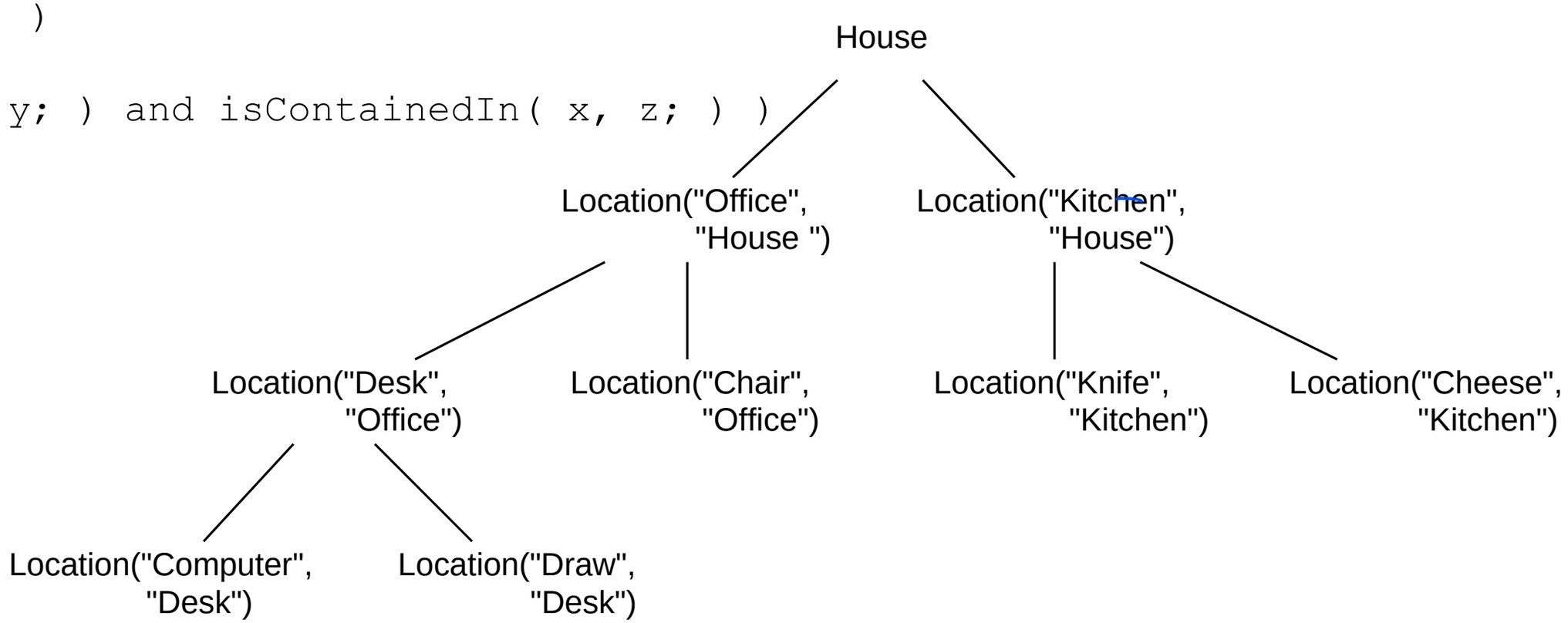
Backward Chaining

```
rule "go2"
when
    String( this == "go2" )
    isContainedIn("Draw", "House"; )
then
    System.out.println( "Draw in the House" );
end
```

```
ksession.insert( "go2" );
ksession.fireAllRules();
---
go2
Draw in the House
```

```
query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```

isContainedIn(x==Draw, y==Office)



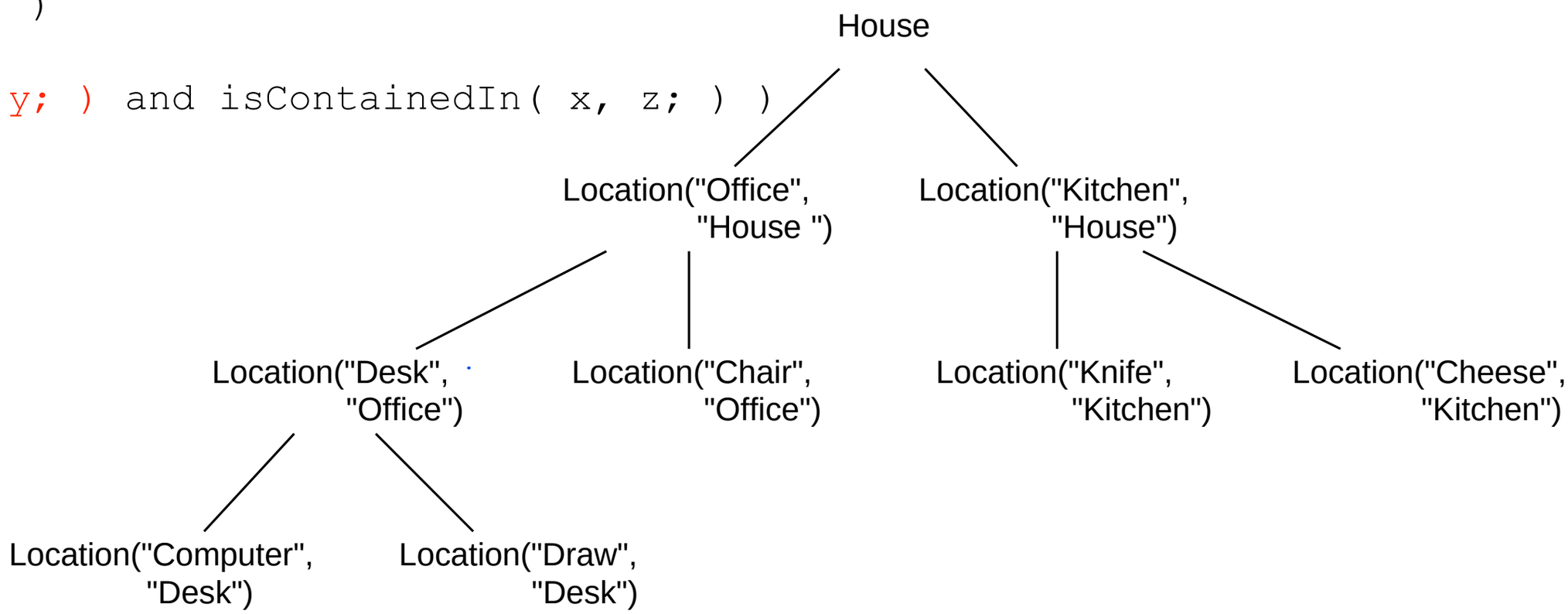
Backward Chaining

```
rule "go2"
when
    String( this == "go2" )
    isContainedIn("Draw", "House"; )
then
    System.out.println( "Draw in the House" );
end
```

```
ksession.insert( "go2" );
ksession.fireAllRules();
---
go2
Draw in the House
```

```
query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```

isContainedIn(x==Draw, y==Office)
Location(z==Desk, y==Office)



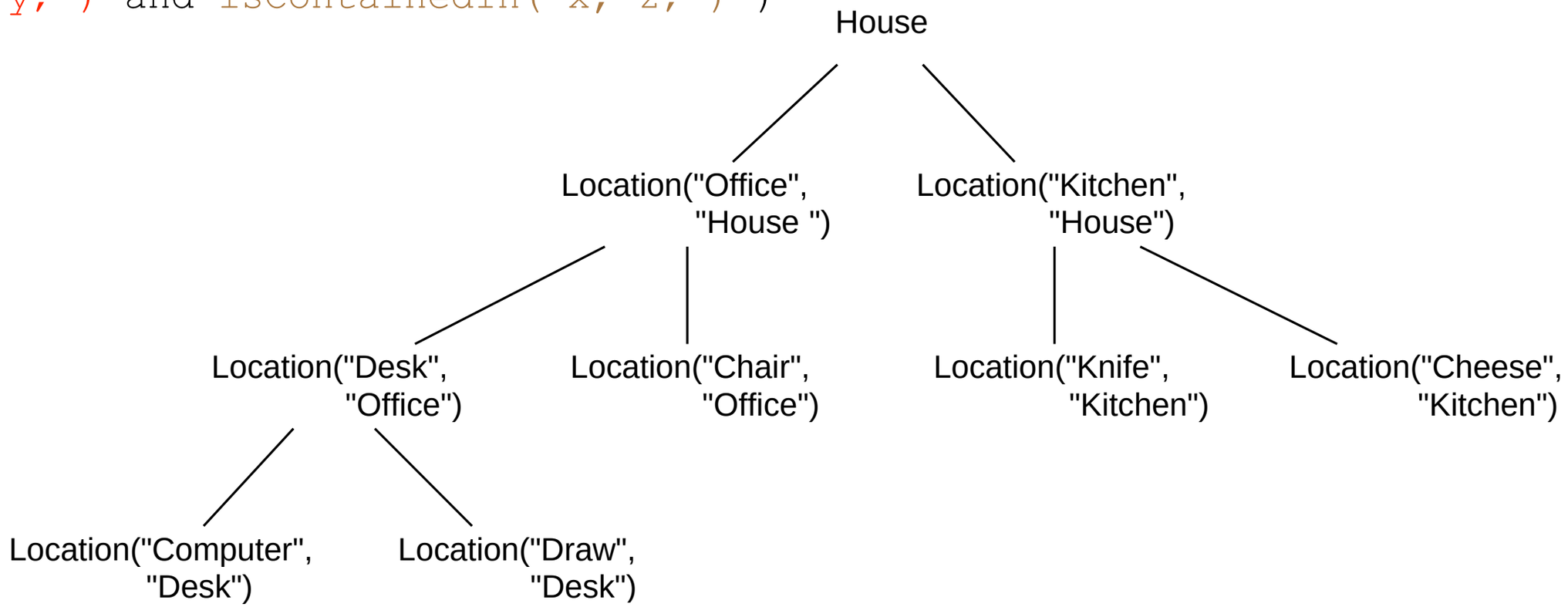
Backward Chaining

```
rule "go2"
when
    String( this == "go2" )
    isContainedIn("Draw", "House"; )
then
    System.out.println( "Draw in the House" );
end
```

```
ksession.insert( "go2" );
ksession.fireAllRules();
---
go2
Draw in the House
```

```
query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```

```
isContainedIn(x==Draw, y==Office)
Location(z==Desk, y==Office)
isContainedIn(x==Draw, z==Desk)
```



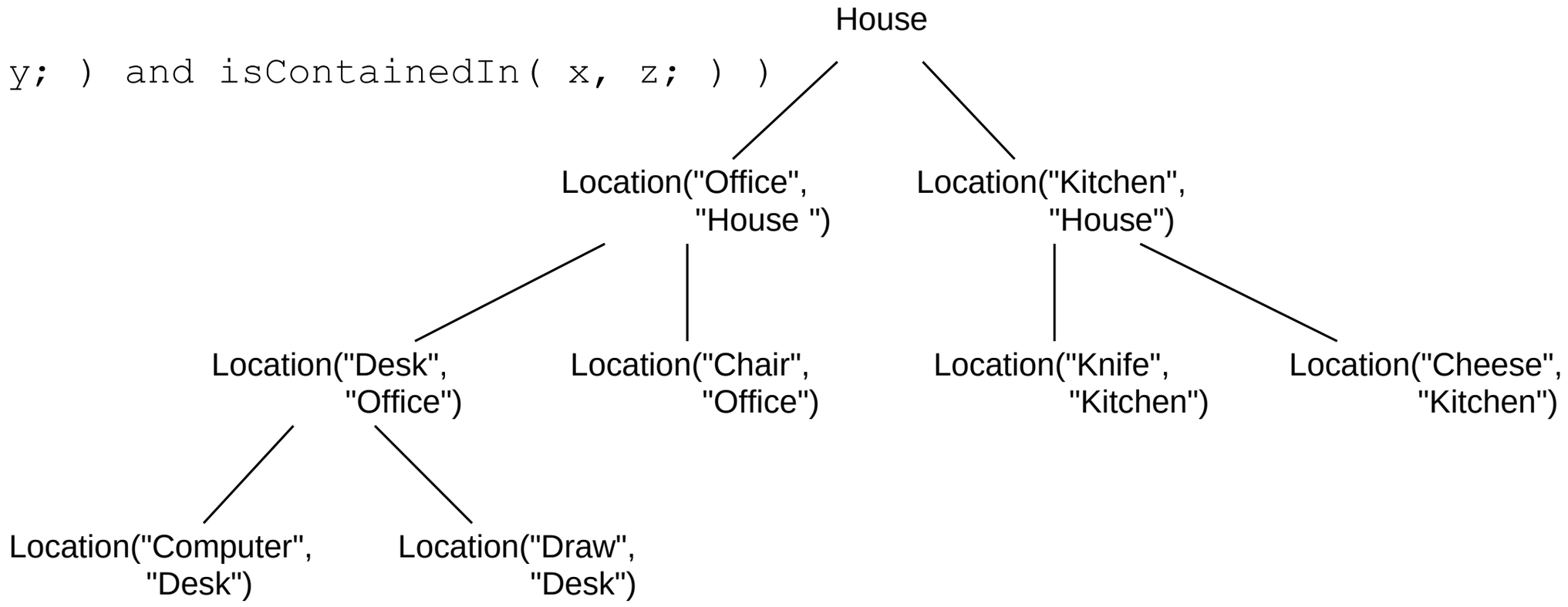
Backward Chaining

```
rule "go2"
when
    String( this == "go2" )
    isContainedIn("Draw", "House"; )
then
    System.out.println( "Draw in the House" );
end
```

```
ksession.insert( "go2" );
ksession.fireAllRules();
---
go2
Draw in the House
```

```
query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```

isContainedIn(x==Draw, y==Desk)



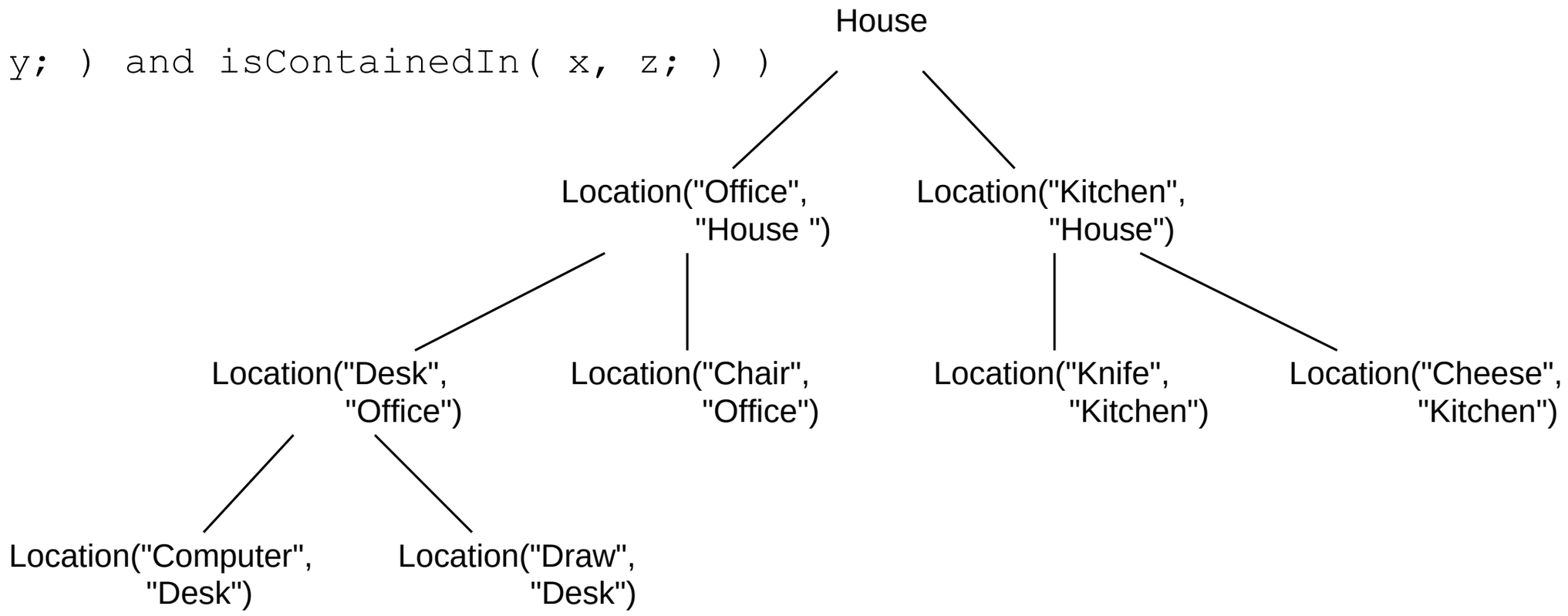
Backward Chaining

```
rule "go2"
when
    String( this == "go2" )
    isContainedIn("Draw", "House"; )
then
    System.out.println( "Draw in the House" );
end
```

```
ksession.insert( "go2" );
ksession.fireAllRules();
---
go2
Draw in the House
```

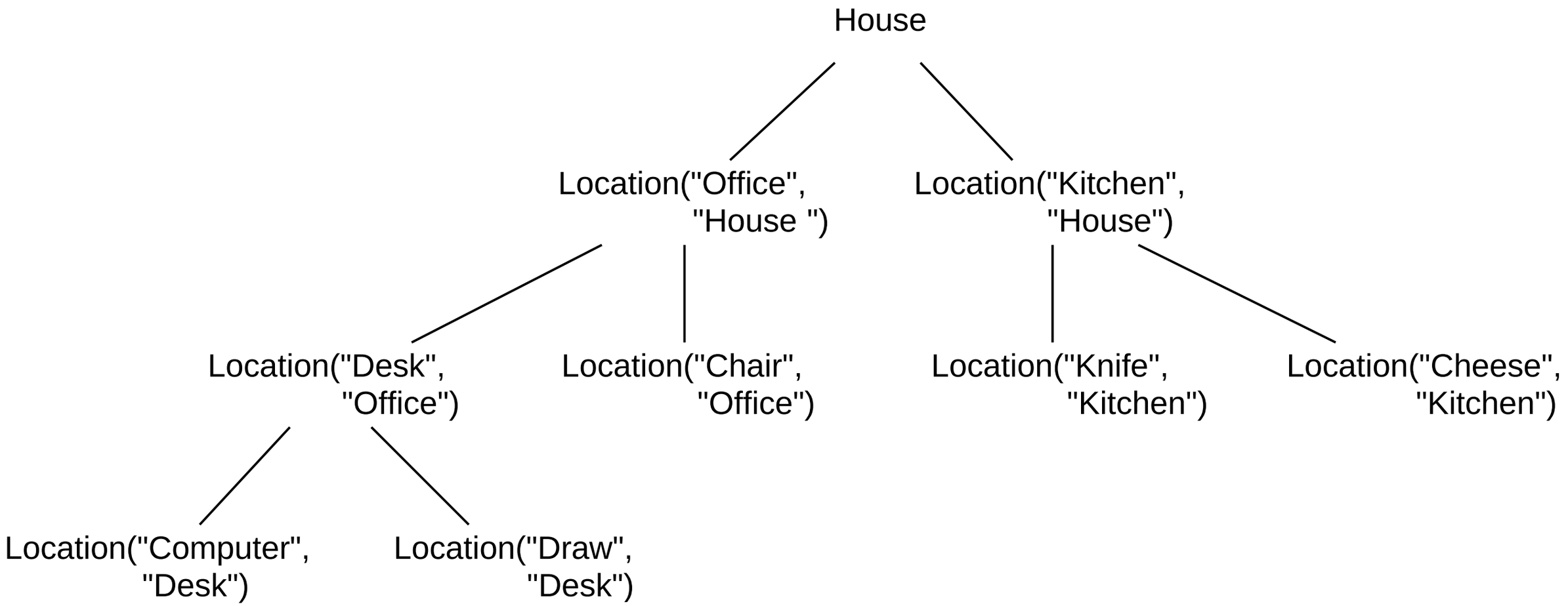
```
query isContainedIn( String x, String y )
  Location( x, y; )
  or
  ( Location( z, y; ) and isContainedIn( x, z; ) )
end
```

isContainedIn(x==Draw, y==Desk)
Location(x==Draw, y==Desk)



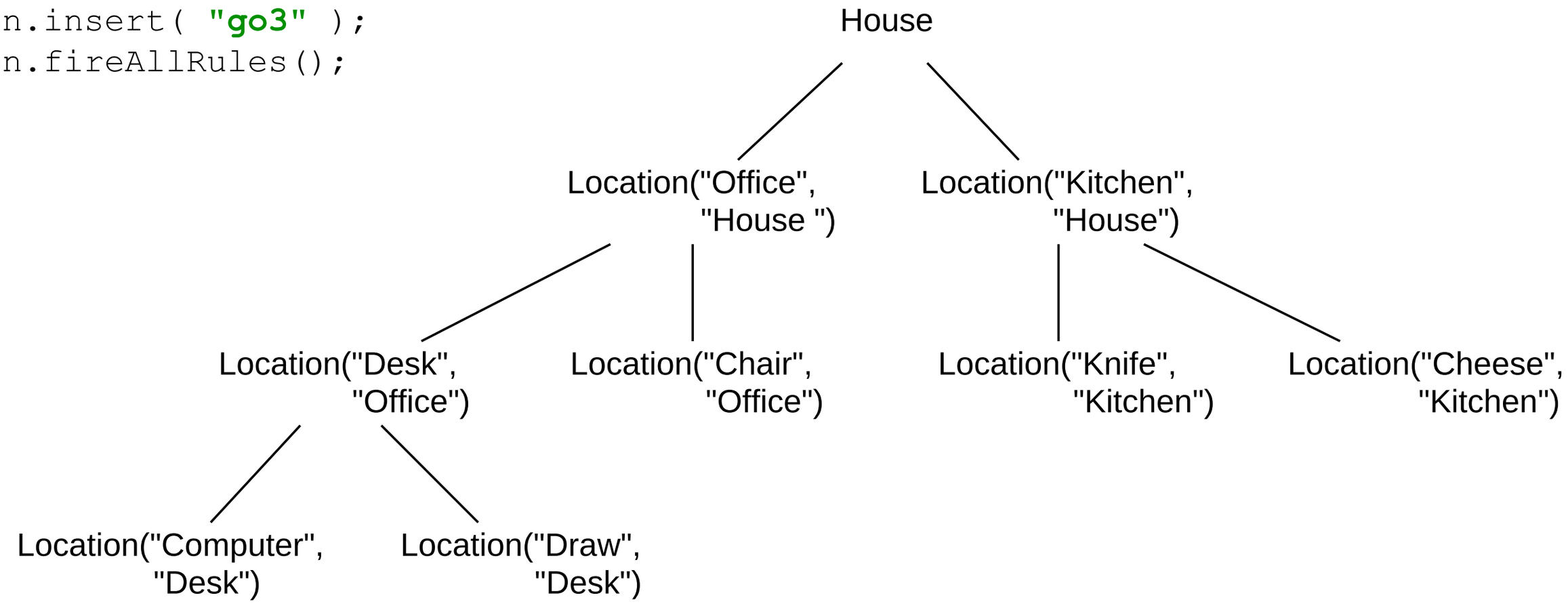
Backward Chaining

```
rule "go3"
when
    String( this == "go3" )
    isContainedIn("Key", "Office"; )
then
    System.out.println( "Key in the Office" );
end
```



Backward Chaining

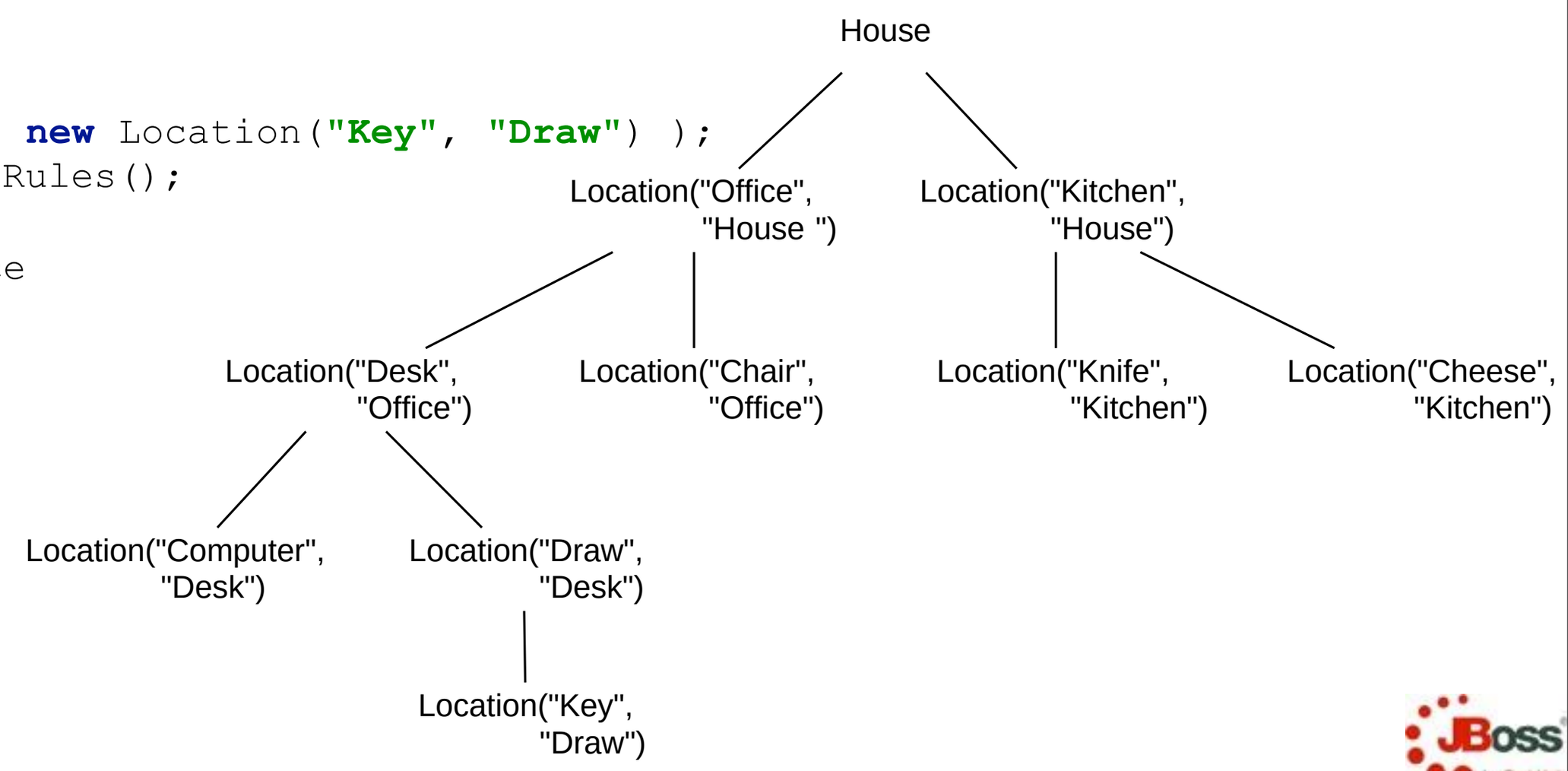
```
rule "go3"
when
    String( this == "go3" )
    isContainedIn("Key", "Office"; )
then
    System.out.println( "Key in the Office" );
end

ksession.insert( "go3" );
ksession.fireAllRules();
---
go3
```



Backward Chaining

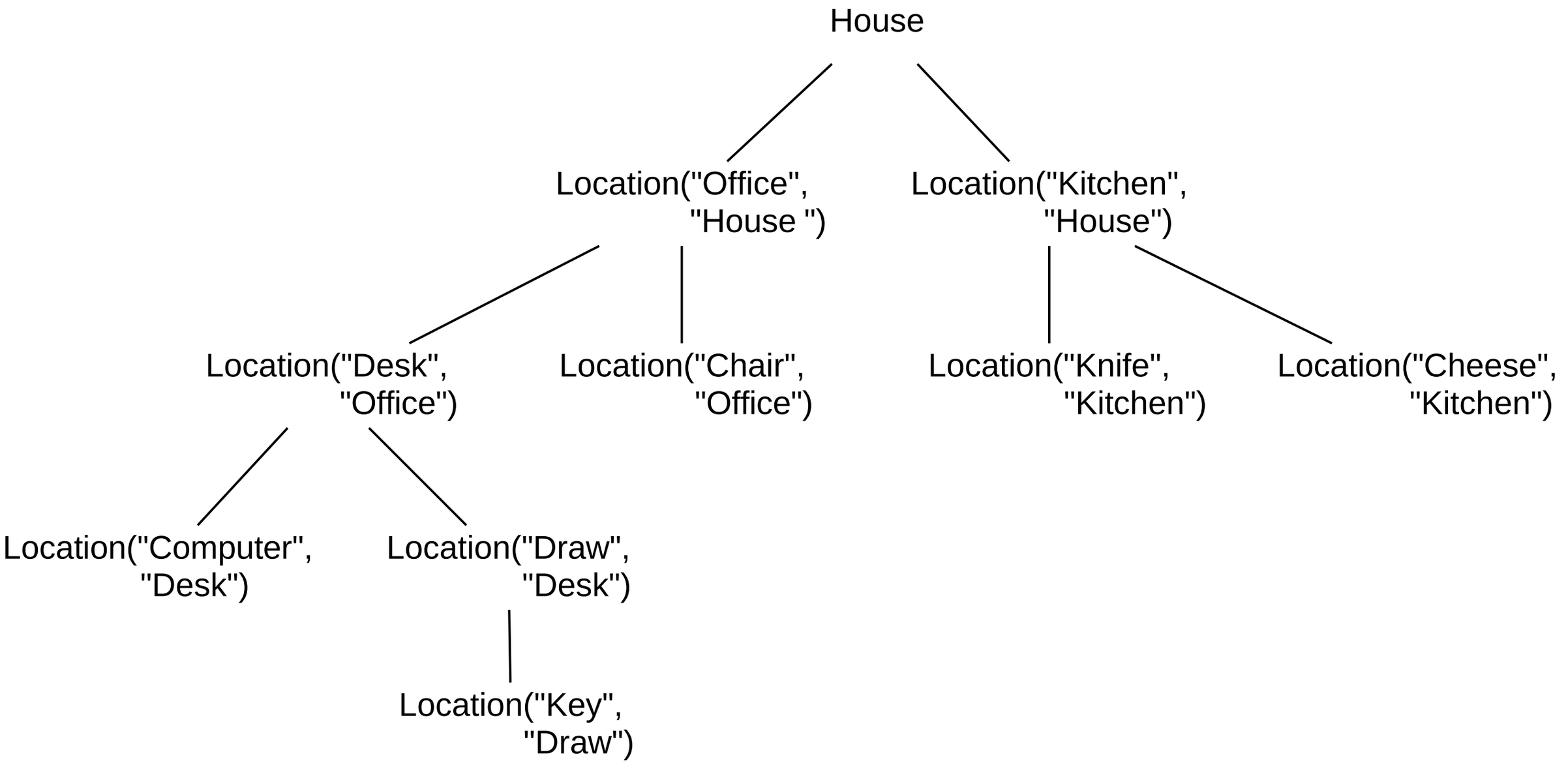
```
rule "go3"
when
    String( this == "go3" )
    isContainedIn("Key", "Office"; )
then
    System.out.println( "Key in the Office" );
end

ksession.insert( "go3" );
ksession.fireAllRules();
---
go3
```

```
ksession.insert( new Location("Key", "Draw") );
ksession.fireAllRules();
---
Key in the Office
```



Backward Chaining

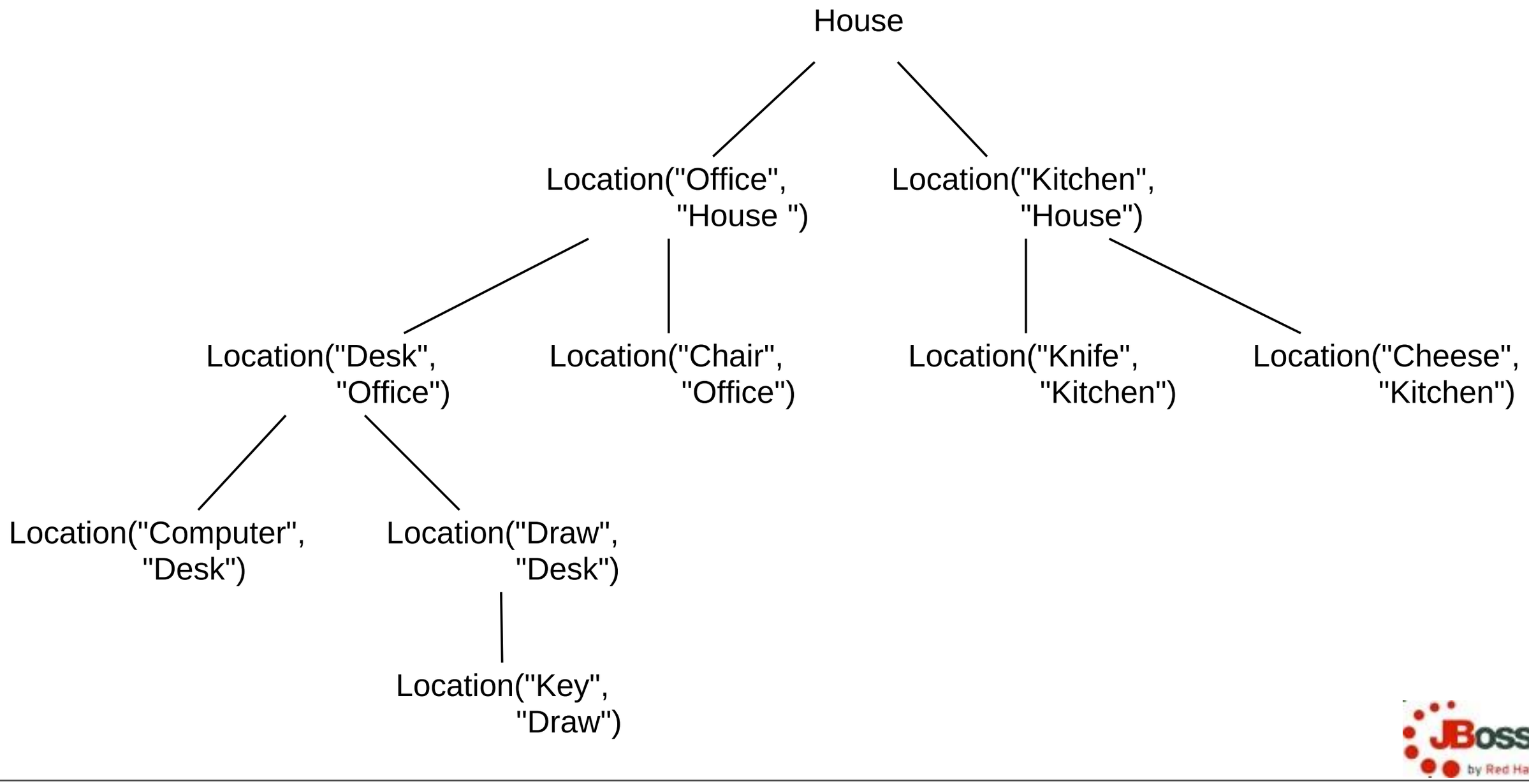
```
rule "go4"
when
    String( this == "go4" )
    isContainedIn(thing, "Office"; )
then
    System.out.println( "thing " + thing + " is in the Office" );
end
```



Backward Chaining

```
rule "go4"
when
    String( this == "go4" )
    isContainedIn(thing, "Office"; )
then
    System.out.println( "thing " + thing + " is in the Office" );
end
```

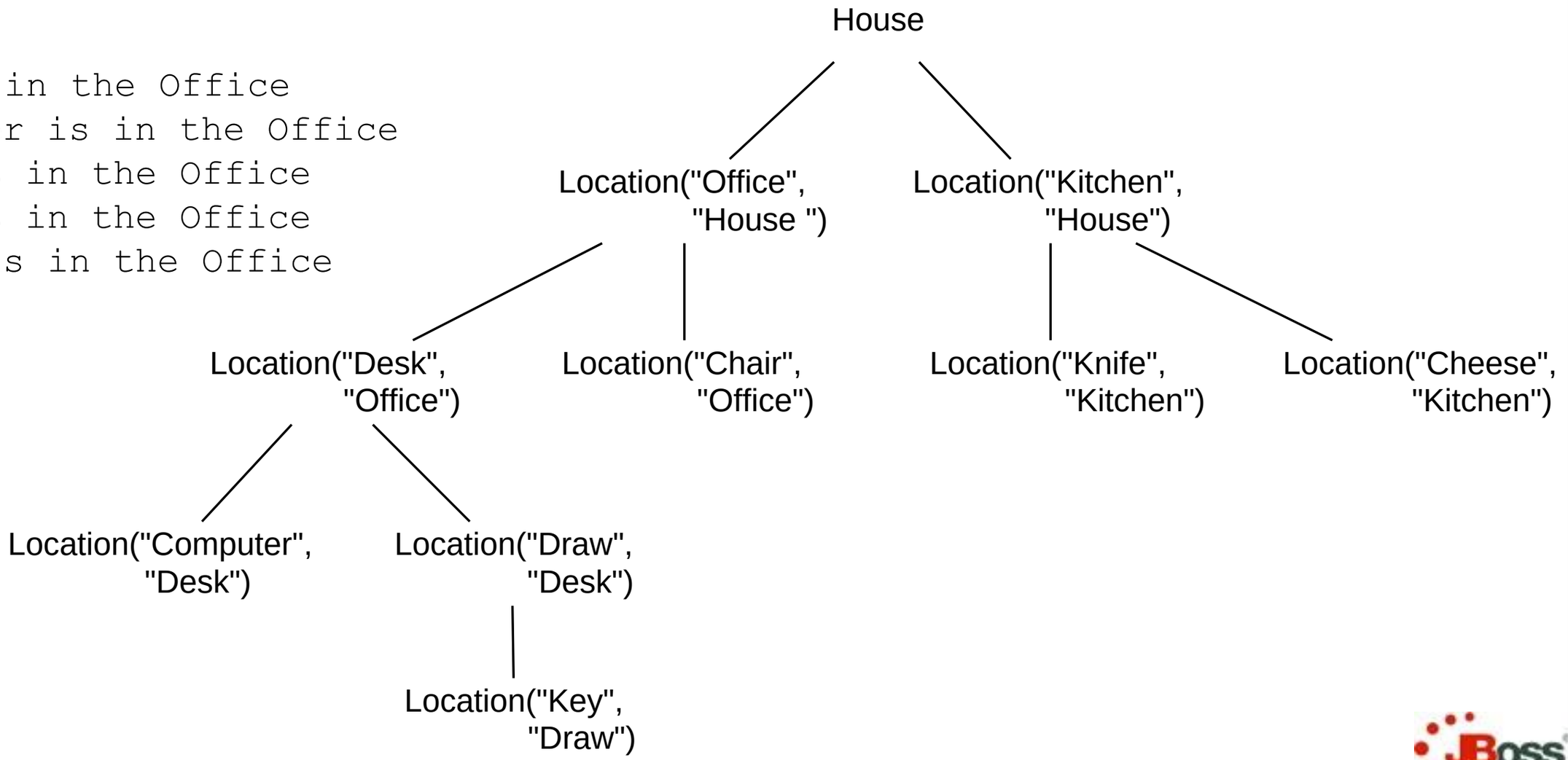
Out Var (unbound)



Backward Chaining

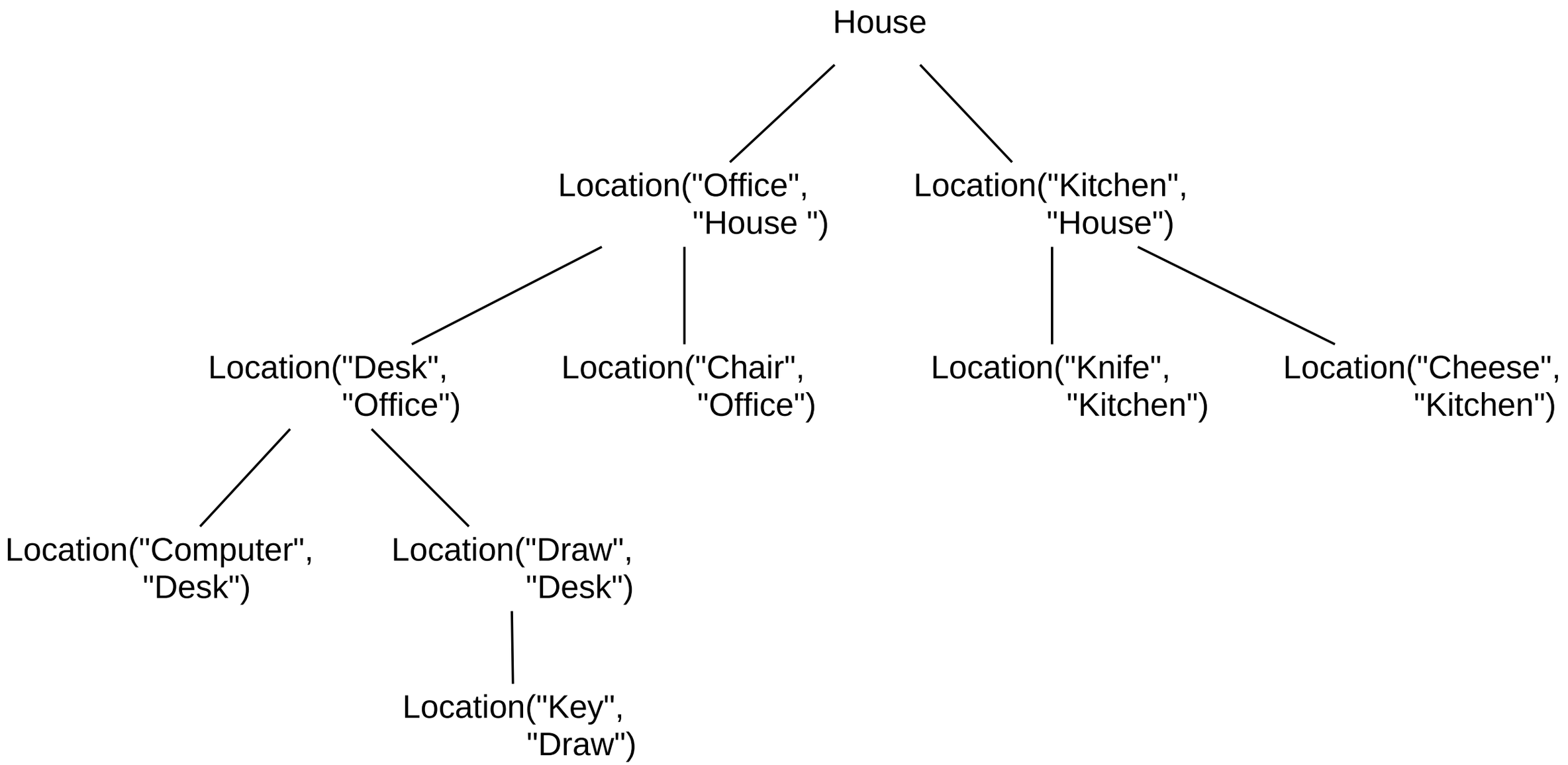
```
rule "go4"
when
    String( this == "go4" )
    isContainedIn(thing, "Office"; )
then
    System.out.println( "thing " + thing + " is in the Office" );
end

ksession.insert( "go4" );
ksession.fireAllRules();
---
go4
thing Key is in the Office
thing Computer is in the Office
thing Draw is in the Office
thing Desk is in the Office
thing Chair is in the Office
```

Out Var (unbound)



Backward Chaining

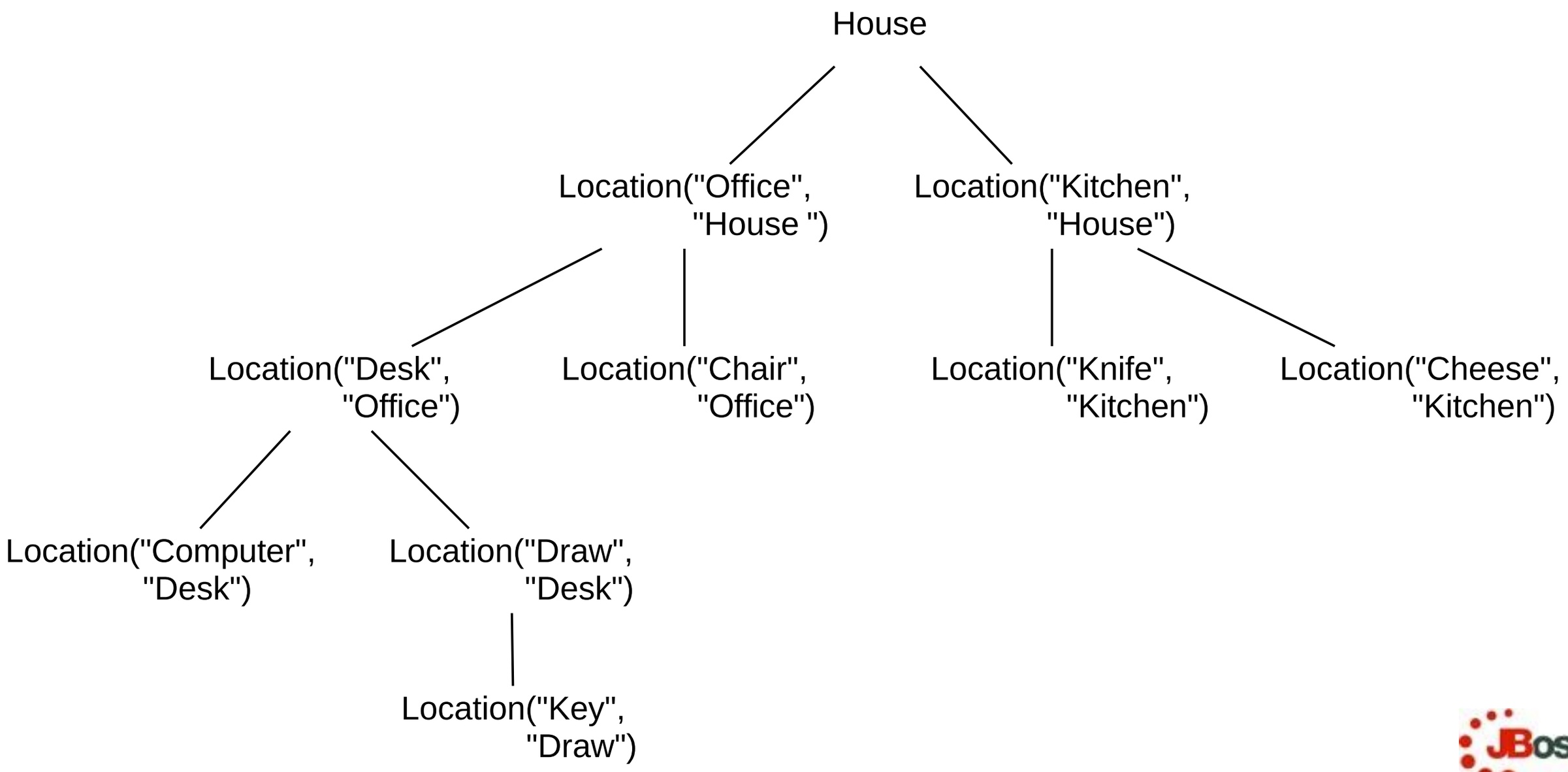
```
rule "go5"
when
    String( this == "go5" )
    isContainedIn(thing, location; )
then
    System.out.println( "thing " + thing + " is in " + location );
end
```



Backward Chaining

```
rule "go5"
when
    String( this == "go5" )
    isContainedIn(thing, location; )
then
    System.out.println( "thing " + thing + " is in " + location );
end
```

Out Var (unbound)

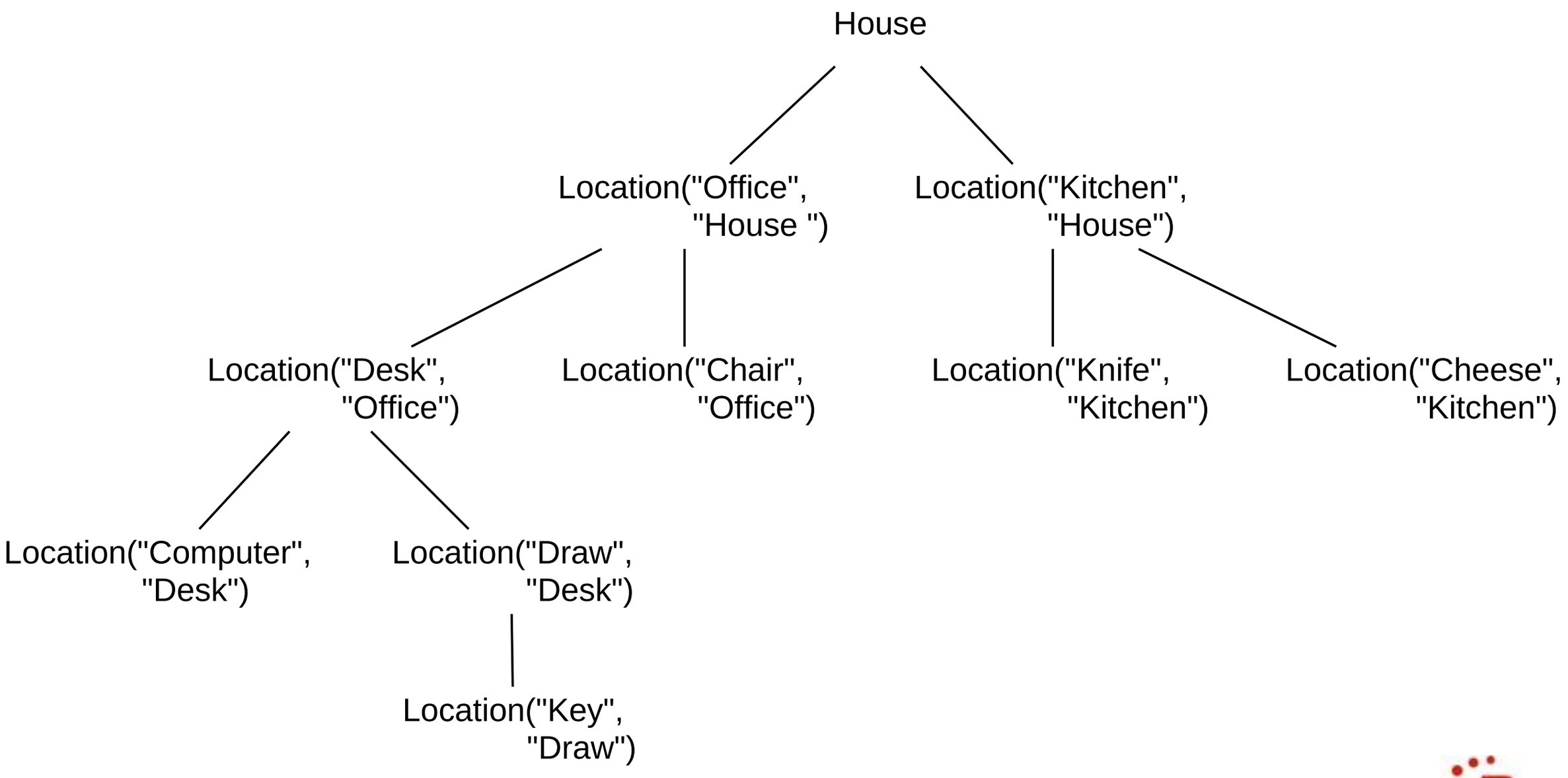


Backward Chaining

```
rule "go5"
when
    String( this == "go5" )
    isContainedIn(thing, location; )
then
    System.out.println( "thing " + thing + " is in " + location );
end
```

Out Var (unbound)

Out Var (unbound)



Backward Chaining

```
rule "go5"
when
    String( this == "go5" )
    isContainedIn(thing, location; )
then
    System.out.println( "thing " + thing + " is in " + location );
end

ksession.insert( "go5" );
ksession.fireAllRules();
---
go5
thing Knife is in House
thing Cheese is in House
thing Key is in House
thing Computer is in House
thing Draw is in House
thing Desk is in House
thing Chair is in House
thing Key is in Office
thing Computer is in Office
thing Draw is in Office
thing Key is in Desk
thing Office is in House
thing Computer is in Desk
thing Knife is in Kitchen
thing Cheese is in Kitchen
thing Kitchen is in House
thing Key is in Draw
thing Draw is in Desk
thing Desk is in Office
thing Chair is in Office
```

Out Var (unbound)

Out Var (unbound)