

Lynx-Deer High Level Design (HLD) Document

1. Introduction

The Lynx-Deer Model will be an AgentSheets model that models the situation in the following story:

Adult and baby deer and lynx walk around a grassy field. If a lynx is hungry and sees a deer, it eats the deer and becomes less hungry. Baby deer are less filling for the lynx than adult deer. If a deer is hungry and sees grass, it eats the grass and becomes less hungry. When a deer or lynx is full, it produces babies. As these babies get older, they become adults. If the field runs out of grass, the deer will starve. If all the deer die, the lynx will starve. Eventually every deer and lynx will die of old age.

2. Subject Matter Experts Agreement List

Name	Title/Role	Mandatory Reviewer (Y/N)	Approved
<i>Apprentice Name</i>	Developer	Y	
<i>Supervisor Name</i>	Supervisor	Y	
<i>Mentor Name</i>	Mentor	Y	

3. Requirements

Look at the story in the introduction and answer the following questions:

- What are the characters in the story(the nouns)? These are the agents in the model.

Deer, Lynx, Grass and Field

- Do any of the characters have adjectives describing them? These are the depictions of the agent. Which agents have multiple depictions and what are they?

Deer: Adult Deer, Baby Deer

- What activities does each character do? These are behaviors of the agent. Deer eat Grass, Deer reproduce, Deer die, Grass grows, Lynx eat Deer, Lynx Die, Lynx Reproduce
- When do the activities take place? Does anything have to be true for the activity to take place?

Lynx and Deer only Reproduce when they have some amount of hunger. Deer have to be on top of grass to eat it.

- How do the characters do each activity? Describe the behaviors in detail, step by step.

Refer to the Chart below.

Based on your answers to these questions, fill in the italics below to create an outline that describes the agents in the story.

- a. An AgentSheets model showing the interactions of agents which exhibit the following behaviors:
 - i. *Deer*
 - 1. *Reproduce*
 - 2. *Eat grass*
 - 3. *Move toward grass.*
 - 4. *Die*
 - 5. *Grow up*
 - ii. *Lynxes*
 - 1. *Move toward Deer*
 - 2. *Eat Deer*
 - 3. *Reproduce*
 - 4. *Die*
 - 5. *Grow up*
 - iii. *Grass*
 - 1. *Eaten by Deer*
 - 2. *Grow back*
- b. A graph showing the changes in population of each species.
- c. Users should be able to change the properties of the simulation to alter the species' behaviors.

4. Timeline

Your project is due by June/25/2012.

5. Desired Behavior / Components

How would you model agent 1 doing behavior 1? Give a step by step explanation of how each agent does each behavior. Think about how you will demonstrate the behavior in the AgentSheets model.

Example: Washing the dishes.

- a. **Put the dirty dish(es) in the sink.**
- b. **Turn on the water.**

- c. **Put soap in the water.**
- d. **When the water is high enough, turn it off.**
- e. **Wash the dishes.**
- f. **Take them out of the water.**
- g. **Dry them.**
- h. **Put them in the cupboard.**

Replace the words in italics with you own words. Add more steps if you need them.
Do this for each behavior of each agent.

Deer: Reproduce

- a. *Check if hunger level is above reproduction level*
- b. *Look for empty spots*
- c. Place baby deer in empty spot

Deer: Eat Grass

- a. *Check grass level if grass level > 0*
- b. *Hunger Level = Hunger Level + Grass Level*
- c. *Grass level = 0*

Deer: Move toward grass

- a. Check surrounding grass levels
- b. Move to highest level of grass

Deer: Grow up

- a. When born take timestep
- b. Check if born timestep + DeerGrow <= Current Timestep

Deer: Die

- a. When born take timestep
- b. Check if born timestep + Deerlife <= Current Timestep

6. Conclusion

The goal of this activity is to understand how to design an AgentSheets model based on a story.