

HOMEWORK 1

ECE505

d2l: hw01

Due: 16 September 2010, 05:00 PM

This homework provides an introduction into GME, and includes an exercise in designing a domain. Additionally, this homework explores the use of English in specification of domains, and gives a gentle introduction to proofs of equivalence. Please submit your homework in a single PDF or Word file (that is zipped) on d2l, do not supply a different file for each question. For Question 2, provide an image (screenshot, EMF or PDF) of your model as part of the document, do not submit the model itself.

1 Logic

Define the domain of simple logical gates (i.e., gates with 2 or fewer inputs), using English. Be specific as to the meaning of the types of logical gates, and any restrictions on their associations with each other.

2 Pure genius

Scientists classify all living things into kinds. The basic kind is the “Species” (e.g. dogs are in Species *familiaris*). Closely related Species are in the same “Genus” (dogs and wolves are of different Species, but belong to Genus *Canis*). Optionally, related Genera (the plural of Genus) may be grouped into the same “Family” (dogs and foxes are of different Genera but are both of Family *Canidae*). Families are grouped into “Orders” (cats, bears, and dogs are of Order *Carnivore*). An Order may optionally be subdivided into “Suborders.” Finally, Orders are organized into “Classes” (dogs are in Class *Mammalia*, as are whales and humans). Using the GME UML paradigm, create a model of these taxonomy relationships.

GME installation

You will find on the website a link to the GME project at Vanderbilt University’s Institute for Software Integrated Systems. You will need to install this software to do the homework.

3 Analog(y) and Design

With the following pairs, tell which member matches to x , y in the analogy, $x:y::MIPS:MIC$, and why. If a pair does not satisfy the analogy, explain why not. If each member of the pair could satisfy x and y , explain why. If necessary, give a definition of each pair member.

Example:

Publishing, Writing \Rightarrow Writing:Publishing::MIPS:MIC

1. Drafting, Compass
2. Geometry, Mathematics
3. Music, The Baroque Period (c. 1600-1750 A.D.)
4. Text file, vi/emacs/notepad
5. Area under a curve, Fundamental Theorem of Calculus
6. Sound, Speaker

4 He who has the gold...

From your imagination or experience, describe a system implementation or historical example where the risk introduced when modifying the system was proportional to the system size rather than the introduced change (i.e., that the Golden Rule is not satisfied). The introduced change need not be a software change. Describe how you would have changed the initial design such that the Golden Rule could be better satisfied.