# The Software Framework for C<sub>3</sub>PO: (Customizable Computer Coaches for Physics Online)

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# Overview

• Written in Adobe Flash, consists of two graphical user interfaces (GUI):



#### **Program Structure**

• Three types of coach building blocks:

- primitives, visual elements, & modules



#### **Physics Exercise**



What is the speed at which the Moon orbits the Earth?



# Primitives



# Primitives

- Components of a written solution:
  - Objects, Quantities, Approaches, Systems, Assumptions, Equations, etc.



Neglect interactions with sun and other planets.

$$F_G = \frac{Gm_1m_2}{r^2}$$

$$a_c = \frac{v^2}{r}$$

#### **Visual Elements**



#### **Visual Elements**

Visual representation of the primitives



# Modules



# Modules

Parent-child relationships of Folders, Questions & Actions



# Actions

- Actions can be used to move the program forward and change the state of the coach
  - The principle action is unlocking a building block of the coach, for example:
    - Unlocking a visual element makes it visible
    - Unlocking a primitive allows that primitive to be accessible
    - Unlocking a module allows questions contained within to be viewed
- Actions give the coach flexibility
  - Students can be fully constrained to answer questions in a certain order OR students can choose the order
  - Students can choose the amount of coaching they receive

# Example: Unlocking a primitive



# Example: Check whether primitives have been unlocked



#### Demonstration

• Student creates a diagram from a picture