nclab
Learning for Industry 4.0

3D Modeling Project #4

CASTLES

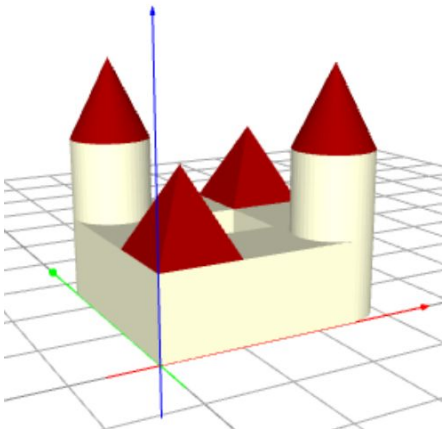
Castles are made of stone and wood. The builders of castles used many clever tricks to get the most out of simple geometry.

Before You Start

Go to the Creative Suite, open a new PLaSM project, and save it as Project-4 in the folder course-3D-projects/.

Project Goal

The goal of this project is to create a castle, given a magic box that contains seven 3D shapes.

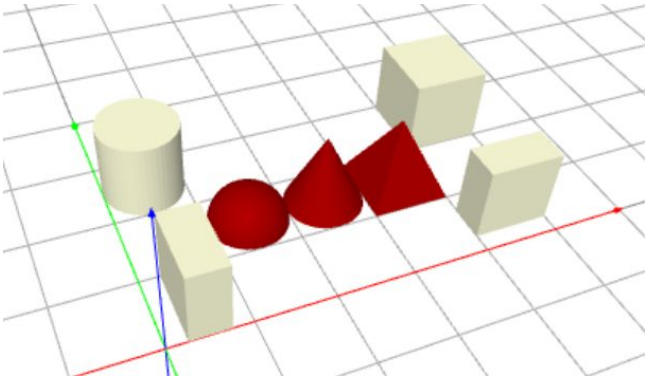


Castles

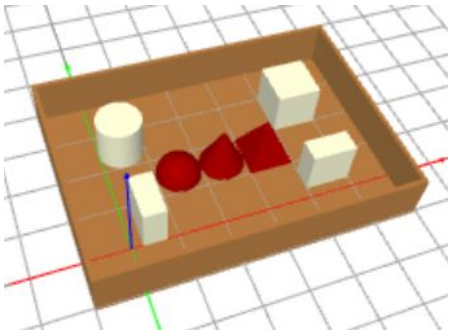
The code below defines the seven objects you need. Copy and paste it at the beginning of your PLaSM worksheet before you start!

```
cu = CASTLE1()
co = CASTLE2()
cy = CASTLE3()
py = CASTLE4()
hs = CASTLE5()
wy = CASTLE6()
wx = CASTLE7()
```

Keep in mind that the objects are not located at the origin. The command SHOW(cu, co, cy, py, hs, wy, wx) will show where each object is:



- 1 x 1 x 1 cube named cu
- cylinder cy of radius 0.5 and height 1
- cone co of radius 0.5 and height 1
- pyramid py of square base 1 x 1 and height 1
- half-sphere (hemisphere) hs of radius 0.5
- wall wx of thickness 0.5, length 1 and height 1 which is parallel to the X axis
- wall wy of thickness 0.5, length 1 and height 1 which is parallel to the Y axis



Alternatively, you can use the seven shapes to build other things. You will need to create copies of objects and move them in the 3D space. The following video will show you how:

https://youtu.be/pA7TKgQMEQA

Creating Copies of Objects

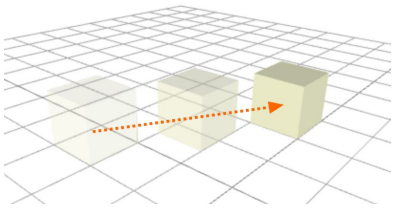
The COPY() command makes it possible to create an identical copy of an object - same shape, same size, same position, same color. To create object b as an identical copy of object a, type:

b = COPY(a)

Moving Objects in 3D Space

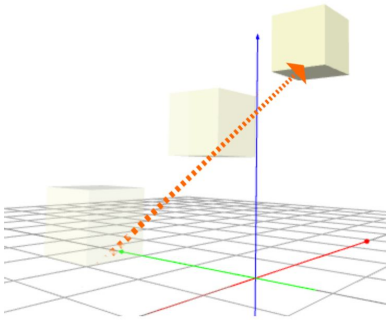
The MOVE() command can be used to move objects in the Z-direction as well. It will have the form:

MOVE(object, dz, Z)



You can also use the full 3D form of the MOVE command:

MOVE(object, dx, dy, dz)

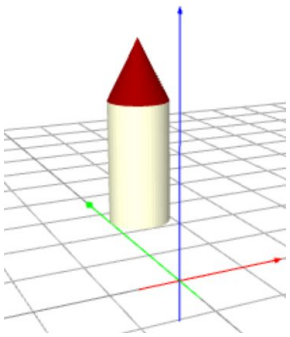


Example

This example uses both the COPY and MOVE commands to create a two-story tower named to1:

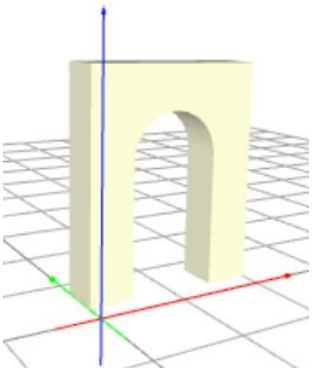
```
cy2 = COPY(cy)
MOVE(cy2, 1, Z)
MOVE(co, -2, 1, 2)
to1 = UNION(cy, cy2, co)
SHOW(to1)
```

The result:



Advanced Shapes

Finally, since you already know how to create unions of objects and how to subtract objects from each other, you can use the seven basic objects to create fairly advanced shapes such as this portal:



If you need to rotate objects in 3D, look it up in the Help menu.

Project Checklist

Your project will be finished when:

1. You have constructed a castle using the CASTLE() command.
2. Your program is saved as Project-4 in folder course-3D-projects/.