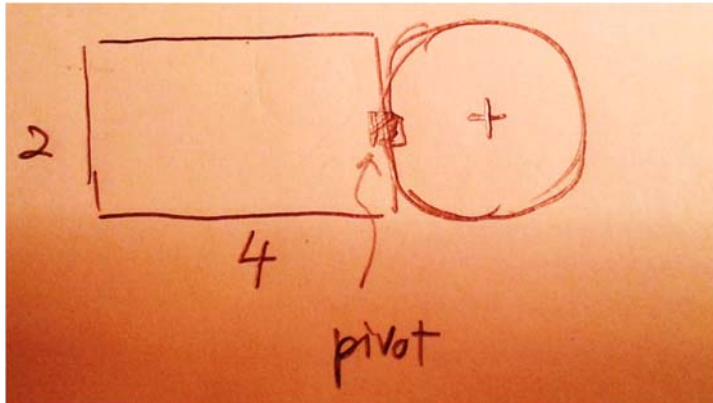# After Example 5.6 1st Question:

Discussion on how to build something with our data structure

Assuming UnitCircle: defined at the origin with radius of 1.0

- You are told there are two Renderables in one SceneNode
- What are the xforms in each of the Renderables and SceneNode?
- Now, if I scale up the SceneNode by (2,2)
    - In order to change the pivot to the left-end of the rectangle, what should be the SceneNode pivot setting? And why?

Answer:

- SceneNode: Xform(Scale=1,1 Translation=0,0, R=0, Pivot=2,0)
  - Square: Xform(Scale=4,2, Translation =0,0, R=0)
  - Circle: Xform(Scale=2,2, Translation=3,0, R=0)

Now try:

- Scale the SceneNode by 2, 2
- To change the pivot to the left end of object, pivot setting is (-2, 0) and NOT (-4, 0)
- Why? Because pivot operates on the original object, BEFORE the SceneNode xforms.
- Notice, the elements' xforms and SceneNode's pivot transforms are independent of the SceneNode position!!
  - Pivot does not affect translation!!

After Example 5.6 2ˢᵗ Question (for MP4):

Discussion on how to build something with our data structure
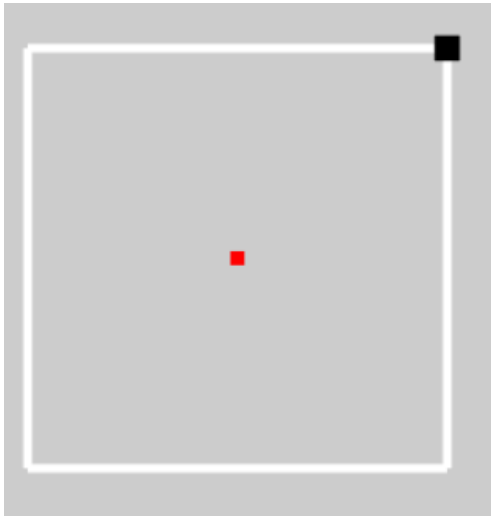
Manipulator object: requirements:

- Square bound of size 1x1

Questions:

- With SquareRenderable, SceneNode
  - How many elements (SquareRenderable) are there?
- How many transforms are there?
- Sketch out the data structure and xforms
- What are the values in the xforms?
- What is the pivot of the Manipulator?
  - How can I change the pivot to the lower-left corner?
- Which is the transform that user will change to manipulate the position of the entire manipulator?
  - Ask: if I want the Manipulator to be located at (4, 2), which is the xform I will change?
- How would I know if a position wcPos(x,y) is close to the center of the Manipulator?
- How would I know if a position wcPos(x,y) is close to the top-right of the Manipulator?
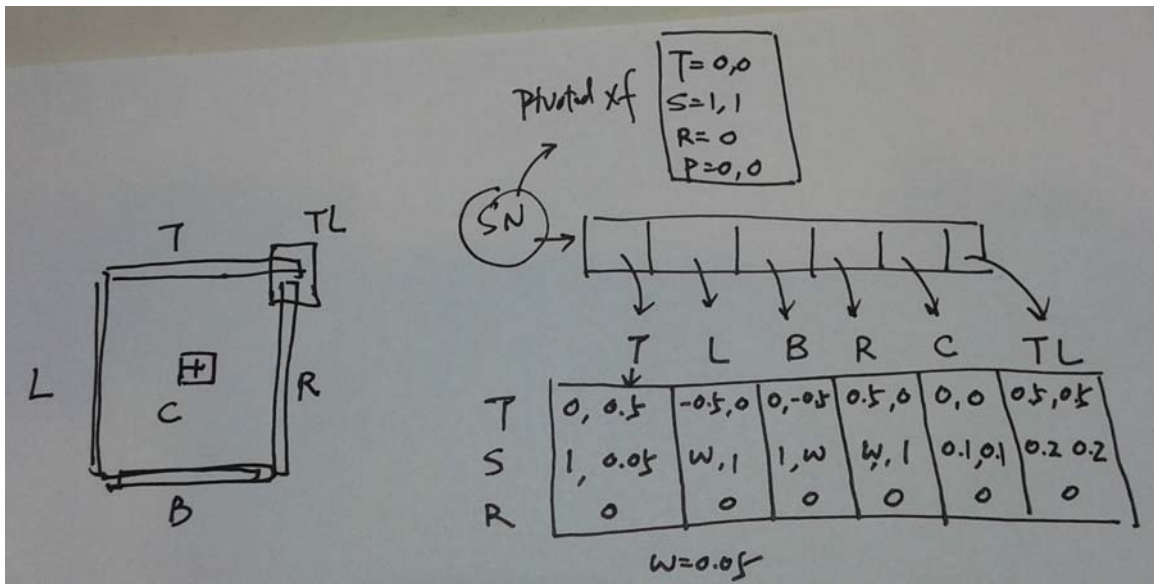- How would your answer changes if the initial size of the Manipulator is 3x3?

- With SquareRenderable, SceneNode
  - How many elements (SquareRenderable) are there?

Six SquareRenderables + SceneNode

- How many transforms are there?

Six SquareRenderables + SceneNode ➔ 7 transforms

- Sketch out the data structure and xforms
- What are the values in the xforms?

- Which is the transform that user will change to manipulate the position of the entire manipulator?
  - if I want the Manipulator to be scaled to (4, 4) which is the xform I will change?

Change SN's pivoted transform

- With manipulator as size (4, 4), What is the pivot of the Manipulator?

Pivot at center of the object

  - How can I change the pivot to the lower-left corner?

Change SN: P(-0.5, -0.5)!! Note, this is _NOT_ (4, 4),

Look at the PivotedTransform.getXform() function: pivot is used BEFORE the transforms' scale/rotate!

- How would I know if a position wcPos(x,y) is close to the center of the Manipulator?

SceneNode transform's Translation -> compare this with wcPos(x, y)

- How would I know if a position wcPos(x,y) is close to the top-right of the Manipulator?

Px = SceneNode Transform->getXPos()

W = SceneNode Transform->getWidth()

Right is located at: Rx = Px + 0.5 * W

Compare Rx to wcPos.x