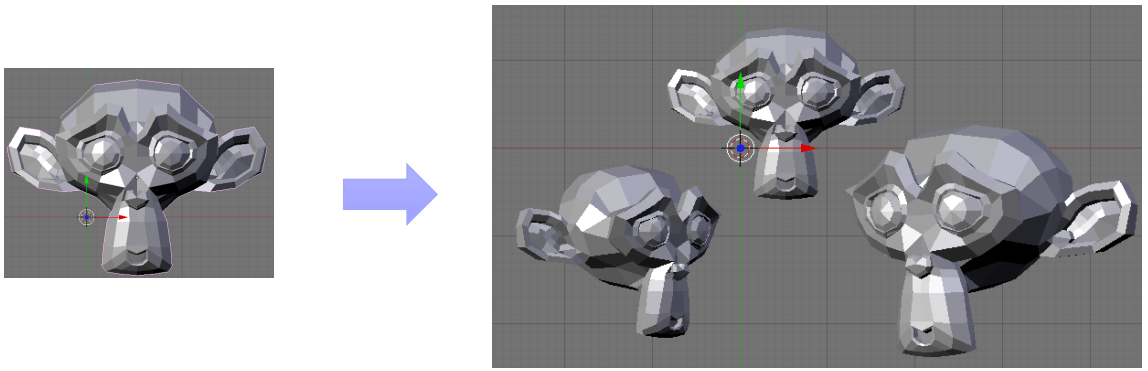
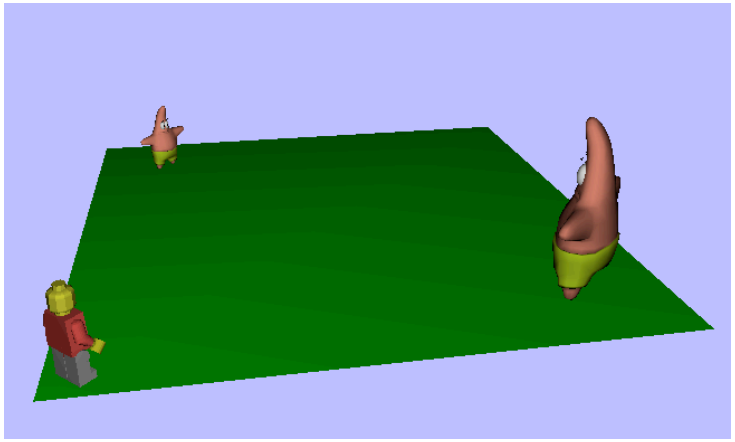
Exercicis TG

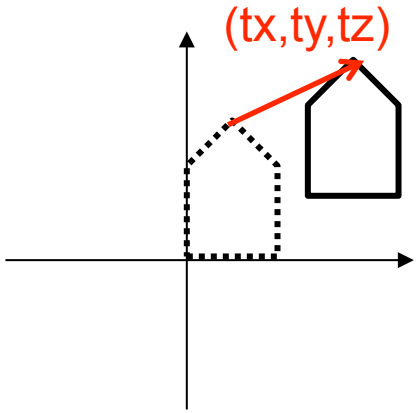
IDI- 2016-2017

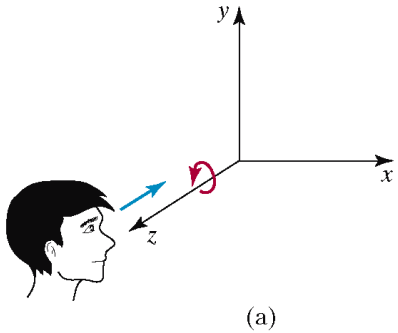
MOTIVACIÓ: càlcul de la TG a aplicar a models

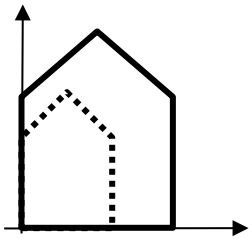




Transformació geomètrica → [ ] → Matriu 4x4 TG







T(tx,ty,tz)

$$T(t_x,t_y,t_z)=\begin{bmatrix}1&0&0&t_x\\0&1&0&t_y\\0&0&1&t_z\\0&0&0&1\end{bmatrix}$$

G_z(angle)

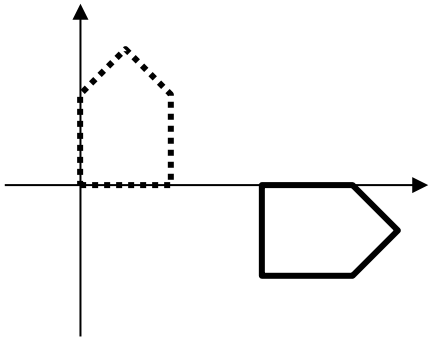
$$\begin{bmatrix}\cos\alpha&-\sin\alpha&0&0\\\sin\alpha&\cos\alpha&0&0\\0&0&1&0\\0&0&0&1\end{bmatrix}$$

S(sx,sy,sz)

$$S(s_x,s_y,s_z)=\begin{bmatrix}s_x&0&0&0\\0&s_y&0&0\\0&0&s_z&0\\0&0&0&1\end{bmatrix}$$

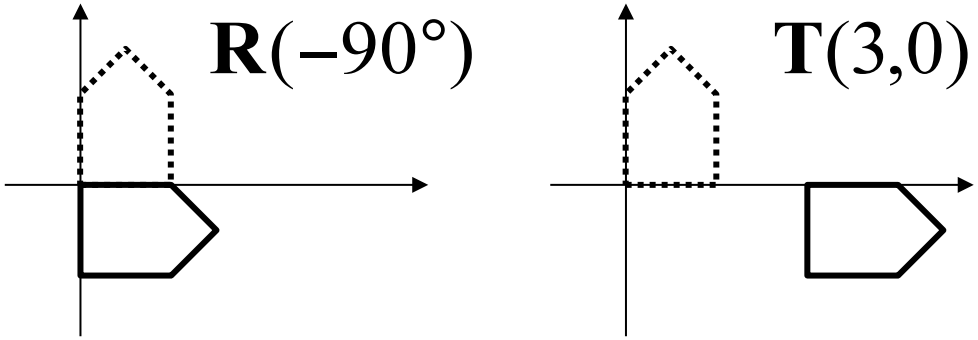
Composició de Transformacions

- Imaginem que volem



No es pot fer amb cap de les matrius anteriors

- Cal composar/efectuar dues transformacions



M = T (3,0) · R(-90º)

P' = T (3,0) · (R(-90º) **P**) = (T (3,0) · R(-90º)) **P** = M · **P**

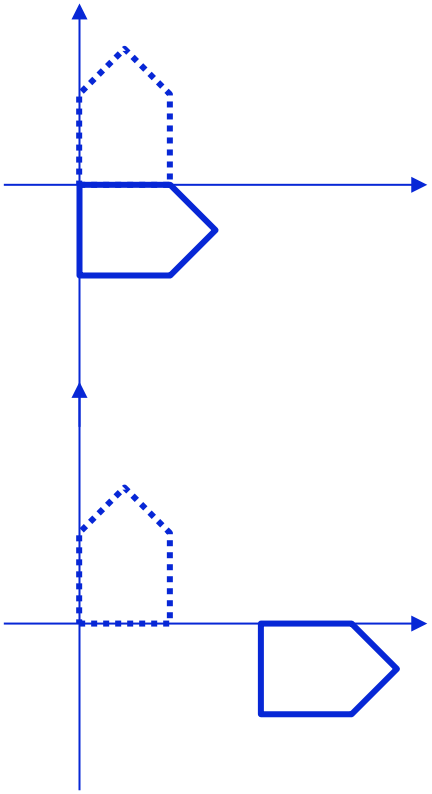
Composició de Transformacions

$$\mathbf{T}(3,0) \cdot \mathbf{R}(-90º) \neq \mathbf{R}(-90º) \cdot \mathbf{T}(3,0)$$

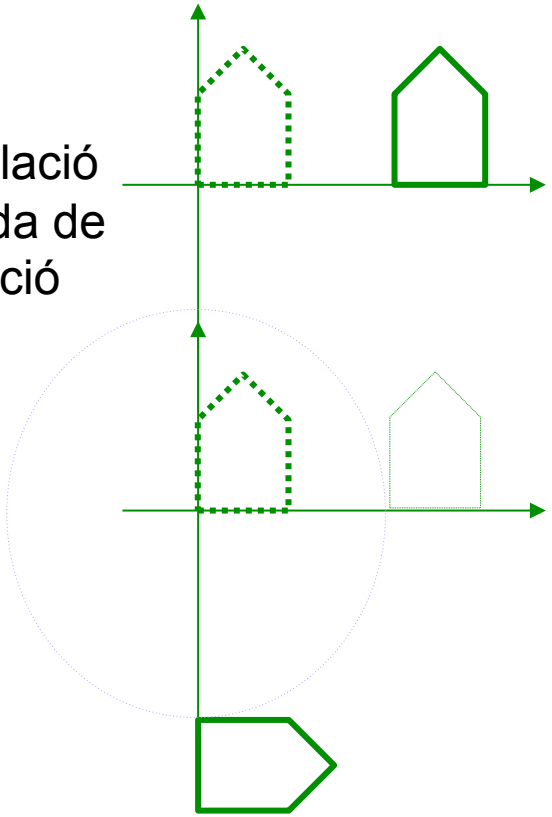
❷ ❶ ❷ ❶

- Multiplicació de matrius no és commutativa

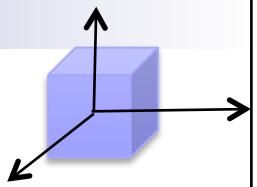
Rotació seguida de translació

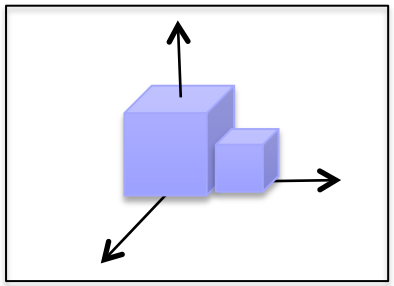


Translació seguida de rotació

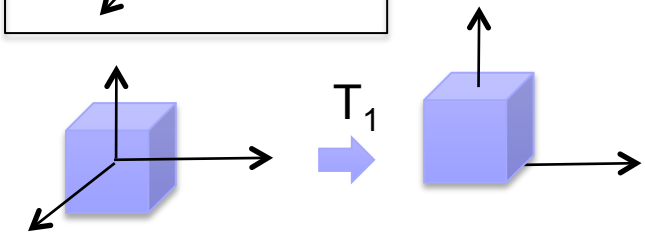


Exemple simple de TG (1)

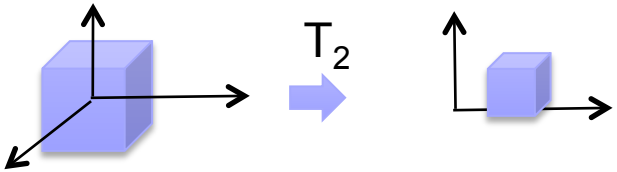




Escena a pintar utilitzant pinta_cub()



T_1= Trans(0,0.5,0)



T_2= Trans(0.75,0.25,0)*S(0.5,0.5,0.5)

Pseudo-codi

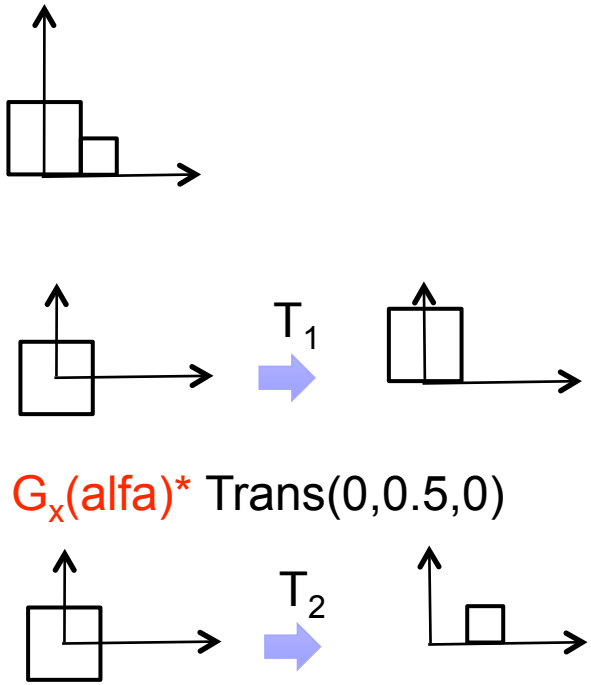
```
TG= Translate(0,0.5,0);
modelMatrix(TG);
pinta_cub ();
TG= Translate(0.75,0.25,0);
TG= TG*Scale(0.5,0.5,0.5);
modelMatrix (TG);
pinta_cub();
```

```
glm::mat4 TG;
TG= glm::translate (glm::mat4(1.f),glm::vec3(0,0.5,0));
glUniformMatrix4fv (transLoc, 1, GL_FALSE, &TG[0][0]);
pinta_cub ();

TG= glm::translate (glm::mat4(1.f),
glm::vec3(0.75,0.25,0));
TG= gml::scale(TG, glm::vec3(0.5,0.5,0.5));
glUniformMatrix4fv (transLoc, 1, GL_FALSE, &TG[0][0]);
pinta_cub();
```

Com faríeu per a girar els dos cubs respecte l'eix x?

Exemple simple (2)

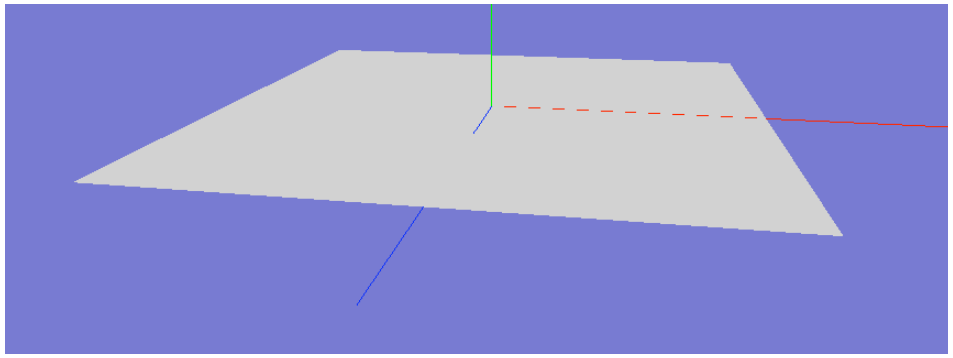


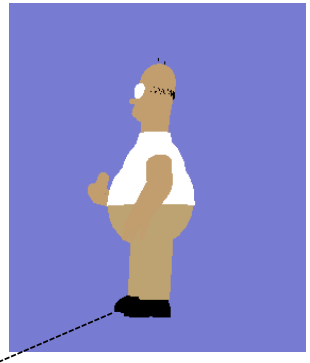
T_1= G_x(alfa)* Trans(0,0.5,0)

T_2= G_x(alfa)* Trans(0.75,0.25,0)*S(0.5,0.5,0.5)

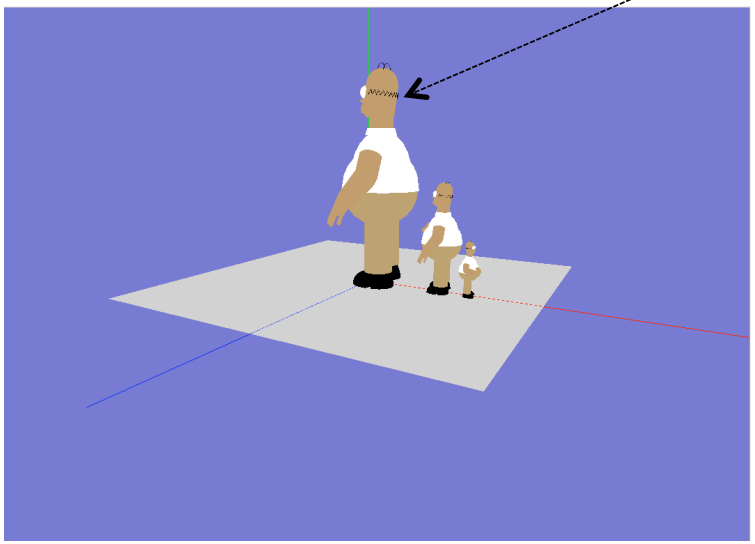
```
glm::mat4 TG, AUX;
AUX=glm::rotate (glm::mat4(1.f), alfa, vec3(1,0,0);
TG= glm::translate (AUX, glm::vec3(0,0.5,0));
modelMatrix (TG); pinta_cub ();
TG= glm::translate (AUX, glm::vec3(0.75,0.25,0));
TG= gml::scale(TG, glm::vec3(0.5,0.5,0.5));
modelMatrix (TG);
pinta_cub();
```

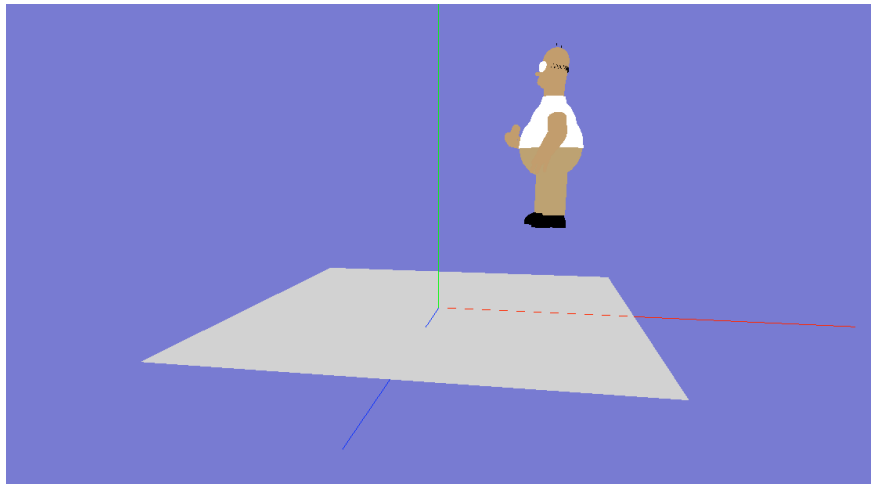
Exercici 1

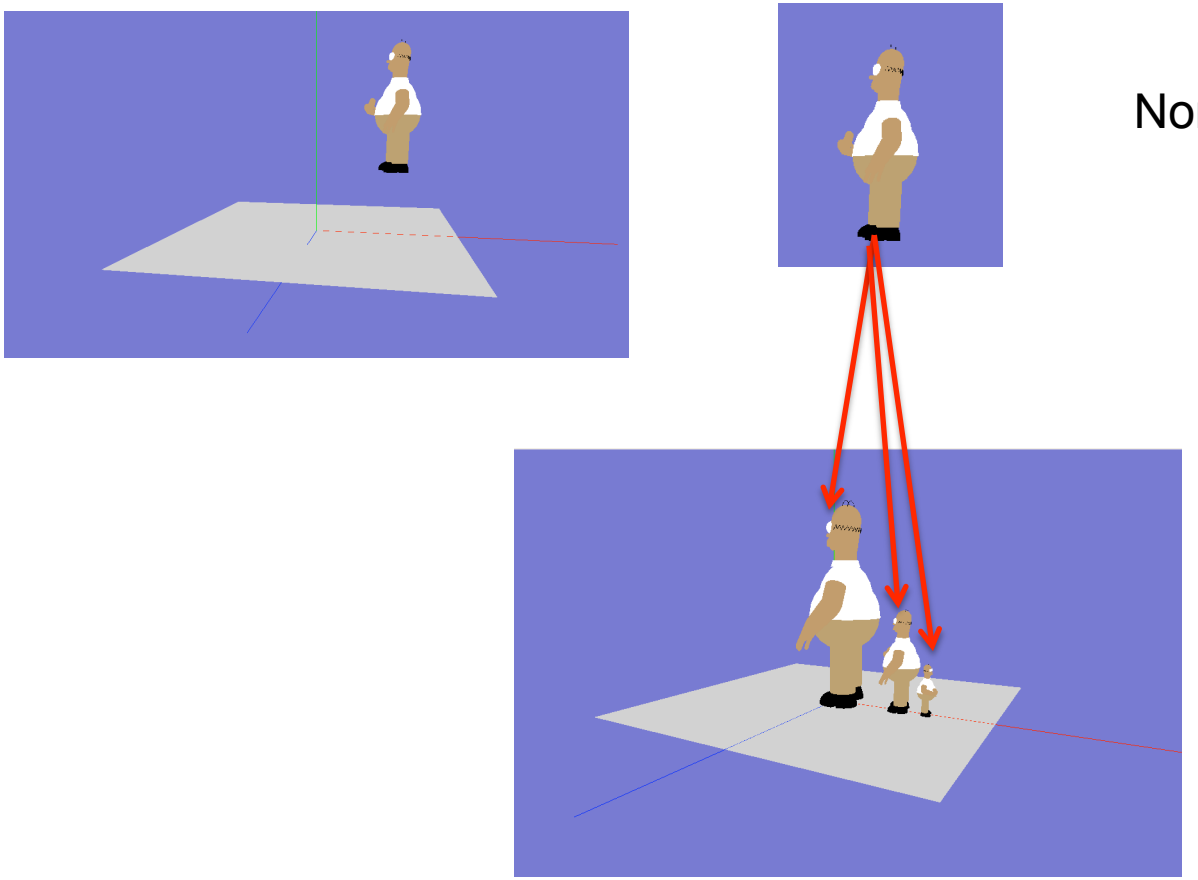




Mateixa grandària

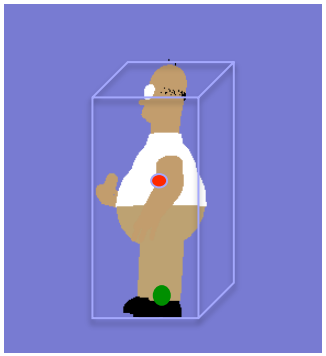






Nomes càlcul de TG

Transformació geomètrica → [ ] → Matriu 4x4 TG

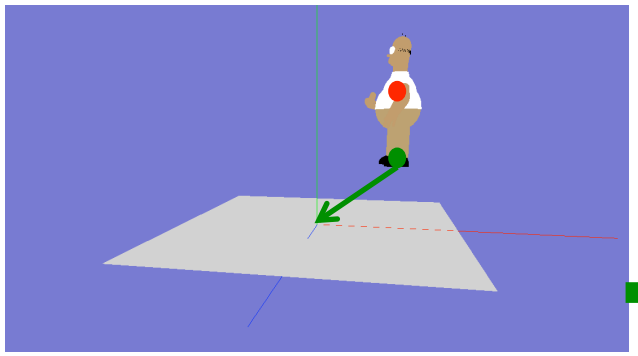


CapsaMinCont = (xmin,ymin,zmin,xmax,ymax,zmax)

Mides => a = (xmax-xmin) , h= (ymax-ymin), f = (zmax-zmin)

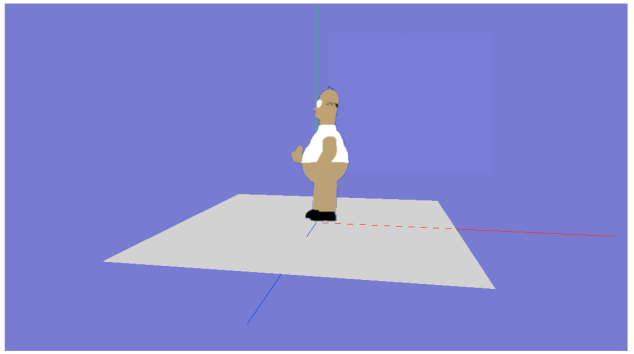
CentBaseCapsa=(cbx,cby,cbz)=(xmin+xmax)/2,ymin,(zmin+zmax)/2)

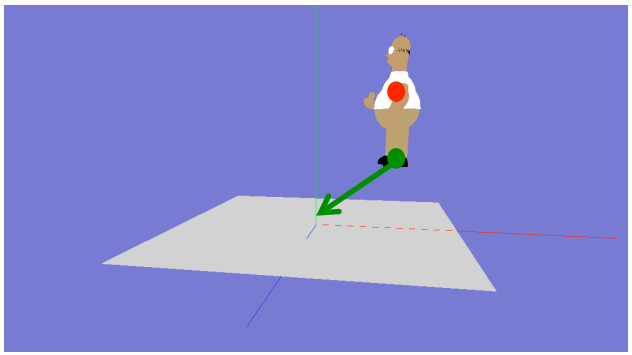
Els podem afegir com atributs al model geomètric



TG_{H1}=Trans(t)

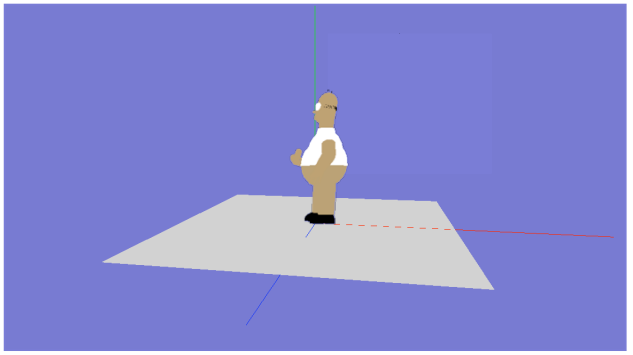
t = (-cbx,-cby,-cbz)

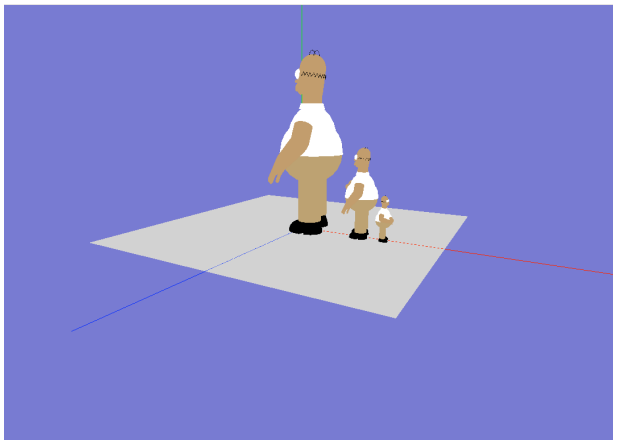




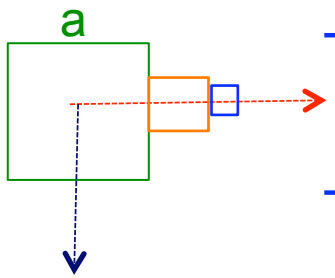
TG_{H1}=Trans(t)

t = (-cbx,-cby,-cbz)





TG_{H2}= Trans(3a/4,0,0) S(1/2,1/2,1/2) Trans (t)

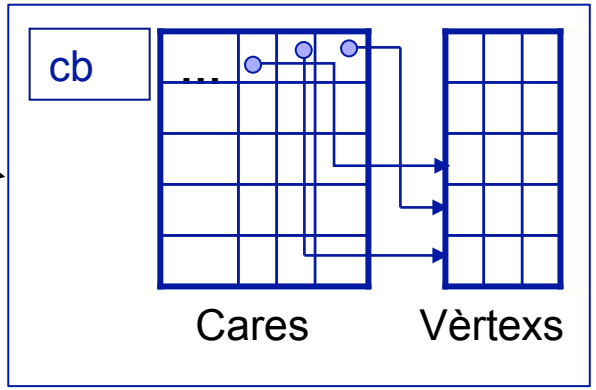


TG_{H3}= Trans(9a/8,0,0) S(1/4,1/4,1/4) R_y(-180) Trans (t)

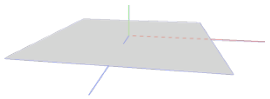
TG_{H3}= Trans(9a/8,0,0) R_y(-180) S(1/4,1/4,1/4) Trans (t)

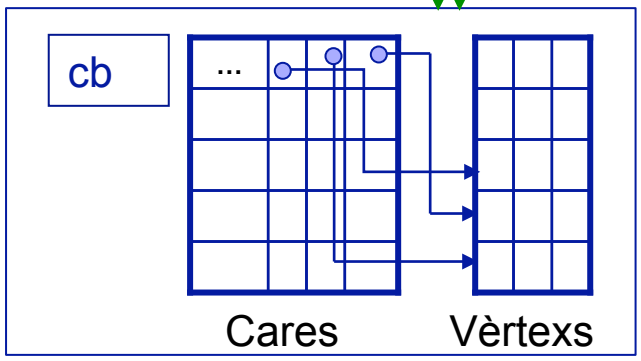
Visualització OpenGL: models en SCM i paràmetres

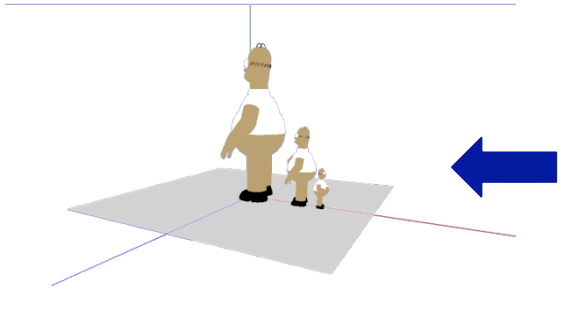
nom	s, pos,…	
Terra		
Homer-1		
Homer-2		
Homer-3		

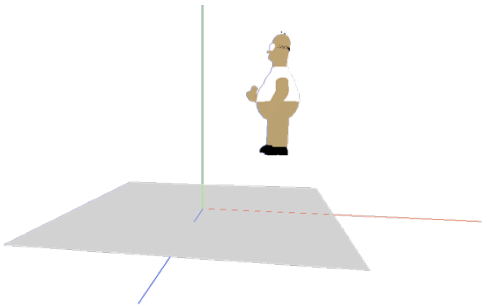


poligon.OBJ









TG_{H1}= Trans(t) t = (-cbx,-cby,-cbz)

TG_{H2}= Trans(3a/4,0,0) S(1/2,1/2,1/2) Trans (t)

TG_{H2}= Trans(9a/8,0,0) S(1/4,1/4,1/4) R_y (-180º)Trans (t)

Homer.OBJ

Visualització OpenGL: models en SCM

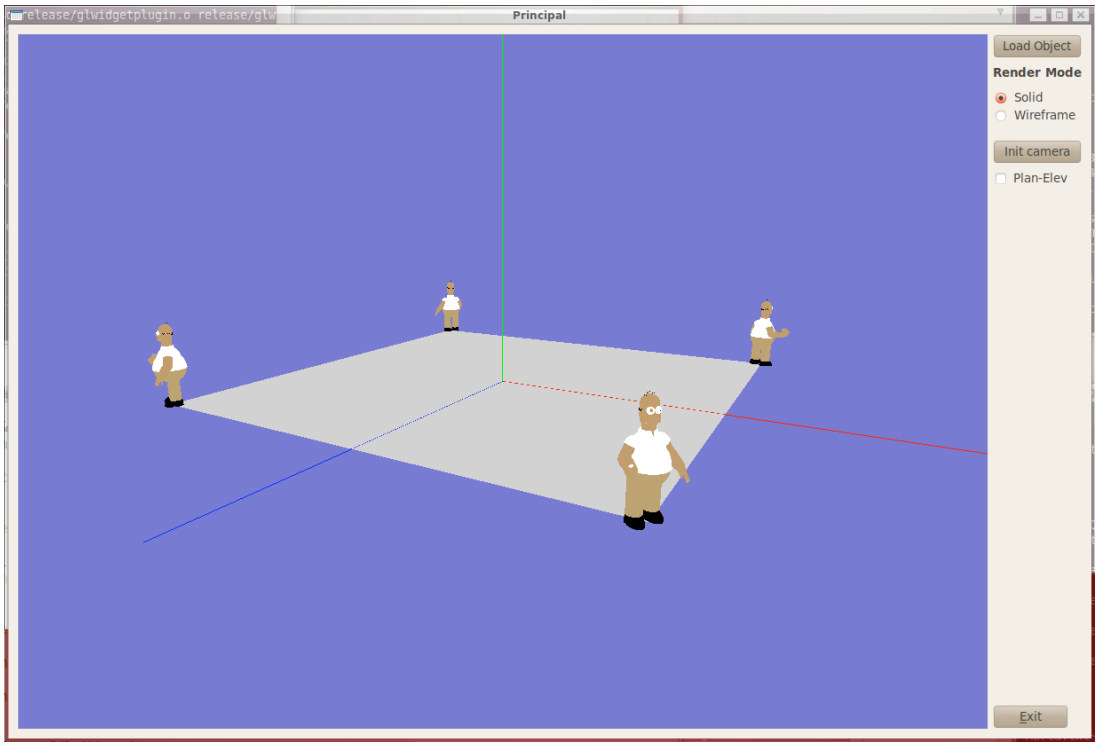
```
per cada objecte_i
  //Càlcul TG_i i enviar a OpenGL
  modelTransform_i()
  pinta_model_i();
fper
```

TG_{H3}= Trans(7a/8,0,0) S(1/4,1/4,1/4) R_y (-180º)Trans (t)

```
modelTransform()
//tercer homer
{
TG=I;
TG= TG*Translate(posx,posy,posz));
TG= TG*Scale(s,s,s);
TG= TG*Rotate (-180, (0,1,0));
TG= TG*Translate (-cb.x,-cb.y,-cb.z);
modelMatrix(TG); //enviar uniform
}

pinta_homer();
```

Exercicis



Mireu la col·lecció de problemes del racó.
Proposta de mínims: 16, 19, 24, 25