



Computação Visual

FUNDAMENTOS – GRAPHICS PIPELINE

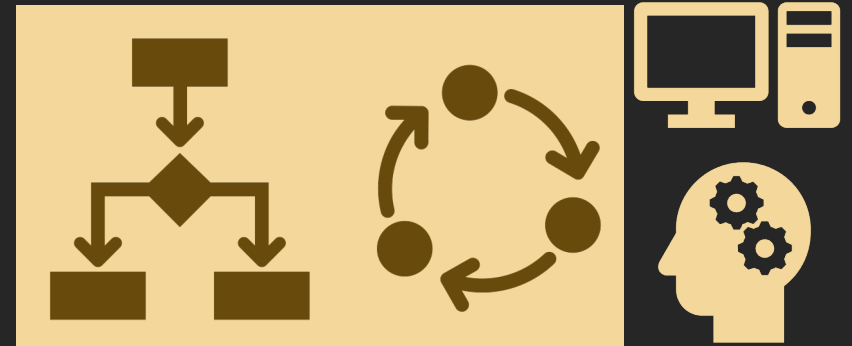
2020

CG

Graphics Process (creating the scene)

- Modelagem
- Animação / Simulação
- Materiais
- Iluminação
- Rendering

Próximas aulas



Graphics Pipeline (rendering)

- Etapas da síntese de imagem

Esta aula



Graphics Pipeline

Fotografando

Filmando

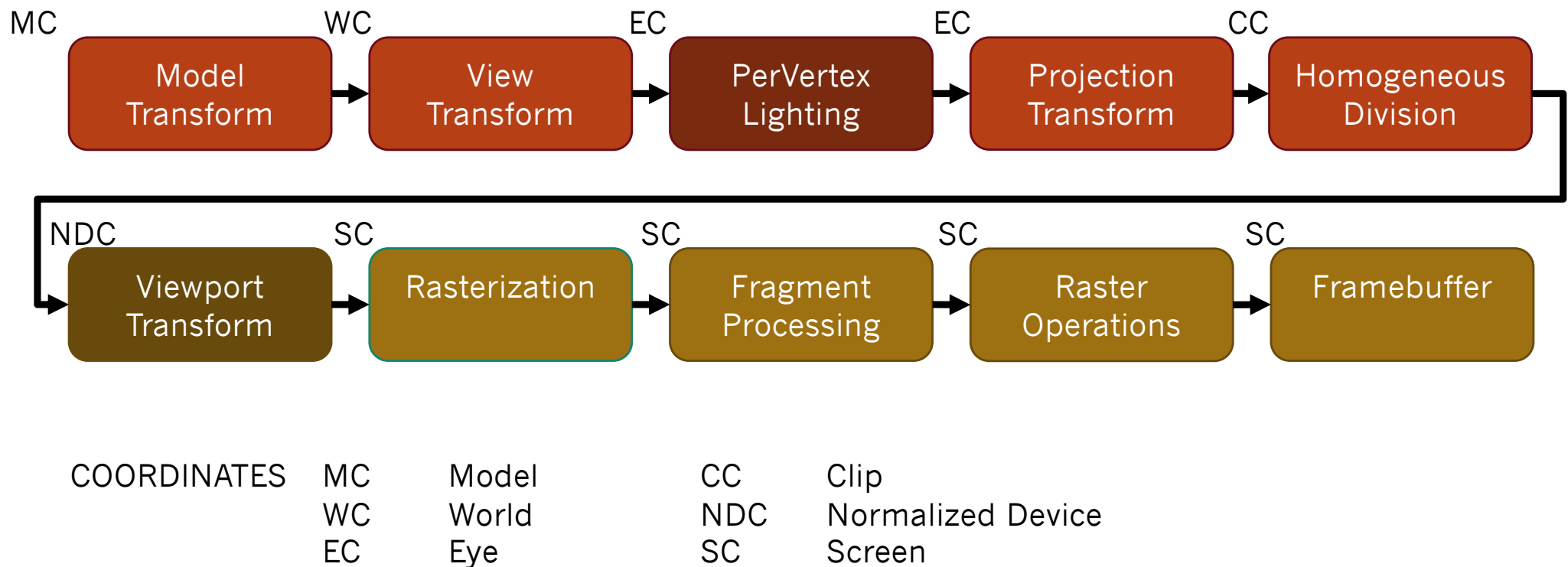
Interagindo

cena / mundo virtual



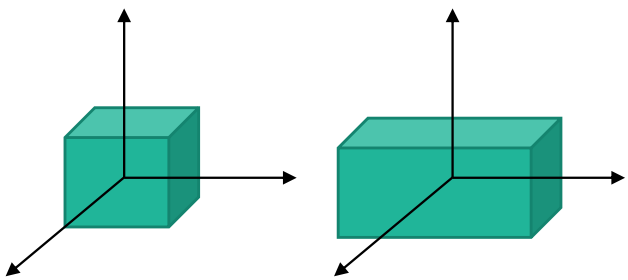
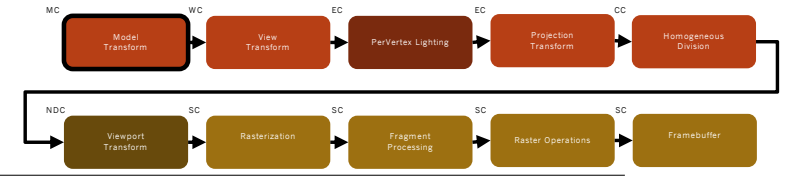
Graphics Pipeline (object => picture)

- fotografando um objeto virtual

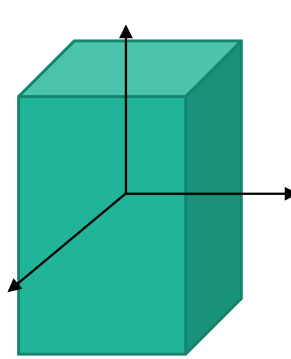


Graphics Pipeline

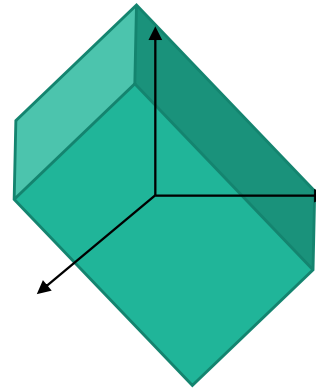
Model Transform (MC)



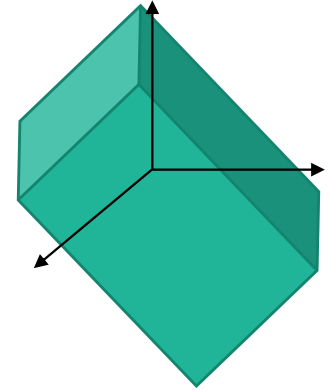
scale (x)



scale (y)



rotate (z)

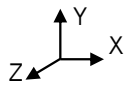
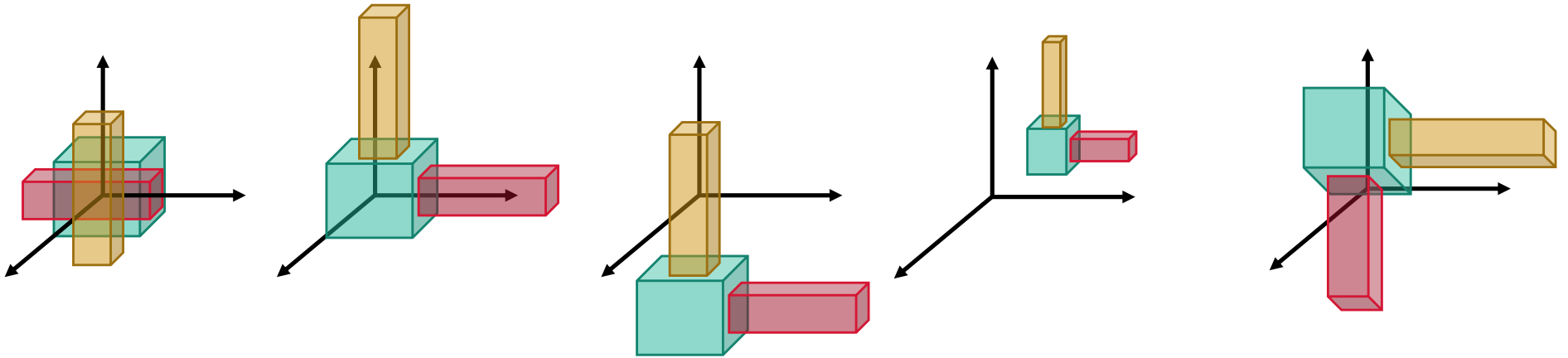
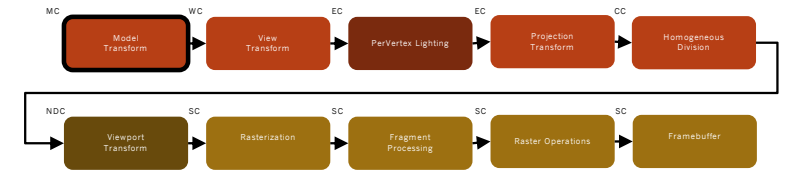


translate (y,z)



Graphics Pipeline

Model Transform (MC=>WC)



replace

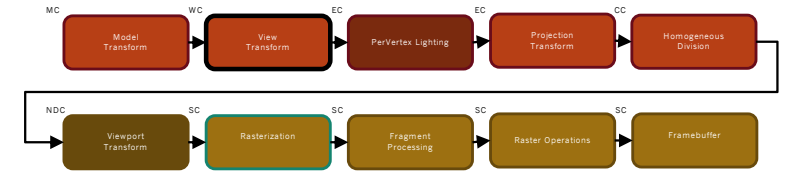
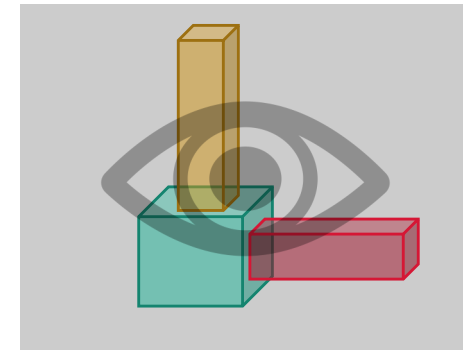
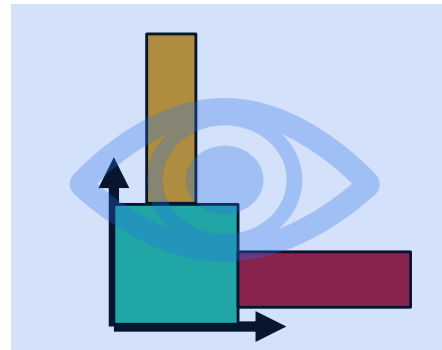
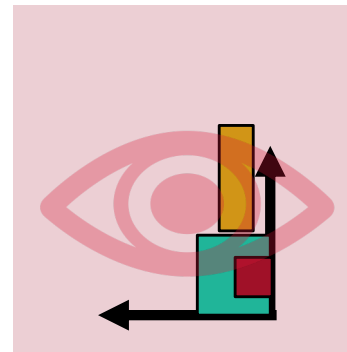
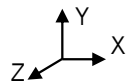
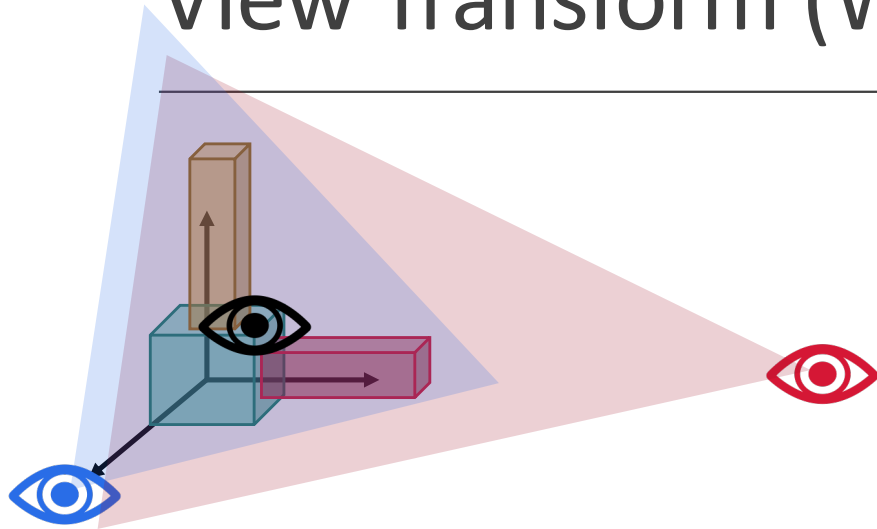
move

scale

rotate/scale/translate

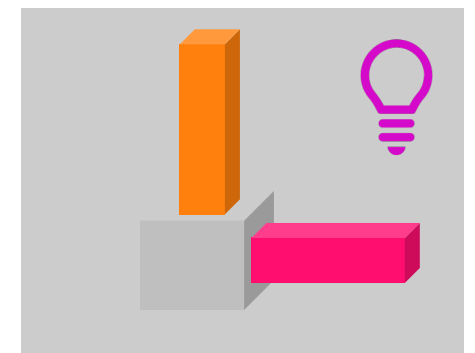
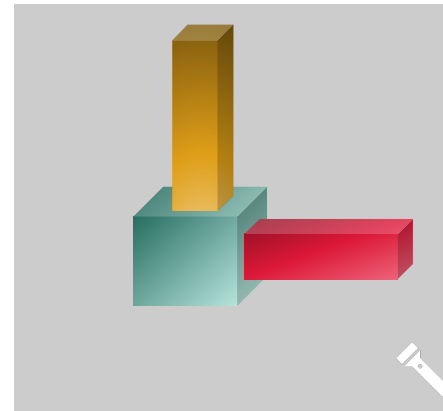
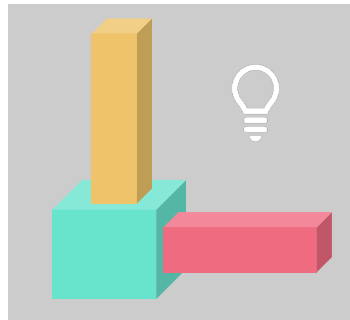
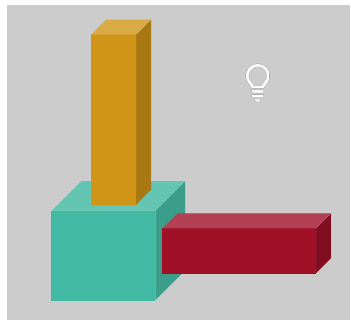
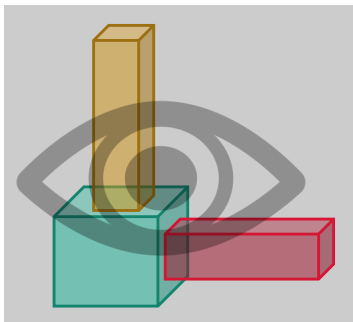
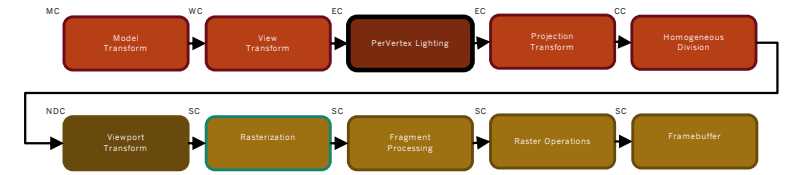
Graphics Pipeline

View Transform (WC=>EC)



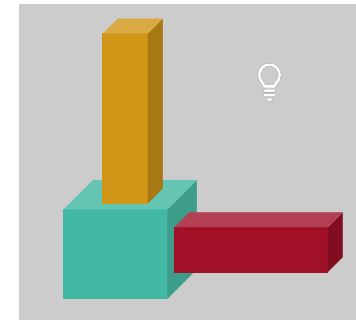
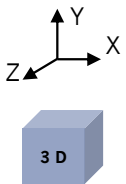
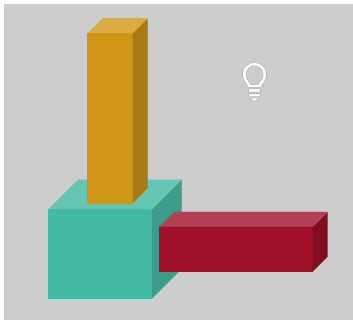
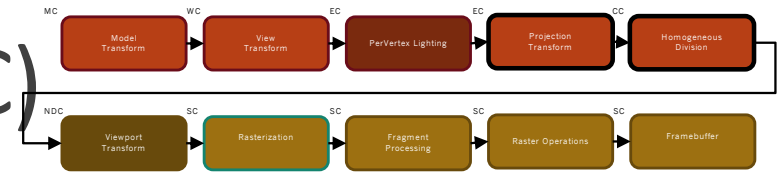
Graphics Pipeline

Per Vertex Lighting (EC)



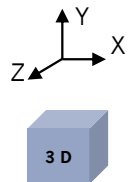
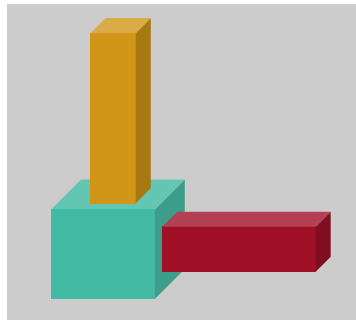
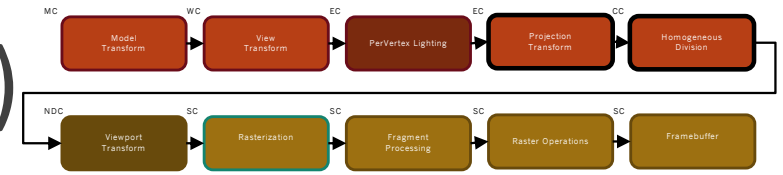
Graphics Pipeline

Projection Transform (EC=>CC)



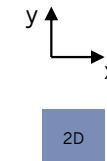
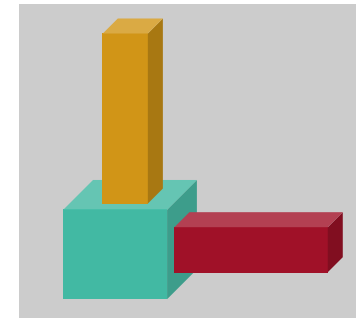
Graphics Pipeline

Homogeneous Div (CC=>NDC)

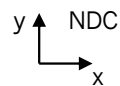
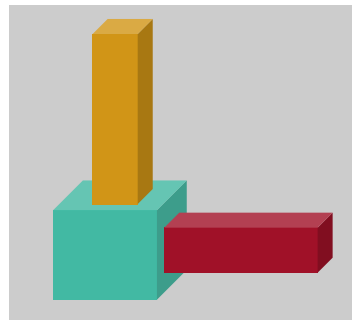
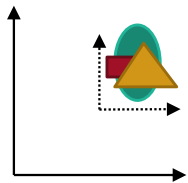
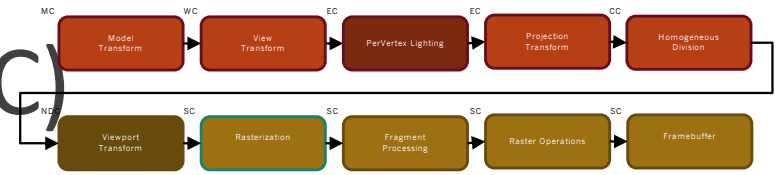


se perspectiva
senão

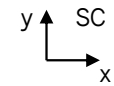
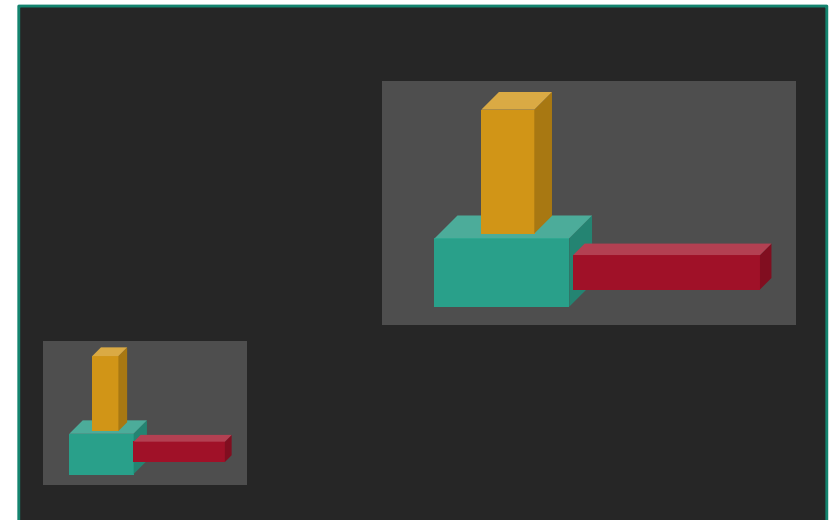
$$\begin{aligned} x &= X/Z & y &= Y/Z \\ x &= X & y &= Y \end{aligned}$$



Viewport Transform (NDC=>SC)



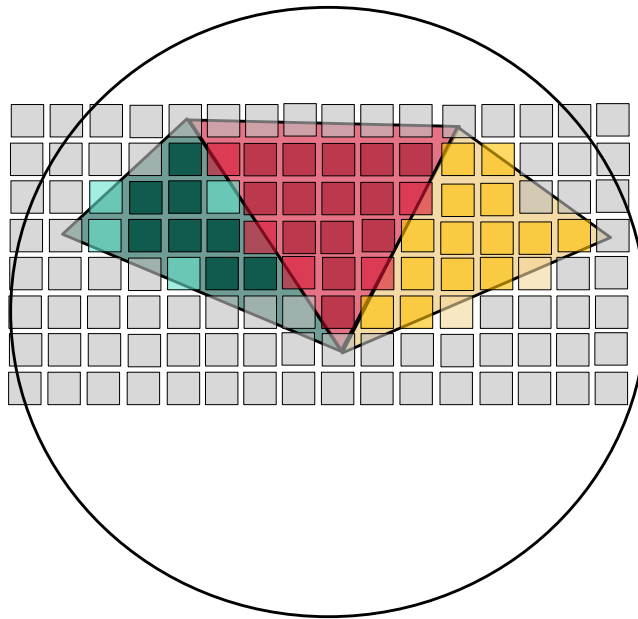
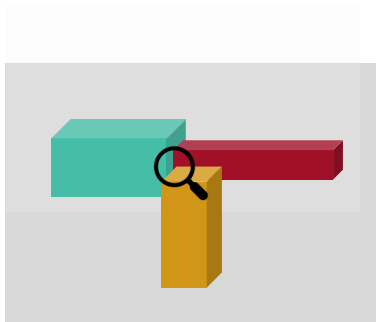
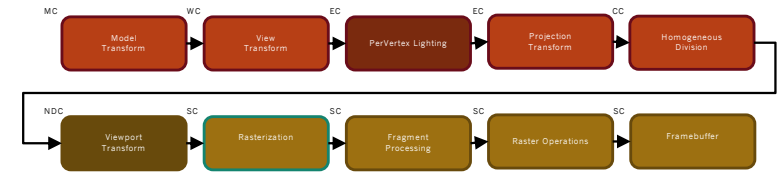
2D



2D

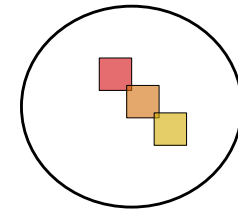
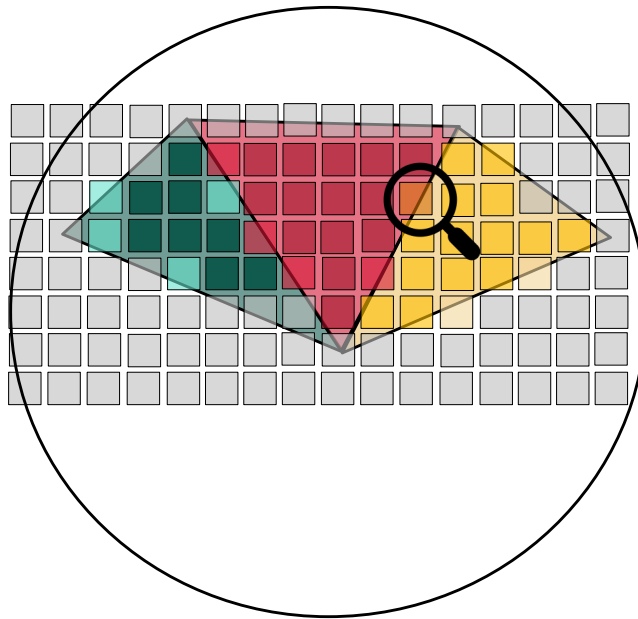
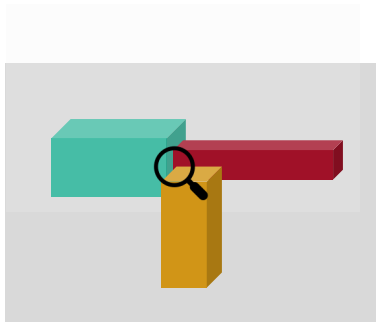
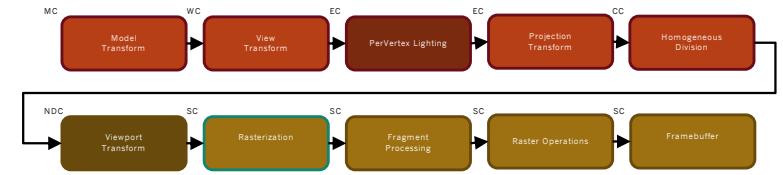
Graphics Pipeline

Rasterization



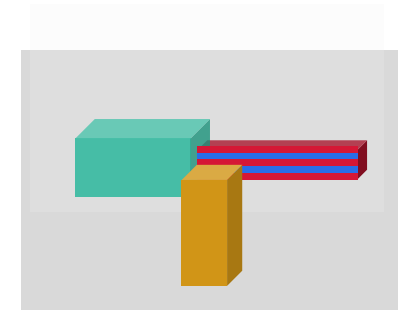
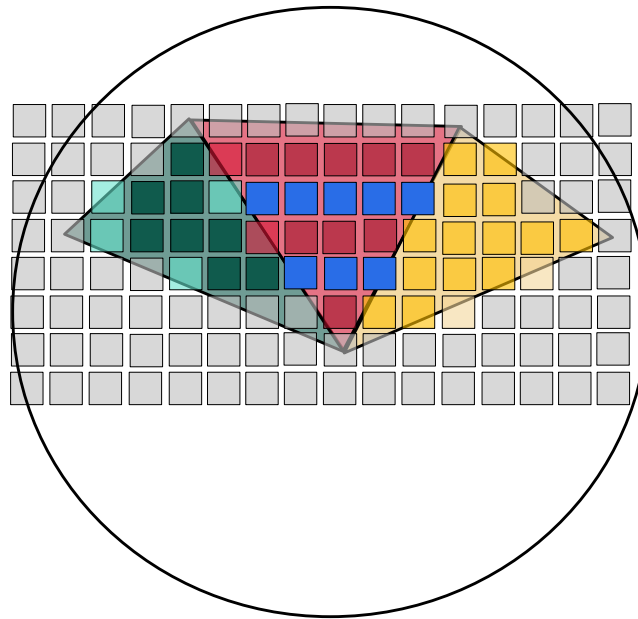
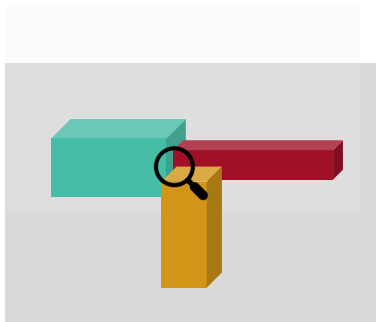
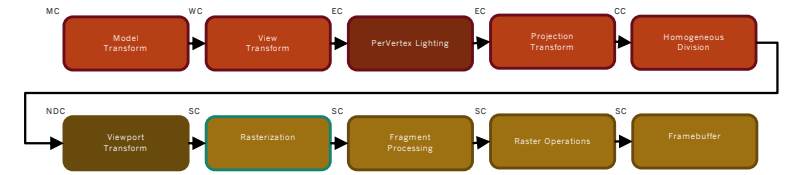
Graphics Pipeline

Fragment Processing



Graphics Pipeline

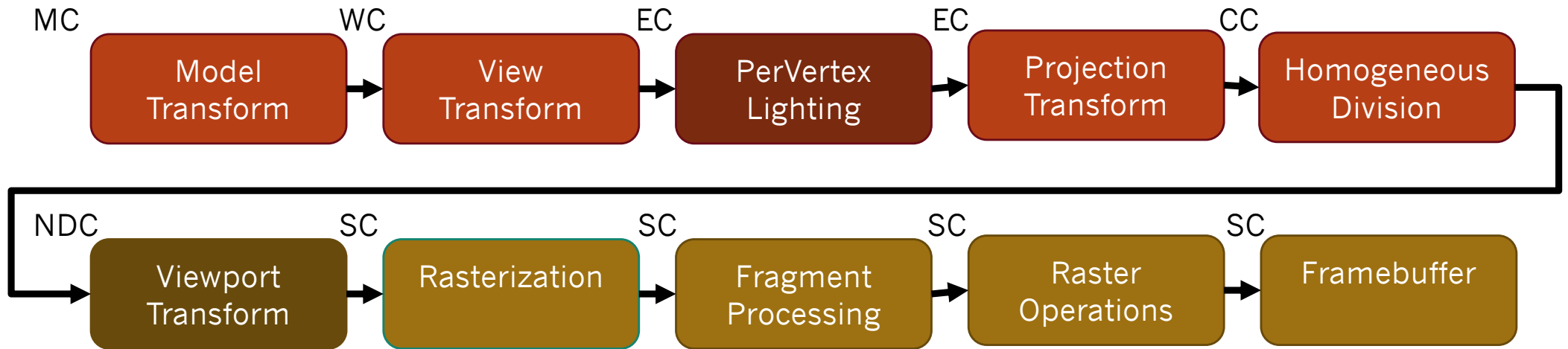
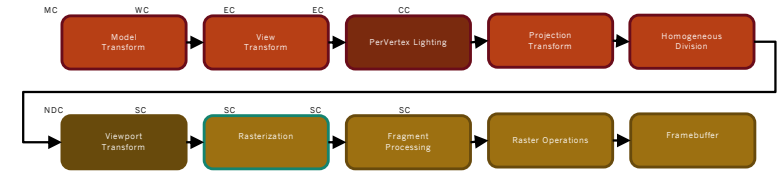
Pixel Operation (texture)



textura



Graphics Pipeline (Obj => Pic)



COORDINATES

MC
WC
EC

Model
World
Eye

CC
NDC
SC

Clip
Normalized Device
Screen

Modelagem / Animação / ... próxima aula



Conclusão

DISCUSSÃO