



INTRODUÇÃO À COMPUTAÇÃO GRÁFICA

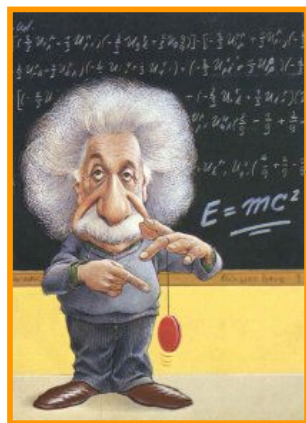
Adair Santa Catarina
Curso de Ciência da Computação
Unioeste – Campus de Cascavel – PR

Jan/2021



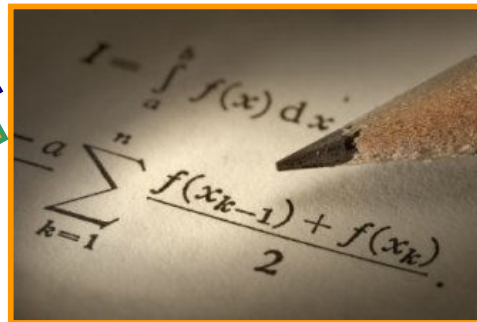
Computação Gráfica

Área da ciência da computação que estuda a geração, manipulação e interpretação de modelos e imagens de objetos utilizando computador.



Física

Matemática



Arquitetura

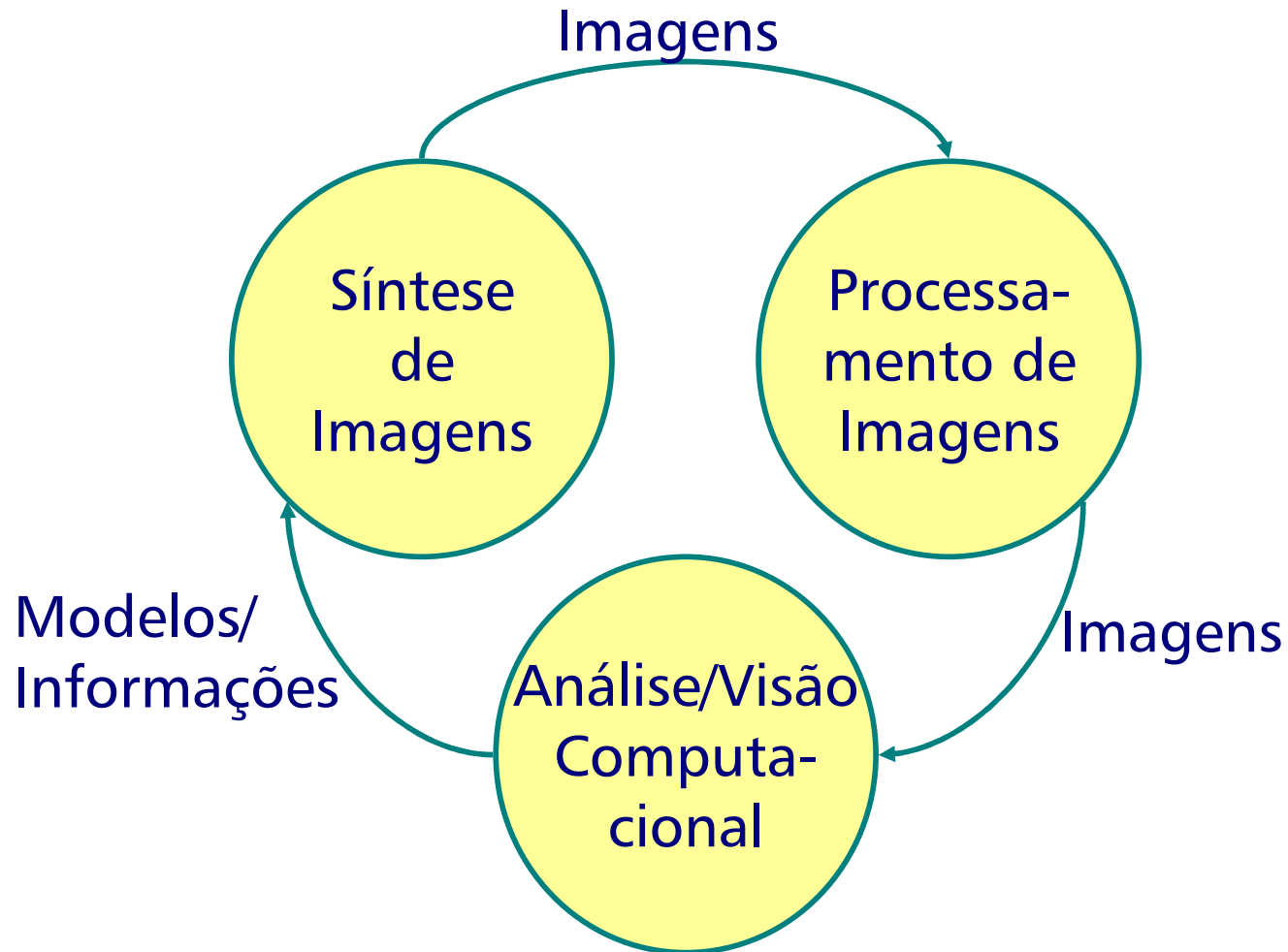
Engenharia



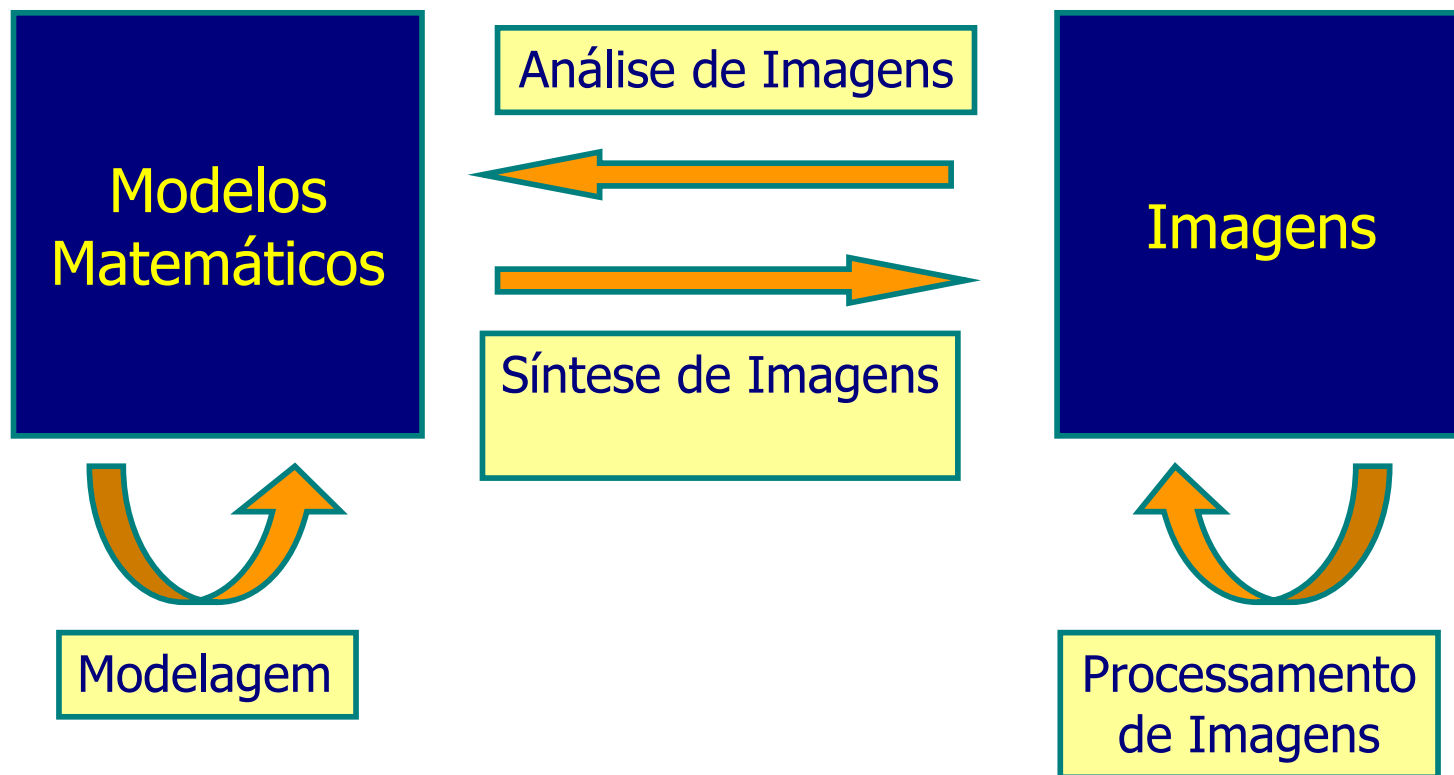
Computação
Gráfica



Subáreas da Computação Gráfica



Outra forma de visualizar as subáreas

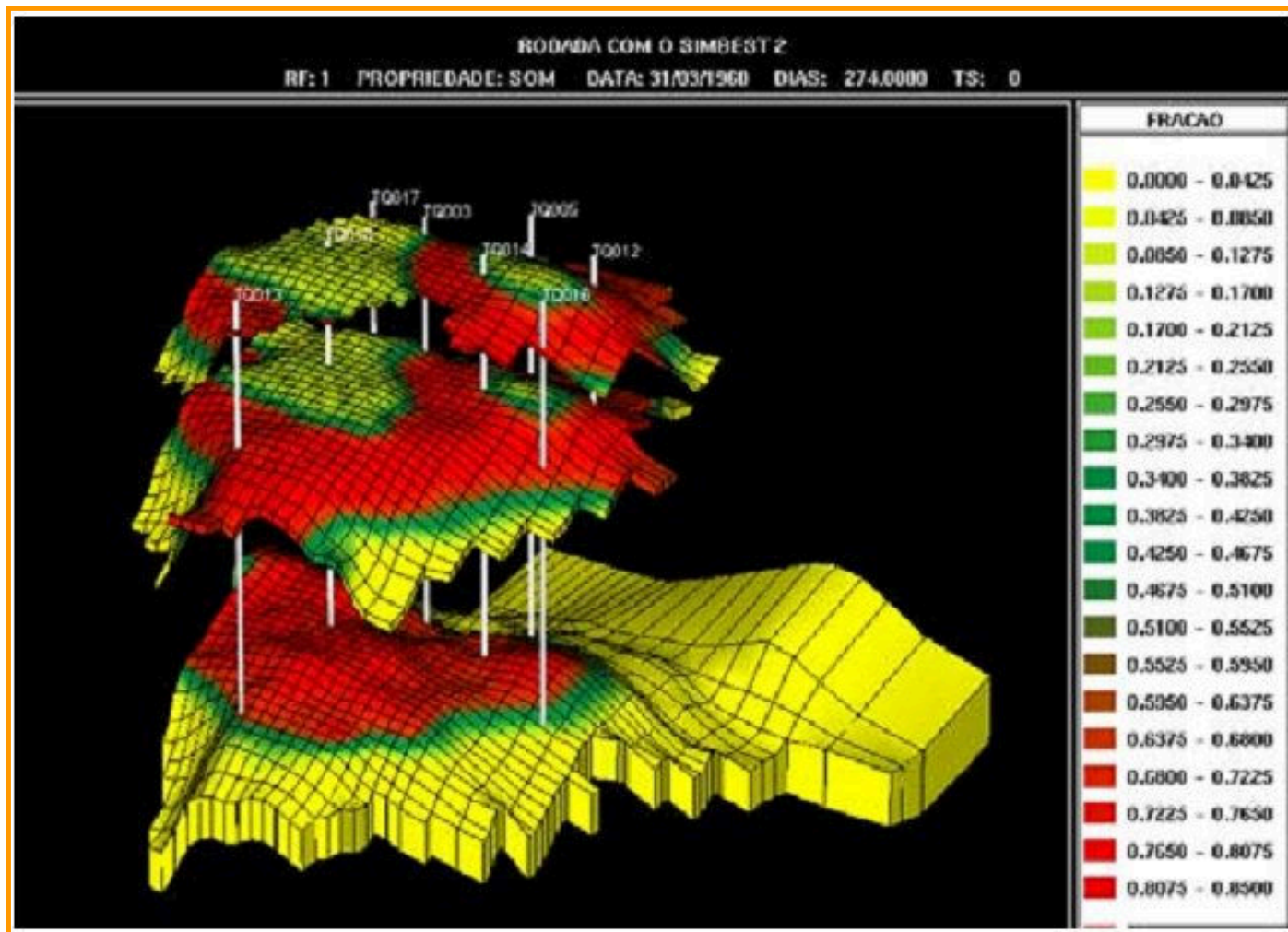


Subáreas da Computação Gráfica



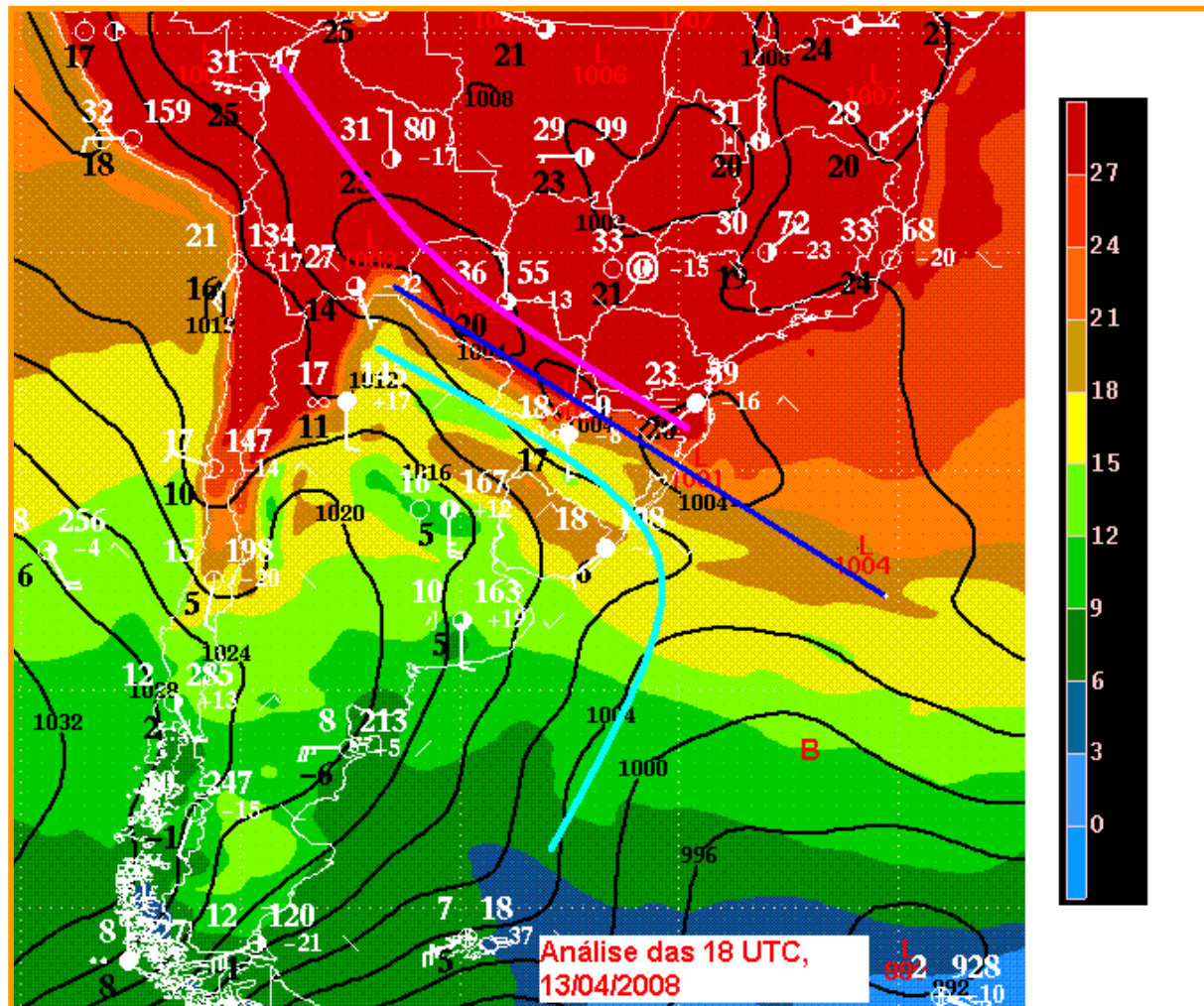


Visualização Computacional – Exemplos



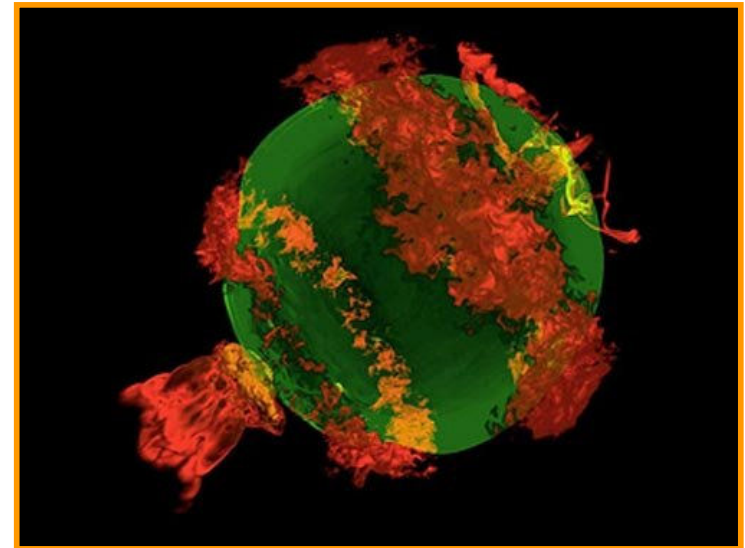
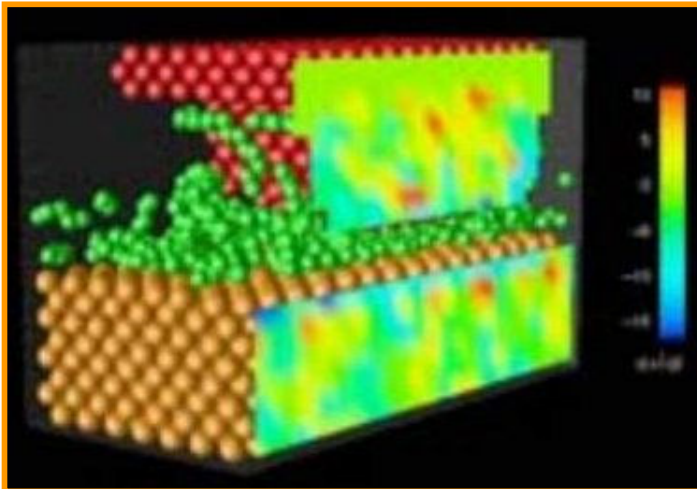
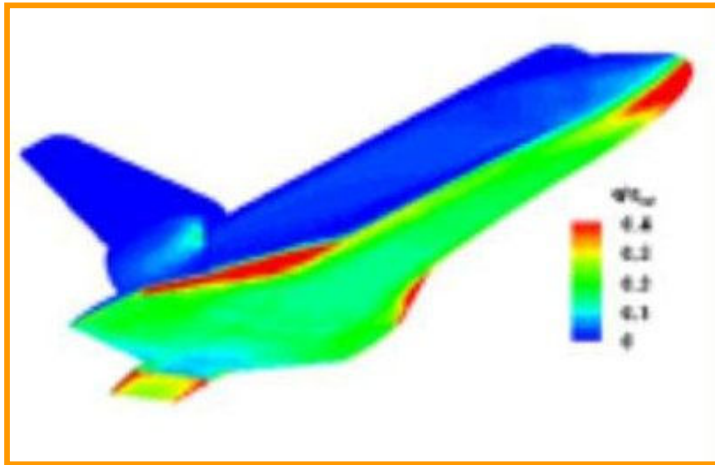


Visualização Computacional – Exemplos



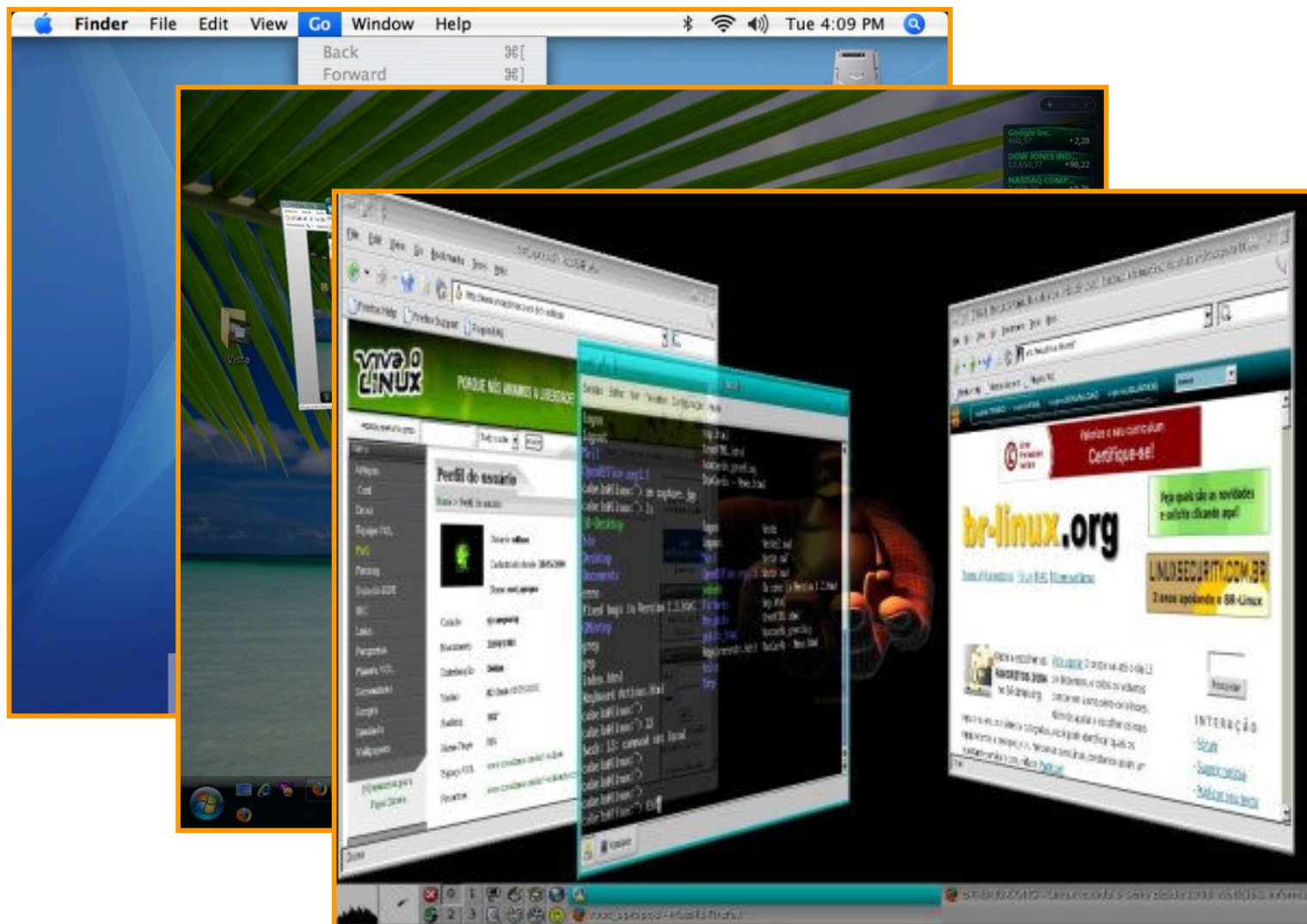


Visualização Computacional – Exemplos

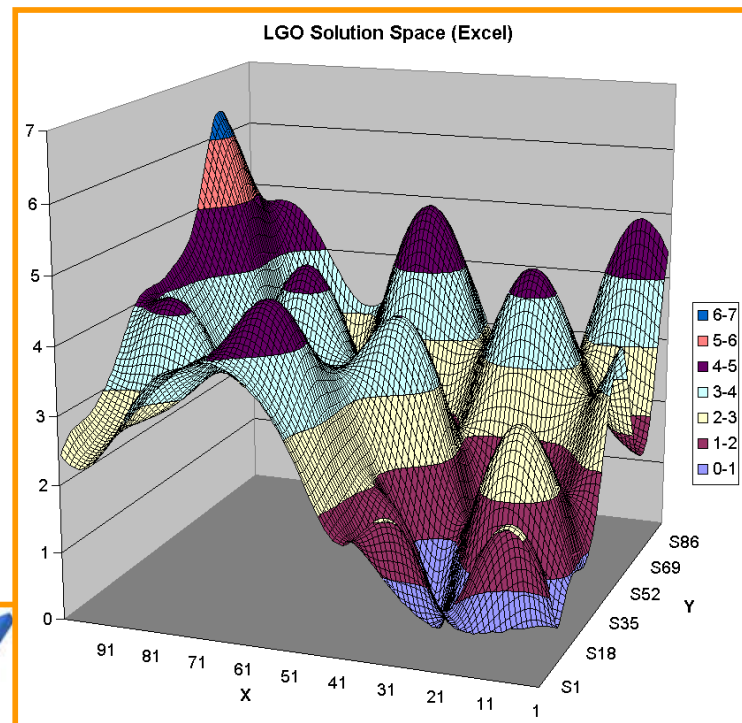
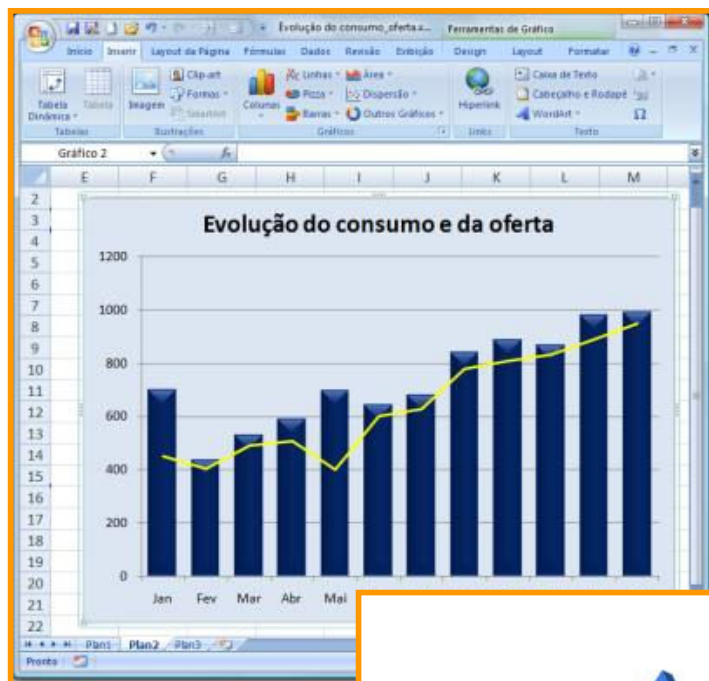




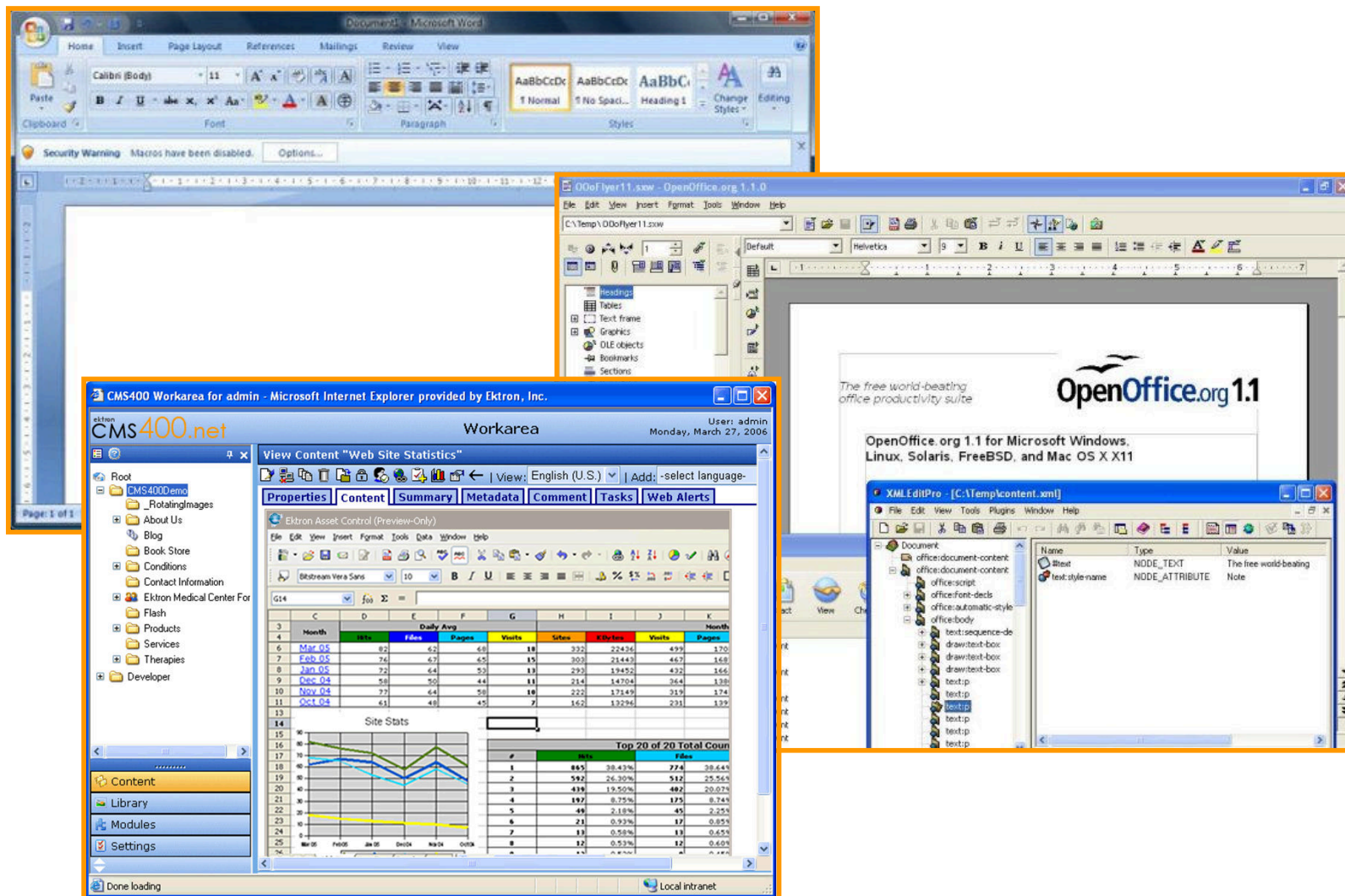
Aplicações da CG – Interfaces gráficas



Traçado de gráficos

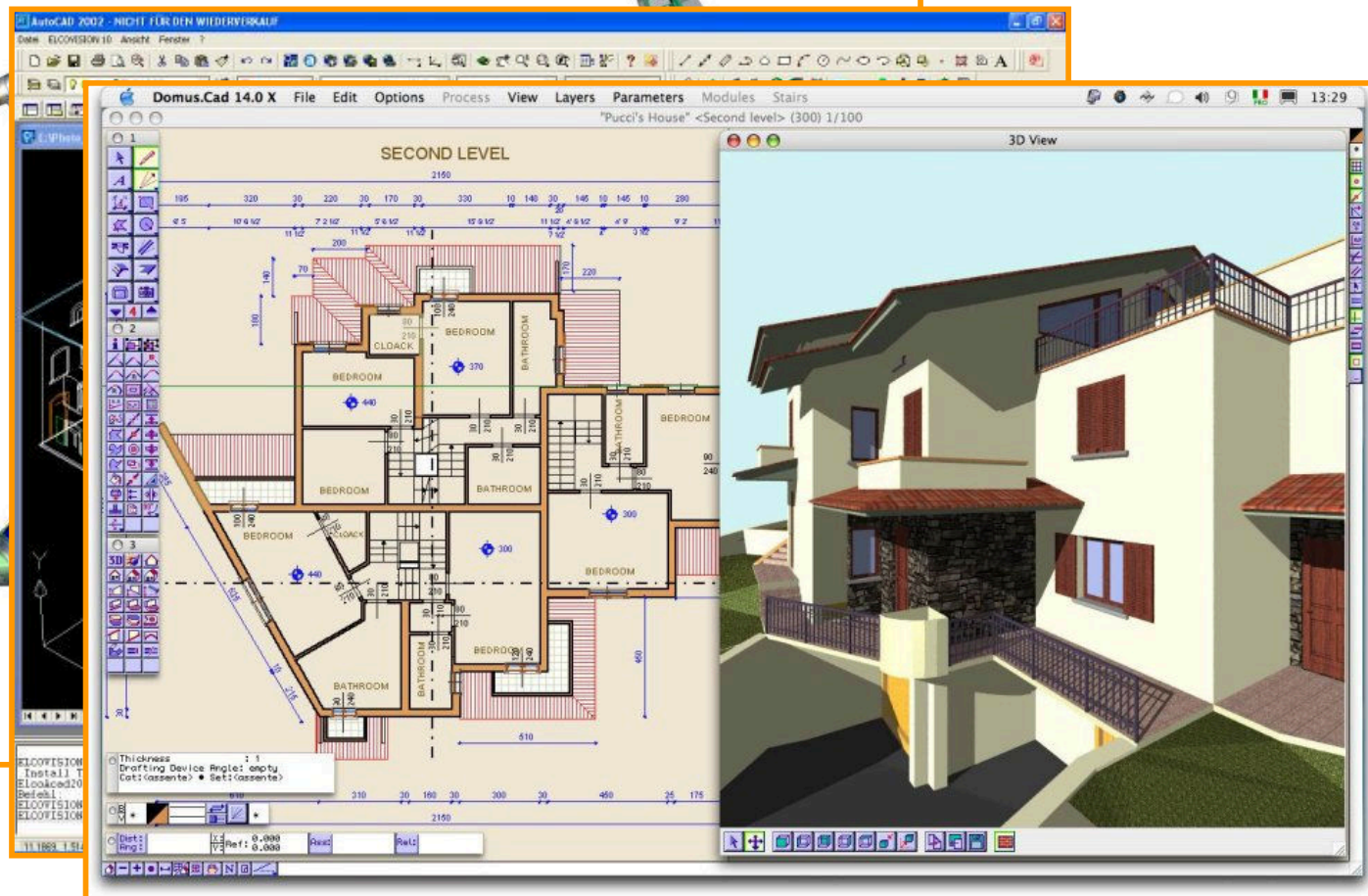


Automação de escritórios



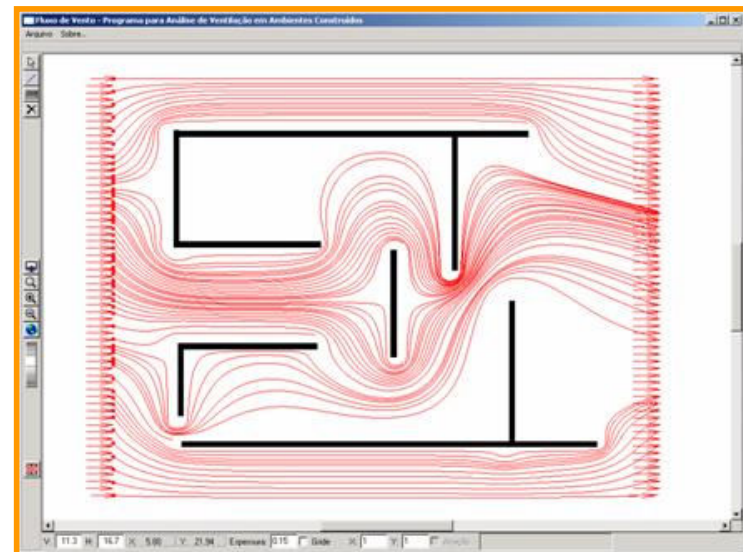
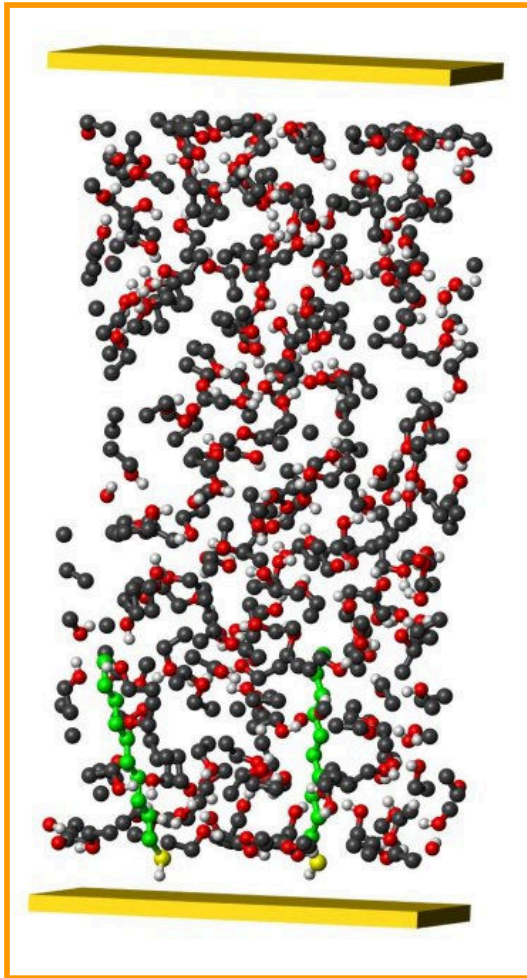


Projeto e desenho auxiliado por computador



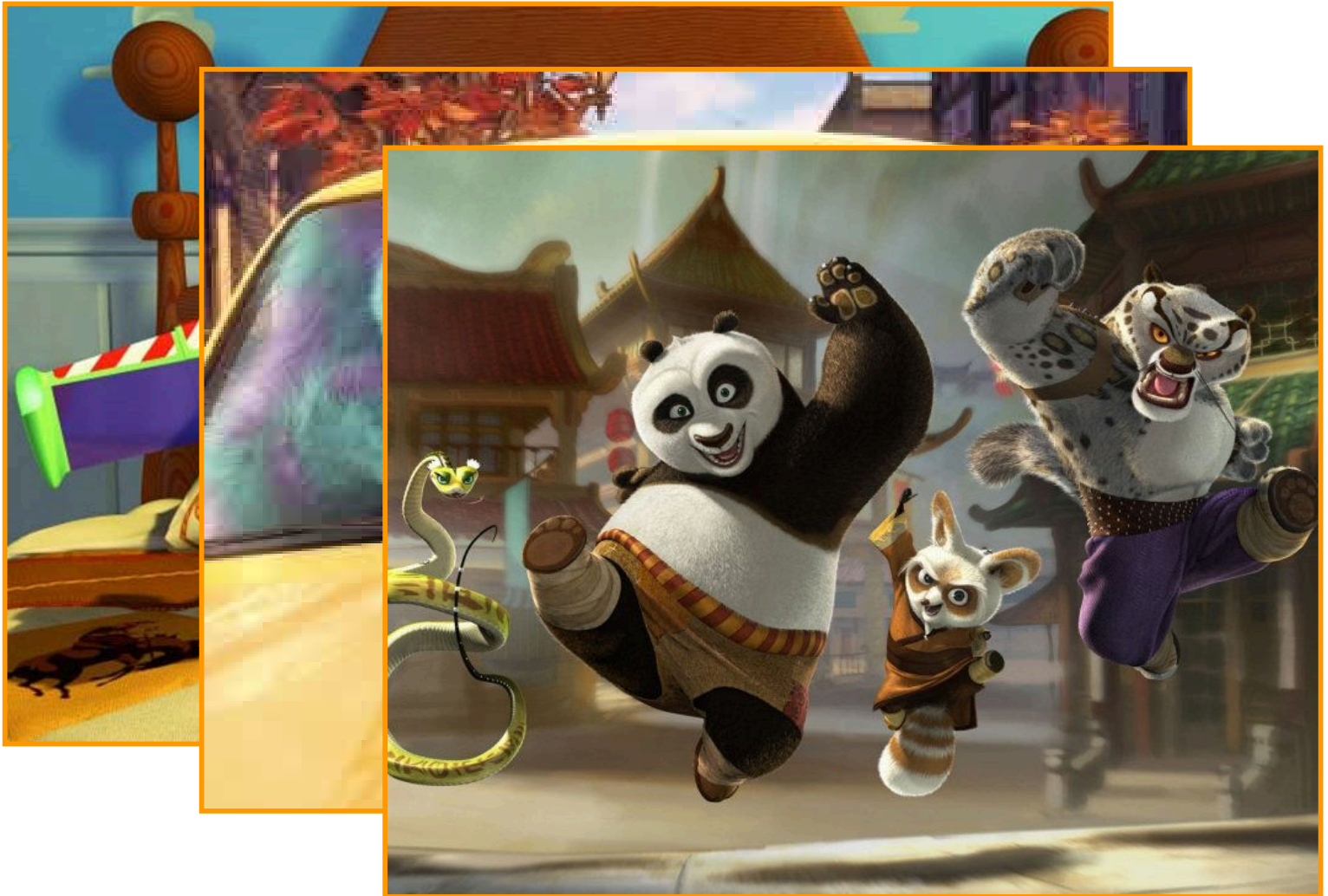


Simulação



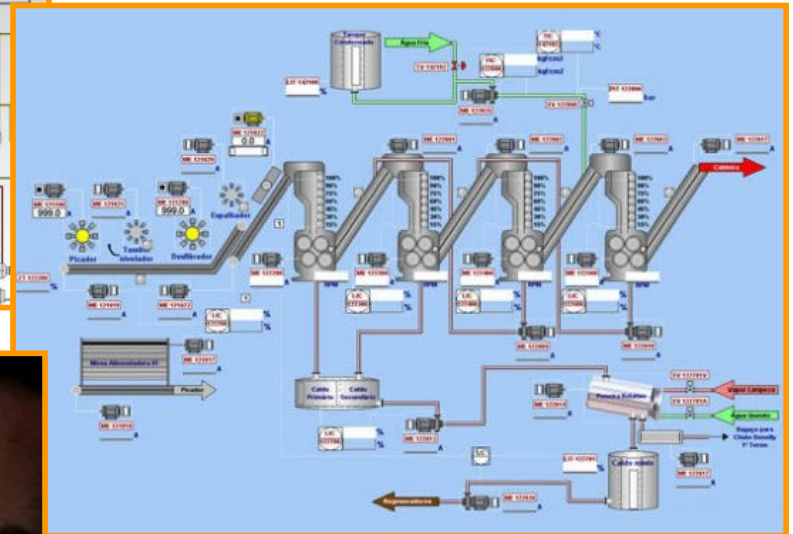
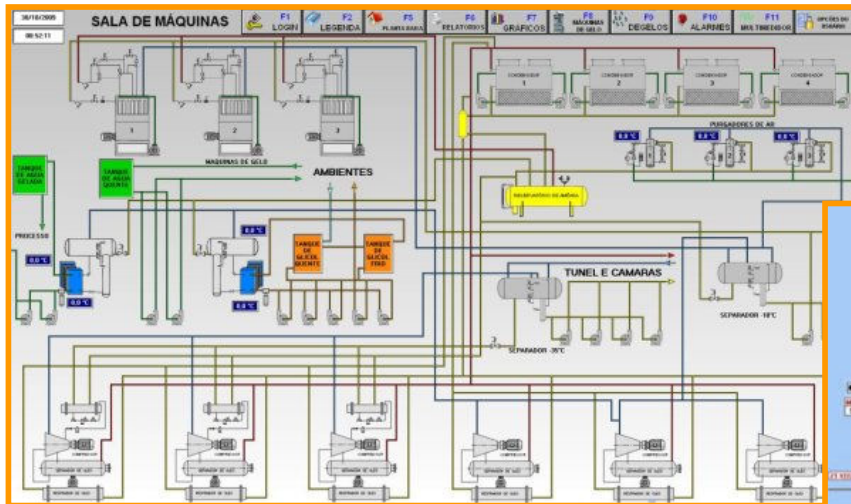


Animação





Controle de processos



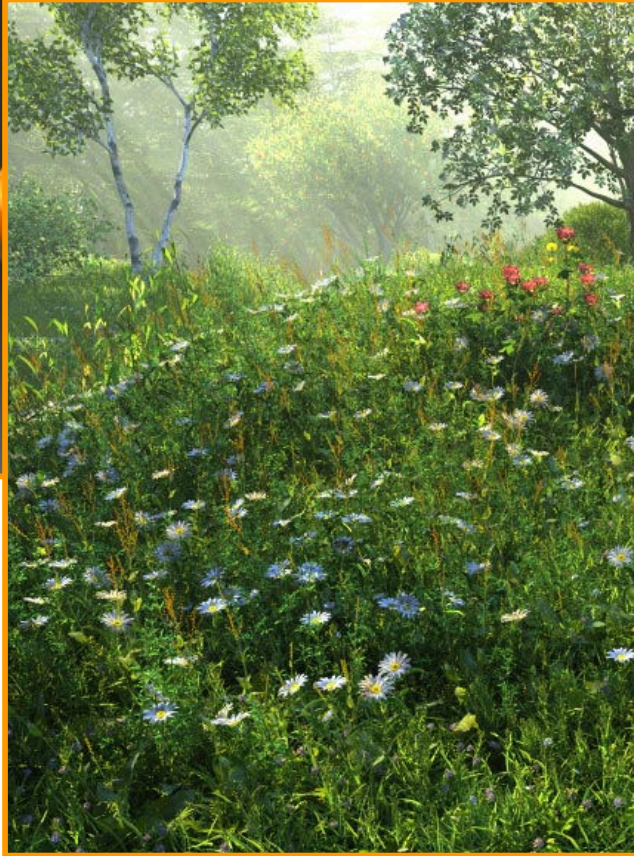


Cartografia





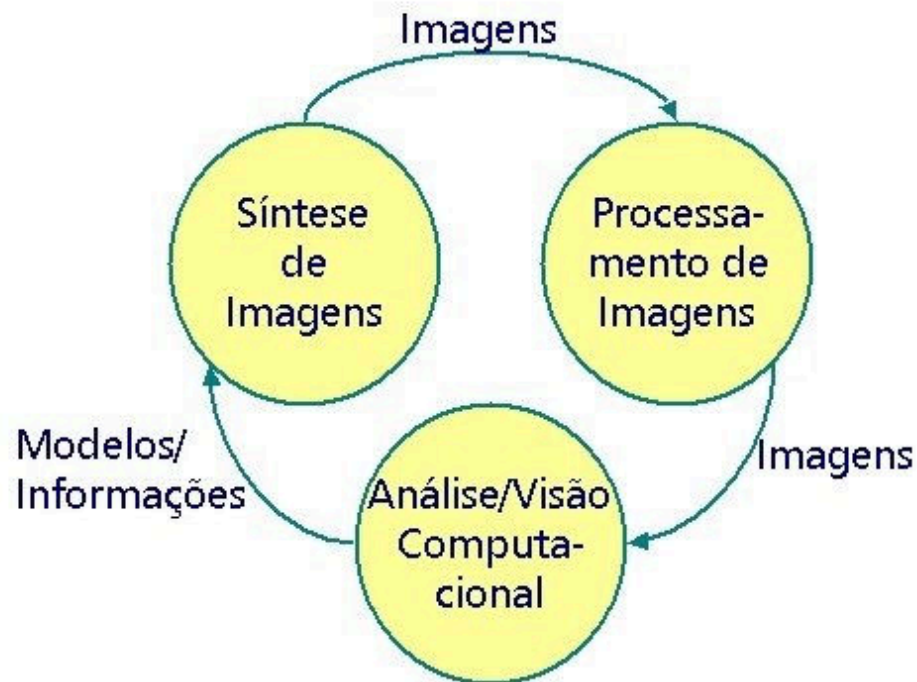
Arte digital





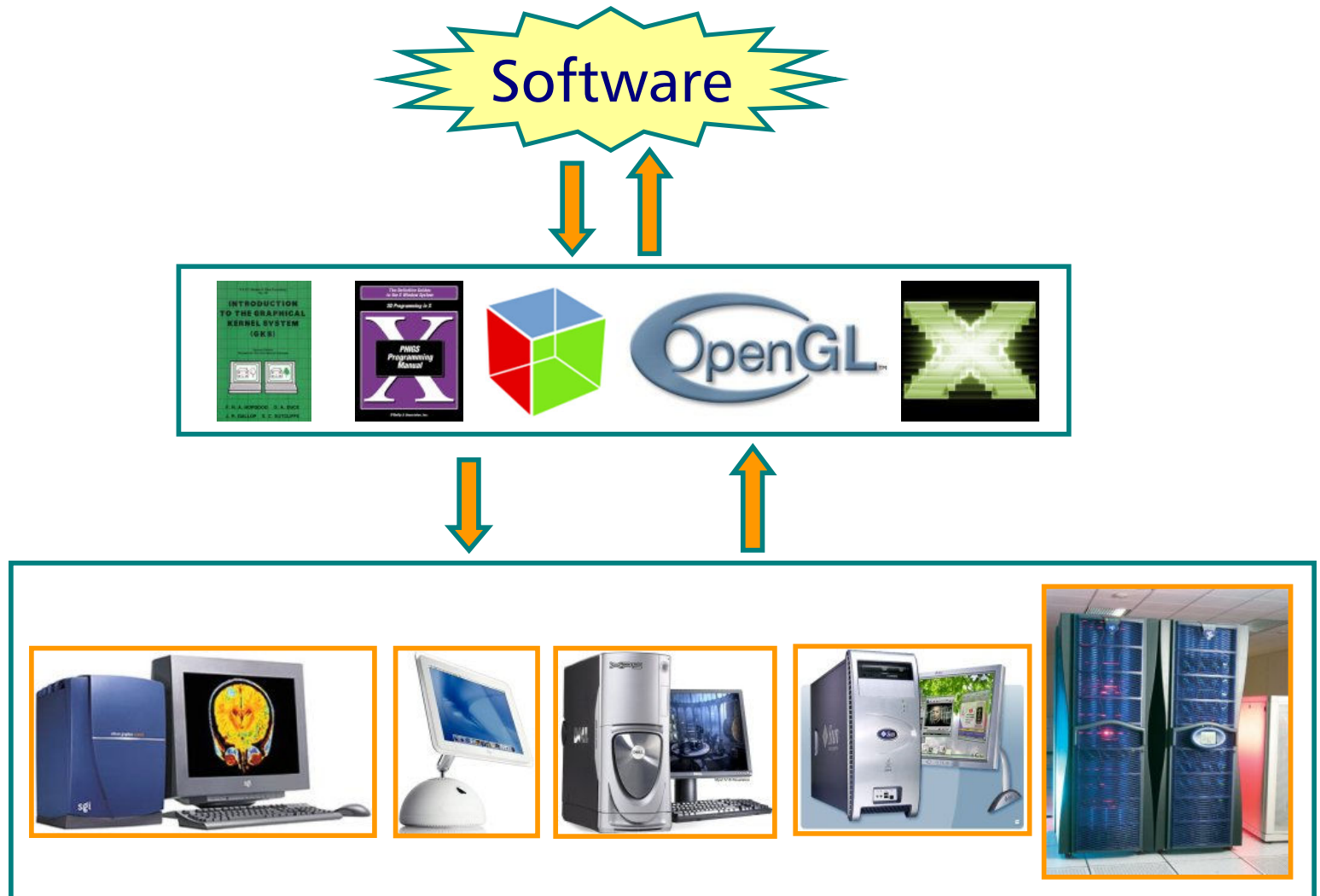
Slides de apresentação

Subáreas da Computação Gráfica





Sistemas Gráficos



Resolução gráfica

width = largura [mm, cm, pol]

ndh



ndv
height = altura [mm, cm, pol]

ndh e ndv = número de posições endereçáveis

Resolução:

Horiz_Res = $\text{ndh} / \text{width}$;

Vert_Res = $\text{ndv} / \text{height}$

Tamanho do ponto:

Horiz_DotSize = $\text{width} / \text{ndh}$

Vert_DotSize = $\text{height} / \text{ndv}$

Total pontos endereçáveis:

Tot_Dots = $\text{ndh} * \text{ndv}$

Resolução de área:

Area_Res = $\text{Tot_Dots} / (\text{width} * \text{height})$

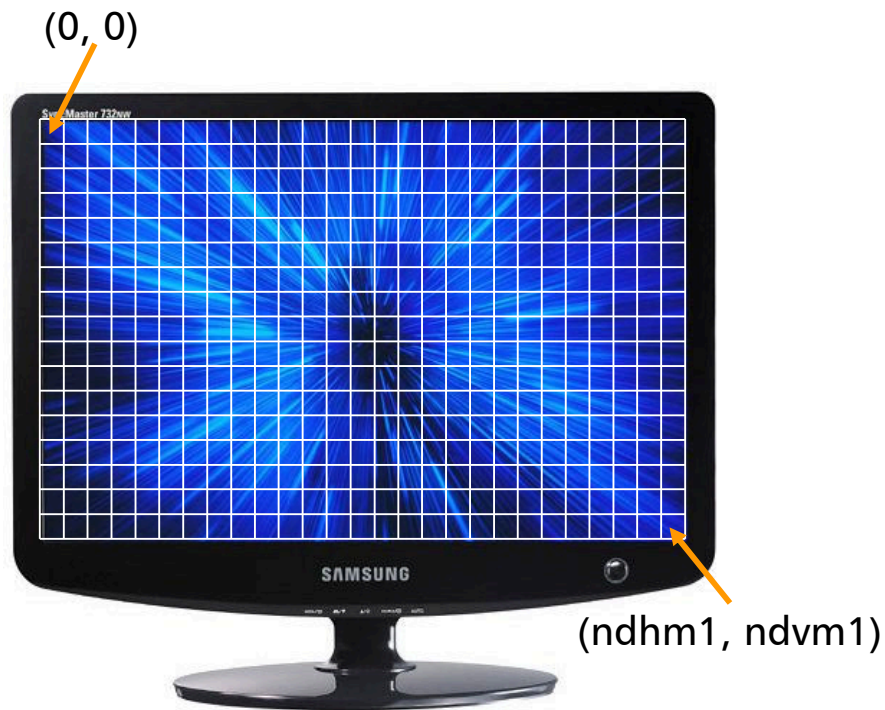
Razão de aspecto gráfica:

Aspect = $\text{Vert_DotSize} / \text{Horiz_DotSize}$

Razão de aspecto física:

PApect = $\text{height} / \text{width}$

Sistemas de coordenadas



$$\begin{aligned}ndhm1 &= ndh - 1 \\ndvm1 &= ndv - 1\end{aligned}$$

Coordenadas do Dispositivo:

$$0 \leq dcx \leq ndhm1$$

$$0 \leq dcy \leq ndvm1$$

Coordenadas Normalizadas:

$$0 \leq ndcx \leq 1$$

$$0 \leq ndcy \leq 1$$

Coordenadas do Mundo:

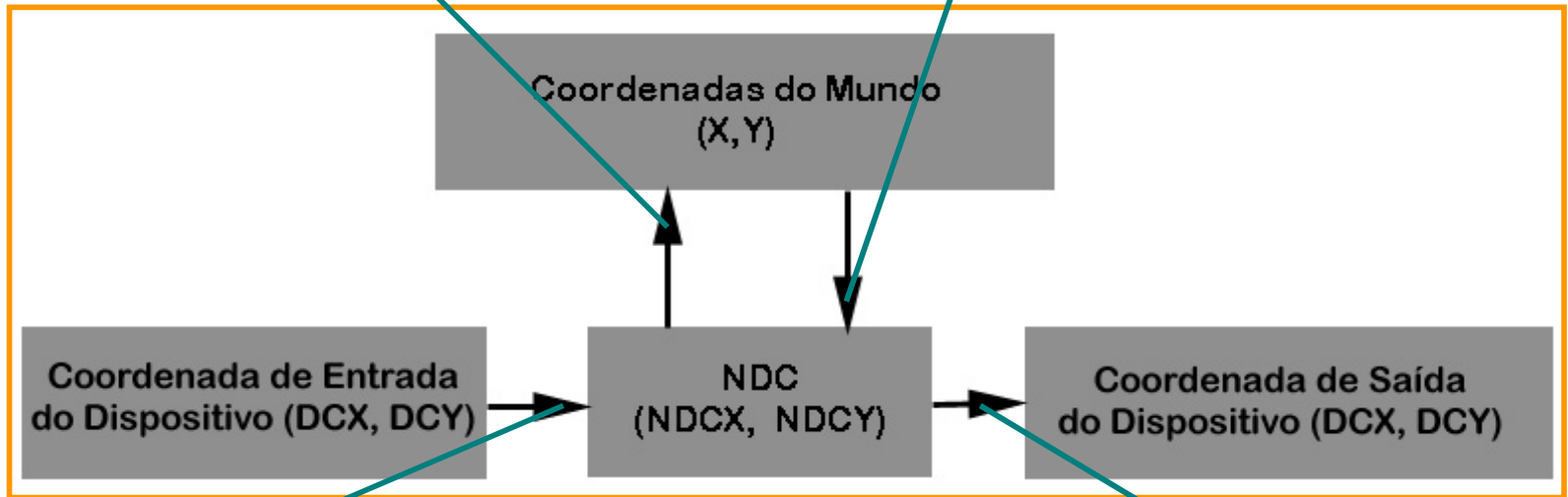
$$x_{\min} \leq x \leq x_{\max}$$

$$y_{\min} \leq y \leq y_{\max}$$

Conversão entre sistemas

$$x = x_{min} + ndcx * (x_{max} - x_{min})$$
$$y = y_{min} + ndcy * (y_{max} - y_{min})$$

$$ndcx = \frac{(x - x_{min})}{(x_{max} - x_{min})}$$
$$ndcy = \frac{(y - y_{min})}{(y_{max} - y_{min})}$$

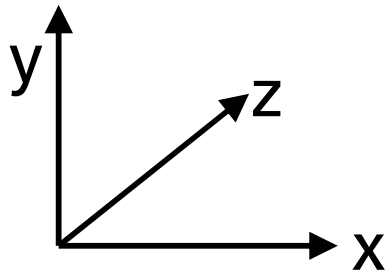


$$ndcx = dcx / ndhm1$$
$$ndcy = dcy / ndvm1$$

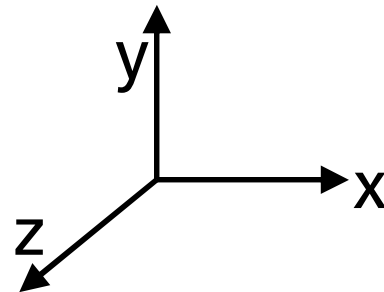
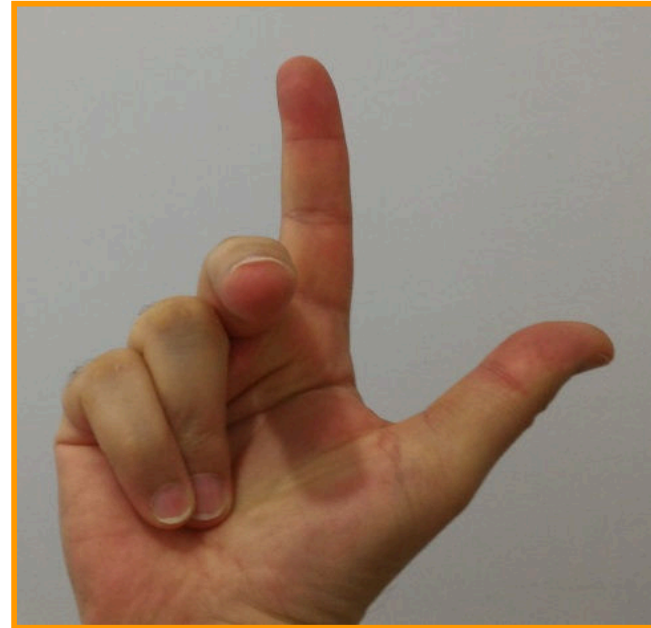
$$dcx = round(ndcx * ndhm1)$$
$$dcy = round(ndcy * ndvm1)$$



Sistemas de coordenadas em 3D



Regra da mão esquerda



Regra da mão direita