

# ***Computer Graphics***

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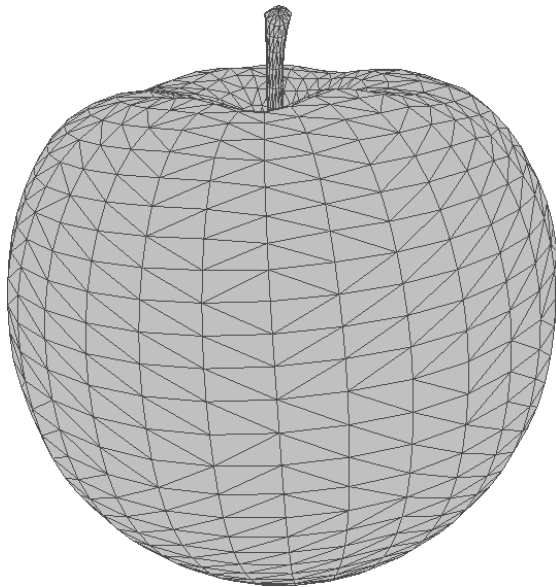
# ***Assignment #3***

***Vertex Lighting***

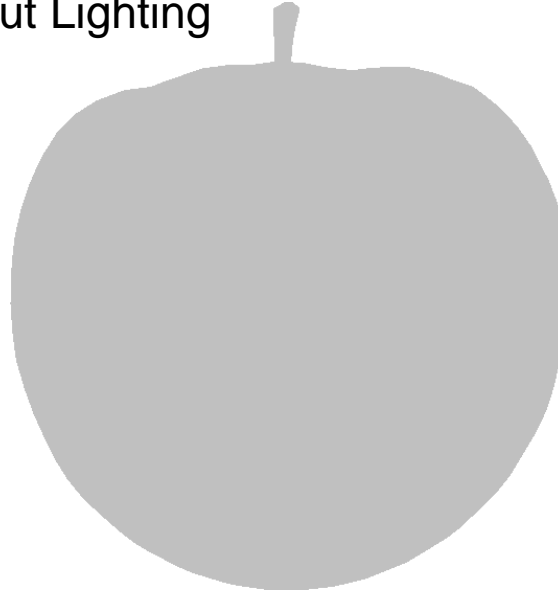


# *Lighting 3D Models*

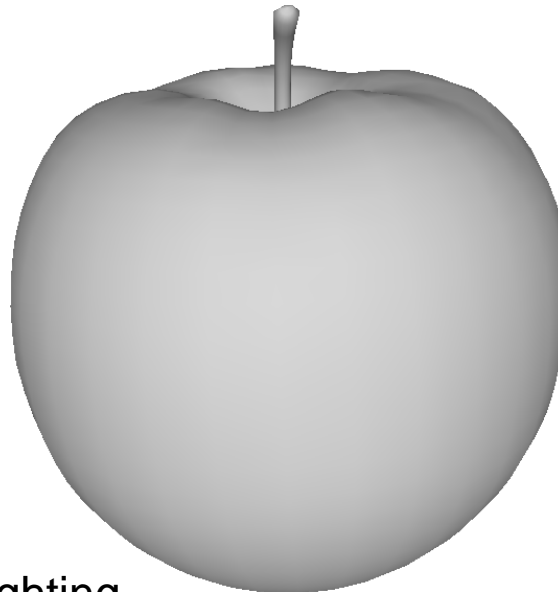
Original 3D Model



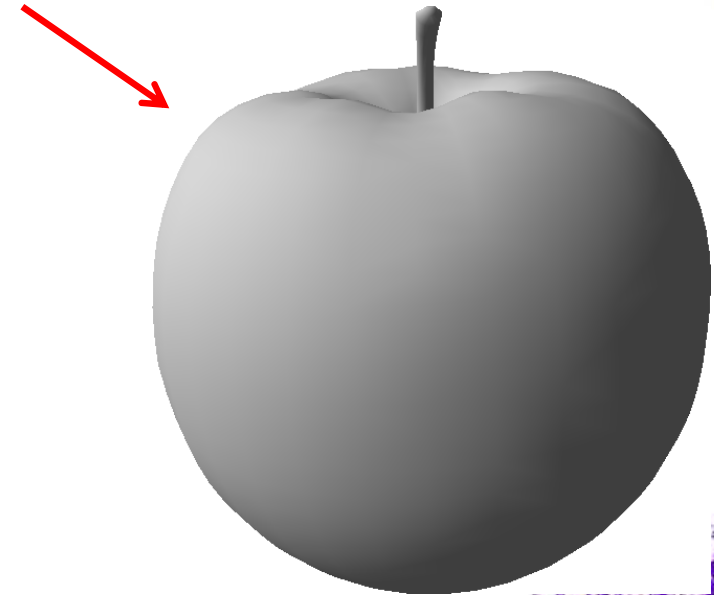
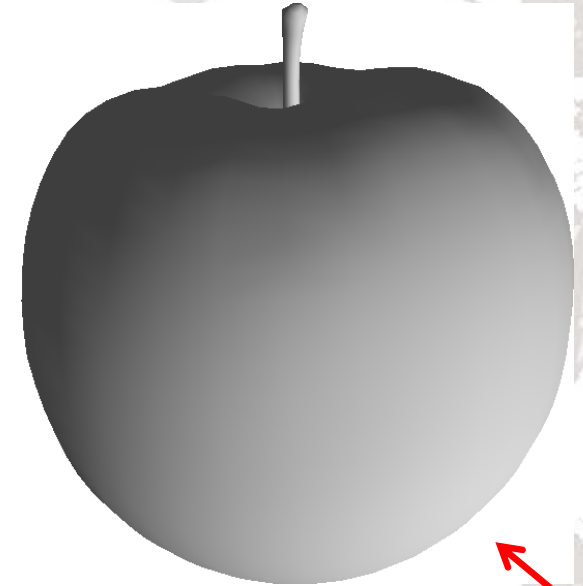
Without Lighting



With Lighting



Changing light source position



# ***Requirement***

- ◆ **You are required to write a program that can accept 3D test models as in assignment #1 and #2**
- ◆ **The models should be rendered with provided light sources**
- ◆ **Multiple light sources (at least 2) are required and can be turned on or off individually**
- ◆ **Each light source can be either directional light, positional light, or spotlight**



# ***Requirement***

- ◆ **Viewing position can be altered to see the lighting result from different viewing direction**
- ◆ **Light source position should be able to change manually**
- ◆ **Vertex lighting, not per pixel lighting, is required. That is, all the lighting calculations should be implemented in vertex shader.**

Bonus: do per pixel lighting



# *Requirement*

- ◆ **Run time modification to the light sources attributes and material attributes**
- ◆ **Smooth shading not flat shading**
- ◆ **Use keyboard or mouse to control the parameters of lights sources and objects**
- ◆ **Display help file, e.g., pressing key 'h', for how to control the actions of your program (display on console window)**



# ***Input Model Format***

- ◆ **Wavefront 3D Graphics model description file with extension .obj**
- ◆ **Models without vertex normal**
  - The input model contains no vertex normal information
  - Generate the vertex normal by yourself
- ◆ **Models with vertex normal**
  - The input model contains not only the vertex position information but also the normal information for lighting calculation



# Hints

- ◆ **Test models with vertex normals are provided for test.**
- ◆ **For those models without vertex normal provided, the vertex normals can be generated by summing up the face normals of triangles that are incident to the vertex**
  - **Don't forget to normalize the vertex normal after summation**





# Hints

- ◆ **Normal transformation is required to derive correct lighting result**
- ◆ **Normalization to the normals is also required to derive correct lighting result**
- ◆ **Don't implement per pixel lighting in this assignment. It will be introduced as another assignment (texture bump mapping)**



# ***Due Date***

- ◆ **Two weeks after announcement. Should be 5/10.**
- ◆ **Submit your assignment, including source codes, executable binary on PC, and documents, to course webpage at NTHU iLMS system.**
- ◆ **Contact with TA if you don't know how to submit your work.**
- ◆ **Late submission is allowed with less score**
- ◆ **No score if you don't submit you assignment**
- ◆ **If you copy from others, your score will be downgraded or become zero.**



# Q&A

Bonus: 拿 normal 內插的結果扔進 fragment shader, 不需要扔 color 進 shader。 原先 shader 完再內插。