CT4510: Computer Graphics

Introduction

BOCHANG MOON

About Me

- Assistant professor in Institute of Integrated Technology at GIST
  - Graduate Program of Culture Technology
  - Joined GIST in Sep. 2016

- Post-Doctoral researcher at Disney Research (Nov. 2014 – July 2016)
- Ph.D from KAIST (Feb. 2008 – Aug. 2014)

- Main research topics:
  - Computer graphics
  - Photorealistic rendering

About TA

- Saerom Ha
- TA email: ta.cg.gist@gmail.com

Information

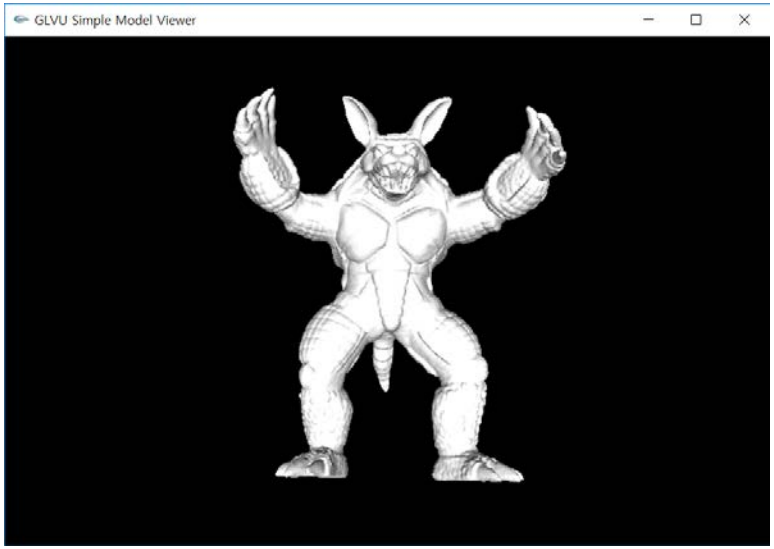
- Instructor: Bochang Moon
- Email: bmoon@gist.ac.kr
- Office: 106 Dasan Building

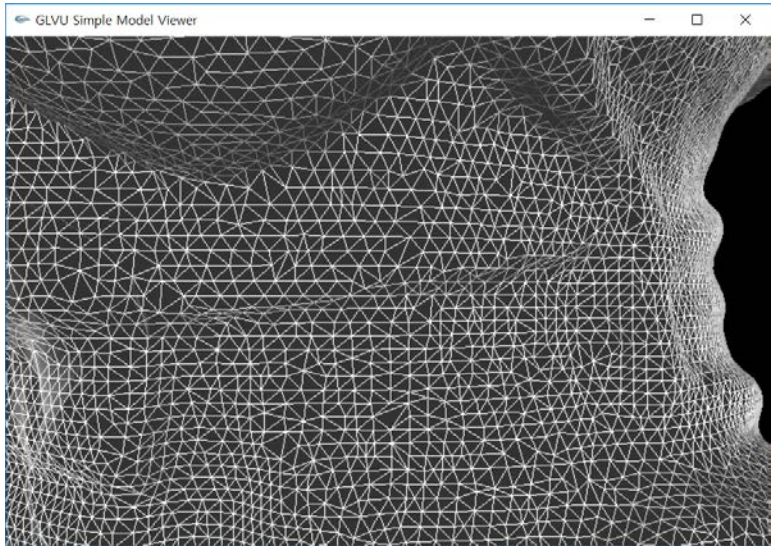
- Office hours
  - 2:30 – 4:00pm on Mon. or by appointment (via email)

- Class time
  - 10:30 – 12:00pm on Mon. and Wed.

Graphics Areas

- Modeling
  - A technique to deal with mathematical specification of shape and appearance that can be stored in computers

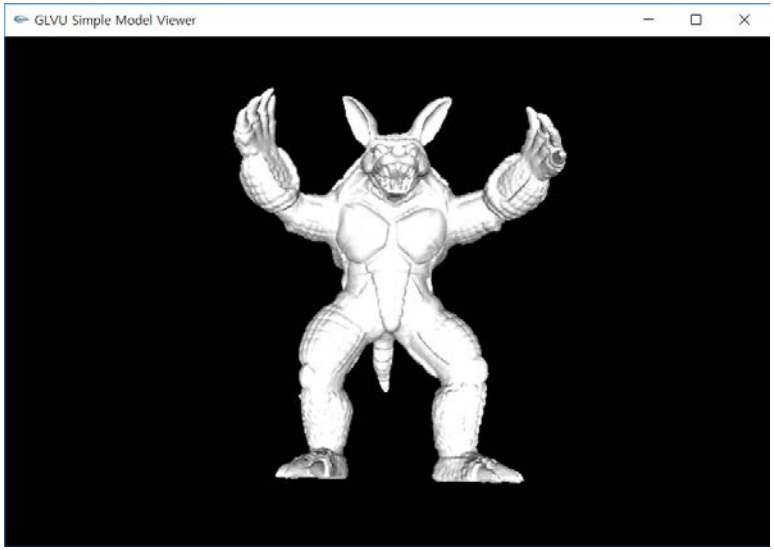




e.g., triangle mesh

Graphics Areas

- Rendering
  - A algorithm to generate digital images from 3D models

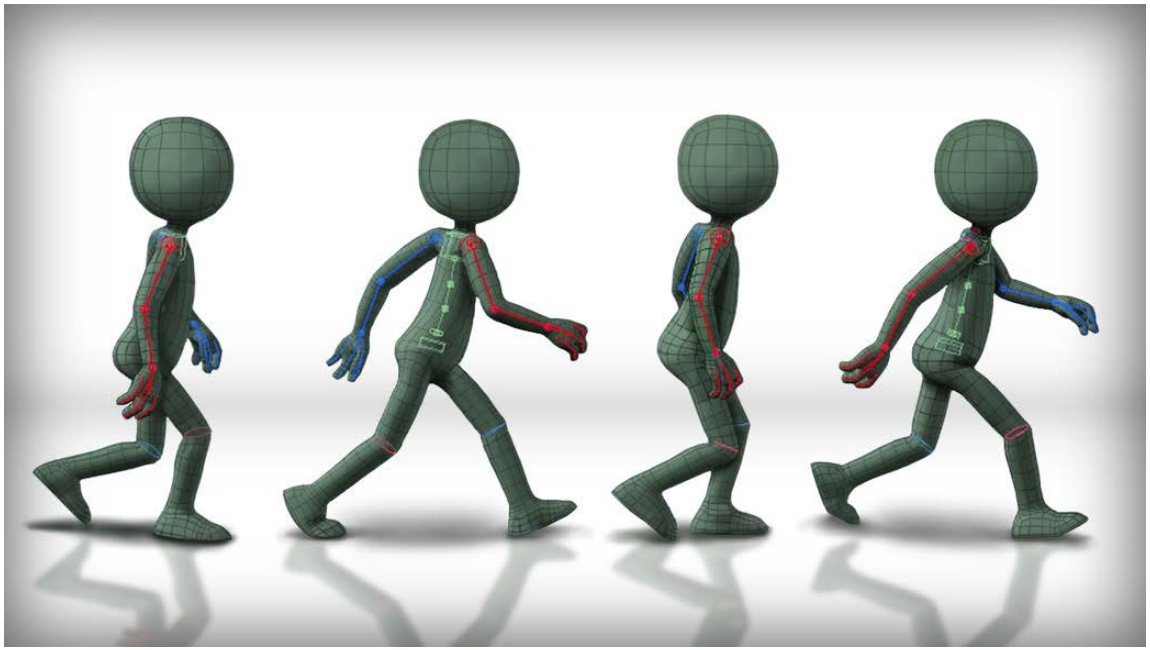


3D model

Rendered image

Graphics Areas

- Animation
  - Address how to create motion of virtual models over time



Images from http://www.digitaltutors.com

Graphics Areas

- Core areas
  - Modeling
  - Rendering
  - Animation
- Other areas
  - User Interface
  - Virtual Reality
  - Visualization
  - Image Processing
  - 3D scanning
  - Computational photography
  - etc.

Application of Computer Graphics

- 3D Animation

Application of Computer Graphics

- Visual Effects in Movies

from http://wonderfulengineering.com

Application of Computer Graphics

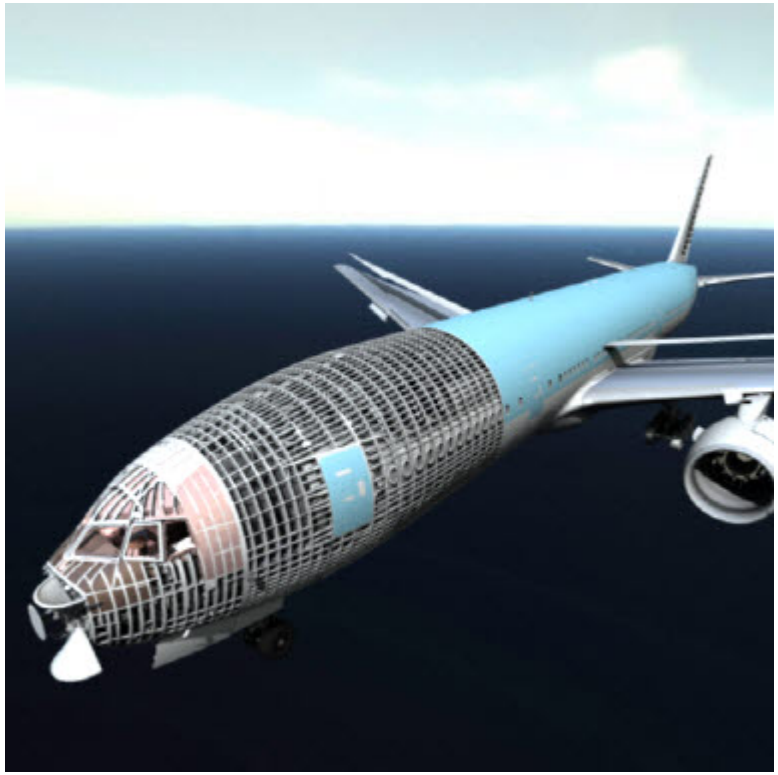
- Games

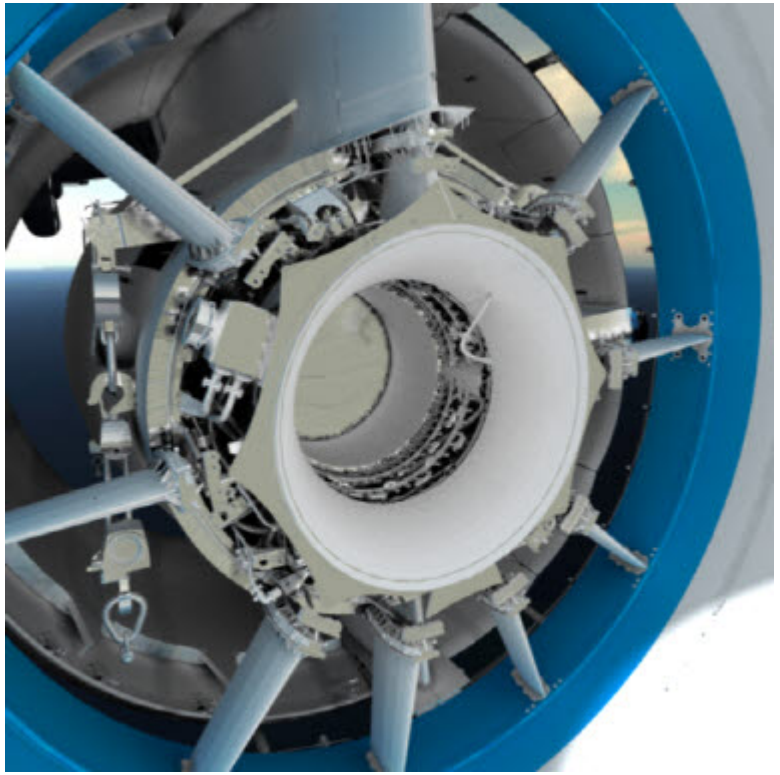
Application of Computer Graphics

- Augmented and virtual reality

Application of Computer Graphics

- Visualization





[Kim et al. 2013]

Some Recent Images

from pbrt.org

Some Recent Images

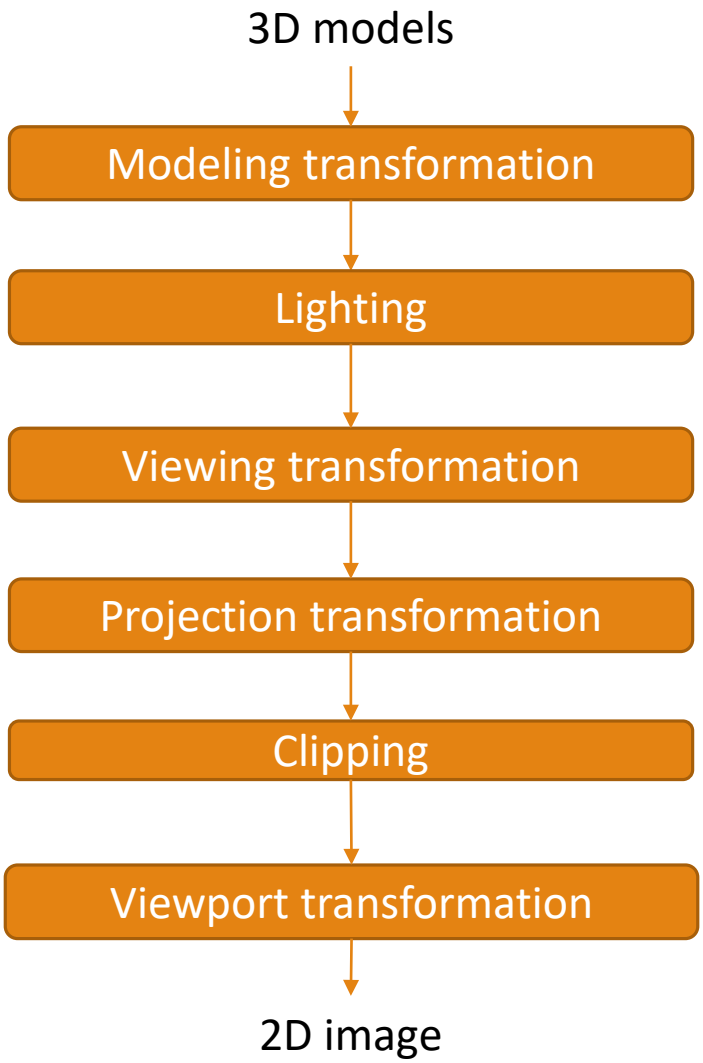
from pbrt.org

Course Overview

- Provide fundamental concepts of compute graphics such as graphics
  - Graphics pipeline & rasterization
  - Transformation
  - Local illumination and shading
  - Texture mapping
  - Ray casting
  - Ray tracing
  - Global illumination

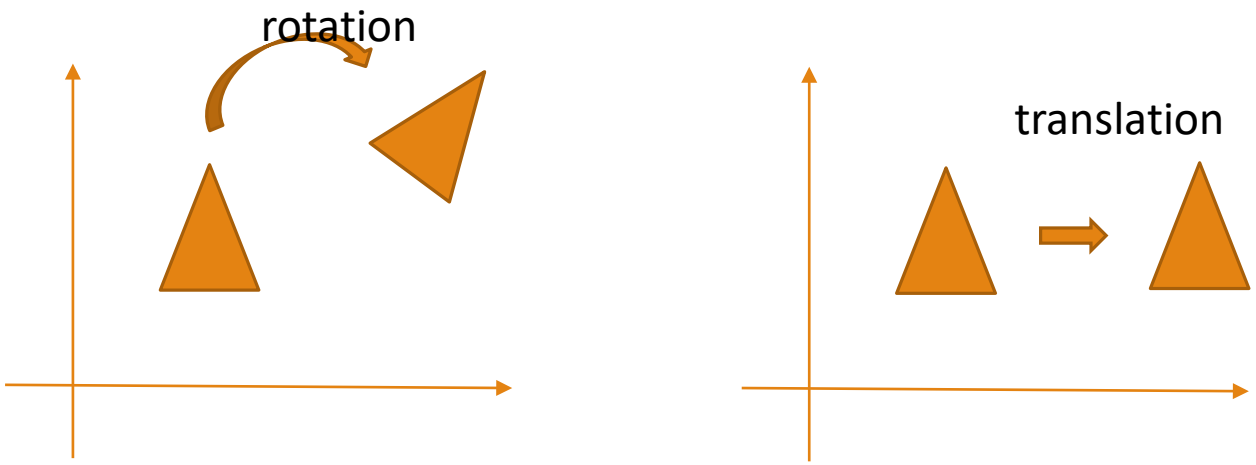
- Learn how to generate digital images from virtual objects, lights, etc.

Graphics Pipeline and Rasterization



Transformations

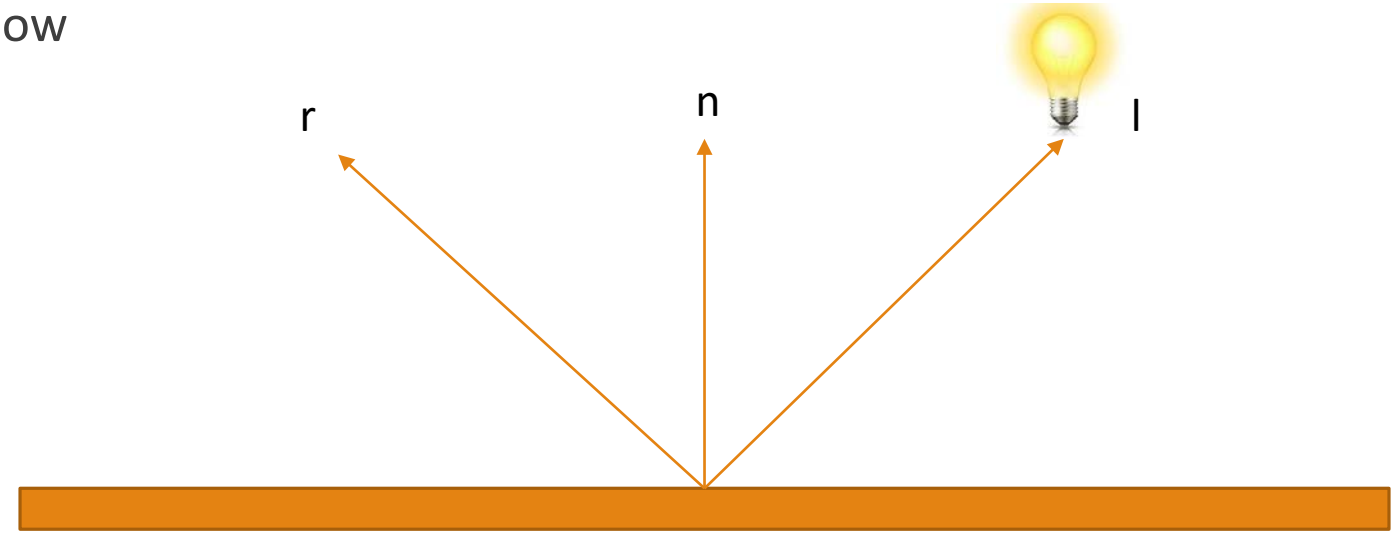
- Affine transformations
- Viewing transformation
- …



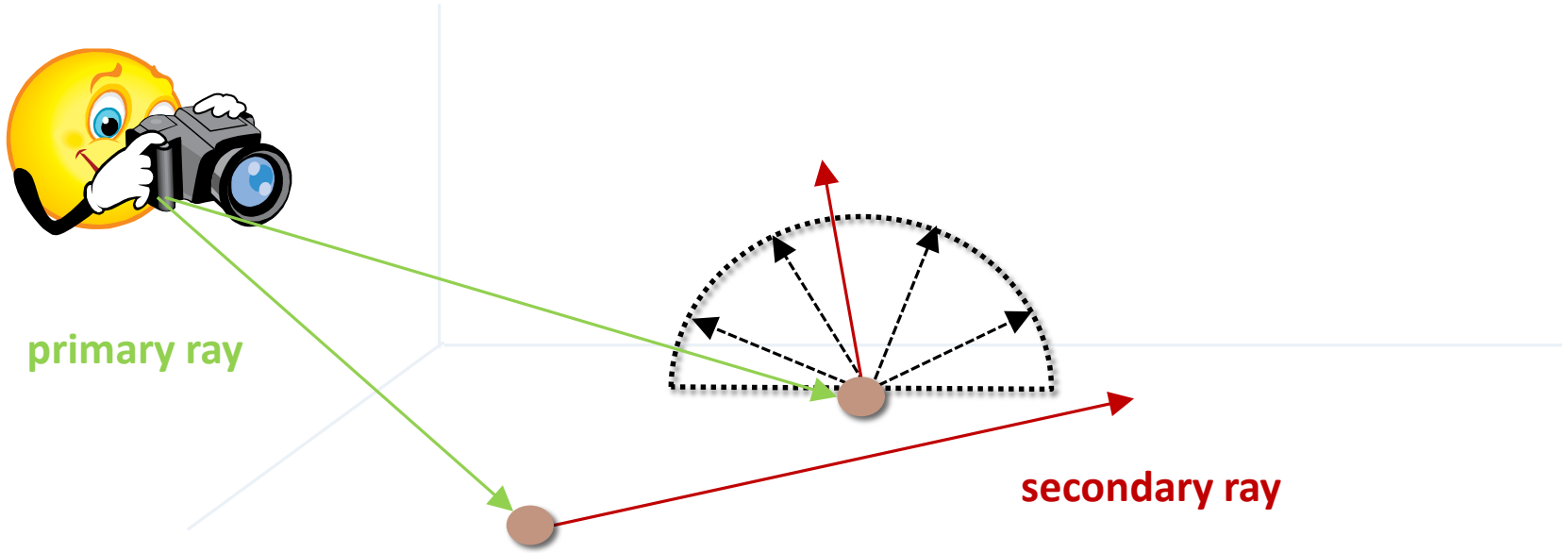
Local Illumination and Shading

- Shading
  - Flat
  - Gouraud
  - Phong

- Shadow



Ray Casting and Tracing



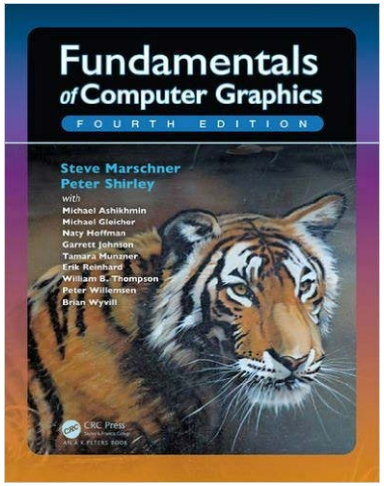
Global Illumination

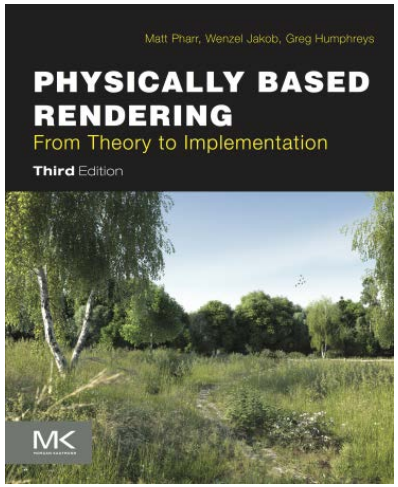
- Simulate realistic lighting
  - Reflections
  - Refractions
  - Shadows
  - Diffuse inter-reflections
  - Caustics

- Global illumination methods
  - Path tracing
  - Photon mapping

Textbook and References

- Book





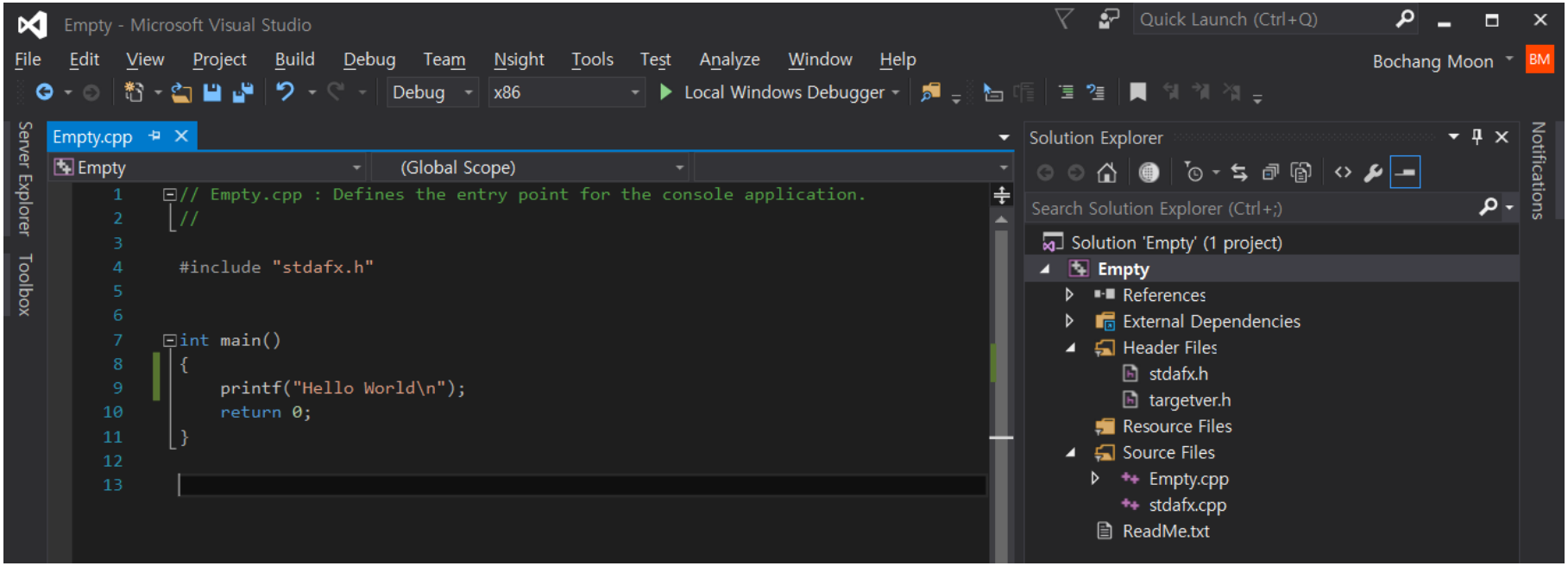
- Papers
  - http://kesen.realtimerendering.com/
  - SIGGRAPH, SIGGRAPH Asia, etc.

Grading

- Mid-term exam: 30%
- Final-term exam: 40%
- Programming assignment: 20%
- Attendance: 10%
  - No absences: 10, One absences: 9, Two absences: 7, Three absences: 4
  - Four or more absences: 0
  - Late two times: one absence
    - I will call your name at the beginning of the class

Prerequisite for This Course

- Basic programming knowledge (e.g., c/c++)
  - e.g., if you can implement a simple program, you will be okay.



Introduce Yourself