Computer Graphics

Department of Software,
Sejong University

Sang Il Park

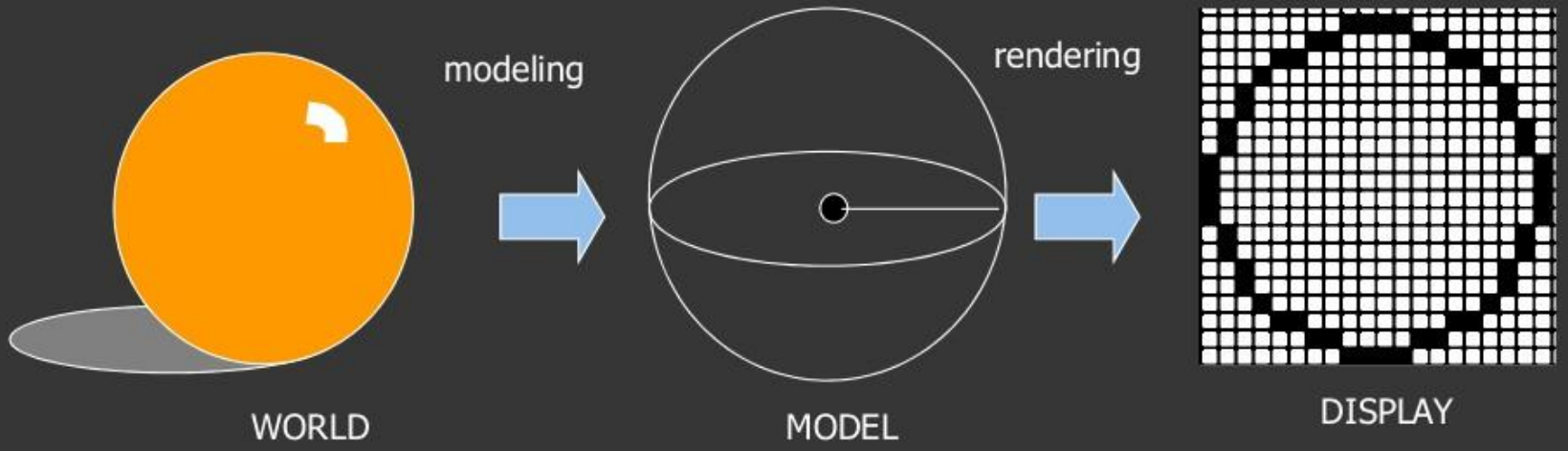
담당교수소개

- 담당교수: 박상일 (소프트웨어학과)
- 연락처
  - 이메일: sipark@sejong.ac.kr
  - 전화: 02-3408-3832

- 연구실:
  - 장소: 대양AI센터 626호
  - Office hour: 월/수 16:30~18:00

- 수업홈페이지:
  - http://eCampus.sejong.ac.kr

Computer Graphics



"Computer Graphics is concerned with producing images (or animations) using a computer."

https://www.instagram.com/ed_pantera_3d/

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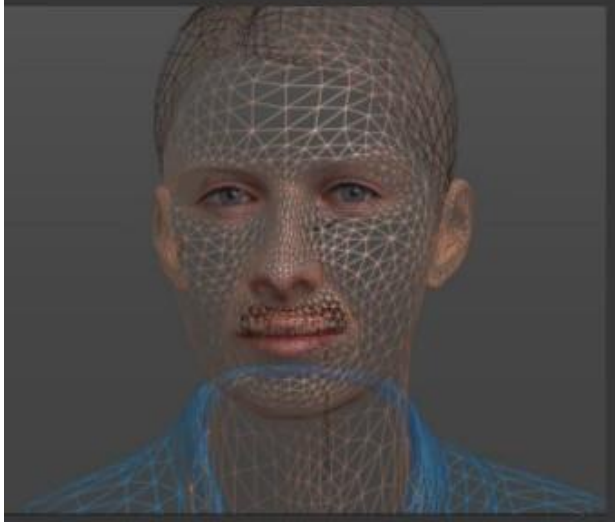
Behind the Scene:

Computer Graphics

Computer Graphics

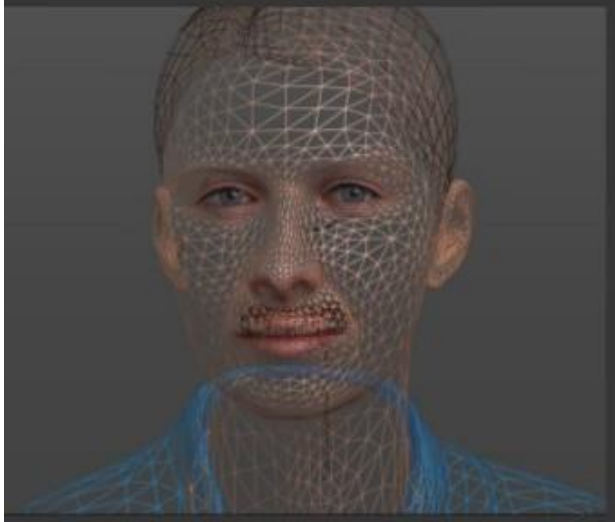
Modelling



Creating or capturing the representation of objects - motion often geometrical

Computer Graphics

Modelling



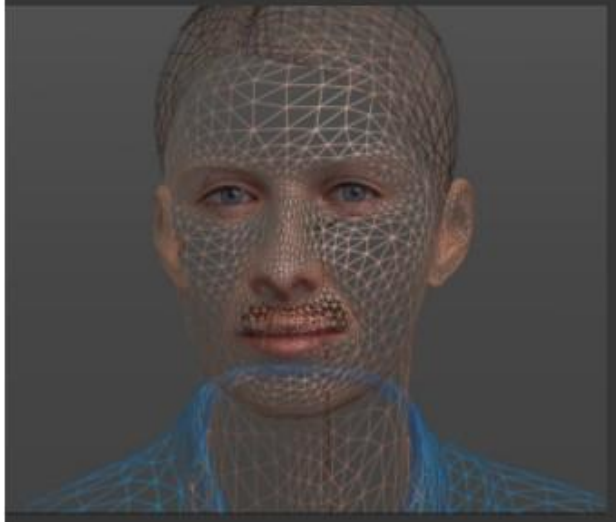
Creating or capturing the representation of objects - motion often geometrical

Rendering

Creating an image of these objects on a display device

Computer Graphics

Modelling



Creating or capturing the representation of objects - motion often geometrical

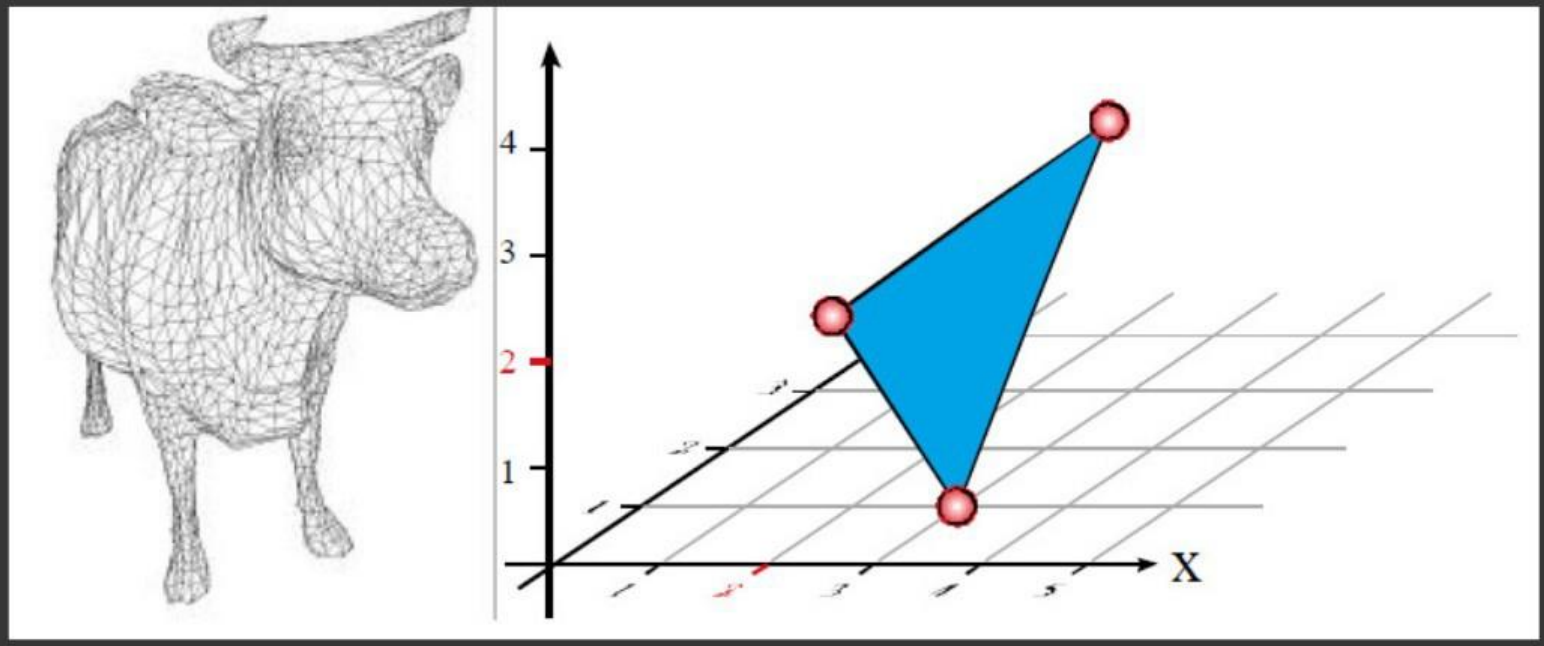
Rendering

Creating an image of these objects on a display device

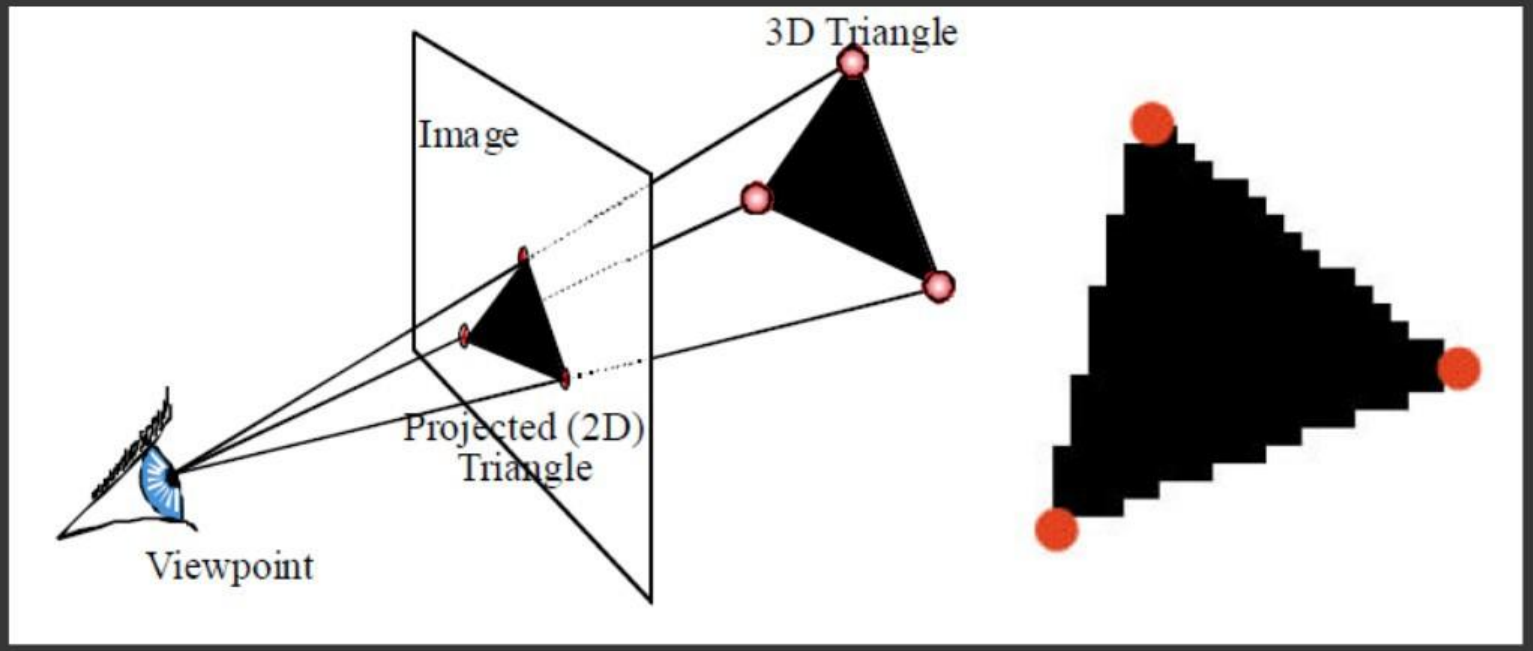
Animating

Making objects move by describing how they change over time

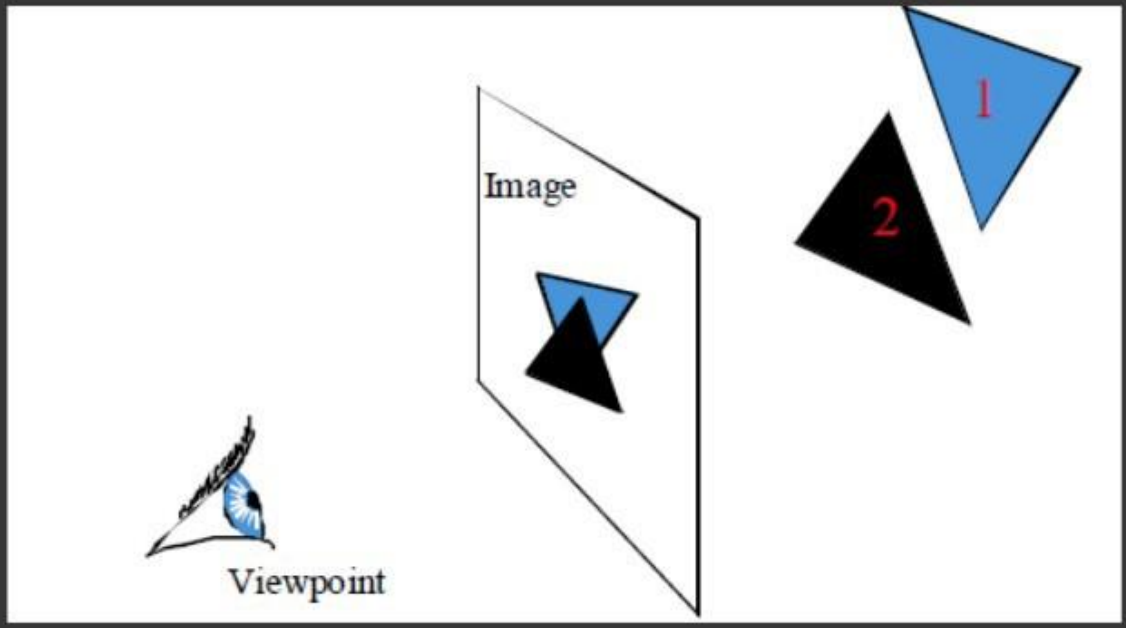
Polygons



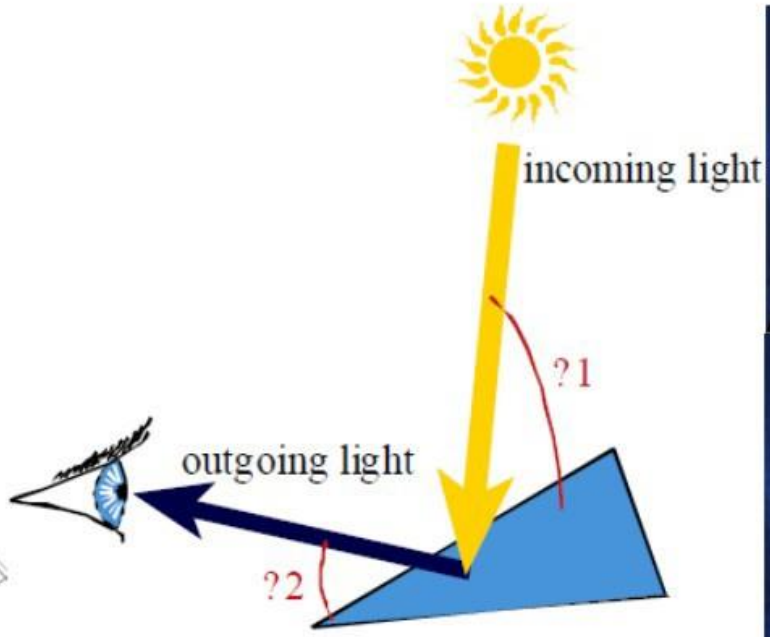
Rendering



Visibility



Shading and Materials



Why do we learn computer graphics

Can you see the differences?

What is in the behind of the scene?

Is this looking good? Why?

https://www.youtube.com/watch?v=Tk7Zbzd-6fs

State-of-the-art of real-time graphics

https://youtu.be/qC5KtatMcUw?t=81
https://youtu.be/Dj60HHy-Kqk

Paradigm changed

- OpenGL 1.0 (1994)
- OpenGL 2.0 (2004)
- OpenGL 3.0 (2008)
- OpenGL 4.0 (2010)

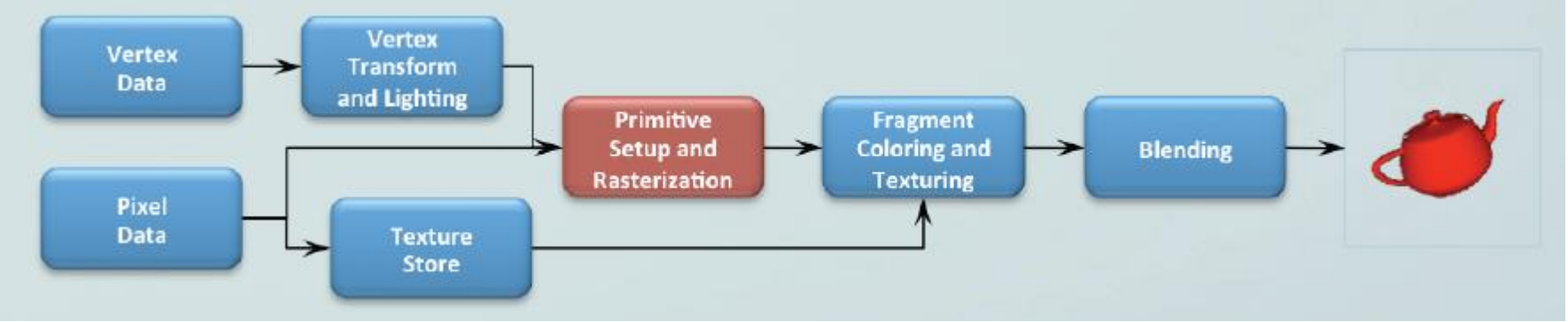
Under the hood: ***Shaders***

- A new way to program OpenGL
  - Before: Fixed Pipeline
  - After: Programmable pipeline

- Modern OpenGL doesn't support many of the classic things such as "glBegin/glEnd".
- Currently all industries use ***shaders*** for their graphics processing

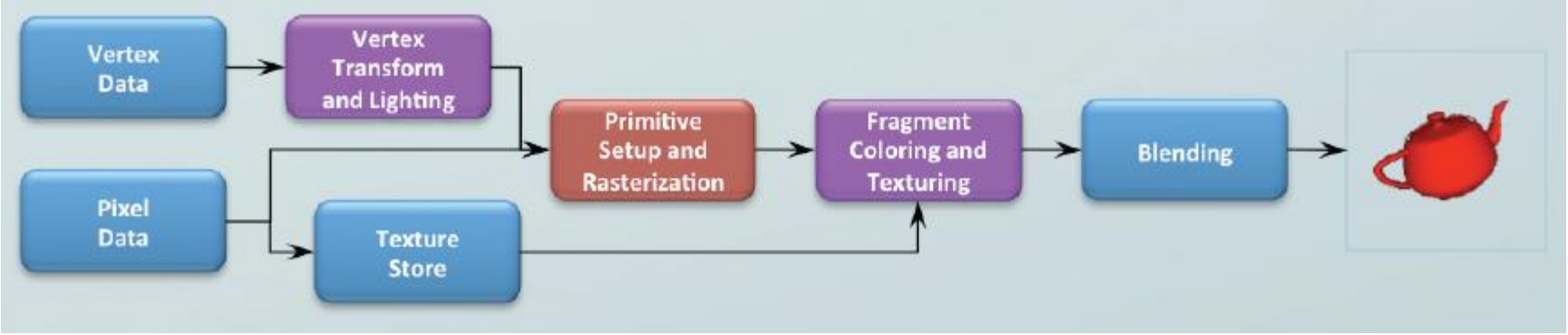
OpenGL 1.0 - 1994

- Fixed-function pipeline



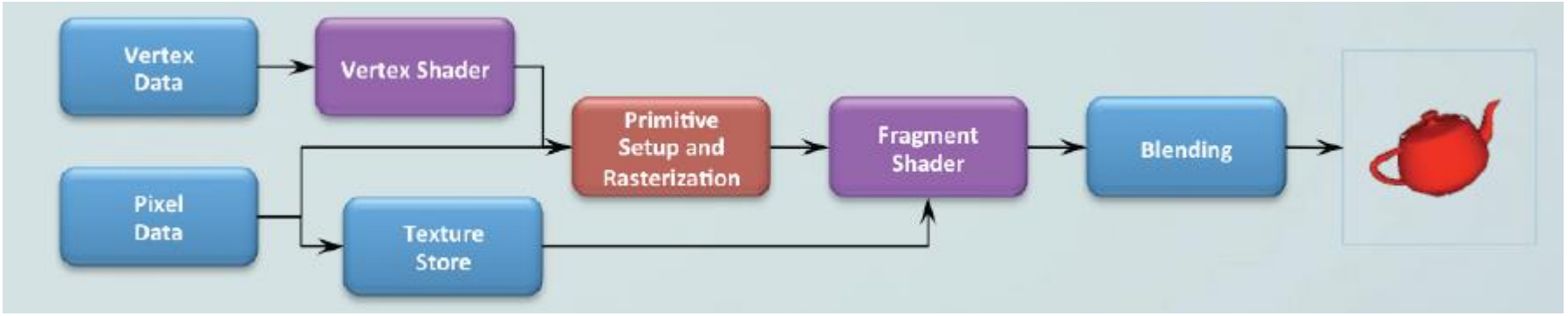
OpenGL 2.0

- Officially added programmable pipeline



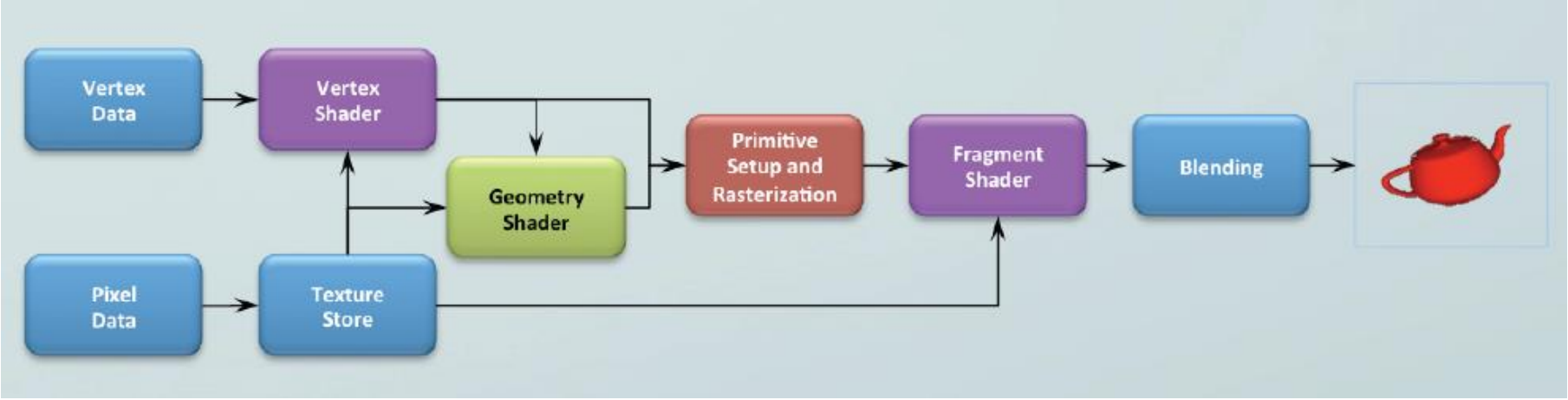
OpenGL 3.1

- Removed the fixed-function pipeline



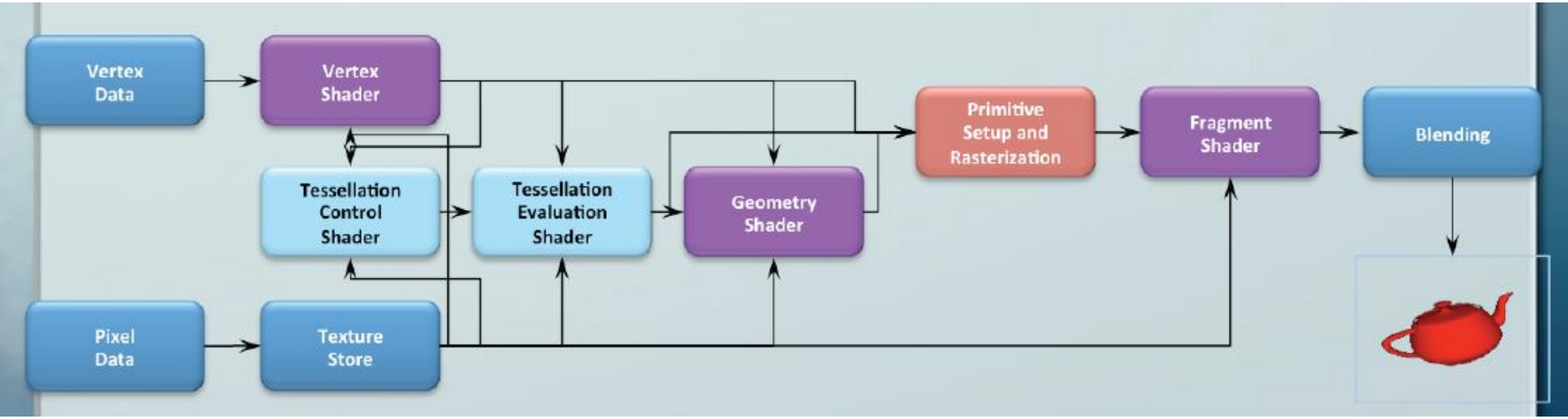
OpenGL 3.2

- Additional shading stage : geometry shader



OpenGL 4.5

- More of shaders!



WebGL

- WebGL
  - JavaScript implementation of OpenGL
  - Runs on most recent browsers (Even on your mobiles!)
    - http://davidwalsh.name/webgl-demo

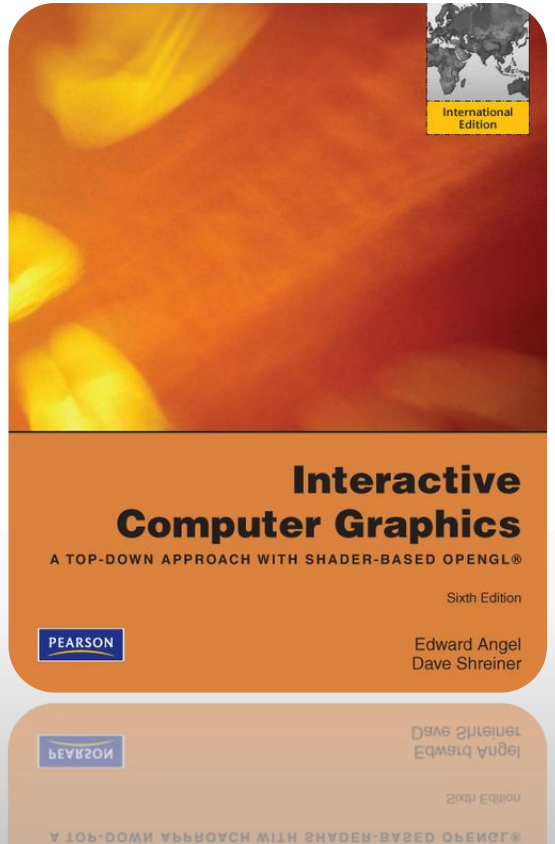
수업소개

- 컴퓨터 그래픽스 심화/최신 이론 학습
  - 기본적인 수학/물리 이론들 review
  - 다양한 기하 요소들에 관한 이론 및 활용

- 프로그래밍 능력 배양
  - 프로그래밍 중심 수업임 (OpenGL 활용)
  - Modern Graphics Pipeline 연습
    : Shader-based OpenGL programming

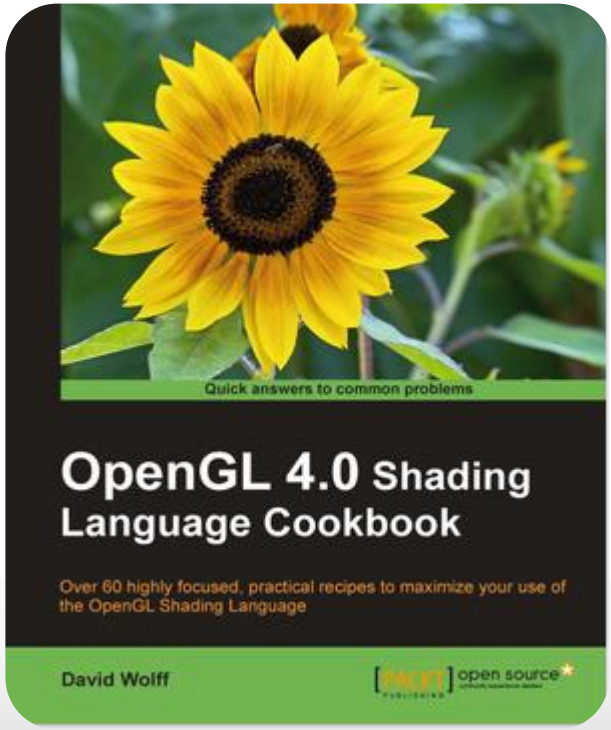
교과서

- **Interactive Computer Graphics – 6th edition (A top-down approach with shader-based OPENGL) by E. Angel and D. Shreiner**



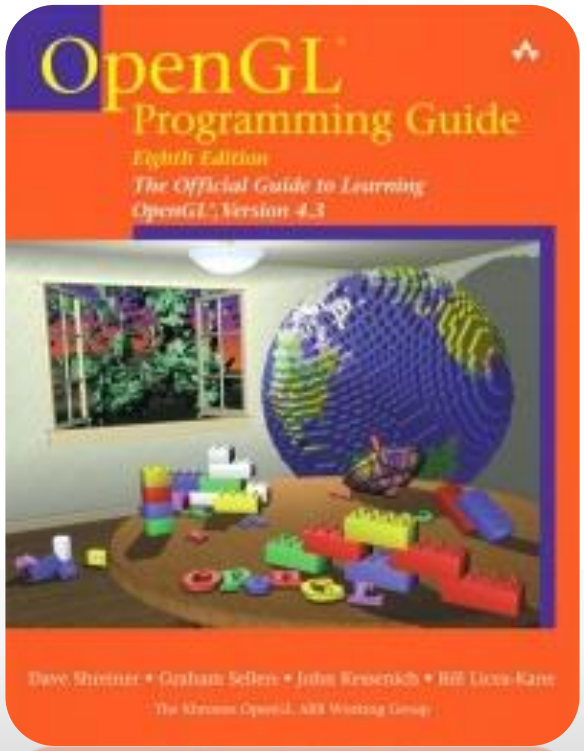
있으면 좋을 책

- OpenGL 4.0 Shading Language Cookbook – many interesting examples



있으면 좋을 책

- OpenGL Programming Guide 8th edition ("Red Book") – everything about OpenGL



수업방법

- 강의:
  - 이론(50%), 실습(50%), 수시고사 등으로 구성
- 과제
  - 프로그래밍 (5번 정도 예상)
- 성적
  - 중간고사(25%)/기말고사(25%)
  - 과제 (50%)
  - 출석 (~10%)
    - 출석은 하루 결석에 전체 총점에서 2점씩, 최대 10점 감점 (6번 이상 결석은 F 처리)
    - 지각 2번은 결석 1번으로 처리

수강필요조건

- C/C++ programming skills
- Basic Data Structures
  - linked list, arrays
- Linear Algebra
  - vector/matrix
- Multimedia Programming
  - some experiences in dealing with images and 2D *Matrix Transform*

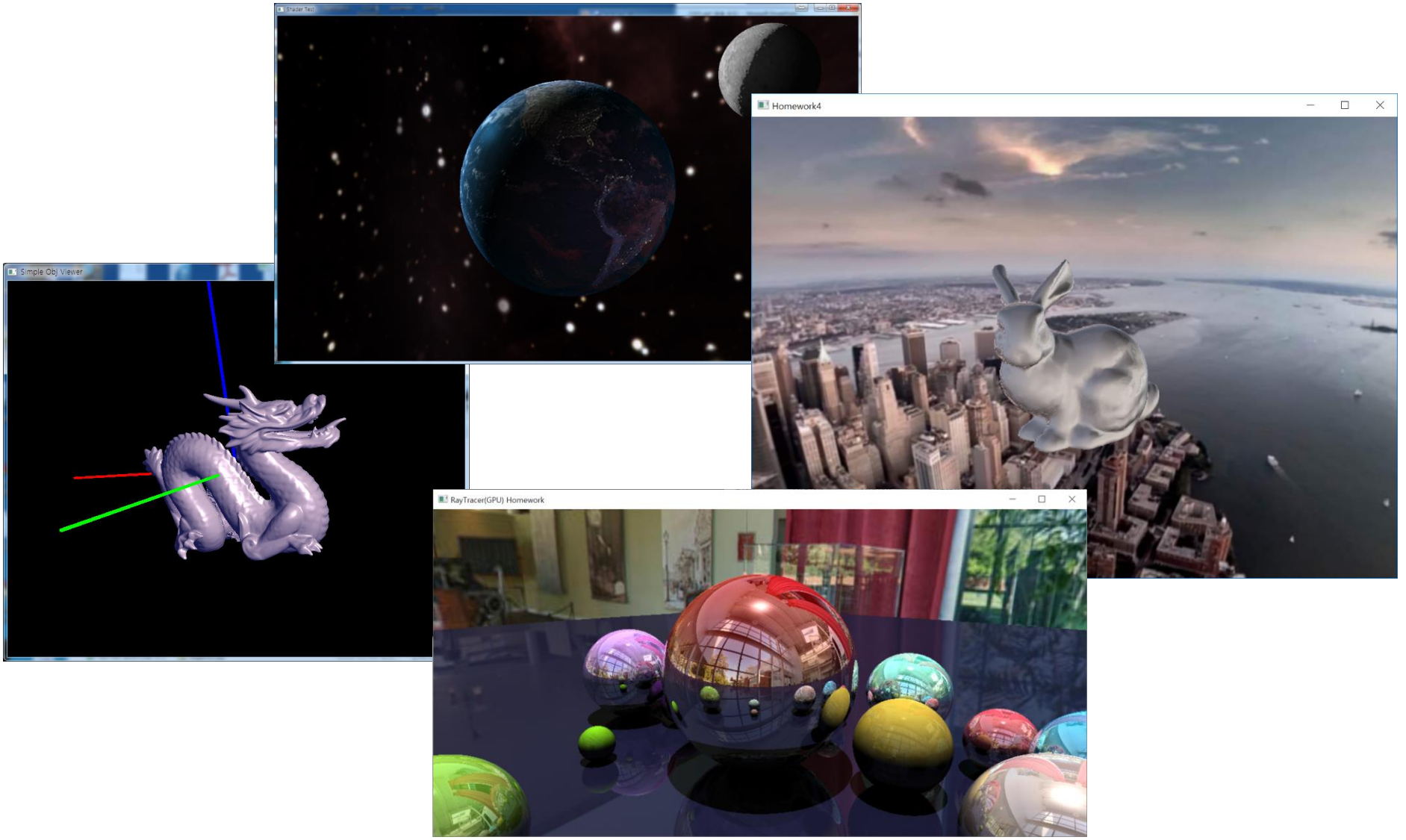
시험 방식

- 주로 필기로 구성 (중간, 기말)
- 필기: 이론 + 프로그래밍

숙제에 관하여

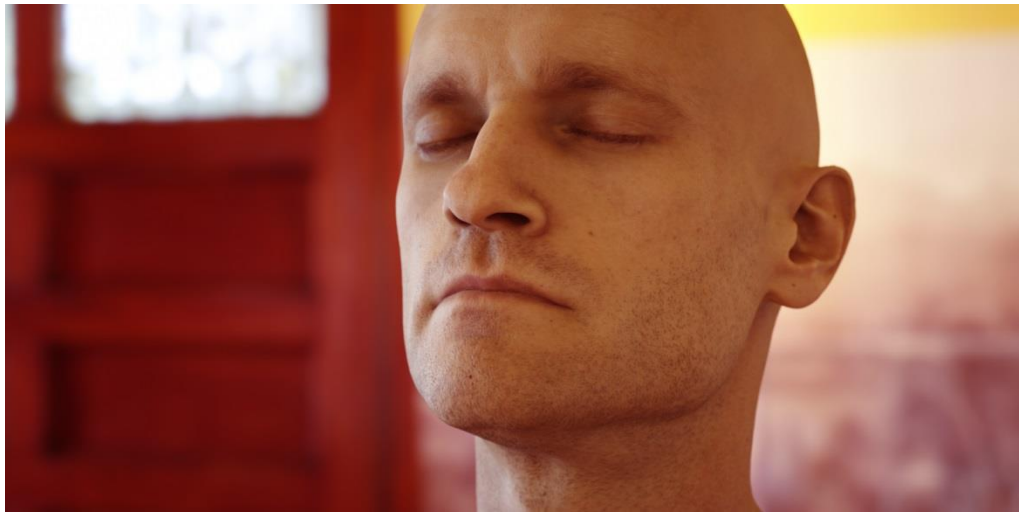
- 모든 숙제는 개별 과제 No Collaboration!
- Do not copy any parts of any of the assignments from anyone.
- Programming Assignments:
  - eCampus.sejong.ac.kr을 통해 제출
  - 주어진 조건의 구현
  - 예술성을 높이기 위한 추가적인 구현도 적극 권장
  - 늦게 제출할 경우 감점
  - 3일 이상 늦을 경우 받지 않음.

지난 프로그래밍 과제 예시:



Welcome to the Graphics World!

- Creating synthetic images indistinguishable from reality.
- Practical, scientifically sound, in real time
- Creating your own translation of the reality



SIGGRAPH

- Special Interest Group on Graphics
- Main computer graphics event in the world
- Once per year
- 30,000 attendees
- Academia, industry

- Technical papers in SIGGRAPH 2023: https://youtu.be/VBZ2sDxvZQE
- NVidia CEO Keynote at SIGGRAPH 2023: https://youtu.be/Z2VBKerS63A
- NVidia Omniverse Address at SIGGRAPH 2023: https://youtu.be/7yjNW04gVMw

See you on this Wednesday

- Your very first 3D programming begins
- We will learn how to install required libraries.
  - OpenGL on your computer