

CPE/CSC 101

Today

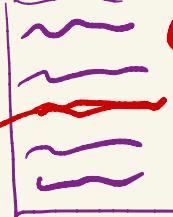
- Approaching new problems
- design
- decomposition

...
Got a 2.4 GPA my first semester in college. Thought maybe I wasn't cut out for engineering. Today I've landed two spacecraft on Mars, and am now designing one for the Moon.
STEM is hard for everyone. Grades ultimately aren't what matter. Curiosity and perseverance matter.

What can go wrong?

- check ahead use
 - index into list
 - list [xyz]
 - divide by zero
- can't check
 - open file
 - fails?
 - try
- convert a string $\xrightarrow{\text{float}}$ $\xrightarrow{\text{int}}$ - try

try :



code we want to
execute → may raise an exception

except IOError as e:



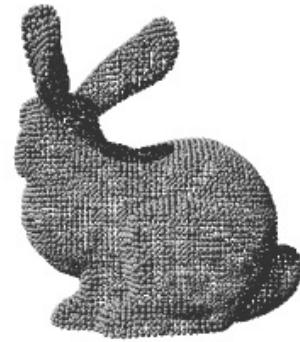
runs if an IOError was
raised, with exception object
named e

Ray caster

- takes command-like args
- reads spheres from file (defines scene)
- generates an image

Data?

- sphere
 - point
- vector
- rays
- colors
- finish



Args

```
|  
process args  
|  
store chrt.  
configs
```

File

```
|
```

- read file
 - get spheres
- write file w/
 - pixels

Scene

Casting Rays

Casting Rays

- determine which rays to cast (scene)
(cast-all-rays)

- cast one ray

- hit?

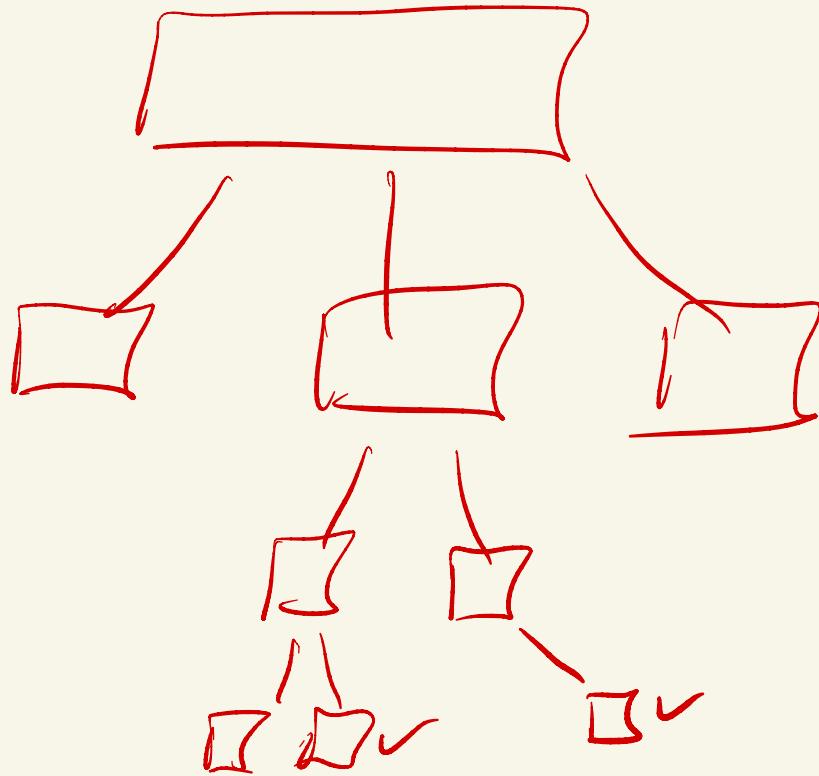
- ray intersect some sphere?
- ray intersect this sphere?

→ compute color

- ambient
- diffuse
- specular

- utility functions
 - vector math

Top - Down Design → Decomposition



Bottom - Up
Implementation

Music Streaming Service

Functionality

- play, pause
- repeat, shuffle
- like, skip, hide
- play list
 - add
 - remove
 - order
- GUI

Data

Artist
Album
Song
Genre

title
duration

- play lists

- images

- covers

- history

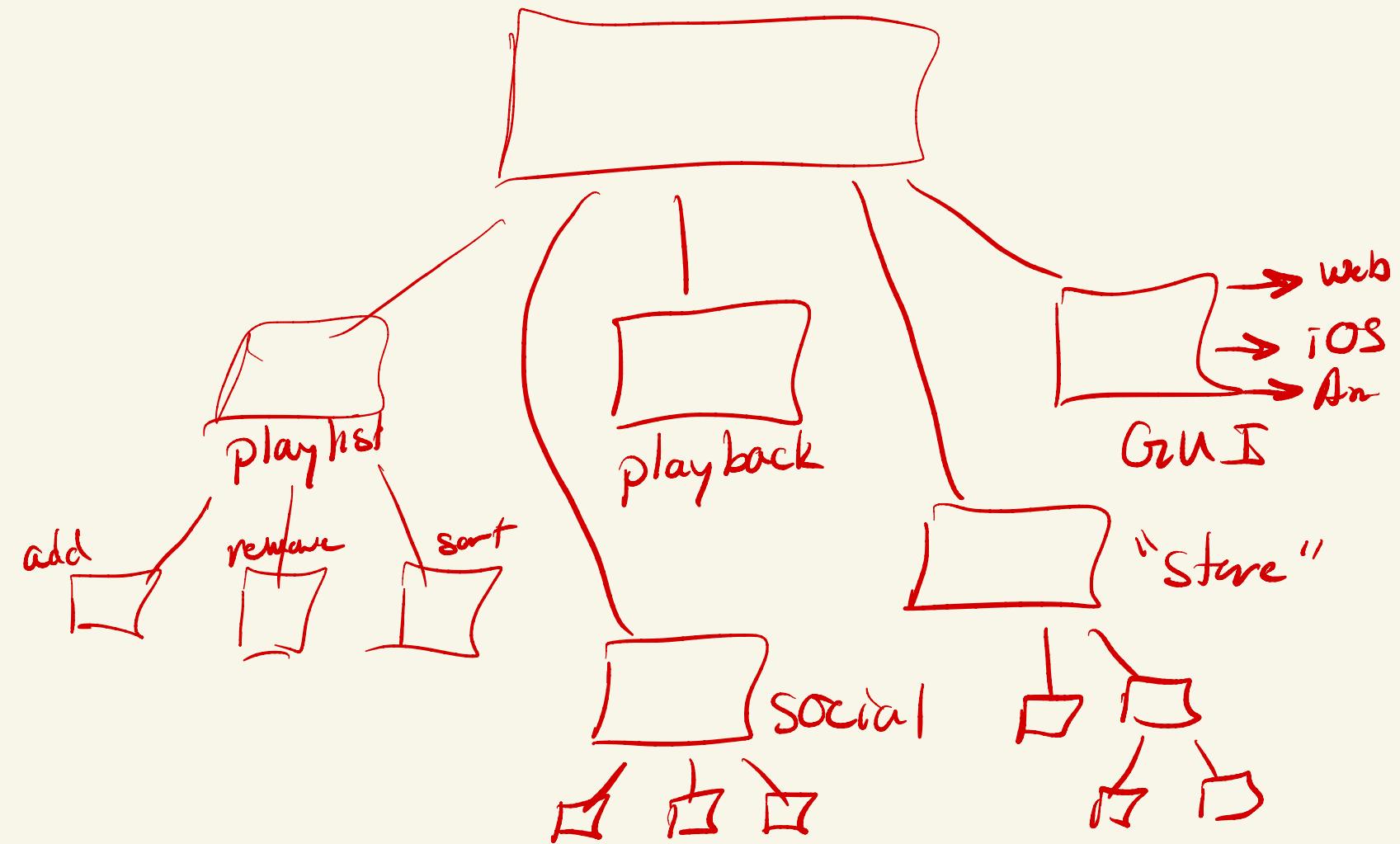
- likes
- search
- plays #

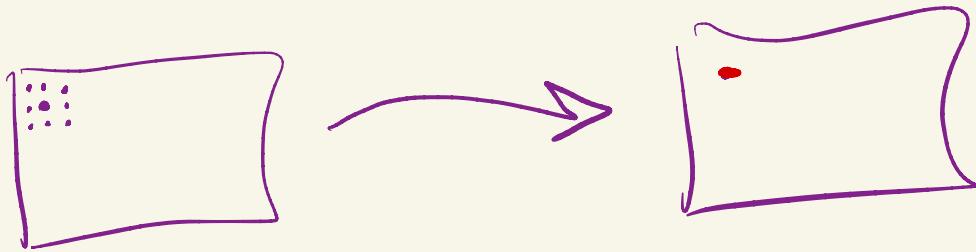
- podcasts

"friends"

- ads







- read file
- write file