the gamedesigninitiative at cornell university

Lecture 8:

Engines and Content

Traditional Way to Break Up a Game

- **Rules and Mechanics**
- **Game Engine**
- **User Interface**
- **Content**

Traditional Way to Break Up a Game

- Rules and Mechanics
- **Game Engine**
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Game Engine

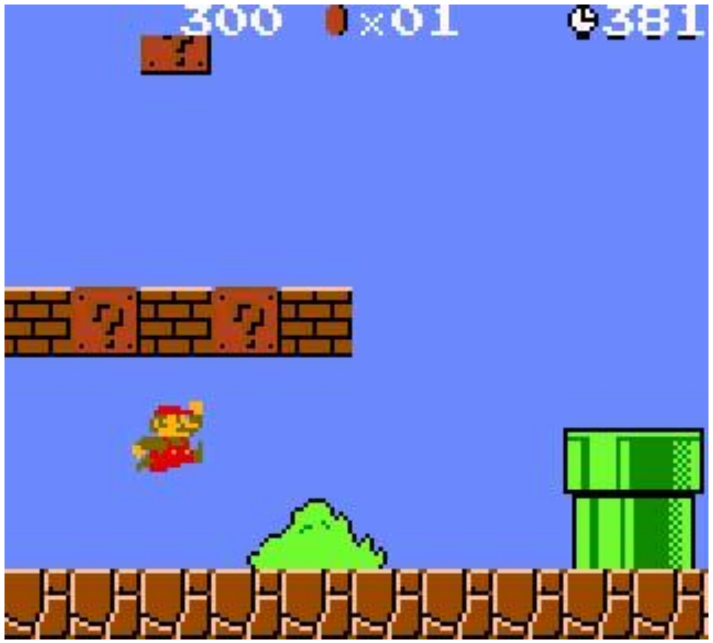
- Component that powers the
  - graphics and sound
  - physics
  - artificial intelligence
  - game mechanics
  - interactions
- Game environment is
  - simulated by the engine
  - populated by the content

Game Engines: Systems

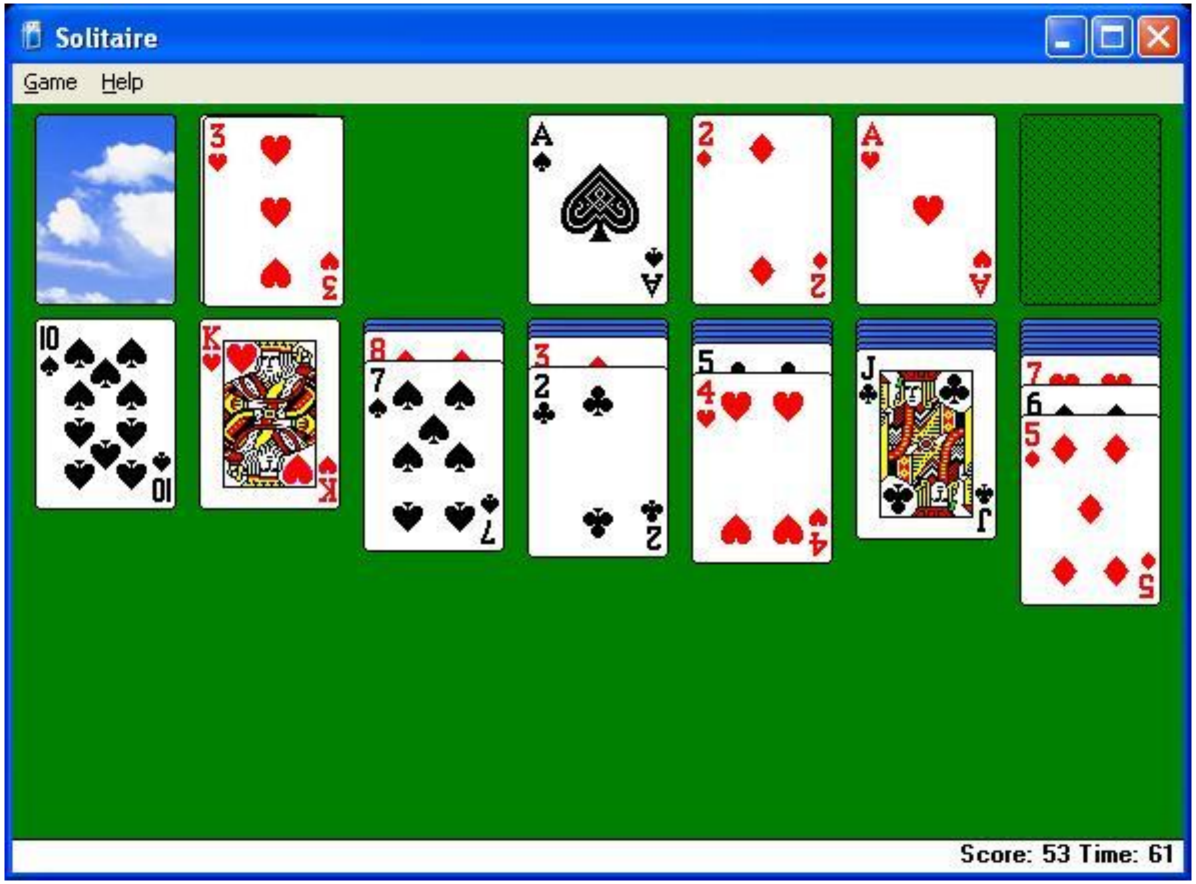
- Physics is an example of a game **system**
  - Specifies the *space of possibilities* for a game
  - But not the *specific parameters* of elements

Systems: *Super Mario Bros.*

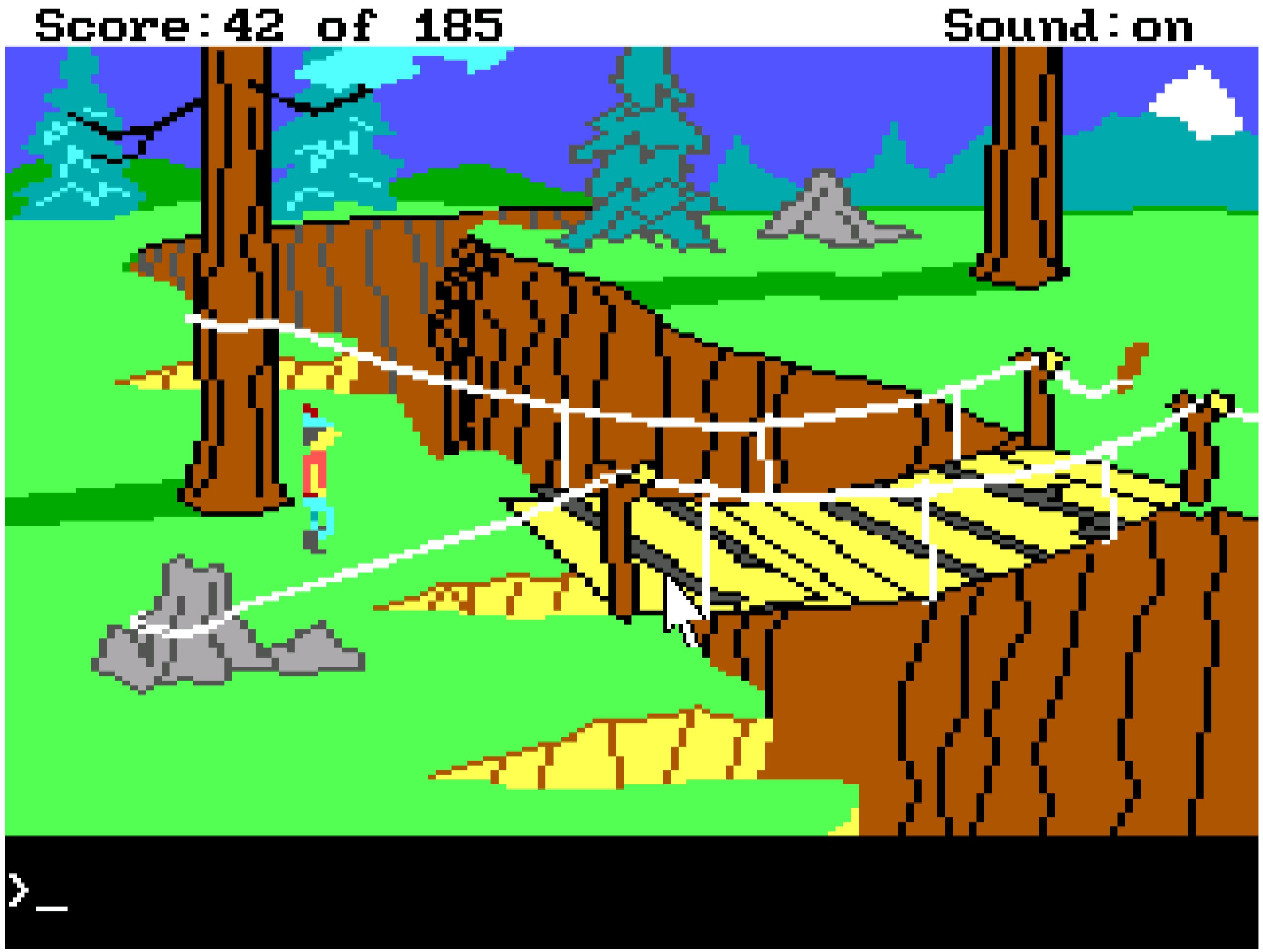
- **Levels**
  - Fixed height scrolling maps
  - Populated by blocks and enemies
- **Enemies**
  - Affected by stomping or bumping
  - Different movement/AI schemes
  - Spawn projectiles or other enemies
- **Blocks**
  - Can be stepped on safely
  - Can be bumped from below
- Mario (and Luigi) can be small, big, or fiery



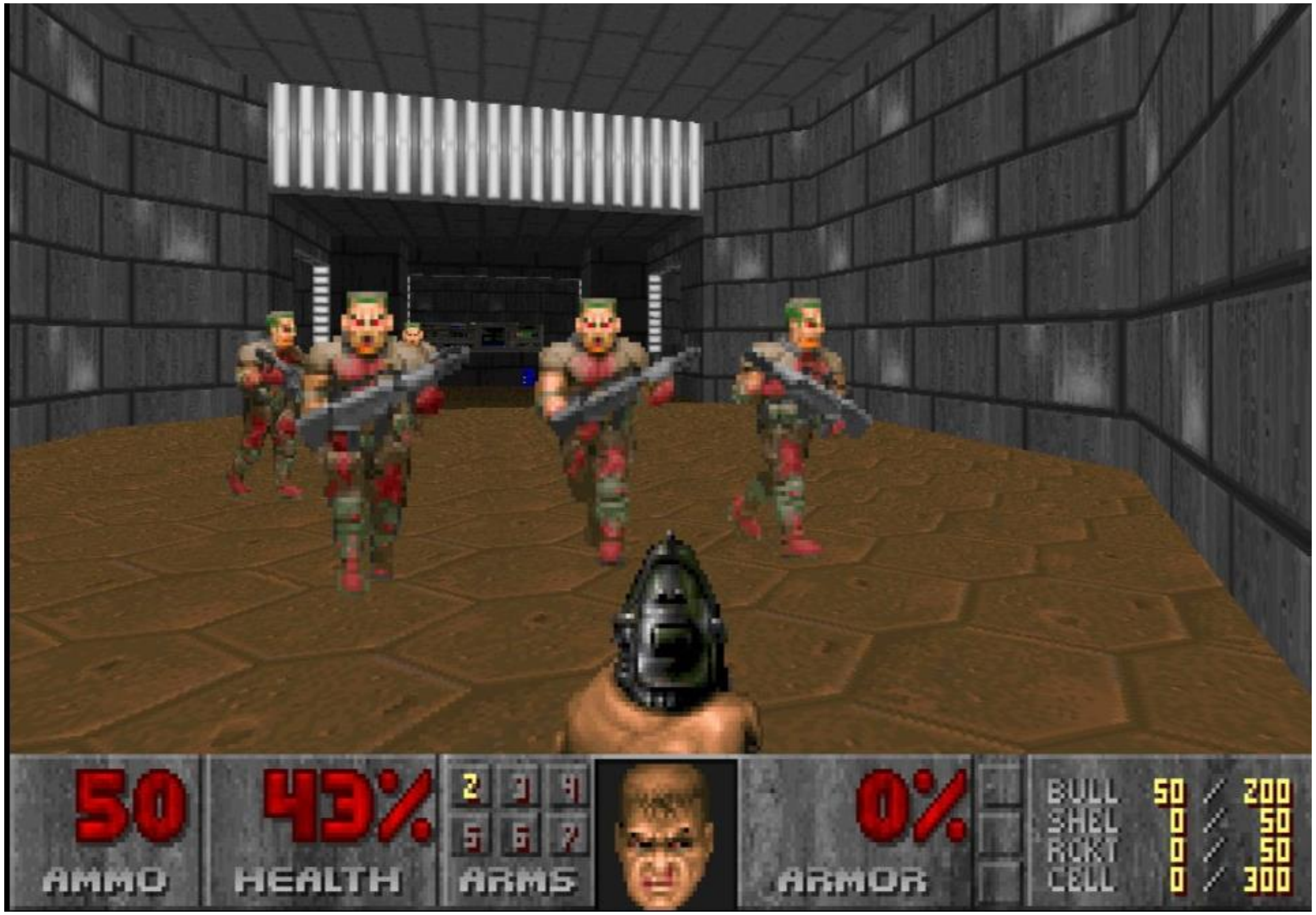
Systems: *Solitaire*



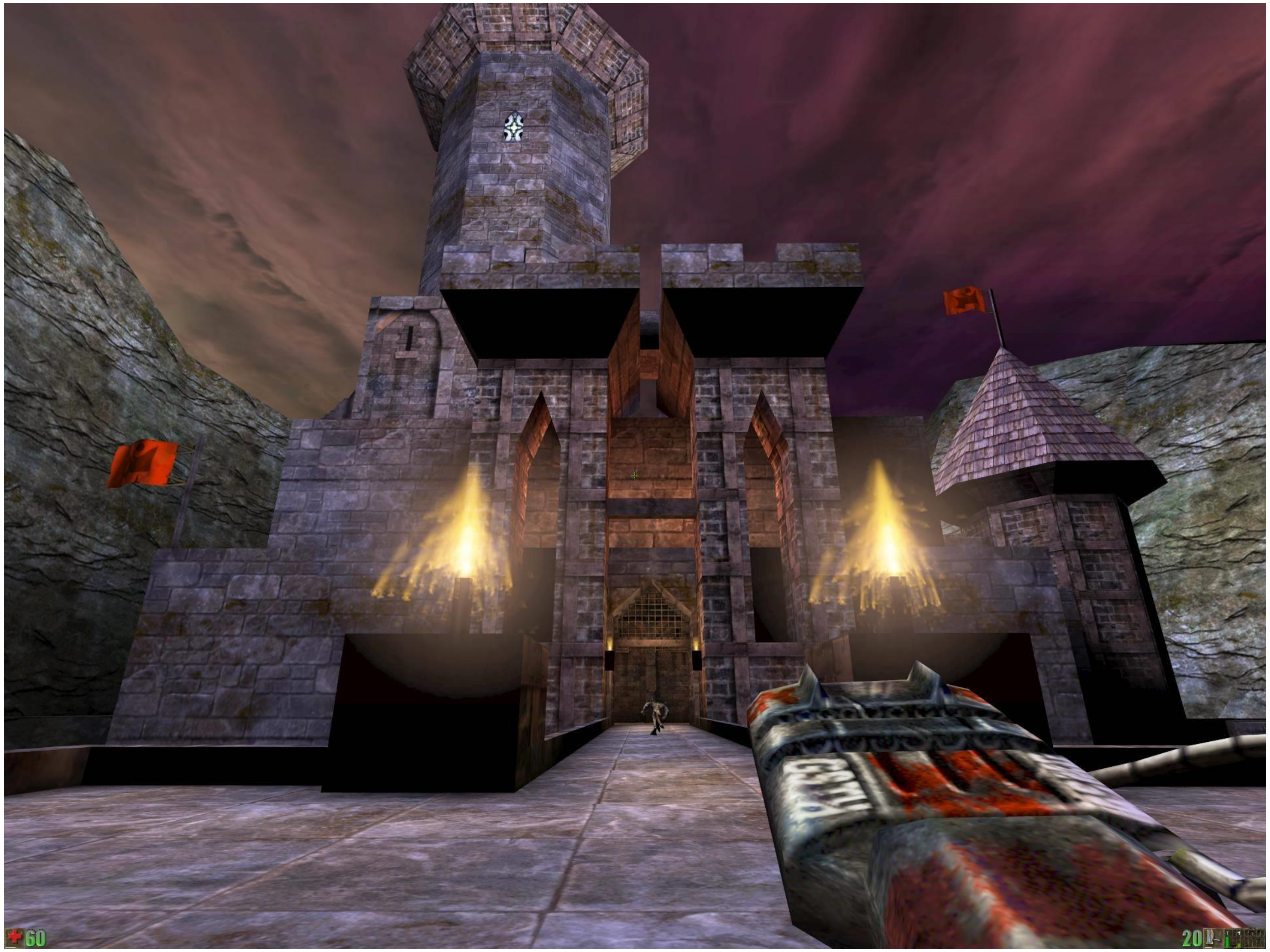
History of Engines



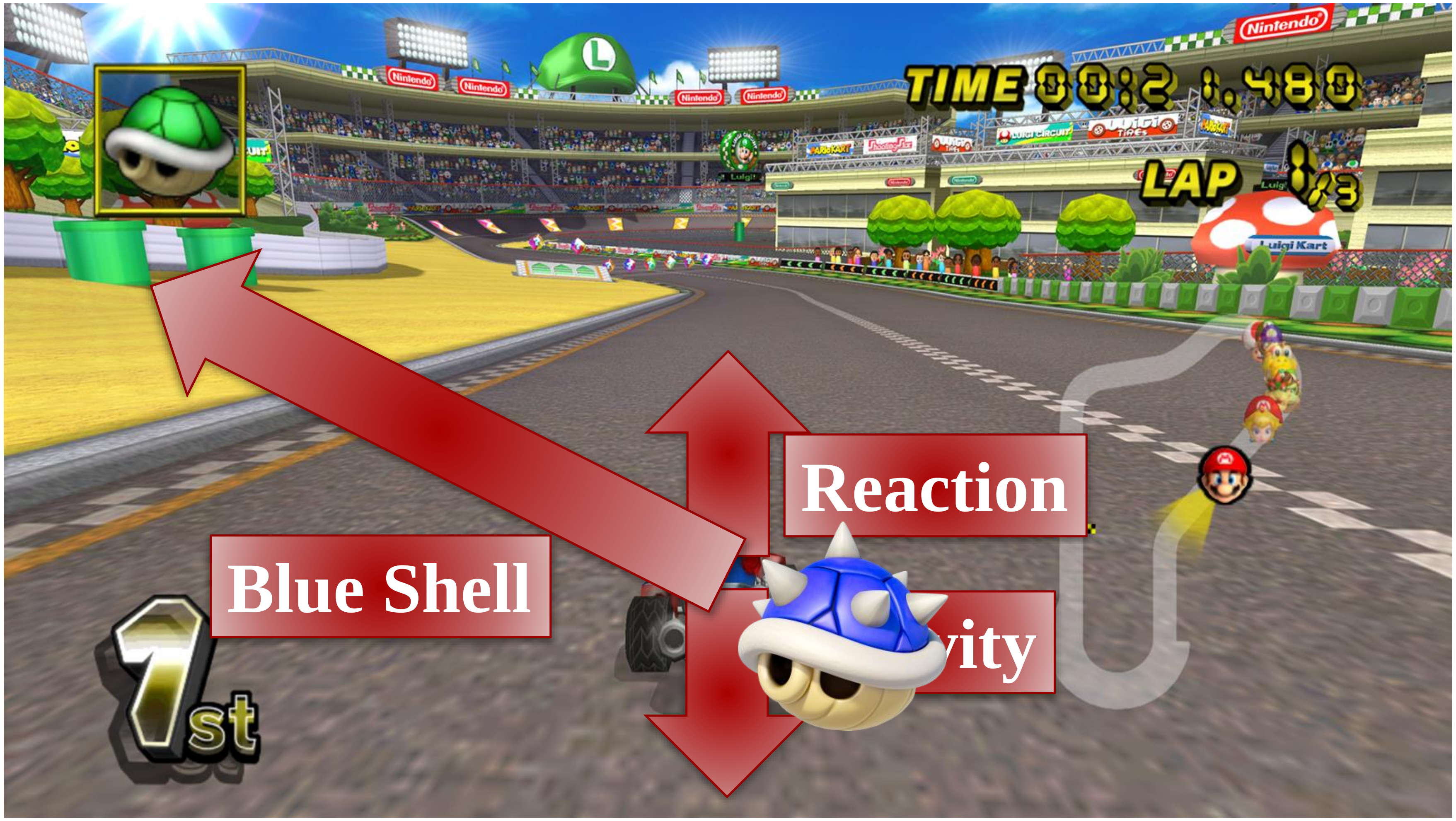
Doom (1994)


50
AMMO
43%
HEALTH
2 3 4
5 6 7
ARMS
0%
ARMOR
BULL 50 / 200
SHEL 0 / 50
RCKT 0 / 50
CELL 0 / 300

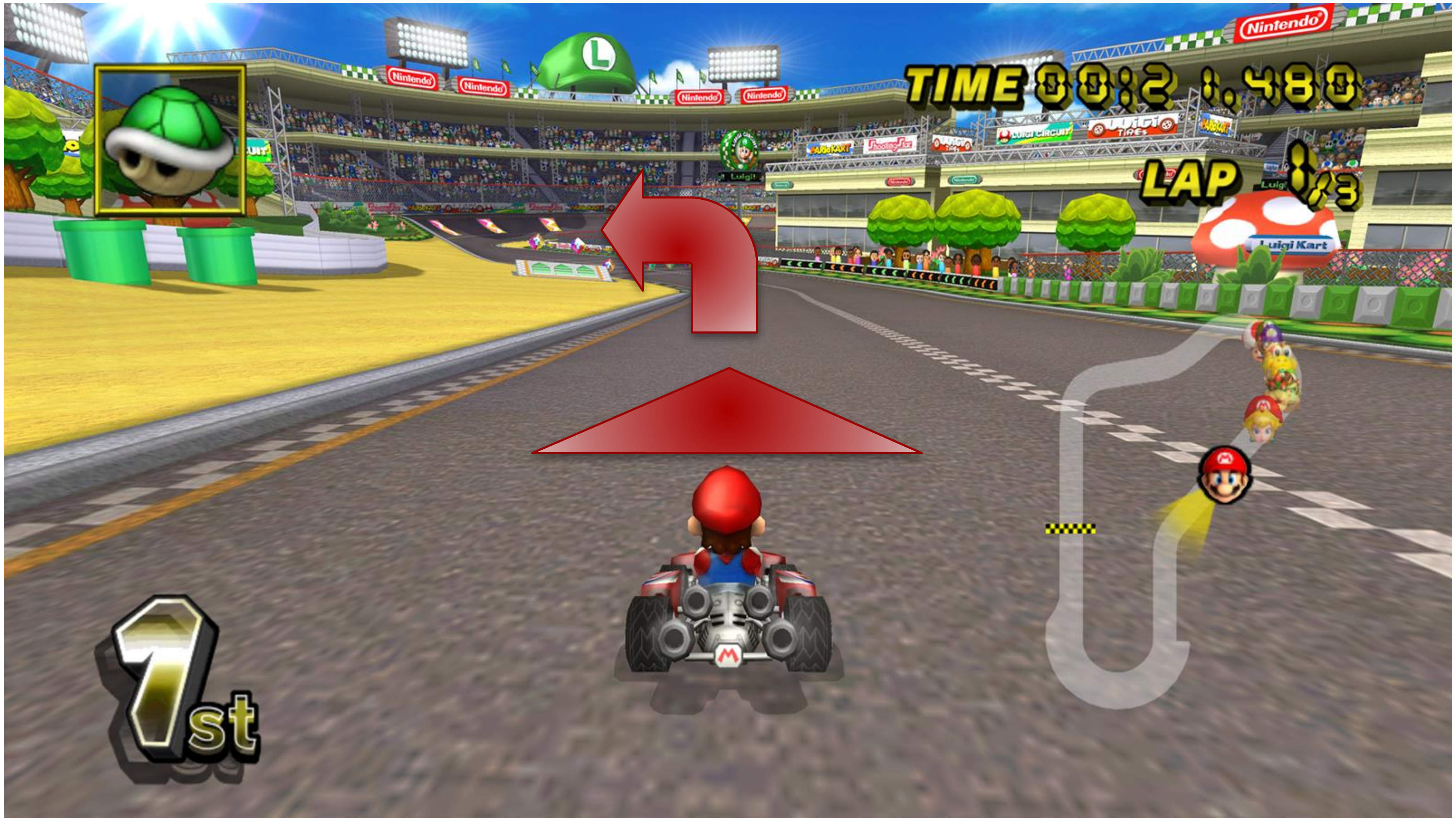
Unreal (1998)



Forces

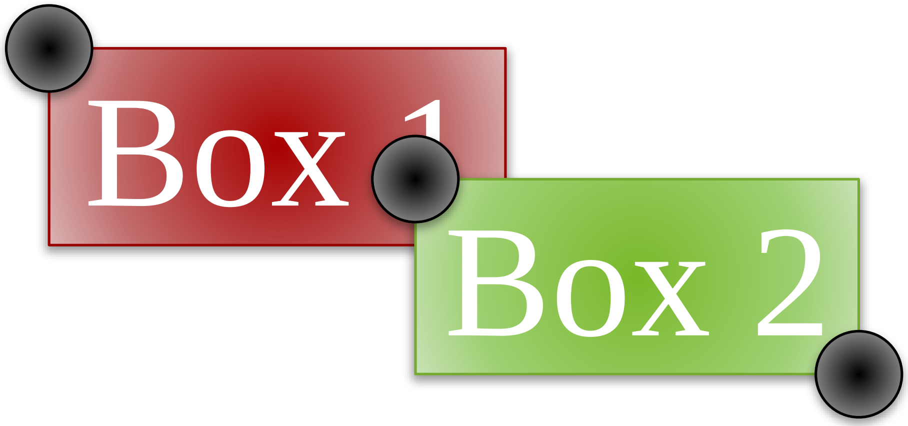


Velocity

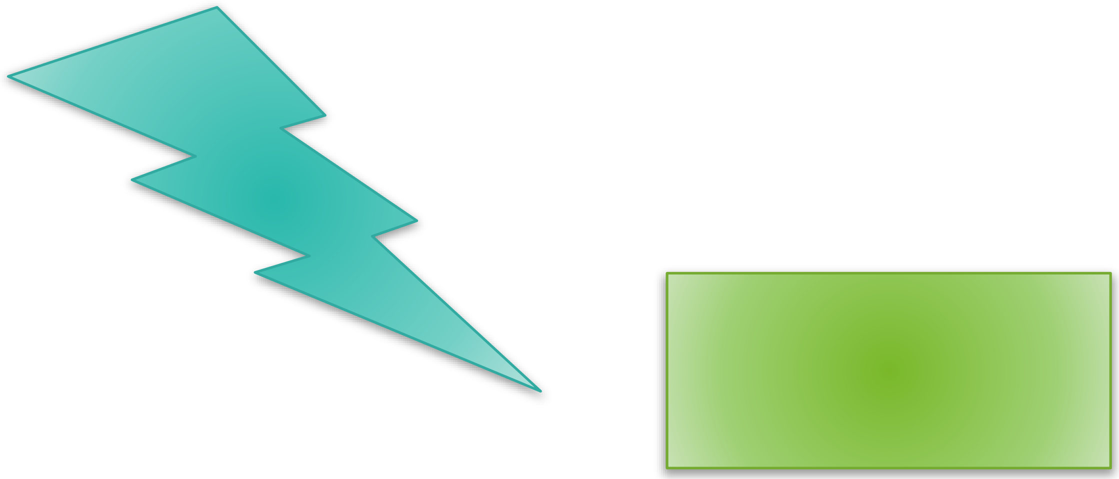


Collision Detection

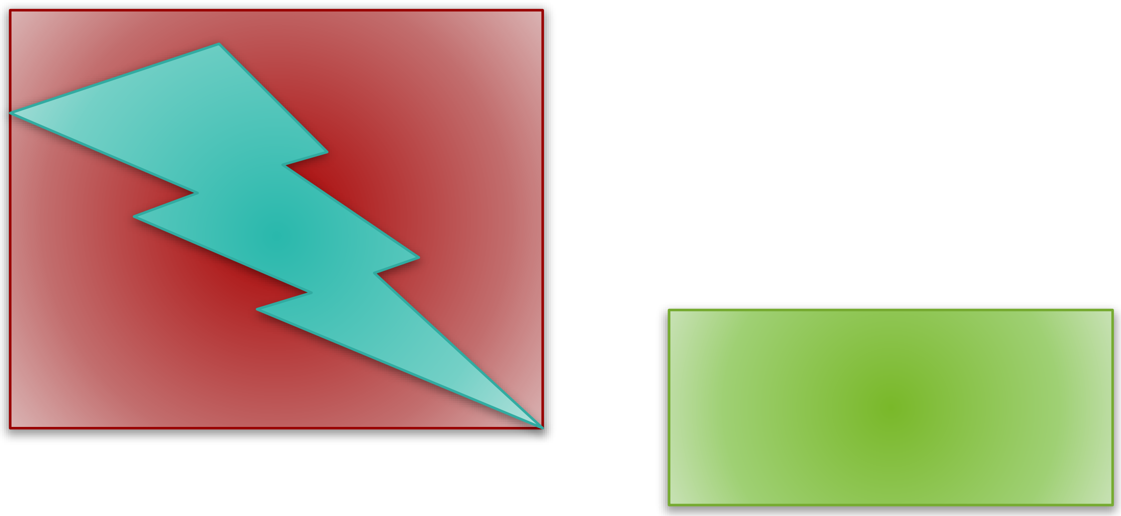
Collision Detection



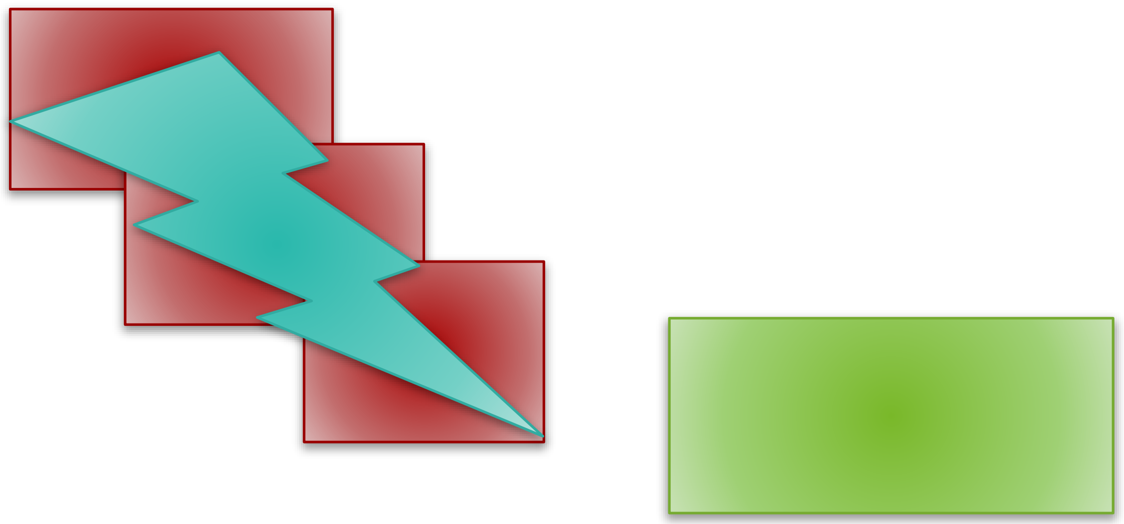
Collision Detection



Collision Detection



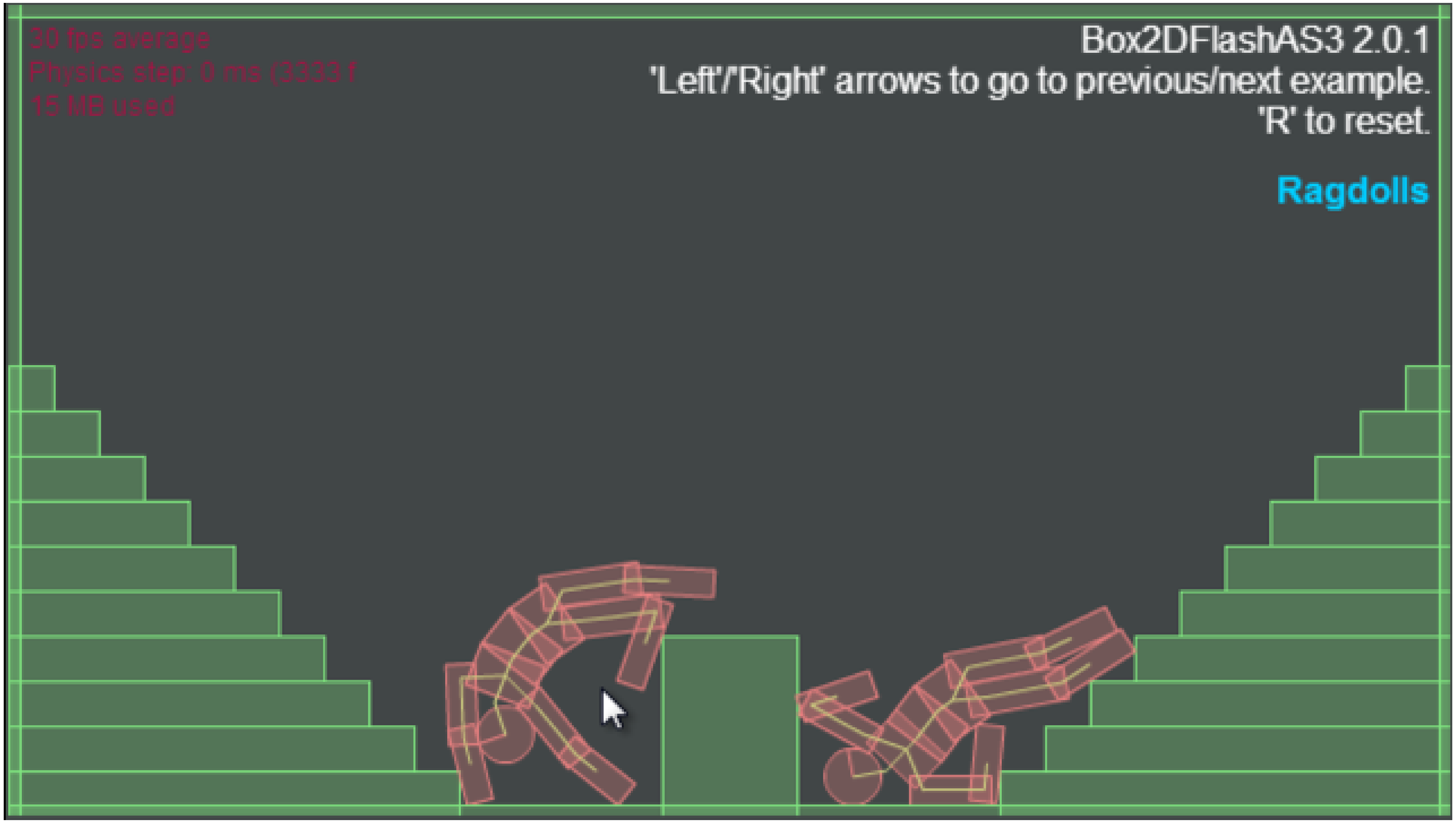
Collision Detection



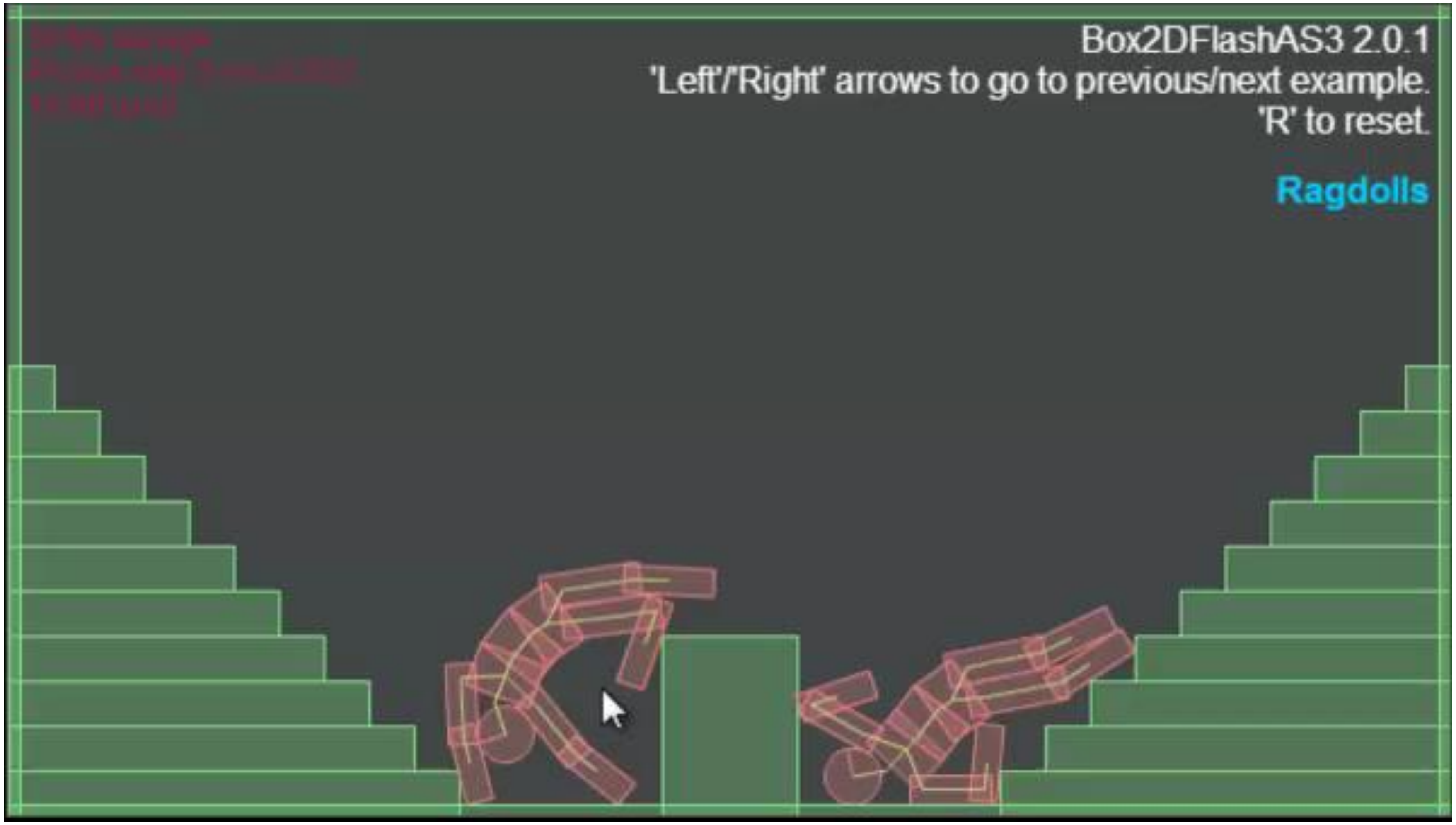
Ways to do physics

- Do math
- Use an existing engine

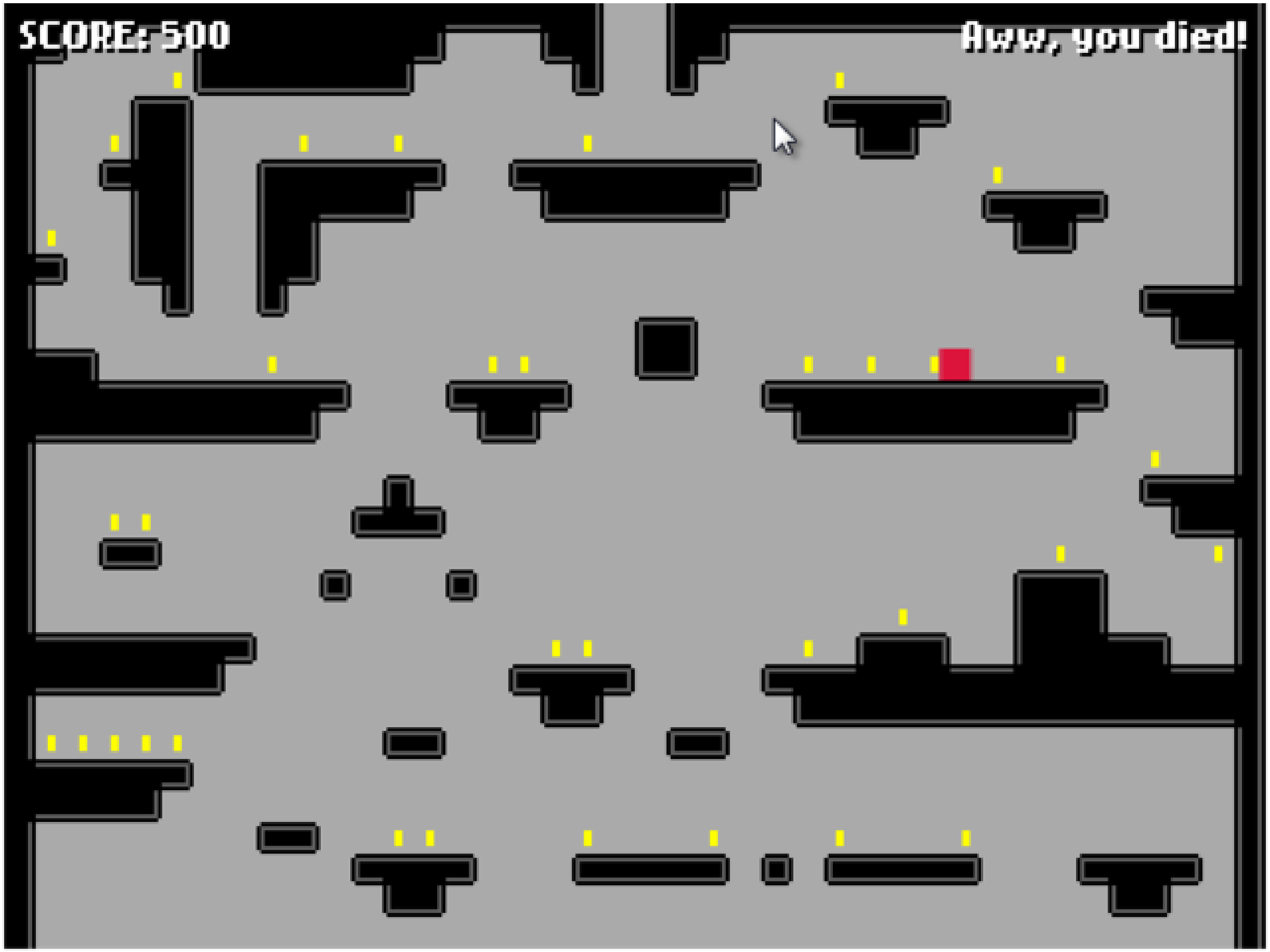
Box2D – in Flash!


30 fps average
Physics step: 0 ms (3333 f
15 MB used
Box2DFlashAS3 2.0.1
'Left'/'Right' arrows to go to previous/next example.
'R' to reset.
Ragdolls

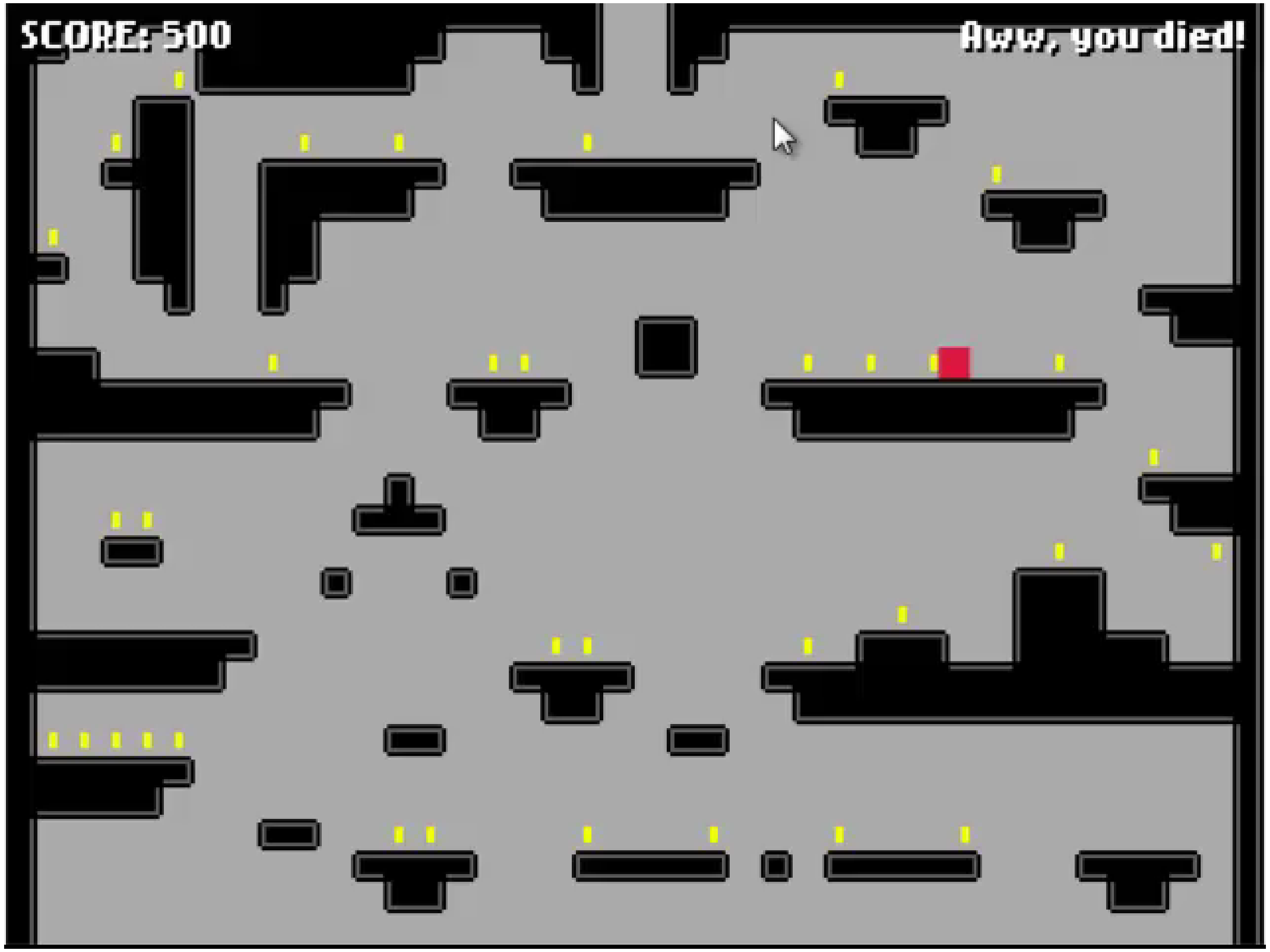
Box2D – in Flash!



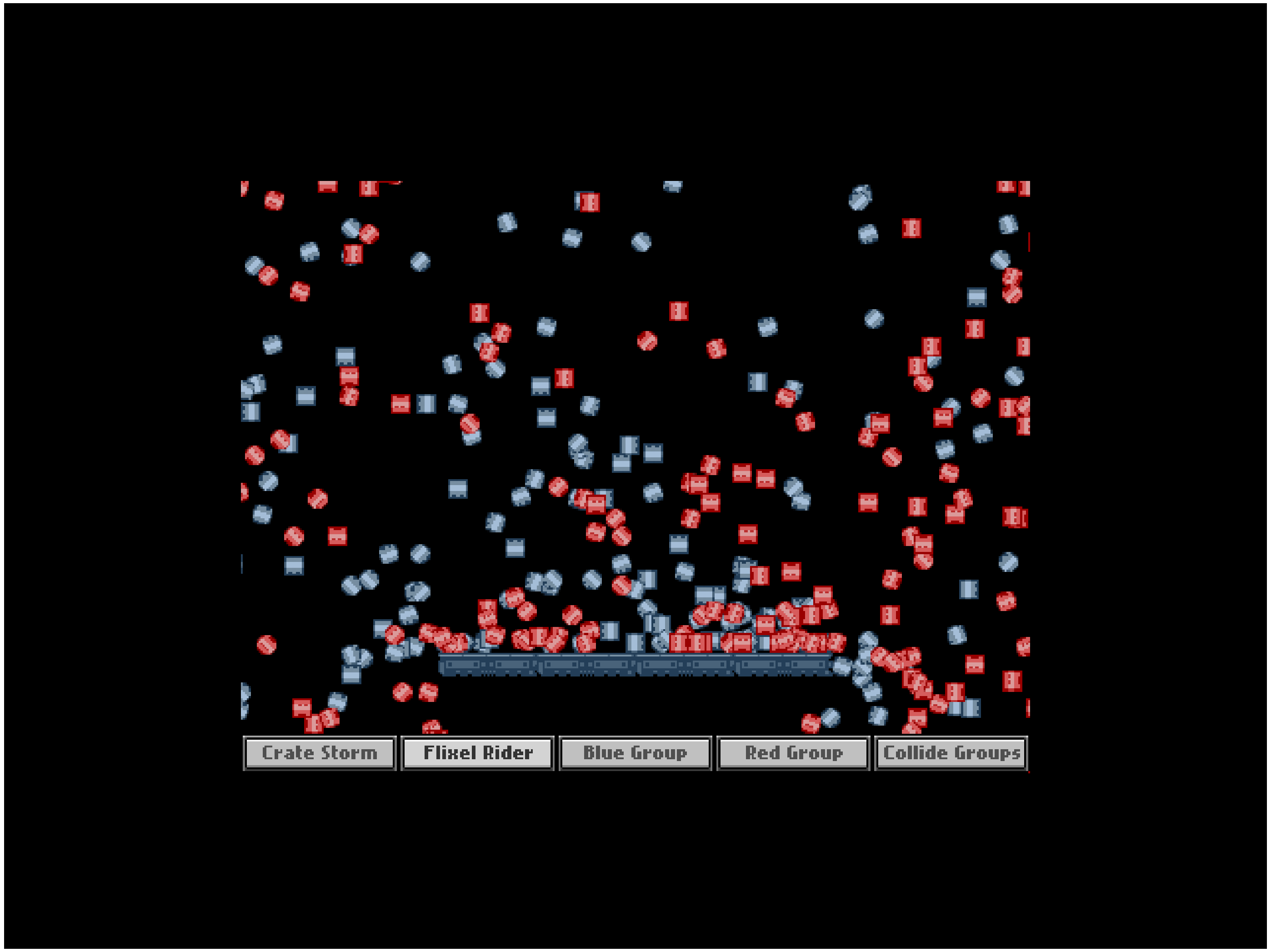
Flixel



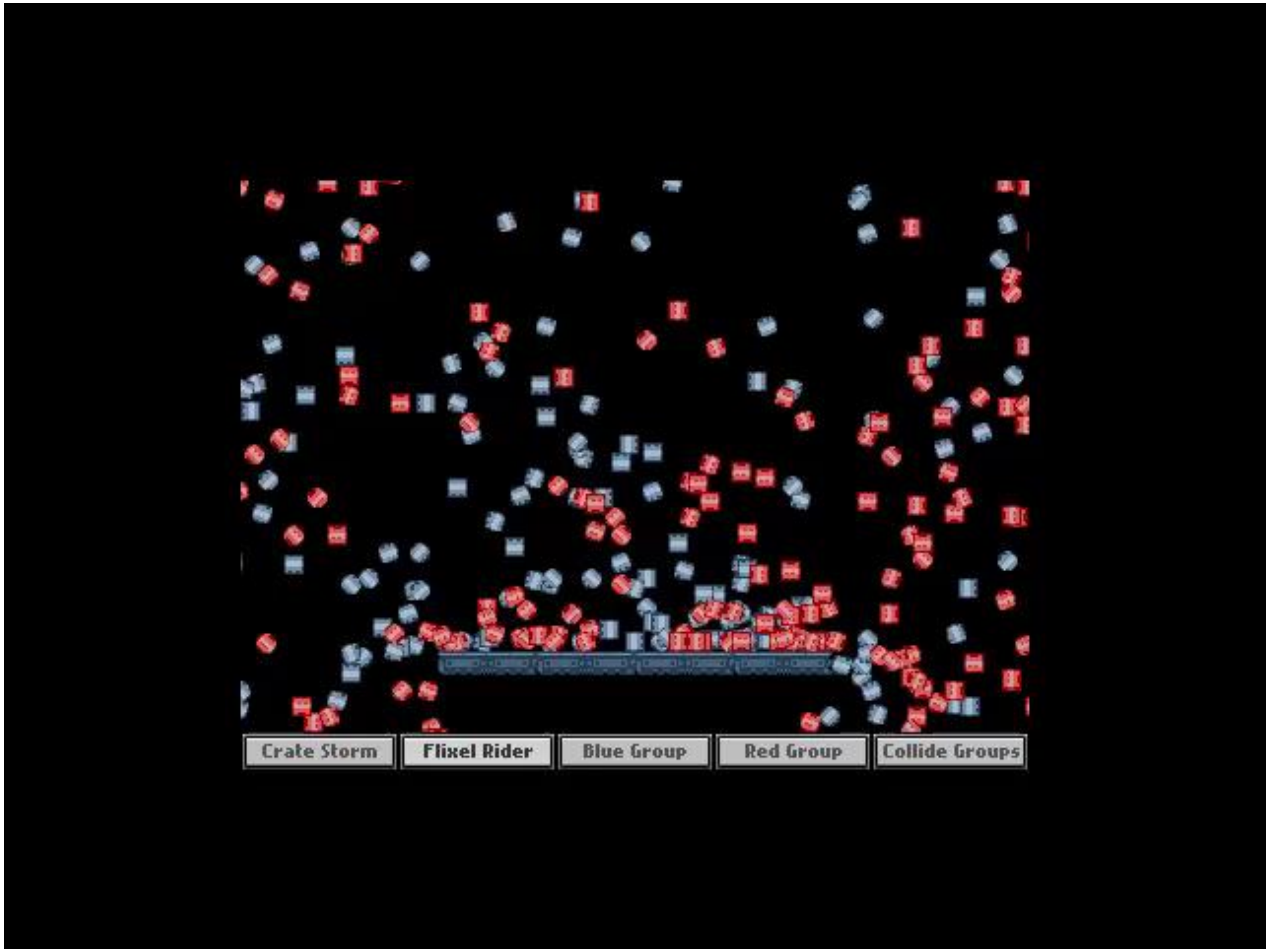
Flixel



Flixel


Crate Storm
Flixel Rider
Blue Group
Red Group
Collide Groups

Flixel


Crate Storm
Flixel Rider
Blue Group
Red Group
Collide Groups

FlxGame

```
public class MyGame extends FlxGame
{
    super(width, height, MyState);
}
```

FlxState

```
public class MyState extends FlxState
{
   public override function create():void
   {
      // create stuff
   }
   public override function update():void
   {
      // update stuff
   }
   public override function destroy():void
   {
      // destroy stuff
   }
}
```

FlxSprite

- Similar to Sprite but also includes
  - acceleration
  - velocity
  - maxVelocity
  - drag
  - scale

FlxState Create

```
public override function create():void
{
   player = new FlxSprite(FlxG.width/2 - 5);
   player.makeGraphic(10,12,0xffaa1111);
   player.maxVelocity.x = 80;
   player.maxVelocity.y = 200;
   player.acceleration.y = 200;
   player.drag.x = player.maxVelocity.x*4;
   add(player);
}
```

FlxState Update

```
public override function update():void
{
   player.acceleration.x = 0;

   if(FlxG.keys.LEFT)
      player.acceleration.x = -player.maxVelocity.x*4;

   if(FlxG.keys.RIGHT)
      player.acceleration.x = player.maxVelocity.x*4;
}
```

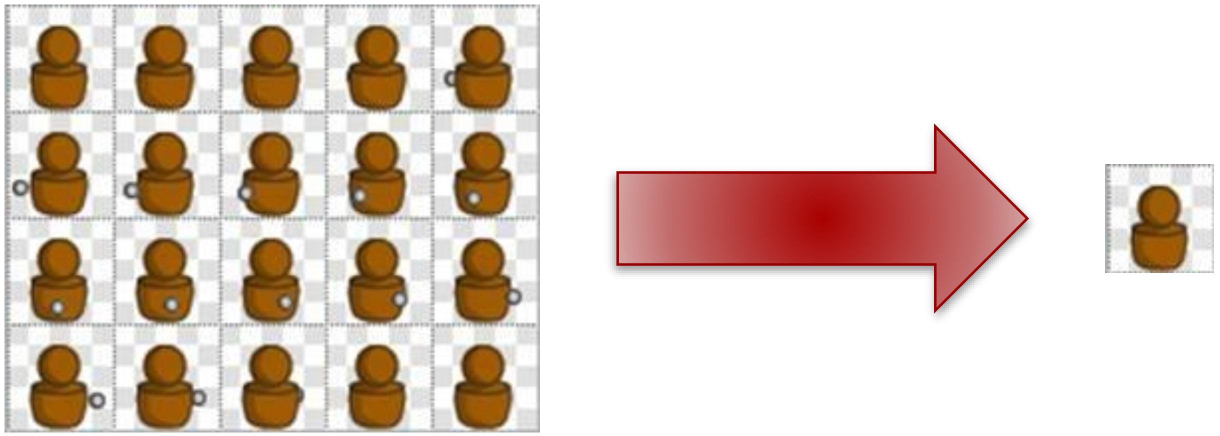
FlxG

```
// size of game
FlxG.width
FlxG.height

// useful methods!
FlxG.overlap(coins, player, getCoin);
FlxG.overlap(exit, player, win);
FlxG.collide(level, player);
```

A note on animations

Blitting (sprite sheet)



http://www.adobe.com/devnet/flex/articles/actionscript_blitting.html

Game Engine

- Component that powers the
  - underlying game system
  - physics
  - artificial intelligence
- Game environment is
  - created by the engine
  - populated by the content

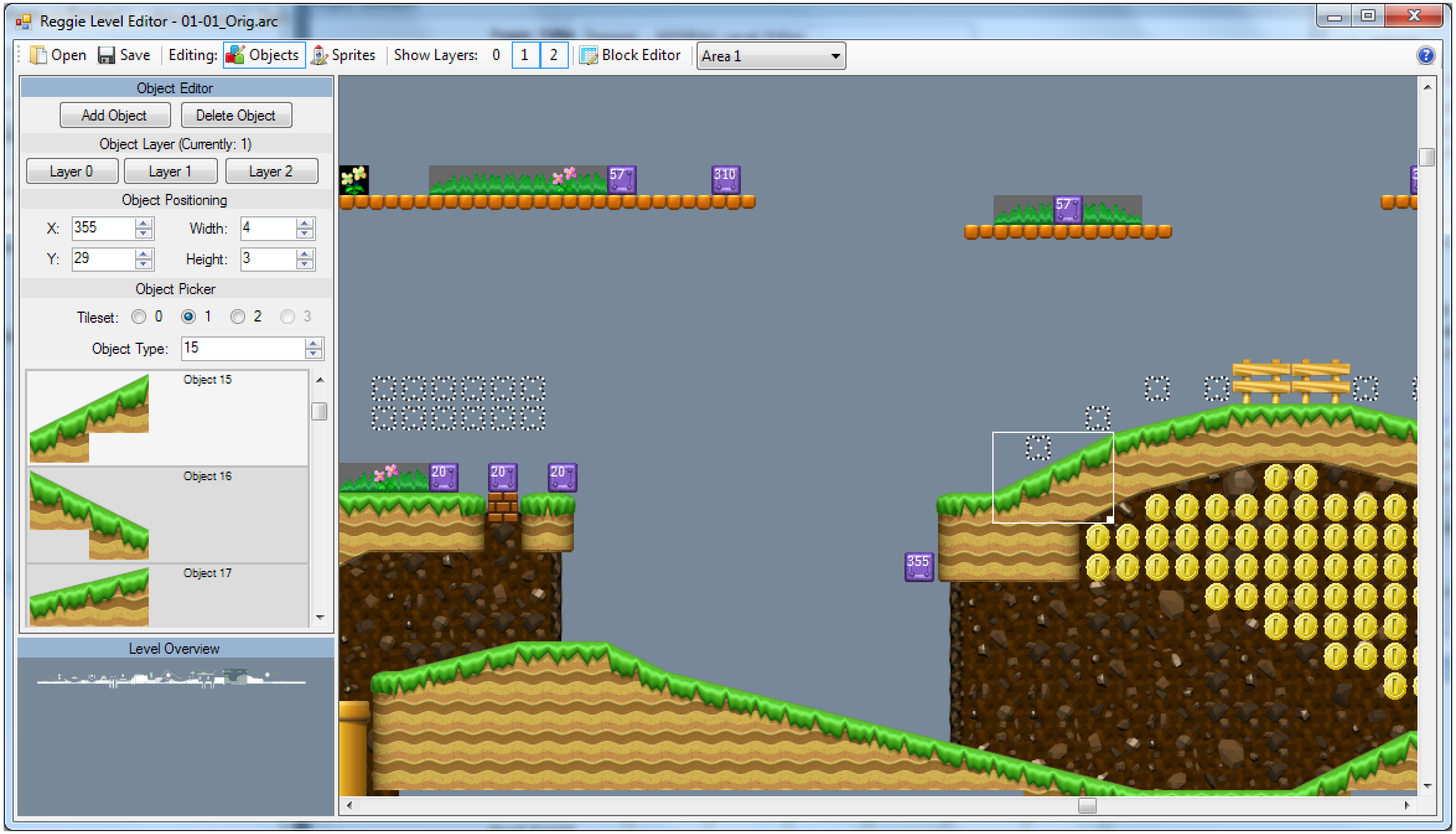
Traditional Way to Break Up a Game

- Rules and Mechanics
- Game Engine
- User Interface
- **Content**

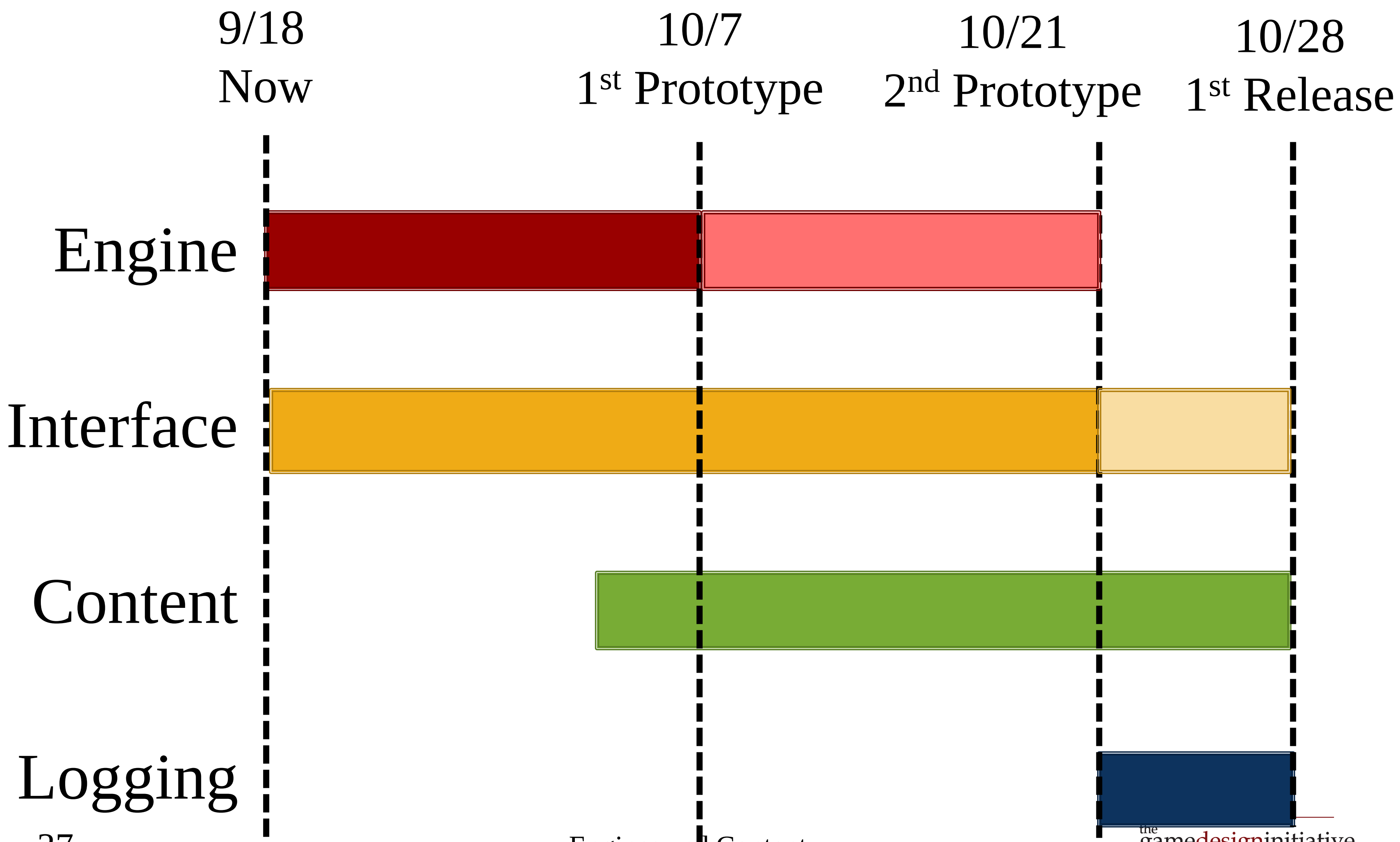
Content

- **Everything else**
  - Levels
  - Art assets
  - Story messages
  - Sound effects
  - Music
  - Tutorial messages

Level Editor



Timeline


9/18
Now
10/7
1st Prototype
10/21
2nd Prototype
10/28
1st Release
Engine
Interface
Content
Logging