raft

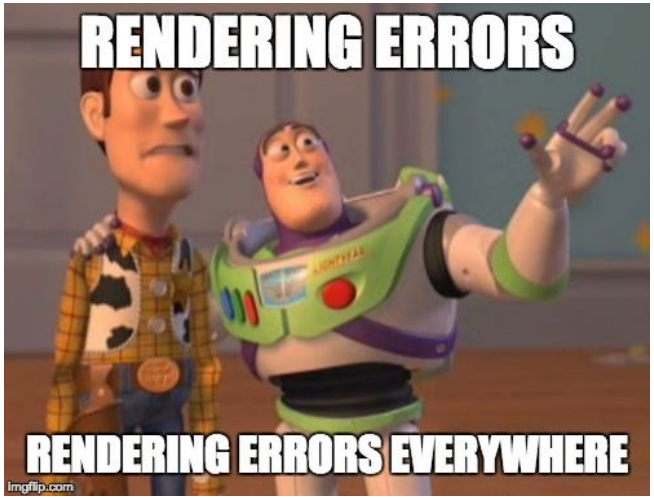
2D Gaming Language

The Team

Member	Main Responsibility
Martin Fagerhus	Code Generation
Roy Prigat	Compiler Front End
Abhijeet Mehrotra	C - Implementation, SDL
Daniel Tal	Semantic Checking

Motivation and Goals

- Why is it so difficult to create games in languages such as C or Java?
  - Worry about game loop
  - Difficulty in defining binding events to specific elements.
  - Tedious



Why Us?

- We allow a user to build a 2D game with ease of just worrying about adding user defined elements, events, and a world
- This is all done with much less code and makes it more straight forward for the programmer to develop a game
- We include in-built language components to make game building easy to do/understand

Program Structure

- Designed for ease of use and straightforward semantics.
- A world is the only required component.
- If an element is defined, it is required to add its properties as well(color,size).

<global variables>

<global functions>

<event definitions>
    <Event>
        <condition>
        <action>

<element definitions>
    <element>
        <properties> - *required*

<world definition> - *required*
    <world>
        <properties> - *required*
        <local variables>
        <statements block>

Types

- Color and size are properties of world and element components.
- Color is a string literal which corresponds to hex codes.
- Size is a pair type which defines the pixel size of an element/world.

```
int a = 3;

bool b = true;

float f = 3.4;

string s = “hello”;

pair p = (50,70);
```

Events

- Define game “rules”
- Condition defines the expression that triggers the event when true.
- Action defines how the event reacts with the element it binds to.

```
event move_down(player) {
    condition = key_press(“DOWN”);
    action {
        Player1.pos.x = 400;
    }
}
```

Elements

- Properties
  - Size of type Pair
  - Color (a hex string)
  - Direction (Integer) - optional
  - Speed (Integer) - optional

```
element player {
    size = (50,50);
    color = "f44141";
    direction = 90;
    speed = 1;
}
```

World

- Properties - required
  - Size of type Pair
  - Color (a hex string)
- Adding new elements to the game environment
- Adding event to the event loop, where each event is bound to a selected element.

```
world {
      properties {
            size = (500,200);
            color = “42f4eb”;
      }
      element player = new player(20,20);
      add_event(move_up);
}
```

Control Flow

If/else

```
if (true){
     x = 5;
} else {
      x = 3;
}
```

While loops

```
int x = 0;
while(x == 0){
     add_event(move_up);
     x = x +1;
}
```

For loops

```
int x = 0;
for(x , x <= 10, x++){
     add_event(move_down);
}
```

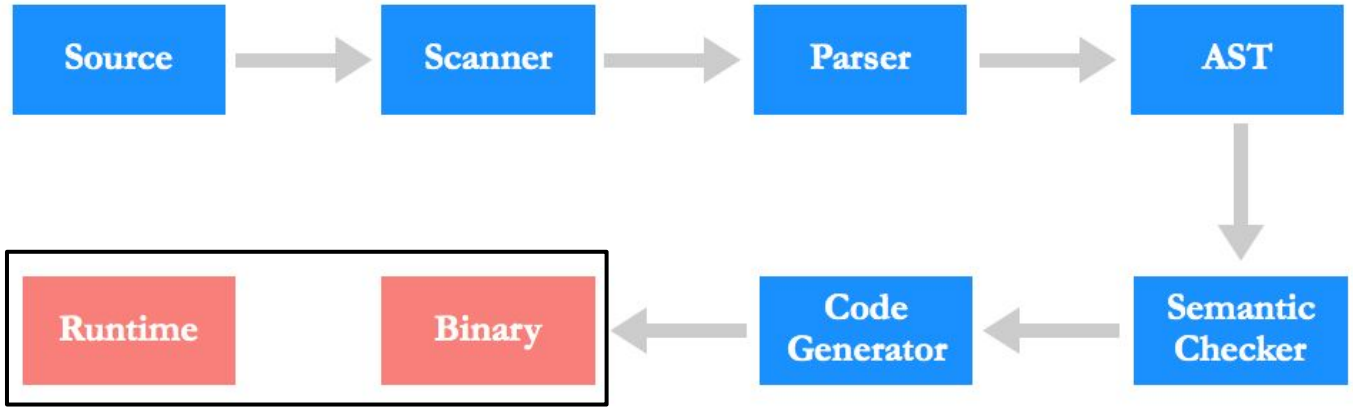
Sample Program

- A game with one player which can move up on pressing “UP” arrow key

```
int global_x = 300;

def int add(int a, int b) {
    return a + b;
}

event move_up(player) {
    condition = key_press("UP");
    action {
        player.pos.x = player.pos.x + add(3,4);
    }
}

element player {
    size = (50,50);
    color = "ffffff";
}

world {
    properties {
        size = (500,500);
        color = "42f4eb";
    }
    while (x < 301) {
        element player = new player(x,x);
        add_event(move_up);
        x = x + 100;
    }
}
```

Runtime

- Based on SDL
- Infinite loop
- Has functions to:
  - Render elements
  - Help determine collisions
  - Trigger callback functions



Architecture

Testing

- An automated testing script runs over all test files and produces a testall.log.
- The log file includes the output of all tests.
- Fail tests output exceptions as defined in the semantics checker, these are printed out in the log file.
- Success tests simply produce an executable program which is later manually tested.

Automated Tests

- Declarations
- Statements
- Functions
- Expressions
- Semantics

Manual Tests

- Colors and size
- Elements
- Event actions

Demo