3 Multimedia Programming with C++ and Multimedia Frameworks

Literature:

cocos2d-x.org

R. Engelbert: Cocos2d-x Beginner's Guide, 2nd ed., Packt Publishing 2015

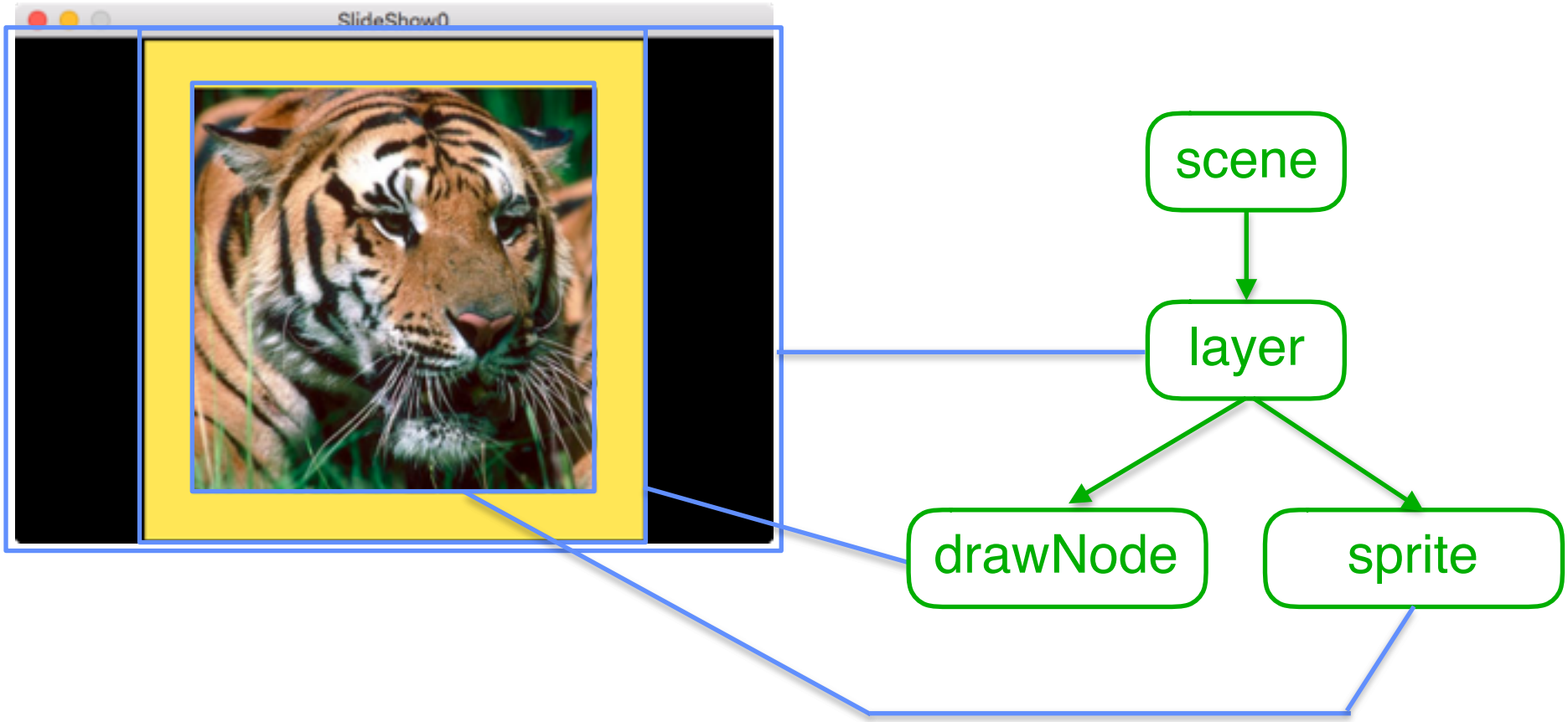
History and Status of Cocos2d(-x)

- February 2008, in "Los Cocos" (Argentina):
  - Meeting of Python(!) game developers
  - Ricardo Quesada and others create 2D game engine called "Cocos2d"
- Juli 2008: Apple AppStore for iPhone, iOS SDK
  - Cocos2d rewritten in Objective-C ("cocos2d-iphone")
  - Successful game apps for iPhone based on Cocos2d (e.g. StickWars)
- Various ports and branches of the framework
- November 2010: Cocos2d-x by Zhe Wang (Xiamen, China)
  - Based on C++
  - One codebase for many platforms
- Cocos2d-x is maintained by Chukong Technologies Inc. (Beijing)
  - Latest version 3.10 (Jan 11, 2016)
  - Claimed to be used by more than 400.000 developers worldwide

Basic Concepts: Layer, Scene, Node, Sprite

Layer, Sprite, DrawNode,
Scene, …:
Subclasses of Node

Basic Concepts: Scene Graph



Scene is a special type of node which is used as root

QUIZ!

- What are the necessary statements (assignments) to create the tree structure indicated on the last slide?

Steps to Create a Basic Window

- Create a subclass of `Layer` (here: `SlideShowScene`)
  - Define an initialization method `init()`
- Create a new `Scene` object `scene`
- Create a new object of the subclass of layer (`SlideShowScene`)
  - Add it as a child to the scene object
  - Hand it over to the engine for running
- Engine calls `init()` method for new object
  - Initialization code
  - Schedule functions and actions to be run

Creating a Standard Code Skeleton

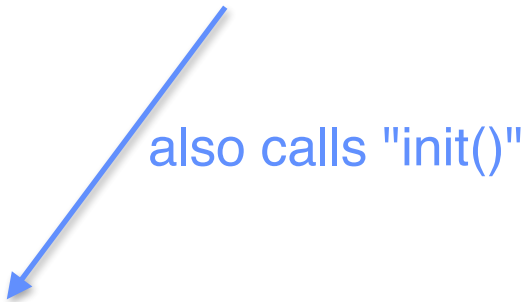
- Using a Python(!)-implemented command for the terminal command line

```
cocos new -l cpp -p slideshow0
  -d /Users/hussmann/cocostest SlideShow0
```

- Creates two classes (four files) with a standard structure
- Following code follows this given structure!

Code Skeleton for Slide Show

```
class SlideShowScene : public cocos2d::Layer {
    …
public:
    static Scene* createScene();

    virtual bool init();

    CREATE_FUNC(SlideShowScene); // implement "static create()" method

    void update(float dt);

};

Scene* SlideShowScene::createScene() {
   auto scene = Scene::create();
   auto layer = SlideShowScene::create();
   scene->addChild(layer);
   return scene;
}

bool SlideShowScene::init() {
  …
}
```



SlideShowScene.hpp
SlideShowScene.cpp

Concepts: AppDelegate, Director

Class AppDelegate is home of the framework

- No need to change much in it!
- Contains the code:

```
auto scene = SlideShowScene::createScene();
director->runWithScene(scene);
```

Director object

- Keeps track of basic properties of application (e.g. size, view)
- Provides access to management of control flow:
  e.g. scheduler, event dispatcher, action manager

AppDelegate.hpp
AppDelegate.cpp

SlideShowScene: Prelude

```
#include "SlideShowScene.hpp"
#include <array>

using namespace cocos2d;

const int NUM_PICS = 4;   //number of available slides
const int INTERVAL = 4;   //interval for slide change, in seconds
const int BORDER = 30;    //size of framing border in design pixels
const Color4F bkgColor = Color4F(255/255.0, 228/255.0, 95/255.0, 1);
                          // Background color (yellowish)

std::array<std::string, NUM_PICS> picFiles =
   {"frog.jpg","cows.jpg","elephant.jpg","tiger.jpg"};
  // Traditional C style would be
  // std::string gPicFiles[NUM_PICS{"frog.jpg","cows.jpg",
        "elephant.jpg","tiger.jpg"};

Size visibleSize;
Size imageSpriteSize;
float originXImg;
float originYImg;
```

QUIZ!

- What is Color4F?
- What is the meaning of a value of 1.0 on fourth position?

SlideShowScene: Initialization (1)

```
bool SlideShowScene::init() {
    // super init first
    if ( !Layer::init() ) {
        return false;
    }

    // Initialize variables
    visibleSize = Director::getInstance()->getVisibleSize();
    Vec2 origin = Director::getInstance()->getVisibleOrigin();
    picIndex = 0;

    // Create DrawNode for image frame rectangle
    imageFrame = DrawNode::create();
    this->addChild(imageFrame);

    // Create sprite for images
    imageSprite = Sprite::create();
    this->addChild(imageSprite);

    // Preload first image and determine image size
    imageSprite->setTexture(picFiles[picIndex]);
    imageSpriteSize = imageSprite->getContentSize();
```

SlideShowScene: Initialization (2)

```
…   // Position the sprite at the center of the screen
    originXImg = origin.x + visibleSize.width/2;
    originYImg = origin.y + visibleSize.height/2;
    imageSprite->setPosition(Vec2(originXImg, originYImg));

    // Draw the border, based on the coordinates and sizes we have computed
    imageFrame->drawSolidRect(
        Vec2(originXImg-imageSpriteSize.width/2-BORDER,
            originYImg-imageSpriteSize.height/2-BORDER),
        Vec2(originXImg+imageSpriteSize.width/2+BORDER,
            originYImg+imageSpriteSize.height/2+BORDER),bkgColor);

    // schedule the update function to be called every INTERVAL seconds
    this->schedule(schedule_selector(SlideShowScene::update), INTERVAL);
    return true;
}


void SlideShowScene::update (float dt) {
    CCLOG("update called, dt = %f, picIndex = %i", dt, picIndex);
    // Increase picIndex and set image according to picIndex
    picIndex = (picIndex+1) % NUM_PICS;
    imageSprite->setTexture(picFiles[picIndex]);
}
```