

Multimedia-Programmierung

Übung 4

Ludwig-Maximilians-Universität München
Sommersemester 2017

Today



Overview – Alternative Engines

libGDX

<https://libgdx.badlogicgames.com/>



<http://www.pygame.org/hifi.html>



<https://unity3d.com/>



<http://www.yoyogames.com/>



SpriteKit for Apple platforms:

<https://developer.apple.com/spritekit/>

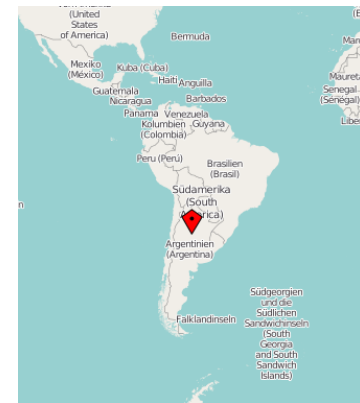


<https://coronalabs.com/>

And many more...

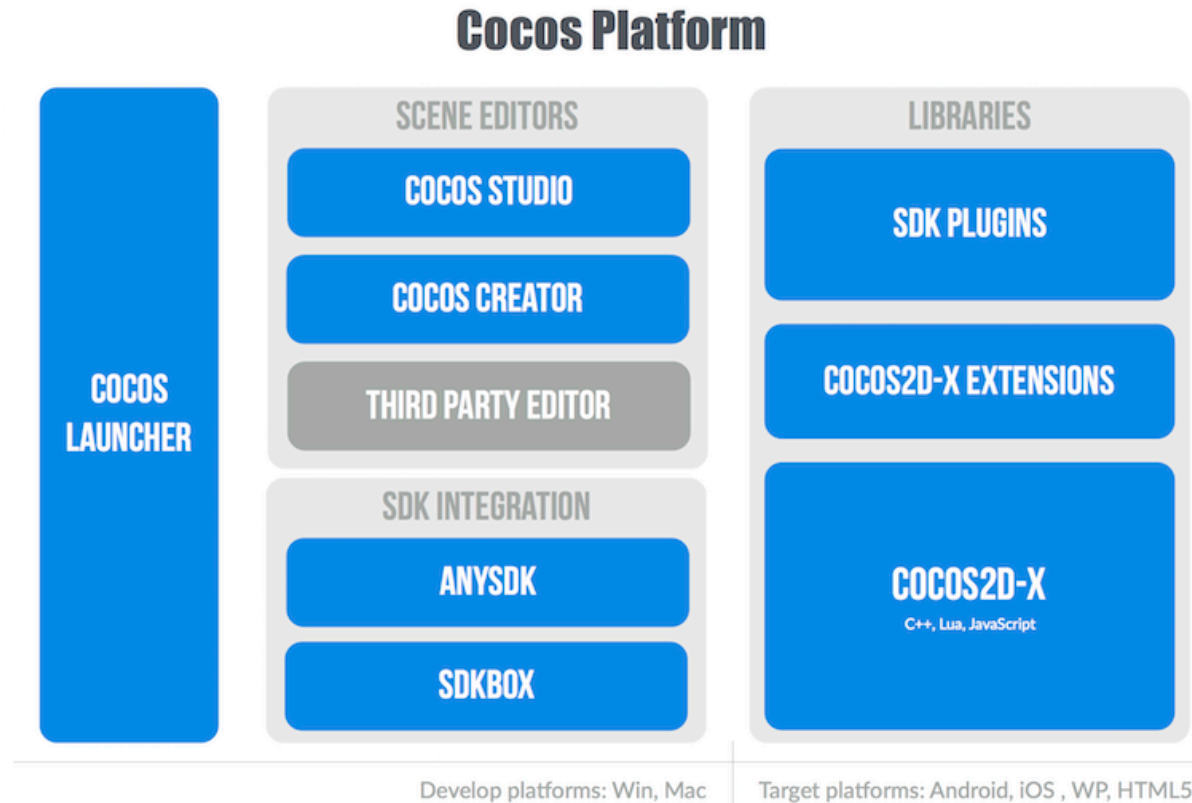
What is Cocos and where does it come from?

- **Cocos2d-x** is an open source, cross-platform game engine
- **Cocos** is a platform to create games, including **Cocos2d-x**, editors, SDK integration



Los Cocos, Argentina

The Platform



<http://www.cocos2d-x.org/docs/cocos/cocos/index.html>

What is a game engine?

<http://www.cocos2d-x.org/docs/programmers-guide/1/index.html>

- A piece of software providing common functionality that all games need
- Important components:
 - Renderer
 - 2d/3d graphics
 - Collision detection
 - Physics engine
 - Animations
 - Sound
- Cross-platform: develop once and deploy to multiple platforms.

Cocos street credibility!?



Many more: <http://www.cocos2d-x.org/games>

Prerequisites


- A working C++ compiler
- Windows: Visual Studio Express
- Mac OS: Xcode
- Python **2.7.x** (version matters!)
- Optional: Android SDK
- And of course: cocos2d-x

<http://www.cocos2d-x.org/docs/static-pages/installation.html>

<http://www.cocos2d-x.org/docs/installation/A/index.html>

Installation and Use of Cocos

<http://www.cocos2d-x.org/products>



Cocos

Cocos is a free and professional game-development toolkit, that enables developers to quickly create game content and remove the tedious work by simplifying it with straightforward GUI editors.

Cocos includes: the Cocos2d-x game engine, a game development environment and project management tool. With this suite, developers can focus on their roles and enjoy a better streamlined workflow. This saves game studios time and money by allowing them to collaborate with ease, and focus on what they do best to achieve better quality and faster turnaround time.

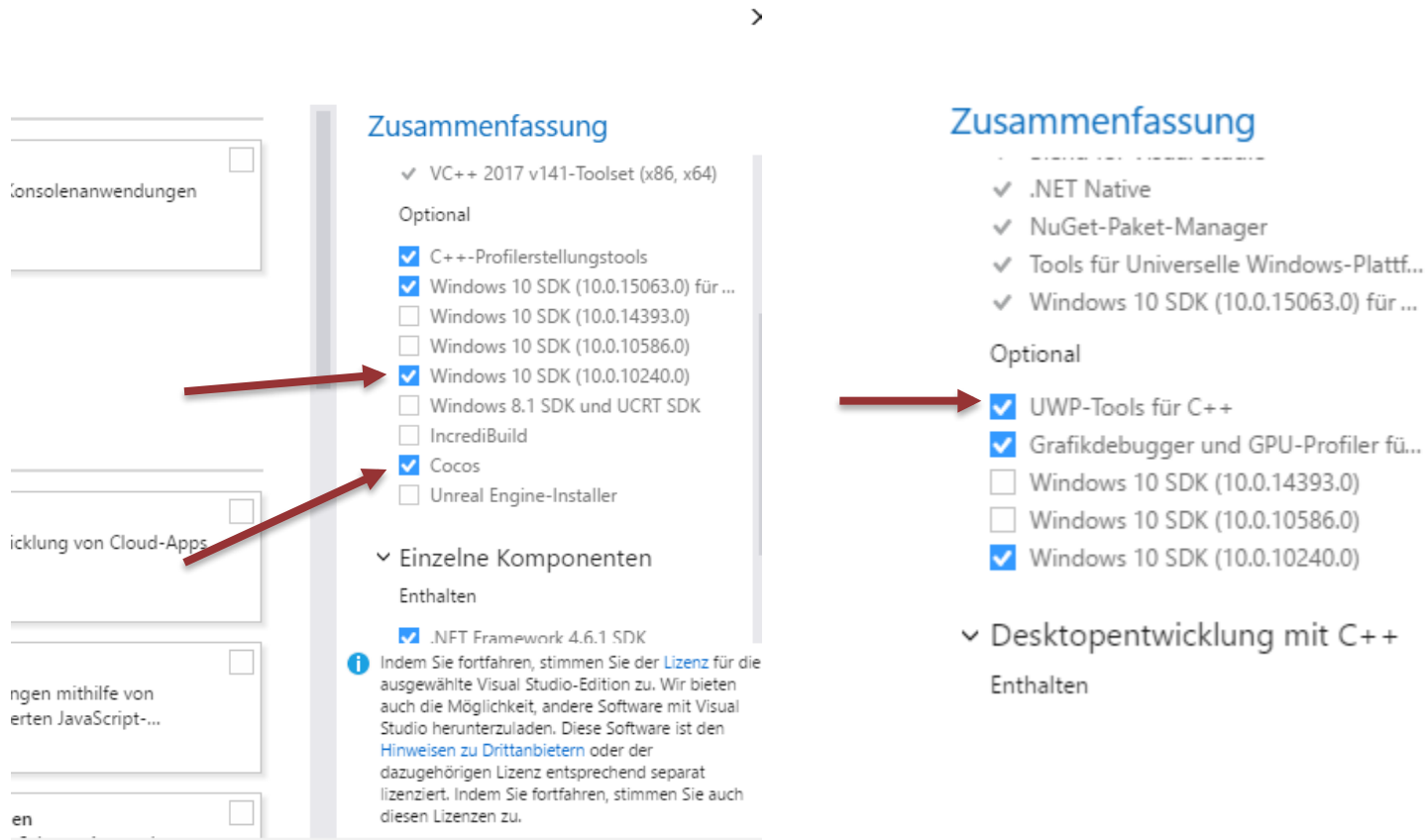
[DOWNLOAD](#)

Installation via Command Line

- Download cocos2d.zip from <http://www.cocos2d-x.org/download>
- Unzip and cd into that folder
- Use “python setup.py” to set environment variables
- Skip all SDK setups with Enter
- Restart concole

Setup Visual Studio 2017

Check the following tools in the Visual Installer



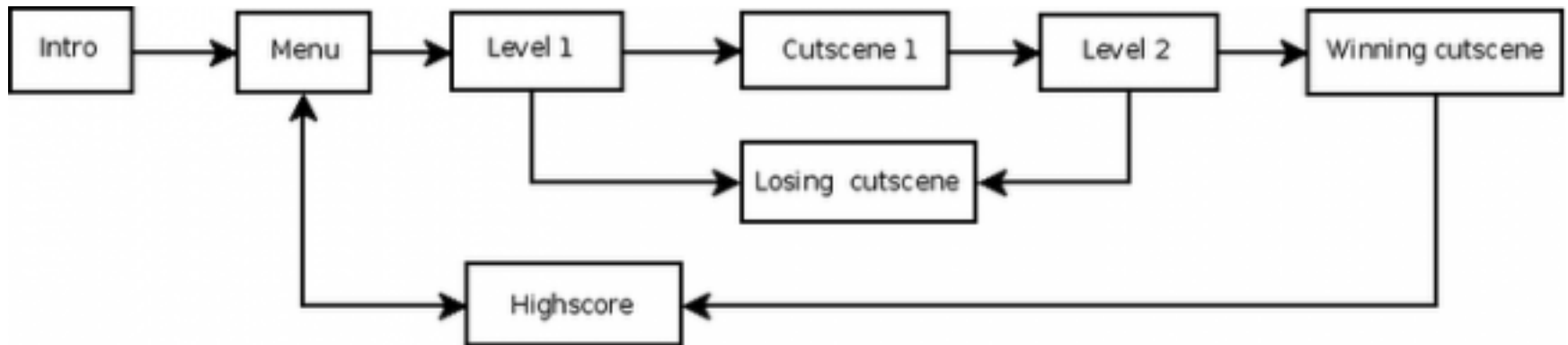
Cocos2d-x basics

Core concepts:

Director, Scene, Node, Sprite, Action

Cocos2d-x basics: Director

- Singleton object, always accessible
- Used to control game flow



Cocos2d-x basics: Scene

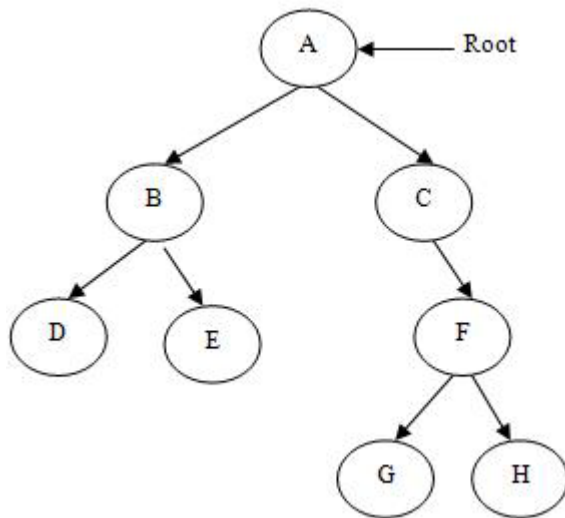
- Typical scenes: main menu, levels, game over
- Renders graphical scene objects

Game example: Banana Kong



Cocos2d-x basics: Scenegraph

- Tree structure
- Arranges graphical scene objects in parent-child relationships
- Contains *node* objects



Nodes in this scene?



Cocos2d-x basics: Sprites

- 2D images that can be moved and transformed
- Example: main character, enemies etc...
- Configurable properties: position, rotation, scale, opacity, color



Cocos2d-x basics: Actions

- Action objects make a *Node* perform a change to its properties over time
- Example: move a sprite from one position to another over a span of time
- Example Actions: *MoveBy*, *Rotate*, *Scale*
- Applicable to all Node objects
- Also available: *sequences* and *spawns* of actions

Building a new Project

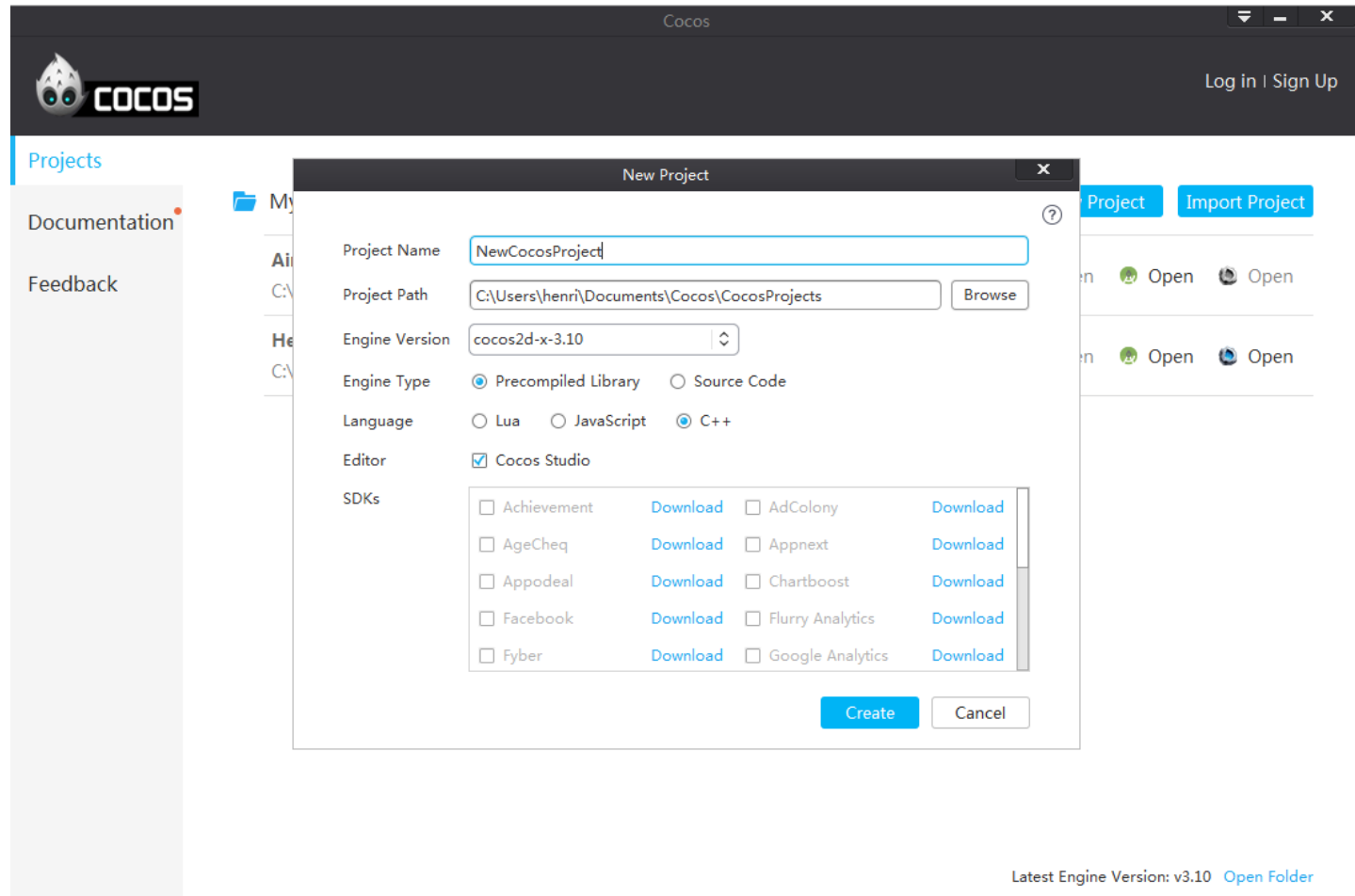
Using Cocos GUI:

<http://www.cocos2d-x.org/docs/cocos/cocos/index.html#using-cocos>

Using the command line tool (only for Python 2.7):

http://www.cocos2d-x.org/docs/editors_and_tools/cocosCLTool/index.html

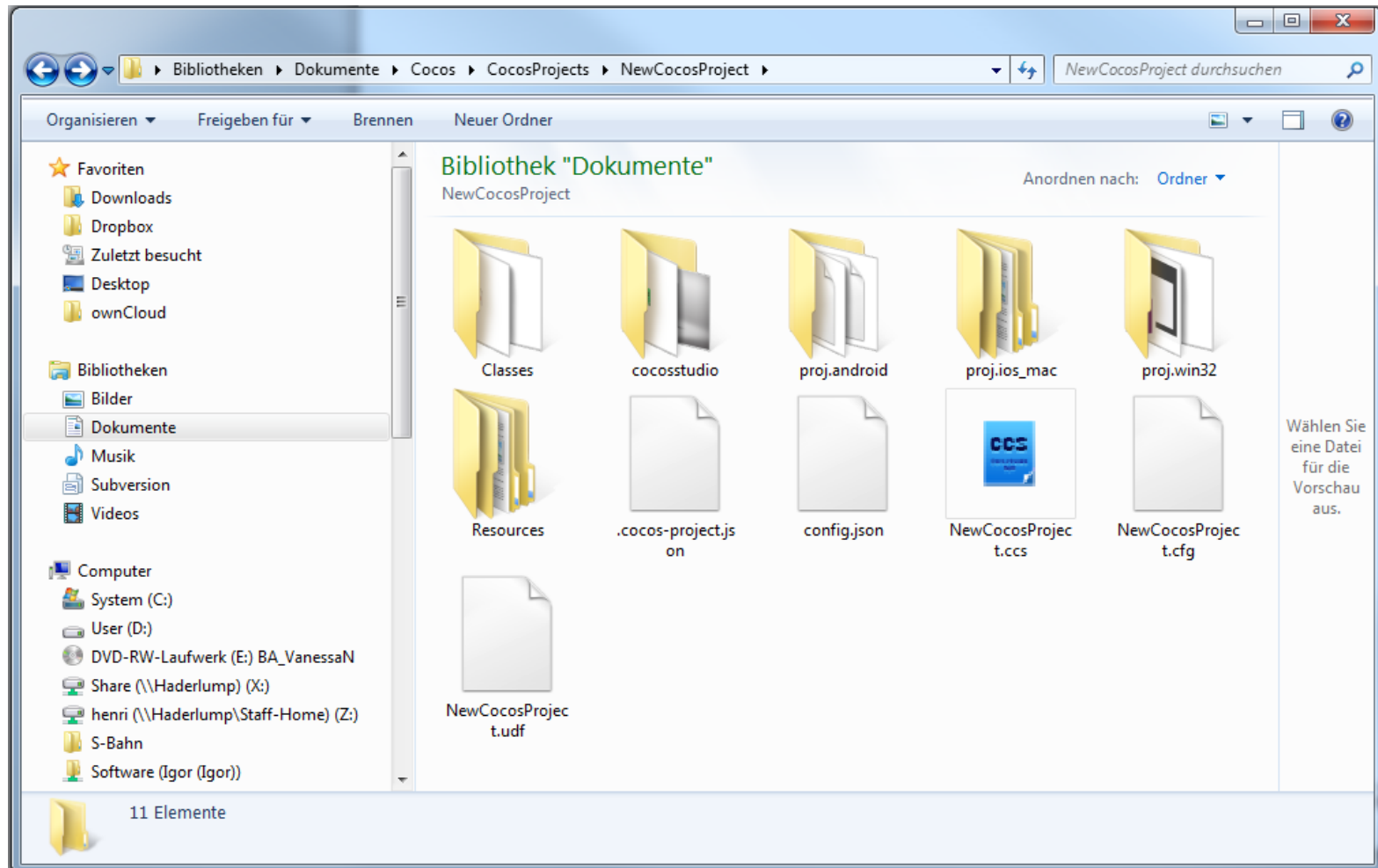
Building a new Project using the GUI



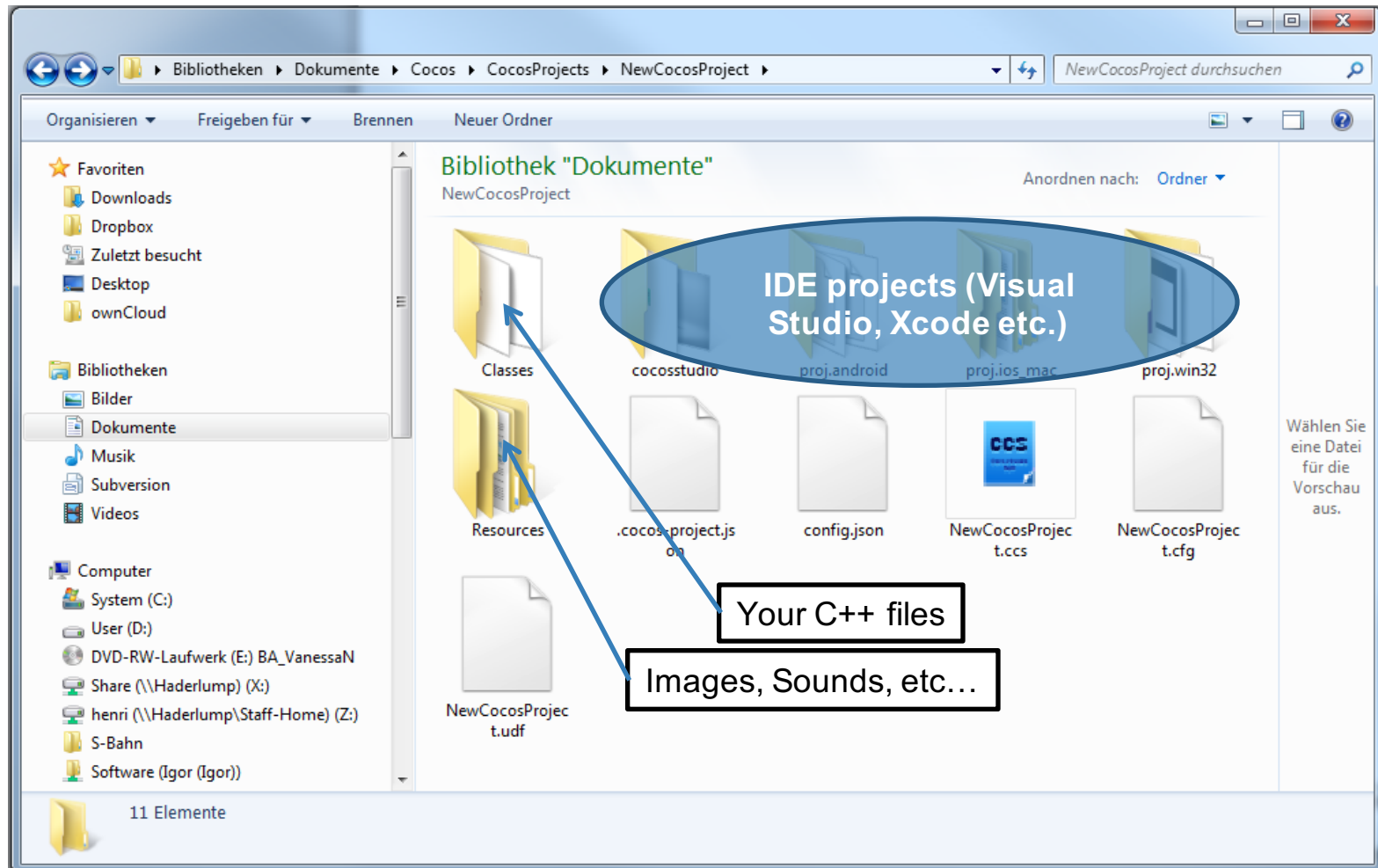
Building a new Project using the Terminal

- Check `python --version`
- Version 2.7.x use command:
`cocos new -p ProjectName -d PathToDirectory`
- Version 3.6.x need to install Python 2.7 and use console tool from cocos folder
- **`cd cocos2d-x-3.15\tools\cocos2d-console\bin`**
- Windows: **`py -2.7 cocos.py new ...`**
- Mac: **`python2 cocos.py new ...`**

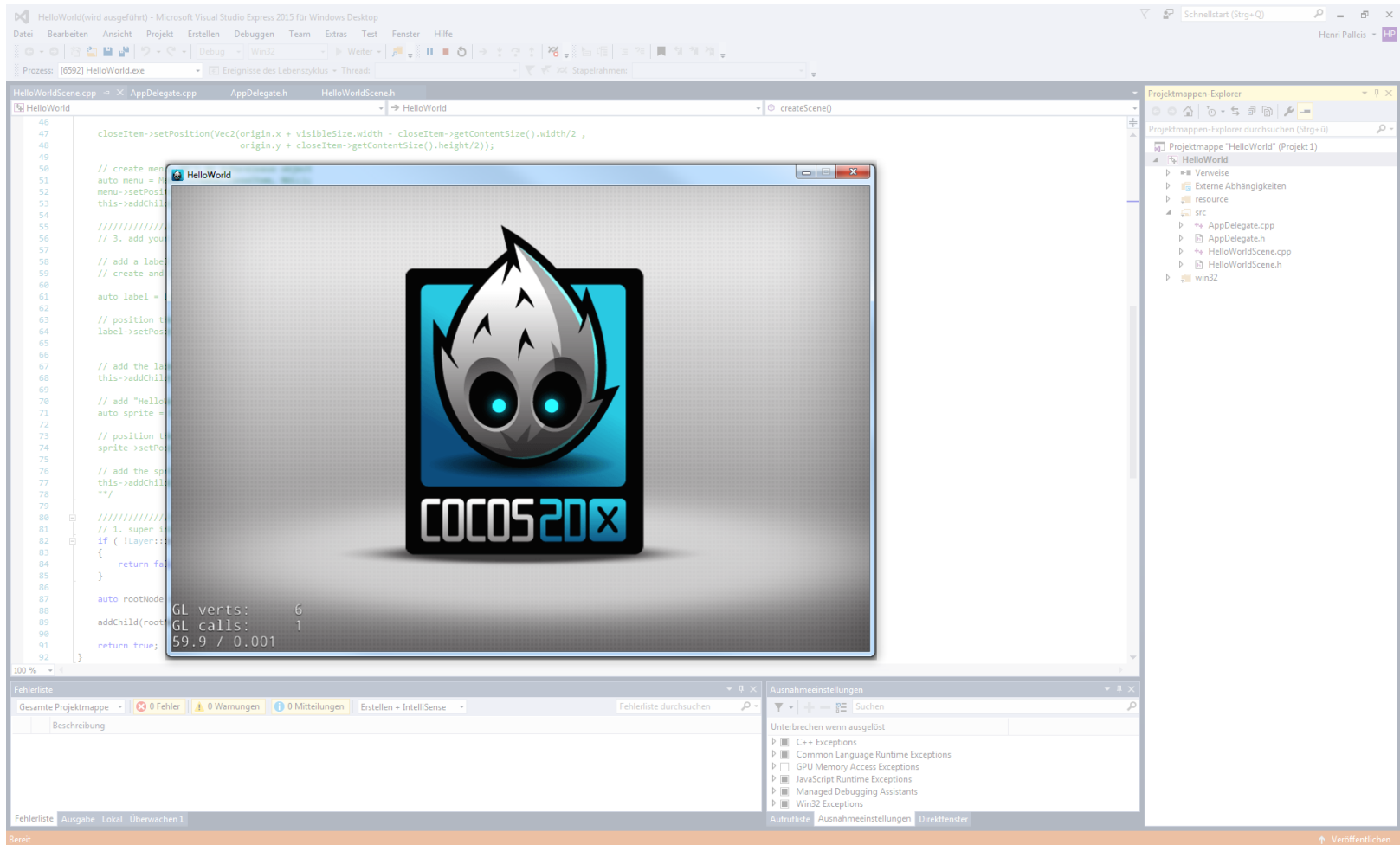
Result



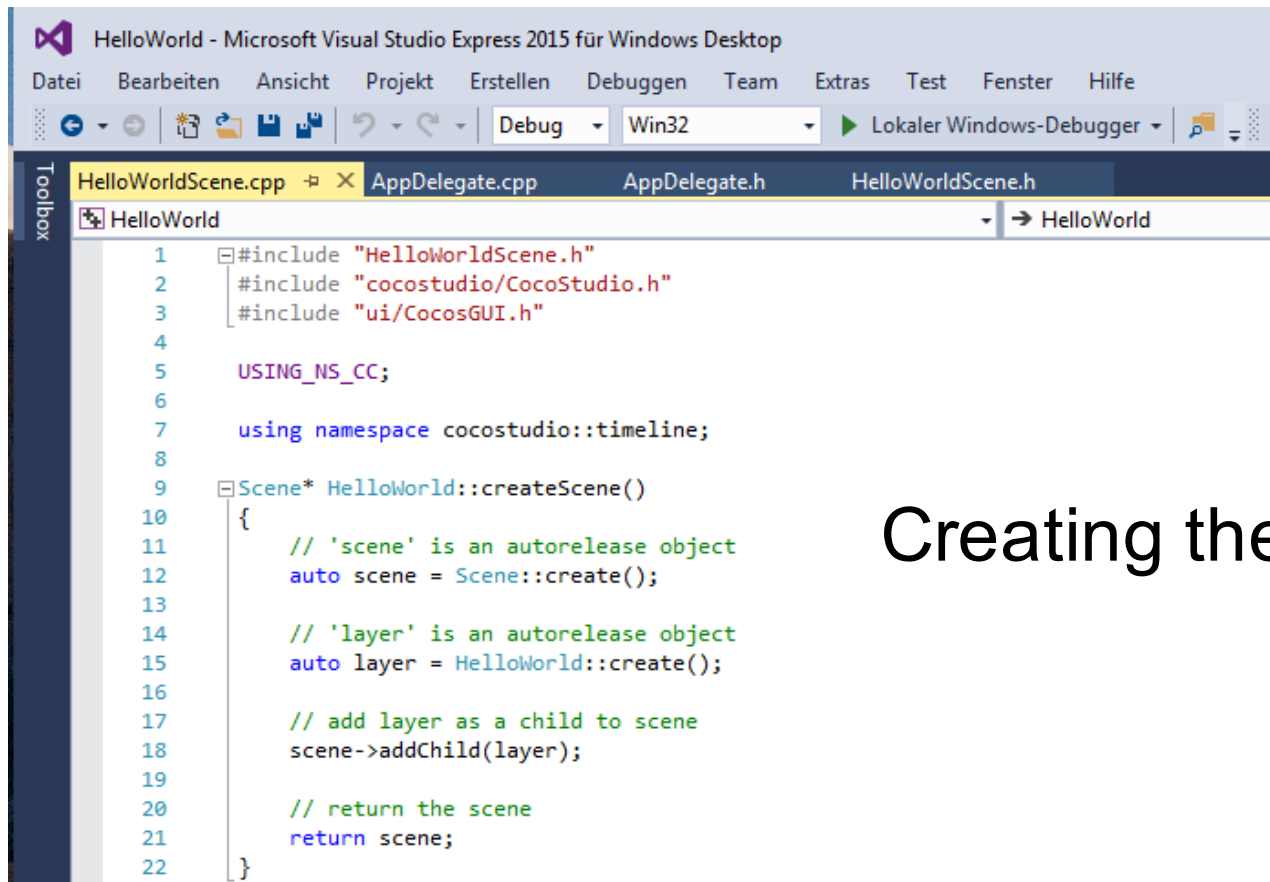
Result



Hello World – Auto-generated App



Hello World – HelloWorldScene.cpp



```
1  #include "HelloWorldScene.h"
2  #include "cocosstudio/CocoStudio.h"
3  #include "ui/CocosGUI.h"
4
5  USING_NS_CC;
6
7  using namespace cocosstudio::timeline;
8
9  Scene* HelloWorld::createScene()
10 {
11     // 'scene' is an autorelease object
12     auto scene = Scene::create();
13
14     // 'layer' is an autorelease object
15     auto layer = HelloWorld::create();
16
17     // add layer as a child to scene
18     scene->addChild(layer);
19
20     // return the scene
21     return scene;
22 }
```

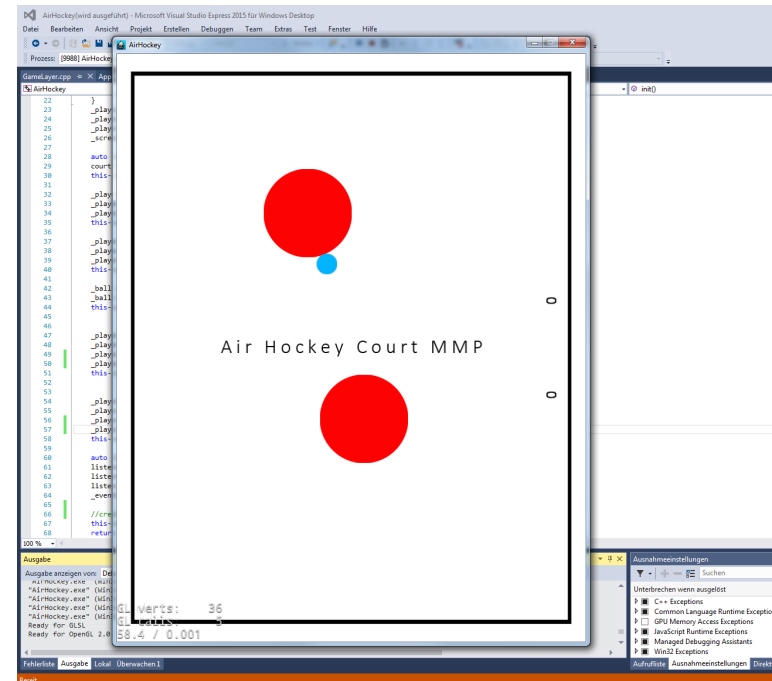
Creating the scene

Hello World – AppDelegate.cpp

```
24
25 bool AppDelegate::applicationDidFinishLaunching() {
26     // initialize director
27     auto director = Director::getInstance();
28     auto glview = director->getOpenGLView();
29     if(!glview) {
30         glview = GLViewImpl::createWithRect("HelloWorld", Rect(0, 0, 960, 640));
31         director->setOpenGLView(glview);
32     }
33
34     director->getOpenGLView()->setDesignResolutionSize(960, 640, ResolutionPolicy::SHOW_ALL);
35
36     // turn on display FPS
37     director->setDisplayStats(true);
38
39     // set FPS. the default value is 1.0/60 if you don't call this
40     director->setAnimationInterval(1.0 / 60);
41
42     FileUtils::getInstance()->addSearchPath("res");
43
44     // create a scene. it's an autorelease object
45     auto scene = HelloWorld::createScene();
46
47     // run
48     director->runWithScene(scene);
49
50     return true;
51 }
```

Using the director
to run the game
with the scene

Today's Project: A small game!



Airhockey-Game

3 Classes:

- AppDelegate
to run the Game
- GameLayer ← Focus on GameLayer
includes the game function
- GameSprite
for the movable objects (players + ball)

Airhockey-Game: GameLayer

Create init () which includes

- 2 player and 1 ball

```
_player1 = GameSprite::gameSpriteWithFile("res/mallet.png");  
_player1->setPosition(Vec2(_screenSize.width * 0.5, _player1->radius() * 2));  
_players.pushBack(_player1);  
this->addChild(_player1);
```

- EventListener

```
auto listener = EventListenerTouchAllAtOnce::create();  
listener->onTouchesBegan = CC_CALLBACK_2(GameLayer::onTouchesBegan, this);  
listener->onTouchesMoved = CC_CALLBACK_2(GameLayer::onTouchesMoved, this);  
listener->onTouchesEnded = CC_CALLBACK_2(GameLayer::onTouchesEnded, this);  
_eventDispatcher->addEventListenerWithSceneGraphPriority(listener, this);
```


Airhockey-Game: GameLayer (2)

Create update()

```
void GameLayer::update(float dt) {
    auto ballNextPosition = _ball->getNextPosition();
    auto ballVector = _ball->getVector();
    ballVector *= 0.98f;
    ballNextPosition.x += ballVector.x;
    ballNextPosition.y += ballVector.y;
    float squared_radii = pow(_player1->radius() + _ball->radius(), 2);
    for (auto player : _players) {
        auto playerNextPosition = player->getNextPosition();
        auto playerVector = player->getVector();
        float diffx = ballNextPosition.x - player->getPositionX();
        float diffy = ballNextPosition.y - player->getPositionY();
        float distance1 = pow(diffx, 2) + pow(diffy, 2);
        float distance2 = pow(_ball->getPositionX() - playerNextPosition.x, 2)
            + pow(_ball->getPositionY() - playerNextPosition.y, 2);
        if (distance1 <= squared_radii || distance2 <= squared_radii) {
            float mag_ball = pow(ballVector.x, 2) + pow(ballVector.y, 2);
            float mag_player = pow(playerVector.x, 2) + pow(playerVector.y, 2);
            float force = sqrt(mag_ball + mag_player);
            float angle = atan2(diffy, diffx);
            ballVector.x = force * cos(angle);
```

Airhockey-Game: GameLayer (3)

Define Eventlistener

- onTouchBegan
- onTouchMoved
- onTouchEnded

```
void GameLayer::onTouchesBegan(const std::vector<Touch*> &touches, Event* event)
{
    for (auto touch : touches) {
        if (touch != nullptr) {
            auto tap = touch->getLocation();
            for (auto player : _players) {
                if (player->boundingBox().containsPoint(tap)) {
                    player->setTouch(touch);
                }
            }
        }
    }
}
```

Links

http://www.cocos2d-x.org/wiki/External_Tutorials

<http://wizardfu.com/book/cocos2d-x/tutorial/>

<http://www.gamefromscratch.com/page/Cocos2d-x-CPP-Game-Programming-Tutorial-Series.aspx>