

# Γραφικά Υπολογιστών

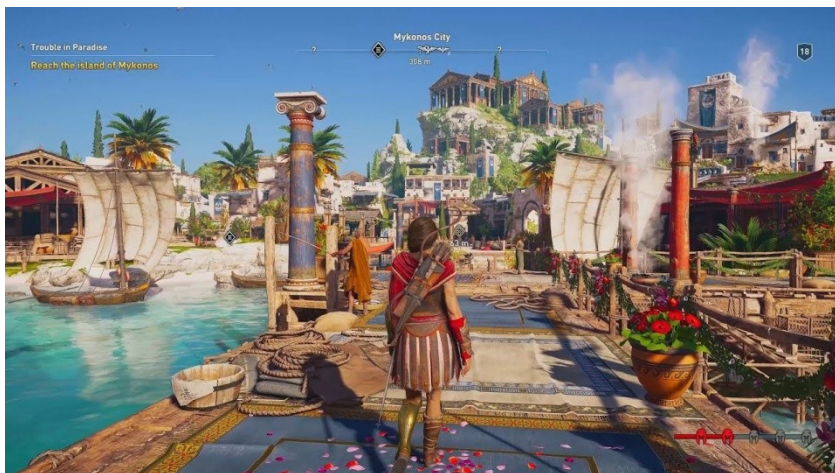
Ιόνιο Πανεπιστήμιο  
Τμήμα Πληροφορικής

Στέργιος Παλαμάς, Επίκουρος Καθηγητής



# Μάθημα 3:

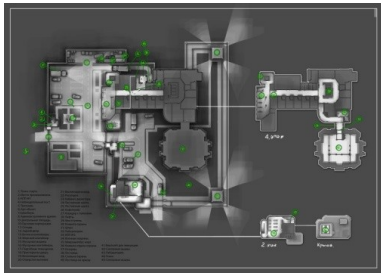
Μηχανές Γραφικών



Εικόνες από σύγχρονα δημοφιλή παιχνίδια

Name	Year	Developer	Publisher	Platform	Development cost (million US\$)	Marketing cost (million US\$)	Total cost (million US\$)	Total cost with 2019 inflation (million US\$)
<i>Red Dead Redemption 2</i>	2018	Rockstar Studios	Rockstar Games	PC, PS4, Stadia, Xbox One	170–240 <sup>[1]</sup>	200–300 <sup>[1]</sup>	370–540 <sup>[1]</sup>	379–550
<i>Star Citizen</i>	–	Cloud Imperium Games	Cloud Imperium Games	PC	275+ <sup>[2]</sup>	45+ <sup>[2]</sup>	320+ <sup>[2]</sup>	320+
<i>Cyberpunk 2077</i>	2020	CD Projekt Red	CD Projekt	PC, PS4, PS5, Xbox One, Xbox Series X, Stadia	174 <sup>[3]</sup>	142 <sup>[3]</sup>	316 <sup>[4]</sup>	316
<i>Call of Duty: Modern Warfare 2</i>	2009	Infinity Ward	Activision	PC, PS3, Xbox 360	50	200	250 <sup>[5]</sup>	298
<i>Grand Theft Auto V</i>	2013	Rockstar North	Rockstar Games	PC, PS3, PS4, Xbox 360, Xbox One	137 <sup>[6]</sup>	128	265 <sup>[7]</sup>	291
<i>Star Wars: The Old Republic</i>	2011	BioWare	Electronic Arts, LucasArts	PC	200 <sup>[8]</sup>		200+ <sup>[8]</sup>	227+
<i>Halo 2</i>	2004	Bungie	Microsoft Studios	PC, Xbox, Xbox One	40 <sup>[9]</sup>	80 <sup>[10]</sup>	120 <sup>[9]</sup>	217
<i>Marvel's Avengers</i>	2020	Crystal Dynamics	Square Enix	PC, PS4, Stadia, Xbox One, PS5, Xbox Series X			170+ <sup>[11]</sup>	170+
<i>Destiny</i>	2014	Bungie	Activision	PS3, PS4, Xbox 360, Xbox One	<140 <sup>[12]</sup>	<140 <sup>[12]</sup>	140 <sup>[12]</sup> <sup>[13]</sup> <sup>[14]</sup>	151
<i>Dead Space 2</i>	2011	Visceral Games	Electronic Arts	PC, PS3, Xbox 360	60 <sup>[15]</sup>	60	120	136
<i>Final Fantasy VII</i>	1997	Square	Square, Sony Computer Entertainment	PS1	40–45 <sup>[16]</sup> <sup>[17]</sup>	40–100 <sup>[18]</sup> <sup>[17]</sup>	80–145	127–231
<i>Shadow of the Tomb Raider</i>	2018	Eidos Montréal	Square Enix	PC, PS4, Xbox One	75–100 <sup>[19]</sup>	35	110–135	112–137
<i>Grand Theft Auto IV</i>	2008	Rockstar North	Rockstar Games	PS3, Xbox 360, PC			100+ <sup>[20]</sup>	119+
<i>APB: All Points Bulletin</i>	2010	Realtime Worlds	Electronic Arts, Realtime Worlds, Deep Silver (PS4, XB1)	PC, PS4, Xbox One			100 <sup>[21]</sup>	117
<i>Max Payne 3</i>	2012	Rockstar Studios	Rockstar Games	PC, Xbox 360, PS3	105 <sup>[22]</sup>		105 <sup>[22]</sup>	117
<i>Battlefield 4</i>	2013	EA DICE	Electronic Arts	PC, PS3, PS4, Xbox 360, Xbox One	100 <sup>[23]</sup>		100	110
<i>Deadpool</i>	2013	High Moon Studios	Activision	PS3, PS4, Xbox 360, Xbox One, PC			100 <sup>[24]</sup>	110
<i>Disney Infinity</i>	2013	Avalanche Software, Altron (3DS)	Disney Interactive Studios	PS3, Xbox 360, Wii, Wii U, 3DS, PC			100 <sup>[25]</sup>	110
<i>Tomb Raider</i>	2013	Crystal Dynamics	Square Enix	PC, PS3, PS4, Xbox 360,			100 <sup>[26]</sup>	110





Level / Game Designer



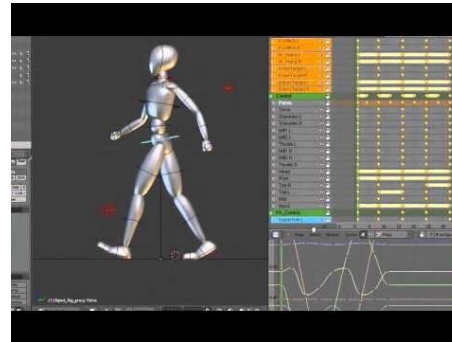
Character Designer



Weapon Designer



Sound Designer



Animator



3D modeler

```
368 int lcd_create_map_value_to_empty_value
369 {
370     memset(empty,0,0);
371     int i = 0;
372     int tmp;
373
374     tmp = percent1 / 10;
375     printf("percent1 = %d, tmp = %d\n", percent1, tmp);
376     for(i = 7; i >= 0 ;i--)
```

Game programmer



Έτοιμα Set κινήσεων



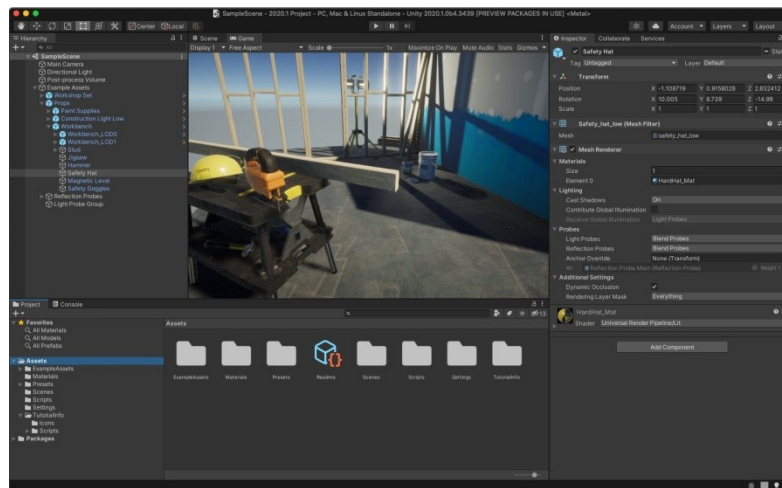
κτήρια



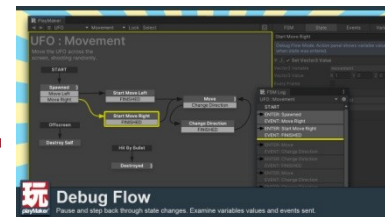
Ηχητικά εφέ



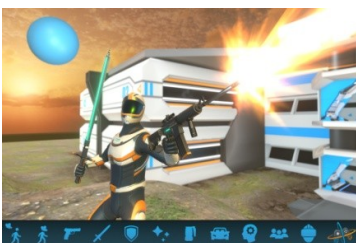
Έτοιμοι χαρακτήρες



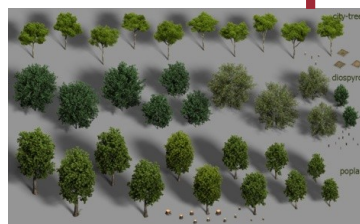
Game Engine



Εργαλεία οπτικού προγραμματισμού



Πλαίσια παιχνιδιών (frameworks)



Αντικείμενα



Οπτικά Εφέ



Real Time Strategy Game (RTS)



First Person Action / Adventure

## Δημοφιλή Game Engines





## Pre-rendered Graphics

VS

## Real-time graphics

1991



2009



2022



Τα Game Engines παρέχουν έτοιμες υλοποιήσεις για σημαντικά υπο-συστήματα όπως:

- physics
- input
- rendering
- scripting
- collision detection
- artificial intelligence (game a.i.)