

Working in The Computer Game Industry

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Human Code/Sapient 2000

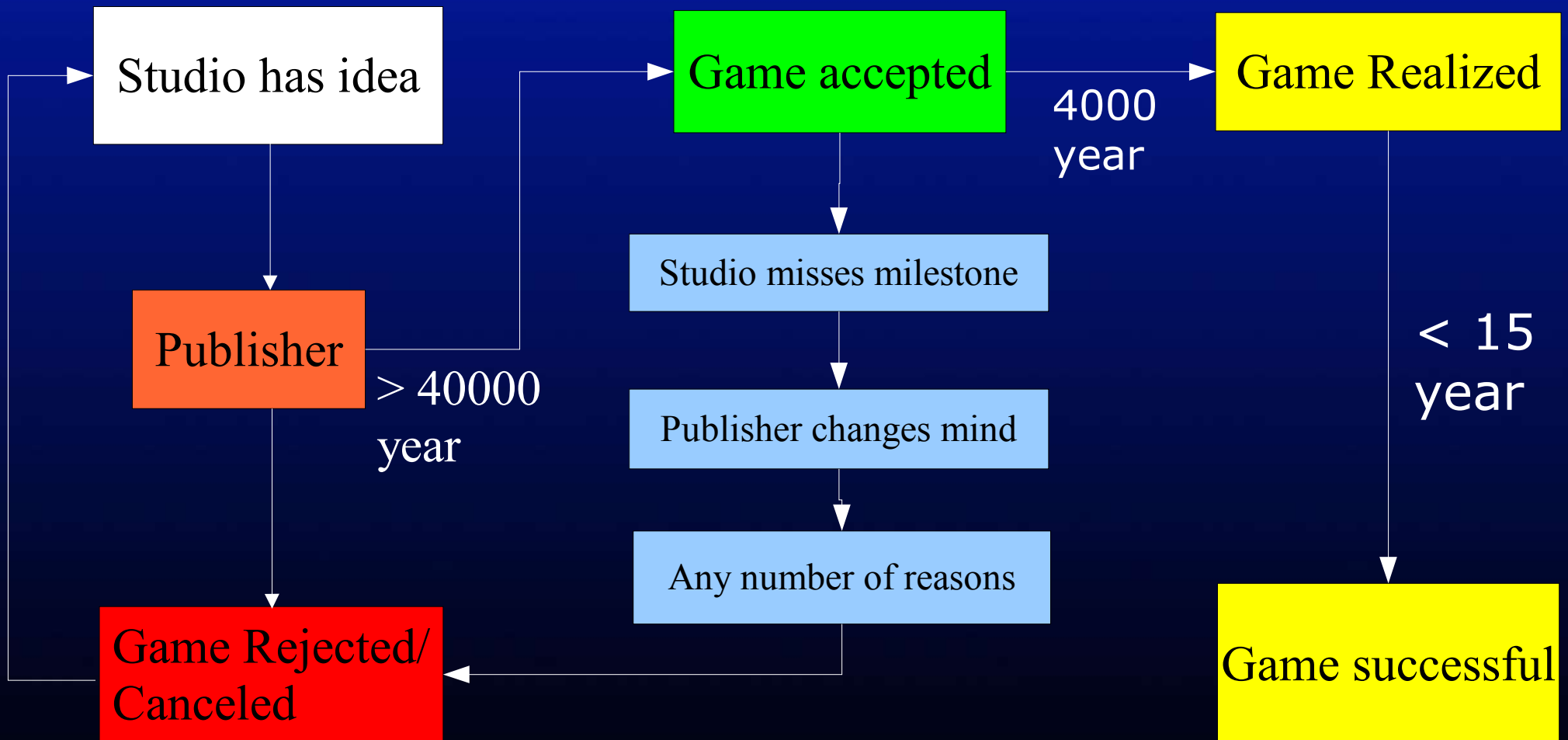
Business Model

How games get funded and created (simplified)

- Studio has a great idea
- Pitch idea to a publisher
- Publisher likes it and funds it
- Studio builds game
- Producer puts game into production
- Game box ends up on your favorite store shelf for everyone to buy

Business Model

How games get funded and created (real world)



Business Model

How games get funded and created (real world)

- Only studios that create a game that ships >300,000 copies get royalties
- Typically studio gets 5% of royalties, publisher gets 95%
- Publishers can own all intellectual property used in the game, so the studio has to start from scratch if they work for another publisher
- Very few people in the game industry drive Ferraris

Careers in Computer Game Creation

- Artist
- Designer
- Audio (Musician/Sound effects)
- Developer
- Producers

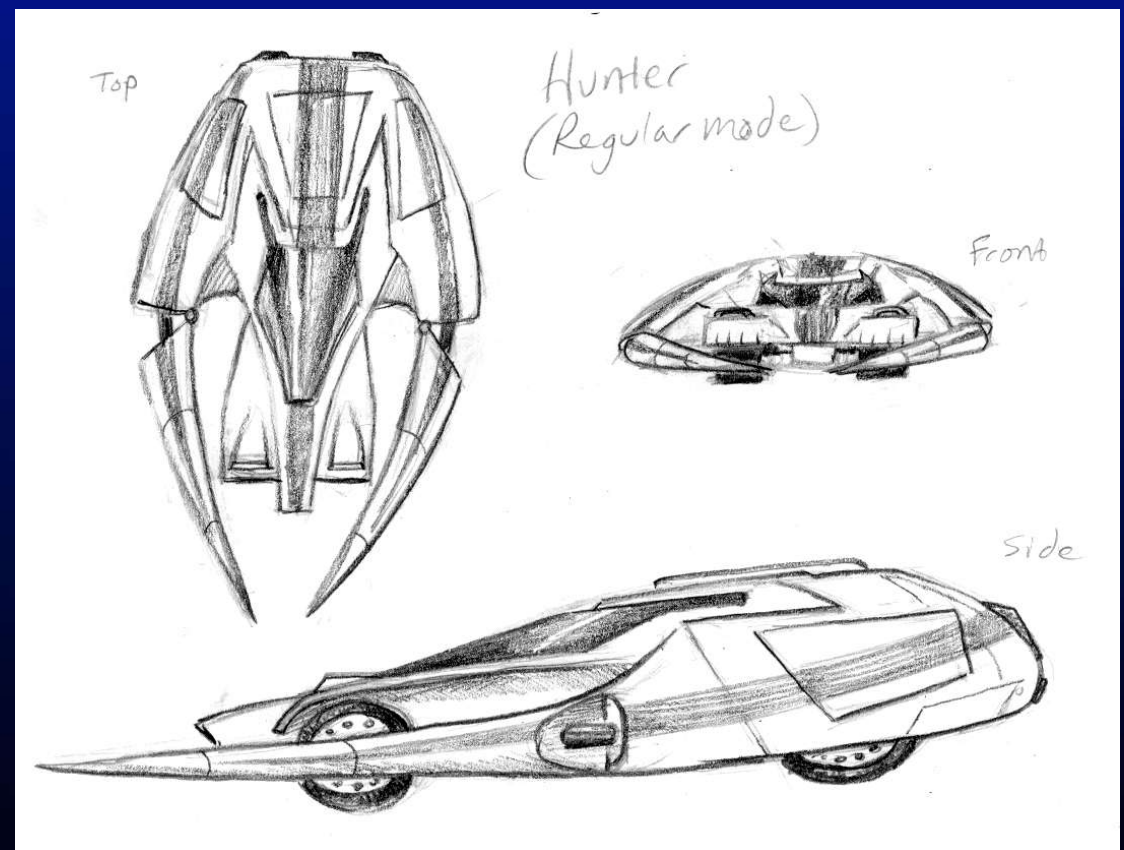
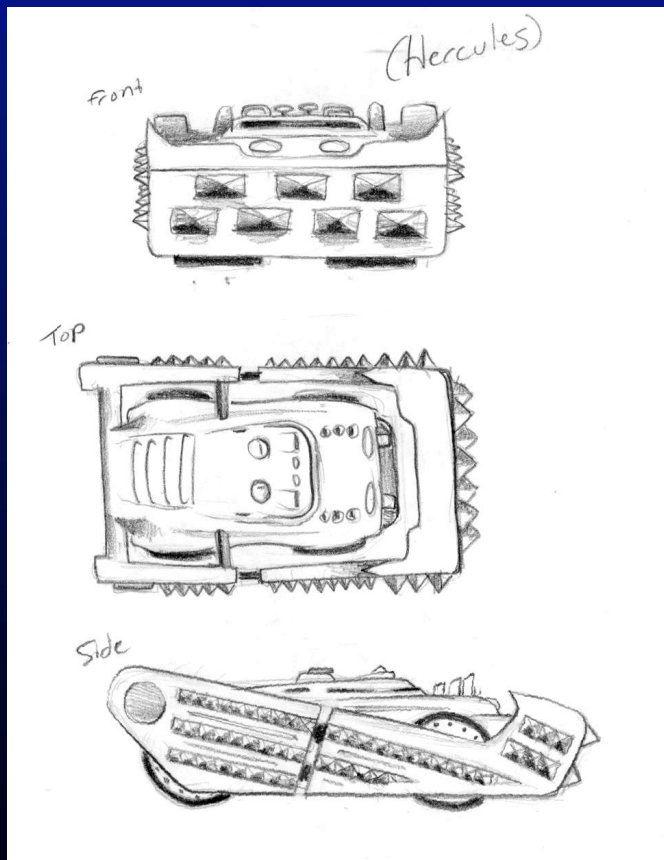
Artist

- Role
 - Create all the visual game content for computer games
- Education
 - College degree desired
 - Varies, personal interaction with BFA (Bachelor Fine Arts)
- Skills relative to interactive game construction
 - Produce the best looking content while working within the technical game constraints
 - Ability to visualize 3D space
 - Experience with popular software packages
 - Maya
 - SoftImage
 - 3D Studio Max

Conceptual Artwork

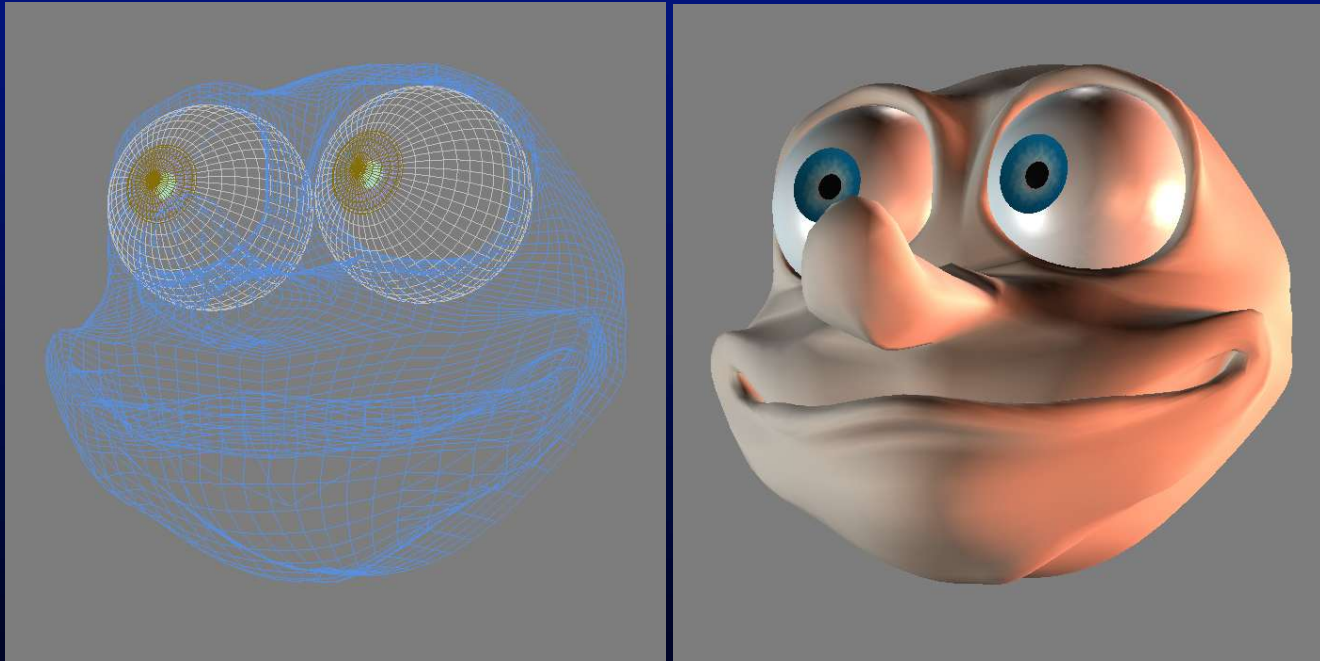


Conceptual Artwork



Artwork

3D Data



Tool Demos

- PhotoShop
 - Bitmap graphics editor
 - Used for creating concept work and textures for 3D models
- Rhinoceros
 - Dedicated 3D modeler (NURBS)
- Maya
 - Commonly used application used for generating 3D game content

Designer

- Responsible for overall design of game
- Has vision of what the game should ultimately be

Designer (cont.)

- Defines all or part of the following areas:
 - Story line
 - Game play
 - Rules
 - Characters
 - Personalities
 - Strengths/Weaknesses
 - Sounds (what, where, when, and why)
 - Level layouts
 - Number of levels
 - Camera angles
 - Art elements, look and feel
 - Create character AI (Artificial intelligence) depends on AI and the designer skills (shared with game developer typically)

Designer (cont.)

- Education
 - College degree preferred
 - Varies, can be from a technical or creative discipline
- Skills
 - Creative (needs many ideas)
 - Good written skills (documentation)
 - Must love games in general, not just playing but thinking about them and dissecting a game to its smallest components
 - Attention to detail

Designer trends*

- Recently designers are being separated into two classifications
 - Game design, rules and more high level design
 - Level design or 3D layout
- Design is being pushed into the art realm as scenes are getting higher quality as hardware gets faster

*Recent input from John Talley, Technology director ion storm

Audio

(Musicians/Sound Effects)

- Role
 - Create original sound tracks and effects sounds for game
- Education
 - College degree preferred. Varies, typically someone one with either a musical background or technical
- Skills
 - Ability to compose music
 - Understand latest recording techniques
- Samples
 - Human Code
 - Slot car game

Developer

- Role
 - Design and implement the actual game (Programming/Engineering)
- Education
 - Varies, typically BSCS, BSCE or related engineering field
- Skills
 - Math
 - Physics
 - AI
 - Software engineering
- Sample
 - Slot car demo

Producer

- Responsible for managing the game development
 - Budget
 - Personnel needs
 - Handles communication between studio & publisher
 - Handles licensing issues
 - Any other roles as necessary
- College degree preferred (BA, MBA)

Basics of 3D Computer Graphics

- Ultimately everything you see on your screen is:
 - Points
 - Lines
 - Triangles
- All triangles are typically texture mapped to improve realism
- 3D Games created today all use hardware acceleration for the rendering process

Some Problems of Computer Game Development

- Graphics (speed improvements)
 - Why
 - Games are real-time interactive environments which need to provide 24+ frames/sec to provide good game play
 - Hardware, although vastly improved needs to be even faster
 - Give an artist a polygon, he will ask for 100x more
 - How
 - Culling example (Frustrum)
 - Muti-resolution mesh example (mrm)
 - Many, many other algorithms

Additional Problems of Computer Game Development

- AI (Artificial Intelligence)
 - Why
 - Path finding demo (astar algorithm)
 - Computer opponent (chess, first person, strategy)
- Different platforms
 - PC vs. Consoles
 - PC are difficult to develop for because of the vast differences in hardware and software
 - Consoles are easier to develop for because the hardware and software are a known and don't change for a product (i.e. Xbox, PS2 etc.)
 - Good development abstracts the differences so that only those parts that are different need to be modified

Case Study

- Slot car demo
 - Shown at Siggraph and Comdex in 2000
 - Design by John Talley, Tony Asleson, Mark Rose
 - Developed by Tony Asleson
 - Artwork by Mark Rose (www.markrose.com)
- Created to show new technology by Macromedia and Intel (contracted by Intel)

Slot Car Demo

- Idea (game design)
 - Design Document

Slot Car Demo Artwork

- Stills
- Models
 - Room
 - Car
- Interface
 - 2D

Slot Car Demo

- Background
- Technology used
 - Intel/Macromedia
- What is intended outcome?
 - Immersive 3D content on the web with the use of the Shockwave plugin

Slot Car Demo

Problems to Solve

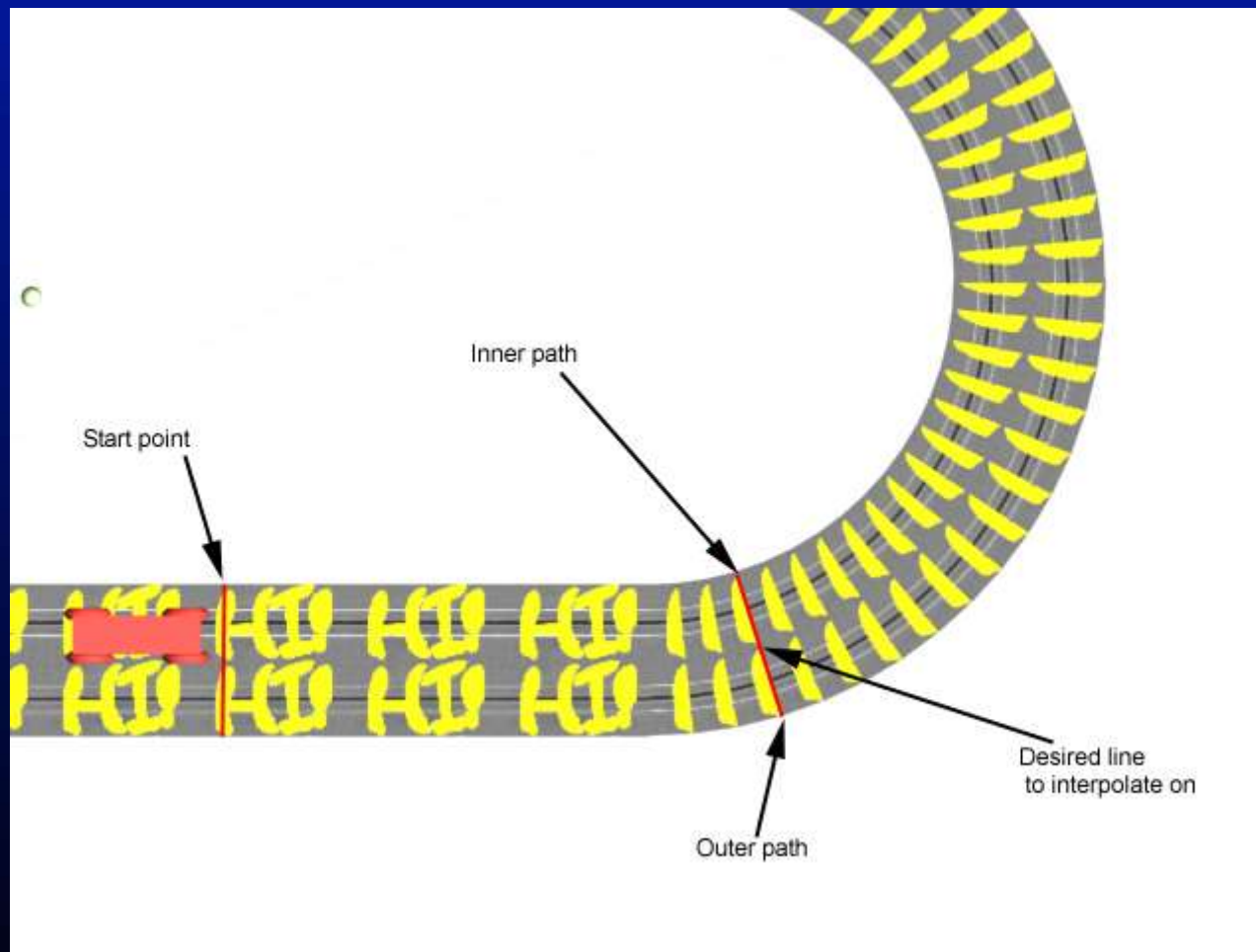
- Path generation
- Physics (Ridge body physics demo)
 - Crashing
 - Sliding
 - Banking
- 3D Sound System
- Computer Opponents (AI)
- Collision Detection

Slot Car Demo

Path Construction

- Why
 - Need a way to represent the track so that the slot cars can operate upon it
- Solution
 - Two splines, one on each side of the track that are used, using a Hermite Spine Algorithm

Path Diagram



Slot Car Demo

Physics

- The slot car game is an accurate real-time simulation of slot car physics
 - Centripetal force is calculated
 - The car can handle higher g-forces on banked corners
 - Cars will slide in corners if the speed is high enough, will crash if speed exceeds cornering ability

Slot Car Demo

3D Sound System

- Every object that emits sound is coordinated by the sound system
- Sound varies by distance and orientation of listener in respect to the sound source
- Sound system is priority based
 - Sounds are given priorities and only those sounds with the 6 highest priorities are played (Technology from Macromedia allows for 6 simultaneous channels playing)
- Slot car game has sound for each car, train and background music. Event sounds for crashes into another car or when a car leaves the track

Slot Car Demo

Artificial Intelligence

- Needed the ability to have computer controlled opponents
 - Simple algorithm employed
 - Car takes a look at how fast it is currently moving and where it will be in the future. It then calculates what it's centripetal acceleration will be in the future and if it is below our threshold we increase speed or decrease speed accordingly
 - Problems
 - Too difficult for human opponents to beat with current controls (computer controlled car makes no mistakes)

Slot Car Demo

Collision Detection

- What is collision detection?
 - Ability to determine when two 3D objects come into contact with each other
- Slot car demo collision detection uses a simple spherical detection system
 - Each of the cars and the train has "hidden" spheres, and when they collide an event is created

Other Challenges

Just when your game went platinum

- The more popular your game becomes, the more likely someone will compromise it (To cheat)
 - Reverse engineer
 - Snoop packets (Aim bots)
 - Client side memory location manipulation
 - Exploit design flaws in game
 - Example: Quake zigzag, bunny hopping and rocket jump

Final remarks

- The computer games industry is very competitive as it is viewed as “fun”, like any other entertainment field
- Requires exposure plus education to land an interview. Education alone will not guarantee success in this field.
- Things that help:
 - Create your own levels or modifications to existing games
 - Create full feature demos that demonstrate your abilities
 - Knowing someone in the field :-)

Final remarks

(The Ugly)

- Expect long hours due to wicked schedules
 - Origin used to have the 100 club, (Work 100 hours in a week!) Either working or sleeping
- Burnout rate is very high
- Games are very seasonal, miss the schedule and miss the profits!

Additional Information

Recommended reading

Computer Graphics Principles & Practice (Foley, VanDam, Feiner, Hughes)

Interactive Computer Graphics with OpenGL (Angel)

3D Game Engine Design (Eberly)

Real-Time Rendering (Mooler, Haines)

Mathematics for Computer Graphics Applications (Mortenson)

The Geometry Toolbox for Graphics and Modeling (Farin, Hansford)

Physics for Game Developers (Bourg)

Game Programming Gems (DeLoura)

Additional Information

web sites

<http://www.realtimerendering.com>

<http://www.igda.org/>

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

<http://www.gamedev.net/>

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

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