History of Computer Games

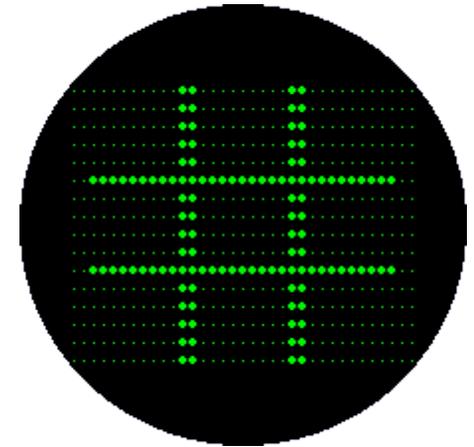## John E. Laird and Sugih Jamin
EECS Department
Updated 9/6/06

Derived from The Ultimate Game Developer's Sourcebook
The First Quarter: A 25 year history of video games, S.Kent
and sources on the WWW

Pre-historic

First "games"

- # 1952
  - ## TicTacToe:
  - ## A.S.Douglas on a EDSAC vacuum-tube computer

- # 1958
  - ## Tennis for Two:
    - ### Willy Higginbotham on an oscilloscope connected to analog Donner computer

```
[OXO]
T56K
[M3]
PFGKIFAFRDLFUFOFE@A6FG@E8FEZPF
@&#9!8!7!!!!!!!!*NOUGHTS!AND!CROSSES
@&#6!5!4!!!!!!!!*!!!!!!!!BY
@&#3!2!1!!!!!!!!*A!S!DOUGLAS#N!*C#M1952
@&@&*LOADING!PLEASE!WAIT#MMM
..PK
T45KP192F   [H-parm]
T50KP512F   [X-parm]
T46KP352F   [N-parm]

T64K
GKT48KP@TZ
[&-sequence]
P4FPFP1FP2FP3FP4FP8FP10FP12FP16F
P300FP32FAHOFU1FU2FK4098FM1FA2DPF
```

1960's and Early 1970's

- 1961-1962 SpaceWar! developed at MIT using vector graphics on PDP-1

- Sega releases Periscope:
  - electronic shooting game - first arcade game
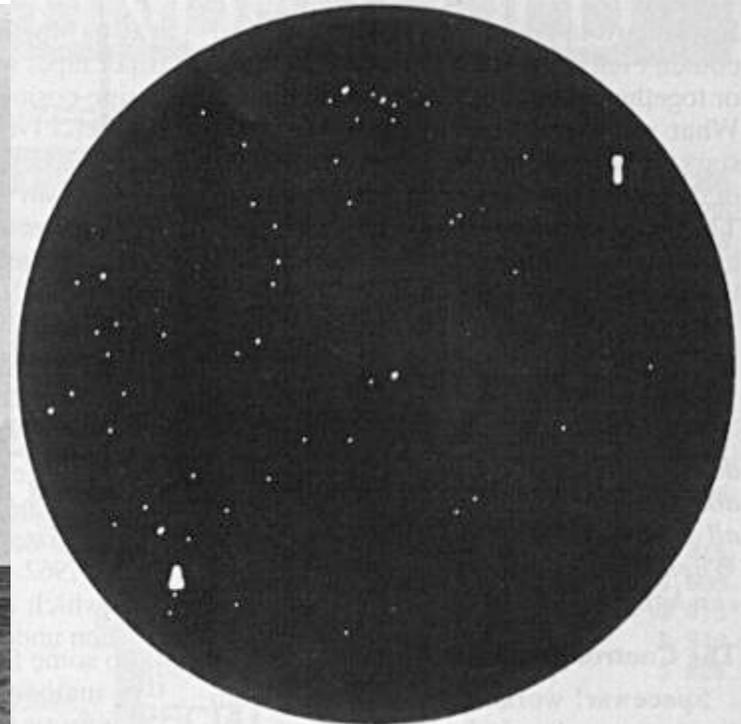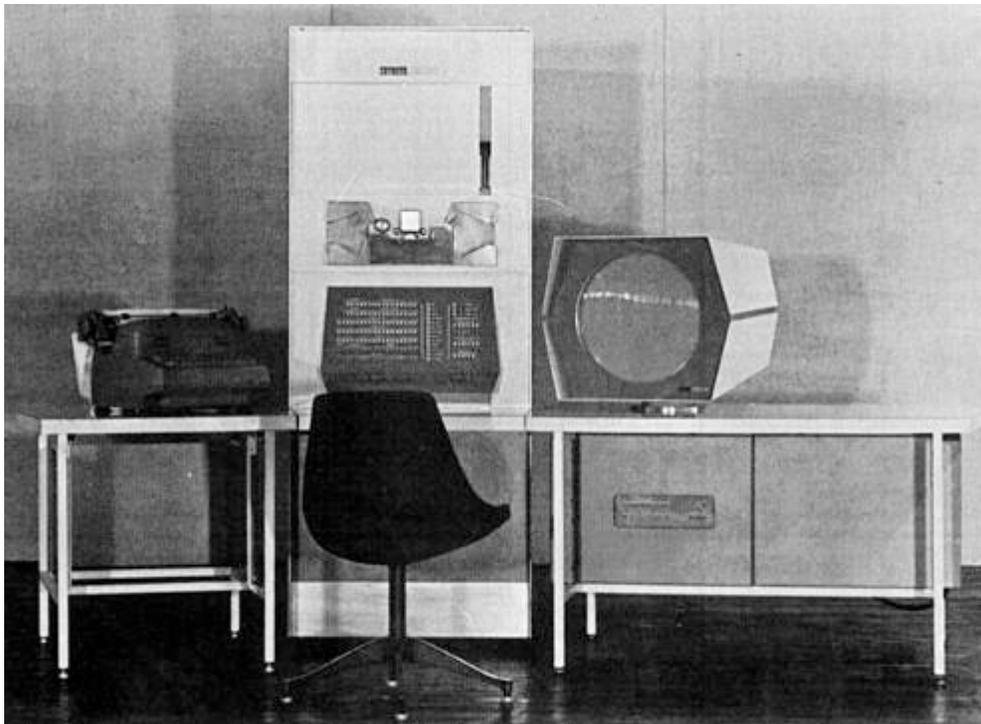
Classical Age

1971-1974
Birth of Commercial Games

- 1971:
  - Nolan Bushnell [Nutting] develops Computer Space
    - First commercial arcade game
    - Based on SpaceWar
    - Vector graphics, but really cool real-time space game
    - Too sophisticated for market. Fails
- 1972:
  - Bushnell starts Atari
    - Named after a move in GO
  - Odyssey by Magnavox – "Hockey"
    - First home TV game – analog not digital
    - 100,000 sold - $100/console –
- 1973:
  - Pong in Arcades by Atari
    - Sued by Magnavox
    - A huge hit in bars, pinball arcades, …
- 1974:
  - Kee releases Tank
    - Fake spinoff from Atari
    - First game to use ROM
  - Atari:
    - First racing game (*Trak 10*) & maze chase game (*Gotcha*).

1972-1976

- ## Adventure: The Colossal Cave
  - ### William Crowther and Don Woods
  - ### First text-based adventure game
 - ### Ran on DEC mainframes (PDP-10)

Late-70's: Atari Expands

- 1976: Bushnell sells Atari to Warner for $26 Million
  - Warner markets Pong to home as a single game
  - BREAKOUT designed by Steve Wozniak, "commissioned" by Steve Jobs
- 1977: Atari introduces the 2600 VCS
  - First home game console with multiple games
  - 2K ROM, 128 Bytes of RAM
  - Very successful – 6M sold by 1980
- 1977: Apple starts selling the Apple II
- 1978:
  - Adventure for Atari comes out
    - Sold 1M copies, first Easter Egg
    - first graphical action/adventure game
  - Space Invader developed by Taito in Japan
- 1979:
  - Activision is formed by Atari developers
    - Third party development houses start up
  - Atari 800 introduced - 8-bit
  - First MUD by Trubshaw & Bartle
    - First online multiplayer game
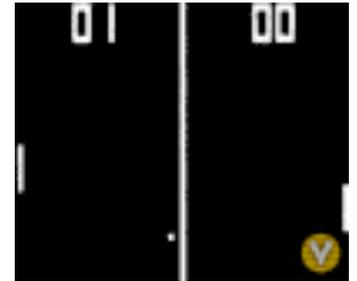
Medieval Times

1980-1981: Rise

- 1980:
  - Phillips Odyssey2 (1978) and Mattel Intellivision
    - Mattel had better graphics, but terrible controller
  - Namco has Pac-Man
    - >$1 billion ($2.3 in 1997 dollars)
    - 300,000 arcade units sold since introduction
  - Atari doing $1 billion:
    - Asteroids & Battlezone released
  - Williams releases Defender
  - Zork released by Infocom, Ultima released
- 1981:
  - Game industry > $6 billion in sales
  - Nintendo: Donkey Kong [converted Radarscope]
  - Galaxian, Centipede, Tempest, Ms. Pac-Man
  - IBM introduces the IBM PC
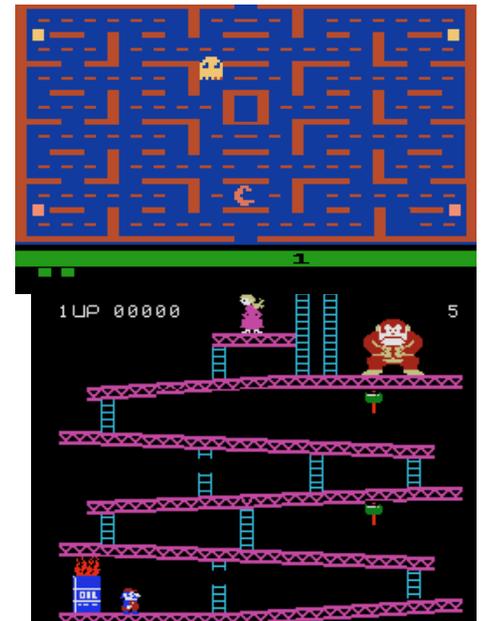
1982: Clouds ahead

- Atari sales down 50% -- starts to lose $$'s
  - Releases 5200
  - But it still controlled 80% of the market
  - Atari buys rights to ET for $22 Million
  - Produced more PacMan cartridges than systems

- Activision releases Pitfall

- ColecoVision gets Donkey Kong

- Game companies start just for home computers
  - Sierra On-Line, Broderbund, BudgeCo

- Electronic Arts is formed

1983: The Dark Ages

- Mattel losses $225 million from Intellivision
  - Doesn't ship the Aquarius
  - Loses as much as it had made the four prior years.
- Atari loses money
  - Market flooded with poor quality games:
  - Fox, CBS, Quaker Oats, Chuck Wagon dog food
- Coleco crashes
  - Saved by Cabbage Patch Kids
- Commodore 64 - home computer
  - 17-22 million total sold
- Dragon's Lair released
  - Laserdisk
 - 6 years to make - Bluth Studios

Crash & Resurgence

- ## 1984:
  - Industry drops to below $800 M
  - Apple introduces the Macintosh
    - Birth of modern computer: good resolution, sound
    - Games not a priority
    - 100,000 sold in first six months
  - King's Quest is released by Sierra On-Line
- ## 1985:
  - Nintendo introduces Nintendo Entertainment System
    - Strict control on software
      - Lockout chip, and restricts companies to 5 games/year
      - Nintendo sells cartridges to software distributors
  - Atari tries to come back with 16-bit 520ST
    - Computer and Game system
 - Carmen Sandiego released by Broderbund

Failed Competition

- 1986:
  - Commodore ships Amiga: cool but marketing kills it.
    - Computer system designed to support games – 3D color
    - Developed by Atari hardware engineer Jay Miner.
  - Sega ships Sega Master System console.
    - Technically superior to Nintendo, but it ignores third-party developers and fails because of lack of games (and maybe Nintendo pressure on developers).
  - Atari ships 7800
  - Nintendo outsells competitors 10 to 1
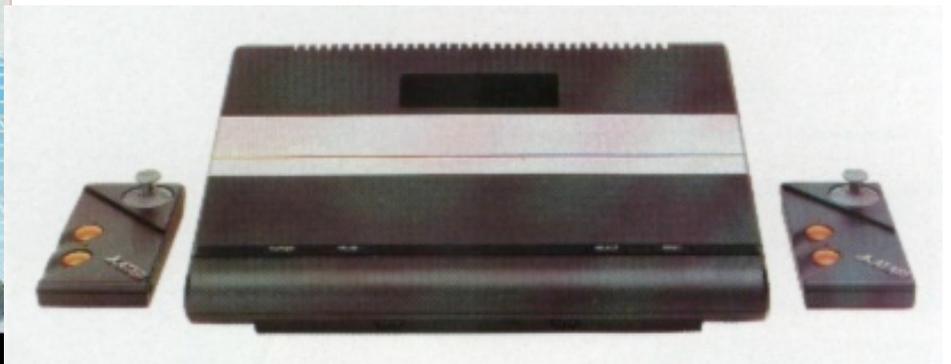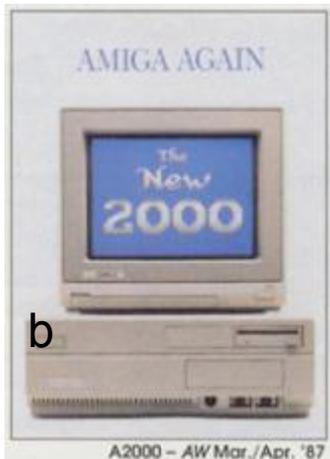
1987-1989 The Renaissance

- 1987:
  - Electronic Arts releases their first in-house game:
    - Skate or Die.
  - Serious games start to show up for IBM PC's.
    - VGA and SVGA help
- 1988
  - Tetris imported from Soviet Union
  - Coleco files for bankruptcy
- 1989:
  - Sega Genesis is released: 16-bit
    - Attacks console market with EA sports titles
    - Aggressive marketing at older market (> 13 year old)
  - Nintendo sticks with 8-bit
    - Releases Gameboy
  - Maxis releases SimCity
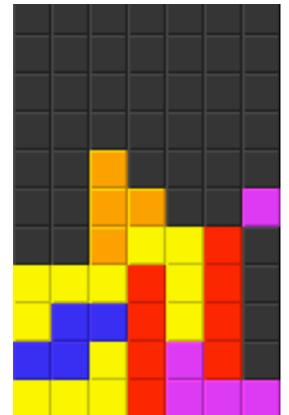
Console Wars

- 1990:
  - Nintendo releases Super Mario 3 - all-time best-seller 11M
  - Amiga and Atari ST die out
  - PC's and Consoles are major game platforms
  - Electronic Arts starts to acquire other game publishers
- 1991:
  - Nintendo launches Super-NES (16-bit)
  - S3 introduces first single chip graphics accelerator for PC
  - Capcom releases Street Fighter II for arcades – big hit
  - id releases Wolfenstein 3D
  - Civilization released
- 1992:
  - PC gaming explodes: Dune II
  - Nintendo has $7 billion in sales ($4.7B in U.S.)
    - Has higher profits than all U.S. movie and TV studios combined
  - Midway releases Mortal Kombat for arcades – extreme violence

Industrial Age

More Wars

- 1993:
  - Pentium chip is launched
  - Consoles (Sega and Nintendo) are 80% of game market
  - Panasonic ships Real-3DO: 32-bit (now out of business)
  - Caesar released

- 1994:
  - Atari ships Jaguar: 64 bit
    - Very expensive for console ~$700, >$100/game
    - Neither 3DO or Jaguar does particularly well
  - DOOM released by id
  - MYST released
    - all time biggest selling PC game until 2002
  - Warcraft: Orcs and Humans released

32-bit Wars

- 1995:
  - Sega ships Saturn (32-bit)
  - Sony ships Playstation (32-bit)
  - Microsoft releases Window 95
    - Includes the Game SDK - Direct-X
    - Bring major game performance to Windows
  - Internet and WWW expanded
  - Command & Conquer released
  - Full-motion video becomes a part of games: 7th Guest

Playstation

- Launched in U.S., Sept. 1995
- 300,000 polygons/sec., 30MIPS processor, 4MB RAM, 2MB VRAM
- 400 U.S. Titles
- 20% penetration in U.S. homes
- Analysis:
  - Multi-platform games look worse on Playstation
  - Playstation-only games look good, but grainy
 - Cheap and lots of them for software developers

1996-1998

- 1996:
  - Nintendo ships Nintendo 64
    - Originally promised for 1995
  - Multi-player gaming goes commercial
    - Via modem and internet and network companies
      - TEN, Mplayer, …
    - First commercial MMOG: Meridian59
- 1997:
  - 3D acceleration starts to standardize on 3D-FX
    - Games start to assume 3D acceleration
  - Pentium II's at 200Mhz make "serious" game machines
  - Ultima Online launches – first MMORPG in 3D (isometric view)
  - Age of Empires, Total Annihilation released
- 1998:
  - Lots of good PC games: StarCraft, CivII, Caesar III released
  - Playstation rules consoles
  - NCSoft's Lineage, most popular MMORPG, launched in S. Korea

Nintendo 64

- Launched in U.S., Sept 1996
- 93.75 MH 64 Bit CPU, 64-bit MIPS co-processor
  - over 500,000,000 16-bit operations/sec
  - Built-in Pixel Drawing Processor (RDP)
- 4.5MB RAM, 150,000 polygons/sec
- Originally aimed at younger market
- Cartridge makes it very expensive
- Very dependent on software
- Legend of Zelda: Ocarina of Time generates more revenue in last 6 weeks of 1998 than any film
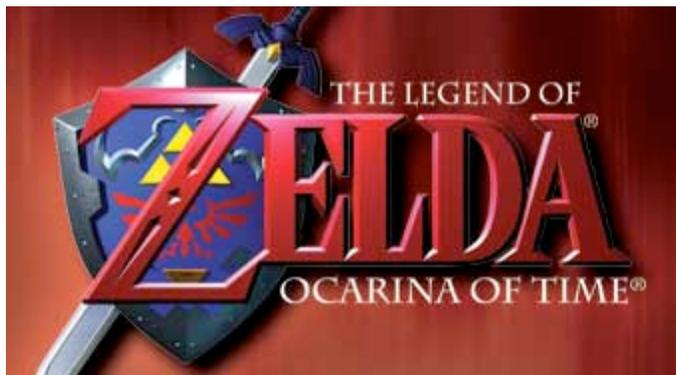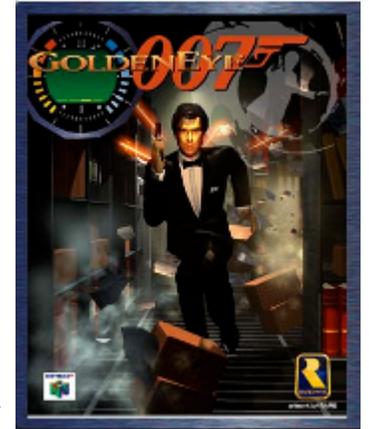
Modern Times

1999-2001
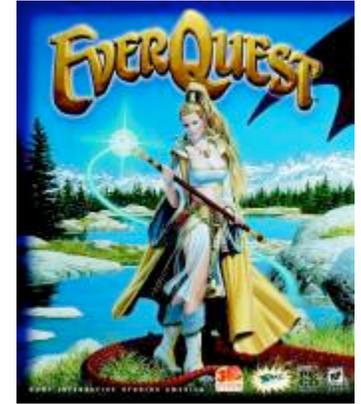
- 1999
  - Dreamcast
  - Maximum Score for Pac-Man Achieved
    Billy Mitchell achieves the highest possible score for Pac-Man when he completes every board and winds up with a score of 3,333,360
  - EverQuest is launched: first non-wireframe 3D MMORPG
  - SM Alpha Centauri released, BigHugeGames founded
- 2000
  - Development moves from PC to consoles
  - Playstation II
  - Diablo II sells 1 million units in 1 week
  - SIMS sells 2.3 million units ($95M)
    - + 1.4 mill. in expansions
  - Shogun: Total War released
- 2001
  - Gamecube (Nintendo)
  - Xbox (Microsoft)
  - CivIII released

Sega Dreamcast

- Sept. 1999, $299 ($99 -> $49 -> $0), 128 bit
- Hitachi 200 MHz CPU, PowerVR 3D, 16MB RAM
  - But faster than a 400MHz Pentium II for 3D
  - 3M polygons/sec
  - Fast CD-ROM loads
- Moderately successful in U.S.
  - But not in Japan

Sony Playstation 2

- Launched May 4, 2000 in Japan
  - In U.S. on October 26, 2000: $299
  - 90 Million sold world wide by 2005 [2 years < PS1]
- Hardware
  - 128 Bit 300MHz processor
  - 3 Special purpose 150 MHz co-processors
  - 32MB DRAM: 3.2 GB/sec
  - DVD & CD
  - MPEG2 hardware
  - Dual Shock 2 analog controller
  - Chip set will be available for other platforms
  - 66M polygons/sec geometry – 16M polygons/sec curved
- Software development is tough

Nintendo GameCube

- Launch in Japan, Fall 2001
  - U.S. Nov. 2001
- Hardware
  - IBM Gekko processor 405 MHz
  - Geometry Engine
  - Mini-DVD
  - 6-12M polygons/sec (fully textured)
  - 24MB Main memory
  - 16MB A-memory
- Emphasis on easier development
  - High memory bandwidth 3.2 GB/sec
  - Fast frame buffers (5ns.)

Microsoft Xbox

- November 2001
- Software
  - Direct X API
- Hardware
  - Pentium IV 733 Mhz
  - Custom 3-D 300Mhz GPU
  - 64MB Ram – 6.4 GB/sec
  - 8GB hard drive
  - DVD
  - 100 MBps Ethernet
- Performance
  - 150 million transformed and lit polygons per second
  - 100+ million polygons per second sustained performance (shaded, textured)
  - 300 million micropolygons/particles per second
  - 4 simultaneous textures
  - Full-scene anti-aliasing
  - 1920x1080 maximum resolution
  - HDTV support

PC 2002

- Americas Army released as free game
- SIMS becomes the best-selling PC game of all time (March 2002)

PC 2003

- PC
  - SIMS continues to grow
    - Unleashed, Superstar
    - But SIMS Online fails
  - Star Wars Galaxies
    - > 275,000 Registered Users
    - Second biggest MMOG, fastest growing
  - WarCraft III, UT 2003, GTA, ports from console
  - Second Life and There.com launch
    - Different approach to MMOG
  - EA grosses $2.5B in 2003
  - Rise of Nations released

Games 2004

- $7.3 B sales
- Madden sells 1.3M copies in one week
- Sequels rule: SIMS 2, Halo 2, Half-life 2, Doom 3, Rome: Total War
- Consoles: 2004
  - Stables of slow growth - lower prices
  - 1,000,000 GBAs sold
  - Nokia Ships >1,000,000 N-Gages

- Nintendo Launches DS
  - >5 million units worldwide by March 2005
  - Ninetendogs – 250K in one week – best handheld?
- Sony Launches PSP
  - 5 million units shipped by July 2005
  - Where are the games
- Shifting away from PC (15% sales) to Consoles

Games 2005

- World of Warcraft
  - 4 Million Subscribers ($700M/year subscriptions)
- EA rolls along:
  - *Madden NFL 2006*, sold 1.7M in first week
- Gamestop and EB games merge
- CivIV released
- Next Gen Consoles coming
  - Difficult software development
  - Very expensive for development (teams twice size)
- US Top selling console games
  1. Madden NFL 06 (PS2) - 2,900,000
  2. Pokemon Emerald (GBA) - 1,700,000
  3. Gran Turismo 4 (PS2) - 1,500,000
  4. Madden NFL 06 (Xbox) - 1,200,000
  5. NCAA Football 06 (PS2) - 1,100,000
  6. Star Wars: Battlefront II (PS2) - 1,000,000
  7. MVP Baseball 2005 (PS2) - 970,000
  8. Star Wars Episode III: Revenge of the Sith (PS2) - 930,000
  9. NBA Live 06 (PS2) - 820,000
  10. LEGO Star Wars (PS2) - 800,000

- US Top Selling PC Games
  1. World of Warcraft - 957,000
  2. The Sims 2: University - 574,000
  3. The Sims 2 - 559,000
  4. Guild Wars
  5. Roller Coaster Tycoon 3
  6. Battlefield 2
  7. The Sims 2: Nightlife
  8. Age of Empires III
  9. The Sims Deluxe
  10. Call of Duty 2

XBOX 360

- Available: November 2005
- Custom IBM PowerPC CPU
  - 3 symmetrical cores: 3.2 GHz each
  - 2 threads/core
  - VMX-128 vector unit/core
  - 1MB L2 cache
  - CPU Game Math: 9.6B dot product/sec
- Custom ATI Graphics Processor
  - 10MB DRAM
  - 48-way parallel floating point
  - Unified shader architecture
  - 500 million triangles per sec
  - 16 gigasamples/sec
  - 48 billion shader operations/sec
  - Supports 16:9, 720p or 1080i – HD output
- 512 MB of 700MHz GDDR3 RAM – unified memory architecture
  - 22.4 GB/s interface bus bandwidth
  - 256 GB/s memory bandwith to EDRAM
  - 21.6 GB/s front-side bus
- Overall system floating-point: 1 teraflop
- Detachable and upgradeable 20GB harddrive
- 12x dual-layer DVD ROM

Games 2006

- US Top 10 best selling console games (May)
  1. New Super Mario Bros-Nintendo (DS)
  2. Kingdom Hearts II-Square Enix (PS2)
  3. Brain Age: Train Your Brain In Minutes-Nintendo (DS)
  4. God of War-Sony Computer Entertainment (PS2)
  5. Tom Clancy's Ghost Recon Advanced Warfighter-UbiSoft (Xbox 360)
  6. Elder Scrolls IV: Oblivion-Bethesda Softworks (Xbox 360)
  7. MLB '06: The Show-Sony Computer Entertainment (PS2)
  8. Guitar Hero (with Guitar)-RedOctane (PS2)
  9. Grand Theft Auto: San Andreas-Take Two Interactive (PS2)
  10. Kingdom Hearts-Square Enix (PS2)
- US Top 10 best selling PC games (August):
  1. World of Warcraft - Blizzard
  2. The Sims 2 - Electronic Arts
  3. Nancy Drew: Danger By Design - Her Interactive
  4. Civilization IV: Warlords - 2K Games
  5. The Sims 2 Open For Business - Electronic Arts
  6. Roller Coaster Tycoon 3: Gold - Atari
  7. Cars - THQ
  8. The Sims 2 Family Fun Stuff - Electronic Arts
  9. Civilization IV - 2K Games
  10. Sim City 4 Deluxe - Electronic Arts
- CivIV: Warlords, Rise of Legend released, Medieval 2: TW Nov release date

Playstation 3

- Cell processors (1 PowerPC PPE, 8 SPE) @3.2 GHz each
- Graphics: Nvidia 550 Mhz GPU 1.8 TFlops
  - 100 billion shader ops/sec
  - 51 billion dot products/sec
  - More powerful than Geforce 6800 Ultra?
  - Full HD (1080p)
- Floating point performance: 2 TFlops
- 512MB RAM
  - split between CPU and graphics
- 512KB L2 cache
- 7 AltiVec vector processing units
- Blu-ray DVD may make it very expensive
  - Don't be surprised by delay (Nov 17, 2006 release date)
- Removable hard drive
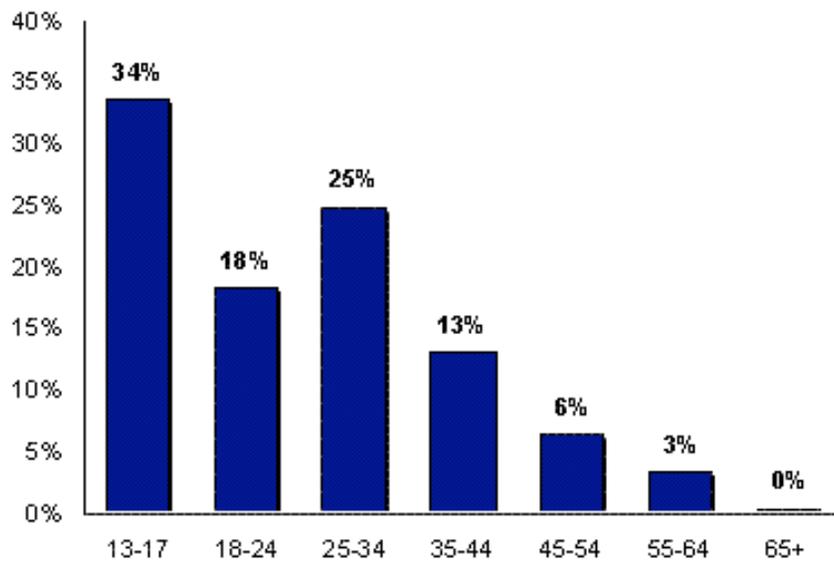
PC Games All Time Best Sellers (2006)

- By genre:
  - *Sandbox -* The Sims (16 million)
  - *Adventure -* Myst (11 million)
  - *RTS -* StarCraft (9 million)
  - *FPS -* Half-Life (8 million)
  - *MMORPG -* World of Warcraft (6 million)
  - *RPG -* Diablo II (7 million)
  - *TBS -* Civilization III (2.5 million) (CivIV catching up?)
  - *Action/Adventure -* Tomb Raider II (2.24 million)
- Others at 3 million and above:
  - *The Sims 2* (4.5 million)
  - *Morrowind* (4.5 million) (includes Xbox release)
  - *Diablo II* (4 million)
  - *Half-Life 2* (4 million)
  - *StarCraft: Brood War* (3 million)
  - *Warcraft II* (3 million)
  - *Warcraft III* (3 million)
  - *Age of Empires* (3 million)

Console Games All Time Best Sellers (2006)

- By genre (unbundled, more than 5 million):
  - *Platformer* - Super Mario Bros. 3 (NES - 17.28 million)
  - *Racing* - Gran Turismo 3: A-Spec (PS2 - 14.36 million)
  - *Sandbox* - Grand Theft Auto: Vice City (PS2 - 13.70 million)
  - *Kart Racing* - Mario Kart 64 (N64 - 9.87 million)
  - *RPG* - Final Fantasy VII (PS1 - 9.72 million)
  - *Adventure* - Legend of Zelda: Ocarina of Time (N64 - 8.6 million)
  - *FPS* - GoldenEye 007 (N64 - 8.09 million)
  - *Action* - Metal Gear Solid 2 (PS2 - 7 million)
  - *Fighting* - Super Smash Bros. Melee (GC - 6.95 million)
  - *Sports* - Tony Hawk's Pro Skater 2 (PS1 - 4.56 million)
- By franchise:
  - *Mario* (190 million+)
  - *Pokémon* (143 million)
  - *Final Fantasy* (60.9 million)
  - *Sonic the Hedgehog* (50 million)
  - *Grand Theft Auto* (48.4 million)
  - *The Legend of Zelda* (47 million)
  - *Tetris* (44.1 million)
  - *Donkey Kong* (44 million)
  - *Gran Turismo* (43.7 million)
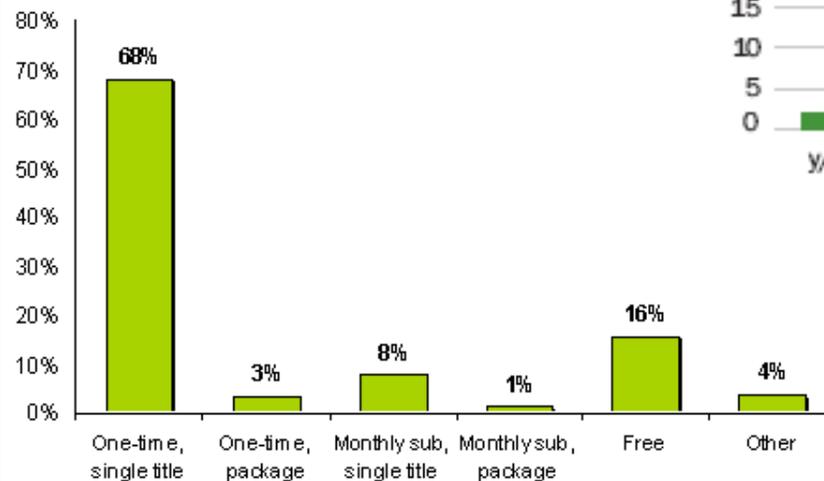 - *Dragon Quest* (35.5 million)
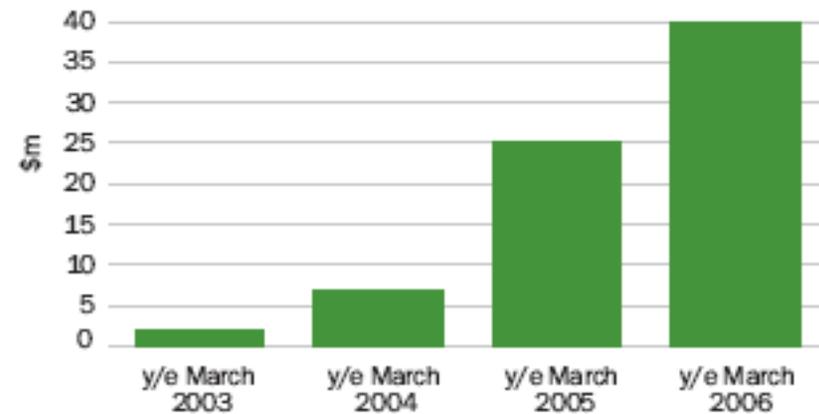
Mobile Gaming

Age of Game Downloaders

| | 34% | 18% | 25% | 13% | 6% | 3% | 0% |

13-17 18-24 25-34 35-44 45-54 55-64 65+

Source: The NPD Group, July 2006

Payment Method

68% 3% 8% 1% 16% 4%

One-time, single title | One-time, package | Monthly sub, single title | Monthly sub, package | Free | Other

Source: The NPD Group, July 2006

THQ wireless revenues

$m

y/e March 2003 | y/e March 2004 | y/e March 2005 | y/e March 2006

Source: Screen Digest analysis of company data