Nintendo 64 Architecture

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Agenda

● Background
● Architectural Overview
  o Computational Units
  o Memory
  o Input and Output
● End of N64 Lifespan
History

- Video games in 1996
- Features
- Notable games
- Improvements
- Influences
The Nintendo 64

Overview of Components

- MIPS R4300i 64-bit processor
- MIPS Reality Coprocessor (RCP)
  - Reality Drawing Processor (RDP)
  - Reality Signal Processor (RSP)
- Memory
- I/O
  - Video
  - Audio
  - Controllers
Diagram

Diagram

MIPS R4300i

- 32-bit interface
- Five-stage pipeline
- 16KB instruction cache
- 8KB data cache
- 64-bit integer and floating point units
- Multiple clock rates for slower peripherals
Diagram

Reality Coprocessor

- Handles audio and graphics
  - Separate hardware for each
- Used for high bandwidth algorithms
- Receives instruction from R4300i
- Connects to DACs for media output
Reality Coprocessor Diagram

Source: http://n64.icequake.net/mirror/www.white-tower.demon.co.uk/n64/
Diagram

Diagram

Diagram

Reality Drawing Processor

- Receives input from controller
- Updates 3D matrix data in real time
- Renders updated frame in memory
- Frame rendered on screen
Diagram

Diagram

Diagram

Reality Signal Processor

- R4300i converts MIDI data to waveforms
- Waves and commands get stored in memory
- RSP processes commands and waveforms
- Results get output to audio DAC
Diagram

Memory

- Unified Memory Architecture
- Available to both CPU and RCP
- Bandwidth of 520 MB per second
- 4 MB DRAM
Diagram

Diagram

Input and Output

Sources:
http://media1.gameinformer.com/imagefeed/featured/replay/conkers/conkers312-610.jpg
Input and Output

http://upload.wikimedia.org/wikipedia/commons/thumb/f/fd/64DD-Attached.jpg/250px-64DD-Attached.jpg
End of the N64

- Last game: Tony Hawk’s Pro Skater 3
- Impact on the next generation
- Life beyond its time
  - Emulation
Bibliography


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