NITRO-System Library Overview

Dan Chang

Senior Software Engineer

Software Development Support Group

DEVELOPERS
CONFERENCE

Nintendo®

Roadmap

- **Purpose of this talk**
- NITRO-System components
- Summary

Purpose

- Overview of what's available
- Answer these questions:
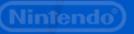 - To use or not to use?
  - Which components to use?

Nintendo®

What is NITRO-System?

- Optional Middleware
- Uses Nitro SDK
- You can pick and choose

Roadmap

- Purpose of this talk
- **NITRO-System components**
- Summary

What's in it?

- Foundation Library (Fnd)
- Graphics Foundation (Gfd)
- Graphics 2D Library (G2d)
- Graphics 3D Library (G3d)
- NITRO-Composer (Snd)
- Multiple Channel Stream (Mcs)

Foundation Library (Fnd)

- Memory Manager

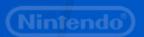- Archive Manager

- List Structure

- Memory Allocator

Nintendo Confidential

Memory Manager

- Extended Heap Manager
  - Allocate and free
- Frame Heap Manager
  - Allocate, allocate, allocate; Free all at once
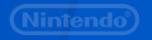- Unit Heap Manager
  - Fixed size allocations

Archive Manager

- Packs many files into an archive file
- Load archive into RAM to access
  - Access using NITRO-SDK's ROM file system API
  - Or use archive library to get address of file in RAM
- Use nnsarc.exe to archive files

Nintendo

Graphics Foundation (Gfd)

- VRAM Managers
  - Deals memory allocation
  - (more details on next slide)
- VRAM Transfer Manager
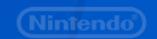 - Queues texture uploads that will take place during VBLANK

VRAM Managers

- Two different managers
  - Texture VRAM Manager
  - Palette VRAM Manager
- Two management strategies
  - Linked-List texture or palette manager
    - allocate and free
  - Frame texture or palette manager
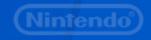   - allocate, allocate, allocate, free all at once

Graphics 2D Library (G2d)

- Interface deals with 2D images
- Use NITRO-CHARACTER to create data
  - Character and OBJ animations
  - Background screens ("BG")
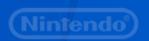- Implemented using either 2D or 3D hardware

NITRO-CHARACTER

- 2D graphics editing software with GUI
- Allows creating and editing of
  - Color Palettes
  - Characters
  - Screens
  - Cells (collections of characters)
  - Multicells (collections of cells)
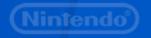 - Animations (Cells and Multicells)

g2dcvtr.exe

- Converts NITRO-CHARACTER save data to runtime binary format that can be loaded by NITRO-System G2D runtime
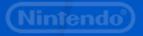- Command-line tool

fontcvtr.exe

- Converts Windows fonts and Sharp LC fonts into NITRO fonts
- GUI tool
- Also available in a command-line tool: fontcvtrc.exe
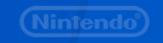
Nintendo Confidential

Nintendo

For More Information

- NITRO-CHARACTER Tutorial (PDF)
  - Written for artists
- NITRO-CHARACTER Data File Format Specifications (PDF)
- NITRO-CHARACTER Help File (CHM)
- g2dcvtr.exe Manual (PDF)
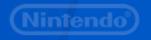- G2D Library Runtime Binary Format File Format Description (PDF)

Graphics 3D Library (G3d)

- Draws 3D objects and characters
- Supports joint animation, animation sharing, motion blending, and partial joint animation
- Refer to joints, materials, and texture palettes by name
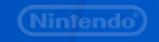- Comes with 3D tool chain

3D Tools

- Use a 3D package + plugin to create intermediate (XML format) data files
  - Maya 7.0, 8.0, 8.5; 3ds max 7.0, 7.5, 8.0 or 9.0; SOFTIMAGE|3D 4.0; and SOFTIMAGE|XSI 5.0, 5.1, 5.11, or 6.0.1
- Export two types of intermediate files
  - Model data files (.IMD files)
  - Animation files (.ICA, .IVA, .IMA, .ITP, .ITA)

DEVELOPERS
CONFERENCE

Nintendo

Photoshop Plugins

- Preview paletted & 4x4 compressed textures
- .TGA or .PIC writers that add additional information about texture format to use
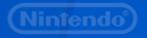 - Paletted, 4x4 texel compressed, direct, etc.

3D Material Editor

- Display model hierarchy structure
- Edit & save material settings (in .IMD file)
- Preview model and animations
- Cannot modify models, create animations, or change animations (use 3DCG tool instead)
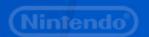
g3dcvtr.exe

- Converts intermediate 3D files saved from 3DCG exporters or 3D Material Editor to runtime binary format that can be loaded by NITRO-System G3D runtime
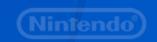
- Command-line tool

For More Information

- NITRO Intermediate File Plug-in for Maya, 3ds max, or SOFTIMAGE (PDF)
  - Written for artists
- NITRO-System 3D Material Editor (PDF)
  - Also written for artists
- G3D Library Overview (PDF)
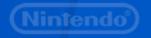- g3dcvtr.exe Manual (PDF)
- G3D Binary Format File Format (PDF)

Nintendo®

NITRO-Viewer

- Supports previewing of artwork from NITRO-CHARACTER and 3D Material Editor

- Works with IS-NITRO-EMULATOR, IS-NITRO-UIC, or ensata

- See NITRO-System NITRO-Viewer User's Manual

Nintendo

NITRO-Composer (Snd)

- Sound development environment
- Includes tools and libraries
- Supports
  - Waveform playback (sample in memory)
  - Stream playback (buffer & play sample)
  - Sequence playback
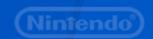- Output effects includes surround mode and headphone mode

NITRO-Composer Tools

- NITRO-SoundMaker
  - Windows tool to edit sound sets, bank files
- NITRO-Player
  - Windows tool to preview sounds on DS
- SoundPlayer
  - Nintendo DS tool to preview sounds
- Data converters

Nintendo®

NITRO-Player

- Preview sound data on DS
- Communicates with DS via MCS server
- Use IS-NITRO-EMULATOR or IS-NITRO-UIC
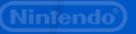
DEVELOPERS
CONFERENCE

Multiple Channel Stream (Mcs)

- Allows multiple Windows programs to communicate with Nintendo DS

Roadmap

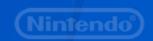- Purpose of this talk
- NITRO-System components
- **Summary**

Summary: Use it?

- Source code provided for library
- Documentation provided
- Sample code provided
- Supported by SDSG
- Tools for sound designers and artists
- Snd is most popular
- G2d & G3d are also popular

Questions?

Ask me during the breaks

Or e-mail support@noa.com

DEVELOPERS
CONFERENCE

(Nintendo)