

TWL-System Overview

Describing the General Concepts Behind TWL-System

2009/03/04

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Revision History

Revision Date	Description
2009/03/04	Revised content related to development tool preparation. Revised the trademark notice.
2008/05/30	Revisions resulting from NITRO-System name change (updating to TWL-System).
2008/04/08	Initial version.

1 Introduction

The tools and libraries that can be used to develop the graphics and sounds for game software that runs on the TWL and the Nintendo DS are collectively known as Nintendo TWL-System. Our goal in developing this collection was to provide game developers with as many basic tools and libraries as possible, therefore allowing developers to focus more on the game's content.

This document provides an overview of the entire Nintendo TWL-System (hereafter referred to as TWL-System) and provides a general idea of the tools and libraries available.

2 TWL-System Development Environments

2.1 Available Development Environments

TWL-System can be broadly broken down into three development environments.

- 3D development
- 2D development
- Sound development

These development environments consist roughly of Windows applications to create data, converters to convert that data into formats that can be used by the TWL and Nintendo DS, and the libraries that allow you to play back the converted data on those game platforms.

2.1.1 3D Development Environment

The 3D development environment includes a set of tools that allow you to create 3D binary data for use on the TWL or Nintendo DS from models and animations created using commonly used 3D computer graphics software (including Maya, 3ds Max, and SOFTIMAGE|XSI). Libraries are also available to render 3D models and play back animations on the game platforms.

For more information about the 3D development environment, see the 3D Graphics Library Overview ([G3D_Overview.pdf](#)).

2.1.2 2D Development Environment

The 2D development environment includes a set of tools that allow you to create 2D screens for use on the TWL or Nintendo DS from data created using NITRO-CHARACTER. Libraries are also available to render 2D screens and play back animations on the game platforms.

For more information about the 2D development environment, see the 2D Graphics Library Overview ([G2D_Overview.pdf](#)).

2.1.3 Sound Development Environment

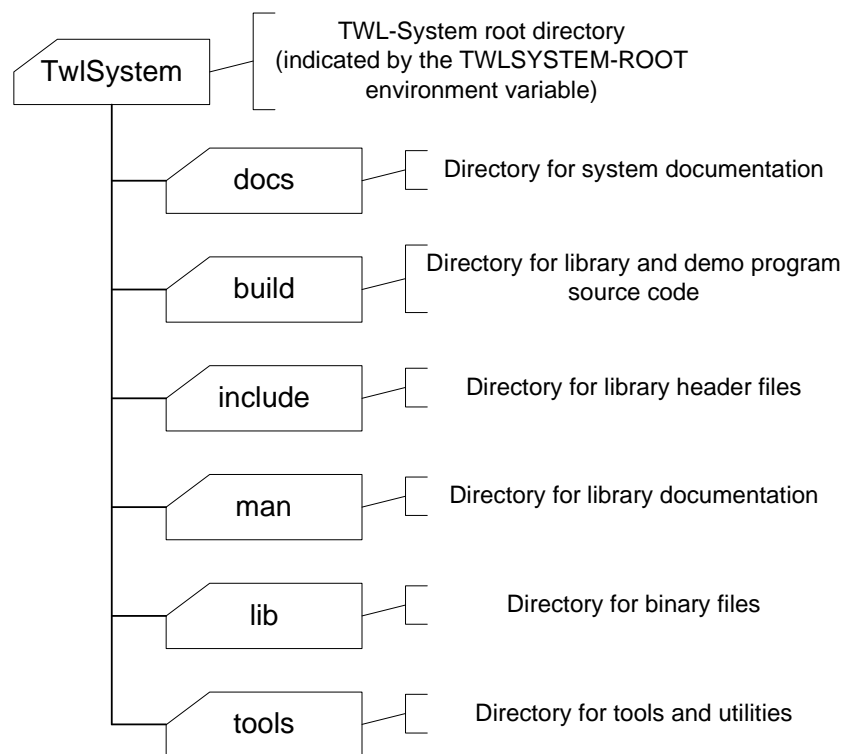
The sound development environment includes a set of tools that allow you to create sound data for use on the TWL or Nintendo DS from data created using commonly used sequencer and waveform editing software. Libraries are also available to play back that sound data on the game platforms.

For more information on the sound development environment, see the NITRO-Composer Overview ([NNS_Composer_Overview.pdf](#)).

2.2 Directory Structure

All of the applications and libraries that comprise TWL-System are installed in the `TwlSystem` directory, as shown in Figure 2-1.

Figure 2-1 Directory Structure



The location of the `TwlSystem` directory must be configured as the `TWLSYSTEM_ROOT` environment variable. To do so, denote the absolute path of the `TwlSystem` directory in Windows notation (using the backslash or yen sign (¥) as a directory delimiter) as the `TWLSYSTEM_ROOT` environment variable's value.

Note: You cannot include spaces and (double-byte) Japanese text in the path configured as the `TWLSYSTEM_ROOT` environment variable.

3 Applications

3.1 Primary Applications

The three TWL-System development environments provide Windows applications that allow visual and audio designers to easily create data for game applications. See Table 3-1, below.

Table 3-1 TWL-System Windows Applications

Application	Description
Plug-ins for Computer Graphic Tools	Plug-ins that produce 3D model data (as 3D intermediate files) from 3D computer graphics tools
Photoshop Plug-ins	Plug-ins that produce texture data for the TWL and DS from Photoshop
NNS-3DMaterialEditor	GUI application to edit material information within 3D model data
NITRO-SoundMaker	GUI application to create sound data
NITRO-Viewer	Application to preview content from GUI applications
NITRO-Viewer Controller	Tool that serves as a communication interface for applications on the computer and NITRO-Viewer
McsServer	Tool that serves as a communication interface for applications on the computer and tools running on test devices
fontcvtr	Converter that converts fonts installed on a computer for use in TWL-System
nnsarc	Tool to combine small files into a single archive file

3.1.1 Application Operating Environments

TWL-System applications have been tested and confirmed to work on the Microsoft Windows XP Service Pack 2 operating system. They have not yet been tested on Windows Vista.

You need Microsoft .NET Framework 1.1 to use NITRO-SoundMaker. Because the TWL-System package does not include .NET Framework, you need to install it if it has not yet been installed on the computer you are working with. Note that we can only guarantee confirmed results with .NET Framework 1.1.

Any attempts to launch NITRO-SoundMaker without having .NET Framework 1.1 installed results in application errors and an inability to run the software. Should this happen, confirm that .NET Framework 1.1 has been properly installed on your computer. To install it, use the **Add or Remove Programs** tool in the Windows XP **Control Panel**. Check to see that .NET Framework 1.1 is included in the **Currently installed programs** list.

4 Overview of the Libraries

4.1 Library Packages

Six libraries are included in TWL-System, as shown in Table 4-1.

Table 4-1 Types of Library Packages

Library	Features Offered
<code>libnnsfnd</code>	Basic functionality, including memory and archive managers
<code>libnnsbfd</code>	Basic graphics functionality, including a VRAM manager
<code>libnns2d</code>	Functionality for 2D graphics rendering and animation
<code>libnns3d</code>	Functionality for 3D graphics rendering and animation
<code>libnnsnd</code>	Functionality to playback music sequences and streams
<code>libnsmcs</code>	Functionality to communicate with applications running on the computer

With the exception of `libnnsfnd`, any of the other five libraries can be installed on its own based on which you want to use. Because other libraries use `libnnsfnd`, it must be installed.

For more information on the libraries, see each of the development environment overviews.

4.2 Library Coding Language

Because the TWL-System libraries are coded in C, you need a C compiler to use the TWL-System libraries. At the present time, we have tested and confirmed that the TWL-System libraries can be built using CodeWarrior for Nintendo DS from Freescale, Inc.

4.3 Preparing to Use Development Tools

The build environment for the TWL-System library is constructed on the build environment for TWL-SDK. For this reason, environments in which the TWL-System can be built are the same as the environments in which TWL-SDK can be built. An environment that enables the use of TWL-SDK is required to use the TWL-System libraries.

4.3.1 Build Environment

The TWL-System has been tested and confirmed to build on Windows XP Service Pack 2. It has not yet been tested on Windows Vista.

The following tools and SDK are needed to build and debug the TWL-System libraries and any applications that use those libraries. For more information on building libraries, see the build system documentation ([BuildSystem.pdf](#)).

- CodeWarrior for Nintendo DS
- Cygwin
- TWL SDK
- NITRO emulator (ensata)
- IS-NITRO-EMULATOR (to run NITRO platform binaries)
- IS-TWL-EMULATOR (to run TWL platform binaries)

5 Publishing Source Code

The following describes our policy with regard to the publication of TWL-System library source code.

5.1 Motivation Behind Source Code Publication

Our goals in publishing the TWL-System source code were mainly to help developers confirm library functionality and assist them when debugging applications. It is acceptable to build your own code by revising library source code, but you do so at your own risk. Nintendo cannot guarantee the behavior of modified code, nor can it, in general terms, offer support for that modified code.

5.1.1 Published Source Code

In general, the TWL-System library source code is publically available. This does not, however, apply in cases where security is of a concern or where publication would raise difficult issues.

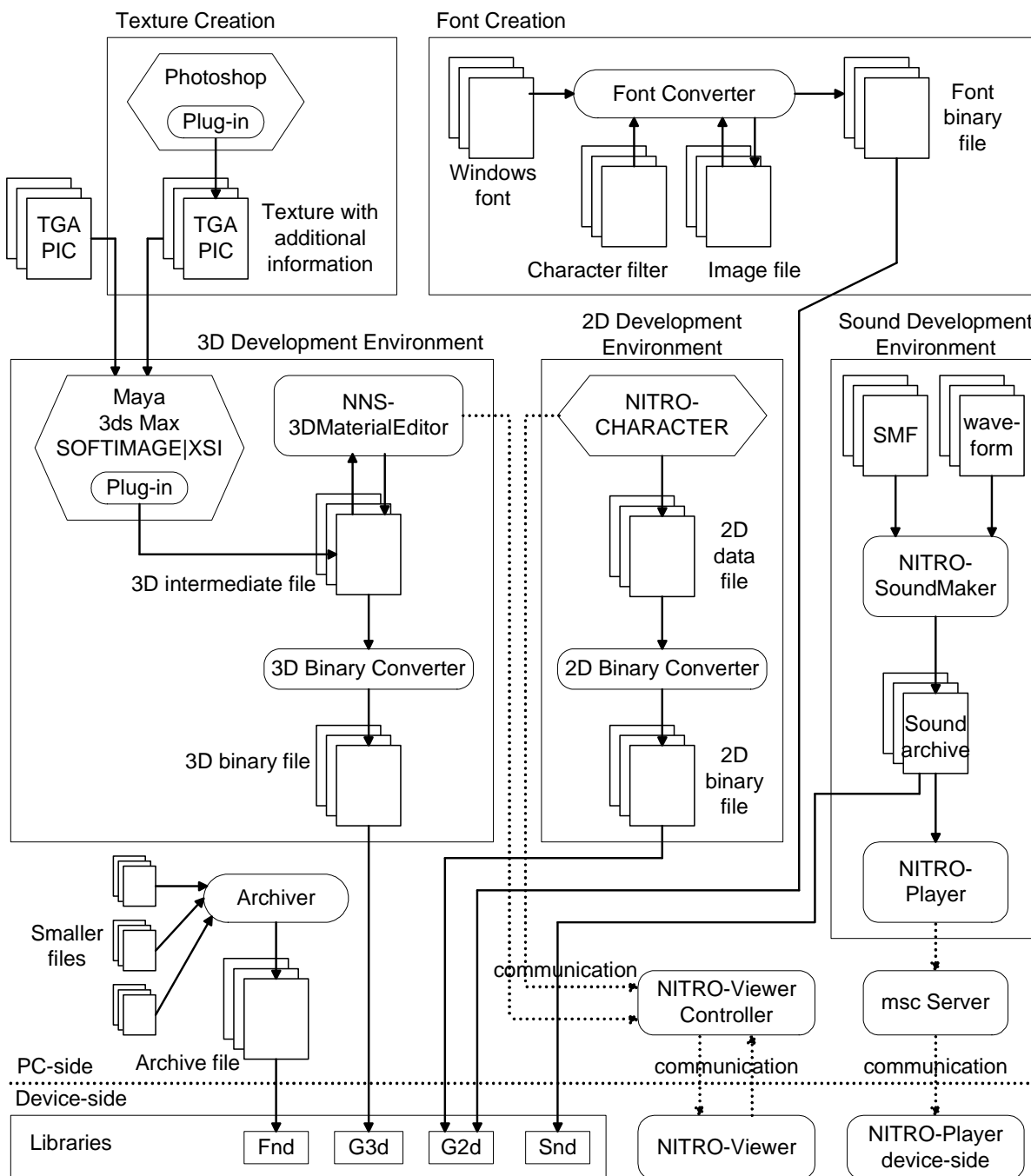
5.1.2 Private Source Code

The source code for the 3D plugins, NNS-3DMaterialEditor, NITRO-SoundMaker, and the other Windows application will not be published.

6 TWL-System Tool Structure

Figure 6-1 shows the structure of the tools and libraries for TWL-System.

Figure 6-1 TWL-System Tool Structure



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