NintendoWare for CTR

Overview of the 2D Development Environment

Revision Date: 2009/03/19

Ver 1.3

PROVISIONAL TRANSLATION

The content of this document is highly confidential and should be handled accordingly.

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1 Introduction

This document gives an overview of the 2D development environment provided with NintendoWare for CTR.

In this document, NintendoWare for CTR is often referred to simply as NintendoWare.

Note: This is based on a NintendoWare for Revolution document. Some descriptions currently differ from the implementation.

1.1 Components of the NintendoWare 2D Development Environment

The NintendoWare 2D development environment consists of the following tools and libraries for using 2D graphics to develop layout displays for CTR game software.

- NW4C_LayoutEditor (henceforth referred to simply as LayoutEditor)
- Layout library
- Various converters

1.2 Features of the NintendoWare 2D Development Environment

This section introduces the main features of the 2D development environment.

1.2.1 Layout Display

NintendoWare provides representations for displaying commonly used pictures, windows, and text. Window and text displays are designed using as their basis a rectangular area called a pane. Boundary condition panes, which are used to check boundary conditions, are also included among the types of panes. You can easily implement these representations by using the Layout library. Animations in which the picture, color, and display position change can also be implemented easily.

The act of displaying (laying out) a combination of windows or other such items is called a layout display.

1.2.2 Editing Using the LayoutEditor and Layout Viewer

Layout data used to make layout displays can be created and edited using LayoutEditor, a tool provided with NintendoWare.

LayoutEditor is designed to be easy to use, even for those new to game development for CTR. It is also designed so that those with a thorough knowledge of CTR hardware specifications can create various representations.

LayoutEditor can communicate with the Layout Viewer so that the result of editing using LayoutEditor can be checked.

1.2.3 Ability to View Displays on the Layout Viewer as-is Under Game Programs

The Layout Viewer uses the same Layout library that is used by game programs. You can therefore display layout data created using the LayoutEditor and Layout Viewer as it appears when displayed by game software.

1.2.4 Display Using the Layout Library

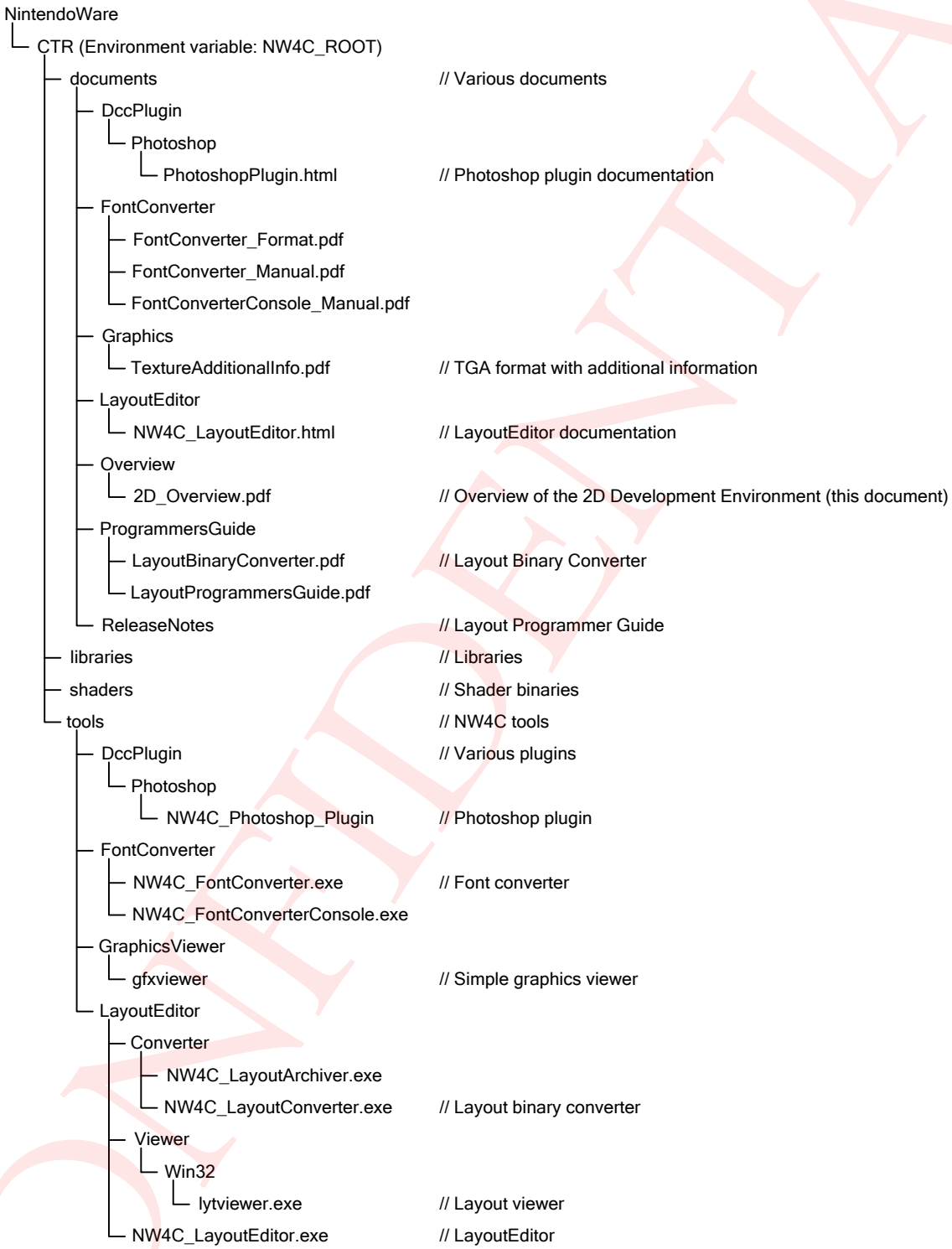
Layouts edited using LayoutEditor can be displayed on a CTR system using the Layout library optimized for CTR.

2 Directory Structure and Setup

2.1 Directory Structure

The directory structure used for 2D-related tools and libraries provided with NintendoWare is shown in Figure 2-1.

Figure 2-1 Folder and File Layout of the 2D Development Environment



2.2 Setup

2.2.1 NintendoWare Setup

To install the 2D development environment, including LayoutEditor, expand the NintendoWare package to a suitable location. You must set the environment variable `NW4C_ROOT`.

Be sure to set the environment variable `NW4C_ROOT` to the path in which the `NintendoWare/CTR` folder has been placed, as shown in the following example.

```
NW4C_ROOT C:¥NintendoWare¥CTR
```

2.2.2 LayoutEditor Setup

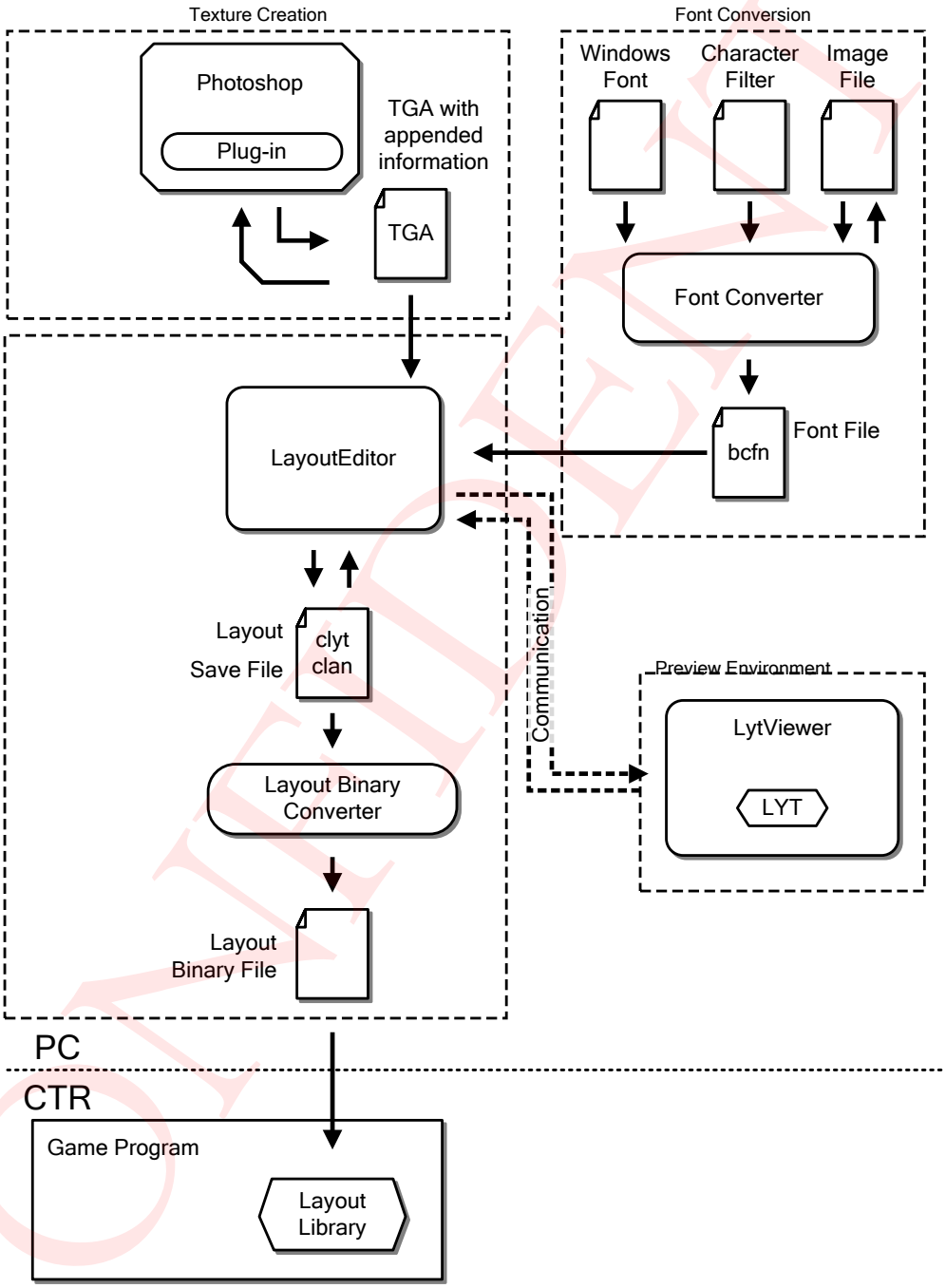
Microsoft .NET Framework 3.5 Service Pack 1 is required to start LayoutEditor.

Since the .NET Framework is not included in the NintendoWare package, it must be installed separately if not already installed on the PC.

3 2D Development Environment Organization

The organization of applications and libraries provided by NintendoWare and the process flow from the creation of data until conversion to a format that can be used by the Layout library is shown in Figure 3-1.

Figure 3-1 Organizational Diagram of the 2D Development Environment



3.1 2D Development Flow

3.1.1 2D Development Flow

Layouts and animations are created using LayoutEditor.

LayoutEditor transfers data to the Layout Viewer to display layouts and animations that are currently being edited.

The Layout Binary Converter converts layout data files created with LayoutEditor. The converter generates layout binary files used by the Layout library for use by game applications.

4 Main Representations and Features Available with NintendoWare

4.1 Main Material Representations

The following material representations are possible in NintendoWare.

The main material representations set using LayoutEditor are the following:

- Vertex color
- Material color
- Multi-UV texture (up to three textures)

4.2 Main Animation Representations

The following animation representations can be made under NintendoWare.

The animation representations that can be edited under LayoutEditor are the following:

- Pane SRT animations (where the scale, rotation, translation, and size of the pane are moved)
- Vertex color animations (where each vertex color of the pane and its transparency are changed)
- Visibility animations (where the pane display is switched on and off)
- Material color animations (where the material color is changed)
- Texture pattern animations (where textures and palettes are swapped)
- Texture SRT animations (where the scale, rotation, and translation of the texture matrix is moved)

4.3 Main Representations and Features Supported by the Layout Library

This section introduces several features supported by the Layout library.

- Window display – Messages that use fonts and freely designed windows can be displayed without bothersome programming.
- Management at the group level – This makes it possible to group panes and windows together.
- Setting parent-child relationships – The panes in parent-child relationships are linked with each other in the transparency or when moving the display location.

5 Applications and Tools

5.1 Photoshop Plug-in

The Photoshop plug-in is used to create texture data for CTR.

The Photoshop plug-in consists of a filter plug-in, a file format plug-in, and an automatic process plug-in.

The filter plug-in is used to set the same image quality for CTR as used under Photoshop.

The file format plug-in is used to save/load TGA files that include additional information for NintendoWare.

The automatic process plug-in is used to create mipmap textures.

For details on the Photoshop plug-in, see the following file:

`NintendoWare/CTR/documents/DccPlugin/Photoshop/PhotoshopPlugin.html`

5.2 Font Converter (NW4C_FontConverter)

Font Converter (NW4C_FontConverter) is a Windows application used to create font resources (bcfnt files) to be used with NintendoWare. The bcfnt and bcfna data is used for the font when rendering text, using LayoutEditor or when using the Layout library.

For details on the Font Converter (FontConverter), see the following file:

`NintendoWare/CTR/documents/FontConverter/FontConverter_Manual.pdf`

5.3 LayoutEditor

LayoutEditor is a GUI application that runs under Windows.

Layout data files can be loaded and edited. Communication with the Layout Viewer allows layouts and animations to be previewed.

Main Features of LayoutEditor

- Allows layouts to be displayed and edited just as they appear on the CTR system.
- Communication with the Layout Viewer allows you to check the display of layouts, check material settings, and play animations.
- Edited layouts can be saved as layout data files or as layout binary files.
- Allows the creation of various representations by setting animations for each pane property.

For details on LayoutEditor, see the following file:

`NintendoWare/CTR/documents/LayoutEditor/NW4C_LayoutEditor.html`

5.4 Layout Viewer (lytviewer)

The Layout Viewer is an application that runs on the PC.

The Layout Viewer communicates with LayoutEditor to display layouts. The Layout Viewer uses the Layout library internally in order to display layouts.

For details on the Layout Viewer, see the following file in the LayoutEditor manual.

`NintendoWare/CTR/documents/LayoutEditor/NW4C_LayoutEditor.html`

5.5 Layout Binary Converter

The Layout Binary Converter converts layout data files into binary format files that can be used by the Layout library.

The Layout Binary converter can be run from inside LayoutEditor. It can also be run on a layout data file from the command line.

For details on the Layout Binary Converter, see the following file:

`NintendoWare/CTR/documents/ProgrammersGuide/LayoutBinaryConverter.pdf`

6 Data Files

6.1 Layout Data Files

Under NintendoWare, an XML-formatted text file called a layout data file is used to store layout data and associated animation data in a data structure suited for the CTR system.

A layout data file defines the format indicated in Table 6-1 for each feature.

Table 6-1 Types of Layout Data Files

Extension	Meaning	Description
clyt	Ctr LaYouT data	Layout data
clan	Ctr Layout ANimation data	Layout animation data

6.2 Layout Binary Files

A layout binary file is a binary-formatted data file used by the Layout library.

Layout data files can be converted into layout binary files using the Layout Binary Converter.

Layout Binary File Extensions

Layout binary files use the same extension as the associated source layout data files, but with the letter “b” prepended to the start of the extension, as shown in Table 6-2.

Table 6-2 Layout Binary File Extensions

Layout Binary File Extensions Created After Conversion	Layout Data File Extensions That Can Be Converted Using Layout Binary Converter
bclyt	clyt
bclan	clan

6.3 TGA Files with Additional Information

In NintendoWare, it is recommend that you use TARGA (TGA) image files (used as textures for picture panes and animations) to which additional information for NintendoWare has been added.

Although these files include additional information such as texel format information, texel data, and texture palette data, they can be treated like regular TGA files.

For details on TGA files with additional information, see the following file:

`NintendoWare/CTR/documents/Graphics/ TextureAdditionalInfo.pdf`

7 Layout Library

7.1 Layout Library

The Layout library is a 2D graphics library created to simply and efficiently display animations on the CTR system. Layouts are displayed, and animations played back using layout binary files converted from layout data files.

This section describes the main features of the Layout library and its organization.

7.2 Main Features of the Layout Library

2D game development can be carried out efficiently using the Layout library to exploit the full performance of the CTR hardware. This section describes the features of the Layout library.

7.2.1 Ability to Output the Layout Viewer Display as-is to the Game Screen

Since layouts displayed using the Layout Viewer provided with NintendoWare are rendered using the Layout library, they can be displayed within games as they appear on the Viewer.

7.2.2 No Guarantee of Compatibility Between Layout Binary File Versions

Each time the Layout library version is updated, layout data files must be re-converted using the corresponding Layout Binary Converter.

8 List of Supported Features

Table 8-1 lists the main features currently supported by the 2D development environment and items scheduled for support in the next release. For details, see each associated document.

The meaning of the Support column entries are as follows.

- O: Already supported
- Planned: Scheduled for support in a future release
- Not set: Under investigation
- X: Not supported (no plan for support)

Table 8-1 List of Supported Features as of 2010/03/19

Area	Feature	Support	Remarks
Overall Workflow	Output of TGA files with additional information from Photoshop	O	
	Conversion of layout data files into layout binary files using the Layout Binary Converter	O	
	Editing and input/output of layout data files using LayoutEditor	O	
	Loading of TGA files with additional information into LayoutEditor	O	
	Display of LayoutEditor data on the Viewer	O	
	Output of layout binary files from LayoutEditor	O	
	Loading of layout binary files into the Viewer for display	O	
	Display of layout binary files using the Layout library	O	
Layout Data	Null panes	O	
	Picture panes	O	
	Text box panes	O	
	Window panes	O	
	Boundary condition panes	O	
	Control of scale, rotate, translate at the pane level	O	
Material Representation	Vertex color	O	
	Monochrome color interpolation	O	
	Texture display	O	Up to 3 multi-textures can be displayed
	Clamp, repeat, and mirror textures	O	

Area	Feature	Support	Remarks
Animation Representations	Output and playback of pane SRT animations	O	
	Output and playback of visibility animations	O	
	Output and playback of vertex color animations	O	
	Output and playback of material color animations	O	
	Output and playback of texture SRT animations	O	
	Output and playback of texture pattern animations	O	

9 Revision History

Version	Revision Date	Description
1.3	2010/03/19	• Rection 3. 2D Development Environment Organization Revised the figure “Organizational Diagram of the 2D Development Environment” • 9. Revision History Changed the format and moved it to the end of the document.
1.2	2009/11/19	• Section 2 Directory Structure and Setup Re-revised the content of section 2.1 Directory Structure.
1.1	2009/11/09	• Section 2 Directory Structure and Setup Revised the content of section 2.1 Directory Structure.
1.0	2009/10/30	• Initial version.