TWL-System g3dcvtr Manual

Using the G3D Binary Converter

2009/07/08

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

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Revision History

Revision Date	Description
2009/07/08	Added descriptions of the options `-maxjnt`, `-maxmat`, and `-maxshp`. Added descriptions of error messages.
2009/03/04	Added information on the `-we` option.
2008/05/30	Made revisions in line with the NITRO-System name change (from NITRO-System to TWL-System).
2008/04/08	Changed the format of the Revision History and the license notification for Xerces-C++.
2007/11/26	Added more information regarding the number of files that can be converted to a single binary.
2006/05/29	Added a description of the `-tex-nomerge` option.
2005/05/11	Added a note on packing restrictions.
2004/10/12	Added a description of the `-texsrt` option.
2004/09/02	Added a description of the file indexing specification.
2004/08/02	Initial version.

1 Introduction

The G3D library uses binary format for drawing data. TWL-System includes the `g3dcvtr` converter, which converts XML-formatted NITRO intermediate files to binary files for use with the G3D library.

2 How to Use g3dcvtr

g3dcvtr is a command-line application that operates on Windows and is used for converting the NITRO intermediate file in TWL-System to the binary file format used by the G3D library. With g3dcvtr, it is possible to convert the six types of intermediate files shown in Table 2-1. The content to be converted is automatically determined from the extension of the intermediate filename specified by the g3dcvtr argument.

Table 2-1 Intermediate Files That g3dcvtr Can Convert

Extension	Type of Intermediate File	File Description
.imd	Model data	Model information including polygons, parent/child structure, materials, and textures.
.ica	Character animation data	Animation data that operates the node matrix.
.iva	Visibility animation data	Animation data that operates the node visibility.
.ima	Material color animation data	Animation data that operates the material colors.
.itp	Texture pattern animation data	Animation data that cycles through multiple textures.
.ita	Texture SRT animation data	Animation data that operates the texture matrix.

2.1 Command-Line Description

Use g3dcvtr in the following format.

```
g3dcvtr Intermediate_file_name ... [option] ...
```

2.1.1 Specifying Filenames of Multiple Intermediate Files

Multiple intermediate files can be specified at one time with g3dcvtr. If multiple intermediate filenames are specified in the command line, g3dcvtr converts these intermediate files and outputs them by packing them into a single binary file. If the intermediate files are not all the same type, an error is generated.

The output binary data can be accessed by using the index that starts at 0, in the order that was specified by the argument. It can also be accessed by using a filename (by eliminating the file extension to limit the length of the filename to 16 characters or fewer). Additionally, to specify multiple intermediate filenames, you must specify the -o option at the same time to specify the output filename.

A maximum of 255 intermediate files can be converted to a single binary file.

2.1.2 Options

The g3dcvtr options are characters or strings that begin with a hyphen (-). The option is described after the intermediate filename. The following options can be specified regardless of the content being converted.

Table 2-2 g3dcvtr Option Descriptions

Option	Description
`-h / --help`	Display help message and exit.
`-o <output>`	Specify output file name. If the file extension was omitted, the proper one is automatically added.
`-we`	Handle warnings as errors.
`--version`	Display the `g3dcvtr` version information and exit.

Besides these common options, unique options for each conversion type exist for `g3dcvtr`. These unique options are introduced with their respective chapters.

2.1.3 Expansion of Command-Line Arguments Stored in Files

For command-line arguments that begin with the `@` symbol, the second and subsequent characters are recognized as the filename, and the contents of the file with that name are expanded to become the argument. There can be multiple files and multi-step expansion of file content. A self-referencing file reference results in an error.

3 Converting the Intermediate File

3.1 Converting Model Data

If the model data file (file extension: `.imd`) is specified in the `g3dcvtr` intermediate filename, it is converted to the model binary file (file extension: `.nsbmd`) used with the G3D library.

3.1.1 Selecting the Output of the Model Binary Data

Select the output content by specifying any of the options below when converting the model data. If these options are omitted, they are converted as if `-eboth` was specified.

Table 3-1 Output Option Descriptions

Option	Description
`-etex`	Outputs only the texture data. The extension of the output file is `.nsbtx`.
`-emdl`	Outputs only the model structure to the file. The extension of the output file is `.nsbmd`.
`-eboth`	Outputs a file that includes both the model structure and texture data. The extension of the output file is `.nsbmd` (default conversion operation).

3.1.2 Storing in the Matrix Stack

You can specify options for the G3D library drawing when converting the model.

Table 3-2 Matrix Option Description

Option	Description
`-s`	Stores all of the joint matrices in the matrix stack.

If the `-s` option is specified, `g3dcvtr` converts all of the joint matrices used in the model drawing to be stored in the matrix stack. The presence of 32 or more joint matrices in the model results in an error. Storing the joint matrices in the matrix stack simplifies obtaining the calculation result of the joint matrix from the application.

3.1.3 Sharing of Textures among Models

If multiple model intermediate files are specified in the command line and multiple model data is stored in one binary file, and if the same texture is used for all that model data, the texture is converted in a way that allows it to be shared.

Comparing the texture name and content determines whether the same texture is used. If the texture name is the same but the content is different, an error occurs.

3.1.4 Outputting the Material Texture Matrix Field

When converting model data, you can specify an option that controls the output of the material's texture matrix field.

Table 3-3 Material Texture Option Description

Option	Description
`-texsrt`	Always outputs the material's texture matrix field to the NSBMD file.

Normally, `g3dcvtr` does not output the material's texture matrix field to the NSBMD file when the texture has a scale of 1 and there are no rotations or translations. When the `-texsrt` option is specified, `g3dcvtr` suppresses this process so that the material's texture matrix field is always output to the NSBMD file.

Use this option to ensure that the material's texture matrix field is included in the NSBMD file so that an application program can modify the material's texture matrix.

3.1.5 Suppressing Merges of Texture and Palette Data

In the default state, if the data in the texture and palette are the same, they will be converted to share the same region, even if the texture and palette have different names. If you want this conversion, specify the following option.

Table 3-4 Texture and Palette Data Merge Option Description

Option	Description
`-tex-nomerge`	If the texture and palette do not have the same name they are not merged.

3.1.6 Checking the Maximum Number of Joints, Materials, and Shapes

Use these options to specify the maximum number of joints, materials, or shapes in model data and output an error if the specified maximum is exceeded. If no option is specified or if no maximum number is specified, a check is made using the maximum value that the library can specify.

Table 3-5 Maximum Number of Joints, Materials, and Shapes Option Description

Option	Description
`-maxjnt <num>`	Specifies the maximum number of joints.
`-maxmat <num>`	Specifies the maximum number of materials.
`-maxshp <num>`	Specifies the maximum number of shapes.

3.2 Converting Character Animation Data

If the character animation data file (file extension: `.ica`) is specified in the `g3dcvtr` intermediate filename, it is converted to the character animation binary file (file extension: `.nsbca`) used with the

G3D library. The number of unique rotation matrices in the character animation data that is converted must be 32,767 or less.

3.2.1 Suppressing the Output Content of the Character Animation Data

The content output when converting model data can be suppressed by specifying the following options. As for the omitted data, information from the model data is used during playback. If these options are not used, all of the data is output without any omissions.

Table 3-5 Output Option for Character Animation Data

Option	Option Name	Description
`-OT`	`--OmitTranslation`	Omits translation data. The translation data of the root node is never omitted.
`-OS`	`--OmitScale`	Omits scaling data.
`-OR`	`--OmitRotation`	Omits rotation data.

3.3 Converting Material Animation Data

TWL-System has four types of material animation.

3.3.1 Converting Material Color Animation Data

If material color animation data (file extension: `.ima`) is specified in the `g3dcvtr` intermediate filename, it is converted to the material color animation binary file (file extension: `.nsbma`) used with the G3D library.

3.3.2 Converting Texture SRT Animation Data

If texture SRT animation data (file extension: `.ita`) is specified in the `g3dcvtr` intermediate filename, it is converted to the texture SRT animation binary file (file extension: `.nsbta`) used with the G3D library.

3.3.3 Converting Texture Pattern Animation Data

If texture pattern animation data (file extension: `.itp`) is specified in the `g3dcvtr` intermediate filename, it is converted to the texture pattern animation binary file (file extension: `.nsbtp`) used with the G3D library.

3.3.4 Converting Visibility Animation Data

If visibility animation data (file extension: `.iva`) is specified in the `g3dcvtr` intermediate filename, it is converted to the visibility animation binary file (file extension: `.nsbva`) used with the G3D library.

3.4 Limitation on the Name Length

To speed up processes with the G3D library, the lengths of the joint name, material name, texture name, palette name, and polygon name are limited to 16 characters.

If the name length of each type used with `g3dcvtr` in the intermediate file exceeds 16, everything past the sixteenth character is truncated. A warning occurs whenever such truncation happens. If this truncation of the filename results in a duplication of names, an error occurs.

3.5 Restrictions on the Number of Files That Can Be Packed

The maximum number of files that can be packed into a single binary file is 255.

4 Utilities Feature

By specifying the binary file used with the G3D library in the `g3dcvtr` command line, you can display (output to `stdout`) information about the content of the corresponding binary file.

5 Warning/Error Messages

5.1 Warning Messages

Table 5-1 describes the warning messages output by `g3dcvtr`. Warnings only indicate potential problems. Conversion is still performed. In actual error messages, applicable data is shown in place of locations in the table surrounded by { and }.

Table 5-1 Description of Warning Messages

Error Message	Description
{file path}'s version is {version name}. older than 1.4.0 you'd better re-generate an imd file with newer plug-ins	The version of the IMD file is old. We recommend that you re-generate the IMD file using version 1.4.0 or later.
{original name}' is truncated to '{truncated string}'.	{original name} has been truncated to {truncated string}. For more details, see section 3.4 Limitation on the Name Length.
StackID={ID number} is prepared for system/user callbacks.	The stack with the stack ID {ID number} has been reserved by the user system.

5.2 Error Messages

Error messages output by `g3dcvtr` can be divided into three categories: errors related to model data files (IMD files), errors related to animation data files (ICA, IMA, ITP, ITA, and IVA files), and common errors. Table 5-2, Table 5-3, and Table 5-4 list these errors and their descriptions. In actual error messages, applicable data is shown in place of locations in the tables surrounded by { and }.

If an error occurs, conversion is stopped at that point, and no conversion data is output.

Table 5-2 Errors Related to Model Data Files

Error Message	Description
(polygon|primitive)_array[@size] is inconsistent with the actual size.	The size attribute of `<(polygon|primitive)_array>` in the IMD file differs from the actual data.
0 < Num(Jnt|Mat|Shp)Max <= NNS_G3D_SIZE_(JNT|MAT|SHP)_MAX_MAX	The value of `Num(Jnt|Mat|Shp)Max` is illegal.
A signature must have four characters.	Enter four characters for the binary file identification signature.
Attribute mtx_prim_size of <polygon> must be 1.	More than one value cannot be specified for the `mtx_prim_size` attribute in the IMD file.
bitmap[@size] is inconsistent with the actual size.	The size attribute of `<bitmap>` in the IMD file differs from the actual data.
Box param out of bound	The box parameter value is illegal.

Error Message	Description
Cannot allocate mtx stack index possibly because a model is too complex	There is not enough available memory to create the matrix stack. The node hierarchy of the model may be too deep.
cannot generate .nsbtx because of empty texture data.	Texture data is empty.
color0_mode must be color/transparency.{color zero mode name} specified.	The `color0_mode` attribute in the IMD file is illegal. Specify either color or transparency.
Conflict in texture name({texture name})	There are conflicting texture names.
Conflict in texture palette name({palette name)).	There are conflicting texture palette names.
Duplicate (matID, shpID) detected.	Nodes (`matID`, `shpID`) are duplicated.
Ele_(clr|pos)_idx not supported	Type `Ele_(clr|pos)_idx` cannot be used.
Envelopes cannot be with billboarding (node {node name}).	Envelopes and billboards cannot be used together.
face must be front/back/both.	The `face` attribute in the IMD file is illegal. Specify one of `front`, `back`, or `both`.
Illegal color parameter((blue|green|red) = {RGB value}).	The RGB value is illegal. Values from 0 to 31 can be specified.
material_array[@size] is inconsistent with the actual size.	The `size` attribute of `<material_array>` in the IMD file differs from the actual data.
No matrices specified in a primitive array	No matrices were found in the primitive array.
Normal (x|y|z) out of range({normal vector value}).	An out-of-range value was assigned to Normal.
num(Node|Material|Shape)={numeric value} exceeds NNS_G3D_SIZE_(JNT|MAT|SHP)_MAX	The value of `num(Node|Material|Shape)` is illegal.
polygon_mode must be modulate/decal/toon_hilight/shadow.	The `polygon_mode` attribute in the IMD file is illegal. Specify one of `modulate`, `decal`, `toon_hilight`, or `shadow`.
size of texture seems illegal({file path}).	The texture size is illegal.
Sorry, the size of <mtx_prim> must be 1	More than one value cannot be specified for the `mtx_prim_size` attribute in the IMD file.
sorry, scaling rule'{scaling rule}' not supported	{scaling rule} cannot be specified for the `scalingrule` attribute in the IMD file. Specify one of `standard`, `maya`, or `si3d`.
sorry, tex_matrix_mode '{texture matrix mode}' not supported	{texture matrix mode} cannot be specified for the `tex_matrix_mode` attribute in the IMD file. Specify either `maya` or `si3d`.
tex_gen_mode must be none/tex/nrm/pos.	The `tex_gen_mode` attribute in the IMD file is illegal. Specify one of `none`, `tex`, `nrm`, or `pos`.
tex_image[@index] is inconsistent with the actual data.	The `index` attribute of `<tex_image>` in the IMD file differs from the actual data.

Error Message	Description
tex_image[@width] and tex_image[@height] seem illegal({file path}).	The `width` and `height` attributes of `<tex_image>` in the IMD file are illegal.
tex_image_array[@size] is inconsistent with the actual size.	The `size` attribute of `<tex_image_array>` in the IMD file differs from the actual data.
tex_palette[@color_size] is inconsistent with the actual size.	The `color_size` attribute of `<tex_palette>` in the IMD file differs from the actual data.
tex_palette_array[@size] is inconsistent with the actual size.	The `size` attribute of `<tex_palette_array>` in the IMD file differs from the actual data.
tex_tiling must be clamp/repeat/flip.	The `tex_tilling` attribute in the IMD file is illegal. Specify one of `clamp`, `repeat`, or `flip`.
tex4x4_palette_idx[@size] is inconsistent with the texture({file path}).	The `size` attribute of `<tex4x4_palette_idx>` in the IMD file differs from the actual data.
TexCoord (S|T) out of range({texture coordinate}).	An out-of-range value has been assigned to `TexCoord`.
Texture format must be palette4/palette16/palette256/tex4x4/a3i5/a5i3/direct.{texture format name} specified.	The `format` attribute in the IMD file is illegal. Specify one of `palette4`, `palette16`, palette256, tex4x4, a3i5, a5i3, or direct.
Texture height must be 8/16/32/64/128/256/512/1024. {texture height} specified.	The `height` attribute in the IMD file is illegal. Specify one of 8, 16, 32, 64, 128, 256, 512, or 1024.
Texture width must be 8/16/32/64/128/256/512/1024.{texture width} specified.	The `width` attribute in the IMD file is illegal. Specify one of 8, 16, 32, 64, 128, 256, 512, or 1024.
The cumulative scale of the node used for envelope is zero.(NodeID {Node ID})Some ancestors may have zero.	The inverse matrix cannot be calculated because the cumulative scale used to calculate the weight envelope is 0.
The size of <node_idx> and <weight> is different.	The `node_idx` and `size` attributes of `<weight>` inside `<envelope>` in the IMD file differ.
The size of 4x4 textures exceeds 128K bytes. Please reduce the size, or split the data and convert again.	The texture size is greater than 128 KB.
The size of palette is not a multiple of 8({palette size}).	Enter the palette size as an 8-byte multiple.
There must be at least one data block.	The number of data blocks in the binary file is illegal. Specify a value equal to or greater than 1.
Too much data blocks.	The number of data blocks in the binary file is illegal. Specify a value equal to or less than `0x10000`.
unknown billboard option({billboard option})	{billboard option} cannot be specified for the billboard attribute in the IMD file. Specify one of `off`, `on`, or `y_on`.
unknown primitive	The primitive type is unknown.

Error Message	Description
Unknown primitive type {primitive type}	{primitive type} cannot be specified for the `type` attribute of `<primitive>` in the IMD file. Specify one of `triangles`, `quads`, `triangle_strip`, or `quad_strip`.
Unknown scaling rule({scaling rule})	{scaling rule} cannot be specified for the `scaling_rule` attribute in the IMD file. Specify one of `standard`, `maya`, or `si3d`.
Unknown texture matrix mode({matrix mode})	{matrix mode} cannot be specified for the `tex_matrix_mode` attribute in the IMD file. Specify one of `maya`, `si3d`, `max`, `3dsmax`, or `xsi`.
VtxDiff (x|y|z) out of range({numeric value}).	An out-of-range value has been assigned to `VtxDiff`.
VtxShort (x|y|z) out of range({numeric value}).	An out-of-range value has been assigned to `VtxShort`.

Table 5-3 Errors Related to Animation Data Files

Error Message	Description
Data error in <visibility>.	The first data index for `<visibility>` must be 0.
Illegal data range [{data_head}, {data_size}].	Animation data for {data_head}+{data_size} does not exist.
Illegal frame idx({frame number} {index}) in<frame_idx>.	{frame number} was returned in an attempt to access illegal frame {index}. Check that the frame exists.
Illegal frame step specified	Specify one of 1, 2, 4, or auto in `frame_step`.
mat_color_anm_array[@size] is inconsistent with the actual size.	Make sure that the `size` attribute of `<mat_color_anm_array>` is the same as the number of included `<mat_color_anm>` instances.
Material animation too big.	There are too many material animations.
node_anm_array[@size] is inconsistent with the actual size.	Make sure the `size` attribute of `<node_anm_array>` is the same as the number of included `<node_anm>` instances.
Tex pattern Anm data too big.	There are too many texture pattern animations.
tex_pattern_anm_array[@size] is inconsistent with the actual size.	Make sure the `size` attribute of `<tex_pattern_anm_array>` is the same as the number of included `<tex_pattern_anm>` instances.
tex_pattern_list_data[@image_size] is inconsistent with the actual size.	Make sure the image_size attribute of `<tex_pattern_list_data>` is the same as the number of included `<image_name>` instances.
tex_pattern_list_data[@palette_size] is inconsistent with the actual size.	Make sure the palette_size attribute of `<tex_pattern_list_data>` is the same as the number of included `<palette_name>` instances.

Error Message	Description
tex_srt_anm_arra[@size] is inconsistent with the actual size.	Make sure the `size` attribute of `<tex_srt_anm_array>` is the same as the number of included `<tex_srt_anm>` instances.
TexSRT animation too big.	There are too many texture SRT animations.
The size of <image_idx> is not equal to <frame_idx>.	Make sure that `<image_idx>` and `<frame_idx>` are the same size.
The size of <palette_idx> is not equal to <frame_idx>.	Make sure that `<palette_idx>` and `<frame_idx>` are the same size.
The size of <visibility> is not equal to <frame_idx>.	Make sure that `<visibility>` and `<frame_idx>` are the same size.
Too much rotation matrices(compressed).	Too many rotation matrices are included in the character animation. Reduce the number of rotation matrices.
unknown texture matrix mode({texture matrix mode})	The texture matrix mode is unknown. Specify one of `maya`, `si3d`, `xsi`, or `3dsmax`.
visibility_info[@node_size] or visibility_anm_array[@size] is inconsistent with the actual size.	Make sure the `node_size` attribute of `<visibility_info>` and the `size` attribute of `<visibility_anm_array>` are the same as the number of instances actually included for each.

Table 5-4 Common Errors

Error Message	Description
{index name}: index < 0	An index cannot be a negative number.
{converter name}: Illegal Options({option}) Try g3dcvtr.exe --help for more information	An illegal option has been specified for {converter name}. For details on options, use the `--help` option.
{numeric value} is out of fx16's range.	An attempt to cast a double or fx32 value of {numeric value} as fx16 failed.
{numeric value} is out of fx32's range.	An attempt to cast a double value of {numeric value} as fx32 failed.
{tag name}: duplicate index({index})	There are conflicting indices in {tag name}.
{file path} has no data	There is no data in {file path}.
{variable name}({numeric value}) < 0, cannot be packed in u16.	An attempt to cast an int value of {numeric value} as u16 failed.
{variable name}({numeric value}) < 0, cannot be packed in u8.	An attempt to cast an int value of {numeric value} as u8 failed.
{variable name}({numeric value}) is too big to be packed in u16.	An attempt to cast a u32 value of {numeric value} as u16 failed.
{variable name}({numeric value}) is too big to be packed in u8.	An attempt to cast a u32 value of {numeric value} as u8 failed.

Error Message	Description
Cannot detect endian of this machine. Sorry, this program works correctly only on little endian machines currently.	Only little-endian can be used by `g3dcvtr`.
Cannot open file '{file path}'	The file cannot be opened. Check that the file path being displayed is correct.
Destination file name must be specified if multiple inputs are specified	If no destination file is specified, there must be only one source file.
Duplicate resource Name '{resource name}'	Duplicate resource names exist. Check the {resource name} being displayed.
File '{directory path}' is recursively unrolling	The displayed directory is being accessed recursively. Check the directory structure.
File '{file path}' cannot be opened.	The file cannot be opened. Check that the file path being displayed is correct.
Index to a bit is out of range	A radix tree index is out of range.
Name is empty.	An empty name exists.
Unknown option specified({option})	An illegal option has been specified. For details on options, use the `--help` option.
Wrong file name specified. '{file path}' cannot be used as a C variable.	The file name includes characters that cannot be used as a C variable. Change the file name being displayed.

6 About Xerces-C++

`g3dcvtr` uses Xerces-C++, developed by the Apache Software Foundation (http://www.apache.org/). Copies of the Xerces-C++ NOTICE file and license file are in the following directories.

- `TwlSystem/docs/Xerces-C++/NOTICE`
- `TwlSystem/docs/Xerces-C++/LICENSE`