WebDANCE

Web Dance for **A**ll usi**N**g advan**C**ed **E**-learning tools

Technical and User Requirements for Dance Visualization

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Document Type: Internal Report

Document Reference No: WebDANCE\W3\VMU\01

Revision Chart

Version	Author(s)	Description of version	Date
1.0	R.Kuncaitis Egidijus Vaskevicius	Final	18 April 2003

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I. Virtual objects on Internet

The new opportunity of 3D object manipulating on the internet changes it very fast.
The most attractive way seams to be the Shockwave 3D standard. You may find a lot of very interesting and inventive samples. A good sample of 3D objects viewing and examination in 3D environment on the Internet.

Most interesting for us are the motion of human body and the sequences of motions.

To:	Use:
Affect performance	Browser window resize
Move character	Cursor (arrow) keys
Dance	Space bar
Walk	Number key 1
Jog	Number key 2
Run	Number key 3
Sneak	Number key 4
Show particles	Number key 5
Jump	Number key 6
Change to shiny suit	Number key 7
Back view	Number key 8
Far view	Number key 9
Front view	Number key 0

II. Test model for dance visualization

While we do not have real data we have created a test model.

This model is accessible via Internet http://www.vdu.lt/dancer/motionMan.html.

The model was created in 3D MAX (requirements for model creation are presented bellow). It was exported to Shockwave Studio. Interactivity was made in Director 8.5 Shockwave Studio.

Another test model is more close to dancer and is accessible to view http://www.vdu.lt/dancer/turningGirl.html.

These models and motion animation what we made helped us to check software possibilities and our skills. The whole work process helped us to find out a number of limitations and rules in this way of animation creation. Some of them we are presenting in the part III.

III. Requirements and results

Requirements for the motion captions:

- Motions must be in .bip format and compatible with the max3D Studio.
- The sound track must be the .wav file

The created model will be:

- The Director Movie .dcr file
- All the motion changes will be controlled by the key pressing.

IV. Rules and limitations of model creation and exportation

Modeling the character
The new 3D engine in Director 8.5 Shockwave Studio includes Multiresolution Mesh and Hierarchical Subdivision Surfaces Technology. Multiresolution Mesh provides continuous polygon decimation, allowing a model's detail to be reduced proportionally on the fly. Subdivision Surfaces provides selective polygon tessellation, permitting a model's detail to be increased on the fly. Previously, real-time 3D applications required using low-polygon models to optimize game engine performance running with limited resources. The typical scene polygon "budget" previously was 3000 polygons, a main character budget was 1200-1500 and a minor character budget was under 500. Also, artists typically made multiple instances of each character at different resolutions (known as levels of detail). Different levels of detail were swapped in/out of the scene based on the distance from the camera, allowing for a more optimum usage of scene budget. 3ds Max 4 software contains both the Multiresolution Mesh and Subdivision Surfaces modifiers. These advances permit characters to be modeled with significantly higher budgets, because the polygon count is reduced via Multiresolution Mesh or increased via Subdivision Surfaces in Director Shockwave Studio.

Polygonal models
Director Shockwave Studio's 3D Engine supports polygons that are viewable in the Shockwave export window. In 3ds Max, this means both the Editable Mesh and Editable Polygons states, and any other polygonal forms collapse to Editable Mesh or Editable Polygon.

Animated modifiers
Modifiers are available to deform or model a mesh, but an animated modifier will not export. This applies to simple modifiers such as Bend, Stretch, Displace or FFD, as well as Morpher. All animated mesh deformations in this release must be bone-driven. This means you must bone a bird's wings to animate its bending; likewise, you must use bones on the character's head to perform facial animation. Character studio's Biped is the only supported bone system. 3D-enhanced Shockwave Player collapses hierarchies that are not bone-based. So, for example, if you want to animate a character's eyes moving back and forth while its head moves up and down, you must use groups. Group each eye and the head separately, then parent each eye group to the head group and animate the groups. Grouping prevents the collapse and the sub-level animations survive.

Texturing the model
In 3ds Max, only the Blinn shader is supported. On export, this is converted to Gouraud. Only the Standard and Multi/Sub-Object materials are supported; there is no support for multi-layered or animated maps. Most Material settings will export properly. Values in the Blinn Basic Parameters rollout, (e.g., Ambient, Diffuse, Specular, Self-Illumination, Opacity, Specular Level, Glossiness) export properly. There is limited Map Support; you can use any Bitmap or 2D procedural map. There is limited Map Channel Support; the above maps can be used in the Diffuse and Reflection Map Channels. Bump Maps will export in the .w3d file, but

are not supported in this version of the Shockwave 3D Player. Opacity maps can be used only in the form of an alpha channel included with the bitmap in the Diffuse Map Channel. If you want the texture to include transparency, you must use a Targa, TIFF, or other bitmap containing an alpha channel. Maps in other channels may export, but the results will be different than they appear in 3ds max. If you have textures which will not export (i.e., unsupported channels, multi-layered Textures, animated textures, etc.) Consider applying them in Director 8.5 Shockwave Studio.

Bones and Biped animation
To animate a mesh deformation, the Shockwave Player requires a Biped character, which uses a bone-based hierarchy. Discreet's character studio is necessary to implement bones animation in Shockwave 3D technology. Even if you do not use the Biped, you will need the Physique modifier to skin the character. 3ds Max's Skin modifier is not supported. The Physique modifier binds the mesh to the Biped bones.You will need to fine-tune the Physique modifier by adjusting the Envelope Sub-Objects. First do this in the stationary "Reference Pose" and then check it against the animation by leaving the Reference Mode and scrubbing the animation bar. You will need patience and practice to master Biped and Physique. They are worth using, however, because they permit recycling of motions among characters, animation layering, as well as importing and editing motion capture data usable in Director Shockwave Studio (8.5). Physique envelopes radiate from each bone link and compete in their influence for each skin vertex, so skin slides across bones as in real life. Since Director 8.5 Shockwave Studio is compatible with character studio 3 characters, you can use character studio 3 and get faithful recreation of the model and motion in Director Shockwave Studio (8.5). On export, 3ds Max Exporter to Director Shockwave Studio will convert the mechanics 3ds Max uses to animate the character (i.e. bones, inverse kinematics, etc.) into a key framed hierarchy that is recognized by Director Shockwave Studio.

The 3ds max Exporter to Director 8.5 Shockwave Studio
The export in whole or in part to Director Shockwave Studio is using the 3ds Max Exporter to Director Shockwave Studio. By default it sends the entire scene to the .w3d file and provides feedback regarding what was written to it. There is the option to limit the export, both in terms of which assets are included and the compression assigned to those assets. The exporter functions are covered in greater depth in the 3ds max Exporter User Guide (on the Director 8.5 installation CD).

How Much Compression?
One of the advantages of Shockwave 3D technology is the ability to deliver high quality media in a small bundle. The exported .w3d file contains polygonal geometry, textures (converted to JPEG) and animation data.

The scale 0–100 in this section is not linear and requires testing to achieve the optimum balance between file size and detail. Setting compression at 50 (down from 100) increases Multiresolution Mesh compression and thereby the agility of the character in the virtual world. On the other hand, the animation component is complex. A loss of detail here significantly compromises movement. The texture maps are very simple and are substantially compressed without noticeable change (i.e., 25 down from 100). These settings dramatically affect the size and performance of the .w3d file. Texture maps make up a significant portion of the file size and are compressed with JPEG compression. (Note: the Exporter converts all maps to JPEG. A JPEG map compresses more than a Targa or TIFF file. Use a TIFF or Targa bitmap only if your texture requires an alpha channel to vary opacity). Geometry is compressed using Multiresolution Mesh technology.

Assembling the Assets in Director 8.5 Shockwave Studio
It's not possible to send a .w3d file straight to the web. The file must be imported into Director Shockwave Studio and saved out as a Director movie (DIR, DCR) before you can display a Shockwave 3D file in your browser. The file comes in as an Internal Cast Member.