

## **Appendix D. GPGT Lists**



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## ***D.1 TGE Must Know Facts***

**T**his appendix is a summary listing of the extremely common factoids which all TGE users should be aware of. It lists such things as supported graphics formats, supported shape and interior formats, general facts about the TGE simulated world, metrics, orientation concepts, ...

### **D.1.1. Texture Support**

#### ***D.1.1.1. Formats***

<b>Texture Extension</b>	<b>Features</b>	<b>Uses</b>
BMP	- Uncompressed - Supports 8-bits per channel - Supports alpha channel	All
BM8	- Custom 8-bit color quantized texture format	Unknown
GIF	- Low quality (only supports 256 colors)	GUIs
JPG	- Lossy (variable) Compression - Supports 8-bits per channel - Does not support alpha channel	All
PNG	- Lossless Compression - Supports 8-bits per channel - Supports alpha channel	All

It is important to remember that regardless of whether you use a JPG or a PNG, both formats at the same resolution will consume the same memory when loaded to the video card, but the PNG will have a much higher visual quality. The only savings involved in using the lossy compressed formats is DISK space. That is, the total size of your game, including images will be smaller on disk if you use JPG. This is, of course, good for downloaded games.

### ***D.1.1.2. Rules/Limitations***

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There are rules governing the dimensions of TGE supported textures and various limits apply.

#### **Dimension Rules**

- Textures dimensions must be a multiple of two. i.e. 2, 4, 8, ..., 256, etc.
- Texture dimension ratio ( width vs height ) must be no greater than 16:1. For example, if a texture is 16 pixels wide, it can be a maximum of 256 pixels high.

#### **Limits**

- The minimum texture resolution is 1 x 1 pixels.
- The maximum texture resolution is 512 x 512 pixels (an 8MB texture)
- There is no limit on the number of textures that can be used. However, one should consider minimum target platform specs.

### ***D.1.1.3. Precedence – Same Prefixed Files in Same Directory***

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TGE allows multiple textures with the same prefix and different suffix to exist in the same directory. Furthermore, it will put each texture found in it's list of named textures. An issue arises when two textures have the same prefix, in there is ambivalence regarding which texture will be used when only a prefix is specified to name it. Fortunately, the problem isn't that hard to resolve. TGE stores the textures int the following order:

- JPG
- PNG
- GIF
- BMP

Thus if we have a texture: 'edo.jpg' and 'edo.png', if we only specify the prefix 'edo', or if the tools do so, then TGE will use the JPG version. The moral of this story is to check your directories and only keep the version you want!

#### **D.1.1.4. Precedence - Same Named Files in Different Directory**

another question arises, which is, "What if I have two textures with the same name in different directories. What happens in this case?" This is really not a big problem, except in wasted space for your game. TGE will keep unique handles for each texture it finds and all the tools and TGE itself rely on hierarchy information embedded in the models other entities to choose the correct texture.

### **D.1.2. The TGE World**

#### **D.1.2.1. Coordinate System**

In TGE, the standard treatment for each of the three axes is:

<b>Axis</b>	<b>Description</b>
+X	Left / West
+Y	Forward / North
+Z	Up

### ***D.1.2.2. Units of Measure***

Although it is perfectly reasonable to treat values as meters, I have chosen to use a more generic term, world unit. In general practice, you may treat these terms the same. Thus we have the following:

<b>Entities</b>	<b>Measurement Notes</b>
Terrain	Standard terrain is 2048 x 2048 meters square.
Terrain Heightmap	Terrain heightmaps (usually BMP) are 256 by 256 pixels which means that each pixel is eight meters from the next pixel in its respective row or column. Note also, the terrain points (as rendered in TGE) are by default 8 meters apart.
Terrain Textures	The standard dimension for a texture used to paint the terrain is 256 by 256 pixels. This texture will be applied at a ratio of 32 pixels per linear-meter. Thus if you need more detail, you'll have to go up to the maximum texture size of 512 by 512 pixels. This will cover the same area but give a coverage of 64 pixels per linear-meter. Suggestion: Be sure you are using PNG files before trying a higher resolution. Using JPG files may result in a poor looking terrain. Also be sure to use the detailTexture.
Terrain detailTexture	There is a special texture which can be specified on a per terrain basis. It's purpose is to add local texture quality by blending the specified texture with the underlying texture. This texture is rendered at a ratio of 256 pixels per linear-meter.
Terrain Scale Factor	Terrain rendering and texturing is controlled by the terrain.scaleFactor field. By default it's value 8, but in can be adjusted to increase the size of the terrain. Increasing this reduces the pixels per linear-meter ratios listed above.
Water	Water Textures follow the same rules as the Terrain and are also tied to scaleFactor.
Shapes	Texture scaling is controlled by the tools in use. Default ratios vary.
Interiors (Hammer)	Interiors generated with Hammer, by default (pre-scaling), apply textures at a ratio of 32 pixels per linear-meter.

## ***D.2 Suggested Reading***

### **D.2.1. Graphics**

#### ***D.2.1.1. Animation***

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##### **Advanced Animation and Rendering Techniques (Theory and Practice)**

Alan Watt / Mark Watt

ISBN: 0-201-54412-1

#### ***D.2.1.2. DirectX***

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##### **Direct3D ShaderX - Vertex and Pixel Shader Tips and Tricks**

Wolfgang F. Engel

ISBN: 1-55622-041-3

#### ***D.2.1.3. General***

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##### **Computer Graphics: Principles and Practice in C (2<sup>nd</sup> Edition)**

Foley / van Dam / Feiner / Hughes

ISBN: 0-201-84840-6

#### ***D.2.1.4. Mathematics***

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##### **Mathematics for 3D Game Programming & Computer Graphics**

Eric Lengyel

ISBN: 1-58450-037-9

#### ***D.2.1.5. OpenGL***

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##### **OpenGL Programming Guide, Third Edition**

OpenGL ARB

ISBN: 0201-60458-2

##### **OpenGL Reference Manual, Fourth Edition**

OpenGL ARB

ISBN: 0-321-173-83X



### ***D.2.1.6. Rendering***

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#### **Real-Time Rendering (Second Edition)**

Tomas Akenine-Möller, Eric Haines

ISBN: 156881-182-9

### **D.2.2. Games**

#### ***D.2.2.1. General***

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#### **Games Programming Gems Series 1 thru 6.**

Various Authors

#### **Game Programming Tricks of the Trade**

Andrew LaMothe

ISBN: 1-931841-69-1

#### **Tricks Of The Windows Game Programming Gurus (2<sup>nd</sup> Edition)**

Andre LaMothe

ISBN: 0-672-323-699

#### ***D.2.2.1. Architecture***

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#### **Game Architecture and Design**

Andrew Rollings / Dave Morris

ISBN: 1-57610-425-7

### **D.2.3. User Interfaces**

#### **User Interface Design for Programmers**

Joel Spolsky

ISBN: 1-893-115-941

## **D.2.4. Programming**

### **Debugging Applications**

John Robbins

ISBN: 0-735-608-865

### **Code Complete**

Steve McConnell

ISBN: 1-55615-484-4

### **Large-Scale C++ Software Design**

John Lakos

ISBN: 0-201-63362-0

### **Software Project Survival Guide**

Steve McConnell

ISBN: 1-57231-621-7

## **D.2.5. General Design**

### **The Design of Everyday Things**

Donald A. Norman Search at Amazon

ISBN: 0-46506-710-7

## D.3 Favorite Resources

### D.3.1. Game Development Sites

<b>GarageGames, Inc.</b>	<a href="http://www.garagegames.com">http://www.garagegames.com</a> <a href="http://tdn.garagegames.com/">http://tdn.garagegames.com/</a>
<ul style="list-style-type: none"> <li>- Torque Community</li> <li>- Engines: TGE, TSE, T2D</li> <li>- Assets and Resources</li> <li>- Torque Developers Network.</li> <li>- Much more ...</li> </ul>	<p>GarageGames is a unique Internet publishing label for independent games and game makers. They are a band of professional game makers committed to publishing truly original and exciting titles on their own terms.</p>
<b>Hall Of Worlds, LLC.</b>	<a href="http://gamers.hallofworlds.com">http://gamers.hallofworlds.com</a>
<ul style="list-style-type: none"> <li>- Articles</li> <li>- Books</li> <li>- Newsletter</li> <li>- Assets and Resources</li> <li>- Research Center</li> </ul>	<p>An independent game studio and developer of educational products. The "Hall Of Worlds For Gamers" site is dedicated to games and the individuals that develop them.</p>
<b>Gamasutra</b>	<a href="http://www.gamasutra.com">http://www.gamasutra.com</a>
<ul style="list-style-type: none"> <li>- Daily news.</li> <li>- Art articles.</li> <li>- Technical articles.</li> <li>- Postmortems.</li> <li>- Job listings.</li> <li>- Developers Directories.</li> </ul>	<p>Gamasutra.com delivers an international audience of over 290,000 registered members with purchasing power. Over 150,000 of the members are from outside the USA.</p> <p>Part of the 'CMP Game Group'  <a href="http://www.cmpgame.com/">http://www.cmpgame.com/</a>.</p>

<b>GameDev.net</b>	<a href="http://www.gamedev.net">http://www.gamedev.net</a>
<ul style="list-style-type: none"><li>- Daily news.</li><li>- Art articles.</li><li>- Technical articles.</li><li>- Forums.</li><li>- Job listings.</li><li>- Developer Sites.</li><li>- Image Of The Day.</li></ul>	<p>A leading online community for game developers of all levels, from the green beginner to the seasoned industry veteran.</p> <p>Host to Neon Helium: <a href="http://nehe.gamedev.net/">http://nehe.gamedev.net/</a>.</p>
<b>Flipcode</b>	<a href="http://www.flipcode.com/">http://www.flipcode.com/</a>
<ul style="list-style-type: none"><li>- Articles.</li><li>- Tutorials.</li><li>- Tips and Tricks.</li><li>- Code Of The Day.</li><li>- Q&amp;A Answer Column.</li><li>- Knowledge Base.</li></ul>	<p>After more than six and a half years of game development goodness, flipCode closed its doors. Although they no longer accept submissions of articles, images, news, etc., their article archives will remain online as reference material for the foreseeable future.</p>

### **D.3.2. Engine Improvements and Scripting Resources**

To find these resources, simply type all or part of the listed title into the GarageGames search engine.

<b>Title</b>
8 terrain textures instead of 6
A better vehicle/simulations control thru the keyboard
Add Gamepad support to Torque
Adding multiple modes to your weapons
Adding Reactive Mission Regions
Adding Relative Pathing
Adding Watercraft to TGE
Advanced Camera
Advanced Options Dialog
AdvancedCam Orbitmode Camera/Player Independant Rotation
AI Senses
Air Control
Animated Menus using guiAnimatedBitmapCtrl
Artificial Horizon GUI Control
Basic TerrainDeformer Object for Torque
Charge Jump
Click n Pick
Client-side radar
Colour Filter Effect (Night Vision / Colourization)
Conform Player to Terrain
Constraining camera to terrain / interiors
Continuous Laser
Cryptainer
Different Explosion when projectile hits a player object.
Distance based Particle Reduction
DragDropGui Control
Dynamic and Individualized Gravity
Dynamic MemStream
Enabling doppler effects in Torque
Flamethrower , bullets that don't disappear on impact with creatures
Flexible rain/snow texture in Torque

<b>Title</b>
FMod for torque
Fractal Cloud Generator
fxDecal
fxGrassReplicator v. 1.5
fxGuiSnooper
fxStarfieldReplicator Object
fxSwarm
Guided or Seeker Projectiles.
guiObjectView - Mountable Animated DTS Viewer
GuiObjectView Update
guiTeleportCtrl
Hand to Hand Combat, Locational Damage and Collision and More.
Hiding nodes in a model
How to get damage emitters in a Player
Image State Manual Transition
Improved Particle Emitters
In-game Music
Increase Terrain Texture Support
Interior (.dif) Transparency
Jet pack love...
Map HUD
Map Triggers that send you to another server
Mission Area Bounds
Mission Area Forcefield V2
MountImage with mount point.
Mouse controlled player movement
Moveable, Destroyable, Mission Area Aware ITEMS
Movie like camera system
Multiple Viewports
MySQL for TGE
Object moving along path
Object moving along path
PathShape
Persistant Character Server

<b>Title</b>
Projectile ballistic coefficients (drag factors)
Projectiles affected by wind
Protecting Art Assets With Encryption
Quick fix to add flight stick for Torque
Racing Wheel, Flight Stick and Gamepad Support for Torque (Windows)
Realistic shotgun script with multiple projectiles and impulse blast
Render To Texture
Rigid Shape Class
RPGDialog
Saving Inventory Between Missions
Scrolling Map, Radar, Compass gui Control
Server Side Melee System
Single Player Level exits
Skinnable GUI Controls in TGE
Slightly advanced bot scripting
SQLite Integration for Torque
Subscription Based Message Router
TGE dynamic lights on interiors fix
TgeLobby v1.2
Turret & AITurret classes, Version 1.20
twSurfaceReference Object
Using a Separate Camera Object

## D.4 Tool Lists

### D.4.1. Interior Creation Tools

Torque Game Engine DIF Exporter Matrix										
	Quark	WorldCraft/Hammer	Cartography Shop	Radiant	max2map	Game Level Builder	GameSpace	GameSpace	Blender	Maya Level Tools
Application Version	6.3		4.0							5.0+
App/Plugin Price	Free	***	\$65	\$5000	free*	\$40*	\$20*	\$25*	free*	free*
Geometry / Export										
Brush Modelling	Full Support	Full Support	Full Support	Full Support	Not Supported	Partial Support	2		Not Supported	
.map Export	Full Support	Full Support	Full Support	Full Support	Partial Support		Full Support		Full Support	
Valve220 .map Export	Full Support	Full Support	Full Support	Not Supported	Not Supported		Full Support		Full Support	
Integrate map2dif Export	Full Support	Full Support	Full Support	Not Supported			Not Supported			
Entities / Misc										
Lights	Full Support	Full Support	Full Support	Full Support	Not Supported	Partial Support	3			
Preview Lightmaps	Not Supported		Not Supported		Not Supported					
Custom Entities	Full Support	Full Support	Full Support	Full Support	Not Supported	Full Support				
Optimization										
Portals	Full Support	Full Support	Full Support	Full Support	Not Supported		Full Support			
Detail Brushes	Full Support	Full Support	Full Support	Full Support	Not Supported		Full Support			
Levels of Detail (LOD)	Full Support		Not Supported		Not Supported					
Optimization Tools										
Textures										
Apply Materials	Full Support	Full Support	Full Support	Full Support	Not Supported	Full Support	Full Support		Full Support	
Texgen Coordinates	Full Support	Full Support	Full Support	Full Support	Not Supported		Full Support			
TSE Light Brushes	Not Supported	Not Supported	Full Support	Full Support	Not Supported		Full Support			
Platforms Supported										
GG Recommended Tool	Full Support	Not Supported	Not Supported	Not Supported	Not Supported	Not Supported	Not Supported	Not Supported	Not Supported	Not Supported
Windows	Full Support	Full Support	Full Support	Full Support	Full Support	Full Support	Full Support	Full Support	Full Support	Full Support
Mac OS X	Not Supported		Not Supported	1	Not Supported	Not Supported	Not Supported	Not Supported	Full Support	Full Support
Linux	Not Supported		Not Supported	Full Support	Not Supported	Not Supported	Not Supported	Not Supported	Full Support	Full Support
Plugin Version	n/a	n/a	SHb1	n/a		3.0	DFI	tSX	0.1.5	1.5
Download/Buy Plugins	n/a	n/a	GO	n/a	CVS					
Documentation		GO	incl.							



\*: This is a plugin and requires the purchase/ download of another application.

\*\*\*: WorldCraft used to be available for Torque owners, but since the release of Hammer, the license authorizes it for use on Half-life based titles only. Thus, it is not legal to use for any commercial Torque project.

1. Runs on Mac OS X under X11 emulation.
2. Includes tutorials on modeling convex polygons for interiors, and a library of convex shapes.
3. Omni light only.

Original matrix can be found at:

<http://www.alexswanson.com/torque/dif/>

### D.4.2. Shape Creation Tools

Torque Game Engine DTS Exporter Matrix										
		3DS Max	3DS Max	Maya	Maya	Lightwave	Blender	MilkShape	GameSpace	Unwrap3D
Application Version		4.2 5.1	6.0 7.0	4.5 5.0	6.0	7.5+	2.33	1.7.0	1.5	v215
Price		\$3500	\$3500	\$2000	\$2000	\$1600	Free	\$20	\$299	\$40
<b>Geometry</b>										
Meshes										
Custom Bounds										
Auto Bounds										
Collision Meshes										
LOS Collision Meshes										
Nodes										
Billboards										
Triangle Stripping										
<b>Animation</b>										
Bone Animation										
Sequence Export										
Blend Sequences										
DSQ Export										
Ground Transform										
IFL										
Morph Animation (outdated)										
Mesh Visibility Animation										
Triggers										
<b>Optimization</b>										
Levels of Detail (LOD)										
Auto LOD (eg. MultiRes)										
Auto Billboard-LOD										
<b>Textures</b>										
Apply Materials										
UV Coords										
UV Animation (outdated)										
Detail Textures										
Decals (not supported by TGE)										
Sorted Meshes										
Translucent (Unsorted)										
Additive										
Subtractive										
2-Sided Materials										
Env. Map										
Bump Map (not supported by TGE)										
Self Illuminated										
NoMipMap										
ZeroBorder MipMap										

Torque Game Engine DTS Exporter Matrix									
	3DS Max	3DS Max	Maya	Maya	Lightwave	Blender	MilkShape	GameSpace	Unwrap3D
Application Version	4.2 5.1	6.0 7.0	4.5 5.0	6.0	7.5+	2.33	1.7.0	1.5	v215
Platforms Supported									
Official GG Exporter	Yes	No*	Yes	Yes	No*	No*	No	No*	No
Windows	Full Support	Full Support	Full Support	Full Support	Full Support	Full Support	Full Support	Full Support	Full Support
Mac OS X	Not Supported	Not Supported	Partial Support	Full Support	Full Support	Full Support	Full Support	Full Support	Full Support
Linux	Not Supported	Not Supported	Partial Support	Partial Support	Full Support	Full Support	Full Support	Full Support	Full Support
Exporter Version	BT		sdkt+	sdkt+	4-2-23	8.3+	8/04	2.0	
Download Exporters									
Documentation							incl.	incl.	

Requires Max 4 Multires Plugin in Max 5.

1. - Note Removed -
2. Exporter GUI can auto-generate detail markers.
3. DSQ Exporter auto-generates .cs files for the shape.
4. Supports only 2 bones per vertex.
5. Supported via Armatures.
6. Supported, but requires implementation found at <http://www.vtk.org>
7. This has not yet been compiled and tested, but should work.
8. This works, but the IFL animation does not show up in the application.
9. Only supports skinning to armatures, not meshes linked directly to individual bones.
10. Mesh visibility data is not saved on application close, must be set up each time before export.

\*. This exporter's development is in-progress with the support of GarageGames.

Original matrix can be found at:  
<http://www.alexswanson.com/torque/dts/>

**D.4.3. Texture Creation, Generation, and Editing Tools**

<b>Tool Name</b>	<b>Web-Site</b>	<b>Cost</b>
Adobe® Photoshop®	<a href="http://www.adobe.com/">http://www.adobe.com/</a>	\$649
Corel® Paint Shop Pro®	<a href="http://www.corel.com">http://www.corel.com</a>	\$99
GIMP	<a href="http://www.gimp.org/">http://www.gimp.org/</a>	Free
Spiral Graphics Genetica 2	<a href="http://www.spiralgraphics.biz/">http://www.spiralgraphics.biz/</a>	\$129
Texture Maker	<a href="http://texturemaker.thegamecreators.com/">http://texturemaker.thegamecreators.com/</a>	\$70

**D.4.4. Texture Filters and Filtering Tools**

<b>Tool Name</b>	<b>Web-Site</b>	<b>Cost</b>
Alien Skin	<a href="http://www.alienskin.com/">http://www.alienskin.com/</a>	Varies
Flaming Pear	<a href="http://www.furbo-filters.com/">http://www.furbo-filters.com/</a>	Varies
Plugin Commander	<a href="http://thepluginsite.com/products/picopro/">http://thepluginsite.com/products/picopro/</a>	\$50
Redfield Plugins	<a href="http://www.redfieldplugins.com/">http://www.redfieldplugins.com/</a>	Varies

**D.4.5. Sound Recording and Editing Tools**

<b>Tool Name</b>	<b>Web-Site</b>	<b>Cost</b>
Audacity	<a href="http://audacity.sourceforge.net/">http://audacity.sourceforge.net/</a>	Free
Sound Forge	<a href="http://www.sonymediasoftware.com">http://www.sonymediasoftware.com</a>	\$299

**D.4.6. Video Capture & Editing Tools**

<b>Tool Name</b>	<b>Web-Site</b>	<b>Cost</b>
FRAPS	<a href="http://www.sonymediasoftware.com">http://www.sonymediasoftware.com</a>	\$37
VirtualDub	<a href="http://www.virtualdub.org/">http://www.virtualdub.org/</a>	Freeware

## ***D.5 Glossary Of Terms***

<b>Term</b>	<b>Meaning</b>
1st-Person (1st POV) (3D Perspective)	The player's view is such that the player "sees" through the eyes of his or her avatar. (The avatar is not normally seen, although appendages and currently held items may be visible.)
2D Sound	A sound that has no apparent origin, and when played, will play equally loud from the left and the right speaker (assuming you have only two).
3D Sound	A sound with an origin associated with it which is then transformed and attenuated based on the listener's location relative to the sound's source. That is, 3D sound may play more loudly from one speaker than the other(s)
3rd-Person (3rd POV) (3D Perspective)	The player's view is that of a camera, usually attached to an avatar by an invisible tether. The distance and angle between the 'camera' and the avatar can and may vary depending on game play needs.
Action (Genre)	Fast paced games requiring accuracy and quick reflexes.
Adventure (Genre)	A genre in which the focus is on graphics, character development, and/or story. The player usually has to solve a series of puzzles while progressing through a story. The player's normal role is that of the protagonist.
AI	Artificial Intelligence
Alpha Channel	An optional channel in some texture file formats that defines the transparency of the texture's pixels.
Axis Aligned Bounding Box (AABB)	A bounding box, encompassing all points on a model aligned to the world axes. This is easier to calculate than, but less efficient than an Oriented Bounding Box for collision detection calculations.

<b>Term</b>	<b>Meaning</b>
Baked Textures	Textures, into which, lighting and other information has been combined (i.e. 'baked').
Billboard	A texture that always maintains it's alignment to the view.
Bit Depth	The number of bits used used for each of a pixels' color channels. For example, a RGBA texture with a bit depth of 8 would use 32 bits per pixel (BPP), 8 bits per the Red, Green, Blue, and Alpha channels.
Bitmap	A texture.
Blended Animation	A type of skeletal animation whereby a blended animation can be applied to the results of subsequent animations of the skeleton to produce an additive result.
Bounding Box	A simplified approximation of the volume of model. In other words a rectangular cube encompassing all points on a model. This box may be aligned to the world as an Axis-Aligned-Bounding Box (AABB), or aligned to the object as an Oriented-Bounding-Box (OBB).
BPP (Bits Per Pixel)	The number of bits used to represent a single pixel.
BSP	Binary Space Partition. An algorithm, whereby 3D space is divided by 2D planes in order to decrease sorting and culling times. Also used for collision detection.
Callback	Any console method (scripted function associated with object in game world) that is automatically (or directly) called by the engine (or scripts) in response to some event. These callbacks are part of what drives a game.
Centroid	The center of an object.

Term	Meaning
Client-Server Architecture	A game system organized such that the server is responsible for making most if not all game play related decisions while the client is responsible for acting on those decisions.
Collision Detection (COLDET)	The process of detecting when two or more objects (in the simulated world) come into contact with each other.
Compile	The conversion of a high-level computer language into machine language.
Concave	The opposite of Convex. A mesh with a dimple in its geometry. A shape where one or more line segments on the mesh, when extended infinitely in both directions, pass through the interior of the mesh. Concave meshes <u>cannot</u> be used for collision meshes.
Convex	The opposite of Concave. A mesh with no dimples. A shape where, when any and all line segments on the mesh are extended infinitely in both directions, they <u>do not</u> pass through the interior of the mesh. Only convex meshes can be used for collision meshes.
Convex Brush	A Convex brush is a single instance of some regular convex geometry. Convex brushes are combined to create models that can then be converted into an interior.
Culling	The act of removing unseen polygons from a scene.
Cyclic Animation	An animation that repeats endlessly in a loop.
Datablock	A special object in Torque created to contain static data and for scoping.
DIF (.dif)	Dynamix Interchange Format. See Interiors



<b>Term</b>	<b>Meaning</b>
DTS (.dts)	Dynamix Three Space Format. See Shapes.
Dynamic Lighting	Lighting that is updated every frame.
Educational (Genre)	The purpose of these games is to increase knowledge and/or improve skills of a student in some area of academia. Can be made with TGE.
Environment Mapping	A technique, whereby a pre-defined texture (bitmap) is applied to a mesh to give the impression that the mesh is reflecting its surroundings.
Field Of View (FOV)	Area that the viewer (camera) can see.
First Person Shooter	A shooter played in 1 <sup>st</sup> POV.
Frame Rate	Same as Frames Per Second.
Frames Per Second	Number of frames rendered, on average, every second.
Frustum	An area that defines the limits of what the viewer can see. It is shaped like a pyramid, with the point of the pyramid beginning at the eye (camera) position and the base of the pyramid is at right angle to the eye-vector (a vector originating at the eye and extending in the direction the eye is looking).
<b>Garage Games, Inc.</b>	Makers of the Torque Game Engine (TGE), Torque 2D Engine (T2D), and Torque Shader Engine (TSE). Become a member of the community at: <a href="http://www.garagegames.com">http://www.garagegames.com</a> .
Genre	A class of games
Ghost	The instance of an object that has been duplicated on a client and represents an object on the server. A ghost will behave as it is told to by the server based on what the server object does.

<b>Term</b>	<b>Meaning</b>
GUI	Graphical User Interface.
<b>Hall Of Worlds, LLC.</b>	The authors' company website. A shameless plug to get you to visit: <a href="http://www.hallofworlds.com">http://www.hallofworlds.com</a>
Height Map	A (grayscale) texture used as a displacement map to define the topography of the polygons.
HUD	Heads-Up-Display.
Image File List (IFL)	A type of animation applied to the texture(s) on an object, where the texture being animated is replaced with a new texture (as specified in the list) at regular intervals. This may be cyclic or non-repetitive.
Interiors	A class, frequently referred to simply as Interior(s), is used to display models that represent any structural object, to include such things as buildings, bridges, walls, and other large structures. Also see DIF.
Interpolation	The process of determining from two or more values what the "in-between" values should be.
Isometric (2D Perspective)	Often confused with 3rd POV, in reality, this is a 2D method that gives the impression of being 3D.
Level of Detail (LOD)	Level of Detail pertains to the complexity of a 3D model relative to the current viewing distance to that model. This complexity increases or decreases as the camera (the viewer) moves nearer to or farther from a shape, accordingly.
Light Map	A texture whose values represent the light contribution for a texture. These are often blended/baked with regular textures to create static lighting effects.
Mesh	Geometry of a model.

<b>Term</b>	<b>Meaning</b>
Mission (.mis)	A special file containing all of the statically defined (placed) object in a game or game level.
Mixed (Play Style)	A combination of real-time and turn-based gameplay.
Node	A point in a mesh, where one or more bones is connected. Every bone in a model has two nodes, one for each end.
Object	Any instance of a game class accessible from within the game world or from scripts.
Opaque	A point in a texture that is completely filled with color and has an alpha value equal to 100%. The opposite of transparent.
Oriented Bounding Box	A bounding box, encompassing all points on a model aligned to the object axes. This is more expensive to calculate than, but more efficient than an Oriented Bounding Box for collision detection calculations.
Pitch	To rotate an object frontwards or backwards (i.e. as if you tilted your the the front or back).
Pixel	Picture element.
Platform (2D Perspective)	Describes any action game where the play field is set up as a series of floors, levels, or platforms for the player to navigate. Platform games usually require a small bit of strategy and/or puzzle solving. Examples: Prince of Persia, Dark Castle, etc.
Polygon	A series of vertices that define a plane. Two common polygons are Triangles and Quads.

<b>Term</b>	<b>Meaning</b>
Portal	A type of rendering where the world is split up into regions. Each is divided from the other regions by one or more portals. Conceptually, you could consider portals to be the doors within doorways, except in the 3D world portals are not rendered and do not collide with object.
Prototype	The most basic test version of a game concept.
Quad	A square polygon, having four vertices and forming a plane.
Racing / Driving (Genre)	A game where one or more players race against, a clock or each other. Normally, the race takes place on some kind of track (not-necessarily on the ground). Can be made with TGE.
Ray	A line.
Ray Casting	The projection of an imaginary point in 3D space, between two separate points. Often used as part of a collision detection test. If the ray pierces or in any way impinges on an object, a collision has occurred.
Real-time (Play Style)	A game that proceeds constantly in which the player needs to respond actively as events and the game world changes from second to second.
Render	To transform 3D (in the game world) data into 2D images (on the screen).
Right Angle	A 90-degree angle.
Role-Playing Game (RPG) (Genre)	A misnomer for most games in this category, these games are usually based on controlling one or more avatars in order to accomplish a series of quests, hack-and-slash foes, and/or to gaining experience points and items. Can be made with TGE.
Roll	To rotate an object leftwards or rightwards (i.e. as if you tilted your head left or right).

<b>Term</b>	<b>Meaning</b>
Shape(s)	A model created using a polygon (or equivalent) editor. See also DTS.
Side-Scrolling (2D Perspective)	Used to describe any game where the main setting of game play involves the player moving from one side of the play field to the other horizontally for a length of time; so named because the player character stays in the same place on-screen, but the entire play field scrolls left or right to accommodate keeping player movement on-screen at all times. Usually used as a modifier in describing action games; "shooters", etc. Not to be confused with Platform games, which may or may not scroll.
Simulation (Genre)	These games aim to simulate a specific activity with a high degree of reality. These games will normally take into account real-world details normally glossed over in other game, for example realistic physics in a bridge building simulation. Can be made with TGE.
Skeletal Animation	An animation technique utilizing 'bones'. Each bone has two nodes. These nodes may optionally contribute to the animation of one or more vertices on a mesh. Thus, moving a bone (or bones) in a model using skeletal animation will move one or more vertices in the model's mesh, thereby animating them.
Sports (Genre)	A game that emulates some real-world or made-up sport, such as football, tennis, or Rollerball. Can be made with TGE.
Static Lighting	Lighting that is calculated only once and the applied in the same way every frame, or baked in. See baked textures.
Strategy (Genre)	A game in which the focus is on planning and resource management in order to achieve a goal. Can be made with TGE.

<b>Term</b>	<b>Meaning</b>
Texture	An image file. A bitmap.
Ticks	A measure of time in Torque, by default equal to 32 milliseconds, but which may be tuned to your needs (if you own the source).
Tile	To repeat the same texture more than once across a surface.
Top-Down (2D Perspective)	Used to describe any game where the main setting of game play is represented by a top-down" view of the play field; used in describing both shooters and adventure games.
Transform	In TGE, Translation and Rotation are combined into a single Transform, while scaling is separated into its own representation. See Transforms.
Transforms	Translation, Rotation and Scale. See Transform.
Translucent	A point in a texture that is completely may be partially filled with color and/or has an alpha value greater than 0% and less than 100%.
Transparent	A point in a texture that is completely devoid of color or has an alpha value equal to 0%.
Triangle	A polygon having three vertices and forming a plane.
Turn-based (Play Style)	A turn-based game, is a game where each player takes a turn. Once each player has taken a turn, the results of these actions are executed.
Vertex	A point in 3D space.
View Sorting	The action of determining in which order objects will render. Most systems render objects back to front in order to present the correct view on a 3D world.

<b>Term</b>	<b>Meaning</b>
Yaw	To rotate on object about the up axis (i.e. as if you rotated your head left or right while keeping your head completely upright).