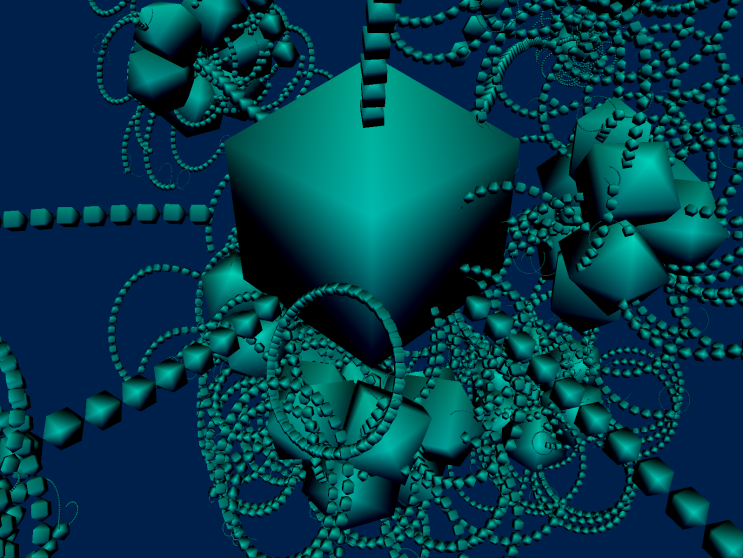
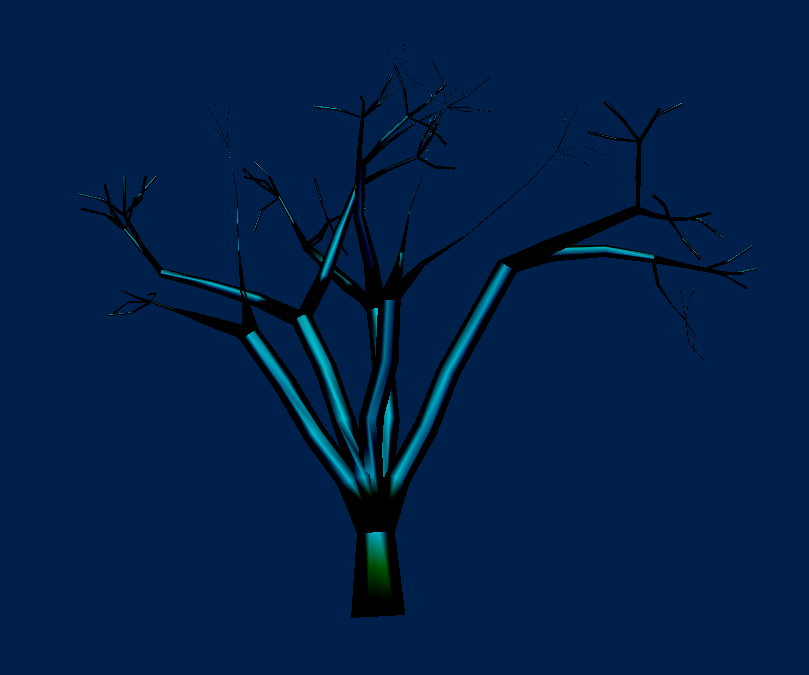
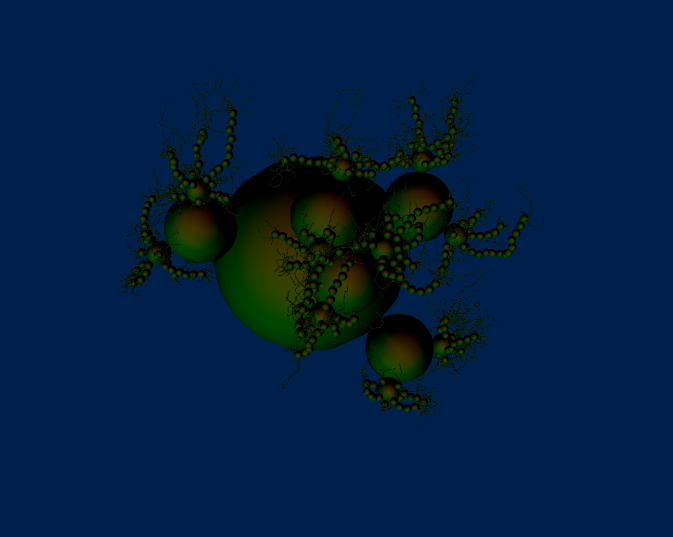
Author: Hugh Smith

This document covers basics of the **Fractal Sphere** and **Tree** libraries for those Intel internal folks wishing to look at that code or run the applications.

Pictures: (plenty more of these pretty pictures upon request)





There is the Harness Applications that utilizes the libraries. You can write your own Harness. There is a public framework using the tree library already. That would be the Intel Smoke Framework. (White Paper <http://isdlibrary.intel-dispatch.com/vc/2685/Procedural%20Trees%20and%20Procedural%20Fire%20Wp%20-%20final1%201_rose.pdf> ) I’m just using a DX 10 harness for this exercise for both libraries.

**Application and Binaries**: **c:\yourProjectDir\yourBinDir\TreeOrchard.exe .\TreeOrchard.ini** or **c:\yourProjectDir\yourBinDir\SphereTree.exe .\SphereTree.ini** . This command line will run the Harness application. The Harness application opens up and reads an ini file that can be modified to effect behavior of the harness application and point to the assets you want to use such as an fx file, texture and grammar definitions. You can also set things like resolution and windowed mode in this file.

WSAD camera commands work. You can use F and C to raise or lower the camera. Also take note that L and U lock and unlock the camera. That is to say it will lock the focal “look at” point of the camera around the object. You can then orbit the object with the same control keys.

**Assets and Config Files.**  First the INI file.

---------------------------------TreeOrchard.ini----------------

[INITVALS]

FXFILENAME="..\TreeOrchard\Source\TreeOrchard.fx"

TREEGRAMMAR="..\TreeOrchard\TG1.tdf"

APPLESEED=1492

TEXTURE1="..\TreeOrchard\media\testquad.dds"

LOCKCAMERA=0

RESOLUTIONWIDTH=1600

RESOLUTIONHEIGHT=1200

WINDOWEDMODE=1

CSVLOC="..\Data\TreeStub.csv"

TOTALBUFFERS=1

TOTALSTREAMOUTBUFFERS=1

DRAWTECHNIQUENAME="GSTree"

STREAMOUTTECHNIQUENAME="StreamOut"

MAXDRAWCALLS=2000000

DRAWCALLSTEP=300

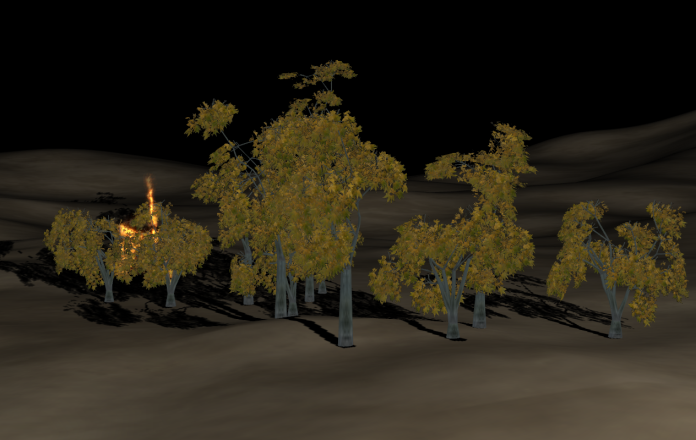
DRAWCALLSTART=1

//Line == 2, Loop == 1, Culdisack == 0

LOOPORCULDISACK=2

Next a bit about the fx file. The pixel shader has both color and texture info. This example is just showing color. The vertex shader is just doing simple lighting using two lights and the normal’s of the object. Nothing special but the objects that the library creates has full uv and normal info so texturing is straight forward just not shown in this example. OK, what the hell let me show you a couple of textured objects so you believe me. These textures would be pointed to with the TEXTURE1 tag in the INI file.

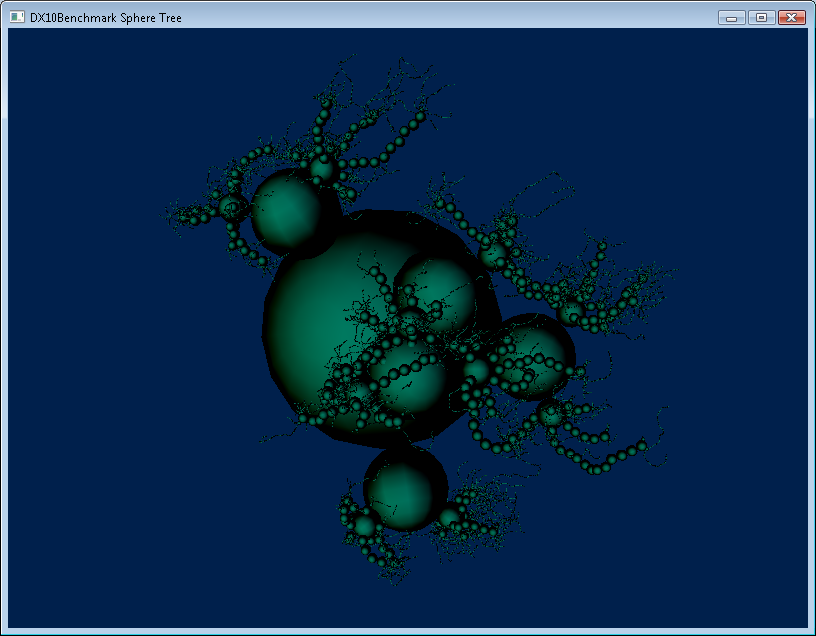
 Our friend Jeff Laflam with a lots of brains.

 Our tried and true example from Smoke.

The next thing in the INI file of interest would be the TREEGRAMMAR or SPHEREGRAMMAR for the SphereTree Harness application. This points to a Grammar that can be parsed by the associated library.

I’m going to give you a two examples here.

Sphere first, then the Tree. Stg and tg stands for sphere tree grammar and tree grammar respectively. The tdf stands for Tree definition file. These are xml files. I use TinyXML in the libraries to import the definition files. I’ve included a ton of these files in the workspace for you to play with. Or you can get brave and make your own.

Mutant\_stg1.tdf APPLESEED=19887 

<SphereTreeGrammar>

<GrammarElement Name="GDV">

<Property Name="Name" value="STG1"/>

<Property Name="LevelCount" value="6"/>

</GrammarElement>

<GrammarElement>

<Properties GrammarToken="Level">

<Property Name="LevelID" value1="0"/>

<Property Name="longitudePointCount" value1="16"/>

<Property Name="latitudePointCount" value1="16"/>

<Property Name="AxialBias" MinAngle="90.0"/>

<Property Name="AxialBias" MaxAngle="330.0"/>

<Property Name="Radius" value1="6.0"/>

<Property Name="dropAngle" Angle="45.0"/>

<Property Name="Heading" value1="0.0" value2="1.0" value3="0.0"/>

<Property Name="SphereType" value1="TRUNK"/>

<Property Name="splitListcount" value1="2"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="0"/>

<Property Name="probability" value1="0.25"/>

<Property Name="splitCount" value1="12"/>

<Property Name="type" value1="FRACTAL\_60\_FULL"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="1"/>

<Property Name="probability" value1="0.750"/>

<Property Name="splitCount" value1="5"/>

<Property Name="type" value1="FRACTAL\_S"/>

</Properties>

</GrammarElement>

<GrammarElement>

<Properties GrammarToken="Level">

<Property Name="LevelID" value1="1"/>

<Property Name="longitudePointCount" value1="12"/>

<Property Name="latitudePointCount" value1="12"/>

<Property Name="AxialBias" MinAngle="30.0"/>

<Property Name="AxialBias" MaxAngle="330.0"/>

<Property Name="Radius" value1="2.0"/>

<Property Name="dropAngle" Angle="10.0"/>

<Property Name="SphereType" value1="CHILD"/>

<Property Name="splitListcount" value1="1"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="0"/>

<Property Name="probability" value1="1.0"/>

<Property Name="splitCount" value1="2"/>

<Property Name="type" value1="FRACTAL\_Y"/>

</Properties>

</GrammarElement>

<GrammarElement>

<Properties GrammarToken="Level">

<Property Name="LevelID" value1="2"/>

<Property Name="longitudePointCount" value1="12"/>

<Property Name="latitudePointCount" value1="12"/>

<Property Name="AxialBias" MinAngle="30.0"/>

<Property Name="AxialBias" MaxAngle="330.0"/>

<Property Name="Radius" value1="0.666666"/>

<Property Name="dropAngle" Angle="10.0"/>

<Property Name="SphereType" value1="CHILD"/>

<Property Name="splitListcount" value1="1"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="0"/>

<Property Name="probability" value1="1.0"/>

<Property Name="splitCount" value1="9"/>

<Property Name="type" value1="FRACTAL\_60"/>

</Properties>

</GrammarElement>

<GrammarElement>

<Properties GrammarToken="Level">

<Property Name="LevelID" value1="3"/>

<Property Name="longitudePointCount" value1="12"/>

<Property Name="latitudePointCount" value1="12"/>

<Property Name="AxialBias" MinAngle="30.0"/>

<Property Name="AxialBias" MaxAngle="330.0"/>

<Property Name="Radius" value1="0.222222"/>

<Property Name="dropAngle" Angle="30.0"/>

<Property Name="SphereType" value1="CHILD"/>

<Property Name="splitListcount" value1="2"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="0"/>

<Property Name="probability" value1="0.25"/>

<Property Name="splitCount" value1="2"/>

<Property Name="type" value1="FRACTAL\_Y"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="1"/>

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<Property Name="splitCount" value1="1"/>

<Property Name="type" value1="FRACTAL\_I"/>

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<GrammarElement>

<Properties GrammarToken="Level">

<Property Name="LevelID" value1="4"/>

<Property Name="longitudePointCount" value1="12"/>

<Property Name="latitudePointCount" value1="12"/>

<Property Name="AxialBias" MinAngle="30.0"/>

<Property Name="AxialBias" MaxAngle="330.0"/>

<Property Name="Radius" value1="0.0740"/>

<Property Name="dropAngle" Angle="10.0"/>

<Property Name="SphereType" value1="CHILD"/>

<Property Name="splitListcount" value1="1"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="0"/>

<Property Name="probability" value1="0.5"/>

<Property Name="splitCount" value1="9"/>

<Property Name="type" value1="FRACTAL\_60"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="1"/>

<Property Name="probability" value1="0.5"/>

<Property Name="splitCount" value1="2"/>

<Property Name="type" value1="FRACTAL\_Y"/>

</Properties>

</GrammarElement>

<GrammarElement>

<Properties GrammarToken="Level">

<Property Name="LevelID" value1="5"/>

<Property Name="longitudePointCount" value1="12"/>

<Property Name="latitudePointCount" value1="12"/>

<Property Name="AxialBias" MinAngle="30.0"/>

<Property Name="AxialBias" MaxAngle="330.0"/>

<Property Name="Radius" value1="0.02469"/>

<Property Name="dropAngle" Angle="20.0"/>

<Property Name="SphereType" value1="CHILD"/>

<Property Name="splitListcount" value1="2"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="0"/>

<Property Name="probability" value1="0.950"/>

<Property Name="splitCount" value1="1"/>

<Property Name="type" value1="FRACTAL\_I"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="1"/>

<Property Name="probability" value1="0.05"/>

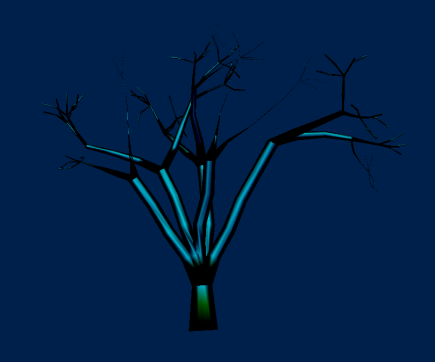
<Property Name="splitCount" value1="0"/>

<Property Name="type" value1="TERMINAL"/>

</Properties>

</GrammarElement>

</SphereTreeGrammar>

Tg1.tdf APPLESEED=3

<TreeGrammar>

<GrammarElement Name="GDV">

<Property Name="Name" value="TG1"/>

<Property Name="LevelCount" value="6"/>

</GrammarElement>

<GrammarElement>

<Properties GrammarToken="Level">

<Property Name="LevelID" value1="0"/>

<Property Name="tipPointCount" value1="13"/>

<Property Name="AxialBias" MinAngle="30.0"/>

<Property Name="AxialBias" MaxAngle="330.0"/>

<Property Name="Length" value1="10.0"/>

<Property Name="Diameter" value1="3.3"/>

<Property Name="taper" value1="0.30"/>

<Property Name="dropAngle" MinAngle="10.0"/>

<Property Name="dropAngle" MaxAngle="25.0"/>

<Property Name="dropAngle" BiasAngle="50.0"/>

<Property Name="Heading" value1="0.0" value2="1.0" value3="0.0"/>

<Property Name="Heading" MinAngle="-5.0"/>

<Property Name="Heading" MaxAngle="5.0"/>

<Property Name="branchType" value1="TRUNK"/>

<Property Name="canopyType" value1="NULL\_CANOPY"/>

<Property Name="splitListcount" value1="4"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="0"/>

<Property Name="probability" value1="0.25"/>

<Property Name="splitCount" value1="5"/>

<Property Name="type" value1="ORDINARY"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="1"/>

<Property Name="probability" value1="0.05"/>

<Property Name="splitCount" value1="2"/>

<Property Name="type" value1="ORDINARY"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="2"/>

<Property Name="probability" value1="0.15"/>

<Property Name="splitCount" value1="3"/>

<Property Name="type" value1="REPEAT\_OPPOSED"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="3"/>

<Property Name="probability" value1="0.55"/>

<Property Name="splitCount" value1="2"/>

<Property Name="type" value1="ORDINARY"/>

</Properties>

</GrammarElement>

<GrammarElement>

<Properties GrammarToken="Level">

<Property Name="LevelID" value1="1"/>

<Property Name="tipPointCount" value1="11"/>

<Property Name="AxialBias" MinAngle="30.0"/>

<Property Name="AxialBias" MaxAngle="330.0"/>

<Property Name="Length" value1="7.0"/>

<Property Name="Diameter" value1="2.0"/>

<Property Name="taper" value1="0.20"/>

<Property Name="dropAngle" MinAngle="35.0"/>

<Property Name="dropAngle" MaxAngle="50.0"/>

<Property Name="dropAngle" BiasAngle="40.0"/>

<Property Name="Heading" MinAngle="-20.0"/>

<Property Name="Heading" MaxAngle="20.0"/>

<Property Name="branchType" value1="BRANCH"/>

<Property Name="canopyType" value1="NULL\_CANOPY"/>

<Property Name="splitListcount" value1="5"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="0"/>

<Property Name="probability" value1="0.05"/>

<Property Name="splitCount" value1="3"/>

<Property Name="type" value1="REPEAT\_OPPOSED"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="1"/>

<Property Name="probability" value1="0.05"/>

<Property Name="splitCount" value1="3"/>

<Property Name="type" value1="REPEAT\_OPPOSED"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="2"/>

<Property Name="probability" value1="0.25"/>

<Property Name="splitCount" value1="3"/>

<Property Name="type" value1="REPEAT\_OPPOSED"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="3"/>

<Property Name="probability" value1="0.45"/>

<Property Name="splitCount" value1="2"/>

<Property Name="type" value1="ORDINARY"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="4"/>

<Property Name="probability" value1="0.20"/>

<Property Name="splitCount" value1="2"/>

<Property Name="type" value1="ORDINARY"/>

</Properties>

</GrammarElement>

<GrammarElement>

<Properties GrammarToken="Level">

<Property Name="LevelID" value1="2"/>

<Property Name="tipPointCount" value1="9"/>

<Property Name="AxialBias" MinAngle="30.0"/>

<Property Name="AxialBias" MaxAngle="330.0"/>

<Property Name="Length" value1="6.0"/>

<Property Name="Diameter" value1="1.0"/>

<Property Name="taper" value1="0.33"/>

<Property Name="dropAngle" MinAngle="35.0"/>

<Property Name="dropAngle" MaxAngle="50.0"/>

<Property Name="dropAngle" BiasAngle="40.0"/>

<Property Name="Heading" MinAngle="-20.0"/>

<Property Name="Heading" MaxAngle="20.0"/>

<Property Name="branchType" value1="BRANCH"/>

<Property Name="canopyType" value1="NULL\_CANOPY"/>

<Property Name="splitListcount" value1="3"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="0"/>

<Property Name="probability" value1="0.25"/>

<Property Name="splitCount" value1="1"/>

<Property Name="type" value1="REPEAT\_OPPOSED"/>

</Properties>

<Properties GrammarToken="SplitList">

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<Property Name="probability" value1="0.25"/>

<Property Name="splitCount" value1="1"/>

<Property Name="type" value1="OPPOSED"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="2"/>

<Property Name="probability" value1="0.5"/>

<Property Name="splitCount" value1="2"/>

<Property Name="type" value1="ORDINARY"/>

</Properties>

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<GrammarElement>

<Properties GrammarToken="Level">

<Property Name="LevelID" value1="3"/>

<Property Name="tipPointCount" value1="7"/>

<Property Name="AxialBias" MinAngle="30.0"/>

<Property Name="AxialBias" MaxAngle="330.0"/>

<Property Name="Length" value1="4.0"/>

<Property Name="Diameter" value1="1.0"/>

<Property Name="taper" value1="0.50"/>

<Property Name="dropAngle" MinAngle="55.0"/>

<Property Name="dropAngle" MaxAngle="70.0"/>

<Property Name="dropAngle" BiasAngle="60.0"/>

<Property Name="Heading" MinAngle="-20.0"/>

<Property Name="Heading" MaxAngle="20.0"/>

<Property Name="branchType" value1="BRANCH"/>

<Property Name="canopyType" value1="NULL\_CANOPY"/>

<Property Name="splitListcount" value1="2"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="0"/>

<Property Name="probability" value1="0.10"/>

<Property Name="splitCount" value1="1"/>

<Property Name="type" value1="REPEAT\_CANOPY"/>

</Properties>

<Properties GrammarToken="SplitList">

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<Property Name="probability" value1="0.9f"/>

<Property Name="splitCount" value1="4"/>

<Property Name="type" value1="OPPOSED"/>

</Properties>

</GrammarElement>

<GrammarElement>

<Properties GrammarToken="Level">

<Property Name="LevelID" value1="4"/>

<Property Name="tipPointCount" value1="7"/>

<Property Name="AxialBias" MinAngle="30.0"/>

<Property Name="AxialBias" MaxAngle="330.0"/>

<Property Name="Length" value1="3.0"/>

<Property Name="Diameter" value1="0.5"/>

<Property Name="taper" value1="0.0"/>

<Property Name="dropAngle" MinAngle="70.0"/>

<Property Name="dropAngle" MaxAngle="90.0"/>

<Property Name="dropAngle" BiasAngle="75.0"/>

<Property Name="Heading" MinAngle="-40.0"/>

<Property Name="Heading" MaxAngle="40.0"/>

<Property Name="branchType" value1="STEM"/>

<Property Name="canopyType" value1="NULL\_CANOPY"/>

<Property Name="splitListcount" value1="2"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="0"/>

<Property Name="probability" value1=""/>0.0

<Property Name="splitCount" value1="0"/>

<Property Name="type" value1="ORDINARY"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="1"/>

<Property Name="probability" value1="1.0"/>

<Property Name="splitCount" value1="0"/>

<Property Name="type" value1="ORDINARY"/>

</Properties>

</GrammarElement>

<GrammarElement>

<Properties GrammarToken="Level">

<Property Name="LevelID" value1="5"/>

<Property Name="PerturbFactor" value1="2.0"/>

<Property Name="branchType" value1="NULL\_BRANCH"/>

<Property Name="canopyType" value1="PATCH"/>

<Property Name="splitListcount" value1="1"/>

</Properties>

<Properties GrammarToken="SplitList">

<Property Name="splitID" value1="0"/>

<Property Name="probability" value1="1.0"/>

<Property Name="splitCount" value1="0"/>

<Property Name="type" value1="ORDINARY"/>

</Properties>

</GrammarElement>

**Source Code Structure:**

How do you get the code and set it up.

Everything is in Perforce. Server name: vmspacet001.amr.corp.intel.com:1666

The Harness applications (SphereTree.exe and TreeOrchard.exe) are DX 10 based applications

You will find all the applications, libraries and source code in the following depot location:

//depot/users/hasmith/LOCAL\_LIB/

//depot/users/hasmith/PCHarness/

//depot/users/hasmith/extern/

In the solutions properties for both the SphereTree and TreeOrchard projects set the debugging cmd arguments as follows

