 <p>The Media School</p>	<h1>Coursework Assignment Brief</h1>	<p>2014/15</p>
	<p>MSc Computer Animation & Visual Effects</p>	<p>Level M</p>
	<p>CGI Tools – Houdini Digital Asset Assignment</p>	
	<p>The City or Garden Builder</p>	<p>This assignment is a sub element of coursework worth 50% of the overall unit mark (Each piece of coursework may vary according to the unit)</p>

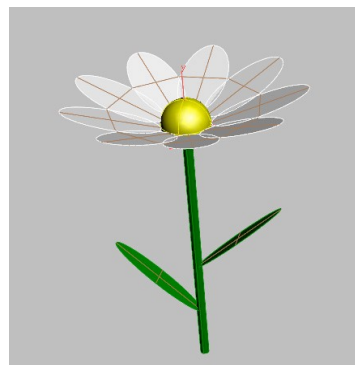
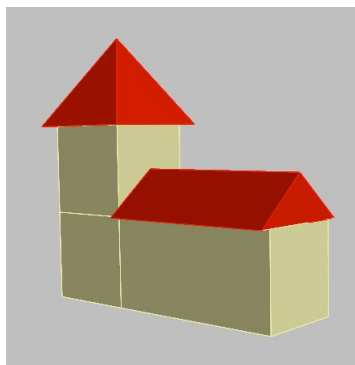
INTENDED LEARNING OUTCOMES:

Having completed this Unit, a student is expected to:

1. Demonstrate a mastery of key computer graphics techniques employed in computer animation production and the use of computer animation tools.
2. Demonstrate an advanced understanding of the techniques and tools applicable to their own practice.
3. Demonstrate the ability to autonomously develop solutions to problems arising in computer animation productions.

THE BRIEF

The aim of this assignment is to create a Houdini Digital Asset (HDA) that can quickly configure either a City or a Garden. The choice to create a City or a Garden for this assignment is up to the individual student. The City / Garden Builder network should be converted into a HDA, and completed with a flexible and intuitive User Interface denoting core controls. Each HDA should also have a Help Card written for it describing its usage.



Examples of primitive modelling

The HDA must either contain or accept five base Primitive Geometry models of City or Garden type. The HDA must arrange, scatter and distribute this Primitive Geometry across a terrain grid in accordance with a series of predefined parameters. The HDA must also have the ability to trade out this Primitive Geometry with higher-level geometry. The generation of this higher-level geometry is not however required; just the functionality to be able to trade out simple geometry for more complex models.

The aim of the tool is to allow an end user the ability to efficiently generate a simple yet believable City or Garden that is aesthetically convincing despite using Primitive Geometry for initial setup. The end user must be able to quickly configure a variety of pleasing aesthetics and layouts of the City / Garden Builder. Controls for example might be generated for modifying the overall terrain shape; the varying heights of the buildings / plants; pattern or random based distribution of the geometry; the ability to dial up or down certain amounts of building / plant types etc. It is anticipated that when the City or Garden HDA is configured it will result in a believable 'real-world' aesthetic despite the primitive geometry assigned to the tool.

SUBMISSION DETAILS

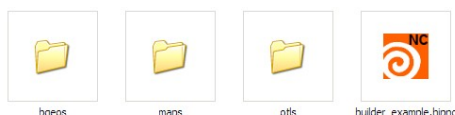
Files for submission should be stored in an assignment directory called:

MScCAVE1415_HDA_ Surname_Initial

Inside this directory should be the HDA components and example files. This should include an .otl file (containing the City / Garden Builder HDA), and example .hipnc file demonstrating the Digital Asset in action. Auxiliary files such as geometry or images can also be stored in this directory. Automated .hipnc backup files should not be included in the submission.

An example of the assignment directory structure might be:

\$HOME/MScCAVE1415_HDA_Dickens_DI



The finalised assignment directory can then be compressed as a .zip file ready for submission using

myBU.

SUBMISSION PROCEDURE: The final zip file should be submitted by the specified deadline using myBU. Inside **myBU > My Units > 2014-08 MS: M – Computer Generated Imagery Tools (061806) >**

Assessment >

Houdini Assignment Submission

Inside this directory you will find a folder with your name, where you can upload your assignment submission. **This folder will only be available until 12pm on the day of the assignment deadline.**

LATE SUBMISSIONS:

If you miss your assignment submission window, you will need to submit a hard copy of your assignment (on CD/DVD) to the Student Support Counter (W304) located on the 3rd Floor of Weymouth House.

SUBMISSION NOTES:

All Files should be thoroughly checked before submission. Corrupt project files will be marked at 0%. Please be aware of network traffic around the time of the deadline. Make sure you hand your work in good time. If there are any problems with myBU's online submission, please contact IT Services immediately.

DEADLINE: FRIDAY 5TH DECEMBER 2014 BY 12PM

Submissions received after this deadline will receive **0%** in accordance with University Policy. **Please note that this is the final time you can submit – not the time to submit!**

Your feedback and mark for this assignment will be provided on 12th December 2014.

HELP AND SUPPORT

If you have any questions about the brief please speak with J.Cox (coxj@bournemouth.ac.uk). For software related queries and support, please speak with the NCCA Demonstrators who can be found in W109 or by using the email animdemons@bournemouth.ac.uk.

Houdini Digital Assets

This is a function of Houdini that collapses entire networks into a single custom node. Digital Assets are saved externally to Houdini and then utilised in any scene as either objects or tools. Digital Assets can be created within any network level of Houdini and can be shared, modified and refined after creation. Digital Assets can also contain and drive other Digital Assets. Core network parameters can be ported up to the top level of the HDA creating a User Interface for the asset.

Useful Houdini Expressions

If Statement Syntax

`if($CR>0.5,1,0)` if the amount of red is greater than 0.5, return a value of 1, otherwise return a value of 0. If statements can also be nested within parent if statements.

opdigits() a function for returning the end number of an operator

`opdigits(".")` will return the number 3 if assigned as parameter to a node called sphere3

`opdigits("..")` will return the end number of the OBJ Level node containing sphere3

`opdigits("../box1")` will return the end number of a neighbouring node to sphere3

opname() a function for returning the name of the current operator as a string

Works in a similar way to `opdigits()`

pic() a function for assigning an COPs image to a geometry attribute. The geometry must have UVs assigned to it.

pow() a function for converting linear information into curve based information

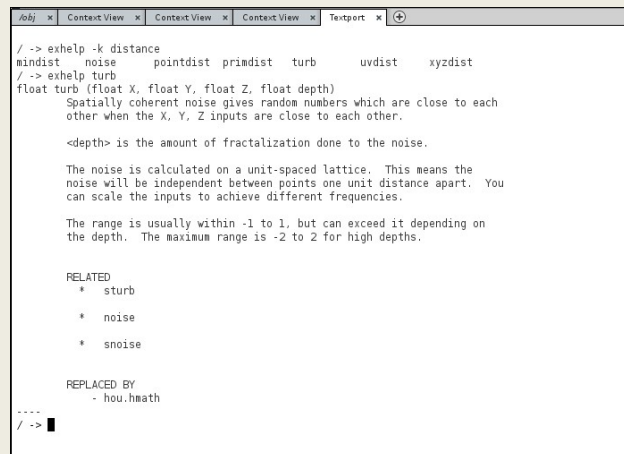
rand() a random number function returning a value between 0 and 1. For example `rand($PT)` will return a random value using the current point number as the seed.

stamp() a function for assigning the values of 'Stamp Inputs' created by Copy SOPs and L-System SOPs.

Houdini Expressions Help

A list of all Houdini native expressions can be accessed through a Textport Pane by typing the

command `exhelp`. Keywords can be used to précis this list by typing `exhelp -k <keyword>`. Help for a specific expression can be returned by typing `exhelp <function name>`.



```
Job x Context View x Context View x Context View x Textport x +
/ -> exhelp -k distance
mindist noise pointdist prindist turb uvdist xyzdist
/ -> exhelp turb
float turb (float X, float Y, float Z, float depth)
Spatially coherent noise gives random numbers which are close to each
other when the X, Y, Z inputs are close to each other.

<depth> is the amount of fractalization done to the noise.

The noise is calculated on a unit-spaced lattice. This means the
noise will be independent between points one unit distance apart. You
can scale the inputs to achieve different frequencies.

The range is usually within -1 to 1, but can exceed it depending on
the depth. The maximum range is -2 to 2 for high depths.

RELATED
* sturb
* noise
* snoise

REPLACED BY
- hou.hmath
----
/ -> █
```

Useful Geometry Operators

Color SOP – a native Digital Asset designed for assigning a colour attribute (Cd) to geometry.

Copy SOP – this will copy input geometry onto a series of template points. This operator will also allow for ‘Stamping’ effects which allow for per copy control over the original geometry input.

COP2Network – a sub-network containing the COPs (Compositing) Level of Houdini.

For Each SOP – a sub-network based operator that allows for internal operators to be iteratively performed on its input geometry.

Group SOP – will create groups of points or primitives. These groups can be specified by the user, created by expressions or governed by a bounding box. Groups can also be subtracted and added to each other using Boolean algebra to form new groups.

L-System SOP – useful for creating curves resembling simple trees

Mountain SOP – useful for creating uneven terrain

Point SOP – this can be used to modify geometry on a per point basis and activate specific point attributes (normals, colour etc).

Primitive SOP – this can be used to modify geometry on a per primitive basis and activate specific primitive attributes (normals, colour etc).

Scatter SOP – this will scatter a specified number of points randomly over a surface.

Switch SOP – A node for switching between multiple inputs.

Trace SOP – Can be used to generate outline based geometry from images

UV Project SOP – will assign a UV co-ordinate system to geometry

UV Texture SOP – will assign a UV co-ordinate system to geometry

VOP SOP Network – a SOP Level custom node generator.

Other Useful Utilities

.bgeo – the native geometry format for Houdini. A model can be rendered out to disk by RMB on the final node in a SOP chain and choosing 'Save Geometry...'. External geometry files can then be read back into Houdini using a File SOP.

\$HIP – a Houdini variable returning the save location of the current .hip file. External files can be located relative to this variable. For example a texture map can be loaded into Houdini using the syntax:

\$HIP/map/mypicture.tif

This will tell Houdini to look inside a subdirectory called 'map' for the file mypicture.tif in the location where the current .hip file is saved.

- **Plagiarism and Self-Plagiarism:** You must acknowledge your source every time you refer to others' work or work that you have previously submitted and been assessed on, using the **Harvard Referencing** system (Author/Date method). Failure to do so amounts to plagiarism or self-plagiarism which is against University regulations. Please refer to <http://www.bournemouth.ac.uk/library/how-to/plagiarism.html> for further details of this and to <http://www.bournemouth.ac.uk/library/how-to/citing-refs-harvard.html> for the University's guide to citation in the Harvard style.
- Students with **Additional Learning Needs** may contact Learning Support on <http://studentportal.bournemouth.ac.uk/learning/als/index.html>
- General **academic support** is available via the Academic Skills community on myBU.
- **Additional support** for Media School students only is provided by a small team of Learning Development Tutors. Please contact MSLearningDevelopmentTeam@bournemouth.ac.uk to make an appointment.
- If you have any valid **mitigating circumstances** that mean you cannot meet an assignment submission deadline and you wish to request an extension, you will need to complete and submit the Mitigating Circumstances Form for consideration to your Programme/Framework Administrator together with appropriate supporting evidence (e.g., GP note) normally before the coursework deadline. Further details on the procedure and the mitigating circumstances form can be found at www.bournemouth.ac.uk/student/mitigating. *Please make sure you read these documents carefully before submitting anything for consideration.*

Disclaimer: The information provided in this assignment brief is correct at time of publication. In the unlikely event that any changes are deemed necessary, they will be communicated clearly via e-mail and myBU and a new version of this assignment brief will be circulated.

Version: 1
(Updated October 2014)