**BEND:** Deformation of an object using CR (bend, scaling, twist, taper()) Relation of capture region and bend axis  
 Spine object

**Scaling** length  
**Twist -** rotate  
**Taper**- non-uniform scale, with ramp scalar

**IF OBJECT DOESNOT BEND ADD MORE DIVISIONS/POINTS USING RESAMPLE (max length 0.1) NODE**.

**CR** Blue curved\_rectangles are Capture Region bounding box for the object.

**THREE PARAMETERS OF CR**: origin, length, direction

**ABOUT LINE in 3D:**

Line and U different direction circles in the same plane Change up angle for circles in 3DWhite circles are there to increase decrease the length  
Red rectangle are there to increase decrease the CR

**RMB** click in scene view also shows the handle tabs   
to activate/deactivate handles **Go to scene view, LMB click on handles  
You see**

**green bend handle**  
if you do not see the green arrow, manually change the bend angledecrease the length of capture region

**Capture Region**  
Default Capture Axis, z, change to x or y and   
immerse  
Red handles increase decrease length of CR  
Bottom dot move the origin of the CR  
Bottom circle rotate the axis direction CR- up   
vector  
Bottom circle rotate the CR box about direction   
CR- up vector angle

**Twist and scale do effect the capture region.**

**Bend handles:** F (toggle bond visibility) G (Toggle capture) H (Toggle deform) B (cycle capture) N (Fit capture) M (Reverse capture)

**Taper notes:**  
Twist tab, and scale length tab are for the   
objects  
Rectangle at the top scale top  
Rectangle at the bottom scale squish value

Vertical arrow moves the squishpoint  
Merge multiple objects, then it bend all together

**POPNET:** Popnet creates particles and supporting nodes like   
Noise, Scatter ($F functionality is in-built)

**dive into popnet** to add windforce node to get wind direction

**IF constructs used with parameter values (related to switch)**Frame used to  
parameter values control  
if ($F<m, m, n)  
ramp function  
if ($F<m, m, if($F>n, n, $F))

**SCATTER:**

Scatter object creates new points for surface of an   
object. Scatter node replaces the points of an object with random point-locations for the object.  
Scatter creates uniformly distributed points on the surface of object

**ISOOFFSET:** Isooffset is for for band about the surface for fog, smoke,   
cloudnear the surface in and out in the band.

**Iso Surface**

A polygonal mesh will be created along the specified offset of the implicit function.

**Fog Volume**

The volume primitive will be set to 1 inside the object and 0 outside the object. Boundary cells will have an interpolated value between these extremes.

**SDF Volume**

The volume primitive will be a Signed Distance Field. Inside the object will store negative numbers storing the distance to the nearest point on the surface. Outside the object will store positive numbers storing the distance to the nearest point on the primitive. In the GL display, these tend to look inverted as the exterior is what renders as opaque. SDFs are also used by the [RBD Solver](https://www.sidefx.com/docs/houdini/nodes/dop/rbdsolver.html) and the [Fluid Solver](https://www.sidefx.com/docs/houdini/nodes/dop/fluidsolver.html). For additional information, see the [Volume Sample VOP](https://www.sidefx.com/docs/houdini/nodes/vop/volumesample.html) help.

**Tetra Mesh**

The interior of the object is filled with tetrahedrons. The resulting mesh can be used for deformers or for softbody approaches.

**POINT JITTER>:**

This node will randomize point locations by slightly altering their values. (scale parameter)

**MOUNTAIN: to create points displacement**

**(amplitude parameter)**

**LOCK/UNLOCK NODE:** select node in network pane and in top tool bar go for asset there u can see lock or unlock nodes

**PREPARE HDNAC creation in both object and geomnetry level**

**Manipulate parameter table in object level without going to geometry level**

For demo, show how can (geometry can be updated from obj level) be done without going into   
geometry.  
Let us start at object level  
At the HDA level, in order to create user parameters,   
RMB click on boxAsset  
Navigate and Click on Type Properties -🡪 parameter tab (float)

**How to create User defined variables for an HDA?**In the parameter pane of hda , there is no parameter “x-   
scale”.  
We will create a parameter x- scale with textfield to use   
x- scale values to change the box parameter values   
as follows.  
First column: the left column , there are parameter types,   
we want float type, select float.  
Second column: to create parameters, you must be at   
the root level. Second column will load label name   
you type in column 3.  
Third column: Type Name and name in label, confirm   
them in second column, then click apply, accept.

**voronoiFracturePoints** -- where to fracture in object  
**voronoiFracture** – fracture keep glued together with cracks on the object  
**explodedView** – separate the pieces

**RBD Material fracture** for fractures  
**RBD Bullet Solver** for natural animation, special   
effect for falling fracture pieces

**autoDop node** for Rendering the Fractured object  
Detecting collision, and fracturing the non-static   
object, directing the motion path, Ground plane   
can be created at wil

**Deficiencies:**Use of rbdBulletSolver for mutual collision   
detection and shattering  
Only one object shatters unless it is merger of   
several objects

**Connection between Real and Virtual Fracturing   
Shattering**  
you will have immersive experience while fracturing   
and disintegrating object in realtime and virtual   
viewing with animationBar .   
you can reverse fracturing through animationBar

**Static object –** rbd static for collision static will not   
move, will not let any object pass through

**Dynamic-** rbdFractured or rbdObject.   
Both use same gravity, to differentiate the   
timing change the gravity rates.   
Gravity allows you to change direction and force   
of motion.  
This shows static and dynamic (crashing and not   
crashing) objects

Mountain Node :

**Lacunarity measure if inhomogeneity, irregularity in**

**textures, pattern, texture of lake water**

**Roughness - pointedness in peaks**

**Height – hight of peaks**

**Element size- size of block causing unevenness**

**offset – displacement of noise**