

# Houdini FX

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# POPs

Random Spin:

```
// The following makes it random:  
axis = rand(@id) - set(0.5, 0.5, 0.5);  
spinspeed *= rand(@id+0.1);
```

# Python

# Fun Shelf Scripts

Version up sops that have a "version" parm - I use this to version up a lot of exports in tops or rops:

```
import hou
nodes = hou.selectedNodes()
for x in nodes:
    ver = x.parm("version").eval() + 1
    x.parm("version").set(ver)
```

Send a ROP fetch to TOPs name "topnet1" for convenient cooking.:

```
import hou
nodes = hou.selectedNodes()
topnet = hou.node("/obj/topnet1")
frb = round((hou.playbar.frameRange()[1] - hou.playbar.frameRange()[0]) / 2)

if not topnet:
    topnet = hou.node("/obj").createNode("topnet")
    topnet.setName("topnet1")
if not hou.node("/obj/topnet1/rangegenerate_start"):
    rg = topnet.createNode("rangegenerate")
    rg.setName("rangegenerate_start")
for x in nodes:
    ver = x.parm("ver")
    path = x.path()
    name = x.name()
    if x.parm("extra"):
        name = name + x.parm("extra").eval()
```

```

else: pass
topcache = topnet.createNode("ropfetch")
p = hou.IntParmTemplate("version", "Version", 1)
g = topcache.parmTemplateGroup()
g.append(p)
topcache.setParmTemplateGroup(g)
topcache.parm("version").set(ver)
topcache.parm("roppath").set(path)
topcache.parm("framesperbatch").set(frb)
topcache.setName(name)

```

Send SOP to a ROP net named "ropnet1", adds version parm to update the original SOP version cache:

```

import hou
nodes = hou.selectedNodes()
ropnet = hou.node("/obj/ropnet1")
for x in nodes:
    name = x.name()+"_"+str(x.parent())
    path= x.path()
    if x.type().name() == "rop_geometry":
        ver = x.parm("vp_version")
    elif x.type().name() == "rop_alembic":
        ver = x.parm("vp_version")
    else:
        ver = x.parm("version")
    topcache = ropnet.createNode("fetch")
    topcache.parm("source").set(path)
    p = hou.IntParmTemplate("version", "Version", 1)
    g = topcache.parmTemplateGroup()
    g.append(p)
    topcache.setParmTemplateGroup(g)
    topcache.parm("version").set(ver)
    topcache.setName(name)

```

Make a file node from a rop export node:

```

import hou, re
nodes = hou.selectedNodes()
parent = nodes[0].parent()
nodeList = []
for x in nodes:
    name = x.name()+"_load"

    version = x.parm("vp_version").eval()
    path= x.parm("sopoutput").eval()
    path = str(path)
    newpath1 = re.sub("_v\d+", "_v{0}", path).format("`padzero(3,ch('version'))`)")
    newpath1 = re.sub("\\.d+", ".$F4", newpath1)

    file = parent.createNode("file")
    try:
        file.setName(name)
    except:
        continue
    file.setColor(hou.Color(0,0,1))
    file.parm("file").set(newpath1)
    p = hou.IntParmTemplate("version", "Version", 1)
    g = file.parmTemplateGroup()
    g.append(p)
    file.setParmTemplateGroup(g)
    file.parm("version").set(version)
    nodeList.append(file)

parent.layoutChildren(items=nodeList)

```

## Open Directory from Tops

```

import hou, re
nodes = hou.selectedNodes()

for x in nodes:
    rpath = x.parm("roppath").eval()
    tnode = rpath.rpartition("/")[0]
    dirpath = hou.node(tnode).parm("file").eval()
    dirpath = dirpath.rpartition("/")[0]

```

```
hou.ui.showInFileBrowser(str(dirpath))
```

Python

# PythonModule Scripts

Get houdini version:

```
hver = hou.applicationVersionString().rpartition('.')[0]
```

# Move Files

```
import os,hou, shutil

selected = hou.selectedNodes()
for x in selected:
    if x.parm("env_map"):
        file = x.parm("env_map").eval()
        parm1 = x.parm("env_map")
    elif x.parm("fileName"):
        file = x.parm("fileName").eval()
        parm1 = x.parm("fileName")
    else:
        pass

filename = os.path.basename(file)
destdir = os.path.join(hou.expandString("$HIP"), "assets")
destpath = os.path.join(destdir, filename)
if os.path.exists(file):
    if os.path.exists(destdir):
        pass
    else:
        os.makedirs(destdir)

    if os.path.exists(destpath):
        dpath = os.path.join(os.path.join("$HIP", "assets"), filename)
        parm1.set(dpath)
    else:
        shutil.copy(file, destdir)
        dpath = os.path.join(os.path.join("$HIP", "assets"), filename)
        parm1.set(dpath)

else:import os,hou, shutil
selected = hou.selectedNodes()
for x in selected:
    if x.parm("env_map"):
        file = x.parm("env_map").eval()
```

```
    parm1 = x.parm("env_map")
elif x.parm("fileName"):
    file = x.parm("fileName").eval()
    parm1 = x.parm("fileName")
else:
    pass
filename = os.path.basename(file)
destdir = os.path.join(hou.expandString("$HIP"), "assets")
destpath = os.path.join(destdir, filename)
if os.path.exists(file):
    if os.path.exists(destdir):
        pass
    else:
        os.makedirs(destdir)

    if os.path.exists(destpath):
        dpath = os.path.join(os.path.join("$HIP", "assets"), filename)
        parm1.set(dpath)
    else:
        shutil.copy(file, destdir)
        dpath = os.path.join(os.path.join("$HIP", "assets"), filename)
        parm1.set(dpath)

else:
    pass
    pass
```

# split by group

```
import hou

selected = hou.selectedNodes()[0]
groups = [g.name() for g in selected.geometry().primGroups()]

for i, name in enumerate(groups, 1):
    #make a split node
    split = selected.createOutputNode("blast")
    split.setName(name)
    split.parm("group").set(name)
    split.parm("negate").set(1)
    split.moveToGoodPosition()

for node in selected:
    out = node.createOutputNode("null")
    out.setName("OUT_" + node)
    out.moveToGoodPosition()
```

# Update frame range from file

```
def grabFrames(self):
    import os
    plate = self.parm("backplate").eval()
    if not plate:
        framex = self.parm("frange1").eval()
        framey = self.parm("frange2").eval()
    else:
        flist = [x.split(".")[2] for x in os.listdir(os.path.dirname(plate))]
        fmin = min(flist)
        fmax = max(flist)
        self.parm("frange1").set(int(fmin))
        self.parm("frange2").set(fmax)
        framex = self.parm("frange1").eval()
        framey = self.parm("frange2").eval()

    hou.playbar.setFrameRange(framex, framey)
    hou.playbar.setPlaybackRange(framex, framey)
```

Python

# OnCreated scripts

## OnCreated Script to set name, color, shape of node:

```
cachename = hou.ui.readInput("Enter cache name")
node = kwargs["node"]
node.setName(cachename[1])
node.setUserData('nodeshape', "tilted")
node.setColor(hou.Color(1,0,0))
```

# Bake Camera from Alembic

```
import hou

obj = hou.node("/obj")

ocam = hou.node(hou.ui.selectNode(node_type_filter=hou.nodeTypeFilter.ObjCamera))

reslist = ["1920x1080", "3840x2160", "3072x2109", "2224x1548", "Keep Original", "Custom"]
sl = hou.ui.selectFromList(reslist, message="choose resolution", sort=True, exclusive=True)
stopval = sl[0]
resolution = reslist[stopval]
if resolution is "Keep Original":
    pass
elif resolution is "Custom":
    custom = hou.ui.readInput("Enter resolution as #x# format, ie: 1920x1080. The x is needed.", title="Enter Resolution")
    resolution = custom[1]
    ocam.parm("resx").set(resolution.split("x")[0])
    ocam.parm("resy").set(resolution.split("x")[1])

else:
    ocam.parm("resx").set(resolution.split("x")[0])
    ocam.parm("resy").set(resolution.split("x")[1])

try:
    shotinfo = hou.node("/obj/SHOTINFO")
    backplate = shotinfo.parm("backplate")
except:
    backplate = " "
pass

camName = ocam.name() + "_baked"
#setback = ocam.parm("vm_background").set(backplate)
tcam = obj.createNode("cam", camName)
```

```
tcam.moveToGoodPosition()
```

```
#copy keyframes
```

```
cam_xform=["tx", "ty", "tz", "rx", "ry", "rz"]
```

```
cam_parms=["resx", "resy", "aspect", "focal", "aperture", "orthowidth", "shutter", "focus", "fstop"]
```

```
tcam.parm("vm_background").set(backplate)
```

```
parms_bake = list()
```

```
parms_bake.extend(cam_xform)
```

```
parms_bake.extend(cam_parms)
```

```
start = hou.playbar.playbackRange()[0]
```

```
end = hou.playbar.playbackRange()[1]
```

```
with hou.undos.group("bake cam"):
```

```
for x in range(int(start), int(end + 1)):
```

```
hou.setFrame(x)
```

```
tcam.setWorldTransform(ocam.worldTransform())
```

```
for p in parms_bake:
```

```
parm = tcam.parm(p)
```

```
if parm.name() in cam_xform:
```

```
parm.setKeyframe(hou.Keyframe(parm.eval()))
```

```
else:
```

```
parm.setKeyframe(hou.Keyframe(ocam.parm(p).eval()))
```

# Get frame range from alembic

```
import _alembic_hom_extensions as ahe; import hou; anode = hou.pwd(); cam =  
anode.parm("camera").eval(); fpath = hou.node(cam).parm("fileName"); ver =  
fpath.eval().split("_")[-1].split("/")[0]; print(ver); name = hou.node(cam).children() ; print(name[0]);  
anode.parm("cameraVer").set(ver); name = str(name[0]); anode.parm("cameraName").set(name);  
alembicpath= fpath.eval(); timerange = ahe.alembicTimeRange(alembicpath);  
start_time=timerange[0]*hou.fps(); end_time = timerange[1]*hou.fps();  
anode.setParms({"framemin":start_time, "framemax":end_time})
```

# Example On Node Buttons

This is how a button on a non-adminned node needs to be laid out:

import hou ; do something ;

This grabs frame range from supplied alembic camera, updates names, etc:

```
import _alembic_hom_extensions as ahe; import hou; anode = hou.pwd(); cam = anode.parm("camera").eval();
fpath = hou.node(cam).parm("fileName"); ver = fpath.eval().split("_")[-1].split("/")[0]; print(ver); name =
hou.node(cam).children() ; print(name[0]); anode.parm("cameraVer").set(ver); name = str(name[0]);
anode.parm("cameraName").set(name); alembicpath= fpath.eval(); timerange =
ahe.alembicTimeRange(alembicpath); start_time=timerange[0]*hou.fps(); end_time = timerange[1]*hou.fps();
anode.setParms({"framemin":start_time, "framemax":end_time})
```

This sets frame range from ranges on node:

```
import hou; anode = hou.pwd(); start = anode.parm("framemin").eval(); end = anode.parm("framemax").eval();
hou.playbar.setFrameRange(start, end); hou.playbar.setPlaybackRange(start, end)
```

This grabs info from animation alembic:

```
import hou; anode = hou.pwd(); anim = anode.parm("anim").eval(); fpath = hou.node(anim).parm("fileName");
ver = fpath.eval().split("_")[-1].split("/")[0]; name = hou.node(anim) ; anode.parm("animVer").set(ver); name =
```

```
str(name); anode.parm("animName").set(name);
```

# Send to Tops

```
import hou

nodes = hou.selectedNodes()

topnet = hou.node("/obj/topnet1")

if not topnet:
    topnet = hou.node("/obj").createNode("topnet")
    topnet.setName("topnet1")

for x in nodes:
    name = x.name()+"_"+str(x.parent())
    fstart = x.parm("f1").eval()
    fend = x.parm("f2").eval()
    if x.type().name() == "rop_geometry":
        ver = x.parm("vp_version")
        path = x.path()
    elif x.type().name() == "rop_alembic":
        ver = x.parm("vp_version")
        path = x.path()
    elif x.type().name() == "filecache::2.0":
        path = x.path() + "/render"
        ver = x.parm("vp_version")
    else:
        ver = x.parm("version")
        path = x.path()

topcache = topnet.createNode("ropfetch")

try:
    if x.parm("cachesim").eval() is 1:
        topcache.parm("batchall").set(1)
        topcache.setColor(hou.Color(.5,0,0))
    else:
        topcache.parm("framesperbatch").set(15)
        topcache.setColor(hou.Color(0,.5,0))
except:
```

```
if x.parm("initsim").eval() is 1:
    topcache.parm("batchall").set(1)
    topcache.setColor(hou.Color(.5,0,0))
else:
    topcache.parm("framesperbatch").set(15)
    topcache.setColor(hou.Color(0,.5,0))
p = hou.IntParmTemplate("version", "Version", 1, min=1, max=40)
g = topcache.parmTemplateGroup()
g.insertAfter("pdg_servicename", p)
topcache.setParmTemplateGroup(g)
topcache.parm("version").set(ver)
topcache.parm("roppath").set(path)
topcache.setName(name)
```

Python

# Set Frame Range without Script

```
import hou; anode = hou.pwd(); start = anode.parm("framemin").eval(); end = anode.parm("framemax").eval();  
hou.playbar.setFrameRange(start, end); hou.playbar.setPlaybackRange(start, end)
```

Python

# ROP

PostRender open MPLAY:

```
import os; img_path = "`chs("picture")`.replace("$F", "\\*"); os.system("mplay %s" % img_path)
```

Python

# Pull version from hipname

Can be used in a parameter. Returns a integer.

```
import hou, re
version = re.findall('_v\d+', hou.hipFile.basename())[0]
version = int(re.findall('\d+', version)[0])
return version
```

Python

# Get Frame Size of Image File

```
node= hou.pwd(); bg=node.parm("image").eval(); res=hou.imageResolution(bg);  
node.parm("framesizex").set(res[0]); node.parm("framesizey").set(res[1]);
```

# Create Agent from built in mocap rig - Simple

This will take a test mocap rig 3 built in to houdini, create an agent, add agent clips from the built in library (must be in your scene already), and lay everything out.

```
import hou

obj = hou.node("/obj")
agentname = hou.ui.readInput("Agent Name", title="Name")
agentname = agentname[1]

agentpNode = obj.createNode("geo")
agentNode = agentpNode.createNode("agent")

agentpNode.setName(agentname)
agentNode.setName(agentname)
agentnet = agentpNode

inputMoc = hou.ui.selectNode(title="Select Character Rig to base agent on", multiple_select=False,
node_type_filter=hou.nodeTypeFilter.ObjSubnet)

agentNode.parm("agentname").set(agentname)
agentNode.parm("objsubnet").set(inputMoc)

#clips = hou.ui.selectNode(multiple_select=True, node_type_filter=hou.nodeTypeFilter.Obj)
clips = hou.ui.selectNode(title="Select all clips - mocap biped 3 rigs", multiple_select=True,
node_type_filter=hou.nodeTypeFilter.ObjSubnet)
agentclip = agentnet.createNode("agentclip")
clipprops = agentnet.createNode("agentclipproperties")

clipnum = len(clips)
```

```
clipcount = 1
```

```
agentclip.parm("locomotionnode").set("Hips")
```

```
#print(clipnum)
```

```
for x in clips:
```

```
    node = hou.node(x)
```

```
    name = node.name()
```

```
    path = str(x)
```

```
    nframes = node.parm("nFrames")
```

```
    fs =hou.playbar.timelineRange()[0]
```

```
    fe = int(fs) + int(nframes.eval())
```

```
    agentclip.parm("framerange" + str(clipcount) + "_1").deleteAllKeyframes()
```

```
    agentclip.parm("framerange" + str(clipcount) + "_2").deleteAllKeyframes()
```

```
    agentclip.parm("clips").set(clipnum)
```

```
    agentclip.parm("name" + str(clipcount)).set(name)
```

```
    agentclip.parm("objsubnet" + str(clipcount)).set(path)
```

```
    agentclip.parm("framerange" + str(clipcount) + "_1").set(fs)
```

```
    agentclip.parm("framerange" + str(clipcount) + "_2").set(fe)
```

```
    agentclip.parm("converttoinplace" + str(clipcount)).set(True)
```

```
    clipprops.parm("numclips").set(clipnum)
```

```
    clipprops.parm("clipname_" + str(clipcount)).set(name)
```

```
    clipprops.parm("enableblending_" + str(clipcount)).set(True)
```

```
    clipprops.parm("framesbefore_" + str(clipcount)).set("5")
```

```
    clipprops.parm("framesafter_" + str(clipcount)).set("5")
```

```
clipcount = clipcount+1
```

```
agentclip.setFirstInput(agentNode)
```

```
clipprops.setFirstInput(agentclip)
```

```
agentpNode.layoutChildren()
```

# Send selected nodes to new object (fancy way to create object merges)

```
import hou

nodes = hou.selectedNodes()

destnode = hou.node(hou.ui.selectNode(title="select destination node"))

for x in nodes:
    name = x.name()+"_"+str(x.parent())
    path= x.path()
    objmergenode = destnode.createNode("object_merge")
    objmergenode.parm("objpath1").set(path)

    objmergenode.setName(name)
    objmergenode.setColor(hou.Color(0,1,0))
```

# Send nodes to new alembic export

```
import hou

nodes = hou.selectedNodes()
destnode = hou.node("/obj/EXPORT")
if not destnode:
    destnode = hou.node("/obj").createNode("geo")
    destnode.setName("EXPORTS")

for x in nodes:
    name = x.name()+"_"+str(x.parent())
    path= x.path()
    objmergenode = destnode.createNode("object_merge")
    objmergenode.parm("objpath1").set(path)

    objmergenode.setName(name)
    objmergenode.setColor(hou.Color(0,1,0))

    alembicrop = destnode.createNode("rop_alembic")
    alembicrop.setName(str(x.parent()))
    alembicrop.parm("trange").set(1)
    alembicrop.parm("f1").deleteAllKeyframes()
    alembicrop.parm("f1").set(int("1001"))
    alembicrop.parm("build_from_path").set(1)
    alembicrop.setInput(0, objmergenode)
    destnode.layoutChildren()
```

Python

# TOPs - symlink output file of parent

```
exportFile = str(work_item.expectedInputFiles[0])  
dir = os.path.dirname(exportFile)  
newFile = os.path.join(dir, "cache.abc")  
  
os.symlink(exportFile, newFile)
```

VEX

VEX

# Camera Stuff

auto focus, get distance from object and camera:

```
vlength(vtorigin("/obj/geo1", "/obj/cam1"))
```

VEX

# Points

divide points into 3 equal parts:

```
i@part = floor(fit(rand(@ptnum+.258), 0, 1, 0, 2.9));
```

point normal to center:

VEX

# If then statements

If the pscale is greater than .4 then set it to .2, if not set it to its current pscale

```
@pscale = @pscale>.4?.2:@pscale
```

# Transforms and Junk

## 1. transforms to attribute matrix:

```
p@orient = quaternion(3@transform);
v@scale = cracktransform(0,0,2,set(0.0.0). 3@transform);
```

## 2. rotate packed fracture based on point + distance:

[Screenshot from 2023-06-21 11-48-58.png](#)

```
vector p1= set(@P.x, @P.y, @P.z);

vector crack1 = point(1, "P", 0);
vector crack2 = point(2, "P", 0);
vector p2 = crack1-p1;
vector p3 = crack2-p1;

float n = fit ( length ( p2 ), 0, ch("maxdist"), ch('mult'), 0 );
float n2 = fit ( length ( p3 ), 0, ch("maxdist2"), ch('mult2'), 0 );

vector4 q0 = quaternion ( 0 );
vector4 q1 = sample_orientation_uniform ( rand ( @ptnum ) );
vector4 q2 = slerp ( q0, q1, n+n2 );
matrix3 xform = qconvert ( q2 );

setprimintrinsic ( 0, "transform", @ptnum, xform );
```

## 3. Blending spiral (end beg):

[Screenshot from 2023-06-21 15-48-58.png](#)

```
vector target = point(1, "P", @ptnum);
float blend = chramp("blendAlongSpiral", @curveu)*chf("multiplier");

@P = lerp(@P, target, blend);
```

4. Position copy via uv:

[Screenshot from 2023-06-21 15-51-53.png](#)

```
v@P = uvsample(1, "P", "uv", @P);
```

5. move near points together:

```
int near = nearpoint(1, @P);  
vector target = point(1, "P", near);  
@P = target;
```

VEX

# Orientation

Get transform and orientation from camera:

```
string camera = "/obj/alembicarchive1/Camera2/CameraShape2"; // path to your camera
@P = ptransform(camera, "space:current", {0,0,0});
@N = ntransform(camera, "space:current", {0,0,-1});
```

# Spiral

```
#include "math.h"
#include "voplib.h"

float easeOutCirc ( float t )
{
    return sqrt ( 1 - ( pow ( ( 1 - t ), 2 ) ) );
}

float index = @ptnum;
float numpts = @numpt;
float startAngle = radians ( ch("angle") );
float dir = 2 * ch("dir") - 1;
float steps = ( numpts - 1 ) / ch("turns");
float stepAngle = ( 2 * PI / steps ) * dir;

float inc = index / ( numpts - 1 );
int mirror = chi("spherical");
float linear = ( 1 + mirror ) * inc;
if ( mirror && index + 1 > numpts / 2 )
    linear = ( 1 + mirror ) * ( 1 - inc );

float circ = easeOutCirc ( linear );
float interp = linear + ( circ - linear ) * ch("roundness");
float r = ( ch("rx") + interp * ( ch("ry") - ch("rx") ) );

// Apply power to radius at the end (after curvature)
inc = ( ( numpts - 1 ) - index ) / ( numpts - 1 );
float theta = 2 * PI * inc;
if ( mirror && index + 1 > numpts / 2 )
    theta = 2 * PI * ( 1 - inc );
r *= pow ( ch("falloff"), theta );

float angle = index * stepAngle + startAngle;
```

```
float x = sin ( angle ) * r;  
float z = cos ( angle ) * r;  
float h = index / ( numpts - 1 );  
float y = vop_bias ( h, 0.5 * ch("bias") + 0.5 );  
y = vop_gain ( y, 0.5 * ch("gain") + 0.5 ) * ch("height");  
  
matrix3 xform = dihedral ( { 0, 1, 0 }, { 0, 0, -1 } ) * lookat ( 0, normalize ( chv("n") ) );  
@P = ch("scale") * set ( x, y, z ) * xform + chv("t");
```

VEX

# Links

Big resource:

<https://lex.ikoon.cz/vex-snippets/>

# Expressions

Switch by Normal:

```
if(point("../resample3", 0, "N", 2)<0, 0, 1)
```