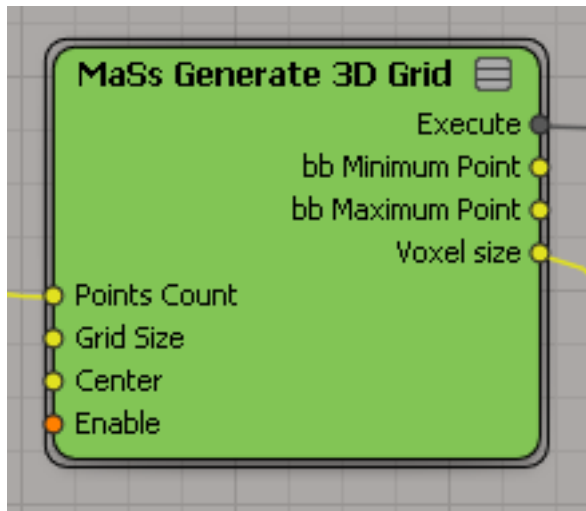# MaSs ICE References

MaSs Generate 3D Grid

Description: generate 3d-grid of points. This node is very similar to standard "Generate 3d Point Grid" node, but contains some additional input parameters and outputs.

Input ports

Points Count: 3d-vector with number of points along x-, y- and z-axis. This vector can contains scalar values, but all of them are rounded to integer.

Grid Size: 3d-vector with sides of the grid along x-, y- and z-axis.

Center: center of the generated grid.
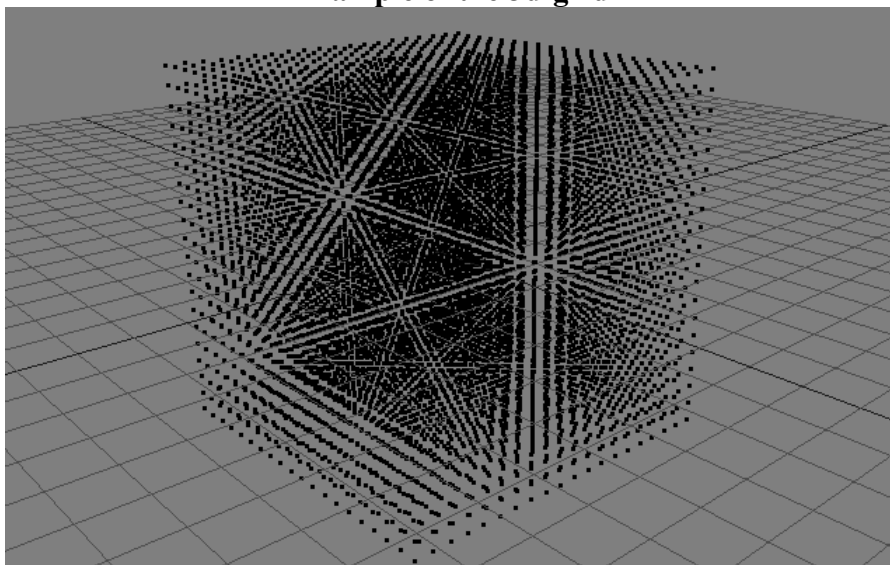
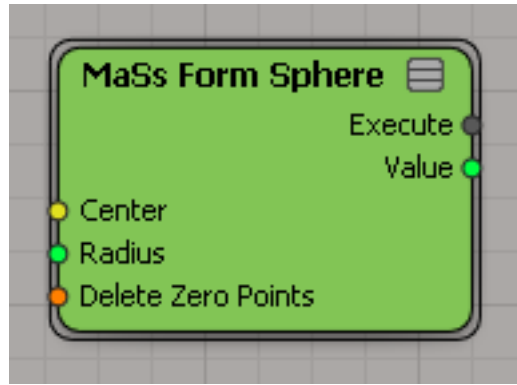**Enable:** should generate points or not.

Output ports

bb Minimum Point: coordinates of the first bounding box corner.

bb Maximum Point: coordinates of the second bounding box corner.

Voxel size: 3d-vector with size of the voxel along x-, y- and z-axis. Each component of this vector calculated as size / (count − 1).

Example of the 3d-grid

MaSs Form Sphere

Description: add to each point in point cloud scalar value and set this values equal for all points in the same distance from the center. Set value 1 for points in the center and 0 for points in the peripheral of the sphere. Contains f-curve for graphical assignment of the values fade from 1 to 0.
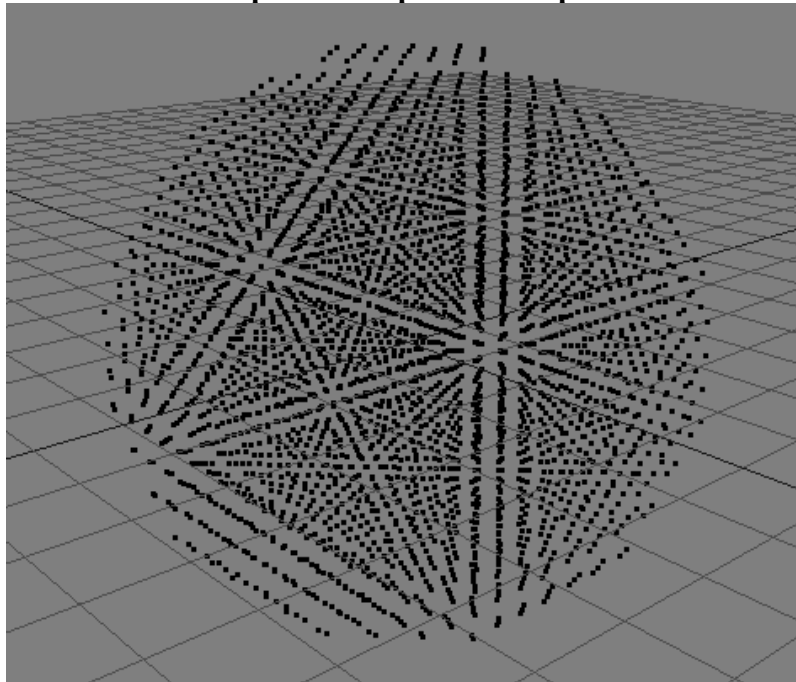
Input ports

Center: the center of the sphere.
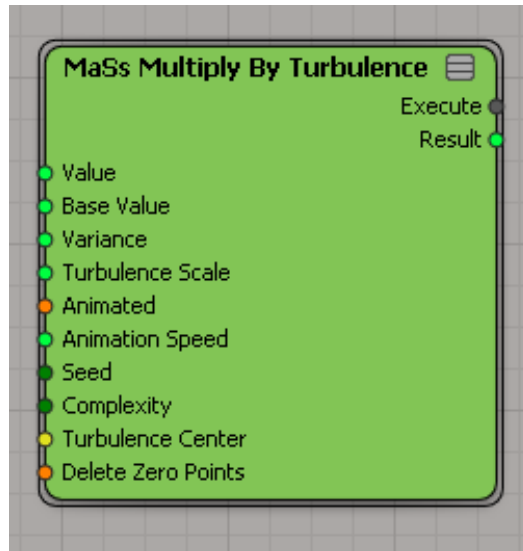**Radius:** the radius of the sphere.
Delete Zero Points: if turn on, then delete points with zero and negative values.

Output ports

Value: per-point attribute of the value in each point.

Example of the sphere from points

MaSs Multiply By Turbulence

Description: add turbulence to values in each point of the point cloud. The effect is similar to the node "MaSs Form Sphere". Based on the standard "Turbulize Around Value" node.

Input ports

Value: which value should be turbulized.
Base Value: base value parameter for turbulence.
Variance: variance parameter for turbulence.
Turbulence Scale: turbulence scale parameter for turbulence.
Animated: animated parameter for turbulence.
Animation Speed: animation speed parameter fro turbulence.
Seed: seed parameter for turbulence.
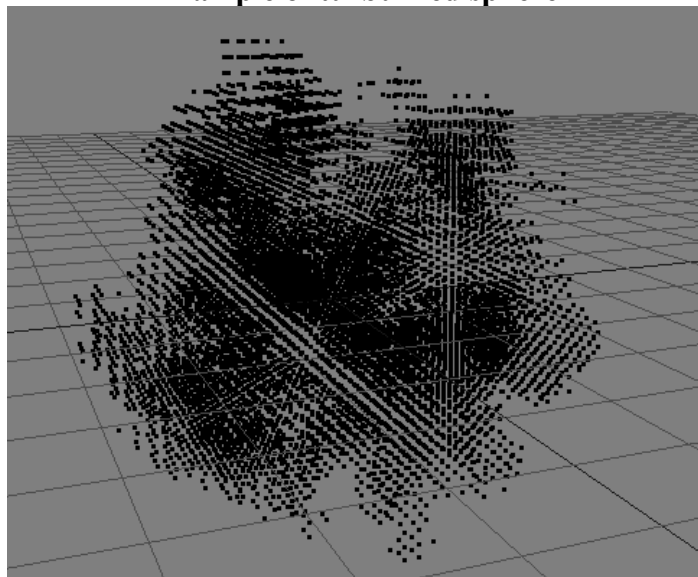**Complexity:** complexity parameter for turbulence.
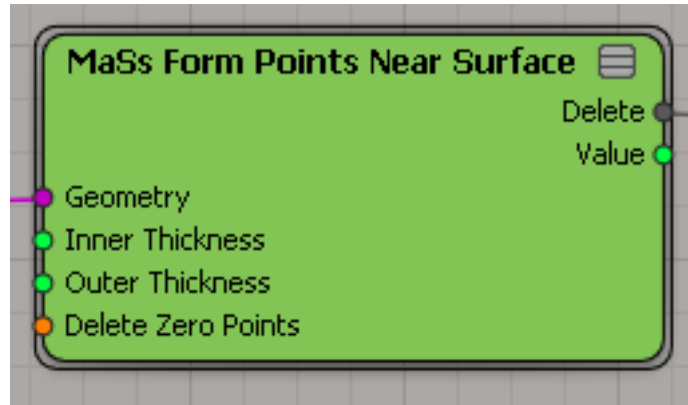**Turbulence Center:** turbulence center parameter for turbulence.
Delete Zero Points: if turn on, then delete points with zero and negative values.

Output ports

Result: the result of the turbulence effect. This value can be stored in separate attribute or rewritten to the initial one.

Example of turbulized sphere

MaSs Form Points Near Surface

Description: add scalar parameter to each point in point cloud. This value is proportional to the distance from a given point to the selected surface. Similar to "MaSs Form Sphere" node.

Input ports
**Geometry:** geometry around which the values of points are calculate.
Inner Thickness: distance to the inner of the surface where points have non-zero values.
Outer Thickness: distance to the outer of the surface where points have non-zero values.
Delete Zero Points: if turn on, then delete points with zero and negative values.

Output ports
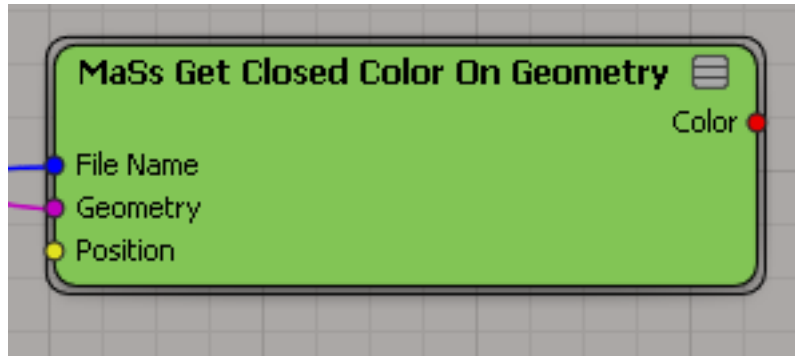**Value:** per-point attribute of the value in each point.
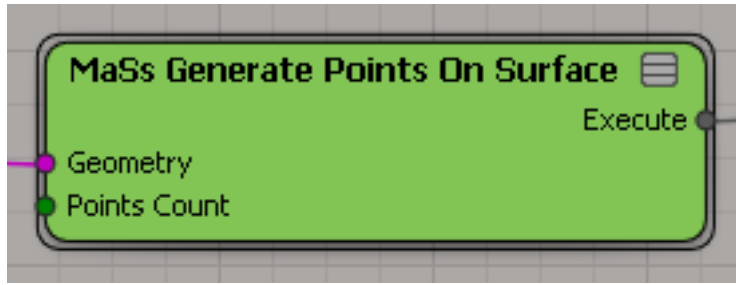
MaSs Generate Points On Surface

Description: Generate points on the surface. Positions of points are not organized in regular grid.

Input ports

Geometry: geometry, where points generated.
Points Count: the number of generated points.

MaSs Get Closed Color On Geometry

Description: for given position find the color of the closest point on textured geometry. "IFX Read Image" node from "Image IO" plugin is needed. If geometry contains non-standard texture coordinates projection, you should go inside the node and change the name of UVs attribute.
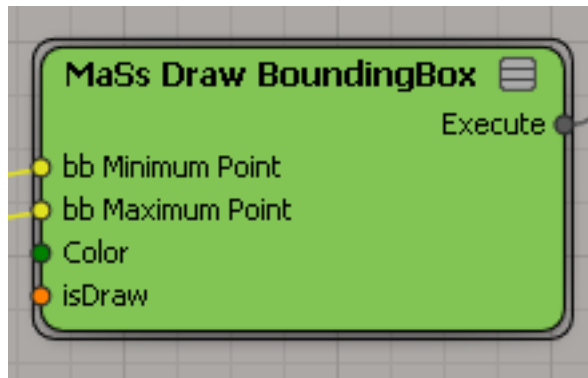
Input ports

File Name: full path to the texture image.
Geometry: geometry where the node search closed points.
Position: position of a point.

Output ports

Color: the color of the closest point on textured geometry.

MaSs Draw BoundingBox

Description: draw a bounding box by using it two corners.
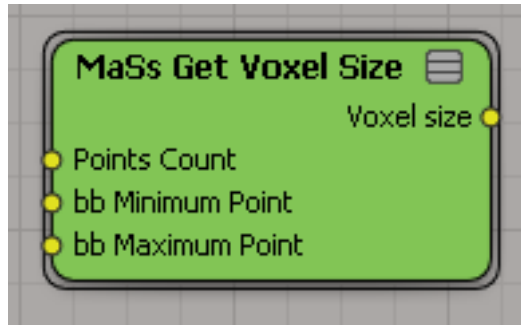
Input ports
bb Minimum Point: the first corner of the bounding box.
bb Maximum Point: the second corner of the bounding box.
Color: the id of the color for drawing bounding box.
isDraw: should draw bounding box or not.

MaSs Get Voxel Size

Description: calculates voxel size of the regular 3d-grid. This node is a part of the "MaSs Generate 3D Grid" node.

<div align="center">

Input ports

</div>

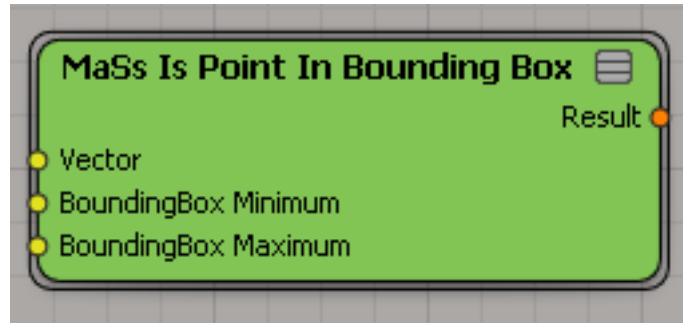**Points Count:** 3d-vector with number of points along x-, y- and z-axis.
bb Minimum Point: the coordinates of the first corner of the bounding box.
bb Maximum Point: coordinates of the second corner of the bounding box.

<div align="center">

Output ports

</div>

Voxel size: 3d-vector with size of the voxel along x-, y- and z-axis. Each component of this vector calculated as bounding box size / (count – 1).

MaSs Is Point In Bounding Box

Description: define is point inside the bounding box or not.

Input ports

Vector: coordinates of the point.
BoundingBox Minimum: coordinates of the first corner of the bounding box.
BoundingBox Maximum: coordinates of the second corner of the bounding box.

Output ports

Result: "True" if the point inside bounding box and "False" otherwise.
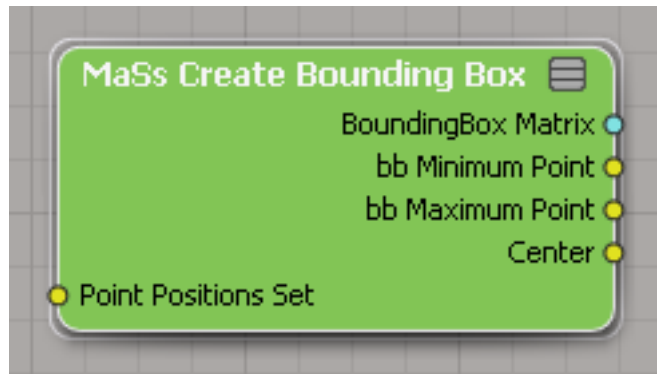
MaSs Set PerPoint Value

Description: use a some trick for adding per-point data.

Input ports

Value: value, which assign to each point.

Output ports

Result: assigned to each point value.

MaSs Create Bounding Box

Description: create a bounding box from the set of point positions.

Input ports

Point Positions Set: array of positions. This data should be per-object, but not per-point. Use standard "Build Array From Set" node for converting per-point data to per-object array.
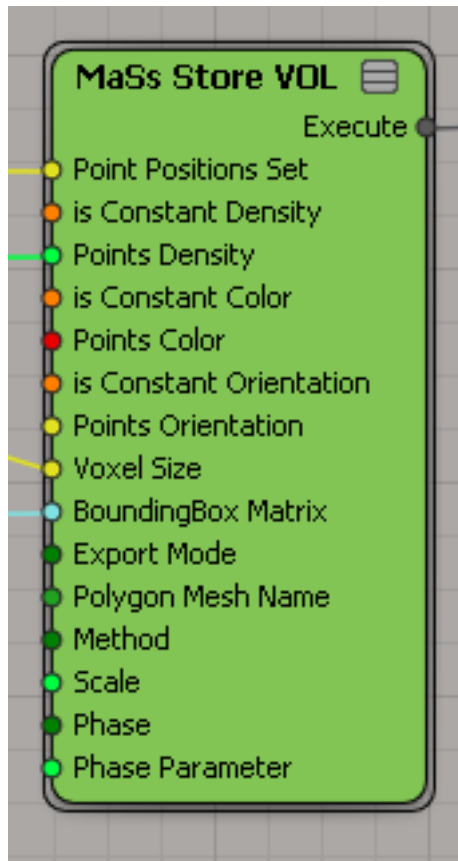
Output ports

BoundingBox Matrix: 3x3-matrix presentation of the bounding box. First row contains coordinates of the first corner, second row contains coordinates of the center and third row contains coordinates of the second corner.

bb Minimum Point: coordinates of the first corner of the bounding box.

bb Maximum Point: coordinates of the second corner fo the bounding box.

Center: coordinates of the center of the bounding box.

MaSs Store VOL

Description: store some data of the point cloud for generating vol-files and rendering in Mitsuba renderer. This data stores in special set of attributes "MaSs_*".

Input ports

Point Positions Set: per-object array with coordinates of point cloud points.

isConstant Density: if "True", then exporter does not export density as separate vol-file. In this case it use scalar value from "Points Density" port.

Points Density: per-object array (or single value) with densities of point cloud points.

isConstant Color: if "True", then exporter does not export albedo as separate vol-file. In this case it use color value from "Points Color" port.

Points Color: per-object array (or single value) with colors of point cloud points.

isConstant Orientation: if "True", then exporter does not export particle orientation as separate vol-file. In this case it use 3d-vector value from "Points Orientation" port.

Points Orientation: per-object array (or single value) with orientation of point cloud points.

Voxel Size: the voxel size for export.

BoundingBox Matrix: the matrix presentation of the bounding box. Can be calculated by using "MaSs Create Bounding Box" node.

Export Mode: is select "Bounding Box", then exporter create bounding box object with vol-data. If select "Polygon Mesh", then exporter create a selected mesh as bounded object for vol-data.

Polygon Mesh Name: the name of the polygon mesh for creating bounded object.

Method: sampling method for rendering.

Scale: the scale of values for vol-data.

Phase: phase for rendering.

Phase Parameter: if the phase is equal to "Henyey-Greenstein" or "Micro-flacke", then this parameter used as phase's parameter for rendering.