

Primitive Variables

Primitive Variables (also known as primvars) are data stored on objects. This data can be used for shading variation, much like [user attributes](#). There are two main distinctions between the two - primvars cannot vary across instances, but they allow more specific variation - constant, uniform, varying, vertex, and facevarying.

Constant: One value remains constant over the entire surface primitive. This is the only level that can be achieved with user attributes.

Uniform: One value remains constant for each uv patch segment of the surface primitive.

Varying: Four values are interpolated over each uv patch segment of the surface. Bilinear interpolation is used for interpolation between the four values.

Vertex: Values are interpolated between each vertex in the surface primitive. The basis function of the surface is used for interpolation between vertices.

Facevarying: For polygons and subdivision surfaces, four values are interpolated over each face of the mesh. Bilinear interpolation is used for interpolation between the four values.

Setting arbitrary primvars

RenderMan for Katana supports primitive variables using Katana's standard [Arbitrary Attribute](#) convention.

Here is the list of supported values for `geometry.arbitrary.<group>.outputType`. Katana's documentation lists other types, but these are the only ones supported by RenderMan:

- float
- double (converted to float)
- string
- int
- color3
- normal3
- vector2
- vector3
- point2
- point3
- point4
- matrix16

Katana only has four values for arbitrary attribute "scope": primitive, face, point, and vertex. For the most part, these scope values map to the RenderMan primvar tags as follows: primitive = constant, face = uniform, point = varying, and vertex = facevarying. Subdivision meshes support different interpolation of primvars with the "point" scope using the "interpolationType" attribute. If `geometry.arbitrary.<group>.interpolationType` is set to "subdiv", the primvar will be "vertex", otherwise the primvar will be "varying".

Here is an example OpScript showing how to set an arbitrary constant color primvar:

```

Interface
{
    SetAttr
    (
        "
        geometry.
arbitrary.myColor.
scope"
        , StringA
ttribute
    (
        "
        primitive"
    ))
Interface
{
    SetAttr
    (
        "
        geometry.
arbitrary.myColor.
value"
        , FloatAt
tribute({
        0.0
        ,
        1.0
        ,
        0.0
        })
    ))
Interface
{
    SetAttr
    (
        "
        geometry.
arbitrary.myColor.
inputType"
        , StringA
ttribute
    (
        "
        color3"
    ))

```

Using Primvars

Typically, production workflows will export these arbitrary attributes as a part of the alembic or USD asset, so no set up inside of Katana is required. Otherwise, you can use an OpScript to set the geometry.arbitrary attribute directly on a geometry location - the attribute is not inheritable.

Primvars are read by various shading plugins. [PxrPrimvar](#), [PxrSeExpr](#), [PxrVariable](#), and [PxrVary](#) are some plugins distributed with RenderMan that use arbitrary primvars.