

ROOT: 3D Graphics

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Viewer Architecture

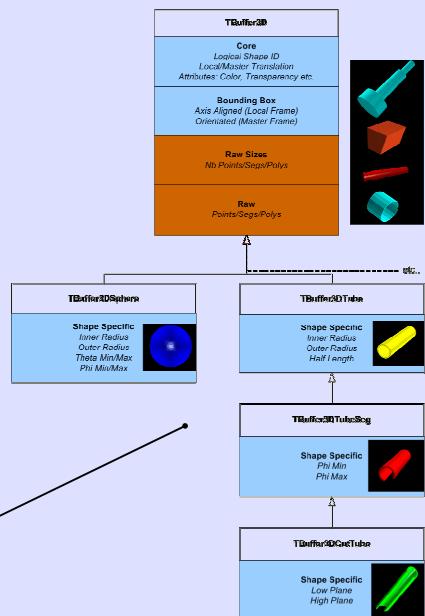
TVirtualViewer3D: Provides generic access to viewers of widely differing capabilities (OpenGL/x3d/TPad). Can test preferences, manage scenes, add objects, adjust camera, lights etc externally (future extension) etc.

```
Bool_t PreferLocalFrame() const
void BeginScene()
Bool_t BuildingScene() const
void EndScene()

Int_t AddObject(const TBuffer3D & buffer, ...)
Int_t AddObject(UInt_t physicalID, const
TBuffer3D & buffer, ...)

Bool_t OpenComposite(const TBuffer3D & buffer, ...)
void CloseComposite()
void AddCompositeOp(UInt_t operation)

....
```



TBuffer3D: 3D Object hierarchy – describe “shapes”.

Generic TBuffer3D for any object in tessellated form.

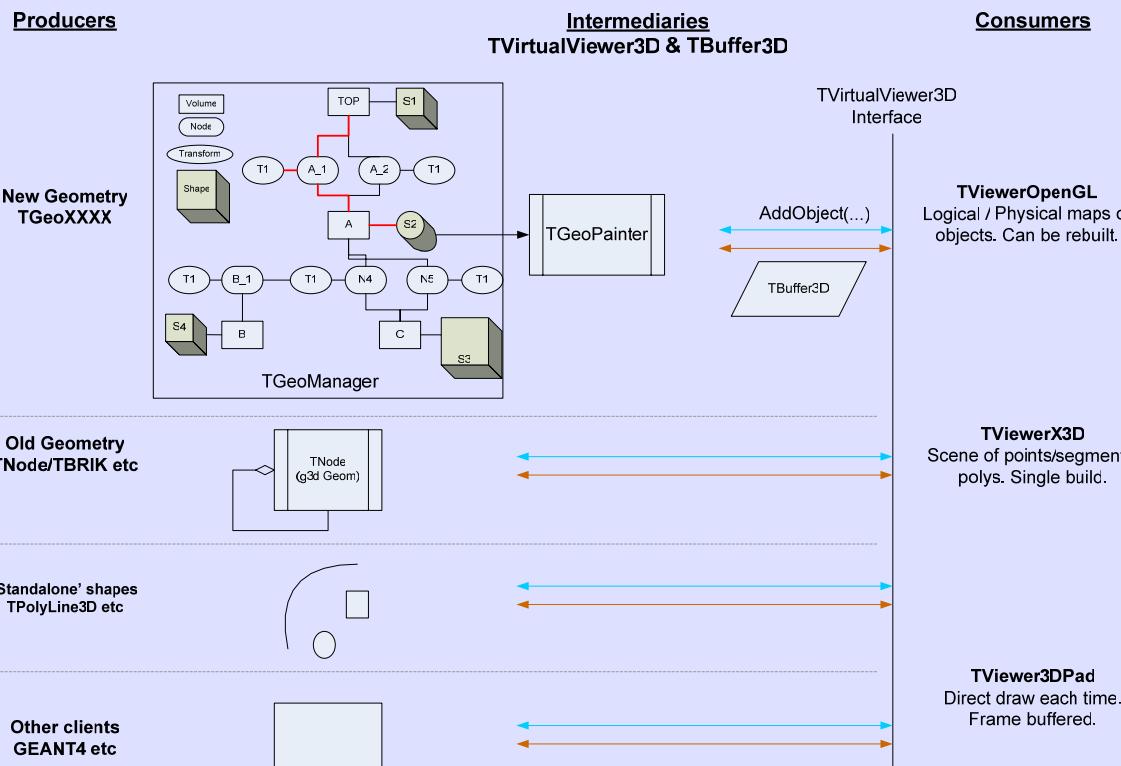
Subclasses for shape specific examples (TBuffer3DSphere etc) which some viewer(s) can tessellate natively.

- TVirtualViewer3D & TBuffer3D act as intermediaries – decouple producers (geometry etc) and consumers (viewers).

- Interface answers questions such as: “prefer local frame?”, “send child objects?”, “fill what in buffer?”

- TBuffer3D composed of sections, filled in negotiation with viewer:

- Create buffer object –shape specific one if suitable, TBuffer3D if not.
- Optionally test viewer local reference frame – if can fill in local frame with translation matrix in Core.
- Fill cheap **mandatory sections** (Core/BoundingBox/ShapeSpecific), and add to viewer:
`UInt_t extraSections = viewer->AddObject(buffer);`
- Returns **extra (costly) sections** (Raw Sizes/Raw) if viewer requires – complete and add again.
- Returns indication if contained children should be sent (addChildren flag)



• TBuffer3D contents are copied into viewer specific internal data structures.

• Some viewers (OpenGL) are able to cache Logical (unique “shapes”) and Physical (placed copies) objects from IDs.

• Recycle TBuffer3D object if required.