Declarative 3D use case for creating a
Web3D public Outreach timeline using an X3D scene

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Abstract

Declarative 3D needs to include a use case for public outreach models that serve as both good demos and good exemplars for authors. This demonstration shows how to structure a Web3D timeline scene using X3D Prototypes. We will also explore the evolution (or perhaps simplification) of this scene using the X3DOM environment and declarative 3D functionality.

Categories and Subject Descriptors

I.3.6 [Methodology and Techniques]: Standards|Languages; I.3.7 [Computer Graphics]: Three-Dimensional Graphics and Realism|Virtual Reality.

Keywords

X3D, X3D Prototypes, X3DOM, Web3D, Declarative 3D.

1. Introduction

With recent developments in declarative 3D for the HTML environment, it is important to have good examples that show how things work.

This is an important use case for Declarative 3D that can help illustrate capabilities while comparing/contrasting tradeoffs of different approaches. Our objective here is to take an initial outreach scene using prototypes, showing the strengths and weaknesses of X3D implementation interoperability. We will then modify this scene to run in the X3DOM environment as a way to analyze the limitations of various Declarative 3D and imperative 3D approaches. We hope to identify several advantages and disadvantages. A well-defined use case for Declarative 3D will likely result from feedback from the group.

2. X3D Prototype Design [1]

X3D Prototypes provide a way for X3D authors to create new nodes that can be repeated in the X3D scene graph. X3D Prototypes or PROTOS are wrapped inside an **X3D Scene** node. Prototypes have a special mandatory structure. A Prototype begins with a **ProtoDeclare**, which is the initial declaration of its name. After that, node fields are described inside the **ProtoInterface**. The final content is then implemented inside the **ProtoBody** node. Via the **IS**/**connect** statement, nodes and fields from the proto interface are connected and linked to those in the proto body.

Prototypes are preferred if initialization values are needed, like in this Web3D timeline scene. ProtoInstance allows repeated reuse of a new node which was used to define each event in this timeline scene. Prototypes are a powerful technique for extending the capabilities of X3D. Few computing languages provide authors with the capability to extend the core vocabulary of the language itself. Whether such capabilities are essential for Declarative 3D remains to be seen.

3. Basic X3D Prototype Structure [4]

```
<!DOCTYPE X3D PUBLIC "ISO//Web3D//DTD
X3D 3.0//EN"
"http://www.web3d.org/specifications/x3d-3.0.dtd">
<X3D version='3.0'>
  <Scene>
    <ProtoDeclaration name="MyNewNode">
      <ProtoInterface>
        <field name="myNewField"
accessType="inputOutput" value="" />
      </ProtoInterface>
      <ProtoBody>
        <!-- content implementation -->
      </ProtoBody>
    </ProtoDeclaration>
  </Scene>
</X3D>
```

4. Basic X3DOM Profile

X3DOM present a model that allows to directly integrate X3D nodes into HTML DOM content. X3DOM uses the **HTML** Profile to extend the X3D-Interchange profile. The goal is provide declarative XML-based X3D scenes support for HTML to script and partition the content from the DOM/HTML side.

5. Demo: Web3D Timeline Scene using X3D Prototype [3]

In this section we will describe the true X3D scene created using X3D Prototype that demonstrate the capabilities and extensibility of X3D.
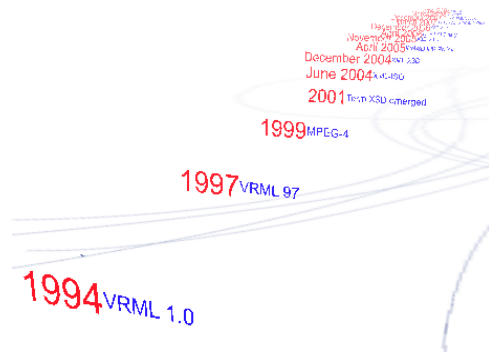
6. Demo: Web3D Timeline scene using X3DOM

In this section we will describe the Web3D timeline scene created using X3DOM functionality.

7. Conclusion

This section will discuss the challenges and design constrains in adapting theWeb3D time line X3D scene to the X3DOM environment.

8. References

[1] Extensible 3D Graphics for Web Authors (http://www.x3dgraphics.com/)

[2] Web3D Outreach Examples

http://www.web3d.org/x3d/content/examples/Basic/Outreach/

[3] Web3D Timeline Scene

http://www.web3d.org/x3d/content/examples/Basic/Outreach/Web3dTimeline.x3d

[4] X3D Prototype Tutorial

http://doc.instantreality.org/tutorial/creating-custom-nodes-with-prototypes/