WebGL & ParaViewWeb

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Outline

- Goal of ParaViewWeb
- Technical choices
- Why WebGL ?
- Architecture of the WebGL renderer
- Network objects
  - scene graph meta-data
  - 3D objects
- Static scene graph

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Goal of ParaViewWeb

- Web framework for...
  - interactive 3D visualization on the Web
  - Full ParaView capability
    - large data, data-processing, plugins, rendering...
  - Collaboration *(Sharing the same visualization)*
  - Toolbox for ad-hoc web application
- Possible scenario
  - Web portal for data analysis on HPC
  - Visualize 3D data (Midas)

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Technical choices

- Large data
  - Remote rendering
- Web browser
  - JavaScript, JSON, JSON-RPC, HTTP
- Full ParaView
  - A JavaScript wrapping of pvpython
- Collaboration
  - Can share visualization session across web clients
- Web Framework
  - JavaScript library with several renderer technologies (JavaScript, Java, Flash and ***WebGL***)

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Why WebGL renderer ?

Remote rendering

- ➕ Network usage is independent of data size
- ➕ Few constraints on client side (iPhone/iPad)
- ➖ 3D navigation cost network bandwidth
- ➖ Interactivity depends on network

HPC visualization on good network connection

Geometry delivery

- ➖ Network usage is dependent of data size
- ➖ Need a WebGL browser + enough resources
- ➕ 3D navigation cost no network bandwidth
- ➕ Interactivity is independent of the network

Visualization of data that doesn't change much

fill a gap...

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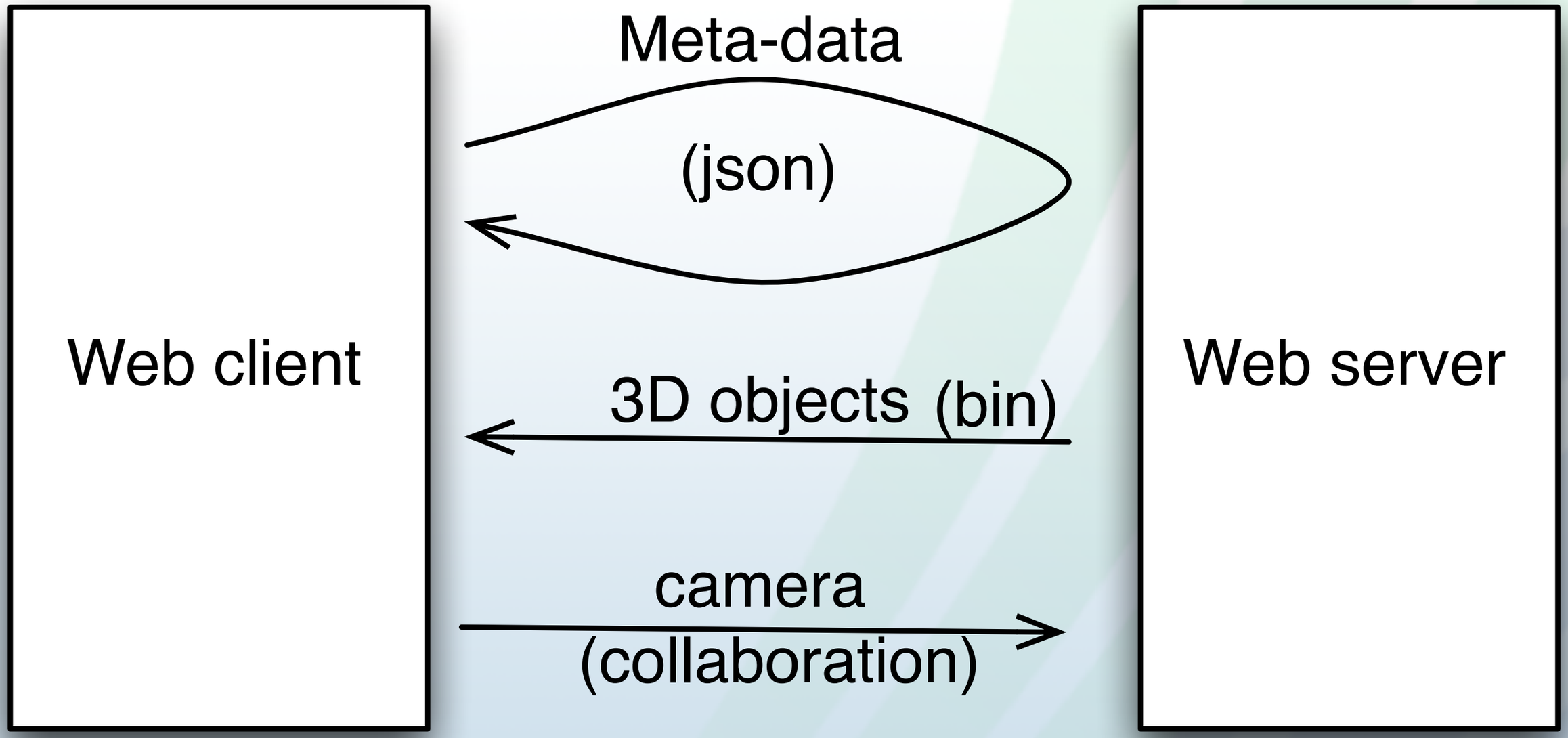
Architecture of WebGL renderer



Network objects

- Meta-data / Scene graph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{
  "id":274,
  "MaxSize":20.16,
  "Center":[0, 0, 0],
  "Renderers": [
    { "layer":0, "Background1":[0,0,0], "Background2":[1,1,1],
      "LookAt":[30,0.0,-0.0,0.0,-0.0,0.79,0.59,35,-19,29],
      "size": [1,1], "origin": [0,0] },
     { "layer":2,
      "LookAt":[30,0,-0,0,-0,0.79,0.59,35.5,-19,29.],
      "size": [1,1],"origin": [0,0] } ],
  "Objects":[
     { "id":578134848, "md5":"798...0b7", "parts":1, "interactAtServer":0,
       "transparency":0, "layer":0, "wireframe":0 },
     { "id":574455072, "md5":"568...556", "parts":1, "interactAtServer":0,
       "transparency":0, "layer":0, "wireframe":0} ]
}
```


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Network objects

- 3D objects
  - WebGLDataSet
  - WebGLPolyData
  - WebGLWidget
- Binary format to save network bandwidth

$$\text{Type} + \underbrace{\text{ArraySize} + \text{Array}}_{\text{Points}} + \underbrace{\text{ArraySize} + \text{Array}}_{\text{Connectivity}} + \underbrace{\text{ArraySize} + \text{Array}}_{\text{Color}}$$

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Static scene graph