

(a)

**Graph Model Manager****Setters**

```

addNode()/removeNode()
...
addLink()/removeLink()

```

**Getters**

```

getNodeById()
...
nodes()/links()

```

**Calculators**

```

Node.neighborNodes()
...
Link.isBridge()

```

**Modifier**

```

Node.attr()
...
Link.strokeWidth()

```

**Data Container****Graph Elements**

```

nodes: [{
  id,
  style,
  attributes,
  position
}, ...],

```

```

links: [{
  source,
  target,
  style,
  attributes
}, ...]

```

**Underlying Classes**

```

class Element
{
  styles
  attributes
  methods
}

```

```

class Node

```

```

class Link

```

derive

**Global Attributes**

```

{
  background
  pixel ratio
  DOM container
  ...
}

```

(b)

**Rendering Engine**

```

class Element Renderer
  WebGL communicator

```

```

Node Renderer
{
  data-shader mapper
  shaders
  id-shaders
}

```

```

Link Renderer
{
  data-shader mapper
  shaders
  id-shaders
}

```

WebGL APIs

```

WebGL Buffer

```

```

GPU Memory

```

(c)

**Interaction Manager**

```

⏱ mouse listener

```

events

element

getElementByPosition()