## Java 3D - Concepts

- Java 3D uses the concept of a *virtual universe* (class VirtualUniverse) in which all graphical objects, transformations, view platforms and observers reside
- This information collected together into a data structure called a *scene graph*
- It is possible for a Java 3D program to create more than one virtual universe but this is rarely likely to be necessary







## Java 3D - Scene Graph Traversal

- All branches in a scene graph are treated independently of each other
  - There can be no cross-referencing between branches
- Java 3D picks a branch group to traverse
  The order is unimportant
- It descends to the leaf nodes of that branch and works its way back up applying transformations as necessary







Java 3D - High-Resolution Co-ordinates	
2 <sup>n</sup> Metres	Units
87.29	Universe (20 billion light years)
69.68	Galaxy (100,000 light years)
53.07	Light year
43.43	Solar system diameter
23.60	Earth diameter
10.65	Mile
9.97	Kilometre
0.00	Metre
-19.93	Micron
-33.22	Angstrom
-115.57	Planck length







## Java 3D - Node Components

- We've already mentioned one type – Views
- NodeComponent objects are NOT part of the scene graph
- They contain attributes (data) required by the leaf nodes of the scene graph
- The basic geometry of a Shape3D object is a node component, as is its appearance













