SNS COLLEGE OF TECHNOLOGY

Coimbatore-35
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DEPARTMENT OF INFORMATION TECHNOLOGY

16IT AUGMENTED REALITY AND VIRTUAL REALITY

III YEAR – V SEM

UNIT 5 – VR PROGRAMMING

TOPIC 2 –Model Geometry and Appearance

What is VRML?

- **VRML stands for Virtual Reality Modelling Language and is pronounced ‘vermil’.**
- **It is a standard for delivering 3D picture on the net, just like HTML is a standard for web pages.**
- **VRML is a subset of the Open Inventor standard developed by SGI for their graphics workstation.**

The ‘World’ representation

It has a way of describing geometry which

- creates objects and spaces in which you can move around, as well as light, texture and sound which can be approached and viewed from whatever angle.
- The files are called ‘worlds’ and have ‘.wrl’ extension and .wrz (compression).

How To Use

- In order to see VRML *worlds,* we need to install a *VRML browser* (or player).
- Internet Explorer comes with a default VRML browser, and almost all other internet browsers can install one.

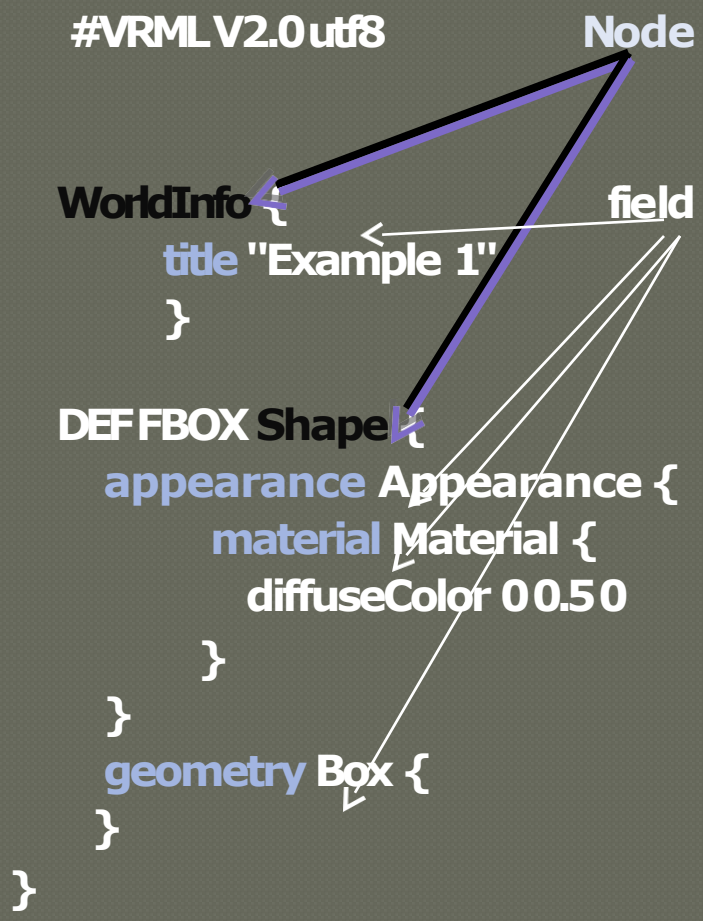
Applications

- *Architecture*
- *Training*
- *Medicine*
- *Engineering and Design*
- *E-Commerce*
- *Entertainment*
- *Manufacturing*

Syntax

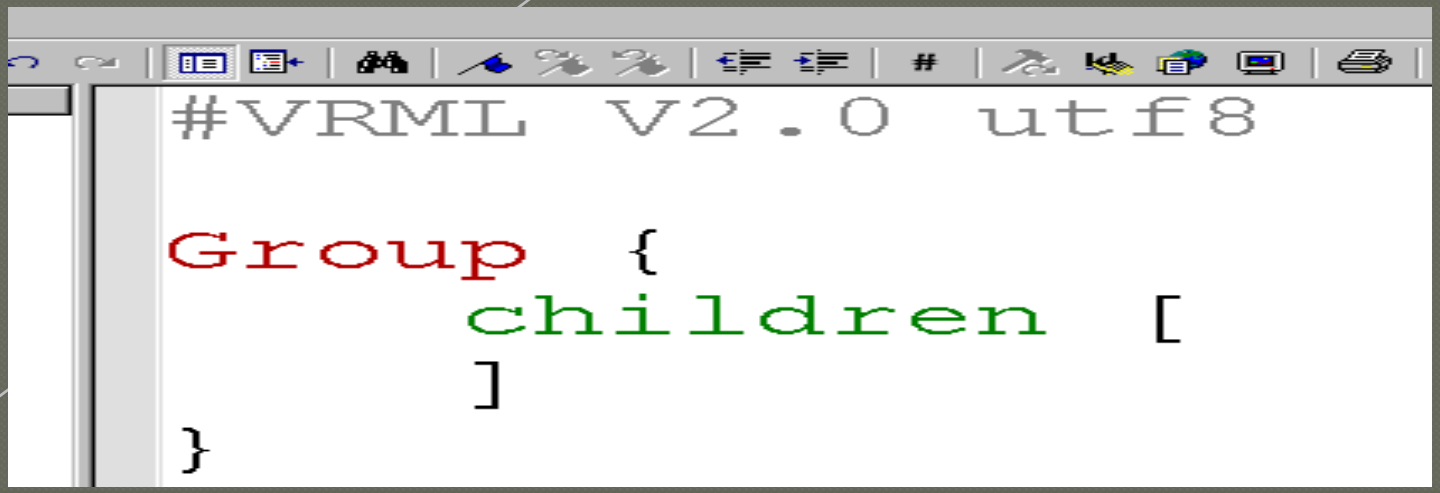
VRML file contains Nodes that describe the scene

- A Node is defined with several Fields
  - Each line give the field, the type of the field, the name and the default value.



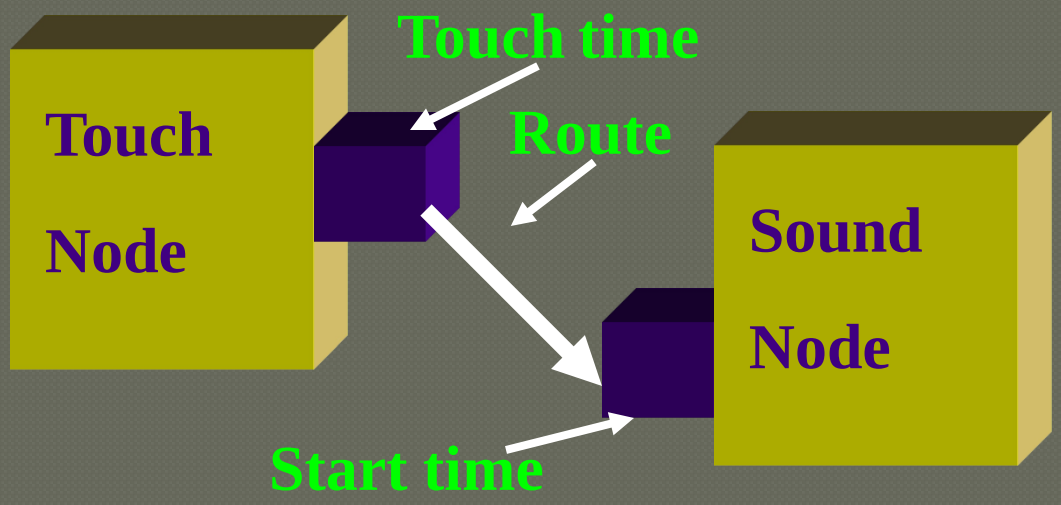
Example

VRML world is made of nodes,
which are types of objects.
Inside the nodes there are fields which are properties of the node.
A node structure is :



Events & Routes

- *A ROUTE wires two events together.*



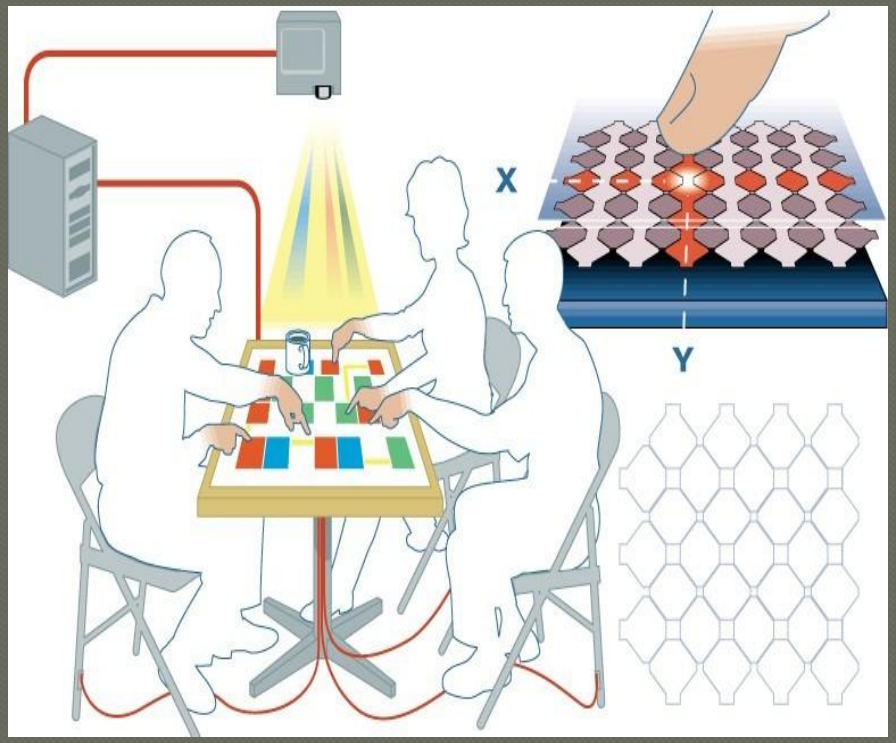

```
DEF SENSOR TouchSensor {
}
 DEF SOUND Sound {
}
ROUTE SENSOR.touchTime TO
```

Sensors

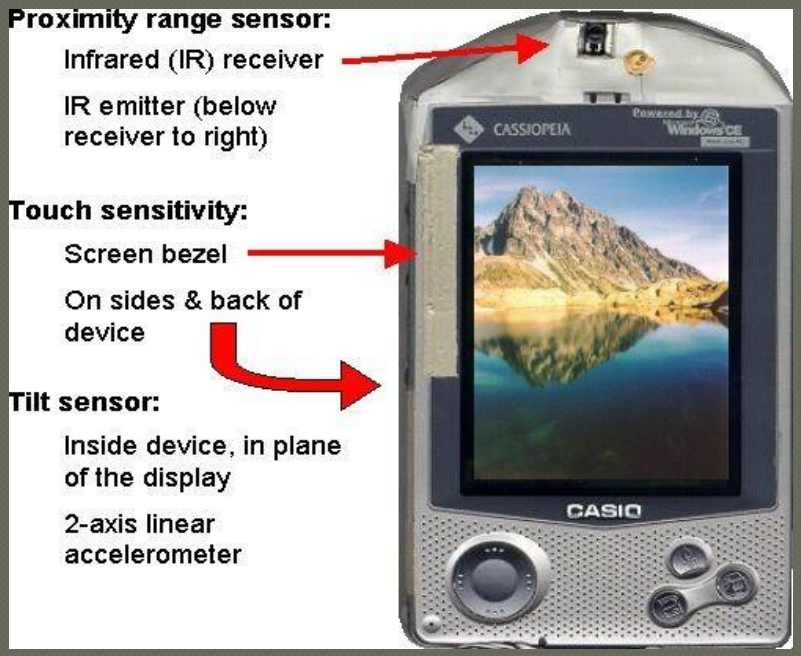
There are several types of sensors in VRML:

- Time Sensors
- Visibility sensors
- Collision Sensors
- Proximity Sensors
- Touch Sensors
- Sphere Sensors
- Cylinder Sensors
- Plane Sensors

In General Life



Capacitive sensing on a table



Sensors on a PDA

Software developed for weather Forecasting (signaled from satt.lite)

Versions

In the beginning there was VRML 1.0.

- It was the first attempt at an internet 3D language.

- VRML 2.0 replaced VRML 1.0 and add many features (animation).
- Version 2.0 was submitted to ISO for standardization, the outcome was VRML97 which is almost identical to VRML 2.0.

Classes of Node

1. Shapes
   - Geometry
   - Appearance
2. Transformations
3. Lights
4. Groups

1. Shapes

- Each Shape has a geometry field that contains a geometry node and an appearance field that contains an Appearance node.

Ex:-

Shape {

appearance <some appearance>

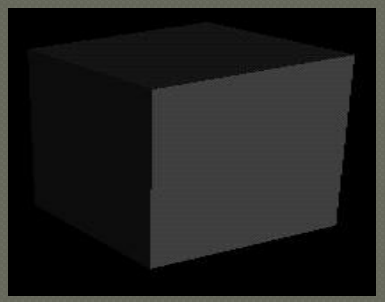
geometry <some geometry> }

Geometry Nodes

- Basic types
  - Box
  - Sphere
  - Cylinder
  - Cone
  - Text

- Box
  - defined by its size field

```
Box {
    size 2.0 2.0 2.0
}
```



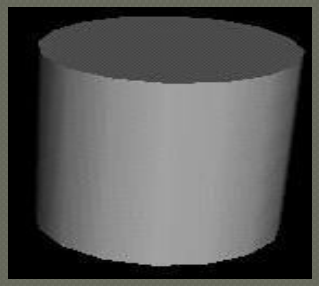
- Sphere
  - defined by its radius field

```
Sphere {
    radius 1.5
}
```

Geometry Nodes

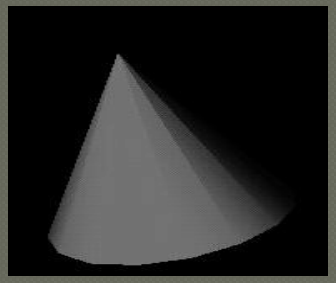
- Cylinder
  - defined by its height and radius fields

```
Cylinder {
    height 2.0
    radius 1.0
}
```



- Cone
  - defined by its height and radius fields

```
Cone {
    radius 1.3
    height 1.8
}
```



- Tex t
  - *defined by the string and the font*

```
geometry Text {string
  ["Hi!"] fontStyle
  FontStyle {
    family "TYPEWRITER"
    style "ITALIC"
  }
}
```

Appearance

Defines the look of some piece of geometry

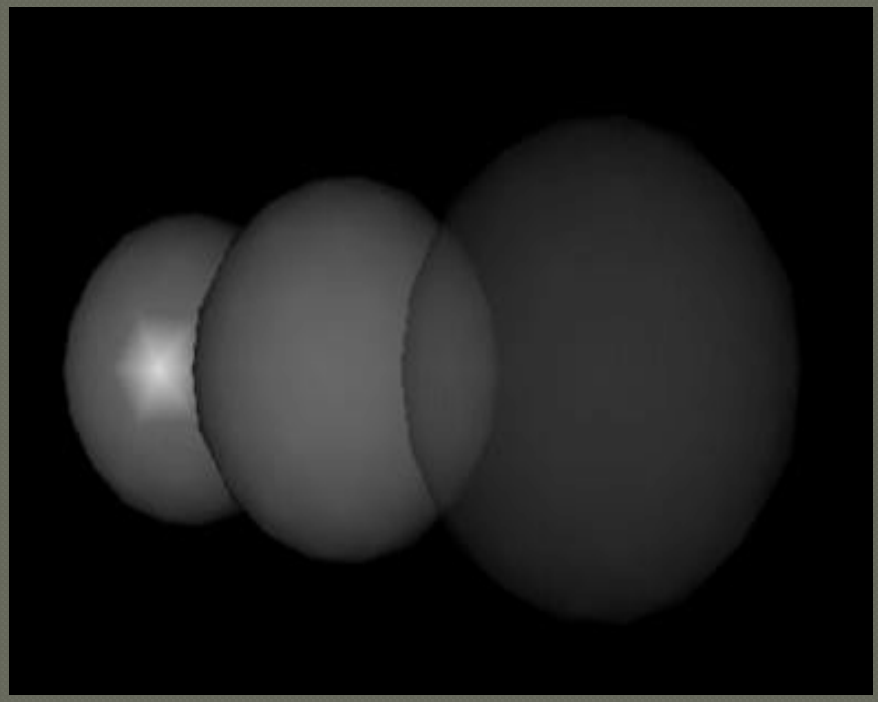
- Material
  - combination of ambient colour, diffuse colour, emmisive colour, shinines, transparency, specular colour.
- Texture
  - defines a picture to paste to the object
    - supports movies
- TextureTransform
  - defines how the picture is applied to the object

Material Examples

Materi
al

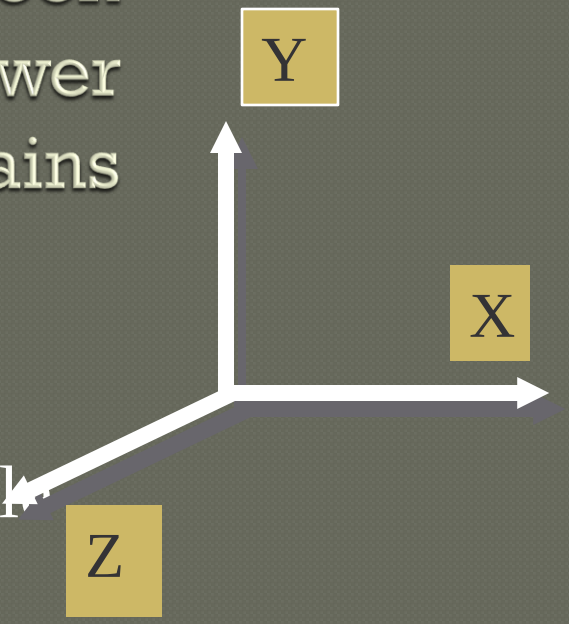
- Shiny Material
  ambientIntensity 0.3
  diffuseColor 0.1 0.7 0.2
  specularColor 0.6 0.8 0.6
  shininess 0.6
- Dull Material
  ambientIntensity 0.1
  diffuseColor 0.1 0.7 0.2
  shininess 0.0
- Transparent Material
  diffuseColor 0.1 0.7 0.2
  transparency 0.5

Colour components defined in RGB (red, green, blue triplets)



Transformations

- Define the positions of objects in 3D space XY are the plane of the screen Z is towards the Viewer
- Transformation basically contains
  - rotation
  - scale
  - translation
- Rotations follow “right-hand” screw rule



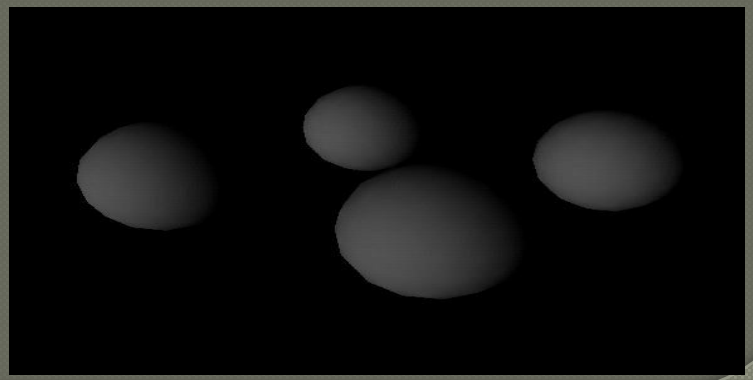
Lights

- Provide illumination in the scene
  - DirectionalLight
  - PointLight
  - SpotLight

1.DirectionalLight

- light rays travelling in parallel lines e.g. sunlight

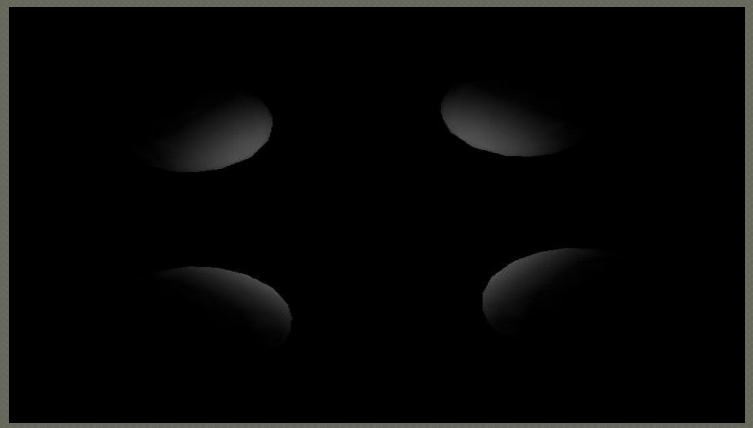
```
DirectionalLight {
        direction -1 -1 -1
        intensity 0.8
}
```



Lights(cont...)

PointLight

- radiate in all directions



- SpotLight
  - radiate only in certain directions, and with volumes of different intensity

Programming

- Real animation must include some sort of programming.
- VRML accepts two kinds of programs:
  - JAVA.
  - JavaScript.
- The script node can receive and send events very easily.

Benefits

1. **Platform Independence** - the viewer is still platform dependent, but the simulation will run on all types of platforms, since it is an ASCII language.
2. **Extensibility** - the first draft of the language runs in concurrence with HTML, not over it.
3. **Low bandwidth requirements** - it runs as fast as your machine will allow it.
4. **Open Standard** - refined be the collective wisdom of expert user community

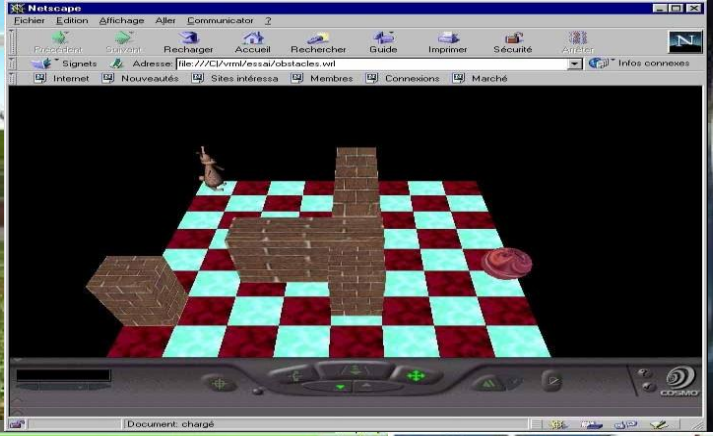
Benefits(cont.)possible developer interfaces

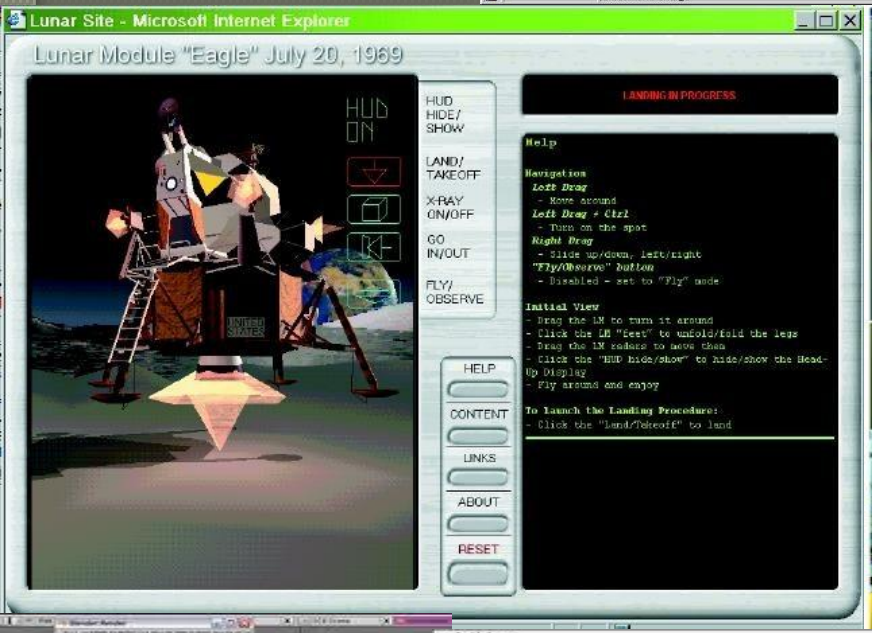
- GUI Editors
- Text Editors
- Translation programs (Java or Perl)
- combinations of the above

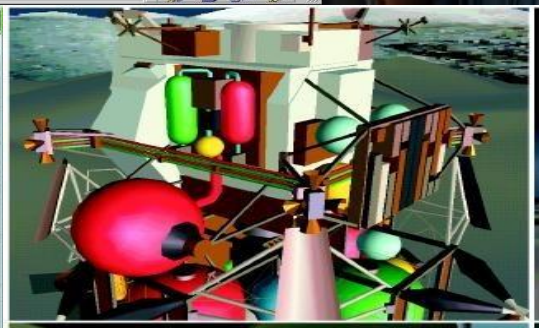
7. **Motivating** - 3D graphics, audio, media files, immediate feedback, visual debugging.
8. **Gradual exposure to programming** - modeling -> animation -> interaction -> scripting -> programming

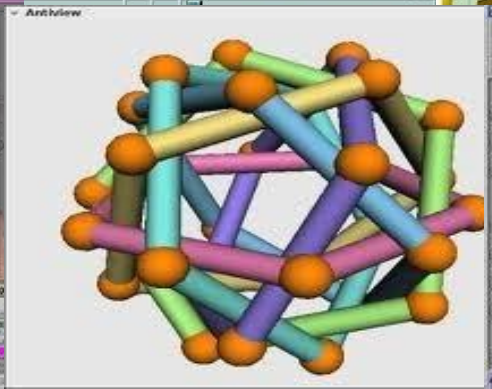
Benefits(cont….)

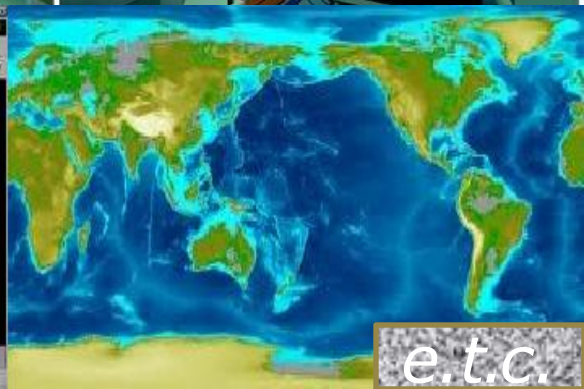
9. **Object-Oriented concepts** - objects (nodes), fields, input/output interfaces (routes), abstraction and inheritence etc.
10. **Other applied concepts** - data structures (trees, stacks, etc), 3D math, linear algebra, etc.
11. **Lots of resources** - content components, examples, tutorials, and tools.


Netscape
Fichier Edition Affichage Aller Communicator ?
Précédent Suivant Recharger Accueil Rechercher Guide Imprimer Sécurité Arrêter
Signets Adresse: file:///C|/vrml/essai/obstacles.wrl Infos connexes
Internet Nouveautés Sites intéressa Membres Connexions Marché
Document: chargé


Lunar Site - Microsoft Internet Explorer
Lunar Module "Eagle" July 20, 1969
HUD ON
HUD HIDE/ SHOW
LAND/ TAKEOFF
X-RAY ON/OFF
GO IN/OUT
FLY/ OBSERVE
HELP
CONTENT
LINKS
ABOUT
RESET
LANDING IN PROGRESS
Help
Navigation
Left Drag
- Move around
Left Drag + Ctrl
- Turn on the spot
Right Drag
- Slide up/down, left/right
"Fly/Observe" button
- Disabled - set to "Fly" mode
Initial View
- Drag the LM to turn it around
- Click the LM "feet" to unfold/fold the legs
- Drag the LM radars to move them
- Click the "HUD hide/show" to hide/show the Head-Up Display
- Fly around and enjoy
To launch the Landing Procedure:
- Click the "Land/Takeoff" to land




Anthview


e.t.c.