

2. Groups

3. Shapes

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

```
Shape {  
    appearance <some appearance>  
    geometry <some geometry>  
}
```

There are different Geometry Nodes available in VRML.

Basic types are as follows:

- Box
- Sphere
- Cylinder
- Cone
- Text

➤ How to Start

3 things to get started.

- A notepad document opens (start/execute/notepad)
- A VRML plugin installed for your browser:
<http://www.parallelgraphics.com/products/cortona/>
- Your browser open

Example Node specification

```
Cone {  
    bottomRadius 1  
    height 2  
}
```

Viva Questions :

1. What is meant by virtual reality?

Virtual reality is a simulated 3D environment that enables one to explore and interact with a virtual surrounding in which one can experience sensations that approximates reality, as it perceived by the user's senses. The environment is created with computer hardware and software.

2. What is meant by augmented reality?

Augmented Reality is the integration of digit information w
the user's environment in the real time. unlike the virtual
reality (VR), which creates a totally artificial environment.

3. What is the difference between HTML & VRML?

HTML	VRML
<ul style="list-style-type: none">① It is a markup lang② It creates 2D document③ HTML is not case sensitive④ It uses markup tags	<ul style="list-style-type: none">① It is a modeling lang② It creates 3D worlds③ VRML is case sensitive④ It does not use markup tags.

Conclusion:-

In this practical, we learn about the basics of VRML, what is the use of VRML language in the virtual Reality, virtual Reality modeling language and the VRML basics.

90:	1.5708
180:	3.1416
270:	4.7124

The Box node defines a rectangular parallelepiped box which allows you to specify height, and depth of the box. The node contains a single optional field size which has three point values, the default values being applied if the field is not specified.

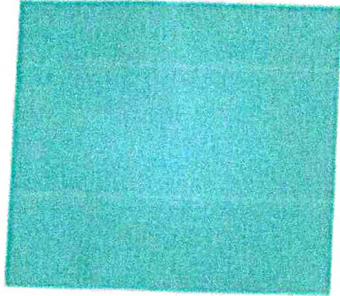
Syntax:-

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

The center of the box is at (0,0,0) of the local coordinate system.

Program Code:-

```
#VRML V2.0 utf8
shape {
    appearance Appearance {
        material Material {
            }
    }
    geometry Box {
        size 2.0 2.0 2.0
    }
}
```



Viva Questions :

1. Which type of box is defined in box node?

The box node defines a rectangular parallelepiped box which allows you to specify the width, height and depth of the box.

2. What are the parameters of box node?

The box node having parameters :-

① **Solid**: A boolean value

② **size**: width, height, depth of box

③ **metadata**: An optional field that can be used to attach metadata to the box.

3. How many fields are there in box node?

The box node contains a single optional field size which has three floating point values the default values being applied if the field is not specified.

Inclusion:-

In this practical, we learn about the how to draw a program for box with the desired shape like radius, size and color by using the nvidia launcher use for the virtual

$*(4, w, h)$ —True color plus transparency in $(3, *, *)$

Transparency—A scalar transparency factor, in the range of 0 to 255.

Discussion

The VRML_SPHERE procedure supports the sphere node in VRML.

Example

The 'wavelogo.dat' file used in this example is found in the following directory:

(UNIX) <wavedir>/demo/web/vrml

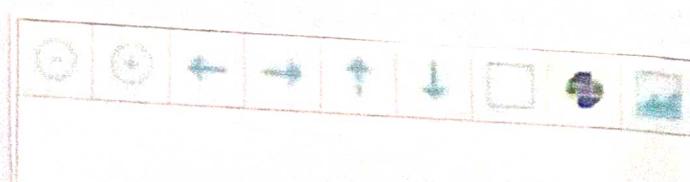
(WIN) <wavedir>\demo\web\vrml

where <wavedir> is the main PV-WAVE directory.

Program Code:-

```
#VRML V2.0 utf8
shape {
    appearance Appearance {
        material Material {
            }
    }
    geometry Sphere {
        radius 1.0
    }
}
```

Output:-



Viva Questions :

1. How many fields are there in Sphere node?

- a) radius : A floating point value that specifies the radius of sphere.
- b) solid : A boolean value that determines whether the sphere is rendered as a solid object.
- c) subdivision
- d) texture coordination,

2. Which field is optional in The Sphere node?

The 'metadata' field is optional in the 'sphere' node. This field can be used to attach metadata to the node, such as descriptive name or other info that may be useful for processing or rendering the scene.

3. What is default value if radius is not specified?

If the 'radius' field is not specified in the 'sphere' node, the default value is 1.0. This means that the sphere will have a radius of 1.0 units.

However it is common to specify a different radius value in order to create spheres of different size.

Inclusion:-

In this practical, we learn about how to draw the Sphere shape and implementation of the program for the sphere shape in VRML and different parameters used for the sphere shape.

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Program Code:-

```
#VRML V2.0 utf8
#A cylinder
shape {
    appearance Appearance {
        material Material {
            color 3
        }
    }
}
```

```
geometry Cylinder {
    height 2.0
    radius 1.5
}
```

3

3

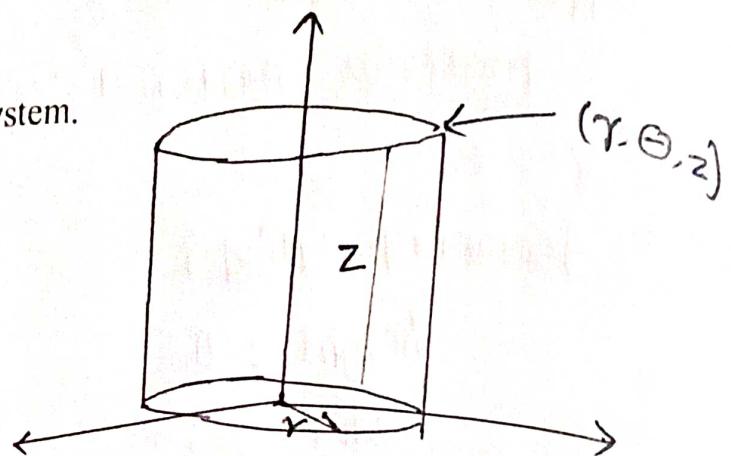
Output:-

Viva Questions:-

1. How many fields are there in Cylinder node?

- c) height b) radius c) bottom d) top
- e) side f) solid g) subdivision h) texture

2. Show the cylinder in coordinate-system.



3. Cylinder is centered on which axis?

→ In VRML the 'cylinder' node is centered on the local z-axis by default. This means that the cylinder is positioned as that its central axis is aligned with the z-axis of the co-ordinate system.

Conclusion:

The VRML program for drawing cylinder with the desired size and color is a valuable asset for any friendly 3D Modeling interface and design. The program's user customizable options.

Program Code:-

```
#VRML V2.0 utf8
shape {
    appearance APPEARANCES
        material MATERIALS
    }
    geometry CONE{
        height 2.0
        bottomRadius 1.0
        bottom TRUE
        side TRUE
    }
}
```

Output:-



Viva Questions:-

1. How many fields are there in Cone node?

- a) height : A floating-pt value that specifies the height along y-axis.
- b) bottom-radius: radius of cone along base x and y axis
- c) side : A boolean value that determines whether the cone has curved side.
- d) solid : determine whether the cone is rendered as the solid object.

2. Central axis of cone is aligned with which axis?

- In VRML, the 'cone' node is aligned with local y-axis by default. This means that the central axis of the cone is aligned with z-axis of the coordinate system.

Conclusion:

This program allows users to specify the dimensions and color of cone, providing flexible and custom options to meet specific design requirements.

Aim: To write program in VRML 2.0 to make sun and earth.

Software Requirement:-VRML launcher

Objectives:- To get one object to be stationary and another should be moving.

Theory:-

There are various ways of using textures in an Appearance node. Here, we will see how to use ImageTexture node. VRML 2 browsers are required to support JPEG and PNG file formats. GIF support is only an option, so use JPEGs or PNGs if ever possible! Image which is to be used as a texture must be present in folder and its path must be given to adopt it in any shape. An ImageTexture node makes all of its children have a specific picture for a background. Basically, you just tell it the URL, and whether to tile the picture horizontally and vertically. The standard says only JPG files can be used, but the Cosmo player can also use GIFs.

Here is a very simple node that dresses a cube with a bitmap file.

```
Shape {  
    appearance Appearance {  
        texture ImageTexture {  
            url "teef/a/mendelsohn.gif"  
        }  
    }  
    geometry Box {}  
}
```

Per default each side of an object will be painted with an image (e.g. cubes will have 6 images, spheres one, and cylinders two).

Program Code:-

```
# VRML V2.0 utf 8
```

```
shape {
```

```
    appearance Appearance {
```

```
        material Material {
```

```
            diffuseColor 0 .
```

```
}
```

```
} geometry
```

```
    sphere {
```

```
        radius 1
```

```
}
```

Transform {

translation 2 1-2

children {

Shape { appearance Appearance {

material Material {

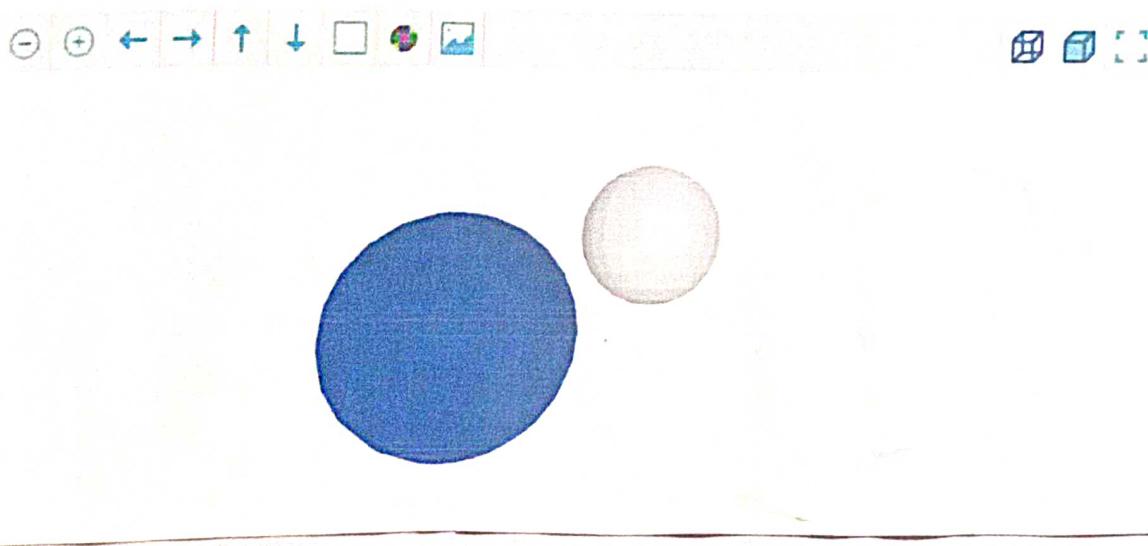
emissiveColor

Shininess 133

geometry Sphere { radius 13 }

33

Output:-



Viva Questions:-

1. How many sides of cube can be printed with images?
→ In VRML, a cube can be textured with images on all six sides. This is accomplished by applying a texture to each face of the cube using the 'texture' field of the 'Appearance' node that is associated with the 'Box' node.
2. How to use image texture node in VRML?
→ In VRML, the 'Image Texture' node is used to apply an image as a texture to a 3D object. The 'Image Texture' node has a single field, 'uri', which specifies the location of the image file to use as the texture.

Conclusion:

With VRML station any objects such as the sun as a fixed object in a 3D environment. In contrast, movable objects such as the earth can be animated to simulate its simulate movement around the sun.

Signature

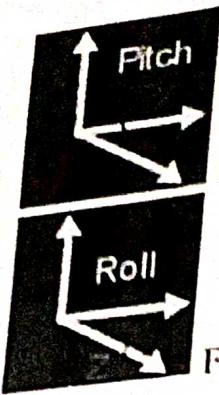


Fig.3: Pitch, X Rotation

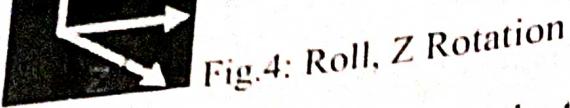


Fig.4: Roll, Z Rotation

The three axes (X, Y and Z) and the three rotations (yaw, pitch and roll), together, are referred to as the **six degrees of freedom**. The location and orientation of objects in space are determined by these six pieces of information.

Program Code:-

```
#VRML V2.0 utf8
```

```
shape {
```

```
appearance Appearance {
```

```
material material {diffuseColor 1 1 0}
```

```
}
```

```
geometry IndexedFaceSet {
```

```
coord coordinate {
```

```
Point [
```

```
-1 0 2,
```

```
-1 0 -2,
```

```
1 0 -2,
```

```
1 0 2,
```

```
-1 1 2,
```

```
-1 1 -2
```

```
1 1 2
```

0 2 2

0 2 -2

]

}

coordinindex [

0, 1, 2, 3, -1,

0, 3, 7, 8, 4, -1,

1, 5, 9, 6, 2, -1,

2, 6, 7, 3, -1,

0, 4, 5, 1, -1,

7, 6, 9, 8, -1,

4, 8, 9, 5, -1

]

3

3

Viva Questions:-

1. What shapes can be used for getting house like structure?

House like structure can be created using variety of shape including Box, cylinder, sphere, cone, extrusions, Indexed faces and text.

2. How to combine different shapes available?

Firstly defines shape you want to combine next, Create a transform node to group the shape together, and finally set the position and orientation.

Conclusion: In this practical we successfully implement a VRML program to draw a house like structure using different shapes.

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Bindable Nodes: Bindable Nodes have the unique behavior that only one of each type can be active (i.e. affecting the user's experience) at any point in time.

ESML contained 6 major (and 36 minor node) types, i.e:

- Shape Nodes (such as cubes, text, sphere)
- Geometry and Material Nodes (such as texture and font style)
- Transformation Nodes (such as rotation and translation)
- Camera Nodes
- Lighting Nodes
- Group Nodes

Program Code:-

shape {

 appearance Appearance {

 material Material {

 diffuseColor 0.4, 54900

 emissive 0 0 0

 shininess 0

 }

 }

 geometry IndexedFaceSet

 coord Coordinate {

 Point [

 2 12 -6,

 2 12 -6

 2 1.2 -6,

 2 0 -6,

 2 0 -6,

 2 0 -6,

 2 1.2 0,

 2 1.2, 0,

 2 1.2, 0,

 2 1.2, 0,

 2 0 0,

2.0.0,
2 0 0,
23.35 -3.450453,
23.35 -3.450453,
23.35 -3.450453,
21.35 -1.505991,
21.35 -1.505991,
21.35 -1.505991,
21.35 -1.505991,
21.35 -5.24187,
21.35 -5.24187,
21.35 -5.24187,
23.35 -4.894044
23.35 -4.894044
23.35 -4.894044
23.35 -2.114686
23.35 -2.114686
23.35 -2.114686
2 0 -0.2545971,
2 0 -0.2545971,
2 0 -0.2545971,
2 0 -1.667909,
2 0 -1.667909
2.0.382883 -0.3728486,
2.0.382883 -0.3728486,
2.0.06435235 -0.6904402,
2.0.06435235 -0.6904402,
2.0.06435235 -0.6904402,
2.0.0578128 -0.6904402,
2.0.0578128 -0.5680937.

Shape {

Appearance

Appearance {

Material

Material {

diffuse color

0.01176 0.54902 0.9254

emissive color

0 0 0

Shininess

3

3

3

ut:-

Viva Questions:-

1. How many structures needed to get car like structure?

VRML are drawn around the origin to create a car like structure in VRML. Several structures are typically needed. The exact no of structure depends on level of detail. The box, cylinder, sphere, extrusions, indexed faceset and text are used.

2. What is the structure of wrl file?

WRL files are an extension of virtual reality modeling language (VRML) format. The structure of WRL file have 3 basic element.

- ① A header that tells the browser that the file is VRML.

Conclusion:

In this practical, I have learned to design car like structure by combining various shapes available in 3D.

Once the polygons have been created, the computer can then **shade** the individual polygons to produce the appearance of a solid object (Fig.3). Optionally, the computer can apply a **texture** to the object (Fig.4). Texturing makes it possible to quickly create very complex object surfaces.



Fig.3: Solid Object

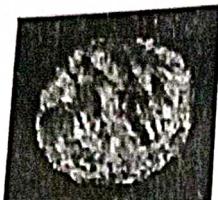


Fig.4: Textured Object

Program Code:-

Shape {

 appearance Appearance {

 texture Image Texture {

 url "abc0.jpg"

 }

 }

 geometry cylinder {

 }

Ques:-

1. How glowing objects are defined in VRML?

In VRML, glowing objects are defined using material node and emissive color field. The material node specifies the visual appearances of the object. The emissive color field within the material node controls the amount of light emitted by the object.

2. What are the types of nodes in VR? Explain with example.

A node can contain four of data field exposed field, event and event out there classes design the behaviour of the nodes.

Conclusion:

In this practical, I learned to represent image texture using VRML (virtual reality modeling language).

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Program Code:
VRML V2.0 utf8

```
Transform {  
    rotation 1 0 0 0.4  
    children Shape {  
        appearance Appearance {  
            material Material {  
                diffuseColor 0.2 0.1 0.6  
            }  
        }  
        geometry Box {  
            size 20 0.1 10  
        }  
    }  
  
    Anchor {  
        url "https://mitra.ac.in"  
        description "A link to the PRMITR Home page"  
        children [  
            Shape {  
                appearance Appearance {  
                    material Material {  
                        diffuseColor 0 0 1  
                    }  
                }  
                geometry Sphere {}  
            }  
        ]  
    }  
}
```

Transform {
 rotation .
 children Shape {
 appearance Appearance {
 material Material {
 diffuseColor 1.8 0.2 1.4
 }
 }
 geometry Sphere {
 radius 0.1
 }
 }
}

Anchor {
 url "https://www.sgbau.ac.in/"
 description "A link to the SANT
 GADGE BAB A AMRAVATI Home
 Page"
 children [

Shape {
 appearance Appearance {
 material Material {
 diffuseColor 0 1 1
 }
 }
}

geometry Sphere {
 }
 }
}



Q How many fields are there in Cone node?

Four Fields:

* Cone node contain

- ① bottomRadius
- ② height
- ③ side
- ④ bottom

2. Central axis of cone is aligned with which axis?

central axis of cone is aligned with the
z-axis.

Conclusion: In this practical, I learn how to link the

VRML world for getting the Particular VR link
while clicking on the any shape. In this

Practical we used the Anchor node and
children node.

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103/23

Signature