RAMA UNIVERSITY

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# FACULTY OF ENGINEERING & TECHNOLOGY

## BCS -504 Computer Graphics & Multimedia

## Lecture-14

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# OUTLINE

- **THREE DIMENSIONAL TRANSFORMATIONS**
- **MATRIX FOR TRANSLATION**
- **MATRIX REPRESENTATION OF POINT TRANSLATION**

# Three Dimensional Transformations

The geometric transformations play a vital role in generating images of three Dimensional objects with the help of these transformations. The location of objects relative to others can be easily expressed. Sometimes viewpoint changes rapidly, or sometimes objects move in relation to each other. For this number of transformation can be carried out repeatedly.

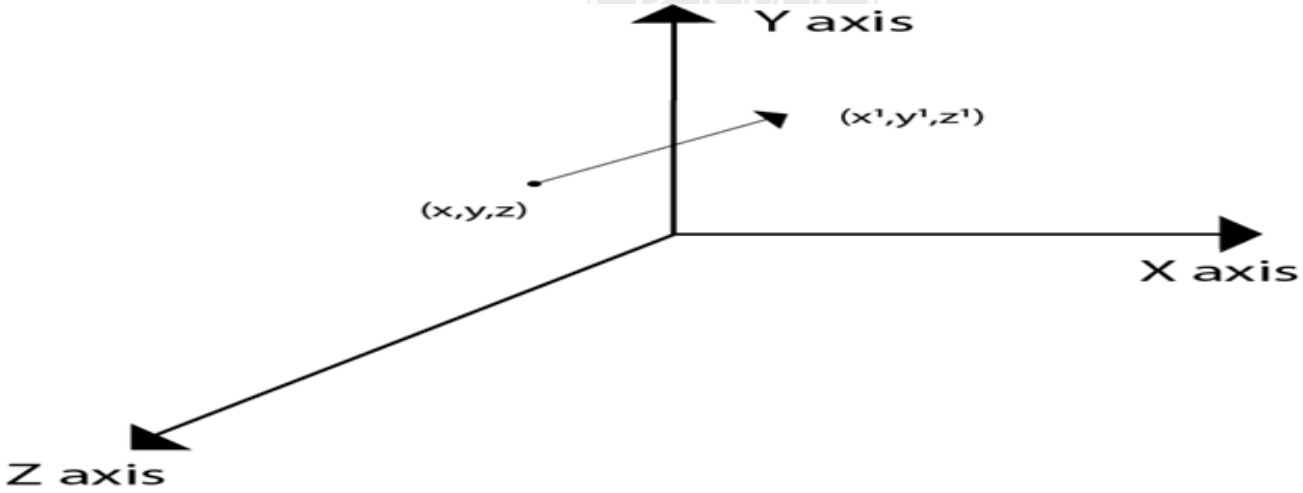
Translation

It is the movement of an object from one position to another position. Translation is done using translation vectors. There are three vectors in 3D instead of two. These vectors are in x, y, and z directions. Translation in the x-direction is represented using $T_x$. The translation is y-direction is represented using $T_y$. The translation in the z-direction is represented using $T_z$.

If P is a point having co-ordinates in three directions (x, y, z) is translated, then after translation its coordinates will be ($x^1$ $y^1$ $z^1$) after translation. $T_x$ $T_y$ $T_z$ are translation vectors in x, y, and z directions respectively.

# Three Dimensional Transformations

Three-dimensional transformations are performed by transforming each vertex of the object. If an object has five corners, then the translation will be accomplished by translating all five points to new locations. Following figure 1 shows the translation of point figure 2 shows the translation of the cube.



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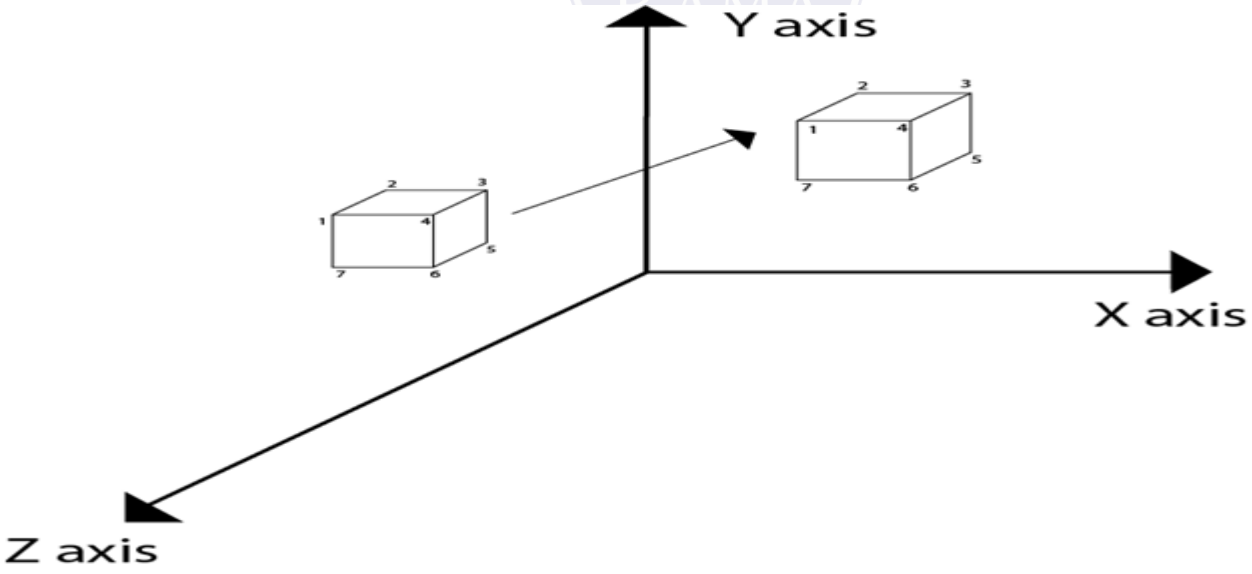

# Matrix for translation

$$\begin{Bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ T_x & T_y & T_z & 1 \end{Bmatrix} \text{ or } \begin{Bmatrix} 1 & 0 & 0 & T_x \\ 0 & 1 & 0 & T_y \\ 0 & 0 & 1 & T_z \\ 0 & 0 & 0 & 1 \end{Bmatrix}$$

# Matrix representation of point translation

Point shown in fig is (x, y, z). It become ($x^1$,$y^1$,$z^1$) after translation. $T_x$ $T_y$ $T_z$ are translation vector.

$$\begin{pmatrix} x^1 \\ y^1 \\ z^1 \\ 1 \end{pmatrix} = \begin{pmatrix} 1 & 0 & 0 & T_x \\ 0 & 1 & 0 & T_y \\ 0 & 0 & 1 & T_z \\ 0 & 0 & 0 & 1 \end{pmatrix} \begin{pmatrix} x \\ y \\ z \\ 1 \end{pmatrix}$$

# Multiple Choice Question

## MUTIPLE CHOICE QUESTIONS:

| Sr no | Question | Option A | Option B | OptionC | OptionD |
|---|---|---|---|---|---|
| 1 | Which display uses optical effects to convert sunlight or light from some other source into graphics patterns? | non scan display | non emissive display | non emitter | b & c |
| 2 | What is refresh buffer rate of Picture definition | 60 frame/sec | 50 frame/sec | 40 frame/sec | b & c |
| 3 | Which display used in glass plates of crt? | rander display | Plasma Panels displays | conforming display | none |
| 4 | How will be separation between pixels ? | magnetic field of conductor | electric field of conductor | transistor | electrical field of conductor |
| 5 | Which display used in Picture definition? | Plasma Panels displays | CRT | SKL | 3D |

# REFERENCES


- http://www.engppt.com/search/label/Computer%20Graphics