

Research Seminar Report

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Course : M – Des (animation and film design 2009-11)

3D Modelling For Game Design

Approval Sheet

The Design research Seminar Project titled “ Modeling For Computer Game Design “ by Manish Hans is approved in partial fulfillment of the requirement for the M.Des Degree in Animation And Film Design.

Guide :

Declaration sheet

I declare that this written submission representation my ideas in own words
And where other's ideas or words have been included, I have adequately
Cited and referenced the original sources. I also declare that I have adhered
to all principles of academic honesty and integrity and have not
misrepresented or fabricated or falsified any ideas/data/fact/sources in my
Submission. I understand that any violation of the above will be cause of
My disciplinary action by the institute and can also evoke penal action from
The sources which have not been properly cited or from whom
Proper permission has not been taken when needed.

Signature :

Name of the student :

Roll No:

Date :

Acknowledgement

I would sincerely like to thank my guide Prof Phani Tetali for his immense guidance and support and also would like to thank Prof Sumant Rao , Prof Nina Sabnani , Prof C.P. Narayan and Prof Shilpa Ranade for their Valuable suggestions during research.

Abstract

The Aim of the project Report is to deeply study the process Of Modeling for Computer Game Design , Which require not only different skill sets but also some rules which have to follow while modeling keeping in mind the slow rendering process of the Computer Hardware.

Digital models

Digital models are virtual entities- though they appear to have depth, in reality they do not. The image in the monitor has only two dimensions. It is the performance of the 3D program which gives the illusion of depth. This requires the program to create a model of a three- dimensional space. To do this it generates three axes perpendicular to each other; references to all three axes can set a point in the space. The axes are typically termed X (breadth) Y (height) and Z (depth). The points where these co-ordinates meet are referred to as the “origin”. A three –figure co-ordinates will define a triangular polygon in space.

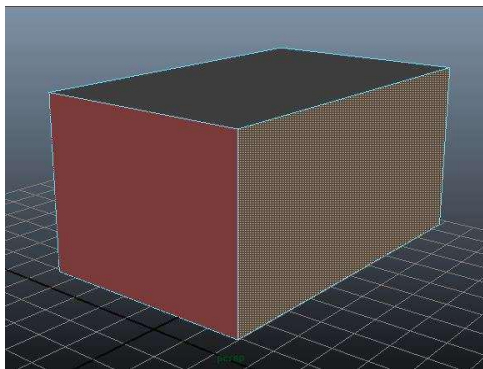
Polys

Three-dimensional models are formed from a mesh of interconnected points in a virtual 3D space. This mesh is made up of triangles, or “polys” (short form of polygon). The point at the corner of a poly is a “vertex” and the line between vertices is “edge”.

A poly mesh forms a virtual surface onto which a colour or an image may be placed. A series of images that tessellate on each poly can be made to appear as a natural material – a “texture”.

The more polygon will it take to make a model, more smooth and lifelike it will look but it also considerable time to render during game play, so while modelling this should taken into account that model should not be too heavy or e can say low no of ploys should be used to keep it light so that it should take much time in rendering

while playing.



Autodesk Maya

Maya is a high end package that is widely used throughout the games, animation, film and television industries. It contains many features of a high –end software including advance modelling, texturing special effects and computer generated effects like hair and cloths. It is expensive to purchase but is considered one of the industry standards.

Softimage

Softimage has come to note partly due to the collaboration with Valve software for the creation of Half-life 2. The release of a Mod Tool plug-in for this package aims it for the Game Industry.

Zbrush

ZBrush is an interesting software, developing a big following due to the way it allows the modeller to “paint” in three dimensions. The programme interface allows the user to generate three dimensional shapes with the aid of special tools which act like a natural paintbrush except in 3 dimensional. ZBrush sees a lot of use in creating highly detailed models quickly: these can be exported as normal maps onto lower poly models to provide higher quality information for rendering.

3D Studio Max

3D studio Max is high-end software that is widely used throughout a variety of media industries. 3D studio Max has the entire feature one would expect to find in any good game making software and is widely supported by a wide range of third-party developers who produce different plug-in application to add functionality to max. This is another high cost software but is often preferred one in the game Industries.

Wings 3D

Wings 3D is an open source and free modelling software. It appears to be geared towards developing low polygon models for in-game use. It is easy to learn and is supported by a large online community.

Blender

Blender is again free open-source software supported by large online community. It has a reputation of being hard to learn because of its interface but its active development may see some of these issues resolved.

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Milkshape 3D

Milkshape 3D is again an open source free software targeting game developers. Primarily designed to create mods for game particularly Half-life. This is capable to creating characters for game mods and rigging them for the animation.

3D modeling Methods

For the student Modeler, the best place to start is with polygon modelling. Getting to grip with the methods of modeling and developing your skill in producing effective low-poly models is a key proficiency if you wish to be a game designer

Polygonal modeling

The advantage of polygonal modeling is that it produces apparently complex forms simply, which allow the processor to animate them easily. Polygonal modeling is ideal for games where there are many elements being rendered to the screen at the high frame-per-second rate. The models in a game must be made to appear on screen in a real time (minimum 24 frames per sec to give illusion of movement and often higher) and respond to the player's movement. As you can imagine this involves a lot of calculating for the processor; cutting down how much work it has to do makes a game run smoothly, with of course high visual appeal.

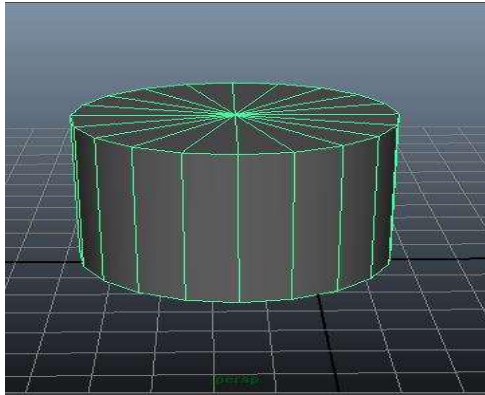
As a polygonal model is constructed, the mesh becomes more complex and the form appears. The disadvantage of this type of modeling is that there is no curved like so the curves has to make from the straight line itself. So the rule is simple make the character with as low poly counts as possible and enhance it using texture on their surface.

Using NURBS

NURBS models have surface that is made up of complex curves formed from splines and control points. They are generally not used in games as it creates mathematically complex models unsuitable for real-time rendering.

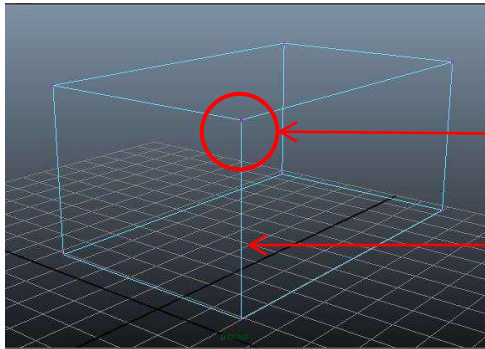
NURBS models are used for animation such as cut scenes where action scene exist only as a recorded video with little or no interaction.

Nurbs models are ideal for generating organic forms such as face s, people and animals . These can then be animated to generate high quality animated video sequences.



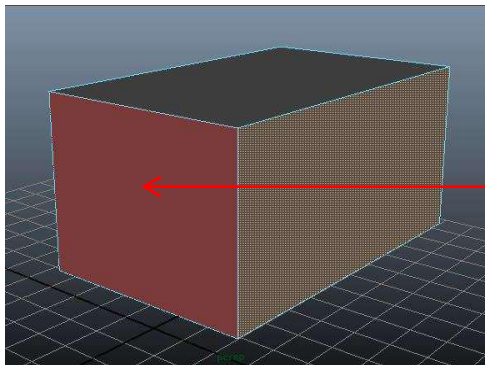
Polygonal Modeling

Polygonal modeling is probably the simplest 3D modeling concept to understand and one of the most common ways of modeling for games. Three vertices are connected by three edges to form a face. link them to their edges and they form a 3d shape. The simplest of these shapes are known as primitives

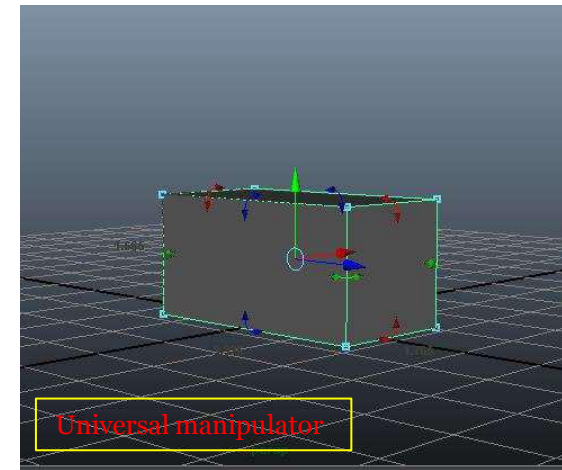
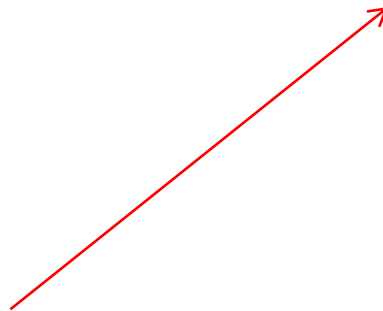
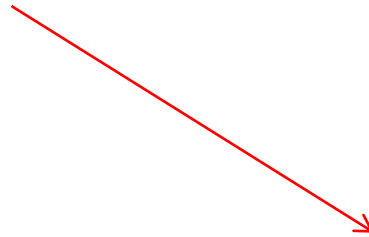
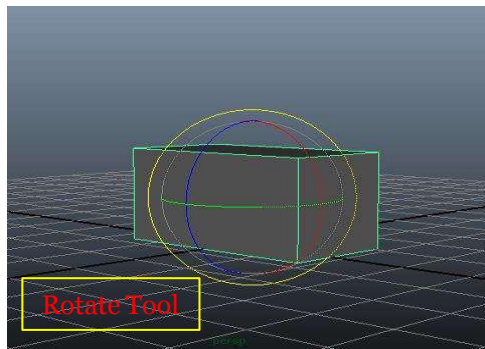
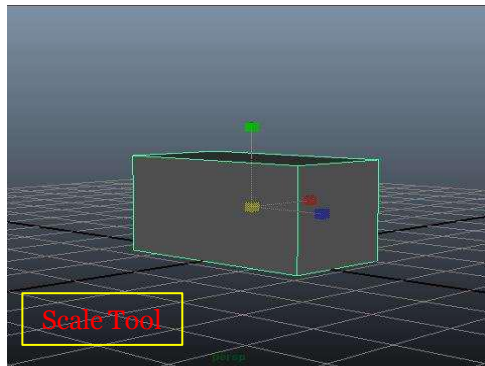
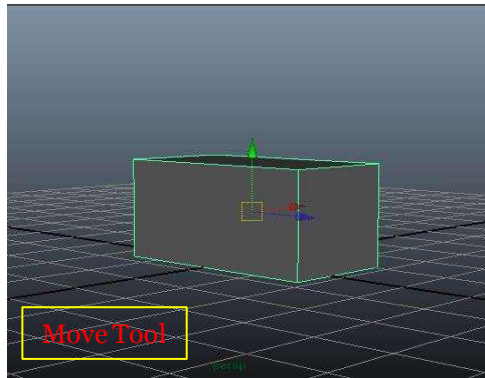


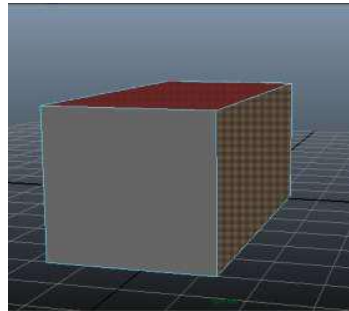
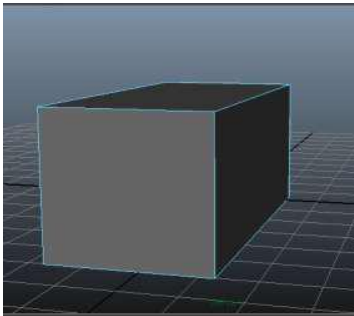
Vertices

Face



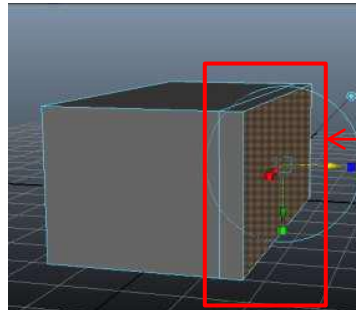
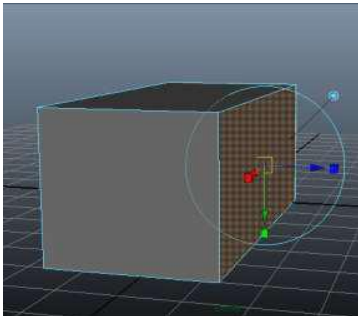
Face



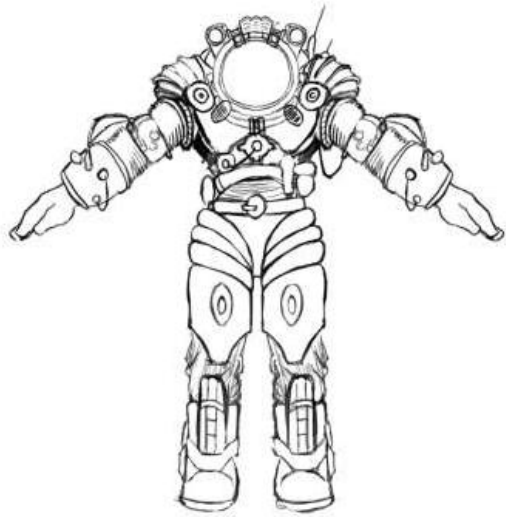


Extrude

Modeling with polygon usually starts with a primitive, on which the modeler can perform simple operation to build and shape their model. The most basic action is extrude, in which the modeler select a face and straches it out from the original position to make a new shape.



Extrude Geometry



Building a Character

Building an in-game character is one of the most complex job facing a designer. Not only representing a human – it might be an animal cartoon characters or an alien . If you prefers to the section on character concept you should have a mental picture of what your character will like and this is an excellent point from which to start the building phase.

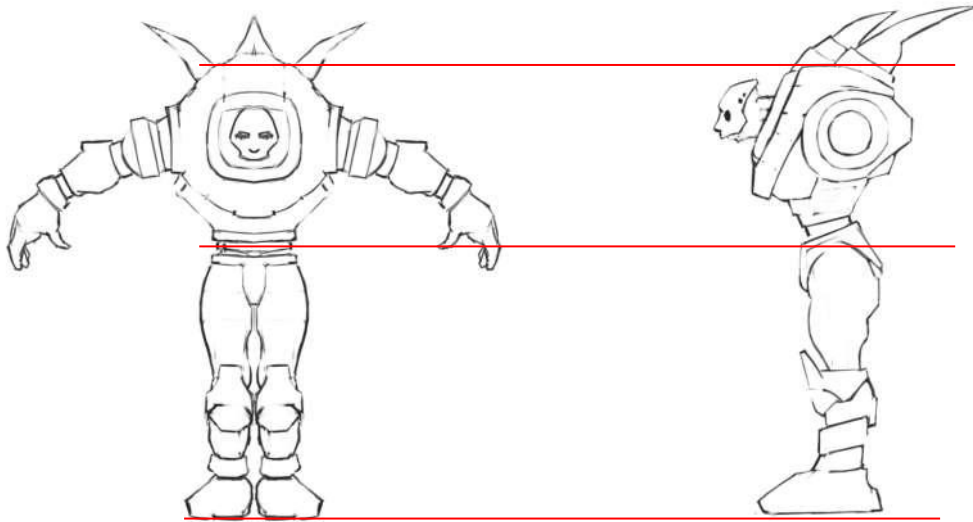
Concept Art

The starting point for any character is the artist's concept illustrations

. The artist will generates may sketches of the character in different styles and with varying attitudes , until the design team decided that they have the right character.

Internet can b a useful toll in your research, as it has lots of references available online anytime





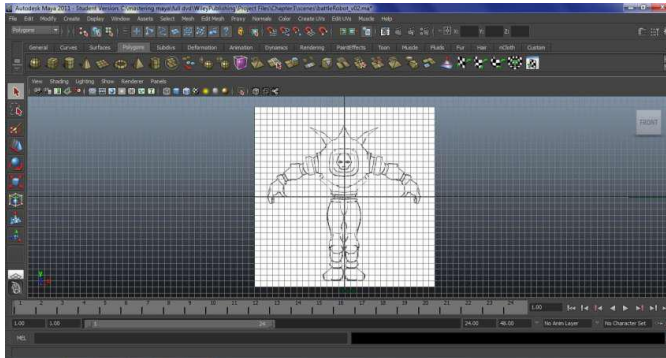
Preparing image for modeling

For modeling reference the model minimum need side and front view

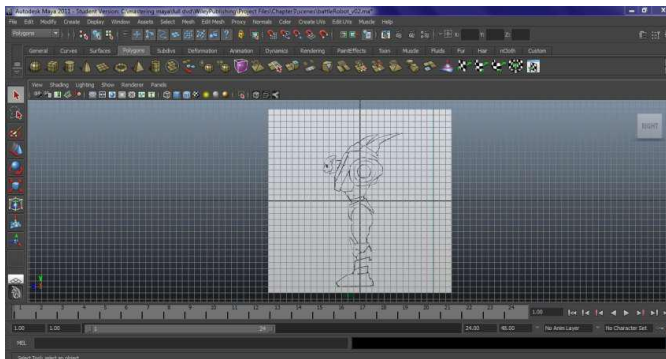
of the character to make its model in 3D software. The images are created carefully so that it matches designed proportions exactly or as correct as possible.

also sometimes its not possible to show each and every part of the character in 2D images which are used as a reference images, its upto the creativity of the modeler to see what is not shown and make the model accordingly. Many assumptions are also made during the process.

The red lines are drawn to see if the two reference images matches their profile or not, if artist find any unsimilarities in the drawings it can be corrected at this level only. Before importing it to the software.



Front View



Side View

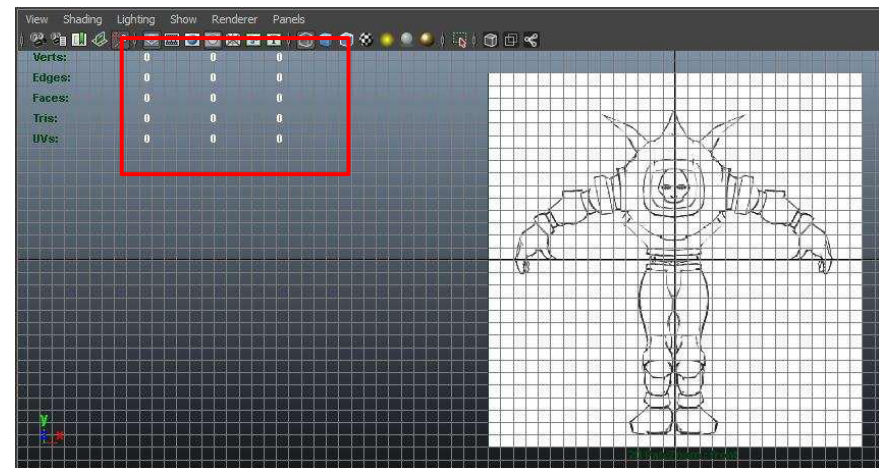
Poly Count Header

Poly count header shows the no of polygons used in the model, it also

shows the no of vertices edges etc.

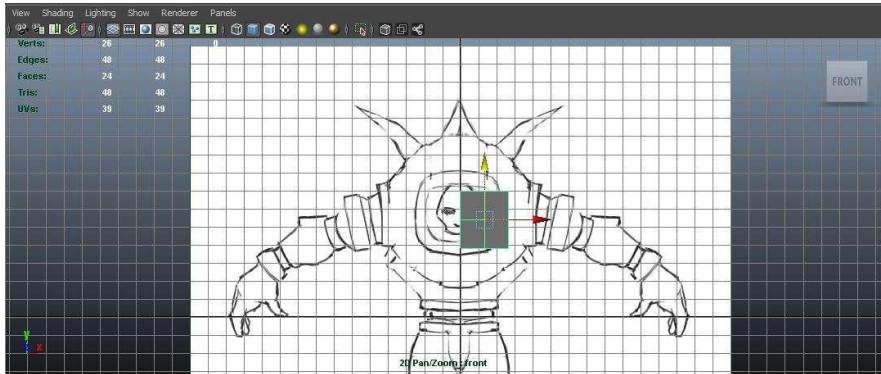
Through out modeling process the modeler should keep in mind that the poly counts should be as low as possible.

The basic rule is to keep poly count under 500. it also depends upon the king of platform you are targeting your game for, it can also be higher .

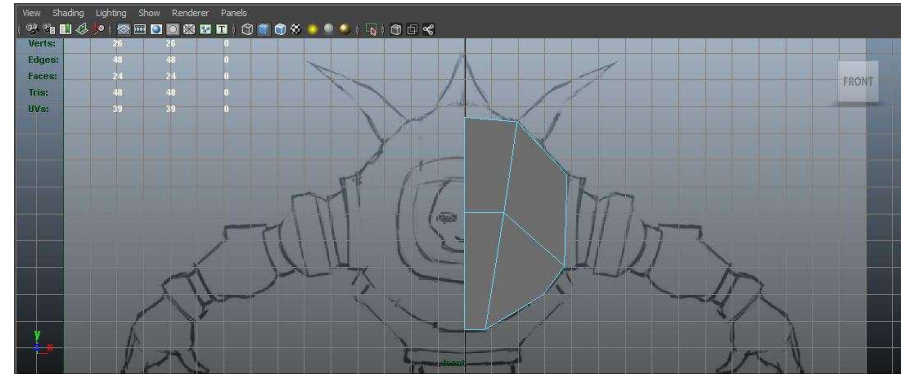


The Red Box showing the poly Counts

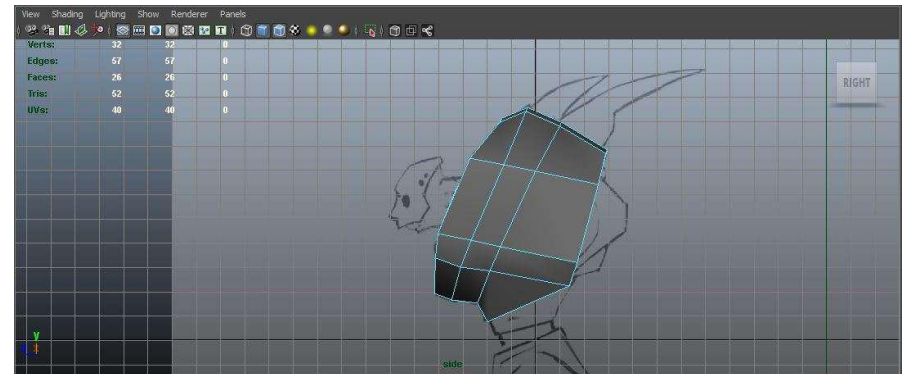
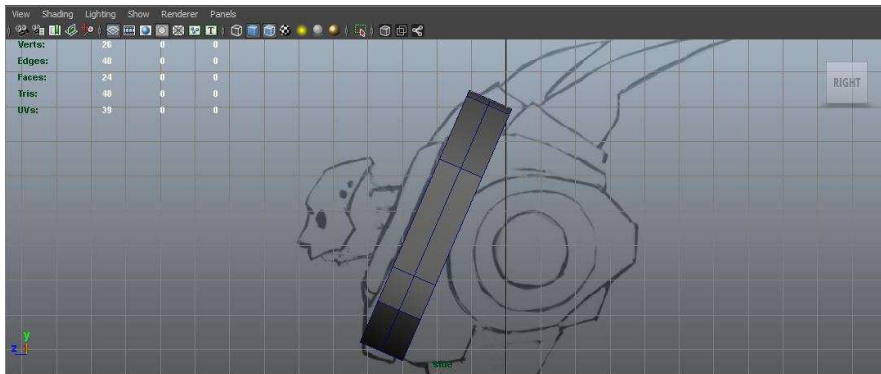
The modeling process is start with primitive box.



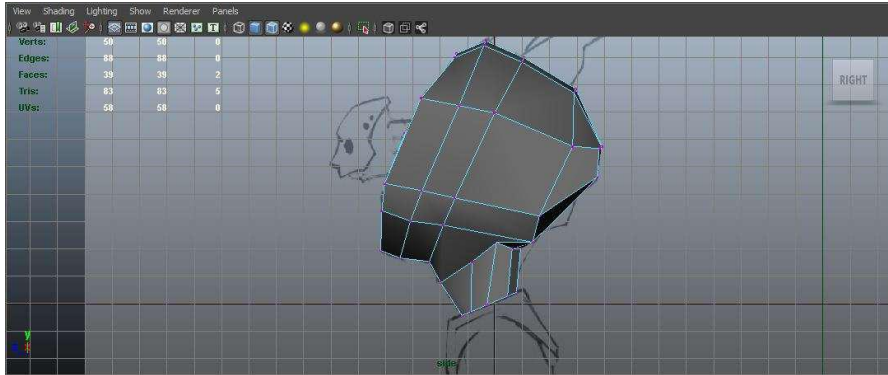
With carefully the vertices of the primitive moved to give the desire shape



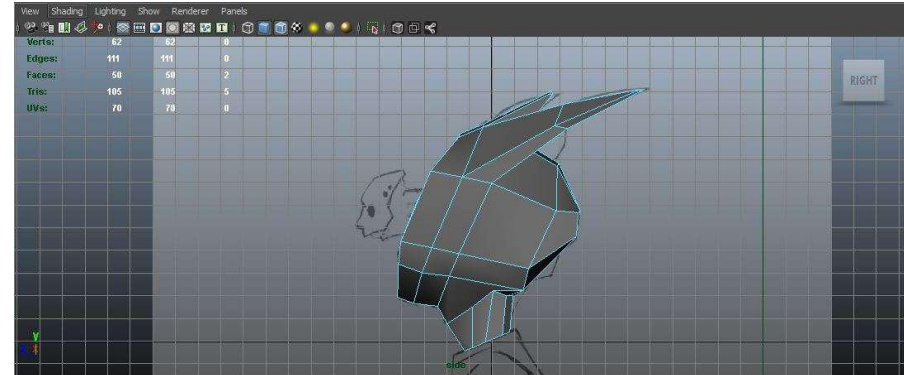
Once the front view shape is matched now the vertices of side view is matched with accordance to the shape of the model



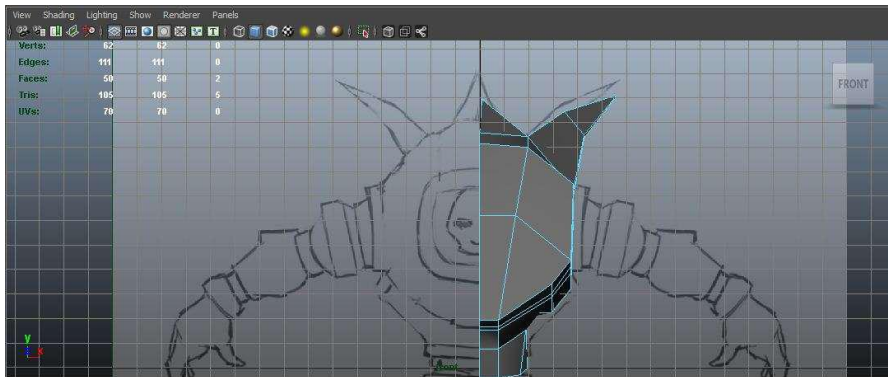
Little more extrude from the back to match the shape of body.



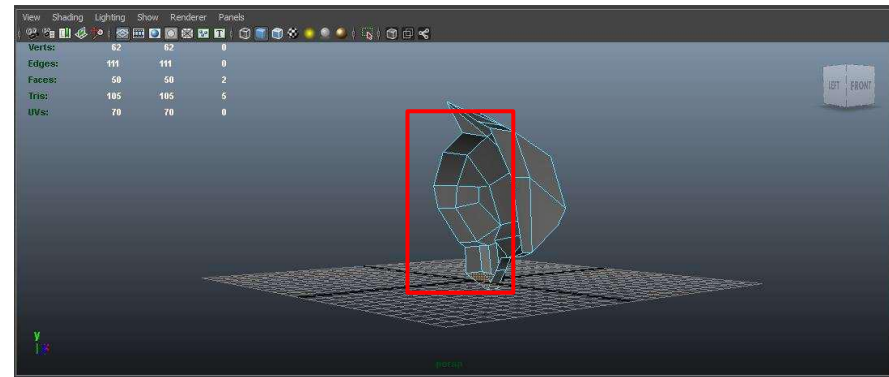
Some faces are extrude to give desire body parts, like the horns here on the back.



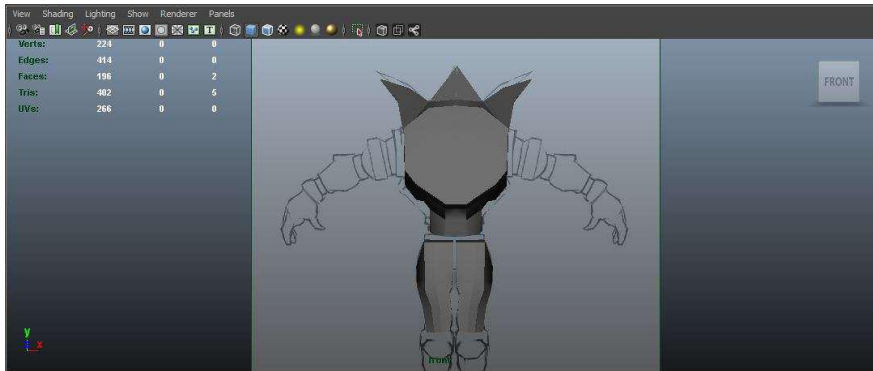
Once the front view shape is matched now the vertices of side view is matched with accordance to the shape of the model



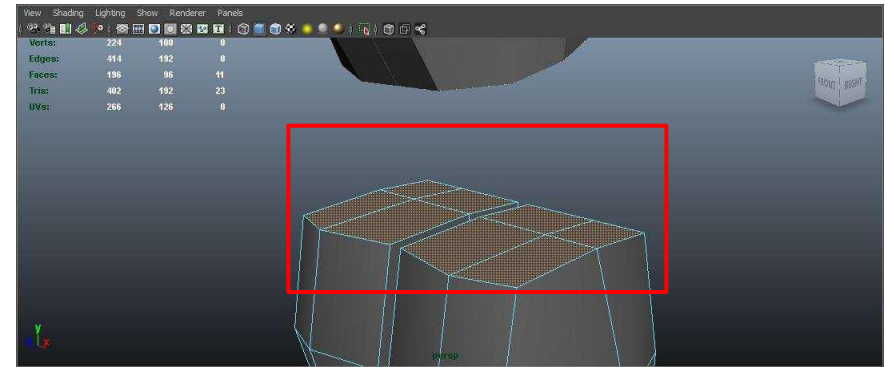
Extra faces are deleted to lower the polycounts.



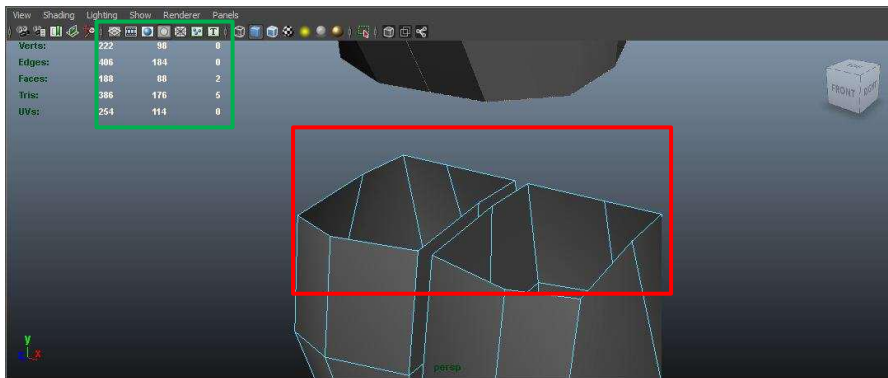
From the front view, the shape will look like this .



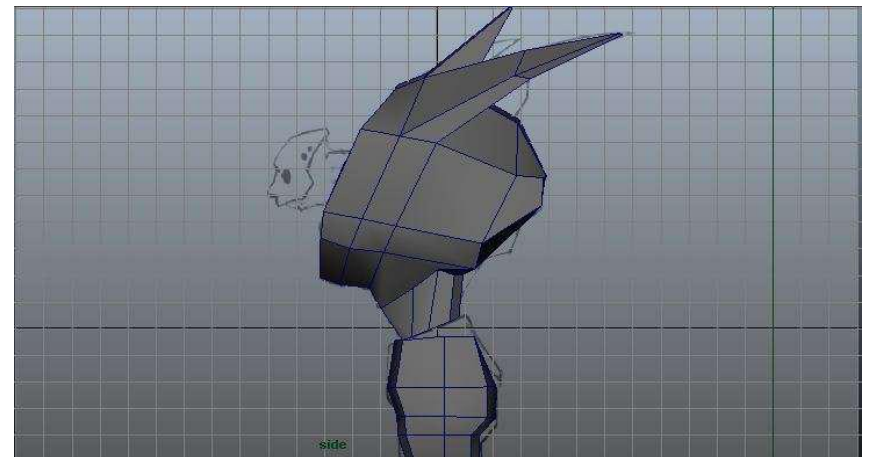
Since the faces shown in red box are upper part of legs, and they are not been Show in the final model, we will delete them to keep the poly counts low.

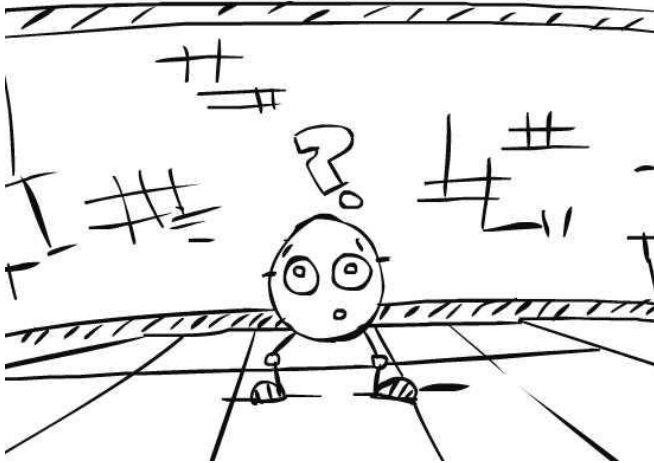


The faces are deleted and hence the poly counts on the green box decreases.



The character is here made with more details because this is central character in the game and will seen lot by the players. In such cases modelers have the opportunity to model the head separately and pay particular attention on details.

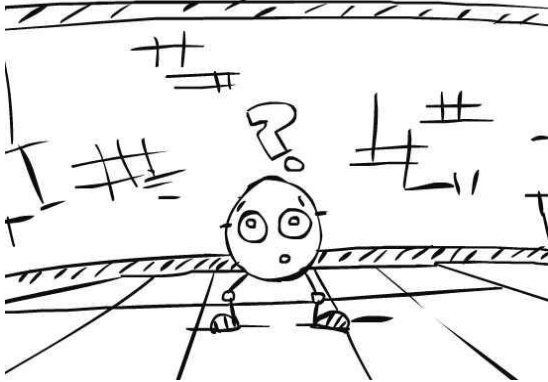




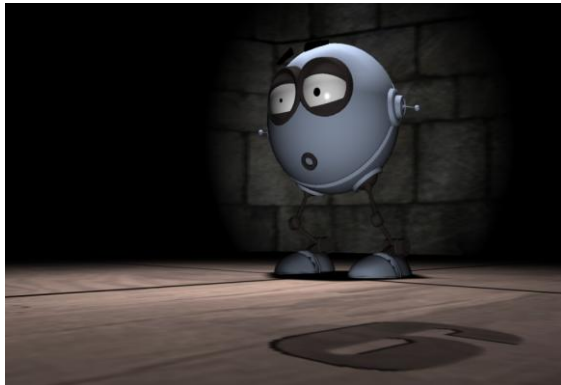
Modeling Process For Level design.

Level Design is a discipline of game design development . Game is proceeds from one level to another and it's the important part of game development.

Props : Props are the stage .



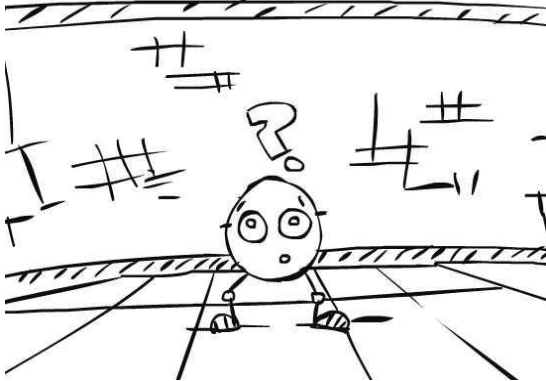
Scene planning (story boarding)



Final output

Modeling Process For Level design.

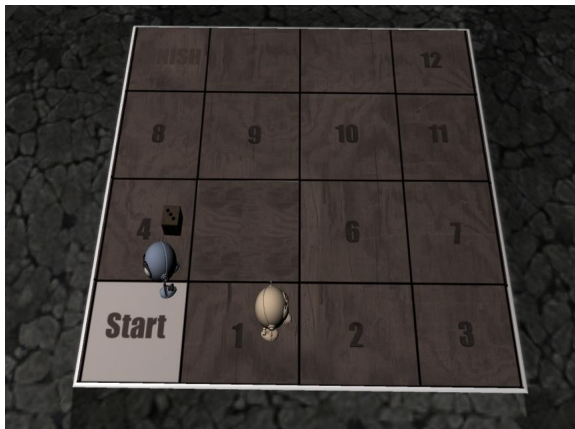
Looking at the first image which is a part of story boarding . A character is standing on some platform .and behind him there is a wall . So over here apart from main character every thing that comes in the screen is called props which again have to get modeled in the software .



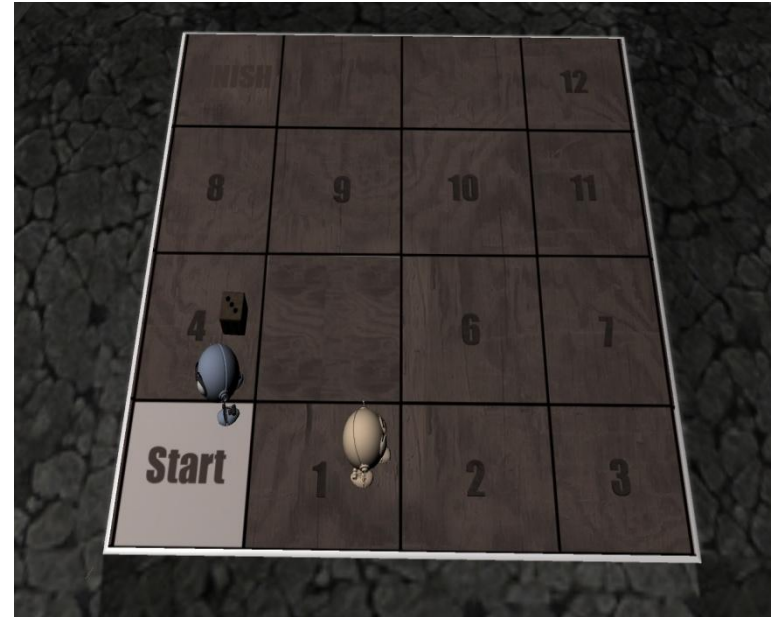
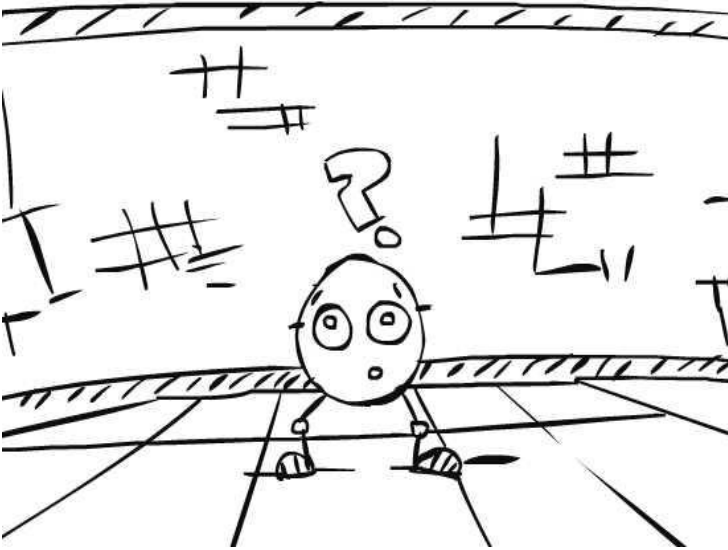
Scene planning (story boarding)

Modeling Process For Level design.

Looking at the first image which is a part of story boarding . A character is standing on some platform .and behind him there is a wall . So over here apart from main character every thing that comes in the screen is called props which again have to get modeled in the software .



Stage from Top

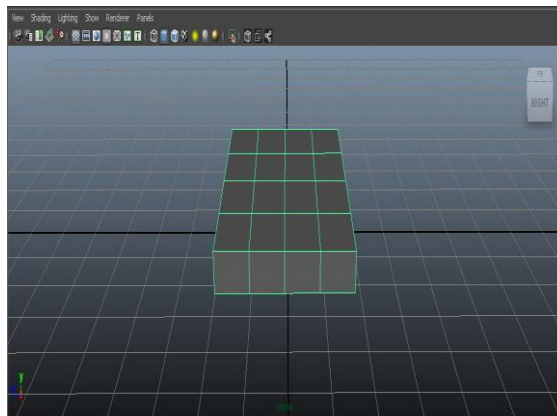
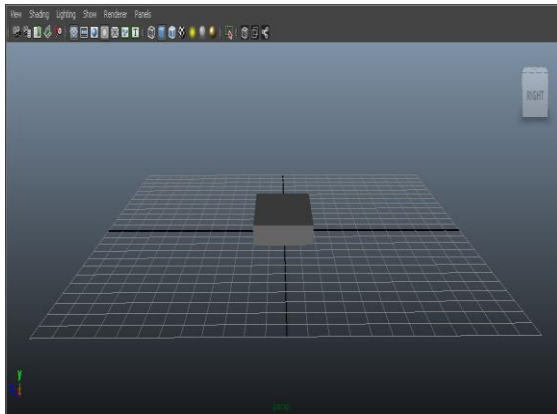


Stage from above

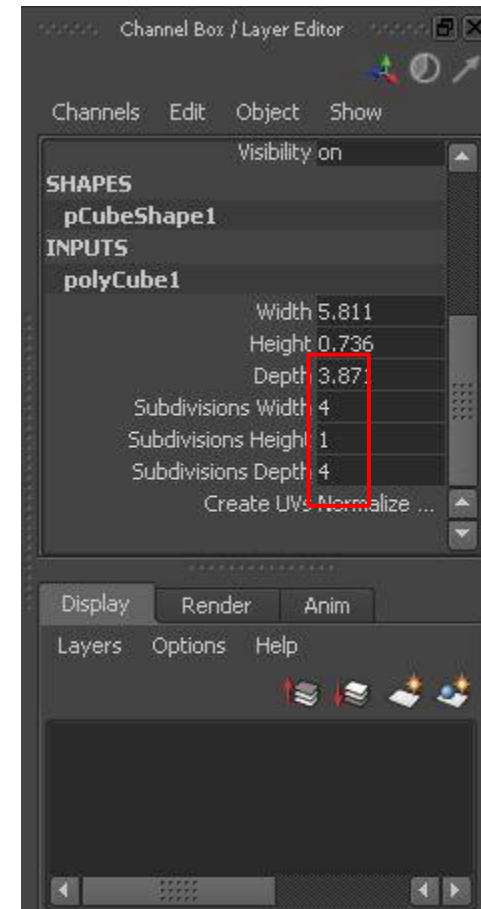
As shown in the image the scene required to make stage with nice details and Numbers written on it.

The Modeling Process for the stage

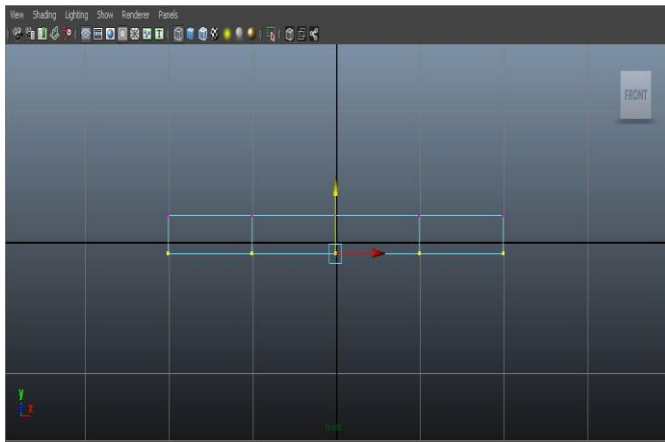
To make the stage as shown in the image we first start with the simple cube.



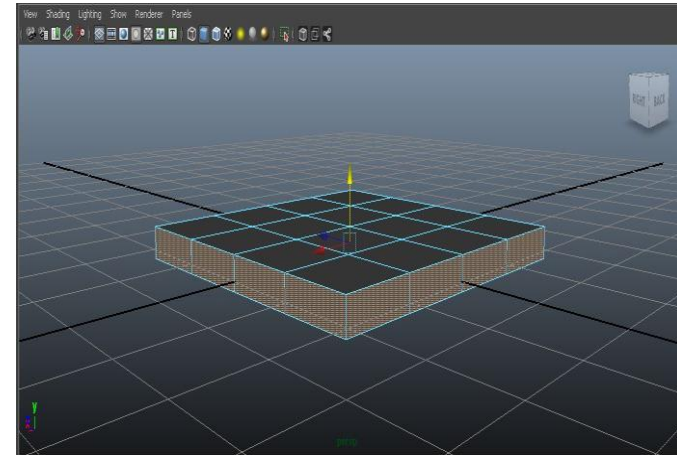
By increasing the subdivision width and depth the cube will look something like this.



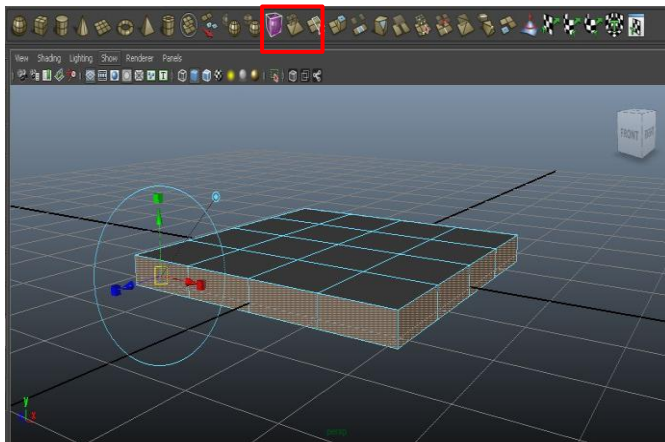
 Increase the subdivision width and Depth to 4.



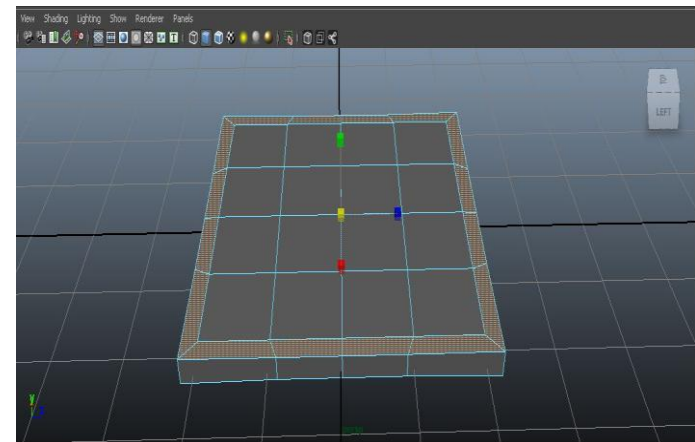
Now select the vertices of the cube from below and decrease the height of the cube.



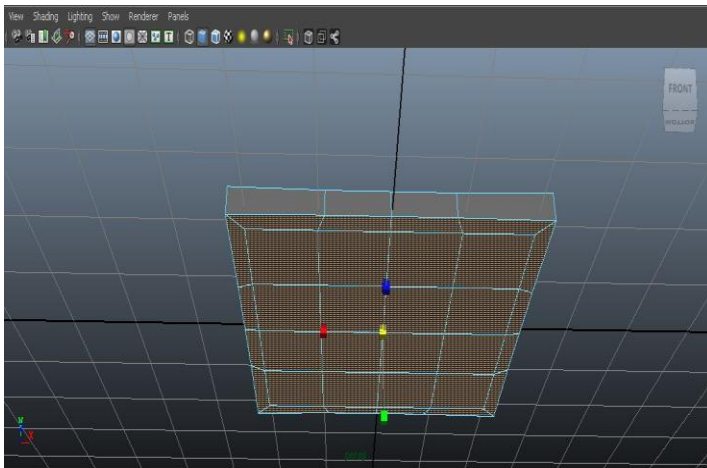
Select the faces from the side of the cube



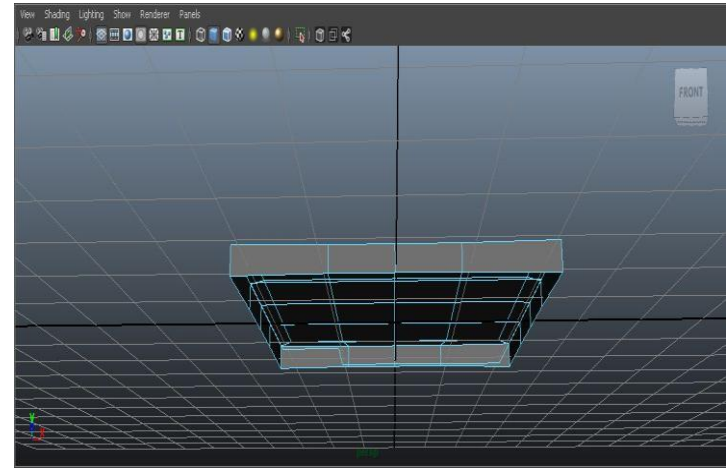
Select the extrude



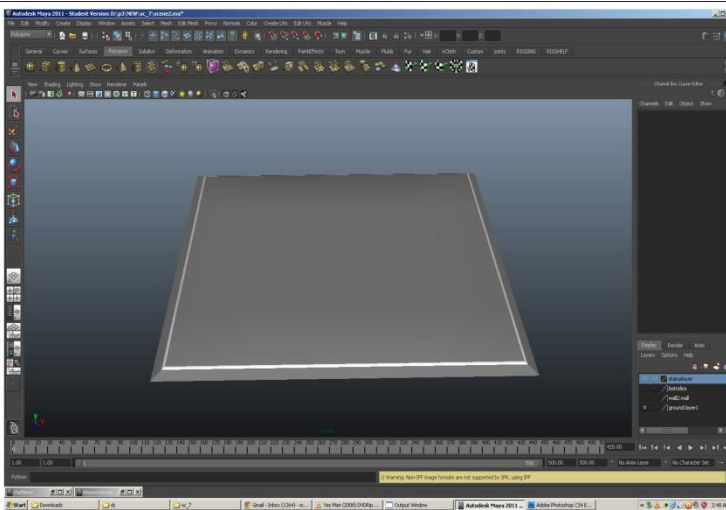
Now extrude the face to give the cube nice boarder



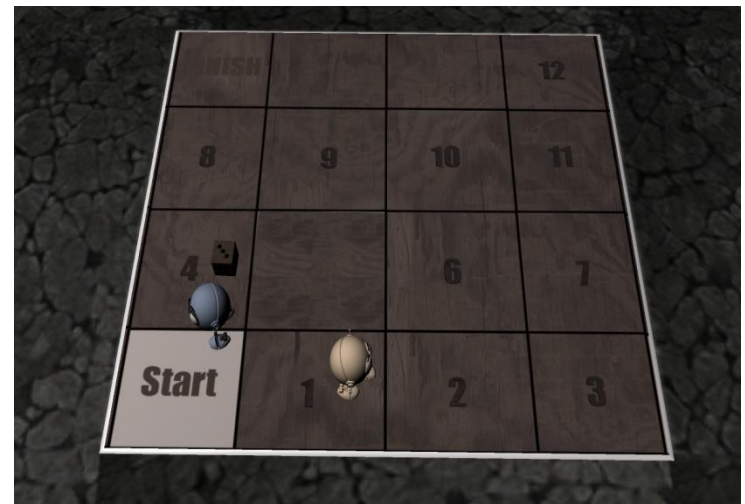
Now select the bottom faces of the cube



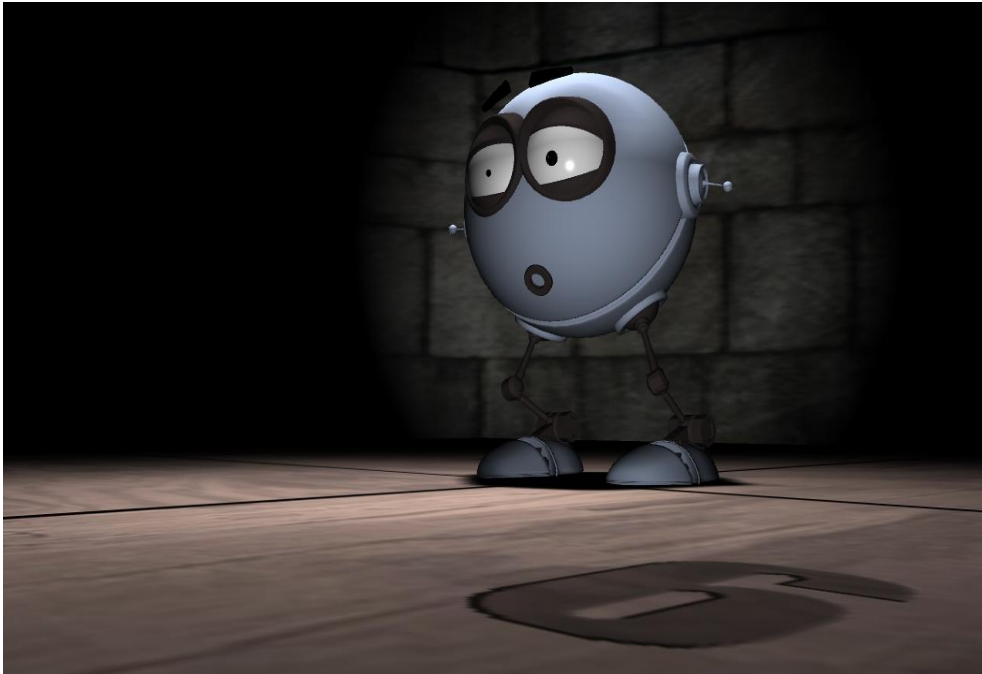
And delete the faces to lower the poly counts



The model will look like this.



By adding the texture the stage will look finally as we wanted for our game.



The Final stage is made and ready to use in the scene .
The detailed texture will put nice details on the stage .