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cs499

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**Requirements Specification**

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| Unique ID | Type | Functional Requirement | Demonstration Scenario(s) | Success Measure(s) | Definitions |
| 1.1 | Shall | Shall tilt the scene in a counter clockwise direction while up keyboard button is pressed. | The camera shall appear to tilt overhead when up button is pressed during demonstration. | When the camera appears to tilt overhead only when up button is pressed. | Tilt - a vertical rotation of the object in question. |
| 1.2 | Shall | Shall tilt the scene in a clockwise while down keyboard button is pressed. | The camera shall appear to move at a closer angle to the terrain when button is pressed during demonstration. | When the camera appears to tilt at an angle closer to the terrain only when down button is pressed. | Tilt - a vertical rotation of the object in question. |
| 1.3 | Shall | Shall not tilt past a 90 degree overhead view. | The camera shall not appear to move past a direct overhead view even when the up button is still pressed. | When the camera appears stop tilting at a 90 degree overhead view even when the up button is pressed. |  |
| 1.4 | Shall | Shall not tilt past the point the terrain will move through the camera. | The camera shall appear to collide with the terrain when the terrain is reached and the down button is still pressed. | When the camera appears stop tilting just before the camera view would see both sides of the terrain surface even when the down button is pressed. |  |
| 1.5 | Shall | Shall rotate the scene clockwise when the right keyboard button is pressed. | The camera shall appear to rotate right when the right button on the keyboard is pressed during the demonstration. | When the camera appears to rotate clockwise around the current tank that is selected when the right button is pressed. | Rotate - a horizontal movement around an axis or center of the object in question. |
| 1.6 | Shall | Shall rotate the scene counter clockwise while the left keyboard button is pressed. | The camera shall appear to rotate left when the left button on the keyboard is pressed during the demonstration. | When the camera appears to rotate counterclockwise around the current tank that is selected when the left button is pressed. | Rotate - a horizontal movement around an axis or center of the object in question. |
| 1.7 | Shall | Point of rotation shall be the center of the current selected tank. | When the up down left or right buttons are pressed the tank selected will not change distance from the camera. (will be axis of rotation) | When the camera appears to rotate counterclockwise or clockwise around the current tank that is selected depending on whether the left or right button is pressed. |  |
| 2.1 | Shall | Terrain surface shall be a flat plane to render objects on. | When demonstrating all objects will appear to be on top of a flat surface with some sort of texture. | When the scene is rendered the terrain shall appear as a flat surface. |  |
| 2.2 | Shall | Skybox shall be a blue gradient appearing to surround all other objects. | A blue gradient shall appear to be the background of the entire terrain, including all object rendered on the terrain. | When the scene is rendered a blue gradient background will appear. | Skybox - a box with a texture on it surrounding the camera but its walls seeming farther than anything else. |
| 2.3 | Shall | Terrain shall be wide and long enough to give room for all tanks to be generated upon, and have some movement animation. | All objects will be seen if zoomed out enough on the terrain. | When the scene is rendered all objects will appear on top of the terrain with room enough for tanks to move around. |  |
| 3.1 | Shall | Terrain shall be rendered within 5 seconds | The terminal will display the time in seconds when the rendering of the terrain is done and will be able to be observed. | When the display of render time is below 5 seconds. |  |
| 3.2 | Shall | Each tank shall be rendered within 10 seconds. | The terminal will display the time in seconds when the rendering of each tank is done and will be able to be observed. | When the display of render time for all tanks individually is below 10 seconds. |  |
| 3.3 | Shall | Each obstacle (hay bale, house, barn, barrel, hangar) shall be rendered within 10 seconds. | The terminal will display the time in seconds when the rendering of each obstacle is done and will be able to be observed. | When the display of render time for all obstacles individually is below 10 seconds. | Obstacle - any object placed on the terrain that is not a tank. |
| 4.1 | Shall | Shall render at least 7 tanks within the scene. | During the demonstration anyone viewing the scene will be able to count at least 7 tanks on the terrain. | When the scene is rendered the number of tanks on the terrain will be between 7 and 10. | Scene - a sequence of continuous action or rendering within the program. |
| 4.2 | Shall | May render up to 10 tanks within the scene. | During the demonstration anyone viewing the scene will be able to count no more than 10 tanks on the terrain. | When the scene is rendered the number of tanks on the terrain will be between 7 and 10. | Scene - a sequence of continuous action or rendering within the program. |
| 4.3 | Shall | All tanks shall be different models. | During the demonstration anyone viewing the scene will not be able to identify identical tanks. | When the scene is rendered none of the tanks shall be identical. |  |
| 5.1 | Shall | Shall create a 3d rendering of a barrel. | During the demonstration anyone viewing the scene will be able to identify an object that looks like a barrel. | When the scene is rendered there shall appear 1 or more objects that resemble a barrel. |  |
| 5.2 | Shall | Shall create a 3d rendering of a hangar. | During the demonstration anyone viewing the scene will be able to identify an object that looks like a hangar. | When the scene is rendered there shall appear 1 or more objects that resemble a hangar. |  |
| 5.3 | May | May create a 3d rendering of a hay bale. | During the demonstration anyone viewing the scene will be able to identify an object that looks like a hay bale. | When the scene is rendered there shall appear 1 or more objects that resemble a hay bale. |  |
| 5.4 | May | May create a 3d rendering of a House. | During the demonstration anyone viewing the scene will be able to identify an object that looks like a house. | When the scene is rendered there shall appear 1 or more objects that resemble a house. |  |
| 5.5 | May | May create a 3d rendering of a barn. | During the demonstration anyone viewing the scene will be able to identify an object that looks like a barn. | When the scene is rendered there shall appear 1 or more objects that resemble a barn. |  |
| 6.1 | Shall | All tanks shall be viewable with the option of 3 different angles from the light source. | During the demonstration each tank will be able to be viewed with the option of the light source in a total of 3 different positions. | When different angles of light are selected the light source will change position. |  |
| 6.2 | Shall | Shall change the light source to the first angle when the f1 button is pressed. | When the f1 button is pressed people viewing the demonstration will be able to observe the angle of shadows and light source position change unless the light source is already in the position assigned to f1. | When the first angle is selected the light source shall be in the first position. | First angle - one of the three angles the light source can be used from. |
| 6.3 | Shall | Shall change the light source to the second angle when the f2 button is pressed. | When the f2 button is pressed people viewing the demonstration will be able to observe the angle of shadows and light source position change unless the light source is already in the position assigned to f2. | When the second angle is selected the light source shall be in the second position. | Second angle - one of the three angles the light source can be used from. |
| 6.4 | Shall | Shall change the light source to the third angle when the f3 button is pressed. | When the f3 button is pressed people viewing the demonstration will be able to observe the angle of shadows and light source position change unless the light source is already in the position assigned to f3. | When the third angle is selected the light source shall be in the third position. | Third angle - one of the three angles the light source can be used from. |
| 6.5 | Shall | Lighting in this program shall be direct lighting. | During the demonstration viewers will be able to observe hard shadows. | When the scene is rendered there will be heavy shadows because of direct lighting. | Direct lighting - lighting in which most of the light is cast directly from the source to the illuminated area. |
| 6.6 | Shall | Shadows shall be rendered in this program. | For each object in the scene there will be shadows associated with it. | When the scene is rendered there will be shadows on the terrain or nearby objects for each object on the scene. |  |
| 6.7 | Shall | Shadows shall be calculated in relation to the direct lighting angle. | During the demonstration viewers will be able to observe changes to the shadows proportional to the angle of the light with the object in question. | When the scene is rendered the shadows will be in the exact opposite direction of the object that the light source is currently in. |  |
| 7.1 | Shall | Animation shall enable tanks to move in their forward and backward directions. | Depending on whether the w or s button is pressed, viewers of the demonstration will observe forward or backward movement of the current selected tank. | When the w or s button is pressed movement forward or backward animation will be executed for the selected tank depending on which button was pressed. |  |
| 7.2 | Shall | Shall animate the tank selected moving forward when the w keyboard button is pressed. | Viewers of the demonstration will observe forward movement of the current selected tank when w button is pressed. | When the w button is pressed movement forward animation for the tank selected will be executed. |  |
| 7.3 | Shall | Shall animate the tank selected moving backward when the s keyboard button is pressed. | Viewers of the demonstration will observe backward movement of the current selected tank when s button is pressed. | When the s button is pressed movement backward animation for the tank selected will be executed. |  |
| 7.4 | Shall | Animation shall enable a tank to rotate its turret. | When a tank is selected that particular tank will appear to rotate its turret to the point that the gun is facing the same direction as the camera horizontally. (Note: does not have to rotate as fast as the camera.) | When the camera angle is changed horizontally the turret will slowly rotate to match the horizontal direction. |  |
| 7.5 | Shall | There shall be firing animation from the tank gun when the left mouse button is clicked. | Viewers of the demonstration will be able to observe the tank gun of the selected tank firing when the left mouse button is clicked. | When the left mouse button is clicked to the animation for firing will be executed. |  |
| 7.6 | May | Animation may enable a tank to explode when shot. | When a tank fires at another tank, and it looks like the bullet would hit one result is that viewers will be able to see the tank being shot at explode. | When a tank is shot by another tank the tank may or may not explode. |  |
| 7.7 | Shall | Sound effects shall enable a bullet to bounce of a tanks armor. | When a tank fires at another tank, and it looks like the bullet would hit one result is that viewers will be able to hear the bullet bounce of the tank shot at. | If a tank does not explode when shot a ricochet sound will be played. |  |