EXAM
DH2320 Computer Graphics and Visualization
2011-12-19

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Aids: None

The exam consists of 9 questions. The number of points awarded for a correct answer is stated next to each question. The maximum score is 21. To pass the exam, you need at least 12 points.

Write legibly! Answers that I cannot read will receive 0 points! When explaining, try to be as concise and clear as possible! Answers that I cannot understand will receive 0 points! Feel free to use figures/sketches to complement your written explanations.

Good luck! /Marcus

Question 1 (2p): In computer program debugging, what is a *breakpoint*? Explain why breakpoints are useful for debugging!

Answer: A breakpoint is a user-defined location in a program where the code execution will pause. The program does not terminate at a breakpoint, but is suspended. As a result, values in variables and registers can be examined before the program is allowed to continue. This is useful, for example, to ensure that a local variable or counter holds the expected value. Breakpoints are also useful when we wish to see in which order different parts of our code are executed: by assigning breakpoints to well-selected locations, the debugger will pause at each one of them as they are executed, which allows us to see that the code is executed in the expected way.

Question 2 (2p): What is temporal aliasing? Explain why it arises!

Answer: Temporal Aliasing is the missmatch between the real movement of objects compared to the sampled data that represent the movement. It arises when the sample time of the movement is not fast enough to cover key elements of the movement and in that replays a movement that does not represent the captured movent! The sampled movement can for example move backwards.

Question 3 (2p): What is normal mapping? Explain how it works!

Answer: Normal mapping is used to create an illusion of more detail for surfaces without increasing the amount of polygons in the rendation. It works by using a data set, usually in the form of an image to represent the normal for reflected light at a certain position. XYZ values for the normal is stored as seperate colors in the image file. This data set is then applied to a 3D surface and used in the calculation of the reflection from the surface.

Question 4 (4p): One common algorithm/principle for removing hidden surfaces in real-time graphics is depth buffering (or depth testing/Z-buffering). Explain how this algorithm/principle works!

Answer: A buffer is used that contains a number for every pixel on the screen. When a part of an object is considered to be rendered, the location between the far clip plane and image plan for this part is compared to the current number in the buffer for the specific pixel that correlates with the pixel that the part will be rendered to. If the number is higher the part can be ignored as another object blocks this part. If it is not higher we replace the number with the depth of the current part and render it! The size of the numbers in the buffer will determine how close objects can be to each other without interfering with the algorithm.

Question 5 (3p): What is the Phong reflection model? What is its three parts and what light reflections do they simulate?

Answer: This question was removed as the material for this question had not been available before the exam! The total for passing was therefore lowered! For those that did answer the question it was graded if it could contribute for a pass or not

Question 6 (1p): Describe one important principle for creating natural looking movement in animation

Answer: The use of arcs for movements are good way of creating movements that look natural as this is something that is common in nature. For example movement of arms and legs.

Question 7 (2p): Describe three different ways to visualize interval data and how these compare when estimating a correct value from the visualization.

Answer: Position, Angle and Contrast. Position is better then angle and angle better then contrast!

Question 8 (2p): what is a diverging color map and what are the benefits of using it for visualization?

Answer: A diverging color map is when values are represented by going from one color to another through white as the center color. It is useful in visualization as it can represent a big range of values and the the area of white can easy be moved and changed in size to better represent what is needed.

Question 9 (3p): Describe three ways of presenting information/data that corrupt and obstruct reasoning.

Answer: Presenting effects without causes, to present data without information about how to connect cause and effect. Cherry picking data so that it support an argument while ignoring data that cotradicts it. Dequantification means removing legends axis with make it hard to get the absolute values in the visualisation.