LETTERS TO THE EDITOR

Space division for ray tracing

Dear Editor:

I note the article in the April CG&A issue by Wyvill et al. on spatial subdivision for fast rendering of CSG-modeled objects ("Space Division for Ray Tracing in CSG," pp.28-34). The authors seem to be unaware of an extensive body of very similar work by Woodwark et al. at the University of Bath, England. The work of the English group predates that of Wyvill et al. substantially:


Sincerely,
Rick Speer
University of California, Berkeley

Geoff Wyvill's reply:

I'd like to thank Rick Speer for his comments. Indeed, at the time our article was prepared, I was unaware of the work to which he refers. Since then, Dr. Woodwark has been kind enough to send me copies of his papers and I agree that he can claim prior publication of a number of the ideas in our article. Dr. Woodwark's papers also anticipated some of the work of Yamaguchi et al. and of Carlbom et al. to which we did refer.

Reports of work in this area seem to get distributed among a wide range of conferences and journals, and it is only too easy to miss some. That IEEE CG&A has brought us together shows that it is doing a good job.

Yours sincerely,
Geoff Wyvill

Productivity in the creative process

Dear Editor:

James T. Brady's article on the effects of response time ("A Theory of Productivity in the Creative Process," May 1986, pp.25-34) contains the same two flaws that virtually all articles of this type have had (including those mentioned in his bibliography). These flaws make articles like this virtually useless to those of us in industry who are arguing with management about the need for faster response time.

First, the fancy curves that are drawn go out to only 2.5 seconds. Difficult as it may be to believe, quite a number of shops have response times in excess of 3 seconds, and 5 seconds is by no means unheard of. While the effects of a 3.5-second response time may be intuitive to computer scientists, we have to prove it to our nontechnical upper management. Having numbers out to, say, 10 seconds (with appropriate pithy commentary) would be very useful to help us make our case with management.

The second flaw is more serious. Most studies of this type measure improved response time in terms of transactions/second. Every single time (and I do mean every) that I have tried to make the case for subsecond response time, management has come back with a cynical doubt that the subsecond transactions are at the same level of efficiency as when response time is higher. For example, management maintains that at subsecond rates, programmers will get lazy and do things such as scroll 20 times rather than issue a single "find" command. What is needed is both a discussion of this and productivity statistics that measure actual output rather than merely transactions. One possibility might be to measure both transactions and wall-clock time needed to remove some simple syntax errors from a program and compile it, varying the response times.

While some writers have touched on these issues, I have not

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seen any research that provides definitive evidence; the results of such research would be extremely welcome to those of us in the trenches.

Ross Pavlac
Lead Programmer/Analyst
First National Bank of Chicago

The author’s reply:

Mr. Pavlac’s frustrations with management acceptance of the value of response time is not unique within his company. I do believe that this is a flaw in the ability of many managers to accept the risk of trying new technologies to achieve better productivity rather than the “flaws” Mr. Pavlac attributes to my article.

The first flaw he mentions is the lack of curves beyond 2.5 seconds. In my article data was provided to extend the curves beyond 2.5 seconds. The data can be found in the third paragraph of the section “Environment and productivity” (p.26). It is further developed on page 154 of the second reference. The net is that for every second beyond 2.5 that system response time is extended, the transaction cycle extends 2 seconds. Other studies indicate that there are two psychological break points: at 4 to 5 seconds SRT, users become very dissatisfied with the system, and at 20 to 25 seconds they will refuse to use the system.

The second flaw mentioned is the lack of measurement of actual output rather than transactions. The concern is that the users would change work habits and submit many short transactions when the system is responding well, and more complex but more productive transactions when the system is not responding well.

These concerns were investigated and reported on in the section “Environment and productivity,” starting at the fifth paragraph (pp. 26-27), and are further developed in the fourth reference. The net is that for a diverse set of applications, which had measurable work output, there was a high degree of correlation between transaction rate, response time, and work output. I have done some inter-viewing of individuals who claim to change their transaction mix as response time varies. In these cases the motivation seems to be to find the kind of transaction that improves their productivity in an environment that gives large variations of response time.

I am sorry that my article did not meet all the needs of Mr. Pavlac, but the intent of the article was to provide an understanding of the mechanisms that improve productivity, in the hope that by understanding the theoretical underpinnings of the transaction cycle, more managers would be willing to accept proposals to improve system response time, work environment, and data entry tools. I did not intend to provide a cookbook on how to justify each of these, although I believe that the information in the article combined with the user's own data could generate convincing proposals to management.

Sincerely,
James T. Brady

Erratum

Dear Editor:

I have discovered two errors in my September 1985 article, “The Beta2-spline: A Special Case of the Beta-spline Curve and Surface Representation,” pp.46-58.

In the equations on p.55 (reproduced below), the assignment statement for $W_{1,1}$ (first shaded area) contains the term $V_{1,3}$. That term should be $V_{1,3}$. In the second shaded area, $(V_{2,2} + V_{1,3} + V_{0,2})$ should be $(V_{2,2} + V_{1,3} + V_{0,1} + V_{1,1})$.

That is, a fourth term is multiplied by $T_3$.

Sincerely,
Brian Barsky
UC Berkeley

$W_{0,1} := \tau_7 (V_{2,2} + V_{0,2}) + \tau_3 (V_{2,1} + 2V_{1,2} + V_{0,1}) + T_{11};$
$W_{1,1} := \tau_8 V_{2,2} + T_{2112} + T_{11};$
$W_{2,1} := \tau_8 V_{1,2} + T_{2211} + \tau_5 V_{2,1};$
$W_{3,1} := \tau_7 (V_{3,2} + V_{1,2}) + \tau_3 (V_{3,1} + 2V_{2,2} + V_{3,3}) + T_{21};$
$W_{0,2} := \tau_7 (V_{2,1} + V_{0,1}) + \tau_3 (V_{2,2} + V_{0,2} + 2V_{1,1}) + T_{12};$
$W_{1,2} := \tau_8 V_{2,1} + T_{2211} + T_{12};$
$W_{2,2} := \tau_8 V_{1,1} + T_{2112} + T_{22};$

$W_{1,2} := \tau_7 (V_{3,1} + V_{1,1}) + \tau_3 (V_{3,2} + V_{1,3} + 2V_{2,1}) + T_{22};$
$W_{0,3} := \tau_4 (V_{2,3} + V_{2,1} + V_{0,3} + V_{0,1}) + \tau_3 (V_{2,2} + V_{1,3} + V_{0,2}) + T_{12};$
$W_{1,3} := \tau_7 (V_{2,3} + V_{2,1}) + \tau_3 (V_{1,3} + V_{1,1} + 2V_{2,2}) + T_{12};$
$W_{2,3} := \tau_7 (V_{1,3} + V_{1,1}) + \tau_3 (V_{2,3} + 2V_{2,1} + 2V_{1,2}) + T_{22};$
$W_{3,3} := \tau_4 (V_{3,3} + V_{3,1} + V_{1,3} + V_{1,1}) + \tau_3 (V_{3,2} + V_{2,3} + V_{2,1} + V_{1,2}) + T_{22};$

end;