UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

MICROSOFT CORPORATION,
Petitioner,

v.

DIRECTSTREAM, LLC,
Patent Owner.

Case No. IPR2018-01605, -01606, -01607
U.S. Patent No. 7,620,800 B2

REPLY DECLARATION OF DR. HAROLD STONE

1. I have reviewed Patent Owner's Response and Dr. Houman Homayoun's supporting declaration. I have been asked to reply to certain statements by Patent Owner and its expert. This is my declaration on those topics.

I. COMPUTATIONAL LOOPS

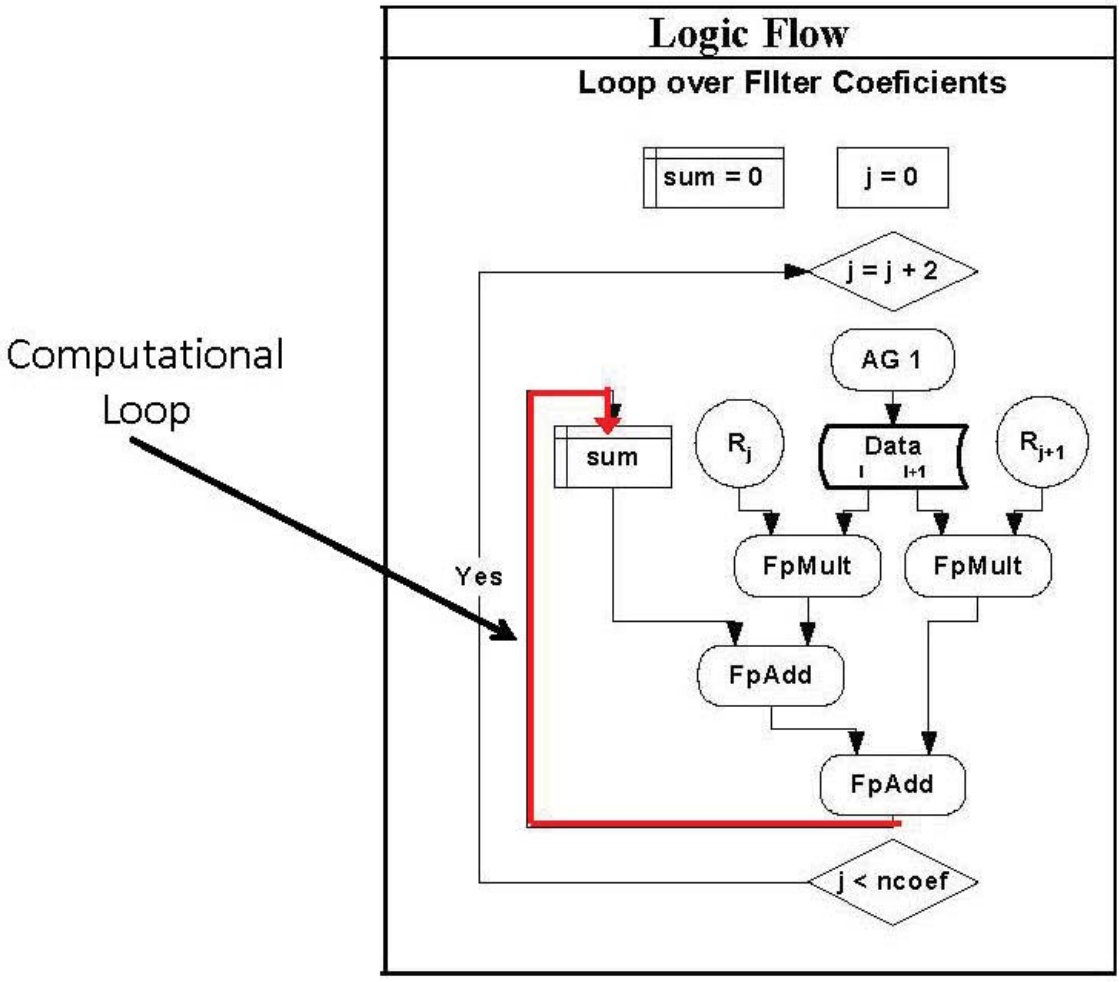
2. Patent Owner and Dr. Homayoun have proposed that the definition of "computational loop" should be "a set of computations that is executed repeatedly **per datum**, either a fixed number of times or until some condition is true or false." Patent Owner Response ("Response"), 65; EX2112¶¶207, 225-226, 229-230, 233, 241. I disagree.

3. In my prior declaration, I did not offer a construction for the phrase "computational loop" because I believed the term should have its plain and ordinary meaning and that meaning was generally well known. I have reviewed the Board's Institution Decision (Paper 21) and agree that the Board's construction of this term as "a set of computations that is executed repeatedly, either a fixed number of times or until some condition is true or false" reflects that plain and ordinary meaning. Institution Decision, 23. Based on my experience, this is how a person of ordinary skill in the art ("a Skilled Artisan") reading the 800 Patent would understand the term in the 2002 time frame. I disagree with Patent Owner's

and Dr. Homayoun's proposed modification because it does not reflect that understanding.

4. For example, nothing in the words "computational loop" requires repeatedly executing computations "per datum," as the dictionary definition relied on by the Board confirms. While the patent discloses loops, EX1005, FIGS. 4A-4B, 6A-6G, 5:65-6:28, and 6:42-7:37, these loops do not disclose loop calculations that are repeated multiple times "per datum." Rather, what is disclosed is merely the repeated execution of certain computations, *i.e.*, a *computational* loop. A Skilled Artisan would understand that these examples are embodiments of "computational loop" as recited in the claims, and these exemplify the broadest reasonable interpretation of "computational loop."

5. Indeed, the Patent Owner's proposed interpretation of "computational loop" is inconsistent with the disclosure of the 800 Patent. For instance, one example of a "computational loop" included in the disclosure of the 800 Patent can be found in the prior art paper published in 2001 by Caliga and Barker and incorporated-by-reference into the 800 Patent at EX1005, 4:58-62. Patent Owner cites this paper in support of its construction of "computational loop." *See* Response, 67. That loop is reproduced below:



EX2037, 5 (annotated).

6. Note that this figure specifically identifies the structure as a "loop over filter coefficients" and implements the following calculation for index ***j***:

Sum = datain(*j*)*R(*j*) + datain(*j* +1)*R(*j*+1)+Sum, *j* = 0,2,4,…,*ncoef*-1

7. Note that to carry out this equation, multiple iterations of the same calculations must occur, albeit with different data values for "datain," "R," and "Sum." The values for "datain" and "R" are different for each iteration, as the indices for each will be different for each iteration. The value of "Sum" will also be different for each iteration, as that value is captured in a register each cycle and fed back over the path that I annotated as "computational loop" to be used in the next cycle for the next iteration of the calculation.

8. The loop above – which is incorporated into the disclosure of the 800 Patent – therefore does not meet the Patent Owner's claim construction for "computational loop" because it is not a set of computations executed repeatedly ***per datum*** a fixed number of times. Patent Owner's interpretation therefore excludes perhaps the most detailed example of a "computational loop" included in its patent. I believe a Skilled Artisan would accordingly not read the claim phrase "computational loop" as narrowly as Patent Owner does.

9. Patent Owner also asserts that Splash2 (EX1007) does not satisfy the claimed "computational loops" under its proposed interpretation. Response, 78-81. I disagree with that conclusion as well. As I discussed in my original declaration, the Unidirectional Systolic Array described in Chapter 8 of Splash2 includes multiple processing elements executing computational loops simultaneously to

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