Data Dependency Analysis

Let’s see the graph below:

图表

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According to the formular:

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In the first data block in k1: 1’ depend on 2 and 2’ depend on 1,so there is no data dependency in each data block when we doing Butterfly operation. So as the first data block in k3,2’ is only related to 1 and 1’ is only related to 2.

So in each data block, the data on the right is only depends on the data on the left, we can divide data according data blocks in each stage.

according to the graph below: Suppose there are N data in first stage(k stages), each thread will handle (N/2^k) data, there are no data dependency in each thread

图示

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图表

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But when there are only two or one data blocks: if we use 4 threads, each block will be handled by 2 threads, which will cause data dependency.

图表

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then we can divide 4 threads by W,because the data on the right is only depends on the data on the left

图表

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