Blockclique Incompatibility Rules

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1 New graph rules

The thread and grandpa rules are replaced by the following sequential validity rule and parallel incompatibility rule.

1.1 Sequential Validity Rule

B is valid if

$$\begin{cases} \text{All parents of } B \text{ are in slots before the slot of } B \\ \text{Ancestors of } B \text{ in a given thread are ancestors of the parent of } B \text{ in that thread} \\ \text{All parents of } B \text{ are mutually compatible} \end{cases} \tag{1}$$

1.2 Parallel Incompatibility Rule

Let B_1 and B_2 be two distinct valid blocks that are parallel (each one is not the ancestor of the other one). B_1 and B_2 are incompatible if and only if:

$$\begin{cases} t(B_1) = t(B_2) \\ \text{or } |t(B_1) - t(B_2)| \geq t_0 \\ \text{or } B_1 \text{ is incompatible with an ancestor of } B_2 \\ \text{or } B_2 \text{ is incompatible with an ancestor of } B_1 \end{cases} \tag{2}$$

where $t(B)$ is the timestamp of block B.

Notes:

- Inside a given thread, this is equivalent to the thread incompatibility rule.

- Across threads, this rule is stronger than the GPI rule: GPI-incompatible blocks are incompatible with this rule, but there are other cases where GPI-compatible blocks are incompatible here. For example, it is no longer possible to get a lagging block in a lagging thread compatible with recent blocks in non-lagging threads.

2 New Operation Finality Rule

The genesis slots are considered final. A non-genesis slot S is considered final as soon as:

$$\begin{cases} \text{the slot just before } S \text{ is final and} \\ \text{there is a final block in } S \text{ or} \\ \quad \text{there exists a final block } B \text{ in any thread at a time } t(B) \geq t(S) + t_0 \end{cases} \tag{3}$$

An operation is considered final as soon as it is included in a final block of a final slot.