The parameter "flatten_hierarchy" during logic synthesis leads to incorrect simulation results

In using Vivado's non-project mode, I encountered an inconsistency issue. My operating system is Linux, and the Vivado version is 2023.1.

Under Vivado's non-project mode, I made modifications to certain parameters rather than using Vivado's default settings. Specifically, I utilized the following command for synthesis:

“synth_design -top top -flatten_hierarchy none -gated_clock_conversion auto -bufg 16 -directive Default -fsm_extraction off -resource_sharing off -control_set_opt_threshold 47 -shreg_min_size 24 -max_bram 14 -max_uram 11 -max_dsp 33 -max_bram_cascade_height 20 -max_uram_cascade_height 1 -cascade_dsp force -incremental_mode off -no_lc -retiming -assert -keep_equivalent_registers ”.

The adjustment of these parameters was intended to achieve resource sharing and optimization. However, contrary to my expectations, these changes should not impact the code's consistency. Yet, during synthesis, due to the influence of the synthesis parameter flatten_hierarchy, I observed consistency issues in the simulation results. I have confirmed that this problem is caused by the flatten_hierarchy parameter. If flatten_hierarchy is removed from the command, the consistency issue does not occur.

To better reproduce the problem and identify its root cause, I plan to meticulously document my steps:

1.vivado.tcl and new_vivado.tcl are scripts for synthesis and simulation with default and modified synthesis parameters, respectively.

2.In a new terminal under the Linux system, I will input the commands "vivado -mode batch -source vivado.tcl" and "vivado -mode batch -source new_vivado.tcl".

Directly in the terminal, it is evident that there is inconsistency in the simulation results, specifically in lines 3 to 5, where values are "400" and "000" respectively. I have marked these inconsistencies with red boxes in the terminal display, as shown in the attached image：

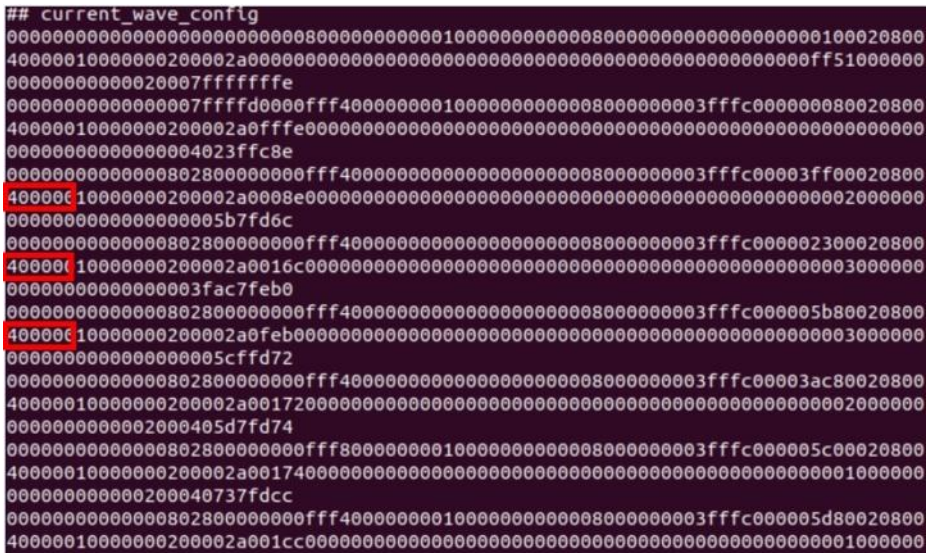

Figure 1: Before Modification

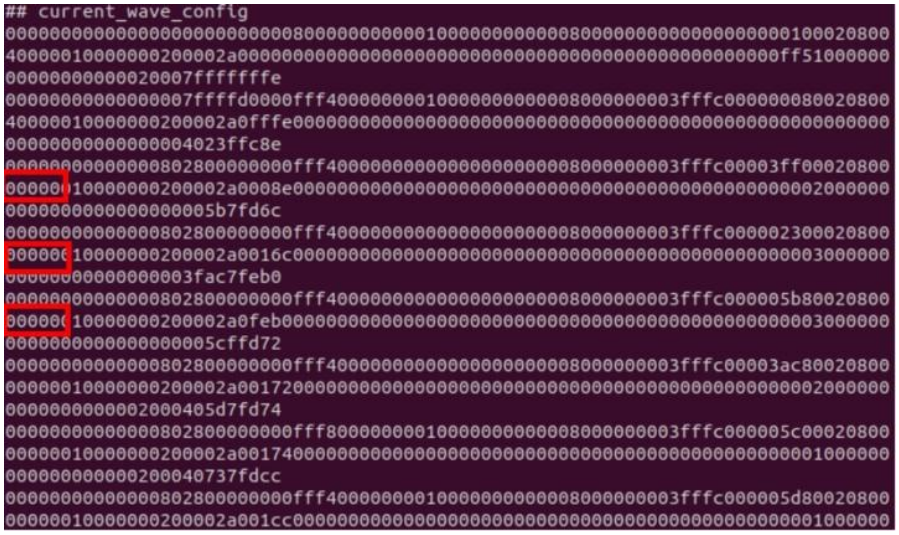

Figure 2: After Modification