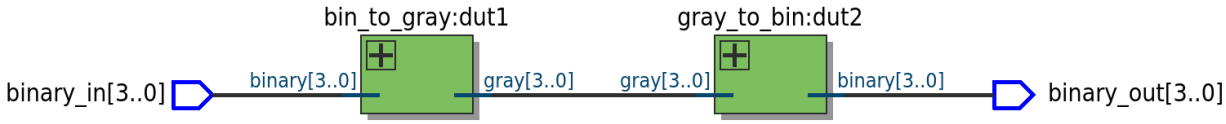
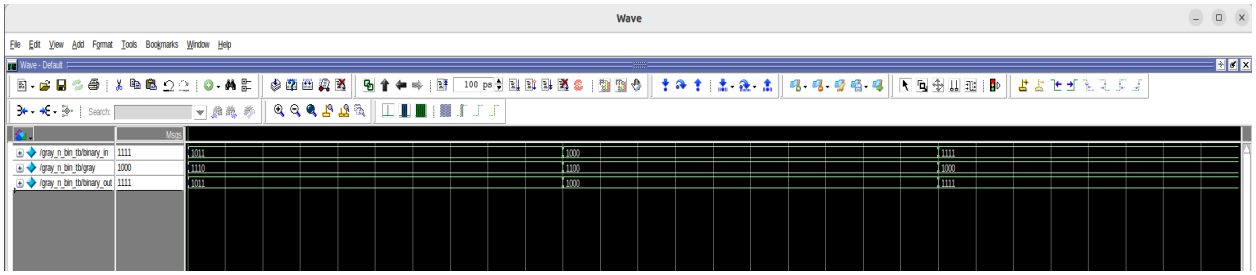
3. Gray and Binary Converters

Design:



- Designed three different parameterized design modules, named “gray_to_bin”, “bin_to_gray, and “gray_n_binary_conv”.
- The two parameterized sub-modules, “gray_to_bin” and “bin_to_gray”, have ports named as “gray” and “binary” for in-between conversions.
- The top design module, “gray_n_bin_conv”, instantiates the two submodules with assumptions of 4bits parameter, customized ports to form a unified module.

Verification:




```
# Applying a set of three binary values to achieve same as output
# binary_in = 1011, gray = 1110, binary_out = 1011
# PASS
# binary_in = 1000, gray = 1100, binary_out = 1000
# PASS
# binary_in = 1111, gray = 1000, binary_out = 1111
# PASS
```

- This testbench verifies the correctness of binary-to-Gray and Gray-to-binary conversions using 4-bit values.
- It applies three binary inputs to ‘binary’ port of bin_to_gray module, converts them to Gray code, then applies gray_to_bin module to convert back to binary, and checks for match.
- The “check_gray” function confirms round-trip accuracy and prints pass/fail results for each case.