VHDL Quick-Start Templates!

Templates for most common VHDL components, ex: state machines, basic components, test benchs, etc. Quickly get started while following a style guide recommended by Xilinx.

I have also included a Demo showing how these different templates can be used together to build a complex system in seconds.

Resources

Great place to get a good idea of proper VHDL coding practices
https://webdocs.cs.ualberta.ca/~amaral/courses/329/labs/VHDL_Guideline.html

The encyclopedia of VHDL. Large database with pretty much everything you need to know.
https://www.ics.uci.edu/~jmoorkan/vhdlref/

For the more interested...
This is a great explanation of the wonders of a 2-process VHDL entity, one being combinational and another being sequential. https://www.gaisler.com/doc/vhdl2proc.pdf

Templates

State Machine

Templates can be used for both Moore or Mealy finite state machines (FSMs).

> Finite State Machines (FSM) are sequential circuit used in many digital systems to control the behavior of systems and dataflow paths. Examples of FSM include control units and sequencers. -Xilinx

State Machine Template

Asynchronous Entity

Asynchronous Entity

Synchronous Entity

Synchronous Entity

Entity Using Combinational Process

Entity With Combinational Process

Testbench

Testbench

Example Files/Useful Files

Clock Frequency Divider

Full-Scale Implementation

I have used the example files as a demonstration of what a complete digital design could look like. I will walk you through the following components and will explain how they all work together.
Note: this is not a tutorial but rather a walkthrough of an example of a complete digital design

State Machine: Central control unit for the digital system
Transmitter: Transmitter Unit
Receiver: Receiver Unit
Transmitter Clock (Frequency Divider): Divide central clock frequency for the transmitter unit
Timer: Timer used for state change in the state machine
System Link: File to import and link all different entities. This is the Unit Under Test (UUT) in the testbench.
Testbench: All design tests

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